

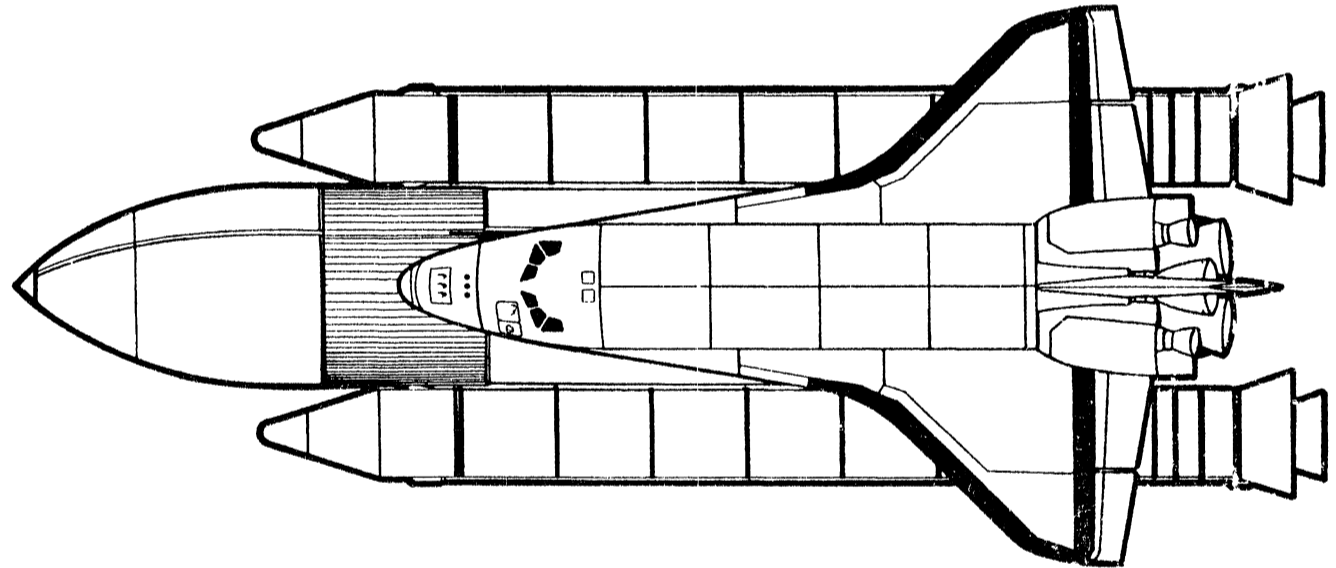
LMC-ET-SE61-1
DR SE61 WBS 3.6.6
NAS8-36200

Space Shuttle External Tank

December, 1997

Layout Drawings Volume II

System Definition Handbook SLWT



INTRODUCTION

GENERAL DESIGN
ARRANGEMENT

STRUCTURAL
ARRANGEMENT

PROPULSION
ARRANGEMENT

ELECTRICAL
ARRANGEMENT

THERMAL PROTECTION
ARRANGEMENT

MANUFACTURING
SEQUENCE

LOCKHEED MARTIN



LMC-ET-SE61-1
DR SE61 WBS 3.6.6
NAS8-36200

VOLUME II

System
Definition
Handbook
SLWT

Layout Drawings
Volume II

December, 1997

Space Shuttle External Tank

Lockheed Martin
Michoud Space Systems
New Orleans, Louisiana

GLOSSARY

FORWARD

This report is prepared and submitted in accordance with Data Requirement Number SE61 of the Space Shuttle External Tank Information Requirements Document Production - Increment III, DPD #660 dated March 31, 1989 incorporated in Contract NAS8-36200.

This Handbook presents a compilation of layout drawings by system and Manufacturing Sequence Flow Charts.

The information contained in this Handbook is based on design information, drawings, and analyses completed prior to December 1997. This Handbook is not intended to form requirements or criteria nor place any constraints or restrictions upon design.

ACRONYMS AND ABBREVIATIONS

AOA	Abort-Once-Around	MLP	Mobile Launch Platform
ATO	Abort-To-Orbit	MST	Mobile Service Tower
BSTRA	Ball-Strut-Tie-Rod Assembly	NASA	National Aeronautics and Space Administration
CE	Contingency Equipment	n mi	Nautical Mile(s)
CRCS	Corrosion Resistant Steel	NPSP	Net Positive Suction Pressure
CSE	Common Support Equipment	NSI	NASA Standard Initiator
DOD	Department of Defense	OD	Outside Diameter
EB	External Tank/Solid Rocket Booster	OI	Operational Instrumentation
ECO	Engine Cut-Off	OMS	Orbital Maneuvering System
ECS	Environmental Conditioning System	OPF	Orbiter Processing Facility
EMC	Electromagnetic Compatibility	Orb	Orbiter
EMI	Electromagnetic Interference	PCF	Pounds per Cubic Foot
EO	External Tank/Orbiter	PETN	Penterythrite
ET	External Tank	PIC	Pyro Initiator Controller
ETCA	ET Intertank Carrier Plate Assembly	RCS	Reaction Control System
ETR	Eastern Test Range	RDX	Cyclotrimethylene Trinitramine
FEP	Fluorinated Ethylene Propylene	RSE	Rotational Support Equipment
Fwd	Forward	RSS	Range Safety System
FRL	Flame Retardant Latex	RTLS	Return-to-Launch Site
GFP	Government Furnished Property	S&A	Safe and Arm
GH2	Gaseous Hydrogen	SAB	Shuttle Assembly Building
GHe	Gaseous Helium	SDH	System Definition Handbook
GN2	Gaseous Nitrogen	SE	Support Equipment
GO2	Gaseous Oxygen	SLA	Super-Light Ablator
GPM	Gallons Per Minute	SLWT	Super Lightweight Tank
GSE	Ground Support Equipment	SOFI	Spray-On Foam Insulation
GUCA	Ground Umbilical Carrier Assembly	SRB	Solid Rocket Booster
He	Helium	Sta	Station
HGDS	Hazardous Gas Detection System	STA	Structural Test Article
HMX	Cyclotetramethylene Tetranitramine	STE	Special Test Equipment
HNS	Hexanitrostilbene	STS	Space Transportation System
ID	Inside Diameter	TAL	Trans Oceanic Abort Landing
IT	Intertank	TFE	Tetrafluorethylene
KSC	Kennedy Space Center	Ti	Titanium
LH2	Liquid Hydrogen	TPS	Thermal Protection System
LO2	Liquid Oxygen	TSE	Transportation and Support Equipment
LN2	Liquid Nitrogen	TVC	Thrust Vector Control
LPS	Launch Processing Systems	VAB	Vehicle Assembly Building
MA	Martin Ablator	VAFB	Vandenberg Air Force Base
MAF	Michoud Assembly Facility	WBS	Work Breakdown Structure
MECO	Main Engine Cut-Off	WTR	Western Test Range

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I. Introduction

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INTRODUCTION

This handbook provides layout drawings and flow charts for the Space Shuttle External Tank.

General

The Systems Definition Handbook (SDH) provides a technical description of the configuration and an operations overview, layout drawings, and performance data for the SLWT Space Shuttle External Tank (ET)

Volume II Contents

Volume I contains 7 sections organized on a functional/system basis as listed below. In addition to a compilation of layout drawings arranged by general system categories, the volume also provides a series of manufacturing sequence and handling flow charts.

Section I, Introduction - Briefly describes the arrangement and contents of the SDH.

Section II, General Design/Arrangement - Depicts the ET inboard/outboard profile and tolerance control drawings.

Section III, Structures Arrangement - Provides the layout drawings for the structures systems.

Section IV, Propulsion Arrangement - Provides the layout drawings for the propulsion systems.

Section V, Electrical Arrangement - Provides the layout drawings for the electrical system.

Section VI, Thermal Protection Arrangement - Provides the layout drawings for the thermal protection system.

Section VII, Manufacturing Sequence and Handling Flow - Provides a series of flow charts depicting the manufacturing production sequence.

Abbreviations and Acronyms - The abbreviations and acronyms used in this SDH are defined in the glossary contained in the front of this volume.

ARRANGEMENT

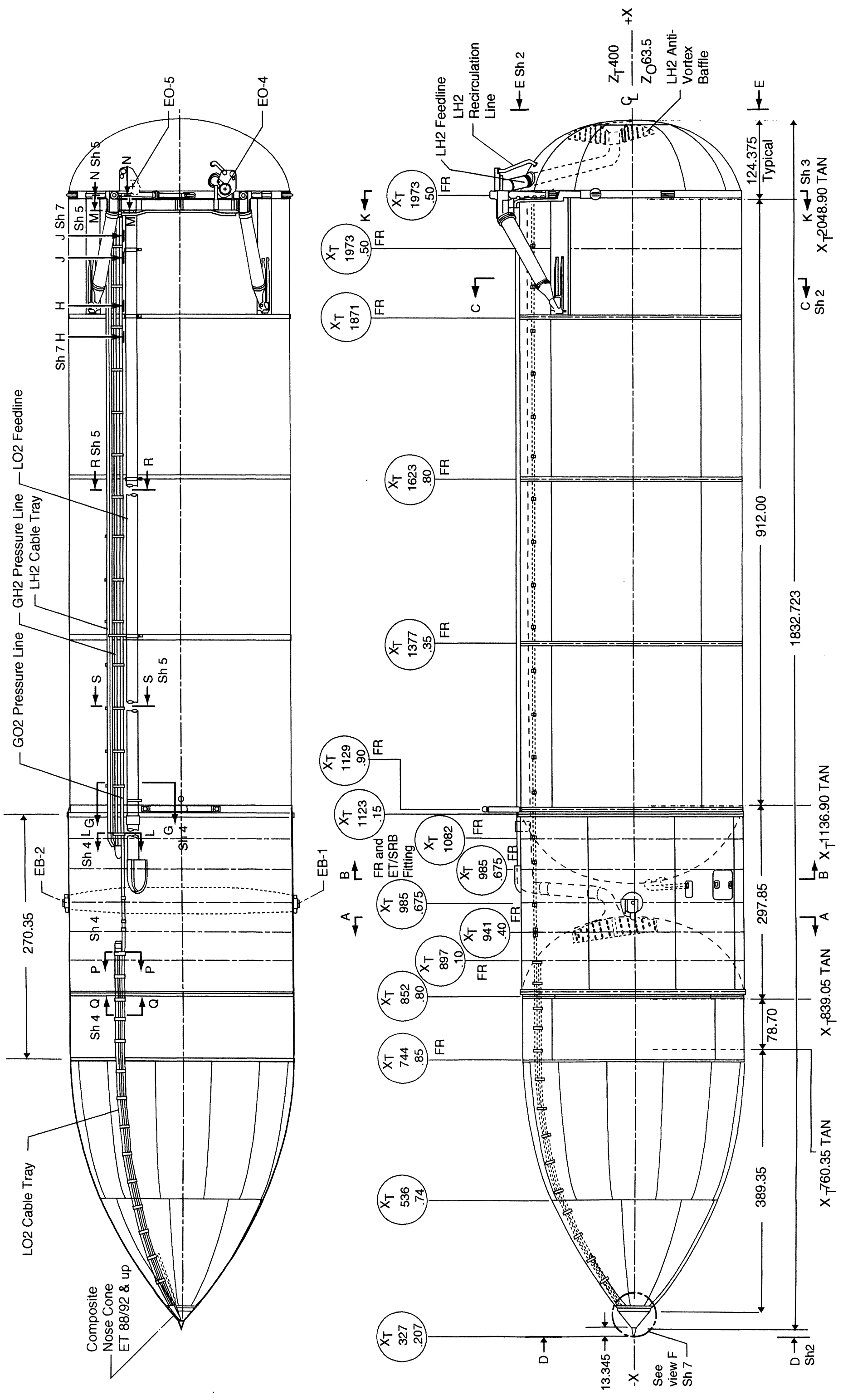
This SDH has been arranged in three volumes to enhance its usability. Volume I, Configuration and Operation, provides a configuration description and an operations overview of the ET. Volume I makes maximum use of illustrations, integrated into the text, to portray the ET and its associated interfaces and equipment. Volume I is standard 8-1/2 x 11-inch size. Volume II, Layout Drawings, provides a compilation of layout drawings depicting the ET design from a system level breakdown. Volume II has been prepared for an 11 x 17-inch size to enhance utilization of the layout drawings. Volume III, Performance Data, is in the convenient 5-1/4 x 8-inch pocket-size format.

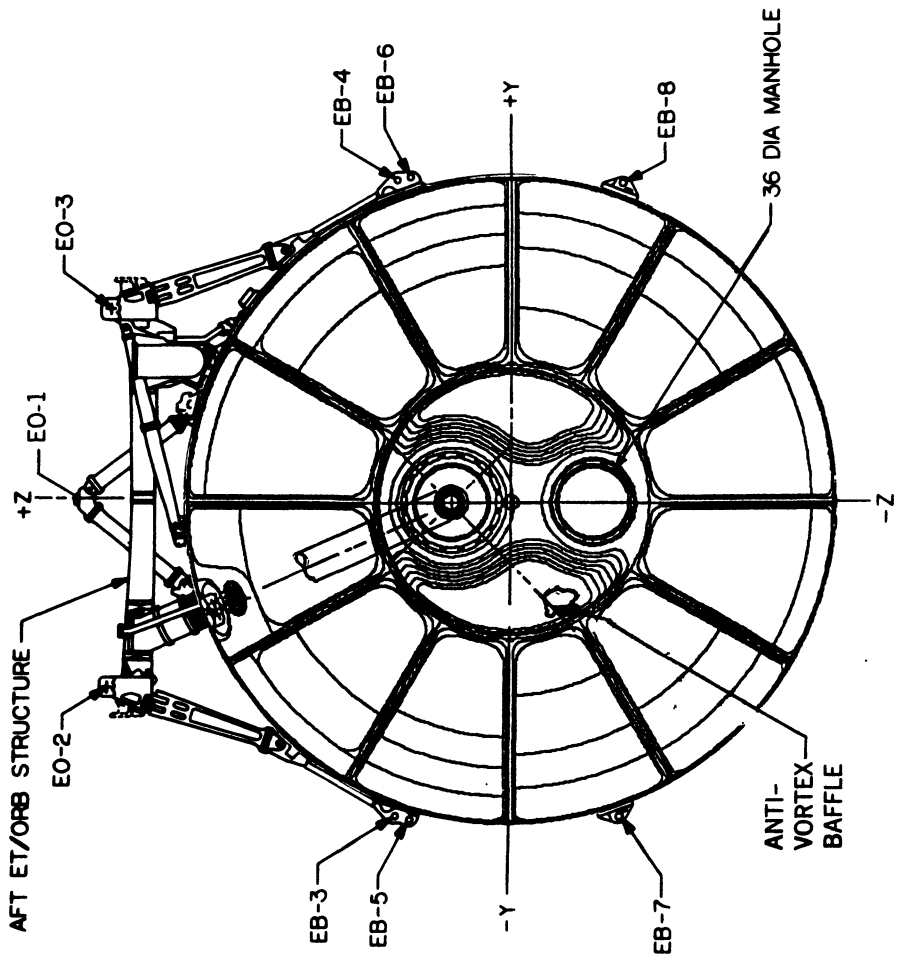
The cover page of each volume contains a section level index (with a bleed border) down the right side of the page.

II. GENERAL DESIGN/ARRANGEMENT

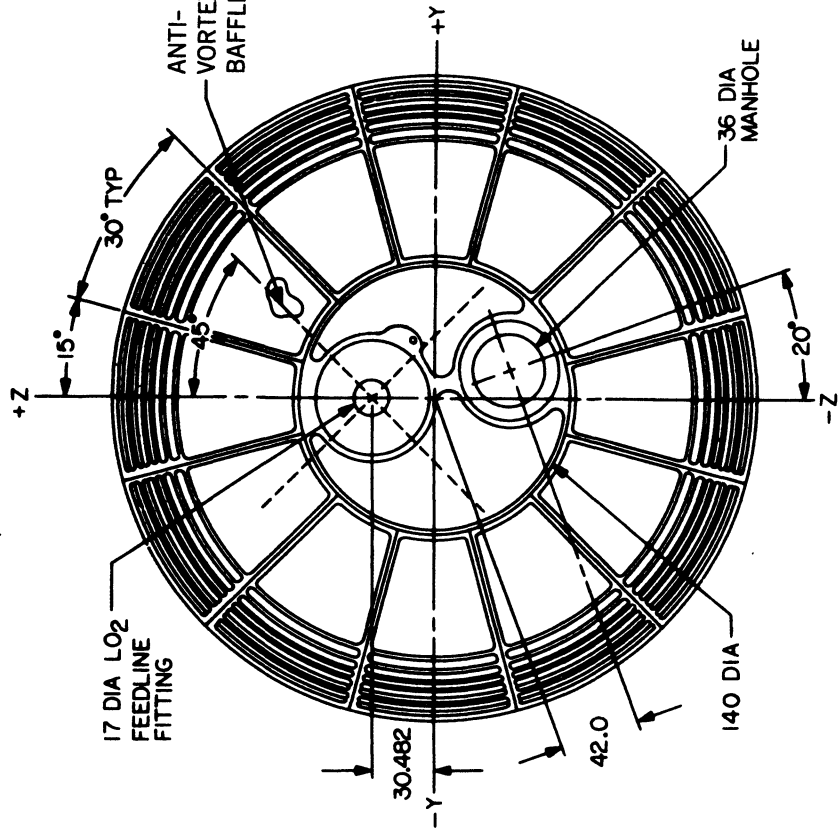
DRAWING	PAGE
Contents	II-1 thru II-10
ET Inboard/Outboard Profile	II-2 thru II-8
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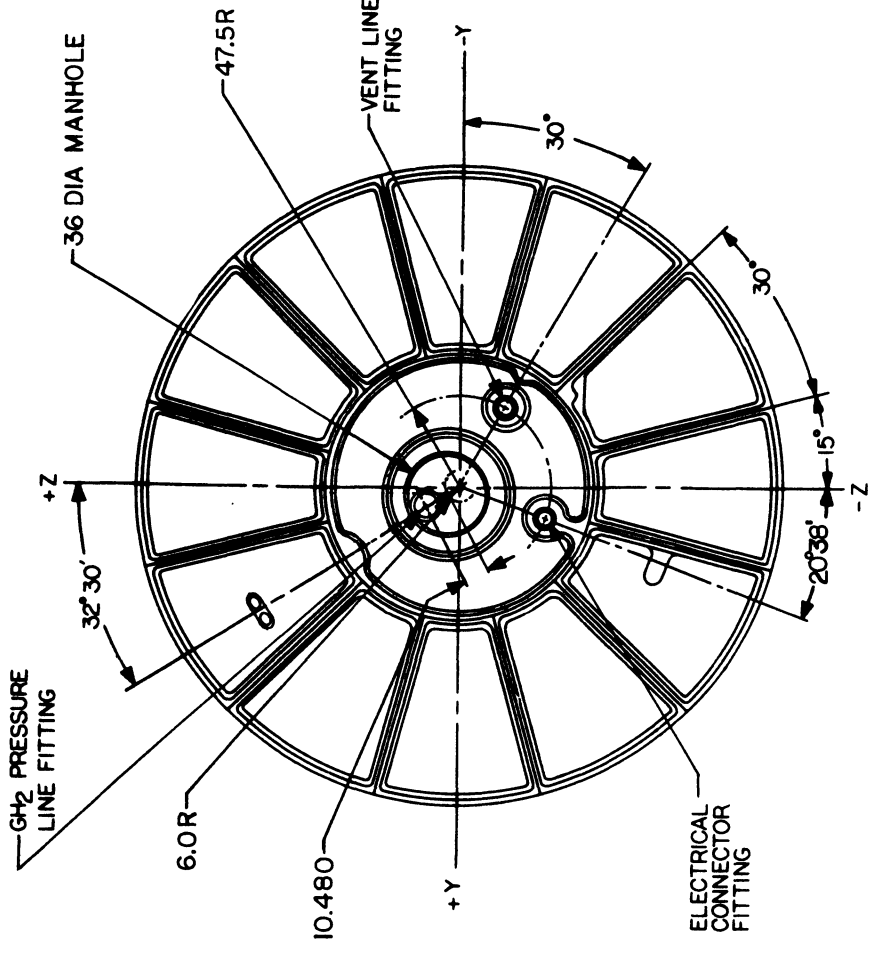




