TO: ALL HOLDERS OF FUEL SYSTEM MODULE ASSEMBLY P5-2 OVERHAUL MANUAL 28-23-01

REVISION NO. 2, DATED JUL 5/83

HIGHLIGHTS

DESCRIPTION OF CHANGE	TOPICS AFFECTED												
	D & O	D/Assy	Cleaning	Insp/Chk	Repair	Assy	F/C	Test	T/Shooting	S/Tools	Storage	IPL	I/Overhaul
Added electrostatic sensitive component handling CAUTION notes	X				X				X			X	

FUEL SYSTEM MODULE ASSEMBLY P5-2

28-23-01

BOEING P/N 69-37312-9, -9M, -9K, -13, -13M, -13K, -15, -17, -18, -22

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 30355	Sep 10/70
		PRR 31143	Sep 10/70
		PRR 31151	Sep 10/70
30-1005		PRR 31219	Sep 10/70
30-1005		PRR 31219K	Sep 10/70
		PRR 31253	Sep 10/70
30-1005		PRR 31476	Sep 10/70
30-1005		PRR 31476-1	Sep 10/70
24-1014		PRR 31763	Sep 10/70

LIST OF EFFECTIVE PAGES

* Indicates pages revised, added or deleted in latest revision

F Indicates foldout pages - print one side only

	PAGE	DATE		PAGE	DATE		PAGE	DATE
28-23-01				1001	Sep 10/70			
	T-1	Sep 10/70		1002	BLANK			
	T-2	BLANK		1101	Sep 10/70			
*	LEP-1	Jul 5/83		1102	Sep 10/70			
	LEP-2	BLANK	*	1103	Jul 5/83			
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	T/C-2	BLANK	*	1105	Jul 5/83			
*	1	Jul 5/83		1106	Jul 5/79			
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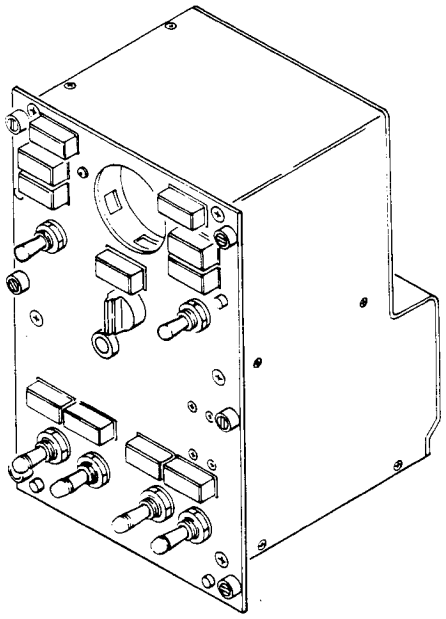
FUEL SYSTEM MODULE ASSEMBLY (P5-2)

Boeing Part Numbers: 69-37312-9, -9M, -9K, -13, -13M, -13K, -15, -17, -18, and -22



Fuel System Module Assembly (P5-2)
Figure 1

DESCRIPTION AND OPERATION

1. Description

CAUTION: THIS COMPONENT CONTAINS PARTS SUBJECT TO DAMAGE FROM ELECTROSTATIC DISCHARGE DURING HANDLING, HANDLE PER 20-12-02.

A. The fuel system module assembly consists of three printed circuit assemblies, a time delay switch, indicator lights, control switches, and a wire bundle assembly. The module assembly may be removed from the aircraft for inspection or repair by loosening the six quick-release fasteners on the baseplate and by disconnecting the primary power connectors.

2. Operation

A. The fuel system module assembly provides manual controls and monitoring devices for the fuel system. Visual indicators alert the crew of low fuel boost pump pressure. The module assembly contains manual switches controlling the fuel deice system, and a position indicator for the fuel crossfeed and engine fuel shutoff valves.

3. Functional Description

A. General

(1) Assemblies 69-37312-9, -9M, -9K, -13, -13M, -13K, -15, -17, -18, and -22 are functionally identical except for the addition of diodes CR3, CR4, or CR5 on some assemblies. (See Schematic Diagram.) The diodes were added to block transients in the power supply voltage and thereby lengthen the life of the module printed circuit assemblies.

(a) Assemblies 69-37312-9, -13, and -15 do not contain diodes CR3, CR4, or CR5.

(b) Assemblies 69-37312-9M, -13M, -17, and -18 contain diodes CR3 and CR4.

(c) Assemblies 69-37312-9K, -13K, and -22 contain diodes CR3, CR4, and CR5.

(2) The indicator lamps are of two types. Lamps L1, L2, and L3 are grounded at lamp pins 2 (through P2-24 for L2 and L3, and P1-24 for L1) and require power at pins 1, 3, or 4 to illuminate. Power is present at pins 4 (through P1-13 for L1, P2-13 for L2, and S3 for L3) such that each lamp will illuminate when pressed to test. Master test power (P1-4) to lamp pins 3 will cause all three to illuminate. The lamps perform their indicator function when power is applied to lamp pins 1 individually. Indicator lamps L4 through L11 receive power at lamp pins 1 and require ground at lamp pins 2, 3, or 4 to illuminate. Pins 4 are grounded through P1-24 or P2-24 such that each will illuminate when pressed to test. Pins 3 are wired in common to P1-7 such that when P1-7 is grounded by master test actuation, all will illuminate. The master test ground input is passed to circuit card A1 to actuate the master caution lamp circuitry. The lamps perform their indicator function when pins 2 are grounded individually.

(3) Circuit card A4 contains two time delay units used to limit the relay hold-on time for the fuel heat valve switches. Circuit cards A1, A2, and A3 contain master caution circuitry, lamp dimming control, fuel boost pump logic to illuminate the master caution lamp when any two pumps in one tank indicate low pressure, and an 18-volt zener regulator to control card power supply transistor Q1.

(4) Refer to Subjects as follows for functional description of circuit cards:

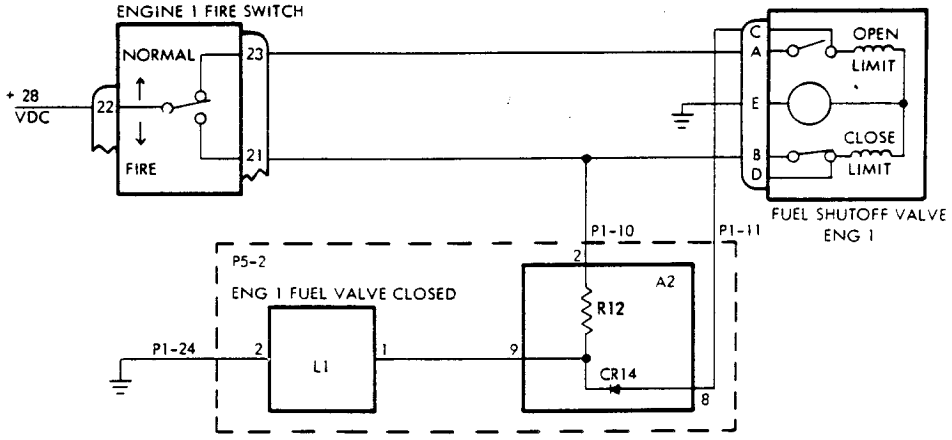
(a) A1 - 31-36-43

(b) A2 and A3 - 31-36-42

(c) A4 - 28-09-60 or manufacturer's instructions if optional 2-462 card installed

B. Indicator L1 (NO. 1 VALVE CLOSED) and indicator L2 (NO. 2 VALVE CLOSED) circuitry is similar and only the L1 circuit will be discussed. Indicator L1 indicates the position of the engine No. 1 fuel shutoff valve. When the valve is open L1 is extinguished and when the valve is closed L1 is dimly illuminated. When the valve is in travel between open and closed or vice versa L1 is brightly illuminated.

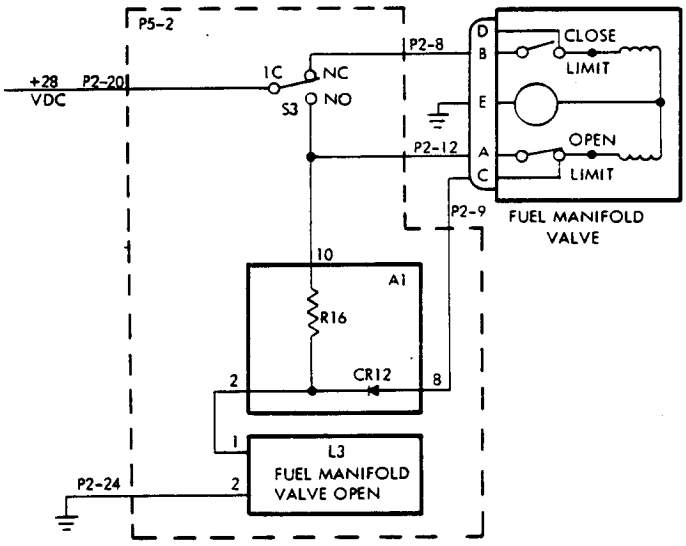
(1) When the fuel shutoff valve is open, neither of pins P1-10 or P1-11 is energized and L1 is extinguished (Fig. 2). When the valve is closed +28 volts dc is applied to pin P1-10 from the external fire switch. Resistor A2-R12 drops the voltage to L1 which is grounded at pin P1-24 and L1 is dimly illuminated. When the valve is in travel, +28 volts dc from the valve motor is applied at pin P1-11 illuminating indicator L1 bright.



