



Propulsion Systems

Huntsville Operations

**MPS
FLIGHT MEASUREMENT
LOCATION DOCUMENT**

REV. C **OCT, 1990**

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For: S&E Shuttle Systems Office - EE31
George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Contract NAS8-38550 WBS 1.3

Approved By:

A handwritten signature in black ink, appearing to read "E N Jackson", written over a horizontal line.

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R. S. Crowder,
Chief Engineer

REVISION CHANGE LOG

REV LTR	CHANGE NO	DESCRIPTION	DATE
		BASIC ISSUE (MSFC-DOC-1631)	JULY 28, 1988
	ERRATA	Issued correct illustration for the GO2 Vent Hood Purge, Pad B configuration; and, the correct area and location for the Hydrogen Leak Detectors.	AUGUST 8, 1988
	1	STS-27R- Added two previous DFI Hydraulic Fluid Temperature Sensors to the return lines form the ET/ORB disconnect actuators (MSID V58T0130A and V58T083A). Changed the MSID Index because of several omissions, and the previous release, by Errata, of the GOX Vent Hood Purge, Pad B Configuration which resulted in adding new MSID's and deleting others. Other changes are ancillary or editorial.	NOVEMBER 7, 1988
	2	STS-29- Added reference to recently installed venturi flow meters and instrumentation in ET intertank and nose cone purge systems. Updated the MSID index to reflect current measurements shown in the MLD. Numerous editorial and typo corrections.	JANUARY 19, 1989
N/A	N/A	This issue of the MPS MLD is published as a Rockwell document. Changes since Change Package 2 include: addition of ET AADS nose cone MSID's; addition of ET LH2 disconnect HE leak detectors; clarification of ssme detail sensor location diagrams, plus major repagination in Sections 7.0 and 8.0.	JULY 17, 1989
A		This revision of the MPS MLD incorporates a description of changes between Pad B and Pad A since STS32 will launch from Pad A. In general, the differences are minor.	DECEMBER 1989
B		This revision of the MLD is a reprint using new diagrams for most schematics. New diagrams added include: 2.10 LOX Transfer Line Leak Check, Drain Assist, Purge; 9.1 Primary Mass Spec. System; 9.2 Back-Up Mass Spec. System.	JULY 1990

REVISION CHANGE LOG

REV LTR	CHANGE NO	DESCRIPTION	DATE
C		This revision of the MPS MLD incorporates MSID changes authorized by DCR's DC001485 (HPOTP strains) and DC001461 (servo currents), and includes an expansion of Section 6.0, Hydraulics, to include some of the system MSID's. Additional detail is included on location of H2 leak detectors LD54 and LD55, and the AADS nose cone pressure measurements. All 11" x 17" foldout pages have been eliminated to simplify reproduction, and the total document is now produced by word processor.	OCTOBER 1990

ACKNOWLEDGEMENT

THIS DOCUMENT IS FOR INFORMATION ONLY. IN THE EVENT OF A CONFLICT BETWEEN THIS DOCUMENT AND FORMAL DOCUMENTATION, THE FORMAL DOCUMENTATION SHALL TAKE PRECEDENCE.

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1.0 GENERAL

1.1 SCOPE

Formal documentation required for measurement sensor installation is too cumbersome for understanding sensor location for data evaluation purposes. The intent of this document is to depict sensor locations, by measurement number, for user convenience and information only. It does not always represent the actual hardware configuration because shuttle element drawing changes are not available to this office on a routine, timely basis. User comments are encouraged in order to correct errors as early as possible.

The following components, subsystems, and facility/GSE for KSC are represented:

- External Tank (ET)
- Orbiter Main Propulsion System (MPS)
- MPS Hydraulic System
- Space Shuttle Main Engine (SSME)
- MPS Pneumatic Service Panels
- MPS Propellant Loading Facility
- Hazardous Gas Leak Detection System
- Hydrogen Leak Detectors
- Fire Detectors

1.2 GENERAL INFORMATION

FUTURE CHANGES

Updates to this document will be provided in the form of page changes only or complete reprints as applicable.

APPENDIX



















The appendix is included to aid in finding a measurement quickly and to provide general vehicle and facility descriptions. If the measurement number is known, the MSID/FD subsection index provides the corresponding subsection number.

ILLUSTRATIONS

System orientation is shown by the flight "bird". Sensor clocking location in the external tank and propellant lines is generally not shown. Zone numbers, where included, refer to the respective zone location of the first letter of the measurement number.

SSME measurements common to all three engine positions have "E" for the fifth, sixth, or seventh character instead of 1, 2, or 3.

LEGEND

	MANUAL VALVE		PRESSURE SENSOR
	SOLENOID VALVE		FLOWMETER
	PNEUM. OPER. VALVE		TEMP. SENSOR
	MOTOR OPER. VALVE		VENTURI
	PRESSURE REGULATOR		LEVEL SENSOR
	CHECK VALVE		PRESSURE SWITCH
	RELIEF VALVE		HEATER
	FILTER		ORIFICE
	PUMP		DISCONNECT

1.3 SOURCE DOCUMENTATION

JSC

Master measurement list, JSC-08220

EXTERNAL TANK (MARTIN MARIETTA, MAF)

MMC-ET-SE09-4 Instrumentation Program Components List
MMC-ET-SE25-0 System Definition Handbook, Rev.B

ORBITER MAIN PROPULSION SYSTEM (SPACE DIVISION, ROCKWELL INTERNATIONAL)

V070-415920 Instrumentation Installation - Feed LH2, Rev.B
V070-415924 Instrumentation Installation - Feed L02, Rev.B
V070-415930 Instrumentation Installation - Prestart and Cond., Rev.A
V070-415932 Instrumentation Installation - Bld. and Pogo, L02, Rev.B
V070-415940 Instrumentation Installation - Pressurization, Rev.B
V070-415951 Instrumentation Installation - Pneum. OV-102 & Subs, Rev.B
V070-415960 Instrumentation Installation - High Pt. Bleed, LH2, Rev.A
V070-415970 Instrumentation Installation - LH2/L02 Fill/Drain, Rev.A
V070-585008 Hydraulic Subsystem Installation - Eng Control and Thrust Vector Control Actuator Lines, Rev.B
V070-755002 Instrumentation Installation - Aft Fuselage, Orb., Rev.D
VS72-941103 Integrated System Schematic, Orbiter OV-103 MPS
VS70-580993 Schematic - Hydraulic Subsystem - OV-104, Rev.C
VS70-580996 Schematic - Hydraulic Subsystem - OV-102, Rev.D
VS70-580999 Schematic - Hydraulic Subsystem - OV-103, Rev.E

SPACE SHUTTLE MAIN ENGINE (ROCKETDYNE DIVISION, ROCKWELL INTERNATIONAL)

SSME flight instrumentation schematic, rocketdyne engine systems
RSS 8559-2-1 Vol III SSME Illustrated Parts Breakdown

KSC DOCUMENTS

79K05444 Space Shuttle Orbiter MPS HE Bottle Fill
79K05640 GN2 Engine Purge Panel Assembly.
79K40008 LOA ECS, EMCD, Pad B : 79K06062, Pad A
79K40018 LOA ET GOX Umb. Arm, Pad B : 79K06067, Pad A
79K40023 LOA MPS LH2 SMS, Pad B : 79K06063, Pad A
79K40024 LOA MPS LH2 EMCD, Pad B : 79K06005, Pad A
79K40027 LOA, MPS LO2 SMS, Pad B : 79K06064, Pad A
79K40028 LOA, MPS LO2 EMCD, Pad B : 79K06006, Pad A
79K40062 LOA SSME GSE, Pad B : 79K06117, Pad A

KSC data bank listing ODIS user list Feb, 1988

1.4 MEASUREMENT (MSID & FD) NO. DESCRIPTION

1.4.1 FLIGHT VEHICLE MEASUREMENT NUMBER DESCRIPTION

The six field numbers for each measurement are defined for user convenience (refer to JSC-08220 MML).

FIELD NO. 1 (FIRST CHARACTER

E - Main Engine
T - External Tank
V - Orbiter Vehicle

FIELD NO. 2 (SECOND & THIRD CHARACTERISTICS)

07 - Aerodynamic/Thermodynamics
08 - Structural Dynamics
09 - Thermal Protection System (TPS)
35 - Aft Fuselage
38 - Purge Vent, And Drain
41 - Main Propulsion
58 - Hydraulic
79 - Flight Control

FIELD NO. 3 (FOURTH CHARACTER CHARACTER)

A - Acceleration
C - Current
D - Vibration

E - Power
G - Force/Stress/Strain
H - Position/Attitude
K - Stimulus
L - Velocity
M - Multi-Data
P - Pressure
Q - Quantity
R - Rate
T - Temperature
V - Voltage
W - Time
X - Discrete Event
Y - Acoustics

FIELD NO. 4 (FIFTH THRU EIGHTH

0001 - 8999 OFI Measurements
9000 - 9999 DFI Measurements
(measurement identifying number,
unique for subfields 1 & 2)

FIELD NO. 5 (NINTH CHARACTER)

DATA TYPE			DATA ROUTING
ANALOG	EVENT	DIGITAL	(MAY BE MULTIPLE)
A	E	D	OFI/DFI
C	X	B	Flight Critical
R	U	L	RF Uplink
G	N	T	Ground Decoder
H	W	-	Ground Hardware
V	Y	J	System Management/Payload
F	-	-	Continuous Signal
-	-	P	Parent Word

FIELD NO. 6 (TENTH CHARACTER, IF USED)

*Identifies software routing (refer to MML)

1.4.2 GROUND SUPPORT EQUIPMENT MEASUREMENT NUMBER DESCRIPTION.

The six subfield numbers for each measurement are defined for user convenience (refer to KSC DL-NED NO. 009)

SUBFIELD NO. 1 (FIRST CHARACTER)

G - Ground Support Equipment
F - Facility

SUBFIELD NO. 2 (SECOND & THIRD CHARACTERS)

EC - Environmental Control
GN - Gaseous Nitrogen
GO - Gaseous Oxygen
HE - Gaseous Helium
LH - Liquid Hydrogen
LO - Liquid Oxygen
WI - Water (Industrial)

SUBFIELD NO. 3 (FOURTH CHARACTER)

Same as flight vehicle measurement field no. 3.

SUBFIELD NO. 4 (FIFTH THRU EIGHTH CHARACTERS)

Measurement identifying number, unique for subfields 1 & 2.

SUBFIELD NO. 5 (NINTH CHARACTER)

A - Analog
E - Discrete event
X - Discrete event software signal

1.4.3 ENVIRONMENTAL, SPECIAL, AND METEOROLOGICAL MEASUREMENT NUMBER DESCRIPTION.

The five subfield numbers for each measurement are defined for user convenience (refer to KSC DL-NED-3).

SUBFIELD NO. 1 (FIRST CHARACTER)

K - DL-NED-3 designator for environmental, special, and meteorological measurements system.

SUBFIELD NO. 2 (SECOND AND THIRD CHARACTER)

SR - GSE subsystem (structural) in major Shuttle element.

SUBFIELD NO. 3 (FOURTH CHARACTER)

Same as flight vehicle measurement field No. 3.

SUBFIELD NO. 4 (FIFTH THRU EIGHTH CHARACTERS)

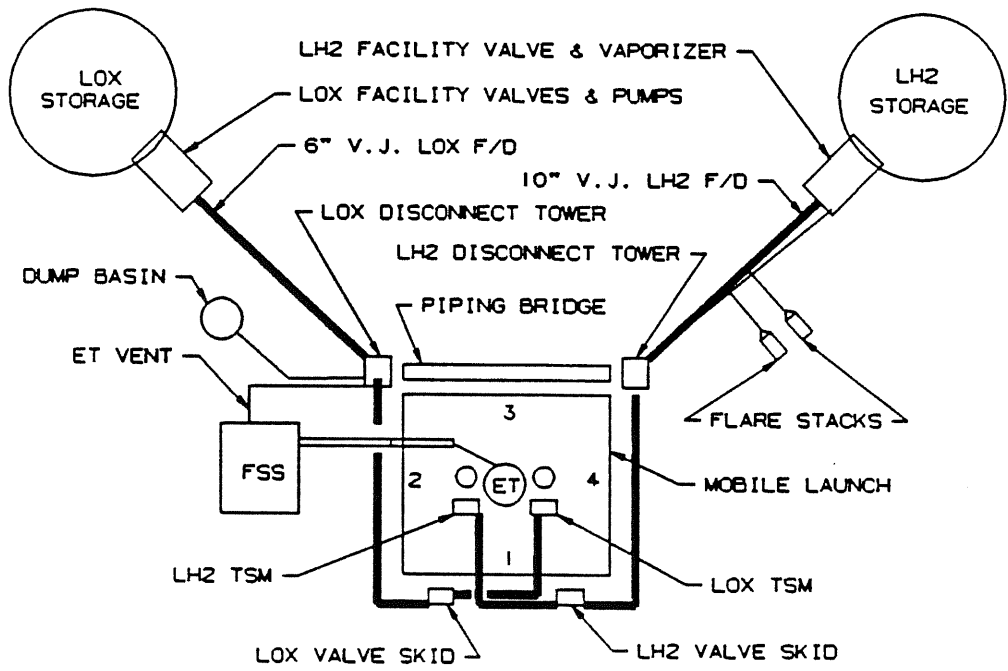
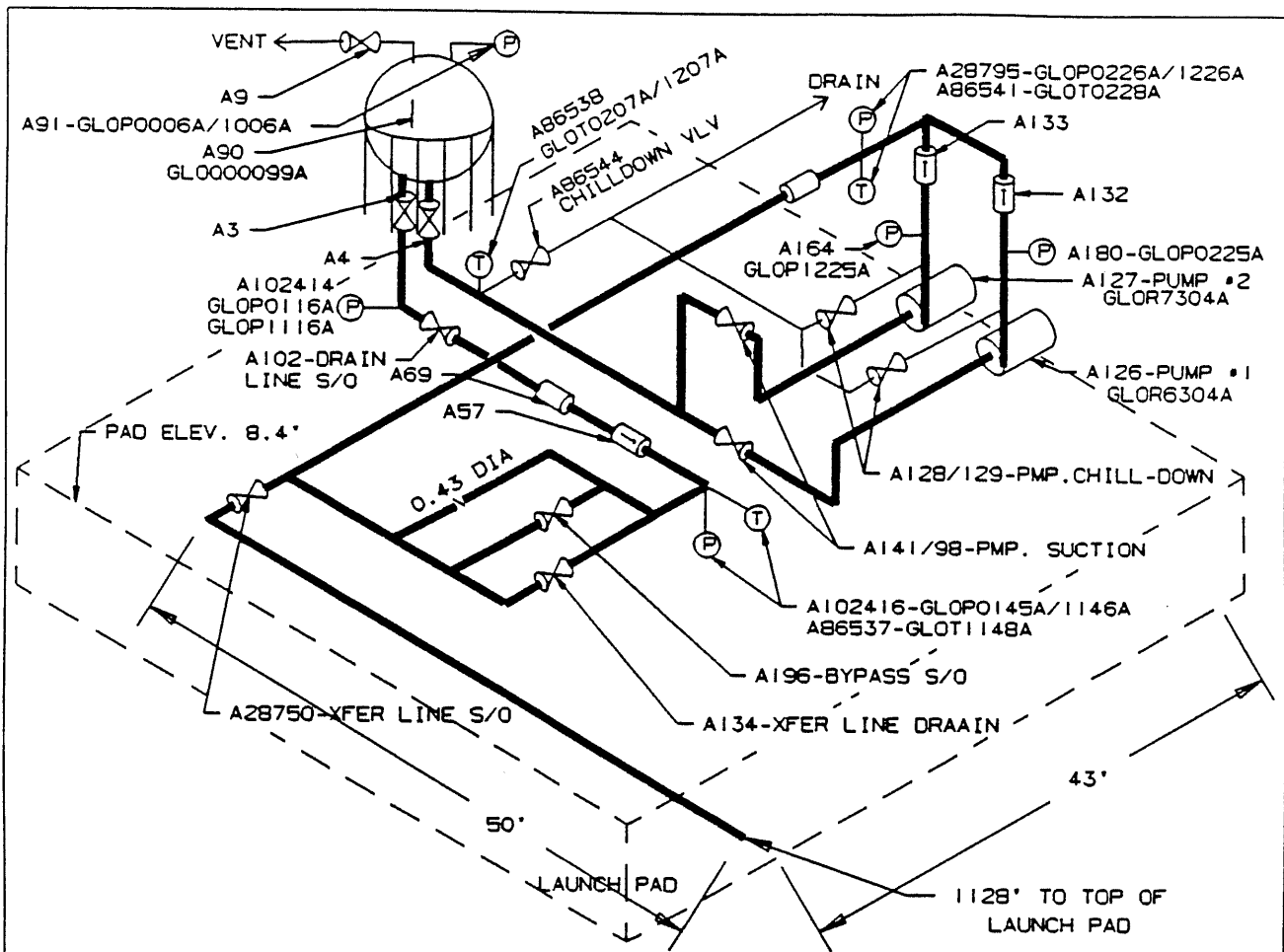
Measurement identifying number, unique for subfields 1 and 2.

SUBFIELD NO. 5 (NINTH CHARACTER)

A - Signal transmission type (analog).

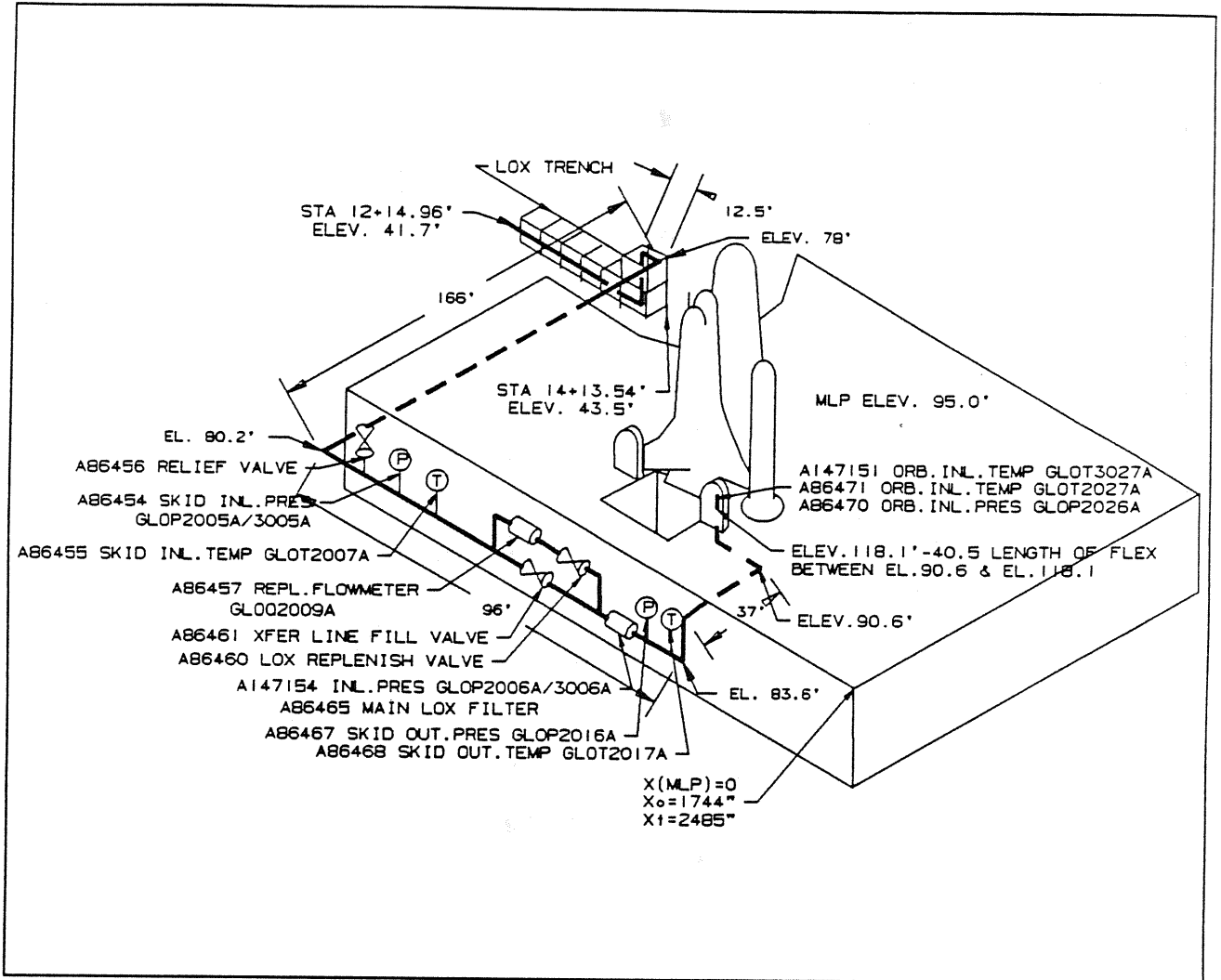
2.0 LOX FLUID SYSTEMS

2.1A LOX LOADING SKETCH

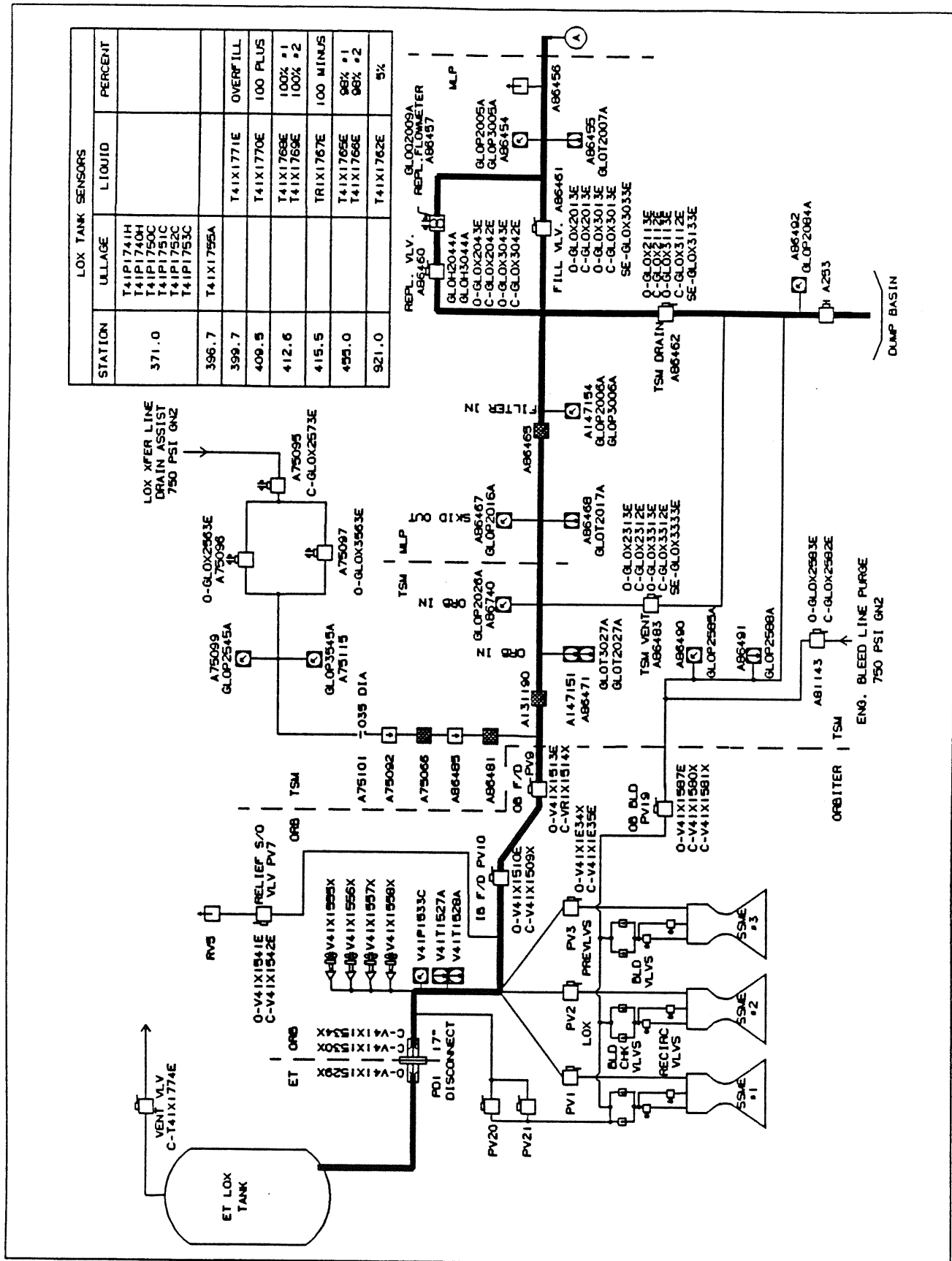


PROPELLANT LOADING FACILITY PLAN VIEW

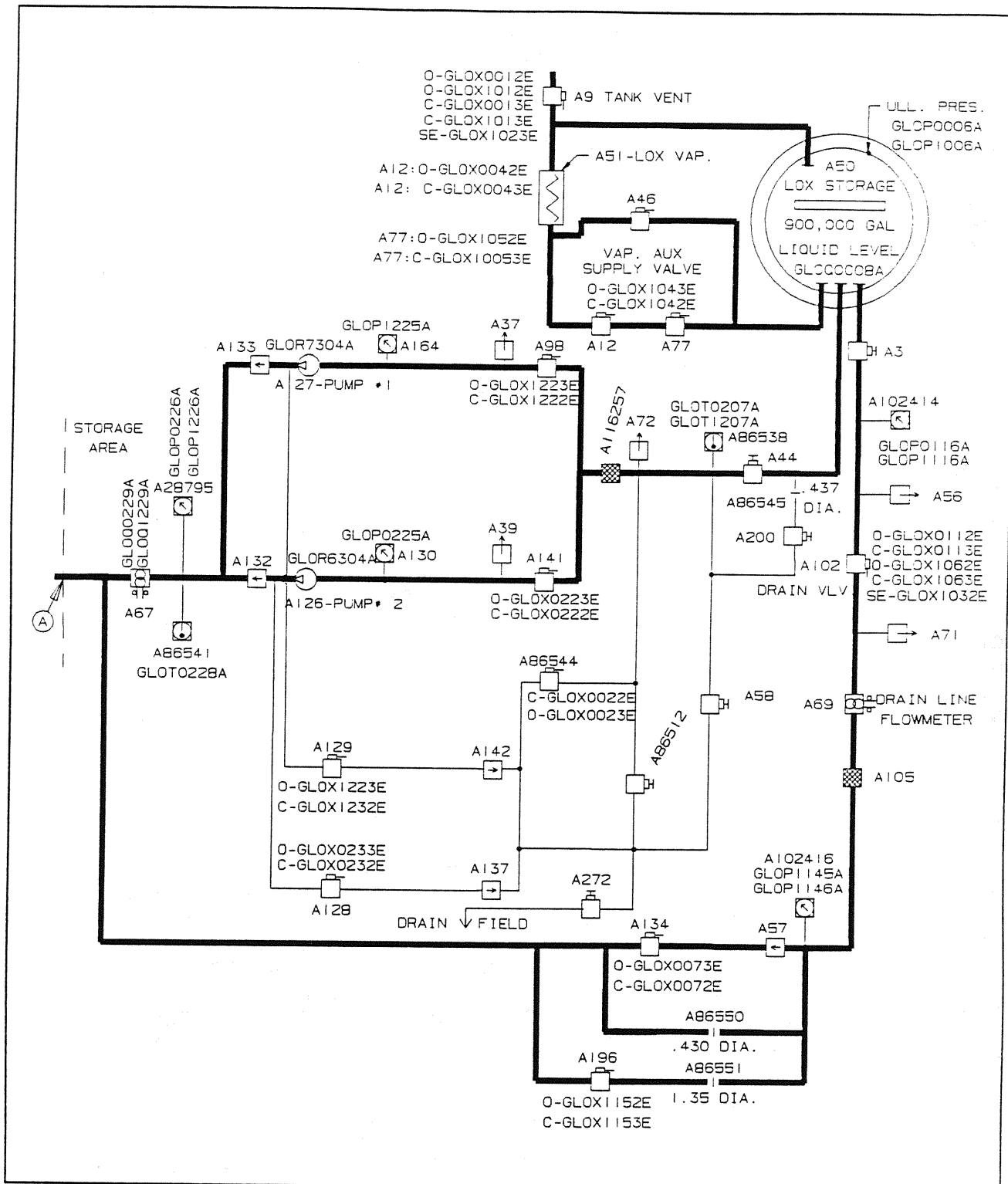
2.1B LOX LOADING SKETCH



2.2A LOX LOADING SCHEMATIC



2.2B LOX LOADING SCHEMATIC



2.2 KSC LOX LOADING SCHEMATIC

E41H1062D	ME-1 OXID BLEED VLV POSITION DW 65, 0 TO 100 PCT
E41H1063D	ME-1 POGO RECIRN ISLN V POS DW63 0 TO 100 PCT
E41H2062D	ME-2 OXID BLEED VLV POSITION DW 65, 0 TO 100 PCT
E41H2063D	ME-2 POGO RECIRN ISLN V POS DW63 0 TO 100 PCT
E41H3062D	ME-3 OXID BLEED VLV POSITION DW 65, 0 TO 100 PCT
E41H3063D	ME-3 POGO RECIRN ISLN V POS DW63 0 TO 100 PCT
GLOH2044A	A86460 REPL VLV POSITION #1, 0 TO 100 PCT
GLOH3044A	A86460 REPL VLV POSITION #2, 0 TO 100 PCT
GLOK4011E	A78392 ET VT PRI CONTROL VLV OP, ONE=ON ZERO=OFF
GLOK4511E	A78393 ET VT SEC CONTROL VLV OP, ONE=ON ZERO=OFF
GLOK4521E	A78394 ET VT SEC SELECT VLV OP, ONE=ON ZERO=OFF
GLOP0006A	A91 ST TANK ULLAGE PRESS #1, -15 TO +15 PSIG
GLOP0116A	A102414 DRAIN LINE PRESS #1, 0 TO 75 PSIG
GLOP0145A	A102416 BYPASS PRESS #1, 0 TO 75 PSIG
GLOP0225A	A180 PUMP A126 SUCTION PRESS, 0 TO 50 PSIG
GLOP0226A	A28795 1M PUMP DISCH PRESS #1, 0 TO 500 PSIG
GLOP1006A	A91 ST TANK ULLAGE PRESS #2, -15 TO +15 PSIG
GLOP1116A	A102414 DRAIN LINE PRESS #2, 0 TO 75 PSIG
GLOP1146A	A102416 BYPASS PRESS #2, 0 TO 75 PSIG
GLOP1225A	A164 PUMP A127 SUCT PRESS, 0 TO 50 PSIG
GLOP1226A	A28795 1M PUMP DISCHARGE PRESS #2, 0 TO 500 PSIG
GLOP2005A	A86454 SKID INLET PRESS #1, 0 TO 500 PSIG
GLOP2006A	A147154 FILTER INLET PRESS #1, 0 TO 500 PSIG
GLOP2016A	A86467 SKID OUTLET PRESS, 0 TO 500 PSIG
GLOP2026A	A86470 ORBITER INLET PRESS, 0 TO 300 PSIG
GLOP2084A	A86492 MLP DRAIN LINE PRESS, 0 TO 75 PSIG
GLOP2545A	A75099 XFR LN DR ASST PRI OUT PRESS, 0 TO 1500 PSIG
GLOP2585A	A86490 TSM ENG BLEED PRESS, 0 TO 150 PSIG
GLOP3005A	A86454 SKID INLET PRESS #2, 0 TO 500 PSIG
GLOP3006A	A147154 FILTER INLET PRESS #2, 0 TO 500 PSIG
GLOP3545A	A75115 XFR LN DR ASST SEC OUT PRESS, 0 TO 1500 PSIG
GLOQ0009A	A90 ST TANK LIQUID LEVEL, 0 TO 950 K GAL
GLOQ0229A	A143 1M PUMP DISCH FLOWRATE PRI, 0 TO 1500 GAL/MIN
GLOQ1229A	A193 1M PUMP DISCH FLOWRATE SEC, 0 TO 1500 GAL/MIN
GLOQ2009A	A86457 REPL FLOW RATE, 0 TO 320 GAL/MIN
GLOR6304A	A126 PUMP MOTOR TACH SIGNAL, 0 TO 3750 RPM
GLOR7304A	A127 PUMP MOTOR TACH SIGNAL, 0 TO 3750 RPM
GLOT0207A	A86538 1M PUMP COM SUCT LINE TEMP, -301 TO -274 DEGF
GLOT0228A	A86541 1M PUMP DISCHARGE TEMP, -301 TO -274 DEGF
GLOT1148A	A86537 BYPASS TEMP, -301 TO -274 DEGF
GLOT1207A	A86538 1M PUMP COM SUCT LN TEMP #2, -301 TO -274 DEGF
GLOT2007A	A86455 SKID INLET TEMP, -301 TO -274 DEGF
GLOT2017A	A86468 SKID OUTLET TEMP, -301 TO -274 DEGF
GLOT2027A	A86471 ORBITER INLET TEMP NO 1, -301 TO -274 DEGF
GLOT2588A	A86491 TSM ENG BLEED TEMP, -301 TO -274 DEGF
GLOT3027A	A147151 ORBITER INLET TEMP NO 2, -301 TO -274 DEGF
GLOX0012E	A9 ST TANK VENT VLV OPEN #1, ONE=ON ZERO=OFF
GLOX0013E	A9 ST TANK VENT VLV CLSD #1, ONE=ON ZERO=OFF
GLOX0022E	A86544 SUCT LN CHILLDOWN VLV CLSD, ONE=ON ZERO=OFF
GLOX0023E	A86544 SUCT LN CHILLDOWN VLV OPEN, ONE=ON ZERO=OFF
GLOX0042E	A12 VAP CONTROL VLV CLSD #1, ONE=ON ZERO=OFF
GLOX0043E	A12 VAP CONTROL VLV OPEN #1, ONE=ON ZERO=OFF
GLOX0072E	A134 XFER LINE DRAIN VLV CLSD #1, ONE=ON ZERO=OFF

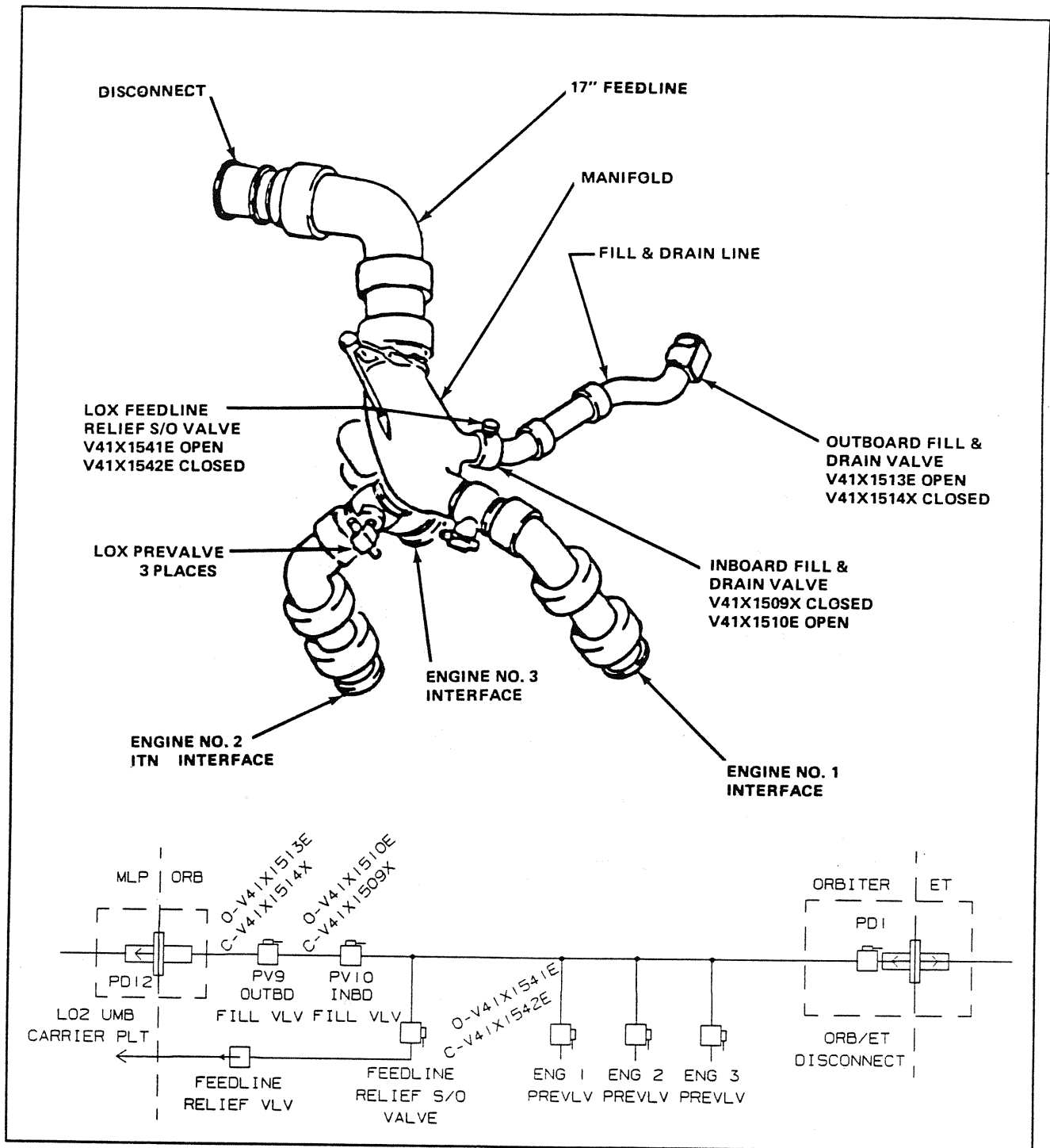
2.2 KSC LOX LOADING SCHEMATIC (CONTINUED)

GLOX0073E	A134 XFER LINE DRAIN VLV OPEN #1, ONE=ON ZERO=OFF
GLOX0112E	A102 DRAIN LINE SH/OFF VLV OPEN #1, ONE=ON ZERO=OFF
GLOX0113E	A102 DRAIN LINE SH/OFF VLV CLSD #1, ONE=ON ZERO=OFF
GLOX0222E	A141 PUMP A126 SUCTION VLV CLSD, ONE=ON ZERO=OFF
GLOX0223E	A141 PUMP A126 SUCT VLV OPEN, ONE=ON ZERO=OFF
GLOX0232E	A128 PUMP A126 CHILLDOWN VLV CLSD, ONE=ON ZERO=OFF
GLOX0233E	A128 PUMP A126 CH/DOWN VLV OPEN, ONE=ON ZERO=OFF
GLOX1012E	A9 ST TANK VENT VLV OPEN #2, ONE=ON ZERO=OFF
GLOX1013E	A9 ST TANK VENT VLV CLOSED #2, ONE=ON ZERO=OFF
GLOX1023E	A9 ST TANK VNT SEC SOL'S ENABLED, ONE=ON ZERO=OFF
GLOX1032E	A102 DRAIN LN SH/OFF SEC SOL SELD, ONE=ON ZERO=OFF
GLOX1042E	A46 VAP AUX SUPPLY VLV CLSD, ONE=ON ZERO=OFF
GLOX1043E	A46 VAP AUX SUPPLY VLV OPEN, ONE=ON ZERO=OFF
GLOX1052E	A77 VAP SHUTOFF VLV OPEN, ONE=ON ZERO=OFF
GLOX1053E	A77 VAP SHUTOFF VLV CLSD, ONE=ON ZERO=OFF
GLOX1062E	A102 DRAIN LINE SH/OFF VLV OPEN #2, ONE=ON ZERO=OFF
GLOX1063E	A102 DRAIN LINE SH/OFF VLV CLSD #2, ONE=ON ZERO=OFF
GLOX1152E	A196 BYPASS SHUTOFF VLV OPEN, ONE=ON ZERO=OFF
GLOX1153E	A196 BYPASS SHUTOFF VLV CLSD, ONE=ON ZERO=OFF
GLOX1222E	A98 PUMP A127 SUCT VLV CLSD, ONE=ON ZERO=OFF
GLOX1223E	A98 PUMP A127 SUCT VLV OPEN, ONE=ON ZERO=OFF
GLOX1232E	A129 PUMP A127 CHILLDOWN VLV CLSD, ONE=ON ZERO=OFF
GLOX1233E	A129 PUMP A127 CHILLDOWN VLV OPEN, ONE=ON ZERO=OFF
GLOX2012E	A86461 XFER LIN FILL VLV CLSD #1, ONE=ON ZERO=OFF
GLOX2013E	A86461 XFER LINE FILL VLV OPEN #1, ONE=ON ZERO=OFF
GLOX2042E	A86460 REPL VLV CLOSED #1, ONE=ON ZERO=OFF
GLOX2043E	A86460 REPL VLV OPEN #1, ONE=ON ZERO=OFF
GLOX2112E	A86462 TSM DRAIN VLV CLSD #1, ONE=ON ZERO=OFF
GLOX2113E	A86462 TSM DRAIN VLV OPEN #1, ONE=ON ZERO=OFF
GLOX2312E	A86483 TSM VENT VLV CLSD #1, ONE=ON ZERO=OFF
GLOX2313E	A86483 TSM VENT VLV OPEN #1, ONE=ON ZERO=OFF
GLOX2563E	A75096 XFER LIN DR ASSIST PRI VLV, ONE=ON ZERO=OFF
GLOX2573E	A75095 XFER LIN DR ASSIST SHUTOFF, ONE=ON ZERO=OFF
GLOX2582E	A81143 ENG BLD LINE PURGE VLV CLSD, ONE=ON ZERO=OFF
GLOX2583E	A81143 ENG BLD LINE PURGE VLV OPEN, ONE=ON ZERO=OFF
GLOX3012E	A86461 XFR LIN FILL VLV CLSD #2, ONE=ON ZERO=OFF
GLOX3013E	A86461 XFR LIN FILL VLV OPEN #2, ONE=ON ZERO=OFF
GLOX3033E	A86461 XFER LINE FILL SEC SEL, ONE=ON ZERO=OFF
GLOX3042E	A86460 REPL VLV CLOSED #2, ONE=ON ZERO=OFF
GLOX3043E	A86460 REPL VLV OPEN #2, ONE=ON ZERO=OFF
GLOX3112E	A86462 TSM DRAIN VLV CLSD #2, ONE=ON ZERO=OFF
GLOX3113E	A86462 TSM DRAIN VLV OPEN #2, ONE=ON ZERO=OFF
GLOX3133E	A86462 TSM DRAIN VLV SEC SEL, ONE=ON ZERO=OFF
GLOX3312E	A86483 TSM VENT VLV CLSD #2, ONE=ON ZERO=OFF
GLOX3313E	A86483 TSM VENT VLV OPEN #2, ONE=ON ZERO=OFF
GLOX3333E	A86483 TSM VENT VLV SEC SEL, ONE=ON ZERO=OFF
GLOX3563E	A75097 XFER LIN DR ASSIST SEC CTL VLV, ONE=ON ZERO=OFF
T41P1740H	ET LO2 ULLAGE PRESSURE NO 5, 0 TO +5 PSIG
T41P1741H	ET LO2 ULLAGE PRESSURE NO 6, 0 TO +5 PSIG
T41P1750C	ET-LO2 ULLAGE PRESSURE NO 1, 0 TO +30 PSIG
T41P1751C	ET-LO2 ULLAGE PRESSURE NO 2, 0 TO +30 PSIG
T41P1752C	ET-LO2 ULLAGE PRESSURE NO 3, 0 TO +30 PSIG
T41P1753C	ET-LO2 ULLAGE PRESSURE NO 4 (SPARE), 0 TO +30 PSIG

2.2 KSC LOX LOADING SCHEMATIC (CONCLUDED)

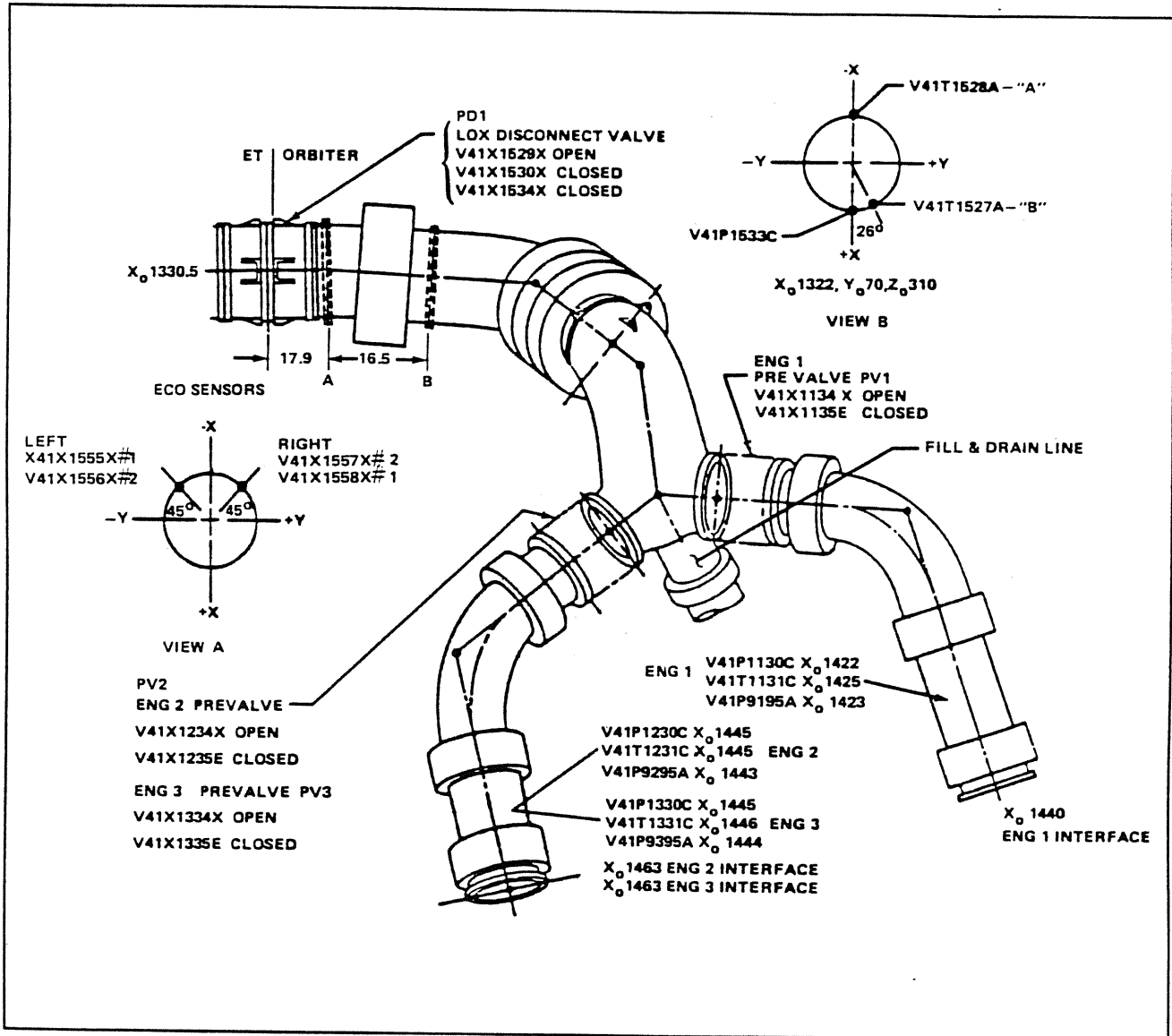
T41T1755A	ET-LO2 ULLAGE TEMPERATURE, -325 TO +500 DEG F
T41X1762E	ET-LO2 5 PCT LIQ LEVEL SENSOR, WET DRY EVENT
T41X1765E	ET-LO2 98 PCT LIQ LVL SNSR NO 1, WET DRY EVENT
T41X1766E	ET-LO2 98 PCT LIQ LVL SNSR NO 2, WET DRY EVENT
T41X1767E	ET-LO2 100 PCT MINUS LIQ LVL SENSOR, WET DRY EVENT
T41X1768E	ET-LO2 100 PCT LIQ LVL SENSOR NO 1, WET DRY EVENT
T41X1769E	ET-LO2 100 PCT LIQ LVL SENSOR NO 2, WET DRY EVENT
T41X1770E	ET-LO2 100 PCT PLUS LIQ LVL SENSOR, WET DRY EVENT
T41X1771E	ET-LO2 OVERFILL LIQ LEVEL SENSOR, WET DRY EVENT
T41X1774E	ET-LO2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT
V41P1533C	MPS LO2 17 IN FEED MANF DISC PRESS, 0 TO 300 PSIA
V41T1527A	MPS LO2 17 IN FEED MANF DISC TEMP B, -305 to -255 DEG F
V41T1528A	MPS LO2 17 IN FEED MANF DISC TEMP A, -305 to -255 DEG F
V41X1134X	MPS E1 LO2 PREVLV (PV1) OP IND, OFF ON EVENT
V41X1135E	MPS E1 LO2 PREVLV (PV1) CL IND, OFF ON EVENT
V41X1234X	MPS E2 LO2 PREVLV (PV2) OP IND, OFF ON EVENT
V41X1235E	MPS E2 LO2 PREVLV (PV2) CL IND, OFF ON EVENT
V41X1334X	MPS E3 LO2 PREVLV (PV3) OP IND, OFF ON EVENT
V41X1335E	MPS E3 LO2 PREVLV (PV3) CL IND, OFF ON EVENT
V41X1509X	MPS LO2 INBD F/D VLV (PV10) CL IND, OFF ON EVENT
V41X1510E	MPS LO2 INBD F/D VLV (PV10) OP IND, OFF ON EVENT
V41X1513E	MPS LO2 OTBD F/D VLV (PV9) OP IND, OFF ON EVENT
V41X1514X	MPS LO2 OTBD F/D VLV (PV9) CL IND, OFF ON EVENT
V41X1529X	MPS LO2 17 IN DISC VLV (PD1) OP IND A, OFF ON EVENT
V41X1530X	MPS LO2 17 IN DISC VLV (PD1) CL IND A, OFF ON EVENT
V41X1534X	MPS LO2 17 IN DISC VLV (PD1) CL IND B, OFF ON EVENT
V41X1541E	MPS LO2 FDLN RLF SOV (PV7) OP IND, OFF ON EVENT
V41X1542E	MPS LO2 FDLN RLF SOV (PV7) CL IND, OFF ON EVENT
V41X1555X	MPS LO2 LEFT ECO SENSOR 1, WET DRY EVENT
V41X1556X	MPS LO2 LEFT ECO SENSOR 2, WET DRY EVENT
V41X1557X	MPS LO2 RIGHT ECO SENSOR 2, WET DRY EVENT
V41X1558X	MPS LO2 RIGHT ECO SENSOR 1, WET DRY EVENT
V41X1580X	MPS LO2 OVBD B/V (PV19) CL IND A, OFF ON EVENT
V41X1581X	MPS LO2 OVBD B/V (PV19) CL IND B, OFF ON EVENT
V41X1587E	MPS LO2 OVBD B/V (PV19) OP IND, OFF ON EVENT
V41X1811X	MPS LO2 POGO RECIRC 1 (PV20) OP IND, OFF ON EVENT
V41X1818E	MPS LO2 POGO RECIRC 1 (PV20) CL IND, OFF ON EVENT
V41X1821X	MPS LO2 POGO RECIRC 2 (PV21) OP IND, OFF ON EVENT
V41X1828E	MPS LO2 POGO RECIRC 2 (PV21) CL IND, OFF ON EVENT

2.3 ORBITER LOX FILL AND DRAIN LINE

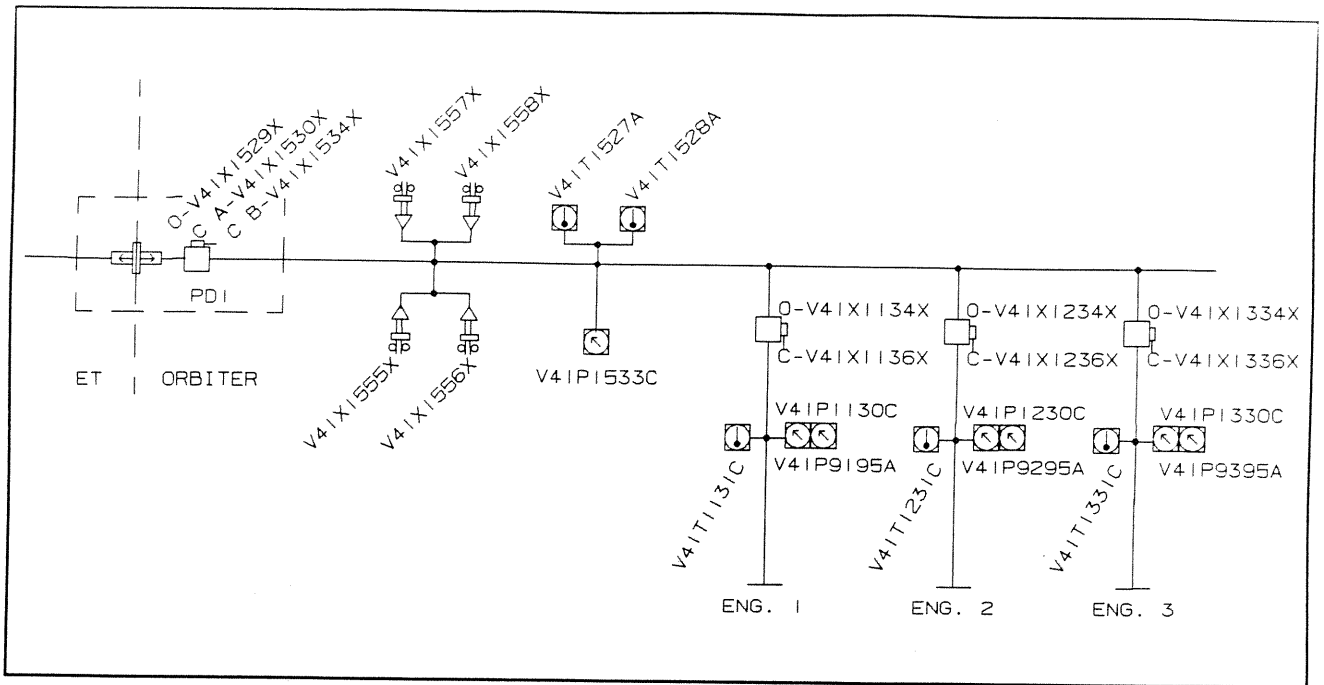


V41X1509X	MPS L02 INBD F/D VLV (PV10) CL IND, OFF ON EVENT
V41X1510E	MPS L02 INBD F/D VLV (PV10) OP IND, OFF ON EVENT
V41X1513E	MPS L02 OTBD F/D VLV (PV9) OP IND, OFF ON EVENT
V41X1514X	MPS L02 OTBD F/D VLV (PV9) CL IND, OFF ON EVENT
V41X1541E	MPS L02 FDLN RLF SOV (PV7) OP IND, OFF ON EVENT
V41X1542E	MPS L02 FDLN RLF SOV (PV7) CL IND, OFF ON EVENT

2.4 LOX FEEDLINE

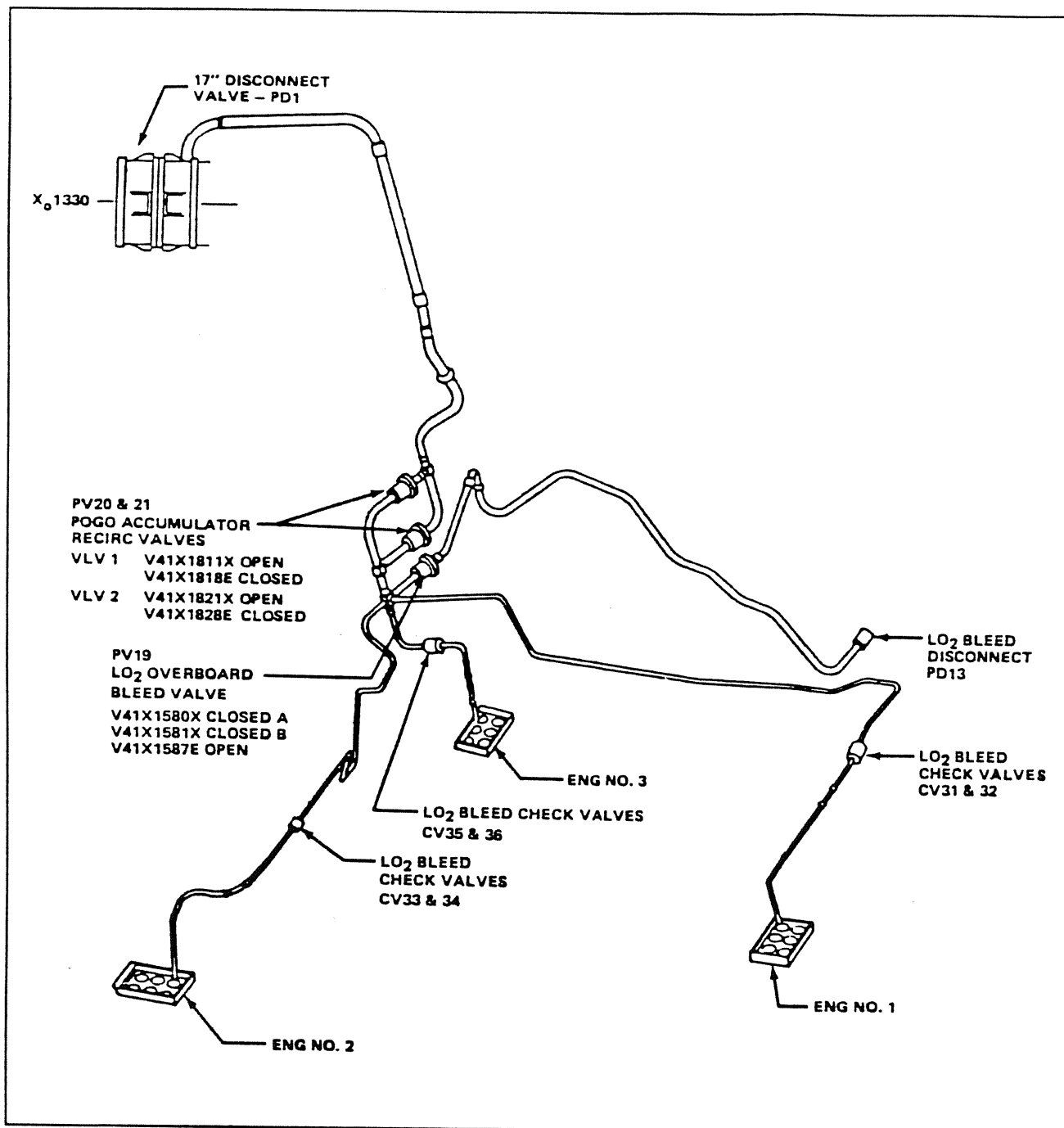


2.4 LOX FEEDLINE SCHEMATIC



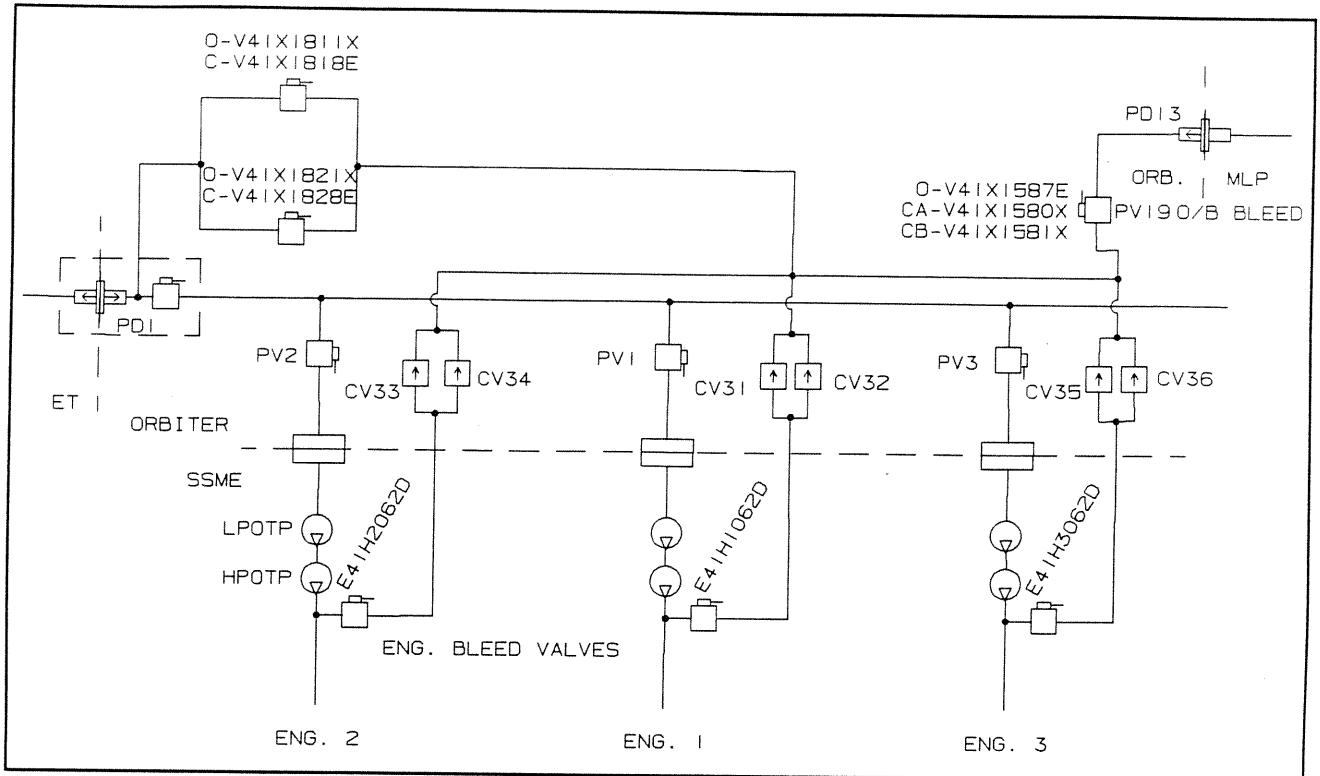
V41P1130C	MPS E1 L02 INLET PRESS, 0 TO 300 PSIA
V41T1131C	MPS E1 L02 INLET TEMP, -305 TO -255 DEGF
V41X1134X	MPS E1 L02 PREVLV (PV1) OP IND, OFF ON EVENT
V41X1135E	MPS E1 L02 PREVLV (PV1) CL IND, OFF ON EVENT
V41P1230C	MPS E2 L02 INLET PRESS, 0 TO 300 PSIA
V41T1231C	MPS E2 L02 INLET TEMP, -305 TO -255 DEGF
V41X1234X	MPS E2 L02 PREVLV (PV2) OP IND, OFF ON EVENT
V41X1235E	MPS E2 L02 PREVLV (PV2) CL IND, OFF ON EVENT
V41P1330C	MPS E3 L02 INLET PRESS, 0 TO 300 PSIA
V41T1331C	MPS E3 L02 INLET TEMP, -305 TO -255 DEGF
V41X1334X	MPS E3 L02 PREVLV (PV3) OP IND, OFF ON EVENT
V41X1335E	MPS E3 L02 PREVLV (PV3) CL IND, OFF ON EVENT
V41T1527A	MPS L02 17 IN FEED MANF DISC TEMP B, -305 TO -255 DEGF
V41T1528A	MPS L02 17 IN FEED MANF DISC TEMP A, -305 TO -255 DEGF
V41X1529X	MPS L02 17 IN DISC VLV (PD1) OP IND A, OFF ON EVENT
V41X1530X	MPS L02 17 IN DISC VLV (PD1) CL IND A, OFF ON EVENT
V41P1533C	MPS L02 17 IN FEED MANF DISC PRESS, 0 TO 300 PSIA
V41X1534X	MPS L02 17 IN DISC VLV (PD1) CL IND B, OFF ON EVENT
V41X1555X	MPS L02 LEFT ECO SENSOR 1, WET DRY EVENT
V41X1556X	MPS L02 LEFT ECO SENSOR 2, WET DRY EVENT
V41X1557X	MPS L02 RIGHT ECO SENSOR 2, WET DRY EVENT
V41X1558X	MPS L02 RIGHT ECO SENSOR 1, WET DRY EVENT
V41P9195A	MPS ME-1 LPOTP INLET PRESS (POGO), -20 TO +20 PSI
V41P9295A	MPS ME-2 LPOTP INLET PRESS (POGO), -20 TO +20 PSI
V41P9395A	MPS ME-3 LPOTP INLET PRESS (POGO), -20 TO +20 PSI

2.5 LOX BLEED AND POGO RECIRCULATION



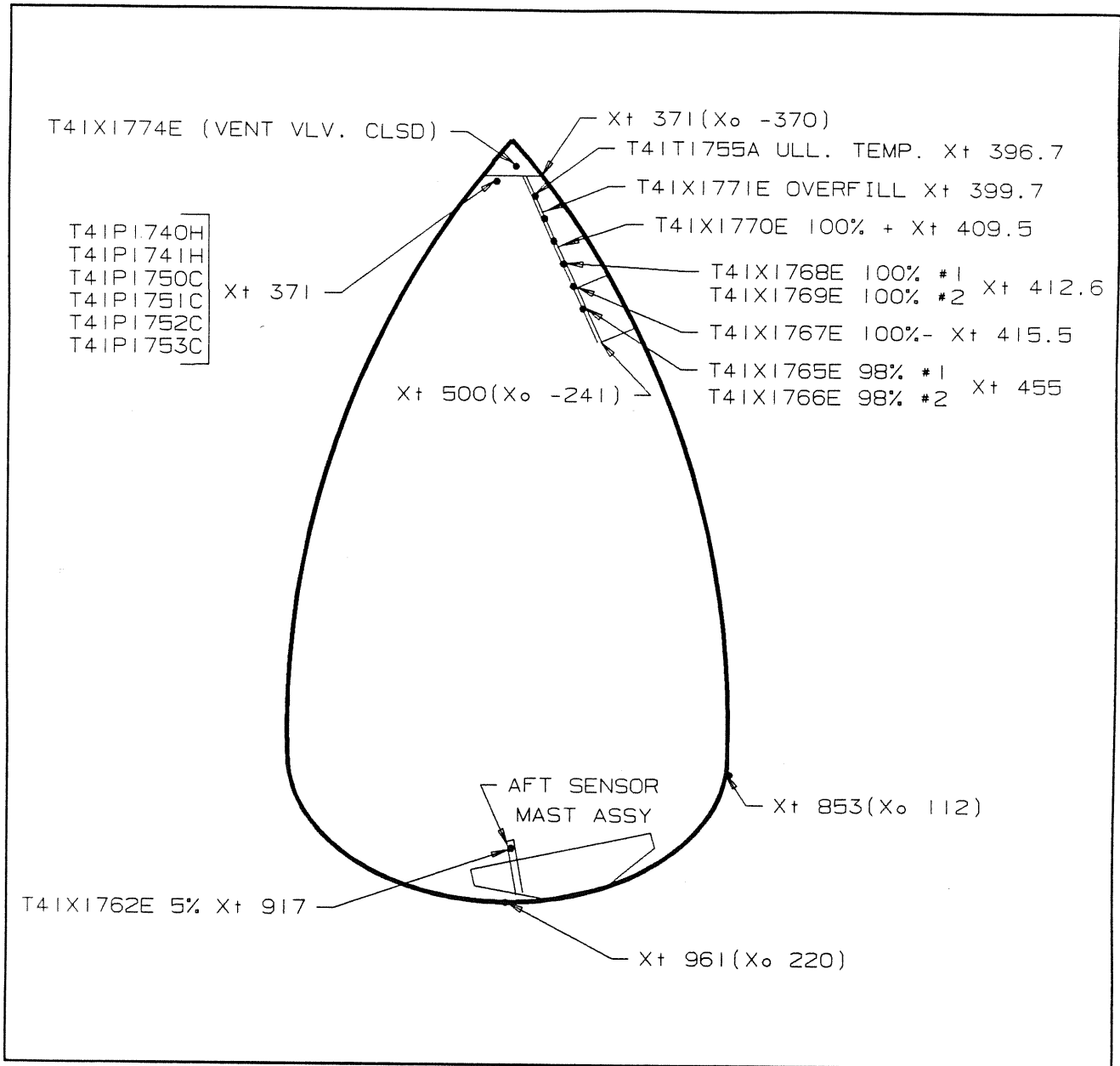
E41H1062D	ME-1 OXID BLEED VALVE POSITION, 0 TO 100 PCT
E41H2062D	ME-2 OXID BLEED VALVE POSITION, 0 TO 100 PCT
E41H3062D	ME-3 OXID BLEED VALVE POSITION, 0 TO 100 PCT
V41X1134X	MPS E1 L02 PREVLV (PV1) OP IND, OFF ON EVENT
V41X1135E	MPS E1 L02 PREVLV (PV1) CL IND, OFF ON EVENT
V41X1234X	MPS E2 L02 PREVLV (PV2) OP IND, OFF ON EVENT
V41X1235E	MPS E2 L02 PREVLV (PV2) CL IND, OFF ON EVENT
V41X1334X	MPS E3 L02 PREVLV (PV3) OP IND, OFF ON EVENT
V41X1335E	MPS E3 L02 PREVLV (PV3) CL IND, OFF ON EVENT

2.5 LOX BLEED AND POGO RECIRCULATION SCHEMATIC



V41X1580X	MPS L02 OVBD B/V (PV19) CL IND A, OFF ON EVENT
V41X1581X	MPS L02 OVBD B/V (PV19) CL IND B, OFF ON EVENT
V41X1587E	MPS L02 OVBD B/V (PV19) OP IND, OFF ON EVENT
V41X1811X	MPS L02 POGO RECRC 1 (PV20) OP IND, OFF ON EVENT
V41X1818E	MPS L02 POGO RECRC 1 (PV20) CL IND, OFF ON EVENT
V41X1821X	MPS L02 POGO RECRC 2 (PV21) OP IND, OFF ON EVENT
V41X1828E	MPS L02 POGO RECRC 2 (PV21) CL IND, OFF ON EVENT

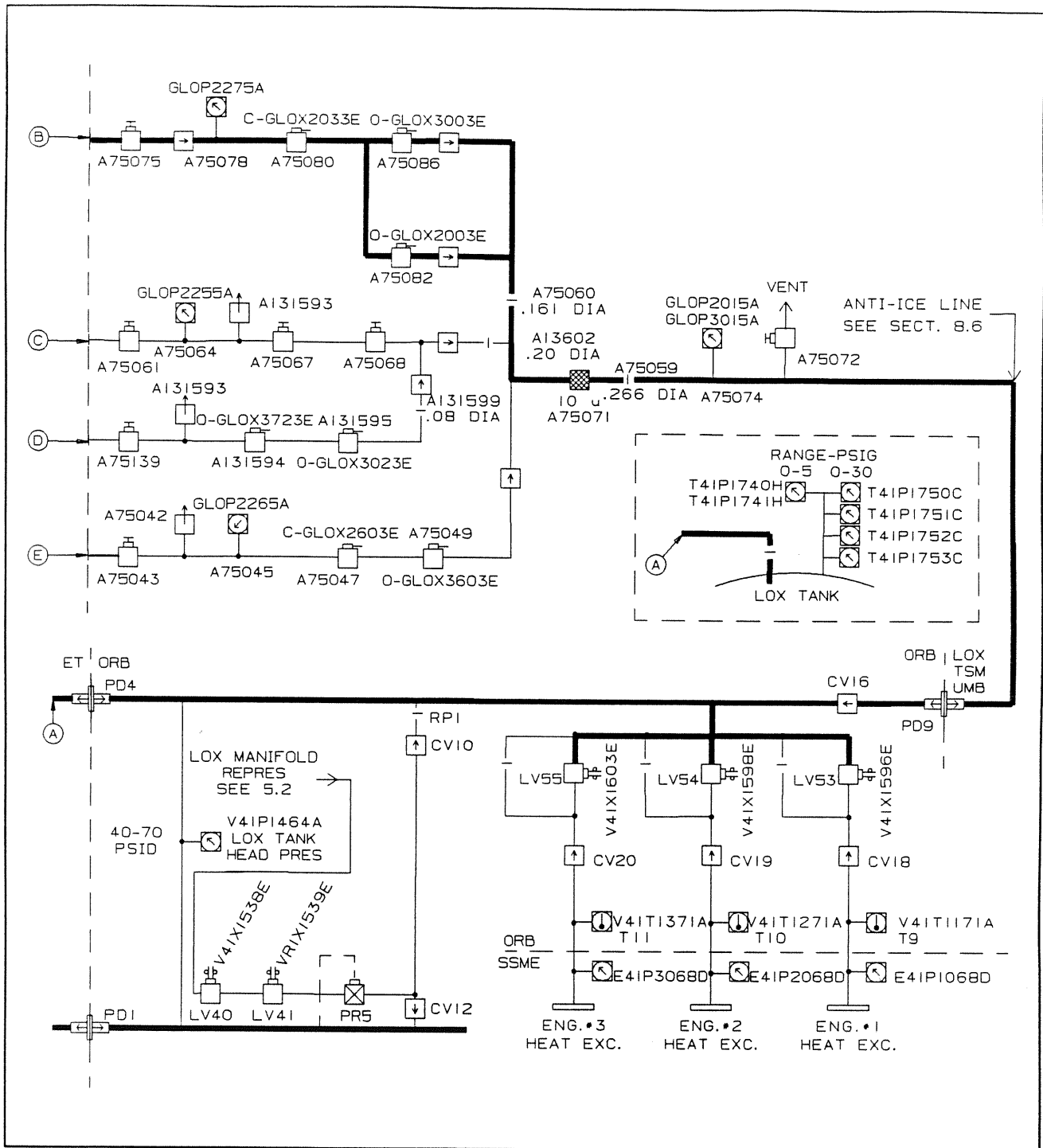
2.6 LOX ULLAGE PRESSURES, LIQUID LEVELS, AND TEMPS.