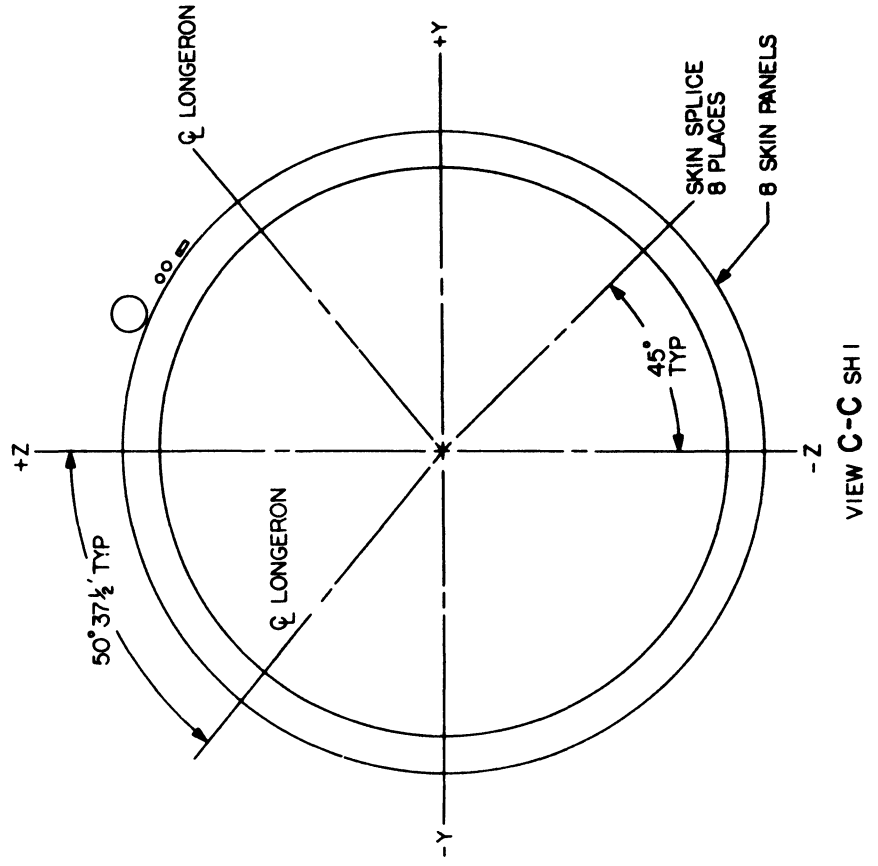
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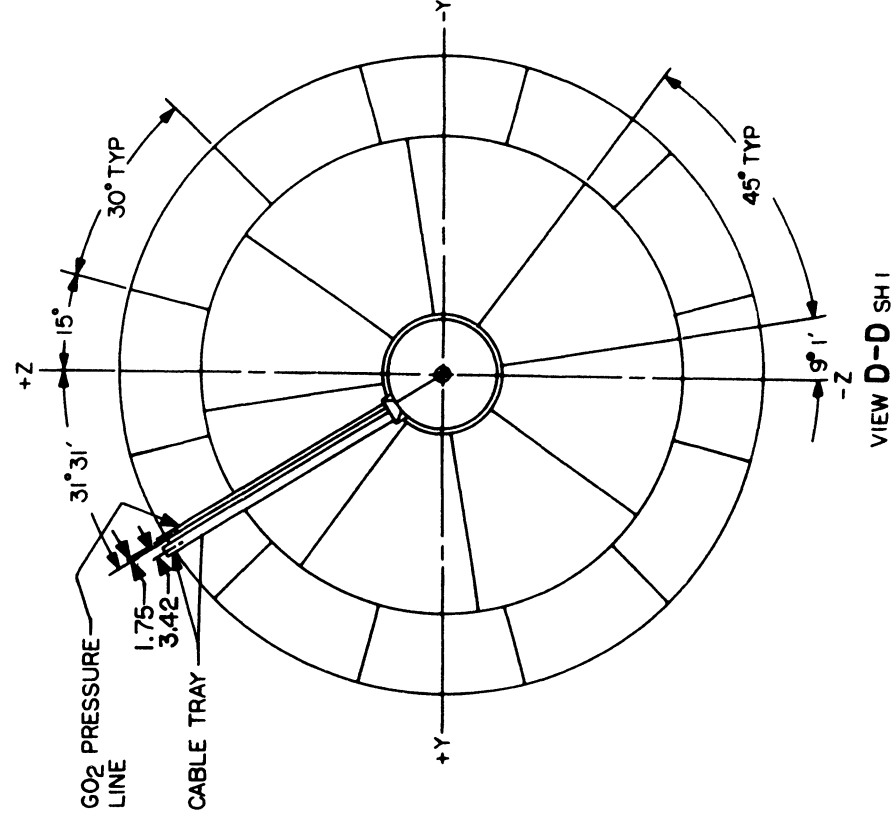
SECTION A-A SH 1
LO2 DOME



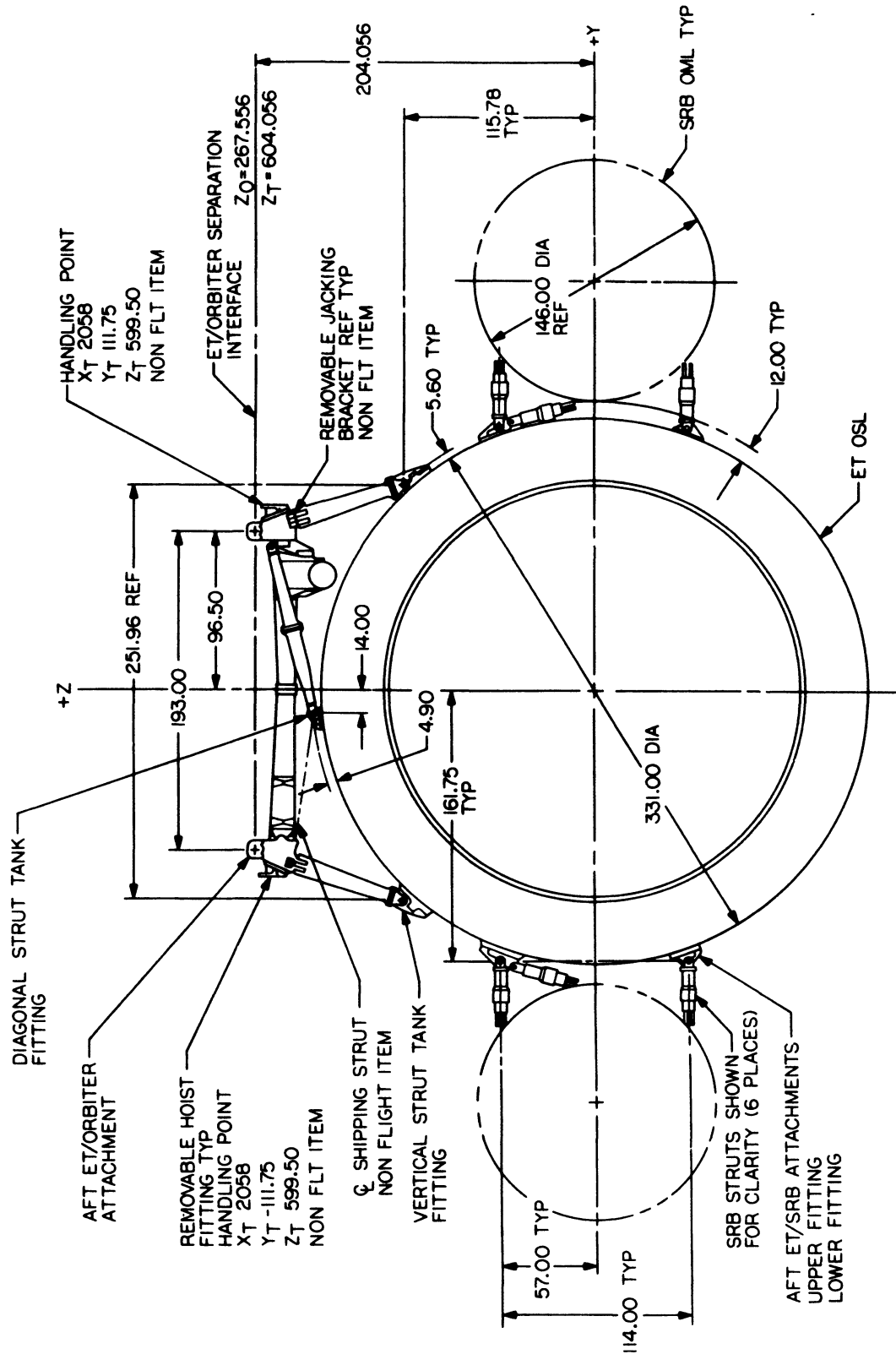
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LH2 DOME



VIEW C-C SH 1

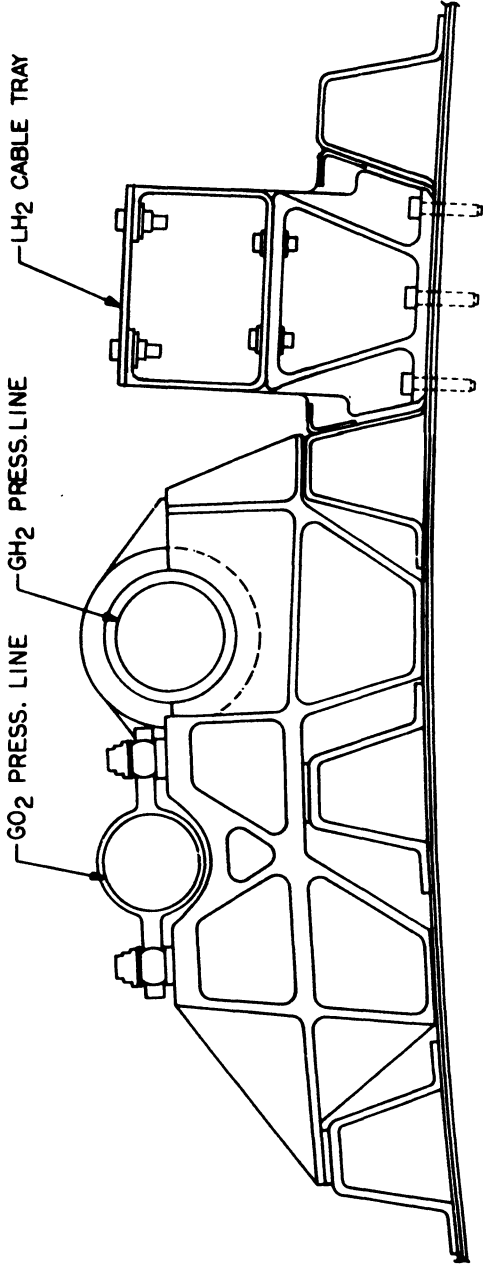


VIEW D-D SH 1

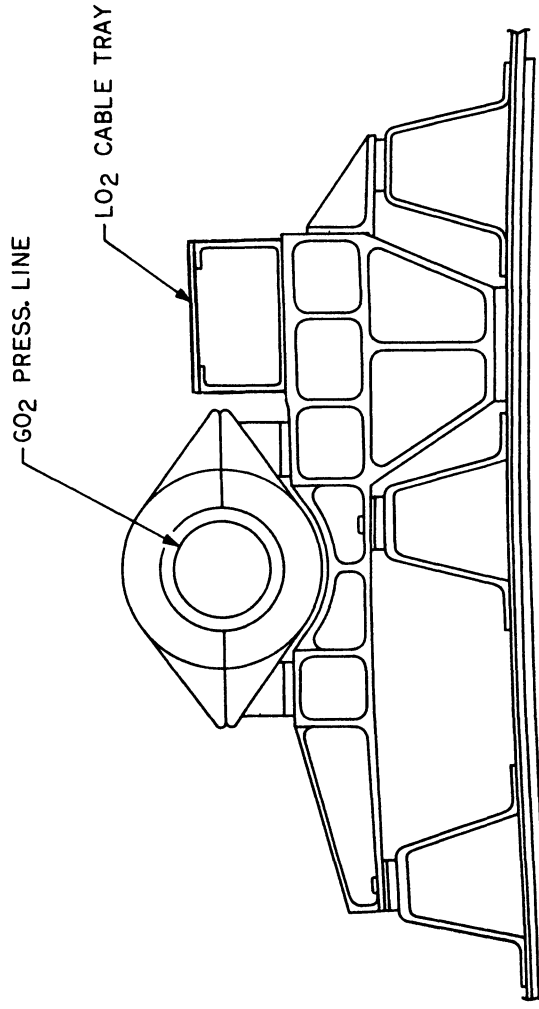


SECTION K-K SH 1

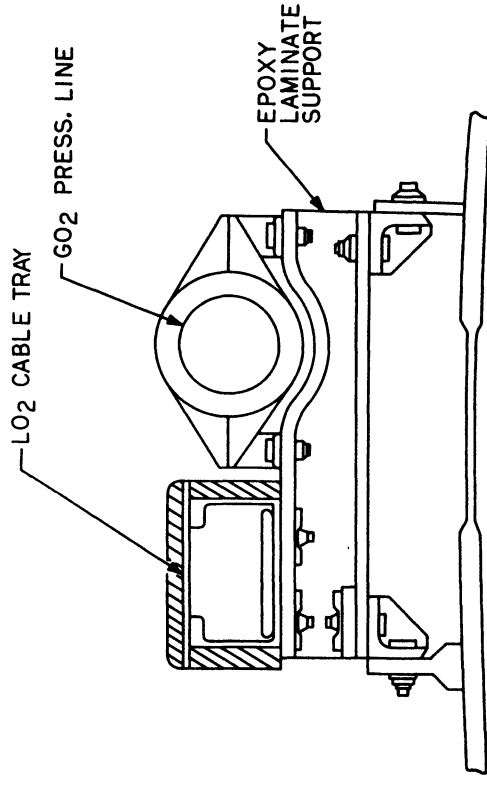
AFT ET/ORBITER AND SRB/ATTACHMENTS
VIEW LOOKING FWD AT FR XT 2058
CABLE TRAY INSTL NOT SHOWN FOR CLARITY



SECTION **L-L** SH 1 X_r-1082
ROTATED 60° CW

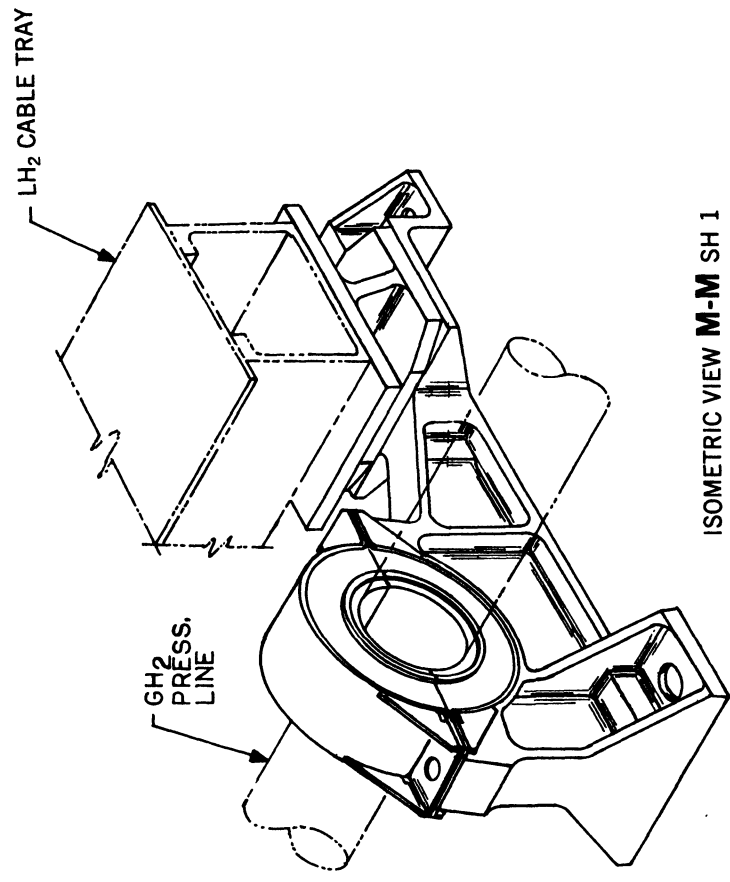


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ROTATED 60° CW
X_r-861.98 AND X_r-897.1

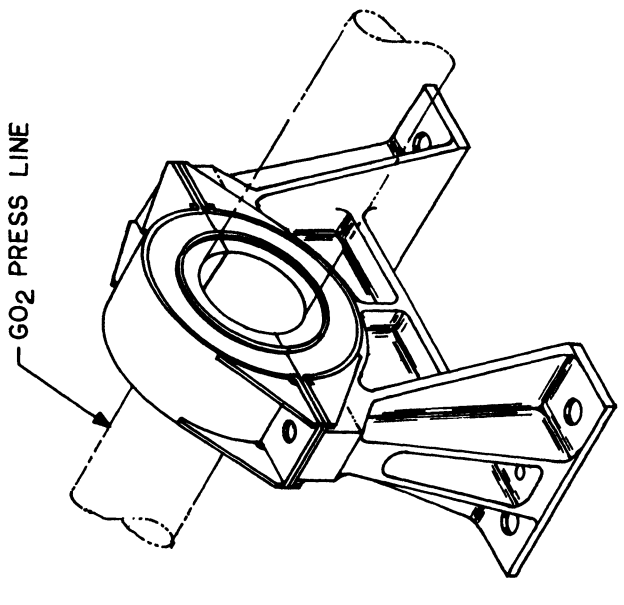


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ROTATED 60° CW

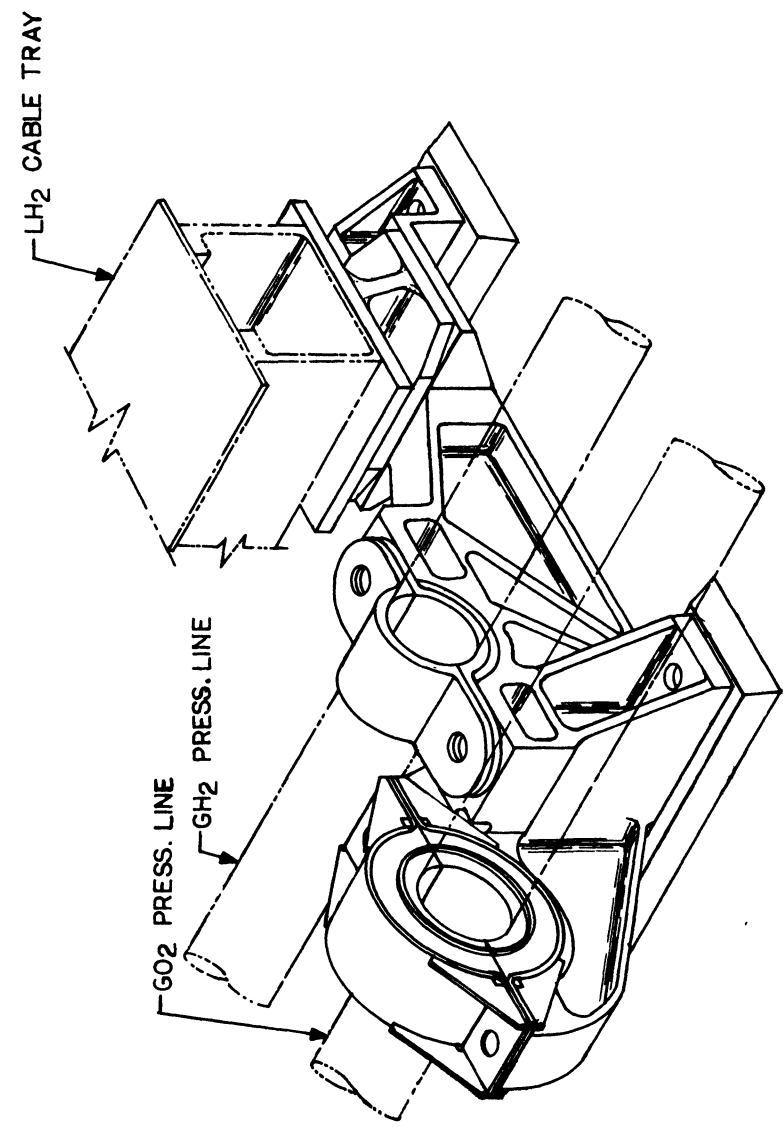
ET INBOARD/OUTBOARD PROFILE (SHEET 4 OF 7)



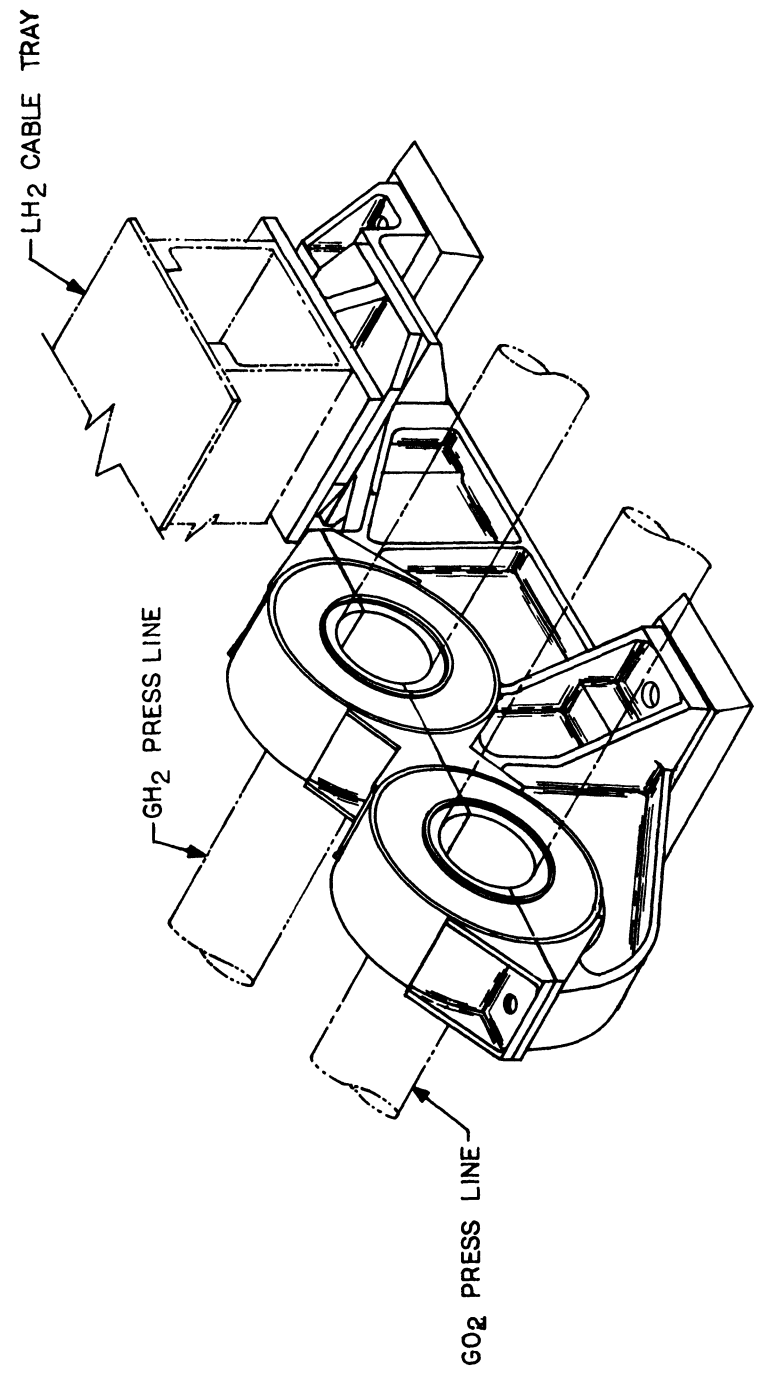
ISOMETRIC VIEW **M-M** SH 1
 ROTATED 60° CW
 SINGLE SLIDING GH₂ PRESS. LINE
 WITH CABLE TRAY X_T2028



