National Defence / Défense nationale

C-12-114-0F0/MF-000

DESCRIPTION AND MAINTENANCE INSTRUCTIONS

CT114 TUTOR

ELECTRICAL SYSTEMS

(ENGLISH)

Issued on Authority of the Chief of the Defence Staff
Publiée avec l'autorisation du Chef d'état-major de la Défense

OPI: DAEPM (FT) 6

1964-03-18
Ch 41 1996-03-15

Canada

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable orders.

NOTE

The portion of the text affected by the latest change is indicated by a black vertical line in the margin of the page. Changes to illustrations are indicated by miniature pointing hands or black vertical lines.

Dates of issue for original and changed pages are:

Original	0	1964-03-18		Change	21	1970-07-27	
Change	1	1964-05-29		Change	22	1970-10-01	
Change	2	1964-06-30		Change	23	1970-12-22	
Change	3	1964-09-30		Change	24	1971-03-30	
Change	4	1964-10-30		Change	25	1972-02-22	
Change	5	1964-12-31		Change	26	1974-06-18	
Change	6	1965-02-26		Change	27	1974-09-27	
Change	7	1965-03-31		Change	28	1975-10-27	
Change	8	1965-05-12		Change	29	1977-10-25	
Change	9	1965-06-11		Change	30	1981-03-18	
Change	10	1965-08-19		Change	31		
Change	11	1965-09-16		Change	32	1986-09-04	
Change	12	1965-12-14		Change	33	1987-02-12	
Change	13	1966-01-14		Change	34	1987-09-14	
Change	14	1966-02-16		Change	35	1989-06-19	
Change	15	1966-08-25		Change	36	1992-01-31	
Change	16	1977-01-24		Change	37	1992-07-15	
Change	17	1967-03-21		Change	38	1994-01-01	
Change	18	1967-09-13		Change	39	1994-07-05	
Change	19	1967-12-13		Change	40	1995-11-20	
Change	20	1970-04-09		Change	41	1996-03-15	

Zero in Change No. column indicates an original page. Total number of pages in this order is 124 consisting of the following.

Page No.	Change No.	Page No.	Change No.
Title	41	2-15	38
A to B/C	41	2-16 to 2-20	40
i to ii	40	2-20A to 2-20B	33
1-1 to 1-2	16	2-20C to 2-20D	37
2-1 to 2-3/2-4	40	2-21/2-22 and 2-23/2-24	29
2-5	3	2-24A to 2-24G/2-24H	40
2-6	40	2-25/2-26	18
2-6A DELETED	40	2-27/2-28	40
2-6B to 2-6C/2-6D	40	3-1/3-2	10
2-7	33	3-3/3-4	21
2-8	29	3-5	39
2-9	3	3-6	38
2-10	29	3-7/3-8	39
2-11 to 2-12A	40	3-8A/3-8B to 3-9	18
2-12B	41	3-10	21
2-13	40	3-11	18
2-14	29	3-12	10

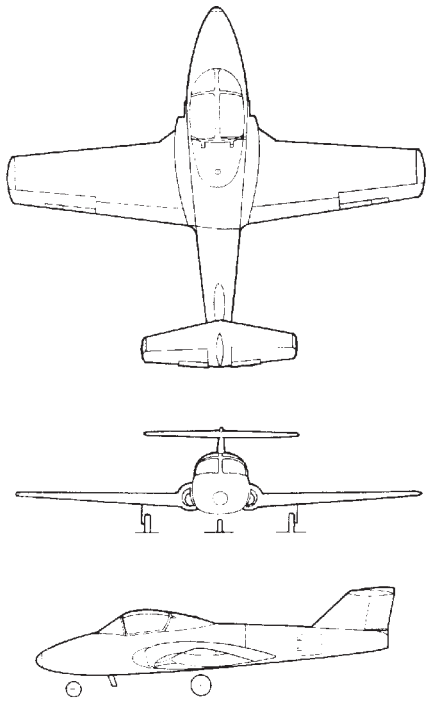
LIST OF EFFECTIVE PAGES (Cont'd)

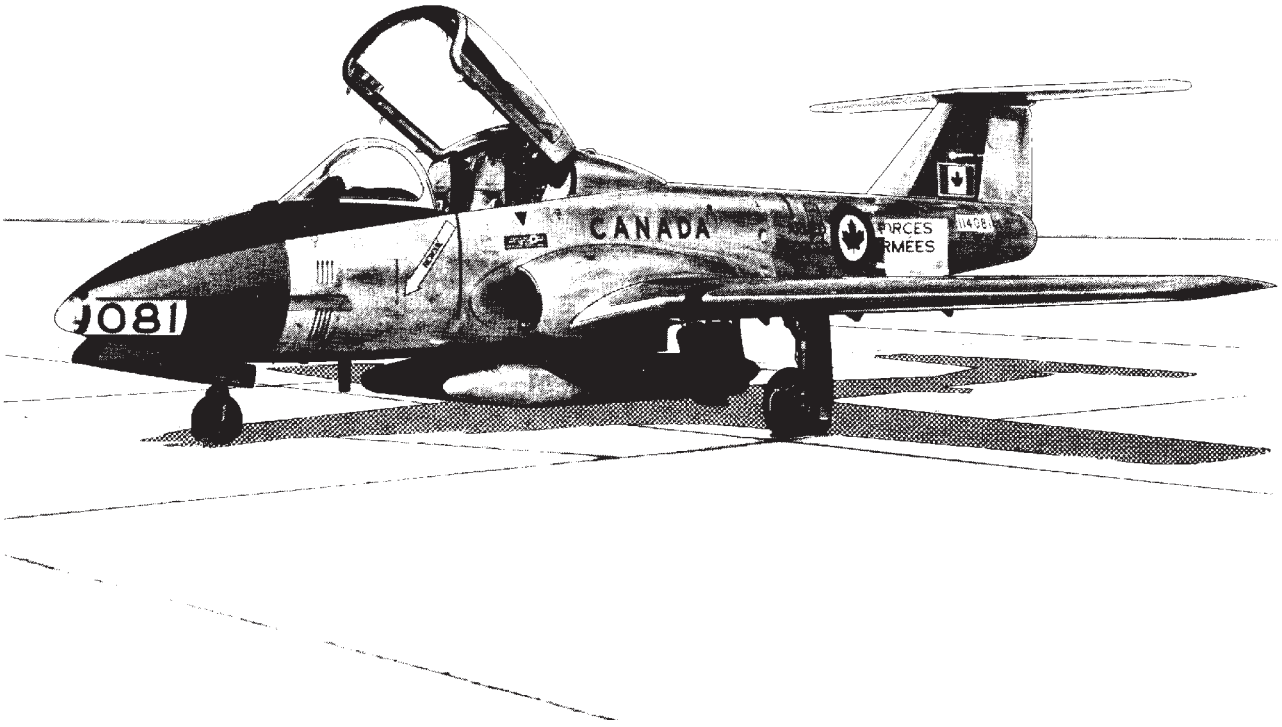
Page No.	Change No.	Page No.	Change No.
3-13/3-14	34	4-20 to 4-25	28
3A-1 to 3A-9/3A-10	40	4-26	36
4-1/4-2	0	4-27 to 4-35/4-36	28
4-3 to 4-13	28	5-1 to 5-6	29
4-14 to 4-15	36	5-7	30
4-16 to 4-17	28	5-8	29
4-18 to 4-19	36	5-9/5-10	32

Contact Officer: DAEPM (FT) 6-2

TABLE OF CONTENTS

CT114 TUTOR





frontispiece

PART 1
GENERAL INFORMATION

Part 1 of this Engineering Order has been deleted and the data formerly included has been consolidated in EI 05-195A-2. When reference to Part 1 is made in this EO, the User should refer to EO 05-195A-2.

PAGES 3 to 39 DELETED

PART 2

TABLE OF CONTENTS

D.C. SYSTEM

PART 2

LIST OF ILLUSTRATIONS

D.C. SYSTEM

PART 2

D.C. SYSTEM

D.C. SYSTEM

GENERAL

1. The d.c. system is a 28-volt single-wire system using the aircraft structure as a ground return. D.C. power is generated by a dual-purpose 300-ampere starter-generator and is fed to the cockpit essential d.c. power feeders through the reverse-current cut-out and starting contactor relay. An emergency d.c. power source is provided by two 24-volt 22 ampere-hour batteries connected in series for starting and in parallel for supplying the essential d.c. buses. An external source of d.c. 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 2-1.

COMPONENTS

2. A list of the main components of the d.c. system and their locations follows. For further information, refer to EO 05-195A-2K.

COMPONENT	LOCATION
LH battery (BTIP)	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
Battery start relay No. 2 (K3P)	MDP nose compartment
LH battery relay (K4P)	MDP nose compartment
RH battery relay (K5P)	MDP nose compartment
Non-essential bus tie-in relay (K6P)	MDP nose compartment
Generator fail indicator relay (K7P)	Centre console
Start reset generator control relay (K8P)	Centre console
Battery start relay No. 1 (K11P)	MDP nose compartment
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

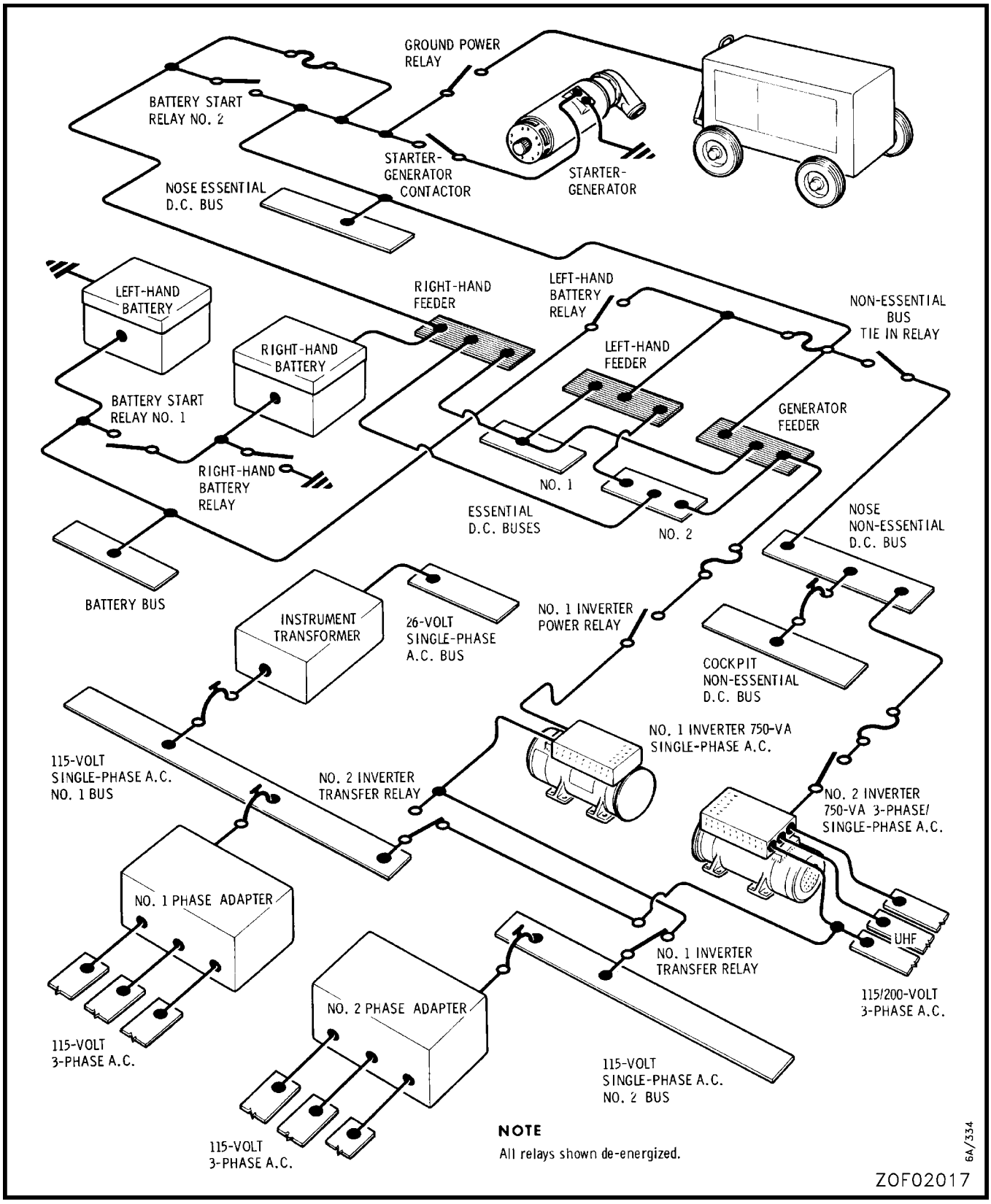


Figure 2-1 Simplified Aircraft Electrical System (Aircraft not modified to CF-458)

D E L E T E D

Figure 2-1 (Sheet 2 of 2) Simplified Aircraft Electrical System (Snowbird aircraft and aircraft modified to CF-458)

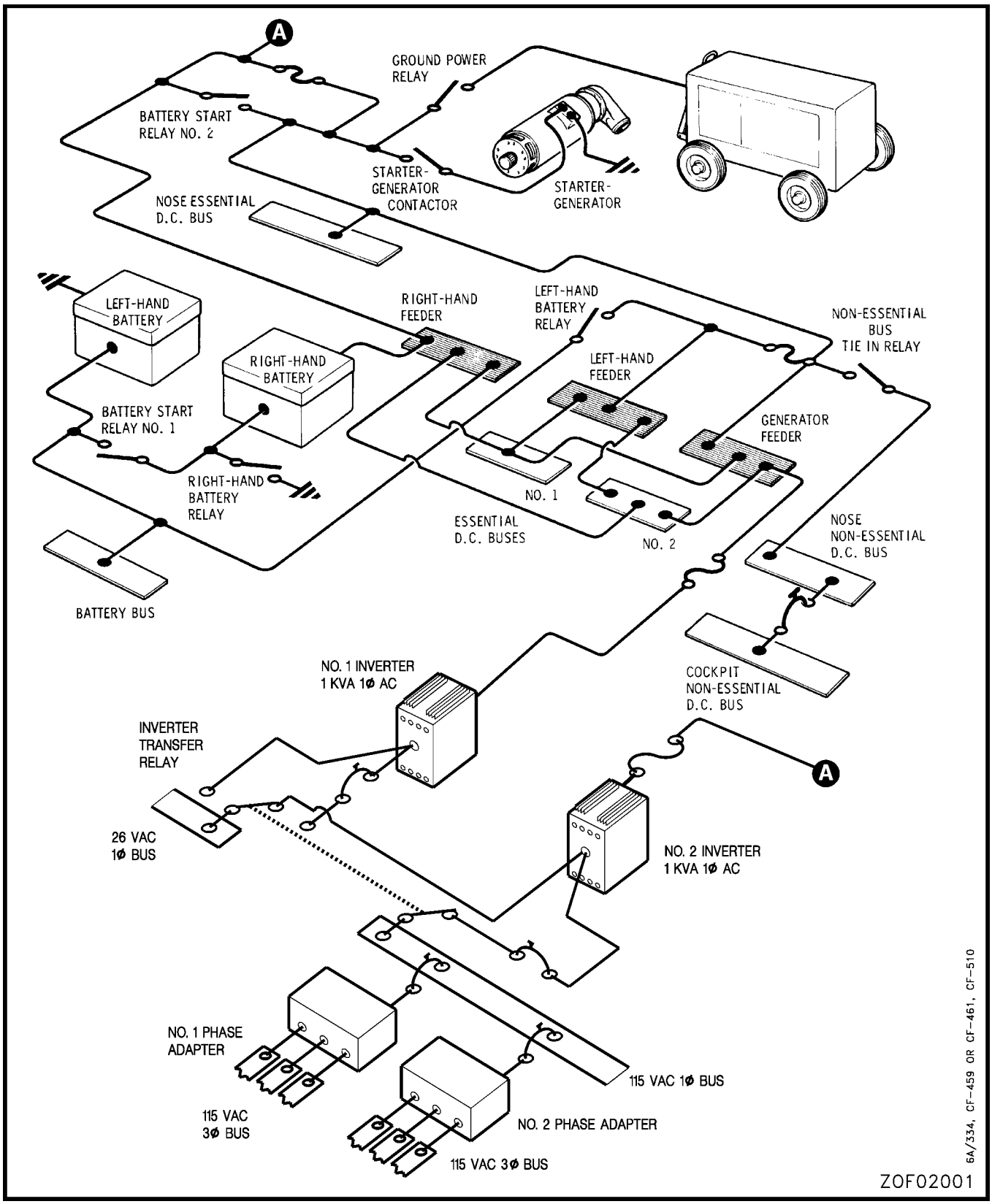


Figure 2-1A (Sheet 1 of 2) Simplified Aircraft Electrical System
(Aircraft modified to CF-459 or CF-461 and CF-510, but not modified to CF-458)

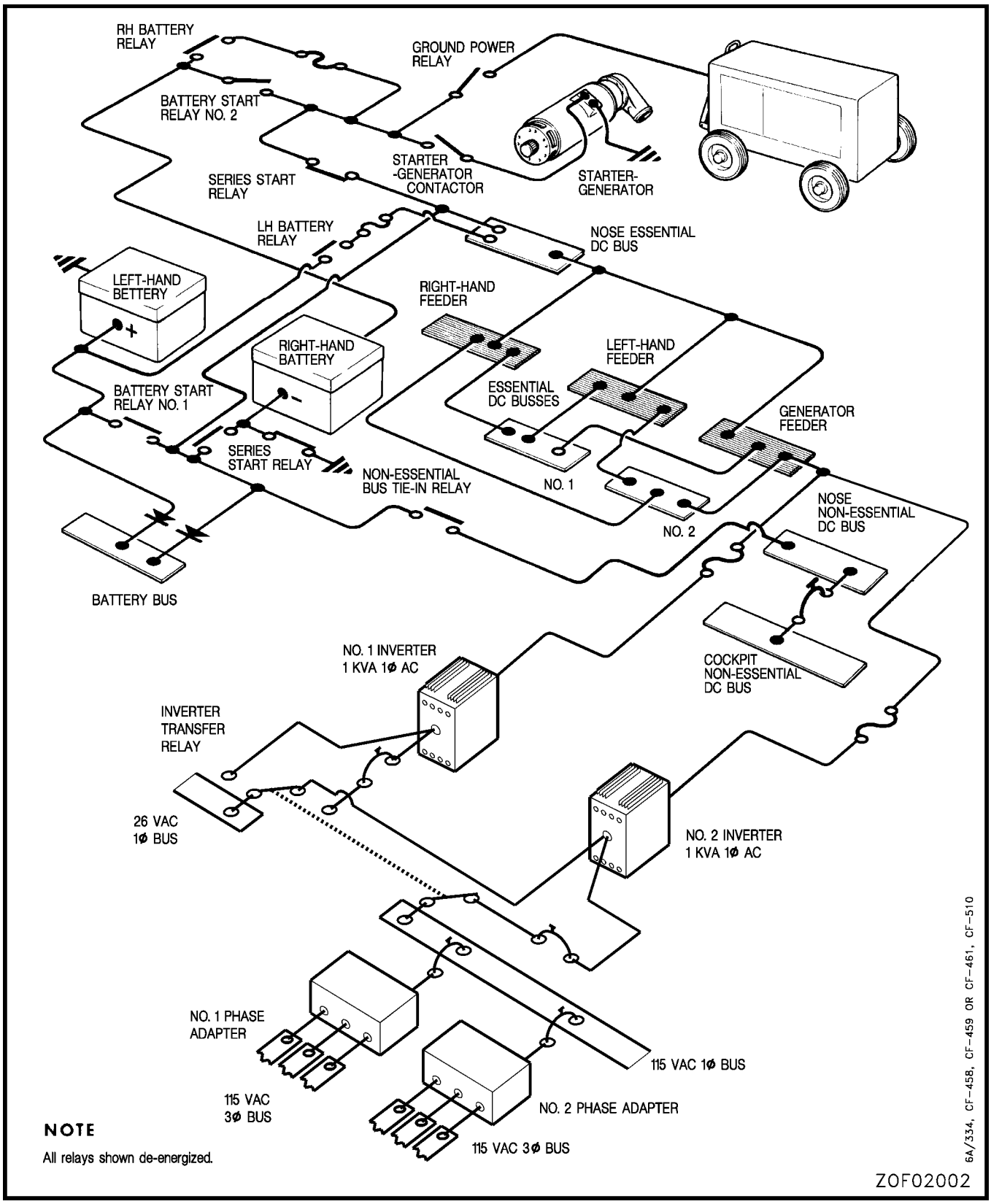


Figure 2-1A (Sheet 2 of 2) Simplified Aircraft Electrical System
(Snowbird aircraft and aircraft modified to CF-458, CF-459 or CF-461, and CF-510)

COMPONENT	LOCATION
Canopy power relay (K9P) D.C. regulator control panel (Z2P) Power protection relay (K2K)	Nose compartment Rear of cockpit, right side Centre console
Engine starter stop switch (K1K) Engine master switch (S1K) Engine Start switch (S2K)	Centre console Centre console panel Centre console panel
Engine starter stop switch (S4K) Battery start indication relay No. 1 (K3K) Battery start indication relay No. 2 (K4K)	Centre console panel Nose compartment, RH shelf Nose compartment, RH shelf
Reset switch (S5K)	Nose compartment, RH shelf
Series start relay (K10P) Aircraft modified to CF-458 only	MDP nose compartment

D.C. 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 d.c. 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, refer to C-12-114-0D0/MF-000. For further information on the starter-generator, refer to C-17-499-000/MF-000.

REMOVAL AND INSTALLATION OF STARTER-GENERATOR

4. For removal and installation procedure, refer to C-12-114- 0D0/MF-000.

STARTER-GENERATOR BRUSH CHECK

5. Procedure:

a. Remove starter-generator (refer to C-12-114-0D0/MF-000).

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 (refer to C-12-114-0D0/MF-000).

D.C. CONTROL PANEL

6. A generator control panel keeps the generator voltage constant at 27.5 (±0.2) volts during engine speed variations and load changes on the electrical system. The panel contains a transistorized voltage regulator, two speed-sensitive transistorized switches with associated relays, an overvoltage relay and a solid-state field control switch.

7. At 35% engine rpm, the output form the engine-driven tachometer triggers the transistorized circuit to allow 28-volt d.c. energize the No. 1 speed-sensitive relay. The energized contacts of the No. 1 speed-sensitive relay operate circuits as follows:

a. Complete the loadmeter circuit.

b. Interrupt the engine starting cycle.

8. When the engine reaches a speed of 47% rpm, speed- sensitive relay No. 2 will be energized in the same manner as the No. 1 relay. This will operate circuits as follows:

a. Complete circuits to allow the generator to come on the line.

b. Complete a circuit to operate the shut-off valve for Zone 2 cooling.

9. Generator field control is achieved by a solid-state switching circuit which can vary the field current up to a maximum of 8 amperes, depending on the generator load and speed. To ensure against system overvoltage, the latch-type electrically tripped and reset overvoltage relay senses the generator voltage output and will trip to open the filed circuit when the voltage exceeds 32 volts. For further information on the d.c. control panel, refer to C-17-198-000/MF-000.

REMOVAL AND INSTALLATION OF D.C. CONTROL PANEL

10. For removal and installation of the d.c. control panel, see Figure 2-2.

REVERSE-CURRENT RELAY CUTOUT AND STARTING CONTACTOR

11. 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 d.c. 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 1200 amperes for one minute.

OPERATION OF CONTACTOR (See Figure 2-3)

12. 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

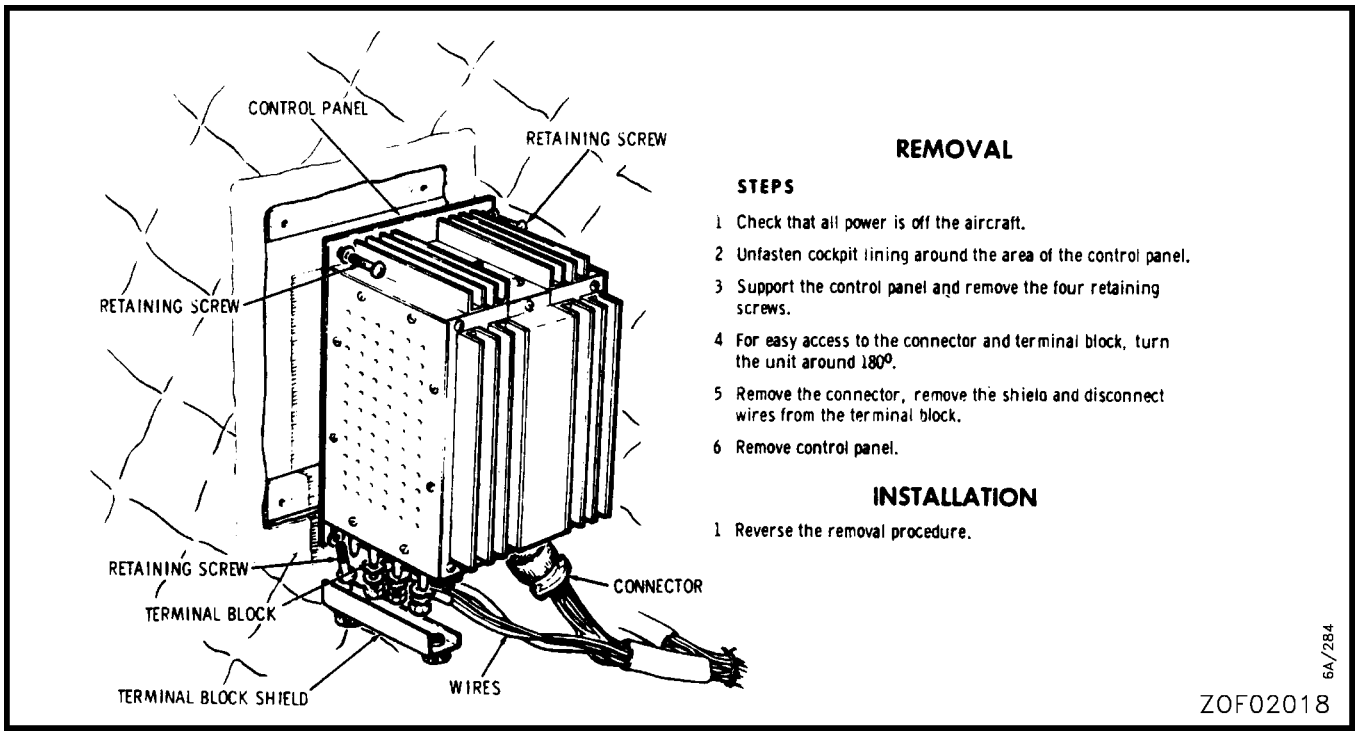


Figure 2-2 Removal and Installation of D.C. Rgulator Control Panel

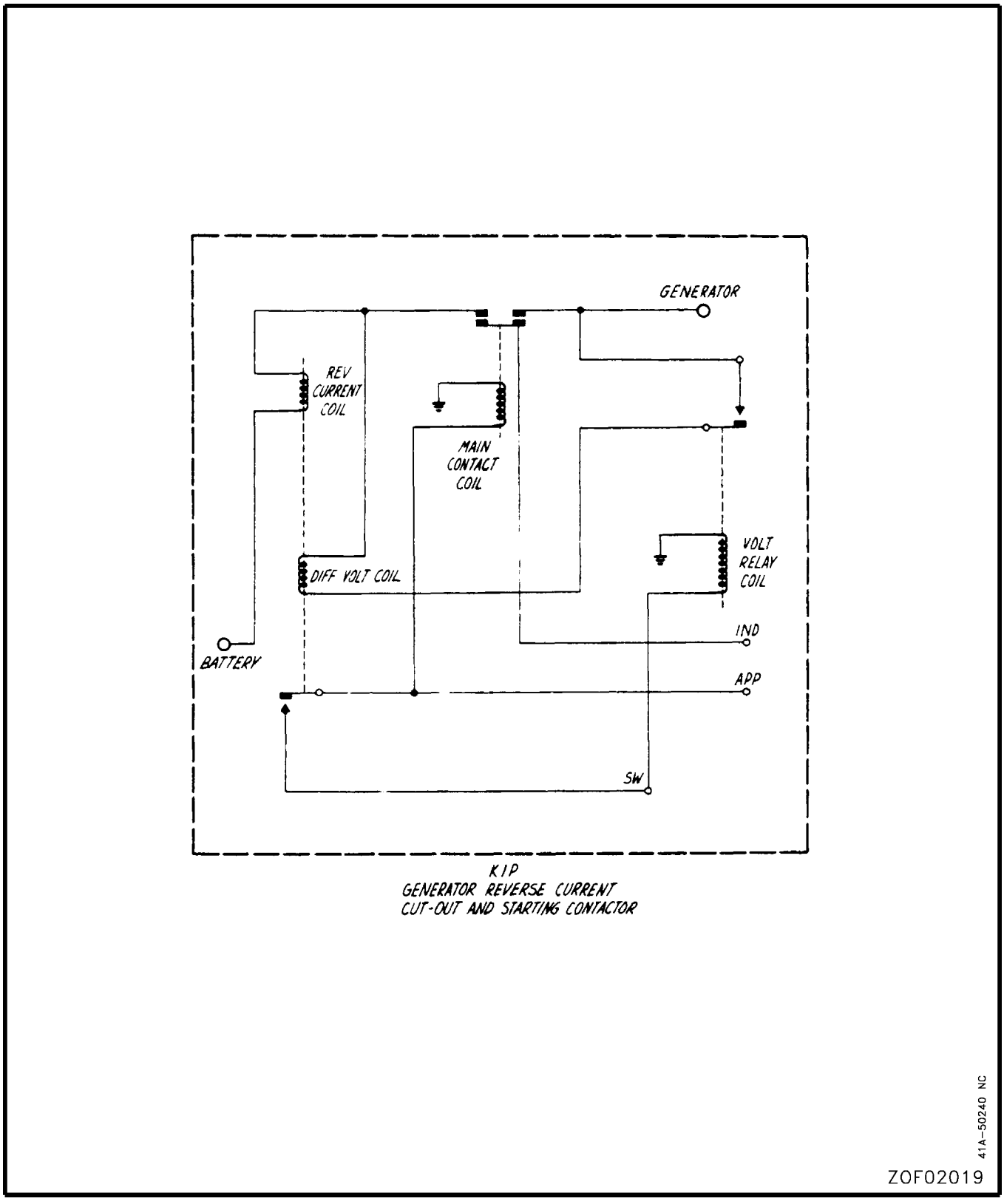


Figure 2-3 Generator Reverse-current Cut-out and Starting Contactor - Schematic

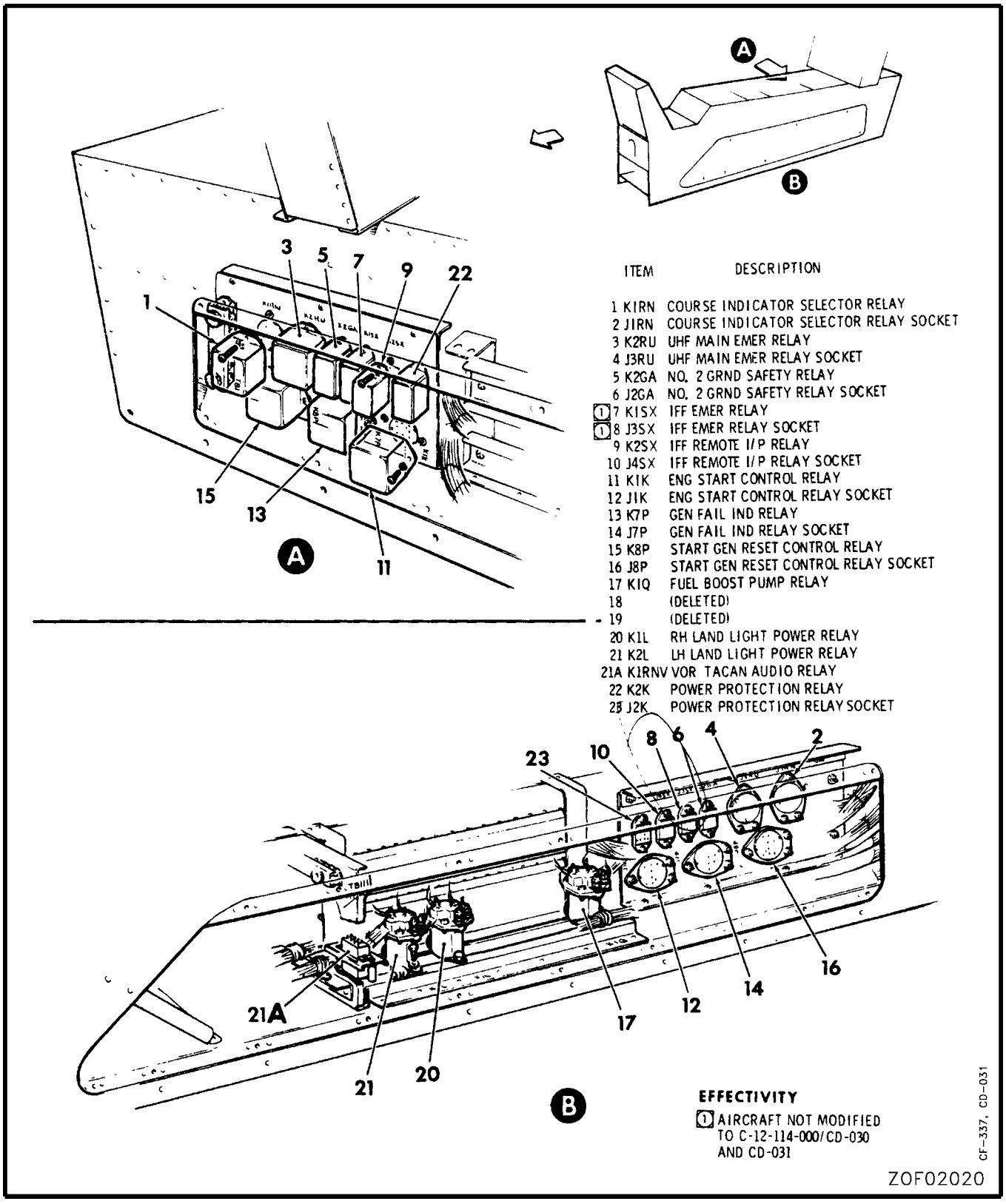


Figure 2-4 Removal and Installation of Centre Console Relays

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, d.c. 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, refer to EO 40-20DF-2.

