COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

LANDING GEAR ACCESSORY UNIT ASSEMBLY, M338

PART NUMBER 65-52811–181

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COMPONENT MAINTENANCE MANUAL

Revision No. 12
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To: All holders of LANDING GEAR ACCESSORY UNIT ASSEMBLY, M338 32-66-47.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
27-1114		PRR 33143	JUN 05/87
31-1049			JUN 05/87
		MC 3151-001K	DEC 05/87

All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

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Temporary Revision		Inserted		Removed	
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INTRODUCTION

1. General

A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.

B. This manual is divided into different parts:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) List of Effective Pages

(5) Table of Contents

(6) Temporary Revision & Service Bulletin Record

(7) Record of Revisions

(8) Record of Temporary Revisions

(9) Introduction

(10) Procedures & IPL Sections

C. Refer to the Table of Contents for the page location of the applicable procedures.

D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.

E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.

F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.

G. Verification:

LANDING GEAR ACCESSORY UNIT ASSEMBLY, M338 - DESCRIPTION AND OPERATION

1. Description

A. The landing gear accessory unit assembly consists of control and safety relays, solid-state circuits, and related wiring and connectors mounted in a chassis assembly. The accessory unit assembly includes air and ground sensing indicators and test swtiches.

2. Operation

A. The landing gear accessory unit assembly receives signals from proximity sensors on the landing gear. These signals are transmitted to solid-state switching circuits in the accessory unit assembly to control the relays. The relays provide the required control and indication of the landing gear. The air and ground sensing indicators and test switches are used to check for malfunction in the accessory unit assembly and to isolate the safety relays for airplane maintenance purpose.

B. The assembly controls and monitors the following systems.

(1) Safety Relay System (squat switches)

(2) Landing Gear Warning System

(3) Automatic Ground Speed Brake System

(4) Takeoff Warning System

C. Functional Description (See Schematic Diagram)

(1) The safety relay system (squat switches) consists of the air safety relays and the ground safety relays.

(a) The air safety relay system consists of normally open proximity switch A2, relays K3 and K5, test switch S1, test indicator L1, and an external proximity sensor S106. The air safety relays provide the functions listed in DESCRIPTION AND OPERATION, Table 1 to the ground critical systems.

Table 1: Air Safety Relay Functions

Ground Critical Systems	Air Mode	Ground Mode
1. Drain mast heater	Switches the heater from 28-volt to 115-volt power source to provide higher heating of the drain mast.	Switches the heater from 115-volt to 28-volt power source to reduce heating of the drain mast.
2. Stall Warning	Arms the stall warning system.	Deactivates the stall warning system.
3. Antiskid System	Prevents inboard brake application by actuating the antiskid control valves to the full dump	Deactivates the antiskid touchdown protection circuit and allows normal braking application.
4. APU Fire Detection Horn	Deactivates the APU wheel well fire warning horn circuit.	Arms the APU wheel well fire warning horn circuit.
5. Landing Gear Latch	Energizes the lever latch solenoid to enable landing gear retraction without override.	De-energizes the landing gear lever latch solen- oid to prevent the landing gear handle from being operated to the up position.

(b) Sensor S106 and switch A2 are connected at pins B35 and B36 and form a bridge circuit. S106 appears as an inductance to A2. (See Manufacturer's Overhaul Manual for details.) S106 is located in the right main landing gear wheel well and will actuate A2 when the landing gear oleo is extended. Twenty-eight volt dc circuit power is provided at pin A33. Circuit ground is at pins A17 and A67 (DESCRIPTION AND OPERATION, Figure 1).

1) K3 and K5 are energized, when A2 is actuated to provide a ground path for the relay coils. K3 and K5 provide the switching to activate (or deactivate) the circuits indicated in DESCRIPTION AND OPERATION, Table 1.

2) The relays can be tested while the airplane is on the ground by pressing S1. This actuates A2 and simulates air mode. L1 will illuminate while S1 is depressed.

(c) The ground safety relays system consists of normally open proximity switch A3, relays K1, K2, K4, K6, K7, and K8, test switch S2, test indicator L2, and an external proximity sensor (S105). The ground safety relays provide the functions indicated in DESCRIPTION AND OPERATION, Table 2 to the air critical systems.

Table 2: Ground Safety Relay Functions

Air Critcal System	Ground Mode	Air Mode
1. Pressurization Control	Deactivates the pressuri- zation control circuit	Activates the automatic control circuit to maintain cabin pressurization when airplane is in the air.
2. Wing Anti-Ice	Prevents hot air from entering anti-ice duct	Permits hot air entering anti-ice duct.
3. Stall Warning	Deactivates the stall warning system	Activates the stall warning system.
4. Turbofans	Opens turbofan valves	Closes turbofan valves.
5. Flight Recorder	Deactivates flight recorder	Activates flight recorder.
6. Comparator-NAV (when installed)	Prevents a NAV warning	Permits a NAV warning
7. Static Inverter	Prevents automatic opera- tion of the static inverter	Permits automatic opera- tion of the static inverter.
8. Engine gravel protection	Activates gravel protec- tion valve	Deactivates gravel protection valve.
9. Thrust Reversal Flap Retraction	Activates thrust reversal flap retract valve Bypass	Activates thrust reversal flap retract valve Normal
10. Thrust Reversers	Deactivates thrust rever- ser disarming circuits	Activates thrust reverser disarming circuits.
The ground safety relays when activated by the parking brake switch provide the following functions to the air critical systems:		
	Ground Mode and Parking Brake Set	Air Mode or Parking Brake NOT Set
1. Hydraulic Inter- connect Valve	Permits hydraulic system interconnection	Automatically closes the hydraulic interconnect valve to isolate the A and B hydraulic systems.
2. Voice Recorder	Permits the erasure of recorder tape	Deactivates the voice recorder erasure circuit.

Table 2: Ground Safety Relay Functions (Continued)

Air Critcal System	Ground Mode	Air Mode
3. Main Cargo Door Control	Permits cargo door oper- ation	Deactivates the cargo door control circuit.
4. Antiskid System	Permits antiskid trouble shooting isolation test	Removes antiskid system tests electrical power.

(d) Sensor S105 and switch A3 are connected at pins A1 and A2. S105 is in the right main gear wheel well and will actuate A3 when the landing gear oleo is compressed. Twenty-eight volt dc circuit power is provided at pin A33. Circuit ground is at pins A29 and A67. In addition, when the parking brake switch is set, 28 volts dc is applied at pin B17 (DESCRIPTION AND OPERATION, Figure 2).

1) K1, K2, K6, and K8 are energized when A3 is actuated. K4 will energize when the parking brake switch is set and A3 is actuated (K6 energized). K7 will energize when the parking brake switch is set and K3 is not energized.

2) Relays K1, K2, K4, K6, and K8 can be tested while the airplane is on the ground by pressing S2. This deactuates A3 and simulates air mode (or brake switch not set). L2 will remain lit while S2 is depressed.

D. The landing gear warning system consists of logic cards A7 and A15, proximity switches A8, A10, A12, A13, A14, and A16 and their associated external proximity sensors, and external indicator lamps and switches. The system provides green lamp indications when the landing gears are down and locked. Also, it provides red lamp indications indicating unsafe conditions (DESCRIPTION AND OPERATION, Figure 3) when:

(1) The landing gear is in transit.

(2) The landing gear position and the landing gear control lever are not in agreement.

(3) The engine throttles are retarded to the idle range and the landing gear is not down and locked.

E. Since the lamp indication circuits are the same, only the right main gear circuit will be explained (DESCRIPTION AND OPERATION, Figure 4). Circuit power (Q1, Q2 base drive) is provided at pin A33 (J15 pin 12). Circuit ground is at pin A30 (J15 pin 2).

(1) A ground path will be provided at pin A41 to turn on the green lamp when normally-open proximity switch A12 is actuated. A12 is connected to an external proximity sensor. When the landing gear is down and locked, the sensor will actuate A12.

(2) A ground path will be provided for the red lamp at pin A42 when either of the following conditions exist:

(a) A15Q1 will provide ground when:

1) The landing gear lever is not down (open circuit to pin A35) and:

2) The landing gear is not in the up and locked position (normally-open proximity switch A13 not actuated).

(b) A15Q2 will provide ground when the landing gear is not in the down and locked position (normally-open proximity switch A12 is not actuated) and one of the following occurs:

1) The landing gear lever is down (ground to pin A35).

2) Engine No. 1 throttle is retarded (ground to pin A52).

3) Engine No. 2 throttle is retarded (ground to pin A51).

F. The landing gear aural warning system (DESCRIPTION AND OPERATION, Figure 5) consists of logic card AII, normally-open proximity switches and associated landing gear position sensors, and external switches and a horn. (See DESCRIPTION AND OPERATION, Figure 6 for logic diagram).

(1) When one or more of the landing gears are not down and locked (proximity switches not actuated), the radio altitude is less than one thousand feet, and the flaps are not up, base voltage is available to AIIQ1. A11Q1 will conduct and provide a ground path for the horn when one of the following conditions exist:

(a) The flaps are extended beyond 25-handle units and one of the two following conditions exists.

(2) Both EPRs are below 1.55

(3) The flaps are extended beyond 30 degrees.

This provides ground at pin A49 and allows AII Q1 to conduct.

(a) Either engine is retaded to idle. This provides a ground at pins A51 and/or A52 and allows A11Q2 or A11Q3 to conduct.

1) In this condition, depressing the horn reset switch provides a positive voltage to the gate of SCR's to turn off A11Q2 and A11Q3 by grounding their base. Advancing either throttle will reset one SCR to again enable the horn circuit.

G. The automatic ground speed brake system actuates the ground and flight spoilers to aid braking after touchdown (DESCRIPTION AND OPERATION, Figure 7). The system consists of logic card A5, relays K9 through K13, and external switches, lamps and modules. The landing gear module controls the automatic mode of operation of the spoilers when the system is armed. It will provide voltage to cause the spoilers to be raised (pin B13) or lowered (pin B5) and provide ground to cause indicator lamps L441 (pin A34) or L442 (pin A18) to illuminate. When either lamp is illuminated, the other must be extinguished. Circuit power (system armed) is provided at pin A56. Pins A7 and A67 are circuit grounds.

(1) When the speed brake control lever is set to the ARMED position, 28 volts dc is provided to pin 12 of circuit card A5 through pin A56. This provides base voltage for Q1 through R1, for Q2 through CR11 and CR9/CR7, and for Q3 through CR5. When Q1 is on, L442 (DO NOT ARM) is illuminated. When Q2 is on, L441 (ARMED) is illuminated, and at the same time Q1 is turned off by shunting of its base voltage to ground. When Q3 is on, base voltage to Q2 received through CR9 or CR7 is shunted to ground.

(2) At the time the speed brake control lever is set to ARMED, if both inboard and outboard antiskid systems are inoperative, Q2 base voltage is shunted to ground through CR8 and CR10. Q2 will be off, Q1 will be on, and the DO NOT ARM indicator will be illuminated.

(3) Presuming antiskid systems operative, and control lever set to ARMED, the 28-volt dc input to pin A56 can be passed through two of relays K9, K10, K11, or K12 provided main landing gear speeds have reached 60 knots. Wheel speed inputs from the antiskid control system energize the wheel speed relays individually. Sixty knots on both outboard wheels, both inboard wheels, or both wheels on one side, is the minimum combination required to energize two relays such that 28 volts dc is passed through pin B13 to the raise coils of the handle actuator (M359). The handle will be driven to the raise position. The lower limit switch shunts A5-Q3 base voltage (received through R4) to ground. As the handle departs the lower limit, the shunt is removed. However, the combination of relays that provided power to the raise windings also passes 28 volts dc to pin 4 of card A5. This holds Q2 on, L441 (ARMED) illuminated, even though Q3 is turned on. The combination of K9, K10, K11, and K12 relays also passes 28 volts dc from pin B46 to the automatic brake control module (M577) autobrake output relay.

(4) A ground input to the automatic brake control module (M577) wheel speed relay is provided at pin A55 until all four wheels reach 60 knots (K9, K10, K11, and K12 all energized.) When any wheel speed reaches 60 knots (any of the four relays energized) a ground output to the M577 wheel speed relay is provided at B-7.

(5) When either throttle is advanced to the 25-degree position, K13 coil is grounded, K13 is energized, and 28 volts dc is provided through pin B5 to lower the handle actuator.

(6) The following are self-check test circuits that simulate the system operation (control in ARMED position).

(a) Test circuit 1 simulates K9 or K10. Twenty-eight volts is applied at pin A58 (J5 pin 3) to remove the ground path at pin A34 (J5 pin 11).

(b) Test circuit 2 simulates K11 or K12. J5 pin 5 is grounded through a 150-ohm resistor at pin A60. This removes the ground path at pin A34 (J5 pin 11).

(c) Test circuit 3 simulates engine throttle advance. It grounds pin B4 to actuate K13. Also, it applies 28 volts dc from pin A60, through K13 to J5 pin 6. This removes the ground path at pin A34 (J5 pin 11).

H. The takeoff aural warning system (DESCRIPTION AND OPERATION, Figure 8 and DESCRIPTION AND OPERATION, Figure 9) consists of logic card A7, relay K3, external switches and the M315 aural warning module (which contains the horn). The landing gear module provides a ground path to M315 when an unsafe flight control condition exists prior to takeoff. The intermittent horn will operate and will not turn off until the condition is corrected. 28-volt dc circuit power is applied at pin A33. Circuit ground is at pins A17 and A30. The ground to M315 to operate the horn is available at pin A22 when the following conditions exist.

(1) Airplane is on ground (K3 de-energized). This removes the ground at pin A17 (A7Q2 base) and:

(2) Either engine throttle is in the advanced position. This grounds pin B4 (A7Q1 base) and prevents A7Q1 from conducting, and:

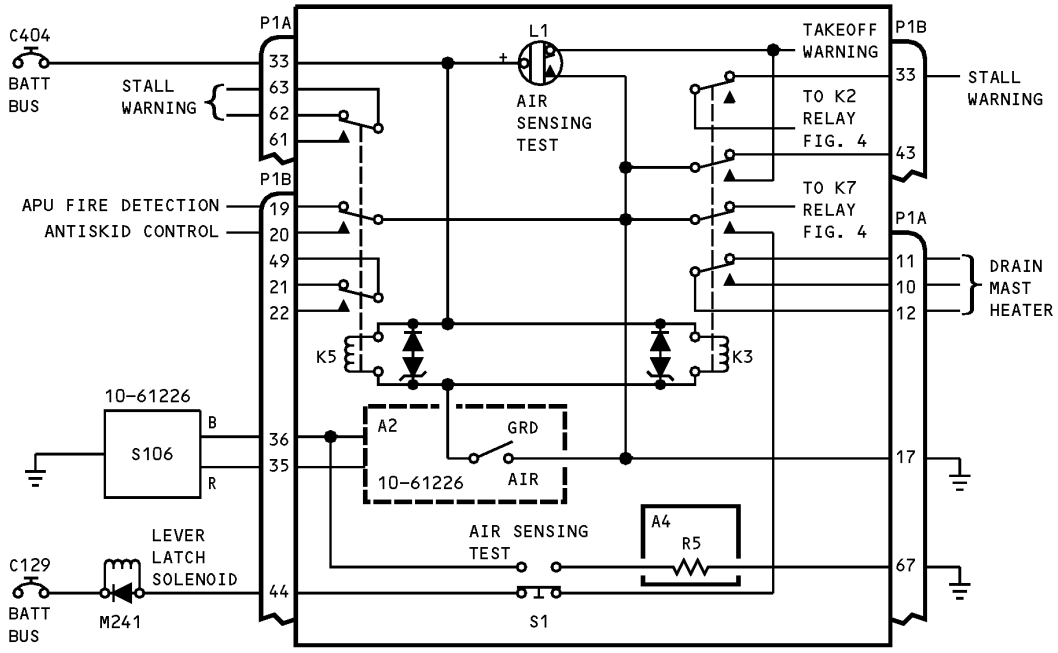
(3) Pin A23 is grounded (A7Q2 emitter) due to any of the following conditions:

(4) Stabilizer set too high or too low, or:

