TO: ALL HOLDERS OF MASTER CAUTION DISPLAY MODULE ASSEMBLY P5-64 OVERHAUL MANUAL, 33-10-07

REVISION NO. 1, DATED JAN 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	L/Overhaul
Added schematic diagram, Figure 801									X				

MASTER CAUTION DISPLAY MODULE ASSEMBLY P5-64
33-10-07

BOEING P/N 69-72631-1

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 32950-64	Jan 5/82

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
	33-10-07					
	T-1	Jan 5/82				
	T-2	BLANK				
*	LEP-1	Jan 5/83				
	LEP-2	BLANK				
	T/C-1	Jan 5/82				
	T/C-2	BLANK				
	1	Jan 5/82				
	2	BLANK				
	401	Jan 5/82				
	402	BLANK				
	701	Jan 5/82				
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	706	BLANK				
	801	Jan 5/82				
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	1101	Jan 5/82				
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*[1] Use applicable procedures in 20-11-04, 31-10-01 and standard industry practices.

*[2] Special instructions not required.

MASTER CAUTION DISPLAY MODULE ASSEMBLY P5-64

DESCRIPTION AND OPERATION

1. Description

   A. The master caution display module assembly P5-64 consists of two relays, three resistors, a printed circuit assembly, and a wire bundle.

2. Functional Description (See Schematic Diagram)

   A. The printed circuit assembly A1 operates as a power and ground seeking master caution sensor.

      (1) Pin 8 is circuit ground. A ground path is provided at pin 24 when transistor Q4 is turned on and Q2 is triggered into conduction. Q2 is triggered thru L1 and CR4 by momentarily turning Q1 on.

      (2) Transistor Q3 provides a constant voltage at its emitter. With pin 8 grounded, and a positive voltage connected to pin 7, current thru R21 and CR1 establishes base drive for Q3. Zener diode CR1 keeps an almost constant voltage at Q3 base.

      (3) SCR Q2 is triggered by Q1 conduction. Q1 is turned on by grounding pin 4, by turning on Q5 or Q6 or by grounding any one of pins of 5, 9, 21 or 22. Q5 or Q6 can be turned on by a positive voltage at pin 15 or pin 16, respectively. When Q5 is turned on, charging of C9 provides current thru R1 and R2 to turn Q1 on. When Q6 is turned on, charging C10 turns Q1 on. In the same manner, charging any one of capacitors C7, C8, C11, C12 or C13, when proper pin is grounded, turns Q1 on.

      (4) Transistor Q4 completes a ground path thru Q2 when turned on. Q4 is turned on when Q7 is on. A positive voltage applied to pins 15 or 16 will turn Q4 on. Q7 is turned on by a ground input at any one of pins 5, 9, 21 or 22.

      (5) Transistor Q8 provides a ground path at pin 23 when conducting. Q8 is turned on by an input voltage at pin 17 or 18. Q8 is turned off by a ground input at pin 19 or 20.

REPAIR

1. All repair can be accomplished with standard industry practices and instructions contained in 20-11-04 or 31-10-01 except as follows:

   A. If keying plug (155, Fig. 1101) required replacement, insert into printed circuit assembly connector XA1 at position 9.

TESTING

1. Test Equipment

   A. Power Supplies:

      (1) 28 ±1 vdc, 1 ampere max

      (2) Variable: 0-28 vdc

   B. Multimeter:

      (1) Voltmeter: capable of measuring 0 to 30 vdc (V1 and V2)

      (2) Ammeter: capable of measuring 0 to 100 mA (M)

   C. Switches:

      (1) SPST: S1 thru S12

      (2) SPDT: S13, S14

      (3) SPDT, center OFF: S15

   D. Lamp Load:

      (1) 28 vdc, 440 mA (L1)

      (2) 28 vdc, 40 mA (L2)

