



## FACTUAL INFORMATION SAFETY INVESTIGATION FOR MH370

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**Malaysia Airlines MH370 Boeing B777-200ER (9M-MRO)**  
**08 March 2014**



**By**  
**The Malaysian ICAO Annex 13 Safety Investigation Team for MH370**

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**OBJECTIVE OF INVESTIGATION**

**The sole objective of the investigation is  
the prevention of future accidents or incidents and  
not for the purpose to apportion blame or liability.**

(Annex 13, Chapter 3, paragraph 3.1, page 3.1)

**DISCLAIMER**

The factual information provided herein is of an interim nature.

Readers are advised that new information may become available that may alter this interim factual information prior to the publication of the Final Report.

This factual information contains facts which have been determined up to the time of issue. This information is published to inform the aviation industry and the public of the general circumstances of the accident of MH370 and must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available.

Extracts can be published without specific permission providing that the source is duly acknowledged.

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### a. GLOSSARY OF TERMS

When the following terms are used, they have the following meaning:

**Accident** - An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

a) a person is fatally or seriously injured as a result of:

- being in the aircraft, or
- direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
- direct exposure to jet blast,

*Except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or*

b) the aircraft sustains damage or structural failure which:

- adversely affects the structural strength, performance or flight characteristics of the aircraft, and
- would normally require major repair or replacement of the affected component,

*except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or*

c) the aircraft is missing or is completely inaccessible.

*Note 1 - For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified, by ICAO, as a fatal injury.*

*Note 2 - An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.*

*Note 3 - The type of unmanned aircraft system to be investigated is addressed in 5.1.*

*Note 4 - Guidance for the determination of aircraft damage can be found in Attachment F.*

**Accredited Representative** - A person designated by a State, on the basis of his or her qualifications, for the purpose of participating in an investigation conducted by another State. Where the State has been established an accident investigation authority, the designated accredited representative would normally be from that authority.

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**Advisor** - A person appointed by a State, on the basis of his or her qualifications, for the purpose of assisting its accredited representative in an investigation.

**Aeronautical fixed telecommunication network (AFTN)** - A worldwide system of aeronautical fixed circuit provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

**Air-ground communication** - Two-way communication between aircraft and stations or locations on the surface of the earth.

**Aircraft** - Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

**Alert Phase** - A situation wherein apprehension exists as to the safety of an aircraft or marine vessel, and of the persons on board.

**Alerting Post** - Any facility intended to serve as an intermediary between a person reporting an emergency and a rescue co-ordination centre or rescue sub-centre.

**Blind transmission** - A transmission from one station to another station in circumstances where two-way communication cannot be established but where it is believed that the called station is able to receive the transmission.

**Cabin Crew Member** - A crew member who performs, in the interest of safety passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

**Cargo** - Any property carried on an aircraft other than mail, stores and accompanied or mishandled baggage.

**Causes** - Actions, omissions, events, conditioning, or a combination of thereof, which led to the accident or incident. The identification of causes does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

**Co-ordinated Universal Time (UTC)** - International term for time at the prime meridian.

**Conversion Training** - Training required when a pilot is posted to a different aircraft type or model

**Detresfa** - The code word used to designate a distress phase

**Distress Phase** - A situation wherein there is reasonable certainty than an aircraft and its occupants are threatened by grave and imminent danger or require immediate assistance.

**Emergency Phase** - A generic term meaning, as the case may be, uncertainty phase, or distress phase

**Filed Flight Plan** - The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

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**Flight plan** - Specified information provided to the air traffic units, relative to an intended flight or portion of a flight of an aircraft.

**Flight Recorder** - Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation - *Annex 6, Parts I, II and III, for specifications relating to flight recorders.*

**Incident** - An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety operation - *The types of incidents which are of main interest to the International Civil Aviation Organization for accident prevention studies are listed in Attachment C of Annex 13.*

**Inmarsat** - A system of geostationary satellites for world-wide mobile communications services, and which support the Global Maritime Distress and Safety System and other emergency communications systems.

**Investigation** - A process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and/or contributing factors and, when appropriate, the making of safety recommendations.

**Investigator-in-Charge** A person charged, on the basis of his or her qualifications, with the responsibility for the organization, conduct and control of an investigation - *Nothing in the above definition is intended to preclude the functions of an investigator-in-charge being assigned to a commission or other body.*

**NOTAM** - A notice distributed by means of telecommunication containing information concerning the establishment, condition of change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

**Operator** - A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

**Pilot-in-command** - The pilot responsible for the operation and the safety of the aircraft during flight time.

**Safety Recommendation** - A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident. In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from the diverse sources, including safety studies.

**State of Design** - The State having jurisdiction over the organization responsible for the type design.

**State of Manufacture** - The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

**State of Occurrence** - The State in the territory of which an accident or incident occurs.

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**State of the Operator** - The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

**State of Registry** - The State on whose register the aircraft is entered. *In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587).*

**State Safety Programme (SSP)** - An integrated set of regulations and activities aimed at improving safety.

**Knot (kt)** - A unit of speed equal to one nautical mile per hour.

**Pilot-in-Command** - The pilot responsible for the operation and the safety of the aircraft during flight time.

**Uncertainty Phase** - A situation wherein doubt exists as to the safety of an aircraft or marine vessel, and of the persons on board.

**b. ABBREVIATIONS & CODES****A**

A/P	Autopilot
A/T	Autothrottle
AAIB	Air Accident Investigation Branch (United Kingdom)
AAIB	Air Accident Investigation Bureau (Singapore)
AC	Alternating Current
ACARS	Aircraft Communications Addressing and Reporting System
ACC	Area Control Centre
ACD	Airways Clearance Delivery
ACE	Actuator Control Electronic
ACIPS	Air foil Cowl Ice Protection System
ACMP	AC Motor Pump
ACMS	Aircraft Condition Monitoring System
ACP	Audio Control Panel
AD	Airworthiness Directive
ADF	Automatic Direction Finder
ADI	Attitude Director Indicator
ADIRS	Air Data Inertial Reference System
ADIRU	Air Data Inertial Reference Unit
ADP	Air Driven Pump
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AES	Aircraft Earth Station
AFD	Assistant Flight Data
AFDS	Autoflight Director System
AFTN	Aeronautical Fixed Telecommunication Network
AIMS	Airplane Information Management System
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
ALERFA	Alert Phase
ALR	Alerting
ALT	Altitude
AM	Amplitude Modification
AMU	Audio Management Unit
AN	Aircraft Number; Airworthiness Notice
AOA	Angle of Attack
AOC	Air Operator's Certificate
APP	Approach
APU	Auxiliary Power Unit
APUC	Auxiliary Power Unit Controller
ARINC	Aeronautical Incorporated
ASB	Amanah Saham Bumiputra (A Government-back Trust Fund)
ASN	Amanah Saham Nasional (A Government-back Trust Fund)
ASCPG	Air Supply Cabin Pressure Controller
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre

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ATPL	Air Traffic Pilot Licence
ATS	Air Traffic Services
ATSB	Australian Transport Safety Bureau
ATSC	Air Traffic Services Centre
ATM	Air Traffic Management
ATSU	Air Traffic Service Unit
ATTN	Attenuator
AUTO	Automatic
AVBL	Available
AWL	Airworthiness Limitation

**B**

BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation civile (France)
BEW	Basic Empty Weight
BFO	Burst Frequency Offset
BITE	Built In Test Equipment
BSCU	Brake System Control Unit
BSU	Beam Steering Unit
BTO	Burst Timing Offset

**C**

C	Degree Celsius (Centigrade)
C of A	Certificate of Airworthiness
C of G	Centre of Gravity
C of R	Certificate of Registration
CA	Collective Agreement
CAAC	Civil Aviation Administration China
CAAS	Civil Aviation Authority Singapore
CAM	Cockpit Area Microphone
CAT	Clear Air Turbulence
CCD	Cursor Control Device
CDU	Control Display Unit
CHIRPS	Confidential Human Factors Accident Incident Reporting System
CLB	Climb
Cm	Centimetre
CMCS	Central Maintenance Computing System
CMR	Certificate Maintenance Requirement
CMS	Central Maintenance System
COSPAS	Space System for Search of Vessels in Distress
CPDLC	Controller Pilot Data Link Communications
CPL	Commercial Pilot Licence
CPM	Core Processor Module
CPMU	Cabin Passenger Management Unit
CRM	Crew Resource Management
CRZ	Cruise
CTR	Control Zone
CTRL	Control

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CTU	Cabin Telecommunications Unit
CVR	Cockpit Voice Recorder
CX	C Extended
CWP	Controller Working Position

**D**

dB	decibel
DC	Direct Current
DCA	Department of Civil Aviation
DCGF	Data Conversion Gateway Function
DCMF	Data Communication Management Function
DCMS	Data Communication Management System
Deg	Degree
DEOR	Daily Engineering Operations Report
DES	Descent
DETRESFA	Distress Phase
DFDAF	Digital Flight Data Acquisition Function
DFDAU	Digital Flight Data Acquisition Unit
DIP	Diplexer
DLNA	Diplexer Low Noise Amplifier
DME	Distance Measuring Equipment
DOW	Dry Operating Weight

**E**

ECL	Electronic Checklist
EDIU	Engine Data Interface Unit
EDP	Engine Driven Pump
EEC	Electronic Engine Control
EFIS	Electronic Flight Instrument System
EFS	Electronic Flight Strips
EHM	Engine Health Monitoring
EICAS	Engine Indicating and Crew Alerting System
ELMS	Electrical Load Management System
ELT	Emergency Locator Transmitter
EMS	Engineering Maintenance System
ENR	En-route
EPR	Engine Pressure Ratio
EST	Estimate
ETA	Estimated Time of Arrival
ETOPS	Extended Twin Engine Operations
EXT	External

**F**

FO	First Officer
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FDP	Flight Data Processing

FDR	Flight Data Recorder
FPL	Filed Flight Plan ( <i>message type designator</i> )
FIR	Flight Information Region
FL	Flight Level
FLCH	Flight Level Change
FMCF	Flight Management Control Function
FMCS	Flight Management Control System
FMS	Flight Management System
FO	Flight Officer
FPA	Flight Path Angle
FSCU	Flap Slat Control Unit
FSEU	Flap Slat Electronic Unit
FPS	Flight Progress Strip
FS	Flight Steward
FSS	Flight Stewardess
FT	Feet ( <i>dimensional unit</i> )

**G**

G/S	Glide Slope
GA	Go Around
GADSS	Global Aeronautical Distress and Safety System
GCC	Golden Class Club
GEN	Generator
GES	Ground Earth Station
GHz	Giga Hertz
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GSP	Ground Service Provider
GWT	Gross Weight

**H**

hPa	Hectopascal
HDG	Heading
HF	High Frequency
HF/AMSS	High Frequency Aeronautical Mobile Service Station
HGA	High Gain Antenna
HLCS	High Lift Control System
HPA	High Power Amplifier
HR	Hours
HYDIM	Hydraulic Interface Module
Hz	Hertz

**I**

i.u.	index unit
IAMSAR	International Maritime Search and Rescue
IAS	Indicated Airspeed
IATA	International Air Transport Association

## **FACTUAL INFORMATION**

SAFETY INVESTIGATION FOR MH370 (9M-MRO)

ICAO	International Civil Aviation Organisation
ID	Identification
IDG	Integrated Drive Generator
IFE	In-flight Entertainment
IFS	In-flight Supervisor
IGV	Inlet Guide Vane
ILS	Instrument Landing System
In.	Inches
INCERFA	Uncertainty Phase
IOM	Input/output Module
IOR	Indian Oceanic Region
IRP	Integrated Refuel Panel
ISLN	Isolation

K

KHz	Kilo Hertz
KLIA	KL International Airport
Kg	Kilogram
Kt	Knot
KVA	Kilo Volt Ampere

L

LAME	Licenced Aircraft Maintenance Engineer
LAT	Latitude
Ib.	Pound
LDW	Landing Weight
LGA	Low Gain Antenna
LH	Left Hand
LLAR	Lower Lobe Attendant Rest
LNA	Low Noise Amplifier
LNAV	Lateral Navigation
LOA	Letters of Agreement
LOC	Localiser
LONG	Longitude
LOPA	Lay Out of Passenger Accommodation
LRU	Line Replaceable Unit
LS	Leading Steward

M

M	Metre
MAC	Mean Aerodynamic Chord
MARA	Majlis Amanah Rakyat (An agency of the Government)
MAS	Malaysia Airlines
MATS	Manual of Air Traffic Services
MET	Meteorological or meteorology
MCC	Maintenance Control Centre

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MCDU	Multi-purpose Control Display Unit
MCP	Mode Control Panel
MEC	Main Equipment Centre
MEL	Minimum Equipment List
MFD	Multi-Function Display
MGSCU	Main Gear Steering Control Unit
MHz	Megahertz
Min	Minute
MOR	Mandatory Occurrence Report
MPD	Maintenance Planning Document
MR1	Maintenance Report 1
MR2	Maintenance Report 2
MRB	Maintenance Review Board
ms	meter second
MTSAT	Multifunctional Transport Satellites of Japan Meteorological Agency (JMA)
MU	Management Unit
MYT	Malaysian Time

**N**

ND	Navigation Display
NDB	Non-directional Beacon
NM	Nautical Mile
NOTAM	Notices to Airmen
NOTOC	Notice to Crew
NTC	Notes to Crew
NTSB	National Transportation Safety Board
NTSC	National Transportation Safety Committee (Indonesia)

**O**

OCC	Operations Control Centre
OCXO	Oven Controlled Crystal Oscillator
OPR	Operator
OPS	Operations
OOOI	Out, Off, On, In

**P**

P/N	Part Number
PASS	Passenger(s)
PDS	Primary Display System
PDU	Power Drive Unit
PFCS	Primary Flight Control System
PFD	Primary Flight Display
PIC	Pilot in Command
PLN	Flight Plan
PMG	Permanent Magnet Generator
POB	Person on Board

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POR	Pacific Oceanic Region
PSA	Power Supply Assembly
PSEU	Proximity Switch Electronic Unit
psi	pounds per square inch
PSR	Primary Surveillance Radar
PSU	Passenger Service Unit
PTT	Push to Talk
PWR	Power
PWS	Predictive Windshear

**Q**

Q & A	Questions and Answers
QAE	Quality Assurance Engineer

**R**

RAT	Ram Air Turbine
REF	Reference
RF	Radio Frequency
RFS	Radio Frequency Splitter
RFU	Radio Frequency U nit
RH	Right Hand
rms	Root Mean Square
RTP	Radio Tuning Panel
RVSM	Reduced Vertical Separation Margin
RQS	Request Supplementary Flight Plan
RADAR	Radio Detection and Range
RCC	Rescue Coordination Centre
RDP	Radar Data Processor
RSC	Rescue Sub-Centre
RNAV	Area Navigation
RWY	Runway

**S**

SAP	Safety Awareness Programme
SAR	Search and Rescue
SATCOM	Satellite Communications
SC	Search and Rescue Coordinator
SEA 1	South East Asia 1
SEA 2	South East Asia 2
SELCAL	Selective Calling System
SIGMET	Significant meteorological information
SIGWX	Significant weather chart
SMC	Search and Rescue Mission Coordinator
SOI	Supplementary Operations Instructions
SRR	Search and Rescue Region
SSR	Secondary Surveillance Radar

**T**

T	Tonne
TAT	Total Air Temperature
TCAS	Traffic Collision Avoidance System
THDG	True Heading
TMA	Terminal Control Area
TH	True Heading
THR	Thrust
TMCF	Thrust Management Control Function
TO	Take-off
TRE	Type Rating Examiner
TRI	Type Rating Instructor
TRK	Track
TRTO	Type Rating Training Organization
TRU	Transformer Rectifier Unit
TSO	Technical Standard Order
UHF	Ultra High Frequency
ULB	Underwater Locating Beacon
USB	Upper Side Band
UTC	Universal Time Coordinated

**V**

V	Volt
V/S	Vertical Speed
VAAC	Very High Frequency
VNAV	Vertical Navigation
VOR	Very High Frequency Omni Directional Range

**W**

W	Watt
WHCU	Window Heat Control Unit
WINDIR	Wind Direction
WINDSP	Wind Speed
WMKC	ICAO 4-letter location indicator for Kota Bharu Airport (used in AFTN messages)
WMKK	ICAO 4-letter location indicator for Kuala Lumpur International Airport
WMKN	ICAO 4-letter location indicator for Kuala Terengganu Airport
WMKP	ICAO 4-letter location indicator for Penang International Airport
WWW	Worldwide web
WXR/WX	Weather

**Z**

ZBAA	ICAO 4-letter location indicator n for Peking-Capital International Airport
ZFW	Zero Fuel Weight
Z	Coordinated Universal Time ( <i>in meteorological messages</i> )

## SECTION 1.1 - HISTORY OF THE FLIGHT

### 1.1.1 Flight between 1642 to 1719:30 UTC [0042 to 0119:30]

On 07 March 2014 at 1642 UTC<sup>1</sup> [0042 MYT, 08 March 2014], a Malaysia Airlines (MAS) Flight MH370, a Beijing-bound international scheduled passenger flight, departed from Runway 32R, KL International Airport [KLIA] with a total of 239 persons on board (227 passengers and 12 crew). The aircraft was a Boeing 777-200ER, registered as 9M-MRO.

The Captain had signed in for duty at 1450 UTC, 07 March 2014 [2250 MYT, 07 March 2014] followed by the First Officer who signed in 25 minutes later. The MAS Operations Despatch Centre (ODC) released the flight at around 1515 UTC [2315 MYT].

The Captain, an authorised examiner for the Department of Civil Aviation (DCA), Malaysia, was conducting line training for the First Officer, who was transitioning to the Boeing 777 (B777) aircraft type from the Airbus A330.

The Captain ordered 49,100 kilograms (kg) of fuel for the flight that gave an endurance of 07 hours and 31 minutes including reserves. The planned flight duration was 05 hours and 34 minutes.

The recorded radio transmissions between Air Traffic Controllers (ATC) at Kuala Lumpur Air Traffic Control Centre (KL ATCC) and the flight crew showed that an airways clearance request to Lumpur Airways Clearance Delivery was made at 1625:52 UTC [0025:52 MYT] and pushback and start clearance at 1627:37 UTC [0027:37 MYT] to Lumpur Ground.

Lumpur Tower cleared MH370 for take-off at 1640:37 UTC [0040:37 MYT]. At 1642:53 UTC [0042:53 MYT] Lumpur Departure cleared MH370 to climb to Flight Level (FL) 180 (the aviation term for 18,000 feet [ft.]) and to cancel the Standard Instrument Departure (SID) clearance by tracking direct to waypoint IGARI.

At 1643:31 UTC [0043:31 MYT] KL ATCC Sector 3 Planner coordinated with Ho Chi Minh (Vietnam) Air Traffic Control Centre (HCM ATCC) on the direct land line, the flight's Estimate Time of Arrival (ETA) of MH370 for waypoint IGARI as 1722 UTC [0122 MYT] and the assigned transponder code A2157.

There was no record of transmission that a revision of ETA was passed by KL ATCC to HCM ATCC when MH370 was cleared direct to waypoint IGARI. However, based on the reconstruction of the flight profile conducted on the B777 simulator, the flight would be at waypoint IGARI one minute earlier than the original ETA of 1722 UTC [0122 MYT].

It was later established that normal automated Aircraft Communication Addressing and Reporting System (ACARS) transmissions (*refer to Section 1.9.4 - ACARS*) were made through the aircraft's satellite communication system up to 1707:29 UTC [0107:29 MYT] when the last ACARS communication occurred.

<sup>1</sup> Unless specified, all times in this report are in Universal Coordinated Time (UTC). Malaysian Time (MYT) is UTC +8 hours.

MH370 was transferred to Lumpur Radar at 1646:39 UTC [0046:39 MYT].

At 1646:58 UTC [0046:58 MYT] MH370 was cleared to climb to FL250 and subsequently to FL350 at 1650:08 UTC [0050:08 MYT]. MH370 reported maintaining FL350 at 1701:17 UTC [0101:17MYT] and reported maintaining FL350 again at 1707:56 UTC [0107:56 MYT].

At 1719:26 UTC [0119:26 MYT], MH370 was instructed to contact HCM ATCC on the radio frequency of 120.9 MHz.

At 1719:30 UTC [0119:30 MYT], MH370 acknowledged with “*Good night Malaysia Three Seven Zero*”. This was the last recorded radio transmission from MH370.

Radar recording showed that MH370 passed through waypoint IGARI at 1720:31 UTC [0120:31 MYT].

The Mode S symbol of MH370 dropped off from radar display at 1720:36 UTC [0120:36 MYT], and the last secondary radar position symbol of MH370 was recorded at 1721:13 UTC [0121:13 MYT].

The disappearance of the radar position symbol of MH370 was captured by the KL ATCC radar at time 1721:13 UTC [0121:13 MYT]. Military radar and radar sources from two other countries, namely Vietnam and Thailand, also captured the disappearance of the radar position symbol of MH370 at about the same time.

(Refer to Figure 1.1A - Chronological Sequence of Events of Disappearance of MH370)

### **1.1.2 Activities by Ground Air Traffic Controllers Thereafter**

At 1739:06 UTC [0139:06 MYT] HCM ATCC queried KL ATCC on the whereabouts of MH370.

Thereafter KL ATCC initiated efforts involving MAS Operations Centre, Hong Kong ATC (China) and Phnom Penh (Cambodia) ATC in an attempt to establish the location of MH370. No contact had been established by any of the ATC units.

The Kuala Lumpur Rescue Coordination Centre (KL RCC) was activated at 2232 UTC [0632 MYT].

### **1.1.3 Diversion from Filed Flight Plan Route - 1721:13 to 1822:12 UTC [0121:13 to 0222:12 MYT]**

(Figure 1.1B shows the diversion from the filed flight plan route in pictorial form [not to scale])

#### **a) Malaysia Military Radar**

The Military data provided more extensive details of what was termed as “Air Turn Back”.

At 1721:13 UTC [0121:13 MYT] the Military radar showed the radar return of MH370 turning right but almost immediately making a constant left turn to a South Westerly direction.

At 1730:35 UTC [0130:35 MYT] to 1735UTC [0135 MYT] the radar return was on heading 231 magnetic (M), ground speed of 496 knots (kt.) and registered height of 35,700 ft.

At 1736 UTC [0136 MYT to 1736:40 UTC [0136:40 MYT] heading was 237M, ground speed fluctuation between 494 and 525 kt. and height fluctuation between 31,100 and 33,000 ft.

At 1739:59 UTC [0139:59 MYT] heading was 244M, ground speed 529 kt. and height at 32,800 ft.

At 1752:35 UTC [0152:35 MYT] radar return was observed to be slightly south of Penang Island.

It was noted by the Investigation Team that the position and heading of the radar return from both Civilian and Military Radar, suggested that it was from the same target.

After the last radar return disappeared from KL ATCC Primary Radar at 1752:35 UTC [0152:35 MYT], the Military Radar continued to track this radar return as it headed towards Pulau Perak, a small island over the Straits of Malacca. The time registered over Pulau Perak was 1802:59 UTC [0202:59].

The tracking by the Military continued as the radar return was observed to be heading towards waypoint MEKAR, a waypoint on Airways N571 when it disappeared abruptly at 1822:12 UTC [0222:12 MYT], 10 nautical miles (Nm) after waypoint MEKAR.

## b) DCA Civilian Radar Data from Kota Bharu

The aircraft diversion from the filed flight plan route was recorded on the DCA radar playback.

(Figure 1.1B shows the diversion from Filed Flight Route in pictorial form [not to scale] and Figure 1.1D shows the Filed Flight Plan message)

From 1730:37 UTC [0130:37 MYT] to 1744:52 UTC [0144:52 MYT] a primary aircraft target was captured by the Terminal Primary Approach Radar located to the south of Kota Bharu Airport runway.

- The appearance of an aircraft target on the KL ATCC radar display, coded as P3362, was recorded at 1730:37 UTC [0130:37 MYT] but disappeared from the radar display at 1737:22 UTC [0137:22 MYT].
- At 1738:56 UTC [0138:56 MYT] an aircraft target, coded as P3401, appeared on the KL ATCC radar display and disappeared at 1744:52 UTC [0144:52 MYT].
- At 1747:02 UTC [0147:02 MYT] an aircraft target, coded as P3415, appeared on the KL ATCC radar display but disappeared at 1748:39 UTC [0148:39 MYT].

- 
- At 1751:45 UTC [0151:45 MYT] an aircraft target, coded as P3426, appeared on the KL ATCC radar display but disappeared at 1752:35 UTC [0152:35 MYT].

The primary aircraft targets above have been confirmed by DCA and its maintenance contractor, Advanced Air Traffic Systems (M) Sdn. Bhd. (AAT), that it was Kota Bharu Primary Radar Station which captured them.

(Figure 1.1E shows primary radar targets (plots) from Kota Bharu Primary Radar Station, plotted by AAT using Eva & Plotter 01.01-27 [after diversion])

(Figure 1.1F - primary radar targets (track), plotted by AAT using Eva & Plotter 01.01-27 [from take-off]).

All the primary aircraft targets that were recorded by the DCA radar are consistent with those of the military data that were made available to the Investigation Team.

References: Aeronautical Information Publication [AIP] Malaysia ENR 1.6 dated 05 JUN 2008, AIP AMDT 2/2008 on the Provision of Radar Services and Procedures, which states in paragraph 1.1.4 that “*In the Kuala Lumpur and Kota Kinabalu FIRs, radar services are provided using the following civil/military ATC Radars:...g) A 60 NM Terminal Primary Approach Radar co-mounted with 200 NM monopulse SSR<sup>2</sup> located to the south of Kota Bharu-Sultan Petra.*”

(Figure 1.1C shows the Radar Coverage Chart of Kuala Lumpur and Kota Kinabalu FIRs)

Source: Malaysian AIP ENR 1.6-11 dated 25 AUG 2011 AIP AMDT 3/2011.

### c) Ho Chi Minh Radar and Automatic Dependent Surveillance - Broadcast (ADS-B)

The tracking of MH370 was captured by HCM ATCC SSR and ADS-B (located at Conson Island/range 270 Nm) at 1711.59 UTC [0111:59 MYT] as it was heading for waypoint IGARI.

At 1720:33 UTC [0120:33 MYT] MH370 SSR and ADS-B radar position symbols disappeared from the radar display.

### d) Medan Indonesia Radar

The Medan ATC Radar has a range of 240 Nm, but for unknown reasons, did not pick up any radar return bearing SSR transponder code A2157 of MH370. The Military however admitted that they picked up MH370 earlier as it was heading towards waypoint IGARI. No other information was made available.

### e) Thailand Radar

The radar position symbol with SSR transponder code A2157 was detected on Aeronautical Radio of Thailand Limited (AEROTHAI) radar display at 1711 UTC [0111 MYT] as the aircraft was tracking for waypoint IGARI. Thailand DCA is a government agency whereas AEROTHAI is a state enterprise under the Ministry of Transport and Communications. AEROTHAI is the air navigation service provider responsible for the provision of Air Traffic Services within Bangkok Flight Information Region (FIR).

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<sup>2</sup> SSR – Secondary Surveillance Radar – A surveillance radar system which uses transmitters/receivers system (interrogators) and transponders.

As the flight plan of MH370 did not fall under Thailand's FIR Bangkok ATCC did not pay much attention to this flight.

On playback of the radar recording it was noted that the radar position symbol of A2157 disappeared at 1721:13UTC [0121:13 MYT].

#### **1.1.4 Search for Aircraft**

Extensive work done by the MH370 Search Strategic group, coordinated by Australian Transport Safety Bureau (ATSB), by analysing signals transmitted by the aircraft's satellite communications terminal to Inmarsat's Indian Ocean Region satellite indicated that the aircraft continued to fly for several hours after loss of contact. The analysis showed the aircraft changed course shortly after it passed the northern tip of Sumatra (Indonesia) and travelled in a southerly direction until it ran out of fuel in the southern Indian Ocean west of Australia. Details of this work can be found in ATSB's report: AE-2014-054 dated 26 June 2014, available at ATSB's website: <http://www.atsb.gov.au>

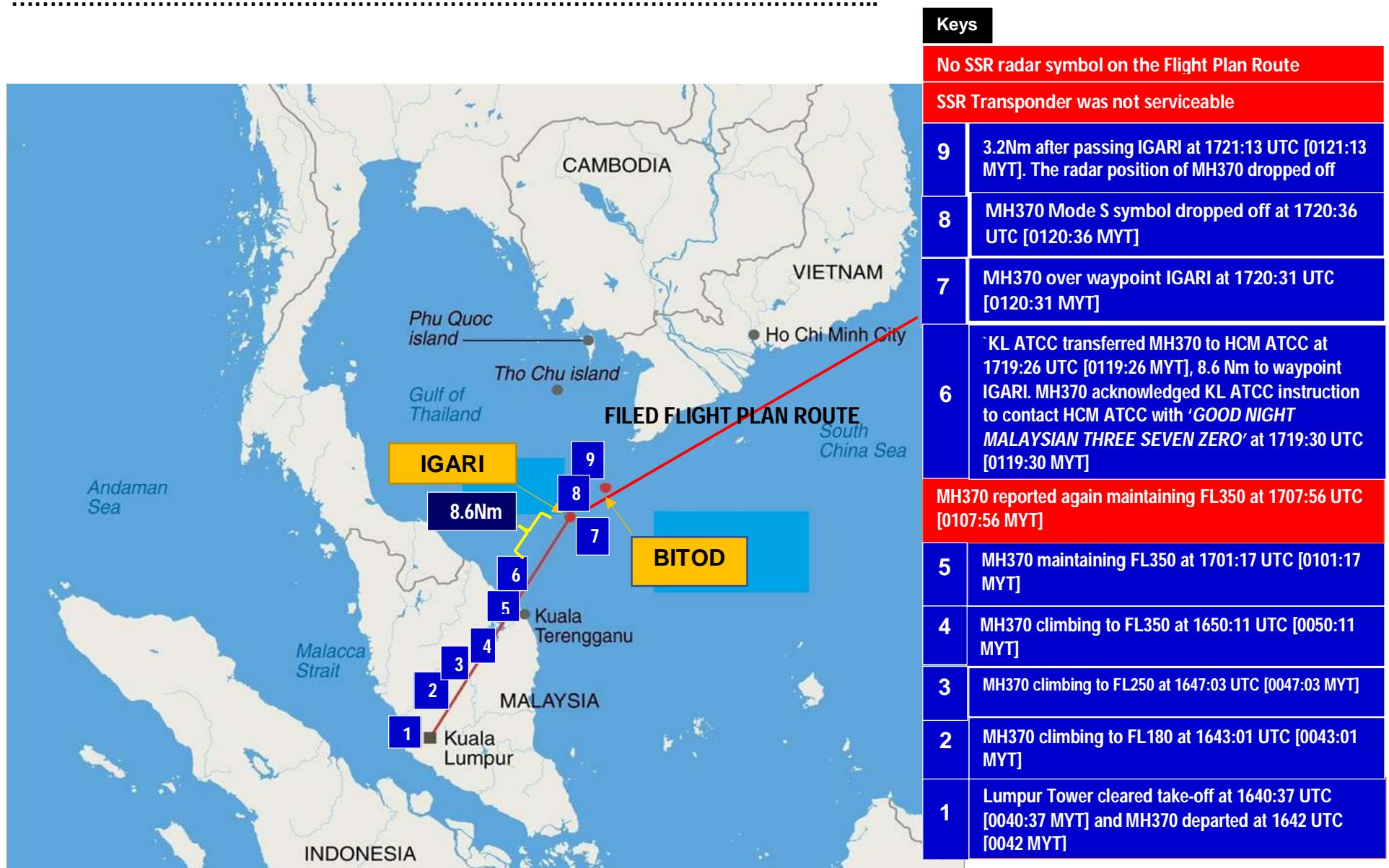


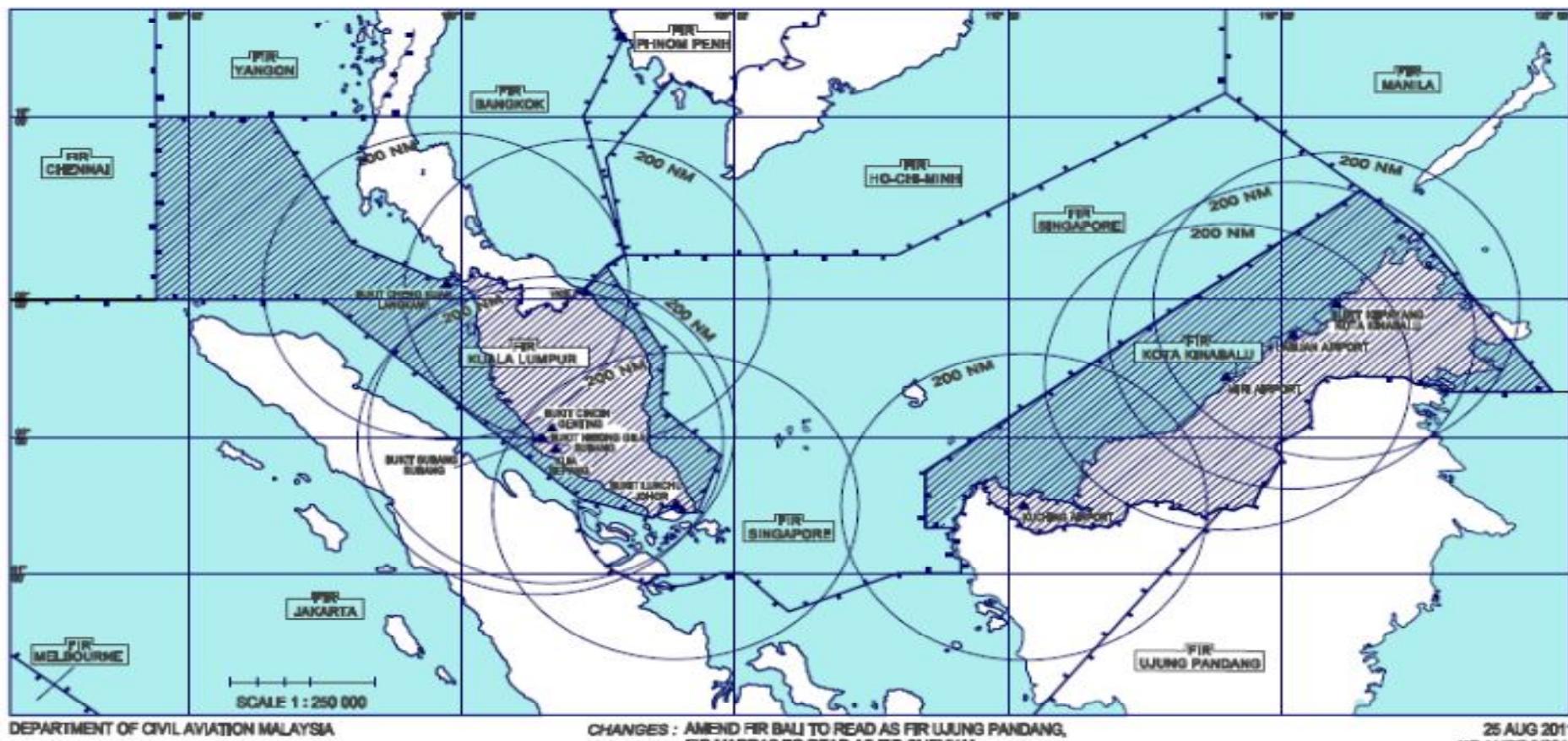
Figure 1.1A - Chronological Sequence of Events of Disappearance of MH370

KEYS	
1	P3362 : Appeared at 1730:37 UTC [0130:37 MYT]
2	P3362 : Coasted at 1737:12 UTC [0137:12 MYT] Dropped at 1737:22 UTC [0137:22 MYT]
3	P3401: Appeared at 1738:56 UTC [0138:56 MYT]
4	P3401 : Coasted at 1744:42 UTC [0144:42 MYT] Dropped at 1744:52 UTC [0144:52 MYT]
SOURCE OF INFORMATION: FROM THE MILITARY	
5	P3415 : Appeared at 1747:02 UTC [0147:02 MYT]
6	P3415 : Coasted at 1748:29 UTC [0148:29 MYT] Dropped at 1748:39 UTC [0148:39 MYT]
7	P3426 : Appeared at 1751:45 UTC [0151:45 MYT]
8	P3426 : Coasted at 1752:25 UTC [0152:25 MYT] Dropped at 1752:35 UTC [0152:35 MYT] P3426 last seen on radar display approximately 6Nm South of Penang
9	The primary target (military radar) appeared to track west-northwest direction joining RNAV Route N571 at waypoint VAMPI then to 10Nm north MEKAR
10	The primary target ended at 10Nm after MEKAR at 1822.12 UTC [0222.12 MYT]



Figure 1.1B – Diversion from Filed Flight Plan Route (not to scale)

## RADAR COVERAGE CHART



*Figure 1.1C - Radar Coverage Chart of Kuala Lumpur and Kota Kinabalu FIRs  
 (Ref: Malaysian AIP ENR 1.6-11 dated 25 Aug 2011 AIP AMDT 3/2011)*

KLA297 070444  
FF WMKKZQZX WMKKZRZX  
070441 WMKKYOYX  
(FPL-MAS370-IS  
-B772/H-SDFGHIJ3J5M1RWXY/LB1D1  
-WMKK1635  
-N0470F290 DCT PIBOS R208 IKUKO/M081F330 R208 IGARI M765  
BITOD/N0480F330 L637 TSN/N0480F350 W1 BMT W12 PCA G221  
BUNTA/N0480F370 A1 IKELA/N0480F370 P901 IDOSI/N0480F390 DCT CH  
DCT BEKOL/K0900S1160 A461 YIN/K0890S1130 A461 VYK  
-ZBAA0534 ZBTJ ZBSJ  
-PBN/A1B1C1D1L1O1S2 DOF/140307 REG/9MMRO EET/WSJC0032 VVTS0042  
  
ZJSA0210 VHHK0233 ZGZU0304 ZHWH0356 ZPE0450 SEL/QRC RMK/ACASII  
EQUIPPED)



Figure 1.1D – Filed Flight Plan Message

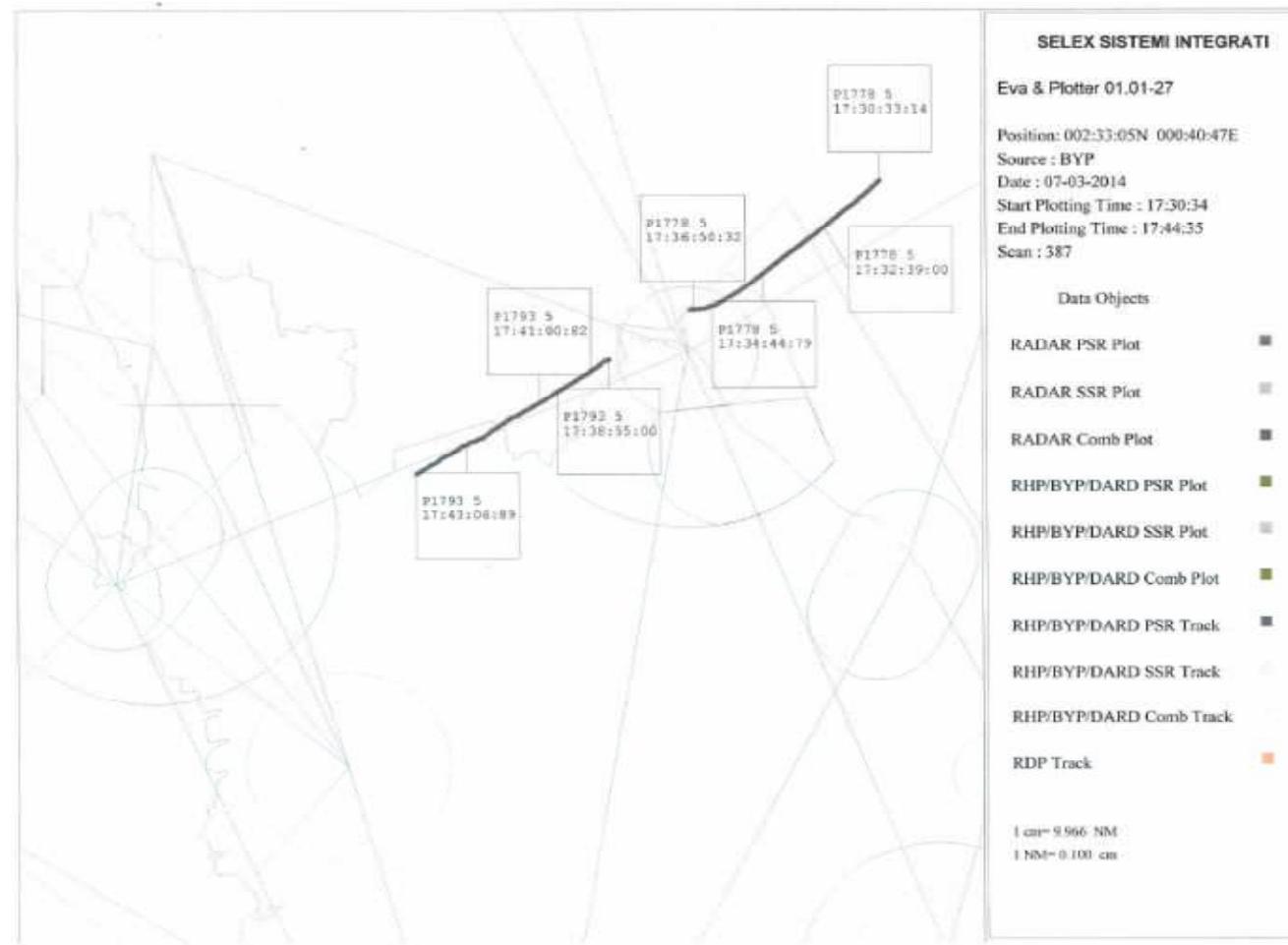


Figure 1.1E – Primary Radar Targets (plots) from Kota Bharu Radar Station, plotted by AAT using EVA & Plotter 01.01-27 (After Diversion)

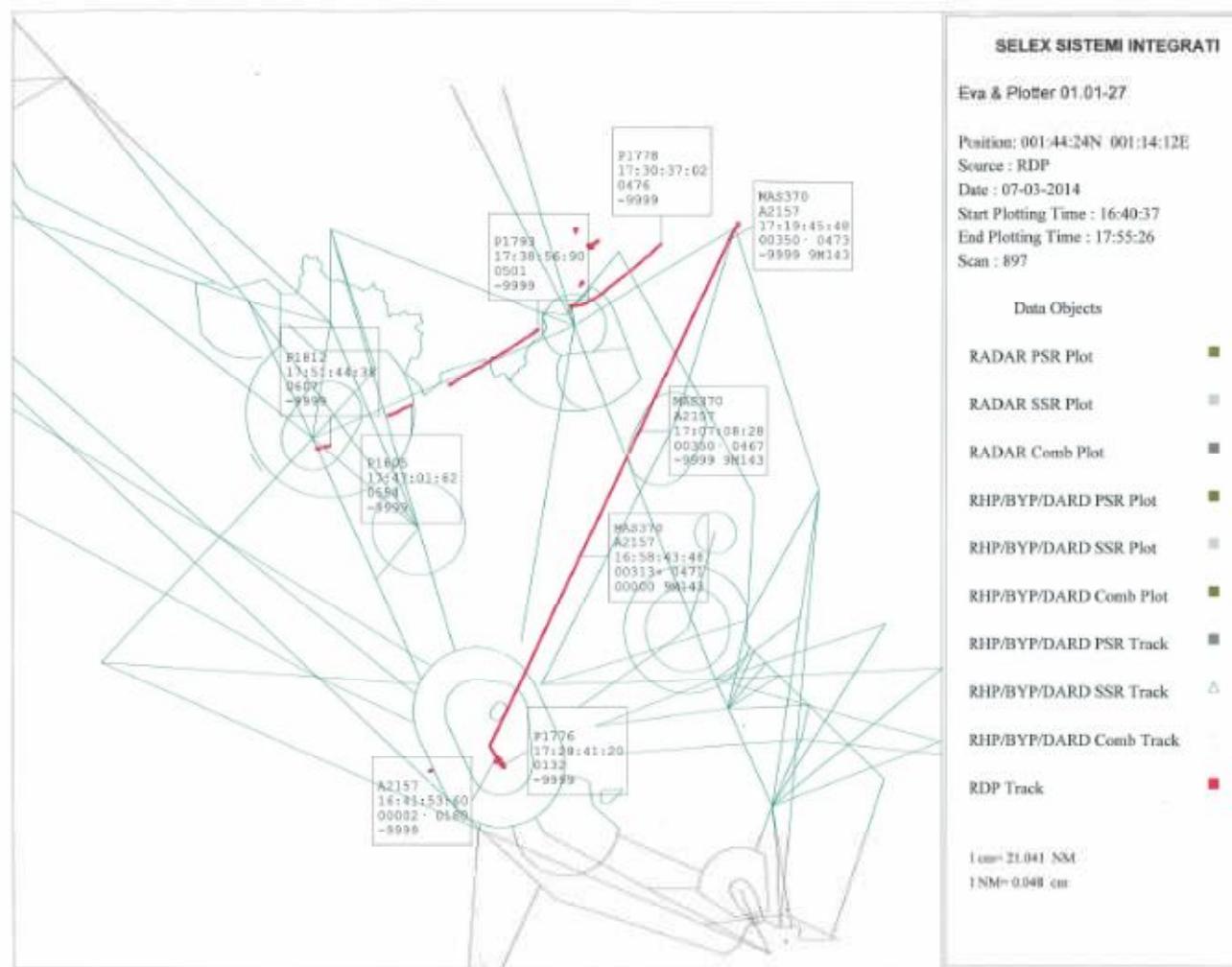


Figure 1.1F - Primary Radar Targets (track),  
plotted by AAT using EVA & Plotter 01.01-27 (From Take-off)

**SECTION 1.2 - INJURIES TO PERSONS**

While injuries to persons on board the flight could not be established as no survivors or bodies were found to date, the fact remains that there are 239 persons still missing. The passenger manifest has already been released on the Ministry of Transport (MOT) Malaysia's website as follows:

<http://www.mot.gov.my/my/Newsroom/ReportMH370/MH370%20-%20Passenger%20Manifest.pdf>

**SECTION 1.3 - DAMAGE TO AIRCRAFT**

Aircraft damage could not be established as no parts of the aircraft were found to date.

**SECTION 1.4 - OTHER DAMAGES**

There was no reported ground impact or damage to any ground facilities or properties.

**SECTION 1.5 - PERSONNEL INFORMATION**

This investigation emphasised on the Captain, First Officer and the 10 cabin crew but did not include the passengers on board Flight MH370. Factual information of the crew were gathered from the following sources:

- Personal records/files of the Captain, First Officer and the Cabin Crew from MAS. These documents included the log book, certificates, licences, medical records and any disciplinary/administrative actions;
- Investigation details from the Polis Di Raja Malaysia (PDRM) - Royal Malaysian Police. These were statements obtained from the next of kin and relatives, doctors/care givers, co-workers, friends and acquaintances; financial records of the flight crew, CCTV recordings at KLIA and analysis of the radio transmission made between MH370 and ground air traffic control;
- Medical records from private health care facility and from MAS Medical Centre; and
- Interviews with MAS staff and several of the next of kin of the crew.

The facts obtained were in relation to the demographic and employment history, financial background and insurance cover, significant past medical and medication history, psychological, social and behavioural pattern of the crew.

**1.5.1 MAS Training & Checks Record**

As professional pilots, the 2 flight crew are subjected to periodic checks when flying on the type of aircraft at least on a bi-annual basis to revalidate the currency of their licence. These checks are conducted in approved flight simulators and in addition, further performance checks are conducted on route flying duties on normal commercial flight on a yearly basis.

### 1.5.2 Pilot in Command (PIC)

The Captain was born in the Island of Penang. He completed his Malaysian Certificate of Education (MCE) - the equivalent of the United Kingdom Ordinary (UK 'O') Level - at the Penang Free School, where he sat for his MCE Examination in 1978. In 1981 he was accepted as Cadet Pilot with MAS under the sponsorship of Majlis Amanah Rakyat (MARA), a Government agency. He was sent to Manila in the Philippines to be provided ab-initio pilot training and graduated 2 years later with a Commercial Pilot Licence & Instrument Rating (CPL & IR). He joined MAS as a Second Officer in 1983 and was posted on the F27 where he obtained his initial airline flying experience. He was then posted to the B737-400 in 1985 and stayed on as First Officer until October 1991. By the end of 1991 he was promoted to Captain on the B737-400 and he stayed on the B737-400 until December 1996. At this point he gained promotion to the A330-300 and stayed on the fleet until September 1998 when he was then promoted to the B777-200 fleet as a Captain until the day of the event. By virtue of his good track record and seniority he was made a Type Rating Instructor (TRI) and Type Rating Examiner (TRE) on this present fleet effective November 2007.

The Captain's flying record for the last 72 hours and preceding 28 days cycle were well within the Company's specified limits. His last flight as an operating Captain was to Denpasar, Bali in the Republic of Indonesia on 03 March 2014. This was a daily return flight with a flight time of approximately 3 hours per sector. During this flight on the day of the event, he was conducting training for the First Officer who was operationally checked out.

All his required licences and certificates were valid when he was operating this flight to Beijing.

#### Personal Profile of PIC

Sex	Male
Age	53 years
Marital Status	Married with 3 children
Date of joining MAS	15 June 1981
Licence country of issues	Malaysia
Licence type	Air Transport Pilot Licence (ATPL)
Licence number	A751
Validity Period of Licence	14 May 2014
Ratings	Boeing B777
Medical Certificate	First Class - 30 June 2014
Aeronautical experience	18423:40 hours
Experience on type	8659:40 hours
Last 24 hours	0:00:00 hours
Last 72 hours	1:59:00 hours
Last 7 days	20:39:00 hours
Last 28 days	91:04:00 hours
Last 90 days	303:09:00 hours
Last line check	8 April 2013
Instrument rating check	15 November 2013
Last proficiency	15 November 2013
Last promotion	B777 Captain (22 September 1998)

### 1.5.3 First Officer (FO)

The First Officer was born in the State of Kelantan and had his basic primary education in Segamat, Johor. He completed his secondary Education in Maktab Rendah Sains MARA (MRSM) or MARA Junior Science College in Taiping, Perak, where he left with the Sijil Pelajaran Malaysia (SPM), which is equivalent to the UK 'O' Level, in 2004. He was accepted as MAS Cadet Pilot and completed his flying training at the Langkawi Aerospace Training Centre, Langkawi in 2008.

His first fleet posting was on the B737-400 where he was made a Second Officer until May 2010 on completion of his Type Rating training. He was promoted to First Officer in May 2010 and was on the fleet until August 2012. He left the fleet for promotion to the A330-300 where he was First Officer until November 2013.

In November 2013 he was promoted to the B777-200. On the day of the flight, he was operating his last training flight before he was scheduled to be checked out on his next scheduled flight. His flying record for the last 72 hours and preceding 28 days cycle were well within the Company's specified limits. His last flight was as an Operational First Officer under Line Training, was to Frankfurt, Germany, on 01 March 2014 and departed back to Malaysia on 02 March 2014. All his required licences and certificates were valid when he was operating this flight to Beijing.

#### Personal Profile of FO

Sex	Male
Age	27 years
Marital Status	Single
Date of joining MAS	23 July 2007
Licence type	Air Transport Pilot Licence (ATPL)
Licence number	A3550
Validity Period of Licence	26 July 2014
Ratings	Boeing B777
Medical Certificate	First Class – Expired 31 October 2014
Aeronautical experience	2813:42 hours
Experience on type	39:11hours
Last 24 hours	0:00:00 hours
Last 72 hours	0:00:00 hours
Last 7 days	28:47:00 hours
Last 28 days	51:17:00 hours
Last 90 days	158:46:00 hours
Last line check *	22 July 2013 (A330)
Instrument rating check *	04 December 2012 (A330)
Last proficiency	26 January 2014
Last promotion	B777 FO (04 November 2013)

\* No record on B777

### 1.5.4 Cabin Crew and Personal Profiles

The crews' flying experience spreads from 13 years for the most junior member to 35 years for the most senior member. A review of their records in MAS reveals that all certificates', which includes Safety Emergency Procedures (SEP) training, Crew Resource Management (CRM), Safety Awareness Programme (SAP), are valid as per the requirement stated in the company's document. CRM & SAP incorporate Human Factors as part of the training modules. The flying records which were monitored by the Scheduling Office indicated that all the cabin crew were well-rested before operating the flight.

#### a) Inflight Supervisor (IFS)

Sex	Male
Age	55 years
Marital status	Married with 4 children
Date of Joining MAS	19 November 1979
Aircraft Ratings	A330/B777/B747
Crew Performance Appraisal	Rating: 4
Validity period of licence	28 April 2014
Aeronautical experience	35 years
Medical History	43 days medical leave including 6 days hospitalisation in 2013
Last 24 hours	0:00:00 hours
Last 72 hours	8:00:00 hours
Last 7 days	19:44:00 hours
Last 28days	82:43:00 hours
Last 90 days	305:06:00 hours
Last promotion	IFS (27 March 2000)

#### b) Chief Steward (CS)

Sex	Male
Age	49 years
Marital status	Married with 2 children
Date of Joining MAS	13 November 1989
Aircraft Ratings	A330/B777/A380
Crew Performance Appraisal	Rating 4
Validity period of licence	26 June 2014
Aeronautical experience	25 years
Last 24 hours	0:00:00 hours
Last 72 hours	0:00:00 hours
Last 7 days	30:56:00 hours
Last 28 days	124:35:00 hours
Last 90 days	408:32:00 hours
Last promotion	CS (06 March 2000)

**c) Chief Stewardess (CSS)**

Sex	Female
Age	49 years
Marital status	Married with a child
Date of Joining MAS	02 January 1990
Aircraft Ratings	A330/B777/A380
Crew Performance Appraisal	Rating 5
Validity period of licence	23 October 2014
Aeronautical experience	24 years
Last 24 hours	0:00:00 hours
Last 72 hours	0:00:00 hours
Last 7 days	30:55:00 hours
Last 28 days	118:02:00 hours
Last 90 days	355:23:00 hours
Last promotion	CSS (22 October 2003)

**d) Leading Steward (LS)**

Sex	Male
Age	42 years
Marital status	Married with 4 children
Date of Joining MAS	05 October 1995
Aircraft Ratings	B737/B777/A380
Crew Performance Appraisal	Rating 4
Validity period of licence	22 August 2014
Aeronautical experience	19 years
Last 24 hours	00:00:00 hours
Last 72 hours	10:47:00 hours
Last 7 days	38:38:00 hours
Last 28 days	106:10:00 hours
Last 90 days	365:51:00 hours
Last promotion	LS (28 May 2005)

**e) Leading Stewardess (LSS)**

Sex	Female
Age	42 Years
Marital status	Married with 2 children
Date of Joining MAS	18 August 1992
Aircraft Ratings	B737/B777/A380
Crew Performance Appraisal	Rating 5
Validity period of licence	01 November 2014
Aeronautical experience	22 years
Last 24 hours	0:00:00 hours
Last 72 hours	11:36:00 hours
Last 7 days	41:27:00 hours
Last 28 days	140:11:00 hours
Last 90 days	443:23:00 hours
Last promotion	LSS (09 May 2004)

**f) Flight Stewardess (FSS) 1**

Sex	Female
Age	42 years
Marital status	Married with 2 children
Date of Joining MAS	18 January 1992
Aircraft Ratings	A330/B777/A380
Crew Performance Appraisal	Rating 4
Validity period of licence	27 June 2014
Aeronautical experience	22 years
Last 24 hours	0:00:00 hours
Last 72 hours	9:39:00 hours
Last 7 days	34:22:00 hours
Last 28 days	93:50:00 hours
Last 90 days	327:18:00 hours
Last promotion	FSS Wide-body aircraft (18 January 1993)

**g) Flight Stewardess (FSS) 2**

Sex	Female
Age	39 years
Marital status	Married with 2 children
Date of Joining MAS	16 April 1996
Aircraft Ratings	A330/B777/A380
Crew Performance Appraisal	Rating 4
Validity period of licence	11 May 2014
Aeronautical experience	18 years
Last 24 hours	0:00:00 hours
Last 72 hours	0:00:00 hours
Last 7 days	16:12:00 hours
Last 28 days	112:11:00 hours
Last 90 days	323:55:00 hours
Last promotion	FSS Wide-body aircraft (01 October 2001)

**h) Flight Steward (FS) 1**

Sex	Male
Age	46 years
Marital status	Married with 3 children
Date of Joining MAS	16 April 1996
Aircraft Ratings	B737/B777/A380
Crew Performance Appraisal	Rating 5
Validity period of licence	24 October 2014
Aeronautical experience	18 years
Last 24 hours	0:00:00 hours
Last 72 hours	11:02:00 hours
Last 7 days	30:58:00 hours
Last 28 days	119:27:00 hours
Last 90 days	429:15:00 hours
Last promotion	FS Wide-body aircraft (03 December 2001)

**i) Flight Steward (FS) 2**

Sex	Male
Age	41 years
Marital status	Married with 2 children
Date of Joining MAS	13 February 1997
Aircraft Ratings	B737/B777/A380
Crew Performance Appraisal	Rating 5
Validity period of licence	03 November 2014
Aeronautical experience	17 years
Last 24 hours	0:00:00 hours
Last 72 hours	0:00:00 hours
Last 7 days	30:36:00 hours
Last 28 days	122:22:00 hours
Last 90 days	391:20:00 hours
Last promotion	FS Wide-body aircraft (15 February 2002)

**j) Flight Steward (FS) 3**

Sex	Male
Age	34 years
Marital status	Married with 2 children
Date of Joining MAS	27 September 2001
Aircraft Ratings	B737/B777/A380
Crew Performance Appraisal	Rating 5
Validity period of licence	06 February 2015
Aeronautical experience	13 years
Last 24 hours	0:00:00 hours
Last 72 hours	10:47:00 hours
Last 7 days	26:24:00 hours
Last 28 days	125:01:00 hours
Last 90 days	435:43:00 hours

**1.5.5 Disciplinary Actions/Administrative Actions**

There were no major disciplinary records on any of the flight and cabin crew. However, there were only minor disciplinary issues among the cabin crew, where cautionary administrative letters were issued.

### **1.5.6 Financial Background and Insurance Cover**

The Captain held bank accounts, two saving accounts, one current account, two national trust funds (ASB and ASN) and a joint account with his wife. He had a credit card. He was contributing to Employees Provident Fund. There is no record of him having secured a life insurance policy. He had 2 houses, one in Shah Alam and the other in Subang Jaya. He had taken a bank loan on one of his houses and had a mortgage insurance policy on this loan. He also had 3 vehicles. His gross monthly income and out-of-pocket expenses indicated nothing unusual.

The First Officer had two saving accounts and a national trust fund (ASB) account. He contributed to Employees Provident Fund. He owned two cars and spent money on the upkeep of his cars. He does not have much savings in his bank account. He has a life insurance policy and mortgage insurance policy for a loan he took for his car.

The cabin crew had bank accounts and loans. However, the gross monthly income and out-of-pocket expenses indicated nothing unusual. There is also no evidence of recent or imminent significant financial transactions carried out.

### **1.5.7 Significant Past Medical and Medication History**

The Captain had received treatment for minor medical ailments and was diagnosed as having osteoarthritis on 05 May 2007. He had spinal injury on 28 January 2007 in a paragliding event. He sustained a fracture of the 2<sup>nd</sup> lumbar vertebra and underwent surgery on 30 January 2007 in a private health care facility. He was discharged on 05 February 2007 and went for follow-up as advised. He was certified fit to fly in mid-2007 and went regularly for his six-monthly medical examinations for his continued licensure as a pilot. For his pain he was noted to have taken analgesics on an irregular basis. To the best of our knowledge, he was not on any regular long term medication for any chronic medical illness.

There was no significant health related issue for the First Officer. He went regularly for his yearly medical examinations for his continued licensure to fly.

Based on the medical records from MAS, there were no unusual health related issues for the cabin crew, except for the inflight supervisor who had a history of first onset of seizures on 09 June 2013. He was admitted on the same day in a private health care facility and was treated by a Consultant Neurologist. He was discharged on 14 June 2013 and went for a follow-up as advised. He had not experienced any further seizures since his discharge. He was certified fit to fly on 06 August 2013.

### **1.5.8 Psychological and Social Events**

The Captain's ability to handle stress at work and home was good. There was no known history of apathy, anxiety, or irritability. There were no significant changes in his life style, interpersonal conflict or family stresses.

### **1.5.9 Behavioural Events**

There were no behavioural signs of social isolation, change in habits or interest, self-neglect, drug or alcohol abuse of the Captain, First Officer and the Cabin Crew.

The Closed Circuit Television (CCTV) recordings at KLIA on the 07 March 2014 were evaluated to assess the behavioural pattern of the Captain and the First Officer from the time of arrival at KLIA until boarding time.

Three previous CCTV recordings of the movements of the Captain in KLIA were also viewed to see the behavioural pattern and were compared with the CCTV recordings on 07 March 2014.

The Captain's movement was captured on CCTV at KLIA on the following days:

- a) 07 March 2014 - To Beijing
- b) 03 March 2014 - To Denpasar
- c) 26 February 2014 - To Melbourne
- d) 21 February 2014 - To Beijing

On studying the Captain's behavioural pattern on CCTV recordings on the day of the flight and prior 3 flights there was no significant behavioural changes observed. On all the CCTV recordings the appearance was similar, i.e. well groomed and attired. The gait, posture, facial expressions and mannerism were his normal characteristics.

The First Officer's movement captured on CCTV at KLIA on 07 March 2014 was observed. The Flight Officer's behavioural pattern on CCTV recordings on the day of the flight showed no significant behavioural changes.

### **1.5.10 Air-ground Communications**

The radio transmissions made between MH370 and the ground air traffic control were studied. The team used the pilots, friends, family members, expert report of objective analysis of the radio transmissions in the voice recognition of the transmissions made between MH370 and ground air traffic control.

Five sets of audio recordings were analysed starting from Airway Clearance Delivery at 1625:52 UTC [0025:52 MYT] till the last utterance from Lumpur Radar at 1719:30 UTC [0119:30 MYT]. There were a total of 23 utterances as follows:

- a. Airway Clearance Delivery (ACD) - frequency 126.0 MHz → 4 utterances
- b. Lumpur Ground (LG) - frequency 122.27 MHz → 6 utterances
- c. Lumpur Tower (LT) - frequency 118.8 MHz → 4 utterances
- d. Approach Radar (AR) - frequency 121.25 MHz → 3 utterances
- e. Lumpur Radar (LR) - frequency 132.6 MHz → 6 utterances

From the information available, the first 3 sets of audio recordings (ACD, LG, LT), the speech segments are those of the Flight Officer before take-off, and the 4<sup>th</sup> & 5<sup>th</sup> (AR & LR) sets of the audio recordings originated from the Captain after take-off.

## SECTION 1.6 - AIRCRAFT INFORMATION

### 1.6.1 Airframe

<b>Manufacturer</b>	Boeing Company
<b>Model</b>	777-2H6ER
<b>Serial Number</b>	28420
<b>Registration</b>	9M-MRO
<b>Date of manufacture</b>	29 May 2002
<b>Date of delivery to MAS</b>	Delivered new on 31 May 2002
<b>Certificate of airworthiness</b>	M.0938 valid to 02 June 2014
<b>Certificate of registration</b>	M.1124 issued 23 August 2006 Replacement of Certificate issued on 17 June 2002
<b>Last Maintenance check</b>	A1 Check on 23 February 2014 at 53,301:17 hours and 7,494 cycles
<b>Total airframe hours/cycles</b>	53,471.6 hours/7,526 cycles (as of 07 March 2014)

### 1.6.2 Engine

<b>Manufacturer</b>	Rolls-Royce
<b>Model</b>	RB211 Trent 892B-17
<b>Engine 1 (Left)</b>	
<b>Serial Number</b>	51463
<b>Date of Construction</b>	November 2004
<b>Date Installed</b>	08 May, 2013
<b>Last Shop Visit</b>	06 September 2010 to 21 November 2010
<b>Time in Service</b>	40,779 hours, 5,574 cycles (as of 07 March 2014)
<b>Engine 2 (Right)</b>	
<b>Serial Number</b>	51462
<b>Date of Construction</b>	October 2004
<b>Date Installed</b>	15 June 2010
<b>Last Shop Visit</b>	05 February 2010 to 14 April 2010
<b>Time in Service</b>	40,046 hours, 5,508 cycles (as of 07 March 2014)

#### 1.6.2.1 Auxiliary Power Unit (APU)

<b>Manufacturer</b>	Allied Signal
<b>Model</b>	GTCP 331-500B
<b>Serial Number</b>	P1196
<b>APU Hours</b>	22,093 (as of 07 March 2014)

### 1.6.3 Airworthiness and Maintenance

The aircraft, Serial Number 28420, was issued with a Federal Aviation Administration (FAA) Export Certificate of Airworthiness No: E370249 on 29 May 2002 and placed on the Malaysian aircraft register as 9M-MRO on 03 June 2002. Ownership of the aircraft, as stated on the Certification of Registration (C of R), was Malaysian Airline System Berhad. The ownership was subsequently changed to Aircraft Business Malaysia Sdn. Bhd., as the lessor, and leased and operated by MAS. A new C of R to reflect the new owner was issued on 17 June 2002.

A Certificate of Airworthiness (C of A) in the 'PRIVATE' category was initially issued on 03 June 2002. The aircraft was then flown to Kuala Lumpur, Malaysia where a C of A in 'TRANSPORT PASSENGER' category was issued by the DCA Malaysia on the 12 June 2002 after the pre-service modifications were accomplished.

The C of A was subjected to annual renewal by DCA Malaysia and its renewal was subjected to compliance to the DCA Malaysia Airworthiness Notice No. 2 - Certificate of Airworthiness Renewal Procedure. The operator was required to declare the aircraft, engine, APU and equipment maintenance status as per the approved Maintenance Schedule, and that they complied with all the mandatory inspections and modifications originating from the State of Manufacture and State of Registry. The Quality Assurance Department of MAS was required to submit an 'Aircraft Physical Inspection for the Purpose of C of A Issue/Renewal' prior to the expiry of the C of A. An 'Aircraft Survey Report for Certificate of Airworthiness' will be issued by the DCA Inspector after a satisfactory physical inspection on the aircraft has been carried out. At times, the physical aircraft inspection has to coincide with the aircraft scheduled check at base or line maintenance.

The last C of A document review by DCA Inspector was carried out on 15 May 2013 for the C of A renewal and the aircraft physical inspection was carried out by MAS Quality Assurance Engineer (QAE) on 12 April 2013. The only inspection defect noted was a torn left hand flaperon inboard seal which was subsequently replaced. The aircraft C of A was renewed with no airworthiness issues identified.

#### 1.6.3.1 Aircraft Maintenance Schedule

The MAS B777-200 Maintenance Schedule was based on the Boeing B777-200 Maintenance Review Board (MRB)/Maintenance Planning Document (MPD). The schedule is divided into four sections which describes the routine check types, intervals and limitations on how this work must be accomplished and the methods to achieve the tasks. Brief description of the sections follows:

- **Section 1** – The definition and introduction of the routine check types, check intervals and limitations at which the maintenance tasks are to be carried out.
- **Section 2** – Task Maintenance Requirements relating to on-wing tasks or tasks to be performed on parts after removal from the aircraft, their intervals and control in the routine maintenance check or independently.

- **Section 3** – Component Maintenance Requirements on tasks to be performed on components, their intervals and controlled independently.
- **Section 4** – which registers all the applicable job cards which are tied up to the maintenance Checks or Phases of inspections or tasks. The job cards/task cards cover the system, power plants, structural and zonal tasks.

The Master document of the approved Maintenance Schedule is stored in the Engineering Maintenance System (EMS) computer system bank and subject to regular revisions.

In addition to the Maintenance Schedule, a Supplementary Maintenance Schedule covered MAS' own generated tasks, non-mandatory manufacturer/vendor recommended tasks and non-airworthiness items.

The Maintenance check cycles are translated into the routine Transit Check, Stayover Check, Equalised 'A' Check, 'C' Check, 'C Extended' Check and 'D' Check. *Table 1.6A* summarises the maintenance check intervals.

Transit	Stay-over	A Check	C Check	CX (Extended) Check	D Check
Whenever aircraft is on transit	6 hours planned or 12 hours Unplanned	In 4 parts A1 thru A4 <ul style="list-style-type: none"> <li>• A1 to A2 = 550 hours</li> <li>• A2 to A3 = 550 hours</li> <li>• A3 to A4 = 550 hours</li> <li>• A4 to A1 = 550 hours</li> </ul>	In 2 parts C1 and C2 <ul style="list-style-type: none"> <li>• C1 to C2 = 13 months</li> <li>• C2 to C1 = 13 months</li> </ul>	52 months	8 years

*Table 1.6A Maintenance Check Intervals*

A review of the maintenance records for 9M-MRO revealed the following sequence of recent checks (*Table 1.6B* below) carried out by MAS prior to the disappearance of the aircraft on the 08 March 2014. No significant defects were noted during the checks including the turn-around transit checks.

No.	Type of Aircraft Checks	Date of Aircraft Checks	Airframe Hours	Landing Cycles
1	A1	23 February 2014	53,301:17	7,494
2	A4	14-16 January 2014	52,785:37	7,422
3	A3	13 December 2013	52,323:00	7,359
4	A2	04 November 2013	51,766:29	7,282
5	C1 and A1	29 August - 26 September 2013	51,270:15	7,208
6	A4	24-25 July 2013	50,810:19	7,132
7	A3	19 June 2013	50,372:07	7,069
8	A2	14 May 2013	49,840:28	6,994
9	A1	04 April 2013	49,331:52	6,910
10	A4	19-20 February 2013	48,836:23	6,840
11	A3	10 January 2013	48,291:37	6,766
12	A2	03 December 2012	47,749:39	6,693
13	A1	25 October 2012	47,214:27	6,617
14	A1, A4 and C2	06-22 July 2012	46,727:16	6,552
15	A4,C2, CX and D	25 May - 26 June 2010	37,014:15	5,304

Table 1.6B Recent Aircraft Checks

The Maintenance Schedule incorporated the Structural Inspection Programme based on the B777 Maintenance Review Board Report and B777 Maintenance Planning Document, which are categorised as Structural Inspection Items, Corrosion Prevention and Control Items and Fatigue Related Inspection Items. Inspection findings will be evaluated by the MAS Reliability Section of the Technical Services Department and the department would recommend any follow-up actions as necessary and report to Boeing Company of all significant structural discrepancies.

The Maintenance Schedule also included compliance procedures for Airworthiness Directives<sup>3</sup>, Airworthiness Limitations (AWL)<sup>4</sup> and Structural Inspections with Provisions for Damage Tolerance Rating. It also included Certification Maintenance Requirement Compliance to the Extended Twin Engine Operations (ETOPS)<sup>5</sup> operational approval, which was obtained from DCA Malaysia. The MAS B777 ETOPS Maintenance Manual specified the maintenance policies, procedures and requirements for ETOPS operations. A policy to prevent the same personnel to perform or certify certain tasks or multiple similar systems at the same downtime is stipulated. ETOPS task intervals cannot be exceeded. If a concession is given for a check that contains ETOPS task or for individual ETOPS task, the aircraft must be downgraded to non-ETOPS status.

MAS and its fleet of B777 are approved for Reduced Vertical Separation Minimum (RVSM) operation.

<sup>3</sup> An AD is a notification to owners and operators of certified aircraft that a known safety deficiency with a particular model of aircraft, engine, avionics or other system exists and must be corrected. It is mandatory in nature.

<sup>4</sup> AWLs are items that the Certificate process has defined as critical from a fatigue or damage tolerance assessment.

<sup>5</sup> ETOPS is an aviation rule that allows twin-engined airliners to fly long distance routes that were previously off-limits to twin-engined aircraft.

### 1.6.3.2 Major Repair

There was an entry in the Aircraft Log Book on 09 August 2012 that the aircraft right wing tip was damaged during taxi at Pudong, Shanghai Airport. During taxiing, the aircraft collided with a China Eastern Airlines A340-600, registered B-6050. The right wing tip of 9M-MRO ran into the left horizontal stabilizer of B-6050. Part of the aircraft wing tip was ruptured and stuck at the left elevator of the B-6050. Figures 1.6A and 1.6B show the damages inflicted.



Figure 1.6A - Right Wing Tip Damage



Figure 1.6B – Damaged Wing Tip

Boeing produced an Aircraft Survey Report reference WB175/W8134/LN404 on 15 August 2012 and the repair was carried out by Boeing Aircraft-On-Ground (AOG) Team at Pudong, Boeing Shanghai facility from 22 September to 03 October 2012. The Boeing repair scheme was approved under DCA Malaysia's Statement of Compliance (SOC) Reference Number SC/2012/081 issued on 03 September 2012. At the time of the incident, the recorded airframe hours was at 46,975:43 and landing cycles at 6,585.

### 1.6.3.3 Cabin Configuration Change

The fleet of B777 of MAS went through a cabin interior retrofit programme which converted the configuration from 12 First Class seats/33 Business Class seats/233 Economy Class seats to 35 Business Class and 247 Economy Class seats. On 9M-MRO, this re-configuration started on 17 August 2006 and was completed on 08 September 2006. The modification was approved under FAA Supplemental Type Certificate (STC) No. STO1493SE dated 24 January 2005 and DCA's Statement of Compliance (SOC) No. SC2004/98.

### 1.6.3.4 Mandatory Occurrence Reports

A review of the Mandatory Occurrence Reports (MORs) for the B777 fleet raised by the Engineering & Maintenance Quality Assurance Department of MAS revealed that only one was raised for 9M-MRO, and this was related to the right wing tip damage stated above. A total of 77 MORs were raised for the MAS fleet of 17 B777 aircraft. MORs raised by the Quality Assurance department are primarily related to technical issues with the fleet. The average age of the B777 fleet as of 01 March 2014 was 14.35 years. 9M-MRO was 11.75 years old.

### **1.6.3.5 Airworthiness Directives**

Maintenance and Inspection records provided by MAS indicate that at the time the aircraft 9M-MRO went missing, the aircraft and engines were fully compliant with all applicable Airworthiness Directives (AD). The most recent AD, which was accomplished on 17 Jan 2014, was FAA AD 2012-13-05 (Replacement of Low Pressure Oxygen hose).

### **1.6.3.6 Technical Log**

The MAS Technical Log Book is divided into Maintenance Report 1 (MR1) and Maintenance Report 2 (MR2). The MR1 has provision for the flight crew to enter any aircraft defects for each flight phase. It can also be used to enter maintenance required and rectifications by the Licensed Aircraft Maintenance Engineers (LAME) or Approval Holders, or defer defects within the Minimum Equipment List (MEL) procedures to the Maintenance Report 2 (MR2) section.

A review of the Technical Log entries for 9M-MRO since the last D check in June 2010 did not reveal any significant defects or trend.

The most recent entries made in the Technical Log Book for 9M-MRO are listed in *Appendix 1.6A*.

#### **1.6.3.6.1 Oxygen System Replenishment**

The crew oxygen system replenishment on 07 March 2014 was reviewed in detail together with information gathered from the interview of the LAME who performed the task. Replenishment (servicing) of the crew oxygen system is a routine procedure, carried out before the minimum pressure required for departure is reached, usually carried out during a Stayover check. The minimum pressure for despatch as per the MAS Minimum Equipment List (MEL) is 310 psi at 35°C for 2-man crew and with a 2 cylinder configuration (as installed on MAS B777 fleet).

During the Stayover check on 07 March 2014, the servicing on 9M-MRO was performed by the LAME with the assistance of a mechanic, as the pressure reading was 1120 psi. The servicing was normal and nothing unusual was noticed. There was no leak in the oxygen system and the decay in pressure from the nominal value of 1850 psi was not unusual. The system was topped up to 1800 psi. Before this servicing, maintenance records showed that the system was last serviced on 14 January 2014 during an A4 check.

A small amount of oxygen is normally expended during pre-departure checks of the oxygen masks by the flight crew. Oxygen pressure is also dissipated by a bleed valve in the system for a few seconds during engine start following the end of a flight.

The crew oxygen system is supplied by two cylinders; each holds 115 cubic ft. (3150 litres) of oxygen at 1850 psi. *Table 1.6C* below shows the expected duration of oxygen supply from the two cylinders with the dilution control of the crew oxygen masks in 'Normal' position and aircraft at 36,000 ft. with a normally pressurised cabin (cabin altitude of 8,000 ft.) and an unpressurised cabin (cabin altitude of 36,000 ft.).

<b>Aircraft Altitude: 36,000 ft. Cabin Altitude: 8,000 ft.</b>		<b>Aircraft Altitude: 36,000 ft. Cabin Altitude: 36,000 ft.</b>	
No. of Crew Members	Expected Duration (hour)	No. of Crew Members	Expected Duration (hour)
1	42	1	27
2	21	2	13
3	14	3	9
4	10.5	4	6.5

Table 1.6C Expected Duration of Crew Oxygen

**Note:** Further details of the Crew Oxygen system, Passenger Oxygen system and Portable oxygen can be found in *Appendix 1.6E – Aircraft Systems Description* under Section: Oxygen Systems.

### 1.6.3.7 Deferred Defects (MR2)

A review of the aircraft records from the MAS Maintenance Control Centre (MCC) showed that the following defects were outstanding on 9M-MRO and deferred to the Deferred Defect Log (*Table 1.6D, below*).

No.	Deferred Date	Defect
1	25 Sep 2013	To carry out installation test for aft water quantity gauge.
2	31 Oct 2013	In-Flight Entertainment (IFE) Airshow does not show arrival time/time to destination logged time & problem still persists.
3	07 Nov 2013	From Daily Engineering Operations Report (DEOR) - Right engine consumes average 1.5T more fuel per/hour compared to left engine
4	21 Jan 2014	Toilet 3F-1L mirror light lens broken
5	30 Jan 2014	Pre-departure F/O seat power adjustment (fwd/aft) found inoperative.
6	05 Mar 2014	Please check alignment for left runway turn/off light.
7	05 Mar 2014	Hole found at 6 o'clock position of the right engine acoustic panel.

Table 1.6D Deferred Defects

### 1.6.3.8 Engine Health Monitoring

Engine Health Monitoring (EHM) is contracted out to Rolls Royce, the engine manufacturer. Engine data ‘snapshot’ reports are generated by the Aircraft Condition Monitoring System (ACMS) and transmitted via ACARS to MAS, who then submit them to Rolls Royce for analysis on its behalf. The transmitted engine parameters primarily used to assess engine health are:

- Turbine Gas Temperature
- Shaft Speeds
- Shaft Vibration (Low Pressure, Intermediate Pressure and High Pressure)
- Oil Pressure

- 
- Oil Temperature

The EHM system trend reports over the last 3 months which cover ‘snapshot’ data points gathered at take-off, climb and cruise received through the ACMS show no evidence of unusual engine behaviour for both engines. On the occurrence flight, 2 EHM reports were transmitted; the first was a Take-off report generated at 1641:58 UTC, 07 March 2014 [0041:58 MYT, 08 March 2014] and the second was a Climb report at 1652:21 UTC, 07 March 2014 [0052:21 MYT, 08 March 2014]. Reports are transmitted by ACARS at convenient times during the flight (not necessarily at the time of generation/data capture). Both reports did not show any unusual engine behaviour. The data transmitted on these reports are shown in *Appendix 1.6B - Engine Health Monitoring Decoded Data for Take-off and Climb Reports*. The ACMS will also generate other pre-defined engine reports including engine parameters’ exceedance reports. However no such EHM reports were received during the flight.

#### **1.6.3.9 Central Maintenance Computing System CMCS)**

The CMCS collects and stores information from most of the aircraft systems. It can store fault histories as well as monitor and conduct tests on the various systems. The fault history contains details of warnings, cautions and maintenance messages.

At regular intervals, during flight, the CMCS transmits any recorded fault messages, via the ACARS, to the Maintenance Control Centre (MCC) of MAS. This helps in the planning and preparation for the rectification of any potential aircraft defects at the main base or line stations.

The traffic log of maintenance messages transmitted for the last 10 flights on 9M-MRO were reviewed. There were messages transmitted, indicating that the CMCS was functioning prior to the occurrence flight. However no maintenance messages were transmitted during the occurrence flight.

#### **1.6.4 Weight and Balance**

The aircraft underwent a scheduled reweighing on 28 April 2009 at the MAS maintenance facility at KLIA. The next aircraft re-weighing was due on or before 27 April 2014. The aircraft Weight Schedule, dated 12 June 2009 was reviewed with the following pertinent details (also refer to *Table 1.6E* below):

Basic Empty Weight (BEW) of 138,918.7 kg

- Centre of Gravity (C of G) position of 1,248.8 Inches
- Index of 60.07 I.U.
- C of G of 26.7 % Mean Aerodynamic Chord (MAC)
- Dry Operating Weight (DOW) of 145,150 kg and Index 61.13

The maximum authorised take-off weight was 286,897 kg. On the occurrence flight, the aircraft departed with a calculated take-off weight of 223,469 kg. This take-off weight was broken down as follows:

	Actual (kg)	Maximum (kg)
Take-off Weight (TOW)	223,469	286,897
Zero Fuel Weight (ZFW)	174,369	195,044
Take-off Fuel	49,100	
Landing Weight (LDW)	186,269	208,652
Trip Fuel	37,200	
Total Traffic Load	31,086	
Total Payload (Load in compartment)	14,296	
Passenger & Luggage	16,790	
Dry Operating Weight (DOW)	143,283	

Table 1.6E Aircraft Weight

The balance corresponding to the aircraft take-off weight and shown on the final loadsheet (after Last Minute Changes) was 33.78% of the Mean Aerodynamic Chord (MAC) which was within limits.

During take-off, the aircraft Basic Empty Weight (BEW) was 138,918.7 kg and the C of G position was 1,248.8 inches (C of G MAC was 26.7%). Total moment was 173,478,288.65 kg in. This indicates the planned weight and balance of the aircraft was within the allowable limits. The planned cargo weight (load in compartment) of 14,296 kg and distribution matched the recorded cargo weight and distribution.

### 1.6.5 Fuel

The aircraft used Jet A-1 fuel. Following the previous flight, as per records in the Transit Check and Fuel Log, the total remaining fuel before refuelling as per the flight deck indication was 8,200 kg (Left Tank was 3,700 kg and Right Tank was 4,500 kg). Total departure fuel after refuelling was 49,700 kg (Left Tank was 24,900 kg and Right Tank was 24,800 kg) as indicated in the flight deck.

The fuel weight on board corresponded to a planned trip-fuel of 37,200 kg. Based on MH370 ATC flight plan dated 07 March 2014, the take-off fuel recorded was 49,100 kg. The investigation estimated that the aircraft would have had 41,500 kg fuel remaining after 41 minutes flying from KLIA to IGARI.

Fuel burn and endurance will be discussed in the Final Report.

The last position report transmitted via ACARS at 1707:29 UTC, 07 March 2014 [0107:29 MYT, 08 March 2014] recorded remaining fuel of 43,800 kg at 35,004 ft. altitude.

ATC flight plan forecast recorded remaining fuel of 11,900 kg at landing, including 7,700 kg of diversion fuel. The first alternate airport, Jinan Yaoqiang International Airport (China), was estimated to be 46 minutes from the diversion point with 4,800 kg fuel required and the second alternate airport, Hangzhou Xiaoshan International Airport (China) was estimated to be 1 hour 45 minutes with 10,700 kg fuel required.

### 1.6.6 Emergency Locator Transmitter (ELT)

An ELT is a radio beacon that when activated will transmit digital distress signals. These signals can be tracked in order to aid the detection and localisation of an aircraft in distress.

The Fixed and Portable ELT radio beacons interface worldwide with the international Cospas-Sarsat satellite system for Search and Rescue (SAR). When activated and under satellite coverage, such beacons send out a distress signal which can be detected by satellites. The satellite receivers send this information to ground stations. This signal is transmitted to Mission Control Centres (MCC) located in six regions worldwide. The MCC covering the Indian Ocean is managed by the Australian Maritime Safety Authority based in Canberra, Australia.

ELTs are mandatory safety items carried on board the aircraft. The cabin and the technical crew attend compulsory safety emergency procedure (SEP) training and have to remain current by attending refresher SEP courses. Operation and functioning of the ELT is part of the SEP training module.

The specifications for the ELT are contained in FAA Technical Standard Orders TSO-C126 and TSO- C91A.

The ELT is a radio beacon; like all other radio equipment installed on-board, its usage is approved by the Malaysian Communications and Multimedia Commission through the Aircraft Radio Licence.

(*Appendix 1.6C - Copy of the Radio Licence issued for 9M-MRO*).

9M-MRO had four ELTs installed. They were located as follows:

- **One FIXED ELT** located above ceiling of the aft passenger at STA 1880.

The aircraft was delivered without a fixed ELT; this component was added by MAS later (between December 2004 and July 2005). This unit is mounted to aircraft structure at the aft passenger cabin at STA 1880. A control switch installed in the cockpit aft overhead panel provides the command signal. This switch is guarded in the ARMED position. If required the flight crew can select the ELT to ON by moving the guarded switch from ARMED to ON.

The fixed ELT is manufactured by ELTA FRANCE and is of the 406 series, part number is 01N65900. The unit is connected to an omni-directional, triple frequency blade antenna located at the rear fuselage forward of the vertical stabilizer at station 1881. The ELT will activate upon a sudden deceleration force per the Technical Standard Order.

This ELT has the provision to operate on the satellite frequency of 406 MHz when activated. The transmission includes the ELT identifier, aircraft nationality and registration markings. It will also transmit on 121.5 MHz and 243 MHz when activated and these signals may be detected by air, sea or ground receivers. Transmissions on VHF frequency (121.5/243 MHz) are line of sight and effective only in close proximity.

The battery expiry date for the FIXED ELT was November 2014.

- **One PORTABLE ELT** located in the forward cabin right hand coat closet. This closet is used by the cabin crew.

This unit is bracket-mounted to the inside of the coat closet door. A label fixed on the coat closet door identifies the ELT. The installation allows quick removal. The Portable ELT is manufactured by ELTA FRANCE and is of the 406 series. It is identical to the fixed ELT except that this unit has its own foldable antenna. The operations and function are the same. The manufacturer part number is 01N65910.

The portable ELT has a control switch on the front face. It is normally in the OFF position. When needed, the crew can select the switch to the ON position to activate the ELT transmission.

The battery expiry date for the PORTABLE ELT was November 2014.

- **Two SLIDE RAFT** mounted ELTs are packed within the slide raft assembly located at Door 1 Left and Door 4 Right.

The slide raft mounted ELT will only be available when the slide rafts at doors 1 Left or 4 Right are deployed. The ELT transmission is not satellite enabled. The transmission signal is on 121.5 MHz and 243 MHz which may be monitored with air, sea and ground-based receivers.

The slide raft ELT is automatically armed when the slide raft is deployed and inflated. Once armed the ELT is automatically activated by a water sensor coming in contact with water. This ELT is not activated by deceleration.

The slide raft ELTs (Part No.: P3-03-0029-10) are manufactured by DME Corporation and the battery expiry dates are as follows:

- Door 1 Left - August 2016
- Door 4 Right - May 2017

#### 1.6.6.1 Review of Effectiveness of ELTs

In general, ELTs are intended for use at or near the water's surface, and neither portable nor fixed ELT signals are detectable when the ELT is submerged in deep water. Portable ELTs are equipped with a floatation device and can be activated by immersion in water. For effective signal transmission, the antenna for a fixed ELT must remain above water. Damage to an ELT or its associated wiring and antenna, or shielding by aircraft wreckage or terrain, may also prevent or degrade transmission.

- a) A review of ICAO accident records over the last 30 years indicates that of the 257 accidents, only 39 cases recorded effective ELT activation. ELTs were carried in 173 of

these cases. This implies that of the total accidents in which ELTs were carried, only 22.5% of the ELTs operated effectively (*Appendix 1.6D*).

- b) The Cospas-Sarsat system has been helpful for search and rescue teams in numerous aircraft accidents on a world-wide basis. Despite these successes, the detection of ELT signals after an aircraft crash remains problematic. Several reports have identified malfunctions of the beacon triggering system, disconnection of the beacon from its antenna or destruction of the beacon as a result of accidents where aircraft was destroyed or substantially damaged. Even when the beacon and its antenna are functioning properly, signals may not be adequately transmitted to the Cospas-Sarsat satellites because of physical blockage from aircraft debris obstructing the beacon antenna or when the antenna is under water.

(Source: *Global Aeronautical Distress and Safety System - GADSS<sup>6</sup> document*)

- c) ELTs can be activated automatically by shock typically encountered during aircraft crashes or manually. It is possible for Flight Crew to manually activate the ELT; however existing flight operating procedures do not call for activation of the ELTs until the incident has occurred.
- d) The Cospas-Sarsat system does not provide a complete coverage of the earth at all times. As a consequence, beacons located outside the areas covered by these satellites at a given moment cannot be immediately detected, and must continue to transmit until a satellite passes overhead.
- e) The global distress beacon detection system, Cospas-Sarsat, no longer detects 121.5 MHz distress signals. Only 406 MHz digital distress beacons are now capable of detection by satellite. Analogue beacon signals may be received by other aircraft within VHF range but there may not be such aircraft within range at the time of beacon transmission and monitoring 121.5 MHz.

### 1.6.7 Aircraft Systems Description

Refer to *Appendix 1.6E* for Aircraft Systems Description. For Communications Systems description, refer to Section 1.9.