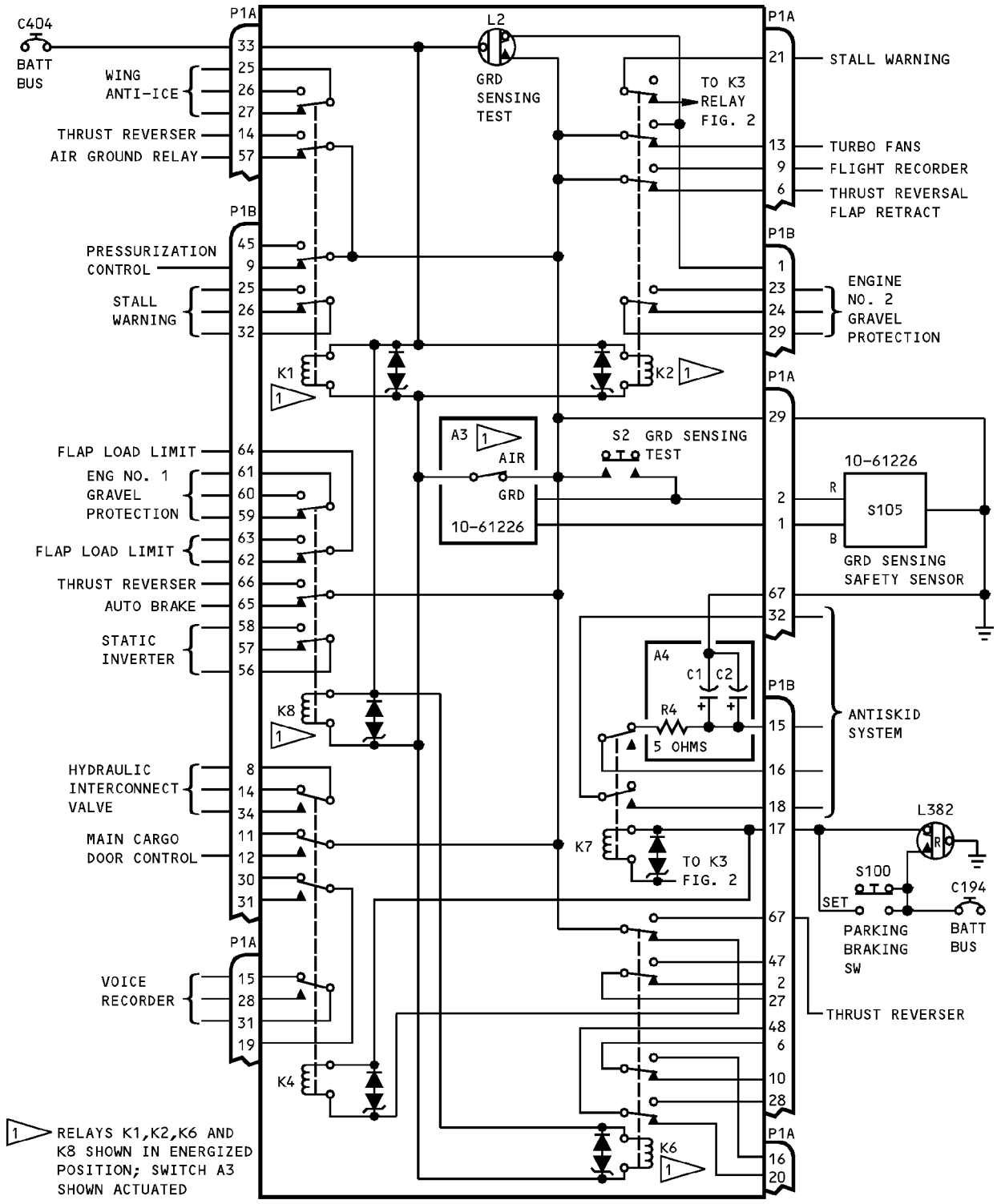
(5) Flaps extended too far, or

(6) Speed brake lever not in proper position.

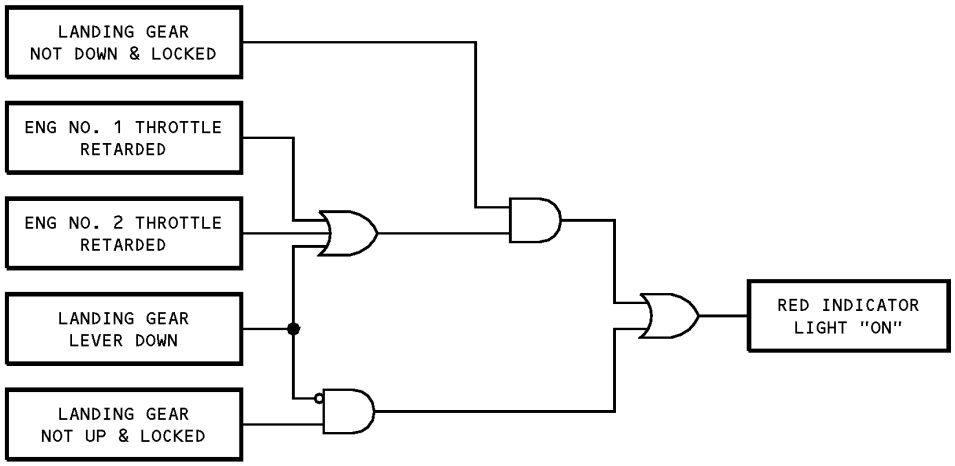
I. A squat backup time delay circuit (A6 card) is used on this assembly. Printed circuit assembly A6 provides suppression and isolation diodes and time delay switching circuitry for operation of the latching relays K16 and K17. See DESCRIPTION AND OPERATION, Figure 10 for simplified diagram. Power to the relays is provided by contacts on the air and ground safety relays, K5 and K6, controlled by proximity switches A2 and A3 respectively. With A2 actuated, K5 provides power from pin A56 to reset K16. With A2 deactuated, power at pin A56 will energize relay K15 for a period of 2.5 to 6.5 seconds controlled by a time delay circuit on A6 before K16 becomes energized and opens the circuit to K15. Similarly K14 is energized for a period of 2.5 to 6.5 seconds when A3 is actuated and power is provided at pin A56. Normally open contacts on K14 and K15 are used in relay logic circuitry for operation of the air speed brake (spoiler) actuator (DESCRIPTION AND OPERATION, Figure 11). This is an advanced configuration of the automatic ground speed brake sytem shown in DESCRIPTION AND OPERATION, Figure 7, (Sheet 2).