   E. Test Connector (with pigtail leads):

      (1) BACC45FT16-24S

2. Functional Test

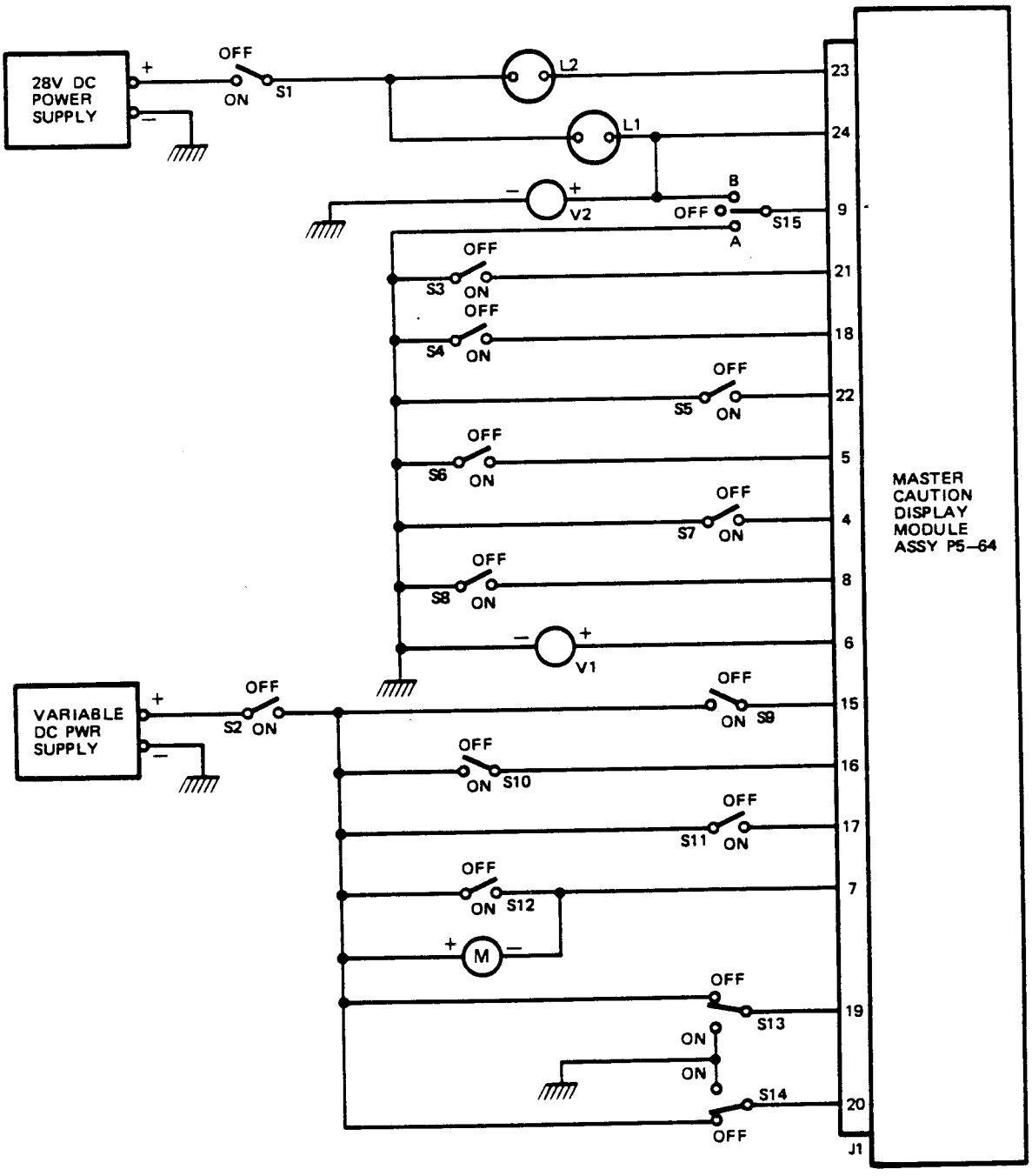
   A. Perform resistor and relay tests per Fig. 701.

Component Tested	Procedure	Measure Between Pins	Required Results
R3	Measure resistance	12 to 10	80.6 ±5.0 ohms
R2		24 to 10	80.6 ±5.0 ohms
K1,K2		8 to 11	No Con
	Connect pin 10 to 28 vdc		
K2	Connect pin 12 to GND Disconnect pin 12 from GND	8 to 11	Con
K1	Connect pin 24 to GND	8 to 11	Con
	Remove all connections		

Resistor and Relay Tests
Figure 701

B. Connect test setup per Fig. 702 with all switches set to OFF.

C. Perform functional tests per Fig. 703


28V DC POWER SUPPLY
+
–
OFF
ON
S1
L2
L1
V2
B
OFF
A
S15
S3
S4
S5
S6
S7
S8
V1
VARIABLE DC PWR SUPPLY
S2
S9
S10
S11
S12
M
S13
S14
23
24
9
21
18
22
5
4
8
6
15
16
17
7
19
20
J1
MASTER CAUTION DISPLAY MODULE ASSY P5–64

