SINGLE IRS - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

   A. This section gives the procedures to do a check of the Single Inertial Reference System - IRS.

   B. The primary IRS components are: the Inertial Reference Unit (IRU), the Mode Select Unit (MSU), and the IRU Mounting Tray.

   C. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	*DESCRIPTION*	*EFFECTIVITY*
34-26-00-700-801-A	SINGLE IRS - OPERATIONAL TEST	ALL
34-26-00-700-802-A	SINGLE IRS - MOUNTING TRAY LEVELING/ALIGNMENT	ALL

TASK 34-26-00-700-801-A
EFFECTIVITY: ALL

2. SINGLE IRS - OPERATIONAL TEST

A. General

(1) This task gives the procedures to do the operational test of the Single IRS.

B. References

REFERENCE	*DESIGNATION*
AMM SDS 31-42-00/1	
AMM SDS 34-15-00/1	
AMM SDS 34-22-00/1	
AMM SDS 34-23-00/1	
AMM SDS 34-62-00/1	
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit

I. Preparation

SUBTASK 841-002-A

(1) Energize the aircraft with the external DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

(2) Make sure that the systems below are serviceable:

- Electronic Flight Instrument System (EFIS) (AMM SDS 34-22-00/1).
- Integrated Computer System (AMM SDS 31-42-00/1).
- Dual FMS (Universal) (AMM SDS 34-62-00/1).

- ADC System (AMM SDS 34-15-00/1).
- Head-up Guidance System (AMM SDS 34-23-00/1).

(3) Make sure that the indicated groundspeed on the PFD is lower than 20 knots.

(4) On the Mode Select Unit (MSU), make sure that the rotary switch is in the OFF position.

(5) On the circuit breaker panel, make sure that the IRS circuit breaker is closed.

J. Single IRS - Test Procedures (Figure 501) (Figure 502)

SUBTASK 710-002-A

(1) Do the IRS power-up and alignment test as follows:

(a) Make sure that the Combiner shows flags ATT FAIL and HDG FAIL.

(b) Turn the MSU rotary switch to the ALIGN position.

– The ALIGN annunciator (amber) comes on.

– The ON BATT and the NO AIR annunciators (amber) may come on momentarily.

(c) NOTE:
- The IRS must receive the present position for the alignment to be completed. The FMS position must be updated to permit this data to be read by the IRS.
- If the aircraft is moved during the alignment, the IRU stops the alignment and starts a full alignment again 30 seconds after the motion stops.

On the INIT 1/1 page, on FMS CDU1, push the ACCEPT line select key to update the FMS position.

(d) Wait until the alignment is completed. The alignment time depends on the local latitude. The time of alignment is less than 10 minutes for latitudes of less than 70.25 degrees.

- After the alignment of the IRS is completed, the NAV RDY annunciator (green) comes on.

(e) Turn the MSU rotary switch to the NAV position.

- The ALIGN and NAV RDY annunciators go out of the MSU.
- The flags ATT FAIL and HDG FAIL go out of the Combiner, and a valid attitude and heading data are shown.

(2) Do the IRS test by the MSU test switch as follows:

(a) On the MSU, push the TEST switch.

Result:

1 All MSU annunciators come on for eight seconds.

2 The Combiner shows the ATT TEST and HDG TEST.

3 The Combiner shows these indications:

- 30 degrees for Magnetic Heading.
- 15 degrees for Pitch Angle.
- 5 degrees for Roll Angle.

K. Follow-on

SUBTASK 842-002-A

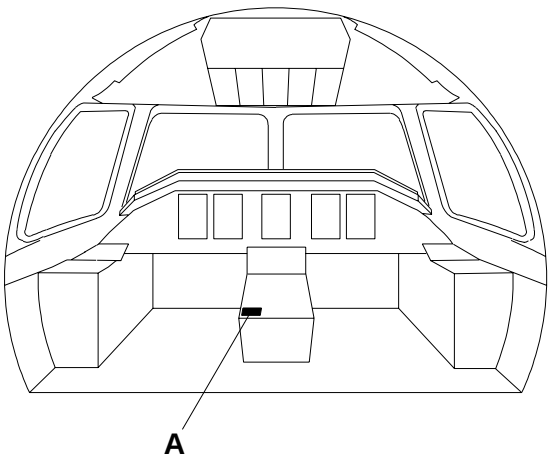
(1) Set the MSU rotary switch to the OFF position.