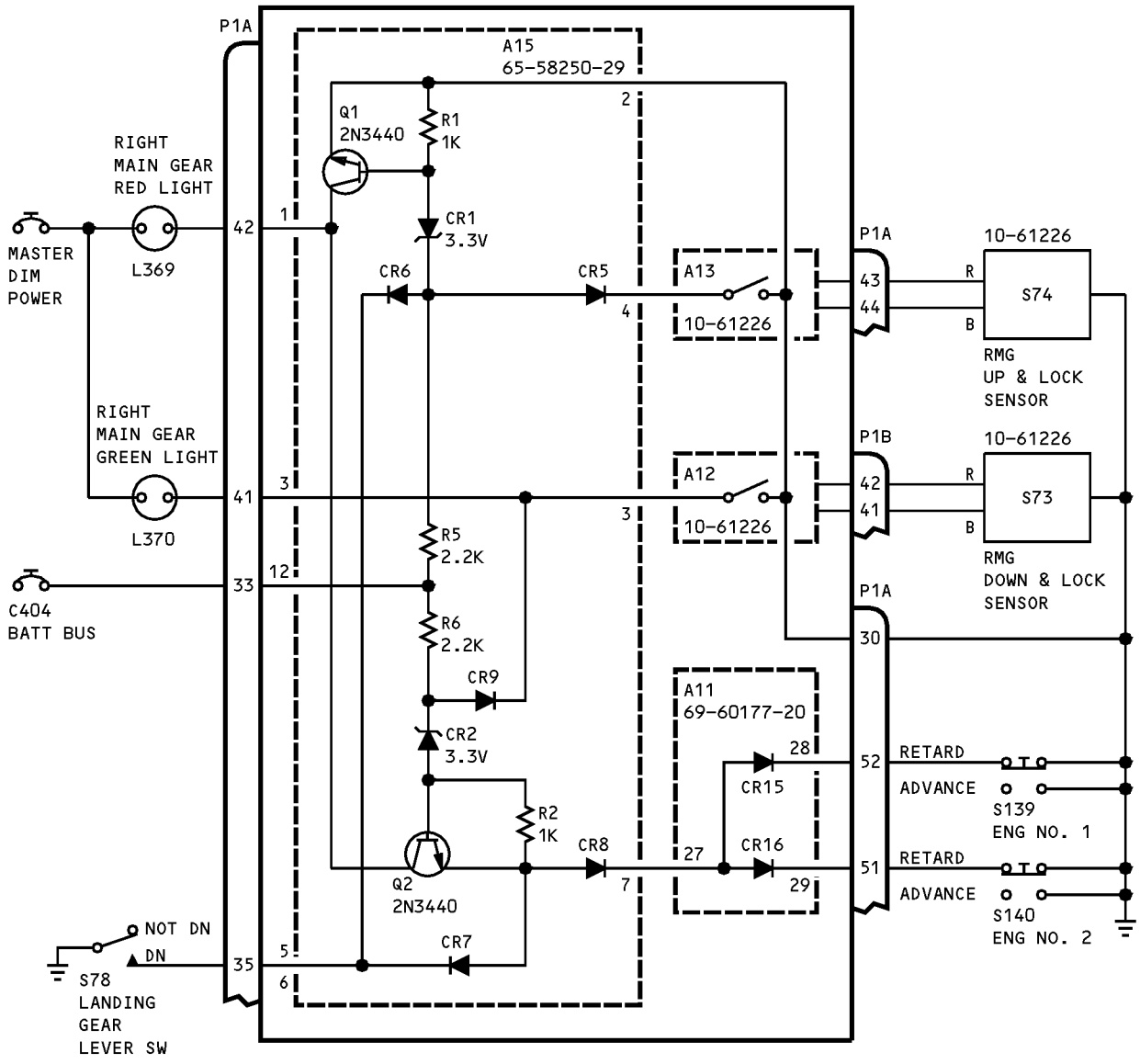
Air Safety Relays
Figure 1



Ground Safety and Parking Brake Relays
Figure 2

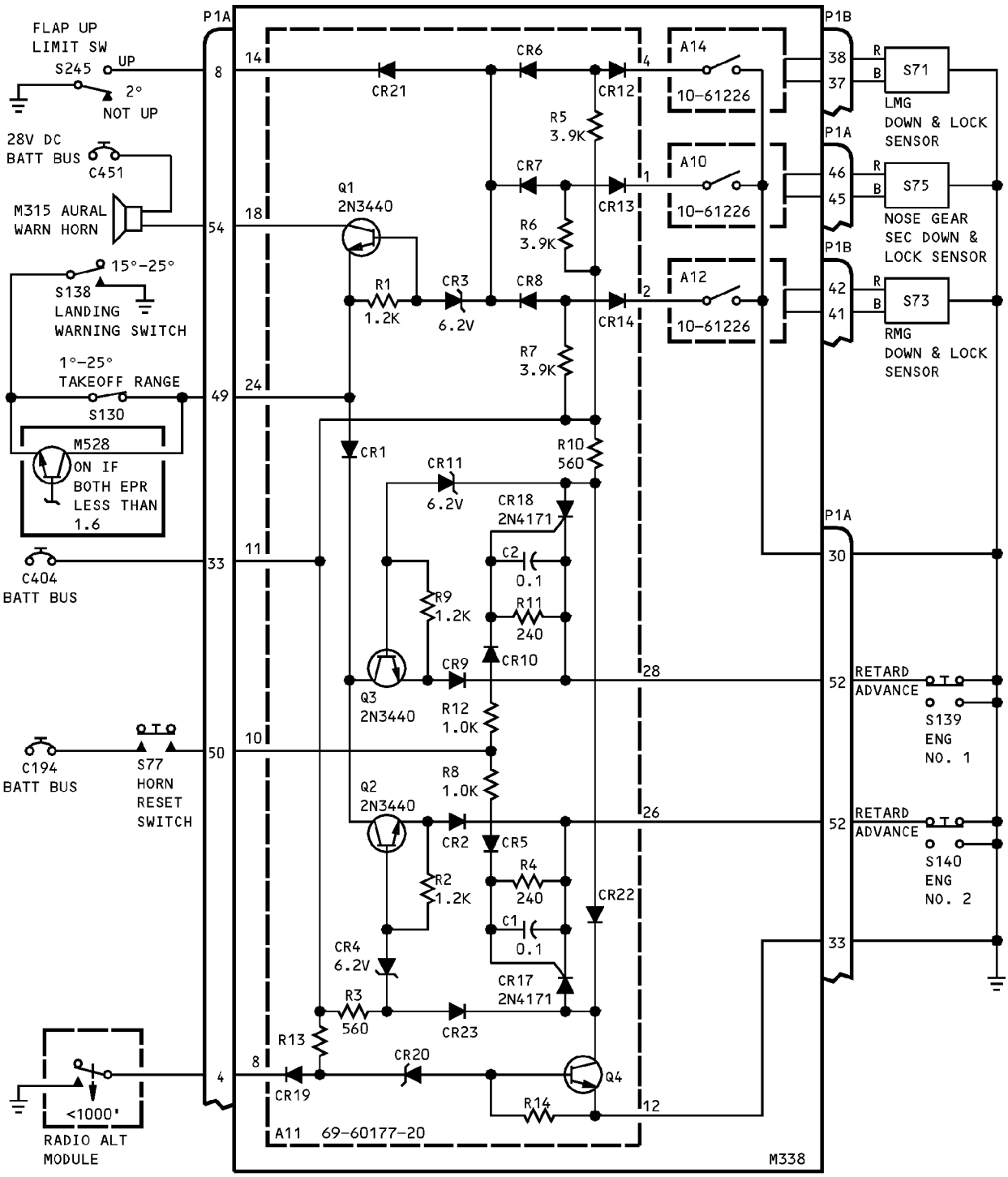


Red Indicator Lamp "ON" Logic Diagram
Figure 3



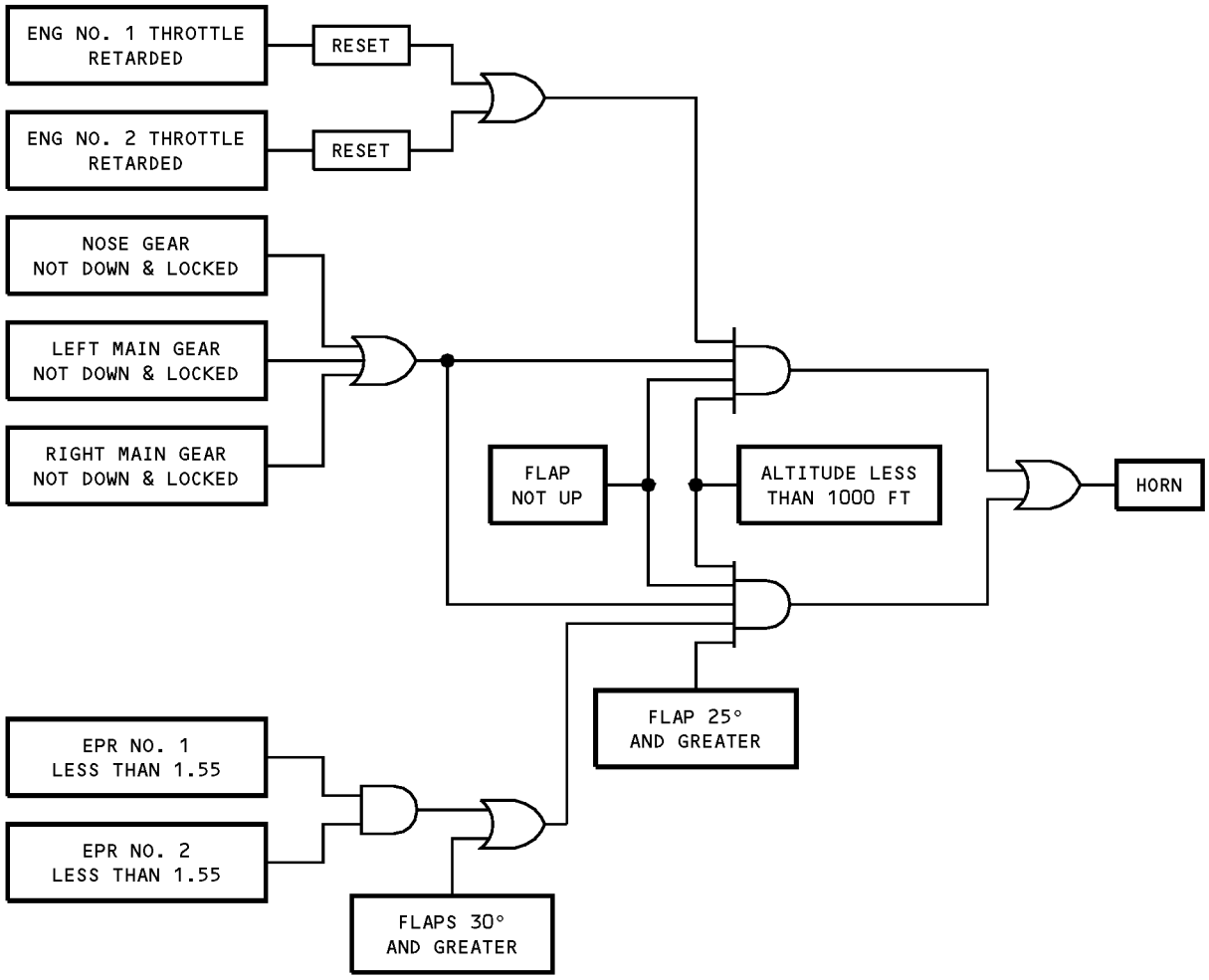
NOTE: UNLESS OTHERWISE SPECIFIED
ALL RESISTANCES ARE IN OHMS ±5%

Right Main Gear Visual Indication
Figure 4

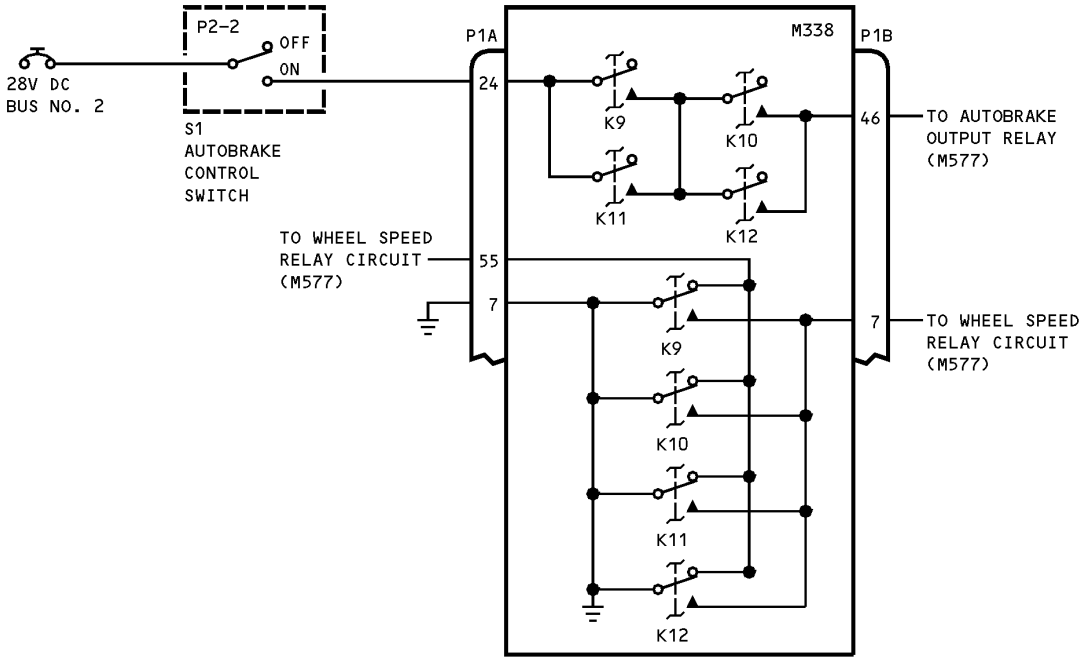


NOTE: UNLESS OTHERWISE SPECIFIED RESISTANCE = OHMS (5%)
CAPACITANCE = UF (10%).

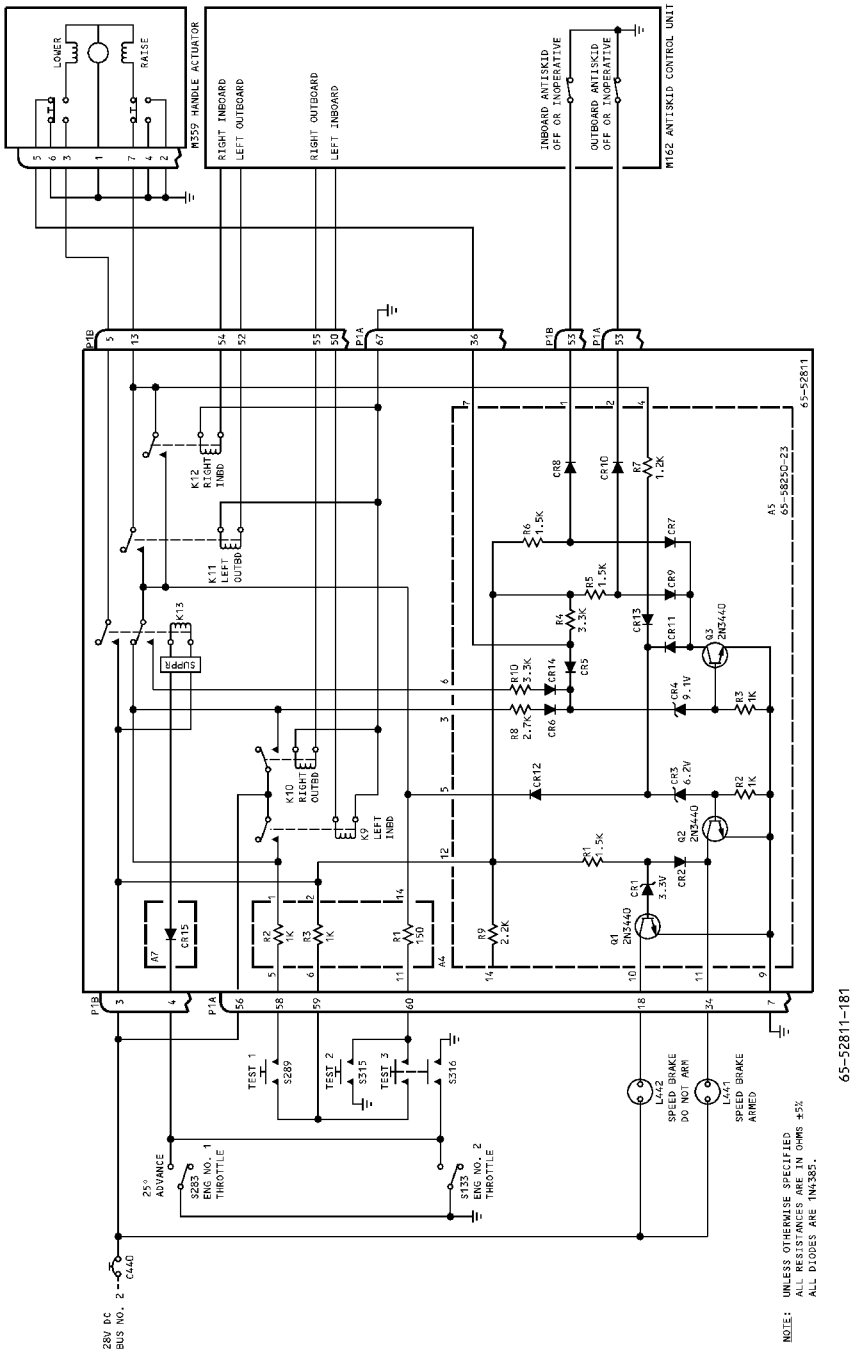
Landing Gear Aural System
Figure 5



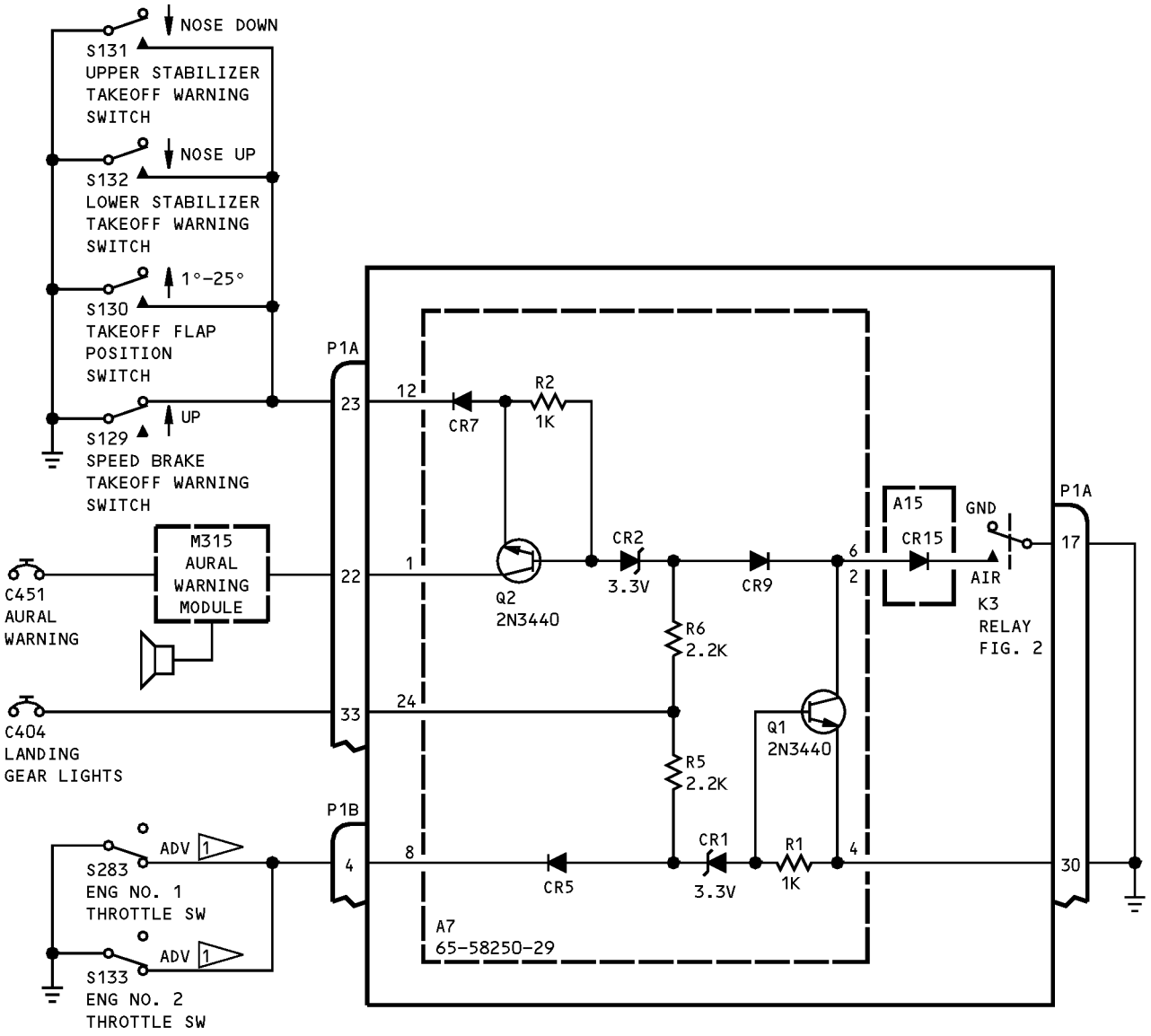
Landing Gear Aural Warning Logic Diagram
Figure 6



Automatic Ground Speed Brake System
Figure 7 (Sheet 1 of 2)



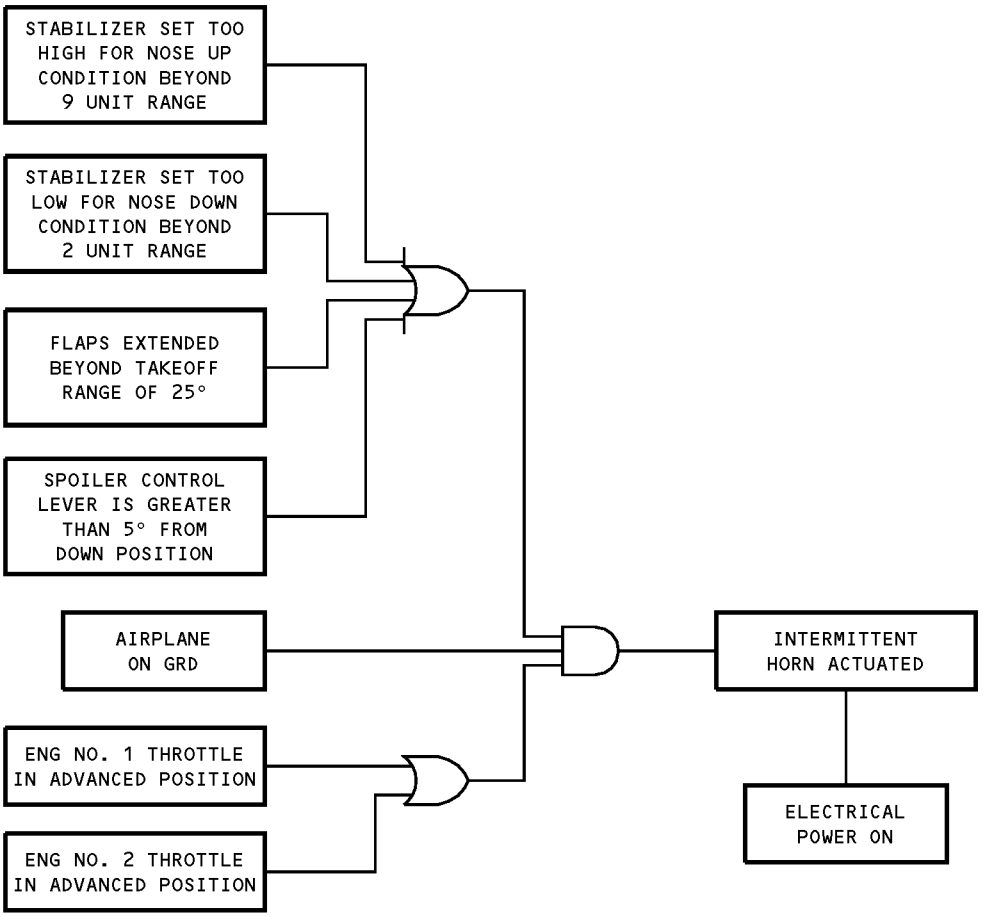
Automatic Ground Speed Brake System
Figure 7 (Sheet 2 of 2)



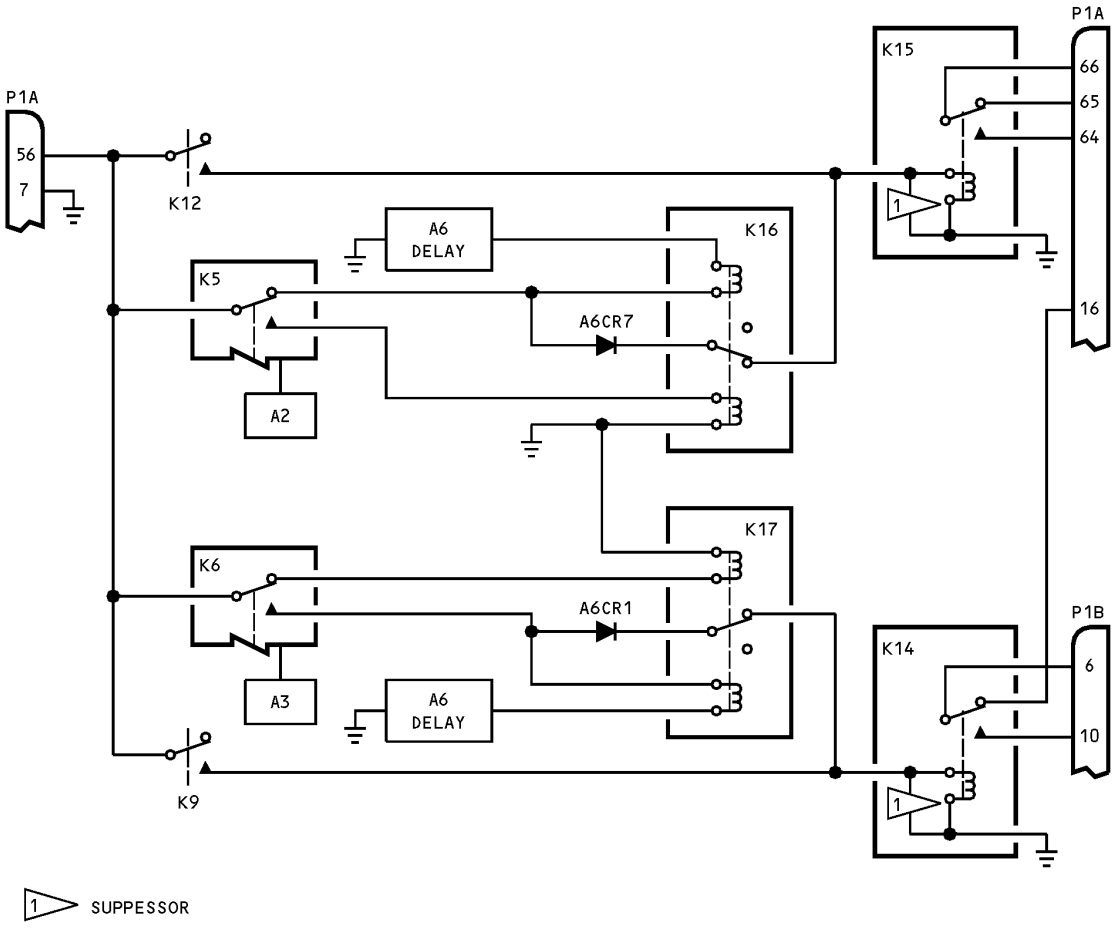
NOTE: UNLESS OTHERWISE SPECIFIED ALL RESISTANCES ARE IN OHMS ±5% DIODES CR5,CR7 AND CR9 ARE 1N4385.