2.6 LOX ULLAGE PRESSURES, LIQUID LEVELS, & TEMPS

T41P1740H	ET LO2 ULLAGE PRESSURE NO 5, 0 TO +5 PSIG
T41P1741H	ET LO2 ULLAGE PRESSURE NO 6, 0 TO +5 PSIG
T41P1750C	ET-LO2 ULLAGE PRESSURE NO 1, 0 TO +30 PSIG
T41P1751C	ET-LO2 ULLAGE PRESSURE NO 2, 0 TO +30 PSIG
T41P1752C	ET-LO2 ULLAGE PRESSURE NO 3, 0 TO +30 PSIG
T41P1753C	ET-LO2 ULLAGE PRESSURE NO 4 (SPARE), 0 TO +30 PSIG
T41T1755A	ET-LO2 ULLAGE TEMPERATURE, -325 TO +500 DEG F
T41X1762E	ET-LO2 5 PCT LIQ LEVEL SENSOR, WET DRY EVENT
T41X1765E	ET-LO2 98 PCT LIQ LVL SNSR NO 1, WET DRY EVENT
T41X1766E	ET-LO2 98 PCT LIQ LVL SNSR NO 2, WET DRY EVENT
T41X1767E	ET-LO2 100 PCT MINUS LIQ LVL SENSOR, WET DRY EVENT
T41X1768E	ET-LO2 100 PCT LIQ LVL SENSOR NO 1, WET DRY EVENT
T41X1769E	ET-LO2 100 PCT LIQ LVL SENSOR NO 2, WET DRY EVENT
T41X1770E	ET-LO2 100 PCT PLUS LIQ LVL SENSOR, WET DRY EVENT
T41X1771E	ET-LO2 OVERFILL LIQ LEVEL SENSOR, WET DRY EVENT
T41X1774E	ET-LO2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT

2.7 LOX PREPRESSURIZATION SYSTEM



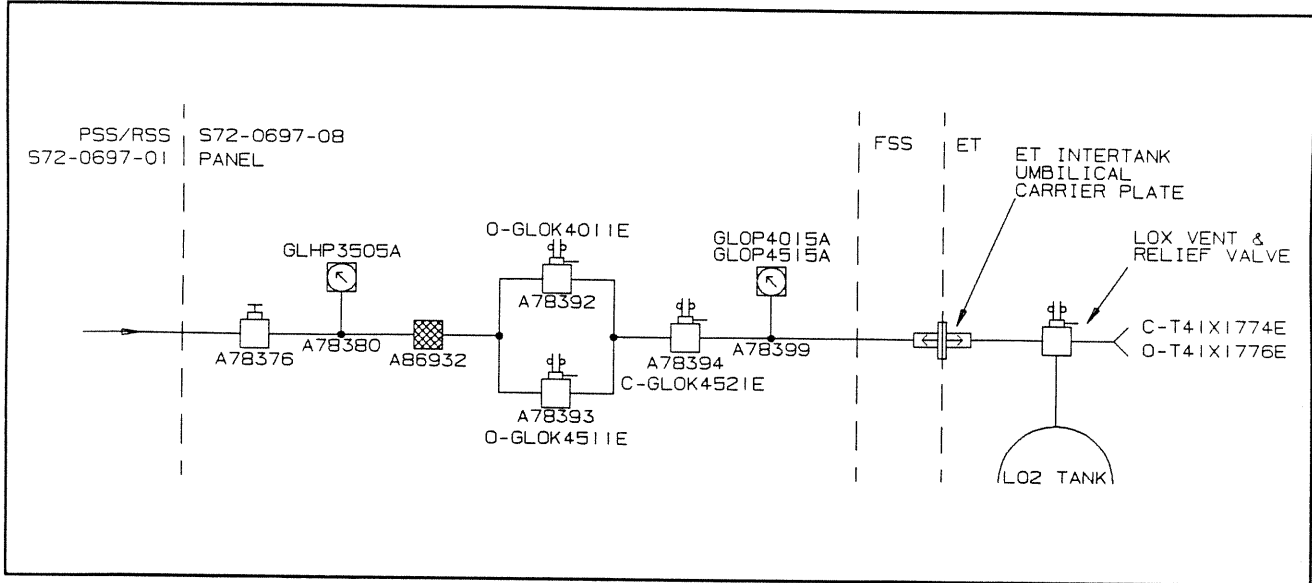
2.7 LOX PREPRESSURIZATION SYSTEM

E41P1068D	ME-1 OX TK PRESSURANT PRESS DW 76, 0 TO 7000 PSIA
E41P2068D	ME-2 OX TK PRESSURANT PRESS DW 76, 0 TO 7000 PSIA
E41P3068D	ME-3 OX TK PRESSURANT PRESS DW 76, 0 TO 7000 PSIA
GLOX2003E	A75082 ET HE PRI PREPRESS VLV OPEN, ONE=ON ZERO=OFF
GLOP2015A	A75074 ET PREPRESS OUT PRESS SOV #1, 0 TO 2000 PSIG
GLOX2033E	A75080 ET HE PREPRESS SOV #1 ONE=ON ZERO=OFF
GLOP2255A	A75064 750 PSI GN2 FAC SUPL PRESS, 0 TO 1500 PSIG
GLOP2265A	A75045 3000 PSI GN2 FAC SUPL PRESS, 0 TO 5000 PSIG
GLOP2275A	A75078 2000 PSIG HE SUPL PRESS, 0 TO 5000 PSIG
GLOX2603E	A75047 ET GN2 PG SHUTOFF VLV CLSD, ONE=ON ZERO=OFF
GLOX3003E	A75086 ET HE SEC PREPRESS VLV OPEN, ONE=ON ZERO=OFF
GLOP3015A	A75074 ET PREPRESS OUTPUT PRESS #2, 0 TO 2000 PSIG
GLOX3023E	A131595 AUX A/I PRG SEC OPEN IND, ONE=ON ZERO=OFF
GLOX3025E	A131597 AUX A/I PRG PRES SW, ONE=ON ZERO=OFF
GLOX3503E	A75049 ET GN2 PG VLV OPEN, ONE=ON ZERO=OFF
GLOX3723E	A131594 AUX A/I PRG PRI OPEN IND, ONE=ON ZERO=OFF
T41P1740H	ET LO2 ULLAGE PRESSURE NO 5, 0 TO 5 PSIG
T41P1741H	ET LO2 ULLAGE PRESSURE NO 6, 0 TO +5 PSIG
T41P1750C	ET LO2 ULLAGE PRESSURE NO 1, 0 TO +30 PSIG
T41P1751C	ET LO2 ULLAGE PRESSURE NO 2, 0 TO +30 PSIG
T41P1752C	ET LO2 ULLAGE PRESSURE NO 3, 0 TO +30 PSIG
T41P1753C	ET LO2 ULLAGE PRESS NO 4 (SPARE), 0 TO +30 PSIG
V41T1171A	MPS E1 G02 PRESS OUTLET TEMP, -250 TO +1000 DEGF
V41T1271A	MPS E1 G02 PRESS OUTLET TEMP, -250 TO +1000 DEGF
V41T1371A	MPS E1 G02 PRESS OUTLET TEMP, -250 TO +1000 DEGF
V41P1464A	MPS L02 MANF TO ET ULL DELTA PRESS, +40 TO +70 PSID
V41X1538E	MPS L02 MANF REPRESS 1 (LV40) OP PWR, OFF ON EVENT
V41X1539E	MPS L02 MANF REPRESS 2 (LV41) OP PWR, OFF ON EVENT
V41P1590A	MPS G02 PRESS DISC PRESS, 0 TO +1000 PSIA
V41X1596E	MPS G02 PRESS FCV 1 (LV53) CL PWR, OFF ON EVENT
V41X1598E	MPS G02 PRESS FCV 2 (LV54) CL PWR, OFF ON EVENT
V41X1603E	MPS G02 PRESS FCV 3 (LV55) CL PWR, OFF ON EVENT

SCHEMATIC KEY

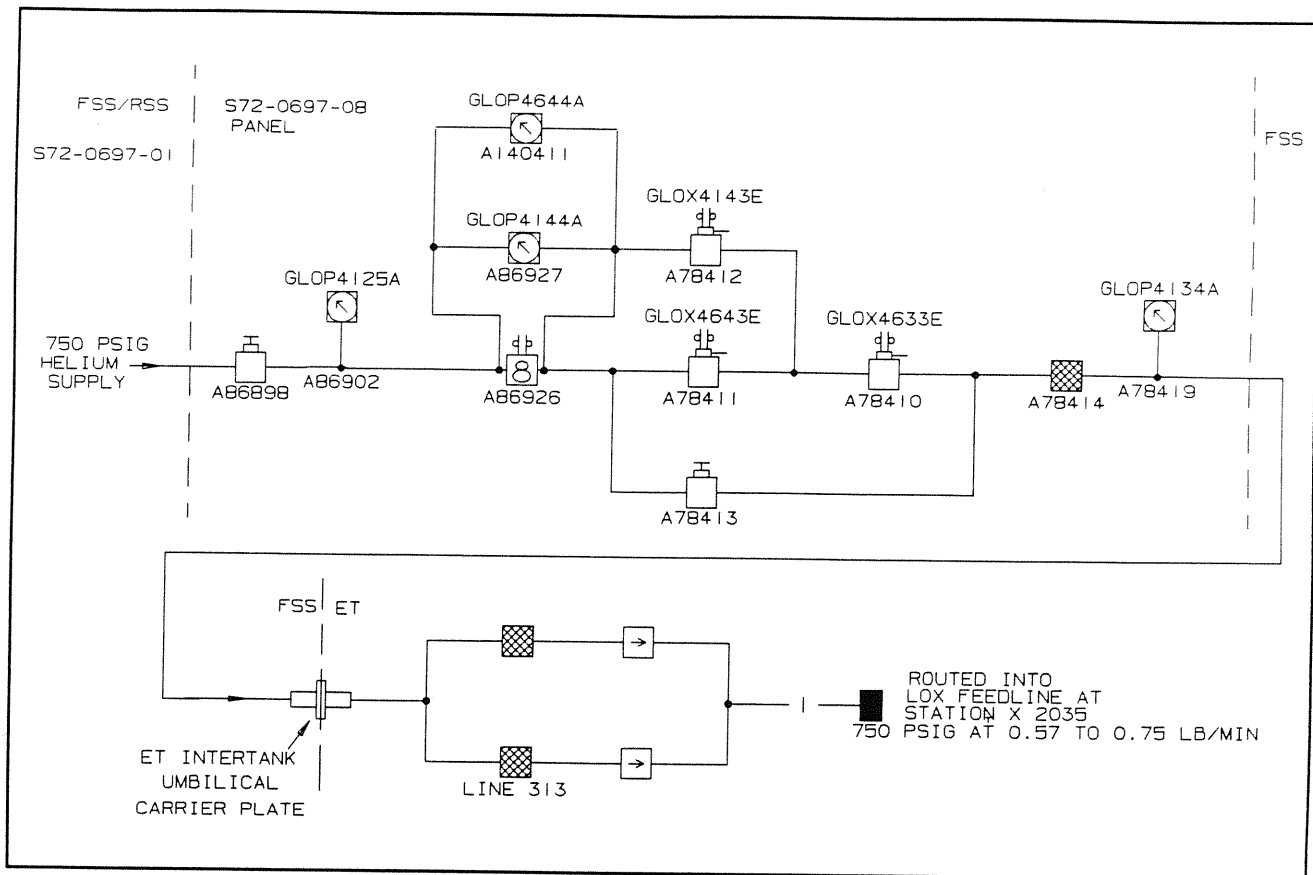
- B HELIUM PRE-PRESS CIRCUIT AND PRESSURE DRAIN.
18 D^H+ LB/MIN HE @ 850 PSIG MAX
- C NITROGEN STANDBY PRESSURE CIRCUIT. 30 LB/MIN
MAX @ 30 PSIG MAX
- D AUX ANTI-ICE LOX PRE-PRESS PURGE CIRCUIT.
1.44 TO 2.81 LB/MIN UNHEATED HELIUM
- E LOX TANK GN425 PURGE CIRCUIT. 123 LB/MIN
NOMINAL.

2.8 LOX VENT VALVE ACTUATION



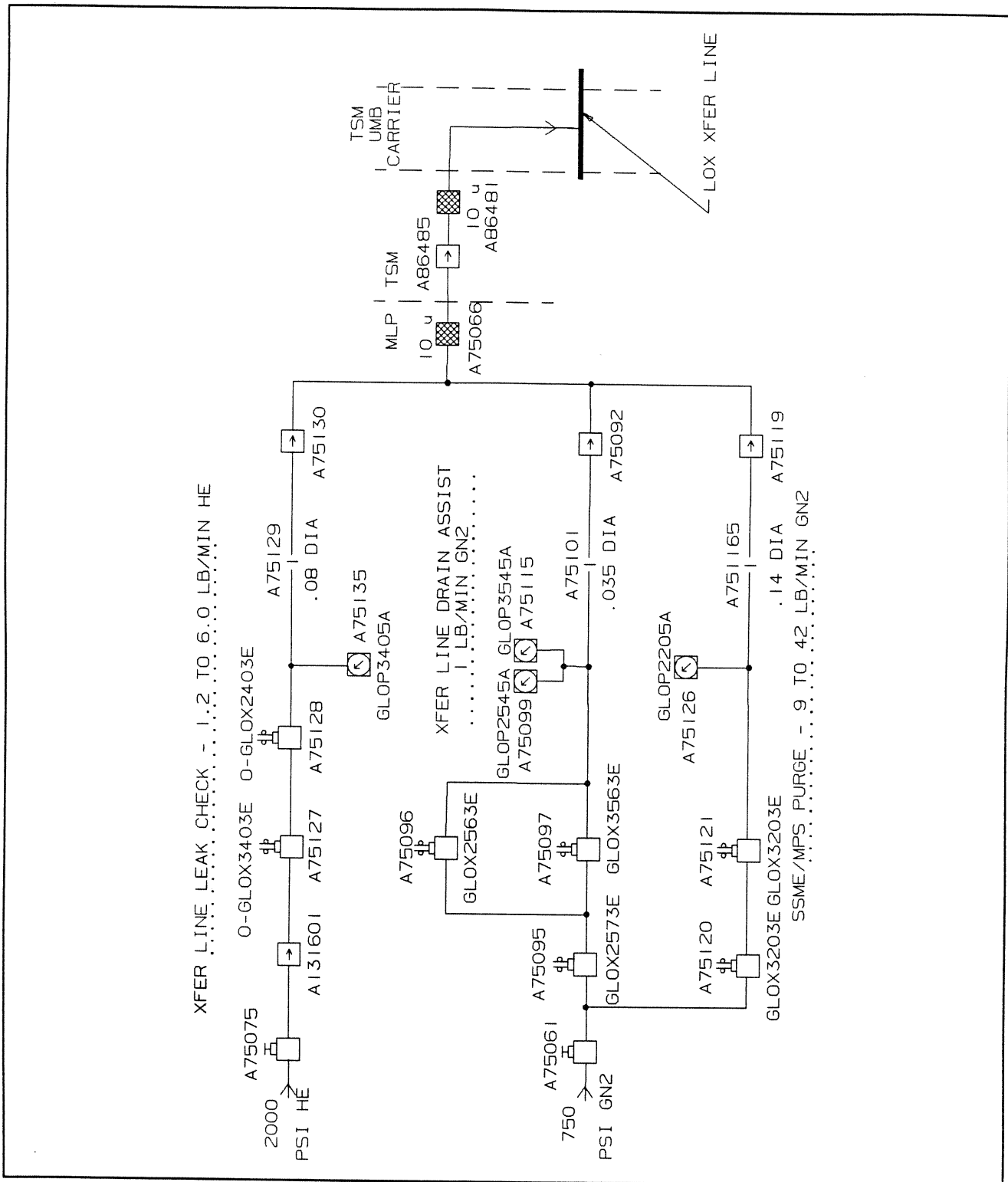
GLHP3505A	A78380	ET VENT CONTROL SUPPLY PRESS, 0 TO 1500 PSIG (KSC ONLY)
GLOK4011E	A78392	ET VT PR1 CONTROL VLV OP ONE=ON ZERO=OFF
GLOK4511E	A78393	ET VT SEC CONTROL VLV OP ONE=ON ZERO=OFF
GLOK4521E	A78394	ET VT SEC SELECT VLV OP ONE=ON ZERO=OFF
GLOP4015A	A78399	ET VT VLV ACTUATING PRES #1, 0 TO 1500 PSIG
GLOP4515A	A4515A	ET VENT VLV ACT PRESS #2, 0 TO 1500 PSIG
T41X1774E		ET-LO2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT
T41X1776E		ET-LO2 VENT VLV NO 1 OPEN IND, OPEN EVENT

2.9 HELIUM BUBBLING SUPPLY



GLOP4125A	A86902	HE BUB SUPPLY PRESS, 0 TO 1500 PSIG
GLOP4144A	A86927	PRI HE BUB DIFF PRESS, 0 TO 2 PSID
GLOP4644A	A140411	SEC HE BUB DIFF PRESS, 0 TO 2 PSID
GLOX4143E	A78412	HE BUB PRI CNT VLV OPEN, ONE=ON ZERO=OFF
GLOX4643E	A78411	HE BUB SEC CNTL VLV OPEN, ONE=ON ZERO=OFF
GLOX4633E	A78410	HE BUS SEC SEL VLV OPEN, ONE=ON ZERO=OFF
GLOP4134A	A78419	HE BUB OUTPUT PRESS, 0 TO 1500 PSIG

2.10 LOX TRANSFER LINE LEAK CHECK, DRAIN ASSIST, AND PURGE



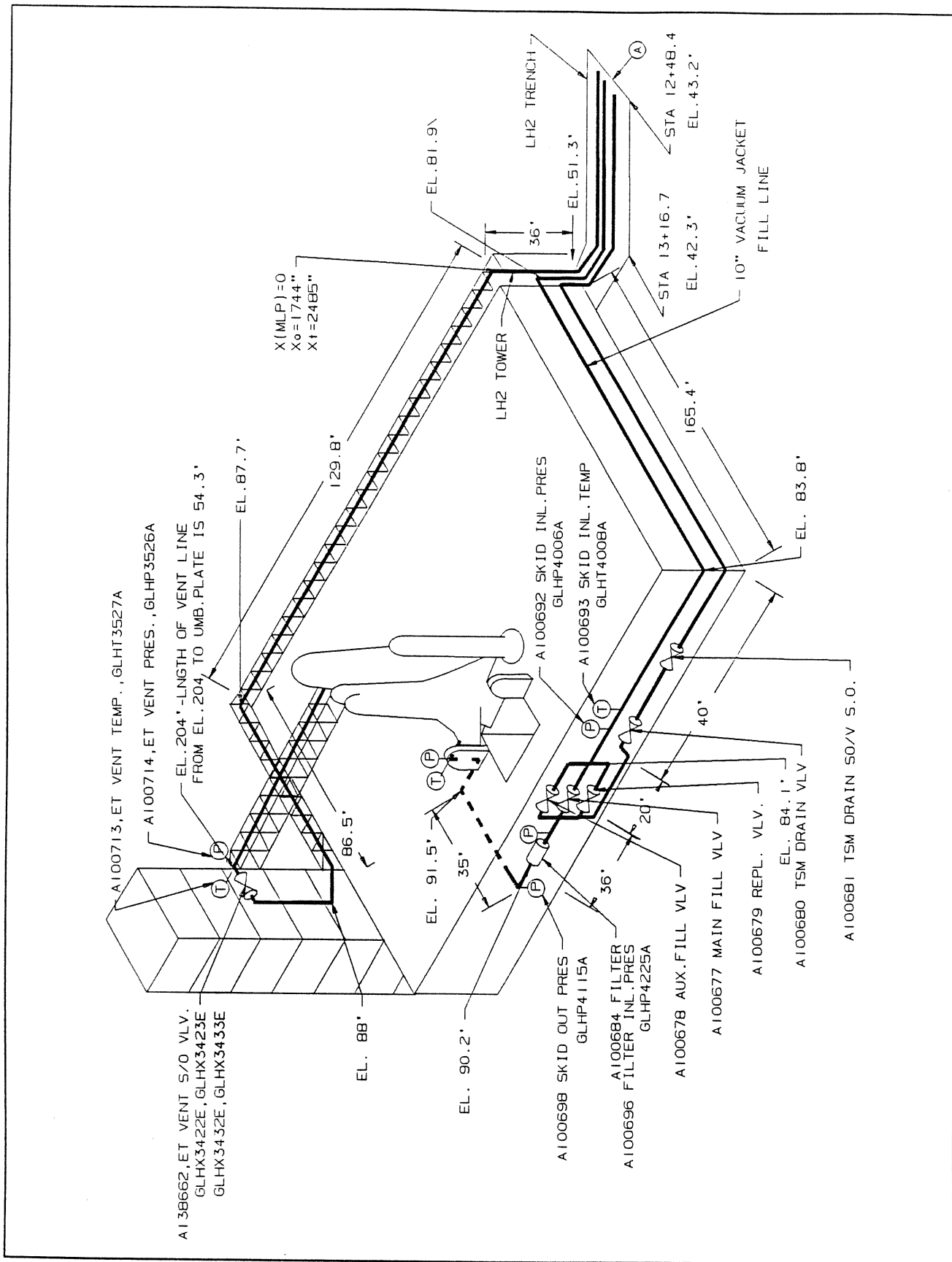
2.10 LOX TRANSFER LINE LEAK CHECK, DRAIN ASSIST, PURGE

GLOP2205A	A75126	SSME PURG PRESS 0-1500 PSIG
GLOP2545A	A75099	TRANSFER LN DR ASST PRI OUT PRES 0-1500 PSIG
GLOP3405A	A75135	TRANSFER LN LEAK CHECK PRESS 0=2000 PSIG
GLOP3545A	A75115	TRANSFER LN DR ASST SEC OUT PRES 0-1500 PSIG
GLOX2203E	A75120	SSME GN2 PG SH/OF VLV OPEN 0=OFF 1=ON
GLOX2403E	A75128	TR LIN LK CHK CTL VLV OPEN 0=OFF 1=ON
GLOX2563E	A75096	TRANSFER LIN DR ASST PRI VLV 0=OFF 1=ON
GLOX2573E	A75095	TRANSFER LN DR ASSIST SHUTOFF 0=OFF 1=ON
GLOX3203E	A75121	SSME GN2 PG SEC CTL VLV OP 0=OFF 1=ON
GLOX3403E	A75127	TRANSFER LN SEC LK CHK VLV OPEN 0=OFF 1=ON
GLOX3563E	A75097	TRANSFER LN DR ASST SEC CTL VLV 0=OFF 1=ON

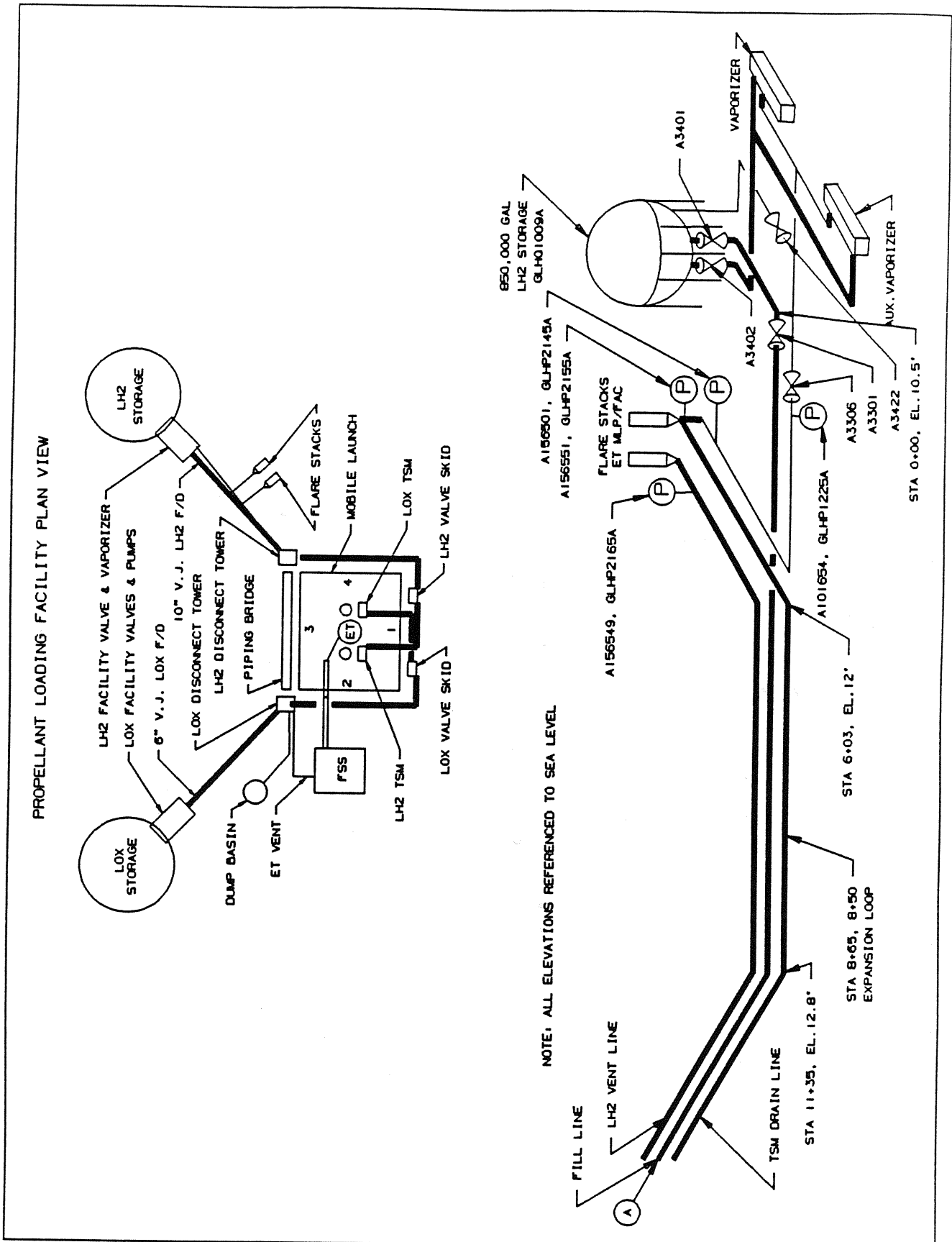
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3.0 LH2 FLUID SYSTEMS

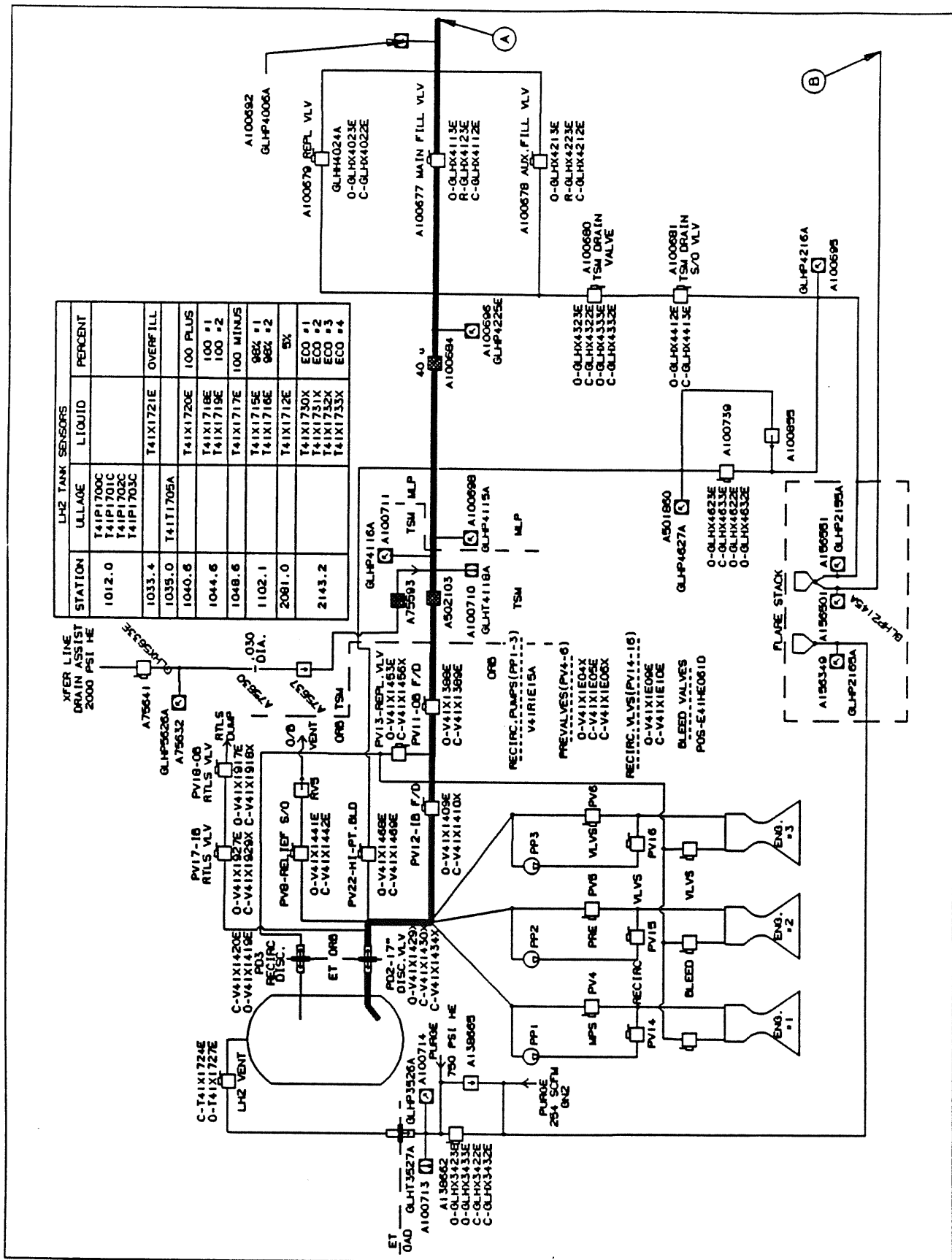
3.1A LH2 LOADING SKETCH



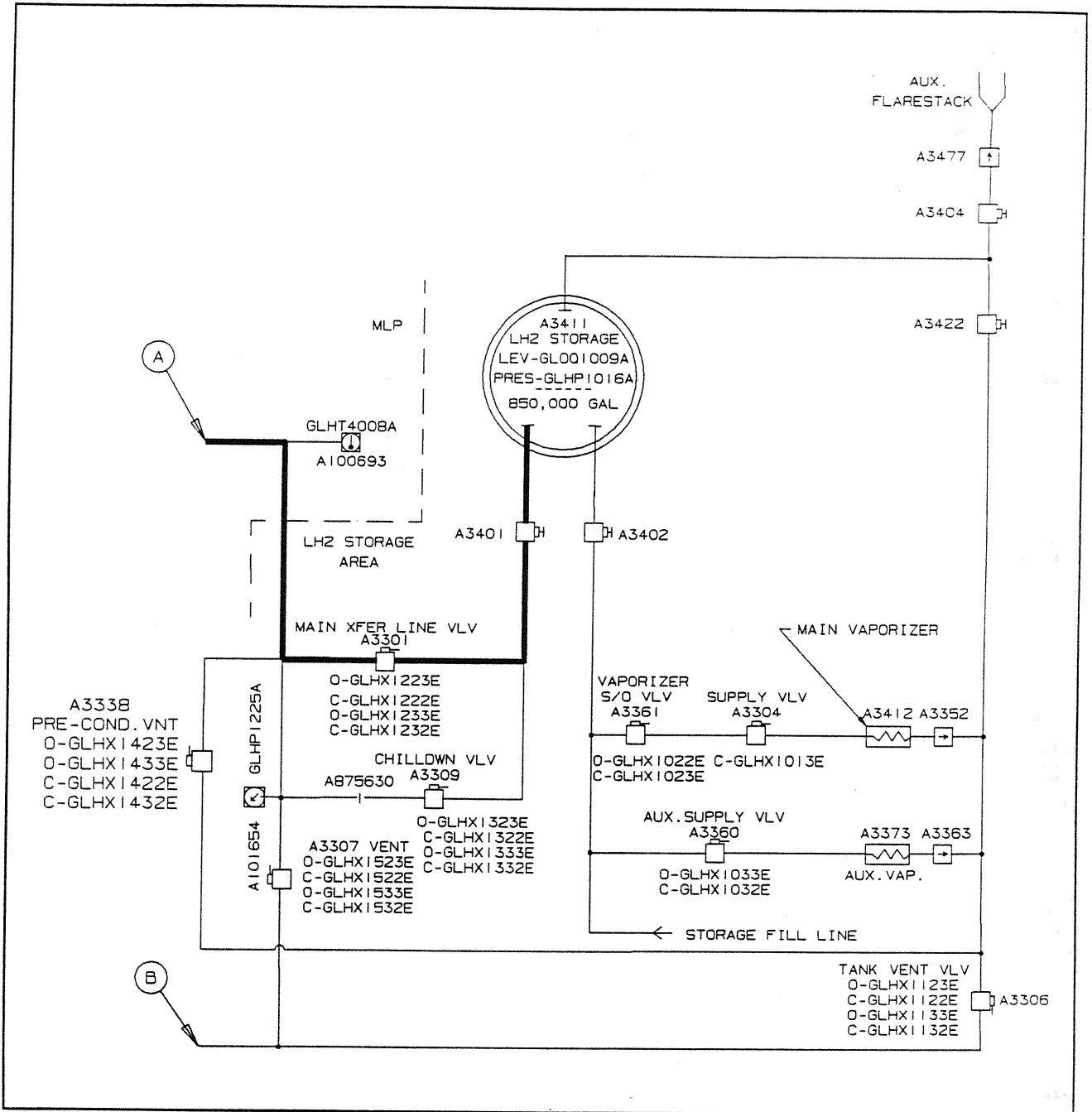
3.1B LH2 LOADING SKETCH



3.2A LH2 LOADING SCHEMATIC



3.2B LH2 LOADING SCHEMATIC



3.2 KSC LH2 LOADING SCHEMATIC

E41H1061D	ME-1 FUEL BLEED VLV POSITION DW 64, 0 TO 100 PCT
E41H2061D	ME-2 FUEL BLEED VLV POSITION DW 64, 0 TO 100 PCT
E41H3061D	ME-3 FUEL BLEED VLV POSITION DW 64, 0 TO 100 PCT
GLHQ1009A	A3312 STORAGE TANK LEVEL, 0 TO 900 KGAL
GLHX1013E	A3304 MAIN VAPOR SPLY VLV CLSD IND, ONE=ON ZERO=OFF
GLHP1016A	A3315 STORAGE TNK PRESS, 0 TO 120 PSIG
GLHX1022E	A3361 MAIN VAPOR SOV OPN IND, ONE=ON ZERO=OFF
GLHX1023E	A3361 MAIN VAPOR SOV CLOSED IND, ONE=ON ZERO=OFF
GLHX1032E	A3360 AUX VAPOR SUPL VLV CLSD IND, ONE=ON ZERO=OFF
GLHX1033E	A3360 AUX VAPOR SUPPLY VLV OPN IND, ONE=ON ZERO=OFF
GLHX1122E	A3306 STOR TNK VNT VLV CL #1 IND, ONE=ON ZERO=OFF
GLHX1123E	A3306 STOR TNK VNT VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHP1125A	A101640 STOR AREA FAC VENT PRESS, 0 TO 100 PSIG
GLHX1132E	A3306 STOR TNK VLV CLSD #2 IND, ONE=ON ZERO=OFF
GLHX1133E	A3306 STOR TNK VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHX1222E	A3301 XFR LINE VLV CLOSED #1 IND, ONE=ON ZERO=OFF
GLHX1223E	A3301 XFR LINE VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHP1225A	AI01654 TRANSFER LINE PRESS, 0 TO 100 PSIG
GLHX1232E	A3301 XFR LINE VLV CLOSED #2 IND, ONE=ON ZERO=OFF
GLHX1233E	A3301 XFR LINE VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHX1322E	A3309 CHLDWN VLV CLOSED #1 IND, ONE=ON ZERO=OFF
GLHX1323E	A3309 CHLDWN VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHX1332E	A3309 CHLDWN VLV CLOSED #2 IND, ONE=ON ZERO=OFF
GLHX1333E	A3309 CHLDWN VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHX1422E	A3338 XFR LN PRCND VLV CLSD #1 IND, ONE=ON ZERO=OFF
GLHX1423E	A3338 XFR LN PRCND VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHX1432E	A3338 XFR LN PRCND VLV CLSD #2 IND, ONE=ON ZERO=OFF
GLHX1433E	A3338 XFR LN PRCND VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHX1522E	A3307 XFR LN VNT VLV CLSD #1 IND, ONE=ON ZERO=OFF
GLHX1523E	A3307 XFR LN VNT VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHX1532E	A3307 XFR LN VNT VLV CLSD #2 IND, ONE=ON ZERO=OFF
GLHX1533E	A3307 XFR LN VNT VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHP2145A	A156501 PRI FAC VNT FS INLET PRESS, 0 TO +75 PSIG
GLHP2155A	A156551 PRI MLP VNT FS INLET PRESS, 0 TO +75 PSIG
GLHP2165A	A156549 PRI VEH VNT FS INLET PRESS, 0 TO +25 PSIA
GLHX3422E	A138662 ET H2 VNT SOV OPENED NO. 1, ONE = ON ZERO=OFF
GLHX3423E	A138662 ET H2 VNT SOV CLOSED NO. 1, ONE = ON ZERO=OFF
GLHX3432E	A138662 ET H2 VNT SOV OPENED NO. 2, ONE = ON ZERO=OFF
GLHX3433E	A138662 ET H2 VNT SOV CLOSED NO. 2, ONE = ON ZERO=OFF
GLHP3526A	A100714 ET VENT LINE PRES., 0-25 PSIA
GLHP3527A	A100713 ET VENT LINE TEMP., -427-32 F
GLHP4006A	A100692 SKID INLET PRESS, 0 TO 100 PSIG
GLHT4008A	AI00693 SKID INLET TEMP, -427 TO -409 DEGF
GLHX4022E	A100679 REPL VLV CLOSED #1 IND, ONE=ON ZERO=OFF
GLHX4023E	A100679 REPL VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHH4024A	A100679 REPLENISH VALVE POSITION, 0 TO 100 PCT
GLHX4112E	A100677 MAIN FILL VALVE CLOSED IND, ONE=ON ZERO=OFF
GLHX4113E	A100677 MAIN FILL VALVE OPEN IND, ONE=ON ZERO=OFF
GLHP4115A	A100698 SKID OUTLET PRESS, 0 TO 100 PSIG
GLHP4116A	A100711 ORBITER INLET PRESS, 0 TO 100 PSIG
GLHT4118A	A100710 ORBITER INLET TEMP, -427 TO -409 DEGF

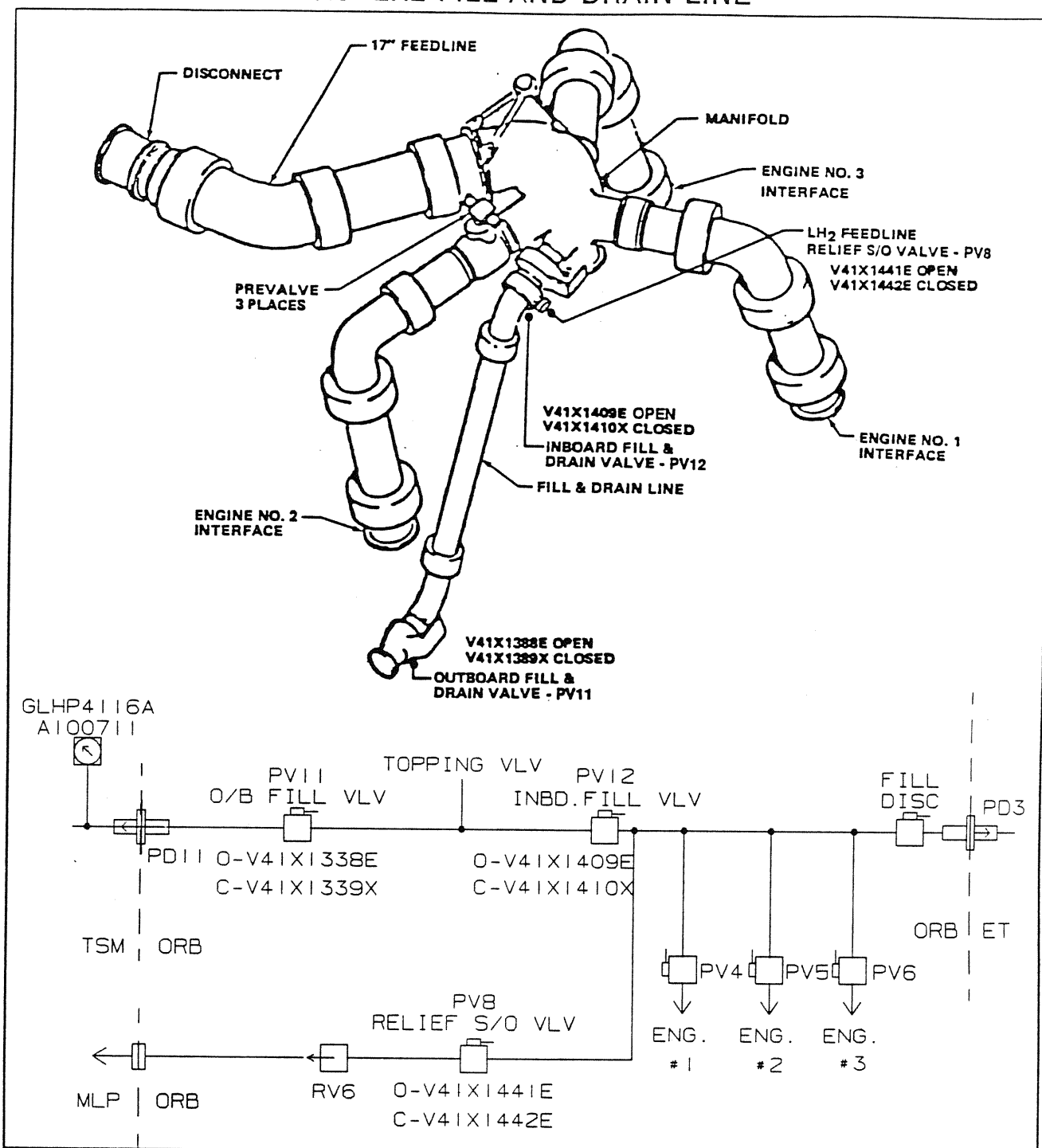
3.2 KSC LH2 LOADING SCHEMATIC (CONTINUED)

GLHT4119A	A131135 HI POINT BLEED TEMP, -427 TO -409 DEGF
GLHX4123E	A100677 MAIN FILL VALVE RED IND, ONE=ON ZERO=OFF
GLHX4212E	A100678 AUX FILL VALVE CLOSED IND, ONE=ON ZERO=OFF
GLHX4213E	A100678 AUX FILL VALVE OPEN IND, ONE=ON ZERO=OFF
GLHP4216A	A100695 MLP VENT LINE PRESS, 0 TO 75 PSIG
GLHX4223E	A100678 AUX FILL VALVE REDUCED IND, ONE=ON ZERO=OFF
GLHP4225A	A100696 FILTER INLET PRESS, 0 TO 100 PSIG
GLHX4322E	A100680 TSM DRAIN VLV CLSD #1 IND, ONE=ON ZERO=OFF
GLHX4323E	A100680 TSM DRAIN VLV OPEN #1 IND, ONE=ON ZERO=OFF
GLHX4332E	A100680 TSM DRAIN VLV CLSD #2 IND, ONE=ON ZERO=OFF
GLHX4333E	A100680 TSM DRAIN VLV OPEN #2 IND, ONE=ON ZERO=OFF
GLHX4412E	A100681 TSM DRAIN SOV OPEN IND, ONE=ON ZERO=OFF
GLHX4413E	A100681 TSM DRAIN SOV CLOSED IND, ONE=ON ZERO=OFF
GLHX4622E	A100739 PRI HI PT BL VLV OP IND, ONE=ON ZERO=OFF
GLHX4623E	A100739 PRI HI PT BL VLV CL IND, ONE=ON ZERO=OFF
GLHP4627A	A501860 HI PT BL 100 PSIG, 0 TO +100
GLHX4632E	A100739 SEC HI PT BL VLV OP IND, ONE=ON ZERO=OFF
GLHX4633E	A100739 SEC HI PT BL VLV CL IND, ONE=ON ZERO=OFF
GLHP5626A	A75632 XFR LN DRN ASST OUT PRESS, 0 TO 5000 PSIG
GLHX5633E	A75641 DRN ASST CTRL VLV OPEN IND, ONE=ON ZERO=OFF
T41P1700C	ET-LH2 ULLAGE PRESS NO 1, +12 TO +52 PSIA
T41P1701C	ET-LH2 ULLAGE PRESS NO 2, +12 TO +52 PSIA
T41P1702C	ET-LH2 ULLAGE PRESS NO 3, +12 TO +52 PSIA
T41P1703C	ET-LH2 ULLAGE PRESS NO 4 (SPARE), +12 TO +52 PSIA
T41T1705A	ET-LH2 ULLAGE TEMP, -430 TO +200 DEGF
T41X1712E	ET-LH2 5 PCT LIQUID LVL SNSR, WET DRY EVENT
T41X1715E	ET-LH2 98 PCT LIQUID LVL SNSR NO 1, WET DRY EVENT
T41X1716E	ET-LH2 98 PCT LIQUID LVL SNSR NO 2, WET DRY EVENT
T41X1717E	ET-LH2 100 PCT MINUS LIQ LVL SENSOR, WET DRY EVENT
T41X1718E	ET-LH2 100 PCT LIQ LVL SENSOR NO 1, WET DRY EVENT
T41X1719E	ET-LH2 100 PCT LIQ LVL SENSOR NO 2, WET DRY EVENT
T41X1720E	ET-LH2 100 PCT PLUS LIQ LVL SENSOR, WET DRY EVENT
T41X1721E	ET-LH2 OVERFILL LIQ LVL SENSOR, WET DRY EVENT
T41X1724E	ET-LH2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT
T41X1727E	ET-LH2 VENT VLV NO 1 OPEN IND, OPEN EVENT
T41X1730X	ET-LH2 LOW LEVEL LIQ SENSOR NO 1, WET DRY EVENT
T41X1731X	ET-LH2 LOW LEVEL LIQ SENSOR NO 2, WET DRY EVENT
T41X1732X	ET-LH2 LOW LEVEL LIQ SENSOR NO 3, WET DRY EVENT
T41X1733X	ET-LH2 LOW LEVEL LIQ SENSOR NO 4, WET DRY EVENT
V41X1104X	MPS E1 LH2 PREVALVE (PV4) OP IND A, OFF ON EVENT
V41X1105E	MPS E1 LH2 PREVALVE (PV4) CL IND, OFF ON EVENT
V41X1106X	MPS E1 LH2 PREVALVE (PV4) OP IND B, OFF ON EVENT
V41X1109E	MPS E1 LH2 RECIRC VLV (PV14) OP IND, OFF ON EVENT
V41X1110E	MPS E1 LH2 RECIRC VLV (PV14) CL IND, OFF ON EVENT
V41R1115A	MPS E1 LH2 RECIRC PUMP (PP1) SPEED, 0 TO 20000 RPM
V41X1204X	MPS E2 LH2 PREVALVE (PV5) OP IND A, OFF ON EVENT
V41X1205E	MPS E2 LH2 PREVALVE (PV5) CL IND A, OFF ON EVENT
V41X1206X	MPS E2 LH2 PREVALVE (PV5) OP IND B, OFF ON EVENT
V41X1209E	MPS E2 LH2 RECIRC VLV (PV15) OP IND, OFF ON EVENT

3.2 KSC LH2 LOADING SCHEMATIC (CONCLUDED)

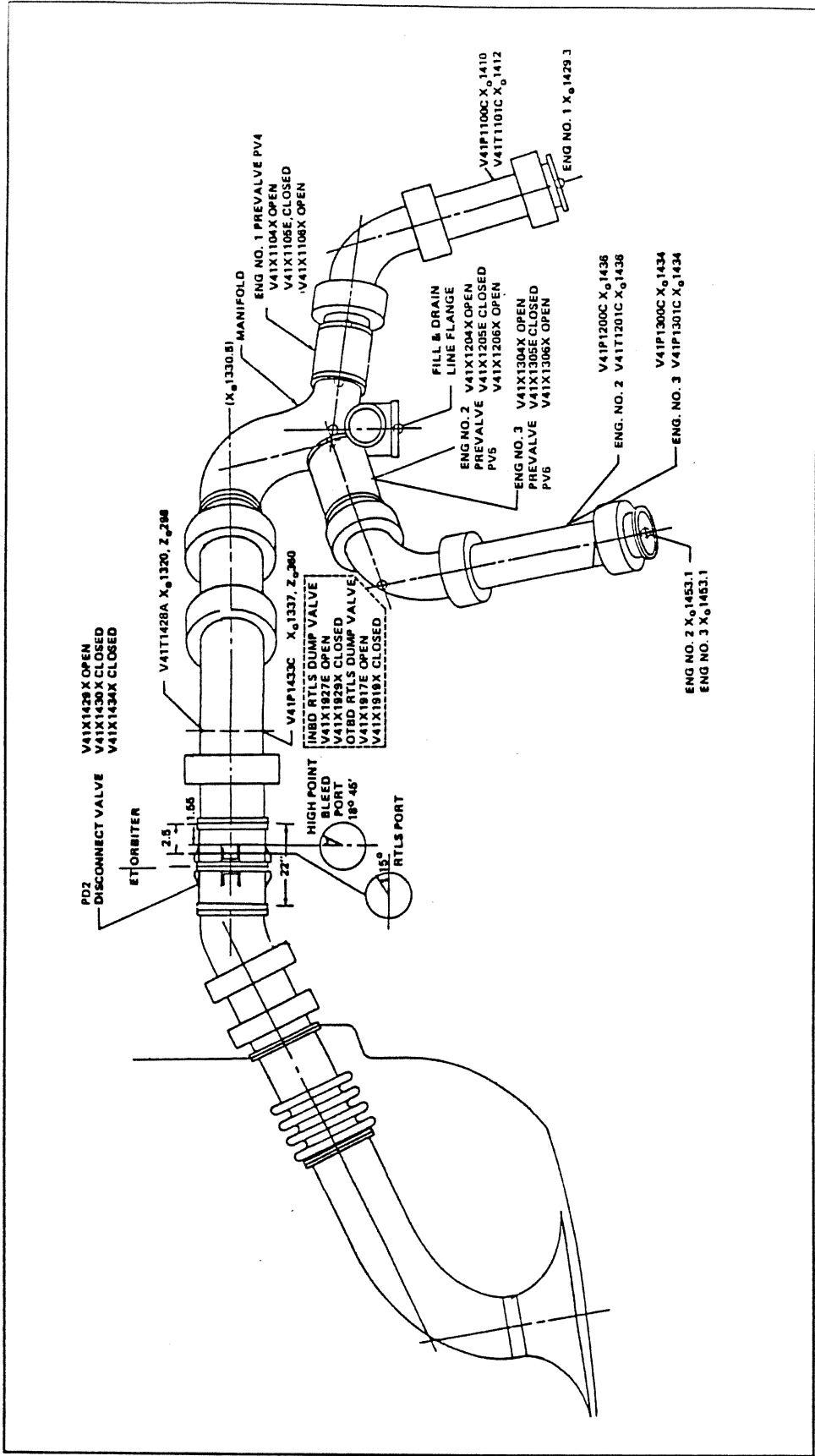
V41X1210E	MPS E2 LH2 RECIRC VLV (PV15) CL IND, OFF ON EVENT
V41R1215A	MPS E2 LH2 RECIRC PUMP (PP2) SPEED, 0 TO 20000 RPM
V41X1304X	MPS E3 LH2 PREVALVE (PV6) OP IND A, OFF ON EVENT
V41X1305E	MPS E3 LH2 PREVALVE (PV6) CL IND, OFF ON EVENT
V41X1306X	MPS E3 LH2 PREVALVE (PV6) OP IND B, OFF ON EVENT
V41X1309E	MPS E3 LH2 RECIRC VLV (PV16) OP IND, OFF ON EVENT
V41X1310E	MPS E3 LH2 RECIRC VLV (PV16) CL IND, OFF ON EVENT
V41R1315A	MPS E3 LH2 RECIRC PUMP (PP3) SPEED, 0 TO 20000 RPM
V41X1388E	MPS LH2 OTBD F/D VLV (PV11) OP IND, OFF ON EVENT
V41X1389X	MPS LH2 OTBD F/D VLV (PV11) CL IND, OFF ON EVENT
V41X1409E	MPS LH2 INBD F/D VLV (PV12) OP IND, OFF ON EVENT
V41X1410X	MPS LH2 INBD F/D VLV (PV12) CL IND, OFF ON EVENT
V41X1419E	MPS LH2 4 IN DISC VLV (PD3) OP IND, OFF ON EVENT
V41X1420E	MPS LH2 4 IN DISC VLV (PD3) CL IND, OFF ON EVENT
V41X1429X	MPS LH2 17 IN DISC VLV (PD2) OP IND A, OFF ON EVENT
V41X1430X	MPS LH2 17 IN DISC VLV (PD2) CL IND A, OFF ON EVENT
V41X1434X	MPS LH2 17 IN DISC VLV (PD2) CL IND B, OFF ON EVENT
V41X1441E	MPS LH2 FDLN RLF SOV (PV8) OP IND, OFF ON EVENT
V41X1442E	MPS LH2 FDLN RLF SOV (PB8) CL IND, OFF ON EVENT
V41X1453E	MPS LH2 TOPPING VLV (PV130) OP IND, OFF ON EVENT
V41X1456X	MPS LH2 TOPPING VLV (PV13) CL IND, OFF ON EVENT
V41X1468E	MPS LH2 HI PT BL VLV (PV22) OP IND, OFF ON EVENT
V41X1469E	MPS LH2 HI BL VLV (PV22) CL IND, OFF ON EVENT
V41X1917E	MPS LH2 RTLS OTBD DV (PV18) OP IND, OFF ON EVENT
V41X1919X	MPS LH2 RTLS OTBD DV (PV18) CL IND, OFF ON EVENT
V41X1927E	MPS LH2 RTLS INBD DV (PV17) OP IND, OFF ON EVENT
V41X1929X	MPS LH2 RTLS INBD DV (PV17) CL IND, OFF ON EVENT

3.3 LH2 FILL AND DRAIN LINE

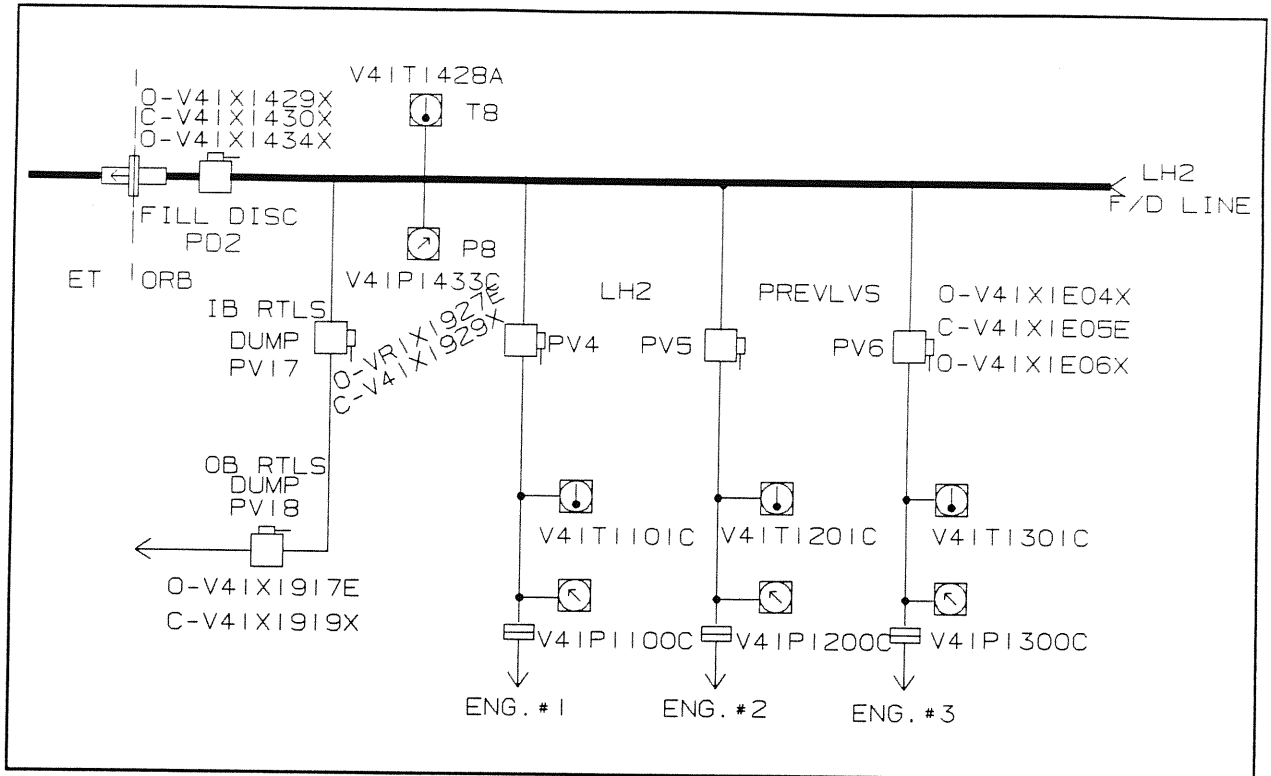


GLHP4116A	A100711	ORBITER INLET PRESS, 0 TO 100 PSIG
V41X1388E	MPS LH2	OTBD F/D VLV (PV11) OP IND, OFF ON EVENT
V41X1389X	MPS LH2	OTBD F/D VLV (PV11) CL IND, OFF ON EVENT
V41X1409E	MPS LH2	INBD F/D VLV (PV12) OP IND, OFF ON EVENT
V41X1410X	MPS LH2	INBD F/D VLV (PV12) CL IND, OFF ON EVENT
V41X1441E	MPS LH2	FDLN RLF SOV (PV8) OP IND, OFF ON EVENT
V41X1442E	MPS LH2	FDLN RLF SOV (PV8) CL IND, OFF ON EVENT

3.4 LH2 FEEDLINE



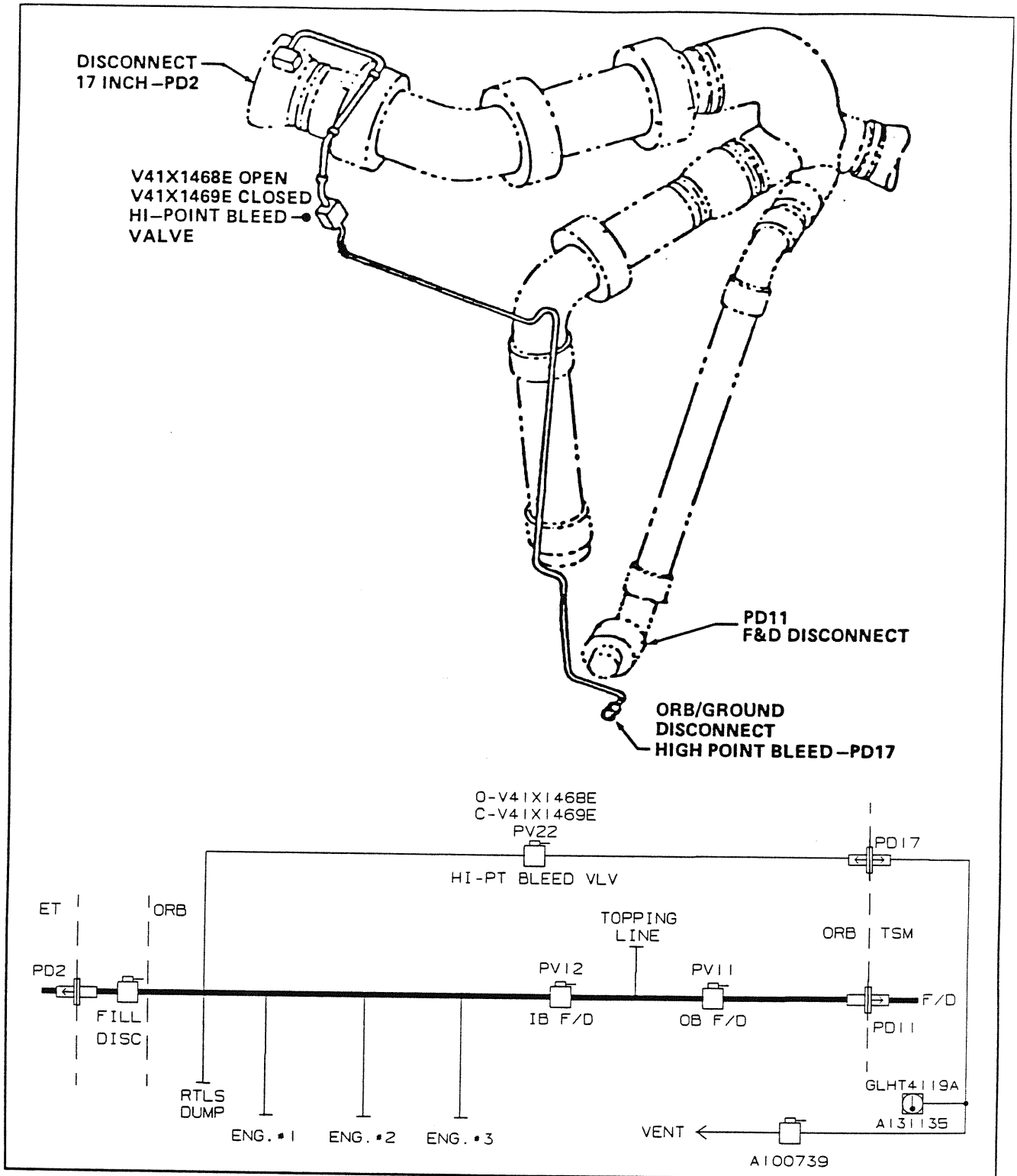
3.4 LH2 FEEDLINE



V41P1100C	MPS E1 LH2 INLET PRESS, 0 TO 200 PSIA
V41T1101C	MPS E1 LH2 INLET TEMP, -430 TO -405 DEGF
V41X1104X	MPS E1 LH2 PREVLV (PV4) OP IND A, OFF ON EVENT
V41X1105E	MPS E1 LH2 PREVLV (PV4) CL IND, OFF ON EVENT
V41X1106X	MPS E1 LH2 PREVLV (PV4) OP IND B, OFF ON EVENT
V41P1200C	MPS E2 LH2 INLET PRESS, 0 TO 200 PSIA
V41T1201C	MPS E2 LH2 INLET TEMP, -430 TO -405 DEGF
V41X1204X	MPS E2 LH2 PREVLV (PV5) OP IND A, OFF ON EVENT
V41X1205E	MPS E2 LH2 PREVLV (PV5) CL IND, OFF ON EVENT
V41X1206X	MPS E2 LH2 PREVLV (PV5) OP IND B, OFF ON EVENT
V41P1300C	MPS E3 LH2 INLET PRESS, 0 TO 200 PSIA
V41T1301C	MPS E3 LH2 INLET TEMP, -430 TO -405 DEGF
V41X1304X	MPS E3 LH2 PREVLV (PV6) OP IND A, OFF ON EVENT
V41X1305E	MPS E3 LH2 PREVLV (PV6) CL IND, OFF ON EVENT
V41X1306X	MPS E3 LH2 PREVLV (PV6) OP IND B, OFF ON EVENT
V41T1428A	MPS LH2 17 IN FEED MANF DISC TEMP, -430 TO -405 DEGF
V41X1429X	MPS LH2 17 IN DISC VLV (PD2) OP IND A, OFF ON EVENT
V41X1430X	MPS LH2 17 IN DISC VLV (PD2) CL IND A, OFF ON EVENT
V41P1433C	MPS LH2 17 IN FEED MANF DISC PRESS, 0 TO 100 PSIA
V41X1434X	MPS LH2 17 IN DISC VLV (PD2) CL IND B, OFF ON EVENT
V41X1917E	MPS LH2 RTLS OTBD DV (PV18) OP IND, OFF ON EVENT
V41X1919X	MPS LH2 RTLS OTBD DV (PV18) CL IND, OFF ON EVENT
V41X1927E	MPS LH2 RTLS OTBD DV (PV17) OP IND, OFF ON EVENT
V41X1929X	MPS LH2 RTLS OTBD DV (PV17) CL IND, OFF ON EVENT

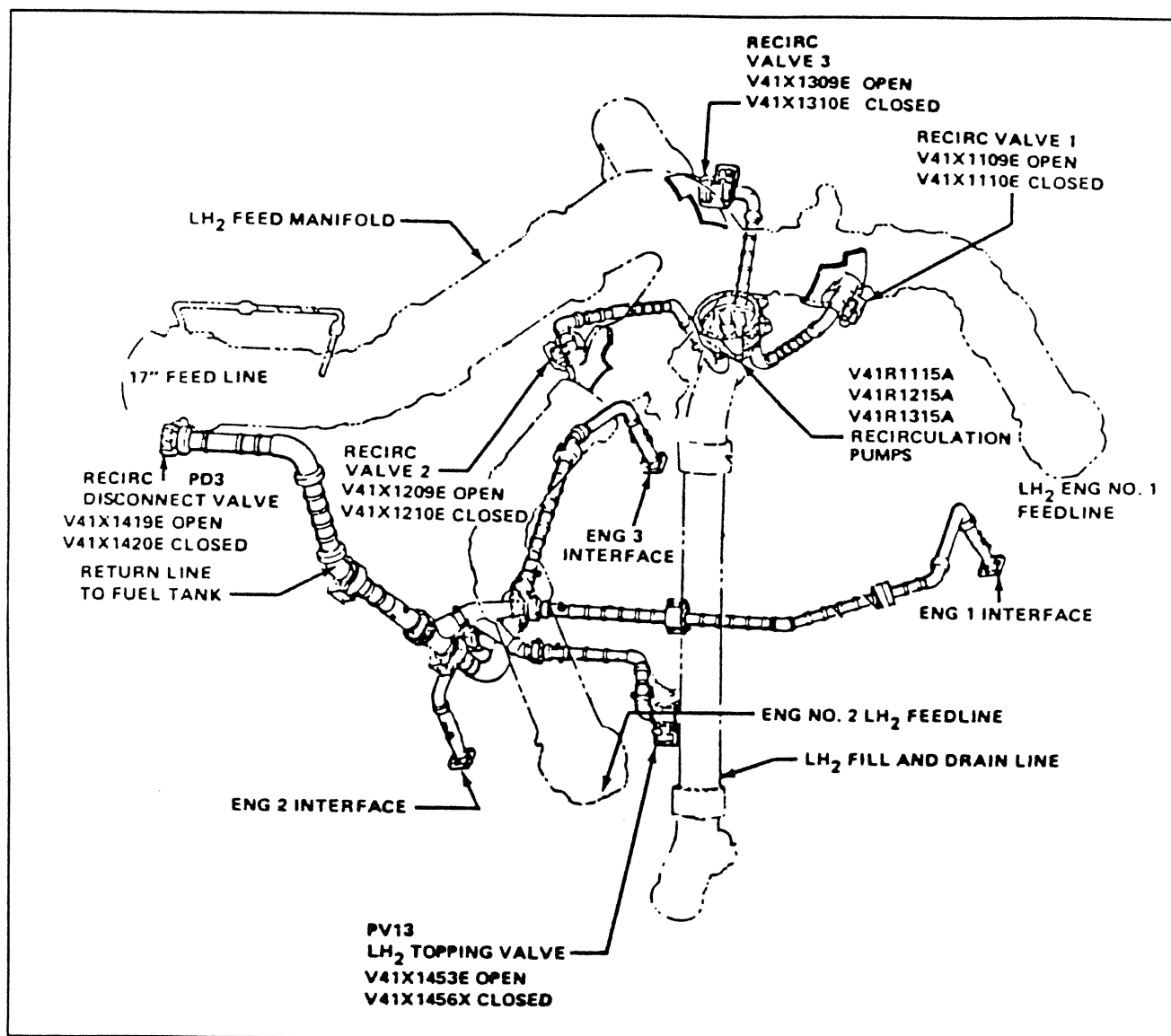
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3.5 LH2 HI-POINT BLEEDLINE



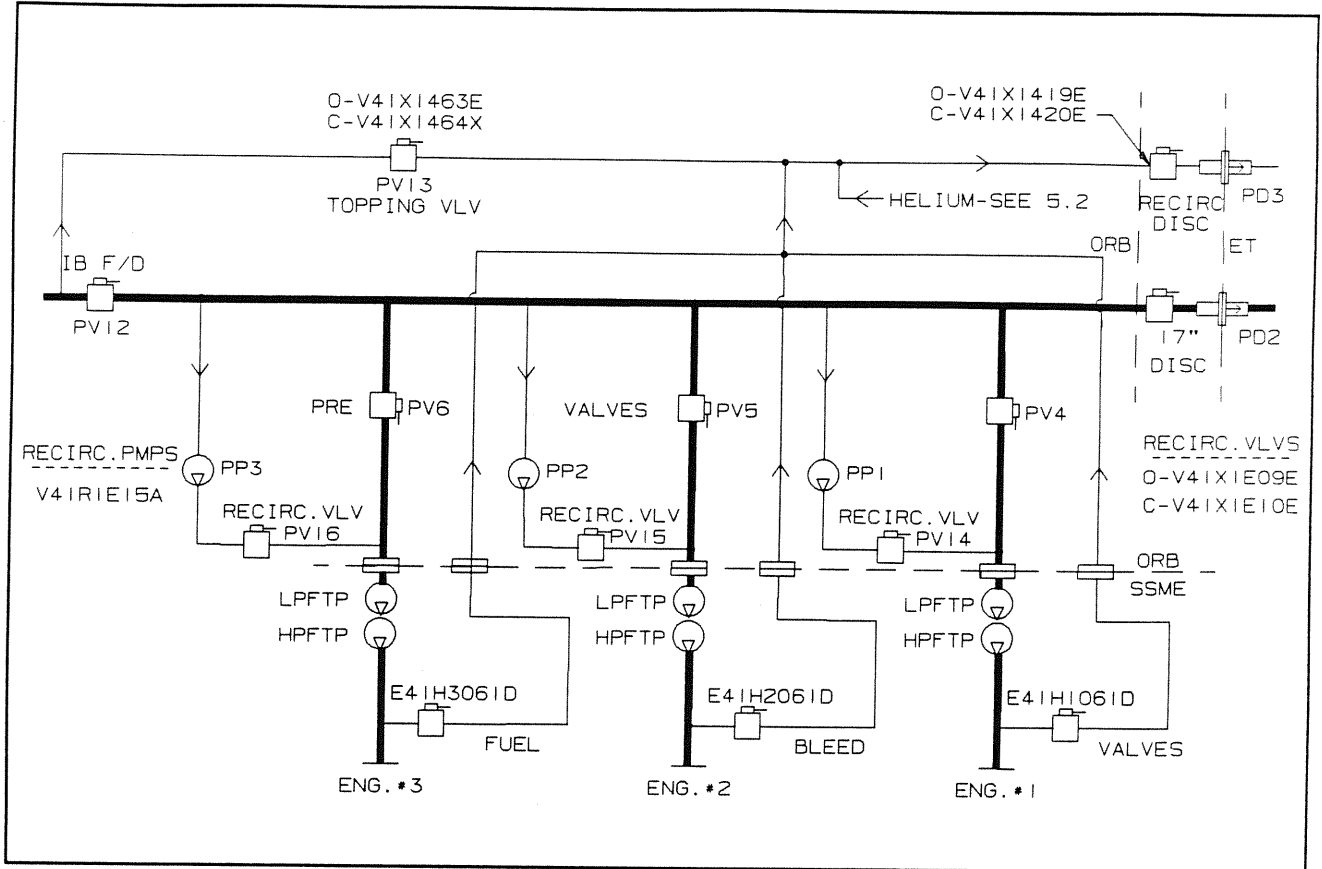
V41X1468E	MPS LH2 HI PT BL VLV (PV22) OP IND, OFF ON EVENT
V41X1469E	MPS LH2 HI PT BL VLV (PV22) CL IND, OFF ON EVENT
GLHT4119A	A131135 - HI PT BLD TEMP - 427 TO -409 F

3.6 LH2 RECIRCULATION



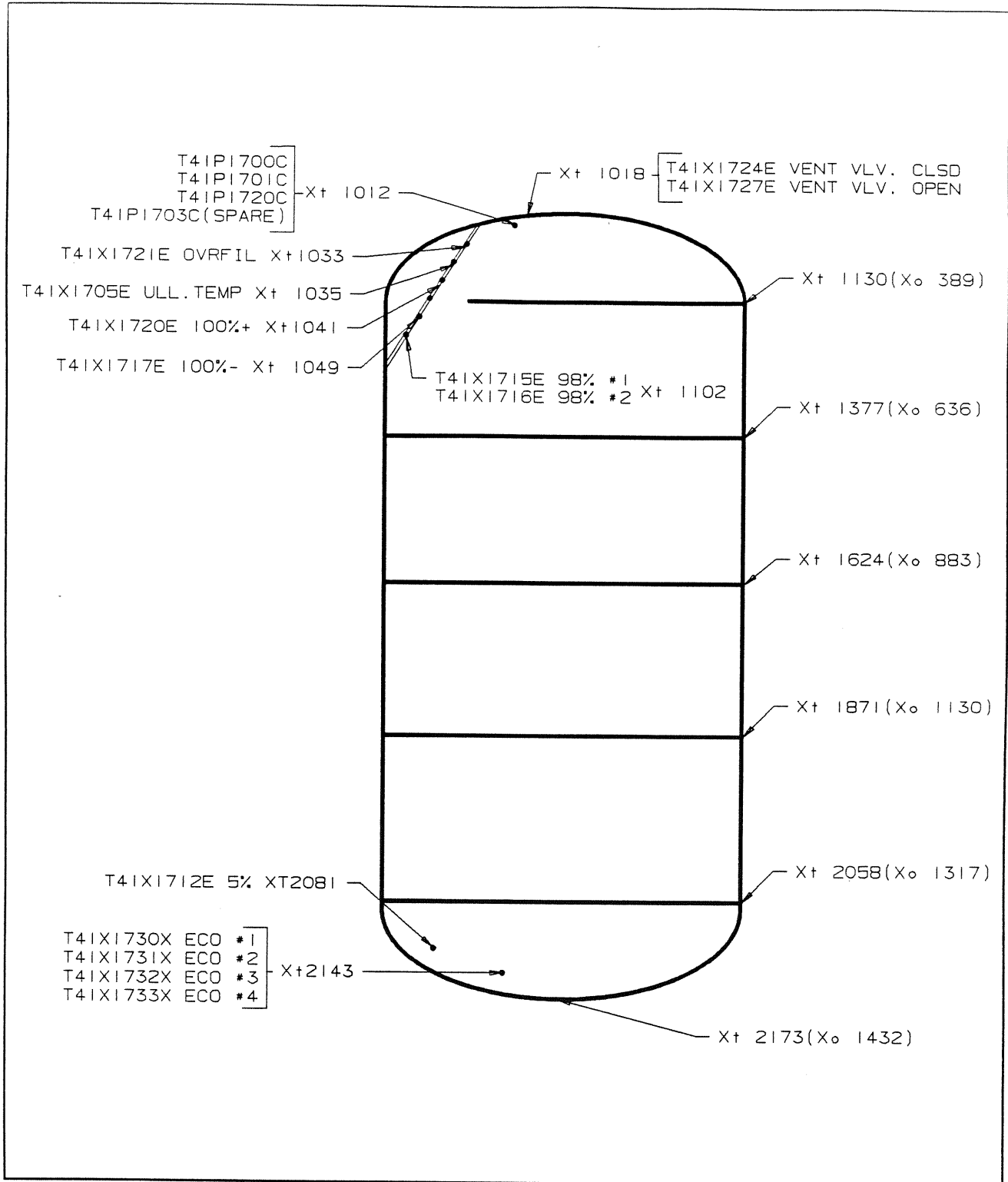
V41X1309E	MPS E3 LH2 RECIRC VLV (PV16) OP IND, OFF ON EVENT
V41X1310E	MPS E3 LH2 RECIRC VLV (PV16) CL IND, OFF-ON EVENT
V41X1315A	MPS E3 LH2 RECIRC PUMP (PP3) SPEED, 0 TO 20000 RPM
V41X1409E	MPS LH2 INBD F/D VLV (PV12) OP IND, OFF ON EVENT
V41X1410X	MPS LH2 INBD F/D VLV (PV12) CL IND, OFF ON EVENT
V41X1419E	MPS LH2 4 IN DISC VLV (PD3) OP IND, OFF ON EVENT
V41X1420E	MPS LH2 4 IN DISC VLV (PD3) CL IND, OFF ON EVENT
V41X1453E	MPS LH2 TOPPING VLV (PV13) OP IND, OFF ON EVENT
V41X1456X	MPS LH2 TOPPING VLV (PV13) CL IND, OFF ON EVENT

