

LUNAR MODULE

7, 8, & 9

ELEMENTARY FUNCTIONAL DIAGRAMS



NAS 9-1100

THIS DOCUMENT SUPERSEDES LED-267-37B DATED 10 MARCH 1970

Approved by:

Config Schem Gr R. W. Rogal
R. W. RogalAsst Elec Pwr S/S Mgr H. W. Grussinger
H. W. GrussingerElec Pwr S/S Mgr C. A. Keenan
C. A. Keenan

Approved by:

Ass't Design Eng Mgr (Elec) C. M. Schuhlein
C. M. SchuhleinAsst Prog Dir, Eng W. R. Bischoff
W. R. Bischoff

PUBLICATIONS SECTION / PRODUCT SUPPORT DEPARTMENT / GRUMMAN AEROSPACE CORPORATION / BETHPAGE / NEW YORK

1 NOVEMBER 1970

LM- 7, 8 & 9
ELEMENTARY FUNCTIONAL DIAGRAMS

UPDATE TO LED 267-37C DATED 1 NOVEMBER 1970

PRELIMINARY INFORMATION

INSERT THE FOLLOWING SHEETS IN FRONT OF THE PROPER
SHEET IN THE LM-7,8 & 9 EFD BOOK (LED 267-37C)

DATED 1-28-71

REVISION D2

FACILITY FORM 602

N 71 - 76 204	
(ACCESSION NUMBER)	(THRU)
602	None
(PAGES)	(CODE)
Q-115225	
(NASA ER OR TMX OR AD NUMBER)	(CATEGORY)

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I. Preface

This edition of LM Elementary Functional Diagrams was prepared for engineering use as the controlling document on the LM Program. No attempt was made to draw the internal diagram of electronic black boxes, except for some minor portions of circuits that would assist in completing the logic flow through the vehicle wiring. The LM cabin controls and displays as shown in figures 1 and 2, the electrical/electronic symbols used on the diagrams are shown in figure 3, and the symbols used for cross-referencing between diagrams are shown in figure 4. To eliminate confusion, since Roman numerals are used to designate vehicle panel numbers on the EFD diagrams, and level three drawings and Arabic numerals are attached to the LM cabin panels, both numbering systems are shown on the panel drawings in this document.

It is expected that this edition and subsequent editions will be updated frequently. Because the diagrams are useful for many purposes it is requested that any constructive criticism be addressed to:

Grumman Aerospace Corporation
Dept. 390 LM Electrical Power Subsystem (EPS)
Bethpage, New York 11714

II. Reference Documents

For more detailed information related to vehicle wiring, the reader should refer to the following documents:

LM-7 Connector List: LED390-84	LM-7 Circuit List: LED390-85
LM-8 Connector List: LED390-93	LM-8 Circuit List: LED390-94
LM-9 Connector List: LED390-100	LM-9 Circuit List: LED390-101

III. General Notes

1. Bethpage GSE/vehicle interfaces for the ACE carry-on console and integrated workstand may be obtained from Document
LM-7 LDD 407-37
LM-8 LDD 407-38
LM-9 LDD 407-39
2. Electrical drawing symbols shown in this document are in accordance with Section 15 of the MFSC Drafting Manual MIL-STD-15 and GS22B.
3. Mechanical drawing symbols shown in this document are in accordance with MSFC-STD-162A, MIL-STD-17, and GS22A.

III. General Notes (Continued)

4. Reference Designations

Partial reference designations are shown. Prefix with subsystem designation.

A	- Assembly	J	- Connector, receptacle
B	- Motor, resolver, synchro	K	- Relay
BT	- Battery	L	- Coil, valve
C	- Capacitor	M	- Meter
CB	- Circuit breaker	MP	- Gyroscope
CP	- Adapter connector (right angle connector)	MT	- Transducer
CR	- Diode	P	- Connector, plug
DS	- Indicator light, electro luminescent, floodlights	Q	- Transistor
E	- Antenna	R	- Resistor
F	- Fuse	RT	- Resistor, current regulating
FL	- Flag, filter	S	- Switch
H	- Mechanical valves, throttle/jets control	SQ	- Pyro squib
HR	- Heater	T	- Transformer
		W	- Umbilical cable assembly
		W/G	- Waveguide
		X	- Thrust translation controller

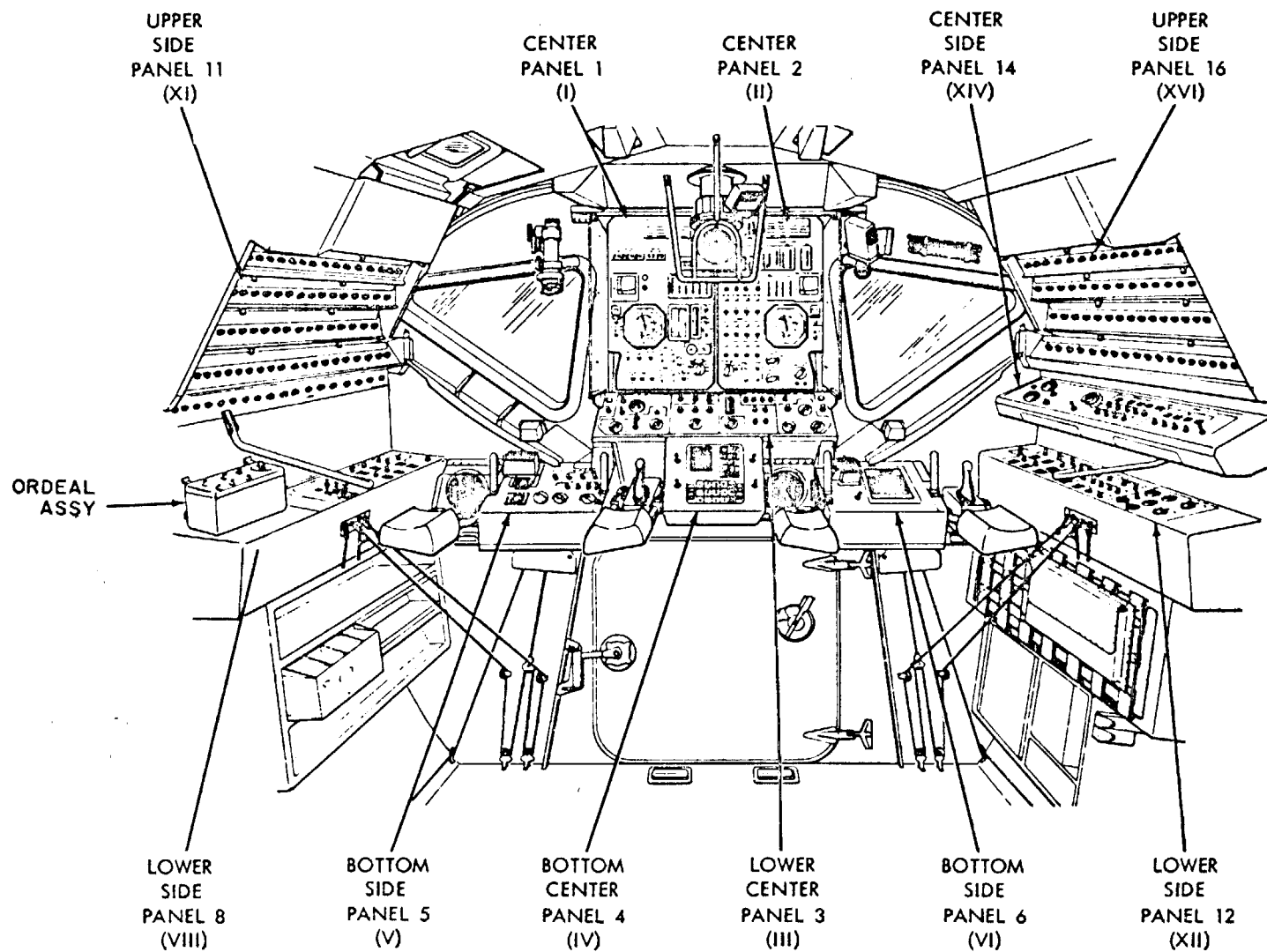


Figure 1. LM Cabin Control and Display Panels

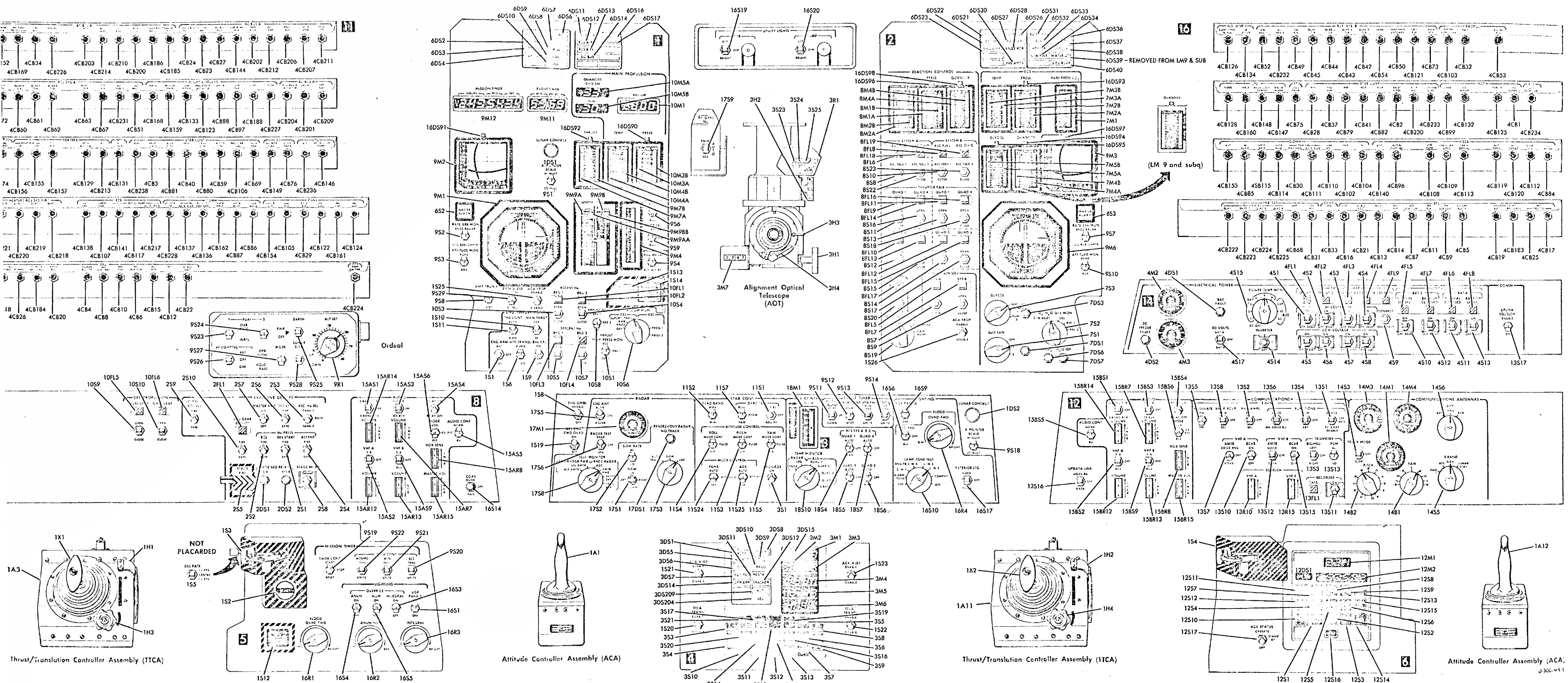


Figure 2. LM7, 8, and 9 Cabin Controls and Displays

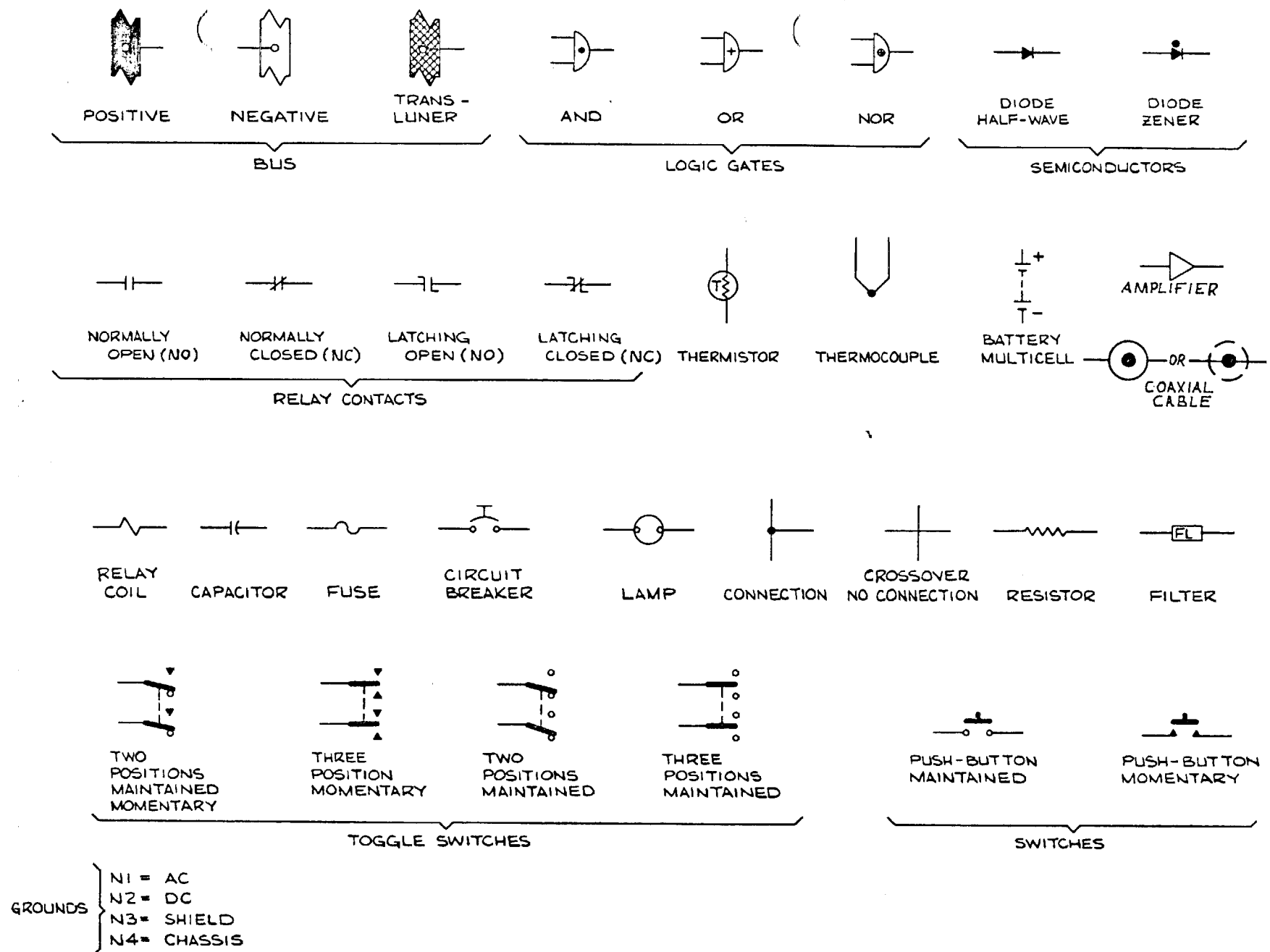


Figure 3. EFD Electrical/Electronic Symbols

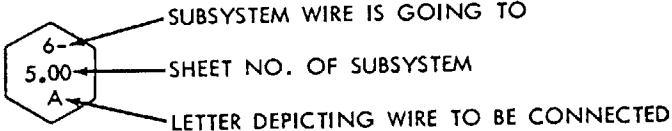
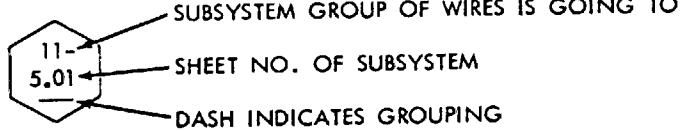
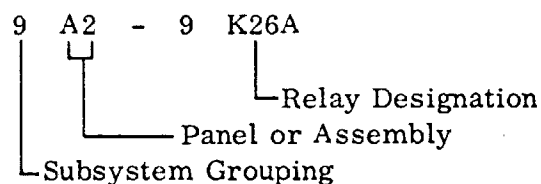
1.  TRIANGLE WITH A NUMBER - INDICATES CONTINUATION OF WIRE ON SAME SHEET.
2.  CIRCLE WITH A LETTER - INDICATES CONTINUATION OF WIRE ON DIFFERENT SHEET OF THE SAME SUBSYSTEM GROUPING. SHEET NO. IS INDICATED NEXT TO SYMBOL AS SHOWN IN EXAMPLE.
 EX.  SEE SH 5.00
3.  HEXAGON WITH SUBSYSTEM GROUP REFERENCE, SHEET NO., AND LETTER - INDICATES CONTINUATION OF WIRE ON DIFFERENT SUBSYSTEM.

 - SUBSYSTEM WIRE IS GOING TO
 - SHEET NO. OF SUBSYSTEM
 - LETTER DEPICTING WIRE TO BE CONNECTED
4.  HEXAGON WITH SUBSYSTEM REFERENCE AND SHEET NO. - INDICATES CONTINUATION OF A GROUP OF WIRES ON A DIFFERENT SUBSYSTEM.

 - SUBSYSTEM GROUP OF WIRES IS GOING TO
 - SHEET NO. OF SUBSYSTEM
 - DASH INDICATES GROUPING

Figure 4. EFD Cross Reference Symbols

IV. Introduction to LM Elementary Functional Diagram Vehicle Relay Index (Table 1)

1. This section is a tabulation of relays appearing on the LM Elementary Functional Diagrams.
2. The table is presented in five columns. The columns and contents of the columns are as follows:

Relay No. Column - This column contains the relay number (Subsystem Grouping, Panel or Assembly Designation and Relay Designation), which can be interpreted as follows:



Latching Relay Column - This column contains a "L" to indicate which relays are latching type; thus, the omission of the "L" indicates the relay is of the nonlatching type.

Coil Located on Column - This column contains a listing of the Elementary Functional Diagram(s) on which the coil appears.

Contacts Located on Column - This column contains a listing of the Elementary Functional Diagrams on which the contacts appear.

Function Column - This column contains a brief function and/or title of the device.

3. The relay location index coding is derived as follows:

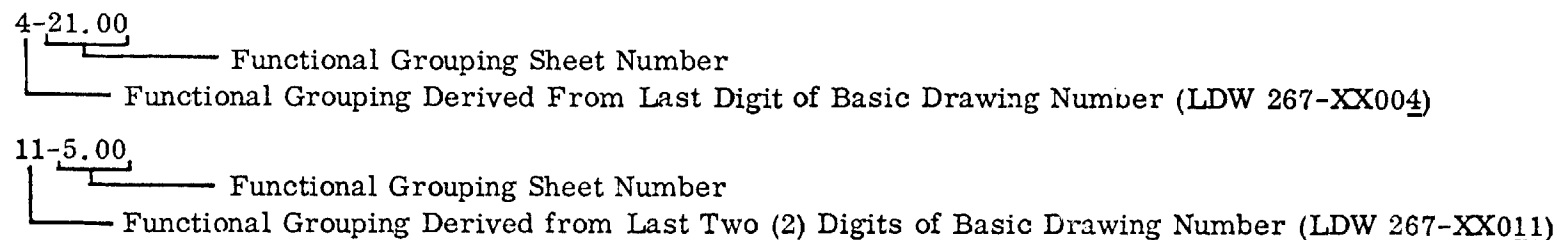


Table 1. LM EFD Relay Index (Sheet 1 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
1A8-K1	L	4-21.00, 11-5.00 11-6.00, 11-7.00	4-21.00, 11-5.00 11-6.00, 11-7.00	PGNS-AGS SEL. CONT.
1A8-K2	L	11-5.00, 11-6.00, 11-7.00	11-5.02, 11-13.00	PGNS-AGS YAW RATE CMD
1A8-K3	L	11-5.00, 11-6.00, 11-7.00	11-5.01, 11-14.00	PGNS-ATS PITCH RATE CMD
1A8-K4	L	11-5.00, 11-6.00, 11-7.00	11-5.01, 11-15.00	PGNS-AGS ROLL RATE CMD
1A8-K5	L	4-21.00, 11-5.00 11-6.00, 11-7.00	4-21.00, 11-15.00	800 Hz PGNS-AGS SEL.
1A8-K6	L	11-5.00, 11-6.00, 11-7.00	11-5.00, 11-6.00, 11-7.00	PGNS-AGS SEL. CONT.
1A8-K7	L	11-5.00, 11-6.00, 11-7.00	3-5.00, 11-23.00	PGNS-AGS SEL.
1A8-K8	L	11-5.00, 11-6.00, 11-7.00	1-5.00, 1-5.02, 1-10.00, 12-8.00	PGNS-AGS SEL. FOLLOW UP
1A8-K9	L	11-5.00, 11-6.00, 11-7.00	1-5.00, 1-5.02, 1-10.00	PGNS-AGS SEL.
1A8-K11	L	11-5.00, 11-6.00, 11-7.00	1-5.00, 1-9.00	PGNS-AGS SEL.
1A8-K12	L	11-5.00, 11-6.00, 11-7.00	11-5.00, 11-7.00	28VDC PGNS PREAMPS IN ATCA
1A8-K13	L	11-5.00, 11-6.00, 11-7.00	11-5.00, 11-6.00	28VDC PGNS PREAMPS IN ATCA
1A8-K14		1-5.00, 1-5.02, 1-6.00	3-5.00	ENGINE ARMED
1A8-K15	L	1-5.00, 1-5.01, 1-5.02, 1-8.00, 1-9.00	1-9.00, 1-20.01, 16-4.01 16-6.00	ENG FIRE OVERRIDE (SET-RESET)
1A8-K16		1-5.00, 1-11.00	1-5.00, 1-11.00, 1-20.01	DESCENT ENGINE ON
1A8-K17		1-5.00, 1-11.00		DESCENT ENGINE ON
1A8-K19	L	1-5.00, 1-5.01, 1-5.02, 1-8.00, 1-9.00	1-5.00, 1-5.01, 1-5.02, 1-8.00, 1-9.00	ENG FIRE OVERRIDE (SET-RESET)
1A8-K22	L	1-5.00, 1-5.01, 1-5.02, 1-8.00, 1-9.00	1-5.00, 1-5.02, 1-9.00	ENG FIRE OVERRIDE (SET-RESET)
1A8-K23		11-10.00	3-9.00, 11-10.00	STIMULATE STAGING CMD
1A8-K24		11-10.00	3-9.00, 11-10.00	STIMULATE STAGING CMD

Table 1. LM EFD Relay Index (Sheet 2 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
1A9-K1		11-5.03, 11-19.00	11-5.00, 11-10.00, 11-23.00	YAW PULSE DIRECT CONT.
1A9-K3		11-5.03, 11-19.00	11-5.00, 11-10.00, 11-23.00	PITCH PULSE DIRECT CONT.
1A9-K5		11-5.03, 11-19.00	11-5.00, 11-10.00, 11-23.00	ROLL PULSE DIRECT CONT.
1A9-K7		11-5.00, 11-6.00	11-23.00, 12-8.00	PGNS-AGS SEL FOLLOW UP
1A9-K8		11-5.00, 11-7.00	3-5.01, 11-23.00	CONTROLLER OUT OF DETENT
1A9-K9		1-5.00, 1-5.01, 1-7.00	1-5.00, 1-5.02, 1-6.00, 12-8.00	PGNS-AGS SEL. ABORT STAGE
1A9-K10		1-5.00, 1-5.01, 1-7.00	3-5.00, 4-8.00	ABORT STAGE
1A9-K11		1-5.00, 1-5.01, 1-8.00	1-5.00, 1-5.01, 1-12.00	PGNS-AGS SEL.
1A9-K12		1-5.00, 1-5.01, 1-8.00	1-5.00, 1-5.01, 1-12.00	28VDC PGNS PREAMP IN ATCA
1A9-K13		1-5.00, 1-5.01, 1-6.00	1-5.00, 1-5.01, 1-12.00	ABORT STAGE CMD
1A9-K14		1-5.00, 1-5.01, 1-10.00	1-5.00, 1-5.01, 1-12.00	ASC ENG ARM
1A9-K15		1-5.00, 1-11.00	11-5.00, 11-5.01 11-10.00, 11-16.00	DESCENT ENG THRUST
1A9-K16		1-5.00, 1-12.00	1-20.01, 12-8.00	ASCENT ENG ON
1A9-K17		1-5.00, 1-5.02, 1-10.00	1-5.00, 1-5.02, 1-10.00, 1-20.01	AUTO ENG OFF CMD
1A9-K18		1-5.00, 1-5.02, 1-10.00	1-5.00, 1-5.02, 1-10.00, 1-20.01	AUTO ENG ON CMD
1A9-K19		1-5.00, 1-7.00	1-20.01, 2-11.00	ABORT STAGE CMD
1A9-K20		1-5.00, 1-7.00	1-5.00, 1-5.02, 1-9.00, 4-8.00	POWER SWITCHOVER & D.E. STOP
1A9-K21		1-5.00, 1-5.01, 1-7.00	1-5.00, 1-5.01, 1-10.00, 3-5.00	ABORT STAGE CMD
1A9-K22		1-5.00, 1-5.01, 1-6.00	1-5.00, 1-501, 1-6.00, 1-10.00	AELD RESET

Table 1. LM EFD Relay Index (Sheet 3 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
1A9-K23		1-5.00, 1-5.01, 1-7.00	1-5.00, 1-6.00, 1-10.00, 11-5.00, 1-5.01	ABORT STAGE CMD
1A9-K24		1-5.00, 1-5.01, 1-10.00	1-5.00, 1-5.01, 1-10.00, 11-5.00	AUTO ASC ENG ON CMD
1A9-K25		1-5.00, 1-5.02, 1-10.00	1-5.00, 1-5.01, 1-10.00	AUTO ASC ENG OFF CMD
1A9-K201		1-5.00, 1-7.00	12-8.00	ABORT STAGE CMD
1A9-K203		1-5.00, 1-12.00	11-5.00, 11-5.01, 11-10.00, 11-16.00	ASC ENG ON CMD
1A9-K204		1-5.00, 1-12.00	11-5.00, 11-5.01, 11-10.00, 11-16.00	ASC ENG ON CMD
1A9-K205		1-5.00, 1-12.00	1-20.01, 12-8.00	ASC ENG ON CMD
1A9-K206		1-5.00, 1-5.01, 1-6.00	1-5.00, 1-5.01, 1-6.00	ENG ARM
1A9-K207		1-5.00, 1-5.01, 1-12.00	1-5.00, 1-5.01, 1-12.00	ABORT OR AUTO START
1A10-K1		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-5.02, 1-13.00	DES ENG ARM
1A10-K2		1-5.00, 1-5.02, 1-6.00	1-15.00	+43 ±15V PWR SUP FAIL
1A10-K3		1-5.00, 1-5.02, 1-9.00	1-5.00, 1-5.02, 1-9.00	DES ENG MAN STOP
1A10-K4		1-5.00, 1-11.00	1-10.00	PITCH GIMBAL OFF
1A10-K5		1-5.00, 1-11.00	1-18.00	ROLL GIMBAL OFF
1A10-K6		1-5.00, 1-5.02, 1-10.00	1-17.00	AUTO DES CONT LATCH
1A10-K7		1-5.00, 1-5.02, 1-9.00	1-5.00, 1-5.02, 1-13.00	DES ENG MAN. START
1A10-K8		1-5.00, 1-11.00	1-5.00, 1-5.02, 1-13.00	PITCH TRIM SHUTDOWN
1A10-K9		1-5.00, 1-11.00	1-5.00, 1-11.00, 1-18.00	ROLL TRIM SHUTDOWN
1A10-K10		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-11.00, 1-17.00	ARM PRE-VALVES
1A10-K13		1-5.00, 1-9.00	1-5.00, 1-5.02, 1-13.00	PITCH TRIM MODE
1A10-K14		1-5.00, 1-9.00	1-18.00	ROLL TRIM MODE
1A10-K15		1-5.00, 1-9.00	1-17.00	AUTO THRUST DISABLE
1A10-K16		1-5.00, 1-5.02, 1-13.00	1-16.00	CLOSE ON DES ENG START
1A10-K21		1-18.00	1-5.00, 1-11.00	PITCH TRIM FAIL
1A10-K22		1-17.00	1-19.00, 3-5.01	ROLL TRIM FAIL

Table 1. LM EFD Relay Index (Sheet 4 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
1A10-K23		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-5.02, 1-13.00	DES ENG ARM
1A10-K24		1-5.00, 1-5.02, 1-6.00	1-15.00	+15V PWR SUP FAIL
1A10K25		1-5.00, 1-5.02, 1-6.00	1-15.00	400 Hz POWER
1A10-K26		1-15.00	1-5.00, 1-5.02, 1-6.00, 1-15.00	POWER SUPPLY FAIL
1A10-K27		1-17.00	1-17.00, 1-18.00	TRIM MALF RESET
1A10-K28		1-5.00, 1-5.02, 1-13.00	1-5.00, 1-5.02, 1-10.00	AUTO DES CONT
1A13-1K1		1.5.00, 1-11.00	1-5.00, 1-11.00	DESCENT ENG THRUSTING
1A13-1K2		1-5.00, 1-11.00	1-5.00, 1-11.00	DESCENT ENG THRUSTING
1A13-1K3		1-5.00, 1-11.00	1-5.00, 1-11.00	DESCENT ENG THRUSTING
1A13-1K4		1-5.00, 1-9.00	1-7.00, 1-8.00, 1-5.00	PITCH GIMBAL OFF
1A13-1K5		1-5.00, 1-7.00	1-5.00, 1-5.02, 1-11.00, 1-13.00	DESCENT ENG OVERRIDE
1A13-1K6		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-5.02, 1-13.00	DESCENT ENG START ENABLE
1A13-2K1		1.5.00, 1-11.00	1-5.00, 1-11.00	LUNAR PROBE Y & Z
1A13-2K2		1-5.00, 1-11.00	1-5.00, 1-11.00	LUNAR PROBE Y & Z
1A13-2K3		1-5.00, 1-11.00	1-5.00, 1-11.00	LUNAR PROBE Y & Z
1A13-2K4		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-7.00, 1-8.00	ENG ARM
1A13-2K5		1-5.00, 1-8.00	1-5.00, 1-5.02, 1-11.00, 1-13.00	DESCENT ENG OVERRIDE
1A13-2K6		1-5.00, 1-5.02, 1-6.00	1-5.00, 1-5.02, 1-13.00	DESCENT ENG START ENABLE
1A13-3K7		1-5.00, 1-11.00	1-5.00, 1-11.00	DESCENT ENG THRUSTING
PNL IV B				
1K1		11-5.00, 11-6.00	11-5.02, 11-11.00	TRANSL CMD
1K2		11-5.00, 11-6.00	11-5.01, 11-11.00	TRANSL CMD
PNL IV A				
1K3		11-5.00, 11-6.00	11-5.02, 11-11.00	TRANSL CMD
1K4		11-5.00, 11-6.00	11-5.01, 11-11.00	TRANSL CMD

Table 1. LM EFD Relay Index (Sheet 5 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
2A1-K1	L	2-5.00	2-7.00, 2-11.00	ED BAT ENABLE - DISABLE
2A1-K2	L	2-5.00	2-7.00, 2-11.00	DELAY TIMER ENABLE - DISABLE
2A1-K3		2-7.00	2-7.00, 2-9.00, 2-11.00	CABLE CUTTER
2A1-K4		2-7.00	2-9.00, 2-11.00	CABLE CUTTER
2A1-K5		2-7.00	2-9.00, 2-11.00	STAGING BOLTS
2A1-K5A		2-7.00	2-9.00, 2-11.00	STAGING BOLTS
2A1-K6		2-7.00	2-9.00, 2-11.00	ELECT CIRCUIT INTERRUPTERS
2A1-K7		2-5.00	2-9.00, 2-11.00	RCS (HE) PRESS
2A1-K8		2-5.00	2-9.00, 2-11.00	LANDING GEAR DEPLOY
2A1-K8A		2-5.00	2-9.00, 2-11.00	LANDING GEAR DEPLOY
2A1-K9		1-5.00, 2-5.00	2-9.00, 2-11.00	DESCENT ENG (HE) PRESS
2A1-K10		2-5.00	2-9.00, 2-11.00	ASCENT ENG (HE) PRESS TANK 1
2A1-K11		2-5.00	2-9.00, 2-11.00	ASCENT ENG (HE) PRESS TANK 2
2A1-K12		2-5.00	2-9.00, 2-11.00	SPARE
2A1-K12A		2-5.00	2-9.00, 2-11.00	ASCENT ENG (HE) PRESS
2A1-K13		2-5.00	2-9.00, 2-11.00	DESCENT ENG (HE) VENT
2A1-K14		2-5.00	2-9.00, 2-11.00	DESCENT ENG (HE) PRESS (START)
2A1-K15		2-5.00	2-9.00, 2-11.00	DESCENT ENG (HE) PRESS
2A2-K1	L	2-6.00	2-8.00, 2-11.00	ED BAT ENABLE - DISABLE
2A2-K2	L	2-6.00	2-8.00, 2-11.00	DELAY TIMER ENABLE - DISABLE

Table 1. LM EFD Relay Index (Sheet 6 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
2A2-K3		2-8.00	2-8.00, 2-10.00, 2-11.00	CABLE CUTTER
2A2-K4		2-8.00	2-10.00, 2-11.00	CABLE CUTTER
2A2-K5		2-8.00	2-10.00, 2-11.00	STAGING NUTS
2A2-K5A		2-8.00	2-10.00, 2-11.00	STAGING NUTS
2A2-K6		2-8.00	2-10.00, 2-11.00	ELECT CIRCUIT INTERRUPTERS
2A2-K7		2-6.00	2-10.00, 2-11.00	RCS (HE) PRESS
2A2-K8		2-6.00	2-10.00, 2-11.00	LANDING GEAR DEPLOY
2A2-K8A		2-6.00	2-10.00, 2-11.00	LANDING GEAR DEPLOY
2A2-K9		1-5.00, 2-6.00	2-10.00, 2-11.00	DESCENT ENG (HE) PRESS
2A2-K10		2-6.00	2-10.00, 2-11.00	ASCENT ENG (HE) PRESS TANK 1
2A2-K11		2-6.00	2-10.00, 2-11.00	ASCENT ENG (HE) PRESS TANK 2
2A2-K12		2-6.00	2-10.00, 2-11.00	ASCENT ENG (HE) PRESS
2A2-K12A		2-6.00	2-10.00, 2-11.00	ASCENT ENG (HE) PRESS
2A2-K13		2-6.00	2-10.00, 2-11.00	DESCENT ENG (HE) VENT
2A2-K14		2-6.00	2-10.00, 2-11.00	DESCENT ENG (HE) PRESS (START)
2A2-K15		2-6.00	2-10.00, 2-11.00	DESCENT ENG (HE) PRESS
4A1-SECT-A-AUX	L	4-6.01	4-15.00	BAT. 3 INSTRUMENTATION
4A1-SECT-A-HV	L	4-6.01	4-5.00, 4-6.01 4-19.00	ENABLES BAT. 3 HIGH VOLTAGE FEED

Table 1. LM EFD Relay Index (Sheet 7 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
4A1-SECT-A-LOR		4-6.01	4-6.01	BAT. 3 ISOLATION
4A1-SECT-A-LV	L	4-6.01	4-5.00, 4-6.01 4-9.00, 4-19.00	ENABLES BAT. 3 LOW VOLTAGE FEED
4A1-SECT-A-OC	L	4-6.01	4-6.01, 4-15.00	BAT. 3 OVERCURRENT PROTECTION
4A1-SECT-A-RC	L	4-6.01	4-15.00	BAT. 3 REVERSE CURRENT PROTECTION
4A1-SECT-B-AUX	L	4-6.01	4-15.00	BAT. 4 INSTRUMENTATION
4A1-SECT-B-HV	L	4-6.01	4-5.00, 4-6.01, 4-19.00	ENABLES BAT. 4 HIGH VOLTAGE FEED
4A1-SECT-B-LOR		4-6.01	4-6.01	BAT. 4 ISOLATION
4A1-SECT-B-LV	L	4-6.01	4-5.00, 4-6.01 4-9.00, 4-19.00	ENABLES BAT. 4 LOW VOLTAGE FEED
4A1-SECT-B-OC	L	4-6.01	4-6.01, 4-15.00	BAT. 4 OVERCURRENT PROTECTION
4A1-SECT-B-RC	L	4-6.01	4-15.00	BAT. 4 REVERSE CURRENT PROTECTION
4A2-SECT-A-AUX	L	4-6.00	4-15.00	BAT. 1 INSTRUMENTATION
4A2-SECT-A-HV	L	4-6.00	4-5.00, 4-6.00 4-19.00	ENABLES BAT. 1 HIGH VOLTAGE FEED
4A2-SECT-A-LOR		4-6.00	4-6.00	BAT. 1 ISOLATION

Table 1. LM EFD Relay Index (Sheet 8 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
4A2-SECT-A-LV	L	4-6.00	4-5.00, 4-6.00 4-9.00, 4-19.00	ENABLES BAT. 1 LOW VOLTAGE FEED BAT. 1 OVERCURRENT PROTECTION BAT. 1 REVERSE CURRENT PROTECTION BAT. 2 INSTRUMENTATION
4A2-SECT-A-OC	L	4-6.00	4-6.00, 4-15.00	
4A2-SECT-A-RC	L	4-6.00	4-15.00	
4A2-SECT-B-AUX	L	4-6.00	4-15.00	
4A2-SECT-B-HV	L	4-6.00	4-5.00, 4-6.00, 4-19.00	
4A2-SECT-B-LOR		4-6.00	4-6.00	ENABLES BAT. 2 HIGH VOLTAGE FEED BAT. 2 ISOLATION
4A2-SECT-B-LV	L	4-6.00	4-5.00, 4-6.00 4-9.00, 4-19.00	
4A2-SECT-B-OC	L	4-6.00	4-6.00, 4-15.00	ENABLES BAT. 2 LOW VOLTAGE FEED BAT. 2 OVERCURRENT PROTECTION BAT. 2 REVERSE CURRENT PROTECTION
4A2-SECT-B-RC	L	4-6.00	4-15.00	
4A3-ALT-MFC	L	4-7.00	4-5.00, 4-7.00 4-8.00, 4-20.00	ENABLES BAT. 5 ALTERNATE FEED BAT. 5 ISOLATION (NORMAL)
4A3-NORM-LOR		4-7.00	4-7.00	
4A3-NORM-MFC	L	4-7.00	4-5.00, 4-7.00, 4-8.00 4-15.00, 4-20.00	ENABLES BAT. 5 NORMAL FEED BAT. 5 OVERCURRENT PROTECTION (NORMAL)
4A3-NORM-OC	L	4-7.00	4-7.00, 4-15.00	

Table 1. LM EFD Relay Index (Sheet 9 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
4A3-RC	L	4-7.00	4-15.00	BAT. 5 REVERSE CURRENT PROTECTION
4A4-ALT-MFC	L	4-7.01	4-5.00, 4-7.01 4-8.00, 4-20.00	ENABLE BAT. 6 ALTERNATE FEED
4A4-NORM-LOR		4-7.01	4-7.01	BAT. 6 ISOLATION (NORMAL)
4A4-NORM-MFC	L	4-7.01	4-5.00, 4-7.01 4-8.00, 4-15.00, 4-20.00	ENABLES BAT. 6 NORMAL FEED
4A4-NORM-OC	L	4-7.01	4-7.01, 4-15.00	BAT. 6 OVERCURRENT PROTECTION (NORMAL)
4A4-RC	L	4-7.01	4-15.00	BAT. 6 REVERSE CURRENT PROTECTION
4A5-K1		4-8.00	4-7.00, 4-7.01, 4-8.00	ENABLES ABORT STAGING
4A5-K2		4-8.00	4-7.00, 4-7.01, 4-8.00	ENABLES ABORT STAGING
4A5-DFR	L	4-8.00	4-5.00, 4-8.00, 4-19.00	DEADFACES BATS. 1 & 2
4A5-LDA	L	4-8.00	4-5.00	LDR EXCITATION IND
4A5-LDR	L	4-8.00	4-5.00	ENABLES GROUND FACILITY POWER
4A6-DFR	L	4-8.00	4-5.00, 4-8.00, 4-19.00	DEADFACES BATS. 3 & 4
PNL XI				
4K3		4-9.00	4-5.00, 4-9.00, 16-6.00	ENABLES CM POWER TO CDR BUS
4K4		4-9.00	4-5.00, 4-9.00, 16-6.00	ENABLES CM POWER TO CDR BUS
4K6		4-9.00	4-9.00	ENABLES INSTRUMENTATION

Table 1. LM EFD Relay Index (Sheet 10 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
7A3-7K5 7A3-7K6	L	7-5.00 7-5.00	7-5.00 7-16.00	CABIN FAN, CONT CABIN REPRESS INST
7A3-7K8 7A3-7K9		7-7.00 7-7.00	7-7.00 7-15.00, 16-4.01	GLYCOL AUTO TRANSFER GLYCOL AUTO TRANSFER
7A4-K12		7-6.00	7-6.00, 7-14.00, 16-4.01	SUIT FAN DIFF
9A5- 9K26A		9-7.00	9-5.00, 9-9.00	} ENABLES PGNS OR AGS ATTITUDE DATA TO FDAI CDR PANEL
9A5- 9K26B		9-7.00	9-5.00, 9-5.01	
9A5- 9K26C		9-7.00	9-5.00, 9-5.01	} ENABLES PGNS OR AGS ATTITUDE
9A5- 9K26D		9-7.00	9-9.00	
9A5- 9K26E		4-21.00, 9-7.00	4-21.00, 9-9.00, 9-14.00	} DATA TO FDAI CDR PANEL
9A5- 9K27A		9-6.00	9-5.00, 9-9.00	
9A5- 9K27B		9-6.00	9-5.00, 9-5.01	
9A5- 9K27C		9-6.00	9-5.00, 9-5.01	

Table 1. LM EFD Relay Index (Sheet 11 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
9A5-9K27D		9-6.00	9-9.00	} ENABLES PNGS OR AGS ATTITUDE DATA TO FDAI LMP PANEL
9A5-9K27E		4-21.00, 9-6.00	4-21.00, 9-9.00, 9-14.00	
9A5-9K33A		9-6.00	9-9.00	RATE ERROR
9A5-9K33B		4-21.00, 9-6.00	4-21.00, 9-9.00, 9-14.00	RATE ERROR
PNL I				
9K28		9-15.00	9-15.00	RATE ERROR
9K32A		9-10.00	9-11.00	RATE ERROR
9K32B		9-10.00	9-10.00	RATE ERROR
PNL II				
9K29A		9-10.00	3-9.00, 9-12.00	RATE ERROR
9K29B		9-10.00	9-11.00	RATE ERROR
9K30A		9-10.00	9-11.00	RATE ERROR
9K30B		9-10.00	9-10.00	RATE ERROR
9K31A		4-21.00, 9-7.00	4-21.00, 9-9.00, 9-14.00	RATE ERROR
9K31B		9-7.00	9-9.00	RATE ERROR
9K34A		9-10.00	3-9.00, 9-10.00, 9-12.00	RATE ERROR
9K34B		9-10.00	9-11.00	RATE ERROR

Table 1. LM EFD Relay Index (Sheet 12 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
11A1-K1		11-5.01, 11-16.00	11-5.01, 11-16.00	ZERO CROSS DETECTOR
11A1-K2		11-5.01, 11-16.00	11-5.01, 11-16.00	ZERO CROSS DETECTOR
11A1-K3		11-5.02, 11-16.00	11-16.00	ZERO CROSS DETECTOR
11A1-K8		11-5.00, 11-10.00	11-13.00	MISS SELECT YAW (CMD RATE)
11A1-K9		11-5.00, 11-10.00	11-14.00	MISS SELECT PITCH (CMD RATE)
11A1-K10		11-5.00, 11-10.00	11-15.00	MISS SELECT ROLL (CMD RATE)
11A1-K11		11-5.00, 11-10.00	11-13.00	MISS SELECT YAW (LIMITER)
11A1-K12		11-5.00, 11-10.00	11-14.00	MISS SELECT PITCH (LIMITER)
11A1-K13		11-5.00, 11-10.00	11-15.00	MISS SELECT ROLL (LIMITER)
11A1-K14		11-5.00, 11-10.00	11-13.00	DEAD BAND SELECT YAW
11A1-K15		11-5.00, 11-10.00	11-14.00	DEAD BAND SELECT PITCH
11A1-K16		11-5.00, 11-10.00	11-15.00	DEAD BAND SELECT ROLL
11A1-K19		11-5.00, 11-10.00	11-5.02, 11-13.00	PULSE MODE YAW
11A1-K20		11-5.00, 11-10.00	11-5.01, 11-14.00	PULSE MODE PITCH
11A1-K21		11-5.00, 11-10.00	11-5.01, 11-15.00	PULSE MODE ROLL
15A1-K1A		13-18.00	13-18.00	VHF "A" KEY SUPPLY
15A1-K1B		13-18.00	13-18.00	VHF "B" KEY SUPPLY
15A1-K2A		13-18.00	13-18.00	VHF "A" KEY SUPPLY
15A1-K2B		13-18.00	13-18.00	VHF "B" KEY SUPPLY

Table 1. LM EFD Relay Index (Sheet 13 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
16A5-K1		10-8.00	16-8.00	PROP PRESS
16A5-K2		9-11.00	16-8.00	CROSS POINTER
16A5-K3		9-15.00	16-8.00	THRUSTER
16A5-K4		7-9.00	16-8.00	SUIT & CABIN PRESS
16A5-K5		7-11.00	16-8.00	OX/WATER
16A5-K6		7-13.00	16-8.00	GLYCOL TEMP/PRESS
16A5-K7		8-12.00	16-8.00	RCS PRESSURE
16A5-K8		8-16.02	16-8.00	CROSS POINTER
16A5-K9		9-11.00	16-8.00	RCS QUANTITY
PNL XI				
16K1		16-6.00	16-6.00 16-4.01	28V/6V CONV.
17A2-K1		17-8.00	3-11.01, 17-8.00 16-4.01, 17-18.00	NO TRACK SIGNAL, OR DATA GOOD
17A2-K2		17-8.00	3-11.01, 17-8.00	PWR ON/LGC MODE
17A2-K3		17-8.00	3-11.01, 17-8.00	RANGE LOW SCALE FACTOR
17A2-K4		17-8.00	17-8.00	DOPPLER SENSE
17A4-K1		17-14.00	3-11.00, 17-14.00	RANGE DATA GOOD
17A4-K2		17-15.00	3-11.00, 17-14.00	POS #1 INDICATION
17A4-K3		17-15.00	3-11.00, 17-14.00	POS #2 INDICATION
17A4-K4		17-17.00	3-11.00, 17-14.00	RANGE LOW SCALE FACTOR
17A4-K5		17-14.00	3-11.00, 17-14.00	VELOCITY DATA GOOD
17A4-K11		17-13.00	17-18.00	POWER ON

Table 1. LM EFD Relay Index (Sheet 14 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
20A20-K1		8-16.00	8-16.00, 16-4.01	RCS A REGULATOR (WARNING)
20A20-K1(MA)		6-5.00	6-5.00, 6-10.00,	MASTER ALARM CLOSURE
20A20-K2		8-16.00	8-16.00 16-4.01	RCS B REGULATOR (WARNING)
20A20-K2(MA)		6-5.00	6-5.00	MASTER ALARM CLOSURE
20A20-K3		8-16.02	8-16.02, 16-4.01	RCS (CAUTION)
20A20-K3(MA)		6-5.00	6-5.00	MASTER ALARM CLOSURE
20A20-K4		4-16.00	4-16.00, 16-4.01	DC BUS WARNING
20A20-K5		4-16.00	4-16.00, 16-4.01	INV CAUTION
20A20-K5(MA)		6-5.00	6-5.00	C/WEA POWER SUPPLY ALARM
20A20K6		4-15.00	4-15.00, 16-4.01, 6-10.00	BATTERY CAUTION
20A20-K6(MA)		6-5.00	6-5.00, 16-4.01	C/WEA POWER SUPPLY ALARM
20A20-K7		7-16.00	7-16.00, 16-4.01	CABIN PRESSURE
20A20-K7(MA)		6-5.00	6-5.00, 6-8.01, 16-4.01	C/WEA POWER SUPPLY ALARM
20A20-K8		7-9.00	7-9.00, 16-4.01	SUIT FAN CAU & WARN
20A20-K9		7-16.00	7-16.00, 16-4.01	GLYCOL PUMP PRESS.
20A20-K10		7-9.00	7-9.00, 16-4.01	H ₂ O SEP CAU & WARN
20A20-K11		7-9.00	7-9.00, 16-4.01	CO ₂ CAU & WARN
20A20-K12		7-12.00	7-12.00, 16-4.01	DESCENT/ASCENT H ₂ O QTY CAU & WARN
20A20-K13		7-12.00	7-12.00, 16-4.01	PRESS CAU & WARN
20A20-K14		7-10.00	7-10.00, 16-4.01	GLYCOL CAU & WARN
20A20-K15		10-12.00	10-12.00, 16-4.01	ASC PRESS WARNING

Table 1. LM EFD Relay Index (Sheet 15 of 16)

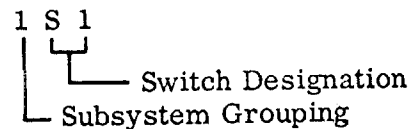
RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
20A20-K16		10-12.00	10-12.00,16-4.01	ASC QTY CAUTION
20A20-K17		10-12.00	10-12.00,16-4.01	ASC HI REG CAUTION
20A20-K18		10-10.00	10-10.00	DESCENT QTY WARNING
20A20-K19		10-10.00	10-10.00,16-4.01	DESCENT REQ'D WARNING
20A20-K20		11-21.00	6-10.00,11-21.00,16-4.01	CES C/WEA DATA
20A20-K21		11-20.00	11-20.00	PRE AMPS CAUTION
20A20-K22		11-20.00	6-10.00,11-20.00 16-4.01	CES C/WEA DATA
20A20-K23		1-19.00	1-19.00,16-4.01	ENG GIMBAL FAIL
20A20-K24		3-14.00	3-14.00,16-4.01	LGC WARNING
20A20-K25		3-14.00	3-14.00,16-4.01	ISS WARNING
20A20-K26		3-14.00	3-14.00	PGNS CAUTION (NOT USED)
20A20-K27		17-18.00	16-4.01,17-18.00	L/R CAUTION LTS
20A20-K28		17-18.00	16-4.01,17-18.00	R/R CAUTION LTS
20A20-K29		12-13.00	6-10.00,12-13.00,16-4.01	AGS WARNING
20A20-K30		8-16.01	8-16.01,16-4.01	RCS HEATER (CAUTION)
20A20-K31		8-16.00	8-16.00,16-4.01	TCA (WARNING)
20A20-K33		8-15.06	8-15.06	SYS A THRUSTER PAIR QUAD 4
20A20-K34		8-15.07	8-15.07	SYS B THRUSTER PAIR QUAD 4
20A20-K35		8-15.04	8-15.04	SYS A THRUSTER PAIR QUAD 3
20A20-K36		8-15.05	8-15.05	SYS B THRUSTER PAIR QUAD 3
20A20-K37		8-15.02	8-15.02	SYS A THRUSTER PAIR QUAD 2

Table 1. LM EFD Relay Index (Sheet 16 of 16)

RELAY NO.	INDICATES LATCHING RELAY	COIL LOCATED ON	CONTACT LOCATED ON	FUNCTION
20A20-K38		8-15.03	8-15.03	SYS B THRUSTER PAIR QUAD 2
20A20-K39		8-15.00	8-15.00	SYS A THRUSTER PAIR QUAD 1
20A20-K40		8-15.01	8-15.01	SYS B THRUSTER PAIR QUAD 1
20A20-K44		2-11.00	2-11.00, 16-4.01	MASTER ALARM ED RELAYS
20A20-K45		13-9.00	13-9.00, 16-4.01	CAUTION & WARNING S-BAND RCVR.

V. Introduction to LM Elementary Functional Diagram Vehicle Switch Index (Table 2)

1. This section is a tabulation of switches appearing on the LM Elementary Functional Diagrams.
2. The table is presented in three columns. The columns and contents of the columns are as follows:
Switch No. Column - This column contains the switch number (Subsystem Grouping and Switch Designation), which can be interpreted as follows:



Switch Nomenclature Column - This column contains the switch nomenclature as placarded on LM Panels.

Switch Located on EFD No. (s) Column: This column contains a listing of the Elementary Functional Diagrams on which the switch appears.

3. The switch location index coding is derived as follows:

9-10.00

└─ Functional Grouping Sheet Number

└─ Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW 267-XX009)

12-10.00

└─ Functional Grouping Sheet Number

└─ Functional Grouping Derived from Last Two(2) Digits of Basic Drawing Number (LDW 267-XX012)

12-704

└─ Functional Grouping Page Number

└─ Functional Grouping Derived from Last Two (2) Digits of Basic Drawing Number (LDW 267-XX012)

Table 2. LM EFD Switch Index (Sheet 1 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
1S1	I	ENGINE ARM	1-5.00, 1-6.00, 1-8.00, 1-9.00, 1-10.00
1S2	V	ENGINE START	1-5.00, 1-8.00, 16-4.01
1S3	V	ENGINE STOP (CDR)	1-5.00, 1-6.00, 1-9.00, 1-10.00, 16-4.01, 16-6.00
1S4	VI	ENGINE STOP (LMP)	1.5.00, 1-6.00, 1-9.00, 1-10.00, 16-4.01, 16-6.00
1S5	V	RATE OF DESCENT	3-9.01
1S6	I	X-TRANSL	11-5.01, 11-16.00
1S8	III	ENGINE GIMBAL	1-5.00, 1-11.00, 1-16.00, 3-5.01
1S9	V	BALANCED COUPLER, UNBALANCED COUPLERS	11-5.00, 11-6.00, 11-23.00
1S10	I	MANUAL THROTTLE	1-5.00, 1-14.00, 4-21.00
1S11	I	THRUST CONTROL	1-5.00, 1-9.00, 3-5.00, 9-15.00
1S12	V	+X TRANSL	11-18.00
1S13	I	ABORT	1-5.00, 1-6.00, 3-5.00, 12-8.00
1S14	I	ABORT STAGE	1-5.00, 1-7.00, 2-5.00, 2-6.00
1S15	LDG LEG	LUNAR PROBE +Y	1-5.00, 1-11.00
1S16	LDG LEG	LUNAR PROBE -Y	1-5.00, 1-11.00
1S18	LDG LEG	LUNAR PROBE -Z	1-5.00, 1-11.00
1S19	III	DES ENG OVRD	1-5.00, 1-7.00, 1-8.00
1S20	IV A	TTCA TRANSLATION	3-10.00, 11-5.00, 11-6.00
1S21	IV A	ACA/4 JET	11-5.03, 11-18.00, 11-19.00
1S22	IV B	TTCA TRANSLATION	11-5.00, 11-6.00, 3-10.00
1S23	IV B	ACA/4 JET	11-5.03, 11-18.00, 11-19.00
1S25	I	ACA PROP	11-15.00, 4-21.00
1S26	II	ACA PROP	11-15.00, 4-21.00
1A1S1	ACA (CDR) 1A1	YAW ATTITUDE CONTROLLER	11-5.00, 11-5.02, 11-7.00, 11-13.00

Table 2. LM EFD Switch Index (Sheet 2 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
1A1S2	ACA(CDR) 1A1	PITCH ATTITUDE CONTROLLER	11-5.00, 11-5.01, 11-7.00, 11-14.00
1A1S3	ACA(CDR) 1A1	ROLL ATTITUDE CONTROLLER	11-5.00, 11-5.01, 11-7.00, 11-15.00
1A1S4	ACA(CDR) 1A1	YAW ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S5	ACA(CDR) 1A1	YAW ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S6	ACA(CDR) 1A1	PITCH ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S7	ACA(CDR) 1A1	PITCH ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S8	ACA(CDR) 1A1	ROLL ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S9	ACA(CDR) 1A1	ROLL ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A1S10	ACA(CDR) 1A1	YAW ATTITUDE CONTROLLER	11-5.03, 11-19.00
1A1S11	ACA(CDR) 1A1	YAW ATTITUDE CONTROLLER	11-5.03, 11-19.00
1A1S12	ACA(CDR) 1A1	PITCH ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A1S13	ACA(CDR) 1A1	PITCH ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A1S14	ACA(CDR) 1A1	ROLL ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A1S15	ACA(CDR) 1A1	ROLL ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A3S1	TTC(CDR) 1A3	"X" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.01, 11-11.00
1A3S2	TTC(CDR) 1A3	"X" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.01, 11-11.00

Table 2. LM EFD Switch Index (Sheet 3 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
1A3S3	TTC(CDR) 1A3	"Y" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A3S4	TTC(CDR) 1A3	"Y" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A3S5	TTC(CDR) 1A3	"Z" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A3S6	TTC(CDR) 1A3	"Z" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A3S7	TTC(CDR) 1A3	THROTTLE JET 1H1 CONTROL SWITCH	1-5.00, 1-14.00
1A11S1	TTC(LMP) 1A11	"X" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.01, 11-11.00
1A11S2	TTC(LMP) 1A11	"X" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.01, 11-11.00
1A11S3	TTC(LMP) 1A11	"Y" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A11S4	TTC(LMP) 1A11	"Y" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A11S5	TTC(LMP) 1A11	"Z" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A11S6	TTC(LMP) 1A11	"Z" THRUST/TRANSLATION CONTROLLER	3-10.00, 11-5.02, 11-11.00
1A11S7	TTC(LMP) 1A11	THROTTLE JET 1H2 CONTROL SWITCH	1-5.00, 1-14.00
1A12S1	ACA(LMP) 1A12	YAW ATTITUDE CONTROLLER	11-5.00, 11-5.02, 11-6.00, 11-13.00
1A12S2	ACA(LMP) 1A12	PITCH ATTITUDE CONTROLLER	11-5.00, 11-5.01, 11-6.00, 11-14.00
1A12S3	ACA(LMP) 1A12	ROLL ATTITUDE CONTROLLER	11-5.00, 11-5.01, 11-6.00, 11-15.00
1A12S4	ACA(LMP) 1A12	YAW ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A12S5	ACA(LMP) 1A12	YAW ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00

Table 2. LM EFD Switch Index (Sheet 4 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
1A12S6	ACA(LMP) 1A12	PITCH ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A12S7	ACA(LMP) 1A12	PITCH ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A12S8	ACA(LMP) 1A12	ROLL ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A12S9	ACA(LMP) 1A12	ROLL ATTITUDE CONTROLLER	11-5.03, 11-12.00, 11-19.00
1A12S10	ACA(LMP) 1A12	YAW ATTITUDE CONTROLLER	11-5.03, 11-19.00
1A12S11	ACA(LMP) 1A12	YAW ATTITUDE CONTROLLER	11-5.03, 11-19.00
1A12S12	ACA(LMP) 1A12	PITCH ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A12S13	ACA(LMP) 1A12	PITCH ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A12S14	ACA(LMP) 1A12	ROLL ATTITUDE CONTROLLER	11-5.03, 11-18.00
1A12S15	ACA(LMP) 1A12	ROLL ATTITUDE CONTROLLER	11-5.03, 11-18.00
2S1	VIII	He PRESS DESCENT START	2-5.00, 2-6.00
2S2	VIII	He PRESS RCS	2-5.00, 2-6.00
2S3	VIII	ASC He SELECT	2-5.00, 2-6.00
2S4	VIII	He PRESS ASCENT	2-5.00, 2-6.00
2S5	VIII	STAGE	2-5.00, 2-6.00
2S6	VIII	DES VENT	2-5.00, 2-6.00
2S7	VIII	MASTER ARM	2-5.00, 2-6.00, 2-11.00
2S8	VIII	STAGE RELAY	2-5.00, 2-6.00
2S9	VIII	DESCENT PRPLNT ISOL VLV	2-5.00, 2-6.00
2S10	VIII	LDG GEAR DEPLOY	2-5.00, 2-6.00

Table 2. LM EFD Switch Index (Sheet 5 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
2S12	-	LANDING GEAR DEPLOY -Y RIGHT	2-12.00
2S13	-	LANDING GEAR DEPLOY -Y LEFT	2-12.00
2S14	-	LANDING GEAR DEPLOY -Z RIGHT	2-12.00
2S15	-	LANDING GEAR DEPLOY -Z LEFT	2-12.00
2S16	-	LANDING GEAR DEPLOY +Z RIGHT	2-12.00
2S17	-	LANDING GEAR DEPLOY +Z LEFT	2-12.00
2S18	-	LANDING GEAR DEPLOY +Y RIGHT	2-12.00
2S19	-	LANDING GEAR DEPLOY +Y LEFT	2-12.00
3S1	III	IMU CAGE	3-13.00
4S1	XIV	DES BAT 1 HV	4-6.00
4S2	XIV	DES BAT 2 HV	4-6.00
4S3	XIV	DES BAT 3 HV	4-6.01
4S4	XIV	DES BAT 4 HV	4-6.01
4S5	XIV	DES BAT 1 LV	4-6.00
4S6	XIV	DES BAT 2 LV	4-6.00
4S7	XIV	DES BAT 3 LV	4-6.01
4S8	XIV	DES BAT 4 LV	4-6.01
4S9	XIV	DES BATS SW	4-8.00
4S10	XIV	ASC BAT 5 NORM	4-7.00
4S11	XIV	ASC BAT 6 NORM	4-7.01
4S12	XIV	ASC BAT 5 BACK-UP	4-7.00
4S13	XIV	ASC BAT 6 BACK-UP	4-7.01
4S14	XIV	INVERTER	4-13.00, 4-16.00
4S15	XIV	PWR/TEMP MONITOR	4-15.00, 4-17.00, 4-18.00
4S17	XIV	ED VOLTAGE MONITOR SW	2-7.00
6S2	I	C/WEA RESET (MANUAL)	6-5.00
6S3	II	C/WEA RESET (MANUAL)	6-5.00

Table 2. LM EFD Switch Index (Sheet 6 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
7S1	II	SUIT FAN	7-6.00, 7-14.00
7S2	II	O ₂ /H ₂ O QTY MON	7-11.00, 7-12.00
7S3	II	GLYCOL	7-7.00, 7-10.00, 7-13.00, 7-16.00
8S7	II	MAIN SOV SYS A	8-6.00
8S8	II	SYS A ASC FEED 1	8-8.00
8S9	II	MAIN SOV SYS B	8-6.00
8S10	II	SYS B ASC FEED 1	8-8.00
8S11	II SYSTEM A	THRUSTER PAIR QUAD 1	3-6.00, 8-7.00
8S12	II SYSTEM A	THRUSTER PAIR QUAD 2	3-6.00, 8-7.00
8S13	II SYSTEM B	THRUSTER PAIR QUAD 1	3-6.00, 8-7.00
8S14	II SYSTEM B	THRUSTER PAIR QUAD 2	3-6.00, 8-7.00
8S15	II SYSTEM A	THRUSTER PAIR QUAD 3	3-6.00, 8-7.01
8S16	II SYSTEM A	THRUSTER PAIR QUAD 4	3-6.00, 8-7.01
8S17	II SYSTEM B	THRUSTER PAIR QUAD 3	3-6.00, 8-7.01
8S18	II SYSTEM B	THRUSTER PAIR QUAD 4	3-6.00, 8-7.01
8S19	II	TEMP/PRESS MON	8-12.00, 8-12.01, 8-13.00, 8-16.02 16-10.02
8S20	II	CRSFD	8-8.00
8S22	II	SYS A ASC FEED 2	8-9.00
8S23	II	SYS B ASC FEED 2	8-9.00
9S2	I	RATE/ERR MON (CDR)	4-21.00, 9-6.00, 9-10.00
9S3	I	ATTITUDE MONITOR (CDR)	4-21.00, 9-6.00
9S4	I	RANGE/ALTITUDE MONITOR	9-12.00
9S6	I	GUIDANCE CONTROL	4-21.00, 11-5.00, 11-6.00, 11-7.00
9S7	II	RATE/ERR MON (LMP)	4-21.00, 9-7.00, 9-10.00,
9S8	I	SHAFT/TRUNNION	9-9.00

Table 2. LM EFD Switch Index (Sheet 7 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
9S9	I	MODE SELECTOR	9-10.00
9S10	II	ATTITUDE MONITOR (LMP)	4-21.00, 9-7.00
9S11	III	RESET/COUNT	9-13.00, 9-13.01
9S12	III	TIMER CONTROL	9-13.00, 9-13.01
9S13	III	MINUTE SLEW CONTROL	9-13.00, 9-13.01
9S14	III	SECOND SLEW CONTROL	9-13.00, 9-13.01
9S17	I	X POINTER SCALE (CDR)	9-10.00, 9-11.00
9S18	III	X POINTER SCALE (LMP)	9-10.00, 9-11.00
9S19	V	TIMER CONTROL	9-13.00, 9-13.01
9S20	V	SECOND SLEW CONTROL	9-13.00, 9-13.01
9S21	V	MINUTE SLEW CONTROL	9-13.00, 9-13.01
9S22	V	HOUR SLEW CONTROL	9-13.00, 9-13.01
9S23	ORDEAL	FDAI 1	9-5.00, 9-5.01
9S24	ORDEAL	FDAI 2	9-5.00, 9-5.01
9S25	ORDEAL	EARTH-PWR-OFF-LUNAR	9-5.00
9S26	ORDEAL	LIGHTING	9-5.00
9S27	ORDEAL	MODE	9-5.00
9S28	ORDEAL	SLEW	9-5.00
9S29	I	RATE SCALE	9-8.00
10S1	I	PROPELLANT TEMP/PRESS MON SWITCH	10-8.00
10S3	I	ASC He REG NO. 1	10-5.00
10S4	I	ASC He REG NO. 2	10-5.00
10S5	I	DES He REG 1	10-5.00
10S6	I	He TEMP/PRESS MON	10-7.00
10S7	I	DES He REG 2	10-5.00
10S8	I	PRPLNT QTY MONITOR SELECTOR SWITCH	10-9.00
10S9	VIII	FUEL VENT	10-5.00
10S10	VIII	OXID VENT	10-5.00

Table 2. LM EFD Switch Index (Sheet 8 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
11S1	III	GYRO TEST	11-5.00, 11-6.00, 11-20.00
11S2	III	DEAD BAND	9-9.00, 11-5.00, 11-10.00
11S3	III	PITCH ATTITUDE CONTROL	11-5.03, 11-12.00, 11-19.00
11S4	III	ROLL ATTITUDE CONTROL	11-5.03, 11-12.00, 11-19.00
11S5	III	ROLL ATTITUDE CONTROL	11-5.03, 11-12.00, 11-19.00
11S7	III	GYRO TEST	11-5.00, 11-6.00
11S24	III	PGNS MODE CONTROL	3-5.01, 11-5.00, 11-7.00, 11-23.00
11S25	III	AGS MODE CONTROL	11-5.00, 11-6.00, 11-23.00, 12-8.00
12S1	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S2	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S3	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S4	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S5	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S6	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S7	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S8	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S9	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S10	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S11	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S12	12A2	PUSH BUTTON DECODING MATRIX	12-10.00
12S13	12A2	CLEAR	12-10.00
12S14	12A2	ENTER	12-10.00
12S15	12A2	READOUT	12-10.00
12S16	12A2	HOLD	12-10.00
12S17	VI	AGS STATUS	12-5.00, 12-6.00, 12-13.00
13S1	XII	RANGE/TV FUNCTION	13-9.00, 13-16.00
13S2	XII	PWR AMPLIFIER	13-6.01, 13-15.00
13S3	XII	BIO-MED	13-13.00, 13-15.00
13S4	XII	PCM/KEY FUNCTION	13-15.00, 13-16.00

Table 2. LM EFD Switch Index (Sheet 9 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
13S5	XII	MODULATE	13-15.00, 13-16.00
13S6	XII	VOICE FUNCTION	13-15.00, 13-16.00
13S7	XII	RANGE/VOICE	13-18.00
13S8	XII	XMTR/RCVR	13-6.01
13S10	XII	VHF A RCVR	13-18.00
13S11	XII	VOICE RECORDER	13-12.00
13S12	XII	VHF B XMTR	13-18.00
13S13	XII	PCM RATE	6-10.00
13S15	XII	VHF B RCVR	13-18.00
13S16	XII	UP DATA LINK	13-14.00
13S17	XIV	UP LINK SQUELCH	13-10.00
14A2S1	S-BAND ANT.	STOW LATCH ARMING SWITCH	13-704.1, 13-705.10, 13-6.00
14S3	XII	TRACK MODE	13-6.00
14S5	XII	S-BAND ANT SELECT	13-7.00
14S6	XII	VHF ANT SELECT	13-17.00
15AS1	VIII	S-BAND T/R	13-11.00
15AS2	VIII	VHF A	13-11.00
15AS3	VIII	ICS T/R	13-11.00
15AS4	VIII	RELAY MODE	13-11.00
15AS5	VIII	CDR AUDIO CONTROL	13-10.00, 13-11.00, 13-13.00
15AS6	VIII	MODE	13-11.00
15AS9	VIII	VHF B	13-11.00
15AS10	1A1(CDR)	PTT	13-11.00
15AS11	15W3(CDR)	PTT/KEYER	13-11.00, 13-13.00
15BS1	XII	S-BAND T/R	13-11.00
15BS2	XII	VHF A	13-11.00
15BS3	XII	ICS T/R	13-11.00
15BS4	XII	RELAY MODE	13-11.00
15BS5	XII	LMP AUDIO CONTROL	13-10.00, 13-11.00, 13-13.00
15BS6	XII	MODE	13-11.00

Table 2. LM EFD Switch Index (Sheet 10 of 10)

SWITCH NO.	PANEL OR LOCATION	SWITCH NOMENCLATURE	SWITCH LOCATED ON
15BS9	XII	VHF B	13-11.00
15BS10	1A12(LMP)	PTT	13-11.00
15BS11	15W4(LMP)	PTT/KEYER	13-13.00, 13-11.00
16S1	V	SIDE PANELS	16-10.03
16S3	V	INTEGRAL OVERRIDE	16-6.00, 16-10.00
16S4	V	ANUN OVERRIDE	16-4.01, 16-6.00
16S5	V	NUM OVERRIDE	16-10.02
16S6	III	FLOOD	16-5.00
16S9	III	SIDE PANELS	16-10.04
16S10	III	LAMP, TONE TEST	16-4.01, 6-5.00, 6-7.00, 6-7.01, 6-8.00 6-8.01, 16-9.00
16S11		DOCKING HATCH	16-5.00
16S12	SLA/LM PLATE	LM/SLA DOCKING LIGHT PRESSURE SWITCH	16-6.00
16S14	VIII	COAS	16-11.00
16S17	III	TRACK & DOCKING LIGHTS	16-4.01, 16-7.00
16S19	16A11	UTILITY LIGHT	16-5.00
16S20	16A11	UTILITY LIGHT	16-5.00
17S1	III	RNDZ RDR SLEW	17-10.00
17S2	III	RNDZ RDR SLEW	17-10.00
17S3	III	RNDZ RDR MODE SELECT	17-8.00, 17-10.00, 17-10.01 4-21.00, 17-18.00
17S5	II	LDG ANT	17-15.00
17S6	III	RNDZ RDR SELF TEST	17-6.00, 17-16.00
17S8	III	TEST/MONITOR	17-7.00
17S9	AOT GUARD RAIL	RNDZ RDR GYRO SEL	17-11.00
18S4	III	SYS A/B-2 QUAD 1	8-11.01
18S5	III	SYS A/B-2 QUAD 2	8-11.01
18S6	III	SYS A/B-2 QUAD 3	8-11.01
18S7	III	SYS A/B-2 QUAD 4	8-11.01
18S10	III	TEMP MONITOR	8-16.01, 8-17.00

VI. Introduction to LM Elementary Functional Diagram Vehicle Measurement Index (Table 3)

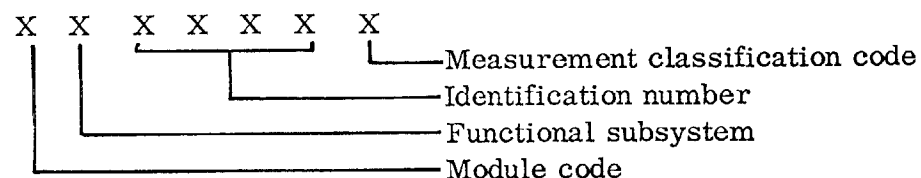
1. This section is a tabulation of measurement numbers appearing on the LM Elementary Functional Diagrams.
2. The table is presented in three columns. The columns and contents of the columns are as follows:

Measurement No. Column - This column contains the measurement number

Measurement No. Located Column - This column contains a listing of the Elementary Functional Diagrams on which the measurement appears.

Function Column - This column contains a description of the measurement.

3. The following defines the measurement index codes.



a. Module codes

D - GSE stimuli
 G - LM
 J - Vehicle Stimuli
 N - GSE Aux or checkout equipment

b. Functional subsystem codes

C - Electrical	G - Navigation & Guidance	I - Stability & Control - AGS
F - Environmental Control	H - Stability & Control - CES	L - Scientific Equipment
M - Mechanical Design	Q - Propulsion - Descent Eng	T - Communications

N - Radar

R - Reaction Control

Y - Pyrotechnic

P - Propulsion - Ascent Eng

c. Measurement classification codes

B - Phase

H - Position

R - Rate

C - Current

L - Velocity

T - Temperature

D - Vibration

N - Resistance/Continuity

U - Combination

E - Power

P - Pressure

V - Voltage

F - Frequency

Q - Quantity

X - Discrete Event

4. The measurement location index coding is derived as follows:

4-16.00

└─ Functional Grouping Sheet Number

└─ Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW267-XX004)

17-6.00

└─ Functional Grouping Sheet Number

└─ Functional Grouping Derived from Last Two(2) Digits of Basic Drawing Number (LDW267-XX017)

Table 3. LM EFD Measurement Index (Sheet 1 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
DN2001	17-6.00	RR ANTENNA INPUT SIG
DN2002	17-16.00	VELOCITY RECEIVER NO. 1 INPUT
DN2003	17-16.00	VELOCITY RECEIVER NO. 2 INPUT
DN2004	17-16.00	VELOCITY RECEIVER NO. 3 INPUT
DN2005	17-16.00	ALTIMETER RECEIVER INPUT
GC0020X	4-8.00	LM UMB RELEASED
GC0071V	4-16.00, 4-17.00, 6-11.00	VOLT INVERTER BUS
GC0155F	4-16.00, 6-11.00	FREQ INVERTER BUS
GC0201V	4-17.00	VOLT BATTERY NO. 1
GC0202V	4-17.00	VOLT BATTERY NO. 2
GC0203V	4-17.00	VOLT BATTERY NO. 3
GC0204V	4-17.00	VOLT BATTERY NO. 4
GC0205V	4-17.00	VOLT BATTERY NO. 5
GC0206V	4-17.00	VOLT BATTERY NO. 6
GC0301V	4-16.00, 4-17.00	VOLT CMD'S BUS
GC0302V	4-16.00, 4-17.00	VOLT LM PILOT'S BUS
GC1201C	4-18.00	CURR BATTERY NO. 1
GC1202C	4-18.00	CURR BATTERY NO. 2
GC1203C	4-18.00	CURR BATTERY NO. 3
GC1204C	4-18.00	CURR BATTERY NO. 4
GC1205C	4-18.00	CURR BATTERY NO. 5
GC1206C	4-18.00	CURR BATTERY NO. 6
GC2101	4-6.00	VOLT, PWR SUP, ECA NO. 1, BATT NO. 1
GC2102	4-6.00	VOLT, PWR SUP, ECA NO. 1, BATT NO. 1
GC2103	4-6.00	VOLT, PWR SUP, ECA NO. 1, BATT NO. 1

Table 3. LM EFD Measurement Index (Sheet 2 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GC2104	4-6.00	VOLT, INVERTER, ECA NO. 1, BATT NO.1
GC2111	4-6.00	VOLT, PWR SUP, ECA NO.1, BATT NO. 2
GC2112	4-6.00	VOLT, PWR SUP, ECA NO. 1, BATT NO. 2
GC2113	4-6.00	VOLT, PWR SUP, ECA NO. 1, BATT NO. 2
GC2114	4-6.00	VOLT, INVERTER, ECA NO. 1, BATT NO. 2
GC2121	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 3
GC2122	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 3
GC2123	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 3
GC2124	4-6.01	VOLT, INVERTER, ECA NO. 2, BATT NO. 3
GC2131	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 4
GC2132	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 4
GC2133	4-6.01	VOLT, PWR SUP, ECA NO. 2, BATT NO. 4
GC2134	4-6.01	VOLT, INVERTER, ECA NO. 2, BATT NO. 4
GC2141	4-7.00	VOLT, PWR SUP, ECA NO. 3
GC2142	4-7.00	VOLT, PWR SUP, ECA NO. 3
GC2143	4-7.00	VOLT, PWR SUP, ECA NO. 3

Table 3. LM EFD Measurement Index (Sheet 3 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GC2144	4-7.00	VOLT, INVERTER, ECA NO. 3
GC2151	4-7.01	VOLT, PWR SUP, ECA NO. 4
GC2152	4-7.01	VOLT, PWR SUP, ECA NO. 4
GC2153	4-7.01	VOLT, PWR SUP, ECA NO. 4
GC2154	4-7.01	VOLT, INVERTER, ECA NO. 4
GC3511X	4-15.00	OVERTEMP BATTERY NO. 1
GC3512X	4-15.00	OVER TEMP BATTERY NO. 2
GC3513X	4-15.00	OVER TEMP BATTERY NO. 3
GC3514X	4-15.00	OVER TEMP BATTERY NO. 4
GC3515X	4-15.00	OVER TEMP BATTERY NO. 5
GC3516X	4-15.00	OVER TEMP BATTERY NO. 6
GC4301X	4-15.00	OVER CURR BATTERY NO. 1
GC4302X	4-15.00	OVER CURR BATTERY NO. 2
GC4303X	4-15.00	OVER CURR BATTERY NO. 3
GC4304X	4-15.00	OVER CURR BATTERY NO. 4
GC4305X	4-15.00	OVER CURR BATTERY NO. 5
GC4306X	4-15.00	OVER CURR BATTERY NO. 6
GC4321X	4-15.00	REVERSE CURR BATTERY NO. 1
GC4322X	4-15.00	REVERSE CURR BATTERY NO. 2
GC4323X	4-15.00	REVERSE CURR BATTERY NO. 3
GC4324X	4-15.00	REVERSE CURR BATTERY NO. 4
GC4325X	4-15.00	REVERSE CURR BATTERY NO. 5
GC4326X	4-15.00	REVERSE CURR BATTERY NO. 6
GC4361X	4-19.00	HIGH VOLTAGE TAP BATT NO. 1
GC4362X	4-19.00	LOW VOLTAGE TAP BATT NO. 1
GC4363X	4-19.00	HIGH VOLTAGE TAP BATT NO. 2
GC4364X	4-19.00	LOW VOLTAGE TAP BATT NO. 2

Table 3. LM EFD Measurement Index (Sheet 4 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GC4365X	4-19.00	HIGH VOLTAGE TAP BATT NO. 3
GC4366X	4-19.00	LOW VOLTAGE TAP BATT NO. 3
GC4367X	4-19.00	HIGH VOLTAGE TAP BATT NO. 4
GC4368X	4-19.00	LOW VOLTAGE TAP BATT NO. 4
GC4369X	4-20.00	BATT NO. 5 ON COMMANDER'S BUS
GC4370X	4-20.00	BATT NO. 6 ON COMMANDER'S BUS
GC4371X	4-20.00	BATT NO. 5 ON LM PILOT'S BUS
GC4372X	4-20.00	BATT NO. 6 ON LM PILOT'S BUS
GC9520V	4-5.00	LDR EXCITATION INDICATION
GC9539	4-14.00	PYRO POWER SYSTEM B
GC9540	4-14.00	PYRO POWER SYSTEM B
GC9541	4-14.00	PYRO POWER SYSTEM B
GC9542	4-14.00	PYRO POWER SYSTEM B
GC9543	4-14.00	PYRO POWER SYSTEM A
GC9544	4-14.00	PYRO POWER SYSTEM A
GC9545	4-14.00	PYRO POWER SYSTEM A
GC9546	4-14.00	PYRO POWER SYSTEM A
GC9547	4-14.00	LOGIC POWER B
GC9549	4-14.00	LOGIC POWER A
GC9961U	4-15.00,6-11.00	BATT NO. 1 MALFUNCTION
GC9962U	4-15.00,6-11.00	BATT NO. 2 MALFUNCTION
GC9963U	4-15.00,6-11.00	BATT NO. 3 MALFUNCTION
GC9964U	4-15.00,6-11.00	BATT NO. 4 MALFUNCTION
GC9965U	4-15.00,6-11.00	BATT NO. 5 MALFUNCTION

Table 3. LM EFD Measurement Index (Sheet 5 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GC9966U	4-15.00, 6-11.00	BATT NO. 6 MALFUNCTION
GF1083X	7-4.03, 7-14.00	PRIME SUIT COMPRESSOR FAIL
GF1084X	7-4.03, 7-14.00	SPARE SUIT COMPRESSOR FAIL
GF1087X	7-6.00	SELECTED SUIT COMPRESSOR FAIL
GF1111R	7-4.03, 7-9.00	RATE H ₂ O SEPARATOR NO. 1
GF1112R	7-4.03, 7-9.00	RATE H ₂ O SEPARATOR NO. 2
GF1201X	7-4.03, 7-14.00	CMDR'S SUIT FLOW CONTROL-DISCNNT
GF1202X	7-4.03, 7-14.00	LMP SUIT FLOW CONTROL-DISCNNT
GF1211X	7-4.03, 7-14.00	SUIT PRESS RLF VPI CLOSED
GF1212X	7-4.03, 7-14.00	SUIT PRESS RLF VPI OPEN
GF1221X	7-4.03, 7-14.00	SUIT DIVERTER VPI CLOSED
GF1231X	7-4.03, 7-15.00	CABIN GAS RETURN VPI CLOSED
GF1232X	7-4.03, 7-15.00	CABIN GAS RETURN VPI OPEN
GF1241X	7-4.03, 7-14.00	CO ₂ CARTRIDGE IN SEC POS
GF1242X	7-4.03, 7-9.00	CO ₂ CARTRIDGE IN SEC POS
GF1281T	7-4.03, 7-10.00	TEMP SUIT INLET
GF1301P	7-4.03, 7-9.00	PRESS SUIT OUTLET
GF1521P	7-9.00	PRESS CO ₂ PARTIAL
GF1522P	7-9.00	PRESS CO ₂ PARTIAL
GF1651T	7-10.00	TEMP CABIN
GF2021P	7-4.02, 7-8.00	DEL P, PRIM COOLANT PUMP
GF2041X	7-4.02, 7-14.00	PRIMARY COOLANT ACCUM LOW LEVEL
GF2042X	7-4.02, 7-14.00	REDUN. COOLANT ACCUM LOW LEVEL
GF2531T	7-4.02, 7-10.00	TEMP MAIN W/B COOLANT INLET
GF2571T	7-4.02, 7-10.00	TEMP REDUNDANT W/B COOLANT OUT
GF2581T	7-4.02, 7-10.00	TEMP MAIN W/B COOLANT OUTLET
GF2681T	7-4.02, 7-10.00	TEMP CLNT UPSTREAM OF CRIT ELECT

Table 3. LM EFD Measurement Index (Sheet 6 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GF2741P	4-12.00, 7-4.02, 7-13.00	PRESS, PRIM PUMP DISCHARGE
GF2921P	4-12.00, 7-4.02, 7-13.00	PRESS, REDUNDANT PUMP DISCHARGE
GF2935X	7-16.00	SELECT COOLANT PUMP FAIL
GF2936X	7-7.00, 7-15.00	SELECT COOLANT PUMP FAIL
GF3070X	7-4.03, 7-15.00	OX REG VLV 306A EGRESS/CLOSED
GF3071X	7-4.03, 7-15.00	OX REG VLV 306A LOCKED CLOSED
GF3073X	7-4.03, 7-15.00	OX REG VLV 306B LOCKED CLOSED
GF3075X	7-4.03, 7-15.00	OX REG VLV 306B EGRESS/CLOSED
GF3571P	7-8.00	PRESS, CABIN
GF3572X	7-16.00	EMER O ₂ VALVE ELEC OPEN
GF3582P	4-12.00, 7-4.03, 7-11.00, 6-11.00	PRESS, ASCENT O ₂ TANK NO. 1
GF3583P	4-12.00, 7-4.03, 7-11.00, 6-11.00	PRESS, ASCENT O ₂ TANK NO. 2
GF3584P	4-12.00, 7-4.03, 7-11.00, 6-11.00	PRESS, DESCENT O ₂ TANK
GF3587T	7-4.03, 7-10.00	TEMP, DESCENT O ₂ TANK SURF
GF3589P	7-4.03, 7-8.00	PRESS SELECTED O ₂ SUPPLY
GF3591P	7-8.00	PRESS, SAFETY VLV NO. 1 SERVO
GF3592P	7-8.00	PRESS, SAFETY VLV NO. 2 SERVO
GF4101P	7-4.01, 7-8.00	DEL P, MAIN H ₂ O REG/ARS
GF4500P	7-4.01, 7-11.00	DESC H ₂ O TANK NO. 1 PRESS
GF4501P	4-12.01, 7-4.01, 7-8.00	PRESS DES H ₂ O
GF4502P	7-4.01, 7-11.00	ASC H ₂ O TANK NO. 1 PRESS
GF4503P	7-4.01, 7-11.00	ASC H ₂ O TANK NO. 2 PRESS
GF4511T	7-4.01, 7-10.00	TEMP, MAIN W/B INLET WATER
GF4581Q	4-12.00, 6-11.00, 7-4.01, 7-11.00	QUANTITY, DESCENT TANK WATER
GF4582Q	4-12.00, 6-11.00, 7-4.01, 7-11.00	QUANTITY, DESCENT TANK NO. 1 WATER
GF4583Q	4-12.00, 6-11.00, 7-4.01, 7-11.00	QUANTITY, ASCENT TANK NO. 2 WATER
GF4585T	7-4.01, 7-13.00	TEMP, ASC TANK NO. 1 WATER LINE
GF4586T	7-4.01, 7-13.00	TEMP, ASC TANK NO. 2 WATER LINE

Table 3. LM EFD Measurement Index (Sheet 7 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GF8507V	7-5.00	VOLT, CABIN PRESS LOGIC OUT
GF8509V	7-6.00	VOLT, O ₂ REG VLV A AND B SW TEST
GF8541X	7-5.00	SUIT PRESSURE SWITCH NORMAL
GF8542X	7-5.00	SUIT PRESSURE SWITCH LOW
GF8543X	7-5.00	SUIT PRESSURE SWITCH NORMAL
GF8544X	7-5.00	SUIT PRESSURE SWITCH LOW
GF8545X	7-5.00	SUIT PRESSURE SWITCH NORMAL
GF8546X	7-5.00	SUIT PRESSURE SWITCH LOW
GF9100	7-4.02	FTP-O QCK DISC, GLYC PRIME RETURN
GF9101	7-4.02	FTP-I/O QCK DISC, GLYC REDUN FILL
GF9102	7-4.02	FTP-O QCK DISC, GLYC REDUN, RETURN
GF9103	7-4.02	FTP-O QCK DISC, GLYC DRIVE FILL
GF9104	7-4.01	FTP-I/O H ₂ O FILL POINT TK 1
GF9105	7-4.01	FTP-I/O GAS CHARGING VALVE H ₂ O TK 1
GF9106	7-4.01	FTP-I/O H ₂ O FILL POINT TK 2
GF9107	7-4.01	FTP-I/O GAS CHARGING VALVE H ₂ O TK 2
GF9108	7-4.01	FTP-I/O H ₂ O FILL POINT DESC
GF9109	7-4.01	FTP-I/O GAS CHARGING VALVE DESC
GF9113	7-4.03	SUIT NO. 1 UMBILICAL
GF9114	7-4.03	SUIT NO. 2 UMBILICAL
GF9117	7-4.03	FTP-I/O INTERSTAGE DISCONNECT O ₂ A/S
GF9118	7-4.03	FTP-I/O INTERSTAGE DISCONNECT O ₂ C/S
GF9119	7-4.01, 7-4.02	FTP-I/O MAIN WATER BOILER EXIT 209

Table 3. LM EFD Measurement Index (Sheet 8 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GF9120	7-4.01, 7-4.02	FTP-I/O RED WATER BOILER EXIT 224
GF9122	7-4.02	FTP-I/O HTS INTERSTAGE DISCONNECT OUT A/S
GF9123	7-4.02	FTP-I/O HTS INTERFACE DISCONNECT OUT D/S
GF9124	7-4.02	FTP-I/O HTS INTERFACE DISCONNECT IN D/S
GF9125	7-4.02	FTP-I/O HTS INTERSTAGE DISCONNECT IN D/S
GF9126	7-4.01	FTP-I/O SUIT WATER BOILER EXIT DUCT
GF9150	7-4.03	FILLING COUPLING O ₂ VALVE
GF9986U	7-14.00	COOLANT ACCUM
GF9993U	6-8.00, 7-9.00	LIOH SELECT/HIGH CO ₂ (7DS6) ADV
GF9997U	7-13.00	PRESS, PRIM PUMP DISCHARGE
GF9998U	7-10.00, 7-13.00	TEMP, SELECTED COOLANT LOOP
GF9999U	7-4.03, 7-9.00	RATE, SELECTED H ₂ O SEPARATOR
GG0001X	3-20.00	PGNS DOWNLINK DATA (TO T/M)
GG0117H	3-9.00, 9-12.00	POS ALTITUDE (LGC)
GG0118L	3-9.00, 9-12.00	VEL ALTITUDE RATE (LGC)
GG0119L	3-18.00, 9-11.00	VEL FORWARD (LGC)
GG0120L	3-18.00, 9-11.00	VEL LATERAL LGC
GG1040V	3-12.00	VOLT, +120 VDC PULSE TORQUE REF
GG1110V	3-12.00	VOLT +2.5 VDC TM BIAS PCM
GG1201V	3-12.01	VOLT, IMU +28 V 800 HZ 1P-CD SUPPLY
GG1313V	3-12.00	VOLT 3200 HZ, +28 V SUPPLY
GG1513X	3-12.01	IMU STANDBY/OFF
GG1523X	3-12.01	LGC OPERATE

Table 3. LM EFD Measurement Index (Sheet 9 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GG2001V	3-12.00	VOLT, X PIPA S.G. OUTPUT IN PHASE - 2.5
GG2021V	3-12.00	VOLT, Y PIPA S.G. OUTPUT IN PHASE - 2.5
GG2041V	3-12.00	VOLT, Z PIPA S.G. OUTPUT IN PHASE
GG2107V	3-12.00	VOLT, IG SERVO ERROR IN PHASE
GG2112V	3-12.01	VOLT, IG 1XRES OUTPUT SIN
GG2113V	3-12.01	VOLT, IG 1XRES OUTPUT COS
GG2122V	3-16.00, 9-5.01	VOLT, IG 1XRES OUTPUT SIN
GG2123V	3-16.00, 9-5.01	VOLT, IG 1XRES OUTPUT COS
GG2137V	3-12.00	VOLT, MG SERVO ERROR IN PHASE
GG2142V	3-12.01	VOLT, MG 1XRES OUTPUT SIN
GG2143V	3-12.01	VOLT, MG 1XRES OUTPUT COS
GG2152V	3-16.00, 9-5.01	VOLT, MG 1XRES OUTPUT SIN
GG2153V	3-16.00, 9-5.01	VOLT, MG 1XRES OUTPUT COS
GG2167V	3-12.00	VOLT, OG SERVO ERROR IN PHASE
GG2172V	3-12.01	VOLT, OG 1XRES OUTPUT SIN
GG2173V	3-12.01	VOLT, OG 1XRES OUTPUT COS
GG2182V	3-16.00, 9-5.01	VOLT, OG 1XRES OUTPUT SIN
GG2183V	3-16.00, 9-5.01	VOLT, OG 1XRES OUTPUT COS
GG2217V	3-18.00, 9-9.00	VOLT, PITCH ATTITUDE ERROR (PGNS)
GG2219V	3-12.00	VOLT, PITCH CDU DAC OUT
GG2247V	3-18.00, 9-9.00	VOLT, ROLL ATTITUDE ERROR (PGNS)

Table 3. LM EFD Measurement Index (Sheet 10 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GG2249V	3-12.00	VOLT, YAW CDU DAC OUTPUT
GG2277V	3-18.00, 9-9.00	VOLT, YAW ATTITUDE ERROR (PGNS)
GG2279V	3-12.00	VOLT, ROLL CDU DAC OUTPUT
GG2300T	3-12.01	TEMP PIPA
GG3304V	3-12.01	VOLT, RDR SHFT 1XRSVR OUTPUT SIN
GG3305V	3-12.01	VOLT, RDR SHFT 1XRSVR OUTPUT COS
GG3324V	3-12.01	VOLT, RDR TRUN 1XRSVR OUTPUT SIN
GG3325V	3-12.01	VOLT, RDR TRUN 1XRSVR OUTPUT COS
GG9001X	3-14.00	LGC WARNING
GG9002X	3-14.00	ISS WARNING
GG9006V	3-13.00	VOLT, IMU TEMP OUT OF LIMITS
GH1204X	11-23.00	ACA OUT OF DETENT
GH1211V	1-16.00	VOLT, AUTO THROTTLE INCREASE
GH1212V	1-16.00	3.2 KPPS
GH1214X	1-20.01	VOLT, AUTO THROTTLE DECREASE
GH1217X	1-20.01	3.2 KPPS
GH1230X	1-20.00	AUTO ENG "ON" CMD
GH1240V	11-22.00	AUTO ENG "OFF" CMD
GH1241V	11-22.00	ASC ENG ARM COMMANDED (FROM
GH1242V	11-22.00	PANEL)
GH1247V	11-22.00	VOLT "X" TRANS CMD
GH1248V	11-14.00, 11-22.00	VOLT "Y" TRANS CMD
GH1249V	11-15.00, 11-22.00	VOLT "Z" TRANS CMD
GH1260X	1-20.01, 6-11.00	VOLT, YAW LOGIC INPUT ERROR
GH1283X	1-20.01, 6-11.00	VOLT, PITCH LOGIC INPUT ERROR
		VOLT, ROLL LOGIC INPUT ERROR
		ASC ENG ON/OFF TO PROP
		ABORT STAGE COMMANDED

Table 3. LM EFD Measurement Index (Sheet 11 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GH1286X	1-20.01	ENGINE FIRE OVERRIDE
GH1301X	1-20.01, 6-11.00	DESC ENG "ON" TO PROP
GH1311V	1-20.00, 9-15.00	VOLT, MANUAL THRUST CMD
GH1313V	1-20.00	VOLT, PITCH GDA POS (RET/EXT)
GH1314V	1-20.00	VOLT, ROLL GDA POS (EXT/RET)
GH1318X	1-18.00	PITCH TRIM EXTEND FROM LGC
GH1319X	1-18.00	PITCH TRIM RETRACT FROM LGC
GH1320X	1-18.00	PITCH GDA (EXT/RET)
GH1323X	1-19.00	PITCH TRIM FAIL
GH1330X	1-19.00	ROLL TRIM FAIL
GH1331V	1-20.00, 9-15.00	VOLT, AUTO THRUST CMD
GH1343X	1-17.00	ROLL TRIM EXTEND FROM LGC
GH1344X	1-17.00	ROLL TRIM RETRACT FROM LGC
GH1345X	1-17.00	ROLL GDA (RET/EXT)
GH1348X	1-13.00, 1-20.00	DESC ENG ARM (DECA OUT) 28 VDC
GH1349V	1-15.00	DESC ENG ARM (DECA OUT) 15 VDC
GH1397V	11-13.00	VOLT, YAW RATE GYRO NULL 800 HZ
GH1398V	11-14.00	VOLT PITCH RATE GYRO NULL 800 HZ
GH1399V	11-15.00	VOLT, ROLL RATE GYRO NULL 800 HZ
GH1401V	6-11.00, 11-9.00, 11-20.00	VOLT, RGA SPN MTR LINE A-B 800 HZ
GH1402V	6-11.00, 11-9.00, 11-20.00	VOLT, RGA SPN MTR LINE B-C 800 HZ
GH1403V	6-11.00, 11-9.00, 11-20.00	VOLT, RGA SPN MTR LINE C-A 800 HZ
GH1405V	6-11.00, 11-9.00, 11-20.00	VOLT, RGA PICKOFF 800 HZ EXCITATION

Table 3. LM EFD Measurement Index (Sheet 12 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GH1406V	6-11.00, 11-8.00, 11-21.00	VOLT +15 VDC SUPPLY
GH1407V	6-11.00, 11-8.00, 11-21.00	VOLT -15 VDC SUPPLY
GH1408V	6-11.00, 11-8.00, 11-21.00	VOLT +4.3 VDC SUPPLY
GH1418V	11-17.00	VOLT, JET NO. 4u DRIVER OUTPUT
GH1419V	11-17.00	VOLT, JET NO. 4d DRIVER OUTPUT
GH1420V	11-17.00	VOLT, JET NO. 4f DRIVER OUTPUT
GH1421V	11-17.00	VOLT, JET NO. 4s DRIVER OUTPUT
GH1422V	11-17.00	VOLT, JET NO. 3u DRIVER OUTPUT
GH1423V	11-17.00	VOLT, JET NO. 3d DRIVER OUTPUT
GH1424V	11-17.00	VOLT, JET NO. 3f DRIVER OUTPUT
GH1425V	11-17.00	VOLT, JET NO. 3s DRIVER OUTPUT
GH1426V	11-17.00	VOLT, JET NO. 2u DRIVER OUTPUT
GH1427V	11-17.00	VOLT, JET NO. 2d DRIVER OUTPUT
GH1428V	11-17.00	VOLT, JET NO. 2f DRIVER OUTPUT
GH1429V	11-17.00	VOLT, JET NO. 2s DRIVER OUTPUT
GH1430V	11-17.00	VOLT, JET NO. 1u DRIVER OUTPUT
GH1431V	11-17.00	VOLT, JET NO. 1d DRIVER OUTPUT
GH1432V	11-17.00	VOLT, JET NO. 1f DRIVER OUTPUT
GH1433V	11-17.00	VOLT, JET NO. 1s DRIVER OUTPUT
GH1434V	11-17.00	VOLT, LGC JET CMD NO. 4u
GH1435V	11-17.00	VOLT, LGC JET CMD NO. 4d
GH1436V	11-17.00	VOLT, LGC JET CMD NO. 4f
GH1437V	11-17.00	VOLT, LGC JET CMD NO. 4s
GH1438V	11-17.00	VOLT, LGC JET CMD NO. 3u
GH1439V	11-17.00	VOLT, LGC JET CMD NO. 3d
GH1440V	11-17.00	VOLT, LGC JET CMD NO. 3f
GH1441V	11-17.00	VOLT, LGC JET CMD NO. 3s
GH1442V	11-17.00	VOLT, LGC JET CMD NO. 2u

Table 3. LM EFD Measurement Index (Sheet 13 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GH1443V	11-17.00	VOLT, LGC JET CMD NO. 2d
GH1444V	11-17.00	VOLT, LGC JET CMD NO. 2f
GH1445V	11-17.00	VOLT, LGC JET CMD NO. 2s
GH1446V	11-17.00	VOLT, LGC JET CMD NO. 1u
GH1447V	11-17.00	VOLT, LGC JET CMD NO. 1d
GH1448V	11-17.00	VOLT, LGC JET CMD NO. 1f
GH1449V	11-17.00	VOLT, LGC JET CMD NO. 1s
GH1450V	11-14.00	VOLT, PITCH TRIM ERROR
GH1452V	11-15.00	VOLT, ROLL TRIM ERROR
GH1453V	11-13.00	VOLT, YAW DEMODULATOR OUTPUT
GH1455V	11-13.00, 11-22.00	VOLT, YAW ATTITUDE ERROR 800 HZ
GH1456V	11-14.00, 11-22.00	VOLT, PITCH ATTITUDE ERROR 800 HZ
GH1457V	11-15.00, 11-22.00	VOLT, ROLL ATTITUDE ERROR 800 HZ
GH1461V	11-13.00, 11-22.00	VOLT, YAW RG SIG (800 HZ)
GH1462V	11-14.00, 11-22.00	VOLT, PITCH RG SIG (800 HZ)
GH1463V	11-15.00, 11-22.00	VOLT, ROLL RG SIG (800 HZ)
GH1488V	6-11.00, 11-8.00, 11-20.00	VOLT, PRIMARY -4.7 VDC
GH1489V	6-11.00, 11-8.00, 11-20.00	VOLT, BACK UP -4.7 VDC
GH1492V	11-8.00	VOLT -4 VDC SUPPLY
GH1493V	6-11.00, 11-8.00, 11-21.00	VOLT +6 VDC SUPPLY
GH1494V	6-11.00, 11-8.00, 11-21.00	VOLT -6 VDC SUPPLY
GH1497V	9-8.00, 11-13.00	VOLT, YAW RGA SIG 800 HZ
GH1498V	9-8.00, 11-14.00	VOLT, PITCH RGA SIG 800 HZ
GH1499V	9-8.00, 11-15.00	VOLT, ROLL RGA SIG 800 HZ
GH1501X	11-6.00	ROLL RGA SMRD ON TORQUER LINE
GH1502X	11-6.00	PITCH RGA SMRD ON TORQUER LINE

Table 3. LM EFD Measurement Index (Sheet 14 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GH1503X	11-6.00	YAW GRA SMRD ON TORQUER LINE
GH1603X	11-10.00	DEAD BAND SELECT
GH1621X	11-23.00	GUIDANCE SELECT SW (AGS)
GH1628X	11-23.00	ROLL ATT CON SEL (PULSED/DIRECT)
GH1629X	11-23.00	PITCH ATT CON SEL(PULSED/DIRECT)
GH1630X	11-23.00	YAW ATT CON SEL (PULSED/DIRECT)
GH1641X	11-23.00	AGS MODE SELECT (AUTO)
GH1642X	11-23.00	AGS MODE SELECT (ATT HOLD)
GH1643X	11-23.00	PGNS MODE SELECT (AUTO)
GH1644X	11-23.00	PGNS MODE SELECT (ATT HOLD)
GH1896X	11-23.00	UNBALANCED COUPLES
GH1852V	1-14.00	VOLT, MANUAL THROTTLE CMD
GH1893X	11-23.00	X TRANSLATION OVER RIDE
GH7000	11-14.00	PITCH NARROW DEADBAND OUT
GH7001	11-15.00	ROLL NARROW DEADBAND OUT
GH7002	11-13.00	YAW NARROW DEADBAND OUT
GH7003	11-16.00	SUMMING AMPLIFIER NO. 1 OUT
GH7004	11-16.00	SUMMING AMPLIFIER NO. 2 OUT
GH7005	11-16.00	SUMMING AMPLIFIER NO. 3 OUT
GH7006	11-16.00	SUMMING AMPLIFIER NO. 4 OUT
GH7007	11-16.00	SUMMING AMPLIFIER NO. 5 OUT
GH7008	11-16.00	SUMMING AMPLIFIER NO. 6 OUT
GH7009	11-16.00	SUMMING AMPLIFIER NO. 7 OUT
GH7010	11-16.00	SUMMING AMPLIFIER NO. 8 OUT
GH7011	11-9.00	800 HZ 1 PHASE (90 DEG L)
GH7012	11-8.00	+2.6 VDC REF
GH7013	11-8.00	+8.4 VDC REF
GH7014	11-8.00	+28 VDC FILTERED
GH7016	11-16.00	ZERO CROSSOVER DET OUTPUT Y1

Table 3. LM EFD Measurement Index (Sheet 15 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GH7017	11-16.00	ZERO CROSSOVER DET OUTPUT Y2
GH7018	11-16.00	ZERO CROSSOVER DET OUTPUT Z1
GH7019	11-16.00	ZERO CROSSOVER DET OUTPUT Z2
GH7020	11-16.00	YAW LOGIC (R-D) INPUT
GH7050V	1-15.00	AUX POWER FAILURE
GH7051V	1-15.00	+4.3 VDC
GH7053V	1-15.00	-15 VDC
GH7054V	1-15.00	ATCA POWER FAIL
GH7055V	1-13.00	+28 VDC
GH7056V	1-13.00	+28 VDC START
GI0001X	12-13.00	AGS DOWNLINK DATA (TO T/M)
GI3137X	12-6.00	ΔVY (Y INCREMENTAL VELOCITY)
GI3138X	12-6.00	ΔVZ (Z INCREMENTAL VELOCITY)
GI3151V	9-5.00, 12-11.00	VOLT, SIN ALP (TO TOT ATT DISP 400 HZ)
GI3152V	9-5.00, 12-11.00	VOLT, COS ALP (TO TOT ATT DISP 400 HZ)
GI3153V	9-5.00, 12-11.00	VOLT, SIN BET (TO TOT ATT DISP 400 HZ)
GI3154V	9-5.00, 12-11.00	VOLT, COS BET (TO TOT ATT DISP 400 HZ)
GI3155V	9-5.00, 12-11.00	VOLT SIN GAM (TO TOT ATT DISP 400 HZ)
GI3156V	9-5.00, 12-11.00	VOLT COS GAM (TO TOT ATT DISP 400 HZ)
GI3166V	9-9.00, 12-12.00	VOLT, EX (YAW ATT ERR TO DISP)
GI3167V	9-9.00, 12-12.00	VOLT, EY (PITCH ATT ERR TO DISP)
GI3168V	9-9.00, 12-12.00	VOLT, EZ (ROLL ATT ERR TO DISP)
GI3171X	12-6.00	Δ INTEGRAL P (YAW INCRMT ANGLE)
GI3172X	12-6.00	Δ INTEGRAL R (ROLL INCRMT ANGLE)

Table 3. LM EFD Measurement Index (Sheet 16 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GI3173X	12-6.00	ΔINTEGRAL Q (PITCH INCRMTANGLE)
GI3175X	12-6.00	ASA CLOCK
GI3176T	12-13.00	BLOCK TEMP REF
GI3177X	12-7.00	CDU ZERO
GI3178X	12-7.00	+ ΔAIG (FROM PGNS)
GI3179X	12-7.00	- ΔAIG (FROM PGNS)
GI3180X	12-7.00	+ ΔAMG (FROM PGNS)
GI3181X	12-7.00	- ΔAMG (FROM PGNS)
GI3182X	12-7.00	+ ΔAOG (FROM PGNS)
GI3183X	12-7.00	- ΔAOG (FROM PGNS)
GI3184X	12-9.00	AGS INITIALIZATION (DOWNLINK DATA) DIGITAL CODE
GI3196X	12-9.00	PGNS DOWNLINK SHIFT PULSES
GI3198X	12-9.00	PGNS DOWNLINK STOP PULSES
GI3203H	9-12.00, 12-11.00	POS, ALT TO DISPLAY
GI3204L	9-12.00, 12-11.00	VEL, ALT RATE TO DISPLAY
GI3205L	9-11.00, 12-11.00	VEL, VY (LATERAL VEL TO DISPLAY)
GI3211V	12-5.00	+13.5 VDC
GI3212V	12-5.00	+4 VDC (STANDBY)
GI3213V	12-5.00	-2 VDC (STANDBY)
GI3214V	12-13.00, 6-11.00	+28 VDC ASA
GI3215V	12-13.00, 6-11.00	+12 VDC ASA
GI3216V	12-6.00	-12 VDC ASA
GI3217V	12-5.00	+6 VDC
GI3224V	12-5.00	-18 VDC
GI3225V	12-5.00	-13.5 VDC
GI3228V	12-5.00	+4 VDC OPERATE
GI3229V	12-5.00	-2 VDC OPERATE
GI3232V	12-13.00	AEA TEST MODE FAIL

Table 3. LM EFD Measurement Index (Sheet 17 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GI3233F	12-13.00, 6-11.00	FREQ, ASA 28 V/400 HZ
GI3301T	12-13.00	ASA TEMP
GI3305X	12-13.00	AGS CONDITION (WARMUP)
GI3306X	12-13.00	AGS CONDITION (STANDBY)
GI3311X	12-6.00	DELTA VX (X INCREMENTAL VELOCITY)
GI3340V	12-12.00	EX (YAW ATT ERROR NULL)
GI3341V	12-12.00	EY (PITCH ATT ERROR NULL)
GI3342V	12-12.00	EZ (ROLL ATT ERROR NULL)
GI3343X	12-6.00	X-GYRO SMRD
GI3344 X	12-6.00	Y-GYRO SMRD
GI3345 X	12-6.00	Z-GYRO SMRD
GI3351V	12-5.00	-3 TO -4.5 VDC (TO DEDA)
GI3352V	12-5.00	+4 to +5 VDC (TO DEDA)
GI3353X	12-10.00	DEDA DATA (TO DEDA)
GI3354X	12-10.00	DEDA ADDRESS/DATA (FROM DEDA)
GI3355X	12-10.00	DEDA SHIFT PULSES (FROM DEDA)
GI3356X	12-10.00	SHIFT 4 BITS IN (TO DEDA)
GI3357X	12-10.00	SHIFT 4 BITS OUT (TO DEDA)
GI3358F	12-10.00	DEDA CLOCK (TO DEDA) 128 KPPS
GI3401V	12-11.00	SIN ALP (TO TOT ATT DISPLAY)
GI3402V	12-11.00	COS ALP (TO TOT ATT DISPLAY)
GI3403V	12-11.00	SIN BET (TO TOT ATT DISPLAY)
GI3404V	12-11.00	COS BET (TO TOT ATT DISPLAY)
GI3405V	12-11.00	SIN GAM (TO TOT ATT DISPLAY)
GI3406V	12-11.00	COS GAM (TO TOT ATT DISPLAY)
GI7001F	12-12.00	INT CLOCK (50 PPS)
GI7002	12-5.00	800 HZ 1 VRMS
GI7003	12-5.00	400 HZ 1 VRMS
GI7005	12-6.00	Z ACCL PREAMP OUTPUT

Table 3. LM EFD Measurement Index (Sheet 18 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GI7007	12-6.00	Y ACCL PREAMP OUTPUT
GI7009	12-6.00	X ACCL PREAMP OUTPUT
GI7010	12-6.00	FINE TEMP HTR VOLT
GI7011	12-6.00	FAST WARMUP HTR VOLT
GI7012V	12-6.00	+28 VDC
GI7013V	12-6.00	+12 VDC
GI7014V	12-6.00	-6 VDC
GI7015V	12-6.00	+4 VDC
GI7016	12-6.00	1 KPPS
GI7017F	12-6.00	GYRO SIG GEN EXCITATION
GI7019V	12-6.00	-2 VDC UTILITY (ASA)
GI7021	12-6.00	X GYRO PREAMP OUTPUT
GI7022	12-6.00	Y GYRO PREAMP OUTPUT
GI7023	12-6.00	Z GYRO PREAMP OUTPUT
GI7024	12-6.00	X GYRO THERMISTOR
GI7025	12-6.00	Y GYRO THERMISTOR
GI7026	12-6.00	Z GYRO THERMISTOR
GI7030X	12-12.00	OUTPUT REGISTER LOADED
GI7031X	12-12.00	GSE INPUT REGISTER UNLOADED
GI7032X	12-12.00	OUTPUT TERMINATED
GI7034X	12-12.00	GSE DATA OUT 100 KPPS
GI7037X	12-12.00	AGS DOWNLINK BIT SYNC PULSES
GI7038X	12-12.00	AGS DOWNLINK STOP PULSES
GI7039L	12-11.00	VEL, VY (LAT VEL TO DISPLAY)
GI7040V	12-5.00	VOLT, +14 VDC (AEA)
GI7045	12-6.00	Z ACCEL DEMOD OUTPUT
GI7046	12-6.00	Y ACCEL DEMOD OUTPUT
GI7047	12-6.00	X ACCEL DEMOD OUTPUT
GI7048	12-6.00	X GYRO DEMOD OUTPUT

Table 3. LM EFD Measurement Index (Sheet 19 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GI7049	12-6.00	Y GYRO DEMOD OUTPUT
GI7050	12-6.00	Z GYRO DEMOD OUTPUT
GI7051X	12-6.00	DELTA INTEGRAL R (ROLL INCR ANG)
GI7052X	12-6.00	DELTA INTEGRAL Q (PITCH INCR ANG)
GI7053X	12-6.00	DELTA VX (X INCREMENTAL VELOCITY)
GI7054X	12-6.00	DELTA VY (Y INCREMENTAL VELOCITY)
GI7055X	12-6.00	DELTA VZ (Z INCREMENTAL VELOCITY)
GI7056	12-12.00	ASA CLOCK
GI7060X	12-6.00	DELTA INTEGRAL P (YAW INCR ANG)
GL0220F	6-12.00	FREQ TE SYNC (RO9) TO DISPLAY
GL0221	6-12.00	SERIAL TIME NRZ TO DSEA, RO1 TP
GL0222	6-12.00	FREQ, TE SYNC (RO2) TO AGS
GL0223	6-12.00	FREQ, TE SYNC (RO3) TO COMM
GL0224	6-12.00	FREQ, TE SYNC (RO4) TO EPS
GL0225	6-12.00	FREQ, TE SYNC (RO5) TO EPS
GL0226	6-12.00	FREQ, TE SYNC (RO6) TO EPS
GL0227	6-12.00	FREQ, TE SYNC (RO7) TO CES

Table 3. LM EFD Measurement Index (Sheet 20 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL0228	6-12.00	FREQ, TE SYNC (RO8) TO DISP
GL0236	6-12.00	50 PPS START SIGNAL (DO8) TO LGC
GL0237	6-12.00	2 KPPS BIT SYNC SIG (DO10) TO LGC
GL0238	6-12.00	50 PPS STOP SIG (DO9) TO LGC
GL0241	6-12.00	1200 PPS BIT SIG TO AGS ON
GL0242	6-12.00	50 PPS STOP SIG TO AGS ON
GL0243	6-12.00	AGS SER DATA NO 1C2 TO PCMT
GL0261	6-12.00	40 BIT SER SYNC 2, TO AEA, DO12 TP
GL0262	6-12.00	40 BIT SER STOP 2, TO AEA, DO11 TP
GL0263	6-12.00	SUB FRAME SYNC TO ACE, DO7 TP
GL0264	6-12.00	SUB CARRIER 2, TO ACE, DO6 TP
GL0265	6-12.00	SUB CARRIER 1, TO COMM, DO5 TP
GL0266	6-12.00	DATA RATE TIMING TO ACE, DO4 TP
GL0267	6-12.00	HI-HI LEVEL LO1 TP
GL0268	6-12.00	R-Z DATA, TO ACE, DO2 TP
GL0269	6-12.00	NRZ DATA, TO COMM, DO1 TP
GL0270	6-12.00	SPLIT PHASE DATA, TO COMM, DO3 TP
GL0300	6-10.00	FRAME SYNC +1D
GL0302	6-10.00	FORMAT 1D
GL0400X	6-10.00	INTERNAL OSC FAILURE DETECT SIG NO. 1

Table 3. LM EFD Measurement Index (Sheet 21 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL0401V	6-10.00	VOLT, CALIB 85 PCT HL
GL0402V	6-10.00	VOLT, CALIB 15 PCT HL
GL0422	6-10.00	INTERNAL OSC FAILURE DETECT SIG NO. 2
GL0423	6-10.00	INTERNAL OSC FAILURE DETECT SIG NO. 3
GL0501W	6-10.00	TIME MISSION ELAPSED
*GL0801	6-12.00	1024 KHZ TIMING SIG TO PCMTE OFF OR ON
GL0802	6-12.00	LGC SERIAL DATA NO 1C1 TO PCMTE
GL4022X	6-7.00, 10-12.00	(6DS2) ASCENT LOW PRESSURE
GL4023X	6-7.00, 10-10.00	(6DS3) PRESS HE REG OUT MNFLD
GL4024X	6-7.00, 10-10.00	(6DS4) LOW DESC PROP QUANT
GL4026X	6-7.00, 11-20.00	(6DS6) CES AC PWR SUPPLY FAIL
GL4027X	6-7.00, 11-21.00	(6DS7) CES DC PWR SUPPLY FAIL
GL4028X	6-7.00, 12-13.00	(6DS8) AGS POWER SUPPLY FAIL
GL4029X	3-14.00, 6-7.00	(6DS9) N AND G LGC WARNING
GL4030X	3-14.00, 6-7.00	(6DS10) N AND G INTERNAL REFER- ENCE
GL4031X	6-7.01, 8-16.00	(6DS11) RCS, TCA JET FAIL WARNING
GL4032X	6-7.01, 8-16.00	(6DS12) PRESS, RCS HE REG A OUT WARNING
GL4033X	6-7.01, 8-16.00	(6DS13) PRESS, RCS HE REG B OUT WARNING
GL4034X	4-16.00, 6-7.01	(6DS14) DC BUS VOLTAGE LOW
GL4036X	6-7.01, 7-16.00	(6DS16) CABIN WARNING
GL4037X	6-7.01, 7-9.00	(6DS17) SUIT/FAN WARNING
*NOT USED FOR LM-9		

Table 3. LM EFD Measurement Index (Sheet 22 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL4041X	6-8.00, 10-12.00	(6DS21) ASC HI P, REG OUT MNFLD
GL4042X	6-8.00, 10-12.00	(6DS22) ASC LOW PROP QUANT
GL4043X	1-19.00, 6-8.00	(6DS23) ENGINE GIMBAL CAUTION
GL4045X	6-8.00	(6DS25) PGNS CAUTION
GL4046X	4-16.00, 6-8.00	(6DS26) EPS INVERTER CAUTION
GL4047X	4-15.00, 6-8.00	(6DS27) EPS BATTERY CAUTION
GL4048X	6-8.00, 17-18.00	(6DS28) RR DATA NO GOOD
GL4049X	6-8.00, 17-18.00	(6DS29) LDG RADAR DATA NO GOOD
GL4050X	6-8.00, 11-20.00	(6DS30) PRE AMPS
GL4051X	2-11.00	(6DS31) EXPLOSIVE DEVICES MALFUNCTION
GL4052X	6-8.01, 8-16.02	(6DS32) RCS CAUTION
GL4053X	6-8.01, 8-16.01	(6DS33) HEATER CAUTION
GL4054X	6-10.00	(6DS34) C/WEA POWER CAUTION
GL4056X	6-8.01, 7-16.00	(6DS36) ECS CAUTION
GL4057X	6-8.01, 7-12.00	(6DS37) ECS O ₂ ACCUM PRESS
GL4058X	6-8.01, 7-10.00	(6DS38) GLYCOL CAUTION
GL4059X	6-8.01, 7-12.00	(6DS39) DESC-ASC TANK H ₂ O QUANTITY
GL4060X	6-8.01, 13-9.00	(6DS40) S-BAND RCVR (AGC ALARM)
GL4069X	6-10.00	C AND WEA MASTER ALARM 1D
GL4121	13-12.00	MONITOR TRACK NO. 2 AND NO. 3
GL4122	13-12.00	MONITOR TRACK NO. 3 AND NO. 4
GL4201	13-12.00	DSEA MONITOR HEAD OUTPUT

Table 3. LM EFD Measurement Index (Sheet 23 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL4203	13-12.00	VOLT, DSEA RECORD MONITOR (TIME)
GL4301	13-12.00	DSEA TCD INPUT
GL4302	13-12.00	DSEA VOICE INPUT
GL4305	13-12.00	DSEA +12 VDC
GL4306	13-12.00	DSEA RECORD INDICATOR
GL4310	13-12.00	DSEA RECORD CMD PWR (VOX)
GL4312	13-12.00	MONITOR TRACK NO. 4
GL4314	13-12.00	MONITOR TRACK NO. 2
GL4315	13-12.00	REVERSE COMPLETE
GL4316	13-12.00	FORWARD COMPLETE
GL4317	13-12.00	DSEA -5 VDC
GL6101	6-12.00	1024 KPPS COUNTER NO. 1T. P.
GL6102	6-12.00	1024 KPPS COUNTER NO. 2T. P.
GL6103	6-12.00	1024 KPPS COUNTER NO. 3T. P.
GL6104	6-12.00	51.2 KPPS COUNTER NO. 1T. P.
GL6105	6-12.00	51.2 KPPS COUNTER NO. 2T. P.
GL6106	6-12.00	51.2 KPPS COUNTER NO. 3T. P.
GL6107	6-12.00	51.2 KPPS COUNTER NO. 1T. P.
GL6108	6-12.00	51.2 KPPS COUNTER NO. 2T. P.
GL6109	6-12.00	51.2 KPPS COUNTER NO. 3T. P.
GL6110	6-12.00	6.4 KPPS COUNTER NO. 1T. P.
GL6111	6-12.00	6.4 KPPS COUNTER NO. 2T. P.
GL6112	6-12.00	6.4 KPPS COUNTER NO. 3T. P.
GL6113	6-12.00	1.6 KPPS COUNTER NO. 1T. P.
GL6114	6-12.00	1.6 KPPS COUNTER NO. 2T. P.
GL6115	6-12.00	1.6 KPPS COUNTER NO. 3T. P.

Table 3. LM EFD Measurement Index (Sheet 24 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL6116	6-12.00	100HZ COUNTER NO. 1 T.P.
GL6117	6-12.00	100HZ COUNTER NO. 2 T.P.
GL6118	6-12.00	100HZ COUNTER NO. 3 T.P.
GL6119	6-12.00	10HZ COUNTER NO. 1 T.P.
GL6120	6-12.00	10HZ COUNTER NO. 2 T.P.
GL6121	6-12.00	10HZ COUNTER NO. 3 T.P.
GL6201	6-12.00	SAMPLE GATE COMMAND AKI TP
GL6202	6-12.00	BIT RATE AC3 TP
GL6204	6-12.00	READ CODER COMMAND ABI TP
GL6205	6-12.00	REDUCE MODE DIG PWR STROBE R2 TP
GL6206	6-12.00	REDUCE MODE ANLG PWR STROBE R1 TP
GL6207	6-12.00	NORM MODE DIGITAL PWR STROBE N2 TP
GL6208	6-12.00	NORM MODE ANLG PWR STROB N1 TP
GL6209	6-12.00	+D6 DIGITAL POWER SUPPLY TP
GL6210	6-12.00	PWR SUPPLY MAIN SW TP
GL6211	6-12.00	FRAME 1 OF 4 TP
GL6212	6-12.00	FRAME 1 OF 5 TP
GL6213	6-12.00	FRAME 1 OF 8 TP
GL6214	6-12.00	WORD 1 TO 16 TP
GL6215	6-12.00	WORD 1 TO 16 OF 128 TP
GL6216	6-12.00	NORMAL TP
GL6217	6-12.00	6.4KPPS TG9 TP
GL6218	6-12.00	MODE SEL B1 STAB OUT +F24 TP

Table 3. LM EFD Measurement Index (Sheet 25 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL8006V	6-12.00	VOLT, MA RELAY DRIVER OUT NO. 1
GL8007V	6-12.00	VOLT, MA RELAY DRIVER OUT NO. 2
GL8008V	6-12.00	VOLT, MA RELAY DRIVER OUT NO. 3
GL8101V	6-12.00, 8-16.00	RELAY DRIVER NO. 1 INPUT
GL8102V	6-12.00, 8-16.00	RELAY DRIVER NO. 2 INPUT
GL8103V	6-12.00, 8-16.02	RELAY DRIVER NO. 3 INPUT
GL8104V	4-16.00, 6-12.00	RELAY DRIVER NO. 4 INPUT
GL8105V	4-16.00, 6-12.00	RELAY DRIVER NO. 5 INPUT
GL8106V	4-15.00, 6-12.00	RELAY DRIVER NO. 6 INPUT
GL8107V	6-12.00, 7-16.00	RELAY DRIVER NO. 7 INPUT
GL8108V	6-12.00, 7-9.00	RELAY DRIVER NO. 8 INPUT
GL8109V	6-12.00, 7-16.00	RELAY DRIVER NO. 9 INPUT
GL8110V	6-12.00	RELAY DRIVER NO. 10 INPUT
GL8111V	6-12.00	RELAY DRIVER NO. 11 INPUT
GL8112V	6-12.00, 7-12.00	RELAY DRIVER NO. 12 INPUT
GL8113V	6-12.00, 7-12.00	RELAY DRIVER NO. 13 INPUT
GL8114V	6-12.00, 7-10.00	RELAY DRIVER NO. 14 INPUT
GL8115V	6-12.00, 10-12.00	RELAY DRIVER NO. 15 INPUT
GL8116V	6-12.00, 10-12.00	RELAY DRIVER NO. 16 INPUT
GL8117V	6-12.00, 10-12.00	RELAY DRIVER NO. 17 INPUT
GL8118V	6-12.00, 10-10.00	RELAY DRIVER NO. 18 INPUT
GL8119V	6-12.00, 10-10.00	RELAY DRIVER NO. 19 INPUT
GL8120V	6-12.00, 11-21.00	RELAY DRIVER NO. 20 INPUT
GL8121V	6-12.00, 11-20.00	RELAY DRIVER NO. 21 INPUT
GL8122V	6-12.00, 11-20.00	RELAY DRIVER NO. 22 INPUT
GL8123V	6-12.00	RELAY DRIVER NO. 23 INPUT
GL8124V	3-14.00, 6-12.00	RELAY DRIVER NO. 24 INPUT

Table 3. LM EFD Measurement Index (Sheet 26 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL8125V	3-14.00,6-12.00	RELAY DRIVER NO. 25 INPUT
GL8126V	3-14.00,6-12.00	RELAY DRIVER NO. 26 INPUT
GL8127V	6-12.00,17-18.00	RELAY DRIVER NO. 27 INPUT
GL8128V	6-12.00,17-18.00	RELAY DRIVER NO. 28 INPUT
GL8129V	6-12.00,12-13.00,	RELAY DRIVER NO. 29 INPUT
GL8130V	6-12.00,8-16.01	RELAY DRIVER NO. 30 INPUT
GL8131V	6-12.00,8-16.00	RELAY DRIVER NO. 31 INPUT
GL8132V	6-12.00	RELAY DRIVER NO. 32 INPUT
GL8133V	6-12.00,8-15.06	RELAY DRIVER NO. 33 INPUT
GL8134V	6-12.00,8-15.07	RELAY DRIVER NO. 34 INPUT
GL8135V	6-12.00,8-15.04	RELAY DRIVER NO. 35 INPUT
GL8136V	6-12.00,8-15.05	RELAY DRIVER NO. 36 INPUT
GL8137V	6-12.00,8-15.02	RELAY DRIVER NO. 37 INPUT
GL8138V	6-12.00,8-15.03	RELAY DRIVER NO. 38 INPUT
GL8139V	6-12.00,8-15.00	RELAY DRIVER NO. 39 INPUT
GL8140V	6-12.00,8-15.01	RELAY DRIVER NO. 40 INPUT
GL8141V	6-12.00	IND NO. 28 TEST POINT A
GL8142V	6-12.00	IND NO. 28 TEST POINT B
GL8143V	6-12.00	IND NO. 28 TEST POINT C
GL8144V	6-12.00	IND NO. 28 TEST POINT D
GL8147V	6-12.00	MASTER ALARM F/F INPUT 3
GL8151V	6-12.00	FLAG AND ADVISORY R/D OUTPUTS
GL8152V	6-12.00	POWER SUPPLY OUTPUT -3 VOLTS
GL8153V	6-12.00	POWER SUPPLY OUTPUT +4 VOLTS
GL8154V	6-12.00	POWER SUPPLY OUTPUT +9 VOLTS
GL8155V	6-12.00	POWER SUPPLY OUTPUT +23 VOLTS
GL8156V	6-12.00	POWER SUPPLY WARN CIRCUIT (INH)
GL8157V	6-12.00	POWER SUPPLY TEST POINT A
GL8158V	6-12.00	POWER SUPPLY TEST POINT B

Table 3. LM EFD Measurement Index (Sheet 27 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GL8159V	6-12.00	POWER SUPPLY TEST POINT C
GL8160V	6-12.00	POWER SUPPLY TEST POINT D
GL8161V	2-11.00, 6-12.00	RELAY DRIVER 44 INPUT
GL8162V	6-12.00, 13-9.00	RELAY DRIVER 45 INPUT
GL8163V	6-12.00	RELAY DRIVER 46 INPUT
GL8164V	6-12.00	RELAY DRIVER 47 INPUT
GL8165V	6-12.00	ELECT SW TEST POINT 1
GL8166V	6-12.00	ELECT SW TEST POINT 2
GL8167V	6-12.00	ELECT SW TEST POINT 3
GL8168V	6-12.00	ELECT SW TEST POINT 4
GL8169V	6-12.00	ELECT SW TEST POINT 5
GL8170V	6-12.00	ELECT SW TEST POINT 6
GL8171V	6-12.00	ELECT SW TEST POINT 7
GL8275U	6-9.00	RGT CASK TEMP
GL8276T	6-9.00	ON PAD RTG CASK SURFACE TEMP
GL8277T	6-9.00	FLT RTG CASK SHLD TEMP COLD SIDE
GL9001	4-15.00	BATTERY FAULT. (4DS1)
GL9002U	7-12.00	ASC TANKS WATER QTY UNEQUAL
GL9501U	8-15.06	TCA FAILURE PAIR QUAD 4A
GL9502U	8-15.07	TCA FAILURE PAIR QUAD 4B
GL9503U	8-15.04	TCA FAILURE PAIR QUAD 3A
GL9504U	8-15.05	TCA FAILURE PAIR QUAD 3B
GL9505U	8-15.02	TCA FAILURE PAIR QUAD 2A
GL9506U	8-15.03	TCA FAILURE PAIR QUAD 2B
GL9507U	8-15.00	TCA FAILURE PAIR QUAD 1A
GL9508U	8-15.01	TCA FAILURE PAIR QUAD 1B
GM0041X	2-12.00	LAND GEAR -Y LS DEPLOY LOCK
GM0042X	2-12.00	LAND GEAR -Y RS DEPLOY LOCK
GM0043X	2-12.00	LAND GEAR -Z LS DEPLOY LOCK

Table 3. LM EFD Measurement Index (Sheet 28 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GM0044X	2-12.00	LAND GEAR -Z RS DEPLOY LOCK
GM0045X	2-12.00	LAND GEAR +Z LS DEPLOY LOCK
GM0046X	2-12.00	LAND GEAR +Z RS DEPLOY LOCK
GM0047X	2-12.00	LAND GEAR +Y LS DEPLOY LOCK
GM0048X	2-12.00	LAND GEAR +Y RS DEPLOY LOCK
GM2431X	1-11.00	+Y LEG LUNAR CONTACT
GM2432X	1-11.00	-Y LEG LUNAR CONTACT
GM2434X	1-11.00	-Z LEG LUNAR CONTACT
GM5000U	2-12.00	LAND LEG DEPLOYED
GN7521X	6-11.00, 17-18.00	LR RANGE DATA NO GOOD
GN7523L	9-12.00	VEL, LRVXA A VEL OR (ALT RATE)
GN7524L	9-11.00, 17-17.00	VEL, LRVYA A VEL
GN7525L	9-11.00, 17-17.00	VEL, LRVZA A VEL
GN7527H	9-12.00, 17-17.00	POS LR RANGE DATA (DISP)
GN7528	17-8.00	RR PHASE LOCK SIGNAL
GN7529V	17-14.00	VOLT, LR RANGE GATE STROBE
GN7530V	17-14.00	VOLT, LR VXA GATE STROBE
GN7531V	17-14.00	VOLT, LR VYA GATE STROBE
GN7532V	17-14.00	VOLT, LR VZA GATE STROBE
GN7533V	17-15.00	VOLT, LR LGC ANTENNA POSITION CMD
GN7534V	17-14.00	VOLT, LR RESET STROBE
GN7535V	17-14.00	VOLT, LR COUNTER READOUT COMMAND
GN7536V	17-14.00	VOLT, LR COUNTER OUTPUT (0)

Table 3. LM EFD Measurement Index (Sheet 29 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GN7537V	17-14.00	VOLT, LR COUNTER OUTPUT (1)
GN7545E	17-17.00	POWER, LR VELXMTR RF POWER OUT
GN7546E	17-17.00	POWER, LR ALT XMTR RF POWER OUT
GN7547V	17-14.00	VOLT D1 TRACKER LOCK
GN7548V	17-14.00	VOLT D2 TRACKER LOCK
GN7549V	17-14.00	VOLT D3 TRACKER LOCK
GN7550V	17-14.00	VOLT LR ALT TRACKER LOCK
GN7552X	17-15.00	LR POS NO. 1 CMD (MANUAL)
GN7553X	17-15.00	LR POS NO. 2 CMD (MANUAL)
GN7557X	6-11.00, 17-18.00	LR VEL SENSOR DATA NO GOOD
GN7563T	6-11.00, 8-16.01, 8-17.00, 17-18.00	TEMP, LR ANTENNA
GN7567V	17-16.00	VOLT, LR GAIN STATE D1
GN7568V	17-16.00	VOLT, LR GAIN STATE D2
GN7569V	17-16.00	VOLT, LR GAIN STATE D3
GN7570V	17-16.00	VOLT, LR GAIN STATE D4
GN7571V	17-13.00	VOLT, LR (-25VDC)
GN7572V	17-13.00	VOLT, LR (+25 VDC)
GN7573V	17-13.00	VOLT, LR (+25 VDC) (SSC)
GN7574V	17-13.00	VOLT, LR (+4 VDC)
GN7575V	17-13.00	VOLT, LR (-2 VDC)
GN7576V	17-15.00	LR ANTENNA POSITION NO. 1 IND
GN7577V	17-15.00	LR ANTENNA POSITION NO. 2 IND
GN7582E	17-17.00	POWER LR VEL XMTR RF POWER OUTPUT
GN7583E	17-17.00	POWER LR ALT XMTR RF POWER OUTPUT
GN7584V	17-17.00	VOLT, LR MODE RANGE MOD CONTROL
GN7585F	17-16.00	FREQ LR SELF TEST
GN7586F	17-17.00	FREQ LR RANGE TRANS BLANKING (SIG)

Table 3. LM EFD Measurement Index (Sheet 30 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GN7589V	17-16.00	VOLT, D1 AT ANGLE 0 DEGREES
GN7590V	17-16.00	VOLT, D2 AT ANGLE 0 DEGREES
GN7591V	17-16.00	VOLT, D3 AT ANGLE 0 DEGREES
GN7592V	17-16.00	VOLT, FR AT ANGLE 0 DEGREES
GN7593V	17-16.00	VOLT, D1 AT ANGLE 90 DEGREES
GN7594V	17-16.00	VOLT, D2 AT ANGLE 90 DEGREES
GN7595V	17-16.00	VOLT, D3 AT ANGLE 90 DEGREES
GN7596V	17-16.00	VOLT, FR AT ANGLE 90 DEGREES
GN7599F	17-16.00	FREQ, LR SELF TEST ALTIMETER
GN7609H	9-9.00	POS, RR SHAFT ANGLE 1X
GN7610R	9-11.00, 17-10.00	RATE, RR SHAFT ANGLE RATE
GN7611H	9-9.00	POS, RR TRUNNION ANGLE 1X
GN7612R	9-11.00, 17-10.00	RATE, RR TRUNNION ANGLE RATE
GN7613H	9-12.00, 17-9.00	POS, RR RANGE (TRANSPONDER MODE)
GN7614L	9-12.00, 17-9.00, 17-8.00	VEL, RR RANGE RATE (PRF)
GN7615V	17-10.00	VOLT, RR AUTO ANGLE TRACK ENABLE
GN7618V	17-5.00	VOLT, RR +4 VDC
GN7619V	17-5.00	VOLT, RR +6 VDC
GN7620V	17-5.00	VOLT, RR -12 VDC
GN7621X	17-18.00	RR NO TRACK INDICATION
GN7623V	17-9.00	VOLT, RR RANGE STROBE
GN7624V	17-9.00	VOLT, RR RANGE RATE STROBE
GN7625V	17-9.00	VOLT, RR RESET STROBE
GN7626X	17-9.00	RR COUNTER READOUT COMMAND
GN7627V	17-9.00	VOLT, RR 0 DATA
GN7628V	17-9.00	VOLT, RR 1 DATA
GN7629V	17-5.00	VOLT, RR +12 VDC
GN7630V	17-5.00	VOLT, RR +25 VDC

Table 3. LM EFD Measurement Index (Sheet 31 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GN7631V	17-5.00	VOLT, RR 25 VDC (MULTIPLIER CHAIN)
GN7636V	17-8.00	VOLT, RR RANGE LOW SCALE FACTOR
GN7637V	17-8.00	RR POWER ON AND MODE SW IN LGC
GN7638V	17-12.00	VOLT, RR TRUNNION 16X RES SINE
GN7639V	17-12.00	VOLT, RR SHAFT 16X RES SINE
GN7642E	17-7.00	PWR, RR RF POWER OUTPUT
GN7644V	17-7.00	VOLT, RR ATM OUTPUT (TRUNNION)
GN7645V	17-7.00	VOLT, RR ATM OUTPUT (TRUNNION)
		ERROR SIG
GN7646V	17-7.00	VOLT, RR ATM OUTPUT (SHAFT)
GN7647V	17-7.00	VOLT, RR ATM OUTPUT (SHAFT)
		ERROR SIG
GN7648V	17-7.00	VOLT, RR ATM OUTPUT (AGC)
GN7649V	17-11.00	VOLT, RR SHAFT MOTOR SINE
GN7650V	17-11.00	VOLT, RR TRUN MOTOR SINE
GN7652V	17-11.00	VOLT, RR SHAFT MOTOR COS
GN7653V	17-11.00	VOLT, RR TRUN MOTOR COS
GN7655V	17-11.00	VOLT, RR 15 VRMS AC POWER 1PH
GN7656V	17-11.00	VOLT, RR 15 VRMS AC POWER 2PH
GN7681F	7-6.00	FREQ, RR TONE NO. 3
GN7682F	17-6.00	FREQ, RR TONE NO. 2
GN7683F	17-6.00	FREQ, RR TONE NO. 1
GN7686V	17-10.01	VOLT, RR 28V/15 800HZ REF
GN7696F	17-8.00	FREQ, RR, REF (SYNTHESIZER)
GN7698V	17-12.00	VOLT, RR TRUNNION 16X RES COS
GN7699V	17-12.00	VOLT, RR SHAFT 16X RES COS
GN7723T	6-11.00, 8-17.00, 17-18.00	TEMP, RR ANTENNA
GN7724	17-11.00	RR SHAFT COMPENSATED GYRO ERROR

Table 3. LM EFD Measurement Index (Sheet 32 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GN7725	17-11.00	RR SHAFT TRUNNION COMPENSATED GYRO ERROR
GN7726	17-10.00	RR SHAFT MANUAL SLEW INPUT
GN7727	17-10.00	RR TRUN MANUAL SLEW INPUT
GN7728	17-7.00	RR 1.7 MHZ IF SIGNAL (TRUNNION)
GN7729	17-7.00	RR 1.7 MHZ IF SIGNAL (REFERENCE)
GN7730	17-7.00	RR 1.7 MHZ IF SIGNAL (SHAFT)
GN7731	17-17.00	RANGE MARKER RESET
GP0001P	4-12.00,6-11.00,10-4.01,10-7.00	PRESS, He SUPPLY TANK NO. 1
GP0002P	4-12.00,6-11.00,10-4.01,10-7.00	PRESS, He SUPPLY TANK NO. 2
GP0018P	4-12.00,10-4.01,10-7.00	PRESS, REG OUT MANIFOLD
GP0025P	4-12.00,6-11.00,10-4.01,10-12.00	PRESS, REG OUT MANIFOLD
GP0041P	4-12.01,10-4.01,10-9.00	PRESS NO. 2, He SUPPLY TANK NO. 1
GP0042P	4-12.01,10-4.01,10-9.00	PRESS NO. 2, He SUPPLY TANK NO. 2
GP0201T	10-4.01,10-7.00	TEMP, He SUPPLY TANK NO. 1
GP0202T	10-4.01,10-7.00	TEMP, He SUPPLY TANK NO. 2
GP0318X	10-4.01,10-6.00	He PRI LINE SOL VALVE CLOSED
GP0320X	10-4.01,10-6.00	He SEC LINE SOL VALVE CLOSED
GP0501P	4-12.01,10-4.01,10-8.00	PRESS FUEL TANK ULLAGE
GP0718T	10-4.02,10-8.00	TEMP, FUEL TANK FUEL BULK
GP0908X	4-12.00,6-11.00,10-4.02,10-12.00	FUEL TANK LOW LEVEL
GP1001P	4-12.01,10-4.01,10-8.00	PRESS, OX TANK ULLAGE
GP1218T	10-4.02,10-8.00	TEMP, OX TANK OX BULK
GP1408X	4-12.00,6-11.00,10-4.02,10-12.00	OX TANK LEVEL LOW
GP1501P	4-12.00,6-11.00,10-4.02,10-12.00	PRESS, FUEL ISOL VALVE INLET
GP1503P	4-12.00,6-11.00,10-4.02,10-12.00	PRESS, OX ISOL VALVE INLET
GP1801X	10-4.02,10-11.00	ISOL VALVE A NOT OPEN
GP1802X	10-4.02,10-11.00	ISOL VALVE B NOT OPEN
GP1805X	10-4.02,10-11.00	BIPROP VALVE A NOT OPEN
GP1806X	10-4.02,10-11.00	BIPROP VALVE B NOT OPEN

Table 3. LM EFD Measurement Index (Sheet 33 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GP1811X	10-4.02, 10-11.00	ISOL VALVE A NOT CLOSED
GP1812X	10-4.02, 10-11.00	ISOL VALVE B NOT CLOSED
GP1813X	10-4.02, 10-11.00	BIPROP VALVE A NOT CLOSED
GP1814X	10-4.02, 10-11.00	BIPROP VALVE B NOT CLOSED
GP2010P	4-12.00, 10-11.00, 10-4.02	PRESS, THRUST CHAMBER
GP2910T	10-4.01, 10-10.00	TRANSDUCER TEMP He TANK NO. 1
GP2911T	10-4.01, 10-10.00	TRANSDUCER TEMP He TANK NO. 2
GP2997U	10-4.02, 10-11.00	ISOL/BIPROP VALVES A DELTA POS
GP2998U	10-4.02, 10-11.00	ISOL/BIPROP VALVES B DELTA POS
GP7551X	10-4.02, 10-11.00	PROP SOL VALVE A OPEN
GP7552X	10-4.02, 10-11.00	PROP SOL VALVE B OPEN
GP9401	10-4.01	FILL He LEFT
GP9402	10-4.01	FILL He RIGHT
GP9406	10-4.01	TEST HIGH PRESS He
GP9425	10-4.01	FTP-I/O, TEST LOW PRESS He
GP9430	10-4.01	FTP-I/O, TEST A CHK VLV OXID
GP9431	10-4.01	FTP-I/O, TEST B CHK VLV OXID
GP9432	10-4.01	FTP-I/O, TEST A CHK VLV FUEL
GP9433	10-4.01	FTP-I/O, TEST B CHK VLV FUEL
GP9440	10-4.01	FTP-I/O, TEST CHK VLV OUT OXID
GP9441	10-4.01	FTP-I/O, TEST CHK VLV OUT FUEL
GP9442	10-4.01	FTP-I/O, VENT OXID
GP9443	10-4.01	FTP-I/O, VENT FUEL
GP9444	10-4.01	FTP-I/O, TEST RELIEF VLV OXID
GP9445	10-4.01	FTP-I/O, TEST RELIEF VLV FUEL
GP9446	10-4.01	FTP-O, DUMP RELIEF VLV OXID

Table 3. LM EFD Measurement Index (Sheet 34 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GP9447	10-4.01	FTP-O, DUMP RELIEF VLV FUEL
GP9450	10-4.02	FTP-C, PRESS OXID TANK
GP9451	10-4.02	FTP-C, PRESS FUEL TANK
GP9452	10-4.02	FTP-I/O, FILL & DRAIN OXID
GP9453	10-4.02	FTP-I/O, FILL & DRAIN FUEL
GP9455	10-4.02	FTP-I/O, TEST S/O PRE-VALVE
GP9458	8-4.00, 10-4.02	FTP-I/O, BLEED RCS INTERCONNECT OXID
GP9459	8-4.00, 10-4.02	FTP-I/O, BLEED RCS INTERCONNECT FUEL
GP9463	10-4.02	FTP-I/O, BLEED INTERFACE OXID
GP9464	10-4.02	FTP-I/O, BLEED INTERFACE FUEL
GP9471	10-4.02	FTP-I/O, DRAIN ISOL SOL A
GP9472	10-4.02	FTP-I/O, DRAIN ISOL SOL B
GP9473	10-4.02	FTP-I/O, DRAIN B1 PROP A
GP9474	10-4.02	FTP-I/O, DRAIN B1 PROP B
GP9476	10-4.02	FTP-O, DRAIN ENG VLV SEAL OXID
GP9477	10-4.02	FTP-O, DRAIN ENG VLV SEAL FUEL
GQ3015P	4-12.01, 10-4.03, 10-7.00	PRESS, AMB He PRE PRESS BOTTLE
GQ3018P	4-12.00, 6-11.00, 10-4.03, 10-10.00	PRESS, He REG OUT MANIFOLD
GQ3025P	4-12.00, 10-4.03, 10-7.00	PRESS, He REG OUT MANIFOLD
GQ3309X	10-4.03, 10-6.00	He PRI SOL VALVE CLOSED
GQ3310X	10-4.03, 10-6.00	He SEC SOL VALVE OPEN
GQ3435P	4-12.00, 10-4.03, 10-7.00	PRESS, SUPER/CRIT He SUPPLY TANK
GQ3436P	4-12.00, 10-4.03, 10-7.00	PRESS, SUPER/CRIT He SUPPLY TANK
GQ3500X	10-4.03, 10-6.00	FUEL VENT SOL VALVE OPEN
GQ3501P	4-12.01, 10-4.03, 10-8.00	PRESS ULLAGE FUEL TANK NO. 1
GQ3541T	10-4.03, 10-10.00	TEMP He TANK START BOTTLE
GQ3603Q	10-4.03, 10-10.00	QUANTITY, FUEL TANK NO. 1

Table 3. LM EFD Measurement Index (Sheet 35 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GQ3604Q	10-4.03, 10-10.00	QUANTITY, FUEL TANK NO. 2
GQ3605Q	10-4.03, 10-9.00	QUANTITY, FUEL TANK SELECTED 1 OR 2
GQ3611P	4-12.00, 10-4.03, 10-8.00	PRESS ENGINE INTERFACE FUEL
GQ3718T	10-4.03, 10-8.00	TEMP FUEL TANK NO. 1 FUEL BULK
GQ3719T	10-4.03, 10-8.00	TEMP FUEL TANK NO. 2 FUEL BULK
GQ4000X	10-4.03, 10-6.00	OXID VENT SOL VALVE OPEN
GQ4001P	4-12.01, 10-4.03, 10-8.00	PRESS, OX TANK NO. 1 ULLAGE
GQ4103Q	10-4.03, 10-10.00	QUANTITY, OXID TANK NO. 1
GQ4104Q	10-4.03, 10-10.00	QUANTITY, OXID TANK NO. 2
GQ4105Q	10-4.03, 10-9.00	QUANTITY, OXID TANK SELECTED NO. 1 OR NO. 2
GQ4111P	4-12.00, 10-4.03, 10-8.00	PRESS, ENGINE INTERFACE OXID
GQ4218T	10-4.03, 10-8.00	TEMP, OX TANK NO. 1 OX BULK
GQ4219T	10-4.03, 10-8.00	TEMP, OX TANK NO. 2 OX BULK
GQ4220T	10-4.03, 10-8.00	DESC ENG FUEL ISOL VLV TEMP
GQ4455X	10-4.03, 10-10.00	PROPELLANT TANK LQD LEVEL LOW
GQ6297V	10-13.00	VOLT, PRE-VALVE A CURR SHUNT
GQ6299V	10-13.00	VOLT, PRE-VALVE B CURR SHUNT
GQ6331V	10-13.00	VOLT, SHUT OFF VALVE A CURR SHUNT
GQ6332V	10-13.00	VOLT, RET,S/O VALVE A CURR SHUNT

Table 3. LM EFD Measurement Index (Sheet 36 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GQ6333V	10-13.00	VOLT, SHUT OFF VALVE B CURR SHUNT
GQ6334V	10-13.00	VOLT, RET S/O VALVE B CURR SHUNT
GQ6335V	10-13.00	VOLT, SHUT OFF VALVE C CURR SHUNT
GQ6336V	10-13.00	VOLT, RET S/O VALVE C CURR SHUNT
GQ6337V	10-13.00	VOLT, SHUT OFF VALVE D CURR SHUNT
GQ6338V	10-13.00	VOLT, RET S/O VALVE D CURR SHUNT
GQ6441V	1-16.00, 10-13.00	VOLT, CHAN 1 MOTOR CURR SHUNT
GQ6442V	1-16.00, 10-13.00	VOLT, RET CHAN 1 MOTOR, CURR SHUNT
GQ6443V	1-16.00, 10-13.00	VOLT, CHAN 2 MOTOR, CURR SHUNT
GQ6444V	1-16.00, 10-13.00	VOLT, RET CHAN 2 MOTOR, CURR SHUNT
GQ6445V	1-16.00, 10-13.00	VOLT, CHAN 3 MOTOR, CURR SHUNT
GQ6446V	1-16.00, 10-13.00	VOLT, RET CHAN 3 MOTOR, CURR SHUNT
GQ6510P	4-12.00, 9-15.00, 10-4.03, 10-13.00	PRESS, THRUST CHAMBER
GQ6806H	10-4.03, 10-13.00	POS, VARIABLE INJECTOR ACTUATOR
GQ9401	10-4.03	FTP-I/O FILL SUPER/CRIT He
GQ9403	10-4.03	FTP-I/O TEST RELIEF SUPER/CRIT He
GQ9404	10-4.03	FTP-I/O PRESS STAB SUPER/CRIT He
GQ9405	10-4.03	FTP-I/O TEST DOWNSTREAM EXP VLV SUPER/CRIT He
GQ9407	10-4.03	FTP-O VENT SUPER/CRIT He
GQ9408	10-4.03	FTP-O DUMP RELIEF VLV SUPER/CRIT He
GQ9409	10-4.03	FTP-I/O TEST UPSTREAM EXP VLV SUPER/ CRIT He
GQ9415	10-4.03	FTP-I/O FILL AMBIENT HELIUM

Table 3. LM EFD Measurement Index (Sheet 37 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GQ9425	10-4.03	FTP-I/O TEST LOW PRESS He
GQ9430	10-4.03	FTP-I/O TEST A CHK VLV OXID
GQ9431	10-4.03	FTP-I/O TEST B CHK VLV OXID
GQ9432	10-4.03	FTP-I/O TEST A CHK VLV FUEL
GQ9433	10-4.03	FTP-I/O TEST B CHK VLV FUEL
GQ9440	10-4.03	FTP-I/O TEST CHK VLV OUT OXID
GQ9441	10-4.03	FTP-I/O TEST CHK VLV OUT FUEL
GQ9442	10-4.03	FTP-I/O VENT OXID
GQ9443	10-4.03	FTP-I/O VENT FUEL
GQ9444	10-4.03	FTP-I/O TEST RELIEF VALVE OXID
GQ9445	10-4.03	FTP-I/O TEST RELIEF VALVE FUEL
GQ9446	10-4.03	FTP-O DUMP RELIEF VALVE OXID
GQ9447	10-4.03	FTP-I/O DUMP RELIEF VALVE FUEL
GQ9448	10-4.03	FTP-I/O TEST LUNAR DUMP OXID
GQ9449	10-4.03	FTP-I/O TEST LUNAR DUMP FUEL
GQ9450	10-4.03	FTP-I/O PRESS OXID TANK
GQ9451	10-4.03	FTP-I/O PRESS FUEL TANK
GQ9452	10-4.03	FTP-I/O FILL & DRAIN OXID
GQ9453	10-4.03	FTP-I/O FILL & DRAIN FUEL
GQ9456	10-4.03	FTP-O DRAIN OXID BAL LINE
GQ9457	10-4.03	FTP-O DRAIN FUEL BAL LINE
GQ9461	10-4.03	FTP-O PRESS OXID INTERFACE
GQ9462	10-4.03	FTP-O PRESS FUEL INTERFACE
GQ9463	10-4.03	FTP-I/O BLEED INTERFACE OXID
GQ9464	10-4.03	FTP-I/O BLEED INTERFACE FUEL
GQ9471	10-4.03	FTP-I/O DRAIN ENG SOL A
GQ9472	10-4.03	FTP-I/O DRAIN ENG SOL B
GQ9473	10-4.03	FTP-I/O DRAIN ENG SOL C
GQ9474	10-4.03	FTP-I/O DRAIN ENG SOL D

Table 3. LM EFD Measurement Index (Sheet 38 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GQ9475	10-4.03	FTP-I/O TEST S/O PRE-VALVE
GQ9476	10-4.03	FTP-O DRAIN ENG FEED OXID
GQ9477	10-4.03	FTP-O DRAIN ENG FEED FUEL
GQ9478	10-4.03	FTP-I/O BLEED ENG OXID
GQ9479	10-4.03	FTP-I/O BLEED ENG FUEL
GQ9481	10-4.03	FTP-O DESC ENG ACTUATOR VENT PORT
GR1085Q	8-4.00, 8-16.02	QTY PROPELLANT SYS A
GR1095Q	8-4.00, 8-16.02	QTY PROPELLANT SYS B
GR1101P	4-12.00, 6-11.00, 8-4.00, 8-12.00	PRESS, He TANK A
GR1102P	4-12.00, 8-4.00, 8-12.01	PRESS, He TANK B
GR1151T	8-4.00, 8-13.00	TEMP, He TANK A (LOADING)
GR1152T	8-13.00, 8-4.00	TEMP, He TANK B (LOADING)
GR1201P	4-12.00, 8-12.00, 8-4.00	PRESS He REG A OUTPUT
GR1202P	4-12.00, 8-12.01, 8-4.00	PRESS He REG B OUTPUT
GR2121T	8-4.00, 8-13.00	TEMP FUEL TANK A
GR2122T	8-4.00, 8-13.00	TEMP FUEL TANK B
GR2201P	4-12.00, 8-4.00, 8-12.00	PRESS A FUEL MNFLD
GR2202P	4-12.00, 8-4.00, 8-12.01,	PRESS B FUEL MNFLD
GR2361X	8-4.00, 8-14.00	FUEL MNFLD X FEED VALVE NOT CLOSED
GR2362X	8-4.00, 8-14.00	OX MNFLD X FEED VALVE NOT CLOSED
GR2461X	8-4.00, 8-14.01	FUEL MAIN FEED S/O A CLOSED
GR2462X	8-4.00, 8-14.01	FUEL MAIN FEED S/O B CLOSED
GR3201P	4-12.00, 8-4.00, 8-12.00	PRESS A OXID MNFLD
GR3202P	4-12.00, 8-4.00, 8-12.01	PRESS B OXID MNFLD
GR3461X	8-4.00, 8-14.01	OXID MAIN FEED S/O A CLOSED
GR3462X	8-4.00, 8-14.01	OXID MAIN FEED S/O B CLOSED

Table 3. LM EFD Measurement Index (Sheet 39 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GR4261X	8-4.00, 8-15.06	TCA ISOL FUEL VALVE NO. 4A CLOSED
GR4262X	8-4.00, 8-15.07	TCA ISOL FUEL VALVE NO. 4B CLOSED
GR4263X	8-4.00, 8-15.04	TCA ISOL FUEL VALVE NO. 3A CLOSED
GR4264X	8-4.00, 8-15.05	TCA ISOL FUEL VALVE NO. 3B CLOSED
GR4265X	8-4.00, 8-15.02	TCA ISOL FUEL VALVE NO. 2A CLOSED
GR4266X	8-4.00, 8-15.03	TCA ISOL FUEL VALVE NO. 2B CLOSED
GR4267X	8-4.00, 8-15.00	TCA ISOL FUEL VALVE NO. 1A CLOSED
GR4268X	8-4.00, 8-15.01	TCA ISOL FUEL VALVE NO. 1B CLOSED
GR4269X	8-4.00, 8-15.06	TCA ISOL OXID VALVE NO. 4A CLOSED
GR4270X	8-4.00, 8-15.07	TCA ISOL OXID VALVE NO. 4B CLOSED
GR4271X	8-4.00, 8-15.04	TCA ISOL OXID VALVE NO. 3A CLOSED
GR4272X	8-4.00, 8-15.05	TCA ISOL OXID VALVE NO. 3B CLOSED
GR4273X	8-4.00, 8-15.02	TCA ISOL OXID VALVE NO. 2A CLOSED
GR4274X	8-4.00, 8-15.03	TCA ISOL OXID VALVE NO. 2B CLOSED
GR4275X	8-4.00, 8-15.00	TCA ISOL OXID VALVE NO. 1A CLOSED
GR4276X	8-4.00, 8-15.01	TCA ISOL OXID VALVE NO. 1B CLOSED
GR5031P	8-4.00, 8-15.07	PRESS THRUST CHAMBER NO. 4u
GR5032P	8-4.00, 8-15.06	PRESS THRUST CHAMBER NO. 4d
GR5033P	8-4.00, 8-15.07	PRESS THRUST CHAMBER NO. 4f
GR5034P	8-4.00, 8-15.06	PRESS THRUST CHAMBER NO. 4s
GR5035P	8-4.00, 8-15.04	PRESS THRUST CHAMBER NO. 3u
GR5036P	8-4.00, 8-15.05	PRESS THRUST CHAMBER NO. 3d
GR5037P	8-4.00, 8-15.05	PRESS THRUST CHAMBER NO. 3f
GR5038P	8-4.00, 8-15.04	PRESS THRUST CHAMBER NO. 3s
GR5039P	8-4.00, 8-15.03	PRESS THRUST CHAMBER NO. 2u
GR5040P	8-4.00, 8-15.02	PRESS THRUST CHAMBER NO. 2d
GR5041P	8-4.00, 8-15.02	PRESS THRUST CHAMBER NO. 2f