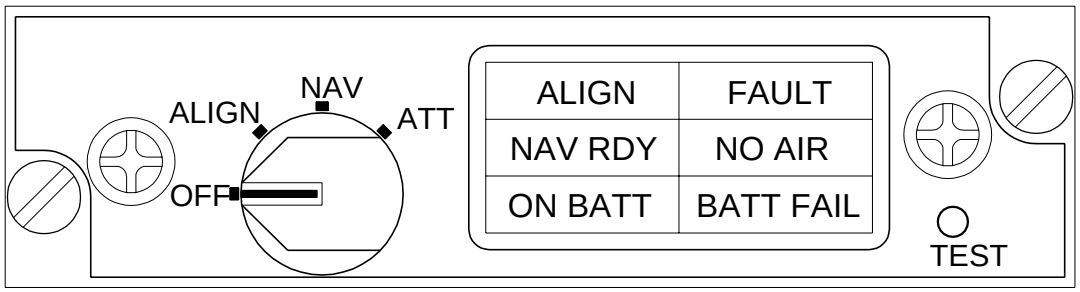
– The ALIGN annunciator comes on.

– After 3 seconds, the IRU disables the outputs, and the flags ATT FAIL and HDG FAIL come on, on the Combiner.

(2) Deenergize the aircraft (AMM TASK 20-40-01-860-801-A/200).