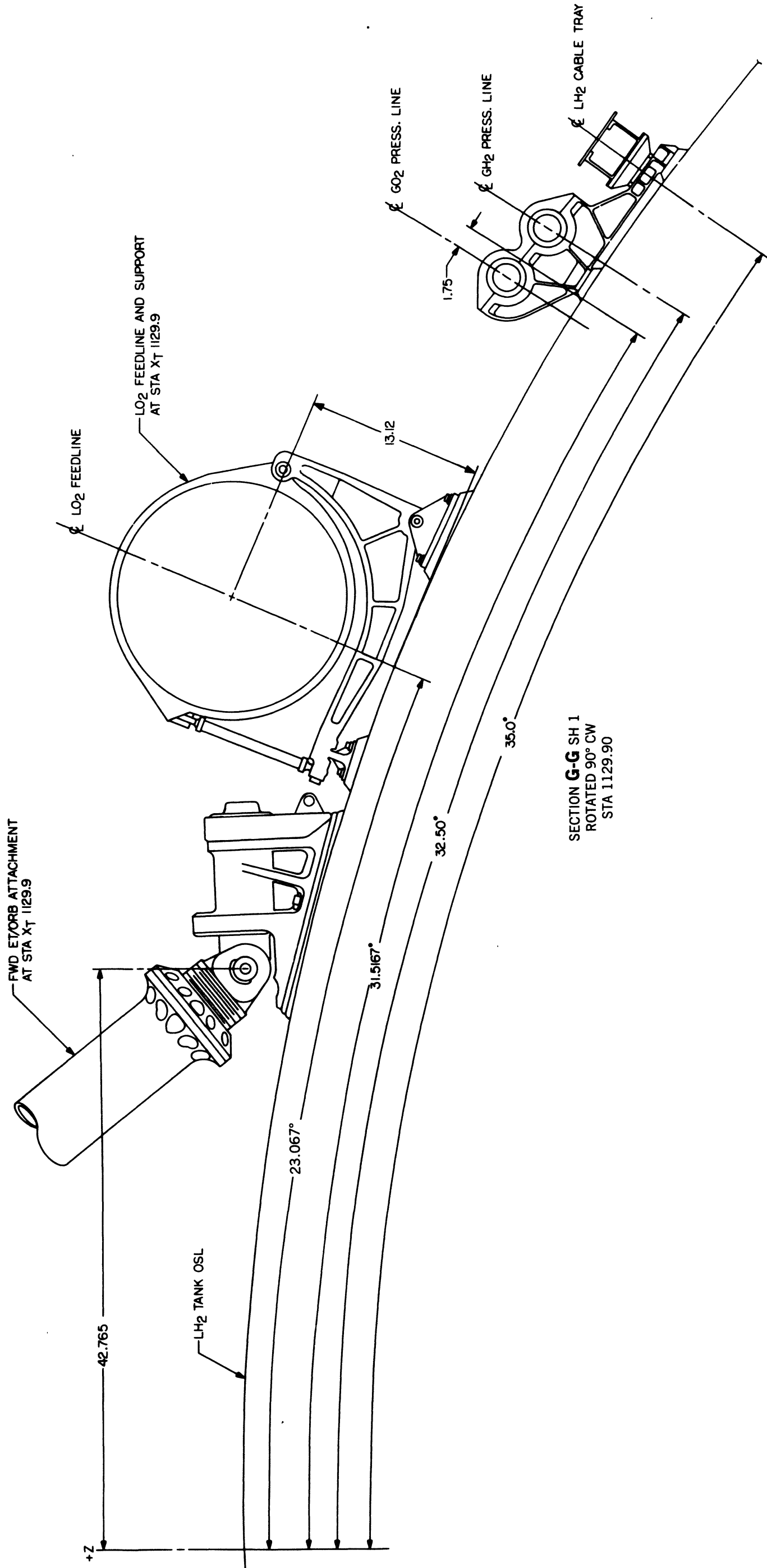
ISOMETRIC VIEW **N-N** SH 1
 ROTATED 60° CW
 SINGLE SLIDING GO₂ PRESS. LINE
 X_T2057.099



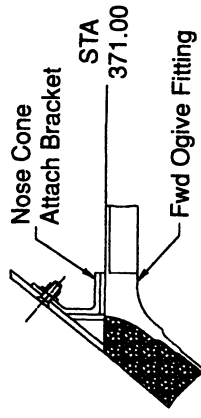
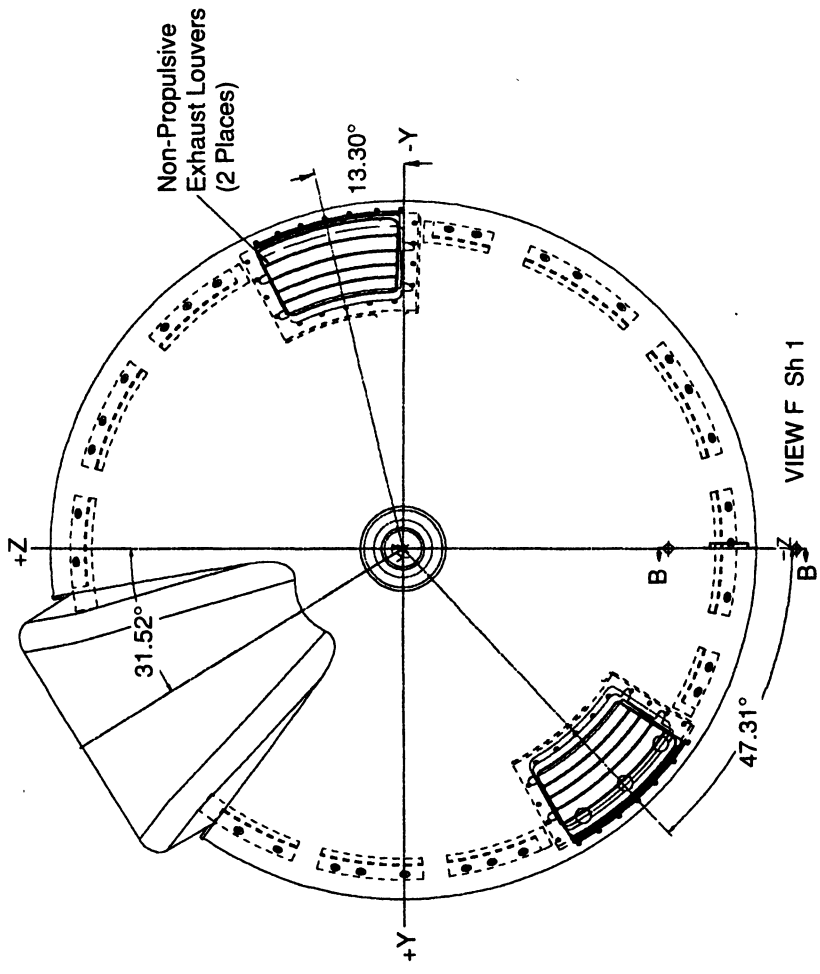
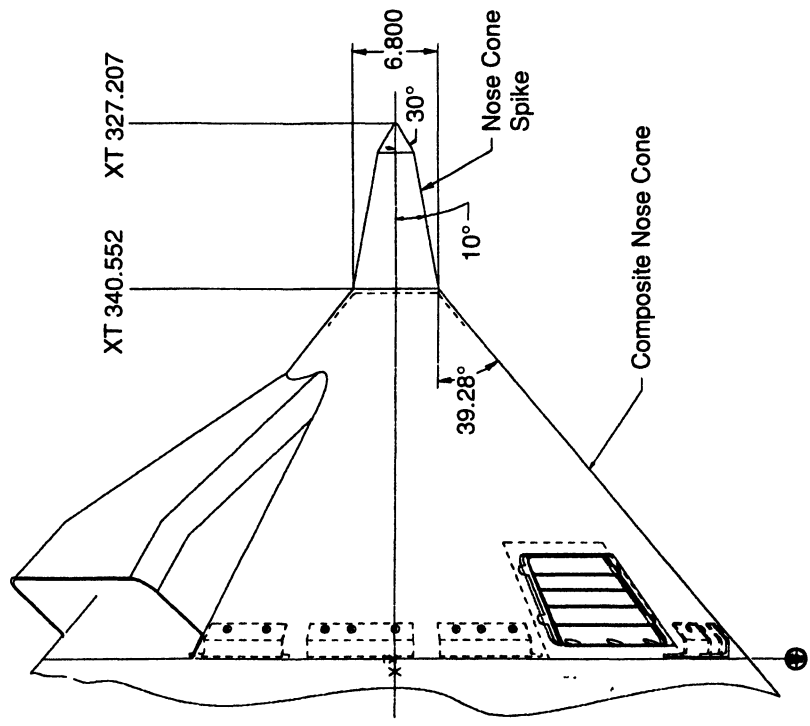
ISOMETRIC VIEW **R-R** SH 1
 ROTATED 60° CW
 FIXED AND SLIDING GO₂ PRESS. LINE
 AND GH₂ PRESS. LINE AT X_T1593.2



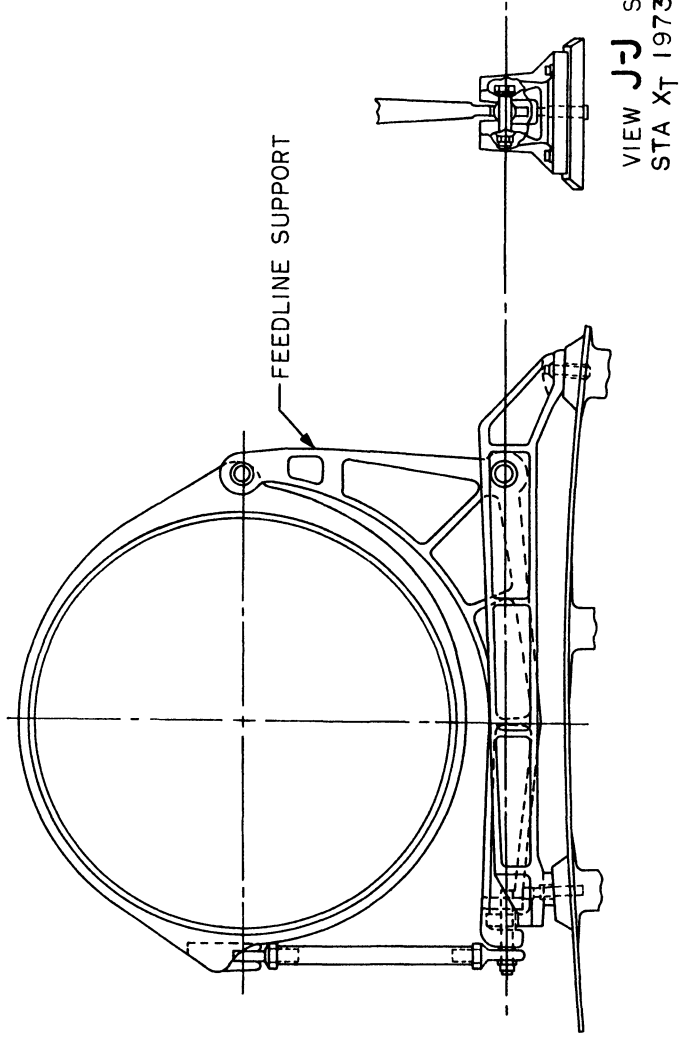
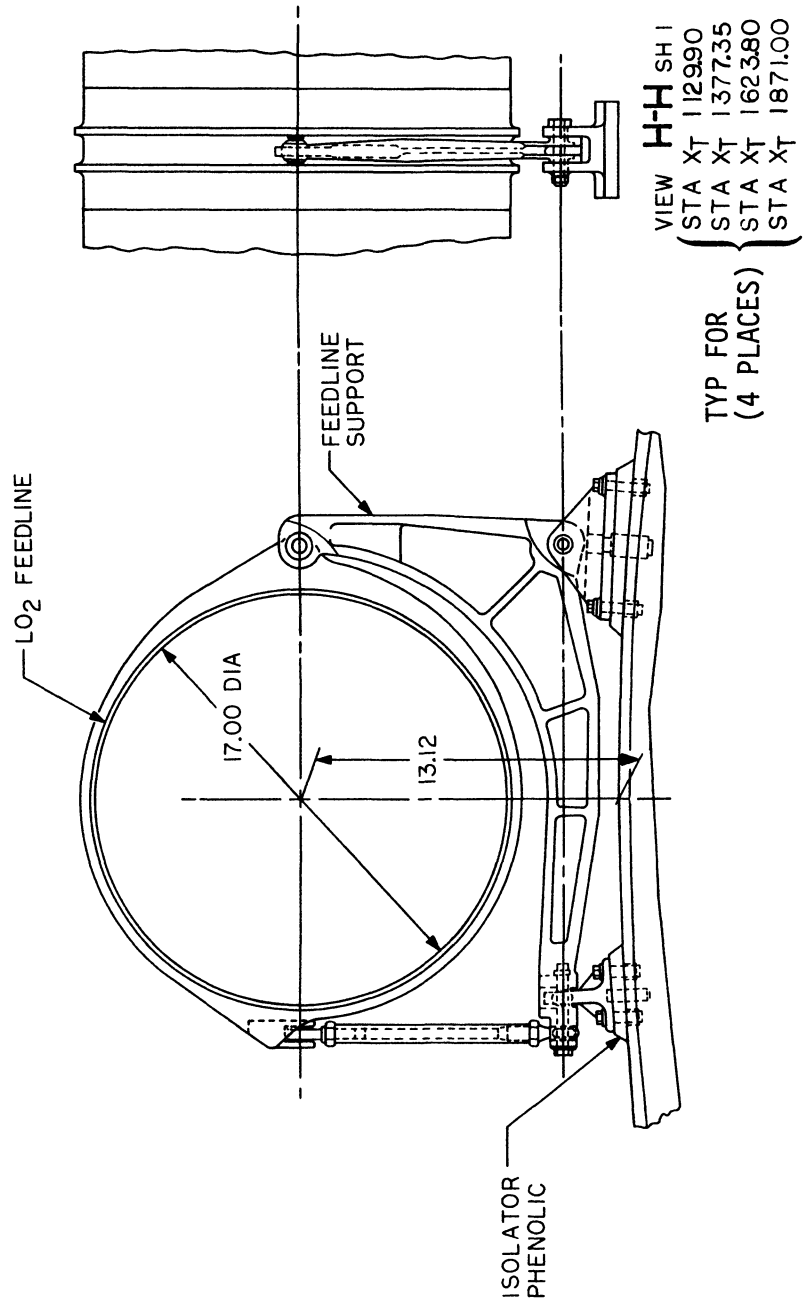
ISOMETRIC VIEW **S-S** SH 1
 ROTATED 60° CW
 TYP 13 PLACES X_T1151.84, X_T1205.6,
 X_T1270.2, X_T1334.8, X_T1399.4, X_T1464.0,
 X_T1528.6, X_T1657.8, X_T1722.4, X_T1787.0,
 X_T1851.6, X_T1916.2, AND X_T1980.8



ET INBOARD/OUTBOARD PROFILE (SHEET 6 OF 7)

