TO: ALL HOLDERS OF LEADING EDGE FLAP AND SLAT COMPARATOR PRINTED CIRCUIT ASSEMBLY OVERHAUL MANUAL, 27-56-47

REVISION NO. 6, DATED NOV 1/08

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 |
| Removed BAE Systems assemblies from manual | X | | | | | | | X | X | | | X | |

# LEADING EDGE FLAP AND SLAT COMPARATOR LOGIC PRINTED CIRCUIT ASSEMBLY

# 27-56-47

BOEING P/N 69-62790-3

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

| BOEING SERVICE BULLETIN | BOEING TEMPORARY REVISION | OTHER DIRECTIVES | DATE DIRECTIVE INCORPORATED INTO TEXT |
|---|---|---|---|
| | | MC 3400-20K | Jun 10/71 |
| | | PRR 31960-11 | Jun 10/71 |

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 |
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| 27-56-47 | | | | | | |
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*[1] Use applicable procedures in SOPM 20-11-04, OHM 31-10-01 and standard industry practices.

*[2] Special instructions not required.

# LEADING EDGE FLAP AND SLAT COMPARATOR LOGIC PRINTED CIRCUIT ASSEMBLY

NOTE: For coverage of 69-62252-9, refer to BAE Systems Controls Inc., (V89954 BAE Systems Controls Inc., 600 Main St., Johnson City, NY 13790-1806) CMM 27-56-47.

## 1. DESCRIPTION AND OPERATION

### A. Description

(1) The leading edge flap and slat comparator logic printed circuit assembly consists of an etched board containing conductor patterns on both sides and various combinations of resistors, transistors and diodes on one side. The components and conductor patterns are protected after mounting by conformal coating of the entire assembly, with the exception of the connector pin area.

### B. Operation

(1) The printed circuit assembly contains logic circuitry which supplies ground paths to illuminate display lamps that indicate leading edge flap and slat positions.

### C. Functional Description

(1) The leading edge flap and slat comparator logic printed circuit assembly consists of logic circuits used to illuminate lamps which indicate in-transit, mid-extend and full-extend leading edge flap and slat positions on an external master panel. (See Figure 1.)

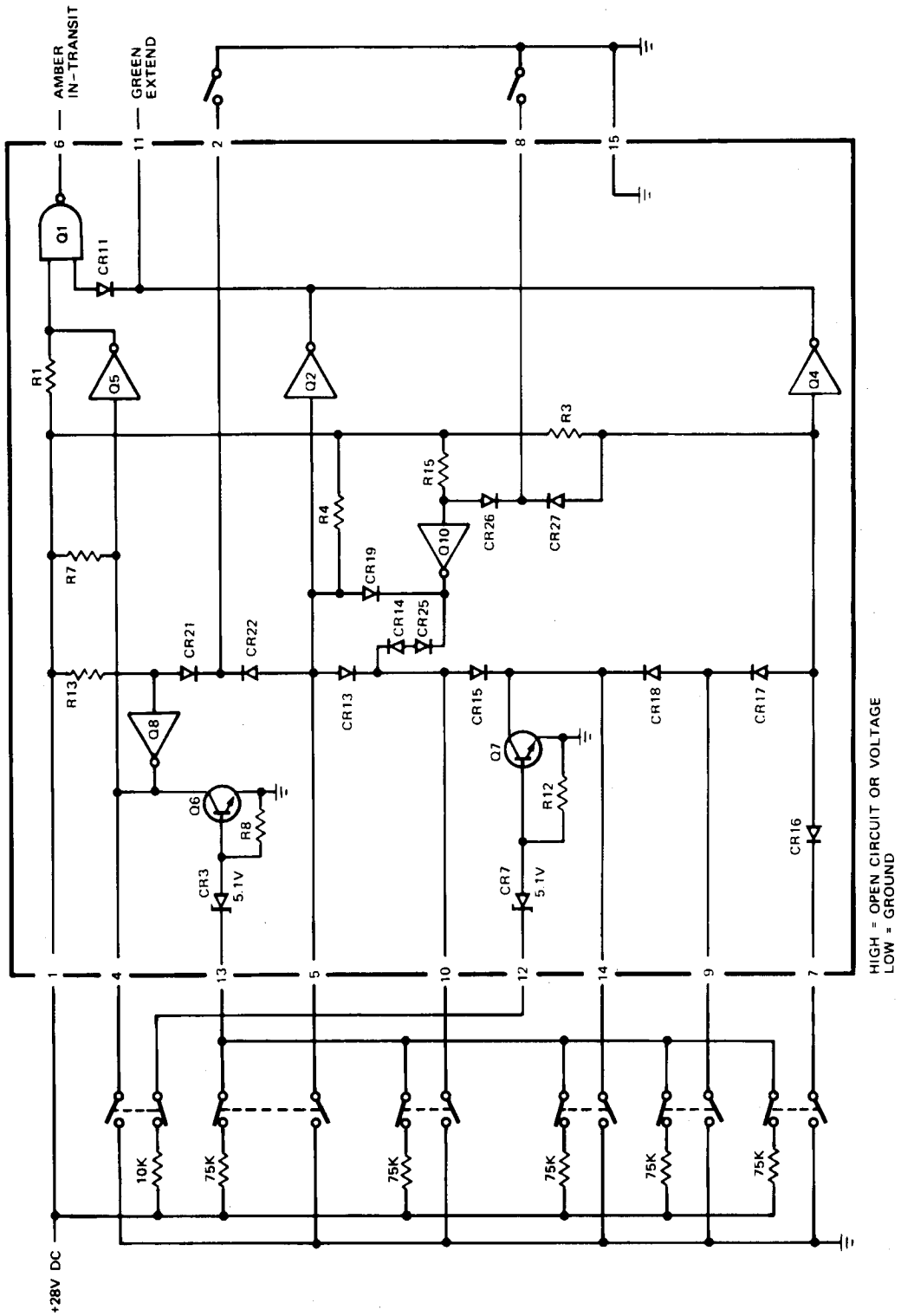
NOTE: High is defined as open circuit or applied voltage and low is defined as ground.

