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C-12-114-0F0/MF-001

DESCRIPTION AND MAINTENANCE INSTRUCTIONS

CT114 TUTOR

ELECTRICAL SYSTEMS

(ENGLISH)

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Page No.	Change No.	Page No.	Change No.
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A	0	4-1 to 4-47/4-48	0
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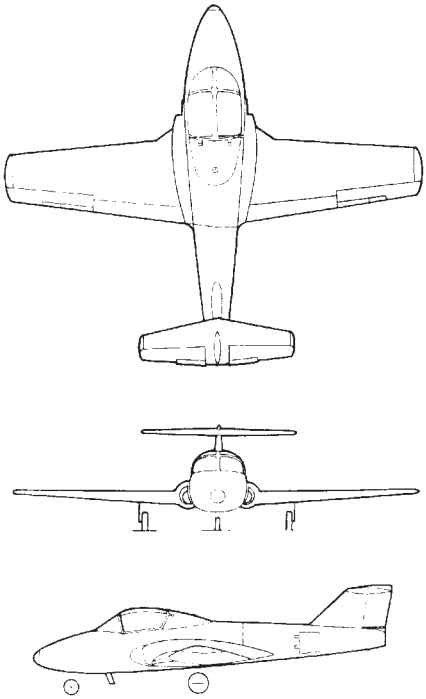
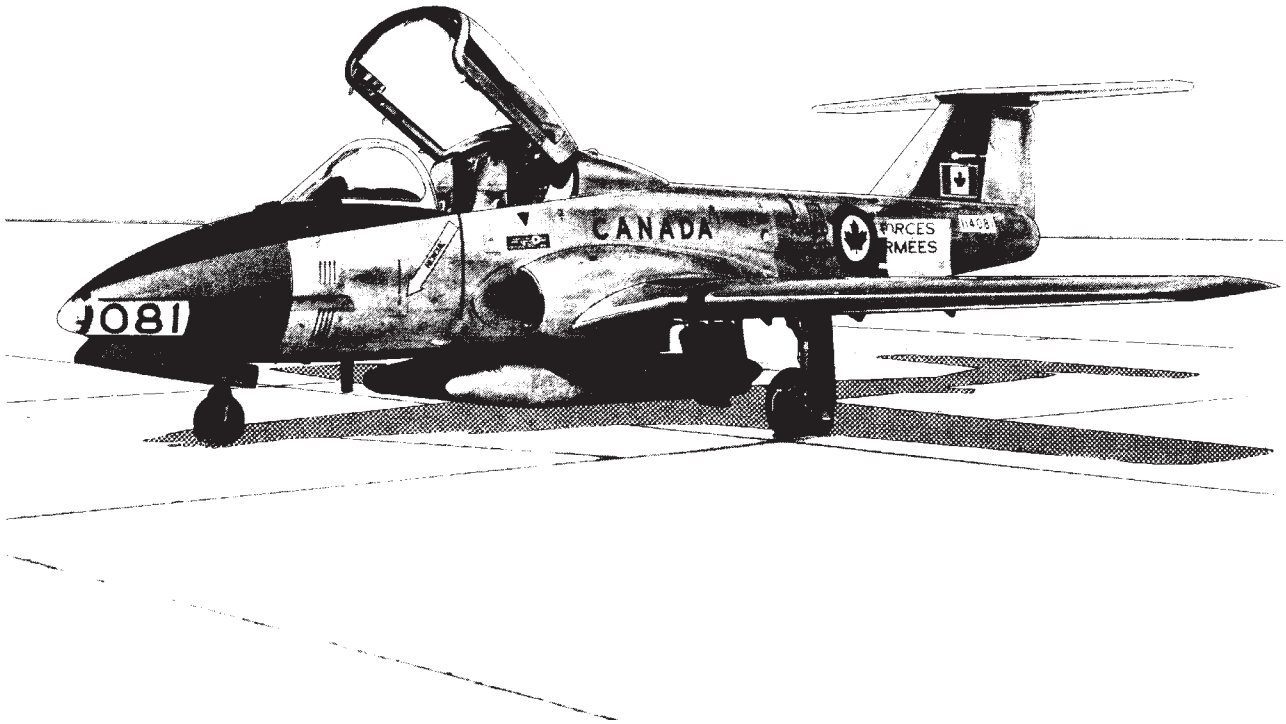
CT114 TUTOR





Frontispiece

TABLE OF CONTENTS

LIST OF FIGURES

PART 1

GENERAL INFORMATION

PURPOSE

This publication is one of a series providing descriptive and corrective maintenance instructions for CT114 Tutor and Snowbird aircraft. For general information and preventive maintenance instructions, see C-12-114-000/MF-001. For a list of applicable publications, see C-12-114-000/AX-000.

NOTE

This publication contains information pertaining to the operation, maintenance and servicing of the electrical system used in CT114 Tutor aircraft rewired in accordance with C-12-114-000/CD-036. For information regarding a pre-rewired aircraft, refer to C-12-114-0F0/MF-000.

PART 2

DC SYSTEM

GENERAL

1. The dc system is a 28 volt single-wire system using the aircraft structure as a ground return. The power feeders are generated by a dual-purpose 300 ampere starter-generator and is fed to the cockpit essential dc power feeders through the reverse-current cut-out and starting contactor relay. An emergency dc power source is provided by two 25.2 volt 24 A•h batteries, connected in series for starting, and in parallel for supplying the essential dc buses. An external source of dc power can be connected to the aircraft buses for engine starting and ground checking of equipment. For a simplified schematic of the aircraft electrical system, see Figure 2-2.

COMPONENTS

2. For a list of the main components of the dc system and their locations, see Figure 2-1.

DC STARTER-GENERATOR

3. The starter-generator has a continuous duty rating of 300 amperes with an overload rating of 375 amperes for a period of 2 minutes and 450 amperes for 5 seconds. There are four terminals (A, B, D, E) on the unit. Terminal B is for the positive output and starting input, terminal E is the negative return, terminal A is field control, and terminal D for an equalizing circuit which is not used. Design features of the starter-generator and circuit make it possible for the unit to be used as a motor for engine starting and as a generator for supplying dc power. In the event of a generator failure, a warning is given by flashing of the MASTER CAUTION light coupled with the generator failure light at the annunciator panel. Air supplied from the eighth stage of the turbine compressor, through a jet pump, provides generator cooling during ground running and in flight. For further information on power plant cooling, see C-12-114-0D0/MF-001. For further information on the starter-generator, see C-17-499-000/MF-000.

REMOVAL AND INSTALLATION OF STARTER-GENERATOR

4. For removal and installation procedure, see C-12-114-0D0/MF-001.

STARTER-GENERATOR BRUSH CHECK

5. Procedure:

a. Remove starter-generator (see C-12-114-0D0/MF-001).

b. Remove brush band cover.

c. Remove brushes from holders.

d. Ensure that there is at least 3/16 inch of brush remaining, measured between the wear edge of brush and the nearest point on wear groove.

NOTE

Brushes must always be replaced in sets and must be bedded in.

e. Check commutator for overheating, arcing, oil contamination and obvious wear.

f. Install brushes in holders.

g. Install brush band cover.

h. Install starter-generator (see C-12-114-0D0/MF-001).

DC VOLTAGE REGULATOR

6. A dc voltage regulator keeps the generator voltage constant at 28.6 (+0 Vdc, -0.2 Vdc) volts during engine speed variations and load changes on the electrical system. The voltage regulator is a compact self-contained unit utilizing state-of-the-art solid state technology. Operating power for the regulator is obtained from the regulated generator. The regulator has an electronic latch-type circuit that automatically resets the generator trip relay when power is removed from the aircraft.

7. The regulator automatically adjusts field current to produce a constant voltage at the generator output which compensates for varying speeds and loads. To protect against system overvoltage, a circuit in the regulator monitors:

a. Generator voltage rise time.

b. Operation time of generator trip relay (K7).

c. Operation time of generator reverse-current cut-out and starting relay (K1P).

Component	Location
LH battery (BT1P)	Nose compartment
RH battery (BT2P)	Nose compartment
Generator reverse-current cut-out and starting contactor (K1P)	LH wing fillet
Ground power relay (K2P)	LH wing fillet
LH battery relay (K4P)	Nose compartment, MDP
RH battery relay (K3P)	Nose compartment, MDP
Non-essential bus tie-in relay (K6P)	Nose compartment, MDP
Generator fail indicator relay (K4)	Nose discrete component box
Generator reset control relay (K8)	Nose discrete component box
Loadmeter (M1P)	LH fascia panel
Starter-generator (MG1P)	Engine bay, underside
Loadmeter shunt (R1P)	Engine bay, left side
Electrical master switch (S1P)	Centre console panel
Generator control switch (S2P)	Centre console panel
Ground power receptacle (J1P)	Trailing edge, LH wing fillet
Canopy power relay (K9P)	Nose compartment, MDP
Voltage regulator panel (Z2P)	Nose compartment
Engine master switch (S1K)	Centre console panel
Engine start switch (S2K)	Centre console panel
Engine starter stop switch (S4K)	Centre console panel
Under current sense relay (K2)	Nose discrete component box

Figure 2-1 (Sheet 1 of 2) DC System – Component Locations

Component	Location
Under current trip time delay relay (K3)	Nose discrete component box
Start gen trip control relay (K7)	Nose discrete component box
50 per cent relay (K6)	Nose discrete component box
Engine start & control relay (K5)	Nose discrete component box
Current sense override switch (E5RU)	Centre console panel
Current select relay (K1)	Nose discrete component box

Figure 2-1 (Sheet 2 of 2) DC System – Component Locations

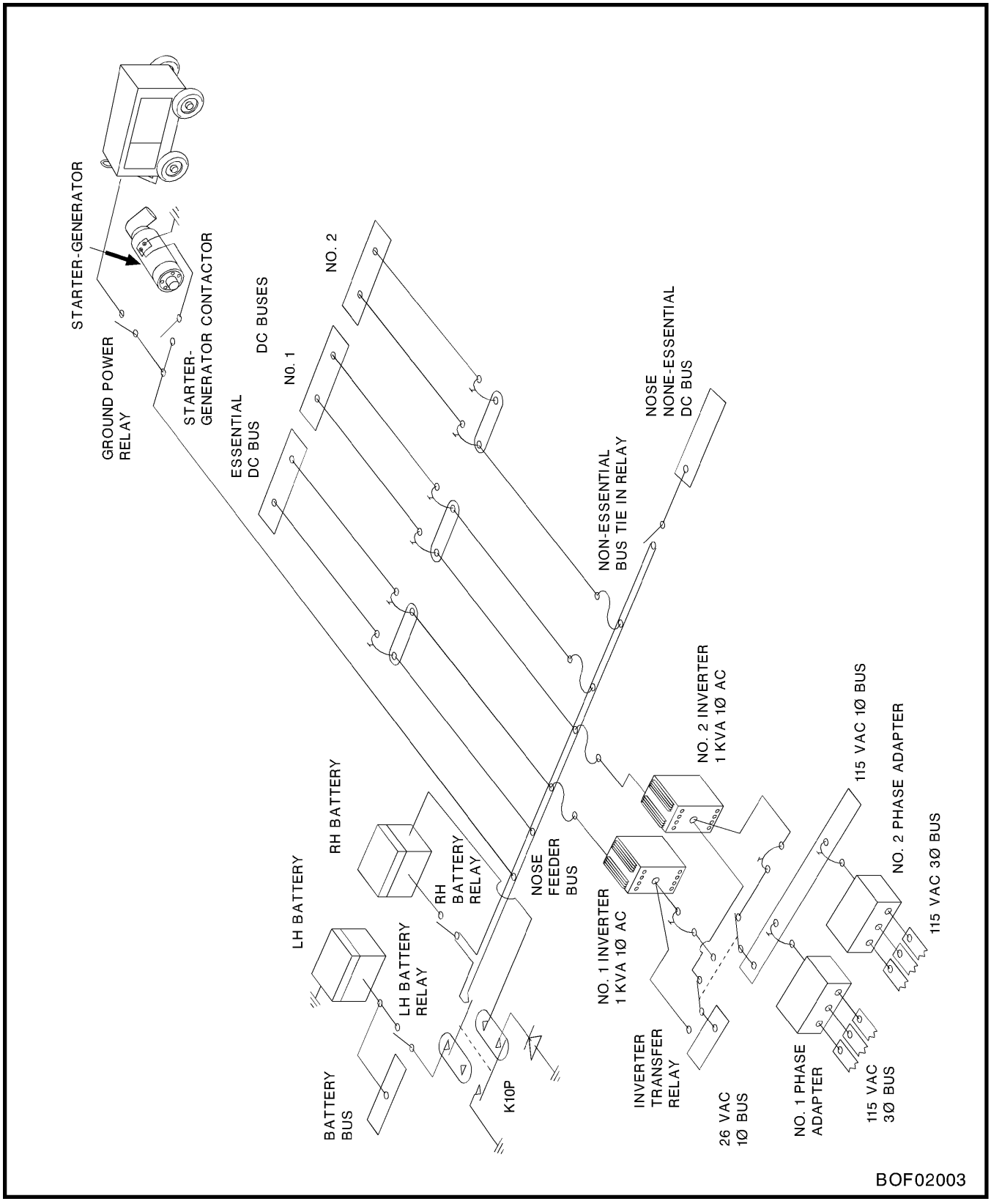


Figure 2-2 Simplified Aircraft Electrical System

REVERSE-CURRENT RELAY CUTOUT AND STARTING CONTACTOR

8. The purpose of the reverse-current relay is to connect the generator to the electrical bus system when the generator builds up to a voltage greater than that of the battery, and to disconnect the generator from the bus when the generator voltage drops to a value lower than that of the battery. The main contacts perform the dual purpose of connecting the battery or ground power to the starter-generator for engine starting and connecting the dc bus to the generator when the engine is at or above idle. The contactor is a heavy-duty type with a continuous duty rating of 600 amperes, and an overload rating of 1200 amperes for 1 minute.

OPERATION OF CONTACTOR (See Figure 2-3)

9. Operation of the reverse-current cutout and starting contactor is as follows: The voltage relay is energized by generator voltage applied to the SW terminal. Its contacts will allow the differential coil to be shunted across the main contacts to sense the difference between generator and bus voltage. When the generator voltage exceeds the bus voltage by a value between 0.35 and 0.65 volts, the differential coil contacts will close. The main contactor coil is energized from battery voltage on the SW terminal, thereby connecting the generator to the bus. When the contactor is used for starting, dc power is applied to terminal APP to energize the main contactor coil, allowing the bus to be connected to the starter-generator. For further information on the reverse-current cutout, see C-17-231-000/MN-000.

REMOVAL AND INSTALLATION OF GENERATOR REVERSE-CURRENT CUTOUT AND STARTING CONTACTOR

10. Removal procedure:

a. Disconnect the aircraft batteries.

b. Gain access to the generator reverse-current cutout and starting contactor through LH wing fillet access panel at station 245.

c. Remove terminal cover.

d. Remove the electrical leads and tape ends.

e. Remove the four retaining screws.

f. Remove the generator reverse-current cutout and starting contactor from the aircraft.

11. To install the generator reverse-current cutout and starting contactor, reverse the removal procedure.

CIRCUIT-BREAKERS (See Figures 2-4 and 2-5)

12. All circuit-breakers in the aircraft are mounted on two panels, one in the nose compartment Main Distribution Panel (MDP), the other on the centre console. The circuit-breakers on the centre console are accessible in flight.

13. All circuit-breakers are single-pole trip-free push-pull type, with the current rating stamped in white on the top portion of the stem. When a circuit-breaker trips under overload condition, the stem moves out. This is made apparent by a white band showing on the stem. A circuit-breaker that has tripped due to an overload can be reset only if the overload has been removed. Manual tripping of the circuit-breaker is achieved by pulling the actuator stem to the tripped position.

DETACHING CIRCUIT-BREAKER PANEL – CENTRE CONSOLE

14. To detach the circuit-breaker panel on the centre console, proceed as follows:

NOTE

It is necessary to detach the centre console circuit-breaker panel for removal and installation of the canopy actuator.

a. Ensure all power is off the aircraft and that electrical MASTER switch is in the OFF position.

b. Disconnect aircraft batteries.

c. Remove the AUX OVERRIDE panel to prevent damage to the circuit-breaker panel wire harness.

d. Disconnect the ten quick-release fasteners on the face of the circuit-breaker panel.

e. Remove the cover at the rear of the circuit-breaker panel by releasing the fasteners.

f. Release the two straps holding the wire harnesses entering the panel (one on each side).

g. Circuit-breaker panel can now be swung forward clear of its mounting.

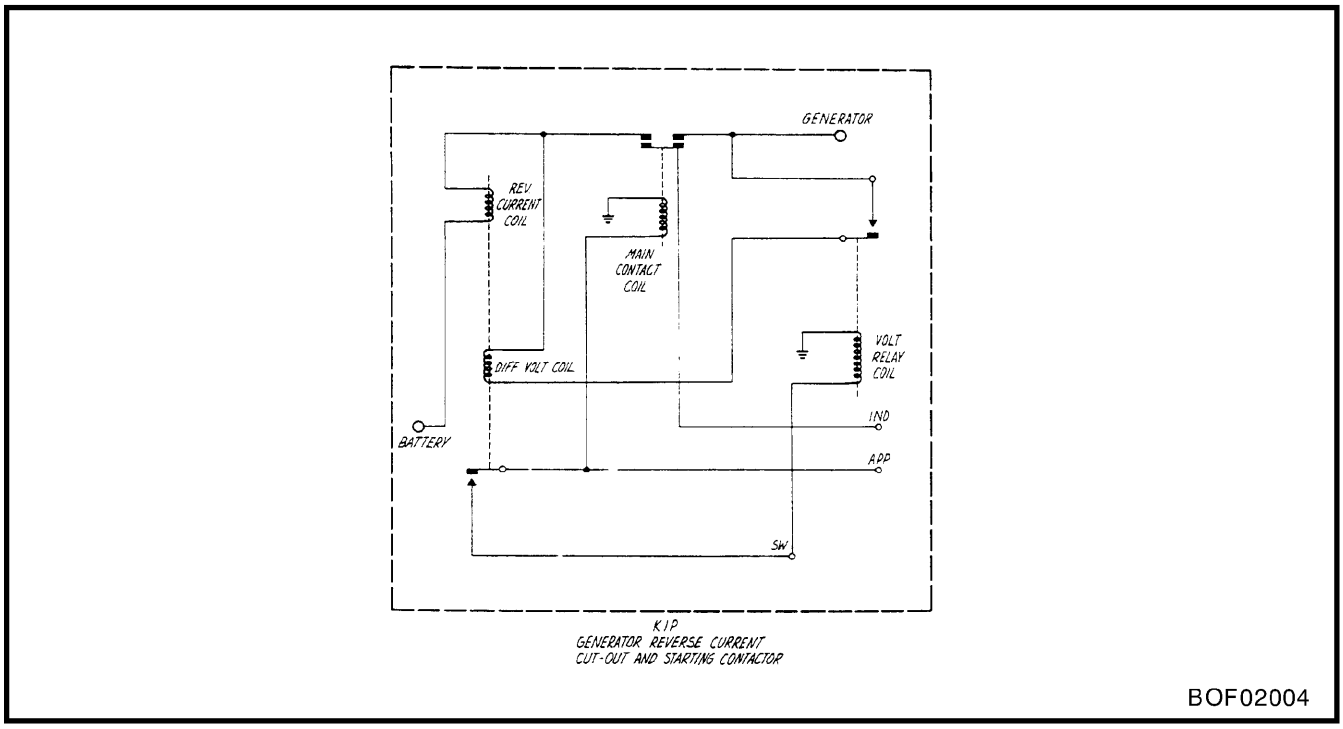


Figure 2-3 Generator Reverse-Current Cutout and Starting Contactor – Schematic

INSTALLATION OF CIRCUIT-BREAKER PANEL – CENTRE CONSOLE

15. To install the centre console circuit-breaker panel, reverse the detaching procedure.

GENERATOR CONTROL SWITCH

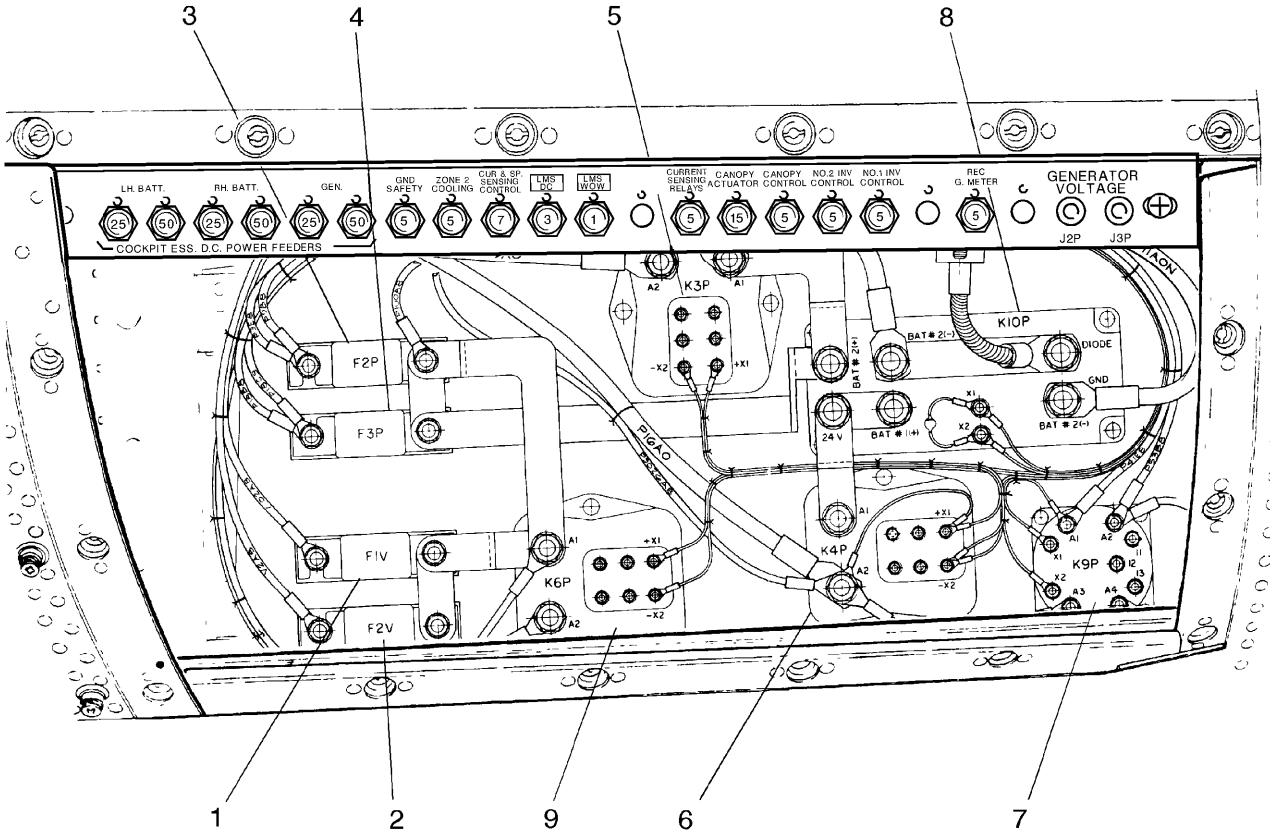
16. The generator control switch is located on the engine electric control panel and is marked RESET/TRIP. The switch is spring-loaded so that upon release, the toggle will return to the centre position (see Figure 2-6). When selected to the TRIP position, the switch contacts close to place power direct from the generator output (through the GENERATOR FIELD circuit-breaker) to the overvoltage relay trip coil. The trip coil energizes to open the generator field circuit, thereby tripping the generator from the bus.