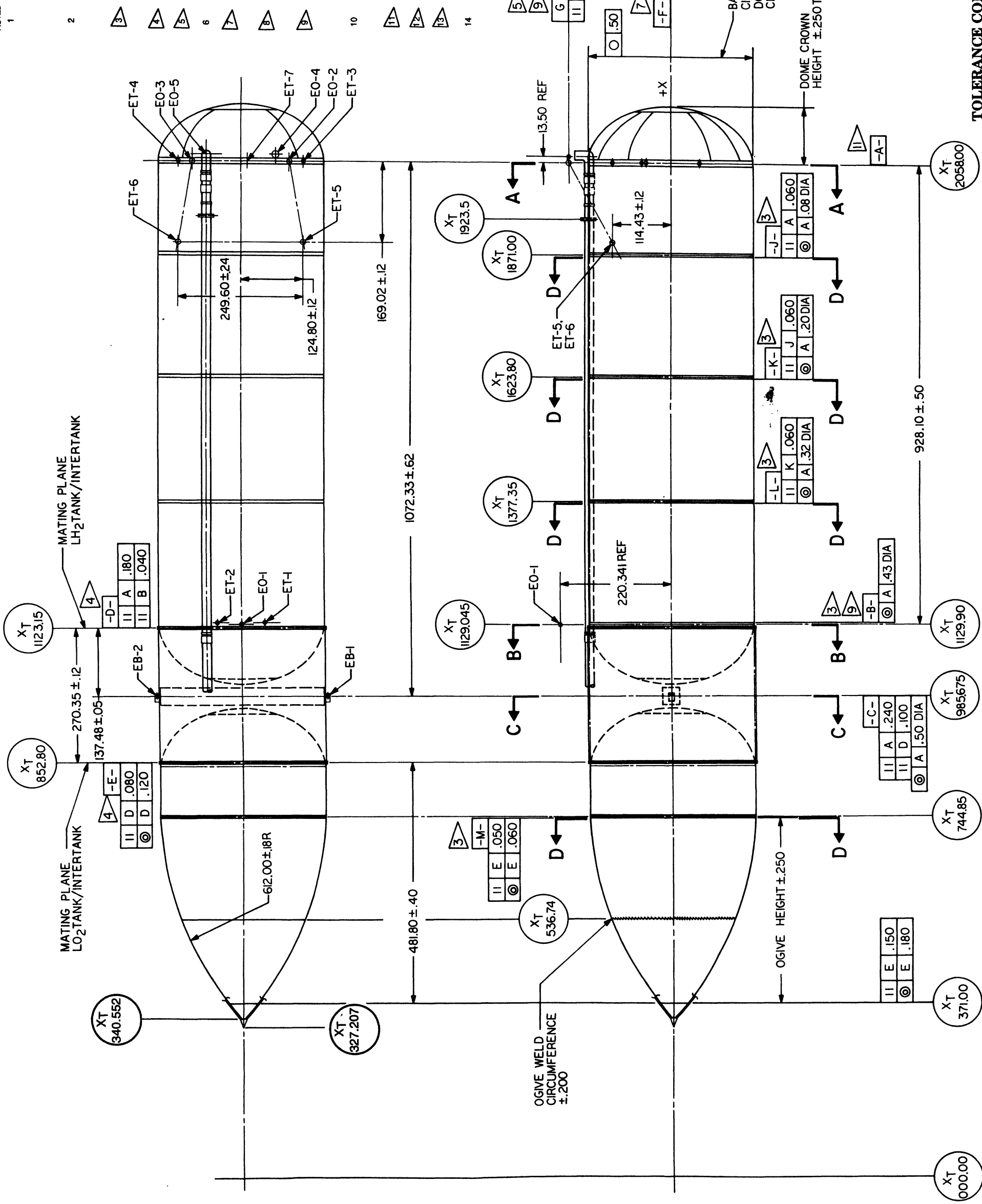


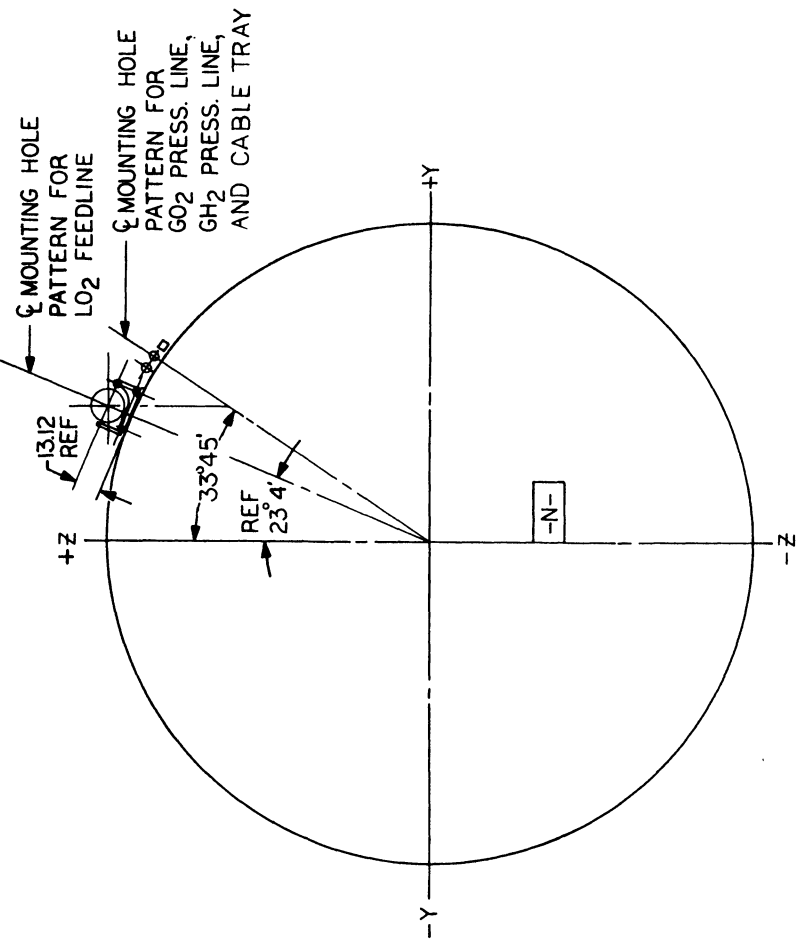
SECTION B-B
ROTATES 90° CW



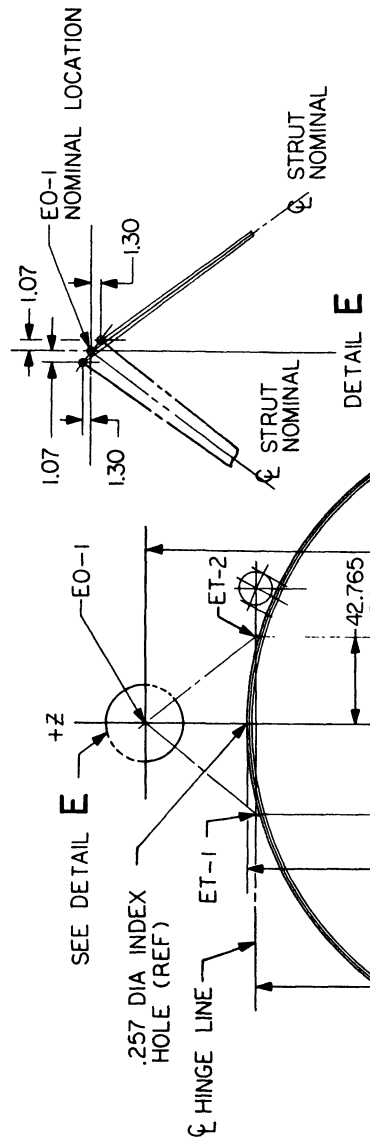
NOTES

- 1 THIS DRAWING IS A CONTROL DRAWING AND DEFINES THE EXTERNAL TANK ASSEMBLY ALIGNMENT REQUIREMENTS IN ACCORDANCE WITH CONTRACTUAL OBLIGATIONS AND IS NOT INTENDED TO CONTROL OR CONSTITUTE AUTHORIZATION TO RELAX TOLERANCES ON THE INDIVIDUAL STRUCTURAL UNIT ASSEMBLIES.
- 2 ALL DIMENSIONS ARE FOR 700F. DIMENSIONS AT ANY TEMP. OTHER THAN 70. °F MUST BE COMPENSATED FOR BY USING A COEFFICIENT OF LINEAR EXPANSION OF 124 x 10⁻⁶ INCH PER INCH PER °F, EXCEPT FOR A12195 WHERE COEFFICIENT OF LINEAR EXPANSION FROM 809-3510 SHALL BE USED
- 3 DATUM PLANES [B] [J] [K] [L] [M] DEFINE THE EDGES OF THE RING FRAMES OF XT STATIONS - 1871.00, 1623.80, 1377.35, 1129.90, 744.85 RESPECTIVELY. PRIOR TO MAKING THE CIRCUMFERENTIAL WELDS AT THESE LOCATIONS.
- 4 DATUM PLANES [D] [E] DEFINE THE MATING SURFACES OF THE LH2 TANK TO THE INTERTANK AND THE INTERTANK TO THE LO2 TANK RESPECTIVELY.
- 5 ET/ORB INTERFACE POINTS EO-2, EO-3, EO-4, EO-5, ARE LOCATED BY MATCHED INTERFACE CONTROL TOOLS (ICTS) NUMBERS T-7210011 AND T-7210012.
- 6 ATTACH POINTS ET-1, ET-2, ET-3, ET-4, ET-5, ET-6, ET-7, ET-8 ARE FOR ET USE ONLY
- 7 DATUM PLANE [Q] IS THE BASIC REFERENCE PLANE ON X, 2058.00, AND IS USED TO DEFINE THE RELATIONSHIP BETWEEN THE ET AND SRB'S BY MEASUREMENT FROM EB-1 & EB-2 ON DATUM PLANE [F] TO EB-3 AND EB-4 ON DATUM PLANE [Q]
- 8 DATUM PLANE [Q] IS THE BASIC REFERENCE PLANE ON XT 2058.00 AND IS USED TO DEFINE THE RELATIONSHIP BETWEEN THE ET AND ORBITER BY MEASUREMENT FROM EB-1 & EB-2 ON DATUM PLANE [F] TO EO-2 & EO-3 ON DATUM PLANE [G]. SEE NOTE 5.
- 9 DATUM PLANE [G] IS THE BASIC REFERENCE PLANE ON X, 2058.00 AND IS USED TO DEFINE THE RELATIONSHIP BETWEEN THE AFT ET/ORB ATTACH POINTS EO-2 & EO-3 AND FWD ET/ORB ATTACH POINT EO-1 BY MEASUREMENT FROM EO-2 & EO-3 ON X, 2058.00 TO EO-1 ON DATUM PLANE [B]
- 10 MANUFACTURING ADJUSTMENT IS PROVIDED IN AFT ET/ORB INTERFACE STRUTS BETWEEN ATTACH POINTS EO-2 TO ET-3, EO-3 TO ET-4 EO-3 TO ET-7 AND IN FWD ET/ORB INTERFACE STRUTS BETWEEN ATTACH POINTS EO-1 TO ET-2.
- 11 DATUM PLANE [A] IS DETERMINED BY THE INTERSECTION OF THE CENTER LINE OF ATTACH POINTS EB-3, EB-4 AND ET-8.
- 12 LOCATION FOR EB-7 AND EB-8 IS ±.09 OFF OF DATUM PLANE [A] AS DEFINED BY NOTE [T]
- 13 ET BIPOD STRUT AT ET-2 IS PROVIDED WITH AN ADJUSTABLE SLEEVE TO PROVIDE FIELD ADJUSTMENT OF EO-1 TO MATE WITH THE ORBITER.
- 14 ET CENTERLINES (C) ARE TO BE USED FOR DESIGN LAYOUT. DESIGN OF TOOLING AND ANALYSIS ONLY. CENTER LINE LOCATIONS SHALL NOT BE VERIFIED.

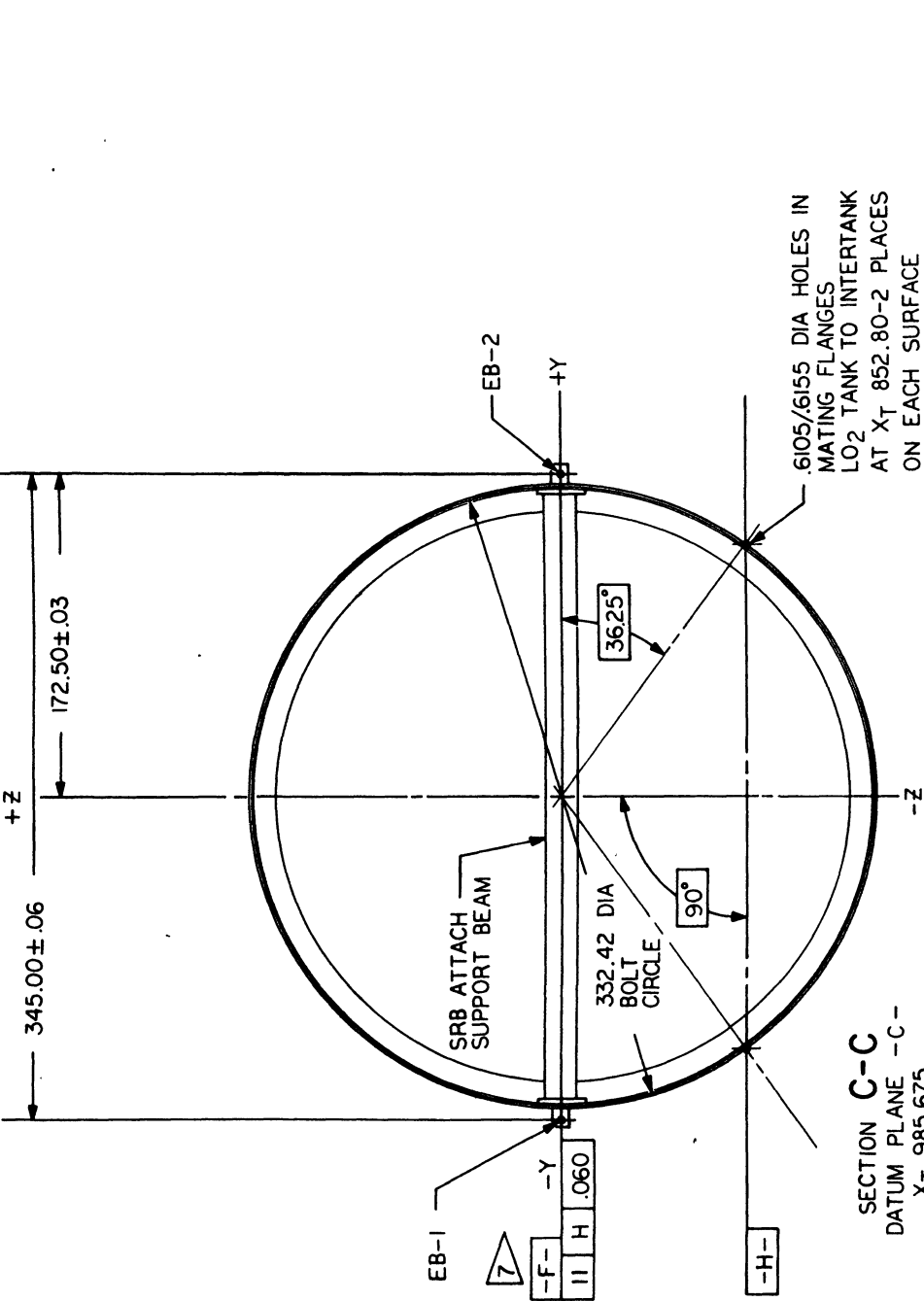




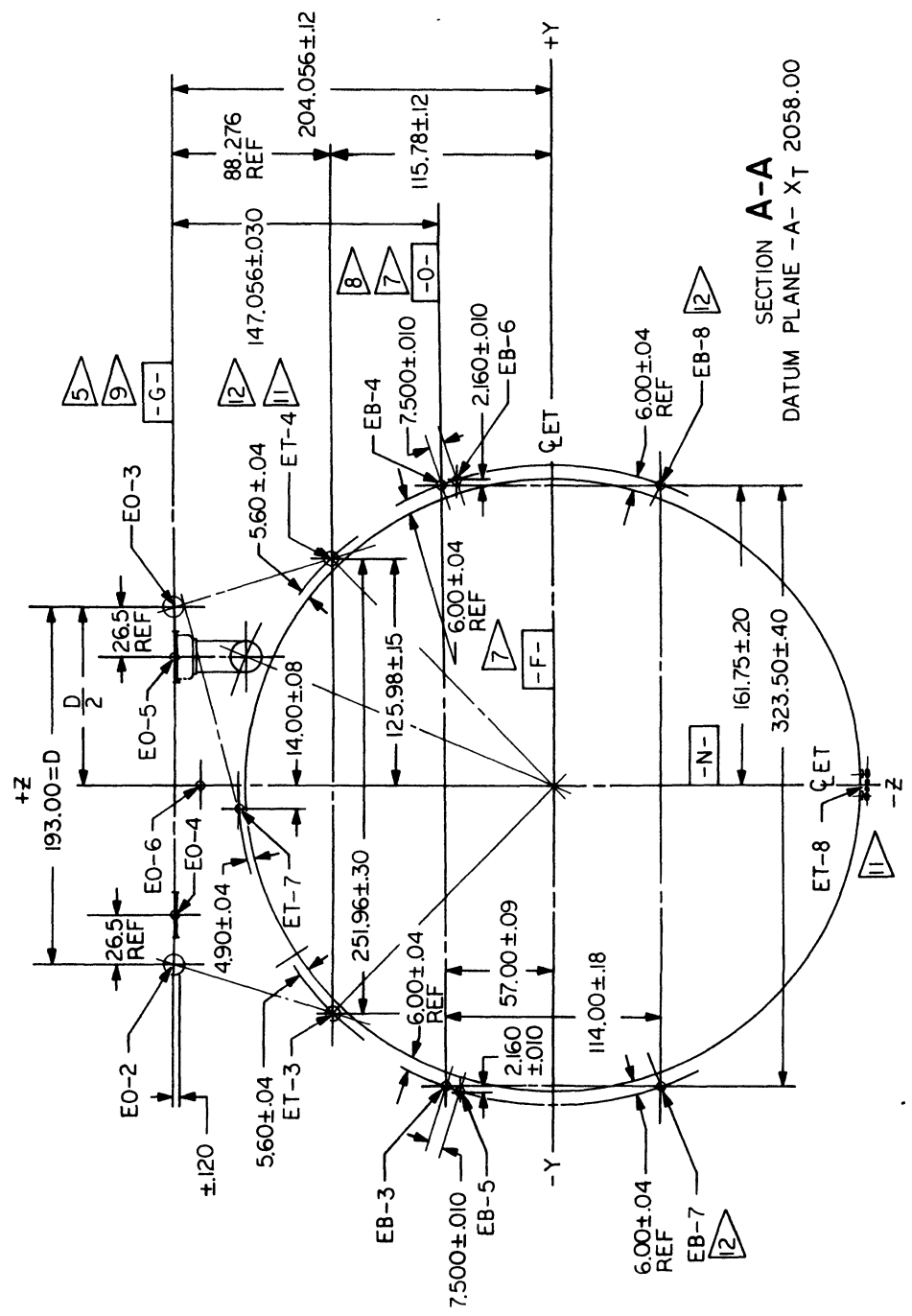
SECTION **D-D**
TYP FOR DATUM PLANES J, K, L, M



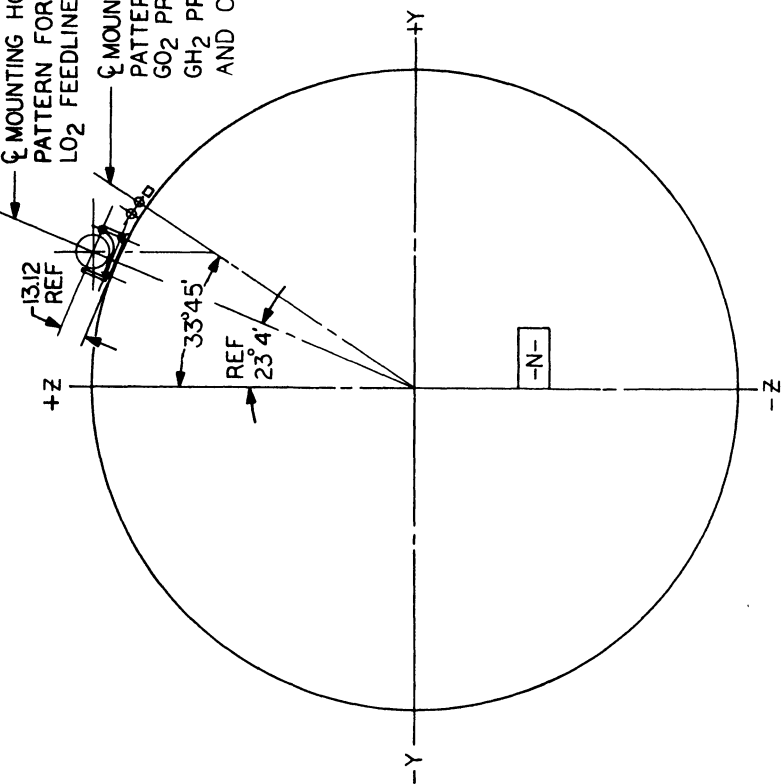
SECTION **E**
DETAIL



SECTION **C-C**
DATUM PLANE -C-
XT 985.675



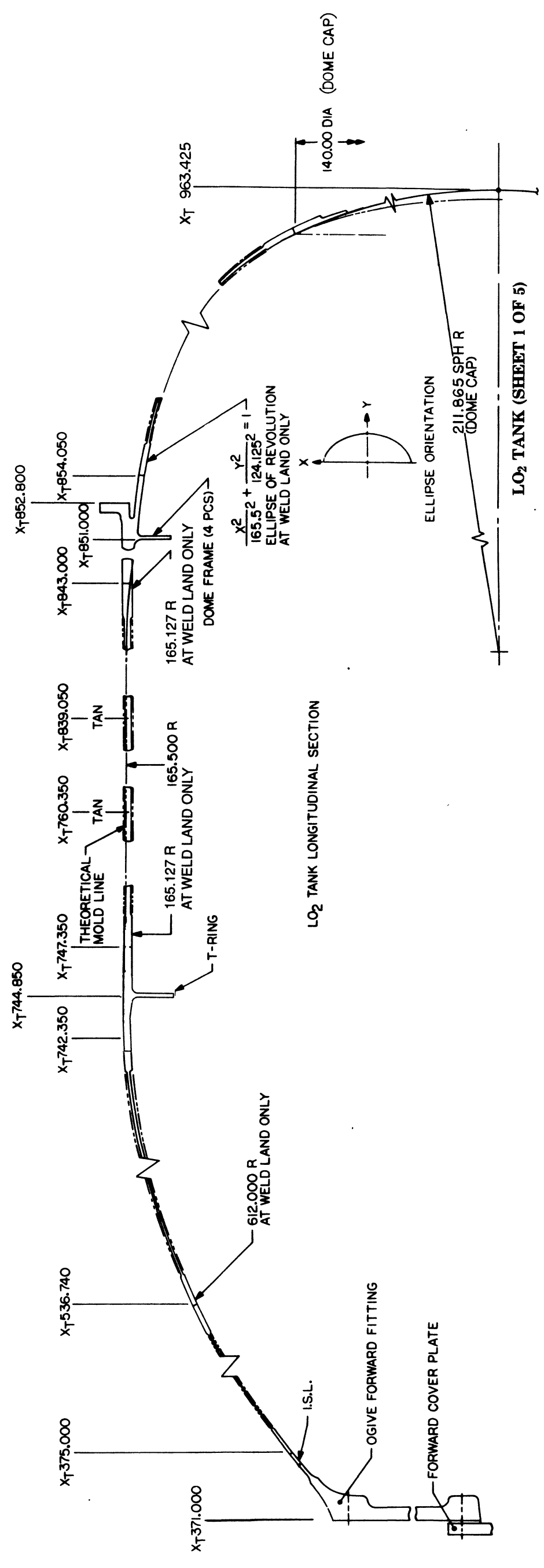
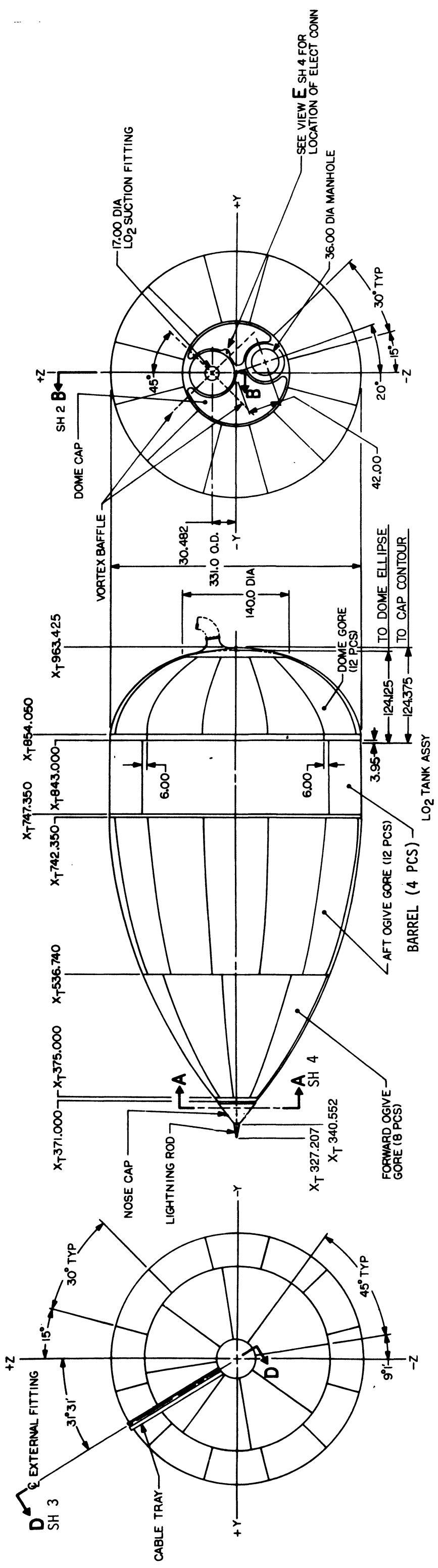
SECTION **A-A**
DATUM PLANE -A-
XT 2058.00