(2) Circuit power is 28 volts dc applied at pin 1 and circuit ground is at pin 15.

(3) Q1 will be turned on, to provide a ground path for a display lamp at pin 6, when Q2, Q4 and Q5 are turned off (providing high outputs).

(a) Q2 will be turned off, providing a high output, when pins 2, 5 or 10 are low (grounded), Q10 is turned on, or Q7 is turned on. Q10 is turned on by a high input at pin 8. Q7 is turned on by applied voltage at pin 12.

(b) Q4 will be turned off, providing a high output, when pins 7, 8, 9, or 14 are low (grounded), or Q7 is turned on. Q7 is turned on by applied voltage at pin 12.




Flap and Slat Comparator Logic
Figure 1

1580417

(c) Q5 will be turned off, providing a high output, when pin 4 is low (grounded), or Q6 is turned on, or Q8 is turned on. Q6 is turned on by applied voltage at pin 13. Q8 is turned on by a high input at pin 2.

(4) Q1 will be turned off, extinguishing the display lamp at pin 6, when Q2, Q4 or Q5 are turned on (providing low outputs).

(a) Q2 will be turned on, providing a low output, when all of pins 2, 5 and 10 are high (open circuit), Q7 is turned off, and Q10 is turned off. Q7 is turned off by an open circuit at pin 12. Q10 is turned off by a low (ground) at pin 8.

(b) Q4 will be turned on, providing a low output, when all of pins 7, 8, 9, and 14 are high (open circuit) and Q7 is turned off. Q7 is turned off by an open circuit at pin 12.

(c) Q5 will be turned on, providing a low output, when pin 4 is high ((open circuit), Q6 is turned off, and Q8 is turned off. Q6 is turned off by an open circuit at pin 13. Q8 is turned off by a low (ground) at pin 2.

(5) Q2 or Q4 will be turned on, to provide a ground path for a display lamp at pin 11, as described in par. 1.C.(4)(a) or 1.C.(4)(b), respectively.

D. 69-62790-3 has the following components physically located on the circuit board but not connected into the circuitry.

(1) CR5, CR9, CR12, CR20, CR23, CR24, R2, R9, R14, and R17

2. TESTING

A. Test Equipment

NOTE: Equivalent test equipment may be substituted for the equipment listed below unless otherwise noted.

(1) Power Supply: 24 ±0.5 volts dc, 1-amp capacity

(2) Volt ohmmeter: RCA WV38A

(3) Lamp Loads: 100 to 110 ma at 24 volts, 2 required (L1, L2)

NOTE: Lamp loads may be obtained by connecting three GE1819 or 387 lamps in parallel with 200-ohm, 10-turn potentiometer in one leg of circuit. Adjust potentiometer for 105 ±5 ma with 24 volts dc applied.