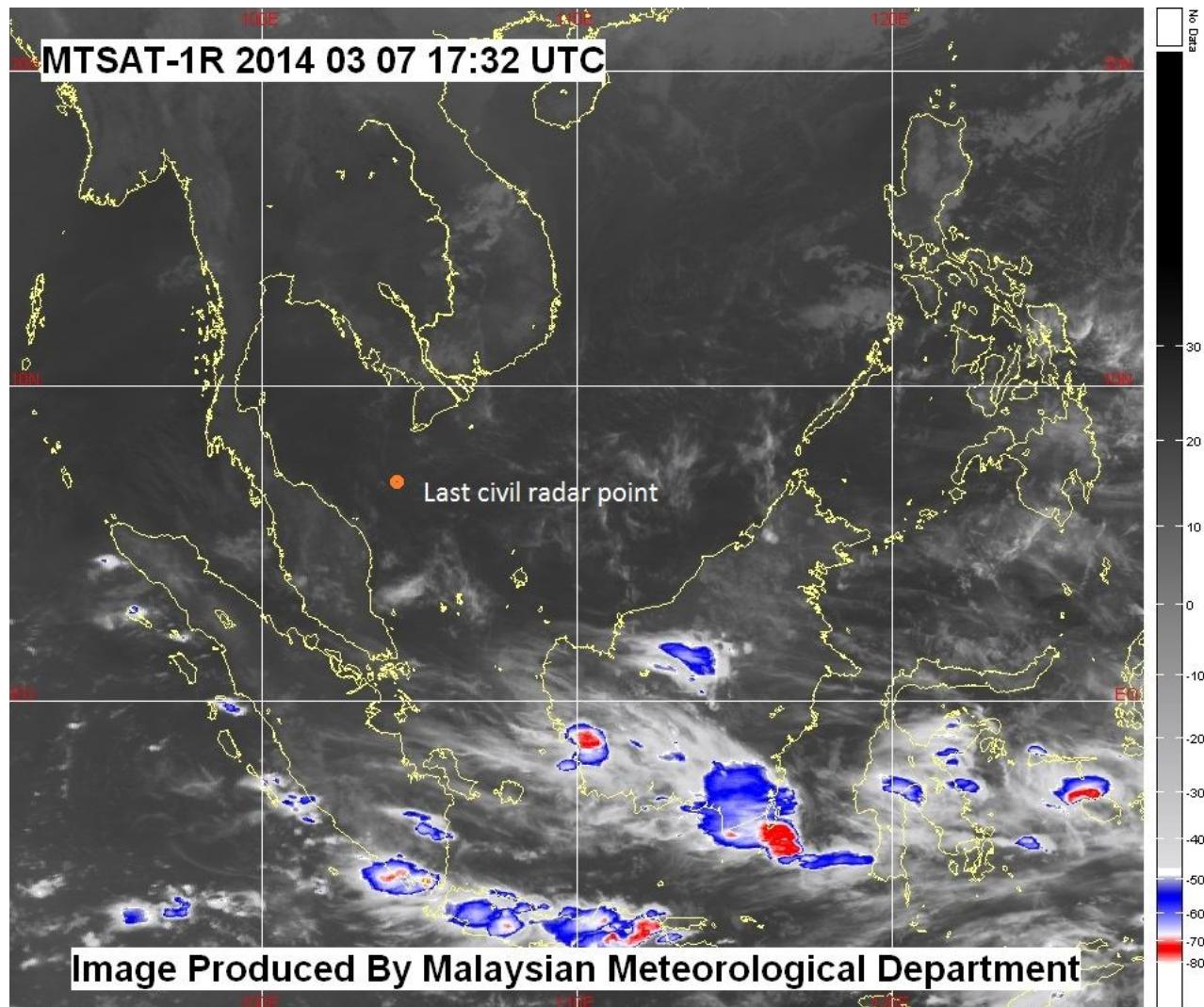
## SECTION 1.7 METEOROLOGICAL INFORMATION

### 1.7.1 Meteorological Situation

Climatologically for the month of March, the position of the sub-tropical high is located over the Gulf of Thailand. The weather is generally dry with very little clouds. The winds are generally light from the surface to the flight level of 40,000 ft.

<sup>6</sup> In the aftermath of the disappearance of MH370, following a multidisciplinary meeting in May 2014, ICAO formed an Ad-hoc Working Group on Flight Tracking with the mandate to develop a Concept of Operation on the sequence of events before and after the occurrence of an accident which should include all identified phases of such a sequence including detection of an abnormal situation, alert phase, distress phase, and search and rescue activities. This Concept of Operation is GADSS.

Infra-red images taken by the geostationary satellite Multifunctional Transport Satellites (MTSAT) 1R of Japan Meteorological Agency (JMA) at 1732 UTC 07 March 2014 (*Figure 1.7A below*) showed that there were no significant clouds at the last civil radar point at 1722 UTC.



*Figure 1.7A: Infrared satellite image taken by MTSAT at 1732 UTC 07 March 2014*

Meteorological radar image taken at 1722 UTC, 07 March 2014 [0122 MYT, 08 March 2014] (*Figure 1.7B*) showed that no rain occurred at the last civil radar point.

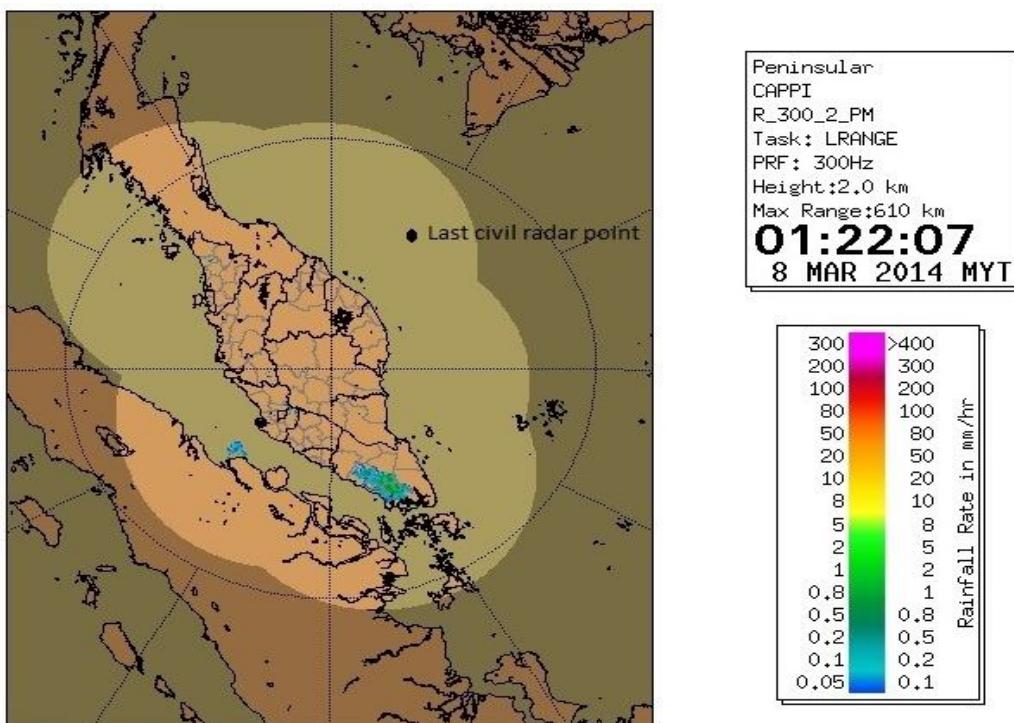


Figure 1.7B: Meteorological radar image at 1722 UTC 07 March 2014

No lightning discharges were detected by the Lightning Detection System of the Malaysia Meteorological Department at the vicinity of last civil radar point from 1600 to 2159 UTC, 07 March 2014 [0000 to 0559 MYT, 08 March 2014]. *Figure 1.7C - blue symbol shows the lightning detected from 1700 UTC to 1800 UTC).*

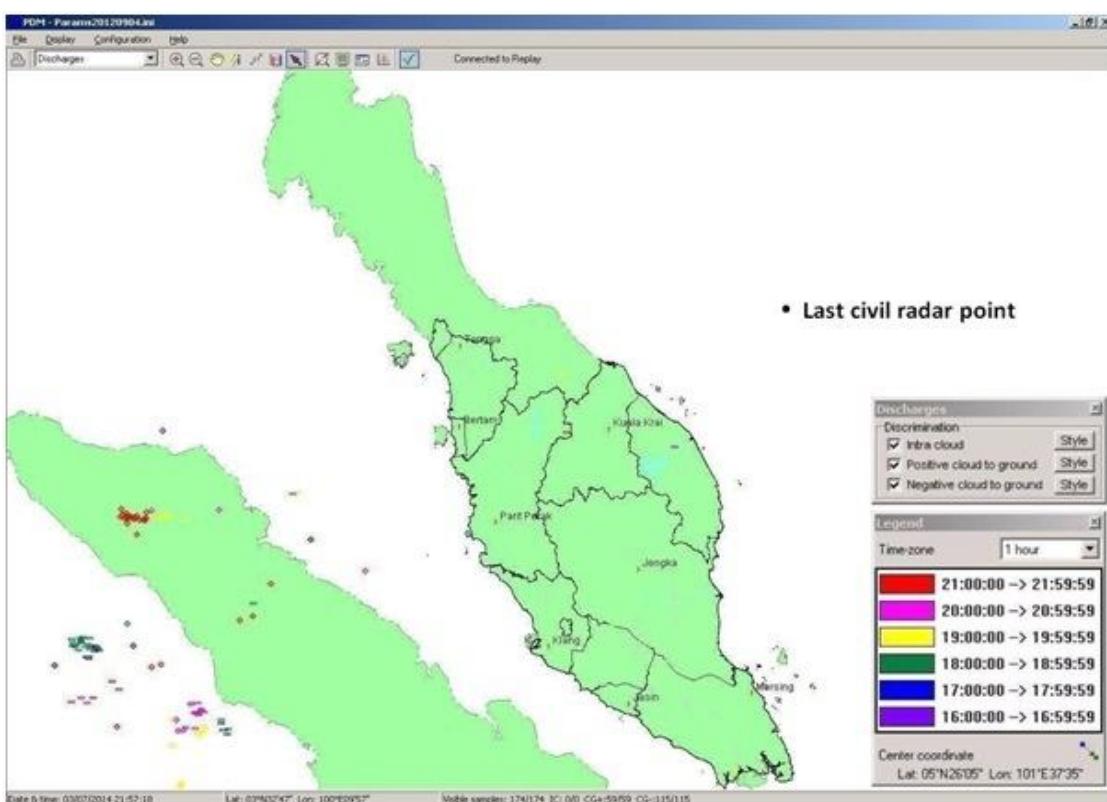
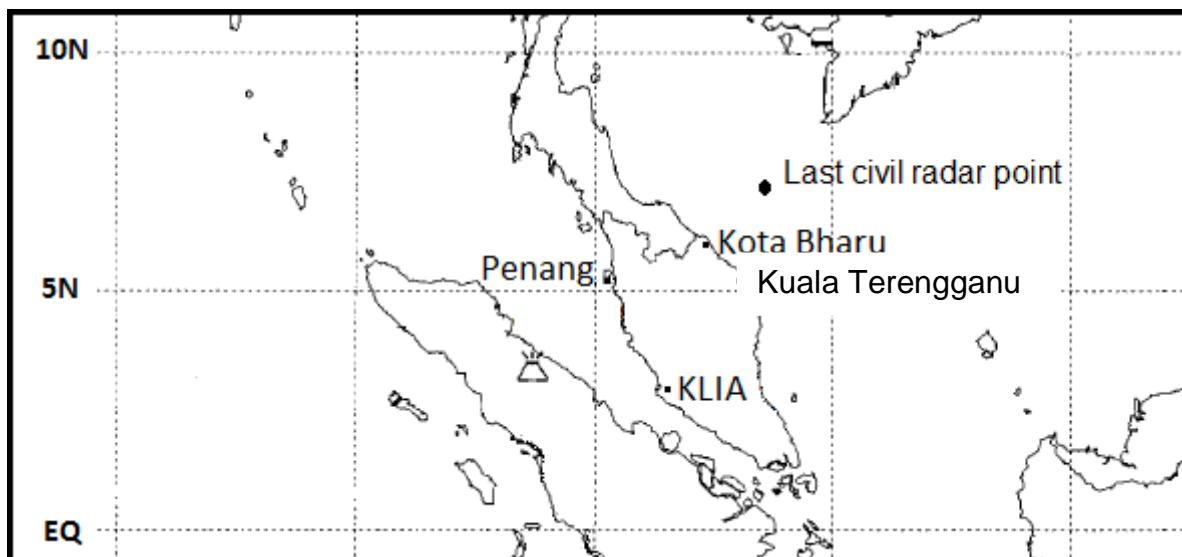


Figure 1.7C: Lightning detection map from 1600 to 2159 UTC 07 March 2014

The Meteorological Aerodrome Report (METAR) issued at 1600, 1700 and 1800 UTC from Kota Bharu Airport (WMKC), Kuala Terengganu Airport (WMKN), Penang International Airport (WMKP) and KLIA (WMKK) (*Figure 1.7D*) below did not report any significant weather phenomena.



*Figure 1.7D: Locations of METAR reports*

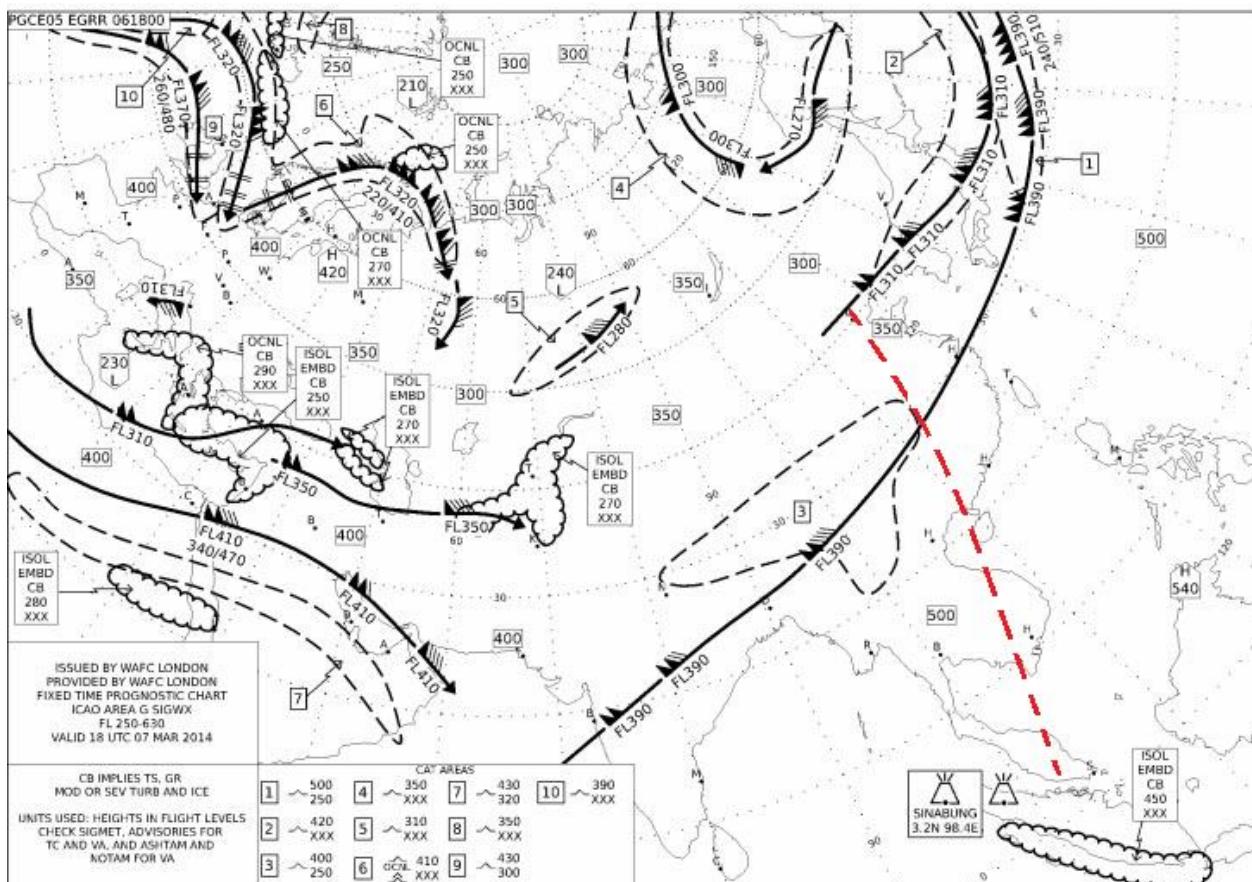
There was no direct observation of the wind conditions at the last civil radar point, the closest upper air observation was at the Kota Bharu Meteorological Station, taken at 1200 UTC, 07 March 2014 and at 0000 UTC, 08 March 2014 respectively, both reported a temperature of -40°C and wind from the north-east at 15 kt. or less at 35,000 ft.

## 1.7.2 Comments on the Information Available

### 1.7.2.1 Forecast charts

#### a) Significant Weather Chart (SIGWX)

The SIGWX PGCE05 EGRR 061800 issued by World Area Forecast Centre (WAFC) London Fixed Time Prognostic Chart ICAO Area G SIGWX for flight level from 25,000 to 63,000 ft. (FL250-630) valid 1800 UTC, 07 March 2014 showed that the filed flight plan route (red dotted line – *Figure. 1.7E* below) passed through a westerly jet stream with wind speed of up to 150 kt. at latitude 30°N at flight level 39,000 ft. (FL390). Another westerly jet stream with wind speed of up to 100 kt. at flight level 31,000 ft. (FL310) at the destination (*Figure 1.7E*). Light clear air turbulence (CAT) might be expected from 25°N onwards to the destination. However, no significant adverse weather phenomena was expected for the whole planned flight route.



*Figure 1.7E: Significant weather chart PGCE05 Issued by WAFC London Fixed Time Prognostic Chart ICAO Area G SIGWX FL 250-630 Valid 1800 UTC, 07 March 2014*

### b) The wind and temperature forecast chart

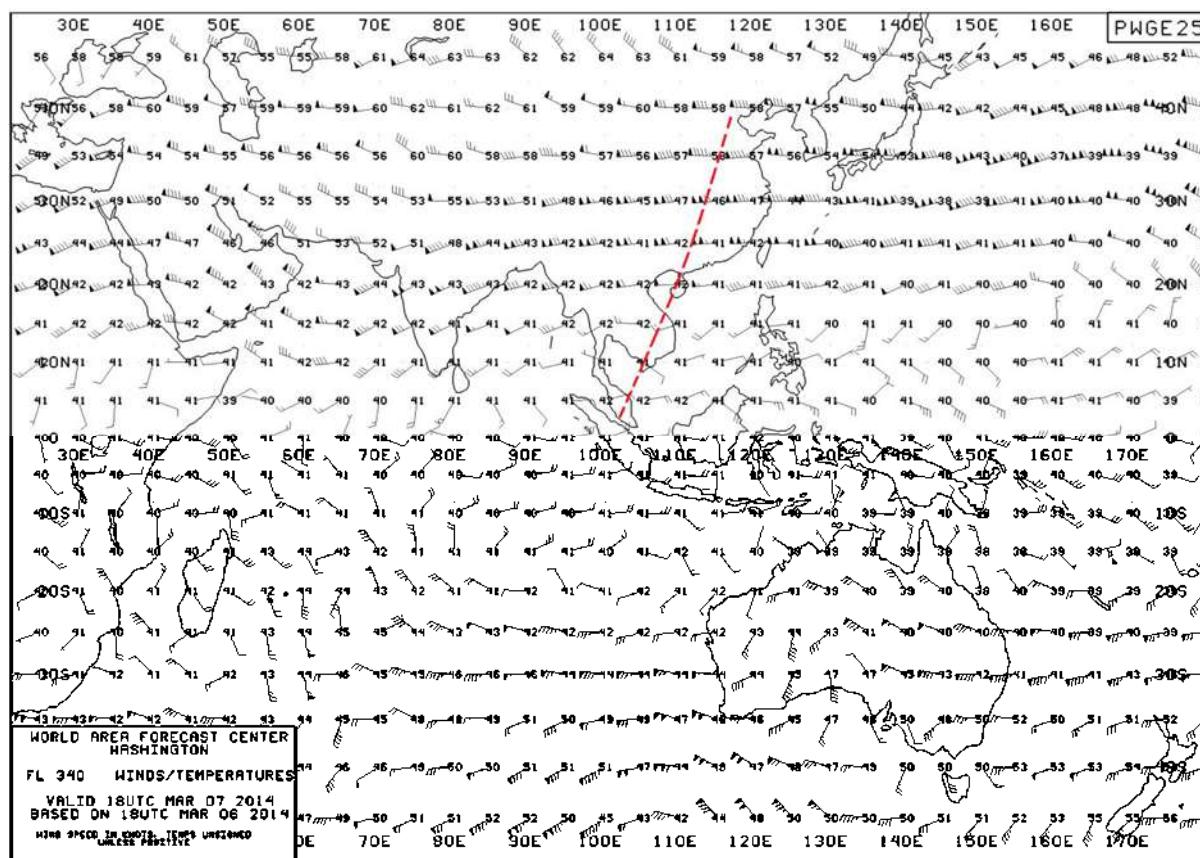
The wind and temperature forecast chart at flight level 34,000 ft. (FL340) PWGE25 valid 1800 UTC, 07 March 2014 issued by WAFC Washington showed the jet stream as in the significant weather chart above. The forecast winds at the last civil radar point and last air defence radar point were below 20 kt., (*Figure 1.7F* below).

#### 1.7.2.2 Significant Meteorological Information (SIGMET)

SIGMET 3 was issued for the GUANGZHOU FIR valid from 12:45 to 16:45 UTC, 07 March 2014 indicated a thunderstorm forecast north of latitude 27°N and moving eastwards at 50 km/h in the layer with cloud tops at flight level 26,000 ft. (FL260).

#### 1.7.2.3 Volcanic Ash Advisory

Volcanic ash advisories issued by Darwin Volcanic Ash Advisory Centre (VACC) on 07 March 2014 at 06:27 and 18:37 UTC for Sinabung (Sumatra, Indonesia) highlighted volcanic eruption located at 3.10°N 98.23°E (*Figure 1.7E* above) and volcanic ash plume observed up to a height of 12,000 ft. (FL120) and the plume was extending toward the west.



*Figure 1.7F: The wind and temperature forecast chart PWGE25 issued by WAFC Washington at flight level 34,000 ft., (FL340) valid 1800 UTC 07 March 2014*

## SECTION 1.8 AIDS TO NAVIGATION

Not applicable at this stage of the investigation.

## SECTION 1.9 COMMUNICATIONS

### 1.9.1 High Frequency (HF) System

This aircraft was installed with Collins HFS-900 HF System. The HF communication system on this aircraft uses two HF systems with a common HF antenna to transmit and receive radio frequency (RF) signals in the HF range.

The HF transceiver operates within the frequency range of 2,000 MHz to 29,999 MHz and one KHz channel spacing.

The Left Transfer bus sends 115V AC three-phase power to the Left HF communication. The Left HF communication transceiver supplies 115V AC single phase to the Left HF antenna coupler for operational power. It also supplies 28V DC for the key interlock function. The Right HF communication system is the same as the Left, except that it uses power from the Right AC Sec 2 bus.

### 1.9.2 Very High Frequency (VHF) System

This aircraft was installed with Collins VHF-900B VHF System. The VHF communication system permits voice and data communication over line-of-sight distances. It permits communication between aircraft or between ground stations and aircraft. The VHF system operates in the VHF aeronautical frequency range of 118.000 MHz to 136.992 MHz.

The VHF communication system on this aircraft uses three VHF systems. Each VHF system has a VHF antenna and a VHF communication transceiver.

The VHF communication system connects with Selective Calling Equipment (SELCAL) decoder that starts an alert when a call comes in for that aircraft.

The captain's flight instrument bus sends 28V DC to the Left VHF communication transceiver and the Left Radio Tuning Panel (RTP). The Left Main DC bus sends 28V DC to the centre VHF communication transceiver and the centre RTP.

The Right Main DC bus sends 28V DC to the right VHF communication transceiver and the right RTP.

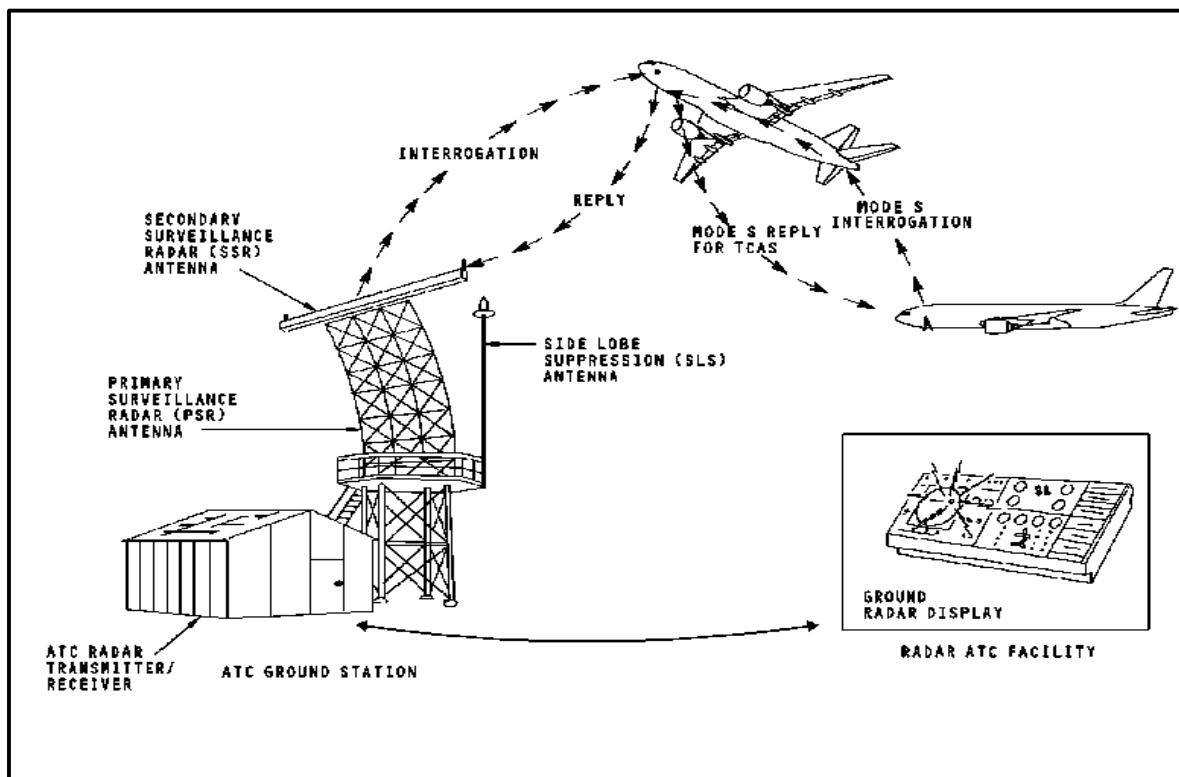
### 1.9.3 Air Traffic Control (ATC)/Mode S Transponder System

This aircraft was installed with Bendix/King TRA-67A Mode S transponder. The ATC ground stations interrogate the airborne ATC/Mode S transponder system as shown in *Figure 1.9A* below.

The ATC/Mode S transponder replies to the interrogations in the form of coded information that the ground station uses. The ground station uses a Primary Surveillance Radar (PSR) to get radar returns from aircraft within the radar range. To make a communication link with the aircraft in the radar range, the ground station uses a Secondary Surveillance Radar (SSR) to interrogate the ATC/Mode S transponder. The ground station transmits a side lobe suppression signal to inhibit close ATC replies that come from a SSR side lobe transmission.

On the ground radar display, the ATC operator sees the radar returns, altitude, and a four digit aircraft identifier. The ATC operator also sees aircraft derived Enhanced Surveillance downlink data on the ground station radar display, such as Magnetic Heading, Air Speed (Indicated Air Speed and Mach number), Ground Speed, Roll Angle, Selected Altitude, True Track Angle, and Vertical Rate.

The ATC/Mode S transponder also replies to mode S interrogations from the Traffic Alert and Collision Avoidance Systems (TCAS) of other aircraft. ATC/Mode S transponders with Extended Squitter function provide broadcast of Global Position System (GPS) position and velocity data.



*Figure 1.9A - Air Traffic Control/Mode S Transponder System*

The Left ATC/Mode S transponder gets 115V AC power from the AC Standby bus. The Right ATC/Mode S transponder gets 115V AC power from the Right AC Transfer bus. The dual transponder panel gets 115V AC power from the AC Standby bus. ATC/Mode S transponder power system is shown in *Figure 1.9B* below.

This system can be deactivated (turned OFF) by pulling the circuit breakers located at the P11 overhead circuit breaker panel or by selecting Transponder Mode Selector (Transponder Panel) to "STBY" position.

The transponder on the occurrence flight was operating satisfactorily up to the time it was lost on the ATC radar screen at 1721.13 UTC, 07 March 2014 [0121:13 MYT, 08 March 2014]. There was no message received from the aircraft to report a system failure.

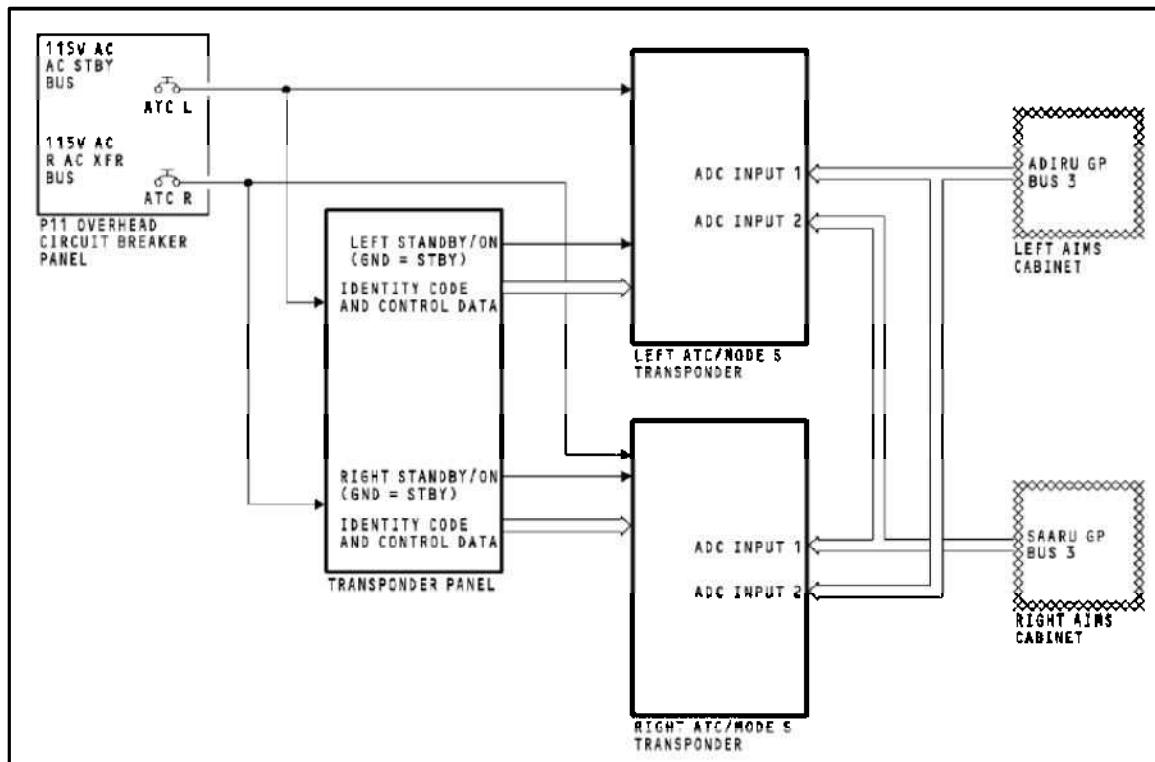


Figure 1.9B - ATC/Mode S Transponder Power System

#### 1.9.4 Aircraft Communications Addressing and Reporting System (ACARS)

ACARS is a digital data-link system that manages flight plan and maintenance data between the aircraft and the Ground Service Provider (GSP) by using radio i.e. VHF or satellite communications (SATCOM) as shown in *Figure 1.9C below*.

ACARS provides message communication between aircraft and its base (ground). The following messages are transmitted:

- a) **Out of the gate, Off the ground, On the ground, and Into the gate (OOOI) events**
  - i. **Out of the gate event:** Departure from the gate with all doors closed and parking brake released
  - ii. **Off the ground event:** Take-off with the nose gear squat switch extended.
  - iii. **On the ground event:** Touch down with the nose gear squat switch compressed.
  - iv. **Into the gate event:** Parked at the gate with the parking brake set and the door open.

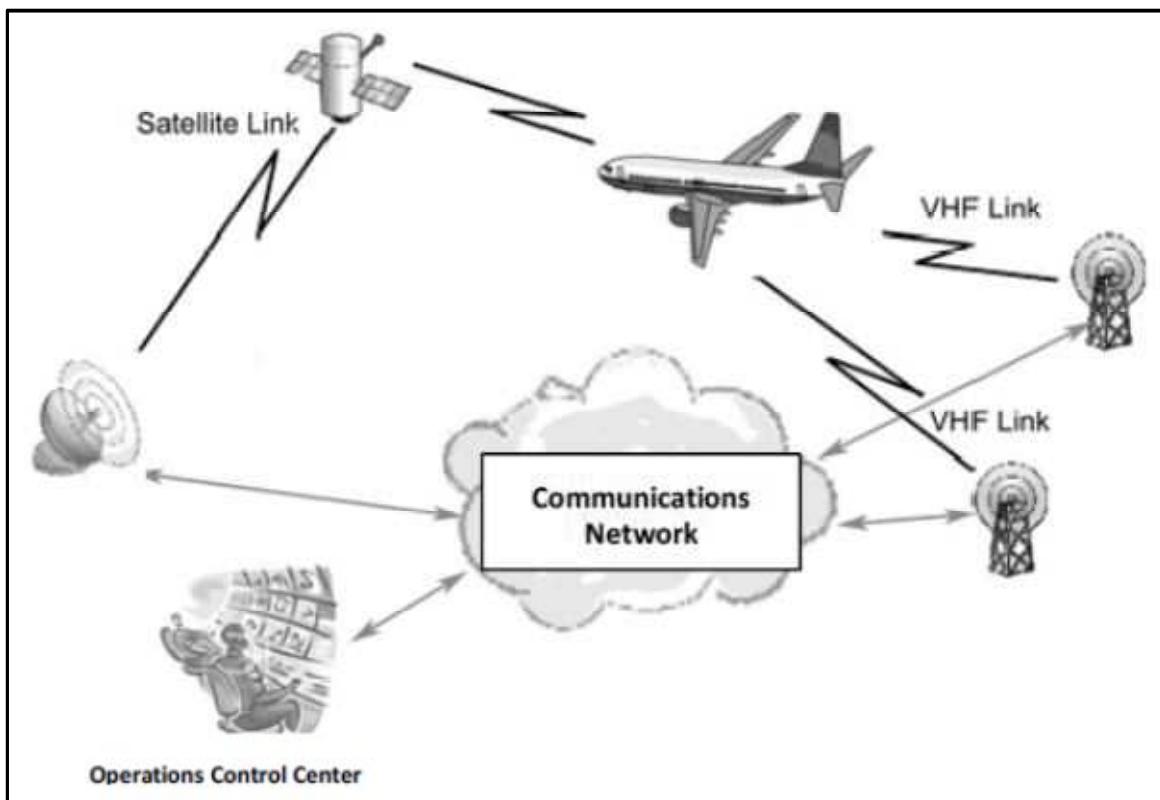


Figure 1.9C - ACARS System

- b) **Flight plans:** ACARS interfaces with Flight Management Systems (FMS) acting as the communication system for flight plans to be sent from the ground to the FMS. This enables the aircraft to update the FMS while in flight, and allows the flight crew to evaluate the alternative flight plans including the status of connecting flights.
- c) **Weather information:** ACARS interfaces with FMS, acting as the communication system for weather information to be sent from the ground to the FMS. This enables the aircraft to update the FMS while in flight, and allows the flight crew to evaluate new weather conditions.
- d) **Equipment health:** ACARS is used to send information from the aircraft to ground stations about the conditions of various aircraft systems and sensors in real-time. Maintenance faults and abnormal events are also transmitted to ground stations along with detailed messages, which are used by MAS for monitoring equipment health, and to better plan the repair and maintenance activities.
- e) Aircraft positions which provide latitude and longitude, altitude, speed, total air temperature total remaining fuel, wind direction and speed and heading.
- f) Engine performance data which provide engine data during take-off, climb, cruise and approach.

ACARS interfaces with interactive display units in the cockpit, which flight crews can use to send and receive technical messages and reports to or from ground stations, such as a

request for weather information or clearances or the status of connecting flights. The response from the ground station is received on the aircraft via ACARS as well.

The ACARS communicates through either SATCOM or VHF. The VHF transceiver can also be used for voice transmission when ACARS is switched from the data mode to the voice mode.

In the event that the aircraft ACARS unit has been silent for longer than a pre-set time interval, the ground station can ping the aircraft (directly or via satellite). A ping response indicates a healthy ACARS communication.

Pre-set time interval for MAS B777 is 30 minutes. When the aircraft ACARS is silent for more than 30 minutes, MAS Operation Control Centre (OCC) will send a text message via ACARS to the cockpit or will call the cockpit via SATCOM.

#### 1.9.4.1 ACARS Traffic Log

ACARS traffic log messages sent/received to/from 9M-MRO between 1554:41 UTC, 07 March 2014 [2354:41 MYT, 08 March 2014] until 1815:25 UTC, 07 March 2014 [0215:25 MYT, 08 March 2014] is shown in *Appendix 1.9A*. Some key events are extracted and explained below.

At 1554:41 UTC, 07 March 2014, ACARS data link was fully established on SATCOM transmission and at 1556:08 UTC the flight information (FI) MH0370 and Aircraft Number (AN) 9M-MRO were keyed in by the crew as per *Figure 1.9D* below.

15:56:08	46817982	Incoming Downlink	9M-MRO	MH0370	POR1	MHKULKJACM001	071556	MED	RELAY
Normal		Established SATCOM				QXSXMXS			
									
QU DPCCAMH .QXSXMXS 071556 → Ground Station Date & Time <input type="checkbox"/> MED FI MH0370/AN 9M-MRO → Protection Code DT QXT POR1 071556_S08A → Aircraft Date & Time - OES155607S									

*Figure 1.9D: ACARS data link established SATCOM transmission*

Notice to Crew (NOTOC) was sent at 1606:15 UTC on 07 March 2014 [0006:15 MYT, 08 March 2014] direct to the aircraft printer and to be printed out by the crew.

NOTOC from the ground station to the cockpit stated the special loads of total 4,566 kg of mangosteen fruit were carried on board. Details of the mangosteens were: 1,128 kg at station 41L, 1,152 kg at station 41R, 1,148 kg at station 43L and 1,138 kg at 44L respectively (*Refer to Section 1.18.2 for details of cargo carried*).

## FACTUAL INFORMATION

## SAFETY INVESTIGATION FOR MH370 (9M-MRO)

16:06:15	46818160	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	071606	AGM	RELAY
Uplink Sent AGM NOTOC Uplink B777 -- AGM NOTOC Uplink B77 QXSXMXS								
QU QXSXMXS .DEPCAMH 071606 □AGM AN 9M-MRO/FI MH0370/MA 989I - NOTOC MESSAGE SPECIAL LOAD NOTOC								
FLIGHT DATE EDNO MH 0370 /08 08MAR14 01 FROM/TO AC/REG KULPEK 9M-MRO								
OTHER SPECIAL LOAD								
TO POS PCS QTY/TI IMP DESCRIPTION PEK 41L 001 1128KG PER MANGOSTEEN								
PEK 41R 001 1152KG PER MANGOSTEEN								
PEK 43L 001 1148KG PER MANGOSTEEN								
PEK 44L 001 1138KG PER MANGOSTEEN								
THERE IS NO EVIDENCE THAT ANY DAMAGED OR LEAKING PACKAGES CONTAINING DANGEROUS GOODS HAVE BEEN LOADED ON THE AIRCRAFT AT THIS STATION.								
END ACARS NOTOC								

Figure 1.9E: Snapshot of ACARS NOTOC message

Declaration of “there is no evidence that any damaged or leaking packages containing dangerous goods have been loaded on the aircraft at this station” was also written in the NOTOC message.

(Figure 1.9E above shows the snapshot of the ACARS NOTOC message).

Aircraft final loadsheet was sent via ACARS at 1606:32 UTC, 07 March 2014 [0006:32 MYT, 08 March 2014] direct to the aircraft printer and to be printed out by the crew. Details of aircraft weight as stated in the final loadsheet are discussed in Section 1.6.4. Figure 1.9F below shows the snapshot of the final loadsheet of this aircraft.

Pilot acknowledgement and confirmation of the final loadsheet is shown in the ACARS snapshot in Figure 1.9G below.

## FACTUAL INFORMATION

## SAFETY INVESTIGATION FOR MH370 (9M-MRO)

16:06:32	381598235	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	071606	AGM	RELAY
Uplink Sent								
QU QXSXMXS - DPCCAMH 071606 CAGM AN 9M-MRO/FT MH0370/MA 990I - X LOADSHEET FINAL 1606 01 MH0370/ 07MAR14 KUL FER 9M-MRO 2/10 ZFW 174369 MAX 195044 I. TOW 49100 MAX 206697 TOW 233469 MAX 208652 UNDLD 20675 PAX/10/215 TTL 227 TTL 222/3/2 TTL COMPARTMENTS 014296 1/2500 2/4530 3/804 4/5 885 5/577 0/0 SEATING CA/10 OB/127 OC/88 DOI 59.07  LIZFW 67.05 MACZFW 31.65 LITOW 70.05 MACTOW 33.78  DLI 57.29 STAB TO 03.9 MID SI: NOTOC YES TTL PAYLOAD 014296 DOW 143283  WBC K8-45 EXP 20SEP14 NOTOC - YES								
 ----- PAX/10/215 TTL 227 TTL 222/3/2  CA/10 OB/127 OC/88  * PLSE ACK WITH *								

Figure 1.9F: Final Loadsheets

16:09:29	46818215	Outgoing Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071609	EMAILCNX
Ground Sent B777 Final Loadsheet Acknowledgement -- B777 LS mtb01mh@malaysiaairlines.com								
***FINAL LOADSHEET ACKNOWLEDGEMENT from PILOT*****								
AIRCRAFT REGISTRATION : 9M-MRO								
Flight No : MH0370								
Date : 07-03-2014 Confirmation from pilot that he has received the								
Time : 16:09 UTC Loadsheet in human readable structure								
Departure Station : KUL(WMKR)								
Acknowledgement From Pilot : LS FINAL OK								
PIC License No : 751 KUL								
*****END of MESSAGE*****								

Figure 1.9G: Final Loadsheets Acknowledgement

Data on aircraft APU is shown in *Figure 1.9H* below. APU report generated by ACMS sent via ACARS at 1629:33 UTC stated the total APU cycles and hours were 15,699 cycles and 22,093 hours. APU hours for the previous flight was 4 hours.

## FACTUAL INFORMATION

## SAFETY INVESTIGATION FOR MH370 (9M-MRO)

16:29:33	46818489	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071629	DFD	RELAY
Normal	B777 APU Report					QXSXMXS			
<b>QU DPCCAMH</b>									
.QXSXMXS 071629									
<b>DDFD</b>									
FI MH0370/AN 9M-MRO									
DT QXT I0R2 071629 D00A									
- MAS002A0 B777 APU OPS REPORT 332									
ACID	FLT	FM	FLCT	DATE	GMT	DPT	DST		
MRO	S370	PO	318	07/03/14	16:29:12	WMKK	ZBAA		
SWID SFC									
316A-BSM-710-02 17911									
APU CYC	APU TOT HRS	APU PREV	FLT HRS						
15699	22093		4						

Figure 1.9H: APU Report

Engine take-off and climb reports transmitted via ACARS are explained in Section 1.6.3.8. Engine parameter reports were transmitted to MAS and then to Rolls Royce for Engine Health Monitoring (EHM). Appendix 1.9A shows these data in coded form. The decoded data are shown in Appendix 1.6B.

The first (which was also the last) position report was transmitted via ACARS at 1707:29 UTC, 07 March 2014 [0107:29 MYT, 08 March 2014]. This was a collation of 6 reports generated at 5-minute intervals by the system at 1641:43 UTC, 1646:43 UTC, 1651:43 UTC, 1656:43 UTC, 1701:43 UTC and 1706:43 UTC, 07 March 2014. Parameters transmitted are as per *Table 1.9A* below. The actual traffic log on the position report is reproduced in *Figure 1.9I*. Position reports were programmed to be transmitted every 30 minutes.

Greenwich Mean Time (GMT) – UTC	1641:43	1646:43	1651:43	1656:43	1701:43	1706:43
Altitude (ALT) – Feet	10,300	10,582	21,193	28,938	34,998	35004
Calibrated Airspeed (CAS) – Knots.	168.4	261.8	301.1	303.1	278.0	278.4
MACH	0.255	0.478	0.669	0.783	0.819	0.821
Total Air Temperature (TAT)	31.1	23.4	11.6	2.6	-13.4	-13.1° C
Static Air Temperature (SAT)	27.3	10.4	-11.8	-27.4	-43.9	-43.8° C
Latitude (LAT)	2.767	3.074	3.553	4.109	4.708	5.299
Longitude (LONG)	101.715	101.760	101.988	102.251	102.534	102.813
Gross Weight (GWT) – Kg	492,520	489,200	486,240	483,840	481,880	480,600
Total Remaining Fuel Weight (TOTFW) – kg	49,200	47,800	46,500	45,400	44,500	43,800
Wind Direction (WINDIR)	140.3	107.6	91.8	58.4	69.6	70.0
Wind Speed (WINDSP)	1.25	9.38	19.50	10.63	17.38	17.13
True Heading (THDG)	-33.5	27.7	27.8	26.0	26.8	26.7

Table 1.9A ACARS Position Report

## FACTUAL INFORMATION

## SAFETY INVESTIGATION FOR MH370 (9M-MRO)

17:07:29	46818992	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071707	DFD	RELAY
Normal		DFD B777 Position Report (NEW)			QXSXMXS				
<b>QU DPCCAMH</b> .QXSXMXS 071707 CAGM FI MH0370/AN 9M-MRO DT QXT IOR2 071707 D03A - MAS001AO B777 POSITION REPORT 565									
ACID FLT FM FLCT DATE DPT DST MRO S370 TR 318 07/03/14 WMKK ZBAA									
SWID SFC 316A-BSM-710-02 18661									
GMT ALT CAS MACH TAT SAT LAT LONG 164143 103 168.4 .255 31.1 27.3 2.767 101.715 164643 10582 261.8 .478 23.4 10.4 3.074 101.760 165143 21193 301.1 .669 11.6 -11.8 3.553 101.988 165643 28938 303.1 .783 2.6 -27.4 4.109 102.251 170143 34998 278.0 .819 -13.4 -43.9 4.708 102.534 170643 35004 278.4 .821 -13.1 -43.8 5.299 102.813									
GWT TOTFW WINDIR WINDSP THDG 492520 49200 140.3 1.25 -33.5 489200 47800 107.6 9.38 27.3 486240 46500 91.8 19.50 27.8 483840 45400 58.4 10.63 26.0 481880 44500 69.6 17.38 26.8 480600 43800 70.0 17.13 26.7									
18:03:23	46819784	Outgoing Uplink	9M-MRO	MH0370		MHKULKJACM001	071803	AGM	RELAY

Figure 1.9I: Position Report

The first message sent to the aircraft cockpit printer from the MAS ODC was at 1803:23 UTC. The ACARS message requested the crew to contact the HCM ATCC immediately. The incoming downlink message at 1803:24 UTC showed the message failed to reach the aircraft. Messages are auto transmitted every 2 minutes and the message was retransmitted until 1843:33 UTC but all messages failed to get a response. Automated downlink message by ACARS showed ‘failed’. Message sent to the aircraft cockpit printer and the Automated Downlink messages are shown in Figures 1.9J and 1.9K, respectively.

18:03:23	46819784	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	071803	AGM	RELAY
Uplink Sent B777 Cockpit Printer Uplink for ODC -- B777 Cockpit QXSXMXS								
QU QXSXMXS .DPCCAMH 071803 CAGM AN 9M-MRO/FI MH0370/MA 991I - =====   MALAYSIA AIRLINES - ODC   =====								
URGET REQUEST  PLS CONTACT HO CHI MING ATC ASAP  THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR  I RECEIVED CALL FROM SUBANG CENTRE  PLS ACK THESE MSG  REGARDS								

Figure 1.9J: Message from MH ODC

18:06:25	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	071806	MAS	RELAY
Normal		MAS-F (failed)			QXSXMXS			

Figure 1.9K: Automated Downlink Message

## 1.9.5 Satellite Communications (SATCOM)

### 1.9.5.1 SATCOM System Description

SATCOM is an acronym of, and generic term for, satellite communications. SATCOM operates by using satellites to relay radio signals between the sender and receiver. It can cover far more distance and wider areas than other radios. SATCOM can be used to transmit words, pictures and other forms of information.

The aircraft, 9M-MRO, was equipped with a SATCOM terminal that used the Inmarsat Classic Aero system. The Inmarsat system utilises a constellation of satellites to provide nearly global coverage, the exception being polar areas. The aircraft SATCOM system, also referred to as an Airborne Earth Station (AES) operates on L Band, transmits at 1.6 GHz and receives at 1.5 GHz. For this aircraft, the SATCOM system provided a total of five voice channels and one data channel. The satellite link provides the following functions:

- Audio and text communication;
- ACARS data; and
- In-flight Entertainment (IFE) Equipment connectivity.

The Earth or Ground Station uses C Band, transmits at 6 GHz and receives at 4GHz. Inmarsat uses a network of Ground Earth Stations (GES) to communicate with the satellites and connect the SATCOM signal to other terrestrial data networks such as telephone systems, internet, etc.

When the SATCOM AES is first powered on, it sends a log-on request to the GES to initiate service.

There are a number of channels available for messages to be sent between the Satellite and Earth Station. One of the channels is called the ‘common access channel’, which aircraft will constantly listen to when able to do so.

If the GES has not heard from an aircraft for an hour after the last communication, it automatically transmits a ‘log on/log off’ (“ping”) message on the common access frequency using the aircraft’s unique identifier. If the aircraft receives its ‘unique identifier’, it returns a short message that it is still logged onto the network. Both the initial log-on request and the hourly ping have been termed as a ‘handshake’.

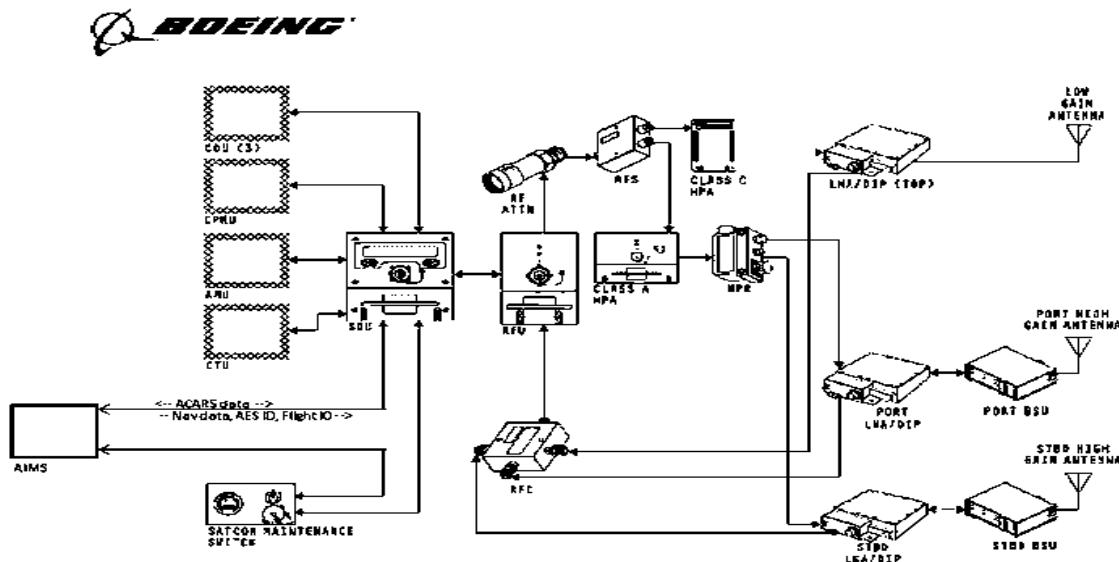
The SATCOM AES consists of the following equipment: Radio frequency unit (RFU), Radio frequency attenuator (RF ATTN), Radio frequency splitter (RFS), Class C high power amplifier (HPA), Class A high power amplifier (HPA), High power relay (HPR), three low noise amplifier/diplexers (LNA/DIPs), Low gain antenna (LGA), two beam steering units (BSUs), two high gain antennas (HGAs), Radio frequency combiner (RFC) and Satellite data unit (SDU).

The SATCOM avionics are located on the E11 rack, which is in the crown area aft of doors 3 left/right. The High Gain antennas are mounted above door 3 left and door 3 right. The Low Gain antenna is mounted on the fuselage centreline. The SATCOM Circuit Breakers (CB) are located in the Main Equipment Center (MEC).

The Satellite Data Unit (SDU) receives 115v ac from the Left Main bus.

The diagram in *Figure 1.9L* below shows the complete set of SATCOM units, including avionics, High Gain Antenna Subsystem and Low Gain Antenna Subsystem. It also shows interfaces to the aircraft cockpit and cabin systems and functions. The following notes are intended to be read in conjunction with *Figure 1.9L*:

1. CDU (3) are the three Control Display Units, otherwise known as Multi-function Control Display Units (MCDUs).
2. CPMU is Cabin Passenger Management Unit, which provides an interface between the Panasonic IFE and the SDU, for any Data-3 SMS/e-mail messages.
3. AMU is the Audio Management Unit, which feeds cockpit audio to and from the SDU.
4. CTU is the Cabin Telecommunications Unit, which provides an interface between the in-seat handsets and the SDU, for cabin telephony calls, were that functions available. In the case of 9M-MRO, the in-seat phones can only be used for seat-to-seat calling.
5. AIMS Cabinet is one of two Airplane Information Management System cabinets, which route numerous information to and from the SDU, including ACARS data, Navigational data, AES ID and Flight ID.
6. SATCOM Maintenance Switch is not relevant to this document, as no maintenance activity is possible in flight.



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*Figure 1.9L: SATCOM System*

The photo in *Figure 1.9M* below shows the Honeywell/Racal (Honeywell/Thales) MCS-6000 SATCOM Units – RFU (left), SDU (centre) and HPA (right)



*Figure 1.9M RFU (left), SDU (centre) and HPA (right)*

#### 1.9.5.2 SATCOM Ground Station Logs of the Event – Introduction

Throughout the flight of MH370, the aircraft communicated through the Inmarsat Indian Ocean Region (IOR) I-3 Satellite and the GES in Perth, Australia.

*Figure 1.9N* shows the Inmarsat I-3 IOR Satellite Coverage Map. The blue lines represent the elevation angle to the IOR satellite for a SATCOM unit on the ground or in the air. Due to the satellite inclination, the elevation angles are approximate.

MH370 departed KLIA at 1642 UTC [0042 MYT, 8 March 2014]. At 1707 UTC, the SATCOM system was used to send a standard ACARS report, normally sent every 30 minutes. This message indicated there was sufficient fuel for MH370 to remain airborne until approximately 0012 UTC [0812 MYT].

The ACARS reports expected at 1737 UTC and 1807 UTC were not received. The next SATCOM communication was a log-on request from the aircraft at 1825 UTC. From that point until 0010 UTC, SATCOM transmissions indicate that the link was available, although not used for any voice, ACARS or other data services. At 0019 UTC, the AES initiated another log-on request. This was the last SATCOM transmission received from the AES.

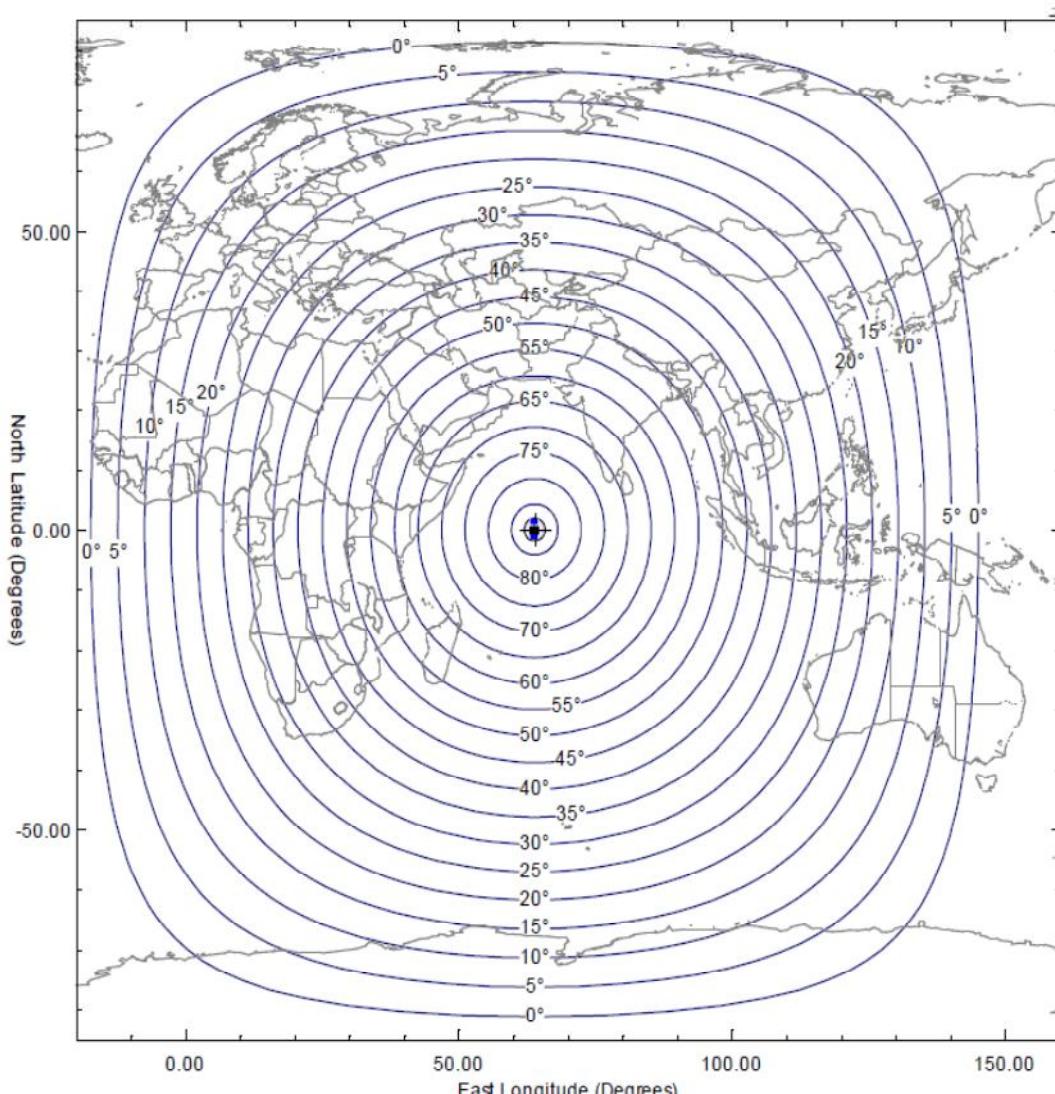


Figure 1.9N: Inmarsat I-3 IOR Satellite Coverage Map

Apart from a short period around 1825 UTC [0225 MYT, 8 March 2014], the SATCOM link was available for the major part of the flight.

Data from the last seven ‘handshakes’ were used to help establish the most probable location of the aircraft. Initially only the first six of these ‘handshakes’ were considered to be complete. The seventh and last ‘handshake’ that was automatically initiated by the aircraft, was originally assessed as a partial ‘handshake’. Subsequent analysis confirmed the 7<sup>th</sup> handshake could be used to help determine the most probable flight path. Two unanswered ground-to-air telephone calls had the effect of resetting the activity log and hence increased the period between the ground initiated ‘handshakes’. The significant times used to identify the most probable final location of the aircraft are tabulated in *Table 1.9B* below. Details of the event’s SATCOM ground station logs are provided in paragraphs 1.9.5.3 and 1.9.5.4 below.

SATCOM TRANSMISSIONS		TIME	
		UTC	MYT*
1	Aircraft departed KLIA	1642	0042
2	Last ACARS transmission	1707	0107
3	1 <sup>st</sup> handshake – log-on initiated by the aircraft	1825	0225
4	Unanswered ground-to-air telephone call	1839	0239
5	2 <sup>nd</sup> handshake initiated by ground station	1941	0341
6	3 <sup>rd</sup> handshake initiated by ground station	2041	0441
7	4 <sup>th</sup> handshake initiated by ground station	2141	0541
8	5 <sup>th</sup> handshake initiated by ground station	2241	0641
9	Unanswered ground-to-air telephone call	2313	0713
10	6 <sup>th</sup> handshake initiated by ground station	0010*	0810
11	7 <sup>th</sup> handshake – log-on initiated by the aircraft	0019*	0819
12	Aircraft did not respond to 'handshake' from Satellite Earth Ground Station	0115*	0915

\* 08 March 2014

Table 1.9B SATCOM 'Handshakes'

### 1.9.5.3 SATCOM Ground Station Logs of the Event - Summary

The SATCOM utilised the Inmarsat Indian Ocean Region (IOR) I-3 satellite and the associated Perth Ground Earth Station (GES) throughout the flight. Inmarsat has confirmed that during the flight, no SATCOM signalling or traffic was routed via any other satellites (including MTSAT) to any other GESs (including MTSAT<sup>7</sup> GESs).

The SATCOM provided the Satellite link for the following functions:

- Cockpit Voice - Call control via the Multi-function Control and Display Units (MCDUs) and audio via the cockpit Audio Management Unit (AMU) and associated headsets
- Cockpit Packet Data (Data-2) - Interface via the ACARS Management Unit (MU)
- Cabin Packet Data (Data-3) - Interface via the Panasonic System 3000i IFE equipment:
  - SMS/e-Mail
  - BITE-offload

The GES logs contain the following key information for each transmission to and from the aircraft:

- Time tag, Satellite and GES (Note: the timestamp accuracy does vary between the different logs, but should always be <1 second, and usually to a few milliseconds)
- Channel Type, Channel Number (frequency), Received Carrier/Noise Density Ratio (C/No), channel Bit-Error-Rate (BER), Burst Frequency Offset (BFO) and Burst Timing Offset (BTO, or round trip delay).

<sup>7</sup> MTSAT – A series of Japanese weather and aviation satellites and GESs. MTSAT-1R and MTSAT-2 satellites are interoperable with Inmarsat satellites.

- 
- All payload data (excluding voice frames) contained within the transmission – these are known as the Signal Unit contents.

The events are summarised below. All times are in UTC. In the summary below, times are truncated to the nearest minute (the format is Hours:Minutes) and in Section 1.9.5.4, times are truncated to the nearest second (the format is Hours Minutes:Seconds).

1. Prior to take-off, the SATCOM Logged On (normally) a number of times, the last time being at 16:00, when it sent a valid Flight ID to the GES. The SATCOM link was available for both voice and data (known as Log-On Class 3).
2. After take-off, the IFE SMS e-mail application sent a normal beginning-of-flight message at 16:42 (containing the correct Airborne Earth Station [AES ID], Flight ID "MAS370", origin airport "WMKK", and destination airport "ZBAA"), indicating that the IFE was receiving the valid Flight ID, origin airport and destination airport from AIMS and the ICAO (AES) ID from the Satellite Data Unit (SDU) at this time.
3. The SATCOM link was available for most of the flight, excluding periods leading up to 18:25 UTC, 07 March and 00:19 UTC, 08 March 2014.
4. When the SATCOM link was re-established at the above times, no Flight ID was present.
5. During each of the two in-flight Log-Ons at 18:25 UTC and 00:19 UTC, the GES recorded abnormal frequency offsets for the burst transmissions from the SATCOM.
6. There is no indication of the SATCOM link being manually Logged Off from the cockpit (via an MCDU). Such activity would have been captured in the GES logs, but it was not.
7. No Data - 2 ACARS traffic was observed after 17:07 UTC, 07 March 2014.
8. The IFE equipment set up two ground connections over SATCOM (for the SMS e-mail application and Built-In Test Equipment (BITE) application) after the SATCOM re-established the link at 18:25 UTC, 07 March 2014 (normal), but not after the SATCOM re-established the link at 00:19 UTC, 08 March (abnormal). At no time during the flight was any user data sent over the link by means of the SMS/e-Mail application.
9. Two Ground-to-Air Telephony Calls were placed to the cockpit from the MAS Operations Centre at Airline Operational Communications (AOC) Q10 priority level at 18:39 UTC and at 23:13 UTC, 07 March. Neither of the calls was answered.
10. The SATCOM responded normally to a series of roughly hourly Log-On Interrogations from the Perth GES, up to and including a Log-On Interrogation at 00:10 UTC, 08 March 2014. The two unanswered ground to air calls at 18:39 UTC and 23:13 UTC reset the Perth GES inactivity timer and hence the Log-On Interrogations were not always hourly.
11. The last transmission received from the SATCOM occurred at 00:19 UTC, 08 March 2014 and the SATCOM failed to respond to a series of three Log-On interrogations starting at 01:15 UTC, 08 March.

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**1.9.5.4 SATCOM Ground Station Logs - Key Observations in Chronological Order**

1. **1250:19** - Prior to take-off, the SATCOM initiates a normal Log-On as Class 1 (data only capable) via the Pacific Ocean Region (POR) I-3 satellite, using the Low Gain Antenna (LGA) subsystem. No flight ID is sent to the GES at this time. This is the first SATCOM activity recorded at the GES since 0802:27.
2. **1555:57** - The SATCOM initiates a normal Log On Renewal as Class 1 (data only capable) via the POR I-3 satellite, using the LGA subsystem, this time with a valid Flight ID.
3. **1557:49** - The SATCOM initiates a normal Log-On as Class 3 (voice and data capable) via the POR I-3 satellite, using the High Gain Antenna (HGA) subsystem, with a valid Flight ID.
4. **1559:57** - The SACOM initiates a Log-On handover as Class 3 (voice and data capable) to the IOR I-3 satellite, using the HGA subsystem, with a valid Flight ID.
5. **1642:04** - After take-off, the IFE SMS e-mail application sends a normal beginning-of-flight message.
  - a. The message contained the correct AES ID, Flight ID "MAS370", origin airport "WMKK", and destination airport "ZBAA".
  - b. This indicates that the IFE was receiving the Flight ID, origin airport and destination airport from AIMS and the ICAO (AES) ID from the SDU at this time.
6. **1707:48** - Last Acknowledged DATA-2 ACARS Message. No further SATCOM Data-2 ACARS messages or acknowledgements were received at the GES for the remainder of the flight.
7. **1803:41** - GES initiates a DATA-2 ACARS transmission (uplink), but receives no acknowledgement from the SATCOM.
  - a. Therefore, the SATCOM Link was lost at sometime between 1707:48 and 1803:41.
  - b. There is no evidence of a cockpit-initiated manual Log-Off of the SATCOM.
8. **1805:11** - GES initiates a DATA-2 ACARS transmission, but receives no acknowledgement from the SATCOM, indicating that there is still no SATCOM link at this time.
9. **1825:27** - SATCOM Log-On, initiated from the aircraft terminal.
  - a. This is the first 'handshake'.
  - b. This marks the end of the link lost period that began at sometime between 1707:48 and 1803:41.
10. **1825:34** – SATCOM Log-On, successfully completed.
  - a. The SATCOM link becomes available (for both voice and data – Class 3) once more and normal SATCOM operation resumes (except that there is no Data-2 ACARS traffic which is normally transmitted at least once every 30 minutes).
  - b. No Flight ID was sent to the GES during the Log-On.

- 
- c. The GES recorded abnormal BFOs for the SATCOM Log-On Request and Log-On Acknowledge transmissions.
11. **1827:03** – The IFE sets up a Data-3 ground connection (X.25 circuit) over SATCOM for an SMS/e-mail application after the SATCOM link is re-established.
12. **1828:05** – The IFE sets up a Data-3 ground connection (X.25 circuit) over SATCOM for a BITE application after the SATCOM link is re-established.
13. **1839:52** – Ground to Air Telephony Call Placed from a number with country code 60
- a. Q10 Airline Operational Communications (AOC) Priority Level
  - b. This call would have been routed to the cockpit and should have resulted in a chime and an incoming visual annunciation on the Audio Control Panels (ACPs), and, if the appropriate SATCOM page was selected, then also on one or more MCDU.
  - c. The GES logs show zero duration, indicating that the call went unanswered. Note that there are two methods for the answering of an incoming call: Either by pressing the relevant Line Select Key on an MCDU, or by keying a microphone.
14. **1840:56** – The GES logs show that the unanswered Ground to Air telephony call was cleared by the calling party.
15. **1941:00** – Log-On Interrogation by the Perth GES, with a response from the SATCOM
- a. This is the second ‘handshake’, whereby the GES inactivity timer has expired and the GES has sent a message to interrogate the status of the SATCOM.
  - b. The SATCOM responded normally and the SATCOM link was therefore available at this time.
16. **2041:02** – Log-On Interrogation by the Perth GES, with a response from the SATCOM
- a. This is the third ‘handshake’.
  - b. The SATCOM responded normally and the SATCOM link was therefore available at this time.
17. **2141:24** – Log-On Interrogation by the Perth GES, with a response from the SATCOM
- a. This is the fourth ‘handshake’.
  - b. The SATCOM responded normally and the SATCOM link was therefore available at this time.
18. **2241:19** – Log-On Interrogation by the Perth GES, with a response from the SATCOM
- a. This is the fifth ‘handshake’.
  - b. The SATCOM responded normally and the SATCOM link was therefore available at this time.
19. **2313:58** - Ground to Air Telephony Call Placed from a number with country code 60

- a. Q10 AOC Priority Level.
  - b. This call would have been routed to the cockpit and should have resulted in a chime and an incoming visual annunciation on the Audio Control Panels, and, if the appropriate SATCOM page was selected, then also on one or more MCDU.
  - c. The GES logs show zero duration, indicating that the call went unanswered. Note that there are two methods for the answering of an incoming call: Either by pressing the relevant Line Select Key on an MCDU, or by keying a microphone.
20. **2315:02** - The GES logs show that the unanswered Ground to Air telephony call was cleared by the calling party.
21. **0010:58** - Log-On Interrogation by the Perth GES, with a response from the SATCOM
- a. This is the sixth 'handshake'.
  - b. The SATCOM responded normally and the SATCOM link was therefore available at this time.
22. **0019:29** - SATCOM Log-On, initiated from the aircraft terminal. This is the seventh 'handshake'.
23. **0019:37** - SATCOM Log-On, successfully completed
- a. The SATCOM link becomes available (for voice and data – Class 3) once more and normal SATCOM operation resumes.
  - b. No Flight ID was sent to the GES during the Log-On.
  - c. The GES recorded an abnormal frequency offset for the SATCOM Log-On Request and Acknowledge transmissions.
  - d. The IFE did not subsequently establish the two Data-3 X.25 connections over the SATCOM.
  - e. Note that this is the last transmission received from the aircraft terminal.
24. **0115:56** - Log-On Interrogation by the Perth GES, with no response from the SATCOM
- a. The SATCOM Link was lost at sometime between 0019:37 and 0115:56.
  - b. There is no evidence of a cockpit-initiated manual Log-Off of the SATCOM.
25. **01:16:06** – Log-On Interrogation by the Perth GES, with no response from the SATCOM
26. **01:16:15** – Log-On Interrogation by the Perth GES, with no response from the SATCOM

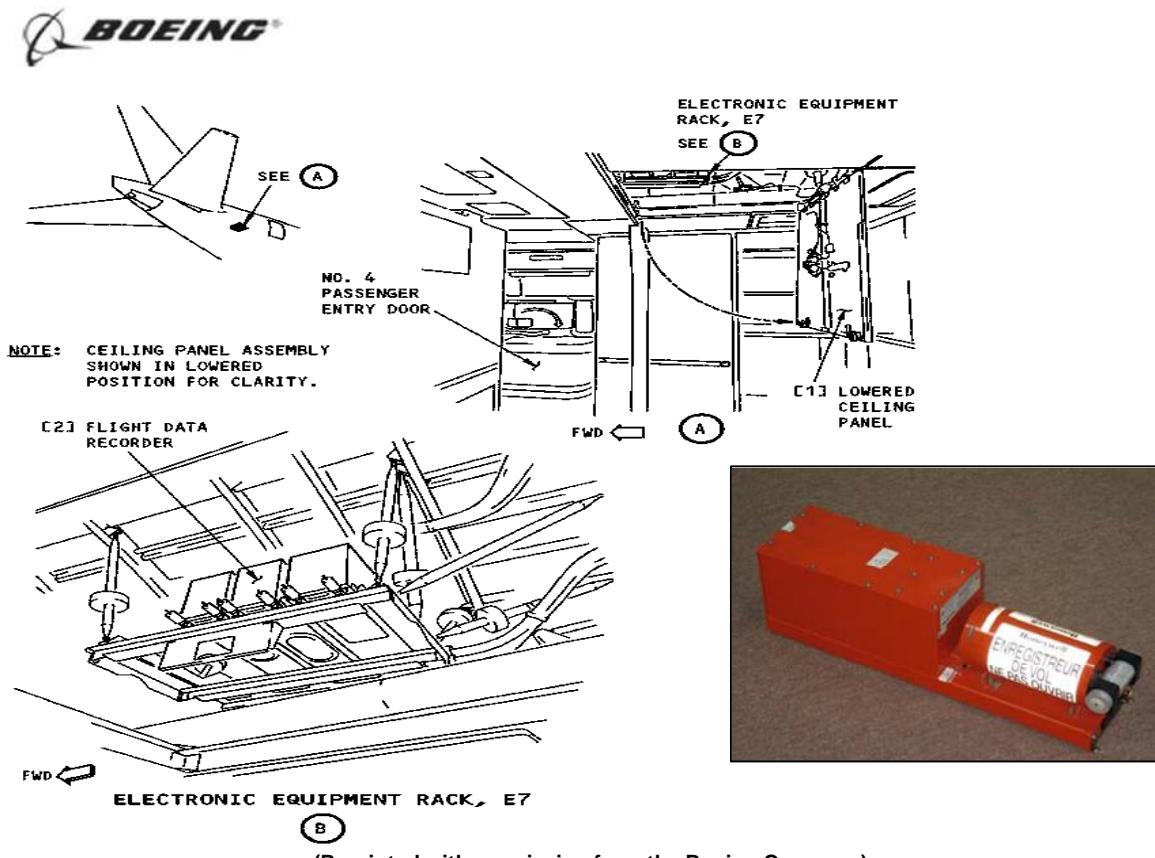
## SECTION 1.10 – AERODROME INFORMATION

Not applicable at this stage of the investigation.

## SECTION 1.11 - FLIGHT RECORDERS

The aircraft was equipped with two crash-protected recorders:

- i. Solid State Flight Data Recorder (SSFDR)
- ii. Solid State Cockpit Voice Recorder (SSCVR)



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*Figure 1.11A Location of SSFDR*

### 1.11.1 Solid State Flight Data Recorder (SSFDR)

The solid state flight data recorder is located in the Electronic Equipment rack, E7, which is in the aft cabin above the ceiling (*Figure. 1.11A* above).

The SSFDR receives and stores selected aircraft parameters from various aircraft systems and sensors in a crash-protected solid state memory.

The flight data recorder system (FDRS) operates during any engine start, while any engine is running, during test or when the airplane is in the air. The SSFDR is powered from the right AC transfer bus which is powered by the engine generators or the APU generator. If none of these generators are functioning due to non-operation of the engines and APU then the bus will not be powered and the SSFDR will not operate in the air.

This is a solid state flight data recorder (SSFDR) with a recording capacity of at least twenty-five hours.

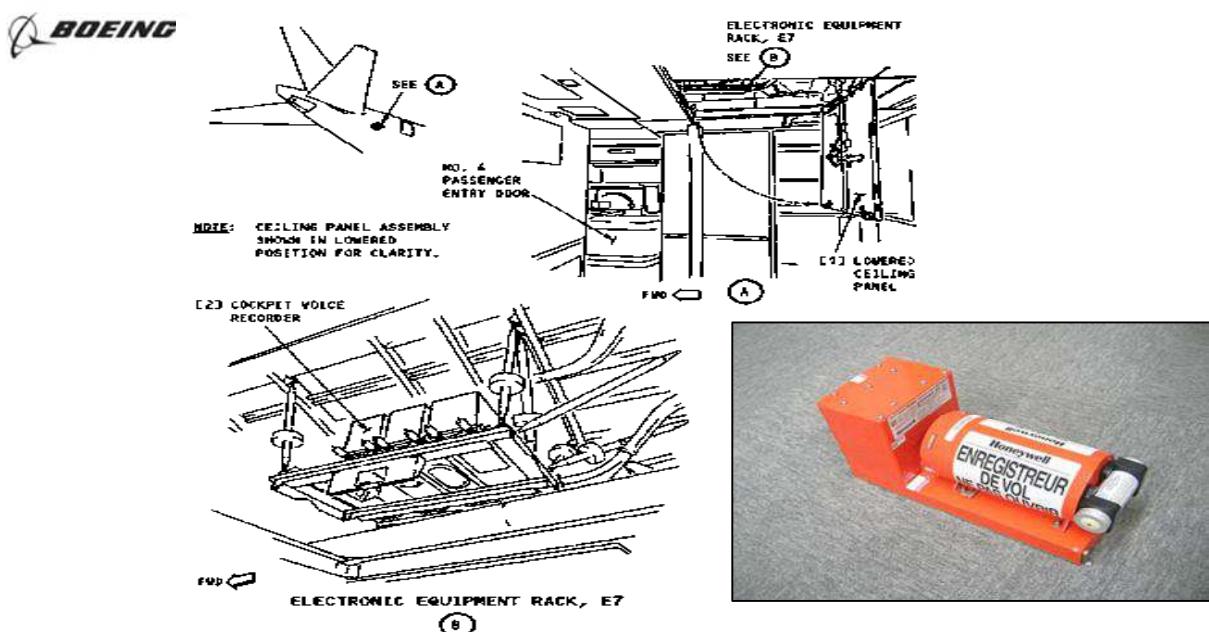
The SSFDR records the most recent 25 hours of flight and records more than 1300 parameters. The SSFDR is a 256 word per second (wps) data rate recorder. The most recent flight data recorder download for this aircraft was in September 2013 and this was carried out for the annual readout. The annual readout extracts 151 parameters for evaluation. Details of the SSFDR installed and specifications are as follows:

- Manufacturer: Honeywell
- Model: SSFDR Model 4700
- Part Number (P/N): 980-4700-042
- Serial Number (S/N): SSFDR-08636
- Date last installed on aircraft: 26 August 2012
- Weight: 6.8 kg
- Electricity Consumption: 15 W, 115 VAC 400 Hz
- Impact Shock: 3400 G for 6.5 ms
- Fire Temperature: Max 1100°C (30 min)
- Deep Sea Pressure and Sea Water Immersion: 20,000 ft.

### 1.11.2 Solid State Cockpit Voice Recorder (SSCVR)

The solid state cockpit voice recorder is in the Electronic Equipment Rack, E7, in the aft cabin above the ceiling and located adjacent to the SSFDR (*Figure 1.11B* below).

The solid state cockpit voice recorder (SSCVR) has a recording capacity of at least two hours in standard quality and thirty minutes in high quality. The voice recorder system receives flight deck sounds and flight crew communications. It keeps this audio in a solid state memory.



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*Figure 1.11B – Location of SSCVR*

Four audio channels go to the SSCVR. Channel 1, 2, and 3 audio is from the audio management unit (AMU). Each channel carries audio from one crew member's flight interphone audio. The audio on each channel is the sum of these signals:

- Hot mic audio (microphone audio when there is no press-to-talk [PTT])
- Received audio as selected on the crew member's audio control panel (ACP)
- Side tone audio to the crew member

Channel 4 audio is from the Cockpit Area Microphone (CAM). The CAM sends flight deck area audio to the SSCVR.

The SSCVR operates any time power is available on the Left AC transfer bus. This bus is not powered from batteries or the Ram Air Turbine (RAT).

Details of the SSCVR installed and the specifications are as follows:

- Manufacturer: Honeywell
- Model: SSCVR Model 6022
- Part Number (P/N): 980-6022-001
- Serial Number (S/N): 2677
- Date last installed on aircraft: 26 August 2012
- Weight: 5.9 kg
- Electricity Consumption: 8 W, 115 VAC 400 Hz
- Impact Shock: 3400 G for 6.5 ms
- Fire Temperature: Max 1100°C (30 min)
- Deep Sea Pressure and Sea Water Immersion: 20,000 ft.

### **1.11.3 Underwater Locator Beacons (ULB)**

Both crash-protected recorders were equipped as provided by the regulations with underwater locator beacons (ULB) whose transmission time is at least 30 days, on the 37.5 kHz frequency, operating depth up to 20,000 ft. (6096 m) and activated with fresh or salt water immersion. Detail specifications are as per below:

- Manufacturer: Dukane
- Model: DK-100 / DK-120
- Operating Frequency: 37.5 kHz ± 1 kHz
- Operating Depth: Surface to 20,000 ft. (6,096 meters)
- Pulse Length: 10 milliseconds + 10%
- Pulse Repetition Rate: Not less than 0.9 Pulse/Sec
- Operating Life: 30 days (minimum)
- Battery Life In Beacon: 6 Years
- Acoustic Output, Initial: 1060 dynes/cm<sup>2</sup> rms pressure at 1 meter (160.5 dB)
- Acoustic Output After 30 Days: 700 dynes/cm<sup>2</sup> rms pressure at 1 meter (157.0 dB)
- Operating Temperature Range: +28°F (-2.2°C) to +100°F (+37.8°C)
- Actuation: Fresh or salt water
- Radiation Pattern: Rated output over 80 percent of sphere

- 
- Size: 1.30 inches (3.30 cm) diameter x 3.92 inches (9.95 cm) long (less mount)
  - Weight, Beacon: 6.7 ounces (190 grams)
  - Storage Temperature Range: -65°F (-54°C) to 160°F (71°C)

The SSFDR was attached with a ULB as below:

- S/N: SC26210
- ULB Expiry Date: December 2012

The SSCVR was attached with ULB as below:

- S/N: Not Recorded
- ULB Expiry Date: June 2014

### **1.11.3.1 SSFDR ULB Battery Expiry**

According to maintenance records, the SSFDR ULB battery expired in December 2012. There is no evidence to suggest that the SSFDR ULB battery had been replaced before the expiry date. The SSCVR ULB battery however was replaced, as scheduled, with the next expiry in June 2014. There is some extra margin in the design to account for battery life variability and ensure that the unit will meet the minimum requirement. However, once beyond the expiry date, the ULB effectiveness decreases so it may operate, for a reduced time period until it finally discharges. While there is a definite possibility that a ULB, will operate past the expiry date on the device, it is not guaranteed that it will work or that it would meet the 30-day minimum requirement. There is also limited assurance that the nature of the signal (characteristics such as frequency and power) will remain within specification when battery voltage drops below the nominal 30-day level.

Technical Log records showed that the SSFDR (together with the ULB) was replaced on the aircraft on 29 February 2008. Component installation records for the ULB showed that at the time the SSFDR was replaced on aircraft the expiry date for the battery was December 2012.

Interviews were held with the MAS Engineering Technical records staff to determine why the ULB battery was not replaced before the expiry. It was revealed that the Engineering Maintenance System (EMS, a computer system used to track and call out maintenance) was not updated correctly when the SSFDR was replaced on 29 February 2008. The update involves 'removal' of the old unit in the system followed by 'installation' of the new unit. In this particular instance, although the old unit was 'removed', the new unit was inadvertently not 'installed' in the system. If the system was updated correctly on the installation, the next due for removal would have been for the replacement of the ULB battery. Since the system was not updated it did not trigger for the removal of the SSFDR for replacement of the ULB battery when it was due. ULB battery replacement is normally done in the workshop by routing the removed SSFDR, together with the ULB, to the workshop. This oversight was not noted until after the disappearance of MH370 when details of the ULBs were requested.

Subsequently, MAS Engineering Technical records carried out a fleet-wide record inspection for the ULBs to ensure all records for other aircraft are updated accordingly.

**SECTION 1.12 - WRECKAGE AND IMPACT INFORMATION**

The aircraft's flight path was estimated using complex analyses of the satellite data and aircraft performance. The last recorded position was determined to be in the south-eastern Indian Ocean, far from land. Since there is no land within fuel plus gliding distance of the last recorded position, the aircraft most likely ditched or impacted the sea in the south-eastern Indian Ocean.

**SECTION 1.13 - MEDICAL AND PATHOLOGICAL INFORMATION**

Refer Section 1.5.10 - Personal Information

**SECTION 1.14 - FIRE**

Aircraft fire could not be established as there was no reported of air or ground fire.

**SECTION 1.15 - SURVIVABILITY**

Not applicable at this stage of the investigation.

**SECTION 1.16 - TESTS AND RESEARCH**

Not applicable at this stage of the investigation.

**SECTION 1.17 - ORGANISATIONAL AND MANAGEMENT INFORMATION****1.17.1 Department of Civil Aviation (DCA) Malaysia**

The DCA is an agency under the purview of the Ministry of Transport (MOT) with the authority to regulate and oversee all technical-operational aspects of the civil aviation industry in Malaysia.

As a Contracting State of the International Civil Aviation Organisation (ICAO) since 1958, Malaysia through DCA is responsible to ensure that the safety and security of flights are consistently maintained at the highest level possible, and at the same time, to ensure the safety of the Malaysian airspace for aircraft operations in conformity to the requirements of ICAO in all aspect of policies, regulations and Standards and Recommended Practices (SARPs).

Malaysia's civil aviation system is based on the Federal Constitution as the supreme law. The legal framework in place consists of the following legislations enacted by Parliament:

- Civil Aviation Act 1969 (Act 3), last amended 01 June 2003
- Aviation Offences Act 1984 (Act 307);
- Airport and Aviation Services (Operating Company) Act 1991 (Act 467); and
- Carriage by Air Act 1974 (Act 148)

Specifically, Section 3 of the *Civil Aviation Act 1969* empowers the Minister of Transport “to give effect to the Chicago Convention and regulate civil aviation.” Under the authority conferred by the same provision, the Minister of Transport also enacted the *Civil Aviation Regulations 1996 (CAR) [P.U. (A) 139/96]*.

CAR 201 stipulates the use of ‘ipso facto’ to address ICAO Annexes 1 to 18, including the application of not only ICAO Standards, but also the recommended practices, provided that a regulation has not already been established in CAR and that a difference has not been notified to ICAO. In particular, DCA relies completely on CAR 201 for the implementation of Annexes 3, 4, 5 and 12.

The *Civil Aviation Act 1969* or Act 3 also empowers the Minister of Transport to make rules providing for “the investigation in such manner as may be prescribed, including by means of a tribunal established for the purpose, of any accident either occurring in Malaysia or occurring to Malaysian aircraft.” In addition, this Act provides the Minister of Transport, the Chief Inspector of Air Accidents Investigation Bureau (AAIB) with the proper authority and legal tools to conduct investigations effectively, and in compliance with Annex 13.

The CAR defines which accidents and incidents shall be reported and empowers the Minister of Transport to appoint a Chief Inspector of Air Accidents and Incidents. CAR provides for the Chief Inspector to “determine whether or not an investigation shall be carried out in respect of any accident to which these regulations apply and the form of the investigation”. The Chief Inspector may carry out, or may cause another Inspector to carry out, an investigation of any such accident. The CAR also makes provision for the mandatory submission of a report to the Director-General of Civil Aviation (DGCA) in respect of any reportable occurrence. No provision is however made for a voluntary non-punitive reporting system.

### **a) Main Functions and Responsibilities of DCA**

- i. To exercise regulatory functions in respect of civil aviation and airport and aviation services including the establishment of standards and their enforcement;
- ii. To represent the Government in respect of civil aviation matters and to do all things necessary for this purpose;
- iii. To ensure the safe and orderly growth of civil aviation throughout Malaysia;
- iv. To encourage the development of airways, airport and air navigation facilities for civil aviation;
- v. To promote the provision of efficient airport and aviation services by the licensed company; and
- vi. To promote the interests of users of airport and aviation services in Malaysia in respect of the prices charged for, and the quality and variety of, services provided by the licensed company.

### b) Responsibility of the Director-General of DCA (DGCA)

The Civil Aviation Act 1969 (Act 3) clearly states the duties and functions of the DGCA (including the authority to delegate powers, duties and functions) and, by extension, the objectives and functions of the DCA.

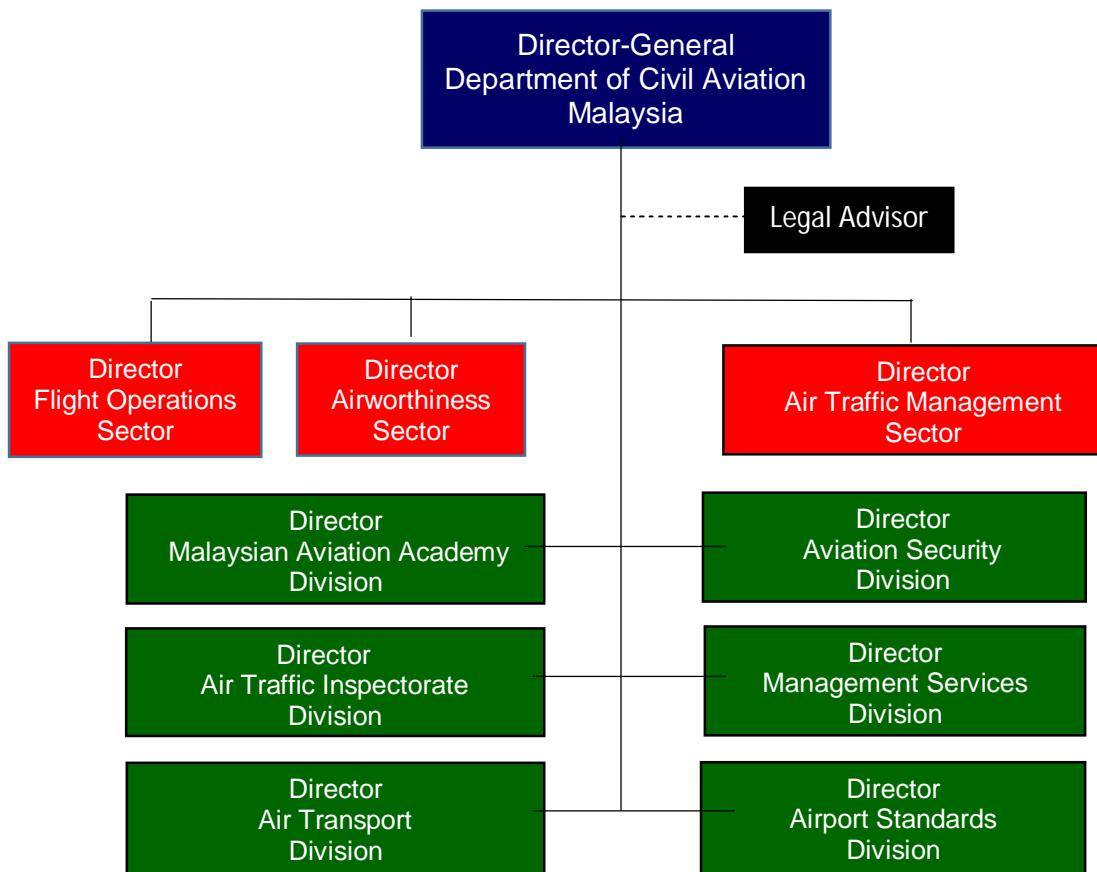


Figure 1.17A Organisation Structure of DCA

Among the several divisions under its jurisdiction, DCA has eight Divisions engaged in safety, security and licensing-related functions, as follows (*Table 1.17A* below):

i. Flight Operations Sector )	Grouped under a broader unit called Engineering and Flight Operations
ii. Airworthiness Sector )	
iii. Flight Calibration Division )	
iv. Air Traffic Management Sector	
v. Air Traffic Management Inspectorate Division	
vi. Aviation Security Division	
vii. Airport Standards Division	
viii. Malaysian Aviation Academy Division	

Table 1.17A – Sectors and Divisions of DCA

This Section focuses only on the Air Traffic Services, Airworthiness and Flight Operations Sectors of the DCA.

### **1.17.1.1 Air Traffic Services (ATS)**

#### **1.17.1.1.1 Air Traffic Management (ATM) Sector**

The Director of the ATM Sector is responsible to the DGCA for the planning, implementation and operation of the air traffic services systems in the two Malaysian Flight Information (FIR), i.e. Kuala Lumpur and Kota Kinabalu FIRs respectively, in accordance with the ICAO SARPS.