17. When selected to RESET, the switch contacts close to place power from the No. 2 cockpit essential dc bus onto the overvoltage reset coil. The reset coil energizes to complete the field circuit, thereby attempting to restore the generator output. Providing the generator output is restored, a second set of switch contacts (in the RESET position) allows power from the generator output to be applied to SW terminal on contactor K1P, permitting the generator to be connected to the bus system.

BATTERIES

18. Two 25.2 volt 24 A•h nickel-cadmium batteries, normally connected in parallel, are available as an emergency dc power supply. The active materials of the battery are cadmium oxide in the negative plates and nickel oxide in the positive plates, with an electrolyte of potassium hydroxide. For further information on the batteries, see C-93-155-000/MF-000.

19. During cold weather operations, battery capacity is reduced, and it is important that the battery be maintained at full charge. If ground power is not available and an engine start is attempted, ensure that batteries are fully charged and warm. If necessary, the batteries should be removed from the aircraft and kept in a warm place prior to engine starting.



COMPONENT		DESIGNATION
1	No. 1 inverter limiter	F1V
2	No. 2 inverter limiter	F2V
3	RH battery current limiter	F2P
4	LH battery current limiter	F3P
5	RH battery relay	K3P
6	LH battery relay	K4P
7	Canopy power relay	K9P
8	Series/parallel relay	K10P
9	Non-essential bus tie-in relay	K6P

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Figure 2-4 Main Distribution Panel – Nose Compartment

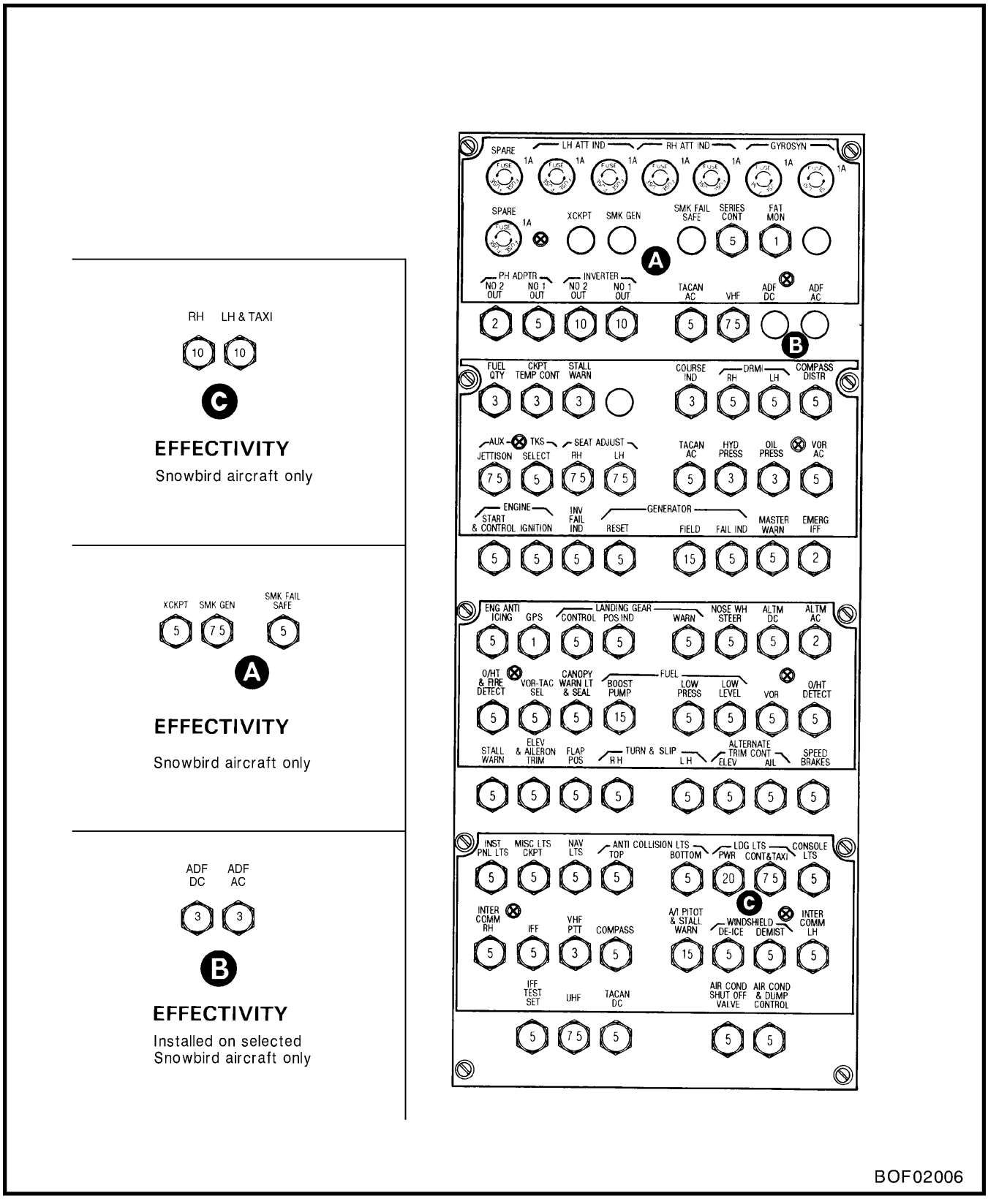


Figure 2-5 Circuit-Breaker Panel – Centre Console

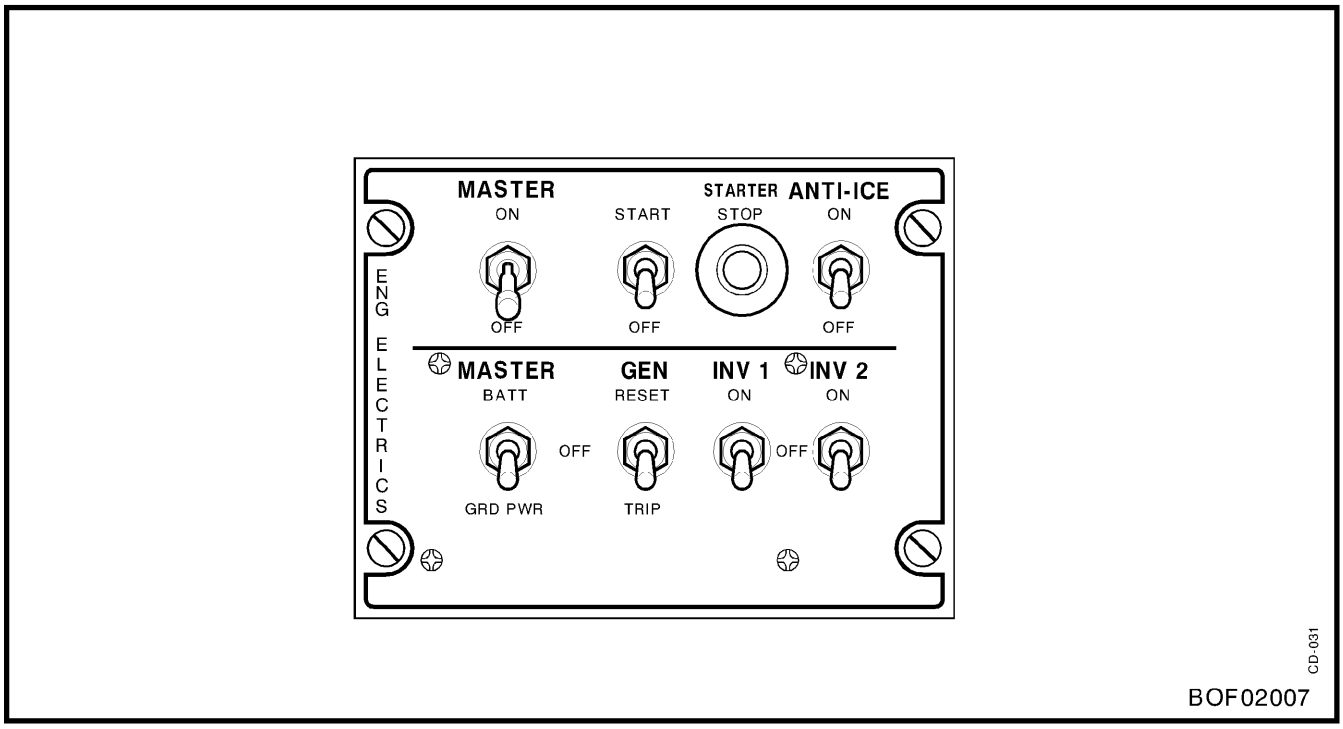


Figure 2-6 Engine Electrics Panel – Centre Console

CAUTION

Batteries must not be serviced with distilled water while in the aircraft. The nickel and cadmium oxide plates absorb increasingly more water as they become discharged. Servicing the batteries with water while in a discharged condition will result in overfilled cells in the charged condition.

BATTERY SYSTEM

20. The battery system consists of the two batteries, left and right battery relays (400 amperes), a series/parallel relay, and an ELECTRICS MASTER switch marked BATT/OFF/GRD PWR.

21. To enable certain essential circuits to operate at all times, the LH battery is directly connected to the battery bus. During a battery start, both batteries are connected in series, because the heavy load applied during engine starting creates a large voltage drop. Owing to this voltage drop the voltage at the starter-generator is normal. Either the LH or RH battery can supply power to both cockpit essential dc busses.

CAUTION

The batteries are installed to provide an emergency source of power and should be used for this purpose only. Whenever possible, a ground power supply should be made available for engine starting and for ground checking equipment.

BATTERY OPERATION (See Figure 2-9)

22. To obtain battery power on the aircraft buses, the ELECTRICS MASTER switch must be placed to BATT. This completes the control circuits to the battery relays (K3P and K4P) by supplying a ground to the coils via contact 9 of switch S1P. Power is then available on the essential buses only.

NOTE

Energizing the non-essential buses is possible only when the generator is on line or when the ELECTRICS MASTER switch is selected to ground power.

REMOVAL AND INSTALLATION OF BATTERY (See Figure 2-7)

WARNING

If a battery is too hot to handle, it may be cooled with a CO_2 fire extinguisher, provided that the extinguisher horn is held at a distance of at least 2 feet from the battery or any nearby airframe structure or equipment. If the horn is held closer, the static charge on it may ignite hydrogen gas accumulated from the battery.

23. Removal:

a. Turn ELECTRICS MASTER switch OFF, and make sure there is no power on the aircraft.

b. Open access panel No. 15-7 or 15-10 (see C-12-114-000/MF-001, Figure 1-4).

c. Release battery cable by rotating quick-disconnect knob counter-clockwise.

d. Disengage connector from battery and secure in dummy receptacle near battery.

CAUTION

The battery connector shall be secured to the dummy receptacle to prevent arcing when ground power is applied.

e. Disconnect the two battery vent tubes.

f. Pull release cables to remove the four safety pins from battery fastenings.

g. Pull down locking tabs and disengage upper from lower parts of latches. Remove top assembly consisting of retaining clamp, tabs and upper latching rods.

h. Remove horizontal retaining rod released from bottom safety pins. Slide battery out of mount.

24. Installation:

a. Repeat Paragraph 23, Steps a and b.

b. Place battery in mount, with connector side outboard. Insert retaining rod through holes in mounting flanges (at bottom, outboard end).

c. Across top of battery place assembly of retaining clamp, threaded adjustable tabs and upper latching rods.

d. Engage upper with lower parts of latches. The retaining clamp should bear down firmly on the battery when both locking tabs are pushed all the way up. Adjust threaded tabs at top of rods to correct rod tension if necessary. Minimum adjustment is 180 degrees turn: flanges of tab must be over edges of retaining clamp.

e. Check that both safety pin holes in horizontal retaining rod are outside the mounting flanges. Insert one safety pin of each release cable through end of rod, with point of pin inboard.

f. Hold left latch locking tab in full up (locking) position, and insert other safety pin of left release cable through hole in locking post, with point of pin inboard. Repeat for right latch and right release cable.

g. Check that all four safety pins are held in place by their spring tension and are in position to be removed by an outward pull on the cables.

h. Connect battery vent tubes.

i. Insert battery connector and secure by turning knob clockwise.

j. Torque connector in accordance with C-12-010-045/TP-000.

BATTERY VENT SYSTEM (See Figure 2-8)

25. The battery vent system consists of a battery cover, a spillage jar containing a pad saturated with a solution of one part of boric acid to nineteen parts of water, an intake vent, and an exhaust vent. Airflow passing over the fuselage nose section creates a differential pressure across the exhaust and intake vents, causing air to flow via the intake vane through the battery cover. This picks up any fumes and moisture and passes them through the spillage jar before venting overboard through the exhaust vent. The extended portion of the vent intake is cut at a 30 degree angle to create a ram air effect for positive battery venting in all flight conditions.

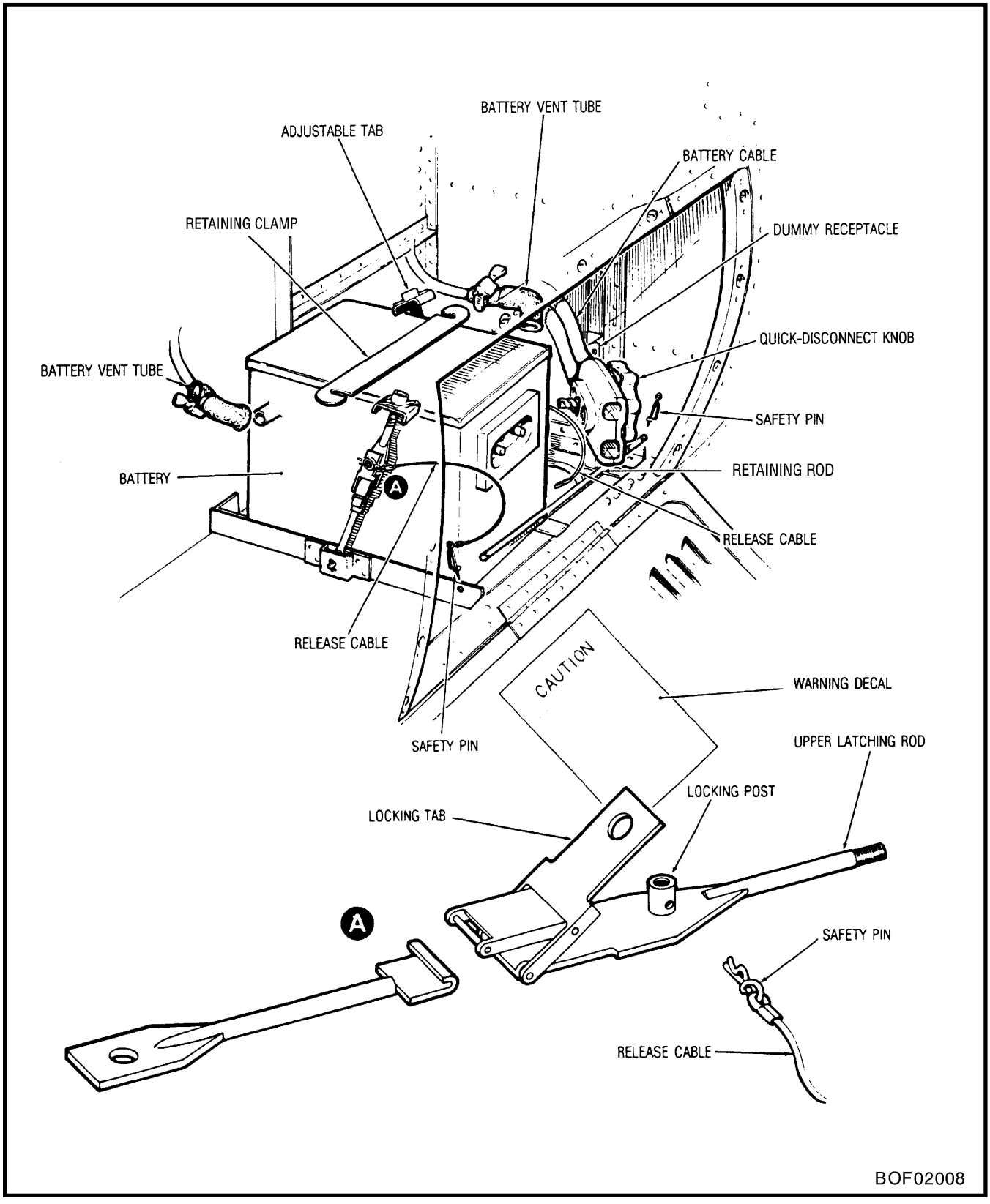


Figure 2-7 Battery Installation

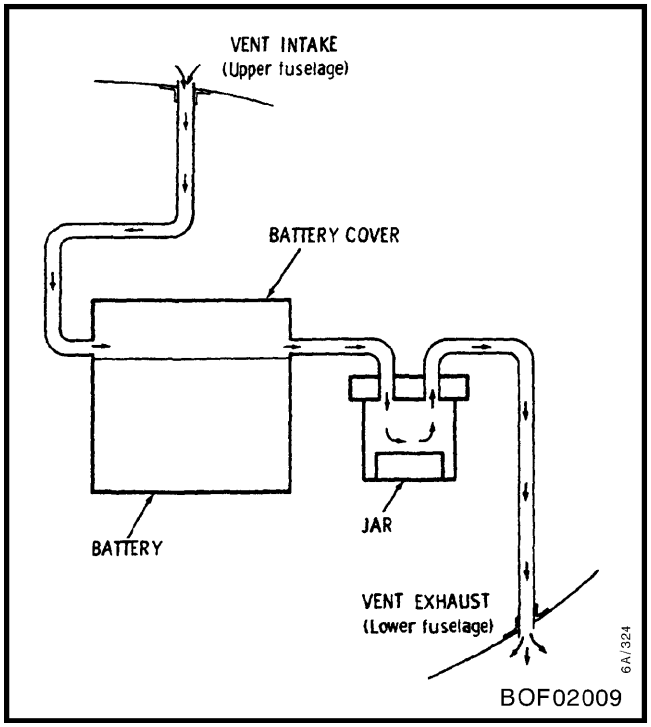


Figure 2-8 Battery Vent System

SERVICING BATTERY VENT SYSTEM

26. To service the battery vent system, proceed as follows:

a. Remove battery (see Paragraph 23).

b. Disconnect vent tubes and remove spillage jar.

c. Wash jar and pad in clean water.

d. Saturate the pad with one part of boric acid to nineteen parts of water.

e. Ensure that the vent system is clear of obstruction by blowing dry compressed air through each tube.

f. Install spillage jar and reconnect vent tubes.

g. Install battery.