3.6 LH2 RECIRCULATION



E41H1061D	ME-1 FUEL BLEED VLV POSITION DW64, 0 TO 100 PCT
E41H2061D	ME-2 FUEL BLEED VLV POSITION DW64, 0 TO 100 PCT
E41H3061D	ME-3 FUEL BLEED VLV POSITION DW64, 0 TO 100 PCT
V41X1109E	MPS E1 LH2 RECIRC VLV (PV14) OP IND, OFF ON EVENT
V41X1110E	MPS E1 LH2 RECIRC VLV (PV14) CL IND, OFF ON EVENT
V41R1115A	MPS E1 LH2 RECIRC PUMP (PP1) SPEED, 0 TO 20000 RPM
V41X1209E	MPS E2 LH2 RECIRC VLV (PV15) OP IND, OFF ON EVENT
V41X1210E	MPS E2 LH2 RECIRC VLV (PV15) CL IND, OFF ON EVENT
V41R1215A	MPS E2 LH2 RECIRC PUMP (PP2) SPEED, 0 TO 20000 RPM

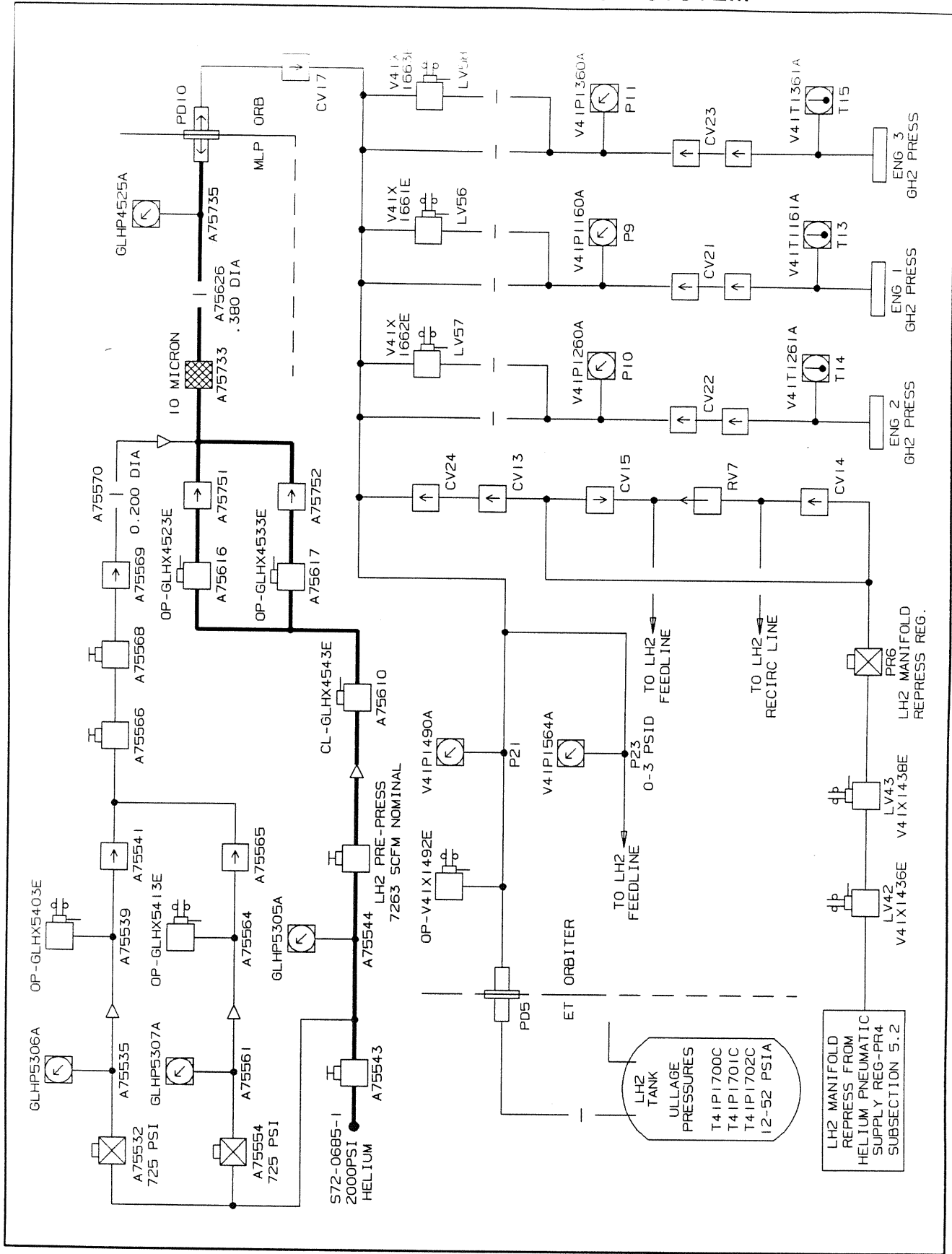
3.7 ET LH2 ULLAGE PRESSURE, LEVEL SENSORS AND TEMPS



3.7 ET LH2 ULLAGE PRESSURE, LEVEL SENSORS, & TEMPERATURES

T41P1700C	ET-LH2 ULLAGE PRESS NO 1, +12 TO +52 PSIA
T41P1701C	ET-LH2 ULLAGE PRESS NO 2, +12 TO +52 PSIA
T41P1702C	ET-LH2 ULLAGE PRESS NO 3, +12 TO +52 PSIA
T41P1702C	ET-LH2 ULLAGE PRESS NO 4 (SPARE), +12 TO +52 PSIA
T41T1705A	ET-LH2 ULLAGE TEMP, -430 TO +200 DEGF
T41X1712E	ET-LH2 5 PCT LIQUID LVL SNSR, WET DRY EVENT
T41X1715E	ET-LH2 98 PCT LIQUID LVL SNSR NO 1, WET DRY EVENT
T41X1716E	ET-LH2 98 PCT LIQUID LVL SNSR NO 2, WET DRY EVENT
T41X1717E	ET-LH2 100 PCT MINUS LIQ LVL SENSOR, WET DRY EVENT
T41X1718E	ET-LH2 100 PCT LIQ LVL SENSOR NO 1, WET DRY EVENT
T41X1719E	ET-LH2 100 PCT LIQ LVL SENSOR NO 2, WET DRY EVENT
T41X1720E	ET-LH2 100 PCT PLUS LIQ LVL SENSOR, WET DRY EVENT
T41X1721E	ET-LH2 OVERFILL LIQ LVL SENSOR, WET DRY EVENT
T41X1724E	ET-LH2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT
T41X1727E	ET-LH2 VENT VLV NO 1 OPEN IND, OPEN EVENT
T41X1730X	ET-LH2 LOW LEVEL LIQ SENSOR NO 1, WET DRY EVENT
T41X1731X	ET-LH2 LOW LEVEL LIQ SENSOR NO 2, WET DRY EVENT
T41X1732X	ET-LH2 LOW LEVEL LIQ SENSOR NO 3, WET DRY EVENT
T41X1733X	ET-LH2 LOW LEVEL LIQ SENSOR NO 4, WET DRY EVENT

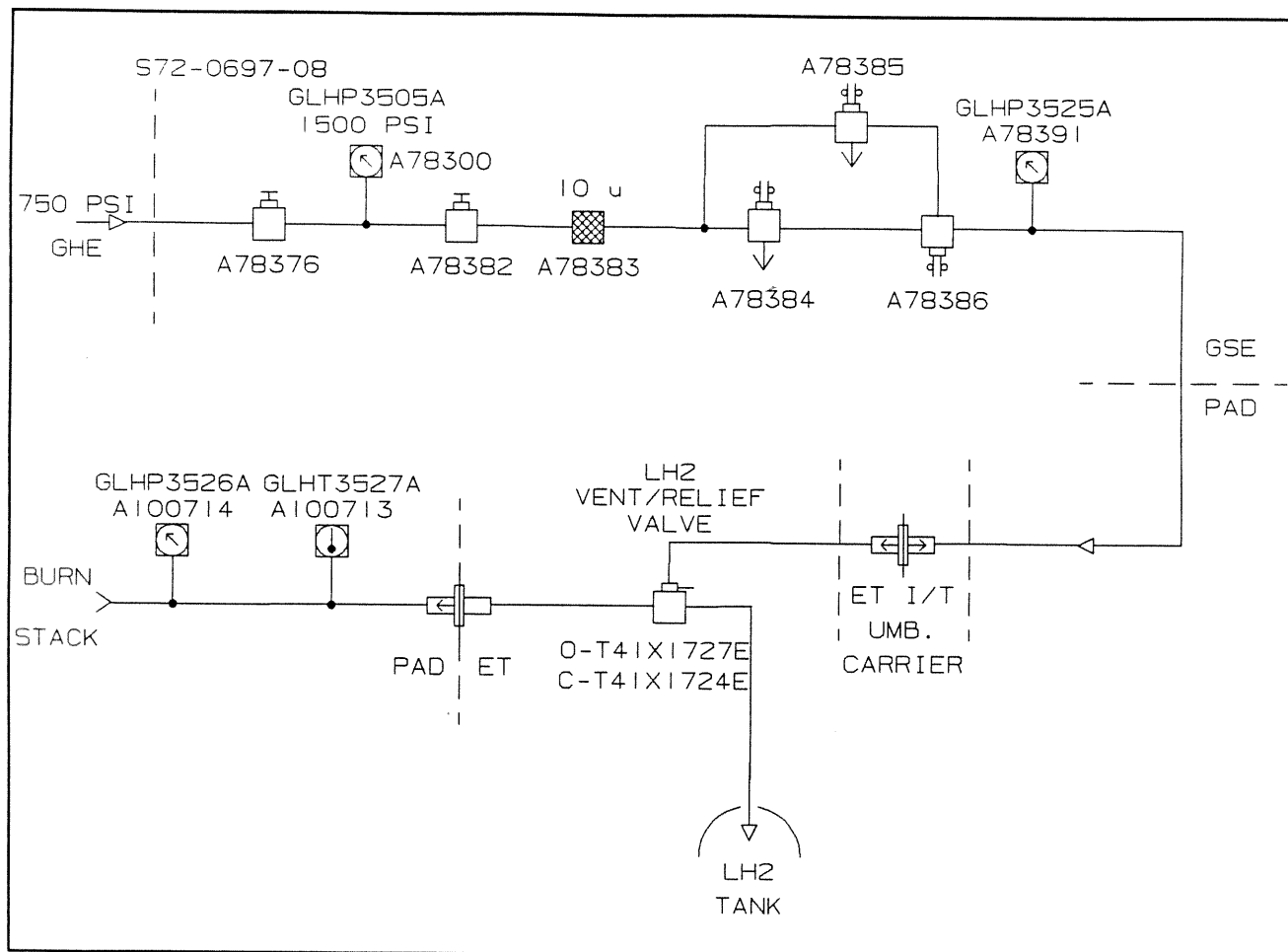
3.8 LH2 PREPRESSURIZATION SYSTEM



3.8 LH2 PREPRESSURIZATION SYSTEM

GLHX4523E	A75616	ET PRESS PRI CTR VLV OP IND, ONE=ON ZERO=OFF
GLHP4525A	A75735	ET PRE-PRSS+PRSS DRN PRESS, 0 TO 2000 PSIG
GLHX4533E	A75617	ET PRESS SEC CTR VLV OP IND, ONE=ON ZERO=OFF
GLHX4543E	A75610	ET PRESS SOV CLOSED IND, ONE=ON ZERO=OFF
GLHP5305A	A75544	MPS HE INLET SUPPLY PRESS, 0 TO 5000 PSIG
GLHP5306A	A75535	PRI 755 PSIG REG HE PRESS, 0 TO 1500 PSIG
GLHP5307A	A75561	SEC 755 PSIG REG HE PRESS, 0 TO 1500 PSIG
GLHX5403E	A75539	PRI UMB PURGE VENT OPEN IND, ONE=ON ZERO=OFF
GLHX5413E	A75564	SEC UMB PRG VNT VLV OPN IND, ONE=ON ZERO=OFF
T41P1700C	ET-LH2	ULLAGE PRESS NO 1, +12 TO +52 PSIA
T41P1701C	ET-LH2	ULLAGE PRESS NO 2, +12 TO +52 PSIA
T41P1702C	ET-LH2	ULLAGE PRESS NO 3, +12 TO +52 PSIA
V41P1160A	MPS E1	GH2 PRESS OUTLET PRESS, 0 TO 5000 PSIA
V41T1161A	MPS E1	GH2 PRESS OUTLET TEMP, -325 TO +500 DEGF
V41P1260A	MPS E2	GH2 PRESS OUTLET PRESS, 0 TO 5000 PSIA
V41T1261A	MPS E2	GH2 PRESS OUTLET TEMP, -325 TO +500 DEGF
V41P1360A	MPS E3	GH2 PRESS OUTLET PRESS, 0 TO 5000 PSIA
V41T1361A	MPS E3	GH2 PRESS OUTLET TEMP, -325 TO +500 DEGF
V41X1436E	MPS LH2	MANF REPRESS 1 (LV42) OP PWR, OFF ON EVENT
V41X1438E	MPS LH2	MANF REPRESS 2 (LV43) OP PWR, OFF ON EVENT
V41P1490A	MPS GH2	PRESSURIZATION DISC PRESS 0 TO 1000 PSIA
V41X1492E	MPS GH2	PRESSURIZATION LN VENT (LV52) OP PWR, OFF ON EVENT
V41P1564A	MPS LH2	MANF TO ET ULL DELTA PRESS, 0 TO +3 PSID
V41X1661E	MPS GH2	PRESS FCV 1 (LV56) CL PWR, OFF ON EVENT
V41X1662E	MPS GH2	PRESS FCV 2 (LV57) CL PWR, OFF ON EVENT
V41X1663E	MPS GH2	PRESS FCV 3 (LV58) CL PWR, OFF ON EVENT

3.9 LH2 VENT VALVE ACTUATION



GLHP3505A
 GLHP3525A
 GLHP3526A
 GLHT3527A
 T41X1727E
 T41X1724E

A78300 ET VENT CONTROL SPLY PRESS, 0 TO 1500 PSIG
 A78391 ET VNT VLV ACTUAT PRESS, 0 TO 1500 PSIG
 A100714 ET VENT LINE PRES. 0 TO 25 PSIA
 A100713 ET VENT LINE TEMP., -427 TO 32 F
 T41X1727E ET-LH2 VENT VLV NO 1 OPEN IND, OPEN EVENT
 T41X1724E ET-LH2 VENT VLV NO 1 CLOSED IND, CLOSE EVENT

4.0 SPACE SHUTTLE MAIN ENGINE (SSME)

NOTE 1: Most engine measurements are common to all three engines. The fifth, sixth, or seventh character in the msid number normally designates engine position (i.E. "1", "2", or "3"). To prevent needless duplication of MSID listings, an "e" is used throughout section 4 in place of the this character to reflect commonality.

NOTE 2: The key number on pgs. 4-3 Thru 4-5 is used throughout section 4.0 as an aid to locating sensor installation detail.

4.1 SSME PARAMETER INDEX

<u>PARAMETER INDEX</u>	<u>KEY NO.</u>	<u>ASSOCIATED MSIDS</u>
HPFT SHAFT SPEED CH A	7	E41RE006D; CH B 007D
HPFP COOLANT PRESS CH A	8	E41PE008B,D; CH B 009B,D
HPFTT DISCH TEMP CH A	9	E41TE012B,D; 010D
HPFTT DISCH TEMP CH B	10	E41TE011B,D; 013D
HPOT I-SEAL PGE PRESS	13	E41PE014B,D; 015B,D
MCC PRESSURE CH A	14	E41PE016B,D; 023B,D; 035D; 036D; 039D
MCC PRESSURE CH B	15	E41PE017B,D; 023B,D; 039D; 052D; 124D
LPFT DISCH PRESS	16	E41PE018B,D; 092D; 127D
LPFT DISCH TEMP	17	E41TE019B,D; 093D; 128D
PBP DISCH TEMP	18	E41TE020B,D; 032D; 125D
FUEL FLOWRATE	19	E41RE021B,D; 034D; 037D; 050D; 089D; 102D; 103D
MFV ACTUATOR POS	20	E41HE024B,D; 040D; 084D
MOV ACTUATOR POS	21	E41HE025B,D; 041D; 085D
CCV ACTUATOR POS	22	E41HE026B,D; 042D; 086D
FPOV ACTUATOR POS	23	E41HE027B,D; 043D, 087D
OPOV ACTUATOR POS	24	E41HE028B,D; 044D, 088D
HPFT DISCH PRESS	25	E41PE029B,D; 045D
HPOT DISCH PRESS	26	E41PE030B,D; 046D
FUEL PREBNR CHMBR PRESS	27	E41PE031B,D; 047D
HPOT BST STG DISCH P	28	E41PE033B,D; 049D
HYDRAULIC SYS PRESS	29	E41PE048D; 054B,D
HPOT SEC SEAL CAV PRESS	30	E41PE051B,D; 053B,D
POGO PRECHG PRESS	31	E41PE055D; 056D
FUEL SYS PGE PRESS	32	E41PE057D; 058D
OXID PREBNR PGE PRESS	33	E41PE059D
FUEL BLEED VLV POS	34	E41HE061D
OXID BLEED VLV POS	35	E41HE062D
POGO RECIRC N ISLN V POS	36	E41HE063D
LPOT DISCH PRESS	37	E41PE064D; 065D
MCC FUEL INJECTOR PRESS	38	E41PE066D
MCC COOLANT PRESS	39	E41PE067D
OX TK PRESSURANT PRESS	40	E41PE068D
CONTROLLER INTERNAL SENSORS	41	E41PE069D; TE071D, TE150A
MCC COOLANT TEMPERATURE	42	E41TE070D
LPFT SHAFT SPEED	43	E41RE072D
LPOT SHAFT SPEED	44	E41RE073D
ANTI-FLOOD VLV POS	45	E41HE104D; 105D
FUEL PREBRN PGE PRESS	46	E41PE106D;
EMERG SHT DN PRESS	47	E41PE107D; 108D
MOV HYD TEMP	48	E41TE109D; 110D
MFV HYD TEMP	49	E41TE111D; 112D
MCC LOX DOME TEMP	50	E41TE120D
OPOV LOX SUPPLY LINE TEMP	51	E41TE151A; 152A
MFV DOWNSTREAM TEMP	52	E41TE153A; 154A
FASCOS PBP RADIAL ACCELS	53	E41DE601A; 602A; 603A
FASCOS HPFP RADIAL ACCELS	54	E41DE604A; 605A; 606A
ENGINE VIBRATION CH A	55	E41DE607A; CH B 608A
AFV DOWNSTREAM TEMP	56	E41TE155A; 156A

4.2 SSME MSID INDEX

<u>MSID</u>	<u>KEY</u>	<u>NOMENCLATURE</u>
E41CE721D		MFV SV1 CURRENT -30 TO 30 MAMPS
E41CE722D		MOV SV2 CURRENT -30 TO 30 MAMPS
E41CE723D		CCV SV3 CURRENT -30 TO 30 MAMPS
E41CE724D		FPOV SV4 CURRENT -30 TO 30 MAMPS
E41CE725D		OPOV SV5 CURRENT -30 TO 30 MAMPS
E41DE601A	53	FASCOS PBP RAD 45 CH A2, -35 TO +35G
E41DE602A	53	FASCOS PBP RAD 135-1 CH B2 ON, -35 TO +35G
E41DE603A	53	FASCOS PBP RAD 135-2 CH C2 ON, -35 TO +35G
E41DE604A	54	FASCOS HPFP RAD 0 CH A1, -35 TO +35G
E41DE605A	54	FASCOS HPFP RAD 174 CH B1 ON, -35 TO +35G
E41DE606A	54	FASCOS HPFP 186 CH C1, -35 TO +35G
E41DE607A	55	ENGINE VIBRATION - CH A, -425 TO +900 GP-P
E41DE608A	55	ENGINE VIBRATION - CH B, -425 TO +900 GP-P
E41GE609A		HPOTP STRAIN RI (O DEG/1) -500 TO 500 IN/IN
E41GE610A		HPOTP STRAIN RI (O DEG/1) -500 TO 500 IN/IN
E41GE611A		HPOTP STRAIN RI (O DEG/1) -500 TO 500 IN/IN
E41GE612A		HPOTP STRAIN RI (O DEG/1) -500 TO 500 IN/IN
E41HE024B,D	20	MFV ACTUATOR POSITION DW24, -5 TO 105 PCT
E41HE025B,D	21	MOV ACTUATOR POSITION DW25, -5 TO 105 PCT
E41HE026B,D	22	CCV ACTUATOR POSITION DW25, -5 TO 105 PCT
E41HE027B,D	23	FPOV ACTUATOR POSITION DW27, -5 TO 105 PCT
E41HE028B,D	24	OPOV ACTUATOR POSITION DW28, -5 TO 105 PCT
E41HE040D	20	MFV ACTUATOR POSITION DW40, -5 TO 105 PCT
E41HE041D	21	MOV ACTUATOR POSITION DW41, -5 TO 105 PCT
E41HE042D	22	CCV ACTUATOR POSITION DW42, -5 TO 105 PCT
E41HE043D	23	FPOV ACTUATOR POSITION DW43, -5 TO 105 PCT
E41HE044D	24	OPOV ACTUATOR POSITION DW44, -5 TO 105 PCT
E41HE061D	34	FUEL BLEED VLV POSITION DW 64, 0 TO 100 PCT
E41HE062D	35	OXID BLEED VLV POSITION DW 65, 0 TO 100 PCT
E41HE063D	36	POGO RECIRN ISLN V POS DW 63 0 TO 100 PCT
E41HE084D	20	MFV ACT POS CH B DW 106, -5 TO 105 PCT
E41HE085D	21	MOV ACT POS CH B DW 107, -5 TO 105 PCT
E41HE086D	22	CCV ACT POS CH B DW 108, -5 TO 105 PCT
E41HE087D	23	FPOV ACT POS CH B DW 109, -5 TO 105 PCT
E41HE088D	24	OPOV ACT POS CH B DW 110, -5 TO 105 PCT
E41HE104D	45	ANTI-FLOOD VLV POS CH A DW 68, 0 TO 100 PCT
E41HE105D	45	ANTI-FLOOD VLV POS CH B DW 69, 0 TO 100 PCT
E41HE117D	-	OPOV CMD LIMIT DW 117, 0 TO 100 PCT
E41M1003P,P*	-	ENGINE STATUS WORD DW3
E41PE008B,D	8	HPFT COOLANT PRESS CH A DW 14, 0 TO 4500 PSIA
E41PE009B,D	8	HPFT COOLANT PRESS CH B DW 15, 0 TO 4500 PSIA
E41PE014B,D	13	HPOT I-SEAL PGEP CH A DW 20, 0 TO 600 PSIA
E41PE015B,D	13	HPOT I-SEAL PGEP CH B DW 21, 0 TO 600 PSIA
E41PE016B,D	14	MCC PRESSURE CH A DW 22, 0 TO 3500 PSIA
E41PE017B,D	15	MCC PRESSURE CH B DW 23, 0 TO 3500 PSIA
E41PE018B,D	16	LPFT DISCH PRESS (AVG) DW 9, 0 TO 300 PSIA
E41PE023B,D	14	MCC PRESSURE (AVG) DW 6, 0 TO 3500 PSIA
E41PE029B,D	25	HPFT DISCHARGE PRESS DW 29, 0 TO 9500 PSIA
E41PE030B,D	26	HPOT DISCHARGE PRESS DW 30, 0 TO 7000 PSIA
E41PE031B,D	27	FUEL PREBNR CHMBR PRESS DW 31, 0 TO 7000 PSIA
E41PE033D	28	HPOT BOOST STG DISCH P DW 33, 0 TO 9500 PSIA
E41PE035D	14	MMC PRESSURE A2 DW 35, 0 TO 3500 PSIA

4.2 SSME MSID INDEX (CONTINUED)

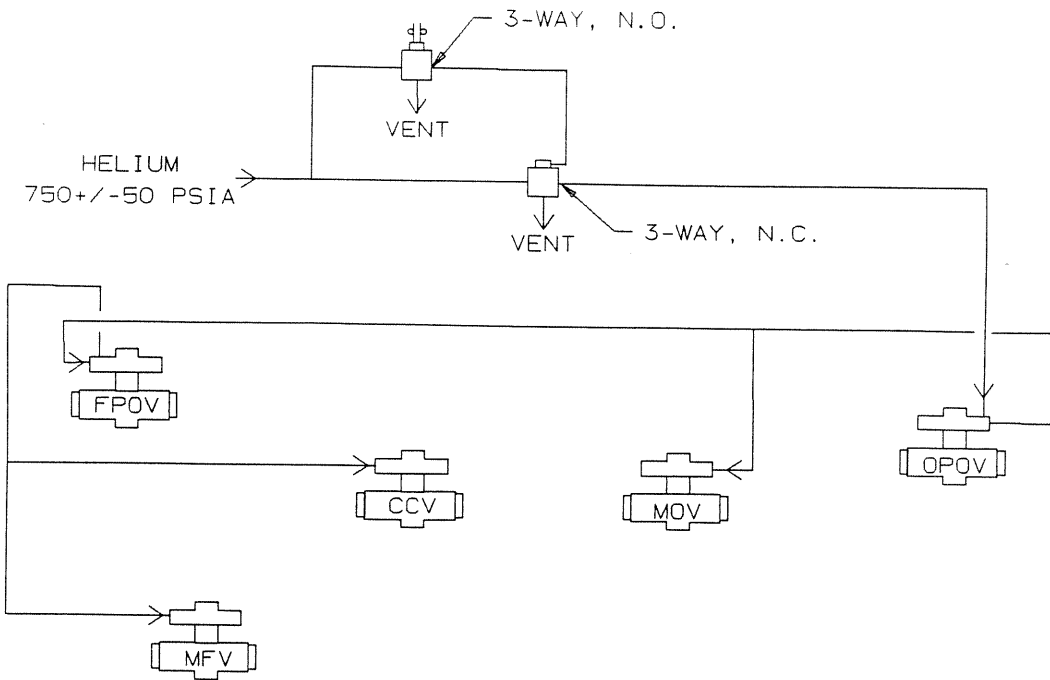
<u>MSID</u>	<u>KEY</u>	<u>NOMENCLATURE</u>
E41PE036D	14	MCC PRESSURE A1 DW 36, 0 TO 3500 PSIA
E41PE039D	14	MCC PRESSURE (AVG) DW 39, -5 TO 3550 PSIA
E41PE045D	25	HPFT DISCHARGE PRESS DW 45, 0 TO 9500 PSIA
E41PE046D	26	HPOT DISCHARGE PRESS DW 46, 0 TO 7000 PSIA
E41PE047D	27	FUEL PREBNR CHMBR PRESS DW 47, 0 TO 7000 PSIA
E41PE048D	29	HYDRAULIC SYSTEM PRESS CHB DW 48, 0 TO 4000 PSIA
E41PE049D	28	HPOT BOOST STG DISCH P DW 49, 0 TO 9500 PSIA
E41PE051B,D	30	HPOT SEC SEAL CAV P CHA DW 12, 0 TO 300 PSIA
E41PE052D	15	MCC PRESSURE B1 DW 52, 0 TO 3500 PSIA
E41PE053B,D	30	HPOT SEC SEAL CAV P CH B, DW13, 0 TO 300 PSIA
E41PE054B,D	29	HYDRAULIC SYSTEM PRESS CHB DW32, 0 TO 4000 PSIA
E41PE055D	31	POGO PRECHG PRESS CHA DW 57 0 TO 1500 PSIA
E41PE056D	31	POGO PRECHG PRESS CHA DW 58 0 TO 1500 PSIA
E41PE057D	32	FUEL SYS PGE PRESS CH A DW 53, 0 TO 600 PSIA
E41PE058D	32	FUEL SYS PGE PRESS CH B DW 54, 0 TO 600 PSIA
E41PE059D	33	OXID PREBNR PGE PRESS DW 75, 0 TO 1500 PSIA
E41PE064D	37	LPOT DISCH PRESS CH A DW 70, 0 TO 600 PSIA
E41PE065D	37	LPOT DISCH PRESS CH B DW 71, 0 TO 600 PSIA
E41PE066D	38	MCC FUEL INJECTOR PRESS DW 77, 0 TO 7000 PSIA
E41PE067D	39	MCC COOLANT PRESSURE DW 78, 0 TO 7000 PSIA
E41PE068D	40	OX TK PRESSURANT PRESS DW 76, 0 TO 7000 PSIA
E41PE069D	41	CONTROLLER INTL PRESS DW 79, 0 TO 50 PSIA
E41PE092D	16	LPFP DISCH PRESS CH A DW 92, 0 TO 300 PSIA
E41PE094D	-	PC REFERENCE DW 94, 0 TO 3500 PSIA
E41PE106D	46	FUEL PREBURN PGE PRESS DW 74, 0 TO 1500 PSIA
E41PE107D	47	EMERG SHT DN PRESS CH A, DW72 0 TO 1500 PSIA
E41PE108D	47	EMERG SHT DN PRESS CH B, DW73 0 TO 1500 PSIA
E41PE124D	15	MCC PRESSURE B2 DW 51, 0 TO 3500 PSIA
E41PE127D	16	LPFP DISCH PRESS CH B DW 127, 0 TO 300 PSIA
E41RE006D	7	HPFT SHAFT SPEED CH A DW 96, 1350 TO 45K RPM
E41RE007D	7	HPFT SHAFT SPEED CH B DW 97, 1350 TO 45K RPM
E41RE021B,D	19	FUEL FLOWRATE (AVG) DW 7, 1080 TO 18K GPM
E41RE022B,D	-	LOX FLOWRATE (CALC) DW 8, 420 TO 7000 GPM
E41RE034D	19	FUEL FLOWRATE CH A DW 34, 1080 TO 18K GPM
E41RE037D	19	FUEL FLOWRATE (AVG) DW 37, 1080 TO 18K GPM
E41RE050D	19	FUEL FLOWRATE CH A DW 50, 1080 TO 18K GPM
E41RE072D	43	LPFT SHAFT SPEED DW 82, 600 TO 20K RPM
E41RE073D	44	LPOT SHAFT SPEED DW 83, 180 TO 6000 RPM
E41RE089D	19	FUEL FLOW RATE CH B1 DW89, 1080 TO 18K GPM
E41RE102D	19	FUEL FLOW RATE CH A2, DW124 1080 TO 18K GPM
E41RE103D	19	FUEL FLOW RATE CH B2, DW125 1080 TO 18K GPM
E41TE010B,D	9	HPFTT DISCH TEMP CH A DW 16, 200 TO 2760 DEGRAN
E41TE011B,D	10	HPFTT DISCH TEMP CH B DW 17, 200 TO 2760 DEGRAN
E41TE012B,D	11	HPOTT DISCH TEMP CH A DW 18, 200 TO 2760 DEGRAN
E41TE013B,D	12	HPOTT DISCH TEMP CH B DW 19, 200 TO 2760 DEGRAN
E41TE019B,D	17	LPFT DISCH TEMP (AVG) DW 10, 30 TO 55 DEGRAN

4.2 SSME MSID INDEX (CONTINUED)

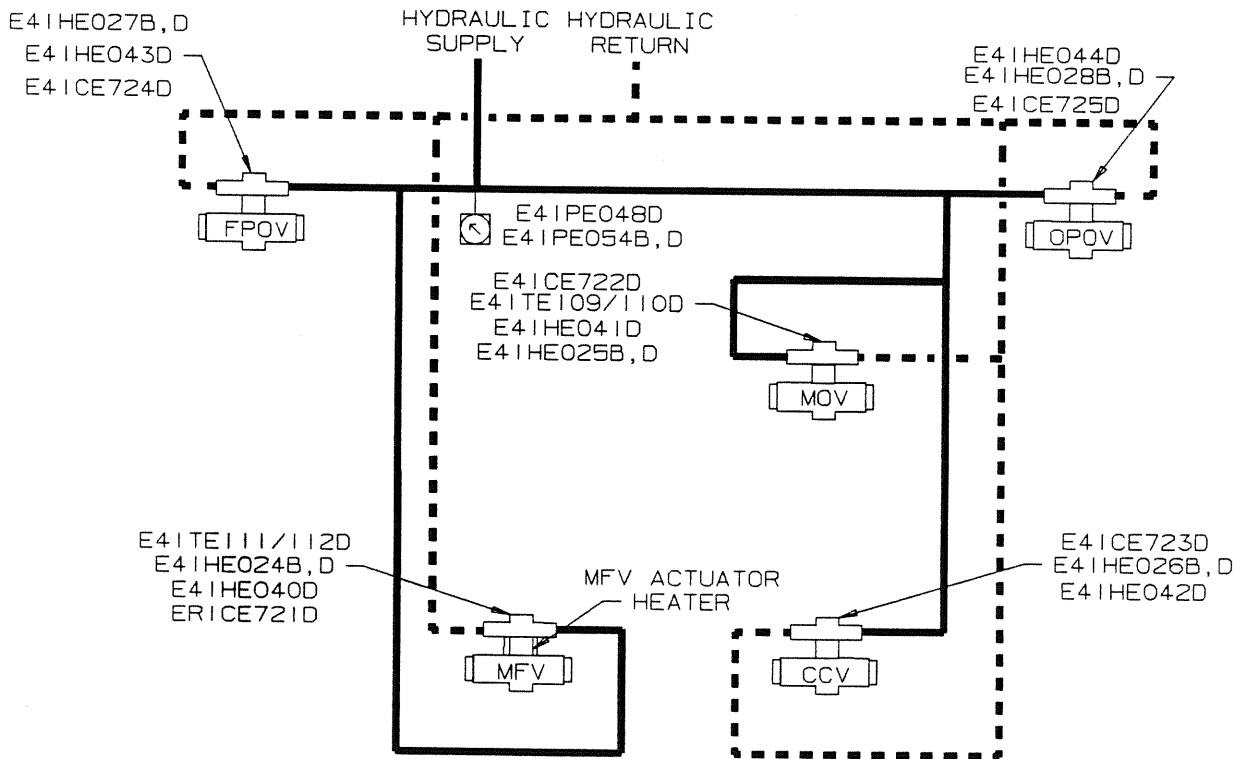
<u>MSID</u>	<u>KEY</u>	<u>NOMENCLATURE</u>
E41TE020B,D	18	PBP DIS TEMP DW 11, 160 TO 230 DEGRAN
E41TE070D	42	MCC COOLANT TEMP DW 81, 460 TO 2760 DEGRAN
E41TE071D	41	CONTROLLER IE TEMP DW 80, 140 TO 760 DEGRAN
E41TE093D	17	LPFP DISCH TEMP CH A DW 93, 30 TO 55 DEGRAN
E41TE109D	48	MOV HYD TEMP CH A DW 59, 360 TO 760 DEGRAN
E41TE110D	48	MOV HYD TEMP CH B DW 60, 360 TO 760 DEGRAN
E41TE111D	49	MFV HYD TEMP CH A DW 61, 360 TO 760 DEGRAN
E41TE112D	49	MFV HYD TEMP CH B DW 62, 360 TO 760 DEGRAN
E41TE120D	50	MCC LOX DOME TEMP DW 120, 110 TO 610 DEGRAN
E41TE125D	18	PBP DISCH TEMP CH B, DW 55, 160 TO 230 DEGRAN
E41TE128D	17	LPFP DISCH TEMP CH B DW 128, 30 TO 55 DEGRAN
E41TE150A	41	CONTROLLER PS TEMPERATURE, -75 TO +300 DEG F
E41TE151A	51	OPOV LOX SUPPLY LINE TEMP #1, -325 TO +300 DEGF
E41TE152A	51	OPOV LOX SUPPLY LINE TEMP #2, -325 TO +500 DEGF
E41TE153A	52	MFV DOWNSTREAM TEMP #1, -430 TO +200 DEGF
E41TE154A	52	MFV DOWNSTREAM TEMP #2, -300 TO +500 DEGF
E41TE155A	56	ANTI-FLOOD VLV DOWNSTREAM TEMP #1
E41TE156A	56	ANTI-FLOOD VLV DOWNSTREAM TEMP #2
E41UE095D	-	MIXTURE RATIO DW 95, 0 TO 15 UNITS
E41VE074D	-	CONTROLLER BUS 1 VOLT DW 66, 0 TO 170 VAC
E41VE075D	-	CONTROLLER BUS 2 VOLT DW 67, 0 TO 170 VAC
E41VE118D	-	+36 VDC OE VOLT CHA DW 118, 0 TO 50 VDC
E41VE119D	-	+36 VDC OE VOLT CHB DW 119, 0 TO 50 VDC
E41XE556D	-	FPB IGN CHA P96B12, ON OFF EVENT
E41XE557D	-	OPB IGN CHA P96B13, ON OFF EVENT
E41XE558D	-	MCC IGN CHA P96B14, ON OFF EVENT
E41XE561D	-	FPB IGN CHA P98B12, ON OFF EVENT
E41XE562D	-	OPB IGN CHA P98B13, ON OFF EVENT
E41XE563D	-	MCC IGN CHA P98B14, ON OFF EVENT
V08D9451A	55	LFAP E1 GMBL PAD X-AXIS VIB A0E001, 0 TO 12 GP-P
V08D9454A	55	LFAP E2 GMBL PAD X-AXIS VIB A0E004, 0 TO 12 GP-P
V08D9457A	55	LFAP E3 GMBL PAD X-AXIS VIB A0E007, 0 TO 12 GP-P

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4.3 SSME HYDRAULIC PNEUMATIC ACTUATED VALVES



SSME VALVE ACTUATORS - PNEUMATIC OPERATION

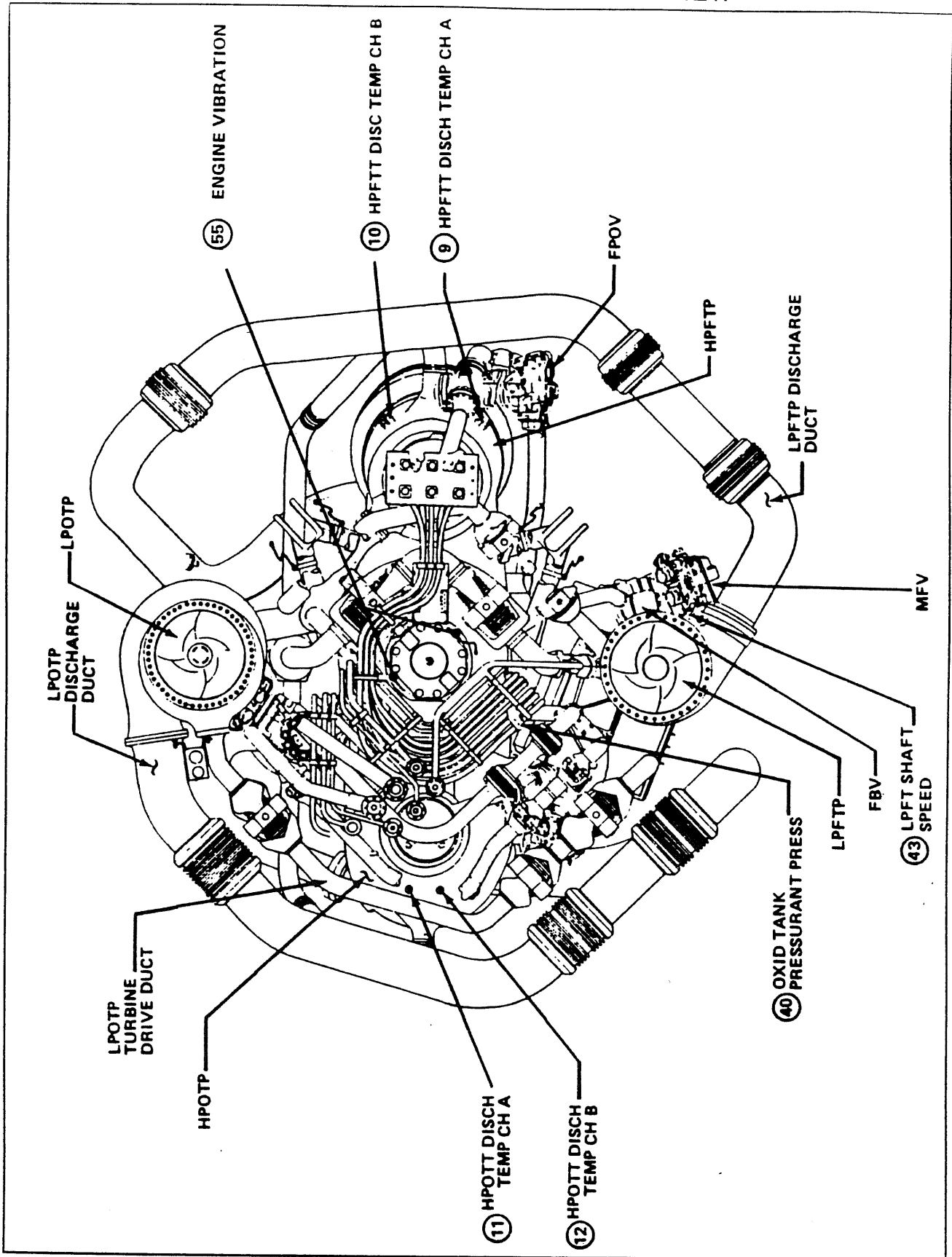


SSME VALVE ACTUATORS - HYDRAULIC OPERATION

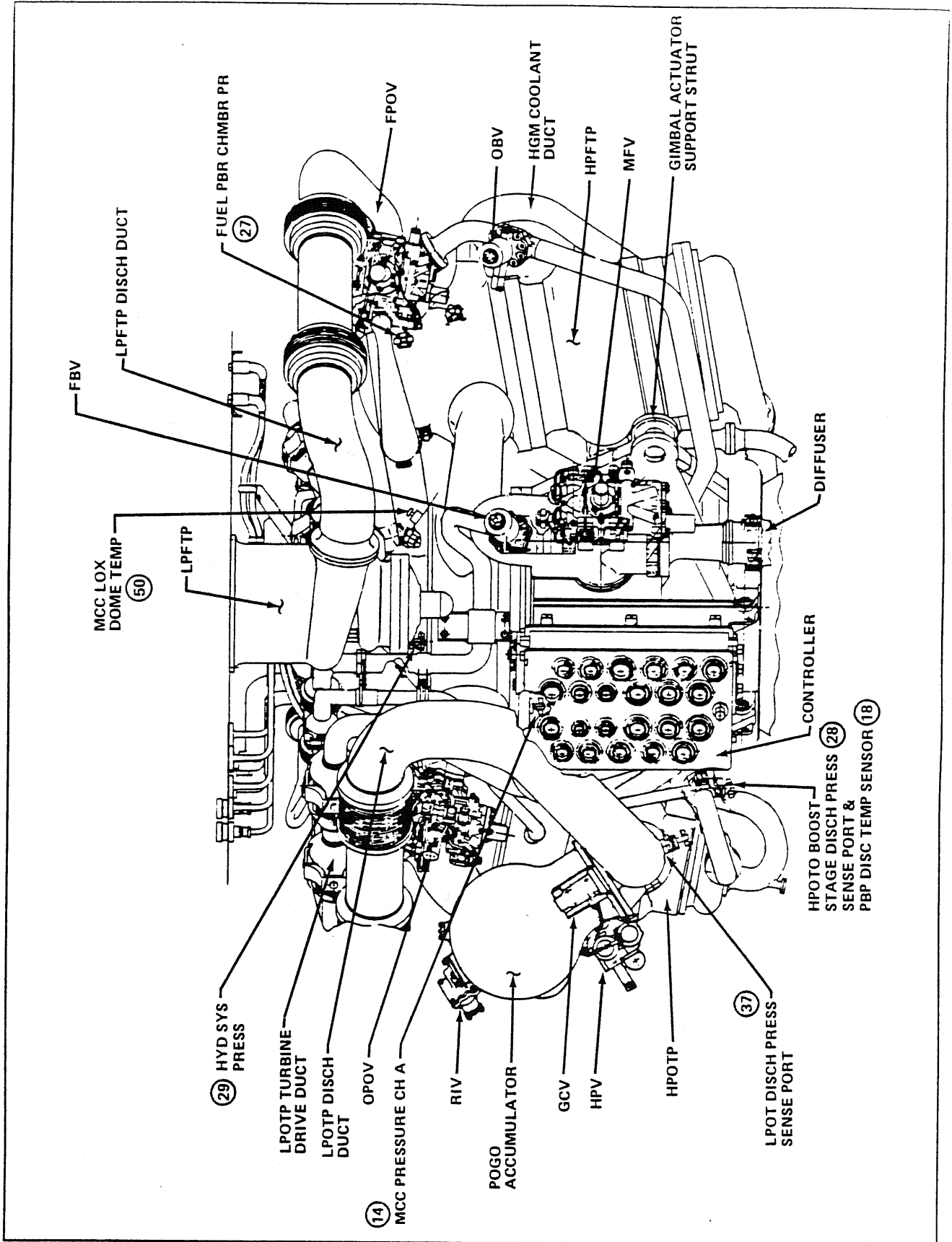
4.3 SSME HYDRAULIC/PNEUMATIC ACTUATED VALVES

E41CE721D	MFV SV1 CURRENT -30 TO 30 MAMPS
E41CE722D	MOV SV2 CURRENT -30 TO 30 MAMPS
E41CE723D	CCV SV3 CURRENT -30 TO 30 MAMPS
E41CE724D	FPOV SV4 CURRENT -30 TO 30 MAMPS
E41CE725D	OPOV SV5 CURRENT -30 TO 30 MAMPS
E41HE024B,D	MFV ACTUATOR POSITION DW 24, -5 TO 105 PCT
E41HE025B,D	MOV ACTUATOR POSITION DW 25, -5 TO 105 PCT
E41HE026B,D	CCV ACTUATOR POSITION DW 26, -5 TO 105 PCT
E41HE027B,D	FPOV ACTUATOR POSITION DW 27, -5 TO 105 PCT
E41HE028B,D	OPOV ACTUATOR POSITION DW 28, -5 TO 105 PCT
E41HE040D	MFV ACTUATOR POSITION DW 40, -5 TO 105 PCT
E41HE041D	MOV ACTUATOR POSITION DW 41, -5 TO 105 PCT
E41HE042D	CCV ACTUATOR POSITION DW 42, -5 TO 105 PCT
E41HE043D	FPOV ACTUATOR POSITION DW 43, -5 TO 105 PCT
E41HE044D	OPOV ACTUATOR POSITION DW 44, -5 TO 105 PCT
E41PE048D	HYDRAULIC SYS PRESSUR ECHB DW 48, 0 TO 4000 PSIA
E41PE054B,D	HYDRAULIC SYS PRESSURE CHB DW 32, 0 TO 4000 PSIA
E41TE109D	MOV HYD TEMP CH A DW 59, 360 TO 760 DEGR
E41TE110D	MOV HYD TEMP CH B DW 60, 360 TO 760 DEGR
E41TE111D	MFV HYD TEMP CH A DW 61, 360 TO 760 DEGR
E41TE112D	MFV HYD TEMP CH B DW 62, 360 TO 760 DEGR
GGNX1013E	MPENG MFV1 HEATER PWR IND, ONE=ON ZERO=OFF
GGNC1015A	MPENG MFV1 HEATER DRIVE CUR, 0 TO 20 AMP
GGNC1016A	MPENG MFV2 HEATER DRIVE CUR, 0 TO 20 AMP
GGNC1017A	MPENG MFV3 HEATER DRIVE CUR, 0 TO 20 AMP
GGNX1023E	MPENG MFV2 HEATER PWR IND, ONE=ON ZERO=OFF
GGNX1043E	MPENG MFV3 HEATER PWR IND, ONE=ON ZERO=OFF
GGNX1112E	MPENG MFV1 HEATER PWR ON (R), ONE=ON ZERO=OFF
GGNX1113E	MPENG MFV2 HEATER PWR ON (R), ONE=ON ZERO=OFF
GGNX1114E	MPENG MFV3 HEATER PWR ON (R), ONE=ON ZERO=OFF
GGNC1115A	MPENG MFV1 HEATER DRIVE CUR (R), 0 TO 20 AMP
GGNC1116A	MPENG MFV2 HEATER DRIVE CUR (R), 0 TO 20 AMP
GGNC1117A	MPENG MFV3 HEATER DRIVE CUR (R), 0 TO 20 AMP

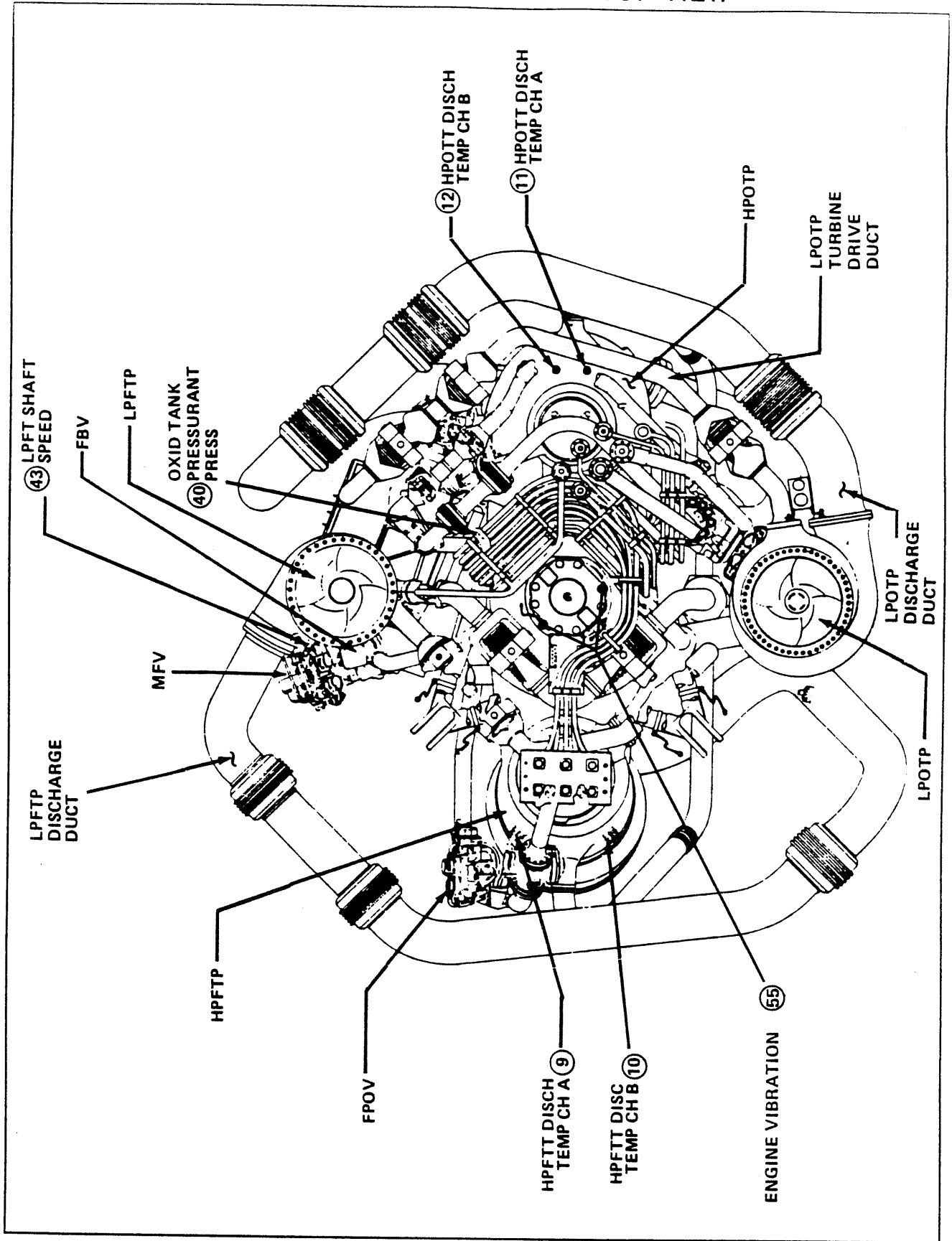
4.4 SSME ILLUSTRATION - TOP VIEW



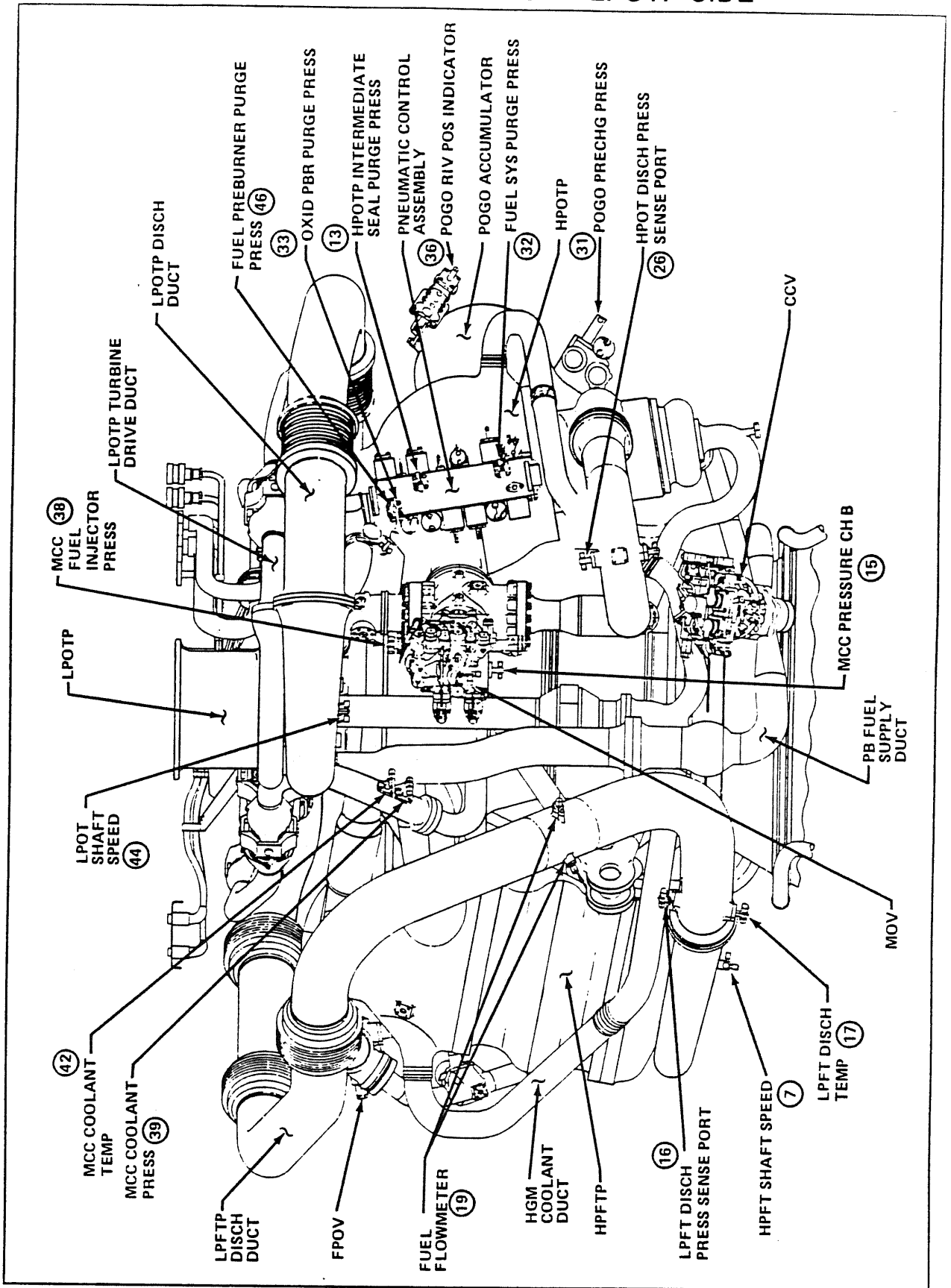
4.4 SSME ILLUSTRATION - LPFTP SIDE



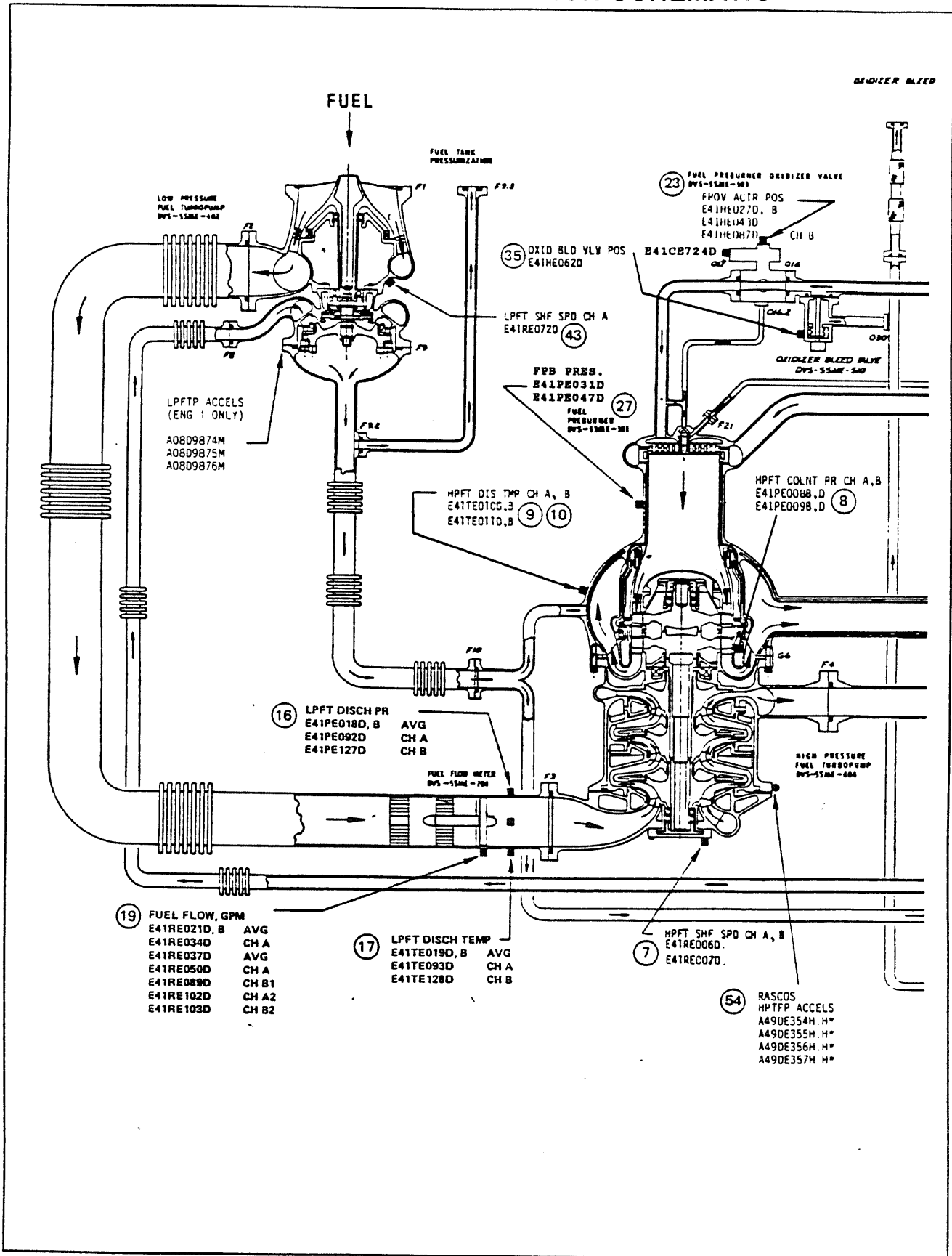
4.4 SSME ILLUSTRATION - TOP VIEW



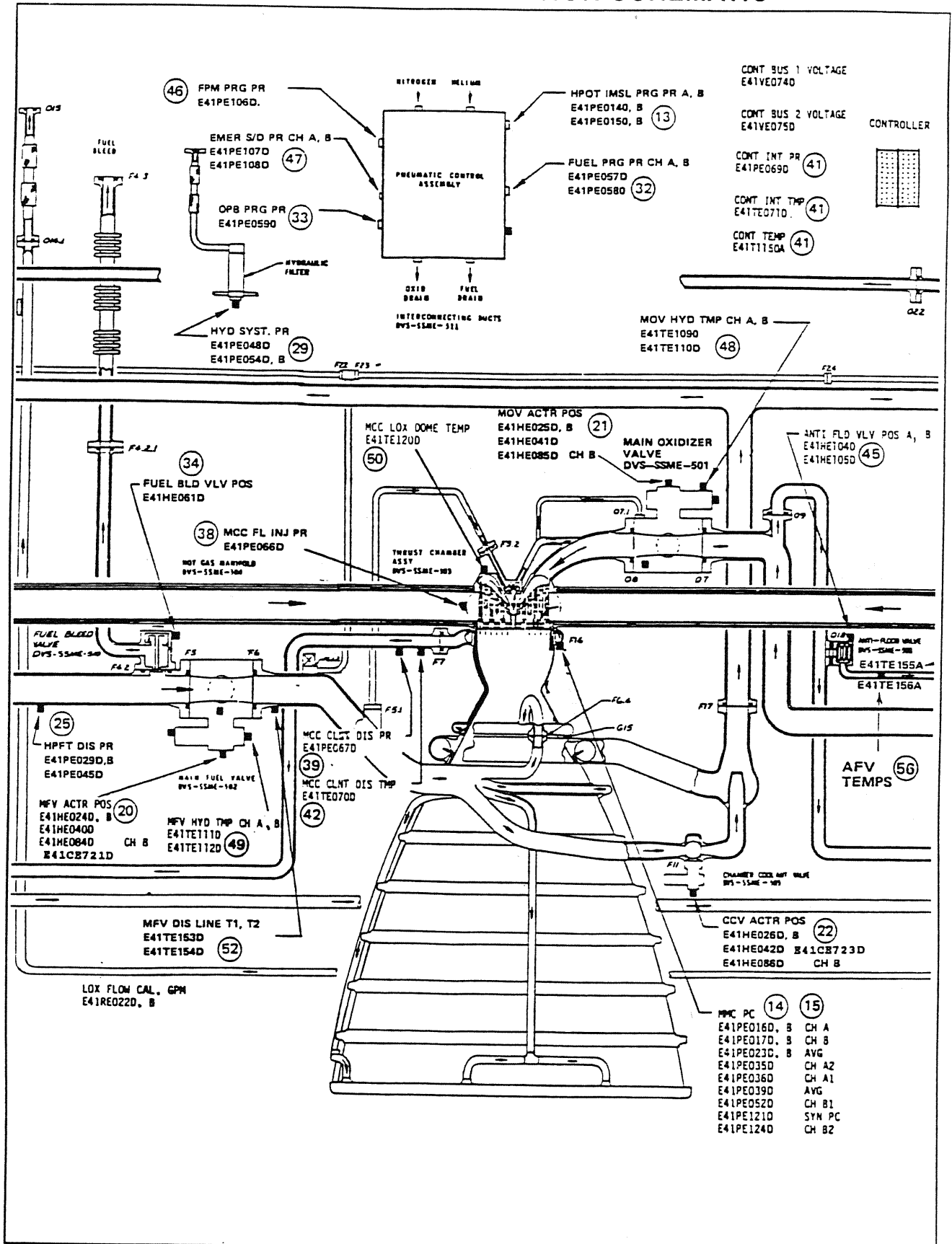
4.4 SSME ILLUSTRATION - LPOTP SIDE



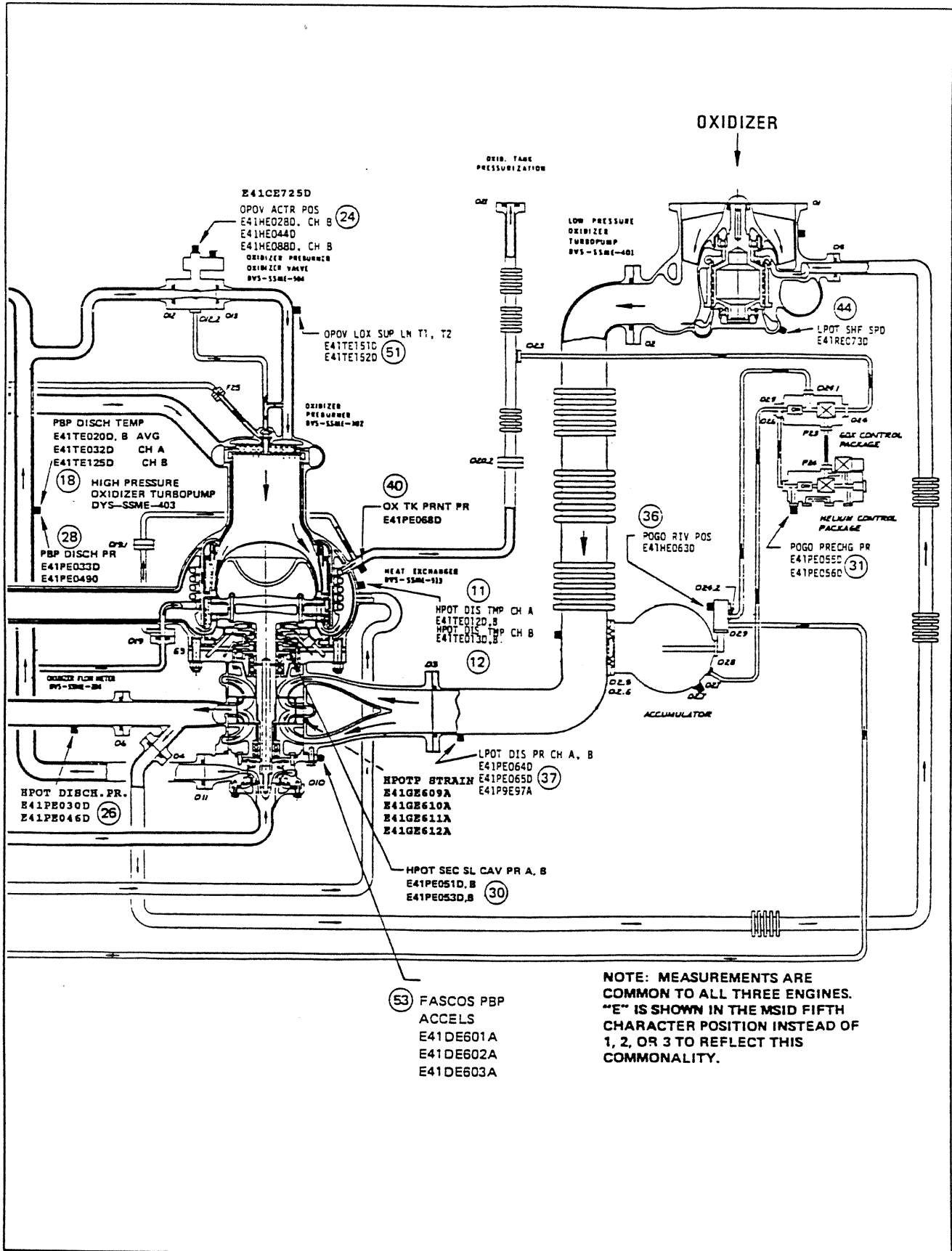
4.5 SSME INSTRUMENTATION SCHEMATIC



4.5 SSME INSTRUMENTATION SCHEMATIC

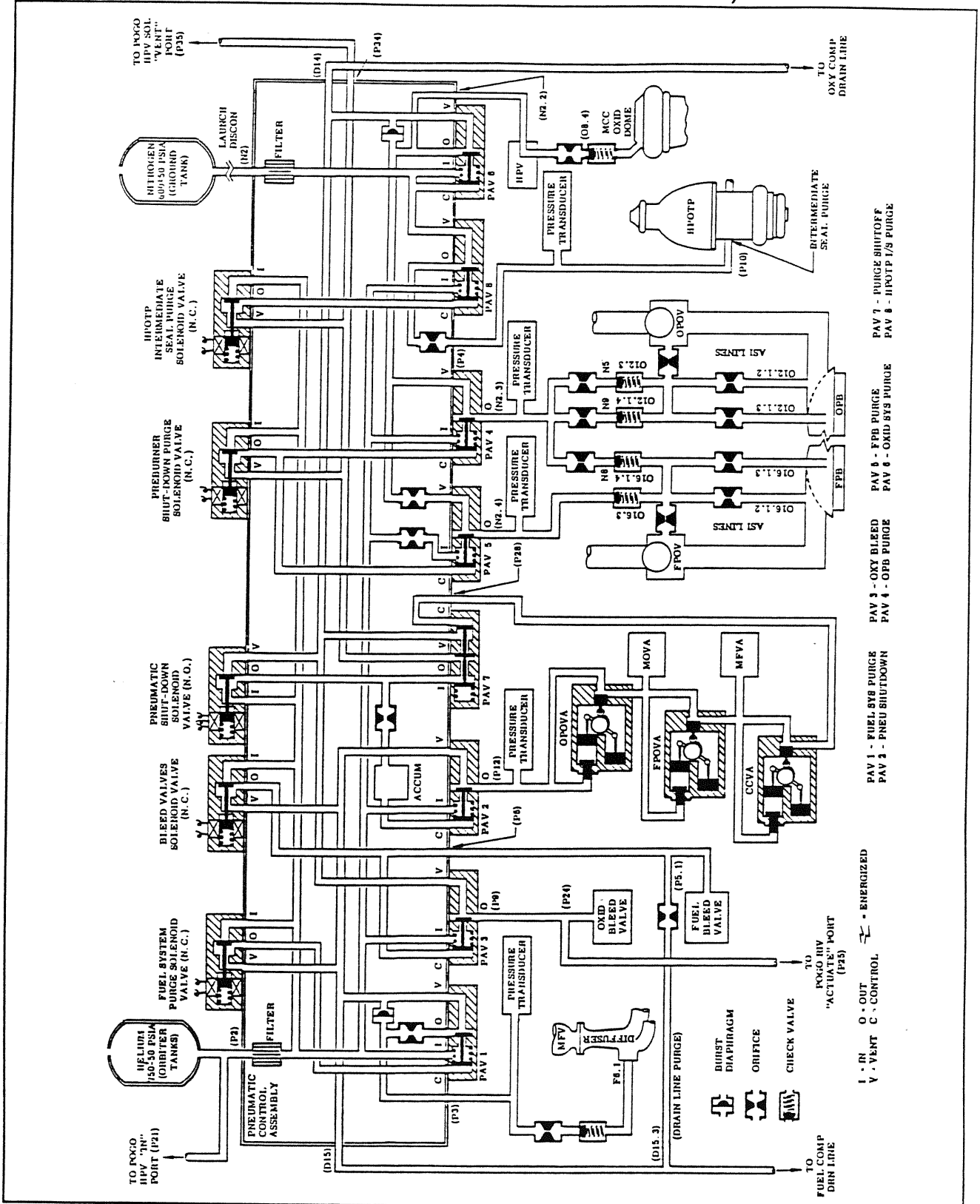


4.5 SSME INSTRUMENTATION SCHEMATIC



NOTE: MEASUREMENTS ARE COMMON TO ALL THREE ENGINES. "E" IS SHOWN IN THE MSID FIFTH CHARACTER POSITION INSTEAD OF 1, 2, OR 3 TO REFLECT THIS COMMONALITY.