Engine 1 Fuel Shutoff Indicator Lamp
Figure 2

C. Indicator L3 (FUEL MANIFOLD VALVE OPEN)

(1) Indicator L3 operates the same as indicators L1 and L2, paragraph 3.A.(1), except that module switch S3 (FUEL FLOW) performs the function of the external fire switch. See Figure 3.



Fuel Manifold Valve Indicator Lamp
Figure 3

D. Master Caution Circuitry (See A1, figure 4.)

(1) The fuel master caution lamp is connected externally to pin P2-19 and requires a ground path for illumination. SCR A1Q2 and transistor A1Q3 are in series in that ground path. The master caution lamp is illuminated by the fuel system module under three conditions:

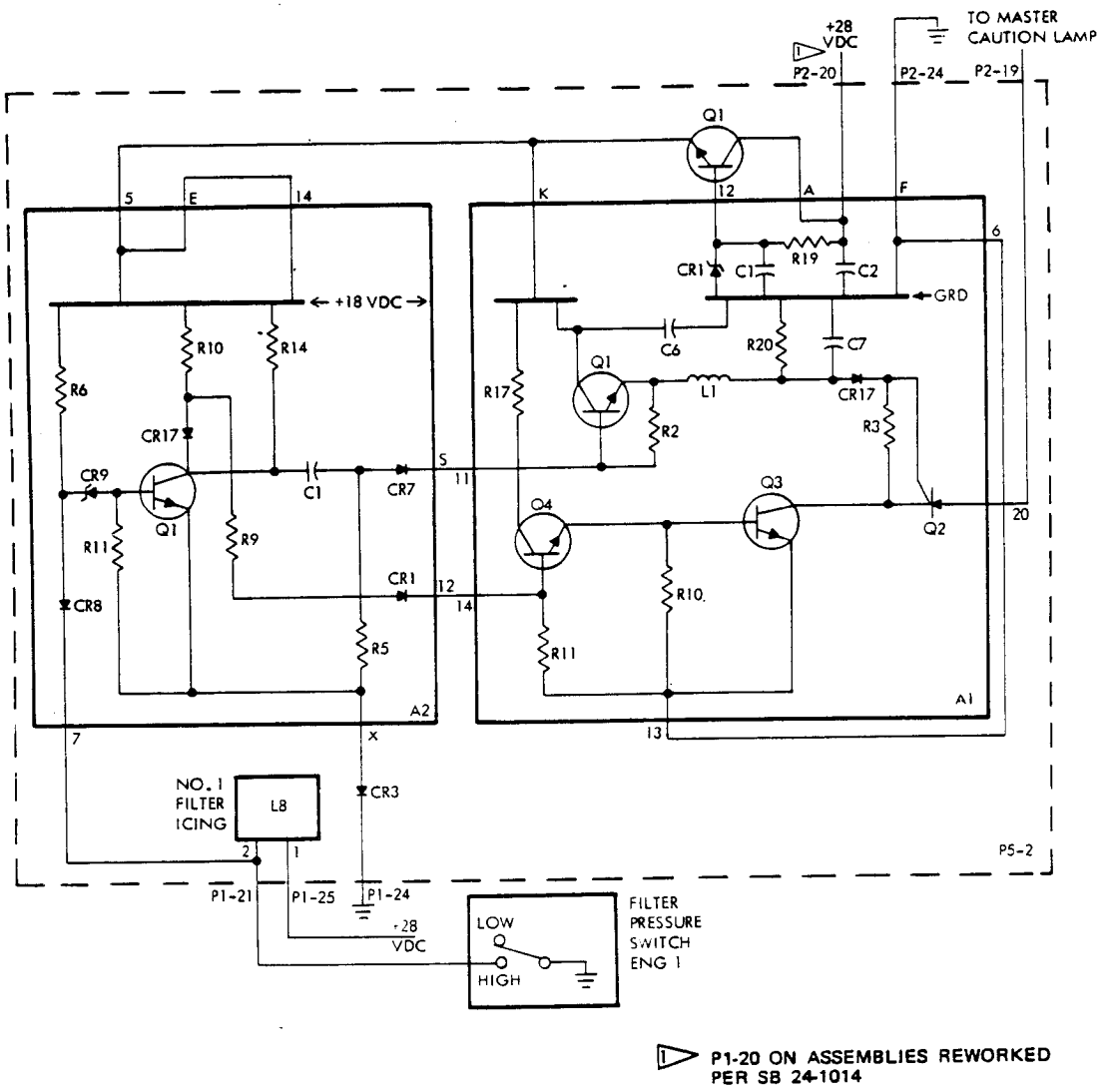
(a) When the pressure drop across engine 1 or engine 2 fuel filter exceeds a preset limit due to filter icing or other obstruction.

(b) When two fuel boost pumps in any one tank simultaneously are registering low pressure.

(c) When the master press-to-test feature is used.

(2) The master caution circuitry operates from a regulated 18 volts dc derived from the +28 volts dc connected to P2-20 (P1-20 on assemblies reworked per SB 24-1014). The regulator consists of Q1 (chassis-mounted) and R19, CR1, C1, and C2 on circuit card A1. Zener diode A1CR1 establishes the +18 volt dc emitter output of Q1. When base drive is provided to A1Q4, A1Q4 will be turned on, turning on A1Q3. Completion of the master caution indicator lamp ground path then requires triggering of A1Q2. A1Q2 is triggered through inductor A1L1 at any time that A1Q1 is turned on or off.

(3) The master press-to-test feature (not shown on figure 4) provides a ground input through P1-7 to P3-18 (A1). This ground input turns on A1Q5 which both triggers the SCR and turns on A1Q3. When illuminated, the circuit path through the SCR may be interrupted to reset the circuit by momentarily depressing the master caution lamp.



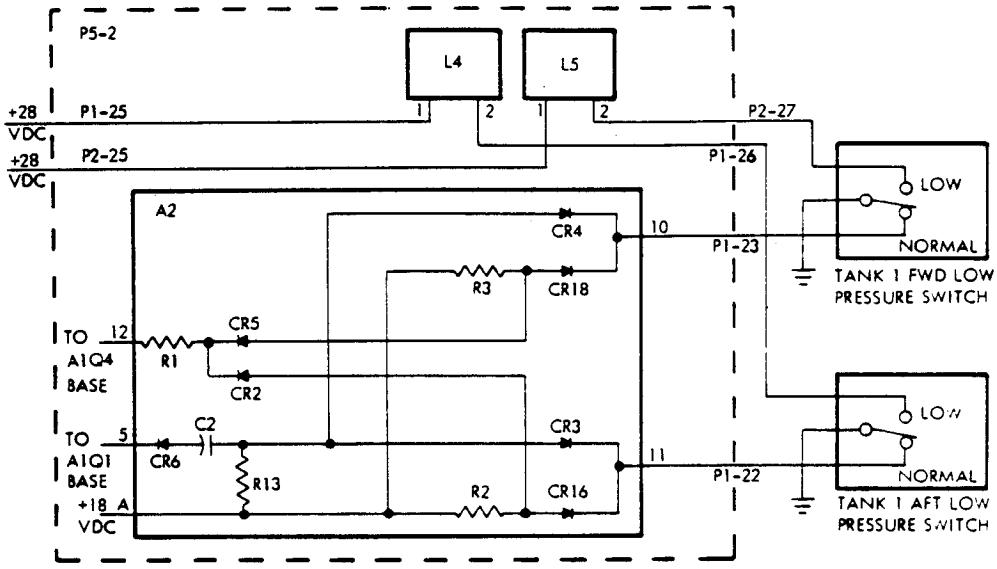
Fuel Filter Icing Indicator Lamp and Master Caution Circuitry
Figure 4

E. Indicators L4 (TANK NO. 1 AFT PUMP LOW PRESS) and L5 (TANK NO. 1 FWD PUMP LOW PRESS), and L6 (TANK NO. 2 FWD PUMP LOW PRESS) and L7 (TANK NO. 2 AFT PUMP LOW PRESS) operate in a similar manner and only the L4 and L5 circuitry will be discussed. See figure 5. The output pressure of the tank No. 1 forward and aft pumps is sensed by a pressure switch at each pump. If one pressure switch senses low pressure, an indicator on the module illuminates. If both pressure switches sense low pressure, both indicators on the module and the external master caution lamp illuminate and will remain illuminated until both pressure switches have returned to normal or the master caution lamp is pressed momentarily. If the master caution lamp is pressed, activating the external master caution recall switch at a later time will illuminate the master caution lamp if a low pressure condition still exists.