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

13. Removal procedure:

a. Check that all power is off the aircraft.

b. Gain access to the generator reverse-current cut-out 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.

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

RELAYS – CENTRE CONSOLE

15. The start generator reset control (K8P), the generator fail indicator relay (K7P), the starting control relay (K1K) and the power protection relay (K2K) are all located in the centre console panel (see Figure 2-4). These relays are mounted on a panel inside the console at the rear, immediately below the circuit-breaker panel. The relays are of the plug-in type and are secured to the base socket by screws. Access to the relay is from the starboard side, access to the relay socket and harness is from the port side of the console. To gain access to either side of the relay, the appropriate seat must be removed.

REMOVAL AND INSTALLATION OF RELAYS

16. To remove either relay K8P, K7P, K1K or K2K from the centre console panel, proceed as follows:

CAUTION

Before removing seat, ensure that all power is disconnected from the aircraft and the UHF and IFF circuit-breakers are pulled out.

a. Remove starboard seat (refer to EO 05-195A-2A).

b. Remove the starboard side panel of the centre console by removing 17 screws.

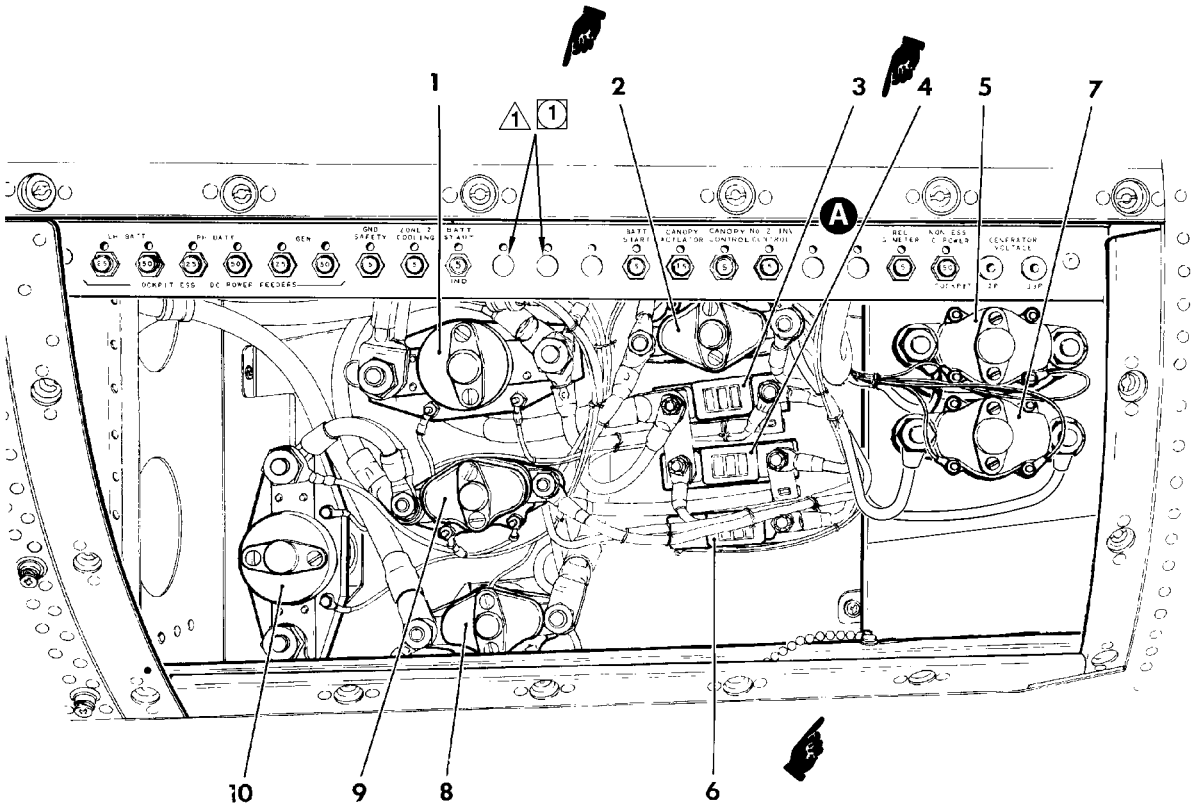
c. Locate relay to be removed. Remove securing screws and unplug relay (see Figure 2-4).

17. To install either relay K8P, K7P, K1K or K2K in position on the centre console panel, reverse the removal procedure.

CIRCUIT-BREAKERS
(See Figures 2-5, 2-5A and 2-6)

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

19. 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.



NUMBER	DESCRIPTION	ITEM
1	BATTERY START RELAY No. 2	K3P
2	NON-ESSENTIAL BUS TIE-IN RELAY	K6P
3	RH BATTERY CURRENT LIMITER	F2P
4	LH BATTERY CURRENT LIMITER	F3P
5	No. 1 INVERTER POWER RELAY	K1V
6	No. 2 INVERTER POWER LIMITER	F1V
7	No. 2 INVERTER POWER RELAY	K2V
8	RH BATTERY RELAY	K5P
9	LH BATTERY RELAY	K4P
10	BATTERY START RELAY No. 1	K11P
11	**DELETED**	

NOTE

⚠1 Provisions for Esprit Load Monitoring System LMS DC (3 amp) and LMS WOW (1 amp) circuit-breakers.

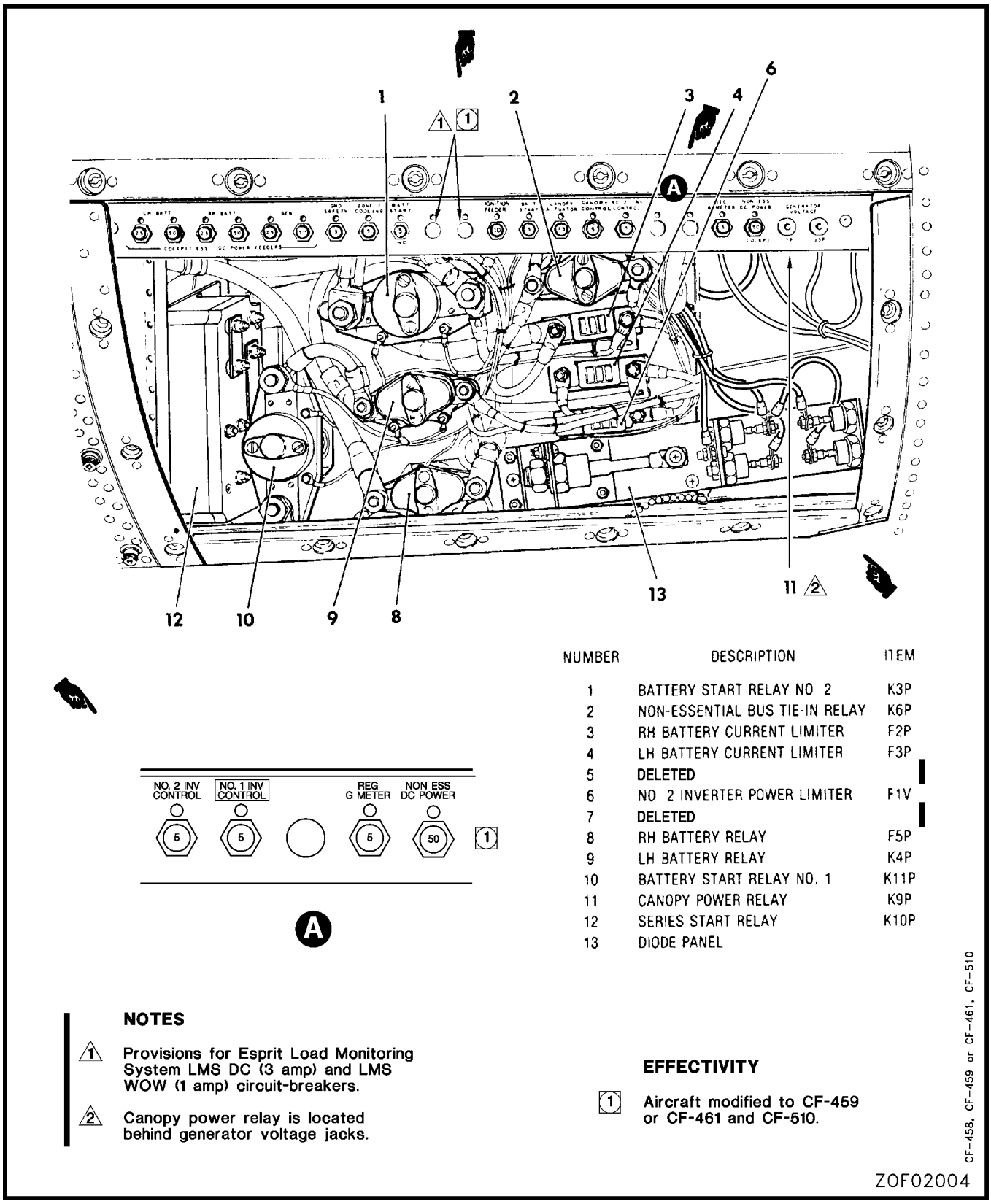
EFFECTIVITY

[1] Aircraft modified to CF-459 or CF-461 and CF-510.

CF-337, CF-354, CF-459 or CF-461, CF-510

ZOF02003

Figure 2-5 (Sheet 1 of 2) Main Distribution Panel – Nose Compartment (Aircraft not modified to CF-458)



NUMBER	DESCRIPTION	ITEM
1	BATTERY START RELAY NO 2	K3P
2	NON-ESSENTIAL BUS TIE-IN RELAY	K6P
3	RH BATTERY CURRENT LIMITER	F2P
4	LH BATTERY CURRENT LIMITER	F3P
5	DELETED	
6	NO 2 INVERTER POWER LIMITER	F1V
7	DELETED	
8	RH BATTERY RELAY	F5P
9	LH BATTERY RELAY	K4P
10	BATTERY START RELAY NO. 1	K11P
11	CANOPY POWER RELAY	K9P
12	SERIES START RELAY	K10P
13	DIODE PANEL	

Figure 2-5 (Sheet 2 of 2) Main Distribution Panel – Nose Compartment
(Snowbird aircraft and aircraft modified to CF-458)

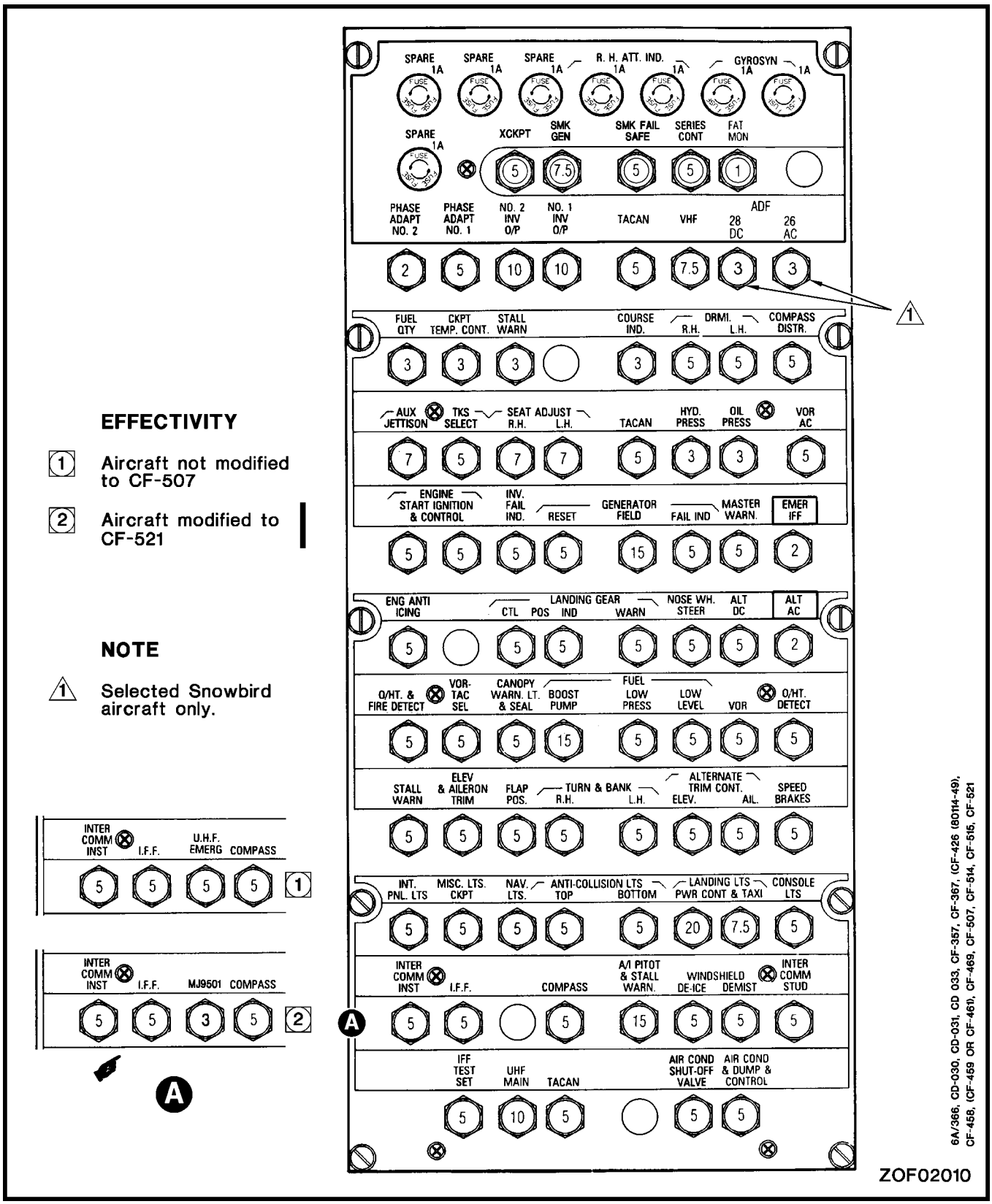


Figure 2-5A Circuit-Breaker Panel – Centre Console (Snowbird Aircraft)

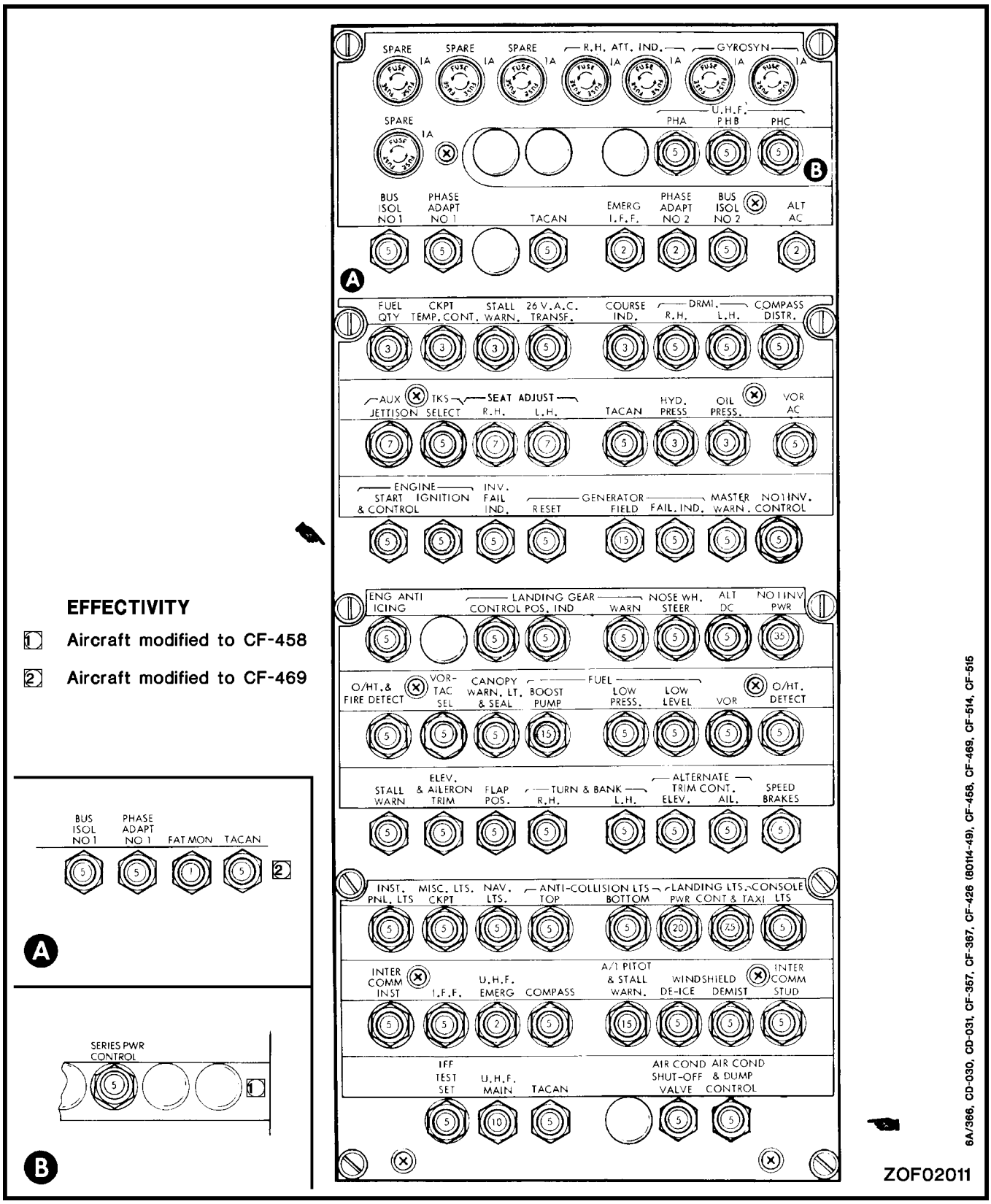


Figure 2-6 Circuit-Breaker Panel – Centre Console

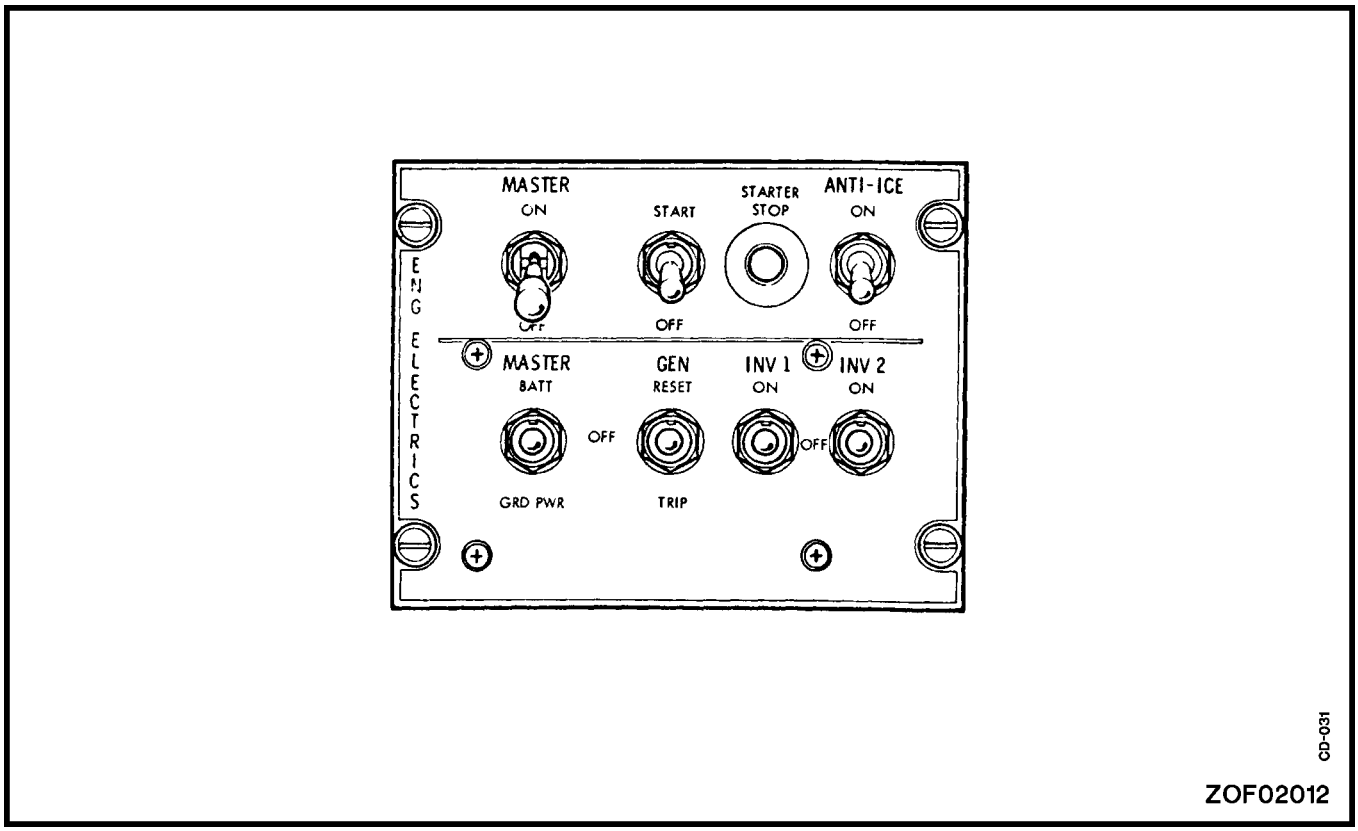


Figure 2-7 Engine Electrics Panel – Centre Console

DETACHING CIRCUIT-BREAKER PANEL – CENTRE CONSOLE

20. 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 on the aircraft and that electrical master switch is in the off position.

b. Disconnect aircraft batteries.

bA. Remove the UHF AUX control panel to prevent damage to the circuit-breaker panel wire harness.

c. Disconnect the eight quick-release fasteners on the face of the circuit-breaker panel.

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

e. Release the two straps holding the wire harnesses entering the panel (one on starboard and one on port).

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

INSTALLATION OF CIRCUIT-BREAKER PANEL – CENTRE CONSOLE

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

GENERATOR CONTROL SWITCH

22. The generator control switch is located on the engine electrics 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 2-7). 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.

23. When selected to RESET, the switch contacts close to place power, from the no. 2 cockpit essential d.c. 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

24. Two 24-volt 22 ampere-hour nickel-cadmium batteried, normally connected in parallel, are available as an emergency d.c. 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 batteries, refer to C-93-155-000/MF-000.

25. 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.

CAUTION

Batteries must not be serviced with distilled water while in the aircraft. The nickel 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

26. The battery system consists of the two batteries, left and right battery relays (200 amperes), No. 1 and No. 2 battery start relays (400 amperes), and an electrical master switch marked BATT/OFF/GRD PWR.

27. To enable certain essential circuits to operate at all times, the left-hand battery is directly connected to the battery bus. During a battery start, both batteries are connected in series, because the heavy load applied during

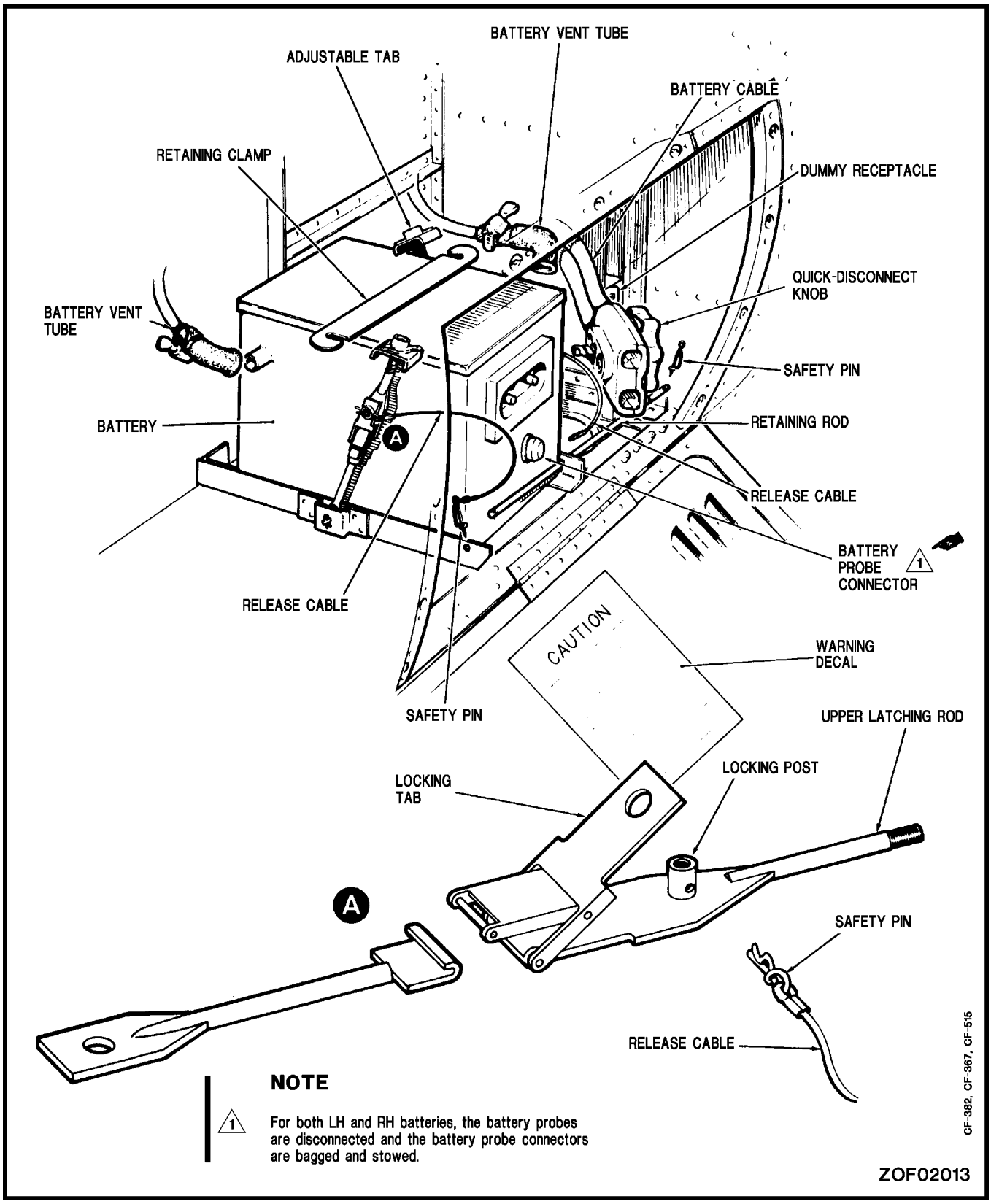


Figure 2-8 Battery Installation

engine starting creates a large voltage drop. Owing to this voltage drop the voltage at the starter-generator is normal. Either the left or right-hand battery can supply power to both cockpit essential d.c. buses.

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 2-10)

28. To obtain battery power on the aircraft buses, the electrical master switch must be placed to BATT. This completes the control circuits to the battery relays (K4P and K5P) by grounding the coils through contacts C2 and C3 of the engine start control relay K1K. Power is then available on the essential buses only.

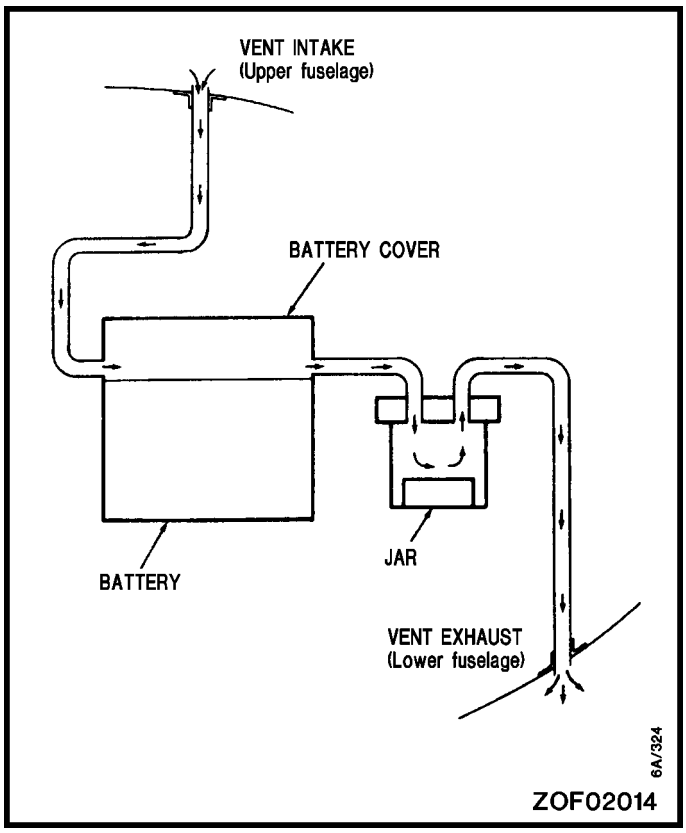


Figure 2-9 Battery Vent System

NOTE

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

REMOVAL AND INSTALLATION OF BATTERY
(See Figure 2-8)

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 two 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.