1 25 ±2% TO FULL ADVANCE

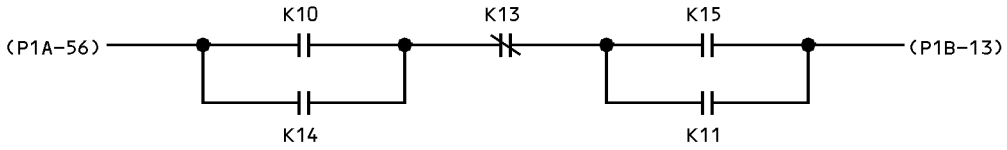
Takeoff Warning System
Figure 8



Takeoff Warning System Logic Diagram
Figure 9



Simplified Squat Backup Time Delay Circuit
Figure 10



LINE DIAGRAM

Airspeed Brake (Spoiler) Circuit
Figure 11

TESTING AND FAULT ISOLATION

1. Test Equipment

A. Power Supplies:

(1) electrical power supply (28VDC), STD-1256

(2) power supply, STD-5467 (28v ac, 400 ±5 Hz)

B. Multimeter:

(1) model 260 simpson voltmeter, STD-3946 or equivalent

C. Oscilloscope:

(1) digital signal analyzer, SPL-4461 or equivalent

D. Test Lamps:

(1) Lamp Load, SPL-5445, 28v dc, 100 ma (1820 or equivalent) (8 required) (L2-L7, L10, L11)

(2) 28v dc, 40 ma (327, 387, 1819 or equivalent) (2 required) (L8, L9)

(3) 28v dc, 500 ma (three 313 or 1821 lamps in parallel or equivalent) (L12)

E. Switches:

(1) SPST

(a) 28 required (S1-S16, S18, S20, S23, S25, S71-S76, S105, S106)

(2) SPDT 3-position (2 required) (S17, S22)

(3) Pushbutton, normally open (S21)

F. Banana Jacks and Plugs:

(1) Jacks

(a) Dual (8 required) J71-J76, J105, J106)

(b) Single (J23)

(2) Plugs (used with centerpoint sensor)

(a) Dual

(b) Single

G. Resistors:

(1) 1K, 10PCT, 1W (R1)

(2) 8.2K, 10PCT, 1W (8 required) (R2-R9)

(3) 50 ohms, 5PCT, 10W (R10)

H. Diode: Diode, STD-5470 or equivalent

I. Calibration Test (Dial) Stand (including 1.2 x 0.5 x 0.05 inch target and dial indicator):

(1) ELDEC P/N 3-455-16 (ELDEC Corp., 16700 13th Place West, P.O. Box 100, Lynnwood, Washington 98036)

J. Centerpoint Sensor Kit (including 1-899-15CP02 centerpoint sensor):

(1) ELDEC P/N 1-899-15CP01 (ELDEC Corp., 16700 13th Place West, P.O. Box 100, Lynnwood, Washington 98036)

K. Test Connector (with pigtail lead):

(1) DPX2MB67S67S33B0000 (International Telephone and Telegraph Corp., ITT Cannon Electric Div., 10550 Talbert Ave., P.O. Box 8040, Fountain Valley, California 92708)

2. Functional Test

A. Verify continuity between pin-pairs listed in TESTING AND FAULT ISOLATION, Table 101. Use positive lead of multimeter on pin listed in From Pin column.

Table 101: Continuity Tests

Component Tested	From Pin (+)	To Pin (-)	Component Tested	From Pin (+)	To Pin (-)
Wiring	A-7	Chassis	K5	A-62	A-63
K1	A-26	A-25		A-65	A-66
	A-29	A-14		B-19	A-17
	A-29	B-45		B-21	B-49
	B-25	B-32	K7/A4R4 *[1]	B-16	B-15
K2	A-29	A-9	K6	B-27	B-47
	A-29	B-1		B-48	B-28
	B-23	B-29		B-67	A-29
K3	B-43	A-17	K8	B-66	A-29
	A-11	A-12		B-61	B-60
K4	A-31	A-15		B-64	B-63
	A-19	B-30		B-58	B-56
	B-11	A-29			
	B-8	B-14	K14	A-16	B-6
K9-K12	A-7	A-55	K15	A-65	A-66

*[1] 4 to 6 ohms

B. Verify noncontinuity (50k minimum) between pin-pairs listed in TESTING AND FAULT ISOLATION, Table 102. Use positive lead of multimeter on pin listed in From Pin column.

Table 102: Noncontinuity Tests

Component Tested	From Pin (+)	To Pin (-)	Component Tested	From Pin (+)	To Pin (-)
K1	A-27	A-25	K6	B-2	B-27
	B-26	B-32	K7	B-18	A-32
	A-57	A-29	K8	B-57	B-56
	B-9	A-29		B-59	B-61
K2	A-6	A-29		B-62	B-64
	A-13	A-29		B-65	A-29
	B-24	B-29	K9-K12	B-7	A-7
K2/K3	B-33	A-21		A-24	B-46

Table 102: Noncontinuity Tests (Continued)

Component Tested	From Pin (+)	To Pin (-)	Component Tested	From Pin (+)	To Pin (-)
K3/S1	B-44	A-17	K13	B-3	B-5
K3	A-10	A-12	K14	B-10	B-6
K4	A-28	A-31	K15	A-64	A-66
	B-12	A-29			
	B-31	A-19			
	B-34	B-8			
K5	B-22	B-49			
	B-20	A-17			
	A-61	A-63			
K6	A-20	B-48	A7/All	A-35	A-51
				A-51	A-35
A5	B-53	A-56	All	A-51	A-50
	A-53	A-56		A-52	A-50
			A7/K13	B-4	B-3

C. Verify continuity between pin A-7 and the case of relays K10, K11, K13, K14, and K15.

D. Verify 1150 ±10% between pins A-58 and A-60.

E. Verify 1000 ±25% between pins A-59 and A-56.

F. Connect test setup per TESTING AND FAULT ISOLATION, Figure 101. Turn on both power supplies.

NOTE: The centerpoint sensor leads are terminated in banana plugs. The red and blue leads are terminated in a dual banana plug such that they are inserted and removed as a pair. The yellow lead is terminated in a single banana plug which is inserted into the Y jack (J23) of the test setup, TESTING AND FAULT ISOLATION, Figure 101. It is important that the red lead connects to the red banana jack and that the blue lead connects to the blue banana jack throughout the entire test.

TESTING AND FAULT ISOLATION, Table 103 lists the functions simulated by the test setup. The reference designators are the same as the airplane reference designators for that function. The M reference designators are for the module within which a function occurs.

The test setup and module both have switches S1 and S2. Consider all switches as part of test setup unless module switches are specifically listed .

Table 103: Items Simulated by Test Setup

Test Item	Initial Condition	Aircraft Circuit Function	Aircraft Ref Desig.
S1	On	Simulates Inboard Antiskid Inoperative	M162F
S2	On (Beyond 25°)	Flap Position Warning Switch	S130
S3	Off (Not Down)	Landing Gear Lever Switch	S78

Table 103: Items Simulated by Test Setup (Continued)

Test Item	Initial Condition	Aircraft Circuit Function	Aircraft Ref Desig.
S4	On (Down)	Landing Warning Switch	S138
S5	On (Up)	Flap Up Limit Switch	S245
S6	Off (Advanced)	Engine No. 1 Throttle	S139
S7	Off (Advanced)	Engine No. 2 Throttle	S140
S8	On	Simulates Speed Brake Handle Actuator	M359B
S9	On	Simulates Outboard Antiskid Inoperative	M162E
S10	Off (Retard)	Engine Throttle Switch	S133
S11	On (Below)	Simulates Alt. Ind. Switch	S79
S12	Off (Not Park)	Park Brake Switch	S100
S13	Off	Simulates Left Outboard Wheelspeed	M162C
S14	Off	Simulates Left Inboard Wheelspeed	M162A
S15	Off	Simulates Right Inboard Wheelspeed	M162D
S16	Off	Simulates Right Outboard Wheelspeed	M162B
S17	Position 2	Simulates Speed Brake Handle Actuator	M359A
S18	Off	Simulates Anti-Skid AC	SV11
S20	Off (Not Armed)	Speed Brake Handle	S276
S21	Off	Throttle Horn Reset	S77
S22	Off	Ground Spoiler Test Switch No.2	S315
S23	Off	Ground Spoiler Test Switch No.1	S289
S25	On (Armed)	Speed Brake Arming Warning Switch grounded via S10-On (throttle at 25 deg.)	S276
S106,J106	Deactuated (Off)	Air Sensing Sensor	S106,J106
S105,J105	Deactuated (Off)	Ground Sensing Sensor	S105,J105
S71,J71	Deactuated (Off)	Left Main Gear Downlock Sensor	S71,J71
S72,J72	Deactuated (Off)	Left Main Gear Uplock Sensor	S72,J72
S76,J76	Deactuated (Off)	Nose Gear Uplock Sensor	S76,J76
S75,J75	Deactuated (Off)	Nose Gear Downlock Sensor	S75,J75
S73,J73	Deactuated (Off)	Right Main Gear Downlock Sensor	S73,J73
S74,J74	Deactuated (Off)	Right Main Gear Uplock Sensor	S74,J74
L2	Illuminated	Left Main Gear (Red)	L367
L3	Not Illuminated	Left Main Gear Downlock (Green)	L368
L4	Illuminated	Nose Gear (Red)	L365
L5	Not Illuminated	Nose Gear Downlock (Green)	L366
L6	Illuminated	Right Main Gear (Red)	L369
L7	Not Illuminated	Right Main Gear Downlock (Green)	L370

Table 103: Items Simulated by Test Setup (Continued)

Test Item	Initial Condition	Aircraft Circuit Function	Aircraft Ref Desig.
L8	Not Illuminated	Simulates Continuous Horn	M315B
L9	Not Illuminated	Simulates Interrupted Horn	M315A
L10	Not Illuminated	Speed Brake Armed (Green)	L441
L11	Not Illuminated	Speed Brake Do Not Arm (Amber)	L442
L12	Not Illuminated	Simulates Speed Brake Handle Actuator	M359

G. Set switches per initial conditions listed in TESTING AND FAULT ISOLATION, Table 103. Verify that initial condition for L2 thru L12.

H. Verify module lamp DS1 is extinguished and module lamp DS2 is illuminated.

I. Perform functional test per TESTING AND FAULT ISOLATION, Table 104.

NOTE: Indicators DS1 and DS2 respond to the test centerpoint sensor as actuation is accomplished. Actuation shall occur as the target bar is brought within 0.275 to 0.325 inch from the sensor. The proximity switch card shall remain actuated as the gap is decreased to zero. Deactuation shall occur as the bar is moved away from the sensor 0.005 to 0.030 inch from the actuation point.

Table 104: Functional Tests

Step	Procedure		Required Results
Air Sensing Squat Switch			
1	Measure resistance between:		
	(K1, K2)	A-9 and B-45	Con
	(K7, A4R4)	B-15 and B-16	4 to 6 ohms
	(K3, K5)	B-19 and B-43	Con
	(K4)	B-30 and A-19	Con
	(K6, K8)	B-66 and B-67	Con
2	Set S12 to ON		
3	Measure resistance between:		
	(K7)	B-18 and A-32	Con
	(K7)	B-15 and B-16	No Con
	(K4)	B-30 and A-19	Con
4	Connect deactuated sensor to test jack J106		
5	Press module switch S1, hold		DS1 on
6	Measure resistance between:		
	(K3, S1)	B-44 and A-17	No Con
7	Release module switch S1		DS1 off
8	Actuate sensor		DS1 on
9	Measure resistance between:		

Table 104: Functional Tests (Continued)

	(K1, K2)	A-9 and A-14	Con
	(K3)	A-10 and A-12	Con
	(K5)	A-61 and A-63	Con
	(K7, A4R4)	B-15 and B-16	4 to 6 ohms
	(K5)	B-20 and A-17	Con
	(K5)	B-22 and B-49	Con
	(K4)	B-30 and A-19	Con
	(K3, S1)	B-44 and A-17	Con
10	Verify both DS1 and DS2 are illuminated		
11	Measure resistance between:		
	(K3)	A-11 and A-12	No Con
	(K5)	A-17 and B-19	No Con
	(K3)	A-17 and B-43	No Con
	(K5)	A-62 and A-63	No Con
	(K5)	B-21 and B-49	No Con
12	Deactuate sensor		DS1 off
13	Disconnect sensor from test jack J106		
Take-Off Warning			
14	Set S10 to ON		L9 on
15	Set S106 to ON		L9 off, DS1 on
16	Set S106 to OFF		L9 on, DS1 off
17	Measure voltage between:		
	(A7)	A-22 and GND	1v dc max
18	Set S2 to OFF		L9 off
Ground Sensing Squat Switch			
19	Connect deactuated sensor to test jack J105		
20	Actuate sensor		DS2 off
21	Measure resistance between:		
	(K2)	A-6 and A-29	Con
	(K2)	A-13 and A-29	Con
	(K6)	A-20 and B-48	Con
	(K2, K3)	A-21 and B-33	Con
	(K1)	A-27 and A-25	Con
	(K4)	A-28 and A-31	Con
	(K1)	A-57 and A-29	Con

Table 104: Functional Tests (Continued)