(1) With normal fuel boost pump pressure, indicator lamps L4 and L5 do not have a ground path for illumination. The CR4/CR18 junction is grounded, and the CR3/CR16 junction is grounded. If one pump fails, either through turn off or inlet not submerged, the corresponding pressure switch is actuated. If tank 1 forward switch shifts to "LOW," a ground path is provided for L5 illumination. At the same time, release of the CR4/CR18 junction from ground permits a voltage rise at A1Q4 base. This sets the master caution circuitry (paragraph 2.D.) such that when the SCR is triggered, the ground path is completed for the fuel master caution lamp.

(2) If capacitor C2 is permitted to charge, A1Q1 will be turned on to trigger the SCR. If tank 1 aft low pressure switch is also actuated, a ground path will be provided to illuminate L4, and at the same time C2 will be permitted to charge and turn A1Q1 on. The master caution light will remain on unless the SCR is reset by a momentary depression of the caution lamp, or until all pumps low pressure switches are deactivated (removing voltage from A1Q4 base).

(3) Activation of any of the low pressure switches will ground the corresponding indicator lamp and activate the master caution circuitry with the exception of the SCR trigger. Activation of a second low pressure switch will not trigger the SCR unless it is the second pressure switch activation in the same tank. Since the master caution circuit is armed by loss of a ground input at either P1-22 or P1-23, the master caution lamp will be illuminated after loss of pressure in a single boost pump if the recall switch is actuated.



Low Pressure Indicator Lamp Circuitry
Figure 5

F. Indicator L8 (NO. 1 FILTER ICING) and L9 (NO. 2 FILTER ICING) circuitry is similar and only the L8 circuit will be discussed. See figure 4. A differential pressure switch measures the pressure drop across the main fuel filter. If the filter becomes clogged the switch closes, illuminating indicator L8 on the module and the external master caution lamp.

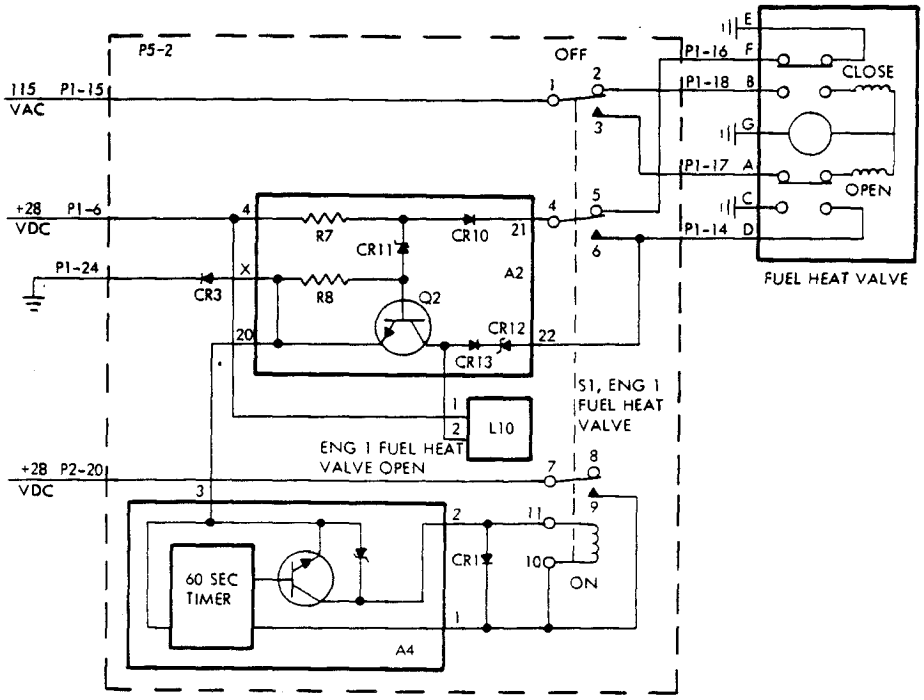
(1) When the pressure differential across engine 1 fuel filter reaches a preset high limit due to filter icing or other obstruction, a switch is actuated to ground pin P1-21. This provides a direct ground path to illuminate L8, and clamps the base of A2Q1 to ground. Prior to grounding of P1-21, A2Q1 is turned on by the voltage divider network consisting of A2R6, A2CR9, and A2R11 between the +18 volts at the emitter of Q1 and ground at P1-24. When A2Q1 is turned off the voltage at the base of A1Q4 rises to turn A1Q4 on. When A1Q4 is turned on, A1Q3 is turned on to provide a ground path for SCR A1Q2.

(2) At the time A2Q1 was turned off, capacitor A2C1 is permitted to charge. While charging, A1Q1 is turned on, delivering a positive pulse to A1Q2 through A1L1 and A1CR17. With A1Q3 on, and A1Q2 triggered, the master caution lamp has a ground path at pin P2-19.

G. Indicator L10 (NO. 1 VALVE OPEN) and L11 (NO. 2 VALVE OPEN) circuitry is similar and only the L10 circuit will be discussed. See figure 6. Indicator L10 indicates the position of the fuel heat valve which supplies hot air to the fuel heater. Indicator L10 is extinguished when the valve is closed and illuminated dimly when the valve is open. L10 is illuminated brightly when the valve is in travel or the valve is not in agreement with the switch S1 (ENG NO. 1 FUEL HEAT VALVE) setting.

(1) The hot air supply to the engine fuel heater is controlled by an electrically operated valve. Fuel heat valve power is controlled through a pilot-operated, magnetically-held switch, S1. After manual actuation, S1 is held in the closed position for a period of 60 (± 5) seconds by the timer on circuit card A4. The indicator lamp, L10, will be off when the valve is closed, bright when the valve is in transit, and dim when the valve is open.

(2) Transistor Q2 provides a ground path through P1-24, when conducting, for bright illumination of the lamp. Dim illumination is provided by a drop of approximately 9 volts across CR12 to ground through P1-14. Before actuation of S1, the base of Q2 is clamped to ground through CR10, P1-16, and the close limit switch of the heat valve. The open limit switch of the fuel heat valve is in the open position, thus interrupting the ground path for the lamp through zener diode CR12. The lamp is not illuminated.



Fuel Heat Valve Indicator Lamp
Figure 6

(3) When switch S1 is actuated, +28 volts dc from P2-20 is connected to the switch holding coil. The coil has a ground path through the timer circuit on card A4, and will therefore hold S1 in the "ON" position. Actuation of S1 removes the ground from the base of Q2. Base voltage to Q2 is then provided through the series voltage divider circuit consisting of +28 volts dc at P1-6, R7, CR11, R8, CR3, and ground at P1-24. Q2 will conduct and the lamp will illuminate bright. Simultaneously, 115 volts ac is connected from P1-15 through P1-17 to the "open" coil of the fuel heat valve until the valve reaches the full open position and the open limit switch operates. The open limit switch then provides a ground path through CR10 to turn Q2 off, and provides a ground path through CR12 for lamp illumination in the dim condition.

(4) After a period of 60 (± 5) seconds, the timer on circuit card A4 interrupts the ground path for the holding coil which permits S1 to return to "OFF." Again, Q2 base is released from ground and Q2 conducts to illuminate the lamp bright. Simultaneously, 115 volts ac is connected to the "close" coil of the valve. When the valve close limit switch is actuated, 115 volts ac is disconnected, Q2 base is clamped to ground, and the lamp ground path through CR12 is broken. The lamp is extinguished until the next actuation of S1.

4. Leading Particulars

Length -- 5.36 inches (approx)
Width -- 5.75 inches (approx)
Height -- 9.00 inches (approx)
Weight -- 3.0 pounds (approx)
Operating Voltage -- 28 volts dc and 115 volts ac, 400 Hz

DISASSEMBLY

1. General

   A. Disassemble only as necessary for cleaning, inspection, repair, and replacement of components.

   B. Unsolder wiring connections and remove connector pins only when replacement of wire or component is required. Tag disconnected wires to facilitate reassembly. Refer to "Repair of Electrical Connectors," Subject 20-11-02 and to "Soldering Electrical Connections," Subject 20-12-01.

2. Disassemble Unit (See figure 1101.)

   A. Remove screws (1) from cover (5) and cover assembly (2).

   B. Remove printed circuit assemblies (6 and 7), and time delay switch (8).

      NOTE: Refer to Subjects 31-36-42 and 31-36-43 for overhaul of printed circuit assemblies.