THERMAL RUNAWAY PRECAUTIONS

27. Thermal runaway occurs in nickel cadmium batteries left on overcharge for long periods of high charge voltage or high ambient temperature, or both. If allowed to continue, runaway causes rapid boil-off of electrolyte and eventual destruction of battery. When a battery, either in an aircraft or in battery shop, gets into an advanced stage of thermal runaway (cell breakdown), an excessive amount of heat is generated and quick action is required in turning off the charging source. This action will arrest the thermal runaway by removing the external source of energy. An advanced stage of thermal runaway is indicated by the discharge of white fumes and the smell of burning plastic from the battery.

WARNING

If a battery is too hot to handle, it may be cooled with a CO_2 fire extinguisher, provided that the extinguisher horn is held at a distance of at least 2 feet from the battery or any nearby airframe structure or equipment. If the horn is held closer, the static charge on it may ignite hydrogen gas accumulated from the battery.

GROUND POWER

28. The external power system consists of a ground power relay, an ELECTRICS MASTER switch and a ground power receptacle. The 28 Vdc power receptacle is located on the trailing edge of the port wing fillet (see C-12-114-000/MF-001, Figure 1-4).

GROUND POWER OPERATION

29. To obtain an external source of power on the aircraft, the ground power is plugged in and the ELECTRICS MASTER switch selected to GRD PWR (see Figure 2-6). The ground power relay will then become energized, allowing dc power to be connected to all dc buses except the battery dc bus. This bus is always energized by the left battery, irrespective of the position of the ELECTRICS MASTER switch. When external power is applied, the canopy power relay is energized and the canopy actuator is operated by external power via contacts A1 and A2 of canopy power relay K9P.

DC SYSTEM OPERATION

GENERAL

30. DC power is obtained either from a ground power source, batteries, or from the generator when the engine is running. When a ground power source is used for starting, the ELECTRICS MASTER switch must be selected to BATT before attempting to select reset. The following paragraphs describe the operation of the starter-generator and its related dc starting system components.

DC STARTING CYCLE – GROUND POWER (See Figure 2-9)

31. When the ELECTRICS MASTER switch (S1P) is selected to GRD PWR, a ground is supplied to energize relay (K2P) through pins 12 and 30 of P218 on the discrete component box (A1). This allows power to reach the BATT terminal of the contactor relay (K1P).

32. With the ENG MASTER switch (S1K) selected to ON, power is supplied to the fuel booster pump. Power is removed from the closed coil of the fuel shut-off valve and applied to the open coil. Terminal 3 of switch (S1K) arms the ignition, air start switches (S1J) and (S2J) and air start relay terminals A2 and B2. Switch (S2K) is armed from terminal 9 of switch (S1K). There is 28 Vdc applied to energize relay (K6) in the discrete component box (A1), which in turn energizes relays (K2) and (K3) through the contacts of relay (K8).

33. Momentarily pressing switch (S2K) to ON energizes relay (K8) in the discrete component box (A1), which in turn de-energizes relays (K2) and (K3). Switches (S2P) and (S4K) are armed by switch (S2K). There is 28 Vdc applied through the contacts in switch (S4K) to terminal APP; this energizes contactor relay (K1P), which in turn supplies dc power to the starter generator. Through the contacts of switch (S4K), relay (K5) is energized through pin 32 of P218; this in turn de-energizes relays (K4) and (K6) by removing the ground through pin 19 of P218. Switch (S3J) is armed through relay (K5) and pin 33 of P218.

NOTE

When an rpm indication becomes noticeable, the throttle lever must be removed from CUT-OFF position to IDLE & START. This will open the engine fuel control valve and operate the ignition system.

34. The speed-sense circuits, located in the discrete component box (A1), define the boundaries of the start and generator modes of operation. During a ground power start, starter/cut-out occurs at 35 per cent rpm; during a battery start, cut-out occurs at 45 per cent rpm. The speed-sense circuit controls starter/cut-out by de-energizing relay (K5) at the appropriate speed. At the same time, relays (K6P) and (K4) are energized and the generator fail light is extinguished by removing power via pin 18 of P218. The same sense circuits also control the 50 per cent relay (K6).

CAUTION

The start cycle must never be interrupted by merely selecting the dc master switch to OFF. The starter stop switch must be pressed first.

35. For further information on engine starting and control circuits, see C-12-114-0D0/MF-001.

GENERATING MODE – GROUND POWER START

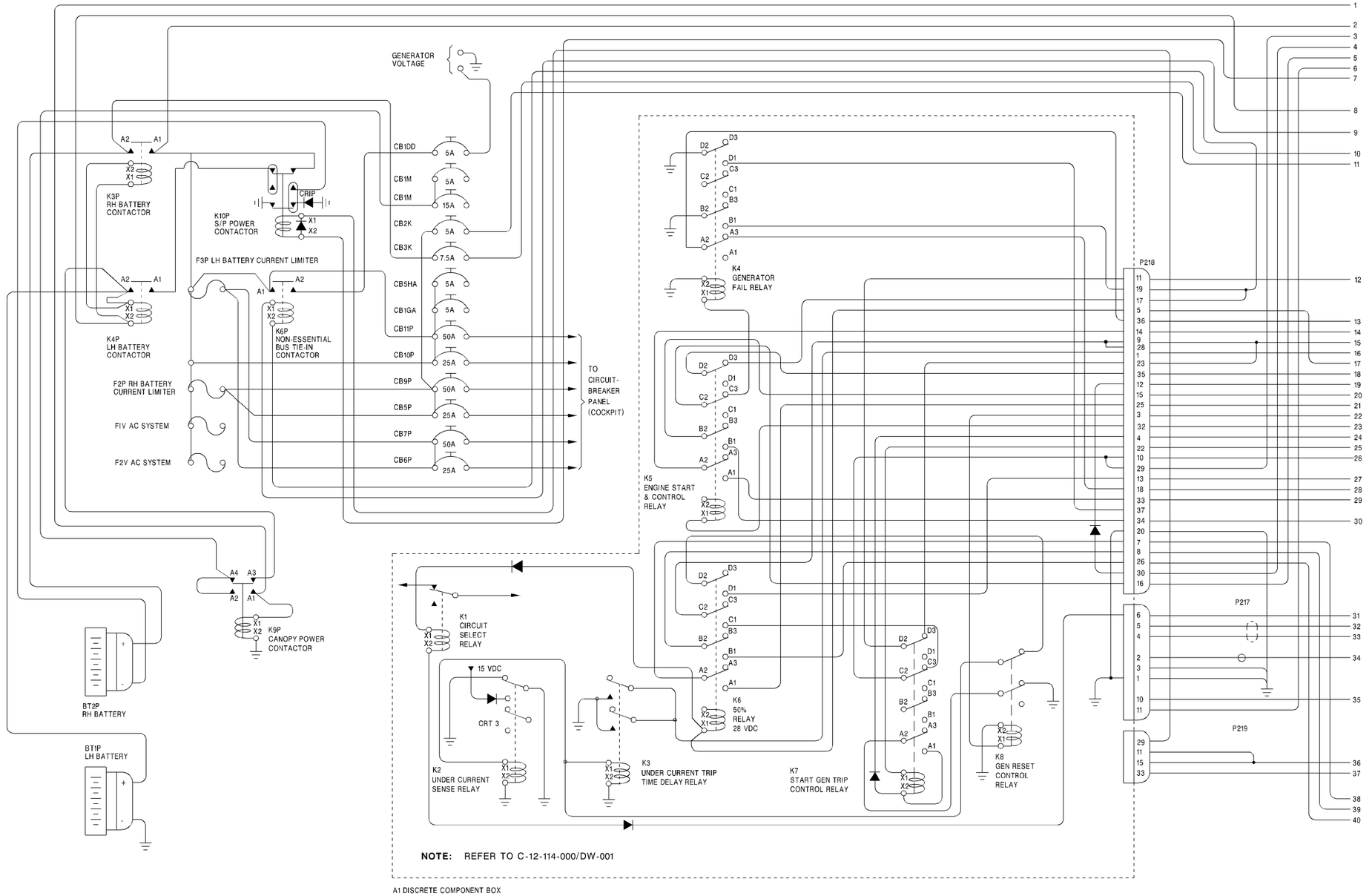
36. To enable the generator to be connected to the bus, the ELECTRICS MASTER switch shall be selected to the BATT position. This disconnects external power from the bus by removing the ground from the coil of relay (K2P) and connects the batteries to the cockpit essential buses by energizing relays (K3P) and (K4P). The main contacts on relay (K1P) will close if the generator voltage exceeds bus voltage by 0.35 to 0.65 volts. Generator voltage from the IND terminal of relay (K1P) energizes relay (K4) through contacts C2 and C3 of relay (K5), and the generator fail light extinguishes.

37. Contactor relay (K1P) hold-in power at terminal SW is now provided by the generator through contacts 13 and 14 of relay (K2P) and contacts 11 and 12 of switch (S1P). The coil of relay (K6P) is energized by a ground picked up through contacts B1 and B2 of relay (K4). Generator power now supplies all the aircraft dc buses.

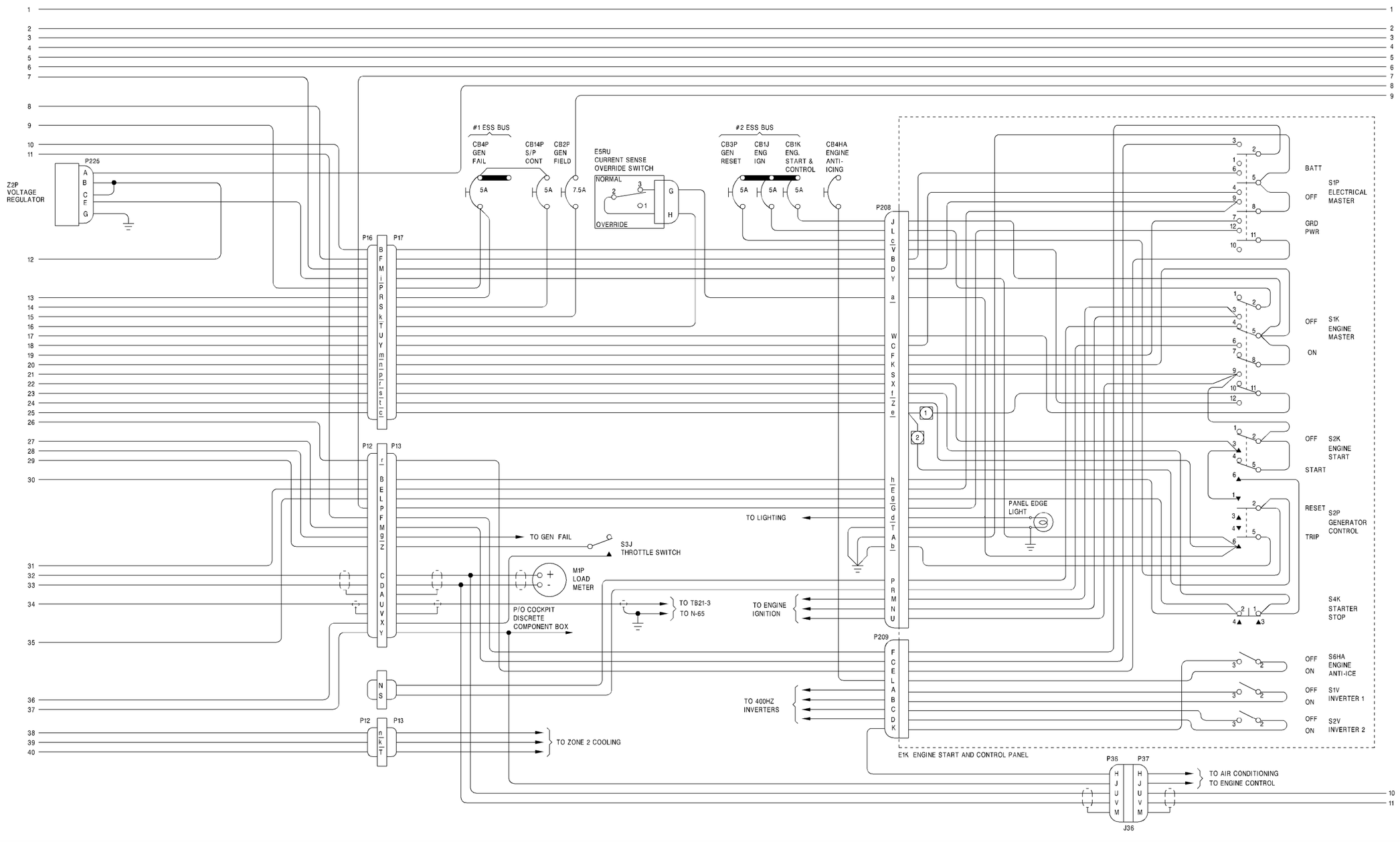
DC STARTING – AIRCRAFT BATTERIES

38. When the ELECTRICS MASTER switch (S1P) is selected to BATT, a ground is provided through contacts 8 and 9 to energize battery relays (K3P) and (K4P). This in turn provides power to the BATT terminal of the RCCO contactor relay (K1P). Upon selecting the ENG MASTER switch (S1K) to the ON position, contacts 6 and 5 enable a ground for the series/parallel contactor relay (K10P) while terminal 3 arms the ignition, air start switches (S1J) and (S2J), and terminals A2 and B2 of the air start relay (K20J). Contacts 11 and 12 provide 28 Vdc to X1 of 50 percent relay (K6) coil in the discrete component box (A1). Power is also supplied to the fuel shut-off valve open coil and boost pump. Engine start switch (S2K) is armed from terminal 9.

39. Momentarily pressing switch (S2K) to START will arm engine starter stop switch (S4K) via contact 6 of switch (S2K). Engine start and control relay (K5) is energized by power applied to contacts B1 and B2 of relay (K5) via contact 2 of switch (S4K). The coil is provided power through the speed sensing circuit.



DC Power Supply and Engine Starting – Electrical Schematic (Sheet 1 of 3) Figure 2-9



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DC Power Supply and Engine Starting – Electrical Schematic (Sheet 2 of 3) Figure 2-9

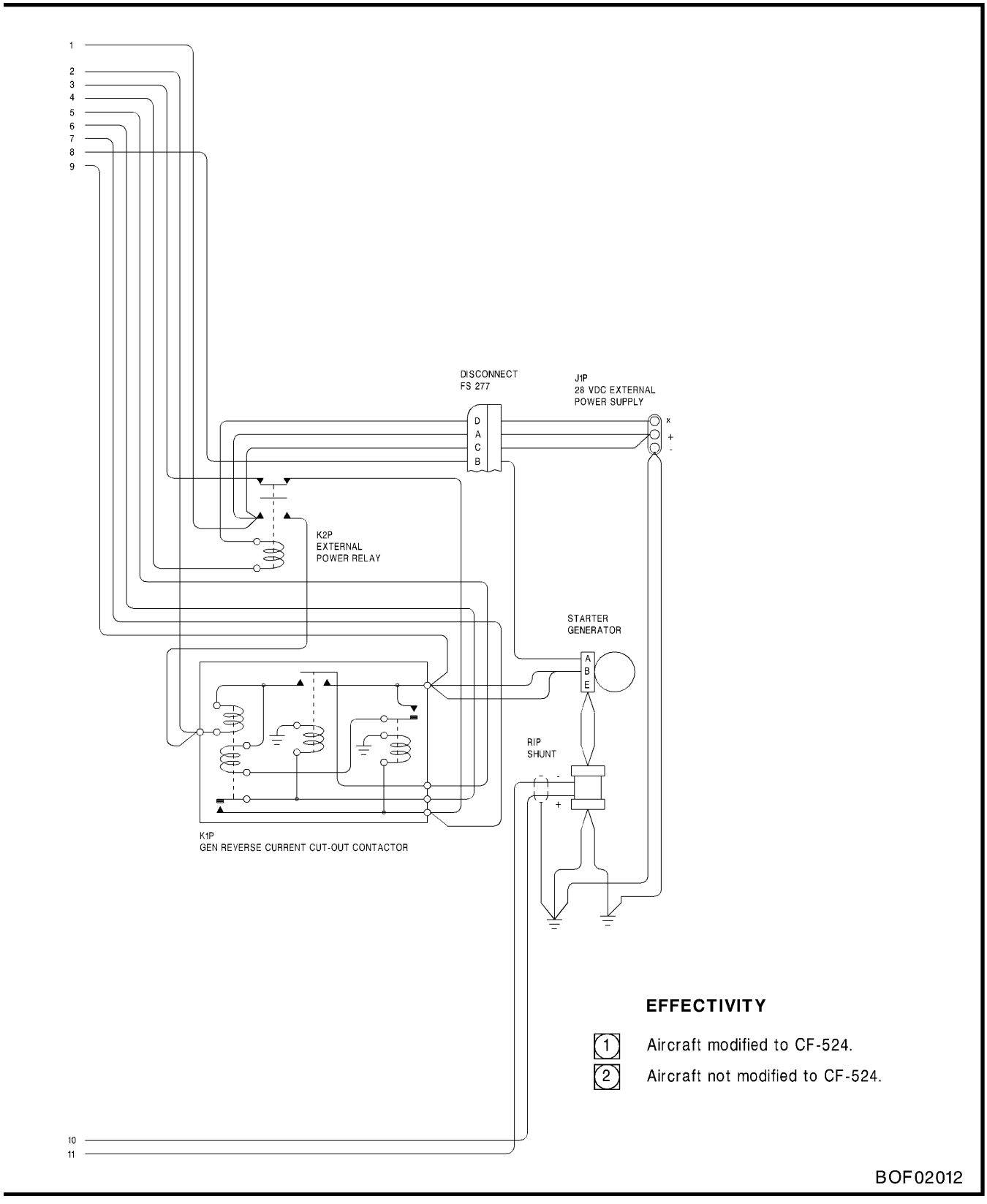


Figure 2-9 (Sheet 3 of 3) DC Power Supply and Engine Starting – Electrical Schematic

The throttle switch (S3J) is armed via contacts A1 and A2 of relay (K5). Power is applied to contact 1 of generator control switch (S2P) and contact A1 of 50 percent relay (K6) via contact 3 of switch (S2K). The generator reset control relay (K8) remains energized as long as Switch (S2K) is selected to START. This will ensure that the starter generator trip control relay (K7) is reset, if necessary. Contactor relay (K1P) will be energized by the 28 Vdc applied to terminal APP through contacts 1 and 2 of switch (S4K). The starter generator begins to rotate from the dc power received from the two batteries in parallel. When the engine speed reaches 9 percent, the throttle is advanced to idle completing a circuit through the NO contacts of the throttle switch (S3J) energizing the series/parallel contactor (K10P) and the engine ignition system. With K10P energized, the batteries are reconfigured to a series connection increasing voltage at the starter/generator to increase the motor torque and reduce spool up time. Diode (CR1P) provides a return path to the RH battery for motor current until both batteries are connected in series (time to energize K10P).

40. A signal voltage from the engine-driven tachometer is applied to the positive input terminal of amplifier IC1 of the speed-sense circuitry in the nose discrete component box (A1). As engine speed increases to 45 percent rpm, Q2 ceases to conduct, thereby de-energizing relay (K5). This disarms switch (S3J), removing power from the ignition system and de-energizing series/parallel contactor (K10P), reverting the batteries to parallel operation. At the same time, power is removed from terminal APP of contactor relay (K1P), causing it to de-energize, removing power from the starter/generator. The batteries in parallel now power the cockpit essential buses.

GENERATING MODE – AIRCRAFT BATTERY START

41. The engine is now allowed to spool up to 50 percent in an unloaded state. The voltage regulator has an opportunity to stabilize and decreases possibility of an engine stall. As engine speed increases to 50 percent rpm, Q1 ceases to conduct, which enables the 50 percent relay (K6) ground circuit. Voltage from the GEN terminal of contactor relay (K1P), through circuit breaker GENERATOR FIELD (CB2P) to contacts C2-C1 of relay (K6), contacts C3-C2 of starter generator trip control relay (K7), and contacts 12 and 11 of the ELECTRICS MASTER switch (S1P) (BATT position) is applied to the SW terminal of contactor relay (K1P). The main contacts on contactor relay (K1P) close if the generator voltage exceeds bus voltage by 0.35 to 0.65 volts. Generator voltage on contactor relay (K1P) IND terminal energizes the generator fail indicator relay (K4) (extinguishing the generator fail light) through contacts C2 and C3 of engine start and control relay (K5). As relay (K4) energizes, a ground is supplied via contacts B1 and B2 to energize non-essential bus tie-in relay (K6P).