Table 3. LM EFD Measurement Index (Sheet 40 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GR5042P	8-4.00, 8-15.03	PRESS THRUST CHAMBER NO. 2s
GR5043P	8-4.00, 8-15.00	PRESS THRUST CHAMBER NO. 1u
GR5044P	8-4.00, 8-15.01	PRESS THRUST CHAMBER NO. 1d
GR5045P	8-4.00, 8-15.00	PRESS THRUST CHAMBER NO. 1f
GR5046P	8-4.00, 8-15.01	PRESS THRUST CHAMBER NO. 1s
GR6001T	6-11.00, 8-4.00, 8-16.01, 8-17.00	TEMP QUAD CLUSTER NO. 4
GR6002T	6-11.00, 8-4.00, 8-16.01, 8-17.00	TEMP QUAD CLUSTER NO. 3
GR6003T	6-11.00, 8-4.00, 8-16.01, 8-17.00	TEMP QUAD CLUSTER NO. 2
GR6004T	6-11.00, 8-4.00, 8-16.01, 8-17.00	TEMP QUAD CLUSTER NO. 1
GR6201	8-4.00	FTP-I/O He FILL & VENT DISC A
GR6202	8-4.00	FTP-I/O He FILL & VENT DISC B
GR6211	8-4.00	FTP-I/O He INLET TEST DISC A
GR6212	8-4.00	FTP-I/O He INLET TEST DISC B
GR6233	8-4.00	FTP-I/O REG OUTLET TEST DISC A
GR6234	8-4.00	FTP-I/O REG OUTLET TEST DISC B
GR6241	8-4.00	FTP-I/O FUEL CHECK TEST DISC A1
GR6242	8-4.00	FTP-I/O FUEL CHECK TEST DISC A2
GR6243	8-4.00	FTP-I/O FUEL CHECK TEST DISC B1
GR6244	8-4.00	FTP-I/O FUEL CHECK TEST DISC B2
GR6251	8-4.00	FTP-I/O OXID CHECK TEST DISC A1
GR6252	8-4.00	FTP-I/O OXID CHECK TEST DISC A2
GR6253	8-4.00	FTP-I/O OXID CHECK TEST DISC B1
GR6254	8-4.00	FTP-I/O OXID CHECK TEST DISC B2
GR6261	8-4.00	FTP-I/O FUEL RELIEF TEST DISC A
GR6262	8-4.00	FTP-I/O OXID RELIEF TEST DISC A
GR6263	8-4.00	FTP-I/O FUEL RELIEF TEST DISC B
GR6264	8-4.00	FTP-I/O OXID RELIEF TEST DISC B
GR6271	8-4.00	FTP-I/O FUEL RELIEF VENT PORT A
GR6272	8-4.00	FTP-I/O OXID RELIEF VENT PORT A

Table 3. LM EFD Measurement Index (Sheet 41 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GR6273	8-4.00	FTP-I/O FUEL RELIEF VENT PORT B
GR6274	8-4.00	FTP-I/O OXID RELIEF VENT PORT B
GR6281	8-4.00	FTP-I/O FUEL TANK VENT DISC A
GR6282	8-4.00	FTP-I/O OXID TANK VENT DISC A
GR6283	8-4.00	FTP-I/O FUEL TANK VENT DISC B
GR6284	8-4.00	FTP-I/O OXID TANK VENT DISC B
GR6301	8-4.00	FTP-I/O FUEL TANK BLEED DISC A
GR6302	8-4.00	FTP-I/O OXID TANK BLEED DISC A
GR6303	8-4.00	FTP-I/O FUEL TANK BLEED DISC B
GR6304	8-4.00	FTP-I/O OXID TANK BLEED DISC B
GR6311	8-4.00	FTP-I/O FUEL TANK FILL DISC A
GR6312	8-4.00	FTP-I/O OXID TANK FILL DISC A
GR6313	8-4.00	FTP-I/O FUEL TANK FILL DISC B
GR6314	8-4.00	FTP-I/O OXID TANK FILL DISC B
GR6321	8-4.00	FTP-I/O FUEL MNFLD SVC DISC A
GR6322	8-4.00	FTP-I/O OXID MNFLD SVC DISC A
GR6323	8-4.00	FTP-I/O FUEL MNFLD SVC DISC B
GR6324	8-4.00	FTP-I/O OXID MNFLD SVC DISC B
GR7001X	8-4.00, 8-14.00	PRI ASC INTCNNCT FUEL VL A OPEN
GR7002X	8-4.00, 8-14.00	PRI ASC INTCNNCT FUEL VL B OPEN
GR7003X	8-4.00, 8-14.00	PRI ASC INTCNNCT OXID VL A OPEN
GR7004X	8-4.00, 8-14.00	PRI ASC INTCNNCT OXID VL B OPEN
GR7009X	8-4.00, 8-14.00	SEC ASC INTCNNT OXID VL A OPEN
GR7010X	8-4.00, 8-14.00	SEC ASC INTCNNT FL VL A OPEN
GR7011X	8-4.00, 8-14.00	SEC ASC INTCNNT OX VL B OPEN
GR7012X	8-4.00, 8-14.00	SEC ASC INTCNNT FL VL B OPEN
GR7121V	8-10.03	VOLT, FUEL INJECTOR VALVE NO. 4u
GR7122V	8-10.03	VOLT, FUEL INJECTOR VALVE NO. 4d
GR7123V	8-10.03	VOLT, FUEL INJECTOR VALVE NO. 4f

Table 3. LM EFD Measurement Index (Sheet 42 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GR7124V	8-10.03	VOLT, FUEL INJECTOR VALVE NO. 4s
GR7125V	8-10.02	VOLT, FUEL INJECTOR VALVE NO. 3u
GR7126V	8-10.02	VOLT, FUEL INJECTOR VALVE NO. 3d
GR7127V	8-10.02	VOLT, FUEL INJECTOR VALVE NO. 3f
GR7128V	8-10.02	VOLT, FUEL INJECTOR VALVE NO. 3s
GR7129V	8-10.01	VOLT, FUEL INJECTOR VALVE NO. 2u
GR7130V	8-10.01	VOLT, FUEL INJECTOR VALVE NO. 2d
GR7131V	8-10.01	VOLT, FUEL INJECTOR VALVE NO. 2f
GR7132V	8-10.01	VOLT, FUEL INJECTOR VALVE NO. 2s
GR7133V	8-10.00	VOLT, FUEL INJECTOR VALVE NO. 1u
GR7134V	8-10.00	VOLT, FUEL INJECTOR VALVE NO. 1d
GR7135V	8-10.00	VOLT, FUEL INJECTOR VALVE NO. 1f
GR7136V	8-10.00	VOLT, FUEL INJECTOR VALVE NO. 1s
GR7261V	8-10.03	VOLT, OXID INJECTOR VALVE NO. 4u
GR7262V	8-10.03	VOLT, OXID INJECTOR VALVE NO. 4d
GR7263V	8-10.03	VOLT, OXID INJECTOR VALVE NO. 4f
GR7264V	8-10.03	VOLT, OXID INJECTOR VALVE NO. 4s
GR7265V	8-10.02	VOLT, OXID INJECTOR VALVE NO. 3u
GR7266V	8-10.02	VOLT, OXID INJECTOR VALVE NO. 3d
GR7267V	8-10.02	VOLT, OXID INJECTOR VALVE NO. 3f
GR7268V	8-10.02	VOLT, OXID INJECTOR VALVE NO. 3s
GR7269V	8-10.01	VOLT, OXID INJECTOR VALVE NO. 2u
GR7270V	8-10.01	VOLT, OXID INJECTOR VALVE NO. 2d
GR7271V	8-10.01	VOLT, OXID INJECTOR VALVE NO. 2f
GR7272V	8-10.01	VOLT, OXID INJECTOR VALVE NO. 2s
GR7273V	8-10.00	VOLT, OXID INJECTOR VALVE NO. 1u
GR7274V	8-10.00	VOLT, OXID INJECTOR VALVE NO. 1d
GR7275V	8-10.00	VOLT, OXID INJECTOR VALVE NO. 1f
GR7276V	8-10.00	VOLT, OXID INJECTOR VALVE NO. 1s

Table 3. LM EFD Measurement Index (Sheet 43 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GR9609U	8-14.01	MAIN SOL VALVES A CLOSED
GR9610U	8-14.01	MAIN SOL VALVES B CLOSED
GR9613U	8-14.00	MNFLD X FEED VALVES NOT CLOSED
GR9631U	8-14.00	SYS "A" FUEL INTCNNCT VALVES OPEN
GR9632U	8-14.00	SYS "B" FUEL INTCNNCT VALVES OPEN
GR9641U	8-14.00	SYS "A" OX INTCNNCT VALVES OPEN
GR9642U	8-14.00	SYS "B" OX INTCNNCT VALVES OPEN
GR9661U	8-15.06	TCA ISOL VALVES 4A CLOSED
GR9662U	8-15.07	TCA ISOL VALVES 4B CLOSED
GR9663U	8-15.04	TCA ISOL VALVES 3A CLOSED
GR9664U	8-15.05	TCA ISOL VALVES 3B CLOSED
GR9665U	8-15.02	TCA ISOL VALVES 2A CLOSED
GR9666U	8-15.03	TCA ISOL VALVES 2B CLOSED
GR9667U	8-15.00	TCA ISOL VALVES 1A CLOSED
GR9668U	8-15.01	TCA ISOL VALVES 1B CLOSED
GT0105	13-15.00	PCM NRZ, DATA IN
GT0106	13-15.00	SYNC SIGNAL IN
GT0107	13-19.00	PCM SPLIT PHASE IN
GT0108	13-15.00	SUBCARRIER REF SIGNAL
GT0161V	13-10.00	VOLT, BACKUP VOICE
GT0163	13-10.00	RECEIVED VHF A VOICE
GT0164V	13-10.00	RECEIVED VHF B VOICE/EMU DATA
GT0206X	13-6.01	PA RECYCLING SIG NO 1
GT0207X	13-6.01	PA RECYCLING SIG NO 2
GT0224C	13-6.01	CURR S-BAND PWR AMP ANODE NO 1
GT0225C	13-6.01	CURR S-BAND PWR AMP ANODE NO 2
GT0441X	13-14.00	DUA VERIFY

Table 3. LM EFD Measurement Index (Sheet 44 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GT0451H	13-8.00	POSITION GIMBAL PICKOFF OUTPUT Y
GT0452H	13-8.00	POSITION GIMBAL PICKOFF OUTPUT X
GT0454T	6-11.00, 8-16.01, 8-17.00, 13-8.00	TEMP S-BAND ST ANT ELECT ASSY
GT0455V	13-6.00	28VDC S-BAND HEATER VOLTAGE
GT0504V	13-12.00	VOLT S-BAND RECEIVER AGC
GT0555V	13-10.00	S-BAND RECEIVER SUBCARRIER OUT
GT0604V	13-19.00	VHF RCVR A AGC
GT0605V	13-19.00	VHF RCVR B AGC
GT0625V	4-12.01, 13-19.00	VHF RCVR B OUTPUT
GT0660V	13-8.00	VOLT TRACKING AGC & COMM
GT0662V	13-8.00	ST ANT X GIMBAL SERVO OUT AT 0 DEG
GT0663V	13-8.00	ST ANT X GIMBAL SERVO OUT AT 90 DEG
GT0664V	13-8.00	ST ANT Y GIMBAL SERVO OUT AT 0 DEG
GT0665V	13-8.00	ST ANT Y GIMBAL SERVO OUT AT 90 DEG
GT0707C	13-6.01	S-BAND P.A. NO 1 HEATER CURRENT
GT0708C	13-6.01	S-BAND P.A. NO 2 HEATER CURRENT
GT0711V	13-8.00	100 CYCLE SYNC SIGNAL
GT0712V	13-8.00	50 CYCLE SYNC SIGNAL
GT0992B	13-9.00	PHASE, ST PH ER, SLCTD S-BAND XPNDR
GT0993E	13-16.00	S-BAND XMTR TLM DET RF PWR
GT0994V	13-9.00	VOLT, SELECTED S-BAND RCVR AGC
GT9501	13-7.00	S-BAND ERECTABLE ANT IN/OUT RF
GT9502	13-7.00	S-BAND IN-FLT ANT NO 1 IN/OUT RF
GT9503	13-7.00	S-BAND IN-FLT ANT NO 2 IN/OUT RF
GT9504	13-8.00	S-BAND STEER ANT IN/OUT RF

Table 3. LM EFD Measurement Index (Sheet 45 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
GT9506	13-17.00	VHF EVA IN/OUT RF
GT9507	13-17.00	VHF IN-FLT ANT NO 1, CONN IN/OUT RF
GT9508	13-17.00	VHF IN-FLT ANT NO 2, CONN IN/OUT RF
GT9509	6-5.00	AUDIO WARNING (CDR) (P316-55)
GT9510	6-5.00	AUDIO WARNING (LMP) (P317-55)
GT9511	13-13.00	LEFT MIKE PWR CDR (P316-22)
GT9512	13-13.00	RIGHT MIKE PWR CDR (P316-39)
GT9513	13-13.00	BIOMED PWR CDR (P316-53)
GT9514	13-13.00	LEFT MIKE PWR LMP (P317-22)
GT9515	13-13.00	RIGHT MIKE PWR LMP (P317-39)
GT9516	13-13.00	BIOMED PWR LMP (P316-53)
GT9517	13-13.00	HEADSET NO 1 SPACE SUIT NO 1 (CDR) (P316-3)
GT9518	13-13.00	HEADSET NO 2 SPACE SUIT NO 2 (LMP) (P317-3)
GY0050X	1-20.00	ABORT COMMANDED
GY0101N	2-7.00	SYS A EED CONTINUITY
GY0102N	2-8.00	SYS B EED CONTINUITY
GY0123X	2-7.00	SYS A STAGING RELAY CLOSED
GY0124X	2-8.00	SYS B STAGING RELAY CLOSED
GY0201X	2-11.00	ED SYS A RELAY TRANSFER
GY0202X	2-11.00	ED SYS B RELAY TRANSFER
GY0231X	2-11.00	SYS A EED RELS 2K7-2K15 CLOSED
GY0232X	2-11.00	SYS B EED RELS 2K7-2K15 CLOSED
GY0701V	2-7.00	SYS A ED BATTERY VOLTAGE
GY0702V	2-8.00	SYS B ED BATTERY VOLTAGE
GY0703	4-17.00	SELECTED ED BATTERY VOLTAGE

Table 3. LM EFD Measurement Index (Sheet 46 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JC9501	4-5.00	BATT NO. 1 HV POWER IN
JC9502	4-5.00	BATT NO. 1 LV POWER IN
JC9503	4-5.00	BATT NO. 2 HV POWER IN
JC9504	4-5.00	BATT NO. 2 LV POWER IN
JC9505	4-5.00	BATT NO. 3 HV POWER IN
JC9506	4-5.00	BATT NO. 3 LV POWER IN
JC9507	4-5.00	BATT NO. 4 HV POWER IN
JC9508	4-5.00	BATT NO. 4 LV POWER IN
JC9509	4-5.00	BATT NO. 5 POWER IN
JC9510	4-5.00	BATT NO. 6 POWER IN
JC9511	4-9.00	LM POWER ON SYS B CMD
JC9512	4-5.00	CM POWER ON SYS B CMD
JC9513	4-9.00	LM POWER ON SYS A CMD
JC9514	4-5.00	CM POWER ON SYS A CMD
JC9515	4-5.00	GSE POWER INPUT
JC9532	4-5.00	CDR BUS 28 VDC POWER IN
JC9533	4-5.00	LM PILOT BUS 28 VDC POWER IN
JC9534	4-13.00	GSE AC BUS POWER IN
JC9881	4-6.00	REV/OVERCURREOPERATE BATT NO. 1
JC9882	4-6.00	REV/OVERCURR OPERATE BATT NO. 2
JC9883	4-6.01	REV/OVER CURROPERATE BATT NO. 3
JC9884	4-6.01	REV/OVERCURREOPERATE BATT NO. 4
JC9885	4-7.00	REV/OVERCURREOPERATE BATT NO. 5
JC9886	4-7.01	REV/OVERCURREOPERATE BATT NO. 6
JC9891V	4-9.00	VOLT, LOW/HIGH VOLTAGE TAPS OFF
JC9892V	4-9.00	VOLT, LOW VOLTAGE TAPS ON
JC9893V	4-8.00	VOLT, LUT DEADFACE RELAY SET
JC9894V	4-8.00	VOLT, LUT DEADFACE RELAY RESET

Table 3. LM EFD Measurement Index (Sheet 47 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JF8521V	7-5.00	VOLT, CABIN FAN
JF8522V	7-5.00	VOLT, CABIN FAN
JF8535V	7-6.00	VOLT, SUIT FAN NO. 2
JF8536V	7-6.00	VOLT, SUIT FAN NO. 1
JF9110	7-4.01	GFE CHARGING PLSS H ₂ O
JF9111	7-4.03	SUIT NO. 1 UMBILICAL
JF9112	7-4.03	SUIT NO. 2 UMBILICAL
JF9137	7-4.02	FTP-I W/G ACCUM REF PORT (VAC 2 TO 4 PSIA)
JF9151	7-4.03	FTP-I O ₂ PRESS RLF VLV DES TK FAIL CP-PRIME
JF9152	7-4.03	FTP-I O ₂ PRESS RLF VLV DES TK FAIL CP-SEC
JF9153	7-4.03	FTP-I O ₂ FILL PRESS RLF VLV FAIL CP-PRIME
JF9154	7-4.03	FTP-I O ₂ FILL PRESS RLF VLV FAIL OP-SEC
JF9155	7-4.03	FTP-I O ₂ HIGH PRESS REG FAIL OP-PRIME
JF9156	7-4.03	FTP-I O ₂ HIGH PRESS REG FAIL OP-SEC
JF9555	7-4.03	FTP-I O ₂ SUPPLY PLSS DISC
JH9001	1-17.00	GIMBAL TRIM MALFUNCTION RESET
JH9003	11-16.00	X TRANSLATION CMD TO ATCA (STIM)
JH9004	11-16.00	Y TRANSLATION CMD TO ATCA (STIM)
JH9005	11-16.00	Z TRANSLATION CMD TO ATCA (STIM)
JI7027X	12-9.00	GSE (INPUT REGISTER LOADED)
JI7028X	12-9.00	GSE (DATA/COMMAND)
JI7029X	12-9.00	GSE DATA RECEIVED

Table 3. LM EFD Measurement Index (Sheet 48 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JI7033X	12-9.00	GSE DATA IN
JI7035X	12-9.00	GSE SHIFT PULSES
JI7043X	12-9.00	GSE IN USE
JI7075	12-6.00	SELF TEST PTSA
JI7101V	12-6.00	AUX HTR PWR (PTMU)
JL0404	6-12.00	INTERNAL OSC CHECKOUT POINT 1
JL0405	6-12.00	INTERNAL OSC CHECKOUT POINT 2
JL8506	13-12.00	DSEA RESET CMD
JL9793	4-9.00	OPERATIONAL INSTR POWER CONTROL
JN9001	17-11.00	GYRO 1 AND 2 ACTIVATE
JN9002	17-7.00	RCVR (SHAFT ERROR) INPUT SIG
JN9003	17-7.00	RCVR (SUM) INPUT SIG
JN9004	17-7.00	RCVR (TRUNNION ERROR) INPUT SIG
JN9012	17-17.00	LR DEVIATION INHIBIT
JN9013	17-11.00	GYRO 3 AND 4 ACTIVATE
JP9410	10-4.01	FTP-I SENSE PRI UPSTREAM REG
JP9411	10-4.01	FTP-I SENSE PRI DOWNSTREAM REG
JP9412	10-4.01	FTP-I SENSE SEC UPSTREAM REG
JP9413	10-4.01	FTP-I SENSE SEC DOWNSTREAM REG
JP9480	10-4.02	FTP-I CONNECT OXID FEED
JP9482	10-4.02	FTP-I CONNECT FUEL FEED
JQ9023V	10-4.03, 10-9.00	VOLT, PQGS FUEL TANK NO. 1 QUANTITY
JQ9024V	10-4.03, 10-9.00	VOLT, PQGS FUEL TANK NO. 2 QUANTITY
JQ9033V	10-4.03, 10-9.00	VOLT, PQGS OXID TANK NO. 1 QUANTITY
JQ9034V	10-4.03, 10-9.00	VOLT, PQGS OXID TANK NO. 2 QUANTITY

Table 3. LM EFD Measurement Index (Sheet 49 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JQ9037X	10-4.03, 10-9.00	PQGS SENSOR TEST DRY
JQ9039X	10-4.03, 10-9.00	PQGS SENSOR OUTPUT INHIBIT
JQ9041V	1-16.00, 10-13.00	VOLT, CHANNEL 1 PWR AMP SIM FAIL
JQ9042V	1-16.00, 10-13.00	VOLT, CHANNEL 2 PWR AMP SIM FAIL
JQ9043V	1-16.00, 10-13.00	VOLT, CHANNEL 3 PWR AMP SIM FAIL
JQ9051V	1-16.00, 10-13.00	VOLT, CHANNEL 1 PWR AMP SIM FAIL
JQ9053V	1-16.00, 10-13.00	VOLT, CHANNEL 2 PRE AMP SIM FAIL
JQ9055V	1-16.00, 10-13.00	VOLT, CHANNEL 3 PRE AMP SIM FAIL
JQ9410	10-4.03	FTP-I SENSOR PRI REG
JQ9412	10-4.03	FTP-I SENSOR SEC REG
JQ9480	10-4.03	FTP-I CONNECT OXID FEED
JQ9482	10-4.03	FTP-I CONNECT FUEL FEED
JR6231	8-4.00	FTP-I/PRI HR REG VENT PORT A
JR6232	8-4.00	FTP-I PRI He REG VENT PORT B
JR6235	8-4.00	FTP-I/O SEC He REG VENT PORT A
JR6236	8-4.00	FTP-I/O SEC He REG VENT PORT B
JR9512V	8-10.03	VOLT, SEC COIL INJECT VLVS NO4u
JR9513V	8-10.03	VOLT, SEC COIL INJECT VLVS NO4d
JR9514V	8-10.03	VOLT, SEC COIL INJECT VLVS NO4f
JR9515V	8-10.03	VOLT, SEC COIL INJECT VLVS NO4s
JR9516V	8-10.02	VOLT, SEC COIL INJECT VLVS NO3u
JR9517V	8-10.02	VOLT, SEC COIL INJECT VLVS NO3d
JR9518V	8-10.02	VOLT, SEC COIL INJECT VLVS NO3f
JR9519V	8-10.02	VOLT, SEC COIL INJECT VLVS NO3s
JR9520V	8-10.01	VOLT, SEC COIL INJECT VLVS NO2u
JR9521V	8-10.01	VOLT, SEC COIL INJECT VLVS NO2d
JR9522V	8-10.01	VOLT, SEC COIL INJECT VLVS NO2f

Table 3. LM EFD Measurement Index (Sheet 50 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JR9523V	8-10.01	VOLT, SEC COIL INJECT VLVS NO2s
JR9524V	8-10.00	VOLT, SEC COIL INJECT VLVS NO1u
JR9525V	8-10.00	VOLT, SEC COIL INJECT VLVS NO1d
JR9526V	8-10.00	VOLT, SEC COIL INJECT VLVS NO1f
JR9527V	8-10.00	VOLT, SEC COIL INJECT VLVS NO1s
JR9531V	8-10.03	RCS PRI FUEL + OXID VALUES PR4A
JR9532V	8-10.03	RCS PRI FUEL + OXID VALUES PR4B
JR9533V	8-10.02	RCS PRI FUEL + OXID VALVES PR3A
JR9534V	8-10.02	RCS PRI FUEL + OXID VALVES PR3B
JR9535V	8-10.01	RCS PRI FUEL + OXID VALVES PR2A
JR9536V	8-10.01	RCS PRI FUEL + OXID VALVES PR2B
JR9537V	8-10.00	RCS PRI FUEL + OXID VALVES PR1A
JR9538V	8-10.00	RCS PRI FUEL + OXID VALVES PR1B
JT8001	13-19.00	VHF XMTR "A" CW CONTROL
JT8002	13-19.00	VHF XMTR "B" CW CONTROL
JT8003V	13-6.01	VOLT, P.A. OPER POINT TEST, PRI
JT8005V	13-6.01	VOLT, P.A. OPER POINT TEST, SEC
JT9519	13-13.00	BIOMED EKG SIG, LMP
JT9520	13-10.00	MIKE INPUT SPACE SUIT NO. 2 (LMP)
JT9522	13-13.00	BIOMED EKG SIG, CDR
JT9523	13-10.00	MIKE INPUT CDR SPACE SUIT
JY8501V	2-7.00	VOLT, SYS A ELEC CKT INT REL CLOSED
JY8502V	2-8.00	VOLT, SYS B ELEC CKT INT REL CLOSED
JY8503V	2-7.00	VOLT, SYS A INTERLOCK RELAY OPEN

Table 3. LM EFD Measurement Index (Sheet 51 of 51)

MEASUREMENT NO.	MEASUREMENT NO. LOCATED	FUNCTION
JY8504V	2-8.00	VOLT, SYS B INTERLOCK RELAY OPEN
JY8511V	2-8.00	VOLT, SYS B STAG NUTS RELAY CLOSED
JY8512V	2-7.00	VOLT, SYS A STAG BOLTS RELAY CLOSED
JY8521V	2-7.00	VOLT, SYS A CABLE CUTTER REL CLOSED
JY8522V	2-8.00	VOLT, SYS B CABLE CUTTER REL CLOSED
JY8541V	2-5.00	VOLT, SYS A, D.E., He PRESS REL CLOSED
JY8542V	2-6.00	VOLT, SYS B, D.E., He PRESS REL CLOSED
JY8551V	2-5.00	VOLT, SYS A, A.E., He PRESS REL CLOSED
JY8552V	2-6.00	VOLT, SYS B, A.E., He PRESS REL CLOSED
JY8553V	2-5.00	VOLT, SYS A, A.E., He PRESS TK1 REL CLOSED
JY8554V	2-6.00	VOLT, SYS B, A.E., He PRESS TK1 REL CLOSED
JY8555V	2-5.00	VOLT, SYS A, A.E., He PRESS TK2 REL CLOSED
JY8556V	2-6.00	VOLT, SYS B, A.E., He PRESS TK2 REL CLOSED
NN0003E	17-6.00	RR POWER OUT
NN0005	17-17.00	VELOCITY TRANSMITTER POWER
NN0006	17-17.00	BLANKING SIGNAL

VII. Introduction to LM Elementary Functional Diagram Vehicle Connector Index (Table 4)

1. This section is a tabulation of connectors appearing on the Elementary Functional Diagrams.
2. The data is presented in two columns. The columns and contents of the columns are as follows:

Connector Number (J or P) Column - This column contains the reference designation of the plug or jack.

Located on Column - This column contains a listing of the Elementary Functional Diagrams on which the connector appears.

3. The connector location index is derived as follows:

3-7.00

└ Functional Grouping Sheet Number

└ Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW267-XX003)

16-6.00

└ Functional Grouping Sheet Number

└ Functional Grouping Derived from Last Two (2) Digits of Basic Drawing Number (LDW267-XX016)

Table 4. LM EFD Connector Index (Sheet 1 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
1	1-16.00, 3-7.00, 16-6.00, 16-7.00, 16-9.00, 16-10.00, 16-10.02, 16-10.03, 16-10.04	*23	4-9.00, 4-14.00
2	1-16.00	*24	4-9.00, 4-14.00
3	1-16.00	26A	4-7.00, 4-7.01, 4-8.00, 4-15.00 4-17.00, 4-18.00, 4-20.00
3A	4-13.00, 6-9.00	26B	4-7.01, 4-8.00, 4-15.00, 4-17.00, 4-18.00, 4-20.00
3B	4-13.00, 6-9.00	27A	4-7.00
4	1-16.00	27B	4-7.01
*9	4-9.00, 4-14.00	28A	4-15.00, 4-17.00
*10	4-9.00, 4-14.00,	28B	4-15.00, 4-17.00
15	2-11.00, 3-14.00, 4-8.00, 4-12.00, 4-16.00, 6-5.00, 6-7.00, 6-7.01, 6-8.01, 6-9.00, 7-9.00, 7-10.00, 7-12.00, 7-16.00, 8-16.00, 8-16.01, 8-16.02, 8-17.00, 9-13.00, 9-15.00, 10-10.00, 10-12.00, 11-7.00, 11-20.00, 11-21.00, 11-23.00, 12-5.00, 12-13.00, 13-9.00, 17-18.00,	29A	4-5.00, 4-6.00, 4-9.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00
		29B	4-5.00, 4-6.01, 4-9.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 2 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
30A	4-5.00, 4-6.00, 4-6.01, 4-9.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00	37	7-6.00, 7-7.00, 7-16.00, 8-7.00, 8-7.01, 8-9.00, 8-12.00
30B	4-5.00, 4-6.01, 4-9.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00	38	1-6.00, 4-5.00, 4-8.00, 4-9.00, 4-10.00, 4-10.01, 4-12.00, 6-5.00, 8-16.02, 8-17.00, 9-7.00, 9-10.00, 9-13.00, 10-6.00, 10-9.00, 16-5.00, 16-6.00, 16-9.00, 16-11.00
*31A	4-6.00	39	4-11.01, 4-12.00, 4-15.00, 7-5.00, 7-7.00, 16-6.00, 16-9.00
*31B	4-6.01	41	1-19.00, 3-14.00, 4-15.00, 4-16.00, 6-5.00, 6-8.00, 7-7.00, 7-9.00, 7-14.00, 10-12.00, 11-20.00, 17-18.00
*32A	4-6.00	42	1-12.00, 4-10.00, 4-10.01, 4-12.00, 4-15.00, 7-5.00, 7-6.00, 7-7.00, 7-9.00, 8-6.00, 8-8.00, 8-12.00
*32B	4-6.01	43	1-6.00, 1-11.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03, 10-11.00, 12-5.00, 12-6.00
33A	4-15.00		
33B	4-15.00		
33C	4-15.00		
33D	4-15.00		
34	4-6.00, 4-6.01, 4-7.00, 4-8.00, 4-19.00		
35	1-16.00, 7-9.00, 7-10.00, 7-11.00, 7-12.00, 7-13.00, 8-13.00, 8-15.04, 8-15.05, 8-15.06, 8-15.07		
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 3 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
45	8-10.00, 8-10.01, 8-10.02, 8-10.03, 10-11.00, 11-7.00	60	1-6.00, 4-5.00, 4-9.00, 4-11.00, 4-11.01, 4-13.00, 9-6.00, 9-7.00, 9-10.00, 9-12.00, 9-13.00, 9-15.00, 10-7.00, 11-7.00, 12-5.00, 16-5.00, 16-10.00, 16-10.02, 16-10.03, 17-7.00
46	1-11.00, 4-10.00, 4-10.01, 4-13.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03, 12-5.00, 13-6.01	63	1-6.00, 1-9.00, 1-10.00, 12-5.00, 12-6.00, 12-13.00, 16-6.00, 16-9.00, 16-10.01,
55	1-6.00, 1-10.00, 10-5.00, 10-6.00, 10-7.00, 10-8.00, 10-9.00	64	2-11.00, 2-12.00, 13-11.00, 13-13.00, 16-6.00, 16-9.00, 16-10.03, 16-11.00
56	1-10.00, 1-11.00, 1-20.00, 4-16.00, 6-7.01, 6-9.00, 7-9.00, 7-16.00, 8-16.00, 9-6.00, 9-9.00, 9-10.00, 9-11.00, 9-12.00, 9-13.00, 9-15.00, 11-16.00, 1-6.00	65	13-10.00, 13-11.00, 13-12.00, 13-18.00, 16-10.04
57	3-9.00, 6-5.00, 9-5.00, 9-5.01, 9-9.00, 9-10.00, 9-11.00, 9-12.00, 9-14.00, 11-15.00, 16-8.00, 16-10.01	*67 **	4-5.00, 4-7.01, 4-8.00, 4-9.00
58	9-10.00, 9-11.00, 9-13.00, 16-7.00, 17-6.00, 17-7.00 17-8.00, 17-10.00, 17-10.01, 17-15.00, 17-16.00, 17-18.00	68	4-8.00, 4-19.00
59	1-8.00, 3-9.01, 9-13.00, 11-18.00, 16-5.00, 16-6.00, 16-9.00, 16-10.00	69	1-6.00, 1-9.00, 1-10.00, 11-23.00, 16-5.00, 16-6.00, 16-9.00, 16-10.00, 16-10.02, 16-10.03, 16-10.04
		70	3-13.00, 3-18.00, 4-9.00, 4-11.01
		71	8-7.00, 8-7.01, 17-13.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 4 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
72	4-10.00, 4-10.01, 7-6.00, 8-7.00, 12-6.00, 16-7.00	**86	6-5.00, 13-10.00, 13-11.00, 13-13.00
73	1-11.00, 4-13.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03, 12-5.00, 13-6.01	87	1-7.00, 4-6.00, 4-7.01, 4-10.00, 4-10.01, 8-9.00, 8-11.01, 10-5.00, 11-6.00, 13-10.00, 13-12.00, 13-18.00, 16-5.00, 16-10.04
74	2-7.00, 4-5.00, 4-6.01, 4-7.00, 4-10.01, 4-19.00, 4-20.00	88	3-9.00, 9-9.00, 9-12.00, 9-13.00, 9-14.00, 11-15.00, 17-9.00, 17-17.00
76	6-10.00, 13-5.00, 13-6.00, 13-6.01, 13-8.00, 13-10.00, 13-11.00, 13-12.00, 13-13.00, 13-15.00, 13-18.00	89	4-13.00, 8-11.00, 17-5.00
80	4-5.00	*92	4-5.00
80A	4-10.01	**	
81	4-5.00, 4-11.01	**93	6-9.00
83	6-10.00, 13-5.00, 13-6.01, 13-8.00, 13-10.00, 13-11.00, 13-12.00, 13-13.00, 13-16.00, 13-18.00	*95	3-13.00, 4-5.00, 4-8.00, 4-9.00
		**	
**85	6-5.00, 13-10.00, 13-11.00, 13-13.00	96	4-11.01, 4-13.00, 16-10.04
		97	4-10.01, 4-13.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 5 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
98	4-12.00, 7-11.00, 7-13.00, 8-12.00, 8-12.01, 10-7.00, 10-8.00, 10-10.00, 10-11.00, 10-12.00, 10-13.00,	148	2-7.00, 4-7.01, 4-10.00, 4-10.01, 4-15.00, 4-16.00, 4-17.00, 4-18.00, 6-5.00, 6-6.00, 13-5.00, 13-6.00, 13-18.00
98A	4-12.01, 7-8.00, 10-7.00, 10-7.01, 10-8.00	156	11-23.00
99	4-9.00, 4-11.00, 4-11.01, 4-13.00, 8-11.00, 17-5.00, 17-13.00, 16-6.00	*166	4-5.00, 4-10.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03
101	1-20.00, 8-16.01, 9-8.00, 11-16.00, 11-20.00, 11-23.00, 12-5.00, 12-10.00, 12-11.00	*167	4-5.00, 4-11.00, 4-13.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03
103	13-6.00, 13-6.01, 13-14.00, 13-15.00, 13-18.00	168A	16-5.00
105	1-7.00, 1-8.00, 1-9.00, 1-12.00, 3-7.00, 4-6.00, 4-7.01, 4-8.00 4-11.00, 4-11.01, 4-13.00, 7-7.00, 9-5.01, 10-5.00, 11-18.00, 13-18.00, 13-5.00	168B	16-5.00
143	4-9.00, 4-14.00, 8-17.00, 16-6.00, 17-13.00	173	1-6.00, 1-10.00, 1-11.00, 1-13.00, 2-6.00, 3-11.00, 4-5.00, 4-6.00, 4-6.01, 4-14.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00, 6-9.00, 10-5.00, 10-6.00, 10-7.00, 10-8.00, 10-9.00, 10-13.00, 13-5.00, 17-15.00, 17-16.00, 17-17.00, 17-18.00
144	4-9.00, 4-14.00	174	1-7.00, 1-8.00, 1-9.00, 1-11.00, 1-13.00, 1-14.00, 1-15.00, 1-16.00, 1-17.00, 1-18.00, 1-19.00, 1-20.00, 2-5.00, 2-7.00, 2-11.00, 2-12.00,
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 6 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
174 (Cont)	3-5.01, 3-9.00, 3-9.01, 4-5.00, 4-6.00, 4-6.01, 4-8.00, 4-9.00, 4-15.00, 4-17.00, 4-18.00, 4-19.00, 7-11.00, 10-7.00, 10-8.00, 10-10.00, 10-13.00, 11-10.00, 12-8.00, 17-13.00	184	1-10.00, 3-5.01, 3-16.00, 11-6.00, 11-8.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00, 12-8.00, 13-9.00, 16-7.00, 17-6.00, 17-7.00, 17-8.00, 17-10.00, 17-10.01, 17-15.00, 17-16.00, 17-18.00
176	4-14.00	185	1-14.00, 2-11.00, 11-6.00, 17-9.00, 17-10.00, 17-12.00, 17-17.00
177	4-14.00	186	1-15.00, 2-11.00, 4-5.00, 4-6.00, 4-7.01, 4-8.00, 4-15.00, 4-16.00, 4-17.00, 4-18.00, 6-5.00, 6-6.00, 11-10.00, 13-14.00, 17-11.00
178	16-5.00	187	6-7.00, 7-10.00, 8-12.00, 8-12.01, 8-14.00, 8-14.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-16.02
180	11-9.00, 12-5.00, 17-10.01	189	1-6.00, 1-7.00, 1-10.00, 3-5.00, 3-14.00, 6-5.00, 6-7.00, 9-6.00, 9-8.00, 9-9.00, 10-6.00, 10-7.00, 10-9.00, 10-10.00, 10-12.00, 11-7.00, 11-20.00, 11-21.00, 12-13.00, 16-10.01, 16-10.02
181	1-14.00, 9-14.00, 11-15.00	190	2-11.00, 6-8.01, 8-16.01, 8-16.02, 9-7.00, 9-8.00, 9-9.00, 9-10.00,
182	1-19.00, 3-14.00, 4-15.00, 4-16.00, 6-5.00, 6-8.00, 7-8.00, 7-9.00, 7-10.00, 7-14.00, 7-15.00, 7-16.00, 10-12.00, 11-20.00, 17-18.00		
183	2-12.00, 4-7.01, 6-9.00, 13-9.00, 13-11.00, 13-12.00, 13-13.00, 13-15.00, 13-16.00, 13-18.00		
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 7 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
190 (Cont)	1-16.00, 9-11.00, 16-10.02	198	13-5.00, 13-6.00, 13-9.00, 13-10.00, 13-11.00, 13-12.00, 13-13.00, 13-15.00, 13-16.00
191	1-11.00, 3-5.01, 11-7.00, 11-10.00, 16-5.00, 16-10.00, 16-10.04, 17-7.00, 17-10.01, 17-18.00	199	1-7.00, 1-8.00, 1-10.00, 4-5.00, 4-6.01, 4-9.00
192	6-5.00, 16-6.00, 16-9.00, 16-10.03	200	3-11.01, 17-5.00, 17-6.00, 17-8.00, 17-9.00, 17-10.00, 17-18.00
193	1-12.00	201	17-6.00, 17-7.00
194	1-15.00, 2-12.00, 4-5.00, 4-6.00, 4-7.01, 4-8.00, 4-11.00, 4-11.01, 4-13.00, 4-16.00, 6-6.00, 13-5.00, 13-6.00, 13-12.00, 13-14.00, 13-18.00, 16-11.00	*202	17-5.00, 17-6.00, 17-7.00, 17-8.00, 17-9.00, 17-10.00, 17-10.01, 17-11.00, 17-12.00
195	6-5.00,	205	17-13.00
196	1-8.00, 1-9.00, 1-14.00, 1-20.00, 6-7.00, 6-7.01, 9-5.00, 9-5.01, 9-9.00, 9-11.00, 9-12.00, 9-15.00, 10-8.00, 11-6.00, 11-7.00, 11-16.00, 12-8.00, 16-8.00, 16-9.00	206	3-11.00, 17-14.00, 17-15.00, 17-16.00, 17-17.00, 17-18.00
197	16-6.00, 16-9.00, 16-10.03	*207	17-13.00, 17-14.00, 17-15.00, 17-16.00, 17-17.00
		208	3-18.00, 17-5.00, 17-6.00, 17-11.00, 17-12.00, 17-18.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 8 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
209	17-6.00, 17-7.00	225	3-17.00, 3-21.00
214	17-13.00, 17-15.00, 17-16.00, 17-17.00, 17-18.00	226	3-16.00
215	3-17.00, 3-21.00	227	3-13.00, 3-15.00, 3-16.00, 3-21.00
216	3-13.00, 3-15.00, 3-16.00, 3-21.00,	228	3-13.00, 3-15.00, 3-21.00
217	3-12.00, 3-12.01, 3-13.00, 3-14.00, 3-20.00, 6-9.00	229	3-14.00, 3-19.00, 16-6.00, 16-10.00, 16-10.01, 17-8.00, 17-15.00
218	3-5.01, 3-8.00, 3-9.01, 3-18.00 3-20.00, 12-7.00	230	3-13.00
219	3-9.00, 3-9.01, 3-13.00, 3-15.00, 3-16.00, 3-18.00, 17-10.00	231	3-7.00, 16-10.01
220	3-5.00, 3-5.01, 3-6.00, 3-7.00, 3-8.00, 3-9.01, 3-10.00	*233	17-6.00, 17-7.00, 17-8.00
221	3-19.00, 3-14.00	234	17-13.00, 17-15.00, 17-16.00, 17-17.00
222	3-13.00, 3-18.00	235	17-6.00
223	3-13.00, 3-15.00, 3-21.00	236	17-6.00
224	3-11.00, 3-11.01, 3-18.00, 17-12.00	238	17-5.00, 17-7.00, 17-10.00, 17-11.00, 17-12.00
		239	17-5.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 9 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
240	3-18.00, 17-5.00, 17-7.00, 17-10.00, 17-10.01, 17-12.00	321	4-11.00, 4-11.01, 7-6.00, 8-6.00, 8-7.00, 8-8.00, 17-13.00
241	17-5.00, 17-6.00, 17-7.00, 17-11.00, 17-12.00	350	13-17.00
243	3-20.00	351	13-17.00
*255	17-6.00	352	13-17.00
257	4-9.00, 4-11.01, 12-5.00, 17-5.00	368	13-14.00
258	17-18.00	371A	13-7.00
304	8-6.00, 8-7.00, 8-7.01, 8-8.00, 8-9.00	371B	13-17.00
305	7-6.00, 8-6.00, 8-7.00, 8-7.01, 8-8.00	372A	13-7.00
306	8-6.00, 8-7.00, 8-8.00	372B	13-17.00
**316	6-5.00, 13-10.00, 13-13.00	373A	13-7.00
**317	6-5.00, 13-10.00, 13-13.00	373B	13-17.00
319	8-6.00, 8-7.00, 8-7.01, 8-8.00, 8-9.00, 10-11.00	374A	13-7.00
320	4-11.00, 7-6.00, 8-7.00, 8-9.00	374B	13-17.00
		375A	13-7.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 10 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
375B	13-17.00	401	2-6.00
379	13-16.00	402	2-5.00
379A	13-16.00, 13-6.01, 13-9.00	403	2-6.00
380	13-9.00	406	2-5.00
381	13-16.00	407	2-6.00
383	13-6.01, 13-7.00	416A	2-5.00
384	13-7.00	416B	2-6.00
385	13-7.00	417A	2-9.00
386	13-7.00	417B	2-10.00
*387	13-6.01	418A	2-9.00
388	13-18.00	418B	2-10.00
389	13-18.00	419A	2-9.00
390	13-17.00	419B	2-10.00
391	13-5.00, 13-10.00, 13-11.00, 13-15.00	420A	2-9.00
*393	13-10.00, 13-15.00	420B	2-10.00
400	2-5.00		
*GSE Connector			
**Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 11 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
421A	2-9.00	432	2-9.00
421B	2-10.00	433	2-9.00
422A	2-9.00	434	2-9.00
422B	2-10.00	435	2-9.00
423A	2-9.00	438	2-9.00
423B	2-10.00	439	2-10.00
424A	2-9.00	440	2-10.00
424B	2-10.00	441	2-10.00
425A	2-9.00	442	2-10.00
425B	2-10.00	443	2-9.00
426A	2-9.00	444	2-9.00
426B	2-10.00	445	2-10.00
*428A	2-5.00, 2-7.00	446	2-10.00
*428B	2-6.00, 2-8.00	447	2-10.00
429A	2-7.00, 2-11.00	448	2-10.00
429B	2-8.00, 2-11.00		
430	2-9.00		
431	2-9.00		
*GSE Connector			
**Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 12 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
451	2-10.00	468	2-5.00
452	2-10.00	469	2-6.00
453	2-10.00	474A	2-9.00
454	2-10.00	474B	2-10.00
455	2-10.00	475A	2-9.00
456	2-9.00	475B	2-10.00
457	2-9.00	476A	2-9.00
458	2-9.00	476B	2-10.00
459	2-9.00	477A	2-9.00
460	2-9.00	477B	2-10.00
461	2-10.00	478A	2-9.00
462	2-9.00	478B	2-10.00
463	2-9.00	479A	2-9.00
464	2-10.00	479B	2-10.00
465	2-10.00		
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 13 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
481A	2-7.00	495	2-6.00, 4-10.00
481B	2-8.00	*556	10-9.00
482A	2-5.00	560	1-13.00, 10-13.00
482B	2-6.00	561	1-16.00, 10-13.00
485A	2-9.00	*562	1-16.00, 10-13.00
485B	2-10.00	565	10-7.00
486A	2-9.00	*566	10-10.00
486B	2-10.00	567	10-13.00
487A	2-9.00	602	9-5.00, 9-5.01, 9-14.00
487B	2-10.00	604	6-9.00, 9-13.00, 16-10.02
488A	2-9.00	607	4-5.00, 4-6.00, 4-6.01, 4-7.00, 4-8.00, 4-14.00
488B	2-10.00	608	1-6.00, 1-10.00, 1-16.00, 3-11.00, 4-8.00, 10-7.00, 10-8.00, 10-10.00, 10-13.00, 17-17.00
494	2-5.00, 4-11.00	609	9-5.00, 9-5.01, 9-6.00, 9-7.00, 9-9.00, 9-14.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 14 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
610	9-5.00, 9-5.01, 9-9.00, 9-14.00	709A	11-7.00, 11-12.00, 11-13.00, 11-14.00, 11-15.00, 13-11.00
611	3-9.00, 9-12.00, 16-10.01, 16-10.02, 17-9.00, 17-17.00	709B	11-6.00, 11-12.00, 11-13.00, 11-14.00, 11-15.00, 13-11.00
612	9-5.00, 9-5.01	713	1-6.00
701	3-8.00, 6-9.00, 9-8.00, 11-6.00, 11-7.00, 11-8.00, 11-9.00, 11-10.00, 11-13.00, 11-14.00, 11-15.00, 11-16.00, 11-17.00	716A	1-18.00
		716B	1-17.00
*702	11-6.00, 11-8.00, 11-9.00, 11-13.00 11-14.00, 11-15.00, 11-16.00, 11-17.00	*720	12-6.00, 12-13.00
		721	12-6.00
*703	8-10.00, 8-10.01, 8-10.02, 8-10.03, 11-8.00, 11-17.00	*722	12-6.00, 12-13.00
704	11-6.00, 11-9.00	725	12-5.00, 12-12.00
706A	1-14.00, 3-10.00, 11-11.00	*726	12-5.00, 12-6.00, 12-10.00, 12-11.00, 12-12.00
706B	1-14.00, 3-10.00, 11-11.00	727	1-13.00
708A	11-12.00, 11-18.00, 11-19.00	*728	1-13.00, 1-14.00, 1-15.00, 1-16.00, 1-17.00, 1-18.00
708B	11-12.00, 11-18.00, 11-19.00	730	12-5.00, 12-10.00, 16-6.00, 16-9.00, 16-10.01, 16-10.02
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 15 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
735	11-8.00, 11-10.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00, 11-17.00, 11-20.00, 11-21.00, 11-22.00	748	1-8.00, 1-9.00, 1-10.00, 1-11.00, 1-20.01, 3-9.00, 6-5.00, 11-6.00, 11-10.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00, 11-23.00, 16-6.00
737	1-6.00, 1-9.00, 1-10.00, 1-11.00, 1-14.00, 1-15.00, 1-16.00, 1-17.00, 1-18.00, 1-19.00, 1-20.00, 3-5.01, 12-8.00	750	7-5.00, 7-6.00, 7-7.00, 7-15.00, 7-16.00
741	1-7.00, 1-8.00, 1-9.00, 1-11.00, 1-12.00, 1-20.01, 2-11.00, 4-8.00, 9-9.00, 11-10.00, 11-16.00, 11-23.00, 12-8.00	751	7-9.00, 7-10.00, 7-14.00, 7-15.00
742	1-6.00, 1-7.00, 1-10.00, 1-12.00, 1-16.00, 3-5.00, 3-5.01, 4-8.00, 11-7.00, 11-10.00, 11-11.00, 11-12.00, 11-16.00, 12-8.00	752	7-14.00, 7-15.00, 7-16.00
743	9-9.00, 11-6.00, 11-12.00, 11-19.00, 11-23.00, 12-8.00	761	7-5.00
747	1-6.00, 1-9.00, 1-10.00, 1-11.00, 3-5.00, 11-7.00, 11-8.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00, 12-8.00	763	7-5.00, 7-6.00, 7-9.00
		764	7-6.00
		*765	7-5.00, 7-6.00
		766	7-7.00
		769	7-8.00, 7-9.00
		771	10-5.00
		772	1-13.00, 10-5.00, 12-6.00, 16-7.00
		773	1-13.00, 4-11.00, 8-9.00, 10-5.00
*GSE Connector			
**Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 16 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
774	10-5.00	808	4-10.00, 8-9.00
		810	16-5.00
*779	7-10.00	812	16-11.00
780	7-7.00, 7-16.00	850	4-16.00, 7-9.00, 7-10.00, 7-12.00, 8-16.00, 8-16.01, 8-16.02, 10-10.00, 10-12.00, 11-20.00, 11-21.00, 12-13.00, 13-9.00
781	7-6.00		
785	7-5.00		
786	7-5.00	851	1-19.00, 1-20.01, 2-11.00, 2-12.00, 3-14.00, 4-15.00, 4-16.00, 6-5.00 7-9.00, 7-10.00, 7-16.00, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 8-16.01, 8-16.00, 10-10.00, 10-12.00, 12-13.00, 13-9.00, 17-18.00
787	7-8.00		
800	16-7.00		
801	16-7.00		
803	1-7.00, 1-8.00, 10-5.00		
804	3-6.00, 6-5.00, 6-8.00, 6-8.01, 7-9.00, 7-10.00, 7-12.00, 7-16.00, 8-16.02, 13-9.00, 16-8.00, 16-9.00, 16-10.01	852	1-20.00, 7-12.00, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 8-16.01 8-16.02, 11-20.00, 12-13.00
805	6-5.00, 6-8.00, 6-8.01 8-16.01, 8-17.00, 9-9.00, 11-6.00, 11-20.00, 11-23.00, 16-6.00, 16-7.00, 16-8.00, 16-9.00, 16-10.00	*853	1-19.00, 2-11.00, 3-14.00, 4-15.00, 4-16.00, 6-5.00, 6-7.00, 6-7.01, 6-8.00, 6-8.01, 6-10.00, 7-9.00, 7-10.00, 7-12.00, 7-16.00, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 8-16.00, 8-16.01, 8-16.02, 10-10.00,
806	16-11.00		
807	7-7.00, 7-9.00, 7-11.00, 7-13.00, 8-12.00, 8-16.02, 9-11.00		
*GSE Connector			
**Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 17 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
*853 (Cont)	10-12.00, 11-20.00, 11-21.00, 12-13.00, 13-9.00, 17-18.00	860	1-20.00, 2-11.00, 2-12.00, 8-14.00, 8-14.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 10-6.00, 11-10.00, 11-23.00
*854	6-12.00, 11-20.00, 11-21.00		
856	1-20.00, 2-11.00, 4-16.00, 6-11.00, 7-9.00, 7-10.00, 7-11.00, 8-12.00, 8-12.01, 8-14.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 8-17.00, 10-7.00, 10-12.00, 11-20.00, 12-13.00, 13-9.00, 17-18.00,	870	3-20.00, 6-9.00, 6-10.00, 11-9.00, 12-13.00, 13-15.00, 13-18.00
		871	13-14.00
		872	1-20.01, 4-15.00, 4-19.00, 4-20.00, 7-14.00, 7-15.00, 10-10.00, 10-11.00, 10-13.00, 11-23.00
857	1-20.00, 4-17.00, 7-9.00, 7-10.00, 7-11.00, 8-12.00, 8-12.01, 8-14.00, 8-17.00, 10-7.00, 10-8.00	873	1-20.00, 2-11.00, 2-12.00, 8-14.00, 8-14.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 10-6.00, 11-10.00, 11-23.00
858	1-20.00, 2-11.00, 2-12.00, 7-16.00, 8-14.00, 8-14.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 10-6.00	874	3-12.01, 6-10.00, 12-13.00
		875	1-19.00, 1-20.01, 3-14.00, 7-14.00, 7-16.00, 10-12.00, 11-23.00, 12-13.00, 17-18.00
859	1-20.00, 7-9.00, 7-11.00, 8-12.00, 8-12.01, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 10-7.00, 10-12.00, 11-20.00, 11-23.00, 12-13.00, 17-18.00	877	4-18.00, 7-8.00, 7-13.00, 8-12.00, 8-12.01, 10-7.00, 10-8.00, 10-13.00
		878	3-12.00, 3-12.01, 6-10.00, 7-13.00, 8-16.02, 8-17.00, 10-10.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 18 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
879	1-20.00, 2-12.00, 4-17.00, 6-9.00, 7-10.00, 7-11.00, 7-13.00, 8-13.00, 10-7.00, 10-8.00, 11-22.00	888	1-20.01, 4-19.00, 4-20.00, 4-15.00, 7-14.00, 7-15.00, 10-10.00, 10-11.00, 10-13.00, 11-23.00
880	1-20.00, 4-16.00, 7-8.00, 7-9.00, 7-10.00, 7-11.00, 8-12.00, 8-12.01, 8-17.00, 10-7.00, 10-8.00, 10-10.00, 10-12.00, 12-13.00, 13-9.00, 17-18.00	889	1-19.00, 1-20.01, 3-14.00, 7-14.00, 10-12.00, 11-23.00, 12-13.00, 17-18.00
881	6-6.00, 6-10.00, 7-8.00, 10-7.00, 10-10.00, 10-11.00, 10-13.00, 13-7.00, 13-9.00, 13-16.00, 13-19.00	900	13-12.00
882	6-12.00	901	13-12.00
885	1-19.00, 1-20.01, 3-14.00, 4-15.00, 4-16.00, 6-10.00, 6-11.00, 7-11.00, 7-16.00, 8-17.00, 10-10.00, 10-12.00, 11-20.00, 11-21.00, 12-13.00, 7-14.00, 17-18.00	914	6-10.00
886	4-15.00, 4-17.00, 4-19.00, 4-20.00, 7-11.00, 7-15.00, 8-13.00, 8-17.00, 10-7.00, 10-10.00	950	1-20.00, 2-11.00, 2-12.00, 7-10.00, 7-11.00, 8-14.01, 10-6.00, 10-8.00, 11-10.00, 12-13.00
887	1-20.00, 1-20.01, 4-16.00, 4-17.00, 6-10.00, 6-11.00, 7-10.00, 11-20.00, 11-21.00, 11-22.00, 11-23.00, 12-13.00	952	1-20.00, 4-16.00, 7-8.00, 7-9.00, 7-10.00, 7-11.00, 8-12.00, 8-12.01, 8-17.00, 10-7.00, 10-8.00, 10-10.00, 10-12.00, 12-13.00, 13-9.00, 17-18.00
		953	1-20.00, 4-16.00, 8-15.02, 8-15.03, 8-15.04, 8-15.05, 8-15.06, 8-15.07, 8-17.00, 10-7.00, 10-10.00, 10-12.00, 12-13.00
		954	6-6.00, 7-10.00, 10-8.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 19 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
955	4-17.00, 7-8.00, 7-12.00, 7-16.00, 8-14.00, 8-15.00, 8-15.01, 8-15.02, 8-15.03, 13-9.00	1101	13-7.00
		1103	13-7.00
970	1-19.00, 3-14.00, 4-19.00, 4-20.00, 7-13.00, 7-14.00, 11-22.00, 11-23.00, 12-13.00	1104	13-7.00
		1105	13-7.00
971	2-12.00, 4-17.00, 6-9.00, 6-10.00, 7-10.00, 8-13.00, 8-17.00, 10-7.00, 10-8.00, 10-11.00, 10-13.00	1107	13-7.00
972	1-20.00, 2-12.00, 4-17.00, 6-9.00, 7-10.00, 7-11.00, 7-13.00, 8-13.00, 10-7.00, 10-8.00, 11-22.00	1110	13-7.00
		1111	13-8.00
973	6-6.00, 7-13.00, 10-7.00	1113	13-7.00
974	4-15.00, 6-10.00, 6-11.00, 7-11.00, 7-14.00, 7-15.00, 7-16.00, 10-10.00, 10-12.00, 11-23.00, 17-18.00	1114	13-17.00
		1116	13-17.00
		1119	13-17.00
1018	13-17.00	1123	13-17.00
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 20 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
1126	13-17.00	1182	13-16.00
1127	13-5.00, 13-16.00	1400	3-18.00, 6-7.00, 6-7.01, 9-9.00 11-6.00, 11-12.00, 11-23.00, 12-8.00, 16-8.00, 16-9.00, 17-8.00, 17-10.00, 17-10.01, 17-15.00
1133	13-5.00, 13-16.00	1401	3-13.00, 10-5.00, 10-6.00, 11-6.00, 11-12.00, 11-18.00, 11-19.00, 16-5.00, 16-6.00, 16-7.00, 16-9.00, 16-10.00
*1138	13-19.00	1404	12-5.00, 12-6.00, 12-7.00, 12-8.00, 12-9.00, 12-11.00, 12-12.00, 12-13.00
*1139	13-19.00	1405	12-5.00
1143	13-6.00, 13-8.00	1406	1-10.00, 12-5.00, 12-10.00, 12-11.00, 12-12.00, 12-13.00
1144	13-6.00, 13-8.00	1407	12-7.00, 12-9.00, 12-11.00, 12-12.00
1145	6-9.00, 13-5.00, 13-10.00, 13-11.00, 13-15.00		
1146	13-18.00		
1147	13-18.00		
1149	13-7.00		
1171	13-8.00		
1172	13-8.00		
1180	13-19.00		
*1181	13-19.00		
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 21 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
1409	1-8.00, 1-9.00, 11-6.00 11-8.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00	1426	3-10.00, 11-6.00, 11-11.00, 16-10.01
1410	1-9.00, 1-11.00, 1-20.00, 1-20.01, 3-9.00, 4-8.00, 9-9.00, 11-9.00, 11-10.00, 11-13.00, 11-14.00, 11-15.00, 11-23.00, 12-8.00, 13-5.00	1427	11-18.00, 11-19.00
*1411	8-10.00, 8-10.01, 8-10.02, 8-10.03, 10-11.00, 11-6.00, 11-10.00	1428	11-18.00, 11-19.00
1416	1-7.00, 1-8.00, 1-11.00, 3-5.01, 8-11.01, 11-18.00, 11-19.00	1589	7-8.00
1419	4-5.00, 4-9.00, 4-11.00, 4-11.01, 4-13.00, 8-10.00, 8-10.01, 8-10.02, 8-10.03, 11-7.00, 13-6.01	1600	2-9.00
1420	1-6.00, 1-9.00, 1-11.00, 1-13.00	1601	2-10.00
1421	1-6.00, 1-7.00, 1-8.00, 1-11.00, 1-13.00	1602	2-9.00
1425	3-10.00, 11-6.00, 11-11.00, 16-10.01	1603	2-10.00
		1604	2-10.00
		1605	2-9.00
		1606	2-9.00
		1607A	2-9.00
		1607B	2-10.00
		1608A	2-9.00
		1608B	2-10.00
		1609A	2-9.00
		1609B	2-10.00

*USE Connector
**Umbilical Connector

Table 4. LM EFD Connector Index (Sheet 22 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
1610	2-10.00	1627	2-10.00
1611A	2-9.00	1628	2-10.00
1611B	2-10.00	1629	2-10.00
1612A	2-10.00	1631	2-10.00
1612B	2-10.00	1632	2-10.00
1613	2-9.00	1633	2-10.00
1614	2-9.00	1772	16-7.00
1615	2-10.00	1800	2-11.00, 3-13.00, 3-14.00, 3-20.00, 4-12.00, 4-16.00, 4-17.00, 4-18.00, 6-9.00, 7-8.00, 7-9.00, 7-10.00, 7-14.00, 8-13.00, 11-20.00, 12-5.00, 12-13.00, 17-10.01, 17-18.00
1616	2-10.00	1801	2-12.00, 3-5.01, 4-15.00, 6-5.00, 6-6.00, 7-11.00, 7-15.00, 7-16.00, 8-16.01, 8-17.00, 10-10.00, 11-7.00, 11-8.00, 11-11.00, 11-13.00, 11-14.00, 11-15.00, 17-16.00 17-18.00
1617	2-10.00		
1618	2-10.00		
1619	2-10.00		
1620	2-9.00		
1623	2-10.00		
1624	2-10.00		
1625	2-10.00		
1626	2-10.00		
*GSE Connector **Umbilical Connector			

Table 4. LM EFD Connector Index (Sheet 23 of 23)

CONNECTOR NO. (J OR P)	LOCATED ON	CONNECTOR NO. (J OR P)	LOCATED ON
1802	11-9.00, 12-5.00, 12-6.00, 12-13.00	1811	7-9.00, 7-11.00, 7-13.00, 8-12.00, 8-16.02, 9-11.00, 9-15.00, 10-8.00
1803 ***	2-7.00, 4-5.00, 4-7.00, 4-8.00, 4-9.00, 17-13.00	1812	10-5.00, 10-6.00
1804	2-11.00, 4-7.01, 4-8.00, 4-19.00, 4-20.00, 6-10.00, 6-9.00, 8-17.00, 13-6.00, 13-9.00, 13-10.00, 13-14.00, 13-15.00, 13-18.00	1813	4-11.00, 4-13.00, 9-5.00
1805	2-12.00, 4-8.00, 13-7.00, 13-9.00, 13-16.00	1816	4-7.01, 13-6.00, 13-15.00, 13-18.00, 13-19.00
1808	1-14.00, 10-6.00, 10-7.00, 10-8.00, 10-9.00, 17-7.00, 17-15.00	1817	7-7.00
1809	1-7.00, 1-8.00, 1-11.00, 8-11.01, 10-5.00, 10-6.00, 11-18.00, 11-19.00	1818	3-5.00, 3-5.01, 3-8.00, 3-9.01
1810	1-12.00, 16-6.00, 16-9.00	1819	1-13.00, 4-6.00, 4-6.01, 4-8.00, 4-10.00
		*1822	8-13.00, 10-10.00
		1825	1-6.00, 1-7.00, 1-8.00, 1-11.00, 10-5.00, 10-6.00
*GSE Connector **Umbilical Connector			

VIII. Introduction to LM Elementary Functional Diagram Vehicle Meter, Indicator and Display Index (Table 5)

1. This section is a tabulation of meters and indicators appearing on the LM Elementary Functional Diagrams.
2. The table is presented in four columns. The columns and contents of the columns are as follows:

Meter No. Column - this column contains the meter number (Subsystem Grouping & Meter Designation), which can be interpreted as follows:

3 MI
|
└─ Meter Designation
Subsystem Grouping

Panel or Location Column - This column indicates the Panel, Meter or Display is located on.

Function Column - This column contains a brief function and/or title of meter.

Location Column - This column contains a listing of elementary functional diagrams and document pages on which meter appears and/or name of display.

3. The meter, indicator and display location index coding is derived as follows:

4-17.00
└─ Functional Grouping Sheet Number
└─ Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW 267-XX004)

16-10.02
└─ Functional Grouping Sheet Number
└─ Functional Grouping Derived from Last Two (2) Digits of Basic Drawing Number (LDW 267-XX016)

12-704
└─ Functional Grouping Page Number
└─ Functional Grouping Derived from Last Two(2) Digits of Basic Drawing Number (LDW 267-XX012)

Table 5. LM EFD Meter, Indicator & Display Index (Sheet 1 of 4)

METER NO.	PANEL OR LOCATION	FUNCTION	LOCATION
3M1	IV	PROG DISPLAY	NOT SHOWN (ON DSKY)
3M2	IV	VERB DISPLAY	NOT SHOWN (ON DSKY)
3M3	IV	NOUN DISPLAY	NOT SHOWN (ON DSKY)
3M4	IV	DATA DISPLAY (R1)	NOT SHOWN (ON DSKY)
3M5	IV	DATA DISPLAY (R2)	NOT SHOWN (ON DSKY)
3M6	IV	DATA DISPLAY (R3)	NOT SHOWN (ON DSKY)
3M7	AOT	AOT COUNTER	Page 3-704.1
4M2	XIV	VOLT METER	4-17.00, 16-10.04
4M3	XIV	AMMETER	4-18.00, 16-10.04
7M1	II	CO ₂ PARTIAL PRESSURE INDICATOR	7-9.00, 16-10.00
7M2	II	CABIN/SUIT PRESSURE INDICATOR	7-9.00, 16-8.00
7M3	II	CABIN/SUIT TEMPERATURE INDICATOR	7-10.00, 16-10.01
7M4	II	OXYGEN/WATER QUANTITY INDICATOR	7-11.00, 16-8.00

Table 5. LM EFD Meter, Indicator & Display Index (Sheet 2 of 4)

METER NO.	PANEL OR LOCATION	FUNCTION	LOCATION
7M5	II	GLYCOL PRESSURE/TEMP INDICATOR	7-13.00, 16-8.00
8M1	II	PRESSURE INDICATOR SYSTEM A AND B	8-12.00, 8-12.01, 16-8.00, 16-10.02
8M2	II	TEMPERATURE INDICATOR SYSTEMS A AND B	8-13.00, 16-10.01
8M4	II	QUANTITY INDICATOR SYSTEM A AND B	8-16.02, 16-8.00, 16-10.01
9M1	I	FLIGHT DIRECTOR ATTITUDE INDICATOR (CDR)	4-21.00, 9-5.00, 9-5.01, 9-6.00, 9-8.00, 9-9.00, 9-14.00, 16-10.01
9M2	I	X POINTER (CDR) INDICATOR	9-10.00, 9-11.00, 16-8.00, 16-10.01
9M3	II	X POINTER (LMP)	9-10.00, 9-11.00, 16-8.00
9M4	I	THRUST/WEIGHT INDICATOR	9-12.00, 16-10.01
9M6	II	FLIGHT DIRECTOR ATTITUDE INDICATOR (LMP)	4-21.00, 9-5.00, 9-5.01, 9-7.00, 9-8.00, 9-9.00, 9-14.00, 16-10.01

Table 5. LM EFD Meter, Indicator & Display Index (Sheet 3 of 4)

METER NO.	PANEL OR LOCATION	FUNCTION	LOCATION
9M7	I	THRUST INDICATOR	9-15.00, 16-8.00, 16-10.01
9M9	I	ALTITUDE/RANGE INDICATOR	3-9.00, 9-12.00, 16-10.01, 16-10.02, 17-9.00, 17-17.00
9M11	I	EVENT TIMER INDICATOR, 4 PLACE DIGITAL DISPLAY	9-13.00, 9-13.01, 16-10.02
9M12	I	MISSION TIMER	9-13.00, 9-13.01, 16-10.02
10M1	I	HELIUM INDICATOR 4 PLACE DIGITAL DISPLAY	10-7.00, 16-10.02
10M3	I	PRESSURE IND (FUEL) PRESSURE IND (OXID)	10-8.00, 16-8.00, 16-10.01
10M4	I	TEMP INDICATOR (FUEL) TEMP INDICATOR (OXID)	10-8.00, 16-10.01
10M5	I	OXIDIZER QUANTITY INDICATOR, FUEL QUANTITY IND, 2 PLACE DIGITAL DISPLAYS	10-9.00, 16-10.02
12M1	DEDA (VI)	ADDRESS INDICATOR	12-7.04, 12-10.00

Table 5. LM EFD Meter, Indicator & Display Index (Sheet 4 of 4)

METER NO.	PANEL OR LOCATION	FUNCTION	LOCATION
12M2	DEDA (VI)	DATA INDICATOR	12-7.04, 12-10.00
14M1	XII	SIGNAL STRENGTH IND	13-12.00, 16-10.04
14M3	XII	ANTENNA PITCH IND	13-8.00, 16-10.04
14M4	XII	ANTENNA YAW IND	13-8.00, 16-10.04
17M1	III	SIGNAL STRENGTH METER	16-10.00, 17-7.00
18M1	III	HEATER CONTROLLED TEMPERATURE INDICATOR	8-17.00, 16-10.00, 16-10.02

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Table 6. LM EFD Indicator, and Light Index (Sheet 1 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
1DS1	I	LUNAR CONTACT LIGHT (CDR)	1-5.00, 1-11.00
1DS2	III	LUNAR CONTACT LIGHT (LMP)	1-5.00, 1-11.00
2DS1	VIII	STAGE SEQUENCE RELAY SYS A COMPONENT CAUTION LIGHT.	2-11.00, 16-4.01, 16-6.00
2DS2	VIII	STAGE SEQUENCE RELAY SYS B COMPONENT CAUTION LIGHT.	2-11.00, 16-4.01, 16-6.00
3DS1	IV	"UPLINK ACTIVITY" STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
3DS5	IV	"NO ATTITUDE" STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
3DS6	IV	"STAND BY" STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
3DS7	IV	"KEY REL" STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
3DS8	IV	"TEMP" CAUTION LIGHT (YELLOW)	NOT SHOWN (ON DSKY)
3DS9	IV	"GIMBAL LOCK" CAUTION LIGHT (YELLOW)	NOT SHOWN (ON DSKY)
3DS10	IV	"PROGRAM" CAUTION LIGHT (YELLOW)	NOT SHOWN (ON DSKY)

Table 6. LM EFD Indicator, and Light Index (Sheet 2 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
3DS11	IV	RESTART CAUTION LIGHT (YELLOW)	NOT SHOWN (ON DSKY)
3DS12	IV	TRACKER CAUTION LIGHT (YELLOW)	NOT SHOWN (ON DSKY)
3DS14	IV	OPERATOR ERROR STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
3DS15	IV	COMPUTER ACTIVITY STATUS LIGHT (WHITE)	NOT SHOWN (ON DSKY)
4DS1	XIV	BATTERY FAULT COMPONENT CAUTION	4-15.00, 16-401, 16-6.00
4DS2	XIV	DC BUSS FAULT COMPONENT CAUTION LIGHT	4-15.00, 16-4.01
6DS1	I	SPARE	6-7.00, 16-4.01
6DS2	I	ASCENT PROPULSION LOW PRESS WARNING LIGHT (RED)	6-7.00, 10-12.00, 16-4.01
6DS3	I	HI/LOW HELIUM REG OUTLET PRESS WARNING LIGHT (RED)	6-7.00, 10-10.00, 16-4.01
6DS4	I	DESCENT PROPELLANT LOW QUANTITY WARNING LIGHT (RED)	6-7.00, 10-10.00, 16-4.01
6DS5	I	SPARE	6-7.00, 16-4.01
6DS6	I	CONTROL ELECTRONICS SECTION AC VOLTAGE FAILURE WARNING LIGHT (RED)	6-7.00, 11-20.00, 16-4.01

Table 6. LM EFD Indicator, and Light Index (Sheet 3 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
6DS7	I	CONTROL ELECTRONICS SECTION DC VOLTAGE FAILURE WARNING LIGHT (RED)	6-7.00, 11-21.00, 16-4.01
6DS8	I	AGS FAILURE WARNING LIGHT (RED)	6-7.00, 12-13.00, 16-4.01
6DS9	I	LGC FAILURE WARNING LIGHT (RED)	3-14.00, 6-7.00, 16-4.01
6DS10	I	INERTIAL SUBSYSTEM FAILURE WARNING LIGHT (RED)	3-14.00, 6-7.00, 16-4.01
6DS11	I	RCS TCA WARNING LIGHT (RED)	6-7.01, 8-16.00, 16-4.01
6DS12	I	RCS "A" REGULATOR FAILURE WARNING LIGHT (RED)	6-7.01, 8-16.00, 16-4.01
6DS13	I	RCS "B" REGULATOR FAILURE WARNING LIGHT (RED)	6-7.01, 8-16.00, 16-4.01
6DS14	I	DC BUS VOLTAGE FAILURE WARNING	4-16.00, 6-7.01, 16-4.01
6DS15	I	SPARE	6-7.01, 16-4.01
6DS16	I	CABIN LOW PRESS WARNING LIGHT (RED)	6-7.01, 7-16.00, 16-4.01
6DS17	I	SUIT/FAN LOW PRESS. WARNING LIGHT (RED)	6-7.01, 7-9.00, 16-4.01

Table 6. LM EFD Indicator, and Light Index (Sheet 4 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
6DS18	I	SPARE	6-7.01, 16-4.01
6DS19	I	SPARE	6-7.01, 16-4.01
6DS20	I	SPARE	6-7.01, 16-4.01
6DS21	II	HIGH HE REG OUTLET PRESS CAUTION LIGHT (YELLOW)	6-8.00, 10-12.00, 16-4.01
6DS22	II	ASCENT PROPELLANT LOW QUANTITY CAUTION LIGHT (YELLOW)	6-8.00, 10-12.00, 16-4.01
6DS23	II	AUTOMATIC GIMBAL FAILURE CAUTION LIGHT (YELLOW)	1-19.00, 6-8.00, 16-4.01
6DS24	II	SPARE	6-8.00, 16-4.01
6DS25	II	ANUN PWR FAILURE CAUTION LIGHT (YELLOW)	3-14.00, 6-8.00, 16-4.01
6DS26	II	INVERTER FAILURE CAUTION LIGHT (YELLOW)	4-16.00, 6-8.00, 16-4.01
6DS27	II	BATTERY FAILURE CAUTION LIGHT (YELLOW)	4-15.00, 6-8.00, 16-4.01
6DS28	II	RENDEZVOUS RADAR DATA FAILURE CAUTION LIGHT (YELLOW)	6-8.00, 16-4.01, 17-18.00

Table 6. LM EFD Indicator, and Light Index (Sheet 5 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
6DS29	II	NOT USED	6-8.00, 16-4.01, 17-18.00
6DS30	II	PRE AMPS POWER FAILURE CAUTION LIGHT (YELLOW)	6-8.00, 11-20.00, 16-4.01
6DS31	II	EXPLOSIVE DEVICES SUBSYSTEM RELAY FAILURES CAUTION LIGHT	2-11.00, 6-8.01, 16-4.01
6DS32	II	RCS FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 8-16.02, 16-4.01
6DS33	II	HEATER FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 8-16.01, 16-4.01
6DS34	II	C/WEA REG POWER FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 16-4.01
6DS35	II	SPARE	6-8.01, 16-4.01
6DS36	II	ECS FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 7-16.00, 16-4.01
6DS37	II	OXYGEN QUANTITY CAUTION LIGHT (YELLOW)	6-8.01, 7-12.00, 16-4.01
6DS38	II	GLYCOL FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 7-12.00, 16-4.01
*6DS39	II	WATER QUANTITY CAUTION LIGHT (YELLOW)	6-8.01, 7-12.00, 16-4.01
*NOT USED FOR LM-9			

Table 6. LM EFD Indicator, and Light Index (Sheet 6 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
6DS40	II	S-BD RCVR FAILURE CAUTION LIGHT (YELLOW)	6-8.01, 13-9.00, 16-4.01
7DS1	II	SUIT CIRCUIT FAN COMPONENT CAUTION LIGHT (YELLOW)	6-8.00, 7-6.00, 16-4.01
7DS3	II	GLYCOL PUMP COMPONENT CAUTION LIGHT (YELLOW)	6-8.00, 7-7.00, 16-4.01
7DS6	II	CO ₂ PARTIAL PRESSURE COMPONENT CAUTION LIGHT (YELLOW)	6-8.00, 7-9.00, 16-4.01
7DS7	II	WATER SEPARATION COMPONENT CAUTION LIGHT (YELLOW)	6-8.00, 7-9.00, 16-4.01
12DS1	DEDA (VI)	OPERATOR ERROR STATUS LIGHT (WHITE)	12-10.00
16DS23	Port Side	DOCKING LIGHTS PORT (RED)	16-7.00
16DS24	Stbd Side	DOCKING LIGHTS STBD (GRN)	16-7.00
16DS25	Aft	DOCKING LIGHTS AFT (WHITE)	16-7.00

Table 6. LM EFD Indicator, and Light Index (Sheet 7 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
16DS26	(Port Side) Fwd	DOCKING LIGHTS FWD (LEFT SIDE) (YELLOW)	16-7.00
16DS27	(Stbd Side) Fwd	DOCKING LIGHTS FWD (RIGHT SIDE) (WHITE)	16-7.00
16DS36	X	FLOOD LIGHTS PNL	16-5.00
16DS37	X	FLOOD LIGHT PNL	16-5.00
16DS38	X	FLOOD LIGHT PNL	16-5.00
16DS39	X	FLOOD LIGHT PNL	16-5.00
16DS40	X	FLOOD LIGHT PNL	16-5.00
16DS41	X	FLOOD LIGHT PNL	16-5.00
16DS55	XVI & XIV	FLOOD LIGHT PNL	16-5.00
16DS56	XVI & XIV	FLOOD LIGHT PNL	16-5.00
16DS57	XVI & XIV	FLOOD LIGHT PNL	16-5.00

Table 6. LM EFD Indicator, and Light Index (Sheet 8 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
16DS58	XVI & XIV	FLOOD LIGHT PNL	16-5.00
16DS59	XVI & XIV	FLOOD LIGHT PNL	16-5.00
16DS60	XVI & XIV	FLOOD LIGHT PNL	16-5.00
16DS61	XIV & XIV	FLOOD LIGHT PNL	16-5.00
16DS62	XIV & XIV	FLOOD LIGHT PNL	16-5.00
16DS63	OVHD. Fwd (Port Side)	FLOOD LTS CDR MAIN CONSOLE	16-5.00
16DS64	OVHD Fwd (Port Side)	FLOOD LIGHTS PNL	16-5.00
16DS65	OVHD Fwd (Stbd Side)	FLOOD LIGHTS PNL	16-5.00
16DS66	OVHD Fwd (Stbd Side)	FLOOD LIGHTS PNL	16-5.00

Table 6. LM EFD Indicator, and Light Index (Sheet 9 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
16DS67	X	FLOOD LIGHTS PNL	16-5.00
16DS68	X	FLOOD LIGHTS PNL	16-5.00
16DS69	X	FLOOD LIGHTS PNL	16-5.00
16DS70	X	FLOOD LIGHTS PNL	16-5.00
16DS71	X	FLOOD LIGHTS PNL	16-5.00
16DS72	X	FLOOD LIGHTS PNL	16-5.00
16DS73	X	FLOOD LIGHTS PNL	16-5.00
16DS74	X	FLOOD LIGHTS PNL	16-5.00
16DS75	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS76	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS77	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS78	XVI & XIV	FLOOD LIGHTS PNL	16-5.00

Table 6. LM EFD Indicator, and Light Index (Sheet 10 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
16DS79	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS80	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS81	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS82	XVI & XIV	FLOOD LIGHTS PNL	16-5.00
16DS83	X	FLOOD LIGHTS PNL	16-5.00
16DS86	X	FLOOD LIGHTS PNL	16-5.00
16DS87	X	FLOOD LIGHTS PNL	16-5.00
16DS88	X	FLOOD LIGHTS PNL	16-5.00
16DS90	I	10M3 PROP PRESS INDICATOR (RED) POWER FAILURE LIGHT	16-8.00
16DS91	I	9M2 CROSS POINTERS INDICATOR (RED) (POWER FAILURE LIGHT)	16-8.00
16DS92	I	9M7 THRUST INDICATOR (RED) (POWER FAILURE LIGHT)	16-8.00

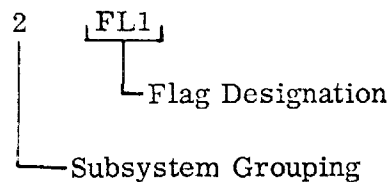
Table 6. LM EFD Indicator, and Light Index (Sheet 11 of 11)

INDICATOR LIGHT NO.	PANEL OR LOCATION	FUNCTION	LIGHT LOCATED ON
16DS93	II	7M2 SUIT & CABIN PRESS INDICATOR (RED) (POWER FAILURE LIGHT)	16-8.00
16DS94	II	7M4 O ₂ /H ₂ O INDICATOR (RED) (POWER FAILURE LIGHT)	16-8.00
16DS95	II	7M5 GLYCOL TEMP & PRESS INDICATOR POWER FAILURE LIGHT (RED)	16-8.00
16DS96	II	8M1 RCS PRESS INDICATOR (RED) (POWER FAILURE LIGHT)	16-8.00
16DS97	II	CROSS POINTER. INDICATOR 9M3 (RED) (POWER FAILURE LIGHT)	16-8.00
16DS98	II	8M4 RCS QUANTITY IND POWER FAILURE LIGHT (RED)	16-8.00
16DS104	-	PORTABLE UTILITY LIGHT	16-5.00
16DS105	-	PORTABLE UTILITY LIGHT	16-5.00
16A3	-	TRACKING LIGHT FLASH HEAD	16-7.00
17DS1	III	NO TRACK LIGHT COMPONENT CAUTION LIGHT (YELLOW)	16-4.01, 16-6.00, 17-18.00

X. Introduction to LM Elementary Functional Diagram Vehicle Flag Index (Table 7)

1. This section is a tabulation of flags appearing on the LM Elementary Functional Diagrams.
2. The table is presented in four columns. The columns and contents of the columns are as follows:

Flag No. Column - This column contains the flag number (Subsystem Grouping & Flag Designation), which can be interpreted as follows:



Panel Column - This column indicates Panel, Flag appears on.

Function Column - This column contains a brief function and/or title of Flag.

Flag Located on Column - This column contains a listing of Elementary Functional Diagrams on which Flags appear.

3. The flag location index coding is derived as follows:

2-12.00
└─ Functional Grouping Sheet Number
└─ Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW 267-XX002)

16-10.03
└─ Functional Grouping Sheet Number
└─ Functional Grouping Derived from Last Two(2) Digits of Basic Drawing Number (LDW 267-XX016)

Table 7. LM EFD Flag Index (Sheet 1 of 3)

FLAG NO.	PANEL	FUNCTION	FLAGS LOCATED ON
2FL1	VIII	LANDING GEAR STATUS 2 POSITION FLAG	2-12.00, 16-10.03
4FL1	XIV	DESCENT BATTERY #1 STATUS 3 POSITION FLAG	4-19.00, 16-10.04
4FL2	XIV	DESCENT BATTERY #2 STATUS 3 POSITION FLAG	4-19.00, 16-10.04
4FL3	XIV	DESCENT BATTERY #3 STATUS 3 POSITION FLAG	4-19.00, 16-10.04
4FL4	XIV	DESCENT BATTERY #4 STATUS 3 POSITION FLAG	4-19.00, 16-10.04
4FL5	XIV	ASCENT BATTERY #5 NORMAL FEED STATUS 2 POSITION FLAG	4-20.00, 16-10.04
4FL6	XIV	ASCENT BATTERY #6 NORMAL FEED STATUS 2 POSITION FLAG	4-20.00, 16-10.04
4FL7	XIV	ASCENT BATTERY #5 BACK UP FEED STATUS 2 POSITION FLAG	4-20.00, 16-10.04
4FL8	XIV	ASCENT BATTERY #6 BACK UP FEED STATUS 2 POSITION FLAG	4-20.00, 16-10.04
4FL9	XIV	DESCENT BATTERY STATUS 2 POSITION FLAG	4-19.00, 16-10.04
8FL5	II	MAIN SHUT OFF VALVE STATUS, SYSTEM A, 2 POSITION FLAG	8-14.01, 16-10.01
8FL6	II	ASCENT FUEL STATUS, SYSTEM A, 2 POSITION FLAG	8-14.00, 16-10.01

Table 7. LM EFD Flag Index (Sheet 2 of 3)

FLAG NO.	PANEL	FUNCTION	FLAGS LOCATED ON
8FL7	II	MAIN SHUT OFF VALVE STATUS, SYSTEM B, 2 POSITION FLAG	8-14.00, 16-10.01
8FL8	II	ASCENT FUEL STATUS, SYSTEM B, 2 POSITION FLAG	8-14.00, 16-10.01
8FL9	II	THRUSTER PAIR STATUS, QUAD. #1, SYSTEM A, 3 POSITION FLAG	8-15.00, 16-10.01
8FL10	II	THRUSTER PAIR STATUS, QUAD. #2, SYSTEM A, 3 POSITION FLAG	8-15.02, 16-10.01
8FL11	II	THRUSTER PAIR STATUS, QUAD. #1, SYSTEM B, 3 POSITION FLAG	8-15.01, 16-10.01
8FL12	II	THRUSTER PAIR STATUS, QUAD. #2, SYSTEM B, 3 POSITION FLAG	8-15.03, 16-10.01
8FL13	II	THRUSTER PAIR STATUS, QUAD. #3, SYSTEM A, 3 POSITION FLAG	8-15.04, 16-10.01
8FL14	II	THRUSTER PAIR STATUS, QUAD. #4, SYSTEM A, 3 POSITION FLAG	8-15.06, 16-10.01
8FL15	II	THRUSTER PAIR STATUS, QUAD. #3, SYSTEM B, 3 POSITION FLAG	8-15.05, 16-10.01
8FL16	II	THRUSTER PAIR STATUS, QUAD. #4, SYSTEM B, 3 POSITION FLAG	8-15.07, 16-10.01

Table 7. LM EFD Flag Index (Sheet 3 of 3)

FLAG NO.	PANEL	FUNCTION	FLAGS LOCATED ON
8FL17	II	CROSS FEED STATUS, 2 POSITION FLAG	8-14.00, 16-10.01
8FL18	II	ASCENT OXIDIZER STATUS, SYSTEM A, 2 POSITION FLAG	8-14.00, 16-10.01
8FL19	II	ASCENT OXIDIZER STATUS, SYSTEM B, 2 POSITION FLAG	8-14.00, 16-10.01
10FL1	I	ASCENT HELIUM REGULATOR STATUS #1, 2 POSITION FLAG	10-6.00, 16-10.01
10FL2	I	ASCENT HELIUM REGULATOR STATUS #2, 2 POSITION FLAG	10-6.00, 16-10.01
10FL3	I	DESCENT HELIUM REGULATOR STATUS #1, 2 POSITION STATUS FLAG	10-6.00, 16-10.01
10FL4	I	DESCENT HELIUM REGULATOR STATUS #2, 2 POSITION STATUS FLAG	10-6.00, 16-10.01
10FL5	VIII	FUEL VENT STATUS, 2 POSITION STATUS FLAG	10-6.00, 16-10.03
10FL6	VIII	OXIDIZER VENT STATUS, 2 POSITION STATUS FLAG	10-6.00, 16-10.03
13FL1	XII	TAPE STATUS, 2 POSITION FLAG	13-12.00, 16-10.04

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Table 8. LM EFD Control Index (Sheet 1 of 4)

CONTROL NO.	FUNCTION	CONTROL LOCATED ON
13R10	VHF A SQUELCH CONTROL THUMBWHEEL	13-18.00
15R15	VHF B SQUELCH CONTROL THUMBWHEEL	13-18.00
14B1	YAW SLEW CONTROL (CONTINUOUS ROTARY CONTROL WITH POSITIVE STOP)	13-8.00
14B2	PITCH SLEW CONTROL (CONTINUOUS ROTARY CONTROL WITH POSITIVE STOP)	13-8.00
15AR7 (15BR7)	ICS VOLUME CONTROL THUMBWHEEL	13-11.00
15AR8 (15BR8)	VOX SENSITIVITY THUMBWHEEL	13-11.00
15AR12 (15BR12)	VHF A VOLUME CONTROL THUMBWHEEL	13-11.00
15AR13 (15BR13)	VHF B VOLUME CONTROL THUMBWHEEL	13-11.00
15AR14 (15BR14)	S BAND VOLUME CONTROL THUMBWHEEL	13-11.00

Table 8. LM EFD Control Index (Sheet 2 of 4)

CONTROL NO.	FUNCTION	CONTROL LOCATED ON
15AR15 (15BR15)	MASTER VOLUME CONTROL THUMBWHEEL	13-12.00
15AR16 (15BR16) 15AR17 (15BR17)	CDR AND LMP AUDIO CONTROL	13-12.00
16R1	FLOODLIGHTING CONTROL OVHD/FWD CONTINUOUS	16-4.01, 16-6.00, 16-10.00, 16-10.02
16R3	INTERNAL LIGHTING CONTROL CONTINUOUS ROTARY	16-10.00
16R2	ANUN/NUM CONTROL	16-4.01, 16-6.00, 16-10.00, 16-10.02
16R4	FLOOD LIGHTING CONTROL OVHD/FWD CONTINUOUS ROTARY	16-5.00
16R5, 16R6, 16R7	UTILITY LIGHT	16-5.00
1A1	ATTITUDE CONTROLLER (CDR)	4-21.00, 11-7.00, 11-12.00 11-13.00, 11-14.00, 11-15.00 11-18.00, 11-19.00, 13-11.00

Table 8. LM EFD Control Index (Sheet 3 of 4)

CONTROL NO.	FUNCTION	CONTROL LOCATED ON
1A12	ATTITUDE CONTROLLER (LMP)	11-12.00, 11-13.00, 11-14.00, 11-15.00, 11-18.00, 11-19.00, 13-11.00
1A3 (1X1)	THRUST/TRANSLATION CONTROLLER (CDR)	1-14.00, 4-21.00, 11-11.00
1A11 (1X2)	THRUST/TRANSLATION CONTROLLER (LMP)	1-14.00, 4-21.00, 11-11.00
1H1	THROTTLE/JETS CONTROL SELECT LEVER (LMP) 2 POSITION	1-14.00
1H2	THROTTLE/JETS CONTROL SELECT LEVER (SE) 2 POSITION	1-14.00
1H3	THROTTLE FRICTION ROTARY CONTROLLER (CDR)	NOT SHOWN MECHANICAL
1H4	THROTTLE FRICTION ROTARY CONTROLLER (LMP)	NOT SHOWN MECHANICAL
3H1	RETICLE CONTROL CONTINUOUS ROTARY	AOT
3H2	AZIMUTH CONTROL 6 POSITION ROTARY	AOT
3H3	EYEPiece ADJUST LEVER	AOT

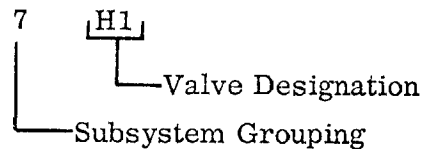
Table 8. LM EFD Control Index (Sheet 4 of 4)

CONTROL NO.	FUNCTION	CONTROL LOCATED ON
3H4	EYEPiece LOCK	AOT
3R1	RETICLE CONTROL CONTINUOUS ROTARY	AOT
9R1	ALTITUDE SET CONTINUOUS ROTARY	9-5.00

XII. Introduction to LM Elementary Functional Diagram Vehicle Valve Index (Table 9)

1. This section is a tabulation of valves appearing on the LM Elementary Functional Diagrams.
2. The table is presented in three columns. The columns and contents of the column are as follows:

Valve No. Column - This column contains the valve number (Subsystem Grouping and Valve Designation), which can be interpreted as follows:



Function Column - This column contains a brief function and/or title of valve.

Valve Located on Column - This column contains a listing of Elementary Functional Diagrams on which valve appears.

3. The valve location index coding is derived as follows:

7-4.03
└── Functional Grouping Sheet Number
└── Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW 267-XX007)

7-704.1
└── Functional Grouping Page Number
└── Functional Grouping Derived from Last Digit of Basic Drawing Number (LDW 267-XX007)

Table 9. LM EFD Valve Index (Sheet 1 of 3)

VALVE NO.	FUNCTION	VALVE LOCATED ON
7H1	ATMOSPHERE REVITALIZATION SECTION PRESSURE REGULATOR "A" 4 POSITION VALVE	7-4.03
7H2	ATMOSPHERE REVITALIZATION SECTION PRESSURE REGULATOR "B" 4 POSITION VALVE	7-4.03
7H3	CABIN REPRESSURIZATION VALVE 3 POSITION	7-4.03
7H4	PLSS FILL VALVE 2 POSITION	7-4.03
7H5	#2 ASCENT OXYGEN VALVE	7-4.03
7H6	SUIT ISOL VALVE (CDR) 2 POSITION	7-4.03
7H7	SUIT ISOL VALVE (LMP) 2 POSITION	7-4.03
7H8	SUIT GAS DIVERTER VALVE 2 POSITION "T" HANDLE	7-4.03
7H9	SUIT CIRCUIT RELIEF VALVE 3 POSITION	7-4.03
7H10	WATER SEPARATOR SELECT VALVE 2 POSITION "T" HANDLE	7-4.03

Table 9. LM EFD Valve Index (Sheet 2 of 3)

VALVE NO.	FUNCTION	VALVE LOCATED ON
7H11	CABIN RELIEF AND DUMP VALVE 3 POSITION BAR LEVER	7-704.5
7H13	ASCENT DRINK WATER VALVE 2 POSITION	7-4.01
7H14	WATER TANK SELECT VALVE 3 POSITION FOLD OUT HAND CRANK	7-4.01
7H15	DESCENT OXYGEN VALVE 2 POSITION	7-4.03
7H16	PRIMARY EVAP FLOW VALVE 2 POSITION	7-4.01
7H17	CABIN GAS RETURN VALVE 3 POSITION	7-4.03
7H18	SECONDARY EVAP FLOW VALVE 2 POSITION	7-4.01
7H19	CO ₂ CANISTER SELECT VALVE 2 POSITION BAR LEVER	7-4.03
7H20	CABIN RELIEF AND 3 POSITION BAR LEVER	7-704.5
7H21	#1 ASCENT OXYGEN VALVE, 2 POSITION	7-4.03
7H22	SUIT TEMPERATURE CONTROL VALVE, MODULATING VALVE	7-4.02

Table 9. LM EFD Valve Index (Sheet 3 of 3)

VALVE NO.	FUNCTION	VALVE LOCATED ON
7H23	PRIMARY CANISTER VENT BUTTON	7-4.03
7H24	SECONDARY CANISTER VENT BUTTON, 2 MOMENTARY PUSH BUTTONS	7-4.03
7H25	PRIMARY EVAP FLOW #1, 2 POSITION VALVE	7-4.01
7H26	DESCENT DRINK/PLSS FILL WATER VALVE 2 POSITION	7-4.01
7H27	LIQUID GARMENT COOLING VALVE	7-4.02

XIII.

1. This section is a tabulation of EL Patches & Strips appearing on the LM Elementary Functional Diagrams.

El Patch & Strip No. Column - This column contains the El Patch & Strip Number (Sub-system Grouping & El Patch & Strip Designation), which can be interpreted as follows:

16 DS1
 └─ El Patch & Strip Designation
└─ Subsystem Grouping

Panel Column - This column indicates panel El Patches & Strips appear on.

Description Column - This column describes whether it is a El Patch or Strip.

Located on Column - This column contains a listing of Elementary Functional Diagrams on which El Patches & Strips appear.

3. The EL Patch & Strip location index coding is derived as follows:

16-10.01 Functional Grouping Sheet Number

Functional Grouping Derived from Last Two(2) Digits of Basic Drawing Number (LDW 267-XX016)

Table 10. LM EFD El Patch & Strip Index (Sheet 1 of 4)

EL PATCH & STRIP NO.	PANEL	DESCRIPTION	LOCATED ON
16DS1	I	EL PATCH	16-10.01
16DS2	I	EL PATCH	16-10.01
16DS3	I	EL PATCH	16-10.01
16DS4	I	EL PATCH	16-10.01
16DS5	I	EL PATCH	16-10.01
16DS6	II	EL PATCH	16-10.01
16DS7	II	EL PATCH	16-10.01
16DS8	II	EL PATCH	16-10.01
16DS9	II	EL PATCH	16-10.01
16DS10	V	EL PATCH	16-10.00
16DS12	VIII	EL PATCH	16-10.03
16DS13	VIII	EL PATCH	16-10.03

Table 10. LM EFD El Patch & Strip Index (Sheet 2 of 4)

EL PATCH & STRIP NO.	PANEL	DESCRIPTION	LOCATED ON
16DS14	VI	EL PATCH	16-10.03
16DS16	III	EL PATCH	16-10.00
16DS17	III	EL PATCH	16-10.00
16DS18	III	EL PATCH	16-10.00
16DS19	XII	EL PATCH	16-10.04
16DS20	XII	EL PATCH	16-10.04
16DS21	XII	EL PATCH	16-10.04
16DS28	XI	EL STRIP NO. 1	16-10.03
16DS29	XI	EL STRIP NO. 2	16-10.04
16DS30	XI	EL STRIP NO. 3	16-10.04
16DS31	XI	EL STRIP NO. 4	16-10.04
16DS32	XI	EL STRIP NO. 5	16-10.04

Table 10. LM EFD El Patch & Strip Index (Sheet 3 of 4)

EL PATCH & STRIP NO.	PANEL	DESCRIPTION	LOCATED ON
16DS33	XI	EL STRIP NO. 6	16-10.04
16DS34	XI	EL STRIP NO. 7	16-10.04
16DS35	XI	EL STRIP NO. 8	16-10.04
16DS44	XIV & XVI	EL STRIP NO. 1	16-10.04
16DS45	XIV & XVI	EL STRIP NO. 2	16-10.04
16DS46	XIV & XVI	EL STRIP NO. 3	16-10.04
16DS47	XIV & XVI	EL STRIP NO. 4	16-10.04
16DS48	XIV & XVI	EL STRIP NO. 5	16-10.04
16DS49	XIV & XVI	EL STRIP NO. 6	16-10.04
16DS50	XIV & XVI	EL STRIP NO. 7	16-10.04
16DS51	XIV & XVI	EL STRIP NO. 8	16-10.04
16DS52	XIV & XVI	EL PATCH	16-10.04

Table 10. LM EFD El Patch & Strip Index (Sheet 4 of 4)

EL PATCH & STRIP NO.	PANEL	DESCRIPTION	LOCATED ON
16DS53	XIV & XVI	EL PATCH	16-10.04
16DS54	XIV & XVI	EL PATCH	16-10.04
16DS84	XI	EL STRIP NO. 9	16-10.03
16DS85	XI	EL STRIP NO. 10	16-10.03
16DS99	XII	EL PATCH	16-10.04
16DS100	XIV & XVI	EL PATCH	16-10.04
16DS101	VIII	EL PATCH	16-10.03
16DS102	IVA	EL PATCH	16-10.01
16DS103	IVB	EL PATCH	16-10.01

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 1)

ENGINE/THRUST CONTROL, CONTROL ELECTRONIC SECTION

(REF LDW 267-57001 D)

1. Applicable Documents

ITEM NAME	DWG. NO.	REV.	E. O. 's
Engine/Thrust Control (CES)	LDW300-56003	G	H1, H2, H3, H4, H5

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	1-701
b) Applicable Documents, Table of Contents, and Revisions	1-702 & 1-702.1
c) Cabin Location of Engine/Thrust Controls and Indicators	1-703
d) Engine/Thrust Controls and Indicators Layout	1-704 & 1-704.1
e) Engine/Thrust Controls and Indicators (Functional Grouping I)	1-705 thru 1-705.7
f) CES Engine/Thrust Block Diagram	LDW267-57001 SH 4.00C
g) CES Engine Thrust Control Elementary Schematic	LDW267-57001 SH 5.00D
h) CES Ascent Engine Start and Stop Control	LDW267-57001 SH 5.01D
i) CES Descent Engine Start and Stop Control	LDW267-57001 SH 5.02D
j) CES Descent Engine Arm and Control	LDW267-57001 SH 6.00B
k) CES Descent Engine Abort Control	LDW267-57001 SH 7.00B
l) CES Ascent and Descent Engine Manual Start Control	LDW267-57001 SH 8.00B
m) CES Ascent and Descent Engine Manual Start and Stop Control	LDW267-57001 SH 9.00D
n) CES Ascent Engine Auto Start and Stop Control	LDW267-57001 SH 10.00B
o) CES Ascent/Descent Engine Start and Stop Control	LDW267-57001 SH 11.00D
p) CES Ascent Engine Start Circuit	LDW267-57001 SH 12.00C

2. Table of Contents (Continued)

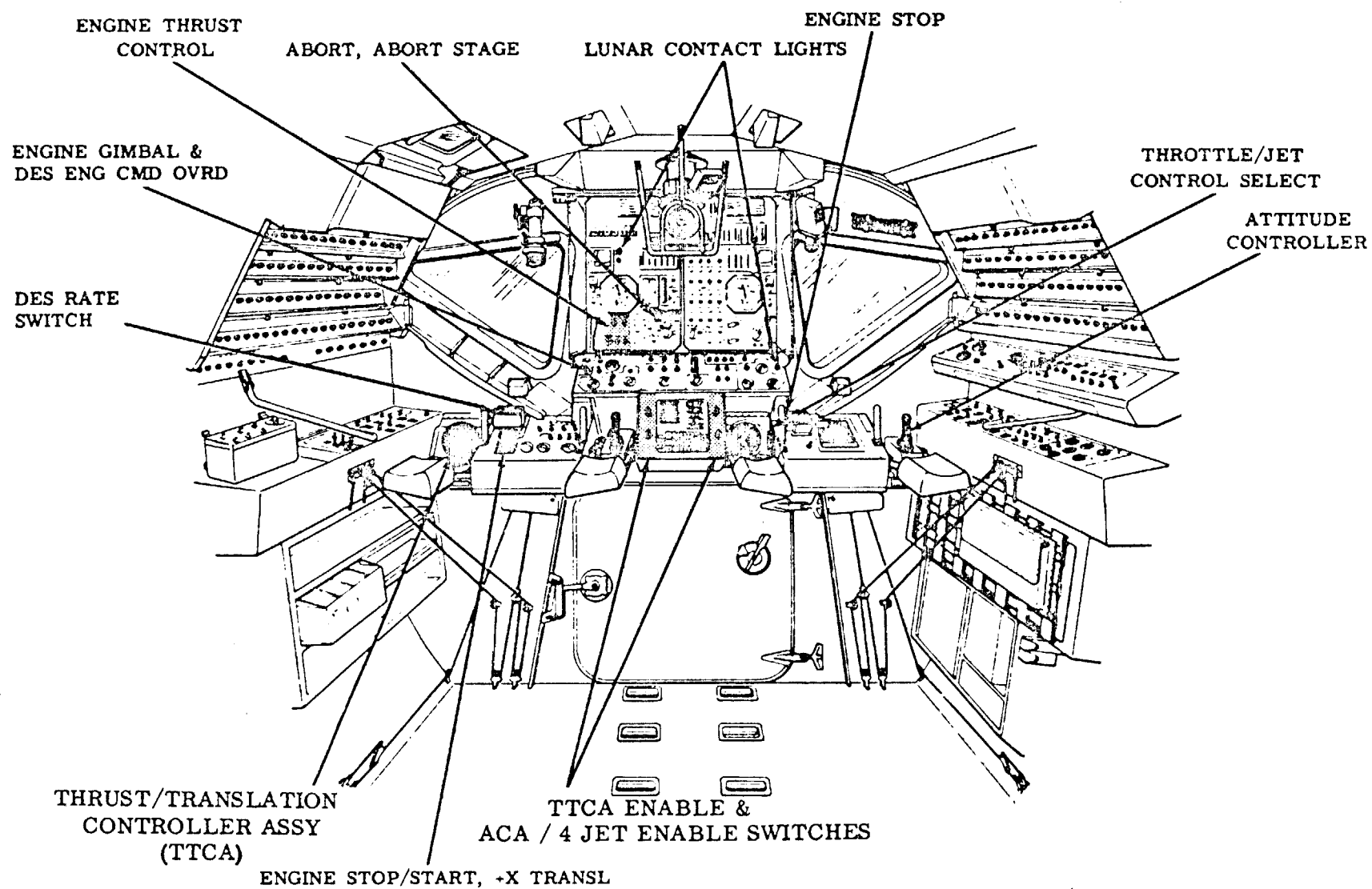
PAGE NO./SHEET NO.

ITEM NAME

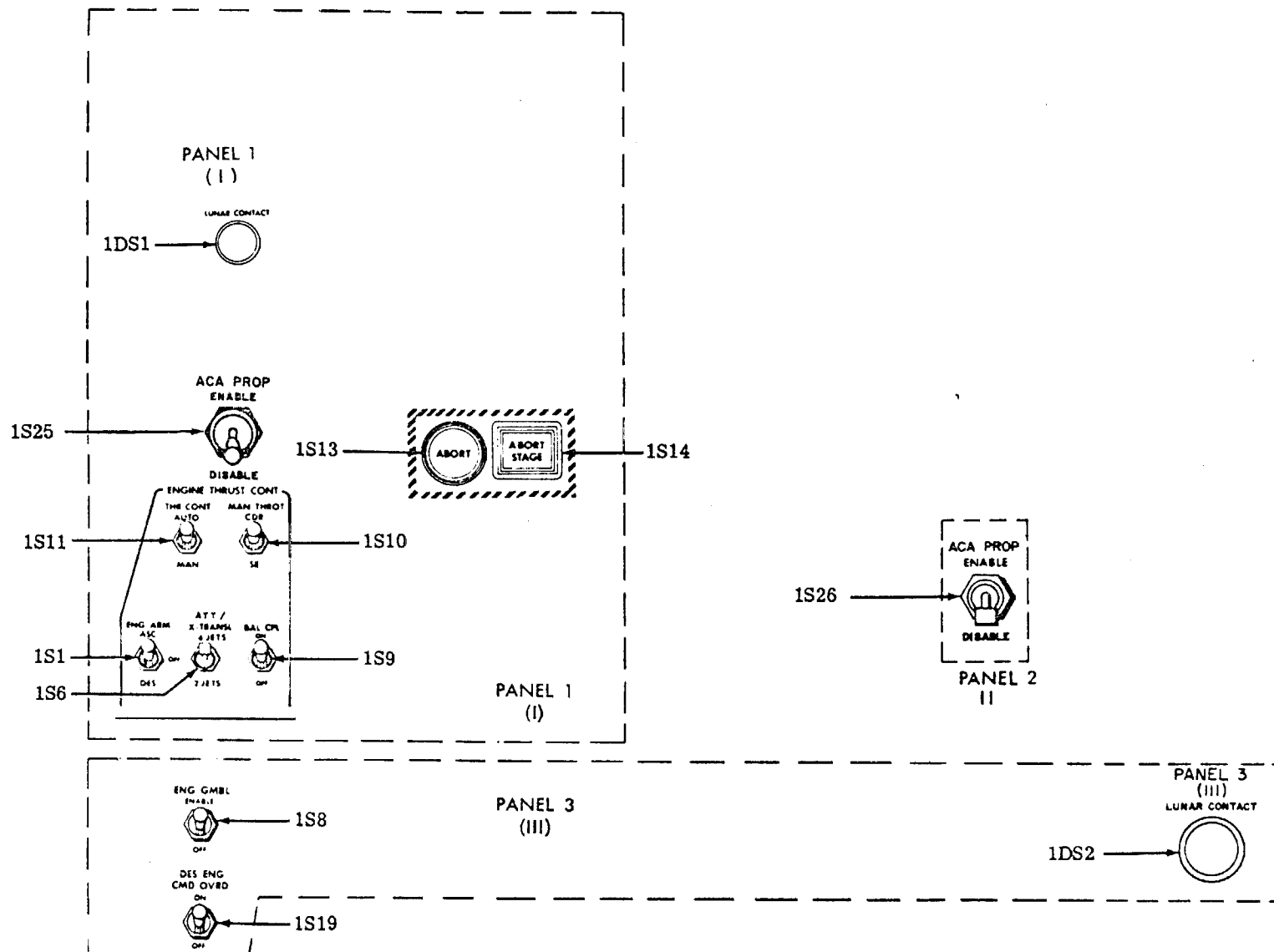
q) CES Descent Engine Start Circuit	LDW267-57001 SH 13.00D
r) CES Descent Engine Thrust Manual Throttle Control	LDW267-57001 SH 14.00B
s) CES Engine Thrust Power Monitor Throttle Control Roll and Trim Failure	LDW267-57001 SH 15.00B
t) CES Throttle Control	LDW267-57001 SH 16.00B
u) CES Engine Thrust Gimbal Control Roll Trim Drive	LDW267-57001 SH 17.00B
v) CES Engine Thrust Gimbal Control Pitch Trim Drive	LDW267-57001 SH 18.00B
w) CES Engine Thrust Pitch and Roll Trim Fail	LDW267-57001 SH 19.00A
x) CES OI Engine Thrust	LDW267-57001 SH 20.00B
y) CES OI Engine Thrust	LDW267-57001 SH 20.01B

3. REVISIONS

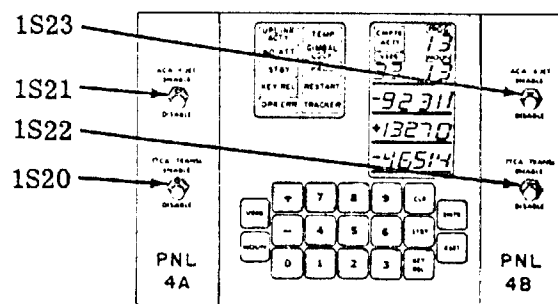
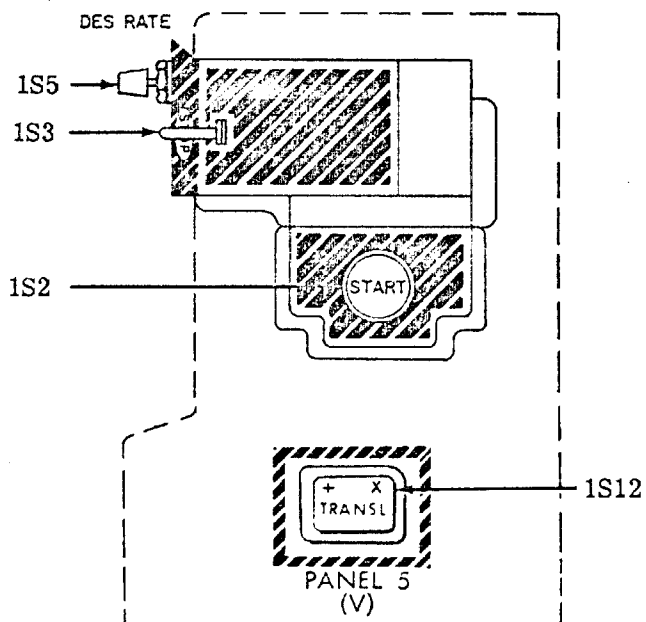
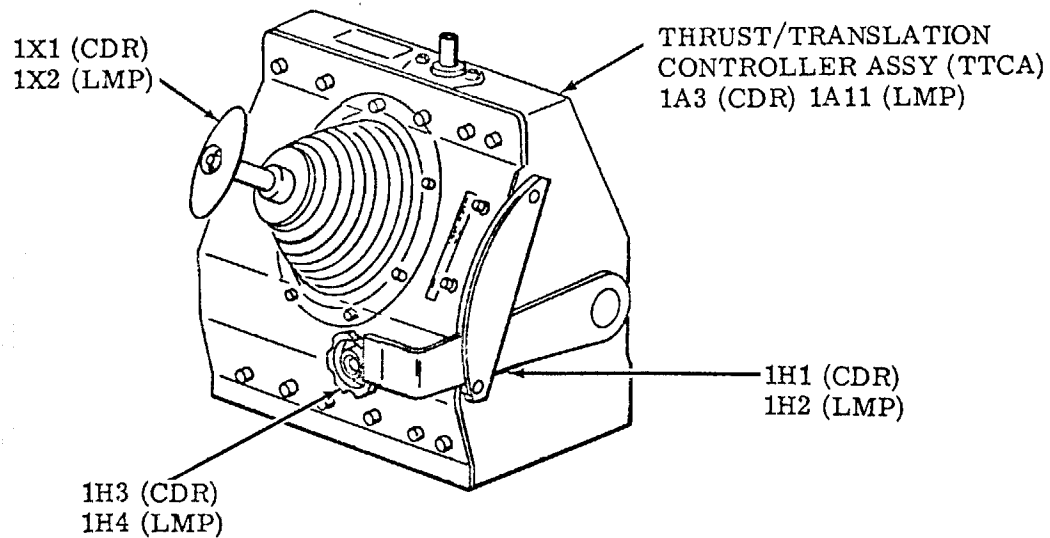
REV	PAGE NO. AND/OR LDW267-57001, SHEET NO.	LCD	DESCRIPTION
A	10.00	3808	BY-PASS ENGINE STOP SWITCHES (CDR & LMP) WITH ABORT STAGE SWITCH



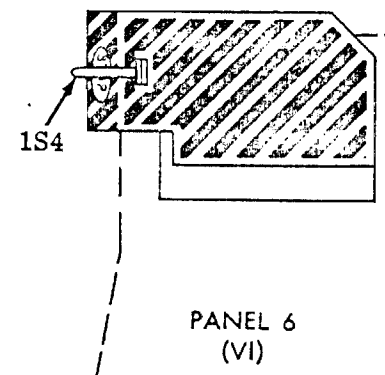
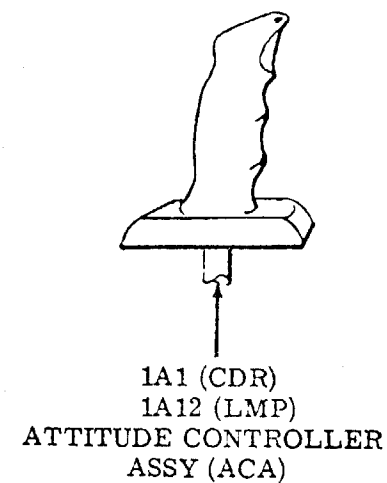
Cabin Location of Engine/Thrust Controls and Indicators



Engine/Thrust Controls and Indicators Layout



PANEL 4
(IV)



Engine/Thrust Controls and Indicators Layout

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

Code	Control/Indicator	Function
1S1	ENGINE ARM SWITCH 3-POSITION TOGGLE LOCK-LOCK-LOCK	This three-position toggle (ASC-OFF-DES) provides arming signals to the engines. The ASC position provides an arming signal enabling firing of the ascent engine while simultaneously signalling the LGC that the engine is armed. In the OFF position the arming signals are removed from the engine valves and the LGC. In the DES position the descent engine is armed and the LGC is notified that the engine is armed. However, regardless of the position of this switch, the appropriate engine will be armed if 1S13 or 1S14 is actuated.
1S2	ENGINE START SWITCH GUARDED PUSHBUTTON MOMENTARY	This pushbutton, located at the Commander's station, provides a manual start capability for immediate firing of either the descent or ascent engine, depending upon the position of 1S1. Once actuated, the engine fire command continues and the button is illuminated red. Activation of 1S3 or 1S4 interrupts the override function and extinguishes the light.
1S3 & 1S4	ENGINE STOP SWITCH (CDR) ENGINE STOP SWITCH (LMP) GUARDED PUSHBUTTONS MAINTAIN	One pushbutton (1S3) is located at the Commander's station and one (1S4) is located at the LM Pilot's station. Each pushbutton sends a discrete stop signal to the descent and ascent engines independent of the position of 1S1. On a lunar landing mission, it will be depressed on lunar landing after the lunar contact lights (1DS1 and 1DS2) are illuminated. When actuated, the button illuminates red. Switch (1S3) & (1S4) should not be reset unless the engine has been dearmed. The switch is reset by depressing it a second time.

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

Code	Control/Indicator	Function
1S5	RATE OF DESCENT SWITCH 3-POSITION TOGGLE MOM-MAIN-MOM	This switch permits the adjustment of vehicle rate of descent under PGNS authority in fixed increments. Each switch actuation provides a discrete pulse, changing the rate of descent by 1 foot per second. A switch actuation in the +X direction decreases the rate of descent by 1 foot per second, and a switch actuation in the -X direction increases the rate of descent by 1 foot per second. Vehicle response to these commands is monitored on the Alt Rate meter (9M9) or on DSKY.
1S6	ATTITUDE/X-TRANSLATION SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (4 JETS-2 JETS) selects the number of jets that will be utilized in X-axis translation, pitch, and roll maneuvers. This control can only be used in the AGS mode.
1S8	ENGINE GIMBAL 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (ENABLE-OFF) is located on structural panel III. In the ENABLE position, gimbal trim signals are enabled to position the descent engine in pitch and roll axes. In the OFF position, power is interrupted to the gimbal drive actuators, thus disabling the gimbal drive capability.
1S9	BALANCED COUPLES SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (ON-OFF) selects either balanced pairs of RCS jets in a couple or unbalanced X-axis RCS jets for use in maintaining pitch and roll attitude during the ascent engine thrust phase when the AGS is in the guidance loop. This switch is normally in the ON position (balanced couples) during the initial phases of lunar ascent. This provides maximum stabilization and control over any center of gravity thrust vector misalignment. After some appropriate minimum burn time when the balanced couples

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

Code	Control/Indicator	Function
1S9 (Cont.)		operation is no longer required, the switch can be positioned to OFF to conserve fuel during powered ascent. During coast periods the switch should be placed in the ON position.
1S10	MANUAL THROTTLE SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (CDR-LMP) selects the controller (1X1 or 12) which will be used for manual descent engine thrust level adjustment if its corresponding select lever (1H1 or 1H2) is in the THROTTLE position. Thus, in the CDR position, only the Commander's Controller (1X1) is enabled to adjust descent engine thrust level, and in the LMP position only the LM PILOTS Controller (1X2) is enabled.
1S11	THRUST CONTROL SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two position toggle (AUTO-MAN) provides the capability for switching from automatic throttle control (LGC) to manual throttle control (selected TTCA). In the AUTO position LGC thrust commands are summed with the manual command signals (TTCA selected by MAN THROTTLE switch 1S10). The TTCA always provides at least a 10% command since it cannot be set below this level. In the AUTO position the THRUST indicator displays the LGC command plus a 10% fixed bias which is summed with the LGC signal to compensate for this 10% fixed command from the TTCA. Manual throttle commands may be introduced by displacing the active TTCA. This would cause the displayed % THRUST CMD to decrease as only the LGC commands plus the fixed bias are displayed in the AUTO position. In the MAN position, LGC throttle commands to the descent engine are interrupted and only manual commands are displayed on the THRUST indicator. The THRUST CMD display will indicate a minimum value of 10% when power is applied to the meter.

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

Code	Control/Indicator	Function
1S12	+X AXIS TRANSLATION SWITCH GUARDED PUSHBUTTON MOMENTARY	This pushbutton is located at the Commander's station. When it is held in the depressed position it provides 4 jet translation in the +X direction by energizing the RCS secondary coils. Upon release of the button the signal is removed from the coils, terminating the jet firings.
1S13	ABORT SWITCH GUARDED PUSHBUTTON MAINTAIN	This pushbutton is activated to initiate an abort using the descent engine. Activation of this switch causes the following events to occur at the appropriate times: (a) a command signal is sent to arm the descent engine, (b) a signal is sent via instrumentation to telemetry indicating that the vehicle is preparing for an abort, and (c) a signal is sent to the LGC and AGS to compute and execute the abort trajectory by using the abort program. It is reset by depressing a second time. NOTE: The ABORT switch does not perform descent engine pressurization. Pressurized by MASTER ARM switch 2S7, DES PRPLNT ISOL VLV switch 2S9 and DES START He PRESS switch 2S1.
1S14	ABORT STAGE SWITCH GUARDED PUSHBUTTON MAINTAIN	This pushbutton is activated to initiate an abort using only the ascent engine. Activation of this switch will cause the following events to occur at the appropriate times: (a) a command signal is sent to the electro-explosive devices to pressurize the ascent engine, (b) a signal is sent to the LGC and AGS to compute and execute the abort trajectory using the abort stage program, (c) a signal is sent via instrumentation to telemetry indicating that the vehicle is preparing to stage for an abort, (d) the descent engine is shut down, (e) EPS is sent a signal allowing the ascent batteries

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

Code	Control/Indicator	Function
1S14 (Cont.)		to assume all loads, and (f) an Abort Stage Delay is initiated. During the Abort Stage Delay, the ascent engine is inhibited from firing to enable descent engine thrust decay. At the termination of the delay, the guidance system selected issues an engine ON command and a "stage" command is sent to E.D. to initiate staging, and an ascent engine on command is sent to APS to turn on the Ascent engine. The ABORT stage button is reset by depressing a second time.
1S15 (1S16) (1S18)	LUNAR PROBE (+Y) LUNAR PROBE (-Y) LUNAR PROBE (-Z)	The (3) lunar probes attached to the (+Y) (-Y) & (-Z) landing gear footpads are electro-mechanical devices. At the final stage of powered descent (just prior to landing) the lunar probe switch is activated (via contact with lunar surface) and enables illumination of the lunar contact lights 1DS1 & 1DS2. This is the signal for the astronauts to shut down the descent engine which will automatically deactivate the lunar contact lights.
1S19	DESCENT ENGINE COMMAND OVERRIDE SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (ON-OFF) in the ON position provides a 28 VDC alternate power source to the descent engine shut-off valves to prevent engine shut down should there occur a loss of DECA power (4CB69) as the vehicle enters the dead-man's zone. The OFF position interrupts this alternate power path.
1S20	TTCA/TRANSL SWITCH (CDR)	This two-position (ENABLE-DISABLE) toggle switch at left hand side of DSKY panel in the nominal (ENABLE) position permits normal operation of TTCA. In the DISABLE position the translation control function of TTCA is disconnected.

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

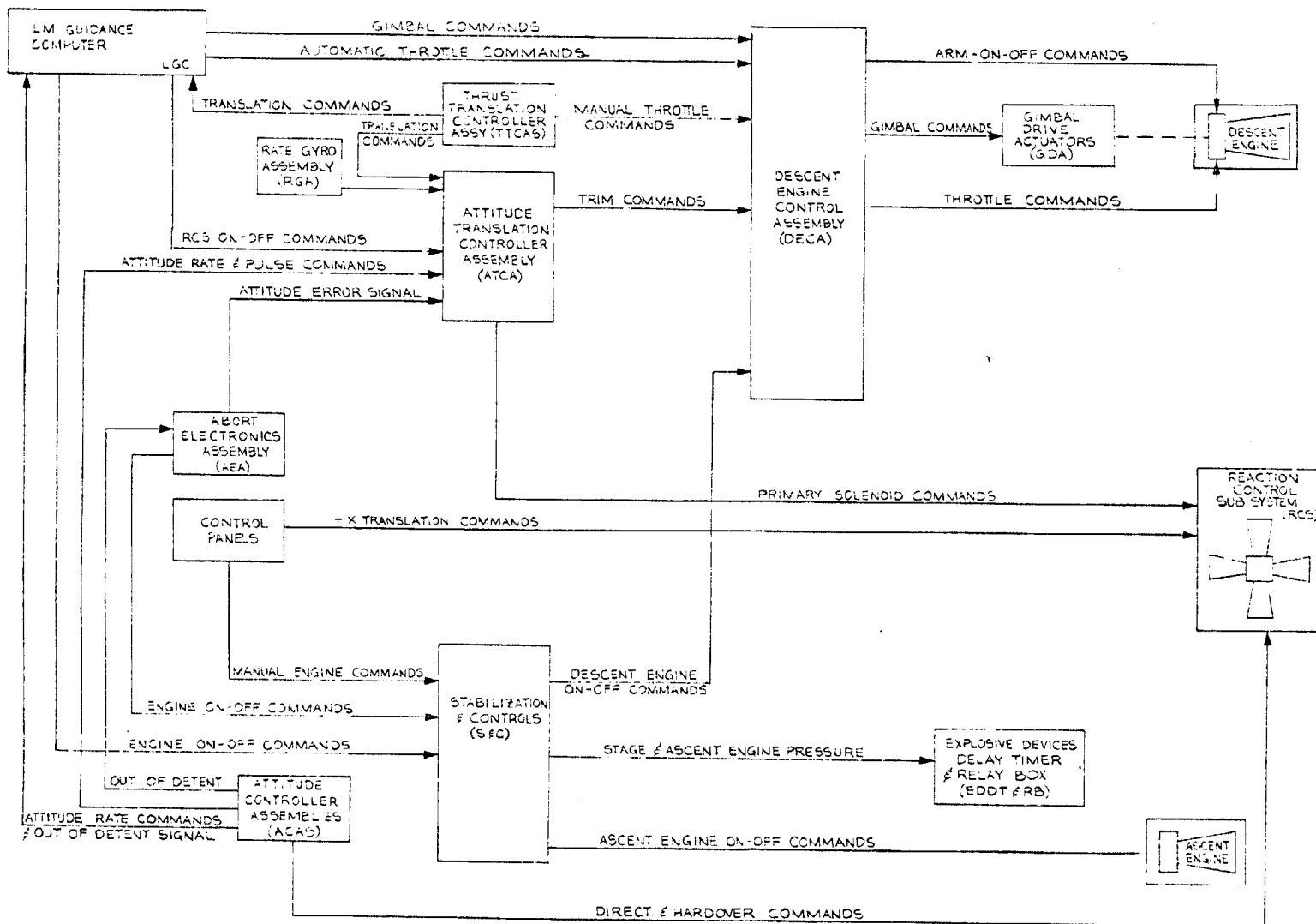
Code	Control/Indicator	Function
1S21	ACA/4 JET SWITCH (CDR) 2-POSITION TOGGLE SWITCH MAIN-MAIN	This two-position (ENABLE-DISABLE) toggle switch at the left hand side of DSKY panel in its nominal (ENABLE) position permits normal four-jet direct attitude control function (hardover position) of ACA and is operated in conjunction with similar (LMP's) switch at right hand side.
1S22	TTCA/TRANSL SWITCH (LMP) 2-POSITION TOGGLE SWITCH MAIN-MAIN	This two-position (ENABLE-DISABLE) toggle switch at right hand side of DSKY panel operates in a similar manner to 1S20 on the CMDR's side. When both are in the nominal (ENABLE) position TTCA can operate normally. Either switch in DISABLE position disconnects the TTCA translation control function.
1S23-	ACA/4 JET SWITCH (LMP) 2-POSITION TOGGLE SWITCH MAIN-MAIN	This two-position (ENABLE-DISABLE) toggle switch at the right side of DSKY panel functions similar to that of 1S21 on the CMDR's side of DSKY panel. When both are in nominal ENABLE position the ACA operates normally, but if either is in the DISABLE position then the four-jet direct attitude control function (hardover position of ACA is disengaged).
1S25	ACA PROP 2 POSITION TOGGLE SWITCH MAIN-MAIN	Commander's - two-position (ENABLE-DISABLE) toggle switch enables isolation 28 volts, 800 Hz to ACA transducer primary coil. The ENABLE position, enables normal operation of the ACA proportional rate mode. The DISABLE position, disables the ACA proportional rate command capability. When in "DISABLE" the attitude hold mode (proportional rate commands) function of the ACA is inoperative.

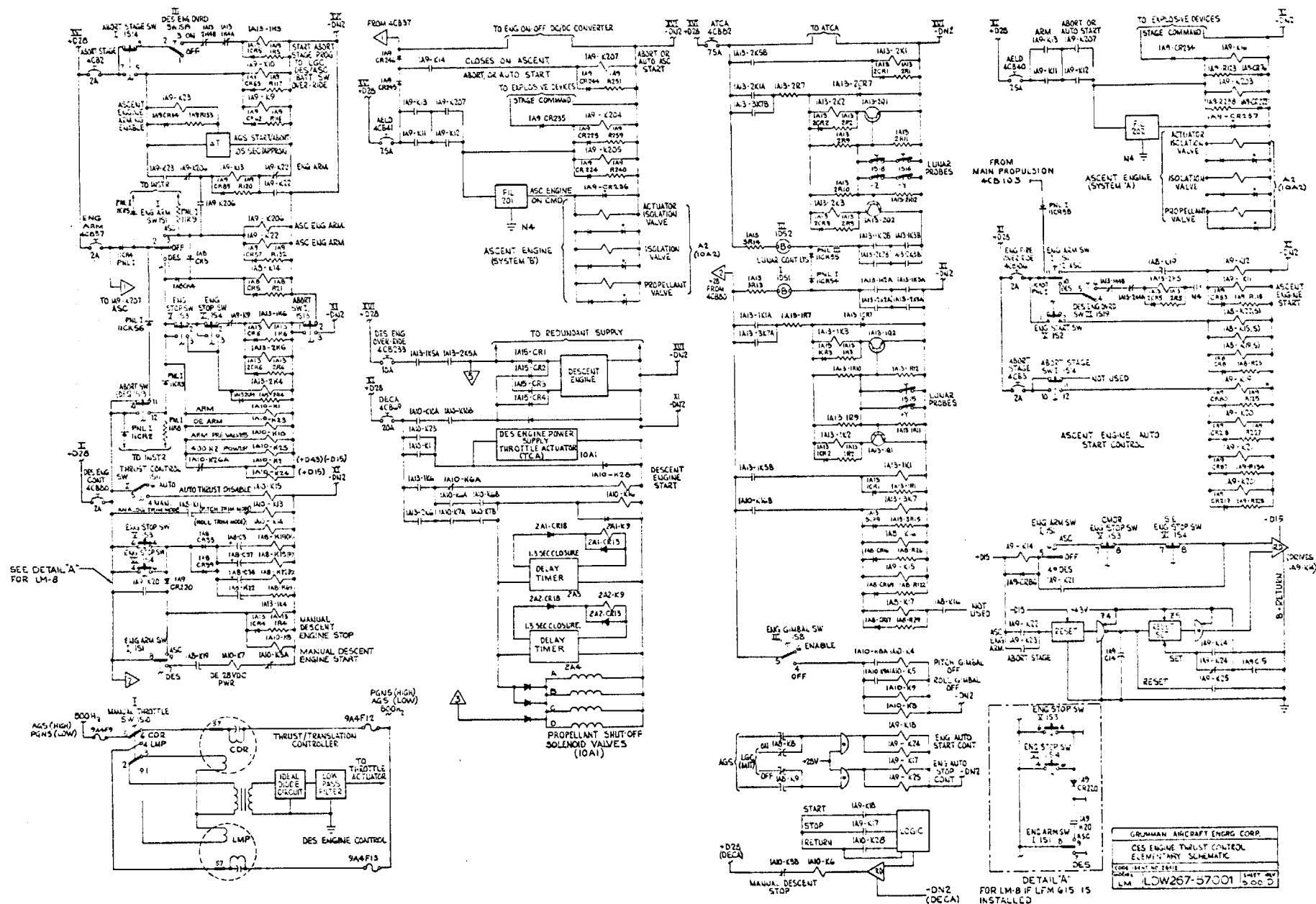
SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

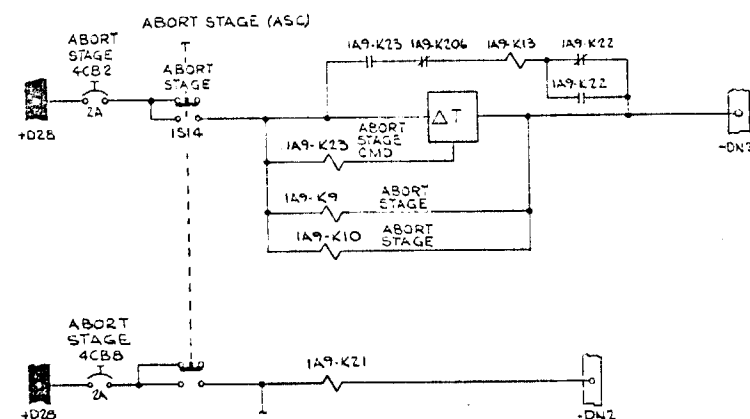
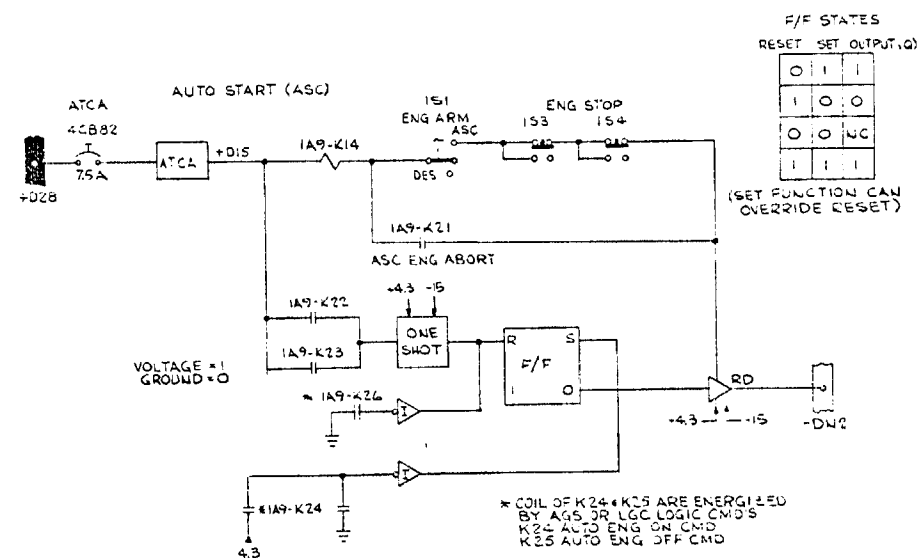
Code	Control/Indicator	Function
1S26	ACA PROP 2-POSITION TOGGLE SWITCH	LM PILOTS two-position (ENABLE-DISABLE) toggle switch enables isolation 28 volts, 800 Hz to ACA transducer primary coil. The ENABLE position, enables normal operation of the ACA proportional rate mode. The DISABLE position, disables the ACA proportional rate command. When in "DISABLE" the attitude hold mode (proportional rate commands) function of the ACA is inoperative.
1A1 1A12	ATTITUDE CONTROLLER (CDR) ATTITUDE CONTROLLER (LMP)	There are two 3-axis attitude Controllers; one at the Commander's station, the other at the LM Pilot's station. Both provide attitude command signals to the vehicle as appropriate for the mode of stabilization and control selected by the MODE CONTROL PGNS (11S24) as modified by GUID CONT (9S6) and ATTITUDE CONTROL (11S3, 4, 5) switches.
1X1 1X2	THRUST/TRANSLATION CONTROLLER (CDR) THRUST/TRANSLATION CONTROLLER (LMP)	One Thrust/Translation Controller is located at the Commander's station and one at the LM Pilot's station. Each controller always provides the crew with translation capability along the Y and Z body axes. X-axis translation capability is added to the CDR's or LMP's controller when the Throttle/Jets select lever (1H1 or 1H2) is positioned to JETS. Thrust control of the descent engine is provided to the CDR's controller when 1H1 is in the THROTTLE position and 1S10 is positioned to CDR. Thrust control of the engine is enabled with the LMP's controller when 1H2 is in THROTTLE and 1S10 is positioned to LMP. The force required to move the THRUST TRANSLATION CONTROLLER (1X1 or 1X2) in the $\pm$ direction when in the THROTTLE position is determined by the setting of the THROTTLE FRICTION ROTARY CONTROLLER (1H3 or 1H4).

SUBSYSTEM: ENGINE/THRUST CONTROLS & INDICATORS (FUNCTIONAL GROUPING 1)

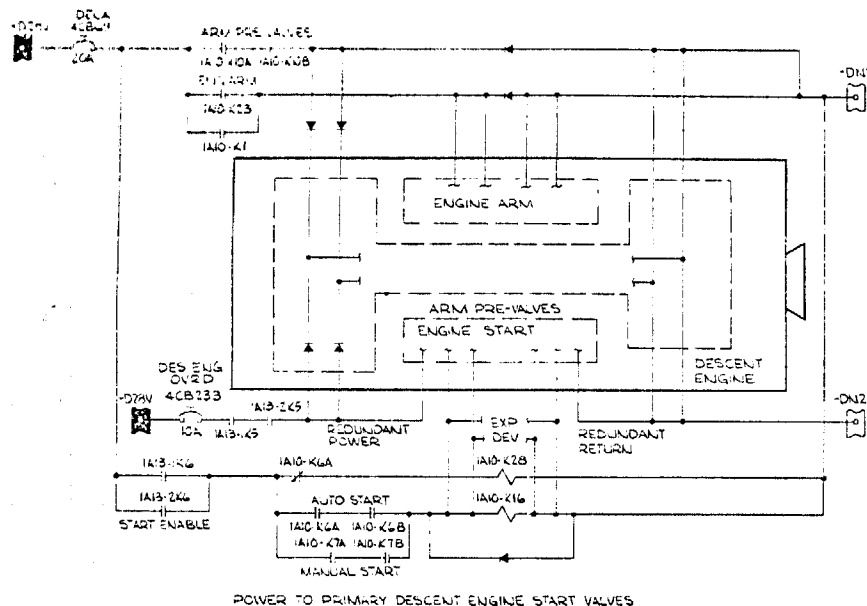
Code	Control/Indicator	Function
1H1 1H2	THROTTLE/JETS CONTROL SELECT LEVER (CDR) THROTTLE/JETS CONTROL SELECT LEVER (LMP) TWO 2-POSITION LEVERS	Each of these two-position levers (THROTTLE-JETS) is associated with its respective Thrust/Translation Controller (1X1 or 1X2). The THROTTLE position selects the manual descent engine throttling capability of the controller. The JETS position selects the RCS X-axis translation capability. However, if both 1H1 and 1H2 are placed in the THROTTLE position, only the controller selected on 1S10 will provide throttle commands.
1H3 1H4	THROTTLE FRICTION ROTARY CONTROLLER (CDR) THROTTLE FRICTION ROTARY CONTROLLER (LMP)	Each of these rotarys (FRICTION) varies the force required to move the associated THRUST TRANSLATION CONTROLLER (1X1 or 1X2) in the $\pm X$ direction. They are only operative when the associated THROTTLE/JETS control SELECT LEVER (1H1 or 1H2) is in the THROTTLE position. The force required to move the THRUST TRANSLATION CONTROLLER (1X1 or 1X2) varies from a minimum of between 1/4 and 1 lb. to a maximum of between 2-1/2 and 3-1/2 lbs.
1DS1- 1DS2-	LUNAR CONTACT LIGHT (CDR) LUNAR CONTACT LIGHT (LMP)	One light is located at the Commander's station and one is located at the LM Pilot's station. Both illuminate blue when a probe on the vehicle's landing gear touches the lunar surface. This provides positive feedback to the crew that the descent engine should be turned off. These lights will extinguish when either 1S3 or 1S4 is actuated which causes the stop logic to interrupt power to the light.



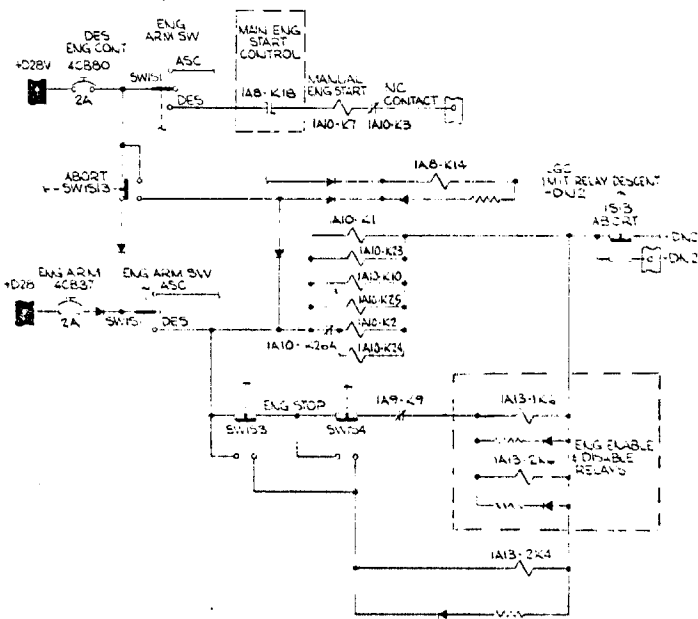




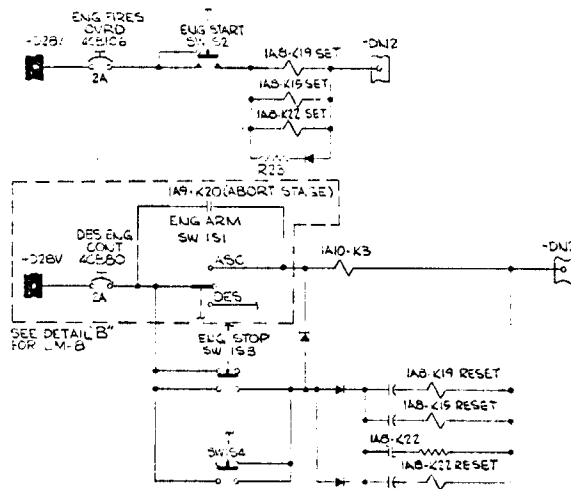
GRUMMAN AIRCRAFT ENGRG CORP	
ELEMENTARY SCHEMATIC	
CES ASCENT ENGINE	
START AND STOP	
COSE CNT NO 2632	
MODEL	SHEET NO
LDW267-57001	501 D



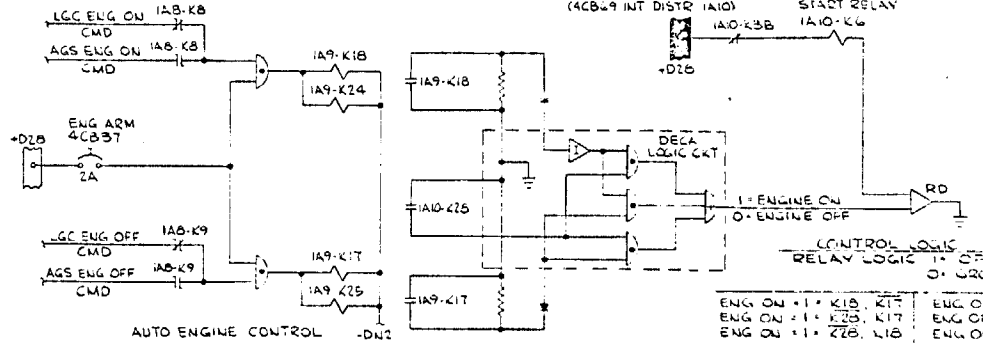
POWER TO PRIMARY DESCENT ENGINE START VALVES



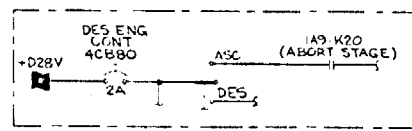
MANUAL ENGINE START & STOP CONTROLS



MANUAL ENGINE START & STOP CONTROLS



AUTO ENGINE CONTROL

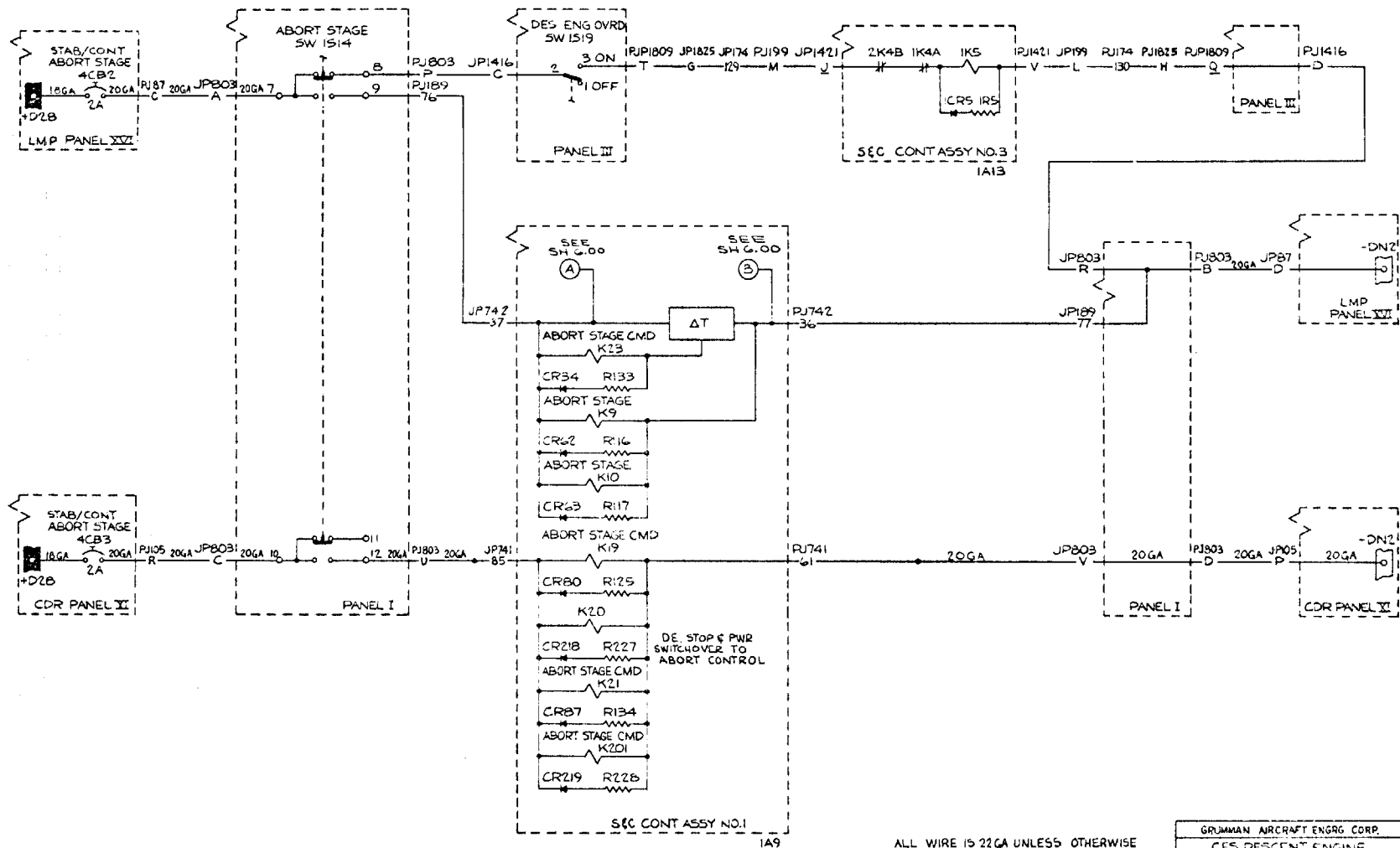


DETAIL 'B' (FOR LM-B IF LFMG15 IS INSTALLED)

ENG ON - 1 - K18, K17	ENG OFF - 0 - K18, K17
ENG ON - 1 - K28, K17	ENG OFF - 0 - K28, K17
ENG ON - 1 - K28, K18	ENG OFF - 0 - K28, K17
OTHER OFF	STATES NOT NOTED

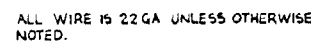
GENERAL INFORMATION
ELEMENTARY SCHEMATIC
DESIGN ENGINE
START & STOP
MODEL 20W267-57001

PARTIAL CIRCUITRY SHOWN FOR REFERENCE ONLY.