   C. Remove screws (9) from clip nuts (10) and connectors (11 and 12).

   D. Remove screws (17), washers (18), and backplate (19).

      NOTE: Do not disconnect wires or remove transistor (13) from backplate (19), unless repair or replacement is required.

   E. Remove screws (26) and mounting plate (27) from standoffs (47 and 48).

      NOTE: Do not disconnect wires or remove connectors (23 and 24) from mounting plate (27), unless repair or replacement is required.

   F. Remove screws (44), terminals (43), and diodes (41 and 42) from baseplate assembly (52).

   G. Disconnect terminals (60) from indicator light assemblies (28 through 32), switches (33, 36, and 38) and power connector (40).

   H. Remove indicator light assemblies (28 through 32), switches (33, 36, and 38), power connector (40), and terminal (61) from baseplate (53).

   I. Remove screws (46), standoffs (47 through 51) and baseplate assembly (52).

      NOTE: Screws (46) are installed with Loctite sealant and may be difficult to remove.

   J. Remove wire bundle assembly (55).

      NOTE: Clip ties holding wire bundle assembly only if replacement of wire is necessary.

CLEANING

CAUTION: USE ONLY CLEANING MATERIAL SPECIFIED HEREIN. USE OF UNAPPROVED MATERIALS MAY DAMAGE THE ASSEMBLY OR CAUSE CIRCUIT FAILURE.

1. Remove dust or foreign matter from assembly using low pressure air suction.

2. Clean with aliphatic naphtha or isopropyl alcohol. Dry thoroughly with low pressure air.

   WARNING: WHEN USING ISOPROPYL ALCOHOL OR ALIPHATIC NAPHTHA, AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. USE ONLY WITH ADEQUATE VENTILATION. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. KEEP AWAY FROM HEAT, SPARKS OR OPEN FLAME.

3. For cleaning information related to soldering, refer to "Preparation for Soldering," in "Soldering Electrical Connections," Subject 20-12-01.

4. Clean terminal lugs and other bonding areas per "Repair of Electrical Terminations and Electrical Bonding Areas," Subject 20-11-03.

INSPECTION/CHECK

1. Check wiring, electrical components, and solder connections with a minimum of 5-power magnification.

   A. Check components for security of mounting.

   B. Check components and wire for damage.

   C. Check wire terminals and connections for proper installation.

   D. Check wire insulation for charring, cracking, and brittleness.

   E. Check connectors for bent, corroded, or cracked pins.

2. Check nameplates, metal labels, and Metal-Cals for proper installation and legibility.

3. Check components for legibility of reference designations and terminal identification.

4. Check finished surfaces for damage.

5. Check chassis assembly for damage.

6. Check insulating sleeving for proper installation and evidence of damage.

REPAIR

1. Repair

CAUTION: A4 IS SUBJECT TO DAMAGE FROM ELECTROSTATIC DISCHARGE WHILE HANDLING THE ASSEMBLY AND THE CARD. HANDLE PER 20-12-02.

A. Repair electrical connectors per "Repair of Electrical Connectors," Subject 20-11-02.

B. Repair soldered connections per "Soldering Electrical Connections," Subject 20-12-01.

C. Repair wire terminations at terminal lugs and bonding areas per "Repair of Electrical Terminations and Electrical Bonding Areas," Subject 20-11-03.

D. Where required, straighten box assembly components and connector pins and tighten component mounting hardware.

E. Restore reference designations, terminal numbers, or component identification markings to a legible condition. Refer to "Application of Stencils, Insignia, Silk Screen, Part Numbering and Identification Markings," Subject 20-50-10.

2. Refinish

NOTE: Refer to Subject 20-30-02 for stripping of protective finishes and Subject 20-41-01 for decoding of F and SRF finish symbols and their BAC equivalents.

A. If protective finishes are worn or damaged, refinish as indicated.

(1) All Structural Parts -- Apply F-2.21, F-2.30, or SRF-2.30 all over.

(2) Front Plate or Baseplate -- Apply F-12.75 or SRF-14.9031 to front surface and edges.

(3) Screws (with heads exposed on front of front plate or baseplate) -- Apply F-14.91 to heads.

3. Replacement

A. Replace damaged wire with wire type as noted on the schematic diagram.

B. Replace damaged Metal-Cals, per "Application of Metal-Cals," Subject 20-50-05.

C. Replace damaged heat shrinkable sleeving per "Repair of Electrical Terminations and Electrical Bonding Areas," Subject 20-11-03.

D. Replace damaged grommets per "Installation of Protective Grommets," Subject 20-50-09.

E. If rivets or nutplates require replacement, apply a coat of primer, Specification BMS 10-11, type 1, to faying surfaces and install while primer is wet.

F. Replace damaged pads with BAC5010, type 60 adhesive per "Application of Adhesives," Subject 20-50-12.

G. If keying plugs require replacement, bond into place per Subject 20-50-12, using type 60 adhesive, as follows:

(1) For connector P3, install keying plug into contact position number 5E.

(2) For connectors P4 and P5, install keying plug into contact position number 17U.

(3) For connector P6, install keying plug into contact position number 11M.

H. If transistor (13) requires replacement, proceed as follows:

(1) Tag and disconnect wires from transistor.

(2) Remove nuts (15), washers (16), screws (14) and transistor (13) from backplate (19).

(3) Position transistor on backplate (19) and install screws (14), washers (16), and nuts (15).

(4) Connect wires to transistor. See schematic diagram.

I. If connectors (23 and 24) require replacement, proceed as follows:

(1) Tag and disconnect wires from connectors.

(2) Remove nuts (22), spacers (21), screws (20) and connector from mounting plate (27).

(3) Position connector on mounting plate (27) with contact position number 1 toward bottom and front of module and install screws (20), spacers (21), and nuts (22).

(4) Connect wires to connector. See schematic diagram.

J. If stud assembly (54) requires replacement, proceed as follows:

(1) Insert punch in end of stud and drive stud assembly from baseplate.

(2) Clean faying surfaces.

(3) Insert new stud assembly in baseplate and flair small end of cup in baseplate.

K. If anchor nuts (45) require replacement, use punch press, or equivalent, utilizing a single impact stroke to install. Drive nut from back of baseplate until top of nut is flush with rear surface of baseplate. Appendage of nut shall protrude from front of baseplate.

ASSEMBLY

1. General

   A. Complete required REPAIR procedures.

   B. Connect electrical wires per schematic diagram.

2. Reassemble Unit (See figure 1101.)

   A. Attach standoffs (47 through 51) with screws (46) to baseplate assembly (52).

      NOTE: Apply Loctite primer, Grade T, and nut lock compound 74 (Loctite Corporation, 705 North Mountain Road, Newington, Connecticut) to threaded areas of screws (46) per manufacturer's instructions.

   B. Install indicator light assemblies (28 through 32), switches (33, 36, and 38), and power connector (40) to baseplate (53).

      (1) Install caps (35) on switches (33).

   C. Position wire bundle (55) and connect terminals (60 and 61) to indicator light assemblies (28 through 32), switches (33, 36, and 38), and power connector (40).

   D. Position terminals (43) on baseplate (53) and install screws (44).

   E. Install mounting plate (27) with screws (26) to standoffs (47 and 48).

   F. Install backplate (19) with screws (17) and washers (18).

   G. Secure connectors (11 and 12) to backplate (19) with screws (9) and clip nuts (10).

   H. Insert printed circuit assemblies (6 and 7) and time delay switch (8) in connectors (23 and 24).

   I. Install cover (5) and cover assembly (2) with screws (1).

TESTING

1. Test Equipment

   A. Power Supply: 28 volts dc, 2 amperes

   B. Multimeter: Triplett Model 625NA, or equivalent

   C. Stop watch or clock with second hand

   D. Test setup as follows:

Components	
Switches:	
SPST	13
SPDT	4
Pushbutton, SPNO	1 (S27)
Pushbutton, SPNC	1 (S28)
Test Lamps:	
28 v dc, 0.1 amp (GE 1820)	1 (L14)
28 v dc, 0.5 amp (three GE 1821 lamps in parallel)	1 (L13)
Connectors:	
BACC45FT18-31S	1 (P1)
BACC45FT18-31S6	1 (P2)

2. Functional Test

   A. Verify module assembly switch continuity per figure 701.

      NOTE: The following continuity checks shall be made prior to connecting the module assembly to the test setup.