(4) Switches: SPST, 12 required (S1, S2, S4, S5, S7-S10, S12-S15)

(5) Resistors: 75k (± 5%), 1/4 watt (R1)
10k (± 5%), 1/4 watt (R2)

(6) Connector (with pigtail leads): 582553-1 (AMP Incorporated, P.O. Box 3608, Harrisburg, Pennsylvania 17105)

B. Functional Test

(1) Insert printed circuit assembly into test connector with component side of assembly matching numbered side of connector.

(2) Verify forward and reverse diode resistance as indicated in Figure 2.

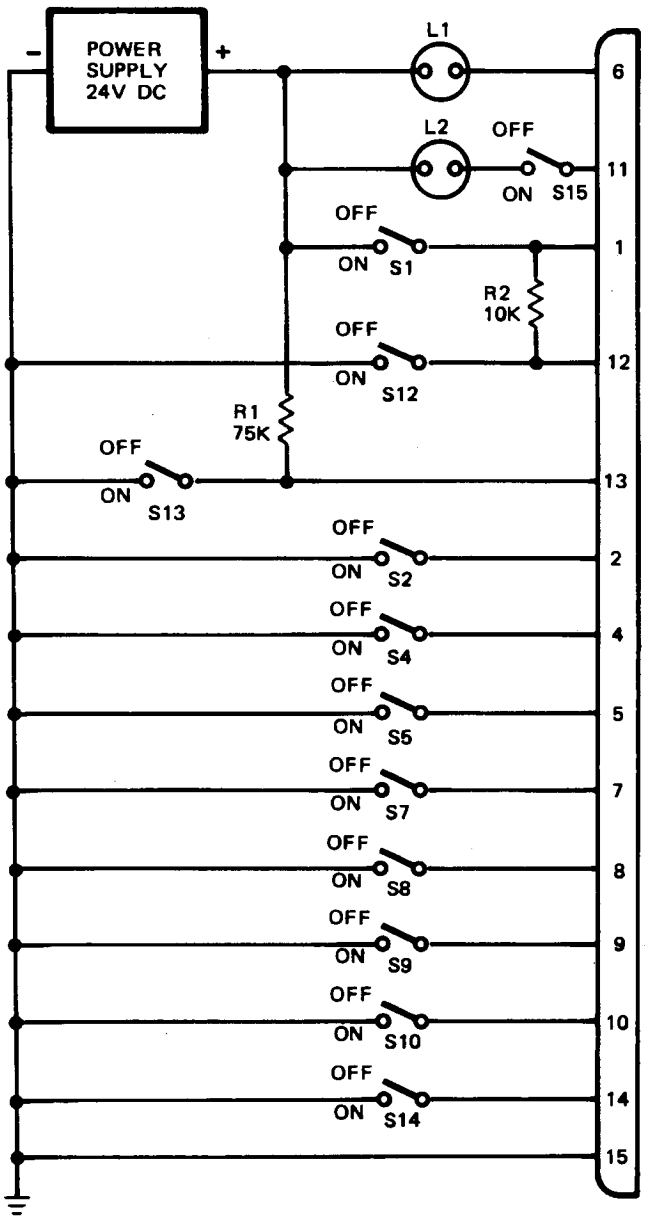
| Component Tested | Measure between Pins | 25 ohms max with + at pin | 50k min with + at pin |
|---|---|---|---|
| CR21, CR22 | 1 and 2 | --- | 2 |
| CR16 | 1 and 7 | --- | 7 |
| CR26, CR27 | 1 and 8 | --- | 8 |
| CR17 | 1 and 9 | --- | 9 |
| CR13, CR14 | 1 and 10 | --- | 10 |
| CR11 | 1 and 11 | --- | 11 |
| CR22 | 2 and 5 | 5 | 2 |
| CR13 | 5 and 10 | 5 | 10 |
| CR18 | 9 and 14 | 9 | 14 |
| CR15 | 10 and 14 | 10 | 14 |

Diode Resistance Tests
Figure 2

(3) Connect test circuit shown in Figure 3. Set all switches to OFF. Turn on power supply.

(4) Starting with step 1 of Figure 4 and continuing in sequence, verify test results as indicated. Leave all switches in last specified position. Any deviation constitutes a failure.

NOTE: EXT indicates lamp extinguished and ILL indicates lamp illuminated.