The function of the ATM Sector is responsible for the provision of air traffic service for the safe and efficient conduct of flight within Malaysian airspace pursuant to the Chicago Convention 1947.

The Malaysian airspace is divided into the Kuala Lumpur and Kota Kinabalu FIRs, where operations are associated with air traffic control units. There are 2 Air Traffic Control Centres; in Kuala Lumpur and Kota Kinabalu, a sub-centre in Kuching as well as 12 Control Towers in Peninsular Malaysia, 4 in Sabah and 8 in Sarawak.

The Director of ATM Sector is supported by Regional Director I (Peninsular Malaysia), Regional Director II (Sabah), Regional Director III (Sarawak), Director KLIA and Director of KL ATCC in the functionality of the Sector.

Supporting the Regional Directors/Directors are ATCC Chiefs, Supervisors, DCA Managers, Unit Chiefs, Operational Controllers and support staff. Other entities are under the direct responsibility of the Director of ATM Sector are Aeronautical Information Service (AIS) and Procedures for Air Navigation Services and Operations (PANS-OPS).

The ICAO SARPS associated with the responsibility of ATM Sector are those contained in:

- a) Annex 1 - Personnel licensing,
- b) Annex 2 - Rules of the Air,
- c) Annex 3 - Meteorological Service for International Air Navigation
- d) Annex 4 - Aeronautical Charts
- e) Annex 5 - Units of Measurement to be used in Air and Ground Operations
- f) Annex 10 - Aeronautical Telecommunications
- g) Annex 11 - Air Traffic Services
- h) Annex 12 - Search and Rescue
- i) Annex 14 - Aerodromes
- j) Annex 15 - aeronautical Information Services

Other relevant documents are;

- a) DOC 4444 - Air Traffic Management Procedures for Air Navigation
- b) Doc 9859 - Safety Management System Manual
- c) CIR 314 - Threat and Error Management (TEM)
- d) DOC 9910 - Normal Operations Survey (NOSS)

- 
- e) DOC 9426 - Air Traffic Services Planning Manual and
  - f) Doc 9683 - Human Factors Manual

#### 1.17.1.1.2 Air Traffic Inspectorate (ATI) Division

The ATI Division is the regulatory body that oversees the provision of Air Navigation Services (ANS) by the ANS providers to ensure compliance with the national legislations, namely the Civil Aviation Act 1969 and the Civil Aviation Regulations 1996, and ANS-related ICAO Annexes to the Chicago Convention.

The ATI Division develops and establishes the ANS safety standards and performs safety oversight and surveillance activities with the sole aim of regulating the ANS providers. The regulatory Manual of ANS Inspectorate contains the requirements and procedures pertaining to the provision of the ANS, based mainly on the standards and recommendation (SARPS) of ICAO Annexes to the Chicago convention, other ICAO documents and best practices, as may be determined by the ATI Division develops and establishes the ANS safety standards and performs safety oversight and to be applicable in Malaysia. From time to time the ATI Division develops and establishes the ANS safety standards and performs safety oversight and may supplement these ANS safety standards in the form of safety publications such as Air Traffic Inspectorate Directives (ATIDS) or Aeronautical Information Circulars (AIC). Where appropriate, these safety publications will be incorporated into the Manual by amendments.

- a) Safety Oversight Audit/Inspection of ANS Providers** are conducted to effectively regulate the provision of ANS. The ATI Division develops and establishes the ANS safety standards and performs safety oversight and schedules formal annual audits and inspections, and also as and required, for which no notification is given. The audit utilises protocols and compliance checklists to evaluate the level of adherence to stipulated national legislations, and ANS-related ICAO Annexes to the Chicago Convention and ICAO documents, including best practices. Audits are carried out on the ATM Sector at Headquarters, and the ATS Units and ATC training organisations for both the DCA and Royal Malaysian Air Force (RMAF).
- b) ATC Examination** activities include all ATC courses at ATC organisations that are approved by the DGCA and operational ATC examinations at ATS units that control civil air traffic. However, some functions are delegated to designated ATC Check Officers who are appointed on a two-year basis by the DGCA.
- c) ATC Licensing** provisions are promulgated in the Civil Aviation Regulations 1996. The ATID is the authority for issuance, renewal, endorsement and validation of an ATC Licence and an ATC Trainee Licence in accordance with ICAO Annex 1 to the Chicago Convention.
- d) Class 3 Medical Assessment** for ATCOs, as part of the pre-requisite for an ATC Licence and an ATC Trainee Licence, shall only be issued by a Designated Aviation Medical Examiner (DAME). The ATI Division develops and establishes the ANS safety standards and performs safety oversight and maintains a comprehensive database of licensing information for all licensed holders.

- 
- e) **English Language Proficiency (ELP) Assessment** is required for ATCOs and aeronautical station operators, and they must meet the minimum required proficiency level for radiotelephony communications i.e. Level 4 in accordance with ICAO Annex 1 to the Chicago Convention.
  - f) **ATC Incident Investigations** are carried out for ATC safety-related occurrences to evaluate the effectiveness of the ATC system and its components, as well as recommending mitigation actions towards enhancements. The investigative process includes the Incident Review Panel (IRP), THE Board of Inquiry (BOI) and the Safety Review Boards).

To enable the military to meet its national operational requirements, a number of control zones, training areas and danger areas have been established. Operational control of these airspaces and responsibility for the provision of air traffic services within these airspaces have been delegated to the military. Close cooperation and coordination between the civil and military authorities has been established.

Provision of approach control service (within lateral limits of Butterworth Control Zone: 5,500 ft. altitude – FL245. (elsewhere 2,500 ft. altitude - FL245). Air traffic to/from the civilian Penang International Airport (PIA) is provided by military ATCOs who have been licensed by the ATI Division develops and establishes the ANS safety standards and performs safety oversight and to ensure the provision of services to civil traffic. The rationale for such an arrangement is based on the military activities at Butterworth Military Airport (BMA) which is in close proximity to PIA, and other military activities carried out over the high seas in danger areas WMD 412A and WMD 413A (permanently established). Furthermore, the final approach segments of both the PIA and the BMA intersect. No major incident has been recorded with the present arrangement/delegation of authority.

In addition to the licensing and validation of ATCOs, the ATI Division develops and establishes the ANS safety standards and performs safety oversight and is responsible for regulating the checks and standards units at various ATS facilities. It also conducts safety oversight of military ATCOs who are charged with the responsibility of providing air traffic services to civil flights in selected portions of the airspace.

The ATI Division also develops and establishes the ANS safety standards and performs safety oversight and has also developed appropriate processes and procedures to enable the division to carry out its safety oversight functions in accordance with established requirements and in a standardised manner. The Division also has the necessary facilities and equipment to enable the personnel to carry out their safety oversight functions in an effective manner. All necessary procedures, including guidance material, have been developed.

#### **1.17.1.1.3 Search and Rescue (SAR)**

With respect to SAR, no legislation specifically addresses the provision of assistance to aircraft in distress. However, in Malaysia, aeronautical SAR (ASAR) is provided in accordance with Annex 12 to the Convention of ICAO and *International Aeronautical and*

*Maritime Search and Rescue (IAMSAR) Manual Vol. I to IV.* As signatory to the Chicago Convention, Malaysia is obligated to provide ASAR services on a 24-hour basis, within the Malaysian Aeronautical Search and Rescue Regions (SRR), (defined within the Kuala Lumpur and Kota Kinabalu FIRs).

With the implementation of National Security Council (NSC) Directive No. 20 effective 11 May 1977, ASAR Operational Procedures have been amended to harmonise with inter-agency actions during an aeronautical incident.

### **a) Primary Aeronautical and Maritime SAR Agencies**

#### **i. National Security Council (NSC)**

National Security Council is the body responsible for establishing, developing and maintaining Aeronautical and Maritime SAR organisation in Malaysia. The Cabinet, through the Secretary of the National Security Council, directs the NSC on policy, international agreements, conventions and operational matter. The NSC is responsible to the Cabinet on all matters pertaining to Aeronautical and Maritime SAR.

#### **ii. DCA**

The DCA is the SAR Authority for aeronautical incidents, and shall be responsible for the provision of Aeronautical SAR service within Malaysia's Aeronautical Search and Rescue Regions (SRRs). As such DCA shall co-ordinate, liaise, train, equip, staff, maintain, develop procedures and operations and conduct exercises for A-SAR. DCA shall also assist the Maritime SAR Authority, when requested.

#### **iii. Malaysian Maritime Enforcement Agency (MMEA)**

The MMEA is the SAR Authority for maritime incidents, and shall be responsible for the provision of Maritime SAR service within Malaysia's Maritime SRRs. As such MMEA shall co-ordinate, liaise, train, equip, staff, maintain, develop procedures and operations and conduct exercises for maritime SAR. MMEA shall also assist the Aeronautical SAR Authority, when required.

### **b) Aeronautical SAR Plan of Operation**

The purpose of this plan is to provide a set of specific Aeronautical SAR Operation Procedures in all SAR missions within the Malaysian SRRs, for which DCA is the SAR Authority for aeronautical incidents and, acts as Chairman to the Aeronautical SAR Working Group.

However, this plan is, by no means, exhaustive in nature, and is to be used in conjunction with IAMSAR MANUAL VOLUMES I, II, and III and as well as other departmental documents issued from time to time.

Operational letters of agreements have also been signed with neighbouring States/SAR Regions. The preparedness and training of all entities is ensured through regular exercises and training.

**c) International SAR Treaties, Convention and Agreements**

DCA Malaysia participates in a number of international organisations such as ICAO, and agreed to adopt search and rescue (SAR) standards and practices in accordance with the Convention on International Civil Aviation. Finally there are agreements between Malaysia and Indonesia, Singapore, Thailand, Brunei and the Philippines SAR agencies to enhance co-ordination, cooperation and mutual support for operations along commons borders.

**d) SAR Agreements****i. Multi-Lateral**

As a member state of the Association of South East Asia Nations (ASEAN), and in line with the declaration of ASEAN Concord for co-operation between the member states of Indonesia, Philippines, Singapore and Thailand, Malaysia formalised the following on aeronautical and maritime SAR:

- ASEAN agreements for the facilitations of search for aircraft in distress and rescue of survivors of aircraft accidents, signed at Singapore on 14 April 1972; and
- ASEAN Agreements for the facilitations of search for ships in distress and rescue of survivors of accidents, signed at Kuala Lumpur on May 1975.

**ii. Bilateral**

Malaysia has signed Bilateral Aeronautical SAR Agreements with the following:

• Singapore	-	11 August 1984
• Indonesia	-	29 August 1985
• Thailand	-	09 September 1985
• Philippines	-	09 December 1985
• Brunei Darussalam	-	16 September 1998

**Others Arrangements**

- Special operational procedures for border SAR Malaysia/Indonesia by the General Border Committee, resulting from the special arrangements between the Malaysia/Indonesia SAR Working Group of both countries
- Under the Operational Letter of Agreements between Singapore and Malaysia pertaining to aeronautical SAR service in the South China Sea Corridor Area\*, Kuala Lumpur ACC shall take alerting actions while Singapore RCC shall conduct the aeronautical SAR mission.(See AIP Malaysia Volume I ENR 2.2-3):

\* *South China Sea Corridor Area is defined as the area West of 105E at flight level 150 to Ground/Sea Level and East of 105E at flight level 200 to Ground/Sea Level, within the dimensions of 023600N 1044500E to 020000N 107000E and along 020000N till the Singapore/Kota Kinabalu FIR boundary*

- thence along 060000N till the Singapore/Kuala Lumpur FIR Boundary - thence along this boundary to 023600N 1044500E).

- It shall be noted that the SAR responsibilities over high seas/Malaysia Exclusive Economic Zone (EEZ) or over Malaysia Maritime SAR Region (MSRR) shall be under the jurisdiction of Malaysia SAR authorities exclusively.

### e) Area of Responsibility

In accordance with ICAO agreements to provide search and rescue (SAR) services in Malaysia and adjacent ocean areas, the country has been divided into two search and rescue regions (SRRs) for aeronautical coordination. The international boundaries are in accordance with ICAO agreements.

### f) The SRRs of Malaysia are defined as follows:

- The areas coincide with the boundaries of the Kuala Lumpur and Kota Kinabalu Flight Information Regions; airspace as delegated by **Aeronautical SAR Region (ASRR) Appendix** ICAO under Malaysia's jurisdiction, as promulgated in ICAO's Regional Air Navigation Plan.

The Malaysia ASRR area of responsibility is as *Figure 1.17B* below:

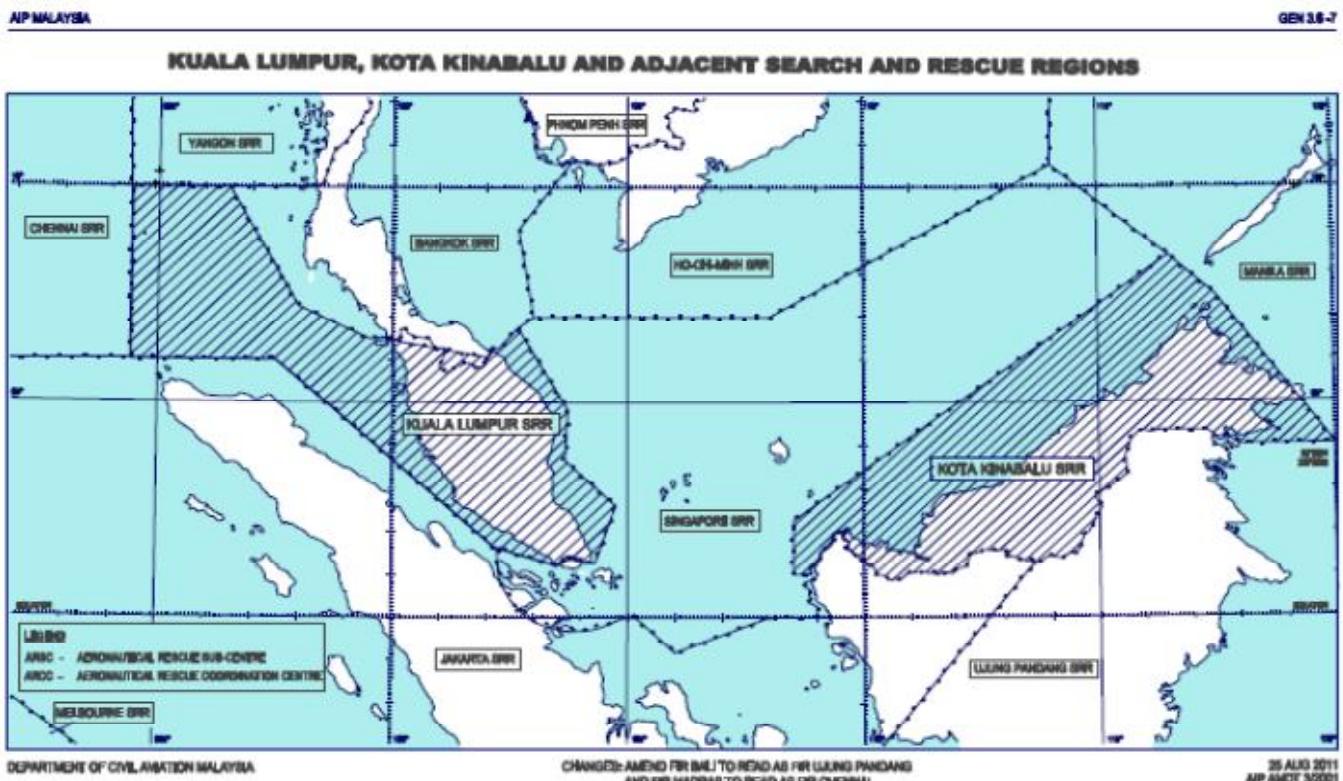
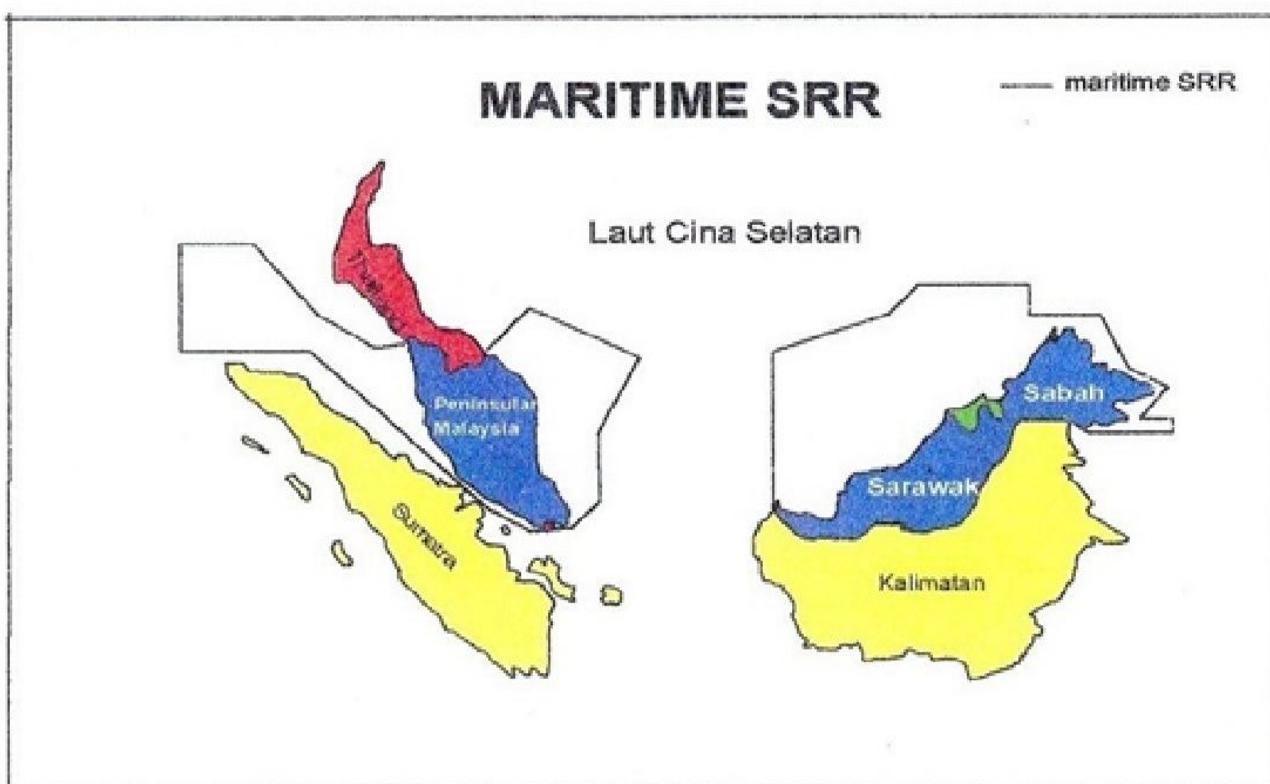


Figure 1.17B - Malaysia Aeronautical SRR

### g) Maritime SAR Regions (MSRR)

The waters of Malaysia including the areas declared as the Continental Shelf Boundary and also the waters under the FIRs delegated to Malaysia. This information is published in IMO SAR Plan. Refer Figure 1.17C for MSSR.

#### MALAYSIA MARITIME SEARCH AND RESCUE REGION



##### MALACCA STRAIT / SOUTH CHINA SEA

1. Along seaward border between Thailand and Malaysia.
2. 06°30'N 99°00'E
3. 07°15'N 98°00'E
4. 10°00'N 96°30'E
5. 10°00'N 94°25'E
6. 06°00'N 94°25'E
7. 06°00'N 97°30'E
8. 01°39'N 102°10'E
9. 01°17'N 103°36'E
10. 01°17'N 103°36'E
11. 01°17'N 104°05'E
12. 01°13'N 104°13'E
13. 01°23'N 104°30'E
14. 01°54'N 105°05'E
15. 04°00'N 105°05'E
16. 06°00'N 106°00'E
17. 07°50'N 103°03'E
18. The coastal border between Thailand and Malaysia.

##### SOUTH CHINA SEA / SULU SEA

19. The coastal border between Malaysia and Indonesia (Tg. Datu).
20. 06°17'N 109°38'E
21. 10°00'N 111°30'E
22. 10°00'N 116°00'E
23. 07°41'N 116°00'E
24. 07°41'N 118°00'E
25. 06°20'N 118°00'E
26. 06°00'N 118°20'E
27. 06°00'N 118°55'E
28. 05°16'N 119°35'E
29. 04°42'N 119°00'E
30. 04°24'N 119°00'E
31. 04°24'N 120°00'E
32. 04°30'N 120°00'E
33. 04°00'N 118°00'E
34. The coastal border between Malaysia and Indonesia.

Figure 1.17C - Malaysia Maritime SRR

### h) The responsibilities of DCA on SAR are as follows:

- Developing SAR policies;
- Developing ASAR bi-lateral agreements with adjacent states;
- Establishing, staffing, equipment and managing the ASAR system;

- 
- Conduct training courses in search and rescue at the Civil Aviation Academy and refresher courses at the ARCC;
  - Co-ordinate for SAR training and refresher courses;
  - Establishing of ARCCs and ARSC;
  - Arranging for SAR facilities;
  - Conduct an co-ordinate all SAR missions involving civil aircraft within its areas of responsibility;
  - Assist in the conduct of all SAR missions involving military aircraft, when requested by RMAF;
  - Assist in the conduct of SAR missions involving vessel when requested by MRCC/MRSC;
  - Provision and maintenance of the Kuala Lumpur ACC, Kota Kinabalu ARSC and Kuching ARSC;
  - Tasking of SAR participating aircraft or vessel for search and rescue operations:
    - Provision of survival equipment;
    - Periodically conduct national and international search and rescue exercises (SAREX)

**i) Kuala Lumpur Flight Information Region (FIR)**

The KL ATCC is headed by the Director and supported by Deputy Director for ATCC, Deputy Director for KL TMA and 243 ATCOs of various grades. Total number of ATCO posts approved by the government is 353, however as of March 2014 there were 110 vacant posts. The KL ATCC's Controller Working Positions (CWP):

**i. Approach Control Surveillance**

- TMA Supervisor.
- Approach North
- Approach South
- Approach Low
- Approach Radar (Flow Control)

**ii. Area Control Surveillance**

- Sector 1 Area Control Surveillance
- Sector 2 Area Control Surveillance
- Sector 3 Area Control Surveillance
- Sector 4 Area Control Surveillance
- Sector 5 Area Control Surveillance
- Sector 6 Area Control Surveillance (Sector 1 Upper)
- Sector 7 Area Control Surveillance

**iii. Area Control Procedural**

- 5 Area Control Porcedural
- Sector 1 Area Control Porcedural
- Sector 2 Area Control Porcedural
- Sector 3 Area Control Porcedural
- Sector 4 Area Control Porcedural

**iv. Sector Flight Data Assistant/Clearance Delivery**

- Sector 1 Flight Data Assistant
- Sector 2 Flight Data Assistant
- Sector 3 Flight Data Assistant
- Sector 4 Flight Data Assistant
- Sector 5 Flight Data Assistant
- Sector 6 Flight Data Assistant
- Flight Data Processing
- Clearance Delivery
- Asst. Clearance Delivery
- Asst. Flight Information Services

**v. Working Positions (No Rating required)**

- Watch Manager
- Controller-Pilot Data Link Communications
- Flight Information Services
- High Frequency/Aeronautical Mobile Services Station (HF/AMSS) South East Asia (SEA)1
- HF/AMSS SEA 2
- Aeronautical Fixed Telecommunications Network (AFTN) 1
- AFTN 2

**1.17.1.2 Airworthiness Sector**

The Civil Aviation Act of 1969 empowers the DGCA to exercise its statutory powers to regulate the civil aviation and airport services including the establishment of standards and its enforcement.

The present Civil Aviation Regulation (CAR) of 1996 was derived from the United Kingdom Air Navigation Order (ANO) of the mid-nineties and adopted with certain provisions for the Malaysian requirements. The CAR Fifth Schedule - Aircraft Equipment and Sixth Schedule - Radio and Radio Navigation Equipment to be carried in aircraft, and the DGCA issued Airworthiness Notices (ANs) specifically AN. No. 1 - Aircraft Certification, forms the basis for aircraft airworthiness and design standard for acceptance into Malaysian registry.

A comprehensive review of the CARs by some consultants was carried out in March 2013 and the submission of the final report was completed in January 2014. It was anticipated that the introduction of the new CARs would streamline the DCA regulatory functions on similar approach to the European Aviation Safety Agency (EASA) requirements. This would include the introduction of CASR (Civil Aircraft Safety Requirements, AMC (Acceptable Means of Compliance) and GM (Guidance Materials) as part of the Malaysian regulatory framework, requirements and procedures.

The Director of Airworthiness Sector reports directly to the DGCA and is responsible for the operations of five divisions, namely: Continuing Airworthiness, Engineering, Maintenance Repair and Overhaul (MRO), Licensing and Standards.

The primary functions of the Airworthiness Sector include surveillance oversight of the aircraft maintenance activities on scheduled and non-scheduled air carriers, MROs, and the licensing of Aircraft Maintenance Engineers (AMEs). The sector is also responsible for the management of the aircraft register and joint technical audits with the Flight Operations Sector and Air Transport Sector for the issue or renewal of Air Operating Certificate (AOC).

With respect to aircraft accidents or incidents investigation, officers with specific trade and specialisation may be called upon, to assist the Air Accident Investigation Bureau, under the Ministry of Transport.

The Airworthiness Sector has established a minimum qualification of a university engineering degree or an Aircraft Maintenance Engineer's Licence (AMEL) for the posts of Airworthiness Engineers or Airworthiness Inspectors respectively and in addition to that, it requires a minimum of five to seven years hands-on aviation industry experience. At present, 37 out of 40 posts have been filled to effectively support an 8 % annual rate of growth of aircraft increment for the local air transport industry. The Airworthiness Sector has developed a good working relationship with the local aviation organisations whereby, the newly recruited technical staff are given the exposure to work closely with the industry players. The DCA has made provision in the AN No. 1 - Aircraft Certification, for the operator to bear the cost of training for DCAM officers, specifically for the airworthiness engineers, airworthiness inspectors and pilots for new aircraft type to be placed on the Malaysian register. This serves to keep them abreast with the latest development on the local airlines or operators fleet expansion programme.

The DCA Airworthiness Division Manual (ADM) provides guidance and procedures to airworthiness inspectors and airworthiness engineers to carry out their duties and function responsibilities.

The sector emplaces a fairly comprehensive audit plan for the local and international organisations that hold the DCA approvals, and these approved organisations are subject to an annual audit. The audit would also include local and international base maintenance and line stations. These audits may be scheduled on mutual arrangement with the organisation or be carried out on an opportunity basis when the DCA officers are in the vicinity of that organisation during the audit period.

Any audit findings or deficiencies will be raised in the NCRs (Non-Conformance Reports) and categorised into the respective levels of either Level 1, Level 2 or Level 3. The Level 1

NCR requires urgent and mandatory compliance to a major deficiency in the audit findings. The sector would review the corrective actions and reschedule an audit of the organisation before closing the finding as acceptable.

The Airworthiness Notices (ANs) are published on regular basis on the DCA website and would serve to notify any current changes on airworthiness policies or requirements for the Aircraft Maintenance Engineers and the aviation organisations to comply with as applicable. Some of the Airworthiness Notices issued by the Airworthiness sector may originate from Original Equipment Manufacturers' (OEMs) service bulletins or in-service difficulties arising from incident or accident reports which may affect aviation safety. The Airworthiness Notices form part of the Malaysian regulatory framework and the expedient means for the aviation industry to comply with at short notice.

The AN No. 11 – Mandatory Occurrence Reporting, requires Air Operators and Maintenance Organisations to transmit information on faults, malfunctions, defects and other occurrences which cause or might cause adverse effects on the continuing airworthiness of the aircraft to the DCA.

With respect to ICAO Annex 19 – Safety Management, the Airworthiness Sector has implemented the requirement under AN No. 101 – Safety Management Systems (SMS) For Approved Maintenance Organisation (AMO) including Approved Training Organisations (ATOs) in March 2008. The SMS was made effective on 1 January 2009.

The sector is actively involved in the audits of 176 local and international Approved Maintenance Organisations (AMOs) that hold the DCA approvals; continuing airworthiness surveillance of 892 aircraft (of which 839 aircraft are active in operations), 12 Approved Training Organisations (ATOs) for Aircraft Maintenance Engineers and Technicians ab-initio training and also aircraft type training programme. There were 4,212 Licensed Aircraft Maintenance Engineers issued with DCA licence but 2,374 licensed holders remain current.

CAR 30 requires that inspection, overhaul, repair, replacement and modification works on a Malaysian-registered aircraft, including the engines, propellers and aircraft components, are carried out by an approved person or organisation, specifically, under the AMO maintenance organisation exposition procedures. The DCA requires the release of an aircraft 'Certificate of Release to Service' to be issued by an approved or authorised personnel, typed rated on the aircraft type under a DCA approved AMO procedures. The introduction of the new CARs would also address the training requirements and certification responsibilities of both Aircraft Maintenance Engineers in Category B and Aircraft Maintenance Technicians in Category A in their respective trades. The DCA Malaysia Part 66 engineers and technicians licensing system is based on the EASA Part 66 syllabus and training requirements.

### **1.17.1.3 Flight Operations Sector**

The Director of Flight Operations reports directly to the DGCA and is responsible for the operations of five divisions, namely: Flight Crew Licensing, Air Operator Regulatory, Flight Simulator, General Aviation and Flight Calibration.

The primary functions of the Flight Operations Sector include surveillance oversight on scheduled and non-scheduled air carriers, flight test and simulator training of pilots, flight

crew licensing on examinations standards, General Aviation activities, airfields and airways calibration and the conduct of a joint technical audit with the Airworthiness Sector and Air Transport Sector for the issue or renewal of Air Operating Certificate (AOC) for scheduled and non-scheduled air carriers.

With respect to aircraft accidents or incidents investigation, pilots from this sector may be called upon, to assist the Air Accident Investigation Bureau, under the Ministry of Transport.

The sector has established the procedures for Mandatory Occurrence Reporting (MOR) Scheme Guidelines in the Flight Operations Notice for the air operators to comply with in DCA Malaysia website.

With respect to ICAO Annex 19 – Safety Management, the Flight Operations Sector has implemented the requirement under the Aeronautical Information Circular (AIC) No: 06/2008 and in conjunction with ICAO Annex 6 Part 1 Chapter 3 paragraph 3.2.4 and 3.2.5 and Part III Chapter 1 paragraph 1.2.4 and 1.2.5 with effect from 1 January 2009 it requires all Malaysian AOC Holders to implement an integrated Safety Management Systems (SMS).

To date, 8 of the AOC Scheduled Operators have complied with the SMS requirements and approved by the Sector. The implementation of the SMS for the 16 Non-Scheduled Operators is being incorporated in stages.

The following documents: Flight Operations Surveillance Inspector Handbook, Flight Crew Licensing Handbook, Flight Operations Policy and Procedure Manual and Ramp Inspection Handbook form part of the sector procedure manual in carrying out their surveillance responsibilities.

As stated in the authorised Flight Examiner Handbook, each flight examiner is required to conduct at least six instrument flight checks and two type rating checks over the three-year period of their authorisation. In addition, they have to submit a quarterly activity report. In accordance with the Handbook, the authorised examiner has to pass an initial test upon appointment and a renewal test, to be conducted six months prior to the expiration of the authorisation. In between the tests, the examiner will also be the subject of one observation session to be conducted by the inspector.

The present activities of the Flight Operations Sector for surveillance oversight includes 8 Scheduled Operators, 21 Non-Scheduled Operators 8 Approved Flying Training Organisations, 16 new AOC applicants, 12 Flying Clubs, international flight en-route Inspections, domestic and international Station Facility Inspections and Ramp Inspections.

The frequency for Station Facility is once in every 2 years, the RAMP Inspection is 4 inspections at every originating en-route or destination stops, 4 inspections annually at every location but may depend on the safety performance of the operator while Base Inspection for Scheduled Operations and Non-Schedule Operations to be carried out on annual basis.

The sector has a total establishment of 28 pilot posts to manage the various divisions, and of which only 16 posts had been filled. The need for experienced pilots to fill up the various posts had been an issue for most authority body worldwide, unless better incentives are offered.

## **1.17.2 Malaysia Airlines (MAS)**

### **1.17.2.1 The Organisation**

The Airline began in 1937, when the Straits Steamship Company and Imperial Airways formed Malayan Airways Limited in Malaya. It evolved through many changes to Malaysia-Singapore Airlines (MSA) until Singapore had its independence in 1965, where its Malaysian part became Malaysian Airline System (MAS) Berhad. In 1987 the Company took the commercial name of 'Malaysia Airlines' in line with the international promotion of the country.

MAS holds an Air Service Licence (ASL) and Air Operators Certificate (AOC) for scheduled and non-scheduled operations. It was public listed in 1985 with the Government holding a golden share. At its peak, MAS was having an extensive network of operations with more than 100 destinations spanning over 5 continents around the world. The recession in 1994 affected the airline's business significantly when the operations were drastically scaled down.

The airline's performance for the last 5 years had been a subject of great interest as it had suffered financial losses. Competition from emerging Low-cost operators significantly contributed to the negative performance of the Company. MAS had in its fleet the A380, A330, B747-400, B777-200 and B737-400 and B737-800. Its subsidiaries Firefly & MASWings operates the ATR-72 plying most of the domestic network in Peninsular & East Malaysia

In spite of its scaled down operations it is still a fairly large organisation (*Figure 1.17D* below shows the *Organisation Structure of MAS*), with a staff strength of more than 20,000 employees. It is headed by a Group Chief Executive Officer (CEO) who reports to the Board. Eight Directors report to him, each heading a Division. The divisions are as follows:

- a) Commercial
- b) Operations
- c) Corporate Services
- d) Customer services
- e) Finance
- f) Human Resources
- g) MAS Aerospace Engineering (Engineering & Maintenance Division-EMD)
- h) Group CEO Office

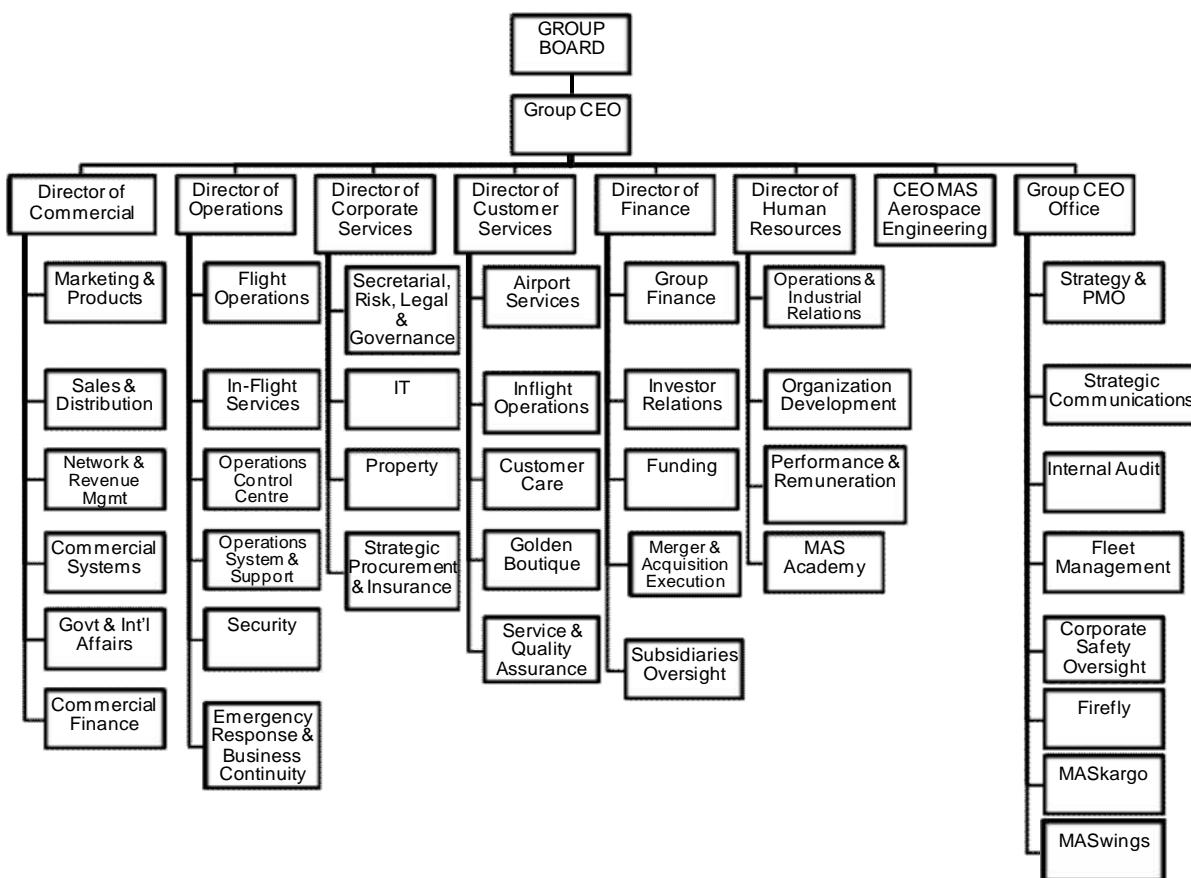


Figure 1.17D - Organisation Structure of MAS

### 1.17.2.2 Engineering & Maintenance

#### a) Organisation Structure

The Engineering and Maintenance Department (EMD), also known as MAS Aerospace Engineering, is headed by a Chief Executive Officer (CEO) who is assisted by a Deputy CEO (Airlines Operations) and Senior Vice President (MRO Operations). The Finance, Engineering Materials, Business Support, Business Development, Legal and Warranty departments of the EMD report direct to the CEO of the EMD. Heavy Maintenance, Engineering Commercial, Training, Special Project, Engineering Facility and Workshop departments report to the SVP (MRO Operations). The Technical Services, Maintenance Operations, Aircraft & Engine Maintenance Planning, Quality Assurance, Aircraft Project, Lease Planning, End-of-Lease (EOL)/Airline Engineering Group (AEG) Special Project and EOL Project Departments report to Deputy CEO (Airlines Operations).

#### b) Maintenance and Design Approval

The EMD is responsible to manage and carry out the maintenance of the MAS fleet of aircraft, which consists of B747-400, B777-200, B737-400, B737-800, A330 and A380.

The Maintenance and Management approval was issued by the DCA Malaysia way back in 1971. The approval continues until today and is now based on the approved quality system laid out in the Maintenance Management Organisation Exposition (MMOE). The

quality management system as detailed in the MMOE is under the responsibility of the Head of the Quality Assurance, who has direct access to the CEO of the EMD.

The EMD also holds other maintenance approvals, notably from the European Aviation Safety Agency (EASA), the Federal Aviation Administration (FAA) of the United States of America (USA), the Civil Aviation and Safety Authority (CASA) of Australia and others, for maintenance of third party aircraft and components. All these approvals have their independent approval process of initial approval, revalidation and surveillance.

The EMD is also issued with Design Organisation Approval by DCA Malaysia. This allows the EMD to make minor design changes on the MAS fleet. To administer this, a team of engineers in the Technical Services department of EMD are qualified and approved in the various aviation disciplines such as Structures, Systems and Avionics.

### **c) Training**

The EMD has its own Training school which provides ab-initio training to qualify selected candidates to obtain the DCA Malaysia Maintenance Engineers' licences in the Mechanical or Avionics category. There are also training programmes for aircraft and workshop technicians as well as Approval holders. The Training School also administers Continuation training which is required for all staff working on aircraft and in workshops.

### **d) Base Maintenance**

The EMD has two main bases for base maintenance: KLIA in Sepang and Subang Airport (SZB) in Subang.

The Kota Kinabalu (KKI) base in Sabah is an extension of the KLIA base. These bases are equipped with the hangars and facilities as required in the scope of the approval. The SZB base has 4 hangars to accommodate all aircraft in the MAS fleet. The SZB facility also accommodates all the support workshops for the required maintenance. The KLIA base has 2 hangars, one of which can accommodate the A380-800. The KLIA base has some limited support workshops for maintenance activity under the scope of approval. The KKI, extension of KLIA, has one smaller hangar only capable to accommodate B737 series aircraft.

### **e) Line Maintenance**

Other than the main bases, there are also line stations according to the regions around the world. These are as follows:

- i. Peninsular Malaysia
- ii. Sabah and Sarawak
- iii. South East Asian
- iv. Far Eastern
- v. America and Pacific
- vi. Australian and New Zealand
- vii. Indo-Pakistan/Mideast and African
- viii. European

Line maintenance of aircraft at international line stations is contracted out to the local maintenance organisations. These line maintenance organisations are approved by DCA Malaysia before they undertake the task. The organisations are also subjected to regular audits by MAS and DCA Malaysia.

**f) Maintenance Authorisation**

The EMD had approximately 4000 staff; distributed among the SZB base, KLIA base and the BKI extension base. There were approximately 1240 certifying staff at both SZB and KLIA bases and 41 certifying staff in BKI. The certifying staff consist of the following:

- i. Licensed Aircraft Maintenance Engineers
- ii. Workshop approval holders
- iii. Certifying mechanics
- iv. Stores Inspectors
- v. Non Destructive Testing (NDT) approval holders
- vi. Welders

The Head of Quality Assurance (QA) is responsible for the administration and control of the Certifying staff.

**g) Safety Management System**

The EMD had implemented Safety Management System as documented in the Safety Management Manual and as required by DCA Malaysia Airworthiness Notice No. 101. This safety management is a part of the company wide Corporate Safety Management led by the Corporate Safety Oversight department which reports to the Group CEO's office.

**1.17.2.3 Operations**

This division is headed by the Director of Operations and supported by:

- i. Flight Operations
- ii. In-flight Services
- iii. Operations Control Centre
- iv. Operations System & Support
- v. Security
- vi. Director of Operations Office.

**1.17.2.3.1 Flight Operations**

The structure consists of 6 Senior Managerial positions namely:

- i. QA & Regulatory Affairs
- ii. Training & Standards
- iii. Flight Safety & Human Factors
- iv. Technical & Development
- v. Crew Planning & Deployment

vi. Line Operations.

All of the above 6 report to the Head of Flight Operations:

**a) Organisation & Management related to B777 Operations**

All the fleets in the company fall under the purview of Chief Pilot Line Operations.

The fleet is headed by Fleet Manager B777 who reports to the Chief Pilot Line Operations. The B777 has been with the company for the past 17 years and until March 2014 the fleet comprised of 17 aircraft. On the B777, MAS is approved for 180 minutes ETOPS operation.

**b) Technical Crew**

Since the early days of operations, MAS started with domestic and regional services. Thus, the fleet of aircraft had always included small propeller aircraft and short haul twin engine jets.

This is where a new recruit would be posted to, be it fresh ab-initio or experienced pilots from the Air force or General Aviation. The career of a pilot begins as a co-pilot on the smallest Turbo Props, or sometimes when the demand and the promotion is rapid, suitable candidates may be posted direct to the B737 upon entry into the airline. A co-pilot would need to serve for at least 5 to 7 years in the company on the lower fleet before one can be considered for promotion to the B777. They are normally promoted from the B737/200/400/800 or sometimes from the A330 fleet.

The airline embarked into sponsoring fresh cadets for pilot training since it first started but had slowed down this programme with the abundance supply of self-sponsored pilots since the last 5 years.

On the average it would take at least 15 years of flying in the company before a pilot can be promoted to command the B777. Among the factors for career progression, is eligibility in terms of total hours, competency, seniority in the pilot ranking and the airlines expansion plan. In Malaysia Airlines, no young fresh ab-initio pilot would be posted direct to the big Wide Body jet without the smaller twin jets experience.

At point of entry the career progression would start from DHC6/F50, B737 and A330/B777 then finally to the B747 and/or A380. Promotions are normally carried out in this above order. By the time a captain is ready for the B777, he would have at least flown F50, B737 or A330 or combination of all the 3 aircraft with at least a total of 6000 hours, part of which has to be a minimum of 2000 command hours on the smaller jets.

**c) Working Schedule**

The working schedule and rest requirement to manage crew fatigue is highly regulated and normally bounded by guidelines stipulated by the CAA UK CAP 371 and the Malaysian Civil Aviation Regulations (MCAR). The MCAR adapts the CAA CAP 371. With the formation of the Joint Aviation Requirements (JAR), DCA Malaysia had gradually

migrated towards regulations stipulated in the JAR. Duty and Flight Time Limitation are strictly guided by these published regulatory documents. In general MAS has since its inception, adopted a more stringent and restrictive measure based on the Memorandum of Understanding (MoU) between the Pilots Association and the Management, to ensure that all Technical Crew are well rested before they are scheduled to any assigned flight duties. The Pilots Association plays an important role to ensure that all these limitations are not exceeded and all these agreed limits are published and available in the MoU. Malaysian Airlines Pilots Association (MAPA) although with limited rights, played a pivotal role in the overall welfare and interest of the pilots.

In the case of MH370, the expected flight and duty time was less than 8 hours, with a single leg of one take-off and one landing. The Regulatory requirement and MoU, only require one set of crew to man the flight. Standard company practice calls for the whole set of crew to lay over in Beijing and fly back the next day. Beijing is a destination that MAS operates on a daily basis with the same aircraft type.

The guidelines for Technical Crew requirement are:

- Less than 8 hours : 2 crew (1 Captain & 1 Co-pilot)
- Between 8 to 10 hours : 3 crew (2 Captains & 1 Co-pilot)
- More than 10 hours : 4 Crew (2 Captains & 2 Co-pilots)

Technical Crew are required to undergo medical check-up by approved Aviation Doctors for their Licence renewal. The medical certificate issued, forms part of the validity of a pilots flying licence.

#### **d) Safety Management System**

MAS Safety Management System (SMS) has been designed to comply with the framework as per ICAO in Annex 6, Appendix 7, Framework for Safety Management Systems and the expanded guidance found in the ICAO Safety Management Manual ICAO SMM (Doc.9859) and IATA SMS Implementation Guide. In addition this system is consistent with the DCA Malaysia's Aeronautical Information Circular (AIC) document number 06-2008: SMS. MAS has established these requirements to ensure positive control and continuous improvement for safe and secure operations, including the operations of its subsidiaries MASWings, Firefly, MAS Aerospace Engineering and MASKargo. This document forms an integral part of the Corporate Safety Policy Manual.

#### **e) Flight Operations Quality Assurance (FOQA)**

The airline acknowledges the importance of safety as its utmost priority. Like most other airlines, with statistics showing Human Factor as the main contributor to Air Accidents, the Flight Operations Quality Assurance (FOQA) programme was introduced. This system has contributed tremendously even in non-eventful cases where impending trend towards an unsafe situation could be recorded. With this system in place investigations of events that could lead to an incident would be undertaken and remedial actions and recommendations put into place.

**f) Line Operations Safety Audit (LOSA)**

LOSA was first introduced in 2004 in collaboration with the University of Texas. The results were fruitful and recommendations were implemented via Safety Change Process (SCP). MAS conducts LOSA every 2 years but not later than 5 years. The way LOSA was conducted is by taking random sampling of all aspect of operations including random audit of normal scheduled commercial flight.

**g) Crew Recourses Management (CRM)**

MAS considers CRM as a critical component of flight safety during operations. The training programme included the Cabin Crew & Dispatchers. For new recruits there will be a 3 days programme for CRM. Recurrent training is conducted on a yearly basis. The Safety Awareness Programme (SAP) conducted on a yearly basis includes the recurrent for the CRM training/ refresher. This programme has been in the system ever since the release of ICAO Annex 6 Part 1.

**h) Training & Standards**

MAS manages their entire training requirement in-house including the mandatory requirement for the Flight Crew. MAS has its own Training Centre for Pilots as well as Engineers. It is presently equipped with various Full Flight Simulators for all the fleet in the Company with most of the Flight training devices certified to FAA Level D, capable of zero flight time training. This Training Centre has been established for more than 40 years and has been certified by many countries as an approved Type Rating Training Organisation (TRTO.)

Type Rating Instructors (TRI) & Type Rating Examiners (TRE) normally come from within the airline and they require stringent training and check before being approved by the DCA Licensing Division of Malaysia.

Besides the availability as a TRTO, the Simulators are utilised by neighbouring airlines and smaller organisations within the region to fulfill their training and checking requirements.

Competency of pilots, as per regulatory requirements worldwide, is normally monitored every 6 months. MAS training policy requires 2 Simulator sessions every 6 months. The two training sorties every 6 months consist of 1 review and training followed by the Proficiency check sessions.

**i) Safety & Emergency Procedures (SEP)**

Proficiency in Safety & Emergency Procedures is also part of the mandatory training requirement which is conducted every 12 months. It is based on the Aircraft Type that the pilot is rated on. This recurrent training requires a minimum of 3 days which covers all aspect of emergencies including medical and first aid knowledge .This section of Training falls under the purview of Flight Safety & Human Factor.

**j) Operation Control Centre (OCC)**

The OCC is where the dispatch of flight crew and cabin crew takes place. A team of Licensed Aircraft Dispatchers are stationed in this Department. Besides the crew formalities required prior to departure, the flight crew will be working in tandem with the assigned dispatcher to review all documentations related to the assigned flight which influences the decision on the finalized routing and fuel ordered by the Captain of the flight.

**k) Technical and Development**

Technical Data and aircraft performance falls under the control of the Ops Engineering Department. This Department works closely with the Technical Services Department of Engineering Division and Aircraft Manufacturers on Performance Engineering matters. Technical & Development department participates in evaluation of new Aircraft Type and Aircraft Equipment.

**1.17.2.3.2 In-flight Services****a) Cabin Crew**

Cabin Crew are required to be present on public transport flights to perform duties in the interest of passenger's safety. They must be well-informed about safety and policies of the Company.

Each cabin crew member shall:

- Be well prepared and fit for the flight
- Ensure adherence of "Fasten seat belt" and "No Smoking" signs
- Ensure the comfort and safety of all passengers
- Ensure passengers safely escape in an emergency evacuation

Cabin Crew is a person employed to facilitate the safety of passengers whose duties are detailed by the Company or the aircraft commander. Cabin Crew will not act as a member of the flight crew.

At the point of recruitment the candidate has to go through a thorough interview and medical check-up. Once selected, a comprehensive training of safety and service procedure will be provided by the airline for the duration of 3 months and he/she will graduate and leave the academy as a qualified Cabin Crew assigned to the selected fleet that one is trained for.

MAS has the policy of fleet grouping for cabin crew in the following order:

- Narrow Body : B737
- Wide Body : A330, B777 & B747/A380

Upon graduation, Cabin Crew would be given a flight duty roster on a monthly basis. The roster is managed by the Crew Planning & Deployment Section.

Initially, Cabin Crew would be required to operate the domestic and the regional flights known as the Narrow Body Fleet for a minimum of 2 years. With sufficient experience gained in the narrow body fleet they may be promoted and will have to undergo additional training for the new fleet that they are promoted to. This will include international network which is normally operated by the Wide Body Fleet. The selection of crew for promotion normally depends on individual's competency and track record.

On yearly basis, Cabin Crew is required to go through a safety recurrent training on their Safety Emergency Procedures (SEP) at the academy in order to keep their licence and training validated by certified instructors. It is mandatory for the crew to achieve the required minimum safety and emergency procedures and knowledge which are assessed through examinations. This recurrent training includes first aid training and examination, to get the certificate renewed. There is also a "Safety Awareness Programme" (SAP) and "Crew Resource Management" (CRM) classes that is compulsory for the Cabin Crew to attend every 2 years. These two programmes are basically similar and they are incorporated within the 3 days of training.

Cabin Crew will be issued with a Safety Card endorsed by the Safety and Human Factors Department of MAS as well as Crew Performance Card issued by the Cabin Crew Line Operation and Performance Department. The crew will be expected to carry these two documents at all times for flight duty.

### **b) Crew Performance Appraisal (CPA)**

To maintain and achieve a high standard of service and safety, each and every Cabin Crew is required to have a CPA which is done twice a year. The assessment is done by the crew in charge on board during the flight.

The Cabin Crew will be checked on aspects such as safety and service procedure, product knowledge, Customs, Immigration and Quarantine, station documents, grooming and leadership skills. The crew in charge will conduct the checking on the crew by Questions & Answers (Q & A) and how the individual performs as part of the operational crew member in his/her assigned capacity.

### **c) In-flight Operation**

On board a Boeing 777-200 aircraft the standard operating cabin crew of 11 is required. The normal cabin crew complement for the Boeing 777-200 aircraft is as follows:

- In-flight Supervisor : 1
- Chief Steward/Chief Stewardess : 2
- Leading Steward/Leading Stewardess: 2
- Flight Steward/Flight Stewardess : 6

The 777-200 fleet has a two-cabin configuration with Golden Class Club (GCC) and Economy Class (EY). Four cabin crew will be designated to work in GCC and six in EY.

The In-flight Supervisor is in charge of the whole cabin. Two Chief Steward/Chief Stewardesses look after the GCC assisted by two cabin crew. Six cabin crew are

designated to work in EY class. The EY class is divided into two sections and each section is looked after by one Leading Steward/Leading Stewardess and assisted by two cabin crew.

The In-flight Supervisor is the person responsible to manage the cabin safety and report to the Commander of the aircraft.

He or she shall:

- Have the overall responsibility to the aircraft commander for the conduct, coordination and performance of the cabin operations and the safety duties.
- Verify that all the cabin crew members are fit for flight and with all relevant documents valid for flight duty.
- Coordinate and organise the functions and tasks of all cabin crew members:
  - i. Execute cabin crew briefing
  - ii. Nominate positions and working areas
  - iii. Nominate in flight service duties
  - iv. Checking of emergency equipment, pre-flight safety briefing and reporting matters concerning safety (irregularities and malfunctions) to the Commander
  - v. Debriefing the cabin crew members when required
  - vi. Ensuring efficient communication with crew members and ground personnel
  - vii. Ensuring contact with the flight deck on a regular basis.

The minimum requirement of the operating cabin crew for the B777-200 fleet is 8 as per Civil Aviation Regulation.

The minimum number of operating Cabin Crew in a flight is governed by the number of the doors of the aircraft. A B777-200 aircraft has 8 doors therefore the minimum number of Cabin Crew for the flight to be dispatched is 8. This is basically a safety requirement where in the event of emergency each door will be operated by a trained Cabin Crew. However the number of Cabin Crew operating may increase in the interest of Customer services requirement.

#### **d) Flight and Duty Time Limitations Scheme for Cabin Crew**

The prime objective of a flight time limitations scheme is to ensure that crew members are adequately rested at the beginning of each flying duty period, and whilst flying, be sufficiently free from fatigue so that they can operate to a satisfactory level of efficiency and safety in all normal and abnormal situations.

The maximum duty hours for cabin crew shall not exceed:

- 60 hours in 7 consecutive days
- 105 hours in any 14 consecutive days
- 210 hours in any 28 consecutive days

Cabin crew will be notified in advance of a flying duty period so that sufficient and uninterrupted pre-flight rest can be obtained. When away from base, opportunities and facilities for adequate pre-flight rest will be provided by the Company in suitable accommodation.

The minimum rest period which must be taken before undertaking a flying duty period shall be:

- At least as long as the preceding duty period, or
- 12 hours,

Whichever is greater.

The minimum rest period shall be the higher of pre-flight or post flight rest. It is not cumulative of both rests.

The minimum rest period which must be provided before undertaking a flight, at home base shall be:

<b>Flight</b>	<b>Rest Period</b>
Pre-Flight	40 hours (inclusive 2-local nights)
Post Flight	72 hours (inclusive 3-local nights)

The minimum rest period which must be provided after performing a flight, out of base shall be:

<b>Flight</b>	<b>Rest Period</b>
Post flight	24hours

MAS Employee Union (MASEU) is the recognised union certified by MAS to represent the cabin crew. Flight Time Limitation and working condition are governed by the Collective Agreement (CA) signed between the union and MAS, in compliance with CAR or whichever is more limiting.

## e) Cabin Safety Report

### Accident/Incident/Hazard Reports Form

MAS manages in-house reporting system to identify many of these Accidents/ Incidents/ Hazards by collecting and then analysing hazard and incident reports to audit incidents encountered during flight. Incident reporting system is one of the most effective tools for pro-active hazard identification. Cabin Crew are to fill up this form and to submit it at the end of the flight within 24 hours.

### Confidential Human Factors Incident Reporting Programme (CHIRPS)

CHIRPS stands for where it applies for the flight crew, cabin crew and engineering personnel only. It is a none-disclosure type of document where one can use and submit to the Company to any complaints and issues. CHIRPS can only be used for human factor and

safety issues, errors and unsafe practices and where some may potentially infringe regulatory practises. It is not to be used for mandatory incidents reporting, personality conflicts, industrial issues and employment problems. It will be reviewed by the members of the CHIRPS staff and actions will be taken accordingly.

All these reports are managed by the Corporate Safety Oversight and Human Factors Department.

## **SECTION 1.18 - ADDITIONAL INFORMATION**

### **1.18.1 Provision of Air Traffic Services (ATS) and Areas of Responsibilities (AOR)**

For the provision of Air Traffic Services, the Kuala Lumpur FIR is divided into seven Sectors, namely Sector 1, Sector 2, Sector 3, Sector 4 Sector 5, Sector 6 and Sector 7.

Each sector has a specified area of responsibility. Sectors 1 to 5 are manned by a Sector Planning and Radar controllers jointly responsible for the safe, efficient and orderly provision of air traffic control service, flight information service and alerting service in their sectors. Each sector has an Assistant Flight Data (AFD) controller.

Sector 6 is manned by a Radar controller and supported by Sector 1 Planning controller and Sector 1 AFD controller. Sector 7 is manned by a Radar controller and supported by Sector 2 Planning controller and Sector 2 AFD controller

#### **a) Responsibilities of Sector Radar Controller:**

- i. Handle all radiotelephony functions;
- ii. When necessary, coordinate to effect transfer of radar identity and control;
- iii. Monitor the Sector Inbound List (SIL) to ensure appropriate action for orderly acceptance, control and transfer of aircraft; and
- iv. Comply with instructions issued by FLOW control.

#### **b) Responsibilities of Sector Planning Controller:**

- i. Plan and coordinate as necessary for the management of all flights that will operate in their sectors; and;
- ii. Ensure that the information on the electronic flight strips (EFS) are updated

Radar and Planning controllers will make available to each other information that is essential to enable them to carry out their responsibilities, e.g. change in cruising level/altitude or revision to transfer of control point estimates.

#### **c) Responsibilities of Controllers at AFD Position:**

- i. Assist the Planning Controller by ensuring that information displayed on the EFS is kept updated in a timely manner;

- ii. Ensure that essential information found on the EFS are also available on the paper strips;
- iii. Display the paper strips on the display board in the correct manner;
- iv. Make paper strips available to the EXE controller if requested;
- v. Wrap up all used strips, and place them at a common place for collection;
- vi. Clear wrong ADP Message Queues as follows:
  - AFD Sector 2 - wrong AFTN Message Queue
  - AFD Sector 5 - wrong METEO and AIS Message Queue
  - AFD Sectors 1 and 4 - wrong FDP Message Queue

### 1.18.1.1 Sector 3 AOR

Sector 3 is responsible (*Appendix 1.18H*) for provision of air traffic services in controlled airspace and outside controlled airspace above FL145 within:

*That airspace from VKL to PIBOS then to 033658N 1022253E then to 040051N 1034109E at the border of Peninsular Malaysia/Singapore International Boundary, thence southwards along the FIR boundary to 012652N 1034540E thence northwards to 021958N 1034235E (10 nm west of VMR) thence westwards to DAMAL thence northwards along the airway R325 to SAROX (but excluding ATS Route R325) thence along the airway G334 to VKL but excluding the Kuantan TMA.*

Sector 3 is also responsible for the provision of FIS and Alerting Service in the South China Sea Corridor (SCSC). The lateral and vertical limits of the SCSC are as follows:

Laterals Limits	Vertical Limits
From 023600N 1044500E to 020000N1070000E and along 020000N till the Singapore/Kota Kinabalu FIR Boundary, thence along this Boundary to 060000N 1132000E, thence along 060000N till the Singapore/Kuala Lumpur FIR Boundary, thence along this Boundary to 023600N 1044500E	West of 105E <u>FL150</u> GND/SL  East of 105E <u>FL200</u> GND/SL

Sector 3 encompasses the following ATS routes or route segments:

Routes	Segments	Routes	Segments
A224	VMR – VJR	N884	VMR – LENDA
B338	VTK – VMR	N891	PU – MANIM
B469	VPK – PU	N892	KIBOL – VMR
G334	VKL – UKASA – VPT – KIBOL	R221	VMR – VPT
G582	Sector 1 boundary – VPK	R325	MATSU–SAROX (FL280 & below)
G584	VKL – VPK	W533	VKL – VKN – VKE
L629	VPK – BUVAL	W540	VPK – A/VKE (FL235 & below)
L635	VPK – DOVOL	Y331	PIBOS – TAXUL
L642	VMR – EGOLO	Y332	TAXUL – PADLI
M751	VPK – A/VKE (FL240 & above)	Y333	PADLI – BUVAL

Routes	Segments	Routes	Segments
M758	VPK – ISDEL	Y334	PADLI – DOVOL
M761	VPK – KETOD	Y335	PADLI – IDSEL
M763	VPK – TAXUL	Y336	ISTAN – PADLI – KETOD
M771	VMR – RAXIM		

**Note:** SAROX is not a waypoint on R325. It is a waypoint on G334 that intersects R325. It is used here for ease of reference.

### Delegation of Airspace and Communication Watch

- i. Delegation of Airspace from Kuala Lumpur ACC (Sector 3) to Singapore ACC

*The contiguous airspace Areas A, C, E and H along eastern Johor/South China Sea and responsibility for provision of air traffic services in these areas remains delegated to Singapore*

- ii. Communication Watch

*To ease air traffic management, communications watch shall be maintained by Singapore HF, Lumpur Sector 3 and Lumpur HF within South China Sea Corridor (AIP Malaysia ENR 2.1-13 below).*

AREAS WITHIN THE SINGAPORE FIR FOR WHICH LUMPUR ACC IS RESPONSIBLE FOR PROVIDING ATS.					
<b>SOUTH CHINA SEA CORRIDOR</b>					
Fm 023600N 1044500E to 020000N 1070000E and along 020000N till the Singapore / Kota Kinabalu FIR BDRY - thence along this BDRY to 060000N 1130000E, thence along 060000N till the Singapore/Kuala Lumpur FIR BDRY - thence along this BDRY to 023600N 1044500E.	W of 105E FL 150 GND / SEA  E of 105E FL 200 GND / SEA	Lumpur ACC  Lumpur Radio  English H24	Lumpur Control  HF 5655 KHZ 8942 KHZ 11396 KHZ	132.6 MHz  HF 5655 KHZ 8942 KHZ 11396 KHZ	Lumpur ACC shall be responsible for the provision of air traffic services to flights operating within the South China Sea Corridor.

*Extract from AIP Malaysia ENR 2.1-13*

- iii. Singapore will pass to Sector 3 Estimate for flights bound for the Natuna and Matak islands, Sector 3 in turn, shall notify Aeronautical Mobile Service (AMS) High Frequency (HF) who shall provide additional communications watch in order to discharge its Flight Information Service (FIS)/Alerting Service functions.

#### 1.18.1.2 Sector 5 AOR

Sector 5 is responsible (Appendix 1.18H) for provision of air traffic services in controlled airspace and outside controlled airspace above FL145 within:

*That airspace from VKL to PIBOS then to 033658N 1022253E then to 040051N 1034109E at the border of Peninsular Malaysia/Singapore*

*International Boundary, thence northwards along the FIR boundary, thence westwards along the Peninsular Malaysia/Thailand International Boundary to 054342N 1010038E thence southwards to 044021N 1012704E, then to VKL but excluding the Kota Bharu TMA/Terengganu and Kerteh CTRs.*

Sectors 5 encompasses the following ATS routes or route segments:

Routes	Segments
A334	PASVA – VKB
B219	Butterwort TMA Boundary East – VKB
B463	KADAX – VKB
G466	VKL – VKB
M644	VKB – ABTOK
M751	A/VKE – VKB – GOLUD (FL240 and above)
M765	VKB – VENLI – IGARI
R208	VKL – GUNBO – VKR – IKUKO – IGARI
R325	ANSOM – MATSU (FL 280 and below)
W540	A/VKE – VKB (FL235 and below)

### **Delegation of Airspace**

- i. Delegation of Airspace from Singapore ACC to Kuala Lumpur ACC (Sector 5)

*RNAV route M765 between VENLI and IGARI has been delegated by Singapore ACC. Lumpur Sector 5 shall provide air traffic services and carry out coordination with Ho Chi Minh ACC.*

- ii. Route segment between IKUKO and IGARI on ATS R208 is released by Singapore ACC subject to daily coordination between Singapore ACC and Kuala Lumpur ACC.

### **Communication Watch**

To ease air traffic management, communication watch is maintained by Lumpur Sector 5 and Lumpur HF between IKUMI and IGARI along N891.

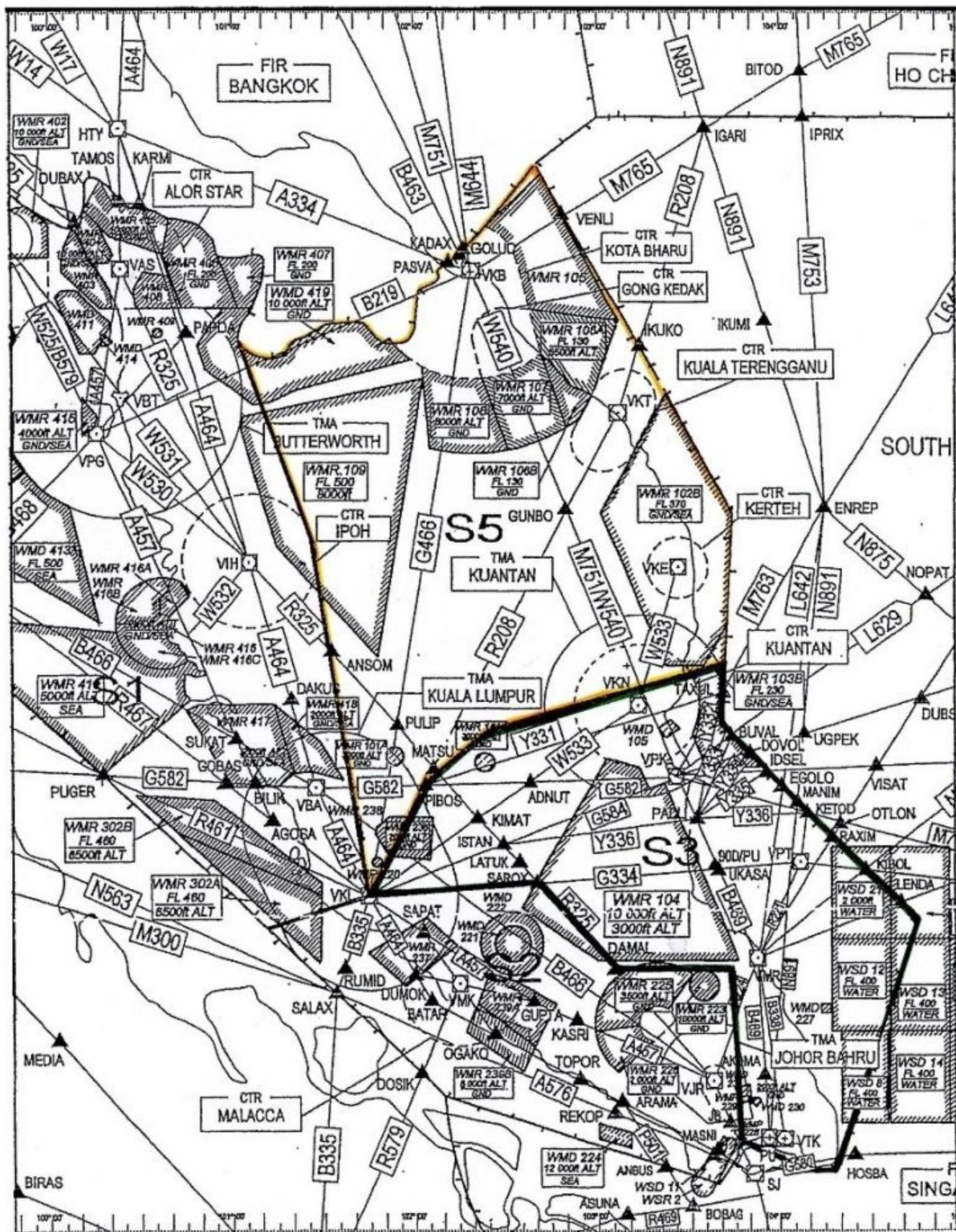
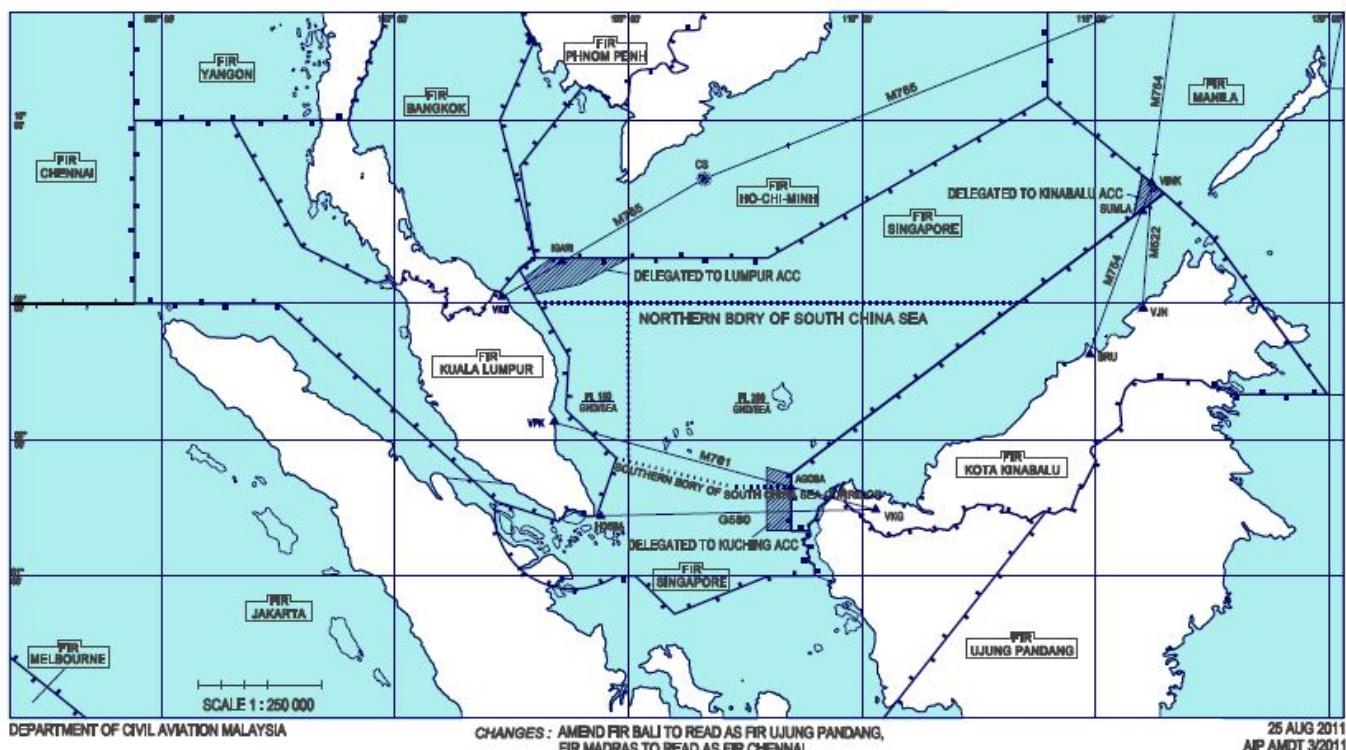


Figure 1.18A - Sector 3 and 5 Area of Responsibilities

### 1.18.1.3 Air Traffic Control (ATC) Operations from 1719 to 2232 UTC, 07 March 2014 [0119 to 0632 MYT, 08 March 2014]

The accident occurred in Singapore FIR where the airspace is either delegated or released to KL ATCC. The portion of airspace delegated is RNAV route M765 between VENLI<sup>8</sup> and IGARI<sup>9</sup>, and the portion released is ATS route R208 between IKUKO<sup>10</sup> and IGARI. (References: Malaysian Aeronautical Information Publication (AIP) ENR 2.1-15 Chart 1.18B below, ENR 3.1-10 and ENR 3.3-5. and Manual of Air Traffic Services [MATS] Vol. 2 page

### AIRSPACE DELEGATED TO MALAYSIA



2-2-10 paragraphs 2.5.3.1 & 2.5.3.2)

*Figure 1.18B – Airspace Delegated to Malaysia by Singapore*

KL ATCC is responsible for the provision of Air Traffic Control Service, Flight Information Service and Alerting Service to all aircraft within Kuala Lumpur FIR and the “released airspace” on ATS route R208 and the “delegated airspace” on RNAV route M765 (*Figure 1.18B above*).

MATS part 9, page 9-6-5 para 6.7.2 states that “if alerting service is required for an aircraft that is flight planned to operate through more than one FIR including the airspace delegated to the Kuala Lumpur and Kota Kinabalu ATSCs and, the position of the aircraft is in doubt,

<sup>8</sup> Coordinates VENLI: 062846N 1024900E

<sup>9</sup> Coordinates IGARI: 065612N 1033506E

<sup>10</sup> Coordinates IKUKO: 054512N 1031324E

*the responsibility for coordinating such service shall normally rest with the ATSC of the respective*

*FIRs;*

- a) *Within which the aircraft was flying at the time of last radio contact;*
- b) *That the aircraft was about to enter when last radio contact was established at or close to the boundary of the two FIRs;*

Operational Letter of Agreement for the Provision of Search and Rescue Services between the Department of Civil Aviation Malaysia and the Department of Civil Aviation Singapore dated August 1984 page 6 para. 7.1 states that; *"In the event of an aircraft emergency occurring within the South China Sea Corridor (SCSC), the KL ATCC shall be responsible to take initial alerting action whilst the Singapore RCC shall be responsible for subsequent coordination of all SAR efforts. While the responsibility for the provision of SAR service within the SCSC rests with Singapore RCC, the Singapore RCC may as provided for in paragraph 3.2.2 delegate responsibility for the overall control of the SAR mission to Kuala Lumpur RCC or Kota Kinabalu RCC, whichever is deemed appropriate"*

- a) Para. 3.2.2 on page 3 states that; *"When a transfer of responsibility for the overall SAR co-ordination is to take place, either from subsequent establishment of an aircraft's position or movement, or because an RCC other than the one initiating the action is more favourably placed to assume control of the mission by reason of better communication, proximity to the search area, more readily available facilities or any other reasons, the following procedures shall be adopted:-*
  - i. *direct discussions, wherever possible, shall take place between the Search and Rescue Mission Co-ordinators (SMCs) concerned to determine the course of action.*
  - ii. *if it is decided that a transfer of responsibility is appropriate for the whole mission or part thereof, full details of the SAR mission shall be exchanged,*
  - iii. *the initiating RCC shall continue to retain responsibility until the accepting RCC formally assumes control for the mission."*

#### **1.18.1.4 KL ATCC Duty Shift System for Air Traffic Controllers**

The duty shift system for Air Traffic Controllers is as follows:

Day 1 - Afternoon shift: 0500 UTC [1300 MYT] - 1100 UTC [1900 MYT]

Day 2 - Morning shift & Night shift:

2300 UTC [0700 MYT] - 0500 UTC [1300 MYT] &  
1100 UTC [1900 MYT] - 1600 UTC [2400 MYT]

Day 3 - Midnight shift: 1600 UTC [0000 MYT] - 2300 UTC [0700 MYT]

Day 4 - Off duty, then to Day 1 again.

On 07 March 2014, Sectors 1, 2, 3, 4 and 5 were manned by a Radar Controller, a Planning Controller and an Assistant Flight Data Controller in each sector from 1100-1600 UTC [1900-2400 MYT]. Sector 6 was manned by a Radar controller and Sector 7 was not manned.

From 1600 UTC [0000 MYT] until 2200 UTC [0600 MYT], the number of controllers in the KL ATCC were scaled down by half to enable the controllers to take a break - the first half from 1600 UTC [0000 MYT] to 1900 UTC [0300 MYT] and the second half from 1900 UTC [0300 MYT] to 2200 UTC [0600 MYT], as follows:

- Sector 1, Sector 2 and Sector 4 each were manned by a Radar Controller with an AFD controller.
- Sector 3 and Sector 5 were combined and operating from a controller working position with a Radar Controller and an AFD controller.
- The area of responsibility would be that of Sector 3 and Sector 5. Between 1600 UTC [0000 MYT] and 2200 UTC [0200 MYT], Sectors 3 & 5 Assistant Flight Data Controller carried out the duty of Planning Controller.

The last radio transmission between KL ATCC and MH370 took place at 1719:30 UTC [0119:30 MYT]. A contact should have occurred at around 1722 UTC [0122 MYT] when passing the waypoint IGARI. The first DETRESFA<sup>11</sup> message was transmitted by KL ARCC at 2232 UTC [0632 MYT].

Thus a total of 5 hours and 13 minutes had passed by between the last message expected from the crew and the transmission of the first message triggering the Distress Phase<sup>12</sup>. It was only at 0330 UTC [1130 MYT] on 08 March 2014 that Malaysian aircraft took off heading to the search areas.

As the ‘custodian’ of the airspace, the KL ATCC was the key witness to the event, having transferred MH370 to HCM ATCC 3 minutes before the estimated time of arrival (ETA) over the Transfer of Control Point<sup>13</sup> (TCP).

The estimate<sup>14</sup> of the aircraft for IGARI which was 1722 UTC [0122 MYT] had been passed to, by KL ATCC, and duly acknowledged by HCM ATCC, as stipulated in the Operational Letter of Agreement between DCA Malaysia and Viet Nam Air Traffic Management.

The Operational Letter of Agreement between DCA Malaysia and Viet Nam Air Traffic Management stipulated that “*the accepting unit shall notify the transferring unit if two-way communication is not established within five (5) minutes of the estimated time over the TCP*”.

At 1739:03 UTC [0139:03 MYT] HCM ATCC queried KL ATCC for news on the MH370.

<sup>11</sup> DETRESFA: The code word used to designate a distress phase

<sup>12</sup> Distress Phase: A situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance.

<sup>13</sup> Transfer of Control Point - A defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or control position to the next.

<sup>14</sup> Estimate: The time at which it is estimated that an aircraft will be over a position or over the destination.

After MH370 was transferred to HCM ATCC, the time of transfer was not recorded manually on the paper Flight Progress Strip as stipulated in MATS Part 2-Gen Section 11 FLIGHT PROGRESS STRIPS.

Manual of Air Traffic Services Part 9, Table 9-2.2 Overdue Action – Radio Equipped Aircraft **preliminary action** stipulates that “*when an aircraft fails to make a position report when it is expected, commence actions not later than the ETA<sup>15</sup> for the reporting point plus 3 minutes*” and.

**a) The following actions shall be taken:**

- i. request information from other ATS units and likely aerodromes,
- ii. notify the RCC that the **Uncertainty Phase**<sup>16</sup> exists
- iii. ensure that RQS<sup>17</sup> message is sent.

**b) Full Overdue Action:** not later than 30 minutes after the declaration of the Uncertainty Phase:

- i. notify the RCC that the Alert Phase<sup>18</sup> exists.
- ii. notify the RCC that Distress Phase exists if:
  - 1 hour has elapsed beyond the last ETA for the destination; or
  - the fuel is considered exhausted; or
  - 1 hour has elapsed since the declaration of the Uncertainty Phase.

MATS Part 9 para 6.2.4 stipulates that “*If controllers have reason to believe that an aircraft is lost, overdue or experiencing communication failure, they shall:*

- a) inform appropriate radar units (civil and military) of the circumstances;
- b) request the units to watch out for emergency SSR<sup>19</sup> code display or the triangular radio failure pattern, and
- c) notify these units when their services are no longer required.”

At 1741:23 UTC [0141:23MYT] KL ATCC Sector (3 & 5) controller made a call on the radio frequency 132.6 MHz to MH370 but there was no response from the aircraft.

The Standard Operating Procedure for Search and Rescue for Kuala Lumpur Aeronautical Rescue Co-ordination Centre (ARCC); page 6 para 2.1 states that:

<sup>15</sup> ETA – Estimated time of Arrival.

<sup>16</sup> Uncertainty phase – A situation wherein doubt exists as to the safety of an aircraft or a marine vessel, and the persons on board

<sup>17</sup> RQS – Request Supplementary Flight Plan

<sup>18</sup> Alert phase – A situation wherein apprehension exists as to the safety of an aircraft or marine vessel and of the persons on board.

***“2.1 The Position of the Distress Aircraft Is Known:***

*2.1.1 When the position of the distress aircraft is known, the responsibility for initiation of a SAR operation will be that of the RCC in whose area the aircraft or the craft is located.*

*2.1.2 When the RCC recognizes that the aircraft is continuing its flight or may leave the search and rescue region (SRR) for which it is responsible, it should;*

- *Notify the RCCs associated with the planned or intended route of the aircraft and pass on all information.*
- *Continue coordination of the SAR operation until it has been notified by an adjacent ARCC that the aircraft has entered its Search and Rescue Region (SRR) and that it is assuming responsibility; and*
- *Remain ready to assist until informed that this is no longer required.” and page 8 para 2.2 states that;*

***“2.2 The Position of the Distress Aircraft Not Known;***

*2.2.1 When the position of the aircraft in distress is in doubt, the ARCC shall;*

*Assume responsibility for the SAR operation; and consult adjacent RCCs along the route of the aircraft as to which centre will assume primary responsibility.*

*2.2.2 Notwithstanding any LOA, the RCC to assume responsibility should be the Centre responsible for the region;*

- ***in which the aircraft was, according to its last reported position;***
- *to which the aircraft was proceeding if the last reported position was the boundary of two SRRs.”*

Para 3.3 on page 2/13 of the Supplementary Operational Instruction (SOI) 2/2014 issued on 1 Mac 2014, by the DCA ATM Sector on Search and Rescue for Air Traffic Control Centre/Aeronautical Rescue Coordination Centre/ Rescue Sub-Centre Requirement stipulates that “...All initial action concerning aircraft overdue shall be under the responsibilities of the respective ATCO<sup>20</sup>’s handling the traffic, Upgrading of SAR phases may be made by the supervisors or ARCC/ARSC after activation.”

- a) It is explicitly stated in para 4.1 of the Supplementary Operational Instruction (SOI) 2/2014 issued on 1 Mac 2014, by the DCA Air Traffic Management Sector on Search and Rescue for Air Traffic Control Centre/Aeronautical Rescue Coordination Centre/Rescue Sub-Centre Requirement that:

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<sup>20</sup> ATCO – Air Traffic Controller

*i. Duties of ATCO's*

- Ensure overdue action followed according to procedures;
- Report overdue action to DCA Managers/Watch Supervisors; and/or
- Report accident to DCA Managers/Watch Supervisors;

*ii. Duties of Watch Supervisor ATCC (para 4.4)*

- Ensure overdue action taken by ATC according to procedures;
- Should SAR operation needed, direct the SAR trained officer to the ARCC, activate ARCC and ensure ATC operation undisrupted.

Event that followed was at time 1804:39 UTC [0204:39 MYT] KL ATCC Radar controller informed HCM ACC; “...reference to the company Malaysian Airlines the aircraft is still flying, is over somewhere over Cambodia”. And thirty one minutes later, at time 1835:52 UTC [0235:52 MYT] MAS Operations Centre informed the position of the aircraft was at latitude N14.9 0000 and longitude E109 15500, which was somewhere east of Vietnam and this information was relayed to HCM ACC.

At 1930 UTC [0330 MYT] MAS Operations Centre called in and spoke to Radar controller, admitting that the information from the ‘flight tracker’<sup>21</sup> was based on projection and could not be relied for actual positioning or search (*Watch Supervisor logbook entry*)

### 1.18.1.5 Operations and Events - Initiation of SAR & Deployment of Resources

The paragraphs below describe the operations and events leading to the initiation of the Search and Rescue operations (SAR) and deployment of the resources for the MH370 search. The complete set of radiotelephony transcripts is attached as Appendices 1.18A to 1.18G.

At 1739:03 UTC [0139:03 MYT] Ho Chi Minh ATCC first enquired about MH370 and informed KL ATCC that verbal contact was not established with MH370 and the radar target was last seen at BITOD.

At 1741:22 UTC [0141:22 MYT] Ho Chi Minh enquired information on MH370 and KL ATCC informed HCM ATCC that after waypoint IGARI, MH370 did not return to Lumpur Radar frequency.

At 1741:23 UTC [0141:23 MYT] KL ATCC radar controller made a “blind transmission” to MH370.

At 1746:47 UTC [0146:47 MYT] HCM ATCC queried about MH370 again, stating that radar contact was established over IGARI but there was no verbal contact. HCM ATCC advised that the observed radar blip disappeared at waypoint BITOD. HCM ATCC stated that effort to establish communication by calling the MH370 many times for more than twenty (20) minutes.

<sup>21</sup> MAS Operations Centre used the name “Flight Explorer”.

At 1750:28 UTC [0150:28 MYT] KL ATCC queried HCM ATCC if any contact with MH370, HCM ATCC's reply was 'negative'.

At 1757:49 UTC [0157:49 MYT] HCM ATCC informed KL ATCC that there was officially no contact with MH370 until this time. Attempts on many frequencies and aircraft in the vicinity received no response from MH370.

At 1803:48 UTC [0203:48 MYT] KL ATCC queried HCM ATCC on status MH370, HCM ATCC confirmed there was no radar contact at this time and no verbal communication was established. KL ATCC relayed the information received from Malaysia Airlines Operations that aircraft was in Cambodian airspace.

At 1807:47 UTC [0207:47 MYT] HCM ATCC queried for confirmation that MH370 was in Phnom Penh FIR as Phnom Penh did not have any information on MH370. KL ATCC indicated would check further with supervisor.

At 1812:15 UTC [0212:15 MYT] KL ATCC informed HCM ATCC that there was no update on status of MH370.

At 1815 UTC [0215 MYT] (no voice recording) extracted from Watch Supervisor Log Book, KL ATCC Watch Supervisor queried Malaysia Airlines Operations who informed that MH370 was able to exchange signals with the Flight Explorer.

At 1818:50 UTC [0218:50 MYT] KL ATCC queried if flight planned routing of MH370 was supposed to enter Cambodian airspace. HCM ATCC confirmed that planned route was only through Vietnamese airspace. HCM ATCC had checked and Cambodian advised that it had no information or contact with MH370. HCM ATCC confirmed earlier information that radar contact was lost after BITOD and radio contact was never established. KL ATCC queried if HCM ATCC was taking Radio Failure action but the query didn't seem to be understood by the personnel. HCM ATCC suggested KL ATCC to call Malaysia Airlines Operations and was advised that it had already been done.

At 1833:59 UTC [0233:59 MYT] KL ATCC Radar Controller enquired with Malaysia Airlines Operations Centre about communication status with MH370 but the personnel was unsure if the message went through successfully or not. Malaysia Airlines Operations Centre informed that aircraft still sending the movement message indicating somewhere in Vietnam and giving the last position as coordinate N14.90000 E109 15500 at time 1833 UTC [0233 MYT].

At 1834:56 UTC [0234:56 MYT] HCM ATCC queried about status of MH370 and was informed that the Watch Supervisor was talking to the Company at this time.

At 1837:34 UTC [0237:34 MYT] KL ATCC informed HCM ATCC MH370 still flying, aircraft kept sending position report to the airline and relayed to HCM ATCC the latitude and longitude as advised by Malaysian Airlines Operations.

At 1853:48 UTC [0253:48 MYT] MH386 which was from KLIA to Shanghai and within HCM FIR was requested by HCM ATCC to try to establish contact with MH370 on Lumpur Radar radio frequency. KL ATCC then requested MH 386 to try on emergency frequencies as well.

At 1930 UTC [03:30 MYT] (no voice recording) (extract from Watch Supervisor's Log Book) MAS Operations Centre informed KL ATCC that the flight tracker information was based on flight projection and not reliable for aircraft positioning.

At 1930:03 UTC [0330:03 MYT] KL ATCC queried if HCM ATCC had checked with next FIR Hainan.

At 1948:52 UTC [0348:52 MYT] KL ATCC queried whether HCM ATCC had checked with the Sanya FIR, HCM ATCC informed KL ATCC no response until now.

At 1956:13 UTC [0356:13 MYT] KL ATCC queried Malaysia Airlines Operations for any latest information or contact with MH370.

At 2025:22 UTC [0425:22 MYT] HCM ATCC Supervisor queried KL ATCC on last position that MH370 was in contact with ATC.

At 2118:32 UTC [0518:32 MYT] HCM ATCC queried for information on MH370, KL ATCC queried if any information had been received from Hong Kong or Beijing

At 2109:13 UTC [0509:13 MYT] Singapore on behalf of Hong Kong enquired for information on MH370.

At 2120:16 UTC [0520:16 MYT] [name redacted] requested for information on MH370. He opined that based on known information, "MH370 never left Malaysian airspace"

At 2130:00 UTC [0530:00 MYT] The Watch Supervisor activated the Kuala Lumpur Aeronautical Rescue Coordination Centre (ARCC).

At 2141:20 UTC [0541:20 MYT] HCM ATCC queried for any updates.

At 2214:13 UTC [0614:13 MYT] KL ATCC queried HCM ATCC if SAR was activated.

At 2232:00 UTC [0632:00 MYT] KL ARCC issued a DETRESFA message (*Figure 1.18C*).