Module Switch		Continuity		No Continuity	
Number	Position	From	To	From	To
S4	"ON"	P1-6	P1-28		
S4	"OFF"			P1-6	P1-28
S5	"ON"	P2-6	P2-28		
S5	"OFF"			P2-6	P2-28
S7	"ON"	P2-6	P2-29		
S7	"OFF"			P2-6	P2-29
S6	"ON"	P1-6	P1-29		
S6	"OFF"			P1-6	P1-29
S1	"OFF"	P1-15	P1-18		
[1] S1	"ON"	P1-15	P1-17	P1-15	P1-18
S2	"OFF"	P2-15	P2-18		
[2] S2	"ON"	P2-15	P2-17	P2-15	P2-18
S3	"OFF"	P2-8	P2-20		
S3	"ON"	P2-12	P2-20	P2-8	P2-20

[1] Module switch S1 must be held in the "ON" position.

[2] Module switch S2 must be held in the "ON" position.

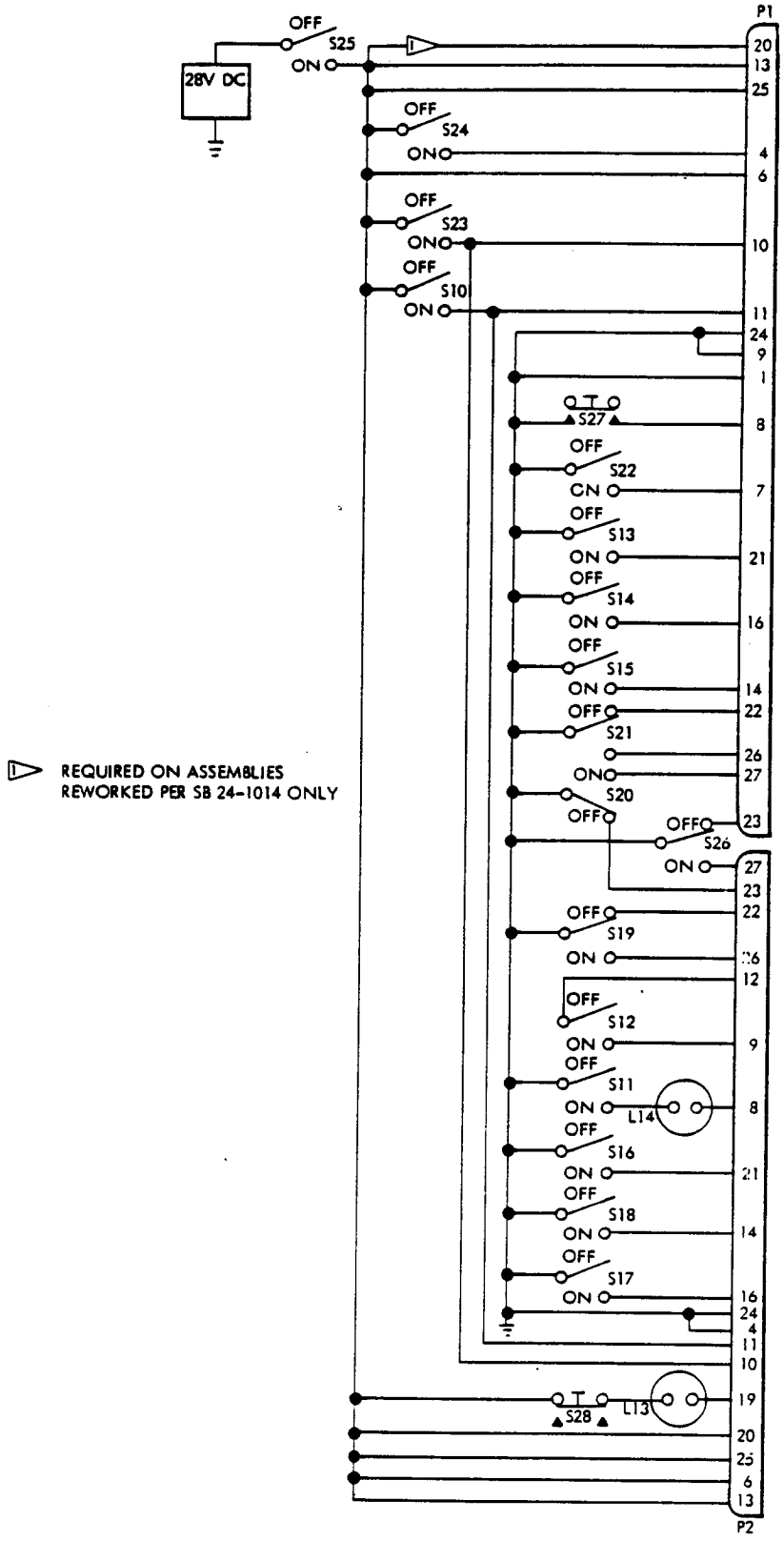
Module Assembly Switches Continuity Check
Figure 701

B. With all module assembly switches set to OFF, there shall be continuity between P1-2 and the center conductor of the power connector (L12), and P1-1 and case ground at the power connector.

C. Mate test setup P1 and P2 to module assembly P1 and P2. (See figure 702.) Set all test switches to OFF except S14 and S17 shall be set to ON. Set all module switches to OFF or CLOSE. Turn on power supply and set test switches S14, S17, and S25 to ON. Press-to-test each module assembly indicator light assembly L1 through L12. Each indicator light shall illuminate when pressed and shall extinguish when released. Set test switch S25 to OFF.

D. Proceed testing in sequence listed in figure 703 and verify lamp condition indicated. Begin each step with all switches in the last specified position.

E. Turn off power supply and disconnect test setup from module assembly.



REQUIRED ON ASSEMBLIES REWORKED PER SB 24-1014 ONLY

Test Setup
Figure 702

	Switches				Lamp Indication			
	Module		Test		Module		Test	
Step	Number	Position	Number	Position	Illum	Not Illum	Illum	Not Illum
1			25	ON		All		All
2			22	ON	L4-L11	L1-L3	L13	L14
3			22	OFF		All		L13 (B) L14
4			21	ON	L4	All others		All
5			26	ON	L4, L5	All others	L13	L14
6			28	(D) OFF	L4, L5	All others		All
7			26	OFF	L4	All others		All
8			27	(D) ON	L4	All others	L13	L14
9			28	(D) OFF	L4	All others		All
10			21	OFF		All		All
11			26	ON	L5	All others		All
12			27	(D) ON	L5	All others	L13	L14
13			28	(D) OFF	L5	All others		All
14			26	OFF		All		All
15			19	ON	L7	All others		All
16			20	ON	L6, L7	All others	L13	L14
17			28	(D) OFF	L6, L7	All others		All
18			27	(D) ON	L6, L7	All others	L13	L14
19			28	(D) OFF	L6, L7	All others		All
20			20	OFF	L7	All others		All
21			27	(D) ON	L7	All others	L13	L14
22			28	(D) OFF	L7	All others		All
23			19	OFF		All		All
24			20	ON	L6	All others		All
25			27	(D) ON	L6	All others	L13	L14
26			28	(D) OFF	L6	All others		All
27			20	OFF		All		All
28			24	ON	L1,L2,L3	All others		All
29			24	OFF		All		All
30			23	ON	L1, L2 (DIM)	All others		All
31			23	OFF		All		All
32			10	ON	L1, L2	All others		All
33			10	OFF		All		All
34			11	ON		All	L14	L13
35			11	OFF		All		All
36			12	ON		All		All
37	3	"OPEN"			L3	All others		All
38			12	OFF	L3(DIM)	All others		All
39	3	"CLOSE"				All		All
40			13	ON	L8	All others	L13	L14
41			28	(D) OFF	L8	All others		All
42			13	OFF		All		All
43			16	ON	L9	All others	L13	L14

Module Assembly and Test Lamp Indications
Figure 703 (Sheet 1)

	Switches				Lamp Indication			
	Module		Test		Module		Test	
Step	Number	Position	Number	Position	Illum	Not Illum	Illum	Not Illum
44			28	[1] OFF	L9	All others		All
45			16	OFF		All		All
46	1	[2] "ON"			L10	All others		All
47			14	OFF	L10	All others		All
48			15	ON	L10 (DIM)	All others		All
49			15	OFF	L10	All others		All
50			14	ON		All		All
51	2	[2] "ON"			L11	All others		All
52			17	OFF	L11	All others		All
53			18	ON	L11 (DIM)	All others		All
54			18	OFF	L11	All others		All
55			17	ON		All		All
56			25	OFF		All		All

[1] Momentarily
[2] Module assembly switches S1 or S2 shall return to "OFF," 60 (± 5) seconds after setting to "ON"
[3] Voltage at pin P2-19 shall be 3.0 volts dc maximum

Module Assembly and Test Lamp Indications
Figure 703 (Sheet 2)