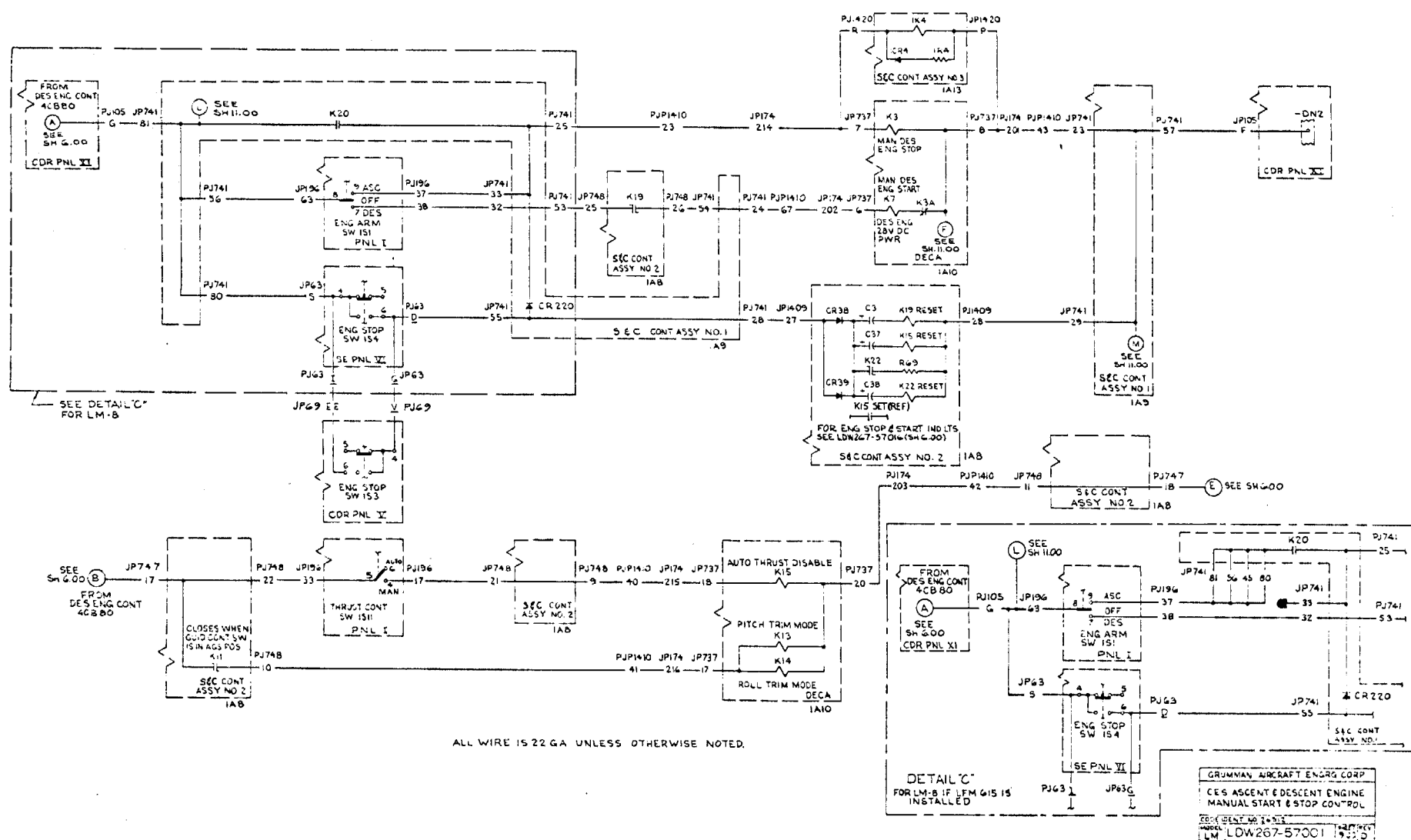


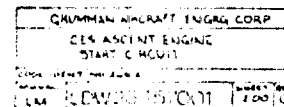
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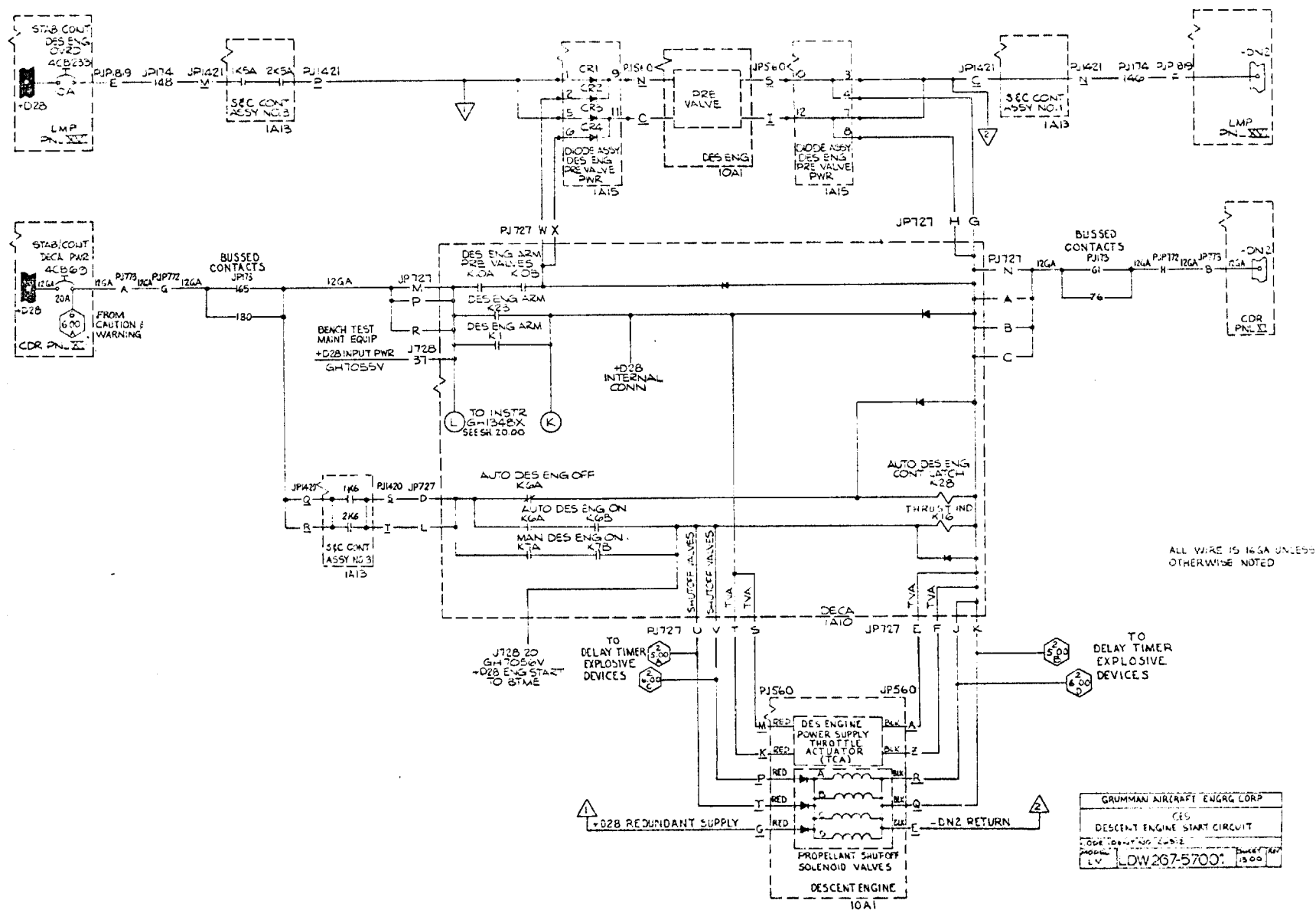
GRUMMAN AIRCRAFT ENGRG CORP.			
CES DESCENT ENGINE ABORT CONTROL			
Class (Rev) No. 10012			
Sheet 1	DN267 5A770	Sheet 2	7742 10

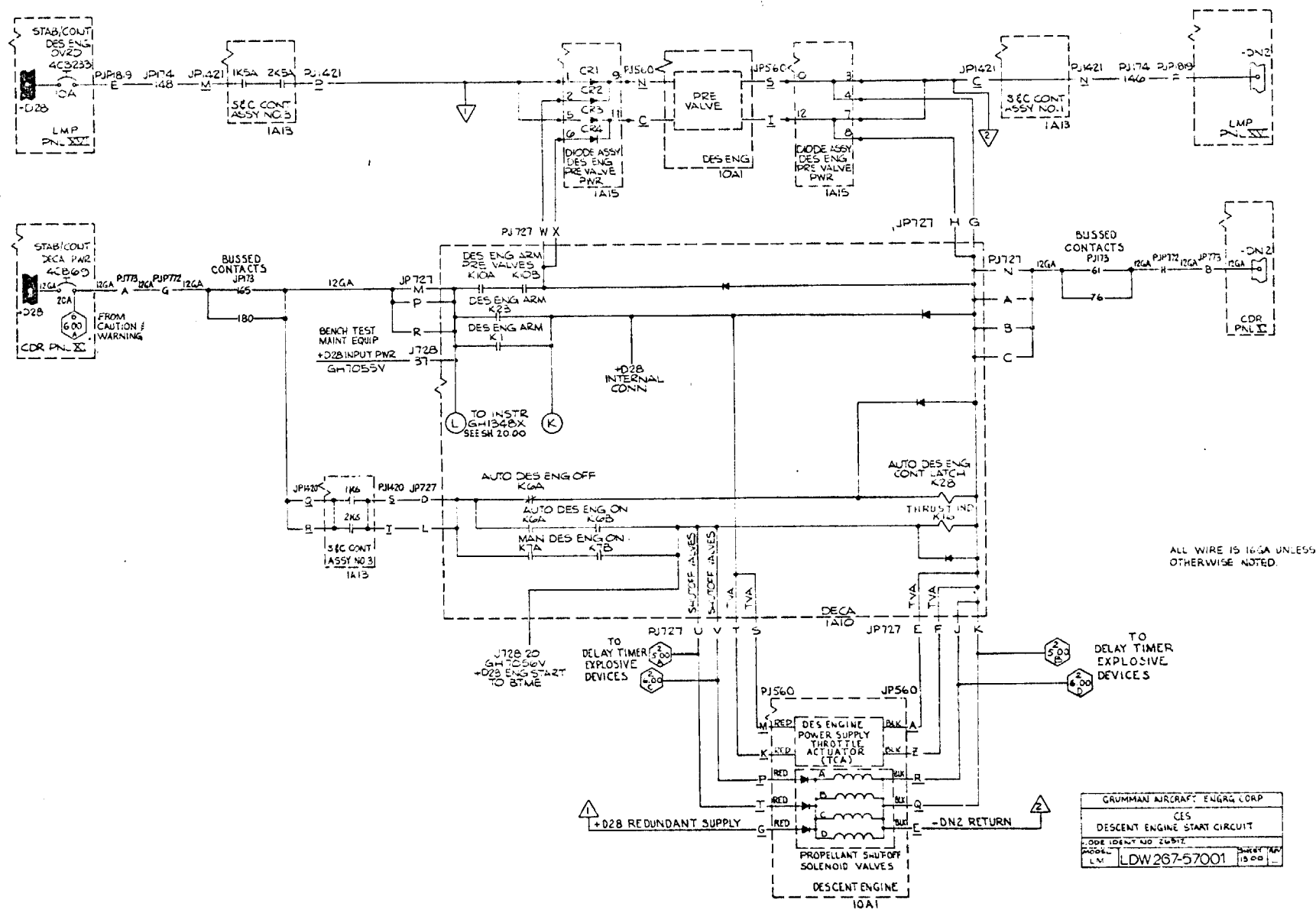


GRUMMAN AIRCRAFT ENGRG CORP.	
CES ASCENT & DESCENT ENGINE	
MANUAL START CONTROL	
CODE IDENT NO 22312	
MODEL	LOW267-57001
	Sheet 4



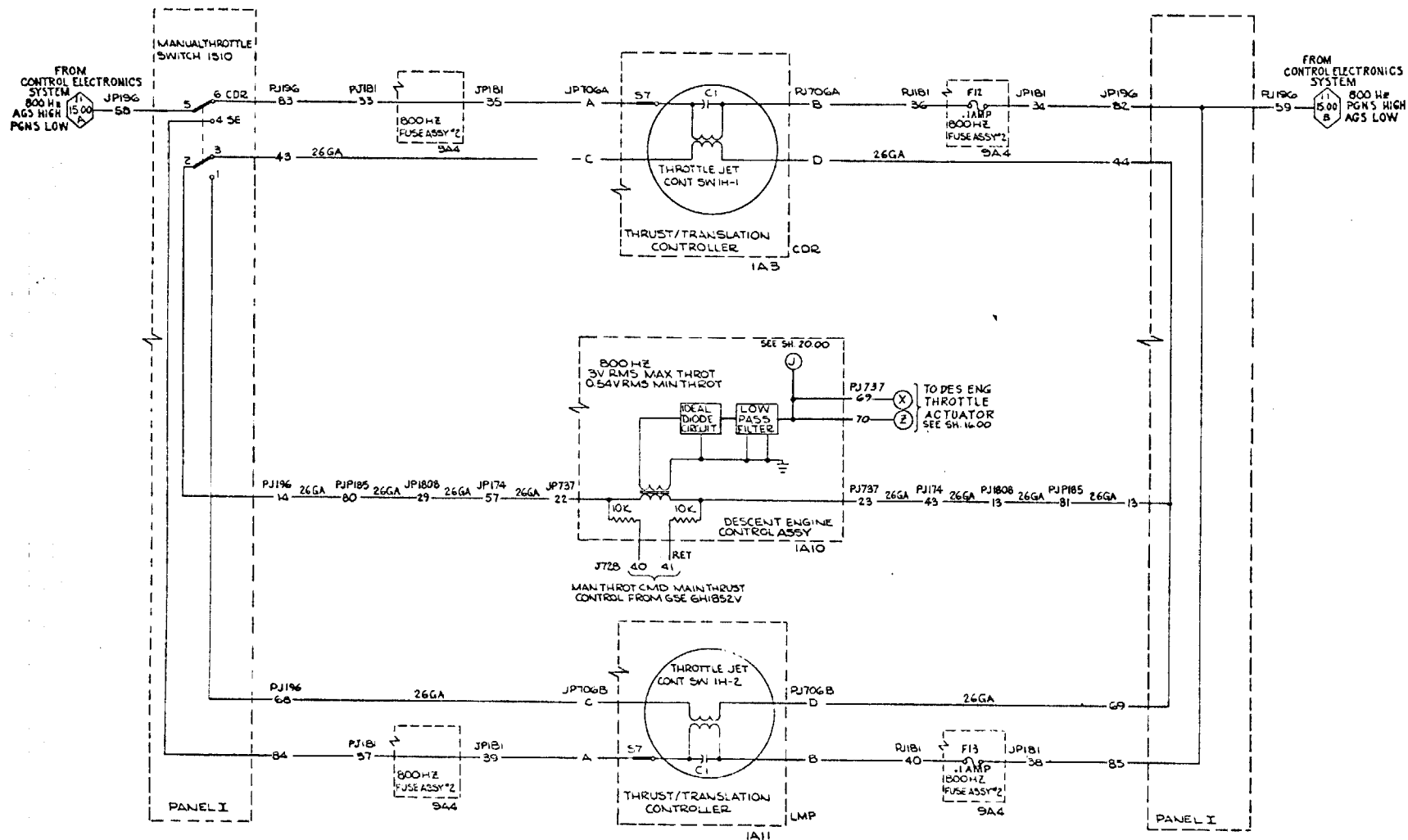






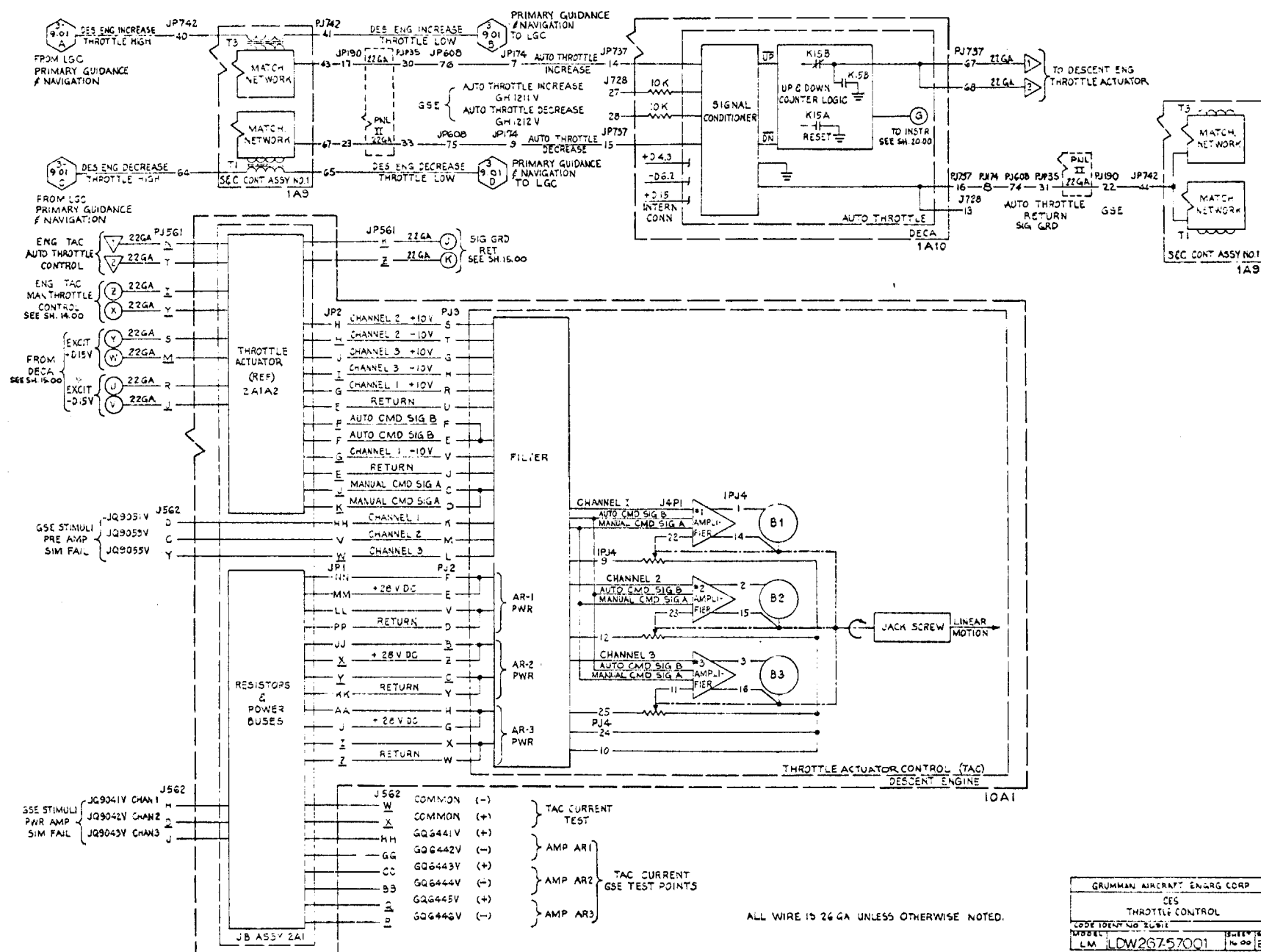
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OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGRG CORP	
CES	
DESCENT ENGINE START CIRCUIT	
MODE IDENT NO 26517	
MODEL LM	LDW 267-57001
	SHEET 00 15 00



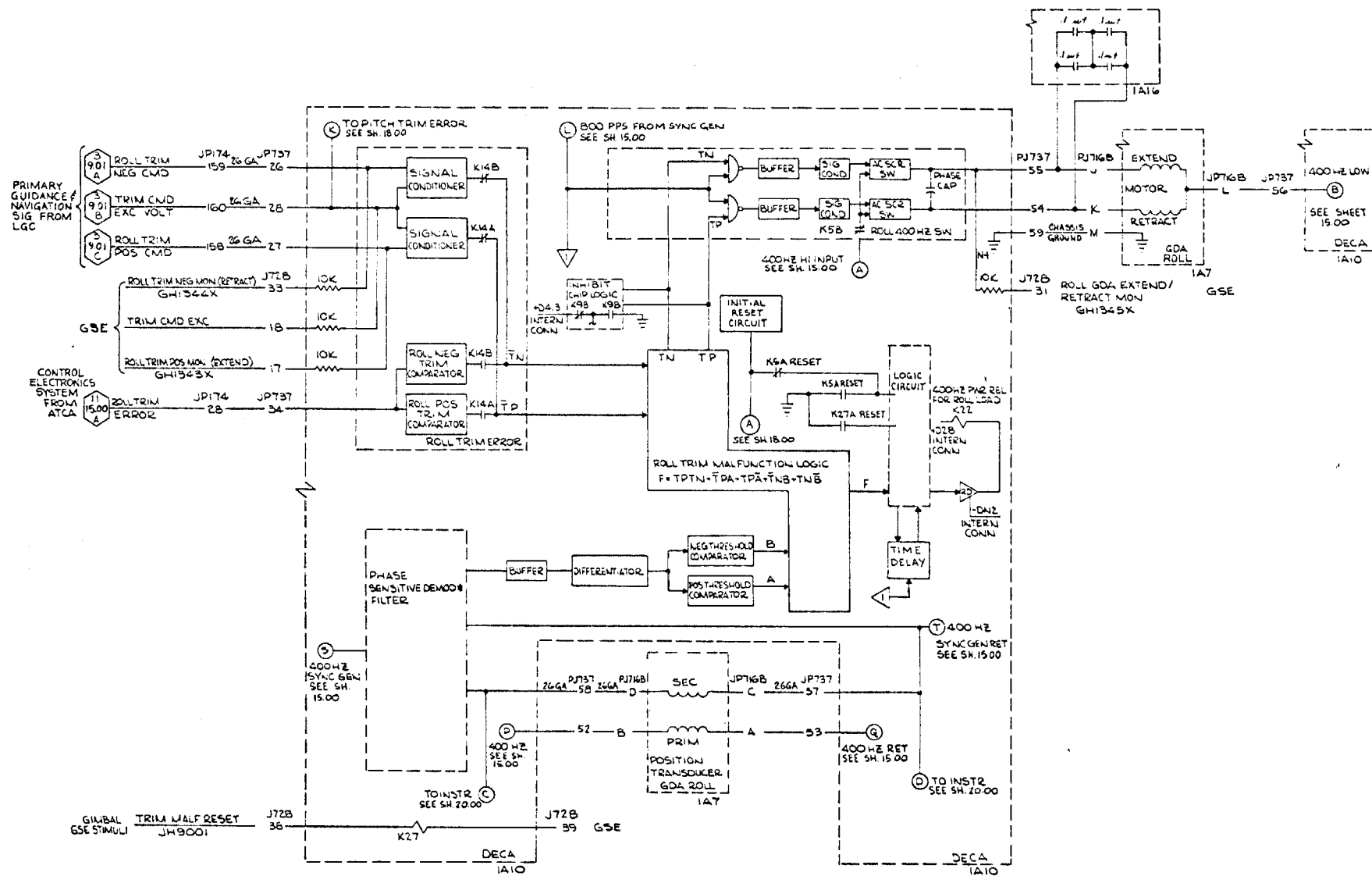
ALL WIRE IS 22 GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP.	
CES-DESCENT ENGINE THRUST	
MANUAL THROTTLE CONTROL	
CODE IDENT NO 24012	
MODEL	LDW267-57001
REV	14.00 B



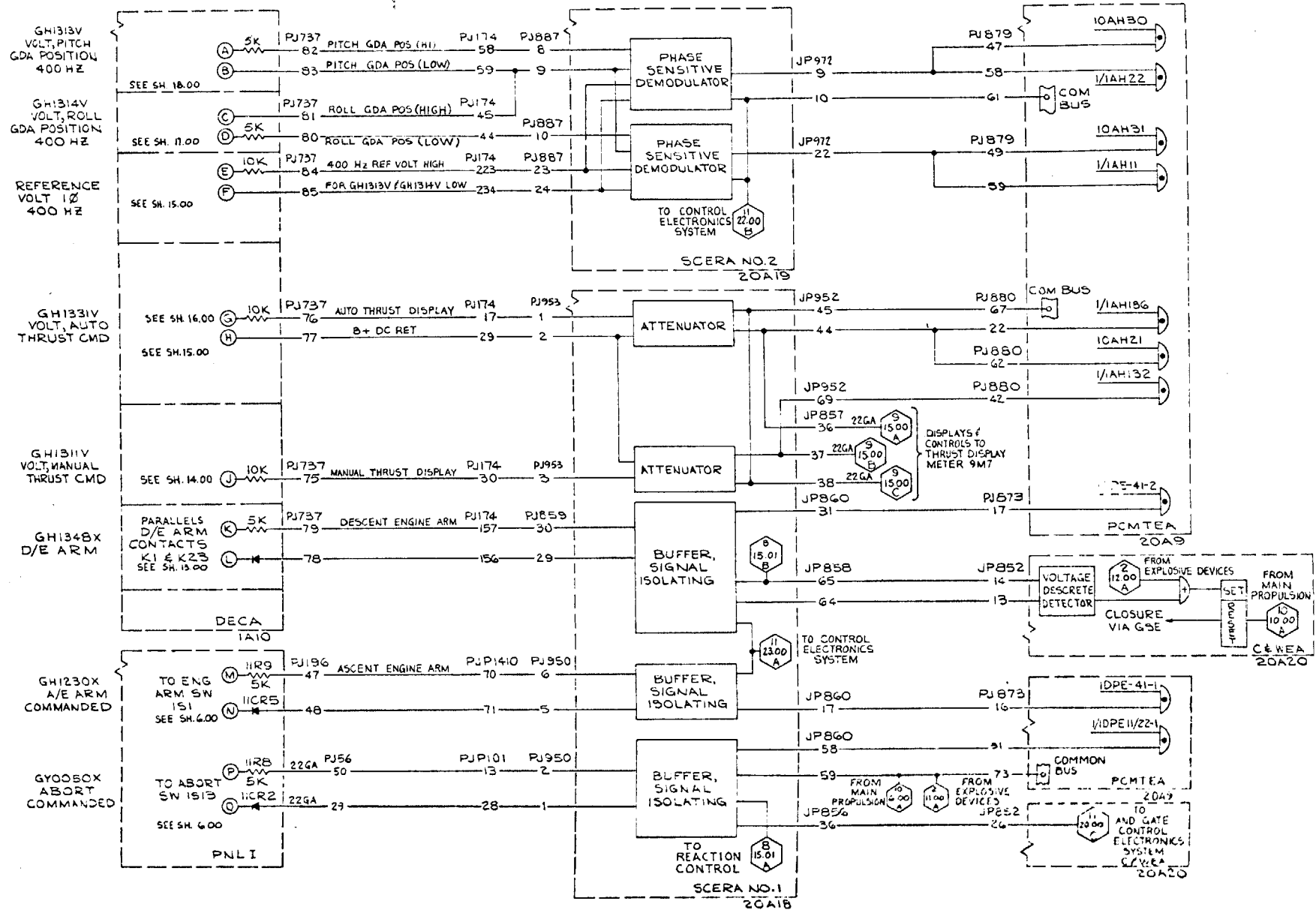
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GRUMMAN AIRCRAFT ENGRG CORP	
CES	
THROTTLE CONTROL	
CODE IDENT NO 26011	
MODEL	
LM	DW267-57001
SHEET	No 00



ALL WIRE IS 22 GA UNLESS OTHERWISE NOTED

GRUMMAN AIRCRAFT ENGINE CORP	
CES	
ENGINE THRUST GIMBAL CONTROL ROLL	
TRIM DRIVE	
CODE 105-110-2	
MODEL	LDW 26757001
LM	1100 1B



ALL WIRE IS 22 GA UNLESS OTHERWISE NOTED

CAUTION: AVOID SHORTS TO GND
 ON
 OF ENGINE THRUST
 10 10.00 A
 20 20.00 A



LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 2)

MECHANICAL DESIGN

EXPLOSIVE DEVICES

(REF LDW 267-57002 B)

1. Applicable Documents

Level Three Drawings

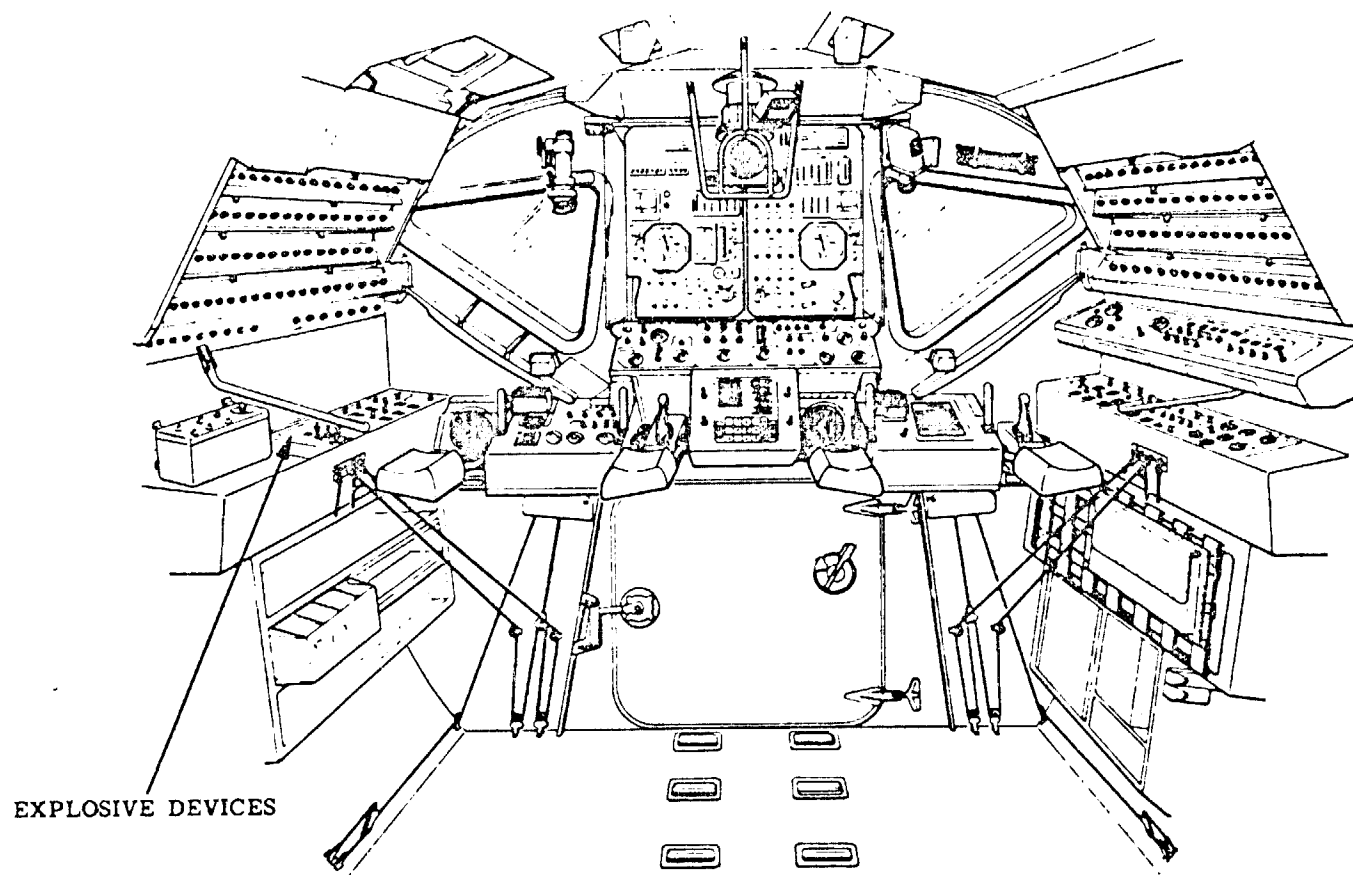
ITEM NAME	DWG. NO.	REV.	E.O.'s
Mechanical Design Sub-System	LDW320-54000	K	

2. Table of Contents

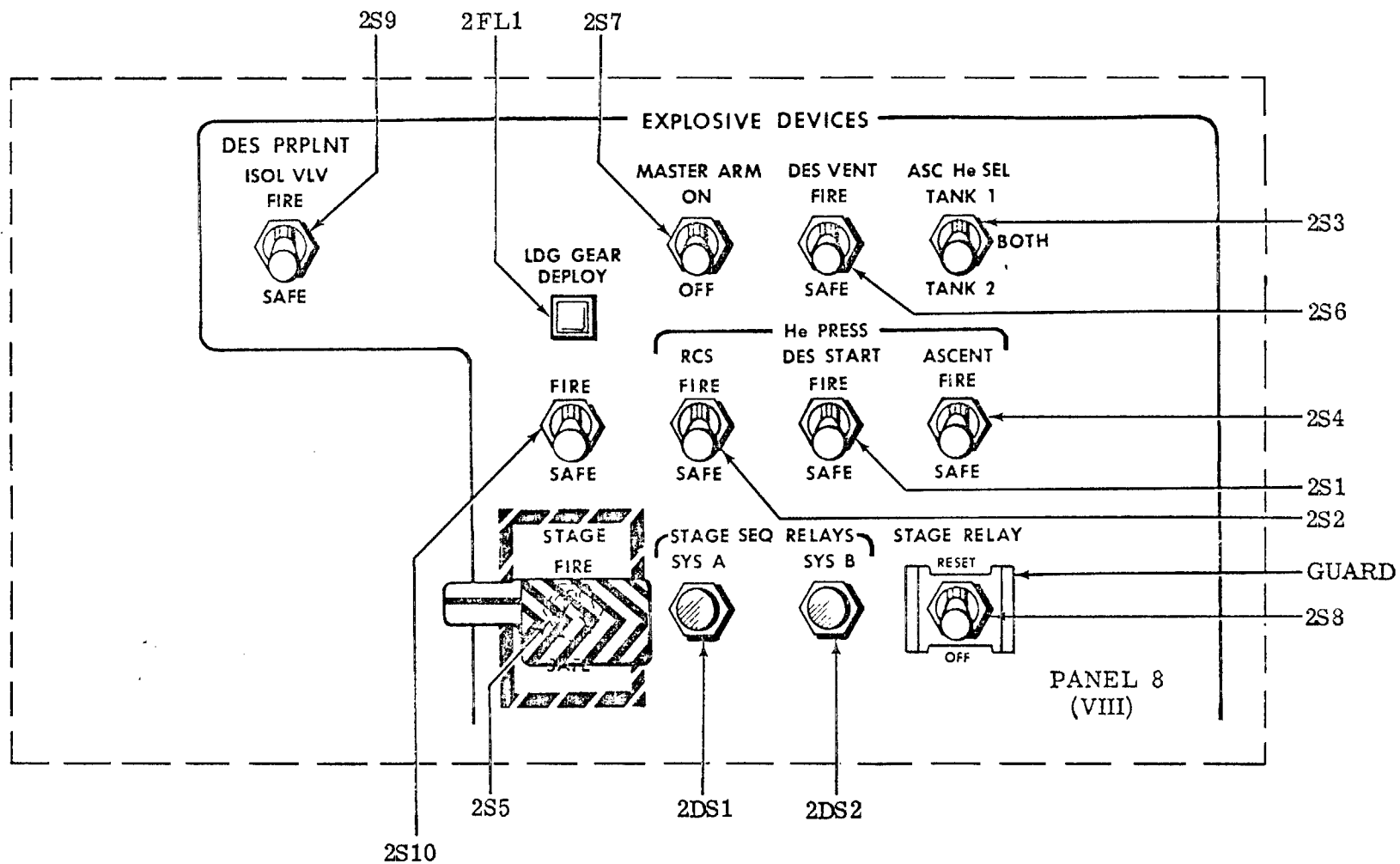
ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	2-701
b) Applicable Documents, Table of Contents and Revisions	2-702 and 2-702.1
c) Cabin Location of Explosive Devices Controls and Indicators	2-703
d) Mechanical Design-Explosive Devices Controls and Indicators Layout	2-704
e) Mechanical Design-Explosive Devices Controls/Indicators/Functional Description	2-705 thru 2-705.2
f) Mechanical Design-Explosive Devices Block Diagram	LDW267-57002 SH 4.00B
g) Mechanical Design-Explosive Devices Panel Control System A	LDW267-57002 SH 5.00B
h) Mechanical Design-Explosive Devices Panel Control System B	LDW267-57002 SH 6.00B
i) Mechanical Design-Explosive Devices Battery Control System A	LDW267-57002 SH 7.00B
j) Mechanical Design-Explosive Devices Battery Control System B	LDW267-57002 SH 8.00B
k) Mechanical Design-Explosive Devices Squib Control System A	LDW267-57002 SH 9.00B
l) Mechanical Design-Explosive Devices Squib Control System B	LDW267-57002 SH 10.00B
m) Mechanical Design-Operational Instrumentation Signals to PCMTEA, CAUTION & WARNING	LDW267-57002 SH 11.00B
n) Mechanical Design-Operational Instrumentation Landing Gear & Delay Timer	LDW267-57002 SH 12.00B

3. REVISIONS

REV	PAGE NO. AND/OR LDW267-57002, SHEET NO.	LCD	DESCRIPTION
B	12.00	5369	DESCENT PROPELLANT SHUT-OFF VALVE ASSY TEMP MEASUREMENT FOR TELEMETRY ONLY (PCMTEA)
C	2-704. 2-705.1	5157	ADDITION OF CIRCUIT BREAKER GUARDS ON PANELS 11 AND 16



Cabin Location of Explosive Devices Controls and Indicators



Explosive Devices Controls and Indicators Layout

SUBSYSTEM: MECHANICAL DESIGN - EXPLOSIVE DEVICES (FUNCTIONAL GROUPING 2)

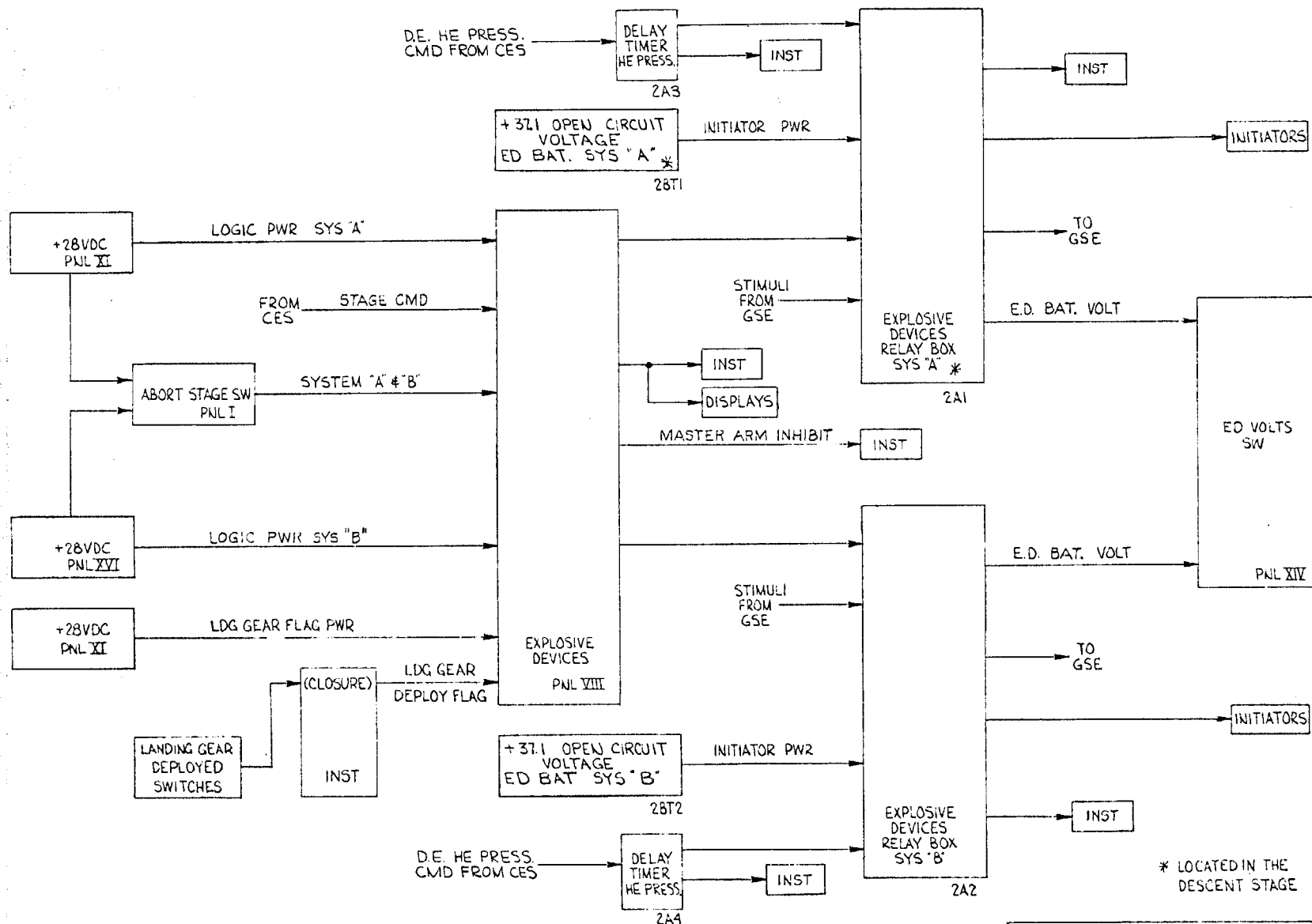
Code	Control/Indicator	Function
2S1	DESCENT START He PRESS SWITCH 2-POSITION TOGGLE MOM-LOCK	This two-position toggle (FIRE-SAFE) activates the squib valves to permit helium flow from the ambient helium storage tank for start pressurization of the descent propulsion subsystem. 2S9 must be activated prior to activating this control to allow the helium regulator to see maximum ullage volume.
2S2	He PRESS RCS SWITCH 2-POSITION TOGGLE MOM-LOCK	This two-position toggle (FIRE-SAFE) actuates squib valves which permit helium to flow from the RCS helium tanks to pressurize the Reaction Control Subsystem. Positive feedback of the firing of the squibs is provided by a nominal pressure reading on the Reaction Control Subsystem's Pressure Indicator (8M1A and 8M1B).
2S3	ASCENT HELIUM SELECT SWITCH 3-POSITION TOGGLE LOCK-LOCK-LOCK	This three-position toggle (TANK 1-BOTH-TANK 2) selects the squib valves of either Ascent Helium Tank 1 or 2, or both, for firing by use of 2S4.
2S4	He PRESS ASCENT SWITCH 2-POSITION TOGGLE MOM-LOCK	This two-position toggle (FIRE-SAFE) actuates the compatibility valves squibs and the Ascent Helium tank(s) selected by 2S3. Actuation of these squib valves will pressurize the Ascent Propulsion Subsystem. Positive feedback of the firing of the squibs is provided by a nominal pressure reading on 10M3A and 10M3B.
2S5	STAGE SWITCH 2-POSITION GUARDED TOGGLE LOCK-LOCK	This guarded two-position toggle (FIRE-SAFE) actuates the explosive devices which separate the descent stage from the ascent stage. This control will only be used when staging is desired without firing the ascent engine.

SUBSYSTEM: MECHANICAL DESIGN - EXPLOSIVE DEVICES (FUNCTIONAL GROUPING 2)

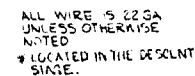
Code	Control/Indicator	Function
2S6	DESCENT VENT SWITCH 2-POSITION TOGGLE MOM-LOCK	This two-position toggle (FIRE-SAFE) activates the squib valves which enable venting of the descent propulsion propellant tanks and helium pressurant through the subsequent activation of the DESCENT FUEL VENT SWITCH (10S9) and the DESCENT OXIDIZER VENT SWITCH (10S10).
2S7	MASTER ARM SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (ON-OFF) enables the firing of all vehicle explosive devices by actuating redundant relays that apply E. D. Battery power to the EDS busses. Thus, this switch must be in the ON position in order for 2S1, 2S2, 2S4, 2S5, 2S6, 2S9, and 2S10 to perform their designated functions. The ON position also inhibits actuation of ED RELAYS CAUTION LIGHT (6DS31). See Functional Grouping No. 4 for E. D. Battery voltage monitoring.
2S8	STAGE RELAY SWITCH 2-POSITION TOGGLE MOM-LOCK	This guarded two-position toggle (RESET-OFF) provides a capability for manual reset of the stage relays.
2S9	DES PRPLNT ISOL VLV 2-POSITION TOGGLE MOM-LOCK	This two position toggle (FIRE-SAFE) actuates the fuel and oxidizer compatibility squib which allow the fuel and oxidizer tanks to be pressured after activation of the 2S1 switch.
2S10	LANDING GEAR DEPLOY SWITCH 2-POSITION TOGGLE MOM-LOCK	This two-position toggle (FIRE-SAFE) actuates the explosive devices which release the stowed landing gear. Positive feedback of landing gear deployment is provided by 2FL1.

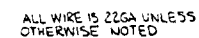
SUBSYSTEM: MECHANICAL DESIGN - EXPLOSIVE DEVICES (FUNCTIONAL GROUPING 2)

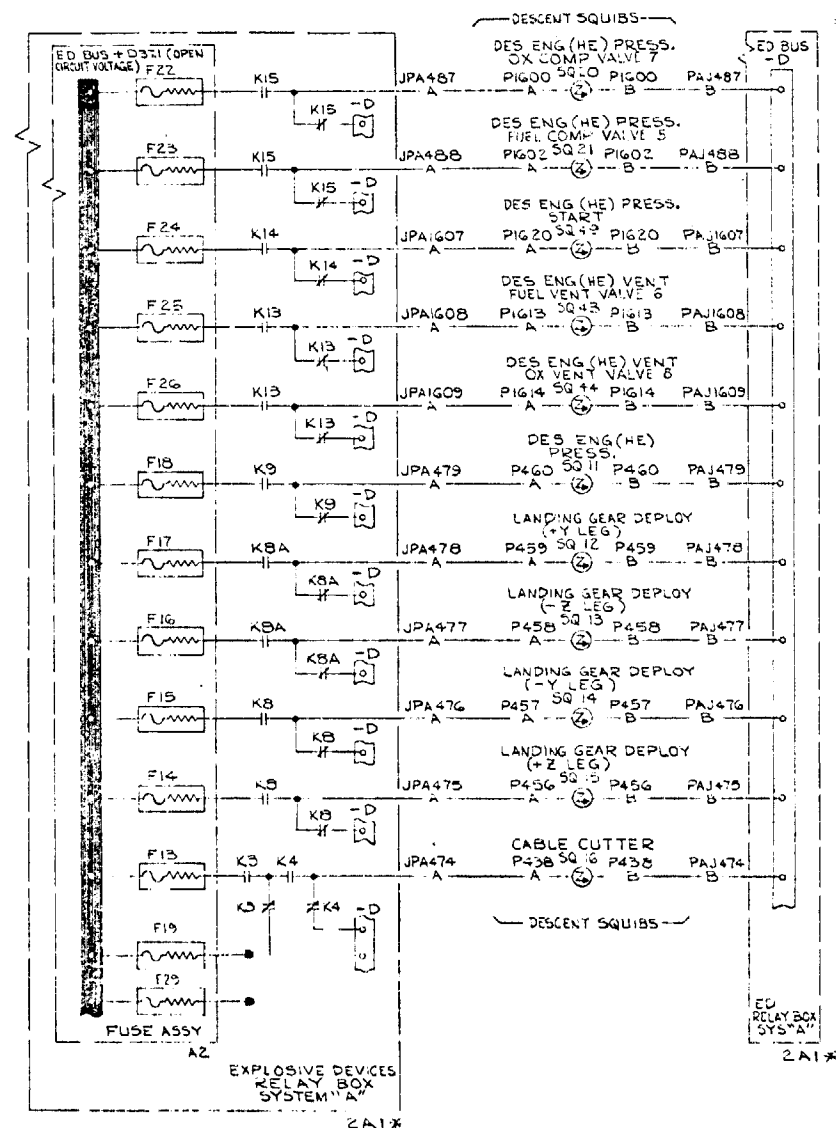
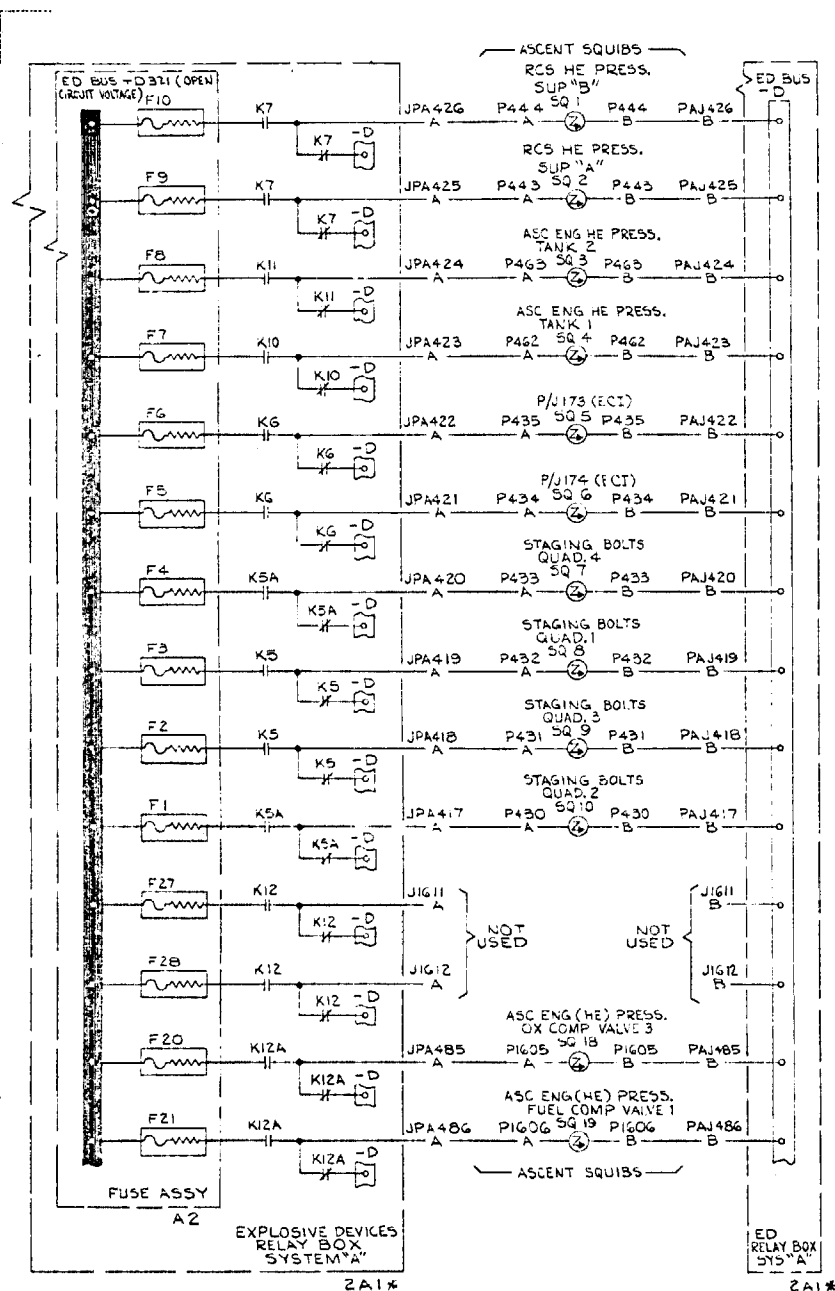
Code	Control /Indicator	Function
2DS1 2DS2	STAGE SEQ RELAYS SYS A STAGE SEQ RELAYS SYS B COMPONENT CAUTION LIGHTS	Each light illuminates if a relay closure occurs in its systems (A or B) stage sequence relay chain. Should either light illuminate because of a stage relay failure, activation of 2S8 to the RESET position will extinguish the light if the stage relay is reset.
2FL1	LANDING GEAR STATUS 2-POSITION FLAG	This two-position flag (GREY-BARBERPOLE) indicates stowed (BARBERPOLE) or deployed (GREY) status of the LM landing gear, as sensed at all four landing struts.



GRUMMAN AIRCRAFT ENGRG CORP		
MECHANICAL DESIGN		
EXPLOSIVE DEVICES BLOCK DIAGRAM		
CODE IDENT NO 26512		
MODEL LM	LDW267-57002	SHEET 4.00
		REV 13

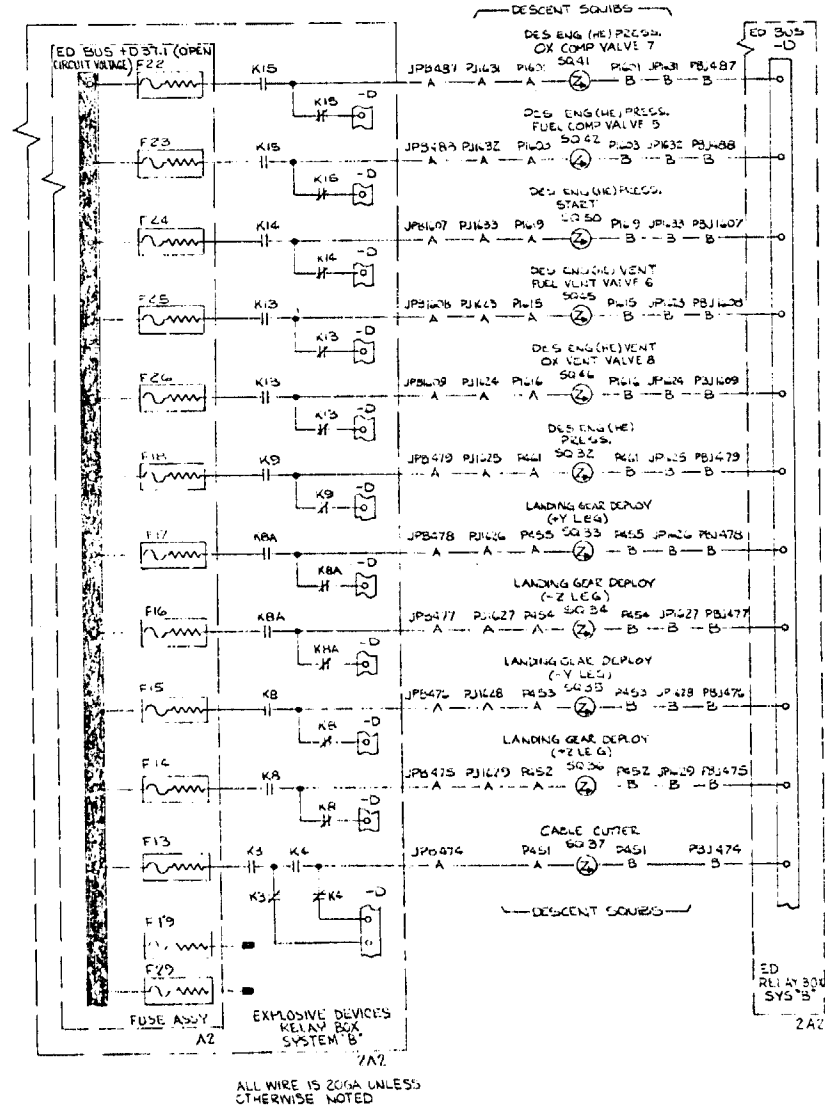
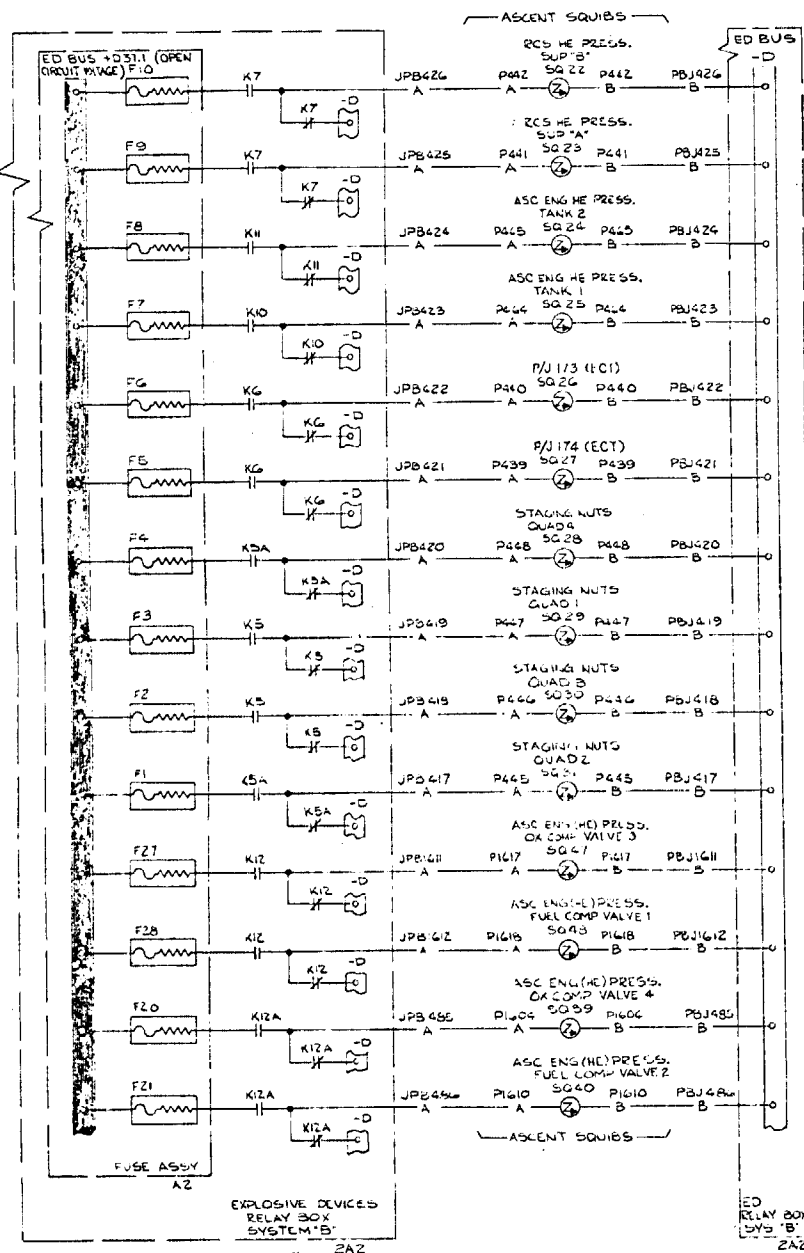




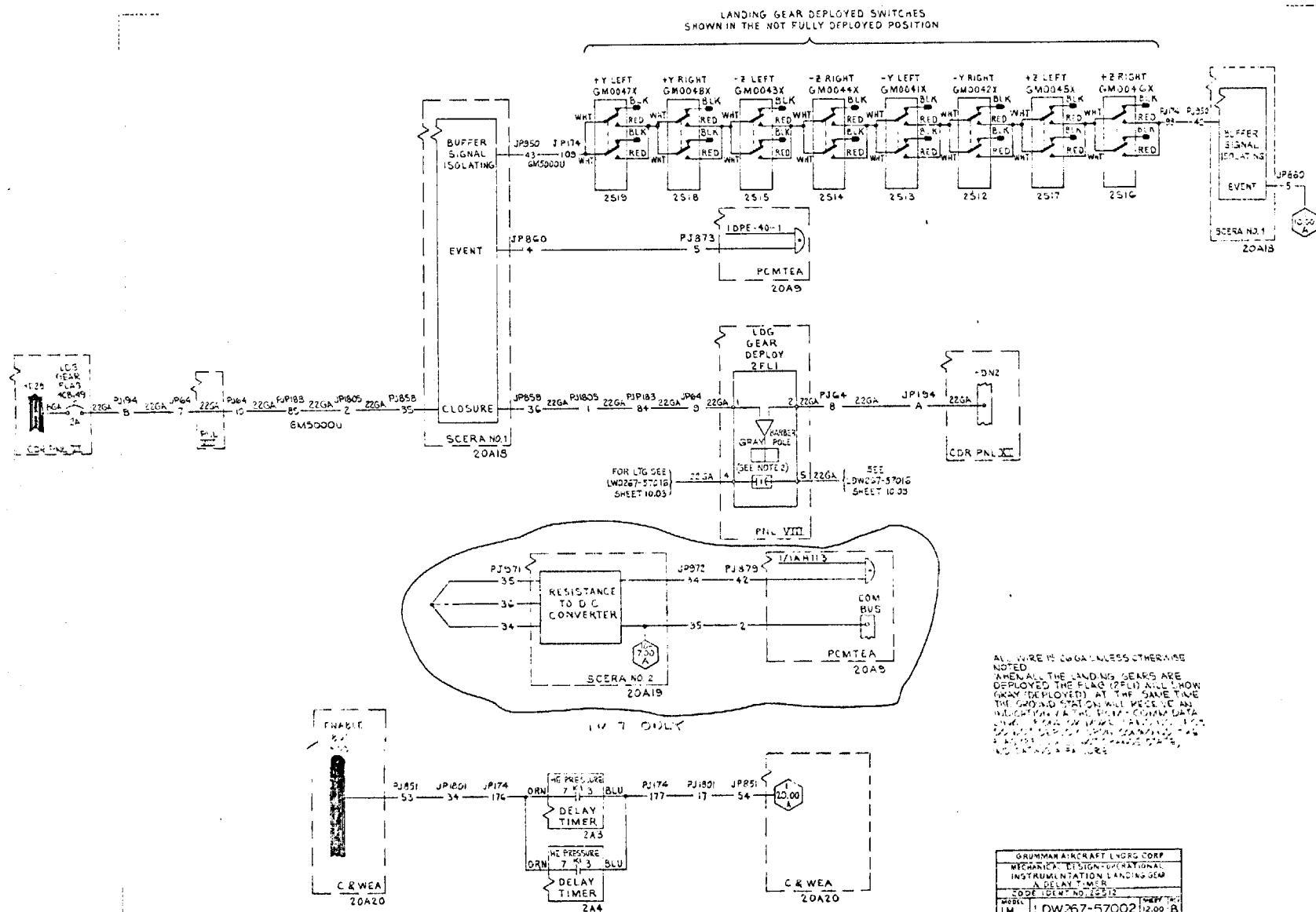


ALL WIRE IS 20 GA UNLESS OTHERWISE NOTED
* LOCATED IN THE DESCENT STAGE

GRUMMAN AIRCRAFT ENGINE CORP	
MECHANICAL DIVISION EXPLOSIVE DEVICES SQUIB CONTROL SYSTEM "A"	
DRAWING NO. 22-212	
DATE: 1M	10DW267-5/002



GRUMMAN AIRCRAFT ENGINE CORP
MECHANICAL DESIGN-EXPLOSIVE
DEVICES-CONTROL
SYSTEM "B"
P/OA EXHIBIT NO 20512
LM 11DW267-57002-10,000



LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 3)

PRIMARY GUIDANCE AND NAVIGATION SUBSYSTEMS (PGNS)

(REF LDW 207-57003 B)

1. Applicable Documents

Level Three Drawings

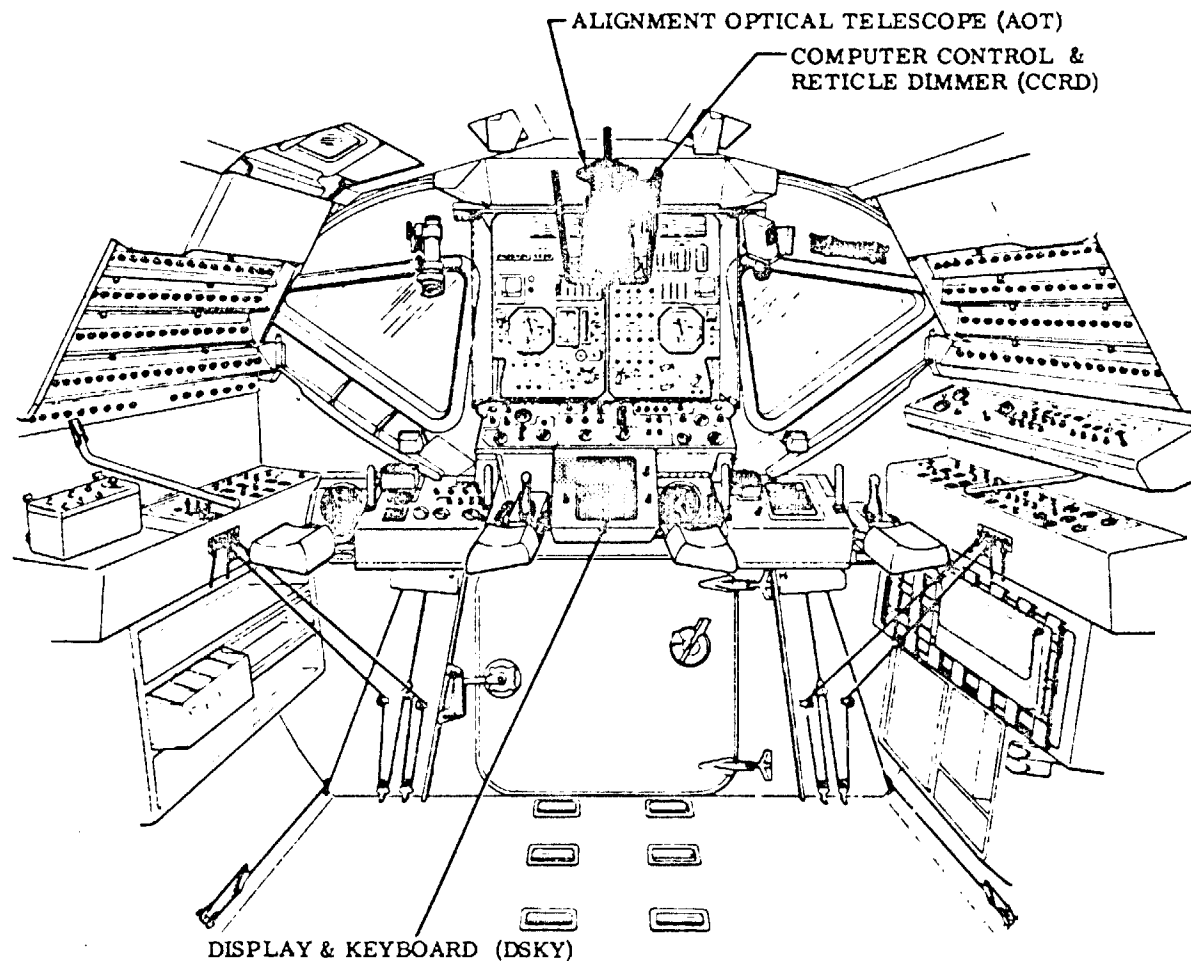
ITEM NAME	DWG. NO.	REV.	E.O.'s
Primary Guidance Navigation and Control	LDW370-54001	M	

2. Table of Contents

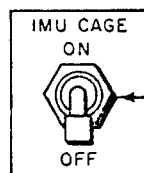
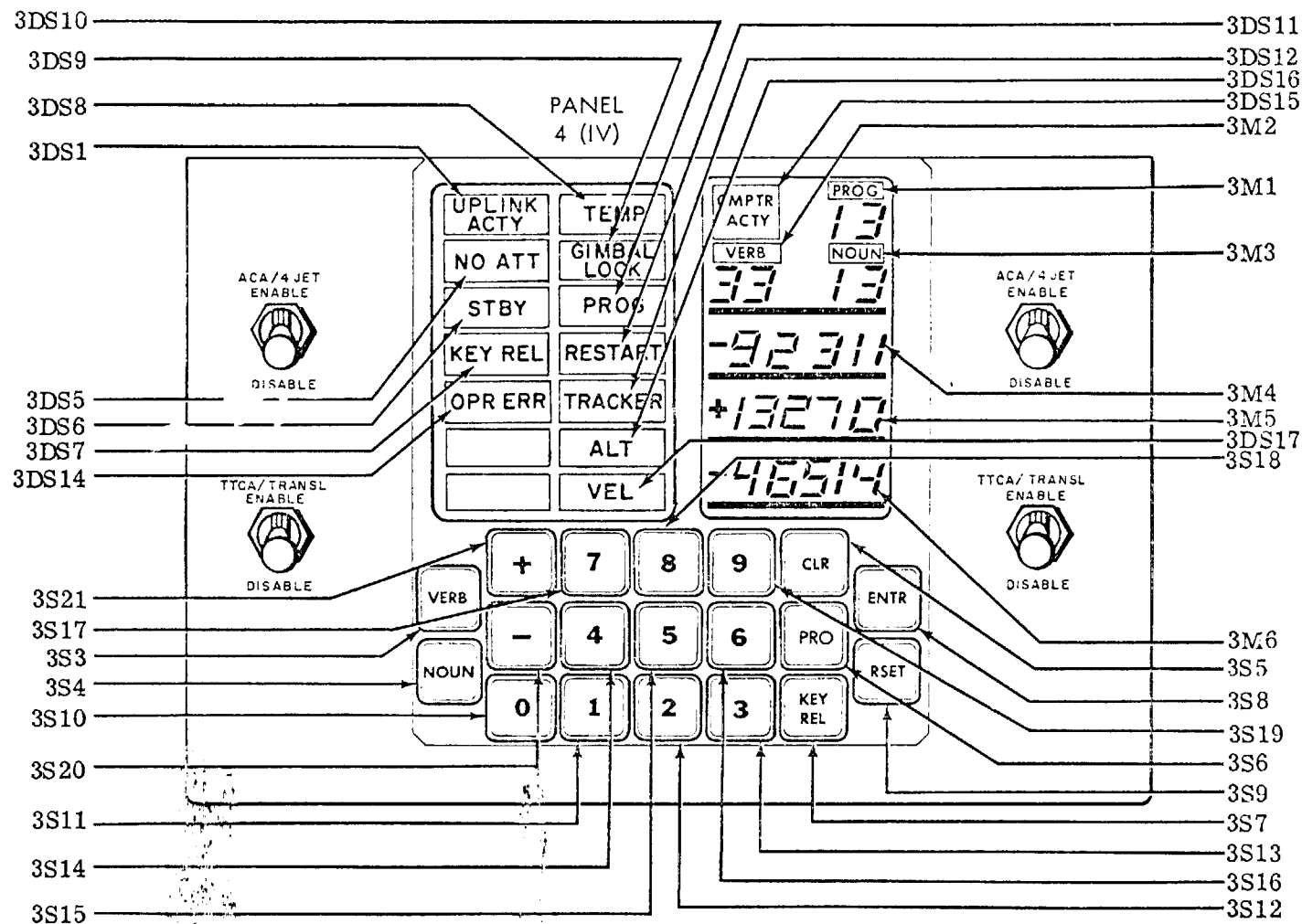
ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	3-701
b) Applicable Documents, Table of Contents, and Revisions	3-702 & 3-702.1
c) Cabin Location of PGNS (MIT)-GN & C Controls & Indicators	3-703
d) DSKY Controls & Indicators Layout	3-704
e) AOT Controls & Indicator Layout	3-704.1
f) PGNS (MIT)-GN & C Controls & Indicators Functional Description	3-705 thru 3-705.6
g) PGNS (MIT)-GN & C Block Diagram	LDW267-57003 SH 4.00
h) PGNS (MIT)-GN & C LGC Signals from Control Electronics Sys.	LDW267-57003 SH 5.00B & LDW267-57003 SH 5.01B
i) PGNS (MIT)-GN & C LGC Signals from RCS	LDW267-57003 SH 6.00B
j) PGNS (MIT)-GN & C AOT Port Supply & Signals to LGC	LDW267-57003 SH 7.00B
k) PGNS (MIT)-GN & C LGC Position & Thruster On-Off Commands	LDW267-57003 SH 8.00B
l) PGNS (MIT)-GN & C Descent Rate Monitoring	LDW267-57003 SH 9.00A

2. Table of Contents (Continued)

ITEM NAME	PAGE NO./SHEET NO.
m) PGNS (MIT)-GN & C LGC Signals for Gimbal Throttle Engine On-Off & Rate of Descent Control	LDW267-57003 SH 9.01
n) PGNS (MIT)-GN & C CES Translation Signals to LGC	LDW267-57003 SH 10.00B
o) PGNS (MIT)-GN & C Input & Output Signals for LGC & Landing & Rendezvous Radar	LDW267-57003 SH 11.00B & LDW267-57003 SH 11.01B
p) PGNS (MIT)-GN & C Oper Inst.	LDW267-57003 SH 12.00B & LDW267-57003 SH 12.01B
q) PGNS (MIT)-GN & C LGC, PSA IMU Power Supply	LDW267-57003 SH 13.00B
r) PGNS (MIT)-GN & C Instr & C/W Alarm Indication	LDW267-57003 SH 14.00B
s) PGNS (MIT)-GN & C Power Distribution from PSA	LDW267-57003 SH 15.00B
t) PGNS (MIT)-GN & C Gimbal Signals from IMU	LDW267-57003 SH 16.00B
u) PGNS (MIT)-GN & C Velocity Signals Between LGC & PTA	LDW267-57003 SH 17.00B
v) PGNS (MIT)-GN & C CDU Signals with Rendezvous Radar FDAI & AGS	LDW267-57003 SH 18.00
w) PGNS (MIT)-GN & C Signals Between DSKY & LGC, RR, LR, INT. LTG & PSA	LDW267-57003 SH 19.00B
x) PGNS (MIT)-GN & C Uplink, Downlink & LGC to AGS Digital Data	LDW267-57003 SH 20.00B
y) PGNS (MIT)-GN & C IMU & PTA Signals to SCA	LDW267-57003 SH 21.00



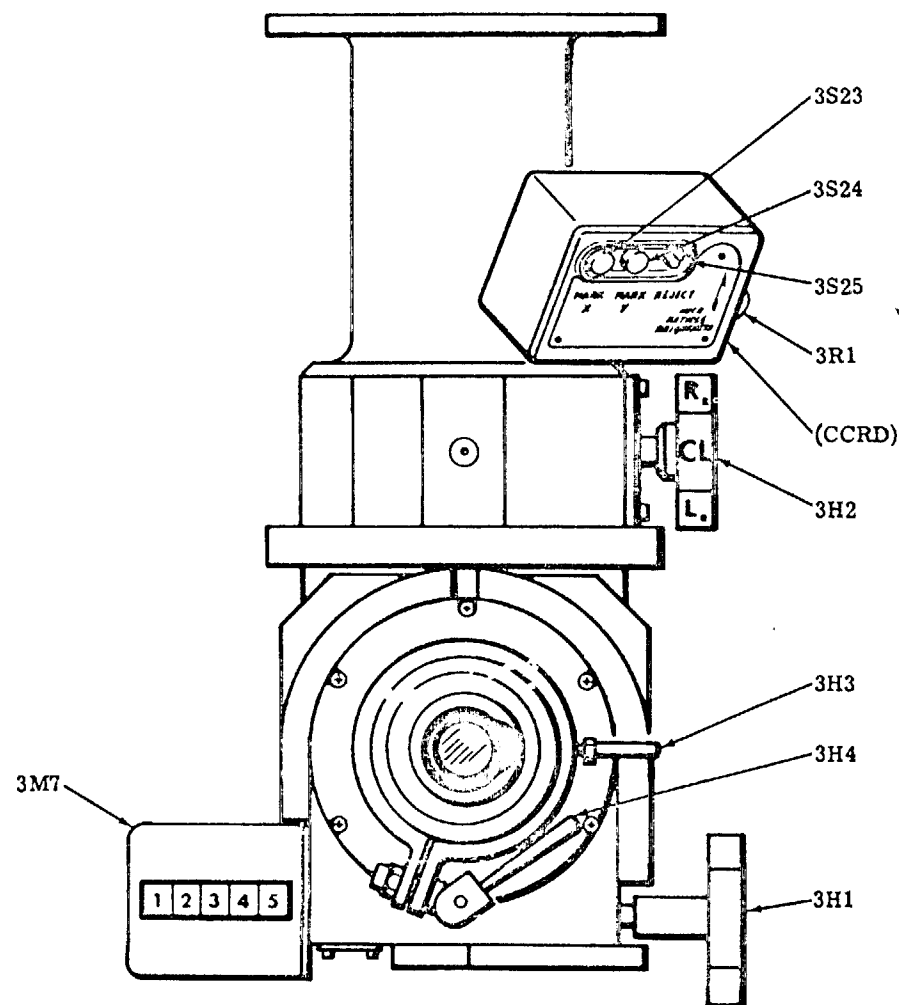
Cabin Location of PGNS (MIT)-GN & C Controls & Indicators



PANEL 3
(III)

NOTE: GUIDANCE CONTROL SWITCH 9S6
IS SHOWN ON PANEL I. SEE
PAGE 9-704.

DSKY Controls & Indicators Layout



(3A3) AOT Controls & Indicator Layout

SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3S1	IMU CAGE SWITCH 2-POSITION MOMENTARY TOGGLE ON-OFF	The IMU cage mode is an emergency backup mode which in the ON position allows the astronaut to recover a tumbling IMU by setting the gimbals to zero. During this mode, the 1X gimbal resolver sine winding outputs are fed through the CDU to the gimbal servo amplifiers to drive the gimbals until the resolver signals are nulled.
3S3	VERB SWITCH MOMENTARY PUSHBUTTON	Pushing the button indicates that the next two numerical characters keyed in are to be interpreted by the LGC as the verb code.
3S4	NOUN SWITCH MOMENTARY PUSHBUTTON	Pushing the button indicates that the next two numerical characters keyed in are to be interpreted by the LGC as the noun code.
3S5	CLR SWITCH MOMENTARY PUSHBUTTON	Used during a data loading sequence to erase the information being loaded into DATA display register R ₁ , R ₂ , or R ₃ . It allows the operator to clear the register in the event of an error in loading.
3S6	PRO SWITCH MOMENTARY PUSHBUTTON	Depressing PRO when STBY is illuminated will place the computer in the Operate mode and STBY will extinguish. Depressing PRO when STBY is not illuminated is a command to the LGC to proceed with the program. (An alternative to a VERB 33 DSKY entry).
3S7	KEY REL SWITCH MOMENTARY PUSHBUTTON	Depressing KEY REL in response to KEY REL (3DS7) illumination will permit information supplied by a LGC program to be displayed on the DSKY. The KEY REL button is depressed subsequent to inserting information into DSKY.

SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3S8	ENTR SWITCH MOMENTARY PUSHBUTTON	(1) To execute the verb/noun displayed on the VERB and NOUN registers. (2) To enter data words loaded into the data register (R_1 , R_2 or R_3) via switches 3S10 through 3S21.
3S9	RSET SWITCH MOMENTARY PUSHBUTTON	Enables turn off of alarm conditions on the DSKY providing the alarm condition has been corrected.
3S10 through 3S21	KEYBOARD SWITCHES MOMENTARY PUSHBUTTONS	Numerical keys 0 thru 9 (pushbutton switches 3S10 thru 3S19) when depressed, enter data, address codes and action request codes into the LGC. The algebraic sign keys + and - (pushbutton switches 3S20 and 3S21) when depressed informs the LGC that the following data is decimal and indicates the sign of the data. These switches (3S10 through 3S21) are used to control the LGC mode of operation manually, (The LGC is normally in the automatic mode of operation and is put in the automatic mode when circuit breaker 4CB122 is turned on.) Typical examples of these modes are: Update lift-off time, zero and align CDU and display, Inertial CDU angles outer, inner and middle gimbals.
3M1	PROG DISPLAY	Displays code number 00 to 99 of current program. NOTE: A program is a block of logic sequences.
3M2	VERB DISPLAY	Displays code number 00 to 99 of current verb. NOTE: A verb indicates what action is to be taken.

SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3M3	NOUN DISPLAY	Displays code number 00 to 99 of current noun. NOTE: A noun indicates to what an action is applied.
3M4	DATA DISPLAY (R1)	Displays decimal data (outputs from LGC or manually inserted data) including a plus or minus sign. Octal data is presented without the sign. Every position in each data display need not be filled.
3M5	DATA DISPLAY (R2)	Displays decimal data (outputs from LGC or manually inserted data) including a plus or minus sign. Octal data is presented without the sign. Every position in each data display need not be filled.
3M6	DATA DISPLAY (R3)	Displays decimal data (outputs from LGC or manually inserted data) including a plus or minus sign. Octal data is presented without the sign. Every position in each data display need not be filled.
3DS1	"UPLINK ACTIVITY" STATUS LIGHT (WHITE)	Energized by the first character of a Digital Uplink message received by the LGC. If it is not extinguished by the termination of uplink transmission which is signified by the end of computer activity, (no further motion on the DSKY register), it should be extinguished by crew use of the RSET or KEY REL buttons when the uplink transmission is complete.
3DS5	"NO ATTITUDE" STATUS LIGHT (WHITE)	Illuminates to indicate that attitude reference data is not available from the IMU. This condition can result for example, when the ISS is not powered or when the IMU is caged. This light illuminates during coarse alignment.

SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3DS6	"STANDBY" STATUS LIGHT (WHITE)	Illuminates when LGC is in a standby mode. Extinguishes when the LGC is in the operate mode or OFF.
3DS7	"KEY REL" STATUS LIGHT (WHITE)	Illuminates when an internal sequence attempts to use the DSKY, but finds it busy due to independent operator action (any keyboard depression except RSET or KEY REL).
3DS8	"TEMP CAUTION" LIGHT (YELLOW)	Illuminates to indicate that the IMU stable member temperature is outside of design limits (126°F to $134^{\circ}\text{F} \pm 5^{\circ}\text{F}$).
3DS9	"GIMBAL LOCK" CAUTION LIGHT (YELLOW)	Illuminates to indicate the IMU middle gimbal angle (MGA) is in excess of $\pm 70^{\circ}$ from its zero position. NOTE: When the MGA exceeds $\pm 85^{\circ}$ from its zero position, the LGC automatically commands a coarse alignment & illuminates the "No Attitude" light on the DSKY.
3DS10	"PROGRAM CAUTION" LIGHT (YELLOW)	Illuminates to indicate a program check has failed. This indicator is controlled by a computer program.
3DS11	"RESTART" CAUTION LIGHT (YELLOW)	Illuminates if internal detection circuits in LGC signifies a program abort (a program abort is not to be confused with a LM abort; it is a LGC main alarm condition which indicates that the program has stopped and LGC is attempting a restart).

SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

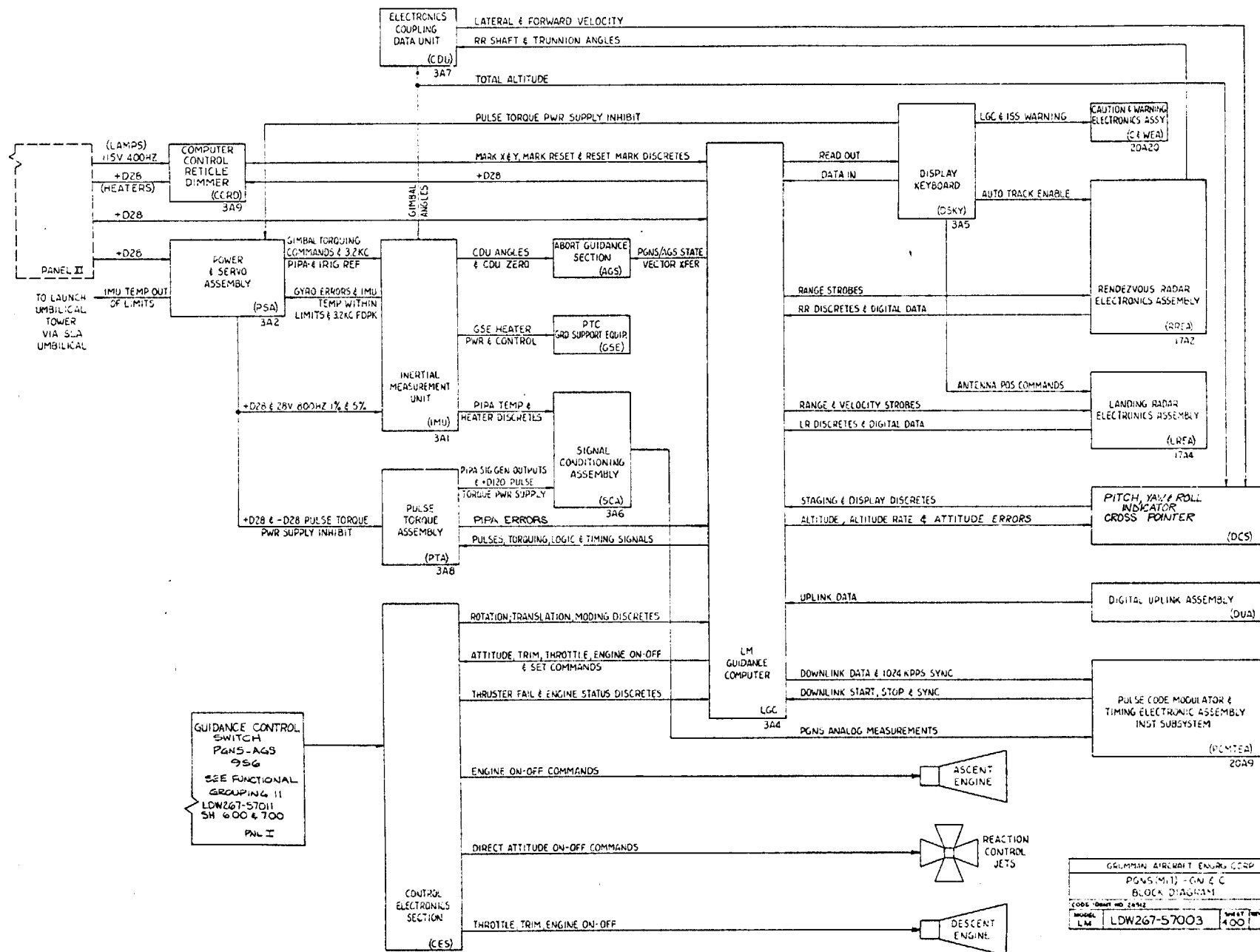
Code	Control/Indicator	Function
3DS12	"TRACKER CAUTION" LIGHT (YELLOW)	Illuminates if one of the following conditions exist: 1. Rendezvous Radar (RR) CDU failure (when the rendezvous radar is in the LGC mode). 2. A RR "data no good" discrete is present when auto track is enabled.
3DS14	"OPERATOR ERROR" STATUS LIGHT (WHITE)	Illuminates to indicate that the astronaut has performed an improper sequence of key depressions on DSKY.
3DS15	"COMPUTER ACTIVITY" STATUS LIGHT (WHITE)	Signifies computer activity in processing data.
3DS16	"ALTITUDE LIGHT" (YELLOW)	Steady: Illuminates to indicate to the astronauts that the LGC has lost Landing Radar altitude data good discretes. Flashing: Illuminates to indicate to the astronauts that the altitude data supplied by the LR to the LGC does not agree proportionally to previous data.
3DS17	"VELOCITY LIGHT" (YELLOW)	Steady: Illuminates to indicate to the astronauts that the LGC has lost Landing Radar velocity data good discretes.

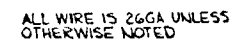
SUBSYSTEM: PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3DS17 (Cont.)		Flashing: Illuminates to indicate to the astronauts that the velocity data supplied by the LR to the LGC does not agree proportionally to previous data.
3A3	AOT ALIGNMENT OPTICAL TELESCOPE	The AOT is used inflight and on the lunar surface to obtain star direction for the determination of inertial orientation. AOT provides updated information to the LGC as to the position of LM for such activities as docking.
3H3	EYEPIECE ADJUST LEVER	This lever moves the eyepiece toward or away from the eye of the observer for focusing.
3S23	MARK X SWITCH MOMENTARY PUSHBUTTON	Depression of this pushbutton sends a signal to the LGC indicating that the star is aligned on the X reticle position.
3S24	MARK Y SWITCH MOMENTARY PUSHBUTTON	Depression of this pushbutton sends a signal to the LGC indicating that the star is aligned on the Y reticle position.
3S25	REJECT SWITCH MOMENTARY PUSHBUTTON	Depression of this pushbutton sends a signal to the LGC indicating that the last Mark signal was incorrect and no action is to be taken until a new Mark signal is received.

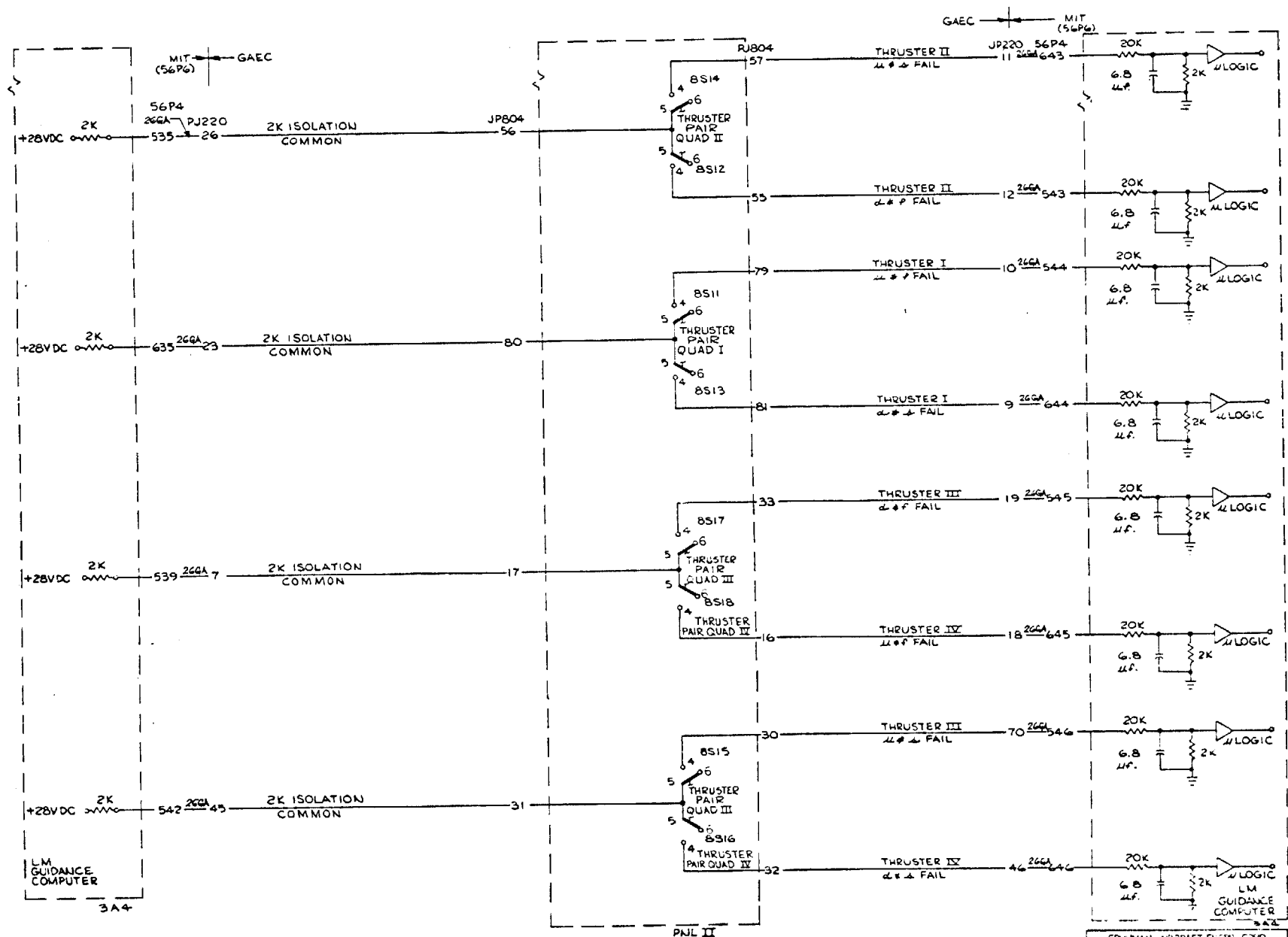
SUBSYSTEM. PRIMARY GUIDANCE AND NAVIGATION (PGNS) (FUNCTIONAL GROUPING 3)

Code	Control/Indicator	Function
3R1	RETICLE ILLUMINATION CONTROL CONTINUOUS ROTARY	This continuous rotary (OFF-BRIGHT) controls the brightness of the AOT reticle.
3H1	RETICLE CONTROL CONTINUOUS ROTARY	This continuous rotary control rotates the AOT reticle. The rotary is used for the following: 1. To zero the AOT Counter. 2. To superimpose the X line on the target star. 3. To superimpose the spiral on the target star.
3H2	AZIMUTH CONTROL 6-POSITION ROTARY	This six position rotary switch (FL-F-FR-RL-R-RR) controls a rotating prism in the AOT. Rotating the prism permits the viewer to view any of six 60° sectors, Front Left (FL), Forward (F) and Front Right (FR), Rear Left (RL), Rear (R) and Rear Right (RR). NOTE: The position of the image on the screen will shift as the rotary is switched to a new position. This is normal as the AOT does not provide compensation for the prism movement.
3M7	AOT COUNTER 4-PLACE DIGITAL DISPLAY	This four-digit indicator displays, in degrees, the rotation of the Reticle Control Knob. The extreme right digit displays tenths of degrees.
3H4	EYEPIECE LOCK	This lever locks the eyepiece in one of its positions as selected by the crew.



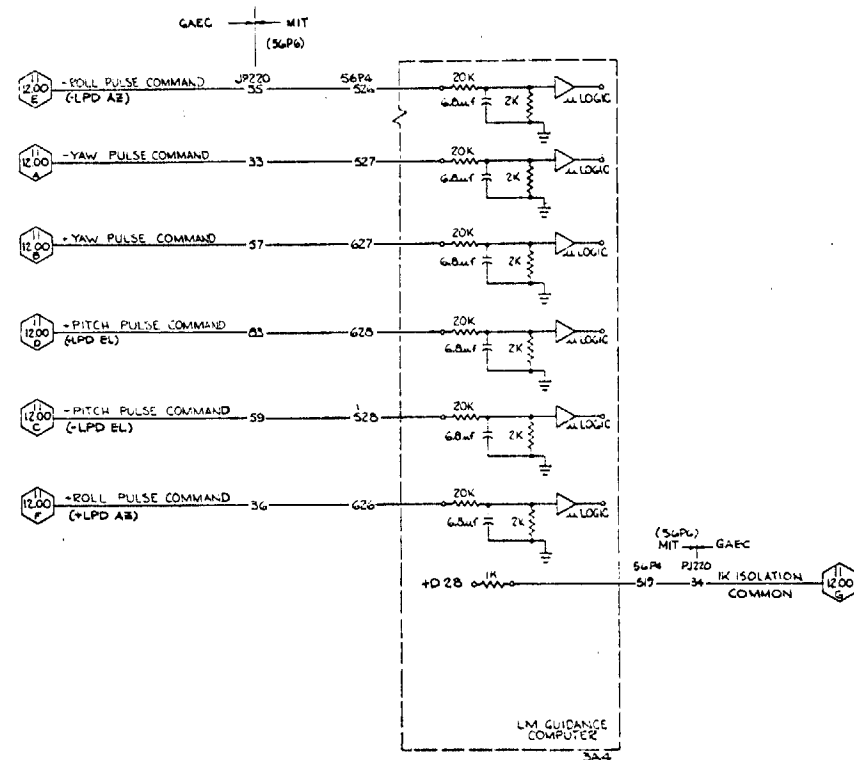
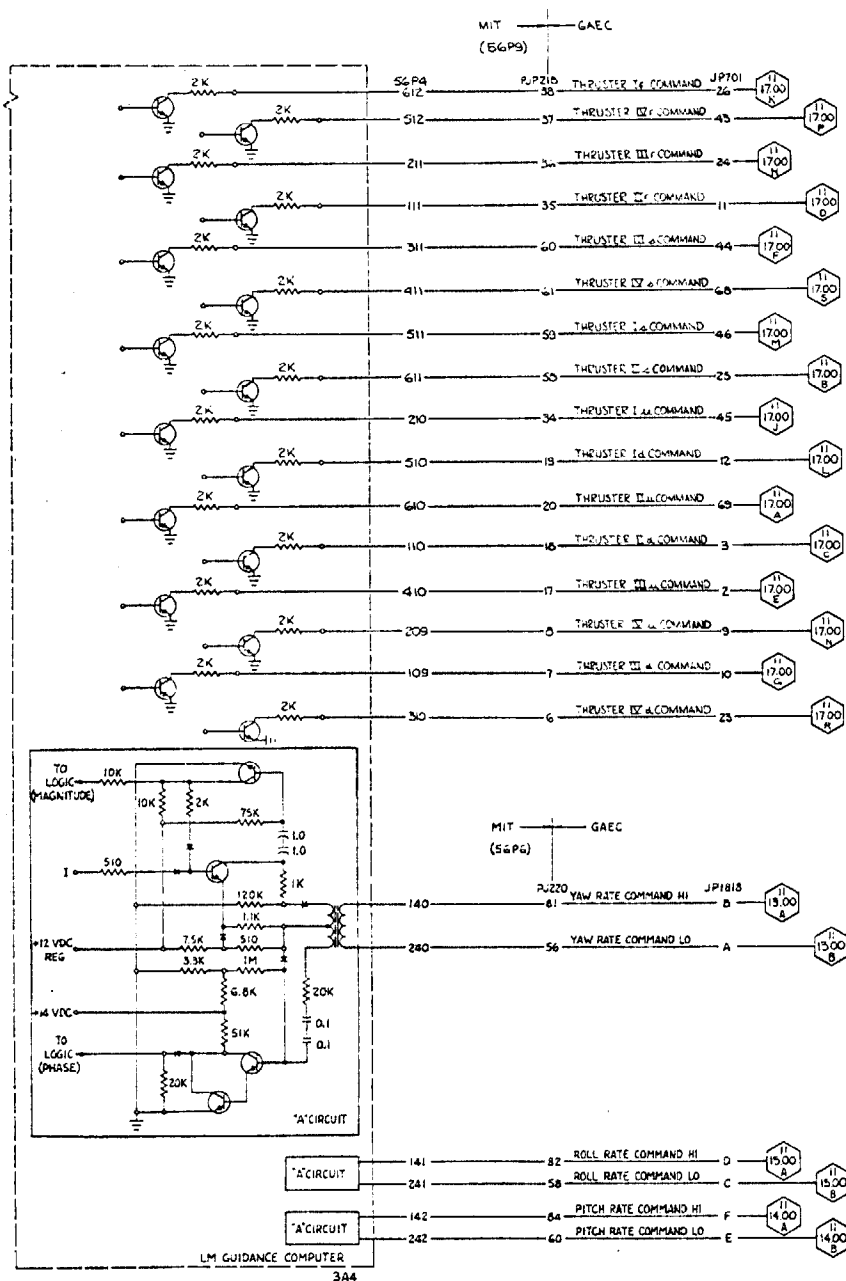


GRUMMAN AIRCRAFT ENGINE CORP	
POMF(S) (M) (C) (S) (L) (G) (S) (I) (N) (A) (L) (S) (F) (R) (O) (M)	
CONTROL ELECTRONICS SYS	
CONFIDENTIAL NO 26212	
MODEL LM	SHEET NO 501
LDW267-57003	



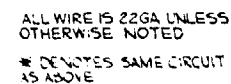
ALL WIRE IS 22GA UNLESS OTHERWISE NOTED

GRIMMAN AIRCRAFT ENGINE COMP
PCN5(MIT) SN 4 C
LOG SIGNALS FROM RCS
LM LDW357-57003 400 B

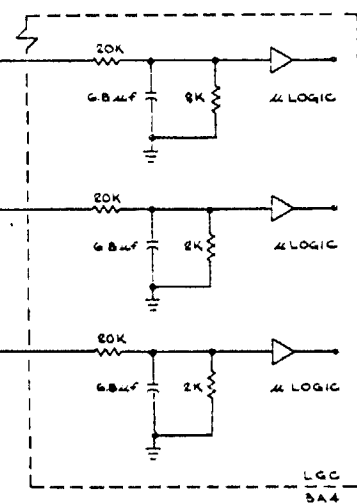


ALL WIRING IS 26 GA
UNLESS OTHERWISE
NOTED

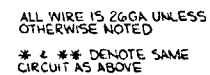
GERMAN SUBVET ENJO CORP	
DESIGNATED FOR USE	
ROTATION & THRUSTER ON-OFF	
COMMANDS	
CODE	IDENT NO. 1571
MODEL	LM
LDW267-57003	800 15



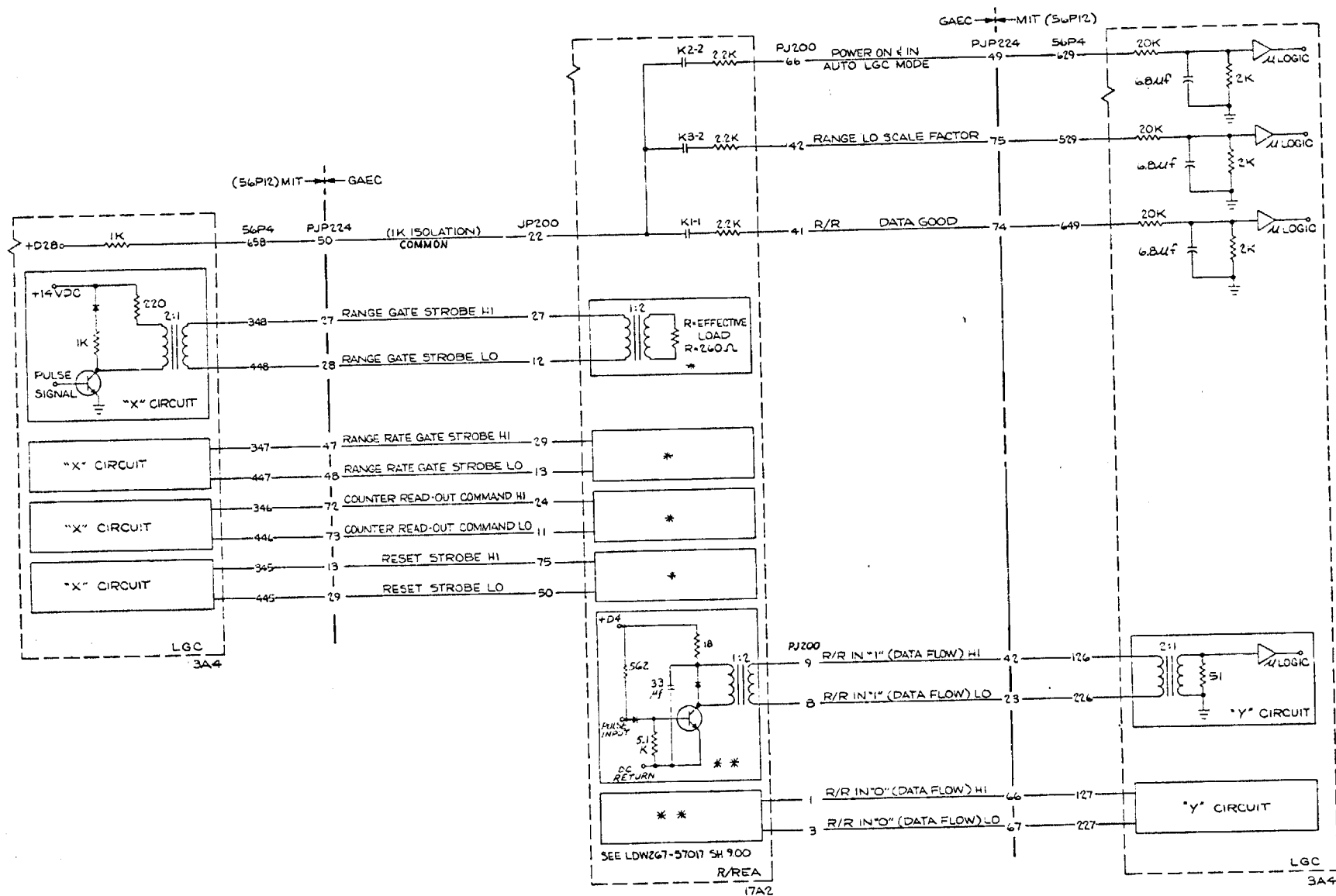
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PGASMT-ONEC DESCENT RATE MONITORING	
CDS 2007 11 18512	
LOW207-00008	LOW207-00008



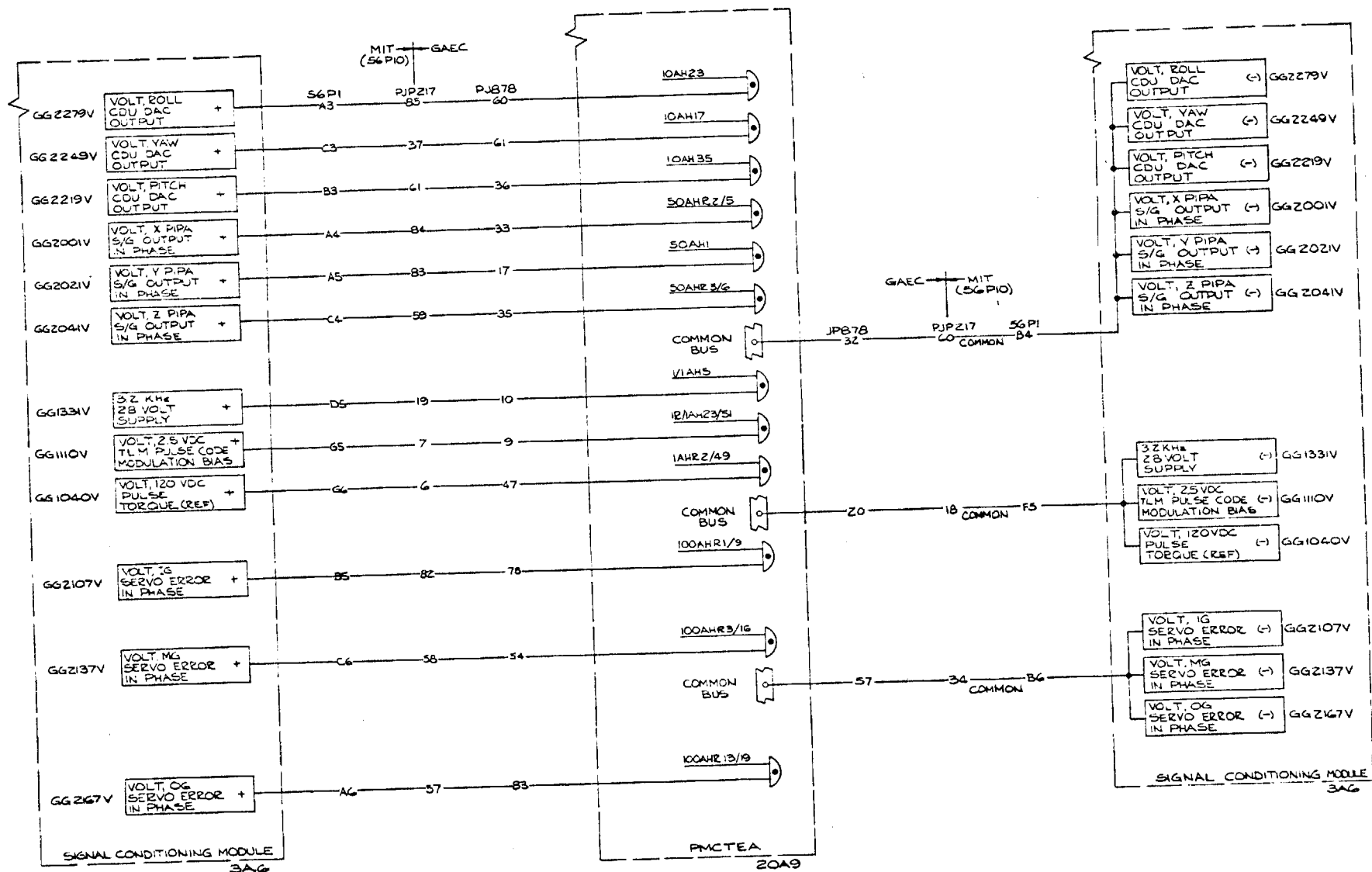
GRUMMAN AIRCRAFT ENGRG CORP			
PWS(MI)IGNIC LUG SIGNALS FOR GUMBLE THROTTLE ENGINE ON OFF RATE OF DESCENT CONTROL			
CODE IDENT NO 265E			
MODEL 1M	LDW267-57003		WEEK 901



GRADYAN AIRCRAFT ENRG CORP	
INPUT & OUTPUT SIGNALS FOR LGC & LANDING RADAR	
C366 10417 40 2512	
MODEL CM	LDW267-57003
	11.00

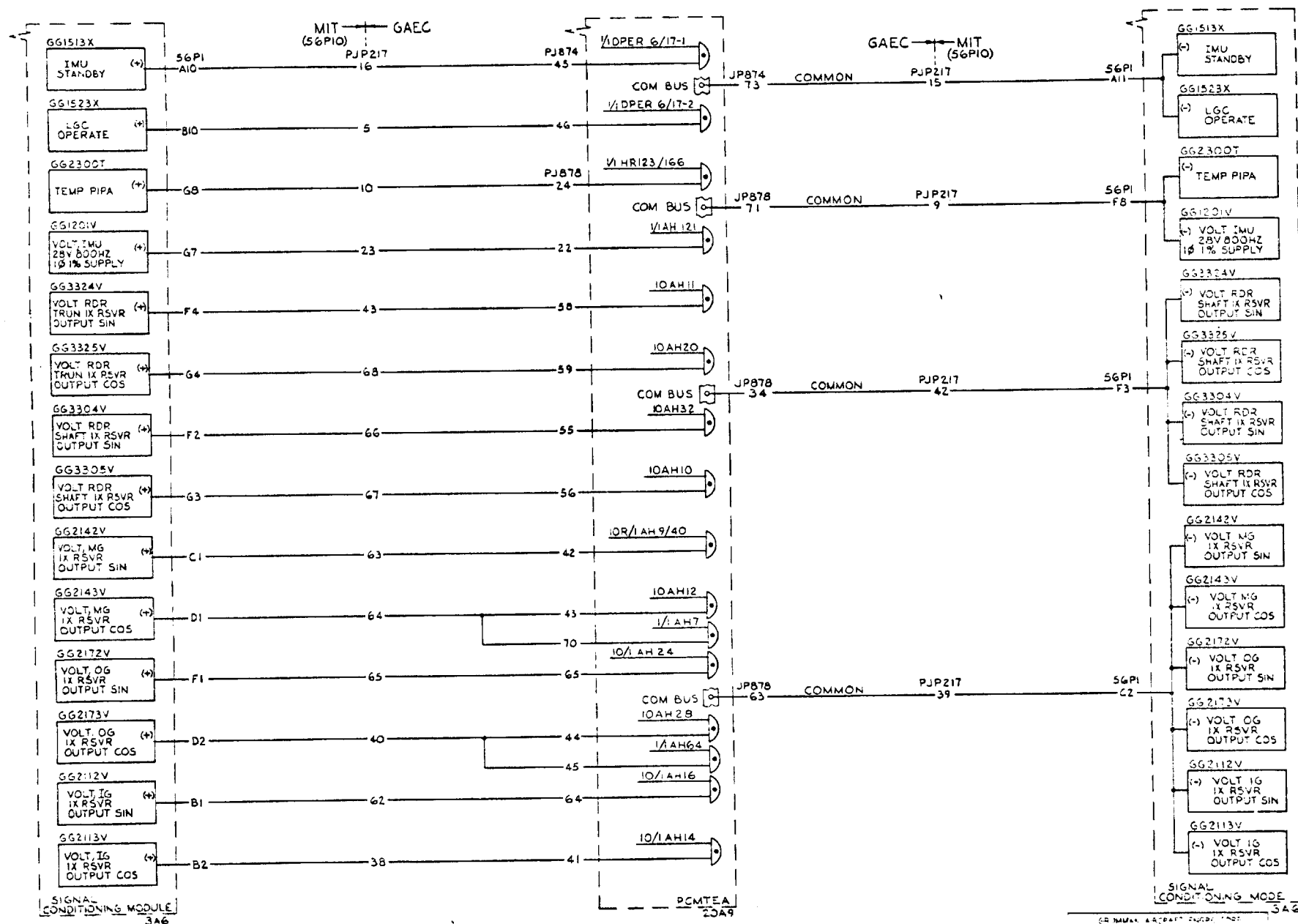


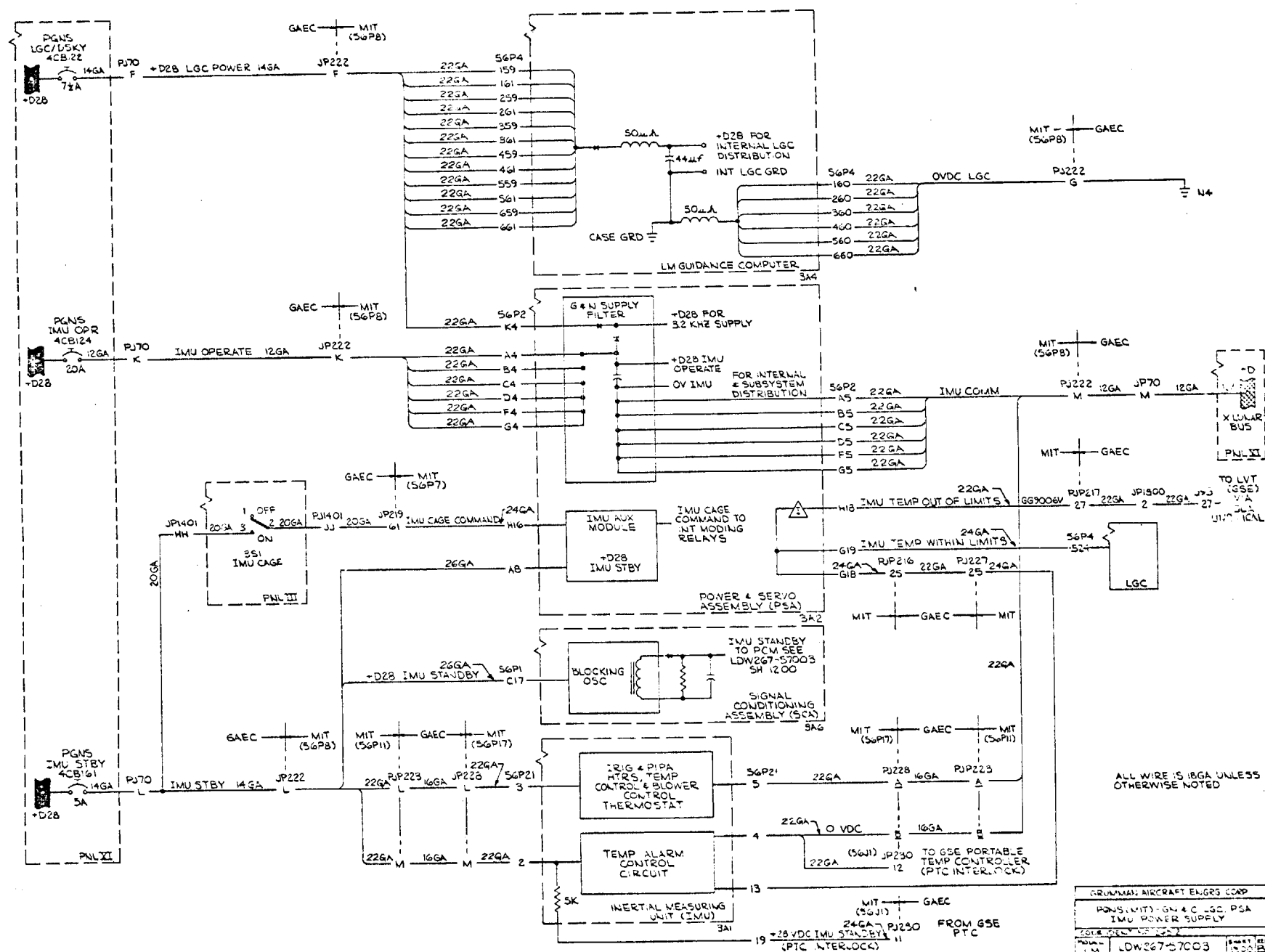
ALL WIRE IS 26 GA UNLESS OTHERWISE NOTED
 * * * DENOTE SAME CIRCUIT AS ABOVE



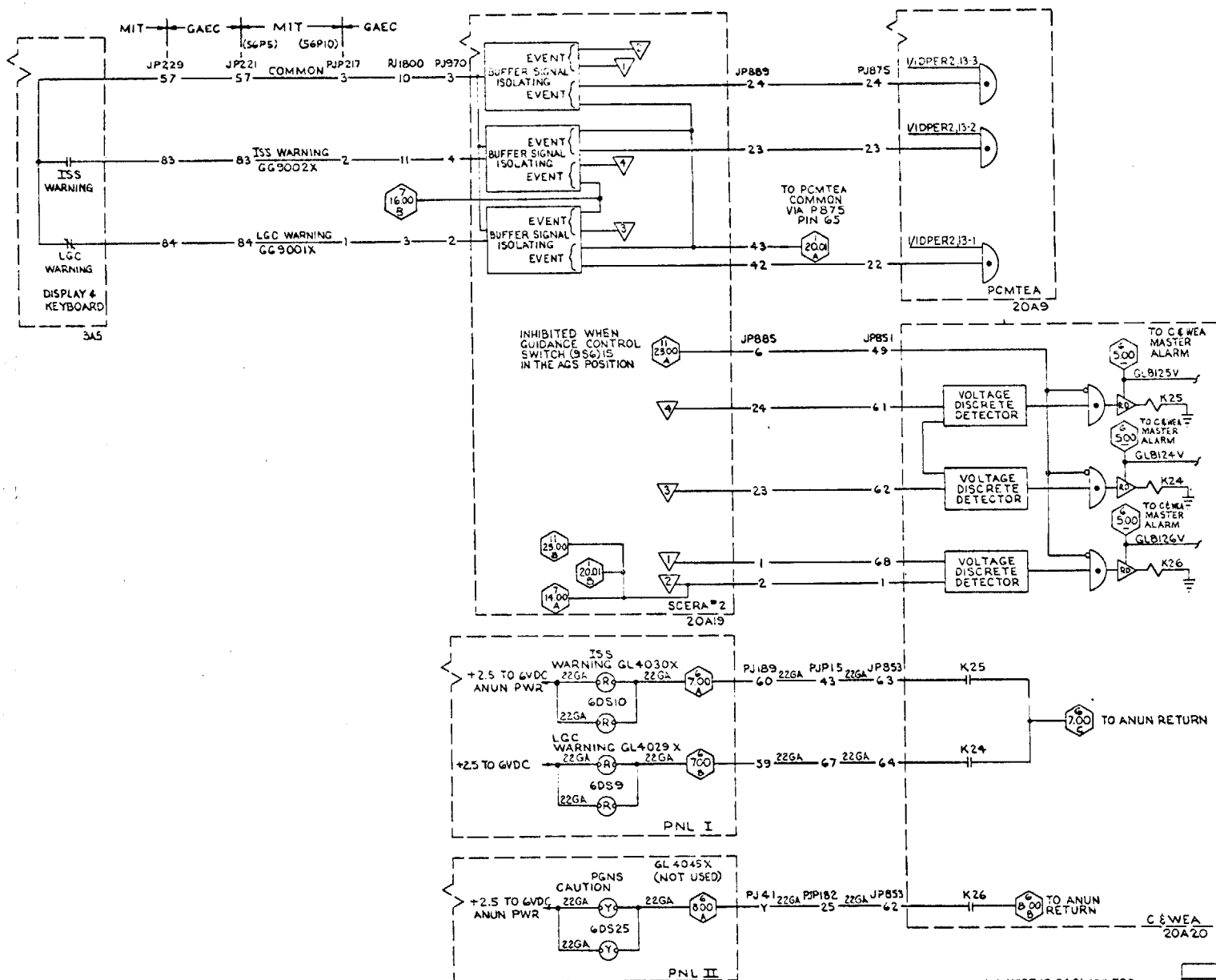
ALL WIRE IS 26GA
UNLESS OTHERWISE
NOTED

GRUMMAN AIRCRAFT ENGINE CORP	
PGNS(MIT) GN4C OPER INST	
CODE IDENT NO 20A9	
MODEL LM	SHEET NO 1200 B



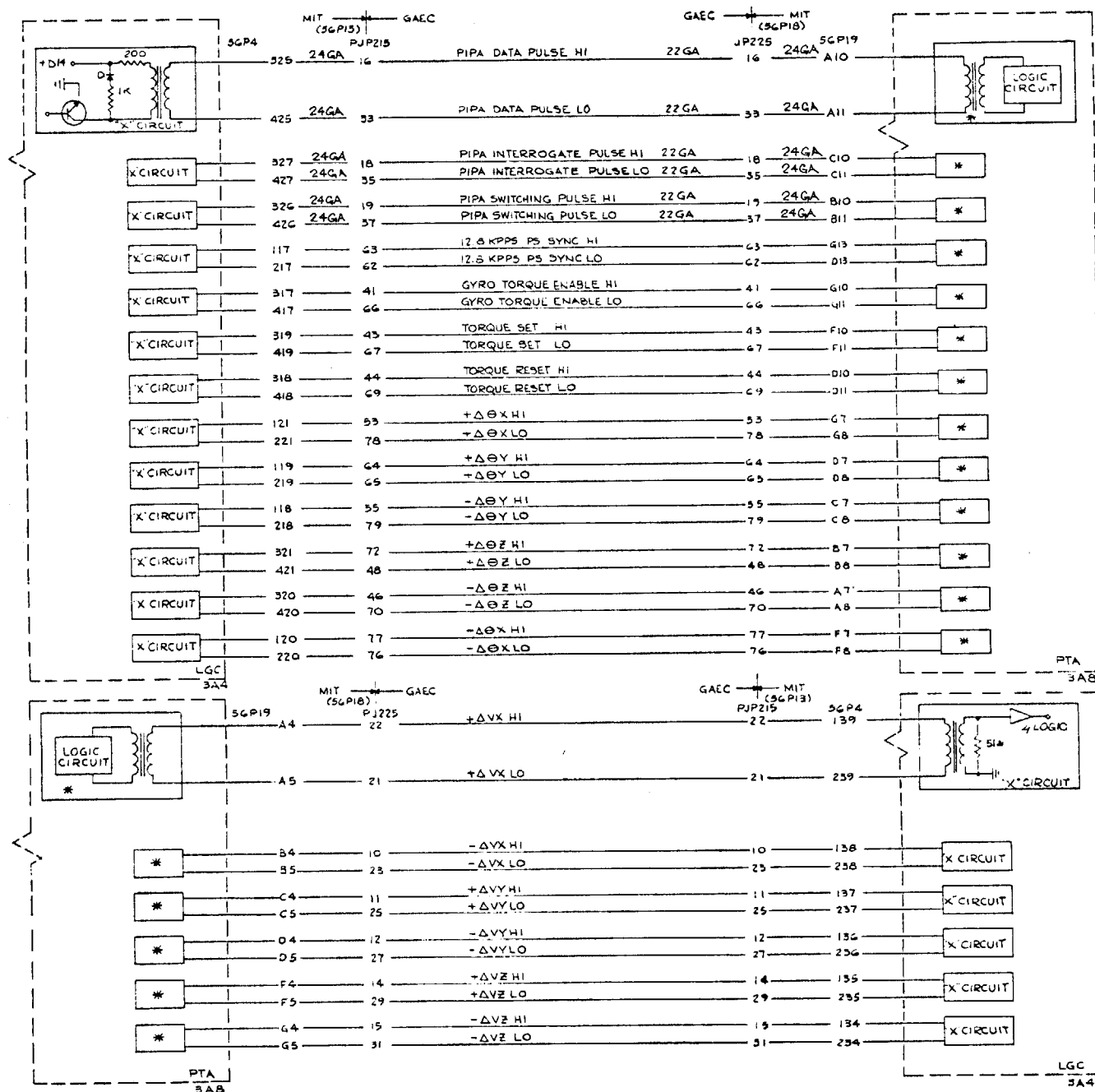


GRUMMAN AIRCRAFT ENGRS CORP			
CONST/INT-GN 4 C LSC PSA			
IMU POWER SUPPLY			
SOLE AGENT			
MODEL 1M	LDW267-57003		SHEET 1 OF 1



ALL WIRE IS 22GA UNLESS OTHERWISE NOTED

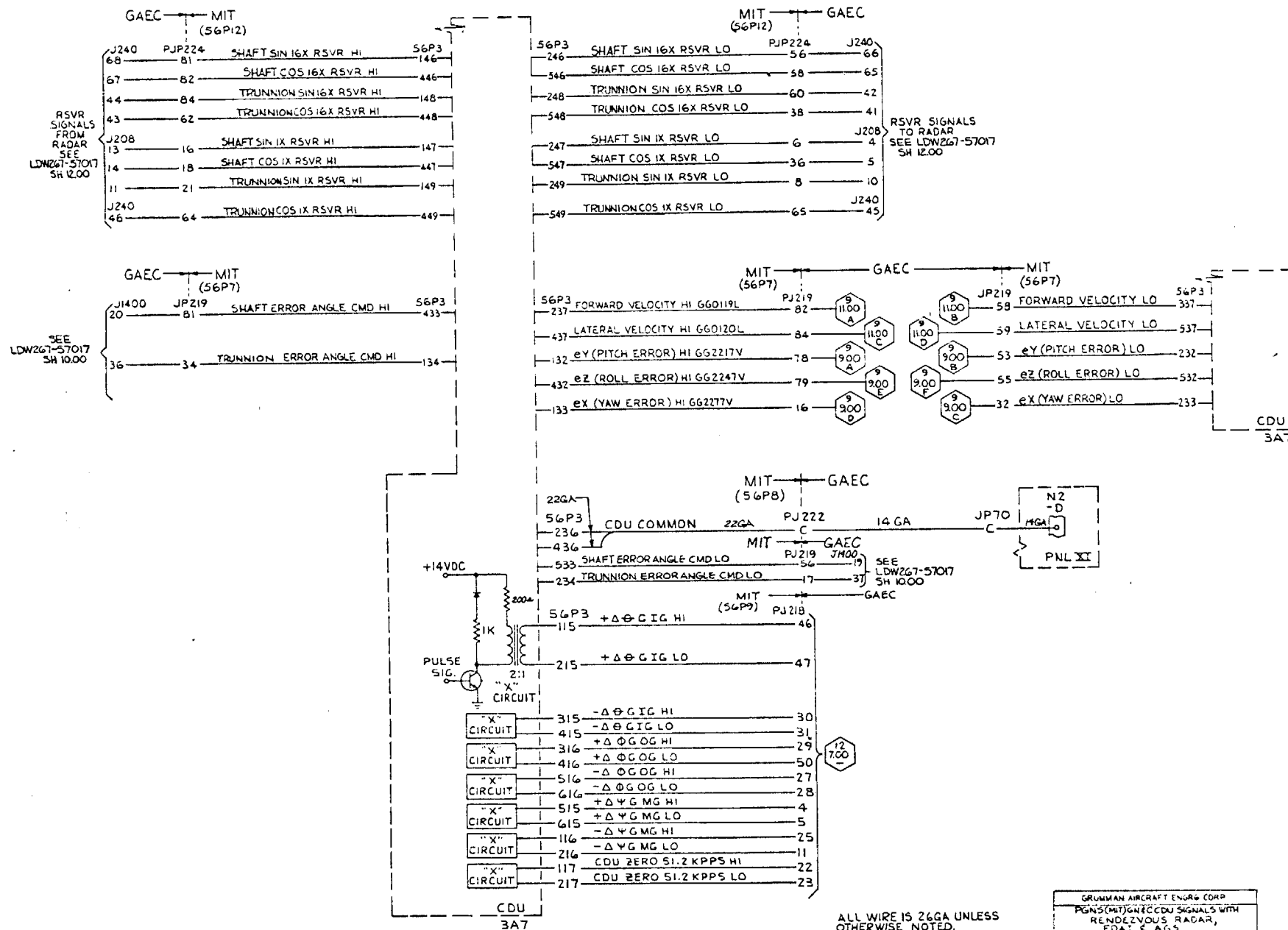
GRUMMAN AIRCRAFT ENGINEERING CORP.	
PGNS (M/T) GN 4 C	
INST. & C/W	
ALARM INDICATION	
CODE: 100000 3012	
MODEL	LDW267-57003
DATE	14-00-8

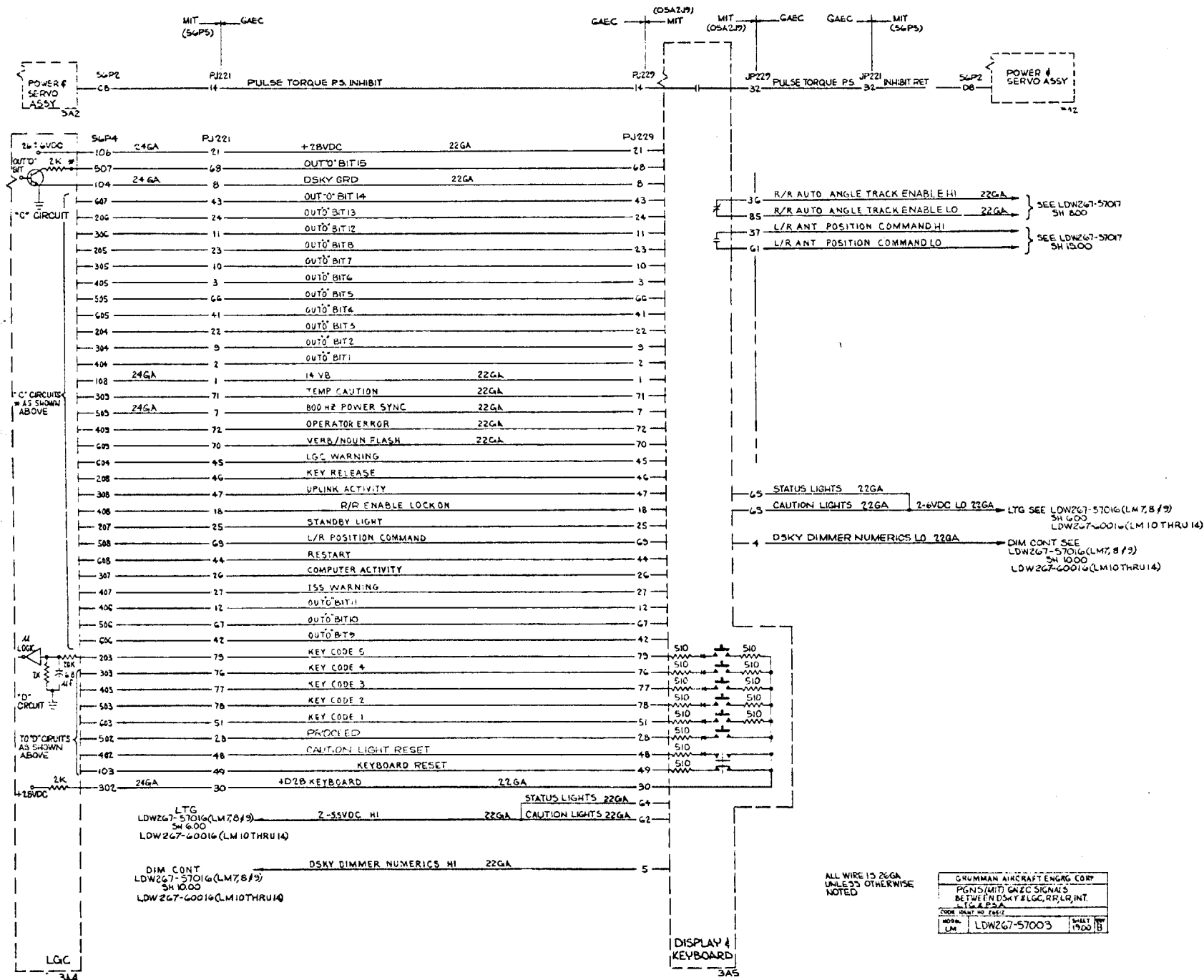


ALL WIRE IS 26GA UNLESS OTHERWISE NOTED

* DENOTES SAME CIRCUIT AS ABOVE

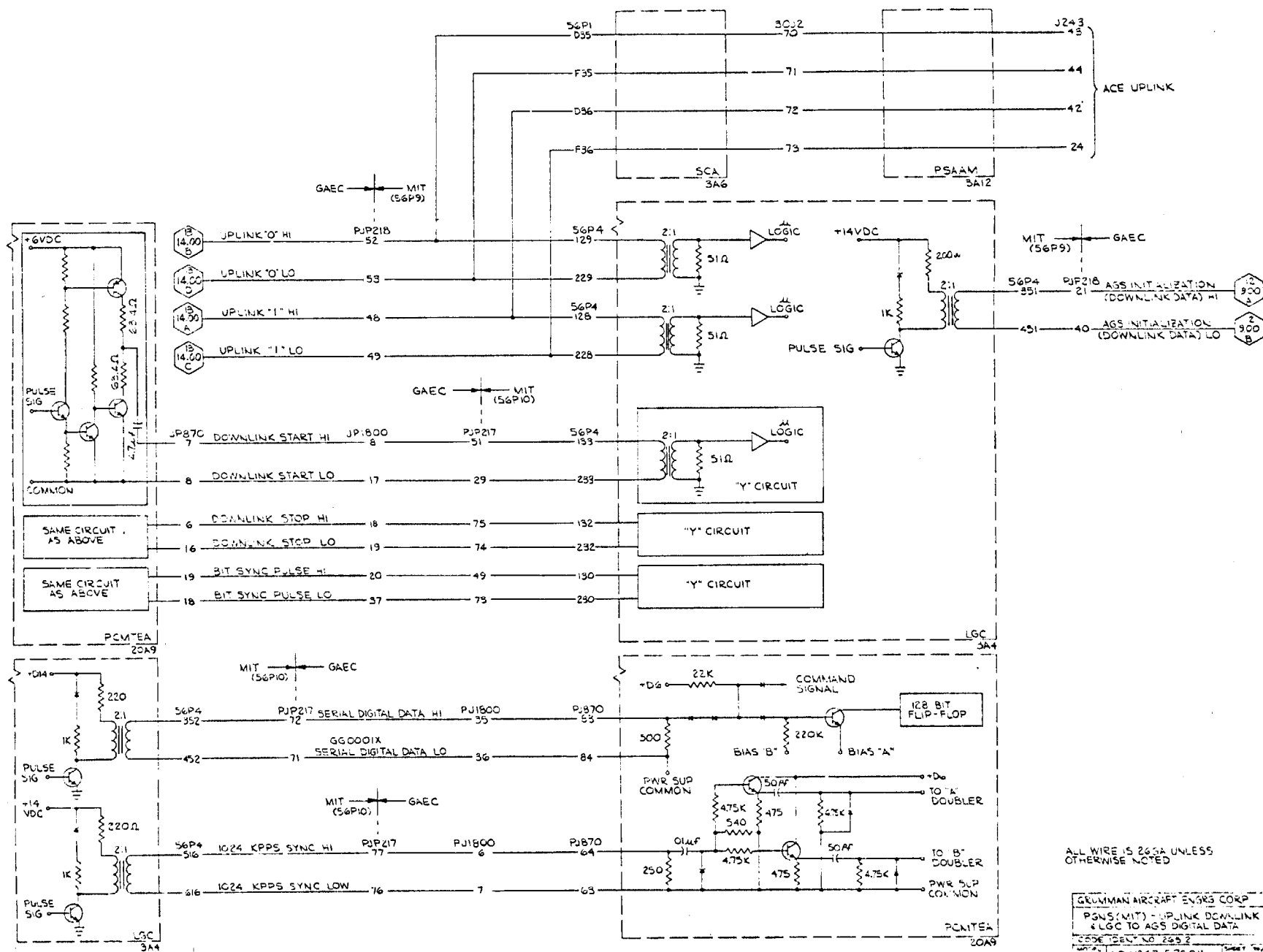
JOHNSON AIRCRAFT ENGINE CORP		
PENS (MIT) ON 6 C VELOCITY		
SIGNALS BETWEEN LGC & PTA		
CODE 180740 7051		
MODEL	LDW267-57003	SHEET 1001 B





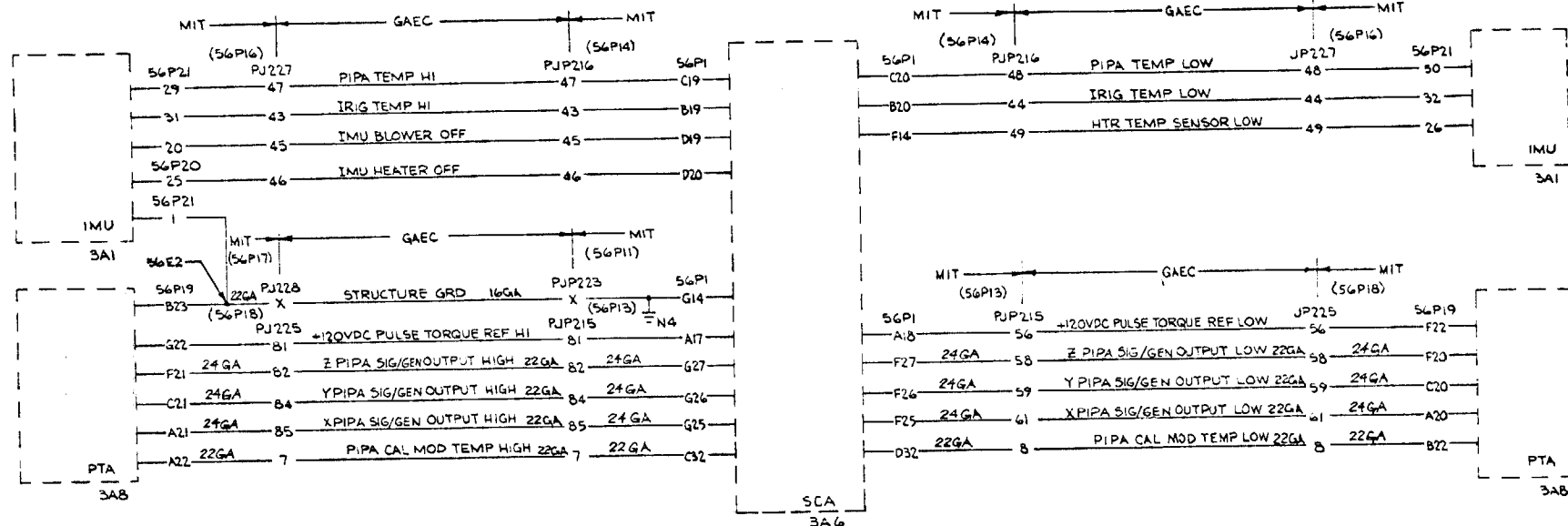
ALL WIRE IS 26GA
UNLESS OTHERWISE
NOTED

GRUMMAN AIRCRAFT ENGRG CORP		
PGNS(MIT) GN2C SIGNALS		
BETWEEN DSKY & LGC, RR, LR, INT.		
LIG & PSA		
CODE IDENT NO F4512		
MODEL LN	LDW267-57003	SHEET 1900



ALL WIRE IS 26 GA UNLESS OTHERWISE NOTED

GUMMAN AIRCRAFT ENGINE CORP
RGS(MIT) - UPLINK DOWNLINK & LGC TO AGS DIGITAL DATA
CODE REL NO 2492
LDW267-57003



ALL WIRE IS 26GA UNLESS
OTHERWISE NOTED

GRUMMAN AEROCRAFT ENGINE CORP
PONS/MIT/GAEC IMU/PTA
RAN/ALIS TO SCA
2000-0000-0000-0000

LM ELEMENTARY FUNCTIONAL
DIAGRAM

(Functional Grouping No. 4)

ELECTRICAL POWER SUBSYSTEM

(REF LDW 267-57004 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
EPS	LDW390-54000	R	S1, S2, T1, T2

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	4-701
b) Applicable Documents, Table of Contents, and Revisions	4-702 thru 4-702.2
c) Cabin Location of Electrical Power Subsystem	4-703
d) Electrical Power Subsystem Controls and Indicators Layout	4-704 thru 4-704.2
e) Electrical Power Subsystem Control and Indicator Functional Description	4-705 thru 4-705.24
f) EPS-Block Diagram	LDW267-57004 SH 4.00B
g) EPS-DC Power System	LDW267-57004 SH 5.00C
h) EPS-Descent ECA 1 Control	LDW267-57004 SH 6.00B
i) EPS-Descent ECA 2 Control	LDW267-57004 SH 6.01B
j) EPS-Ascent ECA 3 Control	LDW267-57004 SH 7.00B
k) EPS-Ascent ECA 4 Control	LDW267-57004 SH 7.01B
l) EPS-Abort & Deadfacing Control	LDW267-57004 SH 8.00B

2. Table of Contents (Continued)

ITEM NAME	PAGE NO./SHEET NO.
m) EPS-Prelaunch & CM Control	LDW267-57004 SH 9.00C
n) EPS-LMP Panel XVI DC BUS Distribution	LDW267-57004 SH 10.00C
o) EPS-LMP Panel XVI DC BUS Distribution	LDW267-57004 SH 10.01C
p) EPS-CDR Panel XI DC BUS Distribution	LDW267-57004 SH 11.00B
q) EPS-CDR Panel XI DC BUS Distribution	LDW267-57004 SH 11.01C
r) EPS-Sensor Power Fuse Assembly 4A9	LDW267-57004 SH 12.00C
s) EPS-Sensor Power Fuse Assembly 4A10	LDW267-57004 SH 12.01C
t) EPS-AC Power System, Distribution & Window Heaters	LDW267-57004 SH 13.00B
u) EPS-Intervehicle Wiring-Systems A&B	LDW267-57004 SH 14.00B
v) EPS-Battery & Bus Fault Indication Circuit	LDW267-57004 SH 15.00C
w) EPS-Caution & Warning	LDW267-57004 SH 16.00B
x) EPS-Voltage Monitoring	LDW267-57004 SH 17.00B
y) EPS-Battery Current Monitoring	LDW267-57004 SH 18.00B
z) EPS-Descent Battery Status Display	LDW267-57004 SH 19.00B
aa) EPS-Ascent Battery Status Display	LDW267-57004 SH 20.00B
bb) EPS-800 Hz Power Distribution	LDW267-57004 SH 21.00B
cc) EPS-800 Hz Power Distribution Block Diagram	LDW267-57004 SH 22.00B

3. REVISIONS

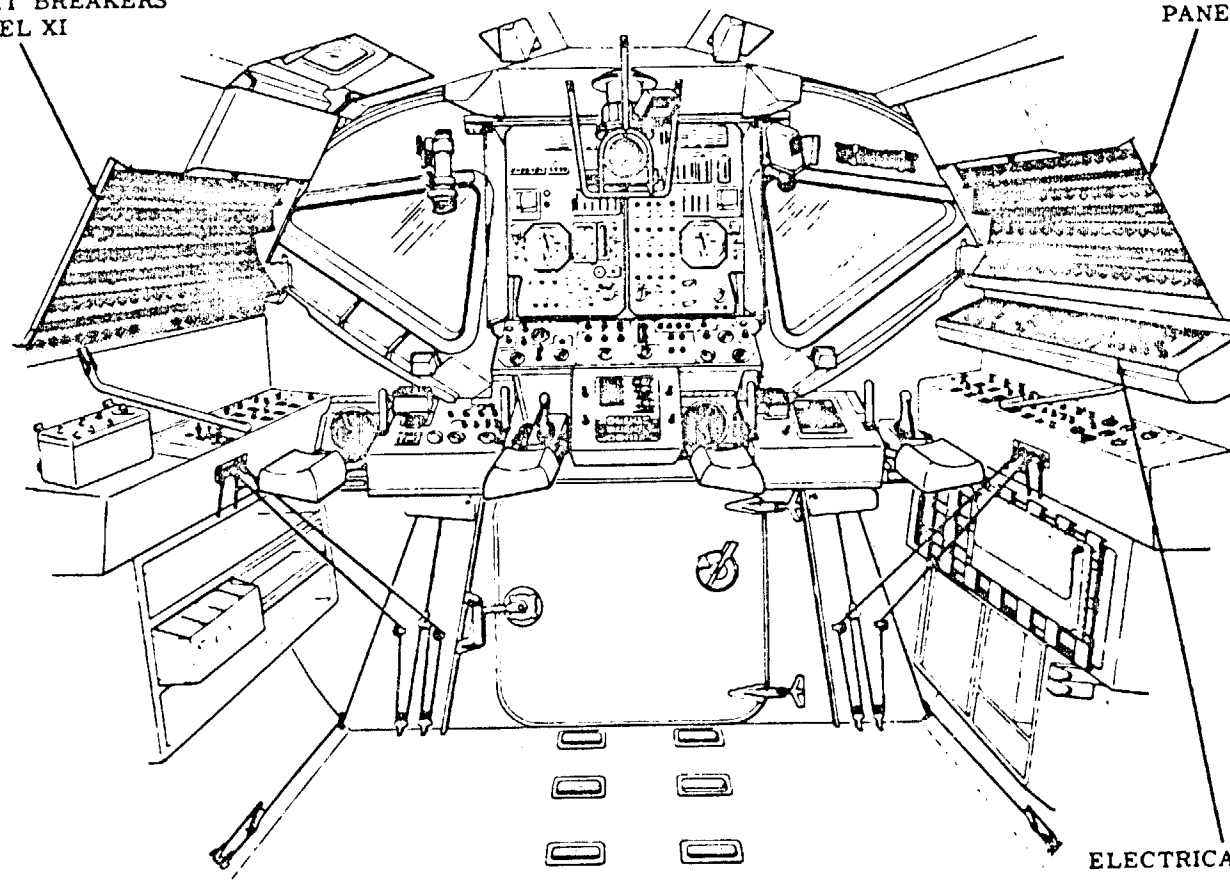
REV	PAGE NO. AND/OR LDW267-57004, SHEET NO.	LCD	DESCRIPTION
A	4-704.2 4-705.7 10.01	3688B	IMPROVEMENT OF ECS/SUIT TEMPERATURE PERFORMANCE

3. REVISIONS (Cont)

REV	PAGE NO. AND/OR LDW267-57004, SHEET NO.	LCD	DESCRIPTION
B	4-704, 4-705.4 5.00, 10.00, 10.01, 11.01, 15.00, 16.00, 17.00	5055	EPS TROUBLESHOOTING MODIFICATION
	12.01	5149	BACK-UP PRESS. DES H ₂ O XDUCER
	12.01	5226	VHF RCVR B AGC MEASUREMENT
	4.00, 5.00, 15.00	3294	DELETION OF BAT. FROM DES STAGE LM
	13.00	5395	WINDOW HTR BUS LEADS REPLACEMENT & WINDOW STRESS STUDIES
C	4-704, 4-705.2	5157	ADDITION OF CIRCUIT BREAKER GUARDS ON PANELS 11 & 16
	12.01	5226B	ADD VHF RECEIVER B AGC MEASUREMENT
	4-704.1, 4-705.23, 5.00, 9.00, 11.01	5297C	PROVIDE LM CAPABILITY TO ACCEPT CSM PWR AFTER STAGING
	10.01	5467B	ADDITION OF CIRCUIT BREAKER CAP TO RCS QUAD I CIRCUIT BREAKER (4CB222)
	12.01	5502	TRANSDUCER INSTALLATION FOR APS HELIUM PRESSURE AND H ₂ O LINE TEMPERATURE

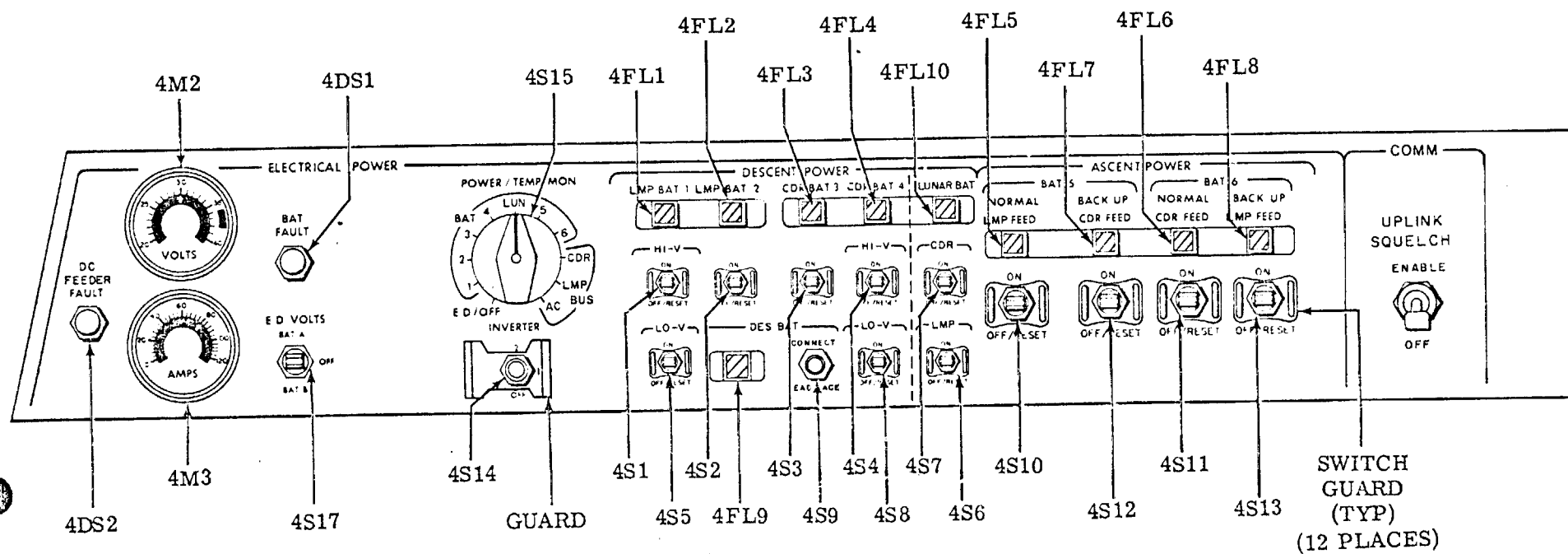
CDR'S CIRCUIT BREAKERS
PANEL XI

LMP'S CIRCUIT BREAKERS
PANEL XVI



ELECTRICAL POWER
LMP PANEL XIV

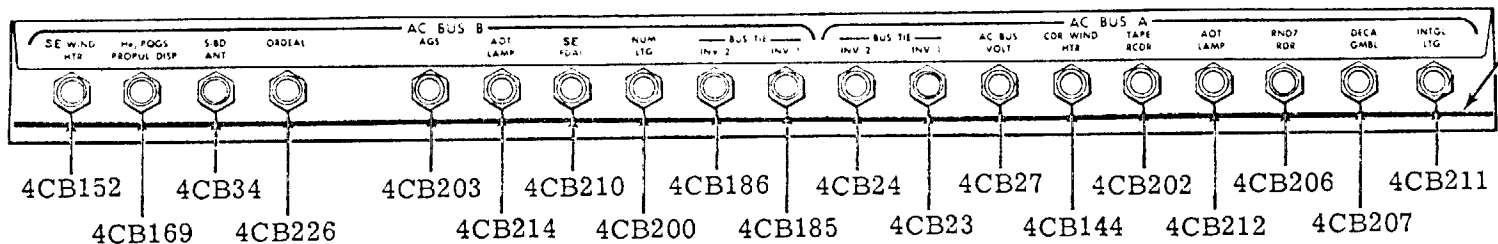
Cabin Location of Electrical Power Subsystem Controls and Indicators



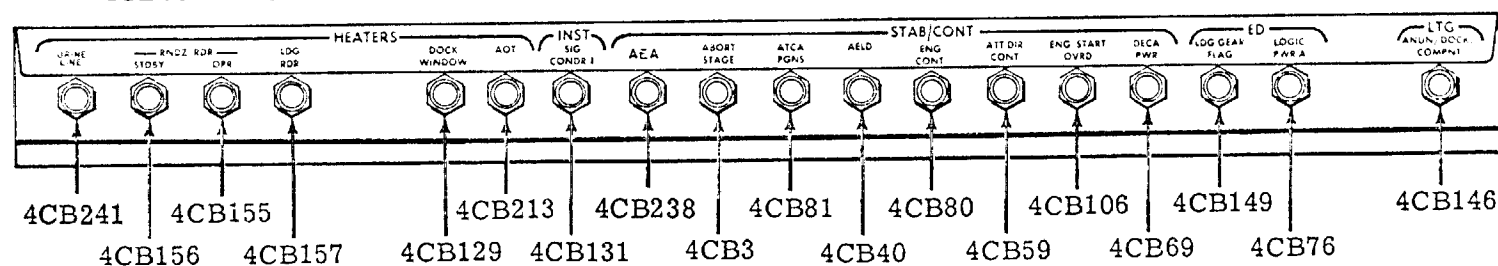
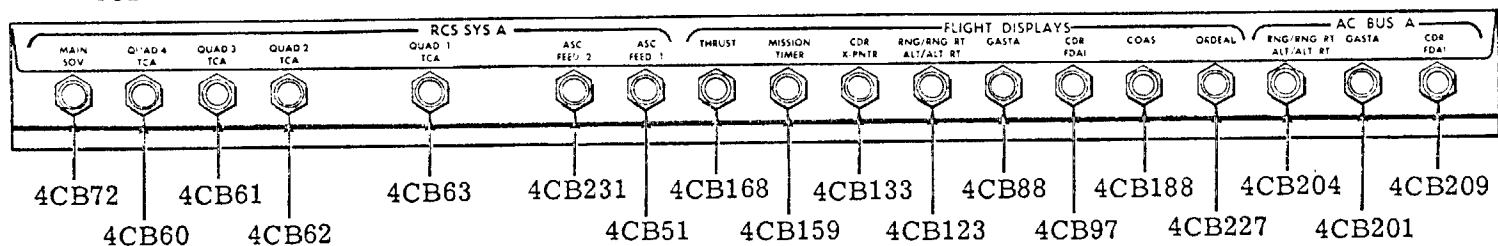
PNL 14
(XIV)

Electrical Power Subsystem Controls and Indicators Layout

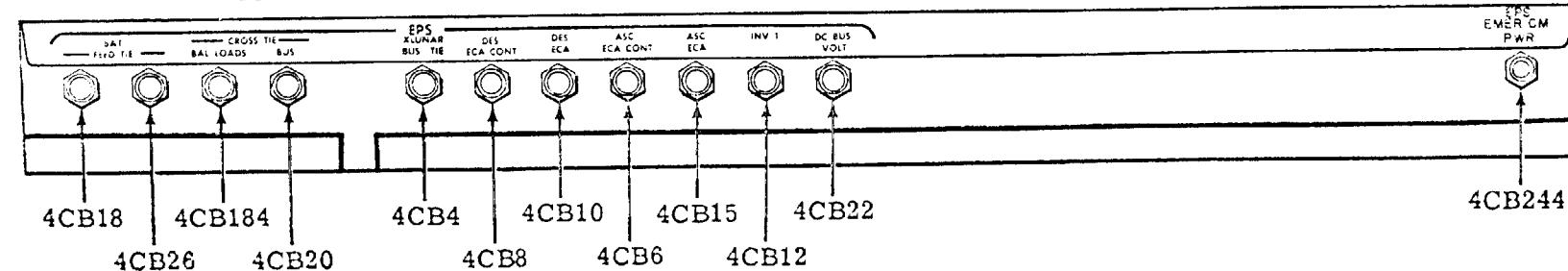
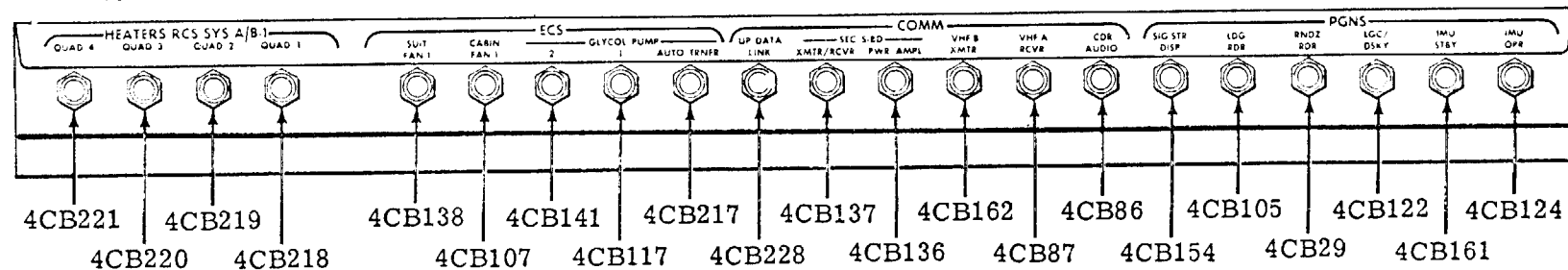
4-704
REV. C



CIRCUIT BREAKER
GUARD (TYP)



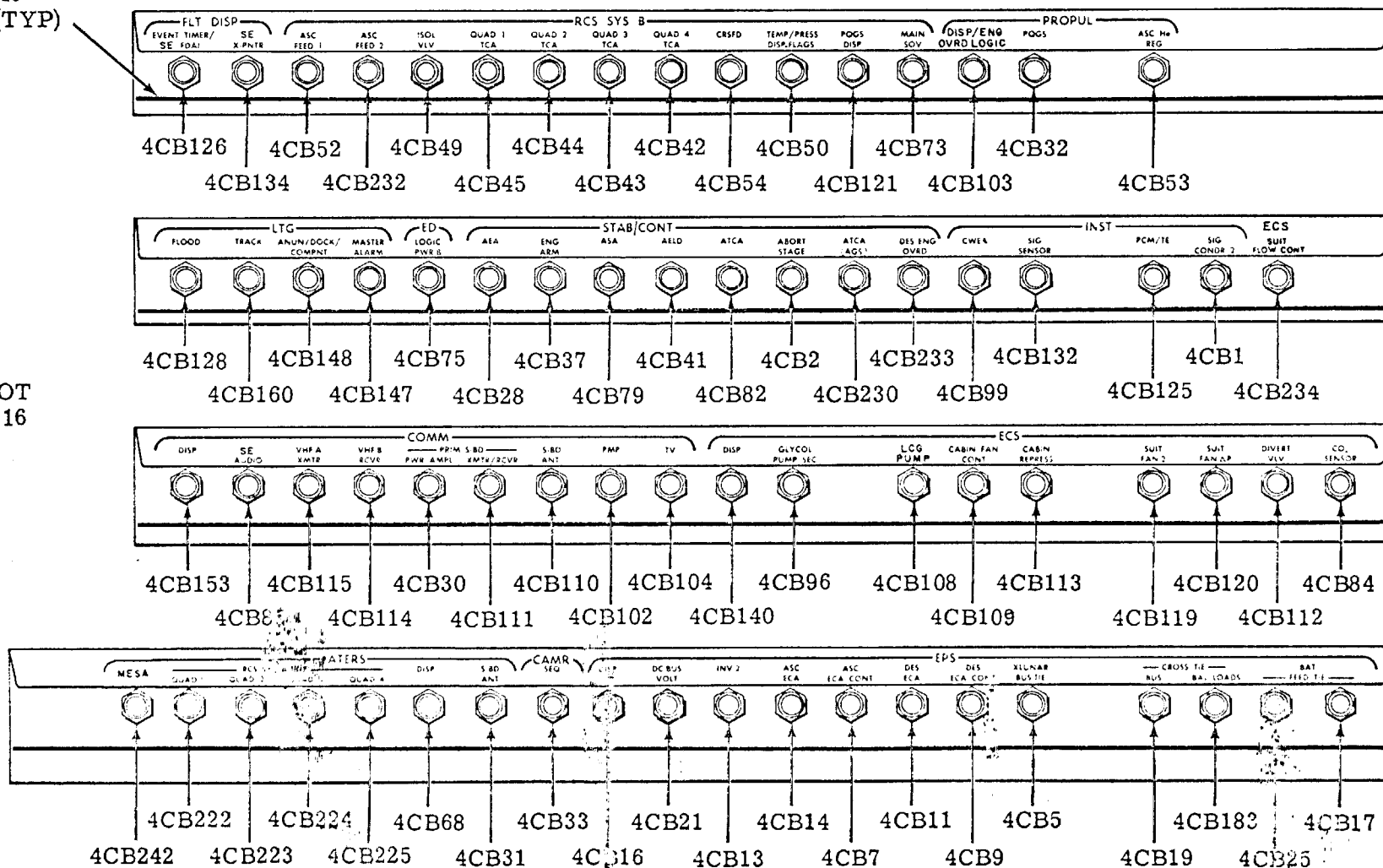
COMMANDER
PANEL 11
(XI)



Electrical Power Subsystem Controls and Indicators Layout

CIRCUIT
BREAKER
GUARD (TYP)

LM PILOT
PANEL 16
(XVI)



Electrical Power Subsystem Controls and Indicators Layout

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Code	Control/Indicator	Function
4S1 4S2 4S3 4S4	DESCENT BATTERY #1 HIGH VOLTAGE SWITCH DESCENT BATTERY #2 HIGH VOLTAGE SWITCH DESCENT BATTERY #3 HIGH VOLTAGE SWITCH DESCENT BATTERY #4 HIGH VOLTAGE SWITCH FOUR 3-POSITION TOGGLES MOM-MAIN-MOM	Each three-position toggle (ON-OFF/RESET) controls the high voltage power output from one of the four descent batteries. Selecting the ON position will place the high voltage battery tap on the line. Selecting the OFF/RESET position disconnects the High Voltage or Low Voltage battery tap from the line. The ECA connects the battery to the power feeder wires. In the event of over current, the ECA will trip this battery off the line. Positive indication of the tripped status of each battery is provided by display flags 4FL1, 4FL2, 4FL3, and 4FL4.
4S5 4S6 4S7 4S8	DESCENT BATTERY #1 LOW VOLTAGE SWITCH DESCENT BATTERY #2 LOW VOLTAGE SWITCH DESCENT BATTERY #3 LOW VOLTAGE SWITCH DESCENT BATTERY #4 LOW VOLTAGE SWITCH FOUR 3-POSITION TOGGLES MOM-MAIN-MOM	Each three-position toggle (ON-OFF/RESET) controls the low voltage power output from one of the four descent batteries. Selecting the ON position will place the low voltage battery tap on the line. Selecting the OFF/RESET position disconnects the Low Voltage or High Voltage battery tap from the line. The ECA connects the battery to the power feeder wires. In the event of over current, the ECA will trip this battery off the line. Positive indication of the tripped status of each battery is provided by display flags 4FL1, 4FL2, 4FL3 and 4FL4.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Code	Control/Indicator	Function
4S9	DESCENT BATTERIES SWITCH 3-POSITION TOGGLE MOM (CONNECT - MAINTAIN- LOCK MOM (DEADFACE)	This three-position toggle enables power interruption of the descent batteries feed path to the ascent stage. The switch is normally placed in the CONNECT position and then released, thus allowing power flow from the descent batteries to the ascent stage. Selecting the DEADFACE position initiates the deadface relays, thus isolating the descent batteries upstream from the staging guillotine (ascent side). The switch may be placed in the CONNECT position again and the descent battery power feed path is restored. Positive indication of descent battery connection is provided by display flag 4FL9.
4S10 4S11	ASCENT BATTERY #5 - NORMAL FEED SWITCH ASCENT BATTERY #6 - NORMAL FEED SWITCH TWO 3-POSITION TOGGLES MOM-MAIN-MOM	These three-position toggles (ON-OFF/RESET) normally control ascent battery #5 and ascent battery #6 power feed paths to the LM Pilots and Commanders DC buses respectively. Selecting the ON position will place the battery on the line. Selecting the OFF/RESET position disconnects the battery from the line and resets the contactors in the Electronic Control Assembly (ECA) for overcurrent protection. The ECA connects the battery to the DC bus and will disconnect the battery in the event of an over-current. Positive indication of the tripped status of each battery is provided by display flags 4FL5 and 4FL6.
4S12 4S13	BATTERY #5 BACKUP FEED SWITCH BATTERY #6 BACKUP FEED SWITCH TWO 3-POSITION TOGGLES MOM-MAIN-MOM	These three-position toggles (ON-OFF/RESET) control the ascent battery #5 and ascent battery #6 backup feed paths to the Commanders and LM Pilots DC buses respectively. Selecting the ON position will place the battery on the line via the backup feed path. Selecting the OFF/RESET position disconnects the battery backup feed path from the line. The ECA connects the

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Code	Control/Indicator	Function
4S13 (Cont.)		battery to the DC bus. In the event of battery #6 failure 4S12 will be placed to ON. Positive indication of this backup feed path operation is provided by display flag 4FL7. In the event of battery #5 failure 4S13 will be placed to ON. Positive indication of this backup feed path operation is provided by display flag 4FL8.
4S14	INVERTER SWITCH 3-POSITION TOGGLE LOCK-LOCK-LOCK	This guarded three-position toggle (2-1-OFF) controls ac power to the AC bus. Selecting the INV 1 position permits the #1 inverter to supply power to the AC busses. Selecting the INV 2 position permits the #2 inverter to supply power to the AC busses.
4S15	POWER/TEMPERATURE MONITOR SELECTOR SWITCH 10-POSITION ROTARY	This ten position rotary (ED/OFF-BAT: 1 -2 -3 -4 -5 -6 -BUS: CDR-LMP-AC) enables voltage-current monitoring of batteries 1 through 6 and voltage monitoring of the CDR, LMP or AC busses on meters 4M2 and 4M3. Additionally, over-temperature and current fault monitoring is enabled whenever the switch is in any position 1 through 6 and that particular battery is, in fact, in an over-temperature, reverse or over current condition. This condition is indicated by illumination of the battery fault component caution light (4DS1). Selecting the ED/OFF position enables ED voltage monitoring on 4M2 when 4S17 is utilized.
4S17	ED VOLTAGE MONITOR SWITCH 3-POSITION TOGGLE MOM-MAIN-MOM	This three-position toggle (BAT A-OFF-BAT B) enables ED voltage monitoring of each pyrotechnics battery provided 4S15 is in the ED/OFF position. BAT A position enables monitoring BAT A. BAT B position enables monitoring BAT B.

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Code	Control/Indicator	Function
4M2	VOLTMETER	This meter will indicate the voltage of any of the six EPS batteries, two pyrotechnic batteries, the LMP the CDR or ACbus depending on the position of 4S15 and 4S17.
4M3	AMMETER	This meter will indicate the current of any of the six EPS batteries depending on the position of 4S15. Descent battery current is meter heading divided by 2. Ascent battery current is read directly.
4FL1 4FL2 4FL3 4FL4	DESCENT BATTERY #1 STATUS DESCENT BATTERY #2 STATUS DESCENT BATTERY #3 STATUS DESCENT BATTERY #4 STATUS FOUR 3-POSITION FLAGS	Each flag (GRAY-LO-BARBERPOLE) indicates that the battery High Voltage Tap is on the line when the GRAY position is in view. The Low Voltage Tap is on the line when the LO position is in view. The battery is off the line when the BARBERPOLE position is in view.
4FL5	ASCENT BATTERY #5 NORMAL FEED STATUS 2-POSITION FLAG	This flag (GRAY-BARBERPOLE) indicates that battery #5 is powering the LM Pilot's bus through this normal feed path when the GRAY position is in view. In the BARBERPOLE position, battery #5 is not feeding the LM Pilot's bus.
4FL6	ASCENT BATTERY #6 NORMAL FEED STATUS 2-POSITION FLAG	This flag (GRAY-BARBERPOLE) indicates that battery #6 is powering the Commander's bus through this normal feed path when the GRAY position is in view. In the BARBERPOLE position, battery #6 is not feeding the Commander's bus.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Code	Control/Indicator	Function
4FL7	ASCENT BATTERY #5 BACKUP FEED STATUS 2-POSITION FLAG	This flag (GRAY-BARBERPOLE) indicates that battery #5 is powering the Commander's bus through this backup feed path when the GRAY position is in view. In the BARBERPOLE position, battery #5 is not feeding the Commander's bus.
4FL8	ASCENT BATTERY #6 BACKUP FEED STATUS 2-POSITION FLAG	This flag (GRAY-BARBERPOLE) indicates that battery #6 is powering the LM Pilot's bus through this backup feed path when the GRAY position is in view. In the BARBERPOLE position, battery #6 is not feeding the LM Pilot's bus.
4FL9	DESCENT BATTERY STATUS 2-POSITION FLAG	This flag (GRAY-BARBERPOLE) indicates whether the descent deadface has been accomplished. The GRAY position indicates that the descent battery feeders are connected to the ascent stage. The BARBERPOLE position indicates that the descent batteries have been disconnected and deadfaced from the ascent stage feeders.
4DS1	BATTERY FAULT COMPONENT CAUTION LIGHT	This light illuminates to indicate a particular battery over-temperature, reverse current, or over-current condition when 4S15 is placed to that battery position and one of the above malfunction conditions exist. A battery over-temperature, reverse current, or over-current condition will illuminate the (BATTERY) caution annunciator (6DS27) and cause the astronaut to determine the battery problem by using 4S15.
4DS2	DC FEEDER FAULT COMPONENT CAUTION LIGHT	This light illuminates to indicate either a DC bus or Main Feeder line grounded.

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NOTE: The primary function of the circuit breaker within the LM is to provide electrical protection. Some of the circuit breakers may also serve as ON-OFF controls. Commander's circuit breakers are located on panel 11, LM Pilot's, on panels 14 and 16.