KLA637 072232  
 SS WMKKZQZX WMKKZRZX  
 072232 WMFCZQZX  
 (ALR-DESTRESFA/WMFCZQZX/MISSING  
 -FPL-MAS370-IS  
 -B772/H-SDFGHIJ3J5M1RWXY/LB1D1  
 -WMKK1635  
 -N0470F290 DCT PIBOS R208 IKUKO/M081F330 R208 IGARI M765  
 BITOD/N0480F330 L637 TSN/N0480F350 W1 BMT W12 PCA G221  
 BUNTA/N0480F370 A1 IKELA/N0480F370 P901 IDOSI/N0480F390 DCT CH  
 DCT BEKOL/K0900S1160 A461 YIN/K0890S1130 A461 VYK  
 -ZBAA0534 ZBTJ ZBSJ  
 -PBN/A1B1C1D1L1O1S2 DOF/140307 REG/9MMRO EET/WSJC0032 VVTS0042  
 ZJSA0210 VHHK0233 ZGZU0304 ZHWH0356 ZPE0450 SEL/QRCS  
 RMK/ACASII EQUIPPED  
 -E/0710 P/TBN R/UVE S/M J/LF D/8 290 GREY A/WHITE WITH RED AND  
 BLUE STRIPE C/TBN)



Figure 1.18C – DETRESFA Message

### 1.18.1.6 Search and Rescue

After four (4) hours and eleven (11) minutes had passed since the last contact with the aircraft, KL Aeronautical Rescue Coordination Centre (ARCC) was activated at time 2130:00 UTC [0530: MYT]. It took another one (1) hour and two (2) minutes for the DETRESFA message to be disseminated via the AFTN at 2232 UTC [0632 MYT]. The Kuala Lumpur Aeronautical Rescue Co-ordination Centre, Standard Operating Procedure for Search and Rescue, page 11, para 3.1 stipulated;

*"The search and Rescue Mission Co-ordinator (SMC) is the officer assigned to co-ordinate response to an actual or apparent distress situation.*

*In aeronautical search and rescue operations, the SMC is usually in the best position to assess the circumstances of a particular case, and to take whatever steps necessary to promote the safety of life and prevent further loss of property.*

*The SMC must use his/her best judgment in initiating and coordination operations to ensure use of the most suitable method of planning with least possible delay.*

### ***Initial Actions***

*On receipt of information regarding aircraft in difficulties normally form the Watch Supervisor in the ATCC, or from request of assistance from RSCs, MRCC (vessel or person – maritime distress) or from any adjacent RCCs and is aware that assistance is required the SMC shall act as follows;*

- *Activate the SAR operation room;*
- *Appraise the situation;*

*Continue to take the following actions if emergency situation involves civil aviation accident;*

- *Declare the Distress phase if not done yet by the duty Watch Supervisor;*
- *Notify the SAR Chief and the SAR Co-ordinator (SC);*
- *Request Supervisor to recall SAR trained staff if deemed necessary;*
- *Initiate ARCC activation message;*
- *Assign specific position accordingly (SMC, ASMC... etc.)*
- *Initiate NOTAM<sup>22</sup> actions.*
- *Initiate RQS<sup>23</sup> request from AIS<sup>24</sup> and weather report from Meteorological Office if not done yet by the Supervisor;*

*Obtain information of aircraft position if necessary by;*

- *Information contained in the flight plan or notification.*
- *Check all airports or possible alighting areas along the route of flight and within the possible flight range of the aircraft concerned.*
- *Notify other aircraft or agencies to attempt establishment of the aircraft's position, informing them of all known frequencies (request for aircraft lookout made through the ATCC Watch Supervisor).*
- *Notify the Police, along the route of flight, and request them to verify alighting areas, or obtain information on the aircraft and its occupants,*
- *Request MRCC<sup>25</sup> to alert the vessels in the area if the flight is over or near water,*
- *Ascertain the type of emergency equipment carried by the missing or distressed craft,*
- *When required, request Radar assistance for search from appropriate radar station or Radar Plot.”*

<sup>22</sup> NOTAM (Notice to Airmen) - A notice issued by, or with the authority of the State and containing information or instruction concerning the establishment, condition change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations. NOTAM are distributed by AFTN. (Aeronautical Fixed Telecommunication Network)

<sup>23</sup> RQS - Request Supplementary Flight Plan.

<sup>24</sup> AIS - Aeronautical Information Service.

<sup>25</sup> MRCC - Maritime Rescue Coordination Centre.

**1.18.1.7 Recorded Telephone Conversations**

From the recorded telephone conversations between the KL ATCC Radar Controller and MAS Operations Centre, the Radar controller at 2123:18 UTC [0523:18 MYT] indicated that he would inform the Watch Supervisor to check on when was the last contact with MH370.

**1.18.1.8 SAR Mission Coordinator**

Upon activation of the RCC at 2130 UTC [0530 MYT], the Emergency Phase appropriate to the situation was declared after a lapse of one (1) hour and two (2) minutes. The DETRESFA message was declared at 2232 UTC [0632 MYT].

There was no activity recorded in the RCC Logbook between 2130 UTC [0530 MYT] and 2232 UTC [0632 MYT].

The RCC activation document received from DCA Malaysia was not endorsed with the official stamp.

**1.18.1.9 Watch Supervisor ATS and Sector (3 & 5) Logbook**

MATS Part 1 – Admin, page 1-1-7 para 1.7 for recording of entries in the logbook as follows:

- a) *The time of entries shall be based on UTC and events recorded in a chronological order,*
- b) *Entries shall give sufficient details to give readers a full understanding of all actions taken.*
- c) *The time an incident occurred and the time at which each action was initiated shall be stated.*

**1.18.2 Cargo**

During the course of the investigation the Investigating Team visited and interviewed the relevant people in MAS at KLIA Sepang, Motorola Solutions Penang, MASKargo Sdn Bhd (MASKargo) Penang, NNR Global Logistic (M) Sdn Bhd. Penang, Poh Seng Kian, Muar, Johore, JJJ International Transportation Co. Ltd. Beijing, China (Forwarding Agent Motorola Solutions China), Motorola Solutions China, TianJin China, Beijing GuangChangMing Trading Co. Ltd. Beijing China.

On 08 March 2014 MAS B777-200 MH370 was on a scheduled flight from KLIA to Beijing, China. The aircraft was carrying 227 passengers with a tabulated passenger weight of 17,015 kg, baggage 3,324 kg, cargo 10,806 kg (gross weight) and Max Take-off Weight of 223,469 kg. All these are stipulated in the cargo manifest attached as Appendix 1.18H.

The list of cargo, Airway Bill, Local Agent and Final Destination are tabulated in *Table 1.18A* below.

	COMPANY (MALAYSIA)	AIRWAY BILL	AGENT [TRANSPORTER] (MALAYSIA)	ITEMS	WEIGHT (nett)	FINAL DESTINATION (CHINA)
1.	Grolier (M) SB Balakong Selangor	232- 12009141	Kerry Logistics (M) (Subang Jaya)	Scholastic Assorted Books	2,250kg	CNPSEC Beijing
2.	Motorola Solutions (M), Bayan Lepas, Penang	232- 10677085	NNR Global Logistic (Batu Maung, Penang)	Lithium Ion Baterries-Walkie- Talkie accessories & chargers	2,453kg	Motorola Solutions, TianJin
3.	Panasonic Industrial Devices Sales, Shah Alam, Selangor	232- 12022382	Panalpina Transport (M) (Mas Cargo, KLIA)	Electrical Parts (Capacitors)	26kg	Continental Automotive System, Changchun
4.	Freescale Semiconductor Petaling Jaya, Selangor	232- 12022404	Panalpina Transport (M) (Mas Cargo, KLIA)	Vehicle Electronic Chip	6kg	Continental Automotive System, Changchun
5.	Agilents Technologies, Bayan Baru, Penang	232- 10664905	Kintetsu World Express (MAS Cargo, Penang	Electronic Measurements	646kg	AGILENTS TECHNOLOGIES , Beijing
6.	Poh Seng Kian, Muar Johor	232- 12007306	Poh Seng Kian Muar, Johore	Fresh Mangosteen	4,566kg	Beijing Guang- ChangMing Trading, Beijing
7.	Malaysian Express Worldwide, Subang Jaya, Selangor	232- 11873632	Malaysian Express Worldwide, Subang Jaya, Selangor	Courier Materials - Documents	6kg	UPS Parcel Delivery, Beijing

*Table 1.18A - List of Cargo on board MH370*

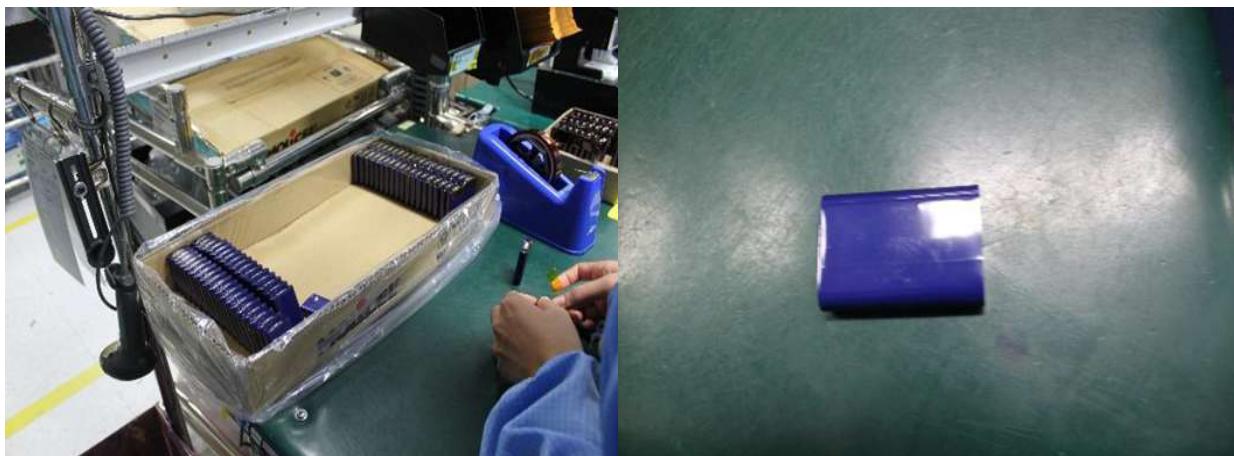
The cargo that had generated interest were:

- Lithium Ion Batteries and Accessories - 2,453 kg
- Mangosteen fruit - 4,566 kg

### 1.18.2.1 Lithium Ion Batteries

Lithium Ion Batteries (Li-Ion) carried on MH370 were from Motorola Solution Penang. Of the total consignment of 2,453 kg, only 221 kg were Li-ion batteries, the rest were chargers and radio accessories.

The batteries were fabricated in the factory before being packed for export. *Figure 1.18D* below shows a raw single cell battery. The step-by-step process of fabricating 2 single cell batteries together to form a battery pack for shipment is shown in *Figure 1.18E* below.



*Figure 1.18D - Raw single cell battery*

The Li-Ion batteries from Motorola Solutions Penang were assembled on 07 March 2014 before being packed, the built-up consignments placed on wooden pallets and delivered by NNR Global Logistic (M) Sdn. Bhd. forwarding agent to MASKargo Penang and subsequently transported by MASKargo truck 'MH6803' to MAS Cargo Complex, KLIA, Sepang. The shipment did not go through security screening in Penang but was inspected physically by MASKargo personnel and went through Custom's inspection and clearance before the truck was sealed and allowed to leave the Penang Cargo Complex. The shipment arrived at KLIA Cargo Complex on the evening of 07 March 2014 before being loaded onto MH370 without going through additional security screening.

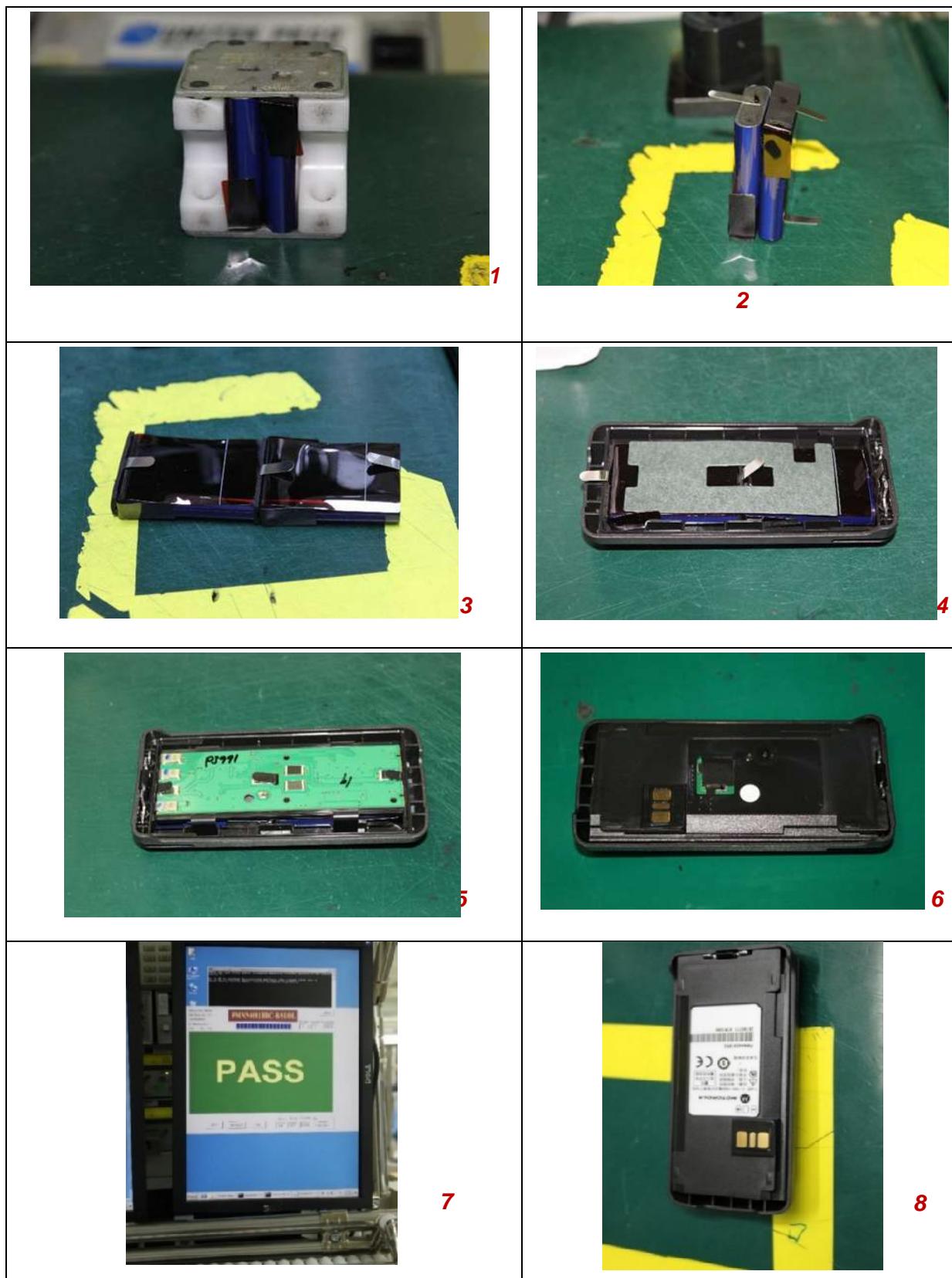
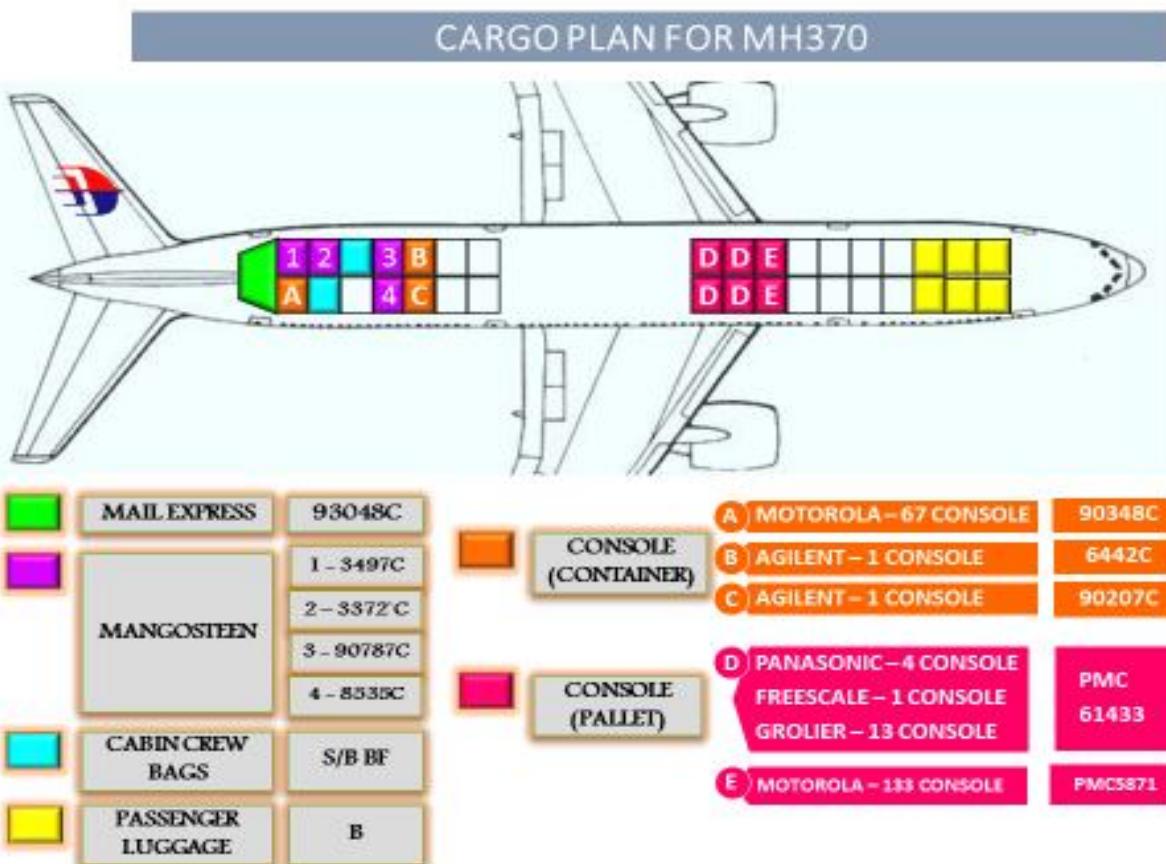


Figure 1.18E – Step-by-step Process of Fabricating 2 Single Cell Batteries to Form a Battery Pack for Shipment

The Motorola Solutions consignments were loaded in the Aircraft at 90348C (47R) and PMC5871 (23L, 23R) as per Loading Instruction/Report. Illustration as shown in *Figure 1.18F* below.



*Figure 1.18F Motorola Solutions Consignment Loading*

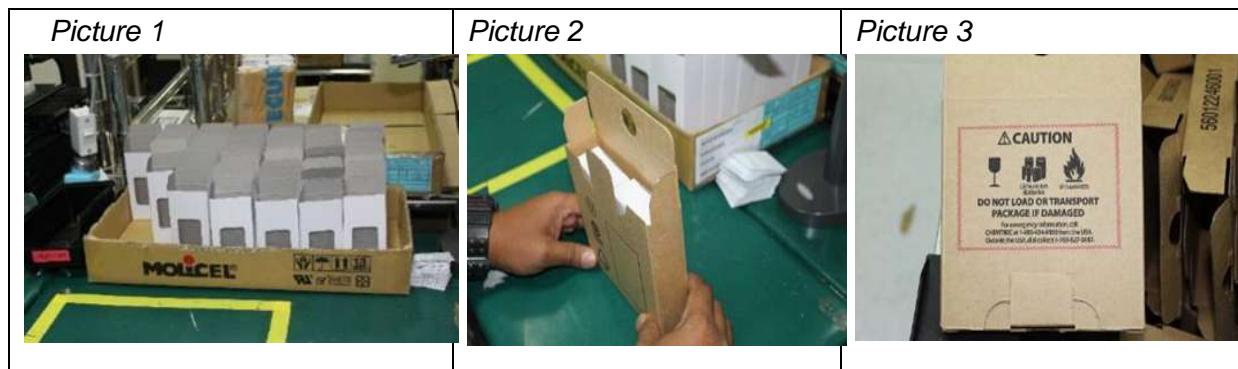
There were two (2) different models of Li-Ion battery consignment on MH370 on 08 March 2014:

- PMNN4073AR Li-ion batteries rated at 7.4V, 11.8Wh.
- PMNN4081BRC Li-ion batteries rated at 7.4V, 11.1Wh.

Both of the batteries were **not** regulated as Dangerous Goods because the packing adhered to the guidelines as per Lithium Battery Guidance Document (3. Section II - Packing Instructions 965-970). This document is based on the provisions set out in the 2013-2014 Edition of the ICAO Technical Instructions for Safe Transport of Dangerous Goods by Air and the 55<sup>th</sup> Edition of the IATA Dangerous Goods Regulations (DGR). The ICAO and IATA documents are as per *Appendix 1.18I*.

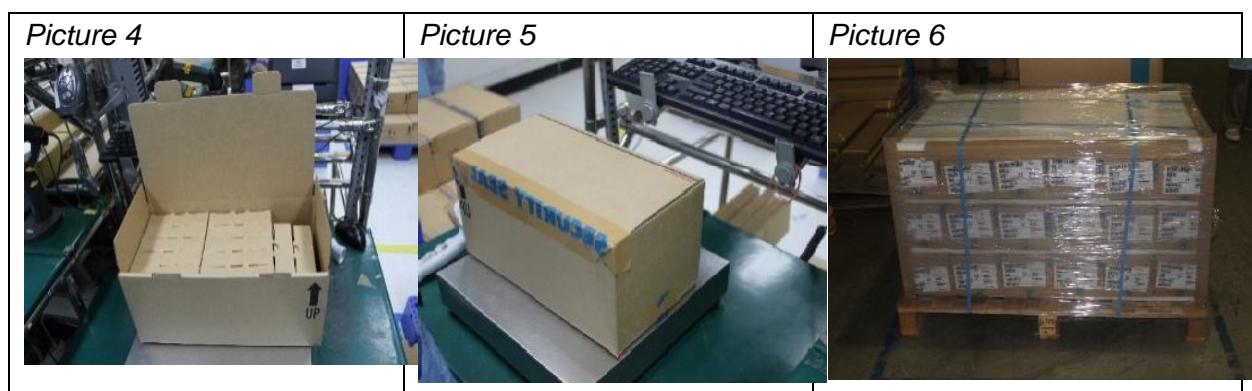
The packing of the batteries by Motorola Solutions is shown in *Figures 1.18G and 1.18H* below.

Each Li-Ion battery was placed in a white window box (*Picture 1*) and two of these filled boxes were then placed in a brown box (*Picture 2*) printed with Li-Ion battery warning shipping information (*Picture 3*) below.



*Figure 1.18G - Packing of Batteries by Motorola Solutions*

The brown box filled with two Li-Ion batteries each was then packed into a larger box. Each box contained twenty-four Li-ion batteries ( $12 \text{ boxes} \times 2 = 24$ , *Picture 4* below), sealed and weighed (*Picture 5*). All the sealed boxes were placed on a wooden pallet and the built-up consignment was wrapped with plastic and polystyrene sheets for protections (*Picture 6*). They were then scanned with the number of batteries determined by means of weighing the boxes.



*Figure 1.18H - Packing of Batteries by Motorola Solutions*

From January 2014 to May 2014 there were ninety nine shipments of Lithium Ion Batteries on MAS flights to Beijing (*Appendix 1.18J - List of Airways Bills*).

### 1.18.2.2 Mangosteen Fruit

The mangosteen fruit on board MH370 on 08 March 2014 originated from Poh Seng Kian of No.79, 6½ mile Kesang, 84000 Muar, Johore, Malaysia. About 2,500 kg of the fruit were harvested from Muar and the rest from Sumatra, Indonesia. Photographs of the mangosteen orchard and a typical mangosteen plant are shown as *Figures 1.18.3I and 1.18.3J*, below respectively.



Figure 1.18I Mangosteen orchard in Muar, Johor, Malaysia

Figure 1.18J Mangosteen plant/fruits

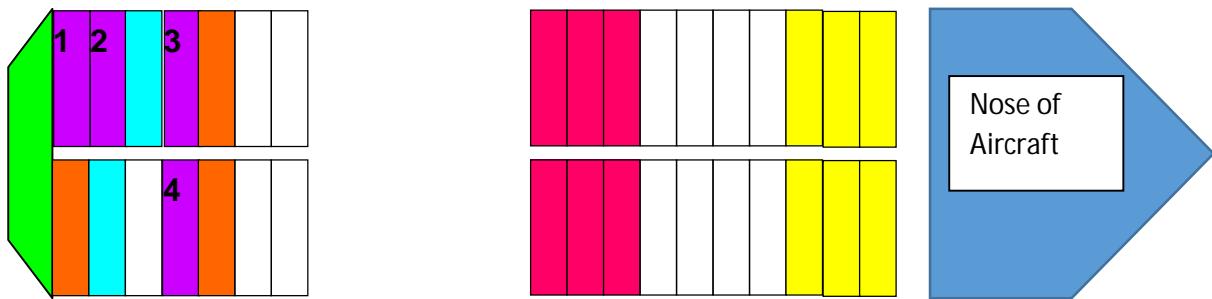
The mangosteens were packed in plastic basket of between 8 to 9 kg per basket with a piece of sponge soaked with water placed on top of the fruits to maintain their freshness (*Figures 1.18K and 1.18L below*). The packed fruits were then loaded on the trucks which proceeded to MAS Cargo Complex at KLIA, Sepang. At the complex, four ULD containers were provided by MAS cargo staff to the forwarding agent. The forwarding agent then loaded the packed fruits into the ULD containers. The consignment was then inspected by the Federal Agriculture Marketing Authority (FAMA) of Malaysia. After obtaining the clearance the forwarding agent handed over the consignments to the MAS loaders for loading them into the aircraft.



Figure 1.18K - Plastic baskets of mangosteens

Figure 1.18L Piece of soaked sponge placed  
on top of mangosteens

Flight MH370 on 08 March 2014 carried four ULD containers of mangosteens - ULD AKE3497MH weighing 1,128 kg was placed at cargo bay 41L, ULD AKE90787MH weighing 1,152 kg at cargo bay 41F, ULD AKE3372MH weighing 1,148 kg at cargo bay 43L and ULD AKE8535MH weighing 1,138 kg at 44L. The loading arrangement is shown in *Figure 1.18M below*. Loading Instruction/report is shown in the MH370 cargo manifest (*Appendix 1.18K*).



*Figure 1.18M - Loading Arrangement of ULDs of Managosteens*

	<u>ULD</u>	<u>Weight</u>	<u>Position</u>
1.	AKE3497MH	1,128kg	41L
2.	AKE90787MH	1,152kg	41F
3.	AKE3372MH	1,148kg	43L
4.	AKE8535MH	1,138kg	44L

From January 2014 till May 2014 there were a total of eighty five shipments of mangosteens to Beijing, China. The list of Airway Bills is shown in *Appendix 1.18C*. The combination of the two cargo shipments (Lithium Ion Batteries and mangosteens) carried together from January to May 2014 were thirty six times (*Appendix 1.18L – List of Shipments (in red) from January to May 2014*).

## SECTION 1.19 – NEW INVESTIGATION TECHNIQUES

Not applicable at this stage of the investigation.

## APPENDIX 1.6A - RECENT TECHNICAL LOG ENTRIES

	<b>Technical Log S/N, Date Entered and Defect</b>	<b>Date Entered and Rectification</b>
1	S/N 4918754 – 07 March 2014 Ref NTC #3 water qty indication inoperative	07 March 2014 Potable water serviced till overflow
2	S/N 4918753 – 07 March 2014 To carry out lavatory waste compartment doors and flaps – AD inspection	07 March 2014 Carried out as per task card SIPCM 2-4-002AD. Satisfactory
3	S/N 4918753 – 07 March 2014 To carry out fwd large cargo door and door to cutout mating surfaces lubrication	07 March 2014 Task carried out as per AMM 12-21-21-640-802. Satisfactory Refer task card SIPL8-5-007 for details
4	S/N 4918753 – 07 March 2014 Main entry task card T1400115-001 Ref TSI/77/CIL/1420. To carry out terrain database loading.	07 March 2014 Said terrain database loading carried out IAW AMM 34-46-00. Satis.
5	S/N 4918752 – 07 March 2014 Night Stop. Crew oxygen system pressure reads 1120 psi (EICAS).	07 March 2014 Crew oxygen system replenished to 1800 psi – EICAS. AMM 12-15-08 refers.
6	S/N 4918752 – 07 March 2014 Maint : To carry out EPESC software down grade.	07 March 2014 EPESC software downgrade carried out IAW TSI/77/SR/14092 IFE of CHI satisfactory.
7	S/N 4918751 – 06 March 2014 Maint: Record APU OPS data	07 March 2014 APU OPS hours: 22089 APU starts: 155697
8	S/N 4918751 – 06 March 2014 Ref NTC #3 potable water qty indications inop	07 March 2014 Potable water serviced to overflow
9	S/N 4880500 – 06 March 2014 Both Eng require oil uplift	06 March 2014 Both Eng require oil uplift 01 QTS added to RH Eng oil consumption 0.02 QTS/HR 01 QTS added to LH Eng oil consumption 0.02 QTS/HR
10	S/N 4880500 – 06 March 2014 To re inspect both eng oil caps	06 March 2014 Both eng oil caps chkd. Found secured
11	S/N 4880499 – 06 March 2014 Maint- ref NTC #3 to service water tank until overflow as rel.	06 March 2014 Servicing c/out and satis
12	S/N 4880498 – 05 March 2014 Autoland Cat III carried out satisfactory	06 March 2014 Info noted.
13	S/N 4880498 – 05 March 2014 Maint entry – refer NTC #3 potable water qty indication inop	06 March 2014 Potable water serviced to overflow
14	S/N 4880497 – 05 March 2014 Hole found at 6 o'clock position of the right engine acoustic panel	05 March 2014 Deferred to MR2 No. K 70331
15	S/N 4880497 – 05 March 2014 maint- ref NTC #3 potable water req. servicing until overflow	05 March 2014 Potable water serviced until overflow

**APPENDIX 1.6A - RECENT TECHNICAL LOG ENTRIES**

16	S/N 4880496 – 05 March 2013 Maint entry – ref NTC #3 potable water qty ind is inop	05 March 2013 Potable water serviced to overflow satis
17	S/N 4880495 – 05 March 2014 Maint entry: w.r.t card SIPA1-4-033, to check brake accumulator precharge pressure	05 March 2014 Task carried out as per AMM task 32-41-00-720-804. Pressure shown on brake accum press gage within 200 psi to direct reading gage.
18	S/N 4880495 – 05 March 2014 Main entry: w.r.t cards SIPC4-4-0319 and SIPC4-4-032, to check LH and RH ENG BUGEN oil filter bypass condition.	05 March 2014 Task carried out as per AMM task 12-13-07-200-802, nil abnormalities.
19	S/N 4880494 – 05 March 2014 Main entry: w.r.t. card SIPA2-6-008MR, to carry out primary flight control actuation operational check.	05 March 2014 Task carried out as per AMM task 27-02-00-400-801. Test passed satisfactory.
20	S/N 4880494 – 05 March 2014 Maint entry – w.r.t cards SIPC4-5-001 and SIPC4-5-002 to c/out LH and RH eng IDG oil servicing	05 March 2014 Task carried out as per task 12-13-03-600-801 - satisfactory
21	S/N 4880494 – 05 March 2014 Maint entry – w.r.t cards SIPL7-5-001MR and SIPL7-5-002MR, to c/out LH and RH MLG truck beam and inner cylinder pivot joints lube	05 March 2014 Task carried out as per AMM task 12-21-14-640-811-001. Satisfactory.
22	S/N 488093 – 05 March 2014 WRT SIPXE-2-6-034, 035 to carry out Emer Lt sys ops test.	05 March 2014 Ops test carried out satis AMM 33-51-00.
23	S/N 488093 – 05 March 2014 WRT SIPX12-6-027 to carry out GPWS self test.	05 March 2014 Test carried out satis test passed AMM 34-46-00.
24	S/N 488093 – 05 March 2014 Maint entry – w.r.t. NTC item No. 3 potable water quantity indication inop	05 March 2014 Potable water system serviced until overflow
25	S/N 4880492 – 05 March 2014 Please check alignment for left runway turnoff light	05 March 2014 Found slight misalignment towards a/c centerline. Deferred to MR2 for longer grd time Transferred to MR2 K 70330
26	S/N 4880492 – 05 March 2014 Main entry wrt SIPX12-6-030 to carry out FQIS FQPU ops chk.	05 March 2014 Ops check carried out. Test passed. Nil related existing faults. Satis. AMM 28-41-00.
27	S/N 4880492 – 05 March 2014 Main entry wrt SIPX12-4-011 to carry out portable oxy bottle/masks inspection.	05 March 2014 Inspection carried out. Found satis. AMM 35-31-00.
28	S/N 4880491 – 04 March 2014 Ref NTC #3 potable water ind inop	04 March 2014 Potable water serviced to overflow
29	S/N 4880490 – 04 March 2014 During transit check found No. 4 main wheel worn to limit	04 March 2014 No. 4 main wheel assy replaced. Torque load, spin, tyre pressure and security checked. satis
30	S/N 4880490 – 04 March 2014 Maint entry – w.r.t. NTC Item No. 3,	04 March 2014 Potable water serviced until overflow

## APPENDIX 1.6A - RECENT TECHNICAL LOG ENTRIES

	water quantity indication inop	
31	S/N 4880489 – 04 March 2014 “shadow” on rudder trim indicator from L 1.5 to R 1.0 units	04 March 2014 Rudder trim indicator replaced. Ops chk c/out ok
32	S/N 4880487 – 03 March 2014 Maint entry – refer NTC #3 water qty ind is inop. Fill all tanks with potable water till o/flow	03 March 2014 Potable water sys sucd to o/flow this transit. Confirmed by MH staff
33	S/N 4880485 – 02 March 2014 For Info: APU in flt start successful	03 March 2014 Info noted
34	S/N 4880485 – 02 March 2014 NTC #3 water qty indication is inop	03 March 2014 Potable water sys serviced to overflow. Ref AMM 12-14-01
35	S/N 4880484 – 02 March 2014 Status mssg WXR sys	02 March 2014 MMSG: 34-44002. WXR transceiver (right) has an internal fault. MSG erased from maintenance page. WXR (R) CB (P11/E16) Nil existing faults. Pls eml and report.
36	S/N 4880484 – 02 March 2014 Maint entry – Refer NTC #3. Water qty ind is inop. Fill all tanks with potable water till o/flow	02 March 2014 Potable water sys sucd to o/flow this transit. Confirmed by MH staff.
37	S/N 4880483 – 02 March 2014 Maint entry – ref: NTC 03 potable water quantity indication inop	02 March 2014 Potable water serviced to overflow
38	S/N 4880483 – 02 March 2014 Maint entry – No 8 Main wheel found with worn spot	02 March 2014 No 8 main wheel assy replaced as per AMM 32-45-01. Spin, torque, leak, security and TPIS check satis.
39	S/N 4880482 – 02 March 2014 Please carry out reinspection for all engine oil tank caps for installation and security	02 March 2014 Both engines oil caps reinspected found secured
40	S/N 4880482 – 02 March 2014 Please remove all landing gear pin prior to departure	02 March 2014 Landing gears down lock pins removed and stowed.
41	S/N 4880481 – 01 March 2014 Right hand nose taxi light lens found cracked on arrival	02 March 2014 Relamped ops check of right hand nose taxi light found satisfactory AMM 33-42-03 refers
42	S/N 4880481 – 01 March 2014 Refer NTC No. 3 potable water indication inop	02 March 2014 Potable water serviced to overflow
43	S/N 4880480 – 28 February 2014 Nil	01 March 2014 Noted with thanks APU data hour: 22056; Starts 15669
44	S/N 4880479 – 28 February 2014 Nil further	28 February 2014 Nil noted. APU data starts 15668, hrs 22049
45	S/N 4880478 – 28 February 2014 LLAR – Vanity light inop	28 February 2014 TXFR to MR2 no K70329
46	S/N 4880477 – 28 February 2014 Nil	28 February 2014 Noted with thanks APU data hour: 22048, starts: 15666

## APPENDIX 1.6A - RECENT TECHNICAL LOG ENTRIES

47	S/N 4880477 – 28 February 2014 Maint entry – during W/A check found one of tie bolt missing at nose L/H tire	28 February 2014 Inspected wheel found satis. No leak pressure c/o tire press chk 198 psi with in limit. Transferred to MR2 per MEL K 70327
48	S/N 4880477 – 28 February 2014 Maint entry – seat 4K IFE inop	28 February 2014 TXFR to MR2 K70328
49	S/N 4880476 – 28 February 2014 To update FMC Nav database.	28 February 2014. FMC Nav database updated as per SIPX12-4-004, satis. Disk S/N: MH61403001 eff date: Mar 6-Apr 3, 2014.
50	S/N 4880475 – 28 February 2014 To raise APU inflight start program.	28 February 2014 Task carried out as per TSI/77/NN/09/038 R03. Satisfactory.
51	S/N 4880475 – 28 February 2014 Maint entry – To c/out physically chk both heat exchanger S/No and due date as per card no STR 1400567-001	28 February 2014 Task carried out. Found LH heat exchanger S/No 200310115 and RH Heat exchanger S/No 9709161. Unfortunately can't find due date on both heat exchanger.
52	S/N 4880475 – 28 February 2014 To carry out flt control system ACE Ops test.	28 February 2014 Flt cont ACE ops test c/out as per SIPX12-6-007MR. Satis.

## APPENDIX 1.6B - ENGINE HEALTH MONITORING – DECODED DATA FOR TAKE-OFF AND CLIMB REPORTS

### EHM Parameter Key

	<b>Parameter description</b>	<b>Units</b>
A/P	Autopilot status	discrete
A/T	Autothrottle status	discrete
ACID	Aircraft identification	
AOHE	Air Oil Heat Exchanger Position Selected	discrete
ASMT	Assumed Day Temperature	Celsius
AVM	Vibration monitoring system status word	hexadecimal
BBA	Broadband vibration channel A	ACU
BBB	Broadband vibration channel B	ACU
CAS	Calculated airspeed	knots
DATE	Date	dd/mm/yyyy
DP	ASCS Duct Pressure	psi
DPT	Departure airport	
DRTE	Thrust derate switch	
DST	Destination airport	
EBFR	Environmental control system bleed flow rate	lb/s
EBLD	Environmental control system discrete	discrete
EECT	EEC temperature	Celsius
EGT	Exhaust gas temperature	Celsius
EPRACT	EPR actual	
EPRACT-L	EPR actual - left	
EPRACT-R	EPR actual - right	
EPRCMD	EPR commanded	
EPRMAX	EPR maximum	
EPRTRA	EPR throttle angle	
ESN	Engine serial number	
	<b>Parameter description</b>	<b>Units</b>
N3	N3 shaft speed	%
N3VA	N3 shaft vibration channel A	ACU
N3VB	N3 shaft vibration channel B	ACU

	<b>Parameter description</b>	<b>Units</b>
ESTAT	EEC status	
FAV	ASCS FAMV Actual Position	
FCC3	EEC status word	
FCC4	EEC status word	
FCC5	EEC status word	
FCC6	EEC status word	
FLCT	Report Copy number	
FLT	Flight number	
FM	Flight phase	
FMVDMD	Fuel metering valve demanded position	
FMVSEL	Fuel metering valve commanded position	
FNDERATESW	Thrust derate switch	
FUEL T	Fuel temperature in a/c tank	Celsius
GENLD	Generator load	shp
GMT	Time	hh:mm:ss
GWT	Gross Weight	
LAT	Latitude	degrees
LONG	Longitude	degrees
MACH	Mach number	
N1	N1 shaft speed	%
N1VA	N1 shaft vibration channel A	ACU
N1VB	N1 shaft vibration channel B	ACU
N2	N2 shaft speed	%
N2VA	N2 shaft vibration channel A	ACU
N2VB	N2 shaft vibration channel B	ACU
	<b>Parameter description</b>	<b>Units</b>
PKFR	Pack mass flow rate	lb/s
PKWD	ECS status discretes	hexadecimal
PTO	ASCS PC Out temperature	Celsius

## APPENDIX 1.6B - ENGINE HEALTH MONITORING – DECODED DATA FOR TAKE-OFF AND CLIMB REPORTS

NAC1	Nacelle temperature zone 1 (firewire resistance)	ohms
NAC2	Nacelle temperature zone 2 (firewire resistance)	ohms
OILP	Oil pressure	psi
OILT	Oil temperature	Celsius
P160	P160 pressure (bypass duct)	psi
P2.5	P25 pressure (HPC inlet)	psi
P20	P20 pressure (inlet)	psi
P30	P30 pressure (HPC outlet)	psi
P50	P50 pressure (LP turbine outlet)	psi
PACK	Cabin bleed discrete	discrete
PALT	Pressure altitude	feet
PHF	Vibration phase front	degrees
PHR	Vibration phase rear	degrees

RATG	EEC rating	
SFC		
SWID	Software identification	
T20	T20 temperature (inlet)	Celsius
T25	T25 temperature (HPC inlet)	Celsius
T30	T30 temperature (HPC outlet)	Celsius
TAT	Total Air Temperature	Celsius
TCAF	Turbine cooling air front	Celsius
TCAR	Turbine cooling air rear	Celsius
THDG	True heading	
TRA	Throttle resolver angle	degrees
TRALOC	Throttle resolver angle	degrees
VSV	VSV angle	degrees
WF	Fuel flow	lb/hr

## APPENDIX 1.6B - ENGINE HEALTH MONITORING – DECODED DATA FOR TAKE-OFF AND CLIMB REPORTS

### Take-off Report

ACID	FLT	FM	FLCT	DATE	GMT	DPT	DST	GWT		
MRO	S370	IC	318	07/03/2014	16:41:58	WMKK	ZBAA	492320		
PALT	CAS	MACH	TAT	LAT	LONG	THDG	SWID	SFC		
344	173.9	0.265	33	2.778	101.708	-349	71002	18676		
A/P	A/T	FUEL T	PKWD	DRTE	ASMT	RHL	RHR	RHC	TEGTL	TEGTR
0	6	30	50F0	3	50	285	286	286	36	36
ESN		N1	N2	N3	EGT	FMVDMD	FMVSEL	NAI	WAI	
L	51463	88.3	96	96.3	760	77.5	77.5	0	0	
R	51462	88.8	95.9	96.7	775.9	78.9	78.9	0	0	
P20	P160	P2.5	P30	P50	T20	T25	T30			
L	15.262	23.65	109.31	444.2	19.8	32.9	282.2	595.8		
R	15.242	23.778	108.53	444.2	19.8	32.9	279.7	593.9		
OILP	OILT	TRA	EPRACT	EPRMAX	EPRCMD	EPRTRA	VSV			
L	103.6	112.5	66.8	1.299	1.497	1.298	1.298	90		
R	109.3	111.6	66.8	1.299	1.5	1.299	1.299	92		
AVM	N1VA	N1VB	N2VA	N2VB	N3VA	N3VB	BBA	BBB	PHF	PHR
L	0	1.13	1.18	0.13	0.12	0.31	0.31	0.71	0.73	66
R	0	1.46	1.49	0.59	0.58	0.28	0.28	0.9	0.92	159
TCAF	TCAR	PACK	PKFR	EBLD	EBFR	FAV	AOHE	FCC3	RATG	
L	427.4	341.2	0	69.7	0	136.6	0	0	0E00	0058
R	425.5	349.2	0	66.8	0	181.5	0	0	0E00	0058
NAC1	NAC2	GENLD	WF	ESTAT	EECT	TRALOC	PTO	DP		
L	3	4	40	22950	3060	38	66.8	366	87	
R	1	2	44	23385	3060	39	66.7	408	85	
TOTL1	TOTL2	TOTL3	TOTL4	TOTL5	TOTL6	TOTL7				
L	0	0	0	0	0	1				
R	0	0	0	0	0	1				
FCC4	FCC5	FCC6								
L	0008	4200	0088							
R	0008	4200	0088							

## APPENDIX 1.6B - ENGINE HEALTH MONITORING – DECODED DATA FOR TAKE-OFF AND CLIMB REPORTS

### Climb Report

ACID	FLT	FM	FLCT	DATE	GMT	DPT	DST	GWT
MRO	S370	CL	318	07/03/2014	16:52:21	WMKK	ZBAA	485880

PALT	CAS	MACH	TAT	LAT	LONG	THDG	SWID	SFC
22278	299.8	0.68	11.8	3.619	102.02	275	71002	19299

A/P	A/T	FUEL T	PKWD	DRTE	ASMT
1	6	30	5030	8	5) Note 1

	ESN	N1	N2	N3	EGT	FMVDMD	FMVSEL	TRALOC
L	51463	93.9	96.6	77.8	778.2	71.3	71.3	65.9
R	51462	94	96.7	78.8	788.1	72.3	72.3	66.1

	P20	P160	P2.5	P30	P50	T20	T25	T30
L	8.39	14.503	70.32	294.8	11.3	11.7	275.2	590.6
R	8.369	14.534	69.79	294.1	11.2	11.7	273.4	590.8

	OILP	OILT	TRA	EPRACT	EPRMAX	EPRCMD	EPRTRA	VSV
L	99	146.8	65.9	1.342	1.363	1.336	1.34	47
R	100	144.8	66.1	1.342	1.366	1.339	1.341	52

	AVM	N1VA	N1VB	N2VA	N2VB	N3VA	N3VB	BBA	BBB	PHF	PHR
L	0	0.62	0.64	0.2	0.21	0.29	0.3	0.48	0.48	25	298
R	0	0.9	0.93	0.55	0.56	0.2	0.2	0.61	0.63	139	) Note 1

	TCAF	TCAR	PACK	PKFR	EBLD	EBFR	FAV	AOHE
L	553.5	501.8	0	217.6	0	163.2	0	0
R	547	512.5	0	217.5	0	154.1	0	0

	NAC1	NAC2	GENLD	WF	ESTAT	EECT	PTO	DP	FCC3	RATG
L	35	35	42	15583	3060	38	392	57	0E00	0058
R	27	29	46	15786	3060	41	392	55	0E00	0058

	ALT	MACH	TAT	EPRACT-L	EPRACT-R	FNDERATESW
	9536	0.449	23.5	1.302	1.302	28
	15000	0.601	22.25	1.283	1.283	38
	25024	0.722	9.5	1.34	1.34	08

	FCC4	FCC5	FCC6
L	0008	4200	0082
	0008	4400	0082

**Note 1:** The character, ), is generated by the ACMS to indicate that the source of information is valid and the parameter data bits are invalid.

## APPENDIX 1.6C – 9M-MRO RADIO LICENCE



### **PENGUNTUKAN RADAS APPARATUS ASSIGNMENT**

Dikeluarkan menurut Akta Komunikasi dan Multimedia 1998  
Issued in accordance with the Communications and Multimedia Act 1998

#### **SYARAT-SYARAT PENGUNTUKAN ASSIGNMENT CONDITIONS**

KATEGORI PERKHIDMATAN SERVICE CATEGORY	JENIS RADAS TYPE OF APPARATUS	TARIKH KUATKUASA EFFECTIVE DATE	TARIKH TAMAT EXPIRY DATE	NO. PENGUNTUKAN RADAS APPARATUS ASSIGNMENT NO.
MOBILE	AIRCRAFT STN	01-01-2013	31-12-2014	01349297-000SU/42013
DIPENGUNTUKAN KEPADA: ASSIGNMENT TO:		NO. PELANGGAN- CLIENT NO.:	LOKASI STesen/ STATION LOCATION:	
<b>MALAYSIAN AIRLINE SYSTEM BERHAD QUALITY ASSURANCE DEPARTMENT, 1ST FLOOR, KIA HANGAR COMPLEX, 64000 SEPANG, SELANGOR</b>		770	BOEING 777-2H6	
FREKUENSI PANCARAN (MHz) TRANSMIT FREQUENCY (MHz)	FREKULENSI TERIMA (MHz) RECEIVE FREQUENCY (MHz)	LEBAR JALUR (kHz) BANDWIDTH (kHz)	KUASA (W) POWER (W)	SYARAT-SYARAT PERHLUBURAN YANG DIBENARKAN AUTHORISED COMMUNICATIONS CONDITIONS

#### Licence Appendix:

2.0 - 27.000 MHz INTERNATIONAL AND NATIONAL AERONAUTICAL MOBILE SERVICES  
ONLY EXCEPT AERONAUTICAL MOBILE SERVICES(OFF ROUTE)  
118.0 - 121.4 MHz INTERNATIONAL AND NATIONAL AERONAUTICAL MOBILE SERVICES  
121.5 MHz EMERGENCY FREQUENCY  
121.6 - 121.975 MHz INTERNATIONAL AND NATIONAL AERODROME SURFACE COMM.  
122 - 123.05 MHz NATIONAL AERONAUTICAL MOBILE SERVICES  
123.1 MHz AUXILIARY FREQUENCY (SAR)  
123.15 - 123.675 MHz NATIONAL AERONAUTICAL MOBILE SERVICES  
123.7 - 129.675 MHz INTERNATIONAL AND NATIONAL AERONAUTICAL MOBILE SERVICES  
129.7 - 130.875 MHz NATIONAL AERONAUTICAL MOBILE SERVICES  
130.9 - 135.975 MHz INTERNATIONAL AND NATIONAL AERONAUTICAL MOBILE SERVICES  
243 MHz EMERGENCY FREQUENCY  
406 MHz EPIRB - EMERGENCY FREQUENCY

ALL USERS OF RADIO ONBOARD AIRCRAFT MUST HOLD A RESTRICTED RADOTELPHONE  
OPERATORS (AERONAUTICAL) CERTIFICATE OF PROFICIENCY.

#### ISYARAT PANGGILAN CALLSIGN

9M-MRO

### **MAKLUMAT INFORMATION**

REF. NO.: IS-AK(4.1)

Pemegang penguntukan radas boleh, tidak kurang daripada enam puluh hari (60) sebelum habis tempoh penguntukan radas, membuat permohonan beru kepada Suruhanjaya bagi mendapatkan penguntukan radas di salah satu daripada alamat-alamat berikut:

The apparatus assignment holder may, not less than sixty days (60) before the expiry of the apparatus assignment, make a fresh application to the Commission for an apparatus assignment at any one of the following addresses:

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Off Persejeraan Multimedia,  
63800 Cyberjaya, Selangor.  
(Tel: +60 3 86 88 80 00 Faks: +60 3 86 88 10 01)  
(http://www.mcmc.gov.my)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Pusat Wilayah Tempatan,  
Leb 17, Wisma Sunwayis,  
No. 1, Jalan Tandu Ampera, Zalakah 9/C,  
Sekyen 9, 40100 Shah Alam, Selangor.  
(Tel: +60 3 55 18 77 01 Faks: +60 3 55 18 77 10)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Agensi Wilayah Utara,  
Bangunan Telukong Mayang,  
No. 2828-1-1, Tingkat 1, Jalan Bagus Luar,  
12005 Butterworth Pulau Pinang.  
(Tel: +60 4 32 28 228 Faks: +60 4 32 29 448)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Pusat Wilayah Selatan,  
Suite 7A, Level 7,  
Menara Aman, Jalan Tuks,  
80000 Jalan Besar, Johor.  
(Tel: +60 7 22 66 700 Faks: +60 7 22 78 700)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Pejabat Wilayah Timur,  
88004, Sri Kuantan Square,  
25000 Kuantan, Pahang.  
(Tel: +60 9 37 31 300 Faks: +60 9 37 57 586)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Pejabat Wilayah Sabah,  
6-10-18, 10<sup>th</sup> Floor,  
No. 6, Menara MAA,  
Lenggong Ap-1, Ap-1 Centre  
88000 Kota Kinabalu, Sabah.  
(Tel: +60 88 27 05 50 Faks: +60 88 29 32 05)

**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Pusat Kawangan Sandakan,  
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Pengerusi Suruhanjaya Komunikasi dan Multimedia Malaysia  
Chairman of the Malaysian Communications and Multimedia Commission  
Chairman of Malaysian Communications and Multimedia Commission  
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## APPENDIX 1.6D – ELT ACTIVATION SUMMARY (SOURCE: ICAO)

### Emergency Locater Transmitter Activation

The parameters in the query for the status of Emergency Locator Transmitters (ELT) after an occurrence were set at:

Dates between 1 January 1983 and 30 June 2014 (approximately 30 years), including all occurrences (accidents and incidents) involving aircraft in the mass group 5 701 kg and above and records with descriptive factors and ELT parameters that have value.

The query found 403 records in the ADREP database in which a response was inserted relating to ELTs. Of these occurrences 257 were classified as accidents. Due to incidents being less severe, a lower probability of ELT implications are expected. The query then focused on accidents. The following table indicates the aircraft mass groupings of the aircraft involved in accidents:

Aircraft mass group	Accidents
5 701 to 27 000 Kg	161
27 001 to 272 000 Kg	87
> 272 000 Kg	9
Total	257

The taxonomy for the attribute to indicate the status of the ELT (whether it worked as designed or why it did not work) was used to compile the following table: (\* after 1994)

## APPENDIX 1.6D – ELT ACTIVATION SUMMARY (SOURCE: ICAO)

ELT status	Cases
Battery failed	14
Damaged	11
Internal failure	5
Not activated	22
Not carried	84 (12)*
Operated effectively	39
Other	21
Submerged	1
Terrain shielding	1
Unknown	59
Total	257

In 39 cases of the 257 accident records, the ELT operated effectively, which implies that 15% of the ELTs operated effectively. The data indicated that in 84 cases, *no ELT* was carried. Considering that provisions for the carriage of ELTs became applicable in Annex 6 on 10 November 1994, the *no ELT carried* data was evaluated to determine the situation after 1994 (past 20 years approximately) and the number reduced from 84 to 12.

29 July 2014

### 1.6E.1 Air Conditioning and Pressurisation

The aircraft has two air conditioning systems divided into left pack and right pack. Engine bleed air provides the pneumatic source for air conditioning and pressurisation.

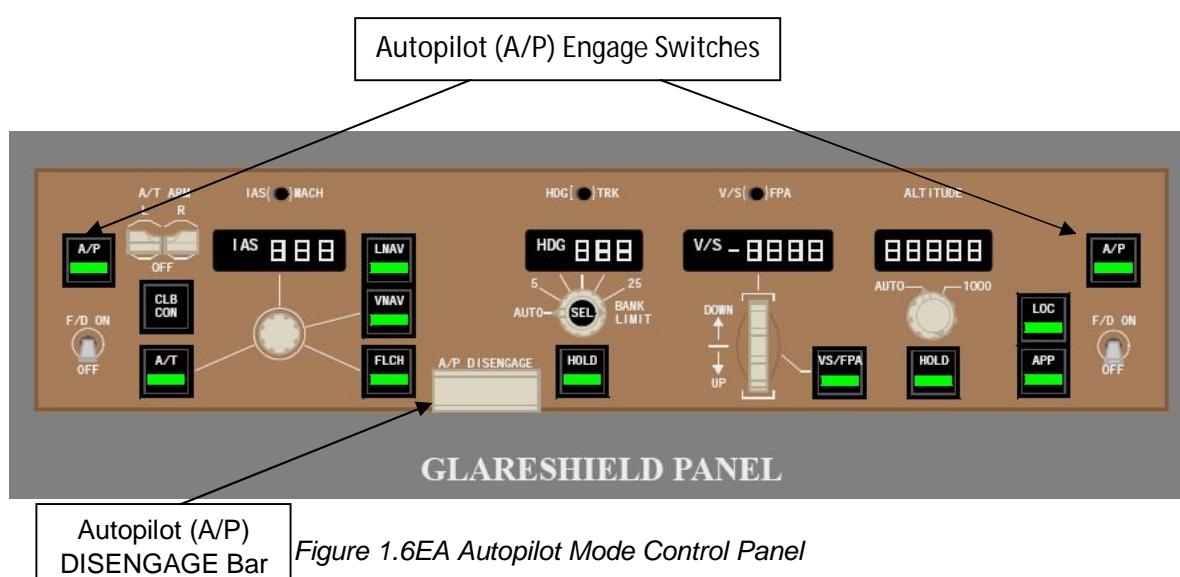
Two electronic controllers provide pack and zone control. Each controller has two channels that alternate command cycle. Cockpit and cabin temperature selection is monitored and the Air cycle machine and temperature control valves will be commanded to deliver temperature conditioned air to the various cabin zones.

Conditioned air is also used for electronic equipment cooling. This is supplied through a series of pneumatic valves with supply and exhaust fans. Exhaust air from the equipment cooling flow is routed to the forward cargo and used for forward cargo compartment heating.

Two cabin pressure controllers regulate the aircraft pressurisation and command the pneumatic system. System operation is automatic and works in conjunction with the forward and aft outflow valves that are used for pressurisation. The outflow valves can also be manually operated.

### 1.6E.2 Autopilot Flight Director System (AFDS)

The autopilot is engaged by operation of either of two A/P pushbutton switches on the Mode Control Panel (MCP) located on the glareshield panel (*Figure 1.6EA*). Once engaged the autopilot can control the aircraft in various modes selected on the MCP. Normal autopilot disengagement is through either control wheel autopilot disengage switch. The autopilot can disengage if the flight crew override an autopilot command through the use of the rudder pedals or control column. The autopilot can also be disengaged by pushing on the A/P Disengage Bar on the MCP. The AFDS consists of three autopilot flight director computers and the MCP.



*Figure 1.6EA Autopilot Mode Control Panel*

### **1.6E.2.1 Roll Modes**

The following AFDS roll modes are available during climb, cruise and descent (*Figure 1.6EB* below):

#### **a) Lateral Navigation (LNAV)**

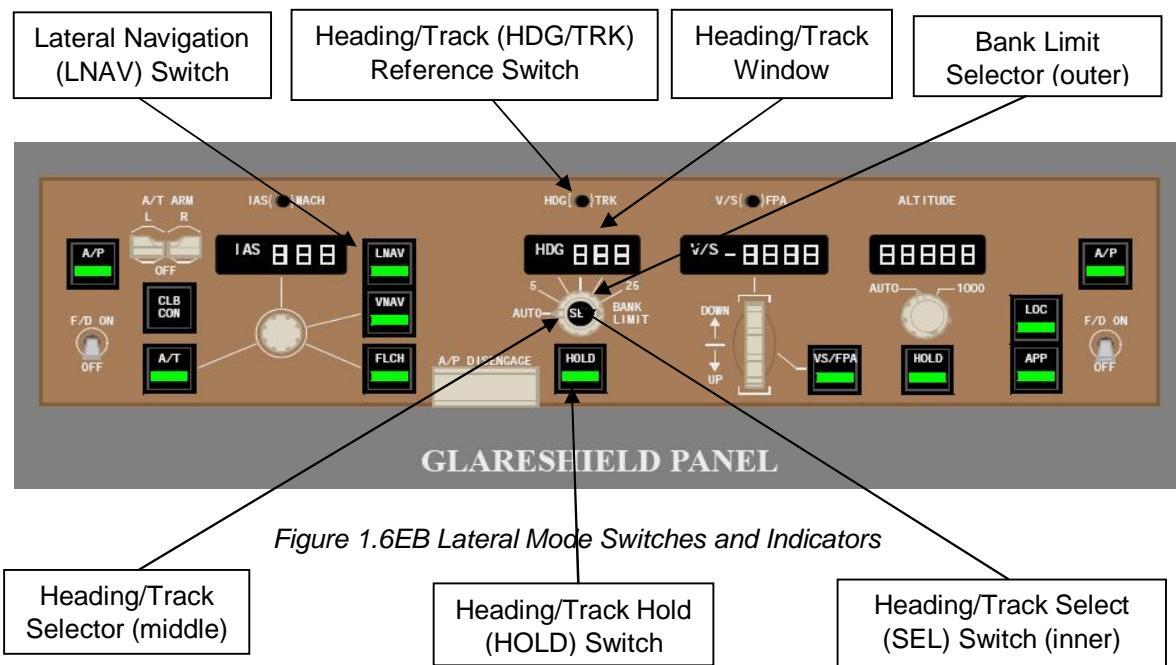
Pushing the LNAV switch arms, selects or disarms the LNAV mode. The commands come from the active Flight Management Computing Function (FMCF) when there is a valid navigation data base and an active flight plan. The Control Display Units (CDUs) can send LNAV steering commands when there is no active FMCF. The AFDS use this priority to select a CDU command:

- Left, if valid
- Centre, if left not valid
- Right, if left and centre not valid.

The CDU is the primary control and display interface for the FMCF. The CDU is used to enter flight plan data and performance data. The CDU can also be used to manually tune the navigation radios and access maintenance pages.

#### **b) Heading Hold (HDG HOLD/Track hold (TRK HOLD))**

Pushing the Heading/Track Hold switch selects Heading or Track hold. In this mode, the aircraft holds either heading (HDG) or track (TRK). If the HDG/TRK display on the MCP shows TRK, the aircraft holds track. If the HDG/TRK display on the MCP shows HDG, the aircraft holds heading.



**b) Heading select (HDG SEL)/Track select (TRK SEL)**

Pushing the Heading/Track Select switch (inner) selects Heading select or Track select modes. In this mode, the aircraft turns to the heading or track that shows in the heading/track window. Pushing the Heading/Track (HDG/TRK) Reference switch alternately changes the heading/track reference between heading and track. Rotating the Heading/Track selector (middle) sets the heading or track in the heading/track window. If the HDG/TRK display shows HDG, the aircraft goes to and holds the heading that shows in the heading/track window. If the HDG/TRK display shows TRK, the aircraft goes to and holds the track that shows in the heading/track window. Rotating the Bank Limit selector (outer) sets the bank limit when in the Heading select or Track select modes. In the AUTO position, the limit varies between 15 - 25 degrees, depending on True Airspeed. When the other detented positions are selected, the value is the maximum, regardless of airspeed.

**1.6E.2.2 Pitch Modes**

The following AFDS pitch modes are available during climb, cruise and descent (*Figure 1.6EC* below).

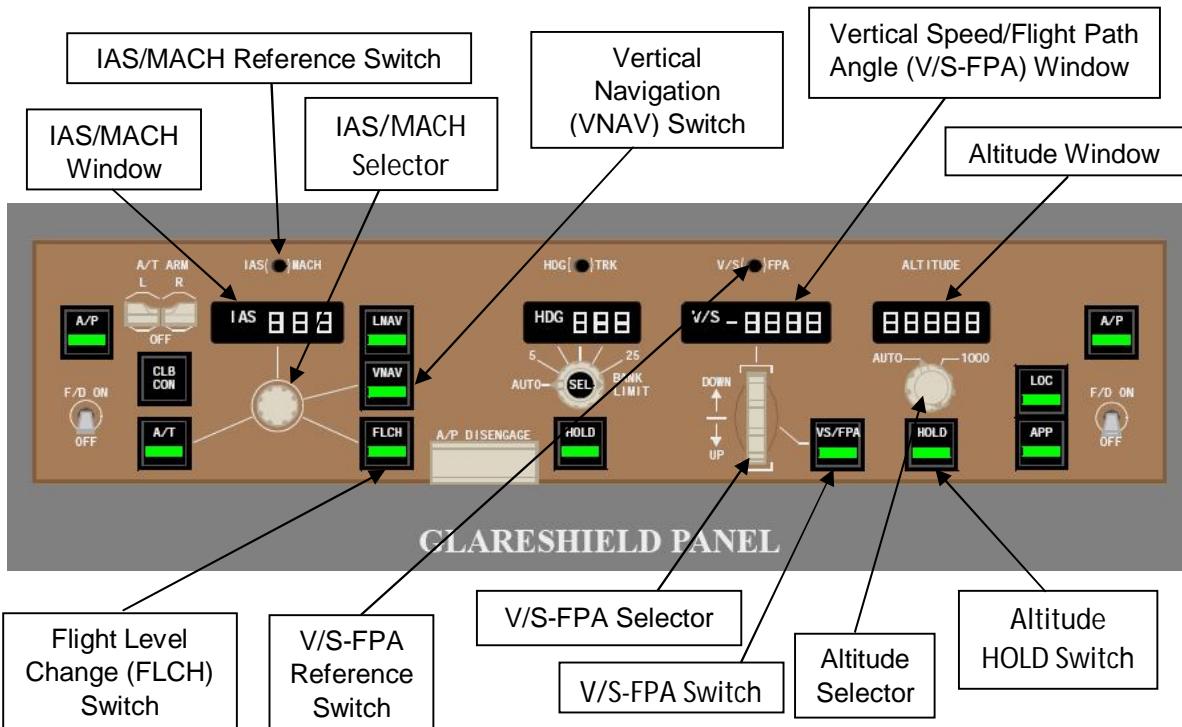
**a) Vertical navigation (VNAV)**

Pushing the VNAV switch arms, selects or disarms the VNAV mode. The VNAV mode is a mix of throttle and elevator commands that control the vertical flight path. The FMCF vertical steering commands come from the active FMCF based on the navigation data and the active flight plan.

**b) Vertical speed (V/S)/Flight Path Angle (FPA)**

Pushing the V/S-FPA switch selects the V/S or FPA mode. Rotating the V/S-FPA selector Up or Down sets the vertical speed or flight path angle in the vertical speed/flight path angle window. Pushing the V/S-FPA Reference switch alternately changes vertical speed/flight path angle window references between vertical speed and flight path angle. The vertical speed or flight path angle command is an elevator command. The pilot uses this mode to change flight levels. The pilot must set the engine thrust necessary to hold the vertical speed or flight path angle command. When the V/S/FPA display shows V/S, the aircraft goes to and holds the vertical speed that shows on the vertical speed/flight path angle window.

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION



*Figure 1.6EC Vertical Mode Switches and Indicators*

### c) Flight Level Change (FLCH)

Pushing the FLCH switch selects the Flight level change speed mode. The FLCH command is a mix of thrust and elevator commands to change flight levels. When the IAS/MACH display shows IAS, the elevator command holds the speed that shows on the IAS/MACH window. When the IAS/MACH display shows MACH, the elevator command holds the MACH that shows on the IAS/MACH window. Rotating the IAS/MACH selector sets the speed in the IAS/MACH window. Pushing the IAS/MACH Reference switch alternately changes the IAS/MACH window between IAS and MACH. The Thrust Management Computing Function (TMCF) supplies the engine thrust commands.

### d) Altitude Hold (ALT)

Pushing the Altitude Hold switch selects the Altitude hold mode. In this mode, the aircraft holds the barometric altitude present when the pilot pushes the altitude HOLD switch.

#### 1.6E.2.3 Landing Modes

The following AFDS functions are available for landing:

##### a) Localizer (LOC)

The LOC mode captures and holds the aircraft to a localizer flight path.

##### b) Glideslope (G/S)

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

The G/S mode captures and holds the aircraft to a vertical descent flight path.

### c) Flare (FLARE)

The flare mode controls the aircraft to a smooth touchdown at a point past the glideslope antenna. This is a computed command and is not part of the glideslope mode.

### d) Runway Alignment

In crosswind conditions, the runway alignment mode supplies roll and yaw control to decrease the aircraft crab angle for touchdown. The runway alignment mode also includes roll and yaw control for an engine failure in approach during autoland.

### e) Rollout (ROLLOUT)

After touchdown, the rollout mode controls the aircraft to the runway centre line. Aircraft deviation from the localizer centre line supplies rudder and nose wheel steering signals.

### f) Go-Around (TO/GA)

The go-around mode controls roll and pitch after an aborted approach. Also, the TMCF controls thrust during go-around.

Pushing the Localizer (LOC) switch arms, disarms or captures the localizer as roll mode. Pushing the Approach (APP) switch arms, disarms or captures the localizer as roll mode and glidepath (G/S) as pitch mode (*Figure 1.6DD* below).



Figure 1.6ED Approach Mode Switches

### 1.6E.3 Autothrottle (Thrust Management Computing Function – TMCF)

The autothrottle (A/T) commands the thrust levers to achieve an engine thrust setting, or a selected airspeed. The A/T is armed by the operation of two toggle switches and engaged by the operation of a pushbutton switch on the MCP (*Figure 1.6DE* below).

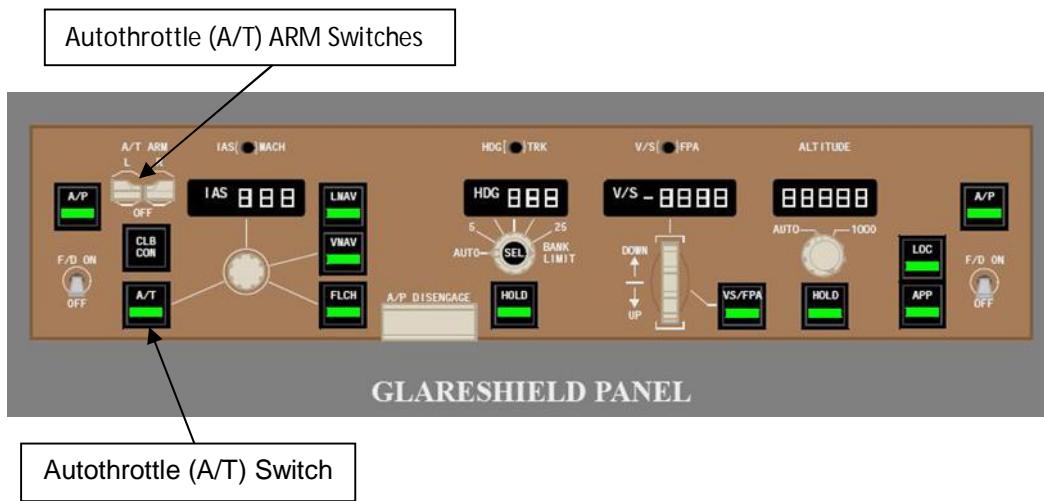


Figure 1.6EE Autothrottle Switches

During normal flight operations, the flight crew uses the TMCF to perform several routine or normal operations and tasks. These operations or tasks relate to autothrottle modes. The autothrottle (A/T) modes operate in these flight phases:

- Take-off (TO)
- Climb (CLB)
- Cruise (CRZ)
- Descent (DES)
- Approach (APP)
- Go-around (GA)

Autothrottle functions that relate to flight phases are flare retard during autoland and autothrottle disconnect. Autothrottle thrust mode annunciations relate to pitch mode annunciations on the Primary Flight Display (PFD).

### 1.6E.3.1 Autothrottle Modes

#### a) Take-off (TO)

In TO, the autothrottle controls thrust to the take-off thrust limit. The autothrottle mode annunciation on the PFD is thrust reference (THR REF). At a threshold air speed, the autothrottle mode annunciation on the PFD changes to HOLD.

#### b) Climb (CLB)

i. These are the three autothrottle mode selections in climb:

- Vertical navigation (VNAV)
- Flight level change (FLCH)
- Autothrottle (MCP) speed mode or thrust mode.

ii. These are the autothrottle mode annunciations for these modes:

- THR REF when VNAV engages

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

- THR when FLCH engages
- SPD or THR REF when autothrottle mode engages.

The autothrottle speed mode only engages when VNAV, FLCH, and TO/GO are not active and the aircraft is in the air.

### c) Cruise (CRZ)

- i. These are the two autothrottle modes in cruise:
  - VNAV
  - Autothrottle speed mode.
- ii. These are the autothrottle mode annunciations in cruise:
  - SPD when VNAV engages
  - SPD, VNAV is not active

### d) Descent (DES)

- i. These are the three autothrottle modes in descent:
  - VNAV
  - FLCH
  - Autothrottle speed mode.
- ii. These are the autothrottle mode annunciations in descent:
  - IDLE, THR, or HOLD shows for VNAV
  - THR, or HOLD shows for FLCH
  - SPD.

### e. Approach (APP)

SPD is normal mode in approach with glideslope active or in a manual approach.

#### i. Go-Around (GA)

A GA mode request causes the autothrottle mode to change to THR. A second GA request causes the autothrottle mode to change to THR REF. The TO/GA lever must be pushed to request GA.

#### ii. Flare Retard

Flare retard occurs when a specified altitude threshold has been achieved during approach with a command from the autopilot flight director system (AFDS). The autothrottle mode changes to IDLE during a flare retard.

### 1.6E.3.2 Autothrottle Disconnect

The autothrottle disconnects when there is a manual autothrottle disconnect or when there is thrust reverser application. This occurs after initial touchdown during rollout.

### 1.6E.4 Electrical Power

The electrical system generates and distributes AC and DC power to other aircraft systems, and is comprised of: main AC power, backup power, DC power, standby power, and flight controls power. System operation is automatic. Electrical faults are automatically detected and isolated. The AC electrical system is the main source for airplane electrical power. *Figure 1.6EF* shows the cockpit Electrical panel where electrical switching can be made. It also shows the associated lights.

#### 1.6E.4.1 Electrical Load Management System (ELMS)

The ELMS provides load management and protection to ensure power is available to critical and essential equipment. If the electrical loads exceed the power available (aircraft or external), ELMS automatically sheds AC loads by priority until the loads are within the capacity of the aircraft or ground power generators. The load shedding is non-essential equipment first, then utility busses. Utility busses are followed by individual equipment items powered by the main AC busses. When an additional power source becomes available or the loads decrease, ELMS restores power to shed systems (in the reverse order). The message LOAD SHED displays on the electrical synoptic when load shed conditions exist.

#### 1.6E.4.2 AC Electrical System Power Sources

The entire aircraft AC electrical load can be supplied by any two main AC power sources. The main AC electrical power sources are:

- left and right engine integrated drive generators (IDGs)
- APU generator
- primary and secondary external power

The power sources normally operate isolated from one another. During power source transfers on the ground (such as switching from the APU generator to an engine generator) operating sources are momentarily paralleled to prevent power interruption.

#### 1.6E.4.3 Integrated Drive Generators (IDGs)

Each engine has an IDG. Each IDG has automatic control and system protection functions. When an engine starts, with the GENERATOR CONTROL switch selected ON, the IDG automatically powers the respective main bus. The previous power source is disconnected from that bus.

The IDG can be electrically disconnected from the busses by pushing the GENERATOR CONTROL switch to OFF. The IDG can also be electrically disconnected from its respective bus by selecting an available external power source prior to engine shutdown. The DRIVE light illuminates and the EICAS message ELEC GEN DRIVE L or R displays when low oil pressure is detected in an IDG. The IDG drive can be disconnected from the engine by pushing the respective DRIVE DISCONNECT switch. The IDG cannot be reconnected by the flight crew. High drive temperature causes the IDG to disconnect automatically.

### **1.6E.4.4 APU Generator**

The APU generator is electrically identical to the IDG generators. The APU generator can power either or both main busses, and may be used in flight as a replacement to an IDG source. If no other power source is available when the APU generator becomes available, the APU generator automatically connects to both main AC busses. If the primary external source is powering both main busses, the APU powers the left main bus, and the primary external source continues to power the right main bus. If the primary external source is powering the right main bus, and the secondary external source is powering the left main bus, the APU then powers the left main bus and the primary external source continues to power the right main bus. If the secondary external source is powering both main busses, the APU then powers both main busses.

The APU generator OFF light illuminates when the APU is operating and the APU generator breaker is open because of a fault or the APU GENERATOR switch is selected OFF. When the APU GENERATOR switch is ON and a fault is detected, the APU generator cannot connect to the busses.

In flight, when both transfer busses are unpowered, the APU starts automatically, regardless of APU selector position.

### **1.6E.4.5 AC Electrical Power Distribution**

AC power is distributed through the left and right main busses and the ground service bus. The right IDG normally powers the right main bus and the left IDG normally powers the left main bus. The APU normally powers both main busses when they are not powered by any other source.

When external power is connected:

- primary external power normally powers the right main bus
- secondary external power normally powers the left main bus

Bus tie relays, controlled by BUS TIE switches, isolate or parallel the right and left main busses. When both BUS TIE switches are set to AUTO, the bus tie system operates automatically to maintain power to both main busses.

Power transfers are made without interruption when the airplane is on the ground, except when switching between primary and secondary external power sources. The source order for powering left and right main busses in flight is the:

- respective IDG
- APU generator
- opposite IDG

### **1.6E.4.6 Autoland**

During autoland, the busses isolate to allow three independent sources to power the three autopilots:

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

- the left IDG powers the left AC transfer bus, the left main DC bus, and the captain's flight instrument bus
- the right IDG powers the battery bus and AC standby bus through the main battery charger
- the backup system powers the right AC transfer bus, the right DC bus, and the first officer's flight instrument bus.

### 1.6E.4.7 Backup AC Electrical System

The backup electrical system is designed to automatically provide power to selected aircraft systems. The backup electrical system automatically powers one or both transfer busses when:

- only one main AC generator (includes APU) is available
- power to one or both of the main AC busses is lost
- approach (APP) mode is selected for autoland
- the system is automatically tested after engine starts

The system transfers power without interruption.

### 1.6E.4.8 Backup Generators

Backup power is provided by one variable speed, variable frequency generator mounted on each engine. A frequency converter converts the generator frequency to a constant 400 Hz. Only one backup generator can power the converter at a time.

Each backup generator contains two permanent magnet generators (PMGs) that supply power to the flight control DC electrical system (refer to DC Electrical System). If both IDGs and the APU generator are inoperative, a backup generator powers essential airplane equipment. To reduce electrical loading on the backup generator, the following systems are inoperative:

- TCAS
- SATCOM
- Right HF radio

### 1.6E.4.9 DC Electrical System

The DC electrical system includes the main DC electrical system and the flight control DC electrical system. The main DC electrical system uses four transformer-rectifier units (TRUs) to produce DC power. The TRUs are powered by the AC transfer busses.

TRU DC electrical power is distributed to various DC busses as follows.

The left TRU powers the left main DC bus, which provides a second DC power source for:

- left flight control power supply assembly (PSA)
- right main DC bus.

The right TRU powers the right main DC bus, which provides a second DC power source for:

- right flight control PSA
- left main DC bus.

The C1 TRU powers the captain's flight instrument bus and the battery bus. The captain's flight instrument bus provides a second DC power source for:

- centre flight control PSA
- first officer's flight instrument bus

The C2 TRU powers the first officer's flight instrument bus, which provides a second DC power source for the captain's instrument bus.

### 1.6E.4.10 Batteries

The main battery is connected directly to the hot battery bus and provides standby power to other busses. The main battery charger normally powers the hot battery bus and maintains the main battery fully charged.

The APU battery is connected directly to the APU battery bus and provides dedicated power to the APU electric starter, which is used when sufficient bleed air duct pressure is unavailable for the APU air turbine starter. The APU battery charger normally powers the APU battery bus and maintains the APU battery fully charged.

### 1.6E.4.11 Flight Control DC Electrical System

The flight control DC electrical system is a dedicated power source for the primary flight control system. Primary power for the flight control DC electrical system comes from permanent magnet generators (PMGs) housed within each backup generator. Variable frequency PMG AC power is used by individual power supply assemblies (PSAs) to provide DC power to the three flight control DC busses. To ensure a high level of system reliability, each PSA also has multiple DC power sources. If primary PMG AC power is not available, secondary power for the left and right PSAs is provided by the related main DC bus. Secondary power for the centre PSA is provided by the captain's flight instrument bus. The hot battery bus provides additional backup power for the left and centre PSAs only. Each PSA also uses a dedicated battery to prevent power interruptions to the related flight control DC bus. The batteries have limited capacity and are incorporated to supply power for brief periods during PSA power source transfers.

### 1.6E.4.12 Standby Electrical System

The standby electrical system can supply AC and DC power to selected flight instruments, communications and navigation systems, and the flight control system, if there are primary electrical power system failures. The standby electrical system consists of:

- the main battery
- the standby inverter
- the RAT generator and its associated generator control unit
- the C1 and C2 TRUs

### a) Main Battery

The main battery provides standby power to the:

- hot battery bus
- battery bus
- captain's flight instrument bus
- left and centre flight control PSAs
- standby inverter.

**Note:** The main battery can power the standby system for a minimum of 10 minutes.

### b) Standby Inverter

The standby inverter converts DC power to AC power. The inverter powers the AC standby bus if the left transfer bus is not powered.

### c) Ram Air Turbine (RAT) Generator

The RAT generator provides standby power to the C1 and C2 TRUs. The RAT can supply electrical and hydraulic power simultaneously. If the RAT is unable to maintain RPM, the RAT generator electrical load is shed until RPM is satisfactory. Power for standby electrical loads is provided by the main battery during deployment of the RAT and when RAT generator loads are shed. The RAT is deployed automatically if both AC transfer busses lose power in flight. The RAT can be manually deployed by pushing the RAM AIR TURBINE switch on the overhead panel.

#### 1.6E.4.13 Cabin Systems and Utility Power

Electrical power to some cabin and utility systems are controlled from the flight deck. The IFE/PASS SEATS Power switch controls power to the IFE and passenger seats. The CABIN/UTILITY Power switch controls power to cabin and utility systems.

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

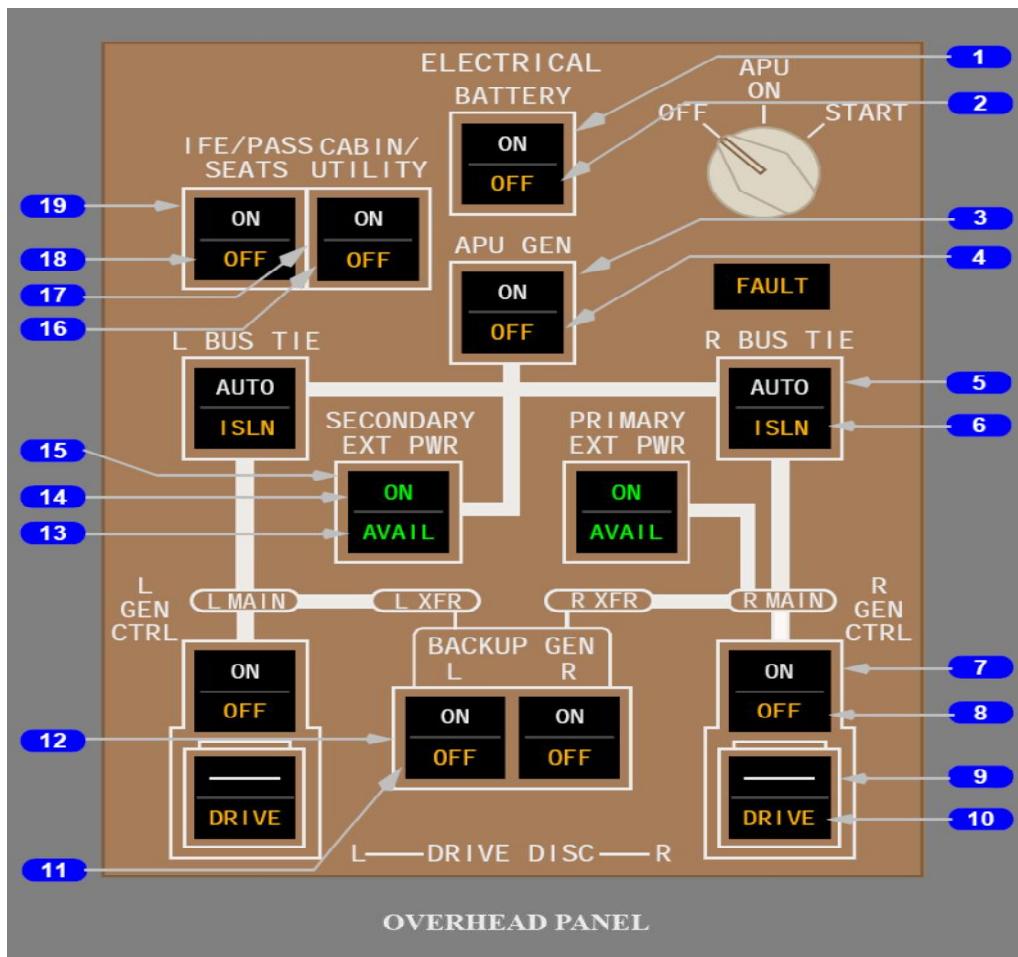


Figure 1.6EF Electrical Power Panel Switches/Lights

Electrical Power Panel Switches/Lights (Figure 1.6EF)			
1	Battery Switch	11	Backup Generator OFF Lights
2	Battery OFF Light	12	Backup Generator (BACKUP GEN) Switches
3	APU Generator (APU GEN) Switch	13	External Power AVAIL Lights
4	APU Generator OFF Light	14	External Power ON Lights
5	BUS TIE Switches	15	External Power (EXT PWR) Switches
6	BUS Isolation (ISLN) Lights	16	CABIN/UTILITY Power OFF Light
7	Generator Control (GEN CTRL) Switches	17	Cabin/Utility (CABIN/UTILITY) Power Switch
8	Generator OFF Lights	18	IFE/PASS SEATS OFF Light
9	Drive Disconnect Switches	19	In Flight Entertainment System/Passenger Seats (IFE/PASS SEATS) Power Switch
10	Generator DRIVE Lights		

### **1.6E.5 Cabin and Cargo Compartments**

The aircraft, 9M-MRO was configured to 35 business class and 247 economy class seats. The business class and economy class seats were procured from BE Aerospace. An approved Lay Out of Passenger Accommodation (LOPA) determines the cabin interior configuration. Safety and emergency equipment are fitted and positioned throughout the cabin.

There is one crew rest area in the forward cabin behind the cockpit. The cockpit door is reinforced and electrically locked. There is a cabin crew rest area in the aft cabin lower lobe. Access is through a compartment door adjacent to Door 3R.

There are four Type A passenger and service doors on each side of the aircraft. Each door has a window. The passenger compartment has windows along both sides of the passenger compartment. Each exit is fitted with a slide raft system for emergency use.

The overhead passenger cabin is fitted with Passenger Service Units (PSU) above each seat row. They are hinged and secured by a magnetic latch that is electrically controlled. In the event of cabin depressurisation the PSU magnetic latch will be electrically released and allow the oxygen masks to drop for passenger use.

The aircraft cabin lighting system comprises of ceiling lights, sidewall lights, entry lights and emergency lights. The cabin management system (CMS) controls the passenger cabin lighting.

The lower section of the fuselage houses forward, aft and bulk cargo compartments. A cargo handling system is fitted for the forward and aft cargo to command power drive units (PDU) to move cargo containers laterally and longitudinally.

Cargo compartment sidewalls, ceilings and walkways are constructed of fire resistant materials. There is a smoke detection warning system and fire extinguishing system installed to contain any smoke or fire eventualities.

### **1.6E.6 Fire Protection**

Fire protection and overheat detection systems are provided for the Engines, APU, wheel well, cargo compartment and the pneumatic ductings.

The Rolls Royce engine has a dual loop fire detection system that monitors the external areas of the engine. The detectors monitor the engine for fire and overheat conditions. Detector signals are monitored by a detection card and sends signals to the cockpit indication system. The engines have a two shot fire extinguishing system. The pilot can select to discharge the fire bottle. Halon gas will be discharged through nozzles positioned around the engine.

The APU has a dual loop fire detection system around the APU compartment. If a fire condition is detected, a signal is sent to the detection card. This will automatically activate a

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

single shot fire extinguishing system that will discharge Halon gas into the APU compartment.

The wheel well fire detection system monitors the wheel well for brake and tyre fires.

The forward cargo compartment and aft cargo compartment have smoke detectors to monitor the air. The smoke detectors analyse the air for smoke particles. The forward cargo smoke detector also process signals from the main equipment centre cooling smoke detector.

The cargo compartment has an extinguishing system that comprises of five extinguishing bottles fitted in the forward cargo compartment. There are series of pipes that connect the bottles to the forward and aft cargo compartments. The detection and extinguishing system is monitored through a smoke detection card file and annunciated in the cockpit,

The high pressure pneumatic ducting from the engines and the APU have overheat protection. Should a duct leak be detected the associated pneumatic system will be isolated.

### 1.6E.7 Flight Controls

The flight control system is an electronic fly by wire system. It is divided into two separate systems to control the aircraft in flight.

Primary Flight control system (PFCS) is a modern three axis, fly by wire system. It controls the roll, yaw and pitch commands using the ailerons, flaperons, spoilers, elevators, rudder and horizontal stabilizer.

The high lift control system (HLCS) comprises of inboard and outboard trailing edge flaps, leading edge flaps and Kruger flaps. It supplies increased lift at lower speeds for take-off and landing.

The PFCS and HLCS uses 3 dedicated ARINC 629<sup>1</sup> Flight Control digital busses to transmit data signals to command the flight controls. Mechanical control is available to two spoilers and horizontal stabilizers.

The PFCS has three operational modes of command - Normal mode, Secondary mode and Direct mode. The PFCS command signals are directed through four Actuator Control Electronic (ACE) units that change analogue signals to digital format to send to three Primary Flight Computers (PFC).

The PFC also receives airspeed, altitude and inertial reference data from Airplane Information Management System (AIMS), Air Data Inertial Reference Unit (ADIRU) and Secondary Attitude and Air Data Reference unit (SAARU). The PFCs calculate the flight control commands based on control laws, augmentation and envelop protections. The digital command signals from the PFCs go to the ACEs that will change the digital signal to

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<sup>1</sup> Aeronautical Radio, Incorporated (ARINC) 629 is an aeronautical standard which specifies multi-transmitter data bus protocol where up to 128 units can share the same bus.

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

analogue format and send to the power control units (PCU) that will command the control surface movement.

The HLCS operates in three modes, primary, secondary and alternate. Command signals are transmitted from the flap lever to two Flap Slat Electronic Units (FSCU).

The FSCU process the flap command and control the sequence of flaps and slats operation. It also commands auto slat, load relief and asymmetry protection.

Two spoilers and the horizontal stabilizer receive mechanical control signals from pilots input.

### **1.6E.8 Fuel System**

The fuel system has three fuel tanks, two integral wing tanks and one centre tank. The tanks are part of the wing structure and have many fuels system components located inside the tanks and on the rear spar.

The fuel tanks are vented through channels in the wing to allow near ambient pressure during all phases of flight.

An integrated refuel panel (IRP) on the lower left wing and two refuel receptacles on each wing allows rapid pressure refueling of the aircraft. The refueling operation is automatic with fuel load selection on the IRP. Fuel quantity indicating system (FQIS) processor unit controls all fuelling operations and measuring of fuel quantity.

Several enhanced features were incorporated in the design to include the following:

- Ultrasonic Fuel Quantity Indicating system
- Automatic centre tank scavenge system
- Ultrasonic water detection system
- Densitometers
- Jettison system

Fuel quantity is displayed on the fuel synoptic page and the upper EICAS fuel block.

### **1.6E.9 Hydraulics**

There are three independent hydraulic systems using electrical, pneumatics or engine driven power source. They are identified as Left, Centre and Right. Each hydraulic system can independently operate the flight controls for safe flight and landing.

Each hydraulic system uses a Hydraulic Interface Module Electronics Card (HYDIM) for automatic control and indications. The three systems operate independently at 3000 psi nominal pressure.

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

The left system is powered by an engine driven pump (EDP) and an electric motor pump (ACMP). The right system is also powered by an EDP and ACMP. The centre system has two ACMP and two air driven pumps (ADP) and a ram air turbine (RAT) pump.

Hydraulic pumps control and indication are on the P5 overhead panel. During normal operation the flight crew will select the switches to the auto position before flight. The pressure and quantity indication is provided on the hydraulic synoptic page and the status page.

The primary pumps are the EDPs in the left and right system and the ACMPs for the centre system. These pumps operate continuously. The demand pumps are the ACMPs for the left and right systems and the ADPs for the centre system. These pumps normally operate only during heavy system demands. The operation logic is controlled and monitored by the HYDIM cards.

The RAT deploys automatically during flight when both engines are shutdown or loss of all three hydraulic power.

### 1.6E.10 Ice and Rain Protection

Ice and rain protection is carried out on the wings, engine intake, air data probes, cockpit windows, water and waste lines.

The aircraft is fitted with two ice detector probes on each side of the forward fuselage. When ice collects on either detector, a signal is sent to the engine Airfoil Cowl Ice Protection System (ACIPS) card. The engine ACIPS card shares information with the wing ACIPS card. The cards then operate the wing and engine anti ice systems automatically when engine and wing anti ice switches are in auto and the aircraft is in the air. Engine bleed air is used for engine anti ice and wing anti ice functions.

Air Data Probes comprise of three Pitot probes, two Angle of Attack (AOA) probes and one Total Air Temperature (TAT) probe fitted on the forward fuselage. These probes have a built-in heater to prevent icing. The Electric Load Management System (ELMS) controls the level of heating in flight and ground mode.

The cockpit windshield and side windows are heated to prevent ice and fog. There is an in-built electrically resistive material in the window lamination that is electrically heated. Two window heat control units (WHCU) control the level of heating when the window heat switches are turned ON.

The cockpit has a windshield wiper system to remove rain from the LH and RH windshield. Two switches operate the LH and RH wiper operation.

The water supply and waste water line are fitted with inline heaters at selected areas to prevent freezing. The waste water drain mast is also heated to prevent icing.