TROUBLE SHOOTING

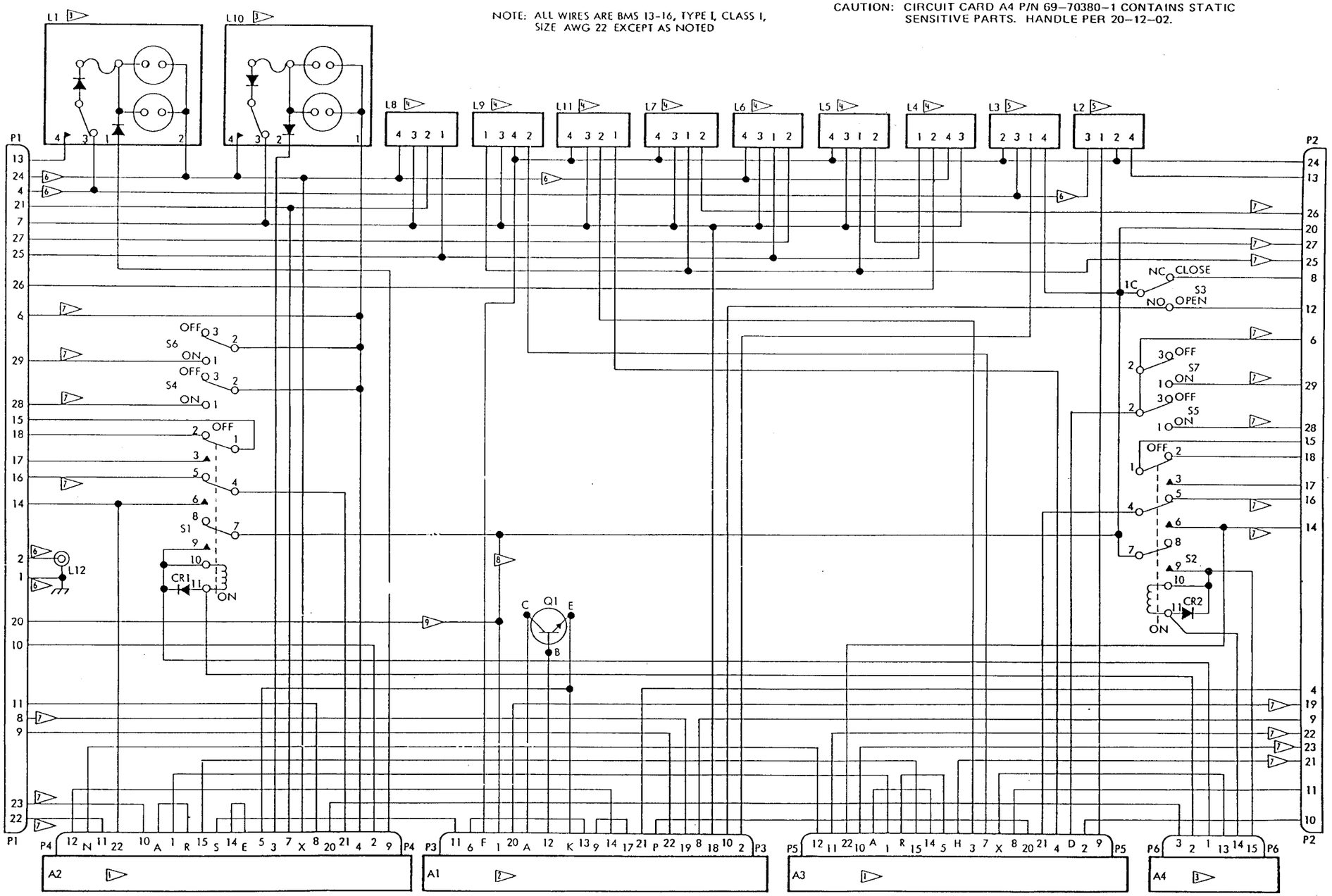
1. Trouble shooting is keyed to steps of the test procedures. Paragraph and step references are to that portion of TESTING wherein the fault specified could occur. The presumption is made that when a fault indication is encountered, the results of all previous steps were normal.

Trouble	Possible Cause and Corrective Action
Paragraph A	Indicated switch.
Paragraph B	L12
Paragraph C	Indicated light assembly.
Figure 703	
L13 fails to illuminate or extinguish all applicable steps	A1 or Q1
Step 2	L4-L11
Step 4	L4
Step 5	L5 or A2
Step 15	L7
Step 16	L6 or A3
Step 28	L1, L2 or L3
Step 30 or 32	L1, L2, A2 or A3
Step 34	S3
Step 37	L3 or A1
Step 38	A1
Step 40	L8 or A2
Step 43	L9 or A3

Trouble	Possible Cause and Corrective Action
Step 46	
L10 fails to illuminate	L10, S1, A2 or A4
S1 fails to go to "OFF" in 60 seconds	A4
Step 47	S1
Step 48 or 49	A2
Step 51	
L11 fails to illuminate	L11, S2, A3 or A4
S2 fails to go to "OFF" in 60 seconds	A4
Step 52	S2
Step 53 or 54	A3

NOTE: ALL WIRES ARE BMS 13-16, TYPE I, CLASS I, SIZE AWG 22 EXCEPT AS NOTED

CAUTION: CIRCUIT CARD A4 P/N 69-70380-1 CONTAINS STATIC SENSITIVE PARTS. HANDLE PER 20-12-02.



1 REFER TO SUBJECT 31-36-42

2 REFER TO SUBJECT 31-36-43

3 REFER TO 28-09-60 OR MANUFACTURER'S INSTRUCTIONS IF OPT CARD INSTALLED

8 ON 69-37312-9, -13 AND -15 ONLY

4 INTERNALS SAME AS L10

5 INTERNALS SAME AS L1

6 WIRE SIZE AWG 20

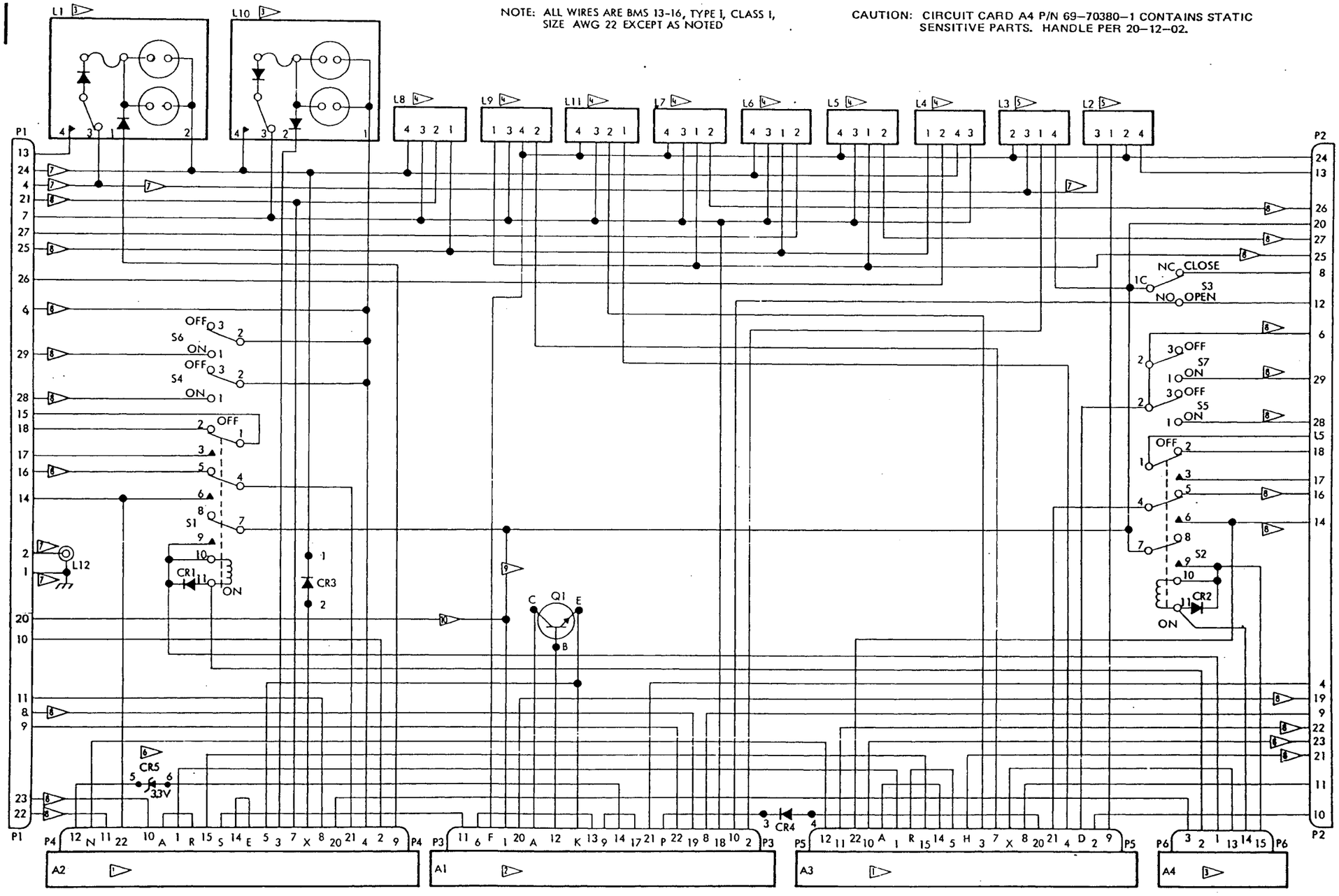
7 WIRE SIZE AWG 24

9 ON ASSEMBLIES REWORKED PER SB 24-1014 ONLY

Schematic Diagram, 69-37312-9, -13, and -15
Figure 801

NOTE: ALL WIRES ARE BMS 13-16, TYPE I, CLASS I, SIZE AWG 22 EXCEPT AS NOTED

CAUTION: CIRCUIT CARD A4 P/N 69-70380-1 CONTAINS STATIC SENSITIVE PARTS. HANDLE PER 20-12-02.