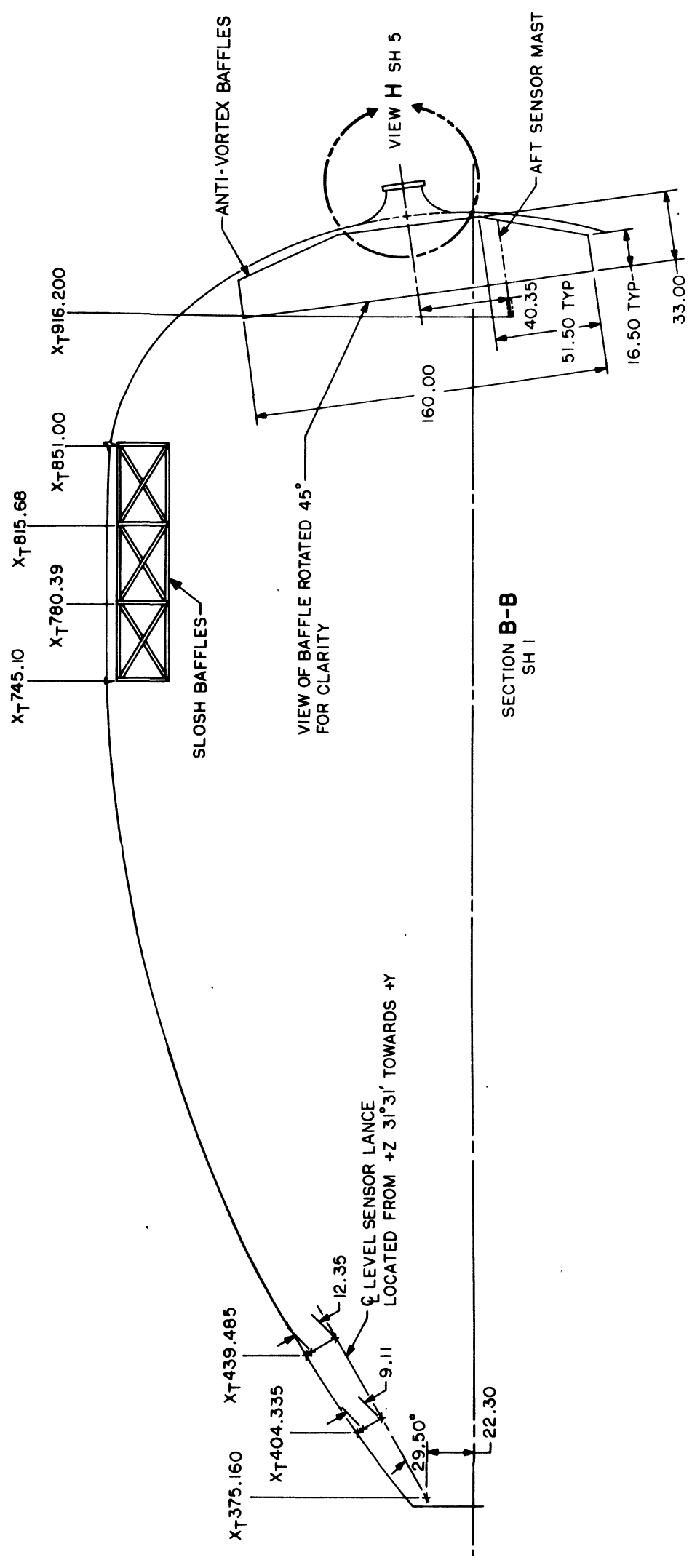
SECTION **B-B**
DATUM PLANE -B-
XT 1129.9

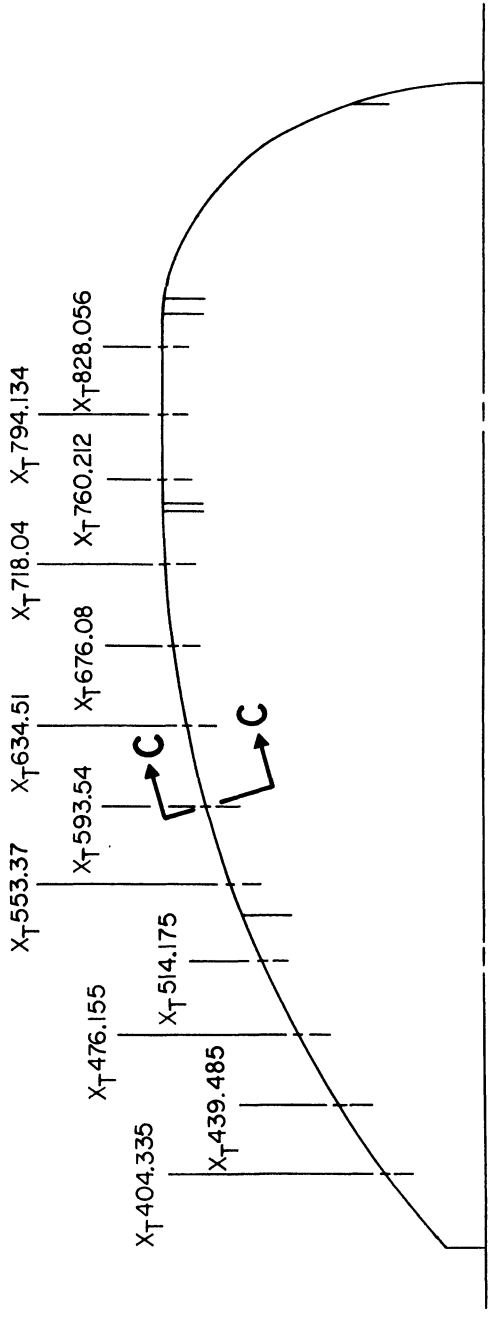
III. STRUCTURES ARRANGEMENT

CHART NO.	TITLE	PAGE
	Contents	III-1 thru III-29
1.	LO2 Tank	III-2 thru III-6
2.	Intertank	III-7 thru III-12
3.	LH2 Tank	III-13 thru III-19
4.	Interface Hardware General Arrangement	III-20
5.	Fwd Orb/ET Attachments	III-21
6.	Aft Orb/ET Attachments	III-22 thru III-28
7.	Facility/ET Attachments	III-29

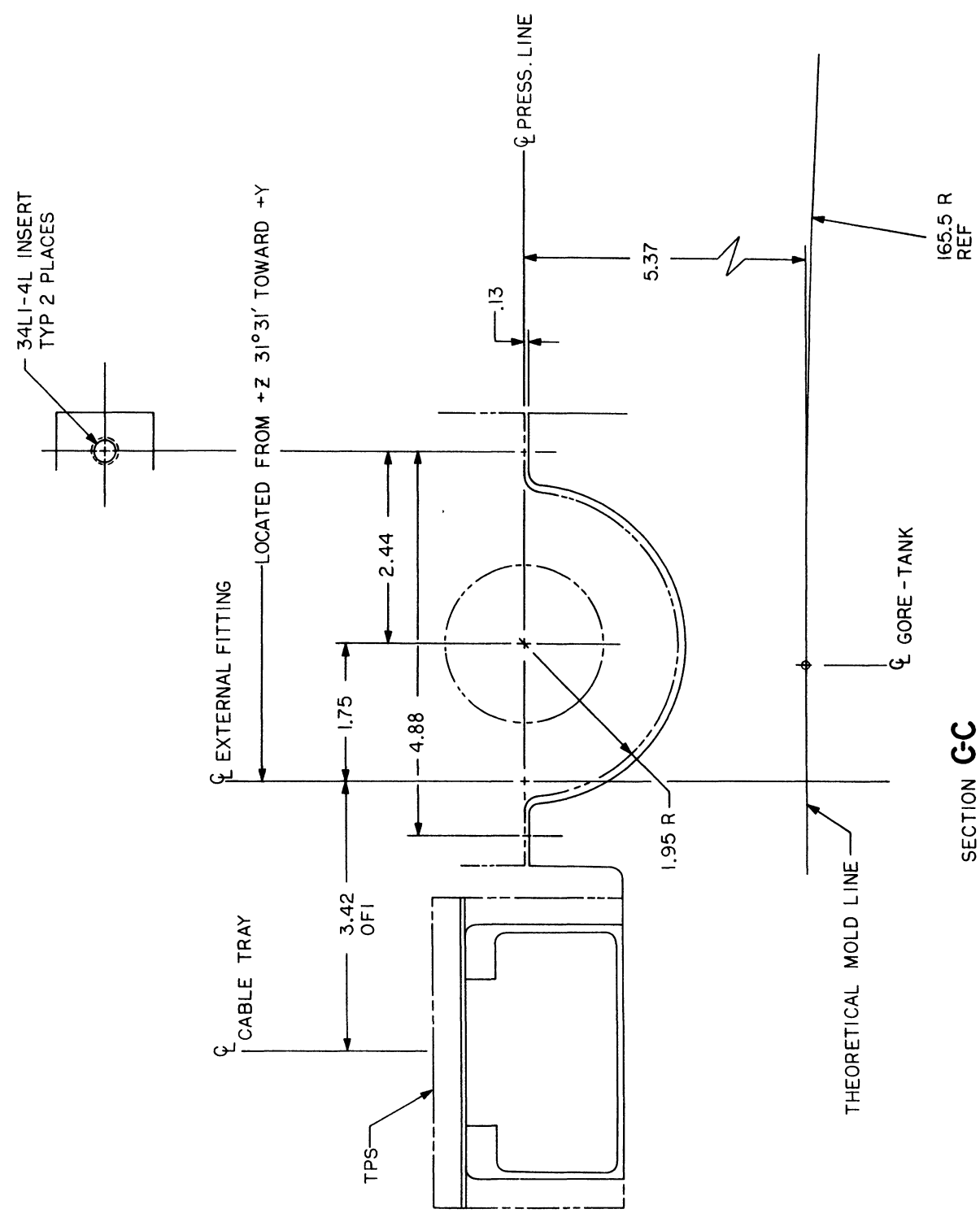


LO₂ TANK (SHEET 1 OF 5)

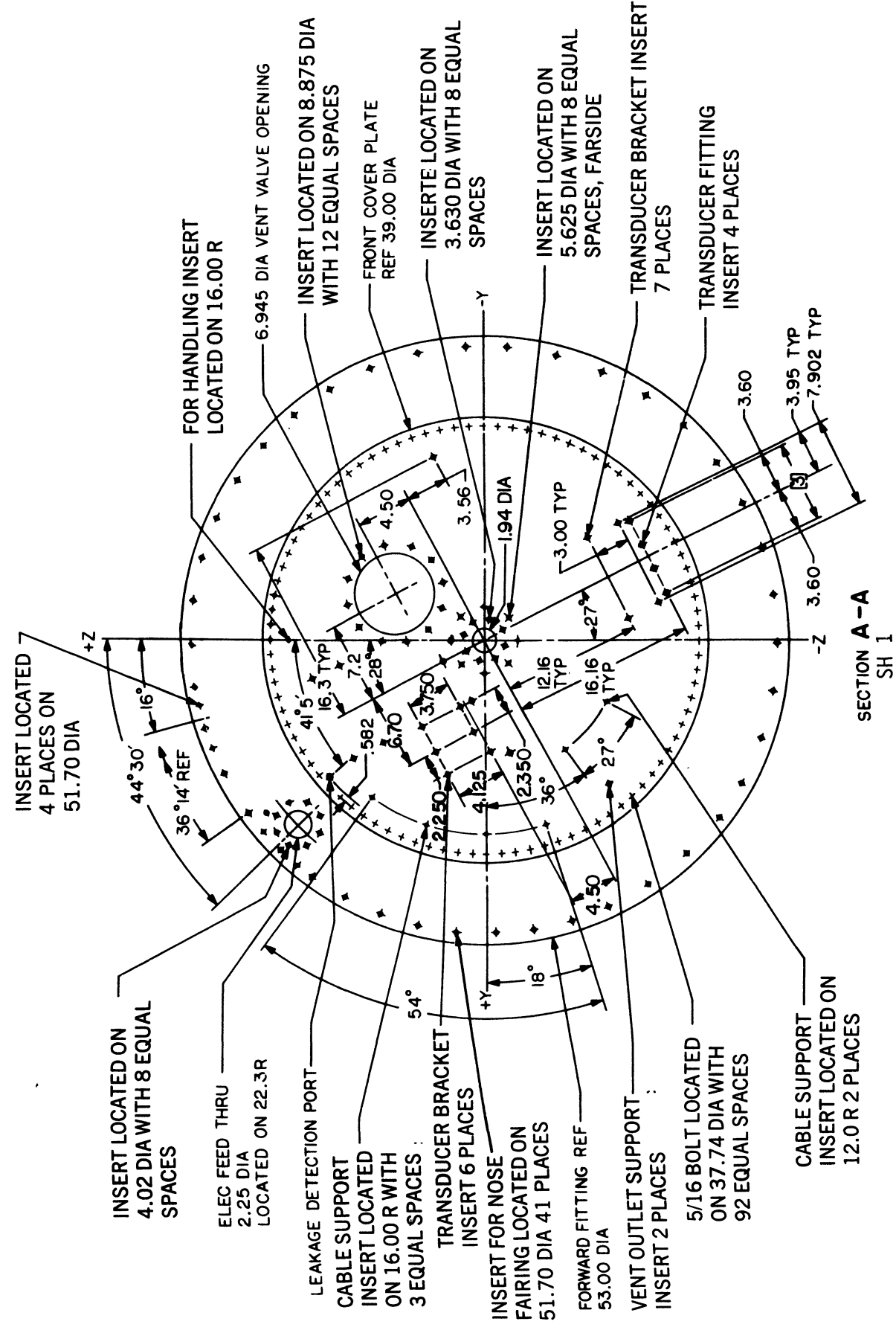
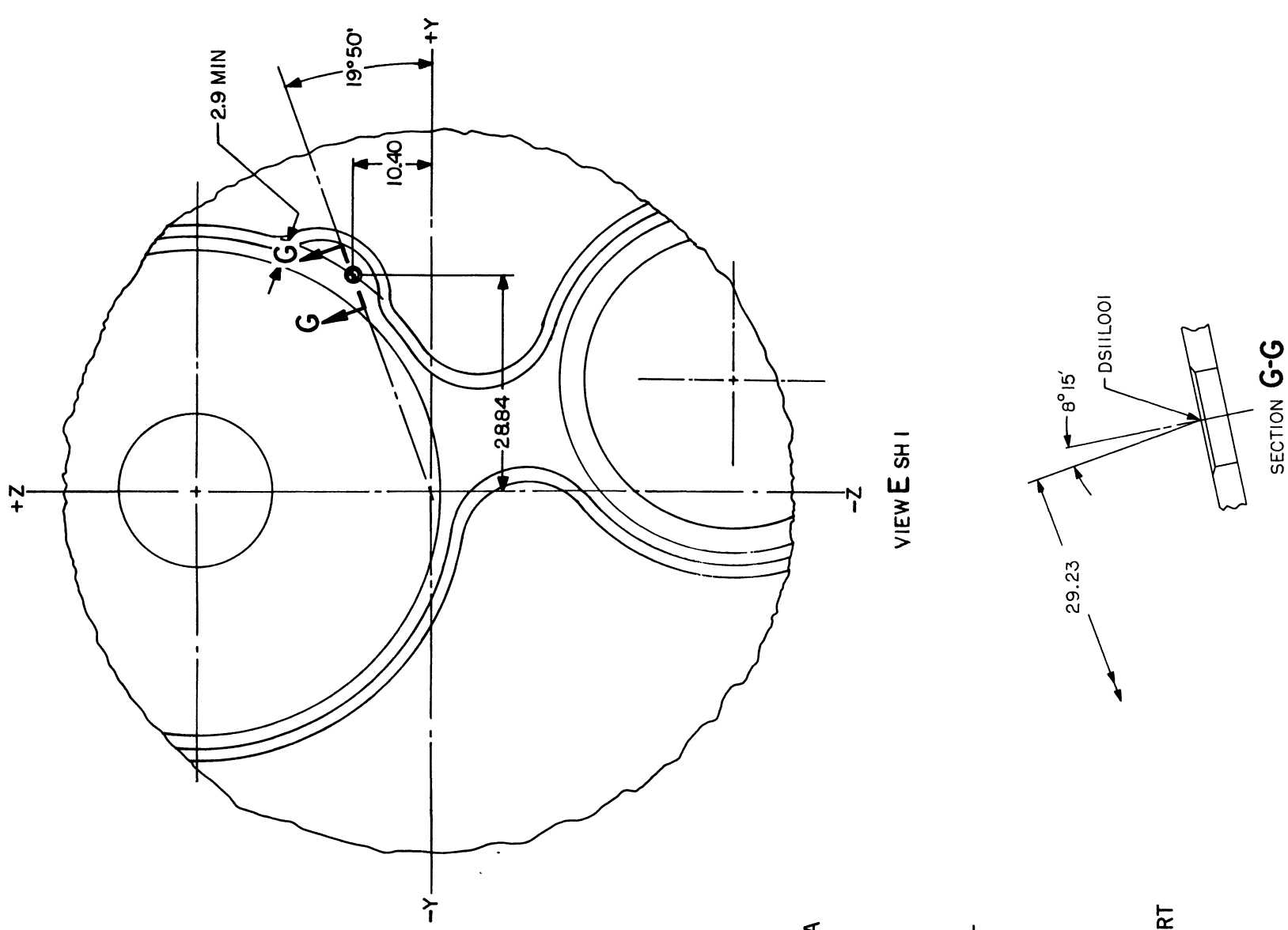