29. Removal:

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

b. Open access panel No. 15-7 or 15-10 (see 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.

dA. D E L E T E D

CAUTION

If connector is not secured in dummy receptacle, it may arc to the aircraft structure 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.

29A. Installation:

a. Repeat Paragraph 29, 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° 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.

hA. D E L E T E D

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

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

BATTERY VENT SYSTEM (See Figure 2-9)

30. 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.

SERVICING BATTERY VENT SYSTEM

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

a. Remove battery (see Figure 2-8).

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

31A. 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 two 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.

BATTERY TEMPERATURE INDICATING SYSTEM

31B. D E L E T E D

31C. D E L E T E D

31D. D E L E T E D

31E. D E L E T E D

31F. D E L E T E D

FUNCTIONAL CHECK OF BATTERY TEMPERATURE INDICATING SYSTEM

31G. D E L E T E D

GROUND POWER

32. The external power system consists of a ground power relay, an electrical master switch and a ground power receptacle. The 28-volt d.c. power receptacle is located on the trailing edge of the port wing fillet (see Figure 1-4).

GROUND POWER OPERATION

33. To obtain an external source of power on the aircraft, the ground power is plugged in and the electrical master switch selected to GRD PWR (see Figure 2-7). The ground power relay will then become energized, allowing d.c. power to be connected to all d.c. buses except the battery d.c. bus. This bus is always energized by the left battery, irrespective of the position of the electrical 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.

D.C. SYSTEM OPERATION

GENERAL

34. D.C. 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 electrical 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 d.c. starting system components.

D.C. STARTING CYCLE – GROUND POWER (Aircraft not Modified to CF-458) (See Figure 2-10A)

35. When the electrical master switch (S1P) is selected to GRD PWR, relay K6P is energized via contacts A2 and A3 on relay K8P and via contacts D2 and D3 on relay K7P. With relay K6P energized, contacts A2 and A1 close and apply power to the No. 2 inverter and to the cockpit non-essential d.c. bus. Relay K2P is energized, allowing power to reach the BATT terminal of contact K1P, the battery bus, the cockpit essential d.c. buses, and the No. 1 inverter.

NOTE

On aircraft modified to CF-459 or CF-461 and CF-510, the No. 2 inverter is powered from the cockpit essential d.c. bus.

36. With the engine master switch 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 switch and terminal B2 of relay K1K. Switch S2K is armed from terminal 9 on switch S1K through contacts M and L of SSR-2, through terminals 1 and 2 of switch S4K and contacts X and W of SSR-1 in panel Z2P. The same circuit also applies 28-volt d.c. to contact C2 of relay K8P.

37. Momentarily pressing switch S2K to ON, resets the overvoltage relay in panel Z2P, resets relay K8P and energizes relay K2K. Through contacts C2 and C1 of relay K8P, 28-volt d.c. is applied to terminal APP to energize contactor K1P, which in turn supplies d.c. power to the starter-generator. From terminal IND on relay K1P, 28-volt d.c. energizes relay K7P, and reset relay K1K via contacts D and C of SSR-1, via contacts D and E and contacts N and P of relay K2K. Relay K1K, contacts D2 and D1, provide a holding circuit through contacts C2 and C1 of relay K8P to terminal APP on contactor K1P, by-passing the momentary on switch S2K. Relay K6P is de-energized through the open contacts A2 and A3 of relay K8P to remove power from the nose non-essential bus. The generator fail light goes out through the open contacts B2 and B3 on relay K7P. The dual-purpose starter-generator now acts as a starter motor to rotate the engine.

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.

38. When the engine speed reaches approximately 35% rpm, relay SSR-1 (located in panel Z2P) is energized by a signal voltage from the engine-driven tachometer. Lock-out coil of relay K1K is energized via contacts X and Y, of relay SSR-1, and L and M contacts of relay SSR-2. This removes the d.c. power from APP of K1P, causing K1P to de-energize, thereby removing power from the starter-generator. At the same time, power is removed from IND terminal of

contactor KIP and relay K7P de-energizes to light the generator fail indicator. The ignition circuit is disconnected through open contacts B1 and B2 on relay K1K.

CAUTION

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

39. For further information on engine starting and control circuits, refer to C-12-114-0D0/MF-000.

GENERATING MODE – GROUND POWER START (Aircraft not modified to CF-458)

40. As engine speed increases to approximately 47% rpm, relay SSR-2 is energized and 28-volt d.c., (contacts L and M open) is removed from relay K1K lockout coil. To enable the generator to be connected to the bus, the electrical master switch is selected to the BATT position. This disconnects external power from the bus by removing the ground from relay coil of K2P and connects the batteries to the cockpit essential buses by energizing relays K4P and K5P. Generator voltage from the electrical master switch, through contacts F and G of relay SSR-2 and contacts B1 and B2 of relay K8P, is connected to terminal SW on contactor K1P. The main contacts on K1P close (providing the generator voltage exceeds bus voltage by 0.35 to 0.65 volts), generator voltage from IND terminal to K1P energizes K7P, and the generator fail light goes out.

41. Contacts A1 and A2 of K7P provide 28-volt d.c. to energize lockout coil of relay K8P. Contactor K1P hold-in power at SW is now provided by the generator through contacts B2 and B3 on relay K8P. Relay coil of K6P is energized by a ground picked up through contacts D1 and D2 of K7P. Generator power now supplies all the aircraft d.c. buses.

D.C. STARTING – AIRCRAFT BATTERIES (Aircraft not modified to CF-458)

42. When the electrical master switch (S1P) is selected to BATT, relays K4P and K5P are energized via the contacts C2 and C3 of K1K. Upon selecting the engine master switch S1K to ON position, relay K3P is energized via switch S1P and contacts M and I of relay SSR-2. (The function of relay K3P is to shunt current limiter F2P to prevent it blowing during the starting cycle.) 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 switch, and terminal B2 of relay K1K. Switch S2K is armed from terminal 9 on switch S1K through terminals 1 and 2 of switch S4K and contacts X and W of SSR-1 in panel Z2P. The same circuit also applies 28-volt d.c. to contact C2 on relay K8P.

43. Momentarily pressing switch S2K to ON will reset the overvoltage relay in panel Z2P and reset relay K8P and energizes relay K2K. Through contacts C1 and C2 of relay K8P, 28-volt d.c. is applied to terminal APP to energize contactor K1P. The starter-generator begins to turn from the d.c. power received from the two batteries in parallel. From terminal IND on relay K1P, d.c. power energizes relay K7P, and resets relay K1K via contacts d and c of SSR-1, via contacts D and E and contacts N and P of relay K2K. Relay K1K contacts C2 and C3 open to de-energize relays K4P and K5P. At the same time, relay K11P is energized from power received from the nose battery bus via contacts A1 and A2 (relay K1K) and contacts D1 and D2 (relay K8P). Relay K11P puts the two batteries in series to maintain normal voltage to the starter-generator. Contacts D1 and D2 on relay K1K provide a holding circuit through contacts C2 and C1 of relay K8P to terminal APP on contactor K1P, by-passing the momentary-on switch S2K. The generator fail light goes out through the open contacts B2 and B3 on relay K7P.

43A. Battery start is indicated on the annunciator panel. Setting the electrical master switch (S1P) to BATT and the engine master switch (S1K) to ON energizes relays K3P and K3K. Contacts A1 and A2 of relay K4K complete the ground circuit for the BATTERY START indicator on the annunciator panel, which illuminates. When relay K11P energizes, relay K3K also energizes and latches mechanically. Power from the d.c. bus is now fed from circuit-breaker CB3K through contacts D2 and D3 of relay K3K to hold relay K4K energized (regardless of subsequent switch selections) to provide the ground for annunciator indication. Diode CR1K prevents power via contacts D2 and D3 of relay K3K from energizing relay K3P during a GRD PWR start. Relay K3K is electrically reset to extinguish the locked-in annunciation indication; relay K3K is reset by manual actuation of switch S5K on the nose compartment RH shelf. Power fed from circuit-breaker CB3K is routed through reset switch S5K to terminal X1 of relay K3K to overcome the mechanical latch. Provided that the electrical master switch (S1P) is not set to BATT while the engine master switch (S1K) is selected ON, the annunciator BATTERY START indicator will be extinguished.

44. When the engine speed increases to approximately 35% rpm, relay SSR-1 (located in panel Z2P) is energized by a signal voltage from the engine-driven tachometer. Lock-out coil of relay K1K is energized via contacts X and Y of relay SSR-1 and L and M contacts of relay SSR-2. This removes the power from APP of K1P, causing K1P to de-energize and thereby disconnecting the batteries from the starter-generator. Relay K11P is de-energized via the open contacts A1 and A2 on relay K1K. At the same time, power is removed from the IND terminal of contactor K1P and relay K7P de-energizes to light the generator fail indicator. The cockpit essential buses are powered (from the batteries in parallel) by the energizing of relays K4P and K5P through contacts C2 and C3 (relay K1K).

GENERATING MODE – AIRCRAFT BATTERY START (Aircraft not modified to CF-458)

45. As engine speed increases to approximately 47% rpm, relay SSR-2 is energized and 28-volt d.c. is removed from relay K1K lock-out coil by open contacts L and M. Power is removed from K3P relay coil by open contacts M and L of SSR-2 relay. Generator voltage from the electrical master switch, through contacts F and G (relay SSR-2) and contacts B1 and B2 (relay K8P), is connected to terminal SW on contactor KIP. The main contacts on K1P close (providing the generator voltage exceeds bus voltage by 0.35 to 0.65 volts), generator voltage from IND terminal of K1P energizes K7P, and the generator fail light goes out.

46. Contacts A1 and A2 of K7P provide 28-volt d.c. to energize lock-out coil of relay K8P. Contactor K1P hold-in power is now provided by the generator through contacts B2 and B3 on relay K8P. Relay coil of K6P is energized by a ground picked up through contacts D1 and D2 of K7P. Generator power now supplies all the aircraft d.c. buses.

D.C. STARTING CYCLE – GROUND POWER (Snowbird aircraft and aircraft modified to CF-458) (See Figure 2-10B)

46A. When electrical master switch S1P is selected to GRD PWR, ground power relay K2P is energized. Contacts A2 and A1 close and apply 28-volts d.c. to the BATT terminal of contactor K1P and, via the closed contacts of series start relay K10P, to the battery bus, the cockpit essential d.c. buses and the No. 1 inverter. Also, 28-volts d.c. is applied to the close coil of the fuel shut-off valve via ENG START & CONT circuit-breaker CB1K and engine master switch S1K. In addition, 28-volts d.c. is fed to non-essential bus tie-in relay K6P and, via closed contacts B2 and B3 of relay K7P to light the GENERATOR FAIL annunciator. Relay K6P is energized; contacts A2 and A1 close and apply power to the No. 2 inverter and to the cockpit non-essential d.c. bus. With the engine master switch S1K selected to on, power is transferred from the close coil to the open coil of the fuel shut-off valve. Terminal 9 of switch S1K arms start switch S2P via contacts L and M of SSR-2, closed contacts 1 and 2 of starter-stop switch S4K and contacts D2 and A2 of engine start control relay K1K, and terminal 3 arms contact B2 of relay K1K.

NOTE

On aircraft modified to CF-459 or CF-461 and CF-510, the No. 2 inverter is powered from the cockpit essential d.c. bus.

46B. Momentarily pressing start switch S2K to ON resets the overvoltage relay in panel Z2P and applies 28-volts d.c. to power protection relay K2K and to the start generator reset control relay K8P. Contacts A2-A3 of relay K8P open and interrupt the ground circuit to relay K6P which de-energizes and removes the power source from the cockpit non-essential bus and the No. 2 inverter. Contacts C2 and C1 of relay K8P close and apply 28-volts d.c. to the engine start control relay K1K via contacts d and c of SSR-1 and contacts E and D of relay K2K. Relay K8P contacts B and D have no function at this time. Contacts N and P of relay K2K close and complete the ground circuit to energize relay K1K. Contacts A2 and A1 close and apply 28-volts d.c. to terminal APP of contactor K1P which energizes and in turn supplies d.c. power to the starter-generator. From terminal IND of contactor K1P, 28-volt d.c. energizes generator fail indicator relay K7P. Contacts B2 and B1 of relay K1K close and apply 28-volts d.c. to throttle switch S3J preparatory to throttle advancement. Contacts C and D have no function at this time. Contacts A2-A1 of relay K7P close but have no function at this time. Contacts B2 and B3 open and the GENERATOR FAIL annunciator goes out. Contacts C2 and C1 refer to the ice detection circuit. Contacts D1 and D2 close and restore the ground circuit to contact A2 of relay K8P in the eventuality that the starter stop switch is pressed. The dual purpose starter-generator now acts as a starter motor to rotate the engine.

NOTE

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

46C. When the engine speed reaches approximately 35% rpm, relay SSR-1 (located in panel Z2P) is energized by a signal voltage from the engine-driven tachometer. Contacts d and e of relay SSR-1 open and interrupt the 28-volt d.c. supply to engine start control relay K1K. Contacts a and b of relay SSR-1 close and complete the circuit between the loadmeter and shunt R1P. Contacts X

and W open and remove the 28-volt d.c. power supply from start switch S2K while contacts X and Y close and apply 28-volts d.c. to the lock-out coil of engine start control relay K1K. Contacts A2 and A1 or relay K1K open and remove the 28-volt d.c. supply form terminal APP of contactor K1P which de-energizes and removes power from the starter-generator. At the same time, power is removed from terminal IND of contactor K1P and relay K7P is de-energized to light the GENERATOR FAIL annunciator. Contacts B2 and B1 of relay K1K open and remove power from the ignition circuit.

CAUTION

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

46D. For further information on engine starting and control circuits refer to C-12-114-0D0/MF-000.

GENERATING MODE – GROUND POWER START (Snowbird aircraft and aircraft modified to CF-458)

46E. As engine speed increases to approximately 47% rpm, relay SSR-2 is energized and 28-volts d.c. (contacts L and M open) is removed from relay K1K lock-out coil. To enable the generator to be connected to the bus, the electrical master switch is selected to the BATT position. This disconnects external power from the bus by removing the ground from relay coil of K2P and connects the batteries to the cockpit essential buses by energizing relays K4P and K5P. Generator voltage from the electrical master switch through contacts F and G or relays SSR-2 and contacts B1 and B2 or relay K8P, is connected to terminal SW and contactor K1P. the main contacts on K1P close (providing the generator voltage exceeds bus voltage by 0.35 to 0.65 volts), generator voltage from IND terminal to K1P energizes K7P, and the GENERATOR FAIL annunciator light goes out.

46F. Contacts A1 and A2 of K7P provide 28-volt d.c. to energize lock-out coil of relay K8P. Contact K1P hold-in power at SW is now provided by the generator through contacts B2 and B3 on relay K8P. Relay coil of K6P is energized by a ground picked up through contacts D1 and D2 of K7P. Generator power now supplies all the aircraft d.c. buses.

D.C. STARTING – AIRCRAFT BATTERIES (Snowbird aircraft and aircraft modified to CF-458)

46G. When electrical master switch S1P is selected to BATT relays K4P and K5P are energized via contacts C2 and C3 or relay K1K and all d.c. buses are energized except the cockpit non-essential bus. Upon selecting engine master switch S1K to ON, 28-volts d.c. is transferred from the closed coil to the open coil of the fuel shut- off valve and toe start switch S2K via contacts M and L of relay SSR-2, contacts 1 and 2 of starter stop switch S4K and contacts X and W or relay SSR-1.

46H. When the start switch is pressed momentarily, 28-volt d.c. is applied to reset the dc regulator control panel and to the coil or relays K2K and K8P. Both relays are energized. Contacts D2 and D1 or relay K8P apply a ground to battery start relays K11P and K3P. The function of relay K3P is to shunt current limiter F2P to prevent it from blowing during the start cycle. Contacts C2 and C1 or relay K8P close and apply 28-volts d.c. to the reset coil of relay K1K via contacts d and c of relay SSR-1 and contacts E and D of relay K2K. Contacts B and A of relay K8P serve no function at this time. Contacts N and P of relay K2K close and complete the ground circuit to engine start control relay K1K. Relay K1K is energized. Contacts A2 and A1 close and apply 28-volts d.c. to the APP terminal of contactor K1P which closes and provides power to turn the starter-generator.

46J. A d.c. output from terminal IND of contactor K1P is applied to relay K7P. At this stage, the batteries are still connected in parallel. Contacts B2 and B1 or relay K1K close and apply 28-volts d.c. to throttle switch S3J preparatory to throttle advancement. Contacts C2 and C3 open and remove the ground circuit from relay K5P and K4P which de-energize while contacts C2 and C1 close and complete the ground circuit to relay K10K. Contacts D2 and D1 close and provide a holding circuit through contacts A2 and A1 to terminal APP of contactor K1P, by-passing the momentary-on start switch S2K. The contacts of relay K11P close and maintain d.c. power to the nose essential buses. Relay K11P is now self-holding through contact A2, LH battery current limiter F3P and diode CR4KA. Relay K7P is energized. Contacts A2 and A1 arm the starter-stop circuit in the event of an aborted engine start attempt. Contacts B2 and B3 open and remove d.c. power from the GENERATOR FAIL annunciator. Contacts C2 and C1 refer to the ice detecting circuits and contacts D1, D2 and D3 have no function at this time.

NOTE

When the RPM indication becomes noticeable, the throttle lever must be removed from the CUT-OFF position and advanced to IDLE & START. This opens the engine fuel control valve and operates the ignition system.

46K. When the throttle lever is advanced, microswitch S3J is closed and d.c. power is applied to the ignition circuit, the fuel contro valve open coil and to the coil of relay K10K. Contacts B1 and B2 of relay K10K close and make it self-holding. Contacts A2 and A1 close and apply 28-volts d.c. to the coil of series start relay K10P which energizes and connects the two batteries in series to maintain normal voltage to the starter-generator.

46M. When the engine speed increases to approximately 35% rpm, relay SSR-1 (located in panel Z2P) is energized

by a signal voltage from the engine-driven tachometer. Contacts d and c or relay SSR-1 open and remove the source of d.c. power from the reset coil of relay K1K while contacts C and Y close and apply 28-volts d.c. to the lock-out coil of relay K1K. Contacts a and b close and complete the circuit between the loadmeter and the generator shunt. Contacts X and W open and remove the 28-volts d.c. from terminal APP of contactor K1P. Meanwhile, contacts A2 and A3 or relay K1K open and break the holding circuit to contactor K1P which de- energizes and disconnects the batteries from the starter-generator. At the same time, power is removed from the IND terminal of contactor K1P and relay K7P de-energizes to light the GENERATOR FAIL annunciator. Contacts B2 and B1 or relay K1K open and remove d.c. power from the ignition system and from relay K10K. Contacts C2 and C1 open and remove the ground circuit from relay K10K, while contacts C2 and C3 close and restore the ground circuit to relays K4P and K5P. Relay K10K is de-energized and it removes the d.c. power source from relay K10P which in turn disconnects the batteries from series operation. With relays K4P and K5P energized, the batteries are now connected in parallel. Contacts D2 and D1 or relay K1K open and remove the holding circuit from the start switch.

GENERATING MODE – AIRCRAFT BATTERY START (Snowbird aircraft and aircraft modified to CF-458)

46N. As the engine speed increases to approximately 47% rpm, relay SSR-2 is energized and the d.c. supply is removed from the lock-out coil of relay K8P. Generator voltage is applied to terminal SW of contactor K1P via the generator field circuit-breaker CB2P, electrical master switch S1P, relay SSR-2 contacts F and G, and relay K8P contacts B1 and B2. Providing the generator voltage exceeds the battery voltage by 0.35 to 0.65 bolts, the main contactor is closed and generator voltage from the IND terminal energizes relay K7P. Contacts A2 and A1 close and apply 28-volts d.c. t the lock-out coil of relay K8P. Contacts B2 and B3 open and remove the d.c. power from the GENERATOR FAIL annunciator and it goes out. Contacts D2 and D1 close and complete the ground circuit to relay K6P via contacts A2 and A3 or relay K8P. Relay K6P is energized to re-establish 28-volts d.c. to the nose non-essential d.c. bus.

46P. Contactor K1P hold-in power at terminal SW is now supplied by the IND terminal via relay K8P contacts B3 and B2. Contacts D2 and D1 or relay K8P open and remove the ground circuit from relays K3P and K11P. With relays K3P and K11P de-energized, the relay contacts open and disconnect the batteries from the d.c. buses. The d.c. buses are now being supplied solely by the generator.

GROUND SAFETY PRECAUTIONS

47. 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 Warning (2).

c. Pitot and Stall Warning Anti-ice.

INSTALLATION OF ENGINE START AND IGNITION CIRCUIT-BREAKERS

47A. 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 pally white enamel 1GP88D to the button, leaving the amperage rating figure unpainted and legible.

FUNCTIONAL CHECK OF THE D.C. POWER SYSTEM

48. To perform a functional check of the d.c. power system, proceed as follows: A voltmeter (Item 64, Figure 1-5) is required.

a. Connect voltmeter to test jacks, located in the nose compartment relay panel, positive to J3P and negative to J2P.

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

(1) Generator Fail Ind.

(2) Generator Field.

(3) Generator Reset

(4) Master Warning Control

c. Start engine and adjust to 51% rpm (refer to C-12-114-000/MB- 000).

d. Switch on aircraft electrical equipment to supply suitable load. Check that loadmeter is reading approximately 0.5.

e. Check that the voltmeter reads 27.5 (±0.2) volts.

f. Reduce aircraft load to as low as possible and increase engine rpm to 98%. Voltmeter should not read more that 27.7 volts.

g. Reduce engine speed to 50% rpm and place generator control switch to TRIP.

h. Check that the generator fail light on the annunciator panel is on and that the master caution light is flashing. Check that the master caution light goes out when pressed. Ensure that the loadmeter reads zero.

j. Place generator control switch to RESET. Check that the generator fail light goes out and that the loadmeter is indicating.

jA. Set d.c. MASTER switch to OFF position. Ensure that GENERATOR FAIL light does not illuminate. If the GENERATOR FAIL light illuminates, isolate and repair the system fault and repeat steps (a) to (k).

NOTE

Modification C-12-114-000/CF-499 installs diodes CR3KB and CR5KB across the coils or relays K5P and K4P, designed to supress an inductive overvoltage spike which causes the d.c. contro panel to trip off when the above selection is made. Concentration in this area is recommended when attempting to isolate the fault.

k. Shut down engine (refer to C-12-114-000/MB-000).

m. Disconnect voltmeter from test jacks.

INTEGRITY CHECK OF THE EMERGENCY D.C. STARTING – AIRCRAFT BATTERIES

49. Faults in the d.c. master switch circuit could prevent relay K11P from closing on a battery start selection using Procedure 2 (refer to Critical Emergencies, C-12-114-000/MB-000, Paragraph 29). This should result in a complete d.c. power failure. The following is the test procedure for checking the integrity of the circuit. An ohmmeter (Item 64, Figure 1-5) is required.

CAUTION

When the starter-generator has been electrically disconnected, ensure that the positive leads are effectively insulated to prevent possible short circuits and/or arcing during power checks.

a. Connect 28-volts d.c. ground power supply to aircraft.

b. Pull out ignition circuit-breaker (on centre console) and battery start circuit-breaker (nose compartment distribution panel).

c. Select d.c. master switch to GROUND POWER. Check that fuel warning light illuminates.

d. Select engine master switch to ON. Check that fuel warning light goes out.

CAUTION

The fuel pump and the main fuel control unit are fuel lubricated. Do not motor the engine unless normal fuel pressure is indicated.

e. Move throttle lever to OFF.

f. Select start switch to ON, hold for 3 seconds, then release.

g. Abort start sequence immediately by selecting d.c. master switch to OFF and engine master switch to OFF.

h. Disconnect LH and RH batteries.

j. Select d.c. master switch to BATTERY position.

k. Check resistance between wire K13A20 (on battery start circuit- breaker in nose compartment distribution panel) and ground. If circuit is serviceable the resistance should be approximately 6 ohms (coil resistance of K11P). An abnormally high resistance may be due to faulty relay K1K or K8P, a poor contact in the d.c. master switch, or other poor connection in the circuit.

m. When check is completed, reconnect the LH battery ONLY. Reset the BATTERY START circuit-breaker.

n. Press STOP START switch (to realign relays K1K and K8P) and ensure that cockpit power restores to normal with BATTERY START indicator illuminated. Press S5K switch (battery start reset) and ensure that BATTERY START indicator extinguishes.

p. Ensure all switches are OFF. Reset IGNITION circuit-breaker. Reconnect the RH battery. Secure both LH and RH batteries and access panels.

NOTE

Ensure the BATTERY START circuit-breaker is reset.

ACTION TO BE TAKEN AFTER A BATTERY START HAS BEEN PERFORMED

50. When a battery start has been performed, the following action must be carried out prior to declaring the aircraft serviceable:

a. Remove aircraft batteries and replace with serviceable batteries.

b. Visually inspect relay K3P, K4P, K5P and K11P and current limiters F2P and F3P to confirm their serviceability. Replace unserviceable components.

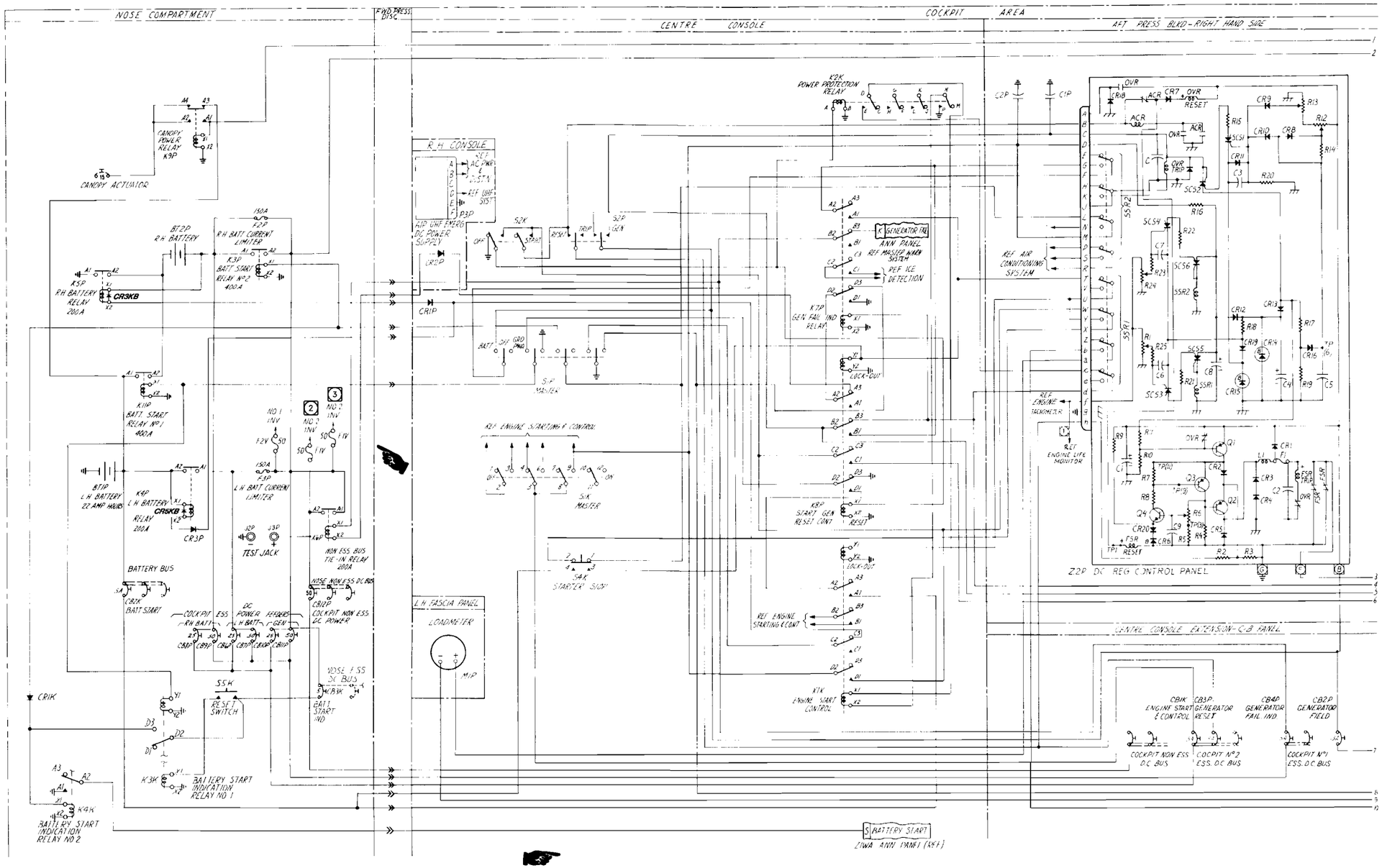
c. If modification CF-354 has been embodied, apply ground electrical power, set electrical master switch to GRD PWR, actuate reset switch (S5K) and confirm that the BATTERY START capsule on the annunciator panel is extinguished.

d. Secure all components. Return all switches to OFF.