Test Setup
Figure 3

1580420

| Step | Procedure | | | Required Results | | |
|---|---|---|---|---|---|---|
| | Test Switch | | Voltage Measurement | Voltage V DC | L1 | L2 |
| | Number | Position | | | | |
| 1 | S15 | ON | | | EXT | EXT |
| 2 | S1 | ON | Pin 6 to gnd | 1 (max) | ILL | EXT |
| 2A | | | Pin 2 to gnd | 2.0 to 6.8 | ILL | EXT |
| 2B | | | Pin 8 to gnd | 2.9 to 6.8 | ILL | EXT |
| 2C | S15 | OFF | | | | |
| 2D | | | Pin 11 to gnd | 3.0 to 4.8 | ILL | -- |
| 2E | S15 | ON | | | ILL | EXT |
| 3 | S2, S13 | ON | Pin 4 to gnd | 3 to 6.8 | EXT | EXT |
| 4 | S4 | ON | | | ILL | EXT |
| 5 | S4 | OFF | | | EXT | EXT |
| 6 | S13 | OFF | Pin 13 to gnd | 3 to 6.8 | ILL | EXT |
| 7 | S13 | ON | | | EXT | ILL |
| 8 | S2 | OFF | | | ILL | EXT |
| 9 | S12 | ON | Pin 11 to gnd | 1 (max) | EXT | ILL |
| 9A | | | Pin 7 to gnd | 4.2 to 6.4 | EXT | ILL |
| 10 | S9 | ON | | | ILL | EXT |
| 11 | S9 | OFF | | | EXT | ILL |
| 12 | S14 | ON | | | ILL | EXT |
| 13 | S14 | OFF | | | EXT | ILL |
| 14 | S7 | ON | | | ILL | EXT |
| 15 | S7 | OFF | | | EXT | ILL |
| 16 | S8, S10 | ON | | | ILL | EXT |
| 17 | S10 | OFF | | | EXT | ILL |
| 18 | S12 | OFF | Pin 12 to gnd | 3 to 6.8 | ILL | EXT |
| 19 | S12 | ON | | | EXT | ILL |
| 20 | S2 | ON | | | EXT | EXT |
| 21 | S2 | OFF | Pin 5 to gnd | 3.2 to 7.4 | EXT | ILL |
| 22 | | | Pin 11 to gnd | 1 (max) | | |
| 23 | S9 | ON | | | | |
| | S8 | OFF | | | ILL | EXT |
| 24 | S8 | ON | | | EXT | ILL |
| 25 | S5 | ON | | | ILL | EXT |

Test Procedure
Figure 4

(5) Turn off power supply and disconnect all test connections.

3. TROUBLE SHOOTING

A. Trouble shooting is keyed to steps of the test procedures. Figure 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. If a fault indication occurs, check for defective connections, incorrect wiring connections, and damaged conductor pattern, prior to replacement of components.

NOTE: Figure 5 lists all test switch positions for each test step. If trouble is encountered during the tests, check the test switch positions against those listed for that particular step before proceeding with trouble shooting. In this table, a blank space in the active switch position column indicates that the switch shall be in the OFF position.