### 1.6E.11 Instrumentation

The flight instruments and displays supply information to the flight crew on six flat panel liquid crystal display units:

- Captain and First Officer Primary Flight Display (PFD)
- Captain and First Officer Navigation Display (ND)
- the Engine Indication and Crew Alerting System (EICAS)
- the Multifunction Display (MFD)

Standby Flight Instruments provide information on separate indicators. Clocks display Airplane Information Management System (AIMS) generated UTC time and date, or manually set time and date.

#### a) Primary Flight Display (PFD)

The PFDs present a dynamic color display of all the parameters necessary for flight path control. The PFDs provide the following information:

- flight mode annunciation
- airspeed
- altitude
- vertical speed
- attitude
- steering information
- radio altitude
- instrument landing system display
- approach minimums
- heading/track indications
- engine fail, Ground Proximity Warning System (GPWS), and Predictive Windshear (PWS) alerts

Failure flags are displayed for aircraft system failures. Displayed information is removed or replaced by dashes if no valid information is available to the display system (because of out-of-range or malfunctioning navigation aids). Displays are removed when a source fails or when no system source information is available.

#### b) Navigation Display (ND)

The NDs provide a mode-selectable color flight progress display. The modes are:

- MAP
- VOR
- APP (approach)
- PLN (plan)

The MAP, VOR, and APP modes can be switched between an expanded mode with a partial compass rose and a centered mode with a full compass rose.

**c) Engine Indication and Crew Alerting System (EICAS)**

EICAS consolidates engine and aircraft system indications and is the primary means of displaying system indications and alerts to the flight crew. The most important indications are displayed on EICAS which is normally displayed on the upper centre display.

**System Alert Level Definitions**

**i) Time Critical Warnings**

Time critical warnings alert the crew of a non-normal operational condition requiring immediate crew awareness and corrective action to maintain safe flight. Master warning lights, voice alerts, and ADI indications or stick shakers announce time critical conditions.

**ii) Warnings**

Warnings alert the crew to a non-normal operational or system condition requiring immediate crew awareness and corrective action.

**iii) Cautions**

Cautions alert the crew to a non-normal operational or system condition requiring immediate crew awareness. Corrective action may be required.

**iv) Advisories**

Advisories alert the crew to a non-normal operational or system condition requiring routine crew awareness. Corrective action may be required.

**v) EICAS Messages**

Systems conditions and configuration information are provided to the crew by four types of EICAS messages:

- EICAS alert messages are the primary method to alert the crew to non-normal conditions
- EICAS communication messages direct the crew to normal communication conditions and messages
- EICAS memo messages are crew reminders of certain flight crew selected normal conditions
- EICAS status messages indicate equipment faults which may affect aircraft dispatch capability

An EICAS alert, communications, or memo message is no longer displayed when the respective condition no longer exists.

**d) Multifunction Display (MFD)**

The electronic checklist (ECL) system shows normal and non-normal checklists on a multifunction display (MFD). The electronic checklist system is not required for dispatch, and a paper checklist or other approved backup checklist must be available on the flight deck.

The checklist display switch on the display select panel opens the electronic checklist. The flight crew operates the checklist with the cursor control devices (CCDs).

**e) Standby Flight Instruments**

The standby flight instruments include:

- standby attitude indicator
- standby airspeed indicator
- standby altimeter
- standby magnetic compass

**i) Standby Attitude Indicator**

The Standby Attitude Indicator displays Secondary Attitude Air Data Reference Unit (SAARU) attitude. A bank indicator and pitch scale are provided.

**ii) Standby Airspeed Indicator**

The Standby Airspeed Indicator displays airspeed calculated from two standby air data modules (one pitot and one static). It provides current airspeed in knots as a digital readout box and with an airspeed pointer.

**iii) Standby Altimeter**

The standby altimeter displays altitude from the standby (static) air data module. Current altitude is displayed digitally. A pointer indicates altitude in hundreds of feet. The pointer makes one complete revolution at appropriate intervals.

**iv) Standby Magnetic Compass**

A standard liquid-damped magnetic standby compass is provided. A card located near the compass provides heading correction factors.

**f) Clock**

A clock is located on each forward panel. Each clock displays Airplane Information Management System (AIMS) generated UTC time and date, or manually set time and date. The AIMS UTC time comes from the global positioning system (GPS). In addition to time, the clocks also provide alternating day-month and year, elapsed time, and chronograph functions.

### **1.6E.12 Airplane Information Management System (AIMS)**

The AIMS collects and calculates large quantities of data. The AIMS manages this data for several integrated avionics systems. These systems are the:

- Primary display system (PDS)
- Central maintenance computing system (CMCS)
- Airplane condition monitoring system (ACMS)
- Flight data recorder system (FDRS)
- Data communication management system (DCMS)
- Flight management computing system (FMCS)
- Thrust management computing system (TMCS)

The AIMS has software functions that do the calculation for each of these avionics systems. The AIMS supplies one other software function that many aircraft systems use. It is the data conversion gateway function (DCGF).

The AIMS has two cabinets which do the calculations for other avionic systems. These cabinets (Left AIMS Cabinet and Right AIMS Cabinet) are located in the Main Equipment Centre (MEC). To do these calculations, each AIMS cabinet has the following:

- A cabinet chassis
- Four Input/output modules (IOM)
- Four Core processor modules (CPM)

The IOMs and the CPMs are in the cabinet chassis. The chassis also has a backplane data bus and a backplane power bus to distribute data and power to the IOMs and CPMs. The input/output module (IOM) transfers data between the software functions in the AIMS CPMs and external signal sources. The CPMs supply the software and hardware to do the calculations for several avionic systems. The software is called functions. To keep a necessary separation between the functions, each function is partitioned. The partitions permit multiple functions to use the same hardware and be in the same CPM.

### **1.6E.13 Landing Gear**

The landing gear is of tricycle design with two main landing gears and one nose landing gear. The nose landing gear is of conventional two wheel design while the main landing gear truck has six wheels.

The nose landing gear strut includes an air oil shock absorber. The nose landing gear uses centre hydraulics pressure to extend and retract. Sequence valves control the door and landing gear movement.

The main landing gear has three axles' trucks and fitted with six wheel and brake assemblies. The main gear uses centre system hydraulic pressure to extend and retract. Sequence valves control the door and gear movements. Drag braces and downlock

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

actuators lock the gear in the extend position. Uunlock hooks lock the gear in the retract position.

Alternate extension system permits landing gear extension if the centre hydraulic system has no pressure. An alternate extend power pack will unlock the landing gear doors and the uplock. The door opens and the gear extend under its own weight. The gear doors will remain open after an alternate extension.

Nose gear steering is available when aircraft is on the ground. Two steering tillers in the cockpit allows nose wheel steering up to a specified maximum in each direction. The rudder pedal input allows smaller nose wheel steering in each direction.

Main gear steering operates when nose wheel steering commands are more than a specified limit. The main gear aft axle is able to steer left or right when commanded by main gear steering control unit (MGSCU).

Two sets of brake pedal controls the brake. Normal braking uses right system hydraulic pressure and alternate brakes use centre system hydraulic pressure. The braking system pressure is applied through the brake system control unit (BSCU) to control brake pressure to prevent tyre skid. Each wheel has a wheel speed transducer which supplies signal to the BSCU.

### 1.6E.14 Navigation Systems

Navigation systems include Global Positioning System (GPS), Air Data Inertial Reference System (ADIRS), Very High Frequency Omni Range (VOR), Distance Measuring Equipment (DME), Instrument Landing System (ILS), Automatic Direction Finder (ADF), Weather Radar, and the Flight Management System (FMS).

#### 1.6E.14.1 Global Positioning System (GPS)

Left and right GPS receivers are independent and supply very accurate position data to the FMC. GPS tuning is automatic. If the Air Data Inertial Reference Unit (ADIRU) becomes inoperative during flight, the EICAS displays the message NAV ADIRU INERTIAL and the FMC uses only GPS data to navigate.

#### 1.6E.14.2 Inertial System

The Air Data Inertial Reference System (ADIRS) calculates aircraft altitude, airspeed, attitude, heading, and position data for the displays, flight management system, flight controls, engine controls, and other systems. The major components of ADIRS are the Air Data Inertial Reference Unit (ADIRU), Secondary Attitude and Air Data Reference Unit (SAARU), and air data modules. The ADIRU supplies primary flight data, inertial reference, and air data. The ADIRU is fault-tolerant and fully redundant. The SAARU is a secondary source of critical flight data for displays, flight control systems, and other systems. If the ADIRU fails, the SAARU automatically supplies attitude, heading, and air data. SAARU heading must be manually set to the standby compass magnetic heading periodically. The ADIRU and SAARU receive air data from the same three sources. The ADIRU and SAARU

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

validate the air data before it may be used for navigation. The three air data sources are the left, centre, and right pitot and static systems.

### **1.6E.14.3 Radio Navigation Systems**

#### **a) Automatic Direction Finding (ADF)**

Two ADF systems are installed. Either ADF can be manually tuned from the left or right CDU on the NAV RADIO page.

#### **b) Very High Frequency Omni Range (VOR)**

Two VOR receivers are usually tuned by the FMC but, can be tuned manually by the crew. The tuned VORs display on the ND and may be used for position updates.

#### **c) Distance Measuring Equipment (DME)**

Two DME systems are installed. The DMEs are usually tuned by the FMC, but may be tuned manually.

#### **d) Instrument Landing System (ILS)**

Three ILS receivers are installed. They are usually tuned by the FMC, but can be tuned manually on the NAV RADIO page.

### **1.6E.14.4 Weather Radar**

The weather radar system consists of receiver-transmitter unit, antenna, and control panel. Radar returns display on the Navigation Display (ND). The EFIS control panel weather radar (WXR) map switch controls power to the transmitter/receiver and controls the weather radar display on the ND.

### **1.6E.14.5 Flight Management System (FMS)**

The FMS aids the flight crew with navigation, in-flight performance optimisation, automatic fuel monitoring, and flight deck displays. Automatic flight functions manage the aircraft lateral flight path (LNAV) and vertical flight path (VNAV). The displays include a map for aircraft orientation and command markers on the airspeed, altitude, and thrust indicators to help in flying efficient profiles. The flight crew enters the applicable route and flight data into the CDUs. The FMS then uses the navigation database, aircraft position, and supporting system data to calculate commands for manual and automatic flight path control. The FMS tunes the navigation radios and sets courses. The FMS navigation database supplies the necessary data to fly routes, SIDs, STARs, holding patterns, and procedure turns. Cruise altitudes and crossing altitude restrictions are used to calculate VNAV commands. Lateral offsets from the programmed route can be calculated and commanded.

The basis of the flight management system is the flight management computer function. Under normal conditions, one FMC accomplishes the flight management tasks while the other FMC monitors. The second FMC is ready to replace the first FMC if system faults occur. The FMC uses flight crew-entered flight plan data, aircraft systems data, and data from the FMC navigation database to calculate aircraft present position and pitch, roll, and

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

thrust commands necessary to fly an optimum flight profile. The FMC sends these commands to the autothrottle, autopilot, and flight director. Map and route data are sent to the NDs. The EFIS control panels select the necessary data for the ND. The mode control panel selects the autothrottle, autopilot, and flight director operating modes.

### 1.6E.15 Oxygen Systems

#### 1.6E.15.1 Crew Oxygen System

The crew oxygen system provides oxygen to the flight crew for emergencies and other procedures which make its use necessary. The oxygen is supplied by two cylinders located in the left side of the main equipment centre. Each cylinder is made of composite material and holds 115 cubic feet (3150 litres) of oxygen at 1850 psi. The oxygen is supplied, through regulators, to four oxygen masks in the cockpit, one each for the Captain, the First Officer, the First Observer and the Second Observer. The mask has a dilution control which is normally set at 'Normal' position. In this position the oxygen is diluted with ambient air according to the pressure altitude in the flight deck. It can also be selected to '100%', in which case 100% oxygen will be supplied. *Table 1.6A* below shows the expected duration of oxygen supply from the two cylinders with the dilution control in 'Normal' position. Aircraft altitude is assumed to be 36,000 ft. A cabin altitude of 8,000 ft. would indicate a normally pressurised cabin and a cabin altitude of 36,000 ft. would indicate an unpressurised cabin. At this cabin altitude of 36,000 ft. 100% oxygen will be supplied even with the dilution control in the 'Normal' position.

Aircraft Altitude: 36,000 ft. Cabin Altitude: 8,000 ft.		Aircraft Altitude: 36,000 ft. Cabin Altitude: 36,000 ft.	
No. of Crew Members	Expected Duration (hour)	No. of Crew Members	Expected Duration (hour)
1	42	1	27
2	21	2	13
3	14	3	9
4	10.5	4	6.5

*Table 1.6EA Expected Duration of Crew Oxygen*

#### 1.6E.15.2 Passenger Oxygen System

The passenger oxygen system is supplied by individual chemical oxygen generators. The oxygen system provides oxygen to:

- passenger seats
- attendant stations
- lower crew rest compartment
- lavatory service units.

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

The passenger oxygen masks and chemical oxygen generators are located in passenger service units (PSUs). Oxygen flows from a PSU generator when any mask hanging from that PSU is pulled. Oxygen is available for approximately 22 minutes. The masks automatically drop from the PSUs if cabin altitude exceeds approximately 13,500 feet. The passenger masks can be manually deployed from the flight deck by pushing the overhead panel PASSENGER OXYGEN switch to the ON position.

### **1.6E.15.3 Portable Oxygen**

Portable oxygen cylinder lets the flight attendants move in the aircraft when oxygen is in use. It is also a gaseous oxygen supply for medical emergencies. The bottle is fitted with disposable mask. 15 cylinders are located throughout the passenger cabin. Each cylinder is of 11 cubic feet (301 litres) capacity. The flow of oxygen can be controlled by an 'Off-On' knob from 0 to 20 litres per minute.

## **1.6E.16 Structures**

The B777-200 is a transport category aircraft certified to Federal Aviation Regulations (FAR) Part 25. The structure construction is a conventional skin, frame, stringers and longeron to handle the flight load on the aircraft during its operation. The structure components are fuselage, wing and empennage which also consist of the horizontal and vertical stabilizers. Control surfaces to control the aircraft manoeuvrability are attached to the wing, and empennage. Engine assemblies are attached to the wings and the landing gear system to the part of the fuselage. The fuselage has numerous cut-outs for doors, windows and inspection doors.

### **1.6E.16.1 Fuselage**

The fuselage is a semi-monocoque thin wall structure, which consists of skin panel, frames and stringers. The fuselage is designed with frames and stringers. Keel beam, located at the underside of the fuselage, provides structural reinforcement and provides protection to the underside of the centre fuel tank in the event of an emergency landing. Boeing has introduced modern materials on the B777-200 structure, which are improved Aluminum Alloy 7055 and carbon fiber with toughened resin (composite).

### **1.6E.16.2 Wings**

The B777-200 wings comprise of two outer wings and a centre wing box. The wings are conventional design with front and rear spars together with the upper and lower wing skins reinforced with stringers. The two outer wings are attached to the wing box using wing joint fittings.

### **1.6E.16.3 Engine Nacelle Attachments**

The B777-200 engine nacelle and pylon assemblies are attached to the wing by four fuse pins. The fuse pins are designed to fail in the event of abnormal loads being applied to the nacelle, such as during an emergency landing, in order to preserve the wing structure and allow the engine assembly to separate cleanly.

### **1.6E.16.4 Landing Gear System**

The main landing gear drag brace is joined to the rear face of the rear spar web, the terminal fitting and the back-up fitting. Attached to the innermost rib is a further back-up fitting which again attaches through the rear spar web to the main landing gear drag brace fitting. The wing box also forms part of the centre fuel tank and the wing fuel tanks.

### **1.6E.17 Central Maintenance Computing System (CMCS)**

The CMCS collects and stores information from most of the aircraft systems. It can store fault histories as well as monitor and conduct tests on the various systems. The fault history contains details of warnings, cautions and maintenance messages.

At regular intervals, during flight, the CMCS transmits any recorded fault messages, via the Aircraft Communications Addressing and Reporting System (ACARS), to the Maintenance Control Centre (MCC) of Malaysia Airlines. This helps in the planning and preparation for the rectification of any potential aircraft defects at the main base or line stations.

### **1.6E.18        Engines**

The aircraft is fitted with two engines (Model: RB211 TRENTE 892B-17) manufactured by Rolls Royce.

The RB211 TRENTE 892B-17 engine is a high bypass turbofan (bypass ratio of 6.4:1 at a typical cruise thrust) axial flow, three-rotor with a single low pressure fan driven by a five-stage turbine.

The engine has an eight-stage intermediate pressure compressor driven by a single-stage turbine and a six-stage high pressure compressor driven by a single-stage turbine.

The engine take-off thrust is 92,800 Lb and weighing approximately 15,700 Lb (7,136 Kg). The engines are certified in accordance with the US FAA Type Certificate E00050EN.

The FAA Type Certificate Data Sheet certifies that the engines meet the smoke and gaseous emission requirements of the US FAR 34. The engine is certified under FAR Part 36 Stage 3 Noise regulation.

The engine is fitted with a digital Electronic Engine Fuel Control System and it interfaces with many systems and components in the form of primary analogue or ARINC 629 buses.

The following analogue engine fuel and control system interfaces and correlates with the other systems for supply and feedback:

- Engine ignition – ignition unit power
- Engine air – actuator and valves

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

- Engine controls – resolver excitation and position
- Engine indicating – engine parameter data
- Engine exhaust – thrust reverser operations
- Engine oil – oil cooling and indications
- Engine starting – auto-start and manual start
- Electrical power – aircraft power from the Electrical Load Management System (ELMS)

The following ARINC 629 engine fuel and control system interfaces and correlates with other systems for supply, control and indication data:

- AIMS – indication, air data and flight management control
- Flight deck controls – switch position and indication
- Flap Slat Electronic Unit (FSEU) – Flap indication
- Proximity Switch Electronic Unit (PSEU) – Landing gear lever position
- Air Supply Cabin Pressure Controller (ASCPG) – Pneumatic system demand

The RB211 TRENT 892B-17 engine Electronic Engine Control (EEC) serves as the primary component of the engine fuel control system and uses data from the engine sensors and aircraft systems to control the engine operations. The EEC controls most of the engine components and receives feedback from them. These digital data go to the Engine Data Interface Unit (EDIU) and send the signal to the AIMS. The AIMS transmits and receives a large amount of data to and from the EEC. These include:

- Engine bleed status – EEC thrust limit calculations
- Air data – EEC thrust limit calculations
- Engine data – system requirements
- Autothrottle Engine Pressure Ratio (EPR) trim – thrust balancing
- Condition monitoring – performance tracking
- Maintenance data – trouble shooting
- Primary display system data – indication.

The RB211 TRENT 892B-17 engine has the capability to generate snapshot reports of engine data for the purpose of Engine Health Monitoring.

### 1.6E.19 Auxiliary Power Unit (APU)

The aircraft is fitted with an APU (Model: GTCP 331-500) manufactured by Allied Signal. The Allied Signal GTCP 331-500 gas turbine APU is a two stage centrifugal flow compressor, a reverse flow annular combustion chamber and a three stage axial flow turbine. It supplies the auxiliary power system for the aircraft pneumatic and electrical power. This permits independent operations from the ground external power sources or the main engines.

The APU generator supplies 120 KVA electrical power at any altitude. Pneumatic pressure is available up to an altitude of 22,000 feet (6,700 m).

The ELMS contains the APU autostart logic and sends signal to the APU Controller (APUC).

## APPENDIX 1.6E - AIRCRAFT SYSTEMS DESCRIPTION

The APU Controller serves to control the APU functions for:

- Starting and ignition
- Fuel metering
- Surge control
- Inlet guide vane (IGV) control
- Data storage
- Protective shutdown
- BITE/Fault reporting
- APU indication

The APU is designed to automatically start when certain logic conditions are met when the aircraft is in the air or electrical power removed from left and right transfer buses from respective No. 1 and No. 2 engine generators.

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
15:54:41	46817961	Incoming Downlink	9M-MRO	MH0000	POR1	MHKULKJACM001	071554	MED	RELAY
Normal		Established SATCOM				QXSXMXS			
QU DPCCAMH .QXSXMXS 071554 MED FI MH0000/AN 9M-MRO DT QXT POR1 071554 S04A - OES155446VS									
15:54:53	46817964	Incoming Downlink	9M-MRO	MH0000	POR1	MHKULKJACM001	071555	MED	RELAY
Normal		Lost VHF				QXSXMXS			
QU DPCCAMH .QXSXMXS 071555 MED FI MH0000/AN 9M-MRO DT QXT POR1 071555 S06A - OLV1554E3S									
15:56:08	46817982	Incoming Downlink	9M-MRO	MH0370	POR1	MHKULKJACM001	071556	MED	RELAY
Normal		Established SATCOM				QXSXMXS			
QU DPCCAMH .QXSXMXS 071556 MED FI MH0370/AN 9M-MRO DT QXT POR1 071556 S08A - OES1556E07S									
15:57:57	46818013	Incoming Downlink	9M-MRO	MH0370	POR1	MHKULKJACM001	071558	MED	RELAY
Normal		Established SATCOM				QXSXMXS			
QU DPCCAMH .QXSXMXS 071558 MED FI MH0370/AN 9M-MRO DT QXT POR1 071558 S10A - OES1557E9S									
16:00:13	46818050	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071600	MED	RELAY
Normal		Established SATCOM				QXSXMXS			
QU DPCCAMH .QXSXMXS 071600 MED FI MH0370/AN 9M-MRO DT QXT I0R2 071600 S12A - OES160015S									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

Time	Trans.	Direction	AN	FI	Medium	Machine	Raw_DTG	SMI	Application	
Status					Source/Destination					
<b>Mar. 7, 2014</b>										
<b>16:06:15</b>	46818160	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	071606	AGM	RELAY		
Uplink Sent			AGM NOTOC Uplink B777 -- AGM NOTOC Uplink B77 QXSXMXS							
			<b>QU QXSXMXS</b> .DPCCAMH 071606 MAS AN 9M-MRO/FI MH0370/MA 989I - NOTOC MESSAGE SPECIAL LOAD NOTOC FLIGHT DATE EDNO MH 0370 /08 08MAR14 01 FROM/TO AC/REG KULPEK 9M-MRO OTHER SPECIAL LOAD TO POS PCS QTY/TI IMP DESCRIPTION PEK 41L 001 1126KG PER MANGOSTEEN PEK 41R 001 1152KG PER MANGOSTEEN PEK 43L 001 1148KG PER MANGOSTEEN PEK 44L 001 1138KG PER MANGOSTEEN THERE IS NO EVIDENCE THAT ANY DAMAGED OR LEAKING PACKAGES CONTAINING DANGEROUS GOODS HAVE BEEN LOADED ON THE AIRCRAFT AT THIS STATION. END ACARS NOTOC							
<b>16:06:15</b>	46818160	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	071606	MAS	RELAY		
Normal			MAS-L (link ack)							
			<b>QU DPCCAMH</b> .QXSXMXS 071606 MAS AN 9M-MRO/FI MH0370/MA 989L							
<b>16:06:32</b>	46818160	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071606	MAS	RELAY	
Normal			MAS-S (successful)							
			<b>QU DPCCAMR</b> .QXSXMXS 071606 MAS AN 9M-MRO/FI MH0370/MA 989S BT QXT I0R2 071606 S15A							

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
16:06:32	381598235	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001		071606	AGM	RELAY
Uplink Sent		Loadsheet FINAL <9M-MR> -- LOADSHEET - AGM(Pi QXSXMXS							
QU QXSXMXS .DPCCAMH 071606 □AGM AN 9M-MRO/FI MH0370/MA 990I - X LOADSHEET FINAL 1606 01 MH0370/ 07MAR14 KUL PEK 9M-MRO 2/10 ZFW 174369 MAX 195044 L COP 49100 COW 223469 MAX 266897 CIF 37200 LAW 186269 MAX 208652 UNDLD 20675 PAX/10/215 TTL 227 CTL 222/3/2 CTL COMPARTMENTS 014296 1/2500 2/4530 3/804 4/5 885 5/577 0/0 SEATING OA/10 0B/127 OC/88  DOI 59.07  LIZFW 67.05 MACZFW 31.65 LITOW 70.05 MACTOW 33.78  DLI 57.29 STAB TO 03.9 MID SI: NOTOC YES CTL PAYLOAD 014296 DOW 143283  WBC K8-45 EXP 20SEP14 NOTOC - YES  ----- PAX/10/215 TTL 227 TTL 222/3/2  OA/10 0B/127 OC/88  *-----* * PLSE ACK WITH * 									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
		*	"LS FINAL OK (LIC NO) (DEP STATION-ICAO)" *	-					
		*	WHEN RECEIVE LS	-					
		*	-----*						
<b>16:06:33</b>	381598235	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	071606	MAS	RELAY	
Normal		MAS-L (link ack)			QXSXMXS				
		QU DPCCAMH	.QXSXMXS 071606						
		CMAS							
		AN 9M-MRO/FI MH0370/MA 990L							
<b>16:07:06</b>	381598235	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071607	MAS	RELAY
Normal		MAS-S (successful)			QXSXMXS				
		QU DPCCAMH	.QXSXMXS 071607						
		CMAS							
		AN 9M-MRO/FI MH0370/MA 990S							
		DT QXT I0R2 071607 S20A							
<b>16:09:28</b>	46818215	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071609	A01	RELAY
Normal		B777 Final Loadsheet Acknowledgement			QXSXMXS				
		QU DPCCAMH	.QXSXMXS 071609						
		CAS1							
		FI MH0370/AN 9M-MRO							
		DT QXT I0R2 071609 M00A							
		- LS FINAL OK							
		751 KUL							
<b>16:10:54</b>	46818244	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071611	MED	RELAY
Normal		Established SATCOM			QXSXMXS				
		QU DPCCAMH	.QXSXMXS 071611						
		CMED							
		FI MH0370/AN 9M-MRO							
		DT QXT I0R2 071611 S21A							
		- OES161101S							
<b>16:27:57</b>	46818462	Incoming Downlink	9M-MRO	MH0370	I0R2	MHKULKJACM001	071628	M11	RELAY
Normal		ODOI B777 OUT Report			QXSXMXS				
		QU DPCCAMH	.QXSXMXS 071628						
		CM11							
		FI MH0370/AN 9M-MRO							
		DT QXT I0R2 071628 M01A							
		- OUT01MAS370 /--071627WMKKZBAA							
		1627 496-----							

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

Time	Trans.	Direction	AN	FI	Medium	Machine	Raw DTG	SMI	Application
Status		Message Type			Source/Destination				
<b>Mar. 7, 2014</b>									
16:29:33	46818489	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071629	DFD	RELAY
Normal		B777 APU Report			QXSXMXS				
QU DPCCAMH .QXSXMXS 071629 □DFD FI MH0370/AN 9M-MRO DT QXT IOR2 071629 D00A - MAS002A0 B777 APU OPS REPORT 332  ACID FLT FM FLCT DATE GMT DPT DST MRO S370 PO 318 07/03/14 16:29:12 WMKK ZBAA  SWID SFC 316A-BSM-710-02 1791  APU CYC AFU TOT HRS APU FREV FLT BRS 15699 22093 4									
16:41:43	46818633	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071641	M12	RELAY
Normal		OOOI B777 OFF Report			QXSXMXS				
QU DPCCAMH .QXSXMXS 071641 □M12 FI MH0370/AN 9M-MRO DT QXT IOR2 071641 M02A - OFF01MAS370 /--071641WMKKZBAA -641 492									
16:42:43	46818641	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071642	DFD	RELAY
Normal		B777 TAKE OFF REPORT<03> (RR)			QXSXMXS				
QU DPCCAMH .QXSXMXS 071642 □DFD FI MH0370/AN 9M-MRO DT QXT IOR2 071642 D01A - <03>CSMROS3701C 318070314164158WMKKZBAA492320 318 3441739265 330 0778 101706 -3497100016676 06 3050F02 50 286 286 286 36 36 51463 883 963 760077577500 51462 888 959 967 775978978900 1506223650109314442198 329 2822 5958 1504223779106534442198 329 2797 5939 1036 1125 6681299149712961298 90 1093 1116 6681299150012991299 92 0113118013012031031071073 66299 0146149059058028028090092159 99 4274 34120 697013660 00E000058 4255 34920 669016150 00E000056 3 4 40229503060 38666 366 87 1 2 44233853060 39667 403 85 0 0 0 0 0 1 0 0 0 0 0 1 000842000088 000844000088									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

Time	Trans.	Direction	AN	FI	Medium	Machine	Raw DTG	SMI	Application
Status		Message Type			Source/Destination				
<b>Mar. 7, 2014</b>									
16:55:58	46818816	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071656	DFD	RELAY
Normal		B777 CLIMB REPORT<43> (RR)			QXSXMXS				
<pre> QU DPCCAMH .QXSXMXS 071656 =DFP FI MH0370/AN 9M-MRO DT QXT IOR2 071656 D02A - &lt;43&gt;CSMROS370CL 318070314165221WMKKZBAA485880 321 222782998680 118 3619 102020 2757100219299 16 3050308 5) 51463 939 971 966 7782713713659 51462 940 967 969 7881723723661 839014503 70322948113 117 2752 5906 836914534 69792941112 117 2734 5908 99 1468 6591342136313361340 47 100 1448 6611342136613391341 52 0062064020021029030048048 25298 0090093055056020020061063139 ) 5535 50180 2176016320 0 5470 51250 2175015410 0 35 35 42155833060 38 392 570E000050 27 29 46157063060 41 392 550E000050 9536449 2350130213028 15000601 2225120312030 25024722 950134013408 000842000082 000844000082 </pre>									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
17:07:29	46818992	Incoming Downlink	9M-MRO	MH0370	IOR2	MHKULKJACM001	071707	DFD	RELAY
Normal		DFD B777 Position Report (NEW)			QXSXMXS				
<pre> QU DPCCAMH .QXSXMXS 071707 EDEF FI MH0370/AN 9M-MRO DT QXT IOR2 071707 D03A - MAS001A0          B777 POSITION REPORT      565  ACID   FLT  FM FLCT   DATE   DPT  DST MRO    S370 TR  318 07/03/14 WMKK ZBAA  SWID      SFC 316A-BSM-710-02 18661  GMT     ALT    CAS  MACH  TAT    SAT    LAT    LONG 164143  103 168.4 .255  31.1   27.3  2.767 101.715 164643  10582 261.8 .478  23.4   10.4  3.074 101.760 165143  21193 301.1 .669  11.6  -11.8  3.553 101.968 165643  26938 303.1 .783  2.6   -27.4  4.109 102.251 170143  34998 278.0 .819  -13.4  -43.9  4.708 102.534 170643  35004 278.4 .821  -13.1  -43.8  5.299 102.813  GWT    TOTFW  WINDIR WINDSP  THDG 492520 49200  140.3  1.25  -33.5 489200 47800  107.6  9.38  27.3 486240 46500  91.8  19.50  27.8 483840 45400  58.4  10.63  26.0 481880 44500  69.6  17.38  26.8 480600 43800  70.0  17.13  26.7 </pre>									
18:03:23	46819784	Outgoing Uplink	9M-MRO	MH0370		MHKULKJACM001	071803	AGM	RELAY
Uplink Sent		B777 Cockpit Printer Uplink for ODC -- B777 Cockpit QXSXMXS							
<pre> QU QXSXMXS .DPCCAMH 071803 EAGM AN 9M-MRO/FI MH0370/MA 991I - -----   MALAYSIA AIRLINES - ODC   ----- URGET REQUEST  PLS CONTACT HO CHI MING ATC ASAP  THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR  I RECEIVED CALL FROM SUBANG CENTRE  PLS ACK THESE MSG  REGARDS </pre>									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
18:03:24	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071803	MAS	RELAY
Normal		MAS-L (link ack)							
QU DPCCAMH .QXSXMXS 071803 MAS AN 9M-MRO/FI MH0370/MA 991L									
18:06:25	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071806	MAS	RELAY
Normal		MAS-F (failed)							
QU DPCCAMH .QXSXMXS 071806 MAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234									
QU QXSXMXS .DPCCAMH 071803 AGM AN 9M-MRO/FI MH0370/MA 991I - ===== ! MALAYSIA AIRLINES - ODC ===== URGET REQUEST PLS CONTACT									
18:08:09	46819784	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071808	AGM	RELAY
Retransmitted		B777 Cockpit Printer Uplink for ODC -- B777 Cockpit							
QU QXSXMXS .DPCCAMH 071808 AGM AN 9M-MRO/FI MH0370/MA 991I - ===== ! MALAYSIA AIRLINES - ODC ===== URGET REQUEST PLS CONTACT HO CHI MING ATC ASAP THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR I RECEIVED CALL FROM SUBANG CENTRE PLS ACK THESE MSG REGARDS									
18:08:11	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071808	MAS	RELAY
Normal		MAS-L (link ack)							
QU DPCCAMH .QXSXMXS 071808 MAS AN 9M-MRO/FI MH0370/MA 991L									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>			<u>Source/Destination</u>				
<b>Mar. 7, 2014</b>									
<b>18:08:13</b>	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	071808	MAS	RELAY	
Normal		MAS-F (failed)			QXSXMXS				
QU DPCCAMH .QXSXMXS 071808 MAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234  QU QXSXMXS .DPCCAMH 071808 AGM AN 9M-MRO/FI MH0370/MA 991I - ===== ! MALAYSIA AIRLINES - ODC ! ===== URGET REQUEST  PLS CONTACT									
<b>18:10:00</b>	46819784	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	071810	AGM	RELAY	
Retransmitted		B777 Cockpit Printer Uplink for ODC -- B777 Cockpit	QXSXMXS						
QU QXSXMXS .DPCCAMH 071810 AGM AN 9M-MRO/FI MH0370/MA 991I - ===== ! MALAYSIA AIRLINES - ODC ! ===== URGET REQUEST  PLS CONTACT HO CHI MING ATC ASAP THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR I RECEIVED CALL FROM SUBANG CENTRE PLS ACK THESE MSG REGARDS									
<b>18:10:00</b>	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	071810	MAS	RELAY	
Normal		MAS-L (link ack)			QXSXMXS				
QU DPCCAMH .QXSXMXS 071810 MAS AN 9M-MRO/FI MH0370/MA 991L									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SIM</u>	<u>Application</u>
<u>Status</u>						<u>Source/Destination</u>			
<b>Mar. 7, 2014</b>									
18:10:02	46819784	Incoming Downlink	9M-MRO	MH0370		MHKULKJACM001	071810	MAS	RELAY
Normal		MAS-F (failed)				QXSXMXS			
<pre> QU DPCCAMH .QXSXMXS 071810 CMAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234 </pre>									
<pre> QU QXSXMXS .DPCCAMH 071810 AGM AN 9M-MRO/FI MH0370/MA 991I - =====+   MALAYSIA AIRLINES - ODC   =====+ URGET REQUEST  PLS CONTACT </pre>									
18:11:50	46819784	Outgoing Uplink	9M-MRO	MH0370		MHKULKJACM001	071811	AGM	RELAY
Retransmitted B777 Cockpit Printer Uplink for ODC -- B777 Cockpit QXSXMXS									
<pre> QU QXSXMXS .DPCCAMH 071811 AGM AN 9M-MRO/FI MH0370/MA 991I - =====+   MALAYSIA AIRLINES - ODC   =====+ URGET REQUEST  PLS CONTACT HO CHI MING ATC ASAP  THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR  I RECEIVED CALL FROM SUBANG CENTRE  PLS ACK THESE MSG  REGARDS </pre>									
18:11:50	46819784	Incoming Downlink	9M-MRO	MH0370		MHKULKJACM001	071812	MAS	RELAY
Normal		MAS-L (link ack)				QXSXMXS			
<pre> QU DPCCAMH .QXSXMXS 071812 CMAS AN 9M-MRO/FI MH0370/MA 991L </pre>									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>						Source/Destination			
<b>Mar. 7, 2014</b>									
18:11:52	46819784	Incoming Downlink	9M-MRO	MH0370		MHKULKJACM001	071812	MAS	RELAY
Normal		MAS-F (failed)				QXSXMXS			
<pre> QU DPCCAMH .QXSXMXS 071812 MAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234  QU QXSXMXS .DPCCAMH 071811 AGM AN 9M-MRO/FI MH0370/MA 991I - =====   MALAYSIA AIRLINES - ODC   =====  URGET REQUEST  PLS CONTACT </pre>									
18:13:40	46819784	Outgoing Uplink	9M-MRO	MH0370		MHKULKJACM001	071813	AGM	RELAY
Retransmitted B777 Cockpit Printer Uplink for ODC -- B777 Cockpit QXSXMXS									
<pre> QU QXSXMXS .DPCCAMH 071813 AGM AN 9M-MRO/FI MH0370/MA 991I - =====   MALAYSIA AIRLINES - ODC   =====  URGET REQUEST  PLS CONTACT HO CHI MING ATC ASAP  THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR  I RECEIVED CALL FROM SUBANG CENTRE  PLS ACK THESE MSG  REGARDS </pre>									
18:13:41	46819784	Incoming Downlink	9M-MRO	MH0370		MHKULKJACM001	071813	MAS	RELAY
Normal		MAS-L (link ack)				QXSXMXS			
<pre> QU DPCCAMH .QXSXMXS 071813 MAS AN 9M-MRO/FI MH0370/MA 991L </pre>									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

Time	Trans.	Direction	AN	FI	Medium	Machine	Raw DTG	SMI	Application
Status		Message Type			Source/Destination				
<b>Mar. 7, 2014</b>									
18:13:42	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071813	MAS	RELAY
Normal		MAS-F (failed)							
<pre> QU DPCCAMH .QXSXMXS 071813 LMAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234 </pre>									
<pre> QU QXSXMXS .DPCCAMH 071813 AGM AN 9M-MRO/FI MH0370/MA 991I -</pre>									
<pre> =====  MALAYSIA AIRLINES - ODC  ===== URGET REQUEST PLS CONTACT </pre>									
18:15:23	46819784	Outgoing Uplink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071815	AGM	RELAY
Retransmitted		B777 Cockpit Printer Uplink for ODC -- B777 Cockpit							
<pre> QU QXSXMXS .DPCCAMH 071815 LASM AN 9M-MRO/FI MH0370/MA 991I -</pre>									
<pre>   MALAYSIA AIRLINES - ODC   URGET REQUEST PLS CONTACT HO CHI MING ATC ASAP THEY COMPLAIN CANNOT TRACK YOU ON THEIR RADAR I RECEIVED CALL FROM SUBANG CENTRE PLS ACK THESE MSG REGARDS </pre>									
18:15:23	46819784	Incoming Downlink	9M-MRO	MH0370	MHKULKJACM001	QXSXMXS	071815	MAS	RELAY
Normal		MAS-L (link ack)							
<pre> QU DPCCAMH .QXSXMXS 071815 LMAS AN 9M-MRO/FI MH0370/MA 991I </pre>									

## APPENDIX 1.9A - ACARS TRAFFIC LOG

### Traffic Log

**From Mar. 07, 2014 12:48:00 to Mar. 07, 2014 20:00:00**

Filter: Aircraft registration [MRO], Source/destination [QXSXMXS]

<u>Time</u>	<u>Trans.</u>	<u>Direction</u>	<u>AN</u>	<u>FI</u>	<u>Medium</u>	<u>Machine</u>	<u>Raw DTG</u>	<u>SMI</u>	<u>Application</u>
<u>Status</u>		<u>Message Type</u>				<u>Source/Destination</u>			
<b>Mar. 7, 2014</b>									
18:15:25	46819784	Incoming Downlink	9M-MRO	MH0370		MHKULKJACM001	071815	MAS	RELAY
Normal		MAS-F (failed)			QXSXMXS				
<pre>QU DPCCAMH .QXSXMXS 071815 □MAS AN 9M-MRO/FI MH0370/MA 991F - UP INTERCEPT AIRCRAFT NOT LOGGED ON 234  QU QXSXMXS .DPCCAMH 071815 AGM AN 9M-MRO/FI MH0370/MA 9911 - ===== MALAYSIA AIRLINES - ODC ===== URGET REQUEST PLS CONTACT</pre>									

AIR-GROUND COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
<b>START AT 1600:00 UTC [0000:00 MYT]</b>			
		1603:37 UTC [0003:37 MYT] MAS 16	Lumpur Delivery Malaysian One Six good morning.
		1603:42 UTC [0003:42 MYT] Lumpur Delivery	Malaysian One Six good morning confirm outward one six two seven.
		1603:46 UTC [0003:46 MYT] MAS 16	Affirm sir one six two seven that Malaysian Amsterdam request flight level three zero zero.
		1603:58 UTC [0003:58 MYT] Lumpur Delivery	Malaysian One Six is cleared to Amsterdam via Agosa Alpha Departure six thousand feet squawk two one one three.
		1604:08 UTC [0004:08 MYT] MAS 16	Cleared to Amsterdam Agosa Alpha Departure initially six thousand squawk two one one three.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1604:16 UTC [0004:16 MYT] Lumpur Delivery	Malaysian One Six contact Ground.
		1604:17 UTC [0004:17 MYT] MAS 16	Contact Ground Malaysian One Six.
		1625:15 UTC [0025:15 MYT] MAS 6	Lumpur Delivery Malaysian Six salammualaikum.
		1625:20 UTC [0025:20 MYT] Lumpur Delivery	Malaysian Six walaikumsalam confirm outward one six three six.
		1625:26 UTC [0025:26 MYT] MAS 6	Outward one six three niner and da requesting level three two zero to Frankfurt.
		1625:41 UTC [0025:41 MYT] Lumpur Delivery	Wa la wa la three er two... er zero to err Frankfurt confirm.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1625:52 UTC [0025:52 MYT] MAS 370	Delivery Malaysian Three Seven Zero good morning.	1625:46 UTC [0025:46 MYT] MAS 6	Affirm level three two zero Malaysian One Malaysian Six.
1626:01 UTC [0026:01 MYT] Lumpur Delivery	Malaysian Three Seven Zero standby and Malaysian Six is cleared to Frankfurt via Agosa Alpha Departure six thousand feet two one zero six.	1626:10 UTC [0026:10 MYT] MAS 6	Clear to Frankfurt via Agosa Alpha Departure six thousand feet squawk two one zero six Malaysian Six.
1626:17 UTC [0026:17 MYT] Lumpur Delivery	Malaysian Six over to Ground good day Malaysian Three Seven Zero request level.		
1626:22 UTC [0026:22 MYT] MAS 370	Malaysian Three Seven Zero we are ready requesting flight level three five zero to Beijing.		

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1626:41 UTC [0026:41 MYT]	Lumpur Delivery Malaysian Three Zeven Zero is cleared to Beijing via Pibos Alpha Departure six thousand feet squawk two one five seven.		
1626:48 UTC [0026:48 MYT]	MAS 370 Beijing Pibos Alpha six thousand feet squawk two one five seven Malaysian Three Seven Zero thank you.		
1626:54 UTC [0026:54 MYT]	Lumpur Delivery Malaysian Three Seven Zero welcome over to ground.		
1626:57 UTC [0026:57 MYT]	MAS 370 Good day sir.		
1626:59 UTC [0026:59 MYT]	Lumpur Delivery Good day.	1637:59 UTC [0037:59 MYT]	Lumpur Delivery Malaysian ahh....
MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		Unknown	

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1638:10 UTC [0038:10 MYT] Lumpur Delivery	Station calling say again callsign.
		1638:20 UTC [0038:20 MYT] MAS 30	Lumpur Delivery good morning Malaysian er Three Zero.
		1638:25 UTC [0038:25 MYT] Lumpur Delivery	Malaysian Three Zero Delivery good good morning.
		1638:29 UTC [0038:29 MYT] MAS 30	Malaysian Three Zero request three four zero to Istanbul.
		1638:35 UTC [0038:35 MYT] Lumpur Delivery	Three four zero to Istanbul call you back stanby.
		1638:38 UTC [0038:38 MYT] MAS 30	Malaysian Three Zero.
		1640:00 UTC [0040:00 MYT] Lumpur Delivery	Malaysian Three Zero Delivery.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1640:02 UTC [0040:02 MYT] MAS 30	Malaysian Three Zero go ahead.
		1640:03 UTC [0040:03 MYT] Lumpur Delivery	Malaysian Three Zero clear to Istanbul Agosa Apha Departure six thousand feet initially flight level two eight zero higher en-route squawk is two one seven one.
		1640:13 UTC [0040:13 MYT] MAS 30	Clear to Istanbul Agosa Alpha zero six thousand feet initial six thousand feet and er initial altitude two eight zero higer level en-route squawk two one seven one Malaysian Three Zero.
		1640:24 UTC [0040:24 MYT] Lumpur Delivery	Malaysian Three Zero contact Ground good morning.
		1642:08 UTC [0042:08 MYT] MAS 6075	Lumpur Delivery Malaysian Six Zero Seven Five good morning.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1642:13 UTC [0042:13 MYT] Lumpur Delivery	Malaysian Six Zero Seven Five good morning.
		1642:17 UTC [0042:17 MYT] MAS 6075	Six Zero Seven Five request clearance flight level four one zero to Jakarta received Juliet.
		1642:24 UTC [0042:24 MYT] Lumpur Delivery	Flight level four one zero to Jakarta standby.
		1642:48 UTC [0042:48 MYT] Lumpur Delivery	Malaysian Six Zero Seven Five will you accept flight level three eight zero.
		1642:51 UTC [0042:51 MYT] MAS 6075	Affirm Malaysian Six Zero Seven Five.
		1642:54 UTC [0042:54 MYT] Lumpur Delivery	Standby.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1643:08 UTC [0043:08 MYT] Lumpur Delivery	Malaysian Six Zero Seven Five clear to Jakarta Mitos Alpha Departure six thousand feet squawk two one six two.
		1643:15 UTC [0043:15 MYT] MAS 6075	Jakarta Mitos Alpha six thousand squawk two one six two good day.
		1643:22 UTC [0043:22 MYT] Lumpur Delivery	Good day.
		1646:55 UTC [0046:55 MYT] XAX 506	Lumpur Delivery Xanadu Five Zero Six good morning.
		1647:00 UTC [0047:00 MYT] Lumpur Delivery	Xanadu Five Zero Six good morning Delivery.
		1647:03 UTC [0047:03 MYT] XAX 506	Xanadu Five Zero Six er request clearance to Incheon flight level three niner zero.

AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz		AIR-GROUND COMMUNICATION AIRWAYS CLEARANCE DELIVERY - FREQUENCY 126.0 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1647:11 UTC [0047:11 MYT] Lumpur Delivery	Three Niner Zero copied standby.
		1647:23 UTC [0047:23 MYT] Lumpur Delivery	Xanadu Five Zero Six clear to Incheon Kimat Alpha Departure six thousand feet squawk is two one two five.
		1647:30 UTC [0047:30 MYT] XAX 506	Cleared to Incheon Kimat Alpha Departure six thousand feet squawk two one two five Xanadu Five Zero Six over to Ground good day.
		1647:39 UTC [0047:39 MYT] Lumpur Delivery	Good day

END OF AIRWAYS CLEARANCE DELIVERY TRANSCRIPT

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
<b>START TIME 1600:00 UTC [0000:00 MYT]</b>			
		1600:00 UTC [0000:00 MYT] Lumpur Ground Bravo Bravo One Three hold short of Bravo initially.	
		1600:06 UTC [0000:06 MYT] AXM 941      Holding Point Alfa One One via Kilo Bravo Bravo One Three hold short of Bravo initially sir Nine Four One.	
		1600:17 UTC [0000:17 MYT] XAX 236      Lumpur Ground good morning Xanadu Two Three Six.	
		1600:21 UTC [0000:21 MYT] Lumpur Ground Xenadu Two Three Six Lumpur Ground morning standby for... Xenadu Two Three Six after clear of towing aircraft Runway Kilo push back and start Runway Three Two Right on to Kilo face east.	
		1600:32 UTC [0000:32 MYT] XAX 236      After towed aircraft push back Three Two Right Kilo face east Xenadu Two Three Six POB two eight five.	

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1600:43 UTC [0000:43 MYT]	Lumpur Ground Two eight five copied.
		1600:44 UTC [0000:44 MYT]	AXM 1258      Lumpur Ground Asian Express One Two Five Eight good morning.
		1600:49 UTC [0000:49 MYT]	Lumpur Ground Express One Two Five Lumpur Ground morning continue via Hotel Three Kilo for Foxtrot Six Two.
		1601:00 UTC [0001:00 MYT]	Lumpur Ground Copied.
		1601:07 UTC [0001:07 MYT]	Lumpur Ground ...Press Nine Four One after Kilo Alfa ah...Airbus Three Twenty cross on Bravo left to right continue via Bravo Bravo One Three.
		1601:15 UTC [0001:15 MYT]	AXM 941      After the Airbus crossing from left to right continue Kilo Bravo Bravo One Three Press Nine Four One.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1601:58 UTC [0001:58 MYT] Unknown	xxxxx [illegible] Bravo xxxx [illegible] decimal eight.
		1602:04 UTC [0002:04 MYT] Unknown	Ah... you are cutting out say again.
		1602:07 UTC [0002:07 MYT] Lumpur Ground	Nine Four One contact Tower one one eight decimal eight.
		1602:10 UTC [0002:10 MYT] AXM 941	One one eight decimal eight Nine Four One selamat malam.
		1602:14 UTC [0002:14 MYT] Lumpur Ground	Malam.
		1602:15 UTC [0002:15 MYT] MAS 2 Super	Lumpur Ground Malaysian Two Super good morning.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1602:18 UTC [0002:18 MYT]	Lumpur Ground Good morning Malaysian Two Super Lumpur Ground... CharlieThree Seven push back and start approved Runway Three Two Right until Hotel.
		1602:28 UTC [0002:28 MYT]	MAS 2 Super Start approved clear to right until Hotel Malaysian Two.
		1602:33 UTC [0003:33 MYT]	FFC Lumpur Ground please advise Foxtrot Foxtrot Charlie.
		1602:37 UTC [0002:37 MYT]	Lumpur Ground Foxtrot Foxtrot Charlie continue to via Delta to hanger.
		1602:44 UTC [0002:44 MYT]	FFC To delta to hanger Foxtrot Foxtrot Charlie.
		1602:47 UTC 0002:47 MYT	Lumpur Ground Malaysian Five Two hold short of Bravo Tower one one eight decimal eight.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1602:51 UTC 0002:51 MYT MAS 2	Hold short of Bravo Tower one one eight decimal eight Malaysian Five Two good night.
		1602:54 UTC [0002:54 MYT] Lumpur ground	Good night.
		1603:18 UTC [0003:18 MYT] MAS 2	Malaysian Two we are Niner Mike Mike November Echo POB of four four eight.
		1603:25 UTC [0003:25 MYT] Lumpur ground	Copied (xxxxx) [illegible] (xxxx) [illegible]
		1605:30 UTC [0005:30 MYT] XAX 236	Xenadu Two Three Six request taxi.
		1605:32 UTC [0005:32 MYT] Lumpur Ground	Xenadu Two Three Six taxi Holding Point Three Two Right via Kilo Bravo Bravo One Three.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1605:38 UTC [0005:38 MYT]	
		XAX 236	Holding Point Three Two Right via Kilo Bravo Bravo One Three Xenadu Two Three Six.
		1607:27 UTC [0007:27 MYT]	
		MAS 2 Super	Malaysian Two Super request taxi clearance.
		1607:31 UTC [0007:31 MYT]	
		Lumpur Ground	Two Super taxi holding point Alfa One One Tree Two Right via standard route.
		1607:37 UTC [0007:37 MYT]	
		MAS 2 Super	Alfa One One Three Two Right via standard route Malaysian Two.
		1608:00 UTC [0008:00 MYT]	
		XAX 236	Xenadu Two Three Six proceed via One One (xxxx) [illegible]
		1608:03 UTC [0008:03 MYT]	
		Lumpur Ground	Tower one one eight decimal eight.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1608:06 UTC [0008:06 MYT]	
		XAX 236	Tower one one eight decimal eight Xenadu Two Three Six
		1608:09 UTC [0008:09 MYT]	Lumpur Ground Malaysian Two Super hold short of Bravo Tower one one eight decimal eight.
		1608:13 UTC [0008:13 MYT]	MAS 2 Super Hold short of Bravo one one eight decimal eight good night.
		1608:16 UTC [0008:16 MYT]	Lumpur Ground Good night.
		1616:31 UTC [0016:31 MYT]	
		5649	Lumpur Ground is Five Six Four Niner good evening Niner Mike Alfa Quebec Victor.
		1616:37 UTC [0016:37 MYT]	
		Lumpur Ground	Four Niner Victor (xxxx) [facing] Kilo Bravo November Victor Foxtrot o one hundred.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1616:47 UTC [0016:47 MYT]	5619 Clear Bravo November to Foxtrot One Zero Zero Five Six One Niner.
		1617:01 UTC [0017:01 MYT]	unknown source Lumpur Ground ah...Towing complete Alfa Foxtrot Charlie good day sir.
		1617:06 UTC [0017:06 MYT]	unknown source Good day.
		1618:50 UTC [0018:50 MYT]	AXM 1824 Lumpur Ground Express One Eight Two Four good evening.
		1618:54 UTC [0018:54 MYT]	Lumpur Ground Good evening Express One Eight Two Four Lumpur Ground continue via Kilo Bravo and November One Foxtrot Eight Kilo.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1619:04 UTC [0019:04 MYT]	
		AXM 1824	Ah... continue Kilo Bravo November One for Foxtrot Eight Kilo Express One Eight Two Four.
		1619:13 UTC [0019:13 MYT]	Lumpur Ground One eight two four aircraft give.
		1619:16 UTC [0019:16 MYT]	
		unknown	In Alfa Quebec track Charlie sir.
		1626:35 UTC [0026:35 MYT]	
		MAS 6	Lumpur Ground Malaysian Six salamualaikum stand Charlie Two Two request push back and start.
		1626:41 UTC [0026:41 MYT]	
			Lumpur Ground Lumpur Ground push back Sierra Two.
		1626:51 UTC [0026:51 MYT]	
		MAS 6	Ah Reading you intermitent and er.... confirm push back exit Sierra Two and we got POB of two niner six Mike Romeo Hotel Malaysian Six.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1627:31 UTC [0027:31 MYT] MAS 370	Ah.. Ground Malaysian Three Seven Zero good morning Charlie One requesting push and start.	1627:05 UTC [0027:05 MYT] Lumpur Ground (xxxx) [illegible] six er... affirm push er... and exit via Charlie Malaysian Six.	
1627:37 UTC [0027:37 MYT] Lumpur Ground	(xxx) [illegible] Lumpur Ground morning push back and start approved Runway Three Two Right exit via Sierra Four.	1627:12 UTC [0027:12 MYT] MAS 6	Roger push back and start approved exit Serra Two Malaysian Six.
		1627:17 UTC [0027:17 MYT] Lumpur Ground	Malaysian Six re-clear er... exit via Sierra Three.
		1627:20 UTC [0027:20 MYT] MAS 6	Roger roger re-clear Sierra Three Malaysian knot Six.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1627:43 UTC [0027:43 MYT]	MAS 370 Push back and start approved Three Two Right exit Sierra Four POB two three niner Mike Romeo Oscar.		
1627:49 UTC [0027:49 MYT]	Lumpur Ground Copied.	1631:27 UTC [0031:27 MYT]	MAS 6 Malaysian Six request taxi.
		1631:30 UTC [0031:30 MYT]	Lumpur Ground Taxi Standard Route hold short of Bravo.
		1631:34 UTC [0031:34 MYT]	MAS 6 Three Two Right Standard Route hold short of Bravo Malaysia Six.
1632:18 UTC [0032:18 MYT]	MAS 370 Malaysian Three Seven Zero request taxi.		

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1632:21 UTC [0032:21 MYT]	Lumpur Ground (xxxxxx) [ illegible] Right Standard Route hold short of Bravo.		
1632:29 UTC [0032:29 MYT]	MAS 370 Ah Ground Malaysian Three Seven Zero you are unreable say again.		
1632:33 UTC [0032:33 MYT]	Lumpur Ground Malaysian Three Seven Zero clear taxi to holding point Alfa One One Runway Three Two Right via Standard Route hold short of Bravo.		
1632:41 UTC [0032:41 MYT]	MAS 370 Alfa one one Standard Route hold short of Bravo Malaysian Three Seven Zero.	1632:46 UTC [0032:46 MYT]	AXM 6121 Tower Asian Express Six One Two One Niner Mike Afla Hotel Zulu.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1632:53 UTC [0032:53 MYT]	Lumpur Ground Six One Two One Lumpur Ground continue via Kilo BravoNovember to Foxtrot bay (xxxx) [illegible]
		1633:01 UTC [0033:01 MYT]	AXM 6121      Bravo November Two for fox thirty Asian Express Six One Two One.
		1633:09 UTC [0033:09 MYT]	Lumpur Ground tration.
		1633:11 UTC [0033:11 MYT]	AXM 6121      Niner Mike Alfa Hotel Zulu.
		1633:50 UTC [0033:50 MYT]	Lumpur Ground Malaysian Six contact Tower one one eight decimal eight good night.
		1633:54 UTC [0033:54 MYT]	MAS 6      Tower one one eight decimal eight salamualaikum.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1636:26 UTC [0036:26 MYT]	Lumpur Ground (xxx) [illegible] Three Seven Zero Tower (xxx) (xxx) [illegible]	1633:58 UTC [0033:58 MYT] Lumpur Ground (xxxx) [illegible] salam (xxxx) [illegible]	
1636:30 UTC [0036:30 MYT]	MAS 370 One one eight eight Malaysian Three Seven Zero thank you.	1637:51 UTC [0037:51 MYT] UAE 343 Ground good morning Emirates Three Four Three.	
		1637:57 UTC [0037:57 MYT] Lumpur Ground Emirates Three Four Three Lumpur Ground morning.	
		1638:01 UTC [0038:01 MYT] UAE 343 Emirates Three Four Three we are in Charlie Twenty Seven and daa... estimated (xxx) [illegible] departure is seventeen ten er... do you know which runway we can expect for departure Three Two Left or Right.	

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1638:16 UTC [0038:16 MYT]	Lumpur Ground Seventeen ten er... still for Three Two Right departure.
		1638:21 UTC [0038:21 MYT]	UAE 343 Thank you and (xxx) [illegible] Three Four Three expect Three Two Right for departure.
		1641:55 UTC [0041:55 MYT]	AXM 1655 Lumpur Ground good morning Asian Express One Six Five Five Niner Mike Alfa Quebec Uniform on Kilo.
		1642:02 UTC [0042:02 MYT]	Lumpur Ground (xxxx)[illegible] Lumpur Ground continue Kilo Foxtrot.
		1642:09 UTC [0042:09 MYT]	AXM 1655 Continue Kilo Foxtrot Five Five Six Asian Express One Six Five Five.
		1643:08 UTC [0043:08 MYT]	UAE 343 Confirm calling Emirates Three Four Three.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1643:12 UTC [0043:12 MYT] Source unknown Negative.	
		1643:30 UTC [0043:30 MYT] MAS 6075	Lumpur Ground Malaysian Six Zero Seven Five good morning.
		1643:35 UTC [0043:35 MYT] Lumpur Ground (xxxxx) [illegible]	
		1643:39 UTC [0043:39 MYT] MAS 6075	Aah... I say again Malaysian Six Zero Seven Five good morning Foxtrot Six request push back and start.
		1643:49 UTC [0043:49 MYT] Lumpur Ground (xxxx) [illegible]	Lumpur Ground Foxtrot Six push back and start approve Rnway Three Two Right on to Kilo face east.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1643:57 UTC [0043:57 MYT] MAS 6075	Roger clear for push back on to Kilo face east Malaysian Six Zero Seven Five POB two Mike Uniform Bravo.
		1644:05 UTC [0044:05 MYT] Lumpur Ground	Copied.
		1645:14 UTC [0045:14 MYT] Lumpur Ground	(xxxx) [illegible] Five after push to pull forward keep clear of the aah... Stand Foxtrot Seven.
		1645:22 UTC [0045:22 MYT] MAS 6075	Keep clear of Stand Foxtrot Seven Malaysian Six Zero Seven Five.
		1648:04 UTC [0048:04 MYT] GSB 305	Lumpur Ground Gading Sari Three Zero Five good morning.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1648:08 UTC [0048:08 MYT]	Lumpur Ground Garing Sari Three Zero Five continue... Kilo Foxtrot Seven Nine.
		1648:13 UTC [0048:13 MYT]	GSB 305 Continue Kilo Foxtrot Seven Nine Niner Mike Golf Sierra Bravo two POB.
		1648:19 UTC [0048:19 MYT]	Lumpur Ground Copied.
		1648:23 UTC [0048:23 MYT]	MAS 6075 Ground Malaysian Six Zero Seven Five request taxi.
		1648:26 UTC [0048:26 MYT]	Lumpur Ground Malaysian Six Zero Seven Five taxi Holding Point Alfa One One Three Two Right take Kilo Bravo Bravo One Three.
		1648:33 UTC [0048:33 MYT]	MAS 6075 Taxi Kilo Bravo Bravo One Three holding point Alfa One One Malaysian Six Zero Seven Five.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1650:57 UTC [0050:57 MYT] XAX 506	Lumpur Ground Xanadu Five Zero Six morning.
		1651:01 UTC [0051:01 MYT] Lumpur Ground	Morning Xanadu Five Zero Six Lumpur Ground push back and start approved Runway Three Two Right on to Hotel Three.
		1651:07 UTC [0051:07 MYT] XAX 506	Push back approved for Runway Three Two Right to Hotel Three and... we have three five five POB Niner Mike X-ray X-ray Papa Xanadu Five Zero Six.
		1651:18 UTC [0051:18 MYT] Lumpur Ground	Five Zero Six copied.
		1651:46 UTC [0051:46 MYT] Lumpur Ground	(xxxx) [illigible] Six Zero Seven Five Tower one one eight decimal eight good night.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1651:52 UTC [0051:52 MYT]	MAS 6075 One one eight eight Malaysian Six Zero Seven Five Good night.
		1652:32 UTC [0052:32 MYT]	MAS 30 Lumpur Ground good evening good morning Malaysian Three Zero.
		1652:38 UTC 0052:38 MYT	Lumpur Ground Morning Malaysian Three Zero Lumpur Ground Foxtrot ah... correction Charlie Two Four push back start up approved Runway Three Two Right exit via Sierra Two.
		1652:49 UTC [0052:49 MYT]	MAS 30 Roger clear for push back and start push back Three Two Right exit Sierra Two we have POB two seven one Mike Romeo Mike.
		1652:58 UTC [0052:58 MYT]	Lumpur Ground Copied.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1653:21 UTC [0053:21 MYT] AXM 1949	(xxxx) [illegible] Express One Niner Four Niner good evening.
		1653:33 UTC [0053:33 MYT]	Lumpur Ground Express One Niner Four Niner Lumpur Ground.
		1653:37 UTC [0053:37 MYT]	Lumpur Ground Te Super One Niner Four Niner continue Kilo Foxtrot Six Five.
		1653:42 UTC [0053:42 MYT] AXM 1949	Continue kilo Foxtrot Six Five Asian Express One Niner Four Niner registration Niner Mike Alfa Quebec Alfa.
		1653:50 UTC [0053:50 MYT]	Lumpur Ground Copied
		1656:15 UTC [0056:15 MYT] XAX 506	Ground ne... Xanadu Five Zero Six ready for taxi.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1656:21 UTC [0056:21 MYT]	Lumpur Ground Xanadu Five Zero Six taxi Holding Point Three Two Right Kilo Bravo Bravo One Three.
		1656:27 UTC [0056:27 MYT]	XAX 506 Taxi holding point Three Two Right via Kilo Bravo Bravo One Three Xanadu Five Zero Six.
		1656:35 UTC [0056:35 MYT]	MAS 30 Lumpur Ground Malaysian Three Zero request taxi.
		1656:39 UTC [0056:39 MYT]	Lumpur Ground Malaysian Three Zero taxi holding point eer... Alfa One OneThree Two Rght via Sierra Two Bravo One One Alfa.
		1656:46 UTC [0056:46 MYT]	MAS 30 Taxi holding point Alfa One OneThree Two right via Sierra Two Bravo One One Alfa Malaysian Three Zero.
		1657:33 UTC [0057:33 MYT]	Lumpur Ground Three Zero contact Tower one one eight decimal eight.

AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz		AIR-GROUND COMMUNICATION LUMPUR GROUND FREQUENCY 122.27 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1657:37 UTC [0057:37 MYT]	
		MAS 30	One one eight decimal eight Malaysian Three Zero good night.
		1657:41 UTC [0057:4 MYT]	Lumpur Ground Xanadu Five Zero Six Tower one one eight.
		1657:46 UTC [0057:46 MYT]	
		XAX 506	Tower one one eight eight Xanadu Five Zero Six good day.
END OF LUMPUR GROUND RADIOTELEPHONY TRANSCRIPT			

AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz		AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
<b>START TIME 1610:00 UTC [0010:00 MYT]</b>			
	1610:14 UTC [0010:14 MYT] Lumpur Tower Malaysian Two Zero are you ready.		
	1610:15 UTC [0010:15 MYT] MAS 20 Affirm Malaysian Two Zero.		
	1610:17 UTC [0010:17 MYT] Lumpur Tower Malaysian Two Zero line up Three Two Right via Alfa One Zero.		
	1610:21 UTC [0010:21 MYT] MAS 20 Line up Three Two Right Alfa One Zero.		
	1610:24 UTC [0010:24 MYT] Lumpur Tower Malaysian Two Super hold short Bravo.		
	1610:28 UTC [0010:28 MYT] MAS 2 Super Hold short Bravo Malaysian Two Zero.		

AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz		AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1611:45 UTC [0011:45 MYT] Lumpur Tower	Malaysian Two Zero...Runway Three Two Right clear for take-off.
		1611:49 UTC [0011:49 MYT] MAS 20	Clear for take-off Three Two Right Malaysian Two Zero good night sir.
		1611:52 UTC [0011:52 MYT] Lumpur Tower	Good night.
		1612:15 UTC [0012:15 MYT] MAS 2	Malaysian Two can we move forward to Alfa Ten.
		1612:18 UTC [0012:18 MYT] Lumpur Tower	Affirm continue taxi Alfa Ten.
		1612:20 UTC [0012:20 MYT] MAS 2	Roger continue taxi Alfa One Zero Malaysia Two.

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION
	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
	1612:29 UTC [0012:29 MYT]	Lumpur Tower Xenadu Three Two Six correction Korean Air Six Seven Two line up ThreeTwo Afa One Zero.
	1612:33 UTC [0012:33 MYT]	KAL 672 Lining up Three Two Right Alfa One Zero Korean Air Six Seven Two.
	1614:33 UTC [0014:33 MYT]	Lumpur Tower Korean Air Six Seven Two... Runway Three Two Right clear for take-off.
	1614:38 UTC [0014:38 MYT]	KAL 672 Clear for take-off clear for take-off Three Two Right Korean Air Six Seven Two.
	1614:43 UTC [0014:43 MYT]	KAL 672 Confirm one two one two five.
	1614:45 UTC [0014:45 MYT]	Lumpur Tower Affirm.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
	SOURCE	
	1614:47 UTC [0014:47 MYT] KAL 672	Clear for take-off Three Two Right Korean Air Six Seven Two.
	1614:51 UTC [0014:51 MYT] Lumpur Tower	(xxxx) [illegible] Two Three Six line up Three Two One One.
	1614:53 UTC [0014:53 MYT] XAX 236	Line up Three Two One One Xanadu Two Three Six.
	1615:54 UTC [0015:54 MYT] KAL 672	We change to departure clearance Six Seven Two.
	1615:57 UTC [0015:57 MYT] Lumpur Tower	Korean Air Six Seven Two good day.
	1616:01 UTC [0016:01 MYT] Lumpur Tower	Xenadu Two Three Six is right clear for take-off.

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION
	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
	1616:04 UTC [0016:04 MYT]	XAX 236 Runway Three Two Rght clear for take-off Xenadu Two Three Six.
	1616:30 UTC [0016:30 MYT]	Lumpur Tower Malaysian Two Super after departing traffic line up Alfa One ( xxx) [illegible] Zero.
	1616:34 UTC [0016:34 MYT]	MAS 2 After departing traffic line up Alfa One Zero (xxx) [illegible] Malaysian Two.
	1617:01 UTC [0017:01 MYT]	MAS 16 Lumpur Tower Malaysian One Six good morning
	1617:04 UTC [0017:04 MYT]	Lumpur Tower One Six good morning ... Alfa One Zero Three Two Right.
	1617:07 UTC [0017:07 MYT]	MAS 16 Holding point Alfa One Zero Runway Three Two Right Malaysian One Six.

AIR-GROUND COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
		1617:48 UTC [0017:48 MYT] Lumpur Tower	Malaysian Two Two Super Runway Three Two Right clear for take-off good night.
		1617:51 UTC [0017:51 MYT] MAS 2 Super	Clear for take-off Malaysian Two Super good night.
		1620:53 UTC [0020:53 MYT] MAS 16	Malaysian One Six request holding point Alfa One One.
		1620:56 UTC [0020:56 MYT] Lumpur Tower	Approved route via Alfa One One nor...
		1620:59 UTC [0020:59 MYT] MAS 16	Thank you sir Alfa One One Malaysia One Six.
		1622:32 UTC [0022:32 MYT] Lumpur Tower	One Six eer... line up Runway ThreeTwo Right via Alfa One One.

AIR-GROUND COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
		1622:36 UTC [0022:36 MYT] MAS 16	Line up Runway Three Two Right via Alfa One One Malaysian One Six.
		1622:43 UTC [0022:43 MYT] Lumpur Tower	Malaysian One Six you have another five minute to go eer... correction line up (xxxx) [illegible] One One.
		1622:50 UTC [0022:50 MYT] MAS 16	Aah...copy sir line up via Alfa One One Malaysian One Six.
		1624:43 UTC [0024:43 MYT] Lumpur Tower	Malaysian One Six Three Two Right clear for take-off good night.
		1624:47 UTC [0024:47 MYT] MAS 16	Three Two Right clear for take-off Malaysian One Six.
		1633:58 UTC [0033:58 MYT] MAS 6	Lumpur Tower Malaysian Six selamalaikum.

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION	
	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
		1634:04 UTC [0034:04 MYT]	Lumpur Tower Malaysian Six walaikumsalam Lumpur Tower taxi Alfa One Zero Three Two Right.
		1634:07 UTC [0034:07 MYT]	MAS 6 Alfa One Zero Three Two Right Malaysian Six.
		1634:54 UTC [0034:54 MYT]	Lumpur Tower (xxxx) [illegible] Six line up Three Two Alfa One Zero.
		1635:01 UTC [0035:01 MYT]	MAS 6 Line up Three Two Alfa One Zero Malaysian Six.
1636:30 UTC [0036:30 MYT] MAS 370	Tower Malaysian Three Seven Zero morning.		
1636:34 UTC [0036:34 MYT] Lumpur Tower	Three Seven Zero good morning Lumpur Tower Alfa One Zero Three Two Right.		
1636:37 UTC [0036:37 MYT] MAS 370	Alfa One Zero Malaysian Three Seven Zero.  MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia	8 of 14	

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION	
	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
		1636:39 UTC [0036:39 MYT]	Lumpur Tower Malaysian Six line up Three Two Alfa One Zero.
		1636:43 UTC [0036:43 MYT]	MAS 6 Line up Three Two Alfa One Zero Malaysian Six.
		1638:04 UTC [0038:04 MYT]	MAS 6 Malaysian Six we are ready.
		1638:06 UTC [0038:06 MYT]	Lumpur Tower Malaysian Six clear for take-off.
		1638:08 UTC [0038:08 MYT]	MAS 6 Clear for take-off Malaysian Six.
1638:43 UTC [0038:43 MYT]	Lumpur Tower Three Seven Zero line up Three Two Right Alfa One Zero.		
1638:45 UTC [0038:45 MYT]	MAS 370 Line up Three Two Alfa One Zero Malaysian Three Three Seven Zero.		
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TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION	
	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	TIME & SOURCE	LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
1640:37 UTC [0040:37 MYT]	Lumpur Tower Three Seven Zero Three Two Right clear for take-off good night.		
1640:40 UTC [0040:40 MYT]	MAS 370 Three Two Right clear for take-off Malaysian Three Seven Zero thank you bye.		
		1651:56 UTC [0051:56 MYT]	
		MAS 6075	Lumpur Tower Malaysian Six Zero Seven Five good morning we are ready.
		1652:03 UTC [0052:03 MYT]	
		Lumpur Tower	Good morning Malaysian Six Zero Seven Five Lumpur Tower taxi holding point Alfa One One Three Two Right.
		1652:08 UTC [0052:08 MYT]	
		MAS 6075	Holding point Alfa One One Malaysian Six Zero Seven Five.
		1652:18 UTC [0052:18 MYT]	
		Lumpur Tower	Zero Seven Five aah... Line up Three Two Right via One One.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
	SOURCE	
	1652:24 UTC [0052:24 MYT] MAS 6075	Clear line up Three Two Right via Alfa One One Malaysian Six Zero Seven Five.
	1654:04 UTC [0054:04 MYT] Lumpur Tower	Six Zero Seven Five free track clear for take-off.
	1654:08 UTC [0054:08 MYT] MAS 6075	Free track clear for take-off Malaysian Six Zero Seven Five good night.
	1657:39 UTC [0057:39 MYT] Unknown	Load cargo.
	1657:41 UTC [0057:41 MYT] MAS 30	Lumpur Tower good morning Malaysian Three Zero.
	1657:42 UTC [0057:42 MYT] Lumpur Tower	Three Zero good morning Lumpur Tower Holding Point Alfa One Zero Three Two Right.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - MAS 370	SOURCE	AIR-GROUND COMMUNICATION LUMPUR TOWER FREQUENCY 118.8 MHz CONTENT - OTHER FLIGHTS
	1657:46 UTC [0057:46 MYT] MAS 30	Holding Point Alfa One Zero Three Two Right Malaysian Three Zero.	
	1658:28 UTC [0058:28 MYT] XAX 506	Lumpur Ground ...eh ai ai Lumpur Tower Xenadu Five Zero Six approaching Bravo good morning.	
	1658:37 UTC [0058:37 MYT] Lumpur Tower	Eer... Five Zero Six Lumpur Ground Holding Point Alfa One Zero Three Two Right.	
	1658:39 UTC [0058:39 MYT] XAX 506	Holding point Alfa One Zero Three Two Right Xenadu Five Zero Six.	
	1659:22 UTC [0059:22 MYT] MAS 30	Malaysian Three Zero we're ready.	
	1659:26 UTC [0059:26 MYT] Lumpur Tower	Three Zero line up Alfa One Zero Three Two Right.	

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION
	LUMPUR TOWER FREQUENCY 118.8 MHz	LUMPUR TOWER FREQUENCY 118.8 MHz
	CONTENT - MAS 370	CONTENT - OTHER FLIGHTS
	1659:28 UTC [0059:28 MYT]	MAS 30 Line up Alfa One Zero Three Two Right Malaysian Three Zero.
	1659:54 UTC [0059:54 MYT]	Lumpur Tower Malaysian Three Zero Three Two Right clear for take-off night.
	1700:00 UTC [0100:00 MYT]	MAS 30 Clear for take-off Three Two Right Malaysian Three Zero.
	1700:50 UTC [0100:50 MYT]	Lumpur Tower Xenadu Five Zero Six Runway Three... correction line up Runway Three Two Right via Alfa One One.
	1700:55 UTC [0100:55 MYT]	XAX 506 Line up Runway Three Two Right via Alfa One One Xenadu Five Zero Six.
	1702:23 UTC [0102:23 MYT]	Lumpur Tower Xenadu Five Zero Six Three Two Right clear for take-off good night.

TIME & SOURCE	AIR-GROUND COMMUNICATION	AIR-GROUND COMMUNICATION
	LUMPUR TOWER FREQUENCY 118.8 MHz	LUMPUR TOWER FREQUENCY 118.8 MHz
	CONTENT - MAS 370	CONTENT - OTHER FLIGHTS
		1702:28 UTC [0102:28 MYT]
	XAX 506	Runway Three Two Right clear for take-off Xenadu Five Zero Six good night sir thank you.

END OF LUMPUR TOWER RADIO TELEPHONY  
TRANSCRIPT

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
<b>START TIME 1631:00 UTC [0031:00 MYT]</b>			
		1631:45 UTC [0031:45 MYT] GSB 305	Lumpur Radar Gading Sari Three Zero Five morning descend to flight level one five zero squawking two zero six zero direct to Nipah.
		1631:53 UTC [0031:53 MYT] Lumpur Radar	Gading Sari Three Zero Five good morning cancel STAR direct to Gosmo maintain high speed descend seven thousand feet one zero one two.
		1632:03 UTC [0032:03 MYT] GSB 305	Direct to Gosmo descend seven thousand (xxxx) [illegible] high speed Gading Sari Three Zero Five
		1632:11 UTC [0032:11 MYT] Lumpur Radar	Asian Express One Six Five Five descend four thousand five hundred feet.
		1632:15 UTC [0032:15 MYT] AXM 1655	Descend four thousand five hundred feet Six Five Five.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1632:21 UTC [0032:21 MYT] AXM 1949	Lumpur Radar Asian Express One Niner Four Niner maintaining flight level one niner zero.
		1632:25 UTC [0032:25 MYT] Lumpur Radar	Express One Niner Four Niner descend one one thousand one zero one two
		1632:30 UTC [0032:30 MYT] AXM 1949	Descend one one thousand feet one zero one two Asian Express One Niner Four Niner.
		1632:34 UTC [0032:34 MYT] Lumpur Radar	Gading Sari Three Zero Five high speed below ten thousand as well.
		1632:39 UTC [0032:39 MYT] GSB 305	High pun below ten Gading Three Zero Five.
		1632:59 UTC [0032:59 MYT] MAS 433	Lumpur Radar Malaysian Four Three Three good evening flight level two two two for level one five zero direct lima.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1633:04 UTC [0033:04 MYT] Lumpur Radar	Malaysian Four Three Three good evening descend seven thousand feet one zero one two descend speed two niner zero knots for space.
		1633:13 UTC [0033:13 MYT] MAS 433	(xxxx)[illegible] speed of two niner zero knots seven thousand feet one zero one two Malaysian Four Three Three.
		1633:23 UTC [0033:23 MYT] Lumpur Radar	And Malaysian Four Three Three cancel STAR track direct to Gosmo.
		1633:26 UTC [0033:26 MYT] MAS 433	Cancel STAR direct to Gosmo Malaysian Four Three Three confirm high speed below ten as well.
		1633:32 UTC [0033:32 MYT] Lumpur Radar	Malaysian Four Three Three affirmitive until further advice.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1633:35 UTC [0033:35 MYT] MAS 433	Malaysian Four Three Three.
		1633:37 UTC [0033:37 MYT] Lumpur Radar	Malaysian One Six contact Lumpur Radar one three two decimal eight selamat jalan.
		1633:43 UTC [0033:43 MYT] MAS 16	Lumpur Radar one three two eight Malaysian One Six (xxxx) [illegible] Two Six
		1633:47 UTC [0033:47 MYT] Lumpur Radar	Asian Express One Six Five Five descend three thousand feet clear for ILS Approach Runway Three Two Left.
		1633:54 UTC [0033:54 MYT] Lumpur Radar	We are clear three thousand (xxxx) [illegible] approach Runway Three Two Left Express One Six Five Five.
		1635:47 UTC [0033:47 MYT] Lumpur Radar	Garing Sari Three Zero Five descend four thousand five hundred feet.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1635:50 UTC [0035:50 MYT] GSB 305	Descend four thousand five hundred Gading Sari Three Zero Five.
		1635:55 UTC [0035:55 MYT] Lumpur Radar	Malaysian Four Three Three descend five thousand five hundred feet.
		1635:58 UTC [0035:58 MYT] MAS 433	Five thousand five hundred Malaysian Four Three Three.
		1636:01 UTC [0036:01 MYT] Lumpur Radar	Asian Express One Nine Four Nine descend seven thousand feet.
		1636:04 UTC [0036:04 MYT] AXM 1949	Descend seven thousand Asian Express one nine four nine.
		1636:07 UTC [0036:07 MYT] Lumpur Radar	Asian Express One Six Five Five establish Localizer Tower one one eight five good night.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1636:12 UTC [0036:12 MYT] AXM 1655	One one eight five Six Five bye.
		1637:56 UTC [0037:56 MYT] Lumpur Radar	Gading Sari Three Zero Five descend three thousand feet clear for ILS Approach Runway Three Two Left.
		1638:02 UTC [0038:02 MYT] GSB 305	Clear three thousand feet clear for ILS Approach Three Two Left Gading Sari Three Zero Five.
		1638:08 UTC [0038:08 MYT] Lumpur Radar	Malaysian Four Three Three descend four thousand five hundred.
		1638:11 UTC [0038:11 MYT] MAS 433	Four thousand five hundred Malaysian Four Three Three.
		1638:21 UTC [0038:21 MYT] Lumpur Radar	Asian Express One Niner Four Niner cancel STAR fly heading one five five expect radar vector for ten you have four four track miles.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1638:31 UTC [0038:31 MYT] AXM 1949	Copy four four track miles fly heading one five five Asian Express One Niner Four Niner can expect radar vector.
		1638:38 UTC [0038:38 MYT] Lumpur Radar	Affirm heading one five five sir.
		1638:40 UTC [0038:40 MYT] AXM 1949	Copy one five five heading Express One Niner Four Niner.
		1638:45 UTC [0038:45 MYT] Lumpur Radar	Malaysian Four Three Three you can resume normal speed.
		1638:49 UTC [0038:49 MYT] MAS 433	Normal speed Malaysian Four Three Three.
		1638:58 UTC [0038:58 MYT] Lumpur Radar	Gading Sari Three Zero Five resume normal speed.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1639:01 UTC [0039:01 MYT] GSB 305	Resume normal speed Garing Sari Three Zero Five.
		1639:04 UTC [0039:04 MYT] unknown	Jason.
		1639:12 UTC [0039:12 MYT] Lumpur Radar	Asian Express One Nine Four Nine maintain seven thousand feet contact Tower.
		1639:16 UTC [0039:16 MYT] AXM 1949	Maintain seven thousand feet Asian Express One Niner Four Niner.
		1639:37 UTC [0039:37 MYT] MAS 6	Lumpur Malaysian Six salammualaikum selamat pagi passing one thousand for six thousand Agosa Alpha Departure.
		1639:44 UTC [0039:44 MYT] Lumpur Radar	Malaysian Six waalaikumsalam identified climb flight level one eight zero cancel S I D direct to Sukat.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1639:51 UTC [0039:51 MYT] MAS 6	Climb level one eight zero cancel S I D direct Sukat Malaysian Six.
		1640:30 UTC [0040:30 MYT] Lumpur Radar	Malaysian Four Three Three descend three thousand feet clear for ILS Approach Runway Three Two Left.
		1640:35 UTC [0040:35 MYT] MAS 433	Three thousand clear ILS Three Two Left Malaysian Four Three Three will call you establish.
		1641:05 UTC [0041:05 MYT] Lumpur Radar	Garing Sari Three Zero Five establish Localizer contact Tower one one eight five good night.
		1641:11 UTC [0041:11 MYT] GSB 305	Tower one one eight five selamat malam sir Gading Sari Three Zero Five.
		1641:15 UTC [0041:15 MYT] Lumpur Radar	Selamat malam.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1641:21 UTC [0041:21 MYT] Lumpur Radar	Asian Express One Nine Four Niner further right heading one six zero and descend three thousand five hundred.
		1641:28 UTC [0041:28 MYT] AXM 1949	Further right heading one six zero and descend three thousand five hundred feet Asian Express One Nine Four Niner.
1642:50 UTC [0042:50 MYT] MAS 370	Departure Malaysian aaa... Three Seven Zero.		
1642:53 UTC [0042:53 MYT] Lumpur Radar	Malaysian Three Seven Zero selamat pagi identified climb flight level one eight zero cancel SID turn right direct to IGARI.		
1643:01 UTC [0043:01 MYT] MAS 370	Okay... level one eight zero direct IGARI Malaysian One... aaa Three Seven Zero.		

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1643:18 UTC [0043:18 MYT] Lumpur Radar	Malaysian Four Three Three established Localizer contact tower one one eight decimal five good day.
		1643:24 UTC [0043:24 MYT] MAS 433	One one eight five Malaysia Four Three Three good night.
		1644:09 UTC [0044:09 MYT] Lumpur Radar	Asian Express One Nine Four Nine maintain three thousand five hundred feet standby lower.
		1644:13 UTC [0044:13 MYT] AXM 1949	Say again three thousand five hundred feet standby for lower Asian Express One Niner Four Niner.
		1645:10 UTC [0045:10 MYT] Lumpur Radar	Asian Express One Nine Four Niner descend two thousand five hundred feet base turn in three miles.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1645:15 UTC [0045:15 MYT] AXM 1949	Copy descend two thousand five hundred base turn in three miles Asian Express One Niner Four Niner.
		1645:20 UTC [0045:20 MYT] Lumpur Radar	Malaysian Six contact Lumpur Radar one three two decimal eight selamat jalan.
		1645:26 UTC [0045:26 MYT] MAS 6	Lumpur one three two eight salamualaikum Malaysian Six.
		1645:30 UTC [0045:30 MYT] Lumpur Radar	Waalaikumsalam.
		1645:44 UTC [0045:44 MYT] Lumpur Radar	Asian Express One Nine Four Niner turn right heading two two five for base.

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
	1645:48 UTC [0045:48 MYT] AXM 1949	Turn right heading two two five for base Asian Express One Niner Four Niner.	
	1646:03 UTC [0046:03 MYT] AXM 1367	Lumpur Express One Three Six Seven selamat pagi cending one three zero passing one nine zero.	
	1646:08 UTC [0046:08 MYT] Lumpur Radar	Asian Express One Three Six Seven selamat pagi high speed direct Gosmo descend seven thousand feet one zero one two.	
	1646:15 UTC [0046:15 MYT] AXM 1367	High speed drect Gosmo seven thousand one zero one three seven three six seven.	
1646:39 UTC [0046:39 MYT] Lumpur Radar	Malaysian Three Seven Zero contact Lumpur Radar one three two six good night.		

AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz		AIR-GROUND COMMUNICATION APPROACH RADAR - FREQUENCY 121.25 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1646:42 UTC [0046:42 MYT]	MAS 370      Night one three two six Malaysian err... Three Seven Zero.	1646:47 UTC [0046:47 MYT]	Lumpur Radar      Express One Nine Four Nine turn right heading two niner zero clear for ILS Approach Runway Three Two Left.
		1646:52 UTC [0046:52 MYT]	AXM 1949      Right heading two niner zero clear for ILS Approach for Runway Three Two Left.