EFFECTIVITY: ALL
MSU - Mode Select Unit
Figure 501





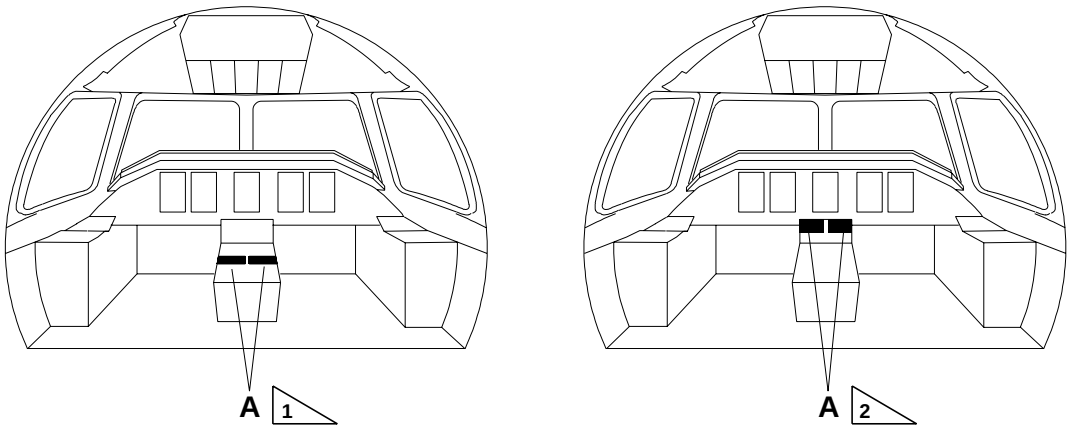
DET. A

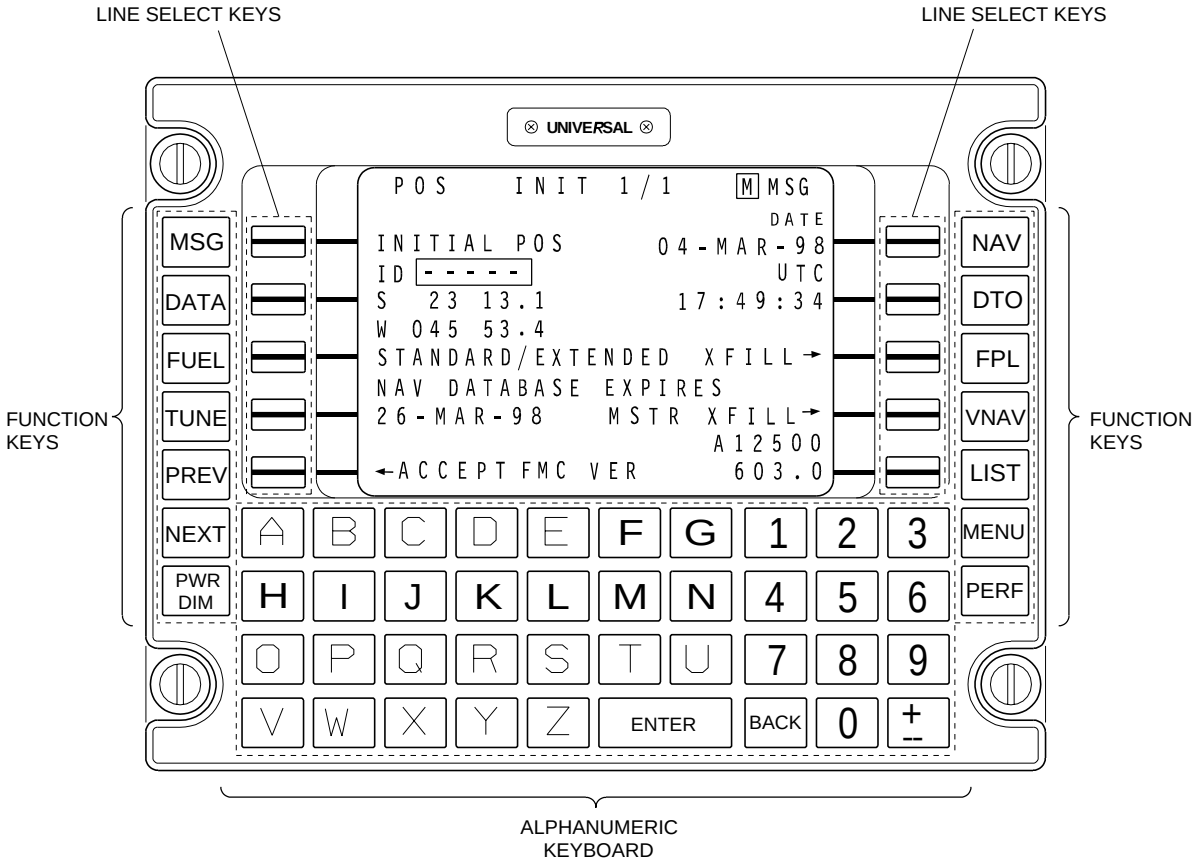
145AMM340440.MCE

EFFECTIVITY: ALL

FMS CDU

Figure 502





DET. A

1 AIRCRAFT WITH FMS CDUS INSTALLED ON CONTROL PEDESTAL AFT PANEL.

2 AIRCRAFT WITH FMS CDUS INSTALLED ON CONTROL PEDESTAL FORWARD PANEL.

145AMM340276.MCE B

TASK 34-26-00-700-802-A
EFFECTIVITY: ALL

3. SINGLE IRS - MOUNTING TRAY LEVELING/ALIGNMENT

A. General

(1) This task gives the procedures to level and align the IRU Mounting Tray.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
AMM TASK 08-20-00-500-801-A/200	AIRCRAFT LEVELING IN THE PASSENGER CABIN
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 29-10-00-860-802-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH EMDP
AMM TASK 32-00-02-910-801-A/200	SAFETY PIN OF THE NLG DOORS SOLENOID VALVE - INSTALLATION AND REMOVAL
AMM TASK 34-26-01-000-801-A/400	INERTIAL REFERENCE UNIT (IRU) - REMOVAL
AMM TASK 34-26-01-400-801-A/400	INERTIAL REFERENCE UNIT (IRU) - INSTALLATION
SB145-32-0036	-
WM 32-61-50	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
213	113CZ	Forward electronic compartment - LH upper side

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 124	Device, Leveling	To make the IRU Mounting Tray level with the aircraft	
GSE 005	Plumb, Aircraft Leveling	To do the projection of the longitudinal axis of the aircraft on the ground	

E. Auxiliary Items

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
Commercially available	Tape measure - from 25 m (82 ft) up, with subdivisions in mm (inches to 8ths)	To measure distances	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Forward electronic compartment

I. Preparation

SUBTASK 841-003-A

(1) Put the aircraft as near as possible or over a reference line of true heading and in a position in which its longitudinal axis goes across the reference line of true heading (Figure 503).

(2) (PRE-MOD SB145-32-0036) Make sure that the pressure in hydraulic system 1 is fully released (AMM TASK 29-10-00-860-802-A/200).

(3) (POST-MOD SB145-32-0036) Install the safety pin of the NLG door solenoid valve (AMM TASK 32-00-02-910-801-A/200).

(4) Open access door 113CZ (AMM MPP 06-41-01/100).

(5) Make the aircraft level (AMM TASK 08-20-00-500-801-A/200).