7 REFER TO SUBJECT 31-36-42

5 INTERNALS SAME AS L1

9 ON ASSEMBLIES NOT REWORKED PER SB 24-1014

7 REFER TO SUBJECT 31-36-43

6 69-37312-9K,-13K AND -22 ONLY

N ON ASSEMBLIES REWORKED PER SB 24-1014 ONLY

3 REFER TO 28-09-60 OR MANUFACTURER'S INSTRUCTIONS IF OPT CARD INSTALLED

7 WIRE SIZE AWG 20

8 INTERNALS SAME AS L10

8 WIRE SIZE AWG 24

Schematic Diagram, 69-37312-9M, -9K, -13M, -13K, -17, -18, and -22

STORAGE INSTRUCTIONS

1. Protect assembly from dust, moisture, and rough handling. Place assembly in plastic bag and insert in protective carton, padded sufficiently to ensure against damage during storage and handling. Close, tape, and mark carton with assembly identity and date of overhaul.

2. For further information, refer to "Protection, Storage, and Handling of Airplane Components," Subject 20-70-01.

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

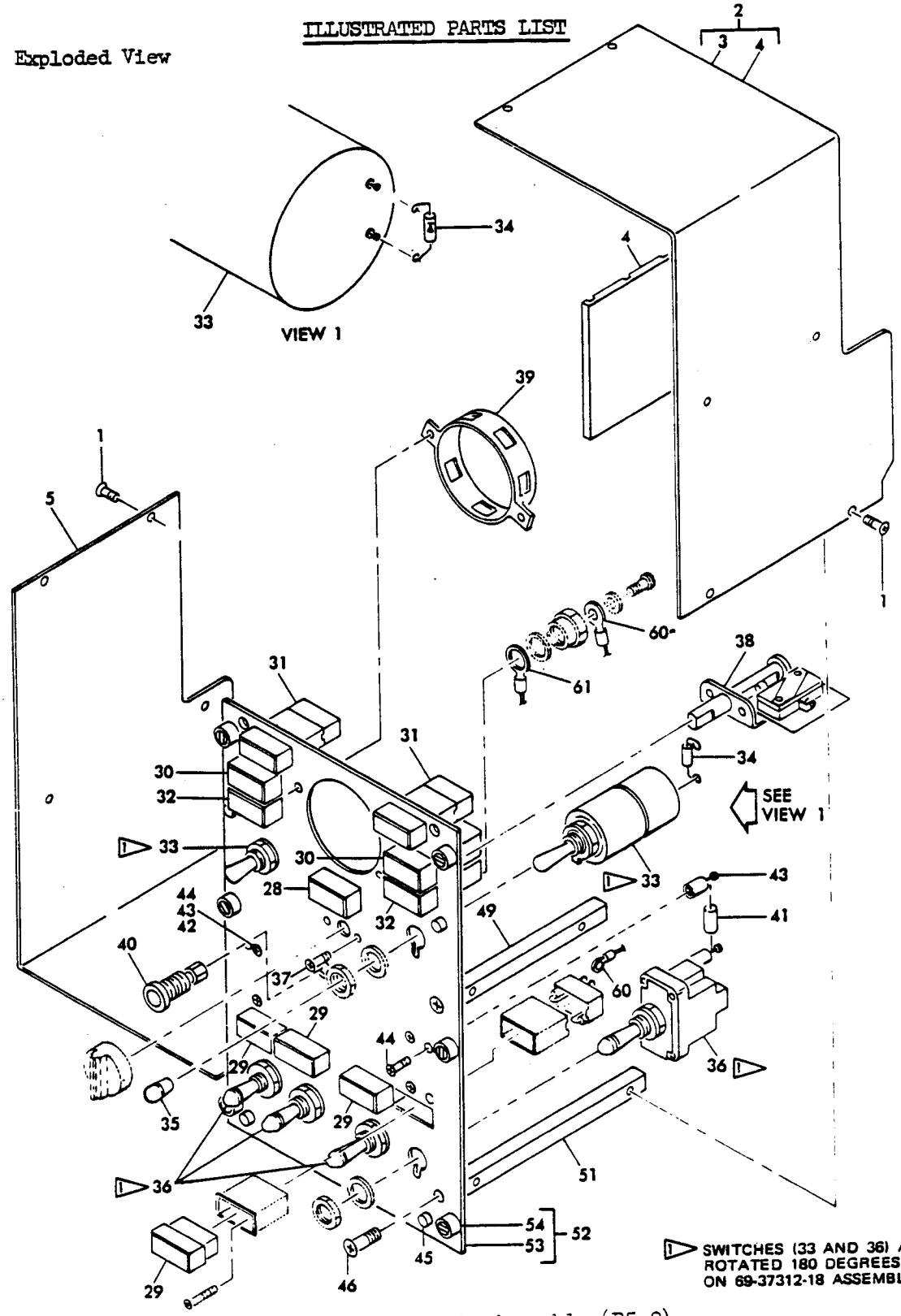
1. Tools used for repair of electrical connectors are listed in "Repair of Electrical Connectors," Subject 20-11-02.

2. Tools used for repair of electrical terminations and for replacement of insulating sleeving are listed in "Repair of Electrical Terminations and Electrical Bonding Areas," Subject 20-11-03.

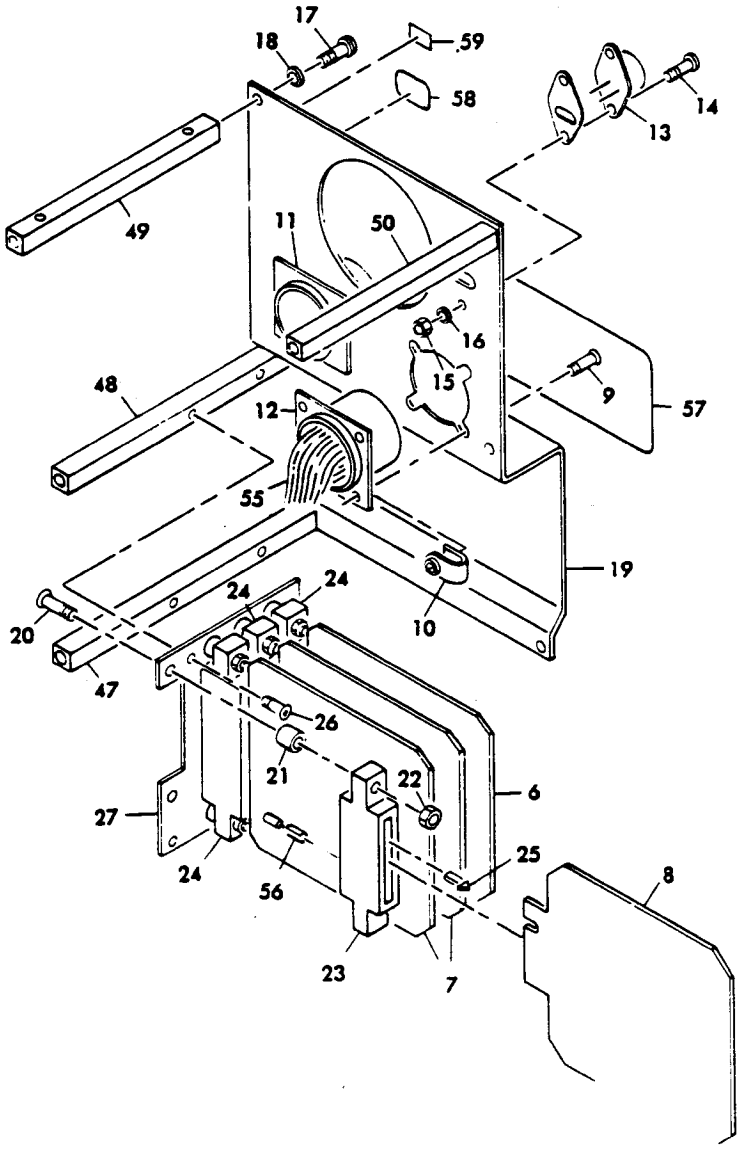
3. Tools used for soldering electrical connections are listed in "Soldering Electrical Connections," Subject 20-12-01.