42. Contactor relay (K1P) hold-in power is now provided by the generator through the starter generator trip control relay (K7). A ground supplied through the contacts of relay (K4) energizes the coil of relay (K6P). Generator power now supplies all the aircraft dc buses.

FAILURE CIRCUITS

43. Control of the generator system is maintained through the start contactor (K1P). When a failure is detected, the generator is taken off line by removing power from (K1P) and the voltage regulator. Generator reset control relay (K8P) is initially reset in the start mode by activating engine start switch (S2K). This will enable power to be supplied to (K1P). If a failure occurs, a ground signal is presented to the trip contact of generator control switch (S2P), which will energize the starter generator trip control relay (K7). Once tripped, (K7) latches in the energized mode through the NC contacts of generator reset control relay (K8) and removes power from the K1P SW contact, which in turn de-energizes K1P. The RCCO removes power from generator fail indicator relay (K4) causing the GENERATOR FAIL light on the annunciator panel to illuminate. The generator can be manually reset by generator control switch (S2P) if engine RPM is above 50 percent. When a failure occurs, the non-essential bus tie-in relay (K6P) is de-energized, removing non-essential power. The voltate regulator provides overvoltage protection. When 32±1 Vdc is exceeded, a (low) ground appears on pin E of the voltage regulator, which energizes the trip coil of the starter generator trip control relay (K7), tripping the generator. The RCCO and the current sensing network in the discrete component box (A1) provides reverse current protection. Whenever the current at the generator shunt (R1P) falls below 30 amps, the under current sense relay (K2) and the under current trip time delay relay (K3) in the sensing network energize to complete a ground to energize the starter generator trip control relay (K7) which will open the field circuit. This was designed to provide a more positive means of tripping the generator when a broken spline shaft is still turning the generator sufficiently to keep the GENERATOR FAIL light from operating. In advent of a failure of the sensing network, it can be corrected by moving the current sense override switch on the centre console auxiliary panel to the OVERRIDE position.

GROUND SAFETY PRECAUTIONS

44. The landing gear weight switches control three relays which provide certain safety features while the aircraft is on the ground. To ensure that these ground safety features are not lost when the aircraft is on jacks, the following circuit-breakers must be pulled out before jacking starts:

a. LANDING GEAR - CONTROL.

b. STALL WARN (2).

c. A/I PITOT & STALL WARN.

INSTALLATION OF ENGINE START AND IGNITION CIRCUIT-BREAKERS

45. The ENGINE START & CONTROL and IGNITION circuit-breaker buttons on the centre console circuit-breaker panel are painted white. When installing a replacement for either of these circuit-breakers, if the button is unpainted, clean it to remove any dirt or oil, roughen the area to be painted, using fine abrasive paper, and apply white enamel CAN/CGSB-1-88-92 to the button, leaving the amperage rating figure unpainted and legible.

FUNCTIONAL CHECK OF DC POWER SYSTEM

46. **General**. The following tests shall be used to verify proper operation of the DC power system. Use a digital multimeter (Phillips PM 2517 or equivalent) to perform all functional checks. Before beginning tests, proceed as follows:

a. Ensure that the following circuit-breakers, located on the centre console, are pushed in:

(1) GENERATOR FAIL IND (CB4P).

(2) GENERATOR FIELD (CB2P).

(3) GENERATOR RESET (CB3P).

(4) MASTER WARN (CB1WA).

(5) ENGINE START & CONT. (CB1K).

(6) ENGINE IGNITION (CB1J).

(7) S/P CONTROL (CB14P).

b. Ensure that the following circuit-breakers, located in the nose compartment, are pushed in:

(1) CURRENT & SPEED SENSING (CB2K).

(2) VOLTAGE REGULATOR (CB3K).

(3) REC. G METER (CB1DD).

47. **Speed Switch Selection Test (External Power/Battery Start)**. Perform speed switch selection test as follows:

a. Select OFF on the electrical master switch (S1P) at the engine start & control panel.

NOTE

The use of break-out boxes in accordance with Figure 2-10 will simplify the tests.

b. Disconnect connector P217 from nose discrete component box (A1).

c. Measure and record voltage between connector P217, pin 6 and generator test jack J2P (ground). Voltage should read between 22 and 29 Vdc.

d. Set electrical master switch to battery ON.

e. Measure and record voltage between connector P217, pin 6 and generator test jack J2P (ground). Voltage should be less than 1 Vdc.

48. **S/P Switching (Throttle) Test**. Perform S/P switching (throttle) test as follows:

a. Ensure throttle is fully aft in the CUT-OFF position.

WARNING

Ensure all sources of power are removed before carrying out the following step.

b. Ensure wires P3A2 and P3B2 are removed from generator reverse current cut-out contactor K1P, terminal GEN. Temporarily tape and stow wires.

CAUTION

Ensure test leads are insulated to prevent short circuits/arcing when performing tests.

c. Ensure ENGINE IGNITION circuit-breaker CB1J, on cockpit ESS dc bus, is open.

d. Disconnect connector P218 and install a jumper between pins 14 and 33 and a jumper between pins 12 and 30.

e. Disconnect connector P221 from cockpit discrete component box (A2).

f. Disconnect connector P2J from engine ignition unit.

WARNING

To prevent 48 Vdc from being applied on the dc bus, ensure throttle is fully aft in the CUT-OFF position.

g. Set DC MASTER SWITCH to BATT.

h. Measure and record voltage between S/P (series/parallel) contactor K10P, terminals BAT #1(+) and generator test jack J2P (ground). Voltage should read between 22 and 30 Vdc.

i. Measure and record voltage between S/P contactor K10P, terminals BAT #2(+) and generator test jack J2P (ground). Voltage should read between 22 and 30 Vdc.

j. Ensure DC MASTER SWITCH is set to OFF.

k. Disconnect wire coded P9054A20 from S/P contactor, K10P terminal X1.

l. Connect a voltmeter between wire coded P9054A20 and S/P contactor K10P, terminal X2.

m. Set DC MASTER SWITCH to BATT.

n. Move throttle to IDLE. Measure and record voltage between wire coded P9054A20 and S/P contactor K10P, terminal X2. Voltage should read between 22 and 30 Vdc.

o. Set DC MASTER SWITCH to OFF.

p. Move throttle to CUT-OFF position.

q. With a GPU supplying power, set DC MASTER SWITCH to GRD PWR.

r. Measure and record voltage between connector P221, pin 35 and aircraft ground. Voltage should be less than 1 Vdc.

s. Advance throttle to IDLE.

t. Measure and record voltage between connector P221, pin 35 and aircraft ground. Voltage should read between 22 and 30 Vdc.

u. Retard throttle to CUT OFF.

v. Measure and record voltage between engine ignition unit connector P2J and aircraft ground. Voltage should be less than 1 Vdc.

w. Advance throttle to IDLE.

x. Measure and record voltage between engine ignition unit connector P2J and aircraft ground. Voltage should read between 22 and 30 Vdc.

y. Set DC MASTER SWITCH to OFF.

49. **Generator Trip Circuit Operation**. Test generator trip circuit operation as follows:

a. Ensure aircraft power is OFF.

b. Disconnect connector P225 from voltage regulator Z2P in nose avionics area.

c. Measure and record resistance between ground and voltage regulator connector P225, pin E and generator test jack J2P (ground). Resistance should be greater than 1 megohm.

d. Select TRIP on generator control switch (S2P) and hold.

NOTE

Switch S2P is a spring-loaded, centre-off type switch.

e. Measure and record resistance between ground and voltage regulator connector P225, pin E and generator test jack J2P (ground). Resistance should be less than 10 ohms.

f. Return generator control switch to OFF (centre) position.

g. Measure and record resistance between connector P218, pin 4 and generator test jack J2P (ground). Resistance should be greater than 1 megohm.

h. Select TRIP on generator control switch S2P and hold.

i. Measure and record resistance between connector P218, pin 4 and generator test jack J2P (ground). Resistance should be less than 10 ohms.

j. Measure and record resistance between connector P218, pins 1 and 4. Resistance should be less than 10 ohms.

k. Select current sense override switch on auxiliary override panel to OVERRIDE.

l. Measure and record resistance between connector P218, pins 1 and 4. Resistance should be greater than 1 megohm.

m. Return current sense override switch to NORMAL.

50. **Generator Reset Circuit Operation**. Test generator reset circuit operation as follows:

a. Ensure aircraft ground power is ON.

b. Ensure generator reset circuit-breaker CB3P (#2 ESS BUS) is closed.

c. Measure and record voltage between connector P218, pin 3 and generator test jack J2P (ground). Voltage should be less than 1 Vdc.

d. Select and hold RESET on generator control reset switch (S2P).

e. Measure and record voltage between connector P218, pin 3 and generator test jack J2P (aircraft ground). Voltage should read between 22 and 30 Vdc.

f. Release generator reset switch to normal OFF position.

g. Select electrical master switch OFF.

h. Measure and record resistance between connector P218, pins 3 and 25. Resistance should be greater than 1 megohm.

i. Press and hold engine start switch (S2K) on engine start & control panel.

j. Measure and record resistance between connector P218, pins 3 and 25. Resistance should be less than 10 ohms.

51. **Ignition System Test**. Test ignition system as follows:

NOTE

The intention of this test is to ensure the integrity of the throttle/ignition system. An alternate method to verify operation of throttle/ignition system is to observe ignition noise, outside aircraft, when igniters are activated.

a. Ensure aircraft ground power is ON.

b. Ensure throttle is fully aft in the CUT-OFF position.

c. Measure and record voltage between engine ignition unit connector P2J and aircraft ground. Voltage should read zero Vdc, or if audible test is being performed, igniters will not operate.

d. Advance throttle to IDLE.

e. Measure and record voltage between engine ignition unit connector P2J and aircraft ground. Voltage should read between 24 and 30 Vdc. If audible test is being performed, igniters will be heard.

f. Ensure that DC MASTER SWITCH is set to OFF.

WARNING

Disconnect batteries and/or power unit prior to connecting P3A2 and P3B2.

g. Remove all test leads and jumpers.

h. Reinstall the following connectors:

(1) P217 (nose discrete component box, A1).

(2) P218 (nose discrete component box, A1).

(3) P2J (engine ignition unit).

(4) P221 (cockpit discrete component box, A2).

(5) P225 (voltage regulator, nose compartment).

i. Reinstall wires coded P3A2 and P3B2 on terminal GEN on the generator reverse current cut-out contactor (K1P).

j. Reinstall wire P9054A20 on terminal X1 of the S/P (K10P).

k. Reconnect batteries.

52. **Engine Run Test**. The following test shall be performed with the aircraft engine running and aircraft dc generator on line:

a. Connect a voltmeter between generator test terminals J3P(+) and J2P(–).

NOTES

1. Terminals J3P and J2P are located in the nose compartment, adjacent to the circuit-breakers.

2. Ensure circuit-breaker CB1DD (recording G-meter), located in the nose electrical compartment, is closed.

b. Start aircraft engine.

c. Run engine at 60 per cent rpm.

d. Measure and record voltage between terminals J3P(+) and J2P(–). Voltage should be 28.6 Vdc.

e. Bring engine up to 98 per cent rpm.

f. Measure and record voltage between terminals J3P(+) and J2P(–). Voltage should remain constant at 28.6 Vdc.

g. Loosen lock-nut on potentiometer and adjust voltage regulator until voltage indicated by voltmeter is 28.6 (+0 Vdc, –0.2 Vdc).

h. Tighten lock-nut on potentiometer.

i. Repeat Steps c through f if a voltage regulator adjustment is made.

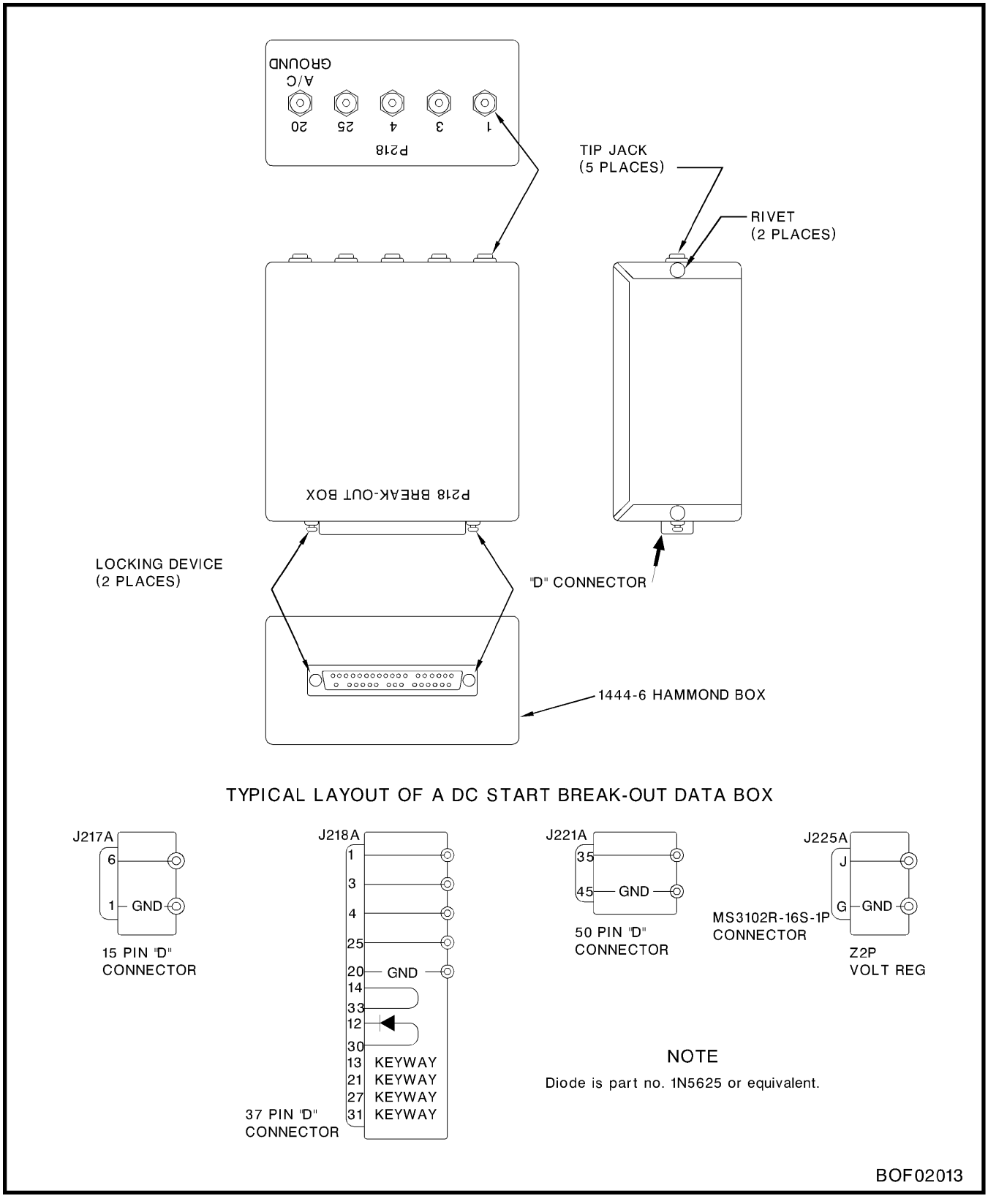


Figure 2-10 Break-out Data Box

PART 3

AC SYSTEM

GENERAL

1. The ac system consists of two 28-volt dc driven static inverters, No. 1 (main) and No. 2 (standby). The static inverters provide an output for a continuous load of 1000 volt-amperes, 400 Hz, 115 and 26 Vac, single phase sine wave power for aircraft electrical loads, such as flight and navigational instruments. The static inverter is designed to operate under severe aircraft environmental conditions. In the event of a No. 1 inverter failure, the No. 2 inverter automatically supplies essential ac loads. Phase adapters are used to convert single-phase 115 Vac to three-phase 115 Vac for various instruments. The static inverters supply single-phase 26 Vac power for engine, flight and navigation instruments. Loss of output from a static inverter is indicated by the MASTER WARNING light flashing and the illumination of the appropriate INVERTER 1 FAIL or INVERTER 2 FAIL capsule on the annunciator panel. For the ac system electrical schematic and wiring diagram, see Figure 3-2 and C-12-114-000/DW-001.

COMPONENTS

2. For the location of ac system main components, see Figure 3-1.

COMPONENT DESCRIPTION

INVERTERS

3. The static inverters deliver 1000 volt-ampere, single-phase, 400 Hz, 115 and 26 Vac power over an input range of 22 to 32 Vdc. The nominal input voltage is 28 Vdc. The 400 Hz power supplied is regulated in voltage, frequency and distortion. The inverters circuitry contains low-level logics, magnetic elements and a series-parallel resonance filter. No adjustments are required prior to installation.

REMOVAL AND INSTALLATION OF INVERTERS

4. To remove inverters, proceed as follows:

a. Ensure that all electrical power is switched off.

b. Gain access to the nose compartment left side and remove access panel, refer to C-12-114-000/MF-001.

c. Disconnect the two electrical connectors on the inverters.

d. Detach inverters from T-bracket by removing 8 bolts and 8 washers.

5. To install the inverter reverse the removal procedure.

TRANSIENT SUPPRESSORS

6. Two transient suppressors are located in the nose compartment on the inverter mounting bracket. One is connected to the No. 1 static inverter, the other to the No. 2 static inverter. When the INV 1 or INV 2 switch is set to ON, with their respective INV CONTROL circuit-breakers closed, the transient supressors protect and limit transient voltage spikes at the inverters input.

PHASE ADAPTERS

7. Two phase adapters are used to convert 115 single-phase ac to 115 Vac three-phase for the operation of some flight instruments. Normally, No. 1 inverter supplies the No. 1 and No. 2 phase adaptors. With the failure of an inverter output, the remaining inverter will automatically supply both phase adapters through the 115 Vac single-phase bus.

TIME-DELAY RELAY

8. A time-delay is used to ensure that, if a circuit fault occurs which causes the ac voltage output of the No. 1 inverter to fail for more than 3 seconds, the dc control voltage will be disconnected from the inverter.

DISTRIBUTION

9. The ac distribution system consists of a 115 Vac single-phase bus, a 26 Vac single-phase instrument bus and two 3-phase buses via phase adapters. All buses are located in the centre console circuit-breaker panel.

SYSTEM OPERATION

GENERAL (See Figure 3-2)

10. The inverters are installed in the nose compartment on the inverter mounting bracket at FS 140. Power for the ac system is primarily supplied by the 115 Vac single-phase 400 Hz No. 1 static inverter (main). If a fault should occur on the ac system, standby ac power is available from the 115 Vac single-phase 400 Hz No. 2 static inverter (standby). Any ac power loads are automatically

Component	Location
No. 1 Inverter (main)	Nose compartment, LH side on inverter mounting bracket
No. 2 Inverter (standby)	Nose compartment, LH side on inverter mounting bracket
Transient suppressor (CZ1A)	Nose compartment, LH side on inverter mounting bracket
Transient suppressor (CZ2A)	Nose compartment, LH side on inverter mounting bracket
Circuit-breaker (CB4V)	Nose compartment, circuit-breaker panel
Circuit-breaker (CB5V)	Nose compartment, circuit-breaker panel
No. 1 Inverter limiter (F1V)	Nose compartment, MDP
No. 2 Inverter limiter (F2V)	Nose compartment, MDP
No. 1 Phase adapter (PA1X)	RH console
No. 2 Phase adapter (PA2X)	RH console
No. 1 Fail sense relay (K1X)	Nose compartment, relay panel
No. 2 Fail sense relay (K2X)	Nose compartment, relay panel
Inverter transfer time delay relay (K4X)	Nose compartment, relay panel
Inverter transfer relay (K6X)	Nose compartment, relay panel
INV 1 ON-OFF switch (S1V)	Centre console
INV 2 ON-OFF switch (S2V)	Centre console
Circuit-breaker (CB1V)	Centre console extension
Circuit-breaker (CB2V)	Centre console extension
RH Battery Current Limiter (F2P)	Nose Compartment, MDP
LH Battery Current Limiter (F3P)	Nose Compartment, MDP

Figure 3-1 AC System – Component Locations

transferred to No. 2 static inverter via the inverter transfer relay (K6X). This automatic feature ensures fail-safe operation. Both main and standby inverters also produce a 26 Vac single-phase 400 Hz output for instrument and navigational equipment.

11. The inverters are supplied with dc power through the cockpit essential dc feeders from a 30 volt, 300 ampere starter-generator. The starter-generator feeds the inverters via the No. 1 (F1V) and No. 2 (F2V) inverter limiters. The inverters convert dc power to produce stable ac voltages of 115 and 26 volts at 400 Hz. If a generator failure occurs, both inverters lose their dc power supply. This is indicated when the INVERTER 1 FAIL and INVERTER 2 FAIL lights illuminate on the master warning annunciator panel. If the dc MASTER switch is set to BATT, battery power restores power to the No. 1 static inverter.