**END OF LUMPUR APPROACH RADAR  
TRANSCRIPT**

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
<b>START TIME 1630:20 UTC [0030:20 MYT]</b>			
	1630:29 UTC [0030:29 MYT] Lumpur Radar		Singapore Nine Five Two ah climb flight level three two zero.
	1630:34 UTC [0030:34 MYT] Lumpur Radar		Singapore Three Five Two climb flight level three two zero.
	1630:37 UTC [0030:37 MYT] SIA 352		Climb level three two zero Singapore Three Five Two
	1630:40 UTC [0030:40 MYT] Lumpur Radar		Zest Nine Four One contact Singapore one two three decimal seven.
	1630:45 UTC [0030:45 MYT] Thai 41		One two three decimal seven Thai Air Four One selamat malam.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1630:52 UTC [0030:52 MYT] MAS 433	Malaysian Four Three Three maintaining flight level two six zero.
		1630:55 UTC [0030:55 MYT] Lumpur Radar	Malaysian Four Three Three.
		1631:09 UTC [0031:09 MYT] Lumpur Radar	Korean Air Six Seven ah... Two climb flight level ah... two niner zero expedite reaching.
		1631:15 UTC [0031:15 MYT] KAL 672	Two nine zero Korean Air Six Seven Two.
		1631:25 UTC [0031:25 MYT] Lumpur Radar	Malaysian Four Three Three descend flight level one five zero.
		1631:28 UTC [0031:28 MYT] MAS 433	Level one five zero Malaysia Four Three Three.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1631:30 UTC [0031:30 MYT] Lumpur Radar	Gading Sari Three Zero Five contact Lumpur Radar one two one two five.
		1631:34 UTC [0031:34 MYT] GSB 305	One two one two five Gading Sari Three Zero Five selamat malam sir.
		1631:38 UTC [0031:38 MYT] Lumpur Radar	Selamat malam.
		1631:47 UTC [0031:47 MYT] Lumpur Radar	Korean Air Six Seven Two expedite passing level two seven zero.
		1631:51 UTC [0031:51 MYT] KAL 672	Through two seven zero now Korean Air Six Seven Two thank you.
		1632:48 UTC [0032:48 MYT] Lumpur Radar	Malaysian Four Three Three contact radar one two one two five.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1632:51 UTC [0032:51 MYT] MAS 433	One two one two five Malaysian Four Three Three good night.
<b>DIRECT LINE COMMUNICATION BETWEEN LUMPUR RADAR AND SINGAPORE</b>			
		1633:37 UTC [0033:37 MYT] Singapore	Singapore.
		1633:38 UTC [0033:38 MYT] Sec 3 Radar Line	Singapore Three Two Four stop climb level two six zero.
		1633:41 UTC [0033:41 MYT] Singapore	Singapore Three Two Four stop climb fliight level two six zero copied.
<b>END OF DIRECT LINE COMMUNICATION</b>			
		1633:46 UTC [0033:46 MYT] KAL 672	Six Seven Two er vacating two seven zero ah... request three six zero the final.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1633:51 UTC [0033:51 MYT] Lumpur Radar	Korean Six Seven Two I say again climb level two niner zero expect passing two seven zero.
		1633:58 UTC [0033:58 MYT] KAL 672	Affirmative we are through two seven zero climbing two niner zero Korean Air Six Seven Two request three six zero the final.
		1634:03 UTC [0034:03 MYT] Lumpur Radar	Copied standby.
		1634:06 UTC [0034:06 MYT] SIA 324	Selamat malam Singapore Three Two Four climbing level two six zero.
		1634:11 UTC [0034:11 MYT] Lumpur Radar	Singapore Three Two Four confirm squawk.
		1634:14 UTC [0034:14 MYT] SIA 324	Squawking two two two seven Singapore Three Two Four.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1634:18 UTC [0034:18 MYT] Lumpur Radar	Singapore Three Two Four identified maintain level two six zero.
		1634:22 UTC [0034:22 MYT] SIA 324	Roger maintain level two six zero Singapore Three Two Four.
		1635:23 UTC [0035:23 MYT] SIA 352	Singapore Three Five Two maintaining level three two zero.
		1635:26 UTC [0035:26 MYT] Lumpur Radar	Singapore Three Five Two.
		1635:29 UTC [0035:29 MYT] Lumpur Radar	Singapore Three Five Two climb flight level two eight zero.
		1635:32 UTC [0035:32 MYT] SIA 324	Climb flight level two eight zero Singapore Two Four.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1636:51 UTC [0036:51 MYT] Lumpur Radar	Korean Air Six Seven Two contact Singapore one two three decimal seven.
		1636:55 UTC [0036:55 MYT] KAL 672	Twenty three seven Korean Air Six Seven Two good day sir.
		1636:58 UTC [0036:58 MYT] Lumpur Radar	Yap.
		1637:07 UTC [0037:07 MYT] Lumpur Radar	Singapore Three Two Four climb flight level three zero zero
		1637:11 UTC [0037:11 MYT] SIA 324	Ahh... confirm SingaporeThree Two Four.
		1637:14 UTC [0037:14 MYT] Lumpur Radar	Singapore Three Two Four climb level three zero zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1637:18 UTC [0037:18 MYT] SIA 324	Climb flight level three zero zero Singapore Three Two Four.
		1639:04 UTC [0039:04 MYT] SIA 324	Singapore Three Two Four request climb flight level three two zero.
		1639:08 UTC [0039:08 MYT] Lumpur Radar	Singapore Three Two Four final three zero zero.
		1639:12 UTC [0039:12 MYT] SIA 324	Final level three zero zero Singapore Three Two Four.
		1645:19 UTC [0045:19 MYT] Lumpur Radar	Malaysian Five Two contact Ho Chi Minh one two zero decimal niner.
		1645:24 UTC [0045:24 MYT] MAS 52	Ho Chi Minh one two zero decimal niner Malaysian Five Two good night.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1645:51 UTC [0045:51 MYT] TSE 738	Lumpur Control Transmile Seven Three Eight good evening flight level three four zero approaching Victor Papa Kilo two zero four zero.
		1646:01 UTC [0046:01 MYT] Lumpur Radar	Transmile Seven Three Eight radar identified Nipah correction clear to Subang Caledonian One Arrival Runway One Five Pibos Transition level three four zero.
		1646:09 UTC [0046:09 MYT] TSE 738	Clear to Subang Caledonian ah... One Arrival ah Runway One Five Subang and naa... Pibos Transition maintain flight level three four zero Transmile Seven Three Eight.
		1646:23 UTC [0046:23 MYT] Lumpur Radar	Transmile Seven Three Eight pilot discretion direct to Pibos now.
		1646:27 UTC [0046:27 MYT] TSE 738	Transmile Seven Three Eight tracking direct Pibos now.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1646:55 UTC [0046:55 MYT] MAS 370	Lumpur Control Malaysian aa Three Seven Zero.		
1646:58 UTC [0046:58 MYT] Lumpur Radar	Malaysian Three Seven Zero Lumpur Radar good morning climb flight level two five zero.		
1647:03 UTC [0047:03 MYT] MAS 370	Level two five zero Malaysian aaThree Seven Zero.	1648:34 UTC [0048:34 MYT] Lumpur Radar	Singapore Three Five Two contact Bangkok one two three decimal niner five.
		1648:38 UTC [0048:38 MYT] SIA 352	One two three niner five Singapore Three Five Two good day.
		1648:41 UTC [0048:41 MYT] Lumpur Radar	Good day sir.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1650:08 UTC [0050:08 MYT] Lumpur Radar	Malaysian Three Seven Zero climb flight level three five zero.		
1650:11 UTC [0050:11 MYT] MAS 370	Flight level three five zero Malaysian aa Three Seven Zero.	1651:13 UTC [0051:13 MYT] TSE 378	TransmileThree Seven Eight (xxxxxx) illegible.
		1651:17 UTC [0051:17 MYT] Lumpur Radar	Transmile Three Seven Eight descend flight level one niner zero.
		1651:20 UTC [0051:20 MYT] TSE 378	Descend level one niner zero Transmile Seven Three Eight.
MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		1652:49 UTC [0052:49 MYT] TSE 738	Transmile Seven Three Eight (xxxx) illegible direct Victor Bravo Alfa.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1652:53 UTC [0052:53 MYT] Lumpur Radar	Transmile Seven Three Eight track direct Victor Bravo Alfa approved.
		1652:57 UTC [0052:57 MYT] TSE 738	Direct Victor Bravo Alfa approved thank you (xxxx) [illegible]
		1653:11 UTC [0053:11 MYT] CPA 791	Lumpur good evening Cathay Seven Nine One flight level three nine zero squawking five three five one.
		1653:19 UTC [0053:19 MYT] unknown	four seven.
		1653:22 UTC [0053:22 MYT] AXM 1017	Express One Zero One Seven good morning level three five zero squawking five one seven six.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1653:29 UTC [0053:29 MYT] Lumpur Radar	Asian Express One Zero One Six Lumpur Radar identified maintain level three five zero and track direct for Nipah Nipah Three Arrival Runway Three Two Right.
		1653:40 UTC [0053:40 MYT] AXM 1017	To Nipah for Three Two Right Express One Zero One Seven identified.
		1653:49 UTC [0053:49 MYT] CPA 791	Lumpur good morning Cathay Seven Nine One flight level three nine zero squawk five three five four.
		1653:54 UTC [0053:54 MYT] Lumpur Radar	Cathay Seven Nine One Lumpur Radar identified Nipah Three Alpha Arrival Runway Three Two Right Pibos Alpha Transition level three nine zero standby for direct track.
		1654:05 UTC [0054:05 MYT] CPA 791	(xxxxx) (xxxxx) [illegible] out of three nine zero (xxxxx) (xxxxx) [illegible] south arrival three two right Pibos Transition Cathay Seven Nine One.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1654:35 UTC [0054:35 MYT] Lumpur Radar	Singapore Three Two Four contact Bangkok one two three decimal nine five.
		1654:39 UTC [0054:39 MYT] SIA 324	One two three niner five Singapore Three Two Four good day.
		1654:43 UTC [0054:43 MYT] Lumpur Radar	Good day.
		1654:58 UTC [0054:58 MYT] Lumpur Radar	Thai Peace Nine Two One contact Singapore one two three decimal seven.
		1655:03 UTC [0055:03 MYT] BBC 921	Contact Singapore two three seven Niner Two One.
		1655:13 UTC [0055:13 MYT] Lumpur Radar	Transmile Seven Three Eight descend to flight level one five zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1655:17 UTC [0055:17 MYT] TSE 738	(xxx) (xxx) [illegible] one five zero Transmile Seven Three Eight.
		1656:23 UTC [0056:23 MYT] CPA 791	Cathay Seven Nine One request descend.
		1656:26 UTC [0056:26 MYT] Lumpur Radar	Cathay Seven Nine One descend flight level three zero zero.
		1656:30 UTC [0056:30 MYT] CPA 791	Descend flight level three zero zero Cathay Seven Nine One.
		1656:42 UTC [0056:42 MYT] AXM 1017	Asian Express One Zero One Seven request descend.
		1656:45 UTC [0056:45 MYT] Lumpur Radar	Express One Zero One Seven descend flight level one nine zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1656:49 UTC [0056:49 MYT] AXM 1017	Flight level one nine zero Asian Express One Zero One Seven.
		1657:45 UTC [0057:45 MYT] Lumpur Radar	Cathay Seven Nine One naa... direct to Nipah and reduce speed two eight zero.
		1657:52 UTC [0057:52 MYT] CPA 792	Nipah reduce speed two eight zero Cathay Seven Nine One..
		1657:56 UTC [0057:56 MYT] Lumpur Radar	Express One Zero One Seven maintain high speed descend level one five zero.
		1658:01 UTC [0058:01 MYT] AXM 1017	High speed to one five zero Express One Zero One Seven.
		1658:04 UTC [0058:04 MYT] Lumpur Radar	Transmile Seven Three Eight contact radar one two one two five.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1658:07 UTC [0058:07 MYT] TSE 738	One two one two five Transmire Seven Three Eight.
		1659:40 UTC [0059:40 MYT] Lumpur Radar	Cathay Seven Nine One descend flight level two eight zero.
		1659:44 UTC [0059:44 MYT] CPA 791	Descend flight level two eight zero Cathay Seven Nine One.
		1701:09 UTC [0101:09 MYT] Lumpur Radar	Cathay Seven Nine One descend flight level two four zero.
		1701:12 UTC [0101:12 MYT] CPA 791	Descend flight level two four zero Cathay Seven Nine One.
1701:17 UTC [0101:17 MYT] MAS 370	Malaysian aaThree Seven Zero maintaining flight level three five zero.		

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1701:21 UTC [0101:21 MYT] Lumpur Radar	Malaysian Three Seven Zero	1701:36 UTC [0101:36 MYT] Lumpur Radar	Cathay Seven Nine One descend flight level one niner zero.
		1701:40 UTC [0101:40 MYT] CPA 791	Descend flight level one niner zero Cathay Seven Niner One.
		1702:38 UTC [0102:38 MYT] Lumpur Radar	Asian Express One Zero One Seven direct to ANSOK maintain high speed.
		1702:44 UTC [0102:44 MYT] AXM 1014	Maintain high speed and aah ..... say again that point.
		1702:48 UTC [0102:48 MYT] Lumpur Radar	One zero one seven direct to ANSOK.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1702:51 UTC [0102:51 MYT] AXM 1017	To ANSOK high speed Express One Zero One Seven.
		1702:55 UTC [0102:55 MYT] Lumpur Radar	Cathay Seven Nine One Runway Three Two Right sir and daa... maintain level one nine zero.
		1703:01 UTC [0103:01 MYT] CPA 791	Cathay Seven Nine One say again.
		1703:03 UTC [0103:03 MYT] Lumpur Radar	Cathay Seven Nine One Runway Three Two Right in used.
		1703:06 UTC [0103:06 MYT] CPA 791	Copy Runway Three Two Right maintain flight level one nine zero Cathay Seven Nine One.
		1703:20 UTC [0103:20 MYT] AXM 7092	Lumpur Control Asia Seven Zero Nine Two good morning flight level three five zero squawk three one four seven.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1703:33 UTC [0103:33 MYT] Lumpur Radar	Asian Express One Zero Eight Niner Radar say again your squawk.
		1703:38 UTC [0103:38 MYT] AXM 1089	Squawk three one four seven.
		1703:41 UTC [0103:41 MYT] Lumpur Radar	Express One Zero Eight Niner identified direct to Nipah Nipah Three Alfa Arrival Runway Three Two Right level three five zero.
		1703:49 UTC [0103:49 MYT] AXM 1089	Track direct Nipah clear ahh Lumpur Nipah Three Alfa Three Two Right Pibos Alfa Transition and track Nipah confirm.
		1703:58 UTC [0103:58 MYT] Lumpur Radar	Affirm ahh direct to Nipah.
		1704:00 UTC [0104:00 MYT] AXM 1089	Nipah Express One Zero Eight Niner.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1704:04 UTC [0104:04 MYT] Lumpur Radar	Cathay seven nine one descend level one seven zero.
		1704:08 UTC [0104:08 MYT] CPA 791	Descend one seven zero Cathay Seven Nine One.
		1704:11 UTC [0104:11 MYT] Lumpur Radar	Express One Zero One Seven nahhh... Descend one one thousand QNH is one zero one two contact Radar one two one two five.
		1704:23 UTC [0104:23 MYT] Lumpur Radar	Express One Zero One Seven descend one one thousand on QNH one zero one two contact Radar one two one two five.
		1704:35 UTC [0104:35 MYT] Lumpur Radar	Express One Zero One Seven Lumpur.
		1704:56 UTC [0104:56 MYT] Lumpur Radar	Express One Zero One Seven Lumpur.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1705:12 UTC [0105:12 MYT] Lumpur Radar	Cathay Seven Nine One descend level one five zero.
		1705:15 UTC [0105:15 MYT] CPA 791	Descend flight level one five zero Cathay Seven Niner One.
		1705:25 UTC [0105:25 MYT] AXM 1089	Express One Zero Eight Niner request descend.
		1705:29 UTC [0105:29 MYT] Lumpur Radar	Express One Zero Eight Niner descend flight level two five zero.
		1705:34 UTC [0105:34 MYT] AXM 1089	Descend to flight level two five zero Express One Zero Eight Niner.
		1705:39 UTC [0105:39 MYT] Lumpur Radar	Asian Express One Zero One Seven Lumpur Radar how do you read.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1705:44 UTC [0105:44 MYT] AXM 1017	Lumpur Express One Zero One Seven how do you read.
		1705:50 UTC [0105:50 MYT] AXM 1017	Lumpur Lumpur Express One Zero One Seven.
		1705:53 UTC [0105:53 MYT] Lumpur Radar	Express One Zero One Seven descend one one thousand.
		1705:57 UTC [0105:57 MYT] AXM 1017	Descend to one one thousand Express (xxxx) (xxxx) [illegible]
		1706:03 UTC [0106:03 MYT] Lumpur Radar	Express One Zero One Seven QNH one zero one two contact Radar one two one two five.
		1706:08 UTC [0106:08 MYT] AXM 1017	One two one two five Control One Seven good day sir.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1706:36 UTC [0106:36 MYT] Lumpur Radar	Cathay Seven Niner One contact Radar one two one two five.
		1706:39 UTC [0106:39 MYT] CPA 792	One two one two five Cathay Seven Nine One good night.
1707:56 UTC [0107:56 MYT] MAS 370	Ehhh... Seven Three Seven Zero maintaining level three five zero.		
1708:02 UTC [0108:02 MYT]	Malaysian Three Seven Zero.		
		1710:54 UTC [0110:54 MYT] XAX 506	Lumpur Xanadu Five Zero Six passing ten thousand seven hundred feet for flight level one eight zero good morning.
		1711:05 UTC [0111:05 MYT] Lumpur Radar	Xanadu Five Zero Six straight climb flight level two zero zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1711:10 UTC [0111:10 MYT] XAX 506	Climb flight level two zero zero and request direct aah... Victor Papa Golf if possible Xanadu Five Zero Six.
		1711:16 UTC [0111:16 MYT] Lumpur Radar	Xanadu Five Zero Six route via Kimat and Approach will advice you for direct track.
		1711:22 UTC [0111:22 MYT] XAX 506	Roger Kimat Xanadu Five Zero Six.
		1712:51 UTC [0112:51 MYT] Lumpur Radar	Asian Express One Zero Eight Niner descend flight level one five zero.
		1712:56 UTC [0112:56 MYT] AXM 1089	Flight level one five zero Express One Zero Eight niner.
		1712:59 UTC [0112:59 MYT] Lumpur Radar	Xanadu Five Zero Six climb flight level two niner zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1713:02 UTC [0113:02 MYT] XAX 506	Climb flight level two nine zero Xanadu Five Zero Six.
		1715:00 UTC [0115:00 MYT] Lumpur Radar	Xanadu Five Zero Six direct Papa Kilo.
		1715:03 UTC [0115:03 MYT] XAX 506	Direct Papa Kilo Xanadu Five Zero Six thank you.
		1715:25 UTC [0115:25 MYT] Lumpur Radar	Asian Express One Zero Eight Niner contact Radar one two one two five.
		1715:30 UTC [0115:30 MYT] AXM 1089	One two one two five (xxx) [illegible] One Zero Eight Nine good bye.
		1715:33 UTC [0115:33 MYT] Lumpur Radar	night.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1719:26 UTC [0119:26 MYT] Lumpur Radar	Malaysian Three Seven Zero contact Ho Chi Minh one two zero decimal niner good night.		
1719:30 UTC [0119:30 MYT] MAS 370	Good night Malaysian Three Seven Zero.	1723:43 UTC [0123:43 MYT] XAX 506	Xanadu Five Zero Six approaching Papa Kilo.
		1723:48 UTC [0123:48 MYT] Lumpur Radar	Xanadu Five Zero Six contact Singapore one two three decimal seven.
		1723:52 UTC [0123:52 MYT] XAX 506	Contact Singapore one two three decimal seven Xanadu Five Zero Six good night.
		1726:17 UTC [0126:17 MYT] CES 5093	Err... Lumpur Control err... China Air Five Zero Niner Three flight level three seven zero.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1726:26 UTC [0126:26 MYT] Lumpur Radar	China Air Five Zero Nine Three Lumpur Radar identified maintain level three seven zero.
		1726:33 UTC [0126:33 MYT] CES 5093	(xxxx) (xxxx) [illegible] Zero Nine Three.
		1729:10 UTC [0129:10 MYT] GBG 76	Lumpur good evening Global Jet Seven Six flight level four one zero.
		1729:34 UTC [0129:34 MYT] GBG 76	Lumpur Global Jet Seven Six flight level four one zero.
		1729:41 UTC [0129:41 MYT] Lumpur Radar	Roger Seven Six Lumpurr control maintain flight level four one zero standby by for arrival.
		1729:49 UTC [0129:49 MYT] GBG 76	Maintain four one zero Global Jet Seven Six.

AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz		AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1731:57 UTC [0131:57 MYT] Lumpur Radar	Global Jet Seven Six clear to Subang Caledonean One Arrival Runway One Five Pibos transition level four one zero.
		1732:06 UTC [0132:06 MYT] GBGt 76	Clear to Subang Caledonean One Arrival Runway One Five emm...daa... request descend.
		1732:13 UTC [0132:13 MYT] Lumpur Radar	Global Jet Seven Six descend to flight level one niner zero.
		1732:17 UTC [0132:17 MYT] GBG 76	Descend to flight level one niner zero Global Jet Seven Six.

**END OF SECTOR 3 + 5 RADAR TRANSCRIPT**

TIME & SOURCE	LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
<b>START TIME 1730:00 UTC [0130 MYT]</b>			
			1731:57 UTC [0131:57 MYT] Lumpur Radar Global Jet Seven Six clear to Subang Caledonean One Arrival Runway One Five Pibos Transition level four one zero.
			1732:06 UTC [0132:06 MYT] GBG 76 Clear to Subang Caledonean One Arrival Runway One Five emm...daa... request descend.
			1732:13 UTC [0132:13 MYT] Lumpur Radar Global Jet Seven Six descend to flight level one niner zero.
			1732:17 UTC [0132:17 MYT] GBG 76 Descend to flight level one niner zero Global Jet Seven Six.
<b>Direct Line Telephone Conversation Between KL ATCC and Bangkok ATCC</b>			
			1739:16 UTC [0139:16 MYT] KL ATCC Lumpur.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1739:17 UTC [0139:17 MYT] Bangkok ATCC Estimate Kota Bharu on Silk Air Nine Three Seven.
			1739:23 UTC [0139:23 MYT] KL ATCC Silk Air Nine Three Seven go ahead.
			1739:25 UTC [0139:25 MYT] Bangkok ATCC Kota Bharu one nine zero six one nine zero six flight level three nine zero squawk one five one three.
			1739:36 UTC [0139:36 MYT] KL ATCC Okay Silk Air Nine Three Seven Victor Kilo Bravo one niner zero six level three nine zero squawk one niner one three.
			1739:44 UTC [0139:44 MYT] Bangkok ATCC One five one three affirm.

End of Direct Line Telephone Conversation  
Between KL ATCC and Bangkok ATCC

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
		1740:11 UTC [0140:11 MYT] GBG 76 (xxxx) [illegible] Global Jet Seven Six request further descend.
		1740:16 UTC [0140:16 MYT] Lumpur Radar Global Jet Seven Six descend flight level aa... one five zero contact Lumpur Radar one two one two five.
		1740:23 UTC [0140:23 MYT] GBG 76 One five zero over one two five Global Jet Seven Six.
1741:23 UTC 0141:23 MYT] Lumpur Radar	Malaysian Three Seven Zero Lumpur Radar how do you read, do you read.	1742:08 UTC [0142:08 MYT] CES 539 Lumpur Control good morning China Eastern Five Three Niner maintaining level three six zero squawk five one one one.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1742:20 UTC [0142:20 MYT]
		Lumpur Radar	China Eastern Five Three Nine Lumpur Radar identified maintain level three six zero Nipah Three Alfa Arrival Runway Three Two Left Pibos Tran correction Nipah Three Alpha Arrival Runway Three Two Right Pibos Apha Transition.
		1742:35 UTC [0142:35 MYT]	CES 539 Nipah Three Alpha Pibos Transition Runway Three Two Right China Southern Five Three Niner.
		1746:21 UTC [0146:21 MYT]	CEB 501 Lumpur Radar good morning Cebu Five Zero One.
		1746:28 UTC [0146:28 MYT]	Lumpur Radar Cebu Five Zero One Radar good morning squawk ident and report level.
		1746:38 UTC [0146:38 MYT]	CEB 501 And daa... Lumpur Radar Cebu Five Zero One request descend.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		1746:44 UTC [0146:44 MYT] Lumpur Radar Cebu Five Zero One identified descend level one nine zero Nipah Three Alpha Arrival RunwayThree Two Right Eastan Alpha Transition.
		1746:55 UTC [0146:55 MYT] CEB 501 Descend level one niner zero and daa... Nipah Three Alpha Arrival Runway Three Two Right Cebu Five Zero One.
		1747:08 UTC [0147:08 MYT] CES 539 Lumpur Control China Eastern Five Three Niner request descend.
		1747:15 UTC [0147:15 MYT] Lumpur Radar China Eastern Five Three Niner descend flight level one niner.
		1747:19 UTC [0147:19 MYT] CES 539 Descend flight level one niner zero China Eastern Five Three Niner.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1748:09 UTC [0148:09 MYT] Lumpur Radar Five zero one direct to Nipah.
		5551	1748:13 UTC [0148:13 MYT] Say again where to Cebu Five Zero One you are coming in garble sir.
			1748:17 UTC [0148:17 MYT] Lumpur Radar Five Zero One track direct Nipah.
		CEB 501	1748:21 UTC [0148:21 MYT] Direct but Cebu Five Zero One.
			<b>Direct Line Telephone Coverstion Between KL ATCC and HCM ATCC</b>
		KL ATCC	1749:54 UTC [0149:54 MYT] Ho Chi Minh Lumpur.
		HCM ATCC	1749:56 UTC [0149:56 MYT] I transfer IGARI for Malaysian Six One Six Three.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1750:01 UTC [0150:01 MYT] Lumpur Radar Malaysian eer... Six One Six Three go ahead.		
	1750:07 UTC [0150:07 MYT] HCM ATCC IGARI one eight three five flight level request three six zero squawk six three four five.		
	1750:15 UTC [0150:15 MYT] KL ATCC Malaysian Six One Six Three IGARI one eight three five flight level three six zero is approved squawk six three four five.		
	1750:23 UTC [0150:23 MYT] HCM ATCC Okay transfer three six zero for Malaysian Six One Six Three.		
1750:27 UTC [0150:27 MYT] KL ATCC	Affirm.... and confirm still negative contact with Malaysian Three Seven Zero.		
1750:32 UTC [0150:32 MYT] HCM ATCC	Affirm negative contact.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1750:34 UTC [0150:34 MYT]	KL ATCC Err... okay thank you advise me...		
1750:38 UTC [0150:38 MYT]	HCM ATCC Okay.		
<b>End Of Direct Line Conversations Between KL ATCC and HCM ATCC</b>			
1751:06 UTC [0151:06 MYT]	Lumpur Radar China Eastern Five Three Niner direct to Nipah and descend level one niner zero.		
1751:13 UTC [0151:13 MYT]	CES 539 Direct to Nipah and descend to level one niner zero China Eastern Five Three Niner.		
1751:19 UTC [0151:19 MYT]	Lumpur Radar China Eastern Five Zero Niner Three contact Singapore one two three decimal seven.		
1751:26 UTC [0151:26 MYT]	CES 5093 One two three decimal seven err... good night China Eastern Five Zero Nine Three.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1751:36 UTC [0151:36 MYT] Lumpur Radar Cebu Five Zero One descend flight level one five zero.
			1751:40 UTC [0151:40 MYT] CEB 5093 Descend flight level one five zero Cebu Five Zero One.
			1752:46 UTC [0152:46 MYT] Lumpur Radar Cebu Five Zero One speed three zero zero or greater.
			1752:51 UTC [0152:51 MYT] CEB 501 Three zero zero or greater Cebu Five Zero One.
			1753:04 UTC [0153:04 MYT] Lumpur Radar Cebu Five Cebu Five Zero One contact Lumpur Radar one two one two five.
			1753:10 UTC [0153:10 MYT] SIA 501 One two one two five good day.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1754:40 UTC [0154:40 MYT] Lumpur Radar China Eastern Five Three Niner contact Lumpur Radar one two one two five.
			1754:45 UTC [0154:45 MYT] CES 539 One two one two five China Eastern Five Three Nine good day.
			1801:46 UTC [0201:46 MYT] MAS 386 Lumpur Control Malaysian Three Eight Six passing one flight level one two four for flight level one eight zero.
			1801:56 UTC [0201:56 MYT] Lumpur Radar Three Eight Six Lumpur radar ...Good morning climb flight level two one zero.
			1802:01 UTC [0202:01 MYT] MAS 386 Level two one zero Malaysian Three Eight Six.
			1803:04 UTC [0203:04 MYT] Lumpur Radar Malaysian Three Eight Six climb initially flight level three three zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		1803:09 UTC 0203:09 MYT [MAS 386]	Level three six zero initially Malaysian Three Eight Six.
		1803:13 UTC [0203:13 MYT] Lumpur Radar	Malaysian Three Eight Six initially flight level three three zero.
		1803:16 UTC [0203:16 MYT] MAS 386	Initially flight level three three zero Malaysian Three Eight Six.

### TELEPHONE CONVERSATION

1803:34 UTC  
 [0203:34] MYT  
 KL ATCC Ah okay okay okay carry on I tell Singa Ho Chi Minh la  
 we told the airline to contact.

1803:38 UTC  
 [0203:38 MYT] *Direct line telephone ringing tone.*

1803:41 UTC  
 [0203:41 MYT]  
 KL ATCC Good night.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1803:48 UTC [0203:48 MYT]			
KL ATCC	Helo.		
1803:49 UTC [0203:49 MYT]			
KL ATCC	Ho Chi Minh.		
1803:50 UTC [0203:50 MYT]			
HCM ATCC	Yes sir.		
1803:51 UTC [0203:51 MYT]			
KL ATCC	Any news for Malaysian Three Seven Zero.		
1803:54 UTC [0203:54 MYT]			
HCM ATCC	Negative sir until now they probably out of radar.		
1803:57 UTC [0203:57 MYT]			
KL ATCC	Okay.		
1803:58 UTC [0203:58 MYT]			
HCM ATCC	We have no information about Malaysian Three Seven Zero right now.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1804:02 UTC [0204:02 MYT]			
KL ATCC	Okay Malaysian.		
1804:03 UTC [0204:03 MYT]			
HCM ATCC	No radar target yeah.		
1804:05 UTC [0204:05 MYT]			
KL ATCC	No radar target confirm.		
1804:07 UTC [0204:07 MYT]			
HCM ATCC	Standby.		
1804:08 UTC [0204:08 MYT]			
KL ATCC	You don't have radar contact.		
1804:12 UTC [0204:12 MYT]			
HCM ATCC	Go ahead sir.		
1804:13 UTC [[0204:13 MYT]			
KL ATCC	No confirm you don't have any radar contact.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1804:17 UTC [0204:17 MYT]			
HCM ATCC	Yeah no radar contact no ADSB contact no communication.	1804:23 UTC [0204:23 MYT]	
		THA 483	Lumpur Control Thai Four Eight Three good evening.
<b>DIRECT LINE TELEPHONE CONVERSATION INTERRUPTED BY AIRCRAFT CALLING</b>			
1804:25 UTC [0204:25 MYT]			
KL ATCC	Eer... Standby please.	THA 483	Squawking six one one four.
		1804:30 UTC [0204:30 MYT]	
		Lumpur Radar	Thai Four Eight Three Lumpur Radar identified maintain level three seven zero.
		1804:33 UTC [0204:33 MYT]	
		THA 483	Maintain level three seven zero Thai Four Eight Three.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
<b>CONTINUE DIRECT LINE CONVERSATION WITH HO CHI MINH</b>			
1804:36 UTC [0204:36 MYT]			
KL ATCC	Okay Ho Chi Minh.		
1804:38 UTC [0204:38 MYT]			
HCM ATCC	Yes sir.		
1804:39 UTC [0204:39 MYT]			
KL ATCC	Okay reference to the... company Malaysian Airlines the aircraft is still flying is over somewhere over Cambodia.		
1804:50 UTC [0204:50 MYT]			
HCM ATCC	Somewhere over Cambodia.		
1804:51 UTC [0204:51 MYT]			
KL ATCC	Affirm.		
1804:52 UTC [0204:52 MYT]			
HCM ATCC	That's mean not enter our FIR.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1804:58 UTC [0204:58 MYT]			
KL ATCC	Okay I am not very sure about that but daa... this is what the airlines represent MAS said that the aircraft ...		
1805:05 UTC [0205:05 MYT]			
HCM ATCC	Okay okay let me check with Cambodia.		
1805:08 UTC [0205:08 MYT]			
KL ATCC	Yeap please check with Cambodia please.		
1805:09 UTC [0205:09 MYT]			
HCM ATCC	Yeah.		
1805:10 UTC [0205:10 MYT]			
KL ATCC	Okay and call me back.		

**End of Direct Line Telephone Conversation  
Between KL ATCC and HCM ATCC**

1809:35 UTC  
[0209:35 MYT]

TGW 2657      Lumpur Control GoCat Two Six Five Seven good morning we are flight level three five zero squawking four seven zero four over Victor Kilo Bravo.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1809:46 UTC [0209:46] MYT Lumpur Radar GoCat Two Six Five Seven Lumpur Radar identified maintain flight level four three seven correction three five zero.
			1809:53 UTC [0209:53] MYT TGW 2657 Maintain GoCat Two Six Five Seven.
			1815:27 UTC [0215:27] MYT CCA 405 Lumpur Control ah good morning China Four Zero Four maintain level two eight zero.
			1815:34 UTC [0215:34] MYT Lumpur Radar Air China Four Zero Four Lumpur Radar confirm squawk.
			1815:38 UTC [0215:38] MYT CCA 405 Squawk two two one seven.
			1815:41 UTC [0215:41] MYT Lumpur Radar Air China Four Zero Four identified climb level three four zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		1815:46 UTC [0215:46 MYT] CCA 405	Climb to three our zero Air China Four Zero Four.
		1816:05 UTC [0216:05 MYT]	<i>Sound of telephone ringing.</i>
		1816:13 UTC [0216:13 MYT] Source unknown Helo.	
		1816:17 UTC [0216:17 MYT] Source unknown Helo.	
		1816:21 UTC [0216:21 MYT]	Telephone line cut-off tone TOO TOO TOO TOO.
		1816:30 UTC [0216:30 MYT]	<i>End of Telephone line cut-off tone.</i>
		1816:36 UTC [0216:36 MYT] THA 465	Lumpur Control Thai Four Six Five good morning maintaining flight level three seen zero.
		1816:46 UTC [0216:46 MYT] Lumpur Radar	Thai Four Six Five Lumpur squawk ident.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1816:49 UTC [0216:49 MYT] THA 465      Squawk six one one six idening Thai Four Six Five.
			1817:01 UTC [0217:01 MYT] Lumpur Radar Four Six Five identified mainain level daa...three seven zero.
			1817:06 UTC [0217:06 MYT] THA 465      Maintain flight level three seven zero Thai Four Six Five.
			1817:10 UTC [0217:10 MYT] Lumpur Radar Malaysian Three Eight Six climb initially level three four zero.
			1817:19 UTC [0217:19 MYT] Lumpur Radar Malaysian Three Eight Six climb initially level three four zero.
			1817:22 UTC [0217:22 MYT] MAS 386      To three four zero Malaysian Three Eight Six.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
	1820:24 UTC [0220:24 MYT] MAS 386	Three Eight Six maintaining flight level three four zero request higher.
	1820:32 UTC [0220:32 MYT] Lumpur Radar	Three Eight Six standby.
<b>Direct Line Telephone Conversation Between KL ATCC and Bangkok ATCC</b>		
	1821:50 UTC [0221:50 MYT] KL ATCC	Yeah Bangkok.
	1821:51 UTC [0221:51 MYT] Bangkok ATCC	Helo three estimates Kota Bharu.
	1821:53 UTC [0221:53 MYT] Source unknown	Songkran around.
	1822:02 UTC [0222:02 MYT] KL ATCC	Okay Bangkok go ahead.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1822:04 UTC [0222:04 MYT] Bangkok ATCC First one Zero One Cargo Five Three Zero.
			1822:08 UTC [0222:08 MYT] KL ATCC Go ahead.
			1822:10 UTC [0222:10 MYT] Bangkok ATCC Kota Bharu one nine one five flight level three five zero squawk six one one seven.
			1822:18 UTC [0222:18 MYT] KL ATCC Next.
			1822:19 UTC [0222:19 MYT] Bangkok ATCC Silk Air Five Zero Nine.
			1822:22 UTC [0222:22 MYT] KL ATCC Go ahead.
			1822:24 UTC [0222:24 MYT] Bangkok ATCC Kota Bharu one nine four two flight level three five zero squawk seven four zero two.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1822:31 UTC [0222:31 MYT] KL ATCC Next.
			1822:31 UTC [0222:31 MYT] Bangkok ATCC Last one Singapore Four Four Seven.
			1822:35 UTC [0222:35 MYT] KL ATCC Go ahead.
			1822:37 UTC [0222:37 MYT] Bangkok ATCC Two zero one three flight level three nine zero squawk four seven five one.
			1822:43 UTC [0222:43 MYT] KL ATCC Okay I read back er... (xxx) [illegible] Cargo Five Three Zero Kota Bharu one nine one one five flight level three five zero squawk six one one seven, Silk Air Five Two Niner Kota Bharu one nine four two flight level three five zero squawk seven four zero two and last one Singapore Four Four Seven IGARI two zero one six one three flight level three niner zero squawk four seven five one confirm.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1823:04 UTC [0223:04 MYT] Bangkok ATCC Yes the second one is Silk Air Five Zero Niner.
			1823:07 UTC [0223:07 MYT] KL ATCC Five Silk Air Five Zero Niner copied.
			1823:09 UTC [0223:09 MYT] Bangkok ATCC Affirm thank you.
<b>End of Direct Line Telephone Conversation Between KL ATCC and Bangkok ATCC</b>			
			1823:16 UTC [0223:16 MYT] Lumpur Radar Malaysian Three Five Zero climb level three five zero.
			1823:20 UTC [0223:20 MYT] Lumpur Radar Malaysian Three Eight Six climb level three five zero.
			1823:22 UTC [0223:22 MYT] MAS 386 Three five zero Malaysian Three Eight Six.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
		1823:26 UTC [0223:26 MYT] Lumpur Radar Malaysian Three Eight Six expect igher later by... Ho Chi Minh.
		1823:29 UTC [0223:29 MYT] MAS 386 Malaysian Three Eight Six.
		1827:06 UTC [0227:06 MYT] Lumpur Radar Thai Four Eight Three contact Singapore one two three decimal seven.
		1827:09 UTC [0227:09 MYT] THA 483 Singapore one two three decimal seven Thai Four Eight Three.
		1830:40 UTC [0230:40 MYT] Lumpur Radar Thai Four Six Five contact Singapore one two three decimal seven.
		1830:45 UTC [0230:45 MYT] THA 465 One two three decimal seven Thai Four Six Five.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1832:23 UTC [0232:23 MYT] MAS 6163      Lumpur Six One SixThree morning.
			1832:32 UTC [0232:32 MYT] MAS 6163      Lumpur Malaysian Six One Six Three.
			1832:42 UTC [0232:42 MYT] MAS 6163      Lumpur Malaysian Six One Six Three one three four two five.
		Lumpur Radar	1832:46 UTC [0232:46 MYT] Malaysian Six One Six Three Lumpur Radar firm squawk and level.
		MAS 6163	1832:51 UTC [0232:51 MYT] Level three six zero squawking six three four five Malaysian Six One Six Three.
		Lumpur Radar	1832:57 UTC [0232:57 MYT] Malaysian Six One Six Three identified maintain level three six zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		1833:00 UTC [0233:00 MYT] MAS 6163	Roger Malaysian Six One Six Three.
		1833:18 UTC [0233:18 MYT] Lumpur Radar	Malaysian Three Eight Six contact Ho Chi Minh one two zero decimal niner.
		1833:22 UTC [0233:22 MYT] MAS 386	One two zero decimal nine Malaysian Three Eight Six.
		1833:26 UTC [0233:26 MYT] Lumpur Radar	GoCat Two Six Five Seven contact Singapore one two three decimal seven.
		1833:31 UTC [0233:31 MYT] TGW 2657	One two three decimal seven GoCat Two Six Five Seven.

1833:50 UTC  
 [0233:50 MYT] **LUMPUR RADAR DAILING TELEPHONE LINE**

1833:53 UTC  
 [0233:53 MYT] Telephone ringing tone.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1833:59 UTC [0233:59 MYT] MAS Operations Hello.		
	1834:00 UTC 0234:00 MYT KL ATCC      Okay aah... hello good good morning.		
	1834:02 UTC [0234:02 MYT] MAS Operations Yeah yeah.		
	1834:03 UTC [0234:03 MYT] KL ATCC      Calling from Subang Centre lah.		
	1834:06 UTC [0234:06 MYT] MAS Operations err... ya.		
	1834:07 UTC [0234:07 MYT] KL ATCC      This is MAS Operations is it.		
	1834:09 UTC [0234:09 MYT] MAS Operations Ya ya		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1834:10 UTC [0234:10 MYT]			
KL ATCC	Okay err.... regarding your Malaysian Three Seven Zero.		
1834:13 UTC [0234:13 MYT]			
MAS Operations Herha.			
1834:14 UTC [0234:14 MYT]			
KL ATCC	Ho Chi Minh said still negative contact.		
1834:17 UTC [0234:17 MYT]			
MAS Operations Haa.			
1834:17 UTC [0234:17 MYT]			
KL ATCC	And the no radar target at all.		
1834:20 UTC [0234:20 MYT]			
MAS Operations Okay.			
1834:21 UTC [0234:21 MYT]			
KL ATCC	But earlier we checked with MAS I think your side somebody said that the aircraft still flying and you already send signal to the aircraft.  MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1834:29 UTC [0234:29 MYT] MAS Operations Ya.		
KL ATCC	1834:30 UTC [0234:30 MYT] Okay and daa... what is daa... I mean did they reply to you or not.		
	1834:34 UTC [0234:34 MYT] MAS Operations No no no they never reply.		
KL ATCC	1834:36 UTC [0234:36 MYT] Malaysian Three Seven Zero.		
	1834:37 UTC [0234:37 MYT] MAS Operations Hmm ya.		
KL ATCC	1834:38 UTC [0234:38 MYT] But daa...how do you know that they ooo...ya...		
	1834:41 UTC [0234:41 MYT] MAS Operations Because of the.... message went through successfully.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1834:44 UTC [0234:44 MYT]	KL ATCC Successfully went through.		
1834:45 UTC [0234:45 MYT]	MAS Operations Aaa...		
1834:46 UTC [0234:46 MYT]	KL ATCC Okay amm.... can you I mean is there (xxx) [illegible] any possible for the aircraft to answer you.		
1834:53 UTC [0234:53 MYT]	MAS Operations Eer...		
1834:54 UTC [0234:54 MYT]	KL ATCC Anyway aircraft can answer you.		
1834:58 UTC [0234:58 MYT]	MAS Operations Do know daa.... You have to try the SATCOM la sir.		
1835:02 UTC [0235:02 MYT]	KL ATCC <small>10/01/15</small> hmm hamm. Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1835:02 UTC [0235:02 MYT] MAS Operations Will try the SATCOM and see.		
	1835:03 UTC [0235:03 MYT] KL ATCC Okay.		
	1835:05 UTC [0235:05 MYT] KL ATCC Hah hah see whether they can I am sure whether the position or whether they contact with anyone and the estimate for landing or anything.		
	1835:13 UTC [0235:13 MYT] MAS Operations Okay.		
	1835:14 UTC [0235:14 MYT] KL ATCC Okay and daa okay daa because da Ho Chi Minh still worry because they have eercompletely no contact at all either radio or radar.		
	1835:26 UTC [0235:26 MYT] MAS Operations Okay.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1835:27 UTC [0235:27 MYT]		
KL ATCC	Okay so.		
	1835:29 UTC [0235:29 MYT]		
MAS Operations	Can fax them the...because is still down loading the..... aircraft movement.		
	1835:35 UTC [0235:35 MYT]		
KL ATCC	Ah huh.		
	1835:36 UTC [0235:36 MYT]		
MAS Operations	Aircraft still sending the ... movement message.		
	1835:38 UTC [0235:38 MYT]		
KL ATCC	Okay.		
	1835:39 UTC [0235:39 MYT]		
MAS Operations	Positioning message.		
	1835:40 UTC [0235:40 MYT]		
KL ATCC	Positioning message okay okay aah....		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1835:43 UTC [0235:43 MYT] MAS Operations Roughly aaa... somewhere Vietnam.		
	1835:46 UTC [0235:46 MYT] KL ATCC Okay can you tell what is the last position aircraft passed now.		
	1835:52 UTC [0235:52 MYT] MAS Operations Is the last position was eer...Lat Long fourteen fourteen point nine zero zero zero zero zero.		
	1836:06 UTC [0236:06 MYT] KL ATCC Eer... say again please.		
	1836:07 UTC [0236:07 MYT] MAS Operations Eer... Latitude is fourteen point nine eer....		
	1836:11 UTC [0236:11 MYT] KL ATCC eeh eeh		
	1836:12 UTC [0236:12 MYT] MAS Operations Zero zero zero zero.		
Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia			

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1836:15 UTC [0236:15 MYT]		
KL ATCC	Four, four time zero.		
	1836:16 UTC [0236:16 MYT]		
MAS Operations	Yeah.		
	1836:18 UTC [0236:18 MYT]		
KL ATCC	Okay.		
	1836:19 UTC [0236:19 MYT]		
MAS Operations	Longitude is one zero niner.		
	1836:22 UTC [0236:22 MYT]		
KL ATCC	One zero nine.		
	1836:24 UTC [0236:24 MYT]		
MAS Operations	One five five zero zero.		
	1836:25 UTC [0236:25 MYT]		
KL ATCC	One five zero zero at what time please.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1836:28 UTC [0236:28 MYT] MAS Operations At one eight three three five six.		
	1836:30 UTC [0236:30 MYT] KL ATCC One eight three three huh.		
	1836:32 UTC [0236:32 MYT] MAS Operations Auh.		
	1836:32 UTC [0236:32 MYT] KL ATCC Okay this is the position aircraft passed by one eight three three uh.		
	1836:36 UTC [0236:36 MYT] MAS Operations Huh		
	1836:37 UTC [0236:37 MYT] KL ATCC Okay aah... this one let them call okay and daadvise okay you try to raise the aircraft and then like aah... I mean to reply you whether they are eer... contact any of the ATC unit along unit or not.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1836:55 UTC [0236:55 MYT] MAS Operations Alright.		
	1836:56 UTC [0236:56 MYT] KL ATCC      Okay please thank you.		
	1837:00 UTC [0237:00 MYT] Tone of telephone cut off too too too.		
	<p style="text-align: center;"><b>End of Direct Line Conversation Between KL ATCC and MAS Operations Centre</b></p>		
	1837:15 UTC [0237:15 MYT] Direct line ringing tone.		
	1837:21 UTC [0237:21 MYT] KL ATCC      They will try <b>[back ground conversation]</b>		
	1837:24 UTC [0237:24 MYT] KL ATCC      Aircraft still flying it seem [back ground conversation]		
	1837:25 UTC [0237:25 MYT] <b>Telephone ringing at this time.</b>		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1837:34 UTC [0237:34 MYT]	HCM ATCC Yes.		
1837:35 UTC [0237:35 MYT]	KL ATCC Okay Ho Chi Minh.		
1837:36 UTC [0237:36 MYT]	HCM ATCC Sir.		
1837:37 UTC [0237:37 MYT]	KL ATCC The... Malaysian Three Seven Zero.		
1837:40 UTC [0237:40 MYT]	HCM ATCC Yes.		
1837:41 UTC [0237:41 MYT]	KL ATCC Okay aircraft is eer... still flying and then keep on sending position report to the company.		
1837:49 UTC [0237:49 MYT]	HCM ATCC Yeah.		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1837:49 UTC [0237:49 MYT]			
KL ATCC	Okay.		
1837:50 UTC [0237:50 MYT]			
HCM ATCC	The aircraft is landing at (xxxx) [illegible]		
1837:52 UTC [0237:52 MYT]			
KL ATCC	Say again.		
1837:53 UTC [0237:53 MYT]			
HCM ATCC	Say again say again for Malaysian Three Seven Zero.		
1837:56 UTC [0237:56 MYT]			
KL ATCC	Affirm Malaysian Three Seven Zero still flying aircraft keep sending position report to the airline okay to the company okay it last at time one eight three three at time one eight three three aircraft passed position one eer... one four nine zero zero zero zero.		
1838:18 UTC [0238:18 MYT]			
HCM ATCC	Yes.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1838:19 UTC [0238:19 MYT]			
KL ATCC	And the... one zero nine east one five zero zero.		
1838:25 UTC [0238:25 MYT]			
HCM ATCC	Five zero zero.		
1838:26 UTC [0238:26 MYT]			
KL ATCC	Yeah affirm.		
1838:27 UTC [0238:27 MYT]			
HCM ATCC	Say again the first one, one four nine.		
1838:29 UTC [0238:29 MYT]			
KL ATCC	One four nine zero zero zero zero.		
1838:31 UTC [0238:31 MYT]			
HCM ATCC	Yes and one zero nine east and one five zero zero at time one eight three three.		
1838:36 UTC [0238:36 MYT]			
KL ATCC	Affirm.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1838:38 UTC [0238:38 MYT]	HCM ATCC      Alright okay thank you information we check position.		
1838:40 UTC [0238:40 MYT]	KL ATCC      Okay right thank you.		

**Direct Line Telephone Conversation  
Between KL ATCC and HCM ATCC**

1840:30 UTC  
[0240:30 MYT]  
MAS 6163      Malaysian Six One Six Three request descend.

1840:36 UTC  
[0240:36 MYT]  
Lumpur Radar    Malaysian Six One Six Three descend flight level three  
five zero.

1840:40 UTC  
[0240:40 MYT]  
MAS 6163      When ready descend now to flight level three five zero  
Malaysian Six One Six Three.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1843:01 UTC [0243:01 MYT] MAS 6163      Malaysian naa Six One Six Three leaving three six zero for flight level three five zero.
			1843:09 UTC [0243:09 MYT] Lumpur Radar    Malaysian Six One Six Three.
			1844:19 UTC [0244:19 MYT] Lumpur Radar    Malaysian Six One Six Three descend to flight level one six zero.
			1844:25 UTC [0244:25 MYT] MAS 6163      K Continue descend now to flight level one six zero Malaysian Six One Six Three.
			1844:30 UTC [0244:30 MYT] OCA 404        Air Asian Four Zero Four contact Bangkok one two three decimal niner five.
			1844:34 UTC [0244:34 MYT] OCA 404        One two three nine five Four Zero Four.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1849:17 UTC [0249:17 MYT] GIA 894      Singapore good morning Indonesia Eight Niner Four flight level three six zero.
			1849:28 UTC [0249:28 MYT] Lumpur Radar   Station calling say again.
			1849:30 UTC [0249:30 MYT] GIA 894      Indonesia Eight Niner Four eer... Flight level three six zero.
			1849:36 UTC [0249:36 MYT] Lumpur Radar   Indonesia Eight Niner Four position please.
			1849:39 UTC [0249:39 MYT] GIA 894      We are just approaching DOGOG sir Indonesia Eight Niner Four squawk seven one one four.
			1849:49 UTC [0249:49 MYT] Lumpur Radar   Indonesia Eight Niner Four say again your squawk number.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1849:53 UTC [0249:53 MYT] GIA 894      Squawk seven one one four Indonesia Eight Niner Four.
			1849:57 UTC [0249:57 MYT] Lumpur Radar   Roger Indonesia Eight Niner Four wrong frequency sir and this is Kuala Lumpur.
			1850:04 UTC [0250:04 MYT] GIA 894      Okay Indonesia Eight Niner Four thank you.
			1852:46 UTC [0252:46 MYT] MAS 6163      Approaching flight level one six zero.
			1852:49 UTC [0252:49 MYT] Lumpur Radar   Malaysian Six One Six Three contact Butterworth one two five decimal eight.
			1852:53 UTC [0252:53 MYT] MAS 6163      Five eight Malaysian Six One Six Three.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1853:48 UTC [0253:48 MYT]	MAS 386      Malysian Three Seven Zero this is Malaysian Three Eight Six.		
1854:02 UTC [0254:02 MYT]	MAS 386      Malysian Three Seven Zero this is Malaysian Three Eight Six.		
1854:14 UTC [0254:14 MYT]	Lumpur Radar    Malaysian Three Eight Six eer... this is Lumpur Radar confirm you are trying to call Malaysian Three Seven Zero.		
1854:21 UTC [0254:21 MYT]	MAS 386      That is affirm sir eer because Ho Chi Minh asked us to contact them they have lost contact eer... with them.		
1854:28 UTC [0254:28 MYT]	Lumpur Radar    Yeah okay affirm already transfer to Ho Chi Minh and Ho Chi Minh negative contact with the aircraft eer please try to raise the aircraft on maybe on emergency frequency.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1854:39 UTC [0254:39 MYT]			
MAS 386	Roger we try one two one five eer... now we try on one two three four five, thank you.		
1854:52 UTC [0254:52 MYT]			
Lumpur Radar	Malaysian Three Eight Six Lumpur.	1904:24 UTC [0304:24 MYT]	SLK 937      Lumpur Control very good morning Silk Air Nine Three Seven flight level three nine zero approaching Victor Kilo Bravo squawk one five one three.
		1904:38 UTC [0304:38 MYT]	Lumpur Radar      Silk Air Niner Three Seven Lumpur Radar identified maintain level three nine zero.
		1904:44 UTC [0304:44 MYT]	SLK 937      Silk air Nine Three Seven roger.
		1909:36 UTC [0309:36 MYT]	CEB 502      Lumpur Radar good morning Cebu Five Zero Two squawk two one four three climbing level one eight zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1909:45 UTC [0309:45 MYT] Lumpur Radar Cebu Five Zero Two good morning climb level two niner zero direct Victor Papa Kilo.
			1909:53 UTC [0309:53 MYT] CEB 502 Climb level two niner zero and daa...say again the direct waypoint sir.
			1909:59 UTC [0309:59 MYT] Lumpur Radar Cebu Five Zero Two direct Victor Papa Kilo.
			1910:02 UTC [0310:02 MYT] CEB 502 Track direct Victor Papa Kilo aah Five Zero Two.
			1912:40 UTC [0312:40 MYT] GEC 530 Lumpur eer good evening German Cargo Five Three Zero flight level three five zero.
			1912:56 UTC [0312:56 MYT] GEC 530 Lumpur good evening German Cargo Five Three Zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1913:04 UTC [0313:04 MYT] Lumpur Radar Station calling standby.
			1913:16 UTC [0313:16 MYT] Lumpur Radar German Cargo Five Zero Two confirm squawk and level.
		GEC 530	1913:20 UTC [0313:20 MYT] Squawking six one one seven and level, level at three five zero approaching ah ah Victor Kilo Barvo German Cargo Five Three Zero.
		Lumpur Radar	1913:28 UTC [0313:28 MYT] German Cargo Three Five Zero identified maintain level three five zero.
		GEC 530	[1913:32 UTC] [0313:32 MYT] Maintain level three five zero German Cargo Three Five Zero.
		CES 540	1917:33 UTC [0317:33 MYT] Lumpur Radar good morning China Eastern Five Four Zero climb level one eight zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		1917:51 UTC 0317:51 MYT CES 540	Lumpur Radar morning China Eastern Five Four Zero.
		1918:00 UTC [0318:00 MYT] CES 540	Lumpur Approach Five Four Zero.
		1918:07 UTC [0318:07 MYT] Lumpur Radar	(xxxx) [illegible] Five four Zero stanby.
		1918:09 UTC [0318:09 MYT] Source unknow	(xxxx) [illegible]
		1918:13 UTC [0318:13 MYT] Lumpur Radar	(xxxx) [illegible] Five Four Zero eer climb to two five zero.
		1918:18 UTC [0318:18 MYT] CES 540	Confirm level two five zero China Air Five Four Zero.
		1918:22 UTC [0318:22 MYT] Lumpur Radar	Affirm direct Victor Papa Kilo.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
	1918:25 UTC [0318:25 MYT] CES 540	Two five zero thank you.
	1920:06 UTC [0320:06 MYT] Lumpur Radar	China Eastern Five Four Zero climb flight level two niner zero.
	1920:10 UTC [0320:10 MYT] CES 540	Level two niner zero China Five Four Zero.
	1920:13 UTC [0320:13 MYT] Lumpur Radar	Cebu Five Zero Three contact Singapore one two three decimal seven.
	1920:18 UTC [0320:18 MYT] CEB 503	One two three decimal seven good day.
	1922:17 UTC [0322:17 MYT] CES 540	Lumpur Radar China Eastern Five Four Zero.
	1922:20 UTC [0322:20 MYT] Lumpur Radar	China Eastern Five Four Zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
	1922:23 UTC [0322:23 MYT] CES 540	China Eastern request direct to Victor Papa Kilo.
	1922:28 UTC [0322:28 MYT] Lumpur Radar	China Eastern Five Four Zero direct Victor Papa Kilo approved.
	1922:32 UTC [0322:32 MYT] Lumpur Radar	Approved China Eastern Five Four Zero.
	1930:55 UTC [0330:55 MYT] Lumpur Radar	China Eastern Five Four Zero contact Singapore one two three decimal seven.
	1931:00 UTC [0331:00 MYT] CES 540	Comfirm (xxxx) [illegible] China Five Four Zero.
	1931:03 UTC [0331:03 MYT] Lumpur Radar	China Eastern Five Four Zero affirm one two three seven good day.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1931:06 UTC [0331:06 MYT] CES 540 One two three seven China Eastern Five Four Zero.
			1932:40 UTC [0332:40 MYT] Lumpur Radar Silk Air Nine Three Seven contact Singapore one two three decimal seven.
			1932:50 UTC [0332:50 MYT] Lumpur Radar Silk Air Nine Three Seven contact Singapore one two three seven.
			1932:54 UTC [0332:54 MYT] SLK 937 Three seven Silk Air Nine Three Seven bye bye.
			1932:56 UTC [0332:56 MYT] Lumpur Radar Bye bye.
			1933:52 UTC [0333:52 MYT] AXA 377 Lumpur Control good morning Xanadu Three Seven Seven flight level three six zero squawk two six three six.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1933:59 UTC [0333:59 MYT] Lumpur Radar Xanadu Three Seven Seven identified direct Nipah for Nipah Three Alpha Arrival Three Two Right and naa... for Istan Transition level three six zero.
			1934:12 UTC [0334:12 MYT] AXA 377 Clear to Lumpur aah for Istan Transition Nipah Three Two Right and aah maintain flight level three six zero, request descend.
			1934:20 UTC [0334:20 MYT] Lumpur Radar Xanadu Three Seven Seven aah Traffic crossing on your eer on your right standby,
			1934:25 UTC [0334:25 MYT] AXA 377 Roger copied,
			1936:24 UTC [0336:24 MYT] GEC 530 German Cargo Five Three Zero request desend,
			1936:30 UTC [0336:30 MYT] Lumpur Radar German Cargo Five Three Zero standby,

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
<b>Lumpur Sector 3+5 calling Singapore on Direct Line</b>			
	1936:40 UTC [0336:40 MYT] Singapore ATC Lumpur Singapore.		
	1936:41 UTC [0336:41 MYT] KL ATCC Aah German Cargo Five Three Zero can descend now.		
	1936:44 UTC [0336:44 MYT] Singapore ATC Can naa descend to flight level two niner zero.		
	1936:46 UTC [0336:46 MYT] KL ATCC Two nine zero thank you.		
<b>END OF DIRECT LINE COMMUNICATION</b>			
	1936:50 UTC [0336:50 MYT] Lumpur Radar Cargo Five Three Zero descend to flight level two niner zero.		
	1936:55 UTC [0336:55 MYT] GEC 530 Descend to flight level two nine zero German Cargo Five Three Zero.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1936:59 UTC [0336:59 MYT] Lumpur Radar Affirm.
			1937:32 UTC [0337:32 MYT] Lumpur Radar Xanadu Three Seven Seven descend to flight level one niner zero.
			1937:37 UTC [0337:37 MYT] AXA 377 Flight level one niner zero Xanadu Three Seven Seven.
			1938:03 UTC [0338:03 MYT] Lumpur Radar German Cargo Five Three Zero contact Singapore now one two three seven.
			1938:08 UTC [0338:08 MYT] GEC 530 Three seven German Cargo Five Three Zero good night.
			1938:12 UTC [0338:12 MYT] Lumpur Radar Good night.
			1942:13 UTC [0342:13 MYT] Lumpur Radar Three Seven Seven descend to flight level one five zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1942:16 UTC [0342:16 MYT] AXA 377 Confirm descend to flight level one five zero for Xanadu Three Seven Seven.
			1942:20 UTC [0342:20 MYT] Lumpur Radar Xanadu Three Seven Seven affirm descend one five zero.
			1942:24 UTC [0342:24 MYT] AXA 377 Roger descend to flight level one five zero Xanadu Three Seven Seven.
			1942:50 UTC [0342:50 MYT] SLK 509 Lumpur Control Silk Air Five Zero Niner good morning.
			1942:54 UTC [0342:54 MYT] Lumpur Radar Silk Air Five Zero Nine morning confirm squawk.
			1942:58 UTC [0342:58 MYT] SLK 509 Squawk seven four zero two flight level three nine zero Victor Kilo Bravo.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			1943:04 UTC [0343:04 MYT] Lumpur Radar Five Zero Nine identified maintain three nine zero.
			1943:07 UTC [0343:07 MYT] SLK 509 Flight level three nine zero Silk Air Five Zero Nine.
			1945:18 UTC [0345:18 MYT] AXA 377 Xanadu Three Seven Seven request lower.
			1945:24 UTC [0345:24 MYT] Lumpur Radar Xanadu Three Seven Seven contact Approach one two one two five.
			1945:28 UTC [0345:28 MYT] AXA 377 One two one two five Xanadu Three Seven Seven.
			1945:52 UTC [0345:52 MYT] TAX 5094 Good morning Jonathan Five Zero Nine Four passing flight level two six seven for flight level two eight zero squawk two two one zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
		1946:06 UTC [0346:06 MYT] Lumpur Radar Five Zero Nine Four Five Zero Nine climb to flight level three four zero.
		1946:14 UTC [0346:14 MYT] TAX 5094 Climb to flight level three four zero Jonathan Five Zero Nine Four.
	Radar direct line ringing Background talking by Sector 3+5 Radar Controller	
1948:46 UTC [0348:46 MYT]	KL ATCC One seven one seven (bukan aku punya) [National Language]	
1948:52 UTC [0348:52 MYT]	HCM ATCC Kuala Lumpur Ho Chi Minh.	
1948:53 UTC [0348:53 MYT]	KL ATCC Ho Chi Minh regarding the Malaysian Three Seven Zero MH370/01/15 earlier any any any news from the aircraft. Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia	

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1949:02 UTC [0349:02 MYT]			
HCM ATCC	Until now nothing.		
1949:04 UTC [0349:04 MYT]			
KL ATCC	Nothing aa so far because aircraft suppose to pass IGARI at time two two two IGARI two two so far you negative contact at all with the aircraft.		
1949:15 UTC [0349:15 MYT]			
HCM ATCC	Standby.		
1949:16 UTC [0349:16 MYT]			
KL ATCC	You check with adjacent FIR.		
1949:20 UTC [0349:20 MYT]			
HCM ATCC	Sorry.		
1949:21 UTC [0349:21 MYT]			
KL ATCC	Aah.... Halo.		
1949:22 UTC [0349:22 MYT]			
HCMMATCO 01/15	Yeah.		
	Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1949:23 UTC [0349:23 MYT]			
KL ATCC	Yeah regarding the Malaysian Three Seven Zero earlier.		
1949:26 UTC [0349:26 MYT]			
HCM ATCC	Yeah.		
1949:27 UTC [0349:27 MYT]			
KL ATCC	Yeah is there any news (dia punya dia punya) [National Language] aircraft.		
1949:32 UTC [0349:32 MYT]			
HCM ATCC	Sorry news.		
1949:33 UTC [0349:33 MYT]			
KL ATCC	News you have anything about the aircraft.		
1949:34 UTC [0349:34 MYT]			
HCM ATCC	Yeah we don't have any information until now.		
1949:37 UTC [0349:37 MYT]			
KL ATCC	Ya informtion that aircraft supposed to pass IGARI time MH370/01/15 two two aah. Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1949:42 UTC [0349:42 MYT]			
HCM ATCC	Sorry.		
1949:43 UTC [0349:43 MYT]			
KL ATCC	Suppose to pass IGARI one seven two two estimate IGARI one seven two two earlier.		
1949:49 UTC [0349:49 MYT]			
HCM ATCC	Yeah.		
1949:50 UTC [0349:50 MYT]			
KL ATCC	Can you check with the adjacent FIR is the aircraft is going to Beijing.		
1949:55 UTC [0349:55 MYT]			
HCM ATCC	Ah... ah... Oh yes I, I after position naa... we have no information and no contact the aircraft at position naaa... IGARI and then about few minutes later the aircraft disappear our radar.		
1950:08 UTC [0350:08 MYT]			
KL ATCC	There there there is the aircraft whether whether contact with you aa... I mean aaa.		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1950:16 UTC [0350:16 MYT]			
HCM ATCC	We just see him on the radar screen one time and after a few minutes later disappear.		
1950:21 UTC [0350:21 MYT]			
KL ATCC	After ah... after ah a few minutes later disappear.		
1950:26 UTC [0350:26 MYT]			
HCM ATCC	Yeah.		
1950:27 UTC [0350:27 MYT]			
KL ATCC	Okay then so far you have no news about the aircraft.		
1950:31 UTC [0350:31 MYT]			
HCM ATCC	Yeah until now we ask many aircraft company or the aircraft on frequency but no response no one ah... know about Malaysian Three Seven Zero until now.		
1950:42 UTC [0350:42 MYT]			
KL ATCC	No one know okay actually by the routing aa after IGARI how is tracking to which FIR which FIR he will be going.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1950:51 UTC [0350:51 MYT]			
HCM ATCC	Yeah Sanya.		
1950:53 UTC [0350:53 MYT]			
KL ATCC	Ah... aah...		
1950:54 UTC [0350:54 MYT]			
HCM ATCC	Yeah, Chinese Sanya Chinese.		
1950:56 UTC [0350:56 MYT]			
KL ATCC	Sanya Chinese can you check with them whether they are is there,		
1950:59 UTC [0350:59 MYT]			
HCM ATCC	I asked already, I already untill now no response from him.		
1951:02 UTC [0351:02 MYT]			
KL ATCC	Okay no response okay in that case if anything you got any news on this thing because operations is asking if you got any news you give me or you just inform Lumpur.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1951:12 UTC [035112 MYT]			
HCM ATCC	Yeah sure.		
1951:13 UTC [0351:13 MYT]			
KL ATCC	And so so so the the you have taken immediate action about the aircraft, you taken any action about the aircraft,		
1951:22 UTC [035122 MYT]			
HCM ATCC	Taking,		
1951:23 UTC [0351:23 MYT]			
KL ATCC	Action action what what action are you taking with regarding the aircraft,,		
1951:27 UTC [035127 MYT]			
HCM ATCC	Aah... currently we are try to coordination with Sanya about the information because the time transfer, flight level,		
1951:36 UTC [0351:36 MYT]			
KL ATCC	Aaah ...		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1951:37 UTC [0351:37 MYT]	HCM ATCC      And we have information to the Sunny nothing.		
1951:41 UTC [0351:41 MYT]	KL ATCC      Okay okay if there is anything you advise Lumpur please aah...		
1951:44 UTC [0351:44 MYT]	HCM ATCC      Yeah.		
1951:45 UTC [0351:45 MYT]	KL ATCC      Okay okay we will keep in touch thank you.		
<b>End Of Direct Line Telephone Conversation Between KL ATCC (Sector 3+5) with HCM ATCC</b>			

**Direct Line Telephone Conversation  
Between KL ATCC (Sector 3+5) And MAS Operations**

1956:13 UTC  
[0356:13 MYT]  
KL ATCC      Dailing Direct Telephone Line.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1956:19 UTC [0356:19 MYT]	KL ATCC (Satu dua Enam Empat) [National Language]		
1956:22 UTC [0356:22 MYT]	Direct Telephone ringing		
1956:27 UTC [0356:27 MYT]	MAS Operations Hello selamat pagi[National Language]		
1956:29 UTC [0356:29 MYT]	KL ATCC Pagi [National Language] Operation Centre here.		
1956:31 UTC [0356:31 MYT]	MAS Operations Centre yeah Centre.		
1956:32 UTC [0356:32 MYT]	KL ATCC Is there anything on any news on Mal Malaysian Three Seven Zero.		
1956:35 UTC [0356:35 MYT]	MAS Operations Not yet laa sir.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1956:36 UTC [0356:36 MYT]			
KL ATCC	Not yet.		
1956:37 UTC [0356:37 MYT]	MAS Operations Aah... takdak lagi [National Language]		
1956:38 UTC [0356:38 MYT]			
KL ATCC	Masa I check with Ho Chi Minh we we can check with Ho Chi Minh laa.. Ho Chi Minh kata takdak dia pun tak contact tapi at one time dia kata nampak blip tau. [National Language]		
1956:45 UTC [0356:45 MYT]	MAS Operations Nampak bling. [National Language]		
1956:46 UTC [0356:46 MYT]			
KL ATCC	Aah... dia nampak blip aaa... IGARI side la kan. [National Language]		
1956:50 UTC [0356:50 MYT]	MAS Operations IGARI side lah.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1956:51 UTC [0356:51 MYT]			
KL ATCC	Aah dia kata last last itu nampak blip tetapi [National Language]		
1956:53 UTC [0356:53 MYT]	MAS Operations Pukul berapa itu. [National Language]		
1956:55 UTC [0356:55 MYT]			
KL ATCC	Aaa...eeh...estimate IGARI tadi lebih kurang pukul satu dua puluh lima laa lebih kurang tu lah. [National Language]		
1957:01 UTC [0357:01 MYT]	MAS Operations Okay.		
1956:02 UTC [0356:02 MYT]			
KL ATCC	Eh lepas tu dia kata nampak blip lepas tu takdak. [National Language]		
1957:06 UTC [0357:06 MYT]	MAS Operations Dalam monitor dia orang masih ada lagi tak. [National Language]		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1956:08 UTC [0356:08 MYT]			
KL ATCC	Takdak tadak dia nampak sekejap dalam monitor dia orang cakap nampak sekejap macam tu lah lebih pada tu takdak contact, no contact. [National Language]		
1957:16 UTC [0357:16 MYT]	MAS Operations Alamak. [National Language]		
1957:16 UTC [0357:16 MYT]	KL ATCC Aah... itulah so saya suruh dia check dia check adjacent FIR aah so far takdak lagi no news dia kata. [National Language]		
1957:24 UTC [0357:24 MYT]	MAS Operations No news so kita orang pun try juga [National Language] I... aircraft.		
1957:28 UTC [0357:28 MYT]	KL ATCC Aah.		
1957:28 UTC [0357:28 MYT]	MAS Operations Belum ada response lagi. [National Language]		
MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia			
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
1957:30 UTC [0357:30 MYT]	KL ATCC Okaylah anything you just inform us lah aah.		
1957:32 UTC [0357:32 MYT]	MAS Operations Aah okay okay.		
1957:33 UTC [0357:33 MYT]	KL ATCC Kita dapat apa apa we inform you lah. [National Language]		
1957:35 UTC [0357:35 MYT]	MAS Operations Okay okay.		
1957:36 UTC [0357:36 MYT]	KL ATCC Eer okay okay right.		
1957:37 UTC [0357:37 MYT]	MAS Operations Siapa cakap ni [National Language]		
1957:37 UTC [0357:37 MYT]	KL ATCC Aaa... saya xxxx sini [National Language]		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	1957:39 UTC [0357:39 MYT] MAS Operations Okay okay.		
KL ATCC	1957:39 UTC [0357:39 MYT] Okay right.		
<p style="text-align: center;"><b>End of Direct Line Telephone Conversation Between KL ATCC and MAS Operations Centre</b></p>			
<p>2003:11 UTC [0403:11 MYT] Lumpur Radar Silk Air Five Zero Niner contact Singapore one two three decimal seven.</p>			
<p>2003:17 UTC [0403:17 MYT] SLK 509 You are coming in broken can you say again Silk Air Five Zero Nine.</p>			
<p>2003:20 UTC [0403:20 MYT] Lumpur Radar Singapore one two three decimal seven.</p>			
<p>2003:23 UTC [0403:23 MYT] SLK 509 One two three decimal seven good day Silk Air Five Zero Nine.</p>			

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2005:19 UTC [0405:19 MYT] Lumpur Radar Silk Air Five Zero Nine contact Singapore one two three seven good day.
			2005:26 UTC [0405:26 MYT] Jonathan 5094 Confirm Jonathan Five Zero Nine Four.
			2005:30 UTC [0405:30 MYT] Lumpur Radar Silk Air, Silk Air Five Zero Niner Singapore one two three seven.
			2006:46 UTC [0406:46 MYT] SIA 67           Lumpur Control Singapore Six Seven good morning passing Victor Kilo Bravo zero niner flight level three seven zero squawk one two one four.
			2006:56 UTC [0406:56 MYT] Lumpur Radar Singapore Six Seven Lumpur Radar can confirm squawk one two one four.
			2007:01 UTC [0407:01 MYT] SIA 67           Affirm Singapore Six Seven.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2007:04 UTC [0407:04 MYT] Lumpur Radar Singapore Six Seven identified.
			2007:07 UTC [0407:07 MYT] SIA 67 Singapore Six Seven.
			2009:22 UTC [0409:22 MYT] KAL 385 Lumpur Radar Korea Air Three Eight Five good morning maintain level three five zero.
			2009:31 UTC [0409:31 MYT] Lumpur Radar Korean Air Three Eight Five identified direct to Nipah for Nipah Three Alpha Arrival Runway Three Two Right, descend when ready to flight level one five zero.
			2009:45 UTC [0409:45 MYT] KAL 385 Korean Air Three Eight Five confirm direct Nipah, Nipah Three Alpha and when ready one five zero, Three Two Right confirm.
			2009:55 UTC [0409:55 MYT] Lumpur Radar Korean Air Three Eight Five that is affirm.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2009:57 UTC [0409:57 MYT] KAL 385      Thank you.
			2011:20 UTC [0411:20 MYT] KAL 385      Lumpur Radar Korean Air Three Eight five leaving three five zero for one five zero.
			2011:25 UTC [0411:25 MYT] Lumpur Radar   Roger Three Eight Five.
			2012:15 UTC [0412:15 MYT] TAX 5094      Jonathan Five Zero Nine Four maintain flight level three four zero, approaching Victor Kilo Bravo.
			2012:30 UTC [0412:30 MYT] TAX 5094      Jonathan Five Zero Nine Four Victor Kilo Bravo.
			2012:37 UTC [0412:37 MYT] Lumpur Radar   Five Zero Nine Four call Bangkok one two three niner five.
			2012:42 UTC [0412:42 MYT] TAX 5094      One two three niner five Jonathan Five Zero Nine Four.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		2015:17 UTC [0415:17 MYT]	
		SIA 447	Lumpur Control selamat pagi Singapore Four Four Seven flight level three nine zero squawk four seven five one estimate Victor Kilo Bravo one six.
		2015:30 UTC [0415:30 MYT]	Lumpur Radar Singapore Four Four Seven identified maintain flight level three nine zero.
		2015:33 UTC [0415:33 MYT]	SIA 447 Flight level three nine zero Singapore Four Four Seven.
		2015:40 UTC [0415:40 MYT]	Lumpur Radar Korean Air Three Eight Five contact Approach one two one two five.
		2015:45 UTC [0415:45 MYT]	KAL 385 One two one two five Korean Air Three Eight Five good day.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2015:48 UTC [0415:48 MYT] Lumpur Radar Good day.
			<i>Noise caused by static from 2016:22 until 2020:48</i>
			2020:40 UTC [0420:40 MYT] Lumpur Radar Singapore Six Seven Lumpur Control radio check how do you read.
			2023:42 UTC [0423:42 MYT] MAS 381 Lumpur Control Malaysian naa...Three Eight One aah good morning flight level three five zero squawk three one two seven.
			2023:51 UTC [0423:51 MYT] Lumpur Radar Good morning Three Eight One direct to Pibos for Nipah Three Alpha Arrival Pibos Transition Three Two Left descend level one five zero.
			2023:58 UTC [0423:58 MYT] MAS 381 Direct Pibos eer... Nipah Three Alpha Arrival Three Two Right confirm and ready desend to flight level one five zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2024:08 UTC [0424:08 MYT] Lumpur Radar Affirm Runway Three Two Right.
			2024:10 UTC [0424:10 MYT] MAS 381 Runway Three Two Right Malaysian Three Eight One.
<b>Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b>			
2025:22 UTC [0425:22 MYT]			
KL ATCC	Lumpur.		
2025:23 UTC [0425:23 MYT]			
HCM ATCC	Yeah this is Tango Alfa Supervisor in Ho Chi Minh let me talk to your supervisor please.		
2025:28 UTC [0425:28 MYT]	,		
KL ATCC	Okay anything anything.		
2025:31 UTC [0425:31 MYT]			
HCM ATCC	I want to talk about Malaysian Three Seven Zero you have any information from company Malaysian Airlines.  MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2025:37 UTC [0425:37 MYT]			
KL ATCC	Negative, negative they are still checking also that's why I am also checking with you.		
2025:43 UTC [0425:43 MYT]			
HCM ATCC	Negative information about our Malaysian Three Seven Zero from Malaysian Airlines.		
2025:48 UTC [0425:48 MYT]			
KL ATCC	Affirm negative, negative information from the Operation negative negative information.		
2025:54 UTC [0425:54 MYT]			
HCM ATCC	Ah okay I want to confirm the last position we have aa... contact with the aircraft.		
2026:01 UTC [0426:01 MYT]			
KL ATCC	The last position we contact the last position we contact that was about IGARI.		
			<i>Lumpur controller communicating with aircraft</i>
		2026:04 UTC [0426:04 MYT]	
		MAS 381	(xxx) [illegible] direct NIPAH (xxx) [illegible] one five.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2026:06 UTC [0426:06 MYT] HCM ATCC	IGARI.	2026:09 UTC [0426:09 MYT] KL ATCC	Roger Three Eight One track direct to Nipah.
2026:10 UTC [0426:10 MYT] HCM ATCC	Helo.	2026:11 UTC [0426:11 MYT] KL ATCC	Helo yeah.
2026:12 UTC [0426:12 MYT] KL ATCC	Malysian Three Eight One.	2026:13 UTC [0426:13 MYT] HCM ATCC	The the Malaysian Three Seven Zero aah still in contact with you at IGARI.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2026:19 UTC [0426:19 MYT]			
KL ATCC	Aah... Time ah... Still flying aah fly over over airspace ... hold on aah hold on aah I still still aah the log book aah negative contact aah emm IGARI one seven two two two aaa Ho Chi Minh has lost radar contact to aah one eight one zero hold on aah hold on the last the last position contact was aircraft was flying. <i>[Note: controller is reading the log book]</i> Aah I am not sure what what the last the last contact what was the time but the aircraft was I mean estimate IGARI estimate IGARI one seven two two if is there a possibility the aircraft calling you.		
2027:07 UTC [0427:07 MYT]	HCM ATCC Neg negative negative.		
2027:17 UTC [0427:10 MYT]	So what aah... you you observe on radar you observe on radar, what time was it last observed on radar.	KL ATCC	
2027:17 UTC [0427:17 MYT]	Aah... After IGARI aah... The position BITOD at BITOD after disappear.	HCM ATCC	
2027:25 UTC [0427:25 MYT]	KL ATCC Ooh ... you you you for how long you you		
	Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		2027:27 UTC [0427:27 MYT] MAS 381	Three Eight One leaving for one five confirm.
2027:29 UTC [0427:29 MYT] KL ATCC	Hold hold on aah...		
		2027:31 UTC [0427:31 MYT] KL ATCC	Three Eight One roger.
2027:32 UTC [0427:32 MYT] KL ATCC	So you observe aah at position BITOD, so for how long you observe the aircraft at what level.		
2027:42 UTC [0427:42 MYT] HCM ATCC	Standby.		
2027:42 UTC [0427:42 MYT] KL ATCC	You have any idea on it.		
2027:50 UTC [0427:50 MYT] HCM ATCC	Helo.  MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2027:50 UTC [0427:50 MYT]			
KL ATCC	Yes.		
2027:52 UTC [0427:52 MYT]			
HCM ATCC	Aah... You said you asked about the flight level		
2027:55 UTC [0427:55 MYT]			
KL ATCC	Ah yes, when you observe on the radar what what level of the aircraft.		
2028:00 UTC [0428:00 MYT]			
HCM ATCC	Three Five Zero.		
2028:01 UTC [0428:01 MYT]			
KL ATCC	Three five zero so after that once you observe the thing and then no contact at all after that.		
2028:08 UTC [0428:08 MYT]			
HCM ATCC	Yeah, no at IGARI we don't have the contact I just seen on the radar three five zero.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2028:14 UTC [0428:14 MYT]	KL ATCC Ooh Three five zero.		
2028:15 UTC [0428:15 MYT]	HCM ATCC And after BITOD so we... disappear the aircraft.		
2028:19 UTC [0428:19 MYT]	KL ATCC The aircraft disappear from the screen so you you you try to contact through relay by another aircraft.		
2028:26 UTC [0428:26 MYT]	HCM ATCC Yeah.... yeah sure all frequencies we have and and all aircraft but no reponse.		
2028:31 UTC [0428:31 MYT]	KL ATCC No response even on emergency frequency no response also.		
2028:34 UTC [0428:34 MYT]	HCM ATCC Yea that's all.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2028:36 UTC [0428:36 MYT]			
KL ATCC	Yeah because Lumpur have no response so no contact even operation MAS operation aah... has no contact.		
2028:42 UTC [0428:42 MYT]			
HCM ATCC	Yeah until now.		
2028:44 UTC [0428:44 MYT]			
KL ATCC	Until now yes until now so.		
2028:46 UTC [0428:46 MYT]			
HCM ATCC	Operation from Malaysia Malaysian Airlines.		
2028:48 UTC [0428:48 MYT]			
KL ATCC	Yes operation from Malaysian Airlines there is no contact with the aircraft so they try they try anything I call you and so if you have anything also you inform me okay.		
2028:58 UTC [0428:58 MYT]			
HCM ATCC	Yea...that is right.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2029:00 UTC [0429:00 MYT]	KL ATCC      Okay okay take immediate action take action then okay thank you.		
	<b>End of Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b>		
		2030:40 UTC [0430:40 MYT]	SIA 67      Singapore Six Seven request descend.
		2030:44 UTC [0430:44 MYT]	Lumpur Radar    Aah... Singapore Six Seven contact now one two three decimal seven.
		2030:48 UTC [0430:48 MYT]	SIA 67      Confirm is one two three decimal seven.
		2030:52 UTC [0430:52 MYT]	Lumpur Radar    That is affirm one two three decimal seven.
		2030:55 UTC [0430:55 MYT]	SIA 67      Jumpa lagi Singapore Six Seven.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2030:57 UTC [0430:57 MYT] Lumpur Radar See you.
			2035:12 UTC [0435:12 MYT] MAS 386 Malaysian Three Eight One approaching one five zero.
			2035:17 UTC [0435:17 MYT] Lumpur Radar Three Eight One contact Approach on one two one decimal two five.
			2035:20 UTC [0435:20 MYT] MAS 386 One two one two five Malaysian aaa... Three Eight Six good morning.
			2035:24 UTC [0435:24 MYT] Lumpur Radar Morning.
			2035:28 UTC [0435:28 MYT] AXM 1019 Lumpur Control good evening Express One Zero One Niner eer... Descend to flight level three six zero squawk three one three zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2035:37 UTC [0435:37 MYT] Lumpur Radar One Zero One Nine Control identified track direct to Pibos for Nipah Three Alpha Arrival Pibos Alpha Transition Runway Three Two Right descend to flight level one five zero.
			2035:48 UTC [0435:48 MYT] AXM 1019 Aaa when ready descend to flight level one five zero Pibos aa... Runway Three Two Right for Nipah Three Alpha Arrival, Express One Zero One Niner when available request track direct Pibos.
			2036:00 UTC [0436:00 MYT] Lumpur Radar Roger will advise.
			2036:23 UTC [0436:23 MYT] Lumpur Radar Singapore Four Four Seven contact Singapore now one two three decimal seven.
			2036:28 UTC [0436:28 MYT] SIA 447 Three seven Singapore Four Four Seven selamat pagi.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2036:32 UTC [0436:32 MYT] Lumpur Radar Pagi.
		GSB 304	2039:45 UTC [0439:45 MYT] Lumpur Radar good morning Gading Three Zero Four on the climb to level one eight zero passing one one seven squawking two one three five direct Victor Papa Kilo.
		Lumpur Radar	2039:54 UTC [0439:54 MYT] Morning Gading Three Zero Four direct Victor Papa Kilo climb two niner zero.
		GSB 304	2040:00 UTC [0440:00 MYT] Direct Victor Papa Kilo climb two niner zero Gading Three Zero Four.
		AXM 1019	2041:22 UTC [0441:22 MYT] Aah Express One Zero One Niner standing by direct Nipah.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	TIME & SOURCE	
	2041:29 UTC [0441:29 MYT] Lumpur Radar	Zero One Niner track direct to Pibos initially, I got traffic tracking direct to Victor Papa Kilo advise when clear.
	2041:37 UTC [0441:37 MYT] AXM 1019	Roger standing by.
	2042:09 UTC [0442:09 MYT] Lumpur Radar	One Zero One Nine fly heading two four zero initially.
	2042:14 UTC [0442:14 MYT] AXM 1019	Heading two four zero Express One Zero One Nine.
	2046:13 UTC [0446:13 MYT] Lumpur Radar	One Zero One Nine track direct to Nipah.
	2046:16 UTC [0446:16 MYT] AXM 1019	Track direct Nipah One Zero One Nine.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2049:28 UTC [0449:28 MYT] Lumpur Radar Express One Zero One Nine contact Approach one two one two five.
			2049:32 UTC [0449:32 MYT] AXM 1019 One two one two five good day Express One Zero One Nine.
			2049:35 UTC [0449:35 MYT] Lumpur Radar Day.
			2054:37 UTC [0454:37 MYT] GSB 304 Gading Three Zero Four request climb to flight level three three zero.
			2054:43 UTC [0454:43 MYT] Lumpur Radar Three Zero Four contact Singapore now on one two three decimal seven.
			2054:47 UTC [0454:47 MYT] GSB 304 Singapore one two three decimal seven Gading Sari Three Zero Four.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2054:50 UTC [0454:50 MYT] Lumpur Radar Good day.
		GSB 306	2104:32 UTC [0504:32 MYT] Lumpur Control selamat pagi Gading Sari Three Zero Six passing one zero thousand.
		Lumpur Radar	2104:37 UTC [0504:37 MYT] Morning Gading Sari Three Zero Six climb level two seven zero direct Victor Papa Kilo.
		GSB 306	2104:41 UTC [0504:41 MYT] Seven zero direct Papa Kilo Gading Sari Three Zero Six terima kasih.
		Lumpur Radar	2105:27 UTC [0505:27 MYT] Gading Three Zero Six climb flight level two niner zero.
		GSB 306	2105:32 UTC [0505:32 MYT] Continue climb two nine zero Gading Sari Three Zero Six.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2108:19 UTC [0508:19 MYT] SIA 345      Lumpur Singapore Three Four Five ah selamat pagi maintaining flight level three niner zero.
			2108:26 UTC [0508:26 MYT] Lumpur Radar    Singapore Three Four Five maintain flight level three niner zero.
			2108:29 UTC [0508:29 MYT] THAI 462        Thai Four Six Two flight level three eight zero.
			2108:36 UTC [0508:36 MYT] Lumpur Radar    Thai Four Six Two flight level three eight zero report TIDAR.
			2108:39 UTC [0508:39 MYT] THAI 462        Maintain three eight zero report TIDAR Thai Four Six Two.
			2113:36 UTC [0513:36 MYT] Lumpur Radar    The Thai Four Six Two contact Bangkok now one two three niner five.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		2113:43 UTC [0513:43 MYT]	THAI 462 Bangkok one two three nine five good day Thai Four Six Two.
		2113:47 UTC [0513:47 MYT]	Lumpur Radar Good day.
		2113:51 UTC [0513:51 MYT]	Lumpur Radar Gading Sari Three Zero Five contact Singapore now one two three decimal seven.
		2113:56 UTC [0513:56 MYT]	GSB 305 Singapore one two three seven (xxxx) [illegible] sir.
		2113:58 UTC [0513:58 MYT]	Lumpur Radar Aah.