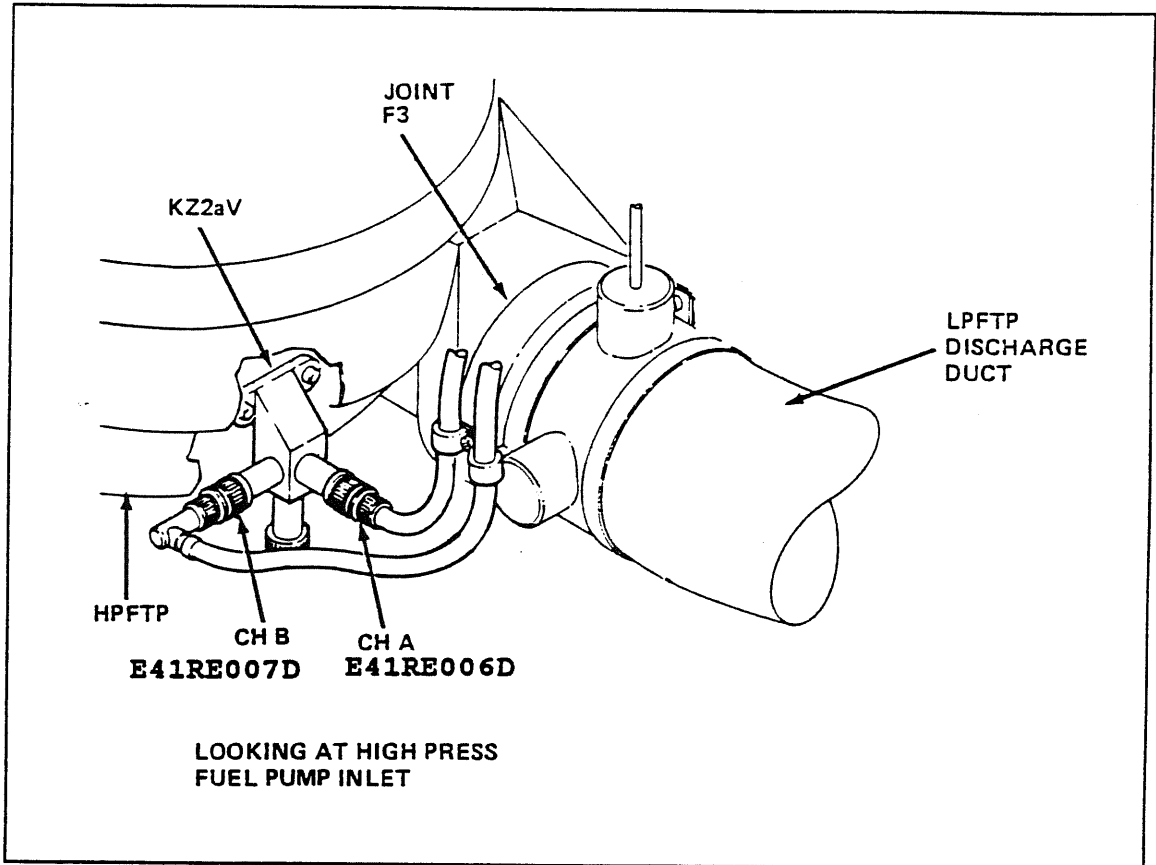
4.6 SSME FLUID SCHEMATIC (PNEUMATIC CONTROL ASSEMBLY)



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4.7 DETAIL SSME SENSOR LOCATION HPFT SHAFT SPEED

7

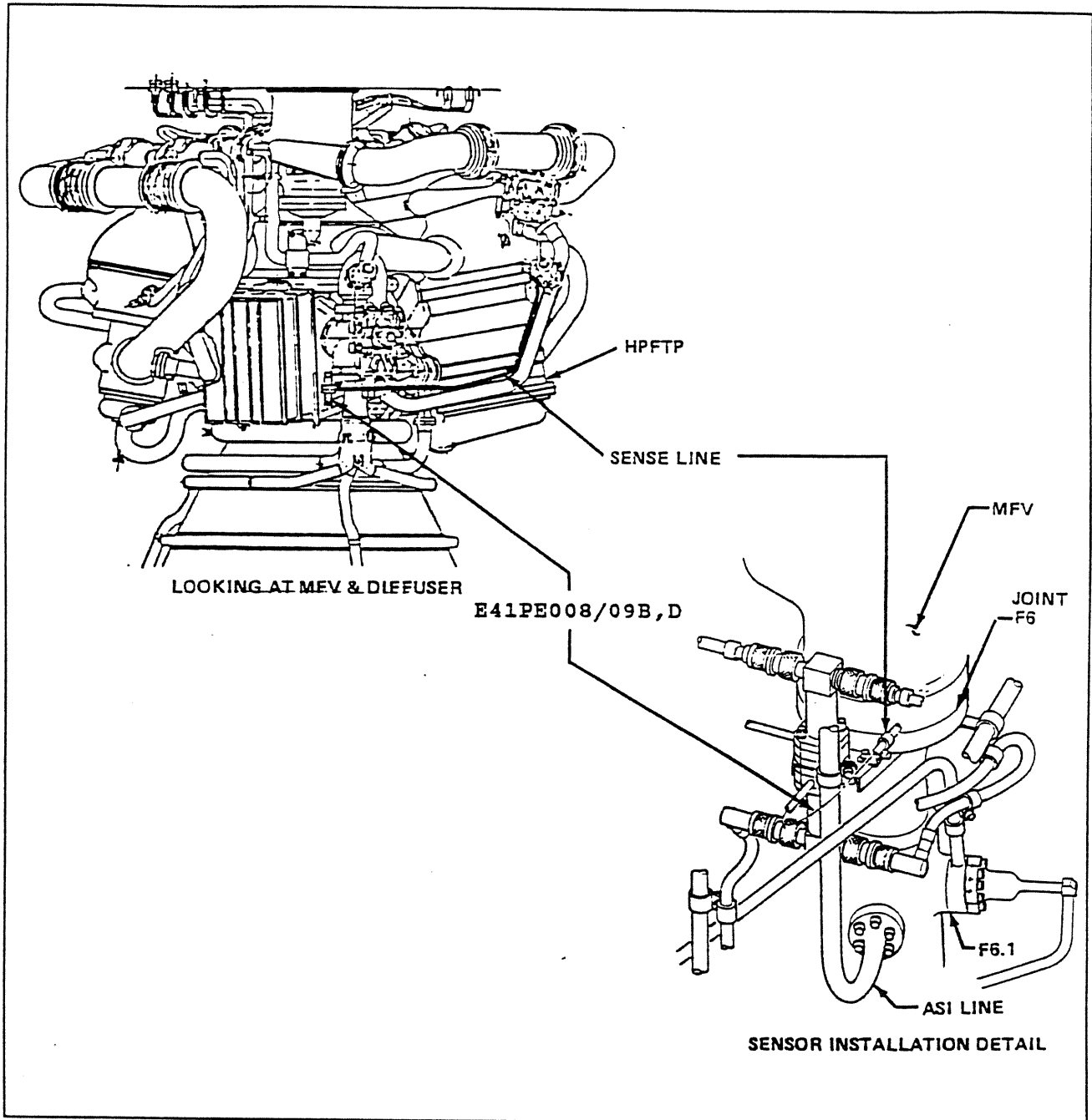


ASSOCIATED MSID'S

E41RE006D HPFT SHAFT SPEED CH. A, 1350-45K RPM
E41RE007D HPFT SHAFT SPEED CH. B, 1350-45K RPM

4.7 DETAIL SSME SENSOR LOCATION HPFT COOLANT PRESSURE

8

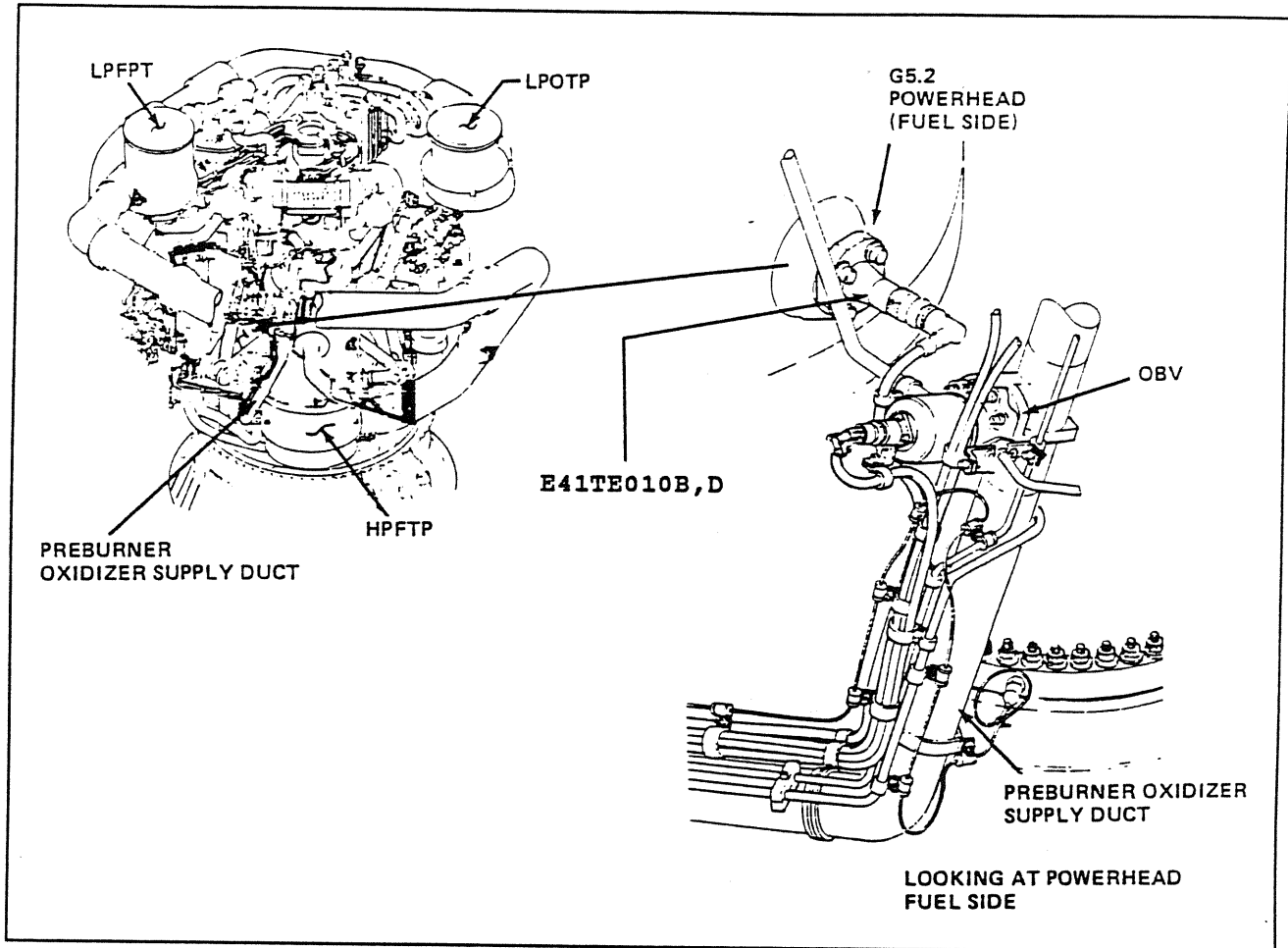


ASSOCIATED MSID'S

E41PE008D HPFT COOLANT PRESS CH. A, 0-4500 PSIA
341PE009D HPFT COOLANT PRESS CH. B, 0-4500 PSIA

4.7 DETAIL SSME SENSOR LOCATION HPFTT DISCHARGE TEMP CH A

9

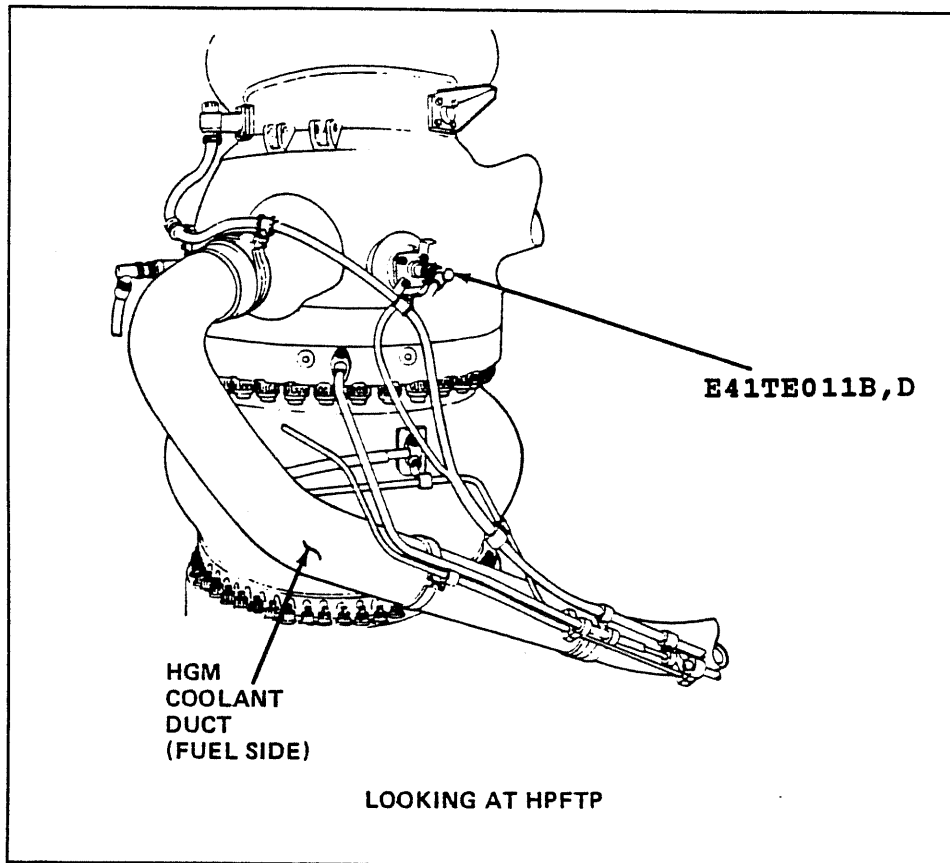


ASSOCIATED MSID'S

E41TE010B,D HPFTT DISCHARGE TEMP CH.A, 200-2760 DEG R

4.7 DETAIL SSME SENSOR LOCATION
HPFTT DISCHARGE TEMP CH B

10

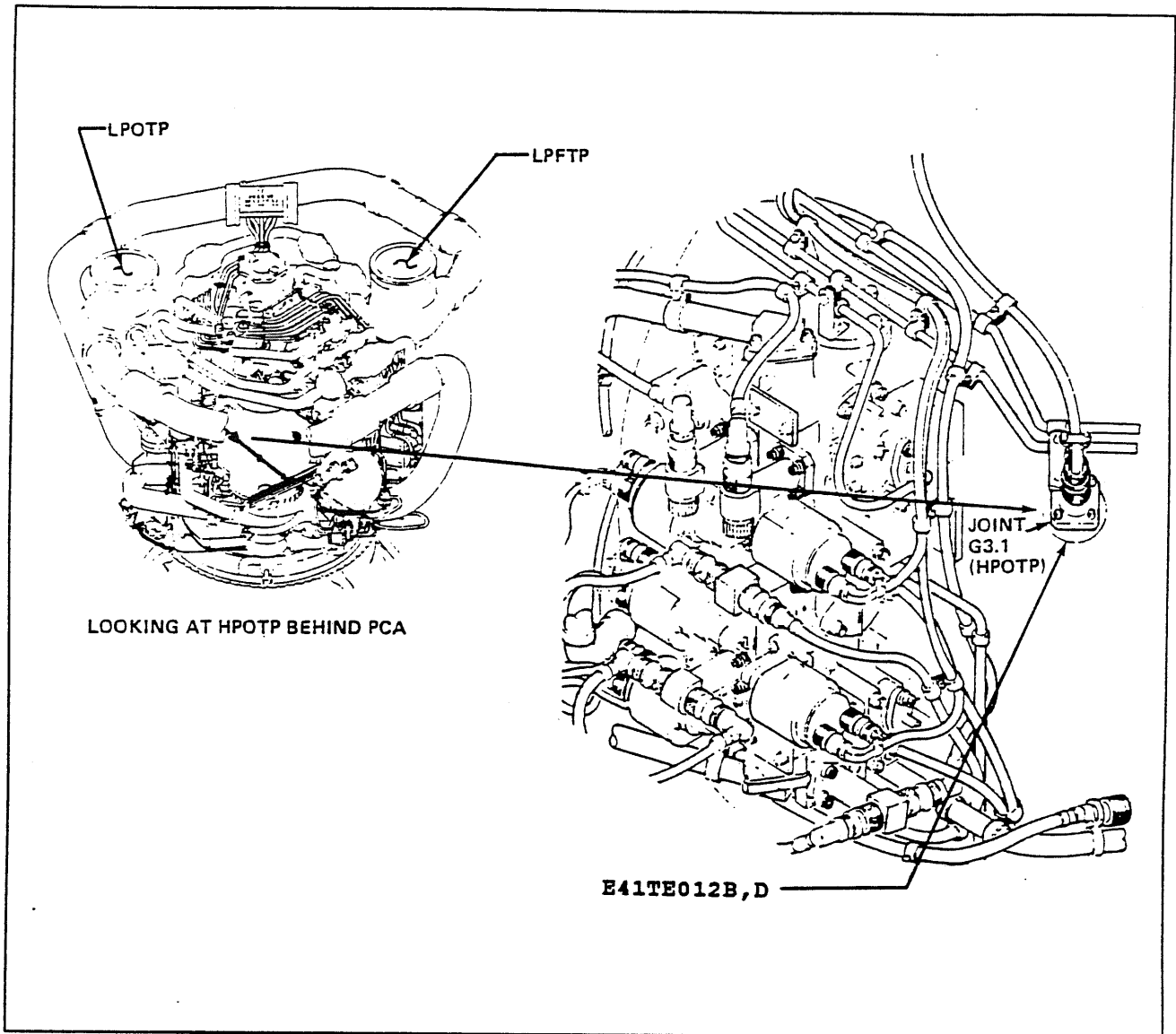


ASSOCIATED MSID'S

E41TE011B,D HPFTT DISCHARGE TEMP CH. B, 200-2760 DEG R

4.7 DETAIL SSME SENSOR LOCATION
HPOTT DISCHARGE TEMP CH A

11

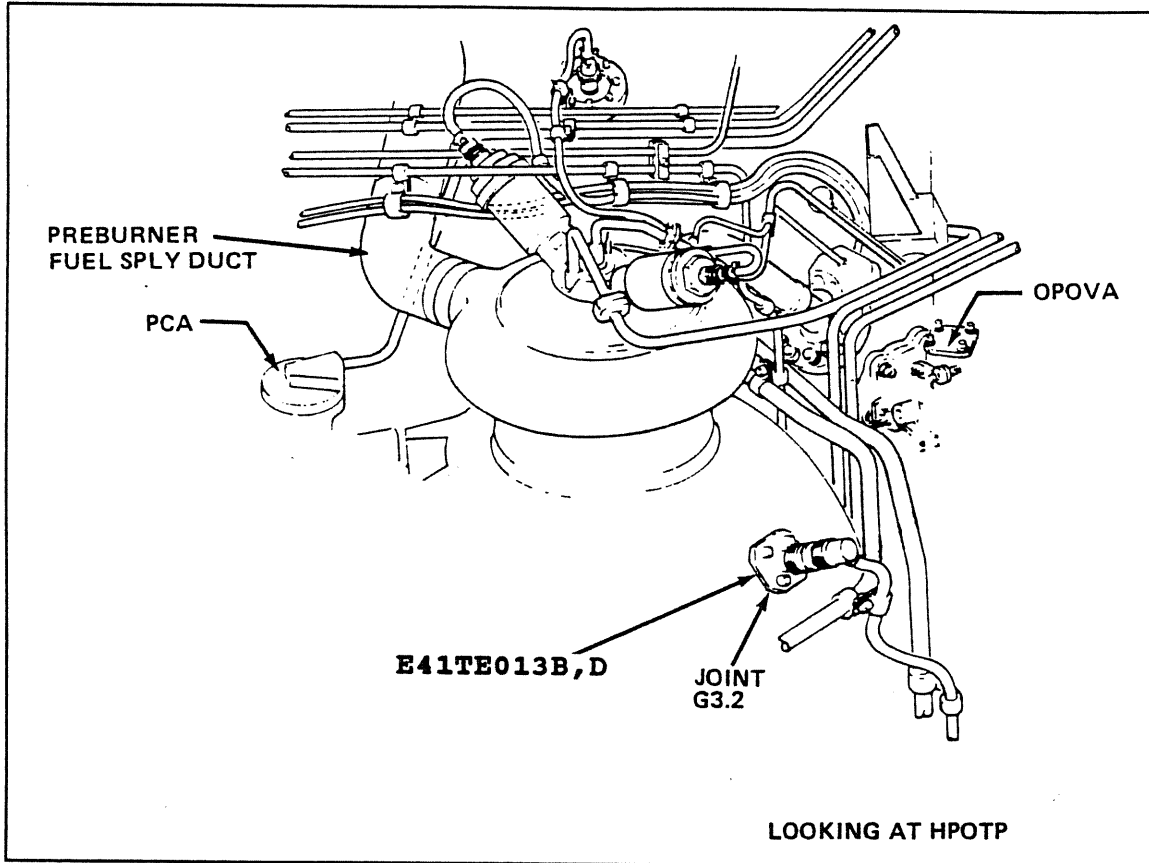


ASSOCIATED MSID'S

E41TE012B,D HPOTT DISCHARGE TEMP CH. A, 200-2760 DEG R

4.7 DETAIL SSME SENSOR LOCATION
HPOTT DISCHARGE TEMP CH B

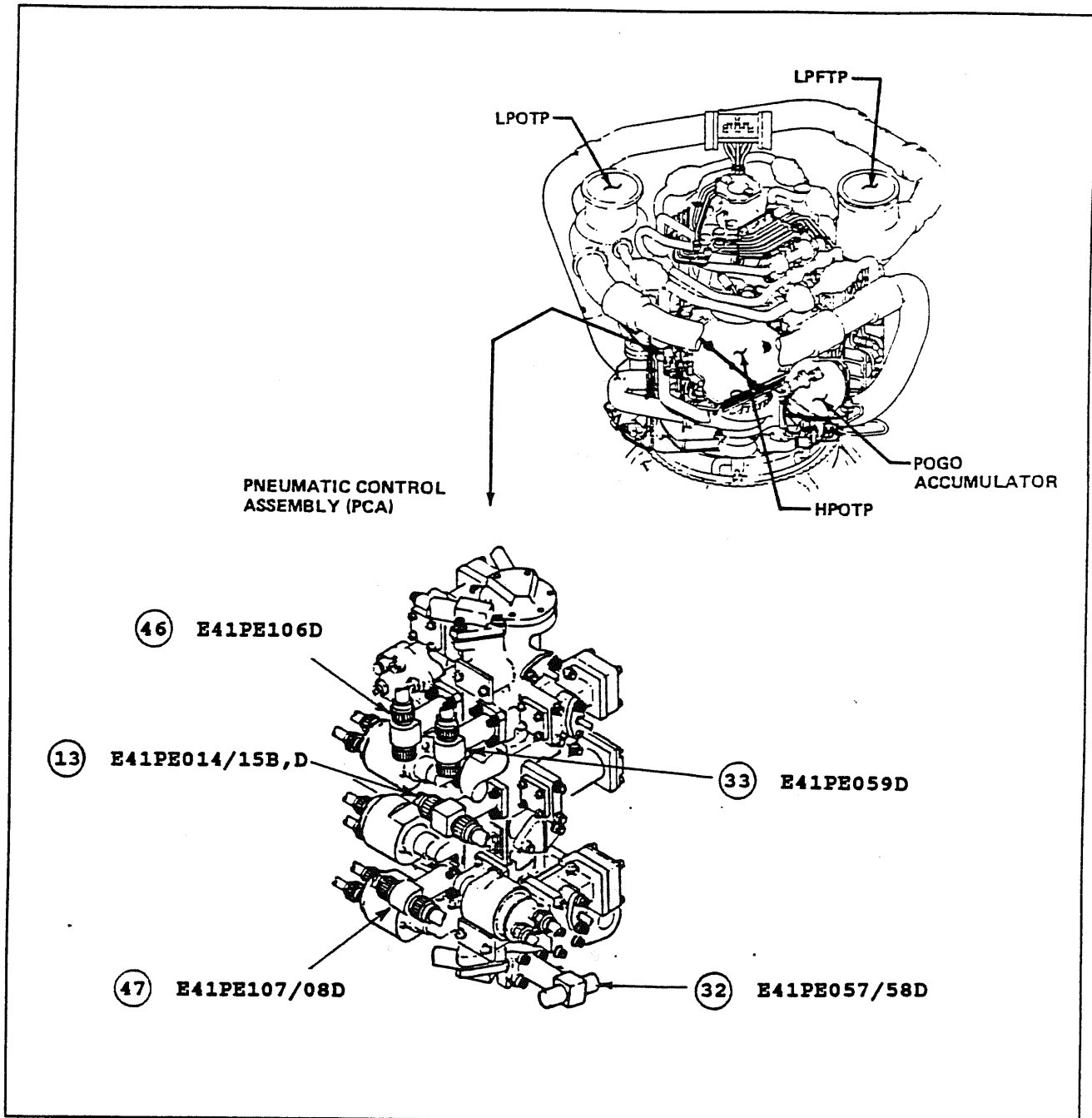
12



ASSOCIATED MSID'S

E41TE013B,D HPOTT DISCHARGE TEMP CH. B, 200-2760 DEG R

4.7 DETAIL SSME SENSOR LOCATION PNEUMATIC CONTROL ASSEMBLY (PCA) MEASUREMENTS

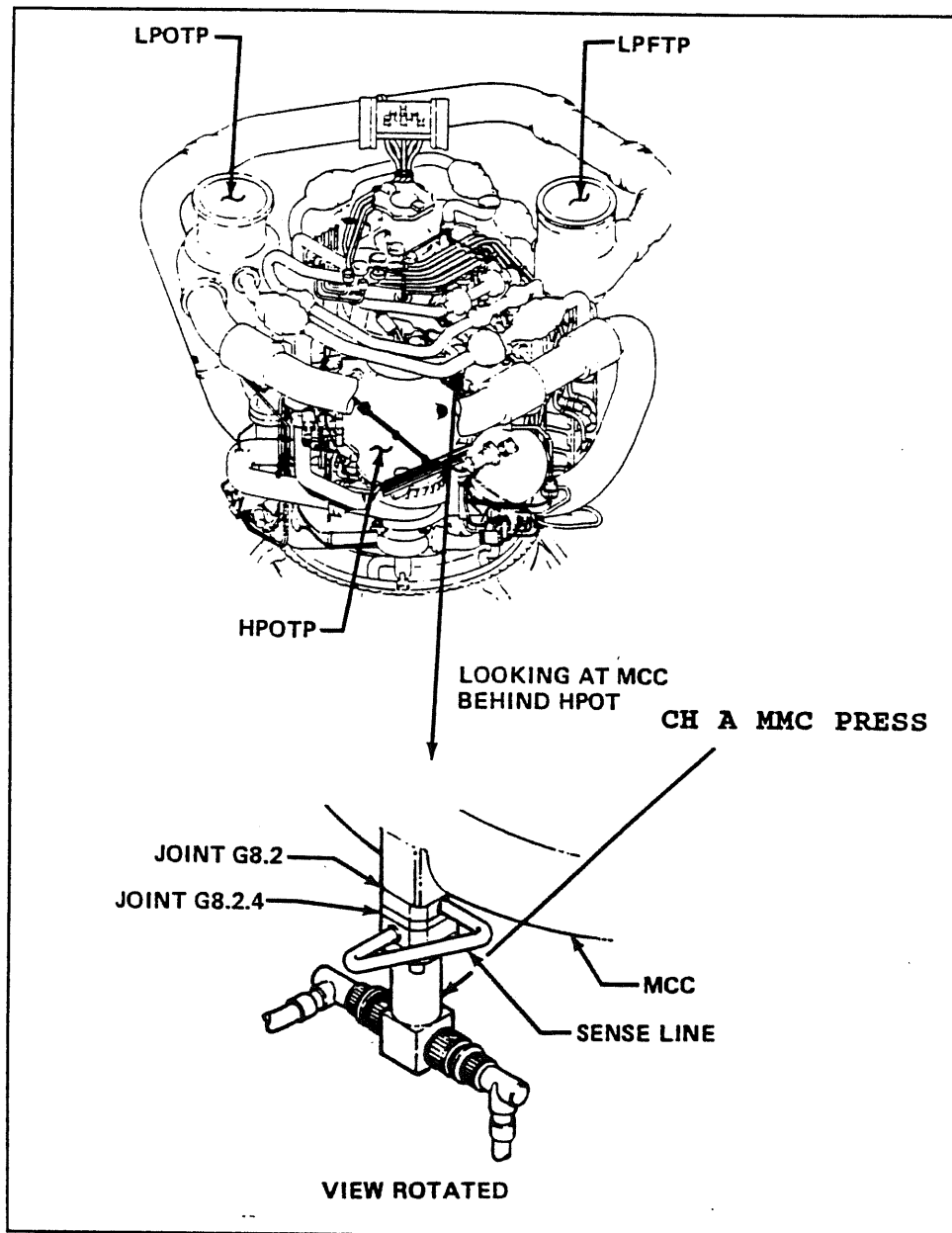


ASSOCIATED MSID'S

E41PE014B,D HPOT I-SEAL PRGE CH A, 0-600 PSIA
 E41PE015B,D HPOT I-SEAL PRGE CH B, 0-600 PSIA
 E41PE057D FUEL SYS. PRGE PRESS CH A, 0-600 PSIA
 E41PE058D FUEL SYS. PRGE PRESS CH B, 0-600 PSIA
 E41PE059D OXID PREBNR PRGE PRESS, 0-1500 PSIA
 E41PE106D FUES PREBNR PRGE PRESS, 0-1500 PSIA
 E41PE107D EMERG. SHT. DN PRESS CH A, 0-1500 PSIA
 E41PE108D EMERG. SHT. DN PRESS CH B, 0-1500 PSIA

4.7 DETAIL SSME SENSOR LOCATION MCC PRESSURE CH A

14

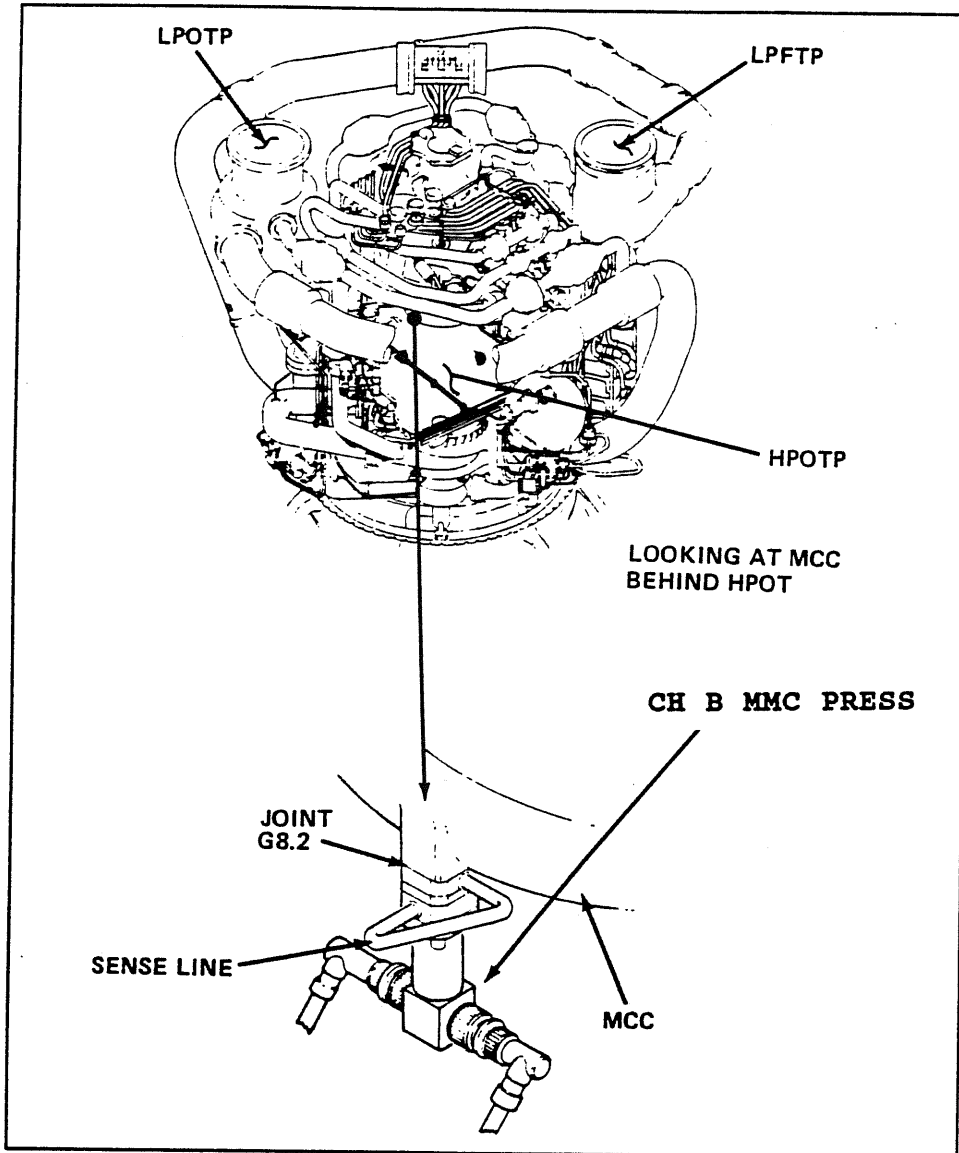


ASSOCIATED MSID'S

E41PE016B,D MCC PRESSURE CH A, 0-3500 PSIA
E41PE023B,D MCC PRESSURE (AVG), 0-3500 PSIA
E41PE035D MCC PRESSURE A2, 0-3500 PSIA
E41PE036D MCC PRESSURE A1, 0-3500 PSIA
E41PE039D MCC PRESSURE (AVG), 0-3500 PSIA

4.7 DETAIL SSME SENSOR LOCALITON MCC PRESSURE CH B

15

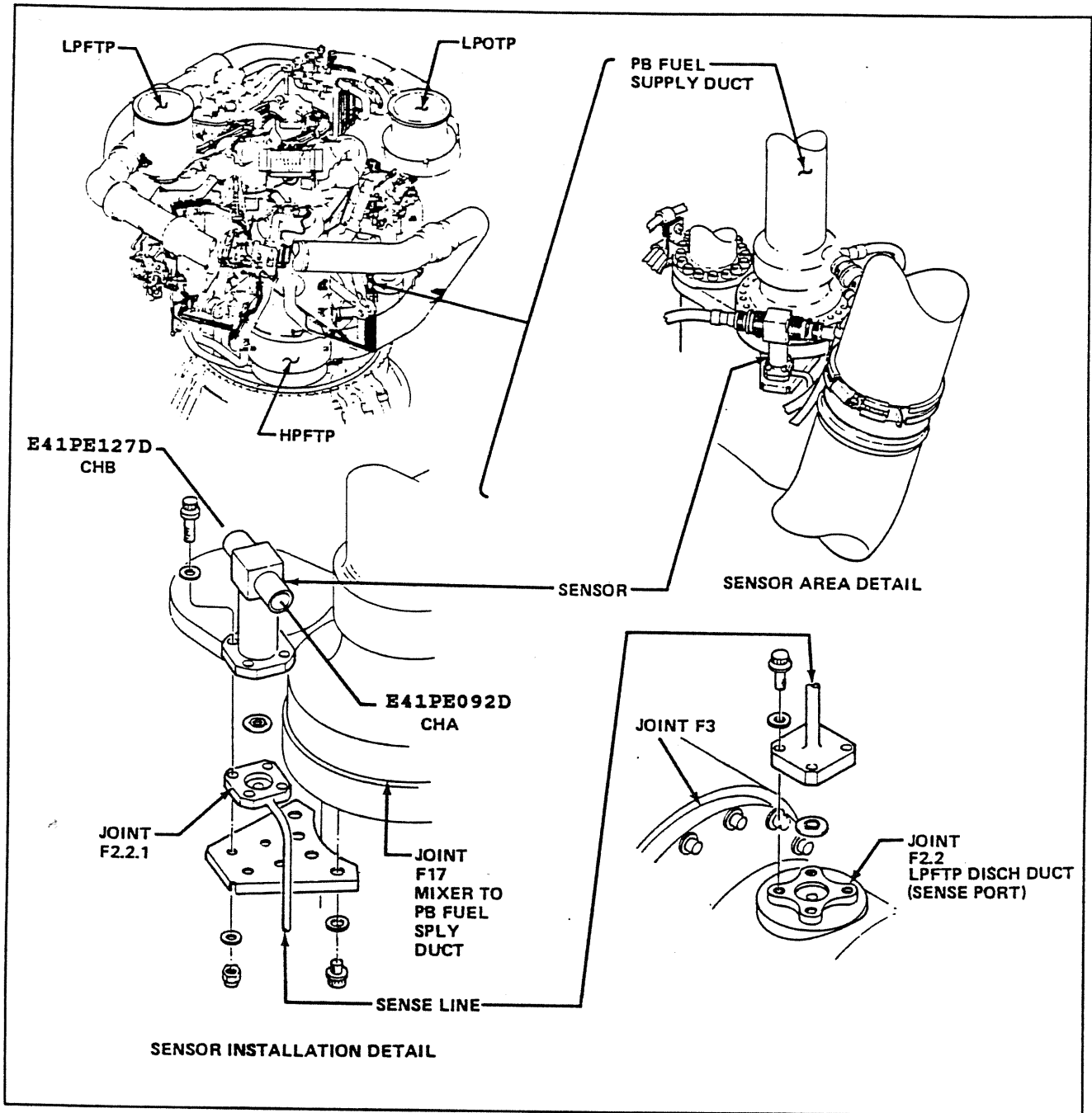


ASSOCIATED MSID'S

- E41PE016B,D MCC PRESSURE CH B, 0-3500 PSIA
- E41PE023B,D MCC PRESSURE (AVG), 0-3500 PSIA
- E41PE052D MCC PRESSURE B1, 0-3500 PSIA
- E41PE024D MCC PRESSURE B2, 0-3500 PSIA
- E41PE039D MCC PRESSURE (AVG), 0-3500 PSIA

4.7 DETAIL SSME SENSOR LOCATION LPFP DISCHARGE PRESSURE

(16)

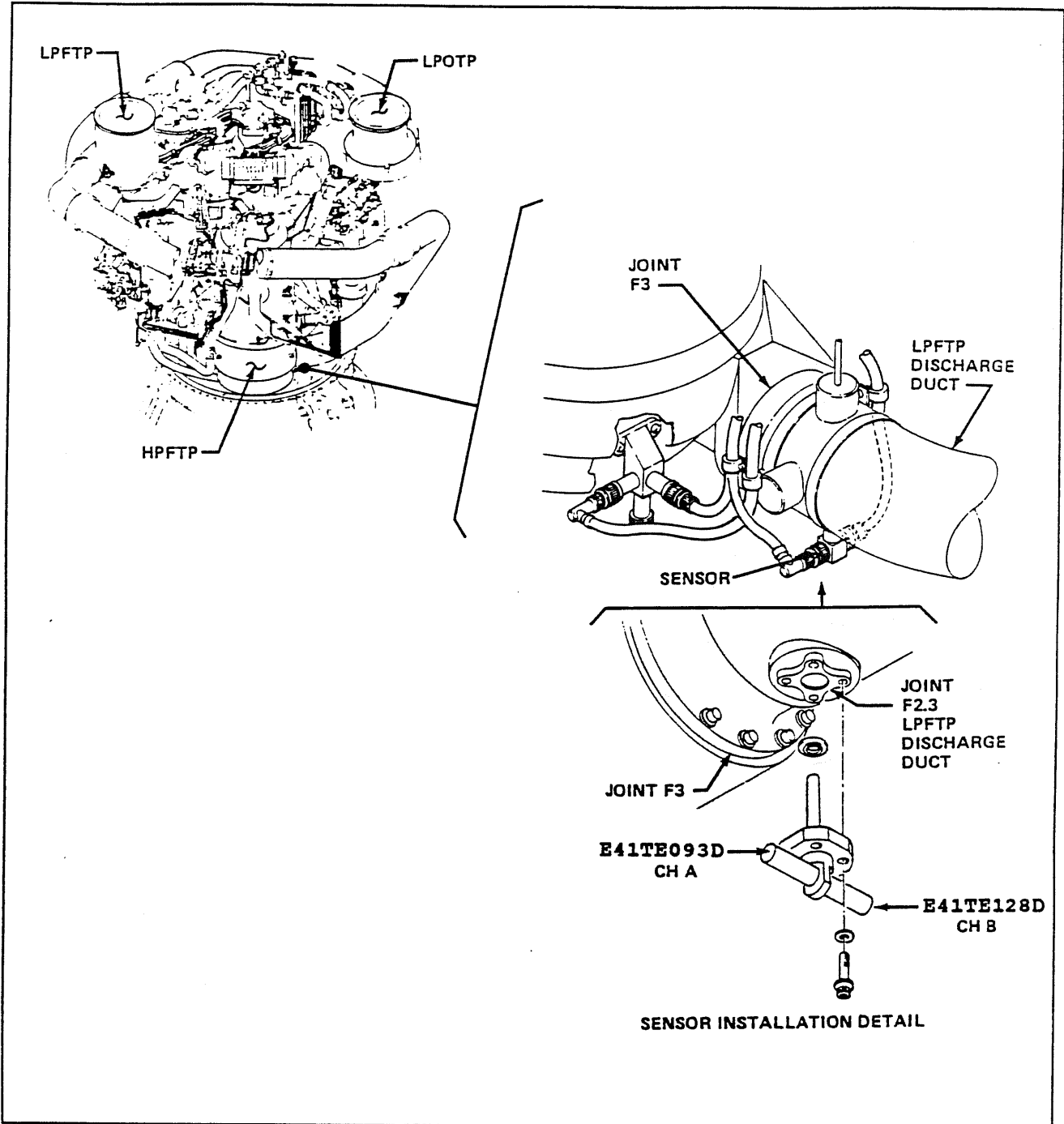


ASSOCIATED MSID'S

E41PE018B,D LPFP DISCH PRESS (AVG), 0-300 PSIA
 E41PE092D LPFP DISCH PRESS CH A, 0-300 PSIA
 E41PE127D LPFP DISCH PRESS CH B, 0-300 PSIA

4.7 DETAIL SSME SENSOR LOCATION LPFP DISCHARGE PRESSURE

(17)

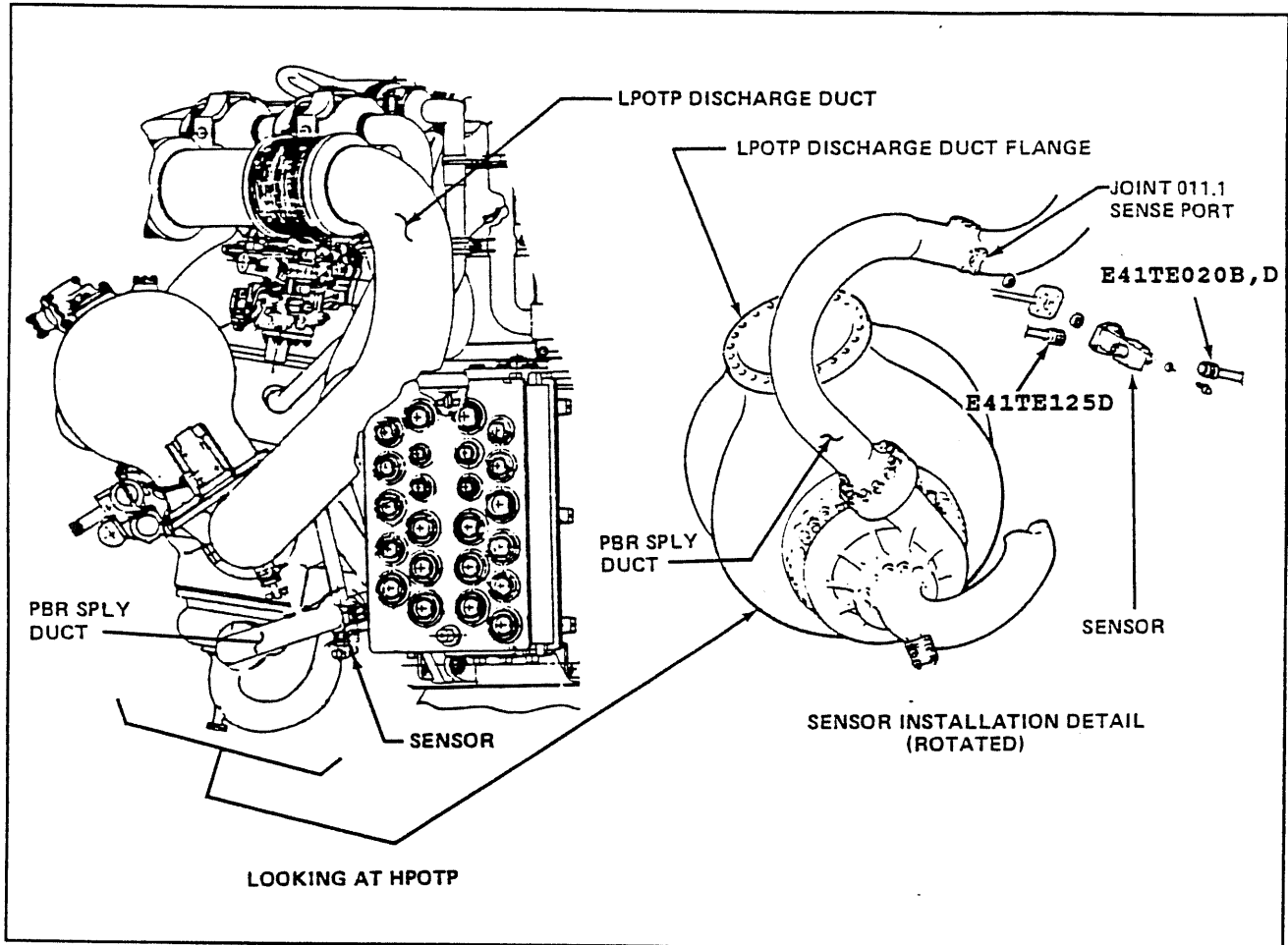


ASSOCIATED MSID'S

E41TE019B,D LPFP DISCH TEMP (AVG), 30-55 DEG R
E41TE093D LPFP DISCH TEMP CH A, 30-55 DEG R
E41TE128D LPFP DISCH TEMP CH B, 30-55 DEG R

4.7 DETAIL SSME SENSOR LOCATION PBP DISCHARGE TEMPERATURE

18

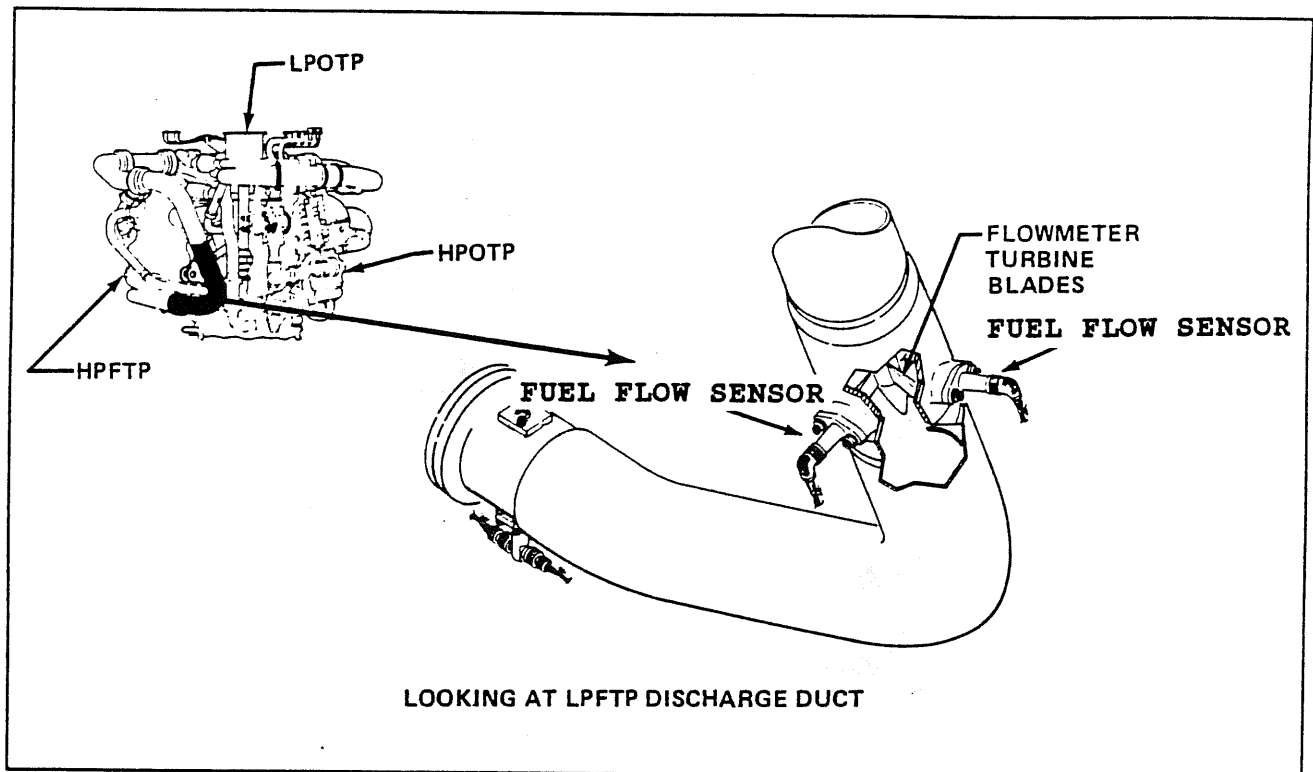


ASSOCIATED MSID'S

E41TE020B,D PBP DISCH TEMP CHA, 160-230 DEG R
E41TE125D PBP DISCH TEMP CHB, 160-230 DEG R

4.7 DETAIL SSME SENSOR LOCATION FUEL FLOWRATE

19

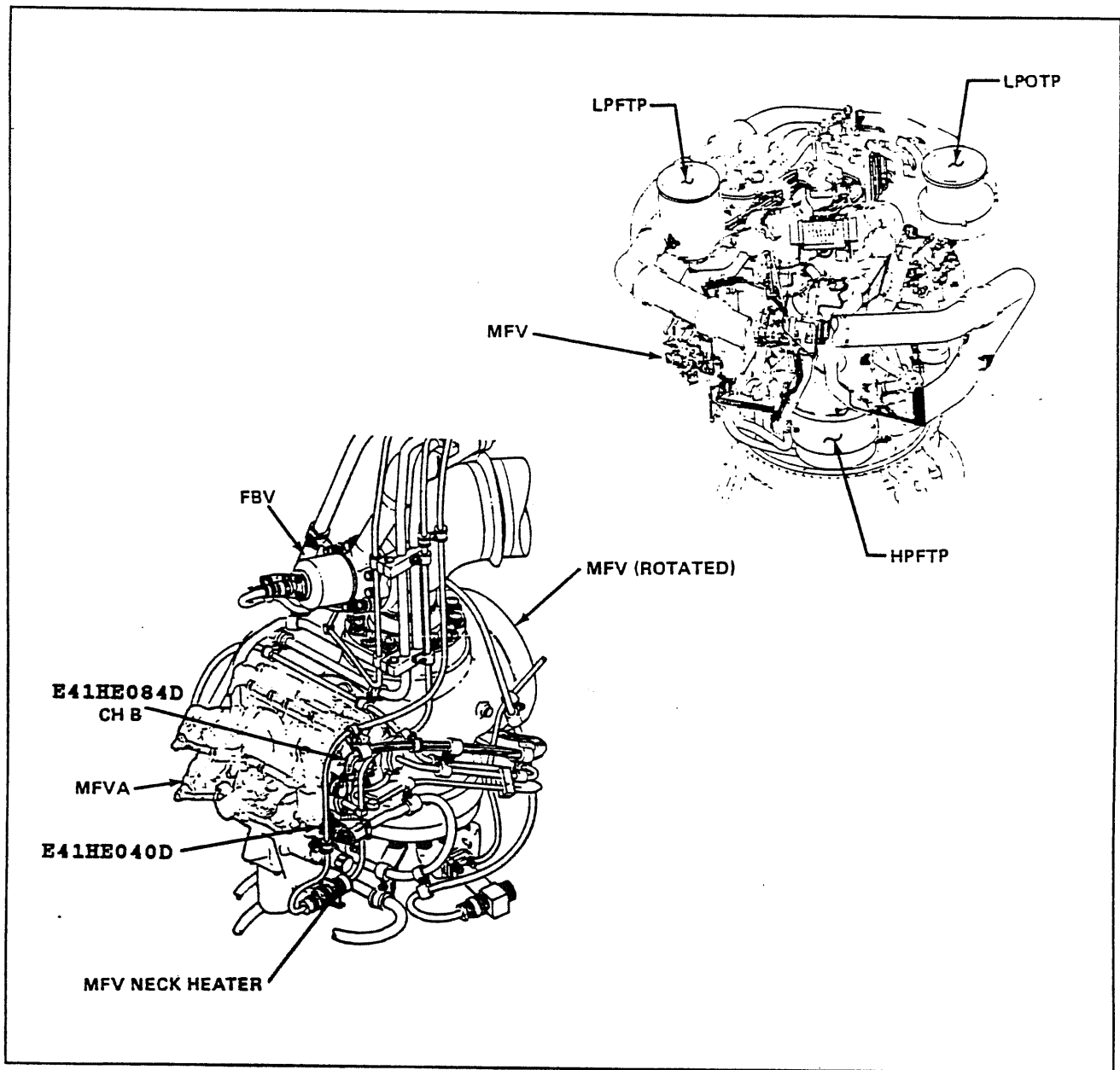


ASSOCIATED MSID'S

ER1RE020B,D FUEL FLOWRATE (AVG), 1080-18000 GPM
ER1RE034D FUEL FLOWRATE CH A, 1080-18000 GPM
E41RE037D FUEL FLOWRATE (AVG), 1080-18000 GPM
E41RE050D FUEL FLOWRATE CH A, 1080-18000 GPM
E41RE089D FUEL FLOWRATE CH B1, 1080-18000 GPM
E41RE102D FUEL FLOWRATE CH A2, 1080-18000 GPM
E41RE103D FUEL FLOWRATE CH B2, 1080-18000 GPM
E41RE123D FUEL MASS FLOW, 5- 185 LBS/SEC

4.7 DETAIL SSME SENSOR LOCATION MFV ACTUATOR POSITION

20

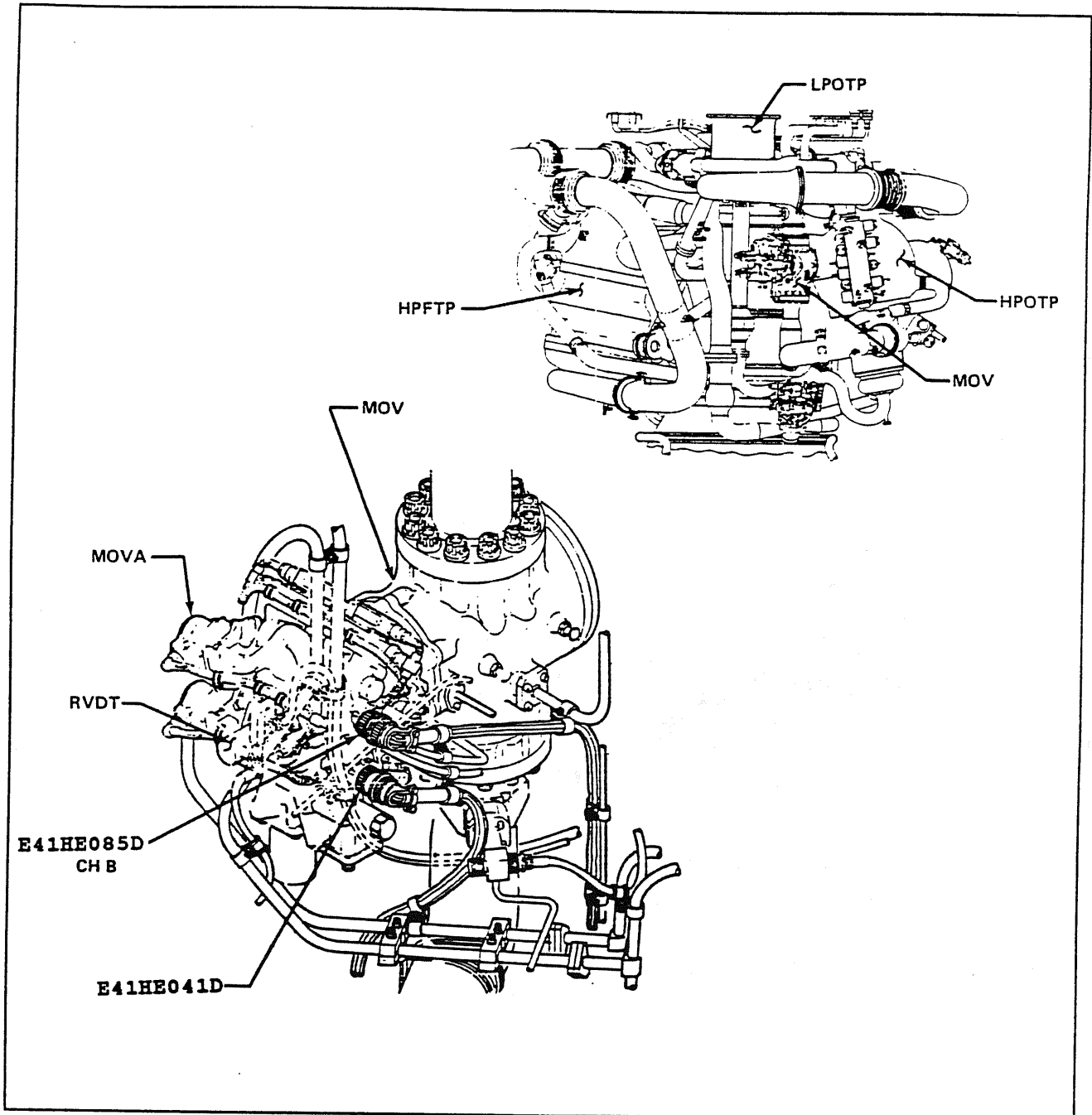


ASSOCIATED MSID'S

E41HE024B,D MFV ACTUATOR POSITION, -5 TO 105 PCT
E41HE040D MFV ACTUATOR POSITION, -5 TO 105 PCT
E41HE084D MFV ACTUATOR POS CH B, -5 TO 105 PCT

4.7 DETAIL SSME SENSOR LOCATION MOV ACTUATOR POSITION

21

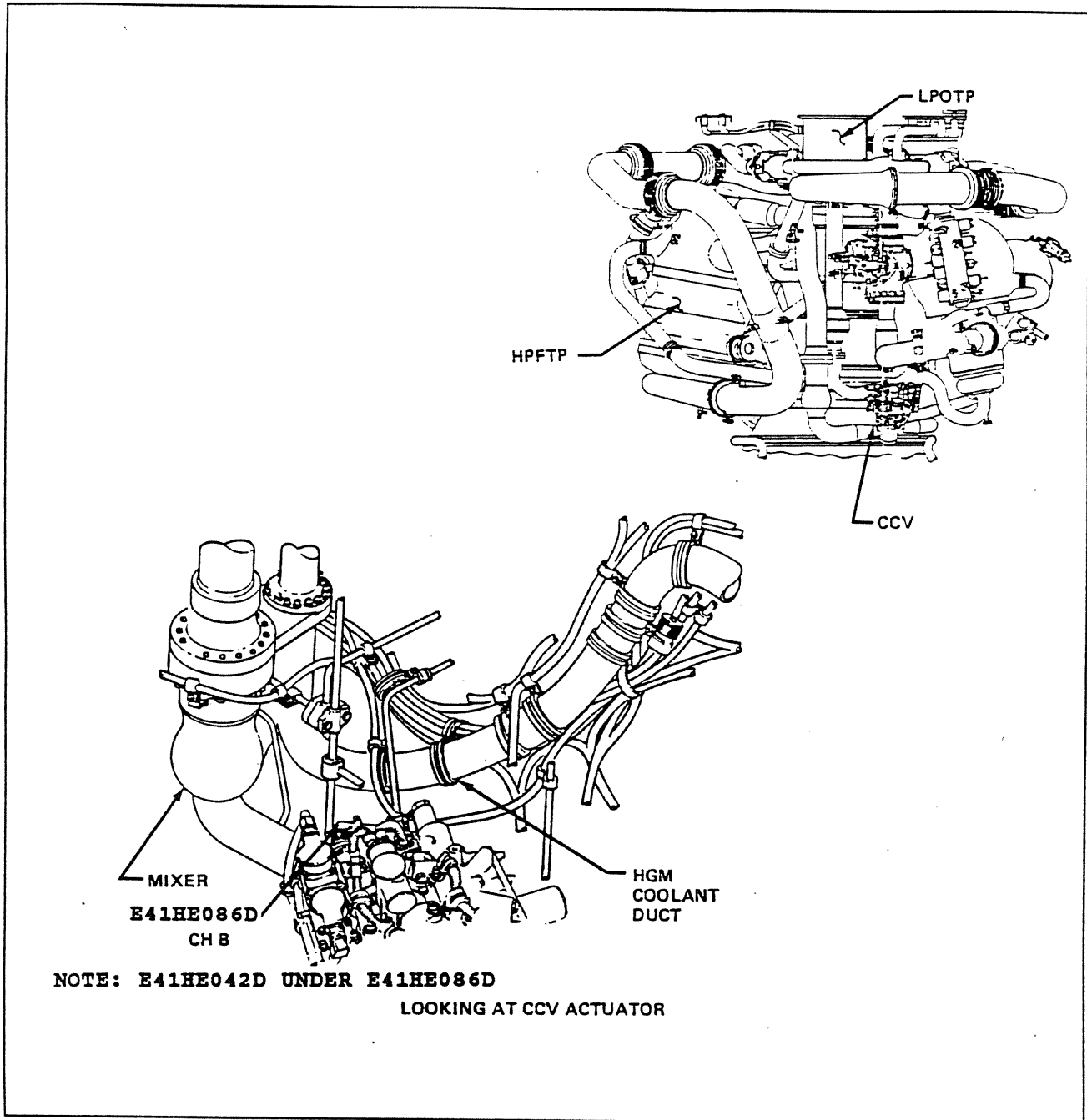


ASSOCIATED MSID'S

E41HE025B,D MFV ACTUATOR POSITION, -5 TO 105 PCT
E41HE041D MFV ACTUATOR POSITION, -5 TO 105 PCT
E41HE085D MFV ACTUATOR POS CH B, -5 TO 105 PCT

4.7 DETAIL SSME SENSOR LOCATION CCV ACTUATOR POSITION

(22)

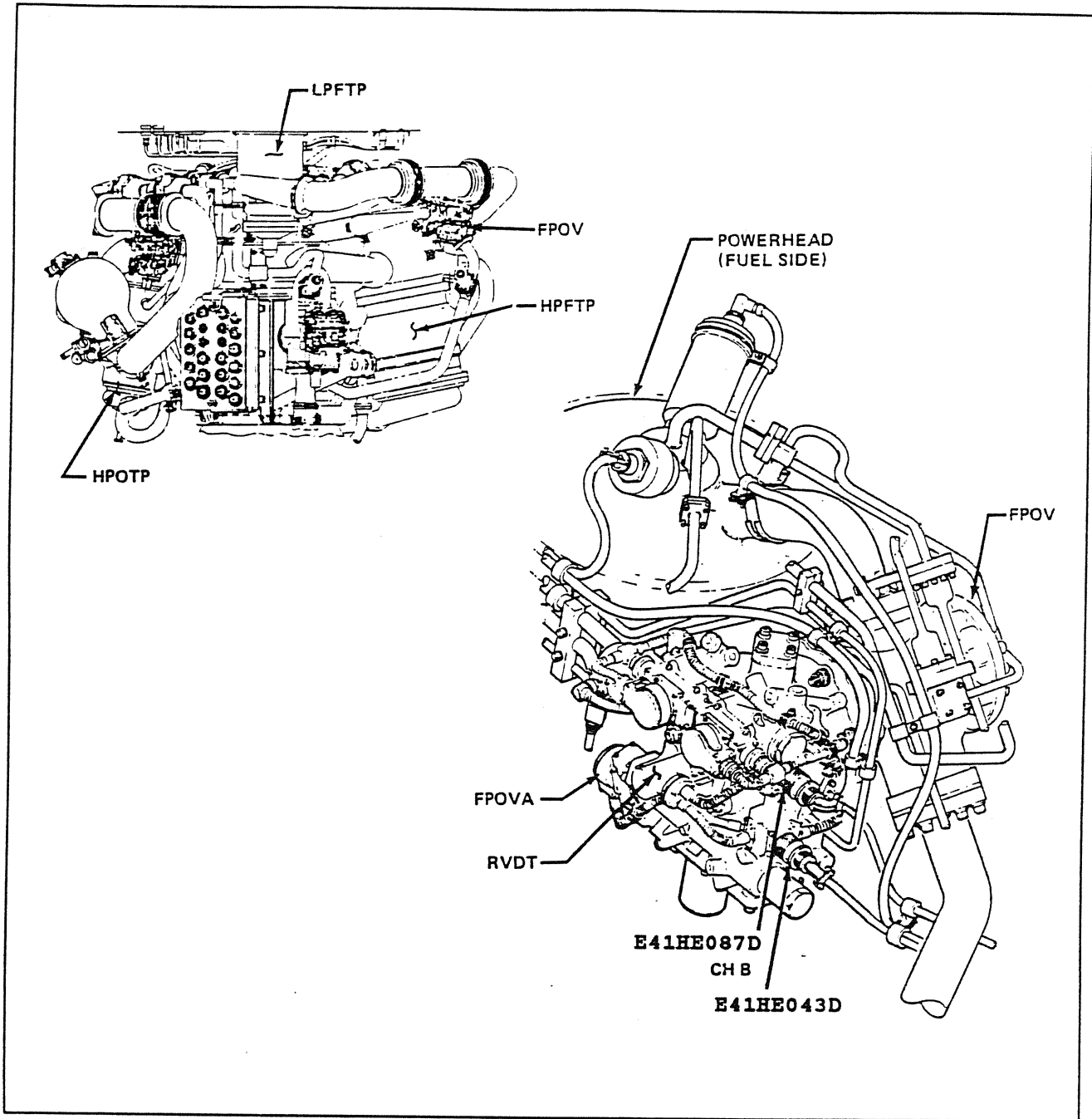


ASSOCIATED MSID'S

E41HE026B,D CCV ACTUATOR POSITION, -5 TO 105 PCT
E41HE042D CCV ACTUATOR POSITION, -5 TO 105 PCT
E41HE086D CCV ACTUATOR POS CH B, -5 TO 105 PCT

4.7 DETAIL SSME SENSOR LOCATION FPOV ACTUATOR POSITION

(23)

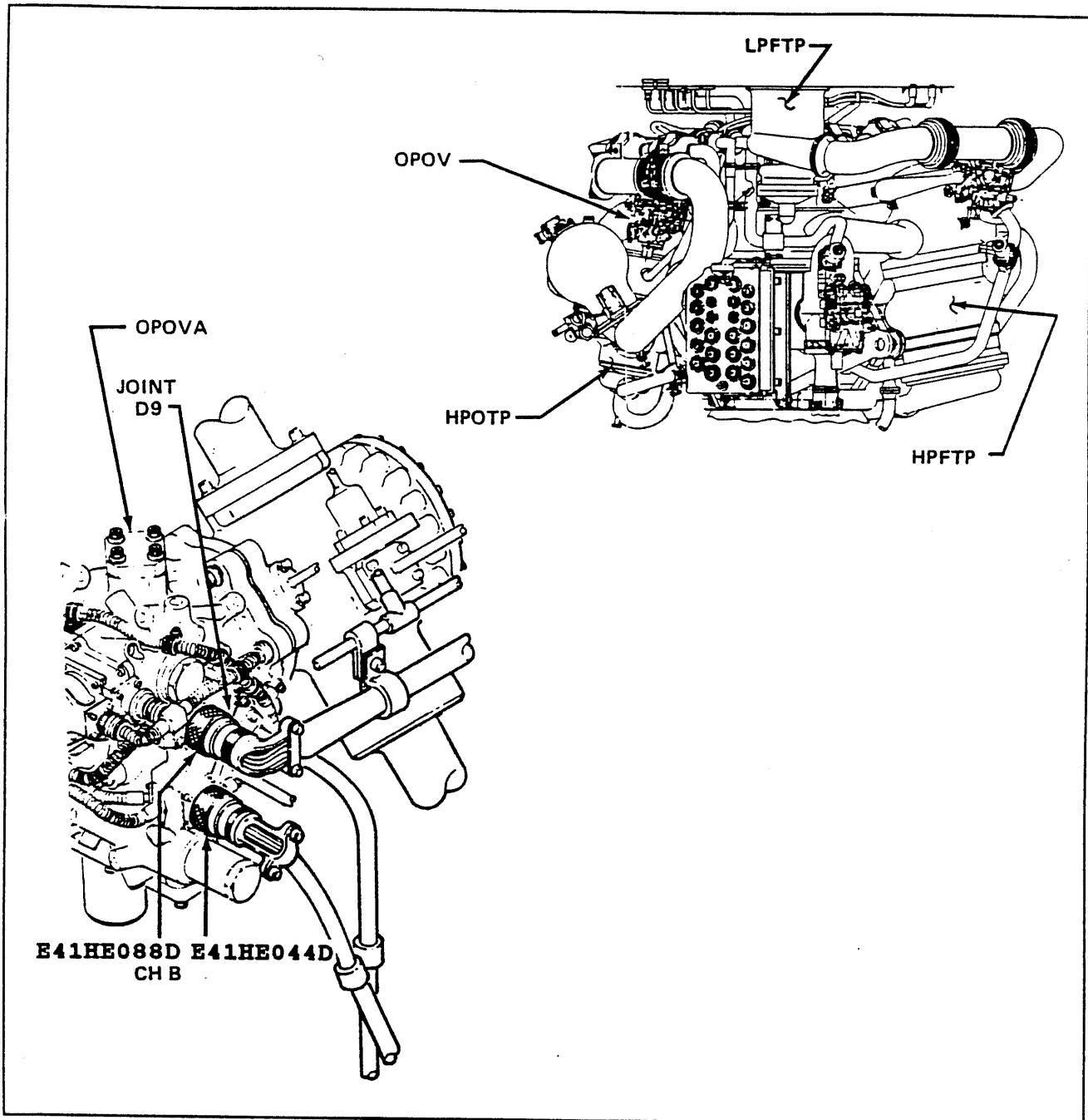


ASSOCIATED MSID'S

- E41HE027B,D FPOV ACTUATOR POSITION, -5 TO 105 PCT
- E41HE043D FPOV ACTUATOR POSITION, -5 TO 105 PCT
- E41HE087D FPOV ACTUATOR POS CH B, -5 TO 105 PCT

4.7 DETAIL SSME SENSOR LOCATION FPOV ACTUATOR POSITION

(24)

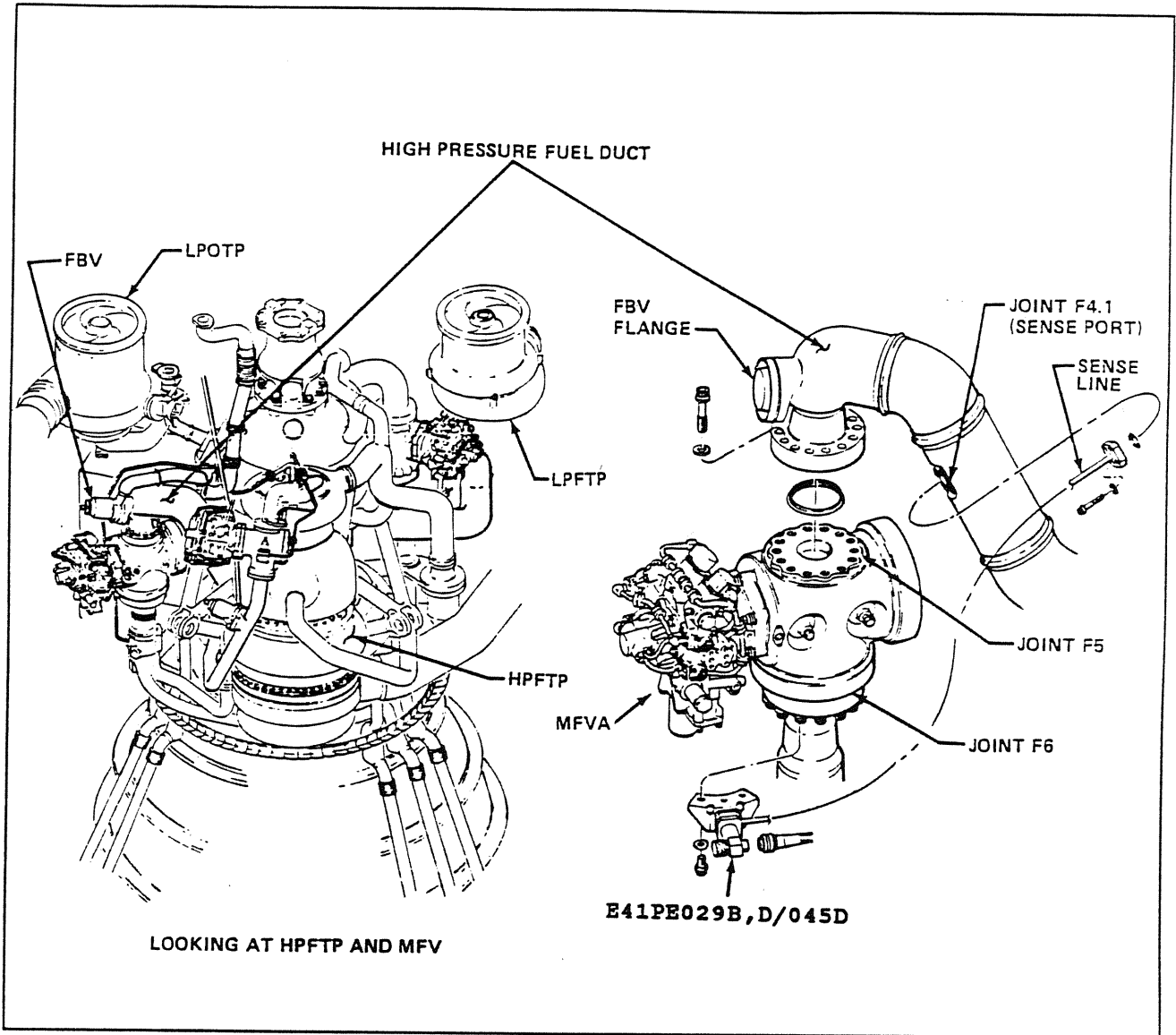


ASSOCIATED MSID'S

E41HE028B,D FPOV ACTUATOR POSITION, -5 TO 105 PCT
E41HE044D FPOV ACTUATOR POSITION, -5 TO 105 PCT
E41HE088D FPOV ACTUATOR POS CH B, -5 TO 105 PCT

4.7 DETAIL SSME SENSOR LOCATION HPFT DISCHARGE PRESSURE

(25)