SYSTEM CIRCUIT FUNCTION (See Figure 3-2)

12. **No. 1 Inverter Mode.** With power supplied to the ESS dc bus, selecting the INV1 switch to the ON position will connect 28 Vdc from the inverter to the coil of the inverter transfer relay (K6X) through the de-energized contacts of the inverter transfer time delay (K4X). The inverter switching control circuit will then be completed through energized contacts of relay K6X powering the No. 1 static inverter.

13. Operation of the inverter provides an ac output through the INVERTER NO. 1 OUT circuit breaker (CB1V) which will energize the No. 1 fail sense relay (K1X) extinguishing the INVERTER 1 FAIL light and de-energizing the transfer time delay (K4X). Power from the No. 1 static inverter now supplies the 115 Vac single-phase and 26 Vac 400 Hz busses through the energized contacts of relay K6X.

14. **No. 2 Inverter Mode.** With the INV1 switch (SIV) set to the OFF position, the INV2 switch (S2V) set to the ON position, or in the event of a No. 1 inverter failure, relay K6X is de-energized. The No. 2 inverter switching control circuit is closed through de-energized contacts of the K6X relay powering the No. 2 inverter ON. The inverter provides ac power through the INVERTER NO 2 OUT circuit breaker (CB2V) to the No. 2 fail sense relay (K2X) extinguishing the INVERTER 2 FAIL light. Power from the No. 2 static inverter will now supply 115 Vac single-phase and 26 Vac 400 Hz to the busses through the de-energized contacts of relay K6X.

15. **No. 1 Inverter Failure.** Failure of the No. 1 static inverter output de-energizes relay K1X connecting 28 Vdc to the heater of relay K4X. After 3 seconds, relay K4X energizes and K6X de-energizes. The INVERTER 1 FAIL light illuminates and the 115 and 26 Vac single-phase bus loads are transferred to the No. 2 static inverter.

16. **No. 2 Inverter Failure.** Failure of the No. 2 static inverter output de-energizes relay K2X and illuminates the INVERTER 2 FAIL light. The No. 2 static inverter is used as standby. If the No. 1 static inverter is on line, a No. 2 static inverter failure will not affect normal system operations.

FUNCTIONAL CHECK

GENERAL

17. The following test verifies correct operation of both No. 1 (main) and No. 2 (standby) static inverters using internal battery power and external dc ground power.

EQUIPMENT

18. The following equipment is required (refer to C-12-114-000/MF-001):

a. Digital Multimeter (Phillips PM2517 or equivalent.

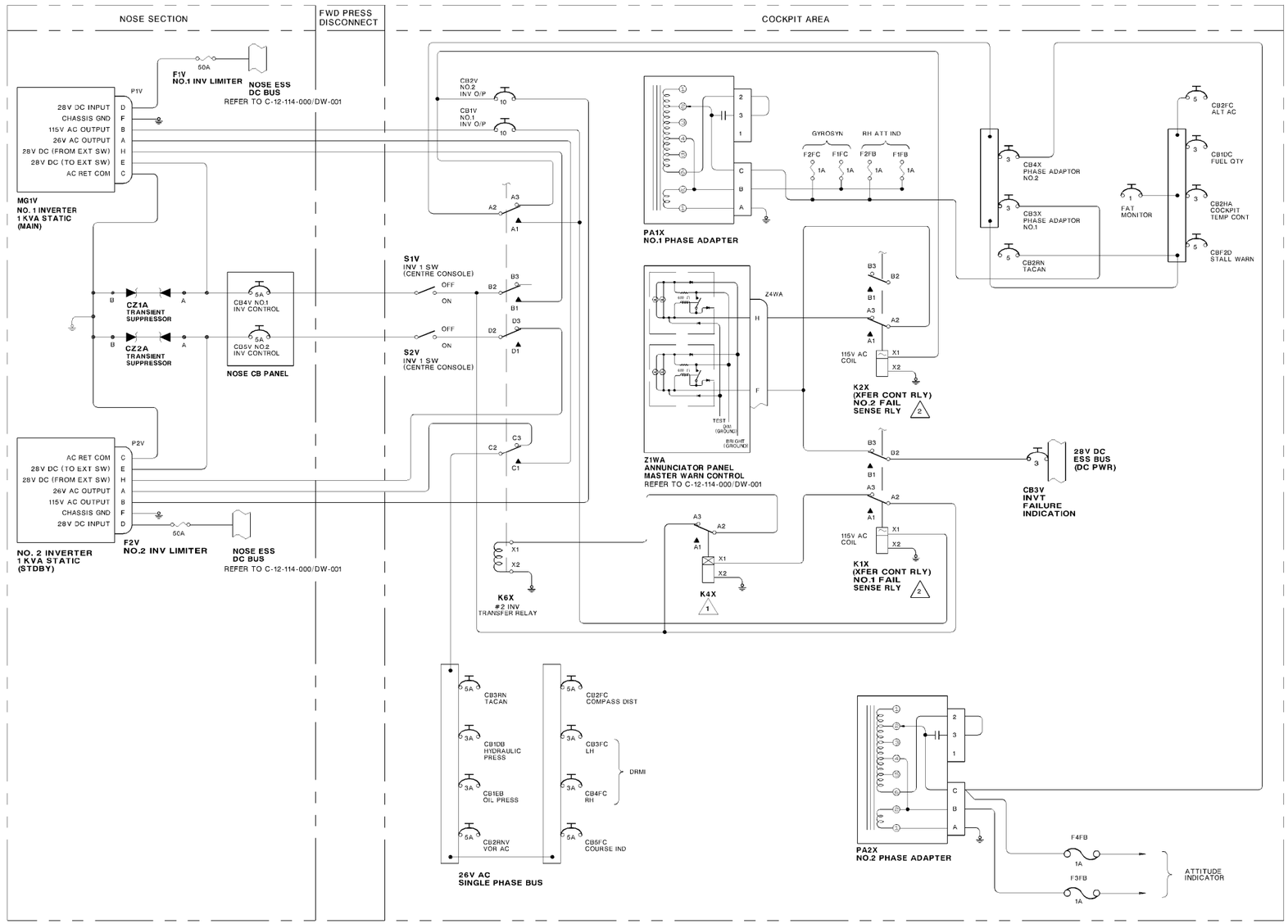
b. Oscilloscope (Phillips MP3305 or PM3524 or equivalent).

c. Tester power supply.

PRIMARY CHECK

19. Before the ac power system functional check is performed, carry out the following procedure:

a. Connect a 28 Vdc ground supply to the ground power receptacle and set the dc MASTER switch to GND PWR.



NOTES :

1. TIME DELAY RELAY (DELAY ON OPERATE: 3 SECONDS).
2. 115V AC COIL.

BOF03002

AC Power Supply – Electrical Schematic Figure 3-2

b. Ensure that the following circuit-breakers are closed:

TACAN AC and DC	Centre Console
INV FAIL IND	Centre Console
NO 1 INV CONT	Nose compartment
NO 2 INV CONT	Nose Compartment
PH ADPTR NO 1 OUT	Centre Console
PH ADPTR NO 2 OUT	Centre Console
COMPASS	Centre Console

c. To perform a functional check of the dc power supply, connect dc voltmeter to test jacks, located in the nose compartment relay panel, positive to J3P and negative to J2P, and ensure voltage is limited to 28.4 volts.

d. Upon completion of the functional checks, place the dc MASTER switch to OFF and disconnect external power.

AC SYSTEM

20. Proceed as follows:

a. Connect aircraft to a static ground pad.

b. Connect voltmeter positive lead to relay K4P-A1 and negative to J2P, located in nose compartment.

c. Ensure that batteries are fully charged and connected to aircraft. Place dc MASTER switch to BATT. Ensure that voltmeter reads 25.0 Vdc (+1, –2 Vdc).

d. Set dc MASTER switch to OFF and disconnect voltmeter from test jacks.

e. Set dc MASTER switch to BATT.

f. Open No. 1 and No. 2 INV CONTROL circuit-breakers on main distribution panel.

g. Verify that INVERTER NO. 1 and No. 2 OUT circuit-breakers are opened and INVERTER 1 FAIL and INVERTER 2 FAIL lights on the annunciator panel are illuminated. Ensure that both INV 1 and INV 2 switches are set to OFF.

h. Close No. 2 INV CONTROL circuit-breaker.

i. Set INV 2 switch to ON and verify that 26 Vac 400 Hz output exists between INV No. 2 test jacks J10X and J11X.

j. Close INVERTER NO. 2 OUT circuit-breaker and verify the following conditions:

(1) INVERTER 2 FAIL light extinguishes.

(2) 115 Vac bus is powered (gyros, attitude indicators, fuel quantity indicator, etc, power up).

(3) 26 Vac bus is powered (compass flag and DRMI flags disappear).

k. Allow gyro compass to stabilize and verify that compass heading agrees with magnetic compass. Verify that 115 Vac 400 Hz exists between INV No. 2 test jacks J8X and J11X (ground).

l. Close No. 1 INV CONTROL circuit-breaker.

m. Set INV 2 switch to OFF and verify that INVERTER 2 FAIL light illuminates.

n. Close INVERTER No. 1 OUT circuit-breaker.

o. Set INV 1 switch to ON and verify the following conditions:

(1) INVERTER 1 FAIL light extinguishes.

(2) 115 Vac bus is powered as in Step 20.k.

(3) 26 Vac bus is powered as in Step 20.k.

p. Allow gyro compass to stabilize and verify that compass heading agrees with magnetic compass. Verify that 115 Vac 400 Hz exists between INV No. 1 test jacks J7X and J11X (ground). Verify that INVERTER 2 FAIL light is extinguished.

q. Set INV 2 switch to ON.

r. Open INVERTER NO. 1 OUT circuit-breaker. Verify that both INVERTER FAIL lights illuminate and after a 3-second delay the INVERTER 2 FAIL light extinguishes and the No. 2 inverter powers the 115 Vac bus. Set INV 1 switch to OFF and wait 2 minutes. Reset INVERTER No. 1 OUT circuit breaker. Set INV 1 switch to ON again.

s. Set INV 1 switch to OFF and, immediately after, verify the following conditions:

(1) INVERTER 1 FAIL light illuminates.

(2) INVERTER 2 FAIL light illuminates and then extinguishes.

(3) No. 2 inverter provides power to the ac buses.

t. Set INV 2 switch to OFF.

u. Set dc MASTER switch to OFF.

v. Connect 28 Vdc ground power supply to aircraft. Set dc MASTER switch to GRD PWR. Check that voltmeter does not read more than 28.0 ±2 Vdc.

w. Repeat Step i.

x. Set the dc MASTER to OFF and disconnect the voltmeter from the test jacks.

y. Set the dc MASTER switch to GRD PWR and observe the following conditions:

(1) INVERTER 1 FAIL light illuminates.

(2) INVERTER 2 FAIL light illuminates and then extinguishes.

(3) No. 2 inverter provides power to the ac buses.

z. Set INV 2 switch to OFF and set the dc MASTER switch to OFF.

aa. Ensure that INV 1 and INV 2 switches are set to OFF and that all appropriate circuit-breakers are reset. Disconnect 28 Vdc ground power supply.

ab. Remove static ground pad.

PART 4

LOAD ANALYSIS CHARTS

GENERAL

1. Load analysis for the dc System is shown in Figures 4-1 and 4-2. The ac System is shown in Figure 4-3. The tables shown list the power requirements for each piece of electrical and electronic equipment under various operating conditions. Figures 4-4 to 4-6 show supplementary data and graphical illustrations for inverters and battery loads. Figures 4-7 and 4-8 show dc system and supplementary data for the Snowbird variant aircraft. (The change in the equipment maximum ac power requirement is insignificant in the conversion of a rewired Tutor aircraft to a Snowbird variant.)

ITEM NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO
						F1 LOADING & ANCHOR				F2 START & WARMUP				F3 TAXI				F4 TAKE OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 30MIN	
	C - FLIGHT CONTROLS																									
1	AILERON TRIM TAB ACTUATOR	R422M22-1	1	1.20	(1)	—	—	—	—	1.20	1.20	0.08	—	—	—	—	—	1.20	0.24	0.02	0.02	1.20	0.48	0.02	0.02	1
2	ELEVATOR TRIM TAB ACTUATOR	R422M25-1	1	1.20	(2)	—	—	—	—	1.20	1.20	0.09	—	—	—	—	—	1.20	1.20	0.05	0.05	1.20	0.96	0.04	0.04	2
3	AILERON TRIM CONTROL RELAY	MS27401-27	1	0.11	(3)	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	3
4	ELEVATOR TRIM CONTROL RELAY	MS27401-27	1	0.11	(3)	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	4
5	SPEED BRAKES SELECT VALVE	362-0377	1	0.70	(4)	—	—	—	—	0.70	0.70	0.02	-	—	—	—	—	—	—	—	—	0.70	0.70	0.02	0.01	5
	D - INSTRUMENTS																									
6	WING FLAP INDICATOR SYSTEM	41A-58065	1	0.16	CONT	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	6
7	SENSOR - REG. ACCELEROMETER	AE320-2B	1	0.30	CONT	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	7
8	INDICATOR - REG. ACCELEROMETER	AE322-3B	2	0.70	CONT	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	8
	F - FLIGHT INSTRUMENTS																									
9	TURN & SLIP INDICATOR	AE355-2A	2	0.20	CONT	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	9
10	COMPASS RELAY	MS27401-27	1	0.11	CONT	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	10
11	COMPASS AMPLIFIER	653278	1	0.58	CONT	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	11
12	LIFT TRANSDUCER HEATER	C75507	1	6.50	(5)	—	—	—	—	—	—	—	—	—	—	—	—	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	12
13	CONTROL SHAKER	C75502	1	2.00	(6)	—	—	—	—	2.00	0.80	0.01	—	—	—	—	—	2.00	0.80	0.01	—	2.00	0.80	0.01	—	13
14	——— DELETED ———	———	—	-	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14
15	SERVO'D ALTIMETER INDICATOR (LH)	81-22-20	1	0.50	(7)	—	—	—	—	—	—	—	—	—	—	—	—	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15
	TOTALS THIS PAGE					3.17	3.17	3.17	3.17	8.27	7.07	3.37	3.17	3.17	3.17	3.17	3.17	14.57	12.41	10.25	10.24	15.27	13.11	10.26	10.24	

BOF04001

Load Analysis Chart – DC Systems (Sheet 1 of 12) Figure 4-1

F OPERATING CONDITIONS

ITEM NO	F6 ROUGH CRUISE AMPS	F6 AVG AMPS 5SEC	F6 AVG AMPS 5MIN	F6 AVG AMPS 30MIN	F7 LANDING AMPS	F7 AVG AMPS 5SEC	F7 AVG AMPS 2MIN	F7 AVG AMPS 5MIN	F8 EMERGENCY AMPS	F8 AVG AMPS 2MIN	F8 AVG AMPS 5MIN	F8 AVG AMPS 20MIN	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	ITEM NO
1	1.20	0.96	0.04	0.04	1.20	0.24	0.02	0.02	1.20	0.02	0.02	0.02									1
2	1.20	1.20	0.05	0.05	1.20	1.20	0.05	0.05	1.20	0.04	0.04	0.04									2
3	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11									3
4	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11									4
5	0.70	0.70	0.03	0.03	0.70	0.70	0.03	—	0.70	0.03	0.02	—									5
6	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16									6
7	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30									7
8	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40									8
9	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40									9
10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11									10
11	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58									11
12	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	1.95									12
13	2.00	0.80	0.01	—	2.00	0.80	0.03	0.01	2.00	0.03	0.01	—									13
14	—	—	—	—	—	—	—	—	—	—	—	—									14
15	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5									15
	15.27	13.83	10.30	10.29	15.27	13.11	10.30	10.25	15.27	10.29	10.26	5.68	TOTALS THIS PAGE								

BOF04002

Load Analysis Chart – DC Systems (Sheet 2 of 12) Figure 4-1

ITEM NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO
						F1 LOADING & ANCHOR				F2 START & WARMUP				F3 TAXI				F4 TAKE OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 30MIN	
	G - LANDING GEAR																									
16	L.G. SAFE - GROUND OBSERVER LIGHT	A4174 -24C	1	1·78	(8)	1·78	1·78	1·78	0·72	1·78	1·78	1·78	0·72	1·78	1·78	1·78	0·72	1·78	1·78	1·78	0·72	–	–	–	–	16
17	LANDING GEAR WARNING SIGNAL	1520-2	1	0·60	(9)	–	–	–	–	0·60	0·60	0·01	–	–	–	–	–	–	–	–	–	–	–	–	–	17
18	LANDING GEAR DOWNLOCK RELAY	M6106/28-024	1	0·08	(10)	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	18
19	LANDING GEAR UPLOCK RELAY	M6106/28-024	1	0·08	(10)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	19
20	LANDING GEAR UPLOCK SAFETY RELAY	MS27401-33	1	0·11	(11)	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	20
21	LANDING GEAR CONTROL UNIT - COIL	A50M6-4	1	1·50	(12)	–	–	–	–	–	–	–	–	–	–	–	–	1·50	1·50	1·50	–	–	–	–	–	21
22	NOSE GEAR STEERING SHUT-OFF VALVE	677C-3	1	1·25	(13)	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	1·25	0·42	–	–	–	–	22
23	MAIN L.G. DOOR SELECTOR VALVE	362-0377	1	0·80	(14)	0·80	0·40	0·01	–	0·80	0·80	0·02	0·01	–	–	–	–	0·80	0·40	0·01	–	–	–	–	–	23
24	LANDING GEAR SELECTOR VALVE	362-0377	1	0·80	(15)	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·80	0·48	0·01	–	–	–	–	–	24
25	LANDING GEAR POSITION INDICATOR	MS27403	3	0·03	CONT	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	25
26	No 1 GROUND SAFETY RELAY	MS27400-17	1	0·12	(16)	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	0·12	–	–	–	–	–	–	26
27	No 2 GROUND SAFETY RELAY	M6106/28-024	1	0·08	(17)	–	–	–	–	–	–	–	–	–	–	–	–	0·08	0·08	0·08	0·03	0·08	0·08	0·08	0·08	27
28	No 3 GROUND SAFETY RELAY	MS27401-27	1	0·11	(16)	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	–	–	–	–	–	–	28
	H - HEAT, VENT & DE-ICING																									
29	SYSTEM SHUT-OFF VALVE	321682-1-1	1	1·00	(18)	1·00	1·00	0·04	0·01	1·00	1·00	0·07	0·03	–	–	–	–	–	–	–	–	–	–	–	–	29
30	CABIN SAFETY VALVE	103308-1	1	0·60	(19)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	30
31	MODULATING VALVE	321682-1-1	1	1·00	(20)	1·00	0·80	0·03	0·01	1·00	0·80	0·03	0·01	1·00	0·80	0·03	0·01	1·00	0·80	0·03	0·01	1·00	0·80	0·03	0·01	31
32	ENGINE ANTI-ICING VALVE	11A00240P01	1	1·00	(21)	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	32
33	ZONE 2 COOLING - FAN & VALVE	104260	1	1·00	(22)	–	–	–	–	1·00	1·00	0·04	0·01	–	–	–	–	1·00	1·00	0·04	0·01	–	–	–	–	33
34	PITOT TUBE HEATER	AN5816-2	1	6·60	(23)	–	–	–	–	6·60	6·60	1·32	0·44	6·60	6·60	1·32	0·44	6·60	6·60	6·60	6·60	6·60	6·60	6·60	6·60	34
35	SHUT-OFF VALVE CONTROL RELAY	MS27401-27	1	0·11	CONT	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	35
36	ZONE 2 COOLING IND. RELAY No. 1	M6106/27-024	1	0·07	(24)	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·02	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·02	0·07	0·07	0·07	0·07	36
37	ZONE 2 COOLING IND. RELAY No. 2	M6106/27-024	1	0·07	(24)	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·02	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·02	0·07	0·07	0·07	0·07	37
38	WINDSHIELD DE-ICE VALVE	321682-1-1	1	1·00	(25)	–	–	–	–	–	–	–	–	–	–	–	–	1·00	1·00	0·07	0·07	1·00	1·00	0·07	0·07	38
39	WINDSHIELD DE-MIST VALVE	321094-3-1	1	1·00	(26)	–	–	–	–	1·00	1·00	0·07	0·02	1·00	1·00	0·07	0·02	–	–	–	–	1·00	1·00	0·07	0·07	39
40	WINDSHIELD DE-ICE ON WARNING RELAY	M6106/27-024	1	0·07	(25)	–	–	–	–	–	–	–	–	–	–	–	–	0·07	0·07	0·01	–	0·07	0·07	0·01	0·01	40
41	DE-ICE VALVE OPENED WARNING RELAY	M6106/27-024	1	0·07	(25)	–	–	–	–	–	–	–	–	–	–	–	–	0·07	0·07	0·01	–	0·07	0·07	0·01	0·01	41
	TOTALS THIS PAGE					8·39	7·79	5·67	4·55	17·59	17·39	3·15	4·95	14·19	13·99	7·01	5·00	17·71	16·79	12·92	9·29	11·35	11·15	8·40	8·38	