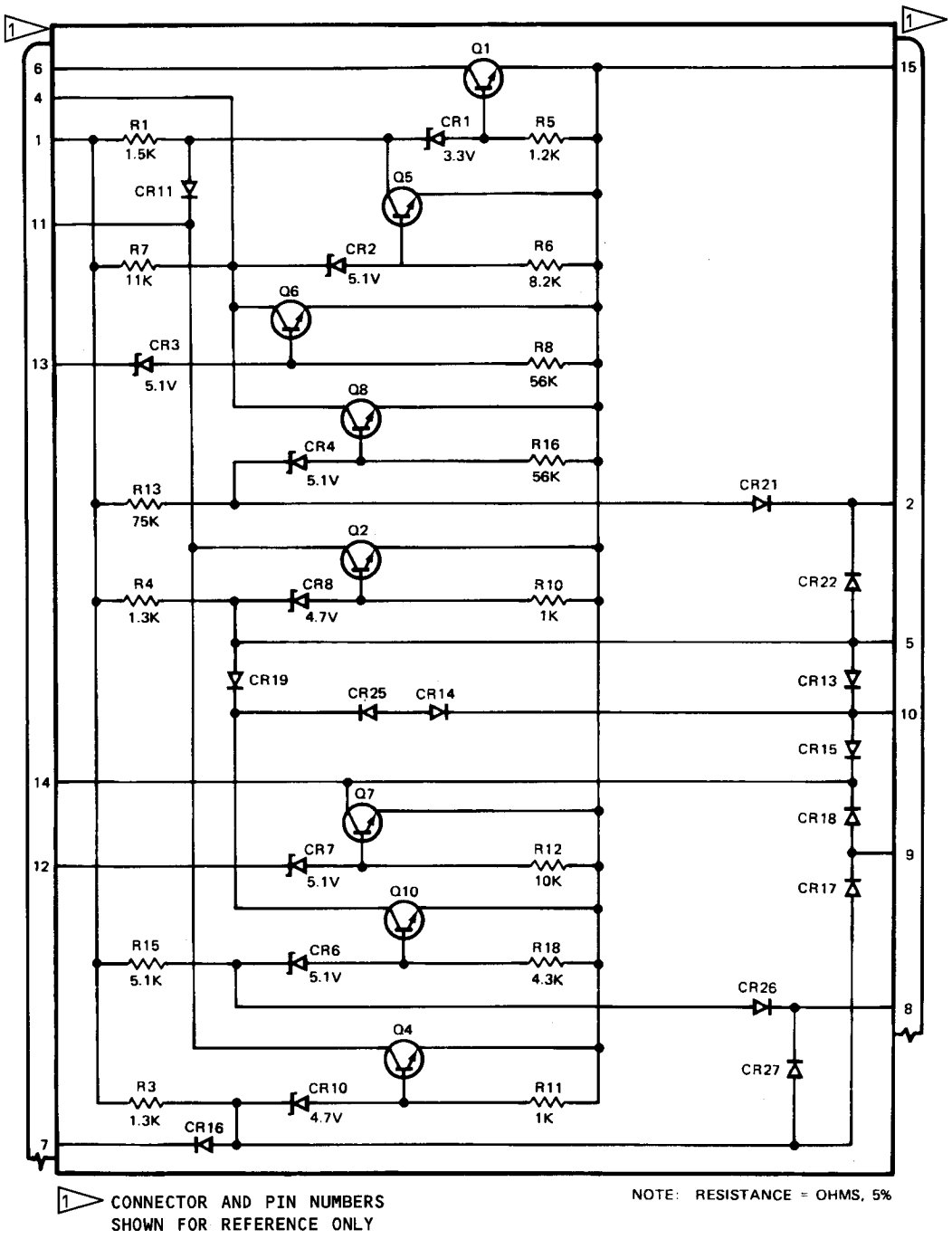
| Figure 4 Test Step | Active Switch Positions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S2 | S4 | S5 | S7 | S8 | S9 | S10 | S12 | S13 | S14 | S15 |
| 1 | ON | | | | | | | | | | | ON |
| 2, 2A, 2 | ON | | | | | | | | | | | ON |
| 2C, 2D | ON | | | | | | | | | | | |
| 2E | ON | | | | | | | | | | | ON |
| 3 | ON | ON | | | | | | | | ON | | ON |
| 4 | ON | ON | ON | | | | | | | ON | | ON |
| 5 | ON | ON | | | | | | | | ON | | ON |
| 6 | ON | ON | | | | | | | | | | ON |
| 7 | ON | ON | | | | | | | | ON | | ON |
| 8 | ON | | | | | | | | | ON | | ON |
| 9 | ON | | | | | | | | ON | ON | | ON |
| 10 | ON | | | | | | ON | | ON | ON | | ON |
| 11 | ON | | | | | | | | ON | ON | | ON |
| 12 | ON | | | | | | | | ON | ON | ON | ON |
| 13 | ON | | | | | | | | ON | ON | | ON |
| 14 | ON | | | | ON | | | | ON | ON | | ON |
| 15 | ON | | | | | | | | ON | ON | | ON |
| 16 | ON | | | | | ON | | ON | ON | ON | | ON |
| 17 | ON | | | | | ON | | | ON | ON | | ON |
| 18 | ON | | | | | ON | | | | ON | | ON |
| 19 | ON | | | | | ON | | | ON | ON | | ON |
| 20 | ON | ON | | | | ON | | | ON | ON | | ON |
| 21, 22 | ON | | | | | ON | | | ON | ON | | ON |
| 23 | ON | | | | | | ON | | ON | ON | | ON |
| 24 | ON | | | | | ON | ON | | ON | ON | | ON |
| 25 | ON | | | ON | | ON | ON | | ON | ON | | ON |