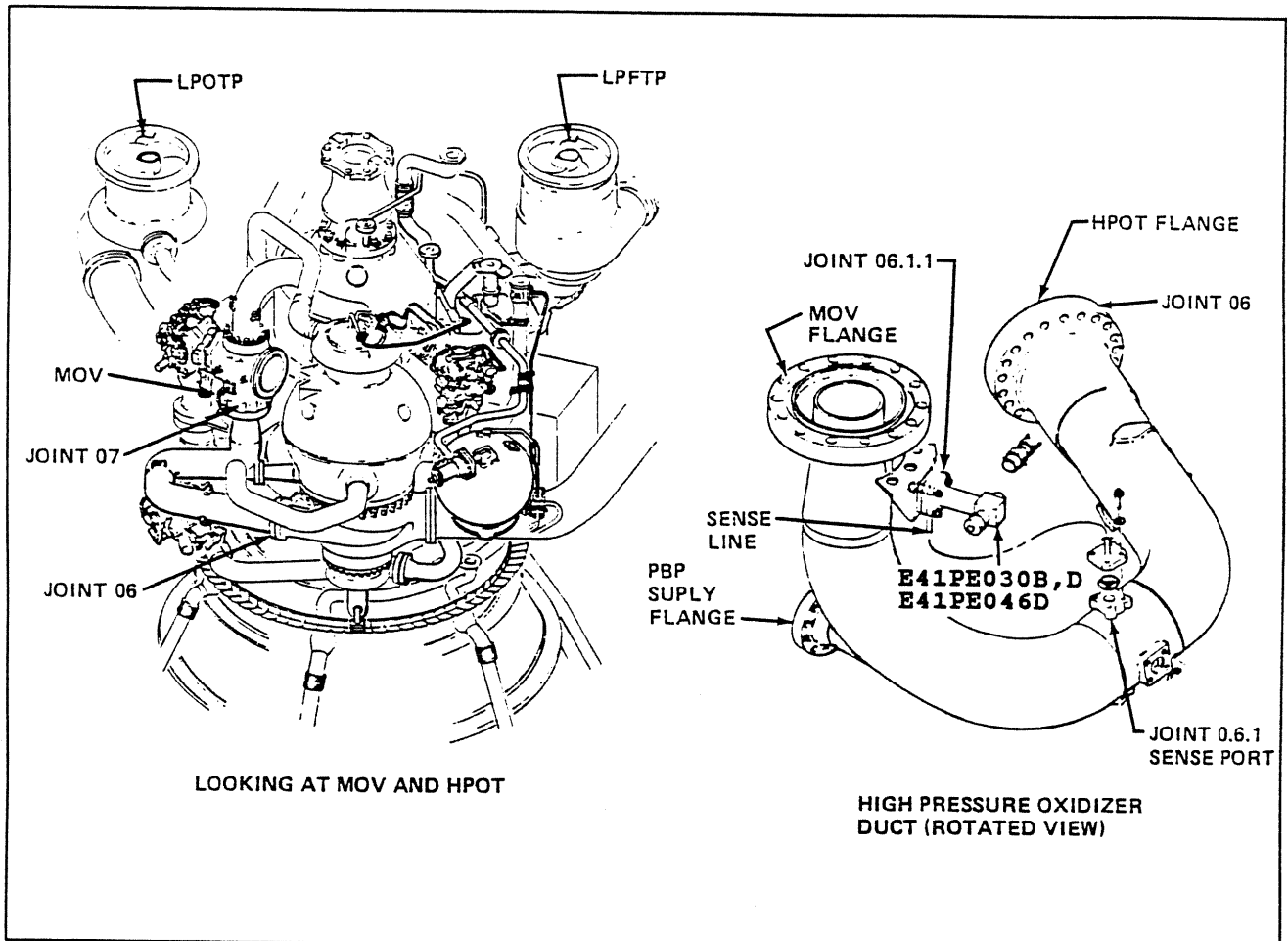


ASSOCIATED MSID'S

E41PE029B,D HPFT DISCHARGE PRESS, 0-9500 PSIA
E41PE045D HPFT DISCHARGE PRESS, 0-9500 PSIA

4.7 DETAIL SSME SENSOR LOCATION HPOT DISCHARGE PRESSURE

26

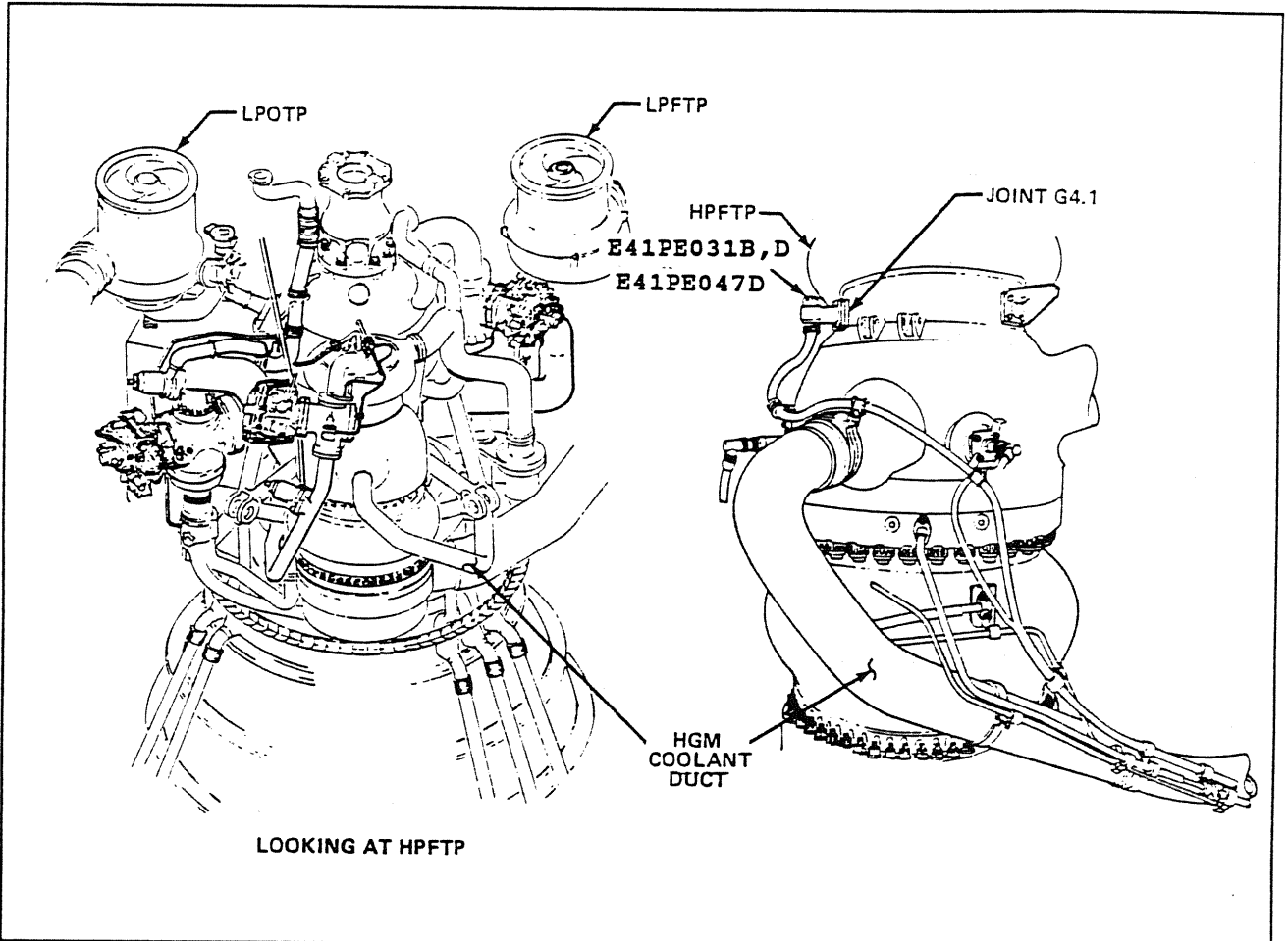


ASSOCIATED MSID'S

E41PE030B,D HPOT DISCHARGE PRESS, 0-7000 PSIA
E41PE046D HPOT DISCHARGE PRESS, 0-7000 PSIA

4.7 DETAIL SSME SENSOR LOCATION FUEL PREBURNER CHAMBER PRESSURE

27

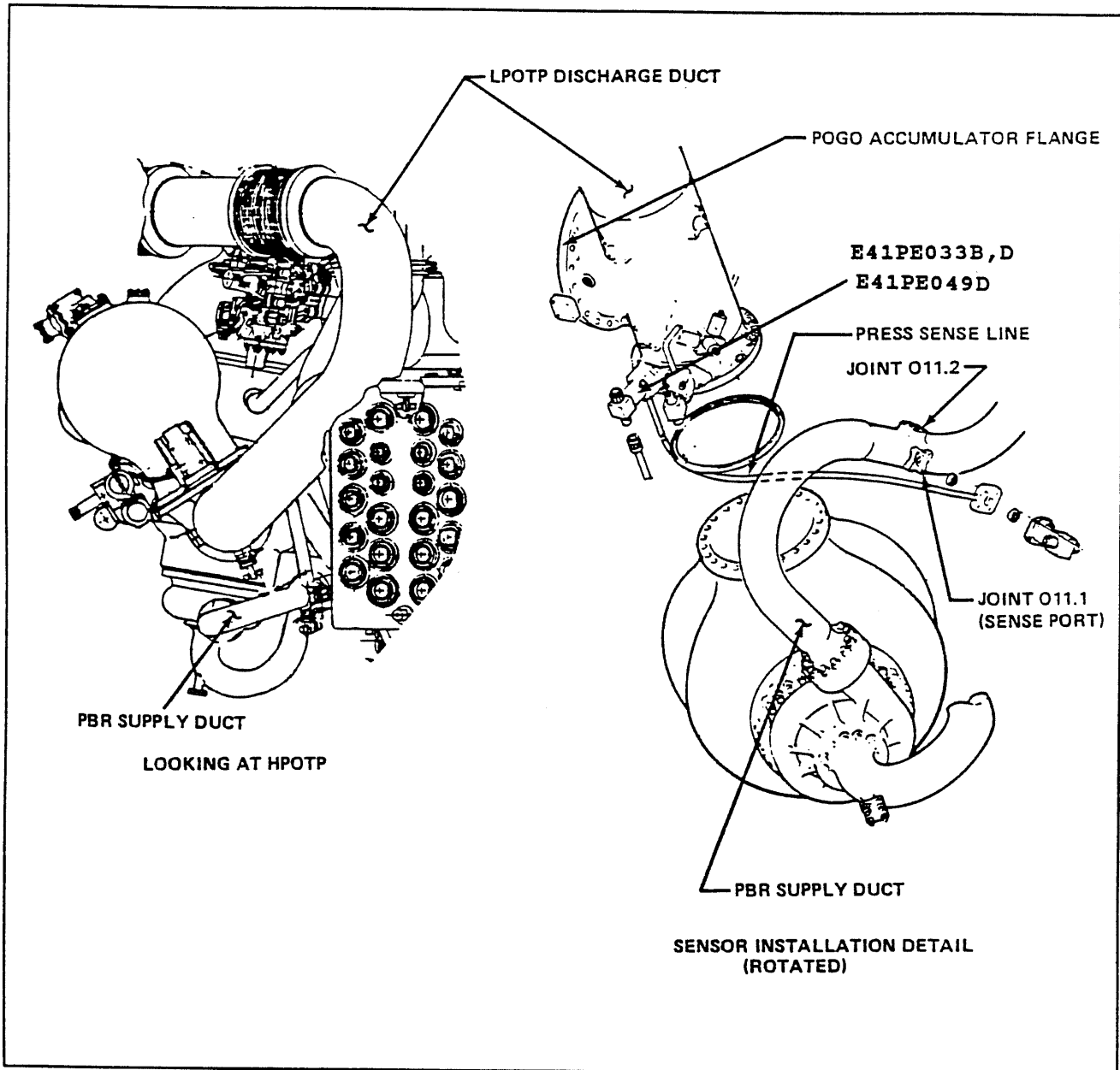


ASSOCIATED MSID'S

E41PE031B,D FUEL PREBURNER CHMBR PRESS, 0-7000 PSIA
E41PE047D FUEL PREBURNER CHMBR PRESS, 0-7000 PSIA

4.7 DETAIL SSME SENSOR LOCATION HPOT BST STG DISCHARGE PRESSURE

28

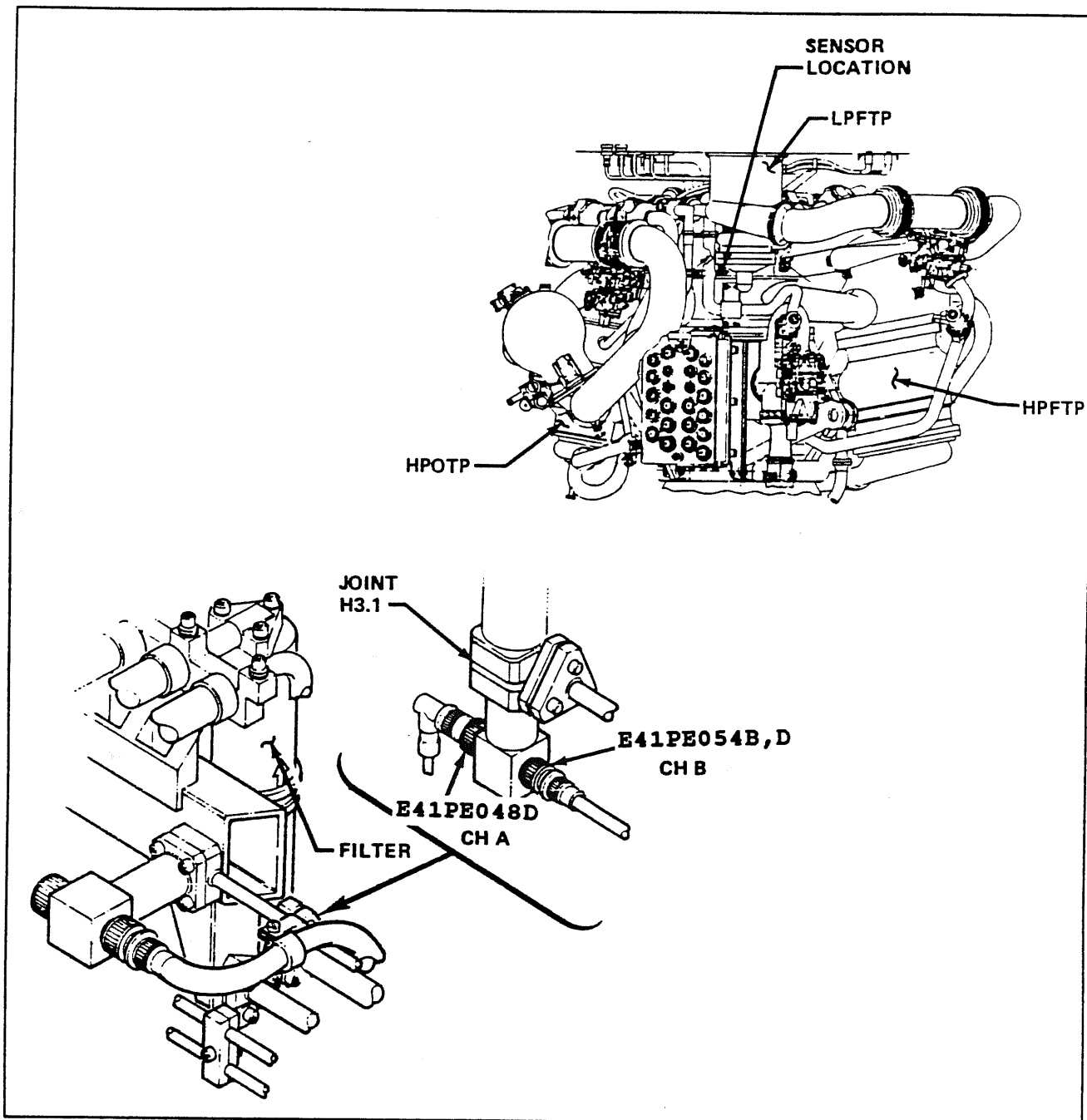


ASSOCIATED MSID'S

E41PE033B,D HPOT BST STG DISCH PRESS, 0-9500 PSIA
E41PE049D HPOT BST STG DISCH PRESS, 0-9500 PSIA

4.7 DETAIL SSME SENSOR LOCATION HYDRAULIC SYSTEM PRESSURE

29

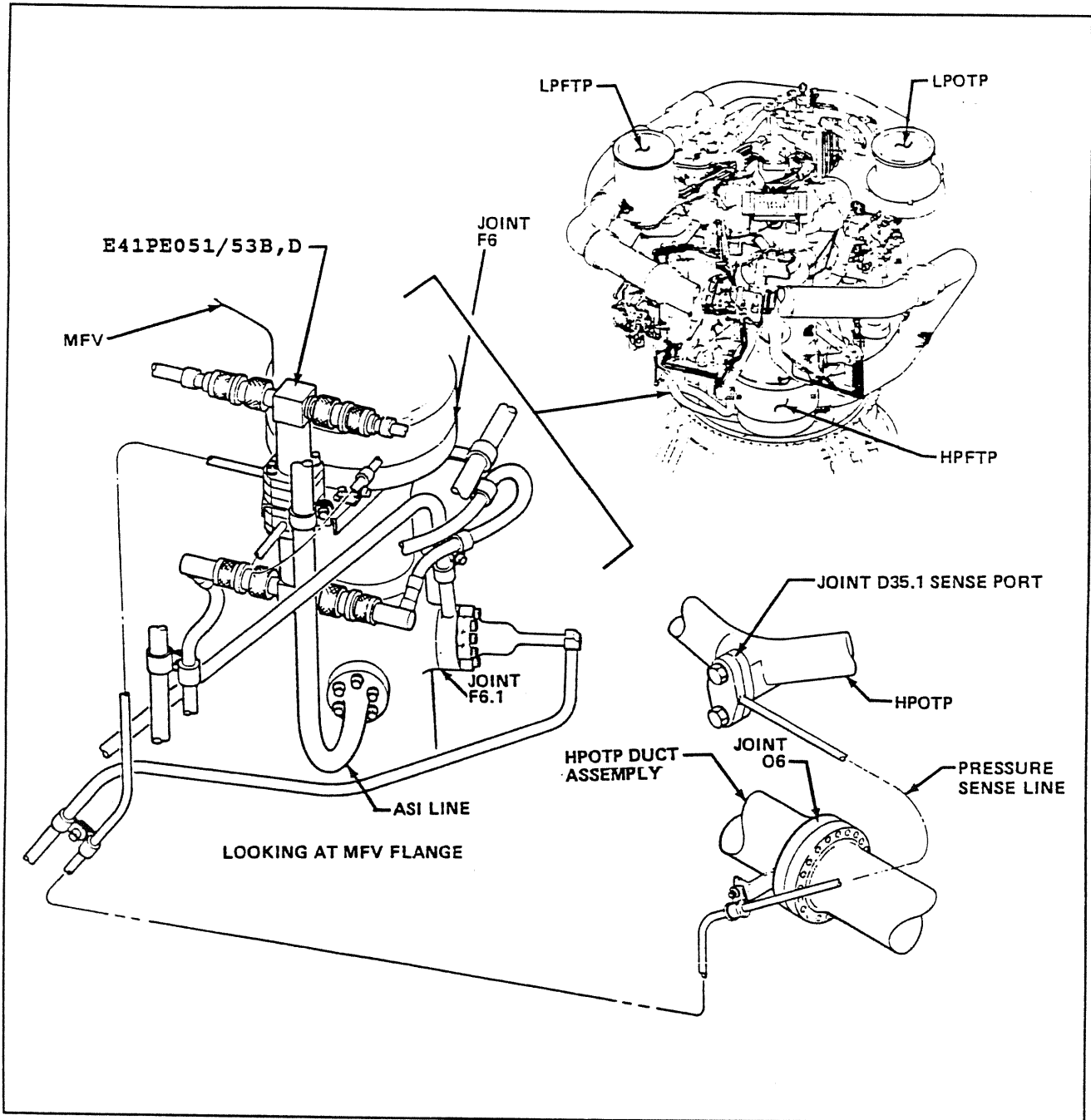


ASSOCIATED MSID'S

E41PE054B,D HYDRAULIC SYSTEM PRESS, 0-4000 PSIA
E41PE048D HYDRAULIC SYSTEM PRESS, 0-4000 PSIA

4.7 DETAIL SSME SENSOR LOCATION HPOT SECONDARY SEAL CAVITY PRESSURE

30

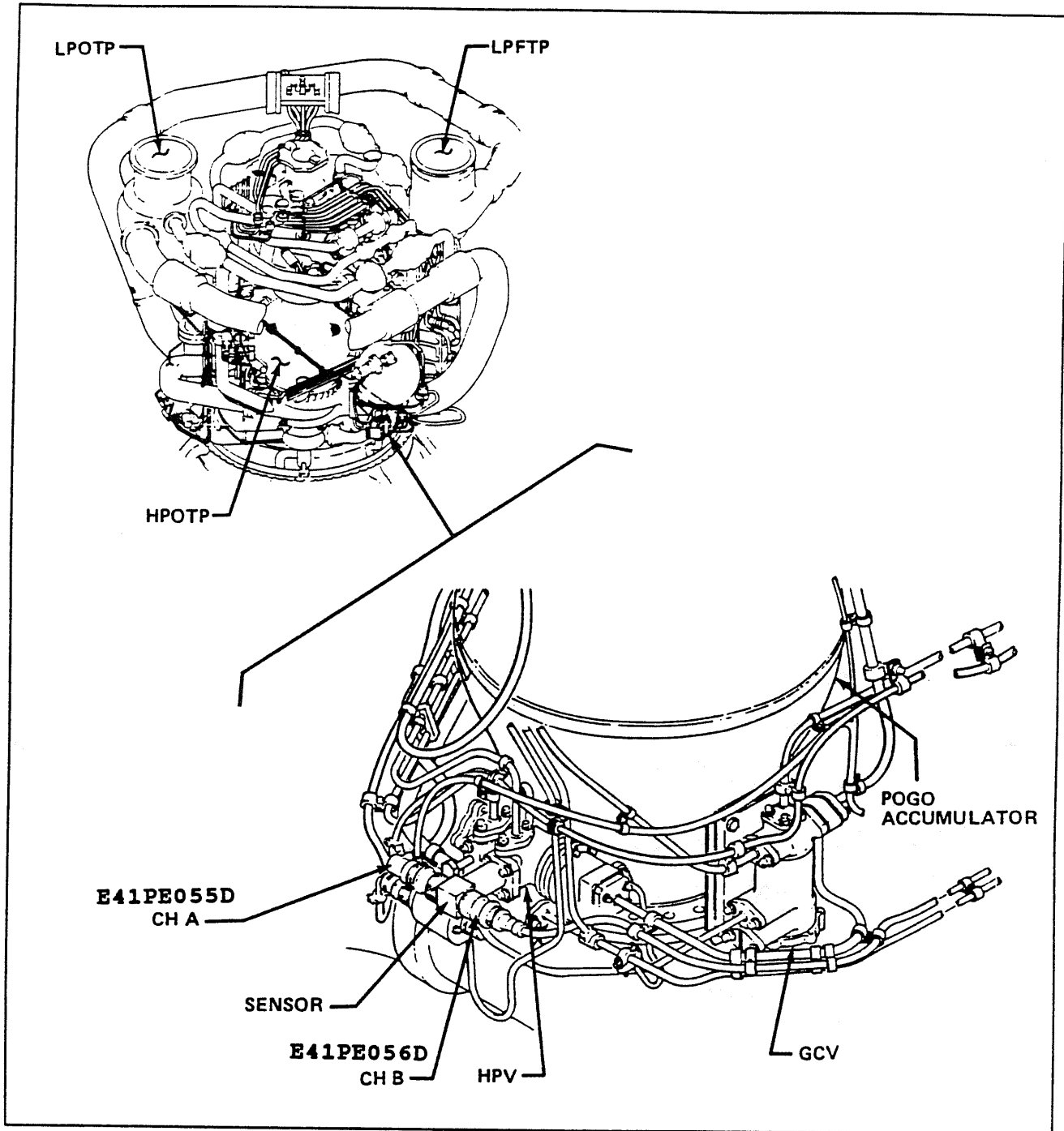


ASSOCIATED MSID'S

E41PE051B,D HPOT SEC SEAL CAV P CH B, 0-300 PSIA
E41PE053B,D HPOT SEC SEAL CAV P CH A, 0-300 PSIA

4.7 DETAIL SSME SENSOR LOCATION POGO PRECHARGE PRESSURE

31

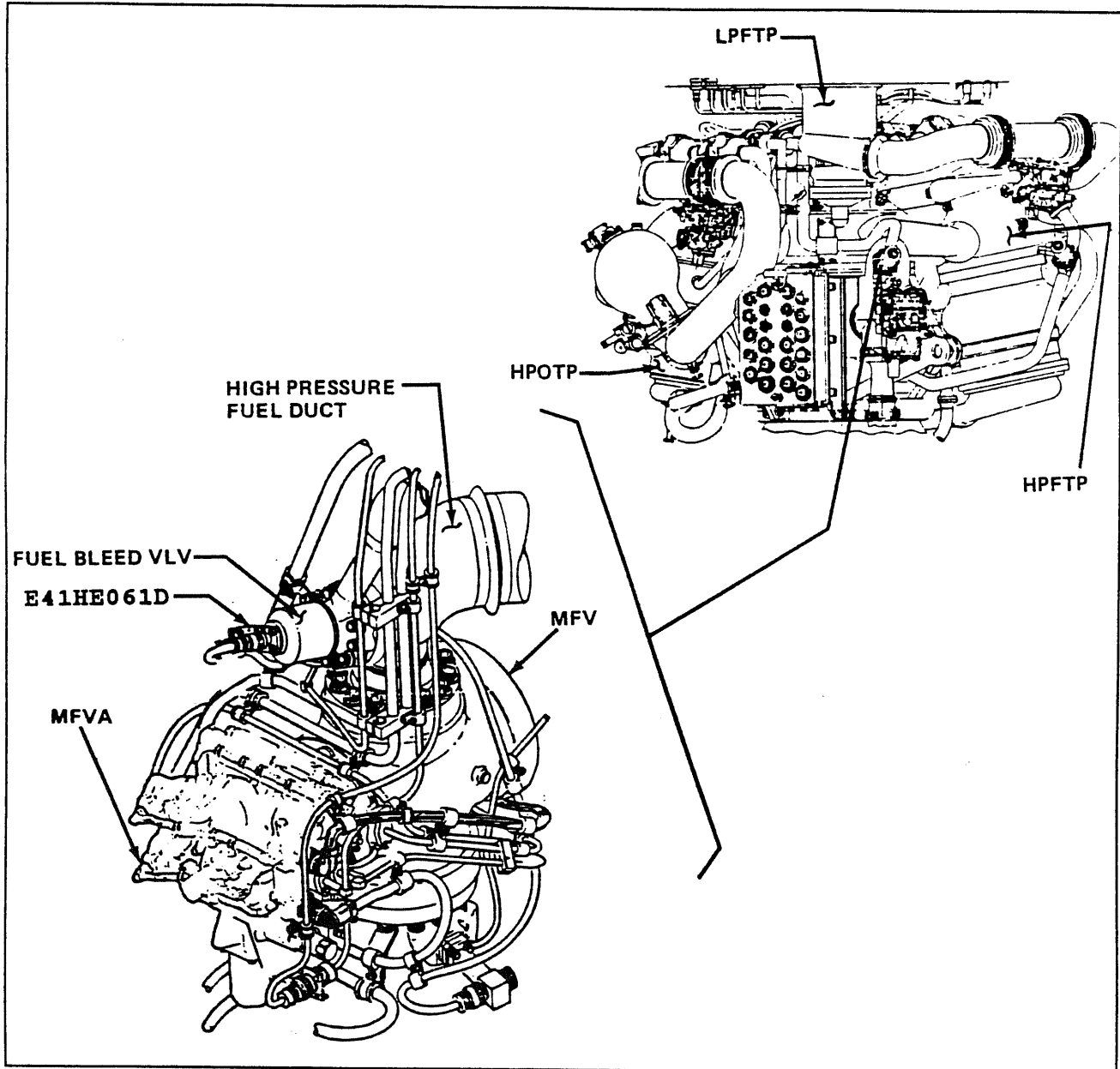


ASSOCIATED MSID'S

E41PE055 D POGO PRECHG PRESS CH A, 0-1500 PSIA
 E41PE056 D POGO PRECHG PRESS CH B, 0-1500 PSIA

4.7 DETAIL SSME SENSOR LOCATION FUEL BLEED VALVE POSITION

34

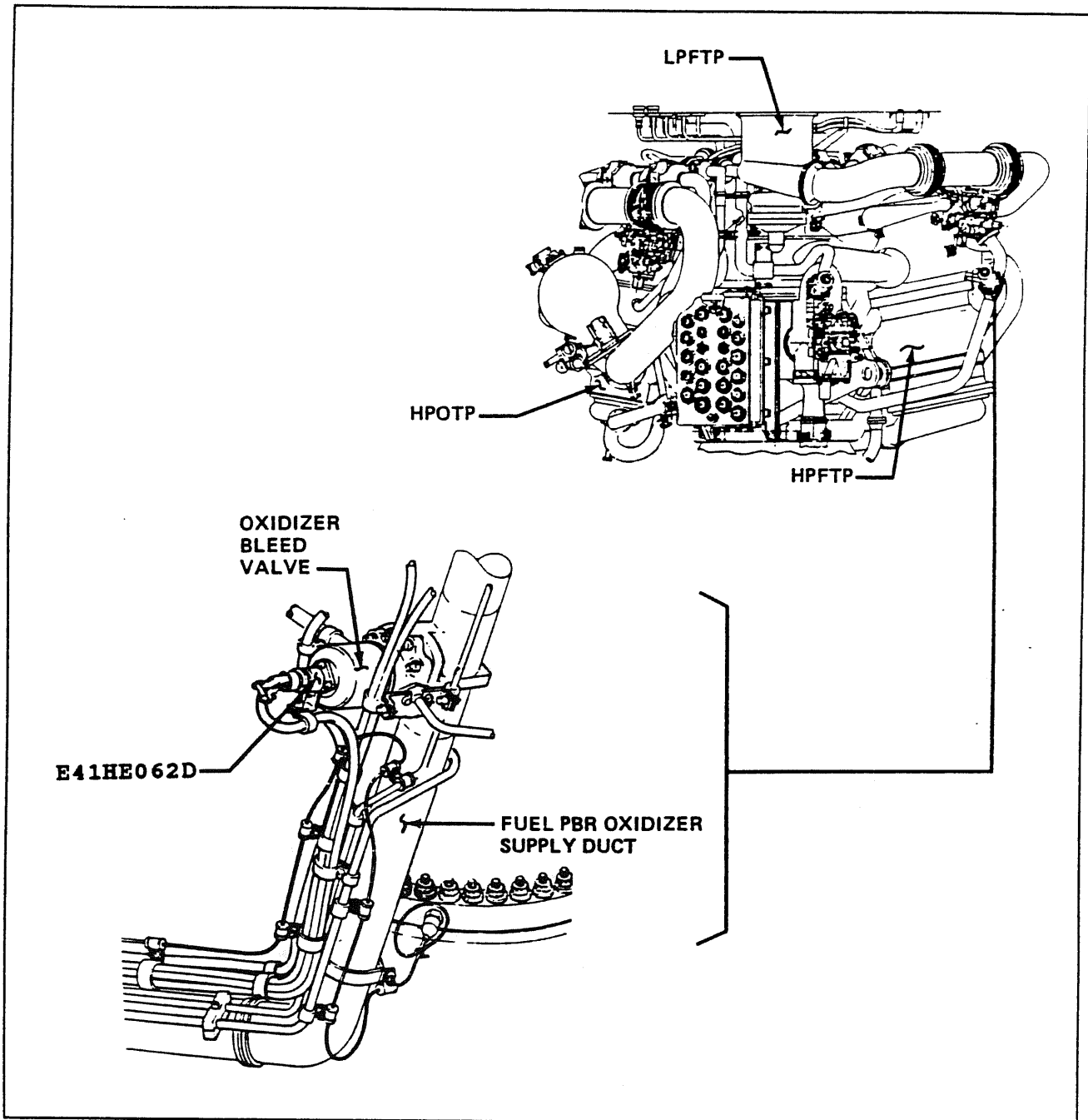


ASSOCIATED MSID'S

E41HE061D FUEL BLEED VLV POSITION, 0-100 PSIA

4.7 DETAIL SSME SENSOR LOCATION OXIDIZER BLEED VALVE POSITION

35

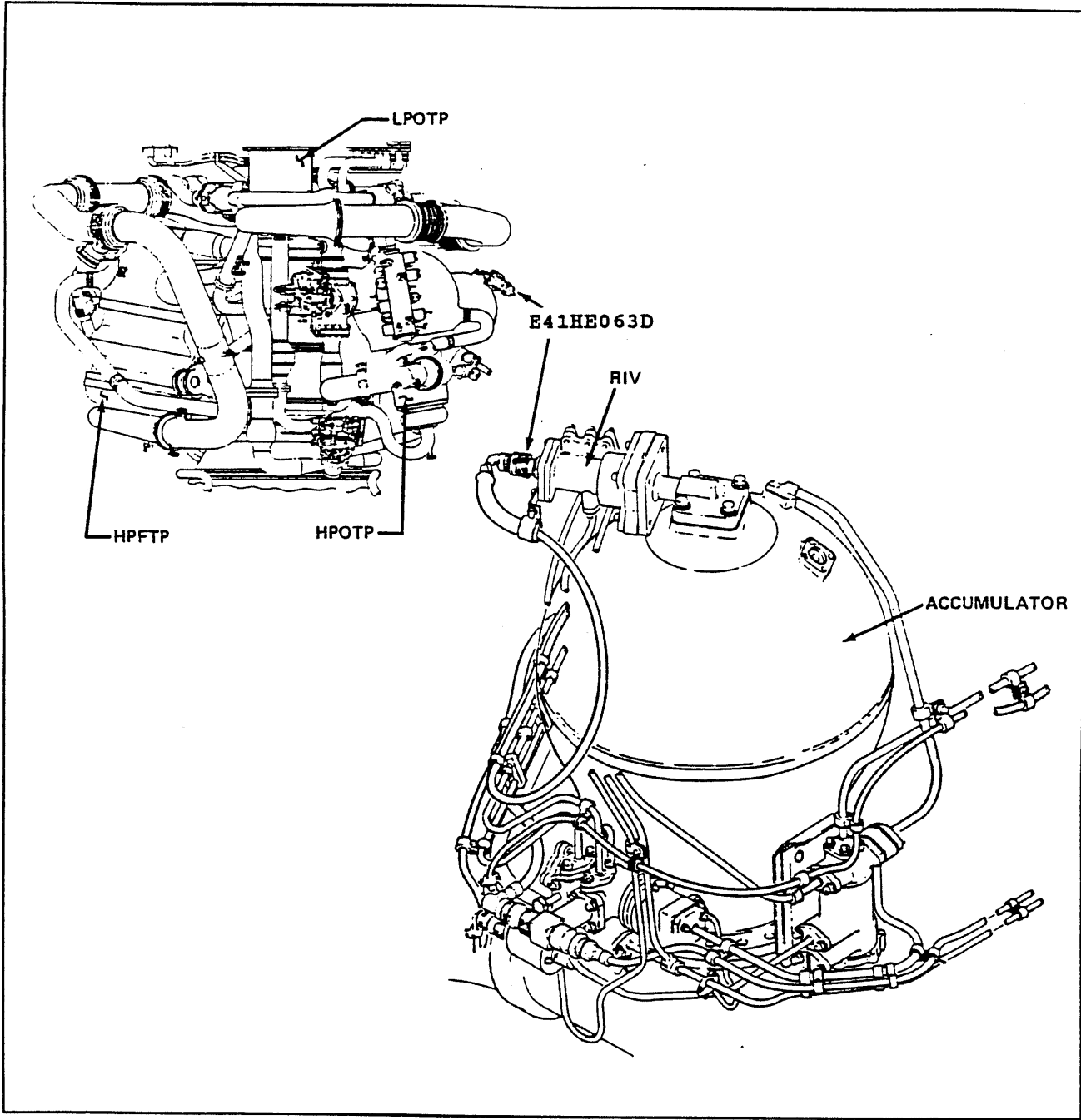


ASSOCIATED MSID'S

E41HE062D OXID BLEED VLV POSITION, 0-100 PCT

4.7 DETAIL SSME SENSOR LOCATION
POGO RECIRCULATION ISOLATION VALVE POSITION

36

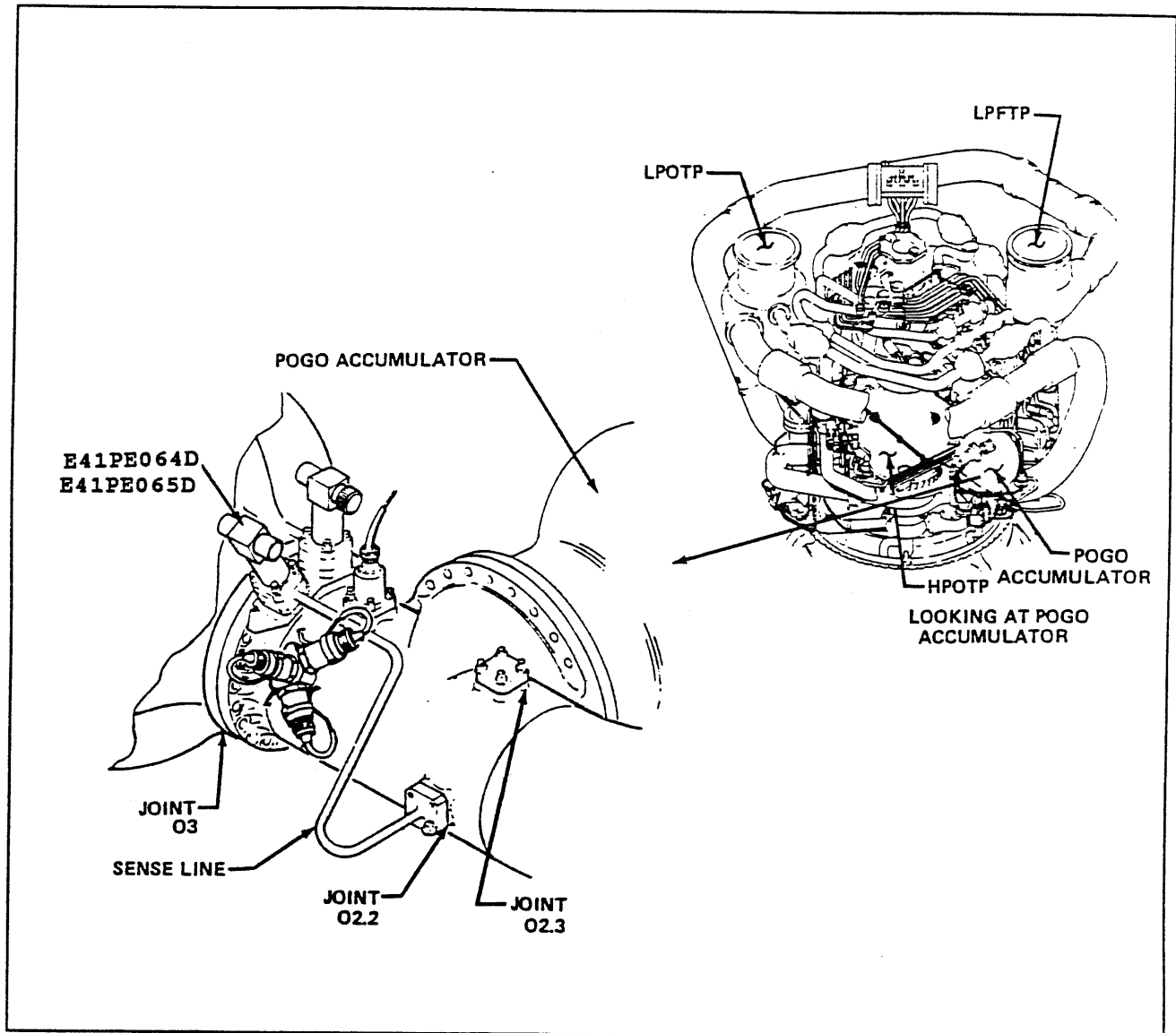


ASSOCIATED MSID'S

E41HE063D POGO RECIRC CN ISNL V POS, 0-100 PCT

4.7 DETAIL SSME SENSOR LOCATION LPOT DISCHARGE PRESSURE

37

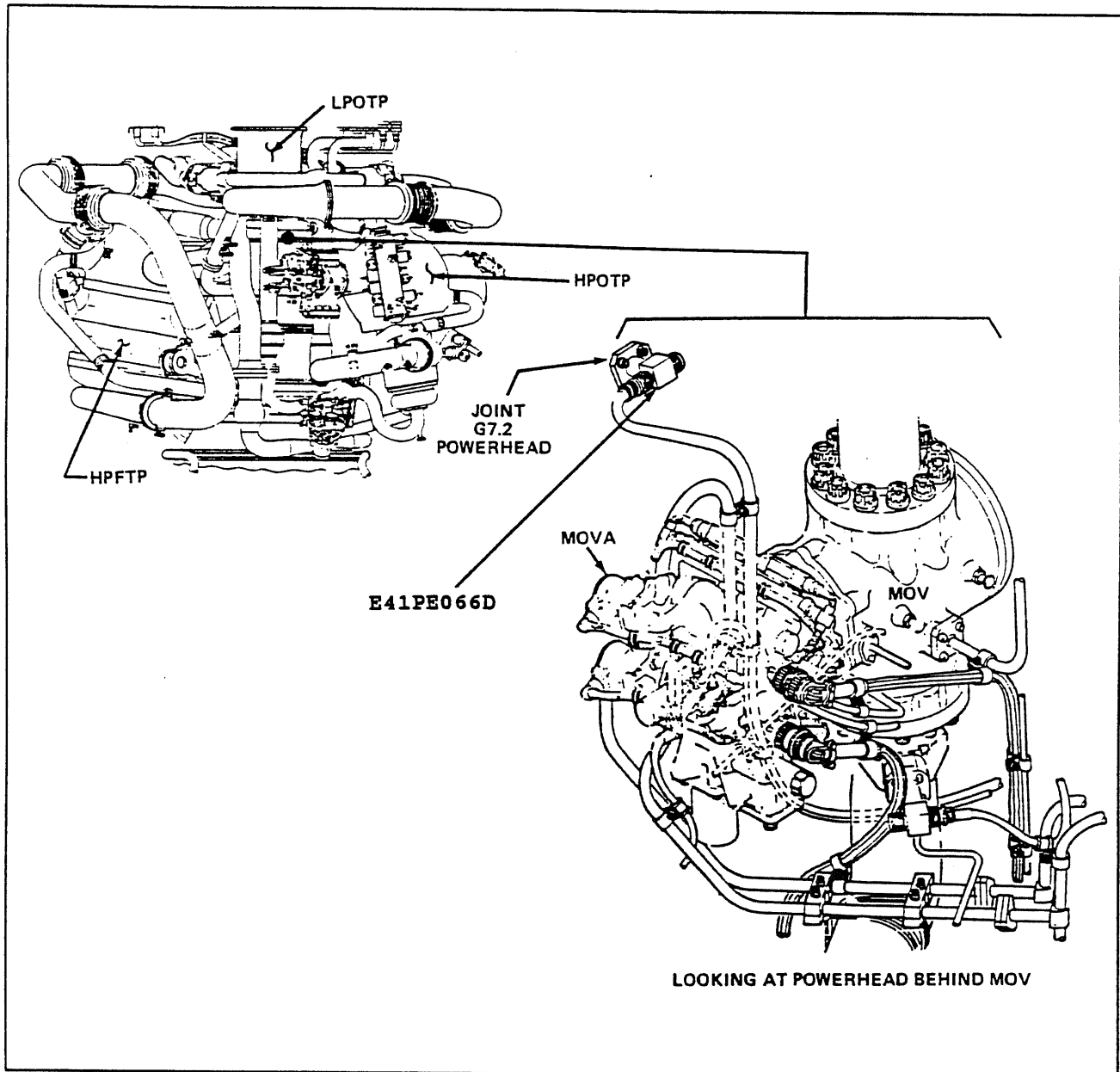


ASSOCIATED MSID'S

E41PE064D LPOT DISCH PRESS CH A, 0-600 PSIA
E41PE065D LPOT DISCH PRESS CH B, 0-600 PSIA

4.7 DETAIL SSME SENSOR LOCATION MCC FUEL INJECTOR PRESSURE

38

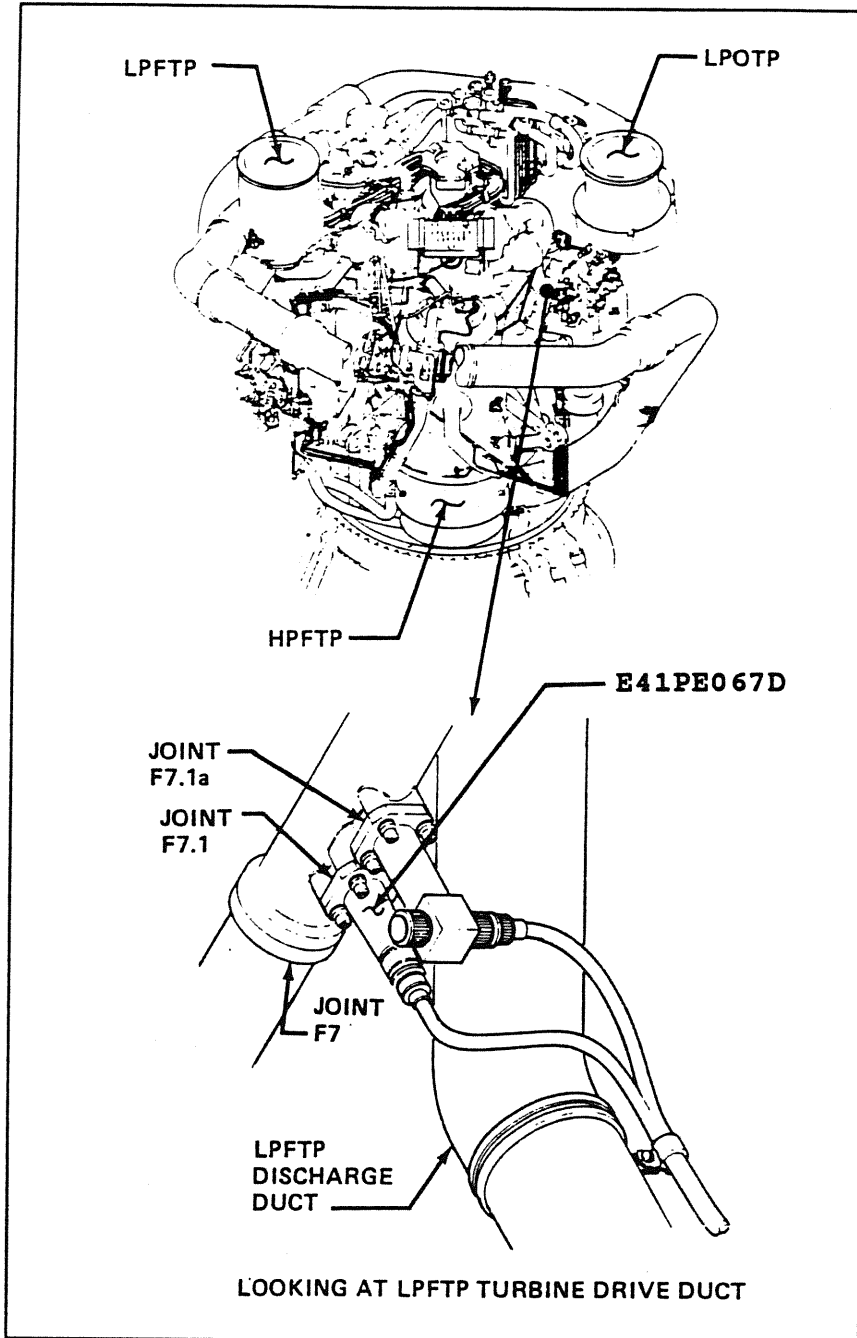


ASSOCIATED MSID'S

E41PE066D MCC FUEL INJECTOR PRESS, 0-4500 PSIA

4.7 DETAIL SSME SENSOR LOCATION MCC COOLANT PRESSURE

39

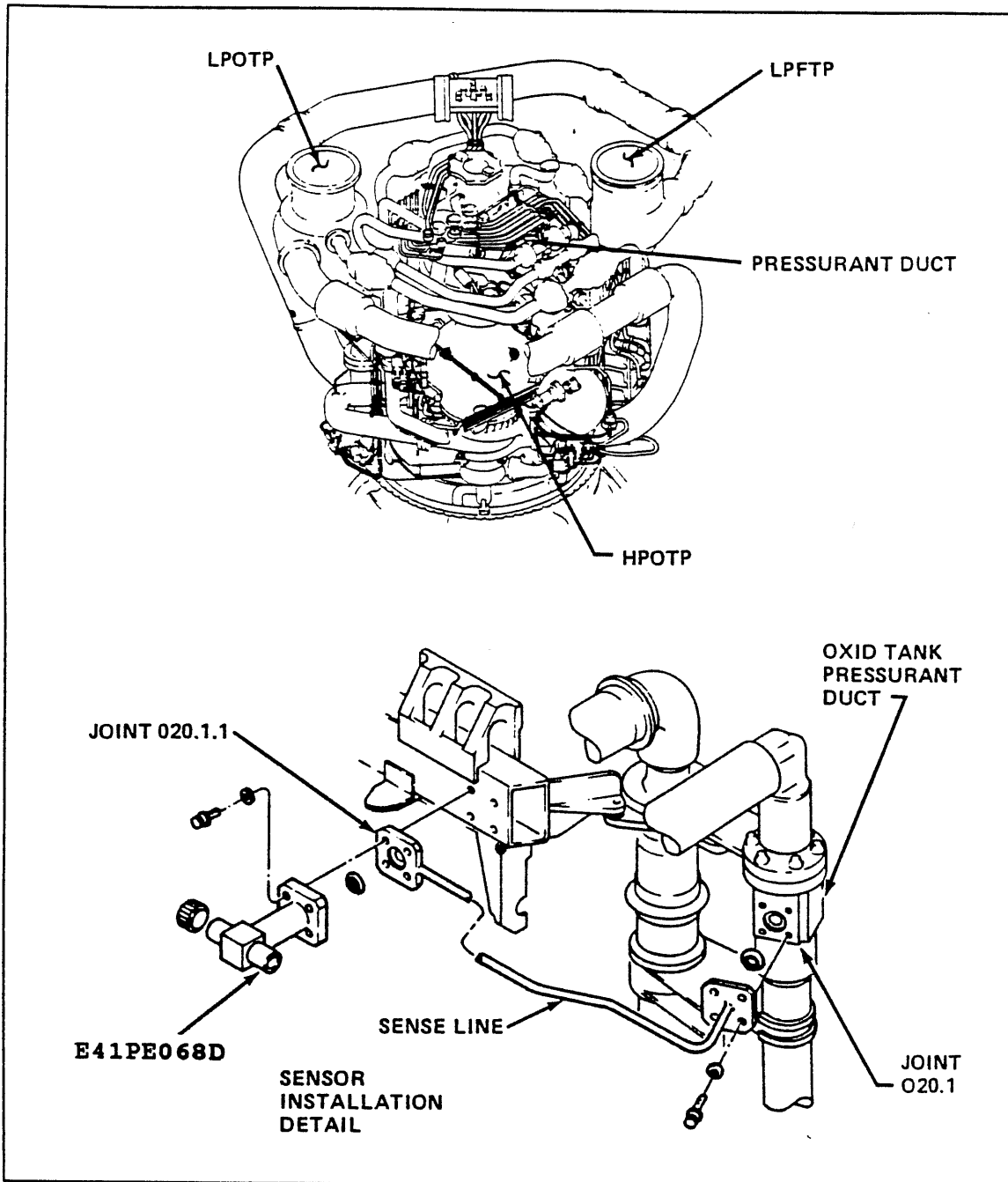


ASSOCIATED MSID'S

E41PE067D MCC COOLANT PRESS, 0-7000 PSIA

4.7 DETAIL SSME SENSOR LOCATION OXIDIZER TANK PRESSURANT PRESSURE

40

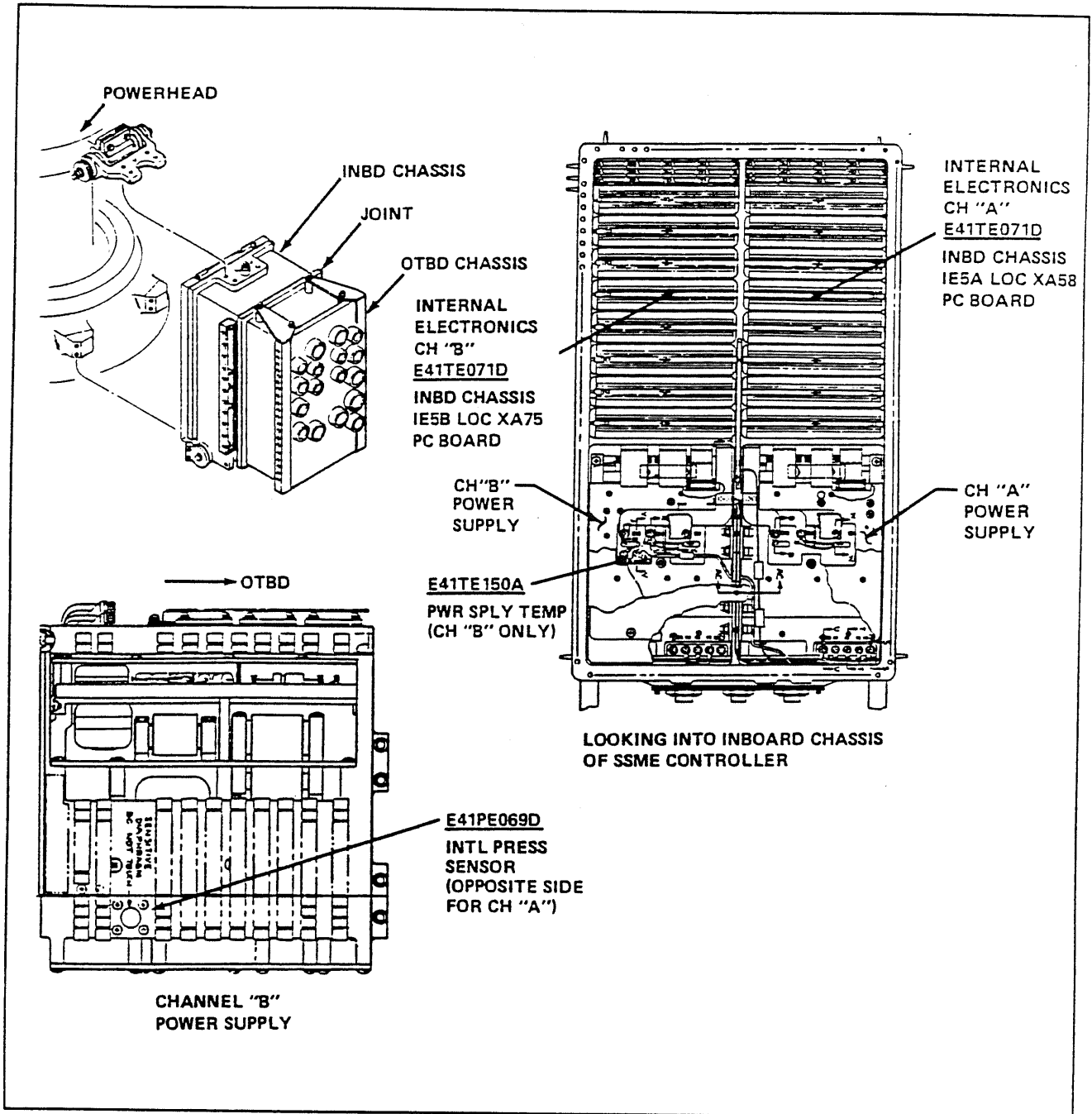


ASSOCIATED MSID'S

E41PE068D OX TK PRESSURANT PRESS, 0-7000 PSIA

4.7 DETAIL SSME SENSOR LOCATION CONTROLLER INTERNAL SENSORS

41

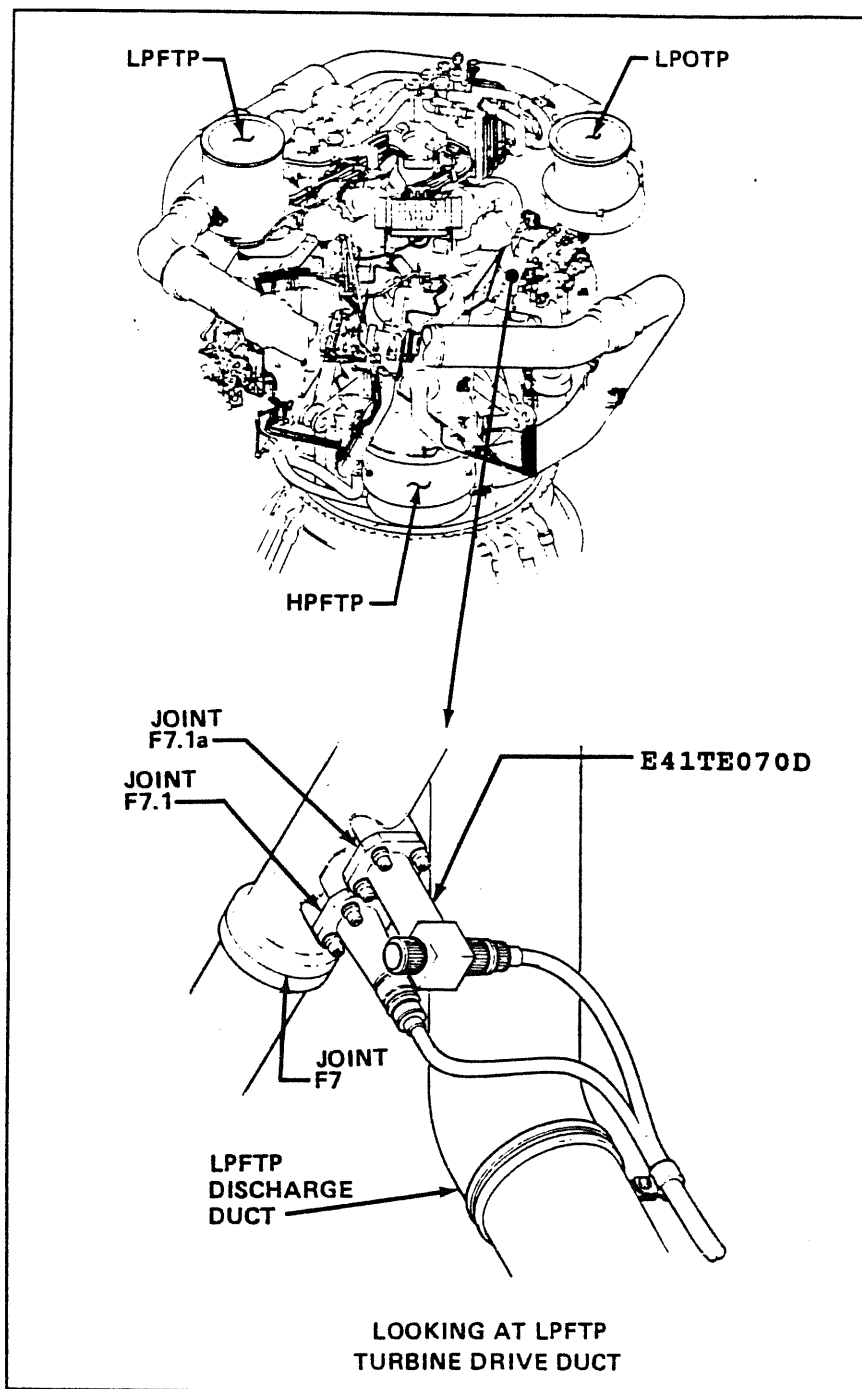


ASSOCIATED MSID'S

- E41PE069D CONTROLLER INTL PRESS, 0-50 PSIA
- E41TE081D CNTRL INTL ELECTRONICS TEM, 140-760 DEG R
- E41TE150A CONTROLLER TEMPERATURE, -75 TO 300 DEG R

4.7 DETAIL SSME SENSOR LOCATION MCC COOLANT TEMPERATURE

42

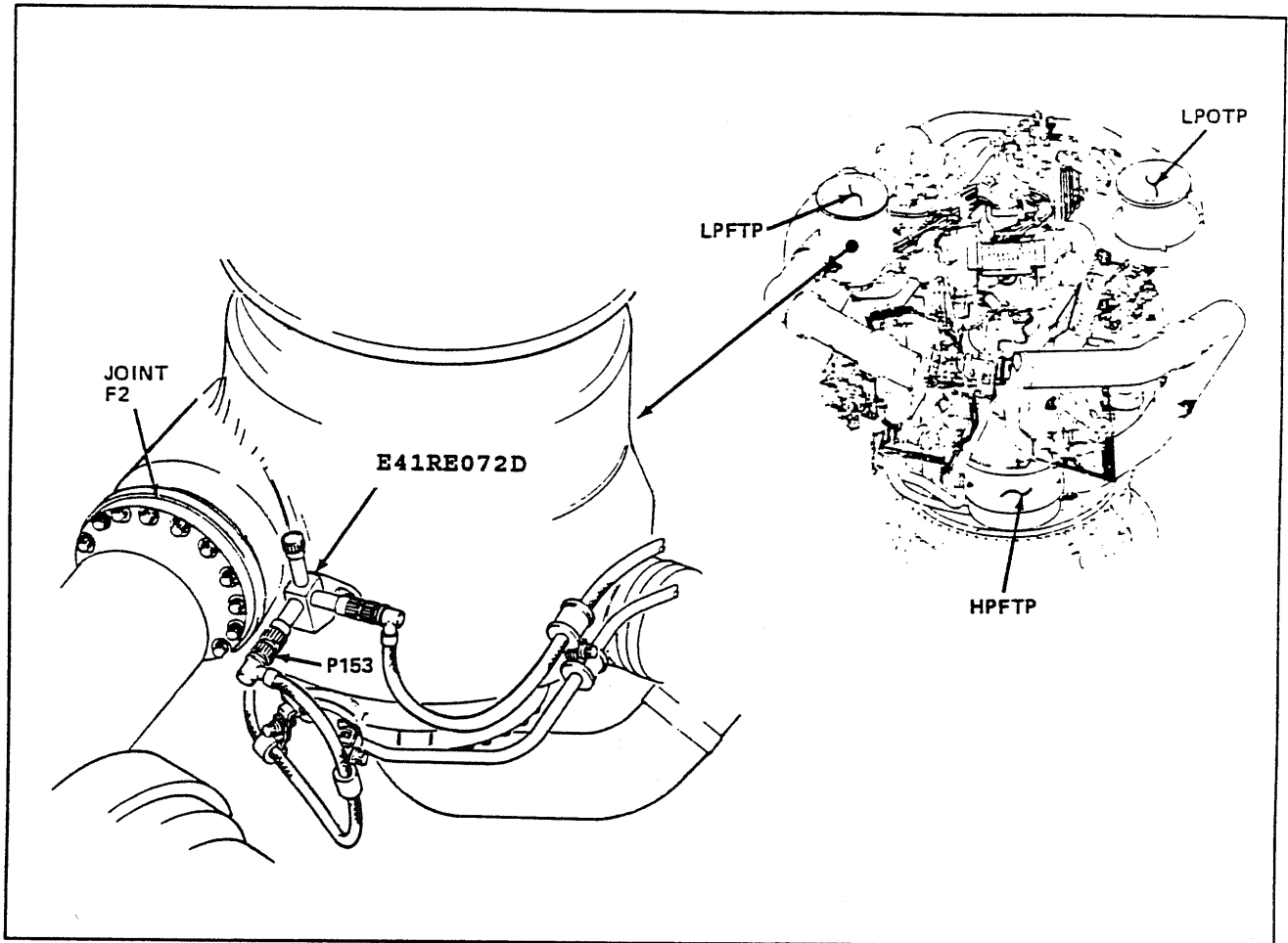


ASSOCIATED MSID'S

E41PE070D MCC COOLANT TEMPERATURE, 460-2760 DEG R

4.7 DETAIL SSME SENSOR LOCATION LPFT SHAFT SPEED

43

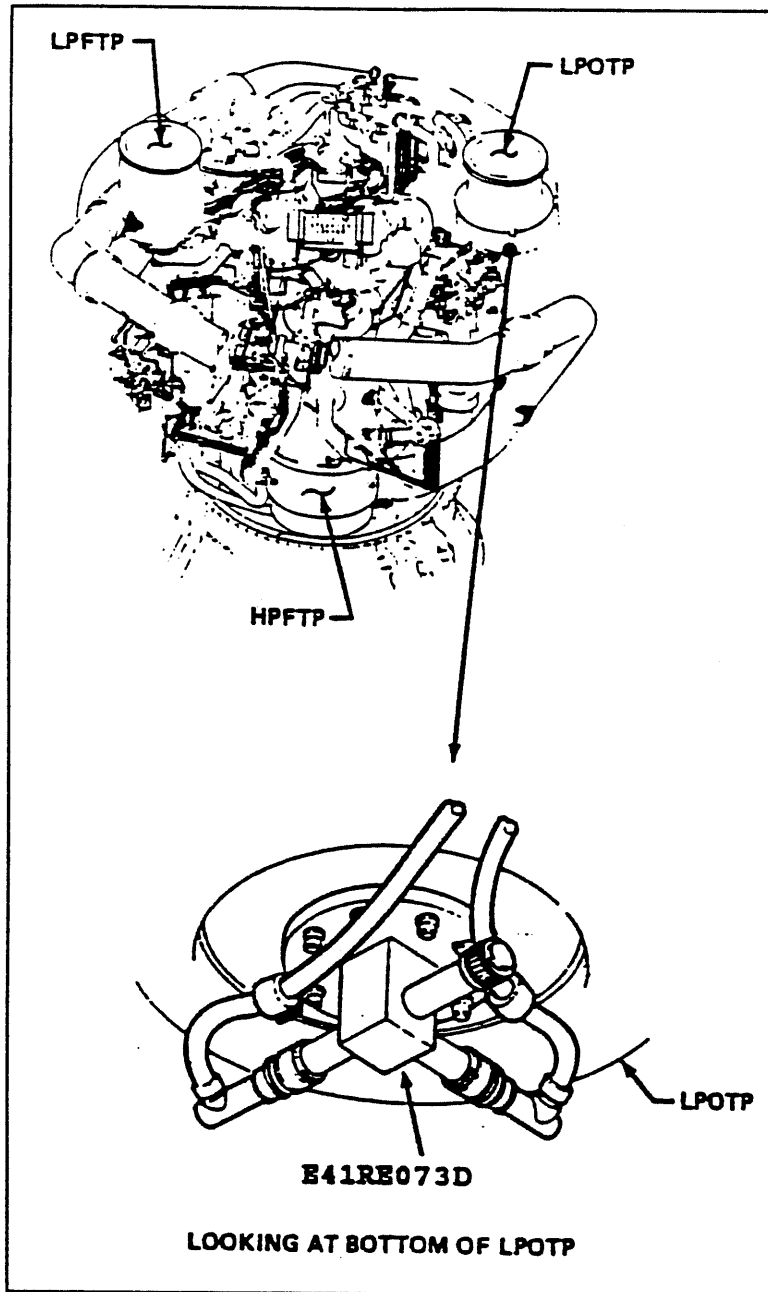


ASSOCIATED MSID'S

E41PE072D LPFT SHAFT SPEED, 600-20K RPM

4.7 DETAIL SSME SENSOR LOCATION
LPOT SHAFT SPEED

44

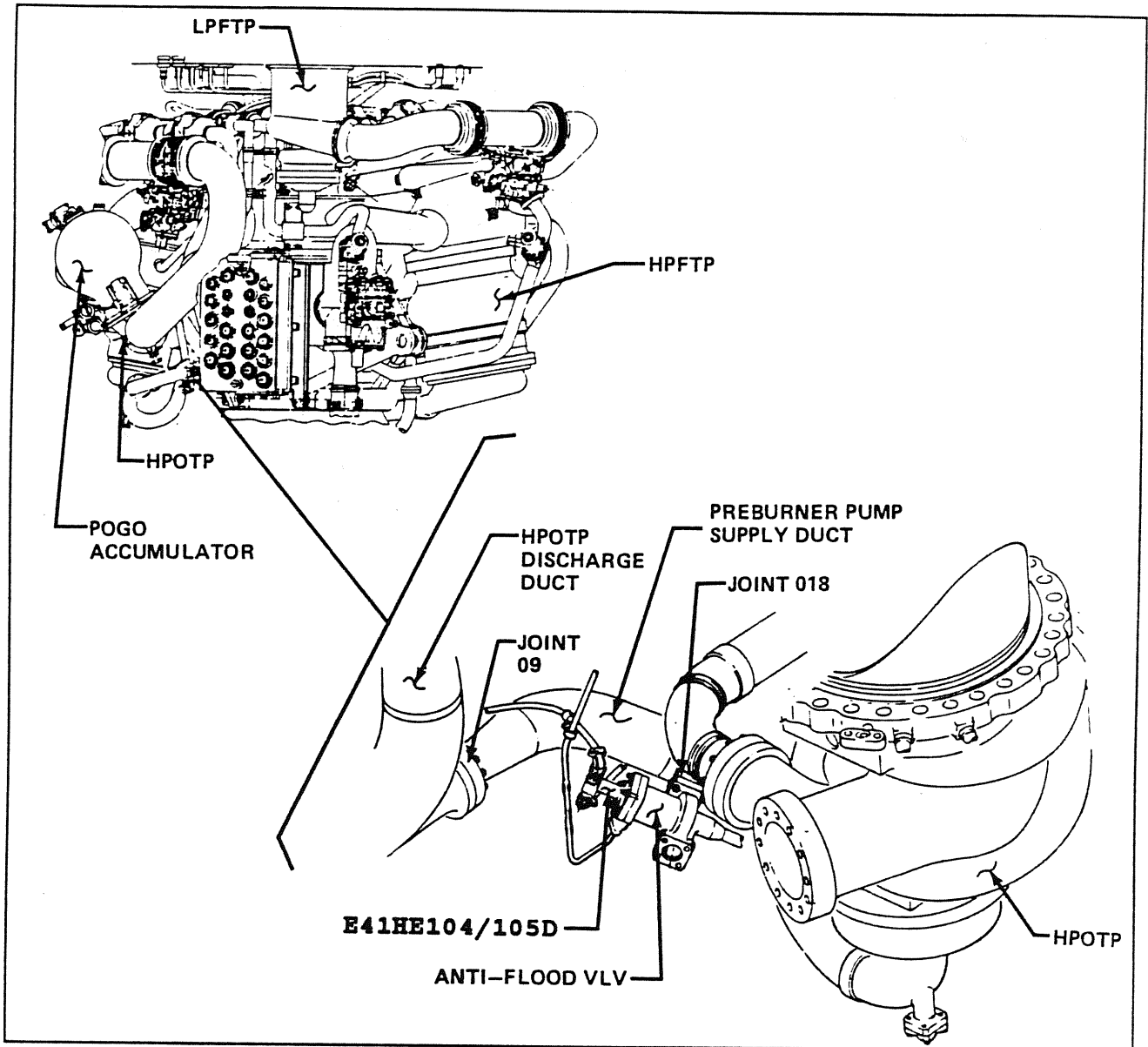


ASSOCIATED MSID'S

E41PE073D LPOT SHAFT SPEED, 180-6000 RPM

4.7 DETAIL SSME SENSOR LOCATION ANTI-FLOOD VALVE POSITION

45

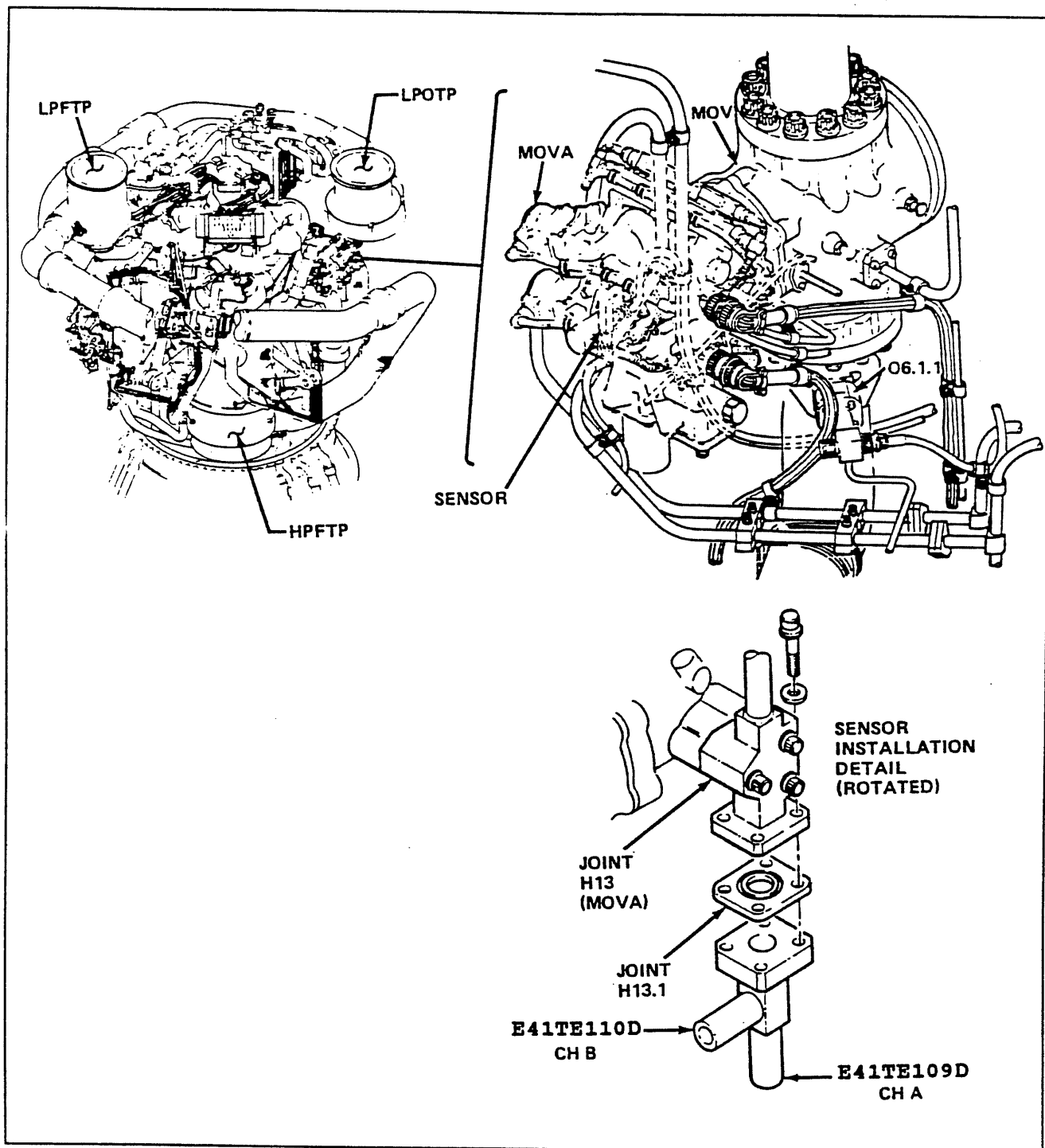


ASSOCIATED MSID'S

E41HE104D ANTI-FLOOD VLV POS CH A, 0-100 PCT
E41HE105D ANTI-FLOOD VLV POS CH B, 0-100 PCT

4.7 DETAIL SSME SENSOR LOCATION MAIN OXIDIZER VALVE HYDRAULIC TEMPERATURE

48

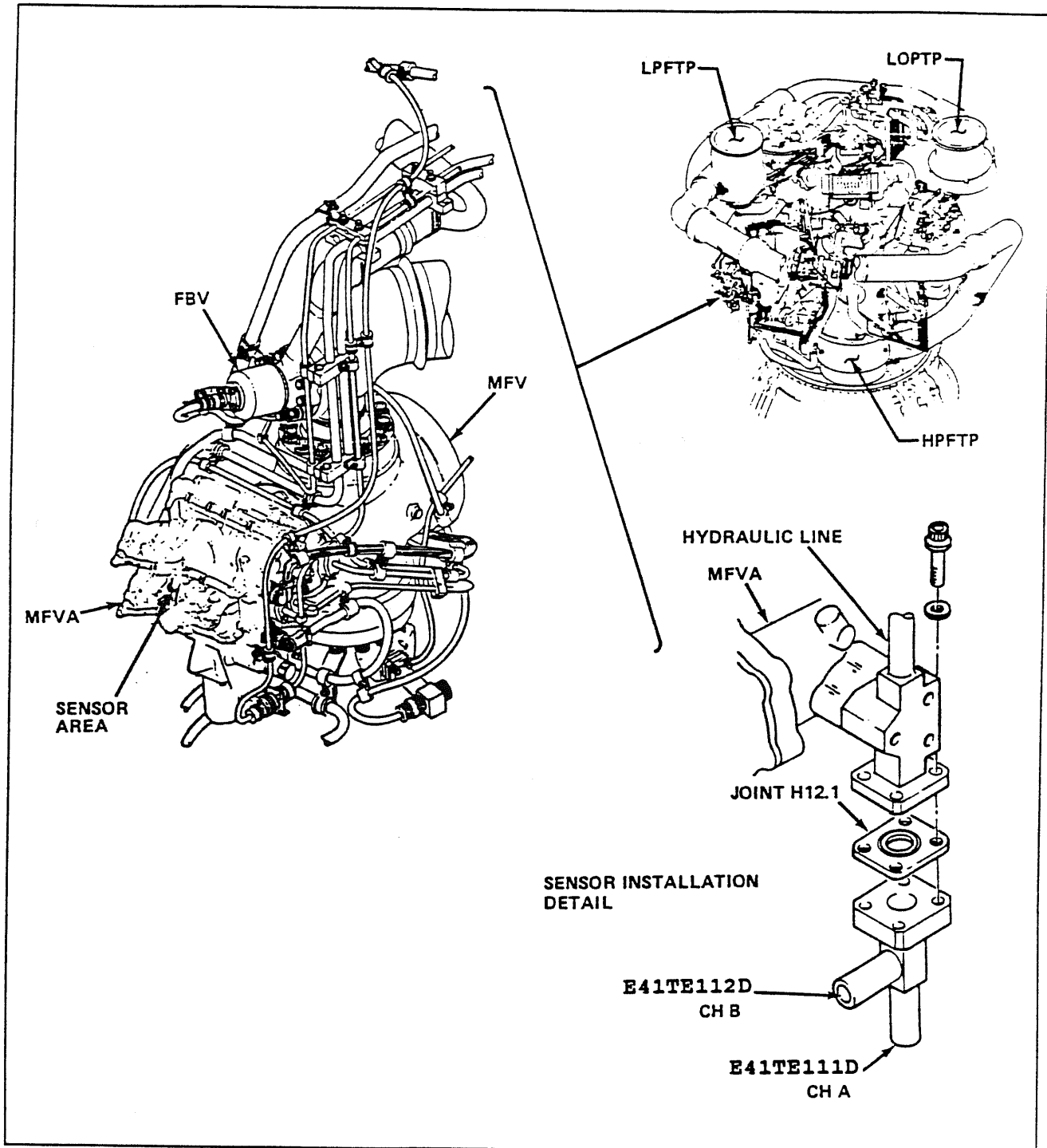


ASSOCIATED MSID'S

E41TE109D MOV HYD TEMP CH A, 360 TO 760 DEG R
E41TE110D MOV HYD TMEP CH B, 360 TO 760 DEG R

4.7 DETAIL SSME SENSOR LOCATION MAIN FUEL VALVE HYDRAULIC TEMPERATURE

49

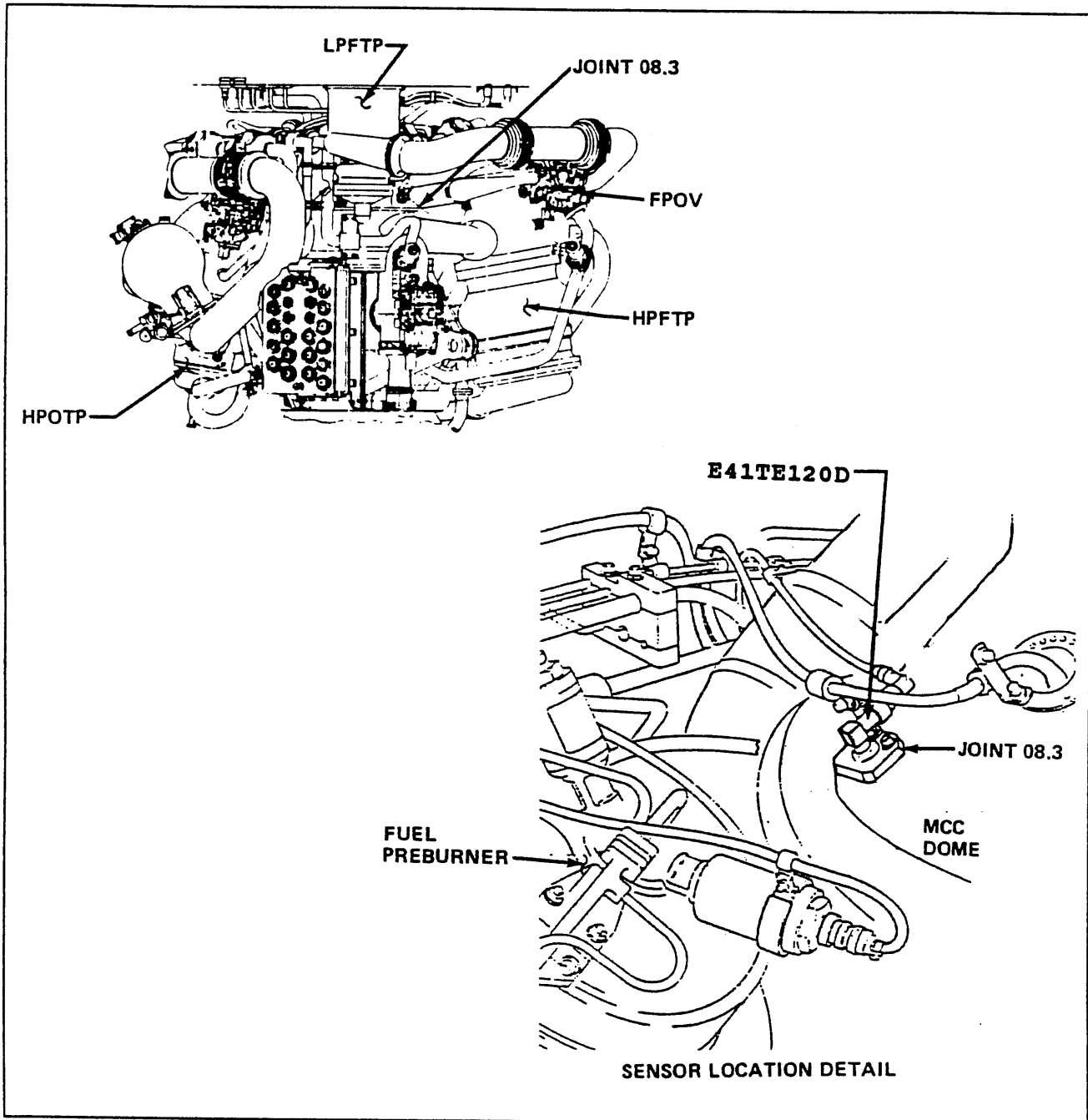


ASSOCIATED MSID'S

E41TE111D MFV HYD TEMP CH A, 360 TO 760 DEG R
E41TE112D MFV HYD TEMP CH B, 360 TO 760 DEG R

4.7 DETAIL SSME SENSOR LOCATION MCC LOX DOME TEMPERATURE

50

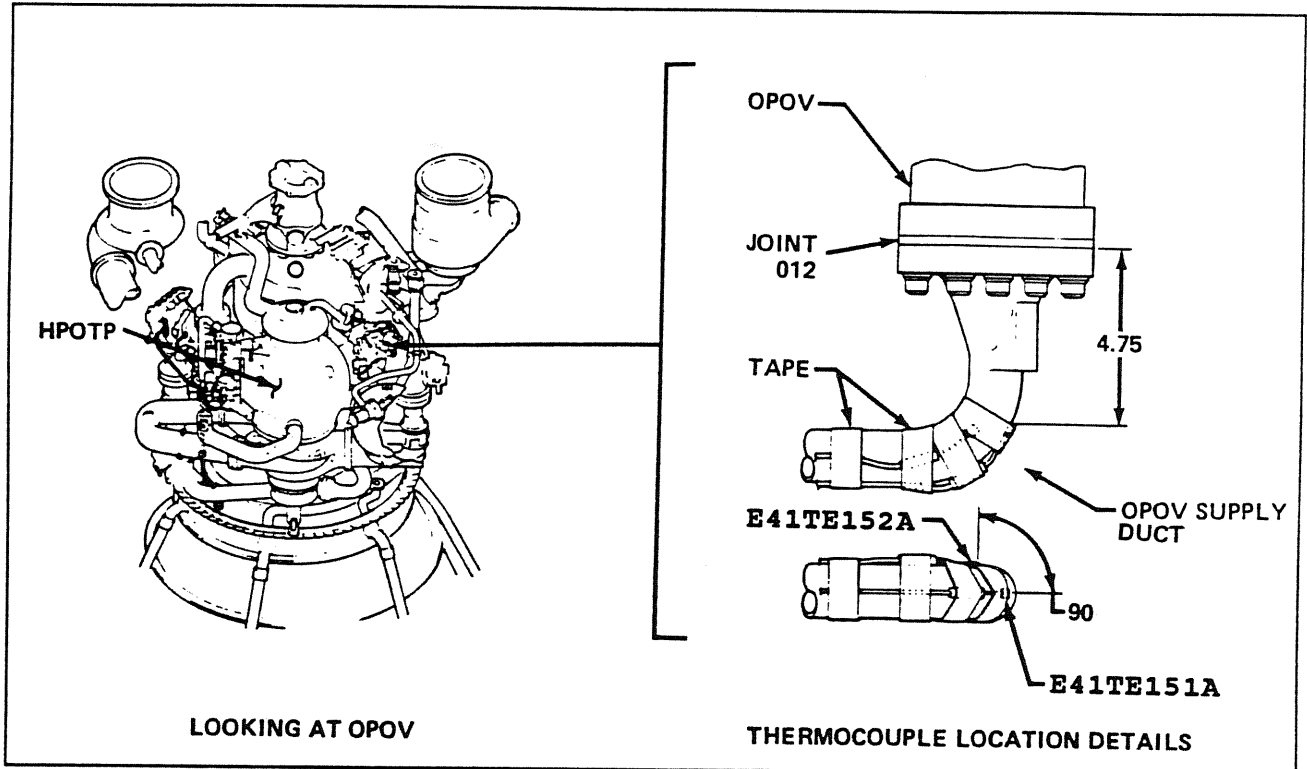


ASSOCIATED MSID'S

E41TE120D MCC LOX DOME TEMP, 110 TO 610 DEG R

4.7 DETAIL SSME SENSOR LOCATION OPOV LOX SUPPLY LINE TEMPERATURE

51

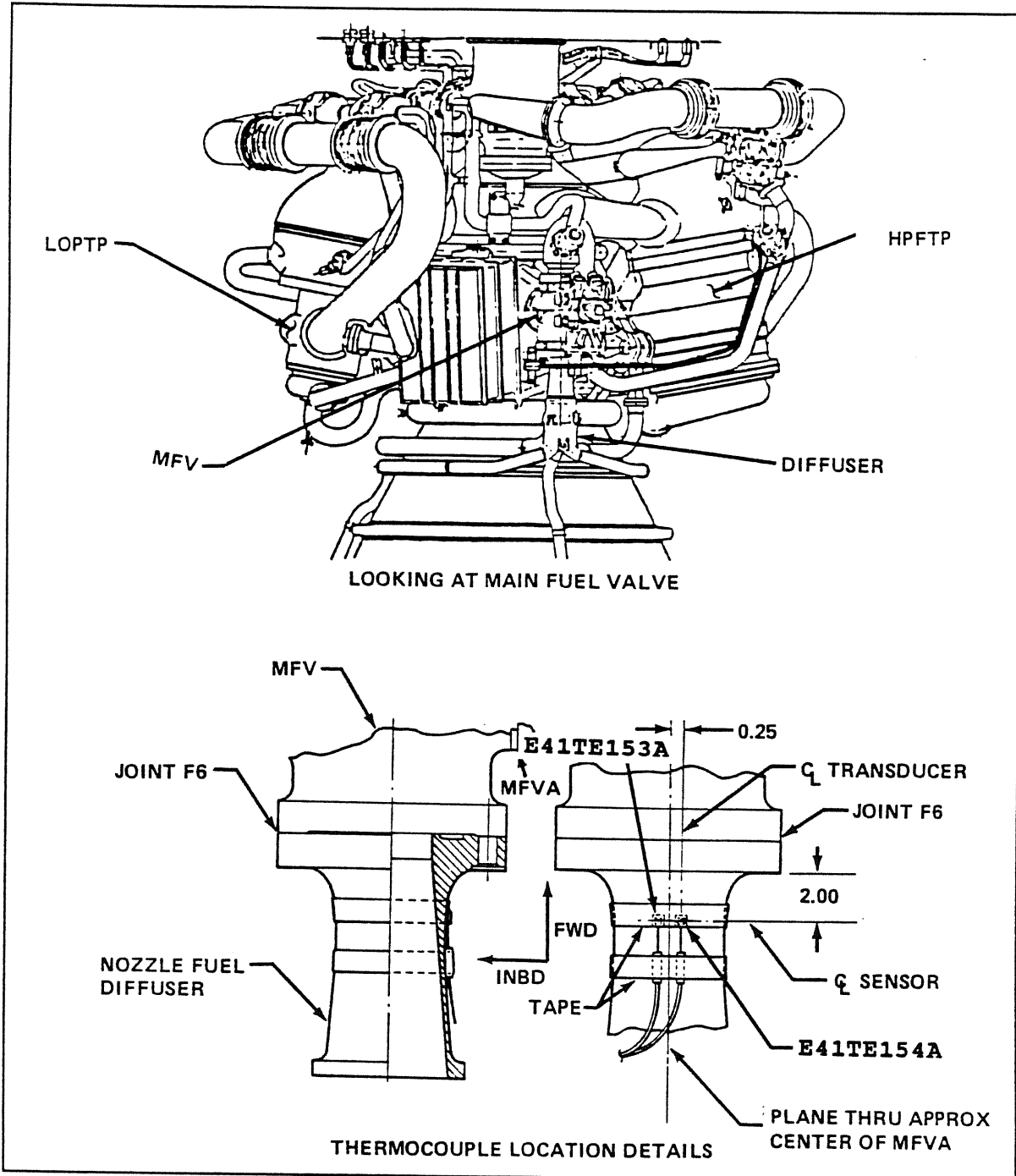


ASSOCIATED MSID'S

E41TE151A OPOV LOX SUPPLY LINE TEMP NO. 1, -325 TO 300 DEG R
 E41TE152A OPOV LOX SUPPLY LINE TEMP NO. 2, -325 TO 300 DEG R