BOF04003

Load Analysis Chart – DC Systems (Sheet 3 of 12) Figure 4-1

F OPERATING CONDITIONS

ITEM NO	F6 ROUGH CRUISE AMPS	F6 ROUGH CRUISE AVG AMPS 5SEC	F6 ROUGH CRUISE AVG AMPS 5MIN	F6 ROUGH CRUISE AVG AMPS 30MIN	F7 LANDING AMPS	F7 LANDING AVG AMPS 5SEC	F7 LANDING AVG AMPS 2MIN	F7 LANDING AVG AMPS 5MIN	F8 EMERGENCY AMPS	F8 EMERGENCY AVG AMPS 2MIN	F8 EMERGENCY AVG AMPS 5MIN	F8 EMERGENCY AVG AMPS 20MIN	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	ITEM NO
16	–	–	–	–	1·78	1·78	1·78	0·Y2	–	–	–	–									16
17	–	–	–	–	0·60	0·60	0·03	0·01	0·60	0·03	0·01	–									17
18	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·08									18
19	–	–	–	–	–	–	–	–	–	–	–	–									19
20	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11									20
21	–	–	–	–	1·50	1·50	1·50	0·60	1·5	1·5	1·5	0·60									21
22	–	–	–	–	1·25	1·25	1·25	0·50	–	–	–	–									22
23	–	–	–	–	0·80	0·40	0·04	0·02	0·80	0·04	0·02	–									23
24	–	–	–	–	0·80	0·48	0·01	–	0·80	0·01	–	–									24
25	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09	0·09									25
26	–	–	–	–	0·12	0·12	0·12	0·05	0·12	0·12	–	–									26
27	0·08	0·08	0·08	0·08	0·08	0·08	0·08	0·05	0·08	0·08	0·08	0·08									27
28	–	–	–	–	0·11	0·11	0·11	0·05	0·11	0·11	–	–									28
29	–	–	–	–	1·00	1·00	0·09	0·04	1·00	0·09	0·04	0·01									29
30	–	–	–	–	–	–	–	–	–	–	–	–									30
31	1·00	0·80	0·03	0·01	1·00	0·80	0·04	0·03	–	–	–	–									31
32	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	–	–	–	–									32
33	–	–	–	–	1·00	1·00	0·17	0·07	–	–	–	–									33
34	6·60	6·60	6·60	6·60	6·60	6·60	6·60	6·60	6·60	6·60	6·60	1·98									34
35	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11	0·11									35
36	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·04	0·07	0·07	0·07	0·07									36
37	0·07	0·07	0·07	0·07	0·07	0·07	0·07	0·04	0·07	0·07	0·07	0·07									37
38	1·00	1·00	0·07	0·07	1·00	1·00	0·17	0·07	1·00	1·00	0·17	0·07									38
39	1·00	1·00	0·07	0·07	1·00	1·00	0·18	0·07	1·00	0·18	0·07	0·02									39
40	0·07	0·07	0·01	0·01	0·07	0·07	0·01	0·01	0·07	0·01	0·01	0·01									40
41	0·07	0·07	0·01	0·01	0·07	0·07	0·01	0·01	0·07	0·01	0·01	0·01									41
	11·35	11·15	8·40	8·38	20·31	19·39	13·72	10·37	14·28	10·31	9·04	3·30	TOTALS THIS PAGE								

BOF04004

Load Analysis Chart – DC Systems (Sheet 4 of 12) Figure 4-1

ITEM NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C NO OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO
						F1 LOADING & ANCHOR				F2 START & WARMUP				F3 TAXI				F4 TAKE OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 30MIN	
	J - IGNITION																									
42	IGNITION UNIT	37D401588	1	4.00	27	—	—	—	—	4.00	4.00	0.08	0.03	—	—	—	—	4.00	4.00	0.08	—	4.00	4.00	0.08	—	42
	K - ENGINE STARTING																									
43	ENGINE START CONTROL RELAY	MA02-4DB	1	0.13	28	—	—	—	—	0.13	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43
46	AIR START TIME DELAY RELAY	TDH8070-2502	1	0.15	30	0.15	0.15	0.01	—	—	—	—	—	—	—	—	—	0.15	0.15	0.01	—	0.15	0.15	0 01	—	46
	L - LIGHTING																									
47	INST PANEL SHROUD FLOOD LIGHTS	MS25069-1495	5	0.34	CONT	1.70	1.70	1 70	1 70	1.70	1.70	1 70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	47
48	CENTRE CONSOLE PANEL LIGHTS	MS25237-327	12	0.04	CONT	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	48
49	CIRCUIT BREAKER EDGE-LIT PANELS	CM8-627	24	0.04	CONT	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	49
50	AILERON TRIM EDGE-LIT PANEL	CM8-627	3	0.04	CONT	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	50
51	ENGINE & ACFT. ELECT. PANEL	CM8-627	8	0.04	CONT	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	51
52	INSTRUMENT PANEL LIGHTS	MS25237-327	53	0.04	CONT	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	52
53	FACIA PANEL LIGHTS RH & LH	MS25237-327	4	0.04	CONT	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	53
54	TAXI LIGHT	4571	1	5.36	31	—	—	—	—	—	—	—	—	5.36	5.36	5.36	5.36	5.36	5.36	2.15	0.72	—	—	—	—	54
55	LANDING LIGHTS	4553	2	8.93	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	55
56	LANDING LIGHT RELAYS	M520-USN-L	2	0.10	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	56
57	AUDIO SELECTOR PANEL	5071-1-1/AIC504	1	0.18	CONT	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	57
58	LIGHT DIMMING RELAY	MS27401-27	1	0.11	CONT	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0 11	0.11	0 11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	58
60	WING NAVIGATION LIGHTS	MS25309-7512	2	0.83	33	—	—	—	—	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	60
61	TAIL NAVIGATION LIGHT	MS35478-1683	1	1.02	33	—	—	—	—	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	61
62	ANTI-COLLISION LIGHTS	MS25338-7079	2	3.10	34	—	—	—	—	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	1.03	62
	TOTALS THIS PAGE					6.30	6.30	6.16	6.15	19.16	19.16	15.11	15.06	20.39	20.39	20.39	20.39	24.54	24.54	17.27	15.75	19.18	19.18	15.12	15.03	

BOF04005

Load Analysis Chart – DC Systems (Sheet 5 of 12) Figure 4-1

F OPERATING CONDITIONS

ITEM NO	F6 ROUGH CRUISE AMPS	F6 AVG AMPS 5SEC	F6 AVG AMPS 5MIN	F6 AVG AMPS 30MIN	F7 LANDING AMPS	F7 AVG AMPS 5SEC	F7 AVG AMPS 2MIN	F7 AVG AMPS 5MIN	F8 EMERGENCY AMPS	F8 AVG AMPS 2MIN	F8 AVG AMPS 5MIN	F8 AVG AMPS 20MIN	AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			ITEM NO
42	4.00	4.00	0.07	0.01	–	–	–	–	4.00	0.17	0.07	0.02																42
43	–	–	–	–	–	–	–	–	–	–	–	–																43
46	0.15	0.15	0.01	–	–	–	–	–	0.15	0.03	0.01	–																46
47	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70																47
48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48																48
49	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96																49
50	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12																50
51	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32																51
52	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12																52
53	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16																53
54	–	–	–	–	5.36	5.36	5.36	2.15	–	–	–	–																54
55	–	–	–	–	17.86	17.86	17.86	10.72	17.86	17.86	10.72	2.68																55
56	–	–	–	–	0.20	0.20	0.20	0.12	0.20	0.20	0.12	0.03																56
57	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18																57
58	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11																58
60	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66																60
61	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02																61
62	6.20	6.20	6.20	1.03	6.20	6.20	6.20	6.20	–	–	–	–																62
	19.18	19.18	15.11	9.87	38.45	38.45	38.45	28.02	31.04	27.09	19.75	11.56	TOTALS THIS PAGE															

BOF04006

Load Analysis Chart – DC Systems (Sheet 6 of 12) Figure 4-1

ITEM NO.	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO.	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO.
						F1 LOADING & ANCHOR				F2 START & WARM-UP				F3 TAXI				F4 TAKE-OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
							5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	30 MIN	
	M – MISCELLANEOUS																									
63	CANOPY OPEN CONTROL RELAY	M520-U5N-L	1	0.10	35	0.10	0.10	–	–	–	–	–	–	0.10	0.10	0.10	0.10	–	–	–	–	–	–	–	–	63
64	CANOPY CLOSE CONTROL RELAY	M520-U5N-L	1	0.10	36	0.10	0.10	–	–	0.10	0.10	–	–	0.10	0.10	–	–	–	–	–	–	–	–	–	–	64
65	CANOPY ACTUATOR	41A-92010-800	1	8.00	37	8.00	8.00	0.43	0.14	8.00	8.00	0.21	0.07	8.00	8.00	0.43	0.14	–	–	–	–	–	–	–	–	65
66	CANOPY SEAL PRESSURE REG.	111828-CL41	1	0.35	38	0.35	0.35	0.01	–	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	66
	P – DC POWER & DISTRIBUTION																									
67	GEN. REV. CURR & START CONTACTOR	MS27433-600	1	0.60	39	–	–	–	–	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	67
68	GENERATOR FAIL IND. RELAY	MS27400-17	1	0.10	39	–	–	–	–	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	68
69	START. GENERATOR RESET CONT. RELAY	M6106/51-005	1	0.08	39	–	–	–	–	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	69
70	GROUND POWER RELAY	AJ-A4N-176	1	0.50	40	0.50	0.50	0.50	0.50	0.50	0.50	0.10	0.03	–	–	–	–	–	–	–	–	–	–	–	–	70
71	SERIES/PARALLEL RELAY	A848KBH	1	5.45	41	–	–	–	–	5.45	5.45	0.36	0.12	–	–	–	–	–	–	–	–	–	–	–	–	71
72	BATTERY RELAYS	AJ-A4N-176	2	0.50	42	–	–	–	–	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	72
73	NON-ESSENTIAL BUS TIE-IN RELAY	AJ-A4N-176	1	0.50	43	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.48	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	73
74	BATTERY CHARGING	30242-002	2	44	44	–	–	–	–		161.00	100.80	55.00		55.00	42.24	21.00		21.00	16.60	11.04		11.04	8.9	6.00	74
75	CANOPY POWER RELAY	C600-A4N	1	0.10	45	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	–	–	–	–	–	–	–	–	75
	Q – ENGINE CONTROL																									
77	FUEL BOOSTER PUMP	RR160B	1	13.00	46	–	–	–	–	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	77
78	FUEL BOOSTER PUMP RELAY	M520-U5N-L	1	0.10	46	–	–	–	–	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	78
79	FUEL SHUT-OFF VALVE	AV16B1692D	1	2.00	47	–	–	–	–	2.00	2.00	0.03	0.01	–	–	–	–	–	–	–	–	–	–	–	–	79
	TOTALS THIS PAGE					9.65	9.65	1.54	1.24	31.88	192.88	117.33	70.99	24.03	79.03	58.60	37.07	15.73	36.73	32.33	26.77	15.73	26.77	24.63	21.73	

BOF04007

Load Analysis Chart – DC Systems (Sheet 7 of 12) Figure 4-1

ITEM NO.	F OPERATING CONDITIONS																												ITEM NO.
	F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY																				
	AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
		5 SEC	5 MIN	30 MIN		5 SEC	2 MIN	5 MIN		2 MIN	5 MIN	20 MIN																	
63	–	–	–	–	–	–	–	–	–	–	–	–																	63
64	–	–	–	–	–	–	–	–	–	–	–	–																	64
65	–	–	–	–	–	–	–	–	–	–	–	–																	65
66	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.33	0.35	0.35	0.35	0.34																	66
67	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	–	–	–	–																	67
68	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	–	–	–	–																	68
69	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	–	–	–	–																	69
70	–	–	–	–	–	–	–	–	–	–	–	–																	70
71	–	–	–	–	–	–	–	–	–	–	–	–																	71
72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00																	72
73	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	–	–	–	–																	73
74	6.60	6.00	6.00	6.00	6.60	6.00	6.00	6.00	–	–	–	–																	74
75	–	–	–	–	–	–	–	–	–	–	–	–																	75
77	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	–	–	–	–																	77
78	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	–	–	–	–																	78
79	–	–	–	–	2.00	2.00	0.08	0.03	2.00	0.08	0.03	0.01																	79
	22.33	21.73	21.73	21.73	24.33	23.73	21.81	21.74	3.35	1.43	1.38	1.35																	

BOF04008

Load Analysis Chart – DC Systems (Sheet 8 of 12) Figure 4-1

ITEM NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO
						F1 LOADING & ANCHOR				F2 START & WARMUP				F3 TAXI				F4 TAKE OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
							5SEC	5MIN	15MIN		5SEC	5MIN	15MIN		5SEC	5MIN	15MIN		5SEC	5MIN	15MIN		5SEC	5MIN	30MIN	
	R - RADIO																									
80	UHF TRANSCEIVER	RT5078/ARC164(V)	1	48	CONT	-	3.82	1.36	1.36	-	3.82	1.36	1.36	-	3.82	1.36	1.36	-	3.82	1.36	1.36	-	3.82	1.36	1.36	80
	RECEIVE MODE	-	-	1.08	-																					
	TRANSMIT MODE	-	-	3.82	-																					
81	UHF CONTROL UNIT	C5367(V)2/ARC164(V)	1	0.36	CONT	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	81
82	UHF REMOTE CHANNEL SELECTOR	C5336/ARC164(V)	1	0.11	CONT	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	82
83	UHF CHANNEL INDICATOR	ID1961/ARC164(V)	1	0.05	CONT	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	83
84	UHF TAKE CONTROL SWITCH	95-41-52-86-57145	1	0.02	CONT	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	84
85	VOR/TACAN SELECT SWITCH	MS24523-23	1	3.50	49	-	-	-	-	3.50	0.70	0.01	-	-	-	-	-	-	-	-	-	3.50	0.70	0.01	0.01	85
86	INTERCOM SYSTEM	5071-1-1/AIC504	1	1.00	CONT	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	86
87	TACAN SYSTEM (DC)	ARN504	1	0.12	50	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	87
88	VOR/ILS RECEIVER	ARN508	1	0.80	CONT	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	88
89	VOR/TACAN AUDIO RELAY	MS27401-27	1	0.11	CONT	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	89
90	VHF COMM. TRANSCEIVER	RT5048/ARC511(V)	1	48	CONT	-	7.00	1.60	1.60	-	7.00	1.60	1.60	-	7.00	1.60	1.60	-	7.00	1.60	1.60	-	7.00	1.60	1.60	90
	RECEIVE MODE	-	-	1.00	-																					
	TRANSMIT MODE	-	-	7.00	-																					
91	NAV/COMM. CONTROL PANEL	313N-2	1	59	CONT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91
	S - RADAR																									
92	IFF/SIF SYSTEM (inc. RELAYS)	APX-77	1	1.96	51	-	-	-	-	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	92
93	IFF/SIF TEST SET	TS1834B/APX	1	0.30	51	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	93
94	IFF/SIF REMOTE INPUT RELAY	M6106/28-024	1	0.08	51	-	-	-	-	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	94
	TOTALS THIS PAGE					2.57	13.39	5.53	5.53	8.41	16.43	7.88	7.87	4.91	15.73	7.87	7.87	4.91	15.73	7.87	7.87	8.41	16.43	7.88	7.88	

BOF04009

Load Analysis Chart – DC Systems (Sheet 9 of 12) Figure 4-1

F OPERATING CONDITIONS

ITEM NO	F6 ROUGH CRUISE AMPS	F6 ROUGH CRUISE AVG AMPS 5SEC	F6 ROUGH CRUISE AVG AMPS 5MIN	F6 ROUGH CRUISE AVG AMPS 30MIN	F7 LANDING AMPS	F7 LANDING AVG AMPS 5SEC	F7 LANDING AVG AMPS 2MIN	F7 LANDING AVG AMPS 5MIN	F8 EMERGENCY AMPS	F8 EMERGENCY AVG AMPS 2MIN	F8 EMERGENCY AVG AMPS 5MIN	F8 EMERGENCY AVG AMPS 20MIN	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	AMPS	AVG AMPS	ITEM NO
80	–	3.82	1.36	1.36	–	3.62	1.36	1.36	–	1.36	1.36	1.36									80
81	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36									81
82	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11									82
83	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05									83
84	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02									84
85	3.50	0.70	0.01	0.01	3.50	0.70	0.03	–	3.50	0.03	0.01	0.01									85
86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									86
87	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.03									87
88	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80									88
89	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11									89
90	–	7.00	1.60	1.60	–	7.00	1.60	1.60	–	1.60	1.60	1.60									90
91	–	–	–	–	–	–	–	–	–	–	–	–									91
92	1.96	1.96	1.96	1.96	–	–	–	–	–	–	–	–									92
93	0.30	0.30	0.30	0.30	–	–	–	–	–	–	–	–									93
94	0.08	0.08	0.08	0.08	–	–	–	–	–	–	–	–									94
	8.41	16.43	7.88	7.88	6.07	14.09	5.56	5.53	6.07	5.56	5.54	5.45									

BOF04010

Load Analysis Chart – DC Systems (Sheet 10 of 12) Figure 4-1

ITEM NO.	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO.	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO.
						F1 LOADING & ANCHOR				F2 START & WARM-UP				F3 TAXI				F4 TAKE-OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
							5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	30 MIN	
	X & V – AC POWER																									
95	NO. 1 INVERTER (MAIN)	ASH564B-6	1	36.00	52	–	–	–	–	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	95
96	NO. 2 INVERTER (STAND-BY)	ASH564B-6	1	36.00	53	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	96
	W – WARNING																									
97	ANNUNCIATOR PANEL LIGHTS	MS25237-327	36	0.04	54	1.44	1.44	0.03	0.01	0.16	0.16	–	–	0.04	0.04	0.01	–	0.04	0.04	0.01	–	0.04	0.04	0.01	–	97
98	MASTER CAUTION & WARNING LIGHTS	MS25237-327	8	0.04	55	0.32	0.32	0.01	–	0.04	0.04	–	–	0.04	0.04	–	–	0.04	0.04	–	–	0.04	0.04	–	–	98
101	FIRE & OVERHEAT DETECTION SYSTEM	377-28-2A	1	0.20	58	0.20	0.20	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	101
	Z - OPERATIONAL LOADS MONITORING																									
102	DATA AQUISITION UNIT	B529	1	0.71	61	–	–	–	–	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	102
	TOTALS THIS PAGE					1.96	1.96	0.04	0.01	36.91	36.91	36.71	36.71	36.79	36.79	36.72	36.71	36.79	36.79	36.72	36.71	36.79	36.79	36.72	36.71	

BOF04011

Load Analysis Chart – DC Systems (Sheet 11 of 12) Figure 4-1

ITEM NO.	F OPERATING CONDITIONS																												ITEM NO.
	F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY																				
	AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
		5 SEC	5 MIN	30 MIN		5 SEC	2 MIN	5 MIN		2 MIN	5 MIN	20 MIN																	
95	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00																	95
96	–	–	–	–	–	–	–	–	–	–	–	–																	96
97	0.04	0.04	0.01	–	0.04	0.04	0.01	0.01	0.04	0.01	0.01	–																	97
98	0.04	0.04	–	–	0.04	0.04	–	–	0.04	–	–	–																	98
101	–	–	–	–	–	–	–	–	–	–	–	–																	101
102	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71																	102
	36.79	36.79	36.72	36.71	36.79	36.79	36.72	36.72	36.79	36.72	36.72	36.71		TOTALS THIS PAGE															

BOF04012

Load Analysis Chart – DC Systems (Sheet 12 of 12) Figure 4-1

ITEM NO.	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO.	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																			ITEM NO.
						F1 LOADING & ANCHOR				F2 START & WARM-UP				F3 TAXI				F4 TAKE-OFF & CLIMB				F5 CRUISE			
						AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS		
							5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	15 MIN		5 SEC	5 MIN	30 MIN	
	SUMMARY																								
	SUBTOTAL FIGURE 4-1, SHEETS 1 AND 2						3.17	3.17	3.17		7.07	3.37	3.17		3.17	3.17	3.17		12.41	10.25	10.24		13.11	10.26	10.24	
	SUBTOTAL FIGURE 4-1, SHEETS 3 AND 4						7.79	5.67	4.55		17.39	7.15	4.95		13.99	7.01	5.00		16.79	12.92	9.29		11.15	8.40	8.38	
	SUBTOTAL FIGURE 4-1, SHEETS 5 AND 6						6.30	6.16	6.15		19.16	15.11	15.06		20.39	20.39	20.39		24.54	17.27	15.75		19.18	15.12	15.03	
	SUBTOTAL FIGURE 4-1, SHEETS 7 AND 8						9.65	1.54	1.24		192.88	117.33	70.99		79.03	58.60	37.07		36.73	32.33	26.77		26.77	24.63	21.73	
	SUBTOTAL FIGURE 4-1, SHEETS 9 AND 10						13.39	5.53	5.53		16.43	7.88	7.87		15.73	7.87	7.87		15.73	7.87	7.87		16.43	7.88	7.88	
	SUBTOTAL FIGURE 4-1, SHEETS 11 AND 12						1.96	0.04	0.01		36.91	36.71	36.71		36.79	36.72	36.71		36.79	36.72	36.71		36.79	36.72	36.71	
	GRAND TOTAL						42.26	22.11	20.65		289.84	187.55	138.75		169.10	133.76	110.21		142.99	117.36	106.63		123.43	103.01	99.97	