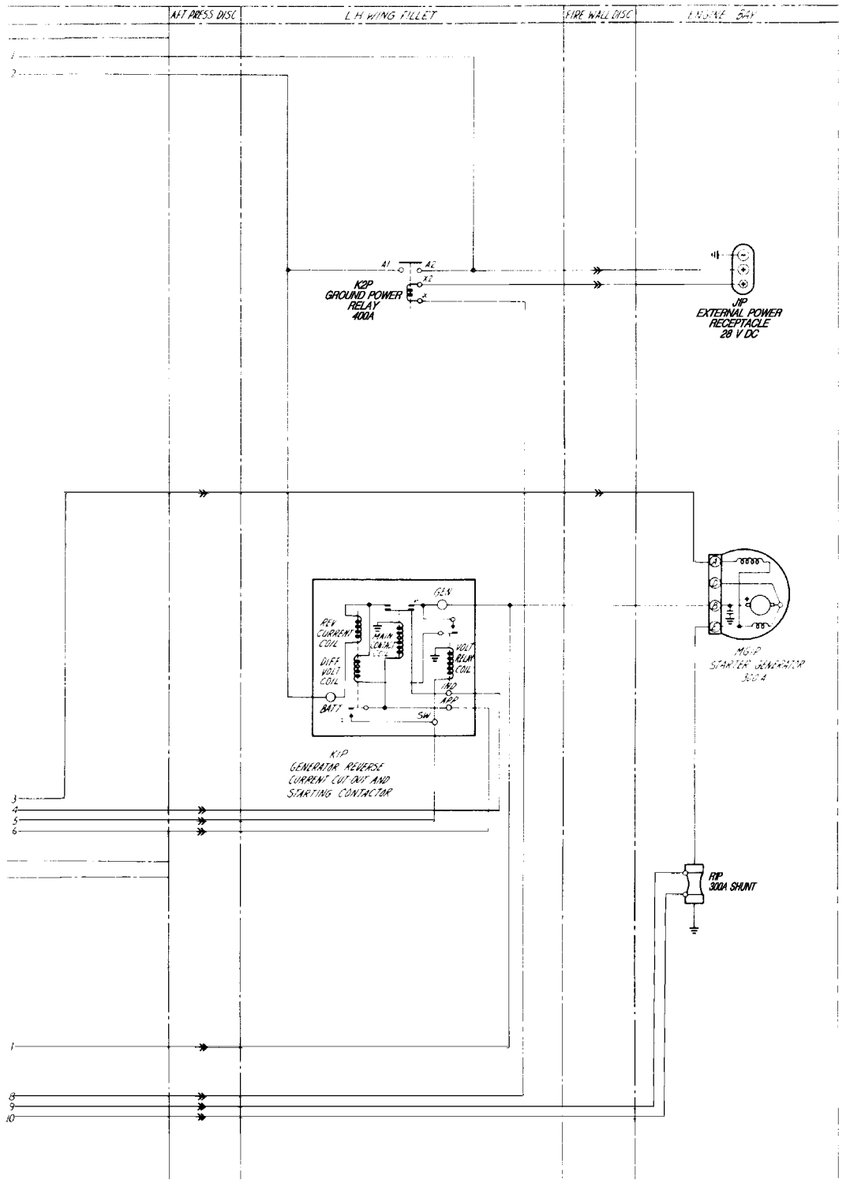
Figure 2-10 D.C. Power Supply and Engine Starting
- Electrical Schematic

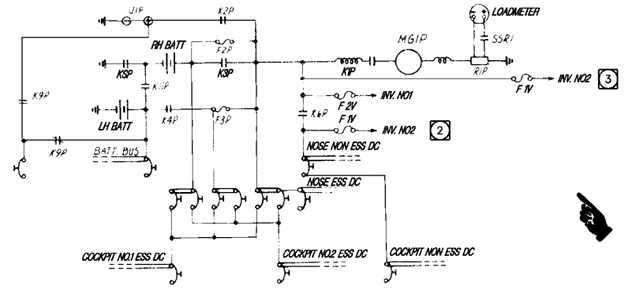
Pages 21-22 and 23-24

D E L E T E D



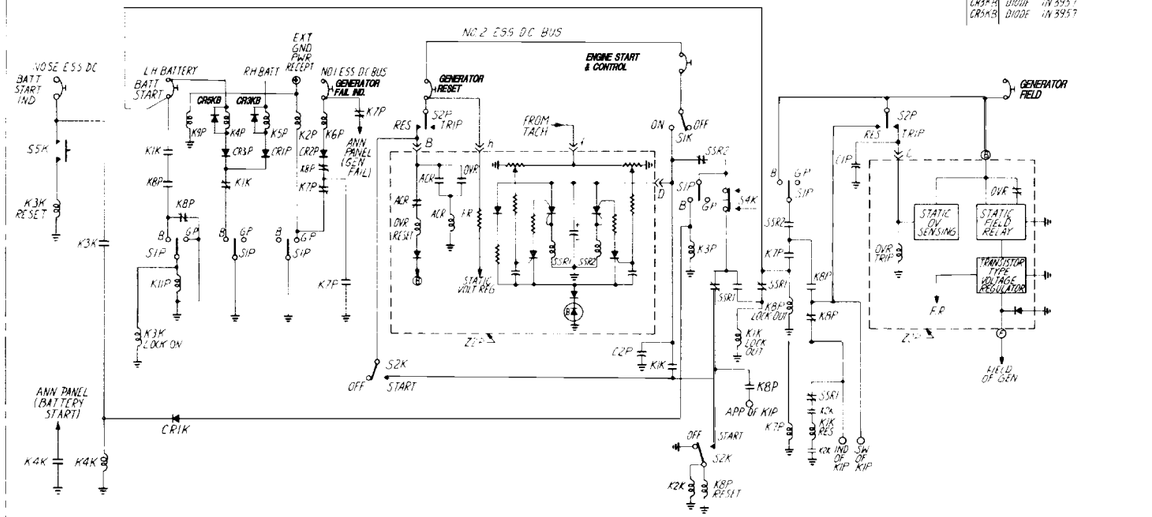
D.C. Power Supply and Engine Starting – Electrical Schematic (Aircraft not modified to CF-458) (Sheet 1 of 2) Figure 2-10A





D.C. POWER LADDER DIAGRAM

ITEM	DESCRIPTION
K1K	RELAY - ENG START CONT.
K2K	" POWER PROTECTION
K3K	" BATTERY START INDICATOR NO 1
K4K	" " " NO 2
K1P	" GEN REV CUR CUT-OUT & START CONTACT
K2P	" GND PWR
K3P	" BATT START NO 2
K4P	" L.H. BATT
K5P	" R.H. BATT
K6P	" NON ESS BUS TIE-IN
K7P	" GEN FAIL IND
K8P	" START GEN RESET CONT
K9P	" CANOPY POWER
K11P	" BATT START NO 1
S1K	SWITCH - ENG MASTER
S2K	" START
S4K	" STARTER STOP
S5K	" RESET (BATT START IND.)
S1P	" ELECT MASTER
S2P	" GEN. CONTROL
C1P	CAPACITOR
C2P	"
CR1P	DIODE IN-253
CR2P	DIODE IN-253
CR3P	DIODE IN-253
CR1K	DIODE IN-540
Z1P	PANEL - DC REG CONT
SSR1	RELAY SPEED SENSING
SSR2	" " "
OVR	" OVERVOLTAGE
ACR	" ANTI-CYCLING
FSR	" FIELD SHORTING
FR	RESISTOR - FLASHING
CR3K-R	DIODE IN 3957
CR3K-B	DIODE IN 3957



CONTROL - D.C. POWER & ENGINE STARTING LADDER DIAGRAM

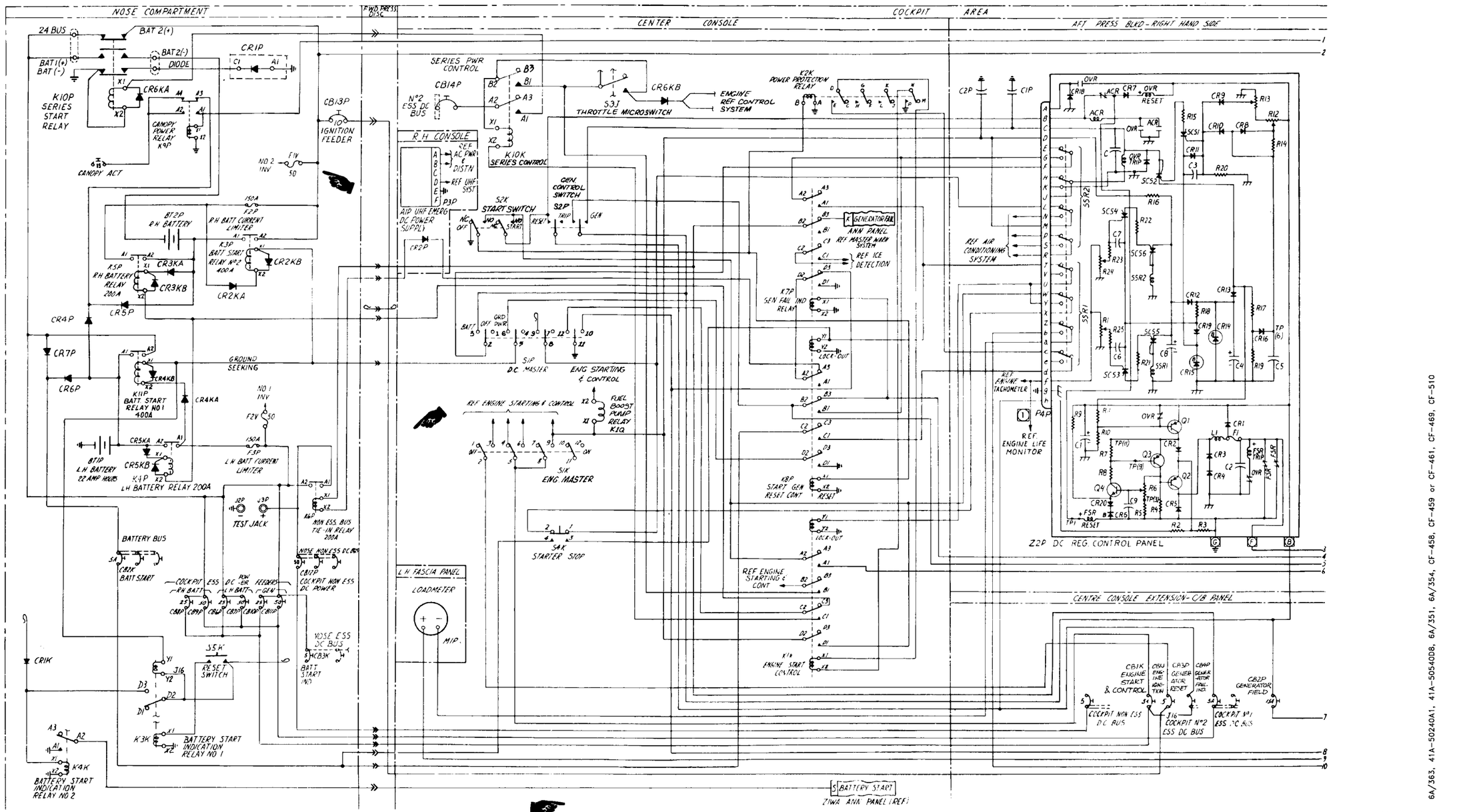
EFFECTIVITY

1. Aircraft modified to CF-469
2. Aircraft not modified to CF-459 or CF-461, and CF-510
3. Aircraft modified to CF-459 or CF-461, and CF-510

41A-50240A, REF 41A-5054007/BD/3, 6A/351, 6A/354, CF-459 or CF-461 and CF-510

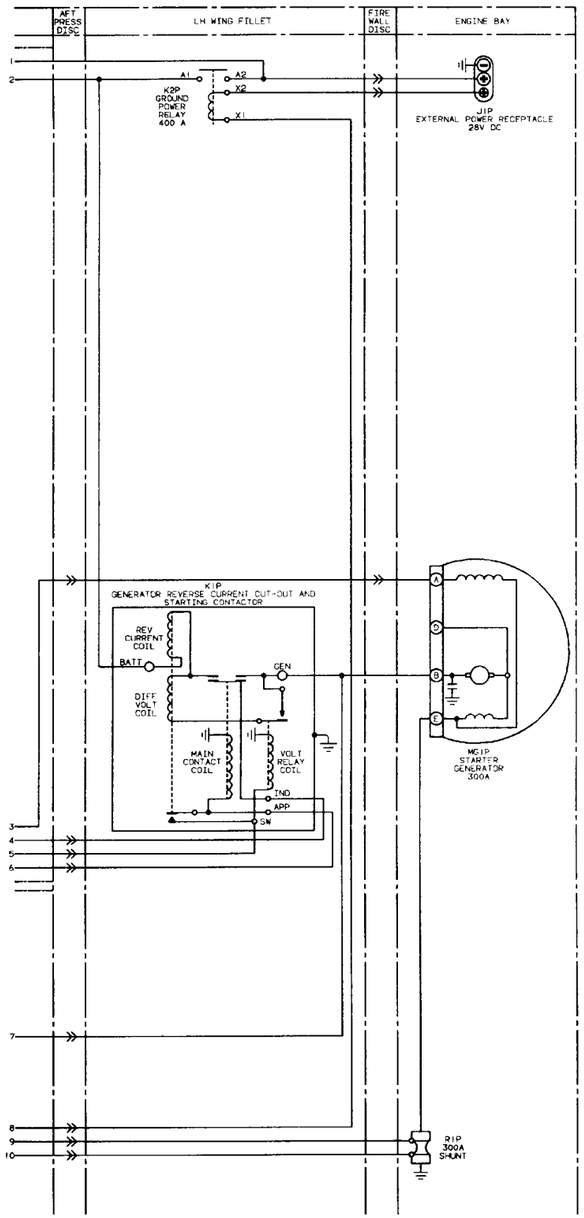
ZOF02007

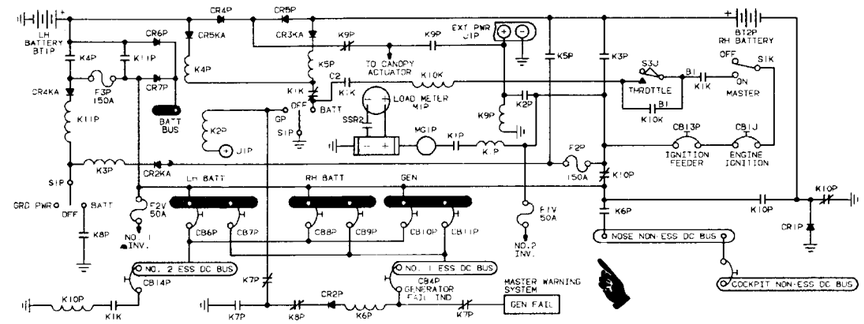
D.C. Power Supply and Engine Starting – Electrical Schematic (Aircraft not modified to CF-458) (Sheet 2 of 2) Figure 2-10A



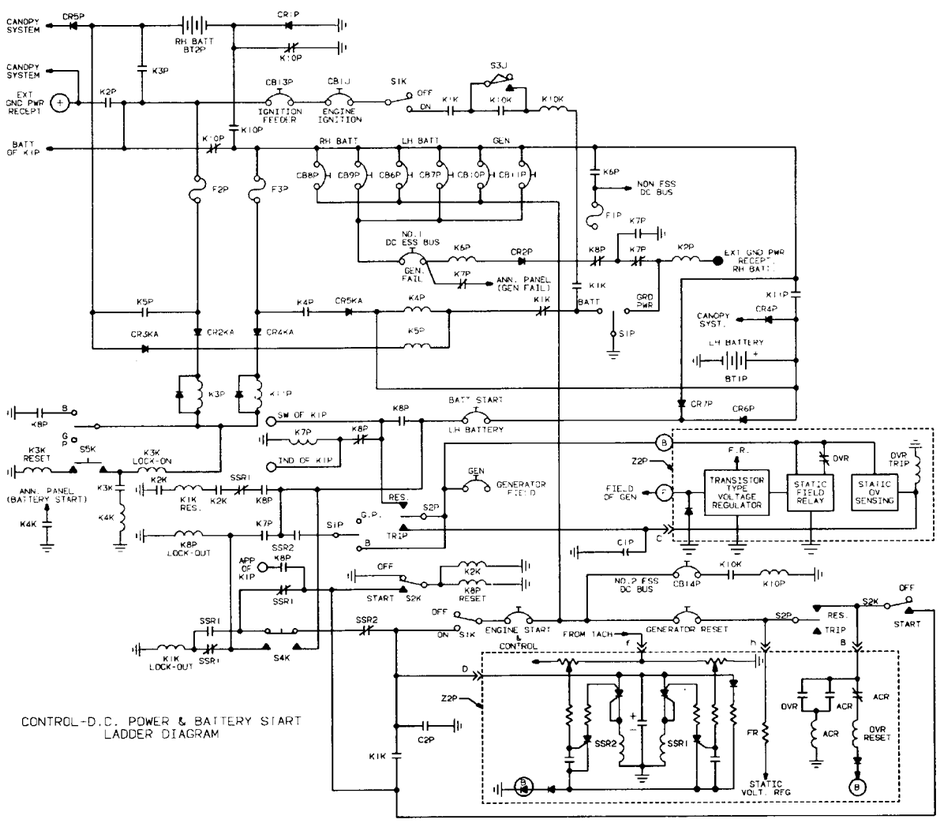
6A/363, 41A-50240A1, 41A-50540D8, 6A/351, 6A/354, CF-458, CF-459 or CF-461, CF-469, CF-510

D.C. Power Supply and Engine Starting – Electrical Schematic (Snowbird aircraft and aircraft modified to CF-458) (Sheet 1 of 2) Figure 2-10B





DC POWER LADDER DIAGRAM



CONTROL-D.C. POWER & BATTERY START LADDER DIAGRAM

ITEM NO.	DESCRIPTION	PART NO. & MFR
BT1P	LH BATTERY	MS24497-1
BT2P	RH BATTERY	MS24497-1
CB1K	C/B ENGINE START AND CNTL	S1412-5 (5A)
CB2K	C/B BATTERY START	S1412-5 (5A)
CB3K	C/B BATT START INDICATION	S1412-5 (5A)
CB2P	C/B GENERATOR FIELD	S1412-15 (15A)
CB3P	C/B GENERATOR RESET	S1412-5 (5A)
CB4P	C/B FAILURE INDICATION	S1412-5 (5A)
CB6P	C/B L.H. BATT	S1412-25 (25A)
CB7P	C/B L.H. BATT	2150-F (50A)
CB8P	C/B R.H. BATT COCKPIT ESS	S1412-25 (25A)
CB9P	C/B R.H. BATT DC PWR FEED	2150-F (50A)
CB10P	C/B GEN	S1412-25 (25A)
CB11P	C/B GEN	2150-F (50A)
CB13P	IGNITION POWER FEEDER	MS26574-10 (10A)
CB14P	SERIES PWR CONTROL	1500-059-5 (5A)
F2P	CURRENT LIMITER RH BATT	FLLE (150A)
F3P	CURRENT LIMITER LH BATT	FLLE (150A)
K1K	RELAY ENGINE START CONT	9225-7221 (12V)
K2K	RELAY POWER PROTECTION	9220-4249
K3K	RELAY BATT START IND NO. 1	9225-4416
K4K	RELAY BATT START IND NO. 2	P26B28H6A
K10K	SERIES CONT RELAY	MS27400-21
K1P	GEN REVERSE CURRENT CUTOUT AND START CONTACTOR	AN3025-600
K2P	RELAY GROUND POWER	MS24185-D1
K3P	RELAY NO. 2 BATT START	MS24185-D1
K4P	RELAY LH BATTERY	MS24171-D1
K5P	RELAY RH BATTERY	MS24171-D1
K6P	RELAY NON ESS. BUS TIE-IN	MS24171-D1
K7P	RELAY GENERATOR FAIL IND	9224-3951
K8P	RELAY START GEN RESET CNTL	9225-4416
K9P	RELAY CANOPY POWER	MS24187-D1
K10P	SERIES START RELAY	A-848-KBH
K11P	RELAY NO. 1 BATT START	MS24179-D1
M1P	LOADMETER	MS25025-1
MG1P	STARTER GENERATOR	2CM621A
R1P	SHUNT DC POWER	8300-300
S1P	SWITCH DC MASTER	MS25068-21
S2P	SWITCH GENERATOR CONTROL	MS35059-27
J1P	EXTERNAL POWER RECEPTACLE	AN3552-3A
P1P	PLUG LH BATTERY	MS25182-2
P2P	PLUG RH BATTERY	MS25182-2
P4P	PLUG DC REGULATOR CNTL PNL	PT06SE-18-32S
S1K	SWITCH ENGINE MASTER	MS24660-23D
S2K	SWITCH START	MS35059-26
S4K	SWITCH STARTER STOP	MS25089-3
S5K	SWITCH RESET	C100U2
CR1P	DIODE	IN4047
CR2P	DIODE	IN253
CR4P	DIODE	152K60A: INT'L RECT
CR5P	DIODE	152K60A: INT'L RECT
CR6P	DIODE	152K60A: INT'L RECT
CR7P	DIODE	152K60A: INT'L RECT
CR1K	DIODE	IN540
CR2KA	DIODE	IN3957: (JAN)
CR2KB	DIODE	↑
CR3KA	DIODE	↓
CR3KB	DIODE	IN3957: (JAN)
CR4KA	DIODE	IN1348A(CF498)
CR4KB	DIODE	
CR5KA	DIODE	
CR5KB	DIODE	
CR6KA	DIODE	
CR6KB	DIODE	

EFFECTIVITY

(1) Aircraft modified to CF-469

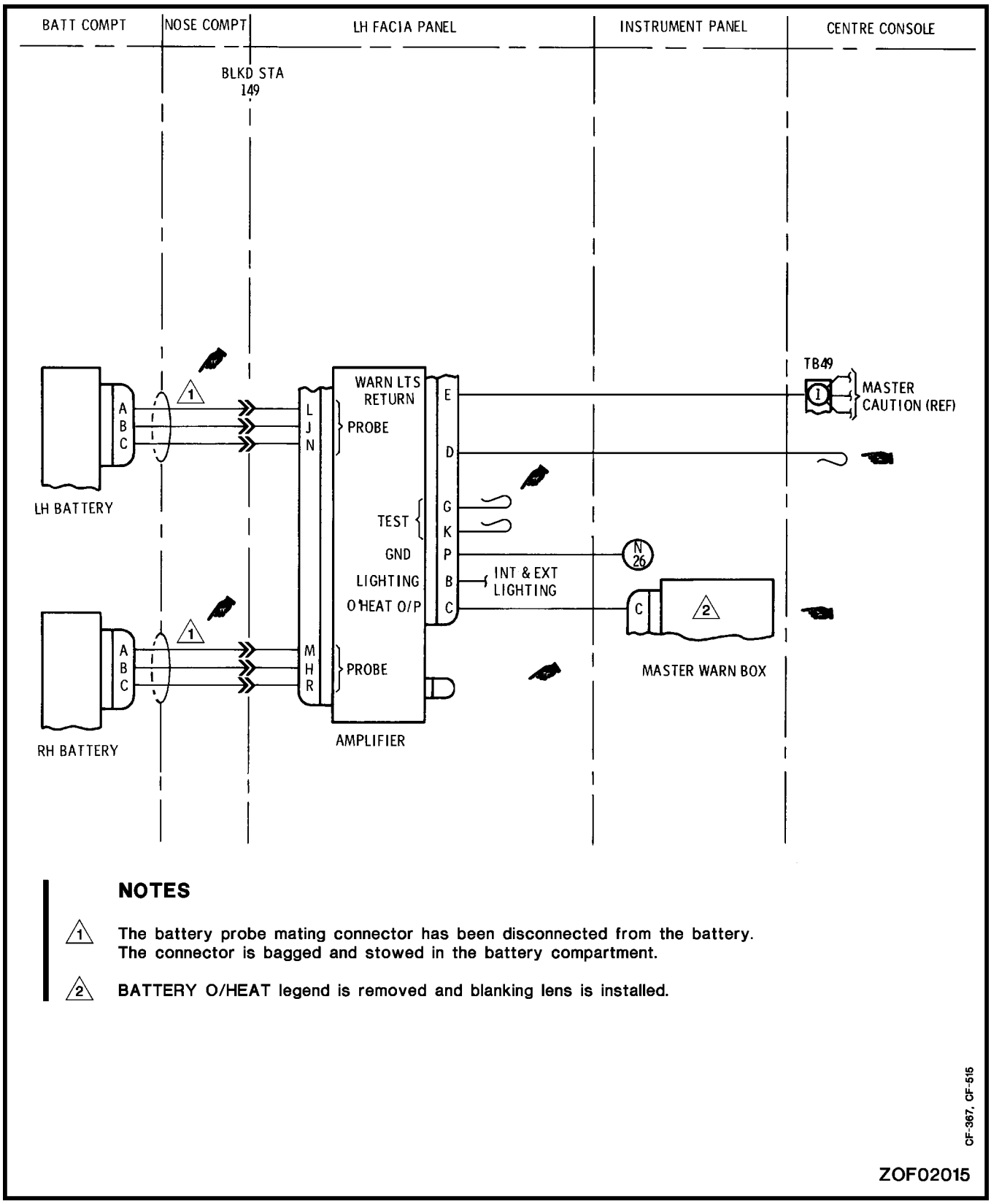
CF-459 or CF-461, and CF-510

Z0F02008

D.C. Power Supply and Engine Starting – Electrical Schematic (Snowbird aircraft and aircraft modified to CF-458) (Sheet 2 of 2) Figure 2-10B

D E L E T E D

Figure 2-11 (Isue 1) Engine Control – Electrical Schematic



NOTES

1. The battery probe mating connector has been disconnected from the battery. The connector is bagged and stowed in the battery compartment.
2. BATTERY O/HEAT legend is removed and blanking lens is installed.

CF-367, CF-516

ZOF02015

Figure 2-12 Battery Temperature Warning and Indication – Electrical Schematic

PART 3

TABLE OF CONTENTS

A.C. SYSTEM

PART 3

LIST OF ILLUSTRATIONS

A.C. SYSTEM

PART 3

A.C. SYSTEM

A.C. SYSTEM

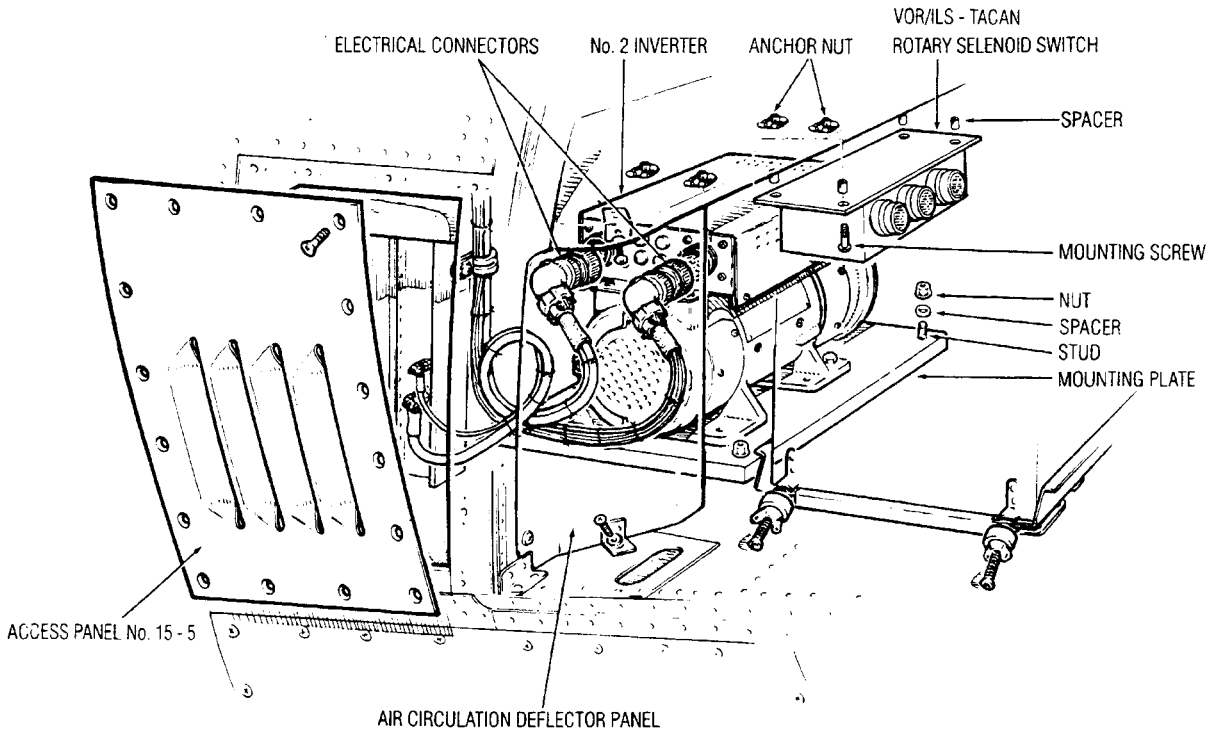
GENERAL

1. The constant-frequency a.c. system is equipped with two 28-volt d.c. driven inverters which provide the necessary power for the UHF and instrument systems. Two switches, located on the centre console panel, control the operation of the inverters through 200-ampere power relays. In the event of an inverter failure, the remaining inverter will supply essential a.c. loads. If the d.c. generator fails, No. 2 inverter will lose its d.c. supply and the No. 1 inverter, which is still supplied from the cockpit essential d.c. power feeders, carries the essential a.c. loads. Phase adapters are used to convert single-phase 115-volt a.c. to 155-volt three-phase a.c. for various instruments. One 26- volt single-phase auto-transformer, supplied from the No. 1 115- volt a.c. single-phase bus, provides power for engine and compass instruments. Loss of output from an inverter is indicated by the master warning light flashing and the appropriate inverter fail capsule on the annunciator panel coming on.

COMPONENTS

2. A list of the main components pertaining to the a.c. inverter system and their location follows. For further details, refer to C-12-114-000/DW-000.

COMPONENT	LOCATION
Inverter No. 1 (MG1X)	Nose compartment, left side
Inverter No. 2 (MG2X)	Nose compartment, right side
Power relay (K1V)	Nose compartment
Power relay (K2V)	Nose compartment
No. 2 inverter power 50- ampere limiter (F1V)	Nose compartment
Phase adapter (PA1X)	RH console
Phase adapter (PA2X)	RH console
Instrument transformer (T1X)	RH console
Transfer delay relay (K4X)	RH console
Transfer delay relay (K5X)	RH console
No. 2 inverter changeover relay (K3X)	RH console
Transfer relay (K6X)	RH console
Transfer relay (K7X)	RH console
Transfer control relay (K1X)	RH console
Transfer control relay (K2X)	RH console
Inverter No. 1 control switch (S1V)	Centre console
Inverter No. 2 control switch (S2V)	Centre console



REMOVAL

STEPS

1. Ensure that all electrical power is switched off.
2. Open Access Panel 15 - 9 for access to the right-hand upper nose compartment.
3. Remove Inverter Access Panel 15 - 5.
4. Disconnect and remove RT 862 APX IFF Transponder.
5. Disconnect and remove the TS 1843A / APX 77 Transponder Test Set.
6. Disconnect and remove the VOR / ILS - Marker Navigation receiver.
7. Disconnect and remove the VOR / ILS - Tacan Rotary Solenoid Switch.
8. Disconnect the two electrical connectors on inverter # 2.
9. Depending on ther inverter's size, it may be necessary to remove the air circulation Deflector Panel.
10. Remove the four nuts that secure the inverter's mounting plate to the compartment's floor studs.
11. Remove the inverter.

INSTALLATION

1. Reverse the removal procedure.

ZOF03003

Figure 3-1 (Issue 2) Removal and Installation of No. 2 Inverter

COMPONENT DESCRIPTION

INVERTER NO. 1

3. The No. 1 inverter is of the rotary type with the a.c. output windings terminated externally in a delta configuration. A 200-ampere power relay connects the No. 1 inverter to the generator bus of the cockpit essential d.c. power feeders through a 50-ampere limiter. Output from the inverter is 750-volt-ampere 115-volt 400-cycle a.c. and, under normal operating conditions supplies the No. 1 115-volt a.c. bus only. If the No. 2 inverter fails, both No. 1 and No. 2 115-volt a.c. buses will be supplied by No. 1 inverter. For further information on the No. 1 inverter, refer to C-17-319-000/MN-000.

CAUTION

After carrying out maintenance on the No. 1 inverter system and before reconnecting and switching on the d.c. supply, it is extremely important to check that the inverter input connections are of the correct polarity. Severe damage to the inverter may result if this caution is not observed.

REMOVAL AND INSTALLATION OF NO. 1 INVERTER

4. To remove the No. 1 inverter, proceed as follows:

a. Ensure that all electrical power is switched off.

b. Gain access to the nose compartment left side.

c. Remove access panels No. 15-8 (see Figure 1-4) and air circulation deflector panel located by the outboard end of the No. 1 inverter.

d. Remove the main Tacan receiver-transmitter.

e. Disconnect the two electrical connectors on the inverter.

f. Remove the four inverter mounting plate nuts.

g. Remove the inverter and detach the mounting plate by removing the four nuts and countersunk screws.

4A. To install the inverter reverse the removal procedure.