4.7 DETAIL SSME SENSOR LOCATION MFV DOWNSTREAM TEMPERATURE

52

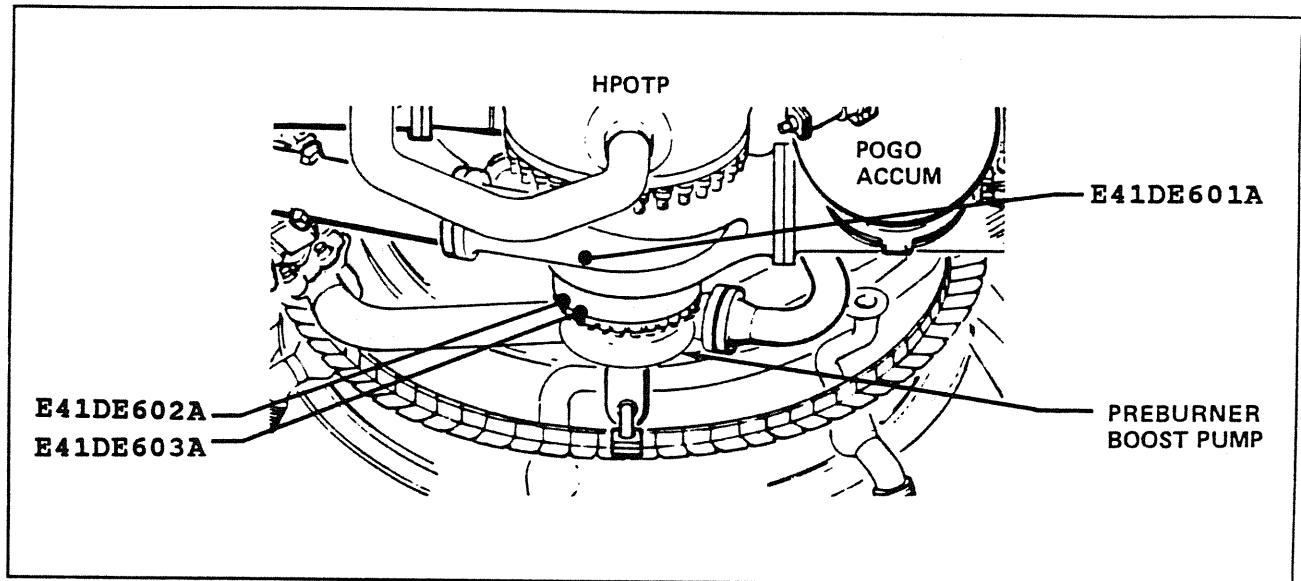


ASSOCIATED MSID'S

E41TE153A MFV DOWNSTREAM TEMP NO. 1, -430 TO 200 DEG R
 E41TE154A MFV DOWNSTREAM TEMP NO. 2, -430 TO 200 DEG R

4.7 DETAIL SSME SENSOR LOCATION FASCOS PBP RADIAL ACCELEROMETERS

53

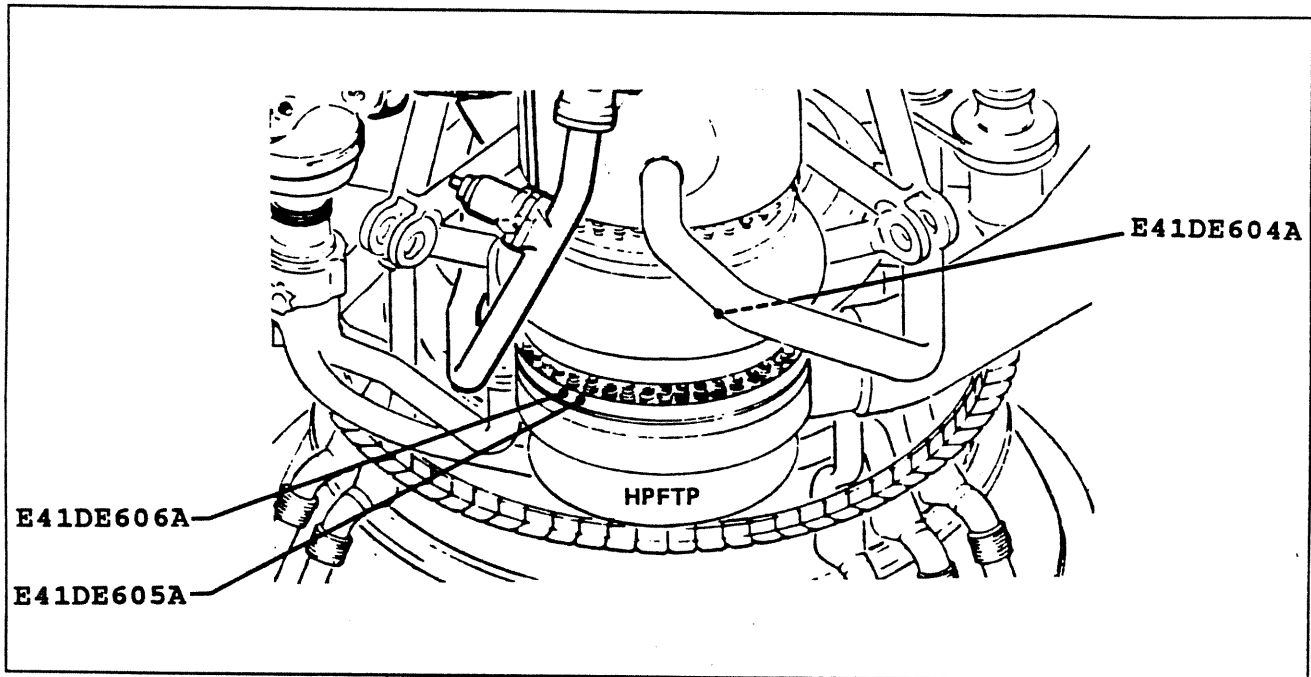


ASSOCIATED MSID'S

E41DE601A FASCOS PBP RAD 45 CH A2, -35 TO +35 G
E41DE602A FASCOS PBP RAD 135-1 CH B2, -35 TO +35 G
E41DE603A FASCOS PBP RAD 135-2 CH C2, -35 TO +35 G

4.7 DETAIL SSME SENSOR LOCATION FASCOS HPFP RADIAL ACCELEROMETERS

54

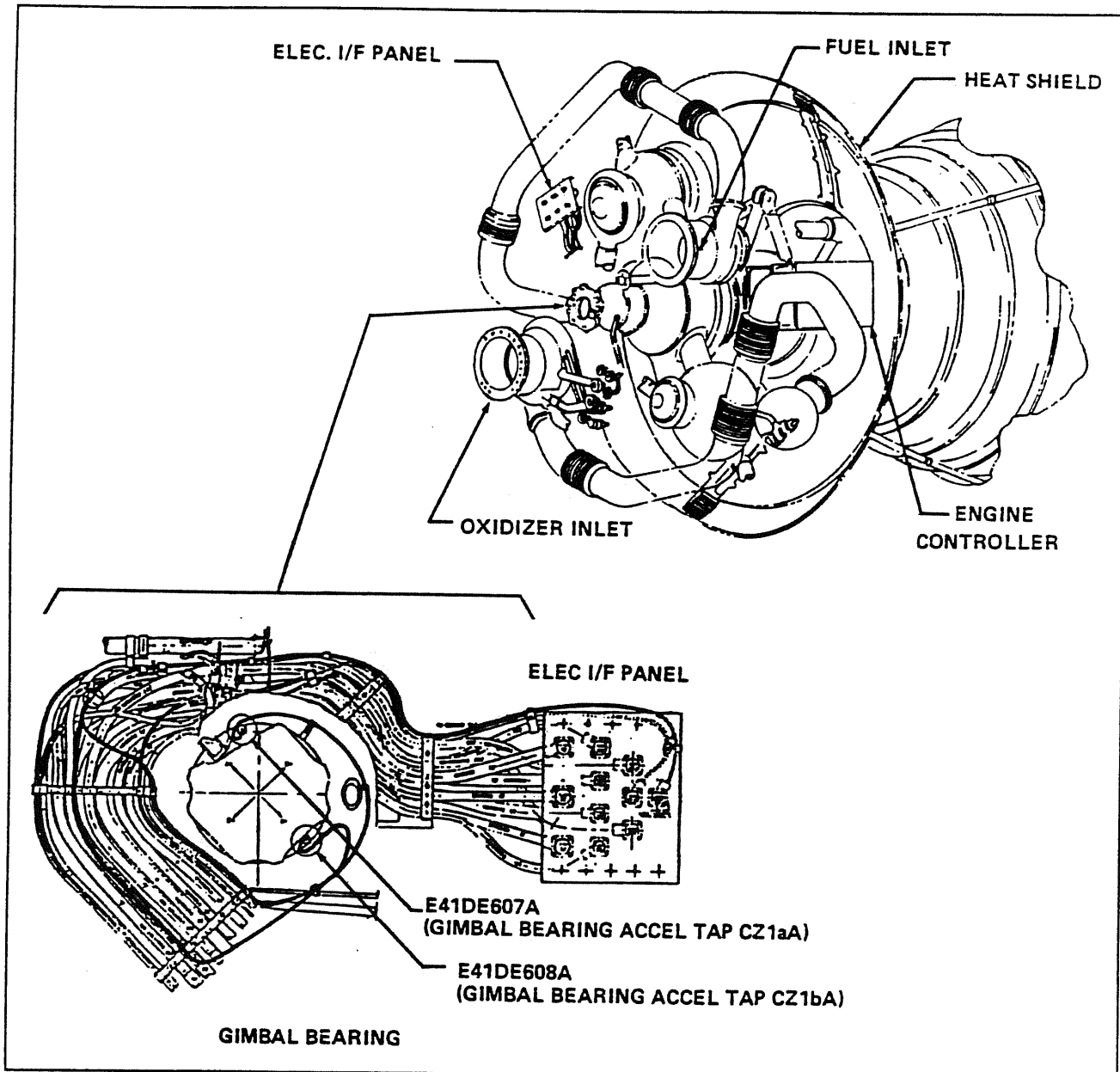


ASSOCIATED MSID'S

E41DE604A FASCOS HPFP RAD 0 CH A1, -35 TO +35 G
E41DE605A FASCOS HPFP RAD 174 CH B1, -35 TO +35 G
E41DE606A FASCOS HPFP RAD 186 CH C1, -35 TO +35 G

4.7 DETAIL SSME SENSOR LOCATION ENGINE VIBRATION (4000 HZ - GIMBAL BEARING)

55

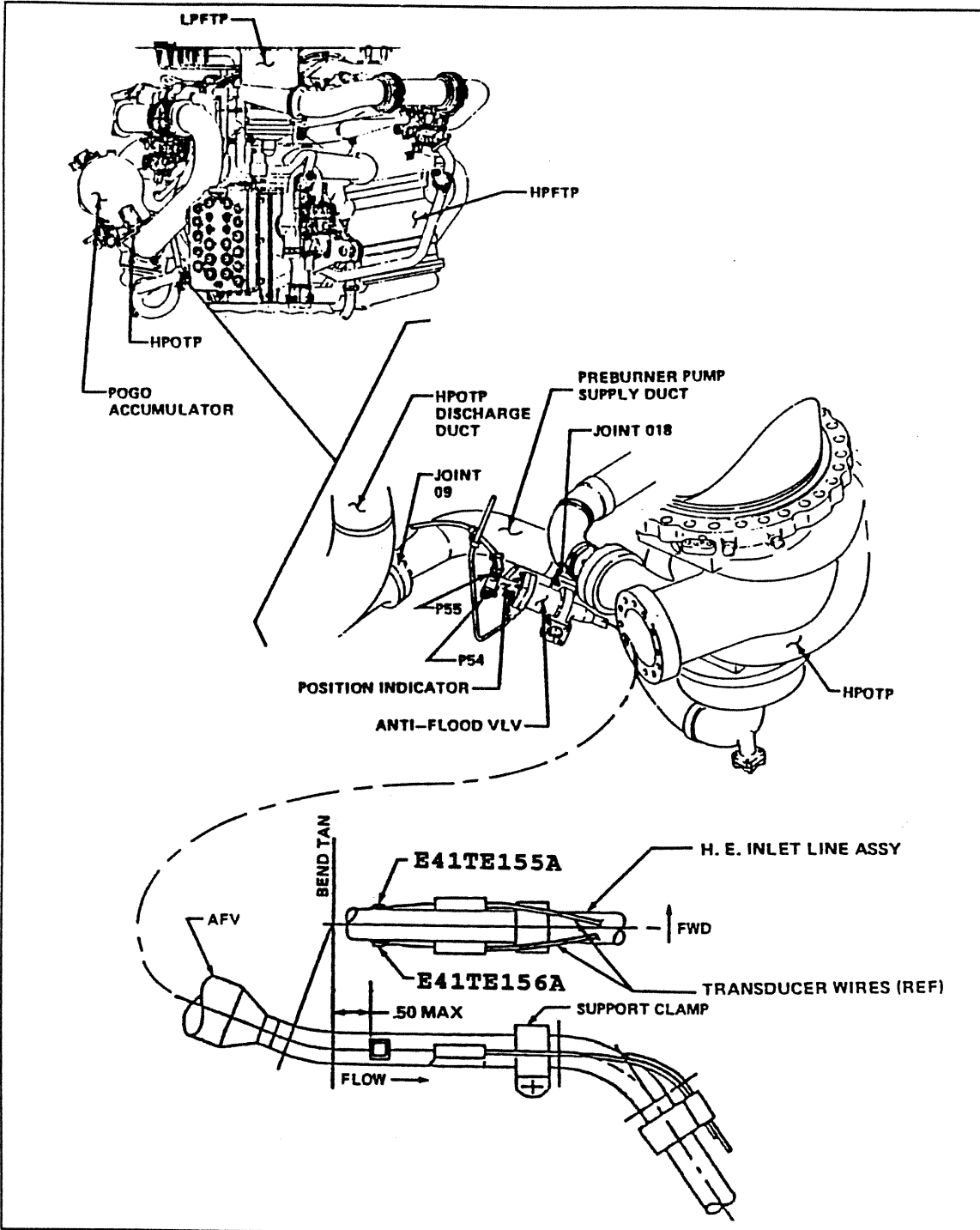


ASSOCIATED MSID'S

E41DE607A ENGINE VIBRATION - CH A, -425 TO 900 G P-P
 E41DE608A ENGINE VIBRATION - CH B, -425 TO 900 G P-P
 V08D9451A LFAP E1 GMBL PAD X-AXIS VIB AOE001, 0-12 G P-P *
 V08D9454A LFAP E2 GMBL PAD X-AXIS VIB AOE004, 0-12 G P-P *
 V08D9457A LFAP E3 GMBL PAD X-AXIS VIB AOE007, 0-12 G P-P *

* N/A FOR OV-102 (STS-28)

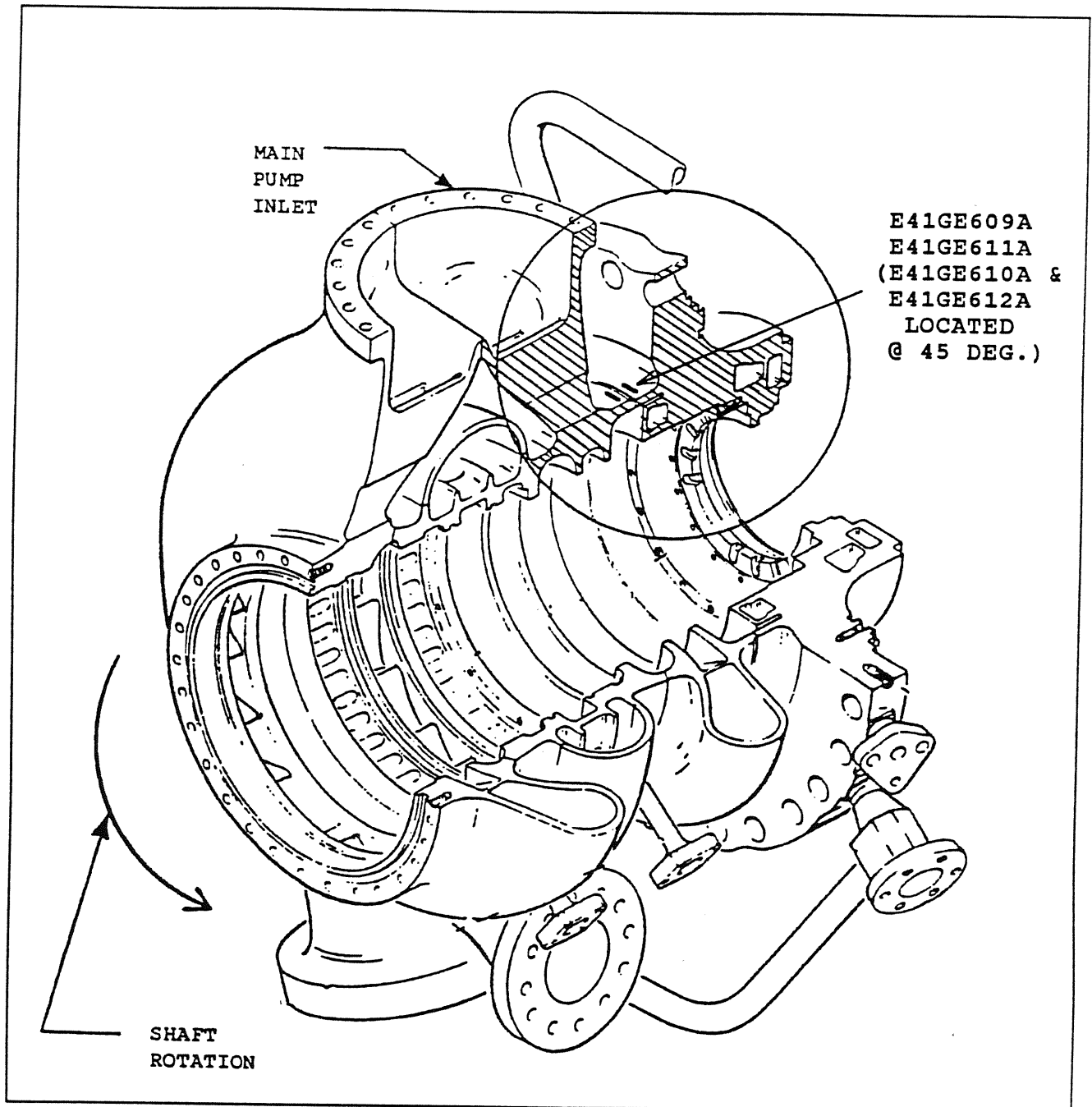
4.7 DETAIL SSME SENSOR LOCATION ANTI-FLOOD VALVE DOWNSTREAM TEMPERATURE



ASSOCIATED MSID'S

- E41TE155A AFV DOWNSTREAM TEMP NO. 1, -325 TO 300 DEG R
- E41TE156A AFV DOWNSTREAM TEMP NO. 2, -325 TO 300 DEG R

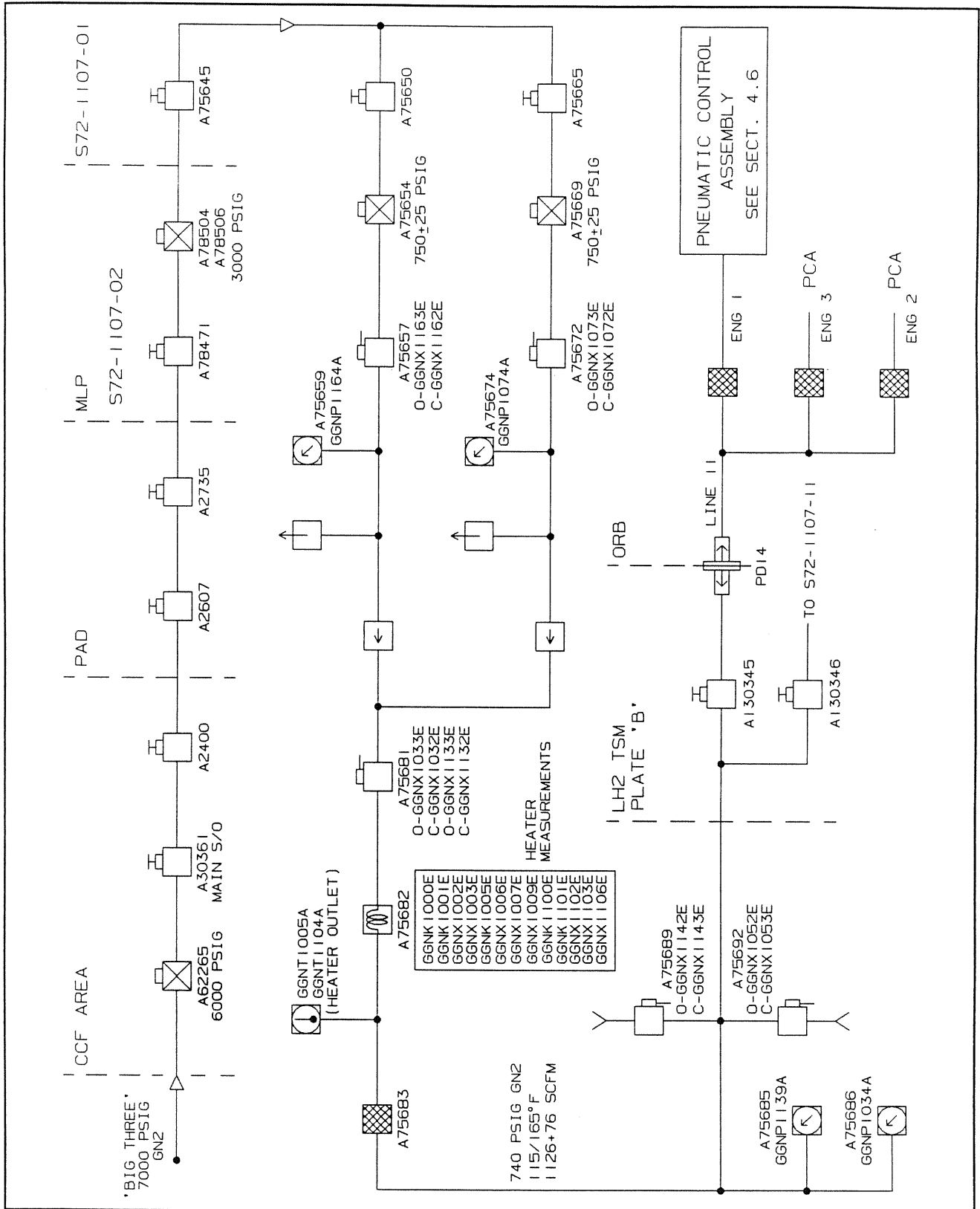
4.7 DETAIL SSME SENSOR LOCATION HPOTP STRAINS



ASSOCIATED MSID'S

E41GE609A HPOTP STRAIN GAGE R1(0 DEG/1) -500 TO +500 uIN/IN
E41GE610A HPOTP STRAIN GAGE R2(45 DEG/1) -500 TO +500 uIN/IN
E41GE611A HPOTP STRAIN GAGE R1(0 DEG/1) -500 TO +500 uIN/IN
E41GE612A HPOTP STRAIN GAGE R2(45 DEG/1) -500 TO +500 uIN/IN

4.8 SSME HEATED GN2 PURGE SUPPLY



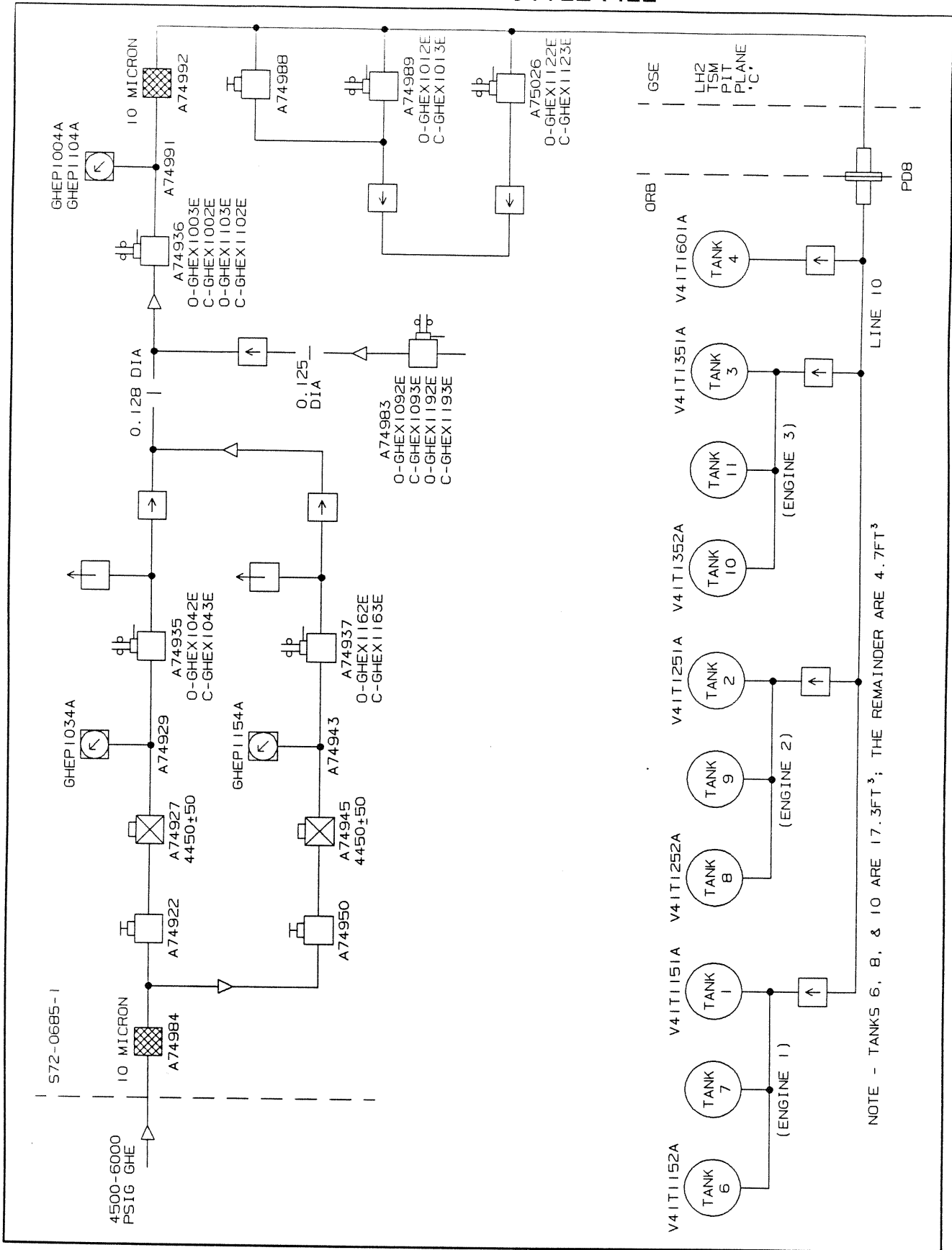
4.8 KSC SSME HEATED GN2 PURGE SUPPLY

GGNK1000E	MPENG GN2 SCR #1 AC PWR ON CMD,	ONE=ON	ZERO=OFF
GGNK1001E	MPENG GN2 SCR #1 ON CMD,	ONE=ON	ZERO=OFF
GGNX1002E	MPENG GN2 SCR #1 AC PWR ON IND,	ONE=ON	ZERO=OFF
GGNX1003E	MPENG GN2 SCR #1 ON IND,	ONE=ON	ZERO=OFF
GGNT1005A	MPENG GN2 PRG HTR TEMP,		-4 TO 302 DEGF
GGNK1005E	MPENG GN2 SCR #1 OVERTEMP OVER CMD,	ONE=ON	ZERO=OFF
GGNX1006E	MPENG GN2 SCR #1 RMT MODE ON IND,	ONE=ON	ZERO=OFF
GGNX1007E	MPENG GN2 SCR #1 OVTP ON IND,	ONE=ON	ZERO=OFF
GGNX1009E	MPENG GN2 SCR #1 OVTP OVR IND,	ONE=ON	ZERO=OFF
GGNX1032E	MPENG GN2 PRG CNT VLV CLD IND,	ONE=ON	ZERO=OFF
GGNX1033E	MPENG GN2 PRG CNT VLV OPN IND,	ONE=ON	ZERO=OFF
GGNP1034A	MPENG GN2 PRG OUT PRESS,		0 TO 1500 PSIG
GGNX1052E	MPENG GN2 PRG VNT OPN IND,	ONE=ON	ZERO=OFF
GGNX1053E	MPENG GN2 PRG VNT CLD IND,	ONE=ON	ZERO=OFF
GGNX1072E	MPENG GN2 PRG SO VLV CLD IND,	ONE=ON	ZERO=OFF
GGNX1073E	MPENG GN2 PRG S/O VLV OPN IND,	ONE=ON	ZERO=OFF
GGNP1074A	MPENG GN2 PRG PRESS,		0 TO 1500 PSIG
GGNK1100E	MPENG GN2 SCR #2 XFER ENABLE CMD,	ONE=ON	ZERO=OFF
GGNK1101E	MPENG GN2 SCR #2 ON CMD,	ONE=ON	ZERO=OFF
GGNX1102E	MPENG GN2 SCR #2 AC PWR ON IND,	ONE=ON	ZERO=OFF
GGNX1103E	MPENG GN2 SCR #2 ON IND,	ONE=ON	ZERO=OFF
GGNT1104A	MPENG GN2 PRG HTR TEMP (R),		-4 TO 302 DEGF
GGNX1106E	MPENG GN2 SCR #2 ENABLED IND,	ONE=ON	ZERO=OFF
GGNX1132E	MPENG GN2 PRG CNT VLV CLD IND (R),	ONE=ON	ZERO=OFF
GGNX1133E	MPENG GN2 PRG CNT VLV OPN IND (R),	ONE=ON	ZERO=OFF
GGNP1139A	MPENG GN2 PRG OUT PRESS (R),		0 TO 1500 PSIG
GGNX1142E	MPENG GN2 PRG VNT OPN IND (R),	ONE=ON	ZERO=OFF
GGNX1143E	MPENG GN2 PRG VNT CLD IND (R),	ONE=ON	ZERO=OFF
GGNX1162E	MPENG GN2 PRG S/O VLV CLD IND (R),	ONE=ON	ZERO=OFF
GGNX1163E	MPENG GN2 PRG S/O VLV OPN IND (R),	ONE=ON	ZERO=OFF
GGNP1164A	MPENG GN2 PRG PRESS,		0 TO 1500 PSIG

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5.0 ORBITER HELIUM

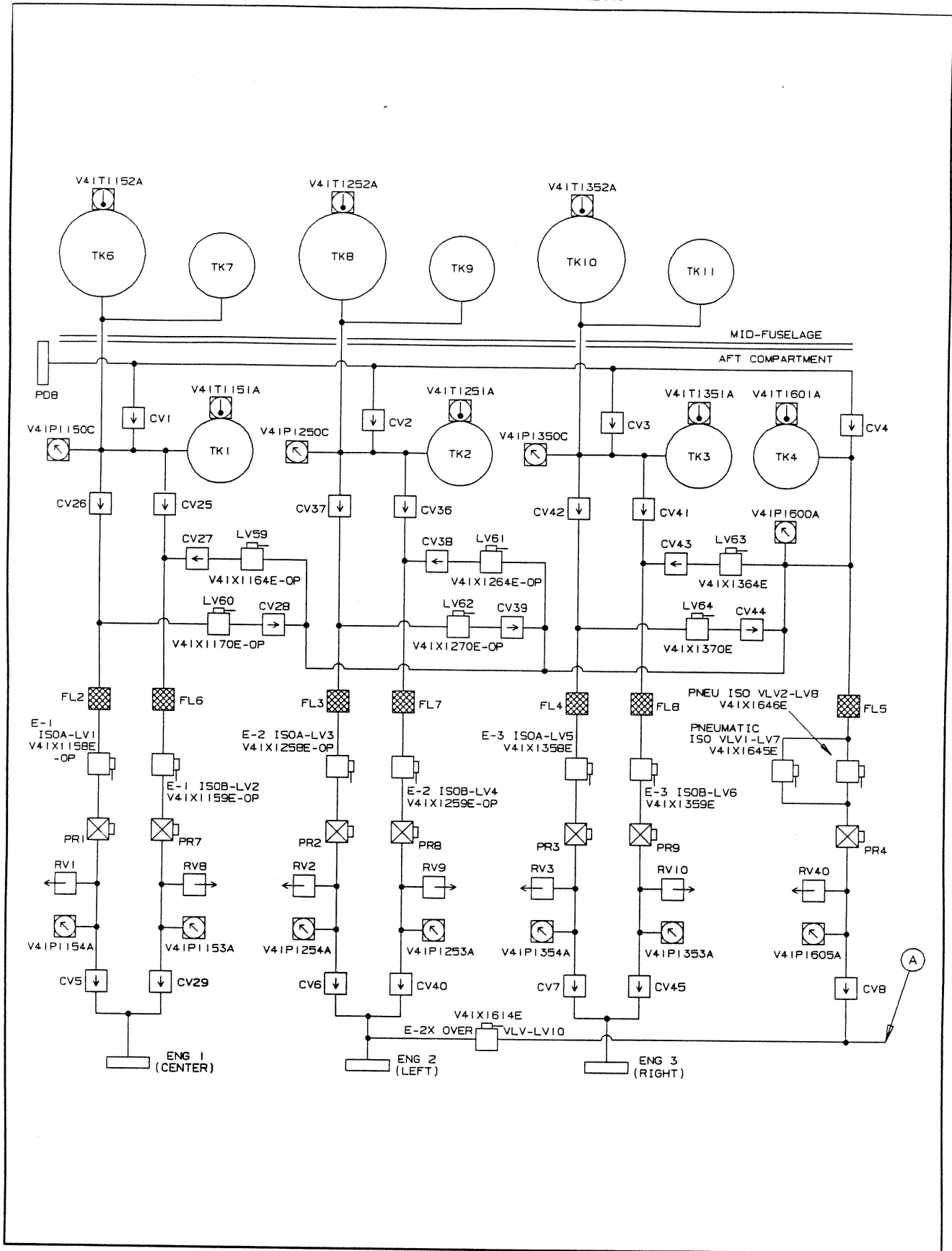
5.1 HELIUM BOTTLE FILL



5.1 MPS HELIUM BOTTLE FILL SCHEMATIC

GHEX1002E	MPHE FSYS S/O CLD IND, ONE=ON ZERO=OFF
GHEX1003E	MPHE FSYS S/O OPN IND, ONE=ON ZERO=OFF
GHEP1004A	MPHE FILL SYS OUTPUT PRESS, 0 TO 7500 PSIG
GHEX1012E	MPHE F/OUT VNT OPN IND, ONE=ON ZERO=OFF
GHEX1013E	MPHE F/OUT VNT CLD IND, ONE=ON ZERO=OFF
GHEP1034A	MPHE FILL SYS PRESS, 0 TO 10000 PSIG
GHEX1042E	MPHE FILL SYS CNT VLV OPN IND, ONE=ON ZERO=OFF
GHEX1043E	MPHE FILL SYS CNT VLV CLD IND, ONE=ON ZERO=OFF
GHEX1092E	MPHE FILL C/O CNT VLV OPN IND, ONE=ON ZERO=OFF
GHEX1093E	MPHE FILL C/O CNT VLV CLD IND, ONE=ON ZERO=OFF
GHEX1102E	MPHE FSYS S/O CLD IND (R), ONE=ON ZERO=OFF
GHEX1103E	MPHE FSYS S/O OPN IND (R), ONE=ON ZERO=OFF
GHEP1104A	MPHE FILL SYS OUTPUT PRESS, 0 TO 7500 PSIG
GHEX1122E	MPHE F/OUT VNT OPN IND (R), ONE=ON ZERO=OFF
GHEX1123E	MPHE F/OUT VNT CLD IND (R), ONE=ON ZERO=OFF
GHEP1154A	MPHE FILL SYS PRESS (R), 0 TO 10000 PSIG
GHEX1162E	MPHE FSYS CNT VLV OPN IND (R), ONE=ON ZERO=OFF
GHEX1163E	MPHE FSYS CNT VLV CLD IND (R), ONE=ON ZERO=OFF
GHEX1192E	MPHE FILL C/O CNT VLV OPN IND (R), ONE=ON ZERO=OFF
GHEX1193E	MPHE FILL C/O CNT VLV CLD IND (R), ONE=ON ZERO=OFF
V41T1151A	MPS E1 AFT FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1152A	MPS E1 MID FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1251A	MPS E2 AFT FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1252A	MPS E2 MID FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1351A	MPS E3 AFT FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1352A	MPS E3 MID FUSLG HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1601A	MPS PNEUMATIC VLV HE SUPPLY BOTTLE TEMP, -325 TO +300 DEGF

5.2 HELIUM SYSTEM

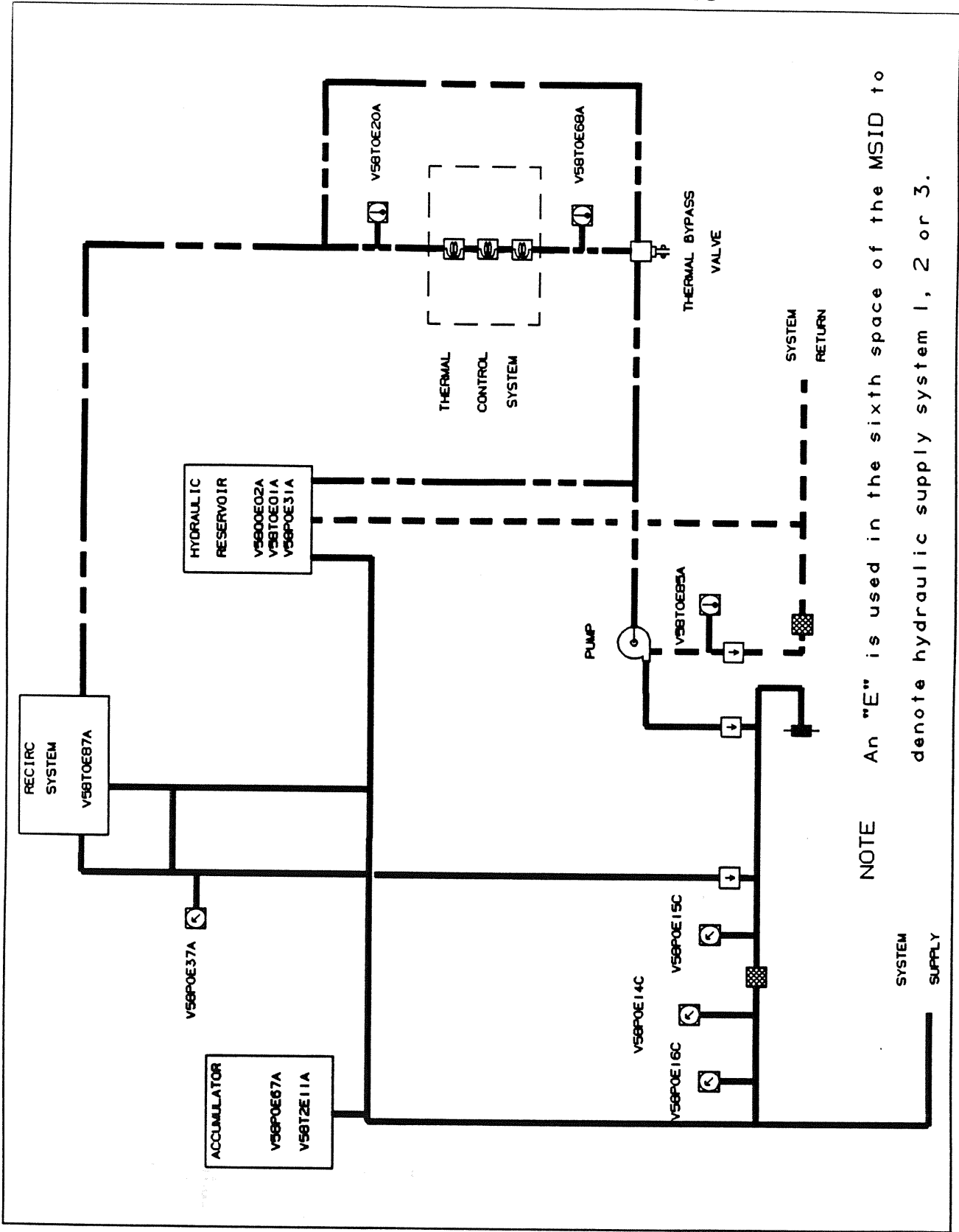


5.2 HELIUM SYSTEM SCHEMATIC

V41P1150C	MPS E1 HE SUPPLY BOTTLE PRESS, 0 TO +5000 PSIA
V41T1151A	MPS E1 AFT FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1152A	MPS E1 MID FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41P1153A	MPS E1 REG B HE OUTLET PRESS, 0 TO +1000 PSIA
V41P1154A	MPS E1 REG A HE OUTLET PRESS, 0 TO +1000 PSIA
V41X1158E	MPS E1 HE ISO VLV A (LV1) OP PWR, OFF ON EVENT
V41X1159E	MPS E1 HE ISO VLV A (LV2) OP PWR, OFF ON EVENT
V41X1164E	MPS E1 HE INTCN IN (LV59) OP PWR, OFF ON EVENT
V41X1170E	MPS E1 HE INTCN OUT (LV60) OP PWR, OFF ON EVENT
V41P1250C	MPS E2 HE SUPPLY BOTTLE PRESS, 0 TO +5000 PSIA
V41T1251A	MPS E2 AFT FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1252A	MPS E2 MID FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41P1253A	MPS E2 REG B HE OUTLET PRESS, 0 TO +1000 PSIA
V41P1254A	MPS E2 REG A HE OUTLET PRESS, 0 TO +1000 PSIA
V41X1258E	MPS E2 HE ISO VLV A (LV3) OP PWR, OFF ON EVENT
V41X1259E	MPS E2 HE ISO VLV A (LV4) OP PWR, OFF ON EVENT
V41X1264E	MPS E2 HE INTCN IN (LV61) OP PWR, OFF ON EVENT
V41X1270E	MPS E2 HE INTCN OUT (LV62) OP PWR, OFF ON EVENT
V41P1350C	MPS E3 HE SUPPLY BOTTLE PRESS, 0 TO +5000 PSIA
V41T1351A	MPS E3 AFT FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41T1352A	MPS E3 MID FUSELAGE HE SUPPLY TEMP, -325 TO +300 DEGF
V41P1353A	MPS E3 REG B HE OUTLET PRESS, 0 TO +1000 PSIA
V41P1354A	MPS E3 REG A HE OUTLET PRESS, 0 TO +1000 PSIA
V41X1358E	MPS E3 HE ISO VLV A (LV5) OP PWR, OFF ON EVENT
V41X1359E	MPS E3 HE ISO VLV A (LV6) OP PWR, OFF ON EVENT
V41X1364E	MPS E3 HE INTCN IN (LV63) OP PWR, OFF ON EVENT
V41X1370E	MPS E3 HE INTCN OUT (LV64) OP PWR, OFF ON EVENT
V41P1600A	MPS PNEU VLVS HE SUPPLY BOTTLE PRESS, 0 TO +5000 PSIA
V41T1601A	MPS PNEU VLVS HE SUPPLY BOTTLE TEMP, -325 TO +300 DEGF
V41P1605A	MPS PNEU VLVS REG HE OUTLET PRESS, 0 TO 1000 PSIA
V41X1614E	MPS REG HE XOVER VLV (LV10) OP PWR, OFF ON EVENT
V41X1632E	MPS HE SUPPLY BLOWDOWN 1 (LV26) OP PWR, OFF ON EVENT
V41X1634E	MPS HE SUPPLY BLOWDOWN 2 (LV27) OP PWR, OFF ON EVENT
V41X1645E	MPS PNEU HE ISO VLV 1 (LV7) OP PWR, OFF ON EVENT
V41X1646E	MPS PNEU HE ISO VLV 2 (LV8) OP PWR, OFF ON EVENT
V41P1650A	MPS PNEU ACCUMULATOR PRESSURE, 0 TO 1000 PSIA

6.0 MPS HYDRAULICS

6.1 MPS HYDRAULIC SCHEMATIC



NOTE An "E" is used in the sixth space of the MSID to denote hydraulic supply system 1, 2 or 3.

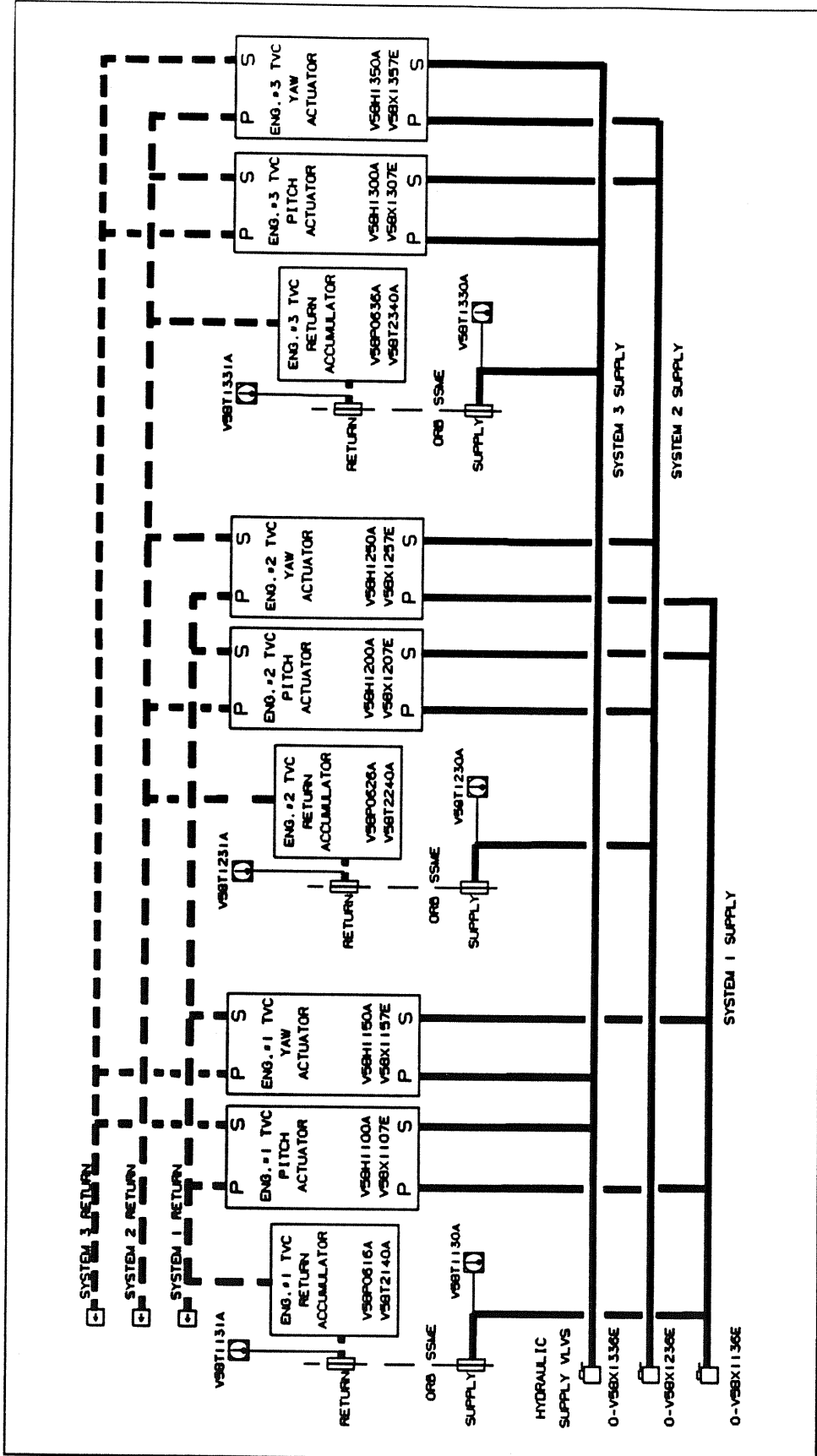
6.1 MPS HYDRAULIC SCHEMATIC

V58P0E14C	HYD SYS SUPPLY PRESS A, 0 TO 4000 PSIA
V58P0E15C	HYD SYS SUPPLY PRESS B, 0 TO 4000 PSIA
V58P0E16C	HYD SYS SUPPLY PRESS C, 0 TO 4000 PSIA
V58P0E31A	HYD SYS RSVR FLUID PRESS, 0 TO 250 PSIA
V58P0E37A	HYD SYS CIRC PUMP PRESS, 0 TO 800 PSIA
V58P0E67A	HYD SYS BOOTSTRAP ACCUM GN2 PRESS, 0 TO 4000 PSIA
V58Q0E02A	HYD SYS FLUID VOLUME, 0 TO 100 PCT
V58T0E01A	HYD SYS RSVR FLUID TEMP, -75 TO 300 DEGF
V58T0E20A	HYD SYS FLUID HEATER OUT TEMP, -75 TO 300 DEGF
V58T0E68A	HYD SYS LO2 ET UMB RTN ACT R LN T, -75 TO 300 DEGF
V58T0E83A	HYD SYS LO2 ET UMB RTN ACT R LN T, -75 TO 300 DEGF *
V58T0E85A	HYD SYS MN PMP CASE DRAIN LN TEMP, -75 TO 300 DEGF
V58T0E86A	HYD SYS LH2 ET UMB RTN ACT R LN T, -75 TO 300 DEGF *
V58T0E87A	HYD SYS CIRC PUMP BODY TEMP, -75 TO 300 DEGF
V58T2E11A	HYD SYS BOOTSTRAP ACCUM TEMP, -75 TO 300 DEGF

* NOT SHOWN

NOTE: AN "E" IS USED IN THE SIXTH SPACE IN THE MSID NUMBER TO DENOTE HYDRAULIC SYSTEM 1, 2, OR 3.

6.2 SSME THRUST VECTOR CONTROL



6.2 SSME THRUST VECTOR CONTROL

V58H1E00A	MPS ENG PITCH ACTR POSN, -10.5 TO 10.5 DEG
V58H1E50A	MPS YAW PITCH ACTR POSN, -8.5 TO 8.5 DEG
V58P06E6A	HYD ACCUM SYS RTN ACCUM PRESS, 0 TO 400 PSIA
V58T1E30A	HYD SYS INTFC PRES LN TEMP, -75 TO 300 DEGF
V58T1E31A	HYD SYS INTFC RETURN LN TEMP, -75 TO 300 DEGF
V58T2E40A	HYD SYS SSME ACCUM TEMP, -75 TO 300 DEGF
V58X0E35E	HYD CIRC PMP 1 MN A PWR/B INHBT, OFF ON EVENT *
V58X0E36E	HYD CIRC PMP 1 MN B PWR/A INHBT, OFF ON EVENT *
V58X1E07E	HYD SYS ME/TVC ISOL V OP IND, OPEN EVENT
V58X1E36E	HYD SYS ME/TVC ISOL V OP IND, OPEN EVENT
V58X1E57A	YAW TVC ACTR SW V ACTV POSN, OFF ON EVENT

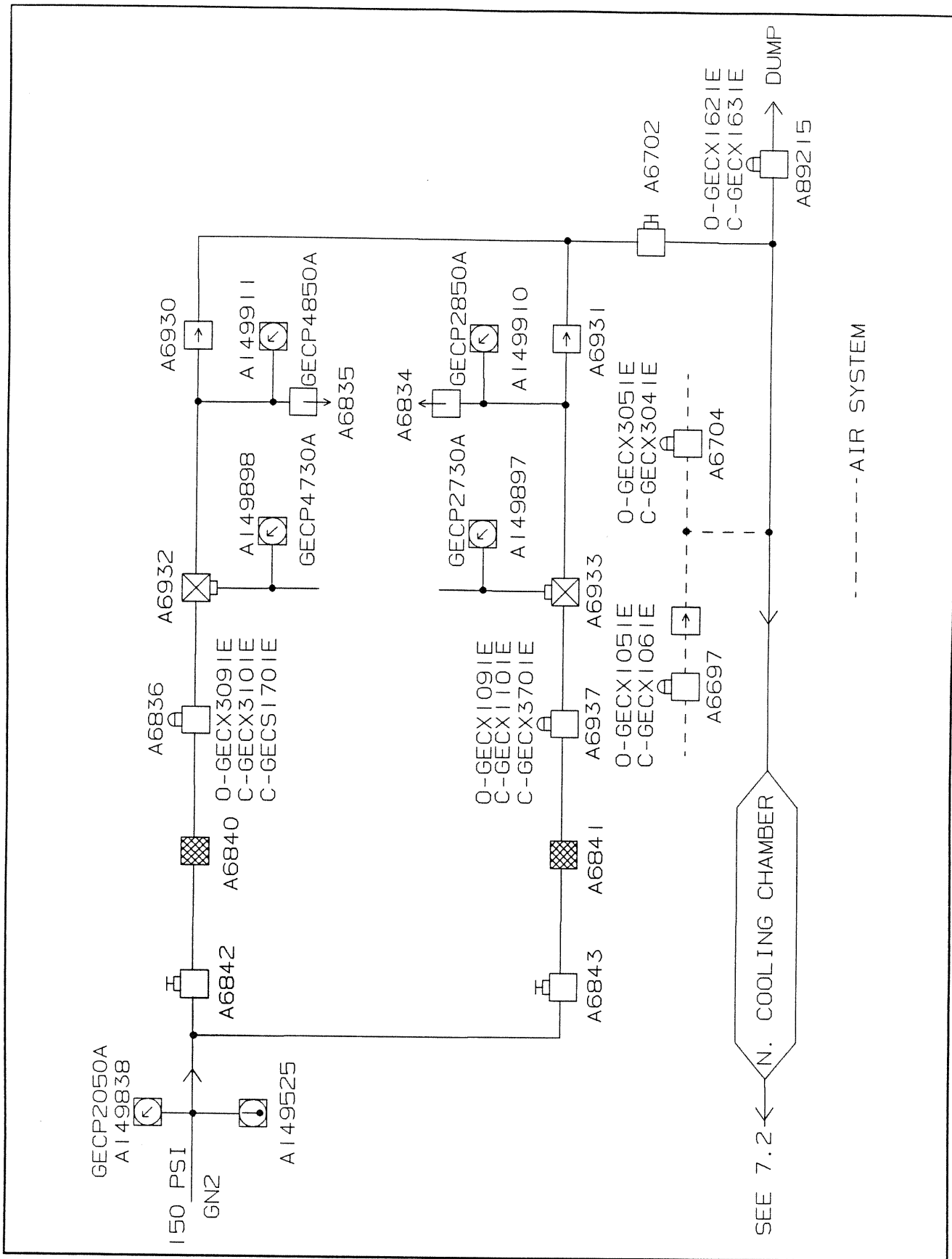
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NOTE: AN "E" IS USED IN THE SIXTH OR SEVENTH SPACE IN THE MSID NUMBER TO DENOTE HYDRAULIC SYSTEM 1, 2, OR 3.