SECTION D-D
SH 1
CENTER LINE OF BRACKETS
FOR CABLE TRAY MOUNTING AT ISL



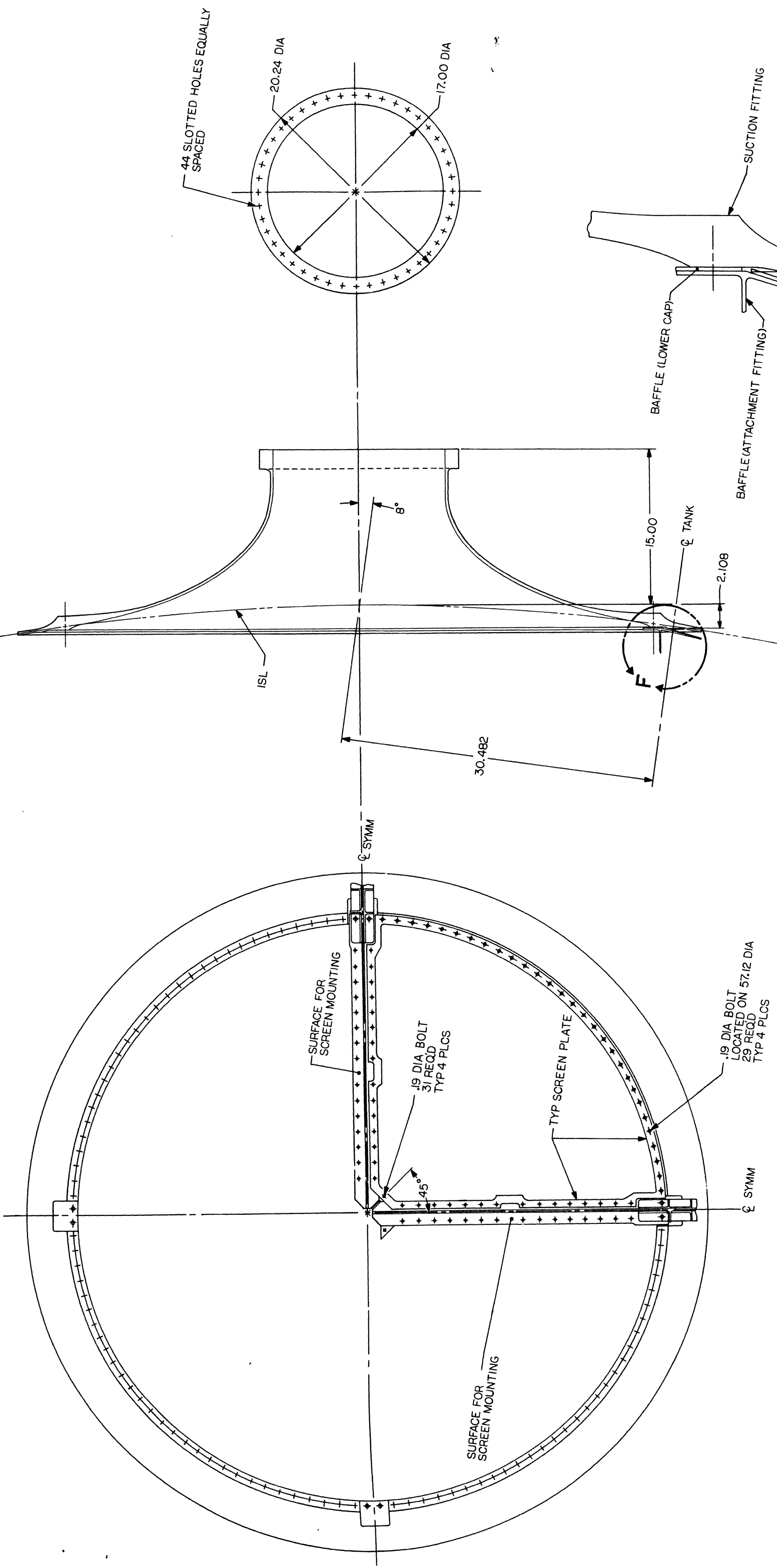
SECTION CC
TYP ALL STA IN SEC D-D



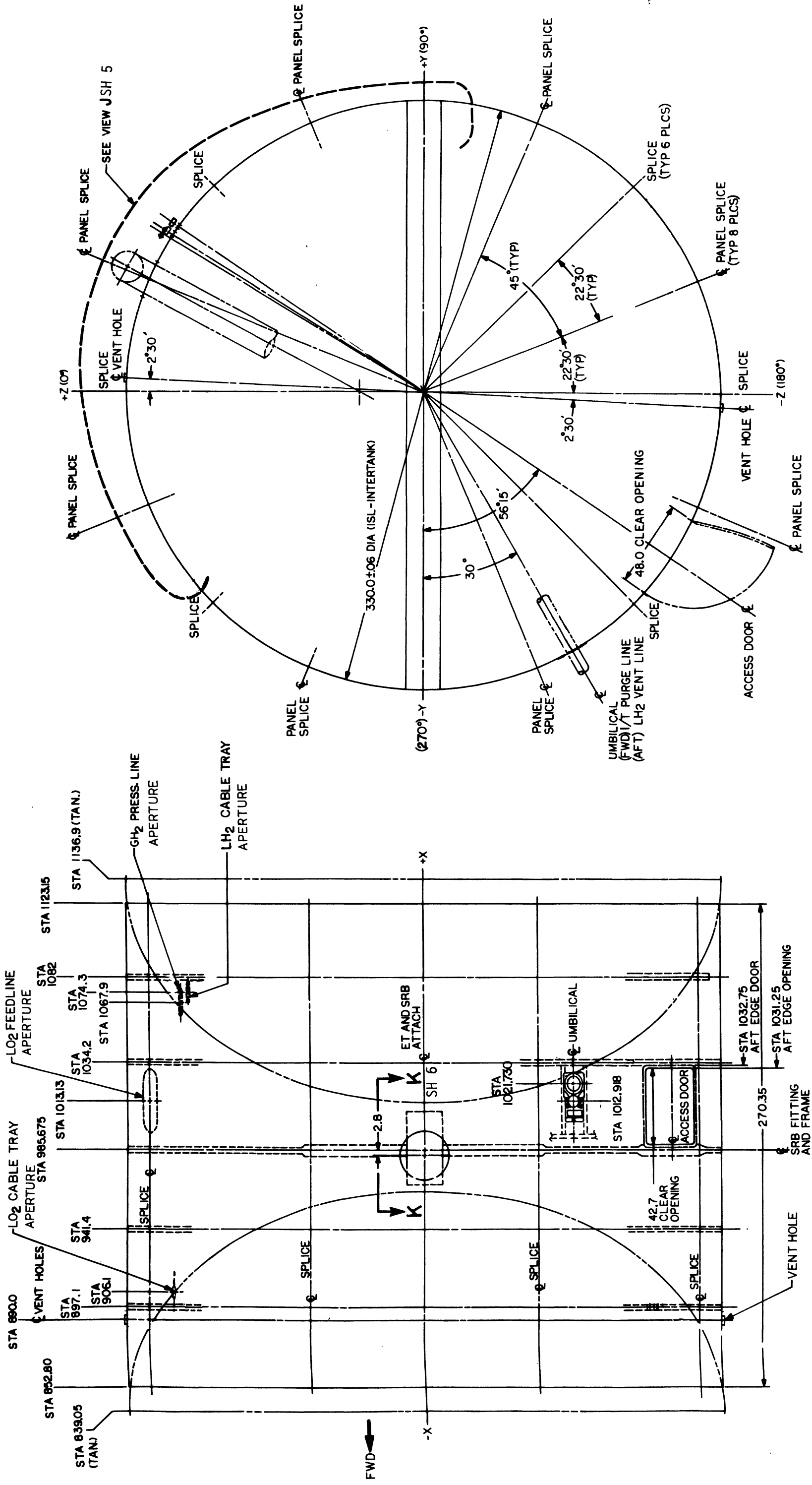
VIEW E SH 1

SECTION G-G

SECTION A-A
SH 1

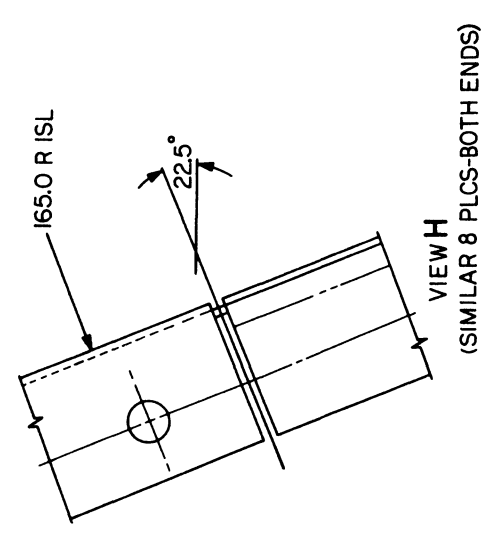
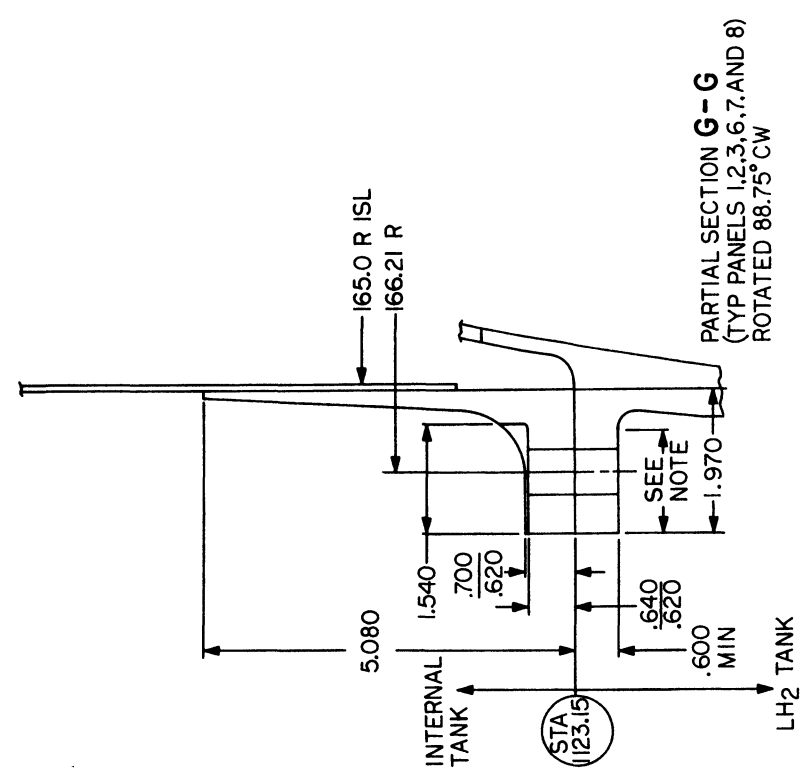
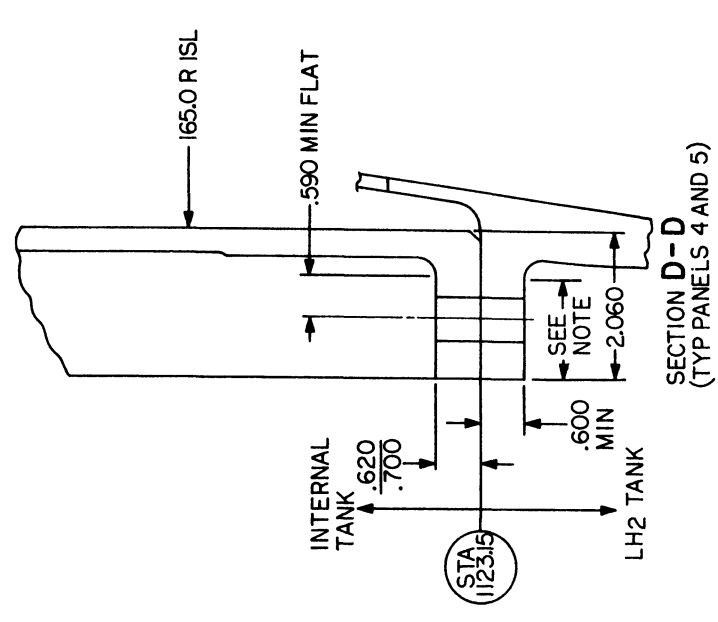
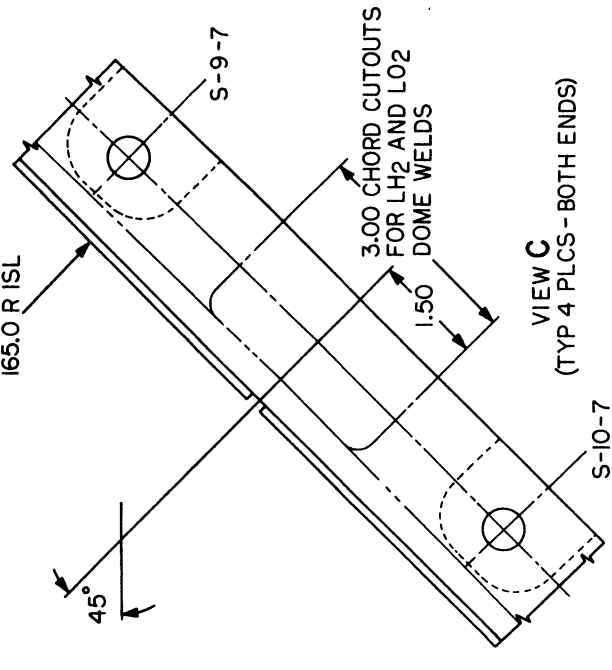
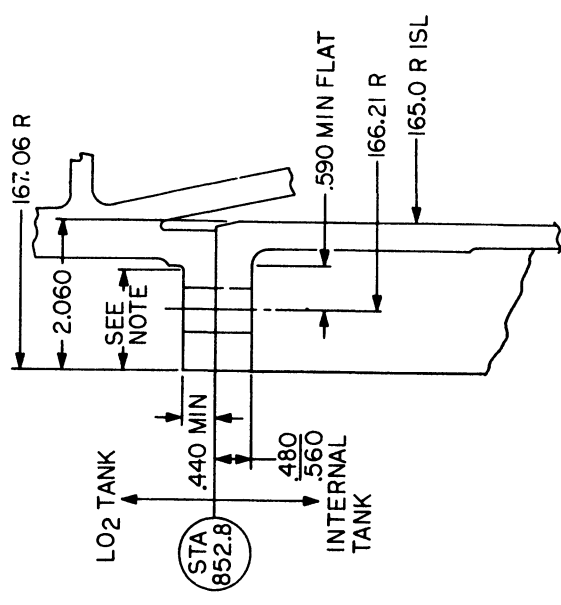
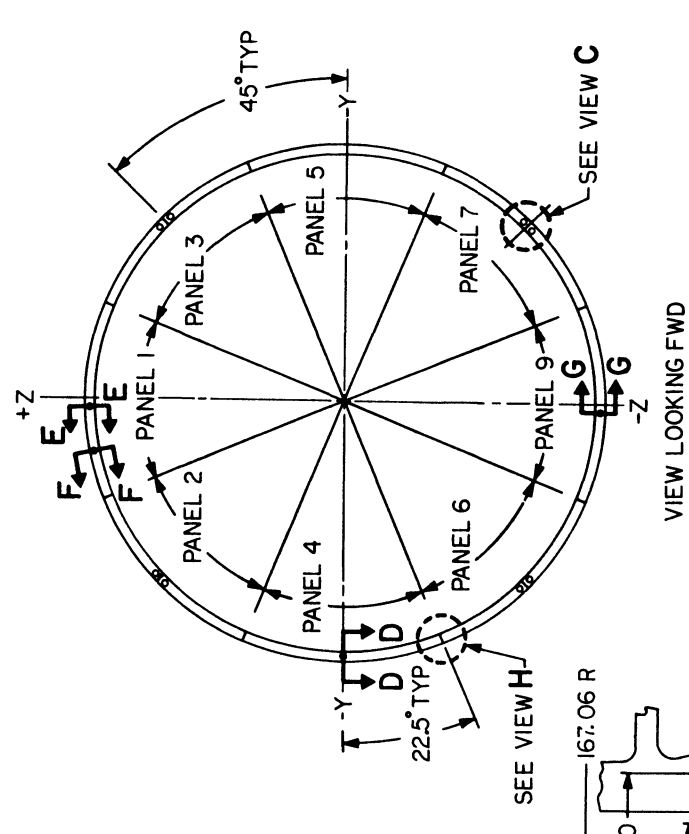
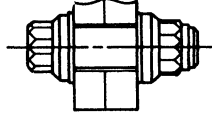
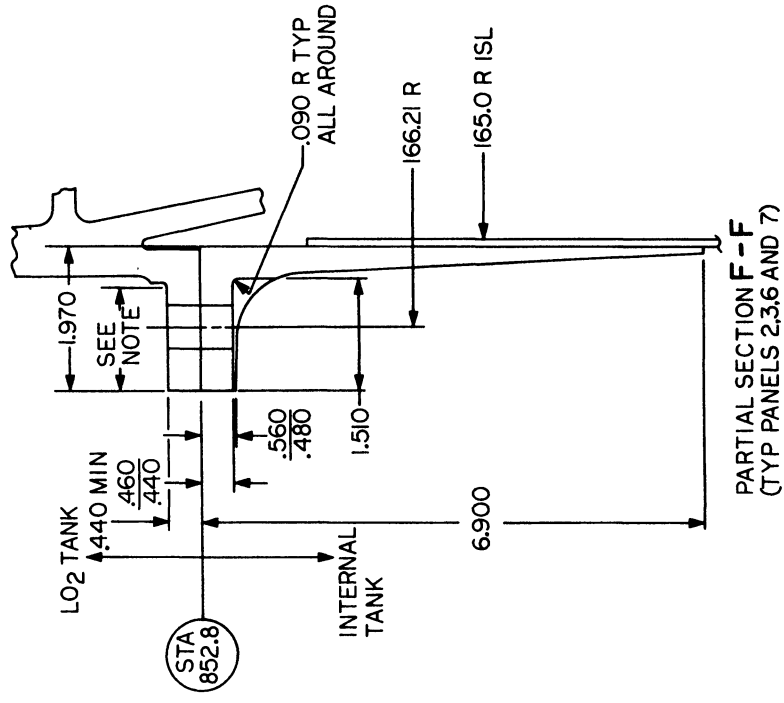
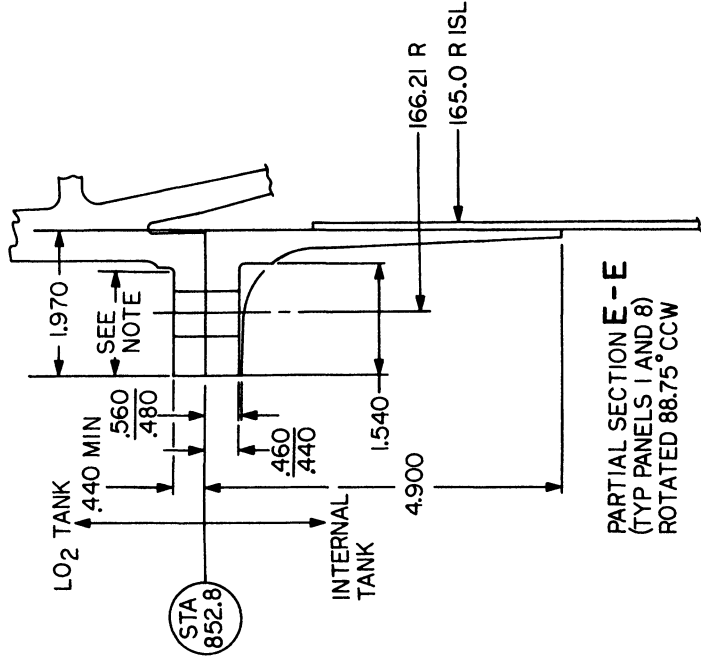


LO₂ TANK (SHEET 5 OF 5)



VIEW LOOKING FWD

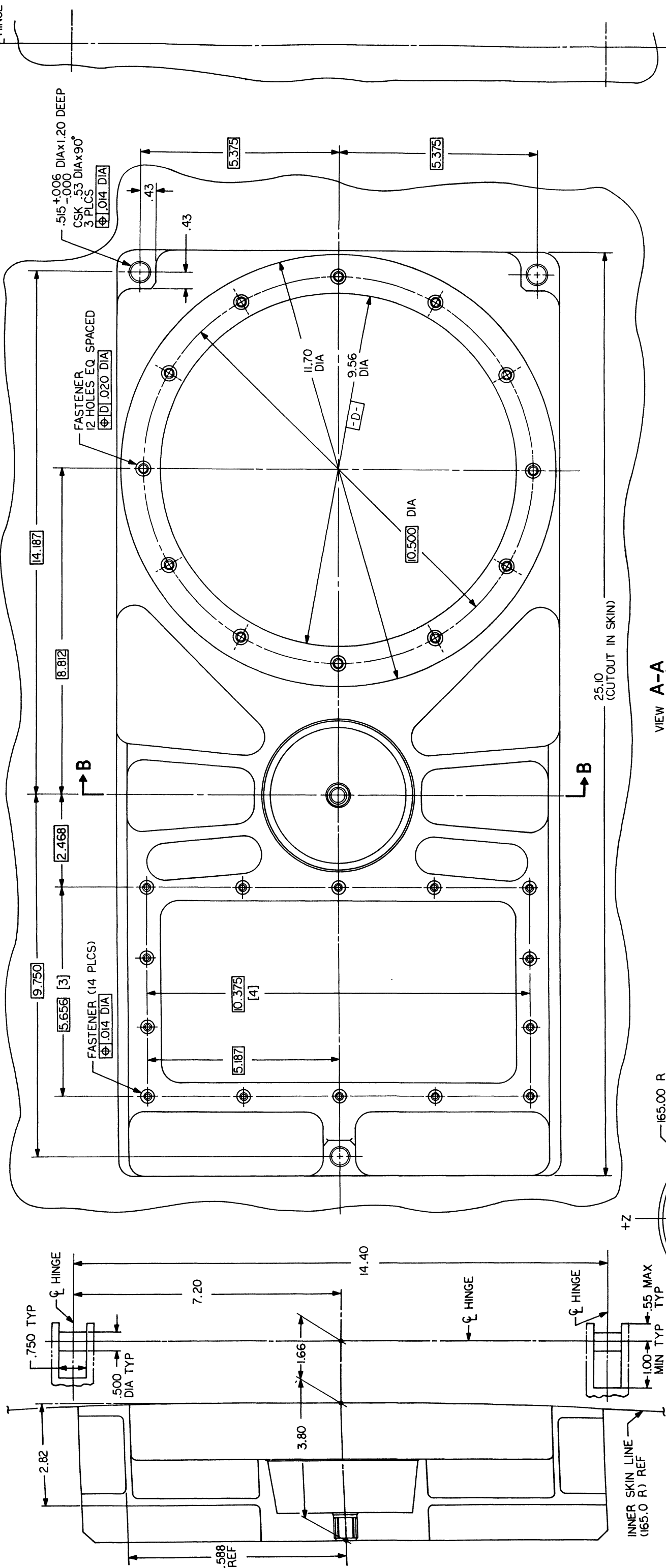
INTERTANK (SHEET 1 OF 6)



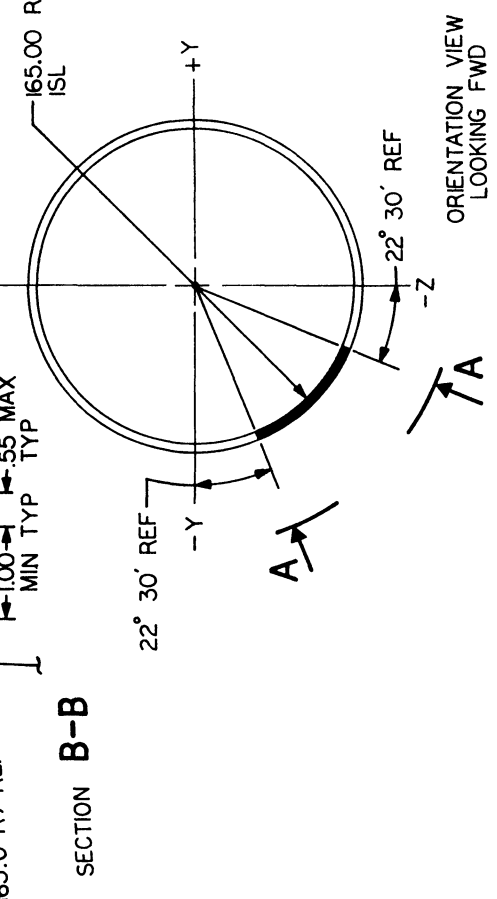
NOTE:
SURFACE TO BE FLAT FOR .968 DIA WASHER.