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Explosive Devices				
4CB75	LOGIC PWR B		X	All explosive devices toggle switches & ED relays.
4CB76	LOGIC PWR A	X		All explosive devices toggle switches & ED relays.
4CB149	LDG GEAR FLAG	X		Landing gear status indicator (2FL1).
Primary Guidance and Navigation				
4CB29	RNDZ RDR	X		This circuit breaker serves as the ON-OFF control for providing prime power to the rendezvous radar.
4CB105	LDG RDR	X		This circuit breaker serves as the ON-OFF control for providing prime power to the landing radar.
4CB122	LGC/DSKY	X		This circuit breaker serves as the ON-OFF control for providing prime power for the LGC & DSKY.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Primary Guidance and Navigation (Cont.)	4CB124	IMU OPR	X	This circuit breaker serves as the ON-OFF control for providing prime power to the IMU, PSA, PTA & CDU.
	4CB154	SIG STR DISP	X	Signal Strength meter (17M1).
	4CB161	IMU STBY	X	This circuit breaker serves as the ON-OFF control for the PIPA and Inertial Reference Integrating gryo control heaters.
	4CB206	RNDZ RDR	X	This circuit breaker serves as the ON-OFF control for providing prime (AC) power to the rendezvous radar.
	4CB212	AOT LAMP	X	These circuit breakers serve as the ON-OFF control for providing prime redundant power to the AOT lamp (AC).
	4CB214	AOT LAMP	X	
Environmental Control	4CB84	CO ₂ SENSOR	X	CO ₂ sensor.
	4CB96	GLYCOL PUMP SEC	X	Secondary glycol pump.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Environment Control (Cont.)				
4CB107	CABIN FAN 1	X		Cabin fan #1.
4CB108	LCG PUMP		X	LCG Pump
4CB109	CABIN FAN CONT		X	Cabin differential pressure sensor, O ₂ pressure regulator valve and relay.
4CB112	DIVERT VLV		X	Suit circuit diverter valve, cabin differential pressure sensor, O ₂ pressure regulator valve.
4CB113	CABIN REPRESS		X	Cabin repressurization and emergency O ₂ valve, cabin differential pressure sensor, O ₂ pressure regulator valve and relay.
4CB117	GLYCOL PUMP 1	X		Glycol pump #1.
4CB119	SUIT FAN 2		X	Suit fan #2.
4CB120	SUIT FAN ΔP		X	Fan differential pressure sensor and relay.
4CB138	SUIT FAN 1	X		Suit fan #1.
4CB140	DISP		X	ECS displays: i.e., CO ₂ Partial Pressure indicator (7M1), Cabin Temperature and Suit Temperature indicator (7M3), Cabin Pressure and Suit Pressure Indicator (7M2), Glycol Pressure and Glycol Temperature indicator (7M5), Oxygen Quantity and Water Quantity indicator (7M4).

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Environment Control (Cont.)				
4CB141	GLYCOL PUMP 2	X		Glycol pump #2.
4CB217	GLYCOL PUMP AUTO TRNFR	X		Energizes transfer relay to automatically switch pumps when low ΔP appears across pumps.
4CB234	SUIT FLOW CONT		X	Energizes relay and subsequently applies DC power to SUIT ISOL valves.
Reaction Control				
4CB42	QUAD 4 - TCA		X	TCA Fuel and Oxidizer valves of Quad 4, System B.
4CB43	QUAD 3 - TCA		X	TCA Fuel and Oxidizer valves of Quad 3, System B.
4CB44	QUAD 2 - TCA		X	TCA Fuel and Oxidizer valves of Quad 2, System B.
4CB45	QUAD 1- TCA		X	TCA Fuel and Oxidizer valves of Quad 1, System B.
4CB49	ISOL VLV		X	Oxidizer and Fuel isolation valves of System B. (8 valves).

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Components(s) Served
		<u>CDR</u>	<u>LMP</u>	
Reaction Control (Cont.)				
4CB50	TEMP/PRESS DISP-FLAGS		X	All status flags (8FL5 to 8FL19 and Temperature and Pressure indicators 8M1 and 8M2).
4CB51	ASC FEED 1	X		Primary RCS/APS interconnect Oxidizer and Fuel valves of System A.
4CB52	ASC FEED 1		X	Primary RCS/APS interconnect Oxidizer and Fuel valves of System B.
4CB54	CRSFD		X	Oxidizer and Fuel crossfeed valves. (2 valves).
4CB60	QUAD 4 - TCA	X		TCA Fuel and Oxidizer valves of Quad 4, System A.
4CB61	QUAD 3 - TCA	X		TCA Fuel and Oxidizer valves of Quad 3, System A.
4CB62	QUAD 2 - TCA	X		TCA Fuel and Oxidizer valves of Quad 2, System A.
4CB63	QUAD 1 - TCA	X		TCA Fuel and Oxidizer valves of Quad 1, System A.
4CB67	ISOL VLV	X		Oxidizer and Fuel isolation valves of System A. (8 valves).

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Reaction Control (Cont.)				
4CB72	MAIN SOV	X		Oxidizer and Fuel main shutoff valves of System A. (2 valves)
4CB73	MAIN SOV		X	Oxidizer and Fuel main shutoff valves of System B. (2 valves)
4CB121	PQGS/DISP		X	Propellant Quantity Gaging Control Unit Assembly, and indicator (8M4).
4CB231	ASC FEED 2	X		Secondary RCS/APS Interconnect Oxidizer and Fuel valves of System A.
4CB232	ASC FEED 2		X	Secondary RCS/APS Interconnect Oxidizer and Fuel valves of System B.
Flight Displays				
4CB88	GASTA	X		Gimbal angle sequencing transformation assembly.
4CB97	CDR FDAI	X		Attitude indicator assembly (9M1).
4CB123	RNG/RNG RT & ALT/ALT RT	X		Range/Altitude indicator (9M9).
4CB126	EVENT TIMER/ SE FDAI		X	Event timer (9M11) and attitude indicator assembly (9M6).

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Flight Displays (Cont.)				
4CB133	CDR X-PNTR	X		Cross Pointer (9M2).
4CB134	SE X-PNTR		X	Cross Pointer (9M3).
4CB159	MISSION TIMER	X		Mission Timer display (9M12).
4CB168	THRUST	X		Thrust Indicator (9M7).
4CB188	COAS	X		Crew Mans Optical Alignment Sight.
4CB201	GASTA	X		Gimbal angle sequencing transformation assembly (AC).
4CB204	RNG/RNG RT & ALT/ALT RT	X		Range/Altitude indicator (9M9) (AC).
4CB209	CDR FDAI	X		Sphere drive system of the Attitude Indicator Assembly (9M1) (AC).
4CB210	SE FDAI	X		Sphere drive system of the Attitude Indicator Assembly (9M6) (AC).
4CB226	ORDEAL	X		This circuit breaker serves as the ON-OFF control for providing prime (AC) power to the ORDEAL.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Flight Displays (Cont.) 4CB227	ORDEAL	X		This circuit breaker serves as the ON-OFF control for providing prime power to the ORDEAL.
Propulsion 4CB32 4CB53 4CB74 4CB103 4CB169	PQGS ASC He REG DES He REG/VENT DISP/ENG OVRD LOGIC He/PQGS PROPUL DISP	 X	X X X	Descent propulsion quantity gaging system. Latching Helium solenoid valves 1 and 2. Latching Helium solenoid valves 1 and 2 and fuel and oxidizer vent solenoid valves. Fuel and Oxidizer Pressure indicator (10M3), Fuel and Oxidizer Temperature Indicator (10M4) and flags (10FL1 through 10FL4). HELIUM quantity, indicator (10M1) and OXIDIZER QUANTITY and FUEL QUANTITY indicators (10M5) (AC).

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Stabilization and Control				
4CB2	ABORT STAGE		X	Abort Staging Electronics.
4CB3	ABORT STAGE	X		Abort Staging Electronics.
4CB28	AEA		X	Abort Electronics Assembly; and DEDA power when AGS status switch (12S17) is in operate.
4CB238	AEA	X		
4CB37	ENG ARM		X	Powers Engine Arm switch.
4CB40	AELD	X		Ascent engine latching device, ascent engine, & stage command to ED.
4CB41	AELD		X	Ascent engine latching device, ascent engine, & stage command to ED.
4CB59	ATT DIR CONT	X		Attitude Controllers for direct firing of RCS.
4CB69	DECA PWR	X		Descent Engine Control Assembly & descent engine.
4CB79	ASA		X	Abort Sensor Assembly
4CB80	DES ENG CONT	X		(1) Lunar Contact Light (1DS2) and Probe switches. (2) Auto switching from wide to narrow deadband with engine on. (3) Auto switching from two to four jets with engine on.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Stabilization and Control (Cont.)				
4CB80 (Cont.)				(4) CES analog control of GDA's when in AGS. (5) Disables auto thrust control when in AGS. (6) Resets Engine Start switches. (7) Redundant power for stopping Descent Engine manually and when staging.
4CB81	ATCA (PGNS)	X		Provides redundant power to Jet Drivers. Provides power to relays in S&C assembly to allow switching from AGS to PGNS.
4CB82	ATCA		X	Attitude/Translation Control Assembly, and Lunar contact light (1DS1) and Probe switches.
4CB106	ENG START OVRD	X		Engine Start Switch and redundant power for Ascent Engine Arming Circuit.
4CB203	AGS	X		Abort Electronics Assy. (outputs to FDAI (AC).
4CB207	DECA GIMBAL	X		Descent Engine GDA's and for auxiliary power within the DECA (AC).
4CB230	ATCA (AGS)		X	Applies DC power through Guidance Control Switch to SELECT AGS and bias power to ATCA. Also supplies DC power through

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Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Stabilization and Control (Cont.) 4CB230 4CB233	DES ENG OVRD		X	MODE CONTROL and BAL CPL switches to ATCA preamplifiers. Redundant DC power feed for DES ENG actuator valves.
Communications 4CB30 4CB34 4CB85 4CB86	PRIM S-BD PWR AMPL S-BD ANT SE AUDIO CDR AUDIO		X X X X	S-BAND Power Amplifier and Diplexer (Power Supply # 1). AC Electronics section of the S-BAND steerable Antenna Assembly. SPA Audio Center #2 which feeds the Systems Engineer's space suit microphone amplifiers and biomedical sensors. This circuit breaker also serves as an ON-OFF control for Audio Center #2. SPA Audio Center #1 which feeds the Commander's space suit microphone amplifiers and biomedical sensors. This circuit breaker also serves as an ON-OFF control for Audio Center #1.

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Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Communications (Cont.)				
4CB87	VHF A RCVR	X		VHF A XCVRS & Diplexer Assembly.
4CB102	PMP		X	Pre-modulation Processor portion of the Signal Processing Assembly. This circuit breaker serves as the ON-OFF control for the PMP.
4CB104	TV		X	Portable Television Camera. This circuit breaker serves as the ON-OFF control for the TV camera. Television transmission requires: (1) That the S-Band power amplifier controlled by switch 13S2, be energized. (2) That the S-Band erectable antenna be connected. (3) That the S-Band antenna select switch (14S5) be in the LUNAR STAY position. (4) That 13S8 be in the PRIM or SEC position. (5) That 13S6 be in either the VOICE or OFF position.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Communications (Cont.)				
4CB110	S-BD ANT		X	DC Electronics section of the S-BAND Steer-able Antenna Assembly.
4CB111	PRIM S-BD XMTR/RCVR		X	S-BAND XCVR, primary transmitter, re-ceiver (portions of the PMP for key functions).
4CB114	VHF B RCVR		X	VHF B XCVRs & Diplexer Assembly.
4CB115	VHF A XMTR		X	VHF A XCVRs & Diplexer Assembly.
4CB136	SEC S-BD PWR AMPL	X		S-BAND Power Amplifier and Diplexer (Power Supply #2).
4CB137	SEC S-BD XMTR/RCVR	X		S-BAND XCVR secondary transmitter & receiver (portions of the PMP for key functions).
4CB153	DISP		X	The Communication's Displays, i. e. , Signal Strength Meter (14M1), Antenna Pitch Meter (14M3) and the Antenna Yaw Meter (14M4).
4CB162	VHF B XMTR	X		VHF B XCVRs & Diplexer Assembly.
4CB228	UP DATA LINK	X		Digital Uplink Assembly.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Lighting				
4CB128	FLOOD		X	Floodlights & Utility Lights.
4CB146	ANUN/DOCK COMPNT	X		LCA which supplies power for Caution/ Warning Annunciators (6DS1 through 6DS40), Component Caution Lights (2DS1, 2DS2, 4DS1, 4DS2, 7DS1, 7DS3, 7DS6, 7DS7, 12DS1, 17DS1) Display Power Failure Indicators (16DS90 through 16DS98) and the Docking Lights. This circuit breaker except for Docking Lights also serve as ON- OFF control for the components listed above.
4CB147	MASTER ALARM		X	The two master alarm lights and the tone generator.
4CB148	ANNUN/DOCK/ COMPNT		X	Alternate power supply for 4CB146.
4CB236	LTG UTILITY	X		Two utility lights (16DS104 & 16DS105)

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Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Lighting (Cont.)				
4CB160	TRACK		X	Tracking Lights.
4CB200	NUM	X		LCA supplies pwr to the numeric displays (3M1, 3M2, 3M3, 3M4, 3M5, 3M6, 9M11, 9M12, 10M1, 10M5A, 10M5B, 12M1, and 12M2) (AC).
4CB211	INTGL	X		LCA supplies pwr to all integral lighting (AC).
Heater Control				
4CB31	S-BD ANT		X	S-band Antenna Heater.
4CB68	DISP		X	Heater Controlled Temperature Indicator (18M1)
4CB129	DOCK WINDOW	X		Powers docking window heater.
4CB144	CDR WINDOW	X		Powers Commander's window heater (AC).
4CB152	SE WINDOW	X		Powers LM Pilot's window heater (AC).
4CB155	RNDZ RDR OPR	X		Provides prime power to the Rendezvous Radar Heater Control Circuit which maintains operating temperature of antenna components and oven assembly.
4CB156	RNDZ RDR STBY	X		Provides prime power to the Rendezvous Radar Heater Control Circuit which maintains standby temperature of the antenna components.
4CB157	LDG RDR	X		Landing Radar Heater Control Circuit.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		CDR	LMP	
Heater Control (Cont.)				
4CB213	AOT	X		AOT Heater.
4CB218	QUAD 1	X		System 1 RCS A and B Engine heaters in Quad 1.
4CB219	QUAD 2	X		System 1 RCS A and B Engine heaters in Quad 2.
4CB220	QUAD 3	X		System 1 RCS A and B Engine heaters in Quad 3.
4CB221	QUAD 4	X		System 1 RCS A and B Engine heaters in Quad 4.
4CB222	QUAD 1		X	System 2 RCS A and B Engine heaters in Quad 1.
4CB223	QUAD 2		X	System 2 RCS A and B Engine heaters in Quad 2.
4CB224	QUAD 3		X	System 2 RCS A and B Engine heaters in Quad 3.
4CB225	QUAD 4		X	System 2 RCS A and B Engine heaters in Quad 4.

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Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Electrical Power				
4CB4	XLUNAR BUS TIE	X		Switches CDR's bus translunar loads to LM ground.
4CB5	XLUNAR BUS TIE		X	Switches LMP's bus translunar loads to LM ground.
4CB6	ASC ECA CONT	X		Powers switches to control Ascent ECA contactor coils, and Dead face contactor coils. (4S9 thru 4S13).
4CB7	ASC ECA CONT		X	Powers switches to control Ascent ECA contactor coils, and Dead face contactor coils. (4S9 thru 4S13).
4CB8	DES ECA CONT	X		Powers switches to control Descent ECA contactor coils. (4S1 thru 4S8).
4CB9	DES ECA CONT		X	Powers switches to control Descent ECA contactor coils. (4S1 thru 4S8).
4CB10	DES ECA	X		Powers both Descent Electronic Control Assemblies.
4CB11	DES ECA		X	Powers both Descent Electronic Control Assemblies.
4CB12	INV 1	X		AC Inverter #1.
4CB13	INV 2		X	AC Inverter #2.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

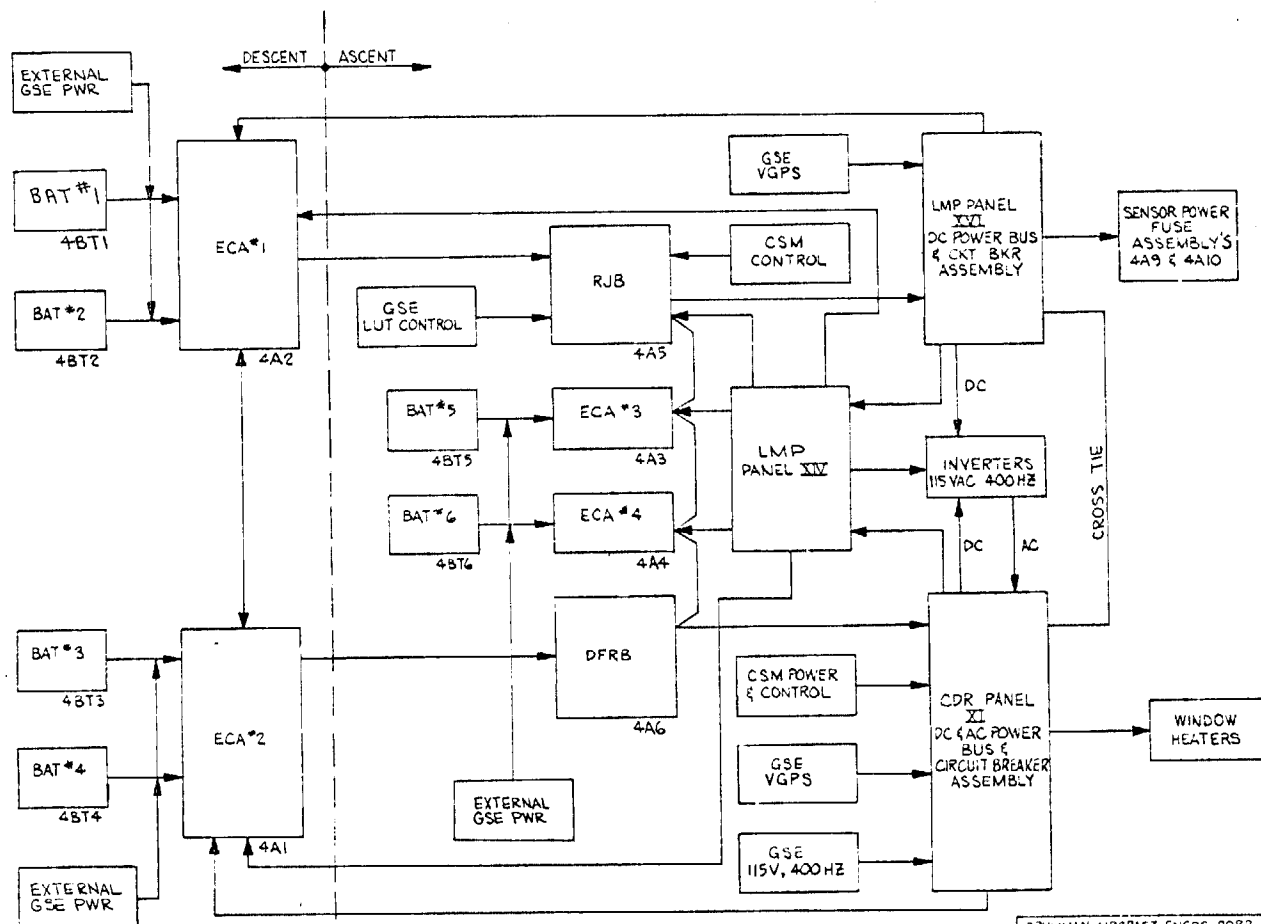
Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Electrical Power (Cont.)				
4CB14	ASC ECA		X	Powers both Ascent Electronic Control Assemblies.
4CB15	ASC ECA	X		Powers both Ascent Electronic Control Assemblies.
4CB16	DISP		X	The Electrical Power System Displays (4M2 and 4M3) and flags (4FL1 through 4FL9).
4CB17	BAT FEED TIE		X	Ties Batteries 1, 2, and 5 normal and 6 alternate to the LM Pilot's Bus.
4CB18	BAT FEED TIE	X		Ties Batteries 3, 4, and 6 normal and 5 alternate to the Commander's Bus.
4CB19	CROSS TIE BUS		X	} Ties LMP Bus to CDR Bus in the event of Feeder failure.
4CB20	CROSS TIE BUS	X		
4CB21	DC BUS VOLT		X	DC Bus voltage instrumentation and DC Bus fault light.
4CB22	DC BUS VOLT	X		DC Bus voltage instrumentation, DC Bus fault light and OI during Prelaunch (4K6).
4CB23	BUS TIE INV 1	X		Connects Inverter Output through Inverter Switch (4S14) to AC Bus A.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

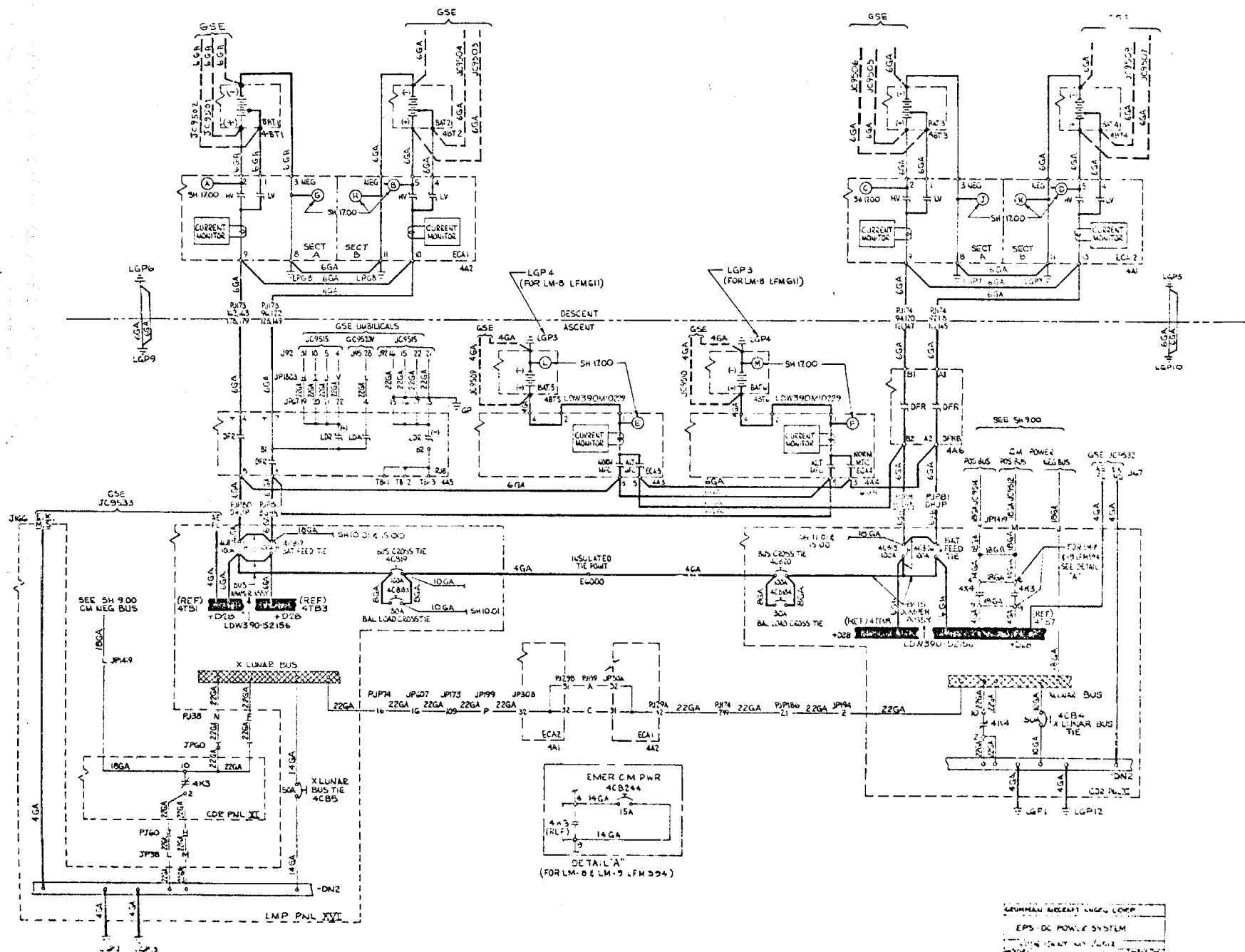
Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		CDR	LMP	
Electrical Power (Cont.)				
4CB24	BUS TIE INV 2	X		Connects Inverter Output through Inverter Switch (4S14) to AC Bus A.
4CB25	BAT FEED TIE		X	Ties Batteries 1, 2, 5 normal and 6 alternate to the LM Pilot's Bus.
4CB26	BAT FEED TIE	X		Ties Batteries 3, 4, and 6 normal and 5 alternate to the Commander's Bus.
4CB27	AC BUS VOLT	X		AC Bus A voltage instrumentation (AC).
4CB183	CROSS TIE BAL LOADS		X	Ties LMP Bus to CDR Bus for parallel battery operation.
4CB184	CROSS TIE BAL LOADS	X		
4CB185	BUS TIE INV 1	X		Connects Inverter output through Inverter switch (4S14) to AC BUS B.
4CB186	BUS TIE INV 2	X		Connects Inverter output through Inverter switch (4S14) to AC BUS B.
4CB244	EMER CM PWR	X		Enables CM power to CDR BUS.
Instrumentation				
4CB1	SIG CONDR 2		X	Electronic Replaceable Assembly #2.
4CB99	CWEA		X	Caution and Warning Electronics Assembly.

SUBSYSTEM: ELECTRICAL POWER (FUNCTIONAL GROUPING 4)

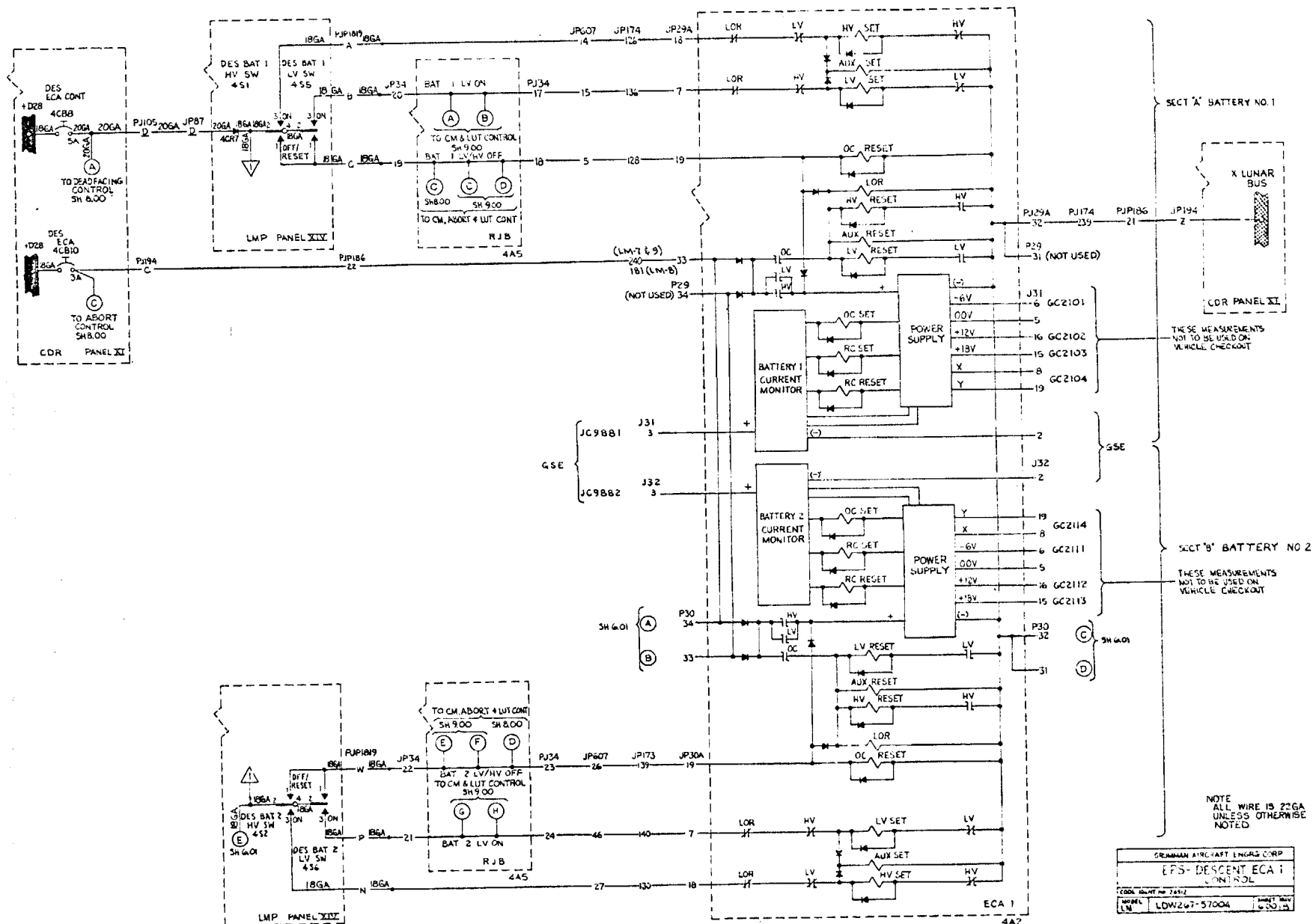
Subsystem/Code	Panel Nomenclature	Panel Location		Component(s) Served
		<u>CDR</u>	<u>LMP</u>	
Instrumentation (Cont.)				
4CB125	PCM/TE		X	Pulse code modulator and Timing Electronics Circuit.
4CB131	SIG CONDR 1	X		Electronic Replaceable Assembly #1.
4CB132	SIG SENSOR		X	All pre-conditioned transducers.
4CB202	TAPE RCDR	X		Data Storage Electronics Assembly (AC).
Camera				
4CB33	SEQ		X	Sequence camera Enabling control.



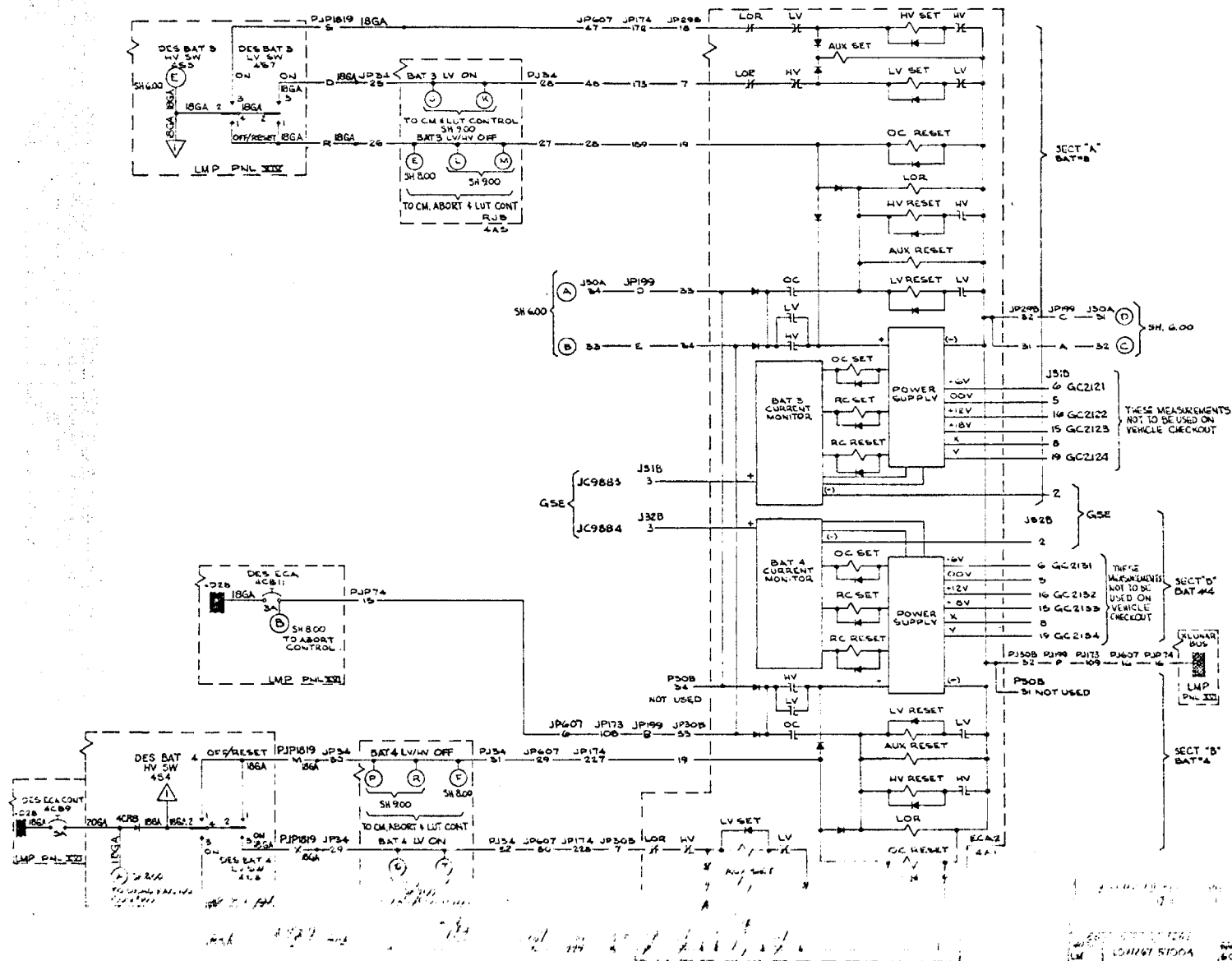
GRUMMAN AIRCRAFT ENGRG CORP		
EPS - BLOCK DIAGRAM		
CODE IDENT NO 26512		
MODEL	LM-	LDW267-57004
		400.B

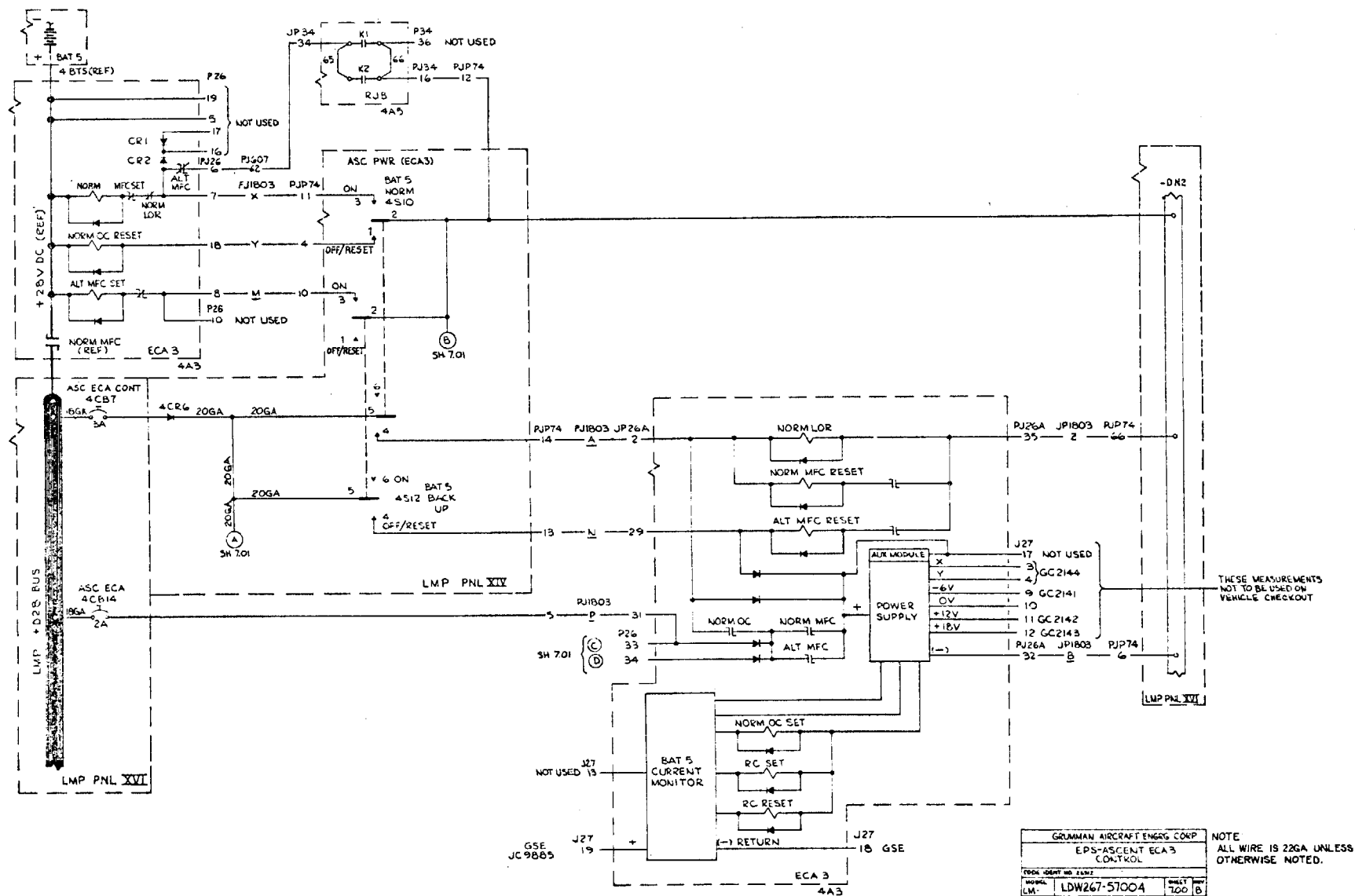


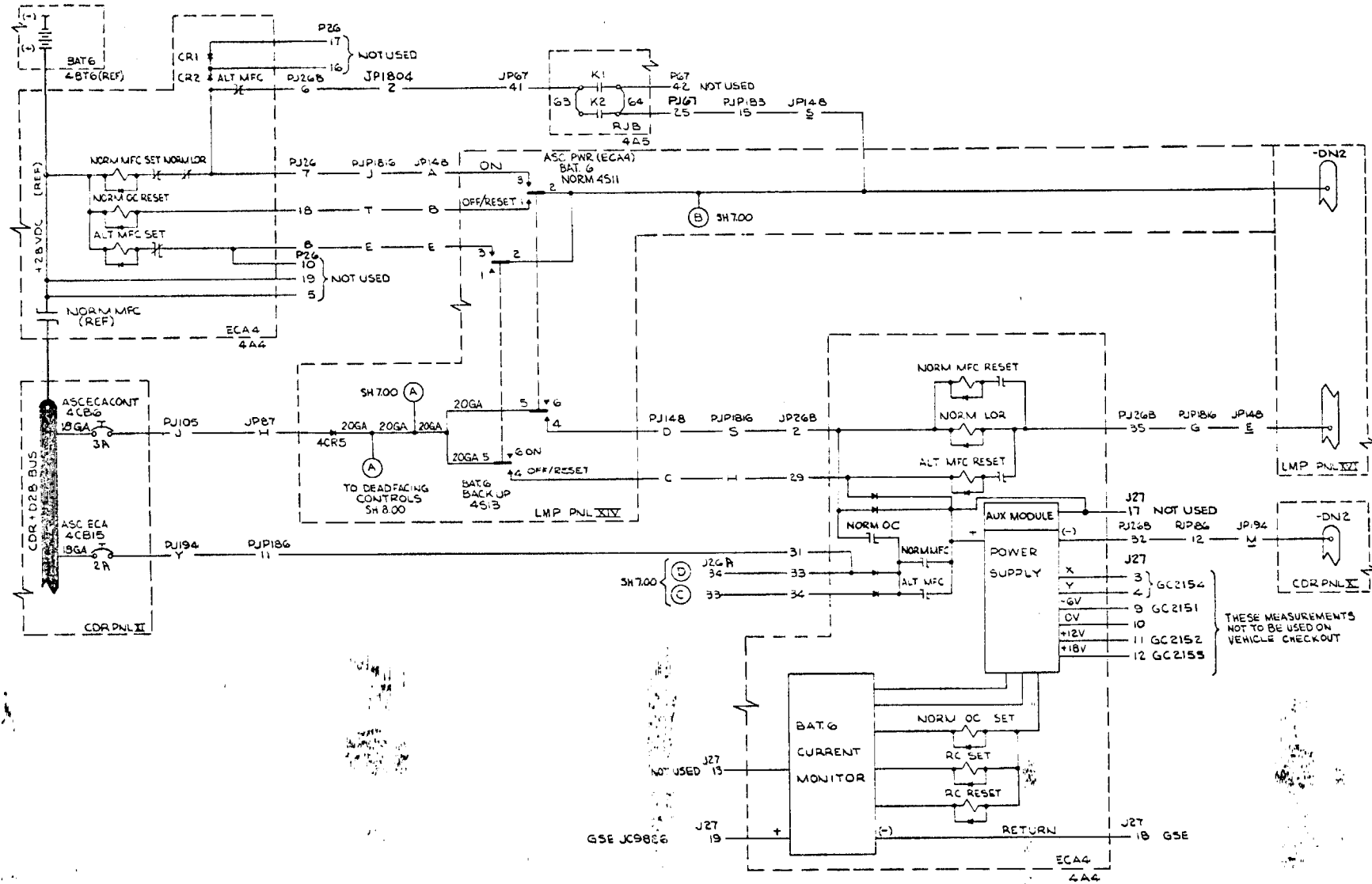
GRUMMAN AIRCRAFT ENGINE COMPANY
EPS-DC POWER SYSTEM
LOW VOLTAGE 28VDC
LOW VOLTAGE 28VDC



NOTE
ALL WIRE IS 22GA
UNLESS OTHERWISE
NOTED.

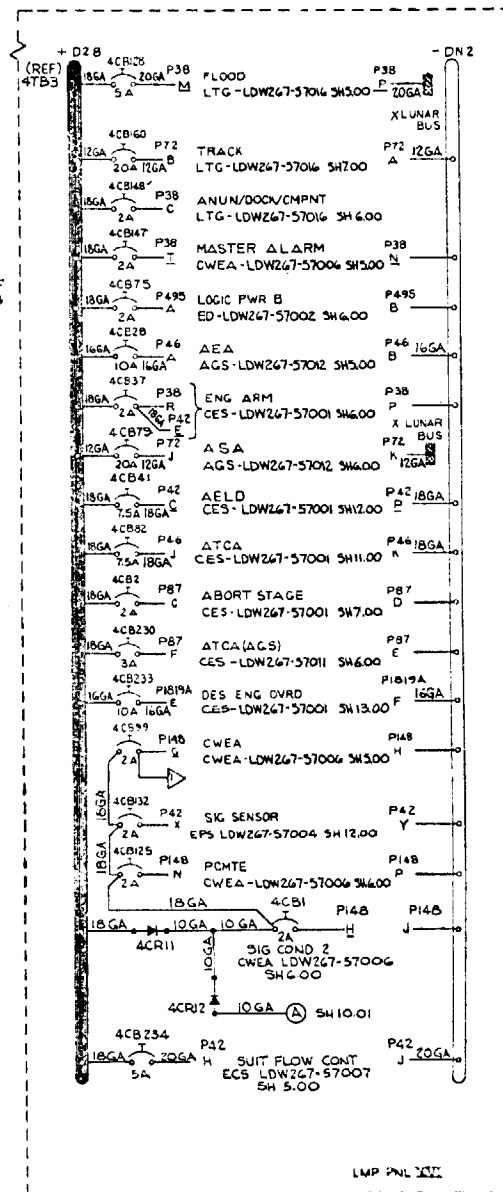
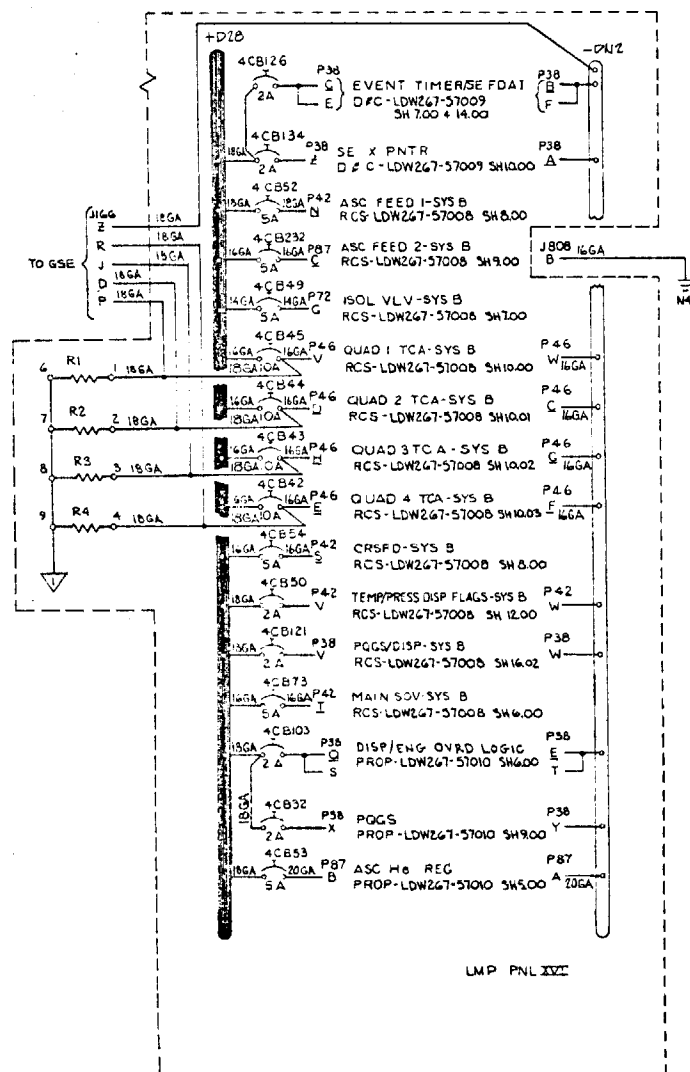






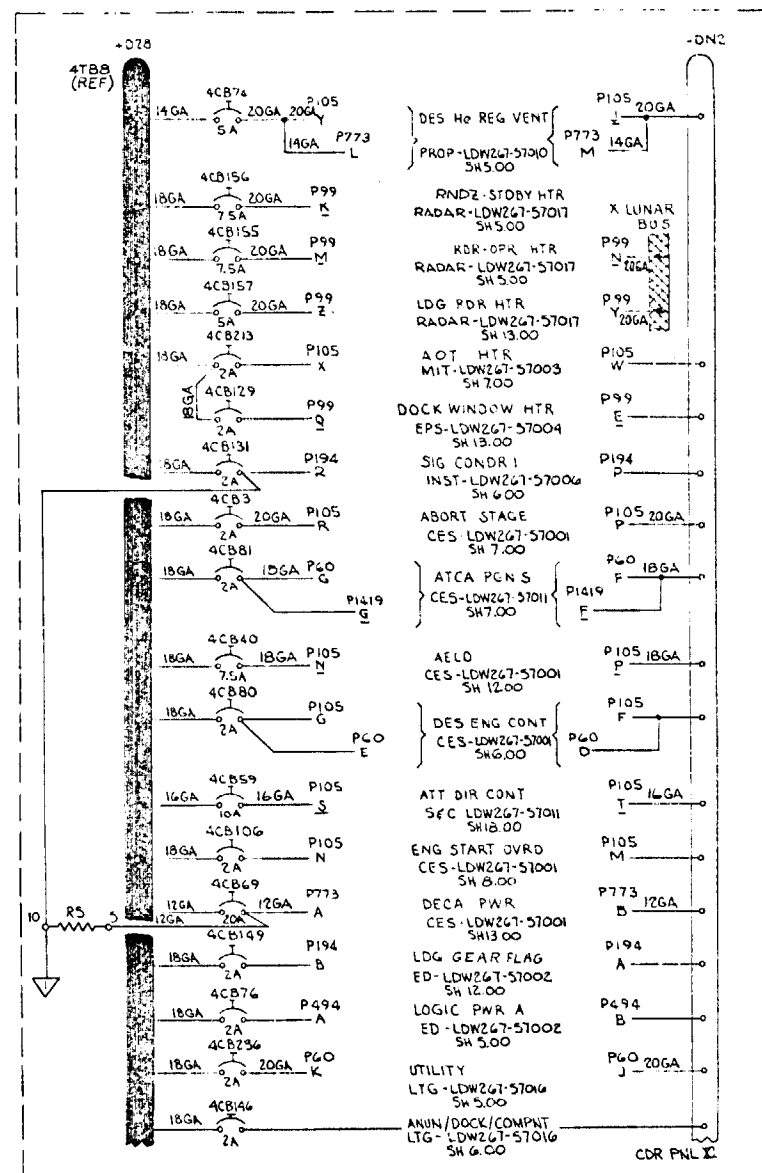
NOTE:
ALL WIRE IS 22GA UNLESS
OTHERWISE NOTED

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EPS-ASCECA ECA4			
CONTROLS			
MODEL NO 24712			
LDW267-3-04			
REV 1			



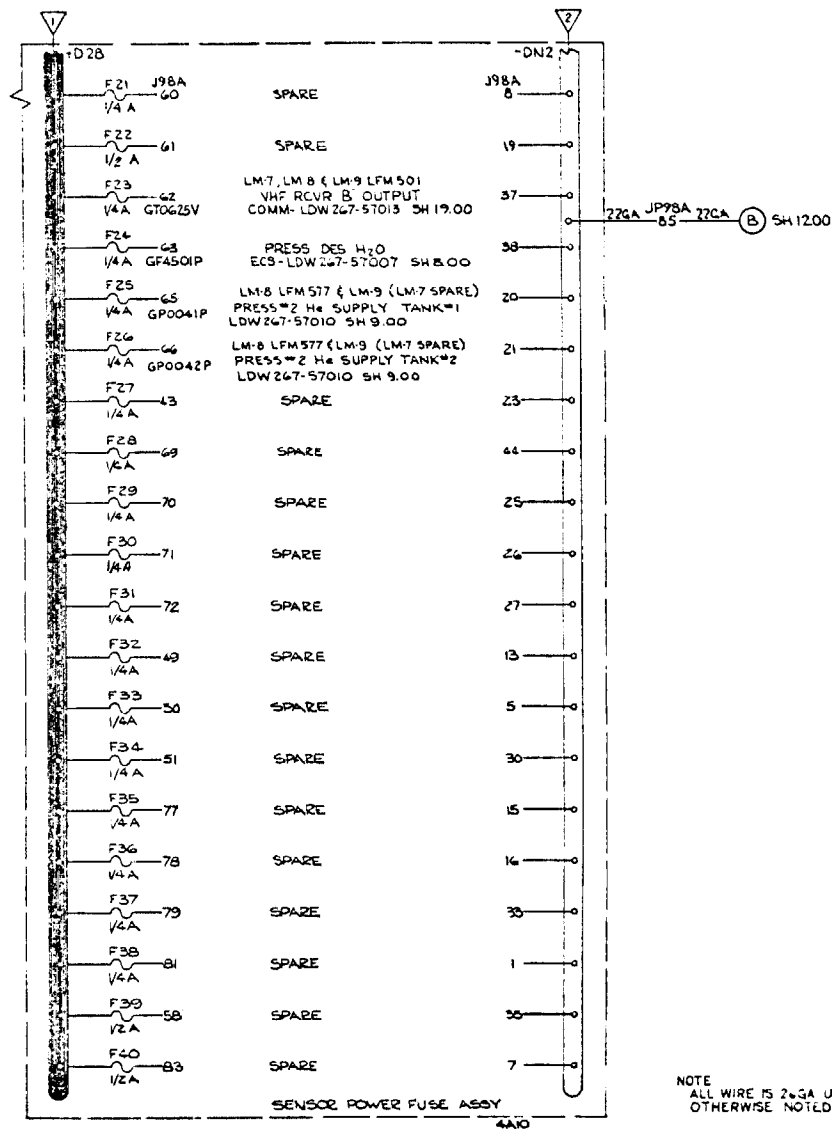
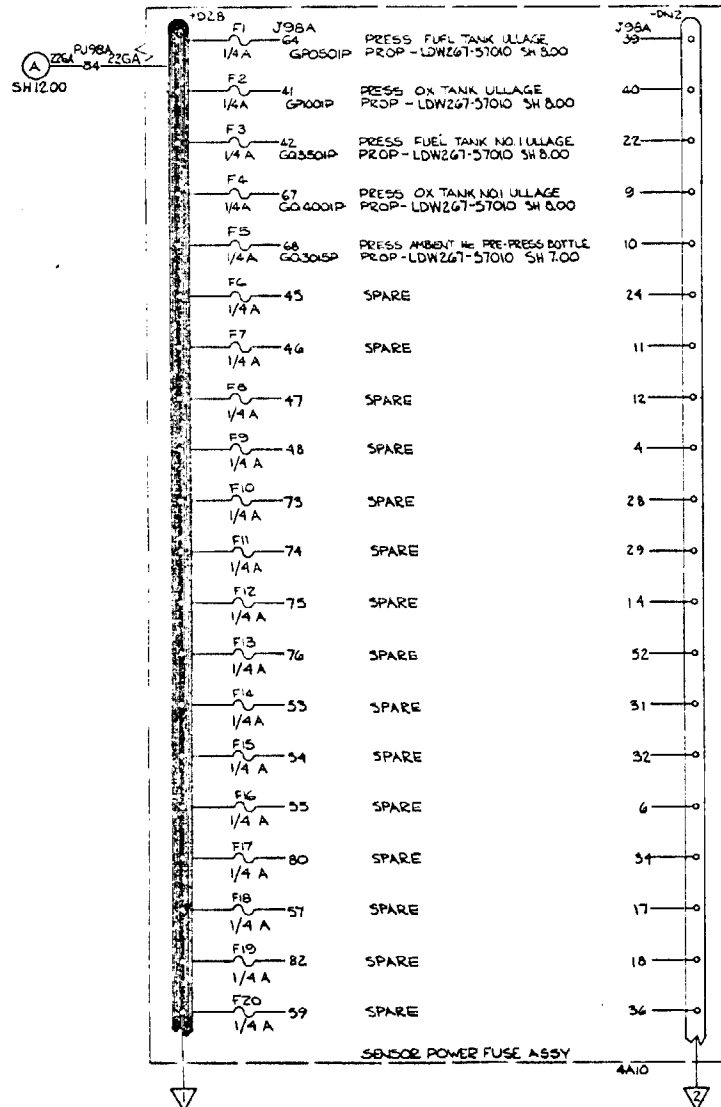
NOTE
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OTHERWISE NOTED

ORIGIN	DATE	BY	CHKD
EPS-EMP PNL XVI			
DC BUS DISTRIBUTION			
LDW267-57004	1000		



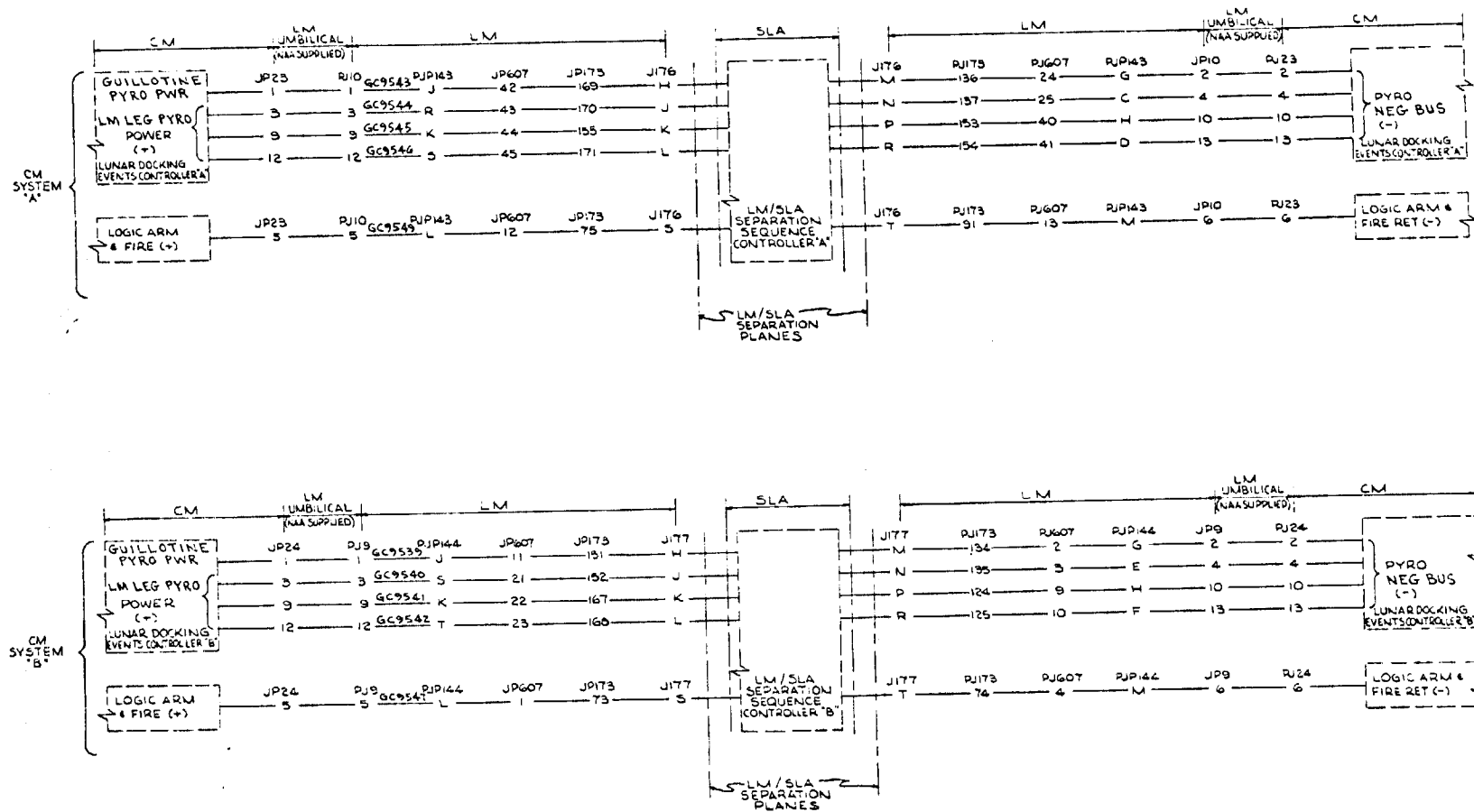
GRUMMAN AIRCRAFT ENGRG CORP
EPS-COR PNL XI
DC BUS DISTRIBUTION
CODE IDENT NO 2451Z
MODEL LDW267-57004
LM-1100 REV B

GRUMMAN AIRCRAFT ENGRG CORP			
EPS-CDR PNL XI			
DC BUS DISTR.BUTION			
CODE IDENT NO 24512			
MODEL		SHEET	REV
LM-	LDW267-57004	11.01	C



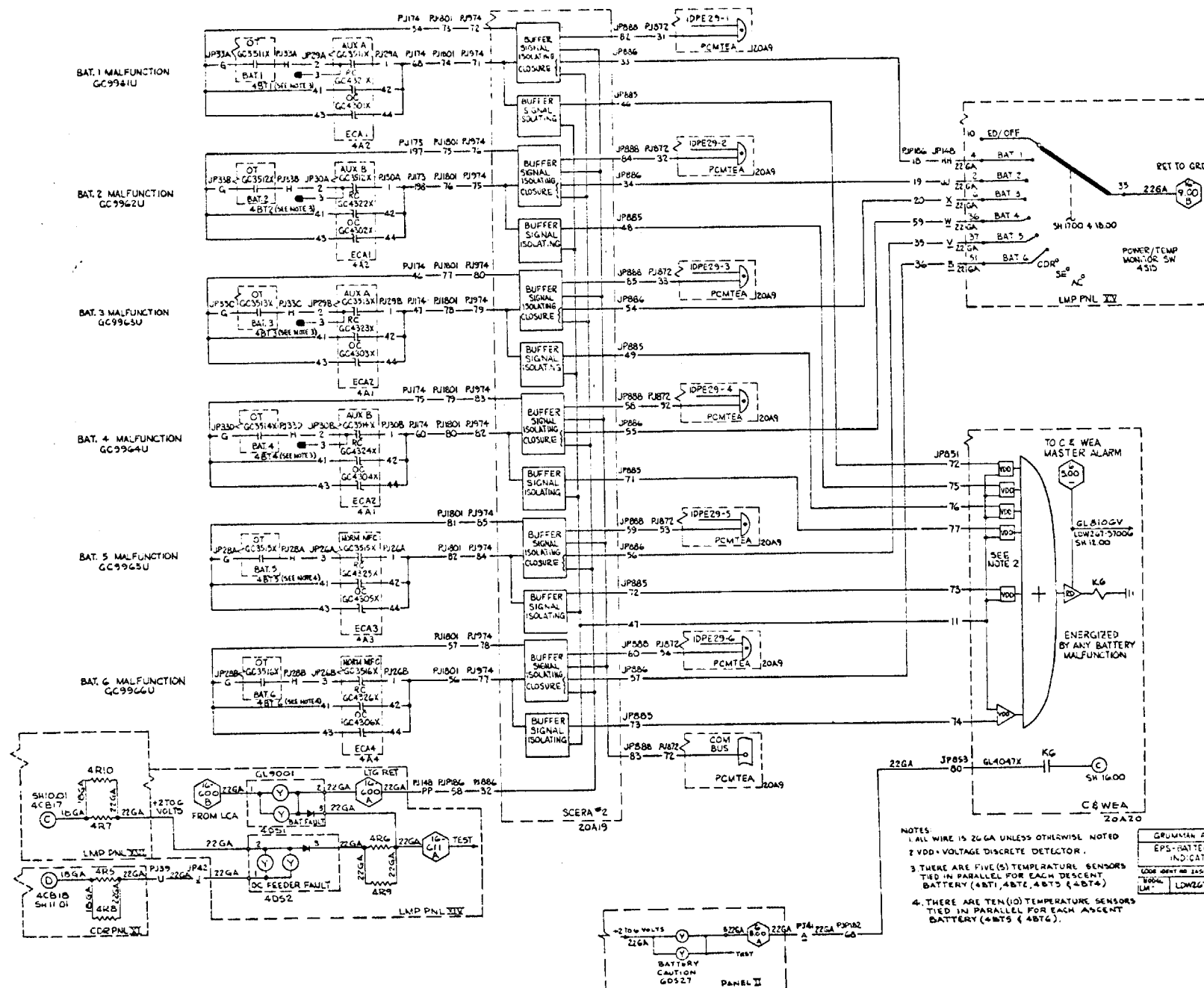
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OTHERWISE NOTED

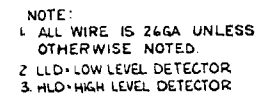
G2-1144 ARCAUT ELEC COOP	
EPS-SENSOR POWER FUSE ASSY 443	
E304 (PRINTED CIRCUIT)	
MODEL	LDW267-57004
DATE	12.01.00



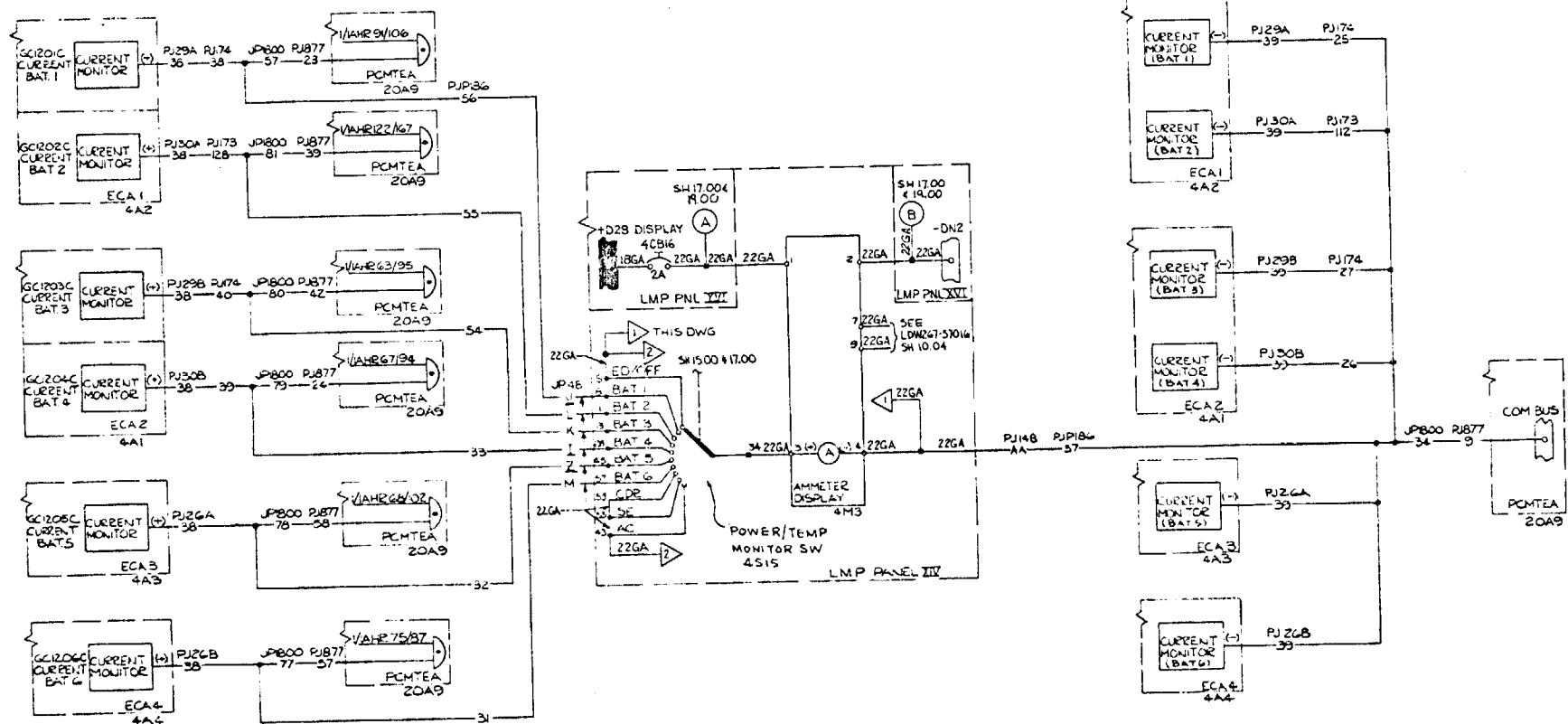
NOTE
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OTHERWISE NOTED

SPURMAN & SUTHERLAND
EPO INTERFERENCE & RING
SYSTEMS & S
1000 1000 1000
1000 1000 1000



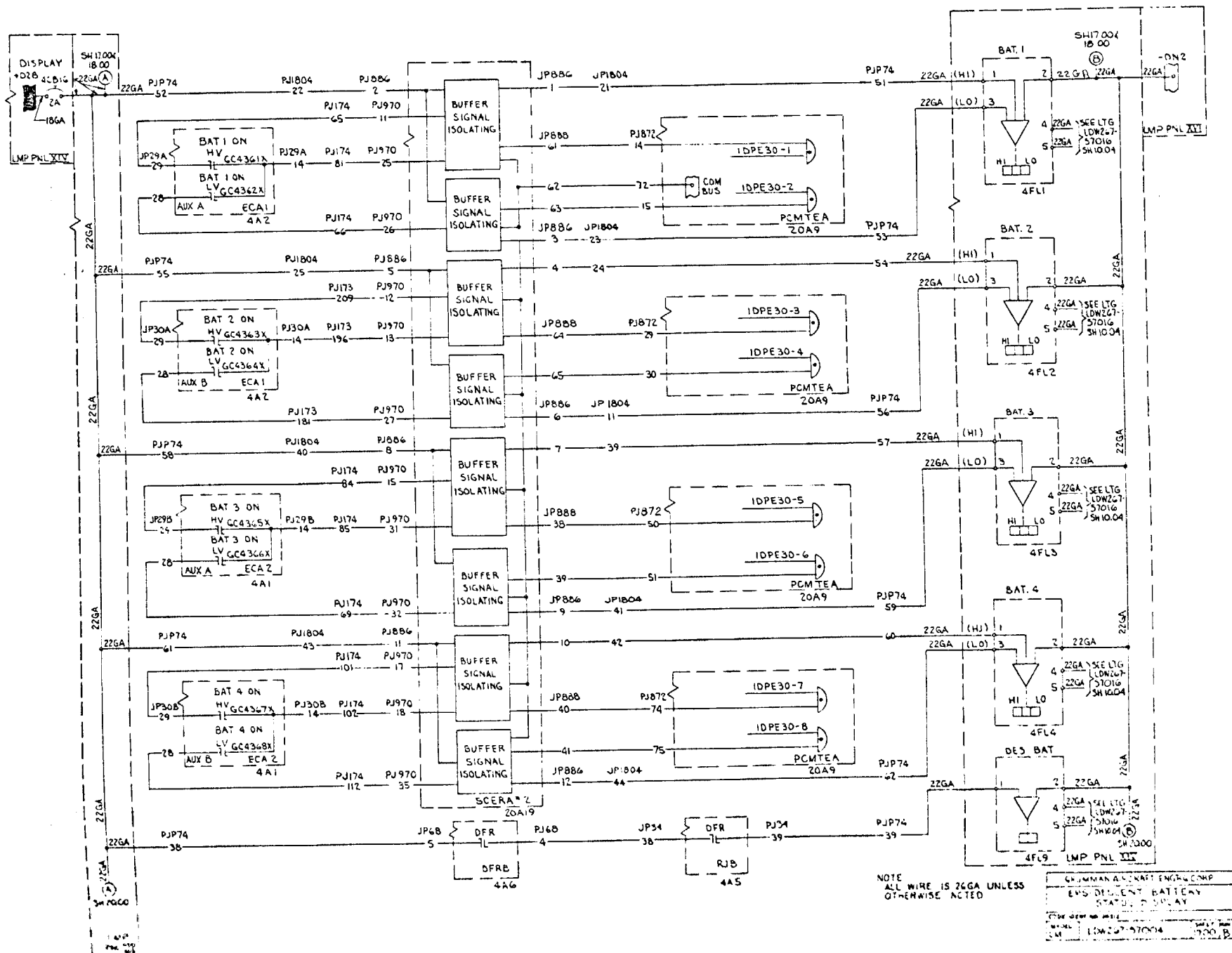


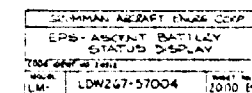
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EPS			
CAUTION + WARNING			
CODE IDENT NO. 26312			
MODEL LM-	LDW267-5700+	SHEET 1600	REV B

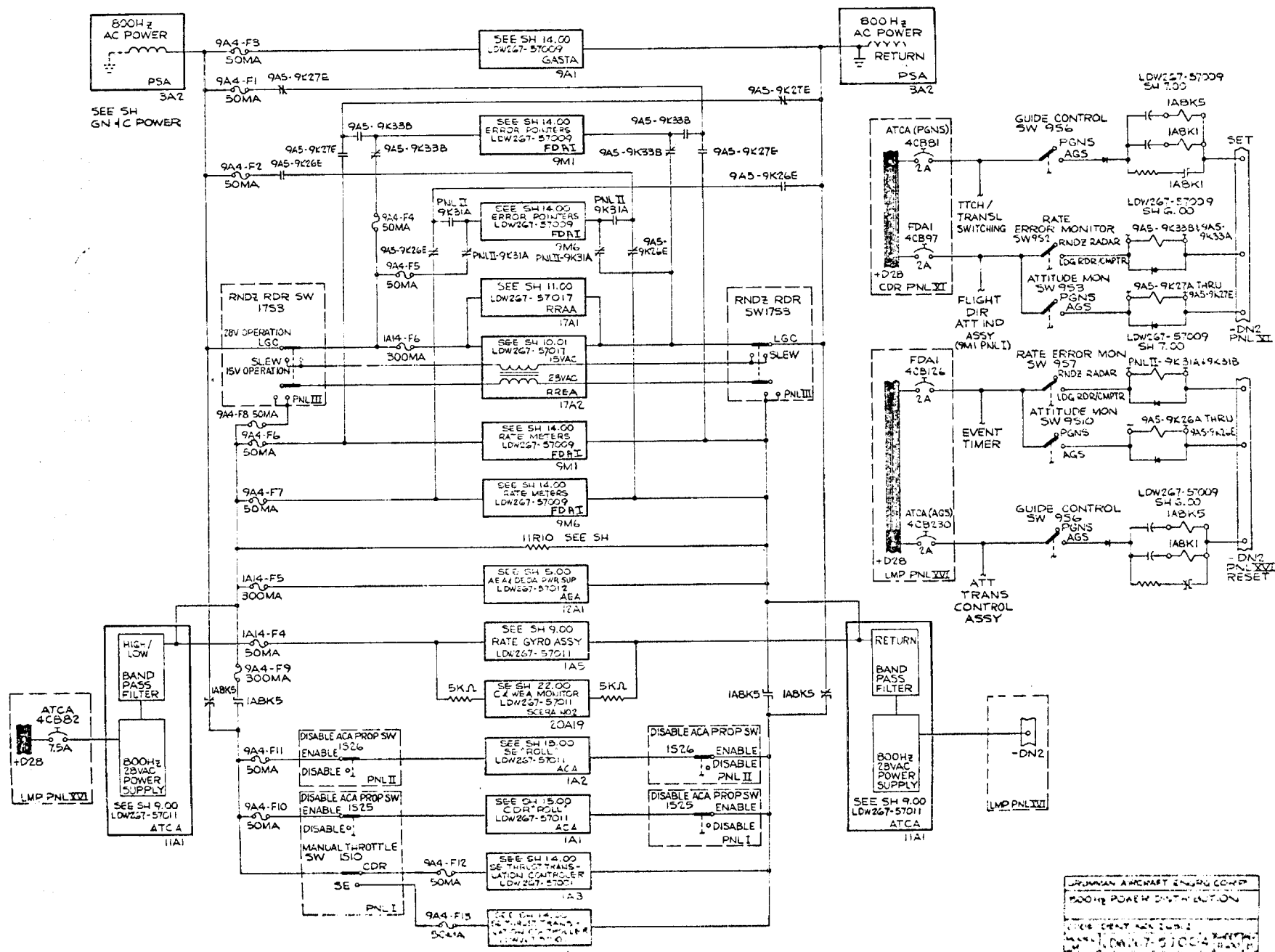


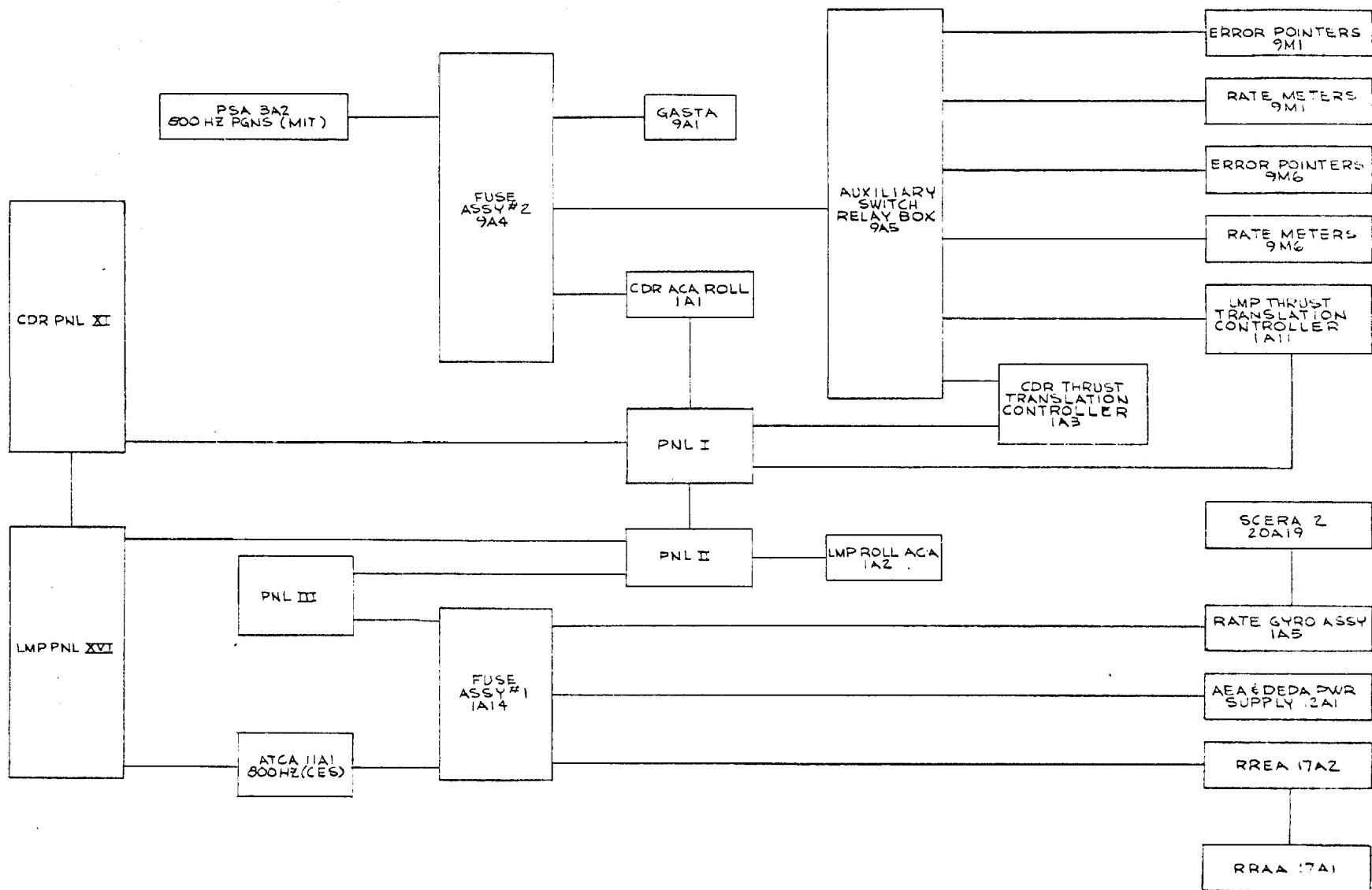
NOTE
ALL WIRE IS 22GA UNLESS
OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP		
EPS-BATTERY CURRENT MONITORING		
DRAWING NO. 12512		
MODEL	LM-1	LOW267-57004
SHEET	15	1800 B









CH. 111111 & 111111 BLDG. CORP
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LM ELEMENTARY FUNCTIONAL
DIAGRAM

(Functional Grouping No. 6)

OPERATIONAL INSTRUMENTATION

POWER AND CONTROL

(REF LDW 267-57006 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG.	REV.	E.O.'s
Operational Instrumentation Power & Control	LDW360-54000	L	M1, M2

2. Table of Contents

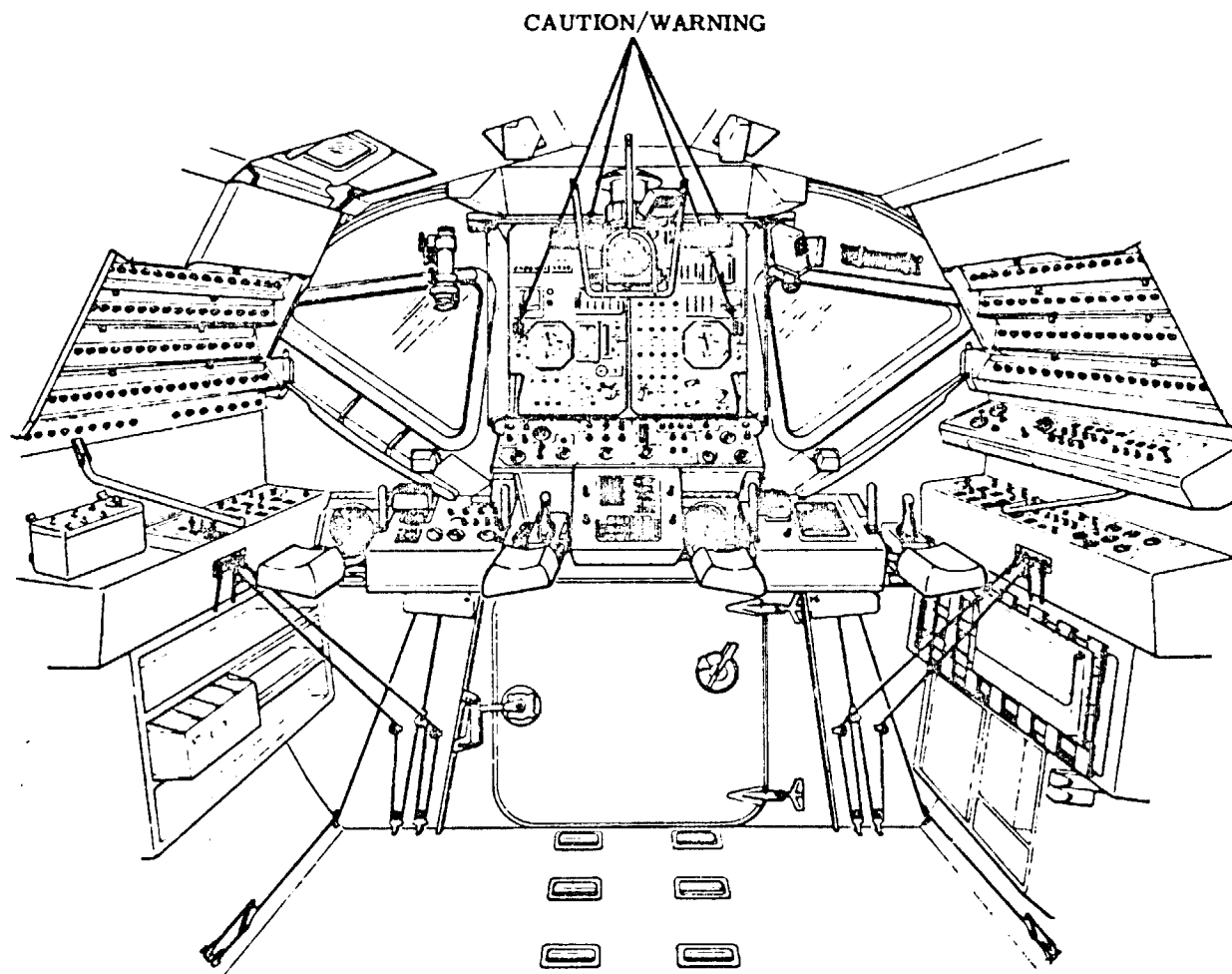
ITEM NAME

PAGE NO./SHEET NO.

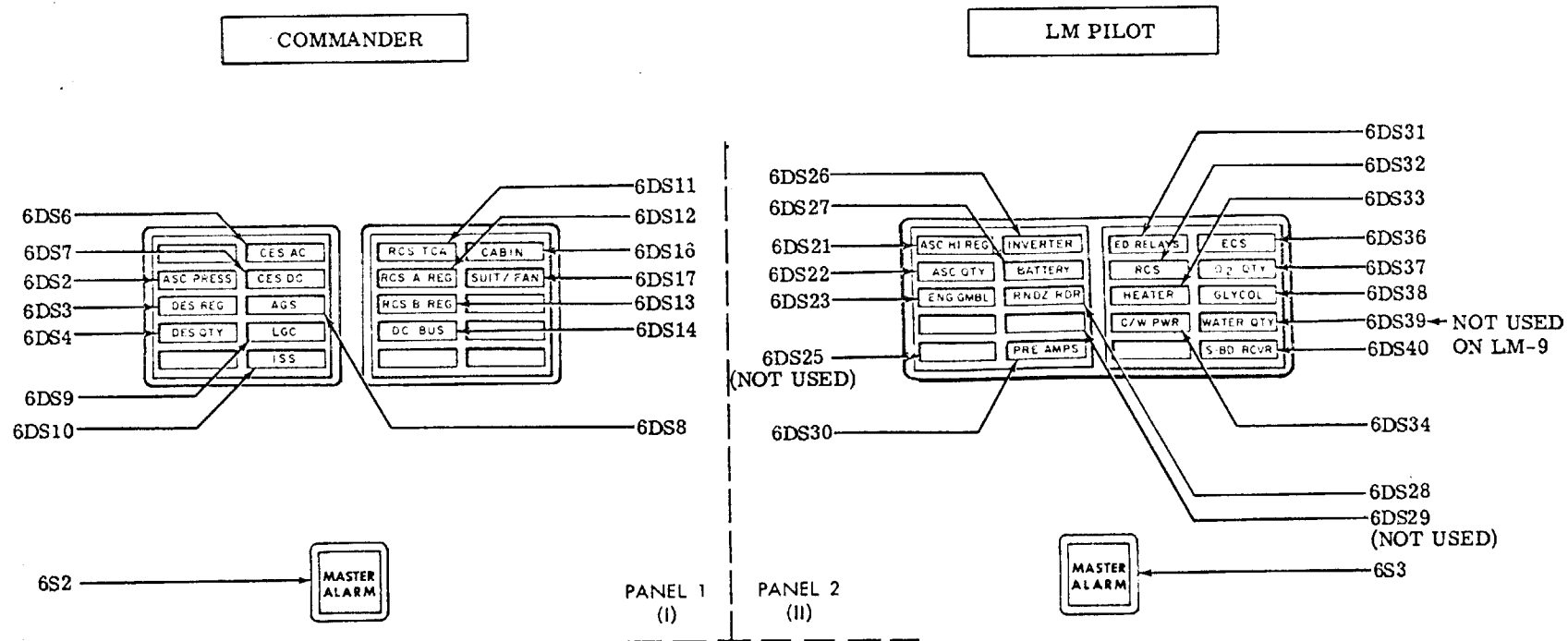
a) Cover Sheet	6-701
b) Applicable Documents, Table of Contents, and Revisions	6-702 & 702.1
c) Cabin Location of Caution and Warning Controls and Indicators	6-703
d) Caution and Warning Controls and Indicators Layout	6-704
e) Caution and Warning Controls and Indicators Functional Description	6-705 thru 6-705.8
f) O.I. Power and Control C & WEA Operation	LDW267-57006 SH 4.00B
g) O.I. Power and Control Functional Block Diagram	LDW267-57006 SH 4.01
h) O.I. Power and Control Block Diagram	LDW267-57006 SH 4.02B
i) O.I. Power and Control Master Alarm Control	LDW267-57006 SH 5.00B
j) O.I. Power and Control SCERA & PCM Power	LDW267-57006 SH 6.00B
k) O.I. Power and Control Panel I Warning IND Test	LDW267-57006 SH 7.00B
l) O.I. Power and Control Panel I Warning IND Test	LDW267-57006 SH 7.01B
m) O.I. Power and Control Panel II Caution IND Test	LDW267-57006 SH 8.00B
n) O.I. Power and Control Panel II Caution IND Test	LDW267-57006 SH 8.01B
o) O.I. Power and Control PCM Timing Electronics Portion	LDW267-57006 SH 9.00B
p) O.I. Power and Control PCM OSC Failure & Timing & Pulse	LDW267-57006 SH 10.00B
q) O.I. Power and Control SCERA Test Points	LDW267-57006 SH 11.00B
r) O.I. Power and Control GSE/BTME Test Points to PCMTEA & C/WEA	LDW267-57006 SH 12.00C

3. REVISIONS

REV	PAGE NO. AND/OR LDW267-57006, SHEET NO.	LCD	DESCRIPTION
B	4.00, 5.00 8.01, 11.00	5374	REPLACEMENT OF WQMD's WITH PRESS X'DUCERS.
C	12.00	5511	DELETION OF MEAS # GL0801, 1024 KHZ TIMING SIGNAL TO PCMTEA FROM MEA- SUREMENT LIST.



Cabin Location of Caution and Warning Controls and Indicators



Caution and Warning Controls and Indicators Layout

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6S2 6S3	MASTER ALARM SWITCH-LIGHT (CDR) MASTER ALARM SWITCH-LIGHT (LMP) MOMENTARY PUSHBUTTON	These two pushbutton indicators, one located on each of the main panels, along with the caution/warning array light(s) (6DS1 through 6DS40) and the audible tone (6T1), are actuated by malfunction conditions or out-of-tolerance signals or by a loss of power to the C/WEA. Depression of either switch will extinguish both red lights and terminate the audible tone, but will have no effect on the illuminated annunciator light(s). Due to existing circuitry these lights will not be activated along with caution/warning array light 6DS4. If C/WEA power is lost, these lights are extinguished by the opening of 4CB147 (LTG master alarm on LM Pilot panel XVI).
6T1	AUDIBLE TONE	This 3KHZ tone is initiated in conjunction with the illumination of master alarm indicator 6S2 and 6S3 and the caution/warning array lights. The tone is interrupted with the depression of either of these switch-lights. This tone will not be initiated if C/WEA light 6DS4 is activated. If the tone is initiated in conjunction with C/WEA reg power caution light 6DS34, it is interrupted when 4CB147 is opened.
6DS2	ASCENT PROPULSION LOW PRESS WARNING LIGHT (RED)	The (ASC PRESS) warning light is illuminated if either: (1) the pressure in either of two ascent helium tanks falls below 2773 psia prior to staging; or (2) if the blanket pressure in the fuel or oxidizer lines at the bi-propellant valves of the ascent stage decays below 120 psia. If illuminated by low helium pressure, this light is extinguished by a signal from a dead face switch resulting from separation of the descent and ascent stages; if illuminated by low fuel or oxidizer pressure, the light is extinguished only by restoration of pressure.

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6DS3	HI/LOW HELIUM REG OUTLET PRESS WARNING LIGHT (RED)	The (DES REG) warning light is illuminated if the pressure within the descent helium lines downstream of the regulators rises above 260 psia or falls below 220 psia. It is enabled by the DES ENG "ON" command. The light is extinguished when nominal pressures are restored or staging is accomplished (deadface switch).
6DS4	DESCENT PROPELLANT LOW QUANTITY WARNING LIGHT (RED)	The (DES QTY) warning light is illuminated if, prior to staging, the fuel or oxidizer in the descent tanks falls below a quantity such that approximately 2 minutes of burning time remains at 25% thrust. The master alarm indicator and 3KHZ tone are disabled if this light is illuminated.
6DS6	CONTROL ELECTRONICS SECTION AC VOLTAGE FAILURE WARNING LIGHT (RED)	The (CES AC) warning light is illuminated if either of the AC voltages (single phase 28V 800 hz or three phase 26 V 800 hz) in the Control Electronics Section of the STAB/CONT subsystem is out of tolerance. The light is extinguished when the Gyro Test Control switch (11S1) is actuated to either the POS RT or NEG RT position.
6DS7	CONTROL ELECTRONICS SECTION DC VOLTAGE FAILURE WARNING LIGHT (RED)	The (CES DC) warning light is illuminated if the DC voltage of one or more of the DC power supplies (+15 V, -15 V, +4.3 V, +6 V -6 V) in the Control Electronics Section of the STAB/CONT subsystem is out of tolerance. The light is extinguished when Gyro Test Control Switch (11S1) is actuated to either the POS RT or NEG RT position.
6DS8	AGS FAILURE WARNING LIGHT (RED)	The (AGS) warning light is illuminated if: (1) a failure is sensed in any of the following ASA power supplies: +28V, +12V, or 28V 400 hz, or (2) if a fail signal is generated by the AEA test assembly,

SYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

	Control/Indicator	Function
6DS8 (Cont.)		or (3) if an ASA heater failure opens the +12V power supply. The signals to illuminate this light are inhibited if the AGS status switch (12S17) is in the OFF position.
6DS9	LGC FAILURE WARNING LIGHT (RED)	The (LGC) warning light is illuminated if: (1) a power failure is sensed in any of the following LGC power supplies: +28V, +3V, +13V, or (2) two types of scaler failures, or (3) restart or counter failures during LGC operate periods or in response to an alarm test program. The light is extinguished by either: (1) restoration of nominal voltage, (2) placing the Guidance Control switch (9S6) to the AGS position.
6DS10	INERTIAL SUBSYSTEM FAILURE WARNING LIGHT (RED)	The ISS warning light is illuminated if a failure of any of the following occurs: (1) failure of 3.2 KHz power supply. (2) Failure of PIPA during main engine thrusting. (3) Gimbal servo error and tolerances. (4) Failure of the CDU. The light is extinguished by either an in value condition restored or Guidance Control Switch (9S6) in AGS position.
6DS11	RCS TCA WARNING LIGHT (RED)	The (RCS TCA) warning light is illuminated if: (1) There is a primary coil command to fire a specific thruster in the absence of chamber pressure at that thruster, or (2) if chamber pressure is present in the absence of an "ON" command, or (3) if opposing colinear jets are on simultaneously. The light is extinguished when the isolation valve associated with the failed TCA is closed.

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6DS12 6DS13	RCS "A" REGULATOR FAILURE WARNING LIGHT (RED) RCS "B" REGULATOR FAILURE WARNING LIGHT (RED)	The (RCS A REG) warning light is illuminated if the pressure in the helium line of the pressurized RCS System A rises above 205 psia or falls below 165 psia. The light is extinguished when the nominal pressure is restored or if the main shutoff solenoid valves of System A (as operated by the System A Main Shutoff Switch (8S7) are closed. The (RCS B REG) warning light for System B is illuminated and extinguished in an identical manner as the (RCS A REG) warning light, as operated by the System B Main Shutoff Switch (8S9).
6DS14	DC BUS VOLTAGE FAILURE WARNING LIGHT (RED)	The (DC BUS) warning light is illuminated if a low voltage condition ($< 26.5\text{V}$) occurs on either the Commander's or the LM Pilot's DC electrical bus. The light is extinguished by restoration of a nominal voltage condition.
6DS16	CABIN LOW PRESSURE WARNING LIGHT (RED)	The (CABIN) warning light is illuminated if the cabin pressure falls below $4.15 \pm .3$ psia. The light is extinguished when cabin pressure is restored to a level greater than $4.65 \pm .25$ psia. This indicator will not operate during periods of intentional cabin depressurization (When the EGRESS or CLOSE position is selected on both Atmosphere Revitalization Section Pressure Regulator Valves (7H1 and 7H2).
6DS17	SUIT/FAN LOW PRESSURE WARNING LIGHT (RED)	The (SUIT/FAN) warning light is illuminated if either: (1) the pressure within the suit falls below 3.12 psia or (2) if the #2 suit circulating fan fails. If illuminated by low suit pressure, it is extinguished by restoration of a nominal pressure. If illuminated because of #2 fan failure, the light is extinguished by deactivation of the Suit Fan ΔP Control circuit breaker (4CB120).
6DS21	HIGH He REG OUTLET PRESS CAUTION LIGHT (YELLOW)	The (ASC HI REG) caution light is illuminated if the helium pressure downstream of the regulators in the ascent helium lines is greater

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6DS21 (Cont.)		than 220 psia. The light is extinguished when pressure is reduced to a nominal value.
6DS22	ASCENT PROPELLANT LOW QUANTITY CAUTION LIGHT (YELLOW)	The (ASC QTY) caution light is illuminated if the level of ascent fuel or oxidizer in the ascent tanks reaches a value such that approximately 10 seconds burning time remains. The signal is intended to permit the crew to manually shut down the ascent engine to avoid possible explosive effects resulting from depletion of either fuel or oxidizer before the other, and to indicate that ascent engine thrusting is not available for midcourse correction or rendezvous braking. These low level signals are enabled only if the ascent engine is on.
6DS23	AUTOMATIC GIMBAL FAILURE CAUTION LIGHT (YELLOW)	The (ENG GMBL) caution light is illuminated if a difference between the gimbal drive signal and gimbal response from the Y or Z-axis trim function is sensed. This signal is enabled only if the Descent Engine is armed and the ENG GMBL switch (1S8) is in the enable position. Additionally, the signal is disabled following staging (deadface switch).
6DS25	NOT USED	Wiring to indicator exists but function is disabled.
6DS26	INVERTER FAILURE CAUTION LIGHT (YELLOW)	The (INVERTER) caution light is illuminated either: (1) if the AC bus voltage is <112V or (2) if the AC bus frequency is <398 hz or >402 hz. The light is extinguished when within tolerance conditions are restored, or if the AC Power switch (4S14) is turned off.

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING G)

Code	Control/Indicator	Function
6DS27	BATTERY FAILURE CAUTION LIGHT (YELLOW)	The (BATTERY) caution light is illuminated if an over-current, reverse-current, or over-temperature condition occurs in any of the four descent or two ascent batteries. The light is extinguished when nominal conditions are restored or if the affected battery is turned off.
6DS28	RENDEZVOUS RADAR DATA FAILURE CAUTION LIGHT (YELLOW)	The (RNDZ RDR) caution light is illuminated if a rendezvous radar data-not-good condition occurs. The light is extinguished when a "Data Good" condition is restored, or if the rendezvous radar is turned off or if the RNDZ RDR mode switch is (17S3) placed to any position other than AUTO TRACK. The RNDZ RDR caution is enabled only when the RNDZ RDR mode switch is in the AUTO TRACK position.
6DS29	NOT USED	Wiring to indicator exists but function is disabled.

SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

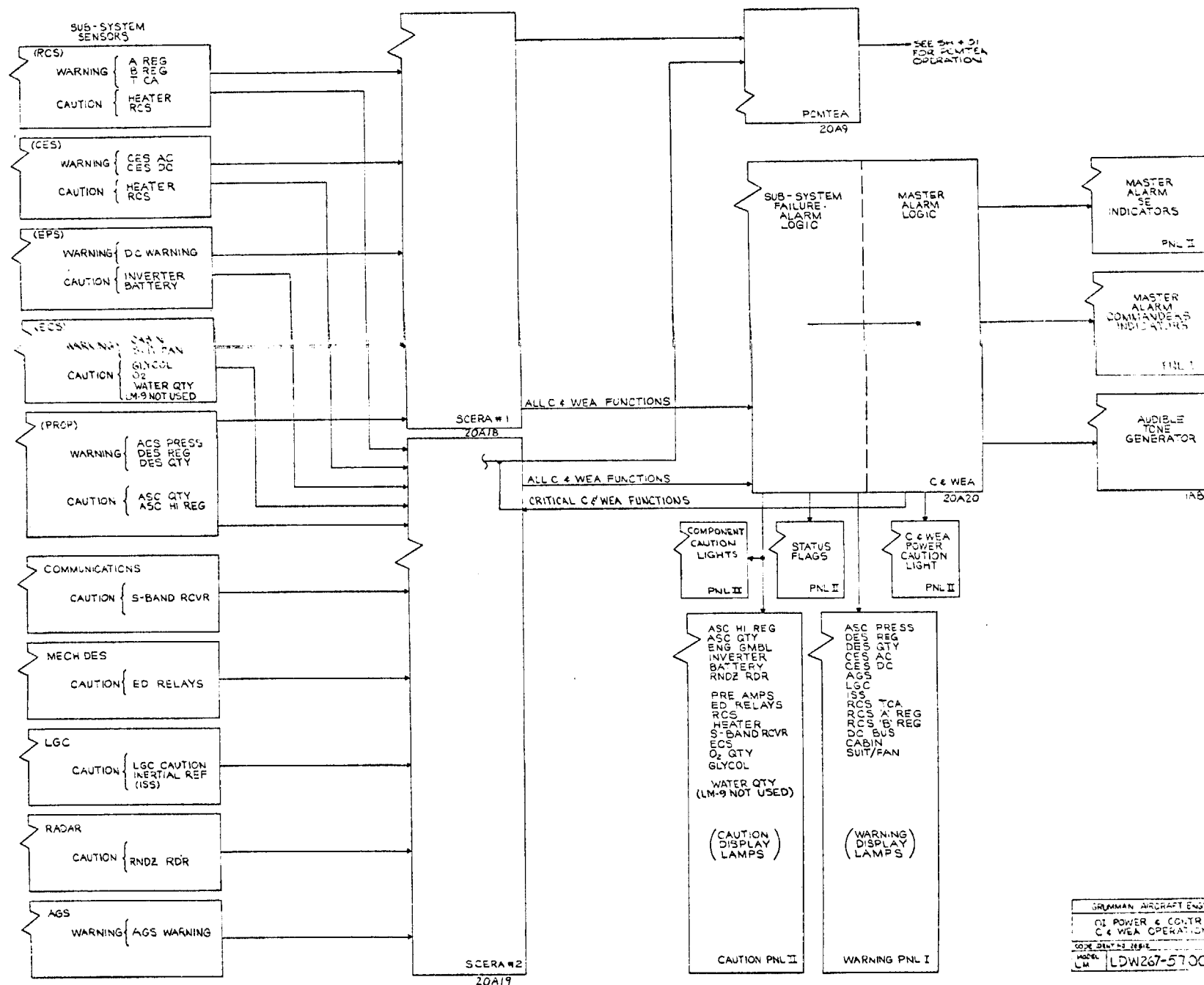
Code	Control/Indicator	Function
6DS30	PREAMPS POWER FAILURE CAUTION LIGHT (YELLOW)	The (PRE AMPS) caution light is illuminated by an out-of-tolerance condition in either of two parallel redundant $-4.7 \pm .5V$ regulated supplies which supply bias voltage to the ATCA solenoid driver. This light is extinguished either by the stage deadface switch or by actuation of the Abort pushbutton (1S13).
6DS31	EXPLOSIVE DEVICES SUBSYSTEM RELAY FAILURES CAUTION LIGHT	The (ED RELAYS) caution light is illuminated if a failure of any of the following EDS relays occur; SYSTEM A or SYSTEM B: Arming relay, stage relay, sequence relay, nuts or bolts firing relay, ECI firing relay or guillotine firing relay. If the failure occurred in the stage relays, positioning the stage relay switch (2S8) to the RESET position will extinguish the light. The light is inhibited if the MASTER ARM switch (2S7) is in the ON position or if ABORT STAGE is commanded.
6DS32	RCS FAILURE CAUTION LIGHT (YELLOW)	The (RCS) caution light is illuminated if the pressure of the helium tank in either RCS system drops below 1700 psia. The light is extinguished by selecting the He position of the RCS Temp/Press Monitor switch (8S19).
6DS33	HEATER FAILURE CAUTION LIGHT (YELLOW)	The (HEATER) caution light is illuminated by an out-of-tolerance temperature condition in: (1) the S-band antenna electronic drive assembly ($<-64.08^{\circ}F$ or $>153.63^{\circ}F$) or (2) the Rendezvous Radar assembly ($<-50.07^{\circ}F$ or $>147.69^{\circ}F$) or (3) the Landing Radar antenna assembly ($<-19.26^{\circ}F$ or $>147.69^{\circ}F$). The light is extinguished by positioning the Temperature Monitor switch (18S10) to the affected heater assembly position.

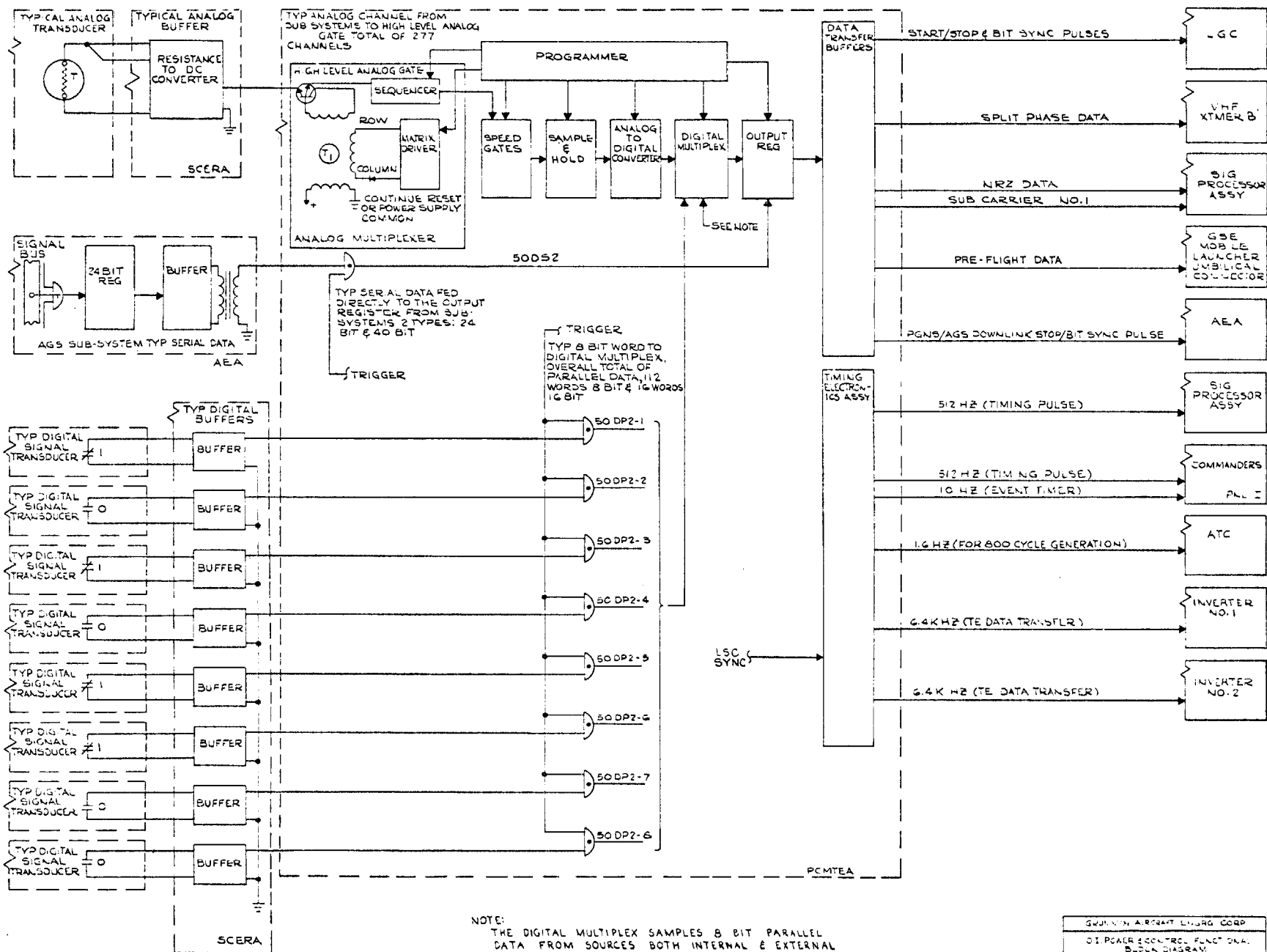
SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6DS34	C/WEA REG POWER FAILURE CAUTION LIGHT (YELLOW)	The (C/WEA PWR) caution light is illuminated if any one or more of the following regulated power supplies fail: +9V, +23V, +4V, -3V, -2.3V, +2.3V. The light is extinguished only by restoration of nominal power to the C/WEA. Unlike the other C/WEA lights, this light is undimmable. Depressing 6S2 or 6S3 will not terminate either master alarm indicators or 3KHz tone when used in conjunction with this light.
6DS36	ECS FAILURE CAUTION LIGHT (YELLOW)	The (ECS) caution light is illuminated by any of the following malfunctions: glycol pump failure; CO ₂ partial pressure greater than 7.6 mm of mercury; water separator failure; or suit fan #1 failure. The light is extinguished by correction of the malfunction which illuminated it as follows: restoration of glycol pump pressure as a result of selecting #2 pump or selecting the INET (SEC) position if #2 has failed; or restoration of nominal CO ₂ partial pressure level; or restoration of nominal water separator speed; or selection of the #2 suit fan.
6DS37	OXYGEN QUANTITY CAUTION LIGHT (YELLOW)	The (O ₂ QTY) caution light is illuminated if a low quantity condition (< 135 psia) occurs in the descent oxygen tank, or if a less than full quantity condition (< 682.4 and < 681.6 psia) occurs in ascent oxygen tank, #2 and #1 respectively or if a low quantity condition (< 99.6 psia) occurs in ascent tank #1. The light is extinguished by momentarily positioning the O ₂ /H ₂ O QTY MON switch (7S2) to the C/WEA RESET position. The descent tank low quantity signal and the ascent tanks less than full signals are inhibited following staging (dead-face switch).

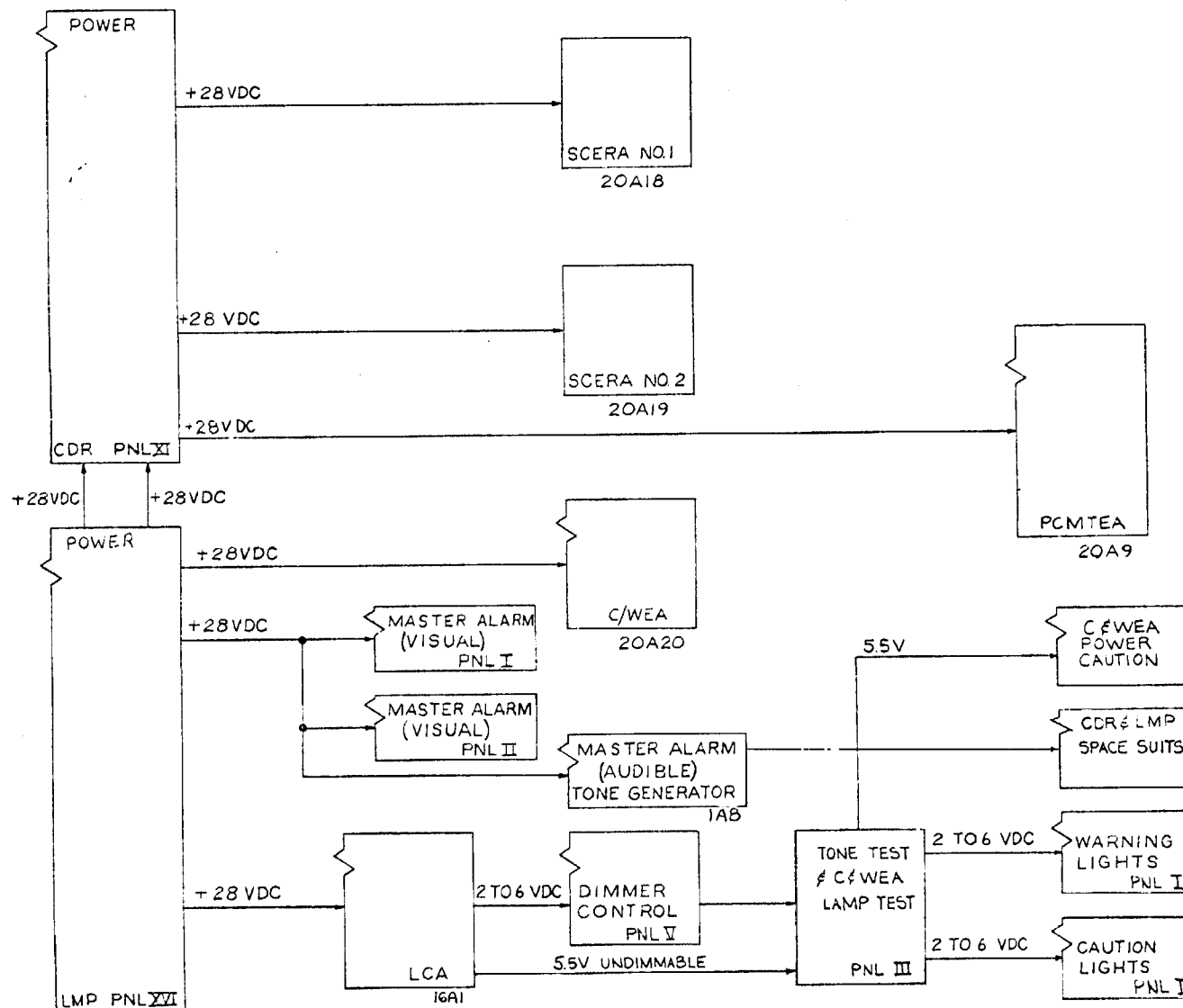
SUBSYSTEM: OPERATIONAL INSTRUMENTATION (FUNCTIONAL GROUPING 6)

Code	Control/Indicator	Function
6DS38	GLYCOL FAILURE CAUTION LIGHT (YELLOW)	The (GLYCOL) caution light is illuminated by either of two malfunctions: (1) low glycol quantity in the primary coolant loop; or (2) high glycol temperature in the primary loop ($>49.98^{\circ}\text{F}$) as sensed at the glycol water evaporator outlet. Both signals are inhibited following selection of the INST (SEC) position of the Glycol Pump switch (7S3). If illuminated by the high temperature condition, restoration of the temperature to a nominal level also extinguishes the light.
6DS39	WATER QUANTITY CAUTION LIGHT (YELLOW)	The (WATER QTY) caution light is illuminated if the quantity remaining in the descent water tank falls below 10%, or if a less than full condition occurs in either ascent water tank, or if unequal levels occur in either of these ascent tanks. The light is extinguished by momentarily positioning the $\text{O}_2/\text{H}_2\text{O}$ QTY MON switch (7S2) to the C/WEA RESET position. The descent tank low level signal and the ascent tanks less than full signals are inhibited following staging (deadface switch).
6DS40	S-BD RCVR FAILURE CAUTION LIGHT	The (S-BD RCVR) caution light is illuminated by loss of the Automatic Gain Control signal in the Receiver. Positioning the Range/TV Function switch (13S1) to the OFF/RESET position extinguishes the light. The light is enabled only if the Range/TV function switch (13S1) is in the TV/C/WEA ENABLE position.

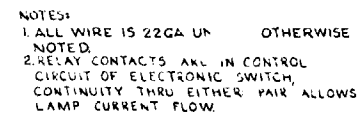




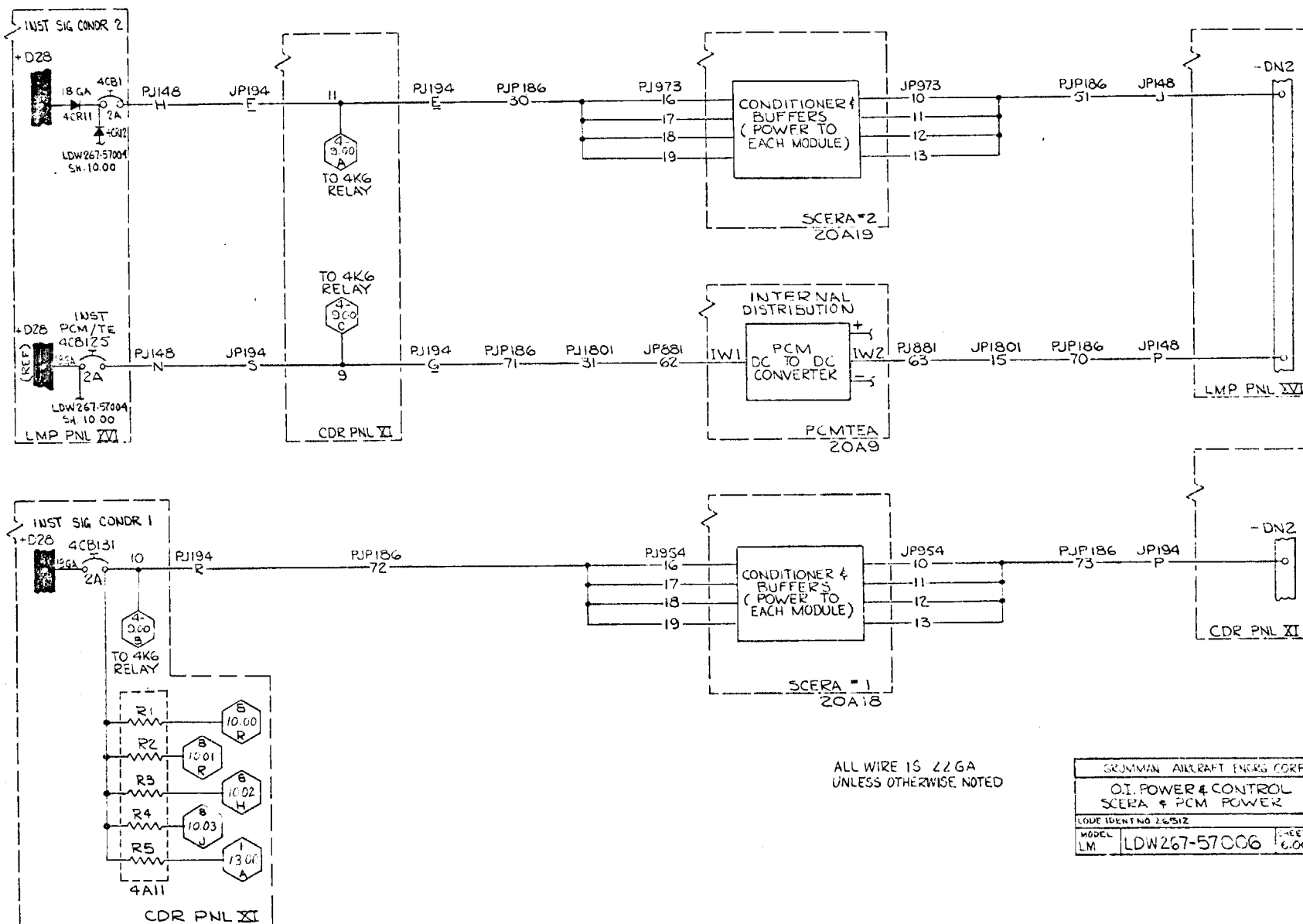
NOTE:
THE DIGITAL MULTIPLEX SAMPLES 8 BIT PARALLEL DATA FROM SOURCES BOTH INTERNAL & EXTERNAL TO THE PCMTA.



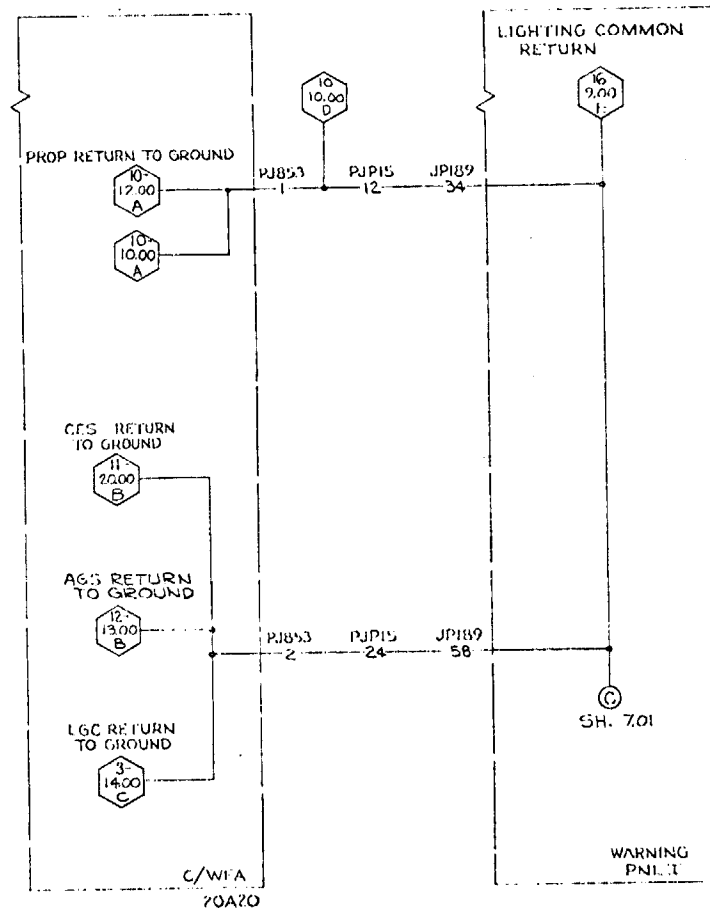
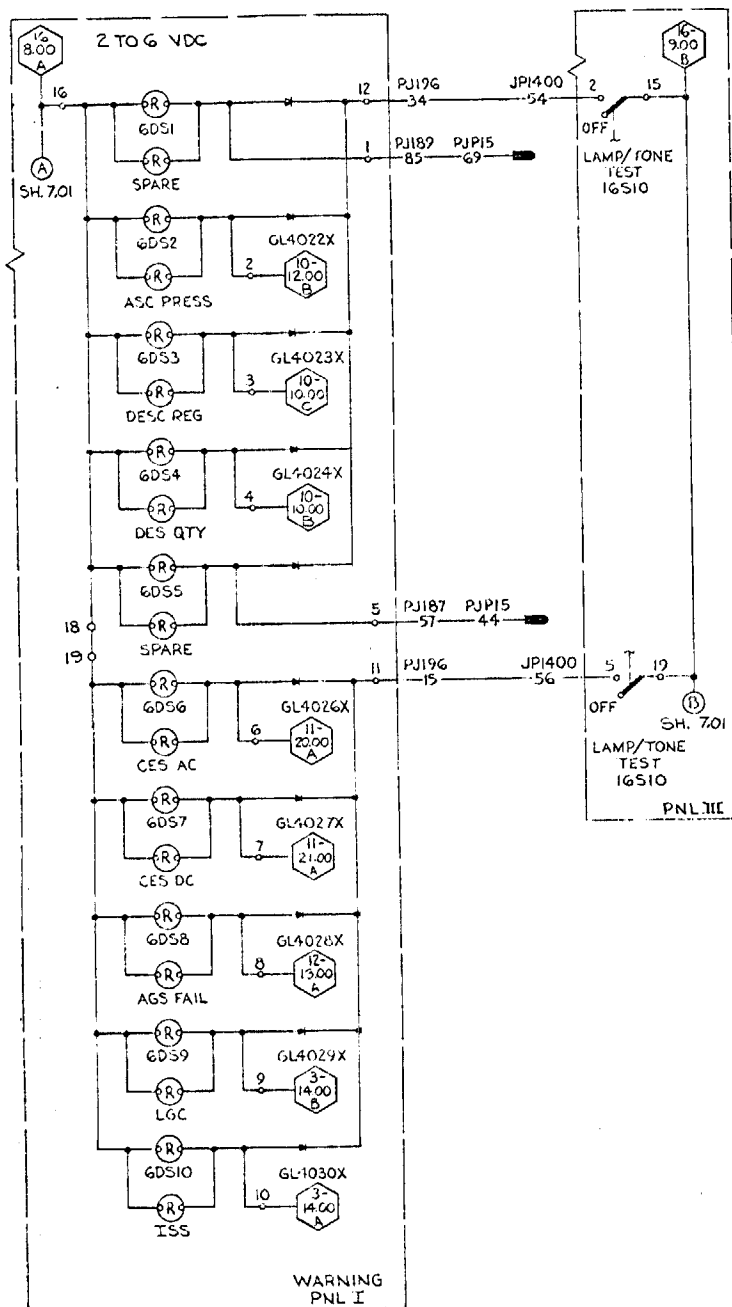
GRUMMAN AIRCRAFT ENGRG CORP			
O.I. POWER & CONTROL BLOCK DIAGRAM			
CODE IDENT NO 26512			
MODEL LM	LDW267-57006	SHEET 4.02	REV 3



GRUMMAN & RIKAL ENGINEERING	
OIL POWER & CONTROL	
MASTER ALARM CONTROL	
S. COPELAND INC. 24-112	
MODEL L.M.	LDW267-5700G
	NET WT. 5.03

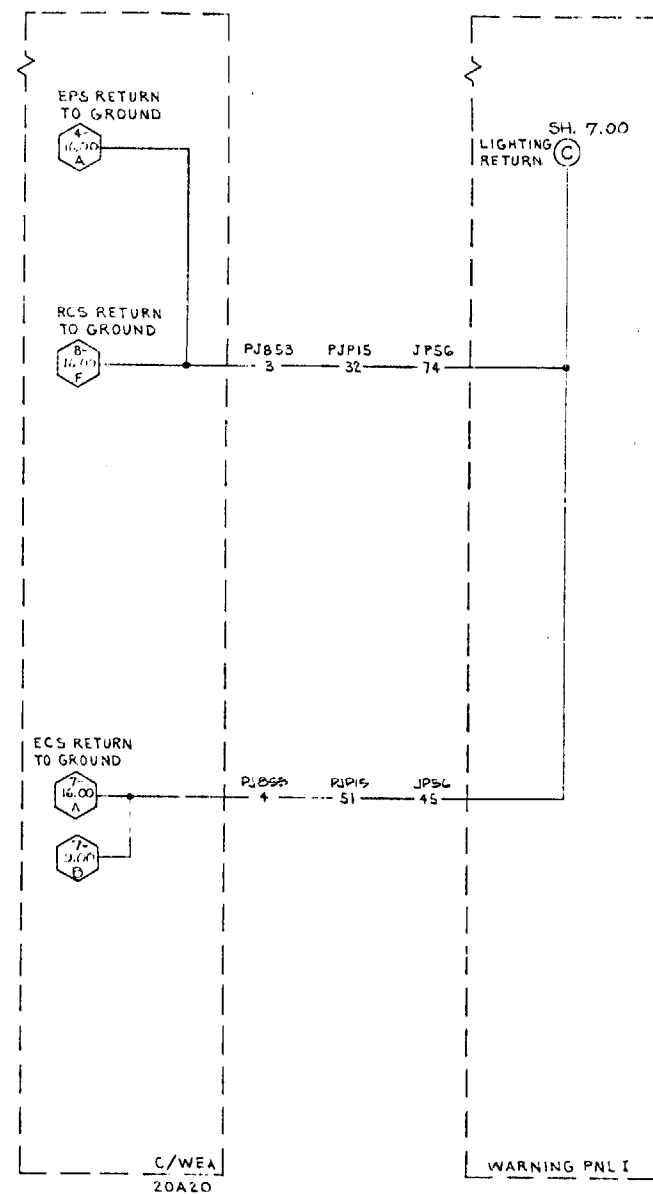
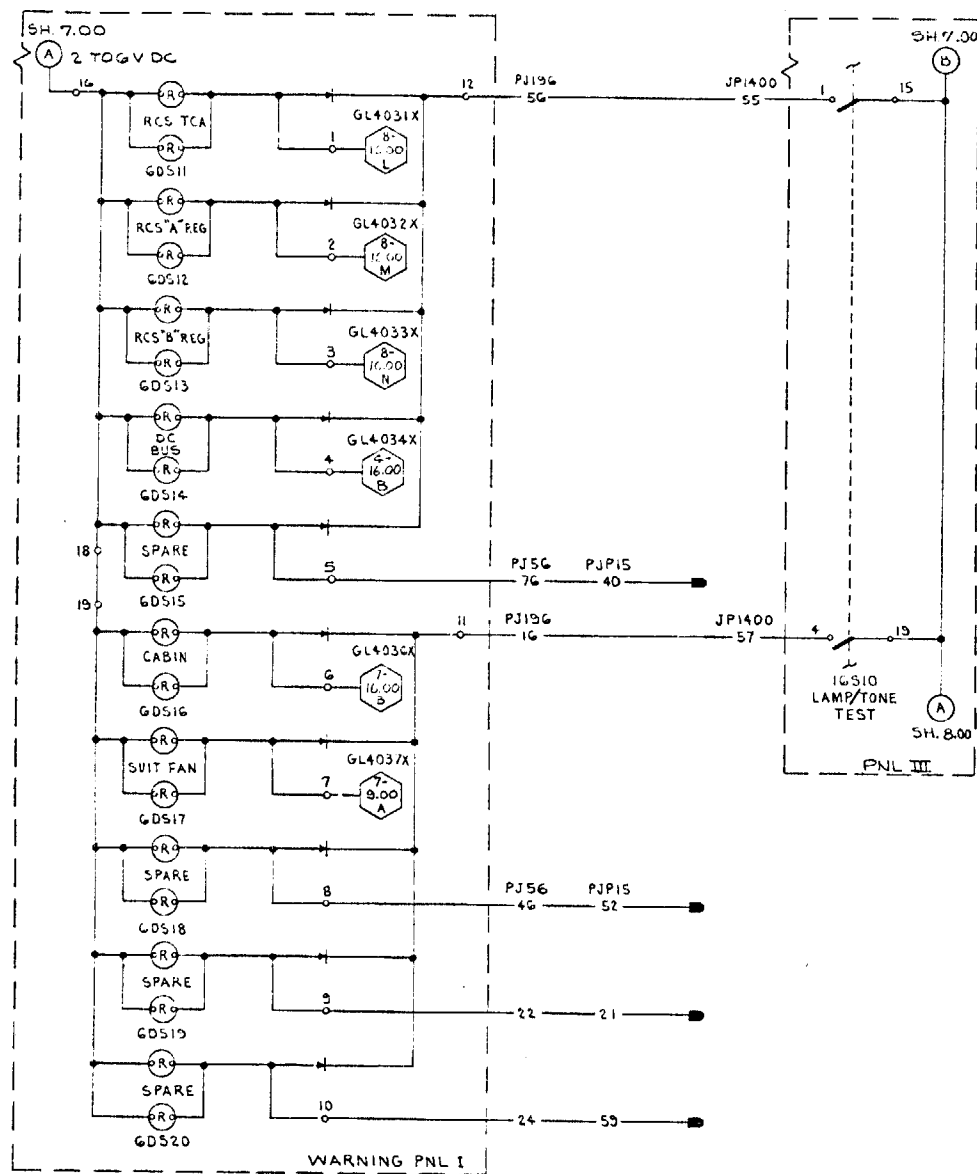


GRUMMAN AIRCRAFT ENGRG CORP.		
O.I. POWER & CONTROL		
SCERA & PCM POWER		
CODE IDENT NO 26512		
MODEL	LDW267-57006	SHEET REV 6.00 15



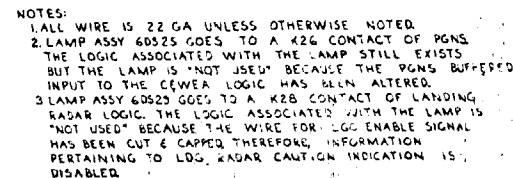
ALL WIPE IS 22GA
UNLESS OTHERWISE NOTED.

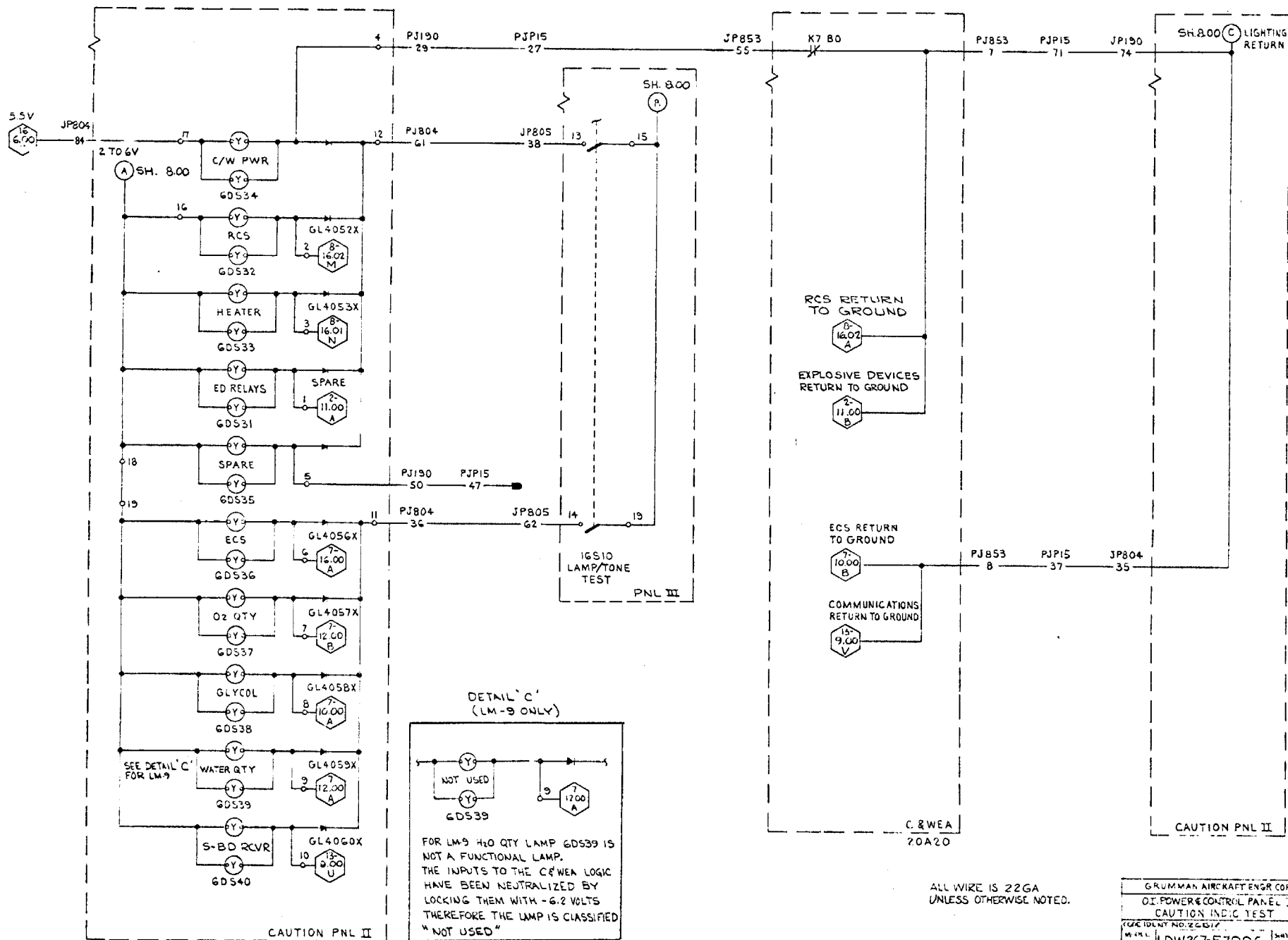
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CODE IDENT NO 26512	
MODEL LM	1LDW267-57006 SHEET 100V 200 B



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UNLESS OTHERWISE NOTE.

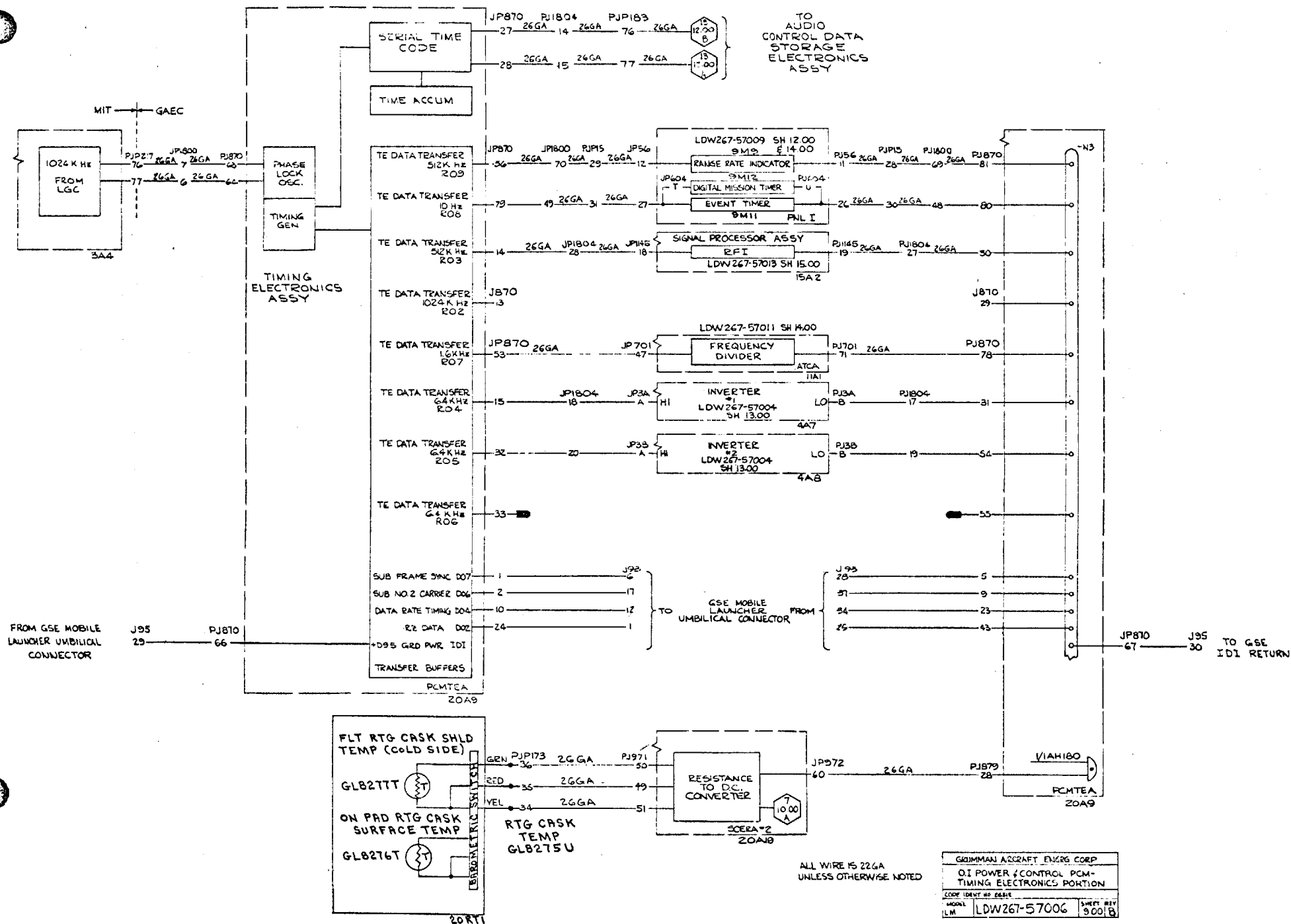
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WARNING INDIC TEST	
1DW267-510001/01	

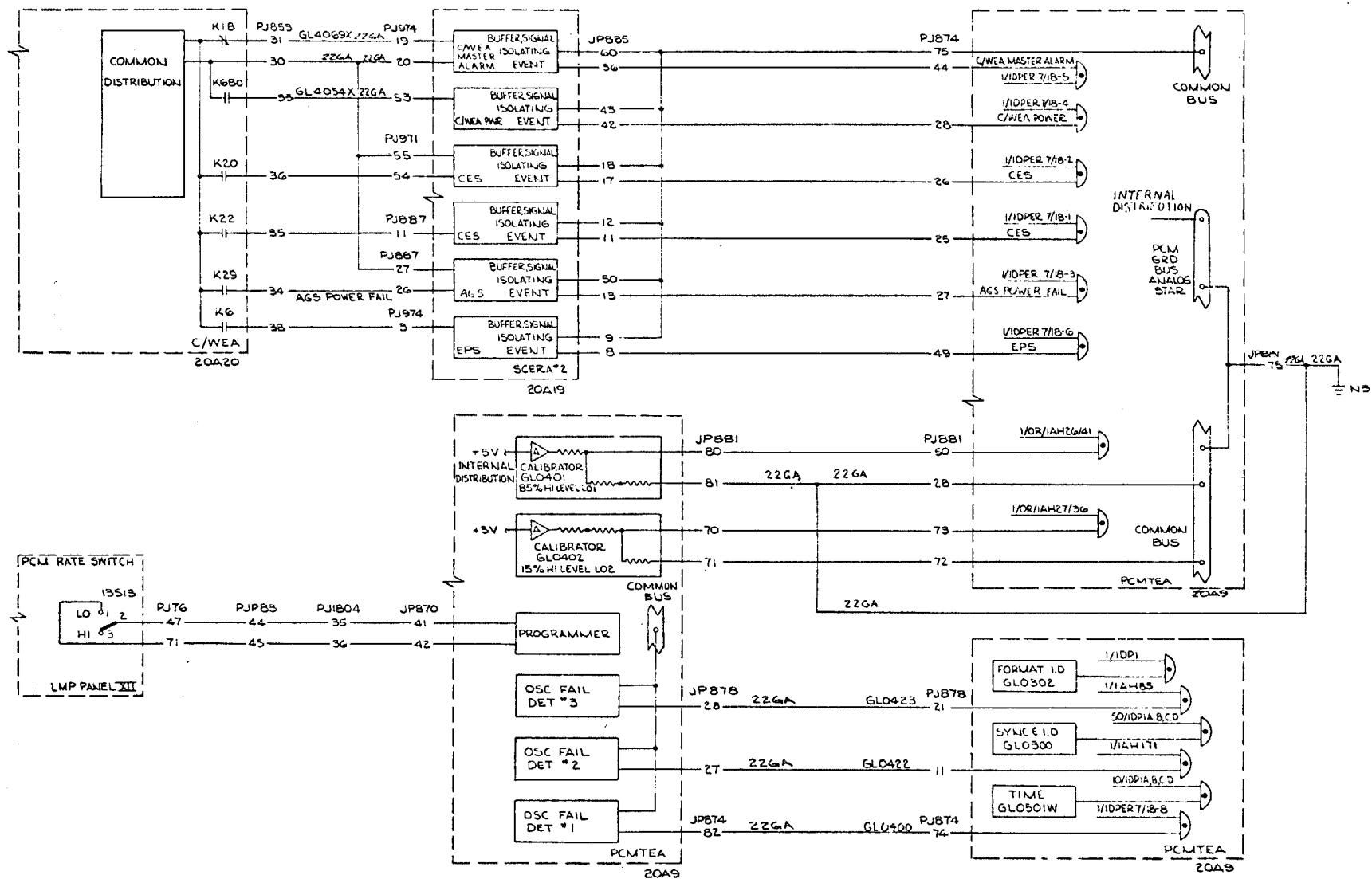




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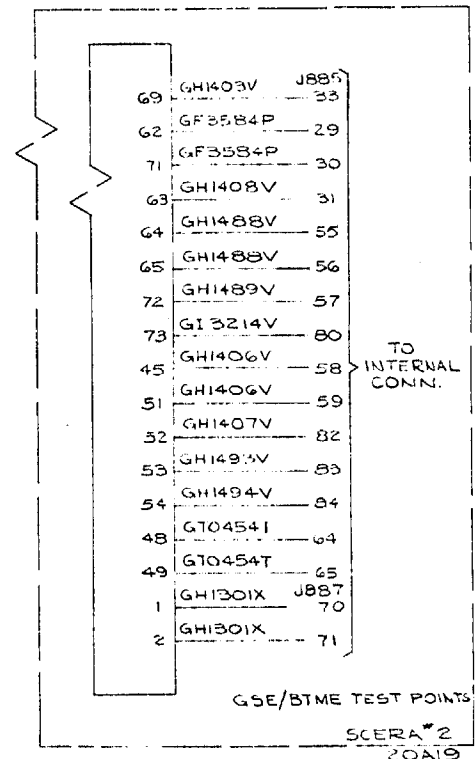
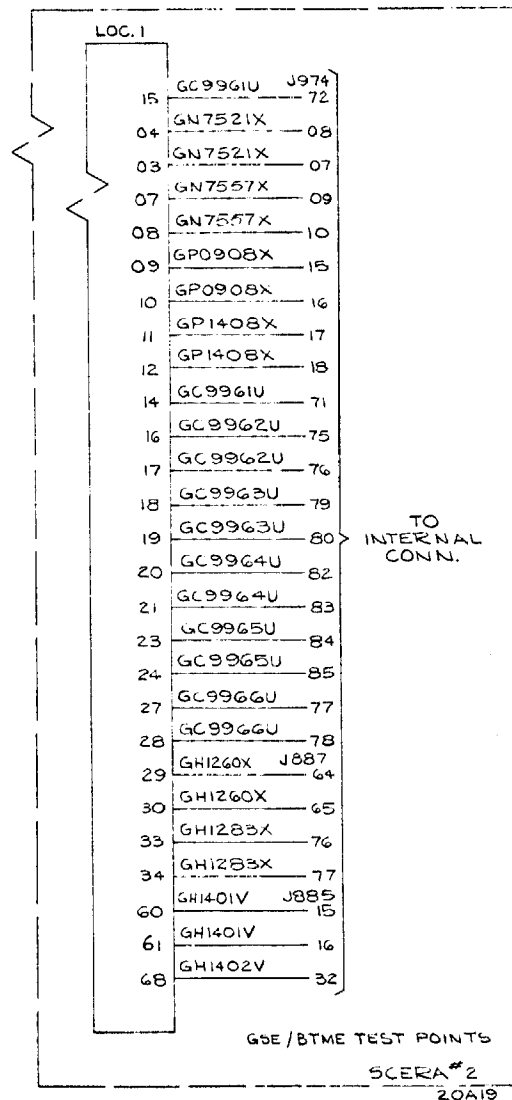
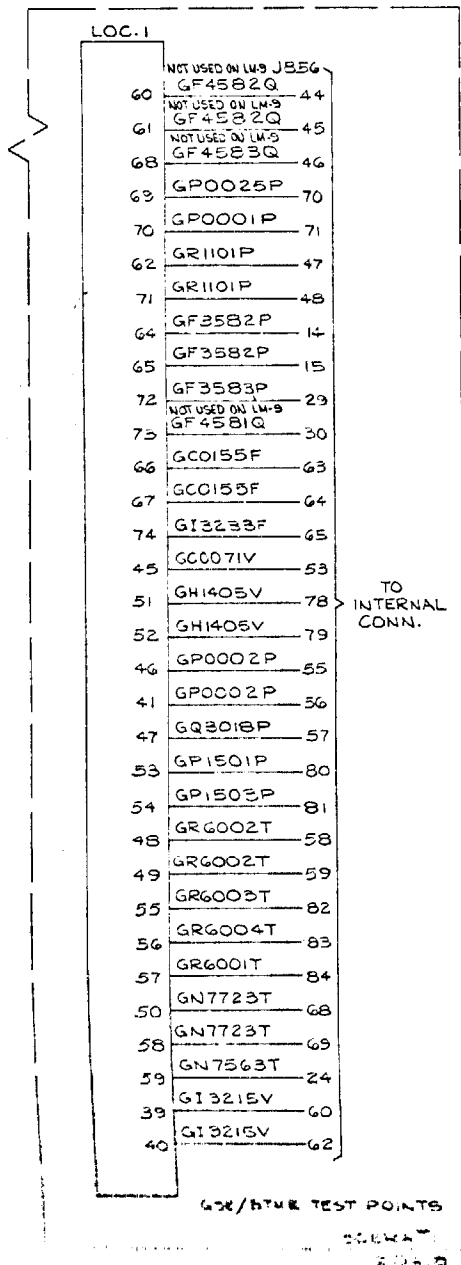
GRUMMAN AIRCRAFT ENGR CORP	
O.I. POWER & CONTROL PANEL II	
CAUTION INDIC TEST	
WIRE NO. 22 GA	
LM	LDW267-57006 8.01 B





ALL WIRE IS 26 GA UNLESS OTHERWISE NOTED

GRUNMAN AIRCRAFT ENGRS CORP		
DI POWER & CONTROL PCM		
OSC FAILURE & TIMING PULSE		
DATE: 10/11/55		
LM	LDN 267-57006	10/00/55



SCERA #2	
TEST POINTS	
DATE	TIME
10/24/57	11:00

GL8171V	ELECT, SW TEST POINT 7	85
GL8170V	ELECT, SW TEST POINT 6	84
GL8169V	ELECT, SW TEST POINT 5	83
GL8164V	RELAY DRIVER 47	82
GL8163V	RELAY DRIVER 46	81
GL8162V	RELAY DRIVER 45	80
GL8161V	RELAY DRIVER 44	79
		78
		77
		76
		75
		74
		73
		72
		71
		70
GL8157V	POWER SUPPLY TEST POINT A	69
GL8158V	POWER SUPPLY TEST POINT B	68
GL8159V	POWER SUPPLY TEST POINT C	67
GL8160V	POWER SUPPLY TEST POINT D	66
GL8156V	POWER SUPPLY WARN. CIRCUIT	65
GL8155V	POWER SUPPLY OUTPUT +23V	64
GL8154V	POWER SUPPLY OUTPUT +9.0V	63
GL8153V	POWER SUPPLY OUTPUT +4.0V	62
GL8152V	POWER SUPPLY OUTPUT -3.0V	61
GL8168V	FLAG & ADV. SOR R/D OUTPUTS	60
GL8167V	ELECT, SW TEST POINT 4	59
GL8166V	ELECT, SW TEST POINT 3	58
GL8165V	ELECT, SW TEST POINT 2	57
	ELECT, SW TEST POINT 1	56
	MA F/F OUTPUT 3	55
	MA F/F OUTPUT 2	54
	MA F/F OUTPUT 1	53
GL8008V	(D) MA RELAY DRIVER OUT(A) 3	52
GL8007V	(E) MA RELAY DRIVER OUT(B) 2	51
GL8006V	(F) MA RELAY DRIVER OUT(C) 1	50
GL8147V	(G) MA F/F INPUT 30	49
	(H) MA F/F INPUT 20	48
	(A) MA F/F INPUT 10	47
GL8144V	IND NO. 28 TEST POINT 'D'	46
GL8143V	IND NO. 28 TEST POINT 'C'	45
GL8142V	IND NO. 28 TEST POINT 'B'	44
GL8141V	IND NO. 28 TEST POINT 'A'	43
GL8140V	RELAY DRIVER NO. 40	42
GL8139V	NO. 39	41
GL8138V	NO. 38	40
GL8137V	NO. 37	39
GL8136V	NO. 36	38
GL8135V	NO. 35	37
GL8134V	NO. 34	36
GL8133V	NO. 33	35
GL8132V	NO. 32	34
GL8131V	NO. 31	33
GL8130V	NO. 30	32
GL8129V	NO. 29	31
GL8128V	NO. 28	30
GL8127V	NO. 27	29
GL8126V	NO. 26	28
GL8125V	NO. 25	27
GL8124V	NO. 24	26
GL8123V	NO. 23	25
GL8122V	NO. 22	24
GL8121V	NO. 21	23
GL8120V	NO. 20	22
GL8119V	NO. 19	21
GL8118V	NO. 18	20
GL8117V	NO. 17	19
GL8116V	NO. 16	18
GL8115V	NO. 15	17
GL8114V	NO. 14	16
GL8113V	NO. 13	15
GL8112V	NO. 12	14
GL8111V	NO. 11	13
GL8110V	NO. 10	12
GL8109V	NO. 9	11
GL8108V	NO. 8	10
GL8107V	NO. 7	9
GL8106V	NO. 6	8
GL8105V	NO. 5	7
GL8104V	NO. 4	6
GL8103V	NO. 3	5
GL8102V	NO. 2	4
GL8081V	RELAY DRIVER NO. 1	3
		2
		1

SIGNAL GROUND

S.P.