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7.0 ENVIRONMENTAL COMPARTMENT PURGES

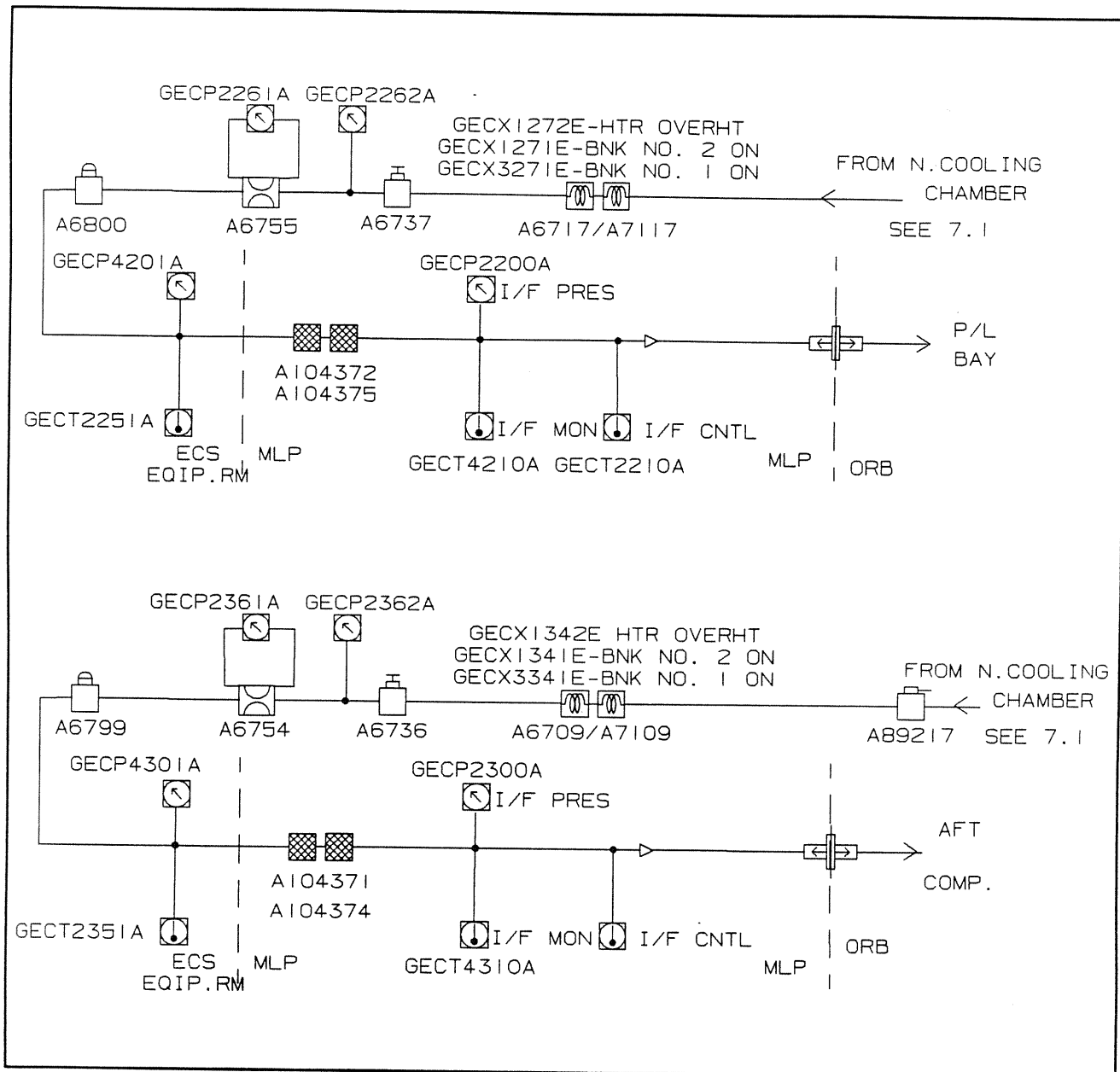
7.1 KSC PURGE CIRCUIT SUPPLY



7.1 KSC PURGE CIRCUIT SUPPLY

GECX1051E	A6697 N BLWD DIS MAIN VLV #2 OPEN IND, ONE=ON ZERO=OFF
GECX1061E	A6697 N BLWR DIS MAIN VLV #2 CLOSED IND, ONE=ON ZERO=OFF
GECX1091E	A6837 PURGE GN2 VLV #1 OPEN IND, ONE=ON ZERO=OFF
GECX1101E	A6837 PURGE GN2 VLV #1 CLOSED IND, ONE=ON ZERO=OFF
GECX1621E	A89215 DUMP VALVE OPEN IND, ONE=ON ZERO=OFF
GECX1631E	A89215 DUMP VALVE CLOSED IND, ONE=ON ZERO=OFF
GECX1701E	A6836 PURGE GN2 VLV NO 2 RED CLOSED IND, ONE=ON ZERO=OFF
GECX2050A	PURGE GN2 SUPPLY PRESS IND, 0.0 TO 200.0 PSIG
GECT2060A	PURGE GN2 SUPPLY TEMP IND, -50.0 TO 212.0 DEGF
GECX2850A	A6834 PURGE GN2 REL VLV #1 PRESS IND, 0 TO 25 PSIG
GECX3041E	A6704 STDBY BLWR ON N MAIN VLV #3 CL IND, ONE=ON ZERO=OFF
GECX3051E	A6704 STDBY BLWR ON N MAIN VLV #3 OP IND, ONE=ON ZERO=OFF
GECX3091E	A6836 PURGE GN2 VLV #2 OPEN IND, ONE=ON ZERO=OFF
GECX3101E	A6836 PURGE GN2 VLV #2 CLOSED IND, ONE=ON ZERO=OFF
GECX3701E	PURGE GN2 VLV NO 1 RED CLOSED IND, ONE=ON ZERO=OFF
GECX4850A	A6835 PURGE GN2 REL VLV #2 PRESS IND, 0 TO 25 PSIG
GECX2730A	PRG GN2 REG #1 DOME PRESS 0 TO 25 PSIG
GECX4730A	PRG GN2 REG #2 DOME PRESS 0 TO 25 PSIG

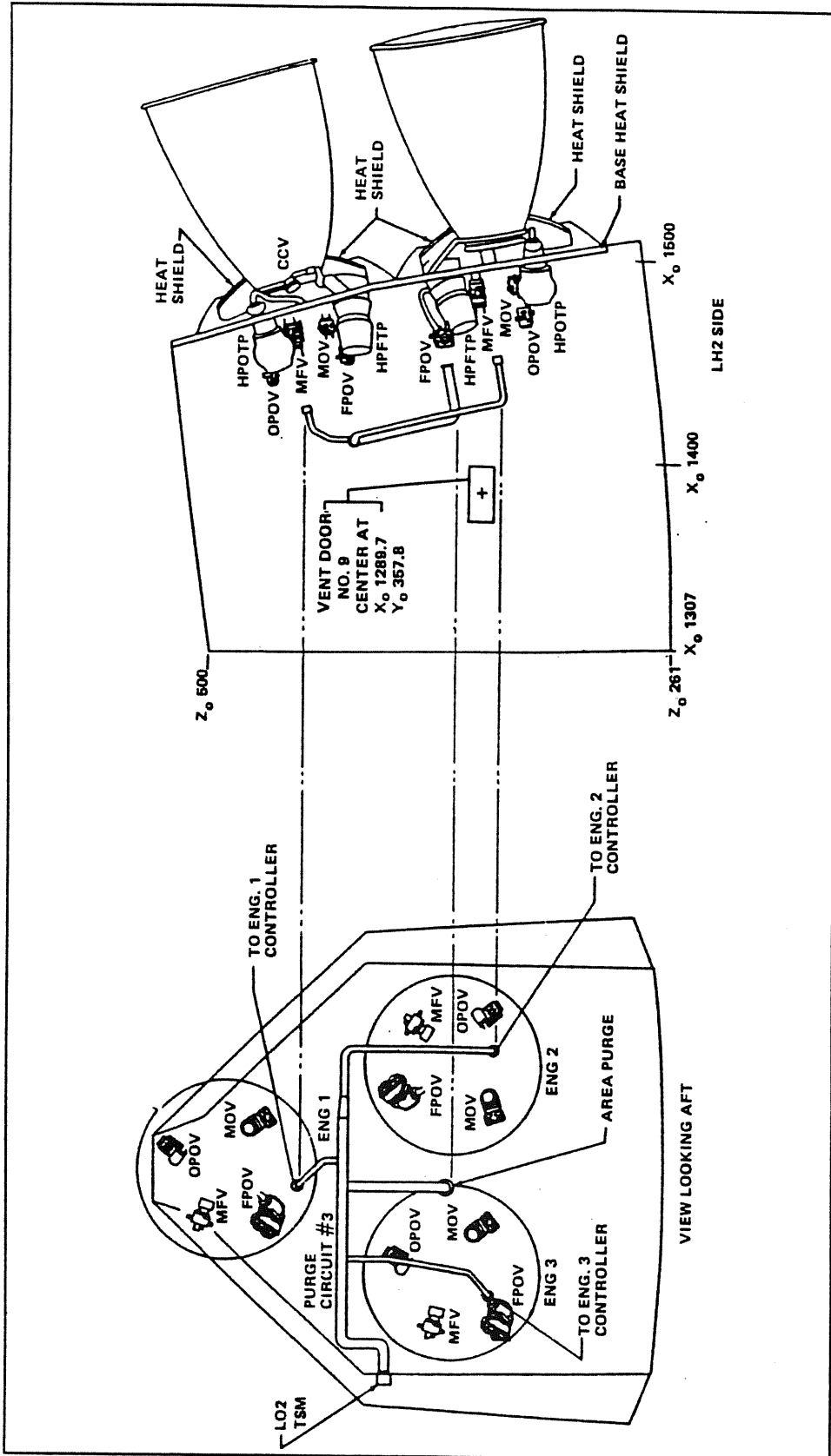
7.2 KSC PURGE CIRCUIT 2 (PAYLOAD BAY), AND 3 (AFT FUSELAGE)



7.2 KSC PURGE CIRCUIT 2 AND 3

GECX1341E A6709 ORB AFT HEATER BAN #2 ON IND, ONE=ON ZERO=OFF
GECX1342E A6709/A7109 ORB AFT HEATERS OVERHEAT ND, ONE=ON ZERO=OFF
GECP2300A ORB AFT INTERFACE PRESS IND, 0 TO 138 IN/H2O
GECT2310A ORB AFT INTERFACE TEMP CNTL IND, +50 TO 120 DEGF
GECT2351A ORB AFT DUCT TEMP IND, -4 TO 302 DEGF
GECT2361A A6754 ORB AFT DUCT FLOW DIFF PRESS IND, 0 TO 19343 IN/H2O
GECP2362A AFT DUCT STATIC PRESS IND, 0 TO 5 PSIG
GECX3341E A7109 ORB AFT HEATER BANK #1 ON IND, ONE=ON ZERO=OFF
GECP4301A ORB AFT DUCT PRESS IND, 0 TO 138 IN/H2O
GECT4310A ORB AFT INTERFACE TEMP MONITOR IND, +50 TO 120 DEGF
GECX1271E A6717 ORB PLB HEATER BANK #2 ON IND, ONE=ON ZERO=OFF
GECX1272E A6717/A7117 ORB PLB HEATERS OVERHEAT IND, ONE=ON
ZERO=OFF
GECP2200A ORB PLB INTERFACE PRESS IND, 0 TO 415 IN/H2O
GECT2210A ORB PLB INTERFACE TEMP CNTL IND, +30 TO +100 DEGF
GECT2251A ORB PLB DUCT TEMP IND, +30 TO +300 F
GECP2261A ORB PLB DUC FLOW DIFF PRESS IND, 0 TO 83.1 IN/H2O
GECP2262A PLB DUCT STATIC PRESS IND, 0 TO 25 PSIG
GECX3271E A7117 ORB PLB HEATER BANK #1 ON IND, ONE=ON ZERO=OFF
GECP4201A ORB PLB DUCT PRESS IND, 0 TO 693 IN/H2O
GECT4210A ORB PLB INTERFACE TEMP MONITOR IND, +30 TO +100 F

7.3 AFT COMPARTMENT PURGE (CIRCUIT NO. 3)



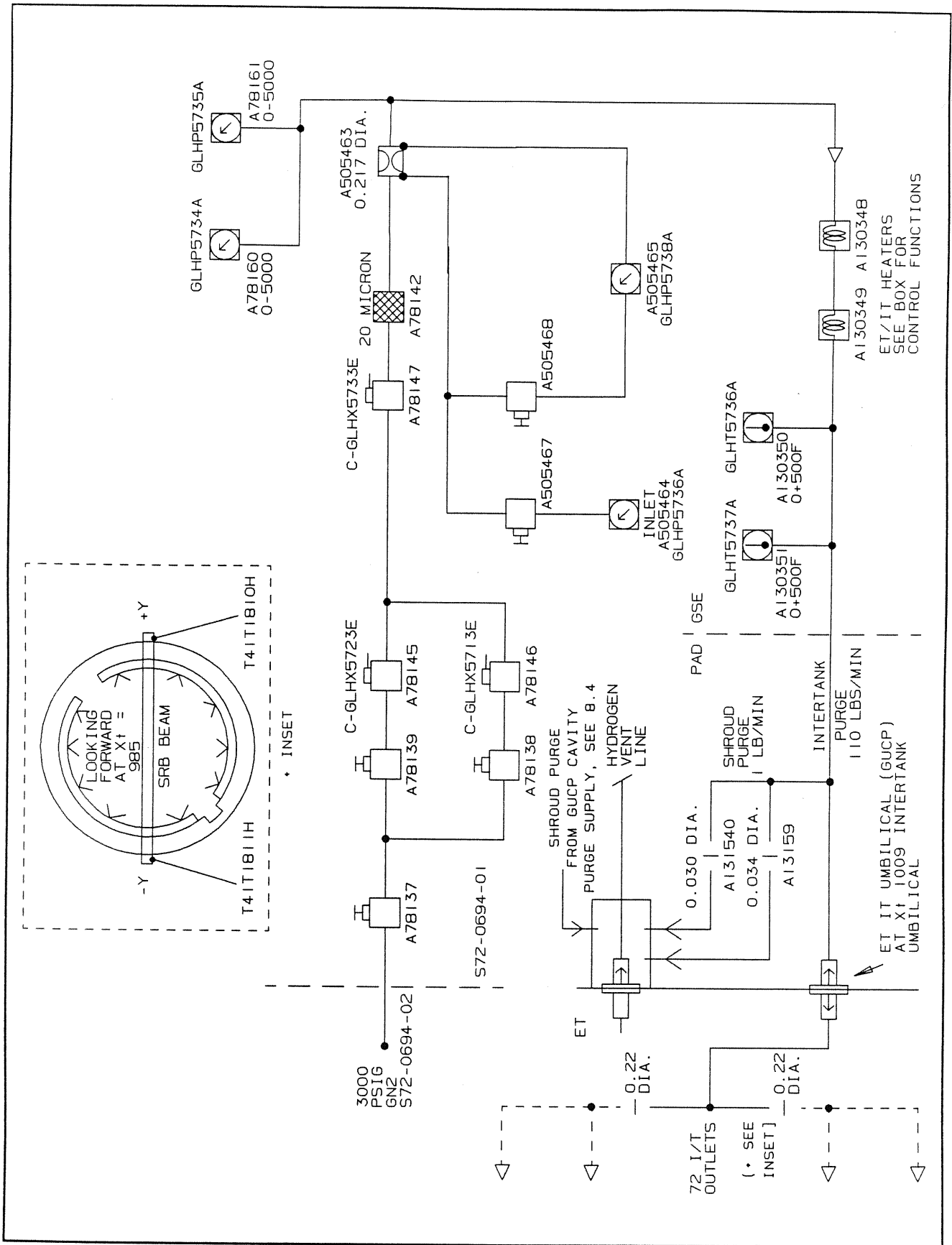
7.3 AFT COMPARTMENT PURGE (CIRCUIT NO. 3)

ASSOCIATED MSIDS

V07P9077A *FWD P/L DOOR DELTA P, -2.5 TO +2.5 PSID
V07P9083A *CARGO BAY LINER DELTA PRESS, -1.0 TO + 1.0 PSID
V07P9087A *PLB INT PRESSURE AT 576 BULKHEAD, 0 TO +15 PSIA
V07P9225A *PAYLOAD BAY VENT #6R PRESSURE, 0 TO +15 PSIA
V07P9301A *376 BULKHEAD DELTA PRESS, -1.0 TO +1.0 PSID
V07P9302A *582 BULKHEAD DELTA PRESS, -2.5 TO +2.5 PSID
V07P9303A *1307 BULKHEAD DELTA PRESS, -2.5 TO +2.5 PSIA
V07P9304A *OMS POD/AFT-FUSE DECK DELTA PRESS, -1.0 TO +1.0 PSID
V07P9305A *WING/PAYLD BAY INTFC DELTA PRESS, -1.0 TO +1.0 PSID
V07P9306A *BASE HEAT SHIELD DELTA PRESS, -2.5 TO +2.5 PSID
V07P9379A FUSL BASE PRESS NO 09, 0 TO 15 PSIA
V59X3805X L AFT VENTS 8&9 CLOSED 1, CLD EVENT
V59X3815X L AFT VENTS 8&9 CLOSED 2, CLD EVENT
V59X3855X L AFT VENTS 8&9 OPEN 1, OPEN EVENT
V59X3865X L AFT VENTS 8&9 OPEN 2, OPEN EVENT
V59X3905X L AFT VENTS 8&9 PURGE IND 1, PURGE EVENT
V59X3915X L AFT VENTS 8&9 PURGE IND 2, PURGE EVENT
V59X4805X R AFT VENTS 8&9 CLOSED 1, CLD EVENT
V59X4815X R AFT VENTS 8&9 CLOSED 2, CLD EVENT
V59X4855X R AFT VENTS 8&9 OPEN 1, OPEN EVENT
V59X4865X R AFT VENTS 8&9 OPEN 2, OPEN EVENT
V59X4905X R AFT VENTS 8&9 PURGE IND 1, PURGE EVENT
V59X4915X R AFT VENTS 8&9 PURGE IND 2, PURGE EVENT
V61X2045E CABIN VENT CLOSED, CLOSE EVENT, -2.5 TO 2.5 PSIA
V61X2065E CABIN VENT OPENED, OPEN EVENT, -2.5 TO 2.5 PSIA

* THESE MSID'S EFFECTIVE FOR OV103 ONLY

7.4 ET INTERTANK PURGE



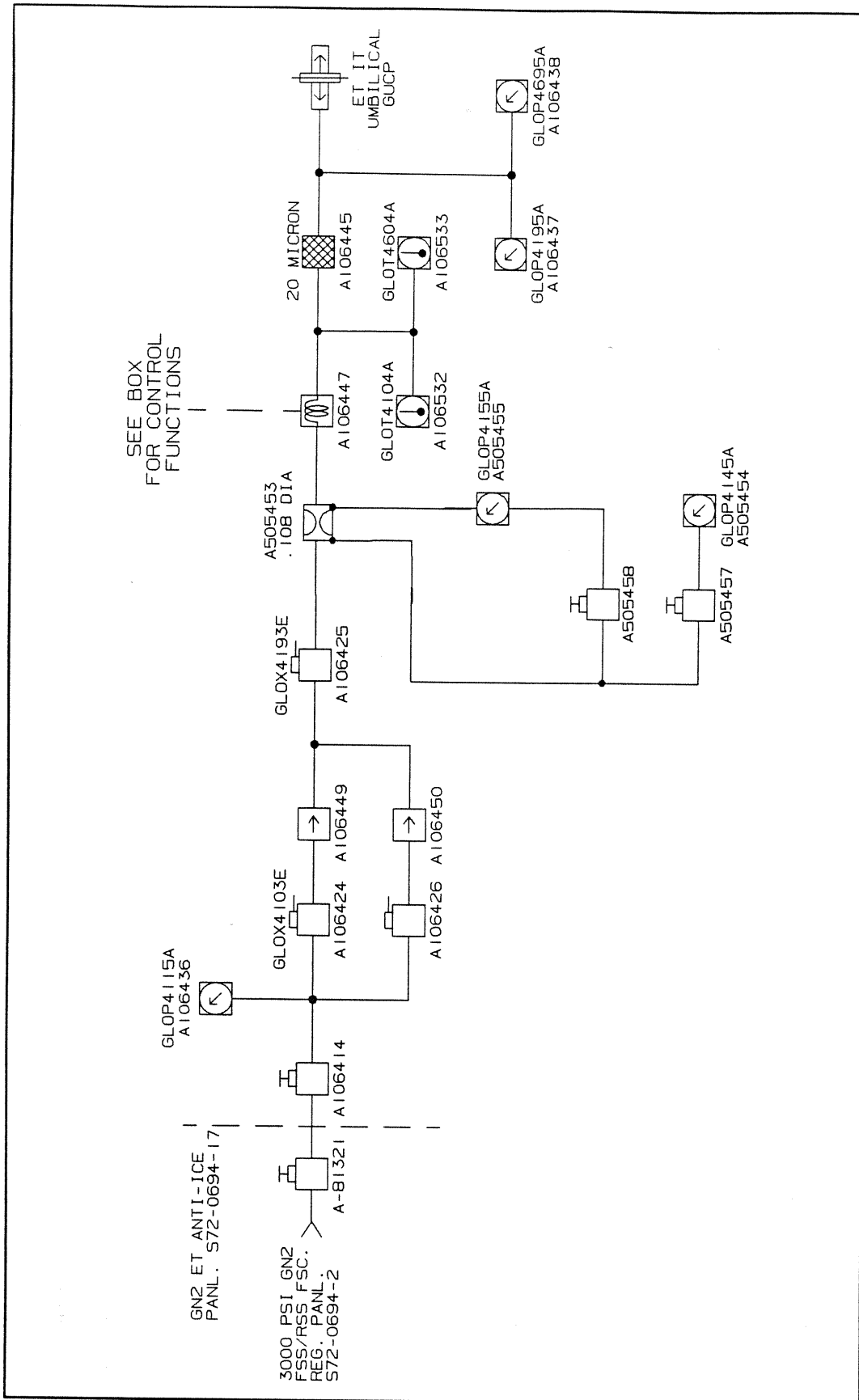
7.4 ET INTERTANK PURGE

HEATER CONTROL FUNCTIONS	PRIMARY	SECONDARY
TEMP CONT. SET PT	GLHK3861A	GLHK3961A
AC PWR ON CMD	GLHK3811E	GLHK3911E
AC PWR ON IND	GLHX3813E	GLHX3913E
SCR PWR ON CMD	GLHK3831E	GLHK3931E
SCR PWR ON CMD	GLHX3833E	GLHX3933E
OVRTEMP OVRD CMD	GLHK3851E	GLHK3951E
HTR OVERTEMP	GLHX3855E	GLHX3955E
CTRL LOOP SET CMD	GLHK3841E	GLHK3941E
INT SET PT CMD	GLHK3871E	GLHK3971E

ASSOCIATED MSID'S

GLHX5713E	A78146 ET/IT SEC PRG SPL VLV CL 1, ONE-ON ZERO-OFF
GLHX5723E	A78145 ET/IT PRI PRG SPL VLV CL 1, ONE-ON ZERO-OFF
GLHX5733E	A78147 ET/IT GN2 PRG O/PT VLV CL 1, ONE-ON ZERO-OFF
GLHP5734A	A78160 ET/IT GN2 PRI PRG O/PUT PRS,) TO 5000 PSIG
GLHP5735A	A78160 ET/IT GN2 SC PG OUT PRSS, 0 TO 5000 PSIG
GLHT5736A	A130350 ET/IT GN2 PURGE PRI TEMP, 0 TO +500 DEGF
GLHT5737A	A130351 ET/IT GN2 PURGE SEC TEMP, 0 TO +500 DEGF
GLHP5736A	A505464 ET/IT PRI VENTURI INLET PR, 0-5000 PSIG
GLHP5738A	A505465 ET/IT PRI VENTURI DIFF PR, 0-1500 PSID
T41T1810H	INTERTANK COMPT GAS TEMP 1, -4 to 158 DEGF
T41T1811H	INTERTANK COMPT GAS TEMP 2, -4 to 158 DEGF

7.5 ET HEATED NOSE CONE PURGE SUPPLY



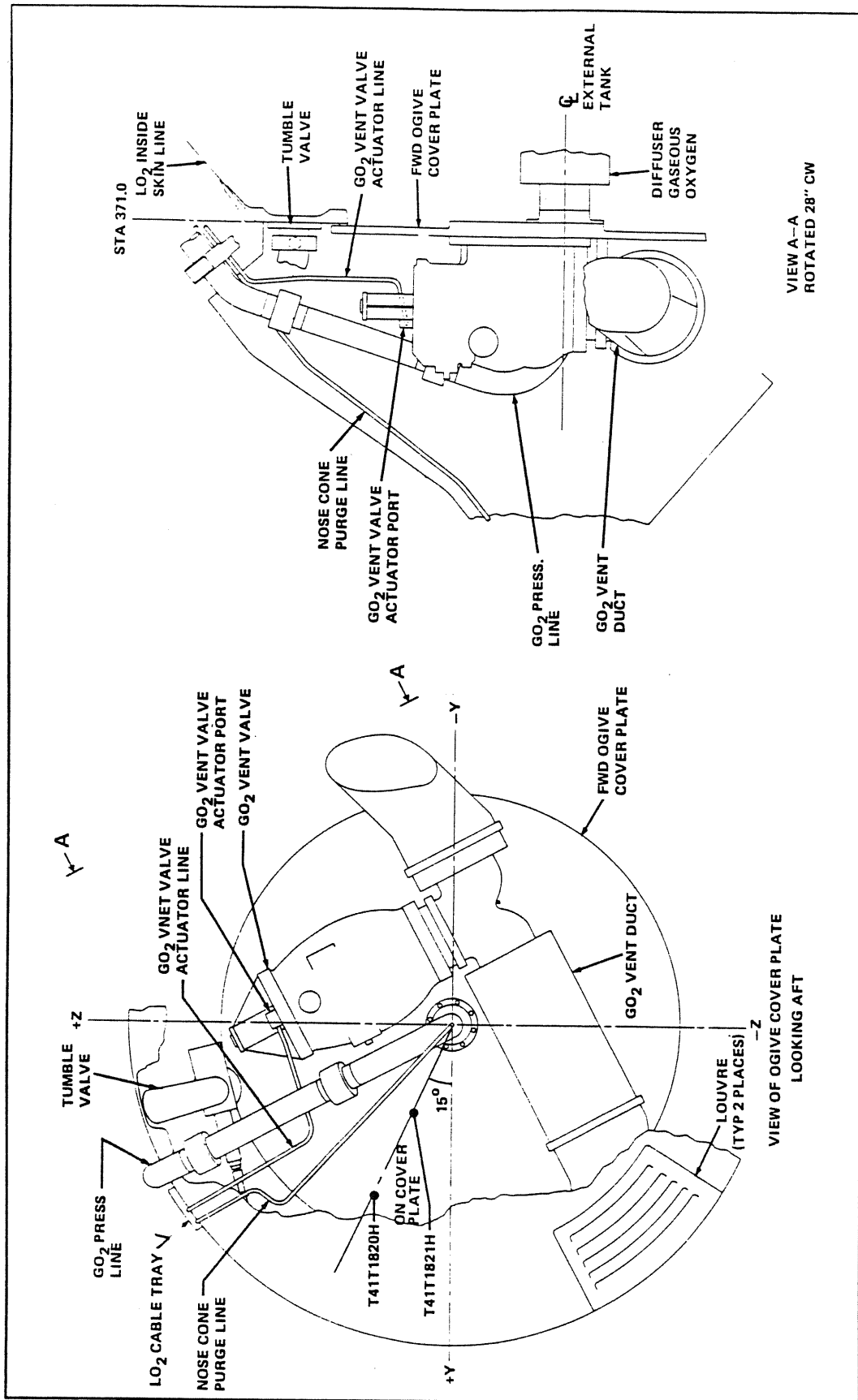
7.5 ET HEATED NOSE CONE PURGE SUPPLY

HEATER CONTROL FUNCTIONS	PRIMARY	SECONDARY
AC PWR ON CMD	GLOK4061E	GLOK4561E
AC PWR ON IND	GLOX406E3	GLOX4563E
REMOTE SEL CMD	GLOK4071E	GLOK4571E
SCR PWR ON CMD	GLOK4081E	GLOK4581E
SCR PWR ON IND	GLOX4083E	GLOX4583E
GN2 OVERTEMP IND	GLOX4093E	GLOX4593E
NC CONTROL LOOP SEL	GLOK4161E	GLOK4661E
NC TEMP INT SET PT	GLOK4171E	GLOK4671E
NC TEMP REM SET PT	GLOK4181E	GLOK4681E

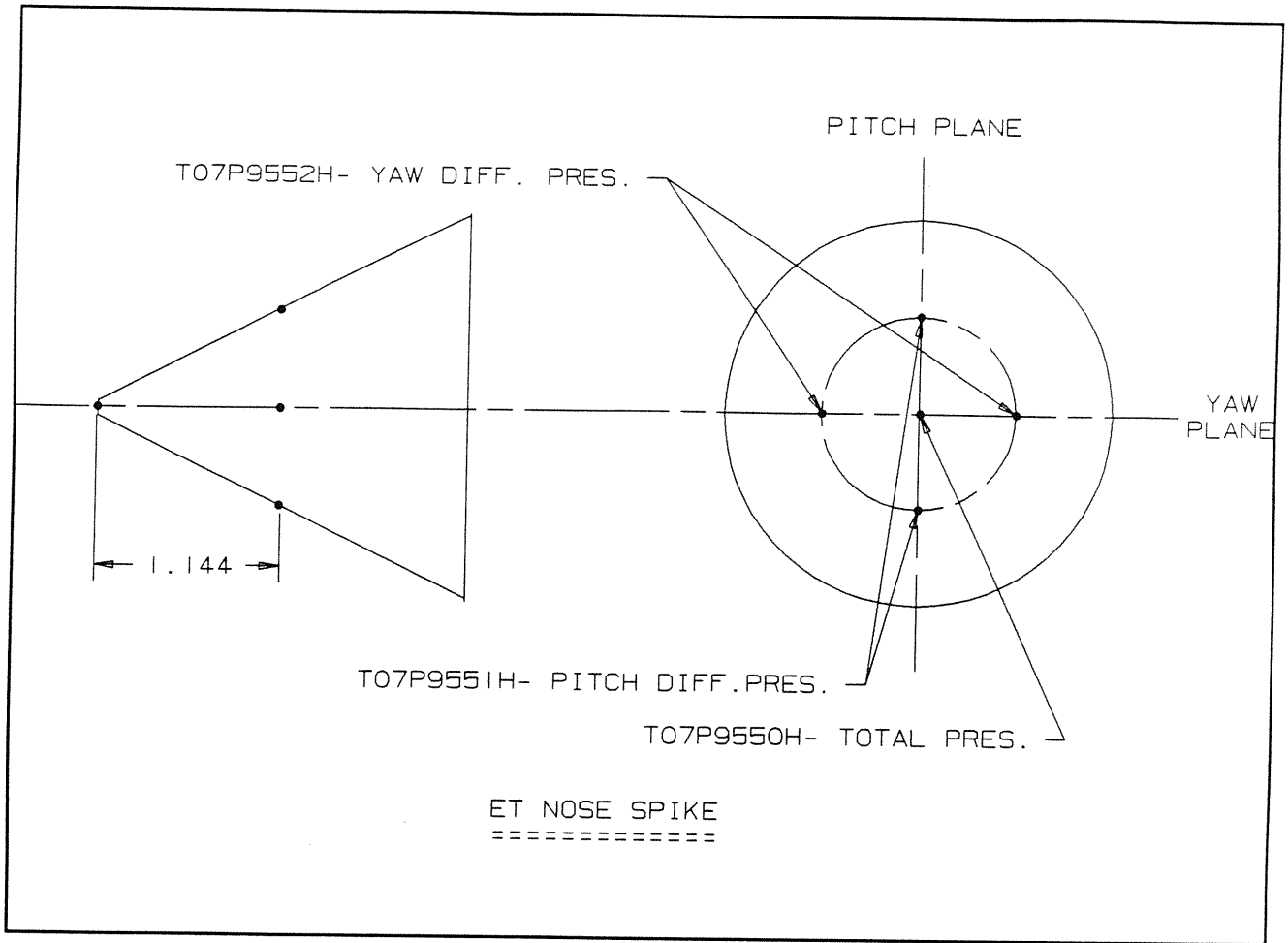
ASSOCIATED MSID'S

GLOX4103E	A106424 PRI NC VLV CL, ONE=ON ZERO=OFF
GLOT4104A	A106532 PRI NC HTD PURGE TEMP, +50 TO +500 DEGF
GLOP4115A	A106436 NC GN2 SUPPLY PRG PRESS. 0 TO 5000 PSIG
GLOP4145A	A505464 NC GN2 PRI VENTURI INLET PR, 0 - 5000 PSIG
GLOP4155A	A505455 NC GN2 PRI VENTURI DIFF PR, 0 - 1500 PSID
GLOX4193E	A106425 NC PRG REDUNDANT SOV CLD
GLOP4195A	A106437 PRI NC HT GN2 OUT PG PRESS, 0 TO 5000 PSIG
GLOX4603E	A106426 SEC NC PRG VLV CL, ONE=ON ZERO=OFF
GLOT4604A	A106533 SEC NOSE CONE HTD PRG TEMP, +50 TO +500 DEGF
GLOP4695A	A106438 SEC NC HT GN2 OUT PG PRES, 0-5000 PSIG

7.6 NOSE CONE



7.6 NOSE CONE (NOSE CAP ENVIRONMENTAL PRESSURES - AADS)



T07P9550H	NOSE CAP TOTAL PRES.,	0-15 PSIA
T07P9551H	NOSE CAP DIFF. PRES., PITCH,	-2 TO +2 PSID
T07P9552H	NOSE CAP DIFF. PRES., YAW,	-2 TO +2 PSID

NOTE: These MSID's effective with OV-102 only.

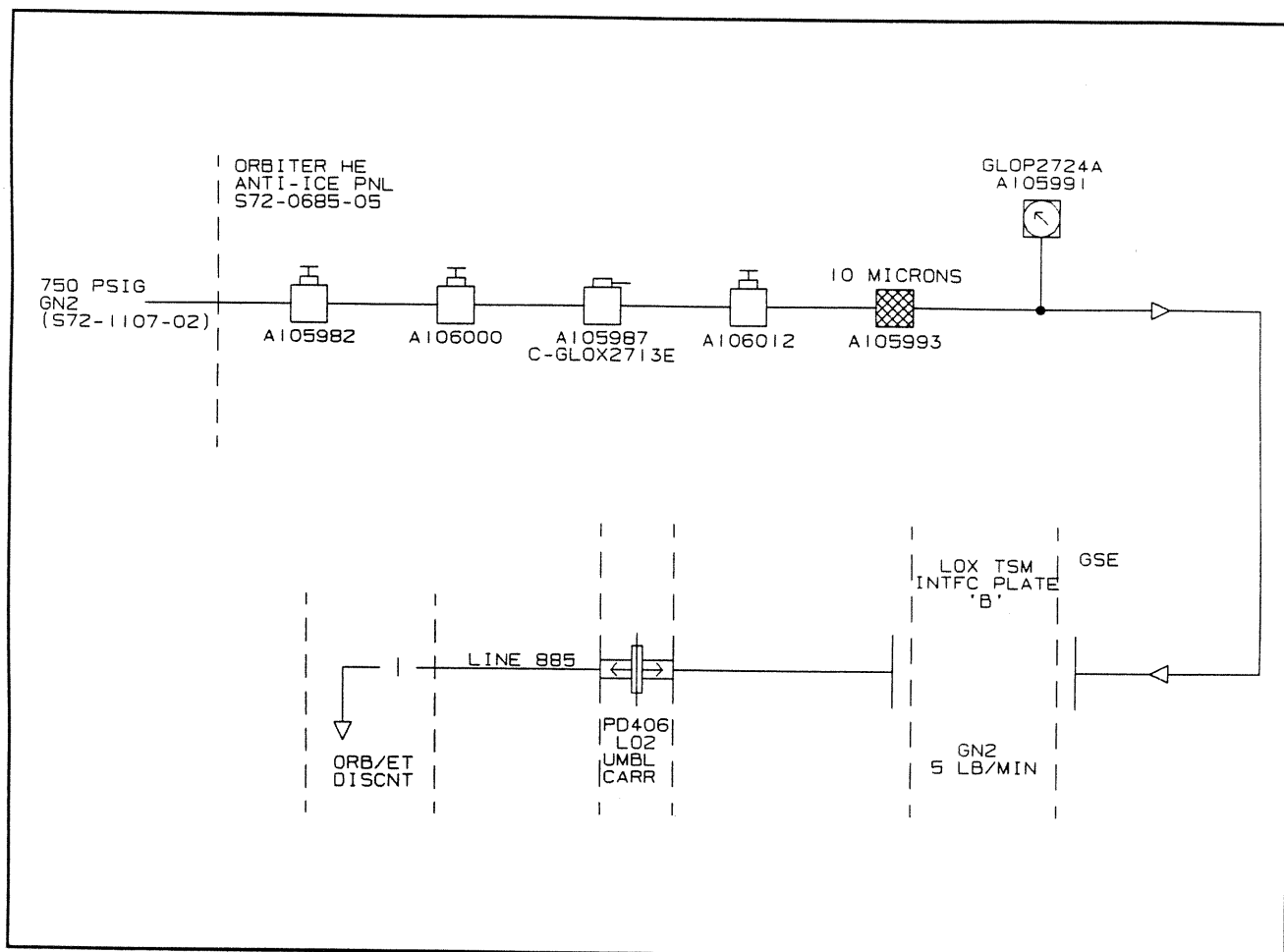
Other associated MSID's:

T41T1802H	NOSE CONE COMPT. TEMP 1,	-4 TO 158 DEG F
T41T1821H	NOSE CONE COMPT. TEMP 2,	-4 TO 158 DEG F

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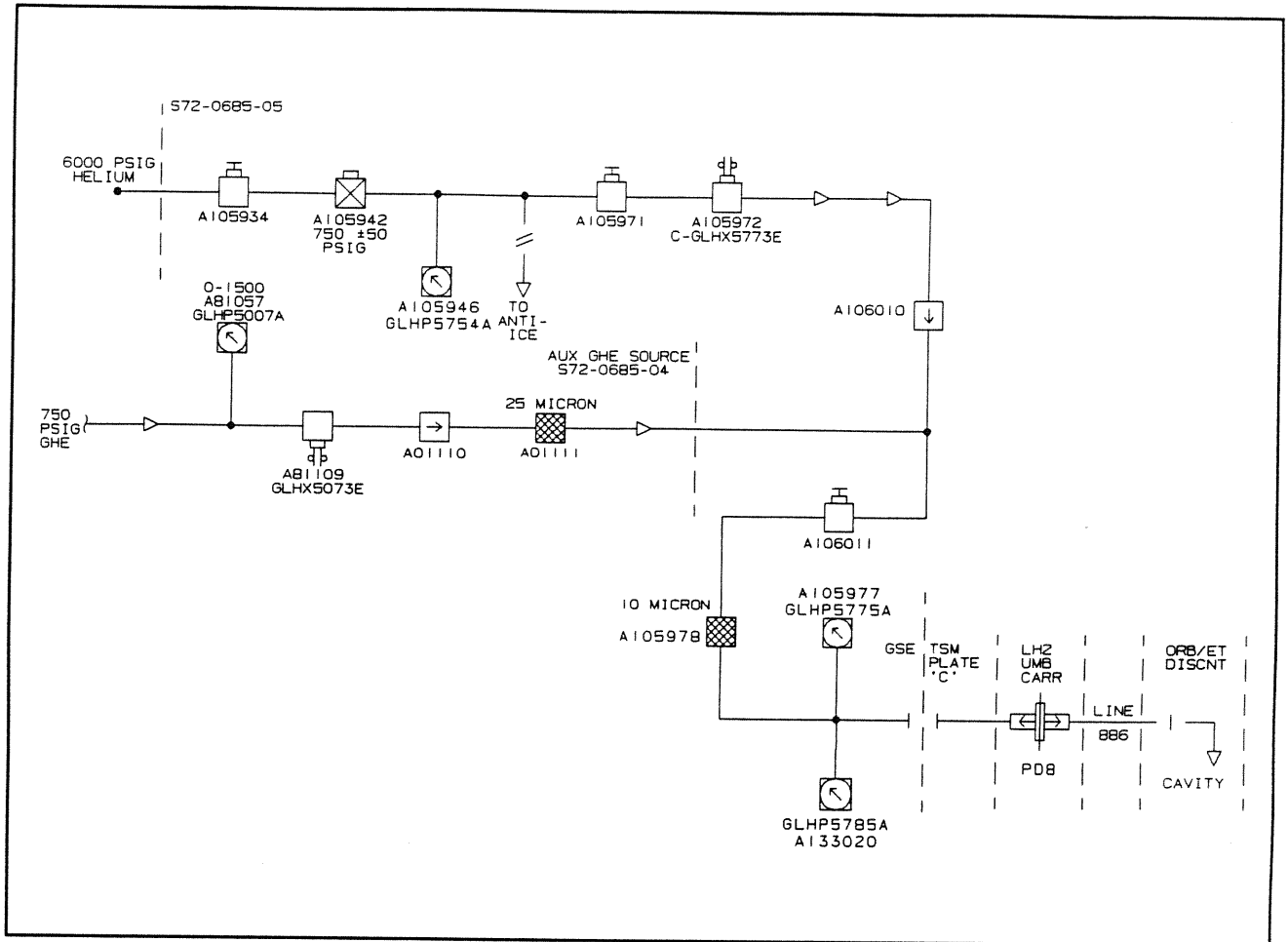
8.0 MPS PURGES

8.1 LOX ORBITER/ET DISCONNECT PURGE



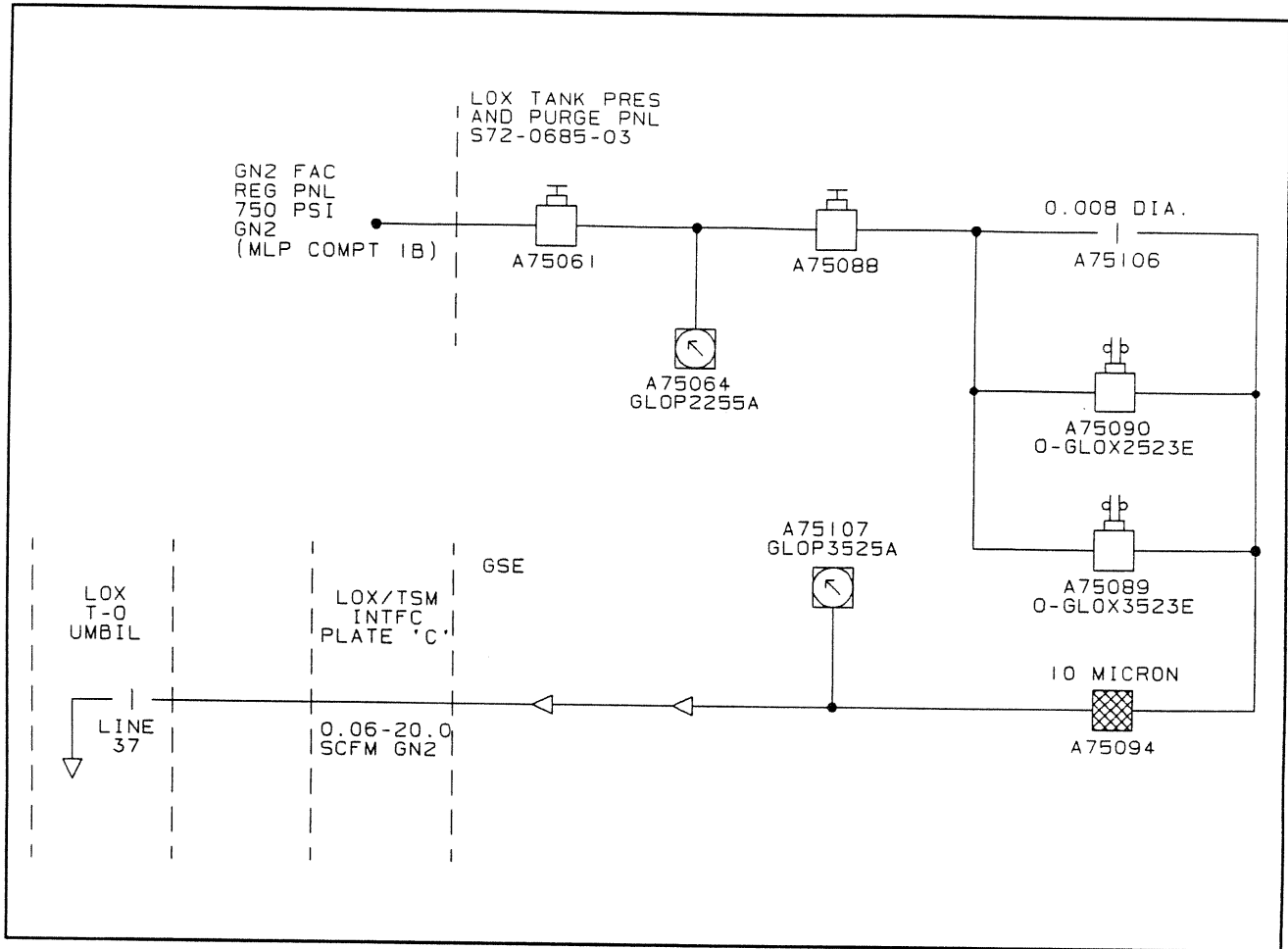
GLOX2713E A105987 ORB/ET DISC CARR PG VLV CL, ONE=ON ZERO=OFF
 GLOP2724A A105991 ORB/ET DISC CARR PRESS, 0 TO 1500 PSIG

8.2 LH2 ORB/ET DISCONNECT PURGE



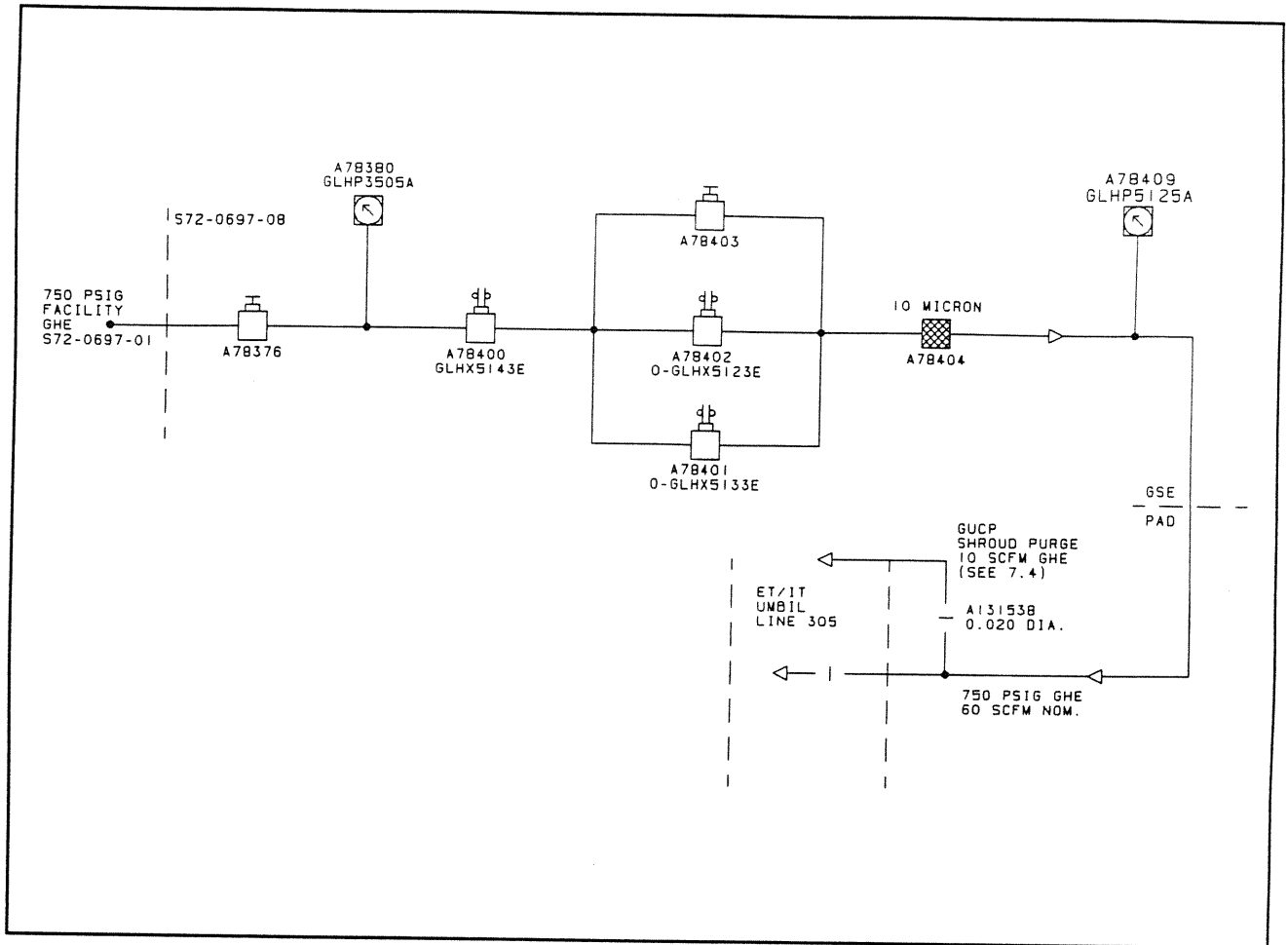
GLHX5073E	A81109	ORB/ET CA PL PG AUX HE IND, ONE=ON ZERO=OFF
GLHP5007A	A81057	PURGE PNL 750 PSI PRESS, 0 TO 1500 PSIG
GLHP5754A	A105946	ORB ANTI-ICE 750 PSI PRESS, 0 TO 1500 PSIG
GLHX5773A	A105972	ORB/ET CARR PLT PRG OFF IND, ONE=ON ZERO=OFF
GLHP5775A	A105977	ORB/ET CARR PLATE PRESS, 0 TO 1500 PSIG
GLHP5785A	A133020	ORB/ET CARR PLATE PRESS, 0 TO 1500 PSIG

8.3 LOX UMBILICAL PURGE



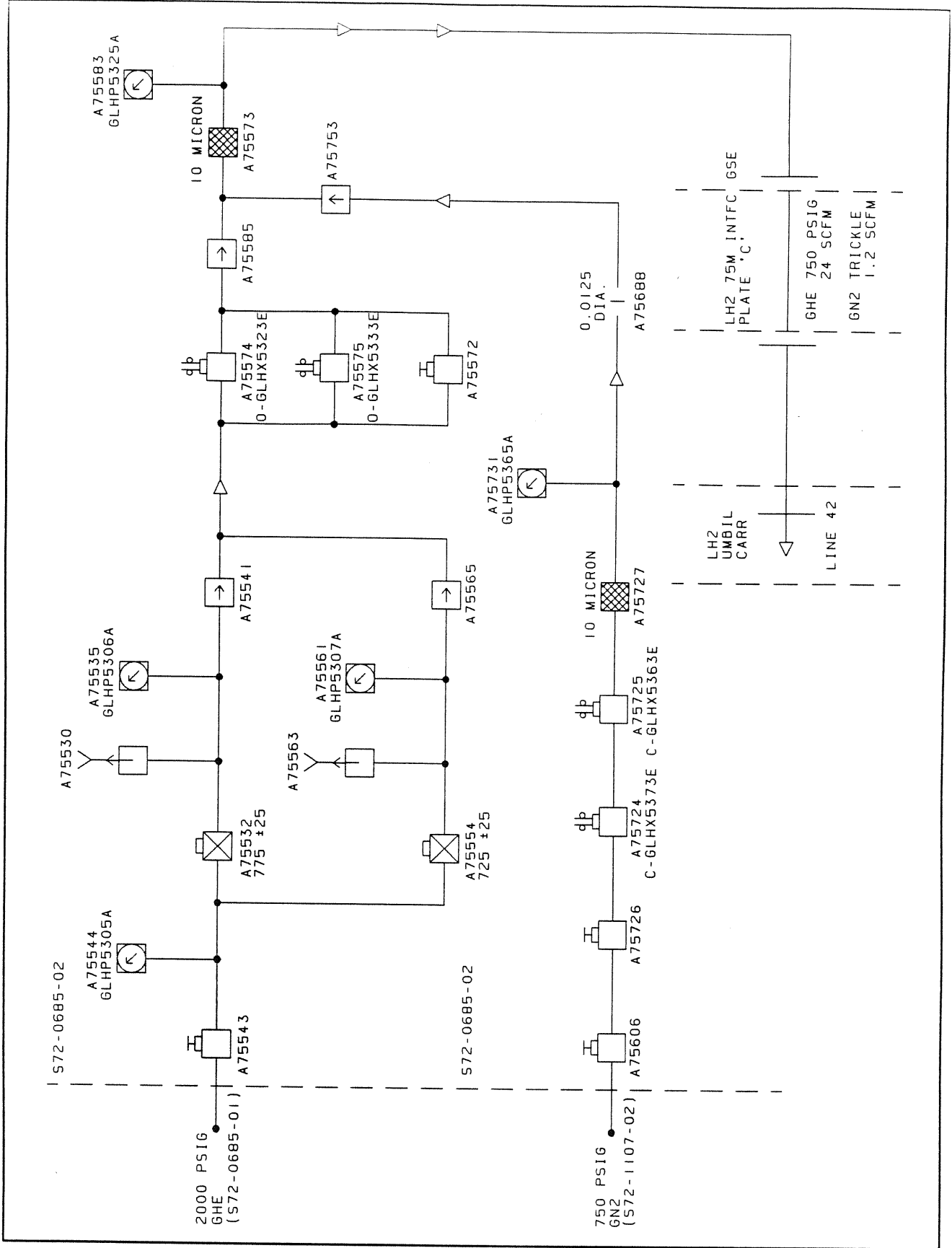
GLOP2255A	A75064	750 PSI GN2 FAC SUPL PRESS, 0 TO 1500 PSIA
GLOX2523E	A75090	UMB PL GN2 OPR PG CTL OPEN, ONE=ON ZERO=OFF
GLOX3523E	A75089	UMB CARR PL SEC PG VLV OPEN, ONE=ON ZERO=OFF
GLOP3525A	A75107	TSM UMB CARR PLATE PG PRESS, 0 TO 1500 PSIG

8.4 ET LH2 VENT DISCONNECT PURGE



GLHP3505A	A78380	ET VENT CONTROL SPLY PRESS, 0 TO 1500 PSIG
GLHX5143E	A78400	ET VNT DISC CAV PRG SOV CL, ONE=ON ZERO=OFF
GLHX5133E	A78401	ET VNT DSC CAV PRG SC V-OPN, ONE=ON ZERO=OFF
GLHX5123E	A78R02	ET VNT DSC CAV PRG PR V OPN, ONE=ON ZERO=OFF
GLHP5125A	A78409	ET VNT DISC CAV PURGE PRESS, 0 TO 1500 PSIG

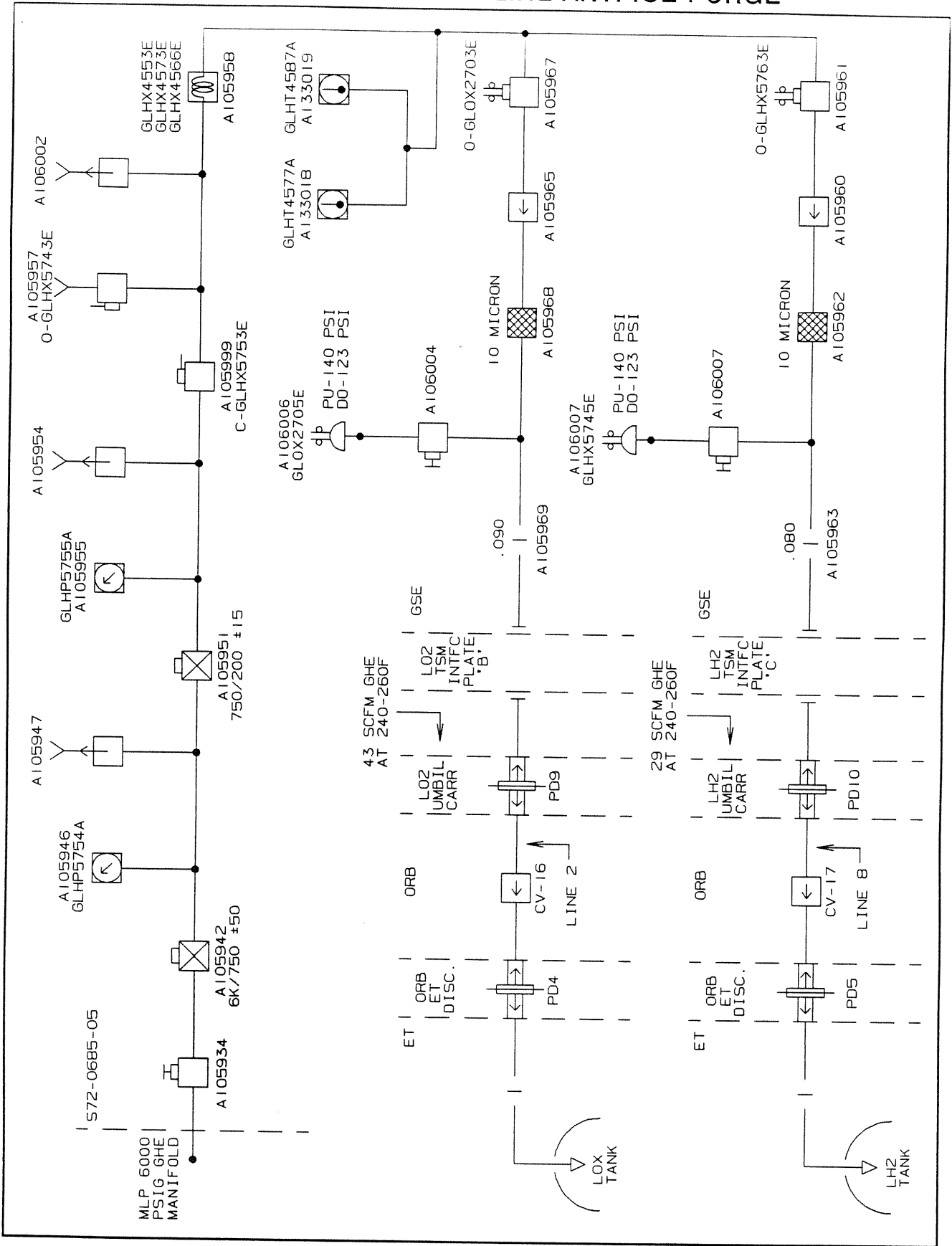
8.5 LH2 UMBILICAL PURGE



8.5 LH2 UMBILICAL PURGE

GLHP5305A	A75544	MPS HE INLET SUPPLY PRESS, 0 TO 5000 PSIG
GLHP5306A	A75535	PRI 755 PSIG REG HE PRESS, 0 TO 1500 PSIG
GLHP5307A	A75561	SEC 755 PSIG REG HE PRESS, 0 TO 1500 PSIG
GLHX5323E	A75574	PRI UMB PURGE VLV OPEN IND, ONE=ON ZERO=OFF
GLHP5325A	A75583	HE UMB CAR PURGE PRESS, 0 TO 1500 PSIG
GLHX5333E	A75575	SEC UMB PURGE VLV OPEN IND, ONE=ON ZERO=OFF
GLHX5363E	A75725	TKL PURGE SEC SOV CLSD IND, ONE=ON ZERO=OFF
GLHP5365A	A75731	GN2 TRICKLE PURGE OUT PRESS, 0 TO 1500 PSIG
GLHX5373E	A75724	PRI TKL PURGE SOV CLSD IND, ONE=ON ZERO=OFF

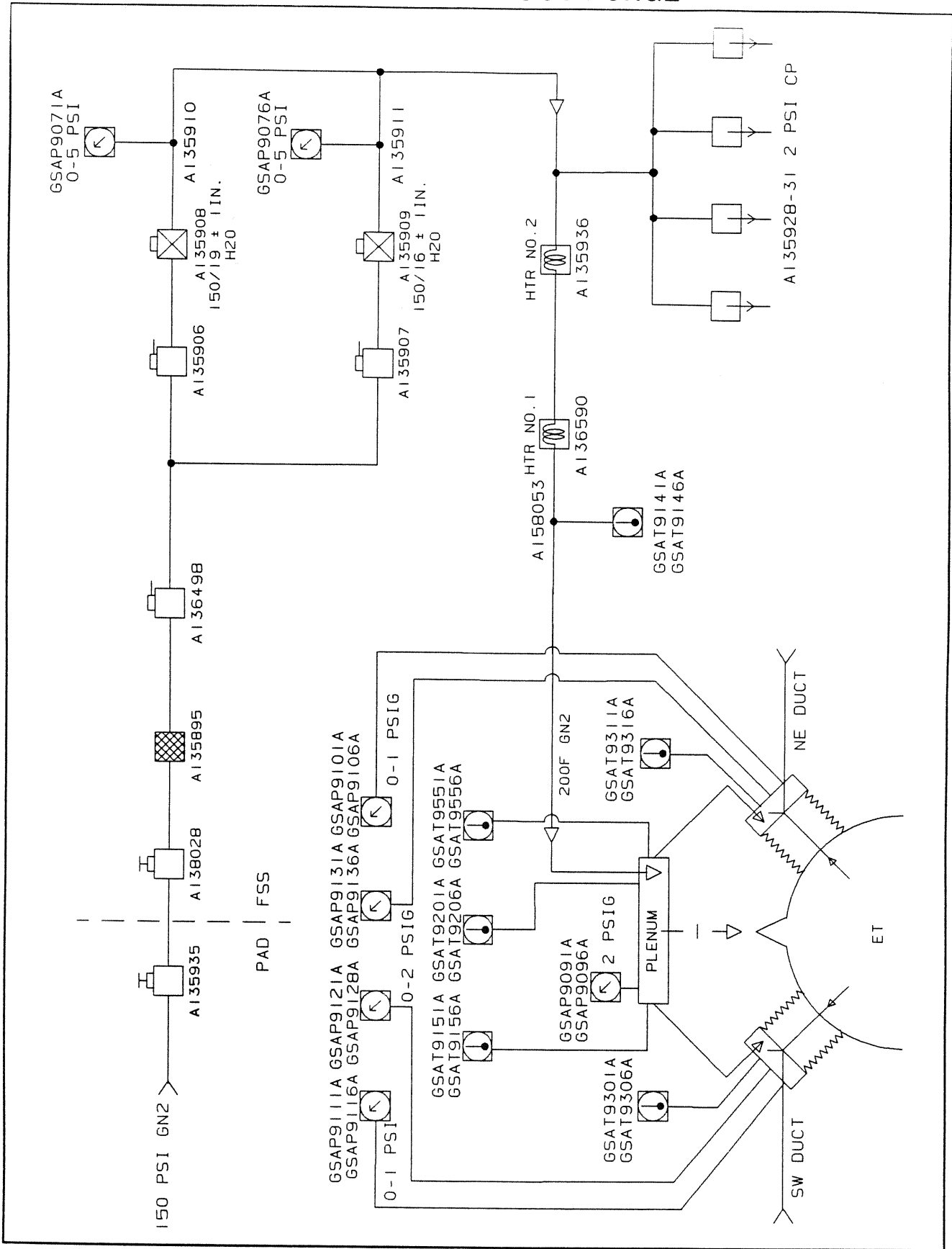
8.6 PRESSURIZATION LINE ANTI-ICE PURGE



8.6 PRESSURIZATION LINE ANTI-ICE PURGE

GLHP5754A	A105946 ORB ANTI ICE 750 PSI, PRESS, 0 TO 1500 PSIG
GLHP5755A	A105955 ORB ANTI ICE 200 PSI, PRESS, 0 TO 300 PSIG
GLHX5753E	A105999 PRE PRESS LINE SOV CL IND, ONE=ON ZERO=OFF
GLHX5743E	A105957 PRE-PRESS VENT VLV OP IND, ONE=ON ZERO=OFF
GLHX4553E	6414 AC PWR ON IND, ONE=ON ZERO=OFF
GLHX4573E	6414 SCR PWR ON IND, ONE=ON ZERO=OFF
GLHX4566E	6414 OVER TEMP IND, ONE=ON ZERO=OFF
GLHT4577A	6413MT4 ORB ANTI-ICE OUT TEM, -4.0 TO 302 DEGF
GLHX5763E	A105961 PRE-PRESS VLV OPEN IND, ONE=ON ZERO=OFF
GLHX5745E	HEATED HE PRE PRESS ACTIVE, ONE=ON ZERO=OFF
GLOX2703E	A105967 PREPRESS ANTI-ICE PG VLV OP, ONE=ON ZERO=OFF
GLOX2705E	HEATED HE PREPRESS ACTIVE, ONE=ON ZERO=OFF

8.7 GOX VENT HOOD PURGE



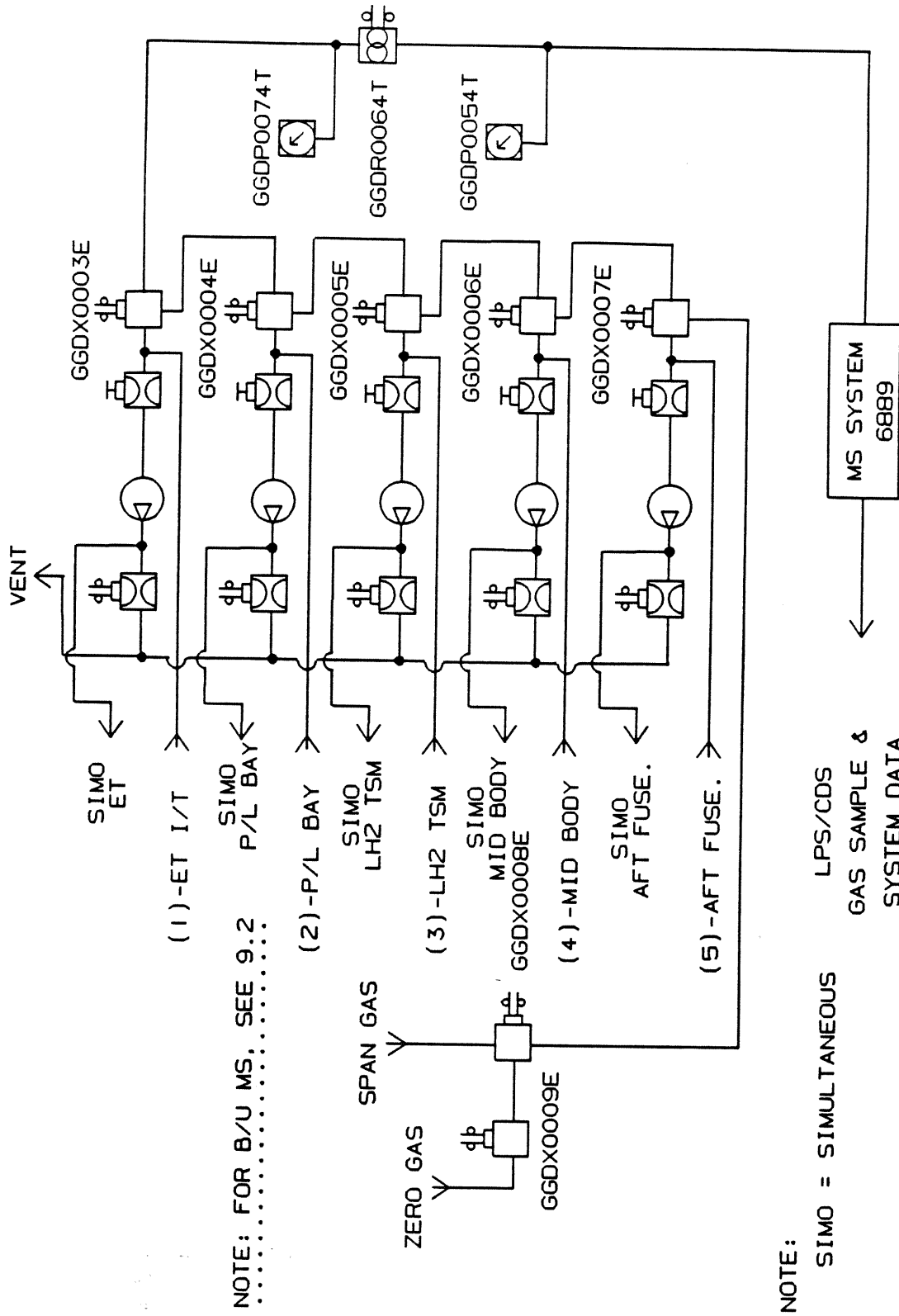
8.7 GO2 VENT HOOD PURGE

GSAP8154A	A133460	GN2 PRESSURE MEASUREMENT (NOT SHOWN), 0 TO 3000 PSIG
GSAP8159A	A133460	GN2 PRESSURE MEASUREMENT (NOT SHOWN), 0 TO 3000 PSIG
GSAH8191A	A133565	GVA ARM POSITION POTENTIOMETER (NOT SHOWN)
GSAH8196A	A133566	GVA ARM POSITION POTENTIOMETER (NOT SHOWN)
GSAP9071A	A135910	PRI REG OUT PRESS, 0 TO 5 PSIG
GSAP9076A	A135910	PRI REG OUT PRESS, 0 TO 5 PSIG
GSAP9081A	A135911	SEC REG OUT PRESS, 0 TO 5 PSIG
GSAP9086A	A135911	SEC REG OUT PRESS, 0 TO 5 PSIG
GSAP9091A	A135915	PLENUM PRESS, 0 TO 2 PSIG
GSAP9096A	A135915	PLENUM PRESS, 0 TO 2 PSIG
GSAP9101A	A140347	NE SEAL PRESS, 0 TO 1 PSIG
GSAP9106A	A140347	NE SEAL PRESS, 0 TO 1 PSIG
GSAP9111A	A140348	SW SEAL PRESS, 0 TO 1 PSIG
GSAP9116A	A140348	SW SEAL PRESS, 0 TO 1 PSIG
GSAP9121A	A136922	SW VENT CAVITY PRESS, 0 TO 2 PSIG
GSAP9126A	A136922	SW VENT CAVITY PRESS, 0 TO 2 PSIG
GSAP9131A	A136923	NE VENT CAVITY PRESS, 0 TO 2 PSIG
GSAP9136A	A136923	NE VENT CAVITY PRESS, 0 TO 2 PSIG
GSAT9141A	A151887	HTR CHAMBER TEMP, 50 TO 500 DEG F
GSAT9146A	A151887	HTR CHAMBER TEMP, 50 TO 500 DEG F
GSAT9151A	A135949	TEMP PROBE NO. 1, 100 TO 200 DEG F
GSAT9156A	A135949	TEMP PROBE NO. 1, 100 TO 200 DEG F
GSAT9201A	A135950	TEMP PROBE NO. 2, 100 TO 200 DEG F
GSAT9206A	A135950	TEMP PROBE NO. 2, 100 TO 200 DEG F
GSAT9301A	A138440	SW HOOD SEAL TEMP, -4 TO +302 DEG F
GSAT9306A	A138440	SW HOOD SEAL TEMP, -4 TO +302 DEG F
GSAT9311A	A138439	NE HOOD SEAL TEMP, -4 TO +302 DEG F
GSAT9316A	A138439	NE HOOD SEAL TEMP, -4 TO +302 DEG F
GSAT9551A	A151003	TEMP PROBE NO. 3, 100 TO 200 DEG F
GSAT9556A	A151003	TEMP PROBE NO. 3, 100 TO 200 DEG F

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9.0 HAZARDOUS GAS AND FIRE DETECTION SYSTEM

9.1 PRIMARY MASS SPECTROMETER



NOTE: FOR B/U MS, SEE 9.2
:.....

NOTE:
 SIMO = SIMULTANEOUS
 LPS/CDS
 GAS SAMPLE &
 SYSTEM DATA

9.1 PRIMARY MASS SPECTROMETER

THE MASS SPECTROMETER SAMPLES FROM THE AFT COMPARTMENT, THE INTERTANK, THE PAYLOAD BAY, THE MIDBODY, AND THE LH2 TAIL SERVICE MAST. SAMPLE LINES FOR THE ORBITER ARE ROUTED THROUGH THE LH2 T-0 UMBILICAL. THE ET/IT SAMPLE LINE IS ROUTED THROUGH THE ET VENT UMBILICAL (GUCP). SAMPLE PICK UP POINTS ARE:

<u>COMPARTMENT</u>	<u>SENSE PORT LOCATIONS</u>
AFT COMPARTMENT	TWO PORTS JUST INSIDE THE LEFT AND RIGHT VENT DOORS (8 & 9).
INTERTANK 890 AXIS	TWO PORTS NEAR THE PLUS Z AXIS NEAR STATIONS AND 1028. A THIRD PORT IS NEAR THE MINUS Z NEAR STATION 890.
PAYLOAD BAY	TWO PORTS ON THE FORWARD WALL OF THE 1307 BULKHEAD APPROXIMATELY CENTERED IN PAYLOAD BAY AREA.
MID BODY	TWO PORTS ON THE FORWARD WALL OF THE 1307 BULKHEAD APPROXIMATELY CENTERED IN THE AREA UNDERNEATH THE PAYLOAD BAY LINER.
LH2 TSM	TOP OF TSM NEAR LD30 PORT.

MULTIPLE PORTS FOR EACH COMPARTMENT FEED INTO A SINGLE SAMPLE LINE FOR THAT COMPARTMENT.

THE MASS SPEC IS MANUALLY CONTROLLED FROM THE FIRING ROOM CONSOLE WITH REMOTE CONTROL VALVES. ONLY ONE COMPARTMENT IS SAMPLED AT A TIME. CYCLE TIME FROM ONE COMPARTMENT TO ANOTHER IS ON THE ORDER OF 30 SECONDS. TRANSIT TIME FROM AN ACTUAL LEAK TO THE MASS SPEC TAKES IN EXCESS OF 20 SECONDS WITH 8 SECONDS REQUIRED TO CYCLE THROUGH EACH GAS (ARGON, HELIUM, HYDROGEN, OXYGEN).

SPAN AND ZERO GAS BOTTLES ARE SAMPLED PERIODICALLY TO CALIBRATE THE MASS SPEC WITH KNOWN CONCENTRATIONS. THE TEST GAS BOTTLE PROVIDES A VERIFICATION OF THE AUTOCAL AT CONCENTRATIONS NEAR NEEDED OPERATING VALUES.

ASSOCIATED MSID'S

GGDX0002E	VLV FAULT INDICATION, ONE=ON ZERO=OFF
GGDX0003E*	ET INTERTANK VLV OPEN, ONE=ON ZERO=OFF
GGDX0004E*	PAYLOAD BAY VLV OPEN, ONE=ON ZERO=OFF
GGDX0005E*	TAIL SERV MAST VLV OPEN, ONE=ON ZERO=OFF
GGDX0006E*	MID FUSELAGE VLV OPEN, ONE=ON ZERO=OFF
GGDX0007E*	AFT FUSELAGE VLV OPEN, ONE=ON ZERO=OFF
GGDX0008E*	SPAN GAS VLV OPEN, ONE=ON ZERO=OFF
GGDX0009E*	ZERO GAS VLV OPEN, ONE=ON ZERO=OFF

* Shown on Fig. 9.1

9.1 PRIMARY MASS SPECTROMETER
ASSOCIATED MSIDS (CONTINUED)

GGDP0054T* MS PRES 0-10,000 MICROTORR
GGDP0074T* MS INL PRES 0-760 TORR
GGDR0064T* MS INLET FLOW - 0 - 50 SCCS
GGDR1017A HGDS FLOW LINE 1 (FM9)
GGDR1018A HGDS FLOW LINE 2 (FM10)
GGDR1019A HGDS FLOW LINE 3 (FM11)
GGDR1020A HGDS FLOW LINE 4 (FM12)
GGDR1021A HGDS FLOW LINE 5 (FM13)
GGDR2110T H2 CONCEN #1 ET INTERTANK LO RANGE, -1250 TO 5000 PPM
GGDR2111T H2 CONCEN #1 ET INTERTANK HI RANGE, -12500 TO 50000 PPM
GGDR2120T H2 CONCEN #1 ET INTERTANK LO RANGE, -50 TO 200 PPM
GGDR2121T H2 CONCEN #1 ET INTERTANK HI RANGE, -500 TO 2000 PPM
GGDR2130T HE CONC #1 ET INTERTANK LO RANGE, -5000 TO 20000 PPM
GGDR2131T HE CONC #1 ET INTERTANK HI RANGE, -5 TO 20 PCT
GGDR2140T HE CONC #2 ET INTERTANK LO RANGE, -50 TO 200 PPM
GGDR2141T HE CONC #2 ET INTERTANK HI RANGE, -500 TO 2000 PPM
GGDR2150T OX CONC #1 ET INTERTANK LO RANGE, -5000 TO 20000 PPM
GGDR2151T OX CONC #1 ET INTERTANK HI RANGE, -5 TO 20 PCT
GGDR2160T OX CONC #2 ET INTERTANK LO RANGE, -50 TO 200 PPM
GGDR2161T OX CONC #2 ET INTERTANK HI RANGE, -500 TO 2000 PPM
GGDR2170T AR CONCEN #1 ET INTERTANK LO RANGE, -250 TO 1000 PPM
GGDR2171T AR CONCEN #1 ET INTERTANK HI RANGE, -2500 TO 10000 PPM
GGDR2180T AR CONCEN #2 ET INTERTANK LO RANGE, -50 TO 200 PPM
GGDR2181T AR CONCEN #2 ET INTERTANK HI RANGE, -500 TO 2000 PPM
GGDR2210T H2 CONCEN #1 PAYLOAD BAY LO RANGE, -1250 TO 5000 PPM
GGDR2211T H2 CONCEN #1 PAYLOAD BAY HI RANGE, -12500 TO 50000 PPM
GGDR2220T H2 CONCEN #2 PAYLOAD BAY LO RANGE, -50 TO 200 PPM
GGDR2221T H2 CONCEN #2 PAYLOAD BAY HI RANGE, -500 TO 2000 PPM
GGDR2230T HE CONC #1 PAYLOAD BAY LO RANGE, -5000 TO 20000 PPM
GGDR2231T HE CONC #1 PAYLOAD BAY HI RANGE, -5 TO 20 PCT
GGDR2240T HE CONC #2 PAYLOAD BAY LO RANGE, -50 TO 200 PPM
GGDR2241T HE CONC #2 PAYLOAD BAY HI RANGE, -500 TO 2000 PPM
GGDR2250T OX CONC #1 PAYLOAD BAY LO RANGE, -5000 TO 20000 PPM
GGDR2251T OX CONC #1 PAYLOAD BAY HI RANGE, -5 TO 20 PCT
GGDR2260T OX CONC #2 PAYLOAD BAY LO RANGE, -50 TO 200 PPM
GGDR2261T OX CONC #2 PAYLOAD BAY HI RANGE, -500 TO 2000 PPM
GGDR2270T AR CONCEN #1 PAYLOAD BAY LO RANGE, -250 TO 1000 PPM
GGDR2271T AR CONCEN #1 PAYLOAD BAY HI RANGE, -2500 TO 10000 PPM
GGDR2280T AR CONCEN #2 PAYLOAD BAY LO RANGE, -50 TO 200 PPM
GGDR2281T AR CONCEN #2 PAYLOAD BAY HI RANGE, -500 TO 2000 PPM
GGDR2310T H2 CONCEN #1 TSM LO RANGE, -1250 TO 5000 PPM
GGDR2311T H2 CONCEN #1 TSM HI RANGE, -12500 TO 50000 PPM
GGDR2320T H2 CONCEN #2 TSM LO RANGE, -50 TO 200 PPM
GGDR2321T H2 CONCEN #2 TSM HI RANGE, -500 TO 2000 PPM
GGDR2330T HE CONC #1 TSM LO RANGE, -5000 TO 20000 PPM
GGDR2331T HE CONC #1 TSM HI RANGE, -5 TO 20 PCT
GGDR2340T HE CONC #2 TSM LO RANGE, -50 TO 200 PPM
GGDR2341T HE CONC #2 TSM HI RANGE, -500 TO 2000 PPM
GGDR2350T OX CONC #1 TSM LO RANGE, -5000 TO 20000 PPM

9.1 PRIMARY MASS SPECTROMETER
ASSOCIATED MSIDS (CONTINUED)

GGDR2351T	OX CONC #1 TSM HI RANGE, -5 TO 20 PCT
GGDR2360T	OX CONC #2 TSM LO RANGE, -50 TO 200 PPM
GGDR2361T	OX CONC #2 TSM HI RANGE, -500 TO 2000 PPM
GGDR2370T	AR CONCEN #1 TSM LO RANGE, -250 TO 1000 PPM
GGDR2371T	AR CONCEN #1 TSM HI RANGE, -2500 TO 10000 PPM
GGDR2380T	AR CONCEN #2 TSM LO RANGE, -50 TO 200 PPM
GGDR2381T	AR CONCEN #2 TSM HI RANGE, -500 TO 2000 PPM
GGDR2410T	H2 CONCEN #1 MID FUSELAGE LO RANGE, -1250 TO 5000 PPM
GGDR2411T	H2 CONCEN #1 MID FUSELAGE HI RANGE, -12500 TO 50000 PPM
GGDR2420T	H2 CONCEN #2 MID FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2421T	H2 CONCEN #2 MID FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2430T	HE CONC #1 MID FUSELAGE LO RANGE, -5000 TO 20000 PPM
GGDR2431T	HE CONC #1 MID FUSELAGE HI RANGE, -5 TO 20 PCT
GGDR2440T	HE CONC #2 MID FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2441T	HE CONC #2 MID FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2450T	OC CONC #1 MID FUSELAGE LO RANGE, -5000 TO 20000 PPM
GGDR2451T	OC CONC #1 MID FUSELAGE HI RANGE, -5 TO 20 PCT
GGDR2460T	OC CONC #2 MID FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2461T	OX CONC #2 MID FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2470T	AR CONCEN #1 MID FUSELAGE LO RANGE, -250 TO 1000 PPM
GGDR2471T	AR CONCEN #1 MID FUSELAGE HI RANGE, -2500 TO 10000 PPM
GGDR2480T	AR CONCEN #2 MID FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2481T	AR CONCEN #2 MID FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2510T	H2 CONCEN #1 AFT FUSELAGE LO RANGE, -1250 TO 5000 PPM
GGDR2511T	H2 CONCEN #1 AFT FUSELAGE HI RANGE, -12500 TO 50000 PPM
GGDR2520T	H2 CONCEN #2 AFT FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2521T	H2 CONCEN #2 AFT FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2530T	HE CONC #1 AFT FUSELAGE LO RANGE, -5000 TO 20000 PPM
GGDR2531T	HE CONC #1 AFT FUSELAGE HI RANGE, -5 TO 20 PCT
GGDR2540T	HE CONC #2 AFT FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2541T	HE CONC #2 AFT FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2550T	OX CONC #1 AFT FUSELAGE LO RANGE, -5000 TO 20000 PPM
GGDR2551T	OX CONC #1 AFT FUSELAGE HI RANGE, -5 TO 20 PCT
GGDR2560T	OX CONC #2 AFT FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2561T	OX CONC #2 AFT FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2570T	AR CONCEN #1 AFT FUSELAGE LO RANGE, -250 TO 1000 PPM
GGDR2571T	AR CONCEN #1 AFT FUSELAGE HI RANGE, -2500 TO 10000 PPM
GGDR2580T	AR CONCEN #2 AFT FUSELAGE LO RANGE, -50 TO 200 PPM
GGDR2581T	AR CONCEN #2 AFT FUSELAGE HI RANGE, -500 TO 2000 PPM
GGDR2610T	H2 CONCEN #1 SPAN GAS LO RANGE, -1250 TO 5000 PPM
GGDR2611T	H2 CONCEN #1 SPAN GAS HI RANGE, -12500 TO 50000 PPM
GGDR2620T	H2 CONCEN #2 SPAN GAS LO RANGE, -50 TO 200 PPM
GGDR2621T	H2 CONCEN #2 SPAN GAS HI RANGE, -500 TO 2000 PPM
GGDR2630T	HE CONC #1 SPAN GAS LO RANGE, -5000 TO 20000 PPM
GGDR2631T	HE CONC #1 SPAN GAS HI RANGE, -5 TO 20 PCT
GGDR2640T	HE CONC #2 SPAN GAS LO RANGE, -50 TO 200 PPM
GGDR2641T	HE CONC #2 SPAN GAS HI RANGE, -500 TO 2000 PPM
GGDR2650T	OX CONC #1 SPAN GAS LO RANGE, -5000 TO 20000 PPM
GGDR2651T	OX CONC #1 SPAN GAS HI RANGE, -5 TO 20 PCT

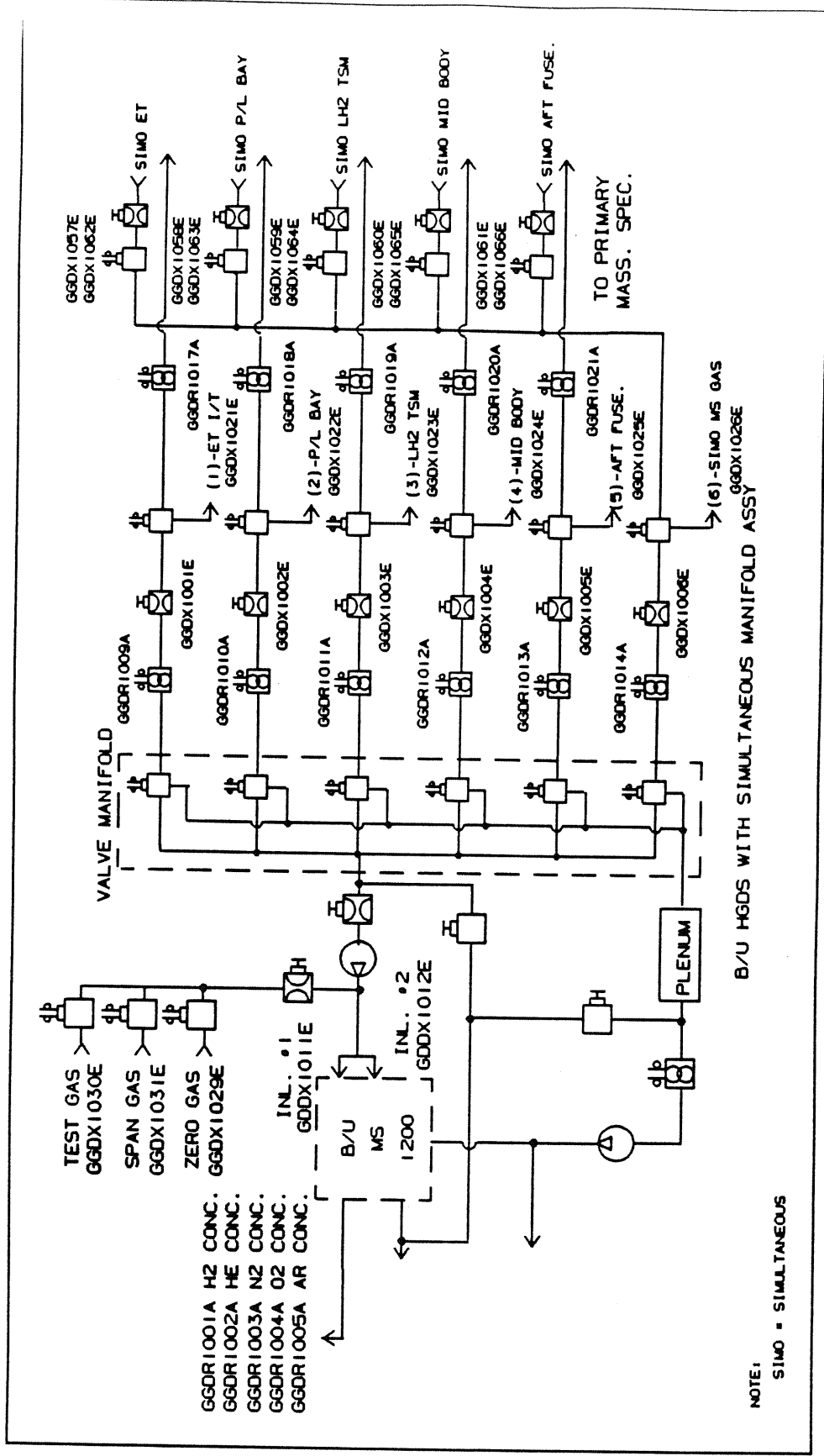
9.1 PRIMARY MASS SPECTROMETER ASSOCIATED MSIDS (CONTINUED)

GGDR2660T	OX CONC #2 SPAN GAS LO RANGE, -50 TO 200 PCT
GGDR2661T	OX CONC #2 SPAN GAS HI RANGE, -500 TO 2000 PPM
GGDR2670T	AR CONCEN #1 SPAN GAS LO RANGE, -250 TO 1000 PPM
GGDR2671T	AR CONCEN #1 SPAN GAS HI RANGE, -2500 TO 10000 PPM
GGDR2680T	AR CONCEN #2 SPAN GAS LO RANGE, -50 TO 200 PPM
GGDR2681T	AR CONCEN #2 SPAN GAS HI RANGE, -500 TO 2000 PPM
GGDR2710T	H2 CONCEN #1 ZERO GAS LO RANGE, -1250 TO 5000 PPM
GGDR2711T	H2 CONCEN #1 ZERO GAS HI RANGE, -12500 TO 5000 PPM
GGDR2720T	H2 CONCEN #2 ZERO GAS LO RANGE, -50 TO 200 PPM
GGDR2721T	H2 CONCEN #2 ZERO GAS HI RANGE, -500 TO 2000 PPM
GGDR2730T	HE CONC #1 ZERO GAS LO RANGE, -5000 TO 20000 PPM
GGDR2731T	HE CONC #1 ZERO GAS HI RANGE, -5 TO 20 PCT
GGDR2740T	HE CONC #2 ZERO GAS LO RANGE, -50 TO 200 PPM
GGDR2741T	HE CONC #2 ZERO GAS HI RANGE, -500 TO 2000 PPM
GGDR2750T	OX CONC #1 ZERO GAS LO RANGE, -5000 TO 20000 PPM
GGDR2751T	OX CONC #1 ZERO GAS HI RANGE, -5 TO 20 PCT
GGDR2760T	OX CONC #2 ZERO GAS LO RANGE, -50 TO 200 PPM
GGDR2761T	OX CONC #2 ZERO GAS HI RANGE, -500 TO 2000 PPM
GGDR2770T	AR CONCEN #1 ZERO GAS LOW RANGE, -250 TO 1000 PPM
GGDR2771T	AR CONCEN #1 ZERO GAS HI RANGE, -2500 TO 10000 PPM
GGDR2780T	AR CONCEN #2 ZERO GAS LO RANGE, -50 TO 200 PPM
GGDR2781T	AR CONCEN #2 ZERO GAS HI RANGE, -500 TO 2000 PPM
GGDX0021E	LOCAL STANDBY MODE, ONE=ON ZERO=OFF
GGDX0022E	TRANSFER ERROR, ONE=ON ZERO=OFF
GGDX0023E	FRESH DATA, ONE=ON ZERO=OFF
GGDX0024E	LOCAL SPECTRUM DISPLAY MODE, ONE=ON, ZERO=OFF
GGDX0025E	LOCAL MANUAL MODE, ONE=ON ZERO=OFF
GGDX0026E	LOCAL AUTOMATIC MODE, ONE=ON ZERO=OFF
GGDX0028E	REMOTE MODE, ONE=ON ZERO=OFF
GGDX0029E	AUTOCAL IN PROGRESS, ONE=ON ZERO=OFF
GGDX0031E	REMOTE SHUTDOWN MODE, ONE=ON ZERO=OFF
GGDX0032E	VACUUM SYSTEM NOT READY, ONE=ON ZERO=OFF
GGDX0033E	MASS SPECTROMETER NOT READY, ONE=ON ZERO=OFF
GGDX0034E	SINGLE FILAMENT INDICATION, ONE=ON ZERO=OFF
GGDX0035E	TOTAL PRESSURE UNDER RANGE, ONE=ON ZERO=OFF
GGDX0036E	TOTAL PRESSURE OVER RANGE, ONE=ON ZERO=OFF
GGDX0037E	ION CURRENT UNDER RANGE, ONE=ON ZERO=OFF
GGDX0038E	ION CURRENT OVER RANGE, ONE=ON ZERO=OFF
GGDX0039E	MS PROCESSOR NOT READY, ONE=ON ZERO=OFF
GGDX0042E	TIMEOUT, ONE=ON ZERO=OFF
GGDX0043E	TRANSMISSION ERROR, ONE=ON ZERO=OFF
GGDX0044E	INTERFACE ERROR, ONE=ON ZERO=OFF
GGDX0045E	LOAD ERROR, ONE=ON ZERO=OFF
GGDX0048E	HGDS POWER ON, ONE=ON ZERO=OFF
GGDX0051E	LOCAL PUMPDOWN, ONE=ON ZERO=OFF
GGDX0061E	REMOTE AUTOMATIC SEQUENCE, ONE=ON ZERO=OFF
GGDX0082E	INLET FLOW UNCONTROLLABLE, ONE=ON ZERO=OFF
GGDX0083E	INLET PRESSURE TOO LOW, ONE=ON ZERO=OFF
GGDX0084E	INLET PRESSURE TOO HIGH, ONE=ON ZERO=OFF

9.1 PRIMARY MASS SPECTROMETER
ASSOCIATED MSIDS (CONTINUED)

GGDX0085E	SD PROCESSOR NOT READY, ONE=ON ZERO=OFF
GGDX0092E	AUX PUMP FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0093E	SAMPLE PUMP 1 FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0094E	SAMPLE PUMP 2 FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0095E	SAMPLE PUMP 3 FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0096E	SAMPLE PUMP 4 FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0097E	SAMPLE PUMP 5 FLOW TOO LOW, ONE=ON ZERO=OFF
GGDX0100E	PRIME HGDS MS POWER, ONE=ON ZERO=OFF
GGDX0101E	PRIME HGDS SPAN GAS, ONE=ON ZERO=OFF
GGDX0102E	PRIME HGDS TEST GAS, ONE=ON ZERO=OFF
GGDX2012E	H2 #1 SELECTED, ONE=ON ZERO=OFF
GGDX2013E	H2 #2 SELECTED, ONE=ON ZERO=OFF
GGDX2014E	HE #1 SELECTED, ONE=ON ZERO=OFF
GGDX2015E	HE #2 SELECTED, ONE=ON ZERO=OFF
GGDX2016E	OX #1 SELECTED, ONE=ON ZERO=OFF
GGDX2017E	OX #2 SELECTED, ONE=ON ZERO=OFF
GGDX2018E	AR #1 SELECTED, ONE=ON ZERO=OFF
GGDX2019E	AR #2 SELECTED, ONE=ON ZERO=OFF

9.2 BACK-UP MASS SPECTROMETER



NOTE:
SIMO = SIMULTANEOUS

9.2 BACKUP MASS SPECTROMETER

THE BACKUP MASS SPECTROMETER USES THE SAME COMPARTMENT SAMPLE LINES AS THE PRIMARY MASS SPECTROMETER. OPERATION IS SIMILAR EXCEPT IN ADDITION TO ARGON, HELIUM, HYDROGEN, AND OXYGEN; THE BACKUP ALSO SAMPLES FOR NITROGEN.