INVERTER NO. 2

5. The No. 2 inverter is of the rotary type and is identical to the No. 1 inverter except for the arrangement of the external connections. In this application the inverter delivers 750 volt-ampere 115/200-volt 3-phase a.c. when wye-connected, or 750 volt-ampere 115-volt single-phase a.c. when delta-connected. Under normal operating conditions, the output windings are wye-connected through the changeover relay (K3X) to supply 115/200-volt 3-phase for the main UHF system and 115-volt a.c. single-phase for the No. 2 bus. If inverter No. 1 fails, the output windings of No. 2 inverter are delta-connected via the changeover relay (K3X) to supply a single-phase output to both No. 1 and No. 2 115-volt single-phase buses. A 200-ampere power relay connects the No. 2 inverter to the 28-volt d.c. non-essential bus through a 50- ampere limiter. For further information on the No. 2 inverter, refer to C-17-297-000/MS-000.

CAUTION

After carrying out maintenance on the No. 2 inverter system and before reconnecting and switching on the d.c. supply, it is extremely important to check that the inverter input connections are of the correct polarity. Severe damage to the inverter may result if this caution is not observed.

REMOVAL AND INSTALLATION OF THE NO. 2 INVERTER

6. For removal and installation of the No. 2 inverter, see Figure 3-1.

INSTRUMENT TRANSFORMER – 26-VOLT

7. A 250 volt-ampere autotransformer is used to supply 26- volt 400-cycle single-phase power to the compass and engine instruments. Normally, the 115-volt input to the transformer is supplied by the No. 1 inverter. Should the No. 1 inverter fail, input to the autotransformer is automatically supplied by the No. 2 inverter.

PHASE ADAPTERS

8. Two phase adapters are used to convert 115-volt single- phase a.c. to 115-volt 3-phase a.c. for the operation of some flight instruments. Normally, No. 1 inverter supplies the No. 1 phase adapter and No. 2 inverter supplies the No. 2 phase adapter. With the failure of an inverter output, the remaining inverter will automatically supply both phase adapters through the No. 1 and No. 2 single-phase buses.

TIME DELAY RELAYS

9. Two time delay relays are used (one in each inverter control circuit) to ensure that, if a circuit fault occurs which causes the a.c. voltage output to fall for more than a 10-second period, the d.c. input will be disconnected from the inverters.

DISTRIBUTION

10. The a.c. distribution system consists of a 115/200-volt 3-phase a.c. bus, (fed from the No. 2 inverter output to supply the UHF system only), a No. 1 115-volt single-phase a.c. bus and a No. 2 115-volt single-phase bus, plus a 26-volt single-phase a.c. 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 3-3)

11. On selecting No. 1 inverter control switch to ON, No. 2 inverter transfer relay and No. 2 inverter changeover relay will energize. No. 1 inverter fail light goes out and No. 1 inverter power relay will energize to connect 28-volt d.c. to the No. 1 inverter input. A.C. power, from the No. 1 inverter output stage, will energize No. 2 inverter transfer relay, thereby removing 28- volt d.c. from the No. 2 inverter transfer delay relay. Power from the No. 1 inverter will now supply No. 1 115-volt single-phase a.c. bus and the No. 2 115-volt single-phase a.c. bus.

12. On selecting No. 2 inverter control switch to ON, No. 1 inverter transfer relay will energize. The No. 2 inverter fail light will go out, the No. 2 single-phase a.c. bus is disconnected from the No. 1 inverter output and No. 2 inverter power relay will energize. D.C. power will now be applied to the No. 2 inverter input stage. A.C. power from the output stage will energize the No. 1 inverter transfer control relay, thereby removing 28-volt d.c. from the No. 1 inverter transfer

delay relay. A.C. power from the No. 2 inverter will now supply No. 2 115-volt single-phase a.c. bus and 3-phase a.c. to the UHF system.

SYSTEM CIRCUIT FUNCTION
(See Figure 3-3)

No. 1 Inverter Mode

13. When the No. 1 inverter control switch is on, 28-volt d.c. is applied to the relay coil of K6X through contacts 5 and 7 of relay K4X. The No. 1 inverter fail light then goes out and 28- volts d.c. is momentarily applied to K4X heater through the contacts A2 and A3 of relay K1X. the No. 2 inverter changeover relay K3X is energized to permit No. 2 inverter to operate as a 3- phase machine. with relay K6X energized, relay (K1V) will energize to connect d.c. power to the No. 1 inverter input stage from the No. 1 essential d.c. supply to K4X heater. Power from the No. 1 inverter, via contacts A1 and A2 of relay K6X, now supplies No. 1 115-volt single-phase a.c. bus. the No. 2 bus will also be supplied from the No. 1 inverter via contacts A2 and A3 of relay K7X.

No. 2 Inverter Mode

14. When the No. 2 inverter contro switch (S2V) is on, 28- volt d.c. is applied to relay coil of K7X through contacts 5 and 7 of relay K5X. The No. 2 inverter fail light goes out and 28-volt d.c. is momentarily applied to relay K5X heater through contacts A2 and A3 or relay K2X. With relay K7X energized, No. 1 inverter is disconnected from No. 2 single-phase bus and 28-volt d.c. is applied to relay K2V from the d.c. non-essential bus to start No. 2 inverter. Relay K2X will energize from phase A of No. 2 inverter to disconnect the 28-volt d.c. from relay K5X heater. The No. 2 invert output now supplies 3-phase a.c. to the UHF system and single-phase a.c. to the No. 2 single-phase bus through relay K7X.

No. 1 Inverter Failure

15. Failure of the No. 1 inverter output will cause relay K1X to de-energize and connect 28-volt d.c. to the heater of relay K4X. After 10 seconds, contacts 5 and 7 of K4X will open to de- energize relays K6X and K3X. This brings on the No. 1 inverter fail warning lights, de-energizes relay K1V, and switches the No. 1 single-phase a.c. bus over to the No. 2 inverter single-phase output. Relay K3X de-energizes and changes No. 2 inverter output from 3-phase to a single-phase supply, thereby causing the loss of the 115/200-volt 3-phase UHF supply. No. 2 inverter is now supplying all single-phase a.c. loads.

No. 2 Inverter Failure

16. Failure of the No. 2 inverter a.c. output will cause relay K2X to de-energize, and connect 28-volt d.c. to the heater of relay K5X. After 10 seconds, contacts 5 and 7 of K5X will open to de-energize relay K7X. This brings on the inverter failure warning light, de-energize relay K2V and switches the No. 2 single-phase a.c. bus over to No. 1 inverter. Failure of No. 2 inverter results in the loss of the 115/200-volt 3-phase UHF supply.

Emergency UHF Switching

16A. The inverter control relays K1X and K2X provide automatic switching on facility for the emergency UHF system when the 3-phase a.c. supply to the main UHF system is interrupted through an inverter failure. The main-emergency UHF relay is operated through closed contacts, B2 and B3, of the de-energized inverter control relay. For further information on main and emergency UHF system, refer to EO-195A-2G.

FUNCTIONAL CHECK

EQUIPMENT

17. The following equipment is required:

a. D.C. external power supply – 28 volts.

b. Tester power supply (Item 71, Figure 1-5).

c. Voltmeter, 30 volts d.c. (Item 101, Figure 1-5).

d. Voltmeter, 130 volts, a.c. (Item 95, Figure 1-5).

e. DELETED

PRIMARY CHECK

18. Before one or more of the a.c. power system functional checks performed, carry out the following procedure:

NOTE

DELETED

a. Connect a 28-volt d.c. ground supply to the ground power receptacle and place the d.c. master switch to GROUND POWER.

b. Ensure that the following circuit-breakers are pushed in:

Tacan	Centre console
Inverter Fail Indicator	Centre console
No. 1 Inverter Control	Centre console
DELETED	
No. 2 Inverter Control	Nose compartment
No. 1 Bus Isolator	Centre console
No. 2 Bus Isolator	Centre console
Phase Adapter No. 1	Centre console
Phase Adapter No. 2	Centre console
26 V.A.C. Transformer	Centre console
Compass	Centre console

c. To perform a functional check of the d.c. power supply, connect d.c. voltmeter (Item 101, Figure 1-5) 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 d.c. master switch to OFF and disconnect external power.

NO. 1 INVERTER OUTPUT CHECK

19. Procedure:

a. Locate TB47 in the nose compartment.

b. Connect tester power supply white test lead (c) to terminal 3 and black test lead (N) to terminal 7.

c. Select No. 1 inverter control switch to ON.

d. Select tester power supply to position C-N in the 150- volt L-N location, check for voltage between 112 and 117 volts and frequency of 400 (plm10) cycles.

e. Select No. 1 inverter control switch to OFF.

f. Disconnect tester power supply.

NO. 2 INVERTER VOLTAGE, FREQUENCY AND PHASE ROTATION CHECK

20. Procedure:

a. Locate UHF main or emergency rapid test facility located on the test panel in the nose compartment.

b. Connect tester power supply red test lead (A) to E receptacle, blue test lead (B) to F receptacle, white test lead (C) to H receptacle and black test lead (N) to ground.

c. Ensure that the UHF circuit-breakers phase A, B and C are selected to ON.

d. Select No. 1 and No. 2 inverter control switches ON.

e. Check that L-N voltage is between 112 and 117 volts a.c. on 150-volt L-N selections AN, BN and CN, and that L-L voltage is 208 (±4) volts a.c. on 300-volt L-L selections CA, BC and AB. On all selections the frequency should be 400 (±10) cycles.

f. Select tester power supply to 150-volt phase rotation selection. Ensure that phase rotation indicates A, B and C.

g. Place No. 1 inverter control switch to OFF.

h. Select tester power supply to 150-volt L-N to C-N selection. Ensure that there is no voltage indication.

j. Select No. 2 inverter control switch to OFF.

k. Disconnect tester power supply.

NO. 1 PHASE ADAPTER VOLTAGE, FREQUENCY AND PHASE ROTATION CHECK

21. Procedure:

a. Locate TB47 in the nose compartment.

b. Connect tester power supply red test lead (A) to terminal 7, blue test lead (B) to terminal 2, white test lead (C) to terminal 3 and black test lead (N) to ground.

c. Ensure that the gyrosyn fuses are installed.

d. Select No. 1 inverter control switch to ON.

e. With tester power supply 150-volt L-L selection CA, check for voltage between 112 to 117.5 volts and frequency of 400 (±10) cycles, selection AB voltage between 120 to 135 volts and frequency of 400 (±10) cycles and selection BC for voltage between 114 to 125 volts and frequency of 400 (±10) cycles.

f. Select tester power supply to 150-volt phase rotation selection. Ensure that phase rotation indicates A, B and C.

g. Select No. 1 inverter control switch to OFF.

h. Select No. 2 inverter contro switch to ON.

j. Repeat tests detailed in (e) to (f) inclusive, preceding.

k. Select No. 2 inverter control switch to OFF.

m. Disconnect tester power supply.

NO. 2 PHASE ADAPTER VOLTAGE, FREQUENCY AND PHASE ROTATION CHECK

22. Procedure:

a. Locate TB11 in the cockpit.

b. Connect tester power supply red test lead (A) to terminal 9, blue test lead (B) to terminal 5, white test lead (C) to terminal 6 and black test lead (N) to ground.

c. Select No. 1 inverter control switch to ON.

d. With tester power supply 150-volt L-L selection CA, check for voltage between 112 to 117.5 volts and frequency of 400 (±10) cycles, selection AB for a voltage between 120 to 135 volts and frequency of 400 (±10) cycles and selection BC for a voltage between 114 to 125 volts and frequency of 400 (±10) cycles.

e. Select tester power supply to 150-volt phase rotation selection. Ensure that phase rotation indicates A, B and C.

f. Select No. 1 inverter control switch to OFF.

g. Select No. 2 inverter control switch to ON.

h. Repeat tests detailed in (d) and (e), preceding.

j. Select No. 2 inverter control switch to OFF.

k. Disconnect tester power supply.

NO. 1 AND NO. 2 INVERTER TIME DELAY UNIT TEST

23. Procedure:

a. Disconnect P4X plug from No. 1 inverter.

b. Place both No. 1 and No. 2 inverter control switches to ON and check that both power relays K1V and K2V (located in the right-hand relay panel nose compartment) energize.

c. After a period of 10 (±3) seconds, check that the No. 1 inverter power relay has de-energized by checking that there is no voltage present across X1 and X2 terminals on K1V. Ensure that No. 1 inverter fail light is on and the master caution light is flashing.

d. Place both No. 1 and No. 2 inverter control switches to OFF and reconnect plug P4X to the No. 1 inverter.

e. Disconnect plug P2X from No. 2 inverter.

f. Place both No. 1 and No. 2 inverter control switches to ON and check that both power relays K1V and K2V energize.

g. After a period of 10 (±3) seconds, check that the No. 2 inverter power relay has de-energized by checking that there is no voltage present across X1 and X2 terminals on K2V. Ensure that No. 2 inverter fail light is on and that the master caution light is flashing.

h. Place both No. 1 and No. 2 inverter control switches to OFF and reconnect plug P2X to the No. 2 inverter.

j. Place both No. 1 and No. 2 inverter control switches to ON and check that both inverter fail warning lights on the annunciator panel are out.

k. Select both No. 1 and No. 2 inverter control switches to OFF.

INSTRUMENT TRANSFORMER VOLTAGE OUTPUT CHECK

24. Procedure:

NOTE

Before proceeding with the following check, ensure that the compass signal repeater is installed.

a. Locate TB47 in the nose compartment.

b. Connect a.c. voltmeter between terminals No. 6 and No. 7.

c. Place No. 1 inverter control switch to ON. Ensure that the compass distribution circuit-breaker on the centre console is pushed in.

d. Check that the voltmeter reads 25.3 to 26.7 volts a.c.

e. Place No. 1 inverter control switch to OFF and select the No. 2 inverter control switch to ON. Repeat (d), preceding.

f. Place No. 2 inverter control switch to OFF.

NO. 1 AND NO. 2 INVERTER FAILURE INDICATION CHECK

25. Procedure:

a. Place the No. 1 and No. 2 inverter control switches to ON.

b. Ensure that both inverter fail lights on the annunciator panel are out.

c. Select No. 1 inverter control switch to OFF. Observe that the master caution light on the instrument panel is flashing and the inverter No. 1 fail light, on the annunciator panel, is on.

d. Place No. 1 inverter control switch to ON and check that both the master caution light and the annunciator fail indication are out.

e. Select No. 2 inverter control switch to OFF. Observe that the master caution light is flashing and that the No. 2 inverter fail light on the annunciator panel is on.

f. Place the No. 2 inverter control switch to ON and check that both the master caution and the annunciator fail indication are out.

g. Place both No. 1 and No. 2 inverter control switches to OFF.

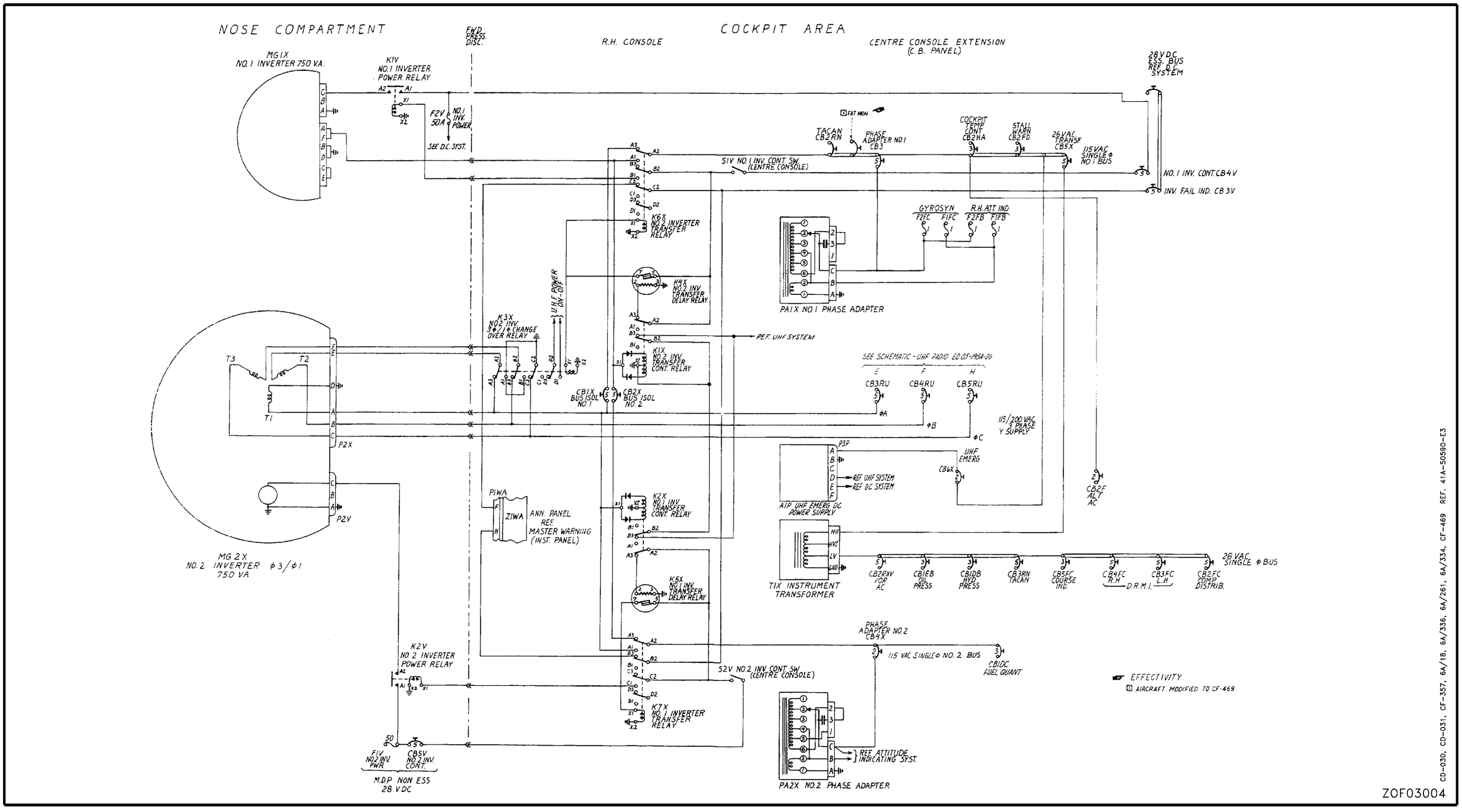


Figure 3-3 A.C. Power Supply – Electrical Schematic

PART 3A

TABLE OF CONTENTS

A.C. SYSTEM

PART 3A

LIST OF ILLUSTRATIONS

A.C. SYSTEM

Part 3A

A.C. SYSTEM

(This part provides descriptive maintenance instructions, and electrical wiring data of the a.c. system for the CT114 aircraft modified in accordance with C-12-114-000/CF-459 or CF-461, and CF-510.)

GENERAL DESCRIPTION

1. The a.c. system consists of two 28-volt d.c. 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-volt a.c., 26-volt a.c. and 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. It performs equally well as a bench power supply in mobile installations, or in many other applications where 400-Hz power is required. In the event of a No. 1 inverter failure, the No. 2 inverter automatically supplies essential a.c. loads. Phase adapters are used to convert single-phase 115-volt a.c. to 115-volt three-phase a.c. for various instruments. The static inverters supply single-phase 26-volt a.c. power for engine and compass 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 capsule or INVERTER 2 FAIL capsule on the annunciator panel. For the a.c. system electrical schematic, see Figure 3A-2.

COMPONENT LOCATIONS

2. For the location of a.c. system main components, see Figure 3A-1.

COMPONENT DESCRIPTION

INVERTERS

3. The static inverters deliver 1000 volt-amperes, single-phase, 400-Hz, 115-volt a.c. and 26-volt a.c. power over an input d.c. voltage range of 22-volt d.c. to 32-volt d.c. The nominal input voltage is 28-volt d.c. 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. The units are light-weight, efficient and highly reliable. Under normal operating conditions, the static inverters supply 115-volt a.c. and 26-volt a.c. power to flight, navigational and engine instruments.

4. The static inverters are thoroughly inspected and tested prior to shipment, and are ready for operation. No adjustments are required prior to installation. Each unit has been subjected to an operating burn-in, at full load, to eliminate failures caused by the semiconductor components.

TRANSIENT SUPPRESSORS

5. There are two transient suppressors 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 suppressors protect and limit transient voltage spikes at the inverters input.

REMOVAL AND INSTALLATION OF NO. 1 AND NO. 2 INVERTERS

6. To remove inverters, proceed as follows:

a. Ensure that all electrical power is switched off.

b. Open access panel 15-12 (refer to C-12-114-000/MF-000) to gain access to the left-hand upper nose compartment.

c. Disconnect the two electrical connectors on the inverters.

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

7. To install the inverters reverse the removal procedure.

OPERATION

GENERAL

8. Power for the a.c. system is primarily supplied by the 115-volt single-phase 400-Hz a.c. No. 1 static inverter (main). If a fault should occur on the a.c. system, standby a.c. power is available from the 115-volt single-phase 400-Hz a.c. No. 2 static inverter (standby). The inverters are installed on the inverter mounting bracket, located in the nose compartment, at FS140. A.C. power loads are automatically transferred to No. 2 static inverter via the inverter transfer relay (K6X). This

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, MDP
Circuit-breaker (CB5V)	Nose compartment, MDP
No. 1 Inverter limiter (F2V)	Nose compartment
No. 2 Inverter limiter (F1V)	Nose compartment
No. 1 Phase adapter (PA1X)	RH console
No. 2 Phase adapter (PA2X)	RH console
No. 1 Fail sense relay (K1X)	RH console
No. 2 Fail sense relay (K2X)	RH console
Inverter transfer time delay relay (K4X)	RH console
Inverter transfer relay (K6X)	RH console
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

Figure 3A-1 A.C. System – Component Locations

automatic feature ensures fail-safe operation. Both main and standby inverters also produce a 26-volt single-phase 400-Hz ac output for instrument and navigational equipment.

9. D.C. power to the inverters is normally supplied, through the cockpit essential d.c. feeders, from a 30-volt d.c. 300-ampere starter-generator. The starter-generator feeds the inverters via the No. 1 (F2V) and No. 2 (F1V) current limiters. The inverters, through their internal circuitry, convert d.c. power to produce a stable a.c. voltage and frequency of 115-volt a.c. and 26-volt a.c. at 400-Hz. If a generator failure occurs, the No. 1 and No. 2 static inverters loses their d.c. supply and the non-essential bus tie-in relay (K6P) de-energizes causing loss of the non-essential d.c. bus. This is indicated when the INVERTER 1 FAIL and INVERTER 2 FAIL lights illuminate on the master warning annunciator panel. If the d.c. MASTER switch is set to BATT, battery power is fed through the cockpit essential d.c. bus feeders. This restores power to the No. 1 and No. 2 static inverters.

A.C. SYSTEM

10. **No. 1 Inverter Mode.** With power supplied to the essential d.c. bus, setting the INV 1 switch (S1V) to ON will connect 28-volt d.c. power from the inverter to the coil of the inverter transfer relay (K6X) through the contacts of the inverter transfer time delay relay (K4X). The inverter switching control circuit will then be completed through energized contacts of relay K6X, powering the No. 1 static inverter on.

11. Operation of the inverter provides an a.c. power through the No. 1 INV O/P circuit-breaker (CB1V) that will energize the No. 1 fail sense relay (K1X), extinguishing the INVERTER 1 FAIL light and de-energize relay K4X. Power from the No. 1 static inverter now supplied 115-volt a.c. single-phase and 26-volt a.c. 400 Hz to the busses through the energized contacts of relay K6X.

12. **No. 2 Inverter Mode.** With INV 1 switch (S1V) set to OFF, INV 2 switch (S2V) set to ON, or in the event of No. 1 inverter failure, relay K6X is de-energized. The No. 2 inverter switching control circuit is closed through de-energized contacts of relay K6X, powering the No. 2 static inverter on. The inverter provides a.c. power through the No. 2 INV O/P 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-volt a.c. single-phase and 26-volt a.c. 400 Hz to the busses through the de-energized contacts of relay K6X.

13. **No. 1 Inverter Failure.** Failure of the No. 1 static inverter output de-energizes relay K1X and connects 28-volt d.c. power to the heater of relay K4X. After ten seconds, relay K4X energizes and K6X de-energizes. The INVERTER 1 FAIL light illuminates and the 115-volt and 26-volt, single-phase a.c. bus loads are transferred to the No. 2 static inverter.

14. **No. 2 Inverter Failure.** Failure of the No. 2 static inverter 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 TEST

GENERAL

15. The following test verifies proper operation of the a.c. system, and demonstrates the automatic power-up of the No. 2 static inverter (standby) for a No. 1 static inverter (main) fail situation.

EQUIPMENT

16. A Philips PM 2517 digital multimeter or equivalent is required.

A.C. SYSTEM

17. Proceed as follows:

a. Connect aircraft to a static ground pad.

b. Connect ground power to the aircraft and set d.c. MASTER switch to GRD PWR.

c. Open both No. 1 and No. 2 INV CONTROL circuit-breakers located on the main distribution panel.

d. Open No. 1 and No. 2 INV O/P circuit-breakers located on the centre console extension. Ensure that both INV 1 and INV 2 switches are set to OFF.

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

f. Set INV 2 switch to ON and verify that 115-volt a.c., 400-Hz output exists at the No. 2 static inverter test receptacle jacks.

g. Close No. 2 INV O/P circuit-breaker and verify the following conditions:

(1) The INVERTER 2 FAIL light extinguishes.

(2) The 115-volt a.c. bus is powered (gyros, attitude indicators, fuel quantity indicator, etc, power up).

(3) The 26-volt a.c. bus is powered (compass flag and DRMI flags disappear).

h. Allow gyro compass to stabilize and verify that compass heading agrees with magnetic compass.

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

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

m. Close No. 1 INV O/P circuit-breaker.

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

(1) The INVERTER 1 FAIL light extinguishes.

(2) The 115-volt a.c. bus is powered as in Step g(2).

(3) The 26-volt a.c. bus is powered as in Step g(3).

p. Repeat Step h. Verify that INVERTER 2 FAIL light is extinguished.

q. Set INV 2 switch to ON.

r. Open No. 1 INV O/P circuit-breaker. Verify that both INVERTER FAIL lights illuminate and, after a ten-second delay, the INVERTER 2 FAIL light extinguishes and the No. 2 inverter powers the 115-volt a.c. bus. Set INV 1 switch to OFF and wait two minutes. Set INV 1 switch to ON again.

s. Close the No. 1 INV O/P circuit-breaker. Verify that both INVERTER FAIL lights extinguish.

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

(1) The INVERTER 1 FAIL light illuminates.

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

(3) The No. 2 inverter provides power to the a.c. buses.

u. Set INV 2 switch to OFF.

v. Set d.c. MASTER switch to OFF and disconnect ground power from aircraft.

w. Remove static ground pad.

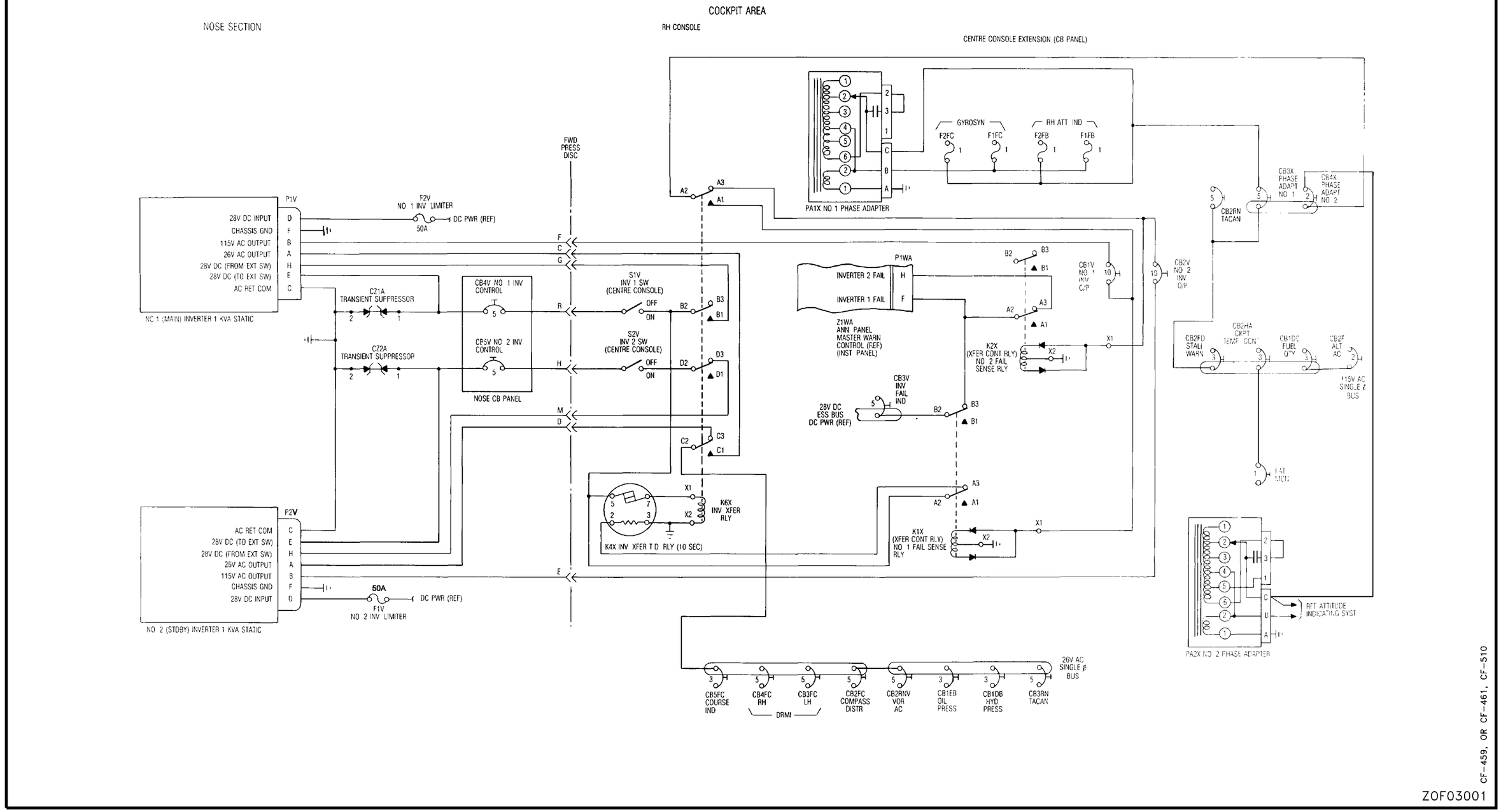


Figure 3A-2 A.C. Power Supply – Electrical Schematic

PART 4

TABLE OF CONTENTS

LOAD ANALYSIS CHARTS

PART 4

LIST OF ILLUSTRATIONS

LOAD ANALYSIS CHARTS

PART 4

LOAD ANALYSIS CHARTS

GENERAL

1. The load analysis for the DC system is shown in Figures 4-1A (1 to 7). The AC system is shown in Figures 4-1B (1 to 3). The tables shown list the power requirements for each piece of electrical and electronic equipment under various operating conditions. Figures 4-1C to 4-1F inclusive show AC loads, DC loads, and supplementary data, which includes graphical illustrations for generator, inverter and battery loads.