J. Leveling of the IRU Mounting Tray (Figure 504)

SUBTASK 710-003-A

(1) Put the IRU Mounting Tray on the mounting surface.

(2) Attach the tray to the aircraft structure, but keep the four bolts loose.

CAUTION: BE CAREFUL WHEN YOU INSTALL THE LEVELING DEVICE (GSE 124) ON THE MOUNTING TRAY AND WHEN YOU MAKE THE MEASUREMENTS TO PREVENT DAMAGE TO THE PRECISION INSTRUMENT.

(3) Install the leveling device (GSE 124) in place of the IRU Computer with the three guide pins on the mounting tray.

(4) Attach the leveling device with the two knurled clamp knobs over the supporting hooks.

(5) Examine the circular level on the leveling device and adjust the IRU Mounting Tray with shims as necessary to get better than 0 ± 0.1 degrees of level in pitch and roll.

CAUTION: MAKE SURE THAT THE IRU MOUNTING TRAY CANNOT "ROCK" ON THE MOUNTING FEET.

(6) Remove the leveling device from the IRU Mounting Tray.

(7) Make sure that the IRS circuit breaker, on the circuit breaker panel, is open.

(8) Install the IRU computer in the IRU Mounting Tray (AMM TASK 34-26-01-400-801-A/400).

(9) Energize the aircraft (AMM TASK 20-40-01-860-801-A/200).

(10) Make sure that the indicated groundspeed on the PFD is lower than 20 knots and put the aircraft in the on-ground configuration, as follows:

(a) On the circuit breaker panel, open the AIR/GND A, AIR/GND B, AIR/GND C, AIR/GND D, IND 1 and IND 2, AWS 1 and AWS 2 circuit breakers.

(b) Remove connectors P7163 and P7164 of the LGEU (WM 32-61-50).

(c) Put a jumper between pins C and E and between pins N and J of connector P7163.

(d) Put a jumper between pins C and E and between pins N and J of connector P7164.

(e) Close the AIR/GND A, AIR/GND B, AIR/GND C and AIR/GND D circuit breakers.

(11) Make sure that the MSU rotary switch is in the OFF position.

(12) On the circuit breaker panel, close the IRS circuit breaker.

(13) Turn on the FMS CDUs and the Head-up Guidance System.

(14) Do the steps below to get the pitch and roll data from the IRU:

(a) Make sure that Combiner shows flags ATT FAIL and HDG FAIL.

(b) Turn the MSU rotary switch to the ALIGN position.

– The ALIGN annunciator (amber) comes on.

– The ON BATT and the NO AIR annunciators (amber) may come on momentarily.

(c) NOTE: • The IRS must receive the present position for the alignment to be completed. The FMS position must be updated to permit this data to be read by the IRS.

• If the aircraft is moved during the alignment, the IRU stops the alignment and starts a full alignment again 30 seconds after the motion stops.

On the INIT 1/1 page, on FMS CDU1, push the ACCEPT line select key to update the FMS position.

(d) Wait until the alignment is completed. The alignment time depends on the local latitude. The time of alignment is less than 10 minutes for latitudes of less than 70.25 degrees.

• After the alignment of the IRS is completed, the NAV RDY annunciator (green) comes on.

(e) Turn the MSU rotary switch to the NAV position.

• The ALIGN and NAV RDY annunciators go out of the MSU.

• The flags ATT FAIL and HDG FAIL go out of the Combiner and a valid attitude and heading data are shown.

(15) Make sure that the IRU pitch and roll outputs shown on the Combiner are within 0 ± 0.1 degrees. If not, use the indicated error to determine the correct pitch and roll leveling to

be made to the IRU Mounting Tray and do the leveling of the IRU mounting tray again until you get a satisfactory result.

(16) Turn the MSU rotary switch to the OFF position.

(17) The ALIGN annunciator comes on.

(18) After 3 seconds, the IRU disables the outputs and the flags ATT FAIL and HDG FAIL come on, on the Combiner.

K. Alignment of the IRU Mounting Tray

SUBTASK 710-004-A

(1) Note the angle of the true heading of the reference line (H_T) in relation to the true north.

(2) Make sure that the aircraft is level.

(3) Put plumb bobs at points 1 (Zones 123 and 124) and 9 (Zones 311 and 312) under the fuselage of the aircraft along the longitudinal axis to determine the true heading of the aircraft (H_A).

NOTE: The plumb bob must not touch the ground, but it must be as near as possible.