Step	Procedure	Required Results
1	Set S8 to ON	
2	Turn on variable power supply Adjust for a voltage of 28 ±1 vdc	
3	Set S2 to ON	Ammeter M indicates 15.5 to 27.0 mA.
4	Set S12 to ON	
5	Adjust variable power supply to a voltage of 18.0 ±0.5 vdc	
6	Turn on 28-volt power supply	V1 indicates 14.0 to 18.5 vdc thru the rest of the test
7	Set S1 to ON and S15 to B	L1 off V2 indicates 26 to 29 vdc
8	Set S15 to A	L1 on V2 indicates 3 vdc max
9	Set S15 to OFF	L1 off V2 indicates 26 to 29 vdc
10	Set S10 to ON	L1 on V2 indicates 3 vdc max
11	Set S10 to OFF	L1 off V2 indicates 26 to 29 vdc
12	Set S9 to ON	L1 on V2 indicates 3 vdc max
13	Set S9 to OFF	L1 off V2 indicates 26 to 29 vdc
14	Set S5 to ON	L1 on V2 indicates 3 vdc max
15	Set S8 to OFF	L1 remains on V2 indicates 4 vdc max
16	Set S8 to ON	L1 remains on V2 indicates 3 vdc max
17	Set S5 to OFF	L1 off V2 indicates 26 to 29 vdc
18	Set S3 to ON	L1 on V2 indicates 3 vdc max
19	Set S8 to OFF	L1 remains on V2 indicates 4 vdc max

Step	Procedure	Required Results
20	Set S8 to ON	L1 remains on V2 indicates 3 vdc max
21	Set S3 to OFF	L1 off V2 indicates 26 to 29 vdc
22	Set S6 to ON	L1 on V2 indicates 3 vdc max
23	Set S8 to OFF	L1 remains on V2 indicates 4 vdc max
24	Set S8 to ON	L1 remains on V2 indicates 3 vdc max
25	Set S6 to OFF	L1 off V2 indicates 26 to 29 vdc
26	Set S7 to ON	L1 on V2 indicates 3 vdc max
27	Set S8 to OFF	L1 remains on V2 indicates 4 vdc max
28	Set S8 to ON	L1 remains on V2 indicates 3 vdc max
29	Set S7 to OFF	L1 off V2 indicates 26 to 29 vdc
30	Set S11 to ON	L2 on V2 indicates 26 to 29 vdc thru the rest of the test
31	Set S13 to ON	L2 off
32	Set S13 to OFF	L2 on
33	Set S14 to ON	L2 off
34	Set S14 to OFF	L2 on
35	Set S4 to ON	L2 off
36	Set S4 to OFF	L2 on
37	Set S11 to OFF	L2 off
38	Turn off power supply and disconnect test setup	