Test Switch Positions
Figure 5

| Trouble | Possible Cause and Correction |
|---|---|
| Fig. 2 | Diode noted in Fig. 2. |
| Fig. 4 | |
| Step 1 | |
| L1 illuminated | Q1 conducting. Replace Q1. |
| L2 illuminated | Q2 or Q4 conducting. Isolate and replace Q2 or Q4. |
| Step 2 | |
| L1 extinguished | Q1 or Q6 and Q8 not conducting, Q5 conducting.<br>(1) Measure voltage from pin 4 to ground. If voltage approximately 5.1 volts dc, Q6 and Q8 not conducting. Measure voltage from pin 2 to ground. If voltage approximately 5.1 volts dc, replace Q8. If voltage not approximately 5.1 volts dc, CR4, R13 or R16 open or incorrect value. Isolate and replace CR4, R13 or R16. Measure voltage from pin 13 to ground. If voltage approximately 5.1 volts dc, replace Q6. If voltage not approximately 5.1 volts dc, CR3 or R8 open or incorrect value. Isolate and replace CR3 or R8.<br>(2) If voltage from pin 4 to ground approximately 1 volt dc, Q5 conducting or Q1 not conducting. Measure voltage from CR1/R1 junction to ground. If voltage approximately 1 volt dc, replace Q5. If voltage approximately 3.3 volts dc, Q1 not conducting, replace Q1. If voltage above 3.3 volts dc or 0 volts dc, CR1, R1 or R5 open or incorrect value. Isolate and replace CR1, R1 or R5. |
| Step 2A | CR4 |
| Step 2B | CR6 |
| Step DD | CR1 |

| Trouble | Possible Cause and Correction |
|---|---|
| L2 illuminated | Q7 not conducting or CR13, CR14, CR15, CR17 or CR18 open. Measure voltage from pin 12 to ground. If voltage approximately 5.1 volts dc, isolate and replace CR13, CR14, CR15, CR17, CR18, or Q7. If voltage not approximately 5.1 volts dc, CR7 open or CR7 or R12 incorrect value. Isolate and replace CR7 or R12. |
| Voltage from pin 6 to ground incorrect | Q1 not fully conducting. CR1, R1 or R5 incorrect value or Q1. Isolate and replace CR1, R1, R5, or Q1. |
| Step 3 | |
| Voltage from pin 4 to ground incorrect | Q6 or Q8 conducting; CR2, R6 or R7 open or incorrect value. Isolate and replace Q6, Q8, CR2, R6, or R7. |
| L1 illuminated | Q5 not conducting. Replace Q5. |
| Step 4 | |
| L1 extinguished | Q5 conducting. Replace Q5. |
| Step 6 | |
| Voltage from pin 13 to ground incorrect | CR3 or R8 open or incorrect value. Isolate and replace CR3 or R8. |
| L1 extinguished | Q6 not conducting. Replace Q6. |
| Step 8 | |
| L1 extinguished | Q8 not conducting; CR4, R13 or R16 open or incorrect value. Isolate and replace Q8, CR4, R13 or R16. |
| Step 9 | |
| Voltage from pin 11 to ground incorrect and L2 extinguished | Q4 not conducting or Q7 conducting. Measure voltage from pin 8 to ground. If voltage approximately 1 volt dc, Q7 conducting. Replace Q7. If voltage approximately 4.7 volts dc, Q4 not conducting. Replace Q4. If voltage 0 or more than 4.7 volts dc, CR10, R3 or R11 open or incorrect value. Isolate and replace CR10, R3 or R11. |
| L1 illuminated | CR11 open. Replace CR11. |
| Step 9A | CR10 |

| Trouble | Possible Cause and Correction |
|---|---|
| Step 10 | CR17 open or Q4 conducting. Isolate and replace CR17 or Q4. |
| Step 12 | CR18 open. Replace CR18. |
| Step 14 | CR16 open. Replace CR16. |
| Step 16 | CR13, CR14 or CR27 open. Isolate and replace CR13, CR14 or CR27. |
| Step 17 | Q2 not conducting or Q10 conducting. Measure voltage from pin 5 to ground. If voltage approximately 1 volt dc, replace Q10. If voltage approximately 4.7 volts dc, CR8, Q2, R4 or R10 open or CR8, R4, or R10 incorrect value. Isolate and replace CR8, Q2, R4, or R10. |
| Step 18 | Q7 not conducting; CR13 or CR14 open. If voltage from pin 12 to ground approximately 5.1 volts dc, isolate and replace CR13, CR14 or Q7. If voltage more than 6 volts dc, CR7 or R12 open or incorrect value. Isolate and replace CR7 or R12. |
| Step 20 | CR21 or CR22 open, or Q2 or Q8 conducting. Isolate and replace CR21, CR22, Q2, or Q8. |
| Step 21 | Q2 not conducting. If voltage from pin 5 to ground 3.2 to 7.4 volts dc, replace Q2. If voltage from pin 5 to ground not 3.2 to 7.4 volts dc, CR8, R4 or R10 open or incorrect value. Isolate and replace CR8, R4 or R10. |
| Step 22 | Q2 not fully conducting. Q2 or CR8, R4 or R10 incorrect value. Isolate and replace CR8, Q2, R4 or R10. |
| Step 23 | CR17 or CR19 open; or Q10 not conducting. Measure voltage from pin 8 to ground. If voltage approximately 5.1 volts dc, isolate and replace CR17 or CR19. If voltage not approximately 5.1 volts dc, CR6, Q10, R15, or R18 open or CR6, R15 or R18 incorrect value. Isolate and replace CR6, Q10, R15, or R18. |
| Step 24 | CR26 open. Replace CR26. |
| Step 25 | Q2 conducting. Replace Q2. |