BOF04013

Load Analysis Chart – Data Summary – DC Loading (Sheet 1 of 2) Figure 4-2

ITEM NO.	F OPERATING CONDITIONS																								ITEM NO.
	F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY																
	AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			
		5 SEC	5 MIN	30 MIN		5 SEC	2 MIN	5 MIN		2 MIN	5 MIN	20 MIN																
		13.83	10.30	10.29		13.11	10.30	10.25		10.29	10.26	5.68																
		11.15	8.40	8.38		19.39	13.72	10.37		10.31	9.04	3.30																
		19.18	15.11	9.87		38.45	38.45	28.02		27.09	19.75	11.56																
		21.73	21.73	21.73		23.73	21.81	21.74		1.43	1.38	1.35																
		16.43	7.88	7.88		14.09	5.56	5.53		5.56	5.54	5.45																
		36.79	36.72	36.71		36.79	36.72	36.72		36.72	36.72	36.71																
		119.11	100.14	94.86		145.56	126.56	112.63		91.40	82.69	64.05																

BOF04014

Load Analysis Chart – Data Summary – DC Loading (Sheet 2 of 2) Figure 4-2

ITEM NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C TOTAL NO OF UNITS	D OPERATING TIME IN MIN	E PF	F OPERATING CONDITIONS VA	WATTS	VARS	ITEM NO
	INVERTER BUS (115V)								
	ENGINE LIFE MONITOR	ELM 100C OR 501-1361-03	1	(4)	.9	10.0	9.0	3.16	
	STALL WARNING SYSTEM	41A58023	1	30	.9	11.5	10.4	5.1	
	SERVO'D ALTIMETER SYSTEM	81-22-20	1	-	.9	17.3	15.6	7.5	
	SERVO ALTITUDE COMPUTER IND	31236-10T-C11	1	-	.9	11.5	10.4	5.1	
	No 1 PHASE ADAPTER	661102-B	1	30	.87	63.6	55.3	31.3	
	No 2 PHASE ADAPTER	661102-B	1	30	.9	77.8	70.0	33.9	
	TACAN	AN/ARN-504	1	(5A)	.95	406.6	386.3	126.7	
	FUEL QUANTITY INDICATOR	JG 602A-1	1	30	.6	10.0	6.0	8.0	
	COCKPIT TEMP CONTROL	45958-10	1	30	.75	183.0	137.2	121.1	
		TOTAL				791.3	700.2	341.86	
	26V AC BUS								
	OIL PRESSURE INDICATOR	EA346-2A	1	30	.192	3.12	0.6	3.06	
	OIL PRESSURE TRANSMITTER	7724-30D5-1	1	30	.22	6.24	1.40	6.08	
	HYDRAULIC PRESSURE INDICATOR	18-1417	1	30	.192	3.12	0.6	3.06	
	HYDRAULIC PRESSURE TRANSMITTER	ST 106 N	1	30	.22	6.24	1.40	6.08	
	COMPASS SIGNAL REPEATER	INST-8-7	1	30	.85	10.0	8.5	3.87	
	DRMI (LH & RH)	ID-5040A/ARN	2	30	.9	35.6	32.2	15.7	
	COURSE INDICATOR (LH&RH)	MN97HA4 WL	2	30	.9	11.2	10.1	4.9	
	TACAN	AN ARN-504	1	(5A)	.95	36.8	35.0	11.37	
	VOR ILS RECEIVER	VIR-31	1	30	.9	9.10	8.19	3.97	
		TOTAL				121.42	97.99	58.09	
	No 1 PHASE ADAPTER								
	RH ATTITUDE INDICATOR	AE 300270-2A	1	30	.925	16.0	13.6	8.4	
	COMPASS AMPLIFIER A-2/C	653278	1	30	.925	28.4	25.7	12.2	
	DIRECTIONAL GYRO S3B/C	673447	1						
	No 1 PHASE ADAPTER (LOSS)					19.2	16.0	10.7	
		TOTAL				63.6	55.3	31.3	
	No 2 PHASE ADAPTER								
	RATE SWITCHING GYRO	138474-01-01	1	30	.9	10.0	9.0	4.4	
	VERTICAL GYRO	124623-01	1	30	.9	30.0	27.0	13.0	
	ATTITUDE INDICATOR (LH)	140140-01-01	1	30	.9	20.0	18.0	8.7	
	No 2 PHASE ADAPTER (LOSS)					17.8	16.0	7.8	
		TOTAL				77.8	70.0	33.9	

NOTE: THE AC LOAD VALUES FOR ALL OPERATING CONDITIONS ARE CONSTANT AND THEREFORE NOT REPEATED THROUGHOUT THIS TABLE.

BOF04015

Load Analysis Chart – AC Systems Figure 4-3

SUPPLEMENTARY DATA – ASSUMPTIONS

CODE NO	EQUIPMENT	LOADING & ANCHOR	START & WARMUP	TAXI	TAKE-OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
1	AILERON TRIM TAB ACTUATOR	OFF	20 SEC TEST	OFF	1 SEC PER MIN	2 SEC PER 2 MIN	4 SEC PER 2 MIN	1 SEC PER MIN	2 SEC PER 2 MIN
2	ELEVATOR TRIM TAB ACTUATOR	OFF	23 SEC TEST	OFF	5 SEC PER 2 MIN	4 SEC PER 2 MIN	← 5 SEC PER 2 MIN →		4 SEC PER 2 MIN
3	TRIM CONTROL RELAY	← CONTINUOUS →							
4	SPEED BRAKES SELECT VALVE	OFF	TEST: 1 OPER. OF 8 SEC	← OFF →		8 SEC/10 MIN	8 SEC/5 MIN	1 OPERATION OF 8 SEC	1 OPERATION OF 8 SEC
5	LIFT TRANSDUCER HEATER	← OFF →			← CONTINUOUS →				6 MIN/20 MIN
6	CONTROL SHAKER	OFF	TEST OF 2 SEC	OFF	1 OPERATION OF 2 SEC	1 OPERATION OF 2 SEC	1 OPERATION OF 2 SEC	1 OPERATION OF 2 SEC	1 OPERATION OF 2 SEC
7	SERVOED ALTIMETER INDICATOR VIBRATOR	← OFF →			← STANDBY MODE OPERATION ONLY →				
8	LANDING GEAR SAFE GROUND OBSERVER LIGHT	← 5 MIN →	← 5 MIN →	← 5 MIN →	5 MIN	← OFF →		2 MIN	OFF
9	LANDING GEAR WARNING SIGNAL	OFF	5 SEC TEST	← OFF →				5 SEC	5 SEC
10	LANDING GEAR DOWNLOCK RELAY LANDING GEAR UPLOCK RELAY	← THE TWO RELAYS ARE ENERGIZED ALTERNATELY. = ONE RELAY OPERATING CONTINUOUSLY →							
11	LANDING GEAR UPLOCK SAFETY RELAY	← CONTINUOUS →			← CONTINUOUS →				
12	LANDING GEAR CONTROL UNIT - COIL	← OFF →			5 MIN			2 MIN	2 MIN
13	NOSE GEAR STEERING SHUT-OFF VALVE	← CONTINUOUS →			5 MIN	← OFF →		2 MIN	OFF
14	MAIN L.G. DOOR SELECTOR VALVE	1 OPERATION OF 2.5 SEC IN 5 MIN	1 OPERATION OF 5 SEC	OFF	2 OPERATIONS OF 2 SEC IN 8 SEC			2 OPERATIONS OF 2.5 SEC IN 8 SEC	OFF
15	LANDING GEAR SELECTOR VALVE	← CONTINUOUS →			3 SEC			3 SEC	OFF
16	No.1 & No.3 GROUND SAFETY RELAYS	← CONTINUOUS @ 0.23 AMP →			5 SEC @ 0.23 A +5 MIN @ 0.08 A			2 MIN @ 0.1 A +3 MIN @ 0.08 A	5 MIN @ 0.23 A +25 MIN @ 0.08 A
17	No.2 GROUND SAFETY RELAY	← OFF →				← CONTINUOUS @ 0.08 A →			
18	SYSTEM SHUT-OFF VALVE	1 OPERATION OF 10 SEC	2 OPERATIONS OF 10 SEC	← OFF →				1 OPERATION OF 10 SEC	1 OPERATION OF 10 SEC
19	CABIN SAFETY VALVE	← EMERGENCY CONDITION ONLY →							OFF
20	MODULATING VALVE	← 4 SEC/2 MIN →							OFF
21	ENGINE ANTI-ICING VALVE	← CONTINUOUS →							OFF
22	ZONE 2 COOLING – FAN S/O VALVE	OFF	1 OPERATION OF 10 SEC	OFF	1 OPERATION OF 10 SEC	← OFF →		2 OPERATIONS OF 10 SEC	OFF
23	PITOT TUBE HEATER	OFF	1 MIN	1 MIN	← CONTINUOUS →				6 MIN/20 MIN
24	ZONE 2 COOLING IND. RELAYS	CONT	3 MIN	CONT	5 MIN	← CONTINUOUS →		3 MIN	20 MIN

BOF04016

Load Analysis Chart – Supplementary Data (Sheet 1 of 3) Figure 4-4

SUPPLEMENTARY DATA - ASSUMPTIONS

CODE NO	EQUIPMENT	LOADING & ANCHOR	START & WARMUP	TAXI	TAKE-OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
25	WINDSHIELD DE-ICE VALVE	OFF	← EMERG. ONLY →		← 20 SEC / 5 MIN →				
26	WINDSHIELD DE-MIST VALVE	OFF	21 SEC	21 SEC	OFF	← 21 SEC / 5 MIN →		21 SEC	21 SEC
27	IGNITION UNIT	OFF	6 SEC	← OFF →	← 25 SECS →		25 SEC	OFF	25 SEC
28	ENGINE START CONTROL RELAY	OFF	10 SEC	← OFF →					
30	AIR START TIME DELAY RELAY	25 SEC TEST	← OFF →		1 OPERATION OF 25 SECS →	1 OPERATION OF 25 SEC	← OFF →		1 OPERATION OF 25 SEC
31	TAXI LIGHT	← OFF →		CONT	2 MIN	← OFF →		2 MIN	OFF
32	LANDING LIGHTS & RELAYS	← OFF →						3 MIN	3 MIN
33	WING/TAIL NAVIGATION LIGHTS	OFF	← CONTINUOUS →						
34	ANTI-COLLISION LIGHTS	OFF	← CONTINUOUS →			← 5 MIN / 30 MIN →		CONT	OFF
35	CANOPY OPEN CONTROL RELAY	8 SEC	OFF	CONT	← OFF →				
36	CANOPY CLOSE CONTROL RELAY	8 SEC	8 SEC	8 SEC	← OFF →				
37	CANOPY ACTUATOR	16 SEC	8 SEC	16 SEC	← OFF →				
38	CANOPY SEAL PRESSURE REG.	8 SEC	← CONTINUOUS →					4.7 MIN	19.7 MIN
39	GEN. REV. CURR. & START CONTACTOR	OFF	← CONTINUOUS →						OFF
40	GROUND POWER RELAY	CONT	1 MIN	← OFF →					
41	SERIES/PARALLEL RELAY	OFF	20 SEC	← OFF →					
42	BATTERY RELAY	OFF	14.3 MIN	← CONTINUOUS →					
43	NON-ESSENTIAL BUS TIE-IN RELAY	CONT	14.3 MIN	← CONTINUOUS →					OFF
44	BATTERY CHARGING	NO CHARGING WITH GROUND PWR	← IN ACCORDANCE WITH MIL-E-7016F →						NONE
45	CANOPY POWER RELAY	← CONTINUOUS →			← OFF →				
46	FUEL BOOSTER PUMP & RELAY	OFF	← CONTINUOUS →						OFF
47	FUEL SHUT-OFF VALVE	OFF	1 OPERATION OF 5 SEC	← OFF →				1 OPERATION OF 5 SEC	1 OPERATION OF 5 SEC
48	UHF/VHF TRANSCEIVERS	← LOAD CALCULATED ASSUMING 90% RECEIVE MODE, 10% TRANSMIT MODE →							
49	VOR/TACAN SELECT SWITCH	OFF	1 OPERATION OF 1 SEC	OFF	OFF	6 OPERATIONS OF 1 SEC	6 OPERATIONS OF 1 SEC	6 OPERATIONS OF 1 SEC	6 OPERATIONS OF 1 SEC

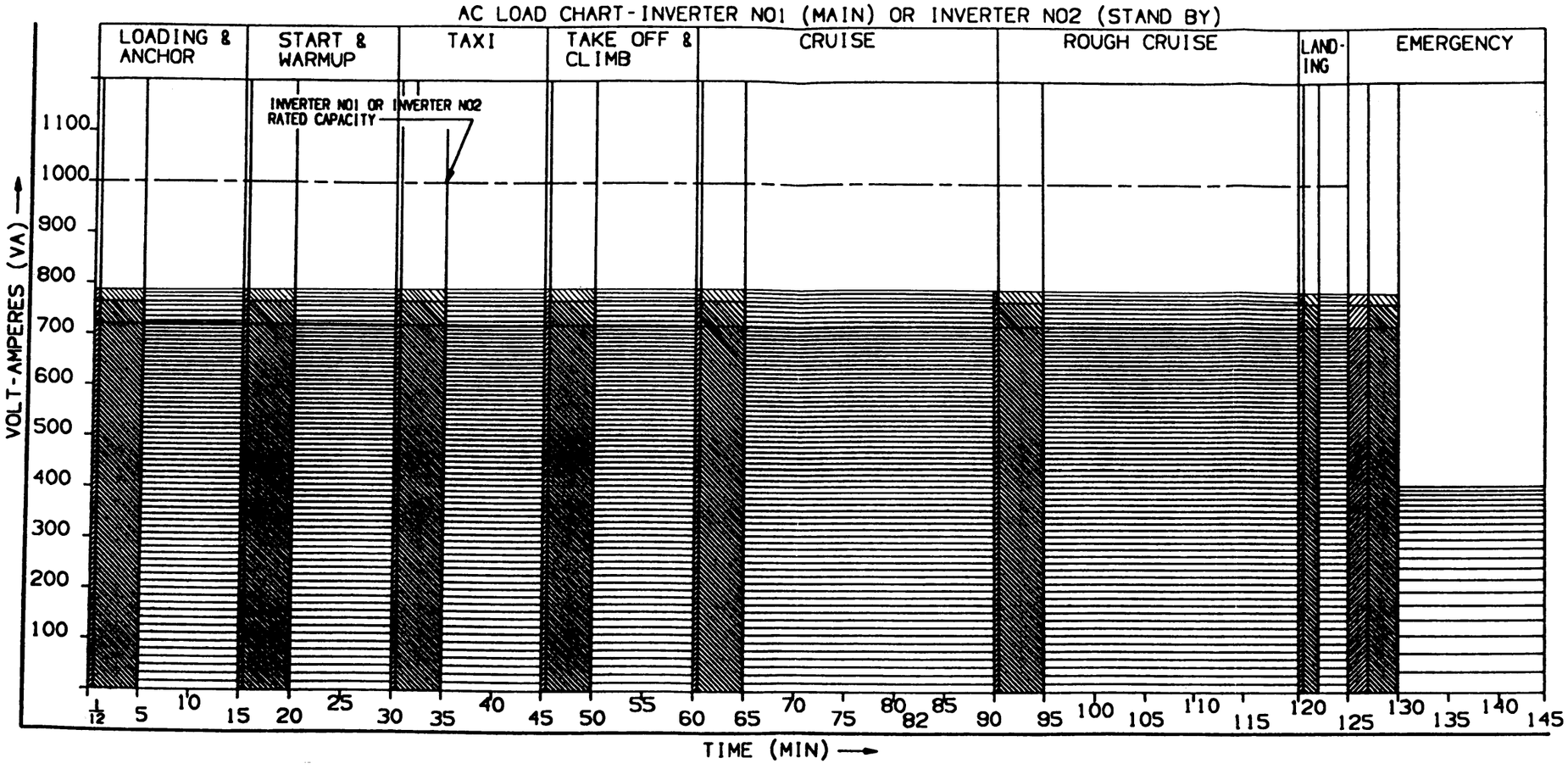
BOF04017

Load Analysis Chart – Supplementary Data (Sheet 2 of 3) Figure 4-4

SUPPLEMENTARY DATA – ASSUMPTIONS									
CODE NO.	EQUIPMENT	LOADING & ANCHOR	START & WARM-UP	TAXI	TAKE-OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
50	TACAN SYSTEM	← CONTINUOUS →							5 MIN
51	IFF/SIF SYSTEM	OFF	← CONTINUOUS →						OFF
52	NO. 1 INVERTER	OFF	← CONTINUOUS →						
53	NO. 2 INVERTER	ALWAYS OFF EXCEPT ON FAILURE OF NO.1 INVERTER; IN THIS CASE, LOAD IS THE SAME AND REPLACES THAT FOR NO. 1 INVERTER							
54	ANNUNCIATOR PANEL LIGHTS	5 SEC TEST	4 LIGHTS/10 SEC	← 1 LIGHT OPERATIONAL AT ANY TIME FOR 30 SEC →					
55	MASTER CAUTION & WARNING LIGHTS	5 SEC TEST	1 LIGHT/5 SEC	← 1 LIGHT OPERATIONAL AT ANY TIME FOR 5 SEC →					
58	FIRE & OVERHEAT DETECTION SYSTEM	5 SEC TEST	← EMERGENCY CONDITION ONLY →						
59	DUAL NAV-COMM CONT. PANEL	LOAD CONSISTS OF LIGHTING ONLY – SEE INSTRUMENT PANEL LIGHTS							
60	ENGINE LIFE MONITOR	OFF	← CONTINUOUS →						
61	OPERATIONAL LOADS MONITORING	OFF	← CONTINUOUS →						