TROUBLE SHOOTING

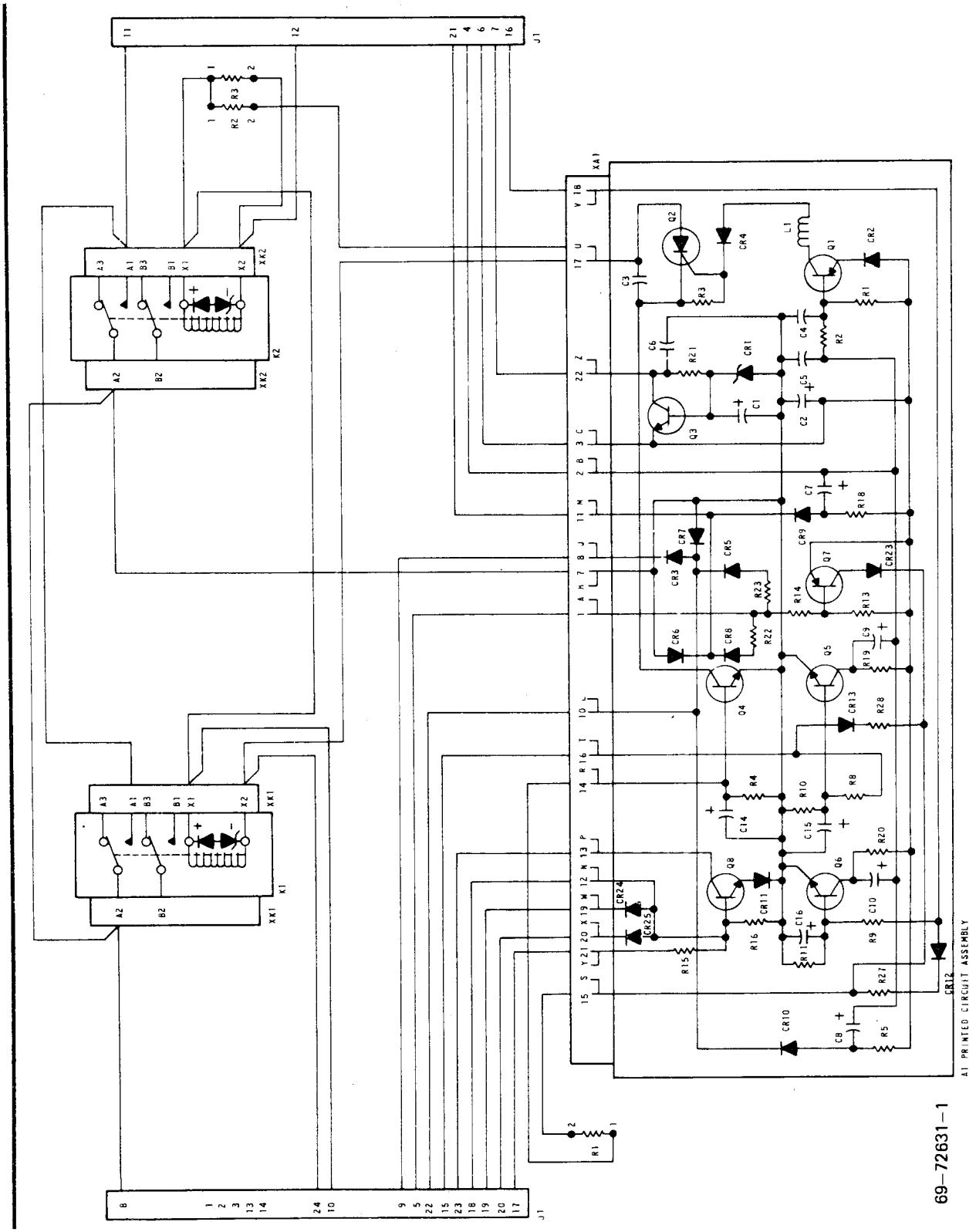
1. If failure of a test occurs, check for defective connections or incorrect wiring prior to replacing components.

NOTE: Trouble shooting is keyed to steps of functional tests and is written with the assumption that previous steps were completed satisfactorily.

Trouble	Possible Cause and Correction
Fig. 701	Listed component
Fig. 702	

NOTE: If V1 does not indicate 14.0 to 18.5 vdc during test, A1CR1, A1C1, A1R21 or A1Q3 is defective and should be replaced. If V2 indicates low voltage at step 7, A1CR3 is leaking. If V2 indicates improper voltage at any other step, A1Q2/Q4 in series are not fully conductive.

Step 8	A1Q1/L1/Q2/Q4/CR2 thru CR5/R1 thru R4/ R13/R15/Q7/C3/C4/C14 defective
Step 9	A1Q4 or A1Q7 defective
Steps 10 and 11	A1Q6/CR12/C10/C16/R9/R11/R27 defective
Steps 12 and 13	A1Q2 defective
Steps 14 thru 17	A1Q5/C9/C15/CR13/R8/R10/R28 defective
Steps 18 thru 20	A1CR6 thru CR9/C7/R18/R22 defective
Steps 21 thru 24	A1CR16/CR19/CR22/C13/R22/R26 defective
Steps 25 thru 29	A1CR17/CR14/CR20/C11/R6/R24 defective
Steps 30 thru 37	A1Q8/CR11/CR14/CR17/CR20/CR24/CR25/C11/R6/ R15/R16/R24 defective