C & WEA
20 A 20

J854

TO GSE / BTME
TEST POINTS

NOT USED FOR LM-9

1024KHZ COUNTER NO. 1	GL6101	60
1024KHZ COUNTER NO. 2	GL6102	37
1024KHZ COUNTER NO. 3	GL6103	20
51.2KHZ COUNTER NO. 1	GL6104	21
51.2KHZ COUNTER NO. 2	GL6105	22
51.2KHZ COUNTER NO. 3	GL6106	42
51.2KHZ COUNTER NO. 1	GL6107	57
51.2KHZ COUNTER NO. 2	GL6108	34
51.2KHZ COUNTER NO. 3	GL6109	17
6.4KHZ COUNTER NO. 1	GL6110	6
6.4KHZ COUNTER NO. 2	GL6111	1
6.4KHZ COUNTER NO. 3	GL6112	3
1.6KHZ COUNTER NO. 1	GL6113	11
1.6KHZ COUNTER NO. 2	GL6114	25
1.6KHZ COUNTER NO. 3	GL6115	45
100 HZ COUNTER NO. 1	GL6116	82
100 HZ COUNTER NO. 2	GL6117	58
100 HZ COUNTER NO. 3	GL6118	35
10 HZ COUNTER NO. 1	GL6119	15
10 HZ COUNTER NO. 2	GL6120	7
10 HZ COUNTER NO. 3	GL6121	2
SAMPLE GATE COMMAND 4	GL6201	AKI
BIT RATE 5	GL6202	AC3
READ COUNTER COMMAND 16	GL6204	AB1
REDUCED MODE PWR STROBE 13	GL6205	R2
REDUCED MODE PWR STROBE 14	GL6206	21
NORM MODE DIGITAL PWR STROBE 15	GL6207	N2
NORM MODE DIGITAL PWR STROBE 32	GL6208	N1
+06 DIGITAL POWER SUPPLY 26	GL6209	26
PWR SUPPLY MAIN SWITCH 46	GL6210	46
FRAME 1 OF 4-81	GL6211	81
FRAME 1 OF 5-47	GL6212	47
FRAME 1 OF 8-27	GL6213	27
WORD 1 TO 16-33	GL6214	33
WORD 1 TO 16 OF 128-56	GL6215	56
NORMAL-55	GL6216	55
6.4 K HZ-59	GL6217	59
MODE SEL BIT STAB OUT +F24-80	GL6218	80
40 BIT SERIAL SYNCH 2 TO AEA-30	GL6261	DO12
40 BIT SERIAL STOP 2 TO AEA-54	GL6262	DO11
SUBFRAME SYNCH TO ACE-50	GL6263	DO7
SUBCARRIER 2 TO ACE-51	GL6264	DO6
SUBCARRIER 1 TO COMM-52	GL6265	DO5
DATE RATE TIMING TO ACE-53	GL6266	DO4
HI-41 LEVEL -72	GL6267	LO1
RZ DATA TO ACE-74	GL6268	DO2
NRZ DATA TO COMM-75	GL6269	DO1
SPLIT PHASE DATA TO COMM-76	GL6270	DO3
SERIAL TIME NRZ TO DSEA-61	GL6271	RO1
IC 2 TO D5194	GL6243	76
DO13TP CARRIER TO PMP ON	GL6242	28
DO14TP REF NO. 1	GL6241	48
DO10TP	GL6237	10K
DO9TP	GL6238	10K
DO8TP	GL6236	10K
DO5TP	GL6225	10K
RO5TP	GL6229	10K
RO2TP	GL6222	10K
RO3TP	GL6223	10K
RO4TP	GL6224	10K
RO6TP	GL6226	10K
RO7TP	GL6227	10K
RO8TP	GL6228	10K
IC1TP	GL6802	10K
INITP	GL6801	10K
TP 1 INT OSC FAILURE	JL0404	64
TP 2 INT OSC FAILURE	JL0405	65
RETURN		71

J882

TO GSE / BTME
TEST POINTS

PCMTEA
20A9

GRUMMAN AIRCRAFT ENGINE CORP	
C1 POWER & CONTROL	
CSE / BTME TEST POINTS	
TO PCMTEA & CWEA	
COPY IDENT NO. 24512	
MODEL	LM
LDW267-51006	SHEET 1250

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 7)

ENVIRONMENTAL CONTROL SUBSYSTEM

(REF LDW267-57007 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
ECS	LDW330-55000	H	J1, J2, & J3

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	7-701
b) Applicable Documents, Table of Contents and Revisions	7-702 thru 7-702.2
c) Cabin Location of ECS Controls and Indicators	7-703 & 7-703.1
d) ECS-Controls and Indicators Layout	7-704 thru 7-704.5
e) ECS-Controls and Indicator Functional Description	7-705 thru 7-705.11
f) ECS-Block Diagram	LDW267-57007 SH 4.00B
g) ECS-H ₂ O Management Section Fluid Schematic	LDW267-57007 SH 4.01C
h) ECS-Pri & Sec Glycol loops System Fluid Schematic	LDW267-57007 SH 4.02C
i) ECS-ARS & OSC PCS Systems Fluid Schematic	LDW267-57007 SH 4.03C
j) ECS-PLSS, OPS Space Suit & Waste Management Interface	LDW267-57007 SH 4.04C
k) ECS-Cabin Fans, Oxygen Supply, Pressure Control & Suit Flow Control	LDW267-57007 SH 5.00B
l) ECS-Suit Fans Control Caution & Warning, O ₂ Suit Control	LDW267-57007 SH 6.00B
m) ECS-Glycol Pump Control & Caution and Warning	LDW267-57007 SH 7.00B
n) ECS-Press Sensors, No. 1 and 2 Press Safety Valve Main H ₂ O/Reg & O ₂ Manifold and Cabin Press	LDW267-57007 SH 8.00C
o) ECS-CO ₂ H ₂ O, Partial Pressure and Press Suit Outlet Indicator	LDW267-57007 SH 9.00B

2. Table of Contents (Cont)

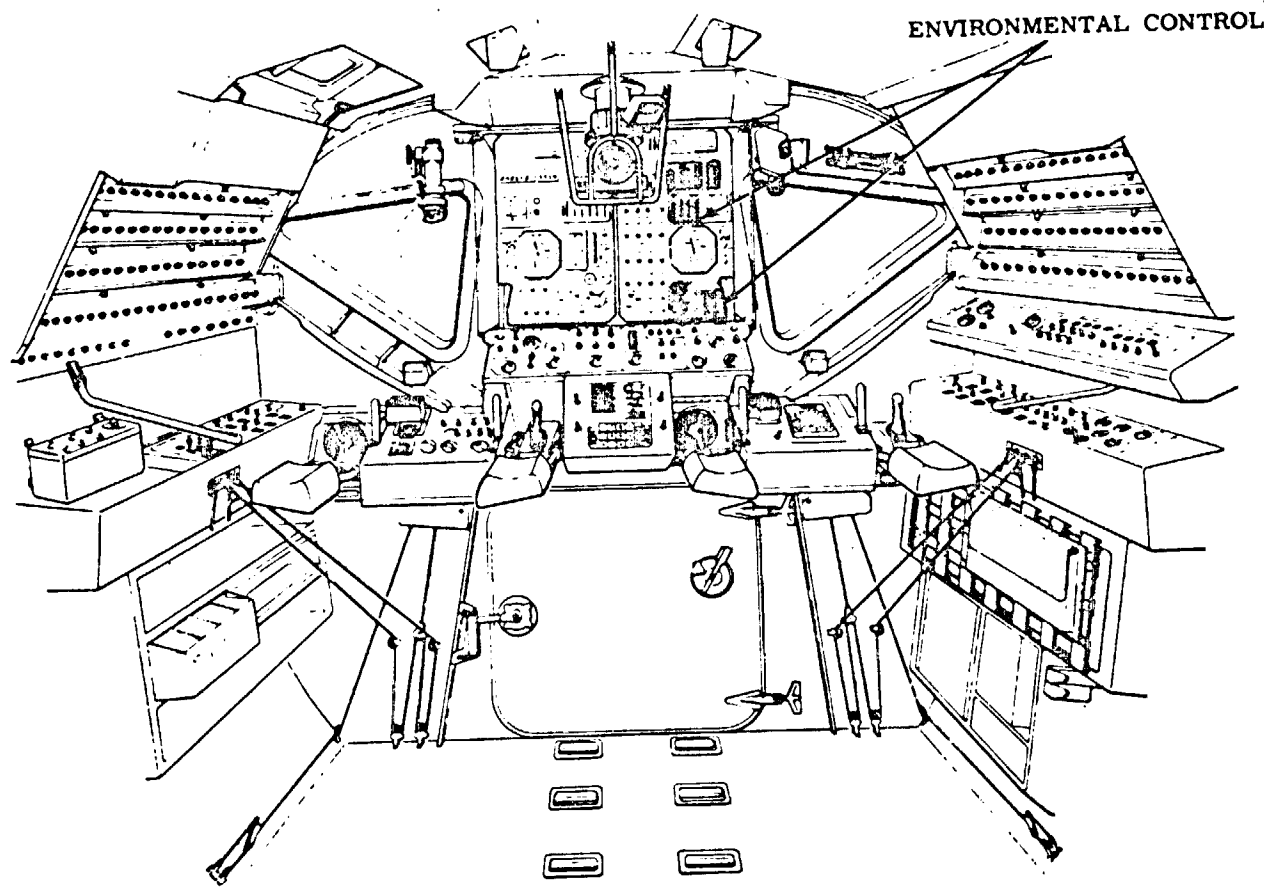
ITEM NAME	PAGE NO. /SHEET NO.
p) ECS-Temp Sensors, Heat Transport Section, Cabin and Suit Temp Indicators	LDW267-57007 SH 10.00B
q) ECS-OI H ₂ O-O ₂ Quantity Indication	LDW267-57007 SH 11.00B
r) ECS-OI H ₂ O-O ₂ Quantity (Caution and Warning)	LDW267-57007 SH 12.00C
s) ECS-OI Glycol Quantity Indication & H ₂ O Line Temps	LDW267-57007 SH 13.00C
t) ECS-OI to PCMTEA - Suit Circuit Controls	LDW267-57007 SH 14.00B
u) ECS-OI to PCMTEA - Suit Circuit Controls	LDW267-57007 SH 15.00B
v) ECS-OI Repressurization Valve Control & Glycol Pump Diff'l Caution and Warning	LDW267-57007 SH 16.00B

3. REVISIONS

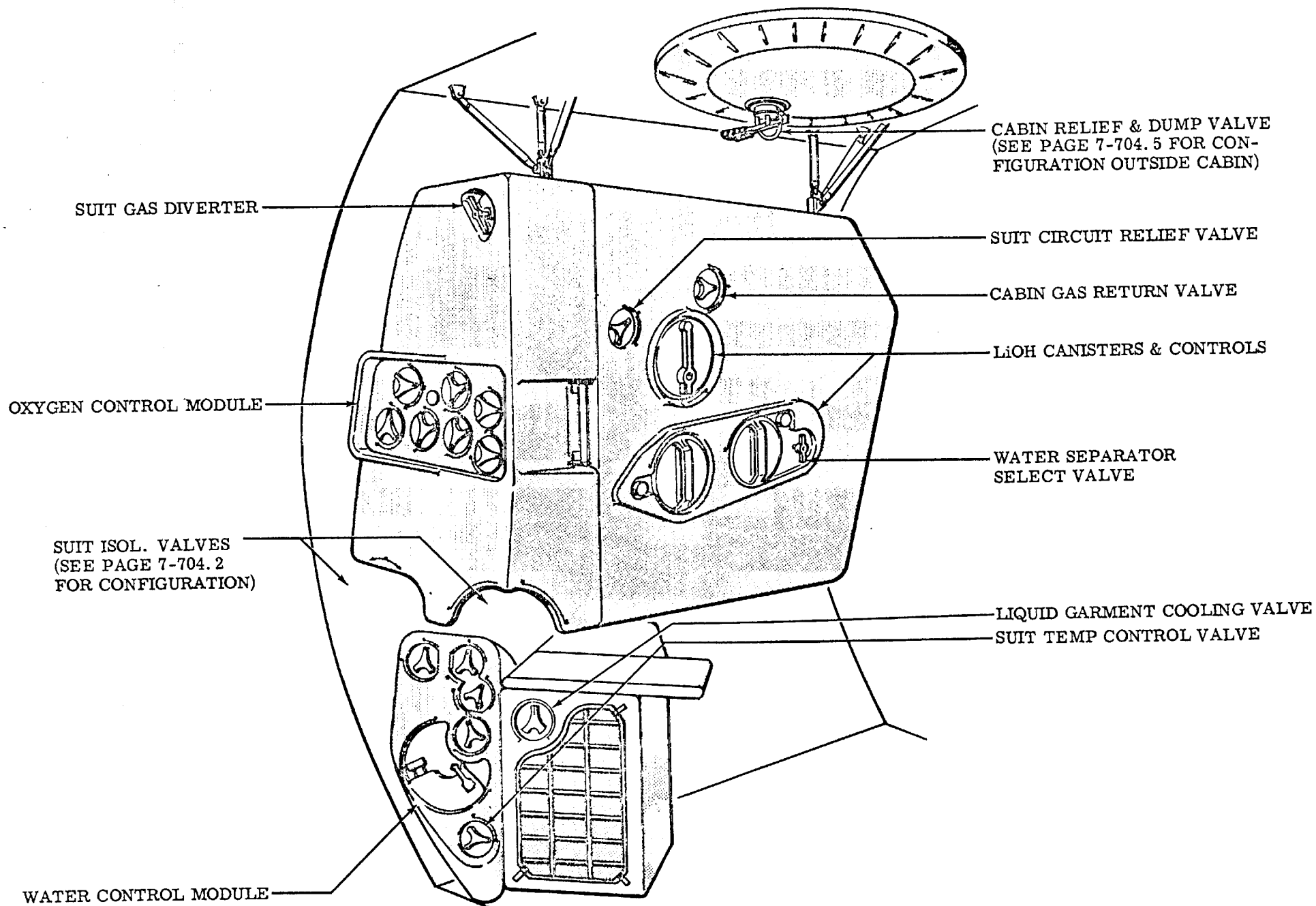
REV.	PAGE NO. AND/OR LDW267-57007, SHEET NO.	LCD	DESCRIPTION
B	4.01 8.00	5149	BACK-UP PRESSURE XDUCER FOR D/S WQMD
	4.01 4.03	5156A	RELOCATION OF ECS SURGE TANK VENT LINE
	4.01 11.00 12.00	5374 5374A	REPLACEMENT OF WATER QUANTITY MEASURING DEVICE (WQMD) WITH ABSOLUTE PRESSURE TRANSDUCER LSC 360-601-203-3 IN WATER MANAGEMENT SYSTEM
	6.00 15.00	5251A	REMOVAL OF LSC 330-306 DOUBLE POLE FUNCTIONAL SWITCH
C	12.00	5374D	REPLACEMENT OF THE WATER QUANTITY MEASURING DEVICE (WQMD) WITH AN ABSOLUTE PRESSURE TRANSDUCER

3. REVISIONS (Cont)

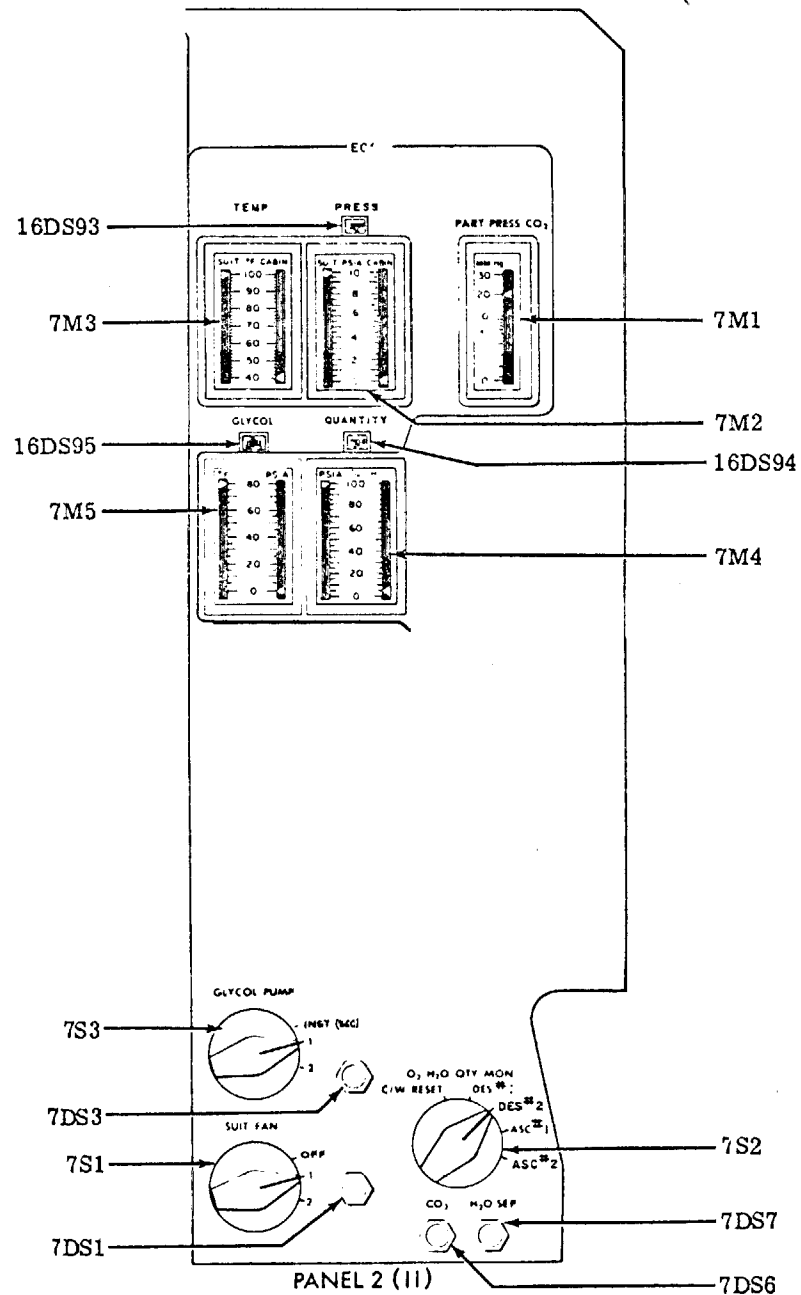
REV.	PAGE NO. AND/OR LDW267-57007, SHEET NO.	LCD	DESCRIPTION
C	4.03	5388A 5388D	O ₂ UMBILICAL MODIFICATION
	4.02	5389	LUNAR DUST PROBLEMS
	4.04	5443A	UMBILICAL STOWAGE (BUDDY SYSTEM)
	4.01 13.00	5502	TRANSDUCER INSTALLATION FOR APS HELIUM PRESSURE AND H ₂ O LINE TEMPERATURE



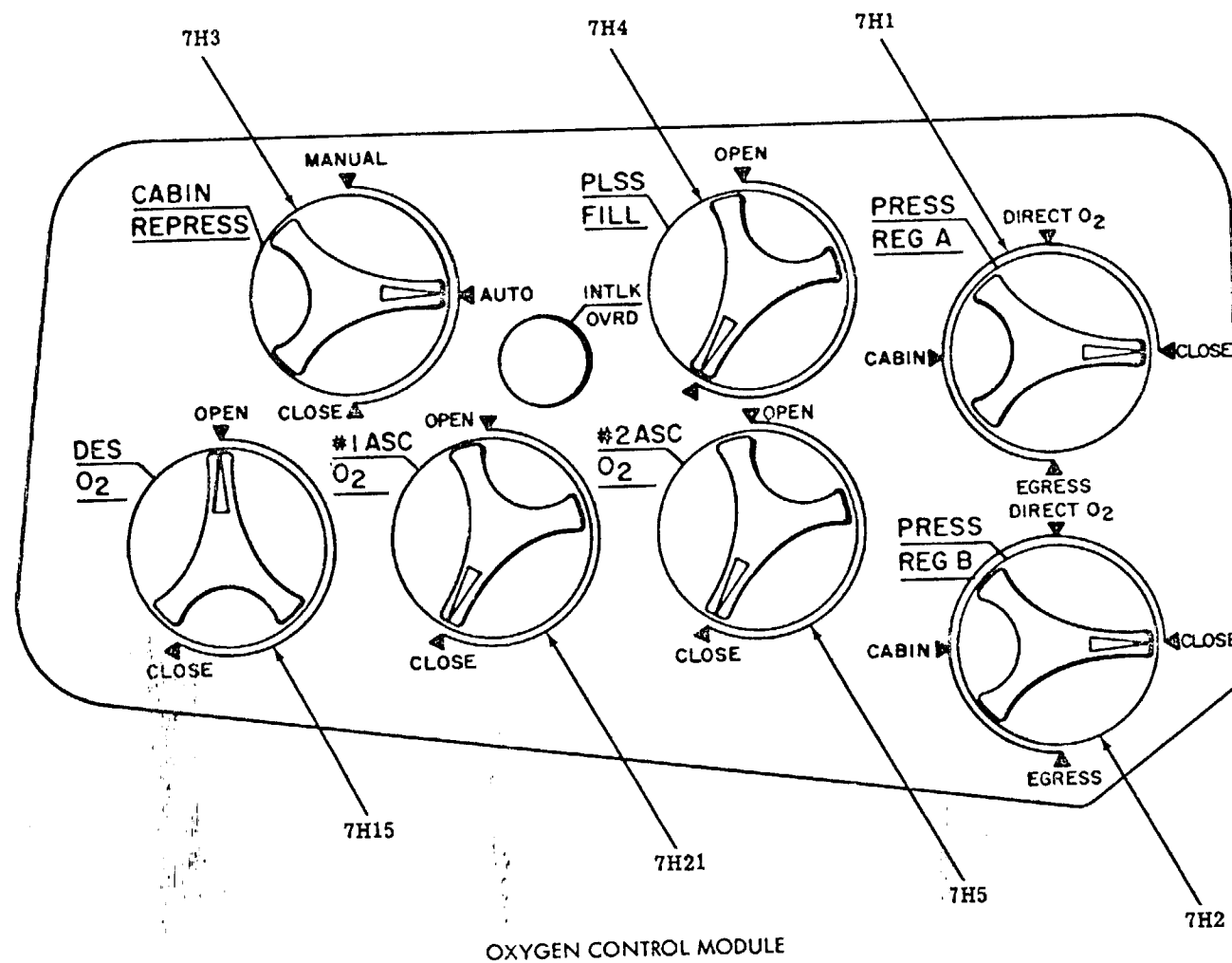
Cabin Location of ECS Controls and Indicators



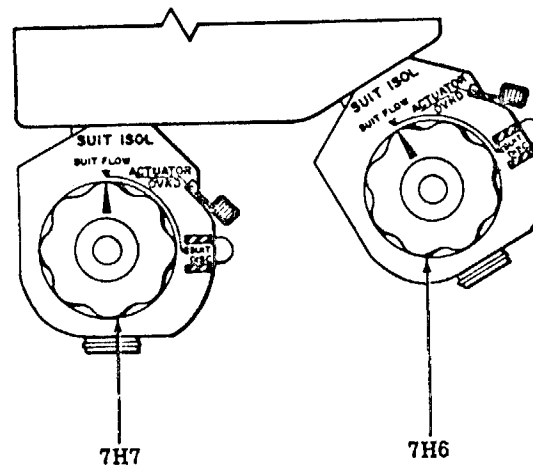
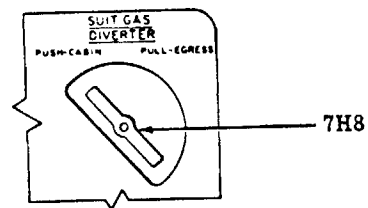
Cabin Location of ECS Controls and Indicators



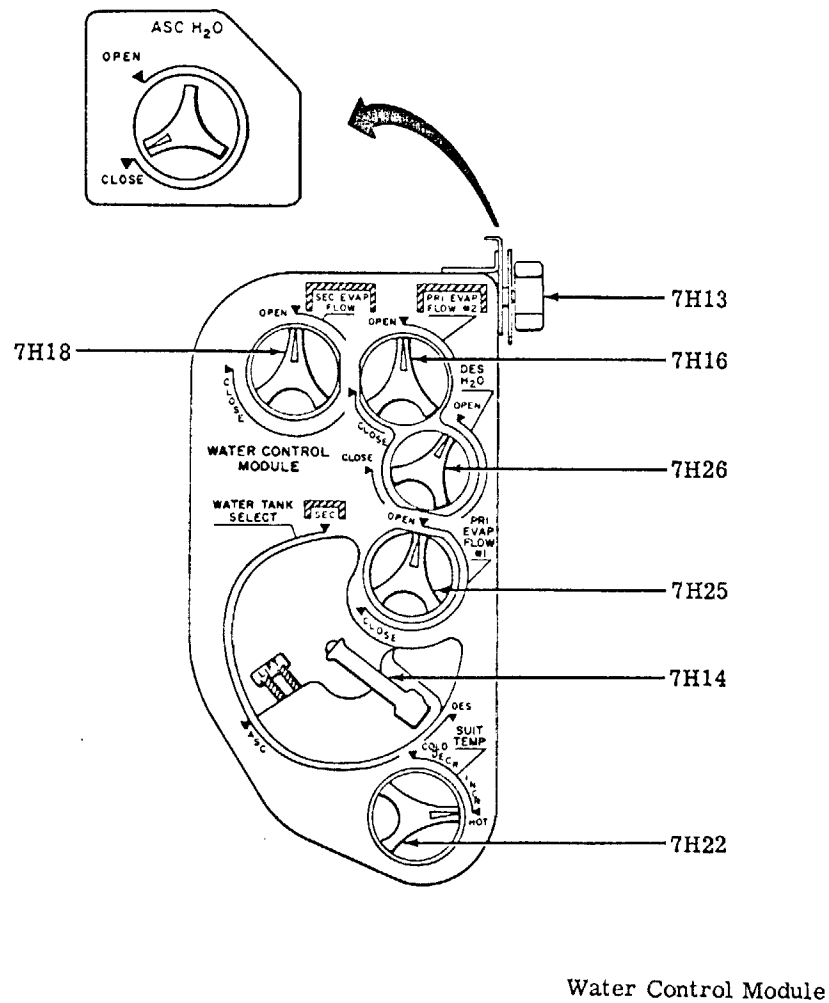
ECS Controls and Indicators Layout



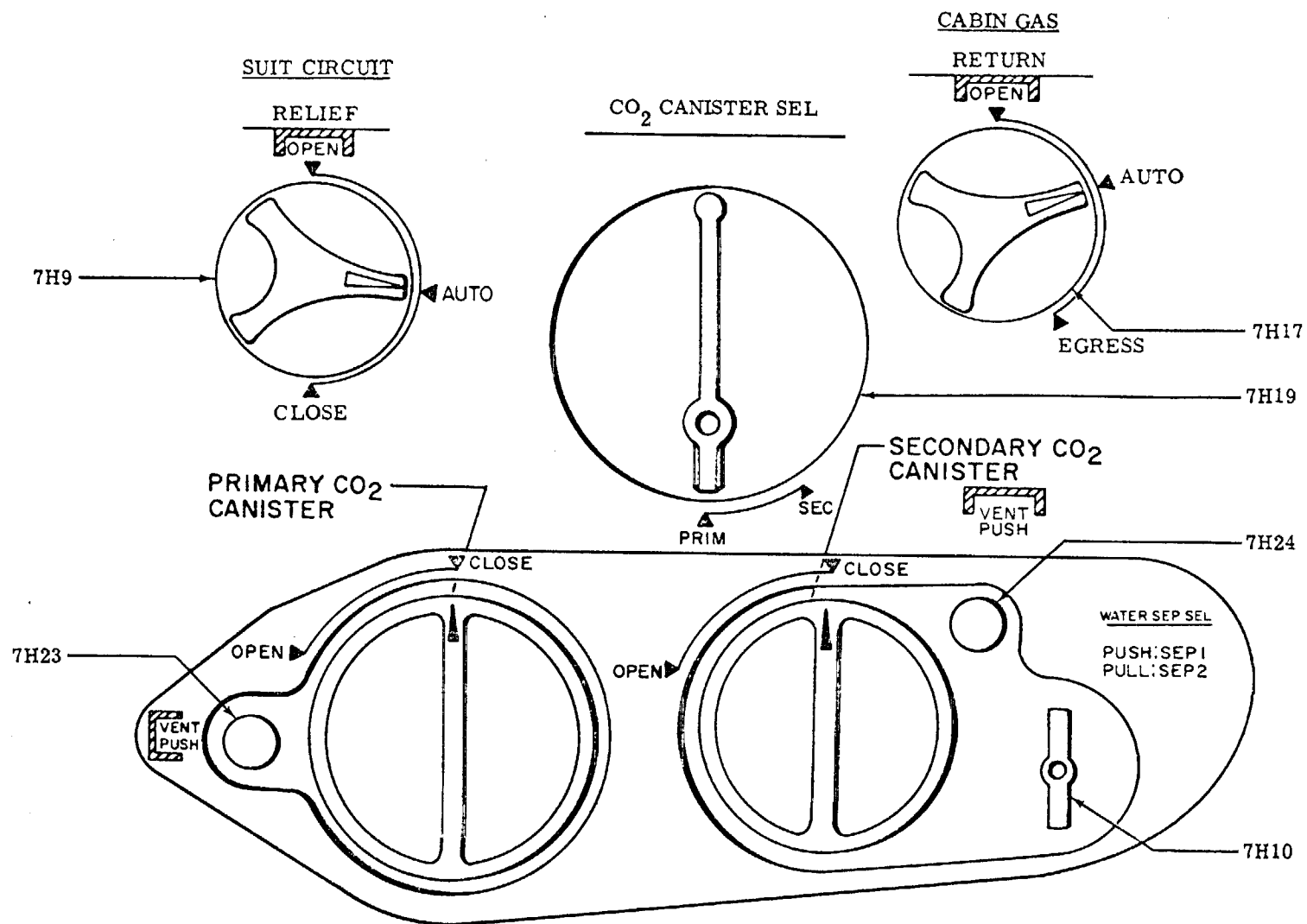
ECS Controls and Indicators Layout



ECS Controls and Indicators Layout

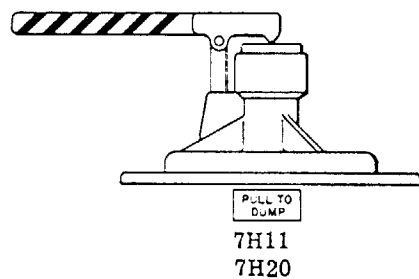


ECS Controls and Indicators Layout

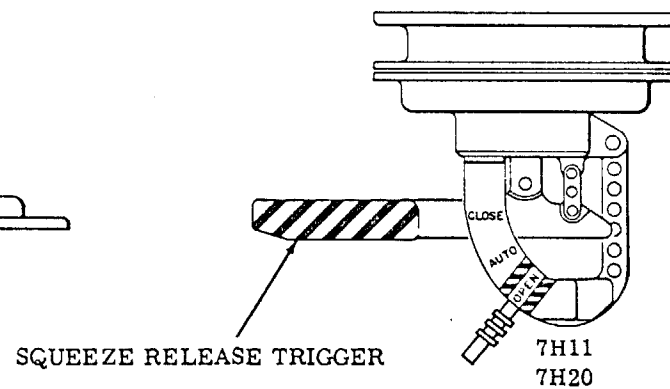


ECS Controls and Indicators Layout

OUTSIDE HATCH INSTALLATION



INSIDE HATCH INSTALLATION



(7H11 & 7H20 ARE SAME CONFIGURATION)

Cabin Relief and Dump Valves

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7S1	SUIT FAN SELECT SWITCH 3-POSITION ROTARY	This three-position rotary (OFF-1-2) selects either of two suit fans to circulate breathing oxygen in the suit circuit. In the nominal condition, fan #1 is selected and operating. Failure of fan #1 results in illumination of the SUIT FAN component caution light (7DS1) as well as activation of the ECS caution light (6DS36). Selection of the 2 position activates the #2 fan. The selection of #2 fan extinguishes the ECS caution light, and illuminates the SUIT/FAN warning light and the SUIT FAN component caution light. Restoration of the proper ΔP extinguishes the SUIT FAN component caution light and the SUIT/FAN warning light. Subsequent failure of #2 fan illuminates the SUIT/FAN warning light, and the SUIT FAN component caution light. The OFF position interrupts power to both fans.
7S2	O ₂ /H ₂ O QTY MON SWITCH 4-POSITION ROTARY	This four-position rotary (C/W RESET-DES-ASC 1-ASC 2) selects for monitoring on 7M4 the percent remaining in the descent or ascent oxygen and water storage tanks. Selection of the C/W RESET position routes a signal to the CWEA to extinguish either the O ₂ QTY caution light (6DS37), the WATER QTY caution light (6DS39) or the AGS warning light (6DS8) if any one is illuminated.
7S3	GYLCOL PUMP SELECT SWITCH 3-POSITION ROTARY	This three-position rotary INST (SEC), 1, 2 selects either of two circulating pumps in the primary collant loop or the INST in the secondary loop. In the nominal condition, with the switch in the 1 position, #1 pump will be operating. Failure of this pump results in the illumination of the GLYCOL pump component caution light (7DS3), and activation of the ECS caution light (6DS36). Selection of the 2 position activates the #2 pump; after the ΔP is restored the component caution and ECS caution lights are extinguished. Should the #2 pump fail, the caution lights will illuminate. Selection of the INST (SEC) position will remain illuminated. To operate the redundant loop pump circuit breaker 4CB96 must be depressed.

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7M1	CO ₂ PARTIAL PRESSURE INDICATOR	This indicator displays the partial pressure of carbon dioxide in the suit circuit.
7M2	CABIN/SUIT PRESSURE INDICATOR	This indicator displays cabin pressure, and suit outlet pressure as sensed downstream of the suit isolation valves.
7M3	CABIN/SUIT TEMPERATURE INDICATOR	This indicator displays the temperature of the cabin and the temperature of the gas to both suits as sensed downstream of the suit circuit regenerative heat exchanger.
7M4	OXYGEN/WATER QUANTITY INDICATOR	This indicator displays the percent remaining in the descent or ascent oxygen and water storage tanks, as selected by 7S2.
7M5	GLYCOL PRESSURE/TEMPERATURE INDICATOR	This indicator normally displays the glycol pump discharge pressure and the glycol pump inlet temperature in the primary loop. However, following failure of the primary loop and upon selection of the INST (SEC) position on 7S3 this indicator displays secondary glycol pump discharge pressure and secondary coolant loop glycol temperature, as sensed downstream of the secondary water sublimator.
7DS1	SUIT CIRCUIT FAN COMPONENT CAUTION LIGHT	This light illuminates to indicate a low ΔP across the suit fan assembly resulting from malfunction of the operating suit fan. Return to normal ΔP , normally accomplished by selection of the other fan, (using 7S1) extinguishes the light. It will illuminate again if a subsequent failure occurs in the selected fan.

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7DS3	GLYCOL PUMP COMPONENT CAUTION LIGHT	This light illuminates to indicate low ΔP across the operating glycol pump (1 or 2) in the primary loop and is extinguished by restoration of normal ΔP . It also illuminates to indicate that glycol pump 2 is running as a result of the automatic glycol pump switching circuit when the GLYCOL switch (7S3) is in position 1. The light is extinguished by the selection of position 2 on switch 7S3 and restoration of ΔP to 7 ± 2 PSID across the selected pump. The light is also illuminated whenever 7S3 is in the INST (SEC) position.
7DS6	CO ₂ PARTIAL PRESSURE COMPONENT CAUTION LIGHT	This light illuminates to indicate that the CO ₂ partial pressure in the suit circuit exceeds 4.3 to 9.5 mmHg in the 5.0 PSIA mode or 5.4 to 12.6 mmHg in the 3.7 PSIA mode. The light also illuminates if the secondary canister is selected by 7H19. This light will remain illuminated until: (1) 7H19 is positioned to the primary canister position and (2) the CO ₂ partial pressure has been restored to a within-tolerance condition. The latter can be accomplished by replacing the primary cartridge.
7DS7	WATER SEPARATOR COMPONENT CAUTION LIGHT	This light illuminates to indicate a low speed (< 800RPM) and an imminent failure condition in the selected water separator. The light remains illuminated until the speed is restored to normal in one of the water separators.

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H1	ATMOSPHERE REVITALIZATION SECTION PRESSURE REGULATOR A	The 4 positions are: EGRESS-CABIN-DIRECT O₂-CLOSE. In the DIRECT O₂ position unregulated flow of oxygen is permitted into the suit circuit. The CABIN position regulates oxygen flow into the suit circuit to maintain a pressure of $4.8 \pm .2$ psia. This mode is selected during normal pressurized cabin operations. The EGRESS position regulates oxygen flow into the suit circuit to maintain a pressure of $3.8 \pm .2$ psia. This mode is selected during egress operations when the cabin is unpressurized. The CLOSE position prevents oxygen flow to the suit circuit. Positive feedback of the results of actuation of this control is provided by 7M2. Both of these controls are normally placed in either the CABIN or EGRESS position simultaneously. These regulators are in parallel and either one can accomplish the regulation function. The CLOSE position is selected when one of the regulator valves falls opens or the ECS is deactivated. The DIRECT O₂ position is selected if the CABIN or EGRESS positions have failed to supply to the suit circuit or during a leak check of the ECS.
7H2	ATMOSPHERE REVITALIZATION SECTION PRESSURE REGULATOR B TWO 4-POSITION VALVES	
7H3	CABIN REPRESSURIZATION VALVE 3-POSITION VALVE	The three positions of this valve are: (MANUAL-AUTO-CLOSE). In the MANUAL position, there is an unregulated flow of oxygen into the cabin from the oxygen manifold. The AUTO position enables the valve to respond to inputs from the cabin pressure switch and the low suit circuit pressure sensor. The valve opens fully whenever cabin pressure drops below 3.70-4.45, and closes as cabin pressure rises above 4.40-5.00 psia. It is also opened when suit circuit pressure falls to 2.9-3.4 psia with the cabin pressure switch closed, and closes when the pressure increases to 3.0-3.5 psia. If both 7H1 and 7H2 are in either the EGRESS or CLOSE position the automatic activation

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H3 (Cont.)		of 7H3 by the cabin pressure switch is disabled, unless the suit pressure falls to 2.9 - 3.4 psia. The CLOSE position prevents oxygen flow into the cabin from the oxygen manifold.
7H4	PLSS FILL VALVE 2-POSITION VALVE	This valve (OPEN-CLOSE), in the OPEN position, permits flow of oxygen to the primary oxygen storage tank in the PLSS. The CLOSE position prevents flow of oxygen to the PLSS oxygen storage tank.
7H5 7H15 7H21	#2 ASCENT OXYGEN VALVE DESCENT OXYGEN VALVE #1 ASCENT OXYGEN VALVE THREE 2-POSITION VALVES	These valves (OPEN-CLOSE), in the OPEN position, permit flow of oxygen from their respective oxygen tanks to the oxygen manifold. The descent oxygen tank is used first, and then the ascent #1 and the ascent #2 oxygen tanks in that order. The CLOSE position prevents flow of oxygen. In order for the ascent oxygen valves to be placed in the OPEN position, the descent oxygen valve must be placed in the CLOSE position due to a mechanical interlock in the system to prevent ascent oxygen from flowing to the empty descent oxygen tank. In the event that the Descent O ₂ valve will not close, an override of the mechanical interlock is provided so that the Ascent O ₂ valves can be opened. This would be performed after vehicle staging.
7H6 7H7	SUIT ISOL. VALVE (CDR) SUIT ISOL. VALVE (LMP) TWO 2-POSITION VALVES	These controls (SUIT FLOW-SUIT DISC.), located at the junction of the suit umbilical and the suit circuit are two position round handle valves. They are operated in conjunction with a suit O ₂ flow control, mounted directly on the suit, which will be referred to as the Body Flow Valve. In the SUIT FLOW position minimum suit circuit flow (12 cfm/suit) be directed to the helmet down over the astronauts body into ducts at the flow suit extremities and back to the return umbilical.

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H6 7H7 (Cont.)		NOTE: When operating from the PLSS, the Body Flow Valve on the suit will be in the CLOSE position, thus allowing the 6 cfm PLSS flow to pass entirely to the helmet. The SUIT DISCONNECT position will prevent suit circuit oxygen flow to the space suit at the connector and the flow will bypass the suit and flow directly to the downstream portion of the suit circuit. 7H6 controls flow through the CDR's suit and 7H7 controls flow through the LMP's suit.
7H8	SUIT GAS DIVERTER VALVE 2-POSITION "T" HANDLE	This control (PUSH: CABIN-PULL: EGRESS), in the PUSH: CABIN position, permits the gas flow in the suit circuit downstream of 7H6 and 7H7 to pass into the cabin. This is done during CABIN operation so that the suit circuit will provide sufficient air flow to maintain the CO₂ and humidity level of the cabin within limits. This valve has provision for automatic closure by a signal from the cabin pressure switch whenever cabin pressure drops below 3.70-4.45 psia. This valve will also close automatically whenever 7H1 and 7H2 are in the EGRESS position. In the PULL: EGRESS position the gas flow in the suit circuit is prevented from passing into the cabin.
7H9	SUIT CIRCUIT RELIEF VALVE 3-POSITION VALVE	This control (OPEN-AUTO-CLOSE) precludes the overpressurization of the suit circuit and the space suit. The AUTO position permits the valve to be operated by an aneroid device in response to suit circuit pressure. The valve is fully open with a suit pressure of 4.7 psia

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H9 (Cont.)		or greater, and fully closed whenever the suit pressure is less than 4.3 psia. The OPEN position manually overrides the automatic mode to open the valve fully. The CLOSE position manually overrides the automatic mode to close the valve fully.
7H10	WATER SEPARATOR SELECT VALVE 2-POSITION "T" HANDLE	This control (PUSH: SEP 1 - PULL: SEP 2) permits the selection of either of two water separators which separate the condensed moisture in the gas centrifugally (as they are driven by the suit circuit gas flow) and normally vents this water to the primary water sublimator. In abort mode the sep. water will be vented to the sec. water sublimator. The PUSH: SEP 1 position selects the #1 separator and the PULL: SEP 2 position selects the #2 separator. Separator #1 will normally be on-line.
7H11 7H20	CABIN RELIEF AND DUMP VALVE TWO 3-POSITION BAR LEVERS	These controls (CLOSE-AUTO-OPEN) provide the dual function of cabin depressurization and cabin pressure relief. There is one control on each LM hatch. The normal position for this control is the AUTO position, which allows the valve to act as a pressure relief device. An aneroid sensor within the valve causes the valve to open at a pressure of 5.25 psia or greater thus bleeding off excess cabin pressure. The CLOSE position permits manual override of the automatic position and serves to close the relief valve in the event of failure of the automatic feature. The OPEN position also overrides the AUTO position and permits the crew to dump the cabin pressure. A squeeze trigger on the Dump Valve Control handle must be depressed to unlock

SUBSYSTEM: ENVIORNMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H11 7H20 (Cont.)		the control handle before it can be moved to another position. This same dump valve, also has a two-position control handle on the outside of the hatch. This outside handle has the legend, PULL TO DUMP and is spring loaded to close. Pulling and holding the handle out for approximately 180 sec. will dump the LM cabin pressure. This "out" position of the outside handle is comparable to the OPEN position of the inside handle. The spring loaded "in" position of the outside handle is comparable to the AUTO position of the inside handle. NOTE: Dumps in 310 sec. thru one valve with bacteria filter, and 120 sec. thru two valves, one with filter. Two valves without filters dumps in 90 seconds. FWD. hatch has removable filter; upper hatch has NONE.)
7H27	LIQUID GARMENT COOLING VALVE	This control valve (cold-hot) is used to control the water temp. at the inlet to the liquid cooled garment. In the cold position all of the cooling water from the liquid cooled garment is routed through the water/water-glycol heat exchanger. If the cooling water should become too cold the control is turned clockwise toward the hot position until the inlet temperature to the liquid cooled garment reaches a comfortable level. In the hot position all of the cooling water bypasses the water/water-glycol heat exchanger and provides maximum water temperature at the inlet to the liquid cooled garment.
7H13	ASCENT DRINK WATER VALVE 2-POSITION VALVE	This control (OPEN-CLOSE) is used to control water flow for drinking and food preparation. The OPEN position supplies water

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

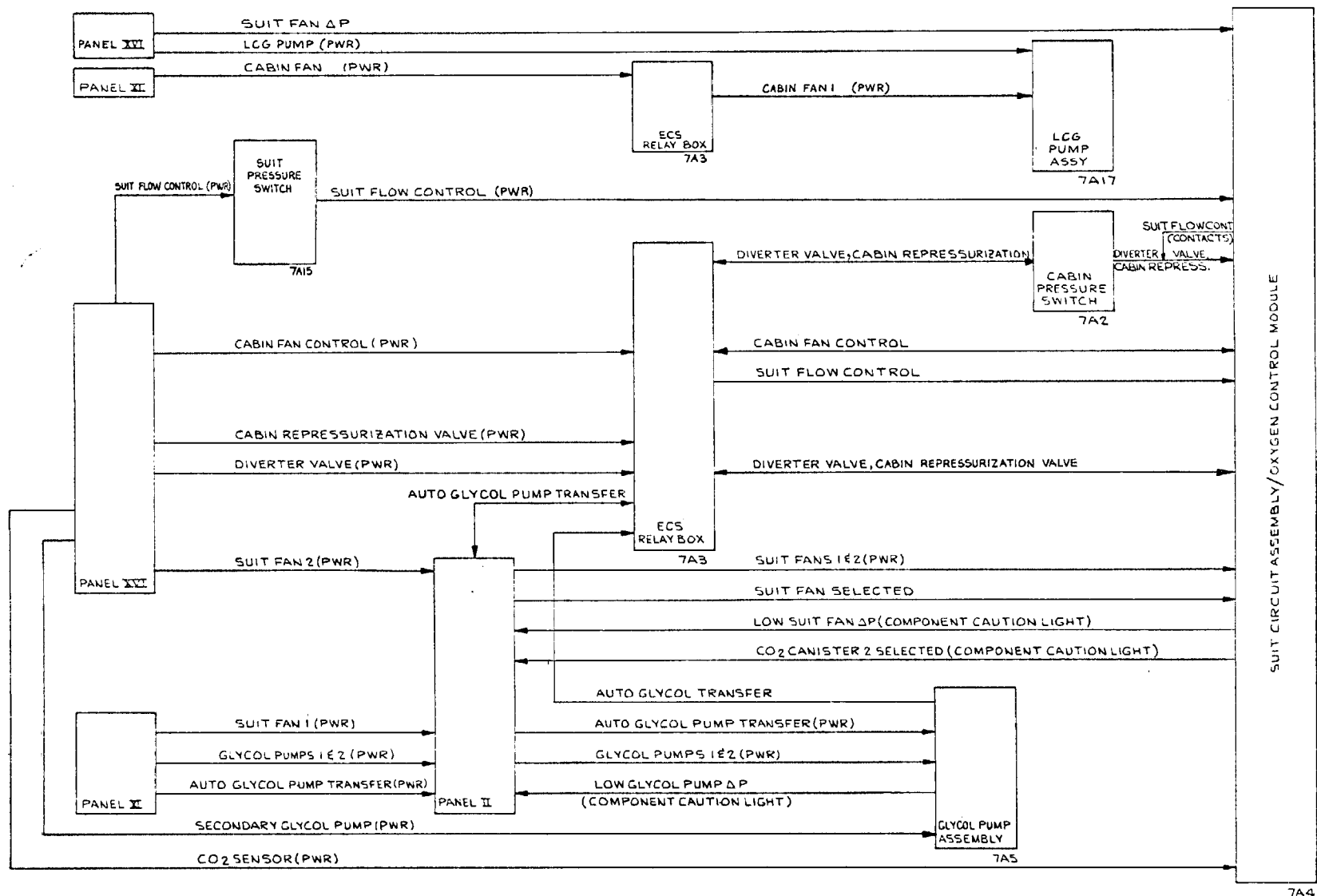
Code	Control/Indicator	Function
7H13 (Cont.)		to the water hose and the CLOSE position prevents water flow to the water hose.
7H14	WATER TANK SELECT VALVE 3-POSITION FOLD-OUT HAND CRANK	This control (DES-ASC-SEC) in the DES position selects the descent water tank to provide water for the primary water sublimators for the period between manning and pre-lunar ascent. Upon manning, the primary water feed valve is opened allowing water from the descent tank to flow to the primary water sublimator. The ASC position selects both ascent water tanks to provide water for the primary water sublimators and 7H13. To place 7H14 in the SEC position, a safety trigger near the handle must be manually tripped. This position: (1) diverts all water from the water separators to the secondary water sublimator and (2) could allow all water flow from the water tanks to the primary water sublimator.
7H16	PRIMARY EVAP FLOW #2 VALVE 2-POSITION VALVE	This valve (OPEN-CLOSE) in the OPEN position, controls the flow of water to the primary sublimator when the secondary water regulator is selected.
7H17	CABIN GAS RETURN VALVE 3-POSITION VALVE	This control (OPEN-AUTO-EGRESS) provides for the return of cabin gas back into the suit circuit under normal operations or provides suit circuit integrity when the cabin is unpressurized. In the OPEN position cabin gas is fed back into the suit circuit for revitalization. The AUTO position allows gas flow into, but not out of, the suit circuit. This is accomplished through the use of a one way check valve. The EGRESS position provides an override closed

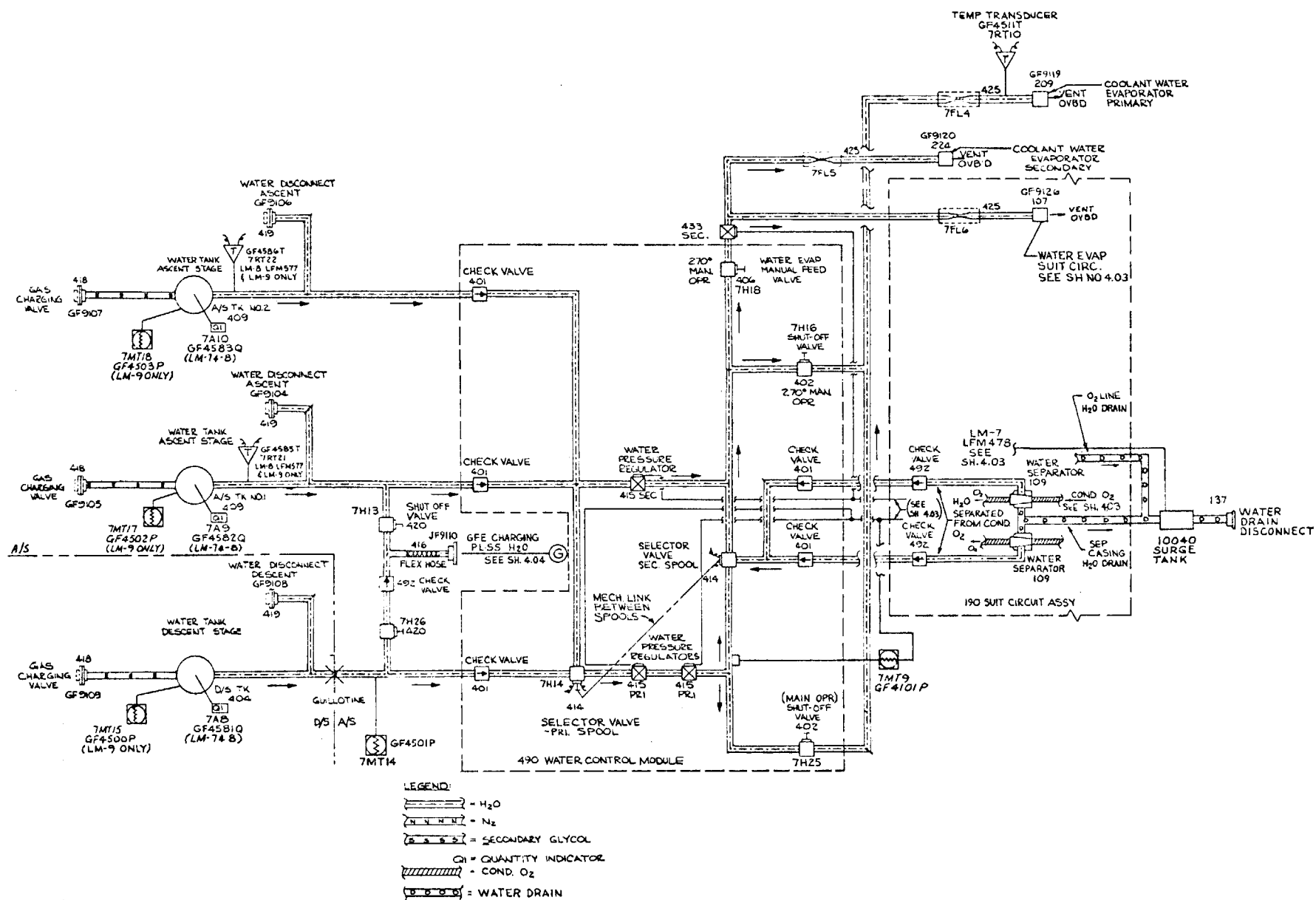
SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

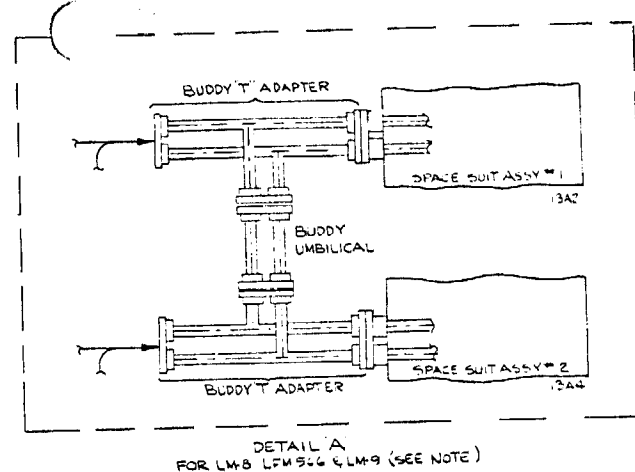
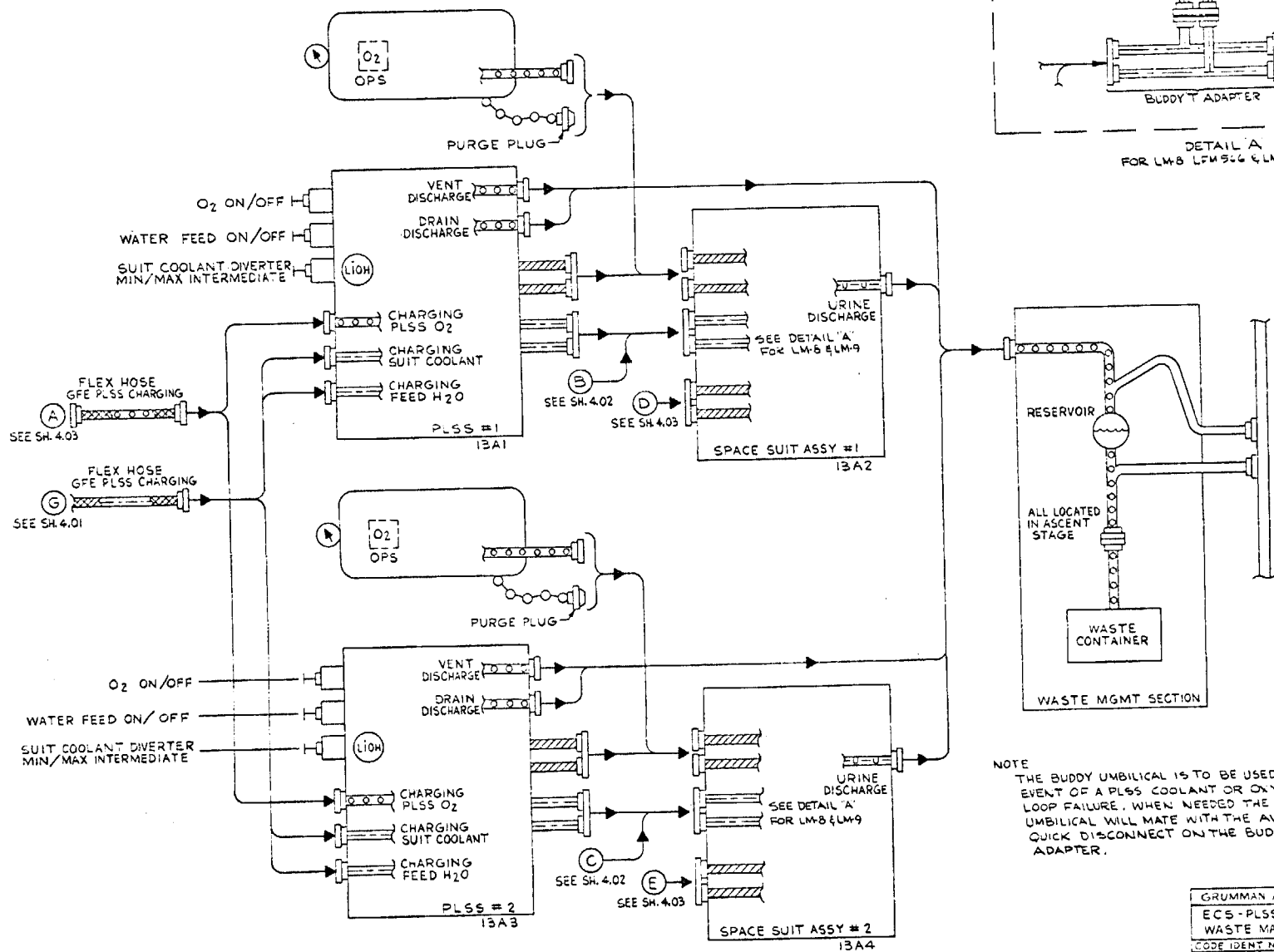
Code	Control/Indicator	Function
7H17 (Cont.)		of the one way check valve, thus insuring suit circuit integrity during unpressurized cabin operations.
7H18	SECONDARY EVAP FLOW VALVE 2-POSITION VALVE	This control (OPEN-CLOSE) provides a flow of water to the secondary water sublimator and suit circuit sublimator to maintain temperature limits for the secondary glycol loop. The OPEN position permits full water flow to the secondary glycol water sublimation, and suit circuit sublimator. The CLOSE position prevents water flow to the sublimator and is the normal position for this valve. The glycol temperature is displayed on 7M5.
7H19	CO ₂ CANISTER SELECT VALVE 2-POSITION BAR LEVER	This control (PRIMARY-SECONDARY), in the PRIMARY position, allows the suit circuit gas to flow through the primary LiOH canister thereby removing CO ₂ and noxious gases from the suit circuit gas. Selecting the SECONDARY position permits the suit circuit gas to flow through the secondary LiOH canister while changing the primary canister.
7H22	SUIT TEMPERATURE CONTROL VALVE MODULATING	This control (COLD-HOT) permits the regulation of suit circuit temperature by varying the flow rate of glycol through the suit regenerative heat exchanger. When the handle is turned in the HOT direction (clockwise), a greater amount of glycol is diverted to the suit regenerative heat exchanger in order to increase suit circuit gas temperature. Turning the handle in the COLD direction (counter-clockwise) decreases the amount of glycol flowing through the suit regenerative heat exchanger, thereby decreasing suit circuit gas temperature.

SUBSYSTEM: ENVIRONMENTAL CONTROL (FUNCTIONAL GROUPING 7)

Code	Control/Indicator	Function
7H23	PRIMARY CANISTER VENT BUTTON	These pushbuttons (VENT PUSH) are associated with the primary and secondary LiOH canisters respectively. When the button is depressed, the gas within a canister is vented thus diminishing the internal pressure within the canister and facilitating removal of the cover from the canister. NOTE: 7H19 must be placed to the opposite canister position from the one which is to have its cartridge replaced before the correct pushbutton is actuated.
7H24	SECONDARY CANISTER VENT BUTTON 2-MOMENTARY PUSHBUTTONS	
7H25	PRIMARY EVAP FLOW #1 2-POSITION VALVE	This control (OPEN-CLOSE) permits the flow of water from the water manifold to the primary water sublimator. When the LM is first manned, this control is set to the OPEN position allowing flow to the primary water sublimator. Setting the control to CLOSE will shut off the flow to the primary water sublimator. The control is located on the water control module.
7H26	DESCENT DRINK/PLSS FILL WATER VALVE 2-POSITION VALVE	This control (OPEN-CLOSE) is used to control water flow from the descent tank for drinking and food preparation and to fill the PLSS reservoir. The OPEN position supplies water to the water hose and the CLOSE position prevents water flow to the water hose.
16DS93	SUIT/CABIN PRESS IND (7M2) POWER FAILURE LIGHT	See page 16-705. 4.
16DS94	O ₂ /H ₂ O QUANTITY IND (7M4) POWER FAILURE LIGHT	See page 16-705. 4.
16DS95	GLYCOL TEMP/PRESS IND (7M5) POWER FAILURE LIGHT	See page 16-705. 4.



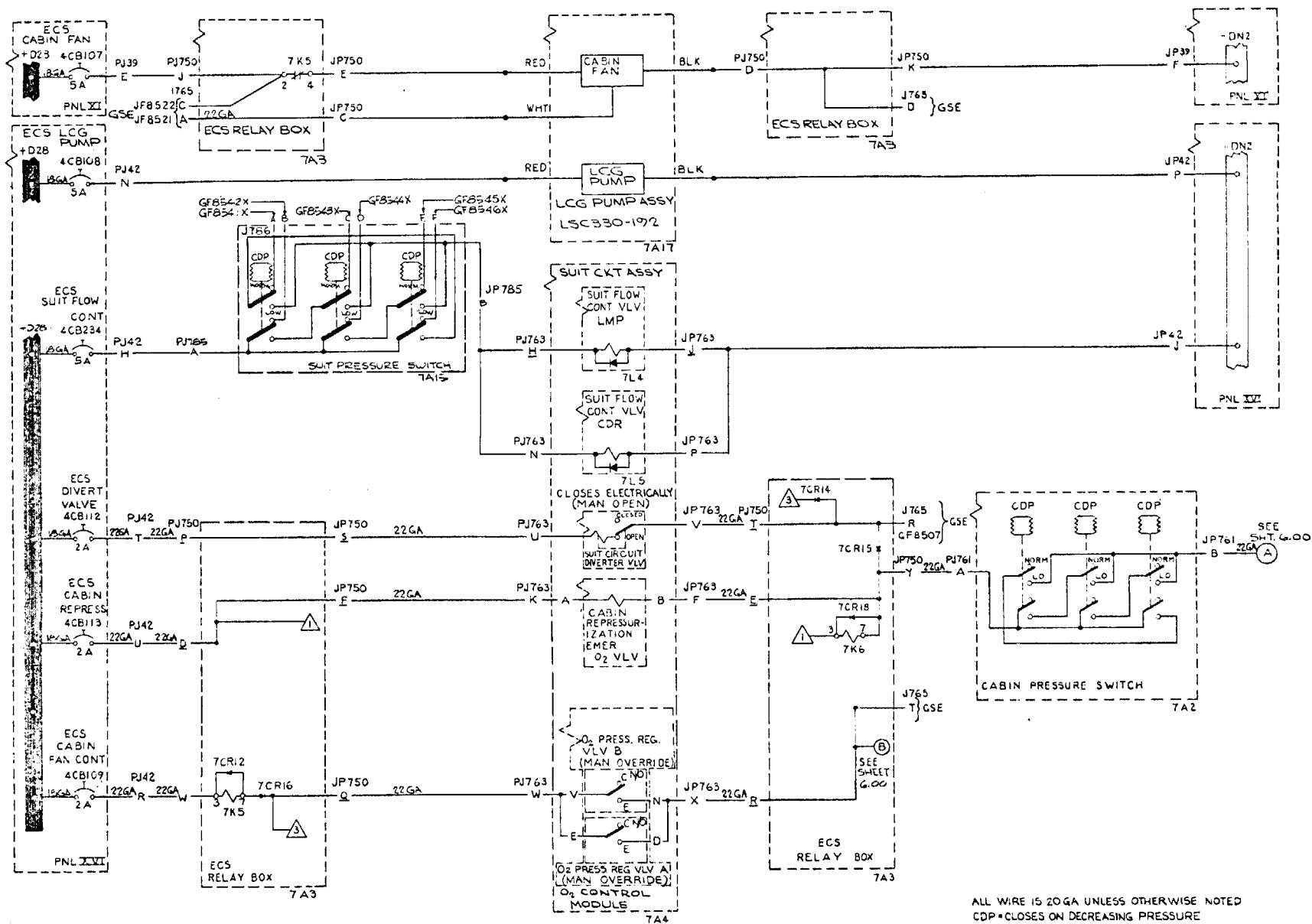


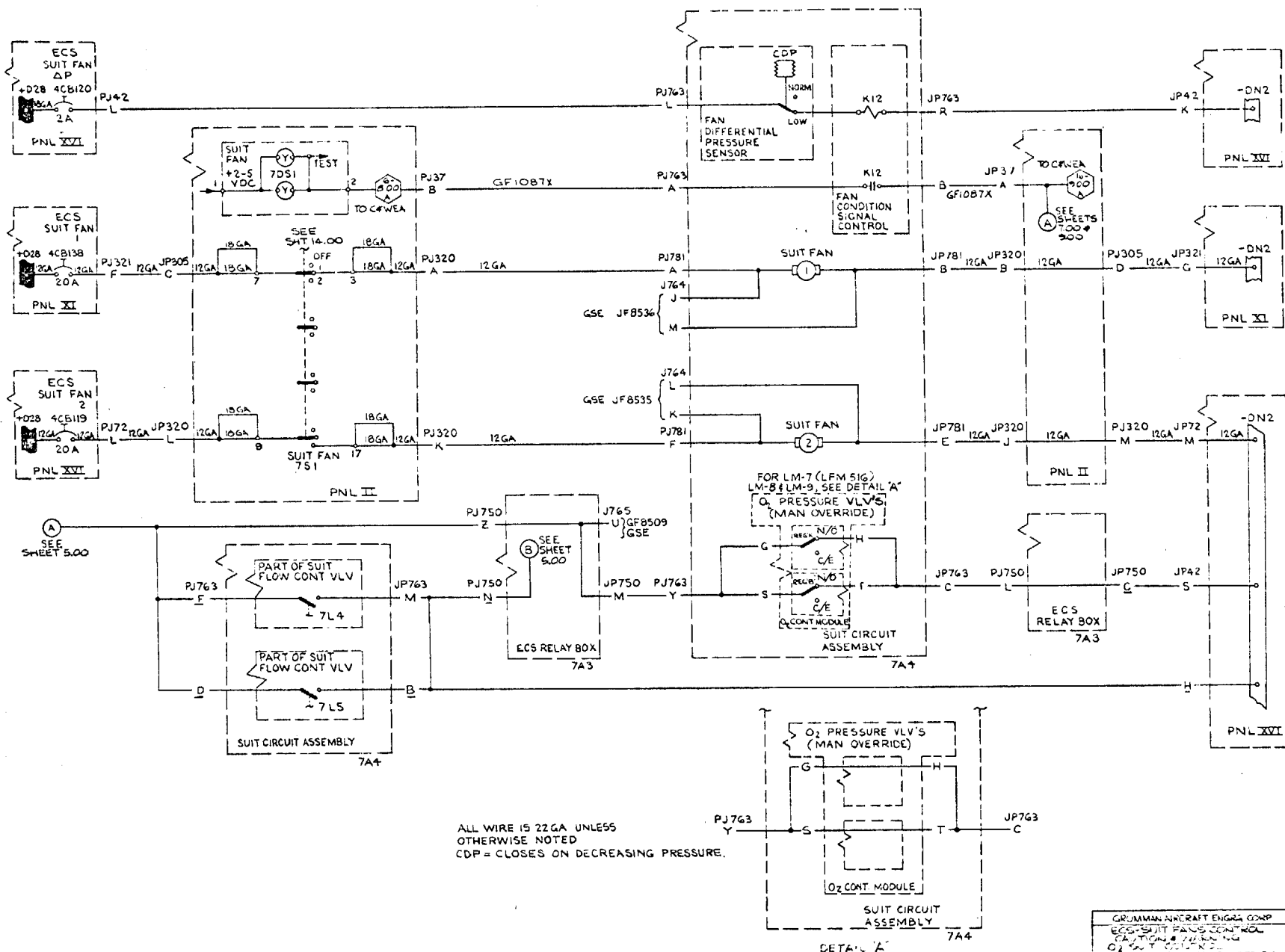


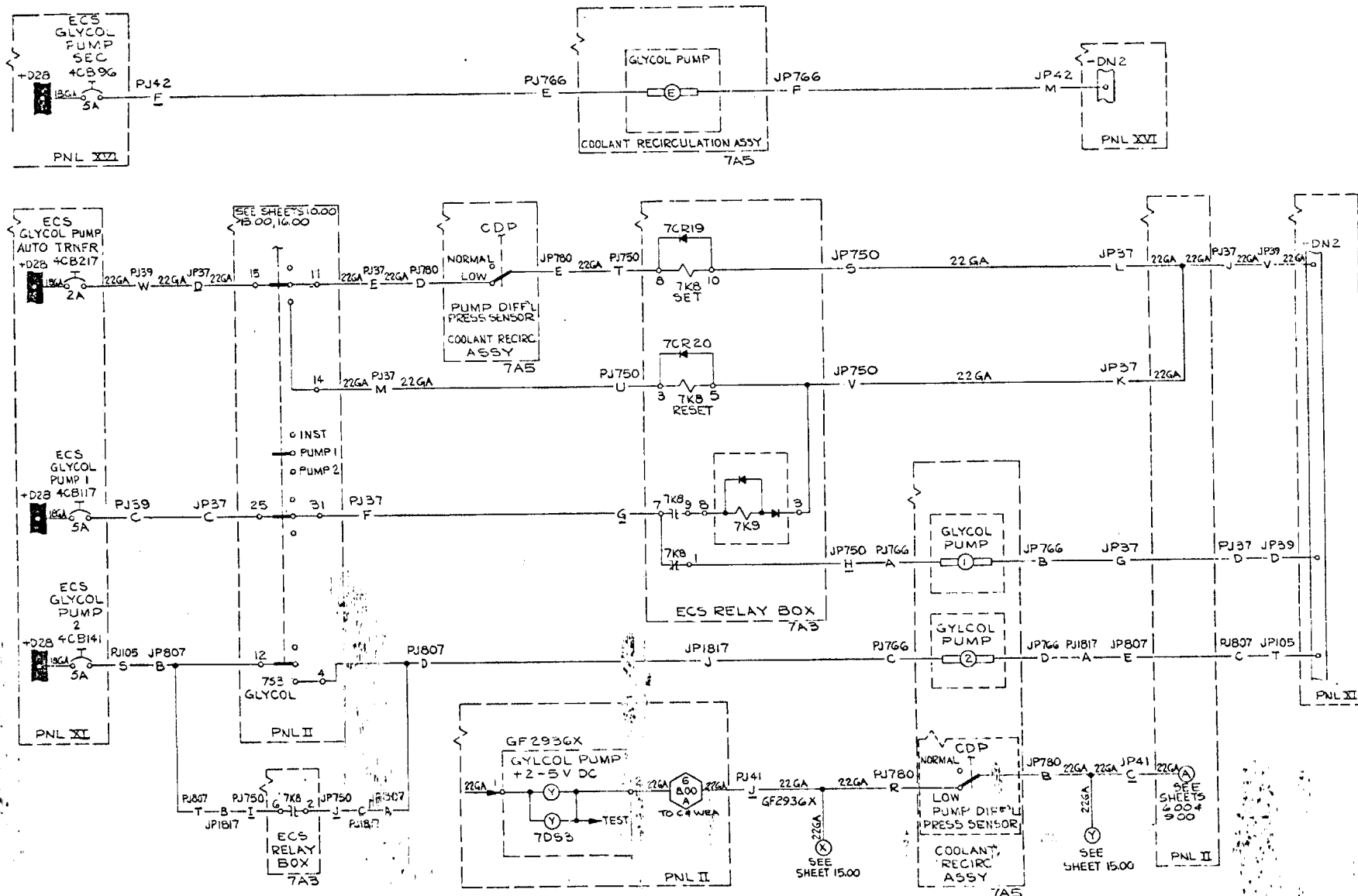
NOTE
THE BUDDY UMBILICAL IS TO BE USED IN THE EVENT OF A PLSS COOLANT OR OXYGEN LOOP FAILURE. WHEN NEEDED THE BUDDY UMBILICAL WILL MATE WITH THE AVAILABLE QUICK DISCONNECT ON THE BUDDY T ADAPTER.

LEGEND
 ○○○○○○ = O₂
 ▨▨▨▨▨ = CONDITIONED O₂
 ▤▤▤▤▤ = H₂O COOLANT
 ▧▧▧▧▧ = URINE
 ▩▩▩▩▩ = DRAINABLE WASTE (LIQUID)

GRUMMAN AIRCRAFT ENGRG CORP	
ECS-PLSS, OPS SPACE SUIT #	
WASTE MANAGEMENT INTERFACE	
CODE IDENT NO. 12612	
MODEL LM	LDW267-57007
	SHEET REV 4.04 1C





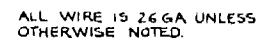


ALL WIRE IS 20 GA UNLESS
OTHERWISE NOTED
CDP = CLOSES ON DECREASING PRESSURE.

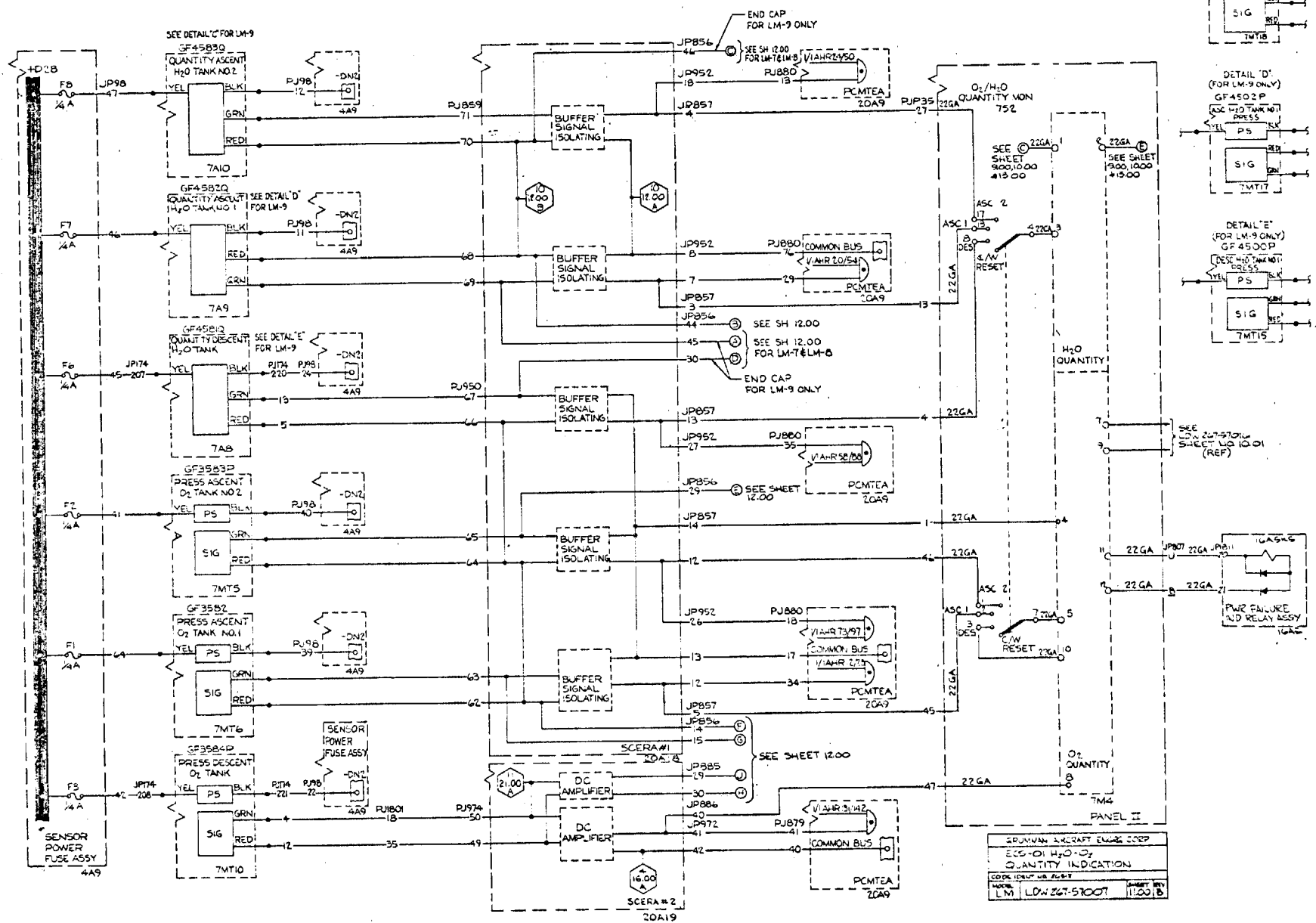
GRAMMAN AIRCRAFT ENGINE CORP.
ECS-GLYCOL PUMP CONTROL
SECTION AND WIRING
DRAWING NO. 267-57007
LM 267-57007

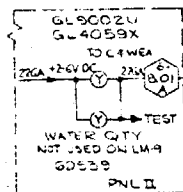
ALL WIRE IS 22 GA UNLESS OTHERWISE NOTED.

GRIMMAN & ROBERT ELLIS CORP
1000 PLYMOUTH STREET, N.E.
ATLANTA, GEORGIA 30316
404-525-1100



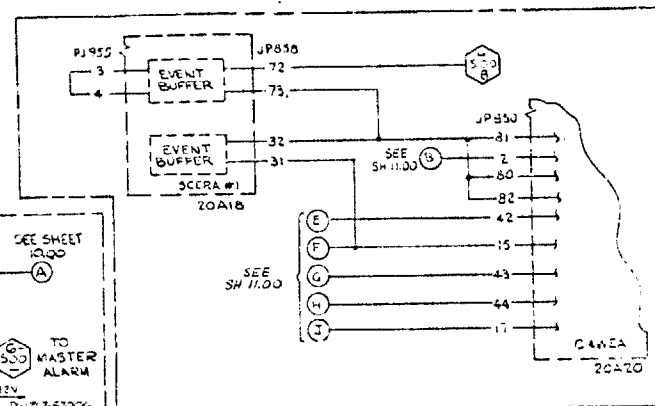
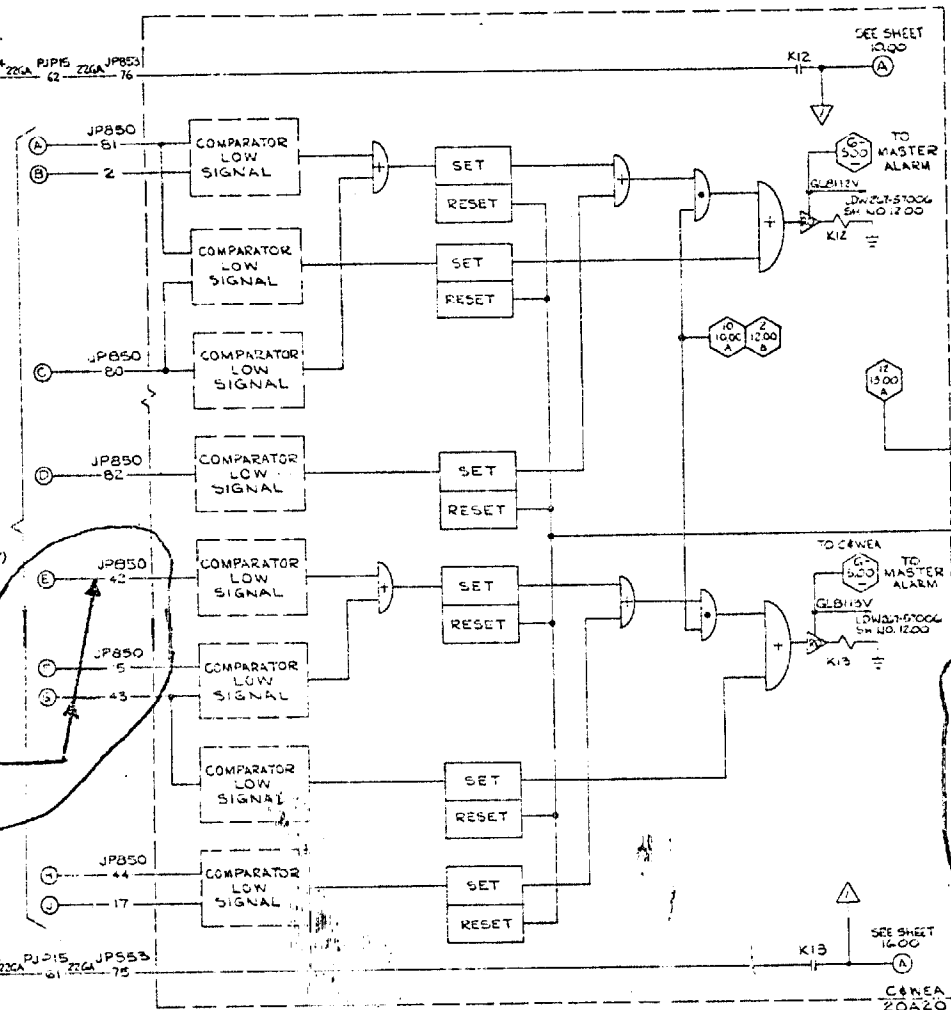
GRUMMAN AIRCRAFT ENGINEERING CORP	
ELECTRICITY & HEAT TRANSPORT SECTION	
CAPABILITY & TEMP INDICATORS	
CAPABILITY & TEMP INDICATORS	
MODEL	LDW267-57007
LM	2000



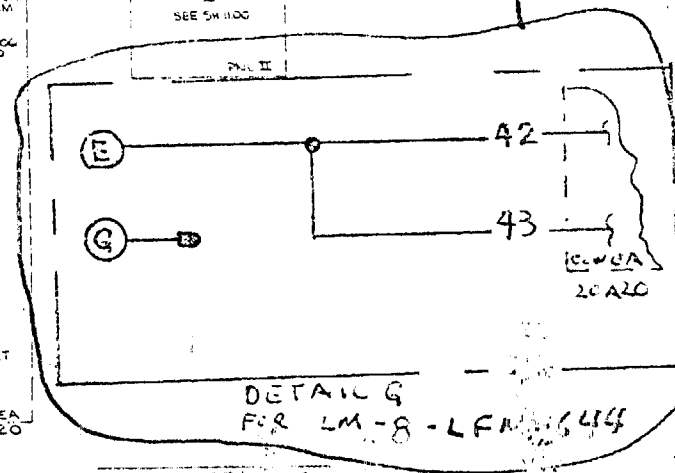
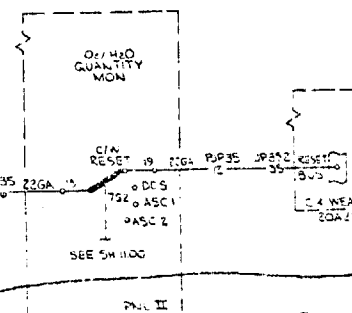


SEE
SHEET 11.00
(SEE DETAIL "F"
FOR LM-9 ONLY)

SEE DETAIL "G"
FOR LM-8
LFM-144



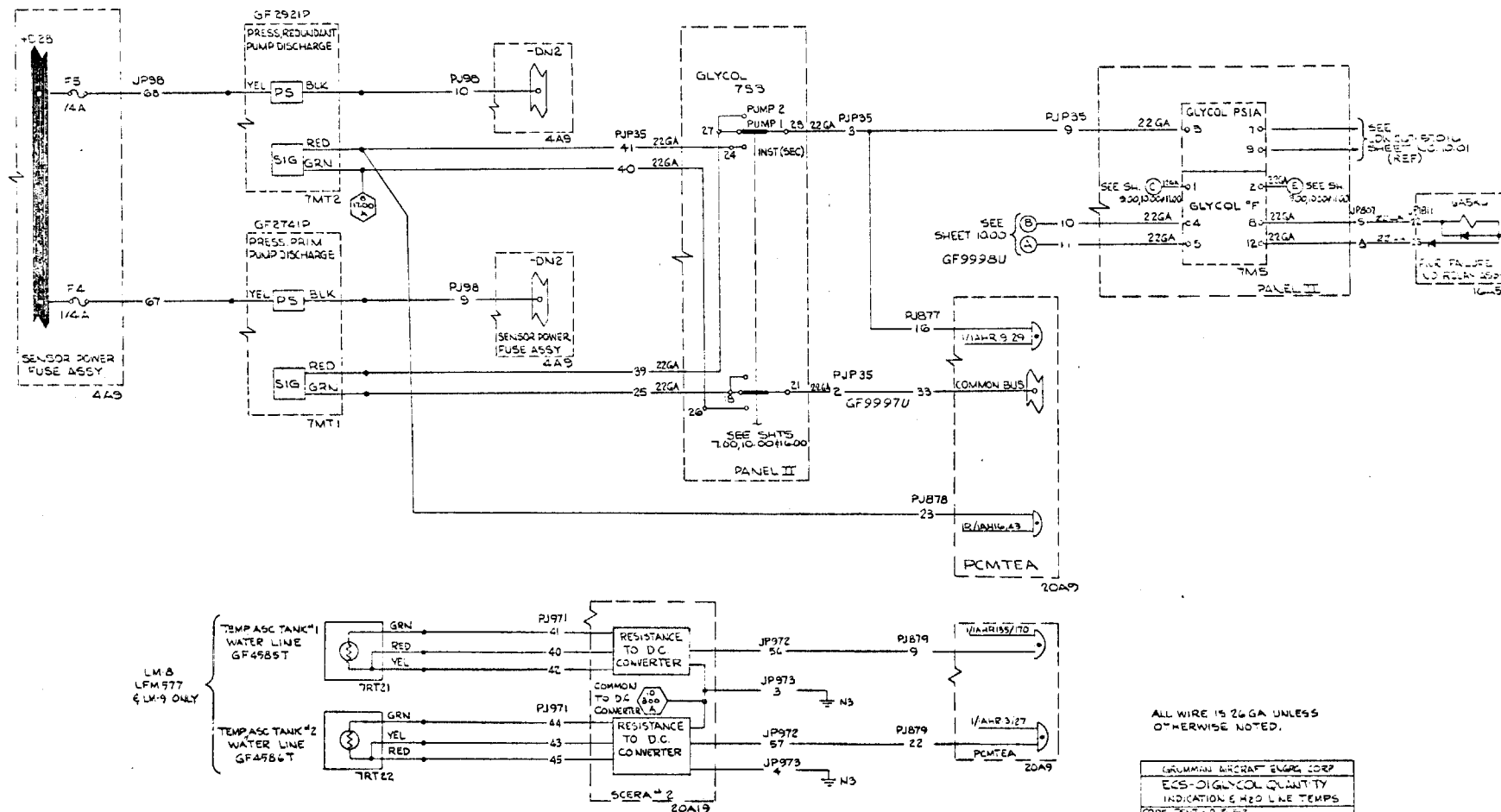
DETAIL "F"
(FOR LM-9 ONLY)



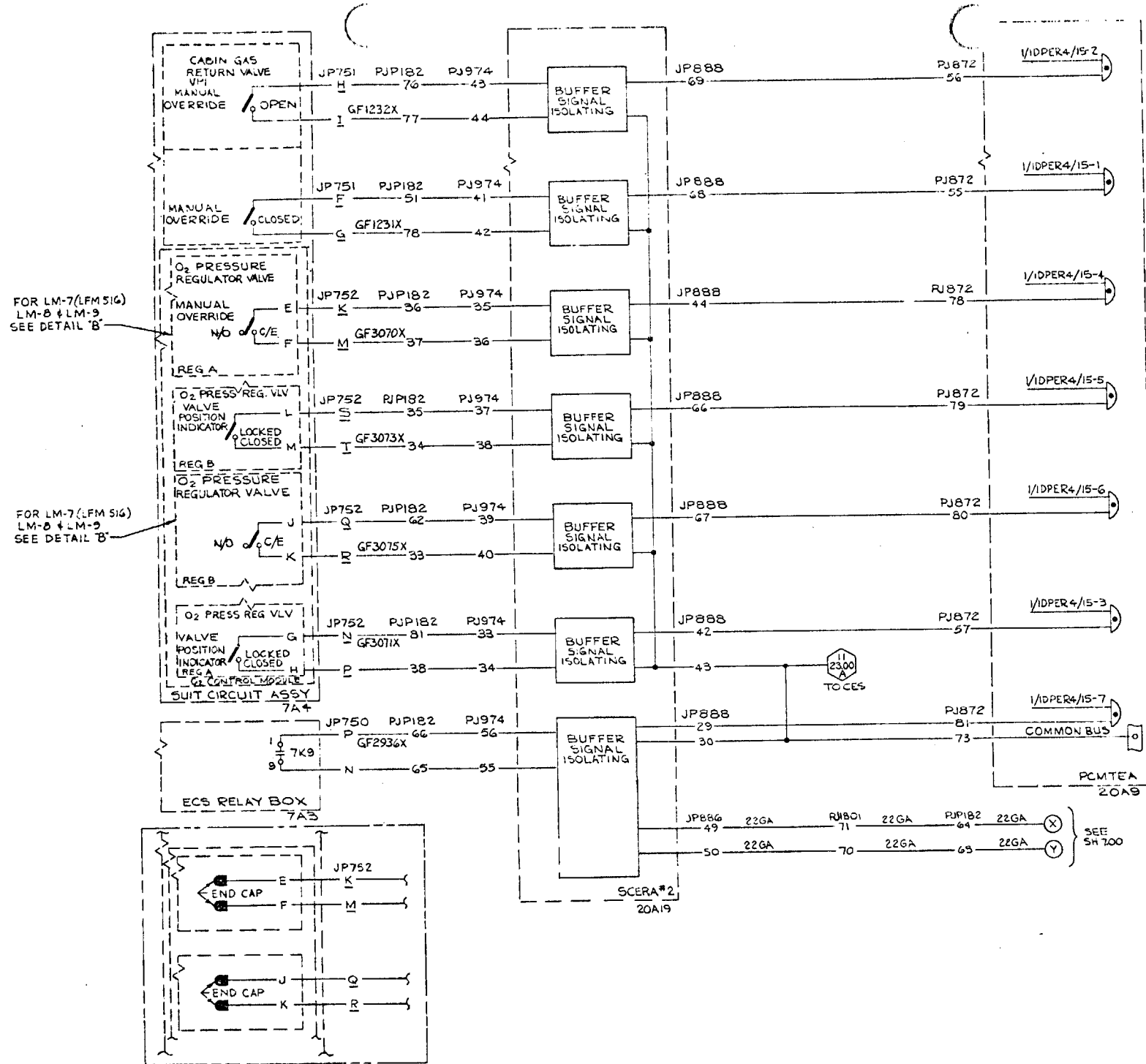
ALL WIRE IS 22GA UNLESS
OTHERWISE NOTED.

REV	LCD	INITIALS
D2	5766	

REVISION	DATE
1	10/1/77
2	10/1/77
3	10/1/77
4	10/1/77
5	10/1/77
6	10/1/77
7	10/1/77
8	10/1/77
9	10/1/77
10	10/1/77

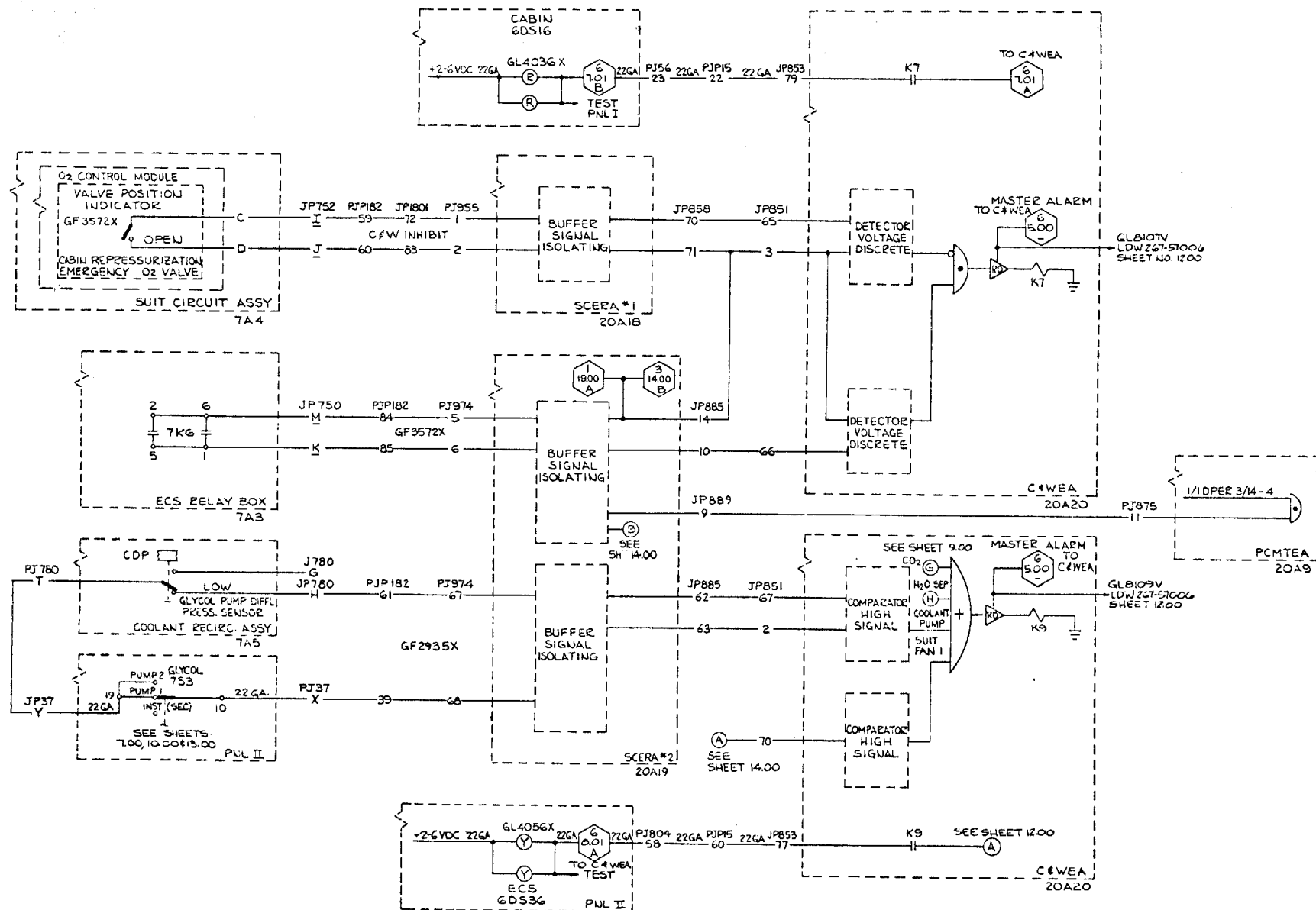


ECS-DIGLYCOL QUANTITY INDICATION & HOT LINE TEMPS		
CODE	2001000000	
WIRE	LM	2001000000
LM	2001000000	2001000000



ALL WIRE IS 26 GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP.		
ECS-O1 TO PLMTEA		
SUIT CIRCUIT CONTROLS		
CODE: 1001 NO 2002		
MODEL	LDW 267-57007	SHEET NO. 8



ALL WIRE IS 26 GA UNLESS
OTHER WISE NOTED
CDP = CLOSES ON DECREASING PRESSURE

GRUMMAN AIRCRAFT ENGRS CORP		
ECS O ₂ REPRESSURIZATION		
VALVE CONTROL & GLYCOL PUMP		
D.T.F. CAUTION & WARNING		
CHECK SCHEMATIC FIRST		
WIRING	LM	LDW 267-51007
		SHEET 16 OF 16

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 8)

REACTION CONTROL SUBSYSTEM

(REF LDW 267-57008 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
RCS	LDW310-57000	B	C1 (LEO 83), C2 (LEO 85) C3 (LEO267-2), C4, C5 (LEO267-3), C6

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	8-701
b) Applicable Documents, Table of Contents and Revisions	8-702 & 8-702.1
c) Cabin Location of RCS Controls and Indicators	8-703
d) RCS Controls and Indicators and Thrusting Layout	8-704 & 8-704.1
e) RCS Controls and Indicators Functional Description	8-705 thru 8-705.5
f) RCS Fluid Schematic	LDW267-57008 SH 4.00B
g) RCS-Thruster Actuation & Propellant Valve Control Functional Block Diagram	LDW267-57008 SH 5.00B
h) RCS-Main Shutoff Valves System A&B	LDW267-57008 SH 6.00B
i) RCS-Thruster Pair Isolation Valves Systems A&B Quads, 1 & 2	LDW267-57008 SH 7.00B
j) RCS-Thruster Pair Isolation Valves Systems A&B Quads, 3 & 4	LDW267-57008 SH 7.01B
k) RCS-Pri RCS/APS Interconnect Valves Systems A & B and Crossfeed Valve	LDW267-57008 SH 8.00B
l) RCS-Sec RCS/APS Interconnect Valves Systems A & B	LDW267-57008 SH 9.00B
m) RCS-Thrust Chamber Assembly Valves Quad 1 Systems A & B	LDW267-57008 SH 10.00B
n) RCS-Thrust Chamber Assembly Valves Quad 2 Systems A & B	LDW267-57008 SH 10.01B
o) RCS-Thrust Chamber Assembly Valves Quad 3 Systems A & B	LDW267-57008 SH 10.02B

2. Table of Contents (Co

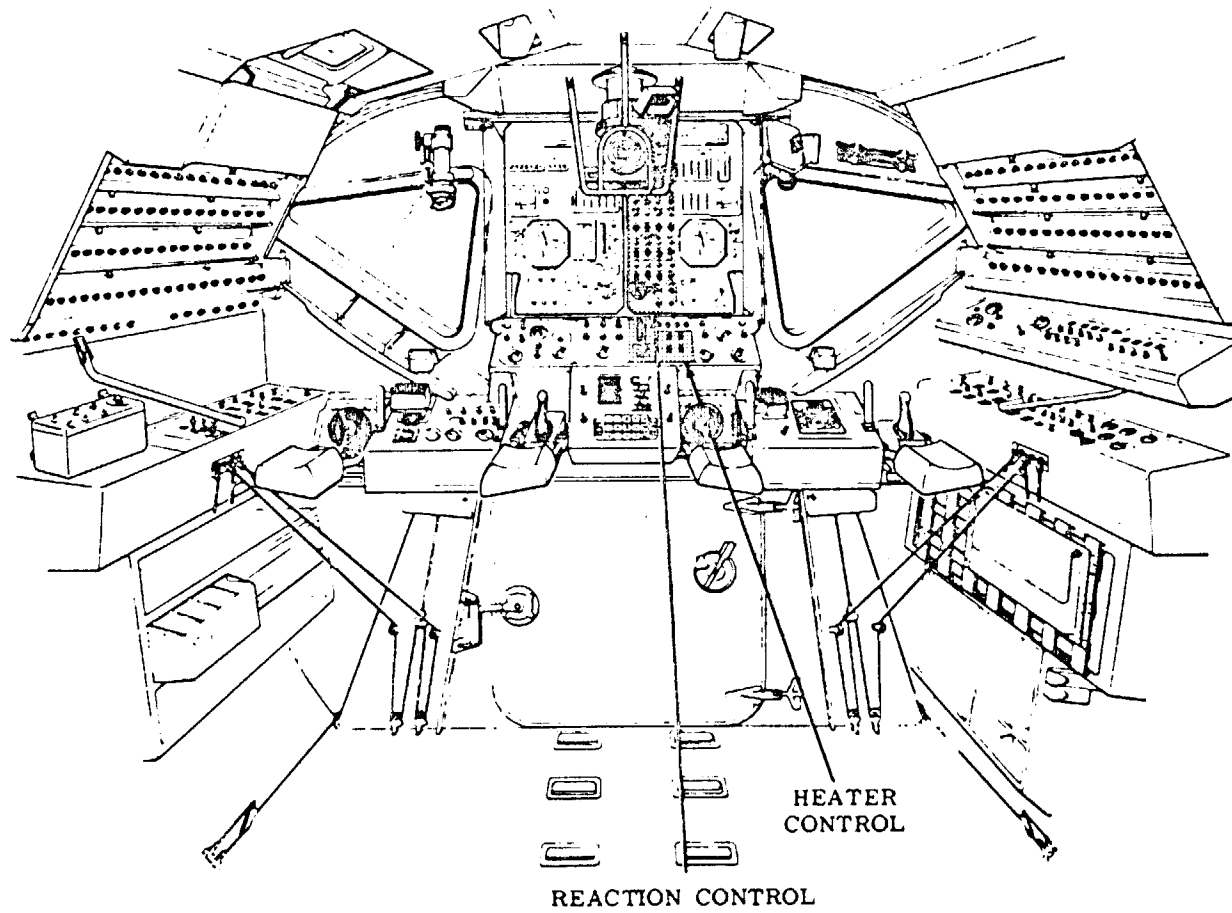
ITEM NAME

PAGE NO./SHEET NO.

p)	RCS-Thrust Chamber Assembly Valves Quad 4 Systems A & B	LDW267-57008 SH 10.03B
q)	RCS-Cluster Heaters Systems 1	LDW267-57008 SH 11.00B
r)	RCS-Cluster Heaters Systems 2	LDW267-57008 SH 11.01C
s)	RCS-Pressure Instrumentation - System A	LDW267-57008 SH 12.00B
t)	RCS-Pressure Instrumentation - System B	LDW267-57008 SH 12.01C
u)	RCS-Temperature Instrumentation for He & Fuel Tanks - Systems A & B	LDW267-57008 SH 13.00B
v)	RCS-X Feed & Interconnect Valve Status Instrumentation	LDW267-57008 SH 14.00B
w)	RCS-Main Shutoff Valve Status Instrumentation	LDW267-57008 SH 14.01B
x)	RCS-Quad 1A Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.00B
y)	RCS-Quad 1B Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.01B
z)	RCS-Quad 2A Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.02B
aa)	RCS-Quad 2B Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.03B
ab)	RCS-Quad 3A Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.04B
ac)	RCS-Quad 3B Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.05B
ad)	RCS-Quad 4A Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.06B
ae)	RCS-Quad 4B Thruster Pair Alarm Ckt & Isolation Valve Status Instrumentation	LDW267-57008 SH 15.07B
af)	RCS-Warning Alarms	LDW267-57008 SH 16.00B
ag)	RCS-Heater Caution Alarm	LDW267-57008 SH 16.01B
ah)	RCS-Caution Alarm and PQMD Power & Display	LDW267-57008 SH 16.02B
ai)	RCS-Thruster Quad Heaters R/R, L/R and S-Band Ant. Temperature Indication	LDW267-57008 SH 17.00B

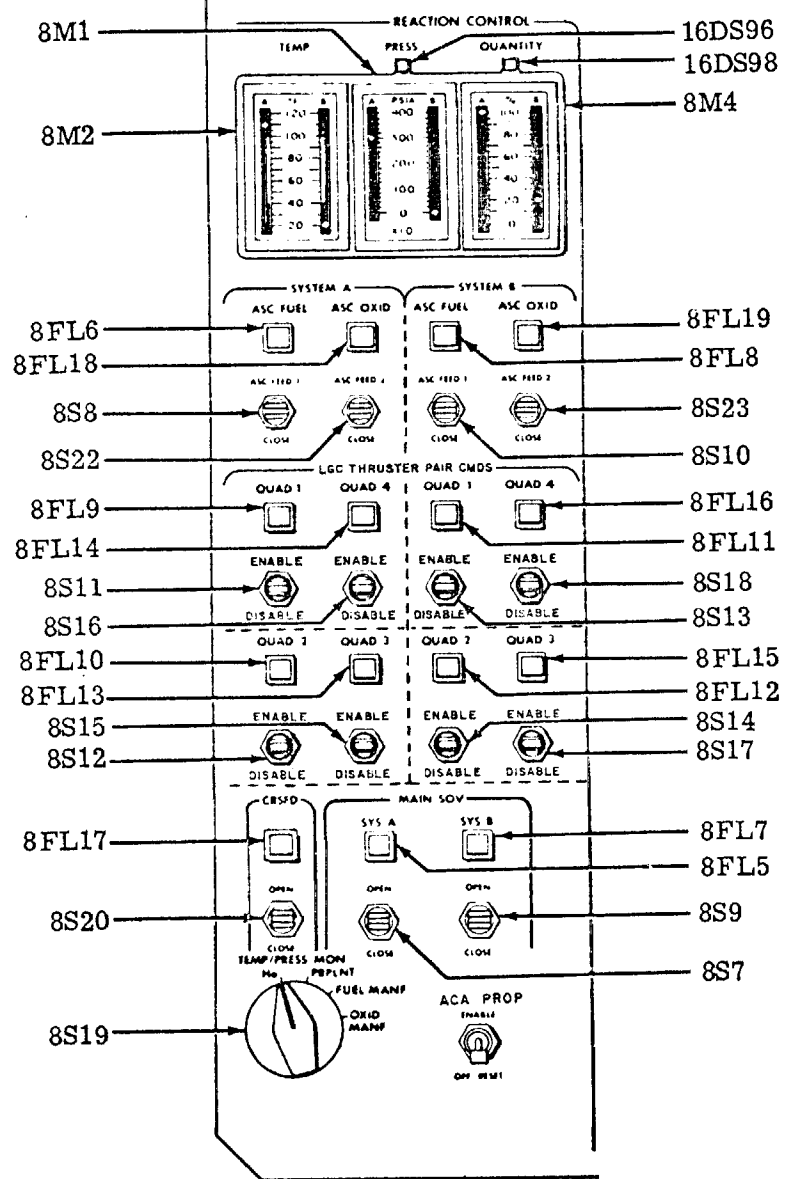
3. REVISIONS

REV	PAGE NO. AND/OR LDW267-57008, SHEET NO.	LCD	DESCRIPTION
B	16.01	3887A	DELETE C & WEA FUNCTION FOR RCS QUAD TEMP MEASUREMENTS
	16.01	5145	INHIBIT C & WEA FUNCTION FOR RCS QUAD TEMP MEASUREMENTS
C	11.01	5467B	ADDITION OF CIRCUIT BREAKER CAP TO RCS QUAD 1 CIRCUIT BREAKER (4CB222)

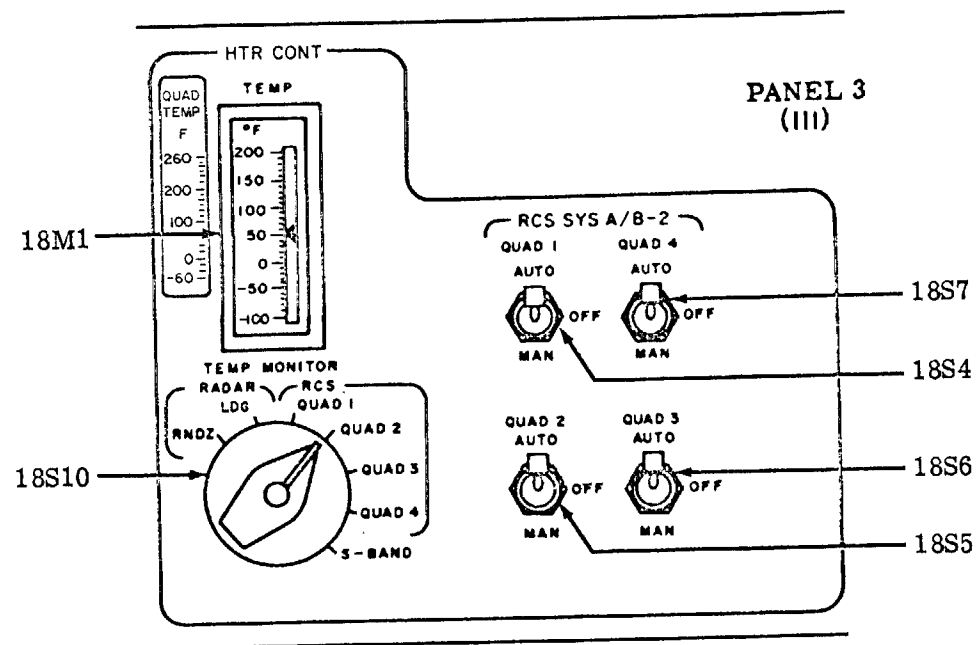


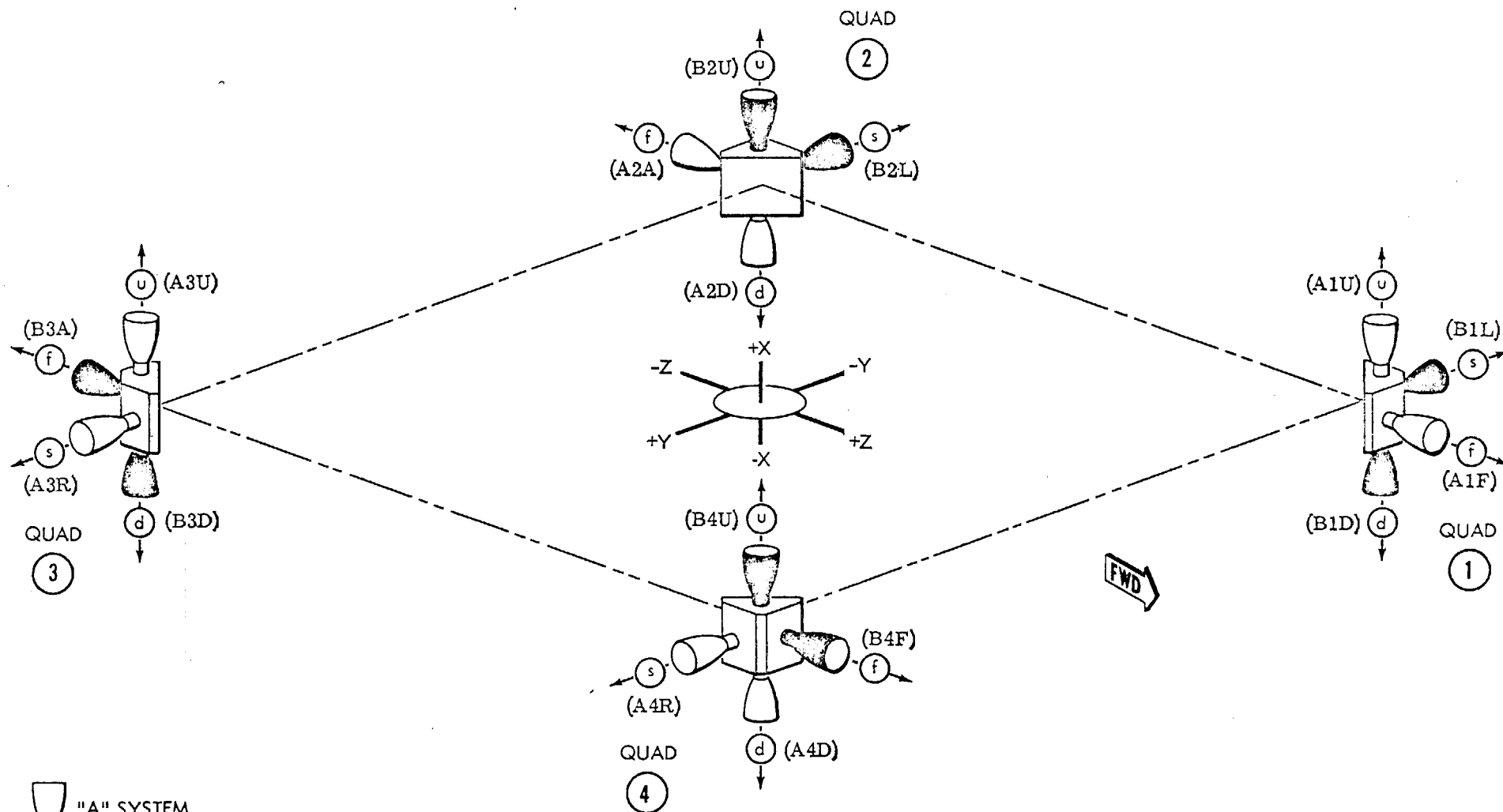
Cabin Location of RCS Controls and Indicators

PANEL 2 (II)



PANEL 3 (III)





NOTE. NASA-ASSIGNED THRUSTER DESIGNATIONS ARE GIVEN PARENTHETICALLY.

RCS Thrusting Layout

SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

Code	Control/Indicator	Function
8S7 8S9	MAIN SHUTOFF VALVE SWITCH: SYSTEM A MAIN SHUTOFF VALVE SWITCH: SYSTEM B (TWO 3-POSITION TOGGLES MOMENTARY-LOCK- MOMENTARY)	Each of these three-position toggles (OPEN-OFF-CLOSE) simultaneously actuates a pair of latch-type solenoid-operated fuel and oxidizer shutoff valves which control the flow of propellant downstream of the propellant tanks. These valves are normally open except for the following circumstances: (a) during the nominal lunar ascent burn these valves are closed by moving switches 8S7 and 8S9 to the CLOSE position prior to ascent engine ignition; ten seconds prior to ascent engine shutdown, these valves are reopened by moving 8S7 and 8S9 to the OPEN position. (b) If a malfunction exists in one of the systems (either "A" or "B"), propellant flow in the malfunctioning system can be interrupted by moving the appropriate toggle to the CLOSE position. These switches are locked in the OFF (center) position and momentarily held in the OPEN or CLOSE position. Positive feedback of the solenoid valve position is displayed by 8 8FL5 and 8FL7 for systems A & B respectively.
8S8 8S10 8S22	ASCENT FEED 1 SWITCH: SYSTEM A ASCENT FEED 1 SWITCH: SYSTEM B ASCENT FEED 2 SWITCH: SYSTEM A	Each of these three-position toggles (OPEN-OFF-CLOSE) actuates a pair of latch-type solenoid-operated fuel and oxidizer valves which enable the flow of propellant from the Ascent Propulsion tanks to the RCS manifolds. Each propellant line has a Primary (1) and a Secondary (2) solenoid-operated valve in series in order to insure shut-off of Ascent Propellant fluids at the completion of Interconnect operation. During normal RCS operation the Secondary valves are closed and the primary valves are open. During the nominal lunar ascent burn the Secondary valves are opened by moving switches 8S22 and 8S23 to the OPEN position prior to ascent engine ignition. Ten seconds prior to ascent engine shutdown either the Primary or Secondary or both sets of valves are closed by moving switches 8S8 and 8S10 or 8S22 and

SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

Code	Control/Indicator	Function
8S23	ASCENT FEED 2 SWITCH: SYSTEM B (FOUR 3-POSITION TOGGLES MOMENTARY-LOCK- MOMENTARY)	8S23, or both sets, to the CLOSE position. Flag numbers 8FL6, 8FL8, 8FL18, and 8FL19 indicate the status of the two valves in series (Primary and Secondary) respectively of each propellant interconnect line.
8S11 8S12 8S13 8S14 8S15 8S16 8S17 8S18	THRUSTER PAIR SWITCH, QUAD #1; SYSTEM A THRUSTER PAIR SWITCH, QUAD #2; SYSTEM A THRUSTER PAIR SWITCH, QUAD #1; SYSTEM B THRUSTER PAIR SWITCH, QUAD #2; SYSTEM B THRUSTER PAIR SWITCH, QUAD #3; SYSTEM A THRUSTER PAIR SWITCH, QUAD #4; SYSTEM A THRUSTER PAIR SWITCH, QUAD #3; SYSTEM B THRUSTER PAIR SWITCH, QUAD #4; SYSTEM B EIGHT 3-POSITION TOGGLES MOMENTARY-LOCK- MOMENTARY	Each of these three-position toggles (OPEN-OFF-CLOSE) simultaneously actuates a pair of latch-type solenoid-operated fuel and oxidizer isolation (shut-off) valves which control the propellant flow to a specific pair of thrusters. The valves are closed from earth launch. They are opened during pre-separation checkout by actuation of each thruster pair switch to the OPEN position. The switches are subsequently used only for emergency shutdown of a thruster pair in flight by actuation to the CLOSE position. Positive feedback of the solenoid valve positions is displayed by 8FL9 through 8FL16 for switches 8S11 through 8S18 respectively.

SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

Code	Control/Indicator	Function
8S19	TEMPERATURE/PRESSURE MONITOR SELECT SWITCH (4-POSITION ROTARY)	This four-position rotary (He-PRPLNT-FUEL MANF-OXID MANF) is used to select for monitoring, the pressures and temperatures of Systems A and B on indicators 8M1 and 8M2. In the He position, pressures of the helium tanks are displayed. In the PRPLNT position, the fuel and oxidizer tank pressures, as sensed at the helium regulator outlet, and the bulk propellant temperature, as sensed in the fuel tank, are displayed. The System A and B fuel and oxidizer manifold pressures are displayed on 8M1 in the FUEL MANF and OXID MANF positions respectively. In these two positions the temperature pointers on 8M2 will deflect to the lowest graduation mark since manifold temperatures are not sensed.
8S20	CROSSFEED SWITCH (3-POSITION TOGGLE MOMENTARY-LOCK- MOMENTARY)	This three-position toggle (OPEN-OFF-CLOSE) controls two latch-type, solenoid-operated fuel and oxidizer valves located in a crossfeed piping arrangement between System A and System B. These solenoid valves are normally closed except when the feed section of either System A or System B malfunctions (upstream of the main shutoff valves) requiring closure of the appropriate main shutoff valves. The crossfeed valves are then opened by moving 8S20 to the OPEN position. This permits fuel and oxidizer to flow through the operative feed section to the thrust chambers of both systems. 8FL17 indicates the status of the crossfeed valves.

SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

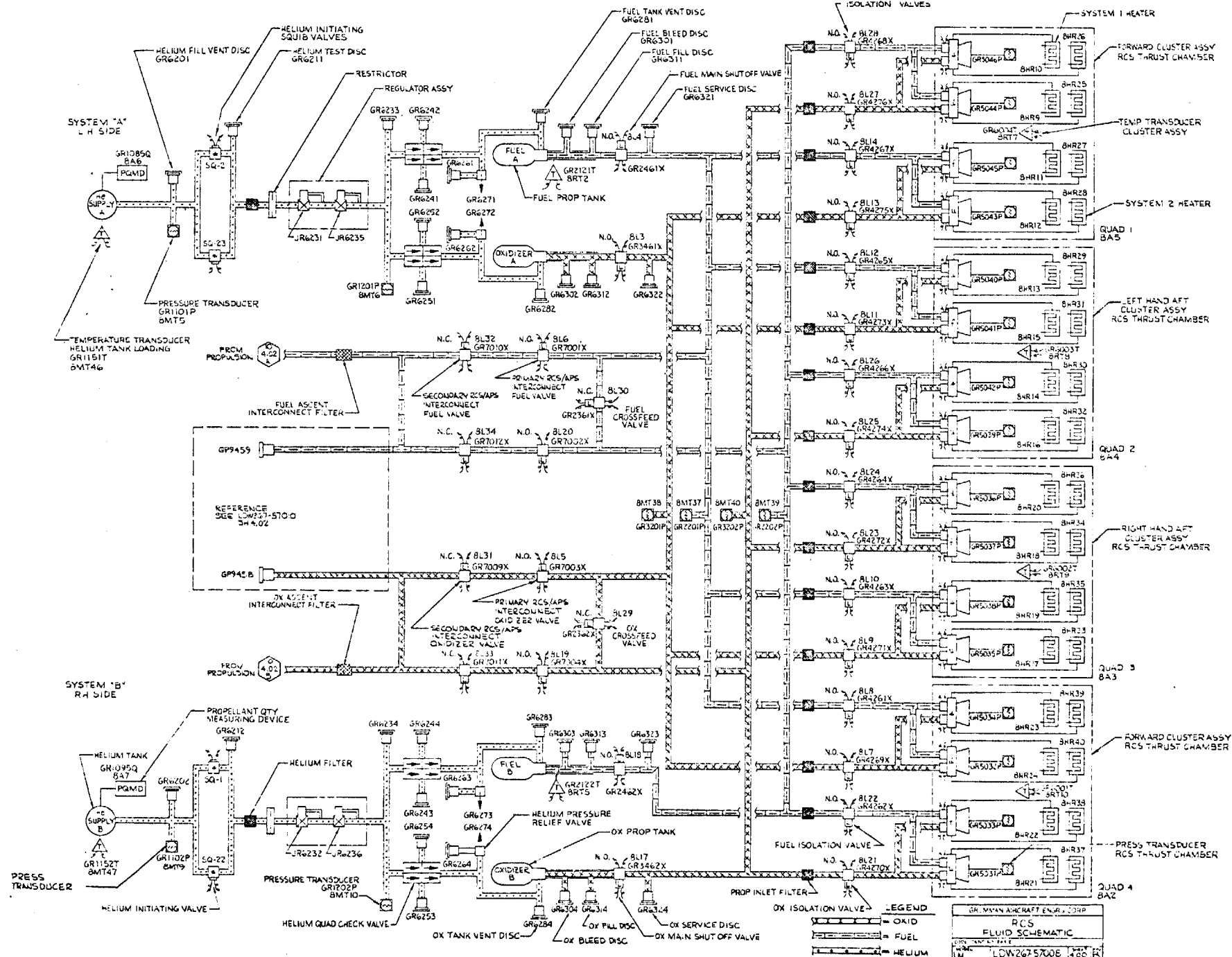
Code	Control/Indicator	Function
8M1	PRESSURE INDICATOR, SYSTEMS A & B	This indicator displays the pressures in the helium tanks or at the outlet of the helium pressure regulators just upstream of the propellant tanks, or in the fuel or oxidizer manifolds of system A and B, as selected by 8S19.
8M2	TEMPERATURE INDICATOR, SYSTEMS A & B	This indicator displays the temperatures in the fuel tanks of systems A and B as selected by 8S19.
8M4	QUANTITY INDICATOR, SYSTEMS A & B	This indicator displays the Propellant Quantity remaining in system A and System B continuously.
8FL5 8FL7	MAIN SHUTOFF VALVE STATUS; SYSTEM A MAIN SHUTOFF VALVE STATUS; SYSTEM B (TWO 2-POSITION FLAGS)	Each of these two-position flags (GREY-BARBERPOLE) indicates the open (GREY) or closed (BARBERPOLE) status of its respective pair of latch-type solenoid-operated fuel and oxidizer valves as controlled by 8S7 and 8S9.
8FL6 8FL8 8FL18 8FL19	ASCENT FUEL STATUS; SYSTEM A ASCENT FUEL STATUS; SYSTEM B ASCENT OXIDIZER STATUS; SYSTEM A ASCENT OXIDIZER STATUS; SYSTEM B (FOUR 2-POSITION FLAGS)	Each of these two-position flags (GREY-BARBERPOLE) indicates the OPEN (GREY) or CLOSED (BARBERPOLE) status respectively of each of the four ascent propellant interconnect lines (two oxidizer and two fuel). If either one or both of the solenoid valves in a single fuel or oxidizer line are closed, the appropriate flag indicates closed. When both solenoid valves in the line are open the flag indicates open.

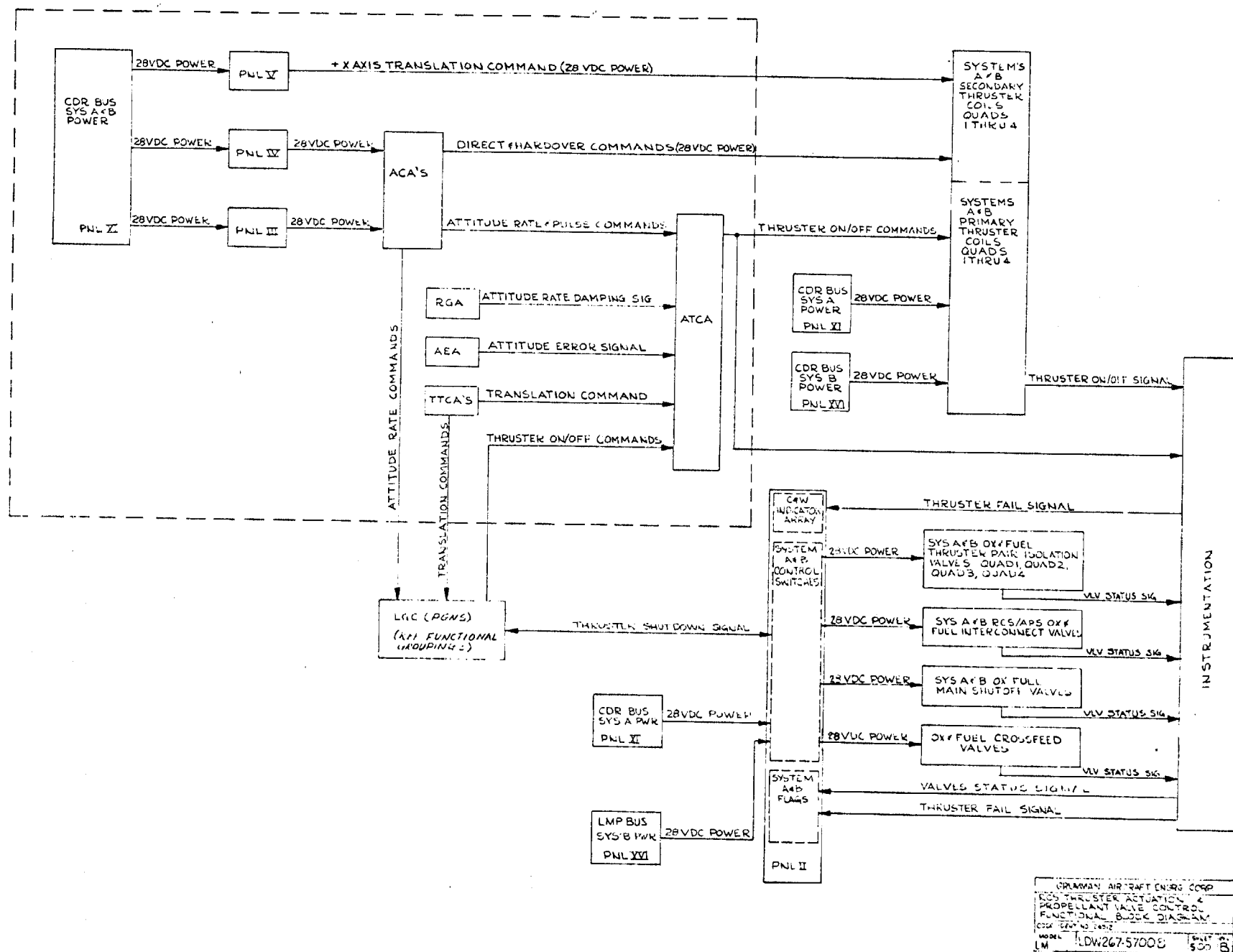
SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

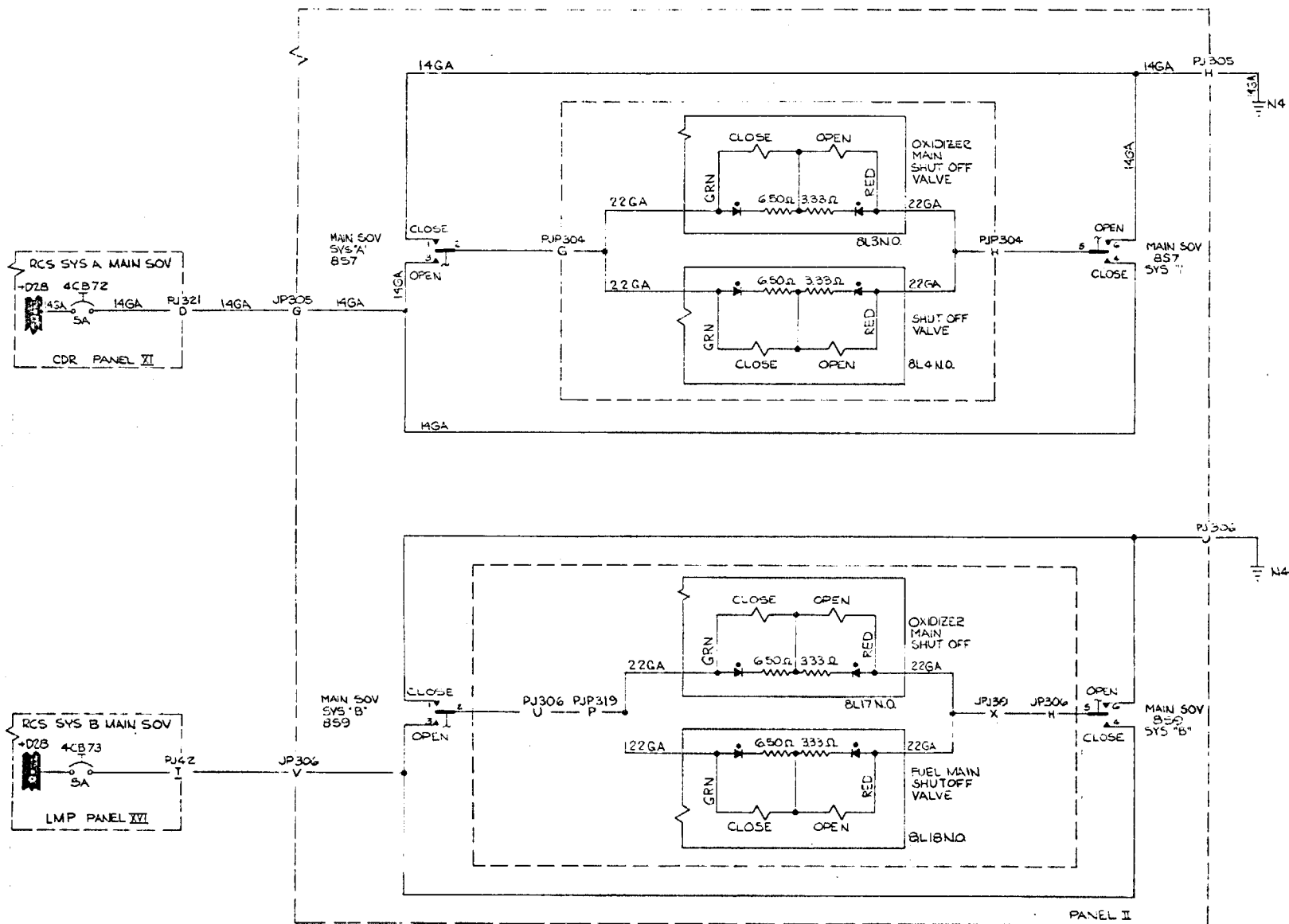
Code	Control/Indicator	Function
8FL9	THRUSTER PAIR STATUS, QUAD #1; SYSTEM A	Each of these flags (GREY-BARBERPOLE-RED) normally indicates the open (GREY) or closed (BARBERPOLE) status of its respective pair of latch-type solenoid-operated isolation fuel and oxidizer valves. In addition a third position (RED) will automatically appear (in conjunction with the RCS TCA warning light) to indicate a thruster or command failure. In the event of such a failure, the Thruster Pair switch associated with the red flag would be actuated to the CLOSE position. This action will shut down the malfunctioning pair and display the barberpole position.
8FL10	THRUSTER PAIR STATUS, QUAD #2; SYSTEM A	
8FL11	THRUSTER PAIR STATUS, QUAD #1; SYSTEM B	
8FL12	THRUSTER PAIR STATUS, QUAD #2; SYSTEM B	
8FL13	THRUSTER PAIR STATUS, QUAD #3; SYSTEM A	
8FL14	THRUSTER PAIR STATUS, QUAD #4; SYSTEM A	
8FL15	THRUSTER PAIR STATUS, QUAD #3; SYSTEM B	
8FL16	THRUSTER PAIR STATUS, (QUAD #4; SYSTEM B (EIGHT 3-POSITION FLAGS))	
8FL17	CROSSFEED STATUS (2-POSITION FLAG)	This two-position flag (GREY-BARBERPOLE) indicates the open (GREY) or closed (BARBERPOLE) status of the latch-type solenoid-operated fuel and oxidizer crossfeed valves as controlled by 8S20.

SUBSYSTEM: REACTION CONTROL (FUNCTIONAL GROUPING 8)

Code	Control/Indicator	Function
18S4 18S5 18S6 18S7	RCS QUAD 1 HEATER SWITCH RCS QUAD 2 HEATER SWITCH RCS QUAD 3 HEATER SWITCH RCS QUAD 4 HEATER SWITCH (FOUR 3-POSITION TOGGLES MAIN-MAN-MAN)	Each of these switches (AUTO-OFF-MAN) controls the system 2 heaters within one Quad of RCS engines. The AUTO position provides system 2 automatic temperature control of each engine in a Quad. The OFF position interrupts power to the heaters of system 2 in the respective Quad. The MAN position bypasses the automatic control and turns the heaters on continuously. The temperature of a Quad may be monitored by selecting the appropriate position on 18S10 and reading the value displayed on 18M1. Note that a redundant heater system 1 also controls the RCS engine temperatures automatically. There are no manual overrides to System 1 operation except OFF, which can be accomplished by opening the system 1 circuit breakers. The automatic temperature control will maintain engine injector temperatures at 120°F.
18S10	TEMPERATURE MONITOR SELECT SWITCH (7-POSITION ROTARY)	This seven-position rotary (RADAR: RNDZ-LDG; RCS: QUAD 1 - QUAD 2-QUAD 3-QUAD 4; COMM: S-BAND) selects the rendezvous or landing radar antenna assembly, the RCS quads, or the S-Band antenna assembly for temperature monitoring.
18M1	HEATER CONTROLLED TEMPERATURE INDICATOR	This indicator displays the temperature, in degrees Fahrenheit, of the radar antenna assemblies or RCS quads or S-Band antenna assembly as selected by switch 18S10.
16DS96	RCS PRESS IND (8M1) POWER FAILURE LIGHT	SEE page 16-705.4.
16DS98	RCS QUANTITY IND (8M4) POWER FAILURE LIGHT	SEE page 16-705.4.

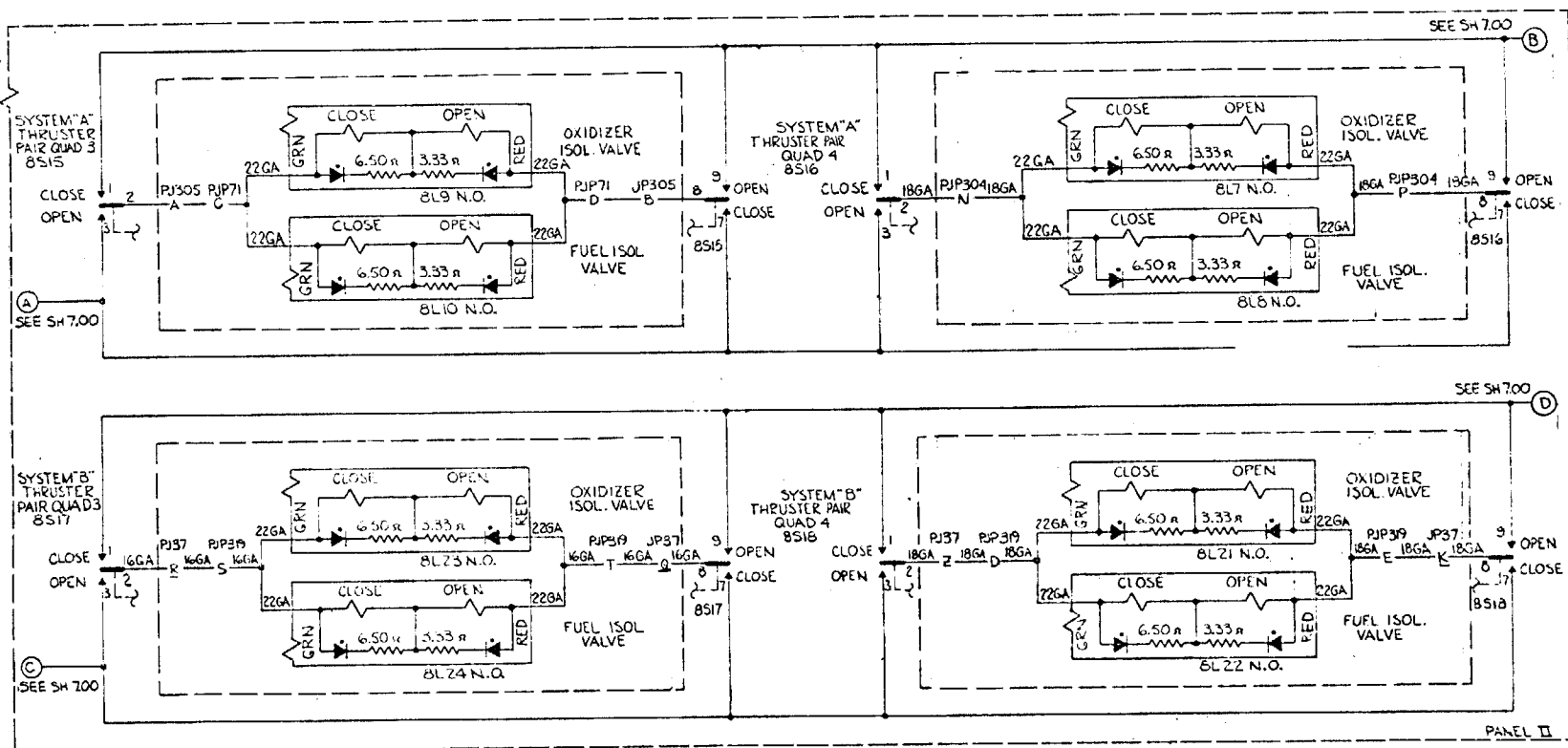






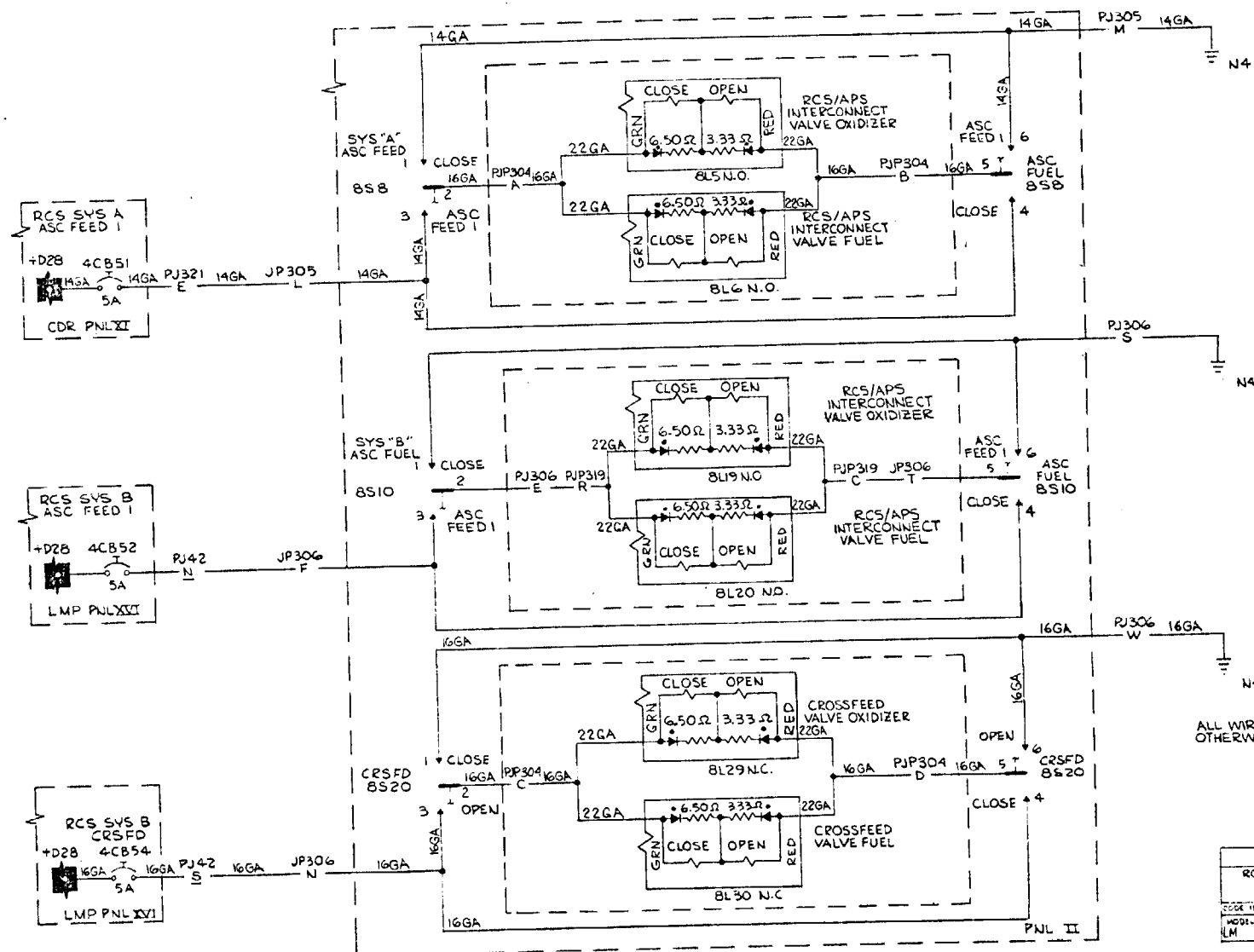
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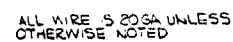
GRUMMAN AIRCRAFT ENGRS CORP		
RCS-MAIN SHUTOFF VALVES		
SYSTEMS "A" & "B"		
CODE IDENT NO. 24512		
MODEL	LDW 267-57008	SHEET NO. 1
LM		600 B

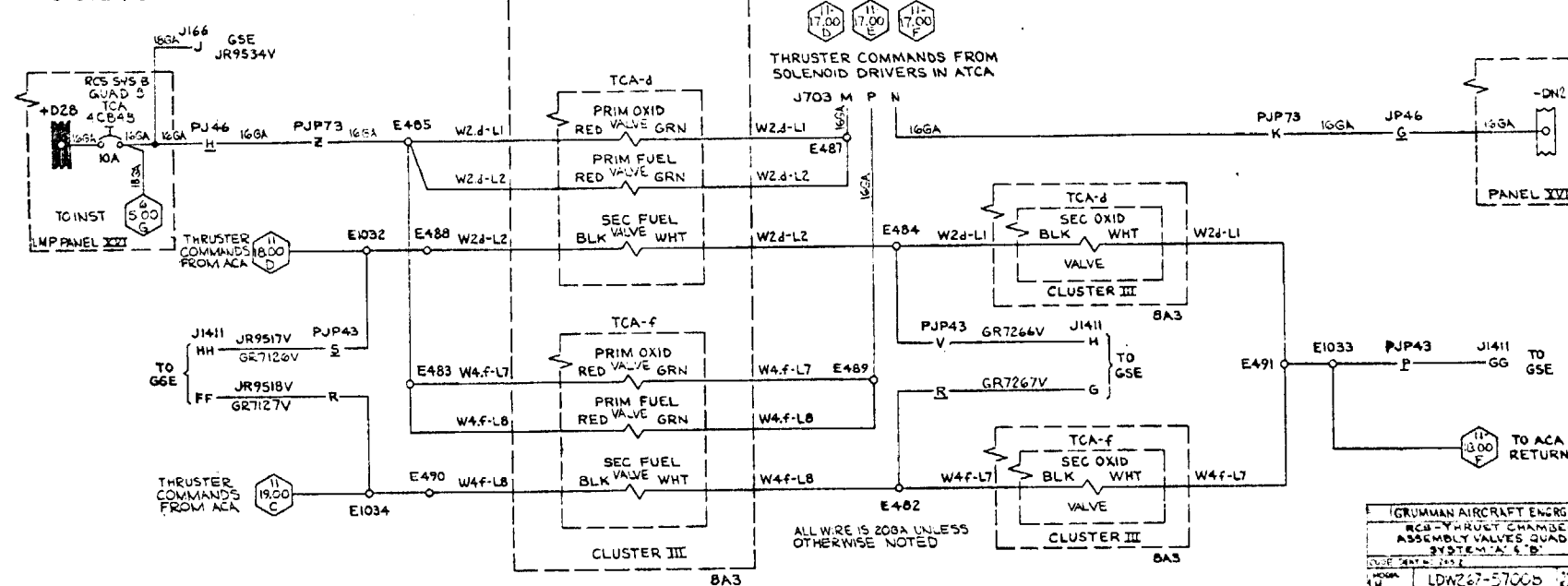
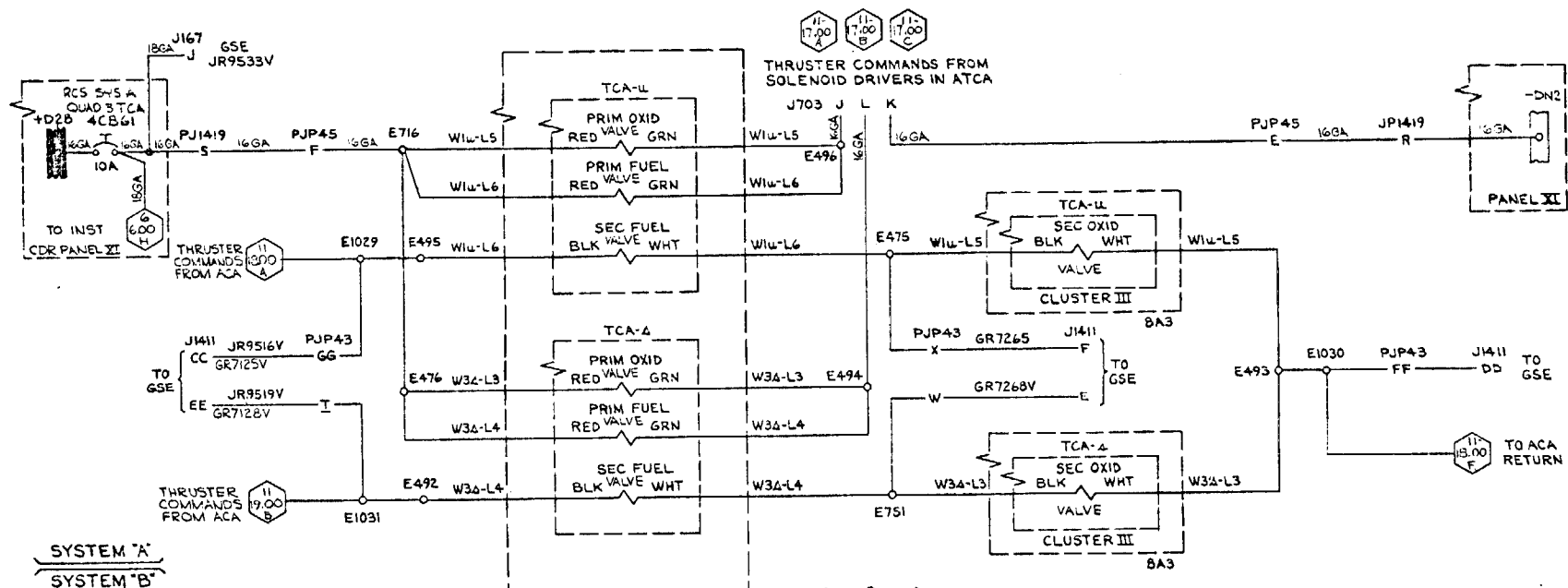


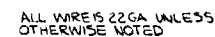
ALL WIRE IS 14GA UNLESS
OTHERWISE NOTED

GRUMMAN AIRCRAFT ENGRG CORP		
RCS THRUSTER PAIR ISOL VALVES		
SYSTEM A & B QUADS 3 & 4		
FORM 100-100-100-100		
MODEL	LDW267-57008	SHEET 1/1
LM	7.01	B

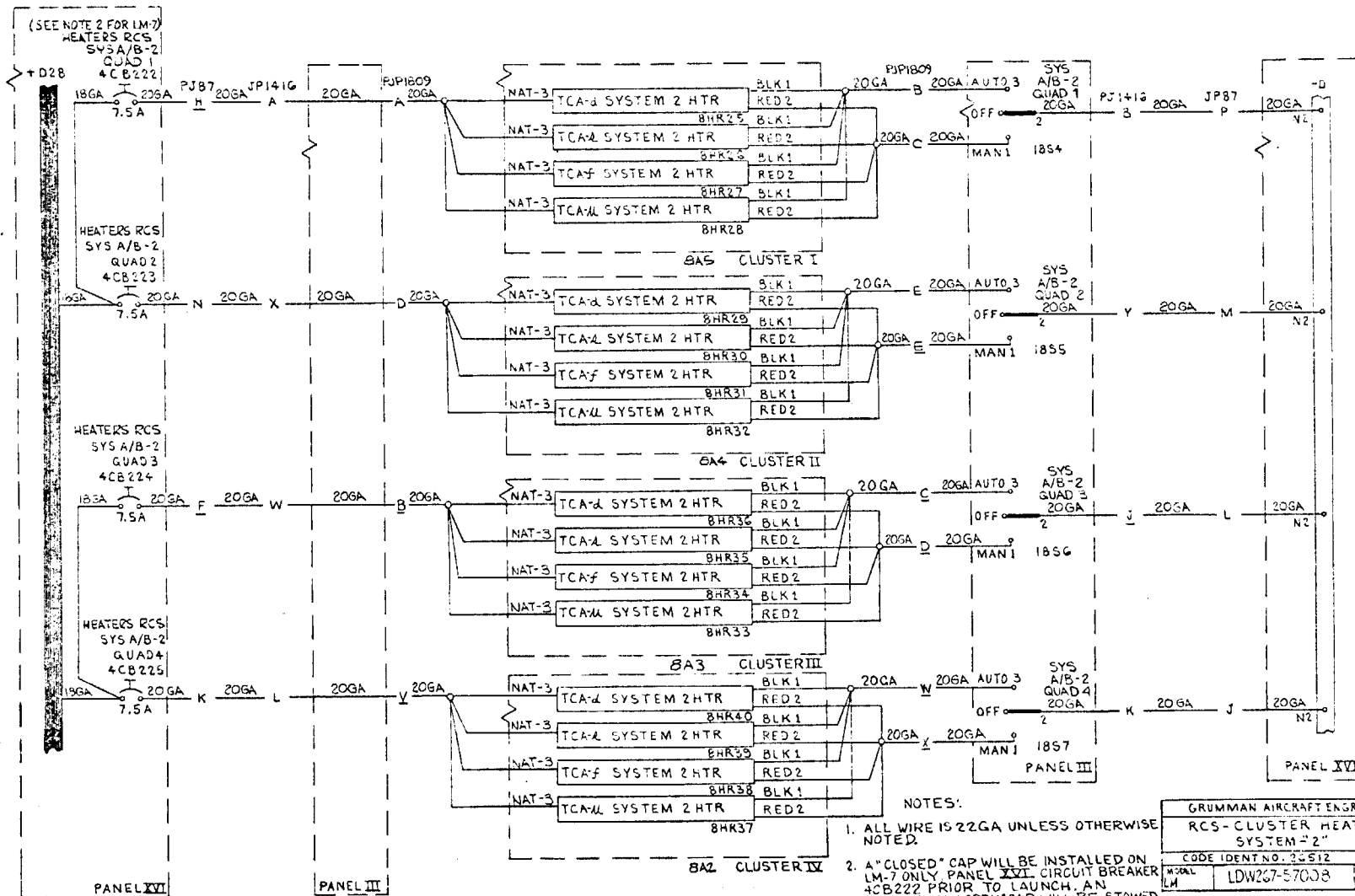




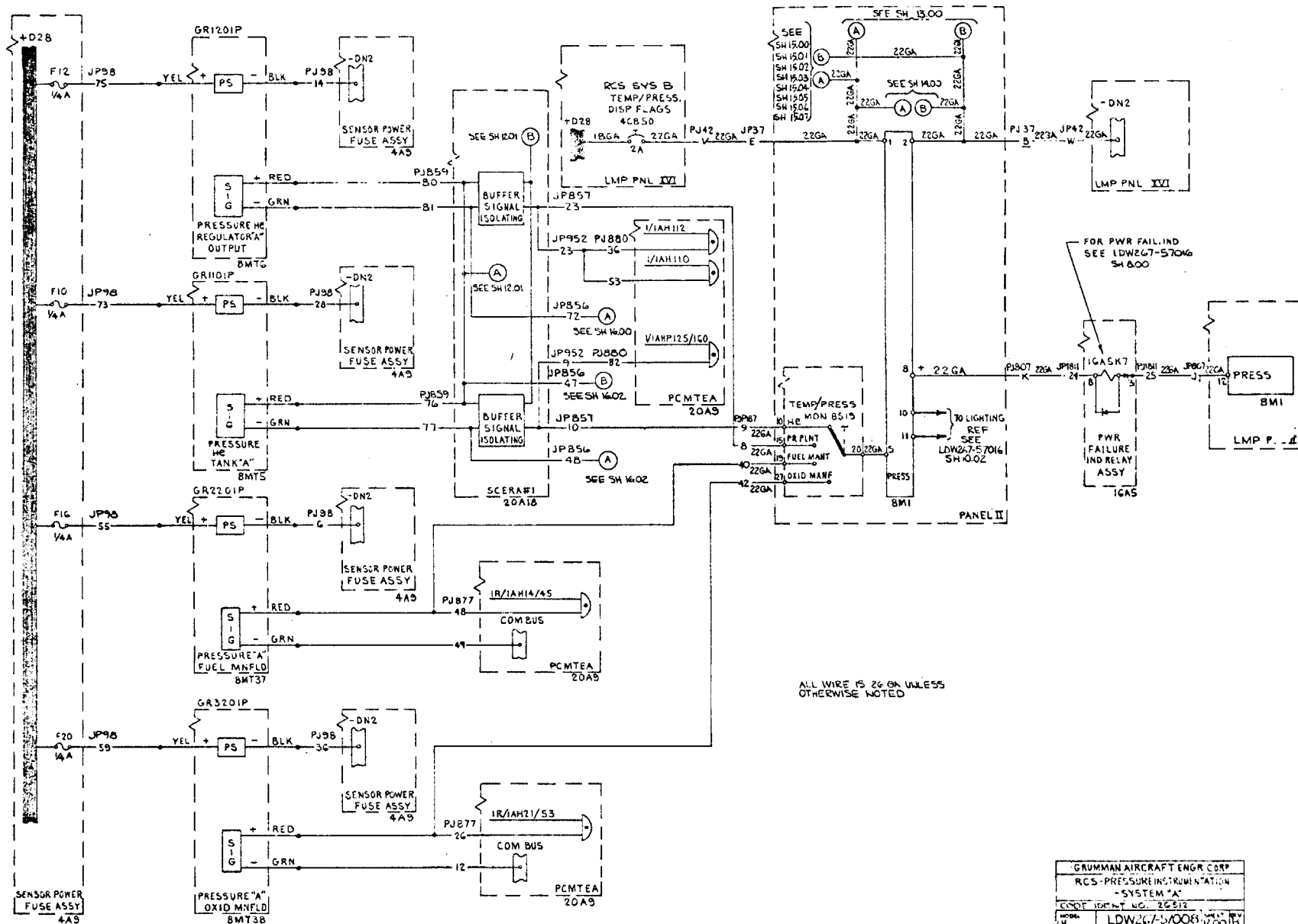




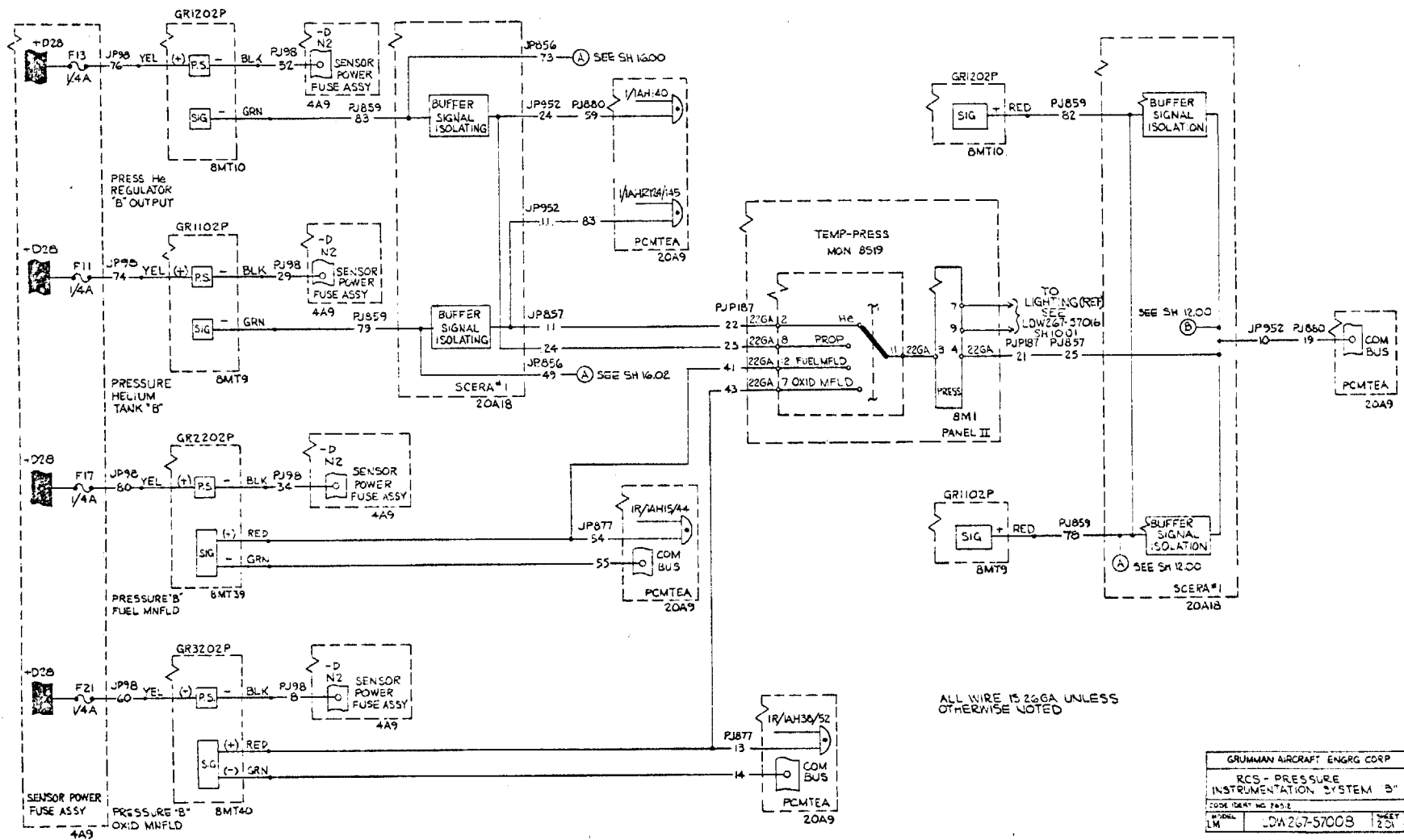
GRUMMAN AIRCRAFT ENGRG CORP			
ACS-CLUSTER HEATERS			
SYSTEM 1			
WIDE IDENT NO 2652			
WATER	LDW267-57008	SHEET 1100	OF 1



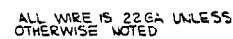
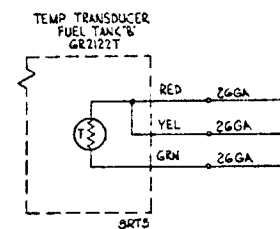
GRUMMAN AIRCRAFT ENGR CORP		
RCS-CLUSTER HEATERS		
SYSTEM "2"		
CODE IDENT NO.: 26512		
LM	LDW267-57008	1 SHEET 11/11

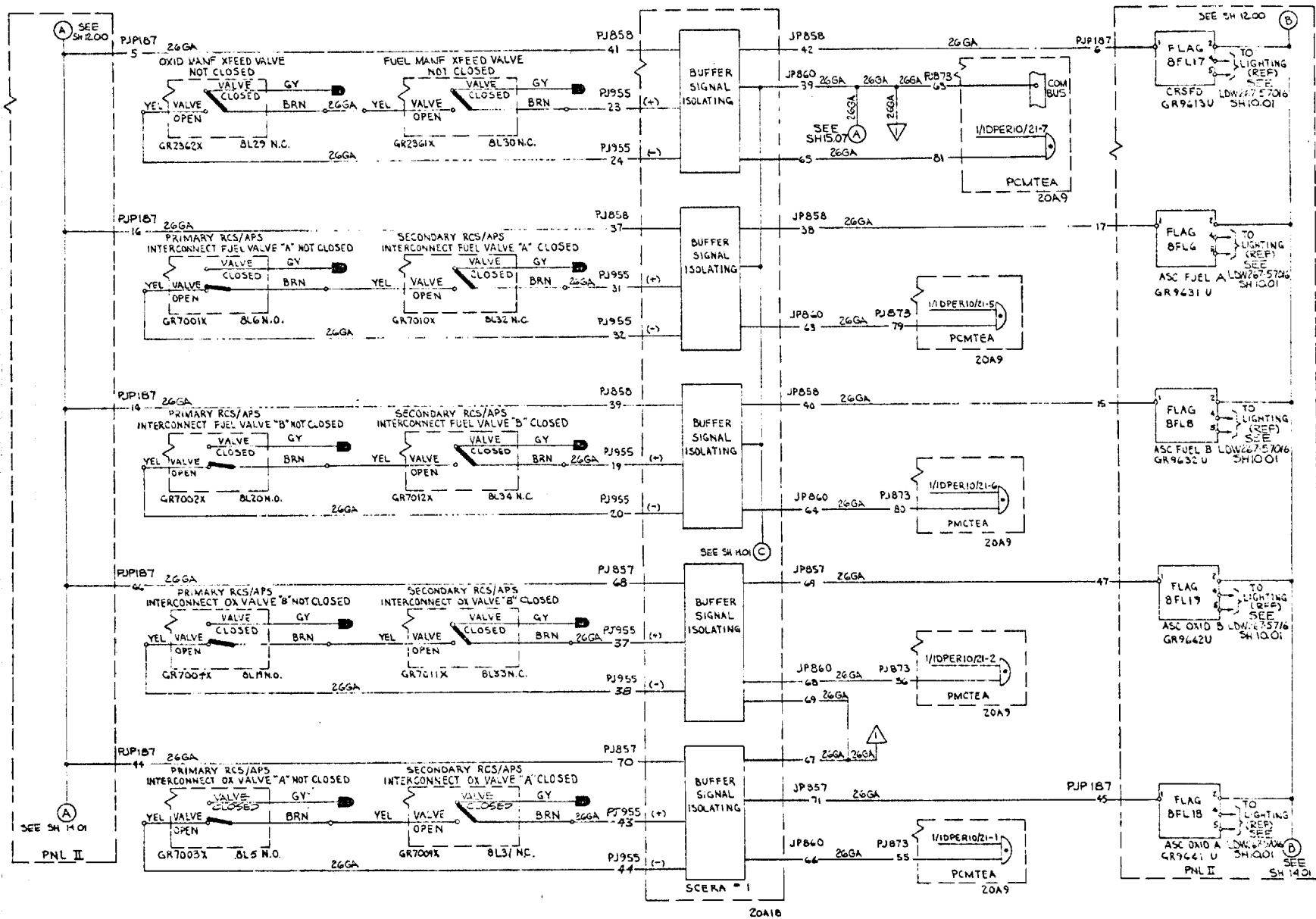


GRUMMAN AIRCRAFT ENGR CORP
RCS-PRESSURE INSTRUMENTATION
SYSTEM 'A'
CODE IDENT NO. 26312
LDW267-57006



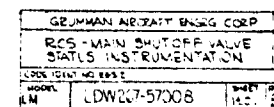
GRUMMAN AIRCRAFT ENGRG CORP		
RCS - PRESSURE INSTRUMENTATION SYSTEM 'B'		
CODE IDENT NO PAGE		
ORIGINAL	LDW267-57008	SHEET 251 G