**Direct Line Telephone Conversation  
Between KL ATCC and HCM ATCC**

2118:32 UTC  
[0518:32 MYT]  
 KL ATCC Lumpur.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2118:34 UTC [0518:34 MYT]			
HCM ATCC	Yeah, Lumpur any news information for Malaysian Three Seven Zero from Malaysian Airlines.		
2118:40 UTC [0518:40 MYT]			
KL ATCC	No nothing nothing no news no news.		
2118:42 UTC [0518:42 MYT]			
HCM ATCC	Aah nothing right.		
2118:44 UTC [0518:44 MYT]			
KL ATCC	So how about your side is there any news from Hong Kong or Beijing any news.		
2118:48 UTC [0518:48 MYT]			
HCM ATCC	I am waiting for them but aaa No reply right now.		
2118:52 UTC [0518:52 MYT]			
KL ATCC	No reply naa...		
2118:53 UTC [0518:53 MYT]			
HCMMATCO 01/15	Yeah no reply yeah.		
	Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2118:54 UTC [0518:54 MYT]	KL ATCC I see I see so...		
2118:55 UTC [0518:55 MYT]	HCM ATCC I am waiting for them and waiting for you too.		
2118:57 UTC [0518:57 MYT]	KL ATCC No I am waiting from your side also aa ah.		
2118:59 UTC [0518:59 MYT]	HCM ATCC Ah ha yeah.		
2119:00 UTC [0519:00 MYT]	KL ATCC Okay who ever got the news all this thing please be informed aah.		
2119:03 UTC [0519:03 MYT]	HCM ATCC Yeah.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2119:04 UTC [0519:04 MYT]	KL ATCC      Okay okay sorry okay right.		
<p style="text-align: center;"><b>End of Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b></p>			
<p><b>RINGING AT 2120:08 UTC [0520:08 MYT] ANSWERED BY MAS OPS: 2120:16 UTC [0521:16 MYT]</b></p>			
<p style="text-align: center;"><b>Direct Line Telephone Conversation Between KL ATCC and MAS Operation</b></p>			
2120:16 UTC [0520:16 MYT]	MAS Operations Morning.		
2120:17 UTC [0520:17 MYT]	KL ATCC      Morning Mas ops aaa centre here any news on Eight Seven Zero.		
2120:20 UTC [0520:20 MYT]	MAS Operations Negative sir ... still ... we are ...haa.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2120:23 UTC [0520:23 MYT]		
KL ATCC	I see.		
	2120:23 UTC [0520:23 MYT]		
MAS Operations	This is aaa... actually I don't know how to explain but we are under aa... mode very stressful mode down here.		
	2120:35 UTC [0520:35 MYT]		
KL ATCC	Yeah yeah yeah laa because even Ho Chi Minh.		
	2120:38 UTC [0520:38 MYT]		
MAS Operations	Okay boss.		
	2120:39 UTC [0520:39 MYT]		
KL ATCC	Aah.		
	2120:39 UTC [0520:39 MYT]		
MAS Operations	Just hang on my xxxx [ <i>name redacted</i> ] want to talk to you.		
	2120:42 UTC [0520:42 MYT]		
KL ATCC	Okay okay.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2120:44 UTC [0520:44 MYT] MAS Operations Good morning xxx xxx [name redacted] here who's on the line please.		
	2120:46 UTC [0520:46 MYT] KL ATCC Good morning I am xxxx [name redacted] here from Air Traffic Control Centre.		
	2120:47 UTC [0520:47 MYT] MAS Operations xxxx [name redacted] is aah xxxx [name redacted] on duty aa takda.		
	2120:51 UTC [0520:51 MYT] KL ATCC Yeah.		
	2120:52 UTC [0520:52 MYT] MAS Operations xxxx xxxx [name redacted]		
	2120:54 UTC [0520:54 MYT] KL ATCC xxxx [name redacted] takda hari ini.		
	2120:55 UTC [0520:55 MYT] MAS Operations Takda aaa I SMS him I think he's still sleeping anyway.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2120:57 UTC [0520:57 MYT] KL ATCC haa.		
	2120:58 UTC [0520:58 MYT] MAS Operations aem... Can you please tell me.		
	2121:01 UTC [0521:01 MYT] KL ATCC Aaa...		
	2121:02 UTC [0521:02 MYT] MAS Operations The aaa... (coughing) is the aircraft aaah... had a positive aaah... reply to handover to Ho Chi Minh.		
	2121:12 UTC [0521:12 MYT] KL ATCC Aah... I see because I... I ... took over roughly three three something I, I am not sure about it I can't say I....I can't I, I don't want to commit lah.		
	2121:22 UTC [0521:22 MYT] MAS Operations Okay.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2121:22 UTC [0521:22 MYT] KL ATCC aah.		
	2121:23 UTC [0521:23 MYT] MAS Operations fine, fair enough.		
	2121:23 UTC [0521:23 MYT] KL ATCC ah but.		
	2121:24 UTC [0521:24 MYT] MAS Operations can you find out		
	2121:25 UTC [0521:25 MYT] KL ATCC ah		
	2121:25 UTC [0521:25 MYT] MAS Operations with the previous controller		
	2121:26 UTC [0521:26 MYT] KL ATCC ah		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2121:26 UTC [0521:26 MYT] MAS Operations or your system record,		
	2121:28 UTC [0521:28 MYT] KL ATCC        aah ha		
	2121:29 UTC [0521:29 MYT] MAS Operation I suggest aaa... whatever we have here.		
	2121:32 UTC [0521:32 MYT] KL ATCC        hm.		
	2121:33 UTC [0521:33 MYT] MAS Operations Suggest that the aircraft had never leave Lumpur airspace, okay.		
	2121:41 UTC [0521:41 MYT] KL ATCC        Had never leave Lumpur airspce.		
	2121:42 UTC [0521:42 MYT] MAS Operations Yea he have not left Lumpur airspace because he has MH370/01/15 failed to call Ho Chi Minh. Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2121:48 UTC [0521:48 MYT] KL ATCC Aah,		
	2121:49 UTC [0521:49 MYT] MAS Operations That's what that's what Ho Chi Minh said lah,		
	2121:51 UTC [0521:51 MYT] KL ATCC hm hm hm,		
	2121:51 UTC [0521:51 MYT] MAS Operations Is it confirm or not you don't know lah,		
	2121:53 UTC [0521:53 MYT] KL ATCC No I don't know but I, I check I check with Ho Chi Minh.		
	2121:57 UTC [0521:57 MYT] MAS Operations aaa.		
	2121:58 UTC [0521:58 MYT] KL ATCC Aah I check with Ho Chi Minh he said he he observed on radar.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2122:04 UTC [0522:04 MYT] MAS Operations aah...		
KL ATCC	2122:05 UTC [0522:05 MYT] Somewhere BITOD the aaa... IGARI, BITOD, BITOD side that's mean under under Ho Chi minh airspace.		
	2122:10 UTC [0522:10 MYT] MAS Operations They observed it on radar until BITOD.		
KL ATCC	2122:13 UTC [0522:13 MYT] Aaa... somewhere BITOD they said few seconds only there just a blip there then I, I asked him what level was the aircraft.		
	2122:19 UTC [0522:19 MYT] MAS Operations Aaa,		
KL ATCC	2122:20 UTC [0522:20 MYT] Then he said level three five zero that that mean true lah, based on aaa because aircraft was flying on three five zero.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2122:26 UTC [0522:26 MYT] MAS Operations Okay.		
	2122:27 UTC [0522:27 MYT] KL ATCC Aah.		
	2122:27 UTC [0522:27 MYT] MAS Operations All the FIR further down the line,		
	2122:29 UTC [0522:29 MYT] KL ATCC Aah		
	2122:30 UTC [0522:30 MYT] MAS Operations Has aah fail to pick up aaa... pick it up on radar and communication.		
	2122:36 UTC [0522:36 MYT] KL ATCC Ehem.		
	2122:37 UTC [0522:37 MYT] MAS Operations So one when was the last communication Ho Chi Minh.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2122:42 UTC [0522:42 MYT]			
KL ATCC	Ya leh last communicatin I also I can't say because based on radar now... nowaday kan...nowaday last communication whenever you talk with the aircraft we didn't we didn't put in the time the timing normally no timing no timing we ar ar ar no.		
2122:58 UTC [0522:58 MYT]	MAS Operations I suggest		
2122:59 UTC [0522:59 MYT]	KL ATCC Aah		
2122:59 UTC [0522:59 MYT]	MAS Operations I suggest,		
2123:01 UTC [0523:01 MYT]	KL ATCC Yes yes.		
2123:02 UTC [0523:02 MYT]	MAS Operations You get,		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2123:02 UTC [0523:02 MYT] KL ATCC I, I.		
	2123:03 UTC [0523:03 MYT] MAS Operations Try to trace back the record.		
	2123:04 UTC [0523:04 MYT] KL ATCC Aaa I see, I see yeah.		
	2123:05 UTC [0523:05 MYT] MAS Operations Voice record.		
	2123:06 UTC [0523:06 MYT] KL ATCC Aah.		
	2123:06 UTC [0523:06 MYT] MAS Operations Aaa what time was that positive hand over.		
	2123:09 UTC [0523:09 MYT] KL ATCC Ya.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2123:10 UTC [0523:10 MYT] MAS Operations To Ho Chi Minh because we need to know where is the aircraft you know.		
	2123:13 UTC [0523:13 MYT] KL ATCC Okay okay okay I got it.		
	2123:14 UTC [0523:14 MYT] MAS Operations This this I appreciate you tell me that that the radar blip at BITOD.		
	2123:18 UTC [0523:18 MYT] KL ATCC Aaaa... never mind laa I wake up my supervisor and ask him to check again to go to the room and check what what the last contact all this thing lah.		
	2123:27 UTC [0523:27 MYT] MAS Operations Yes.		
	2123:27 UTC [0523:27 MYT] KL ATCC I will ask them to check la.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2123:29 UTC [0523:29 MYT] MAS Operations Okay.		
	2123:29 UTC [0523:29 MYT] KL ATCC      Okay okay who is on the line?		
	2123:30 UTC [0523:30 MYT] MAS Operations Eer xxx [ <i>name redacted</i> ] here I'll give you my mobile number		
	2123:33 UTC [0523:33 MYT] KL ATCC      Aah.. hold on hold on		
	2123:34 UTC [0523:34 MYT] MAS Operations Zero one two.		
	2123:34 UTC [0523:34 MYT] KL ATCC      Hold on hold on yeah aaa eee hmm.... aaa...xxxxx xxxx [ <i>name redacted</i> ] aaa okay zero one two.		
	2123:46 UTC [0523:46 MYT] MAS Operations xxx xxx xxx [ <i>number redacted</i> ]		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2123:47 UTC [0523:47 MYT] KL ATCC xxx xxx xxxx [ <i>number redacted</i> ]		
	2123:48 UTC [0523:48 MYT] MAS Operations xxx xxx xxx xxxx [ <i>number redacted</i> ]		
	2123:50 UTC [0523:50 MYT] KL ATCC xxx xxx xxx xxxx [ <i>number redacted</i> ] aah		
	2123:53 UTC [0523:53 MYT] MAS Operations Okay xxxxx [ <i>name redacted</i> ] how do I get you?		
	2123:54 UTC [0524:54 MYT] KL ATCC Aah.. okay you keep give my centre centre number.		
	2123:57 UTC [0523:57 MYT] MAS Operations Okay what is the number please.		
	2123:59 UTC [0523:59 MYT] KL ATCC Aah...hold on naa		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2124:14 UTC [0524:14 MYT]	Source unknown "Eeh eeh up up" "via Papa Kilo" ( <i>background voice</i> )		
2124:18 UTC [0524:18 MYT]	KL ATCC xxxxxxxx okay xxxx xxxx xxxx [number redacted]		
2124:24 UTC [0524:24 MYT]	MAS Operations ahm		
2124:25 UTC [0524:25 MYT]	KL ATCC xxx xxx aah xxx xxx [number redacted]		
2124:29 UTC [0524:29 MYT]	MAS Operations Sorry xxx xxx xxx [number redacted]		
2124:30 UTC [0524:30 MYT]	KL ATCC xxx xxx xxx xxx xxx [number redacted] hold on hold on.	2124:33 UTC [0524:33 MYT]	JSA 20 Lumpur good morning Jet Airways Two Zero flight level three seven zero squawk zero five one five

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2124:38 UTC [0524:38 MYT]	KL ATCC Hold on aah  <i>Controller answering aircraft's transmission</i>	2124:39 UTC [0524:39 MYT]	Lumpur Radar Jets Airway Two Zero Control morning identified maintain level three seven zero.
2124:49 UTC [0524:49 MYT]	KL ATCC Aaa halo	2124:43 UTC [0524:43 MYT]	JSA 20 Maintain three seven zero Jets Airway Two Zero.
2124:50 UTC [0524:50 MYT]	MAS Operations Ya		
2124:51 UTC [0524:51 MYT]	KL ATCC Halo xxx xxx xxx xxxx [number redacted]		
2124:53 UTC [0524:53 MYT]	MAS Operations xxx xxx xxx xxxx [number redacted] Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2124:54 UTC [0524:54 MYT]	KL ATCC xxx xxx xxx xxx [number redacted]		
2124:55 UTC [0524:55 MYT]	MAS Operations xxx xxx xxx xxx [number redacted] aah		
2124:56 UTC [0524:56 MYT]	KL ATCC hm hm		
2124:58 UTC [0524:58 MYT]	MAS Operations Okay thank you.		
2124:59 UTC [0524:59 MYT]	KL ATCC Okay right.		
<p style="text-align: center;"><b>End of Direct Line Telephone Conversation Between KL ATCC and MAS Operations Centre</b></p>			
		2132:03 UTC [0532:03 MYT]	
		SIA 345	Lumpur SingaporeThree Four Five request descend.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2132:07 UTC [0532:07 MYT] Lumpur Radar Singapore Three Four Five contact Singapore one two three decimal seven.
			2132:11 UTC [0532:11 MYT] SIA 345 One two three seven good day.
			2132:53 UTC [0532:53 MYT] SIA 517 Eer Lumpur Control good morning Singapore Five One seven flight level three niner zero.
			2133:00 UTC [0533:00 MYT] Lumpur Radar Morning Singapore Five One Seven Control identified maintain level three nine zero.
			2133:04 UTC [0533:04 MYT] SIA 517 Three nine zero Singapore Five one Seven.

**Direct Line Telephone Conversation  
Between KL ATCC and HCM ATCC**

2141:20 UTC  
[0541:20 MYT]

KL ATCC 20/01/15 Lumpur  
 Malaysian ICAO Annex 13  
 Safety Investigation Team for MH370  
 Ministry of Transport, Malaysia

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2141:21 UTC [0541:21 MYT]			
HCM ATCC	Ho Chi Minh ACC aah any information about Malaysian Three Seven Zero from the company.		
2141:27 UTC [0541:27 MYT]			
KL ATCC	Negative company is checking with me also and negative no no information about it no information about it so we are checking we are playing back back the tape we are we want to track back where the aircraft when was the last contact all this thing we too we play we play the tape and if there is informatin we inform you.		
2141:49 UTC [0541:49 MYT]			
HCM ATCC	Roger.		
2141:50 UTC [0541:50 MYT]			
KL ATCC	Okay okay then if there any from your side or from the Beijing side all this thing you inform Lumpur please.		
2141:56 UTC [0541:56 MYT]			
HCM ATCC	Okay any information will advise you.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
	2141:59 UTC [0541:59 MYT] KL ATCC      Yap, okay okay.		
<b>End of Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b>			
	2147:38 UTC [0547:38 MYT] JSA 20      (xxxx) (xxxx) [illegible] Jets Airway Two Zero.		
	2147:48 UTC [0547:48 MYT] JSA 20      Lumpur Jets Airway Two Zero.		
	2147:51 UTC [0547:51 MYT] Lumpur Radar      Jets Airway Two Zero contact Singapore one two three seven for descend.		
	2147:55 UTC [0547:55 MYT] JSA 20      Singapore one two three seven good day.		
	2151:25 UTC [0551:25 MYT] Lumpur Radar      Singapore Five One Seven naa change squawk zero four two six and contact Singapore now one two three decimal seven.		
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TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		2151:33 UTC [0551:33 MYT] SIA 517	Squawk on zero four two six and one two three seven Singapore Five One Seven good day.
		2151:40 UTC [0551:40 MYT] Lumpur Radar	One Seven good day.
		2152:16 UTC [0552:16 MYT]	Thai Piece 920 Lumpur Control Thai Peace Niner Two Zero good morning maintain three eight zero approaching Victor Papa Kilo squawk two three four two.
		2152:27 UTC [0552:27 MYT] Lumpur Radar	(xxx) (xxx) (xxx) (xxx) [illegible] Nine Two Zero control maintain three eight zero.
		2152:32 UTC [0552:32 MYT] Thai Piece 920	Maintain three eight zero Thai Peace Nine Two Zero.
		2152:36 UTC [0552:36 MYT] Lumpur Radar	Thai Peace Nine Two Zero.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2153:13 UTC [0553:13 MYT] AXM 1012      Lumpur Radar Express One Zero One Two good morning climbing level one eight zero direct IGARI.
			2153:21 UTC [0553:21 MYT] Lumpur Radar    Good morning aa Express One Zero One Two Control identified climb to flight level three five zero.
			2153:26 UTC [0553:26 MYT] AXM 1012      Three five zero Asian Express One Zero One Two.
			2153:34 UTC [0553:34 MYT] AXM 1012      Asian Express One Zero One Two request direct to BITOD.
			2153:37 UTC [0553:37 MYT] Lumpur Radar    One Zero One Two track IGARI initially.
			2153:40 UTC [0553:40 MYT] AXM 1012      Asian One Zero One Seven.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
<b>Direct Line Telephone Conversation Between KL ATCC and Singapore</b>			
	2207:54 UTC [0607:54 MYT] KL ATCC      Lumpur.		
	2207:55 UTC [0607:55 MYT] Singapore ATC Eer Lumpur two estimates first Malaysian Two Five Four Seven.		
	2207:59 UTC [0607:59 MYT] KL ATCC      Hold on hold on hold on please eer... Malaysian Two Five Four Seven go ahead.		
	2208:06 UTC [0608:06 MYT] Singapore ATC Affirm PADLI two three zero four flight level three four zero squawk two zero six three and next Malaysian Three Six One.		
	2208:14 UTC [0608:14 MYT] KL ATCC      Eer... (xxx) (xxx) (xxx) [illegible] Malaysian.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2208:17 UTC [0608:17 MYT] Singapore ATC Three Six One.
			2208:18 UTC [0608:18 MYT] KL ATCC Three Six One go.
			2208:20 UTC [0608:20 MYT] Singapore ATC TAKSU two three two seven flight level four zero zero squawk zero zero one three.
			2208:25 UTC [0608:25 MYT] KL ATCC Zero zero one three four hundred two three six seven Three Six One and...Malaysian Two Five Four Seven PADLI two zero two three zero four and two zero six three.
			2208:38UTC [0608:38 MYT] Singapore ATC Affirm Sierra Bravo.
			2208:39 UTC [0608:39 MYT] KL ATCC Okay (xxx) (xxx) [illegible] thank you.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2209:42 UTC [0609:42 MYT]
		XAX 523	Kuala Lumpur Control selamat pagi Xanadu Five two Three three four niner descending three four zero transponder three six five one.
		2209:52 UTC [0609:52 MYT]	Lumpur Radar Xanadu Five Two Three Lumpur Control good morning identified Lumpur for NIPAH Three Alpha Arrival Eastan Runway Three Two Left and descend to flight level aaah one niner zero.
		2210:03 UTC [0610:03 MYT]	XAX 523 NIPAH Three Alpha Arrival Eastan Transition and ... Runway Three Two Left confirm you said flight level one nine zero sir, Xanadu Five Two Three.
		2210:12 UTC [0610:12 MYT]	Lumpur Radar Five Two Three affirm descend level one niner zero direct to NIPAH.
		2210:16 UTC [0610:16 MYT]	XAX 523 Roger descend flight level one niner zero direct NIPAH Xanadu Five Two Three,

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2210:33 UTC [0610:33 MYT] XAX 523      Xanadu Five Two Three request high speed and aah below ten.
			2210:40 UTC [0610:40 MYT] Lumpur Radar   Five Two Three to be advised by Approach.
			2210:43 UTC [0610:43 MYT] XAX 523      Thank you Five Two Three.
			2212:41 UTC [0612:41 MYT] AXM 1034      Lumpur Radar Asian Express One Zero Three Four selamat pagi climbing flight level one eight zero passing eight thousand eight hundred.
			2212:49 UTC [0612:49 MYT] Lumpur Radar   (xxx) (xxx) [illegible] Lumpur Control good morning climb flight level two nine zero.
			2212:53 UTC [0612:53 MYT] AXM 1034      Flight level two nine zero Asian Express One Zero Three Four.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
			2212:56 UTC [0612:56 MYT] Lumpur Radar Zero Four and level requesting.
			2212:59 UTC [0612:59 MYT] AXM 1034 Requesting flight level Three Five Zero final Asian Express One zero Three Four.
			2213:03 UTC [0613:03 MYT] Lumpur Radar Thanks.
<b>Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b>			
			2213:36 UTC [0613:36 MYT] HCM ATCC Helo.
			2213:37 UTC [0613:37 MYT] KL ATCC Ho Chi Minh estimate on Asian Express One Zero Three Four
		<i>Conversation interrupted by aircraft radio transmission</i>	
			2213:41 UTC [0613:41 MYT] HCM ATCC Standby, One Zero Three Four go ahead.

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
		2213:50 UTC [0613:50 MYT]	KL ATCC Express One Zero Three Four estimate IGARI two two five.....eight flight level three five zero squawk two one two one.
		2214:03 UTC [0614:03 MYT]	HCM ATCC Asian Express One Zero Three Four IGARI aa two two five eight level three five zero approved squawk two one two one.
		2214:11 UTC [0614:11 MYT]	KL ATCC Affirm and tranfer level three five zero.
2214:13 UTC [0614:13 MYT]	KL ATCC and anyway your aah SAR you activated your SAR room.		
2214:18 UTC [0614:18 MYT]	HCM ATCC Yes standby.		
2214:26 UTC [0614:26 MYT]	HCM ATCC Yap.  MH370/01/15 Malaysian ICAO Annex 13 Safety Investigation Team for MH370 Ministry of Transport, Malaysia		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2214:27 UTC [0614:27 MYT]	KL ATCC      Halo your you're your SAR room is act... active now.		
2214:31 UTC [0614:31 MYT]	HCM ATCC      Aah ... for Malaysian Three Seven Zero.		
2214:33 UTC [0614:33 MYT]	KL ATCC      Affirm affirm Malaysian Three Seven Zero is it activate your your SAR your SAR search and rescue is it activated uuh.		
2214:41 UTC [0614:41 MYT]	HCM ATCC      Estimated.		
2214:42 UTC [0614:42 MYT]	KL ATCC      Negative is it aah... you aah... you activated your SAR room or not you open up your your..		
2214:49 UTC [0614:49 MYT]	HCM ATCC      I am not understand you say confirm you have any information about it.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2214:52 UTC [0614:52 MYT]			
KL ATCC	Neg... negative negative we don't have any information so at the moment we activate we activate our SAR Room now.		
2215:00 UTC [0615:00 MYT]			
HCM ATCC	SAR SAR Room.		
2215:01 UTC [0615:01 MYT]			
KL ATCC	SAR Search and Rescue, Search and Rescue.		
2215:05 UTC [0615:05 MYT]			
HCM ATCC	Ah yes you know on search and rescue		
2215:07 UTC [0615:07 MYT]			
KL ATCC	Aaah..		
2215:08 UTC [0615:08 MYT]			
HCM ATCC	Yeah.		

TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - MAS 370	TIME & SOURCE	AIR-GROUND COMMUNICATION LUMPUR RADAR - FREQUENCY 132.6 MHz AND RADAR DIRECT LINE COMMUNICATION CONTENT - OTHER FLIGHTS
2215:09 UTC [0615:09 MYT]			
KL ATCC	Na... naa... your your search and rescue is activate now you activated your search and rescue.		
2215:12 UTC [0615:12 MYT]			
HCM ATCC	Ya that's right, that's right.		
2215:13 UTC [0615:13 MYT]			
KL ATCC	I see okay okay right okay.		
<b>End of Direct Line Telephone Conversation Between KL ATCC and HCM ATCC</b>			
<b>END AT 2218:00 UTC [0618:00MYT]</b>			

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		START TIME 1620:00 UTC [0020:00 MYT]	
		1620:20 UTC [0020:20 MYT] KL ATCC	Lumpur Sector aah Five.
		1620:23 UTC [0020:23 MYT] Bangkok ATCC	Thai Peace Nine Two One revise level three five zero.
		1620:28 UTC [0020:28 MYT] KL ATCC	Thai Peace Nine Two One revise flight level three five zero confirm.
		1620:33 UTC [0020:33 MYT] Bangkok ATCC	Affirm.
		1620:33 UTC [0020:33 MYT] KL ATCC	Three five zero copied.
		1620:38 UTC [0020:38 MYT] KL ATCC	Call you back for higher.
		1620:40 UTC [0020:40 MYT] KL ATCC	Call you back for higher.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1620:42 UTC [0020:42 MYT] KL ATCC	Call you back for higher Background "helo"
		1620:47 UTC [0020:47 MYT] KL ATCC	<i>Background conversation "Mai saya buat jar ha"</i>
		1620:48 UTC [0020:48 MYT] KL ATCC	<i>Background conversation " Huh huh buat lah tadi itu Bangkok bukan Singapore"</i>
		1620:55 UTC [0020:55 MYT] KL ATCC	Helo Singapore.
		1621:05 UTC [0021:05 MYT] KL ATCC	Singapore.
		1621:08 UTC [0021:08 MYT] Singapore ATCC	Singapore.
		1621:08 UTC [0021:08 MYT] KL ATCC	Singapore I get one estimate and one revision.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1621:11 UTC [0021:11 MYT] Singapore ATCC	Go ahead revision.
		1621:12 UTC [0021:12 MYT] KL ATCC	Eer okay Beach Air Nine Two One revise now Victor Papa Kilo one six five three and requesting flight level three five zero.
		1621:19 UTC [0021:19 MYT] Singapore ATCC	One six five three .
		1621:21 UTC [0021:21 MYT] KL ATCC	Affirm.
		1621:22 UTC [0021:22 MYT] Singapore ATCC	Standby.
		1621:30 UTC [0021:30 MYT] Singapore ATCC	Ah confirm transfer only three three zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1621:32 UTC [0021:32 MYT] KL ATCC	Transfer only three three zero eh.
		1621:34 UTC [0021:34 MYT] Singapore ATCC	Affirm.
		1621:35 UTC [0021:35 MYT] KL ATCC	Okay copied and eer estimate for you Korean Air Six Seven Two.
		1621:39 UTC [0021:39 MYT] Singapore ATCC	Korean Six Seven Two go ahead.
		1621:42 UTC [0021:42 MYT] KL ATCC	Victor Papa Kilo one six three five requesting flight level three six zero squawk two one four one.
		1621:48 UTC [0021:48 MYT] Singapore ATCC	Korean Six Seven Two Victor Papa Kilo one six three five request flight level three six zero squawk two one four one.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1621:56 UTC [0021:56 MYT] KL ATCC	Affirm.
		1621:56 UTC [0021:56 MYT] Singapore ATCC	Climb to flight level two nine zero.
		1621:58 UTC [0021:58 MYT] KL ATCC	Two nine zero copied thank you mdm.
		1622:02 UTC [0022:02 MYT] Singapore ATCC	Thank you.
		1622:07 UTC [0022:07 MYT] KL ATCC	Okay reference to Thai Peace Nine Two One.
		1622:11 UTC [0022:11 MYT] Bangkok ATCC	Go head.
		1622:12 UTC [0022:12 MYT] KL ATCC	Okay only flight level three three zero from Singapore due traffic.

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1622:16 UTC  
[0022:16 MYT]  
Bangkok ATCC Okay.

1622:16 UTC  
[0022:16 MYT]  
KL ATCC And I got estimate helo.

1622:21 UTC  
[0022:21 MYT]  
KL ATCC *Background talking*  
Yang nak kena ni.

1622:25 UTC  
[0022:25 MYT]  
KL ATCC *Background talking*  
Eer tau kena tak suruh pergi Jakarta.

1622:28 UTC  
[0022:28 MYT]  
KL ATCC Helo.

1622:28 UTC  
[0022:28 MYT]  
Bangkok ATCC Go ahead.

1622:29 UTC  
[0022:29 MYT]  
KL ATCC Okay one estimate and... Singapore Three Two Four.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1622:34 UTC [0022:34 MYT] Bangkok ATCC	Go ahead.
		1622:35 UTC [0022:35 MYT] KL ATCC	Singapore Three Two Four Kota Bahru one seven one four request flight level three two zero squawk two two two seven.
		1622:42 UTC [0022:42 MYT] Bangkok ATCC	Approve three zero zero.
		1622:44 UTC [0022:44 MYT] KL ATCC	Three zero zero only mdm confirm three two zero not approve okay how about Singapore Three Five Two is it three two zero approve.
		1622:50 UTC [0022:50 MYT] Bangkok ATCC	Expect three four zero.
		1622:51 UTC [0022:51 MYT] KL ATCC	Expect three four zero climb three two zero confirm.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1622:53 UTC [0022:53 MYT] Bangkok ATCC	Affirm.
		1622:54 UTC [0022:54 MYT] KL ATCC	Okay copied.
		1622:57 UTC [0022:57 MYT] KL ATCC	Singapore Lumpur.
		1622:59 UTC [0022:59 MYT] Singapore ATCC	Lumpur reference to Korean Six Seven Two.
		1623:01 UTC [0023:01 MYT] KL ATCC	Go ahead.
		1623:02 UTC [0023:02 MYT] Singapore ATCC	Reclear flight level two seven zero.
		1623:05 UTC [0023:05 MYT] KL ATCC	Two seven zero copied mdm.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1623:06 UTC [0023:06 MYT] Singapore ATCC	Affirm subject to Singapore departure Singapore Three Two Four.
		1623:10 UTC [0023:10 MYT] KL ATCC	Singapore Three Two Four copied.
		1623:13 UTC [0023:13 MYT] Singapore ATCC	And got one estimate Global Jet Seven Six.
		1623:15 UTC [0023:15 MYT] KL ATCC	Okay Singapore Three Five Two still with you.
		1623:18 UTC [0023:18 MYT] Singapore ATCC	Singapore Three Five Two standby.
		1623:21 UTC [0023:21 MYT] Singapore ATCC	<i>Background conversation</i> Singapore Three Five Two still with you.
		1623:24 UTC [0023:24 MYT] Singapore ATCC	Ah affirm.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1623:24 UTC [0023:24 MYT] KL ATCC	Okay you may climb to flight level three zero zero now and Singapore Three Two Four step climb flight level two eight zero.
		1623:30 UTC [0023:30 MYT] Singapore ATCC	Three zero zero feet.
		1623:32 UTC [0023:32 MYT] KL ATCC	Okay.
		1623:33 UTC [0023:33 MYT] Singapore ATCC	Standby haa.
		1623:33 UTC [0023:33 MYT] KL ATCC	Okay.
		1623:35 UTC [0023:35 MYT] Singapore ATCC	<i>Background conversation</i> Ah Singapore Three Five Two still with you then naa Singapore Three Two Four two eighty.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1623:40 UTC [0023:40 MYT] Singapore ATCC Ah I got estimate Global Jet Seven Six.	
		1623:42 UTC [0023:42 MYT] KL ATCC Global Jet Seven Six Global Jet Seven Six eer okay go ahead.	
		1623:47 UTC [0023:47 MYT] Singapore ATCC Victor Papa Kilo one seven three five request flight level four one zero squawk two zero four three.	
		1623:52 UTC [0023:52 MYT] KL ATCC Two zero four three flight level four one zero approved and Victor Papa Kilo one seven three five confirm.	
		1624:00 UTC [0024:00 MYT] Singapore ATCC Thank you.	
		1624:00 UTC [0024:00 MYT] KL ATCC Welcome.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1626:30 UTC [0026:30 MYT] KL ATCC	Helo Sector Three yes go ahead.
		1626:33 UTC [0026:33 MYT] Singapore ATCC	Dess Niner Four One can you put over to me and I will climb subject to Singapore Three Five Two.
		1626:40 UTC [0026:40 MYT] KL ATCC	Dess Niner Four One okay put over say again level.
		1626:46 UTC [0026:46 MYT] Singapore ATCC	Eer Dess Niner Four One you can climb to flight level two nine zero and put over to me now.
		1626:50 UTC [0026:50 MYT] KL ATCC	Put over to you now Dess Niner Four One eer subject to.
		1626:55 UTC [0026:55 MYT] Singapore ATCC	Aah... no no I will I mean I will climb Singpore Three Five Two SUBJECT TO Dess Niner Four One.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1626:59 UTC [0026:59 MYT] KL ATCC	Okay copied thank you.
		1627:01 UTC [0027:01 MYT] Singapore ATCC	Thank you.
		1627:19 UTC [0027:19 MYT] Singapore ATCC	Singapore.
		1627:19 UTC [0027:19 MYT] KL ATCC	Okay reference to...Zest Air and Singapore Three Five Two Singapore Three Five Two you stop climb two two eight zero and transfer to us because we gay ada trafficalah Yea two eight zero.
		1627:28 UTC [0027:28 MYT] Singapore ATCC	Transfer only two eight zero.
		1627:29 UTC [0027:29 MYT] KL ATCC	Ya.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1627:30 UTC [0027:30 MYT] Singapore ATCC	For Singapore Three Five Two.
		1627:31 UTC [0027:31 MYT] KL ATCC	Three Five Two affirm.
		1627:33 UTC [0027:33 MYT] Singapore ATCC	And one revision.
		1627:34 UTC [0027:34 MYT] KL ATCC	Go ahead.
		1627:35 UTC [0027:35 MYT] Singapore ATCC	Cebu Five Zero One.
		1627:36 UTC [0027:36 MYT] KL ATCC	Say again callsign.
		1627:37 UTC [0027:37 MYT] Singapore ATCC	Cebu Five Zero One.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1627:37 UTC [0027:37 MYT] KL ATCC	Go ahead.
		1627:40 UTC [0027:40 MYT] Singapore ATCC	Revise PADLI one seven five niner.
		1627:42 UTC [0027:42 MYT] KL ATCC	One seven five niner okay copied.
		1627:46 UTC [0027:46 MYT] Singapore ATCC	Thank you.
		1630:30 UTC [0030:30 MYT] KL ATCC	Lumpur Sector Three.
		1630:31 UTC [0030:31 MYT] Singapore ATCC	Lumpur reference to Korean Air Six Seven Two.
		1630:34 UTC [0030:34 MYT] KL ATCC	Okay Korean Air Six Seven Two go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1630:37 UTC [0030:37 MYT] Singapore ATCC	Reclear to flight level two niner zero no closing speed with Zest Niner Four One.
		1630:41 UTC [0030:41 MYT] KL ATCC	Okay ah two niner zero okay ah no closing aa speed with Zest Niner Four One copied thank you.
		1630:50 UTC [0030:50 MYT] Singapore ATCC	Thank you.
		1632:03 UTC [0032:03 MYT] KL ATCC	Singapore.
		1632:04 UTC [0032:04 MYT] Singapore ATCC	Lumpur Korean Air Six Seven Two you want to put over to me and I will sort with Singapore Three Two Five correction Singapore Three Two Four.
		1632:10 UTC [0032:10 MYT] KL ATCC	Three Two Four eer... standby. Transfer to Lumpur ( <b><i>background voice [male]</i></b> ) Ah... Singapore ah yes transfer to Lumpur.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1632:21 UTC [0032:21 MYT] Singapore ATCC Copied.	
		1632:22 UTC [0032:22 MYT] KL ATCC Thank you.	
1643:30 UTC [0043:30 MYT] HCM ATCC	Helo.		
1643:31 UTC [0043:31 MYT] KL ATCC	Kay Ho Chi Minh ah estimate Malaysian Three Seven Zero.		
1643:36 UTC [0043:36 MYT] HCM ATCC	Go ahead.		
1643:37 UTC [0043:37 MYT] KL ATCC	Okay estimate IGARI one seven two two request flight level three five zero and squawk two one five seven.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1643:46 UTC [0043:46 MYT] HCM ATCC	Two one five seven three five zero is approved one seven two two.	1702:14 UTC [0102:14 MYT] KL ATCC	Lumpur Sector Three.
1643:50 UTC [0043:50 MYT] KL ATCC	Okay copied thank you..	1702:17 UTC [0102:17 MYT] Singapore ATCC	Lumpur revision Cebu Five Zero One.
		1702:19 UTC [0102:19 MYT] KL ATCC	Cebu Five Zero One go.
		1702:22 UTC [0102:22 MYT] Singapore ATCC	Revise PADLI one seven five two.
		1702:24 UTC [0102:24 MYT] KL ATCC	One seven five two copied thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1702:28 UTC [0102:28 MYT] Singapore ATCC Thank you.	
		1705:16 UTC [0105:16 MYT] Singapore ATCC Singapore.	
		1705:16 UTC [0105:16 MYT] KL ATCC Singapore one estimate.	
		1705:18 UTC [0105:18 MYT] Singapore ATCC Go ahead.	
		1705:19 UTC [0105:19 MYT] KL ATCC Xanadu Five Zero Six.	
		1705:21 UTC [0105:21 MYT] Singapore ATCC Xanadu Five Zero Six go ahead.	
		1705:23 UTC [0105:23 MYT] KL ATCC Victor Papa Kilo one seven two four request flight level three niner zero and squawk two one two five.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1705:34 UTC [0105:34 MYT] Singapore ATCC	Xanadu Five Zero Six Victor Papa Kilo one seven two four flight request flight level three niner zero squawk two one two five climb to flight level two niner zero.
		1705:43 UTC [0105:43 MYT] KL ATCC	Two niner zero copied.
		1705:45 UTC [0105:45 MYT] Singapore ATCC	Affirm.
		1705:46 UTC [0105:46 MYT] KL ATCC	Thank you.
		1708:40 UTC [0108:40 MYT] KL ATCC	Lumpur Sector Five.
		1708:42 UTC [0108:42 MYT] Bangkok ATCC	Transfer Victor Kilo Bravo Thai Four Eight Three.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1708:46 UTC [0108:46 MYT] KL ATCC	Okay aah say again callsign mdm.
		1708:48 UTC [0108:48 MYT] Bangkok ATCC	Thai Four Eight Three.
		1708:51 UTC [0108:51 MYT] KL ATCC	Thai Four Eight Three Victor Kilo Bravo go ahead mdm.
		1708:55 UTC [0108:55 MYT] Bangkok ATCC	One eight zero five flight level three seven zero six one one four.
		1709:02 UTC [0109:02 MYT] KL ATCC	Thai Four Eight Three Victor Kilo Bravo one eight zero five flight level three seven zero zero squawk six one one four.
		1709:10 UTC [0109:10 MYT] Bangkok ATCC	Affirm next.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1709:11 UTC [0109:11 MYT] KL ATCC	Go ahead mdm.
		1709:13 UTC [0109:13 MYT] Bangkok ATCC	Go Cat Two Six Five Seven.
		1709:17 UTC [0109:17 MYT] KL ATCC	<b>Background voice</b> Two Six Five Seven.
		1709:20 UTC [0109:20 MYT] KL ATCC	Two Six Five Seven go ahead mdm.
		1709:23 UTC [0109:23 MYT] Bangkok ATCC	One eight one two flight level three three zero transponder four seven zero four.
		1709:31 UTC [0109:31 MYT] KL ATCC	Okay Go Cat Two Six Five Seven Victor Kilo Bravo one eight one two flight level three three zero squawk four seven zero four.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1709:40 UTC [0109:40 MYT] Bangkok ATCC	Affirm.
		1709:42 UTC [0109:42 MYT] KL ATCC	Thank you.
		1711:24 UTC [0111:24 MYT] Lumpur Sector 1	Sector One.
		1711:25 UTC [0111:25 MYT] Lumpur Sec 3+5	Yes Sector One busy.
		1711:26 UTC [0111:26 MYT] Lumpur Sector 1	Busy.
		1715:04 UTC [0115:04 MYT] Singapore ATCC	Singapore.
		1715:06 UTC [0115:06 MYT] KL ATCC	Singapore two estimates.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1715:08 UTC [0115:08 MYT] Singapore ATCC	Go ahead.
		1715:09 UTC [0115:09 MYT] KL ATCC	The first one Thai Four Eight Three.
		1715:13 UTC [0115:13 MYT] Singapore ATCC	Thai Four Eight Three go ahead.
		1715:14 UTC [0115:14 MYT] KL ATCC	Victor Papa Kilo one eight two seven flight level three seven zero and squawk six one one four.
		1715:23 UTC [0115:23 MYT] Singapore ATCC	Thai Four Eight Three Victor Papa Kilo one eight two seven flight level three seven zero squawk six one one four next.
		1715:29 UTC [0115:29 MYT] KL ATCC	Ah yes squawk six one one four.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1715:33 UTC [0115:33 MYT] Singapore ATCC	Squawk six one one four copied.
		1715:35 UTC [0115:35 MYT] KL ATCC	Next is Go Cat Two Six Five Seven.
		1715:40 UTC [0115:40 MYT] Singapore ATCC	Go Cat Two Six Five Seven go ahead.
		1715:41 UTC [0115:41 MYT] KL ATCC	Victor Papa Kilo one eight three five flight level three three zero squawk four seven zero four.
		1715:49 UTC [0115:49 MYT] Singapore ATCC	Go Cat Two Six Five Seven Victor Papa Kilo one eight three zero squawk four seven zero four.
		1715:56 UTC [0115:56 MYT] KL ATCC	Yes read back correct.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1715:58 UTC [0115:58 MYT] Singapore ATCC	Thank you.
		1715:58 UTC [0115:58 MYT] KL ATCC	Thank you.
		1721:44 UTC [0121:44 MYT] KL ATCC	Sector Five.
		1721:46 UTC [0121:46 MYT] Bangkok ATCC	Transfer TIDAR Thai Four Six Five.
		1721:50 UTC [0121:50 MYT] KL ATCC	Thai Four Six Five TIDAR.
		1721:55 UTC [0121:55 MYT] Bangkok ATCC	Affirm.
		1721:57 UTC [0121:57 MYT] KL ATCC	Okay go ahead mdm.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1721:58 UTC [0121:58 MYT] Bangkok ATCC	One eight one seven flight level three seven zero transponder six one one five.
		1722:06 UTC [0122:06 MYT] KL ATCC	Okay aah... Thai Four Six Five TIDAR one eight one seven flight level three seven zerosquawk six one one five.
		1722:14 UTC [0122:14 MYT] Bangkok ATCC	Affirm.
		1722:14 UTC [0122:14 MYT] KL ATCC	Call you back for level mdm [male voice] Ya ah I call you back for..... level [female voice]
		1722:20 UTC [0122:20 MYT] KL ATCC	<i>Background voice</i> Panggil
		1722:50 UTC [0122:50 MYT] KL ATCC	Singapore.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1722:52 UTC [0122:52 MYT] KL ATCC	Okay ah Singapore.
		1722:53 UTC [0122:53 MYT] Singapore ATCC	Yes go ahead.
		1722:54 UTC [0122:54 MYT] KL ATCC	Okay ah... Thai ah okay estimate Thai Four Six Five.
		1723:00 UTC [0123:00 MYT] Singapore ATCC	Thai Four Six Five go ahead.
		1723:02 UTC [0123:02 MYT] KL ATCC	TIDAR one eight one seven request flight level three seven zero squawk six one one five.
		1723:09 UTC [0123:09 MYT] Singapore ATCC	Six one one five Thai Four Six Five TIDAR one eight one seven flight level three seven zero is approved and squawk six one one five.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1723:17 UTC [0123:17 MYT] KL ATCC	Okay copied thank you.
		1723:19 UTC [0123:19 MYT] KL ATCC	You.
		1723:30 UTC [0123:30 MYT] Bangkok ATCC	(xxx) (xxx) (xxx) [illegible] [words spoken in Thai]
		1723:31 UTC [0123:31 MYT] KL ATCC	Sector Five okay aah... Bangkok reference to Thai Four Six Five flight level three seven zero is approved.
		1723:40 UTC [0123:40 MYT] Bangkok ATCC	Thai Four Six Five transfer to you three seven zero and...Go Cat Two Six Five Seven request flight level three five zero.
		1723:47 UTC [0123:47 MYT] KL ATCC	Two Six Five Seven aah... say again.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1723:50 UTC [0123:50 MYT] Bangkok ATCC	Request three five zero.
		1723:51 UTC [0123:51 MYT] KL ATCC	Request three five zero.
		1723:53 UTC [0123:53 MYT] Bangkok ATCC	Affirm.
		1723:54 UTC [0123:54 MYT] KL ATCC	Okay standby I call you back.
		1723:56 UTC [0123:56 MYT] Bangkok ATCC	Call back okay.
		1723:59 UTC [0123:59 MYT] KL ATCC	Aah..... dia tak (words spoken in National Language) [Malay Language]

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1724:12 UTC [0124:12 MYT] KL ATCC	Dia tak bagi tahu lagi dia approve tak (words spoken in National Language) [Malay Language]
		1724:14 UTC [0124:14 MYT] Bangkok ATCC	Yes.
		1724:15 UTC [0124:15 MYT] KL ATCC	Okay Go Cat Two Six Five Seven flight level three five zero is approved.
		1724:20 UTC [0124:20 MYT] Bangkok ATCC	Revised transfer three five zero thank you.
		1724:22 UTC [0124:22 MYT] KL ATCC	Thank you.
		1724:33 UTC [0124:33 MYT] Singapore ATCC	Singapore.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1724:34 UTC [0124:34 MYT] KL ATCC	Singapore aah... level change.
		1724:38 UTC [0124:38 MYT] Singapore ATCC	Yes mdm go.
		1724:39 UTC [0124:39 MYT] KL ATCC	Okay aah... for Go Cat Two Six Five Seven flight level.
		1724:44 UTC [0124:44 MYT] Singapore ATCC	Go ahead.
		1724:45 UTC [0124:45 MYT] KL ATCC	Three five zero flight level three five zero.
		1724:49 UTC [0124:49 MYT] Singapore ATCC	Three five zero for Go Cat Two Six Give Seven copied mdm thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1739:03 UTC [0139:03 MYT] KL ATCC	Lumpur		
1739:06 UTC [0139:06 MYT] HCM ATCC	Any information on Malaysian Three Seven Zero sir.		
1739:08 UTC [0139:08 MYT] KL ATCC	Malaysian Three Seven Zero already transfer to you right		
1739:12 UTC [0139:12 MYT] HCM ATCC	Yeah yeah I know at time two zero but we have no just about in contact after... BITOD we have na... radar lost with him the other one here to track identified on my radar.		
1739:24 UTC [0139:24 MYT] KL ATCC	Okay at what point.		
1739:25 UTC [0139:25 MYT] HCM ATCC	And no contact right now.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1739:26 UTC [0139:26 MYT] KL ATCC	At what point.		
1739:27 UTC [0139:27 MYT] HCM ATCC	Yea.		
1739:28 UTC [0139:28 MYT] KL ATCC	At what point.		
1739:29 UTC [0139:29 MYT] HCM ATCC	Yea.		
1739:30 UTC [0139:30 MYT] KL ATCC	At what point you lost contact.		
1739:33 UTC [0139:33 MYT] HCM ATCC	BITODS.		
1739:34 UTC [0139:34 MYT] KL ATCC	BITODS hah.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1739:35 UTC [0139:35 MYT] HCM ATCC	Yea.		
1739:36 UTC [0139:36 MYT] KL ATCC	BITODS okay .....call you back.	1740:26 UTC [0140:26 MYT] Unknown	Go ahead.
		1740:26 UTC [0140:26 MYT] Unknown	You call earlier.
		1740:29 UTC [0140:29 MYT] Unknown	No.
		1740:29 UTC [0140:29 MYT] Unknown	Okay copied.
1741:10 UTC [0141:10 MYT] HCM ATCC	Yap.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1741:11 UTC [0141:11 MYT]			
KL ATCC	Hello Ho Chi Minh.		
1741:12 UTC [0141:12 MYT]			
HCM ATCC	Yes sir.		
1741:13 UTC [0141:13 MYT]			
KL ATCC	Okay Malaysian Three Seven Zero never call us after IGARI.		
1741:17 UTC [0141:17 MYT]			
HCM ATCC	Eer sorry.		
1741:18 UTC [0141:18 MYT]			
KL ATCC	Never call us after IGARI.		
1741:21 UTC [0141:21 MYT]			
HCM ATCC	Never call you.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1741:22 UTC [0141:22 MYT]			
KL ATCC	Yea yea after IGARI we transferred to you and aircraft never call me back.		
1741:26 UTC [0141:26 MYT]			
HCM ATCC	Yea we have radar contact but not verbal contact until BITOD we are no ADSB identity and no radar contact.		
1741:35 UTC [0141:35 MYT]			
KL ATCC	Eh Okay copied that.		
1741:37 UTC [0141:37 MYT]			
HCM ATCC	Yea.		
1746:47 UTC [0146:47 MYT]			
KL ATCC	Go ahead Lumpur.		
1746:49 UTC [0146:49 MYT]			
HCM ATCC	Yes do you have any information from Malaysian Three Seven Zero currently.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1746:54 UTC [0146:54 MYT]	KL ATCC Negative sir what information do you want.		
1746:57 UTC [0146:57 MYT]	HCM ATCC Yes we just told you before la we have radar contact over IGARI not verbal contact and after BITOD we have no radar ident also ADS-B identity .		
1747:08 UTC [0147:08 MYT]	KL ATCC And how about earlie.r		
1747:09 UTC [0147:09 MYT]	HCM ATCC And we call him many times until naa more than 20 minutes.		
1747:14 UTC [0147:14 MYT]	KL ATCC Yea how about earlier after IGARI did he call you or not.		
1747:17 UTC [0147:17 MYT]	HCM ATCC Negative sir just verbal just radar contact only.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1747:22 UTC [0147:22 MYT] KL ATCC	No contact since IGARI confirm.		
1747:25 UTC [0147:25 MYT] HCM ATCC	Affirm.		
1747:26 UTC [0147:26 MYT] KL ATCC	Okay I will try aah..... give a call and then eer... after your helo.		
1757:49 UTC [0157:49 MYT] KL ATCC	Yea Ho Chi Minh.		
1757:51 UTC [0157:51 MYT] HCM ATCC	Yes sir we officially no contact from Malaysian Three Seven Zero until now and we tried on many frequencies and all the airraft calling no response from Malaysian Three Seven Zero.		
1758:06 UTC [0158:06 MYT] KL ATCC	Okay.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1758:06 UTC [0158:06 MYT]	HCM ATCC Could you check back for your side.		
1758:08 UTC [0158:08 MYT]	KL ATCC Okay we will do that and the first at IGARI did you ever in contact with the aircraft or not first place.		
1758:17 UTC [0158:17 MYT]	HCM ATCC Negative sir we have radar contact only not verbal contact.		
1758:21 UTC [0158:21 MYT]	KL ATCC But no when aircraft passed IGARI did the aircraft call you.		
1758:26 UTC [0158:26 MYT]	HCM ATCC Negative sir.		
1758:27 UTC [0158:27 MYT]	KL ATCC Negative why you didn't tell me first within five minutes you should be called me.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1758:31 UTC [0158:31 MYT]			
HCM ATCC	After BITOD seven minute we have no radar contact then ask you.		
1758:37 UTC [0158:37 MYT]			
KL ATCC	Okay okay we will try to call the company.		
1758:40 UTC [0158:40 MYT]			
HCM ATCC	Yea.	1759:27 UTC [0159:27 MYT]	KL ATCC Go ahead Singapore.
		1759:28 UTC [0159:28 MYT]	Singapore ATCC Lumpur one transfer one estimate transfer Singapore departure Air China Four Zero Four.
		1759:33 UTC [0159:33 MYT]	KL ATCC Air China Four Zero Four go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1759:36 UTC [0159:36 MYT] Singapore ATCC	Estimating Victor Papa Kilo one eight one nine request flight level three four zero squawk two two one seven.
		1759:42 UTC [0159:42 MYT] KL ATCC	Two two one seven climb initially flight level two eight zero.
		1759:46 UTC [0159:46 MYT] Singapore ATCC	Two eight zero for Air China Four Zero Four next Xanadu Three Seven Seven.
		1759:51 UTC [0159:51 MYT] KL ATCC	Xanadu Three Seven Seven go ahead.
		1759:53 UTC [0159:53 MYT] Singapore ATCC	PADLI one nine four zero flight level four zero zero squawk two six three six.
		1759:57 UTC [0159:57 MYT] KL ATCC	Two six three six flight level four zero zero, PADLI one niner four zero copied thank you mdm,

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1800:02 UTC [0200:02 MYT] Singapore ATCC	Thank you.
		1800:17 UTC [0200:17 MYT] HCM ATCC	Lumpur Ho Chi Minh.
		1800:18 UTC [0200:18 MYT] KL ATCC	Okay estimate for you Malaysian Three Eight Six.
		1800:21 UTC [0200:21 MYT] HCM ATCC	Three Eight Six yes.
		1800:22 UTC [0200:22 MYT] KL ATCC	Okay IGARI one eight three six flight level three seven zero squawk two one three one.
		1800:28 UTC [0200:28 MYT] HCM ATCC	Helo standby one eight three six flight aah...squawk two one three one say again the flight level.
		1800:34 UTC [0200:34 MYT] KL ATCC	Three seven zero sir.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1800:36 UTC [0200:36 MYT] HCM ATCC	Three seven zero okay copied.
1807:47 UTC [0207:47 MYT] KL ATCC	Yea Ho Chi Minh.		
1807:48 UTC [0207:48 MYT] HCM ATCC	Yeap just confirm that aircraft in Phnom Penh FIR.		
1807:52 UTC [0207:52 MYT] KL ATCC	Say again.		
1807:54 UTC [0207:54 MYT] HCM ATCC	The Malaysian Three Seven Zero sorry.		
1807:56 UTC [0207:56 MYT] KL ATCC	Okay yeah go ahead.		
1807:59 UTC [0207:59 MYT] HCM ATCC	Aah...confirm that the aircraft enter Phnom Penh FIR.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1808:04 UTC [0208:04 MYT]			
KL ATCC	Okay from the... MAS operator the airlines from the airlines itself he said the aircraft is still flying and now is over Cambodia airspace.		
1808:14 UTC [0208:14 MYT]			
HCM ATCC	Oh... really we call you we don't have any information before and we ask Phnom Penh Phnom Penh don't know any information Malaysian Three Seven Zero.		
1808:22 UTC [0208:22 MYT]			
KL ATCC	Oh...he also didn't no contact with the aircraft right.		
1808:25 UTC [0208:25 MYT]			
HCM ATCC	Yeah.		
1808:26 UTC [0208:26 MYT]			
KL ATCC	Okay okay I will check with my Supervisor again.		
1808:28 UTC [0208:28 MYT]			
HCM ATCC	Thank you.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1809:26 UTC [0209:26 MYT] KL ATCC	Macam macam (xxx) [illegible] (words spoken in National Language) [Malay Language]
		1809:26 UTC [0209:26 MYT] Bangkok ATCC	Yes.
		1809:27 UTC [0209:27 MYT] KL ATCC	Okay estimate for you Air China Four Zero Four.
		1809:30 UTC [0209:30 MYT] HCM Bangkok ATC	Four Zero Four yes.
		1809:32 UTC [0209:32 MYT] KL ATCC	Victor Kilo Bravo one eight four two flight level three four zero squawk two two one seven.
		1809:39 UTC [0209:39 MYT] Bangkok ATCC	One eight four two three four zero two two one seven.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1809:43 UTC [0209:43 MYT] KL ATCC	Affirm.
		1809:44 UTC [0209:44 MYT] Bangkok ATCC	Thank you.
		1809:44 UTC [0209:44 MYT] KL ATCC	Welcome.
		1809:57 UTC [0209:57 MYT] BUTTERWORTH	Go ahead sir.
		1809:58 UTC [0209:58 MYT] KL ATCC	Estimate Malaysian Six One Six Three.
		1810:00 UTC [0210:00 MYT] BUTTERWORTH	Standby.
		1810:02 UTC [0210:02 MYT] BUTTERWORTH	Six One Six Three go.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1810:04 UTC [0210:04 MYT] KL ATCC	Okay estimate Victor Papa Golf one niner one four flight level three six zero squawk six three four five.
		1810:11 UTC [0210:11 MYT] BUTTERWORTH	Six three four five thank you.
		1810:13 UTC [0210:13 MYT] KL ATCC	Welcome.
		1812:01 UTC [0212:01 MYT] HCM ATCC	Yeah Lumpur Ho Chi Minh.
		1812:02 UTC [0212:02 MYT] KL ATCC	Okay reference to Malaysian Three Eight Six.
		1812:05 UTC [0212:05 MYT] HCM ATCC	Yes.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1812:07 UTC [0212:07 MYT] KL ATCC	Okay due traffic transfer to you flight level three five zero higher from Ho Chi Minh.
		1812:11 UTC [0212:11 MYT] HCM ATCC	Three five zero.
		1812:12 UTC [0212:12 MYT] KL ATCC	Higher from you.
		1812:13 UTC [0212:13 MYT] HCM ATCC	Okay.
		1812:14 UTC [0212:14 MYT] KL ATCC	Okay.
		1812:15 UTC [0212:15 MYT] HCM ATCC	Okay.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1812:15 UTC [0212:15 MYT]			
KL ATCC	And then naa Malaysian Seven Five Zero still aah... Three Seven Zero still no information from us la.		
1812:22 UTC [0212:22 MYT]			
HCM ATCC	Ah No information.		
1812:23 UTC [0212:23 MYT]			
KL ATCC	Yea.		
1812:26 UTC [0212:26 MYT]			
HCM ATCC	Okay.	1818:07 UTC [0218:07 MYT]	Singapore ATCC Singapore.
		1818:08 UTC [0218:08 MYT]	KL ATCC Okay reveision Thai Four Six Five.
		1818:11 UTC [0218:11 MYT]	Singapore ATCC Thai Four Six Five.
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DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1818:13 UTC [0218:13 MYT] KL ATCC	Okay squawk Six One One Six.
		1818:16 UTC [0218:16 MYT] Singapore ATCC	Copied.
		1818:18 UTC [0218:18 MYT] KL ATCC	Right.
1818:50 UTC [0218:50 MYT] HCM ATCC	Helo.		
1818:51 UTC [0218:51 MYT] KL ATCC	Ho Chi Minh.		
1818:53 UTC [0218:53 MYT] HCM ATCC	Liau.		
1818:53 UTC [0218:53 MYT] KL ATCC	Okay the reference to Malaysian Three Seven Zero confirm you received the flight plan.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1819:02 UTC [0219:02 MYT] HCM ATCC	Affirm.		
1819:03 UTC [0219:03 MYT] KL ATCC	Okay aah... the flight plan suppose to be over Ho Chi Minh or over Cambodia.		
1819:10 UTC [0219:10 MYT] HCM ATCC	Originally over Ho Chi Minh.		
1819:12 UTC [0219:12 MYT] KL ATCC	Okay and then aircraft didn't enter Ho Chi Minh confirm.		
1819:18 UTC [0219:18 MYT] HCM ATCC	Aaah... According to the record the aircraft passing that position IGARI disappear radar symbol.		
1819:26 UTC [0219:26 MYT] KL ATCC	Harhar.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1819:26 UTC [0219:26 MYT]	HCM ATCC Naaa...five minutes ... later.		
1819:30 UTC [0219:30 MYT]	KL ATCC Hmm hmm.		
1819:31 UTC [0219:31 MYT]	HCM ATCC Is gone and we try with many capacity to call him		
1819:36 UTC [0219:36 MYT]	KL ATCC No aft after IGARI confirm after IGARI you have lost radar contact after IGARI.		
1819:44 UTC [0219:44 MYT]	HCM ATCC After position BITOD.		
1819:46 UTC [0219:46 MYT]	KL ATCC BITOD aircraft aaah... lost radar contact.		
1819:50 UTC [0219:50 MYT]	HCM ATCC Aah... disappeared.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1819:53 UTC [0219:53 MYT] KL ATCC	Disappeared okay.		
1819:56 UTC [0219:56 MYT] KL ATCC	Okay eer...		
1819:56 UTC [0219:56 MYT] HCM ATCC	Yeah.		
1819:57 UTC [0219:57 MYT] KL ATCC	And then..... the aircraft daa...still until now you don't have any radar contact.		
1820:02 UTC [0220:02 MYT] HCM ATCC	Not at all.		
1820:04 UTC [0220:04 MYT] KL ATCC	Not at all okay what about Ho Chi Minh aah... aah Cambodia.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1820:09 UTC [0220:09 MYT]	HCM ATCC      They said they have no information.		
1820:15 UTC [0220:15 MYT]	KL ATCC      No information so you are takng radio failure action.		
1820:19 UTC [0220:19 MYT]	HCM ATCC      Pardon.		
1820:20 UTC [0220:20 MYT]	KL ATCC      You are taking necessary action for the aircraft.		
1820:24 UTC [0220:24 MYT]	HCM ATCC      Position operation.		
1820:26 UTC [0220:26 MYT]	KL ATCC      Those radio failure action and naa that action.		
1820:36 UTC [0220:36 MYT]	HCM ATCC      What do you mean by that.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1820:38 UTC [0220:38 MYT]			
KL ATCC	No confirm that you are in contact with Malaysian Three Seven Zero now.		
1820:43 UTC [0220:43 MYT]			
HCM ATCC	Just one time.		
1820:45 UTC [0220:45 MYT]			
KL ATCC	Once only.		
1820:46 UTC [0220:46 MYT]			
HCM ATCC	Once but aah... by radar symbol.		
1820:51 UTC [0220:51 MYT]			
KL ATCC	I am asking radio contact.		
1820:55 UTC [0220:55 MYT]			
HCM ATCC	No voice.		
1820:56 UTC [0220:56 MYT]			
KL ATCC	No voice communi communication.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1820:58 UTC [0220:58 MYT]	HCM ATCC Yeah.		
1820:59 UTC [0220:59 MYT]	KL ATCC Okay and daa... so you're your advice me when you receive aah any information about this aricraft.		
1821:09 UTC [0221:09 MYT]	HCM ATCC So far...is coming up three zero minutes and naa I afraid that something wrong with him but I don't know what.		
1821:21 UTC [0221:21 MYT]	KL ATCC Hmm okay according to the.		
1821:23 UTC [0221:23 MYT]	HCM ATCC Actually actually should be appear by radar.		
1821:27 UTC [0221:27 MYT]	KL ATCC Hmm...		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1821:28 UTC [0221:28 MYT]			
HCM ATCC	But then naa...Ho Chi Minh naaeight zero miles from Tan Tansonhat but is something wrong nothing.		
1821:36 UTC [0221:36 MYT]			
KL ATCC	Nothing yet.		
1821:37 UTC [0221:37 MYT]			
HCM ATCC	Just radar...just aa... flight plan track you know what.		
1821:41 UTC [0221:41 MYT]			
KL ATCC	Just flight plan track only.		
1821:43 UTC [0221:43 MYT]			
HCM ATCC	Ah ha.		
1821:44 UTC [0221:44 MYT]			
KL ATCC	You confirm just flight plan track only.		
1821:47 UTC [0221:47 MYT]			
HCM ATCC	Just flight plan track only.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1821:51 UTC [0221:51 MYT]			
KL ATCC	Okay naa thank you advise me if you have any information.		
1821:56 UTC [0221:56 MYT]			
HCM ATCC	So so so you get the just daa you contact with the his company and na I think there's some like ah the internal call.		
1822:09 UTC [0222:09 MYT]			
KL ATCC	Aah no I already inform the company.		
1822:13 UTC [0222:13 MYT]			
HCM ATCC	Eer... ha.		
1822:14 UTC [0222:14 MYT]			
KL ATCC	Okay so the company already.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1822:15 UTC [0222:15 MYT]	HCM ATCC      What did they say.		
1822:17 UTC [0222:17 MYT]	KL ATCC      Nah I am not sure but the company already sent signal to the aircraft to contact relevant ATC unit.		
1822:24 UTC [0222:24 MYT]	HCM ATCC      Yea but aa...I would like to know after IGARI have you received any signal or any voice contact or something like aah radar symbol.		
1822:38 UTC [0222:38 MYT]	KL ATCC      Negative.		
1822:39 UTC [0222:39 MYT]	HCM ATCC      Before you transfer to me.		
1822:40 UTC [0222:40 MYT]	KL ATCC      Yea after after I transfer and then naa... we aa...I mean no other information after IGARI.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1822:49 UTC [0222:49 MYT] HCM ATCC	But before IGARI before in your airspace what aa... was it work.		
1822:55 UTC [0222:55 MYT] KL ATCC	It is working until IGARI.		
1822:58 UTC [0222:58 MYT] HCM ATCC	Working normally.		
1823:00 UTC [0223:00 MYT] KL ATCC	Affirm affirm working normal until IGARI.		
1823:03 UTC [0223:03 MYT] HCM ATCC	Yea ... okay okay thank you.		
1823:05 UTC [0223:05 MYT] KL ATCC	Thank you.		
		1823:55 UTC [0223:55 MYT] KL ATCC	Lumpur.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1823:56 UTC [0223:56 MYT] Bangkok ATCC	Ah Lumpur revision for Silk Air Five Zero Nine.
		1824:00 UTC [0224:00 MYT] KL ATCC	Silk Air Five Zero Niner go ahead.
		1824:03 UTC [0224:03 MYT] Bangkok ATCC	Flight level three niner zero.
		1824:05 UTC [0224:05 MYT] KL ATCC	Three niner zero copied.
		1830:37 UTC [0230:37 MYT] Singapore ATCC	Singapore.
		1830:38 UTC [0230:38 MYT] KL ATCC	Two estimate for you number one Silk Air Nine Three Seven.
		1830:42 UTC [0230:42 MYT] Singapore ATCC	Silk Air Nine Three Seven go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1830:44 UTC [0230:44 MYT] KL ATCC	Victor Papa Kilo one niner two niner flight level three niner zero squawk five one five one three.
		1830:50 UTC [0230:50 MYT] Singapore ATCC	Silk Air Niner Three Seven Victor Papa Kilo one niner two niner flight level three niner zero squawk one five one three.
		1830:56 UTC [0230:56 MYT] KL ATCC	Affirm next German Cargo Five Three Zero.
		1831:00 UTC [0231:00 MYT] Singapore ATCC	German Cargo Five Three Zero go ahead.
		1831:02 UTC [0231:02 MYT] KL ATCC	Victor Papa Kilo one niner three six flight level three five zero squawk six one one seven.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1831:08 UTC [0231:08 MYT]	Singapore ATCC German Cargo Five Three Zero Victor Papa Kilo one niner three six flight level three five zero squawk six one one seven.
		1831:14 UTC [0231:14 MYT]	KL ATCC Readback correct thank you.
		1831:15 UTC [0231:15 MYT]	Singapore ATCC Thank you.
1834:56 UTC [0234:56 MYT]	KL ATCC Lumpur.		
1834:59 UTC [0234:59 MYT]	KL ATCC Lumpur.		
1835:01 UTC [0235:01 MYT]	HCM ATCC	Helo request status of Malaysian Three Seven Zero.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1835:03 UTC [0235:03 MYT] KL ATCC	Okay go ahead.		
1835:05 UTC [0235:05 MYT] HCM ATCC	Do you have any information about it.		
1835:07 UTC [0235:07 MYT] KL ATCC	Eer negative yet but we are still trying to ask from MAS whether there is anyway to contact the aircraft.		
1835:17 UTC [0235:17 MYT] HCM ATCC	Aah Aah could you call your company company.		
1835:23 UTC [0235:23 MYT] KL ATCC	Yeah yeah...we are talking with the...my my supervisor my supervisor is talking with the airlines right now whether we can call this aircraft in any way maybe aah...there's another frequency for us ... airlines frequency or what.		
1835:40 UTC [0235:40 MYT] HCM ATCC	Okay should you have any information.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1835:42 UTC [0235:42 MYT]			
KL ATCC	Yea... yea... will advise anyway have you check with other sector the next sector.		
1835:48 UTC [0235:48 MYT]			
HCM ATCC	Okay negative		
1835:51 UTC [0235:51 MYT]			
KL ATCC	Aah... no nobody nobody in contact with the aircraft aah okay okay alright	1850:16 UTC [0250:16 MYT]	Lumpur.
		KL ATCC	
		1850:18 UTC [0250:18 MYT]	Singapore ATCC Lumpur estimate Korean Air Three Eight Five.
		KL ATCC	Korean Air.....okay Three Eight Five go.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1850:28 UTC [0250:28 MYT] Singapore ATCC	Affirm.
		1850:29 UTC [0250:29 MYT] KL ATCC	Go ahead.
		1850:31 UTC [0250:31 MYT] Singapore ATCC	PADLI two zero one four flight level three five zero squawk four one six seven.
		1850:36 UTC [0250:36 MYT] KL ATCC	Four one six seven flight level three five zero, PADLI two zero one four.
		1850:40 UTC [0250:40 MYT] Singapore ATCC	Thank you.
		1906:35 UTC [0306:35 MYT] KL ATCC	Singapore transfer Cebu Five Zero Two.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1906:39 UTC [0306:39 MYT] Singapore ATCC	Five Zero Two go ahead.
		1906:41 UTC [0306:41 MYT] KL ATCC	Eer... Papa Kilo one nine two five flight level request three six zero squawk two one four three.
		1906:50 UTC [0306:50 MYT] Singapore ATCC	You said one nine two five flight level.
		1906:55 UTC [0306:55 MYT] KL ATCC	Three six zero November Eight Eight Four squawk two one four three.
		1907:01 UTC [0307:01 MYT] Singapore ATCC	Two one four three flight level three six zero Five Zero Two climb to flight level two niner zero.
		1907:09 UTC [0307:09 MYT] KL ATCC	Thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1907:11 UTC [0307:11 MYT] Singapore ATCC	And I have two for you.
		1907:12 UTC [0307:12 MYT] KL ATCC	Okay.
		1907:14 UTC [0307:14 MYT] Singapore ATCC	Malaysian Three Eight One.
		1907:16 UTC [0307:16 MYT] KL ATCC	Yea.
		1907:18 UTC [0307:18 MYT] Singapore ATCC	TAXUL two two zero seven flight level three five zero three one two seven.
		1907:23 UTC [0307:23 MYT] KL ATCC	Three one two seven three five zero TAXUL two two zero seven next.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1907:31 UTC [0307:31 MYT] Singapore ATCC	Asian Express One One Zero Nine.
		1907:34 UTC [0307:34 MYT] KL ATCC	Go ahead.
		1907:36 UTC [0307:36 MYT] Singapore ATCC	TAXUL two zero four zero flight level three five zero squawk three one three zero.
		1907:41 UTC [0307:41 MYT] KL ATCC	Three one three zero three five zero SABTO two zero four zero Zero One Niner thank you.
		1907:46 UTC [0307:46 MYT] Singapore ATCC	Thank you.
		1919:09 UTC [0319:09 MYT] KL ATCC	Lumpur.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1919:10 UTC [0319:10 MYT] Bangkok ATCC	Estimate Singapore Six Seven.
		1919:12 UTC [0319:12 MYT] KL ATCC	Singapore Six Seven go ahead.
		1919:15 UTC [0319:15 MYT] Bangkok ATCC	Kota Bahru two zero one eight flight level three five zero squawk one two one four and next revision Singapore Four Four Seven.
		1919:24 UTC [0319:24 MYT] KL ATCC	Go ahead.
		1919:25 UTC [0319:25 MYT] Bangkok ATCC	Time two zero one six.
		1919:29 UTC [0319:29 MYT] KL ATCC	One six and Singapore Six Seven estimate two zero one eight level three five zero squawk one two one four.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1919:36 UTC [0319:36 MYT] Bangkok ATCC	Negative two zero zero eight.
		1919:38 UTC [0319:38 MYT] KL ATCC	Two zero zero eight level three five zero one two one four.
		1926:36 UTC [0326:36 MYT] KL ATCC	Lumpur.
		1926:37 UTC [0326:37 MYT] Bangkok ATCC	Revision Singapore Six Seven.
		1926:39 UTC [0326:39 MYT] KL ATCC	Yes.
		1926:40 UTC [0326:40 MYT] Bangkok ATCC	Revise final three seven zero.
		1926:42 UTC [0326:42 MYT] KL ATCC	Three seven zero two zero zero eight.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1928:03 UTC [0328:03 MYT] Singapore ATCC	Lumpur Singapore.
		1928:04 UTC [0328:04 MYT] KL ATCC	Three transfer Papa Kilo for you first one Silk Air Five Zero Niner.
		1928:11 UTC [0328:11 MYT] Singapore ATCC	Say again Silk Air.
		1928:12 UTC [0328:12 MYT] KL ATCC	Five Zero Niner.
		1928:14 UTC [0328:14 MYT] Singapore ATCC	Standby.
		1928:18 UTC [0328:18 MYT] Singapore ATCC	Silk Air Five Zero Niner request the flight plan detail.
		1928:23 UTC [0328:23 MYT] KL ATCC	Eer Yangon to Singapore Airbus Three Twenty.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1928:29 UTC [0328:29 MYT] Singapore ATCC Eer from where to Singapore.	
		1928:31 UTC [0328:31 MYT] KL ATCC Aah Victor Yankee Yankee Yankee .	
		1928:36 UTC [0328:36 MYT] Singapore ATCC Standby.	
		1928:43 UTC [0328:43 MYT] Singapore ATCC I select (xxx) (xxx) [illegible] Victor Papa Kilo.	
		1928:45 UTC [0328:45 MYT] KL ATCC Victor Papa Kilo two zero zero five flight level three niner zero squawk seven four zero two.	
		1928:53 UTC [0328:53 MYT] Singapore ATCC Seven four zero two flight level three niner zero Victor Papa Kilo two zero zero five Silk Air Five Zero Nine is it.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1928:59 UTC [0328:59 MYT] KL ATCC	Okay next Singapore Four Four Seven.
		1929:02 UTC [0329:02 MYT] Singapore ATCC	Go ahead.
		1929:03 UTC [0329:03 MYT] KL ATCC	Victor Papa Kilo two zero three niner flight level three niner zero squawk four seven five one.
		1929:12 UTC [0329:12 MYT] Singapore ATCC	Four seven five one flight level three niner zero Victor Papa Kilo two zero three niner Singapore Four Four Seven.
		1929:18 UTC [0329:18 MYT] KL ATCC	Last one Singapore Six Seven.
		1929:20 UTC [0329:20 MYT] Singapore ATCC	Go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1929:21 UTC [0329:21 MYT] KL ATCC	Two zero two zero flight level three seven zero, squawk one two one four.
		1929:28 UTC [0329:28 MYT] Singapore ATCC	One two one four, flight level three seven zero, Victor Papa Kilo two zero three zero, Singapore Six Seven.
		1929:33 UTC [0329:33 MYT] KL ATCC	That's all for now thank you.
		1929:36 UTC [0329:36 MYT] Singapore ATCC	And Xanadu Three Seven Seven request descend can I descend to flight level three six zero.
		1929:40 UTC [0329:40 MYT] KL ATCC	Three six zero roger thank you.
1930:03 UTC [0330:03 MYT] HCM ATCC	Kuala Lumpur Ho Chi Minh.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1930:05 UTC [0330:05 MYT]			
KL ATCC	Ho Chi Minh okay aa... do you have any news on Malaysian Three Seven Zero.		
1930:10 UTC [0330:10 MYT]			
HCM ATCC	Aaa... not yet.		
1930:11 UTC [0330:11 MYT]			
KL ATCC	Okay can you check with the next FIR Hainan.		
1930:16 UTC [0330:16 MYT]			
HCM ATCC	Okay we are checking now with Sanya.		
1930:18 UTC [0330:18 MYT]			
KL ATCC	Okay I advise aa... I mean aa... according to the company aircraft should be around Hainan at this time.		
1930:28 UTC [0330:28 MYT]			
HCM ATCC	Yes.		
1930:28 UTC [0330:28 MYT]			
KL ATCC	Okay can you check whether.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1930:30 UTC [0330:30 MYT] HCM ATCC	What daa what daa the company they said aah.		
1930:32 UTC [0330:32 MYT] KL ATCC	Company said according to the flight plan daa... the what we call the departure time they don't have any information they don't have any information.		
1930:45 UTC [0330:45 MYT] HCM ATCC	That according to the flight plan route.		
1930:47 UTC [0330:47 MYT] KL ATCC	Flight plan route aircraft should be around Hainan at this moment.		
1930:51 UTC [0330:51 MYT] HCM ATCC	Yes but you still now they not yet in contact from the aircraft.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1930:55 UTC [0330:55 MYT]			
KL ATCC	Okay they don't have any information can you check with Hainan whether they have any radar contact with this aircraft or any other information radio or radar contact.		
1931:04 UTC [0331:04 MYT]			
HCM ATCC	Yes okay I will check.		
1931:07 UTC [0331:07 MYT]			
KL ATCC	Okay and then call us back can you inform Lumpur please.		
1931:11 UTC [0331:11 MYT]			
HCM ATCC	Yes sure if we have any information .		
1931:13 UTC [0331:13 MYT]			
KL ATCC	Okay.		
1931:13 UTC [0331:13 MYT]			
HCM ATCC	We call you back thank you.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
1931:14 UTC [0331:14 MYT]	KL ATCC Okay alright thank you	1934:37 UTC [0334:37 MYT]	KL ATCC Yeah.
		1934:38 UTC [0334:38 MYT]	Singapore ATCC Lumpur transfer China Eastern Five Zero Niner Four.
		1934:41 UTC [0334:41 MYT]	KL ATCC Five Zero Niner Four go ahead.
		1934:44 UTC [0334:44 MYT]	Singapore ATCC Victor Papa Kilo one niner four niner request flight level three four zero zero squawk two two one zero.
		1934:51 UTC [0334:51 MYT]	KL ATCC Two two one zero six zero one nine four nine two eight zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1935:03 UTC [0335:03 MYT] Singapore ATCC Helo.	
		1935:05 UTC [0335:05 MYT] Singapore ATCC Aa helo give again the level.	
		1935:07 UTC [0335:07 MYT] KL ATCC Two eight zero initially.	
		1935:08 UTC [0335:08 MYT] Singapore ATCC Two eight zero.	
		1936:49 UTC [0336:49 MYT] Bangkok ATCC Yes.	
		1936:50 UTC [0336:50 MYT] KL ATCC Transfer Kota Bahru China Eastern Five Zero Niner Four.	
		1936:54 UTC [0336:54 MYT] Bangkok ATCC Go ahead.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1936:56 UTC [0336:56 MYT] KL ATCC	Baba Victor Kilo Bravo two zero one three flight level three four zero squawk two two one zero.
		1937:02 UTC [0337:02 MYT] Bangkok ATCC	You are very weak say again please.
		1937:04 UTC [0337:04 MYT] KL ATCC	Helo okay aa... how do you read now.
		1937:06 UTC [0337:06 MYT] Bangkok ATCC	Now better.
		1937:08 UTC [0337:08 MYT] KL ATCC	Kota Bahru two zero one three flight level three four zero squawk two two one zero.
		1937:13 UTC [0337:13 MYT] Bangkok ATCC	Two two one zero two zero one three thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1937:16 UTC [0337:16 MYT] KL ATCC	Welcome.
		1944:00 UTC [0344:00 MYT] KL ATCC	Lumpur.
		1944:02 UTC [0344:02 MYT] Singapore ATCC	Lumpur revision Asian Express One Zero One Niner.
		1944:05 UTC [0344:05 MYT] KL ATCC	Yes.
		1944:06 UTC [0344:06 MYT] Singapore ATCC	Revise flight level three seven zero.
		1944:08 UTC [0344:08 MYT] KL ATCC	Three seven zero copied.
		1944:11 UTC [0344:11 MYT] Singapore ATCC	Thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1949:10 UTC [0349:10 MYT] KL ATCC	Lumpur Sector Five aah Sector Three.
		1949:13 UTC [0349:13 MYT] Singapore ATCC	Aa estimate for Thai Four Six Two.
		1949:16 UTC [0349:16 MYT] KL ATCC	Thai Four Six Two go ahead.
		1949:19 UTC [0349:19 MYT] Singapore ATCC	Estimate TIDAR two one one seven flight level three eight zero squawk one three two zero.
		1949:24 UTC [0349:24 MYT] KL ATCC	One seven three eight zero two one one seven TIDAR Thai Four Six Two.
		1949:30 UTC [0349:30 MYT] Singapore ATCC	Correct one three two zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1949:31 UTC [0349:31 MYT] KL ATCC	One three two zero copied.
		1949:34 UTC [0349:34 MYT] Singapore ATCC	Thank you.
		1952:06 UTC [0352:06 MYT] Bangkok ATCC	Yeah.
		1952:06 UTC [0352:06 MYT] KL ATCC	TIDAR estimate Thai Four Six Two.
		1952:11 UTC [0352:11 MYT] Bangkok ATCC	Four Six Two go ahead.
		1952:12 UTC [0352:12 MYT] KL ATCC	Two one one seven flight level three eight zero squawk one three two zero.
		1952:17 UTC [0352:17 MYT] Bangkok ATCC	One three two seven and then.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		1952:20 UTC [0352:20 MYT] KL ATCC	Aaa only one.
		1952:21 UTC [0352:21 MYT] Bangkok ATCC	Copied.
		1952:22 UTC [0352:22 MYT] KL ATCC	Okay thank you.
		2011:45 UTC [0411:45 MYT] KL ATCC	Lumpur.
		2011:46 UTC [0411:46 MYT] Bangkok ATCC	Estimate Singapore Three Two Five.
		2011:49 UTC [0411:49 MYT] KL ATCC	Three Two Five go.
		2011:51 UTC [0411:51 MYT] Bangkok ATCC	Kota Bahru two one one one flight level three niner squawk three zero zero six and then.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2012:00 UTC [0412:00 MYT] KL ATCC	Two Zero go ahead.
		2012:01 UTC [0412:01 MYT] Bangkok ATCC	Two zero two three flight level three seven zero squawk zero five one five and then Singapore Five One Seven.
		2012:08 UTC [0412:08 MYT] KL ATCC	Go.
		2012:09 UTC [0412:09 MYT] Bangkok ATCC	Two one three eight flight level three nine zero.
		2012:12 UTC [0412:12 MYT] KL ATCC	Standby standby Singapore.
		2012:13 UTC [0412:13 MYT] Bangkok ATCC	Singapore Two Five.
		2012:14 UTC [0412:14 MYT] KL ATCC	Singapore Two Five go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2012:17 UTC [0412:17 MYT] Bangkok ATCC	Helo.
		2012:18 UTC [0412:18 MYT] KL ATCC	Yea Singapore Two Five go ahead.
		2012:20 UTC [0412:20 MYT] Bangkok ATCC	Negative Singapore Two Five.
		2012:21 UTC [0412:21 MYT] KL ATCC	Then.
		2012:22 UTC [0412:22 MYT] Bangkok ATCC	Transfer.
		2012:25 UTC [0412:25 MYT] KL ATCC	The callsign.
		2012:27 UTC [0412:27 MYT] Bangkok ATCC	Singapore Five One Seven.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2012:28 UTC [0412:28 MYT] KL ATCC	Singapore.
		2012:30 UTC [0412:30 MYT] Bangkok ATCC	Five One Seven.
		2012:31 UTC [0412:31 MYT] KL ATCC	Five One Seven go ahead Kota Bharu.
		2012:34 UTC [0412:34 MYT] Bangkok ATCC	Two one three eight three five zero zero four two five.
		2012:38 UTC [0412:38 MYT] KL ATCC	Two one three eight three five zero squawk again.
		2012:42 UTC [0412:42 MYT] Bangkok ATCC	Zero four two five.
		2012:43 UTC [0412:43 MYT] KL ATCC	Zero four two five okay thank you.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2012:46 UTC [0412:46 MYT] Bangkok ATCC	Three nine zero.
		2012:49 UTC [0412:49 MYT] KL ATCC	Three nine zero okay roger.
		2016:11 UTC [0416:11 MYT]	<b>Direct ringing until 2016:59 UTC [0416:59 MYT]</b>
		2016:59 UTC [0416:59 MYT] KL ATCC	Halo.
		2017:01 UTC [0417:01 MYT] Singapor ATCC	(xxx) (xxx) [illegible] Malaysian Three Eight One aircraft request direct to PIBOS.
		2017:06 UTC [0417:06 MYT] KL ATCC	Direct PIBOS.
		2017:09 UTC [0417:09 MYT] Singapor ATCC	Sorry sir.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2017:10 UTC [0417:10 MYT] KL ATCC	Aproved.
		2017:12 UTC [0417:12 MYT] KL ATCC	Halo.
		2017:15 UTC [0417:15 MYT] Singapor ATCC	Halo.
		2017:16 UTC [0417:16 MYT] KL ATCC	Yes PIBOS approved.
		2017:18 UTC [0417:18 MYT] Singapor ATCC	Thank you.
		2017:19 UTC [0417:19 MYT] KL ATCC	Three transfer for you.
		2017:21 UTC [0417:21 MYT] Singapor ATCC	Okay go ahead please.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2017:23 UTC [0417:23 MYT] KL ATCC	Singapore Three Four Five Papa Kilo.
		2017:27 UTC [0417:27 MYT] Singapor ATCC	Three Four Five yes sir go ahead please.
		2017:29 UTC [0417:29 MYT] KL ATCC	Two one three three flight level three niner zero squawk three zero zero six.
		2017:37 UTC [0417:37 MYT] Singapor ATCC	Squawk three zero zero six two one three three Singapore Three Four Five.
		2017:45 UTC [0417:45 MYT] KL ATCC	Affirm next.
		2017:47 UTC [0417:47 MYT] Singapor ATCC	Go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2017:47 UTC [0417:47 MYT] KL ATCC	Jet Airway Two Zero.
		2017:50 UTC [0417:50 MYT] Singapor ATCC	Jet Airway wait a second aah...
		2017:59 UTC [0417:59 MYT] Singapor ATCC	Jet Airway Two Zero Victor Papa Kilo.
		2018:02 UTC [0418:02 MYT] KL ATCC	Two one four six flight level three seven zerosquawk zero five one five.
		2018:09 UTC [0418:09 MYT] Singapor ATCC	Two four five five.
		2018:11 UTC [0418:11 MYT] KL ATCC	Zero five one five.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2018:14 UTC [0418:14 MYT] Singapor ATCC	My error there sorry about that zero five one five flight level.
		2018:21 UTC [0418:21 MYT] KL ATCC	Three seven zero.
		2018:23 UTC [0418:23 MYT] Singapor ATCC	VPK two one four six flight level three even zero Jet Airway Two Zero thank you next.
		2018:29 UTC [0418:29 MYT] KL ATCC	Jet Airway squawk zero five one five.
		2018:33 UTC [0418:33 MYT] Singapor ATCC	Jet Airway one five thank you.
		2018:37 UTC [0418:37 MYT] KL ATCC	Negative negative Jet Airway Two Zero squawk zero five one five.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2018:44 UTC [0418:44 MYT] Singapor ATCC	Jet Airway.
		2018:50 UTC [0418:50 MYT] Singapor ATCC	Jet Airway Two Zero the transponder is zero five.
		2018:54 UTC [0418:54 MYT] KL ATCC	One five.
		2018:55 UTC [0418:55 MYT] Singapor ATCC	Zero five one five got it now and next.
		2018:59 UTC [0418:59 MYT] KL ATCC	Singapore Five One Seven.
		2019:05 UTC [0419:05 MYT] Singapor ATCC	Yes sir.
		2019:06 UTC [0419:06 MYT] KL ATCC	Two one five eight flight level three niner zero squawk zero four two five.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2019:14 UTC [0419:14 MYT] Singapor ATCC	Zero four two five flight level three nine zero VPK two one five eight Singapore Five One Seven.
		2019:23 UTC [0419:23 MYT] KL ATCC	Affirm thank you.
		2019:25 UTC [0419:25 MYT] Singapor ATCC	Okay thank you.
		2020:19 UTC [0420:19 MYT] KL ATCC	Yeah Lumpur.
		2020:20 UTC [0420:20 MYT] Singapor ATCC	Lumpur very sorry this aah Singapore Five One Seven what is the transponder again I lost from my system.
		2020:27 UTC [0420:27 MYT] KL ATCC	Eer Singapore Five One Seven Papa Kilo two one five eight.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2020:34 UTC [0420:34 MYT] Singapor ATCC	Sir transponder code.
		2020:35 UTC [0420:35 MYT] KL ATCC	Transponder zero four two five.
		2020:38 UTC [0420:38 MYT] Singapor ATCC	Okay sir thank you very much.
		2020:39 UTC [0420:39 MYT] KL ATCC	Alright.
		2036:14 UTC [0436:14 MYT] KL ATCC	Helo.
		2036:15 UTC [0436:15 MYT] Singapore ATCC	Lumpur transfer Xanadu Five Two Three.
		2036:20 UTC [0436:20 MYT] KL ATCC	Xanadu Five Two Three go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2036:24 UTC [0436:24 MYT] Singapore ATCC	Xanadu Five Two Three Victor Papa Kilo two two one seven flight level three nine zero squawk three six five one.
		2036:34 UTC [0436:34 MYT] KL ATCC	Three six five one okay ni next.
		2036:40 UTC [0436:40 MYT] KL ATCC	Only one aah.
		2036:40 UTC [0436:40 MYT] Singapore ATCC	Just wait a second aah.
		2036:46 UTC [0436:46 MYT] Singapore ATCC	Xanadu VPK two two one even.
		2036:49 UTC [0436:49 MYT] KL ATCC	Okay only one naa.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2036:51 UTC [0436:51 MYT] Singapore ATCC	Yes sir.
		2036:52 UTC [0436:52 MYT] KL ATCC	Okay transfer Papa Kilo Gading Sari Five Thre Zero Four.
		2036:57 UTC [0436:57 MYT] Singapore ATCC	Gading Sari Five Thre Zero Four go ahead sir.
		2037:02 UTC [0437:02 MYT] KL ATCC	Two zero five four request three three zero squawk two one three five.
		2037:09 UTC [0437:09 MYT] Singapore ATCC	Two one three five request flight level three three zero confirm.
		2037:12 UTC [0437:12 MYT] KL ATCC	Affirm.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2037:14 UTC [0437:14 MYT]	Singapore ATCC Okay climb to flight level two niner zero for Gading Sari Three Zero Four.
		2037:20 UTC [0437:20 MYT]	KL ATCC Okay thank you.
		2037:21 UTC [0437:21 MYT]	Singapore ATCC Thank you.
		2045:14 UTC [0445:14 MYT]	KL ATCC Lumpur.
		2045:15 UTC [0445:15 MYT]	Bangkok ATCC I got revision Singapore Five One Seven.
		2045:17 UTC [0445:17 MYT]	KL ATCC Aah go ahead.
		2045:19 UTC [0445:19 MYT]	Bangkok ATCC Two one three two.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2045:21 UTC [0445:21 MYT] KL ATCC	Two one three two.
		2045:23 UTC [0445:23 MYT] Bangkok ATCC	Thank you Bangkok.
		2045:37 UTC [0445:37 MYT] Singapore ATCC	Singapore.
		2045:38 UTC [0445:38 MYT] KL ATCC	Okay revision Singapore Five One Seven.
		2045:43 UTC [0445:43 MYT] Singapore ATCC	Helo.
		2045:44 UTC [0445:44 MYT] KL ATCC	Halo how do you read?
		2045:46 UTC [0445:46 MYT] Singapore ATCC	Very weak.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2045:47 UTC [0445:47 MYT] KL ATCC	Okay Singapore Five One Seven revise time two one five two..
		2045:52 UTC [0445:52 MYT] Singapore ATCC	Two one five two and we are having some problem with zero four two five for his transponer.
		2045:58 UTC [0445:58 MYT] KL ATCC	Yes.
		2045:59 UTC [0445:59 MYT] Singapore ATCC	Reset zero four two six.
		2046:02 UTC [0446:02 MYT] KL ATCC	Zero four two six okay calling you at zero four two six aah.
		2046:08 UTC [0446:08 MYT] Singapore ATCC	Yes sir.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2046:09 UTC [0446:09 MYT] KL ATCC	Alright thank you.
		2046:10 UTC [0446:10 MYT] Singapore ATCC	Okay thank you.
		2103:09 UTC [0503:09 MYT] Singapore ATCC	Singapore.
		2103:10 UTC [0503:10 MYT] KL ATCC	Transfer Papa Kilo Gading Sari.
		2103:17 UTC [0503:17 MYT] KL ATCC	No sound la over here.
		2103:20 UTC [0503:20 MYT] Singapore ATCC	Gading Sari Three Zero Six go ahead.
		2103:22 UTC [0503:22 MYT] KL ATCC	Two one one eight flight level three three zero squawk two.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2103:29 UTC [0503:29 MYT]	Singapore ATCC Two one two two two one five eight requesting flight level three three zero for Gading Five Zero Six.
		2103:36 UTC [0503:36 MYT]	KL ATCC Affirm.
		2103:38 UTC [0503:38 MYT]	Singapore ATCC Climb to flight level two nine zero first.
		2103:43 UTC [0503:43 MYT]	KL ATCC Okay two niner zero any transfer.
		2103:45 UTC [0503:45 MYT]	Singapore ATCC Revision for you.
		2103:46 UTC [0503:46 MYT]	KL ATCC Okay go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2103:47 UTC [0503:47 MYT] Singapore ATCC (xxx) (xxx) [illegible] one is revision of China Five Two Three.	
		2103:52 UTC [0503:52 MYT] KL ATCC Five Two Three yes.	
		2103:54 UTC [0503:54 MYT] Singapore ATCC It should be PADLI two two one seven.	
		2103:58 UTC [0503:58 MYT] KL ATCC PADLI okay roger.	
		2104:00 UTC [0504:00 MYT] Singapore ATCC And then the Thai Peace Niner Two zero.	
		2104:04 UTC [0504:04 MYT] KL ATCC Nine Two Zero Thai Peace three letter word.	
		2104:08 UTC [0504:08 MYT] Singapore ATCC And the Bravo Charlie Charlie Niner Two Zero.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		210411 UTC [0504:11 MYT] KL ATCC	Aah okay clear.
		2104:14 UTC [0504:14 MYT] KL ATCC	Victor Papa Kilo confirm.
		2104:17 UTC [0504:17 MYT] Singapore ATCC	Two one yes sir.
		2104:19 UTC [0504:19 MYT] KL ATCC	Go ahead.
		2104:20 UTC [0504:20 MYT] Singapore ATCC	Victor Papa Kilo two one five two flight level two eight zero squawk two three four two.
		2104:27 UTC [0504:27 MYT] KL ATCC	Two three four two roger and the you are calling from Singapore three P right.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2104:33 UTC [0504:33 MYT] Singapore ATCC Aah no is a overflight.	
		2104:36 UTC [0504:36 MYT] KL ATCC Oo no I mean your you're your.	
		2104:38 UTC [0504:38 MYT] Singapore ATCC The flight from Jakarta to Bangkok.	
		2104:41 UTC [0504:41 MYT] KL ATCC I mean your number that mean that Singapore Sector Eight or Singapore Three P.	
		2104:47 UTC [0504:47 MYT] Singapore ATCC Aah I am Singapore Sector Three.	
		2104:49 UTC [0504:49 MYT] KL ATCC Sector Three aah okay because I got no (xxx) [illegible]	
		2104:52 UTC [0504:52 MYT] Singapore ATCC (xxx) (xxx) [illegible]	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2104:53 UTC [0504:53 MYT] KL ATCC	Alright.
		2106:32 UTC [0506:32 MYT] Bangkok ATCC	Go ahead.
		2106:33 UTC [0506:33 MYT] KL ATCC	Kota Bharu Thai Peace Niner Two Zero.
		2106:37 UTC [0506:37 MYT] Bangkok ATCC	Thai Peace Nine Two Zero standby.
		2106:46 UTC [0506:46 MYT] Bangkok ATCC	Go ahead.
		2106:47 UTC [0506:47 MYT] KL ATCC	Kota Bharu two two one four flight level three eight zero squawk ... helo.
		2107:29 UTC [0507:29 MYT] Bangkok ATCC	Helo.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2107:30 UTC [0507:30 MYT] KL ATCC	Okay Thai Peace Niner Two Zero.
		2107:33 UTC [0507:33 MYT] Bangkok ATCC	Yes Kota Bahru two two one four two eight zero what is transponder.
		2107:38 UTC [0507:38 MYT] KL ATCC	Two three four two.
		2107:39 UTC [0507:39 MYT] Bangkok ATCC	Okay.
		2107:40 UTC [0507:40 MYT] KL ATCC	Okay.
2109:13 UTC [0509:13 MYT] KL ATCC	Lumpur.		
2109:14 UTC [0509:14 MYT] Singapore ATCC	Lumpur aa I am calling on behalf of Hong Kong ACC.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2109:19 UTC [0509:19 MYT]			
KL ATCC	Okay.		
2109:20 UTC [0509:20 MYT]			
Singapore ATCC	They are requesting for aircraft Malaysian Three Seven Zero.		
2109:23 UTC [0509:23 MYT]			
KL ATCC	Okay.		
2109:23 UTC [0509:23 MYT]			
Singapore ATCC	Confirm you were in contact with the aircraft previously.		
2109:26 UTC [0509:26 MYT]			
KL ATCC	Okay from our departure.		
2109:30 UTC [0509:30 MYT]			
Singapore ATCC	Affirm.		
2109:31 UTC [0509:31 MYT]			
KL ATCC	Aah... in contact until we transferred at IGARI.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2109:35 UTC [0509:35 MYT]	Singapore ATCC Hmm hmm.		
2109:36 UTC [0509:36 MYT]	KL ATCC After that no contact we got the infor from IGARI aah they not in contact with the aircraft at... time er... after we transferred it the IGARI time was one seven two two.		
2110:01 UTC [0510:01 MYT]	Singapore ATCC Okay.		
2110:01 UTC [0510:01 MYT]	KL ATCC And and the Ho Chi Minh told us at around one negative contact with (xxx) (xxx) [illegible] one eight one zero.		
2110:16 UTC [0510:16 MYT]	Singapore ATCC At one eight one zero Ho Chi Minh called you to say negative contact.		
2110:19 UTC [0510:19 MYT]	KL ATCC Yes and we've been trying to check with Ho Chi Minh.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2110:24 UTC [0510:24 MYT]	Singapore ATCC Aah aah.		
2110:25 UTC [0510:25 MYT]	KL ATCC Of the aircraft because we check with eer the MAS operations they said they are not able to... aa... no comm with them.		
2110:41 UTC [0510:41 MYT]	KL ATCC They.		
2110:41 UTC [0510:41 MYT]	Singapore ATCC Confirm the Malaysian Airlines on the ground also no contact with Malaysian Three Seven Zero.		
2110:45 UTC [0510:45 MYT]	KL ATCC Yes.		
2110:47 UTC [0510:47 MYT]	Singapore ATCC Yes aah.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2110:48 UTC [0510:48 MYT] KL ATCC	Yes.		
2110:49 UTC [0510:49 MYT] Singapore ATCC	Aah and the aircraft is no longer on your frequency one three four two five.		
2110:53 UTC [0510:53 MYT] KL ATCC	Affirm at time one seven two two we transferred the aircraft to Ho Chi Minh.		
2111:00 UTC [0511:00 MYT] Singapore ATCC	Aha at one seven two two was the aircraft still on radar.		
2111:04 UTC [0511:04 MYT] KL ATCC	Affirm		
2111:07 UTC [0511:07 MYT] Singapore ATCC	Okay.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2111:08 UTC [0511:08 MYT]			
KL ATCC	So... aah or from aa... Hong Kong or... any update from Hong Kong.		
2111:13 UTC [0511:13 MYT]			
Singapore ATCC	No Hong Kong is requesting er any update on this aircraft.		
2111:17 UTC [0511:17 MYT]			
KL ATCC	Okay eer... if they are calling you again aa... can you update us.		
2111:26 UTC [0511:26 MYT]			
Singapore ATCC	Okay copied.		
2111:27 UTC [0511:27 MYT]			
KL ATCC	Okay thank you.		
		2129:55 UTC [0529:55 MYT]	
		KL ATCC	Singapore.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2129:58 UTC [0529:58 MYT] Singapore ATCC Lumpur.	
		2129:59 UTC [0529:59 MYT] KL ATCC Yeah halo.	
		2130:00 UTC [0530:00 MYT] Singapore ATCC Transfer for you Xanadu Six One correction Three Three One.	
		2130:06 UTC [0530:06 MYT] KL ATCC Three Three One go ahead.	
		2130:08 UTC [0530:08 MYT] Singapore ATCC Xanadu Three Three One TAXUL two two four four flight level three six zero squawk six three six six.	
		2130:18 UTC [0530:18 MYT] KL ATCC Okay only one aaa.	
		2130:20 UTC [0530:20 MYT] Singapore ATCC Yeah only one lah.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2134:47 UTC [0534:47 MYT]	Planner telephone ringing answered by AAT at 2134:47 UTC [0534:56 MYT] <b><i>This conversation was conducted in National Language that is Malay Language</i></b>	2130:21 UTC [0530:21 MYT] KL ATCC	Alright thank you.
2134:56 UTC [0534:56 MYT]		2130:23 UTC [0530:23 MYT] Singapore ATCC	Thank you.
AAT	Halo		
2134:57 UTC [0534:57 MYT]			
Sec 3+5 Planner	Yang tadi Malaysian Three Seven Zero tu eer... kau boleh follow dia punya radio for transmission dari departure terus sampai sampai kita... transferred boleh tak.		
2135:11 UTC [0535:11 MYT]			
AAT	Eh aah tak apa nanti kita tengok tengok kalau boleh bagi tahu la masa kita last contact.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2135:19 UTC [0535:19 MYT]	Sec 3+5 Planner Okay thank you.		
2144:59 UTC [0544:59 MYT]	AAT Helo		
2145:00 UTC [0545:00 MYT]	Sec 3+5 Planner Ya ni saya cakap sikit bagi pihak (xxx) [illegible] Malaysian Three Seven Zero tadikan boleh tengok eerdia punya radar daripada dia departure depart dah pukul berapa pukul satu tujuh dari (xxx) (xxx) [illegible] ini abang nak kalau.		
2145:10 UTC [0545:10 MYT]	AAT Recording radar.		
2145:19 UTC [0545:19 MYT]	Sec 3+5 Planner Pukul satu kut.		
2145:20 UTC [0545:20 MYT]	Sec 3+5 Planner Dia nak tengok kut.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2145:21 UTC [0545:21 MYT]	AAT      Tak ini abang nak kalau.		
2145:35 UTC [0545:35 MYT]	Sec 3+5 Planner    Aah.		
2145:47 UTC [0545:47 MYT]	AAT      Kalau (xxx) (xxx) [illegible] bagi tengok.		
2145:51 UTC [0545:51 MYT]	Sec 3+5 Planner    Supervisor (xxx)[illegible] tengok ta'boleh.		
2145:54 UTC [0545:54 MYT]	AAT      Ta'dak eer.		
2145:56 UTC [0545:56 MYT]	AAT      Ia duk lupa shaja.		
2145:58 UTC [0545:58 MYT]	Sec 3+5 Planner    Orang dulu daripada pukul empat empat puluh lima.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2146:08 UTC [0546:08 MYT]	Sec 3+5 Planner Pukul dua belas lebih kurang pukul.		
2146:12 UTC [0546:12 MYT]	Sec 3+5 Planner ATC pukul pukul kejak ia.		
2146:19 UTC [0546:19 MYT]	Sec 3+5 Planner One six three zero dia lah kut.		
2146:21 UTC [0546:21 MYT]	AAT Duabelas local time ia.		
2146:23 UTC [0546:23 MYT]	Sec 3+5 Planner Local time hm local time.		
2146:24 UTC [0546:24 MYT]	Sec 3+5 Planner Duabelas tujuhbelas local time sampai lebih kurang dua jam macam itu shaja la.		