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING: F1 LOADING & ANCHOR AMPS	F1 AVERAGE AMPS 1/12 MIN.	F1 AVERAGE AMPS 5 MIN	F1 AVERAGE AMPS 15 MIN.	F2 START & WARMUP AMPS	F2 AVERAGE AMPS 1/12 MIN.	F2 AVERAGE AMPS 5 MIN.	F2 AVERAGE AMPS 15 MIN.	F3 TAXI AMPS	F3 AVERAGE AMPS 1/12 MIN.	F3 AVERAGE AMPS 5 MIN.	F3 AVERAGE AMPS 15 MIN.	F4 TAKE OFF & CLIMB AMPS	F4 AVERAGE AMPS 1/12 MIN.	F4 AVERAGE AMPS 5 MIN.	F4 AVERAGE AMPS 15 MIN.
1	C.— FLIGHT CONTROLS (REF: 41A-50360-B)																				
2	AILERON TRIM TAB. ACTUATOR	41A-90702-4	1	1.2	1					1.20	1.20	0.08						1.20	0.24	0.02	0.02
3	ELEVATOR TRIM TAB ACTUATOR	41A-90702-16	1	1.2	2					1.20	1.20	0.09						1.20	1.20	0.05	0.05
4	AILERON TRIM CONTROL RELAY	MS-24149-D1	1	0.35	CONT.					0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
5	ELEVATOR TRIM CONTROL RELAY	MS-24149-D1	1	0.35	CONT					0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
6	AILERON O/RIDE RELAY	LEACH 9220-4249	1	0.15	NEG.																
7	ELEVATOR O/RIDE RELAY	LEACH 9220-4249	1	0.15	NEG.																
8	RESISTOR	RW 22 V 140	1		3																
9	SPEED BRAKES SELECTOR VALVE	41A-75005	1	0.7	4					0.70	0.70	0.02									
10	ELEVATOR TRIM INDICATOR RELAY	RY4NA3B-3L01	1	0.06	NEG.																
11																					
12																					
13																					
14																					
15																					
16	D.— INSTRUMENTS (OTHER THAN FLIGHT OR ENG.)	(REF: 41A-50380-B & 41A-50383-NC)																			
17	WING FLAP IND SYSTEM	41A-50380	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
18	TRANSDUCER - COUNT. ACCEL. (3)(1)	AVIATION ELECT AE-320-2-A	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
19	INDICATOR - " " (2)(1)	AVIATION ELECT AE-322-3-B	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
20																					
21																					
22																					
23																					
24																					
25	F— FLIGHT INSTRUMENTS	(REF: 41A-50420-A, 41A-50422-A & 41A-50423-B)																			
26	TURN & BANK INDICATOR	TYPE B/C 6A/1299	2	1.20	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
27	RELAY (FOR COMPASS SYSTEM)	MS24149-D1	1	0.25	CONT	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
28	COMPASS AMPLIFIER	6B/1111	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
29	LIFT TRANDUCER HEATER	41A-50700-2	1	6.50	36													6.50	6.50	6.50	6.50
30	CONTROL SHAKER	41A-50700-6	1	2.00	37					2.00	0.80	0.01	—					2.00	0.80	0.01	—
31	SIGNAL SUMMING UNIT	41A-50700-4	1		NEG																
32	SERVOED ALTIMETER INDICATOR	81-22-20	1	0.5	39	—	—	—	—	0.5	0.5	—	—	—	—	—	—	0.5	0.5	0.5	0.5
33																					
34																					
35	SUB TOTAL (2)(1)					3.09	3.09	3.09	3.09	9.39	8.19	3.99	3.79	3.79	3.79	3.79	3.79	15.19	13.03	10.87	10.86
36	(3)					1.39	1.39	1.39	1.39	7.69	6.49	2.29	2.09	2.09	2.09	2.09	2.09	13.49	11.33	9.17	9.16

ZOF04001

Figure 4-1A-1 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	F5 CRUISE				F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN.		1/12 MIN.	5 MIN.	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN.	20 MIN
1																
2	1.20	0.48	0.02	0.02	1.20	0.96	0.04	0.04	1.20	0.24	0.02	0.02	1.20	0.02	0.02	0.02
3	1.20	0.98	0.04	0.04	1.20	1.20	0.05	0.05	1.20	0.20	0.05	0.05	1.20	0.04	0.04	0.04
4	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
5	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
6																
7																
8																
9	0.70	0.70	0.02	0.01	0.70	0.70	0.02	0.01	0.70	0.70	0.02	–	0.70	0.19	0.02	–
10																
1																
2																
3																
4																
5																
6																
7	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
8	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
9	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
20																
1																
2																
3																
4																
5																
6	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
7	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
8	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
9	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	1.95
30	2.00	0.80	0.01	—	2.00	0.80	0.01	—	2.00	0.80	0.03	0.01	2.00	0.03	1.03	—
1																
2	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
3																
4																
5	15.89	13.75	10.88	10.86	15.89	14.45	10.91	10.89	15.89	12.73	10.91	10.87	15.89	11.07	10.4	5.85
6	14.19	12.05	9.18	9.16	14.19	12.75	9.21	9.19	14.19	11.03	9.21	9.17	14.19	9.37	8.70	4.15

ZOF04002

Figure 4-1A-1 (Sheet 2 of 2) Load Analysis Chart – D.C. Systems

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING F — LOADING & ANCHOR F1 AMPS	LOADING & ANCHOR F1 AVERAGE AMPS 1/12 MIN.	LOADING & ANCHOR F1 AVERAGE AMPS 5 MIN.	LOADING & ANCHOR F1 AVERAGE AMPS 15 MIN.	START & WARMUP F2 AMPS	START & WARMUP F2 AVERAGE AMPS 1/12 MIN.	START & WARMUP F2 AVERAGE AMPS 5 MIN.	START & WARMUP F2 AVERAGE AMPS 15 MIN.	TAXI F3 AMPS	TAXI F3 AVERAGE AMPS 1/12 MIN	TAXI F3 AVERAGE AMPS 5 MIN.	TAXI F3 AVERAGE AMPS 15 MIN.	TAKE OFF & CLIMB F4 AMPS	TAKE OFF & CLIMB F4 AVERAGE AMPS 1/12 MIN.	TAKE OFF & CLIMB F4 AVERAGE AMPS 5 MIN.	TAKE OFF & CLIMB F4 AVERAGE AMPS 15 MIN.
37	G - LANDING GEAR	(REF: 41A-50440-B & 41A-50441-A)																			
8	LDG. GEAR UNSAFE LT.	MS-25237-327	1	0.04	NEG.																
9	L.G. SAFE GRD. OBSERVER LT.	GE 1939	1	1.79	5	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	0.60
40	LDG. GEAR WARNING SIGNAL	MIL-S-9320 (MA)	1	0.60	6					0.60	0.60	0.01	—								
1	LDG GEAR DOWNLOCK RELAY	9220-4249 (LEACH)	1	0.15	7	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
2	LDG GEAR UPLOCK RELAY	9220-4249 (LEACH)	1	0.15																	
3	LDG GEAR UPLOCK SAFETY RELAY	9228-4424 (LEACH)	1	0.17	8	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.06
4	U/C AUDIO WARN O/R RELAY	41A-42219	1	0.05	NEG.																
5	L.G. CONTROL UNIT - COIL	41A-50751	1	1.60	9	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	0.50
6	L.G. CONTROL UNIT - LAMPS.	MS-25237-328	2	0.20	NEG.																
7	NOSE GEAR STEERING S/O VALVE	41A-75004	1	1.25	10	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
8	MAIN L.G. DOOR SELECTOR VALVE	41A-75005	1	0.80	11	0.80	0.40	0.01	0.01	0.80	0.80	0.01	—					0.80	0.50	0.01	—
9	L.G. SELECTOR VALVE	41A-75005	1	0.80	12	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	0.50	0.01	—
50	L.G. POS IND INDICATOR	41A-00010-32	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
1	NO 1 GROUND SAFETY RELAY	MS-24568-D1	1	0.58	13	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.38
2	NO 2 GROUND SAFETY RELAY	9220-4249	1	0.15	14																
3																					
4																					
5																					
6	H. - HEAT. VENT & DE-ICING	(REF: 41A-50450-F)																			
7	SYSTEM SHUT-OFF VALVE	41A-95101-2	1	1.00	57	1.00	1.00	0.03	0.01	1.00	1.00	0.07	0.02								
8	CABIN SAFETY VALVE	41A-97101	1	0.60	15																
9	MODULATING VALVE	41A-95102-2	1	1.00	16	1.00	0.80	0.03	0.03	1.00	0.80	0.03	0.03	1.00	0.80	0.03	0.03	1.00	0.80	0.03	0.03
60	ENGINE ANTI-ICING VALVE	GENERAL ELECTRIC 37D401642P101	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	ZONE 2 COOL. HYD. FAN S/O VALVE	41A-00010-82	1	1.00	17					1.00	1.00	0.03	—					1.00	1.00	0.03	—
2	PITOT TUBE HEATER	AN-5816-2	1	6.60	53					6.60	6.60	1.32	0.44	6.60	6.60	1.32	0.44	6.60	6.60	6.60	6.60
3	CABIN AIR INLET OVERHEAT RELAY	VAP AIR 25830071	1	0.07	NEG.																
4	S/O VALVE CONTROL RELAY	MS24149-D1	1	0.25	CONT.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5	ZONE 2 COOLING IND. RELAY	RY4NA3B3L01	1	0.06	18	0.06	0.06	0.06	0.06	0.06	0.06	0.04	0.01	0.06	0.06	0.04	0.01	0.06	0.06	0.06	0.02
6	CABIN TEMP. SELECTOR	41A-95104	1	NEG.																	
7	CABIN INLET TEMP. SENSOR	41A-95106	1	NEG.																	
8	CONTROL UNIT.	41A-95105	1	NEG.																	
9	TIME DELAY RELAY	26ND15	2	NEG.																	
70																					
1																					
2	SUB TOTAL					10.36	9.76	7.63	7.61	18.56	18.36	9.01	8.0	15.16	14.96	8.89	7.98	16.96	16.16	13.44	10.1

ZOF04003

Figure 4-1A-2 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	F5 CRUISE				F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN.		1/12 MIN.	5 MIN.	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN.	20 MIN
37																
8																
9									1.79	1.79	1.79	0.72				
40									0.60	0.60	0.03	0.01	0.60	0.10	0.03	—
1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0 15	0.15
2																
3									0.17	0.17	0.17	0.07				
4																
5									1.50	1.50	1.50	0.60				
6																
7									1.25	1.25	1.25	0.50				
8									0.80	0.50	0.01	—	0.80	0.13	0.01	—
9									0.80	0.50	0.01	—	0.80	0.08	0.01	—
50	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
1									0.50	0.50	0.50	0.29	0.50	0.50	0.50	0 21
2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15								
3																
4																
5																
6																
7									1.00	1.00	0.08	0.03	1.00	0.33	0.08	—
8																
9	1.00	0.80	0.03	0.03	1.00	0.80	0.03	0.03	1.00	0.80	0.03	0.03				0.03
60	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									1.00	1.00	0.17	0.07				
2	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.60	1.98
3																
4	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.04	0.06	0.06	0.06	0.05
6																
7																
8																
9																
70																
1																
2	9.30	9.10	8.33	8.33	9.30	9.10	8.33	8.33	18.56	17.76	13.69	10.45	10.85	8.29	7.78	2.73

Z0F04004

Figure 4-1A-2 (Sheet 2 of 2) Load Analysis Chart – D.C. Systems

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING F: LOADING & ANCHOR F1 — AMPS	LOADING & ANCHOR F1 — AVERAGE AMPS 1/12 MIN.	LOADING & ANCHOR F1 — AVERAGE AMPS 5 MIN	LOADING & ANCHOR F1 — AVERAGE AMPS 15 MIN.	START & WARMUP F2 — AMPS	START & WARMUP F2 — AVERAGE AMPS 1/12 MIN.	START & WARMUP F2 — AVERAGE AMPS 5 MIN.	START & WARMUP F2 — AVERAGE AMPS 15 MIN.	TAXI F3 — AMPS	TAXI F3 — AVERAGE AMPS 1/12 MIN.	TAXI F3 — AVERAGE AMPS 5 MIN.	TAXI F3 — AVERAGE AMPS 15 MIN.	TAKE OFF & CLIMB F4 — AMPS	TAKE OFF & CLIMB F4 — AVERAGE AMPS 1/12 MIN.	TAKE OFF & CLIMB F4 — AVERAGE AMPS 5 MIN.	TAKE OFF & CLIMB F4 — AVERAGE AMPS 15 MIN.
73	H - HEAT. VENT & DE-ICING (CONT'D)	(REF: 41A-50451-A)																			
4	RAIN REMOVAL & DE-ICE VALVE	41A-95101-2	1	0.60	19													0.60	0.60	0.04	0.04
5																					
6	WINDSHIELD DEMIST VALVE	41A-81100	1	1.00	20					1.00	1.00	0.07	0.02	1.00	1.00	0.07	0.02				
7	WINDSHIELD DE-ICE ON LIGHT	MS25237-327	2	0.04	19									0.08	0.08	0.08	0.08	0.08	0.08	0.01	0.01
8	WINDSHIELD DE-ICE IND. RELAY	MS24250-6	2	0.06	19	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.12	0.12	0.12	0.12	0.06	0.06	0.01	0.01
9																					
80																					
1																					
2	J - IGNITION	(REF: 41A-50490-B)																			
3	IGNITION UNIT	GENERAL ELECT. 37D401588	1	4.00	21					4.00	4.00	0.08	0.03								
4																					
5																					
6																					
7																					
8	K - ENGINE STARTING (REF: 41A-50540-E)																				
9	ENGINE START CONT. RELAY	9225-7221	1	0.55	22					0.55	0.55	0.02	—								
90	BATTERY START IND. RELAY	P26B28H6A	1	0.05	58					0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1	BATTERY START IND. LOCK-ON RELAY	9225-4416	1	0.14	58					0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
2	BATTERY START IND. LIGHT	MS25237-327	2	0.04	58					0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
3	L - LIGHTING (REF: 41A-50510-D)																				
4	INST. PANEL SHROUD FLOOD LTS.	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
5	CENT. CONSOLE PANEL LTS	MS25237-327	20	0.04	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
6	C.B. EDGE-LIT PANELS	CHICAGO MIN. CMB-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
7	AILERON TRIM EDGE-LIT PANEL	CHICAGO MIN. CMB-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
8	ENG., PWR. & INT LTG EDGE-LIT PL.	CHICAGO MIN. CMB-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
9	INSTRUMENT PANEL LTS.	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
100	L.H. FACIA PANEL LTS.	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
1	COCKPIT UTILITY LIGHTS.	MS25231-313	2	0.17	NEG.																
2	STANDBY COMPASS LIGHT	MS25237-327	1	0.04	NEG.																
3	TAXI LIGHT.	MS24517-4570	1	5.36	23									5.36	5.36	5.36	5.36	5.36	5.36	2.15	0.72
4	LANDING LIGHT.	AN3129-4523	2	8.93	24																
5	RH FACIA PANEL LIGHTS	MS25237-327	2	0.04	NEG.																
6																					
7																					
8	SUB TOTAL					6.24	6.24	6.24	6.24	12.05	12.05	6.67	6.55	13.00	13.00	12.07	12.02	12.54	12.54	9.65	7.22

ZOF04005

Figure 4-1A-3 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	F5 CRUISE				F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN		1/12 MIN.	5 MIN.	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN	20 MIN
73																
4	0.60	0.60	0.04	0.04	0.60	0.60	0.04	0.04	0.60	0.60	0.10	0.04	0.60	0.40	0.10	0.04
5																
6	1.00	1.00	0.07	0.07	1.00	1.00	0.07	0.07	1.00	1.00	0.18	0.07	1.00	0.5	0.2	0.05
7	0.08	0.08	0.01	0.01	0.08	0.08	0.01	0.01	0.08	0.08	0.01	0.01	0.08	0.05	0.01	0.01
8	0.06	0.06	0.01	0.01	0.06	0.06	0.01	0.01	0.06	0.06	0.01	0.01	0.06	0.04	0.01	0.01
9																
80																
1																
2																
3					4.00	4.00	0.08	0.03					4.00	0.70	0.17	0.01
4																
5																
6																
7																
8																
9																
90	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1	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
2	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
3																
4	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	170	1.70	1.70	1.70
5	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
6	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
7	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
8	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
9	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
100	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
1																
2																
3									5.36	5.36	5.36	2.15				
4									17.86	17.86	17.86	10.70	17.86	17.86	10.6	2.68
5																
6																
7																
8	8.18	8.18	6.57	6.57	12.18	12.18	6.65	6.60	31.40	31.40	29.96	19.42	30.04	25.99	17.43	9.24

ZOF04006

Figure 4-1A-3 (Sheet 2 of 2) Load Analysis Chart – D.C. Systems

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING F — LOADING & ANCHOR F1 — AMPS	LOADING & ANCHOR F1 — AVERAGE AMPS 1/12 MIN.	LOADING & ANCHOR F1 — AVERAGE AMPS 5 MIN	LOADING & ANCHOR F1 — AVERAGE AMPS 15 MIN.	START & WARMUP F2 — AMPS	START & WARMUP F2 — AVERAGE AMPS 1/12 MIN.	START & WARMUP F2 — AVERAGE AMPS 5 MIN.	START & WARMUP F2 — AVERAGE AMPS 15 MIN.	TAXI F3 — AMPS	TAXI F3 — AVERAGE AMPS 1/12 MIN	TAXI F3 — AVERAGE AMPS 5 MIN	TAXI F3 — AVERAGE AMPS 15 MIN	TAKE OFF & CLIMB F4 — AMPS	TAKE OFF & CLIMB F4 — AVERAGE AMPS 1/12 MIN.	TAKE OFF & CLIMB F4 — AVERAGE AMPS 5 MIN.	TAKE OFF & CLIMB F4 — AVERAGE AMPS 15 MIN.
109	L.— LIGHTING (CON'T)	(REF: 41A-50510-D)																			
110	LANDING LIGHT RELAY	MS24166-D1	2	0.35	23																
1	WING NAVIGATION LIGHT	MS25309-7512	2	0.93	CONT					1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
2	TAIL NAVIGATION LIGHT	MS35478-1683	1	1.02	CONT					1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
3	NAV. LT. FLASHER	MIL-F-7414	1	0.16	NEG																
4	ANTI-COLLISION LT.	GRIMES GB400A-B-24	2	3.10	26					6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
5	LET-DOWN CHART HOLDER LIGHT	MS25069-1495	1	0.34	NEG.																
6																					
7																					
8																					
9																					
120	M.- MISCELLANEOUS	(REF: 41A-50520-B)																			
1	CANOPY OPEN CONTROL RELAY	MS24166-D1	1	0.35	27	0.35	0.35	0.01	—												
2	CANOPY CLOSE CONTROL RELAY	MS24166-D1	1	0.35	28	0.35	0.35	0.01	—	0.35	0.35	0.01	—								
3	CANOPY ACTUATOR	41A 92010	1	8.00	29	8.00	8.00	0.43	0.14	8.00	8.00	0.21	0.07								
4	CANOPY SEAL PRESS. REG	CARMA 111828-CL41A	1	0.35	30	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
5	SEAT ACTUATOR	W808928	2	3.5	NEG																
6																					
7																					
8																					
9	P-DC. POWER & DISTRIBUTION	(REF: 41A-50540-E)																			
130	GEN. REV. CURRENT CUT-OUT & START CONT	AN3025-600	1	0.60	CONT					0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
1	GROUND POWER RELAY	MS24185-D1	1	0.60	31	0.60	0.60	0.60	0.60	0.60	0.60	0.12	0.04								
2	BATT STARTING RELAY NO 2.	MS24185-D1	1	0.60	32					0.60	0.60	0.04	—								
3	BATTERY RELAY	MS24171-D1	2	0.60	33					1.20	1.20	1.20	1.14	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
4	NON ESS. BUS TIE-IN RELAY	MS24171-D1	1	0.60	34	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.57	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
5	GENERATOR FAIL IND. RELAY	9224-3951	1	0.35	CONT					0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
6	START. GEN. RESET CONT. RELAY	9225-4416	1	0.17	CONT					0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
7	BATTERY STARTING RELAY NO 1	MS24179-D1	1	5.50	OFF																
8																					
9	BATTERY CHARGING	MS 24497-1	2		36						136.4	80.52	48.4		48.4	33.0	26.4		26.4	22	13.2
140	LOADMETER	MS 25025-1	1	NEG.																	
1	POWER PROTECTION RELAY	9220-4249	1	0.15	NEG.																
2																					
3																					
4	SUB TOTAL					10.25	10.25	1.66	1.34	21.90	156.5	93.25	60.77	12.35	60.75	45.35	38.75	12.35	38.75	34.35	25.55

ZOF04007

Figure 4-1A-4 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	"B" CRUISE				"C" ROUGH CRUISE				"D" LANDING				"E" EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN.		1/12 MIN	5 MIN	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN.	20 MIN
109																
110									0.70	0.70	0.70	0.42	0.70	0.70	0.42	0.10
1	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
2	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
3																
4	6.20	6.20	6.20	1.03	6.20	6.20	6.20	1.03	6.20	6.20	6.20	6.20				
5																
6																
7																
8																
9																
120																
1									0.35	0.35	0.02	0.01				
2									0.35	0.35	0.02	0.01				
3									8.00	8.00	1.07	0.43				
4	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.33	0.35	0.35	0.35	0.35
5																
6																
7																
8																
9																
130	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60				
1																
2																
3	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
4	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60				
5	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35				
6	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17				
7																
8																
9		13.2	11.0	6.6		6.6	6.6	6.6		6.6	6.6	6.6				
140																
1																
2																
3																
4	12.35	25.55	23.35	18.95	12.35	18.95	18.95	18.95	21.75	28.35	20.76	19.8	5.13	5.13	4.85	4.53

ZOF04008

Figure 4-1A-4 (Sheet 2 of 2) Load Analysis Chart – D.C. Systems

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING F — LOADING & ANCHOR F1				START & WARMUP F2				TAXI F3				TAKE OFF & CLIMB F4			
						AMPS	AVERAGE AMPS 1/12 MIN	5 MIN	15 MIN	AMPS	AVERAGE AMPS 1/12 MIN	5 MIN	15 MIN	AMPS	AVERAGE AMPS 1/12 MIN	5 MIN	15 MIN	AMPS	AVERAGE AMPS 1/12 MIN.	5 MIN	15 MIN.
145																					
6																					
7																					
8																					
9	Q- ENGINE CONTROL	(REF: 41A50490-B)																			
150	FUEL BOOSTER PUMP	41A-65053	1	13.00	CONT.					13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
1	FUEL SHUT-OFF VALVE	41A-65054	1	2.00	38					2.00	2.00	0.03	0.01								
2	FUEL BOOSTER PUMP RELAY	MS24166-D1	1	0.35	CONT					0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
3																					
4																					
5																					
6																					
7																					
8	R- RADIO	(REF: 41A-70140-B, 41A-70160-B																			
9	UHF (MAIN)	AN/ARC 552	1	5.54	CONT.	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
160	COAXIAL RELAY	28-73008	1	0.20	39																
1	UHF MAIN-EMERG RELAY	9226-3887	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
2	UHF NORM-EMERG REYAY	9226-3887	4	0.18	40																
3	VOR.ILS/TACAN SELECT SWITCH	LEDEX 172934-001	1	3.5	60	—	—	—	—	3.5	0.7	0.01	NEG	—	—	—	—	—	—	—	—
4	INTERCOM.	AIC-502	2	1.25	CONT	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
5	TACAN	AN/ARN-50A	1	0.12	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
6	TACAN COURSE SEL. RELAY	9226-3887	1	0.18	NEG																
7	VOR/LOC RECEIVER	COLLINS VIR-31A	1	0.8	CONT	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
8	ADF SYSTEM 4	Collins ADF-20A	1	0.53	CONT	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
9																					
170																					
1																					
2	S.- RADAR																				
3																					
4	IFF/SIF	RT862/APX-77	1	1.8						1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
5	IFF/SIF TEST SET	TS-1834B/APX	1	0.3						0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
6	IFF/SIF SYSTEM RELAY	MS757/1-021	1	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
7																					
8																					
9	SUB TOTAL					9.14	9.14	9.14	9.14	30.21	27.41	25.75	24.72	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71
180	4					9.67	9.67	9.67	9.67	30.74	27.94	25.28	25.25	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24

ZOF04009

Figure 4-1A-5 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	F5 CRUISE				F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN		1/12 MIN	5 MIN.	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN	20 MIN
145																
6																
7																
8																
9																
150	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00				
1									2.00	2.00	0.08	0.03				
2	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35				
3																
4																
5																
6																
7																
8																
9	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54				
160																
1	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18				
2													0.18	0.18	0.18	0.18
3	3.5	0.7	0.01	0.01	3.5	0.7	0.01	0.01	3.5	0.7	0.03	0.01	3.5	0.12	0.03	0.01
4	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
5	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	0.03
6																
7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
8	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
9																
170																
1																
2																
3																
4	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
6	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
7																
8																
9	28.21	25.41	24.72	24.72	28.21	25.41	24.72	24.72	30.21	27.41	24.82	24.74	9.32	5.94	5.85	5.74
180	28.74	25.94	25.25	25.25	28.74	25.94	25.25	25.25	30.74	27.94	25.35	25.27	9.85	6.47	6.38	6.27

ZOF04010

Load Analysis Chart – D.C. Systems (Sheet 2 of 2) Figure 4-1A-5

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C No. OF UNITS	D AMPS PER UNIT	E OPERATING TIME MINS	OPERATING F1 LOADING & ANCHOR AMPS	F1 AVERAGE AMPS 1/12 MIN	F1 AVERAGE AMPS 5 MIN	F1 AVERAGE AMPS 15 MIN	F2 START & WARMUP AMPS	F2 AVERAGE AMPS 1/12 MIN	F2 AVERAGE AMPS 5 MIN	F2 AVERAGE AMPS 15 MIN	F3 TAXI AMPS	F3 AVERAGE AMPS 1/12 MIN	F3 AVERAGE AMPS 5 MIN	F3 AVERAGE AMPS 15 MIN	F4 TAKE OFF & CLIMB AMPS	F4 AVERAGE AMPS 1/12 MIN.	F4 AVERAGE AMPS 5 MIN	F4 AVERAGE AMPS 15 MIN
181	X EV. - AC POWER	(REF: 41A-50590-E)																			
2	INVERTER POWER RELAY	MS24171D1	2	0.60	CONT.	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
3	NO. 2 INV. 3φ/1φ CHANGEOVER RELAY	MS2456BD1	1	0.50	CONT	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
4	INVERTER TRANSFER DELAY RLY	AMPERITE 26C10	2	0.48	47																
5	INVERTER TRANSFER RELAY.	MS2456BD1	2	0.50	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
6	NO. 1 INVERTER	32B180-1B	1	48	CONT	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38
7	NO. 2 INVERTER	MS25095-1	1	48	CONT	37.99	37.99	32.45	30.30	37.99	37.99	31.67	31.67	37.99	37.99	33.81	33.81	37.99	37.99	33.81	33.81
8																					
9																					
190																					
1																					
2																					
3																					
4	W. - WARNING.	(REF: 41A-50580-B 41A-50581-B 41A-50582-B)																			
5	ANNUNCIATOR PANEL	41A-50704-70	16	0.13	49	2.19	2.19	0.66	0.57	0.56	0.56	0.06	0.02								
6	MASTER CAUTION & WARNING LTS.	MS25237-327	8	0.04	50	0.32	0.32	—	—												
7																					
8	ICE DETECTOR	575-7 (COOK ELECT)	1	7.90	52	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	7.90	7.90	3.82	3.82
9	ICE DETECTION RELAY	MS 24149-01	1	0.25	53													0.25	0.25	0.10	0.10
200																					
1	FIRE & O/H DETECTION (5)	337-20-2 (EDISON)	1	0.20	51	0.20	0.20	—	—												
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
210																					
1																					
2																					
3																					
4																					
5																					
6	SUB TOTAL					92.89	92.89	85.24	83.06	90.74	90.74	83.92	83.88	90.18	90.18	86.0	86.0	97.22	97.22	88.81	88.81

ZOF04011

Figure 4-1A-6 (Sheet 1 of 2) Load Analysis Chart – D.C. Systems

CONDITIONS

ITEM No.	F5 CRUISE				F6 ROUGH CRUISE				F7 LANDING				F8 EMERGENCY			
	AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS			AMPS	AVERAGE AMPS		
		1/12 MIN	5 MIN.	30 MIN		1/12 MIN	5 MIN	30 MIN.		1/12 MIN.	2 MIN.	5 MIN.		2 MIN.	5 MIN	20 MIN
181																
2	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.60	0.60	0.60	0.60
3	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
4																
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50
6	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	48.38	74.35	74.35	74.35	54.41
7	37.99	37.99	32.45	32.45	37.99	37.99	33.81	33.81	37.99	37.99	35.81	33.81				
8																
9																
190																
1																
2																
3																
4																
5																
6																
7																
8	7.90	7.90	3.82	3.82	7.90	7.90	3.82	3.82	7.90	7.90	3.82	3.82	7.90	3.82	3.82	3.82
9	0.25	0.25	0.10	0.10	0.25	0.25	0.10	0.10	0.25	0.25	0.10	0.10	0.25	0.25	0.10	0.10
200																
1																
2																
3																
4																
5																
6																
7																
8																
9																
210																
1																
2																
3																
4																
5																
6	97.22	97.22	87.45	87.45	97.22	97.22	88.81	88.81	97.22	97.22	88.81	88.81	84.1	79.87	79.87	59.93

ZOF04012

Figure 4-1A-6 (Sheet 2 of 2) Load Analysis Chart – D.C. Systems

OPERATING

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DWG. NO.	C - No. OF UNITS	AMPS PER UNIT D	OPERATING TIME MINS E	LOADING & ANCHOR F1				START & WARMUP F2				TAXI F3 C				TAKE OFF & CLIMB F4			
						AMPS	AVERAGE AMPS 1/12 MIN.	5 MIN.	15 MIN.	AMPS	AVERAGE AMPS 1/12 MIN.	5 MIN.	15 MIN.	AMPS	AVERAGE AMPS 1/12 MIN.	5 MIN.	15 MIN.	AMPS	AVERAGE AMPS 1/12 MIN.	5 MIN.	15 MIN.
217	SUMMARY																				
8																					
9	SUB TOTAL, SHEET 1 (1)(2)					3.09	3.09	3.09	3.09	9.39	8.19	3.99	3.79	3.79	3.79	3.79	3.79	15.19	13.03	10.87	10.86
220	" " " 1 (3)					1.39	1.39	1.39	1.39	7.69	6.49	2.29	2.09	2.09	2.09	2.09	2.09	13.49	11.33	9.17	9.16
1																					
2																					
3	SUB TOTAL, SHEET 2					10.36	9.76	7.63	7.61	18.56	18.36	9.01	8.0	15.16	14.96	8.89	7.98	16.96	16.16	13.44	10.1
4																					
5																					
6																					
7	SUB TOTAL, SHEET 3					6.24	6.24	6.24	6.24	12.05	12.05	6.67	6.55	13.00	13.00	12.07	12.02	12.54	12.54	9.65	7.22
8																					
9																					
230																					
1	SUB TOTAL, SHEET 4					10.25	10.25	1.66	1.34	21.98	156.5	93.25	60.77	12.35	60.75	45.35	38.75	12.35	38.75	34.35	25.55
2																					
3																					
4																					
5	SUB TOTAL, SHEET 5					9.14	9.14	9.14	9.14	30.21	27.41	24.75	24.72	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71
6	(4)					9.67	9.67	9.67	9.67	30.74	27.94	25.28	25.25	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24
7																					
8																					
9	SUB TOTAL, SHEET 6					92.89	92.89	85.24	83.06	90.74	90.74	83.92	83.88	90.18	90.18	86.0	86.0	97.22	97.22	88.81	88.81
241																					
1																					
2																					
3																					
4																					
5	GRAND TOTAL (1)(2)					131.97	131.37	113.0	110.48	182.85	313.25	221.59	187.71	159.19	207.39	180.81	173.25	178.97	202.41	181.83	167.25
6	" " (3)					130.27	129.67	111.3	108.78	181.15	311.55	219.89	186.01	157.49	205.69	197.11	171.55	177.27	200.71	180.13	165.55
7	(4)					132.5	131.9	113.53	111.01	183.38	313.78	222.12	188.24	159.72	207.92	181.34	173.78	179.5	202.94	182.36	167.78
8	(4)					130.8	130.2	111.56	109.31	181.68	312.08	220.42	186.54	158.02	206.22	197.64	172.08	177.8	201.24	180.66	166.08
9																					
258																					
1																					
2																					