(4) Wait the plumb bob to stabilize and, after that, mark the projection of its tip on a piece of adhesive tape put on the ground.

(5) Determine the distances L, D_1, and D_2, with a tape measure (Figure 503).

- Where:

  L = Length of aircraft between plumb bobs (mm or in.). L is always positive.

  D_1 = Displacement of the plumb bob at the front of the aircraft (mm or in.). D_1 is positive if the plumb bob is at the right of the reference line, when you look from the rear to the nose of the aircraft.

  D_2 = Displacement of the plumb bob at the rear of the aircraft (mm or in.). D_2 is positive if the plumb bob is at the left of the reference line, when you look from the rear to the nose of the aircraft.

NOTE:
- D_1 and D_2 must be perpendicular to the reference line (true north or known true heading).
- D_1 and D_2 must be measured with an accuracy of 1 mm (or 1/8 in.).

(6) Use this equation to determine the true heading of the aircraft (H_A):

$$H_A = H_T + \text{Sin}^{-1}[(D_1 + D_2)/L] \text{ degrees}$$

– Where:

  H_A = True heading of the aircraft (in decimal degrees).

  H_T = True heading of the surveyed line (in decimal degrees).

(7) Make sure that the aircraft is in the on-ground configuration and the indicated groundspeed on the PFD is lower than 20 knots.

(8) Make sure that the MSU rotary switch is in the OFF position.

(9) On the circuit breaker panel, make sure that the IRS circuit breaker is closed.

(10) Make sure that the FMS CDUs and the Head-up Guidance System are operational and on.

(11) Do the steps below to get the heading data from the IRU:

(a) Make sure that the Combiner shows flags ATT FAIL and HDG FAIL.

(b) Turn the MSU rotary switch to the ALIGN position.

– The ALIGN annunciator (amber) comes on.

– The ON BATT and the NO AIR annunciators (amber) may come on momentarily.

(c) NOTE:
- The IRS must receive the present position for the alignment to be completed. The FMS position must be updated to permit this data to be read by the IRS.
- If the aircraft is moved during the alignment, the IRU stops the alignment and starts a full alignment again 30 seconds after the motion stops.

On the INIT 1/1 page, on FMS CDU1, push the ACCEPT line select key to update the FMS position.

(d) Keep the MSU rotary switch in the ALIGN position for approximately 15 minutes to maximize the heading solution accuracy.

- After the alignment of the IRS is completed, the NAV RDY annunciator (green) comes on.

(e) Turn the MSU rotary switch to the NAV position.

- The ALIGN and NAV RDY annunciators go out of view on the MSU.
- The flags ATT FAIL and HDG FAIL go out of view on the Combiner, and a valid attitude and heading data are shown.

(12) On the Head-up Control Panel (HCP), do the steps below to get the true heading data on the Combiner Display:

(a) Push the TEST key.

Result:

1 The HGS Test Menu page is shown on the Combiner Display.

(b) On the HGS Test Menu page, select the Sensor Data option with the BRT+ and DIM− keys, on the Head-up Control Panel, and, after that, push the ENTER key.

NOTE: The BRT+ key is used to scroll up the cursor on the HGS Test Menu and the DIM− key is used to scroll down the cursor on the HGS Test Menu.

Result:

1 The Sensor Menu page is shown on the Combiner Display.

(c) On the Sensor Menu page, select the IRS option with the BRT+ and DIM− keys, on the Head-up Control Panel, and, after that, push the ENTER key.

NOTE: The BRT+ key is used to scroll up the cursor on the HGS Test Menu and the DIM− key is used to scroll down the cursor on the HGS Test Menu.

Result:

1 The IRS Data page is shown on the Combiner Display. The true heading data from the IRU is shown on the IRS Data page.

(13) Compare the true heading data from the IRU with the true heading value calculated in step (6).

(14) If the IRU output is not within the desired accuracy (± 0.2 degree), use the indicated error to determine the correct yaw adjustment to be made to the IRU mounting tray. Align the IRU mounting tray again, until you get a satisfactory result.

(15) Tighten the two aft screws of the IRU mounting tray and make sure that the true heading indication on the IRS Data page, on the Combiner Display, continues within the tolerance.

(16) Turn the MSU rotary switch to the OFF position.

(17) The ALIGN annunciator comes on.

(18) After 3 seconds, the IRU disables the outputs, and the flags ATT FAIL and HDG FAIL come on, on the Combiner.