	(K4)	B-12 and A-29	Con
	(K1)	B-9 and A-29	Con
	(K6)	B-2 and B-27	Con
	(K7)	B-18 and A-32	Con
	(K2)	B-24 and B-29	Con
	(K1)	B-26 and B-32	Con
	(K4)	B-31 and A-19	Con
	(K4)	B-34 and B-8	Con
	(K8)	B-57 and B-56	Con
	(K8)	B-59 and B-61	Con
	(K8)	B-62 and B-64	Con
	(K8)	B-65 and A-29	Con
22	Measure voltage between:		
	(K2)	B-1 and A-29	26 to 28v dc
23	Measure resistance between:		
	(K2)	A-9 and A-29	No Con
	(K1)	A-14 and A-29	No Con
	(K4)	A-15 and A-31	No Con
	(K1)	A-26 and A-25	No Con
	(K4)	B-11 and A-29	No Con
	(K4)	B-14 and B-8	No Con
	(K2)	B-23 and B-29	No Con
	(K1)	B-25 and B-32	No Con
	(K4)	B-30 and A-19	No Con
	(K1)	B-45 and A-29	No Con
	(K8)	B-58 and B-56	No Con
	(K8)	B-60 and B-61	No Con
	(K8)	B-63 and B-64	No Con
	(K8)	B-66 and A-29	No Con
	(K6)	B-48 and B-28	No Con
	(K6)	B-47 and B-27	No Con
24	Set S12 to OFF		
25	Measure resistance between:		
	(K7, A4R4)	B-15 and B-16	4 to 6 ohms
	(K4)	B-30 and A-19	Con
	(K1, K2)	A-57 and A-13	Con

Table 104: Functional Tests (Continued)

26	Press module switch S2, release		DS2 on while pressed
27	Press-to-test DS1 and DS2		DS1, DS2 on while pressed
28	Set S106 to ON		DS1 on
Squat Switch Time Delays			
29	Measure resistance between:		
	(K2,K3)	B-33 and A-21	No Con
30	Deactuate sensor		DS2 on
31	Disconnect sensor from test jack J105		
32	Set S20 and S25 to ON		L11 on
33	Set S17 to position 1		No lamps change state
34	Set S106 to OFF		DS1 off
35	Measure resistance between:		
	(K15)	A-66 and A-64	Con *[1]
	(K15)	A-66 and A-65	No Con *[1]
36	Set S105 to ON		DS2 off
37	Measure resistance between:		
	(K14)	B-6 and B-10	Con *[1]
	(K14)	B-6 and A-16	No Con *[1]
38	Set S105 to OFF		DS2 on
39	Set S106 to ON		DS1 on
40	Set S10 to OFF		
41	Simultaneously set S106 to OFF and S105 to ON		L10 and L12 illuminated momentarily and L11 extinguished momentarily (6.5 sec max) DS1 and DS2 off
42	Set S20 and S25 to OFF		L11 off
43	Set S106 to ON		DS1 on
44	Measure resistance between:		
	(A6)	A-7(+) and A-56	25 ohms max
45	Set S106 to OFF		DS1 off
46	Set S105 to OFF		DS2 on
47	Measure resistance between:		
	(A6)	(A-7(+) and A-56	25 ohms max

*[1] Momentarily for more than 2.5 seconds but less than 6.5 seconds

J. Left Main Gear Indication

(1) Verify all test switches and lamps are in the initial conditions listed in TESTING AND FAULT ISOLATION, Table 103.

(2) Perform left main gear indication circuitry tests per TESTING AND FAULT ISOLATION, Table 105.

Table 105: Left Main Gear Indication Circuitry Tests

Step	Procedure	Required Results
NOTE: Indicators L2 and L3 respond to the test centerpoint sensor as actuation is accomplished. Actuation shall occur as the target bar is brought within 0.275 to 0.325 inch from the sensor. The proximity switch card shall remain actuated as the gap is decreased to zero. Deactuation shall occur as the bar is moved away from the sensor 0.005 to 0.030 inch from the actuation point.		
1	Connect deactuated sensor to test jack J72	
2	Actuate sensor	L2 off
3	Deactuate sensor	L2 on
4	Disc onnect sensor from test jack J72	
5	Connect deactuated sensor to test jack J71	
6	Actuate sensor	L3 on
7	Measure voltage between: A-38 and GND	1v dc max
8	Deactuate sensor	L3 off
9	Disconnect sensor from test jack J71	
NOTE: L4 and L6 must remain illuminated. L5 and L7 thru L12 must remain extinguished.		
10	Set S3, S71 to ON	L2 off, L3 on
11	Set S71 to OFF	L2 on, L3 off
12	Set S3 to OFF	L2 on, L3 off
13	Set S72 to ON	L2 off, L3 off
14	Set S6 to ON	L2 on, L3 off
15	Set S6 to OFF	L2 off, L3 off
16	Set S7 to ON	L2 on, L3 off
17	Measure voltage between: A-38 and GND	2.5v dc max

K. Right Main Gear Indication

(1) Verify all test switches and lamps are in the initial conditions listed in TESTING AND FAULT ISOLATION, Table 103.

(2) Perform right main gear indication circuitry tests per TESTING AND FAULT ISOLATION, Table 106.

Table 106: Right Main Gear Indication Circuitry Tests

Step	Procedure	Required Results
NOTE: Indicators L6 and L7 respond to the test centerpoint sensor as actuation is accomplished. Actuation shall occur as the target bar is brought within 0.275 to 0.325 inch from the sensor. The proximity switch card shall remain actuated as the gap is decreased to zero. Deactuation shall occur as the bar is moved away from the sensor 0.005 to 0.030 inch from the actuation point.		
1	Connect deactuated sensor to test jack J74	
2	Actuate sensor	L6 off
3	Deactuate sensor	L6 on
4	Disconnect sensor from test jack J74	
5	Connect deactuated sensor to test jack J73	
6	Actuate sensor	L7 on
7	Measure voltage between: A-38 and GND	1v dc max
8	Deactuate sensor	L7 off
9	Disconnect sensor from test jack J73	
NOTE: L2 and L4 must remain illuminated. L3 and L8 thru L12 must remain extinguished.		
10	Set S3, S73 to ON	L6 off, L7 on
11	Set S73 to OFF	L6 on, L7 off
12	Set S3 to OFF	L6 on, L7 off
13	Set S74 to ON	L6 off, L7 off
14	Set S6 to ON	L6 on, L7 off
15	Set S6 to OFF	L6 off, L7 off
16	Set S7 to ON	L6 on, L7 off
17	Measure voltage between: A-42 and GND	2.5v dc max

L. Nose Gear Indication

(1) Verify all test switches and lamps are in the initial conditions listed in TESTING AND FAULT ISOLATION, Table 103.

(2) Perform right main gear indication circuitry tests per TESTING AND FAULT ISOLATION, Table 107.

Table 107: Nose Gear Gear Indication Circuitry Tests

Step	Procedure	Required Results
NOTE: Indicator L4 responds to the test centerpoint sensor as actuation is accomplished. Actuation shall occur as the target bar is brought within 0.275 to 0.325 inch from the sensor. The proximity switch card shall remain actuated as the gap is decreased to zero. Deactuation shall occur as the bar is moved away from the sensor 0.005 to 0.025 inch from the actuation point.		
1	Connect deactuated sensor to test jack J76	
2	Actuate sensor	L4 off
3	Deactuate sensor	L4 on
4	Disconnect sensor from test jack J76	
NOTE: Indicator L5 responds to the test centerpoint sensor as actuation is accomplished. Actuation shall occur as the target bar is brought within 0.130 to 0.160 inch from the sensor. The proximity switch card shall remain actuated as the gap is decreased to zero. Deactuation shall occur as the bar is moved away from the sensor 0.005 to 0.020 inches from the actuation point.		
5	Connect deactuated sensor to test jack J75	
6	Actuate sensor	L5 on
7	Measure voltage between: A-40 and GND	1v dc max
8	Deactuate sensor	L5 off
9	Disconnect sensor from test jack J75	
NOTE: L2 and L6 must remain illuminated. L3 and L7 thru L12 must remain extinguished.		
10	Set S3, S75 to ON	L4 off, L5 on
11	Set S75 to OFF	L4 on, L5 off
12	Set S3 to OFF	L4 on, L5 off
13	Set S76 to ON	L4 off, L5 off
14	Set S6 to ON	L4 on, L5 off
15	Set S6 to OFF	L4 off, L5 off
16	Set S7 to ON	L4 on, L5 off
17	Measure voltage between: A-40 and GND	2.5v dc max

M. Aural Warning

(1) Verify all test switches and lamps are in the initial conditions listed TESTING AND FAULT ISOLATION, Table 103.

(2) Perform aural warning circuitry test per TESTING AND FAULT ISOLATION, Table 108.

NOTE: L2, L4 and L6 must remain illuminated. L9 thru L12 must remain extinguished.

Table 108: Aural Warning Circuitry Tests

Step	Procedure	Test Lamp Indications	
		Illuminated	Extinguished
1	Set S5 to OFF	L8	L3, L5, L7
2	Set S4 to OFF		L3, L5, L7, L8
3	Set S11 to OFF		L3, L5, L7, L8
4	Set S6 to ON		L3, L5, L7, L8
5	Set S11 to ON	L8	L3, L5, L7
6	Press and release S21		L3, L5, L7, L8
7	Set S11 to OFF		L3, L5, L7, L8
8	Set S7 to ON		L3, L5, L7, L8
9	Set S11 to ON	L8	L3, L5, L7
10	Press and release S21		L3, L5, L7, L8
11	Set S6 to OFF		L3, L5, L7, L8
12	Set S6 to ON	L8	L3, L5, L7
13	Press and release S21		L3, L5, L7, L8
14	Set S7 to OFF		L3, L5, L7, L8
15	Set S7 to ON	L8	L3, L5, L7
16	Press and release S21		L3, L5, L7, L8
17	Set S11 to OFF		L3, L5, L7, L8
18	Set S4 to ON	L8	L3, L5, L7
19	Set S11 to ON	L8	L3, L5, L7
20	Set S4 to OFF		L3, L5, L7, L8
21	Set S4 to ON and S71 to ON	L3, L8	L5, L7
22	Set S73 to ON	L3, L7, L8	L5
23	Set S75 to ON	L3, L5, L7	L8
24	Set S73 to OFF	L3, L5, L8	L7
25	Set S73 to ON	L3, L5, L7	L8
26	Set S71 to OFF	L5, L7, L8	L3
27	Set S71 to ON	L3, L5, L7	L8
28	Measure voltage between:		
	A-39 and GND	1v dc max	
	A-37 and GND	1v dc max	
	A-41 and GND	1v dc max	

N. Automatic Ground Spoiler

(1) Verify all test switches and lamps are in the initial conditions listed in TESTING AND FAULT ISOLATION, Table 103.

(2) Perform automatic ground spoiler circuitry tests per TESTING AND FAULT ISOLATION, Table 109.

NOTE: L2, L4 and L6 must remain illuminated. L3, L5, L7 and L8 must remain extinguished.

Table 109: Automatic Ground Spoiler Circuitry Tests

Step	Procedure	Test Lamp Indications	
		Illuminated	Extinguished
1	Set S25 to ON		
2	Set S20 to ON	L11	L9, L10, L12
3	Set S17 to position 3	L10	L9, L11, L12
4	Set S17 to position 2	L11	L9, L10, L12
5	Set S1 to OFF	L10	L9, L11, L12
6	Set S1 to ON	L11	L9, L10, L12
7	Set S9 to OFF	L10	L9, L11, L12
8	Set S1 to OFF	L10	L9, L11, L12
9	Set S8 to OFF	L11	L9, L10, L12
10	Set S8 to ON	L10	L9, L11, L12
11	Set S22 to position 1	L11	L9, L10, L12
12	Set S22 to OFF	L10	L9, L11, L12
13	Set S23 to ON	L11	L9, L10, L12
14	Set S23 to OFF	L10	L9, L11, L12
15	Set S22 to position 2	L11	L9, L10, L12
16	Set S10 to ON	L9, L11	L10, L12
17	Measure between pins:		
	A-18 and GND	1v dc mac	
	B-5(+) and B-4	26 to 28v dc	
18	Confirm all test switches and lamps are in the initial condition listed in TESTING AND FAULT ISOLATION, Table 103		
19	Set S25 to ON		
20	Set S20 to ON	L11	L9, L10, L12
21	Set S15 to ON	L11	L9, L10, L12
22	Set S16 to ON	L10	L9, L11, L12
23	Set S17 to position 1	L10, L12	L9, L11
24	Set S10 to ON	L9, L11	L10, L12
25	Set S10 to OFF	L10, L12	L9, L11
26	Set S16 to OFF	L11	L9, L10, L12
27	Set S14 to ON	L10, L12	L9, L11
28	Set S10 to ON	L9, L11	L10, L12

Table 109: Automatic Ground Spoiler Circuitry Tests (Continued)

Step	Procedure	Test Lamp Indications	
		Illuminated	Extinguished
29	Set S10 to OFF	L10, L12	L9, L11
30	Set S15 to OFF	L11	L9, L10, L12
31	Set S13 to ON	L10, L12	L9, L11
32	Set S10 to ON	L9, L11	L10, L12
33	Set S10 to OFF	L10, L12	L9, L11
34	Set S14 to OFF	L11	L9, L10, L12
35	Set S16 to ON	L10, L12	L9, L11
36	Set S10 to ON	L9, L11	L10, L12
37	Set S10 to OFF	L10, L12	L9, L11
38	Set S16 to OFF	L11	L9, L10, L12
39	Set S15 to ON	L11	L9, L10, L12
40	Set S14, S16 to ON		
41	Set S13, S15 to OFF	L11	L9, L10, L12
42	Set S13, S15 to ON		
43	Set S10 to ON	L9, L11	L10, L12
44	Set S10 to OFF	L10, L12	L9, L11
45	Measure voltage between:		
	A-34 and GND	1v dc max	

O. Automatic Brakes

(1) Verify all test switches and lamps are in the initial conditions listed in TESTING AND FAULT ISOLATION, Table 103.

(2) Perform automatic brake circuitry tests per TESTING AND FAULT ISOLATION, Table 110.

NOTE: Test lamps must not change state during test.

Table 110: Automatic Brake Circuitry Tests

Test Step	Procedure	Verify Continuity or No Continuity		
		From Pin A-7 To Pin B-7	From Pin A-7 To Pin A-55	From Pin A-24 To Pin B-46
1	Set S13 thru S16 to OFF	Non Con	Con	No Con
2	Set S13 to ON	Con	Con	No Con
3	Set S16 to ON	Con	Con	Con
4	Set S13 to OFF	Con	Con	No Con
5	Set S14 to ON	Con	Con	Con
6	Set S16 to OFF	Con	Con	No Con

Table 110: Automatic Brake Circuitry Tests (Continued)

Test Step	Procedure	Verify Continuity or No Continuity		
		From Pin A-7 To Pin B-7	From Pin A-7 To Pin A-55	From Pin A-24 To Pin B-46
7	Set S15 to ON	Con	Con	Con
8	Set S14 to OFF	Con	Con	No Con
9	Set S16 to ON	Con	Con	No Con
10	Set S13 to ON	Con	Con	Con
11	Set S14 to ON	Con	No Con	Con
12	Set S15 to OFF	Con	Con	Con
13	Set S15 to ON	Con	No Con	Con
14	Set S13 to OFF	Con	Con	Con
15	Set S13 to ON	Con	No Con	Con
16	Set S16 to OFF	Con	Con	Con
17	Set S16 to ON	Con	No Con	Con
18	Set S14 to OFF	Con	Con	Con
19	Set S14 to ON	Con	No Con	Con
20	Set S13 thru S16 to OFF	No Con	Con	No Con

P. Anti-Skid

(1) Connect oscilloscope between pins B-15 and A-67 (-).

(2) Set S18 to ON.

(3) Verify voltage shall be between 28 and 50 volts dc with a ripple content of less than 5 volts peak-to-peak.

(4) Set S18 to OFF.

(5) Connect pin B-15 through 50-ohm resistor (R10) to ground (A-67) for minimum of 5 seconds.