ZOF04013

Figure 4-1A-7 (Sheet 1 of 2) Load Analysis Chart – Data Summary – D.C. Loading

CONDITIONS

ITEM No.	CRUISE (F8) AMPS	CRUISE (F8) AVERAGE AMPS 1/12 MIN	CRUISE (F8) AVERAGE AMPS 5 MIN.	CRUISE (F8) AVERAGE AMPS 30 MIN.	ROUGH–CRUISE (F6) AMPS	ROUGH–CRUISE (F6) AVERAGE AMPS 1/12 MIN	ROUGH–CRUISE (F6) AVERAGE AMPS 5 MIN.	ROUGH–CRUISE (F6) AVERAGE AMPS 30 MIN.	LANDING (F7) AMPS	LANDING (F7) AVERAGE AMPS 1/12 MIN.	LANDING (F7) AVERAGE AMPS 2 MIN.	LANDING (F7) AVERAGE AMPS 5 MIN.	EMERGENCY (F8) AMPS	EMERGENCY (F8) AVERAGE AMPS 2 MIN.	EMERGENCY (F8) AVERAGE AMPS 5 MIN	EMERGENCY (F8) AVERAGE AMPS 20 MIN
217																
8																
9	15·89	13·75	10·88	10·86	15·89	14·45	10·91	10·89	15·89	12·73	10·91	10·87	15·89	11·07	10·4	5·85
220	14·19	12·05	9·18	9·16	14·19	12·75	9·21	9·19	14·19	11·83	9·21	9·17	14·19	9·37	8·7	4·15
1																
2																
3	9.30	9.18	8.33	8.33	9.30	9.18	8.33	8.33	18·56	17.76	13.69	10.45	10.85	8.29	7·78	2·73
4																
5																
6																
7	8·18	8·18	6.57	6.57	12·18	12·18	6.65	6.60	31.40	31.40	29.96	19.42	30·04	25·99	17·43	9·24
8																
9																
230																
1	12.35	25·55	23·35	18·95	12.35	18·95	18·95	18·95	21.75	28·35	20·76	19·8	5·13	5.13	4.85	4·53
2																
3																
4																
5	28.21	25.41	24.72	24.72	28.21	25.41	24.72	24.72	30.21	27.41	24.82	24.74	9.32	5.94	5.85	5.74
6	28.74	25.94	25.25	25.25	28.74	25.94	25.25	25.25	30.74	27.94	25.35	25.27	9.85	6.47	6.38	6.27
7																
8																
9	97.22	97.22	87.45	87.45	97.22	97.22	88.81	88.81	97.22	97.22	88.81	88.81	84.1	79.87	79.87	59.93
240																
1																
2																
3																
4																
5	171·15	179·21	161·3	156·88	175·15	177·31	158·37	158·3	215·03	214·87	188·95	174·09	155·33	136·29	126·18	88·02
6	169·45	177·51	159·6	155·18	173·45	175·61	156·67	156·6	213·33	213·17	187·25	172·39	153·63	134·59	124·48	86·72
7	171.68	179.74	161.83	157.41	175.68	177.84	158.90	158.83	215.56	215.4	189.48	174.62	155.86	136.82	126.71	88.55
8	169.98	178.04	160.13	155.71	173.98	176.14	157.2	157.13	213.86	213.7	187.78	172.92	154.16	135.12	125.01	87.25
9																
250																
2																

ZOF04014

Load Analysis Chart – Data Summary – D.C. Loading (Sheet 2 of 2) Figure 4-1A-7

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DRAWING No.	C TOTAL No. OF UNITS	D OPERATING TIME IN MIN	E ELECTRICAL REQUIREMENTS PER UNIT												F PF	G VOLT REG	H FREQ RANGE	I CONNECTED LOAD	
					200V 3 PHASE										115 V 1 PHASE						
					E1 TOTAL VA	E2 WATTS				E3 VARS					E4 VA	E5 WATTS	E6 VARS			I1 WATTS	I2 VARS
						Ø1	Ø2	Ø3	TOTAL	Ø1	Ø2	Ø3	TOTAL								
253	Nº 1 INVERTER (NORMAL OPERATION)	REF 41A-50590																			
4	FUEL QUANTITY IND	41A-50706	1	30											10·0	6·0	8·0	0·60			6·0	8·0
5	TACAN	AN/ARN-504	1	43											39.1	35.1·9	17.0·3	0·90				
6	Nº 1 PHASE ADAPTER	661102-B (SPERRY)	1	44											63·6	55·3	31·3	0·87				
7	TRANSFORMER (115/26 V)	41A-50780	1	44											200·8	167·5	110·7	0·83				
8	STALL WARNING	41A-50700-2	1	30											11·5	10·4	5·1	0·90			10·4	5·1
9	Nº 2 INV. TRANSF. CONT. RELAY	LEACH 9330-4027	1	30											6·9	6·9	—	1·00			6·9	—
260	DC POWER SUPPLY- UHF EMERGENCY	28VS3C-2	1	41											93	84	40	0·90			84	40
1	SERVOED ALTIMETER COMPUTER IND	31236-10T-C11	1												11·5	10·4	5·1	0·90			10·4	5·1
2	SERVOED ALTIMETER INDICATOR	81-22-20	1												17·3	15·6	7·5	0·90			15·6	7·5
3																						
4																						
5																						
6	TOTAL Nº 1 INVERTER (WATTS & VARS)	32B180-1B																				
7	TOTAL Nº 1 INVERTER (VA)	32B180-1B																				
8																						
9																						
270	Nº 2 INVERTER (NORMAL OPERATION)																					
1	RATE SWITCHING GYRO	MIL-G-25591-A (MC-1)	1	30											10·0	9·0	4·4	0·90			9·0	4·4
2	LH ATTITUDE IND	ARU-13/A	1	30											20·0	18·0	8·7	0·90			18·0	8·7
3	UHF (RECEIVE)	AN/ARC-552	1	30	278	83·3	83·3	83·3	250·0	40·6	40·6	40·6	121·8					0·90			250·0	121·8
4	UHF (TRANSMIT)	AN/ARC-552	1	45	167·0	50·0	50·0	50·0	150·0	24·4	24·4	24·4	73·2					0·90			150·0	73·2
5	Nº 2 PHASE ADAPTER	661102-B (SPERRY)	1	44											57·7	52·0	25·2	0·90			52·0	25·2
6	Nº 1 INV. TRANSFER CONTROL RELAY	9330-4027 (LEACH)	1	30											6·9	6·9	—	1·0			6·9	—
7																						
8																						
9																						
280	TOTAL Nº 2 INVERTER (WATTS & VARS)	MS25095-1																				
1	TOTAL Nº 2 INVERTER (VA)	MS25095-1																				
2																						
3																						
4																						
5																						
6																						
7																						
8																						

ZOF04015

Figure 4-1B-1 (Sheet 1 of 3) Load Analysis Chart – A.C. Systems

J ITEM No.	K OPERATING																													
	K1 LOADING OR ANCHOR								K2 START AND WARMUP								K3 TAXI								K4 TAKEOFF AND CLIMB							
	WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS		
		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN		1/12 MIN	5 MIN	15 MIN
253																														
4	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0
5	351.9	351.9	351.9	351.9	170.3	170.3	170.3	170.3	351.9	351.9	351.9	351.9	170.3	170.3	170.3	170.3	351.9	351.9	351.9	351.9	170.3	170.3	170.3	170.3	351.9	351.9	351.9	351.9	170.3	170.3	170.3	170.3
6	55.3	55.3	55.3	55.3	31.3	31.3	31.3	31.3	55.3	55.3	55.3	55.3	31.3	31.3	31.3	31.3	55.3	55.3	55.3	55.3	31.3	31.3	31.3	31.3	55.3	55.3	55.3	55.3	31.3	31.3	31.3	31.3
7	167.5	167.5	167.5	167.5	110.7	110.7	110.7	110.7	167.5	167.5	167.5	167.5	110.7	110.7	110.7	110.7	167.5	167.5	167.5	167.5	110.7	110.7	110.7	110.7	167.5	167.5	167.5	167.5	110.7	110.7	110.7	110.7
8	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1
9	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—
260	48.0	48.0	48.0	48.0	22.0	22.0	22.0	22.0	48.0	48.0	48.0	48.0	22.0	22.0	22.0	22.0	48.0	48.0	48.0	48.0	22.0	22.0	22.0	22.0	48.0	48.0	48.0	48.0	22.0	22.0	22.0	22.0
1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1	10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1
2	15.6	15.6	15.6	15.6	7.5	7.5	7.5	7.5	15.6	15.6	15.6	15.6	7.5	7.5	7.5	7.5	15.6	15.6	15.6	15.6	7.5	7.5	7.5	7.5	15.6	15.6	15.6	15.6	7.5	7.5	7.5	7.5
3																														
4																														
5																														
6	672	672	672	672	360	360	360	360	672	672	672	672	360	360	360	360	672	672	672	672	360	360	360	360	672	672	672	672	360	360	360	360
7	762.4	762.4	762.4	762.4					762.4	762.4	762.4	762.4					762.4	762.4	762.4	762.4					762.4	762.4	762.4	762.4				
8																														
9																														
270																														
1	9.0	9.0	9.0	9.0	4.4	4.4	4.4	4.4	9.0	9.0	9.0	9.0	4.4	4.4	4.4	4.4	9.0	9.0	9.0	9.0	4.4	4.4	4.4	4.4	9.0	9.0	9.0	9.0	4.4	4.4	4.4	4.4
2	18.0	18.0	18.0	18.0	8.7	8.7	8.7	8.7	18.0	18.0	18.0	18.0	8.7	8.7	8.7	8.7	18.0	18.0	18.0	18.0	8.7	8.7	8.7	8.7	18.0	18.0	18.0	18.0	8.7	8.7	8.7	8.7
3	250.0	250.0	250.0	250.0	121.8	121.8	121.8	121.8	250.0	250.0	250.0	250.0	121.8	121.8	121.8	121.8	250.0	250.0	250.0	250.0	121.8	121.8	121.8	121.8	250.0	250.0	250.0	250.0	121.8	121.8	121.8	121.8
4	150.0	150.0	30.0	10.0	73.2	73.2	14.6	4.9	150.0	150.0	12.5	12.5	73.2	73.2	6.1	6.1	150.0	150.0	50.0	50.0	73.2	73.2	24.5	24.5	150.0	150.0	50.0	50.0	73.2	73.2	24.5	24.5
5	52.0	52.0	52.0	52.0	25.2	25.2	25.2	25.2	52.0	52.0	52.0	52.0	25.2	25.2	25.2	25.2	52.0	52.0	52.0	52.0	25.2	25.2	25.2	25.2	52.0	52.0	52.0	52.0	25.2	25.2	25.2	25.2
6	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—	6.9	6.9	6.9	6.9	—	—	—	—
7																														
8																														
9																														
280	485.9	485.9	365.9	345.9	233.3	233.3	174.7	165.0	485.9	485.9	348.4	348.4	233.3	233.3	166.2	166.2	485.9	485.9	385.9	385.9	233.3	233.3	184.6	184.6	485.9	485.9	385.9	385.9	233.3	233.3	184.6	184.6
1	539	539	405.5	383.2					539	539	386	386					539	539	427.8	427.8					539	539	427.8	427.8				
2																														
3																														
4																														
5																														
6																														
7																														
8																														

ZOF04016

Figure 4-1B-1 (Sheet 2 of 3) Load Analysis Chart – A.C. Systems

CONDITIONS

ITEM No	K5 CRUISE								K6 ROUGH CRUISE								K7 LANDING								K8 EMERGENCY							
	WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS		
		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	2 MIN	5 MIN		1/12 MIN	2 MIN	5 MIN		2 MIN	5 MIN	20 MIN		2 MIN	5 MIN	20 MIN
253																																
4	6·0	6·0	6·0	6·0	8·0	8·0	8·0	8·0	6·0	6·0	6·0	6·0	8·0	8·0	8·0	8·0	6·0	6·0	6·0	6·0	8·0	8·0	8·0	8·0	6·0	6·0	6·0	6·0	8·0	8·0	8·0	8·0
5	351·9	351·9	351·9	351·9	170·3	170·3	170·3	170·3	351·9	351·9	351·9	351·9	170·3	170·3	170·3	170·3	351·9	351·9	351·9	351·9	170·3	170·3	170·3	170·3	351·9	351·9	351·9	105·6	170·3	170·3	170·3	51·1
6	55·3	55·3	55·3	55·3	31·3	31·3	31·3	31·3	55·3	55·3	55·3	55·3	31·3	31·3	31·3	31·3	55·3	55·3	55·3	55·3	31·3	31·3	31·3	31·3	55·3	55·3	55·3	55·3	31·3	31·3	31·3	31·3
7	167·5	167·5	167·5	167·5	110·7	110·7	110·7	110·7	167·5	167·5	167·5	167·5	110·7	110·7	110·7	110·7	167·5	167·5	167·5	167·5	110·7	110·7	110·7	110·7	167·5	167·5	167·5	167·5	110·7	110·7	110·7	110·7
8	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1
9	6·9	6·9	6·9	6·9	–	–	–	–	6·9	6·9	6·9	6·9	–	–	–	–	6·9	6·9	6·9	6·9	–	–	–	–	6·9	6·9	6·9	6·9	–	–	–	–
260	48·0	48·0	48·0	48·0	22·0	22·0	22·0	22·0	48·0	48·0	48·0	48·0	22·0	22·0	22·0	22·0	48·0	48·0	48·0	48·0	22·0	22·0	22·0	22·0	84·0	84·0	84·0	84·0	40·0	40·0	40·0	40·0
1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1	10·4	10·4	10·4	10·4	5·1	5·1	5·1	5·1
2	15·6	15·6	15·6	15·6	7·5	7·5	7·5	7·5	15·6	15·6	15·6	15·6	7·5	7·5	7·5	7·5	15·6	15·6	15·6	15·6	7·5	7·5	7·5	7·5	15·6	15·6	15·6	15·6	7·5	7·5	7·5	7·5
3																																
4																																
5																																
6	672	672	672	672	360	360	360	360	672	672	672	672	360	360	360	360	672	672	672	672	360	360	360	360	787	787	787	540·7	416·3	416·3	416·3	297·1
7	762·4	762·4	762·4	762·4					762·4	762·4	762·4	762·4					762·4	762·4	762·4	762·4					890	890	890	617				
8																																
9																																
270																																
1	9·0	9·0	9·0	9·0	4·4	4·4	4·4	4·4	9·0	9·0	9·0	9·0	4·4	4·4	4·4	4·4	9·0	9·0	9·0	9·0	4·4	4·4	4·4	4·4	9·0	9·0	9·0	9·0	4·4	4·4	4·4	4·4
2	18·0	18·0	18·0	18·0	8·7	8·7	8·7	8·7	18·0	18·0	18·0	18·0	8·7	8·7	8·7	8·7	18·0	18·0	18·0	18·0	8·7	8·7	8·7	8·7	18·0	18·0	18·0	18·0	8·7	8·7	8·7	8·7
3	250·0	250·0	250·0	250·0	121·8	121·8	121·8	121·8	250·0	250·0	250·0	250·0	121·8	121·8	121·8	121·8	250·0	250·0	250·0	250·0	121·8	121·8	121·8	121·8	–	–	–	–	–	–	–	–
4	150·0	150·0	30·0	30·0	73·2	73·2	14·6	14·6	150·0	150·0	50·0	50·0	73·2	73·2	24·5	24·5	150·0	150·0	50·0	50·0	73·2	73·2	24·5	24·5	–	–	–	–	–	–	–	–
5	52·0	52·0	52·0	52·0	25·2	25·2	25·2	25·2	52·0	52·0	52·0	52·0	25·2	25·2	25·2	25·2	52·0	52·0	52·0	52·0	25·2	25·2	25·2	25·2	52·0	52·0	52·0	52·0	25·2	25·2	25·2	25·2
6	6·9	6·9	6·9	6·9	–	–	–	–	6·9	6·9	6·9	6·9	–	–	–	–	6·9	6·9	6·9	6·9	–	–	–	–	–	–	–	–	–	–	–	–
7																																
8																																
9																																
280	485·9	485·9	365·9	365·9	233·3	233·3	174·7	174·7	485·9	485·9	385·9	385·9	233·3	233·3	184·6	184·6	485·9	485·9	385·9	385·9	233·3	233·3	184·6	184·6								
1	539	539	405·5	405·5					539	539	427·8	427·8					539	539	427·8	427·8												
2																																
3																																
4																																
5																																
6																																
7																																
8																																

ZOF04017

Figure 4-1B-1 (Sheet 3 of 3) Load Analysis Chart – A.C. Systems

ITEM No.	A EQUIPMENT	B PART DESIGNATION OR DRAWING No.	C TOTAL No. OF UNITS	D OPERATING TIME IN MIN	E ELECTRICAL REQUIREMENTS PER UNIT												F PF	G VOLT REG	H FREQ RANGE	I CONNECTED LOAD	
					200V 3 PHASE										115 V 1 PHASE						
					E1 TOTAL VA	E2 WATTS Ø1	Ø2	Ø3	TOTAL	E3 VARS Ø1	Ø2	Ø3	TOTAL		E4 VA	E5 WATTS	E6 VARS				I1 WATTS	I2 VARS
253A	ONE INVERTER OUT			81																	
4A	DC POWER SUPPLY - UHF EMERGENCY	28VS3C-2	1	41											93·0	84·0	40·0	0·90			84·0	40·0
5A	FUEL QUANTITY INDICATOR	41A-50706		30											10·0	6·0	8·0	0·6			6·0	8·0
6A	TACAN	AN/ARN-504	1	43											391	351·9	170·3	0·90			351·9	170·3
7A	STALL WARNING	41A-50700-2	1	30											11·5	10·4	5·1	0·90			10·4	5·1
8A	RATE SWITCHING GYRO	MIL-G-25591-A(MC-1)	1	30											10·0	9·0	4·4	0·90			9·0	4·4
9A	L.H. ATTITUDE INDICATOR	ARU-13/A	1	30											20·0	18·0	8·7	0·90			18·0	8·7
260A	INV. TRANSFER CONTROL RELAY	9330-4027(LEACH)	1	30											6·9	6·9	-	1·0			6·9	-
1A	Nº1 PHASE ADAPTER (LOAD)	661102-B (SPERRY)	1	44											63·6	55·3	31·3	0·87			55·3	31·3
2A	Nº2 PHASE ADAPTER (LOAD)	661102-B (SPERRY)	1	44											57·7	52·0	25·2	0·90			52·0	25·2
3A	TRANSFORMER LOAD (115/26V)	41A-50780	1	44											200·8	167·5	110·7	0·83			167·5	110·7
4A	SERVOED ALTIMETER COMPUTER IND	31236-10T-C11	1												11·5	10·4	5·1	0·90			10·4	5·1
5A	SERVOED ALTIMETER INDICATOR	81-22-20	1												17·3	15·6	7·5	0·90			15·6	7·5
6A																						
7A	TOTAL - ONE INVERTER OUT (WATTS & VARS)																					
8A	TOTAL - ONE INVERTER OUT (VA)																					
9A																						
270A																						
1A																						
2A																						
3A																						
4A																						
5A																						
6A																						
7A																						
8A																						
9A																						
280A																						
1A																						
2A																						
3A																						
4A																						
5A																						
6A																						
7A																						
8A																						

ZOF04018

Figure 4-1B-2 (Sheet 1 of 2) Load Analysis Chart – A.C. Systems

CONDITIONS

ITEM No.	K5 CRUISE									K6 ROUGH CRUISE									K7 LANDING									K8 EMERGENCY								
	WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS			WATTS	AVERAGE WATTS			VARS	AVERAGE VARS				
		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	5 MIN	30 MIN		1/12 MIN	2 MIN	5 MIN		1/12 MIN	2 MIN	5 MIN		2 MIN	5 MIN	20 MIN		2 MIN	5 MIN	20 MIN	
									84.0	84.0	84.0	84.0	40.0	40.0	40.0	40.0																		
									6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0																		
									351.9	351.9	351.9	351.9	170.3	170.3	170.3	170.3																		
									10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1																		
									9.0	9.0	9.0	9.0	4.4	4.4	4.4	4.4																		
									18.0	18.0	18.0	18.0	8.7	8.7	8.7	8.7																		
									6.9	6.9	6.9	6.9	—	—	—	—																		
									55.3	55.3	55.3	55.3	31.3	31.3	31.3	31.3																		
									52.0	52.0	52.0	52.0	25.2	25.2	25.2	25.2																		
									167.5	167.5	167.5	167.5	110.7	110.7	110.7	110.7																		
									10.4	10.4	10.4	10.4	5.1	5.1	5.1	5.1																		
									15.6	15.6	15.6	15.6	7.5	7.5	7.5	7.5																		
									787.0	787.0	787.0	787.0	416.3	416.3	416.3	416.3																		
									890.3	890.3	890.3	890.3																						

ZOF04019

Figure 4-1B-2 (Sheet 2 of 2) Load Analysis Chart – A.C. Systems

SUBJECT A EQUIPMENT	B PART DESIGNATION	C TOTAL NO. OF UNITS	D OPERATING TIME MIN	E ELECTRICAL REQUIREMENTS PER UNIT 115V 1PHASE VA	115V 1PHASE WATTS	115V 1PHASE VARS	115V 3PHASE VA	115V 3PHASE WATTS	115V 3PHASE VARS	26V 1PHASE VA	26V 1PHASE WATTS	26V 1PHASE VARS	F P.F	G VOLT REG	H FREQ RANGE	I CONNECTED LOAD WATTS	CONNECTED LOAD VARS
PHASE ADAPTER NO 1	661102-B(SPERRY)																
RH ATTITUDE IND.	MIL-I-5133B (J8)	1	30				16.0	13.6	8.4				0.85			13.6	8.4
AMPLIFIER - AZ/C (SPERRY)	6B/111 (MIL-A-6589)	1	30				28.0	25.7	12.2				0.925			25.7	12.2
GYRO - S3B/C (SPERRY)	6B/1138 (MIL-G-6231B)	1	30														
NO.1 PHASE ADAPTER (LOSS)		1	30													16.0	10.7
I/P LOAD - NO 1 PHASE ADAP.				63.6	55.3	31.3							0.87			55.3	31.3
PHASE ADAPTER NO. 2.	661102-B(SPERRY)																
VERTICAL GYRO	MIL-G-25597-A(MD-1)	1	30				30.0	27.0	13.0				0.90			27.0	13.0
RATE SWITCHING - GYRO	MIL-G-25591-A(MD-1)	1	30	10.0	9.0	4.4							0.90			9.0	4.4
NO.2 PHASE ADAPTER (LOSS)													0.90			16.0	7.8
I/P LOAD - NO.2 PHASE ADAP.				57.7	52.0	25.2							0.90			52.0	25.2
TRANSFORMER (26V-400N)	41A-50780																
HYD. PRESS. IND	MIL-I-7084	1	30							3.12	0.60	3.06	0.192			0.60	3.06
HYD PRESS. TRANS	MIL-T-7748	1	30							6.24	1.40	6.08	0.22			1.40	6.08
OIL PRESS. IND	MIL-I-7086(MOD)	1	30							3.12	0.60	3.06	0.192			0.60	3.06
OIL PRESS. TRANS	MIL-T-25624	1	30							6.24	1.40	6.08	0.22			1.40	6.08
AMPL - COMPASS REPEATER	6B/6605-21-806-5922	1	30							30.00	27.00	13.20	0.90			27.00	13.20
TACAN SYSTEM (43)	AN/ARN-504	1	(43)							20.8	18.72	9.06	0.90			18.72	9.06
MAGNETIC IND.	ID-416	2	30							35.60	32.20	15.70	0.90			64.40	31.40
COURSE IND	MN-97 HA-4	2	30							11.20	10.10	4.90	0.90			20.20	9.80
VOR/LOC RECEIVER	COLLINS VIR-31A	1	30							9.10	8.19	3.97	0.90			8.19	3.97
ADF SYSTEM (4)	COLLINS ADF-206A	1	CONT							13.00	11.70	5.70	0.90			11.70	5.70
TRANSFORMER (LOSS)	41A-50780	1	30	XFMR LOSS ASSUMED TO BE 10% AT RATED LOAD												25.00	25.00
LOAD - TRANSFORMER	41A-50780			200.78	167.51	110.71							0.83			167.51	110.71

ZOF04020

Figure 4-1B-3 Load Analysis Chart – A.C. Systems

SUBJECT · — SUPPLEMENTARY DATA – ASSUMPTIONS —

CODE NO.	EQUIPMENT	LOADING & ANCHOR	START & WARMUP	TAXI	TAKE OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMEGENCY
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	RESISTOR	OFF			EMERGENCY OPERATION ONLY				
4	SPEED BRAKES SELECTOR VALVE	OFF	TEST: 1 OPER^{n} OF 8 SEC	OFF		8 SEC / 10 MIN.	8 SEC / 5 MIN.	1 OPERATION OF 8 SEC.	1 OPERATION OF 8 SEC
5	LANDING GEAR SAFE GROUND OBSERVER LT.	CONTINUOUS		5 MIN.	OFF			2 MIN.	OFF
6	LANDING GEAR WARNING SIGNAL	OFF	5 SEC. TEST	OFF				5 SEC.	5 SEC.
7	L.G. DOWNLOCK RELAY / L.G. UPLOCK RELAY	THE TWO RELAYS ARE ENERGIZED ALTERNATELY = ONE RELAY OPERATING CONTINUOUSLY							
8	L.G. UPLOCK SAFETY RELAY	CONTINUOUS		5 MIN.	OFF			2 MIN	OFF
9	L.G CONTROL UNIT - COIL								
10	NOSE GEAR STEERING VALVE								
11	MAIN L.G. SELECTOR VALVE	1 OPERATION OF 2.5 SEC IN 5 MIN.	1 OPERATION OF 5 SEC.	OFF	2 OPERATIONS OF 2.5 SEC. IN 8 SEC			2 OPERATIONS OF 2.5 SEC IN 8 SEC.	2 OPERATIONS OF 2.5 SEC IN 8 SEC
12	L.G. SELECTOR VALVE	CONT		3 SEC.				3 SEC	3 SEC.
13	NO. 1 GROUND SAFETY RELAY	CONTINUOUS @ 0.5 A		10 MIN. @ 0.5A +5 MIN. @ 0.15A	CONT @ 0.15A			2 MIN @ 0.5 A +3 MIN. @ 0.15A	5 MIN. @ 0.5A -25 MIN @ 0.15A
14	NO. 2 " " "	OFF							
15	CABIN SAFETY VALVE	EMERGENCY CONDITION ONLY							OFF
16	MODULATING VALVE	4 SEC / 2 MIN.							
17	ZONE 2 COOLING HYD. FAN S/D VALVE	OFF	1 OPERATION OF 10 SEC	OFF	1 OPERATION OF 10 SEC	OFF		2 OPERATIONS OF 10 SEC.	
18	ZONE 2 COOLING IND. RELAY K4HA OR K5HA	CONT	3 MIN	CONT	5 MIN.	CONT		3 MIN.	20 MIN.
19	RAIN REMOVAL & DE-ICE VALVE	OFF	EMERG. ONLY		20 SEC / 5 MIN				
20	WINDSHIELD DEMIST VALVE	OFF	21 SEC.	21 SEC.	OFF	21 SEC / 5 MIN		21 SEC.	21 SEC
21	IGNITION UNIT	OFF	6 SEC.	OFF			5 SEC	OFF	5 SEC.
22	ENGINE START CONTROL RELAY	OFF	10 SEC	OFF					
23	TAXI LIGHT	OFF		CONT.	2 MIN.	OFF		2 MIN.	OFF

ZOF04021

Figure 4-1C-1 Load Analysis Chart – Supplementary Data

SUBJECT:

SUPPLEMENTARY DATA - ASSUMPTIONS

CODE No.	EQUIPMENT	LOADING & ANCHOR	START & WARM UP	TAXI	TAKE OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
24	LANDING LIGHT	OFF						3 MIN.	3 MIN
25	LANDING LT. RELAY								
26	ANTI-COLLISION LT	OFF	CONT			5 MIN./30 MIN.		CONT.	OFF
27	CANOPY OPEN CONTROL RELAY	8 SEC.	OFF					8 SEC	OFF
28	CANOPY CLOSE CONTROL RELAY	8 SEC.	8 SEC	OFF				8 SEC	OFF
29	CANOPY ACTUATOR	16 SEC	8 SEC	OFF				16 SEC.	OFF
30	CANOPY SEAL PRESS.	8 SEC.	CONT					4.7 MIN.	19.7 MIN.
31	GROUND POWER RELAY	CONT.	1 MIN.	OFF					
32	BATTERY START. RELAY No2	OFF	20 SEC.	OFF					
33	BATTERY RELAY	OFF	14.3 MIN	CONT.					
34	NON ESS. BUS TIE-IN RELAY	CONT	14.3 MIN.	CONT					OFF
36	BATTERY CHARGING	NO CHARGING WITH GRD. PWR.	IN ACCORDANCE WITH MIL-E-7016D						NONE
37	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
38	FUEL SHUT-OFF VALVE	OFF	1 OPERATION OF 5 SEC.	OFF				1 OPERATION OF 5 SEC.	1 OPERATION OF 5 SEC
39	COAXIAL RELAY	EMERGENCY CONDITION ONLY							CONT.
40	UHF NORM-EMER. RELAY	EMERGENCY CONDITION ONLY							
41	AC POWER SUPPLY FOR EMER. UHF XCEIVER	48 W ON STANDBY							84 WATTS
42	IFF RELAY	EMERGENCY CONDITION ONLY							
43	TACAN SYSTEM	CONT							5 MIN
44	PHASE ADAPTERS & TRANSFORMER	SEE AC LOAD ANALYSIS, SHEET 9							
45	UHF TRANSMIT	TEST OF 1 MIN	5SEC/1MIN	20 SEC/1MIN		1 MIN 5 MIN	1 MIN 3 MIN	20SEC 1MIN	OFF
46	No. 2 INV. LOAD								ADDED ON INVERTER No. 1
47	INVERTER TRANSF. RELAY	EMERGENCY CONDITION ONLY							

ZOF04022

Figure 4-1C-2 Load Analysis Chart – Supplementary Data

SUBJECT

SUPPLEMENTARY DATA — ASSUMPTIONS.