(19) On the circuit breaker panel, open the IRS circuit breaker.

(20) Remove the IRU (AMM TASK 34-26-01-000-801-A/400) and tighten the two forward screws of the IRU mounting tray.

NOTE: Do this step carefully not to lose the adjustment of the IRU mounting tray.

(21) Install the IRU in its mounting tray again (AMM TASK 34-26-01-400-801-A/400).

(22) On the circuit breaker panel, close the IRS circuit breaker.

(23) Do steps (11) to (14) again and make sure that the true heading indication on the IRS Data page, on the Combiner Display, continues within the tolerance.

L. Follow-on

SUBTASK 842-003-A

(1) Set the MSU rotary switch to the OFF position.

– The ALIGN annunciator comes on.

– After 3 seconds, the IRU disables the outputs, and the flags ATT FAIL and HDG FAIL come on, on the Combiner.

(2) Remove all jumpers installed on connectors P7163 and P7164, and install these connectors on the LGEU.

(3) On the circuit breaker panel, close the IND 1, IND 2, AWS 1 and AWS 2 circuit breakers.

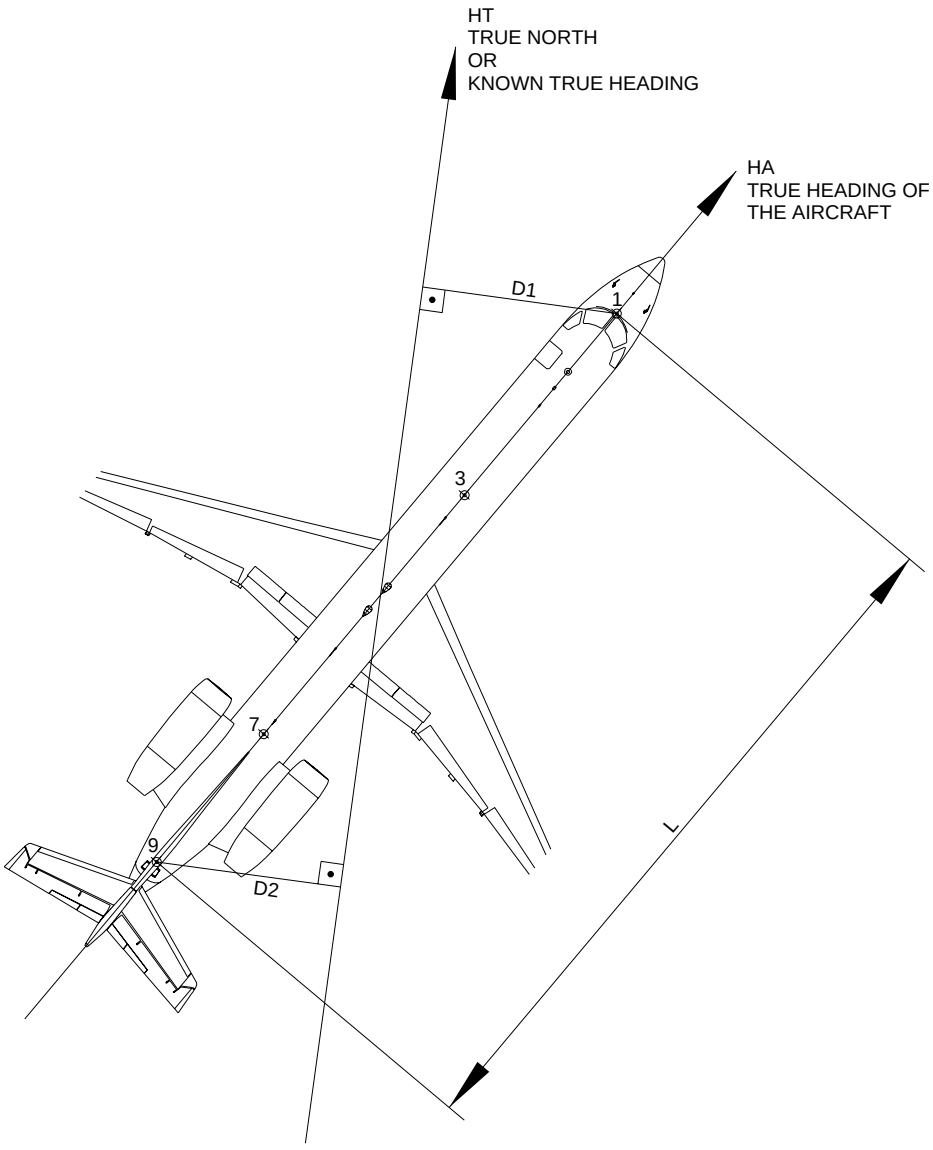
(4) Close access door 113CZ (AMM MPP 06-41-01/100).