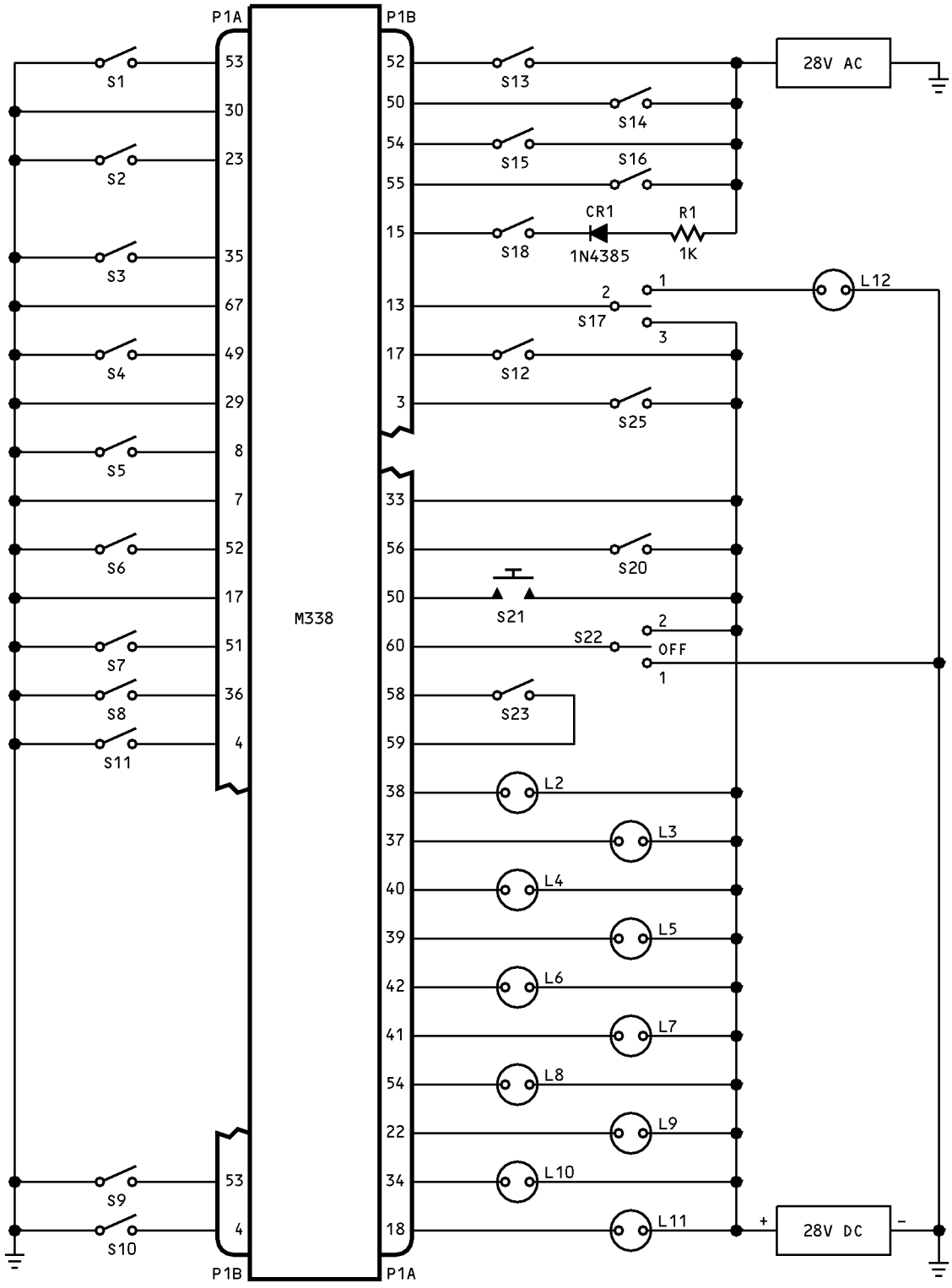
(6) Disconnect R10 and pin B-15 from ground.

Q. Turn off both power supplies.

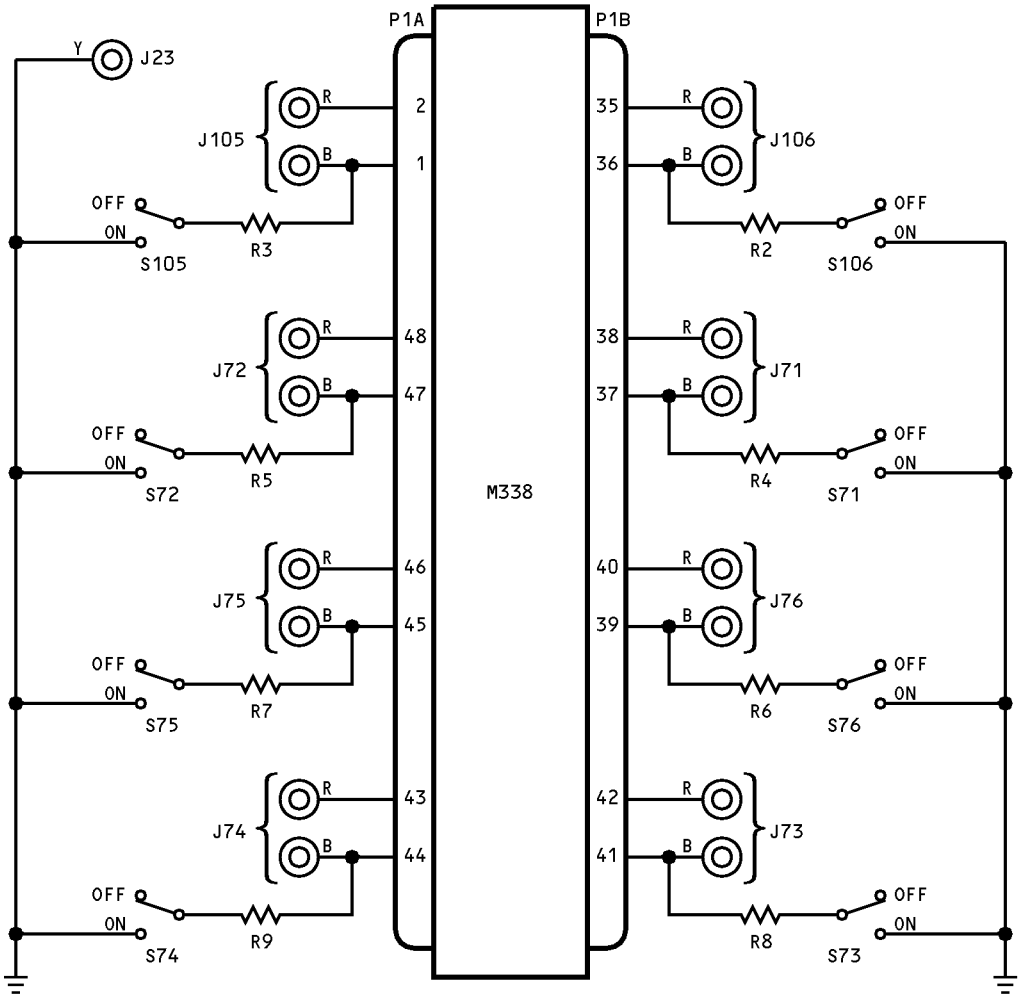
R. Disconnect test setup, TESTING AND FAULT ISOLATION, Figure 101.

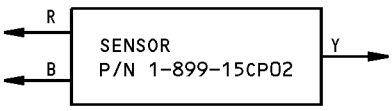
S. Verify indexing on rear connector as follows:

NOTE: Darkened portion indicates extended part of keying post.



Test Setup
Figure 101 (Sheet 1 of 2)





THE RED AND BLUE BANANA JACKS SHALL BE PAIRED AND SPACED TO RECEIVE DOUBLE BANANA PLUGS

R2 THRU R9 = 8.2K ±10 PCT, 1W

NOTE:

R = RED BANANA JACK

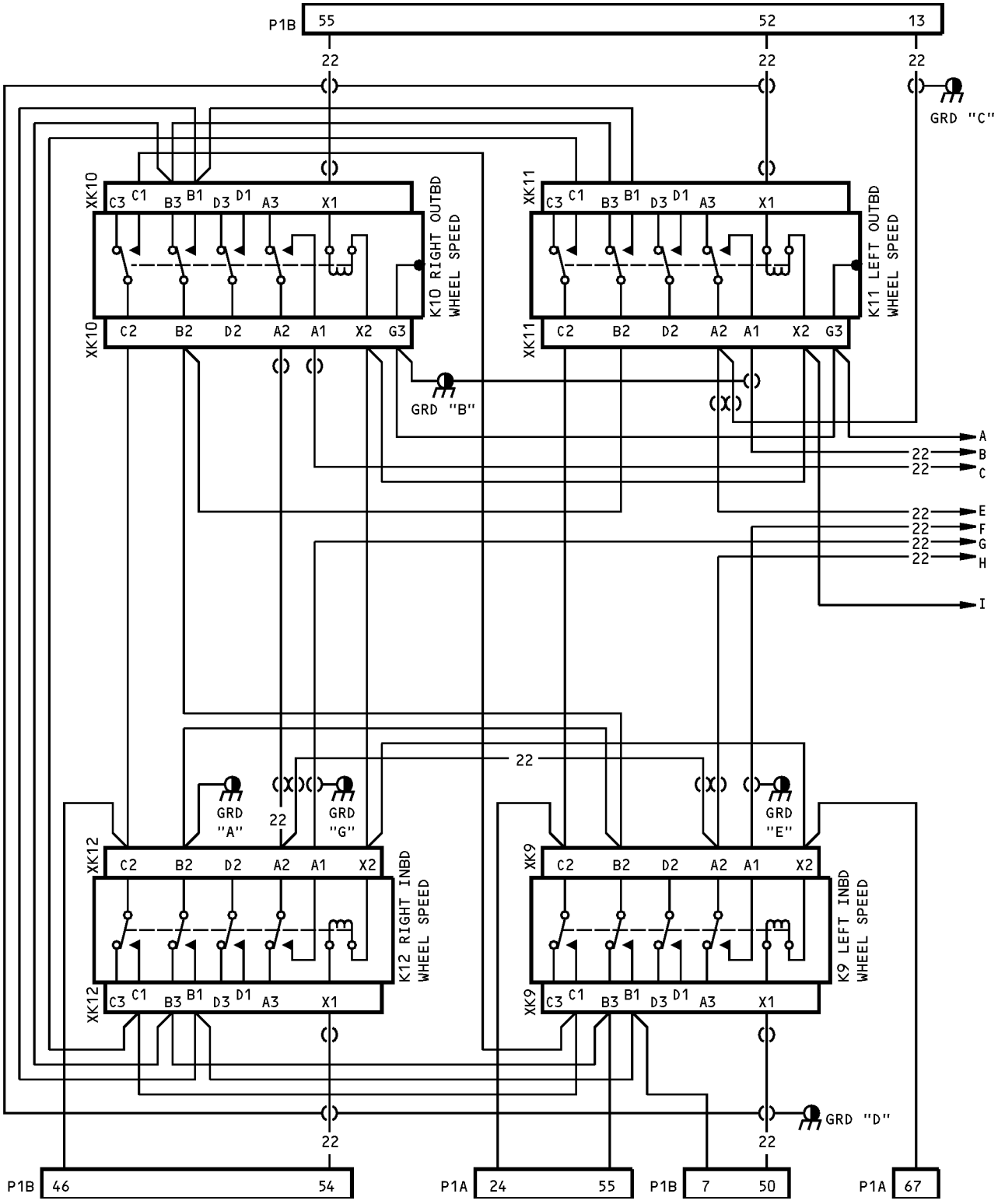
B = BLUE BANANA JACK

Y = YELLOW BANANA JACK

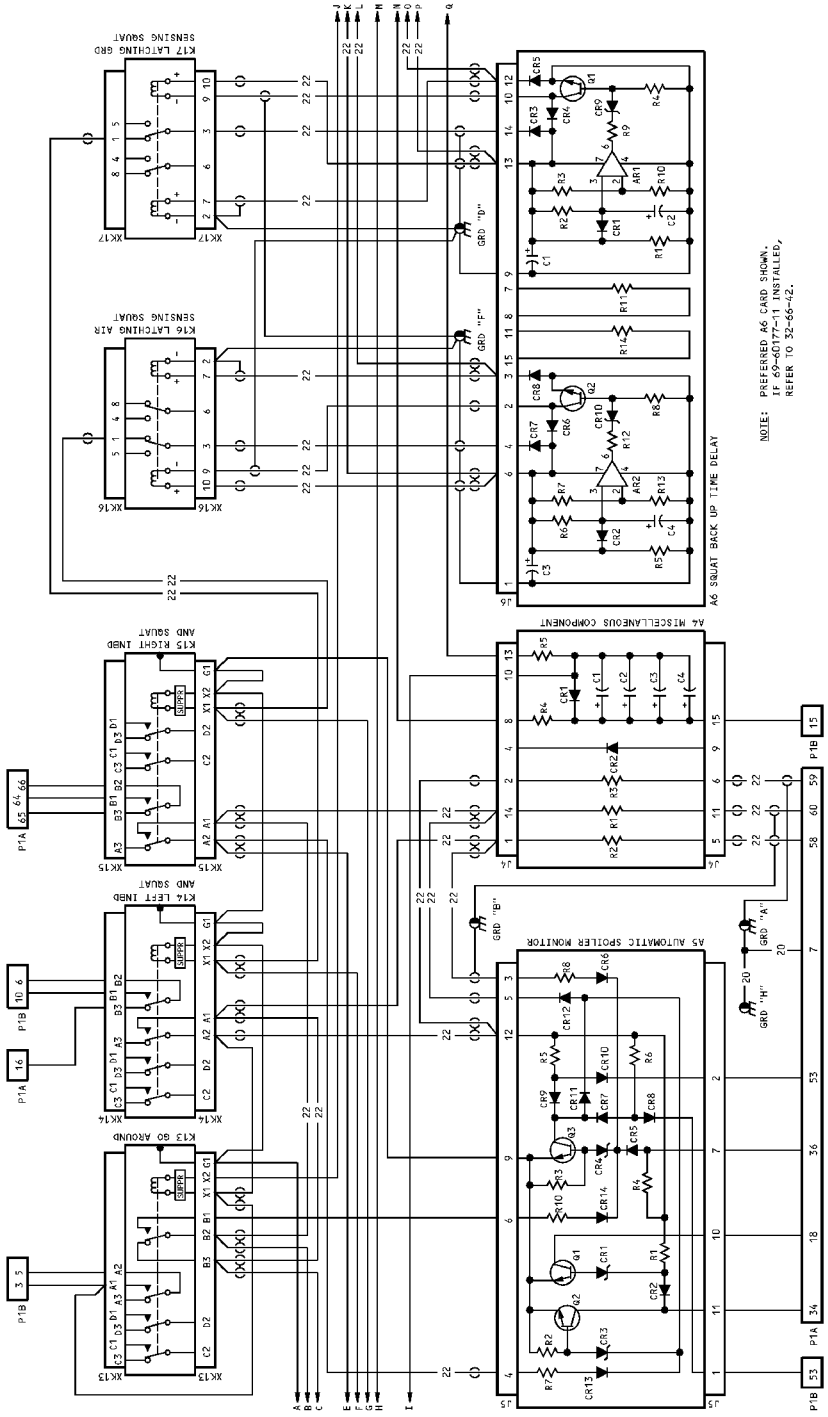
Test Setup
Figure 101 (Sheet 2 of 2)