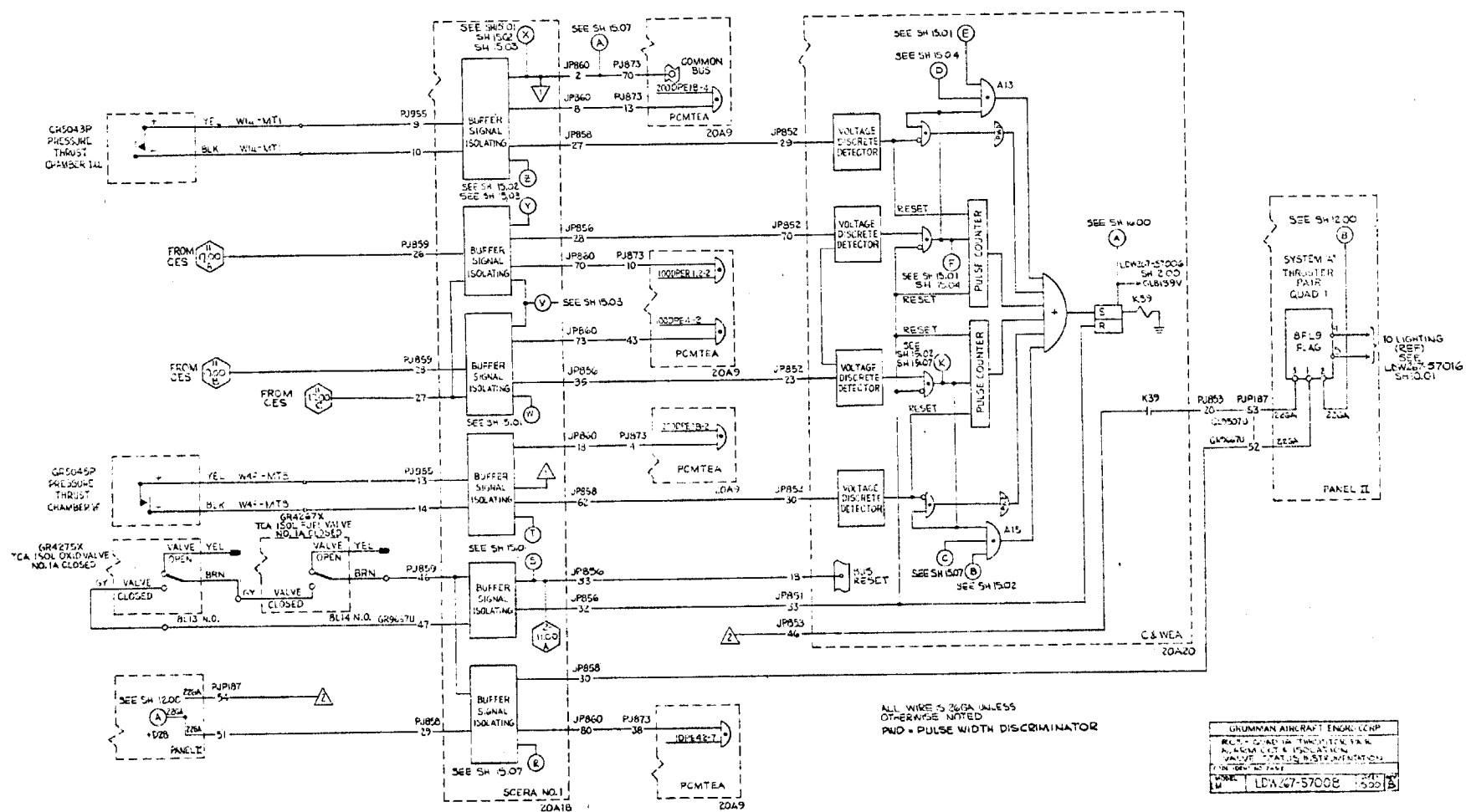
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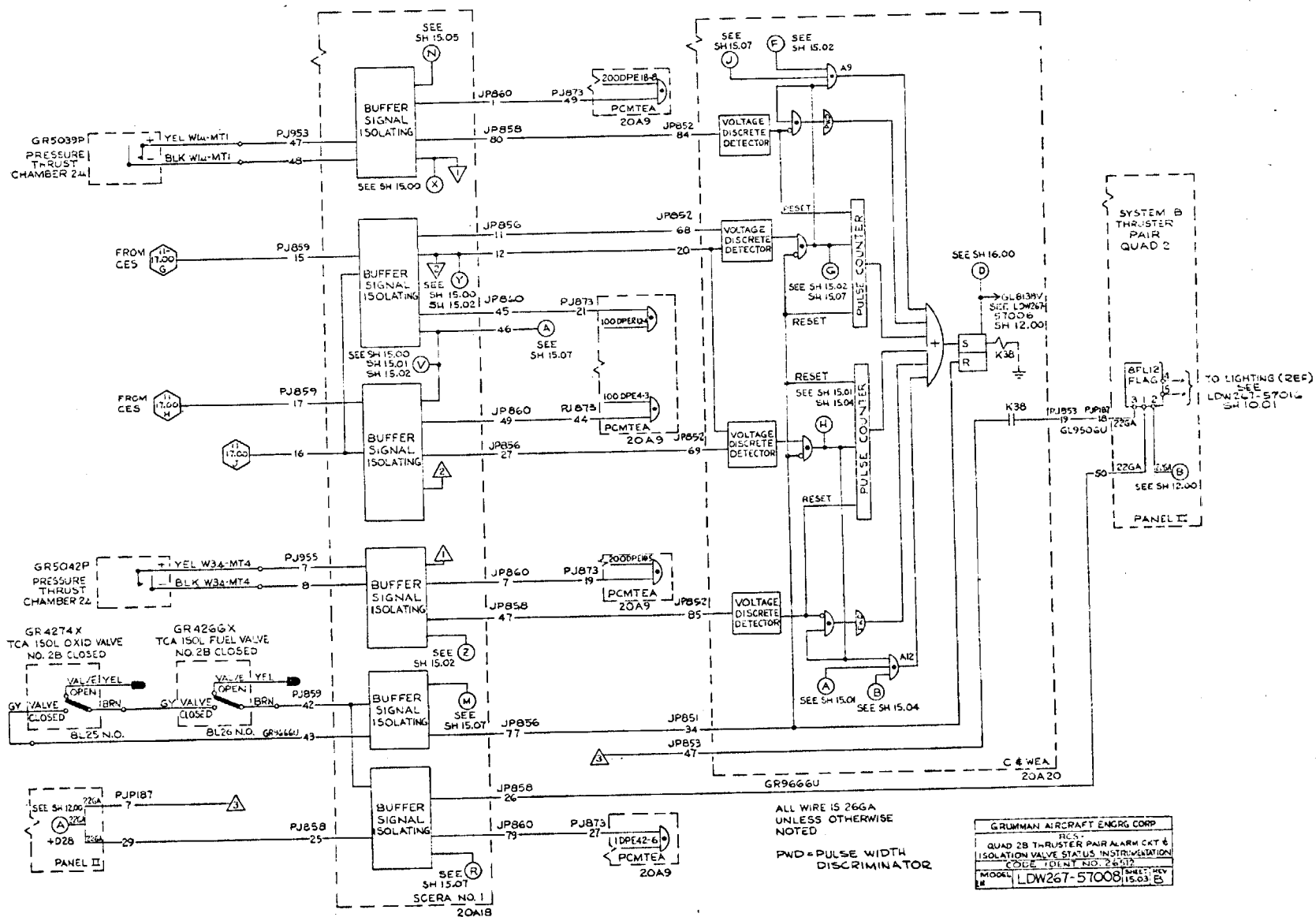
GRUMMAN AIRCRAFT ENGINE CORP.			
RCS-XFEED & INTERCONNECT VALVE STATUS INSTRUMENTATION			
REVISION NO. 1			
MODEL	LDW267-51008	DATE	1/1/68

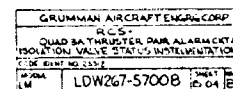


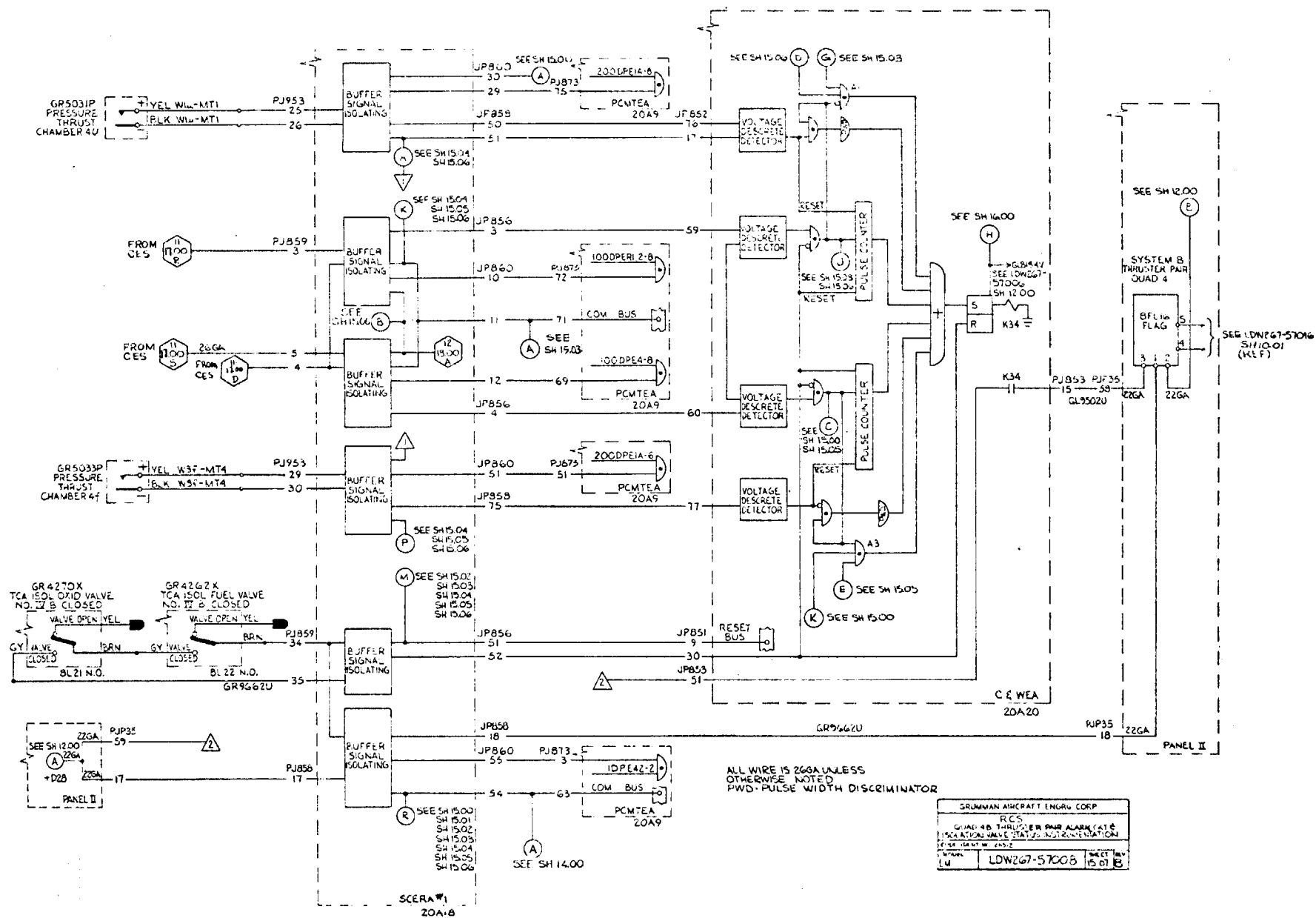
RCS - MAIN SHUTOFF VALVE
STATUS INSTRUMENTATION

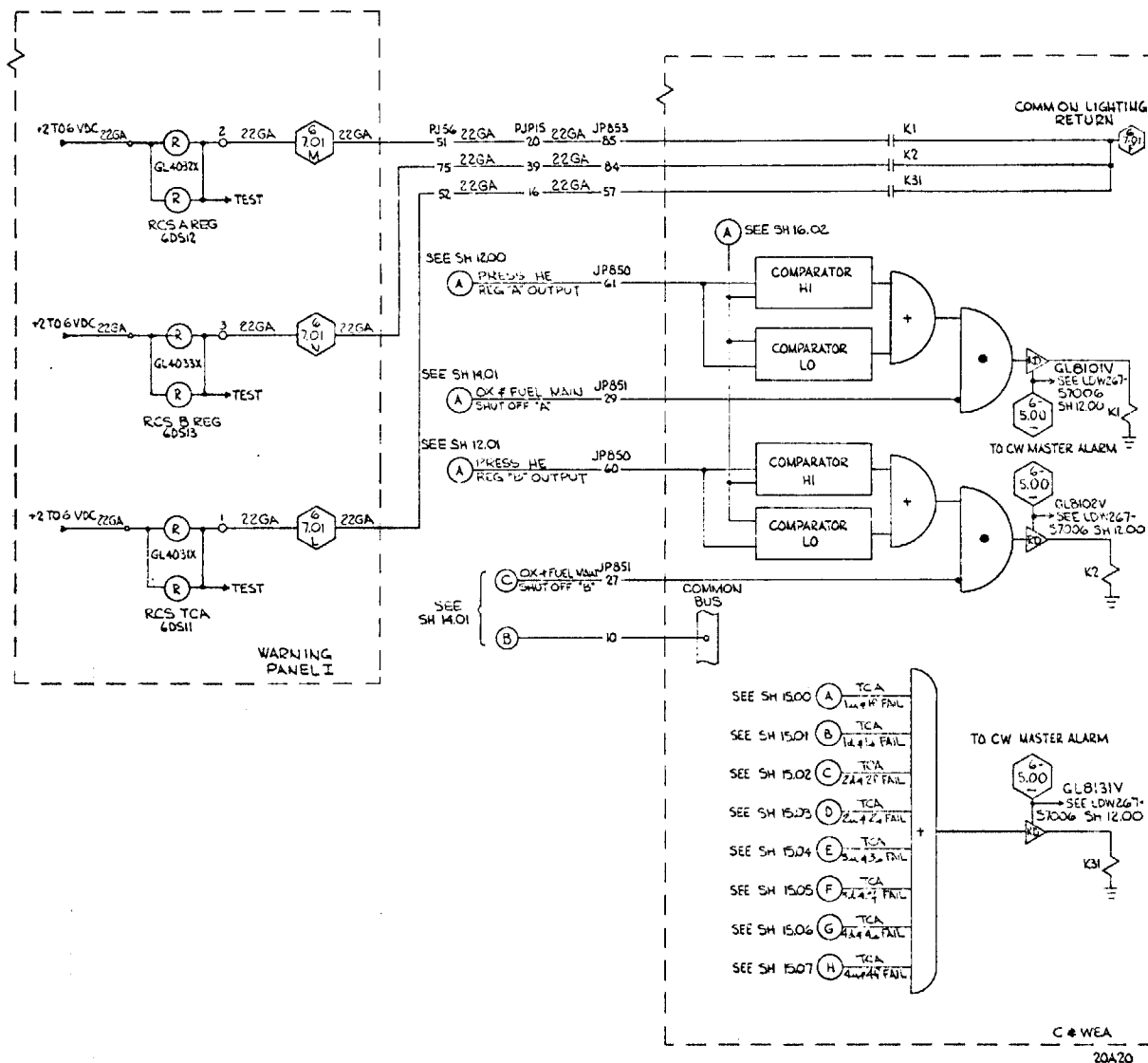
MODEL	LDW267-57008	DATE	14.0
LM			





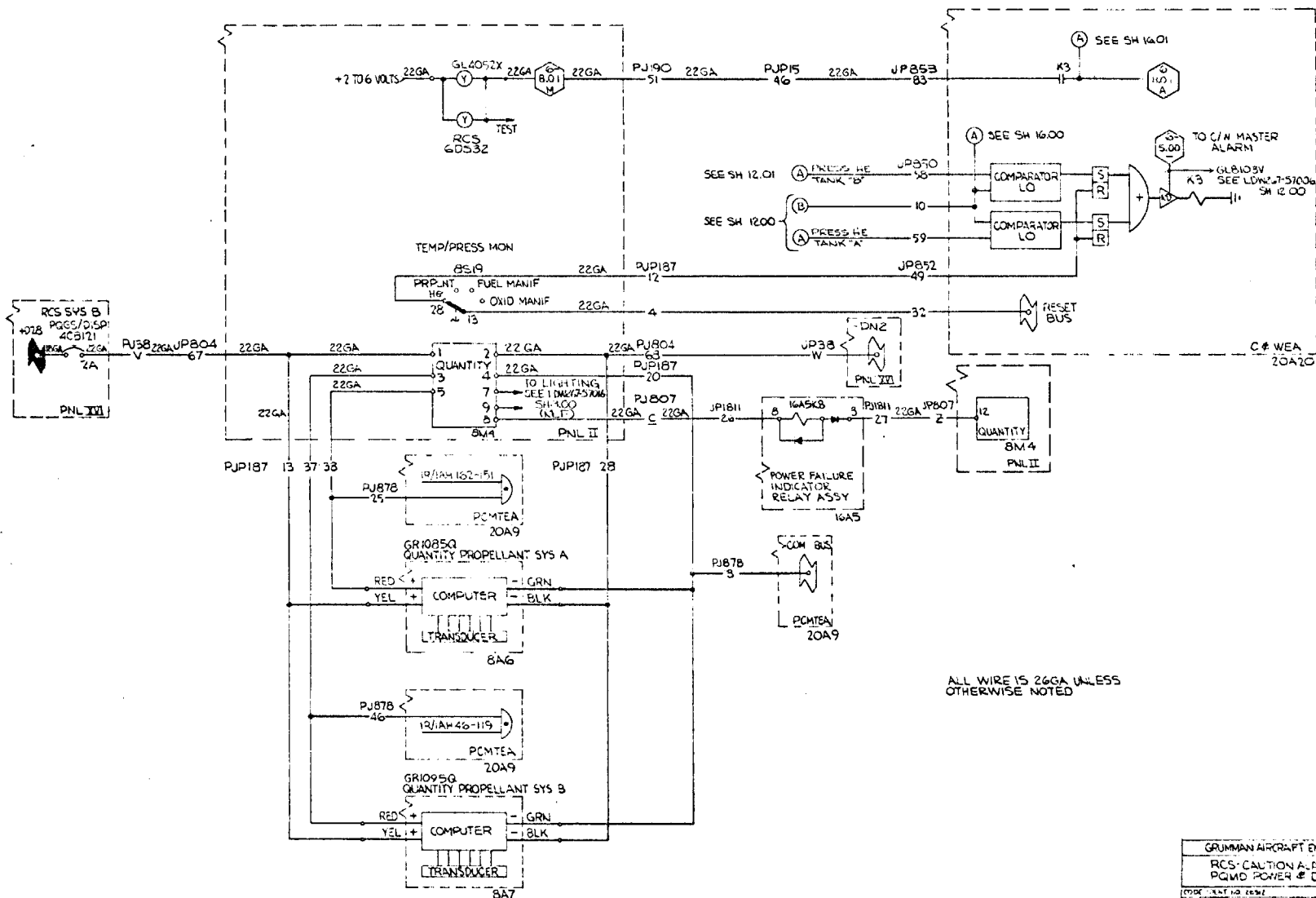


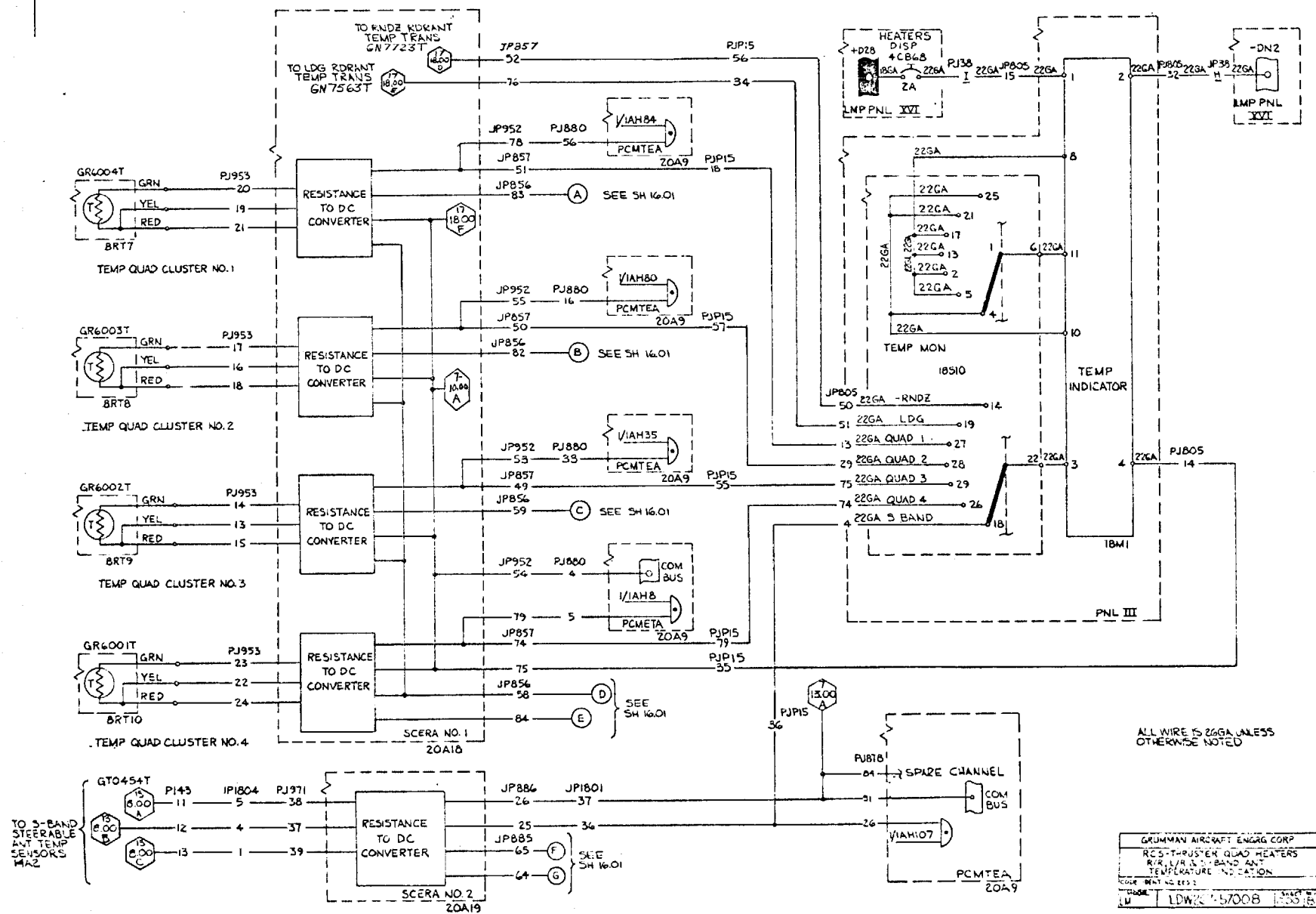




ALL WIRE IS 26 GA UNLESS OTHERWISE NOTED

GRUMMAN AIRCRAFT ENGINE CORP			
RCS-WARNING ALARMS			
FORM 100-100-100-100			
MODEL	LDW27K-57008	WIRE	1600 B





LM ELEMENTARY FUNCTIONAL

DIAGRAMS

(Functional Grouping No. 9)

FLIGHT GUIDANCE DISPLAYS AND CONTROLS

(REF LDW 267-57009 D)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
Displays and Controls	LDW350-54000	N	P1, P2, P3

2. Table of Contents

ITEM NAME

PAGE NO./SHEET NO.

a) Cover Sheet	9-701
b) Applicable Documents, Table of Contents and Revisions	9-702 & 9-702.1
c) Cabin Location of Flight Guidance Displays and Controls	9-703
d) Flight Guidance Displays and Controls Indicators Layout	9-704 & 9-704.1
e) Flight Guidance Displays and Controls Functional Description	9-705 thru 9-705.10
f) Flight Guidance D&C Block Diagram	LDW267-57009 SH 4.00B
g) Flight Guidance D&C FDAI Sphere Drive System Data Inputs from AGS & PGNS	LDW267-57009 SH 5.00B 7 5.01B
h) Flight Guidance D&C CDR FDAI Power Supply and Data Selection Control	LDW267-57009 SH 6.00A
i) Flight Guidance D&C LMP FDAI Power Supply and Data Selection Control	LDW267-57009 SH 7.00B
j) Flight Guidance D&C LMP & CDR FDAI Roll, Pitch and Yaw Rate Signals	LDW267-57009 SH 8.00B
k) Flight Guidance D&C Signals to Yaw, Pitch & Roll FDAI Error Meters	LDW267-57009 SH 9.00B
l) Flight Guidance D&C Lighting and Power Supply and Data Selection Control for Cross-Pointer	LDW267-57009 SH 10.00B
m) Flight Guidance D&C Cross-Pointer Data Inputs	LDW267-57009 SH 11.00B
n) Flight Guidance D&C Range/Range Rate & Attitude/Altitude Rate Data Inputs to Range/Range Rate Indicator	LDW267-57009 SH 12.00B
o) Flight Guidance D&C Mission and Event Timers - Power and Control	LDW267-57009 SH 13.00D

2. Table of Contents (Cont)

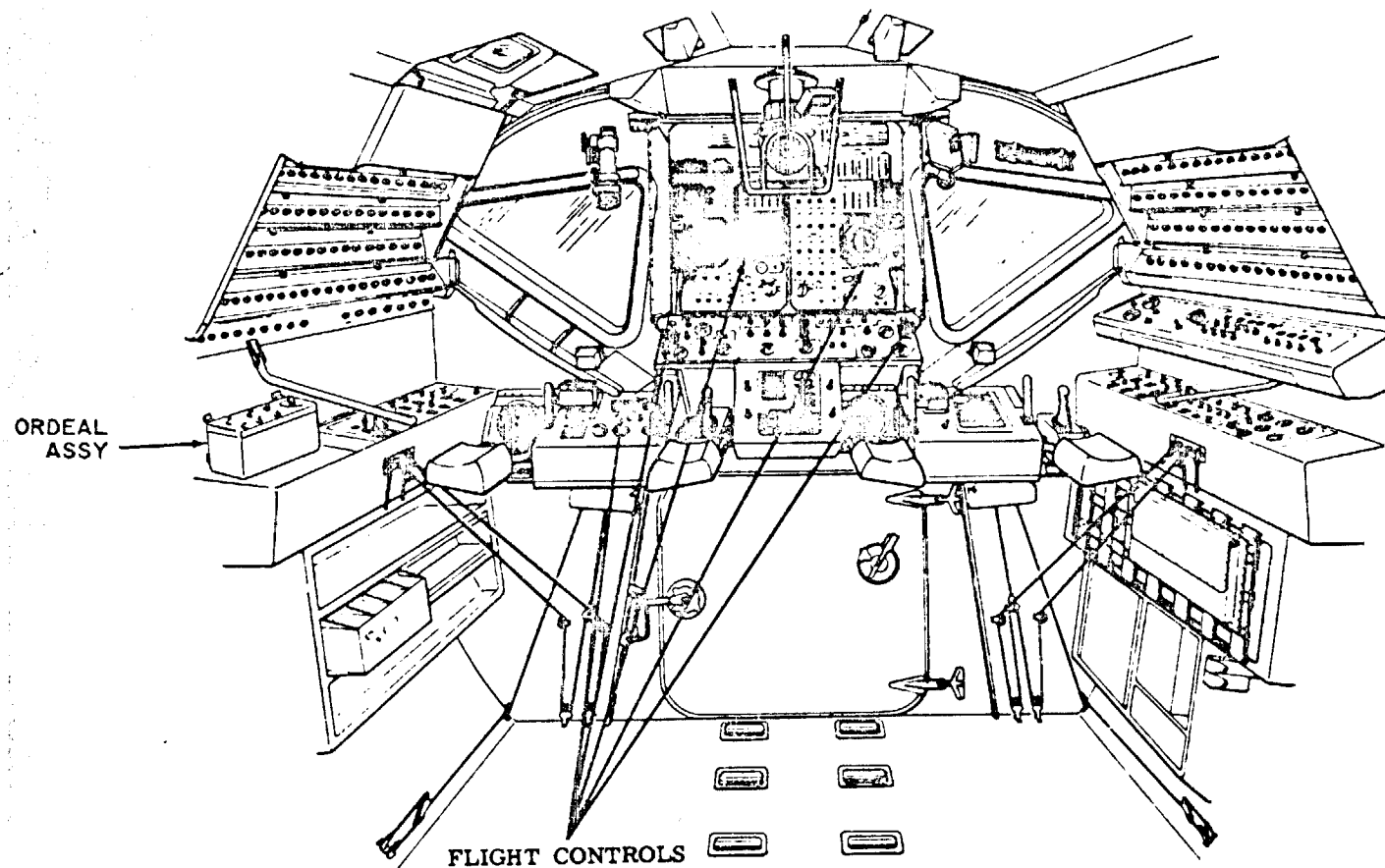
ITEM NAME

PAGE NO./SHEET NO.

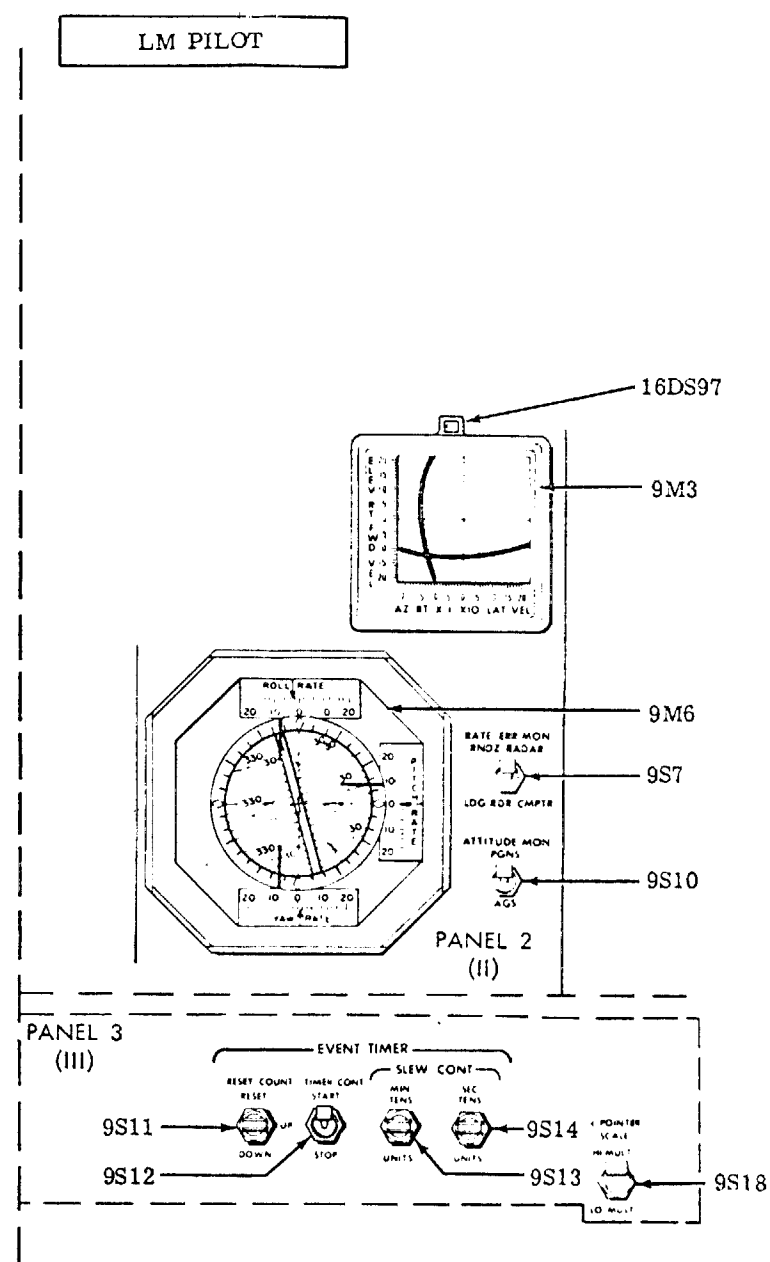
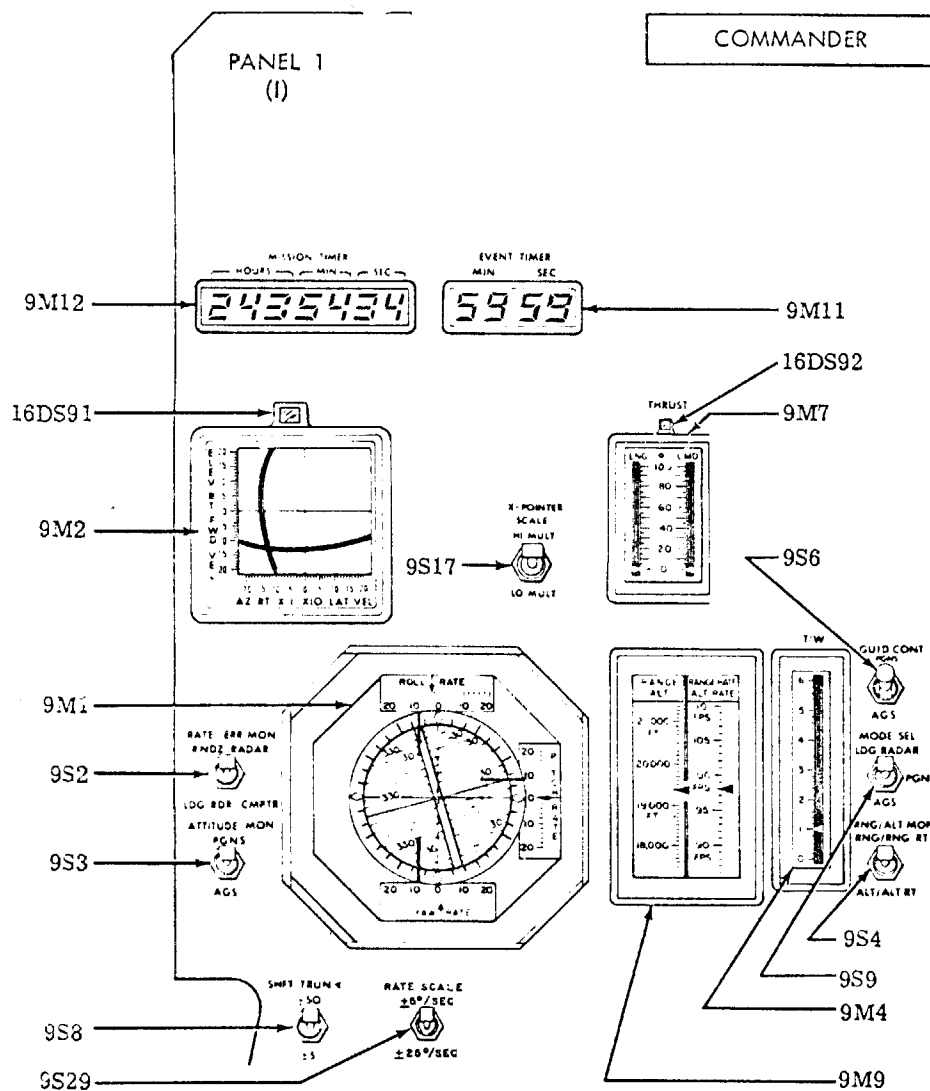
- p) Flight Guidance D&C Mission Event Timers & EMI Filter Power & Control LDW267-57009 SH 13.01D
 q) Flight Guidance D&C GASTA, and FDAI (Error & Rate Meters) 800 Hz LDW267-57009 SH 14.00B
 Fusing & Distribution
 r) Flight Guidance D&C Thrust Display Data Inputs LDW267-57009 SH 15.00B

3. REVISIONS

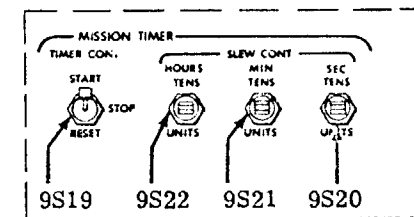
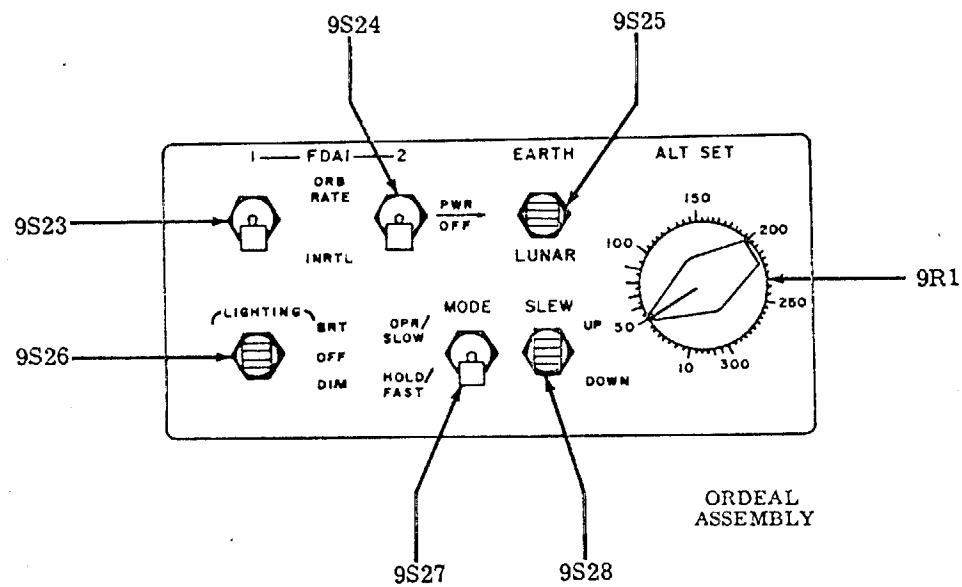
REV	PAGE NO. AND/OR LDW267-57009, SHEET NO.	LCD	DESCRIPTION
B	13.01	5182C	DESIGN & FABRICATION OF PROTOTYPE AND FLIGHT QUALIFIED FIX FOR EVENT TIMER & MISSION CLOCK
C	13.01 13.01	5449	REINSTALLATION OF SYLVANIA MISSION CLOCK AND EMI FILTER ASSY (EVENT TIMER KEARFOTT)
D	13.00 13.01	5160	IMPLEMENTATION OF REDESIGN OF APOLLO MISSION CLOCK AND LM EVENT TIMER



Cabin Location of Flight Guidance Displays and Controls



Flight Guidance Displays & Controls Indicators Layout



PANEL 5
(V)

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S2 9S7	RATE/ERR MON SWITCH (CDR) RATE/ERR MON SWITCH (LMP) TWO 2-POSITION TOGGLES MAIN-MAIN	The functions of 9S2, 9S7, 9S3, 9S10 and 9S9 are all inter-related. Switches 9S2 and 9S3 will affect the CMDRS FDAI and CROSSPOINTER and 9S7 and 9S10 will affect the LMP FDAI and CROSSPOINTER. The following combinations will yield the noted results: 1. RATE ERR MON (9S2, 9S7) - RNDZ RADAR position ATTITUDE MON (9S3, 9S10) - PGNS position (a) PGNS attitude signals via GASTA to the FDAI ball (b) Shaft and trunnion angles from RNDZ radar antenna to the FDAI pitch and yaw error meters. 2. RATE ERR MON (9S2, 9S7) - LDG RADAR/CMPTR position ATTITUDE MON (9S3, 9S10) - PGNS position (a) PGNS attitude signals via GASTA to the FDAI ball (b) Pitch, yaw & roll error signals from PGNS to the FDAI error meters/or pitch, yaw & roll rates ($\pm 1.25^\circ/\text{sec}$) signals from PGNS to error meters. 3. RATE ERR MON (9S2, 9S7) - RNDZ RADAR position ATTITUDE MON (9S3, 9S10) - AGS position (a) AGS attitude signals to the FDAI ball (b) Shaft and trunnion angles from RNDZ RADAR antenna to the FDAI pitch and yaw error meters 4. RATE ERR MON (9S2, 9S7) - LDG RADAR/COMPTR position ATTITUDE MON (9S3, 9S10) - AGS position (a) AGS attitude signals to the FDAI ball (b) Pitch, yaw & roll error signals from AGS to the FDAI error meters
9S3 9S10	ATTITUDE MON SWITCH (CDR) ATTITUDE MON SWITCH (SE) TWO 2-POSITION TOGGLES MAIN-MAIN	
9S9	MODE SEL SWITCH 3 POSITION TOGGLE MAIN-MAIN-MAIN	

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S2 9S7 (Cont) 9S3 9S10 (Cont) 9S9 (Cont)		5. RATE ERROR MON (9S2, 9S7) - RNDZ RADAR position (a) LOS shaft angle rate from RNDZ RADAR to the crosspointer horizontal pointer (b) LOS trunnion angle rate from RNDZ RADAR to the crosspointer vertical pointer (c) AZ rate and EL rate lights on the crosspointer will be illuminated. 6. RATE ERR MON (9S2, 9S7) - LDG RADAR position MODE SEL (9S9) - LDG RADAR position (a) Forward velocity (VZA) from LDG RADAR to the crosspointer horizontal pointer (b) Lateral velocity (VYA) from LDG RADAR to the crosspointer vertical pointer. (c) FWD VEL and LAT VEL lights on crosspointer illuminated 7. RATE ERR MON (9S2, 9S7) - LDG RADAR position MODE SEL (9S9) - PGNS position (a) Forward velocity from PGNS (CDU) to the crosspointer horizontal pointer (b) Lateral velocity from PGNS (CDU) to the crosspointer vertical pointer (c) FWD VEL and LAT VEL lights on crosspointer illuminated 8. RATE ERR MON (9S2, 9S7) - LDG RADAR position MODE SEL (9S9) - AGS position

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S2 9S7 (Cont) 9S3 9S10 (Cont) 9S9 (Cont)		(a) No input to crosspointer horizontal pointer (b) Lateral velocity from AGS to the crosspointer vertical pointer (c) LAT VEL light on the crosspointer illuminated NOTE: RATE ERR MON switches (9S2 and/or 9S7) in the RNDZ RADAR position will override all inputs from the MODE SEL switch (9S9), therefore with 9S2 and/or 9S7 in RNDZ RADAR, only shaft and trunnion angle rates will be displayed on the crosspointer. See Step 5.
9S4	RNG/ALT MON SWITCH 2 POSITION TOGGLE MAIN-MAIN	This two position toggle (RNG/RNG RT-ALT/ALT/RT) selects the proper display legend (RNG/RNG RT-ALT/ALT RT) on the range indicator 9M9. In the RNG/RNG RT position, range and range rate data from RNDZ RADAR is displayed on 9M9. In the ALT/ALT RT position, data from whatever source is selected by 9S9 (LDG RDR-PGNS-AGS) will be displayed on 9M9.
9S6	GUID CONT SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (PGNS-AGS) selects either PGNS or AGS for guidance control of the LM.
9S8	SHFT/TRUN SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle ($\pm 50^\circ$ - $\pm 5^\circ$) selects the range of Rendezvous Radar Shaft and Trunnion angles to be displayed on the pitch and yaw error needles of 9M1 and/or 9M6 when 9S2 and/or 9S7 are placed in the RNDZ/RADAR position. In the $\pm 50^\circ$ position each graduation represents 10° . In the $\pm 5^\circ$ position the last graduation represents 5° , but due to the non-linear scale the intermediate graduations represent approximately 1° .

Code	Control/Indicator	Function
9S11	RESET/COUNT SWITCH 3-POSITION TOGGLE MOM-MAIN-MAIN	This three-position toggle (RESET-UP-DOWN) is used to reset the Event Timer and select the direction in which the timer will count. The momentary spring loaded RESET position immediately resets 9M11 to zero. Zero is maintained until a start pulse is initiated by activation of 9S12. In the UP position the timer will count in an increasing direction to 59 minutes and 59 seconds, return to zero and begin counting up again. In the DOWN position the timer will count in a decreasing direction from a preset value to 0 minutes and 0 seconds, return to 59 minutes and 59 seconds and count down again.
9S12	TIMER CONTROL SWITCH 2-POSITION TOGGLE MAIN-MAIN	This is a two-position toggle (START-STOP) switch. In the START position the Event Timer will begin counting in a direction selected by 9S11. In the STOP position the count is stopped and frozen until either the START position is again selected or the RESET/COUNT switch is placed in the reset position, in which case it remains at zero until the start position is again selected.
9S13 9S14	MIN SLEW CONTROL SWITCH SEC SLEW CONTROL SWITCH TWO 3-POSITION TOGGLES MOM-MAIN-MOM	These toggles are used to set the four digits of 9M11. They have two momentary springs loaded positions (TENS-UNITS) which permit resetting each of the four digits independently. Positioning 9S13 to the TENS position slews the tens column digit of the minutes pair at the rate of 2 digits per second as long as the toggle is held in this position. In the UNITS position, the unit column digit of the minutes pair is changed at a rate of 2 digits per second. All digits change in an increasing direction, regardless of the position of 9S11. In the center maintain position the slewing function is disabled. 9S14 is used in the same manner to set the seconds pair of digits on the Events Timer Indicator.

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S17 9S18	X-POINTER SCALE SWITCH (CDR) X-POINTER SCALE SWITCH (LMP) TWO 2-POSITION TOGGLES MAIN-MAIN	These two-position toggles (HI MULT-LO MULT) control the scale range of 9M2 and 9M3. When LOS rates are displayed, the HI MULT position will provide a scale of ± 20 mrad/sec. , and the LO MULT position will illuminate the X.1 multiplier to provide a scale of ± 2 mrad/sec. When horizontal velocities are displayed, the HI MULT position will illuminate the X.10 multiplier to provide a scale of ± 200 ft/sec. The LO MULT position will provide a scale of ± 20 ft/sec. 9S17 controls scale range input to 9M2; and 9S18 controls scale range inputs to 9M3.
9S19	TIMER CONTROL 3-POSITION TOGGLE MAIN-MAIN-MOM	This three-position toggle (START-STOP-RESET) is maintained in the START and STOP positions and momentary in the RESET position. The START position enables the clock to count in an upward direction from any number pre-set by the slew controls (9S20, 9S21, and 9S22). In the STOP position, the count is stopped and frozen. Returning to the START position continues the count. The momentary spring loaded RESET position resets all numbers to zero.
9S20 9S21 9S22	SECONDS SLEW CONTROL MINUTES SLEW CONTROL HOURS SLEW CONTROL THREE 3-POSITION TOGGLES MOM-MAIN-MOM	These three-position toggles have two momentary spring loaded positions (TENS-UNITS) which permit the selection of any digits for the mission timer. Positioning 9S22 to the TENS position slews the tens column digit of the hours at the rate of 2 digits per second as long as the toggle is held in this position. The hundreds digit of the hours is also controlled by the TENS position of 9S22, changing one digit for every 5 seconds of slew. In the UNITS position, the unit column digit of the hours is changed at a rate of 2 digits per second. All digits change in an increasing direction. In the center position, the slewing function is stopped. 9S21 and 9S20 are used in the same manner to set the minutes and seconds digits, and slew at the rate of 2 digits per second.

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S23 9S24	FDAI 1 SWITCH FDAI 2 SWITCH TWO 2-POSITION TOGGLES MAIN-MAIN	These two-position toggles (ORB RATE-INRTL) when placed in the ORB RATE position provide a pitch angle input to their respective FDAI which causes the FDAI to display total attitude with respect to a local horizontal reference frame. When the toggle is placed in the INRTL position, the ORDEAL is bypassed and the FDAI displays total spacecraft attitude with respect to an inertial reference frame.
9S25	EARTH-PWR OFF-LUNAR 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (EARTH-PWR OFF-LUNAR) is used in conjunction with 9R1 to insert an appropriate scale factor into the ORDEAL electronics. In the lunar position, power is applied to the ordeal and the lunar rate logic circuitry is activated. In the POWER OFF position, AC&DC power is removed from the ordeal. When the switch is in the EARTH position, the earth rate logic circuitry is activated.
9S26	LIGHTING SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (BRT-OFF-DIM) controls the brightness of the ORDEAL EL panel lighting.
9S27	MODE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (OPR/SLOW-HOLD/FAST) is used in conjunction with 9S28 to insert and maintain the proper angular offset into the FDAI's. The HOLD/FAST slew position in conjunction with the UP and DOWN positions permits slewing at an orbital rate X200 in the plus or minus direction. This is used as a coarse adjustment. The OPR/SLOW position in conjunction with the UP and DOWN position permits slewing at an orbital rate X10 in the plus or minus direction. This is used for fine adjustment. When the switch is placed to the OPR/SLOW position in conjunction with the center maintain position of 9S28, the ORDEAL slews at the orbital rate.

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9S28	SLEW SWITCH 3-POSITION TOGGLE MOM-MAIN-MOM	This three-position toggle (UP-DOWN) is used to slew the pitch indication on the FDAI in the plus or minus direction at a rate dependent on the position of 9S27. When this switch is in the center, maintain position and 9S27 is in the OPR/SLOW position the ORDEAL will slew at the orbital rate and the FDAI will display total attitude with respect to a local horizontal reference frame. With this switch (9S28) in the center, maintained position and 9S27 in the HOLD/FAST position, the ordeal will hold and not slew at the orbital rate.
9S29	RATE SCALE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle ($\pm 5^\circ/\text{SEC}$ - $\pm 25^\circ/\text{SEC}$) selects the range of the pitch, yaw and roll rate signals into the rate needles of 9M1 and 9M6. In the $\pm 5^\circ/\text{SEC}$ position, a full scale deflection of the rate needles indicates a rate of $\pm 5^\circ/\text{second}$. In the $\pm 25^\circ/\text{SEC}$ position, a full scale deflection of the rate needles indicates a rate of $\pm 25^\circ/\text{SEC}$. Less than full scale deflection needle positions are linearly proportional to pitch, yaw and roll rates of less than $\pm 5^\circ/\text{SEC}$ or $\pm 25^\circ/\text{SEC}$, respectively.
9R1	ALT SET CONTINUOUS ROTARY	This continuous rotary (10 to 310) nautical miles is used to insert the LM orbital altitude into the ORDEAL.

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

Code	Control/Indicator	Function
9M1 9M6	FLIGHT DIRECTOR ATTITUDE INDICATOR (CDR) FLIGHT DIRECTOR ATTITUDE INDICATOR (LMP)	Each of these indicators displays: (1) vehicle Attitude, Attitude Rates and Attitude errors or (2) vehicle Attitude, Attitude Rates and Rendezvous Radar Antenna Shaft and Trunnion angles, depending upon the position of 9S2 and 9S7. The position of 9S3 and 9S10 will select either PGNS or AGS as the source of displayed vehicle Attitude and Attitude errors for 9M1 and 9M6 respectively. The attitude rate information displayed on the three meters surrounding the ball is always obtained from the CES rate gyros. The Shaft and Trunnion angles are displayed respectively on the pitch and yaw error needles of 9M1 and/or 9M6 when 9S2 and/or 9S7 is in the RNDZ RADAR position.
9M2 9M3	X-POINTER (CDR) X-POINTER (LMP)	These indicators display: (1) Forward and Lateral Velocity, (2) Lateral Velocity only or (3) Rendezvous Radar LOS Elevation and Azimuth angular rates. What is displayed on 9M2 is a function of the position of 9S2 and 9S9 and what is displayed on 9M3 is a function of the position of 9S7 and 9S9. Forward and Lateral Velocities are measured in the horizontal plane along the LM Z and Y body axis when the source driving the display is the PGNS. When the Landing Radar is the driving source the Forward and Lateral Velocities are coincident with LM Z and Y body axis velocities. This is true only when the radar beams are coincident with the vehicle body axis (from Hi-Gate to Touchdown phase). When the AGS system is the driving source, Lateral velocity is the only information displayed and is vehicle Y body axis velocity. When Rendezvous Radar is selected LOS rates are displayed.

SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

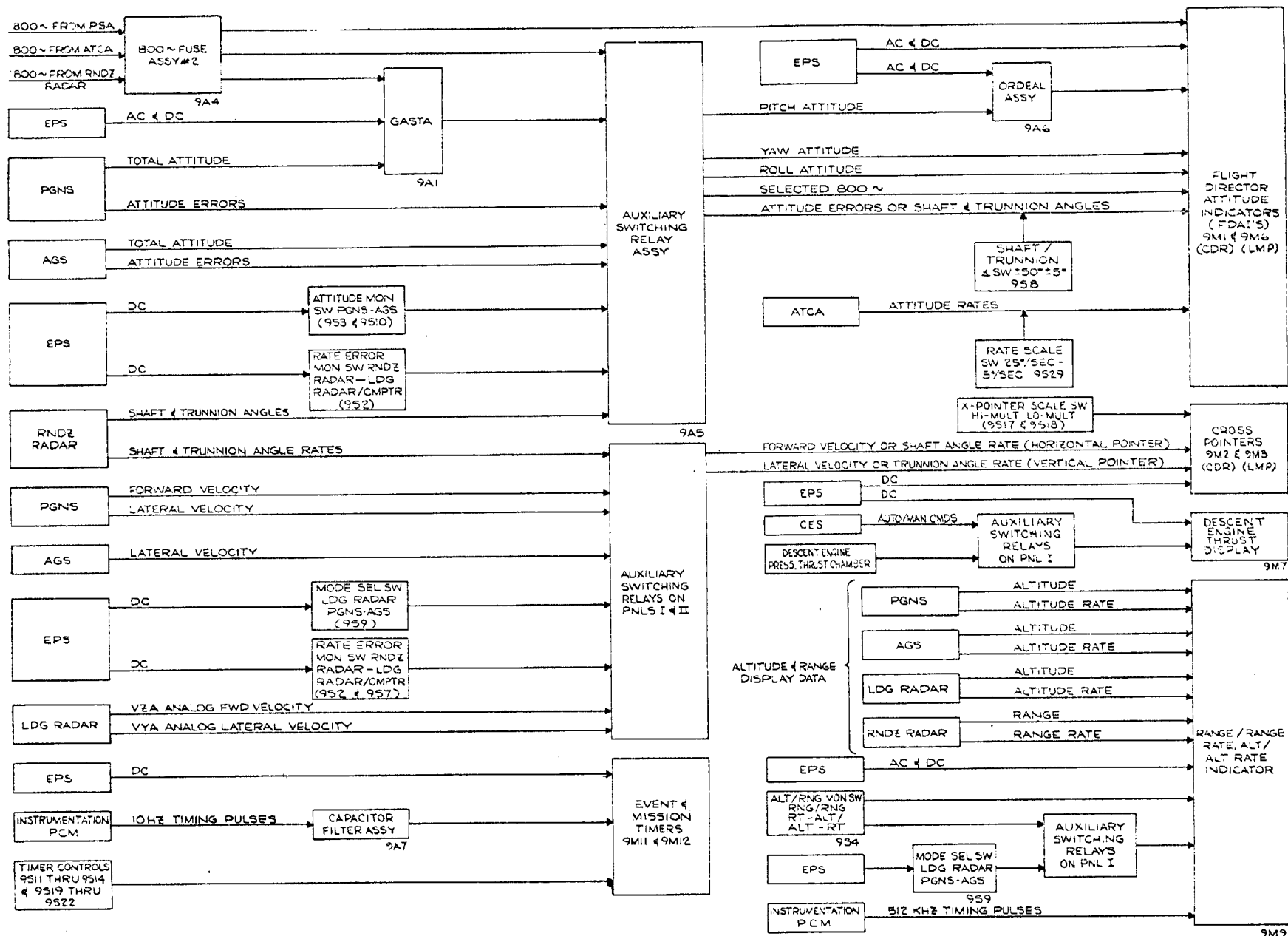
Code	Control/Indicator	Function
9M4	THRUST/WEIGHT INDICATOR	This indicator is a self-contained accelerometer which displays instantaneous X-axis acceleration in lunar g units ($1g = 5.23 \text{ ft/sec}^2$). The instrument may be used to provide a gross check on engine performance since any given throttle setting will provide a specific acceleration when the vehicle has a given mass.
9M7	THRUST INDICATOR	This is a dual vertical indicator with left and right pointers. The left pointer displays descent engine chamber pressure which corresponds to thrust. The right pointer displays the level of throttle commands (via TTCA) or LGC thrust commands. THRUST CONT switch 1S11 selects either the MANUAL or AUTO modes of operation. If the MANUAL mode is selected by 1S11, then the right pointer will indicate either the CDR's or LMP throttle command depending on the position of the MAN THROT switch 1S10. Both meter scales read from 0 to 100%. When 1S11 is in the MANUAL mode, and the TTCA is set to minimum, the indicators right pointer will indicate 10% (minimum output of TTCA). Increasing the TTCA will correspondingly increase this reading. At this time, the left and right pointers should be aligned and continue to track. With 1S11 set in the AUTO position, and the GUID CONT switch (9S6) set to PGNS, the actual thrust command to the engine is the sum of the thrust commands from the LGC and the TTCA. However, the THRUST INDICATOR right pointer will indicate only the LGC command. Therefore, with the TTCA set to minimum and 1S11 in AUTO, there should be no divergence between the left and right pointers. A divergence would indicate a malfunction (engine not responding to commands) or that manual authority is being introduced (via the TTCA). When manual control is introduced, the right pointer will continually decrease since the LGC will automatically decrease its command proportionately. When the TTCA control is set to the original LGC command, the right pointer

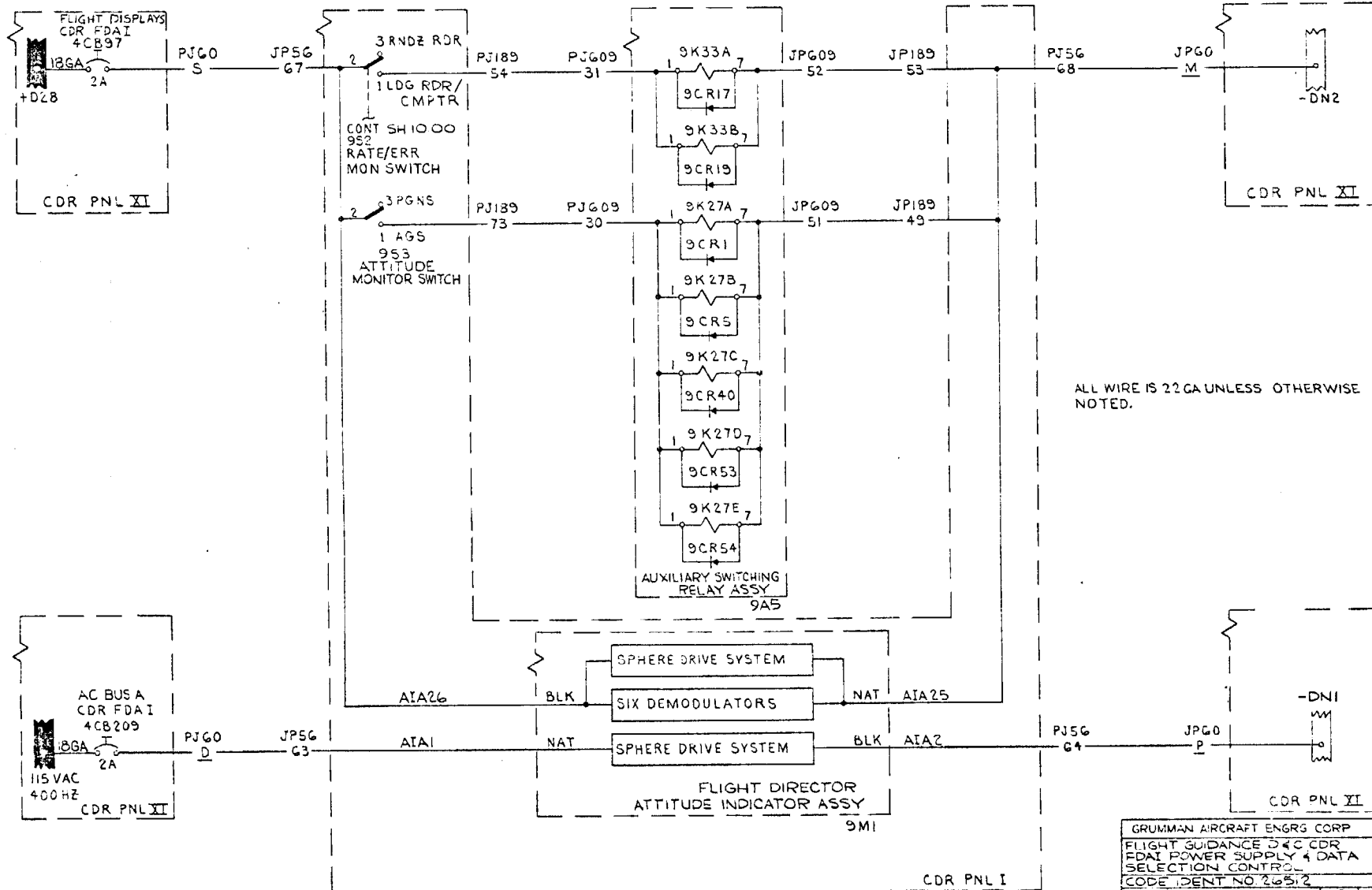
SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

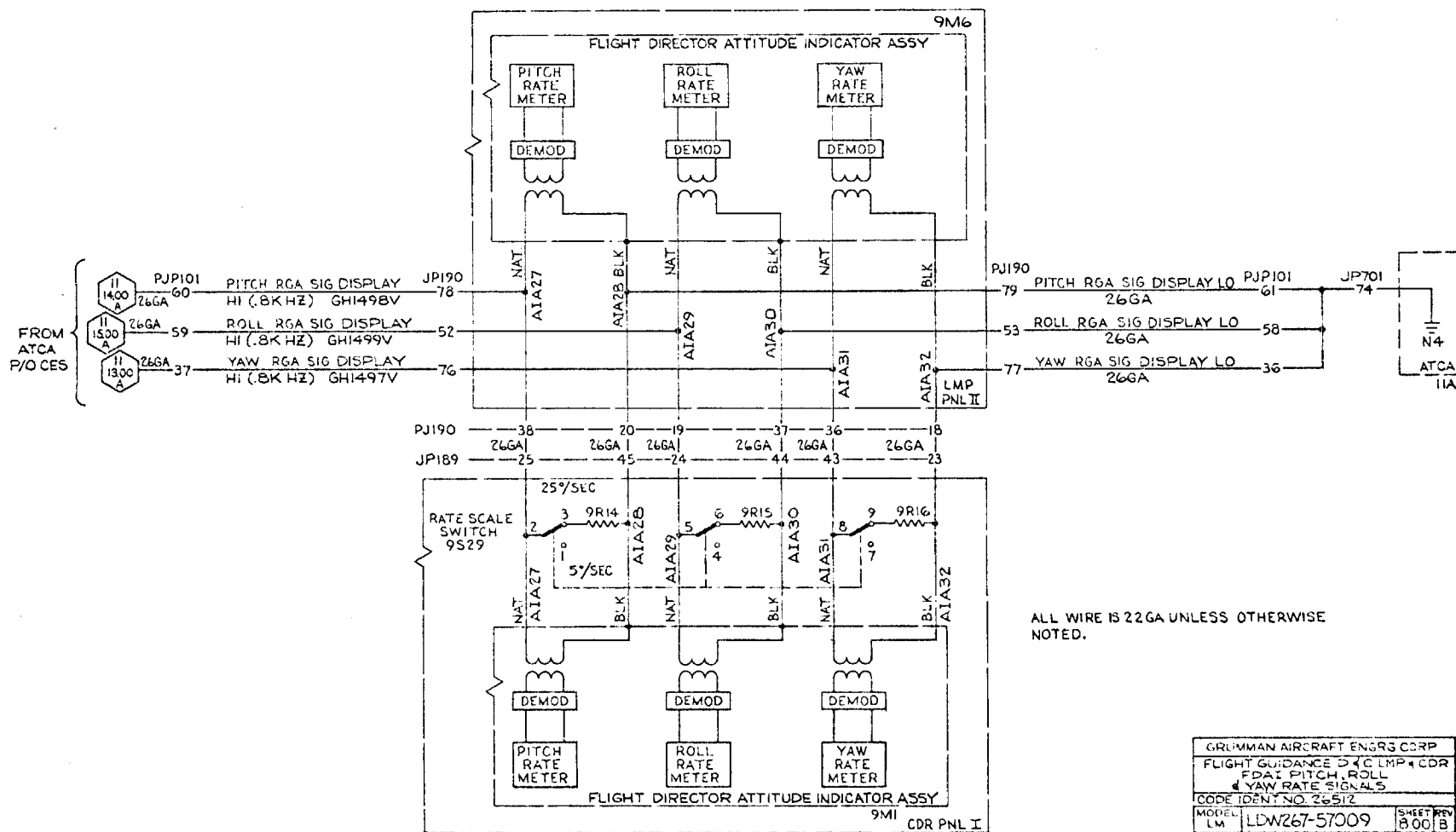
Code	Control/Indicator	Function
9M7 (Cont)		will indicate 10%. At this time, 1S11 may be placed to MANUAL, whereby the left and right pointers will be aligned and the descent engine is in full manual control. If the GUID CONT switch (9S6) is in the AGS position, the ascent engine is controlled only by the TTCA.
9M9	ALTITUDE/RANGE INDICATOR	This indicator will display either Range/Range Rate information or Alt/Alt Rate information as selected by 9S4. The Range/Range Rate data are from the Rendezvous Radar. The Altitude/Altitude Rate information is from one of three sources; the Landing Radar, PGNS or AGS as selected by 9S9. When Landing Radar information is selected, true altitude and altitude rate data are available from Lo-Gate to Touchdown if the LM X axis is vertical. When either PGNS or AGS is selected inertially derived altitude and altitude rate data are available for display. Prior to Lo-Gate the most reliable altitude data will be available from PGNS providing the LGC and the radar are functioning accurately.
9M11	EVENT TIMER INDICATOR 4-PLACE DIGITAL DISPLAY	This four digit indicator displays time in minutes and seconds. It is capable of counting up or down. The maximum time displayed is 59 minutes, 59 seconds. 9S11, 9S12, 9S13 and 9S14 control the operation and settings of this display.
9M12	MISSION TIMER	This seven digit indicator displays time in hours, minutes and seconds. It is capable of only counting up. The maximum time displayed is 999 hours, 59 minutes and 59 seconds. 9S19, 9S20, 9S21, 9S22 control the operation and settings of this display.

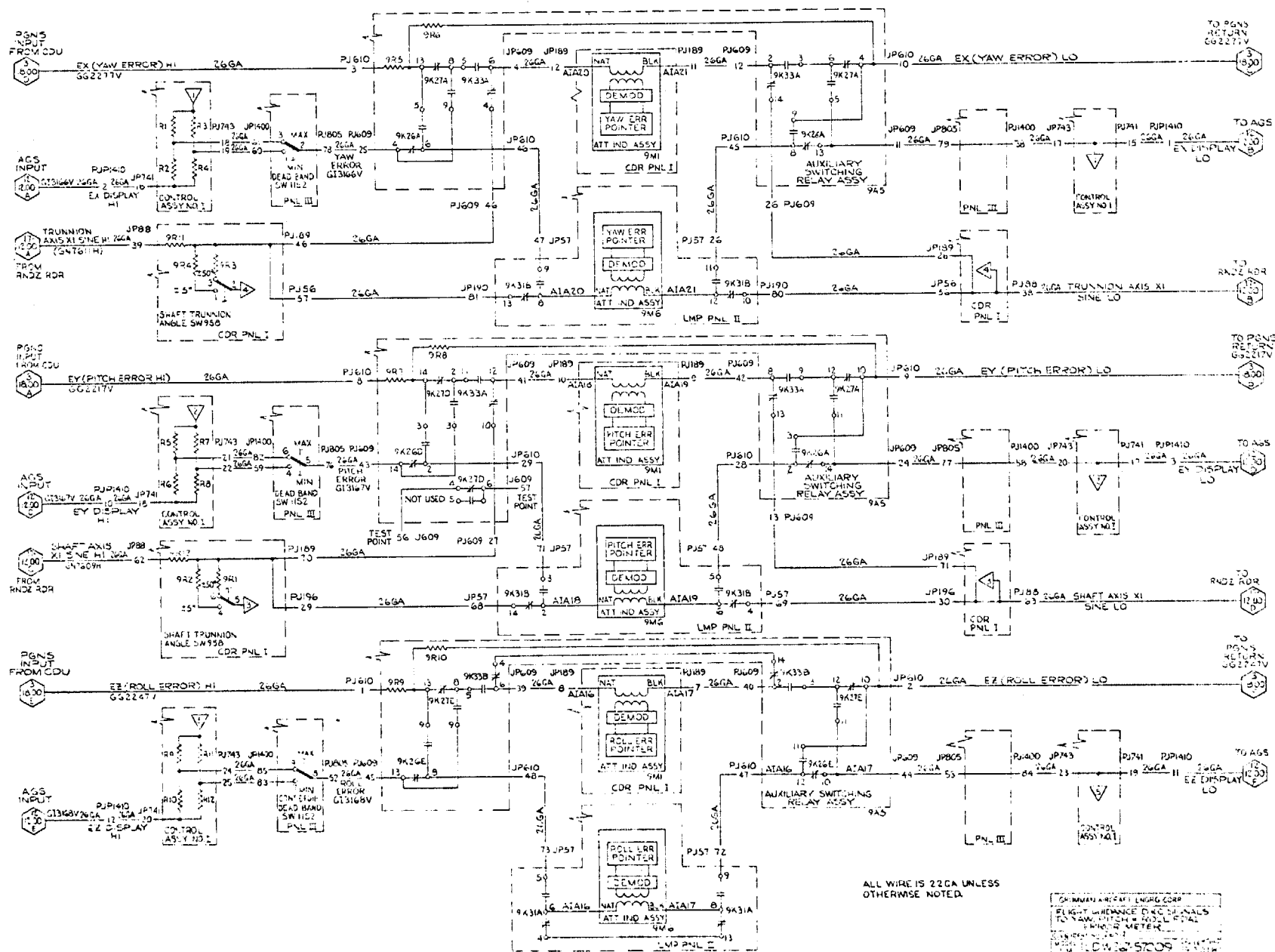
SUBSYSTEM: FLIGHT GUIDANCE DISPLAYS & CONTROLS (FUNCTIONAL GROUPING 9)

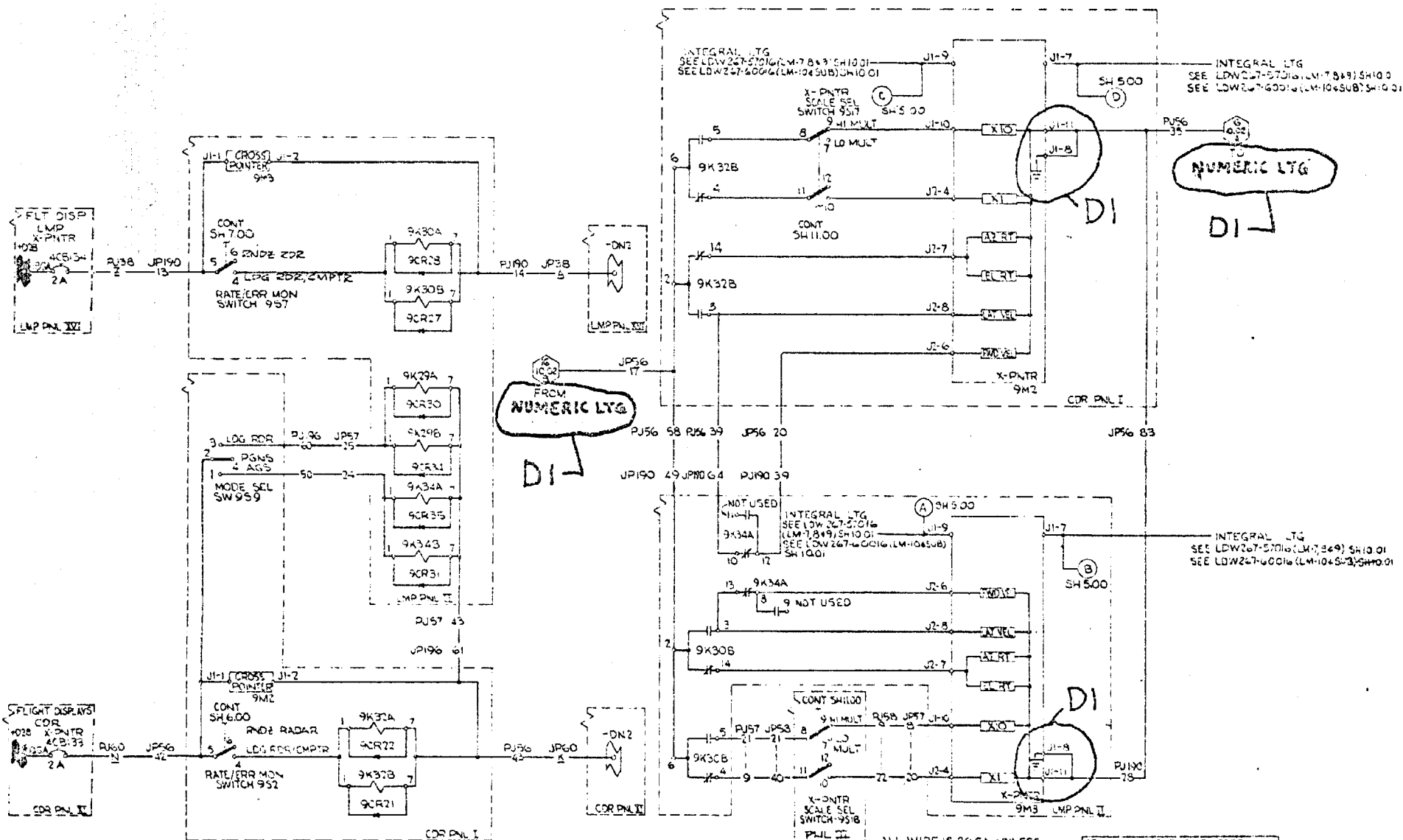
Code	Control/Indicator	Function
16DS91	CDR CROSS POINTER INDICATOR (9M2) POWER FAILURE LIGHT	See page 16-705.3.
16DS92	THRUST INDICATOR (9M7) POWER FAILURE LIGHT	See page 16-705.4.
16DS97	LMP CROSS POINTER IND (9M3) POWER FAILURE LIGHT	See page 16-705.4.







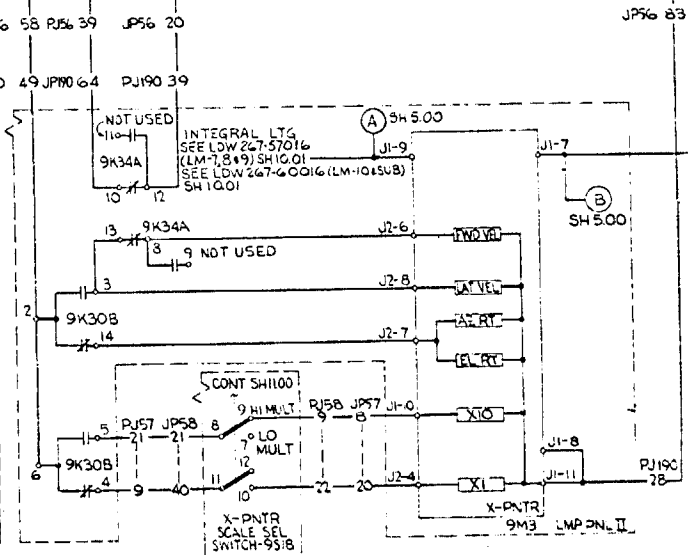
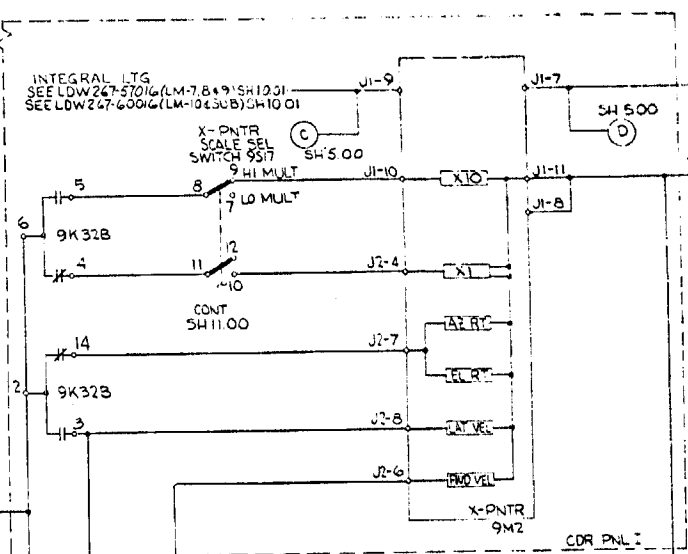
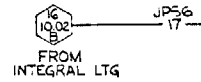
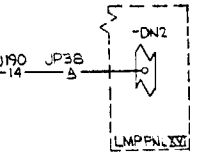
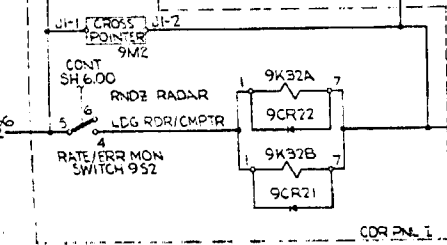
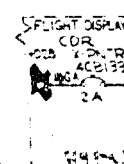
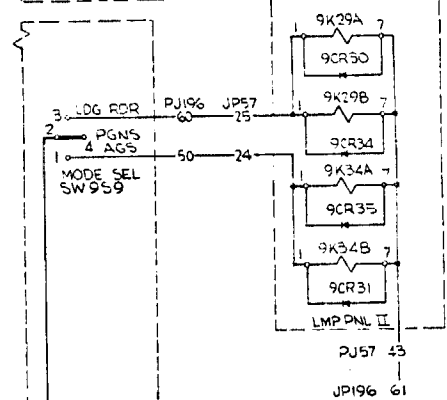
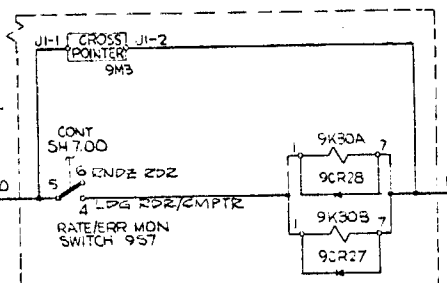
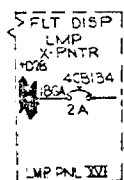




REV	LCD	INIT
DI	DWR CORRECT	Low 7/15/41 HG

ALL WIRE IS 22 GA UNLESS
OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINEERING CORP
FLIGHT DISPLAY SYSTEMS DIVISION
SUPPLY & DATA SELECT CONT FOR
X-PNTR
MODEL
LDW267-57009
1000 A

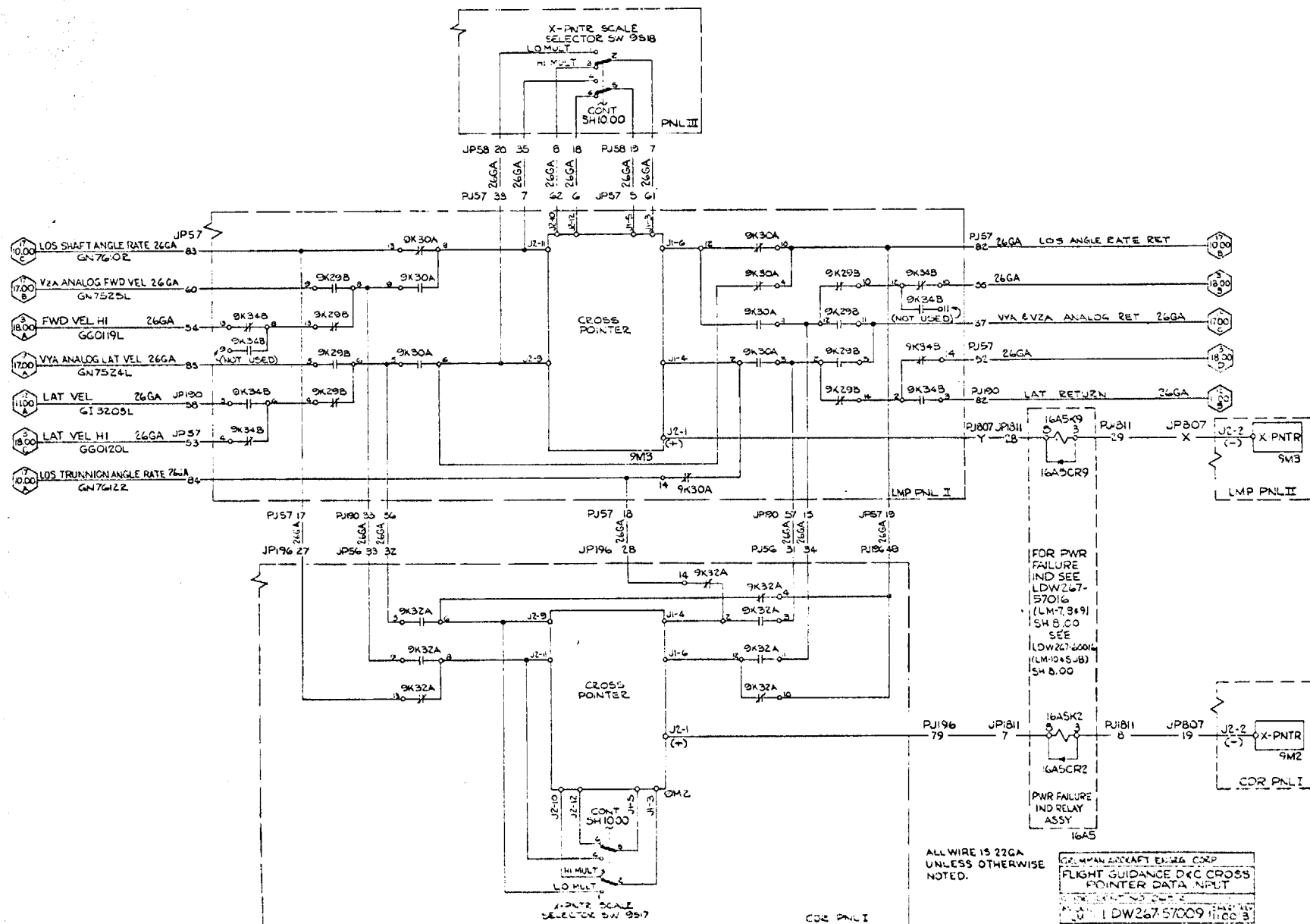


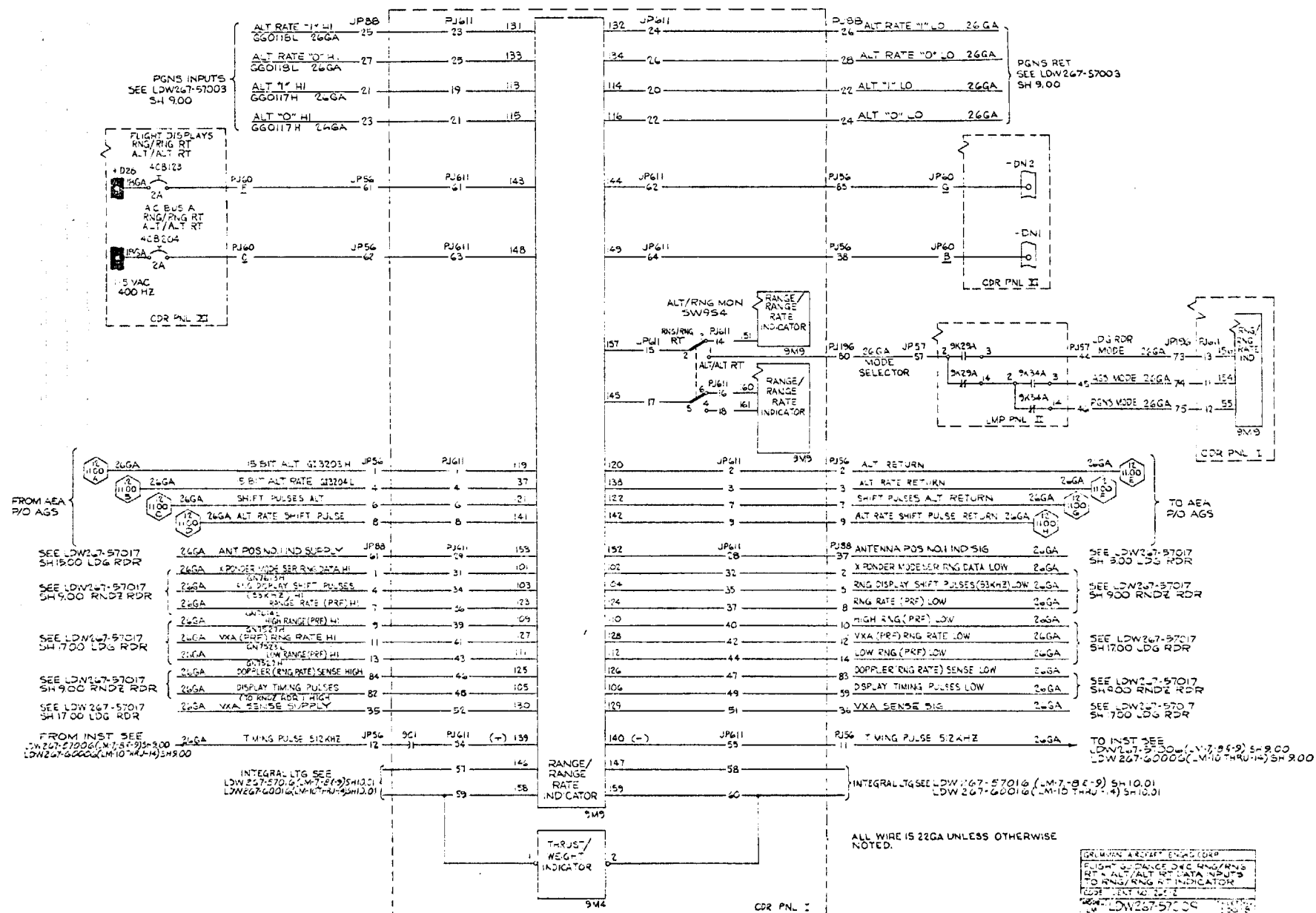
INTEGRAL LTG
SEE LDW267-57016 (LM-7,8,9) SH10.01
SEE LDW267-60016 (LM-10,11,12) SH10.01

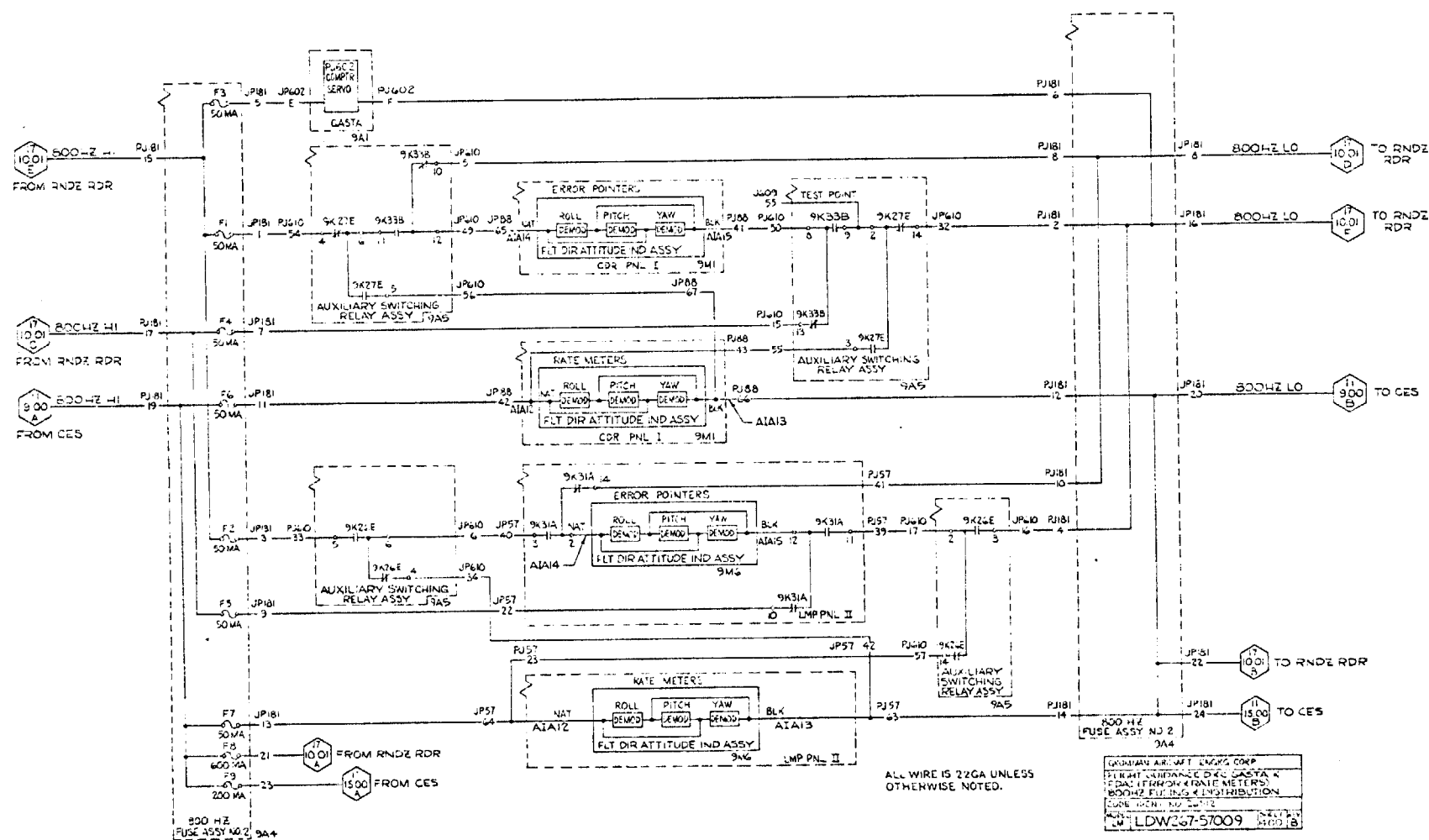
INTEGRAL LTG
SEE LDW267-57016 (LM-7,8,9) SH10.01
SEE LDW267-60016 (LM-10,11,12) SH10.01

ALL WIRE IS 22 GA UNLESS
OTHERWISE NOTED.

CAUTION: AIRCRAFT ENGINE COMP
SYSTEMS ARE NOT TO BE
USED FOR OTHER PURPOSES
UNLESS SPECIFICALLY
AUTHORIZED BY THE
MANUFACTURER.







GRUMMAN AIRCRAFT ENGRG CORP			
FLIGHT GUIDANCE D&C			
THRUST DISPLAY DATA INPUTS			
CODE IDENT NO. 26512			
MODEL			
LM	LDW267-57009	SHEET 15.00	REV 8

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 10)

MAIN PROPULSION

(REF LDW 267-57010 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E. O. 's
Propulsion	LDW270-56000	G	H1, H2

2. Table of Contents

PAGE NO./SHEET NO.

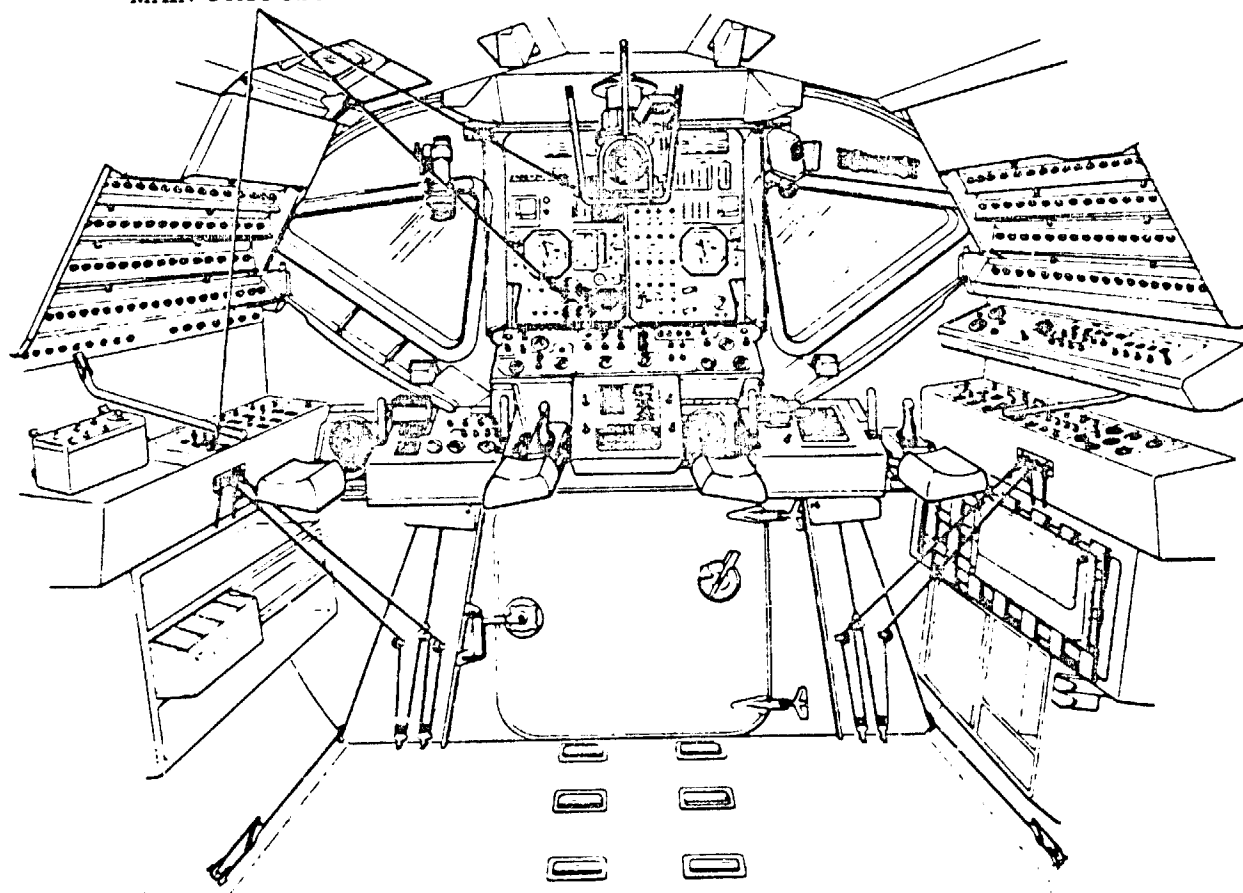
ITEM NAME

a) Cover Sheet	10-701
b) Applicable Documents, Table of Contents, and Revisions	10-702 & 10-702.1
c) Cabin Location of Main Propulsion Controls and Indicators	10-703
d) Main Propulsion Controls and Indicators Layout	10-704
e) Main Propulsion Controls and Indicator Functional Description	10-705 thru 10-705.3
f) Propulsion-Ascent/Descent Block Diagram	LDW267-57010 SH 4.00A
g) Propulsion-Ascent Fluid Schematic (Pressurization)	LDW267-57010 SH 4.01C
h) Propulsion-Ascent Fluid Schematic (Feed)	LDW267-57010 SH 4.02B
i) Propulsion-Descent Fluid Schematic	LDW267-57010 SH 4.03B
j) Propulsion-He Regulator Solenoid Valves	LDW267-57010 SH 5.00B
k) Propulsion-OI Ascent and Descent He Valves & Fuel & Oxide Vent Valve Display	LDW267-57010 SH 6.00B
l) Propulsion-OI Helium Tank Temperature and Pressure Monitoring	LDW267-57010 SH 7.00C
m) Propulsion-OI Helium Tank Temperature and Pressure Monitoring	LDW267-57010 SH 7.01C
n) Propulsion-OI Fuel and Oxid Tank Temperature and Pressure Monitoring	LDW267-57010 SH 8.00C
o) Propulsion-Propellant Quantity Gaging & He Tanks Press.	LDW267-57010 SH 9.00C
p) Propulsion-Propellant Quantity OI and Warning Indication	LDW267-57010 SH 10.00B
q) Propulsion-OI Ascent Solenoid Valve Position Indicating Circuits	LDW267-57010 SH 11.00B
r) Propulsion-OI Ascent Oxidizer and Fuel Level Caution and Warning	LDW267-57010 SH 12.00C
s) Propulsion-OI Descent Solenoid Valve Position Indicating Circuits	LDW267-57010 SH 13.00C

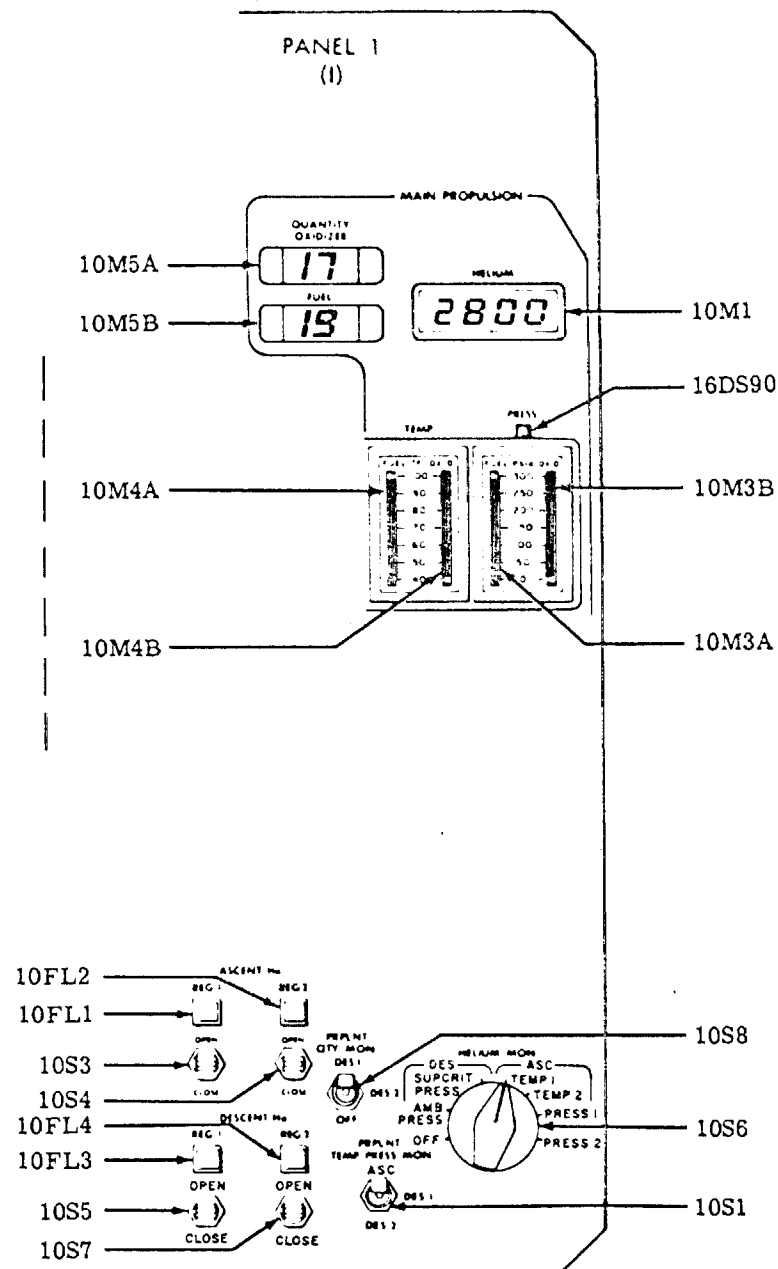
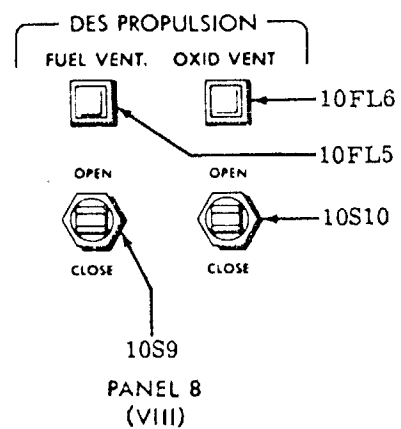
3. REVISIONS

REV	PAGE NO. AND/OR LDW267-57010, SHEET NO.	LCD	DESCRIPTION
B	4.03 8.00	5369	ADDITION OF DESC PROP S/O VALVE ASSY TEMP MEASUREMENT
	4.03	5263	FABRICATION OF HEAT EXCHANGER BYPASS ASSEMBLY
	10.00	5378	INCREASED TELEMETRY SAMPLING RATE ON PQGS
C	4.01, 7.00, 7.01, 8.00, 9.00	5502	TRANSDUCER INSTALLATION FOR APS HELIUM PRESSURE AND H ₂ O LINE TEMPERATURE
	7.00, 12.00, 7.01	5638	APS WARNING LIGHT

MAIN PROPULSION



Cabin Location of Main Propulsion Controls and Indicators



Main Propulsion Controls and Indicators Layout

SUBSYSTEM: MAIN PROPULSION (FUNCTIONAL GROUPING 10)

Code	Control/Indicator	Function
10S1	PROPELLANT TEMPERATURE/ PRESSURE MONITOR SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (ASC-DES 1 - DES 2) selects for monitoring on 10M3 the propellant tank pressures, and on 10M4, propellant tank temperatures. In the ASC position, ascent tank pressures and temperatures are displayed. In the DES positions propellant temperatures and pressures are displayed as follows: DES 1 - Temp: in fuel tank #1 and oxidizer tank #1. Pressure: both fuel tanks at common inlet and both oxidizer tanks at their common inlet. DES 2 - Temp: in fuel tank #2 and oxidizer tank #2. Pressure: same as DES 1.
10S3 10S4	ASCENT HELIUM REGULATOR #1 SWITCH ASCENT HELIUM REGULATOR #2 SWITCH TWO 3-POSITION TOGGLES MOM-MAIN-MOM	Each of these three-position toggles (OPEN-CLOSE) controls a latch-type solenoid-operated valve located upstream of each helium pressure regulator. The solenoid valves are normally in the opened position. Selecting the OPEN position will actuate the associated shutoff valve, opening it and enabling helium to flow through the regulator. Selecting the CLOSE position will actuate the associated shutoff valve, closing it and isolating that leg. Positive feedback of the solenoid valve position is provided by the status of 10FL1 and 10FL2.
10S5 10S7	DESCENT HELIUM REGULATOR #1 SWITCH DESCENT HELIUM REGULATOR #2 SWITCH TWO 3-POSITION TOGGLES MOM-MAIN-MOM	Each of these three-position toggles (OPEN-CLOSE) controls a latch type solenoid-operated valve upstream of each helium pressure regulator. The solenoid valve associated with 10S5 is normally in the opened position while the solenoid valve associated with 10S7 is normally in the closed position. Selecting the OPEN position will actuate the associated shutoff valve, opening it and

SUBSYSTEM: MAIN PROPULSION (FUNCTIONAL GROUPING 10)

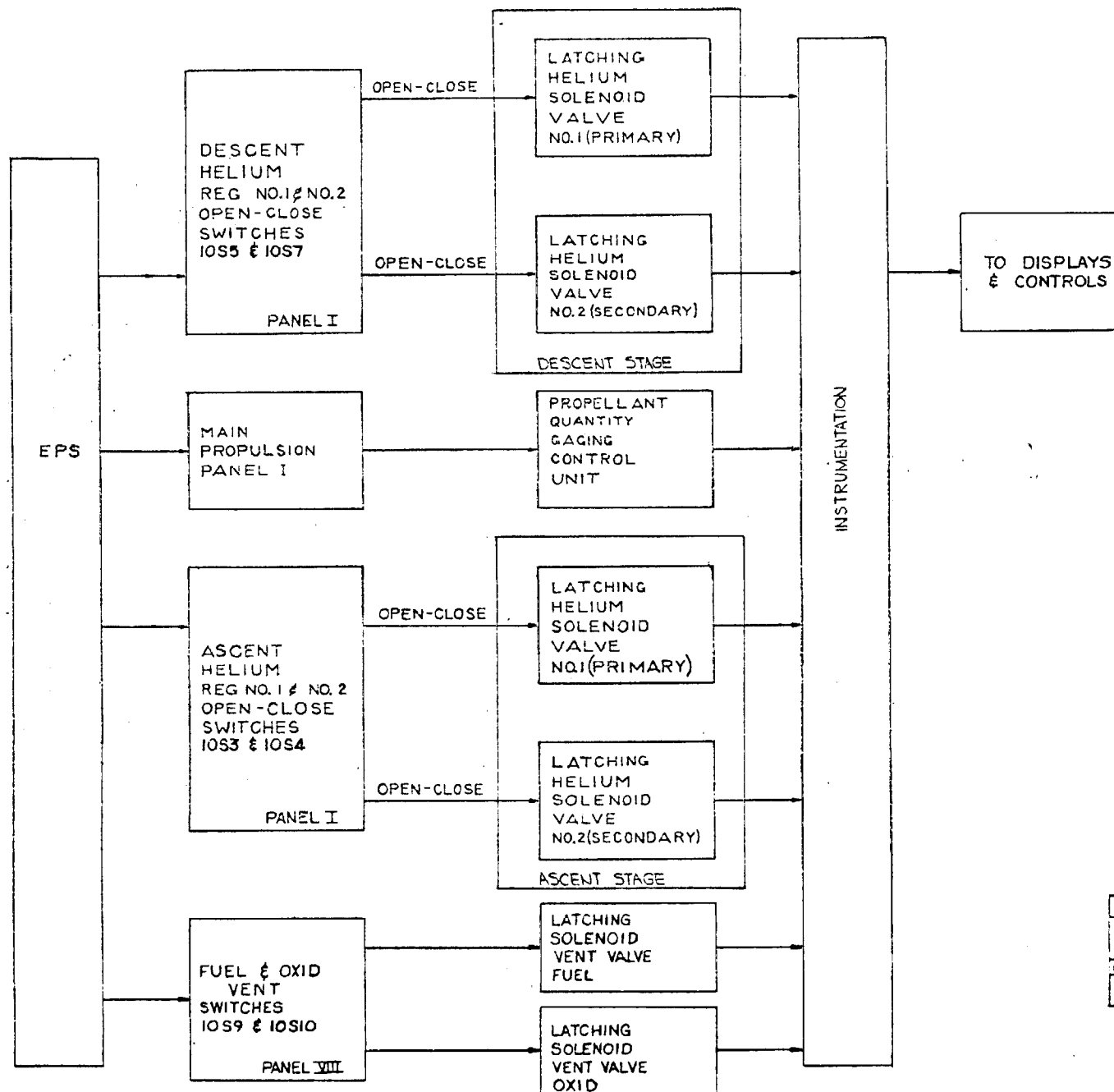
Code	Control/Indicator	Function
10S5 10S7 (Cont.)		enabling helium to flow through the regulator. Selecting the CLOSE position will actuate the associated shutoff valve, closing it and isolating that leg. Positive indication of the solenoid valve position is provided by the status of 10FL3 and 10FL4.
10S6	HELIUM MONITOR SWITCH 7-POSITION ROTARY	This seven-position rotary switch (DES: OFF, AMB PRESS, SUPCRIT PRESS, ASC: - TEMP 1 - TEMP 2 - PRESS 1 - PRESS 2) enables monitoring temperatures and pressures on 10M1. In the DES: OFF position, power to the display is interrupted. In the DES: AMB press position pressure in the ambient helium tank is monitored. In the DES: SUPCRIT PRESS position, the pressure of the supercritical helium in the descent tank is monitored. Selection of the ascent switch positions permits similar monitoring of ambient helium, except that pressures are sensed at two independent manifolds downstream of the tanks and upstream of the squib valves.
10S8	PROPELLANT QUANTITY MON SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (DES 1 - DES 2 - OFF) selects a pair of descent tanks for monitoring the percent of oxidizer and fuel quantities remaining in the tanks on indicator 10M5. Selecting the DES 1 position enables the outputs from the quantity gaging probes of oxidizer tank #1 and fuel tank #1 to be displayed on 10M5. Selecting the DES 2 position enables the outputs from the quantity gaging probes of oxidizer tank #2 and fuel tank #2 to be displayed on 10M5. In the OFF position, DC power is removed from the gaging system and no quantities are displayed on 10M5.

SUBSYSTEM: MAIN PROPULSION (FUNCTIONAL GROUPING 10)

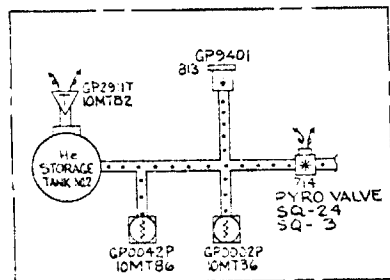
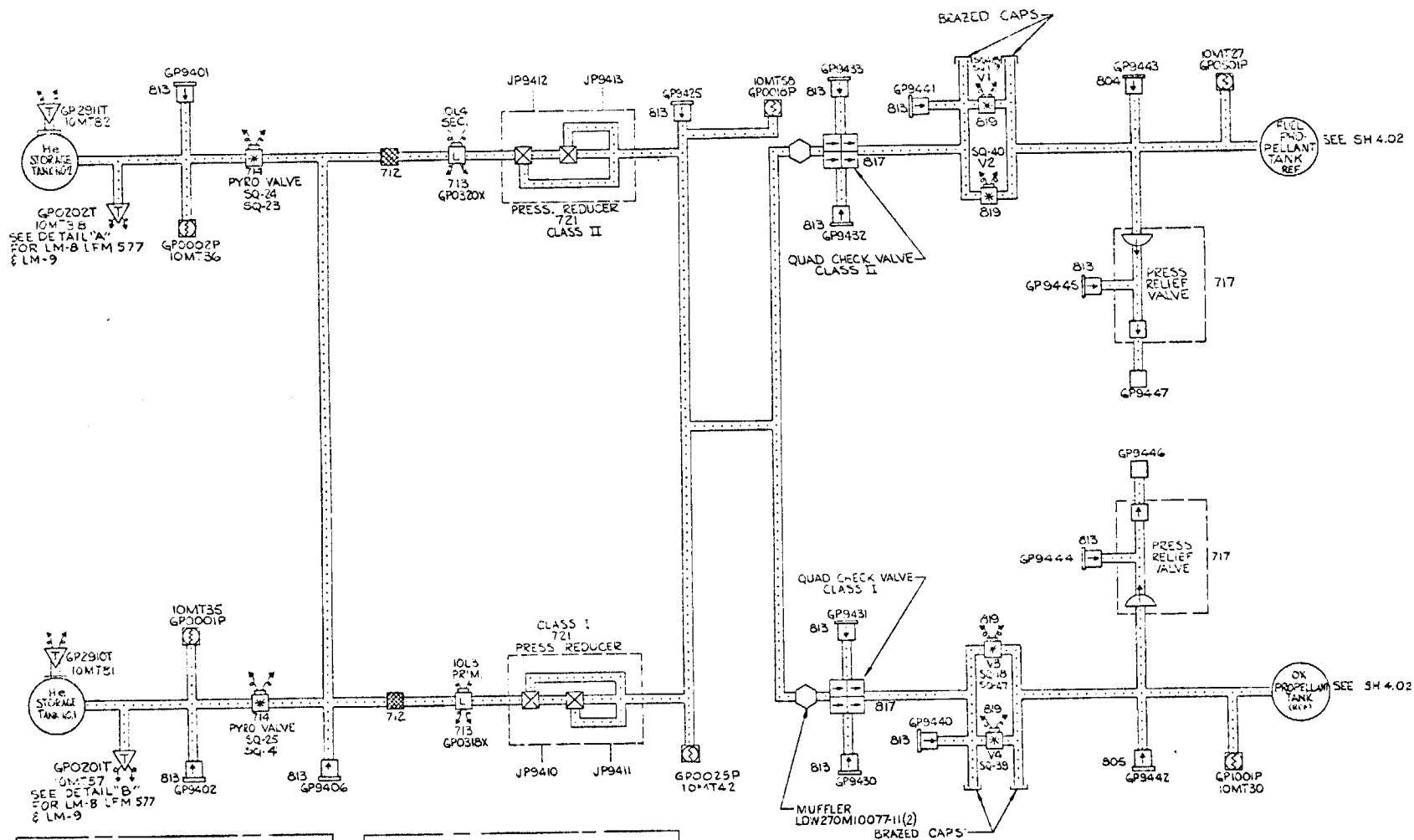
Code	Control/Indicator	Function
10S9	FUEL VENT SWITCH 3-POSITION TOGGLE MON-MAIN-MOM	This three-position toggle (OPEN-CLOSE) enables venting of pressure from the descent fuel tanks and helium pressurization section. Selecting the OPEN position will actuate the associated shutoff valve opening it and enable venting. Selecting the CLOSE position will actuate the associated shutoff valve closing it and preventing venting. Positive feedback of the solenoid valve position is provided by the status of 10FL5.
10S10	OXID VENT SWITCH 3-POSITION TOGGLE MOM-MAIN-MOM	This three position toggle (OPEN-CLOSE) enables venting of pressure from the descent oxidizer tanks and helium pressurization section. Selecting the OPEN position will actuate the associated shutoff valve opening it and enable venting. Selecting the CLOSE position will actuate the associated shutoff valve closing it and preventing venting. Positive feedback of the solenoid valve position is provided by the status of 10FL6.
10M1	HELIUM INDICATOR 4-PLACE DIGITAL DISPLAY	This display indicates descent ambient helium tank pressure, supercritical helium tank pressure or ascent ambient helium tank temperatures and pressures as selected by 10S6.
10M3	PRESSURE INDICATOR (FUEL) PRESSURE INDICATOR (OXID)	This dual scale indicator displays fuel and oxidizer pressure for the ascent or descent propellant system as selected by 10S1.
10M4	TEMPERATURE INDICATOR (FUEL) TEMPERATURE INDICATOR (OXID)	This dual scale indicator displays fuel and oxidizer temperatures for the ascent or descent propellant system as selected by 10S1.

SUBSYSTEM: MAIN PROPULSION (FUNCTIONAL GROUPING 10)

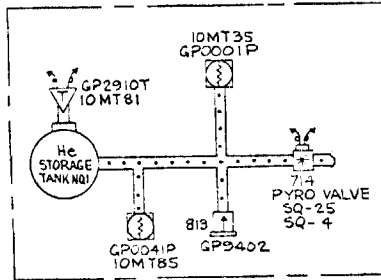
Code	Control/Indicator	Function
10M5	OXIDIZER QUANTITY INDICATOR FUEL QUANTITY INDICATOR TWO 2-PLACE DIGITAL DISPLAYS	These indicators display the percentage of usable oxidizer and fuel quantities remaining in the descent tanks only, as selected by 10S8.
10FL1 10FL2	ASCENT HELIUM REGULATOR STATUS #1 ASCENT HELIUM REGULATOR STATUS #2 TWO 2-POSITION STATUS FLAGS	Each of these two-position flags (GREY-BARBERPOLE) indicates the open (GREY) or closed (BARBERPOLE) status of its respective latch-type solenoid-operated valve, as controlled by 10S3 and 10S4.
10FL3 10FL4	DESCENT HELIUM REGULATOR STATUS #1 DESCENT HELIUM REGULATOR STATUS #2 TWO 2-POSITION STATUS FLAGS	Each of these two-position flags (GREY-BARBERPOLE) indicates the open (GREY) or closed (BARBERPOLE) status of its respective latch-type solenoid-operated valve, as controlled by 10S5 and 10S7.
10FL5 10FL6	FUEL VENT STATUS OXIDIZER VENT STATUS TWO 2-POSITION STATUS FLAGS	Each of these two-position flags (GREY-BARBERPOLE) indicates the open (GREY) or closed (BARBERPOLE) status of its respective latch-type solenoid-operated valve as controlled by 10S9 and 10S10.
16DS90	PROPULSION PRESS INDICATOR (10M3) POWER FAILURE LIGHT	See page 16-705. 3.



GRUMMAN AIRCRAFT ENGRG CORP			
PROPULSION-ASCENT/DESCENT			
BLOCK DIAGRAM			
CODE IDENT NO 26512			
MODEL	LDW267-57010	SHEET	REV
LM		4.00	A



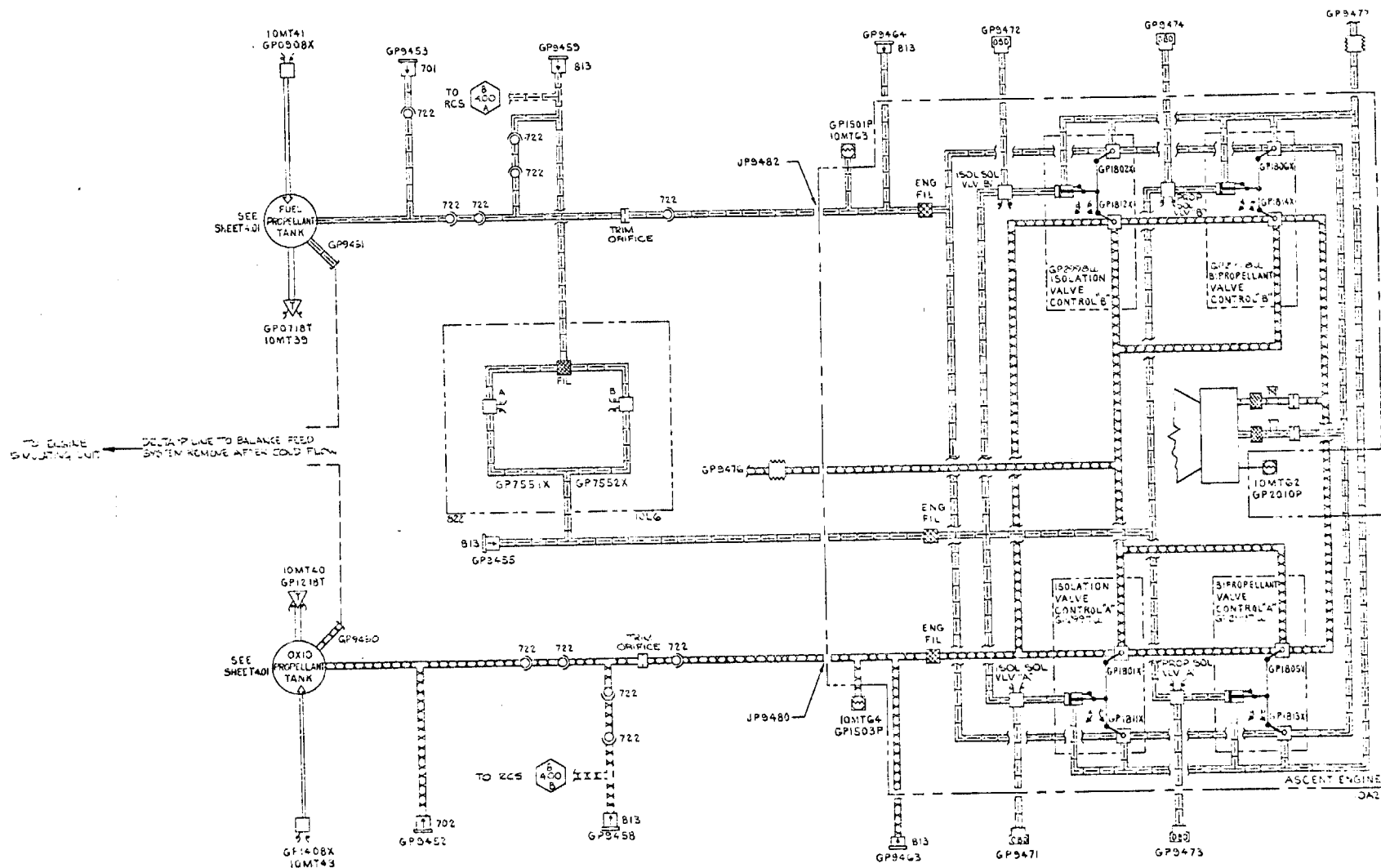
DETAIL "A"
FOR LM-B LFM 577 & LM-9

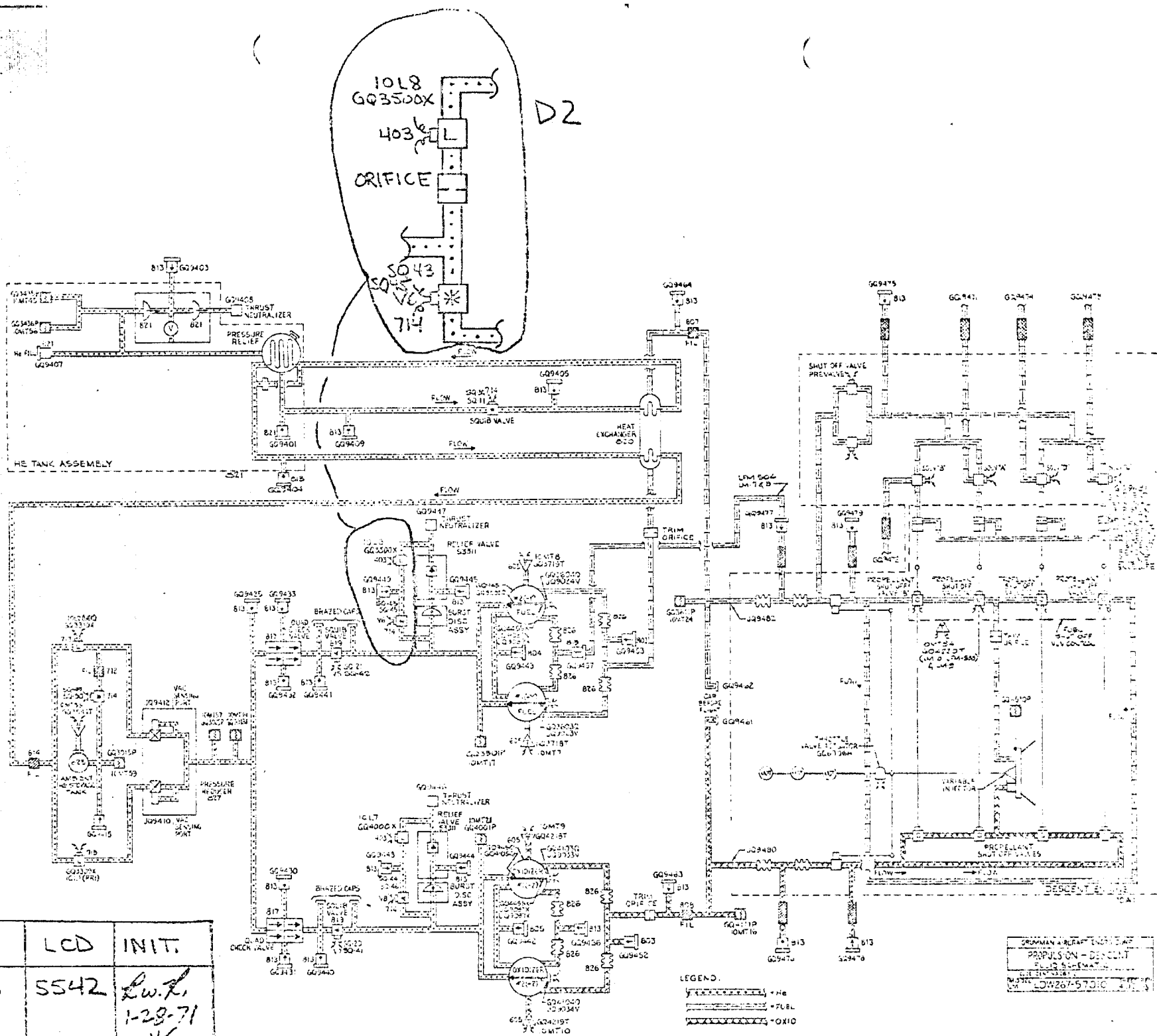


DETAIL "B"
FOR LM-B LFM 577 & LM-9

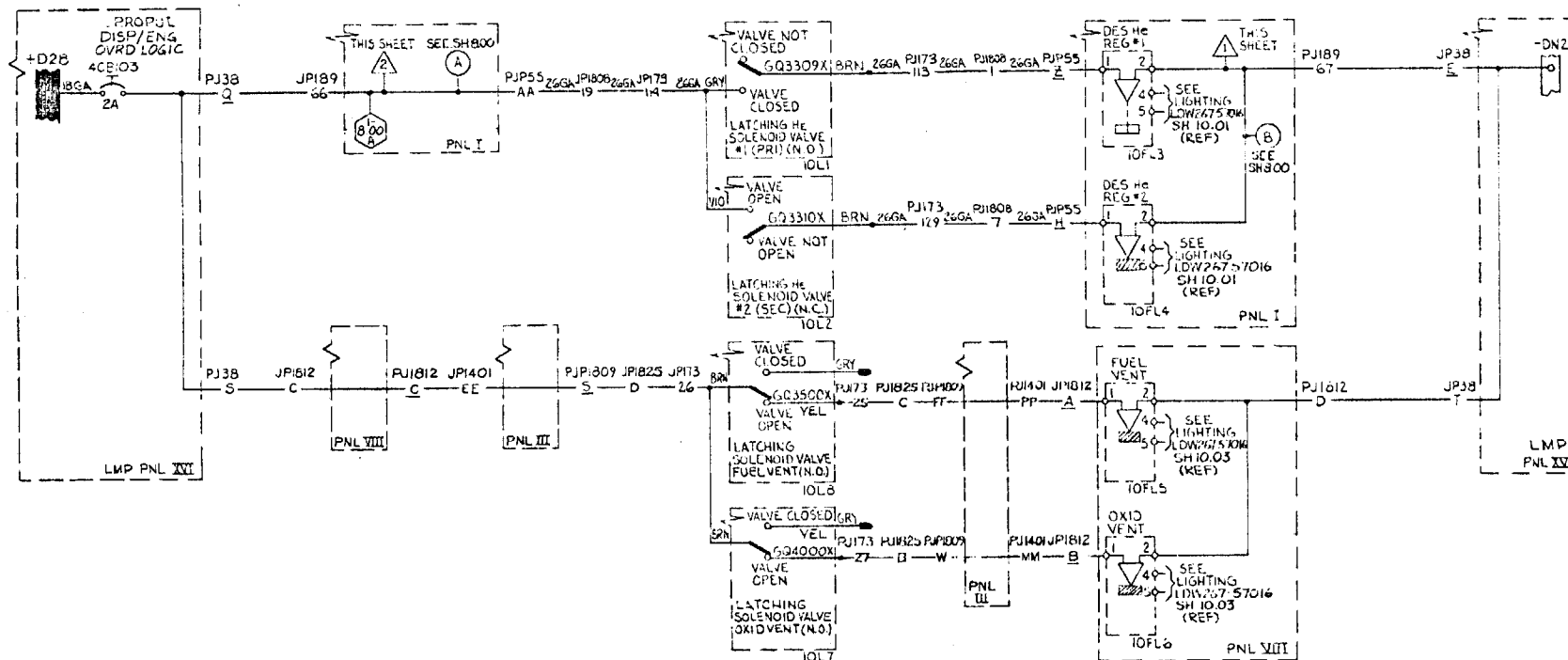
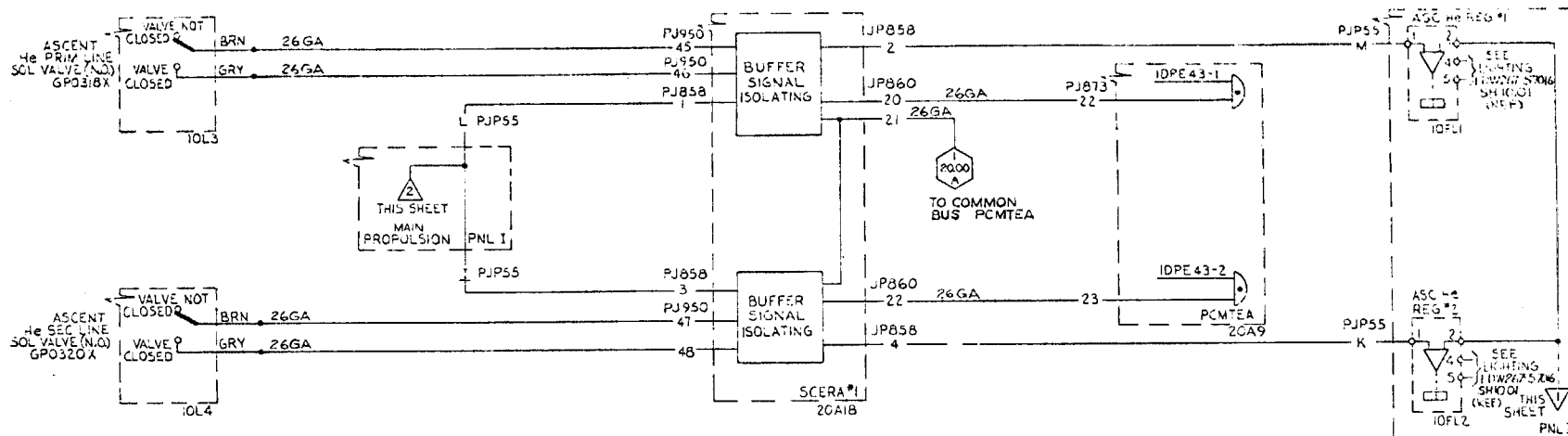
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GRUMMAN AIRCRAFT ENGINEERING	
PROPULSION ASCENT	
FLUID SCHEMATIC PRESSURIZATION	
100 PERCENT WORK	
WOLF	SMITH
LM-LDW267-57010	SHEET REV 1



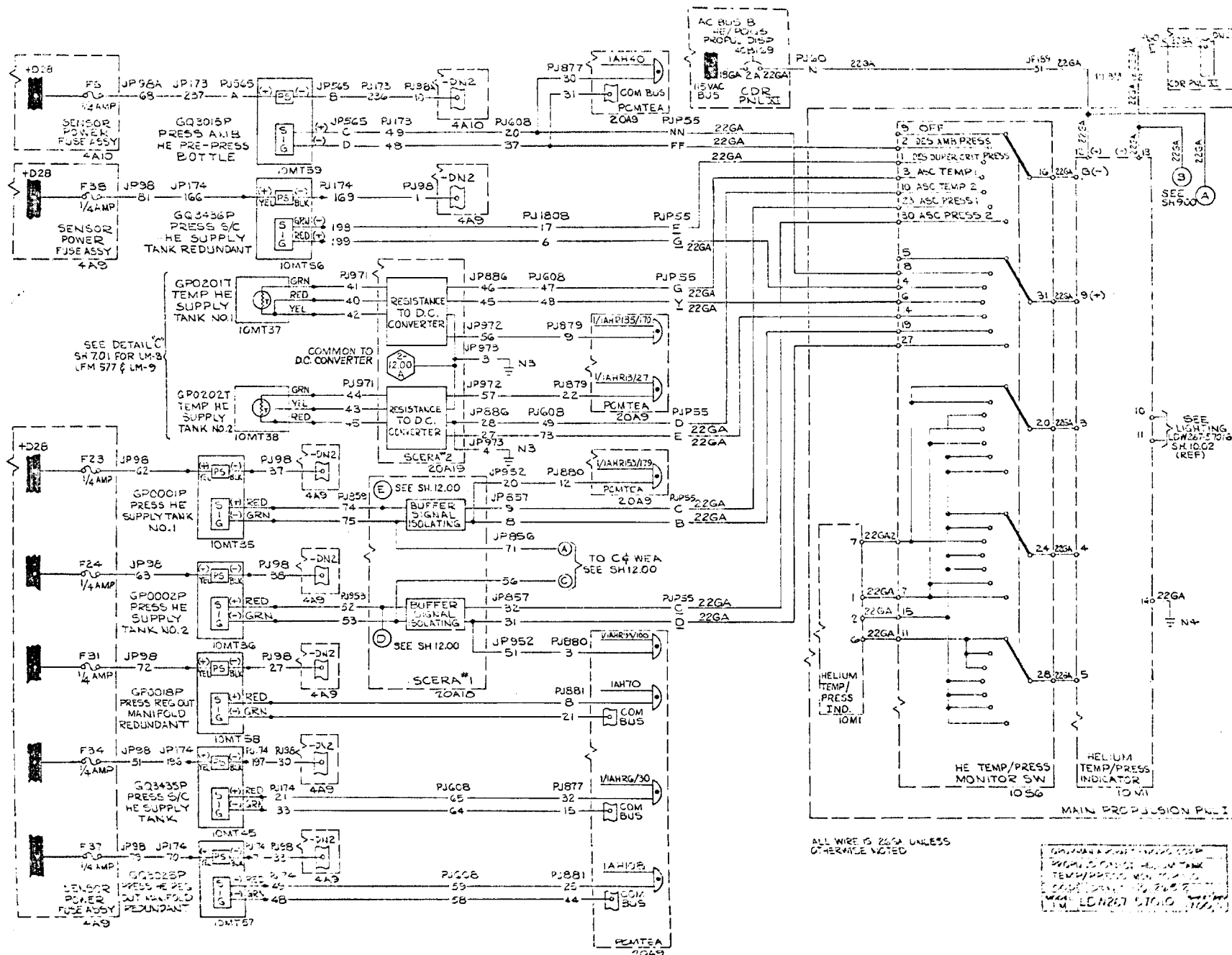


REV	LCD	INIT.
D2	5542	Lw.L. 1-28-71 HG



ALL WIRE IS 26GA UNLESS OTHERWISE NOTED

GRUMMAN AIRCRAFT ENGINE CORP.	
PROPULSION SIGNAL -	
ASCENT & DESCENT HE VALVES & -	
FUEL & OXID VENT VALVE DISPLAY	
CODE IDENT NO. 26512	
MODEL	LDW26757010
DATE	11/1/87
BY	60018

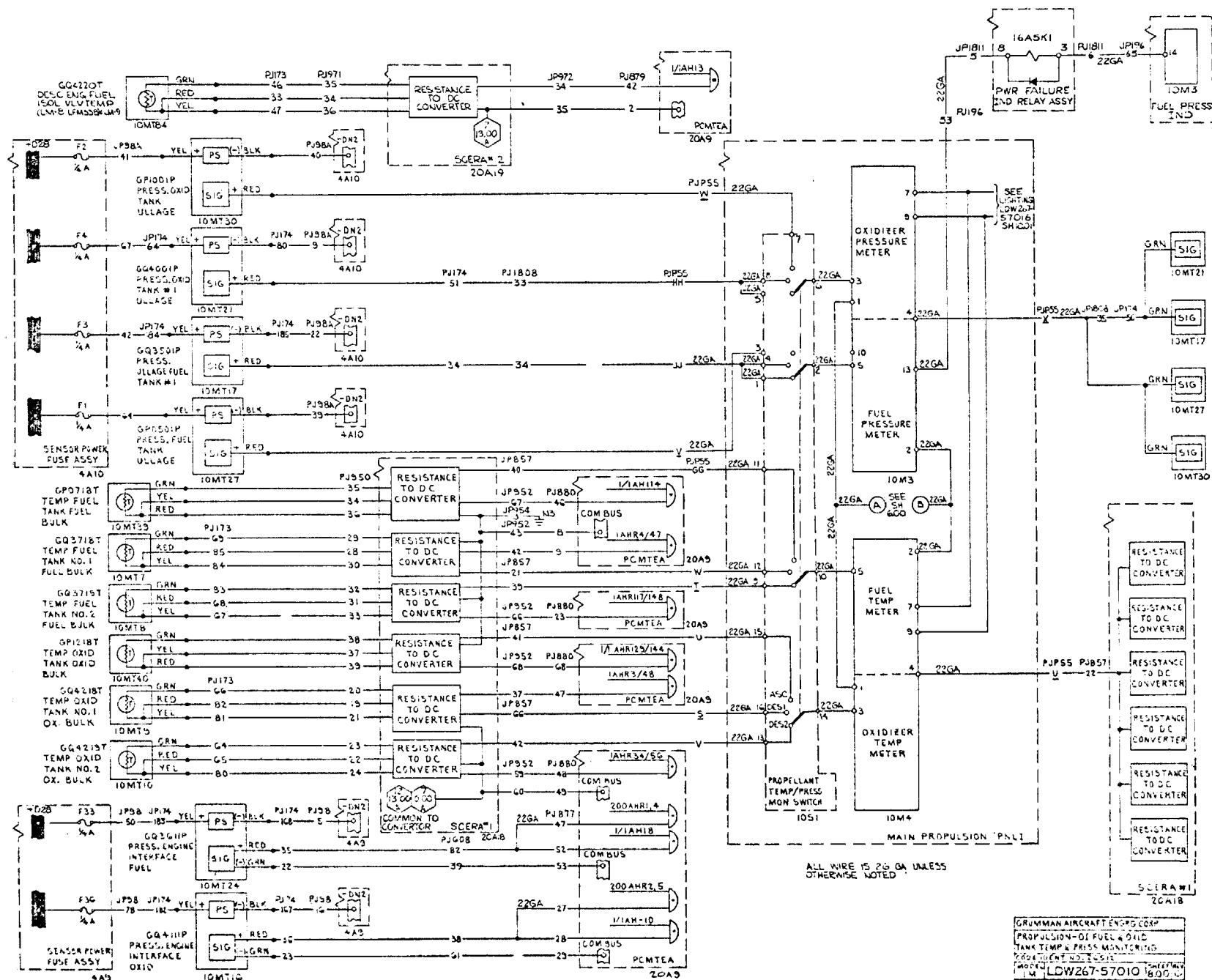


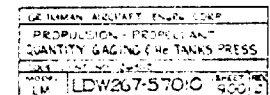
SH.9.00 LM-8 LFM 577
£ LM-9 ONLY

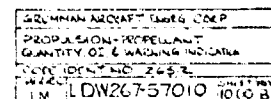
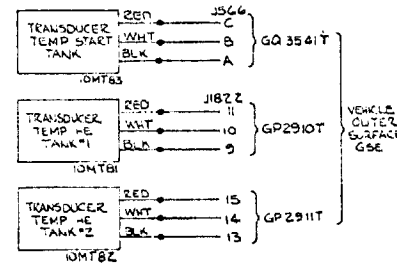


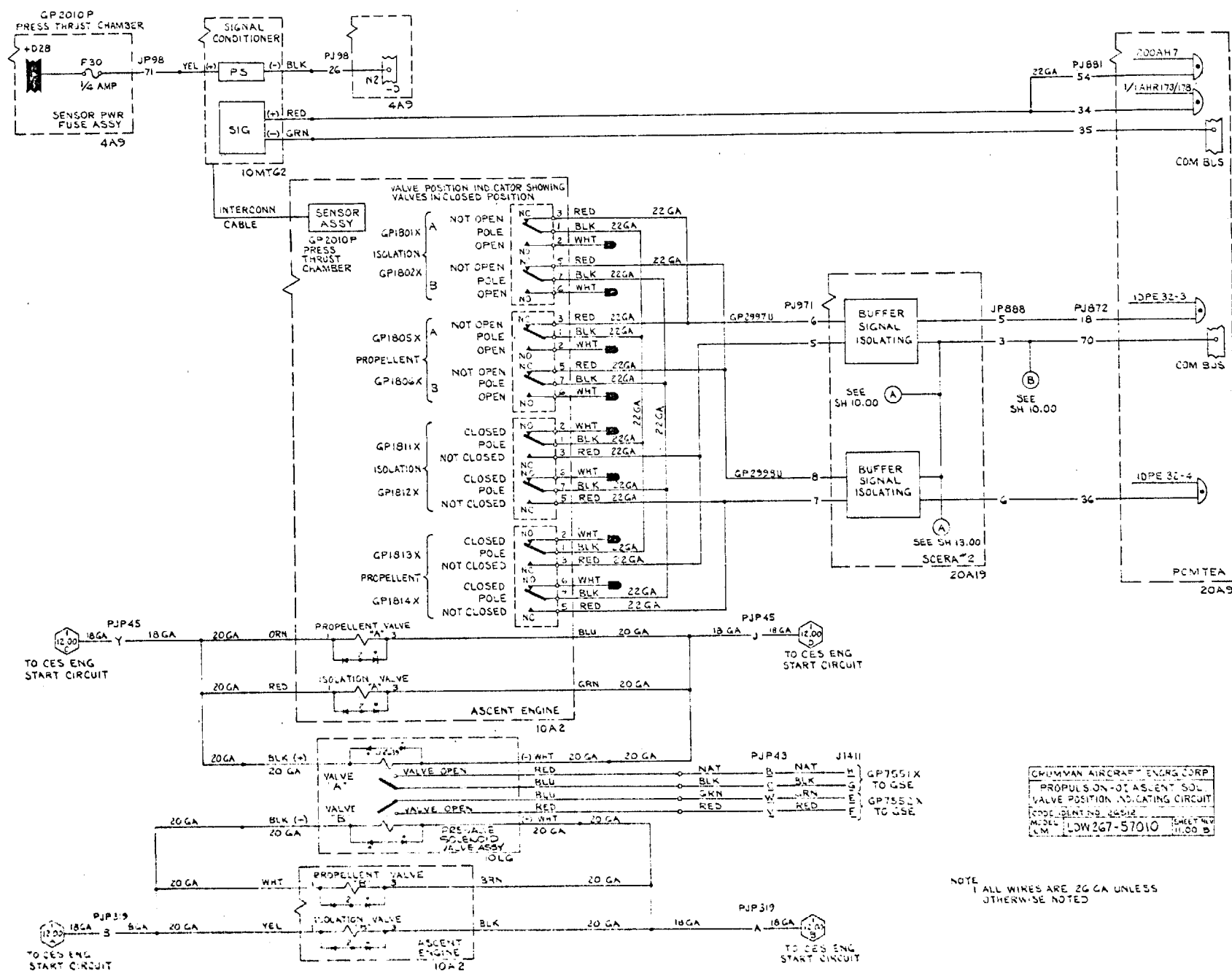
DETAIL "C"
LM-8 LFM577 & LM-9 ONLY

GRUMMAN AIRCRAFT ENGRG CORP
PROPULSION OXHELIUM TANK
TEMP/PRESS MONITORING
CORRECTION TO SIE





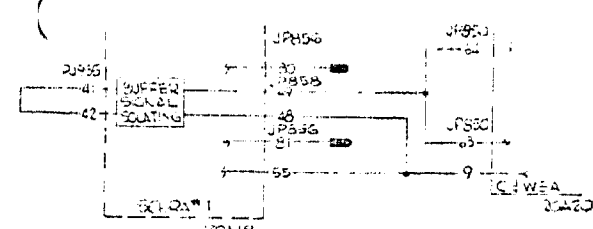




GRUMMAN AIRCRAFT ENGRG CORP	
PROPULSION-OF-ASCENT SOL	
VALVE POSITION INDICATING CIRCUIT	
CODE IDENT NO 22512	
MODEL CM	SHEET 41 11.00 B
LOW 267-57010	

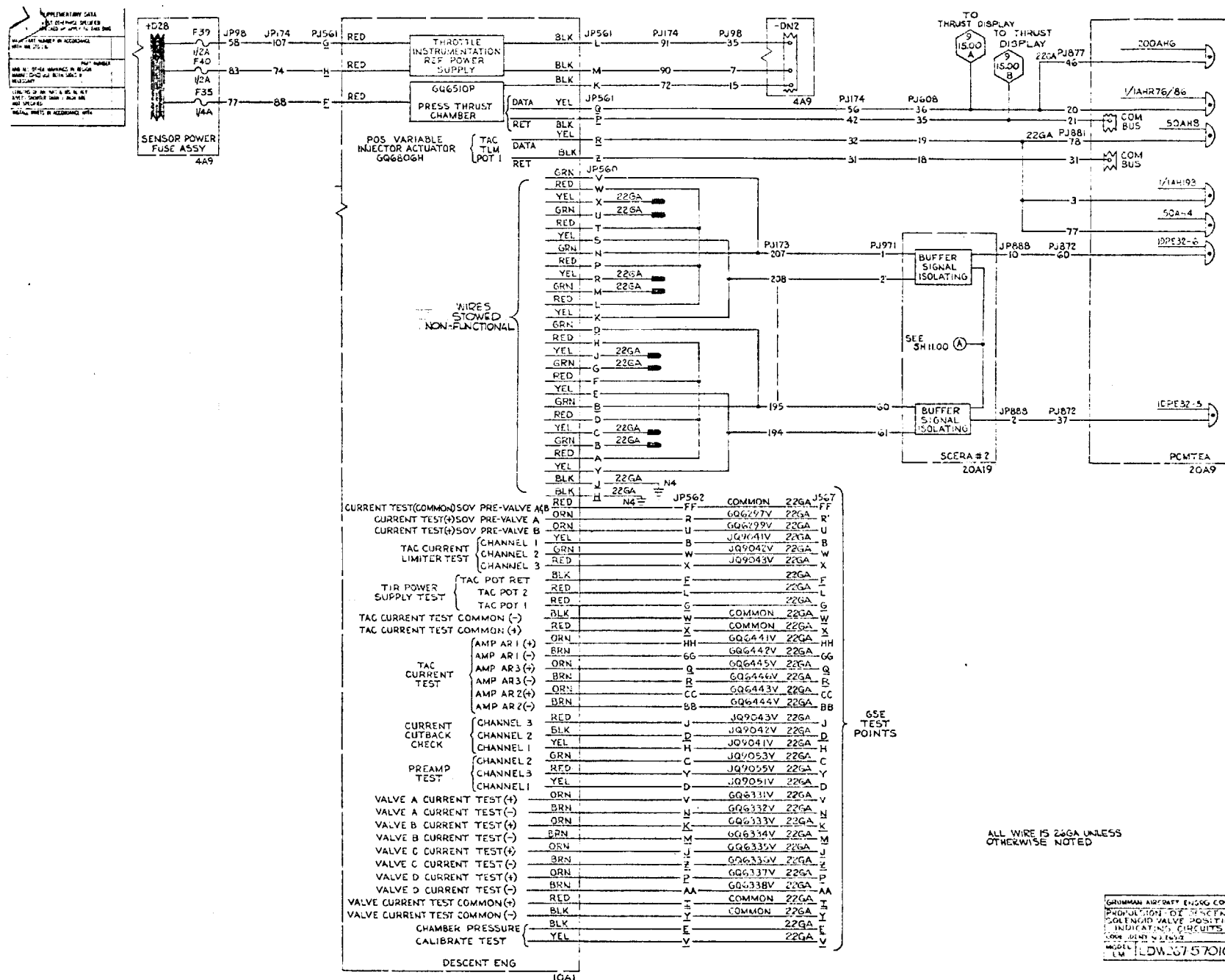
NOTE
1 ALL WIRES ARE 26 GA UNLESS
OTHERWISE NOTED

02



DETAIL D
LM-8 & LM-9 (FM60)

GRUMMAN AIRCRAFT ENGRG CORP
PROPULSION-01 ASCENT OKD ZER
FUEL LEVEL CAUTION & WARNING
FOUR GENT 45 1957
MODEL
13, LDW267-57010 SHEET 11
760 C



LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 11)

STABILIZATION AND CONTROL, CONTROL ELECTRONICS SECTION

(REF LDW267-57011 C)

1. Applicable Documents

Level Three Drawings

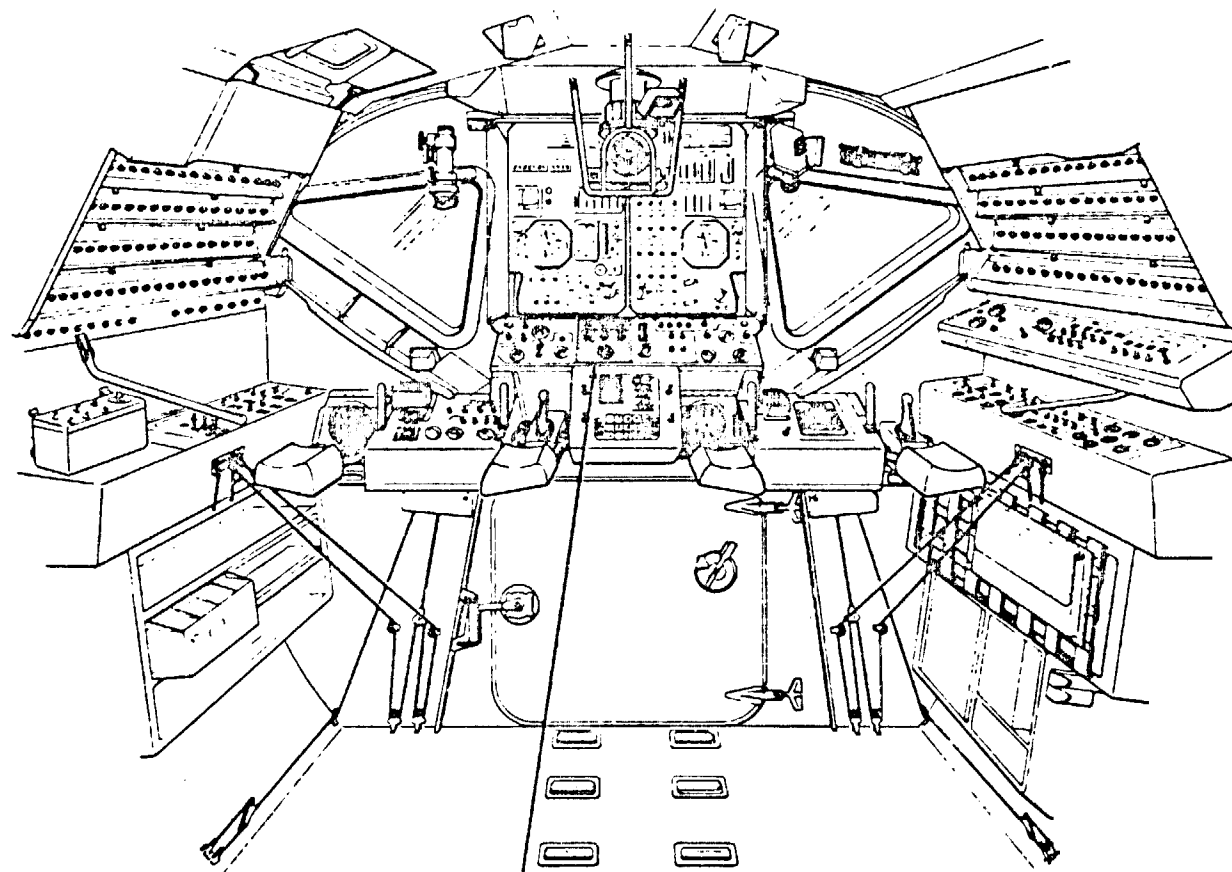
ITEM NAME	DWG. NO.	REV.	E. O. 's
CES	LDW300-56003	G	H1, H2, H3 H4, H5

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	11-701
b) Applicable Documents, Table of Contents, and Revisions	11-702 thru 11-702.2
c) Cabin Location of CES Controls and Indicators	11-703
d) CES Controls and Indicators Layout	11-704
e) CES Controls and Indicators Functional Description	11-705 thru 11-705.5
f) CES-STAB and Control Block Diagram	LDW267-57011 SH 4.00C
g) CES-S & C/RCS Engine Thrust Control Elementary Schematic	LDW267-57011 SH 5.00B thru LDW267-57011 SH 5.03
h) CES-STAB and Control Thruster Enable Power, Gyro Rate Signals & AGS Select	LDW267-57011 SH 6.00B
i) CES-STAB and Control Thruster Enable Power and PGNS Select	LDW267-57011 SH 7.00B
j) CES-STAB and Control ATCA DC Power Supply	LDW267-57011 SH 8.00B
k) CES-STAB and Control 800 HZ Power Supply and Gyro Rate Signals	LDW267-57011 SH 9.00B
l) CES-STAB and Control Mission Pulse Mode and Dead Band Select Relays	LDW267-57011 SH 10.00B
m) CES-STAB and Control "X", "Y", and "Z" Translation to ATCA	LDW267-57011 SH 11.00
n) CES-STAB and Control Attitude Control-Roll, Pitch and Yaw from ACA	LDW267-57011 SH 12.00B
o) CES-STAB and Control Yaw Rate and Yaw Attitude Error Control Commands	LDW267-57011 SH 13.00B
p) CES-STAB and Control Pitch Rate and Pitch Attitude Error Control Commands	LDW267-57011 SH 14.00B
q) CES-STAB and Control Roll Rate and Roll Attitude Error Control Commands	LDW267-57011 SH 15.00B
r) CES-STAB and Control ATCA Horizontal and Vertical Thruster Control	LDW267-57011 SH 16.00B
s) CES-STAB and Control Thruster Primary Solenoid Driver Control	LDW267-57011 SH 17.00A

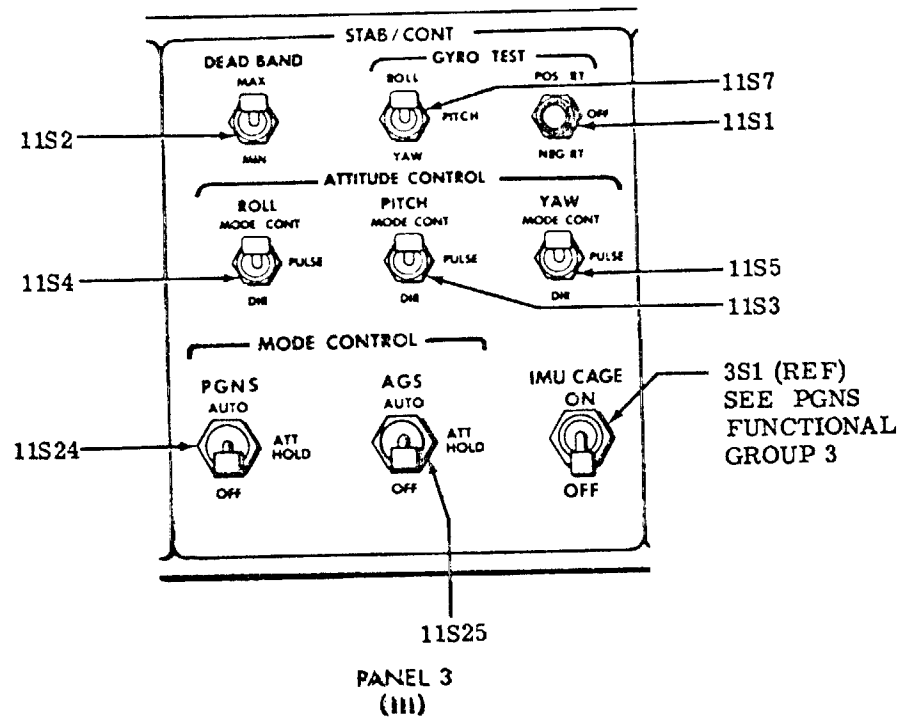
2. Table of Contents (Cont)

ITEM NAME	PAGE NO./SHEET NO.
t) CES-STAB and Control Thruster Secondary Solenoids Manual Select(Roll and Pitch)	LDW267-57011 SH 18.00B
u) CES-STAB and Control Thruster CES Solenoids Manual Select Yaw, Pitch and Roll	LDW267-57011 SH 19.00B
v) CES-STAB and Control Caution and Warning	LDW267-57011 SH 20.00B
w) CES-STAB and Control Caution and Warning	LDW267-57011 SH 21.00A
x) CES-STAB and Control OI	LDW267-57011 SH 22.00B
y) CES-STAB and Control PGNS and AGS Mode Control to OI	LDW267-57011 SH 23.00B



STABILIZATION AND CONTROL

Cabin Location of CES Controls and Indicators



CES Controls and Indicators Layout

SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

Code	Control/Indicator	Function
11S1	GYRO TEST CONTROL SWITCH 3-POSITION TOGGLE MOM-LOCK-MOM	This three-position toggle (POS RT - OFF - NEG RT) enables a test signal to be applied to the rate gyro selected by 11S7. It is maintained in the OFF position and momentarily held in the other two. When this switch is held in the POS RT position, a $\pm 5^\circ/\text{sec}$ attitude rate will be indicated on the appropriate rate needles of the Flight Director Attitude Indicators (9M1 and 9M6). The NEG RT position produces the opposite effect. In OFF, no test signal is produced.
11S2	DEADBAND SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (MAX-MIN) selects either a large amplitude limit cycle (MAX) for the attitude control system, to conserve RCS fuel during coasting flight, or a narrow deadband (MIN) for periods when accurate manual control is required. Regardless of this switch position the minimum deadband will operate during main engine thrusting. This switch is not functional when the PGNS is in use. But dead band output modes (logic error input) can also be tracked for AGS analog inputs.
11S3 11S4 11S5	PITCH ATTITUDE CONTROL SWITCH ROLL ATTITUDE CONTROL SWITCH YAW ATTITUDE CONTROL SWITCH THREE 3-POSITION TOGGLES MAIN-MAIN-MAIN	The three ATTITUDE CONTROL switches, one for each axis, each having three positions (MODE CONT-PUSE-DIR), are normally in the MODE CONT position while PGNS is the guidance authority. This allows use of the proportional mode of the attitude controller while in ATT HOLD. When the MODE CONTROL PGNS switch (11S24), is in AUTO, the LGC supplies attitude commands to maneuver the vehicle. Placing the MODE CONTROL PGNS switch (11S24) to ATT HOLD or AUTO allows use of the DIR mode in any axis. Each axis must be positioned to DIR independently. Displacing an attitude controller (1A1 or 1A12) one fourth of full throw commands a 2 jet firing in the axis selected. This usage

SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

Code	Control/Indicator	Function
11S3 11S4 11S5 (Cont.)		is not recommended, as it results in an open loop acceleration that is opposed by the DAP above the command rate. The PULSE position is inoperative while under PGNS guidance authority. When AGS is the guidance authority, the MODE CONT positions of the ATTITUDE CONTROL switches function in the same manner as in PGNS. That is, when AUTO is selected on the MODE CONTROL switch, automatic attitude commands are issued by the guidance authority (PGNS or AGS). When ATT HOLD is selected on the MODE CONTROL switch, displacing either attitude controller to the out of detent position commands on angular rate proportional to the displacement. Under AGS control, the PULSE and DIR modes differ only in the way the reaction jets fire. When PULSE is selected, two jets in the appropriate axis fire at a constant pulsed rate for as long as the attitude controller is displaced more than one fourth of full throw. When DIR is selected, two jets in the appropriate axis fire continuously for as long as the Attitude Controller is displaced more than one fourth of full throw. Both PULSE and DIR provide open-loop acceleration. The rates produced by PULSE or DIR commands must be nulled to zero by inducing an opposite acceleration command, and the attitude is not automatically maintained until the ATTITUDE CONTROL switch is returned to MODE CONT. When the MODE CONT switch is in the OFF position, only the DIR position of 11S3, 11S4 and 11S5 are operative. Selecting DIR

SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

Code	Control/Indicator	Function
11S3 11S4 11S5 (Cont.)		produces two jet open loop accelerations when an Attitude Controller is displaced more than one fourth of full throw. This is irrespective of the guidance authority.
11S7	GYRO TEST SELECT SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (ROLL-PITCH-YAW) associated with 11S1, selects the rate gyro which is to be tested. The test output is displayed as described for switch 11S1.
11S24	PGNS ATTITUDE MODE CONTROL SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	The three-positions (OFF-ATT HOLD-AUTO) are associated with the ATTITUDE CONTROL switches (11S3, 11S4 and 11S5) and the GUID CONT switch (9S6). Thus it affects the usage of the attitude controllers (1A1 and 1A12) and the firing of the RCS jets. When the OFF position is selected, PGNS guidance authority (as selected on 9S6) can not command RCS firing to maintain or change attitude. The attitude controller cannot command proportional mode or pulse mode maneuvers. The attitude controllers can command four jet hard over firing of the RCS, and if DIR is selected on 11S3, 11S4, or 11S5, 2 jet firing in the appropriate axis. The translation controllers are not enabled. The ATT HOLD position is used to maintain attitude and to allow manual adjustment of attitude at commanded rates, which will then be maintained automatically. Neither automatic attitude or translation maneuvers are provided in ATT HOLD, nor are automatic

SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

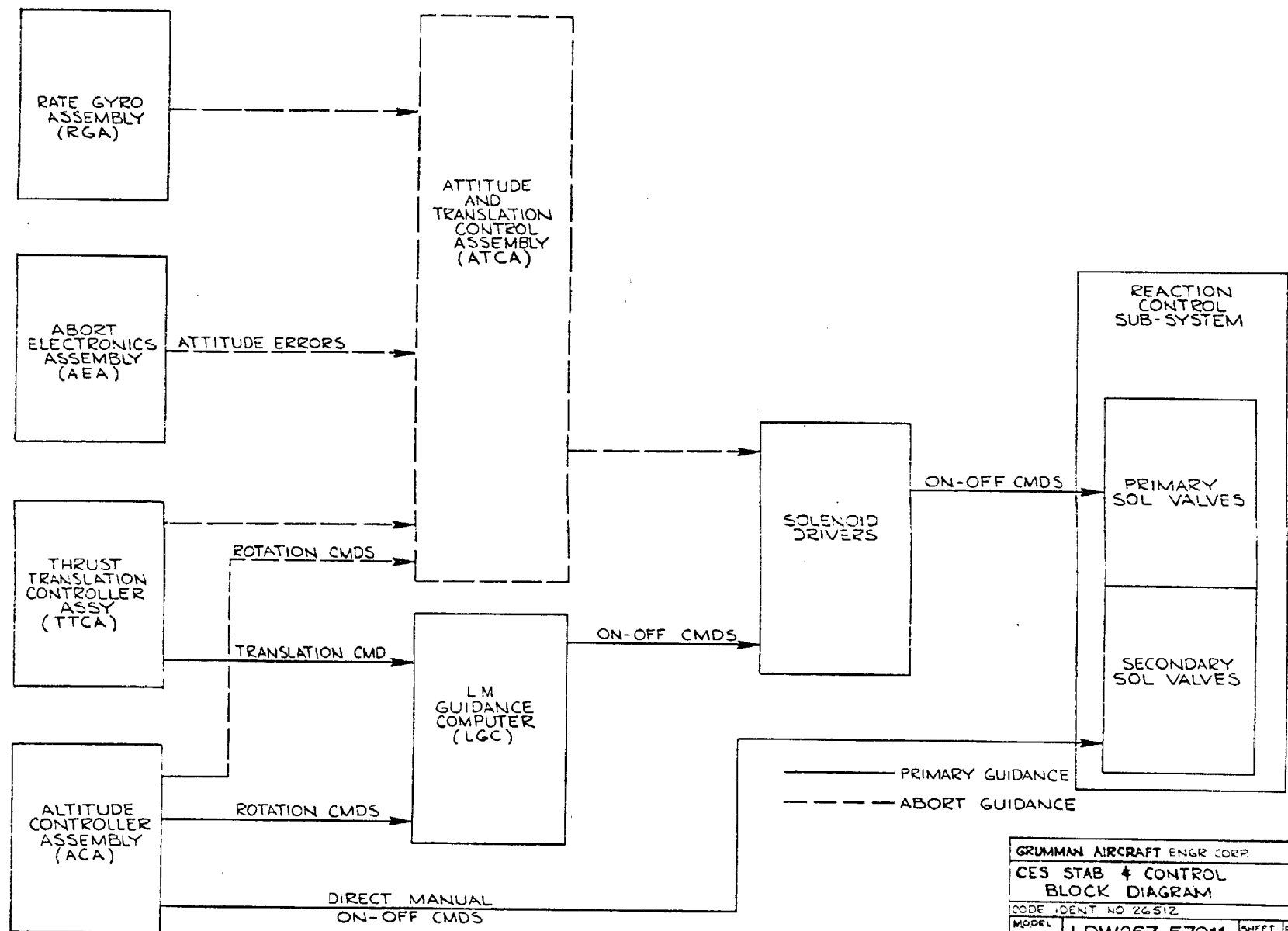
Code	Control/Indicator	Function
11S24 (Cont.)		APS or DPS starts and stops. The attitude is changed by commanding an angular rate proportional to the displacement of an attitude controller (1A1, or 1A12). With PGNS as the guidance authority, PULSE is inoperative, and while not recommended, DIR provides an open loop acceleration. The translation controllers are enabled while the MODE CONTROL switch is in ATT HOLD. In the AUTO position, the guidance authority (PSNS) issues RCS commands via ATCA to maintain and/or change the vehicles attitude, and the PGNS performs RCS translation. The guidance authority will also stop and start the main propulsion systems, and vary the DPS thrust as required. With PGNS as the guidance authority and MODE CONTROL 11S24 in AUTO, attitude controller proportional commands are normally ineffective, except for certain LGC determined periods of the mission. Selecting DIR on one or more of the ATTITUDE CONTROL switches (11S3, 11S4 or 11S5) will cause opposing jets to fire when the attitude controllers are displaced more than one fourth of full throw. The LGC will command jets to fire in opposition to both DIR and hard over commands.
11S25	AGS ATTITUDE MODE CONTROL SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	The three-positions (OFF-ATT-HOLD-AUTO) are associated with the ATTITUDE CONTROL switches (11S3, 11S4 and 11S5) and the GUID CONT switch (9S6). Thus it affects the usage of the attitude controllers (1A1 and 1A12) and the firing of the RCS jets.

SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

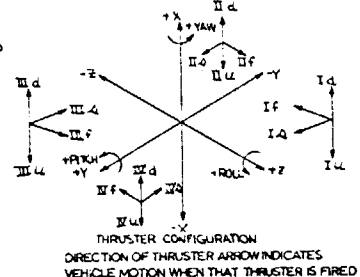
Code	Control/Indicator	Function
11S25 (Cont.)		When the OFF position is selected, AGS guidance authority (as selected on 9S6) cannot command RCS firing to maintain or change attitude. The attitude controller cannot command proportional mode or pulse mode maneuvers. The attitude controllers can command four jet hard over firing of the RCS, and if DIR is selected on 11S3, 11S4, or 11S5, 2 jet firing in the appropriate axis. The translation controllers are not enabled. The ATT HOLD position is used to maintain attitude and to allow manual adjustment of attitude at commanded rates, which will then be maintained automatically. Neither automatic attitude or translation maneuvers are provided in ATT HOLD, nor are automatic APS or DPS starts and stops. The attitude is changed by commanding an angular rate proportional to the displacement of an attitude controller (1A1, or 1A12). (1) With AGS as the guidance authority, both PULSE and DIR (as selected on 11S3, 11S4, or 11S5) provide open loop acceleration when an attitude controller is displaced more than one fourth of full throw. The rate created by a DIR or PULSE mode RCS firing must first be nulled to zero by inducing an opposite acceleration command. Attitude is not automatically maintained until the ATTITUDE CONTROL switch is returned to the MODE CONT position. In the AUTO position, the guidance authority (AGS) issues RCS commands to maintain and/or change the vehicles attitude.

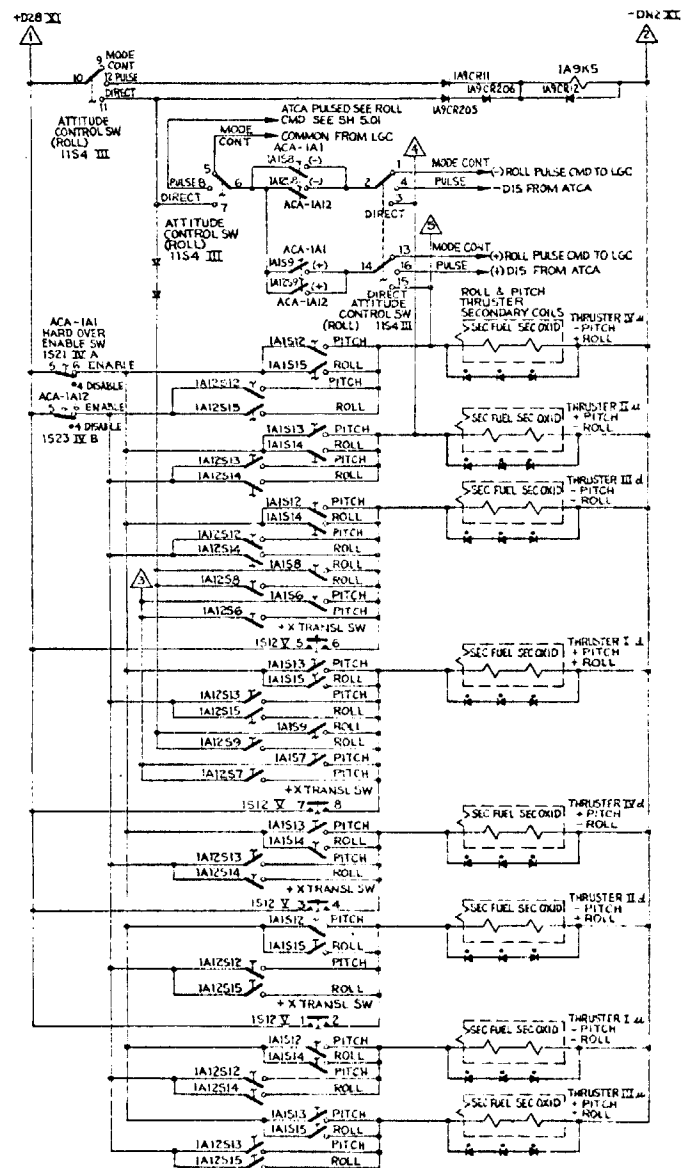
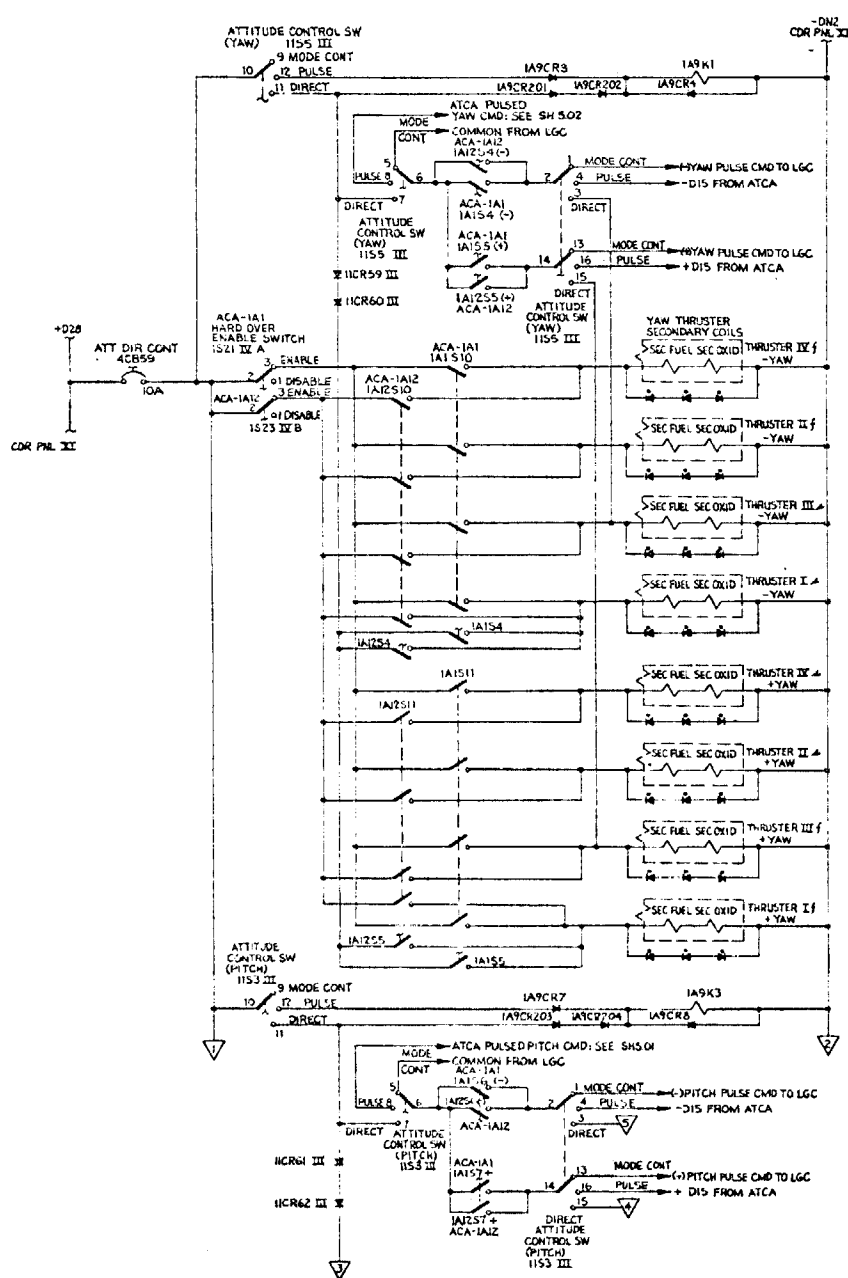
SUBSYSTEM: STABILIZATION AND CONTROL (FUNCTIONAL GROUPING 11)

Code	Control/Indicator	Function
11S25 (Cont.)		(2) AGS - The AUTO mode allows the AEA to initiate attitude maneuvers. Ullage maneuvers prior to a main engine burn must be commanded manually. This is also true for AGS controlled aborts that are initiated via the ABORT switch (1S13) or the ABORT STAGE switch (1S14). Assuming the ullage maneuver has occurred, AGS will start or stop a main propulsion system burn in AUTO mode. Displacing an attitude controller to the out of detent position results in conflicting commands. PULSE and DIR modes produce open loop acceleration when an attitude controller is displaced more than one fourth of full throw, and drifting while in detent. The hard over mode will cause opposing jets to fire when ATTITUDE CONTROL switches (11S3, 11S4, and 11S5) are in MODE CONT. The translation controllers function normally.



GRUMMAN AIRCRAFT ENGR CORP.			
CES STAB & CONTROL BLOCK DIAGRAM			
CODE IDENT NO 26512			
MODEL	LDW267-57011	SHEET	REV
LM		400	C



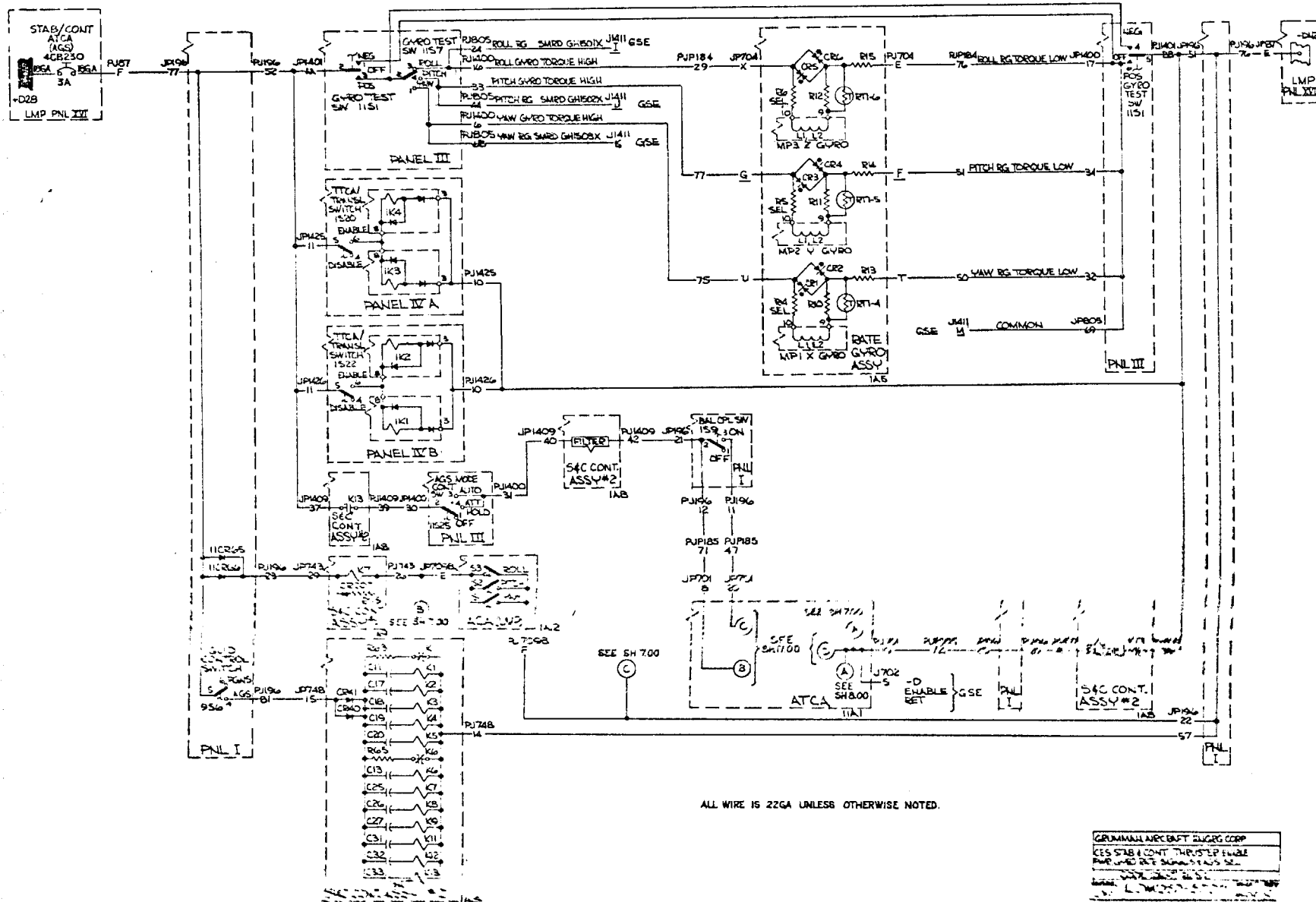


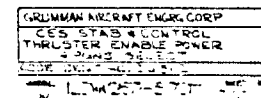
ATTITUDE CONTROLLER ASSY ACA OUT OF DETENT SWITCHES 51, 52 & 53 CLOSE WHEN HAND CRIMP DISPLACEMENT EXCEEDS 0.5" IN EITHER DIRECTION.

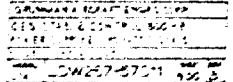
ACA SOFT STOP SWITCHES 54, 55, 56, 57, 58 & 59 CLOSE WHEN HAND CONTROLLER IS DISPLACED 2.5" OR GREATER FROM NEUTRAL.

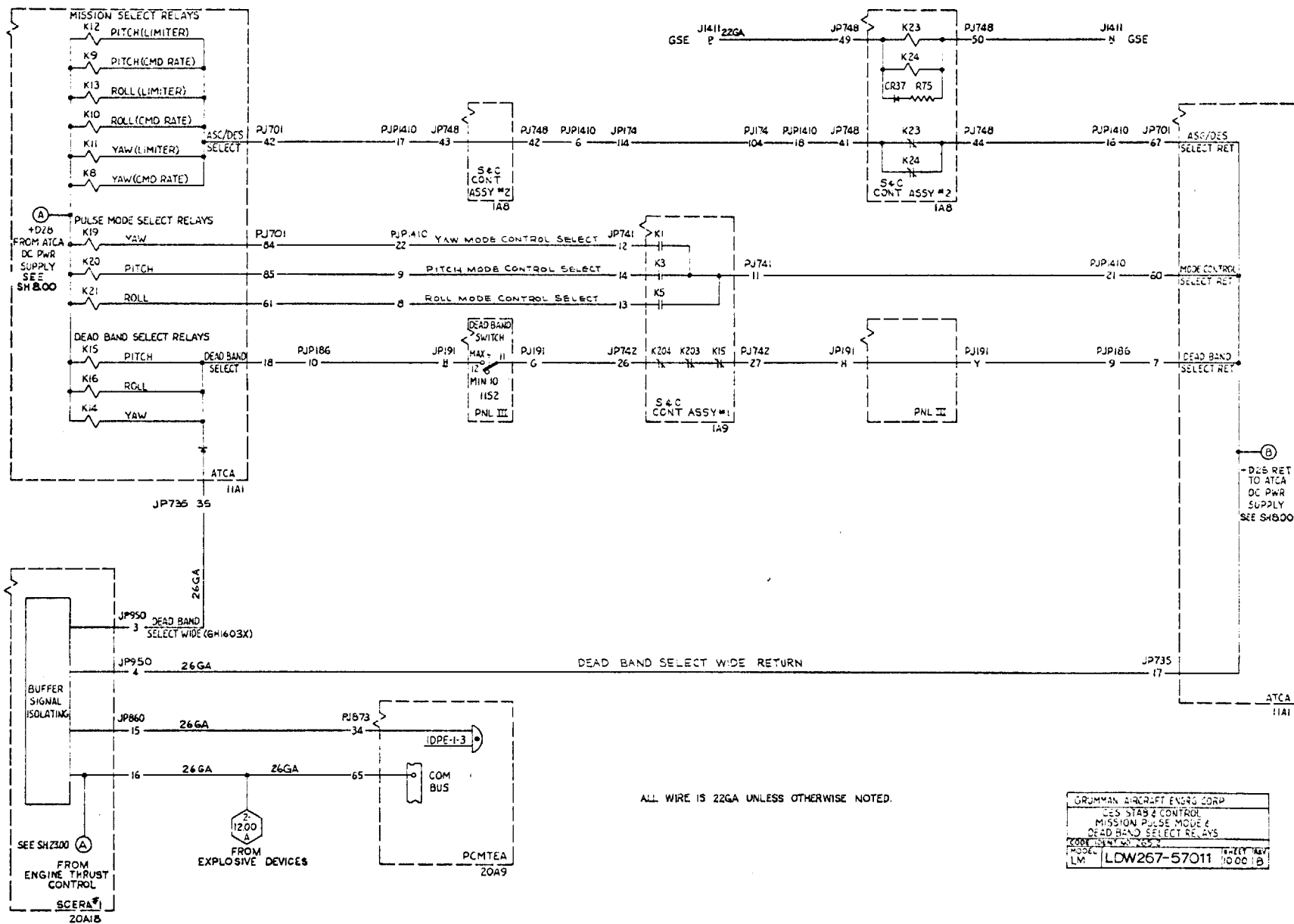
ACA HARD OVER SWITCHES 510, 511, 512, 513, 514 & 515 CLOSE WHEN HAND CONTROLLER IS DISPLACED 12" OR GREATER.

GRUMMAN AIRCRAFT ENGINEERING
CES STAB & CONTROLS ENG THRUST
CONT ELEMENTARY SCHEMATIC
3000 INCHES SCALE
LW LDW267-57011 3.03

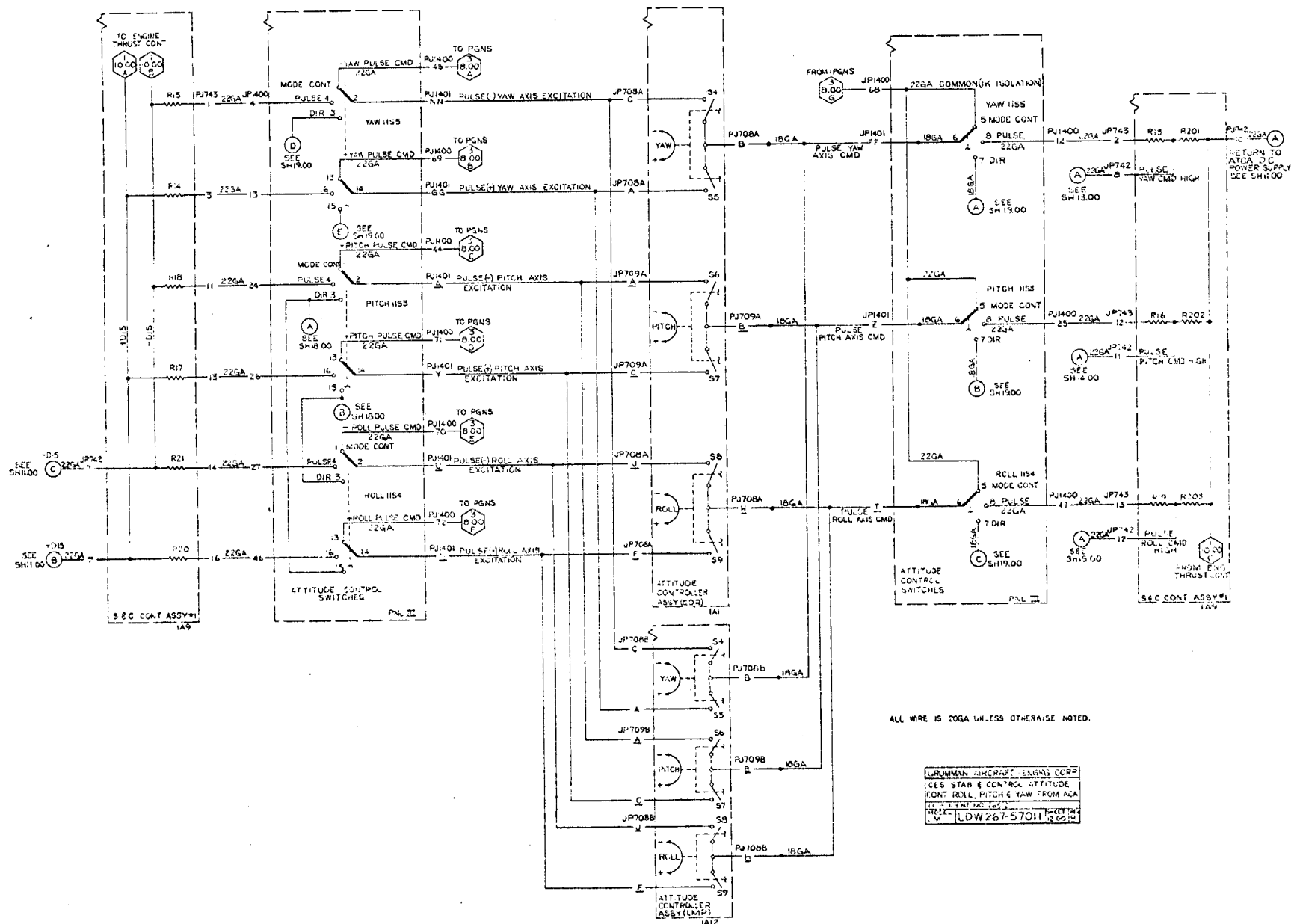


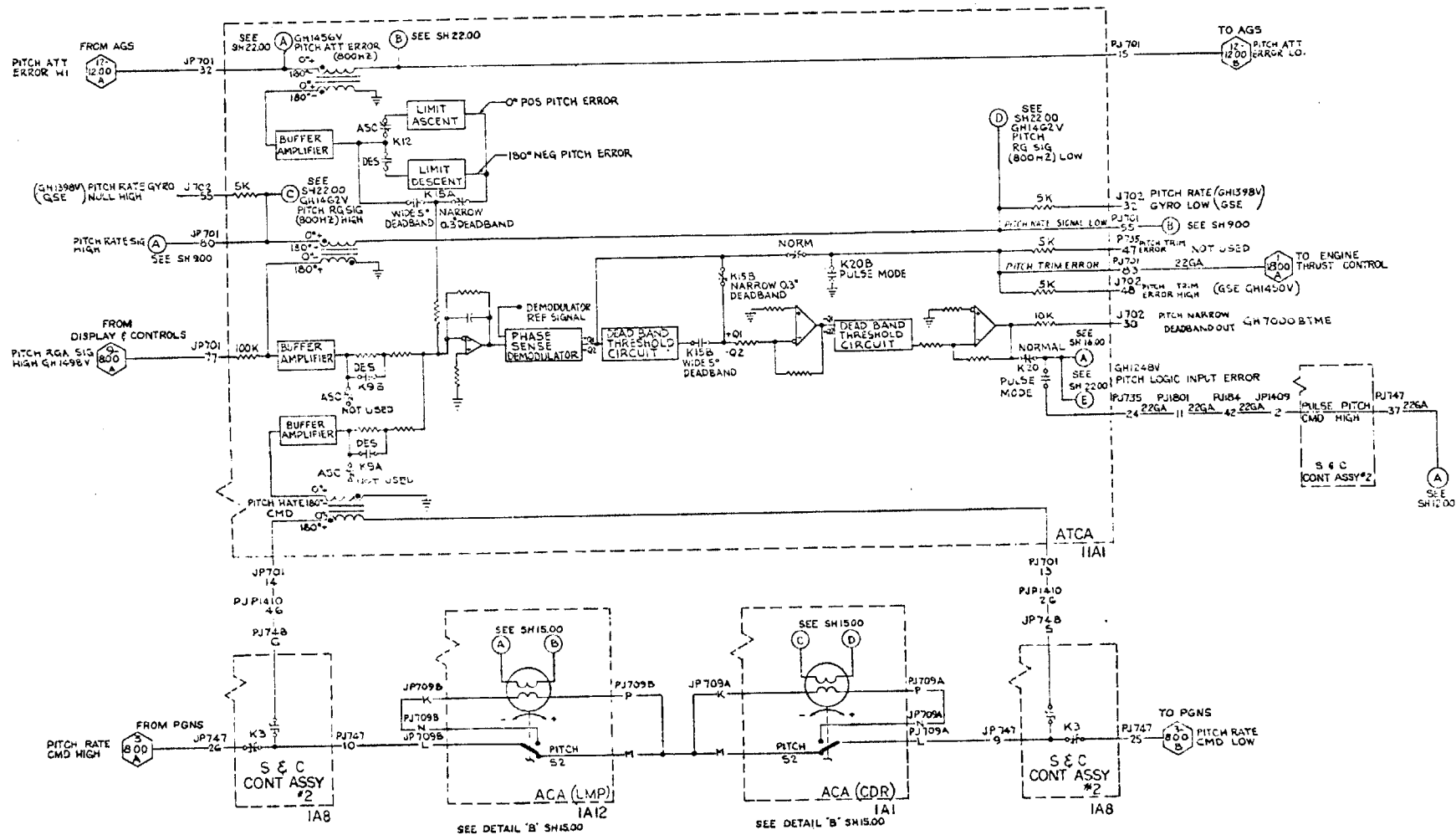






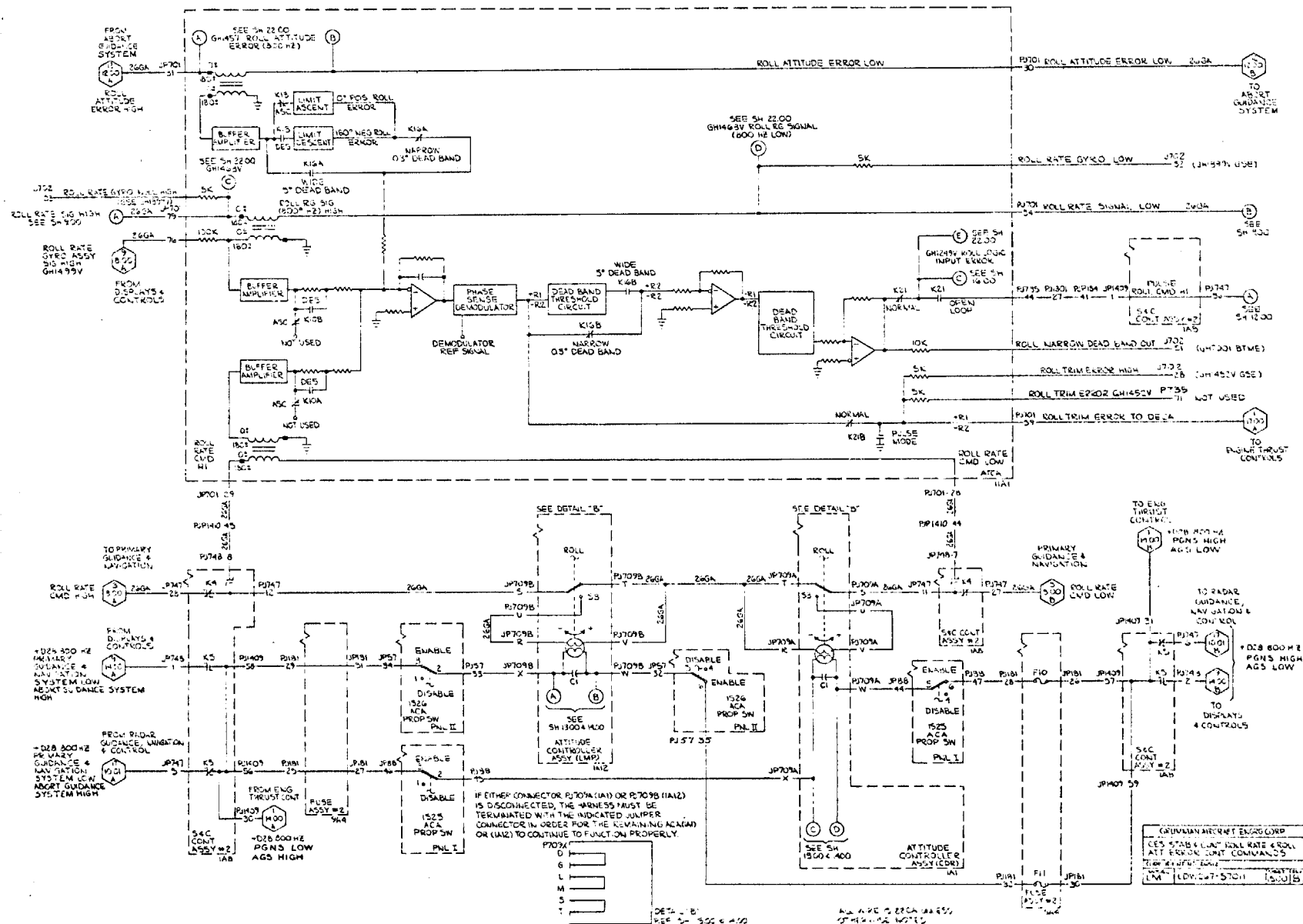
GRUMMAN AIRCRAFT ENGINE CORP.
 CES STAB & CONTROL
 MISSION PULSE MODE &
 DEAD BAND SELECT RELAYS
 MODEL LM LDW267-57011 10-11-1971 1000 1B





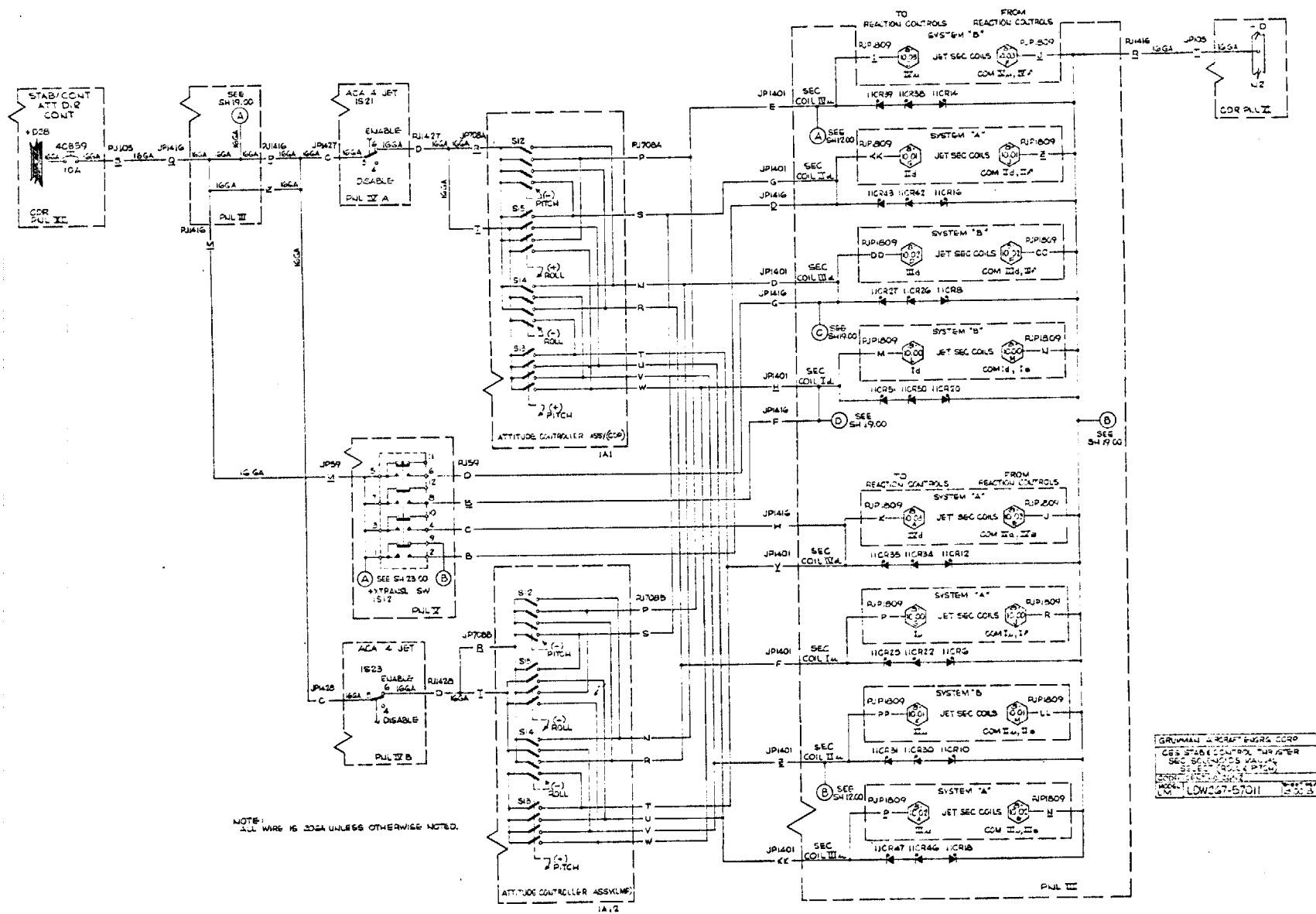
ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

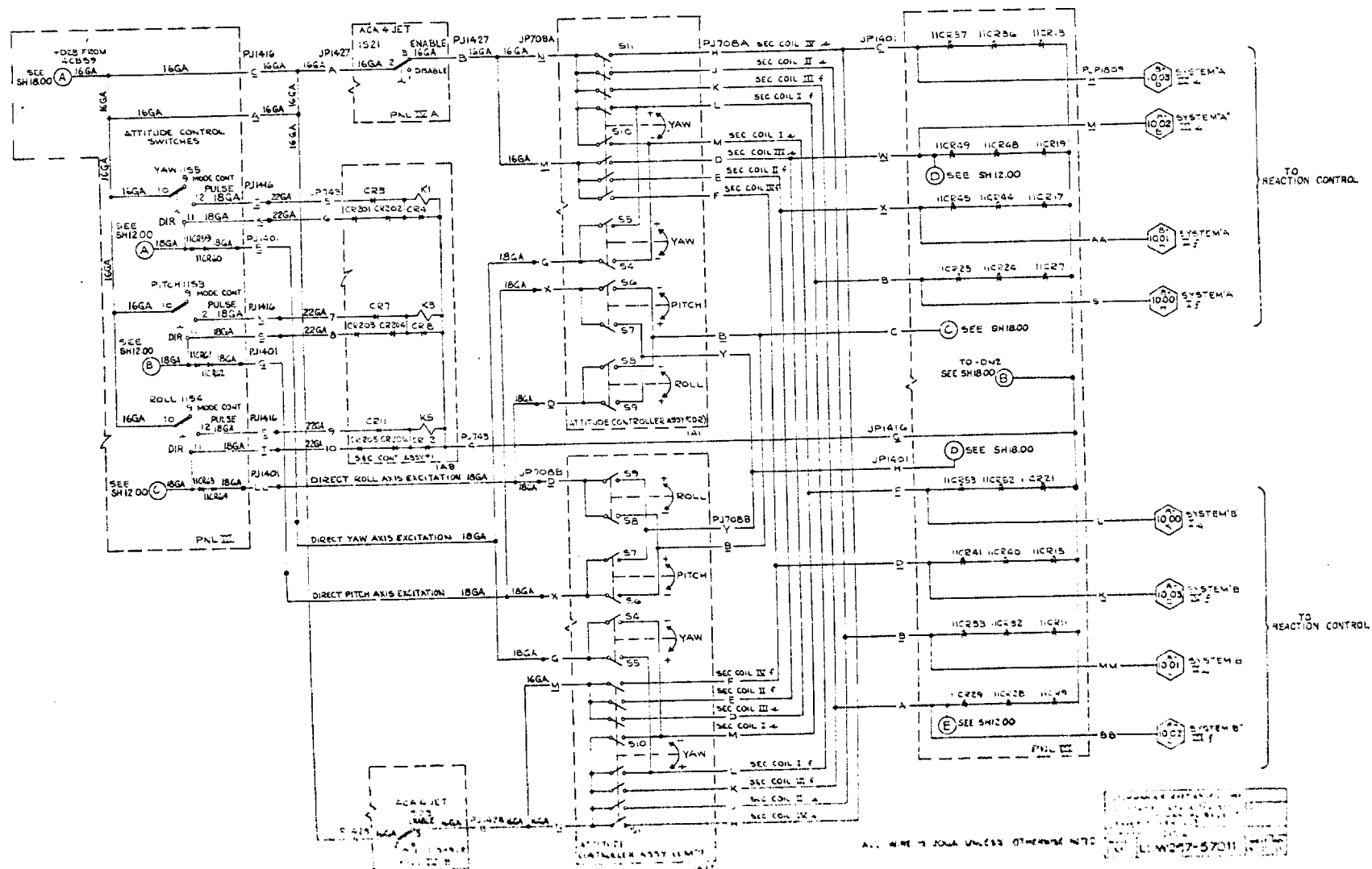
GUMPHREY AIRCRAFT ENGINEERING CORP.		
PITCH RATE & ATTITUDE ERROR CONTROL		
PITCH RATE & ATTITUDE ERROR CONTROL		
COMMAND		
CODE IDENT NO. 57011		
WORK	LDW267-57011	1400

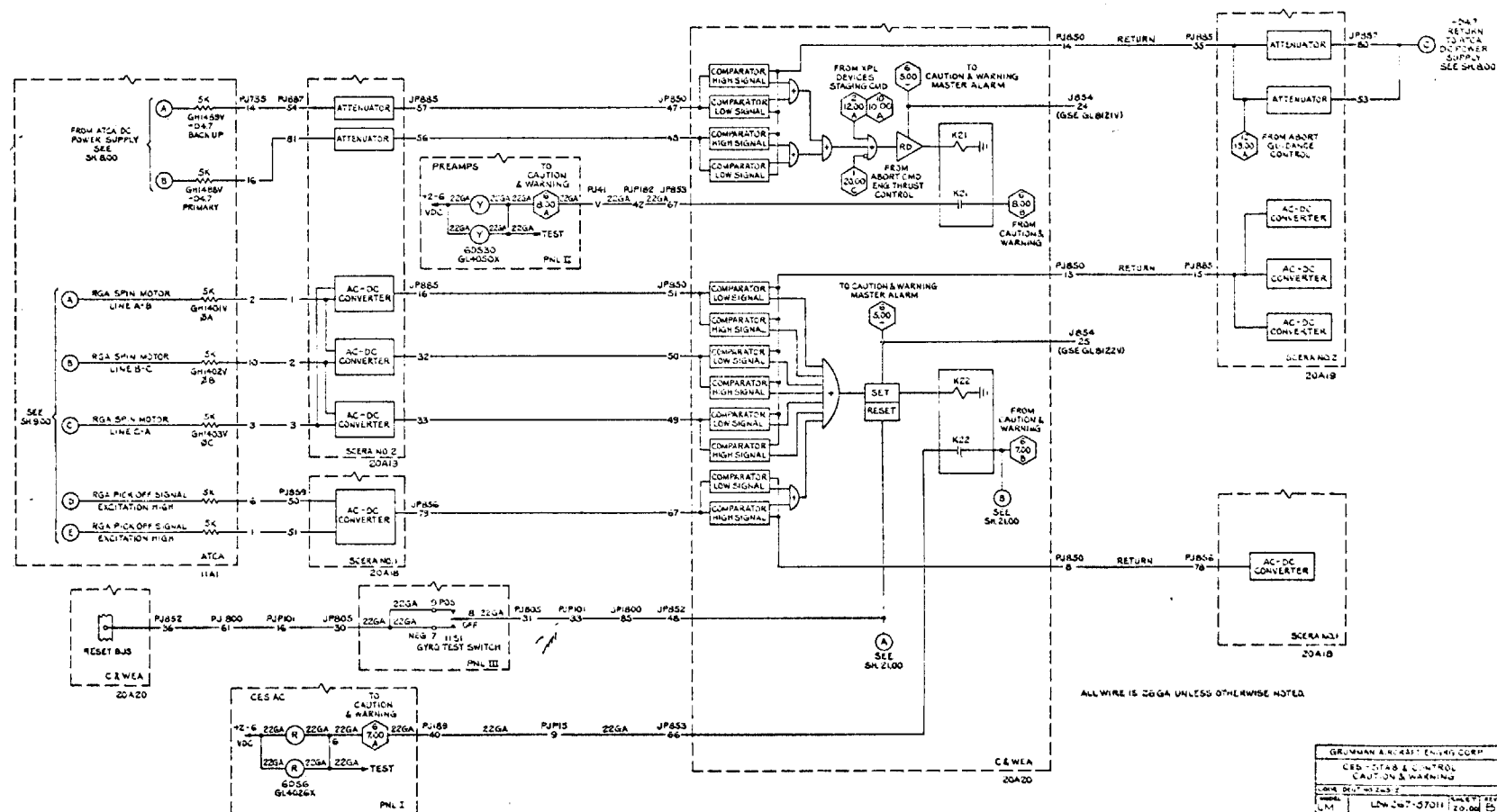


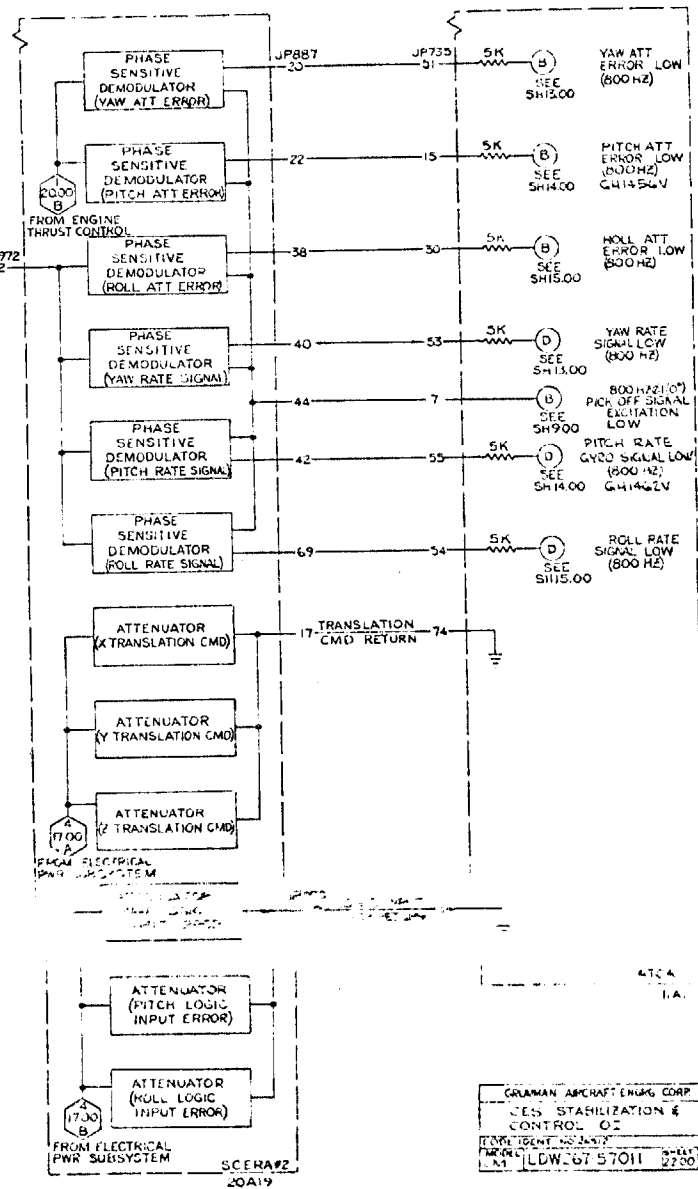
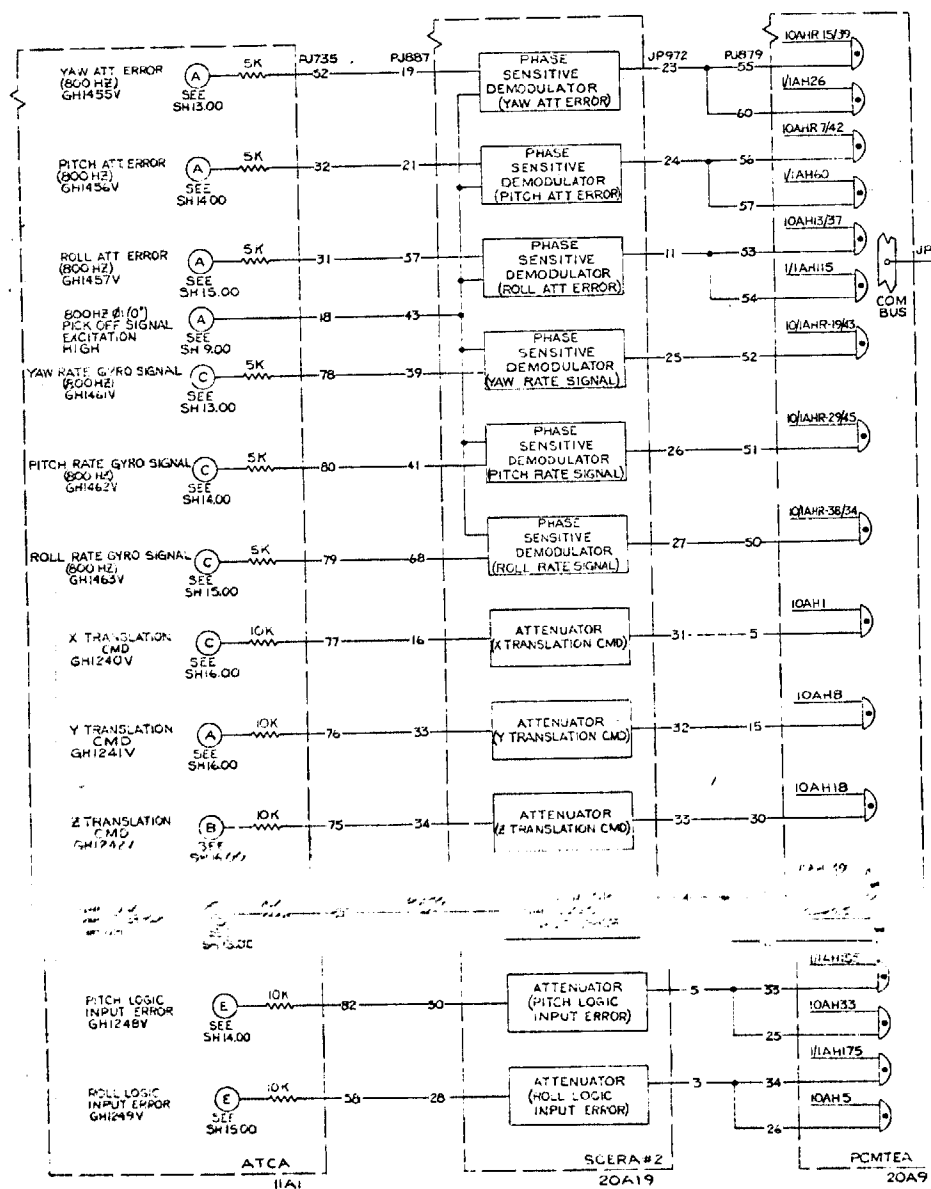


CELEMAN AIRCRAFT ENGRG CORP
CES STAB & CONTROL ATCA
HORIZONTAL/VERTICAL THRUSTER CONTROL
100% PART NO. 20002
MODEL
M D-267-57011









GRAMMAN AIRCRAFT ENGINE CORP.
 LESS STABILIZATION &
 CONTROL O2
 FROM ELECTRICAL
 PWR SUBSYSTEM
 LDW-67 57011 2700 5

GRUMMAN AIRCRAFT ENGRG CORP
CES STAB & CONTROL PGNS &
AGS MODE CONTROL TO DL
CODE IDENT NO. 1251
MODEL LDW267-57011 SHEET 23 OF 25
LM

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 12)

ABORT GUIDANCE SYSTEM

(REF LDW267-57012 B)

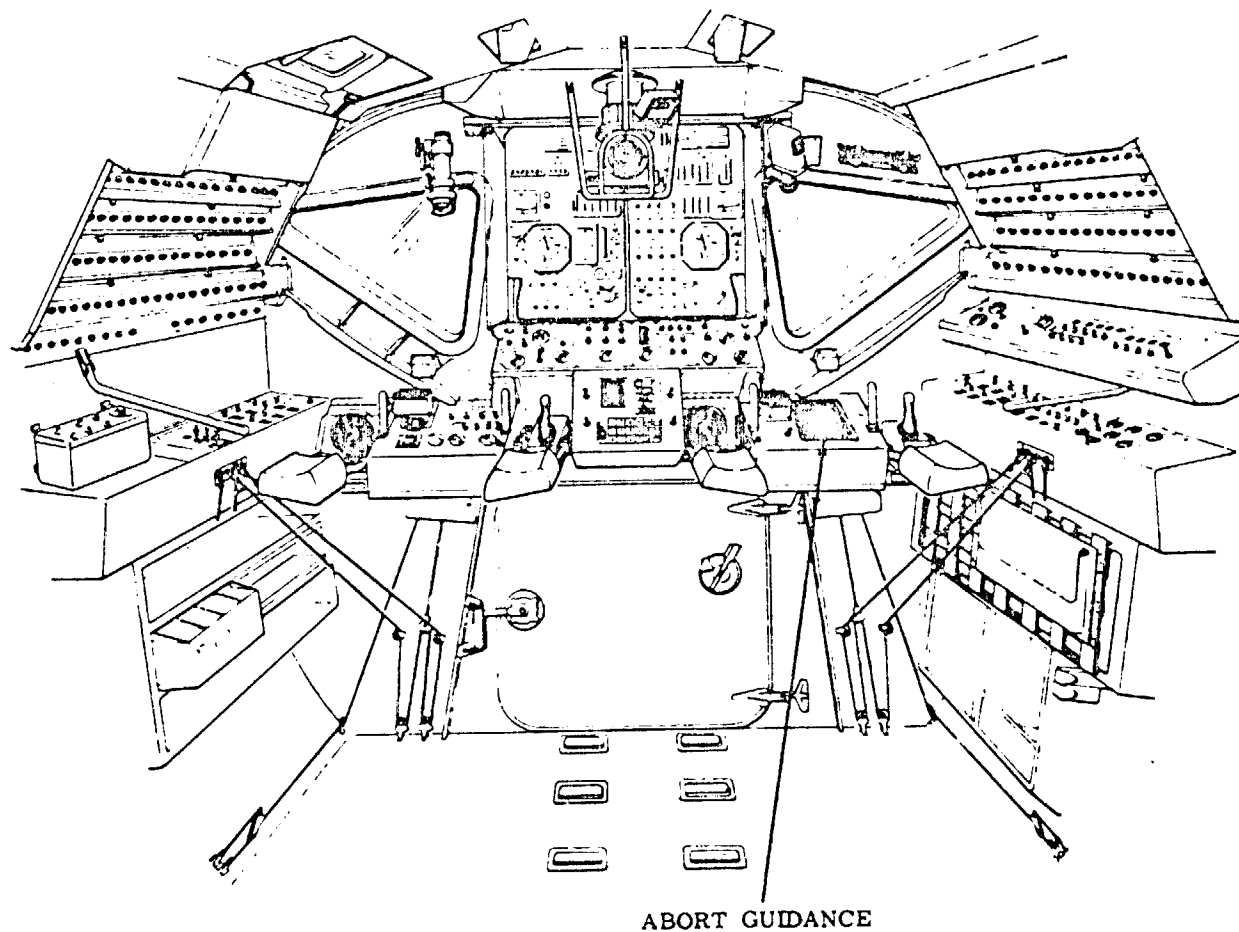
1. Applicable Documents

Level Three Drawings

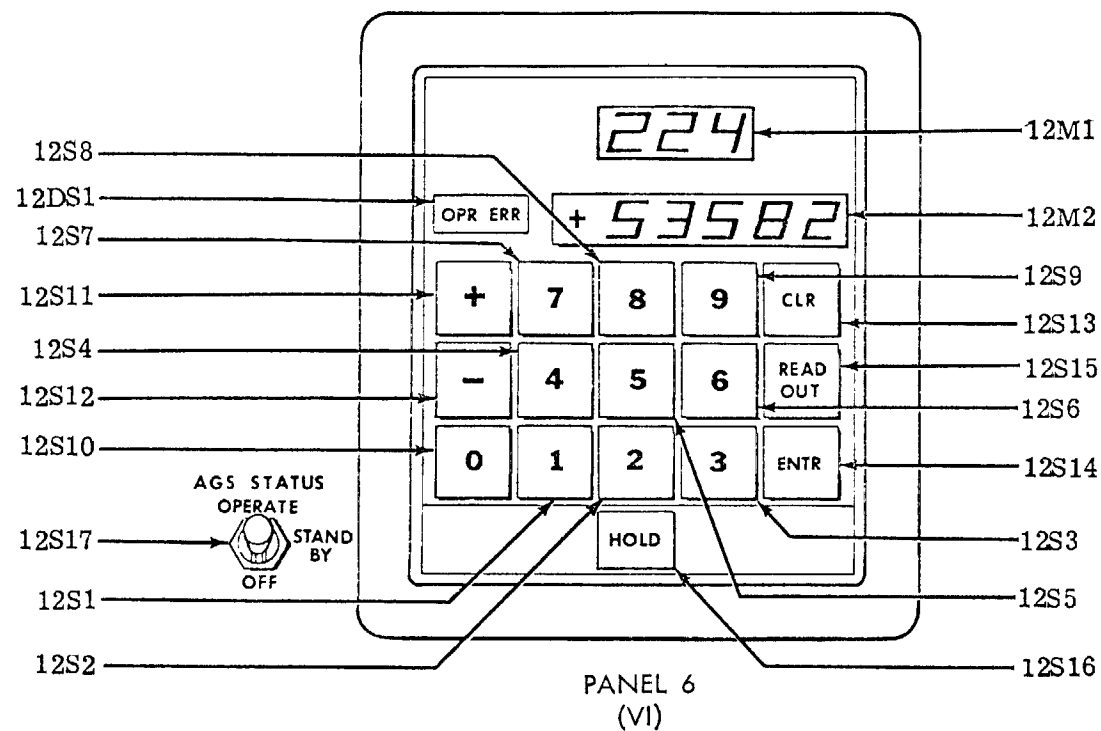
ITEM NAME	DWG. NO.	REV.	E.O.'s
Abort Guidance System	LDW300-54002	H	J1 (LEO267-2), J2

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	12-701
b) Applicable Documents, Table of Contents and Revision	12-702
c) Cabin Location of AGS Controls and Indicators	12-703
d) AGS Controls and Indicators Layout - DEDA (Data Entry Display Assy)	12-704
e) AGS Controls and Indicators Functional Description	12-705 thru 12-705.2
f) AGS - Block Diagram	LDW 267-57012 SH 4.00
g) AGS - Power Distribution (AEA)	LDW 267-57012 SH 5.00B
h) AGS - GYRO-Accelerometer Inputs to AEA BTME & GSE	LDW 267-57012 SH 6.00B
i) AGS - LGC/CDU to AEA Signals	LDW 267-57012 SH 7.00
j) AGS-CES to AEA Signals	LDW 267-57012 SH 8.00
k) AGS-GSE Data Inputs	LDW 267-57012 SH 9.00
l) AGS-DEDA Signals	LDW 267-57012 SH 10.00B
m) AGS-DATA Output to Display	LDW 267-57012 SH 11.00
n) AGS-Attitude Error and Engine Signals	LDW 267-57012 SH 12.00
o) AGS-OI Warning Indication	LDW 267-57012 SH 13.00A



Cabin Location of AGS Control and Indicators



NOTE: GUIDANCE CONTROL SWITCH 9S6
IS SHOWN ON PANEL I. SEE PAGE
9-704.

AGS Controls and Indicators Layout - DEDA

SUBSYSTEM: ABORT GUIDANCE (DEDA) (FUNCTIONAL GROUPING 12)

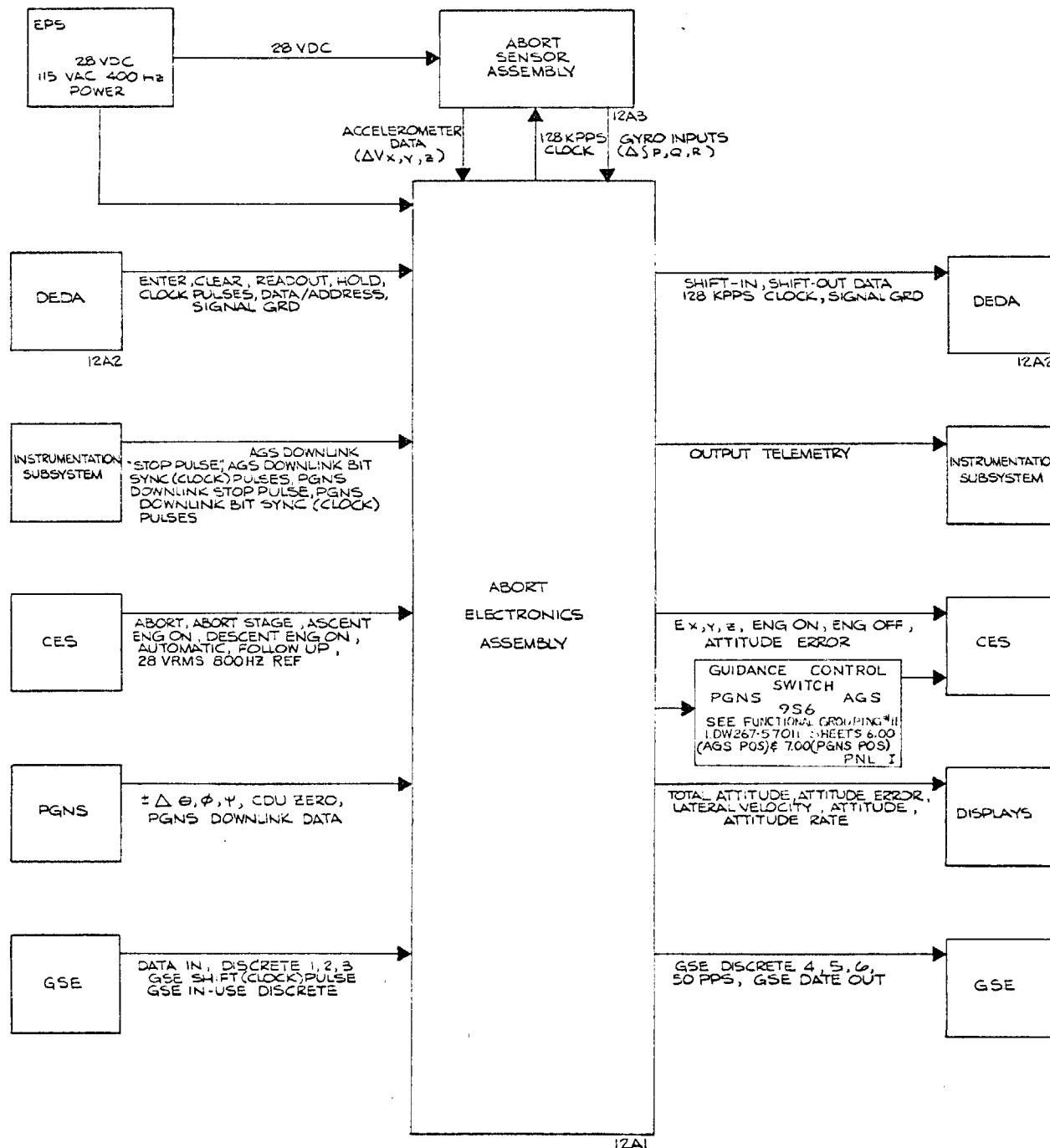
Code	Control/Indicator	Function
12S1 to 12S12	KEYBOARD SWITCHES MOMENTARY PUSHBUTTONS	Numerical keys 0 thru 9 (pushbuttons switches 12S1 thru 12S10) and the algebraic sign keys + and - (pushbuttons switches 12S11 and 12S12) perform the following when depressed; the first three numerical keys enter the address codes and are displayed on the Address Indicator 12M1, the fourth is the algebraic sign (+ or -) of data to be inserted, and the remaining five numerical keys represent the data in decimal or octal form and are displayed on the Data Indicator 12M2. All 12 keys are used to control the AGS mode of operation manually. Typical examples of these modes are: Attitude hold submode, Guidance steering submode, IMU alignment (PGNS to AGS) alignment submode, Lunar alignment submode, In-flight calibration submode, Reinitalize in-flight AGS self test and Initialize LM or CSM via DEDA.
12S13	CLEAR SWITCH MOMENTARY PUSHBUTTON	This pushbutton erases all numerals displayed on Address Indicator 12M1 and Data Indicator 12M2 and cancels effect of hold switch 12S16. When pressed this switch extinguishes OPR ERR indicator lamp. This switch must be pressed before any DEDA entry.
12S14	ENTER SWITCH MOMENTARY PUSHBUTTON	This pushbutton enables the crew to enter data which has been set up on the Data Indicator (12M2) into the computer address set up on the Address Indicator (12M1). The indicators are now clear, prior to any further operations the clear (12S13) button must be depressed.
12S15	READOUT SWITCH MOMENTARY PUSHBUTTON	This pushbutton enables the crew to call up AEA computer data. The contents of the Memory Location called out on 12M1 will be displayed as data on 12M2, and will be updated every 1/2 second. It will also cancel the effect of 12S16.
12S16	HOLD SWITCH MOMENTARY PUSHBUTTON	This pushbutton enables the crew to interrupt the updating of any continuously changing data displayed on 12M2. The data will remain unchanged until the readout or clear pushbutton is depressed. Depression of the readout pushbutton enables display of the present value of the data and continuance of updating. Depression of the CLR pushbutton (12S13) causes resetting of the HOLD condition as well as clearing of the display. A new display with updating, can then be commanded.

SUBSYSTEM: ABORT GUIDANCE (DEDA) (FUNCTIONAL GROUPING 12)

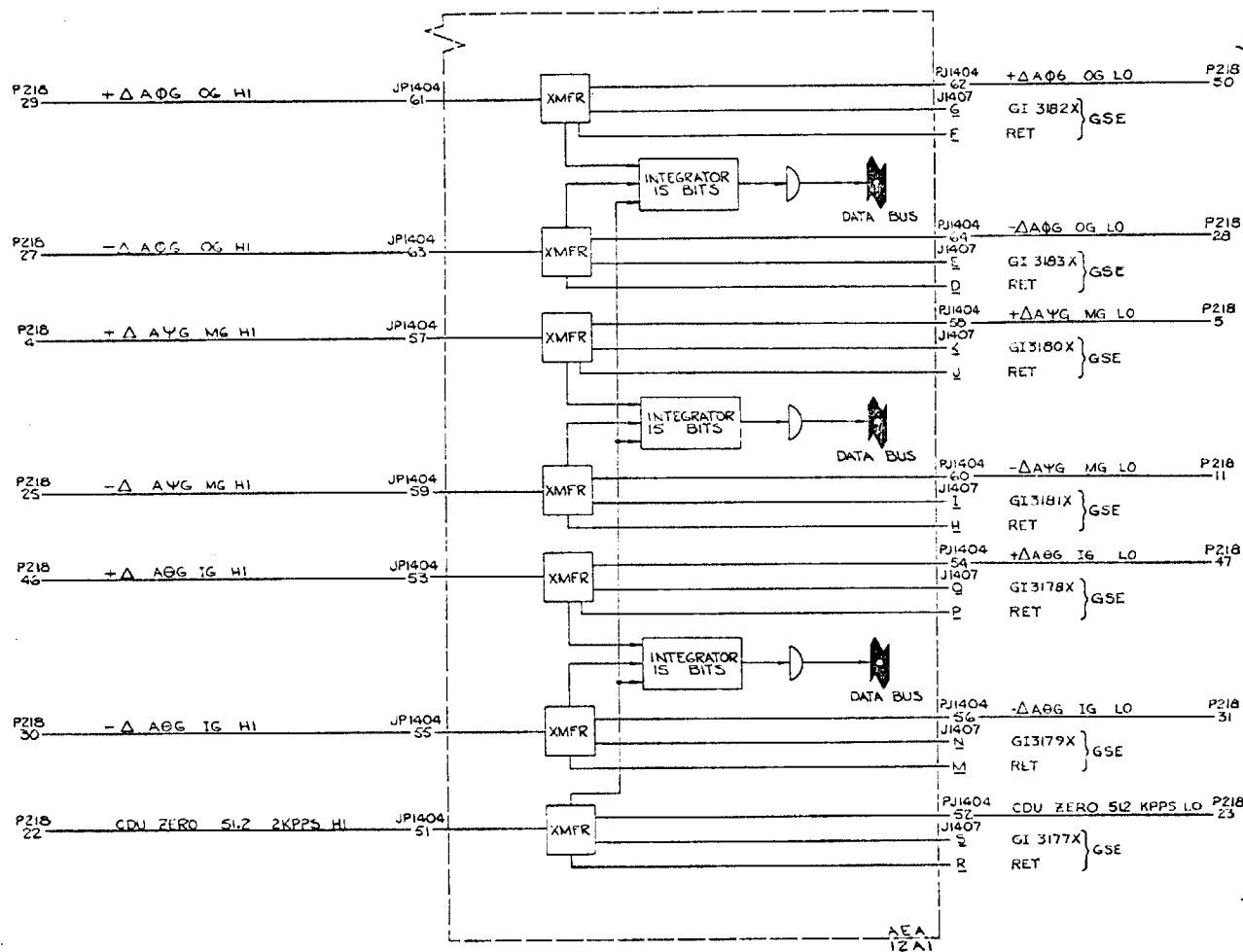
Code	Control/Indicator	Function
12S17	AGS STATUS SWITCH 3-POSITION TOGGLE LOCK-LOCK-LOCK	This three-position toggle (OPERATE-STANDBY-OFF) enables the crew to place the AGS in any one of three states. In the OFF position, all AGS activity is inhibited except for the Abort Sensor Assembly (ASA) heaters. In STANDBY, full activity is enabled in the ASA, and the Abort Electronics Assembly (AEA) is placed in its STANDBY mode. In OPERATE, full activity is enabled to both the ASA and AEA. Twenty five minutes of standby operation is required or ten minutes in EMERGENCY WARM-UP mode before OPERATE can be selected. In addition, the AEA DC circuit breaker must also be activated to provide power both for the heaters and for all AGS activity.
12M1	ADDRESS INDICATOR	This three digit indicator displays the Abort Electronics Assembly computer address selected by the crew via the keyboard, following the depression of the clear (12S13) pushbutton. Three octal digits must be set up on this indicator by means of the keyboard prior to each ENTR or READOUT pushbutton depression.
12M2	DATA INDICATOR	This sign (+ or -) and five digit indicator, displays data to be entered into, or read out from, the AEA computer address displayed on 12M1. Data to be entered is selected by the crew via the keyboard and entered by depressing 12S14. Data selected for readout by the AEA computer address identified on 12M1 is displayed if 12S15 is depressed. The display updating rate of any changing data selected for readout is limited to two times per second.
12DS1	OPERATOR ERROR STATUS LIGHT (WHITE)	This (OPR ERR) status light is illuminated if the crew depresses an incorrect number or sequence of pushbuttons for the operation

SUBSYSTEM: ABORT GUIDANCE (DEDA) (FUNCTIONAL GROUPING 12)

Code	Control/Indicator	Function
12DS1 (Cont.)		being performed. If too few pushbuttons have been pushed the indicator illuminates after the ENTR or READOUT buttons have been depressed. The indicator is also illuminated if the plus or minus keys are not pressed first in entering data and if an eight or nine or sign is used in entering an address (which is limited to octal digits). If too many depressions of the buttons have been made the OPR ERR indicator will illuminate before the ENTR or READOUT buttons are depressed.



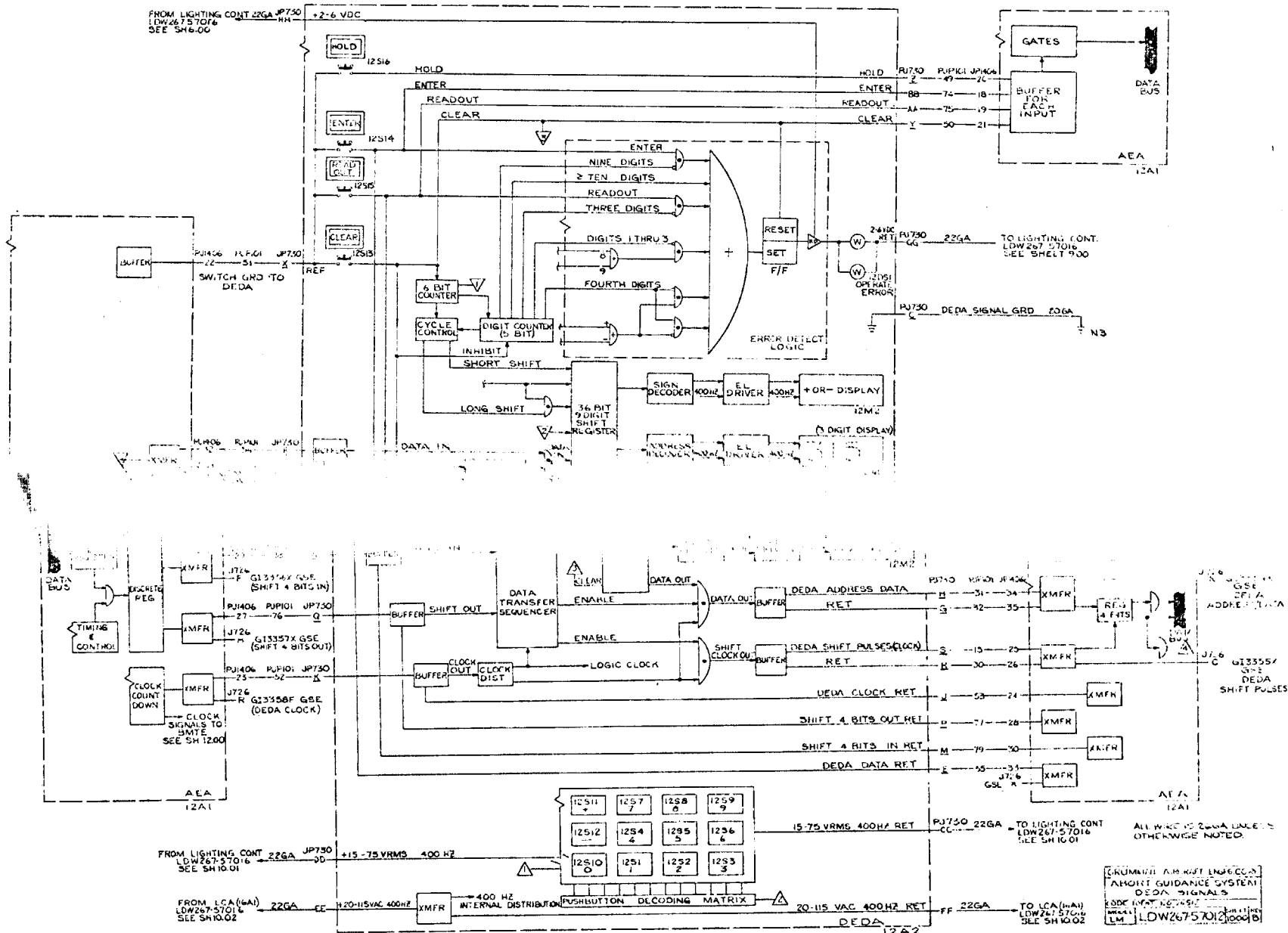
FROM PGNS
CDU BOX

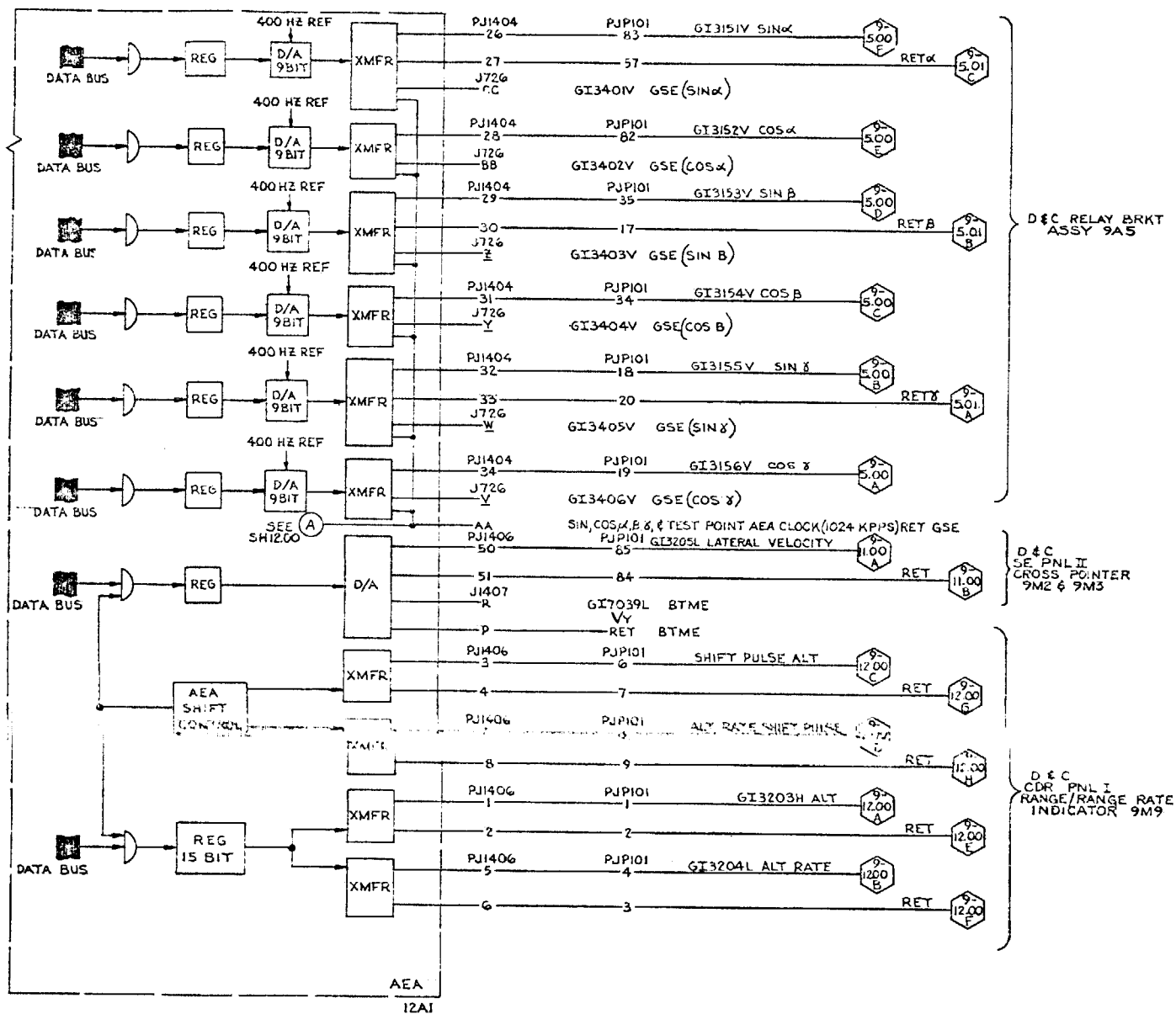


TO PGNS
CDU BOX

ALL WIRE IS 26GA UNLESS
OTHERWISE NOTED.

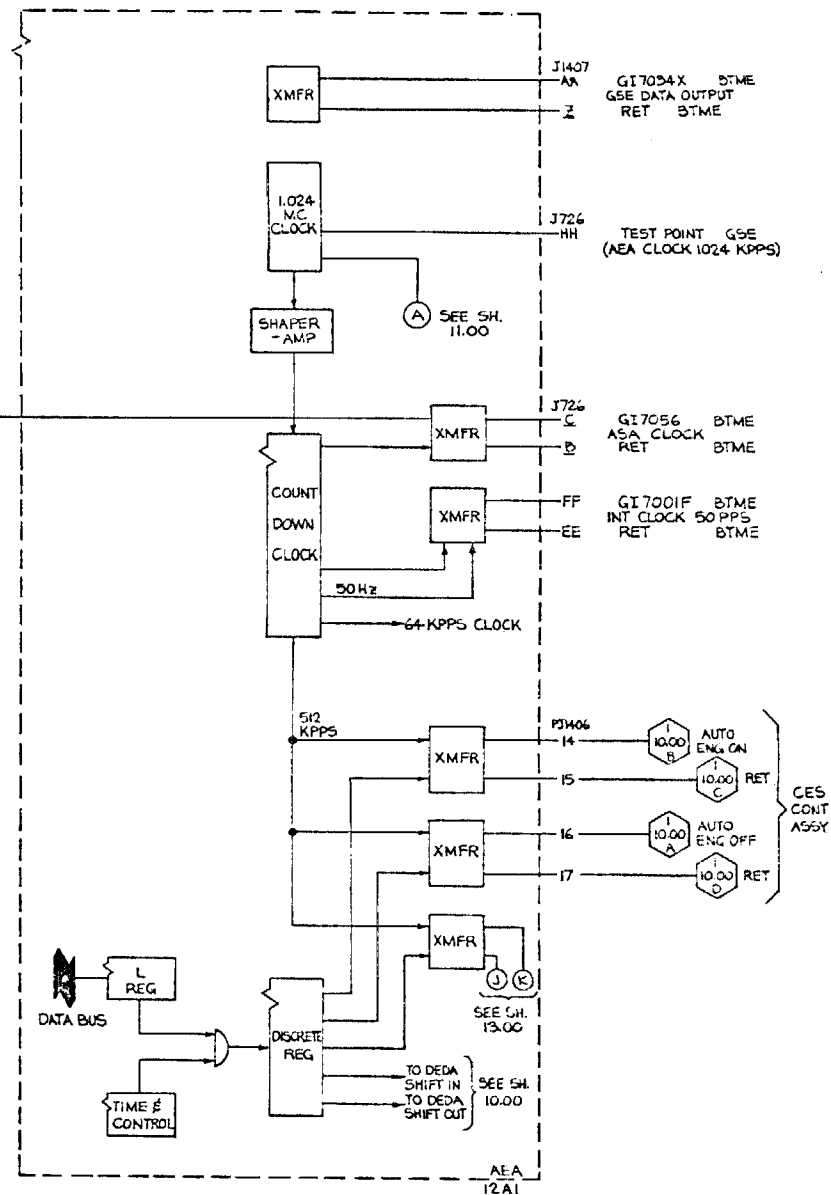
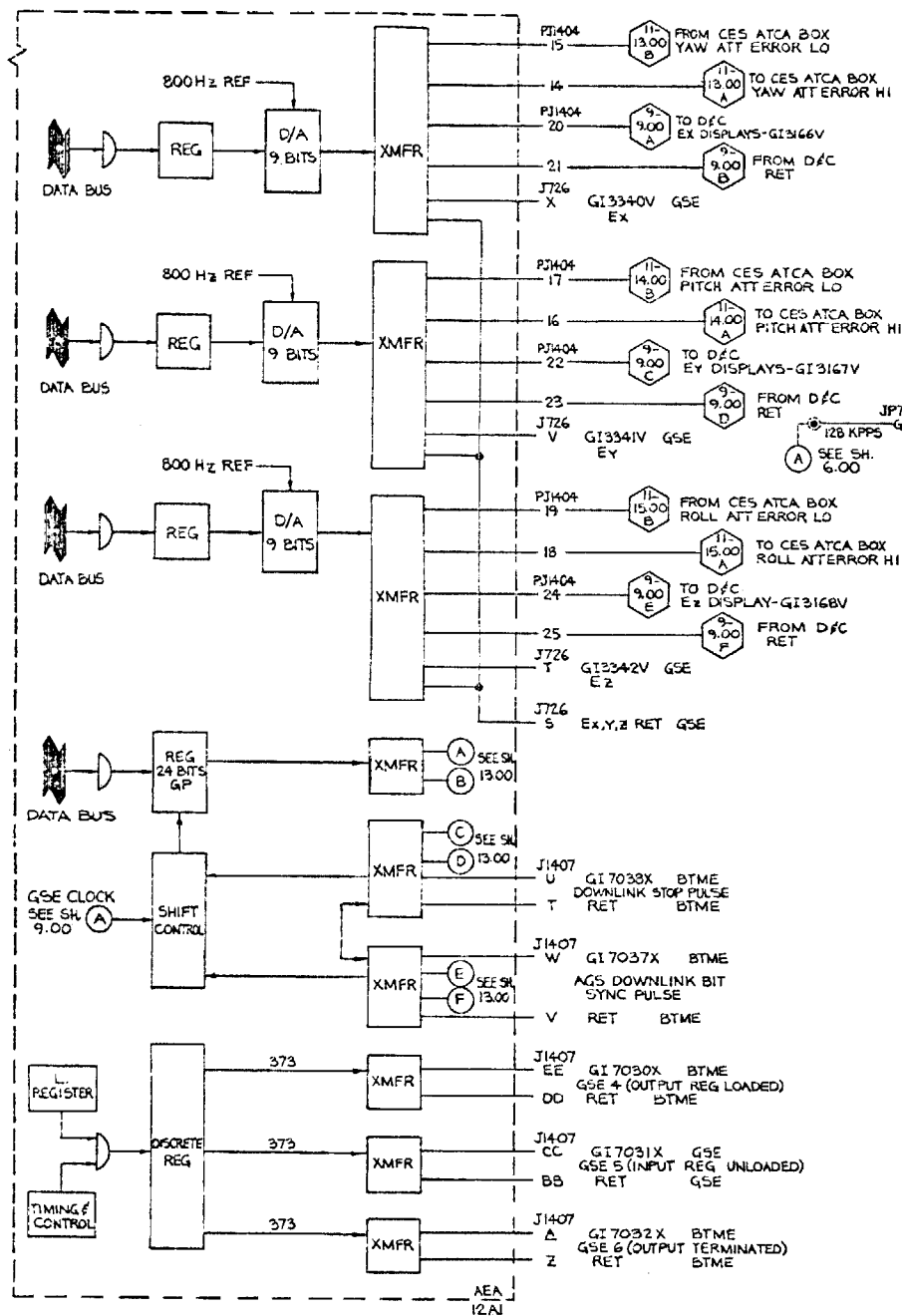
BOEING AIRCRAFT ENGINE CORP.	
BOEING GUIDANCE SYSTEM	
LOC / CDU TO AEA SIGNALS	
CIRCUIT NO. 25014	
MODEL	LDW267-57012
REV	000





ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGRG CORP	
ABORT GUIDANCE SYSTEM	
DATA OUTPUT TO DISPLAY	
CODE IDENT NO. 26512	
MODEL	11.00
LM	11.00



ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGRG CORP	
ABORT GUIDANCE SYSTEM, ATTITUDE ERROR AND ENGINE SIGNALS	
CODE IDENT NO 24012	
LM	LDW267-57012
LM	2.00

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 13)

COMMUNICATIONS

(REF LDW267-57013 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
Communications	LDW380-56000	H	J1, J2

2. Table of Contents

ITEM NAME	PAGE NO./SHEET NO.
a) Cover Sheet	13-701
b) Applicable Documents, Table of Contents, Notes and Revisions	13-702 thru 13-702.2
c) Cabin Location of Communications Controls and Indicators	13-703
d) S-Band Antenna Controls and Indicators Layout	13-704
e) VHF & S-Band Communications Controls and Indicators Layout	13-704.1
f) Audio Control and Indicators Layout	13-704.2
g) Controls and Indicators - Functional Description	13-705 thru 13-705.9
h) Communications Signal Flow Block Diagram	LDW267-57013 SH 4.00C
i) Communications Power Flow Block Diagram	LDW267-57013 SH 4.01C
j) TV and Signal Processor Power Distribution	LDW267-57013 SH 5.00C
k) S-Band Steerable Antenna Power Distribution	LDW267-57013 SH 6.00C
l) S-Band Transceiver, Diplexer and Amplifier Power Supplies	LDW267-57013 SH 6.01B
m) S-Band Antennas, Input and Output	LDW267-57013 SH 7.00B
n) S-Band Steerable Antenna	LDW267-57013 SH 8.00
o) S-Band Transceiver, Receiver Section	LDW267-57013 SH 9.00
p) Power Distribution, Processor Audio Section	LDW267-57013 SH 10.00B
q) SPA Audio Centers	LDW267-57013 SH 11.00B
r) Tape Recorder Power and Control	LDW267-57013 SH 12.00
s) Communication Umbilical Assembly and Space Suit Headset	LDW267-57013 SH 13.00B

2. Table of Contents (Cont)

ITEM NAME

PAGE NO./SHEET NO.

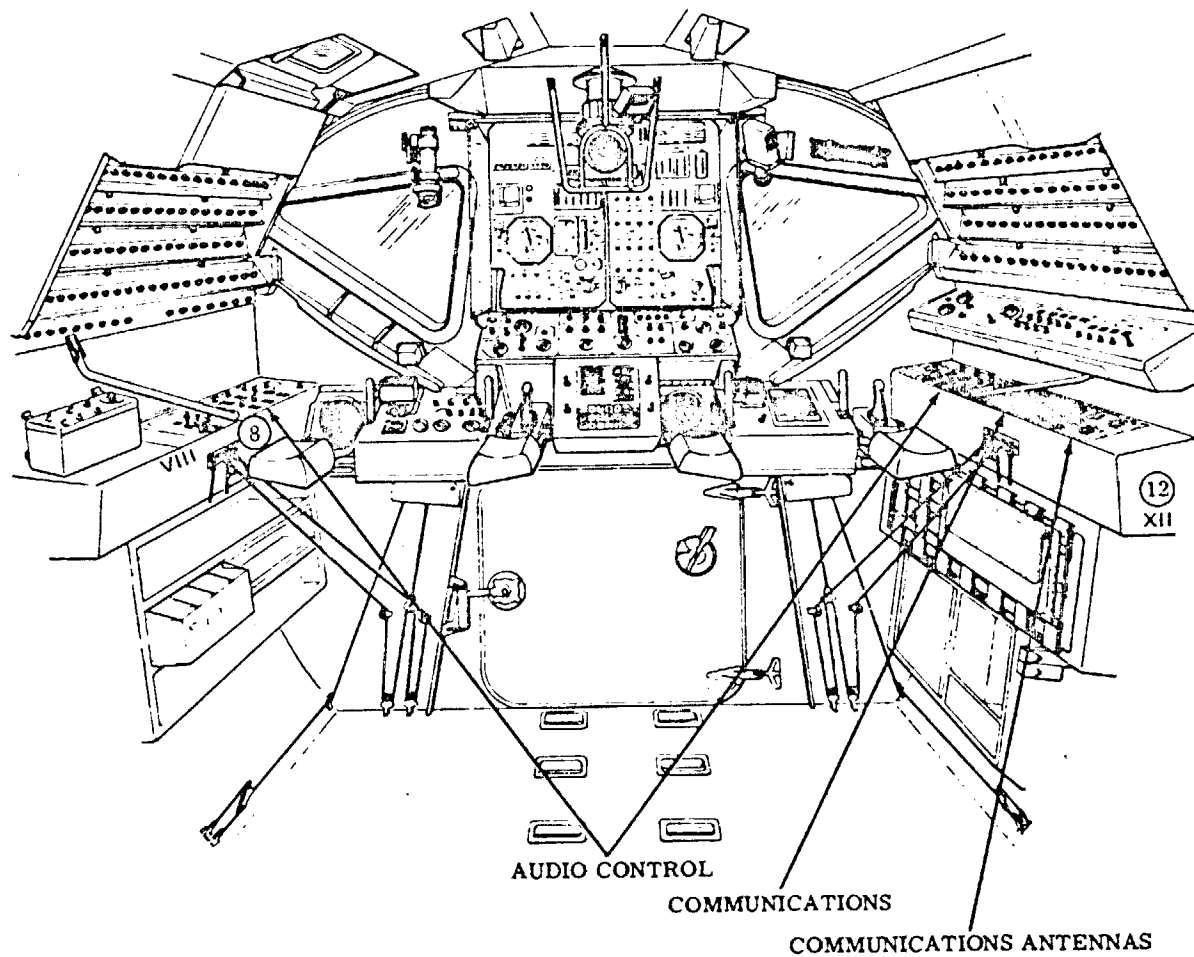
t) Digital Uplink Assembly, Power, Range Indication and BU Voice	LDW267-57013 SH 14.00
u) Signal Processor Assembly PMP Data Section	LDW267-57013 SH 15.00B
v) S-Band Transceiver Transmit Section	LDW267-57013 SH 16.00C
w) VHF Antennas and PLSS System	LDW267-57013 SH 17.00
x) VHF Transceivers	LDW267-57013 SH 18.00B
y) Ranging Tone Transfer Assy	LDW267-57013 SH 19.00C

3. REVISIONS

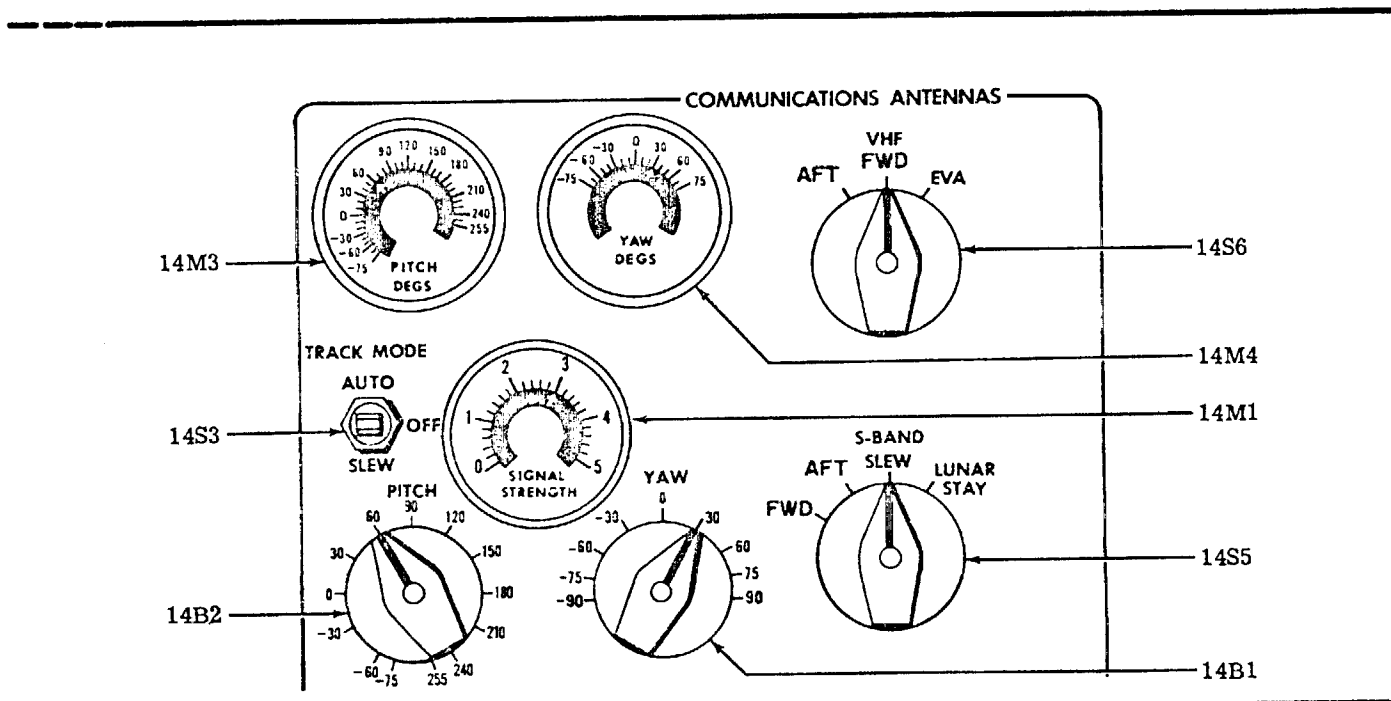
REV	PAGE NO. AND/OR LDW267-57013, SHEET NO.	LCD	DESCRIPTION
A	15.00	3887A	TO ELIMINATE OUT OF SPEC 1.024 MHZ S-BAND MODULATION INDEX
B	4.00, 4.01 5.00, 16.00	5370A	STOWAGE PROVISIONS FOR SPARE BLACK & WHITE T.V. CAMERA
	19.00	5226	ADD VHF B AGC MEASUREMENT
	4.00, 4.01 5.00, 16.00	5093	COLOR T.V. CAMERA INSTALLATION IN MESA
	7.00	3782A	PRESSURIZATION OF S-BAND POWER AMPLIFIER

3. REVISIONS (Cont)

REV	PAGE NO. AND/OR LDW267-57013, SHEET NO.	LCD	DESCRIPTION
C	19.00	5226B	ADD VHF RECEIVER B AGC MEASUREMENT
	4.00, 4.01, 5.00, 16.00	5370B	STOWAGE PROVISIONS FOR SPARE BLACK AND WHITE TV CAMERA
	704.1, 705.3	5157	ADDITION OF CIRCUIT BREAKER GUARDS ON PANELS 11 AND 16

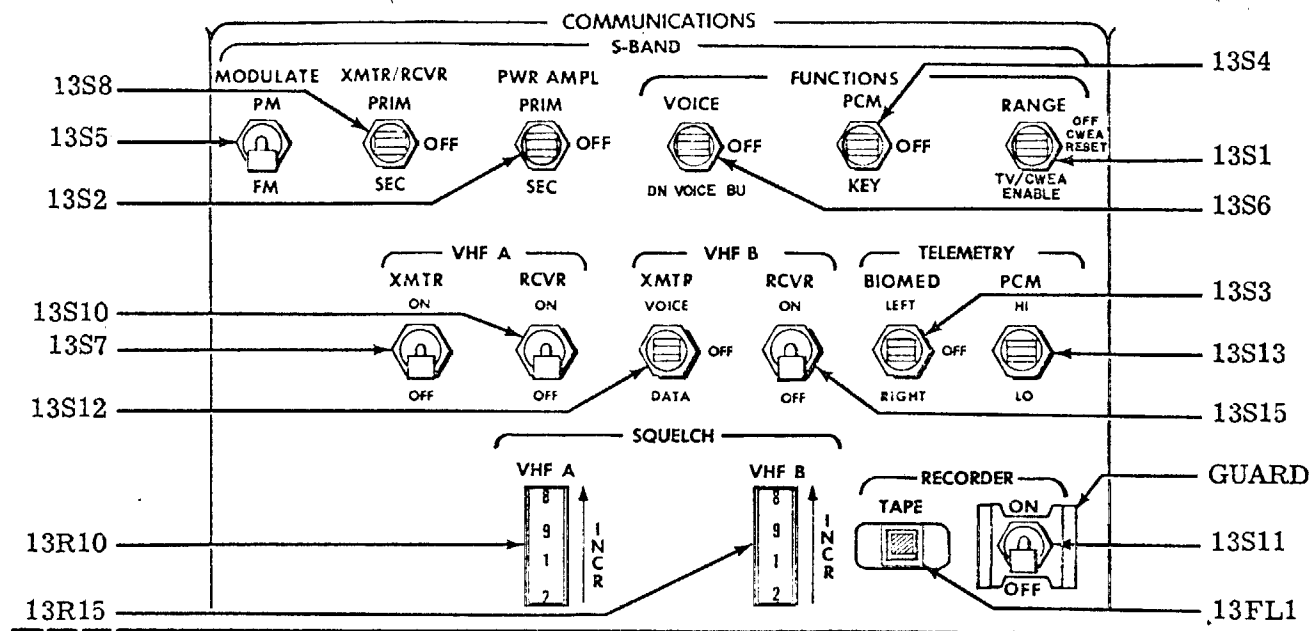


Cabin Location of Communications Controls and Indicators

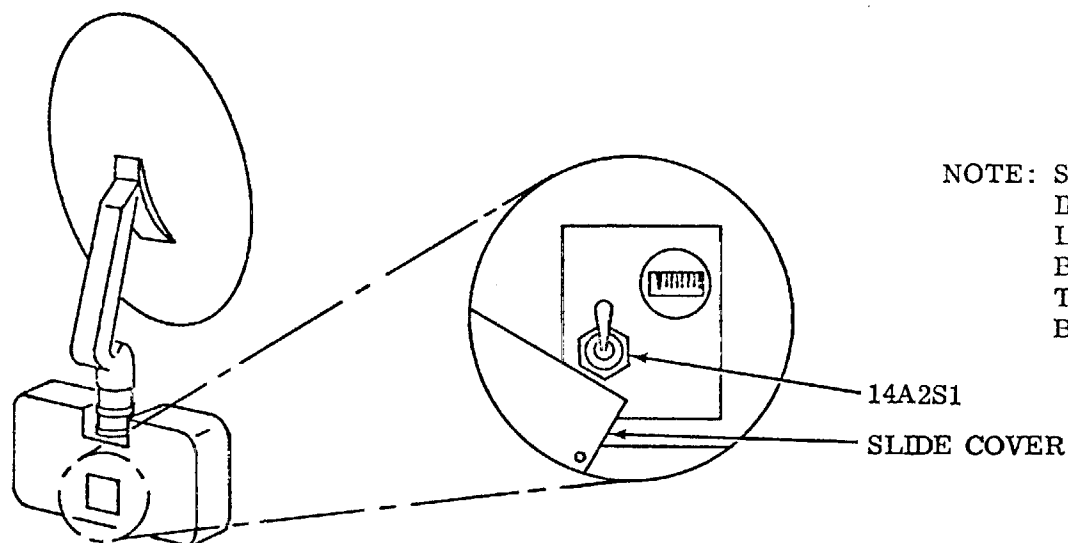
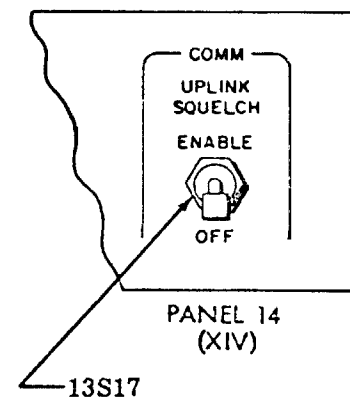


PANEL 12
(XII)

S-Band Antenna Controls and Indicators Layout



PANEL 12
(XII)

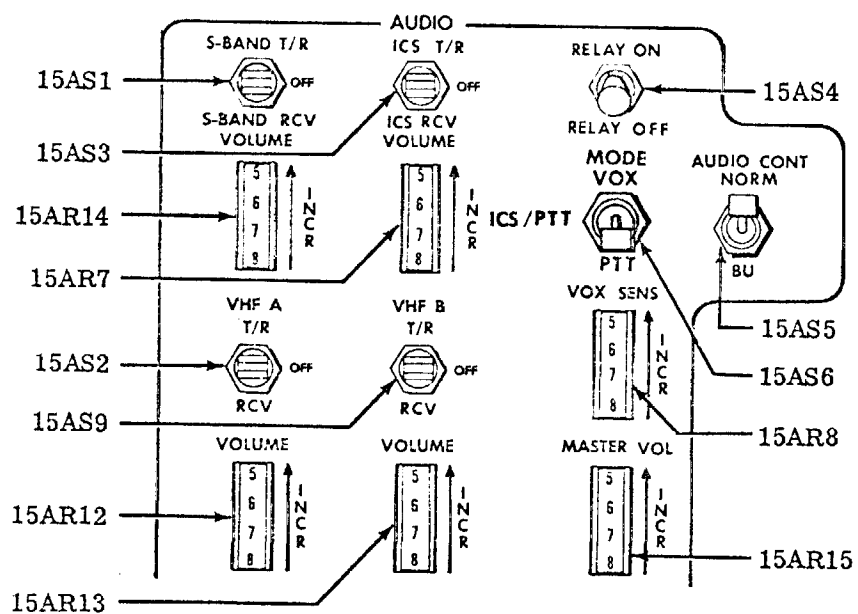


S-BAND STEERABLE ANTENNA

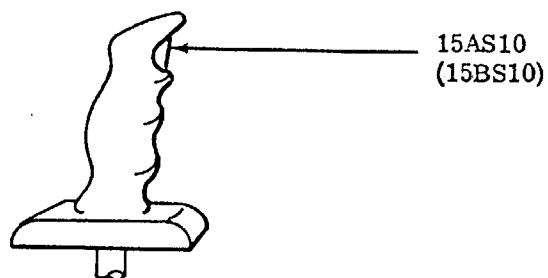
NOTE: SWITCH 14A2S1 IS LOCKED
IN UP (SAFE) POSITION BY
L-BRACKET. REMOVE
BRACKET AND SET SWITCH
TO DOWN (ARMED) POSITION
BEFORE FLIGHT.

VHF & S-Band Communications Controls and Indicators Layout

COMMANDER

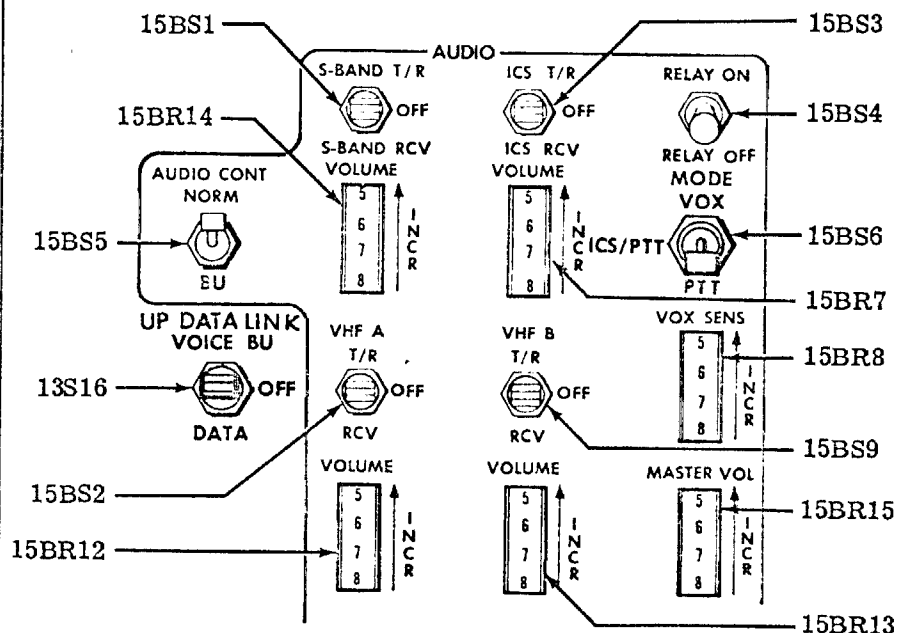


PANEL 8
(VIII)

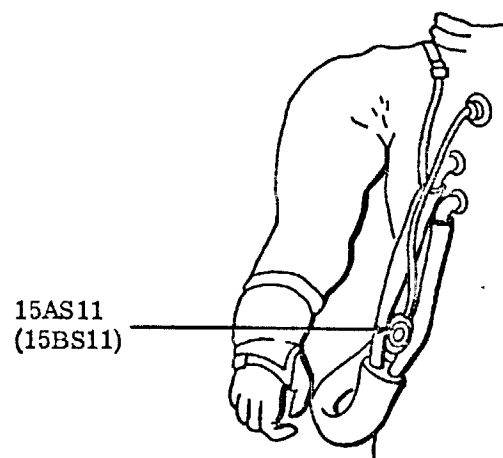


ATTITUDE CONTROLLER ASSY (ACA)

LM PILOT



PANEL 12
(XII)



SUIT UMBILICAL

Audio Control and Indicators Layout

SUBSYSTEM: COMMUNICATIONS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
13S1	RANGE FUNCTION SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (RANGE-OFF/RESET-TV/CWEA ENABLE) permits the selection of the ranging function for transmission via the S-Band equipment. In the RANGE position, the received ranging signal is re-transmitted back to earth via the phase modulated S-Band transmitter (13S5 in PM position). The TV CWEA ENABLE position enables the CWEA logic which feeds the annunciator light S-BD RCVR (6DS40). This light and the Master Alarm light and warning tone will be activated, if for any reason, the received signal is interrupted. This position disables the range gate, thereby interrupting the re-transmission of the ranging signal to earth. This position is not wired into the TV circuitry. If 13S1 is in the OFF/RESET position, the range gate is disabled. This position also provides a reset to the CWEA logic which feeds the annunciator light S-BD RCVR (6DS40). A reset will extinguish the light, if on, or inhibit it from illuminating if not on.
13S2	POWER AMPLIFIER SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (PRIM-OFF-SEC) permits the selection of either of two redundant power amplifiers for use with the S-Band equipment. When activated, the amplifier requires a 72 watt power input; however during certain phases of the lunar stay, S-Band transmissions are possible in a low power mode, with the power amplifier turned off. This switch is enabled only if 13S8 is in the PRIM or SEC position, thus preventing operation of either power amplifier without a driving signal.
13S3	BIOMEDICAL SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (LEFT-OFF-RIGHT) selects which crew station hard-line biomedical data will be sent to earth via the S-Band. In the LEFT or RIGHT positions, inputs are fed from the Commander's

SUBSYSTEM: COMMUNICATIONS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
13S3 (Cont.)		or LM PILOT'S stations respectively. With this switch in the OFF position, and with 13S6 in the DN VOICE BU position, the transmission of hardline BIOMED and EMU data is interrupted, and additional speech processing of the voice signal transmitted to earth is accomplished.
13S4	PCM/KEY FUNCTION SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (PCM-OFF-KEY) permits the selection of either the telemetry or the emergency keying function for transmission via the S-Band equipment. In the PCM position, telemetry data is routed to the PMP for transmission to earth via the S-Band. (This function is used in conjunction with 13S13). In the OFF position no data is transmitted, nor is the subcarrier transmitted. In the KEY position all other selected S-Band functions (13S1, 13S3, 13S5, and 13S6) are interrupted and the PM section of the selected S-Band transmitter is enabled; DC power is applied to the PMP emergency key gating circuitry, and the PTT/Keyer switches (15AS10, 15BS10, 15AS11 and 15BS11) located on the ACA's and ECS suit umbilicals, are enabled to serve as Morse code keyers for emergency transmissions.
13S5	MODULATE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This switch (PM-FM) permits selection of either the PM or the FM mode of transmission for the S-band transmitter. All S-band transmission modes are normally PM, except for television transmissions during lunar stay, which require the FM mode. In addition, transmission of television data requires that 13S2 and 13S8 be in the PRIM or SEC positions.

SUBSYSTEM: COMMUNICATIONS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
13S6	VOICE FUNCTION SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (VOICE-OFF-DN VOICE BU) permits the selection of either normal voice or backup voice for transmission via the S-band equipment. In the VOICE position, the voice output is modulated onto a 1.25 MHz subcarrier within the PMP and routed to the S-band PM transmitter for transmission to earth. If the FM transmitter is selected, and 13S1 is in the OFF/Reset position, the voice is routed to the FM transmitter for modulation directly on the carrier (used during lunar stay). In the VOICE BU position, the PM section of the S-band transmitter is automatically selected (regardless of the position of 13S5) to transmit voice directly on the carrier, bypassing the PMP. In this position the system is permitted to transmit low bit rate PCM data on a 1.024 MHz subcarrier if the PCM position is selected on 13S4 and either of the hardline biomedics are selected on 13S3. (Additionally, in the DN VOICE BU position, the ranging or television function of 13S1 is interrupted if either has been selected). In the OFF position, all S-band voice transmission capability is interrupted.
13S7	RANGE/VOICE SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (VOICE/RNG-OFF-VOICE) enables simultaneous voice transmission & range capability via the VHF A XMTR when in the VOICE/RNG position. In the VOICE position it enables voice transmission only. All power from the VHF A XMTR is removed in the OFF position.
13S8	TRANSMITTER/RECEIVER SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (PRIM-OFF-SEC) selects either of two redundant S-Band transmitter/receiver combinations. The redundant components involved are: power supplies, receivers, PM modulators

SUBSYSTEM: COMMUNICATIONS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
13S8 (Cont.)		and transmitter chains. In the OFF position power to this S-band equipment is interrupted.
13S10 13S15	VHF A RECEIVER SWITCH VHF B RECEIVER SWITCH TWO 2-POSITION TOGGLES MAIN-MAIN	These switches (ON-OFF) control primary power to the VHF A receiver (296.8 MHz) and VHF B receiver (259.7 MHz) respectively. In the ON position, electrical power is applied to the A or B receiver assembly and in the OFF position power to the assembly is interrupted.
13S11	TAPE RECORDER SWITCH 2-POSITION TOGGLE MAIN-MAIN	This guarded switch (ON-OFF) is used in conjunction with the VOX circuit for controlling tape recording. In the ON position the tape transport equipment is capable of being turned on and off automatically under the control of the VOX trigger signal. In the OFF position the VOX trigger signal to the recorder is interrupted. The recorder unit includes a ten-hour tape supply. End of tape sensing provides automatic turn-off and termination of tape movement.
13S12	VHF B TRANSMITTER SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (VOICE-OFF-DATA) provides primary power of the VHF B transmitter (259.7 MHz) for either of two modes of operation. In the VOICE position the transmitter can be used for voice transmissions to the CSM and/or EVA and in the DATA position this equipment can be used to transmit PCM Telemetry data to the CSM. However, in the DATA position, 13S13 must be in the LO position. In the OFF position power to the assembly is interrupted.
13S13	PCM RATE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This switch (HI-LO) selects the high or low bit rate telemetry to be transmitted via PCM to earth on S-band. Some information is sent in high bit rate telemetry only, including AGS and PGNS downlink,

SUBSYSTEM: COMMUNICATIONS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
13S13 (Cont.)		and AGS State Vector update via PGNS downlink. Additionally, with this switch in the LO position, and with switch 13S12 in the DATA position, PCM telemetry data is transmitted to the CSM and recorded there for eventual re-transmission to earth. (Used when LM is behind the moon and when CSM is in LOS.)
13S16	UPDATA LINK SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This switch (VOICE BU-OFF-DATA) in the VOICE BU position, enables the voice circuitry of the digital uplink assembly (DUA) and inhibits the data circuitry. In the DATA position it enables the DATA circuitry of the DUA and inhibit the voice circuitry. In the OFF position all power is removed from the DUA.
13S17	UPLINK SQUELCH SWITCH 2-POSITION TOGGLE MAIN-MAIN	This switch (ENABLE-OFF) in the ENABLE position prevents the voice output of the S-Band transceiver from being received or retransmitted via the signal processor assembly (SPA) whenever there is a loss of the 30 KHz subcarrier. In the OFF position all power is removed.
13R10 13R15	VHF A SQUELCH CONTROL THUMBWHEEL VHF B SQUELCH CONTROL THUMBWHEEL	These thumbwheels (↑INCR) permit continuous adjustment of the threshold of the VHF A and VHF B receiver squelch circuits, i.e.: they adjust the level which the incoming signal must exceed in order for it to be heard, and thereby serve to eliminate the noise level in the VHF A or VHF B receiver during periods when no voice signal is present.
13FL1	TAPE STATUS 2-POSITION FLAG	This flag (GREY-BARBERPOLE) indicates, in the grey position, that the tape is moving and that voice recording is taking place. Conversely, the barberpole position indicates that the tape is not moving and that voice recording is not taking place.

SUBSYSTEM: COMMUNICATIONS ANTENNAS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
14S3	TRACK MODE SELECT SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (AUTO-OFF-SLEW) selects the control mode by which the S-band steerable antenna is positioned. In the OFF position, power to the antenna drive motors is interrupted. In the SLEW position the steerable antenna is positioned by using 14B1 and 14B2 to peak 14M1. In the AUTO position, the earth sensor is activated, which will automatically keep the antenna pointed at earth, provided the antenna is oriented to within ± 12 degrees of the earth.
14S5	S-BAND ANTENNA SELECT SWITCH 4-POSITION ROTARY	This four-position rotary (FWD-AFT-SLEW-LUNAR STAY) provides selection of any of the four S-band antennas for communication with earth. The FWD and AFT positions select #1 and #2 omni-directional antennas respectively, for use in the event of S-band steerable antenna failure. The SLEW position selects the steerable antenna, and the LUNAR STAY position selects the S-band erectable antenna for use during lunar stay. A lock mechanism is incorporated in this rotary knob to prevent inadvertent selection of the LUNAR STAY position in the absence of an antenna load at the connector.
14S6	VHF ANTENNA SELECT SWITCH 3-POSITION ROTARY (SEE EFD13-704)	This rotary (AFT-FWD-EVA) provides selection of any of three VHF antennas for communication with (a) command module or (b) the extra-vehicular astronaut. The AFT position is used for checking out the Portable Life Support System Communications. Positions AFT and FWD are used for communication with the CM. The EVA position is provided for LM/EVA communications during lunar stay. A lock mechanism is incorporated in this rotary knob to

SUBSYSTEM: COMMUNICATIONS ANTENNAS (FUNCTIONAL GROUPING 13)

Code	Control/Indicator	Function
14S6 (Cont.)		prevent inadvertent selection of the EVA position in the absence of an antenna load at the connector.
14M1	SIGNAL STRENGTH INDICATOR	This indicator displays the intensity of S-band signals received from the earth. It is utilized in conjunction with 14B1 and 14B2 to manually establish signal contact with the earth. When peaked, it indicates that the S-band steerable antenna is pointing at the earth. It can be used as an indication of the pointing accuracy of the steerable antenna or erectable antenna, or it can indicate which of the two in-flight antennas is providing the best link to earth.
14M3 14M4	ANTENNA PITCH INDICATOR ANTENNA YAW INDICATOR	These indicators display the pitch (14M3) and yaw (14M4) angles of the S-band dish antenna. The antenna pitch limits are 255° above and 75° below a plane parallel to the vehicle Y-Z plane. The antenna yaw limits are 90° to the left and 90° to the right of a plane parallel to the vehicle X-Y plane. The antenna is positioned to the desired pitch and yaw angles by using 14B1 and 14B2, and by reference to the antenna pitch and yaw indicators.
14B1 14B2	PITCH SLEW CONTROL YAW SLEW CONTROL (TWO CONTINUOUS ROTARY CONTROLS WITH POSITIVE STOPS)	Each of these rotary controls actuates a synchro transmitter which generates position command signals to the antenna drive assembly in the pitch and yaw axes, when 14S3 is in the SLEW position. Positioning these controls transmits corresponding position commands to the antenna drive assembly in two axes, and position signals from the antenna assembly drive and panel indicators (14M3 and 14M4).

SUBSYSTEM: AUDIO CONTROL (FUNCTIONAL GROUPING 13)

Note: The Commander's Audio controls (15A) and the LM Pilot's Audio controls (15B) have identical components. Therefore, this listing and description of controls applies to both functional groupings.

Code	Control/Indicator	Function
15AS1 (15BS1)	S-BAND SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (S-BAND T/R-OFF-S-BAND RCV), in the S-BAND T/R position, routes received S-band voice to the headset, and mike amplifier outputs to the PMP for transmission via S-band equipment. In the OFF position, neither the S-band receiver nor transmitter output is routed through the Audio Center. In the S-Band RCV position, the audio center is enabled to accept received S-Band voice.
15AS2 15AS9 (15BS2) (15BS9)	VHF A SWITCH VHF B SWITCH TWO 3-POSITION TOGGLES MAIN-MAIN-MAIN	These three-position toggles (T/R-OFF-RCV), in the T/R positions, route received VHF voice signals to the headsets, and mike amplifier outputs to the PMP for transmission via the VHF equipment. In the T/R position, the VOX or PTT keying voltages are routed to the VHF transmitter. In the OFF position the respective microphone and headset amplifiers are disconnected from the VHF transceivers. In the RCV position, the audio center is enabled to accept received VHF voice. 15AS2 and 15BS2 enable these control capabilities with the VHF A equipment. 15AS9 and 15BS9 enable these control capabilities with the VHF B equipment.
15AS3 (15BS3)	INTERCOM SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (ICS T/R-OFF-ICS RCV), in the ICS T/R position, routes mike amplifier outputs to the ICS bus and from there to the headset. In the OFF position the intercom capability is disabled. In the ICS RCV position voice signals on the ICS bus are routed to the headsets.

SUBSYSTEM: AUDIO CONTROL (FUNCTIONAL GROUPING 13)

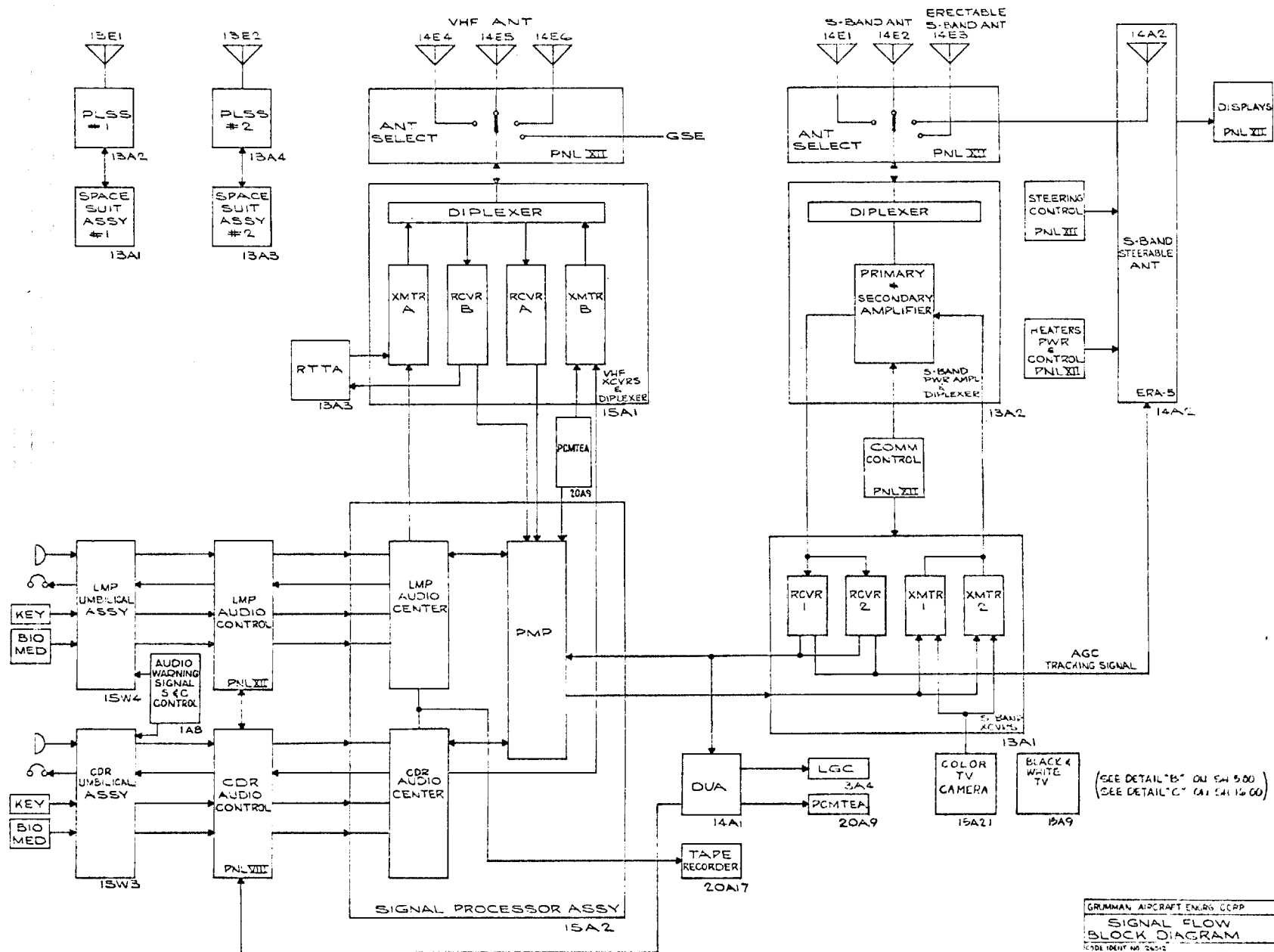
Code	Control/Indicator	Function
15AS4 (15BS4)	RELAY SWITCH 2-POSITION TOGGLE LOCK-LOCK	This two-position toggle (RELAY ON-RELAY OFF) in the RELAY ON position, establishes a voice conference capability among the Earth, LM and the Extra-Vehicular Astronaut, and relays received Extra-Vehicular Astronaut biomed data to Earth. Additionally, in the event of failure of the CSM-earth S-band link, received VHF from CSM can be relayed to earth via the LM S-band transmitter. In the RELAY OFF position these capabilities are not enabled. Only one relay switch must be "ON" at a time. Appropriate switch positions on both audio control panels must be selected to establish the desired relay link.
15AS5 (15BS5)	AUDIO CONTROL SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (NORM-BU) selects the audio center and microphone circuit which is to be utilized. In the NORM position the crewman is using his own audio center and microphone assembly. In the BU position he is utilizing the other crewman's audio center and microphone assembly.
15AS6 (15BS6)	MODE SWITCH 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (VOX-ICS/PTT-PTT) selects the manner in which the various equipments are keyed. In the VOX position the VOX control circuitry in the audio center is enabled to key both the intercom and selected transmitter(s). In the ICS position, the intercom is always "hot" (e.g., an open line continually exists between the astronauts; selected transmitters are keyed only by the push-to-talk (PTT) switches (15S10 and 15S11). In the PTT position the VOX circuit is disabled and both the intercom and selected transmitters can be keyed only by the PTT switches.

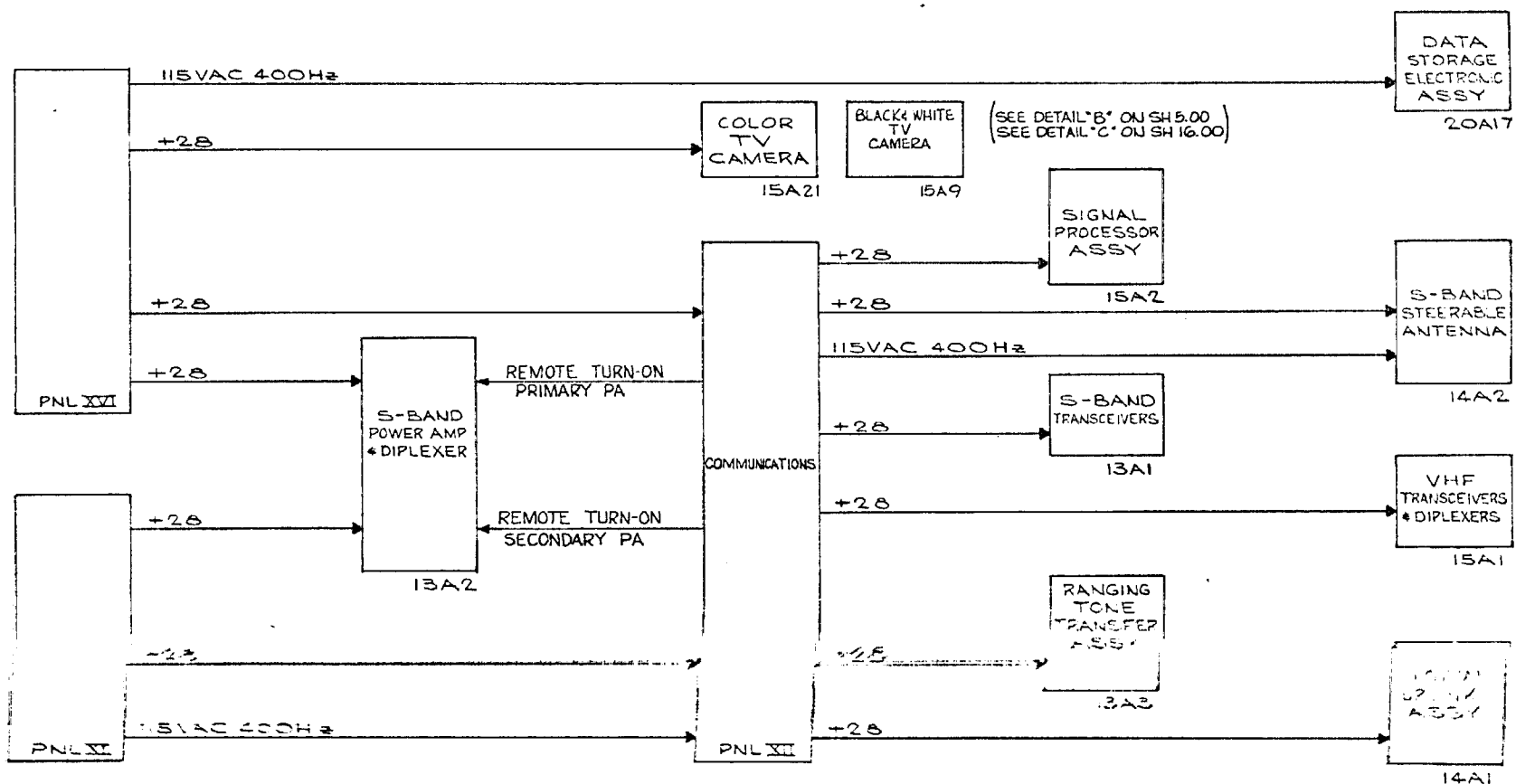
SUBSYSTEM: AUDIO CONTROL (FUNCTIONAL GROUPING 13)

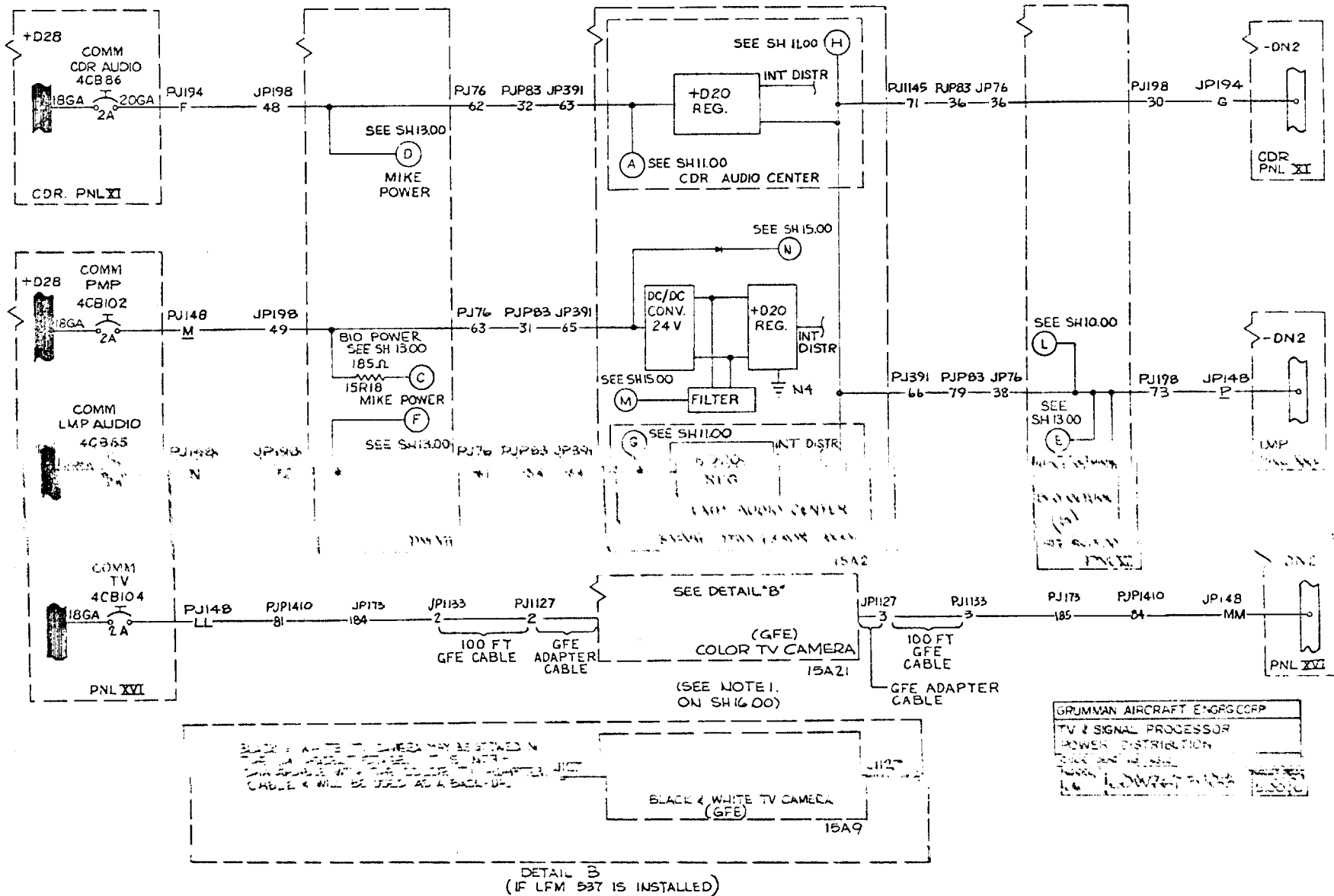
Code	Control/Indicator	Function
15AR7 (15BR7)	ICS VOLUME CONTROL THUMBWHEEL	This thumbwheel (↑ INCR) permits continuous adjustment of the level of the audio input of the ICS to the headset. Movement of the thumbwheel in an upward direction increases the volume; a downward movement decreases it.
15AR8 (15BR8)	VOX SENSITIVITY THUMBWHEEL	This thumbwheel (↑ INCR) permits continuous adjustment of the threshold of the VOX control circuit in the audio center. Movement of the thumbwheel in an upward direction increases VOX sensitivity, a downward movement decreases it.
15AS10 (15BS10)	PTT SWITCH MOMENTARY PUSHBUTTON	This momentary pushbutton, located on the astronaut's attitude controller, is used to key the intercom and/or selected transmitter(s).
15AS11 (15BS11)	PTT/KEYER SWITCH MOMENTARY PUSHBUTTON	This momentary pushbutton, located on the astronaut's LM Communications umbilical, is used to key the intercom and/or selected transmitter(s). Additionally, in the event of a voice communication failure, the S-band Function switch 13S4 can be placed in the KEY position, thus enabling this PTT switch to serve as a Morse code keyer. (In this mode, the PM section of the S-band transmitter is automatically utilized to transmit Morse code.)
15AR12 15AR13 (15BR12) (15BR13)	VHF A VOLUME CONTROL VHF B VOLUME CONTROL TWO THUMBWHEELS	These thumbwheels (↑ INCR) permit continuous adjustment of the audio level of the VHF A and VHF B receiver signals to the headset amplifier.

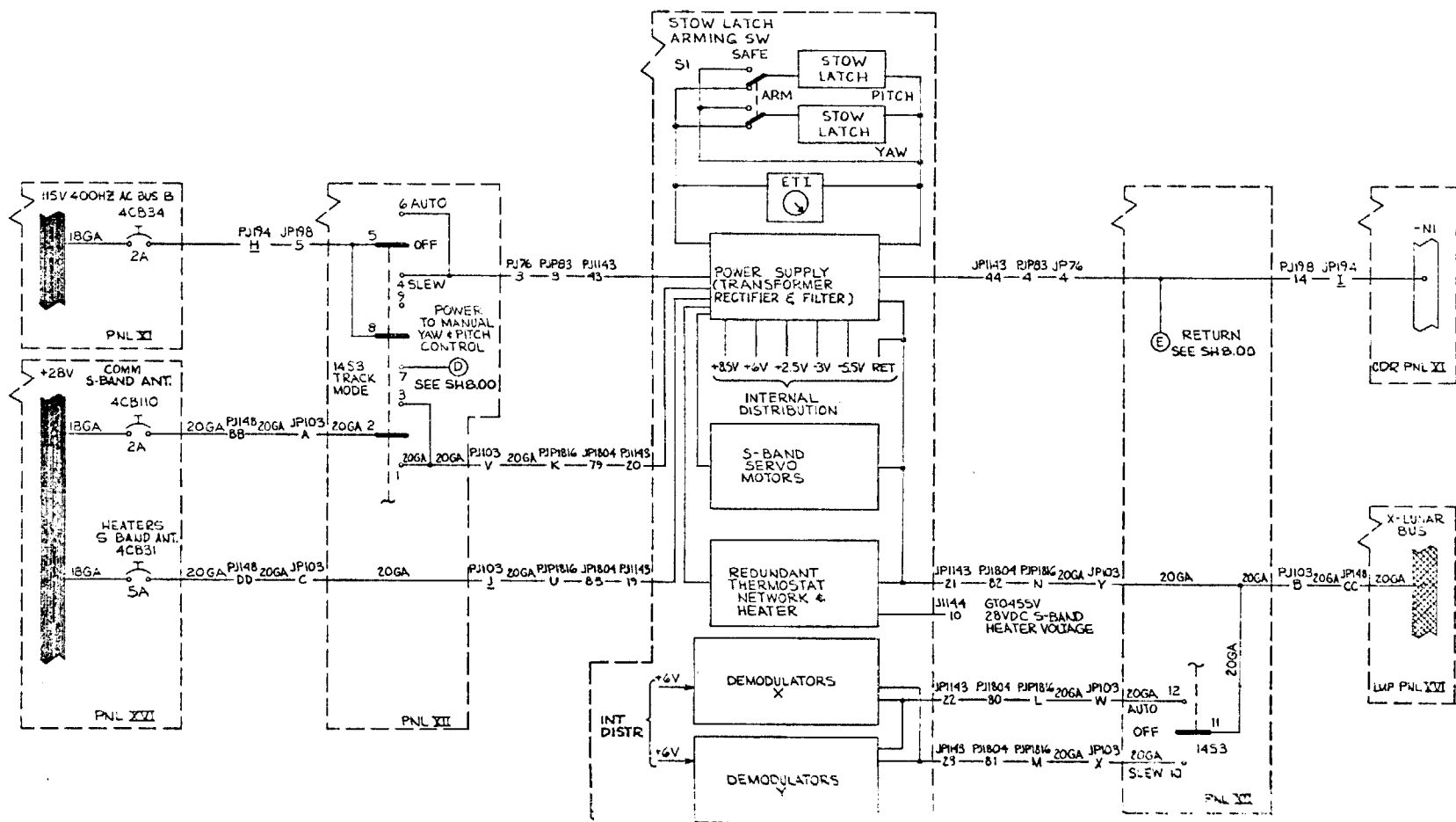
SUBSYSTEM: AUDIO CONTROL (FUNCTIONAL GROUPING (13)

Code	Control/Indicator	Function
15AR14 (15BR14)	S-BAND VOLUME CONTROL THUMBWHEEL	This thumbwheel (↑ INCR) permits continuous adjustment of the audio level of the S-band receiver signal to the headset amplifier.
15AR15 (15BR15)	MASTER VOLUME CONTROL THUMBWHEEL	This thumbwheel (↑ INCR) permits continuous adjustment of the level of all audio outputs (received VHF A and B, ICS and S-band) from the headset amplifier simultaneously. Thus, individual input levels would be set by using the respective volume control thumbwheels, and the overall level would be adjusted with this thumbwheel.
14A2S1	STOW LATCH ARMING SWITCH MAIN - MAIN (NOT ACCESSIBLE DURING FLIGHT)	This two-position switch (up-down) operates the stow latch mechanism, which restricts steerable antenna gimbal (pitch and yaw axes) movement. This switch, on the steerable antenna, is locked in the up (safe) position by an L-bracket. The bracket must be removed and the switch set to the down (armed) position before flight, to transfer control of the stow latch mechanism to the TRACK MODE switch (14S3). With 14A2S1 set to the armed position and 14S3 set to AUTO or SLEW, the stow latch mechanism releases the antenna to permit normal gimbal functions. If an electrical failure occurs, manually operated mechanical latches can be used to release the stow latch mechanism. The latches, mounted on the antenna, can only be released by an EVA.