CODE NO.	EQUIPMENT	LOADING & ANCHOR	START & WARMUP	TAXI	TAKE-OFF & CLIMB	CRUISE	ROUGH CRUISE	LANDING	EMERGENCY
48	INVERTERS	← EFF: SEE SHTS 15 & 16. — SEE AC LOAD ANALYSIS FOR INVERTER LOADS, SHT. NO 8 →							
49	ANNUNCIATOR PANEL	2.19A FOR 5 SEC. 1.44A FOR NEXT 5 SEC 0.56A CONT.	0.56A FOR 30 SEC.	← EMERGENCY CONDITION ONLY →					
50	MASTER CAUTION & WARNING LIGHTS	5 SEC. TEST	← EMERGENCY CONDITION ONLY →						
51	FIRE & O/H DETECTION								
52	ICE DETECTOR	← 1.1A CONTINUOUSLY →			7.9A FOR 2 MIN./5 MIN. & 1.1A REST OF TIME →				OFF
53	ICE DETECTION RELAY	← OFF →			← 2 MIN./5 MIN. →				
54									
55	PITOT HEATER	OFF	1 MIN.	1 MIN.	← CONTINUOUS →				6 MIN/20 MIN
56	LIFT TRANSDUCER HEATER	← OFF →							
57	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.
58	BATTERY START INDICATOR RELAY	OFF	← CONTINUOUS →						
59	SERVOED ALTIMETER INDICATOR VIBRATOR	← OFF →			← STANDBY MODE OPERATION ONLY →				
60	TACAN-VOR/ILS SELECTOR 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
61									
62									

ZOF04023

Figure 4-1C-3 Load Analysis Chart – Supplementary Data

SUBJECT - SUPPLEMENTARY DATA - ASSUMPTIONS

CODE No.	
80	BATTERY CAPACITY @ -5°F IS 50 AMPS. (25 AMPS./BATTERY) BASED ON A 25 MIN. RATE, ASSUMING AN 80% INITIAL CHARGE
81	INVERTER IS LOADED TO 118·6% RATED CAPACITY BUT LOAD FIGURES ARE PESSIMISTIC. (OVERLOAD CURRENT IS LESS THAN 1·25A)
82	THE STARTING CURRENT CHARACTERISTIC WILL BE INCORPORATED AS SOON AS THE NECESSARY ADDITIONAL DATA ARE MADE AVAILABLE.
83	PESSIMISTIC FIGURES ARE INDICATED IN THIS COLUMN (BATTERIES WERE ASSUMED TO BE 30% CHARGED AFTER A BATTERY START). DUE TO POOR VOLTAGE REGULATION AT HIGH CURRENTS AND LOW GENERATOR SPEED, THE CHARGING CURRENT WILL BE CONSIDERABLY LOWERED AND THE VOLTAGE MAY BE REDUCED TO A MINIMUM OF 25 VOLTS.

ZOF04024

Figure 4-1C-4 Load Analysis Chart – Supplementary Data

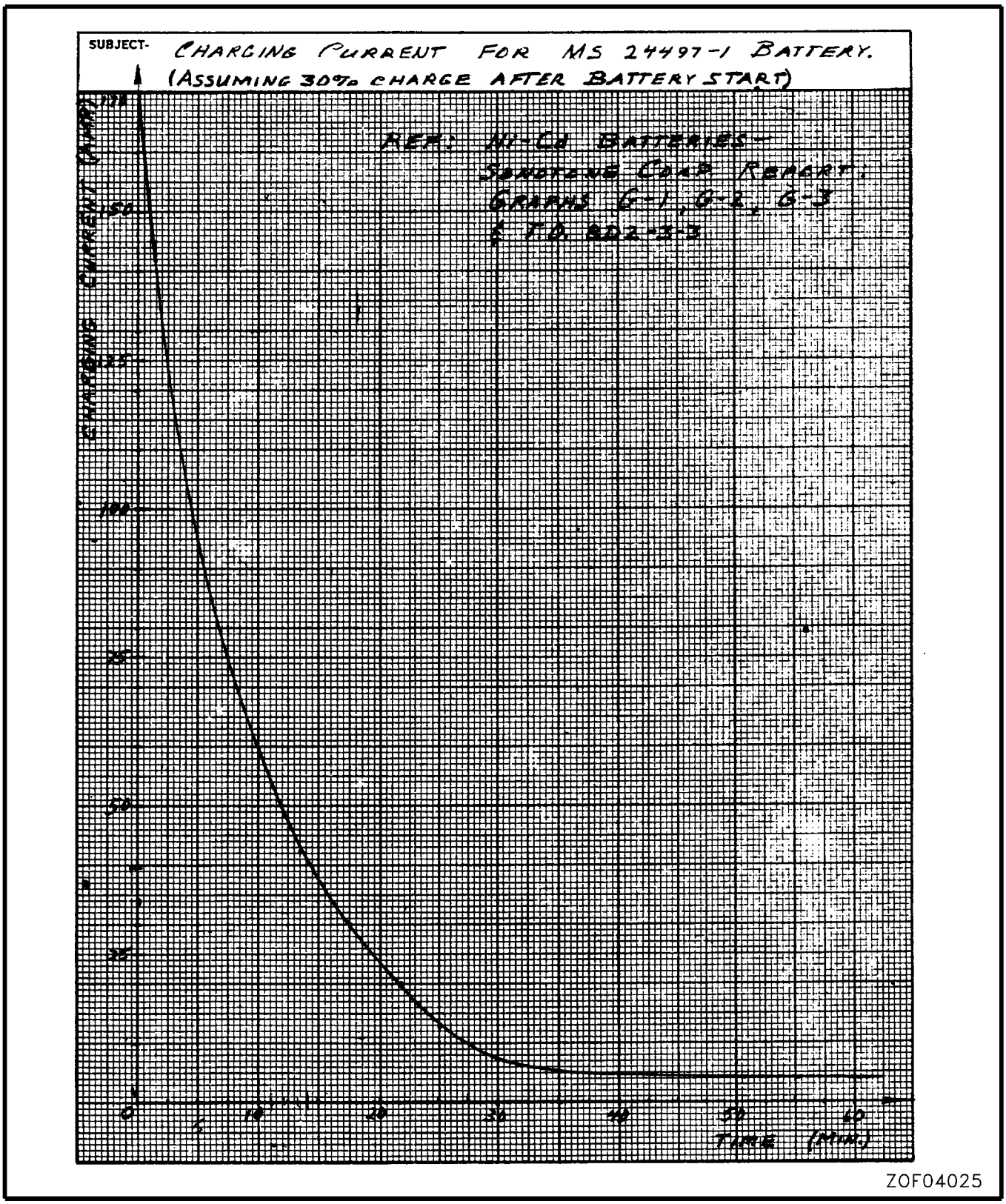


Figure 4-1D-1 Load Analysis Chart – Battery Changing Current

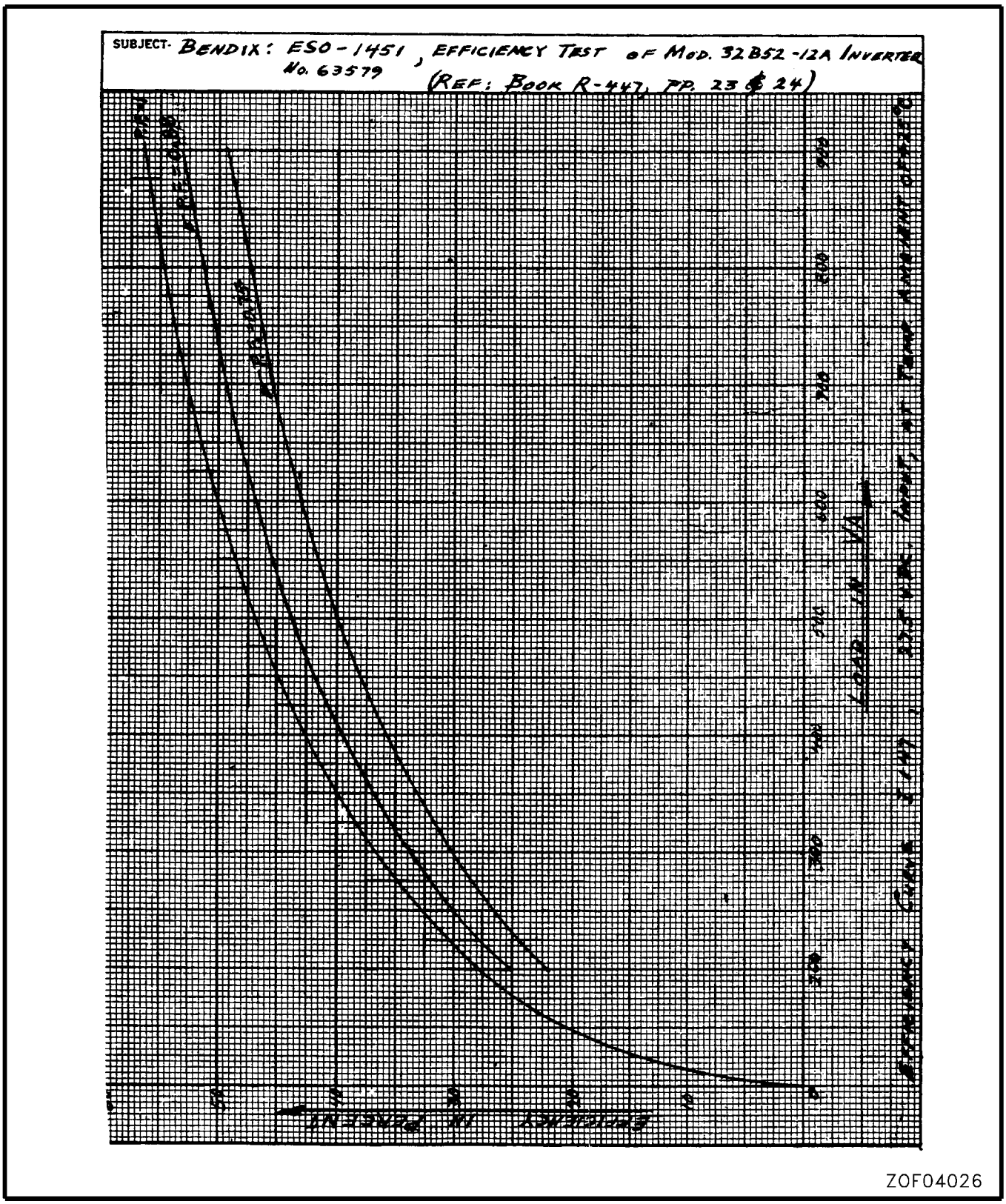


Figure 4-1E-1 Load Analysis Chart – Inverter No 2

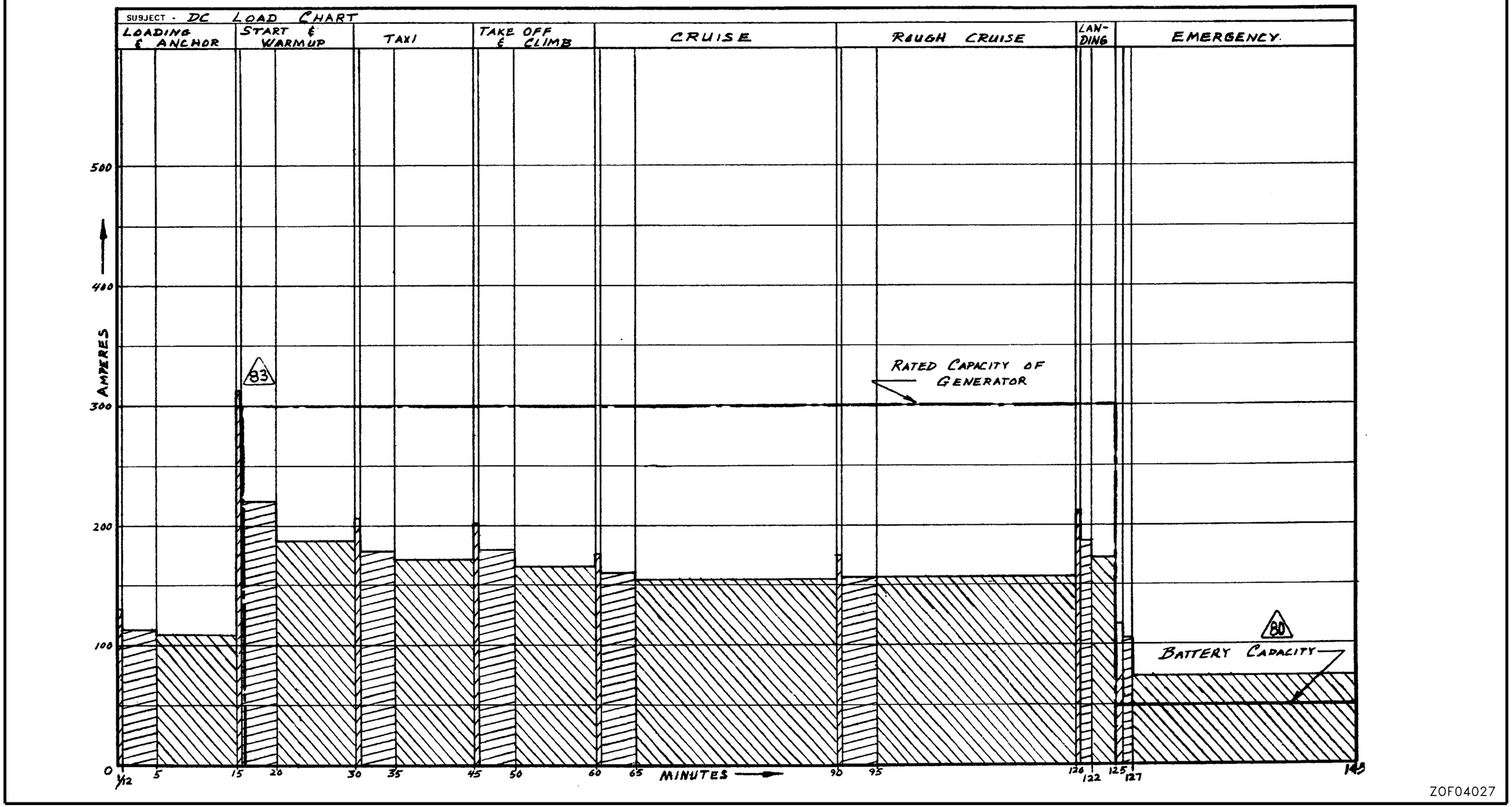


Figure 4-1F-1 Load Analysis Chart – D.C. Loads

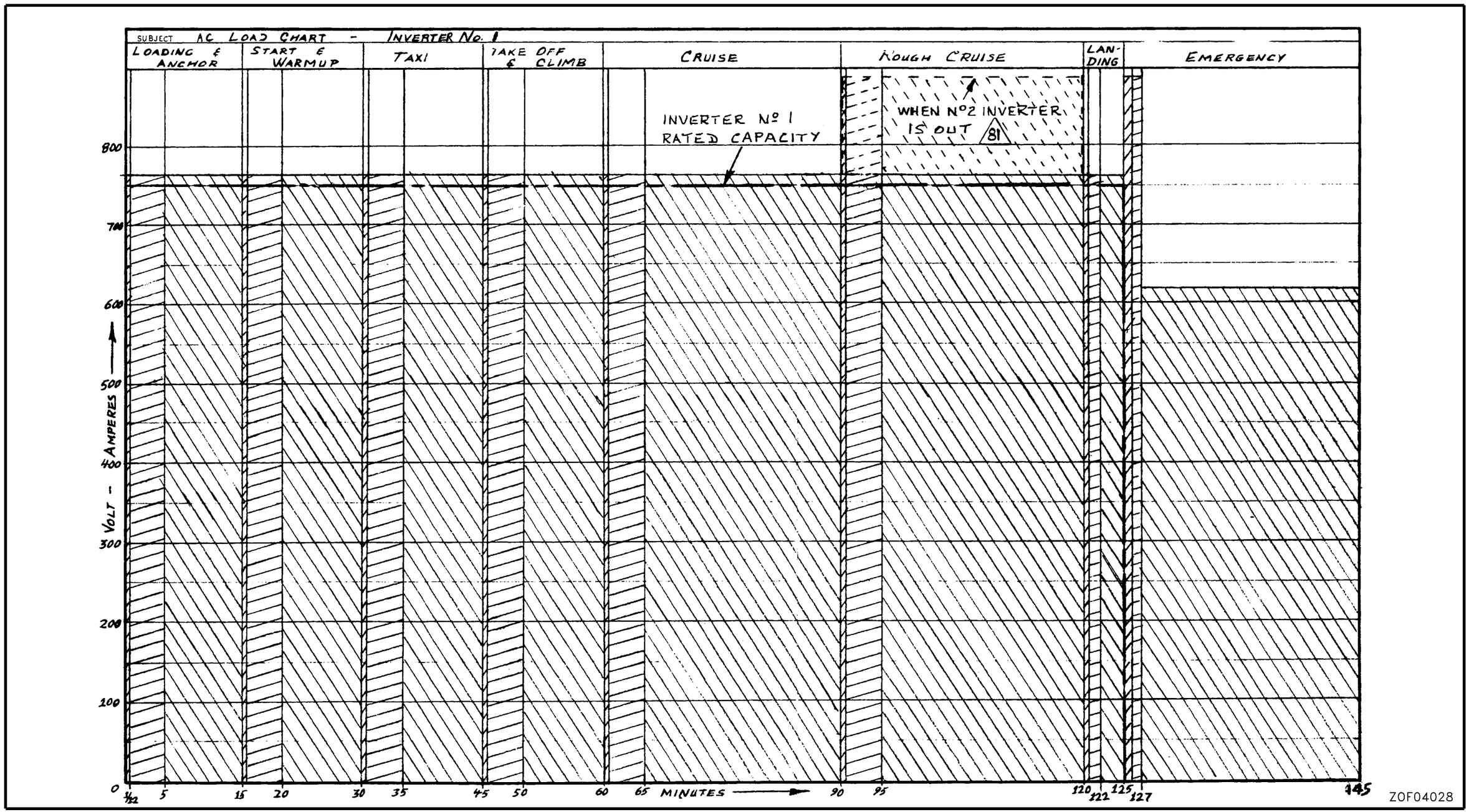


Figure 4-1F-2 Load Analysis Chart – A.C. Loads – Inverter No 1

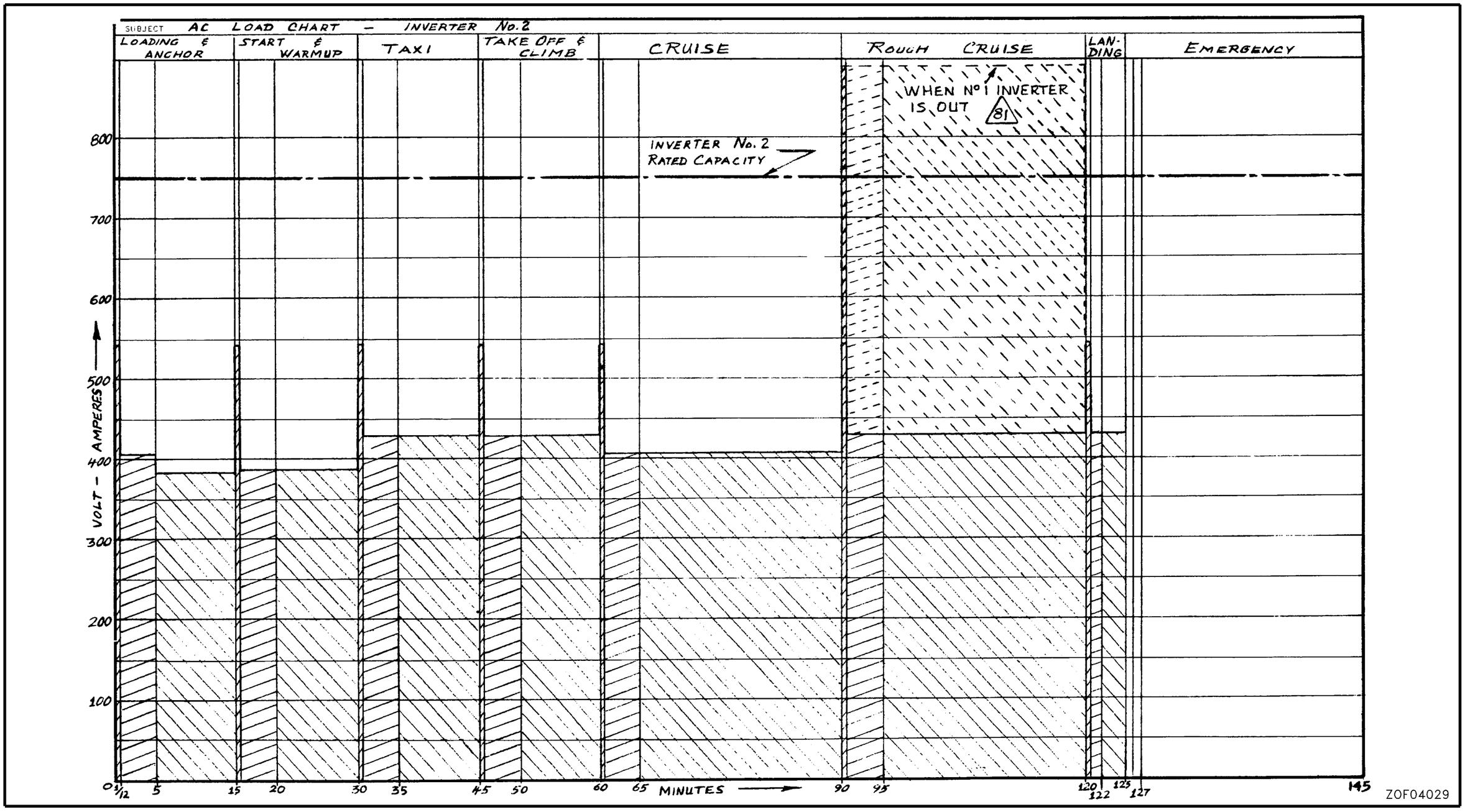


Figure 4-1F-3 Load Analysis Chart – A.C. Loads – Inverter No 2

PART 5

TABLE OF CONTENTS

LIGHTING SYSTEMS

Section 1 – INTERIOR LIGHTING

Section 2 – EXTERIOR LIGHTING

PART 5

LIST OF ILLUSTRATIONS

LIGHTING SYSTEMS

PART 5 – SECTION 1

INTERIOR LIGHTING

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) located on the centre console. For a schematic of all interior lighting, see Figure 5-2

INSTRUMENT PANEL LIGHTING

2. The instrument panel lighting consist of individual eyebrow and post light located on the main instrument panel and the LH fascia panel. The instrument panel lights dimmer controls the brilliance of all the instrument lamps and receives its power from the d.c. 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 d.c. 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 intensity of the lights is controlled by the consoles and circuit-breaker panel lights dimmer powered from the No. 2 d.c. essential bus.

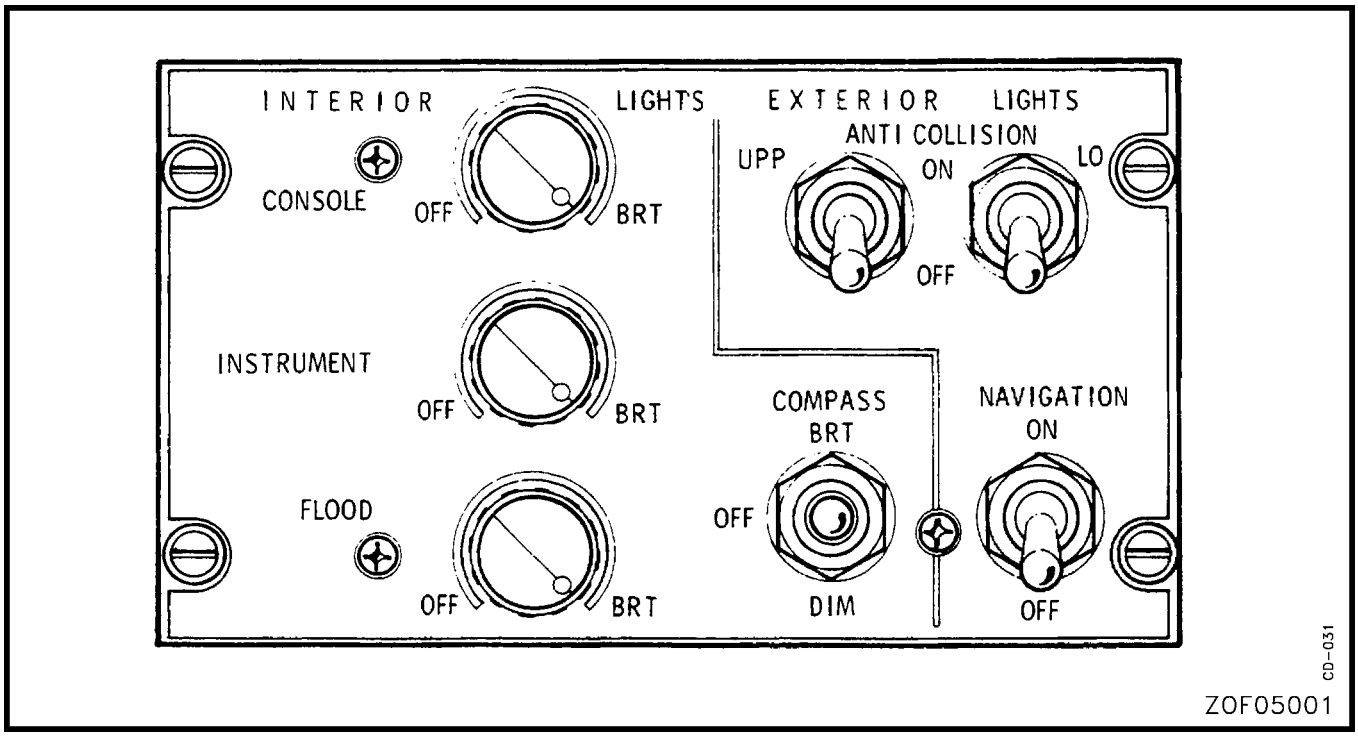


Figure 5-1 Lighting Control Panel

UTILITY LIGHTS

6. Utility light provide additional illumination for the right and lift 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 d.c. essential bus.

STANDBY COMPASS

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

PILOTS LET DOWN SHEET LIGHTS

7A. To provide for additional illumination of the pilots let down sheet, a lamp is mounted on the canopy. Dimming and contro 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 form 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.

PART 5 – SECTION 2

EXTERIOR LIGHTING

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 d.c. essential buses. For a schematic of the exterior lighting, see Figure 5-2.

LANDING AND TAXI LIGHTS

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-watttaxi 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 d.c. 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.

REMOVAL AND INSTALLATION OF LANDING LIGHTS

3. 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.

4. 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

5. The navigation and anti-collision lights are controlled by three switches located on the centre console panel (see Figure 5-1). With the two anti-collision light selector switches in the OFF position and the navigation light control switch selected ON, the red and green wing tip lights and the white tail light will flash on and off. With the navigation light control switch ON, and wither one or both of the anti-collision lights selector on, the navigation lights will cease to flash and remain on steady. Power for the navigation and anti-collision lights is provided from the No. 1 and No. 2 essential d.c. 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

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

a. Energize the No. 1 and No. 2 28-volts d.c. essential buses (see Figure 1-1).

b. Place the d.c. master switch to GND PWR.

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

(1) Navigation Lights.

(2) Top Anti-collision Light Power.

(3) Bottom Anti-collision Light Power.

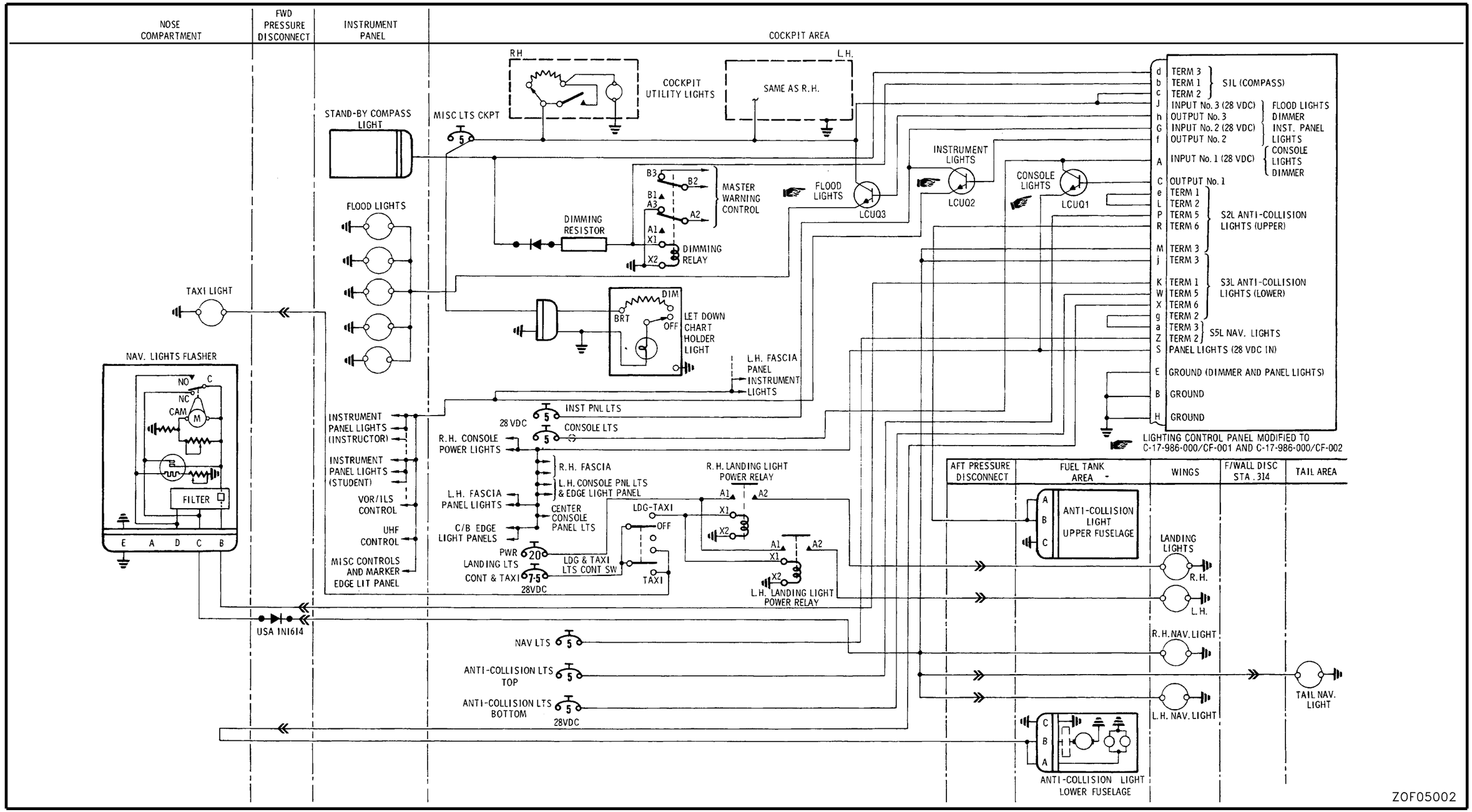
d. Place the navigation light control switch to the ON position and check that both the wing and tail navigation are flashing on and off.

e. Place the lower anti-collision light to the ON position and check that it is illu-minated and rotating. Check that the navigation lights are not flashing and are continuously on.

f. Place the upper anti-collision light to ON and check that it comes on and rotates. Check that the navigation lights are not flashing and are continuously on.

g. Place the lower anti-collision light to OFF and check that it is out and has stopped rotating. Check that the navigation light are not flashing and are continuously on.

h. Place the upper anti-collision and navigation light switches to OFF. Place the d.c. master switch to OFF.



Interior and Exterior Lighting – Electrical Schematic Figure 5-2