65-52811-181

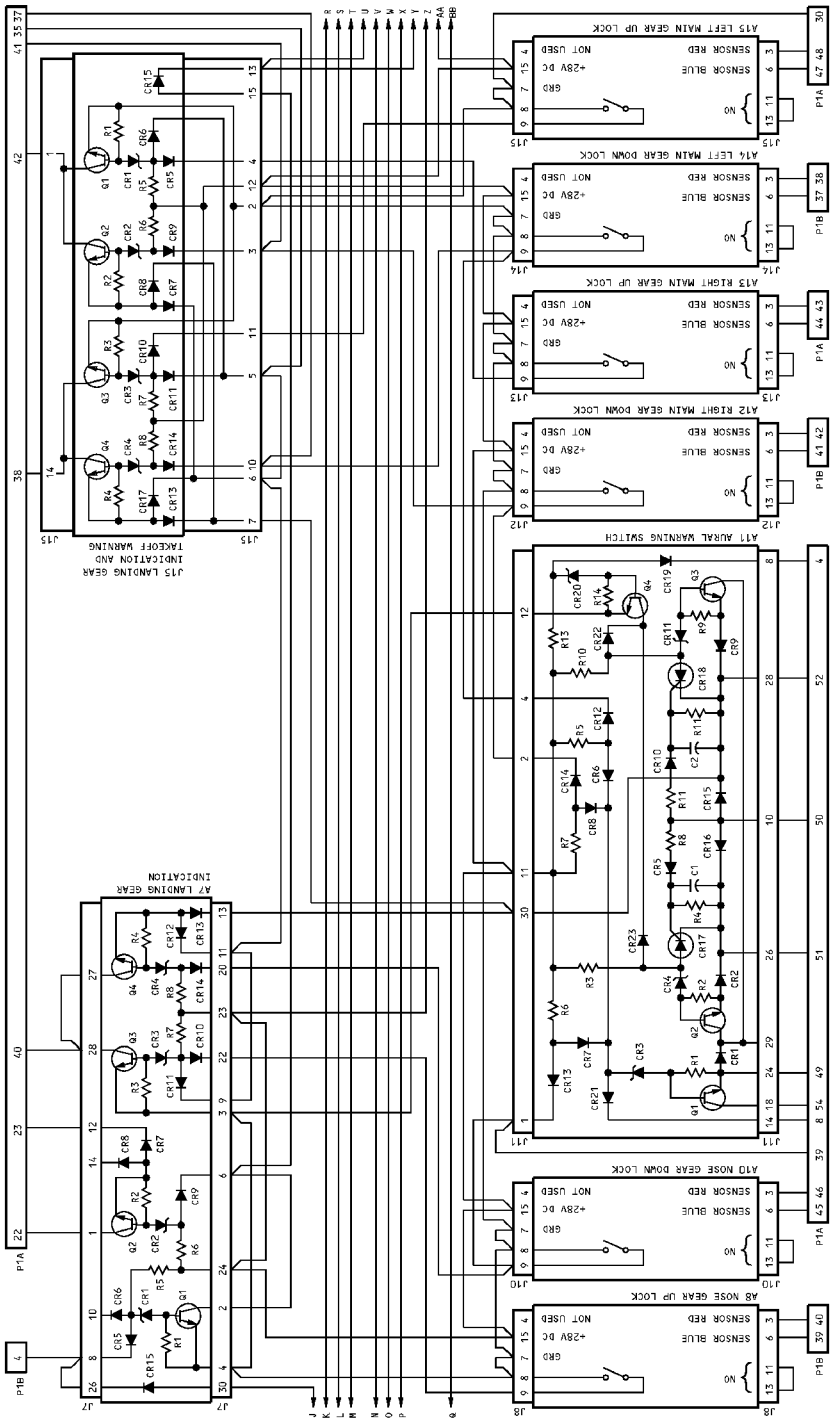
Connector Indexing
Figure 102



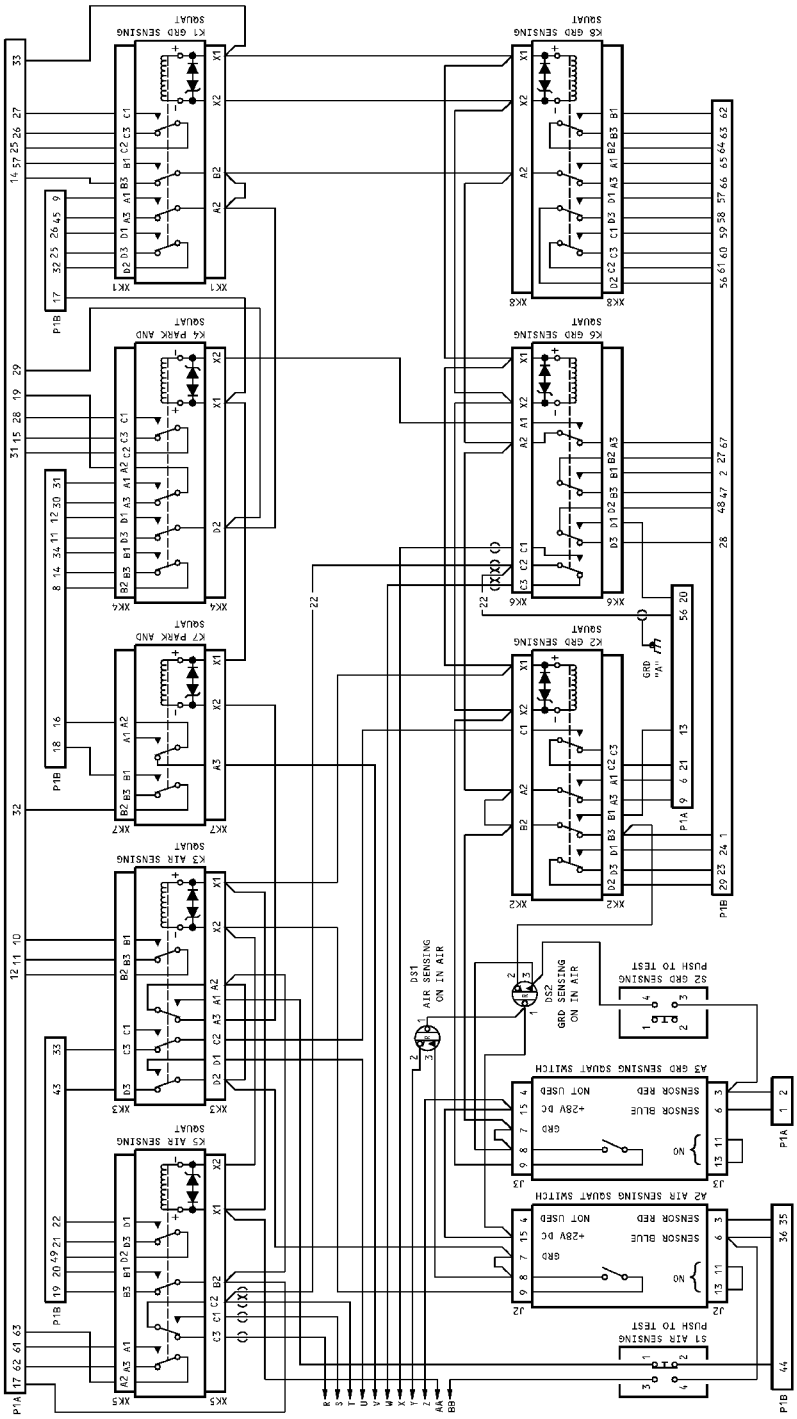
65-52811-181 Schematic Diagram
Figure 103 (Sheet 1 of 4)



65-52811-181 Schematic Diagram
Figure 103 (Sheet 2 of 4)



65-52811-181 Schematic Diagram
Figure 103 (Sheet 3 of 4)



65-52811-181 Schematic Diagram
Figure 103 (Sheet 4 of 4)

3. Trouble Shooting

A. 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.

Table 111: Troubleshooting

Trouble	Possible Cause and Corrective Action
TESTING AND FAULT ISOLATION, Table 101, TESTING AND FAULT ISOLATION, Table 102	Listed component
TESTING AND FAULT ISOLATION, Paragraph 2.C.	Wiring
TESTING AND FAULT ISOLATION, Paragraph 2.D.	A4R1/R2
TESTING AND FAULT ISOLATION, Paragraph 2.E.	A4R3
TESTING AND FAULT ISOLATION, Table 104	
Steps 1, 3, 9, 11, 21-25, 35, 37	Listed component
Steps 4-8, 10, 12	
Continuity fault	S1, K3
DS1 fault	A2, DS1
Steps 14-18	A7, DS1
Steps 20, 21	A3, DS2
Steps 26-29	DS1, DS2, S1, S2
Steps 32-47	A6, K14 thru K17
TESTING AND FAULT ISOLATION, Table 105	
Steps 1-4	A16
Steps 5-9	A14
Steps 10-17	A11, A15
TESTING AND FAULT ISOLATION, Table 106	
Steps 1-4	A13
Steps 5-9	A12
Steps 10-17	A11, A15
TESTING AND FAULT ISOLATION, Table 107	
Steps 1-4	A8
Steps 5-9	A10
Steps 10-11	A7, A11
TESTING AND FAULT ISOLATION, Table 108	
Steps 1-28	A11
TESTING AND FAULT ISOLATION, Table 109	
Steps 1-17	A4, A5, A7, K13, K14, K15
Steps 19-45	K9 thru K12
TESTING AND FAULT ISOLATION, Table 110	

Table 111: Troubleshooting (Continued)

Trouble	Possible Cause and Corrective Action
Steps 1-20	K9-K12
TESTING AND FAULT ISOLATION, Paragraph 2.P.Par. 2.P.	A4C1-A4C4

(NOT APPLICABLE)

(NOT APPLICABLE)

(NOT APPLICABLE)

REPAIR

1. Procedure

A. All repair can be accomplished with standard industry practices and information contained in SOPM 20-11-04 except as noted in the following:

(1) If keying plugs (395, IPL Figure 1) require replacement, install in connectors as indicated in REPAIR-GENERAL, Table 601

Table 601: Keying Plug Installation

Connector	Position
J2, J3, J8, J13, J16	10-L
J4	3-C, 12-N
J5	8-J, 13-P
J6	5-E
J7	15-16, 17-18
J10	2-B
J11	23-24, 25-26
J12, J14	10-L
J15	8-J, 9-K

(2) When replacing relays K16 and K17 (355, IPL Figure 1) insert with contrasting bead matching pin 2 of socket.

(NOT APPLICABLE)

BOEING®

COMPONENT MAINTENANCE MANUAL

FITS AND CLEARANCES

(NOT APPLICABLE)

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

A. This section lists the special tools, fixtures, and equipment necessary for maintenance.

NOTE: Equivalent substitutes may be used.

Special Tools

Reference	Description	Part Number	Supplier
SPL-4461	Analyzer - Digital Signal	TDS-540	80009
SPL-5445	Lamp Load - 100 mA max, 28v dc	387	08806

Tool Supplier Information

CAGE Code	Supplier Name	Supplier Address
08806	GENERAL ELECTRIC CO.	NELA PARK CLEVELAND, OH 44112 Telephone: (216) 266-2536
80009	TEKTRONIX INC.	14200 S W KARL BRAUN DRIVE P. O. BOX 500 BEAVERTON, OR 97077 Telephone: (800) 835-9433 Facsimile: (503) 627-3866

ILLUSTRATED PARTS LIST

1. Introduction

A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.

B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

Detail Installation Parts (Included only if installation parts may be sent to the shop as part of assembly)

C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.

D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.

E. Color-coded parts are identified with a single digit alpha following the dash number or with ''SP'' suffix. If the ''SP'' suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.

F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a ''~'' at the end of the line and will be continued on the next line. The ''~'' denotes that the part number continues on the next line.

G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.

(1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.

(2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.

H. Interchangeable Parts

Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES, REPLACED BY)	The part replaces and is interchangeable with, or is an alternative to, the initial part.

VENDOR CODES

Code	Name
00213	MSD INC 700 ORANGE ST DARLINGTON, SOUTH CAROLINA 29532 FORMERLY V01350; FORMERLY 78290; FORMERLY NYTRONICS COMPONENTS GROUP
00779	TYCO ELECTRONICS CORP 2800 FULLING MILL ROAD PO BOX 3608 MIDDLETOWN, PENNSYLVANIA 17057 FORMERLY AMP INC; FORMERLY V04618 FORMERLY GENICOM COMP V01526
05574	VIKING ELECTRONICS INC. 5455 ENDEAVOUR CT MOORPARK, CALIFORNIA 93021 FORMERLY VIKING IND DATACON DIV; VIKING SPECIAL PROD V53156; FORMERLY VIKING CONN SUB OF CRITON CORP; ARIZONA INTEGRATED ELEC V0P9C6; FORMERLY IN CHATSWORTH, CA
08748	CRANE ELDEC CORP 16700 13TH AVE WEST LYNNWOOD, WASHINGTON 98036 FORMERLY VB0043; FORMERLY ELECTRO DEVELOPMENT CORP; FORMERLY ELDEC CORP.

Code	Name
35344	Replaced: [V35344] LEACH CORP RELAY DIV SEE LEACH CORP CONTROL PROD DIV V58657 by Code: Name and Address below 58657: LEACH INTERNATIONAL OF NORTH AMERICA 6900 ORANGETHORPE AVE PO BOX 5032 BUENA PARK, CALIFORNIA 90622-5032 FORMERLY LEACH CORP V35344 AND V00614 FORMERLY LEACH CORP
71286	ALCOA GLOBAL FASTENERS INC 3014 W LOMITA BLVD TORRANCE, CALIFORNIA 90505 FORMERLY REXNORD INC SPECIALITY FASTENER DIV IN HASBROUCK HEIGHTS, NEW JERSEY; FORMERLY CAMLOC FASTENER CORP V08733
71468	ITT CANNON DIV OF ITT CORP 666 EAST DYER ROAD SANTA ANA, CALIFORNIA 92702 FORMERLY CANNON ELECTRIC CO AND ITT CANNON ELECTRIC AND ITT CANNON ELECTRIC DIV OF INTERNATIONAL TELEPHONE CORP FORMERLY IN LOS ANGELES AND FOUNTAIN VALLEY, CALIFORNIA FORMERLY ITT CANNON ELECTRIC SALEM DIV, SALEM, MA V91146
72962	HARVARD INDUSTRIES INC 3 WERNER WAY SUITE 210 LEBANON, NEW JERSEY 08833 FORMERLY ESNA V7A079 FORMERLY ELASTIC STOP NUT IN UNION, NJ
73949	GUARDIAN ELECTRIC MFG CO 1425 LAKE AVENUE WOODSTOCK, ILLINOIS 60098 FORMERLY IN CHICAGO, ILLINOIS

Code	Name
81640	EATON CORP AEROSPACE AND COMMERCIAL CONTROLS DIV 2250 WHITFIELD AVENUE EAST SARASOTA, FLORIDA 34243-9703 FORMERLY SINGER CO CONTROLS DIV AND CONTROLS CO OF AMERICA AND CONTROL SWITCH A CUTLER-HAMMER CO AND EATON CORP CUTLER-HAMMER GROUP V97198, V81641 IN FOLCROFT, PENNSYLVANIA INFO FROMVDR THRU M2880 FEB 1987 SWITCHES
82050	ESTERLINE ELECTRONICS CORP COSTA MESA. CALIFORNIA 92626-1437 FACILITIES DISCONTINUED FORMERLY BABCOCK ELECTRONIC CORP ELECTRONIC PRODUCTS
89954	BAE SYSTEMS CONTROL 600 MAIN STREET JOHNSON CITY, NEW YORK 13790 FORMERLY MARTIN MARIETTA AIRCRAFT CONTROL SYSTEMS; FORMERLY LOCKHEED MARTIN CONTROL SYSTEMS
94867	CHURCHILL CORPORATION BOX G MELROSE, MASSACHUSETTS 02176 FORMERLY CHURCHILL LIGHTING CORP

REFERENCE DESIGNATOR INDEX

REFERENCE DESIGNATOR	PART NUMBER	FIG-ITEM
A10	8-060-07	1-320
A10	2-899-113	1-320A
A11	69-60177-20	1-325
A12-A14	8-060-02	1-295
A12-A14	2-899-111	1-295A
A16	8-060-02	1-295
A16	2-899-111	1-295A
A2	8-060-02	1-295
A2	2-899-111	1-295A
A3	8-060-02	1-295
A3	2-899-111	1-295A
A4	69-60177-13	1-300
A5	65-58250-23	1-305
A6	69-63485-6	1-310
A6	69-63485-4	1-310A
A6	69-60177-11	1-310B
A8	8-060-02	1-295
A8	2-899-111	1-295A
DS1	MS25041-6	1-365
DS2	MS25041-6	1-365
J11	582585-1	1-385
J7	582585-1	1-385
K1-K6	BACR13CG2AB	1-330
K12	KAX9E004	1-340
K13-K15	A410-159673-06	1-350
K7	BACR13CF2AB	1-335
K8	BACR13CG2AB	1-330
K9	KAX9E004	1-340
P1A	BCREF3150	1-440
P1B	BCREF3150	1-440
S1	C2006	1-360
S2	C2006	1-360
XK1-XK6	18-0006-0000	1-410
XK10	000300-0598	1-425

REFERENCE DESIGNATOR	PART NUMBER	FIG-ITEM
XK11	000300-0598	1-425
XK12	BACS16W2	1-420
XK13-XK15	000300-0596	1-430
XK7	18-0007-0000	1-415
XK8	18-0006-0000	1-410
XK9	BACS16W2	1-420