(5) (POST-MOD SB145-32-0036) Remove the safety pin from the NLG door solenoid valve (AMM TASK 32-00-02-910-801-A/200).

(6) Deenergize the aircraft (AMM TASK 20-40-01-860-801-A/200).

EFFECTIVITY: ALL

Determination of the True Heading
Figure 503 - Sheet 1

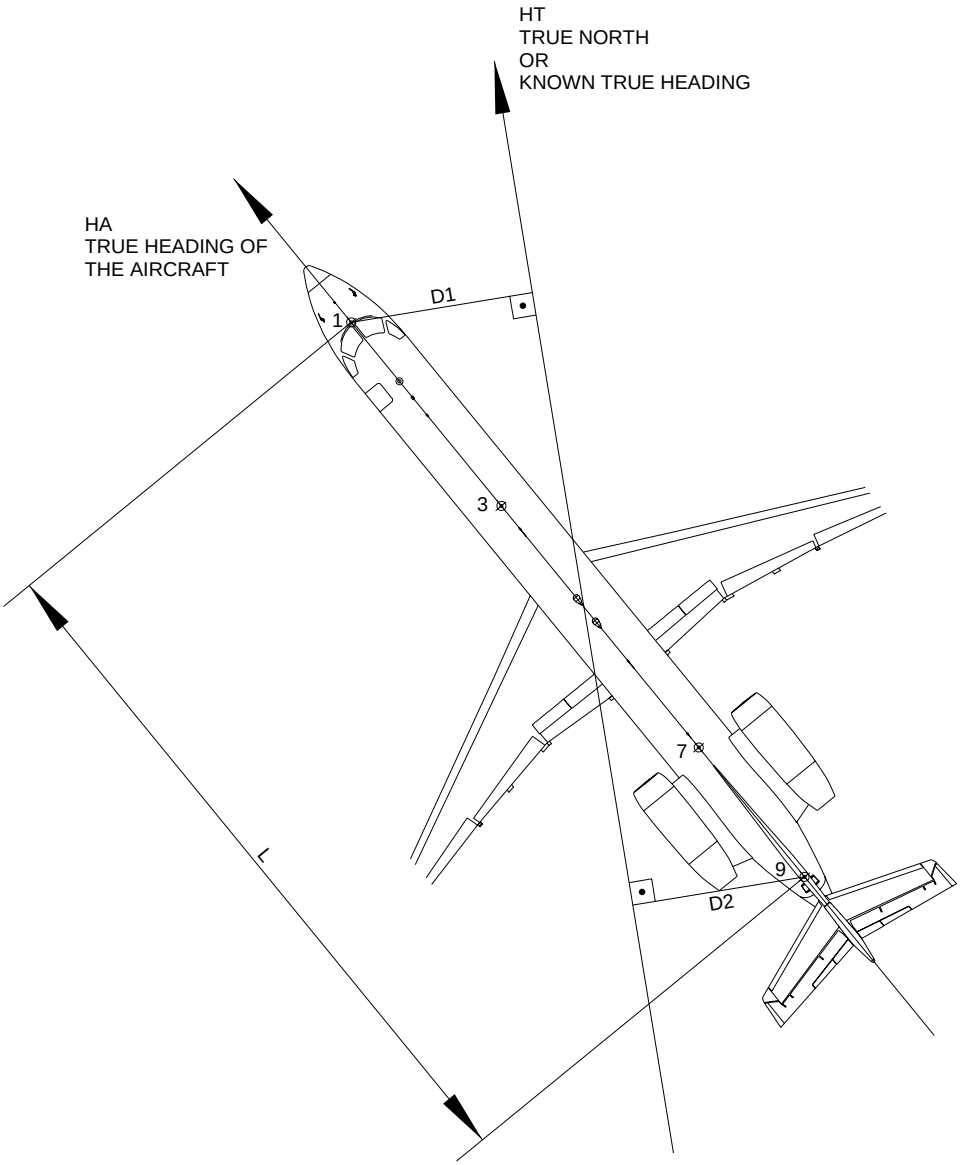


D1 AND D2 ARE POSITIVE