BOF04018

Load Analysis Chart – Supplementary Data (Sheet 3 of 3) Figure 4-4



BOF04019

Load Analysis Chart – AC Loads – Inverter No. 1 or No. 2 Figure 4-5

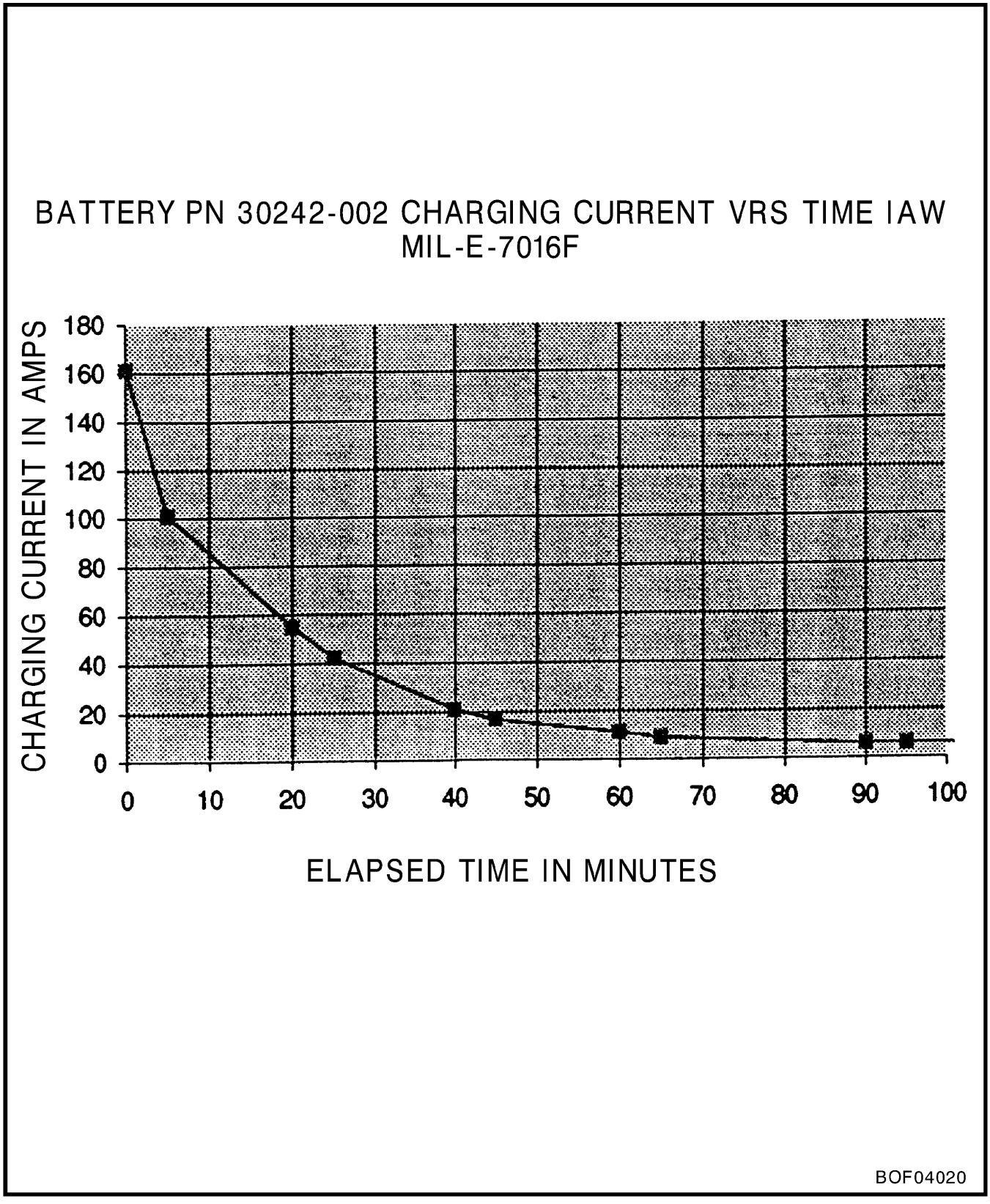


Figure 4-6 Load Analysis Chart – Battery Charging Current

NO	A EQUIPMENT	B PART DESIGNATION OR DRAWING NO	C NO. OF UNITS	D AMPS PER UNIT	E OPERATING TIME IN MIN	F OPERATING CONDITIONS																				ITEM NO
						F1 LOADING & ANCHOR				F2 START & WARMUP				F3 TAXI				F4 TAKE OFF & CLIMB				F5 CRUISE				
						AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 15MIN	AMPS	AVG AMPS 5SEC	AVG AMPS 5MIN	AVG AMPS 30MIN	
	SG - SMOKE GENERATION																									
1	SMOKE CONTROL UNIT	NW4514004-1	1	0.51	⚠1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.51	0.51	0.51	0.51	
2	FAIL SAFE RELAY	9330-4026	2	0.18	⚠2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.18	0.18	0.18	0.18	
3	SMOKE VALVE	AV16B1692DSB	2	2.00	⚠3	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
4	SMOKE INDICATOR LIGHT	MS25237-327	2	0.04	⚠4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.08	0.08	0.08	0.08	
	EX - CROSS COCKPIT																									
5	L/G CONTROL RELAY K1EX	9223-4833	1	0.14	CONT	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
6	MASTER XCKPT CRSVR RELAY K2EX	9223-4833	1	0.14	CONT	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
7	LDG GR UNSAFE IND RELAY K3EX	9235-4842	1	0.09	CONT	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
8	CONT XCKPT XFER RELAY NO1 K4EX	Y-D4N	1	0.07	CONT	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	
9	CONT XCKPT XFER RELAY NO 2 K5EX	Y-D4N	1	0.07	CONT	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	
10	MASTER CAUTION & WARNING LIGHT	MS25237-327	8	0.04	⚠5	0.32	0.32	0.01	–	0.04	0.04	–	–	0.04	0.04	–	–	0.04	0.04	–	–	0.04	0.04	–	–	
11	POST LIGHT	MS25237-327	8	0.04	CONT	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	
	ADF 206A SYSTEM																									
12	*ADF RECEIVER*	*622-6812-001*	*1*	*0.5*	*CONT*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	
13	*ADF CONTROL*	*622-6813-001*	*1*	*0.03*	*CONT*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	
	TOTAL					*5.68*	*5.68*	*5.37*	*5.36*	*5.40*	*5.40*	*5.36*	*5.36*	*5.40*	*5.40*	*5.36*	*5.36*	*5.40*	*5.40*	*5.36*	*5.36*	*6.17*	*6.17*	*6.13*	*6.13*	
	STANDARD REWIRED TUTOR D.C. LOAD					*42.79*	*42.79*	*22.64*	*21.18*	*289.66*	*289.66*	*187.37*	*138.57*	*168.92*	*168.92*	*133.58*	*110.03*	*142.81*	*142.81*	*117.18*	*106.45*	*123.25*	*123.25*	*102.83*	*99.79*	
	(AS PER TN 90-64, REV 'D')																									
	TOTAL - REWIRED SNOWBIRD VARIANT D.C. LOAD					*47.94*	*47.94*	*27.48*	*26.01*	*294.53*	*294.53*	*192.20*	*143.40*	*173.79*	*173.79*	*135.37*	*114.86*	*147.68*	*147.68*	*122.01*	*111.28*	*128.89*	*128.89*	*108.43*	*105.39*	

BOF04021

Load Analysis Chart – DC Systems (Snowbird Aircraft Only) (Sheet 1 of 2) Figure 4-7

F OPERATING CONDITIONS

ITEM NO	F6 ROUGH CRUISE AMPS	F6 AVG AMPS 5SEC	F6 AVG AMPS 5MIN	F6 AVG AMPS 30MIN	F7 LANDING AMPS	F7 AVG AMPS 5SEC	F7 AVG AMPS 2MIN	F7 AVG AMPS 5MIN	F8 EMERGENCY AMPS	F8 AVG AMPS 2MIN	F8 AVG AMPS 5MIN	F8 AVG AMPS 20MIN	AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			AMPS	AVG AMPS			ITEM NO
1	0.51	0.51	0.51	0.51	-	-	-	-	-	-	-	-																	1
2	0.18	0.18	0.18	0.18	-	-	-	-	-	-	-	-																	2
3	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00																	3
4	0.08	0.08	0.08	0.08	-	-	-	-	-	-	-	-																	4
5	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14																	5
6	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14																	6
7	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09																	7
8	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07																	8
9	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07																	9
10	0.04	0.04	-	-	0.04	0.04	-	-	0.04	-	-	-																	10
11	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32																	11
12	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																	12
13	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	13
	6.17	6.17	6.13	6.13	5.40	5.40	5.36	5.36	5.40	5.36	5.36	5.36																	
	118.93	118.93	99.96	94.68	145.38	145.38	126.38	112.45	91.22	91.22	82.51	63.87																	
	124.57	124.57	105.56	100.28	150.25	150.25	131.21	117.28	100.09	96.05	87.34	68.70																	

BOF04022

Load Analysis Chart – DC Systems (Snowbird Aircraft Only) (Sheet 2 of 2) Figure 4-7

SUPPLEMENTARY DATA - ASSUMPTIONS									
CODE NO	EQUIPMENT	LOADING & ANCHOR	START & WARMUP	TAXI	TAKE-OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
1	SMOKE CONTROL UNIT	← OFF →				CONTINUOUS		← OFF →	
2	FAIL SAFE RELAYS	← OFF →				TWO RELAYS ARE ENERGIZED ALTERNATELY = ONE RELAY OPERATING CONTINUOUSLY		← OFF →	
3	SMOKE VALVES	← CONTINUOUS →							
4	SMOKE INDICATOR LIGHT	← OFF →				CONTINUOUS		← OFF →	
5	MASTER CAUTION & WARNING LIGHT	5 SEC TEST	1 LIGHT/5 SEC	← 1 LIGHT OPERATIONAL AT ANY TIME FOR 5 SEC →					

BOF04023

Load Analysis Chart – Supplementary Data (Snowbird Aircraft Only) Figure 4-8

PART 5

LIGHTING SYSTEMS

SECTION 1

INTERIOR LIGHTING

GENERAL DESCRIPTION

1. The interior lighting system provides illumination for the instrument panels, LH and RH consoles, centre console, standby compass and circuit-breaker panels. Intensity of all lights, except the standby compass and two utility lights, is controlled by three dimming units in the lighting control panel (see Figure 5-1-1) located on the centre console. For a schematic of all interior lighting, see Figure 5-1-2.

INSTRUMENT PANEL LIGHTING

2. The instrument panel lighting consists of individual eyebrow and post lights located on the main instrument panel and the LH fascia panel (on Snowbird aircraft eyebrow and post lights are also installed on the RH fascia panel). The instrument panel lights dimmer controls the brilliance of all the instrument lamps and receives its power from the dc essential bus.

INSTRUMENT PANEL FLOODLIGHTS

3. The instrument panels are provided with secondary illumination by white lights mounted on the undersurface of the instrument panel shroud. Dimming and control is achieved by the floodlights dimmer. Power is received from the No. 2 dc essential bus.

CONSOLE AND CIRCUIT-BREAKER PANEL LIGHTING

4. Controls and equipment located on the LH fascia panel, LH and RH consoles, centre console and circuit-breaker panel are illuminated by plastic edge-lit panels.

5. The console and circuit-breaker panel lights are powered by the No. 2 essential dc bus and dimmed with the CONSOLE control on the lighting control panel.

UTILITY LIGHTS

6. Utility lights provide additional illumination for the right and left consoles. The lamps are equipped with a built-in rheostat and switch, plus a coiled extension cord, so they may be detached from their mounting and used as hand lamps. Power for the lights is provided by the No. 2 dc essential bus.

STANDBY COMPASS

7. The standby compass light is controlled by a three-position bright-off-dim switch fed from the No. 2 dc essential bus through a 5 ampere circuit-breaker.

PILOT LETDOWN SHEET LIGHTS

8. To provide for additional illumination of the pilot letdown sheet, a lamp is mounted on the canopy. Dimming and control of this light is provided by a built-in rheostat and switch. A coiled cord is used to connect the lamp to the aft bulkhead so that the electrical wiring is protected from breakage when the canopy is opened or closed. At the aft bulkhead, a quick-disconnect plug is used to connect power to the lamp so that if the pilot has to eject the canopy, the electrical connections to the lamp will immediately release. Power to the lamp is provided from the No. 2 essential bus.

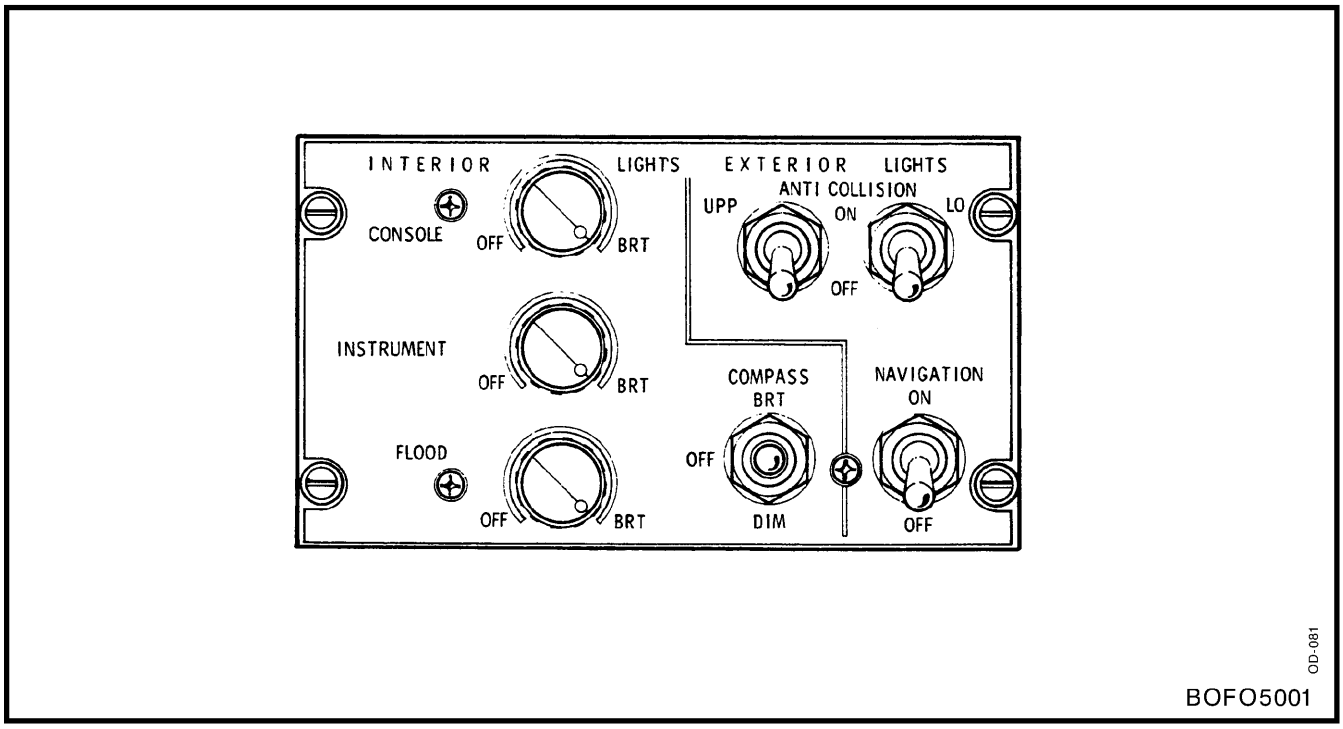
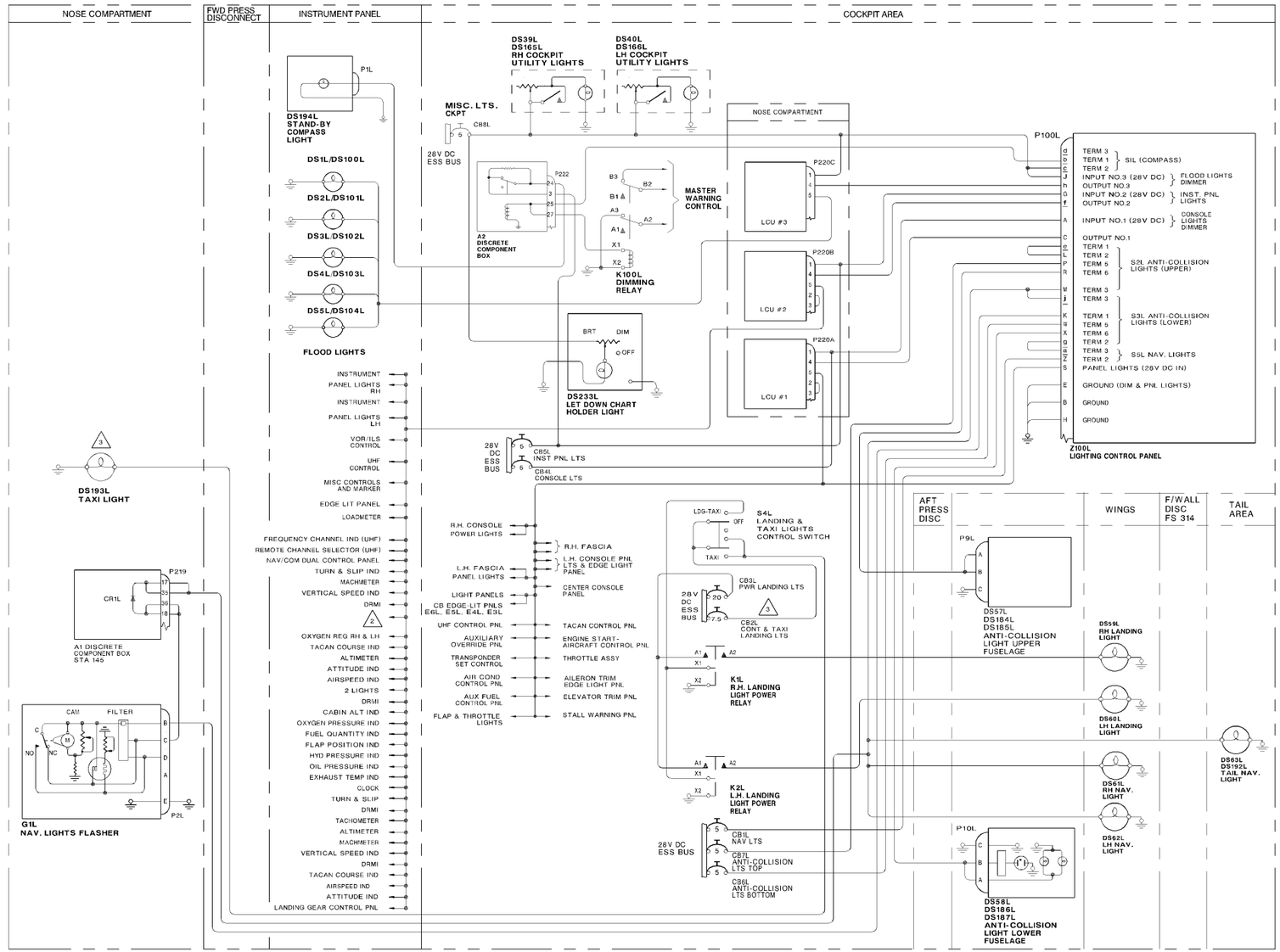


Figure 5-1-1 Lighting Control Panel



NOTES:

1. SEE C-12-114-000/DW-001, MASTER WARNING CONTROL SCHEMATIC
2. SEE C-12-114-000/DW-001, LANDING GEAR CONTROL WARNING AND INDICATION
3. SEE C-12-114-000/DW-001, TAXI/LANDING LIGHTS - SNOWBIRD AIRCRAFT

BOF05002

Interior and Exterior Lighting – Electrical Schematic Figure 5-1-2

SECTION 2

EXTERIOR LIGHTING

GENERAL

1. The exterior lighting system consists of the navigation lights, upper and lower anti-collision lights, landing lights and a taxi light. Power for the lighting is obtained from the No. 1 and No. 2 dc essential buses. For a schematic of the exterior lighting, see Section 1, Figure 5-1-2.

LANDING AND TAXI LIGHTS (FLEET)

2. One 28 volt 250 watt fixed landing lamp is installed in a transparent portion of each wing leading edge and one 28 volt 150 watt taxi lamp is located on the nose section. The landing and taxi lights are controlled by a two-section switch located on the LH fascia panel . On No. 1 dc essential bus a 20 ampere circuit-breaker supplies power for the landing lights, and a 7.5 ampere circuit-breaker supplies for the taxi light and for control of the landing lights. One section of the switch energizes the taxi light directly from the 7.5 ampere circuit-breaker in either TAXI or LANDING-TAXI position. The other section of the switch energizes the two landing light control relays from the 7.5 ampere circuit-breaker in LANDING-TAXI position only, and the relays energize the landing lights from the 20 ampere circuit-breaker.

LANDING AND TAXI LIGHTS (SNOWBIRD)

3. During snowbird conversion the taxi light is replaced by a landing light bulb and assembly. The selector switch is relocated to the centre instrument panel. Unlike the fleet, operation of the taxi and landing light are independent of each other. The dc power is provided from two 10A circuit breakers to the landing lights via control relays operated by the switch. The taxi (landing light bulb) light receives its power from one of the 10A circuit breakers directly through the switch.

REMOVAL AND INSTALLATION OF LANDING LIGHTS

4. To remove the left or right landing light, proceed as follows:

a. Ensure that the LH and RH landing light power circuit-breakers are pulled out.

b. Support the acrylic plastic cover and remove the 28 retaining screws.

c. Draw plastic cover away from wing leading edge.

d. Support landing lamp and remove the four screws holding the retaining shroud.

e. Remove shroud.

f. Withdraw the sealed beam landing lamp and disconnect the two electrical supply wires.

5. To install the left or right landing light, reverse the removal procedure.

CAUTION

Care should be taken to avoid over-tightening the acrylic plastic cover retaining screws. Over-tightening can result in cracking the plastic.

NAVIGATION AND ANTI-COLLISION LIGHTS

6. The navigation and anti-collision lights are controlled by three switches located on the centre console panel (see Section 1, Figure 5-1-1). Power for the navigation and anti-collision lights is provided from the No. 1 and No. 2 essential dc buses through three 5 ampere circuit-breakers located on the centre console circuit-breaker panel. The upper anti-collision light is located on the top of the fuselage at station 253, the lower anti-collision light is located at station 233 on the underneath section of the fuselage.

FUNCTIONAL CHECK

7. To perform a functional check of the navigation and anti-collision lights, proceed as follows:

a. Energize the No. 1 and No. 2, 28 Vdc essential buses (see Section 1, Figure 5-1-1).

b. Set the dc MASTER switch to GRD PWR.

c. Ensure that the following circuit-breakers on the centre console circuit-breaker panel are pushed in:

(1) NAV LTS.

(2) ANTI-COLLISION LTS TOP.

(3) ANTI-COLLISION LTS BOTTOM.

d. Set the navigation light control switch to ON and check that both the wing and tail navigation lights are on.

e. Set the lower anti-collision light switch to ON and check that it is illuminated and rotating.

f. Set the upper anti-collision light switch to ON and check that the light is illuminated and rotating.

g. Set the lower anti-collision light switch to OFF and check that it is extinguished and has stopped rotating.

h. Set the upper anti-collision and navigation light switches to OFF. Set the dc MASTER switch to OFF.