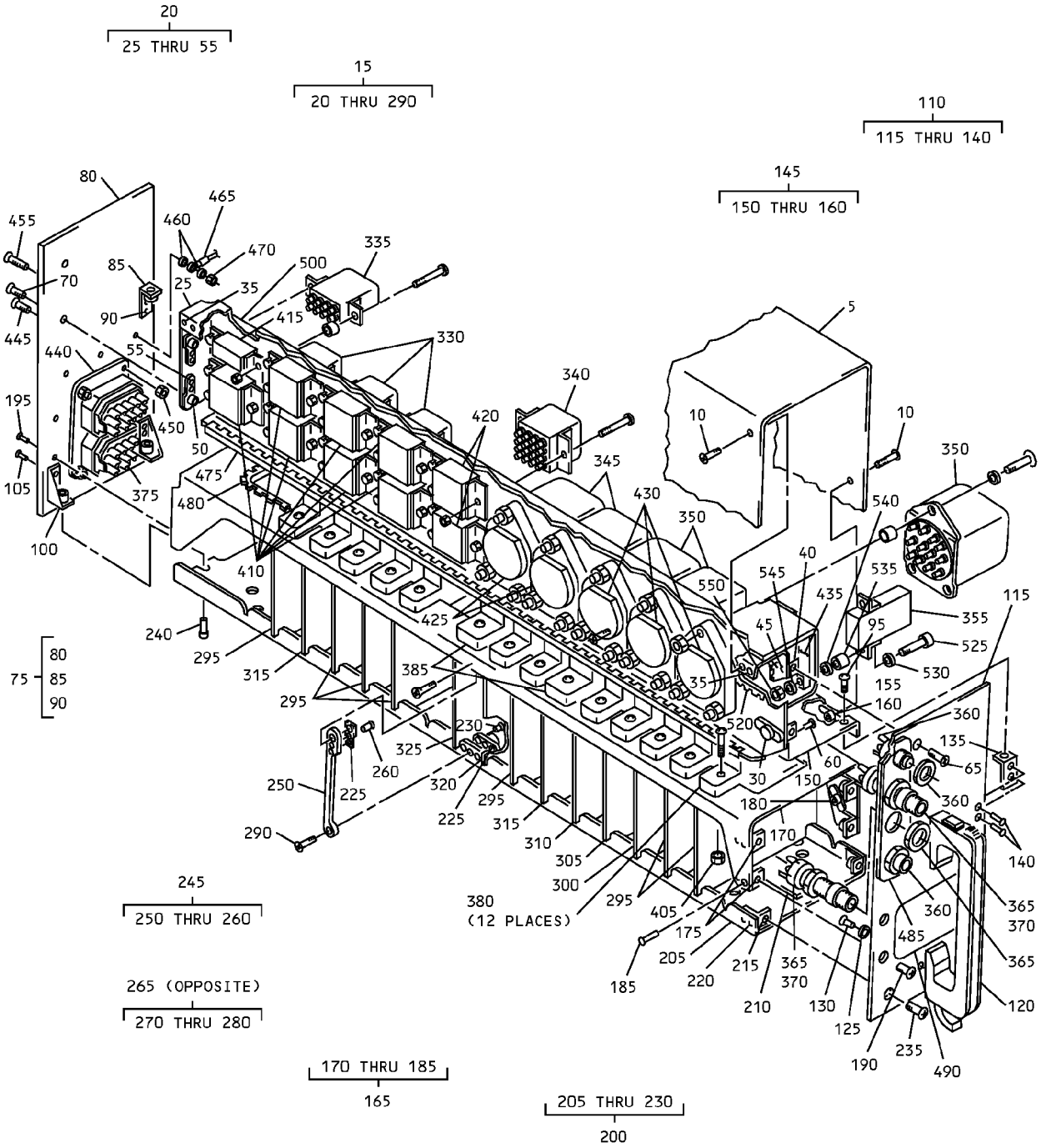
NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
000300-0596		1	430	3
000300-0598		1	425	2
10-60450-3		1	345	2
10-60450-6		1	350	3
10-61226-111		1	295A	7
10-61226-113		1	320A	1
10-61226-211		1	295	7
10-61226-213		1	320	1
108-0022-000		1	540	4
118-0090-000		1	535	4
18-0006-0000		1	410	7
18-0007-0000		1	415	1
2-899-111		1	295A	7
2-899-113		1	320A	1
22NM107-62		1	470	3
40L2-2		1	120	1
40L2-2A		1	120A	1
52LHA227-62		1	40	2
		1	85	1
		1	100	2
		1	135	1
		1	175	4
		1	215	2
52LHTA51M40		1	225	2
52LHTA57M40		1	255	2
		1	275	1
582507-1		1	395	AR
582553-1		1	380	12
582585-1		1	385	2
65-52811-181		1	1	RF
65-52811-41		1	375	1
65-58250-23		1	305	1
65-58250-29		1	315	2
65-73698-64		1	210	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
65-73698-69		1	165	1
65-73698-70		1	170	1
65-73698-74		1	200	1
65-73698-75		1	205	1
65-80014-8		1	145	1
65-80014-9		1	150	1
65-80041-10		1	505	1
65-80041-13		1	25	1
65-80041-14		1	20	1
65-80041-15		1	15	1
65-80041-4		1	75	1
65-80041-5		1	80	1
65-80041-6		1	110	1
65-80041-7		1	115	2
66143-2LP		1	390	AR
69-60036-1		1	245	1
69-60036-2		1	265	1
69-60036-3		1	250	1
		1	270	1
69-60177-11		1	310B	1
69-60177-13		1	300	1
69-60177-20		1	325	1
69-63485-4		1	310A	1
69-63485-6		1	310	1
8-060-02		1	295	7
8-060-07		1	320	1
9524-6508		1	345	2
9524-8208		1	350	3
990-0001-063		1	530	4
990-0002-033		1	550	4
990-0004-021		1	525	4
A410-159673-03		1	345	2
A410-159673-06		1	350	3
AN960-4L		1	545	4
AN960D6L		1	460	6

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BAC27DEX1843		1	500	1
BAC27DEX3512		1	490	1
BAC27DEX975		1	485	1
BACC47DJ1		1	495	AR
BACG10ZA350		1	520	1
BACG20ZA1850		1	475	1
BACG20ZA680		1	480	1
BACN10DN40		1	405	26
		1	450	4
		1	515	2
BACR13CF2AB		1	335	1
BACR13CG2AB		1	330	7
BACR15BA2A		1	230	4
		1	260	2
		1	280	2
BACR15BA3D		1	35	12
		1	55	4
		1	90	2
		1	105	2
		1	140	2
		1	160	6
		1	185	12
		1	220	4
BACR15BA4D		1	195	4
BACR15BB3D		1	45	4
BACS16W1		1	410	7
BACS16W2		1	420	2
BACS16X1		1	415	1
BACT12AC		1	465	3
BCREF3150		1	440	1
BR20AXH5V3		1	355	2
BR9AXH5V3		1	355	2
C2006		1	360	2
DL200-225		1	5	1
DPXMB67P67P34B0059		1	440	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
FCC 400-7		1	345	2
FCC 400-8		1	350	3
G59673-3		1	345	2
G59673-3A		1	345	2
KAX9E004		1	340	2
MS18209-387		1	370	2
MS25041-6		1	365	2
MS35337-43		1	125	2
NAS1068A04L		1	30	6
		1	155	3
		1	180	2
NAS514P440-5		1	285	2
NAS514P440-6		1	445	4
NAS514P632-()P		1	455	3
NAS514P632-6B		1	65	2
		1	190	4
		1	235	2
NAS600-5B		1	10	8
		1	60	3
		1	510	2
NAS600-5P		1	290	2
NAS600-9P		1	400	26
NAS601-5P		1	240	2
NAS601-6B		1	70	2
		1	95	2
NAS603-6P		1	130	2
NAS687A06		1	50	2
VB10-1PWC11-43		1	435	2



Landing Gear Accessory Unit Assy (M338)
IPL Figure 1

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
1	65-52811-181		LANDING GEAR ACCESSORY UNIT ASSY M338 (POST SB 737-31-1049)	A	RF
5	DL200-225		. DUST COVER (V94867)		1
10	NAS600-5B		. SCREW		8
15	65-80041-15		. CHASSIS ASSY		1
20	65-80041-14		. . BRACKET ASSY, RELAY		1
25	65-80041-13		. . . BRACKET, RELAY		1
30	NAS1068A04L		. . . NUTPLATE		6
35	BACR15BA3D		. . . RIVET		12
40	52LHA227-62		. . . NUTPLATE (V72962)		2
45	BACR15BB3D		. . . RIVET		4
50	NAS687A06		. . . NUTPLATE		2
55	BACR15BA3D		. . . RIVET		4
60	NAS600-5B		. . SCREW		3
65	NAS514P632-6B		. . SCREW		2
70	NAS601-6B		. . SCREW		2
75	65-80041-4		. . REAR PLATE ASSY		1
80	65-80041-5		. . . REAR PLATE		1
85	52LHA227-62		. . . NUTPLATE (V72962)		1
90	BACR15BA3D		. . . RIVET		2
95	NAS601-6B		. . . SCREW		2
100	52LHA227-62		. . NUTPLATE (V72962)		2
105	BACR15BA3D		. . RIVET		2
110	65-80041-6		. . FRONT PLATE ASSY		1
115	65-80041-7		. . . FRONT PLATE		2
120	40L2-2		. . . LATCH (V71286)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
120A	40L2-2A		. . . LATCH (V71286) (OPT ITEM 120)		1
125	MS35337-43		. . . WASHER		2
130	NAS603-6P		. . . SCREW		2
135	52LHA227-62		. . . NUTPLATE (V72962)		1
140	BACR15BA3D		. . . RIVET		2
145	65-80014-8		. . BUNDLE COVER ASSY		1
150	65-80014-9		. . . BUNDLE COVER		1
155	NAS1068A04L		. . . NUTPLATE		3
160	BACR15BA3D		. . . RIVET		6
165	65-73698-69		. . LOWER SHELF ASSY		1
170	65-73698-70		. . LOWER SHELF		1
175	52LHA227-62		. . . NUTPLATE (V72962)		4
180	NAS1068A04L		. . . NUTPLATE		2
185	BACR15BA3D		. . . RIVET		12
190	NAS514P632-6B		. . SCREW		4
195	BACR15BA4D		. . RIVET		4
200	65-73698-74		. . BOTTOM COVER ASSY		1
205	65-73698-75		. . . BOTTOM COVER		1
210	65-73698-64		. . . PAD		1
215	52LHA227-62		. . . NUTPLATE (V72962)		2
220	BACR15BA3D		. . . RIVET		4
225	52LHTA51M40		. . . NUTPLATE (V72962)		2
230	BACR15BA2A		. . . RIVET		4
235	NAS514P632-6B		. . SCREW		2
240	NAS601-5P		. . SCREW		2
245	69-60036-1		. . STRAP ASSY		1
250	69-60036-3		. . . STRAP		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
255	52LHTA57M40		. . . NUTPLATE (V72962)		2
260	BACR15BA2A		. . . RIVET		2
265	69-60036-2		. . STRAP ASSY		1
270	69-60036-3		. . . STRAP		1
275	52LHTA57M40		. . . NUTPLATE (V72962)		1
280	BACR15BA2A		. . . RIVET		2
285	NAS514P440-5		. . SCREW		2
290	NAS600-5P		. . SCREW		2
295	8-060-02		. PRINTED CIRCUIT ASSY, PROXIMITY SWITCH (V08748) (SPEC 10-61226-211) (PREFERED) (OPT ITEM 295A) (A2, A3, A8, A12-A14, A16)		7
295A	2-899-111		. PRINTED CIRCUIT ASSY, PROXIMITY SWITCH (V08748) (SPEC 10-61226-111) (OPT ITEM 295) (A2, A3, A8, A12-A14, A16)		7
300	69-60177-13		. PRINTED CIRCUIT ASSY (A4) (V89954)		1
305	65-58250-23		. PRINTED CIRCUIT ASSY (A5) (V89954)		1
310	69-63485-6		. PRINTED CIRCUIT ASSY (A6) (V89954) (OPT ITEM 310A, 310B)		1
310A	69-63485-4		. PRINTED CIRCUIT ASSY (A6) (V89954) (OPT ITEM 310, 310B)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
310B	69-60177-11		. PRINTED CIRCUIT ASSY (A6) (V89954) (OPT ITEM 310, 310A)		1
315	65-58250-29		. PRINTED CIRCUIT ASSY (V89954) (A7,A15)		2
320	8-060-07		. PRINTED CIRCUIT ASSY, PROXIMITY SWITCH (V08748) (SPEC 10-61226-213) (A10) (PREFERED) (OPT ITEM 320A)		1
320A	2-899-113		. PRINTED CIRCUIT ASSY, PROXIMITY SWITCH (V08748) (SPEC 10-61226-113) (A10) (OPT ITEM 320)		1
325	69-60177-20		. PRINTED CIRCUIT ASSY (A11) (V89954)		1
330	BACR13CG2AB		. RELAY (K1-K6, K8)		7
335	BACR13CF2AB		. RELAY (K7)		1
340	KAX9E004		. RELAY (V35344) (K9, K12)		2
345	A410-159673-03		. RELAY (V73949) (K10,K11) (SPEC 10-60450-3) (OPT FCC 400-7 (V00213)) (OPT G59673-3 (V73949)) (OPT G59673-3A (V73949)) (OPT 9524-6508 (V35344))		2

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
350	A410-159673-06		. RELAY (V73949) (K13-K15) (SPEC 10-60450-6) (OPT FCC 400-8 (V00213)) (OPT 9524-8208 (V35344))		3
355	BR9AXH5V3		. RELAY (V82050) (K16,K17) (OPT BR20AXH5V3 (V82050))		2
360	C2006		. SWITCH, SNAP (V81640) (S1, S2)		2
365	MS25041-6		. INDICATOR (DS1, DS2)		2
370	MS18209-387		. LAMP		2
375	65-52811-41		. WIRE BUNDLE (MODIFIED PER 737-SB 31-1049)		1
380	582553-1		. CONNECTOR (V00779) (J2-J6,J8,J10,J12-J16)		12
385	582585-1		. CONNECTOR (V00779) (J7, J11)		2
390	66143-2LP		. TERMINAL, TAB (V00779)		AR
395	582507-1		. PLUG, KEYING (V00779)		AR
400	NAS600-9P		. SCREW		26
405	BACN10DN40		. NUT		26
410	18-0006-0000		. SOCKET, RELAY (V05574) (XK1-XK6, XK8) (SPEC BACS16W1)		7
415	18-0007-0000		. SOCKET, RELAY (V05574) (XK7) (SPEC BACS16X1)		1
420	BACS16W2		. SOCKET, RELAY (XK9, XK12)		2

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
425	000300-0598		. SOCKET, RELAY (V05574) (XK10, XK11)		2
430	000300-0596		. SOCKET, RELAY (V05574) (XK13-XK15)		3
435	VB10-1PWC11-43		. SOCKET, RELAY (V05574) (XK16,XK17)		2
440	BCREF3150		. CONNECTOR (V71468) (DPXMB67P67P34B0059) (P1A, P1B)		1
445	NAS514P440-6		. SCREW		4
450	BACN10DN40		. NUT		4
455	NAS514P632-()P		. SCREW		3
460	AN960D6L		. WASHER		6
465	BACT12AC		. TERMINAL LUG		3
470	22NM107-62		. NUT (V72962)		3
475	BACG20ZA1850		. GROMMET		1
480	BACG20ZA680		. GROMMET		1
485	BAC27DEX975		. MARKER, AL FOIL		1
490	BAC27DEX3512		. MARKER		1
495	BACC47DJ1		. CONTACT		AR
500	BAC27DEX1843		. MARKER, AL FOIL		1
505	65-80041-10		. PLATE		1
510	NAS600-5B		. SCREW		2
515	BACN10DN40		. NUT		2
520	BACG10ZA350		. GROMMET		1
525	990-0004-021		. SCREW (V05574)		4
530	990-0001-063		. LOCK WASHER (V05574)		4
535	118-0090-000		. STUD (V05574)		4

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
540	108-0022-000		. SPACER (V05574)		4
545	AN960-4L		. WASHER		4
550	990-0002-033		. NUT (V05574)		4

–Item not Illustrated