69-62790-3

Leading Edge Flap and Slat Comparator Logic
Printed Circuit Assembly Schematic Diagram
Figure 6

1580430

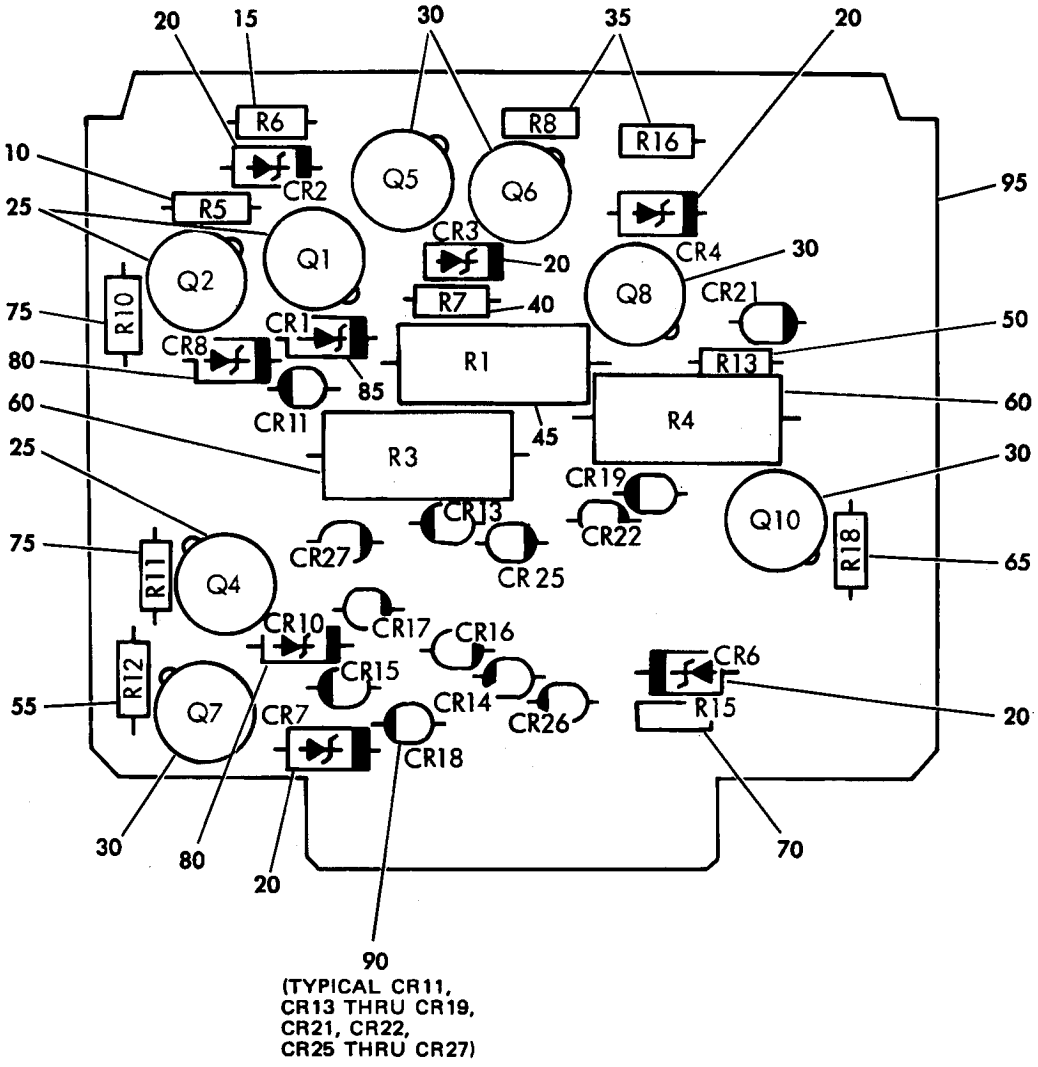
4. ILLUSTRATED PARTS LIST

| REFERENCE DESIGNATION INDEX (SEE SCHEMATIC DIAGRAM) | | |
|---|---|---|
| REFERENCE DESIGNATION | PART NUMBER | ITEM NO. |
| CR1 | 1N746 | 85 |
| CR2, CR3, CR4, CR6, CR7 | 1N751 | 20 |
| CR8, CR10 | 1N750 | 80 |
| CR11, CR13 thru CR19, CR21, CR22, CR25 thru CR27 | 1N5061 | 90 |
| Q1, Q2, Q4 | *2N3440 | 25 |
| Q1, Q2, Q4 | 91SP266 | 25 |
| Q5 thru Q8, Q10 | 2N3440 | 30 |
| R1 | RC42GF152J | 45 |
| R3, R4 | RC42GF132J | 60 |
| R5 | RCR07G122JM | 10 |
| R6 | RCR07G822JM | 15 |
| R7 | RCR07G113JM | 40 |
| R8, R16 | RCR07G563JM | 35 |
| R10, R11 | RCR07G102JM | 75 |
| R12 | RCR07G103JM | 55 |
| R13 | RCR07G753JM | 50 |
| R15 | RCR07G512JM | 70 |
| R18 | RCR07G432JM | 65 |

* Preferred part

VENDORS

V21845 SOLITRON DEVICES, INC., 3301 ELECTRONICS WAY, WEST PALM BEACH, FLORIDA, 33407-4697




69-62790-3

NOTE: THE FOLLOWING ADDITIONAL COMPONENTS (NOT SHOWN) ARE ON 69-62790-3:

CR5, CR9, CR12, CR20, CR23, CR24, R2, R9, R14, R17; THESE COMPONENTS HAVE NO EFFECT ON CIRCUITRY.

Leading Edge Flap and Slat Comparator
Logic Printed Circuit Assembly
Figure 7

1580442