L IS POSITIVE

145AMM340450.MCE A

EFFECTIVITY: ALL

Determination of the True Heading
Figure 503 - Sheet 2

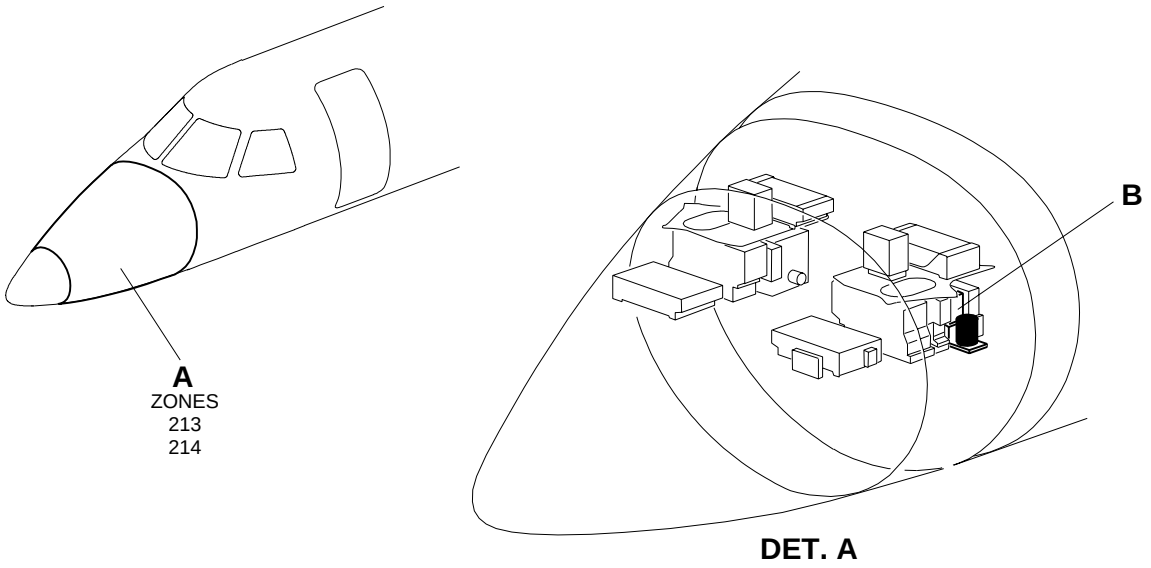


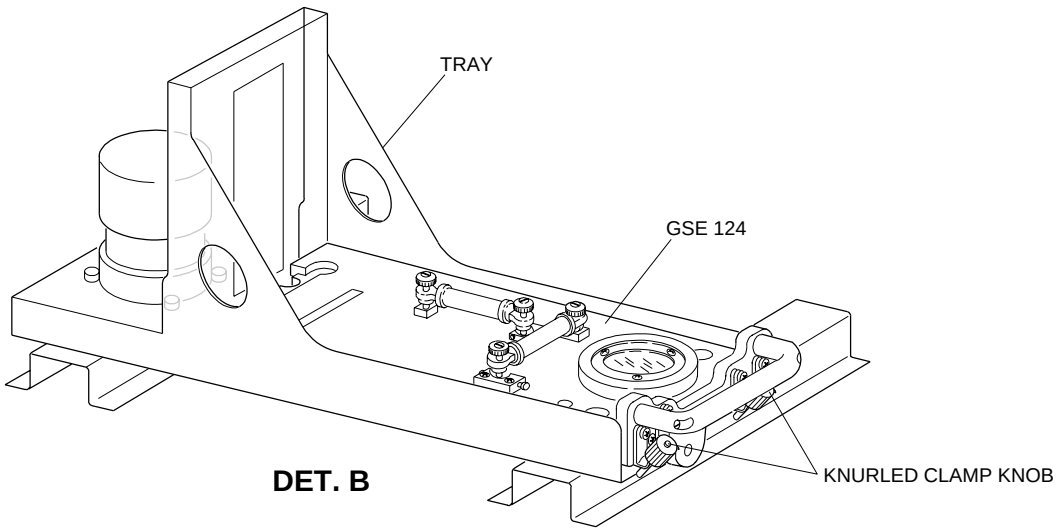
D1 AND D2 ARE NEGATIVE
L IS POSITIVE

145AMM340451.MCE A

EFFECTIVITY: ALL

IRU Mounting Tray Leveling
Figure 504





145AMM340452.MCE