ASSOCIATED MSID'S

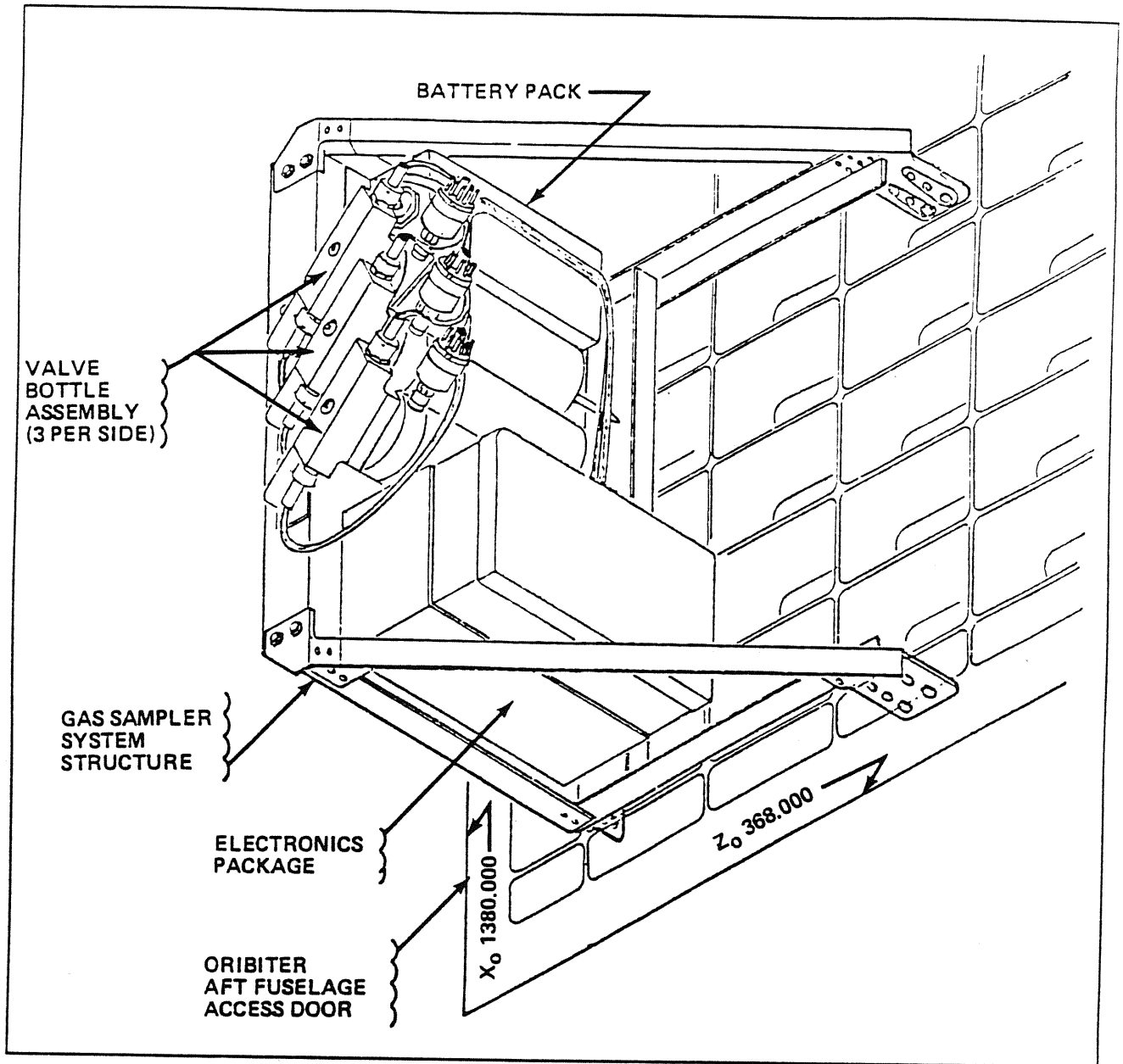
GGDR1001A	B/U HGDS HYDROGEN CONCENTRATION, 0 TO 20000 PPM
GGDR1002A	B/U HGDS HELIUM CONCENTRATION, 0 TO 20 PCT
GGDR1003A	B/U HGDS NITROGEN CONCENTRATION, 0 TO 100 PCT
GGDR1004A	B/U HGDS OXYGEN CONCENTRATION, 0 TO 20000 PPM
GGDR1005A	B/U HGDS ARGON CONCENTRATION, 0 TO 10000 PPM
GGDR1006A	B/U HGDS SAMPLE LINE SELECTED, 0 TO 250 CNT
GGDR1007A	B/U HGDS THERMOCOUPLE GAUGE RDG, 0 TO 5 V
GGDR1008A	B/U HGDS ION PUMP CURRENT, 0 TO 250 MAMP
GGDR1009A	B/U HGDS FLOW LINE 1 (FM1), -2 TO 10000 UNITS
GGDR1010A	B/U HGDS FLOW LINE 2 (FM2), -2 TO 10000 UNITS
GGDR1011A	B/U HGDS FLOW LINE 3 (FM3), -2 TO 10000 UNITS
GGDR1012A	B/U HGDS FLOW LINE 4 (FM4), -2 TO 10000 UNITS
GGDR1013A	B/U HGDS FLOW LINE 5 (FM5), -2 TO 10000 UNITS
GGDR1014A	B/U HGDS FLOW LINE 6 (FM6), -2 TO 10000 UNITS
GGDR1015A	B/U HGDS FLOW LINE 7 (FM7), -2 TO 10000 UNITS
GGDR1016A	B/U HGDS FLOW LINE 8 (FM8), -2 TO 10000 UNITS
GGDR1017A	HGDS FLOW LINE 1 (FM9), -4 TO 20 UNITS
GGDR1018A	HGDS FLOW LINE 2 (FM10), -4 TO 20 UNITS
GGDR1019A	HGDS FLOW LINE 3 (FM11), -4 TO 20 UNITS
GGDR1020A	HGDS FLOW LINE 4 (FM12), -4 TO 20 UNITS
GGDR1021A	HGDS FLOW LINE 5 (FM13), -4 TO 20 UNITS
GGDR1022A	B/U HGDS TRANSPORT FLOW (FM14), -10 TO 50 UNITS
GGDR1023A	B/U HGDS CAL GAS FLOW (FC1), -2 TO 10 UNITS
GGDR1024A	B/U HGDS SAMPLE FLOW (FC2), -2 TO 10 UNITS
GGDR1025A	B/U HGDS CAL GAS VALVE PSN (FC1), 0 TO 100 PCT
GGDR1026A	B/U HGDS SAMPLE VALVE PSN (FC2), 0 TO 100 PCT
GGDR1027A	B/U HGDS PLENUM PRESSURE (XD1), 0 TO 800 TORR
GGDR1028A	B/U HGDS SAMPLE PRESSURE (XD2), 0 TO 800 TORR
GGDX1001E	B/U HGDS FLOW LINE 1 (FS1), ONE = ON ZERO = OFF
GGDX1002E	B/U HGDS FLOW LINE 2 (FS2), ONE = ON ZERO = OFF
GGDX1003E	B/U HGDS FLOW LINE 3 (FS3), ONE = ON ZERO = OFF
GGDX1004E	B/U HGDS FLOW LINE 4 (FS4), ONE = ON ZERO = OFF
GGDX1005E	B/U HGDS FLOW LINE 5 (FS5), ONE = ON ZERO = OFF
GGDX1006E	B/U HGDS FLOW LINE 6 (FS6), ONE = ON ZERO = OFF
GGDX1007E	B/U HGDS FLOW LINE 7 (FS7), ONE = ON ZERO = OFF
GGDX1008E	B/U HGDS FLOW LINE 8 (FS8), ONE = ON ZERO = OFF
GGDX1009E	B/U HGDS INLET FLOW (FS9), ONE = ON ZERO = OFF
GGDX1010E	B/U HGDS BLOCKED INLET, ONE = ON ZERO = OFF
GGDX1011E	B/U HGDS INLET 1 SELECTED, ONE = ON ZERO = OFF
GGDX1012E	B/U HGDS INLET 2 SELECTED, ONE = ON ZERO = OFF
GGDX1013E	B/U HGDS PRIME HGDS SELECTED, ONE = ON ZERO = OFF
GGDX1014E	B/U HGDS B/U HGDS SELECTED, ONE = ON ZERO = OFF
GGDX1015E	B/U HGDS MGA ON, ONE = ON ZERO = OFF
GGDX1016E	B/U HGDS MGA STANDBY, ONE = ON ZERO = OFF

9.2 BACKUP MASS SPECTROMETER (CONTINUED)

ASSOCIATED MSIDS

GGDX1021E	B/U HGDS SAMPLE LINE 1 SELECTED, ONE = ON ZERO = OFF
GGDX1022E	B/U HGDS SAMPLE LINE 2 SELECTED, ONE = ON ZERO = OFF
GGDX1023E	B/U HGDS SAMPLE LINE 3 SELECTED, ONE = ON ZERO = OFF
GGDX1024E	B/U HGDS SAMPLE LINE 4 SELECTED, ONE = ON ZERO = OFF
GGDX1025E	B/U HGDS SAMPLE LINE 5 SELECTED, ONE = ON ZERO = OFF
GGDX1026E	B/U HGDS SAMPLE LINE 6 SELECTED, ONE = ON ZERO = OFF
GGDX1027E	B/U HGDS SAMPLE LINE 7 SELECTED, ONE = ON ZERO = OFF
GGDX1028E	B/U HGDS SAMPLE LINE 8 SELECTED, ONE = ON ZERO = OFF
GGDX1029E	B/U HGDS ZERO GAS SELECTED, ONE = ON ZERO = OFF
GGDX1030E	B/U HGDS TEST GAS SELECTED, ONE = ON ZERO = OFF
GGDX1031E	B/U HGDS SPAN GAS SELECTED, ONE = ON ZERO = OFF
GGDX1032E	B/U HGDS PARALLEL MODE ENABLED, ONE = ON ZERO = OFF
GGDX1041E	B/U HGDS SAMPLE FLOW CLOSED (FC2), ONE = ON ZERO = OFF
GGDX1042E	B/U HGDS SAMPLE FLOW OPEN (FC2), ONE = ON ZERO = OFF
GGDX1043E	B/U HGDS CAL GAS FLOW CLOSED (FC1), ONE = ON ZERO = OFF
GGDX1044E	B/U HGDS CAL GAS FLOW OPEN (FC1), ONE = ON ZERO = OFF
GGDX1045E	B/U HGDS TRANSPORT PUMP ON (M1), ONE = ON ZERO = OFF
GGDX1046E	B/U HGDS TRANSPORT PUMP OFF (M1), ONE = ON ZERO = OFF
GGDX1047E	B/U HGDS SAMPLE PUMP ON (M2), ONE = ON ZERO = OFF
GGDX1048E	B/U HGDS SAMPLE PUMP OFF (M2), ONE = ON ZERO = OFF
GGDX1057E	B/U HGDS FLOW SIMO 1 (MV1), ONE = ON ZERO = OFF
GGDX1058E	B/U HGDS FLOW SIMO 2 (MV2), ONE = ON ZERO = OFF
GGDX1059E	B/U HGDS FLOW SIMO 3 (MV3), ONE = ON ZERO = OFF
GGDX1060E	B/U HGDS FLOW SIMO 4 (MV4), ONE = ON ZERO = OFF
GGDX1061E	B/U HGDS FLOW SIMO 5 (MV5), ONE = ON ZERO = OFF
GGDX1062E	B/U HGDS NO FLOW SIMO 1 (MV1), ONE = ON ZERO = OFF
GGDX1063E	B/U HGDS NO FLOW SIMO 2 (MV2), ONE = ON ZERO = OFF
GGDX1064E	B/U HGDS NO FLOW SIMO 3 (MV3), ONE = ON ZERO = OFF
GGDX1065E	B/U HGDS NO FLOW SIMO 4 (MV4), ONE = ON ZERO = OFF
GGDX1066E	B/U HGDS NO FLOW SIMO 5 (MV5), ONE = ON ZERO = OFF
GGDX1070E	B/U HGDS BLOCKED INLET, ONE = ON ZERO = OFF

9.3 AFT FUSELAGE VACUUM SAMPLE BOTTLES



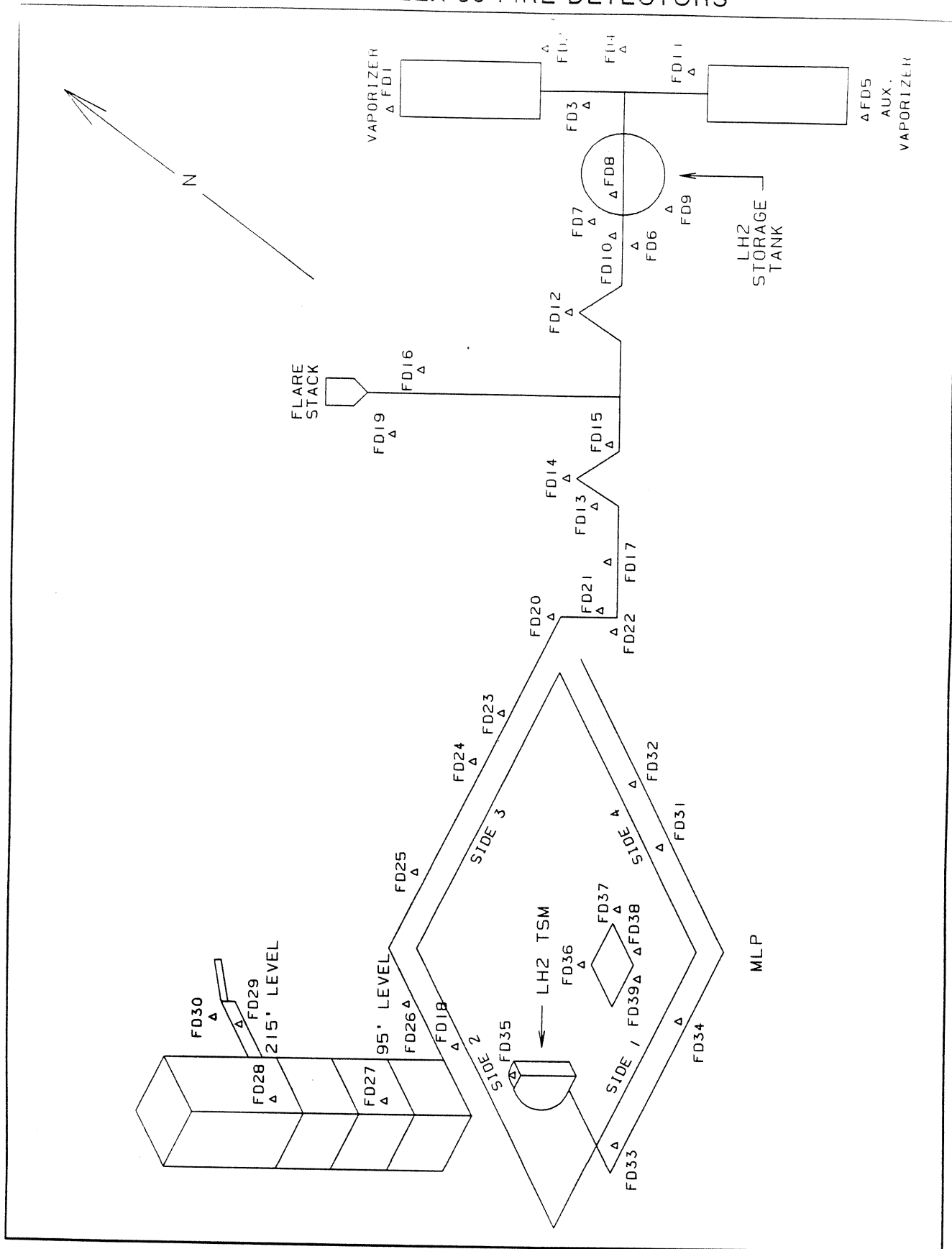
BOTTLES LOCATED ON EACH SIDE AT APPROXIMATELY X₀ 1372, Z₀ 380 NEAR AFT FUSELAGE VENT DOORS. VENT DOORS ARE LOCATED AT X₀ 1390, Z₀ 358. IT SHOULD BE NOTED THAT THERE ARE NO MSID'S ASSOCIATED WITH THE VACUUM BOTTLES.

9.4 HYDROGEN LEAK DETECTORS

<u>NO.</u>	<u>AREA</u>	<u>LOCATION</u>
GLHR7005A	LD1 LH2 STORAGE	STOR TK FLEX HOSE ON INLET SIDE OF VLV A3422
GLHR7006A	LD2 LH2 STORAGE	STOR TK PRE-CONDITION VALVE A3338
GLHR7007A	LD3 LH2 STORAGE	LH2 TRANSFER LINE VALVE A3301
GLHR7008A	LD4 LH2 STORAGE	LH2 TRANSFER LINE CHILLDOWN VALVE A3309
GLHR7009A	LD5 LH2 STORAGE	LH2 MAIN VAPORIZER CONTROL VALVE A3304
GLHR7015A	LD6 LH2 STORAGE	MAIN VAPORIZER FLANGE, VALVE A3362
GLHR7016A	LD7 LH2 FLARE STACK	A156391
GLHR7017A	LH8 LH2 FLARE STACK	A156393
GLHR7018A	LD9 LH2 C C LN	18" V LN EXP AT LOOP END, A64034
GLHR7019A	LD10 LH2 C C LN	18" V LN EXPAN AT LOOP CENTER, A64035
GLHR7025A	LD11 LH2 C C LN	18" V LN EXP AT LOOP END, A64036
GLHR7026A	LD12 PAD APRON	10" FILL EXP AT LH2 DISC PAD APRON, A64021
GLHR7027A	LD13 PAD APRON	EXPANSION JOINT IN TRENCH PAD APRON, A64033
GLHR7028A	LD14 PAD APRON	18" V LN EXP AT PAD APRON INTRENCH, A101665
GLHR7029A	LD15 LH2 TOWER	10" FILL LINE DISC AT MLP DISCONNECT
GLHR7035A	LD16 PAD APRON	18" V UPR EXP @ BASE, E END OF BRGE, A64030
GLHR7036A	LD17 PAD APRON	18" V LWR EXP @ BASE, E END OF BRGE, A64031
GLHR7037A	LD18 NORTH BRIDGE	18" V LN EXP E END OF BRIDGE, A100790
GLHR7038A	LD19 NORTH BRIDGE	18" V EX JT 50' FROM E END OF BRGE, A100789
GLHR7039A	LD20 NORTH BRIDGE	18" V EX JT 100' FROM E END OF BRGE, A100788
GLHR7045A	LD21 LOX TOWER	18" VT EXP ABOVE LOX DISC TOWER, A100787
GLHR7046A	LD22 FSS, 200' EL	18" VT EXP JT 155 FT LEVEL OF FSS, A100744
GLHR7047A	LD23 FSS, 200' EL	18" VT LN UMB CARRIER PLATE
GLHR7048A	LD24 FSS, 200' EL	18" VT LN FLX LN FLNG FSS, ET ACCESS ARM
GLHR7049A	LD25 FSS, 200' EL	18" VT LN UMB CARRIER PLATE
GLHR7055A	LD26 MLP-3	LH2 VALVE SKID REPLENISH VALVE MLP SIDE 1
GLHR7056A	LD27 MLP-3	LH2 VALVE SKID MAIN FILL VALVE, MLP SIDE 1
GLHR7057A	LD28 COMP 43A	T-0 UMBILICAL LH2 TSM
GLHR7058A	LD29 COMP 43A	LH2 FILL LN FLEX INTFC UPR END, BASE LH2 TSM
GLHR7059A	LD30 COMP 43A	T-0 UMBILICAL LH2 TSM
GLHR7065A	LD33 MLP-3	ENTRANCE TO LOX TUNNEL
GLHR7066A	LD34 MLP-3	INTERSEC OF BLAST ROOF OVER LH2 VLV SKID AND MLP SIDE 1
GLHR7067A	LD32 COMP 43A	T-0 UMBILICAL LH2 TSM
GLHR7068A	LD35 LH2 TOWER	14" VT LN EXP, IN TRENCH AT BASE OF DISC TWR
GLHR7069A	LD36 LH2 TOWER	14" VT LN FLEXHOSE AT MLP DISC TOWER
GLHR7075A	LD37 FSS-200' EL	ET VENT CONTROL VALVE
GLHR7076A	LD51 LH2 TOWER	14" VT LINE, TRENCH AT BASE OF DISC. TOWER
GLHR7077A	LD52 LH2 TOWER	14" VT LINE, TRENCH AT BASE OF DISC. TOWER
GLHR7078A	LD56 CARRIER PL.	LH2 UMB TOWER LH2 UMB CARRIER (TORQUE BOX)
GLHR7079A	LD57 CARRIER PL.	LH2 UMB TOWER LH2 UMB CARRIER (TORQUE BOX)
GLHR7088A	LD54 ET LH2 DISC.	PRI. INB, ET LH2 DISC
GLHR7098A	LD55 ET LH2 DISC.	PRI. OUTBD. ET LH2 DISC
GLHR9088A	LD54 ET LH2 DISC.	SEC. INB, ET LH2 DISC
GLHR9098A	LD55 ET LH2 DISC.	SEC. OUTBD. ET LH2 DISC

NOTE: RANGE FOR ALL LEAK DETECTORS EXCEPT LD 28, 29, 30, 32 56, AND 57 IS -10,000 TO 40,000 PPM. THE RANGE FOR THESE SIX LEAK DETECTORS IS -10,000 TO 60,000 PPM (6%). THE NEGATIVE PORTION IS USED FOR FAULT DETECTION.

9.5 COMPLEX 39 FIRE DETECTORS



9.5 COMPLEX 39 FIRE DETECTORS

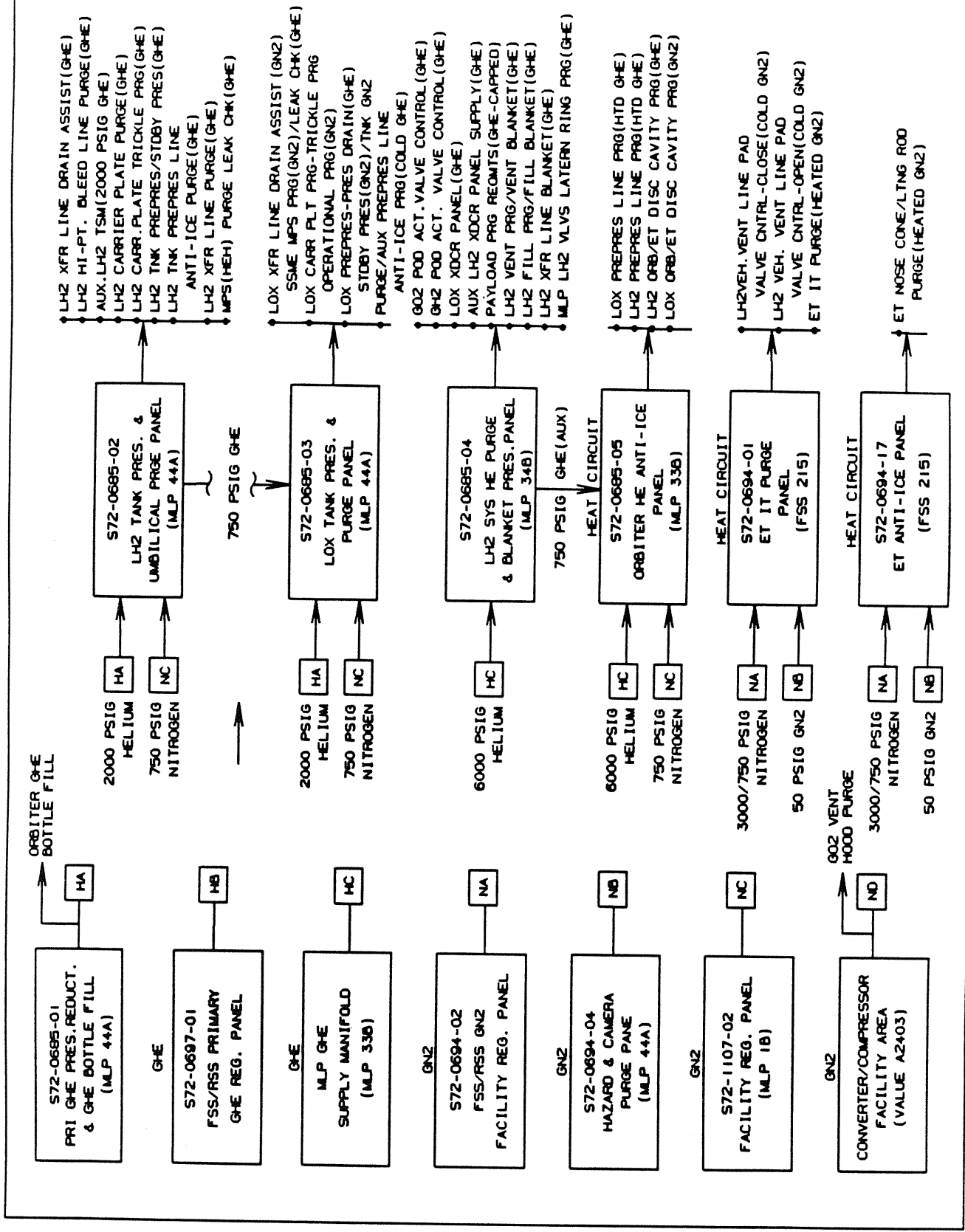
	<u>NO.</u>	<u>AREA</u>	<u>LOCATION</u>
GLHX7003E	FD1	LH2 STORAGE	MAIN VAPORIZER AREA LOOKING SOUTH
GLHX7013E	FD2	LH2 STORAGE	MAIN VAPORIZER AREA LOOKING NORTH
GLHR7023E	FD3	LH2 STORAGE	AUXILIARY VAPORIZER AREA LOOKING SOUTH
GLHX7033E	FD4	LH2 STORAGE	AUXILIARY VAPORIZER AREA
GLHX7043E	FD5	LH2 STORAGE	AUXILIARY VAPORIZER AREA LOOKING NORTH
GLHX7053E	FD6	LH2 STORAGE	VLV CMPLX AT LH2 STORAGE TANK LOOKING EAST
GLHX7063E	FD7	LH2 STORAGE	VLV CMPLX AT LH2 STORAGE TANK LOOKING SOUTH
GLHX7073E	FD8	LH2 STORAGE	VLV CMPLX AT LH2 STORAGE TANK LOOKING WEST
GLHX7083E	FD9	LH2 STORAGE	VLV CMPLX AT LH2 STORAGE TANK LOOKING NORTH
GLHX7093E	FD10	LH2 STORAGE	FILL LINE VALVE
GLHX7103E	FD11	LH2 STORAGE	VAPORIZER VALVE AREA
GLHX7113E	FD12	LH2 STORAGE	12 INCH VENT LINE EXPANSION JOINT
GLHX7123E	FD13	LH2 C C LN	14/18 IN V LN EXPAN JNT AT LOOP WEST END
GLHX7133E	FD14	LH2 C C LN	14/18 IN V LN EXPAN JNT AT LOOP CENTER
GLHX7143E	FD15	LH2 C C LN	14/18 IN V LN EXPAN JNT AT LOOP EAST END
GLHX7153E	FD16	FLARE STACK	VALVE A156545 AT THE FLARE STACK
GLHX7163E	FD17	PAD SLOPE	VENT LINE EXPANSION JOINT TOP PAD SLOPE
GLHX7173E	FD18	ESC BRIDGE	VENT LINE EXPANSION JOINT
GLHX7183E	FD19	FLARE STACK	VALVE A156389 AT THE FLARE STACK
GLHX7193E	FD20	LH2 DISC TWR	MECHANICAL JOINTS, MLP DISCONNECT
GLHX7203E	FD21	LH2 DISC TWR	18 IN V LINE EXPAN JNT IN TRENCH
GLHX7213E	FD22	LH2 DISC TWR	18 IN V LINE EXPAN JNT AT PAD LEVEL
GLHX7223E	FD23	NORTH BRIDGE	18 IN V LINE EXPAN JNT E END OF N BRDGE
GLHX7233E	FD24	NORTH BRIDGE	18 IN V LN EXPAN JNT 50 FT FROM E END OF N BRDGE
GLHX7243E	FD25	NORTH BRIDGE	18 IN V LN EXPAN JNT 100 FT FROM E END OF N BRDGE
GLHX7253E	FD26	LOX DISC TWR	18 IN V LINE EXPAN JNT AT W END OF LOX DISC TWR
GLHX7263E	FD27	FSS	18 IN V LN EXPANSION JOINT FSS 95 FT LEVEL
GLHX7273E	FD28	FSS	18 IN V LN FLANGE FSS 200 FT LEVEL
GLHX7283E	FD29	FSS	18 IN V LN FLEX FLNG FSS, ET ACCESS ARM PVT PT END
GLHX7293E	FD30	FSS	18 IN V LN FLEX FLNG FSS, ET ACCESS ARM UMB END
GLHX7303E	FD31	MLP	14 IN V LN EXP JT, MLP SIDE 4
GLHX7313E	FD32	MLP	14 IN V LN EXP JT, MLP SIDE 4
GLHX7323E	FD33	MLP	LH2 VLV SKID WEST SIDE, MLP SIDE 1
GLHX7333E	FD34	MLP	LH2 VLV SKID EAST SIDE, MLP SIDE 1
GLHX7343E	FD35	MLP	LH2 TSM INTFC W/T-O UMB
GLHX7453E	ORB AFT LFT VENT	FD36	ALARM ON
GLHX7463E	ORB AFT RT VENT	FD37	ALARM ON
GLHX7473E	SSME C/O	FD38	ALARM ON
GLHX7483E	SSME C/O	FD39	ALARM ON

NOTE: ALARM ON INDICATORS, ONE=ON, ZERO=OFF

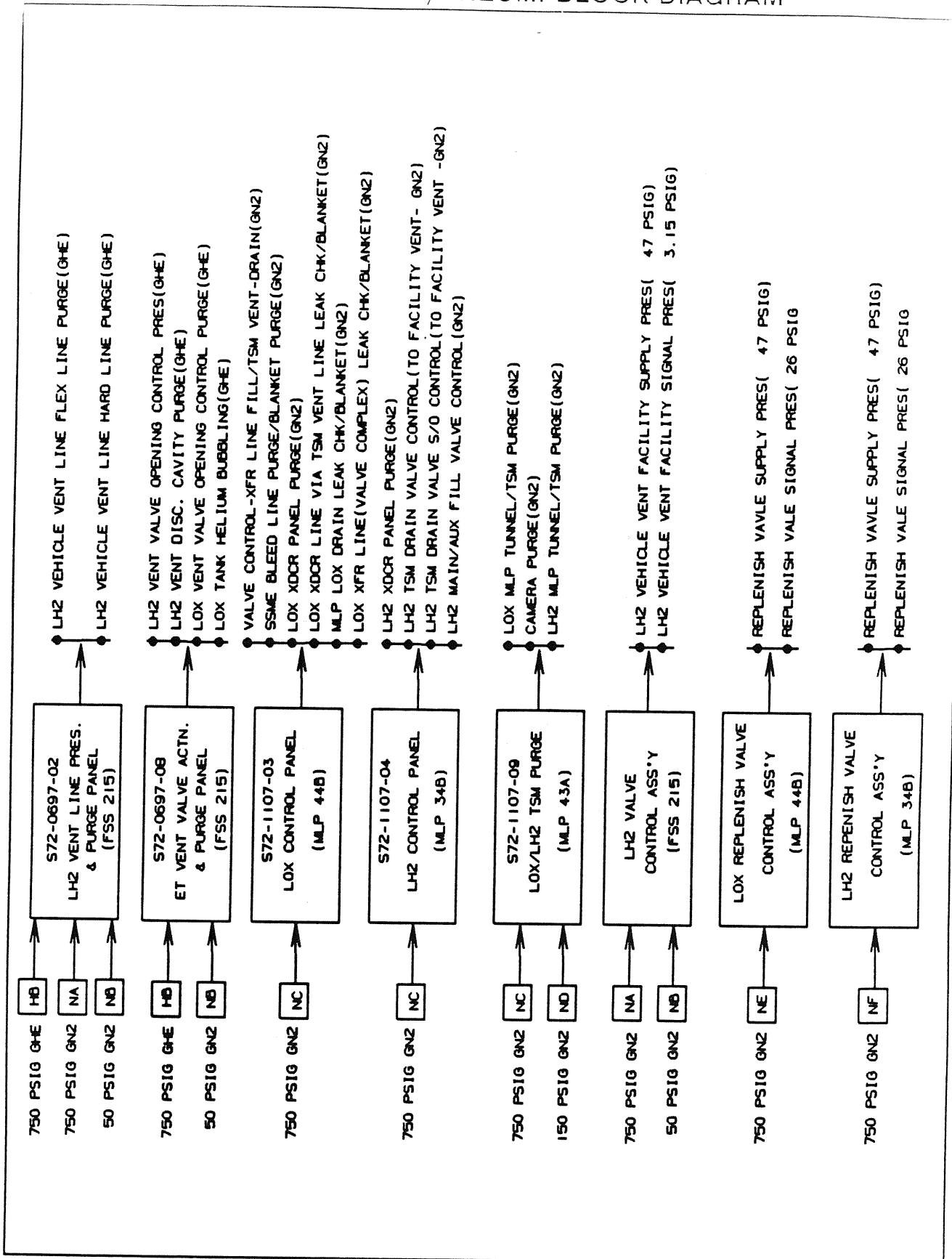
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APPENDIX A

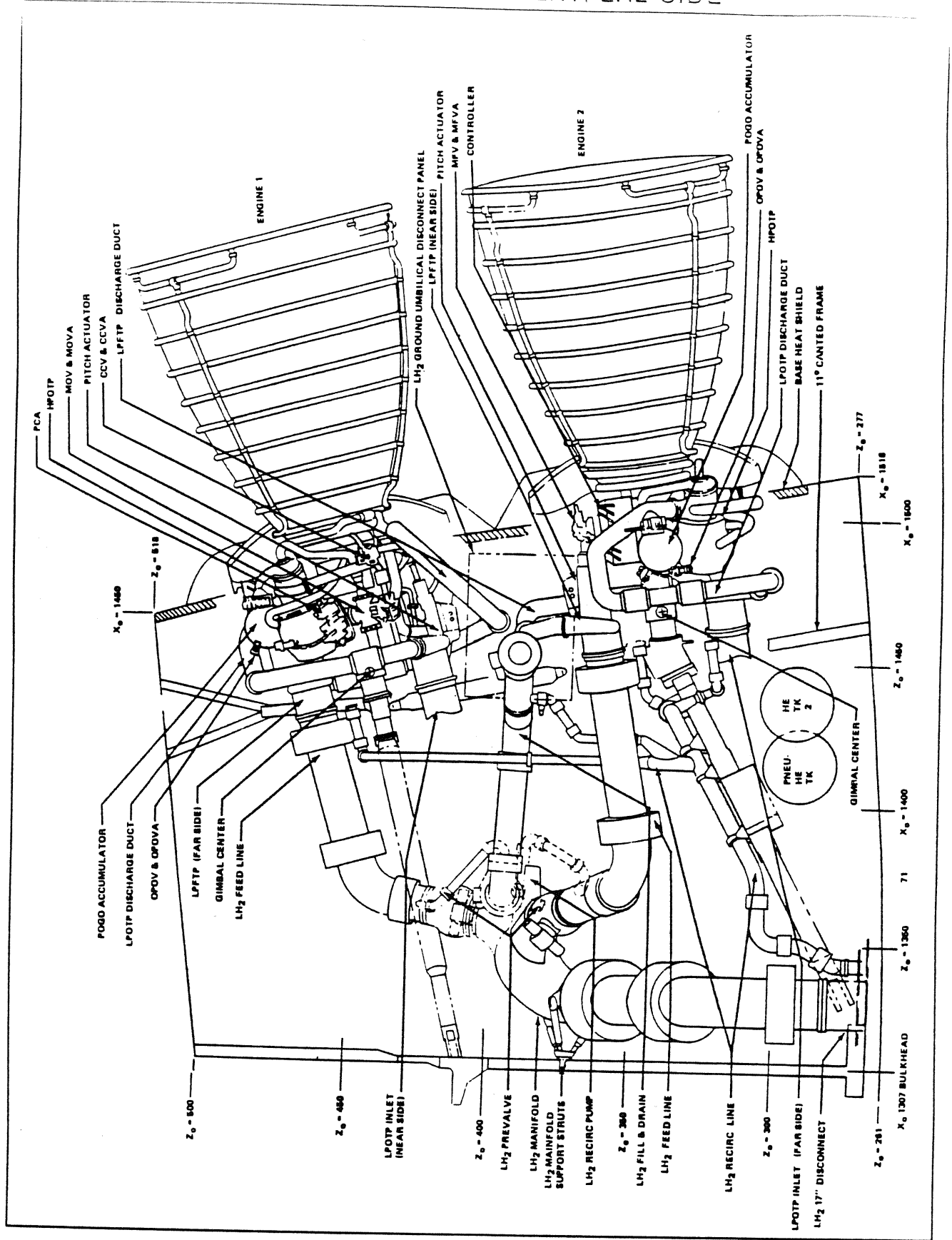
A-1 MPS PURGE/PNEUM. BLOCK DIAGRAM



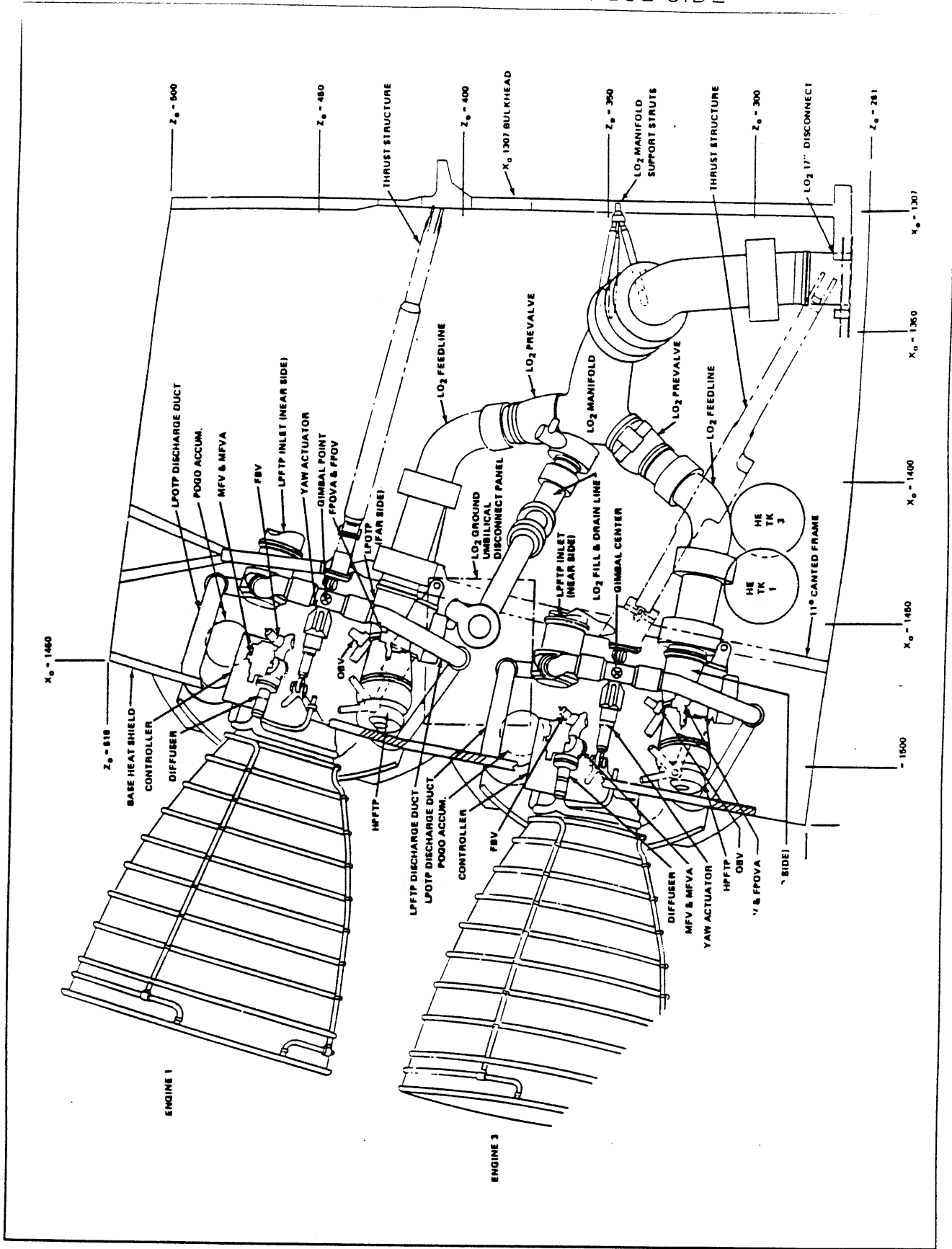
A.1 MPS PURGE/PNEUM. BLOCK DIAGRAM



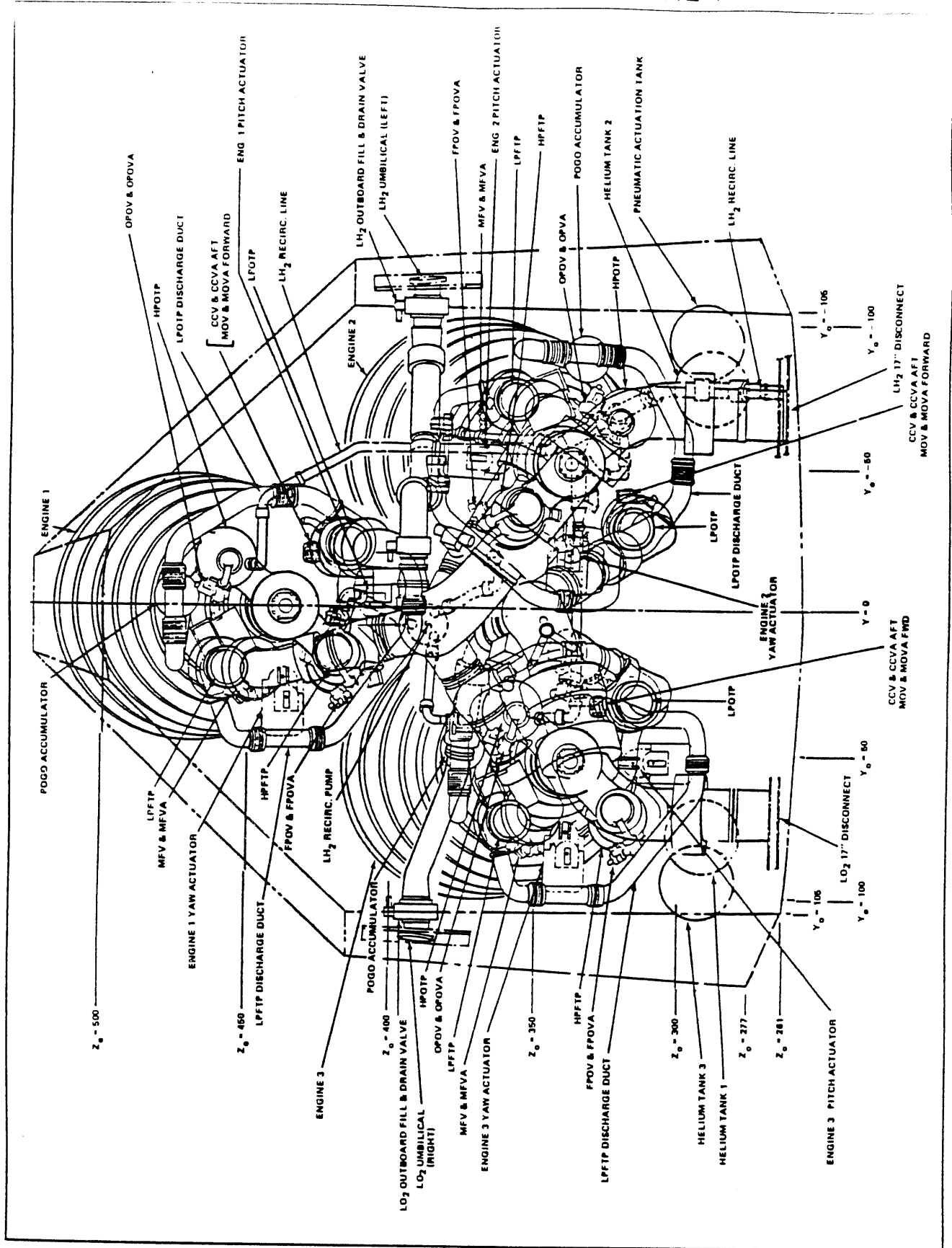
A.2 AFT COMPARTMENT, LH2 SIDE



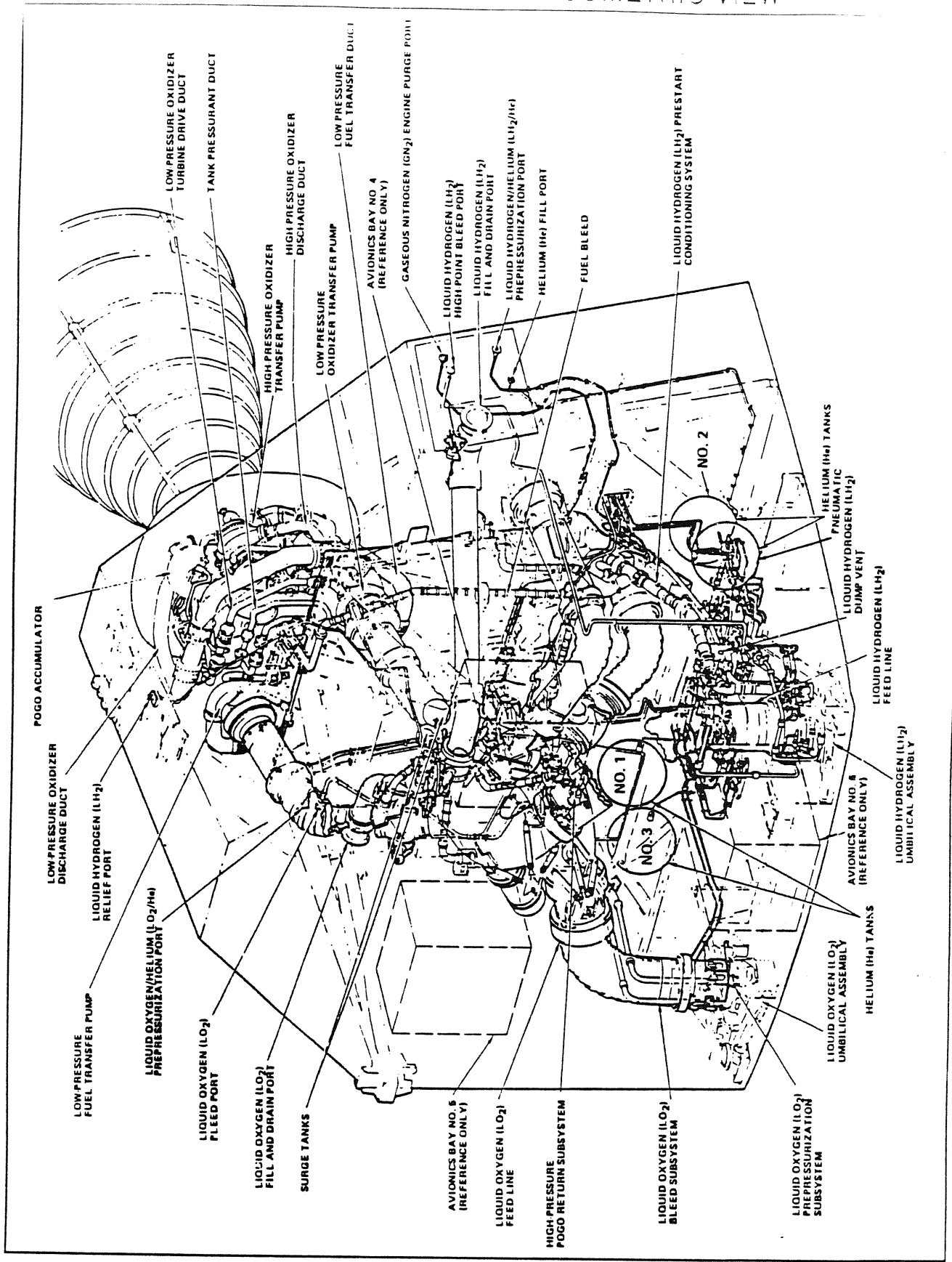
A.3 AFT COMPARTMENT, LO2 SIDE



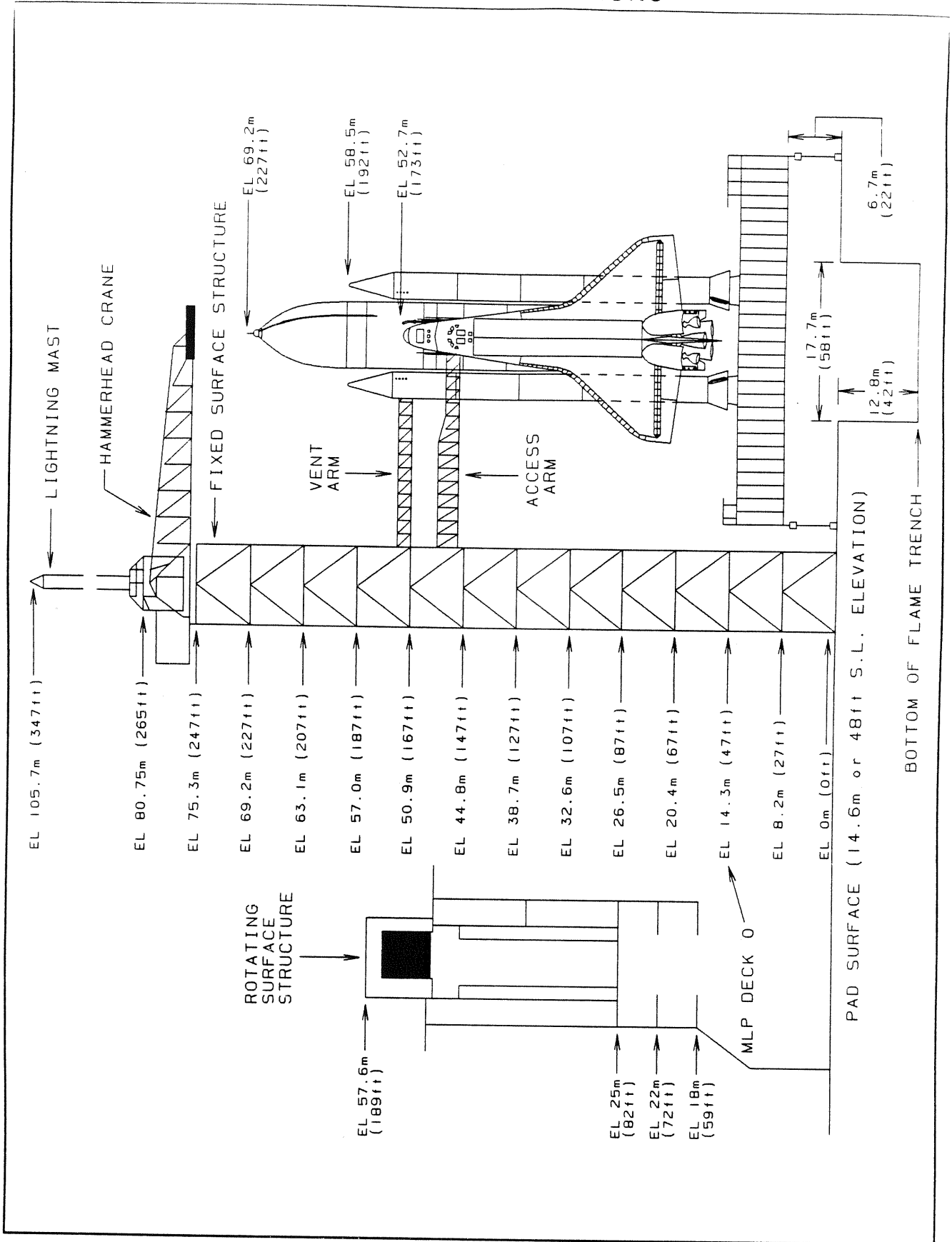
1-4 AFT COMPARTMENT, AFT VIEW



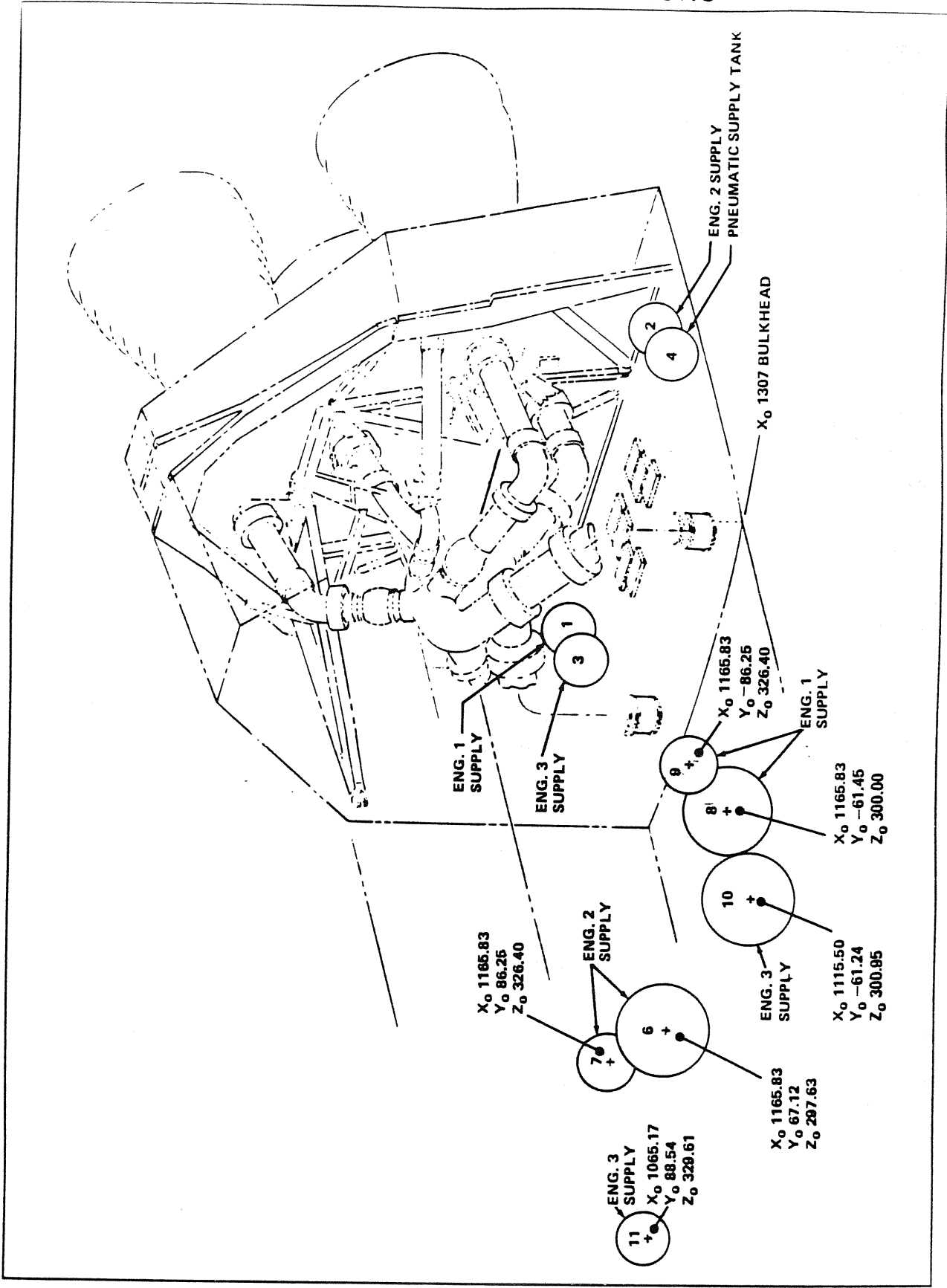
A-1 AFT COMPARTMENT ISOMETRIC VIEW



A.6 KSC PAD ELEVATIONS



A.7 HELIUM BOTTLE LOCATIONS



A.3 MSID/FD SUBSECTION NO. INDEX

<u>MEAS. NO.</u>	<u>SUB SEC.</u>	<u>MEAS. NO.</u>	<u>SUB SEC.</u>	<u>MEAS. NO.</u>	<u>SUB SEC.</u>
GSAP9071A	8.7	T41X1720E	3.2,3.7	V41P1353A	5.2
GSAP9076A	8.7	T41X1721E	3.2,3.7	V41P1354A	5.2
GSAP9081A	8.7	T41X1724E	3.2,3.7,3.9	V41P1360A	3.8
GSAP9086A	8.7	T41X1727E	3.2,3.7,3.9	V41P1433C	3.4
GSAP9091A	8.7	T41X1730X	3.2,3.7	V41P1464A	2.7
GSAP9096A	8.7	T41X1731X	3.2,3.7	V41P1490A	3.8
GSAP9101A	8.7	T41X1732X	3.2,3.7	V41P1533C	2.2,2.4
GSAP9111A	8.7	T41X1733X	3.2,3.7	V41P1564A	3.8
GSAP9116A	8.7	T41X1752C	2.2,2.6,2.7	V41P1590A	2.7
GSAP9121A	8.7	T41X1753C	2.2,2.6,2.7	V41P1600A	5.2
GSAP9126A	8.7	T41X1762E	2.2,2.6	V41P1605A	5.2
GSAP9131A	8.7	T41X1765E	2.2,2.6	V41P1650A	5.2
GSAP9136A	8.7	T41X1766E	2.2,2.6	V41P9195A	2.4
GSAT9141A	8.7	T41X1767E	2.2,2.6	V41P9295A	2.4
GSAT9146A	8.7	T41X1768E	2.2,2.6	V41P9395A	2.4
GSAT9151A	8.7	T41X1769E	2.2,2.6	V41R1115A	3.2,3.6
GSAT9156A	8.7	T41X1770E	2.2,2.6	V41R1215A	3.2,3.6
GSAT9201A	8.7	T41X1771E	2.2,2.6	V41R1315A	3.2,3.6
GSAT9206A	8.7	T41X1774E	2.2,2.6,2.8	V41T1101C	3.4
GSAT9301A	8.7	*V07P9077A	7.3	V41T1131C	2.4
GSAT9306A	8.7	*V07P9083A	7.3	V41T1151A	5.1,5.2
GSAT9311A	8.7	*V07P9087A	7.3	V41T1152A	5.1,5.2
GSAT9316A	8.7	*V07P9225A	7.3	V41T1161A	3.8
GSAT9551A	8.7	*V07P9301A	7.3	V41T1171A	2.7
GSAT9556A	8.7	*V07P9302A	7.3	V41T1201C	3.4
T07P9550H	7.6	*V07P9303A	7.3	V41T1231C	2.4
T07P9551H	7.6	*V07P9304A	7.3	V41T1251A	5.1,5.2
T07P9552H	7.6	*V07P9305A	7.3	V41T1252A	5.1,5.2
T41P1700C	3.2,3.7,3.8	*V07P9306A	7.3	V41T1261A	3.8
T41P1701C	3.2,3.7,3.8	*V07P9379A	7.3	V41T1271A	2.7
T41P1702C	3.2,3.7,3.8	V08D9451A	4.2	V41T1301C	3.4
T41P1703C	3.2,3.7	V08D9454A	4.2	V41T1331C	2.4
T41P1740H	2.2,2.6,2.7	V08D9457A	4.2	V41T1351A	5.1,5.2
T41P1741H	2.2,2.6,2.7	V41P1100C	3.4	V41T1352A	5.1,5.2
T41P1750C	2.2,2.6,2.7	V41P1130C	2.4	V41T1361A	3.8
T41P1751C	2.2,2.6,2.7	V41P1150C	5.2	V41T1371A	2.7
T41T1705A	3.2,3.7	V41P1153A	5.2	V41T1428A	3.4
T41T1755A	2.2,2.6	V41P1154A	5.2	V41T1527A	2.2,2.4
T41T1810H	7.4	V41P1160A	3.8	V41T1528A	2.2,2.4
T41T1811H	7.4	V41P1200C	3.4	V41T1601A	5.1,5.2
T41T1820H	7.6	V41P1230C	2.4	V41X1104X	3.2,3.4
T41T1821H	7.6	V41P1250C	5.2	V41X1105E	3.2,3.4
T41X1712E	3.2,3.7	V41P1253A	5.2	V41X1106X	3.2,3.4
T41X1715E	3.2,3.7	V41P1254A	5.2	V41X1109E	3.2,3.6
T41X1716E	3.2,3.7	V41P1260A	3.8	V41X1110E	3.2,3.6
T41X1717E	3.2,3.7	V41P1300C	3.4	V41X1134X	2.2,2.4,2.5
T41X1718E	3.2,3.7	V41P1330C	2.4	V41X1135E	2.2,2.4,2.5
T41X1719E	3.2,3.7	V41P1350C	5.2	V41X1158E	5.2

NOTE: Asterisk (*) preceding MSID No. indicates it was effective for OV103 only.

A.8 MSID/FD SUBSECTION NO. INDEX

<u>MEAS. NO.</u>	<u>SUB SEC.</u>	<u>MEAS. NO.</u>	<u>SUB SEC.</u>	<u>MEAS. NO.</u>	<u>SUB SEC.</u>
V41X1159E	5.2	V41X1530X	2.2,2.4	V58T0E87A	6.1
V41X1164E	5.2	V41X1534X	2.2,2.4	V58T1E30A	6.2
V41X1170E	5.2	V41X1538E	2.7	V58T1E31A	6.2
V41X1204X	3.2,3.4	V41X1539E	2.7	V58T2E11A	6.1
V41X1205E	3.2,3.4	V41X1541E	2.2,2.3	V58T2E40A	6.2
V41X1206X	3.2,3.4	V41X1542E	2.2,2.3	V58X0E35E	6.2
V41X1209E	3.2,3.6	V41X1555X	2.2,2.4	V58X0E36E	6.2
V41X1210E	3.2,3.6	V41X1556X	2.2,2.4	V58X1E07E	6.2
V41X1234X	2.2,2.4,2.5	V41X1557X	2.2,2.4	V58X1E36E	6.2
V41X1235E	2.2,2.4,2.5	V41X1558X	2.2,2.4	V58X1E57A	6.2
V41X1258E	5.2	V41X1580X	2.2,2.5	V59X3805X	7.3
V41X1259E	5.2	V41X1581X	2.2,2.5	V59X3815X	7.3
V41X1264E	5.2	V41X1587E	2.2,2.5	V59X3855X	7.3
V41X1270E	5.2	V41X1596E	2.7	V59X3865X	7.3
V41X1304X	3.2,3.4	V41X1598E	2.7	V59X3905X	7.3
V41X1305E	3.2,3.4	V41X1603E	2.7	V59X3915X	7.3
V41X1306X	3.2,3.4	V41X1614E	5.2	V59X4805X	7.3
V41X1309E	3.2,3.6	V41X1632E	5.5	V59X4815X	7.3
V41X1310E	3.2,3.6	V41X1634E	5.5	V59X4855X	7.3
V41X1334X	2.2,2.4,2.5	V41X1645E	5.2	V59X4865X	7.3
V41X1335E	2.2,2.4,2.5	V41X1646E	5.2	V59X4905X	7.3
V41X1358E	5.2	V41X1661E	3.8	V59X4915X	7.3
V41X1359E	5.2	V41X1662E	3.8	V61X2045E	7.3
V41X1364E	5.2	V41X1663E	3.8	V61X2065E	7.3
V41X1370E	5.2	V41X1811X	2.2,2.5		
V41X1388E	3.2,3.3	V41X1818E	2.2,2.5		
V41X1389X	3.2,3.3	V41X1821X	2.2,2.5		
V41X1409E	3.2,3.3,3.6	V41X1828E	2.2,2.5		
V41X1410X	3.2,3.3,3.6	V41X1917E	3.2,3.4		
V41X1419E	3.2,3.6	V41X1919X	3.2,3.4		
V41X1420E	3.2,3.6	V41X1927E	3.2,3.4		
V41X1429X	3.2,3.4	V41X1929X	3.2,3.4		
V41X1430X	3.2,3.4	V58H1E00A	6.2		
V41X1434X	3.2,3.4	V58H1E50A	6.2		
V41X1436E	3.18	V58P0E66A	6.2		
V41X1438E	3.18	V58P0E14C	6.1		
V41X1441E	3.2,3.3	V58P0E15C	6.1		
V41X1442E	3.2,3.3	V58P0E16C	6.1		
V41X1453E	3.2,3.6	V58P0E31A	6.1		
V41X1456X	3.2,3.6	V58P0E37A	6.1		
V41X1468E	3.2,3.5	V58P0E67A	6.1		
V41X1469E	3.2,3.5	V58Q0302A	6.1		
V41X1492E	3.8	V58T0E01A	6.1		
V41X1509X	2.2,2.3	V58T0E20A	6.1		
V41X1510E	2.2,2.3	V58T0368A	6.1		
V41X1513E	2.2,2.3	V58T0E83A	6.1		
V41X1514X	2.2,2.3	V58T0E85A	6.1		
V41X1529X	2.2,2.4	V58T0E86A	6.1		