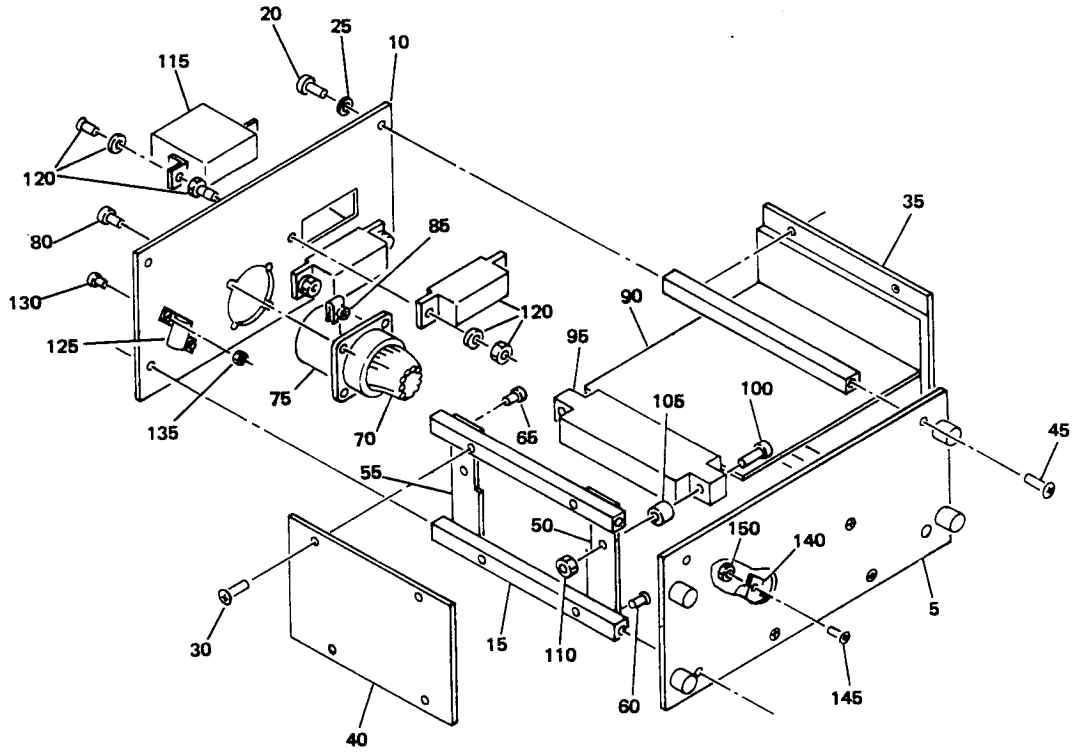
Schematic Diagram
Figure 801

ILLUSTRATED PARTS LIST

FIG. 1101 REFERENCE DESIGNATION INDEX (SEE SCHEMATIC DIAGRAM)		
REFERENCE DESIGNATION	PART NUMBER	ITEM NO.
A1	69-51810-9	90
J1	BACC45FN16-24P	75
K1, K2	BACR13CF2AB	115
R1	RER60F1001M	125
R2, R3	RER70F80R6M	140
XA1	582557-1	95
XK1, XK2	BACS16X1	120

VENDORS

V00779 AMP. INC., P. O. BOX 3608, HARRISBURG, PENNSYLVANIA 17105



69-72631-1

Master Caution Display Module Assembly P5-64
Figure 1101

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
1	69-72631-1		MASTER CAUTION DISPLAY MODULE ASSY P5-64		
5	69-72631-2		. BASEPLATE ASSY		1
10	69-72631-3		. BASEPLATE		1
15	69-72631-5		. STANDOFF		4
20	BACS12CB06-5		. SCREW		4
25	MS35337-41		. WASHER		4
30	NAS514P440-4		. SCREW		8
35	69-39431-16		. SIDE COVER ASSY		1
40	69-39431-7		. SIDE COVER		1
45	NAS514P632-5		. SCREW		4
50	69-39431-5		. SUPPORT PLATE		1
55	69-39431-6		. SUPPORT PLATE		1
60	NAS514P440-4		. SCREW		2
65	BACS12CB04-4		. SCREW		2
70	69-72631-4		. WIRE BUNDLE		1
75	BACC45FN16-24P		. CONNECTOR		1
80	BACS12CB04-5		. SCREW		3
85	BACN10NW1		. CLIP NUT		3
90	69-51810-9		. PRINTED CIRCUIT ASSY (REF 31-36-05)		1
95	582557-1		. CONNECTOR, V00779		1
100	BACS12CB06-14		. SCREW		2
105	NAS43DD1-17		. SPACER		2
110	NAS679A06W		. NUT		2
115	BACR13CF2AB		. RELAY		2
120	BACS16X1		. SOCKET, RELAY		2
125	RER60F1001M		. RESISTOR, 1K ±1 PCT, 5W		1
130	BACS12BE02-6		. SCREW		2
135	BACN10DN26		. NUT		2
140	RER70F80R6M		. RESISTOR, 80.6 OHMS ± 1 PCT, 25W		2
145	BACS12BE04-6		. SCREW		4
150	BACN10DN40		. NUT		4
155	582507-1		. KEYING PLUG, V00779		1