***END OF TELEPHONE CONVERSATION  
BETWEEN SECTOR 3+5 PLANNER AND AAT***

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2148:55 UTC [0548:55 MYT] HCM ATCC	Ho Chi Minh.
		2148:56 UTC [0548:56 MYT] KL ATCC	Okay Ho Chi Minh transfer Asia Express One Zero One Two.
		2149:01 UTC [0549:01 MYT] HCM ATCC	Asia Express One Zero One Two go.
		2149:04 UTC [0549:04 MYT] KL ATCC	IGARI Two Two Two Six request three Five Zero squawk two one five zero.
		2149:13 UTC [0549:13 MYT] HCM ATCC	Asian Express One Zero One Two time IGARI two two two six flight level three five zero approved squawk two one five zero over.
		2149:23 UTC [0549:23 MYT] KL ATCC	Okay thank you transfer three five zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2149:23 UTC [0549:23 MYT] HCM ATCC	(xxx) (xxx) [illegible]
		2159:50 UTC [0559:59 MYT] KL ATCC	<i>Sound of punching telephone number</i>
		2200:05 UTC [0600:05 MYT] Service Provider	<i>Nombor ya</i> <i>Telephone engaged tone from time</i> 2200:05 UTC [0600:05MYT] - 2200:17 UTC [0600:17 MYT]
		2200:21 UTC [0600:21 MYT] Singapore ATCC	Lumpur confirm calling.
		2200:26 UTC [0600:26 MYT] KL ATCC	Nothing disregard.
		2200:28 UTC [0600:28 MYT] Singapore ATCC	Okay disregard.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2200:30 UTC [0600:30 MYT] KL ATCC	<i>Telephone open line</i>
		2200:34 UTC [0600:34 MYT] KL ATCC	<i>Sound of punching telephone number</i>
		2200:36 UTC [0600:36 MYT] Service Provider	<i>"Nombor yang anda dial tiada dalam perkhidmatan" The number you dialled is not in service</i>
		2200:46 UTC [0600:46 MYT] KL ATCC	<i>Telephone open line</i>
		2201:19 UTC [0601:19 MYT] KL ATCC	<i>Sound "too too too" until time 2201:23 UTC [0601:23 MYT]</i>
		2201:27 UTC [0601:27 MYT] KL ATCC	<i>Telephone open line</i>
		2201:29 UTC [0601:29 MYT] KL ATCC	<i>Sound of punching telephone number.</i>

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2201:36 UTC [0601:36 MYT] KL ATCC	<i>Telephone engaged tone until 2201:40 UTC [0601:40 MYT]</i>
		2201:40 UTC [0601:40 MYT] KL ATCC	<i>Telephone open line.</i>
		2201:45 UTC [0601:45 MYT] Service Provider	<i>Nombor yang anda dial tiada dalam perkhidmatan.</i>
		2201:55 UTC [0601:55 MYT] KL ATCC	<i>Telephone open line and sound of punching telephone number until time 2202:06 UTC [0602:06 MYT].</i>
		2202:34 UTC [0602:34 MYT] KL ATCC	<i>Telephone open line.</i>
		2203:00 UTC [0603:00 MYT] KL ATCC	<i>Sound of punching telephone number.</i>
		2203:19 UTC [0603:19 MYT] KL ATCC	<i>Sound of telephone ringing (voice) [illegible]</i>

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2203:48 UTC [0603:48 MYT] KL ATCC	<i>Sound of music after the voice then sound of telephone ringing until 2204:11 UTC [0604:11 MYT] cut-off tone until 2204:24 UTC [0604:24 MYT].</i>
		2204:29 UTC [0604:29 MYT] KL ATCC	<i>Sound of punching telephone number.</i>
		2204:42 UTC [0604:42 MYT] KL ATCC	<i>Telephone engaged tone until 2204:47 UTC [0604:47 MYT] voice [illegible] 2205:10 UTC [0605:10 MYT] telephone line cut off Redial at 2205:11 UTC [0605:11 MYT] At 2205:17 UTC [0605:17 MYT] music followed by phone ringing at 2205:26 UTC [0605:26 MYT] and phone cut off at 2205:46 UTC [0605:46 MYT].</i>
		2205:48 UTC [0605:48 MYT] KL ATCC	Singapore.
		2205:49 UTC [0605:49 MYT] Singapore ATCC	Aah Lumpur one estimate Fedex Five Three Four Three.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2205:53 UTC [0605:53 MYT] KL ATCC	Five Three Seven Three.
		2205:56 UTC [0605:56 MYT] Singapore ATCC	Five Three Four Three.
		2205:58 UTC [0605:58 MYT] KL ATCC	Five Three Four Three go ahead.
		2206:00 UTC [0606:00 MYT] Singapore ATCC	TAXUL two three one eight flight level two eight zero squawk three one two three.
		2206:05 UTC [0606:05 MYT] KL ATCC	Three one two three two eight zero TAXUL two three one eight.
		2206:11 UTC [0606:11 MYT] Singapore ATCC	Affirm and naa sir reference to Xanadu Five Two Three request descend.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2206:18 UTC [0606:18 MYT] KL ATCC	Xanadu Five Two Three level three four zero.
		2206:22 UTC [0606:22 MYT] Singapore ATCC	Three four zero copied thank you Siera Bravo.
		2210:13 UTC [0610:13 MYT] KL ATCC	<i>Sound of punching telephone number [foreign language]</i> <i>then "Sorry the call that you (xxx) [illegible] mobile phone</i> <i>(xxx) [illegible].</i>
		2218:47 UTC [0618:47 MYT] Bangkok ATCC	Lumpur please release Thai Peace Nine Two Zero to Bangkok now.
		2218:53 UTC [0618:53 MYT] KL ATCC	Thai Peace Nine Two Zero (xxx) (xxx) [illegible]
		2218:57 UTC [0618:57 MYT] Bangkok ATCC	Yeah yeah not contact yet.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2220:34 UTC [0620:34 MYT] Singapore ATCC	Singapore. Singapore.
		2220:35 UTC [0620:35 MYT] KL ATCC	Singapore estimate Victor Papa Kilo Asian Express Five Eight Seven Six.
		2220:40 UTC [0620:40 MYT] Singapore ATCC	Go ahead.
		2220:41 UTC [0620:41 MYT] KL ATCC	Aah estimate Asian Express Five Eight Seven Six estimate Victor Papa Kilo two two three three requesting flight level three seven zero squawk two one zero one.
		2220:53 UTC [0620:53 MYT] Singapore ATCC	Asian Express Five Eight Seven Six Victor Papa Kilo two two three three requesting flight level three seven zero squawk two one zero one climb to flight level two niner zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2221:03 UTC [0621:03 MYT] KL ATCC	Two niner zero thank you.
		2221:05 UTC [0621:05 MYT] Singapore ATCC	(xxx) [illegible] thank you Sierra Brabo.
		2223:36 UTC [0623:36 MYT] Singapore ATCC	Lumpur.
		2223:37 UTC [0623:37 MYT] KL ATCC	Yeah go ahead.
		2223:38 UTC [0623:38 MYT] Singapore ATCC	Estimate Malaysian Two Six Three Seven.
		2223:42 UTC [0623:42 MYT] KL ATCC	Malaysian Two Six go ahead.
		2223:44 UTC [0623:44 MYT] Singapore ATCC	Three Seven PADLI two three five niner flight level three eight zero squawk zero four four two.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2223:55 UTC [0623:55 MYT] KL ATCC	Say again squawk.
		2223:57 UTC [0623:57 MYT] Singapore ATCC	Zero four four two.
		2224:00 UTC [0624:00 MYT] KL ATCC	Okay Malaysian Two Six Five Eight three three five one flight level three eight zero squawk zero four four two.
		2224:07 UTC [0624:07 MYT] Singapore ATCC	Aah... negative PADLI two three five niner.
		2224:13 UTC [0624:13 MYT] KL ATCC	Five niner okay Malaysian Two Six Five Eight PADLI two three five niner flight level three eight zero squawk zero four four two.
		2224:19 UTC [0624:19 MYT] Singapore ATCC	Affirm and naa callsign is Maaysian Two Six Three Seven.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2224:25 UTC [0624:25 MYT] KL ATCC	Three Seven.
		2224:27 UTC [0624:27 MYT] Singapore ATCC	Affirm.
		2224:28 UTC [0624:28 MYT] KL ATCC	Eer Malaysian Two Six Three Seven PADLI five niner, flight level three eight zero, squawk zero four four two.
		2224:36 UTC [0624:36 MYT] KL ATCC	Affirm thank you sir Sierra Bravo.
		2232:03 UTC [0632:03 MYT] Unknown	Good morning mdm.
		2232:05 UTC [0632:05 MYT] KL ATCC	Morning.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2232:06 UTC [0632:06 MYT] Unknown	(xxx) [illegible] cerntral reauest airspace release eight thousand and below.
		2232:14 UTC [0632:14 MYT] KL ATCC	(xxx) (xxx) [illegible]
		2232:17 UTC [0632:17 MYT] Unknown	Again airspace release eight thousand feet and below.
		2232:26 UTC [0632:26 MYT] KL ATCC	Eight thousand.
		2232:28 UTC [0632:28 MYT] Unknown	Eight thousand feet and below.
		2232:31 UTC [0632:31 MYT] KL ATCC	Ah (xxx) [illegible]

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2232:32 UTC [0632:32 MYT] Unknown	Okay aah.
		2232:44 UTC [0632:44 MYT] Unknown	Approve mdm.
		2232:46 UTC [0632:46 MYT] KL ATCC	Yeah approve.
		2232:47 UTC [0632:47 MYT] Unknown	Thank you.
2233:23 UTC [0633:23 MYT] KL ATCC	Lumpur Sector Three.		
2233:24 UTC [0633:24 MYT]	Singapore ATCC	Okay Lumpur is that just to check with you aaa, earlier on ah you guys call up regarding MalaysiaThree Seven Zero no contact.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2233:32 UTC [0633:32 MYT] KL ATCC	Yes.		
2233:34 UTC [0633:34 MYT] Singapore ATCC	Confirm now the aircraft in contact with anybody already.		
2233:37 UTC [0633:37 MYT] KL ATCC	Aaa... I am not sure aaa... standby aaa...		
2233:40 UTC [0633:40 MYT] Singapore ATCC	Okay.		
2233:43 UTC [0633:43 MYT] KL ATCC	Lumpur IGARI.		
2233:45 UTC [0633:45 MYT] Singapore ATCC	Okay Lumpur just to check with you earlier on regarding Malaysian Three Seven Zero when you guys say no contact aah confirm in contact with anyone already.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2233:54 UTC [0633:54 MYT]			
KL ATCC	This one aircraft actually passed IGARI at time one seven two two.		
2234:00 UTC [0634:00 MYT]			
Singapore ATCC	Passed IGARI at time one seven two two ya.		
2234:04 UTC [0634:04 MYT]			
KL ATCC	Yea so we after IGARI after IGARI we transferred this aircraft to Ho Chi Minh and then after about fourteen or fifteen minutes like that Ho Chi Minh called us you know Sector Five Lumpur Sector Five asking aaa... whether we in contact with this aircraft I told the we already transferred you fourteen or fifteen minutes ago.		
2234:26 UTC [0634:26 MYT]			
Singapore ATCC	Oh... but all the while until the full control you guys are in contact with the aircraft.		
2234:30 UTC [0634:30 MYT]			
KL ATCC	No problem yeah.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2234:32 UTC [0634:32 MYT] Singapore ATCC	Ooh.		
2234:33 UTC [0634:33 MYT] KL ATCC	We transferred the aircraft at IGARI and then we thought the aircraft in contact with Ho Chi Minh but after fourteen to fifteen minutes they called us this aircraft never contact them and then they said they have a radar contact with this aircraft up until this BITOD position after BITOD only they said aircraft disappeared from their radar with no ADC everything cannot see the aircraft cannot contact the aircraft.		
2234:57 UTC [0634:57 MYT] Singapore ATCC	Okay.		
2234:58 UTC [0634:58 MYT] KL ATCC	And then aah that's all what we know laa.		
2235:00 UTC [0635:00 MYT] Singapore ATCC	Okay that's all what you know laa okay thanks.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2235:03 UTC [0635:03 MYT] KL ATCC	Okay.	2235:11 UTC [0635:11 MYT] KL ATCC	Sector Three good morning.
		2235:13 UTC [0635:13 MYT] Unknown	(xxx) (xxx) [illegible]
		2235:22 UTC [0635:22 MYT] KL ATCC	One two six three.
		2235:36 UTC [0635:36 MYT] KL ATCC	Copied.
2236:28 UTC [0636:28 MYT] KL ATCC	Yea go ahead ... Ho Chi Minh.		
2236:30 UTC [0636:30 MYT] HCM ATCC	Yes saahelo this is xx xx xx [name redacted] Supervisor in Ho Chi Minh may I talk to your supervisor please.		
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DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2236:36 UTC [0636:36 MYT]	KL ATCC You want to talk to my supervisor aah hold on aah okay ah Can you wait a minute I call you back shortly.	2237:30 UTC [0637:30 MYT]	Singapore ATCC Singapore.
		2237:33 UTC [0637:33 MYT]	KL ATCC (xxx) [illegible]
		2237:34 UTC [0637:34 MYT]	Singapore ATCC Singapore line check how do you read me.
		2237:36 UTC [0637:36 MYT]	KL ATCC Read you strength five how do you read me.
		2237:38 UTC [0637:38 MYT]	Singapore ATCC Read you strength two.
		2237:40 UTC [0637:40 MYT]	KL ATCC Okay Singapore aa... one estimate.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2237:43 UTC [0637:43 MYT] Singapore ATCC	Go ahead.
		2237:44 UTC [0637:44 MYT] KL ATCC	Estimate Transmile Three One Five.
		2237:49 UTC [0637:49 MYT] Singapore ATCC	Go ahead.
		2237:50 UTC [0637:50 MYT] KL ATCC	Okay Victor Papa Kilo two two five four request flight level three three zero squawk two one one five.
		2237:58 UTC [0637:58 MYT] Singapore ATCC	Transmile Three One Five okay Victor Papa Kilo two two five four request flight level three three zero squawk two one one five climb to flight level two niner zero.
		2238:10 UTC [0638:10 MYT] KL ATCC	Yes.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2238:12 UTC [0638:12 MYT] Singapore ATCC	Two estimates and one traffic information.
		2238:14 UTC [0638:14 MYT] KL ATCC	Okay go with estimate.
		2238:17 UTC [0638:17 MYT] Singapore ATCC	Estimate Malaysian Two Five Five One.
		2238:20 UTC [0638:20 MYT] KL ATCC	Two Five Five One go.
		2238:24 UTC [0638:24 MYT] Singapore ATCC	PADLI two three five six flight level three four zero squawk zero four six three.
		2238:33 UTC [0638:33 MYT] KL ATCC	Aah
		2238:37 UTC [0638:37 MYT] Singapore ATCC	Two three five six.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2238:39 UTC [0638:39 MYT] KL ATCC	Two three five six okay Malaysian Two Five Five One PADLI two three five six flight level three four zero squawk zero four six three.
		2238:48 UTC [0638:48 MYT] Singapore ATCC	Read back correct and next Xanadu Three One Seven.
		2238:51 UTC [0638:51 MYT] KL ATCC	Xanadu Three One Seven go ahead.
		2238:54 UTC [0638:54 MYT] Singapore ATCC	Taxul zero zero zero eight flight level four zero zero squawk zero zero one five.
		2239:02 UTC [0639:02 MYT] KL ATCC	Zero zero one five okay Xanadu Three One Seven Taxul zero zero zero eight flight level four zero zero squawk zero zero one five.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2239:12 UTC [0639:12 MYT] Singapore ATCC	Read back correct one traffic information Pelita Five Five Zero.
		2239:20 UTC [0639:20 MYT] KL ATCC	Okay aaa Pelita..... Five One Five.
		2239:27 UTC [0639:27 MYT] Singapore ATCC	Five Five Zero.
		2239:28 UTC [0639:28 MYT] KL ATCC	Okay Five Five Zero go ahead.
		2239:33 UTC [0639:33 MYT] Singapore ATCC	Take-off from Halim to Matak estimating abeam Tioman two three four niner flight level one niner zero squawk two five six six.
		2239:45 UTC [0639:45 MYT] KL ATCC	Pelita five five Zero Halim to Matak abeam Tioman two three four niner flight level one niner zero squawk two five six six.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2239:57 UTC [0639:57 MYT] Singapore ATCC Affirm.	
		2239:58 UTC [0639:58 MYT] Singapore ATCC And Lumpur.	
		2239:59 UTC [0639:59 MYT] KL ATCC Yeah go ahead.	
		2240:00 UTC [0640:00 MYT] Singapore ATCC Xanadu Two Three One request direct.	
		2240:02 UTC [0640:02 MYT] KL ATCC Say again.	
		2240:04 UTC [0640:04 MYT] Singapore ATCC Xanadu Two Three One anywhere direct.	
		2240:06 UTC [0640:06 MYT] KL ATCC The the Three Three One standby.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2240:10 UTC [0640:10 MYT] Singapore ATCC Lumpur you are mumbling say again.	
		2240:13 UTC [0640:13 MYT] KL ATCC Xanadu Three Three One.	
		2240:14 UTC [0640:14 MYT] Singapore ATCC Helo.	
		2240:17 UTC [0640:17 MYT] Singapore ATCC What man.	
		2240:20 UTC [0640:20 MYT] Source Unknown Lumpur.	
		2240:32 UTC [0640:32 MYT] Source Unknown Helo.	
		2240:44 UTC [0640:44 MYT] KL ATCC Sector Three.	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2240:58 UTC [0640:58 MYT]	<i>Tone of direct telephone line ringing and answer by KL ATCC at time 2241:09 UTC [0641:09 MYT].</i>
		2241:09 UTC [0641:09 MYT] KL ATCC	Singapore.
		2241:13 UTC [0641:13 MYT] Singapore ATCC	Singapore.
		2241:14 UTC [0641:14 MYT] KL ATCC	Singapore just now Xanadu Three Three One direct PIBOS okay.
		2241:19 UTC [0641:19 MYT] Singapore ATCC	Is okay (xxx) (xxx) [illegible] thank you.
		2241:39 UTC [0641:39 MYT] HCM ATCC	Helo.
		2241:40 UTC [0641:40 MYT] KL ATCC	Ho Chi Minh.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2241:41 UTC [0641:41 MYT] HCM ATCC	Yeah.
		2241:43 UTC [0641:43 MYT] KL ATCC	One estimate.
		2241:46 UTC [0641:46 MYT] HCM ATCC	Go ahead.
		2241:47 UTC [0641:47 MYT] KL ATCC	Asian Express One Six Five Six IGARI two three one five request flight level three seven zero squawk two one five one.
		2241:58 UTC [0641:58 MYT] HCM ATCC	Two one five one three seven zero two three one five Asian Express One Six Five Six.
		2242:04 UTC [0642:04 MYT] KL ATCC	Asian Express One Six Five Six.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2242:08 UTC [0642:08 MYT] HCM ATCC	Any transfer.
		2242:10 UTC [0642:10 MYT] KL ATCC	Any transfer no aaaflight level three seven zero sir.
		2242:15 UTC [0642:15 MYT] HCM ATCC	Three seven zero okay approved.
		2242:18 UTC [0642:18 MYT] KL ATCC	Three seven zero approved.
		2242:19 UTC [0642:19 MYT] HCM ATCC	Yeah.
		2242:50 UTC [0642:50 MYT] KL ATCC	Centre.
		2242:51 UTC [0642:51 MYT] Unknown source (xxx) (xxx) ATC[illegible]	

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2242:52 UTC [0642:52 MYT] KL ATCC	ATC Malaysian One Two Six Three cleared to Lumpur via (xxx) [illegible] flight level one six zero squawk zero three one six.
		2243:07 UTC [0643:07 MYT] Unknown source	(xxx) [illegible] Clear to Lumpur one six zero zero three one six.
		2244:18 UTC [0644:18 MYT] KL ATCC	Calling tone of direct telephone line.
		2244:40 UTC [0644:40 MYT] KL ATCC	Calling tone of direct telephone line stopped.
		2244:58 UTC [0644:58 MYT] KL ATCC	Calling tone of direct telephone line.
		2245:32 UTC [0645:32 MYT] HCM ATCC	Helo.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2245:34 UTC [0645:34 MYT] KL ATCC	Okay Ho Chi Minh.
		2245:35 UTC [0645:35 MYT] HCM ATCC	Yes sir.
		2245:37 UTC [0645:37 MYT] KL ATCC	One estimate.
		2245:39 UTC [0645:39 MYT] HCM ATCC	Go ahead.
		2245:40 UTC [0645:40 MYT] KL ATCC	Asian Express One Zero Five Eight IGARI two three two two flight level three five zero squawk two one two three.
		2245:53 UTC [0645:53 MYT] HCM ATCC	Two three three two right.
		2245:56 UTC [0645:56 MYT] KL ATCC	Two one two two for the squawk.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2245:59 UTC [0645:59 MYT] HCM ATCC	No no no I (xxx) (xxx) [illegible]
		2246:01 UTC [0646:01 MYT] KL ATCC	Okay affirm.
		2246:06 UTC [0646:06 MYT] HCM ATCC	Flight level three five zero (xxx) [illegible] time two one three two and flight level three five zero.
		2246:13 UTC [0646:13 MYT] KL ATCC	No aaa time is two three three two squawk is two one.
		2246:18 UTC [0646:18 MYT] HCM ATCC	Two thirty three two the squawk two one two three and flight level three five zero is approved.
		2246:25 UTC [0646:25 MYT] KL ATCC	Three five zero approved.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2246:27 UTC [0646:27 MYT] HCM ATCC	Yes.
		2246:29 UTC [0646:29 MYT] KL ATCC	(xxx) [illegible]
		2247:52 UTC [0647:52 MYT] KL ATCC	Sector three.
		2247:57 UTC [0647:57 MYT] Singapore ATCC	Singapore.
		2247:58 UTC [0647:58 MYT] KL ATCC	Yes you call me Singapore.
		2248:01 UTC [0648:01 MYT] Singapore ATCC	Singapore.
		2248:02 UTC [0648:02 MYT] KL ATCC	Lumpur Sector Three you call me.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2248:03 UTC [0648:03 MYT] Singapore ATCC	Go ahead.
		2248:04 UTC [0648:04 MYT] Singapore ATCC	Negative.
		2248:05 UTC [0648:05 MYT] KL ATCC	Okay disregard.
		2248:09 UTC [0648:09 MYT] KL ATCC	Sector Three.
		2248:09 UTC [0648:09 MYT] Kuantan	Sector Three departure Malaysian One Two Six Three time four four six.
		2248:16 UTC [0648:16 MYT] KL ATCC	(xxx) [illegible] climb.
		2248:37 UTC [0648:37 MYT] Kuantan	Kuantan.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2248:38 UTC [0648:38 MYT] KL ATCC	Kuantan eer Malaysian One Two Six Three initially climb to what level.
		2248:45 UTC [0648:45 MYT] Kuantan	Eer... just now you give final level on six zero.
		2248:48 UTC [0648:48 MYT] KL ATCC	One six zero okay.
		2248:49 UTC [0648:49 MYT] Kuantan	Affirm.
2250:22 UTC [0650:22 MYT] KL ATCC	Yeah Singapore		
2250:23 UTC [0650:23 MYT] Singapore ATCC	Aaa...Lumpur morning this is the Watch Manager is your supervisor free.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2250:27 UTC [0650:27 MYT]			
KL ATCC	My supervisor aa... is quite busy right time ... right now anything.		
2250:31 UTC [0650:31 MYT]			
Singapore ATCC	Okay with regard to the earlier callsign Malaysian Three Seven Zero.		
2250:35 UTC [0650:35 MYT]			
KL ATCC	Okay.		
2250:36 UTC [0650:36 MYT]			
Singapore ATCC	Yeah... Hong Kong is aah... just sent a AFTN to Singapore to help check they have sent out a detresfa.		
2250:43 UTC [0650:43 MYT]			
KL ATCC	Okay.		
2250:43 UTC [0650:43 MYT]			
Singapore ATCC	aircraft missing.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2250:45 UTC [0650:45 MYT] KL ATCC	Okay		
2250:46 UTC [0650:46 MYT] Singapore ATCC	Yeah and aah I just call Ho Chi Minh to confirm Ho Chi Minh said Hong Kong aah got a call from aah from Beijing that aah still no contact with the aircraft aah... is there anyway to call the airline to contact them.		
2251:02 UTC [0651:02 MYT] KL ATCC	Aaah.		
2251:03 UTC [0651:03 MYT] Singapore ATCC	And try and establish contact on company frequency.		
2251:05 UTC [0651:05 MYT] KL ATCC	We have been trying that since aa zero correction aaa... one eight something like that UTC.		
2251:13 UTC [0651:13 MYT] Singapore ATCC	Aaa...		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2251:13 UTC [0651:13 MYT]			
KL ATCC	Aaa straight away after Ho Chi Minh asked us a few minutes after that we already asked the airline to contact this aircraft you know.		
2251:20 UTC [0651:20 MYT]			
Singapore ATCC	Yeah... because at time two two three three aah Hong aaaactually this is from you aah.		
2251:28 UTC [0651:28 MYT]			
KL ATCC	Two two three three is ah you follow the flight plan aircraft already ... say again.		
2251:35 UTC [0651:35 MYT]			
Singapore ATCC	I have a detresfa AFTN message sent by WMFC.		
2251:41 UTC [0651:41 MYT]			
KL ATCC	WMFC is from us.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2251:42 UTC [0651:42 MYT]	Singapore ATCC Yeah... that's right and ah the the... a... remark is missing detresfa aircraft.		
2251:52 UTC [0651:52 MYT]	KL ATCC Hm...hm okay.		
2251:55 UTC [0651:55 MYT]	Singapore ATCC Okay so aaa... can I just confirm that aaa Malaysia Airlines is still trying to establish contact.		
2252:04 UTC [0652:04 MYT]	KL ATCC Yeah yeah we also trying to establish contact with this aircraft and this Malaysian Airlines already request earlier much much earlier since aah...aircraft reported missing by by Ho Chi Minh lah but until now no information about this aircraft.		
2252:24 UTC [0652:24 MYT]	Singapore ATCC Okay but earlier on when aah over the point IGARI was it positive contact with your all.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2252:31 UTC [0652:31 MYT]			
KL ATCC	At position IGARI we our procedure is we transferred the aircraft to Ho Chi Minh.		
2252:36 UTC [0652:36 MYT]			
Singapore ATCC	Ho Chi Minh right.		
2252:38 UTC [0652:38 MYT]			
KL ATCC	Ho Chi Minh yeah after IGARI is Ho Chi Minh control.		
2252:41 UTC [0652:41 MYT]			
Singapore ATCC	Correct Ho Chi Minh said on their radar it wasn't positive.contact with them.		
2252:47 UTC [0652:47 MYT]			
KL ATCC	Aaa... but earlier part actually got radar contact but the thing is no radio contact only lah.		
2252:55 UTC [0652:55 MYT]			
Singapore ATCC	Radar contact but no radio contact.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2252:59 UTC [0652:59 MYT]	KL ATCC Yeah yeah.		
2253:00 UTC [0653:00 MYT]	Singapore ATCC Okay but IGARI is a suppose to be before IGARI is with you all radar is it.		
2253:06 UTC [0653:06 MYT]	KL ATCC Yeah.		
2253:08 UTC [0653:08 MYT]	Singapore ATCC That part is radar contact I mean that part is your radar contact.		
2253:12 UTC [0653:12 MYT]	KL ATCC Radio and radar contact.		
2253:13 UTC [0653:13 MYT]	Singapore ATCC Ooo okay but you all don't have radio contact with the aircraft at IGARI.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2253:19 UTC [0653:19 MYT]			
KL ATCC	No after IGARI after transfer by right aircraft should be with Ho Chi Minh lah.		
2253:24 UTC [0653:24 MYT]			
Singapore ATCC	Correct... no what I am trying to ask is before you all QSY to Ho Chi Minh was the aircraft in positive radio contact with you all also.		
2253:35 UTC [0653:35 MYT]			
KL ATCC	Earlier before IGARI yes.		
2253:37 UTC [0653:37 MYT]			
Singapore ATCC	Okay at point IGARI where you have to hand over aircraft to Ho Chi Minh.		
2253:41 UTC [0653:41 MYT]			
KL ATCC	Okay that one I am not sure because that one is the radar man working at that time.		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
2253:46 UTC [0653:46 MYT]	Singapore ATCC Okay I need your to help confirm that there was positive radio and radar contact.		
2253:54 UTC [0653:54 MYT]	KL ATCC I will advise you aaa later because this one my supervisor is taking the playback tape now.		
2254:02 UTC [0654:02 MYT]	Singapore ATCC Oh okay okay when he comes up can you give me a call please I am xxxxx <i>[name redacted]</i>		
2254:08 UTC [0654:08 MYT]	KL ATCC xxxxx <i>[name redacted]</i> aah.		
2254:09 UTC [0654:09 MYT]	Singapore ATCC Aah xxxxx... xxxxx <i>[name redacted]</i>		
2254:10 UTC [0654:10 MYT]	KL ATCC xxxxx <i>[name redacted]</i>		

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
	2254:10 UTC [0654:10 MYT] Singapore ATCC Okay thank you.		2256:40 UTC [0656:40 MYT] KL ATCC Yes.
			2256:41 UTC [0656:41 MYT] Singapore ATCC Confirm in contact Asian Express Five Zero Three Four
			2256:44 UTC [0656:44 MYT] KL ATCC Yeah.
			2256:44 UTC [0656:44 MYT] Singapore ATCC Okay thank you.
			2257:40 UTC [0657:40 MYT] Singapore ATCC Singapore.
			2257:40 UTC [0657:40 MYT] KL ATCC Estimate Victor Papa Kilo Asian Express One Six Niner Two.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2257:45 UTC [0657:45 MYT] Singapore ATCC	Asian Express One Six Niner Two go ahead.
		2257:48 UTC [0657:48 MYT] KL ATCC	Asian Express One Six Niner Two Victor Papa Kilo two three one seven request flight level three three zero squawk two one four seven.
		2257:56 UTC [0657:56 MYT] Singapore ATCC	Asian Express One Six Niner Two Victor Papa Kilo two three one seven request flight level three three zero squawk two one four seven.
		2258:03 UTC [0658:03 MYT] KL ATCC	Affirm.
		2258:03 UTC [0658:03 MYT] Singapore ATCC	Climb two niner zero.
		2258:05 UTC [0658:05 MYT] KL ATCC	Two niner zero thank you nut This Asian Five One One Zero.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2258:09 UTC [0658:09 MYT] Singapore ATCC	Asian Express Five One One Zero go ahead
		2258:12 UTC [0658:12 MYT] KL ATCC	Victor Papa Kilo two three one niner request flight level three seven zero squawk two one seven four.
		2258:19 UTC [0658:19 MYT] Singapore ATCC	Asian Express Five One One Zero Victor Papa Kilo two three one niner request flight level three seven zero squawk two one seven four climb to flight level two seven zero.
		2258:29 UTC [0658:29 MYT] KL ATCC	Two seven zero thank you.
		2258:31 UTC [0658:31 MYT] Singapore ATCC	One revision Malaysian Two Six Three Seven.
		2258:33 UTC [0658:33 MYT] KL ATCC	Two Six Three Seven go ahead.

DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER		DIRECT LINE COORDINATION COMMUNICATION KL ATCC SECTOR 3+5 PLANNER	
TIME & SOURCE	CONTENT - MAS 370	TIME & SOURCE	CONTENT - OTHER FLIGHTS
		2258:35 UTC [0658:35 MYT] Singapore ATCC Revise PADLI two three five six.	
		2258:37 UTC [0658:37 MYT] KL ATCC Two three five six copied and thank you.	
		2258:40 UTC [0658:40 MYT] Singapore ATCC Thank you.	
		<b>End of Direct Telephone Conversation Between KL ATCC and Singapore ATCC</b>	
		<b>END AT TIME 2300:00 UTC [0700:00 MYT]</b>	

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

I.C.A.O ANNEX9 APPENDIX 3

**CARGO MANIFEST** NBR 03  
**OPERATOR** MH  
**MARSH OF NATIONALITY** KUL  
**FROM** 07MAR 1505Z WT  
**MALAYSIA AIRLINES**  
**FLT/DATE** MH 370 08MAR14

**B E I J I N G**

		97
232 1200 73068	1 MANGOSTEEN	AKE 3072MH
		PER 1148 KULPEK KLN 07
232 1200 73068	1 MANGOSTEEN	AKE 3497MH
		PER 1128 KULPEK KLN 07
232 1066 49058	1 CONSOL	AKE 5442MH
		KEY QTC PPP 320 PENPEK MH6803 07
232 1200 73069	1 MANGOSTEEN	AKE 6536MH
		PER 1138 KULPEK KLN 07
232 1066 49058	1 CONSOL	AKE 90207MH
		KEY QTC PPP 326 PENPEK MH6803 07
232 1067 70858	67 CONSOL	AKE 90348MH
		SSR QTC B 463 PENPEK MH6803 07
232 1200 73068	1 MANGOSTEEN	AKE 90787MH
		PER 1152 KULPEK KLN 07
232 1067 70858	133 CONSOL	PMC 5871MH
		SSR QTC B 1990 PENPEK MH6803 07
232 1202 2382	4 CONSOL	PMC 61433MH
232 1202 2404	1 CONSOL	B 26 KULPEK PTM 07
232 1200 9141	13 CONSOL	B 6 KULPEK PTM 07
		B 2250 KULPEK KLN 07
		2282

<b>TOTAL</b>	<b>PCS</b>	<b>224</b>	<b>KGS</b>	<b>9947</b>	<b>6 SHPTS</b>
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## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

### I.C.A.O ANNEX9 APPENDIX 3

CARGO MANIFEST	NBR 02	07MAR 1356Z SJ
OPERATOR	MH	MALAYSIA AIRLINES
MARKS OF NATIONALITY		FLT/DATE MH 370 08MAR14
FROM	KUL	

B E I J I N G

07

BULK

\*\*\*EXPRESS HANDLING\*\*\*  
232 1107 3632 2 COURIER MATERIAL EXP G KULPEK MEW 07

TOTAL	PCS	2	KGS	6	1 SHPTS
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**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232-KUT 1200 7306 Shipper's Name and Address		Shipper's Account Number		Not Negotiable	232-1200 7306																																																																																																																																		
<b>POH SENG KIAN</b> <b>79, BATU 6 1/4 KESANG</b> <b>84000 . MUAR JOHOR</b> <b>MALAYSIA</b>				<b>Air Waybill</b> Issued by <b>MALAYSIA AIRLINES</b> <b>CARGO BERHAD</b> <small>Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.</small>																																																																																																																																			
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<b>BEIJING GUANGCHANGMING TRADING CO., LTD.</b> , 18 HUANDING DUAN, QING LILU, HUANDINGCUN, ANDING ZHEN, DAXINGQU, BEIJING, CHINA				<small>Accounting Information/Air Waybill</small>																																																																																																																																			
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ORIGINAL 1 (FOR ISSUING CARRIER)

Original 2 - (For Consignee)

232-10677085

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232-10677085		232-10677085																																																																																																																	
Shipper's Name and Address NNR GLOBAL LOGISTICS (M) SDN BHD NO. 15, JALAN BATU MAUNG DISPLEX FREE COMMERCIAL ZONE AIRFREIGHT FORWARDERS WAREHOUSING CARGO BATU MAUNG, PENANG 11960		Shipment Number Not negotiable Issued By <b>MALAYSIAN AIRLINE SYSTEM BERHAD</b> <b>Air Waybill</b> , ADMIN-BUILDING 1, MAS COMPLEX SULTAN ABDUL AZIZ SHAH AIRPORT, 4 SUBANG, SELANGOR DARUL EHSAN, MAL																																																																																																																	
Consignee's Name and Address JET INTERNATIONAL TRANSPORTATION CO LTD BEIJING BRANCH C/O NNR GLOBAL LOGISTICS (HEIJING) CO LTD ROOM 302 LOGISTIC BLDG. NO. 10 TIANZHU ROAD, TIANZHU IND ESTATE Issuing Carrier's Agent Name and City NNR GLOBAL LOGISTICS (M) SDN BHD NO. 15, JALAN BATU MAUNG DISPLEX FREE COMMERCIAL ZONE		Conditions of carriage Contract Number 10062469 It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR MY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.																																																																																																																	
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From/First Carrier KUL MH		to PEK	by MH																																																																																																																
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**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232-KUL 1202 2382		UTN:14 847 032267			232-1202 2382
Shipper's Name and Address PANALPINA TRANSPORT (M) SDN BHD LOT CTBGF 02&03 KLAS CARGO TERMINAL KLAS CARGO COMPLEX KLIA 64000 SEPANG SELANGOR		Shipper's Account Number 7703	Not Negotiable Air Waybill Issued by	MALAYSIAN AIRLINE SYSTEM SDN BHD 33RD FLOOR, BANGUNAN MAS 50250 KUALA LUMPUR, MALAYSIA MEMBER OF IATA	
			Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.		
Consignee's Name and Address CTS INTERNATIONAL LOGISTICS CORP. LIMITED BEIJING BRANCH ROOM E409 SOUTH BLD,ACLP INTL BLD,566SHUNPING CN RD,SHUNYI DIST,BEIJING		Consignee's Account Number 7230			
Issuing Carrier's Agent Name and City PANALPINA TRANSPORT (M) S/B-KLIA LOT CTBGF 02&03 KLAS CARGO COMPLEX KLIA, 64000 SEPANG SELANGOR MALAYSIA			Accepting Information FILE : 032267/7082 FREIGHT PREPAID		
Agent's IATA Code 20-3 0968/1501		Account No.	VOLUME 0.194 M3		
Airport of Departure (Addr. of First Carrier) and Requested Routing KUL KUALA LUMPUR MY			Reference Number	Original Shipping Information	
To PEK MAS	By First Carrier Routing and Destination PEK MAS	To By BT	Currency MYR	Check PPX	Declared Value for Carriage NUD
Airport of Destination BEIJING	Requested Flight/Date MH 370/08		Check COLL	Other PPD COL	Declared Value for Customs NCV
Handling Information ENCL. CONSOL POUCH ATTCHD PLS NTFY CNEE IMMED UPN ARRVL. **FINAL DESTINATION TIANJIN**			Amount of Insurance XXX	INSURANCE - If carrier offers insurance, and such insurance is required in accordance with conditions on reverse thereof, indicate amount to be insured in figures in box marked "Amount of Insurance". BCI	
No. of Pieces ROP	Gross Weight kg 26.08	Rate Class Commodity Item No.	Chargeable Weight	Rate / Charge 13.66	Total 450.78
Nature and Quantity of Goods (Incl. Dimensions or Volume) CONSOLIDATION AS PER ATTACHED MANIFEST 2PCS 61x 36x 25 1PCS 37x 30x 25 1PCS 61x 36x 25					
Prepaid 450.78 Weight Charge Valueation Charge Tax Total Other Charges Due Agent 42.88 Total Other Charges Due Carrier 42.88 Total Prepaid 493.66 Currency Conversion Rates CC Charges in Dest. Currency Exempted on (date) For Carrier Use Only at Destination					
Other Charged FSC 33.00 SSC 9.88 Signature of Shipper or his Agent SAIFUL ON BEHALF OF THE SHIPPER PANALPINA TRANSPORT (M) SDN BHD AS AGENT OF CARRIER PANALPINA TRANSPORT (M) SDN BHD 07 MAR 2014 At (place) Signature of Issuing Carrier or its Agent 232-1202 2382					

**COPY 11 (EXTRA COPY)**

5 of 18

## **APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232 KUL 1187 3632 Shipper's Name and Address		Shippers Name and Address		232 1187 3632 Air Waybill Issued by	
MALAYSIAN EXPRESS WORLDWIDE SDN BHD NO 3 USJ 16 2F 47630 UEP SUBANG JAYA SELANGOR DARUL EHSAN TE0380247875 EX0380247870 MS ANUM				MALAYSIAN AIRLINE SYSTEM BERHAD 3RD FLR, ADMIN BLDG 1, MAS COMPLEX SAAS AIRPORT, 47200 SUBANG, MY	
Consignee's Name and Address		Consignee's Account Number		Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.	
UPS PARCEL DELIVERY [GUANGDONG] CO., BEIJING BRANCH NO.3 ZAOYING RD MAIZIDIAN CHAOYANG DISTRICT BEIJING 100125 CHINA. TEL : 65934088				It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIERS LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.	
Issuing Carrier's Agent Name and City				Accounting Information Also Notify	
MALAYSIAN EXPRESS WORLDWIDE SDN BHD KUL				FREIGHT PREPAID EXPRESS HANDLING UNIT [EHU]	
Agent's IATA Code		Account No.			
2037091		0000000			
Airport of Departure (Addr. of 1stst Carrier) and requested Routing				Reference Number	
KUALA LUMPUR				Optional Shipping Information	
To By First Carrier		Request for Destination		Decelerated Value for Customs	
PEK MH370		08MAR		Decelerated Value for Customs	
Airport of Destination		Requested Flight Date		Amount of Insurance	
BEIJING		MH370/08		XXX	
HANDLING INFORMATION <b>EXP PLS NOTIFY CNEE UPON ARRIVALS</b>					
(For USA only) These commodities, technology or software were exported from the United States in accordance with the Export Administration Regulations. Disclosure contrary to USA law prohibited.					
No. of Pieces RCP	Gross Weight kg lb	Rate Class Commodity Item No.	Chargeable Weight	Rate Charge	Total
02	6.0		6.0	13.66	
					<b>COURIER MATERIALS</b>
					81.96
Weight Charge		Other Charges <b>20 : 25.00</b>			
Valuation Charge		<b>RSC : 6.00</b>			
Tax		<b>RSC : 2.25</b>			
Total other Charges Due Agent		Shipper certifies that the particulars on the face hereof are correct and that <b>INSO FAR AS ANY PART OF THE CONSIGNMENT CONTAINS DANGEROUS GOODS, SUCH PART IS PROPERLY DESCRIBED BY NAME AND IS IN PROPER CONDITION FOR CARRIAGE BY AIR ACCORDING TO THE APPLICABLE DANGEROUS GOODS REGULATIONS.</b>			
27.40					
Total other Charges Due Carrier					
8.28					
Total paid prepaid		Total collect			
Currency Conversion Rates		cc charges in Dest. Currency			
Signature of Shipper or His Agent					
26FEB14		KUALA LUMPUR		ANUM	
Executed on (Date)		SI (Piece)		Signature of Issuing Carrier or its Agent	
Total collect Charges					
For Carriers Use only at Destination					
Charges at Destination					
232 1187 3632					

**COPY 11 (EXTRA COPY)**

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232 KUL 1202 2404 UTM:14 847 032265		232-1202 2404					
Shipper's Name and Address PANALPINA TRANSPORT (M) SDN BHD LOT CTBGF 02&03 KLAS CARGO TERMINAL KLAS CARGO COMPLEX KLIA 64000 SEPANG SELANGOR		Shipper's Account Number 7703 Air Waybill Issued by Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.					
Consignee's Name and Address CTS INTERNATIONAL LOGISTICS CORP. LIMITED BEIJING BRANCH ROOM E409 SOUTH BLD, ACP INTL BLD, 566 SHUNPING CN RD, SHUNYI DIST, BEIJING		Consignee's Account Number 7230 FILE : 032265/7081 ACCOUNT INFORMATION FREIGHT PREPAID					
Booking Carrier's Agent Name and City PANALPINA TRANSPORT (M) S/B-KLIA LOT CTBGF 02&03 KLAS CARGO COMPLEX KLIA, 64000 SEPANG SELANGOR MALAYSIA		Reference Number VOLUME 0.029 M3					
Agent's IATA Code 20-3 0968/1501		Account No.					
Airport of Departure (Add'l. of Port, Carrier and Requested Routing) KUL KUALA LUMPUR MY		Optional Shipping Information					
To PEK MAS	By Port Center Routing and Destination	To by to by	Common Code PPD COL MYR PP X	WT/MA Code PPD COL XXX	Other Code PPD COL NVD	Declared Value for Carriage NCU	Declared Value for Customs NCU
Airport of Destination BEIJING		Requested Flight Date MH 970/03		Amount of Insurance XXX		INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with conditions on reverse thereof, indicate amount to be insured in figures in box marked "Amount of Insurance".	
Handling Information ENCL. CONSOL POUCH ATTACHED PLS NTFY CNEE IMMED UPN ARRVL.							
SCI							
No. of Pieces Pcs	Gross Weight kg	No. Ref.	Rate Class Commodity Ref. No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)
7	6.0K	M		6.0	MIN.	75.00	CONSOLIDATION AS PER ATTACHED MANIFEST 1 PCS 42x 42x 17
75.00 SLAC-00001/CONT. RIDER							
Prepaid Valuation Charge Collected							
75.00 Other Charges							
75.00 Tax							
Total Other Charges Due Agent							
Total Other Charges Due Carrier							
ON BEHALF OF THE SHIPPER PANALPINA TRANSPORT (M) SDN BHD SAIFUL Signature of Shipper or Its Agent							
AS AGENT OF CARRIER MAS PANALPINA TRANSPORT (M) SDN BHD 07 MAR 2014 Executed on (date) At (place) Signature of (Agent Carrier or Its Agent)							
For Carrier's Use Only at Destination		Changes of Declaration		Total Declared Charges			

232-1202 2404

**COPY 11 (EXTRA COPY)**

7 of 18

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

232 KUL 12009141		232-12009141				
Shipper's Name and Address <b>KERRY LOGISTICS (MALAYSIA) SDN BHD - KUALA LOT 844, 1ST FLOOR JLN SUBANG 7 TMN PERINDUSTRIAN SUBANG, 47500 SUBANG JAYA, SELANGOR D.E. TEL: 60-3-80238266 FAX: 60-3-80238277</b>		Not Negotiable Malaysia Airline System Berhad Air Waybill Issued by 33RD FLOOR, MAS BUILDING, JALAN SULTAN ISMAIL, KUALA LUMPUR, FEDERAL TERRITORY, MALAYSIA 50250				
		Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.				
Consignee's Name and Address <b>KERRY EAS LOGISTICS LIMITED NO.21 XIAOYUN ROAD, CHAOYANG DISTRICT, BEIJING 100027 CHINA ATTN: MR DAVID ZHANG TELE: 8610-84546956 FAX: 8610-64647246</b>	Consignee's Account Number	It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.				
Issuing Carrier's Agent Name and City <b>INTERNATIONAL AIR TRANSPORT ASSOCIATION</b>		Accounting Information				
Agency IATA Code <b>20312481501</b>	Account No.	FREIGHT PREPAID				
Airport of Departure (Addr. of First Carrier) and Requested Routing <b>KUALA LUMPUR</b>		Reference Number	Optional Shipping Information			
By First Carrier <b>PKK MH</b>	Requesting Destination <b>BEIJING CAPITAL INTL</b>	To by To by	Current Currency <b>MYR</b> P P F P P NVD	Declared Value for Carriage <b>NCV</b>		
Airport of Destination <b>BEIJING CAPITAL INTL</b>	Requester Flight Data / <b>MH370/08</b>		Amount of Insurance <b>XXX</b>	Declared Value for Customs <b>INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figure in box marked "Amount of Insurance".</b>		
Handling Information				BCI		
<b>TOTAL: (13) PACKAGE(S) ONLY. ONE FOUCH OF DOCUMENT ATTACHED.</b>						
No. of Pieces KG	Gross Weight	Rate Class Commodity Item No.	Chargeable Weight	Rate Charge	Total	Nettage and Quantity of Goods (Incl. Dimensions or Volume)
13	2,250.0	Q	2,250	10.25	23,062.50	<b>CONSOLIDATION DETAILS AS PER CARGO MANIFEST ATTACH ED</b> 100x31x13 (CM)/2 13x30x25 (CM)/5 105x95x105 (CM)/1 105x95x118 (CM)/1 105x95x140 (CM)/1 105x95x144 (CM)/1 105x95x150 (CM)/1 105x95x161 (CM)/1
13	2,250.0				23,062.50	
Payable 23062.50	Weight Charge Valuation Charge Tax	Collected Other Charges MYC: 2250.00 SCC: 855.00 CGC: 3.00				
Total Other Charges Due Agent		Shipper certifies that the particulars on the face hereof are correct and that no other as any part of the consignment contains dangerous goods, such parts being properly described by name and in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.				
Total Other Charges Due Carrier 3108.00		<b>KERRY LOGISTICS (MALAYSIA) SDN BHD - KUALA LUMPUR</b>				
Total Paid 26170.50	Total Collected	Signature of Shipper or his Agent <b>NAZROL NASTIR</b>				
Currency Conversion Rates	CC Charges in Dest. Currency 0.5/MAR/2014 Executed on (date)	Signature of Issuing Carrier or its Agent at (place) 232-12009141				
For Carriers Use only at Destination	Charges at Destination	Total Collected Charges				

ORIGINAL 2 (FOR CONSIGNEE)

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

BVC-17957 1606 07MAR14

MALAYSIA AIRLINES

LOAD SHEET  
ALL WEIGHTS IN KG

CHECKED BY  
FAIZAL

APPROVED  
EDNO  
02

FROM/TO FLIGHT	A/C REG VERSION	CREW	DATE	TIME
KUL PEK MH370/08	9M-MRO J35Y245	2/10	07MAR14	1606
LOAD IN COMPARTMENTS	WEIGHT	DISTRIBUTION		
	14296 1/2500 2/4530 3/804 4/5885 5/577	O/O		
PASSENGER/CABIN BAG	16790 222/3/2	TTL 227 CAB O		
	PAX 10/215			
TOTAL TRAFFIC LOAD	31086 BLKD 1/0			
DRY OPERATING WEIGHT	143283			
ZERO FUEL WEIGHT ACTUAL	174369 MAX 195044 L ADJ			
TAKE OFF FUEL	49100			
TAKE OFF WEIGHT ACTUAL	223469 MAX 286897	ADJ		

TRIP FUEL	37200	
LANDING WEIGHT ACTUAL	186269 MAX 208652	ADJ

BALANCE AND SEATING CONDITIONS			LAST MINUTE CHANGES		
DOI	59.07 DL1	57.29	DEST	SPEC	CL/CPT + - WEIGHT
LIZFW	67.05 MACZFW	31.65			
LITOW	70.05 MACTOW	33.78			

STAB TO 03.9 MID  
SEATING  
OA/10 OB/127 OC/88

UNDERLOAD BEFORE LMC 20675 LMC TOTAL + -

LOADMESSAGE AND CAPTAINS INFORMATION BEFORE LMC

PANTRY B 4564/-01.0

\*\*\* CONNECTED TO CHECK-IN APPLICATION \*\*\*

WBC KB-45  
EXP 20SEP14  
NOTOC - YES

LDM  
MH370/07. 9M-MRO. J35Y245. 2/10  
PEK. 222/3/2. 0. T14296. 1/2500. 2/4530. 3/804. 4/5885. 5/577  
PAX/10/215. PAD/0/1. PER/41L. PER/41R. PER/43L. PER/44L  
B3490. C10806. MNIL. ENIL

## **APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

10 of 18

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

DVC-10329 1448-07MAR14

LOADING INSTRUCTION/REPORT CONFIG  
ALL WEIGHTS IN KG J35Y245

PREPARED BY ELMI ZAMRI  
EDNO 01

FROM/TO FLIGHT A-C/REG D/V VERSION CREW DATE TIME  
KULPEK MH 0370 9M-MRO 06/12 772 2/12 08MAR 1448

**PLANNED LOAD**

PEK J 10 Y 218 C 010897 M 000000 B 004720 E 000000

JBINING SPECS PEK PER/4 PER/4 PER/4 PER/4

TRANSIT SPECS

RELOADS

CPT 1. FLF MAX 015308

::CPT TOTAL :

:11P :  
:ONLOAD PEK B/02000  
:REPORT

:12L :12R :  
:ONLOAD PEK B/00840 :ONLOAD PEK B/00840  
:REPORT

CPT 2 FLA MAX 017780 1+2 033088

::CPT 1 TOTAL :

:22P :PMC5871MH :  
:ONLOAD PEK C/02110  
:REPORT

:23P :PMC61433MH :  
:ONLOAD PEK C/02420  
:REPORT

CPT 3 ALF MAX 003174

::CPT 2 TOTAL :

:33L :AKE6442MH :33R :AKE90207MH :  
:ONLOAD PEK C/00410 :ONLOAD PEK C/00394  
:REPORT :REPORT

CPT 4 ALC MAX 012701 3+4 015875

::CPT 3 TOTAL :

:41L :AKE90787MH :41R :AKE8535MH :  
:ONLOAD PEK C/01242 :ONLOAD PEK C/01220  
:SPECBS PER :SPECBS PER  
:REPORT :REPORT

:42L :  
:ONLOAD PEK SS/00091 :ONLOAD  
:REPORT :REPORT

:43L :  
:ONLOAD PEK TB/00200 :ONLOAD  
:REPORT :REPORT

:43L :AKE3372MH :43R :  
:ONLOAD PEK C/01238 :ONLOAD PEK FB/00840  
:SPECBS PER :SPECBS  
:REPORT :REPORT

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

:44L	AKE3497MH	:44R	AKE90348MH
:ONLOAD	PEK C/01218	:ONLOAD	PEK C/00540
:SPECS	PER	:SPECS	
:REPORT		:REPORT	
CPT 5 ALA MAX 004082		45	019957
::CPT 4 TOTAL ::			
:52	000000000000		
:ONLOAD	PEK C/00006		
:REPORT			
::CPT 5 TOTAL ::			

SI

THIS AIRCRAFT HAS BEEN LOADED IN ACCORDANCE WITH THESE  
INSTRUCTIONS AND THE DEVIATIONS SHOWN ON THIS REPORT. THE  
CONTAINER/PALLETS AND BULK LOAD HAVE BEEN SECURED IN  
ACCORDANCE WITH COMPANY INSTRUCTIONS.

SIGNATURE:

DVC-10329 1448 07MAR14  
FLR  
MH370/08MAR14/KUL  
;

DVC-10329 1448 07MAR14  
EZW MH 370/07MAR 9M-MRD J35Y245 02/12/00 KULPEK  
PASSENGER 017015KG  
BAGGAGE 003324KG  
CARGO 010806KG  
MAIL 000000KG  
EQUIPMENT 000000KG  
TR DEADLOAD 000000KG  
TR PASSENGER 000000KG  
TTL TRAFFIC LOAD 031145KG  
J 010 Y 218  
TTL PASSENGER 228  
BW 138919KG  
WT ADJ 004564KG  
ADJ~DOW 143483KG  
EST ZFW 174628KG OR 384989LB

DVC-10329 1448 07MAR14  
EZW MH 370/08MAR 9M-MRD J35Y245 02/12/00 KULPEK  
PASSENGER 017015KG  
BAGGAGE 003324KG  
CARGO 010806KG  
MAIL 000000KG  
EQUIPMENT 000000KG  
TR DEADLOAD 000000KG  
TR PASSENGER 000000KG  
TTL TRAFFIC LOAD 031145KG

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

131571 RCVD 07MAR14 1443Z  
 QX KULKJMH  
 KULFGMH 071443 KUL/QF/4C90  
 U L D S A S S I G N E D T O F L I G H T                    07MAR 1443Z QF  
 OTHERS .....  
 IRREGULARITIES AWB NBR .....  
 WEATHER    GOOD / RAIN  
 IF RAIN SPECIFY    TIME START..... / END .....

PART02 END  
 SENT  
 KULKJMH KULKCMH HDQFEMH KULFWMH KULOCMH KULFOMH KULFGMH  
 \*\*

130 - 0    175 - 0

131572 RCVD 07MAR14 1443Z  
 QX KULKJMH  
 KULFGMH 071443 KUL/QF/4C90  
 U L D S A S S I G N E D T O F L I G H T                    07MAR 1443Z QF

MH 370 08MAR 772	K U L	UFL
FIRST UFL: 2243 07MAR14 QF	LAST UFL:	

P E K	PCS	VOL	WGT SYST	IN KGS ACTL	DEVIATION KGS	PERC
01*AKE 3372MH PER	1	6.9*	1148	1238	21	1.8
02*AKE 3497MH PER	1	6.8*	1128	1218	21	1.8
03*AKE 6442MH PPP QTC KEY	1	4.0*	320	410	21	6.5
04*AKE 8535MH PER	1	6.8*	1138	1228		0.0
05*AKE 90207MH PPP QTC KEY	1	4.0*	326	394	-18	-5.5
06 AKE 90348MH QTC SSR	67	2.8*	463	540	-9	-1.9
07*AKE 90787MH PER	1	6.9*	1152	1242	4	0.3
08*PMG 5871MH QTC SSR	133	10.0*	1990	2110		0.0
09 PMG 61433MH	18	8.6*	2282	2420	18	0.7
<b>TOTAL</b>	<b>224</b>	<b>56.8</b>	<b>9947</b>	<b>10800</b>	<b>58</b>	<b>0.5</b>

B U L K   L O A D	PCS	VOL	WGT SYST	IN KGS ACTL	DEVIATION KGS	PERC
PEK	2	0.0*	6	6		0.0
**EXS CN-11873632 2P/6.KG SEND BY VAN THRU EHJ**MSD**						

\*\*\* PGM BULK OP OKG \*\*\*

CHECKED BY.....  
NAME.....

APRON CHECKED.....  
NAME.....

CONDITION OF CARGO AT BAY                                    GOOD / TORN / DAMAGE / WET / LEAK  
 PART01 CONTINUED  
 SENT  
 KULKJMH KULKCMH HDQFEMH KULFWMH KULOCMH KULFOMH KULFGMH  
 \*\*

4.

APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

02*AKE	3497MH PER	1	6.8*	1128	1218	21	1.8
03*AKE	6442MH PPP QTC KEY	1	4.0*	320	410	21	6.5
04*AKE	8535MH PER	1	6.8*	1138	1228		0.0
05*AKE	90207MH PPP QTC KEY	1	4.0*	326	394	-18	-5.5
06 AKE	90348MH QTC SSR	67	2.8*	463	540	-9	-1.9
07*AKE	90787MH PER	1	6.9*	1152	1242	4	0.3
08*PMC	5871MH QTC SSR	133	10.0*	1990	2110		0.0
09*PMC	61433MH	18	8.6*	2282	2420	18	0.7
TOTAL		224	56.8	9947	10800	58	0.5

BULK LOAD            PCS    VOL    WGT IN KGS    DEVIATION  
                       SYST    ACTL    KGS · PERC  
 PEK                 2    0.0\*    6    6    --- 0.0  
 \*EXS CN-11872528 8B/6 KB SEND BY VAN THRU EHU\*\*MGO\*\*

卷之三

CHECKED BY.....  
NAME

APRON CHECKED.....  
NAME.....

**CONDITION OF CARGO AT BAY**      **GOOD / TORN / DAMAGE / WET / LEAK**  
**PORTAL CONTINUED**

PART OF SENTENCE  
SENT  
KULKJMH KULKCMH HDQFEMH KULFWMH KULOCMH KULFOMH KULFGMH

三

131596 RCVD 07MAR14 1443Z  
QX KULKJNH  
.KULFGMH 071443 KUL/QF/4C90  
SPECIAL LOAD NOTIFICATION TO CAPTAIN

FROM FLIGHT DATE A/C REG  
KUL MH 0370 08MAR14

NO RESTRICTED LOAD EX KUL

**OTHER SPECIAL LOAD**

TO	AWB	CONTENTS	PCS	QTY	IMP CODE	PC LD
PEK	12007306	MANGOSTEEN	1	1128KG	PER AKE	3497M
PEK	12007306	MANGOSTEEN	1	1148KG	PER AKE	3372M
PEK	12007306	MANGOSTEEN	1	1138KG	PER AKE	8535M
PEK	12007306	MANGOSTEEN	1	1152KG	PER AKE	90787M

SIR NIL

THERE IS NO EVIDENCE THAT ANY DAMAGED OR LEAKING PACKAGES CONTAINING DANGEROUS GOODS HAVE BEEN LOADED ON THE AIRCRAFT AT THIS STATION

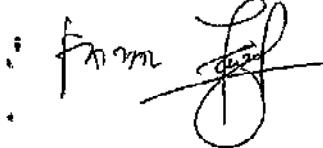
CHARTER OF PRINCIPLES CONTAINING STANOTURE

**APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS**

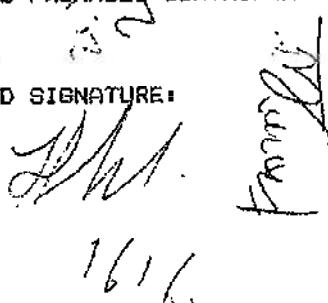
DVC-17957 1529 07MAR14  
 SPECIAL LOAD NOTIFICATION TO CAPTAIN PRE-FLIGHT 08:54

FROM	FLIGHT	DATE	A/C REG	PREPARED BY		
KUL	MH 0370 /08	08MAR14	9M-MRO	MASGO		
***** OTHER SPECIAL LOAD *****						
TO	AWB	CONTENTS	PCS	QTY	IMP CODE	POE
NR					ULD CODE	
001.	PEK	MANGOSTEEN 12007306 MANGOSTEEN	0001	1128KG	PER	41L
						AKE3497MH
002.	PEK	MANGOSTEEN 12007306 MANGOSTEEN	0001	1132KG	PER	41F
						AKE90767MH
003.	PEK	MANGOSTEEN 12007306 MANGOSTEEN	0001	1148KG	PER	43L
						AKE3372MH
004.	PEK	MANGOSTEEN 12007306 MANGOSTEEN	0001	1138KG	PER	44L
						AKE8535MH
***** THERE IS NO EVIDENCE THAT ANY DAMAGED OR LEAKING PACKAGES CONTAINING DANGEROUS GOODS HAVE BEEN LOADED ON THE AIRCRAFT *****						

LOADING SUPERVISOR  
 NAME AND SIGNATURE:



CAPTAIN  
 NAME AND SIGNATURE:



16/6

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

DVC-10329, 1448 07MAR14

LOADING INSTRUCTION/REPORT CONFIG  
ALL WEIGHTS IN KG J35Y245

PREPARED BY  
ELMI ZAMRI

EDNO  
01

FROM/TO FLIGHT	A-C/REG	D/V	VERSION	CREW	DATE	TIME
KULPEK MH 0370	9M-MRO	06/12	778	2/12	08MAR	1448

**PLANNED LOAD**

PEK J 10 Y 218 C 010897 M 000000 B 004720 E 000000

JOINING SPECS PEK PER/4 PER/4 PER/4 PER/4

TRANSIT SPECS

RELOADS

CPT 1 FLF MAX 015308

::CPT TOTAL ::

:11P :ONLOAD PEK B/02000  
:REPORT

:12L :12R :ONLOAD PEK B/00840 :ONLOAD PEK B/00840  
:REPORT :REPORT

CPT 2 FLA MAX 017780 1+2 033088

::CPT 1 TOTAL ::

:22P PMC5871MH :ONLOAD PEK C/02110  
:REPORT

:23P PNC61433MH :ONLOAD PEK C/02420  
:REPORT

CPT 3 ALF MAX 003174

::CPT 2 TOTAL ::

:33L AKE6442MH :33R AKE90207MH :ONLOAD PEK C/00410 :ONLOAD PEK C/00394  
:REPORT :REPORT

CPT 4 ALC MAX 012701 3+4 015875

::CPT 3 TOTAL ::

:41L AKE90787MH M :41R AKE8535MH M :ONLOAD PEK C/01242 :ONLOAD PEK C/01228  
:ONLOAD PEK C/01242 :SPECs PER :SPECs PER  
:REPORT :REPORT

:42L :ONLOAD PEK SS/00091 :ONLOAD :REPORT  
:REPORT :REPORT

:42L :ONLOAD PEK TB/00200 :ONLOAD :REPORT  
:REPORT :REPORT

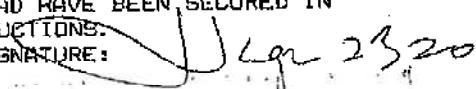
:43L AKE3372MH M :43R :ONLOAD PEK FB/00840 :ONLOAD PEK FB/00840  
:ONLOAD PEK C/01238 :SPECs :SPECs  
:SPECs PER :REPORT :REPORT

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

:46L	AKE3497MH	:44R	AKE90348MH
:ONLOAD	PEK C/01218	:ONLOAD	PEK C/00540
:SPECs	PER	:SPECs	
:REPORT		:REPORT	
CPT 5 ALA MAX 004082 *#5 019957		CPT 4 #07FAL 2	
:52	000000000000		
:ONLOAD	PEK C/00006		
:REPORT			
CPT 5 TOTAL			

SI

THIS AIRCRAFT HAS BEEN LOADED IN ACCORDANCE WITH THESE INSTRUCTIONS AND THE DEVIATIONS SHOWN ON THIS REPORT. THE CONTAINER/PALLETS AND BULK LOAD HAVE BEEN SECURED IN ACCORDANCE WITH COMPANY INSTRUCTIONS.

SIGNATURE: 

DVC-10329 1448 07MAR14

FLR  
MH370/08MAR14/KUL

DVC-10329 1448 07MAR14  
EZFW MH 370/07MAR 9M-MRD J35Y245 02/12/00 KULPEK  
 PASSENGER 017015KG  
 BAGGAGE 003324KG  
 CARGO 010806KG  
 MAIL 000000KG  
 EQUIPMENT 000000KG  
 TR DEADLOAD 000000KG  
 TR PASSENGER 000000KG  
 TTL TRAFFIC LOAD 031145KG  
 J 010 Y 218  
 TTL PASSENGER 228  
 BW 138919KG  
 WT ADJ 004564KG  
 ADJ-DOW 143483KG  
 EST ZFW 174628KG OR 384985LB

DVC-10329 1448 07MAR14  
EZFW MH 370/08MAR 9M-MRD J35Y245 02/12/00 KULPEK  
 PASSENGER 017015KG  
 BAGGAGE 003324KG  
 CARGO 010806KG  
 MAIL 000000KG  
 EQUIPMENT 000000KG  
 TR DEADLOAD 000000KG  
 TR PASSENGER 000000KG  
 TTL TRAFFIC LOAD 031145KG

## APPENDIX 1.18H - CARGO MANIFEST AND ASSOCIATED DOCUMENTS

PAGE 01  
BSD: MH370/08MAR KUL 1007NAM  
772/D GTO/C1 POS/GATE BDT2335 SD0035 ED0035 SA0630 FT0555  
PASSENGERS CHECKED-IN : J10Y215  
PASSENGERS BOARDED : J10Y215  
PASSENGERS NOT BOARDED : JOYO  
NIL

## APPENDIX 1.18I – LITHIUM BATTERY GUIDANCE DOCUMENT



# Lithium Battery Guidance Document

*Transport of lithium Metal and Lithium Ion Batteries*

*Revised for the 2014 Regulations*

## △ Introduction

This document is based on the provisions set out in the 2013-2014 Edition of the ICAO Technical Instruction for the Safe Transport of Dangerous Goods by Air and the 55<sup>th</sup> Edition of the IATA Dangerous Goods Regulations (DGR).

The purpose of this document is to provide guidance for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR. Specifically the document provides information on:

- Definitions;
- Classification (including classification flowcharts);
- Transport Conditions
- Exceptions;
- Special Provisions;
- Packaging provisions for lithium batteries;
- Prohibitions;
- Passenger Provisions; and
- Frequently Asked Questions

## APPENDIX 1.18I – LITHIUM BATTERY GUIDANCE DOCUMENT

IATA Lithium Battery Guidance Document - 2014

*provisions of DGR 1.3.3.3 and 1.3.3.6 apply. If packages are assembled into an overpack the requirements for overpacks in DGR 8.1.6.9.3, Step 7 apply.*

**Note 3:** Until 31 March 2014 the shipper may , provide the information set out below on an air waybill or on an alternative transport documentation in lieu of using a Shipper's Declaration.

*When the transitional provisions are applied and an air waybill is used, the information required by 2, 3 and 4 below must be shown in the "Nature and Quantity of Goods" box of the air waybill and the air waybill must clearly identify the name and address of the shipper and of the consignee. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:*

- 1) *the name and address of the shipper and consignee;*
- 2) *UN 3480 or UN 3090, as applicable;*
- 3) *Lithium ion batteries PI 965 IB, or lithium metal batteries PI 968 IB;*
- 4) *the number of packages and the gross weight of each package.*

### **3. Section II - Packing Instructions 965 – 970**

"Small" Lithium ion and lithium metal cells and batteries that meet the Watt-hour or lithium content limits set out in Section II of PI 965 to PI 970 are only subject to certain parts of the DGR when shipped as cargo. The bulk of the requirements for these small lithium batteries are contained within the General Requirements at the start of each packing instruction which apply to all lithium batteries and then the specific requirements set out in Section II of each packing instruction, which are as follows:

- (a) classification (DGR 3.9.2.6);
- (b) limits on the quantity of lithium cells or batteries per package (Table II of the applicable packing instruction);
- (c) strong outer packagings (see Section II of applicable packing instruction);
- (d) marking and labelling of packages (Additional Requirements of Section II of the applicable packing instruction);
- (e) the details of the consignment must be described (Additional Requirements of Section II of the applicable packing instruction).

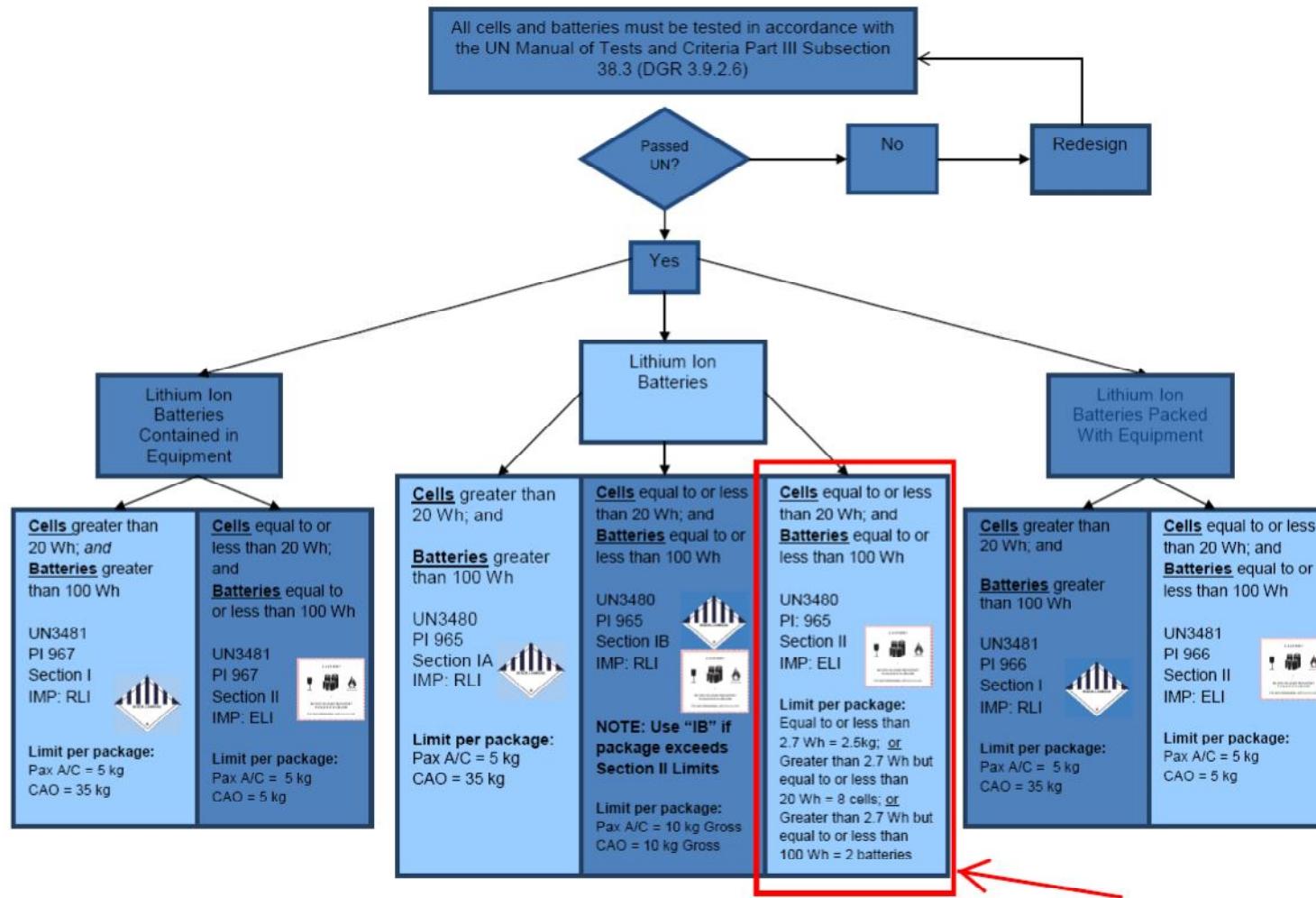
### **Exceptions**

Small lithium metal and lithium ion batteries are not subject to all of the provisions of the DGR provided that they comply with all of the requirements set out in Section II of Packing Instructions 965, 966 and 967 for lithium ion batteries and Section II of Packing Instructions 968, 969 and 970 for lithium metal batteries in the 55<sup>th</sup> Edition of the IATA DGR.

Packages containing lithium batteries, or lithium batteries contained in, or packed with, equipment that meet the provisions of Section II of these packing instructions are not required to have a Class 9 hazard label and there is no requirement for a Shipper's Declaration for Dangerous Goods for consignments of these batteries.

## APPENDIX 1.18I – LITHIUM BATTERY GUIDANCE DOCUMENT

Classification Flowchart – Lithium Ion Batteries



**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

\*In red (Mangosteens and Lithium Ion Batteries carried together)

MANGOSTEEN				LITHIUM ION BATTERIES			
FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION	FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION
MH 376	01 JAN	232-11828622	KUL/PEK				
MH 370	02 JAN	232-11828795	KUL/PEK	MH 370	02 JAN	232-10629920	PEN/PEK
				MH 360	02 JAN	232-10638095	PEN/PEK
MH 370	03 JAN	232-11828806	KUL/PEK				
MH 370	03 JAN	232-11828795	KUL/PEK				
MH 370	04 JAN	232-11828810	KUL/PEK				
MH 370	05 JAN	232-11828821	KUL/PEK				
MH 370	06 JAN	232-11828832	KUL/PEK				
MH 370	07 JAN	232-11828843	KUL/PEK	MH 370	08 JAN	232-10638434	PEN/PEK
				MH 360	09 JAN	232-11843436	PEN/PEK
				MH 370	09 JAN	232-10638191	PEN/PEK
MH 360	10 JAN	232-11830976	KUL/PEK	MH 370	10 JAN	232-10638202	PEN/PEK
				MH 370	10 JAN	232-10630200	PEN/PEK
				MH 370	11 JAN	232-11812802	PEN/PEK
				MH 370	11 JAN	232-10630211	PEN/PEK
				MH 370	11 JAN	232-10638445	PEN/PEK
				MH 370	12 JAN	232-10630222	PEN/PEK
MH 370	15 JAN	232-11828935	KUL/PEK	MH 370	15 JAN	232-10630454	PEN/PEK
				MH 370	15 JAN	232-10638106	PEN/PEK
MH 360	16 JAN	232-11879792	KUL/PEK				
MH 370	16 JAN	232-11851055	KUL/PEK	MH 370	16 JAN	232-10638375	PEN/PEK
MH 370	17 JAN	232-11851066	KUL/PEK	MH 370	17 JAN	232-10630476	PEN/PEK
				MH 370	17 JAN	232-10638526	PEN/PEK
MH 370	18 JAN	232-11879781	KUL/PEK	MH 370	18 JAN	232-10630480	PEN/PEK
MH 360	19 JAN	232-11879770	KUL/PEK				
MH 370	19 JAN	232-11851081	KUL/PEK				

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATERRIES			
MH 370	20 JAN	232- 11851092	KUL/PEK	MH 370	20 JAN	232- 10638810	PEN/PEK
MH 360	21 JAN	232- 11879766	KUL/PEK	MH 360	21 JAN	232- 11859105	PEN/PEK
MH 360	21 JAN	232- 11880643	KUL/PEK	MH 360	21 JAN	232- 11898445	PEN/PEK
MH 370	21 JAN	232- 11865685	KUL/PEK				
MH 360	22 JAN	232- 11884600	KUL/PEK				
MH 360	22 JAN	232- 11884633	KUL/PEK				
MH 370	22 JAN	232- 11865696	KUL/PEK				
MH 360	23 JAN	232- 11880654	KUL/PEK				
MH 370	23 JAN	232- 11865700	KUL/PEK				
MH 360	24 JAN	232- 11775831	KUL/PEK				
MH 360	24 JAN	232- 11831621	KUL/PEK				
MH 370	24 JAN	232- 11865711	KUL/PEK	MH 370	24 JAN	232- 10639053	PEN/PEK
MH 360	25 JAN	232- 11831632	KUL/PEK				
MH 370	25 JAN	232- 11865722	KUL/PEK	MH 370	25 JAN	232- 10639064	PEN/PEK
MH 370	26 JAN	232- 11828880	KUL/PEK				
MH 360	27 JAN	232- 11831643	KUL/PEK				
MH 370	27 JAN	232- 11828902	KUL/PEK				
MH 360	28 JAN	232- 11831761	KUL/PEK				
MH 370	28 JAN	232- 11828913	KUL/PEK				
MH 360	30 JAN	232- 11831654	KUL/PEK				

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATTERIES			
FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION	FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION
				MH 360	09 FEB	232- 11945894	PEN/PEK
				MH 370	12 FEB	232- 10664054	PEN/PEK
				MH 370	15 FEB	232- 10639193	PEN/PEK
				MH 370	15 FEB	232- 10664080	PEN/PEK
				MH 370	16 FEB	232- 10639204	PEN/PEK
				MH 370	16 FEB	232- 10664091	PEN/PEK
				MH 370	16 FEB	232- 10665395	PEN/PEK
				MH 370	17 FEB	232- 10639215	PEN/PEK
				MH 370	18 FEB	232- 11962786	PEN/PEK
				MH 370	20 FEB	232- 10639510	PEN/PEK
				MH 370	20 FEB	232- 10664334	PEN/PEK
				MH 370	21 FEB	232- 10664345	PEN/PEK
				MH 370	21 FEB	232- 10639532	PEN/PEK
				MH 370	22 FEB	232- 10639543	PEN/PEK
				MH 370	23 FEB	232- 10639554	PEN/PEK
				MH 360	25 FEB	232- 10639775	PEN/PEK
				MH 370	26 FEB	232- 10639086	PEN/PEK
				MH 370	26 FEB	232- 10664603	PEN/PEK

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATTERIES			
FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION	FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN /DESTINATION
MH 370	03 MAR	232-12007413	KUL/PEK				
				MH 360	04 MAR	232-10676853	PEN/PEK
MH 370	05 MAR	232-11989176	KUL/PEK	MH 370	05 MAR	232-10677052	PEN/PEK
MH 360	06 MAR	232-12007671	KUL/PEK				
				MH 370	06 MAR	232-10677063	PEN/PEK
				MH 370	06 MAR	232-10664883	PEN/PEK
MH 370	07 MAR	232-12007295	KUL/PEK	MH 370	07 MAR	232-10677074	PEN/PEK
MH 370	09 MAR	232-12008441	KUL/PEK	MH 370	09 MAR	232-10677096	PEN/PEK
MH 360	10 MAR	232-12007332	KUL/PEK	MH 360	10 MAR	232-10677111	PEN/KUL
MH 370	10 MAR	232-12007321	KUL/PEK	MH 370	10 MAR	232-10677100	PEN/PEK
MH 360	12 MAR	232-12026136	KUL/PEK				
				MH 370	12 MAR	232-10677203	PEN/PEK
MH 370	13 MAR	232-12008905	KUL/PEK	MH 370	13 MAR	232-10677214	PEN/PEK
MH 360	14 MAR	232-12017250	KUL/PEK				
				MH 370	14 MAR	232-10677225	PEN/PEK
MH 318	15 MAR	232-11865976	KUL/PEK	MH 318	15 MAR	232-10677236	PEN/PEK
MH 318	16 MAR	232-12017412	KUL/PEK	MH 318	16 MAR	232-10677240	PEN/PEK
MH 318	16 MAR	232-11865980	KUL/PEK	MH 318	16 MAR	232-10665185	PEN/PEK
MH 318	16 MAR	232-12009163	KUL/PEK				
MH 318	17 MAR	232-11865991	KUL/PEK	MH 318	17 MAR	232-10677251	PEN/PEK
MH 360	17 MAR	232-11866046	KUL/PEK	MH 360	17 MAR	232-1067762	PEN/PEK
MH 318	19 MAR	232-11866050	KUL/PEK	MH 318	19 MAR	232-5652865	PEN/PEK
				MH 318	19 MAR	232-10680762	PEN/PEK
MH 318	20 MAR	232-11866061	KUL/PEK				
MH 318	21 MAR	232-11866035	KUL/PEK	MH 318	21 MAR	232-69867700	PEN/PEK
MH 318	22 MAR	232-11908116	KUL/PEK	MH 318	22 MAR	232-69868315	PEN/PEK
MH 318	23 MAR	232-11828865	KUL/PEK	MH 318	23 MAR	232-69907994	PEN/PEK

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATERRIES			
				MH 318	23 MAR	232- 10680806	PEN/PEK
MH 318	25 MAR	232- 11828924	KUL/PEK				
MH 318	26 MAR	232- 11865921	KUL/PEK	MH 318	26 MAR	232- 54905620	PEN/PEK
MH 318	27 MAR	232- 11865932	KUL/PEK	MH 318	27 MAR	232- 592064442	PEN/PEK
MH 318	28 MAR	232- 11866002	KUL/PEK	MH 318	28 MAR	232- 10681053	PEN/PEK
				MH 318	28 MAR	232- 59207072	PEN/PEK
MH 318	29 MAR	232- 11866013	KUL/PEK	MH 318	29 MAR	232- 59242315	PEN/PEK
MH 318	30 MAR	232- 11775901	KUL/PEK	MH 318	30 MAR	232- 56872771	PEN/PEK
MH 318	30 MAR	232- 11851173	KUL/PEK				
MH 318	31 MAR	232- 11828666	KUL/PEK				
MH 360	31 MAR	232- 11908105	KUL/PEK				

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATTERIES			
FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION	FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION
MH 360	01 APR	232-118851044	KUL/PEK				
MH 360	02 APR	232-12955795	KUL/PEK	MH 360	02 APR	232-10681344	PEN/PEK
MH 360	02 APR	232-11908061	KUL/PEK				
MH 318	02 APR	232-11851151	KUL/PEK				
MH 318	04 APR	232-11865943	KUL/PEK	MH 318	04 APR	232-10677542	PEN/PEK
MH 318	04 APR	232-12955806	KUL/PEK				
MH 360	04 ARP	232-12955983	KUL/PEK				
MH 318	05 APR	232-12955810	KUL/PEK	MH 318	05 APR	232-10677553	PEN/KUL
MH 318	05 APR	232-11865954	KUL/PEK				
MH 318	06 APR	232-11070076	KUL/PEK				
MH 318	06 APR	232-12955821	KUL/PEK				
MH 318	07 APR	232-12955832	KUL/PEK				
MH 318	08 APRIL	232-11866024	KUL/PEK				
MH 318	09 APL	232-11908094	KUL/PEK				
MH 318	09 APR	232-12955854	KUL/PEK				
MH 318	10 APR	232-11908072	KUL/PEK	MH 318	10 APR	232-10681646	PEN/PEK
MH 318	11 APR	232-11851184	KUL/PEK				
				MH 318	12 APR	232-12976784	PEN/PEK
MH 318	13 APR	232-11908083	KUL/PEK				
MH 318	17 APR	232-12956053	KUL/PEK	MH 318	17 APR	232-10681952	PEN/PEK
				MH 318	18 APR	232-10681963	PEN/PEK
				MH 318	19 APR	232-10681974	PEN/PEK
				MH 318	19 APR	232-12977101	PEN/KUL
				MH 360	22 APR	232-10678136	PEN/PEK
				MH 318	25 APR	232-10682276	PEN/PEK
				MH 360	25 APR	232-10678161	PEN/PEK
				MH 360	25 APR	232-12992055	PEN/PEK
				MH 360	26 APR	232-12977565	PEN/PEK

**APPENDIX 1.18J - AIRWAY BILL (FROM JANUARY TO MAY 2014)**

MANGOSTEEN				LITHIUM ION BATERRIES			
FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION	FLIGHT NO	DATE	AIRWAYS BILL	ORIGIN/ DESTINATION
				MH 360	01 MAY	232-10682560	PEN/PEK
				MH 360	03 MAY	232-13053250	PEN/PEK
				MH 360	10 MAY	232-13053784	PEN/PEK
				MH 360	18 MAY	232-13053832	PEN/PEK
				MH 360	20 MAY	232-12582511	PEN/PEK
				MH 360	21 MAY	232-12582522	PEN/PEK
				MH 360	22 MAY	232-12582533	PEN/PEK
				MH 360	23 MAY	232-12594794	PEN/PEK
				MH 360	24 MAY	232-12594805	PEN/PEK
				MH 360	25 MAY	232-12977020	PEN/PEK
				MH 360	27 MAY	232-12594934	PEN/PEK
				MH 360	28 MAY	232-12582835	PEN/PEK
				MH 360	28 MAY	232-12594945	PEN/PEK
				MH 360	29 MAY	232-12582846	PEN/PEK
				MH 360	29 MAY	232-12594956	PEN/PEK
				MH 360	30 MAY	232-12582850	PEN/PEK
				MH 360	31 MAY	232-13144563	PEN/PEK