| FIG. & ITEM NO. | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1 2 3 4 5 6 7 | USE CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 7- | 69-62790-3 | | LE FLAP AND SLAT COMPARATOR LOGIC PRINTED CIRCUIT ASSY *[1] | | |
| 10 | PCR07G122JM | | . RESISTOR, 1.2K (± 5%), 1/4 W | | 1 |
| 15 | RCR07G822JM | | . RESISTOR, 8.2K (± 5%), 1/4 W | | 1 |
| 20 | 1N751 | | . DIODE, ZENER, 5.1 V (± 10%) 0.4 W | | 5 |
| 25 | 2N3440 | | . TRANSISTOR (PREF) | | 3 |
| 25 | 91SP266 | | . TRANSISTOR, V21845 (OPT) | | 3 |
| 30 | 2N3440 | | . TRANSISTOR | | 5 |
| 35 | RCR07G563JM | | . RESISTOR, 56K (± 5%), 1/4 W | | 2 |
| 40 | RCR07G113JM | | . RESISTOR, 11K (± 5%), 1/4 W | | 1 |
| 45 | RC42GF152J | | . RESISTOR, 1.5K (± 5%), 2 W | | 1 |
| 50 | RCR07G753JM | | . RESISTOR, 75K (± 5%), 1/4 W | | 1 |
| 55 | RCR07G103JM | | . RESISTOR, 10K (± 5%), 1/4 W | | 1 |
| 60 | RC42GF132J | | . RESISTOR, 1.3K (± 5%), 1/4 W | | 2 |
| 65 | RCR07G432JM | | . RESISTOR, 4.3K (± 5%), 1/4 W | | 1 |
| 70 | RCR07G512JM | | . RESISTOR, 5.IK (± 5%), 1/4 W | | 1 |
| 75 | RCR07G102JM | | . RESISTOR, 1K (± 5%), 1/4 W | | 2 |
| 80 | 1N750 | | . DIODE, ZENER, 4.7 V (± 10%), 0.4 W | | 2 |
| 85 | 1N746 | | . DIODE, ZENER, 3.3 V (± 10%), 0.4 W | | 1 |
| 90 | 1N5061 | | . DIODE | | 13 |
| 95 | 69-62252-8 | | . ETCHED BOARD | | 1 |

*[1] SEE NOTE ON FIG. 7