SECTION D-D
(TYP PANELS 4 AND 5)

STA 1046.73
CL HINGE

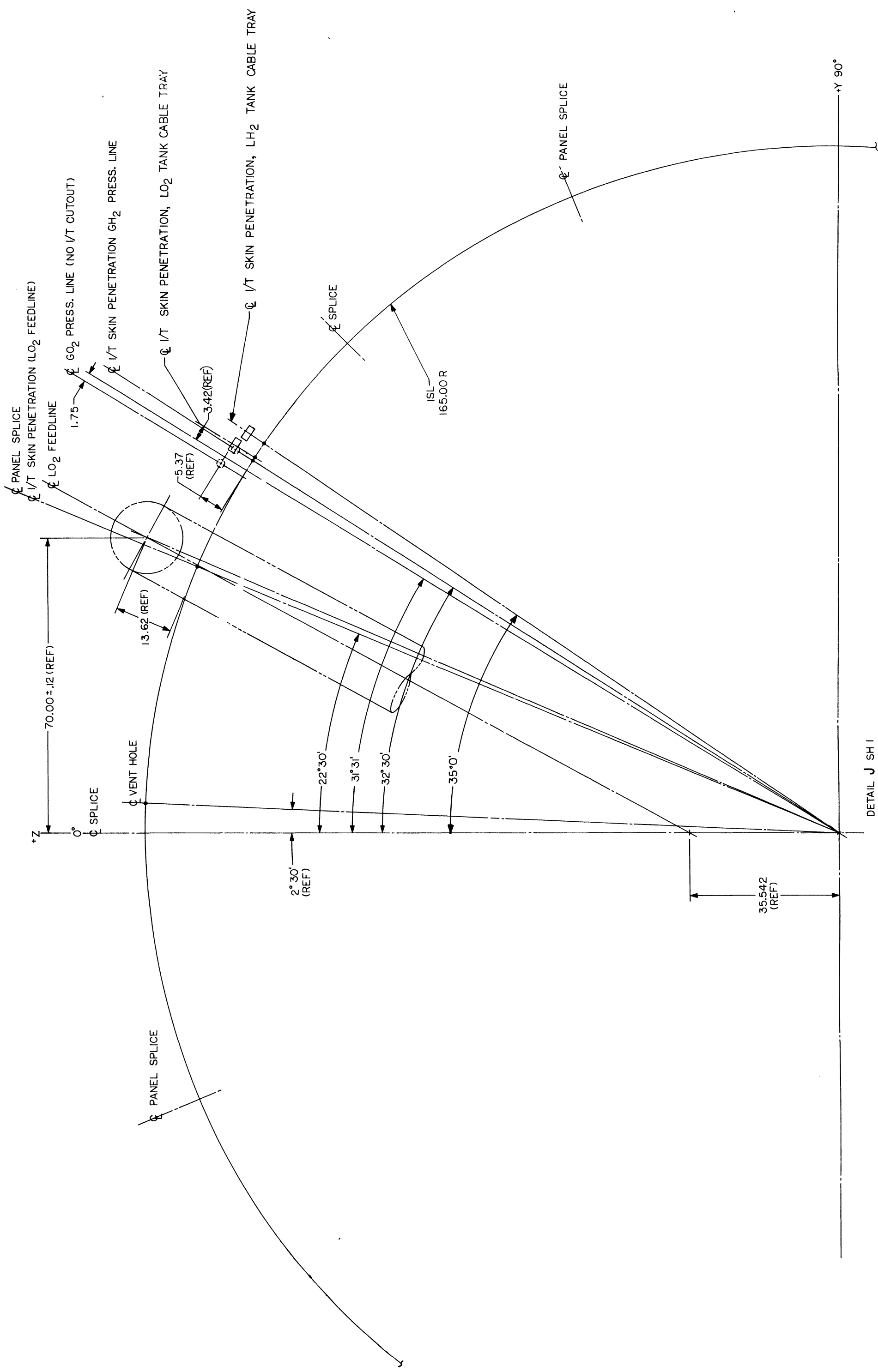


VIEW A-A
ROTATED 30° CW

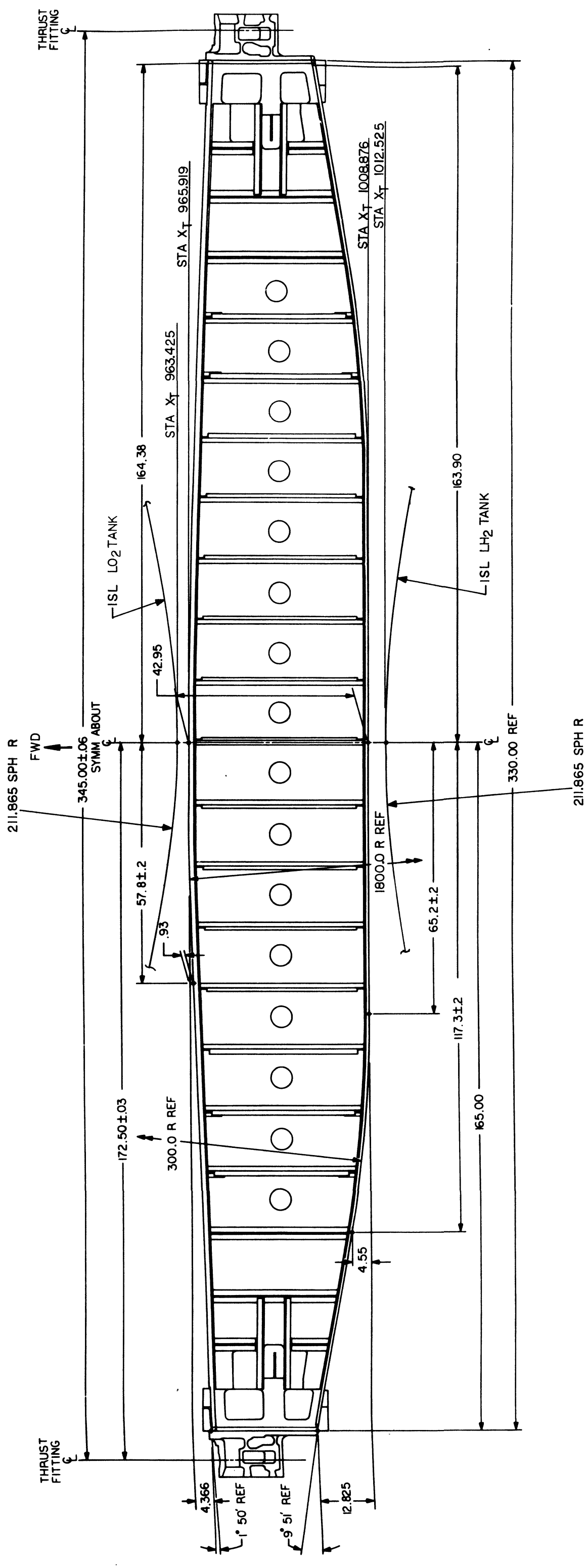


SECTION B-B

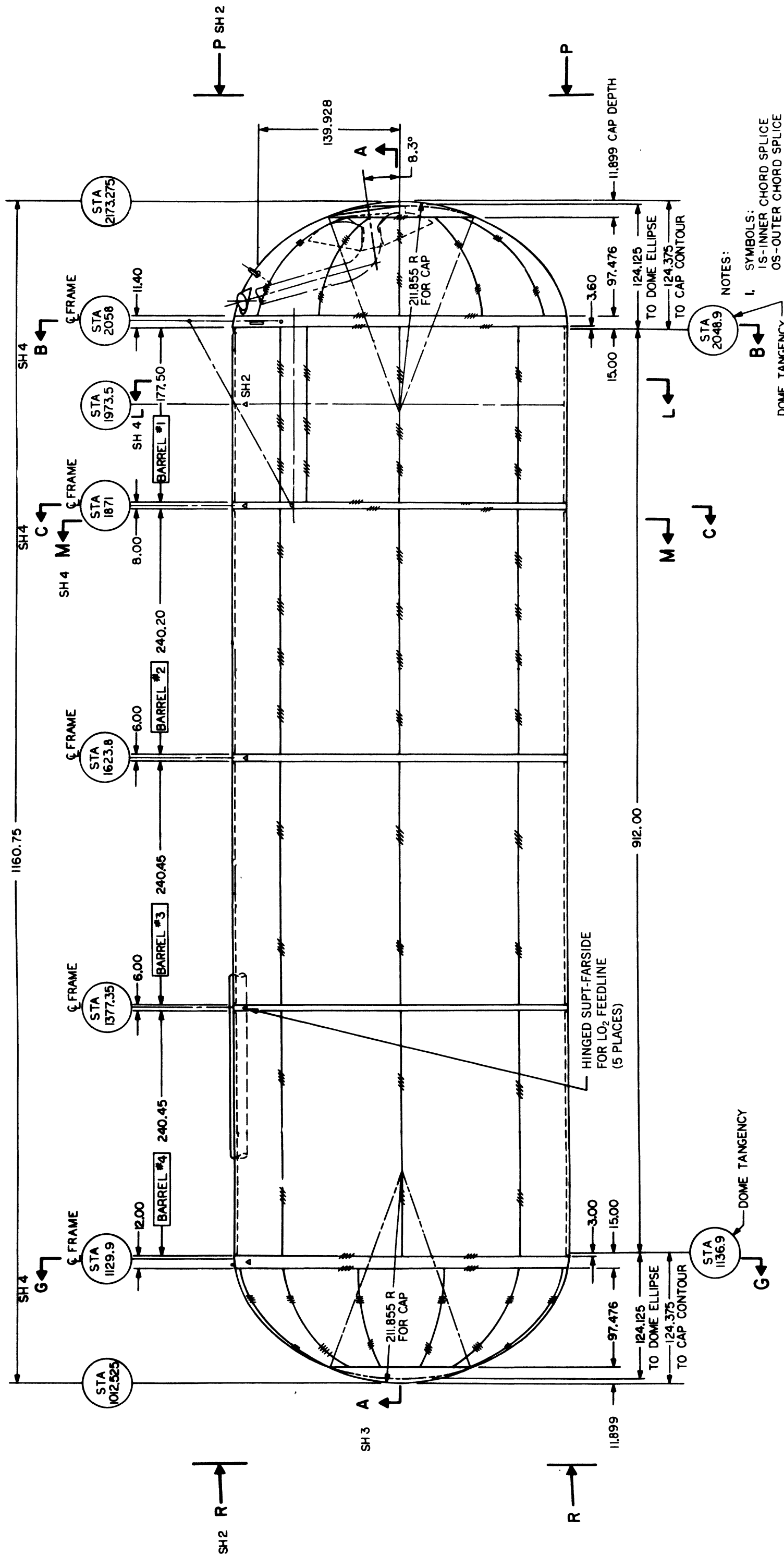
INTERTANK (SHEET 4 OF 6)



DETAIL J SH I

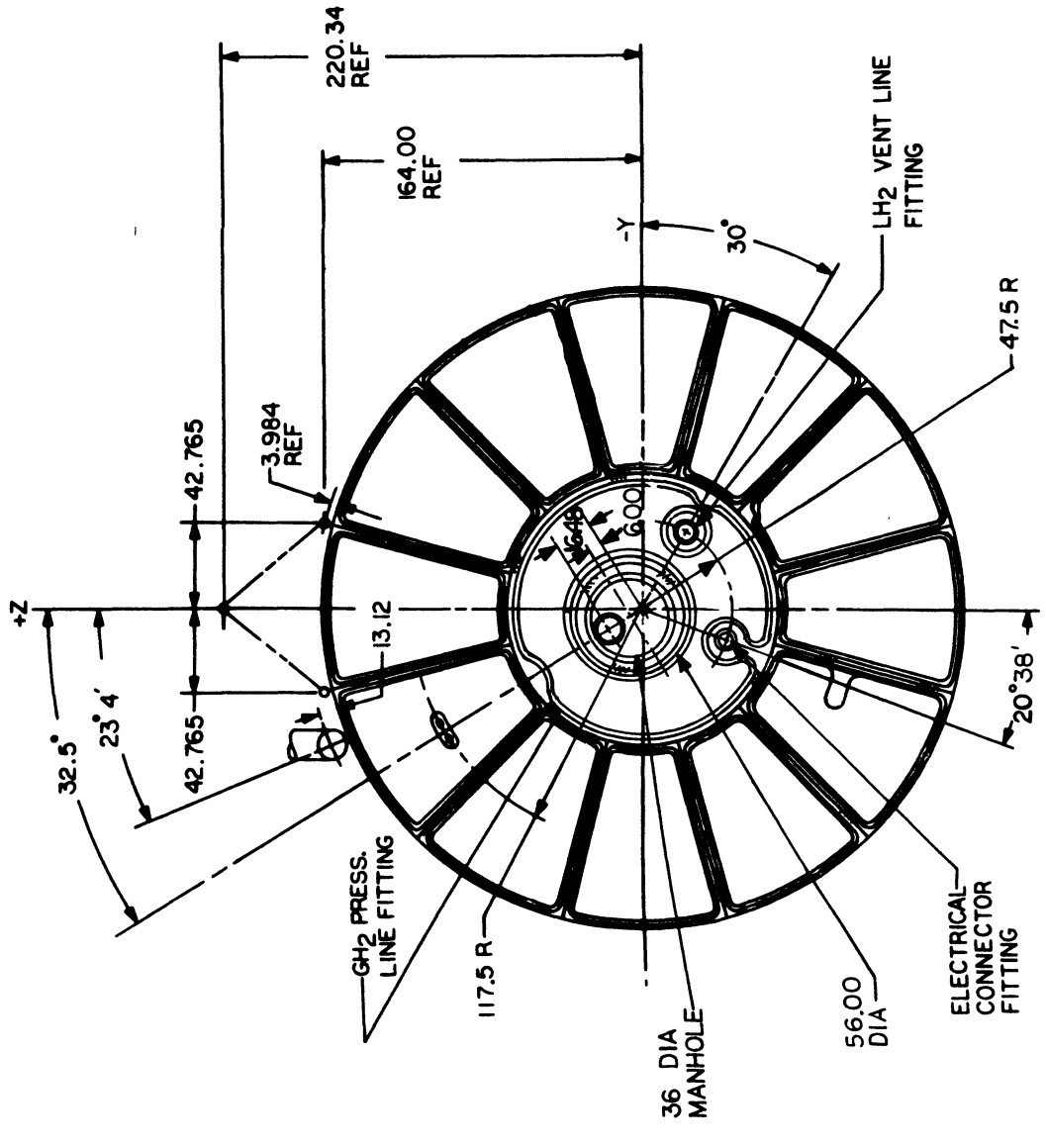
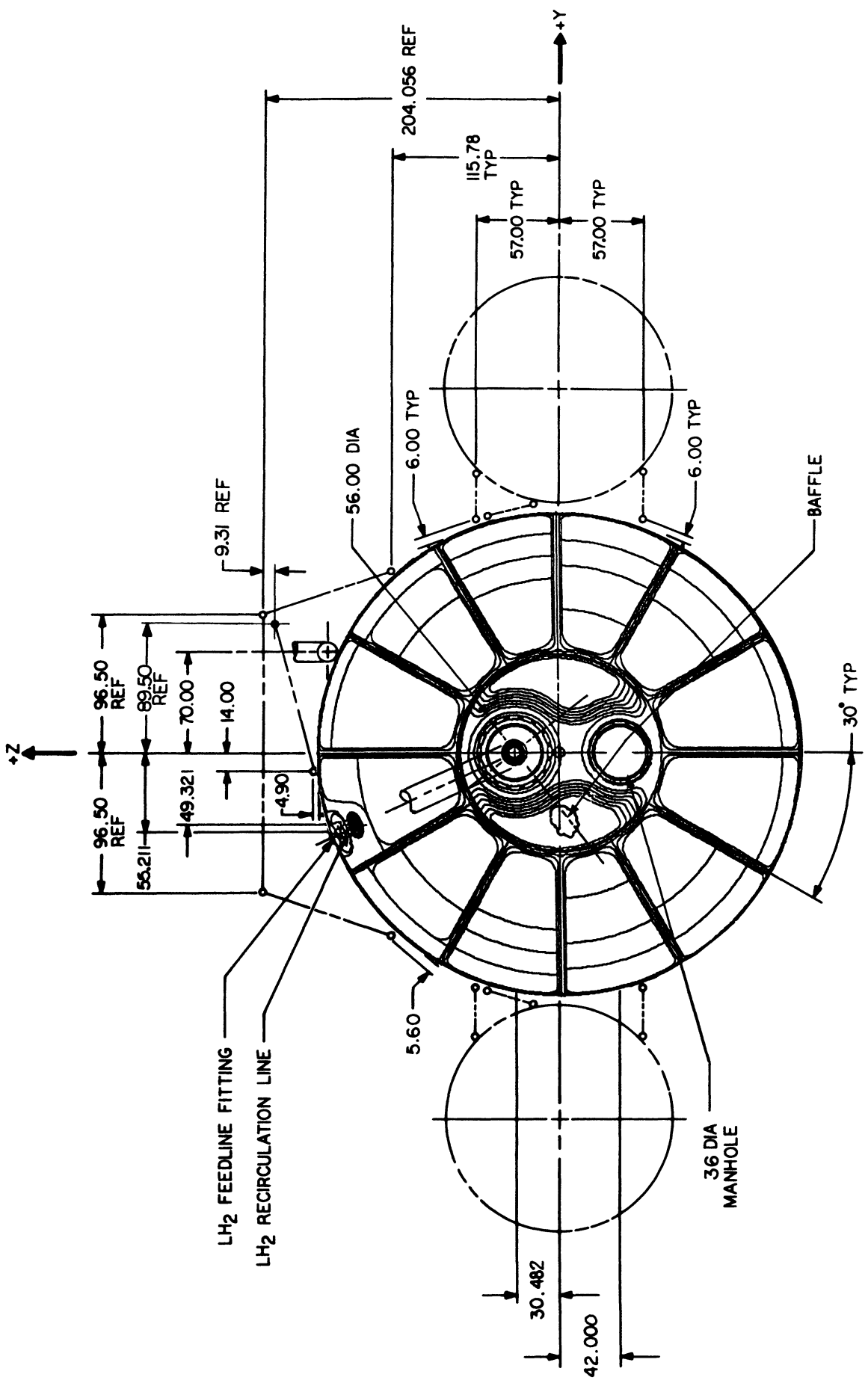


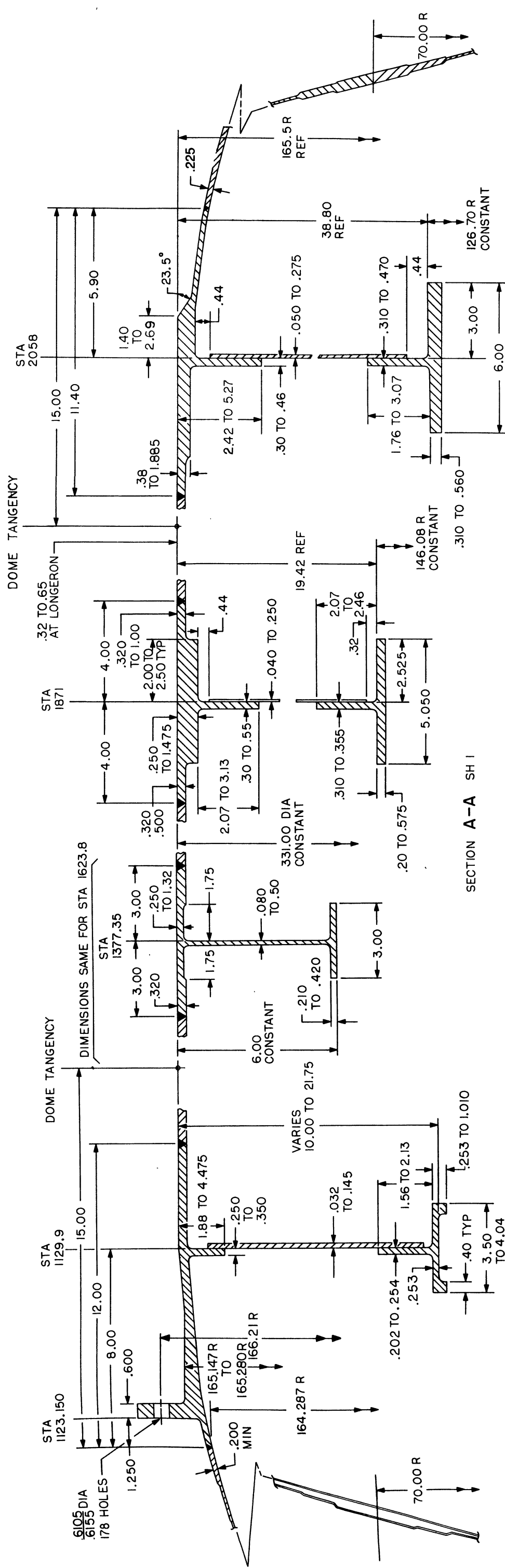
VIEW K-K SH 1
 ROTATED 90° CW



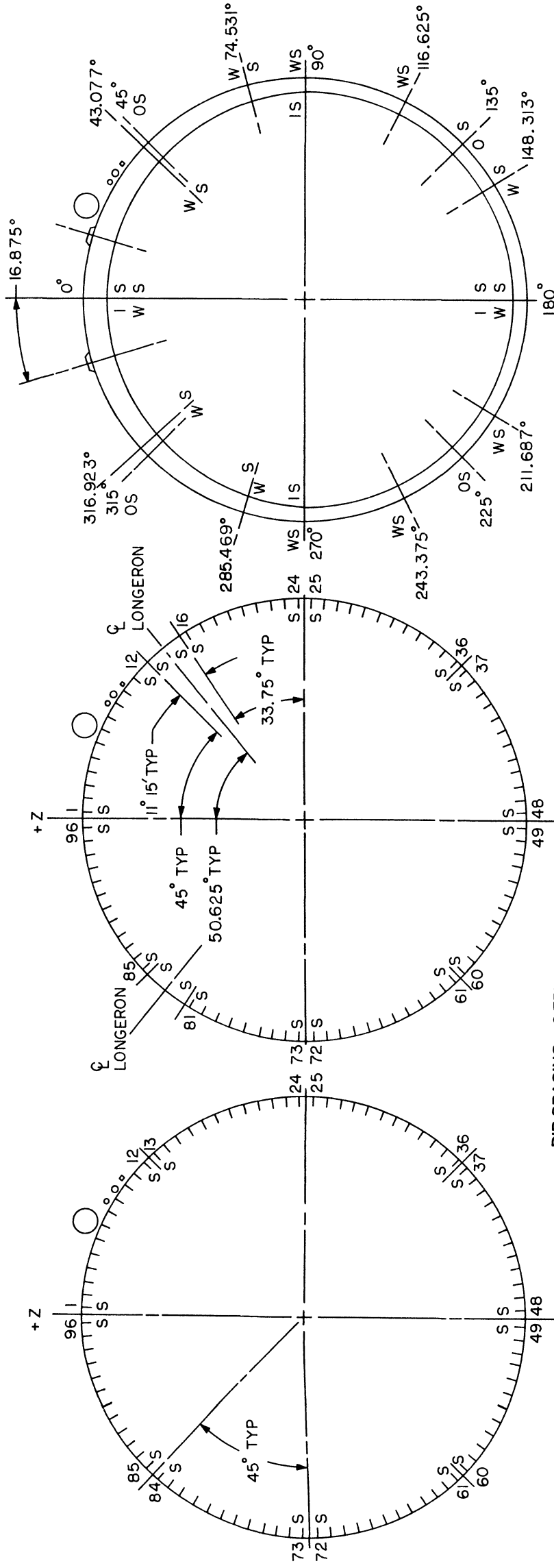
- NOTES:
- 1. SYMBOLS:
 - I-S-INNER CHORD SPLICE
 - O-S-OUTER CHORD SPLICE
 - W-S-WEB SPLICE
 - F-S-FRAME SPLICE
 - S-S-SKIN WELD SPLICE
 - 2. DIMENSIONS SHOWN DO NOT REFLECT TOLERANCES.