   NOTE: For additional equipment required for testing, refer to TESTING.

1. Exploded View



Fuel System Module Assembly (P5-2)
Figure 1101 (Sheet 1)



Fuel System Module Assembly (P5-2)
Figure 1101 (Sheet 2)

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
	69-37312-9		FUEL SYSTEM MODULE ASSY (P5-2)	A	
	69-37312-9M		FUEL SYSTEM MODULE ASSY (P5-2)	B	
	69-37312-9K		FUEL SYSTEM MODULE ASSY (P5-2) (SB 30-1005)	C	
	69-37312-13		FUEL SYSTEM MODULE ASSY (P5-2)	D	
	69-37312-13M		FUEL SYSTEM MODULE ASSY (P5-2)	E	
	69-37312-13K		FUEL SYSTEM MODULE ASSY (P5-2) (SB 30-1005)	F	
	69-37312-15		FUEL SYSTEM MODULE ASSY (P5-2)	G	
	69-37312-17		FUEL SYSTEM MODULE ASSY (P5-2)	H	
	69-37312-18		FUEL SYSTEM MODULE ASSY (P5-2)	I	
	69-37312-22		FUEL SYSTEM MODULE ASSY (P5-2) (SB 30-1005)	J	
	*[1]		FUEL SYSTEM MODULE ASSY (P5-2) (SB 24-1014)	K	
1	NAS514P440-4		. SCREW		12
2	69-44456-1		. COVER ASSY		1
3	69-44456-2		. . COVER (USED ON 69-44456-1)		1
4	69-44456-6		. . FOAM (USED ON 69-44456-1)		1
5	69-44456-3		. COVER		1
6	69-51876-1		. PRINTED CIRCUIT ASSY (REF 31-36-43)	ABC	1
6	69-51876-3		. PRINTED CIRCUIT ASSY (REF 31-36-43)	DEF	1
6	69-51876-5		. PRINTED CIRCUIT ASSY (REF 31-36-43)	GHIJ	1
7	69-44603-5		. PRINTED CIRCUIT ASSY (REF 31-36-42)		2
8	69-70380-1		. 60-SECOND TIME DELAY PRINTED CIRCUIT ASSY (REF 28-09-60) STATIC SENSITIVE PART		L
8	2-402-02		. TIME DELAY SWITCH, V08748 (OPT)	AGI	1
8	2-462		. TIME DELAY SWITCH, V08748 (OPT)		1
9	BACS12CB04-5		. SCREW		8
10	BACN10NW1		. NUT, CLIP-ON		8
11	BACC45FN18-31P		. CONNECTOR		1
12	BACC45FN18-31P6		. CONNECTOR		1
13	2N3584		. TRANSISTOR, V86684		1
14	NAS601-6		. SCREW		2
15	NAS679A06W		. NUT		2
16	495334-7		. WASHER, INSULATING, V86684		2
17	BACS12CB06-5		. SCREW		6
18	MS35338-4		. WASHER		6
19	69-44456-7		. BACKPLATE		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
20	NAS514P632-14		. SCREW		8
21	NAS43DD1-17		. SPACER		8
22	NAS679A06W		. NUT		8
23	582553-1		. CONNECTOR, V00779		1
24	582557-1		. CONNECTOR, V00779		3
25	582507-1		. KEYING PLUG, V00779		4
26	BACS12CB04-4		. SCREW		4
27	69-44457-6		. MOUNTING PLATE		1
28	319-619-1002-002		. INDICATOR LIGHT ASSY, V81590 (BOEING 10-61305-3)		1
29	319-619-1001-019		. INDICATOR LIGHT ASSY, V81590 (BOEING 10-61305-25)		4
30	319-619-1001-020		. INDICATOR LIGHT ASSY, V81590 (BOEING 10-61305-26)		2
31	319-619-1002-016		. INDICATOR LIGHT ASSY, V85190 (BOEING 10-61305-66)		2
32	319-619-1001-051		. INDICATOR LIGHT ASSY, V85190 (BOEING 10-61305-71)		2
33	8ET1T		. SWITCH, TOGGLE, V91929		2
34	1N4384		. DIODE, V14936		2
35	69-44578-2		. CAP, CUSHION		2
36	1TL150-3D		. SWITCH, TOGGLE, V91929		4
37	NAS514P632-6		. SCREW		2
38	7AS12		. SWITCH, ROTARY, V91929		1
39	BACC10EL3		. CLAMP, INSTRUMENT		1
40	SCN001		. POWER CONNECTOR, V95354		1
41	1N4385		. DIODE, V14936	HIJ	2
42	1N746		. DIODE, V01295	J	1
43	1411A		. TERMINAL, INSULATED, V88245	HI	4
43	1411A		. TERMINAL, INSULATED, V88245	J	6
44	NAS514P632-3		. SCREW	HI	4
44	NAS514P632-3		. SCREW	J	6
45	BACN10PA06-6		. NUT, Anchor		4
46	NAS514P632-5		. SCREW		6
47	69-37312-4		. STANDOFF		1
48	69-37312-5		. STANDOFF		1
49	69-37268-13		. STANDOFF		2
50	69-37268-14		. STANDOFF		1
51	69-37268-21		. STANDOFF		1
52	69-37312-8		. BASEPLATE ASSY	ADG	1
52	69-37312-2		. BASEPLATE ASSY	I	1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
52	69-37312-20		. BASEPLATE ASSY	H	1
52	69-37312-8M		. BASEPLATE ASSY	BEH	1
52	69-37312-8K		. BASEPLATE ASSY	CFJ	1
52	69-37312-20K		. BASEPLATE ASSY	J	1
52	69-37312-23		. BASEPLATE ASSY	J	1
53	BACP10U0862G		. . BASEPLATE		1
54	BACS21DD1G		. . STUD ASSY		6
55	69-37312-11		. WIRE BUNDLE	ADG	1
55	69-37312-19		. WIRE BUNDLE	BEHI	1
55	69-37312-24		. WIRE BUNDLE	CFJ	1
56	66143-2		. TAB TERMINAL, V00779		68
57	BAC27DCC225		. MARKER		1
58	BAC27DCC243		. MARKER		1
59	BACM10L001CU		. MARKER		1
60	BACT12AC		. TERMINAL		AR
61	BACT12S		. TERMINAL		1

*[1] NO BOEING ASSIGNED PART NUMBER

REFERENCE DESIGNATION INDEX (SEE SCHEMATIC DIAGRAM)		
REFERENCE DESIGNATION	PART NUMBER	ITEM NO.
A1	69-51876-1	6
A1	69-51876-3	6
A1	69-51876-5	6
A2, A3	69-44603-5	7
A4	2-462	8
A4	69-70380-1	8
A4	2-462-02	8
CR1, CR2	1N4384	34
CR3, CR4	1N4385	41
CR5	1N746	42
L1, L2	319-619-1002-016	31
L3	319-619-1002-002	28
L4 thru L7	319-619-1001-019	29
L8, L9	319-619-1001-020	30
L10, L11	319-619-1001-051	32
L12	SCN001	40
P1	BACC45FN18-31P	11
P2	BACC45FN18-31P6	12
P3, P4, P5	582557-1	24
P6	582553-1	23
Q1	2N3584	13
S1, S2	8ET1T	33
S3	7AS12	38
S4 thru S7	1TL150-3D	36

VENDOR CODE

Code	Name and Address
V00779	AMP Incorporated P.O. Box 3608 Harrisburg, Pennsylvania 17105
V01295	Texas Instruments Incorporated Semi-Conductor Components Div. 13500 N. Central Expressway Dallas, Texas 75231
V08748	Electro Development Corporation 16700 13th West Lynnwood, Washington 98036
V14936	General Instrument Corp. Semi-Conductor Division 600 West John Street Hicksville, L.I., New York 11802
V81590	Korry Manufacturing Co. 233 - 8th Avenue North Seattle, Washington 98109
V86684	Radio Corporation of America Electronic Components and Devices 415 S. 5th Street Harrison, New Jersey 07029
V88245	Litton Industries USECO Division 13536 Saticoy Street Van Nuys, California 91406
V91929	Honeywell Incorporated Micro Switch Division Chicago and Spring Streets Freeport, Illinois 61032
V95354	Methode Manufacturing Co. 1700 South Hicks Road Rolling Meadows, Illinois 60008