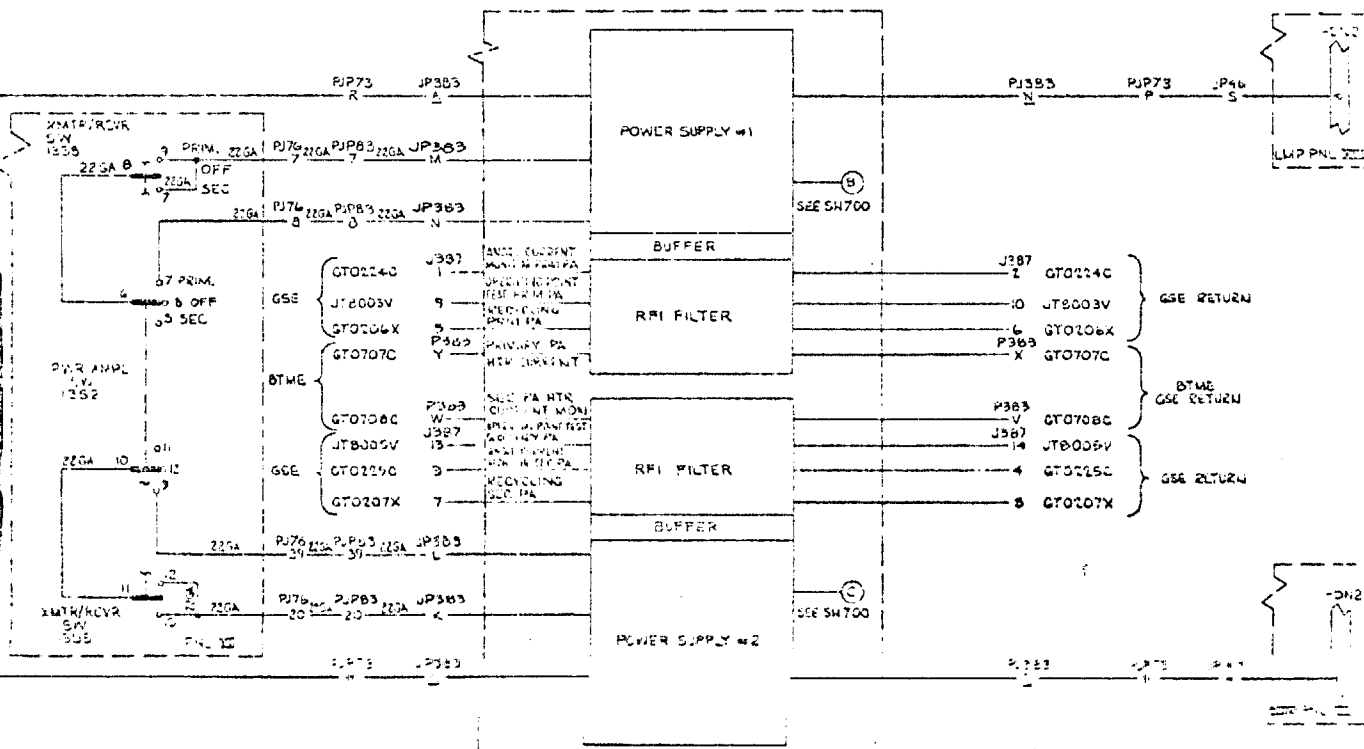
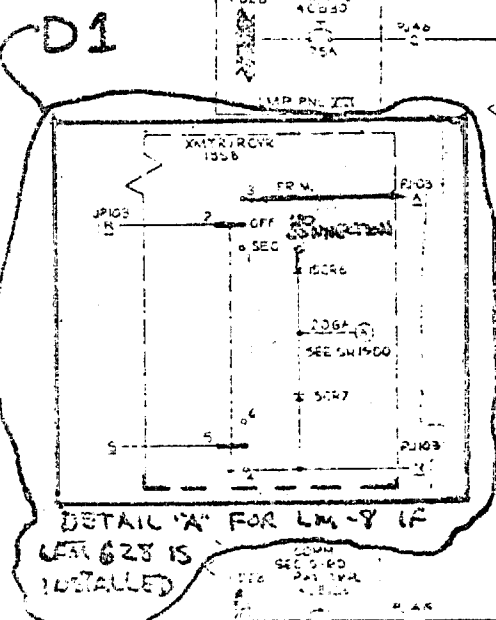
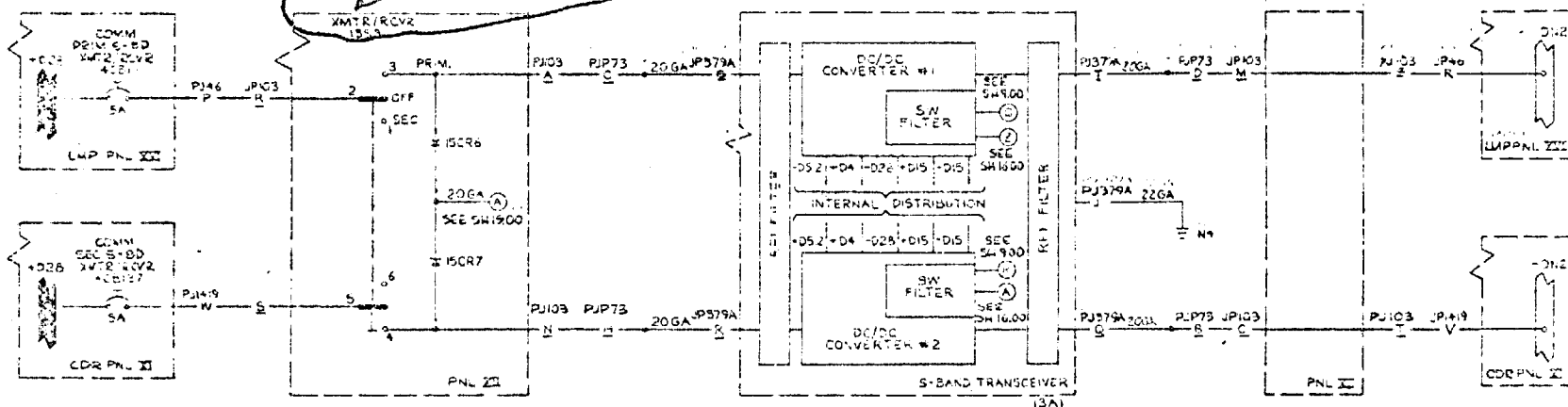






SEE DETAIL "A" FOR LM-8

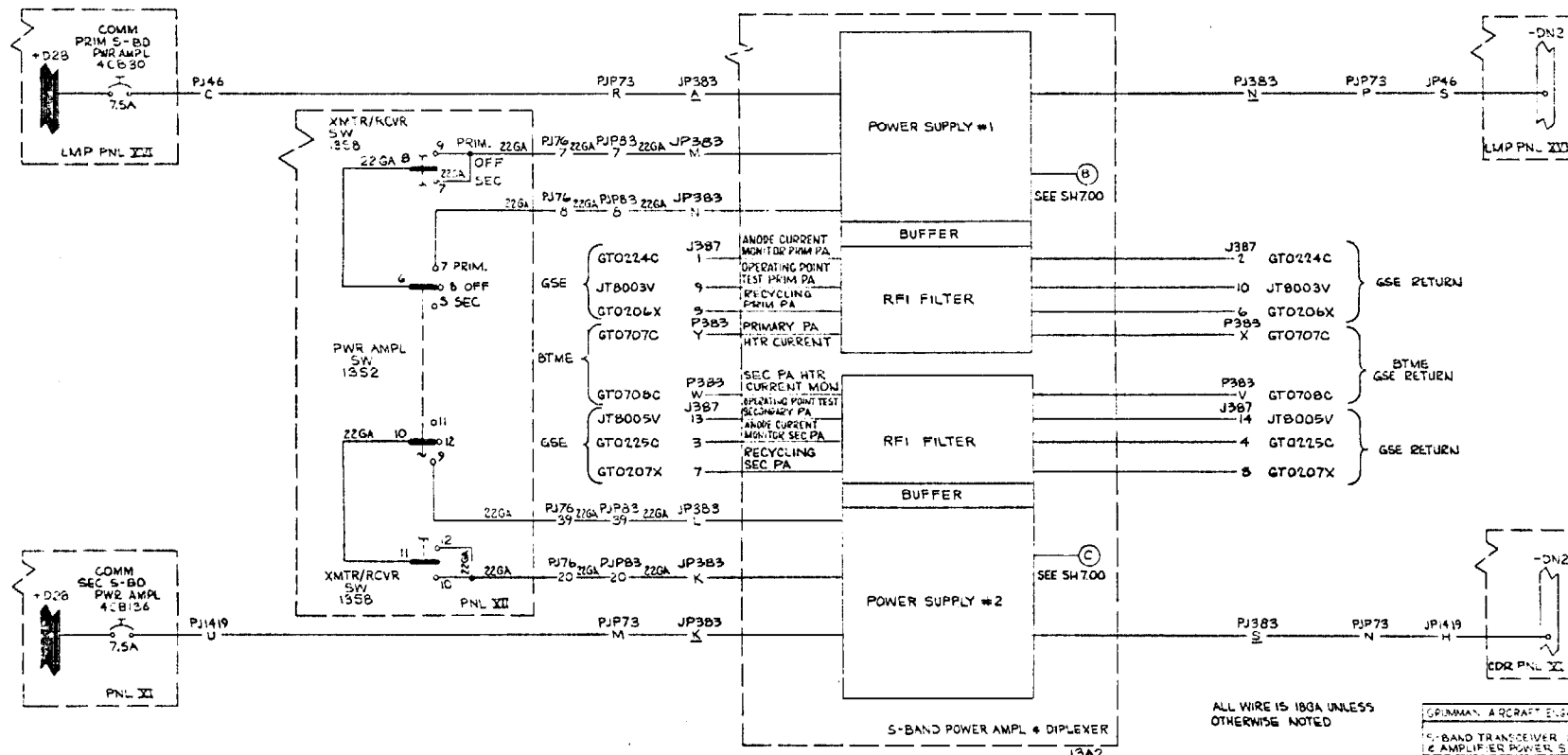
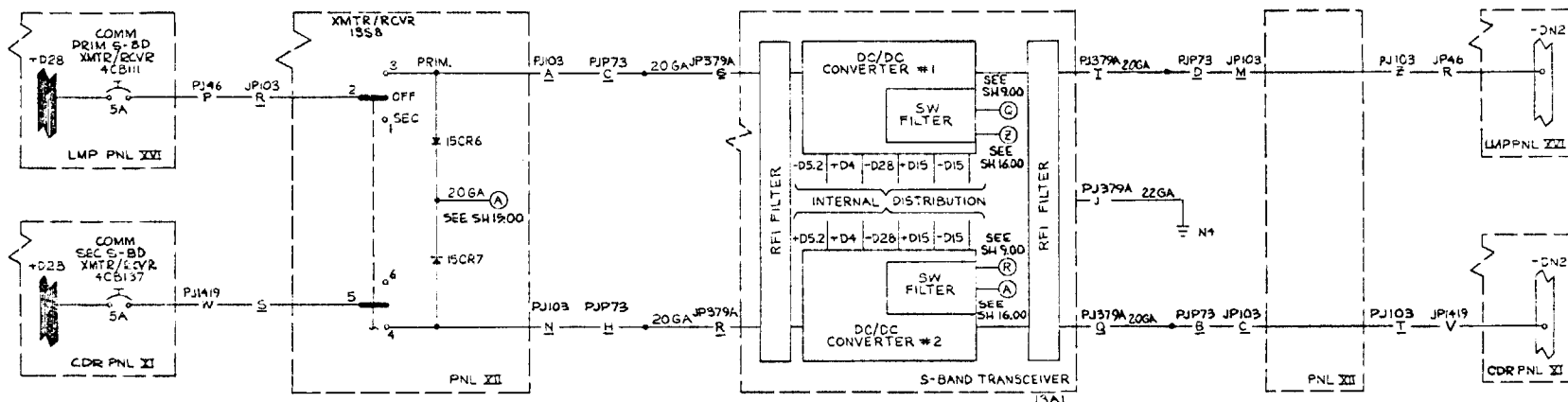
D1



REV	LCD	INITIAL
D1	5706	Low 12/1/70 HG

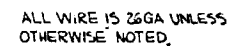
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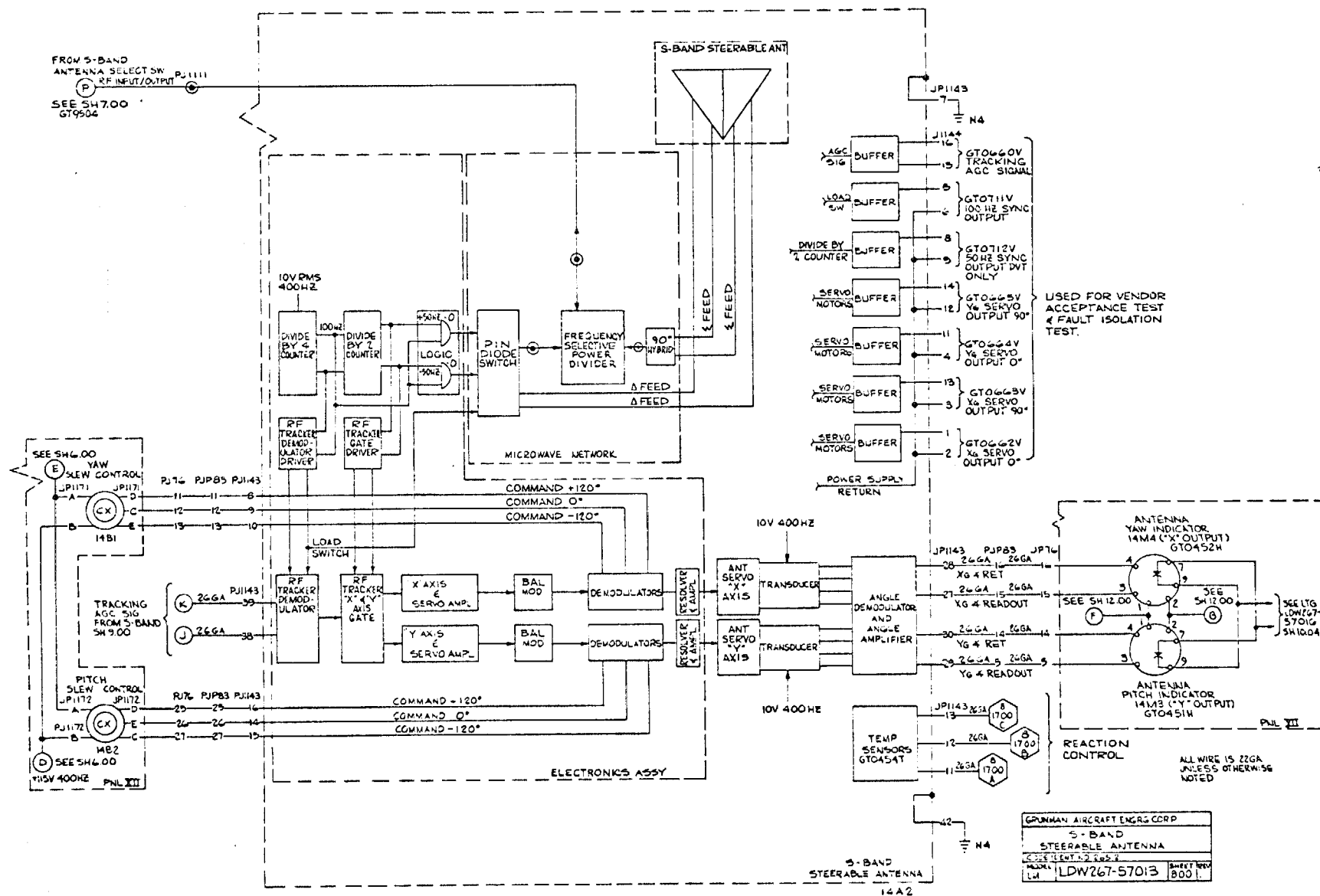
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12/1/70	HG		

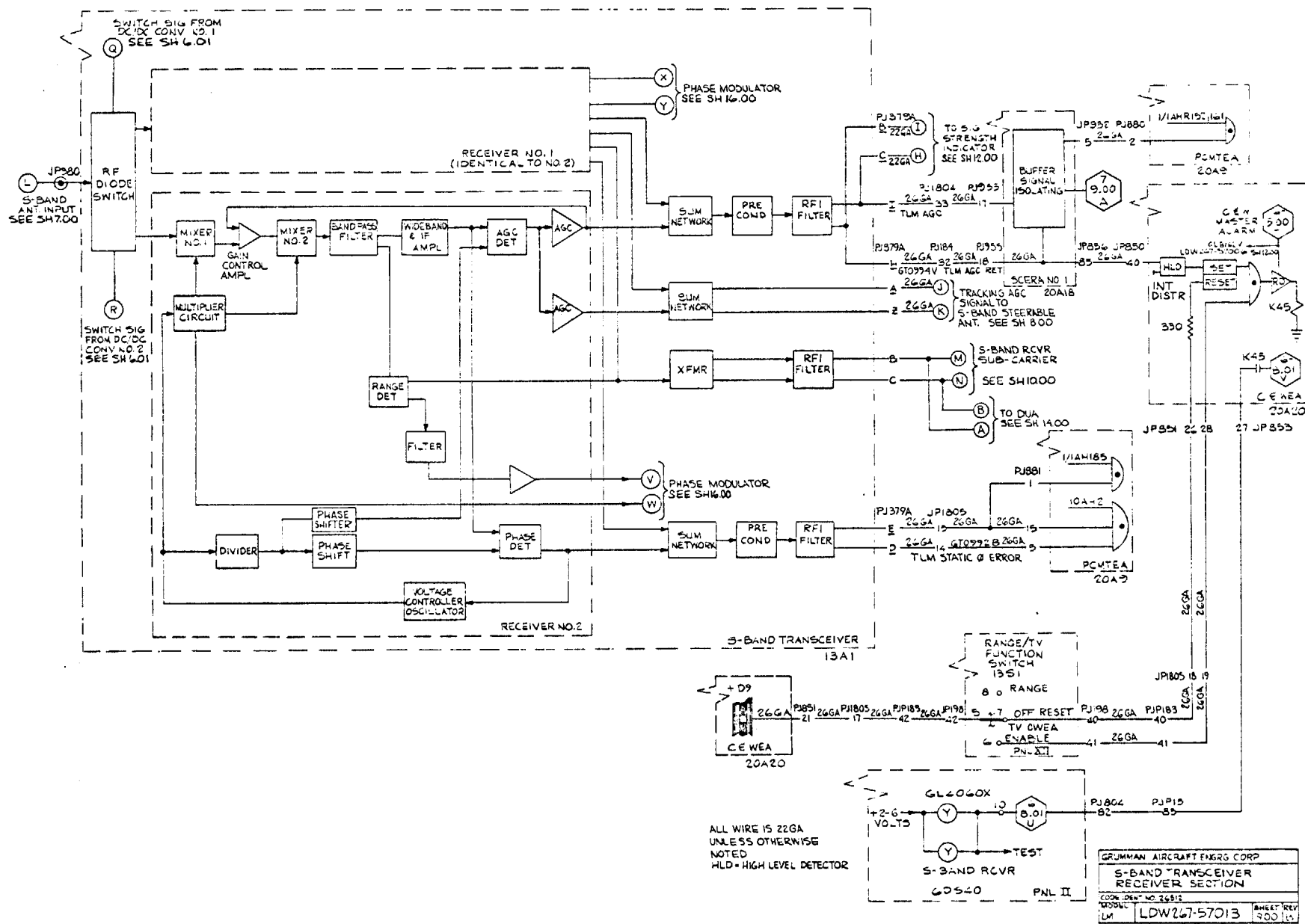


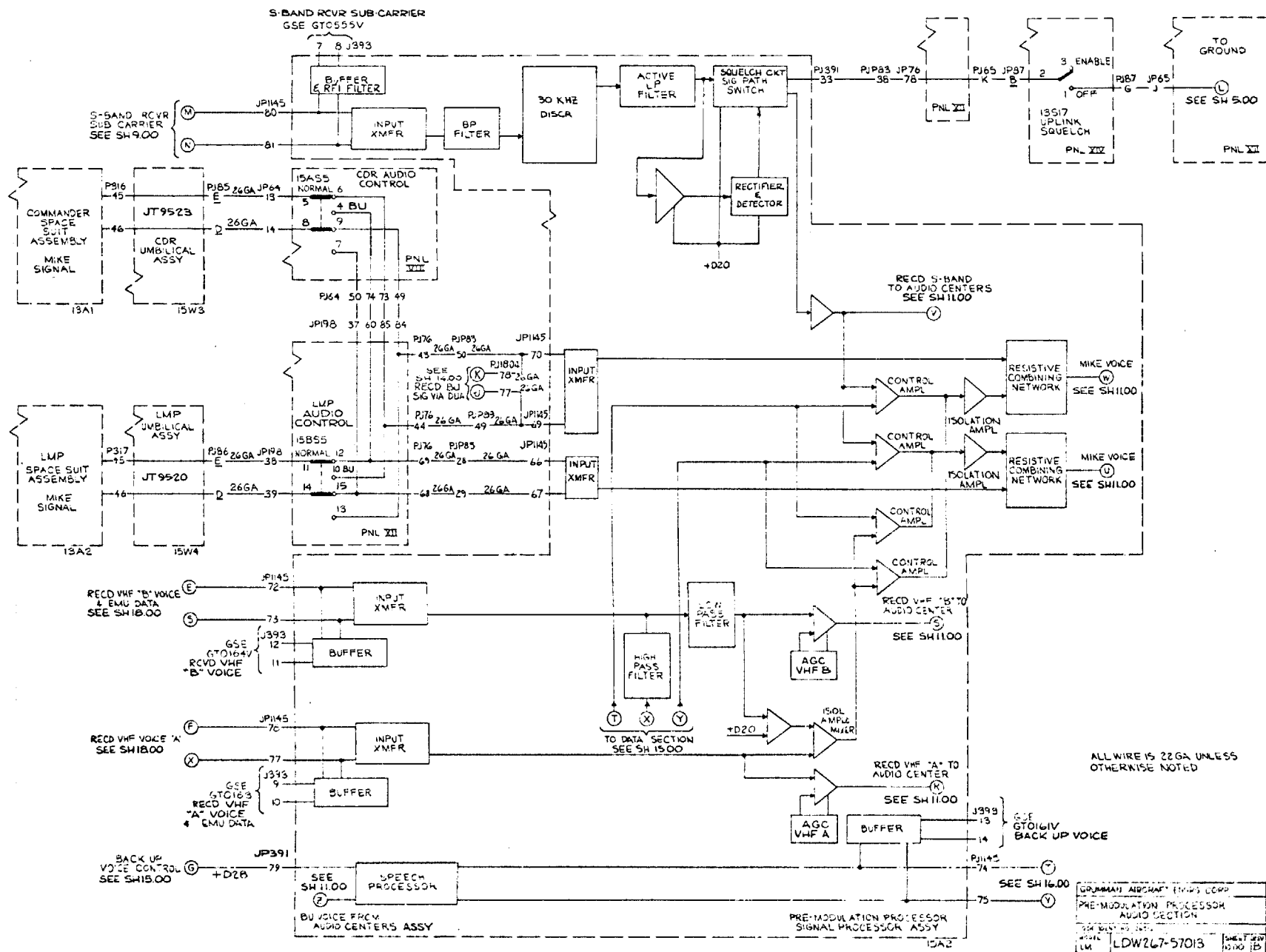
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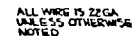
SPINMAN, AIRCRAFT ELECTRONIC CORP	
S-BAND TRANSCIVER, POWER SUPPLY & AMPLIFIER POWER SUPPLIES	
REV. 10-75	
LDW267-57013	REV. 10-75



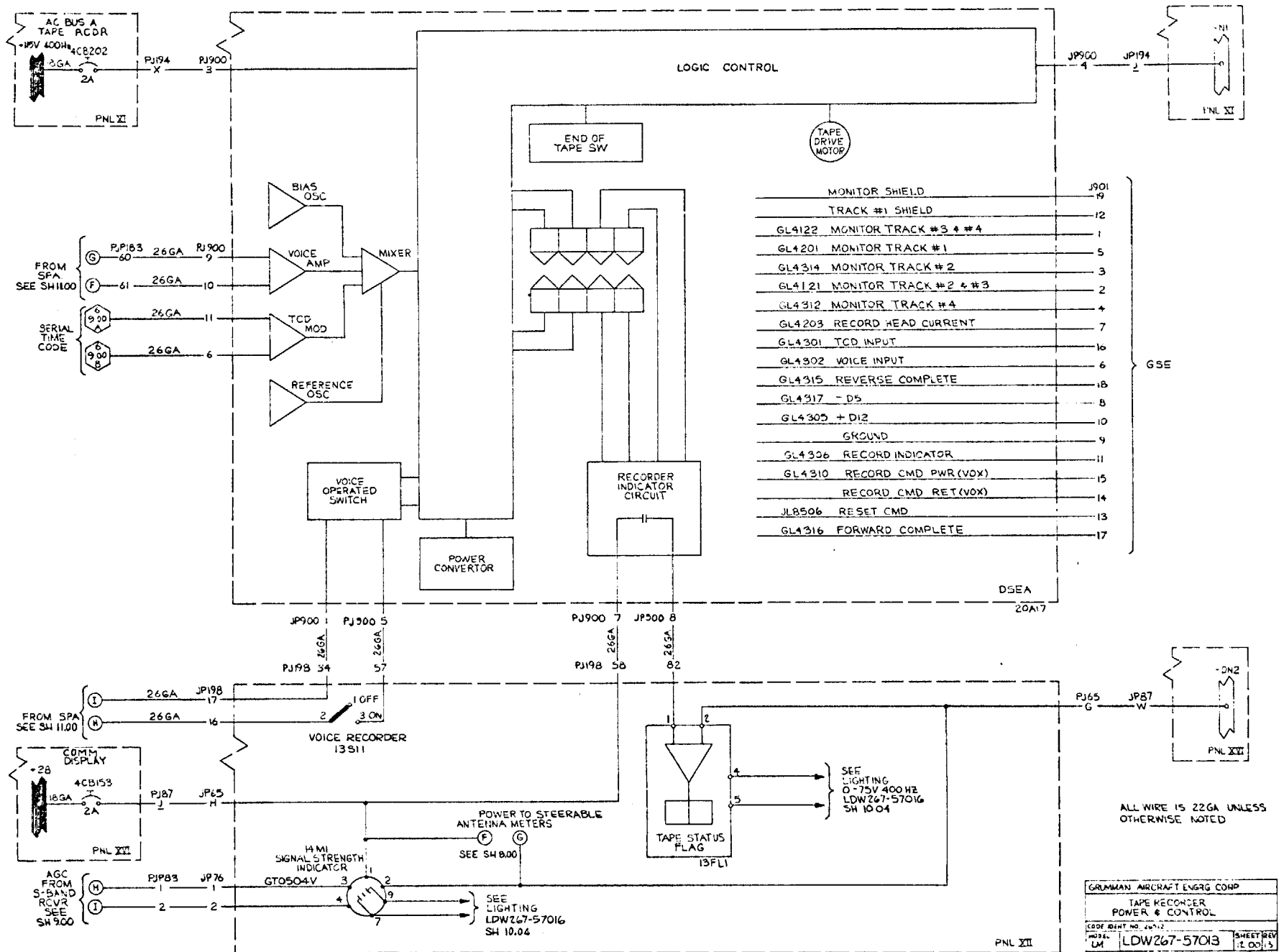


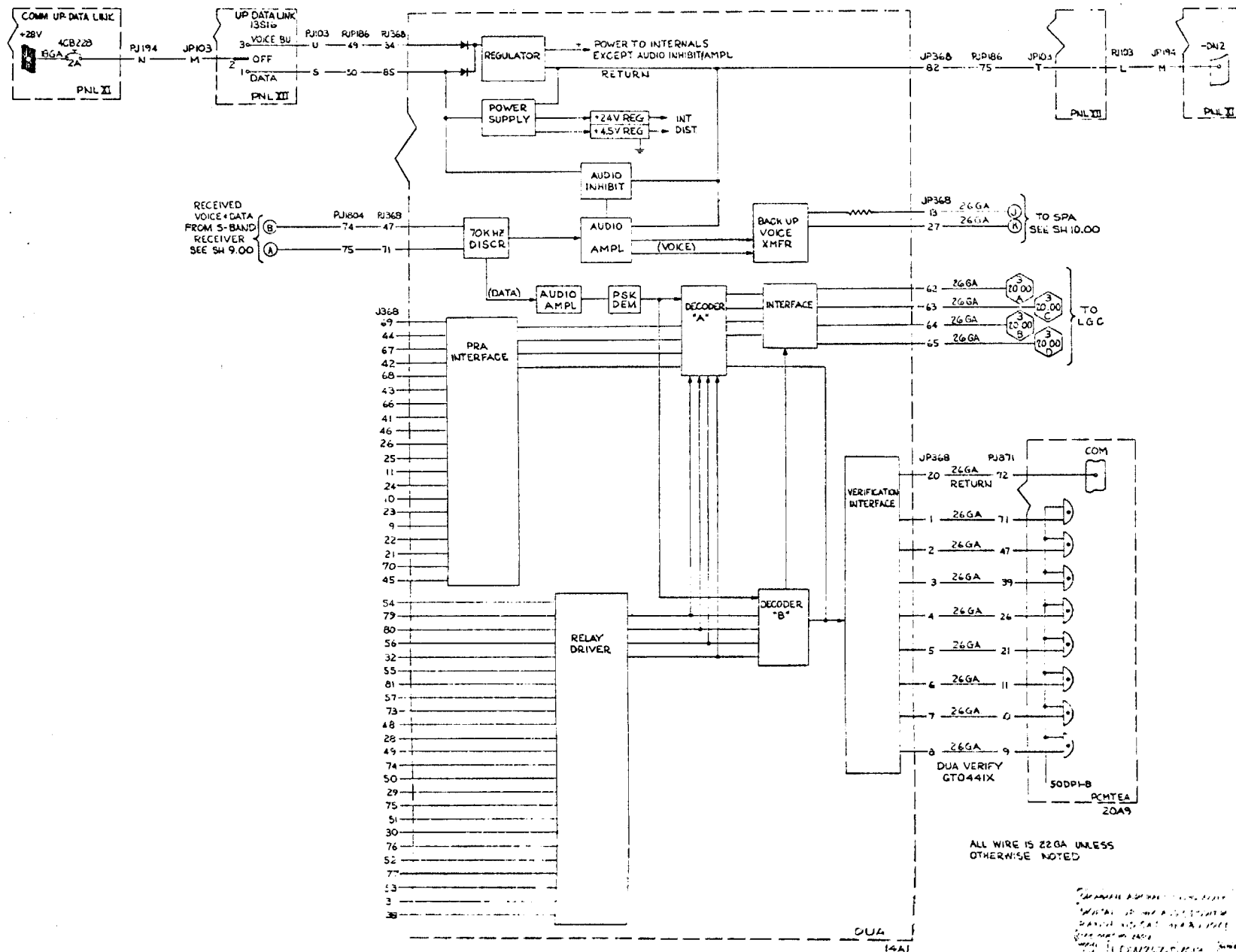




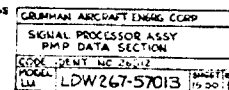


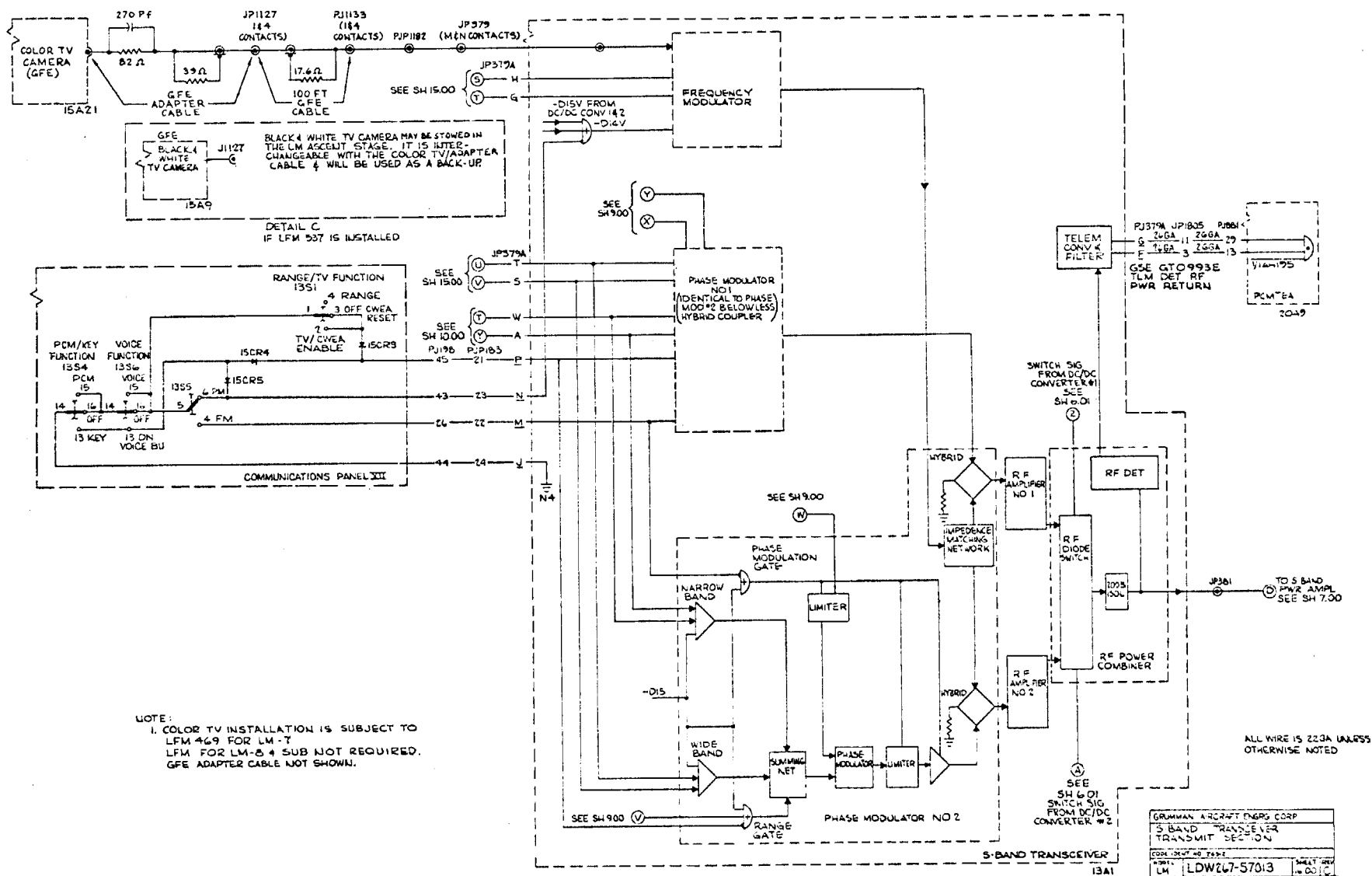
GLADMAN AIRCRAFT ENRG CORP
SPA AUDIO CENTERS
FROM: NEW YORK, NY
TO: LIA LDW267-57013
TIME: 11:00 AM





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 100. LUN 267-0003





LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 16)

CREW PROVISIONS AND LIGHTING CONTROL

(REF LDW267-57016 C)

1. Applicable Documents

Level Three Drawings

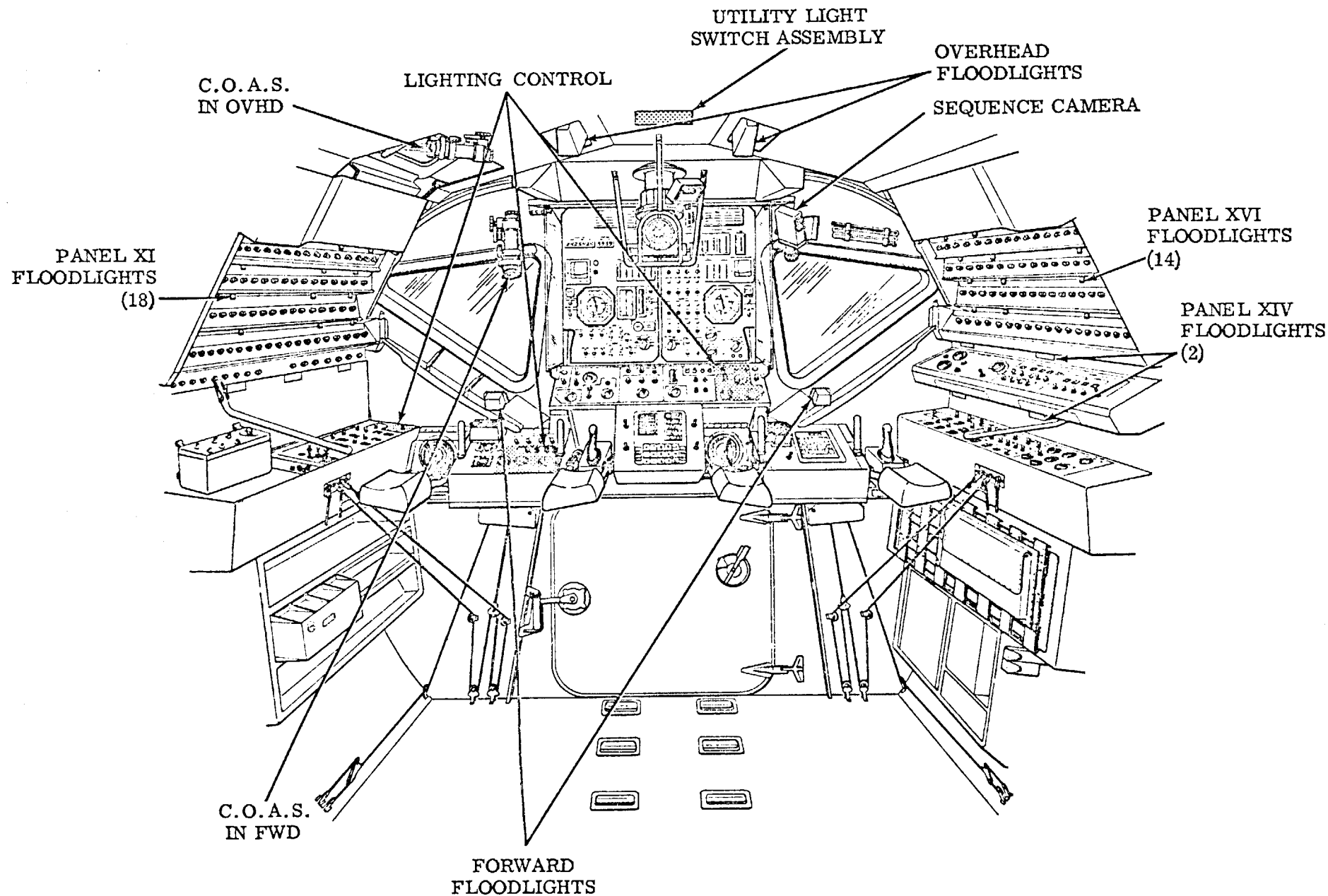
ITEM NAME	DWG. NO.	REV.	E. O.'s
Crew Provisions	LDW340-55000	E	F1

2. Table of Contents

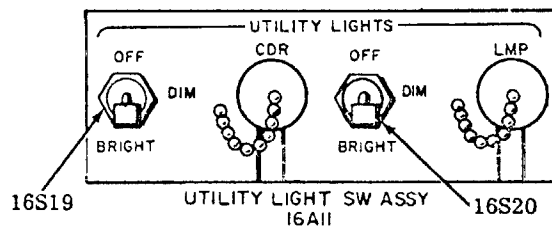
ITEM NAME	PAGE NO./SHEET NO.
a) Sheet Cover	16-701
b) Applicable Documents, Table of Contents, and Revisions	16-702 & 16-702.1
c) Cabin Location of Lighting Controls and Indicators	16-703
d) Lighting Controls and Indicators Layout	16-704
e) Location of Floodlights PNL XI	16-704.1
f) Location of Floodlights PNL XIV & XVI	16-704.2
g) Optical Alignment Sight System Configuration	16-704.3
h) Lighting Controls and Functional Description	16-705 thru 16-705.4
i) Crew Provisions Lighting Block Diagram	LDW267-57016 SH 4.00B
j) Crew Provisions - Schematic Diagram LCA Distribution	LDW267-57016 SH 4.01B
k) Crew Provisions - Lighting Floodlights	LDW267-57016 SH 5.00B
l) Crew Provisions - LCA Power Distribution Engine Start and Stop	LDW267-57016 SH 6.00C
m) Crew Provisions - Docking and Tracking Lights	LDW267-57016 SH 7.00B
n) Crew Provisions - Power Failure Relay Indicators	LDW267-57016 SH 8.00B
o) Crew Provisions - Common Return to Lighting	LDW267-57016 SH 9.00B
p) Crew Provisions - Integral Lighting for PNLS III & V (EL Illumination)	LDW267-57016 SH 10.00B
q) Crew Provisions - Integral Lighting for PNLS I, II, IV & VI (EL Illumination)	LDW267-57016 SH 10.01B
r) Crew Provisions - Lighting Numerics (EL Illumination)	LDW267-57016 SH 10.02C
s) Crew Provisions - Integral Lighting for PNLS VIII & XI (EL Illumination)	LDW267-57016 SH 10.03B
t) Crew Provisions - Integral Lighting for PNLS XII, XIV, & XVI (EL Illumination)	LDW267-57016 SH 10.04B
u) Crew Provisions - Sequence Camera & Crew Optical Alignment Sight	LDW267-57016 SH 11.00B

3. REVISIONS

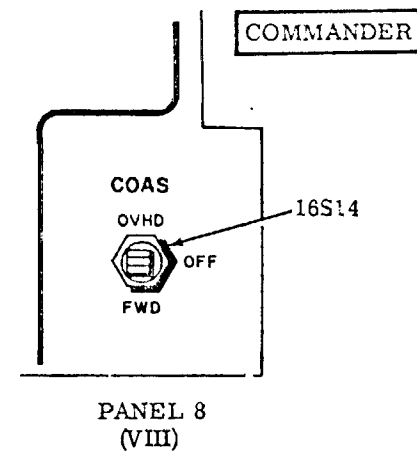
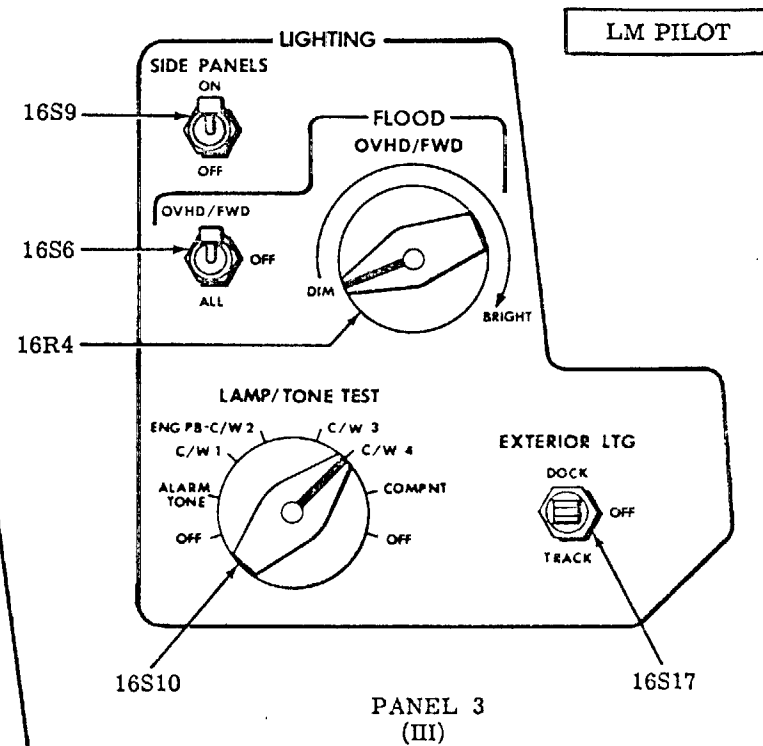
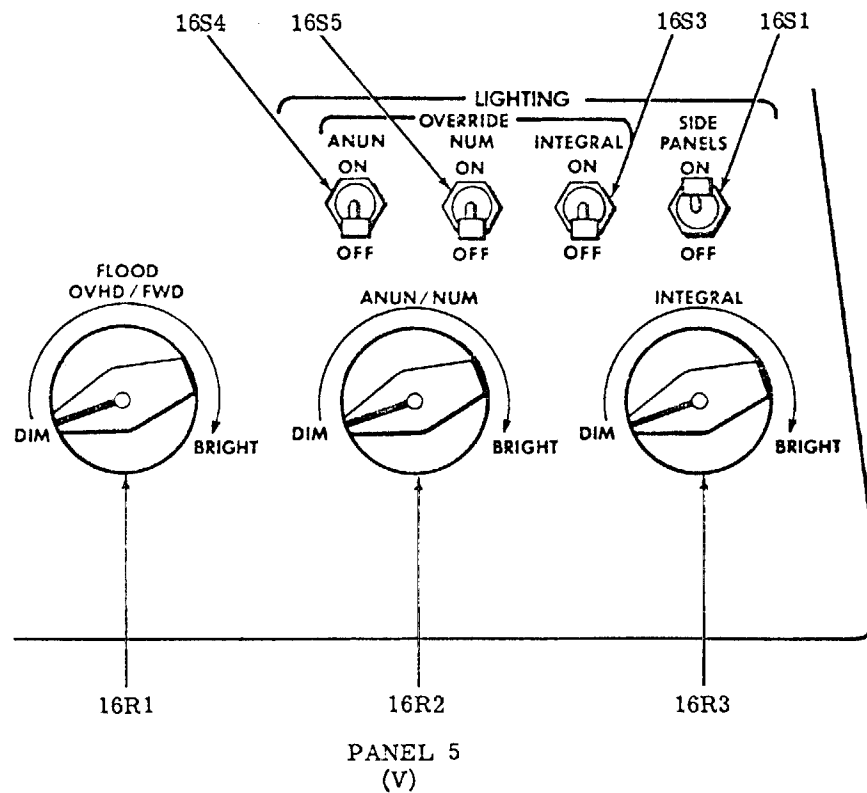
REV	PAGE NO. AND/OR LDW267-57016, SHEET NO.	LCD	DESCRIPTION
B	10.02	5182C	DESIGN & FABRICATION OF PROTOTYPE AND FLIGHT QUALIFIED EMI FIX FOR EVENT TIMER & MISSION CLOCK
	4.01	5374A	REPLACEMENT OF THE WQMD WITH AN ABSOLUTE PRESSURE TRANSDUCER
	10.02	5449	REINSTALLATION OF SYLVANIA MISSION CLOCK AND EMI FILTER ASSY.
	10.02	5160E	IMPLEMENTATION OF REDESIGN OF APOLLO MISSION CLOCK AND LM EVENT TIMER
C	10.02	5160P, 5160R	IMPLEMENTATION OF REDESIGN OF APOLLO MISSION CLOCK AND LM EVENT TIMER



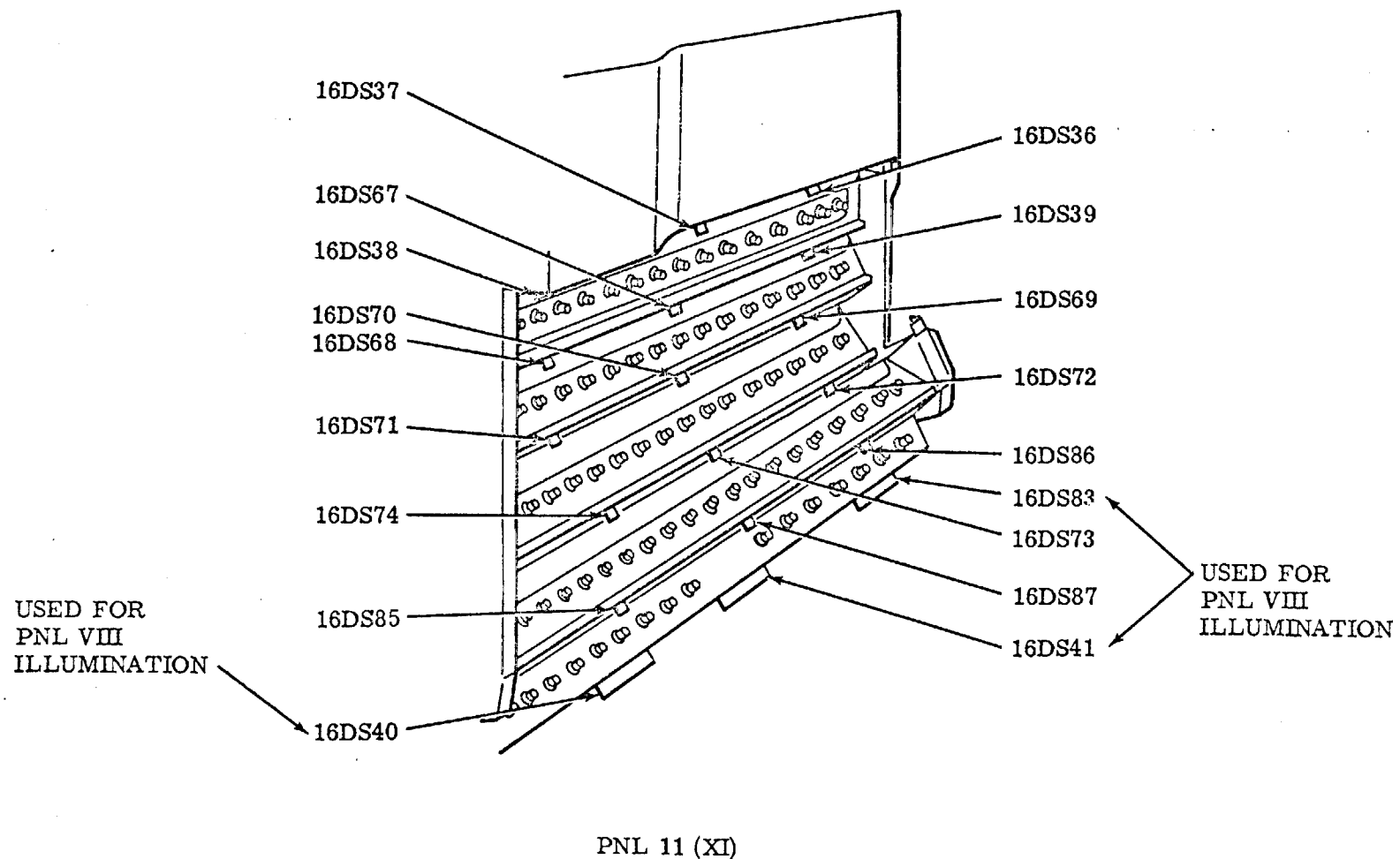
Cabin Location of Lighting Controls and Indicators



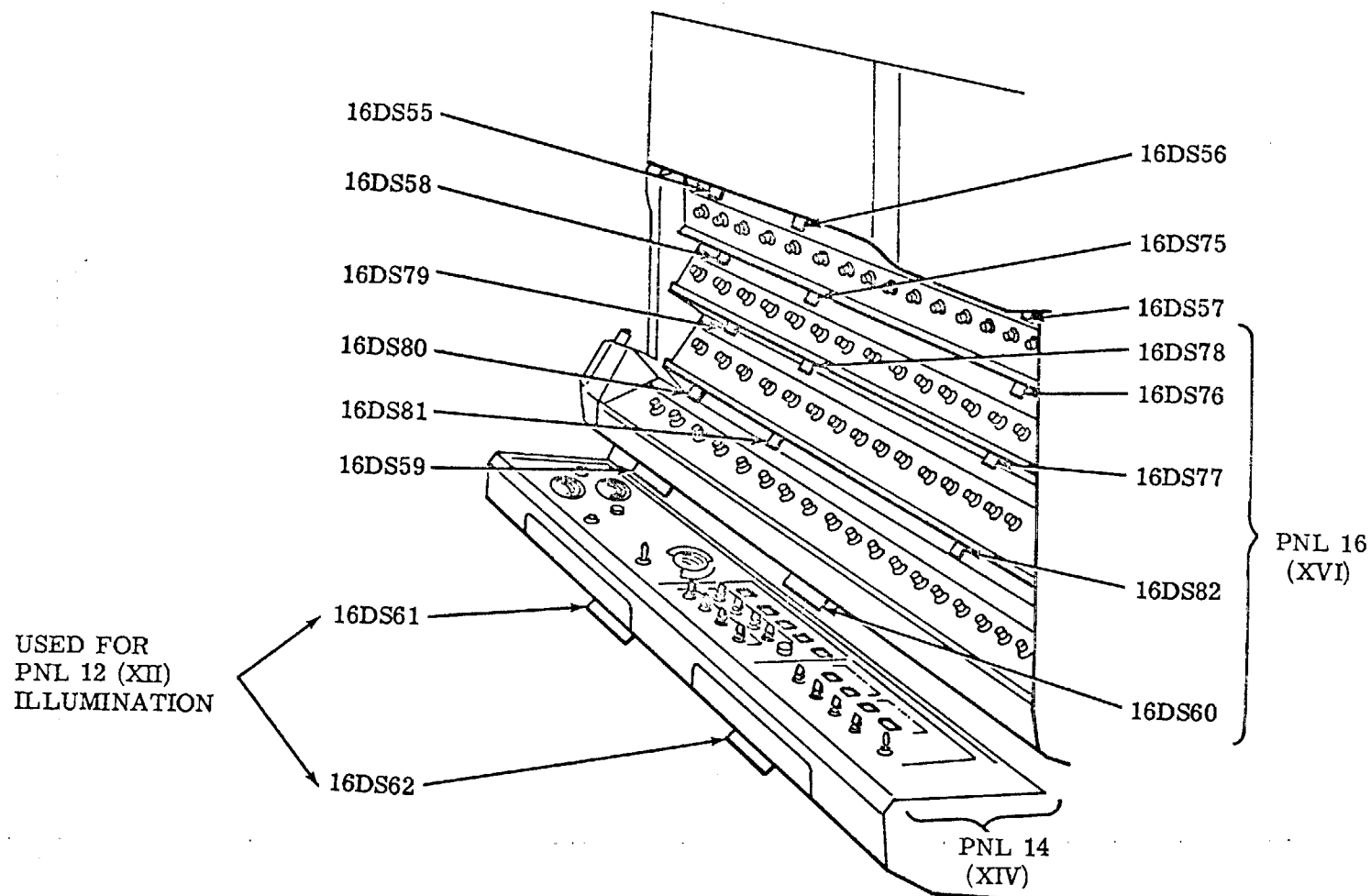
COMMANDER



Lighting Controls and Indicators Layout

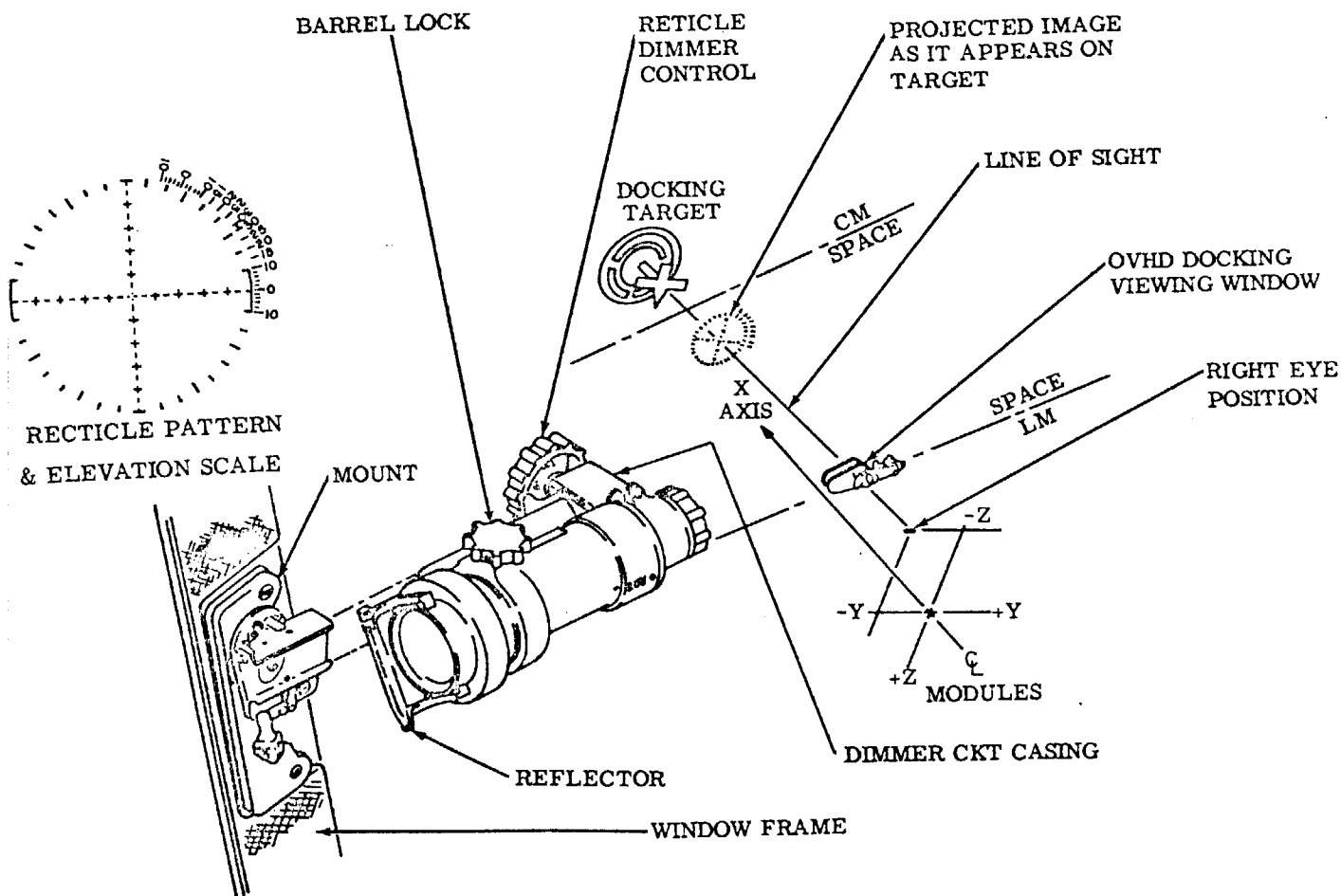


Location of Floodlights (Side Panel Illumination)



PNL 14 & 16 (XIV & XVI)

Location of Floodlights (Side Panel Illumination)



Optical Alignment Sight System Configuration

SUBSYSTEM: LIGHTING CONTROL (FUNCTIONAL GROUPING 16)

Code	Control/Indicator	Function
16R1	FLOOD LIGHTING CONTROL OVHD/FWD CONTINUOUS ROTARY	This continuous rotary (DIM-BRIGHT) controls the brightness of the 28V incandescent overhead and forward flood lights on the Commander's side of the cockpit from DIM to BRIGHT. It is operable only when 16S6 is in either the OVHD/FWD or ALL position when the OVHD hatch is closed. If the hatch is open, the dimmer adjusts the intensity level regardless of the position of 16S6.
16R2	ANUN/NUM CONTROL	This continuous rotary (DIM-BRIGHT) controls the brightness of the annunciators (except the C/W PWR annunciator), some of the component caution lights, incandescently illuminated pushbuttons, the electroluminescent numeric displays and time-shared displays (i.e., temporary legends or multipliers). An override switch (16S4) is provided for the annunciators, component caution lights and pushbuttons, and a second override switch (16S5) for the EL numeric and time-shared displays in the event that either of these two portions of the ANUN/NUM control fails. A third portion of this control varies DSKY numerics lights. It has no override switch.
16R3	INTEGRAL LIGHTING CONTROL CONTINUOUS ROTARY	This continuous rotary (DIM-BRIGHT) controls the brightness of the low level EL integrally illuminated markings and displays from DIM to BRIGHT. Should this control fail, it may be bypassed by 16S3, which will increase the maximum operating voltage from 75V to 115V.
16R4	FLOOD LIGHTING CONTROL OVHD/FWD CONTINUOUS ROTARY	This continuous rotary (DIM-BRIGHT) controls the brightness of the 28V incandescent overhead and forward flood lights on the LM Pilot's side of the cockpit from DIM to BRIGHT.

SUBSYSTEM: LIGHTING CONTROL (FUNCTIONAL GROUPING 16)

Code	Control/Indicator	Function
16R4 (Cont.)		It is operable only when 16S6 is in either the OVHD/FWD or ALL position when the OVHD hatch is closed. If the hatch is open the dimmer adjusts the intensity level regardless of the position of 16S6.
16S1 16S9	SIDE PANELS SWITCH (CDR) SIDE PANELS SWITCH (LMP) TWO 2-POSITION TOGGLES MAIN-MAIN	These two-position toggles (ON-OFF) provide ON/OFF control of the CDR's and LMP's side panel EL illumination. In the ON position these switches connect the integral lights located on the CDR's and/or LMP's side panels to 16R3 and 16S3. In the OFF position, the side panels are not connected to 16R3 and 16S3 and are therefore not EL illuminated.
16S2	EXTERIOR LIGHTING CONTROL 3-POSITION TOGGLE MAIN-MAIN-MAIN	This 3-position toggle switch (DOCK-OFF-TRACK) controls the docking and tracking lights. In the DOCK position the docking lights are turned on. In the TRACK position, the tracking light is turned on. The OFF position interrupts power to both docking and tracking lights.
16S3	INTEGRAL OVERRIDE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (ON-OFF) permits 16R3 to be by-passed if the dimmer circuit becomes inoperative. In the OFF position, the intensity of the markings and displays are controlled by 16R3. In the ON position, 16R3 is bypassed and 115 V 400 Hz is applied directly to the EL markings and displays. This switch should only be used in an emergency as full line voltage is detrimental to lamp life.

SUBSYSTEM: LIGHTING CONTROL (FUNCTIONAL GROUPING 16)

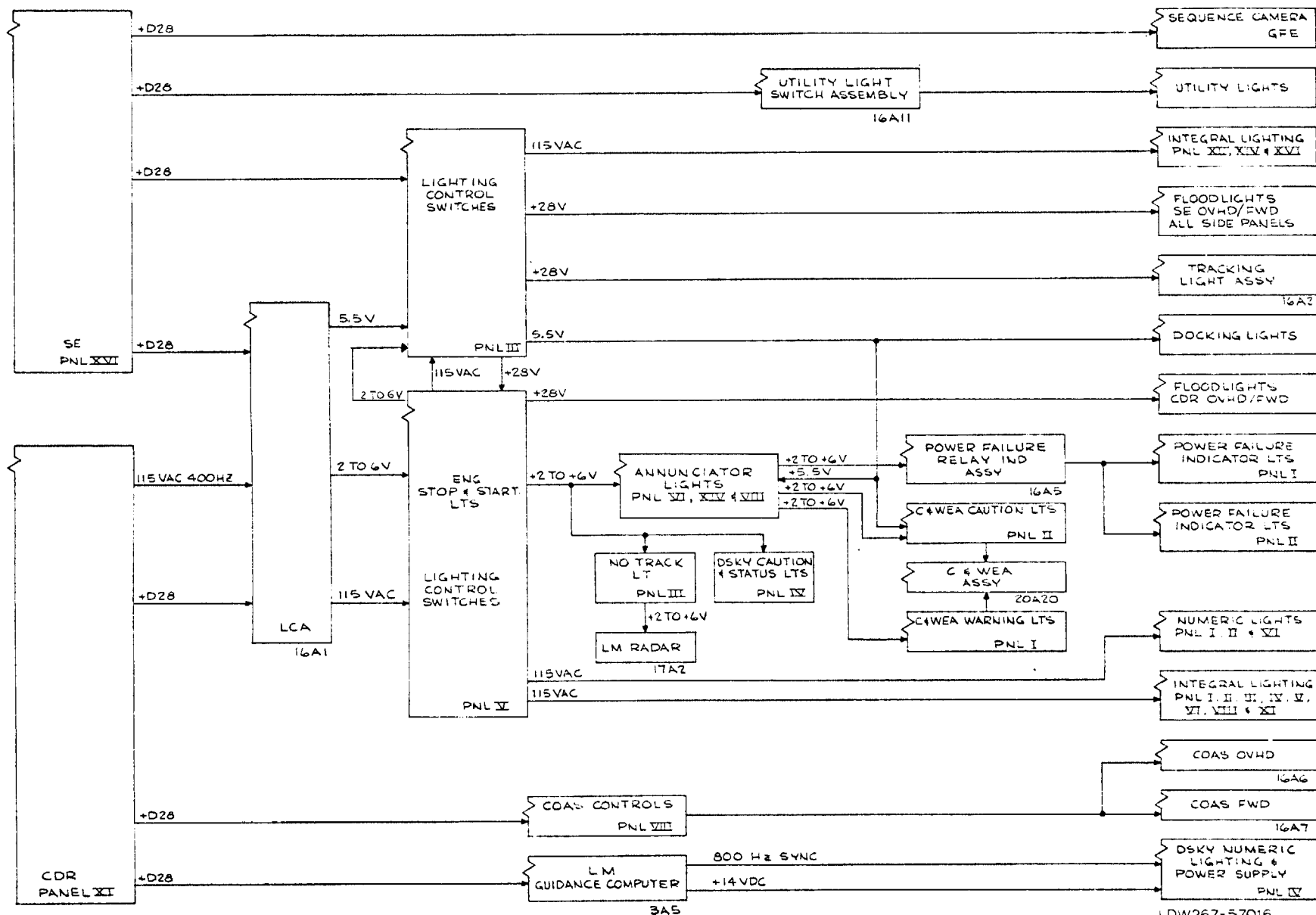
Code	Control/Indicator	Function
16S4	ANUN OVERRIDE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (ON-OFF) provides a full voltage bypass of the brightness control of the ANUN portion of the ANUN/NUM control. In the OFF position some of the annunciators, component caution lights and incandescent pushbutton intensities are controlled by 16R2. In the ON position that control is bypassed and 5 V DC is applied directly to the annunciators, component caution lights and incandescently illuminated pushbuttons.
16S5	NUM OVERRIDE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (ON-OFF) provides a full voltage override to the brightness control of the NUM portion of the ANUN/NUM control. In the OFF position, the electroluminescent numerics (except DSKY numerics) and the time-shared displays are controlled by 16R2. In the ON position that control is bypassed and 115 V 400 Hz is supplied directly to the numerics and displays.
16S6	FLOODLIGHT CONTROL 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (OVHD/FWD-OFF-ALL) in the OVHD/FWD position, turns on the two forward floodlights and the two overhead floodlights (fitted with reflectors which can be rotated). In the OFF position, all floodlights will be turned off. The two overhead lights and forward lights can also be turned on by opening the overhead hatch. This overrides all positions of 16S6. The ALL position turns on all cockpit flood lights; overhead, forward and side panels.
16S10	LAMP/TONE TEST SWITCH 8-POSITION ROTARY	This eight-position rotary (OFF-ALARM/TONE-C/W 1 - ENG PB and C/W 2 - C/W 3 - C/W 4 - COMPNT-OFF) is used to perform the following test functions. In the ALARM/TONE position, it tests the lamps in the Master Alarm buttons (6S2 and 6S3) and the

SUBSYSTEM: LIGHTING CONTROL (FUNCTIONAL GROUPING 16)

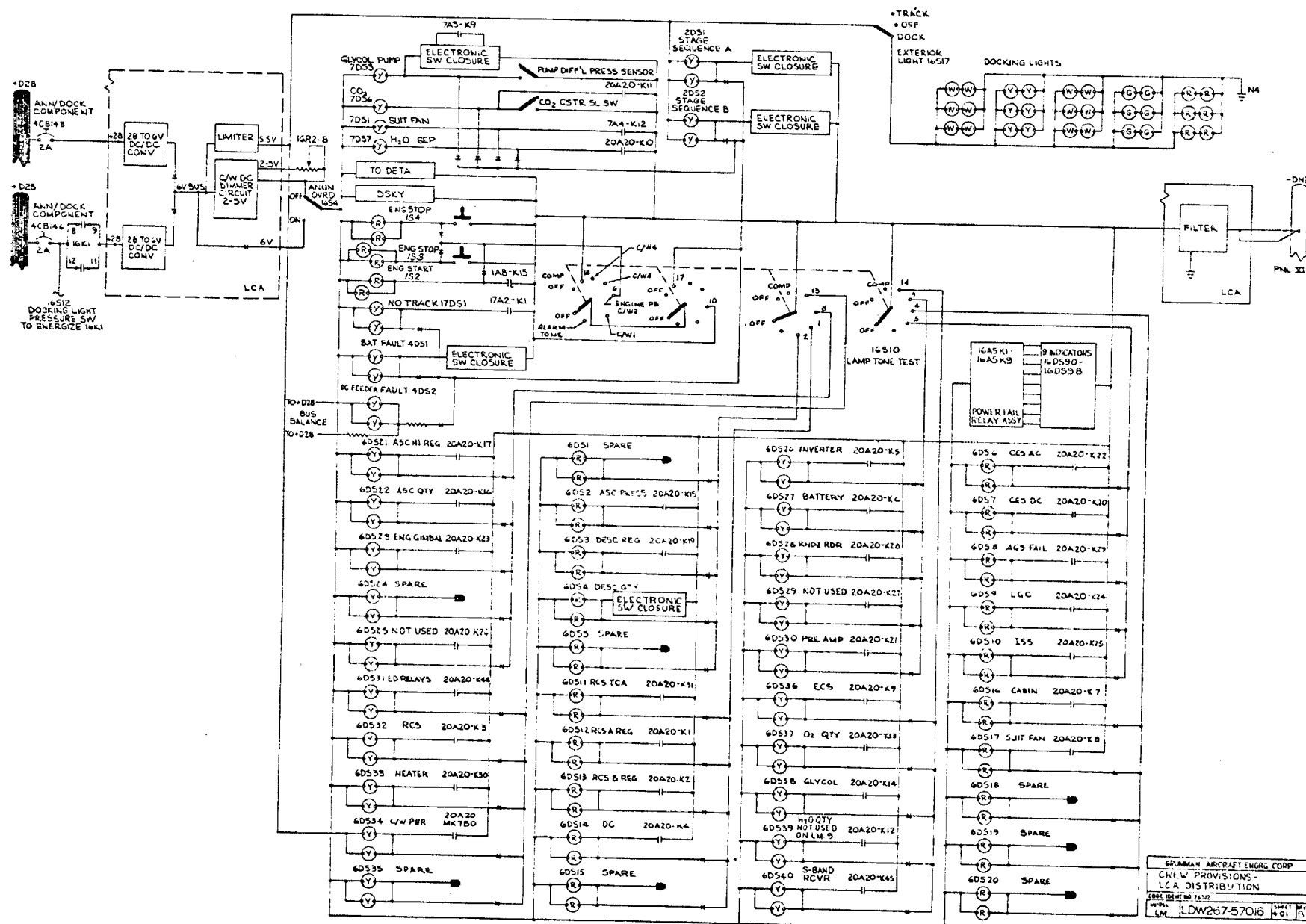
Code	Control/Indicator	Function
16S10 (Cont.)		Audible Tone (6T1). In the C/W 1 position it tests the lamps in one bank of the Caution/Warning annunciators 6DS1 through 6DS10). The ENG and C/W 2 position tests the lamps in the Engine Start (1S2) and Stop (1S3 and 1S4) buttons as well as the second bank of C/W annunciators (6DS11 through 6DS20). In the C/W 3 and C/W 4 positions the lamps in the remaining two banks of C/W annunciators (6DS21 through 6DS30 and 6DS31 through 6DS40) are tested. In the COMPNT position the lamps in the Component Caution lights and lunar contact lights are tested. OFF positions are located at each end of the switching sequence. This will permit the switch to be placed in an OFF position, without recycling through all of the test positions.
16S14	COAS 3-POSITION TOGGLE MAIN-MAIN-MAIN	This three-position toggle (OVHD-OFF-FWD) provides ON/OFF control reticle lighting for the crewman's optical alignment sight, (COAS) when it is used in either of the two mounts provided.
16S19 16S20	PORTABLE UTILITY LIGHTS CONTROL MAIN-MAIN-MAIN	Each switch controls an overhead outlet on either side of the vehicle that will accept a portable utility light. Each switch is a 3-position toggle (OFF-DIM-BRIGHT).
16DS90	PROPULSION PRESS INDICATOR (10M3) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS91	CDR CROSS POINTER INDICATOR (9M2) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.

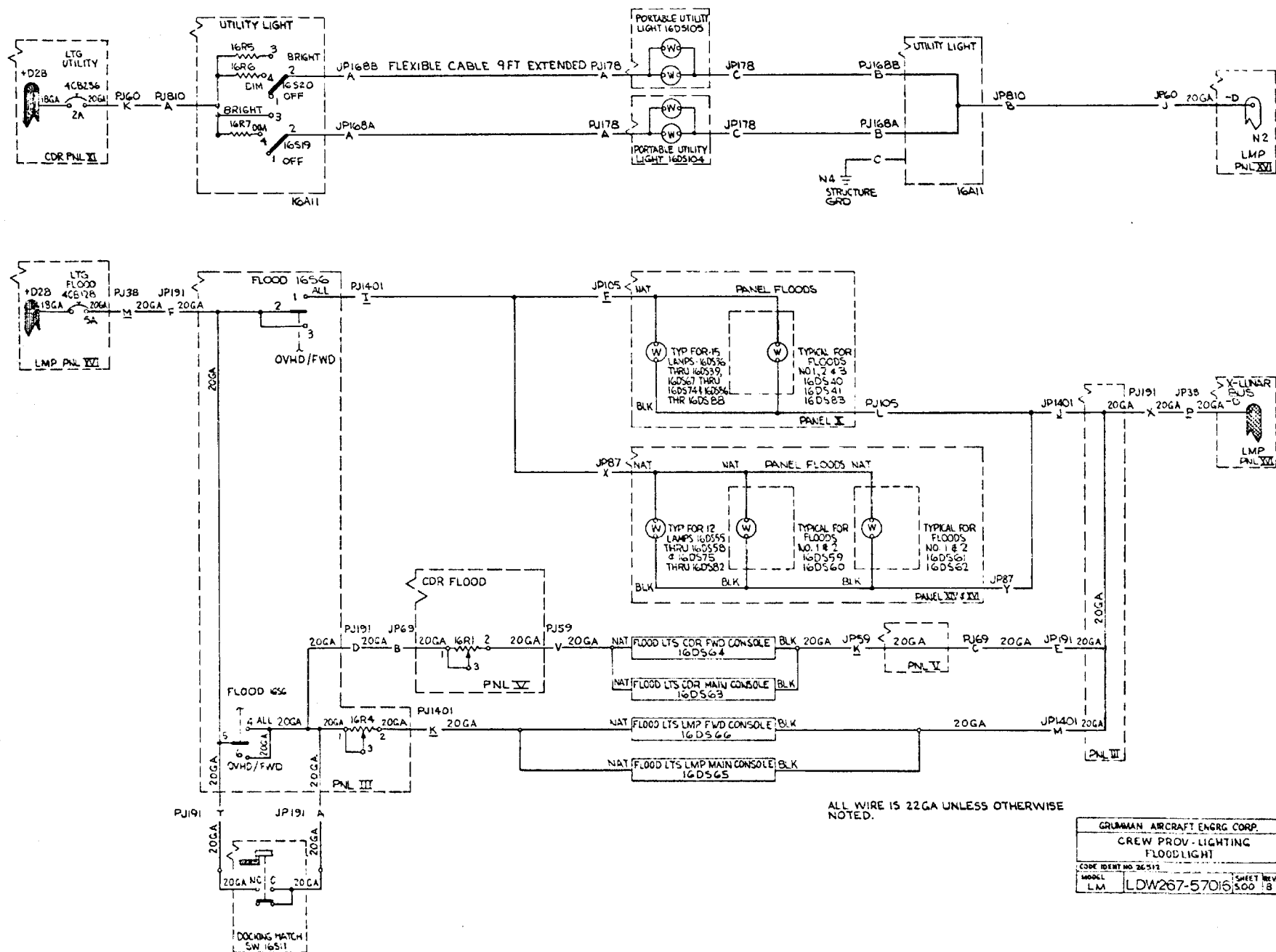
SUBSYSTEM: LIGHTING CONTROL (FUNCTIONAL GROUPING 16)

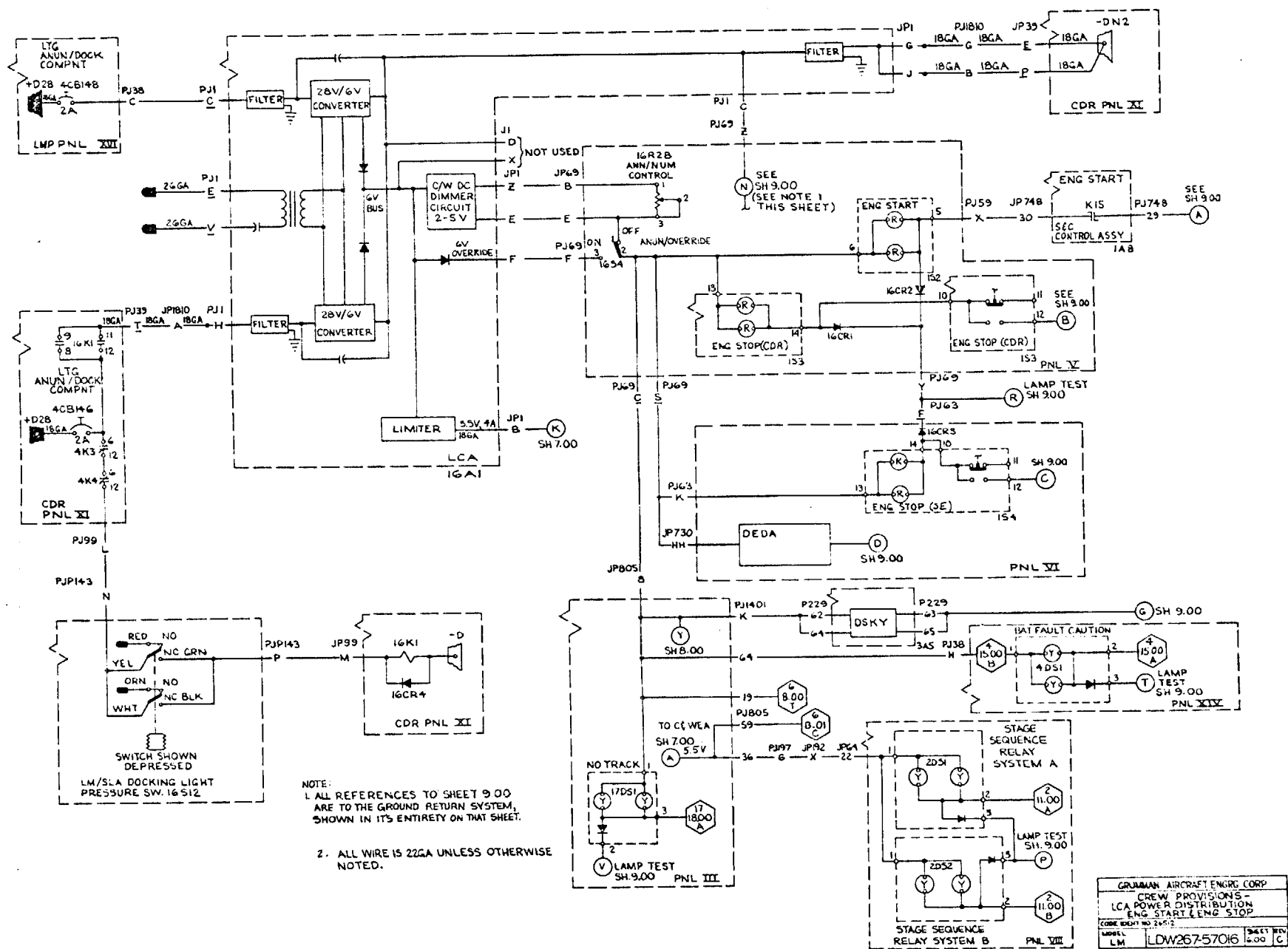
Code	Control/Indicator	Function
16DS92	THRUST INDICATOR (9M7) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS93	SUIT/CABIN PRESS IND (7M2) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS94	O ₂ /H ₂ O QUANTITY IND (7M4) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS95	GLYCOL TEMP/PRESS IND (7M5) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS96	RCS PRESS IND (8M1) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS98	LMP CROSS POINTER IND (9M3) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.
16DS97	RCS QUANTITY IND (8M4) POWER FAILURE LIGHT	This red incandescent light will illuminate when there is a 28 VDC power interruption to this display.

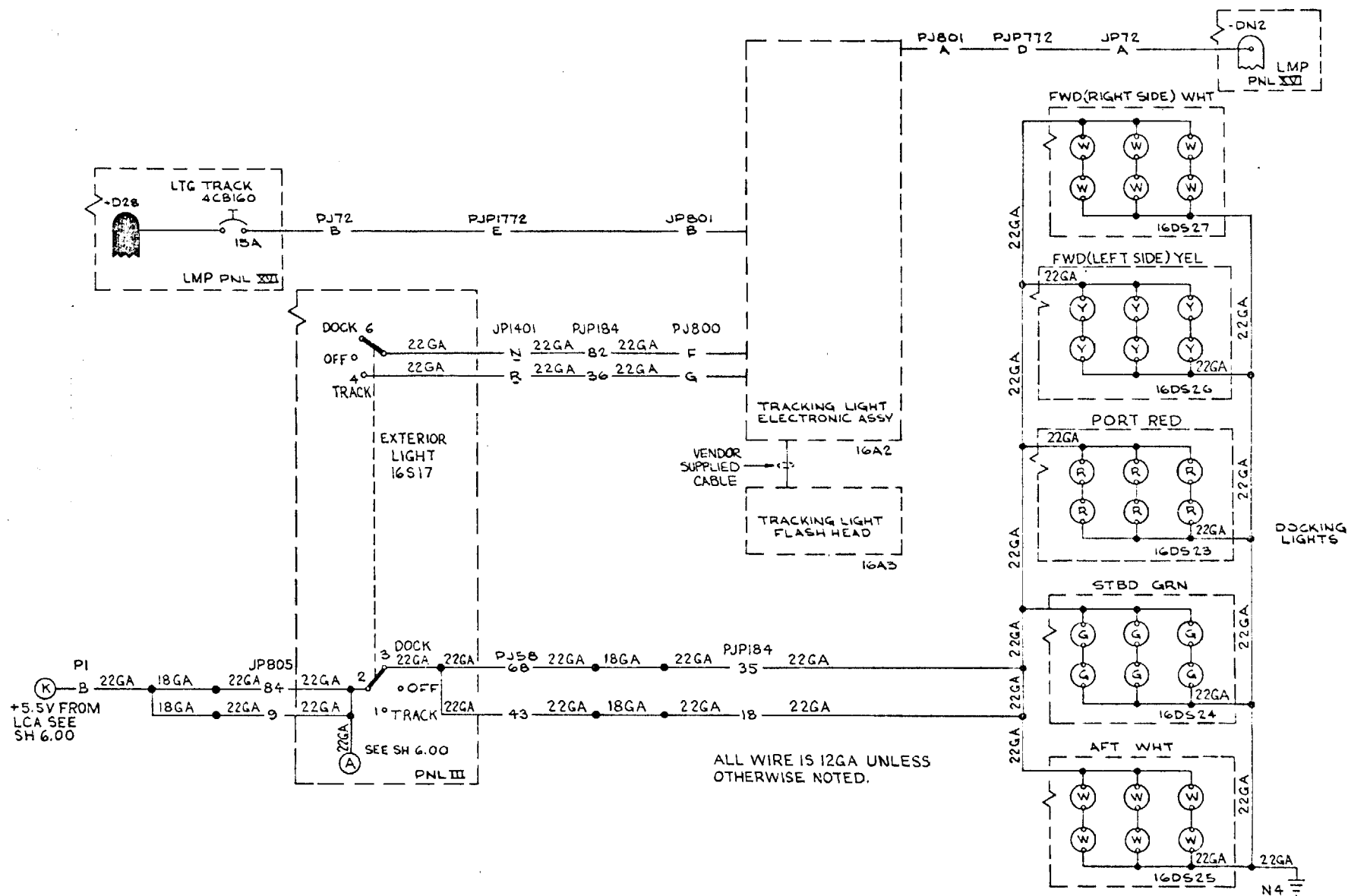


LDW267-57016
 GRUMMAN AIRCRAFT ENGINE CORP.
 CREW PROX LIGHTING
 BLOCK DIAGRAM
 CODE IDENT NO. 24512
 MODEL LM LDW267-57016-60:5

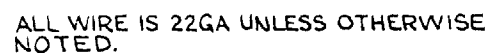




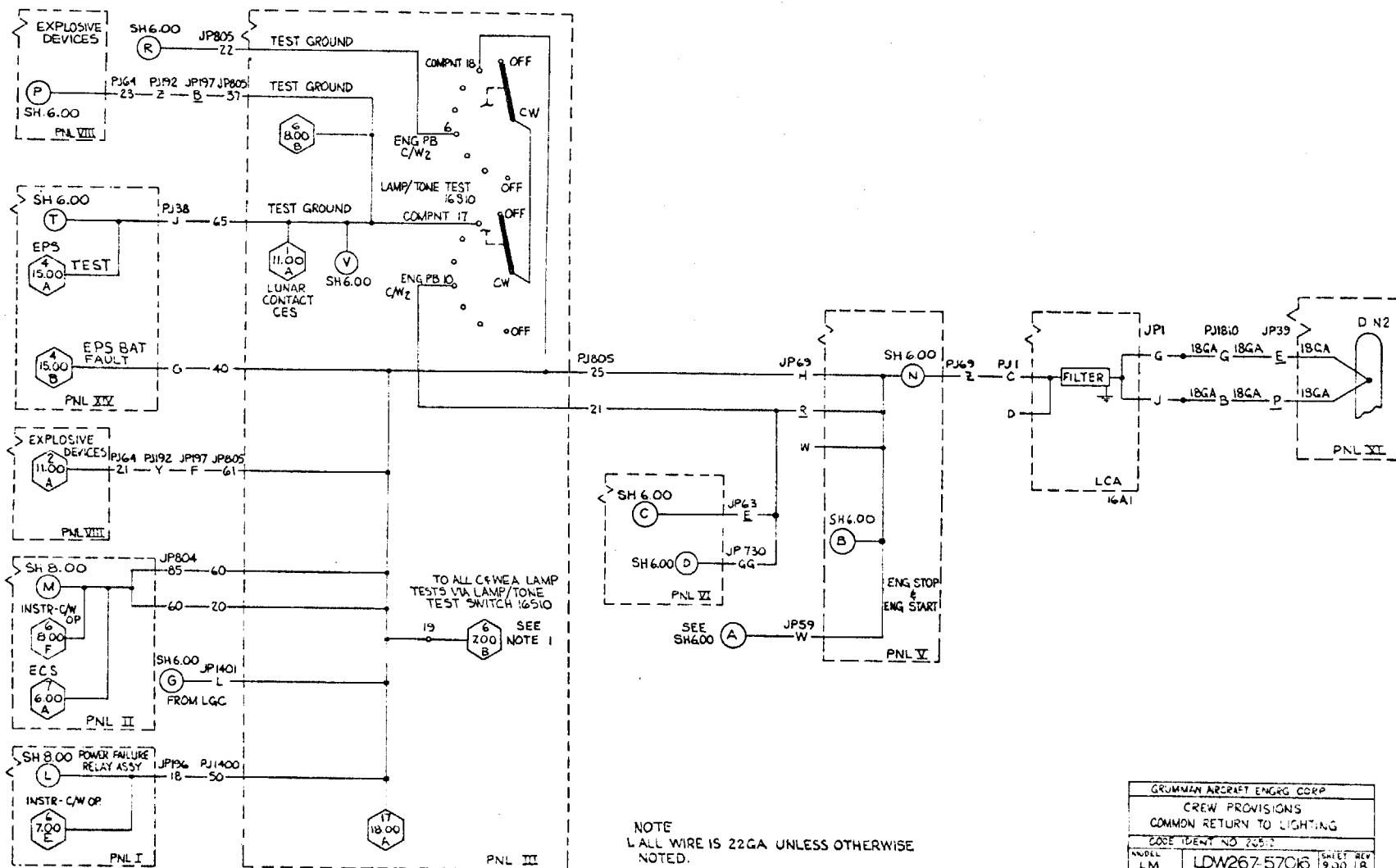




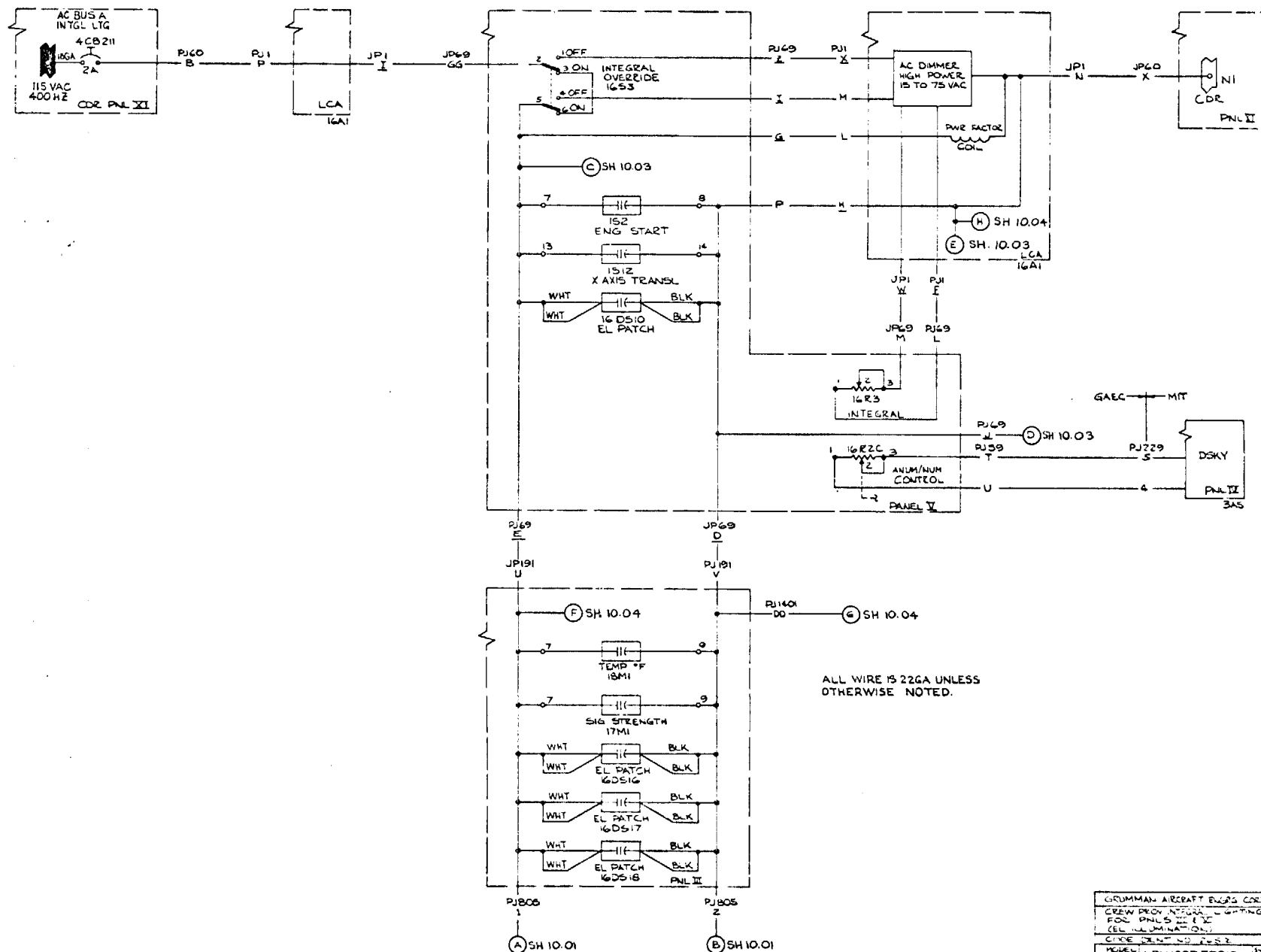
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CREW PROVISIONS		
DOCKING & TRACKING LIGHTS		
CODE IDENT NO 26912		
MODEL	LDW267-57016	SHEET REV
LM		700 B

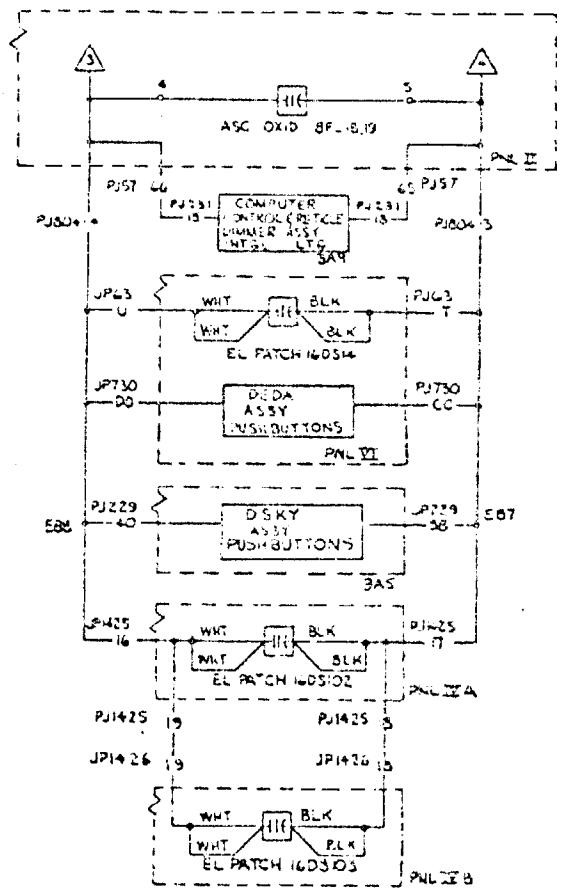
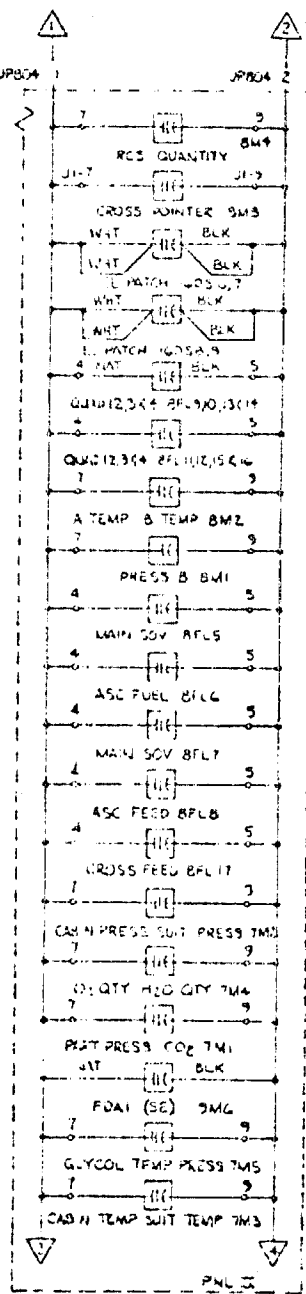
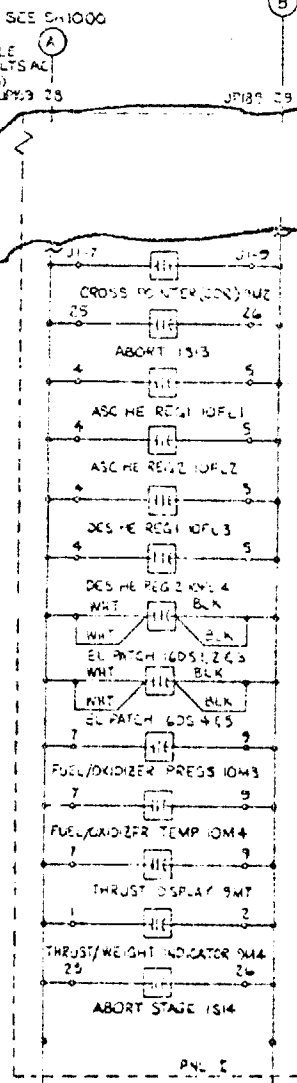
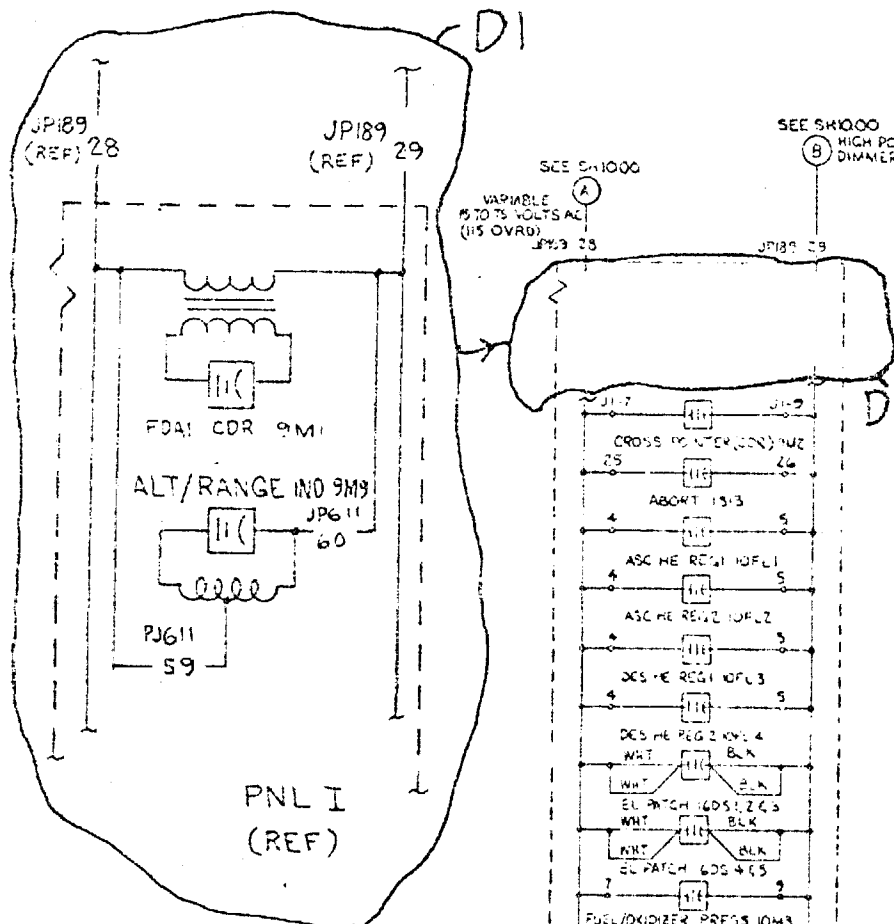


GRUMMAN AIRCRAFT ENGRG CORP			
CREW PROVISIONS POWER FAILURE RELAY INDICATORS			
CODE IDENT NO. 26512			
MODEL LM	LDW267-57016		SHEET 800



GRUMMAN AIRCRAFT ENGG CORP	
CREW PROVISIONS	
COMMON RETURN TO LIGHTING	
CROSS IDENT NO 2251	
MODEL	SHEET REV
LM	LDW267-57016 9.00 B





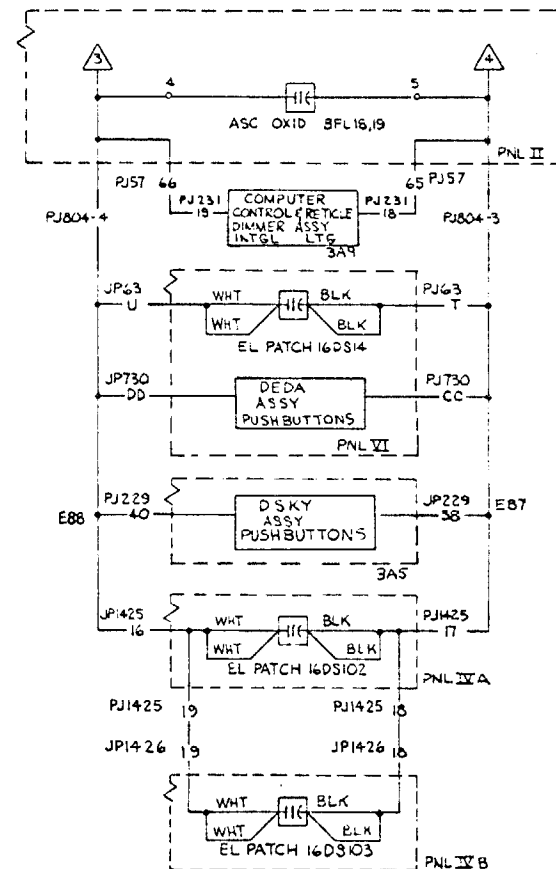
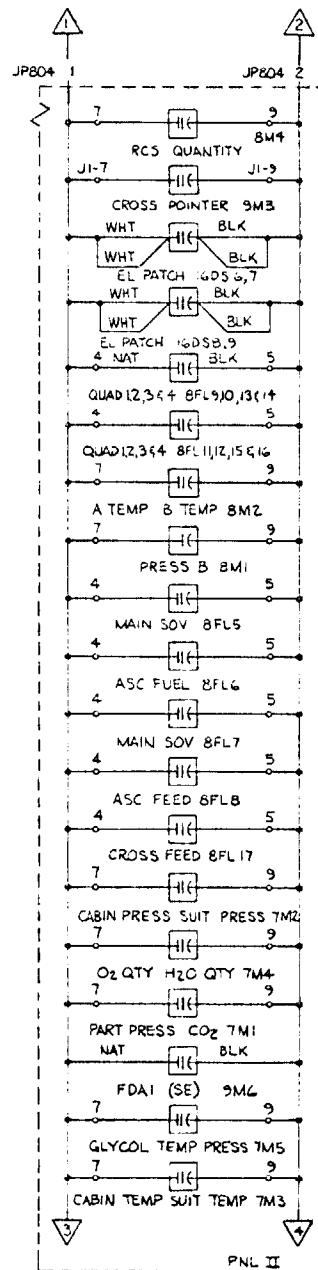
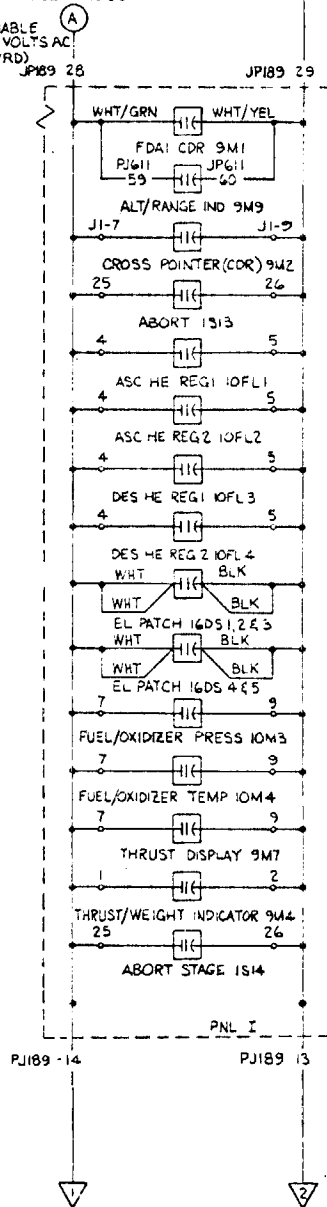
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ORIGINAL PARTS	DATE
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LOWE 12/4/72	DATE
LOWE 12/4/72	DATE
LOWE 12/4/72	DATE

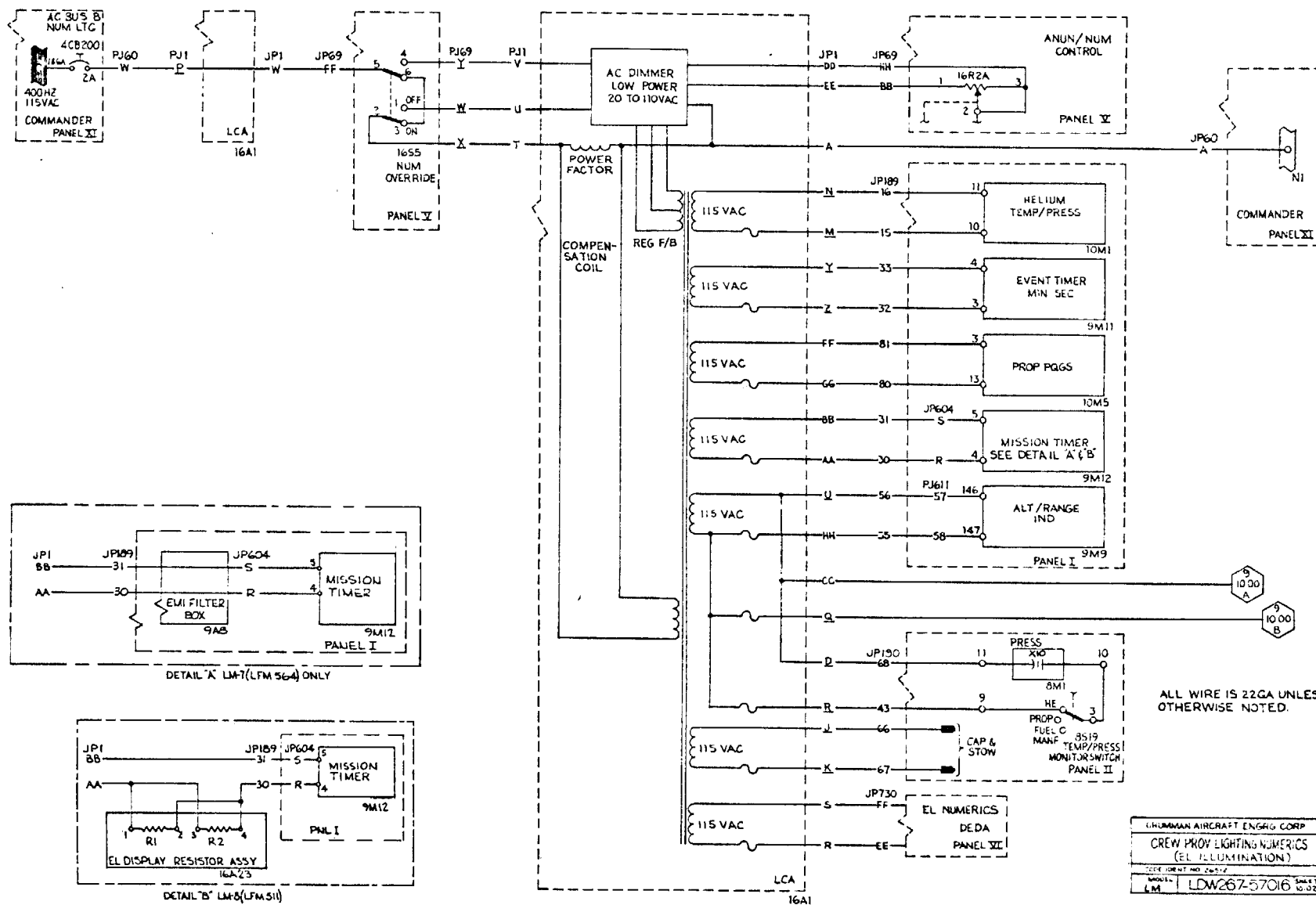
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VARIABLE
5 TO 75 VOLTS AC
(115 OVVD)

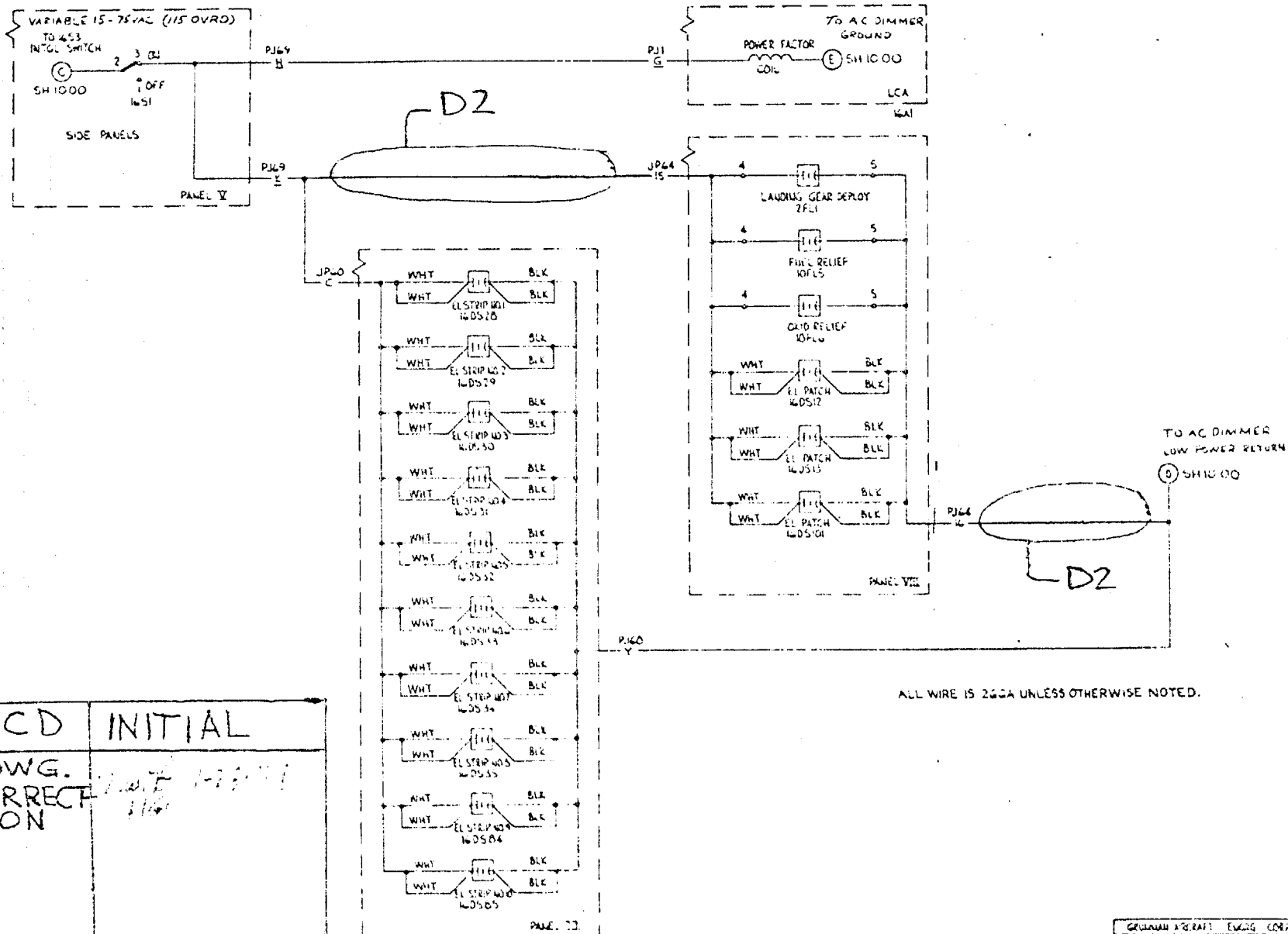
SEE SH1000
HIGH POWER AC
DIMMER RETURN



ALL WIRE IS 22 GA UNLESS OTHERWISE NOTED.

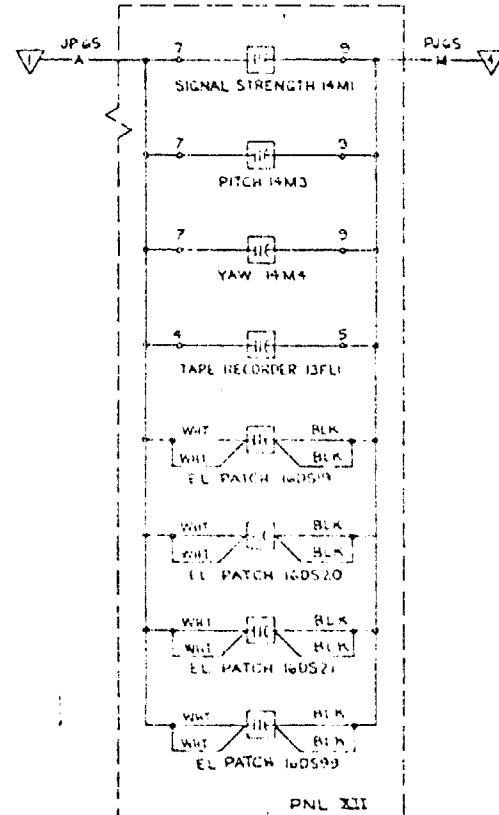
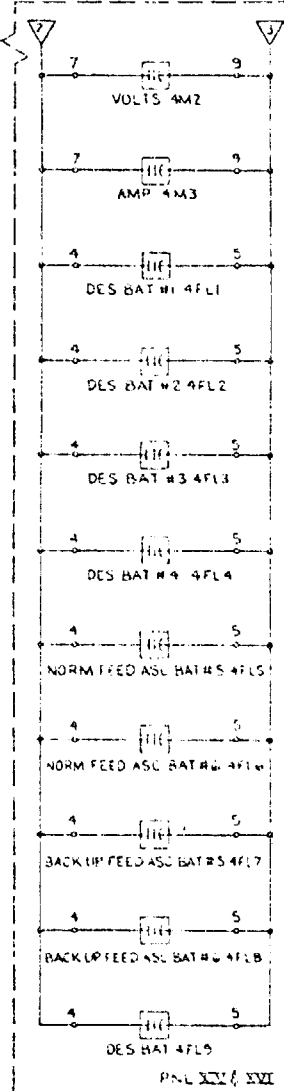
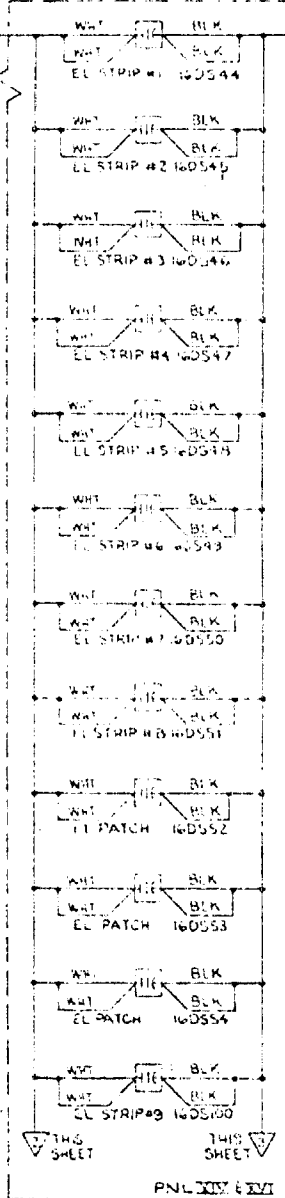
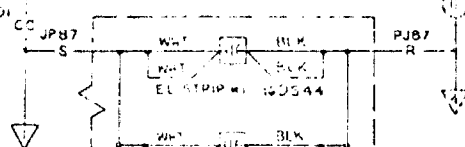
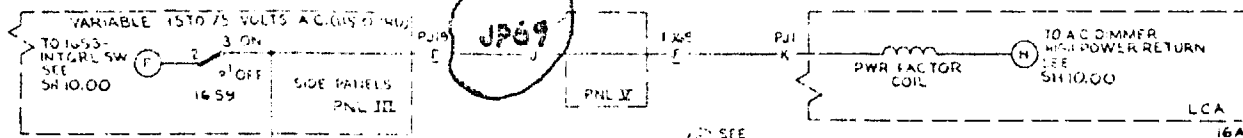
GRUMMAN AIRCRAFT ENGINE CORP.	
CREW PRV INTEGRAL LIGHTING	
FOR PNLS I, II, IV & VI	
(EL ILLUMINATION)	
CODE IDENT NO 20502	
MODEL	SHEET 157
LM	LDW267-57016 001 B





REV	LCD	INITIAL
D2	DWG. CORRECTION	DATE 12/1/71 116

D-2



GERMANIAN AIRCRAFT ENGINE CO. LTD.
LOW POWER INTERNAL LIGHTING
FOR PANELS WITH 100V & 250V
115V & 250V AC
LOW POWER LIGHTING
LM LDW267-57016

ALL WIRE IS 22GA UNLESS OTHERWISE NOTED.

REV	LCD	INT.
D-2	DWG CORR	2/77

LM ELEMENTARY FUNCTIONAL

DIAGRAM

(Functional Grouping No. 17)

RADAR

SUBSYSTEM

(REF LDW267-57017 C)

1. Applicable Documents

Level Three Drawings

ITEM NAME	DWG. NO.	REV.	E.O.'s
Radar Subsystem	LDW370-54000	N	

2. Table of Contents

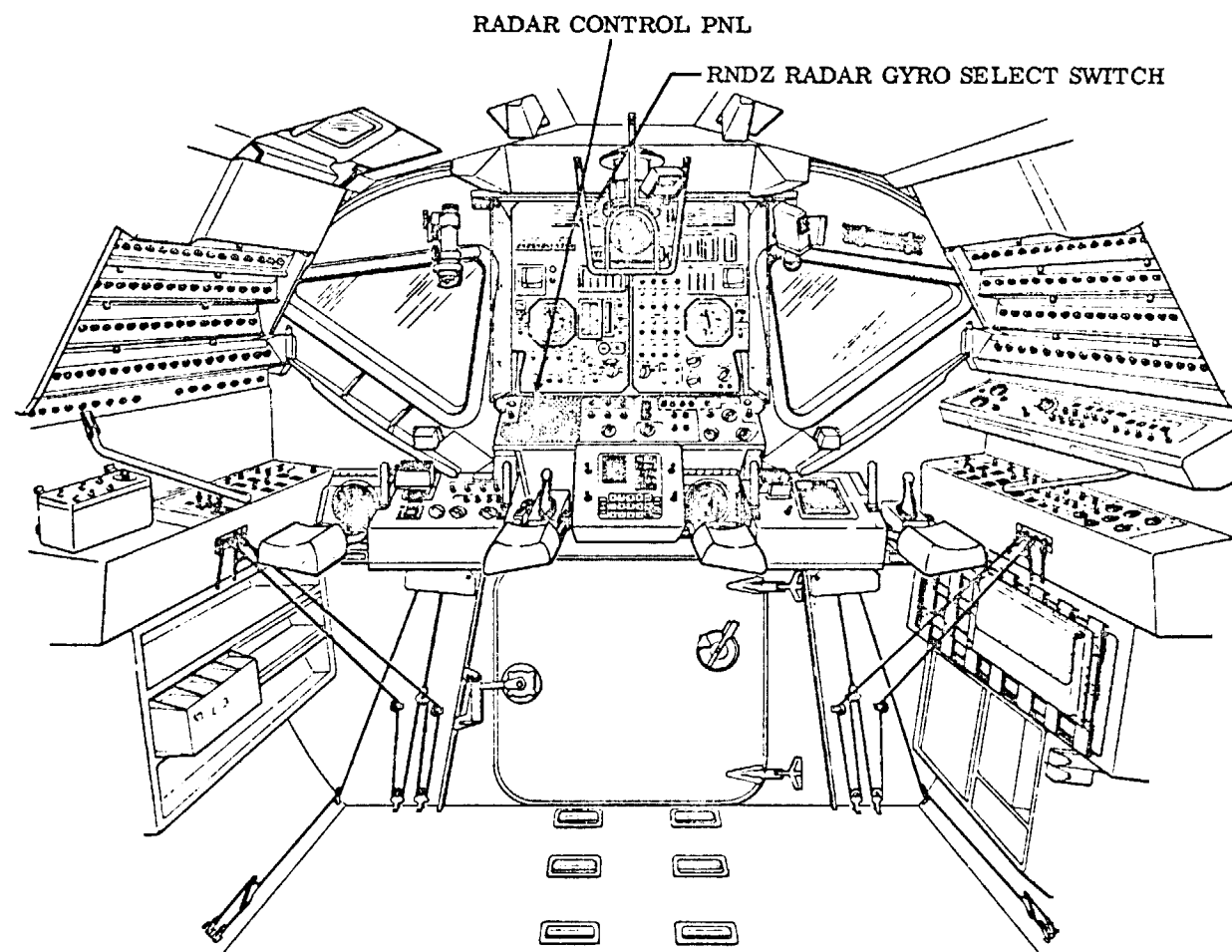
ITEM NAME

PAGE NO./SHEET NO.

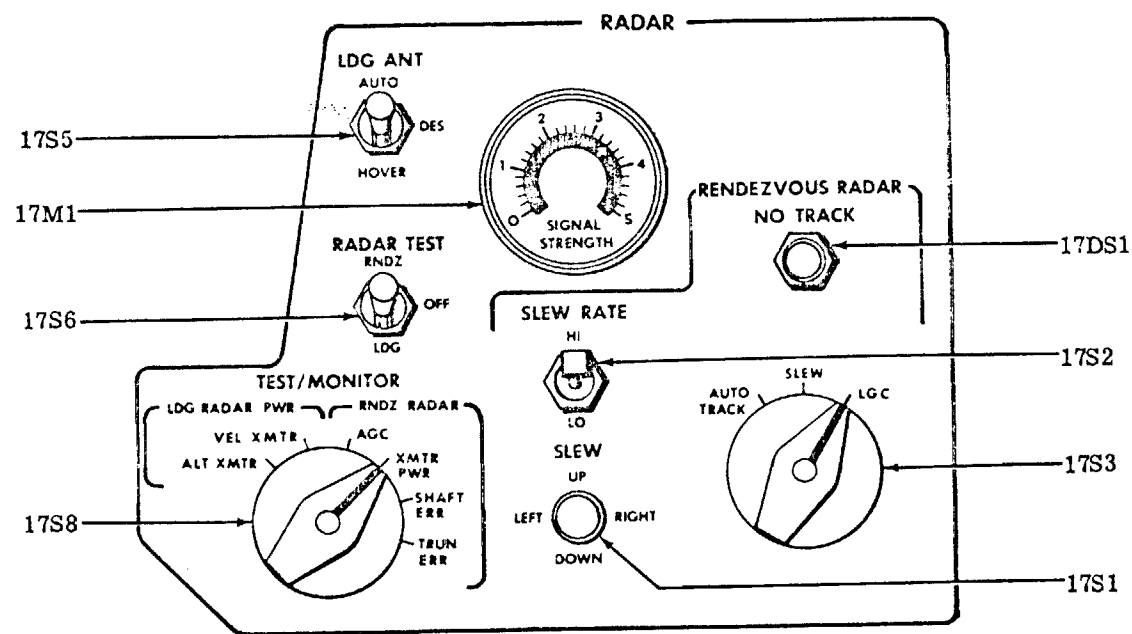
a) Cover Sheet			17-701
b) Applicable Documents Table of Contents, and Revisions			17-702 and 17-702.1
c) Cabin Location of Radar Controls and Indicators			17-703
d) Radar Controls and Indicators Layout			17-704
e) Radar Controls and Indicators Functional Description			17-705 thru 17-705.2
f) Radar Rendezvous Radar - Block Diagram	LDW 267-57017	SH.	4.00B
g) Radar Landing Radar - Block Diagram	LDW 267-57017	SH.	4.01A
h) Radar Rendezvous Radar - Prime and Heater Power, 28VDC and 115VAC	LDW 267-57017	SH.	5.00C
i) Radar RR Antenna Assembly and Transponder Mode Tracker and Self Test Interface	LDW 267-57017	SH.	6.00A
j) Radar Angle Tracker Outputs to Signal Strength Meter	LDW 267-57017	SH.	7.00B
k) Radar RR Computer Interface Unit Inputs	LDW 267-57017	SH.	8.00C
l) Radar RR Computer Interface Unit to LGC and Outputs to Range and Range Rate Meter	LDW 267-57017	SH.	9.00C
m) Radar RR Inputs to Servo Amplifier Assembly	LDW 267-57017	SH.	10.00B
n) Radar RR 800Hz Input to Servo Amplifier Assembly	LDW 267-57017	SH.	10.01B
o) Radar RR Servo Amplifier Output to RRAA, Resolvers, and Gyros	LDW 267-57017	SH.	11.00B
p) Radar RR Antenna Assembly and Electronics Assembly Outputs	LDW 267-57017	SH.	12.00B
q) Radar Landing Radar Prime Power and Heater Distribution	LDW 267-57017	SH.	13.00B
r) Radar Landing Radar MIT/LGC Interface	LDW 267-57017	SH.	14.00B
s) Radar Landing Radar Position and Indication Circuits	LDW 267-57017	SH.	15.00B
t) Radar Landing Radar Self Test Signal to Freq. Tracker	LDW 267-57017	SH.	16.00C
u) Radar Landing Radar Range and Velocity Signals	LDW 267-57017	SH.	17.00B
v) Radar Landing and Rendezvous Radar Antenna Temperature and Caution Lights	LDW 267-57017	SH.	18.00C

3. REVISIONS

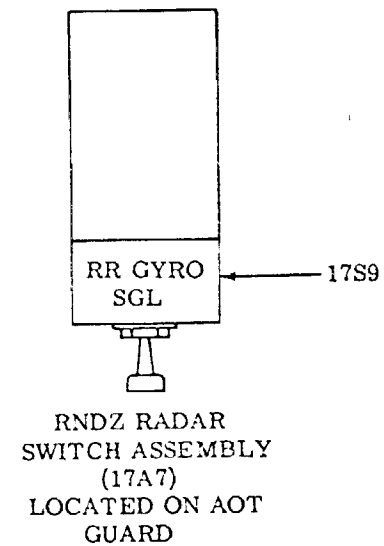
REV	PAGE NO. AND/OR LDW267-57017, SHEET NO.	LCD	DESCRIPTION
B	4.00 & 5.00	5183	TO ENABLE APPLICATION OF GSE PWR (+D28) TO RR HEATERS
	13.00	5004	LGC REPAIR MODULE AND PRODUCT IMPROVEMENT PROGRAM



Cabin Location of Radar Controls and Indicators



PANEL 3
(III)



Radar Controls and Indicators Layout

SUBSYSTEM: RADAR GUIDANCE NAVIGATION AND CONTROL SUBSYSTEM (FUNCTIONAL GROUPING 17)

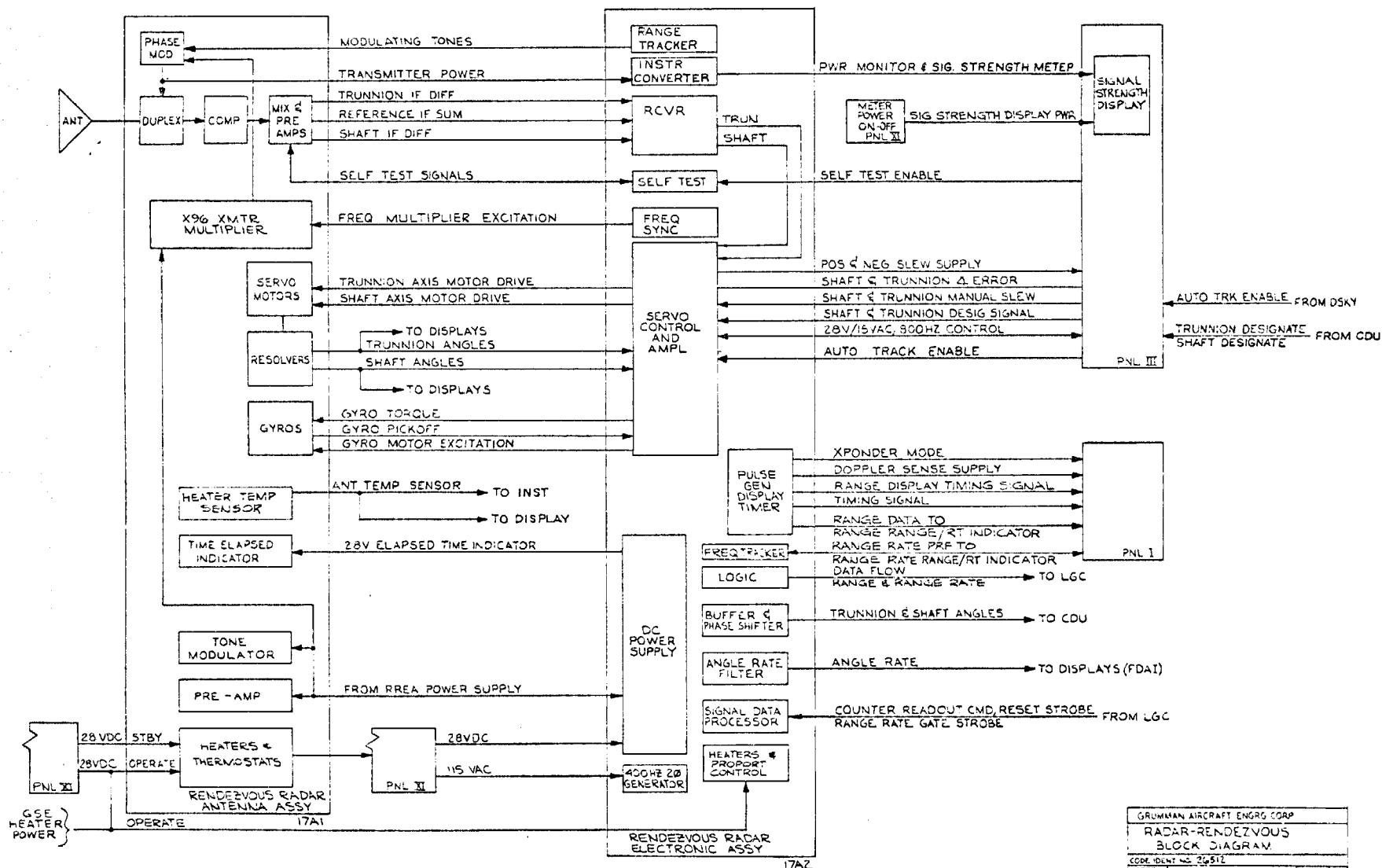
Code	Control/Indicator	Function
17S1	MANUAL SLEW SWITCH SPRING LOADED 4-WAY CENTER OFF TOGGLE	This four-way toggle (UP-RIGHT-DOWN-LEFT) is used when 17S3 is in the SLEW position to slew the trunnion and/or shaft servos. This in turn will position the Rendezvous Radar antenna for manual acquisition of the target. Two antenna slew rates are available through 17S2. When the target (CSM) has been acquired, as noted on 17M1, it may be tracked automatically by placing 17S3 in the AUTO TRACK position. The position of the Rendezvous Radar antenna (shaft and trunnion) can be determined from either the Commander's or LM PILOT'S FDAI (9M1 or 9M6) pitch and yaw error needles when the Rate/Error Monitor switches (9S2 and 9S7) are positioned to RNDZ RADAR.
17S2	SLEW RATE SWITCH 2-POSITION TOGGLE MAIN-MAIN	This two-position toggle (HI-LO) provides two rates for manually slewing the Rendezvous Radar antenna. The HI slew rate is 7°/sec. and the LO slew rate is 1-1/3°/sec. The HI slew rate is used for quick, coarse adjustments to guide the antenna in the direction of the target. The LO slew rate is used for slow, fine adjustments to drive the antenna toward maximum signal strength as monitored on 17M1 thus enabling the subsequent initiation of auto track through 17S3.
17S3	RNDZ RADAR MODE SWITCH 3-POSITION ROTARY	This three-position rotary (AUTO TRACK-SLEW-LGC) enables control of the Rendezvous Radar antenna drive. In the AUTO TRACK position, tracking is maintained by comparing the received radar signals from the shaft and trunnion channels; with the sum channel signal in the Rendezvous Radar angle error detection circuitry; the resultant error signals are used to drive the antenna servos thus maintaining track. In the SLEW position

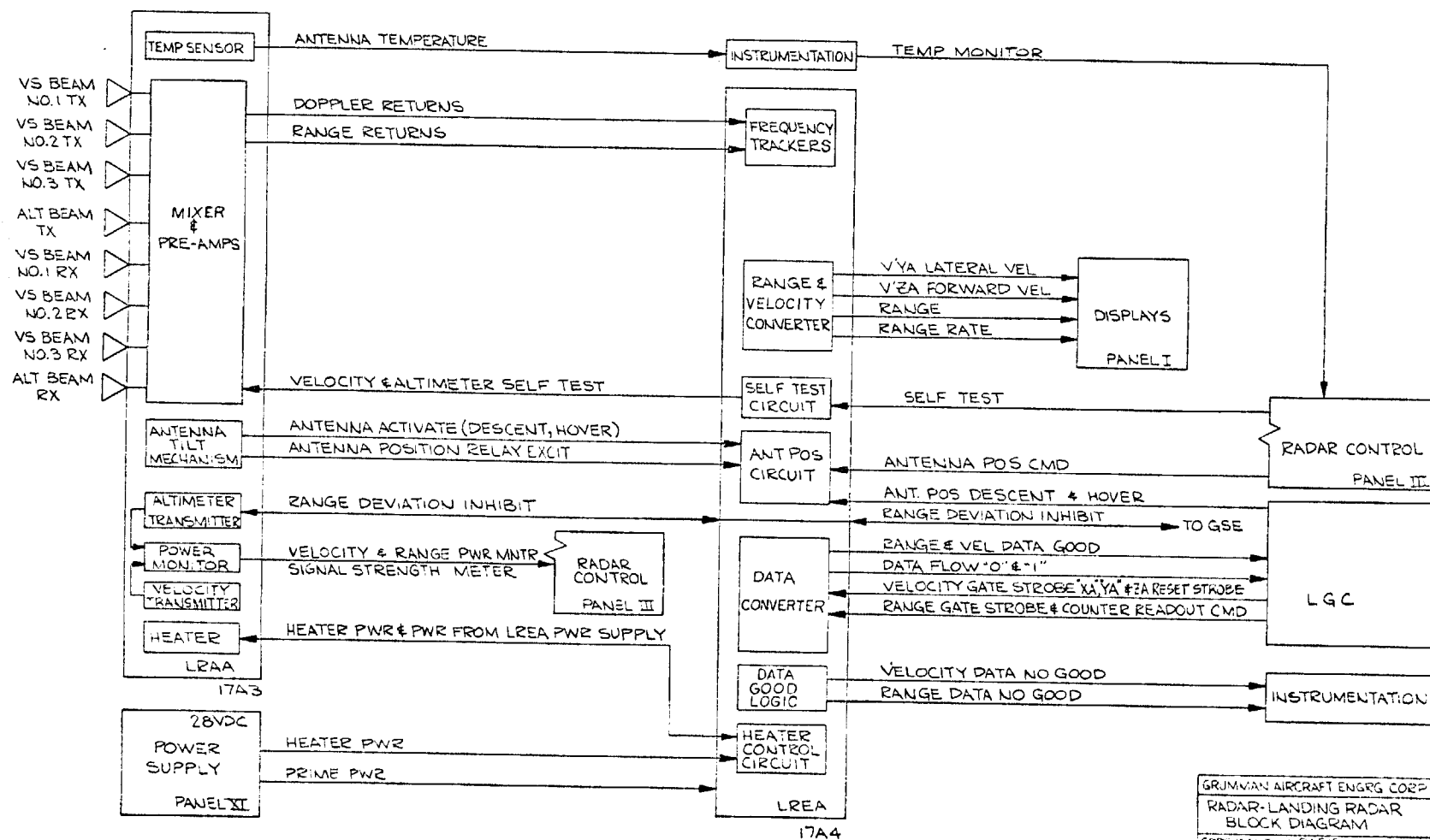
SUBSYSTEM: RADAR GUIDANCE NAVIGATION AND CONTROL SUBSYSTEM (FUNCTIONAL GROUPING 17)

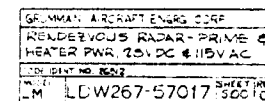
Code	Control/Indicator	Function
17S3 (Cont.)		the Rendezvous Radar antenna drive is controlled manually from 17S1. In the LGC position the computer automatically drives the antenna towards the target. Once the target is acquired the Radar will automatically maintain track and the No-Track component caution light (17DS1) will extinguish.
17S5	LDG ANT SWITCH 3-POSITION TOGGLE LOCK-LOCK-LOCK	This three position toggle (AUTO-DES-HOVER) in the AUTO position enables the LGC to position the Landing Radar antenna appropriate to a particular mission phase. The DES and HOVER positions provide an override of the antenna position drive signal in case of LGC/Antenna interface failure. The DES position is also used to reposition the antenna after testing.
17S6	RADAR TEST SWITCH 3-POSITION TOGGLE MAIN-LOCK-MAIN	This three-position toggle (RNDZ-OFF-LDG) provides signals to the Rendezvous and Landing Radar's test circuitry. In the RNDZ or LDG position, test circuitry is enabled and Rendezvous Radar or Landing Radar performance is determined by monitoring 17M1, the Altitude/Range meter (9M9), and the X-Pointers (9M2 and 9M3) after the appropriate positioning of the following switches: a) Radar Test Switch (17S8) b) Mode Sel. Switch (9S9) c) Rate/Err Mon. Switches (9S2 and 9S7) d) RNG/ALT Mon Switch (9S4).
17S8	TEST/MONITOR SWITCH 6- POSITION ROTARY	This six-position rotary (LDG RADAR PWR: ALT XMTR-VEL XMTR; RNDZ RADAR: AGC-XMTR PWR-SHAFT ERR-TRUN ERR) selects either Landing or Rendezvous Radar test data or flight performance data for monitoring on meter 17M1. In the ALT XMTR position, the landing radar altitude transmitter power output is

SUBSYSTEM: RADAR GUIDANCE NAVIGATION AND CONTROL SUBSYSTEM (FUNCTIONAL GROUPING 17)

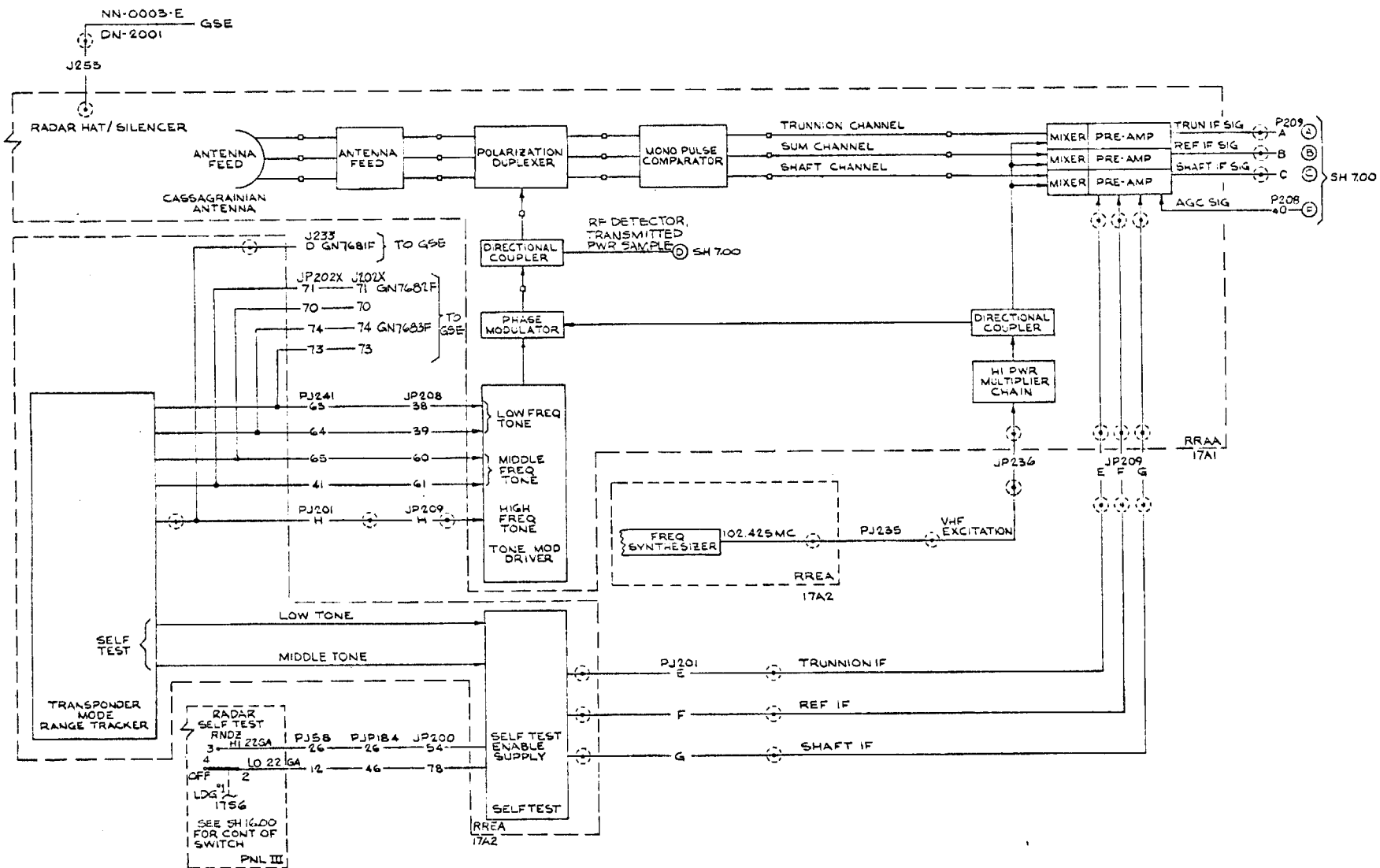
Code	Control/Indicator	Function
17S8 (Cont.)		displayed on 17M1 during testing and flight operations. In the VEL XMTR position, the landing radar velocity transmitter power output is displayed on 17M1 during testing and flight operations. In the AGC position, during testing, a specific value of Rendezvous Radar receiver signal strength will be displayed on 17M1; however, during flight operations the signal will vary. In the XMTR PWR position, a specific value of Rendezvous Radar transmitter output power is displayed on 17M1. In the SHAFT ERR and/or TRUN ERR positions, during testing Rendezvous Radar angle error signals will be displayed as needle fluctuations with equal amplitude on 17M1. During flight operations these error signals will be displayed as needle fluctuations which represent the smoothness of servo tracking, and will usually be unequal in amplitude.
17S9	RNDZ RADAR GYRO SELECT SWITCH 3-POSITION TOGGLE MAIN-LOCK-MAIN	This three-position toggle (PRIM-AUTO-SEC) provides the means to override the automatic gyro voting logic circuit in the Rendezvous Radar Electronic Assembly by selecting either the primary or secondary pair of Rendezvous Radar gyros.
17DS1	NO TRACK LIGHT COMPONENT CAUTION LIGHT	The illumination of this light indicates that the Rendezvous Radar has broken track (data not good).
17M1	SIGNAL STRENGTH METER	The Signal Strength meter displays Landing Radar and Rendezvous Radar data as selected by 17S8 for test and flight operations.







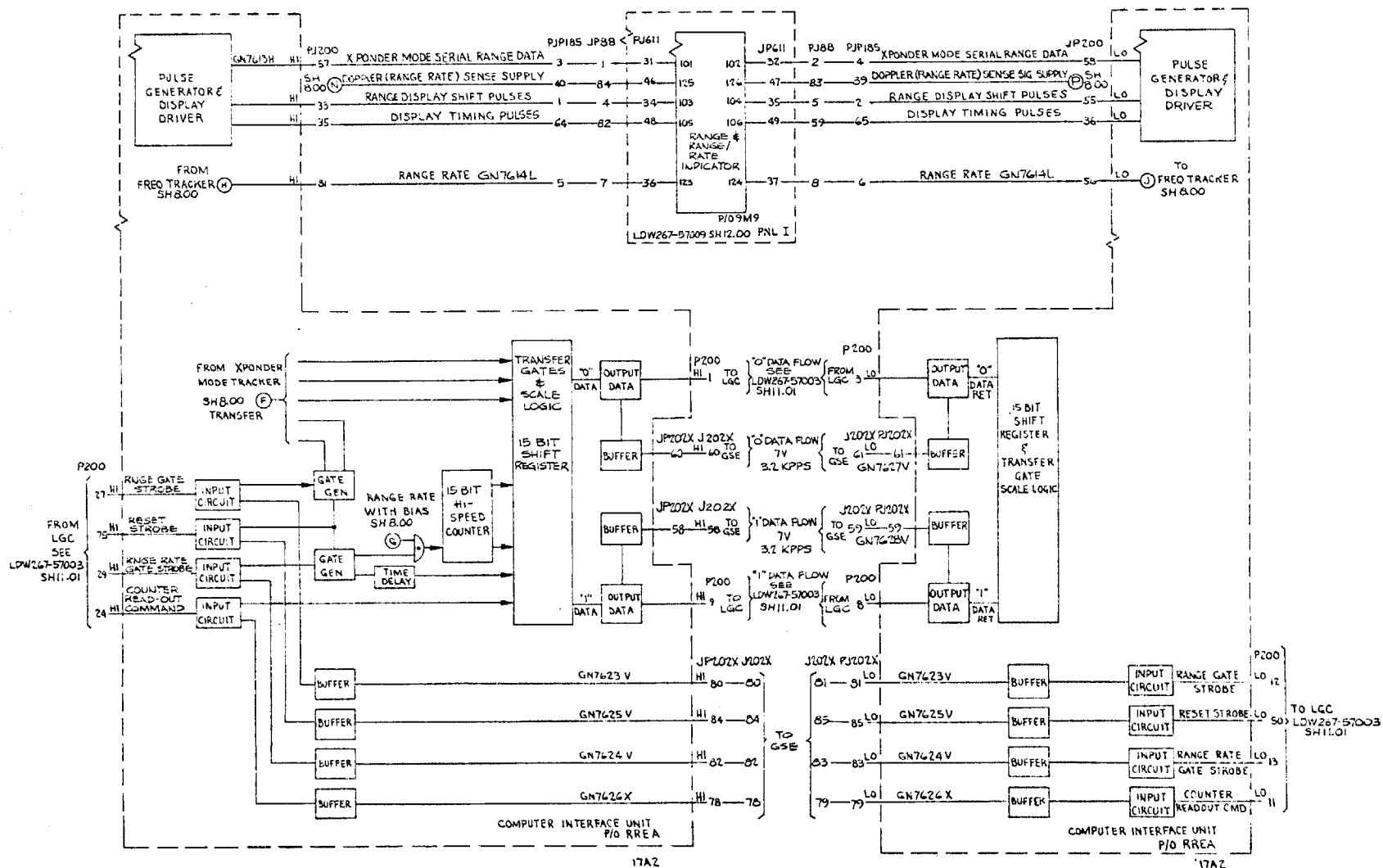
DETAIL "A"
FOR LM-8 THRU LM-146
FOR LM-1 IF LFM487 IS INSTALLED



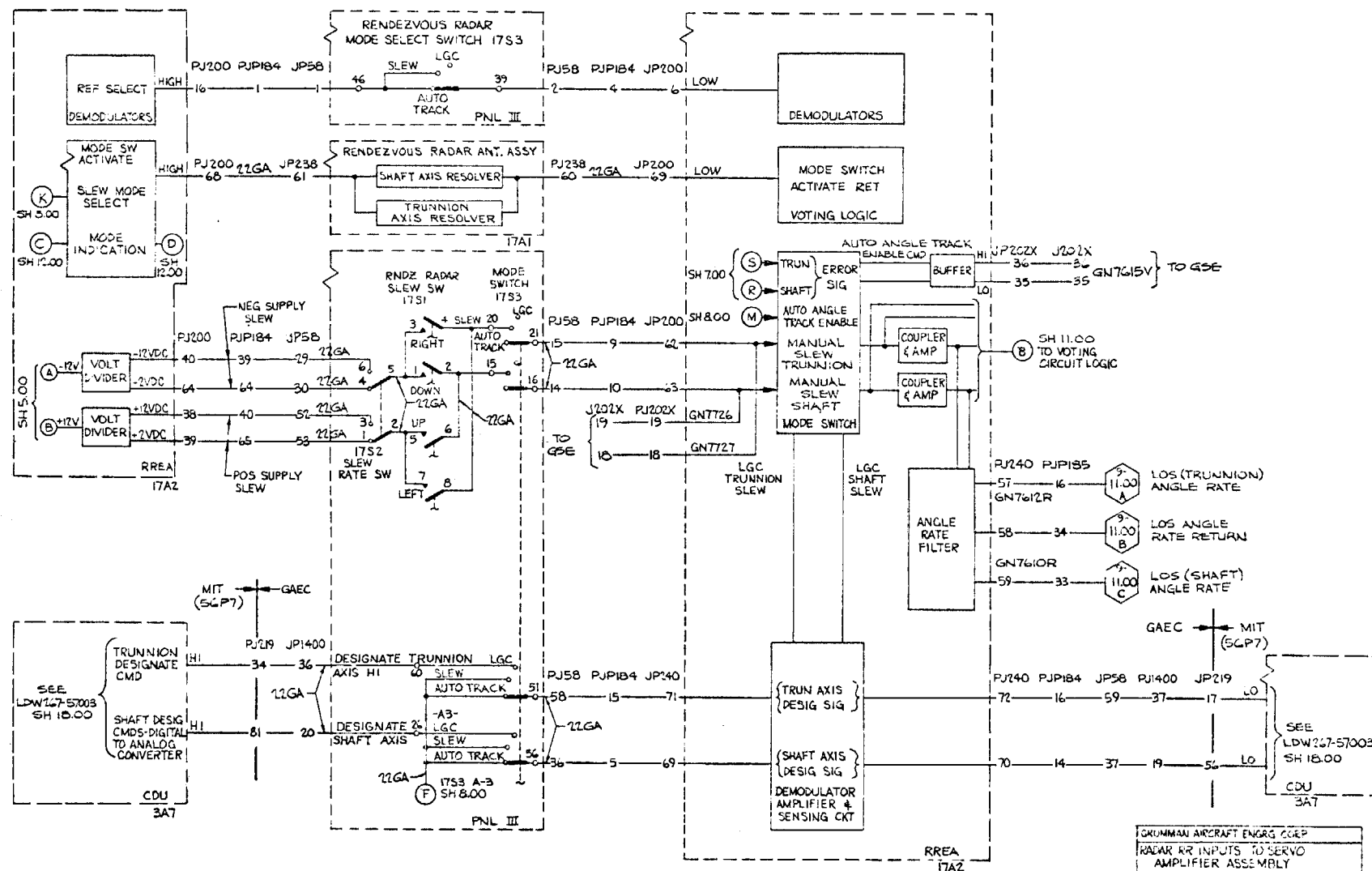
ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP	
RADAR RR ANTENNA ASSEMBLY	
TRANSPONDER MODE TRACKER	
SELF TEST INTERFACE	
CODE IDENT NO. 20011	
MODEL	LDW267-57017
LM	6.00 A

GRUMMAN AIRCRAFT ENGRG CORP			
RADAR COMPUTER INTERFACE			
UNIT INPUTS			
FORM IDENT NO. 24-512			
REVISED	BY	DATE	REVISION
1	LDW	267-57017	1800

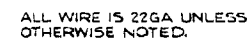


ALL WIRE IS 24-GA UNLESS OTHERWISE NOTED.

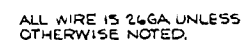


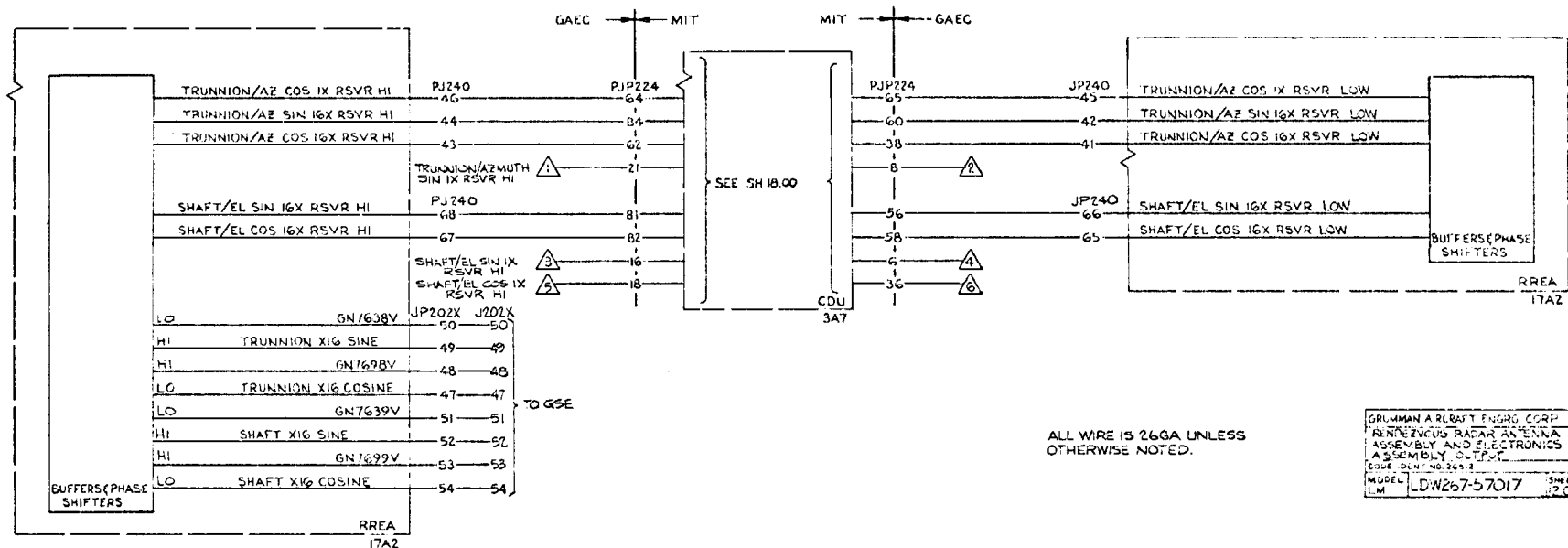
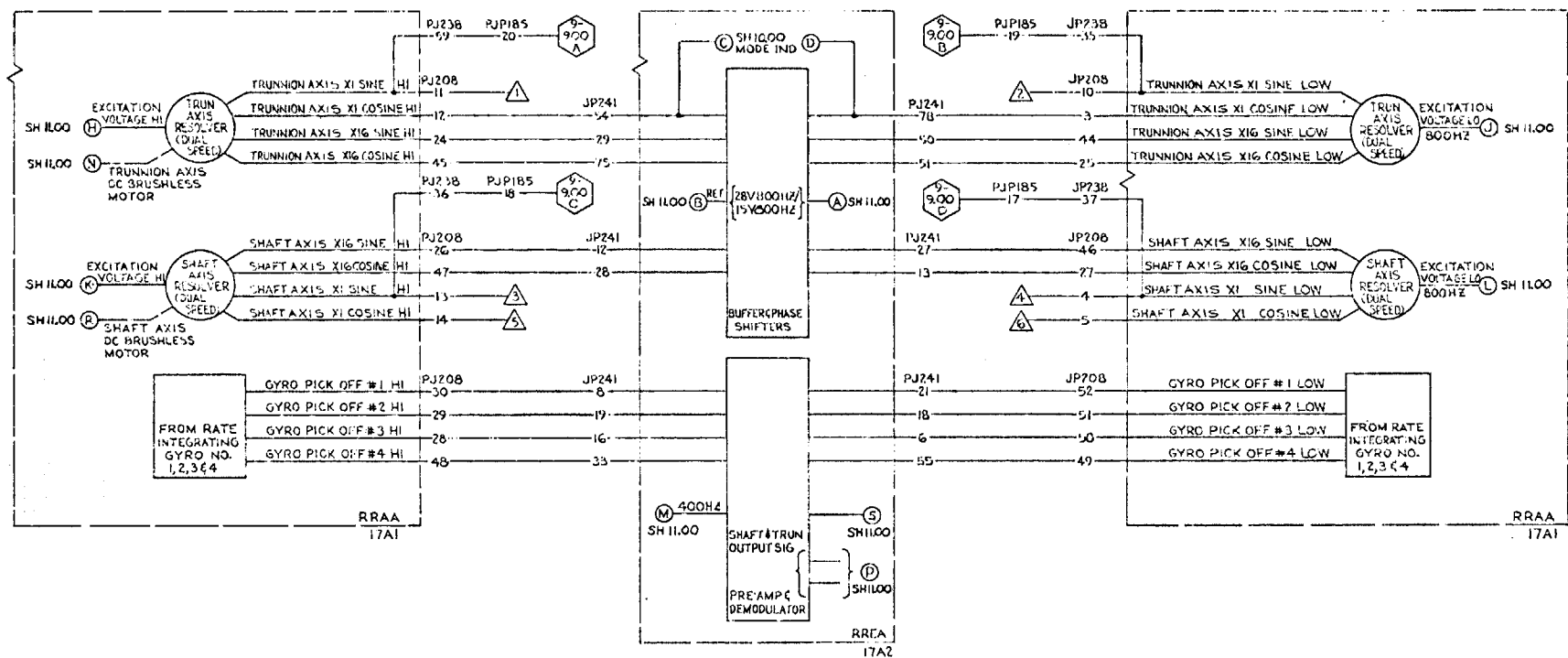
ALL WIRE IS 22GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGRG CO
RADAR KR INPUTS TO SERVO
AMPLIFIER ASSEMBLY
CDU REPORT NO. 7-512
MODEL NO. LDW267-57017
REV. 10.00.18



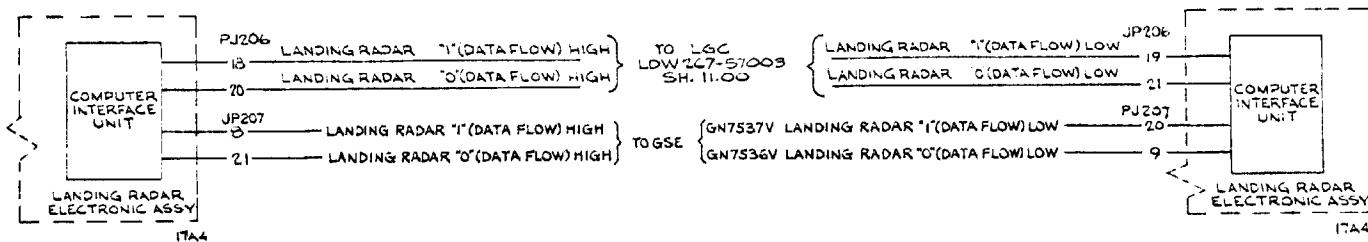
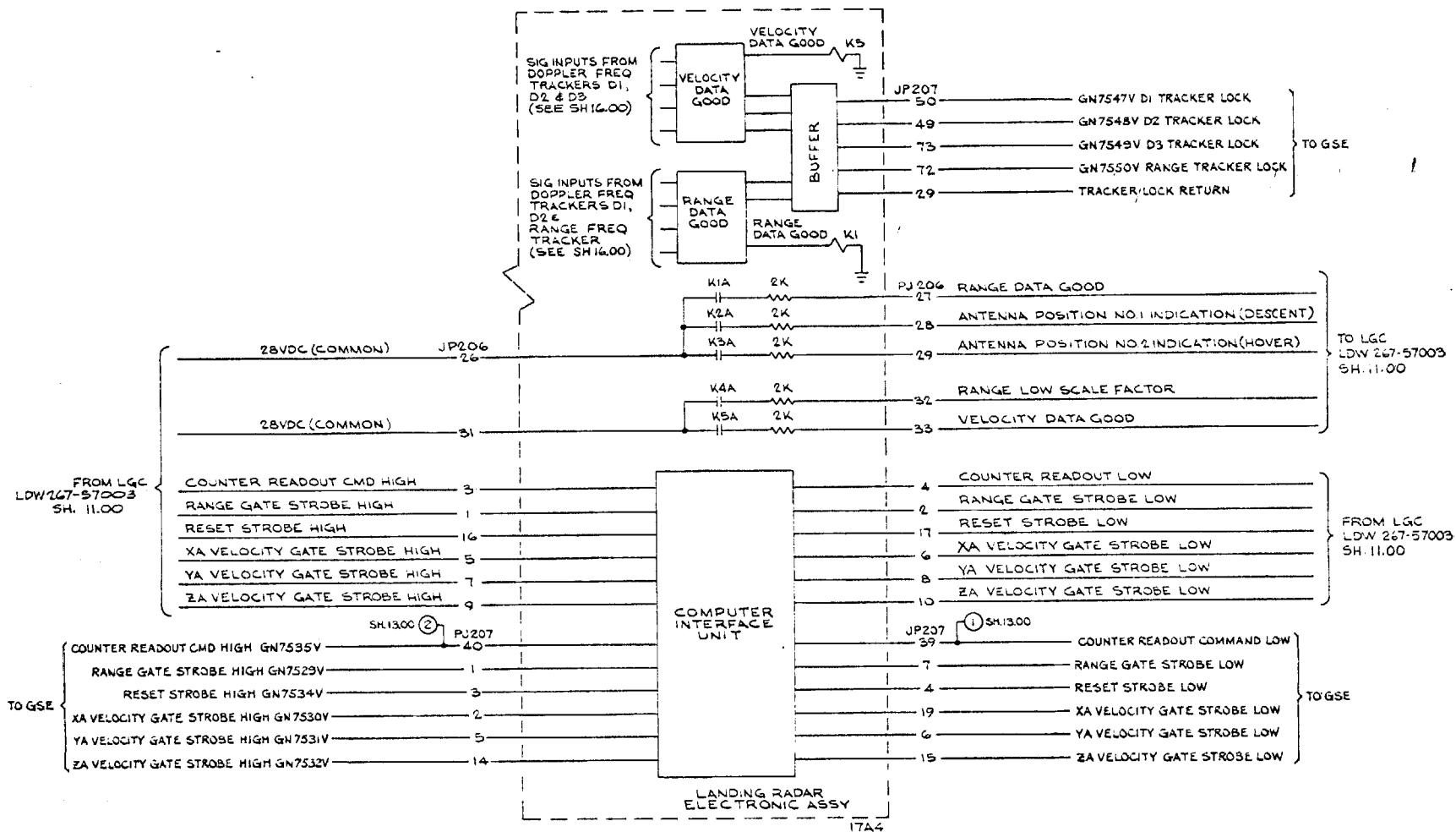
GRUMMAN AIRCRAFT ENGINE CORP
RADAR-RR BOOCH INPUT TO
SERVO AMPLIFIER ASSY
CODE IDENT NO 22-52
WAVEC L
LM LDW267-57017
SHEET REV
0-01B





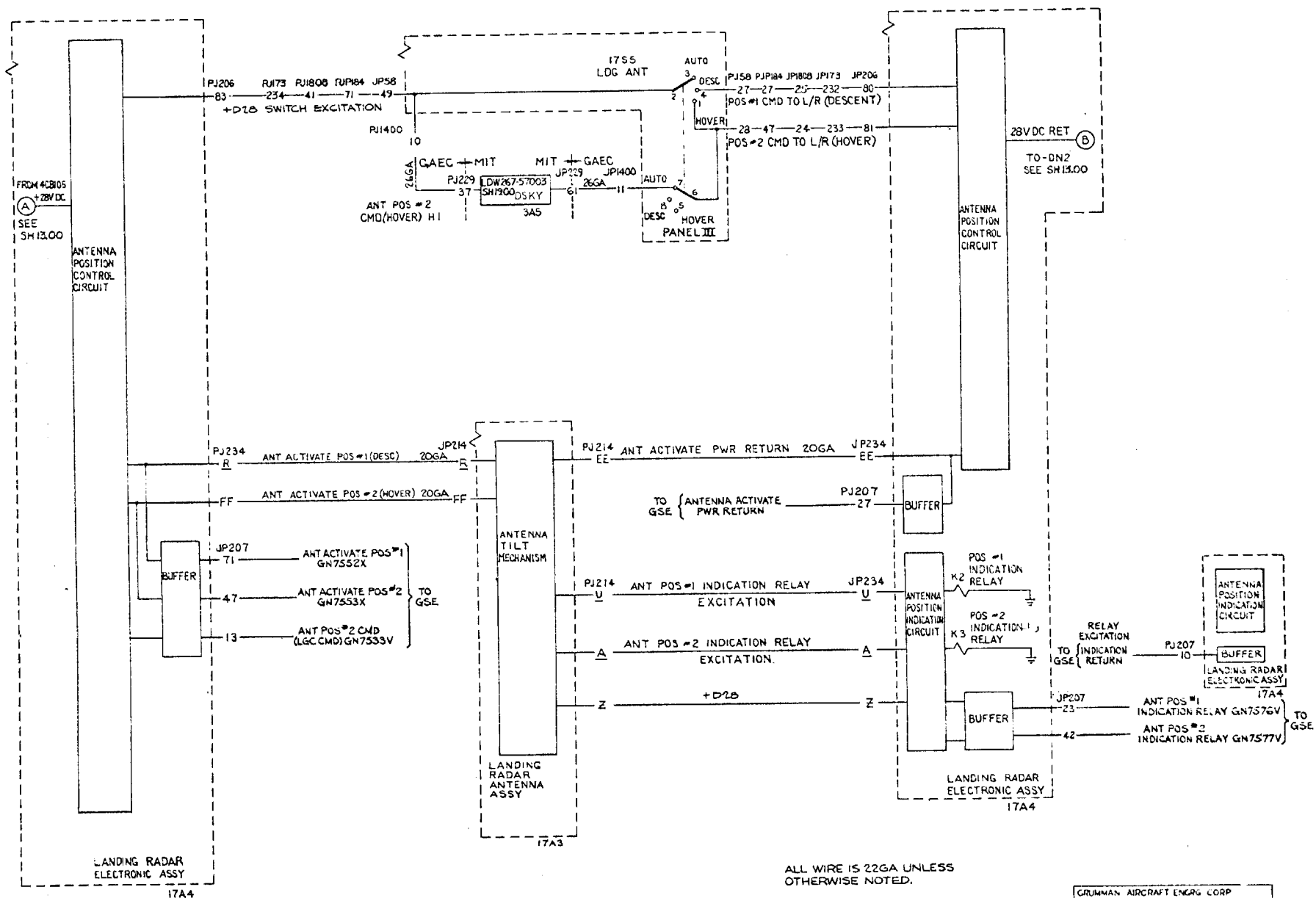
ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINEERING CORP.
 INTERFEROMETER RADAR ANTENNA
 ASSEMBLY AND ELECTRONICS
 MODEL NO. 265-2
 LDW265-57017
 SHEET REV 1200, A

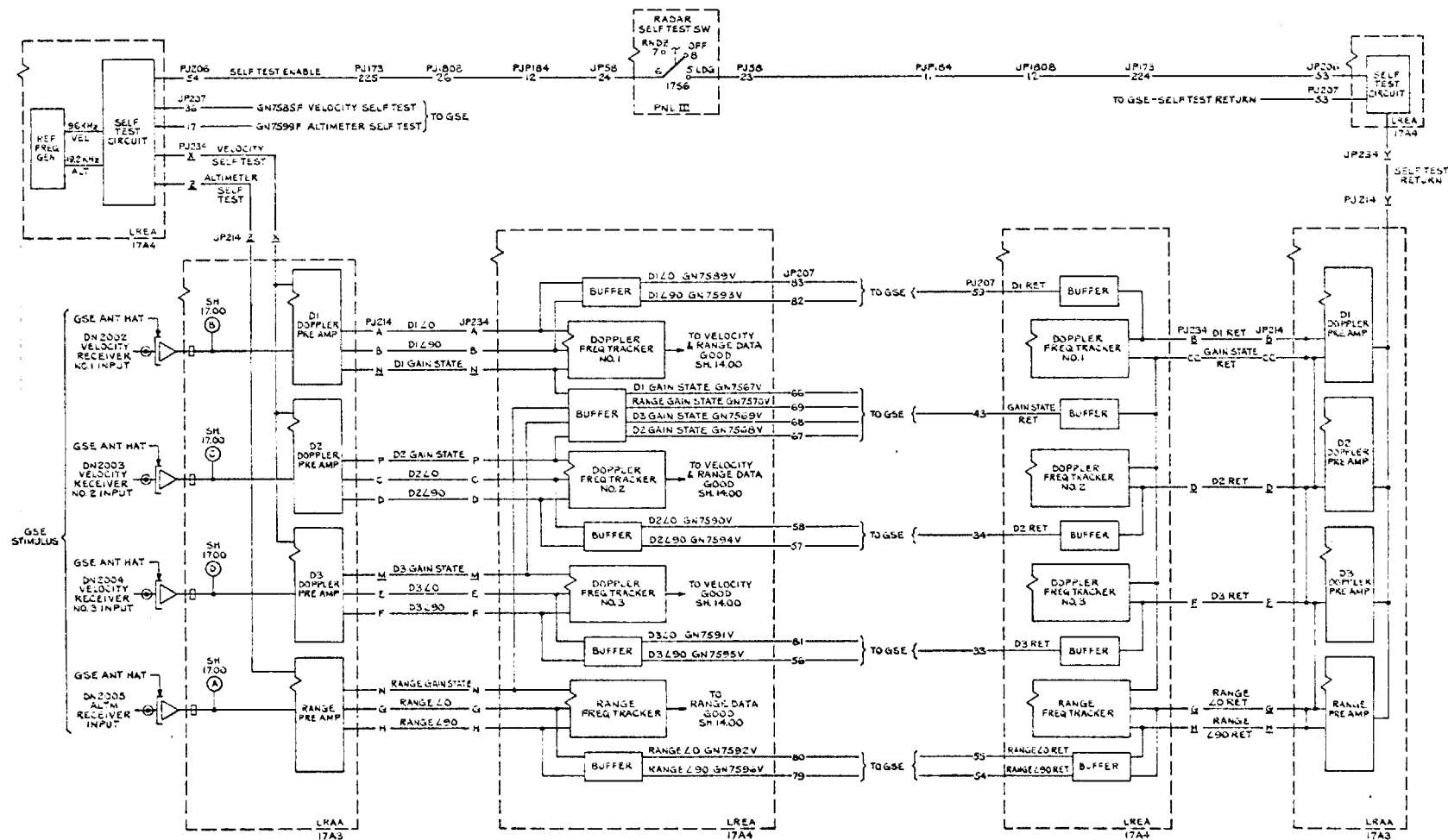


ALL WIRE IS 26GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP	
RADAR-LANDING RADAR	
MIT/LGC INTERFACE	
COUL. DESIG. NO. 1-512	
MODEL	SHEET KEY
LDW 267-57017	14001 B

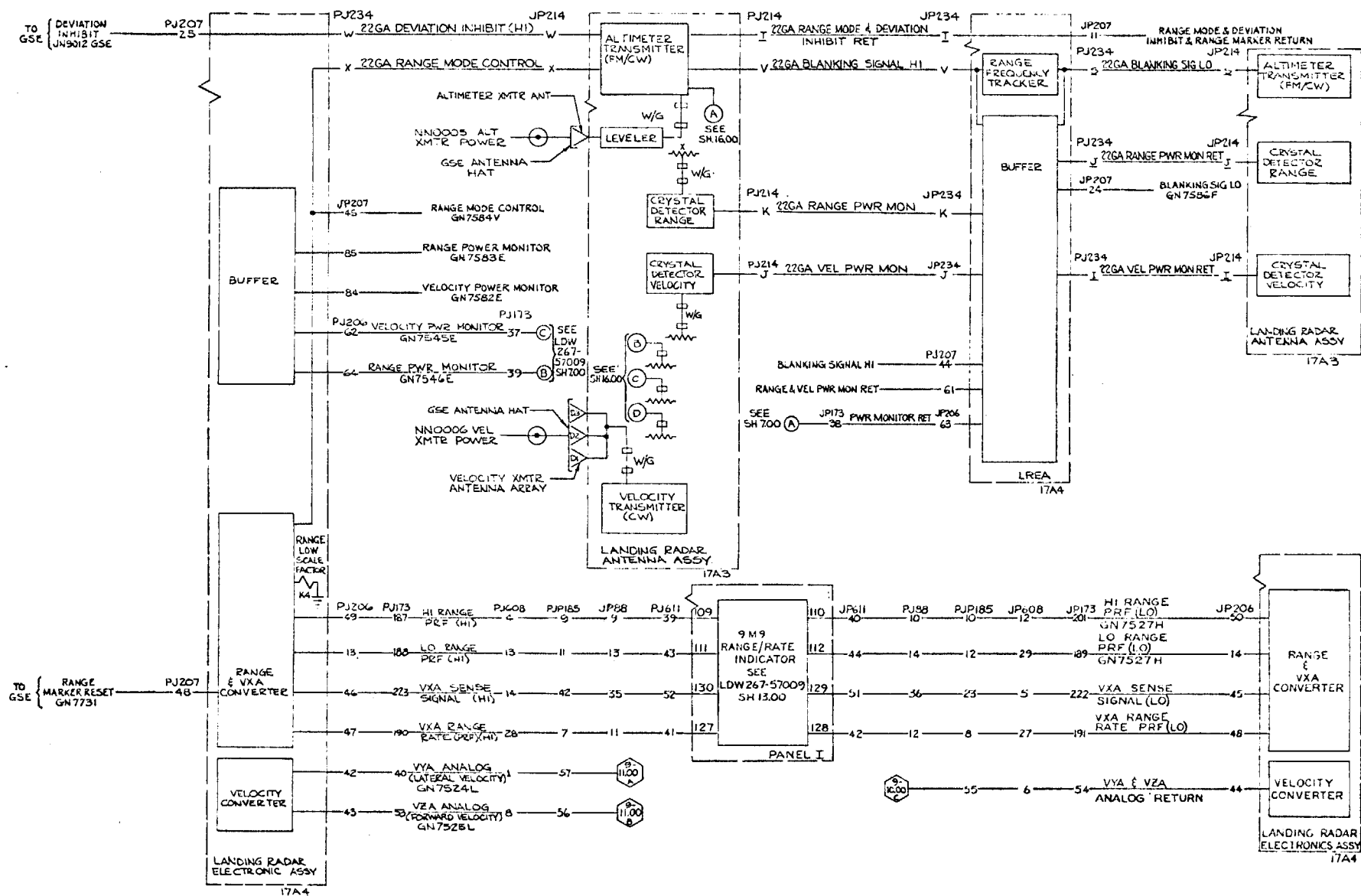


GRUMMAN AIRCRAFT ENGINE CORP.	
LANDING RADAR-POSITION	
# INDICATION CIRCUITS	
CODE: 100-245.2	
MODEL	LDW267-57017
REV	15.00



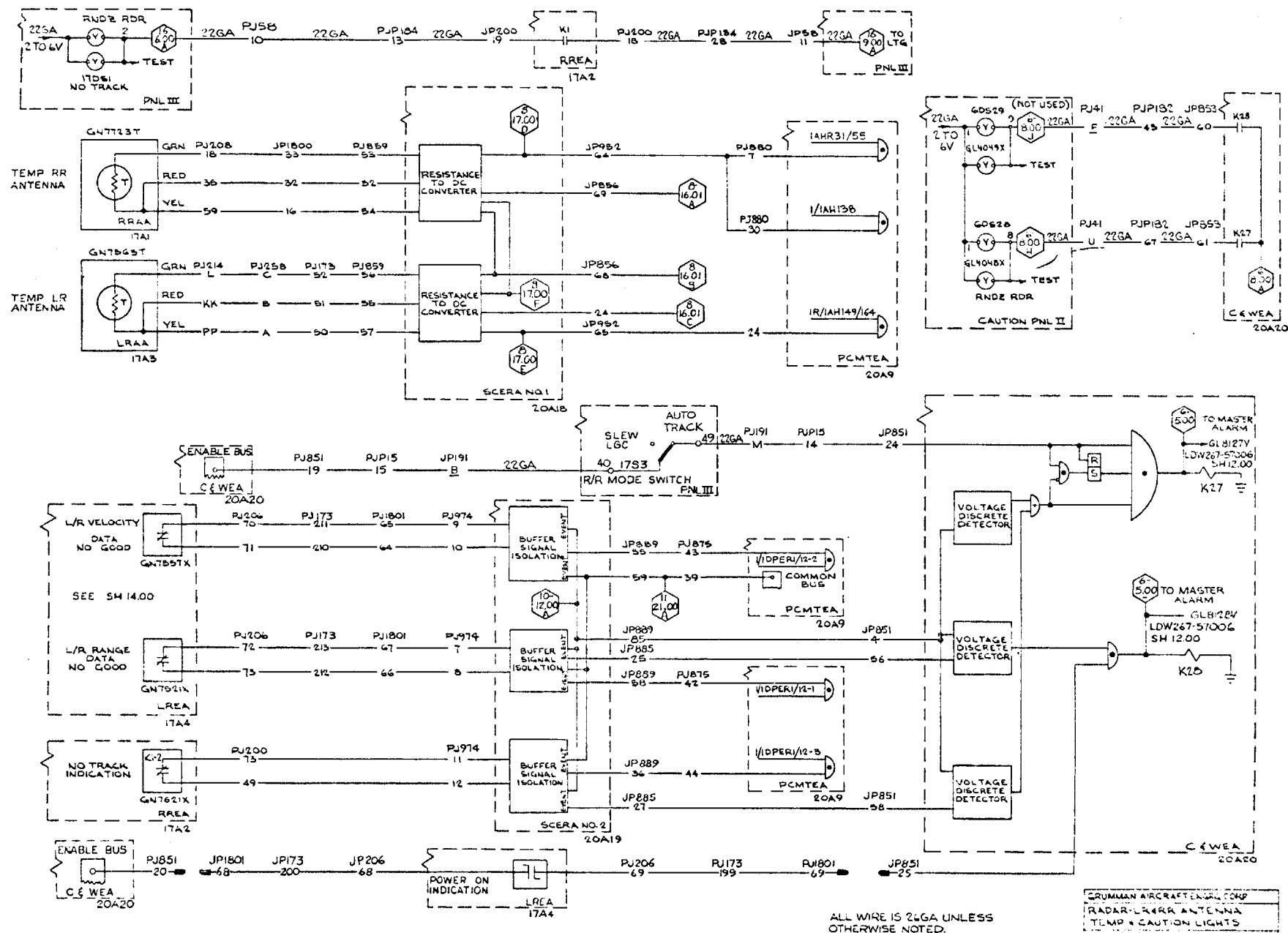
ALL WIRE IS 22GA UNLESS OTHERWISE NOTED

GRUMMAN AIRCRAFT ENGINE CORP
RADAR SELF TEST ANGLE
SIGNALS TO FREQUENCY TRACKERS
CIRCUITRY
MODEL LM 10W267-57017 (REV. 10/60)



ALL WIRE IS 22GA UNLESS OTHERWISE NOTED.

GRUMMAN AIRCRAFT ENGINE CORP
RADAR-LANDING RADAR RANGE & VELOCITY SIGNALS
IDENTIFICATION
LM LOW267-57017 1700B



GRUMMAN AIRCRAFT ENGINEERING CORP.
RADAR - LRAA ANTENNA
TEMP & CAUTION LIGHTS
C6WEA 20A20
LDW267-57017 1500°C