LH₂ TANK (SHEET 1 OF 4)





SECTION A-A SH 1

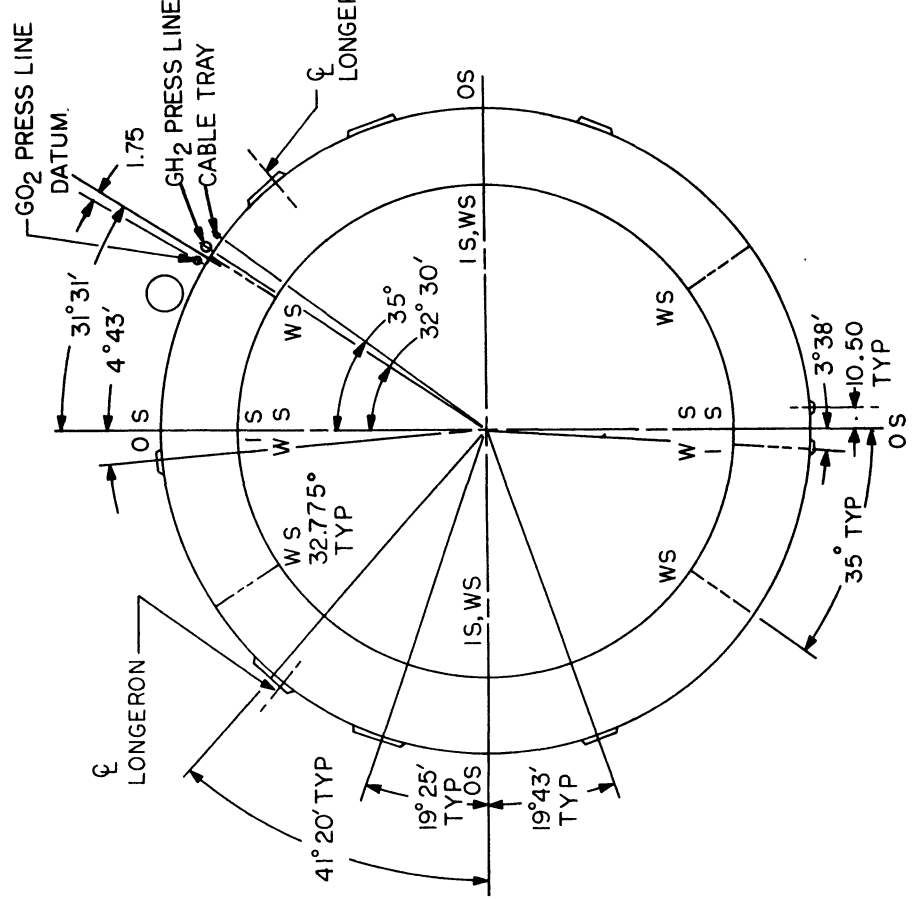
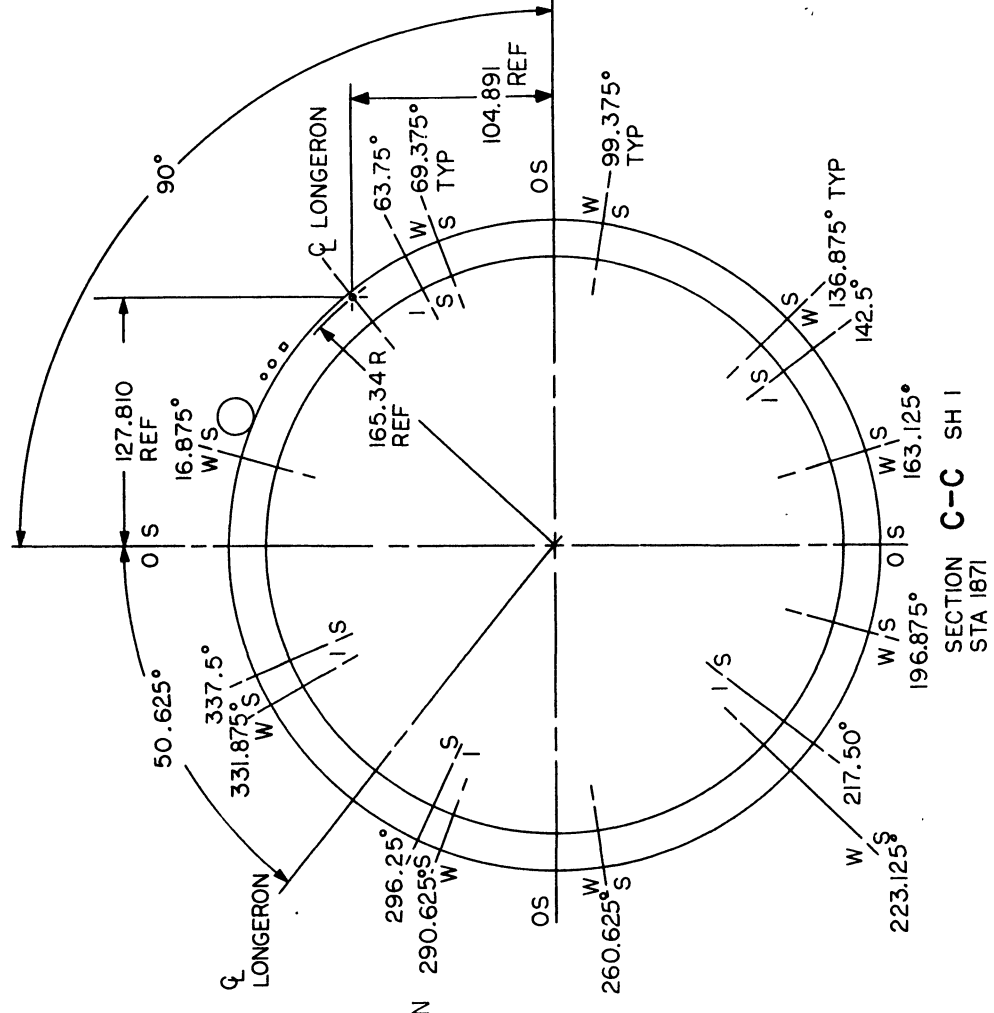


SECTION G-G SH 1
STA 1129.9

SECTION L-L SH 1

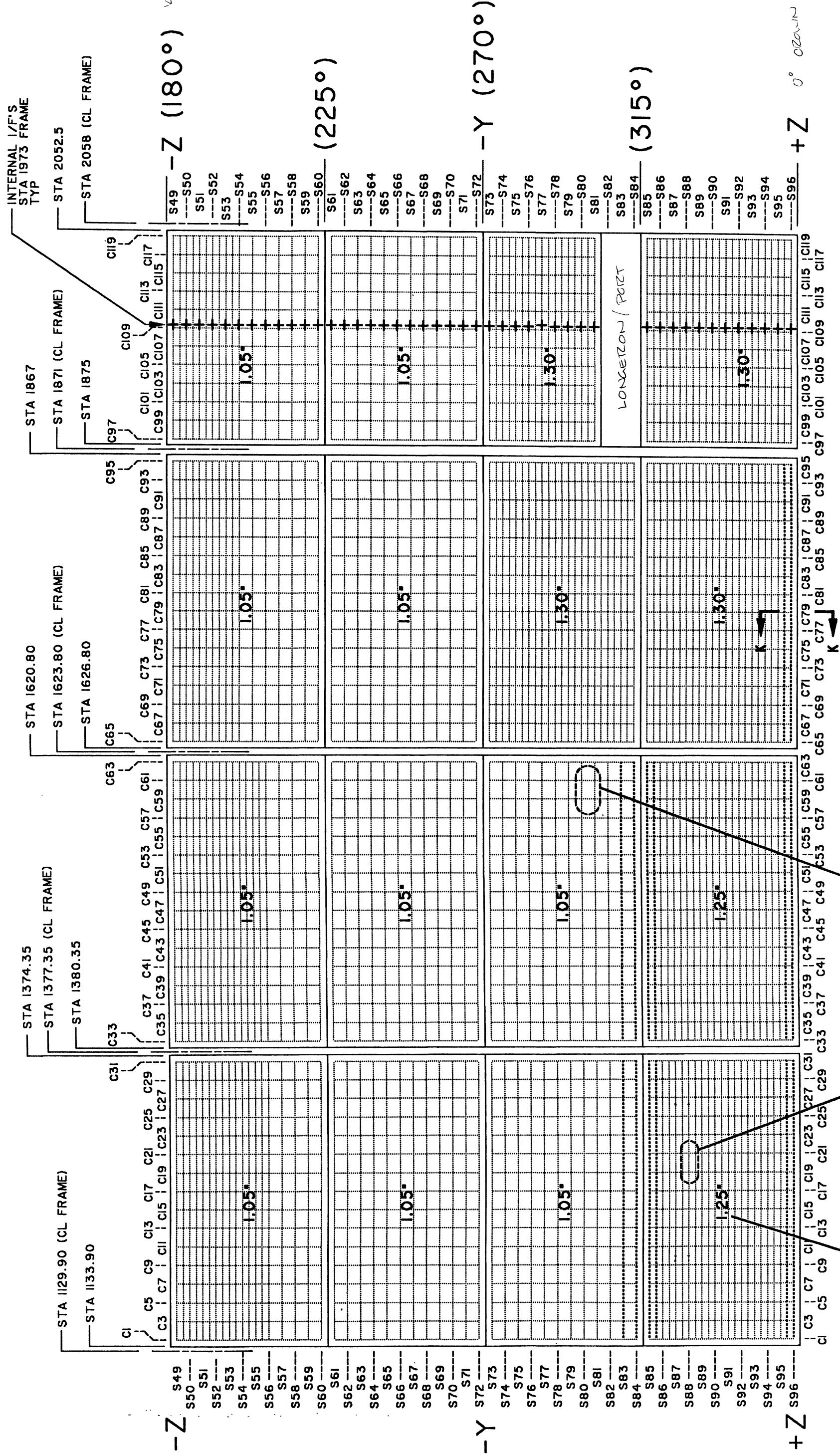
RIB SPACING = 3.75° =
10.8319 @ 165 R

SECTION M-M SH 1



SECTION B-B SH 1
STA 2058

SECTION C-C SH 1
STA 1871



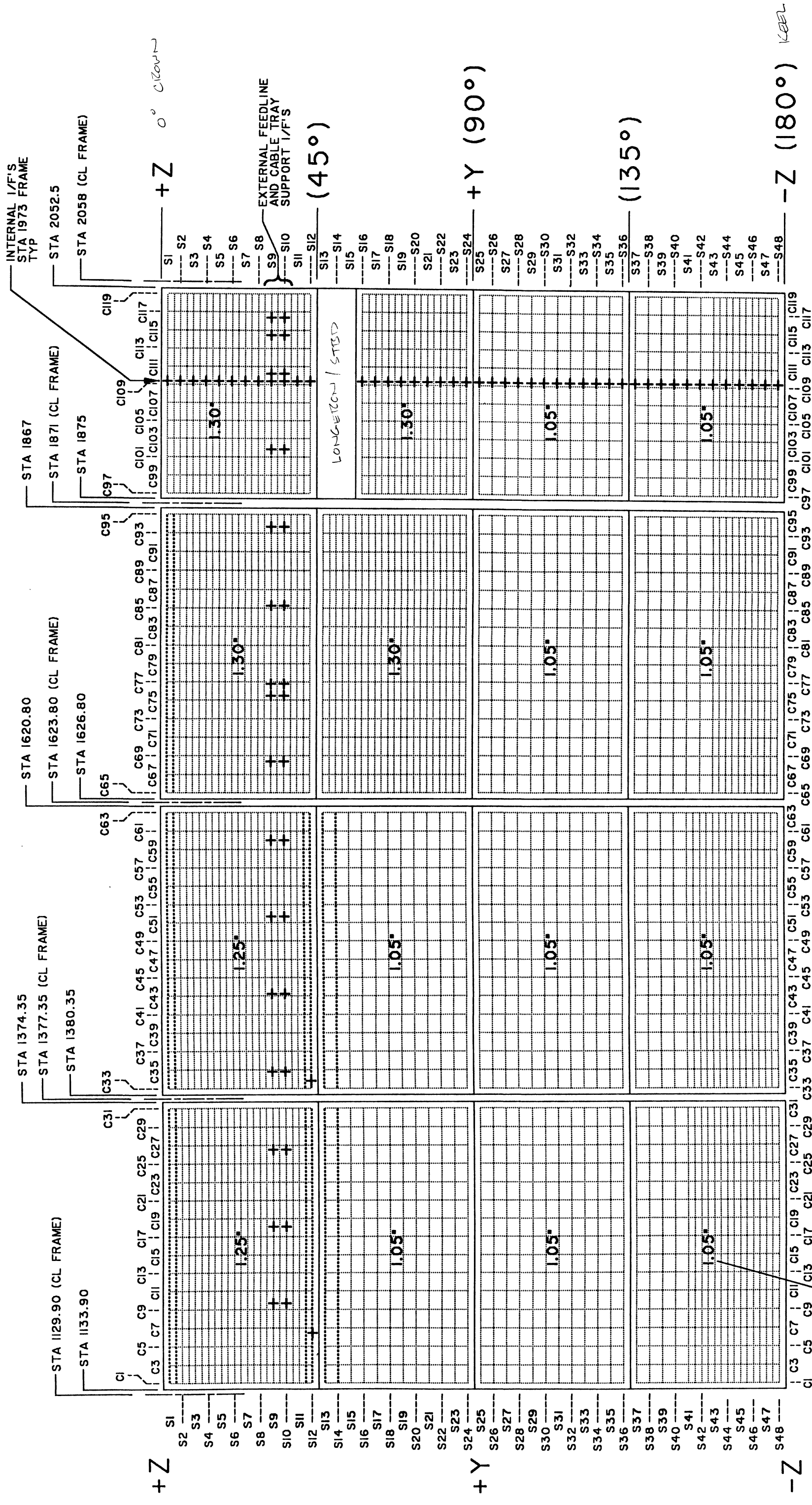
PANEL DEPTH IN INCHES, TYP

SEE VIEW J

SEE VIEW H

LEGEND	
.....	INDICATES RIB LOCATION
.....	INDICATES FLANGED RIB

LH2 BARREL PANEL DEVELOPMENT (SHEET 1 OF 2)
LOOKING OUTBOARD

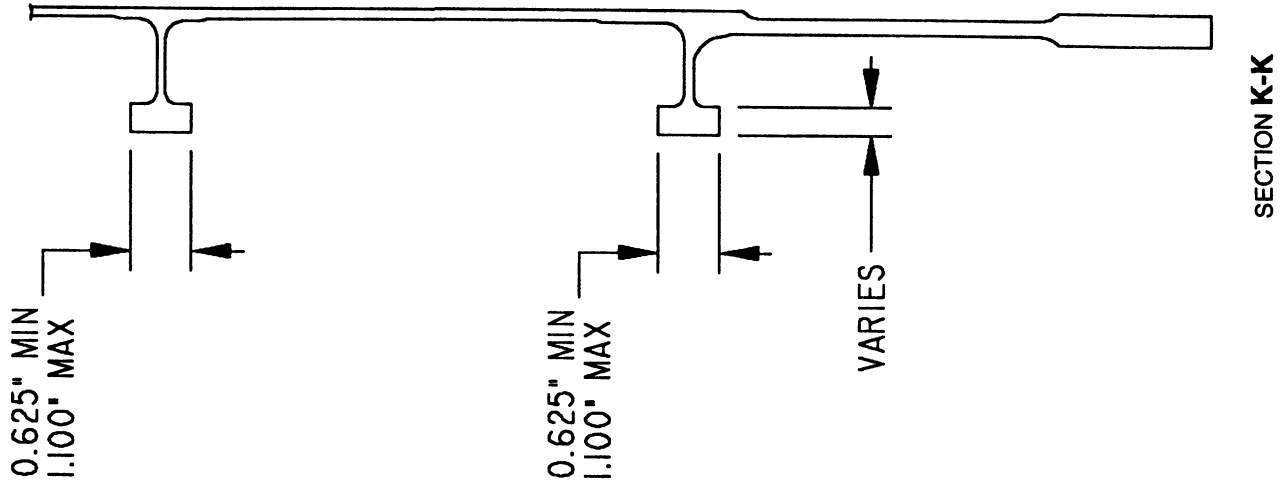
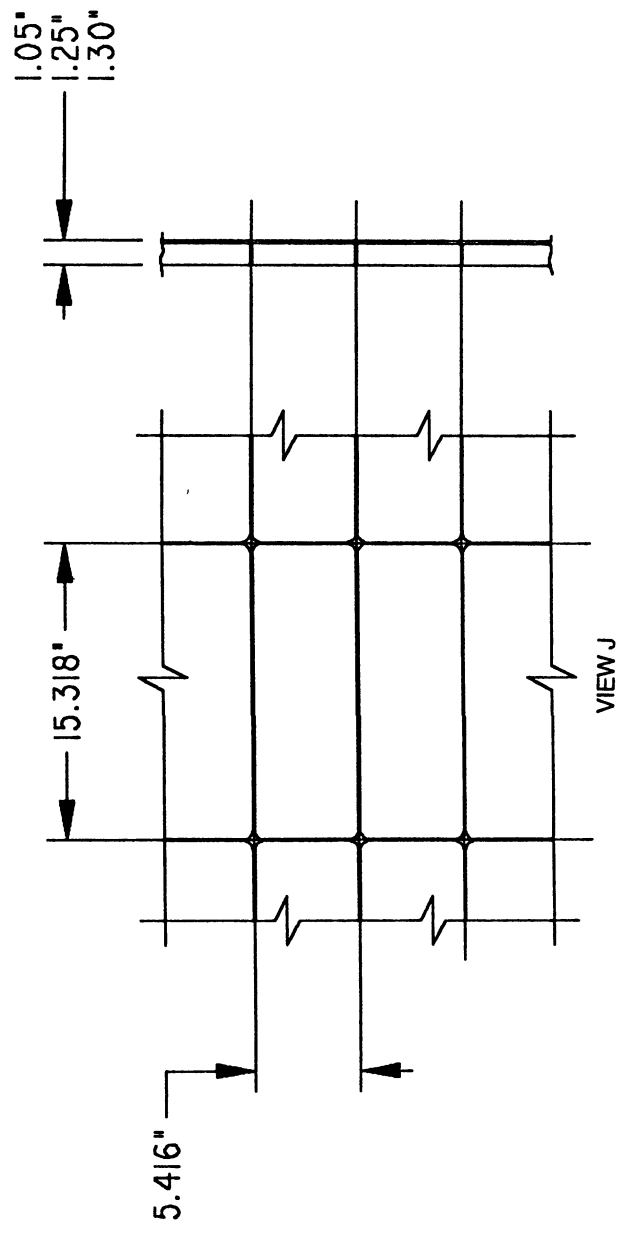
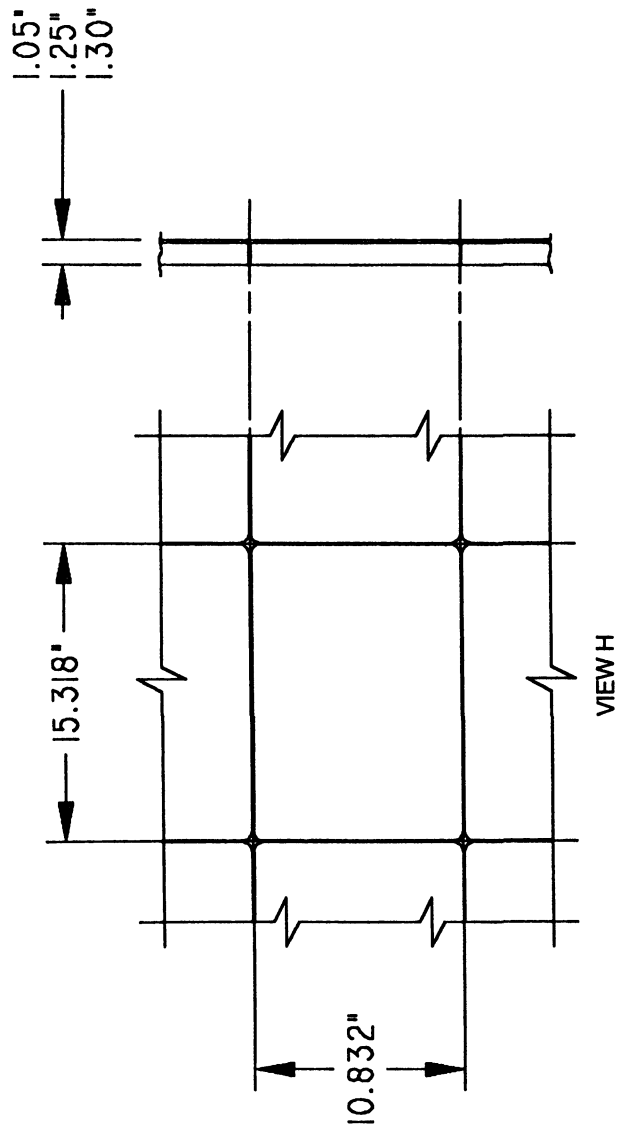


LEGEND

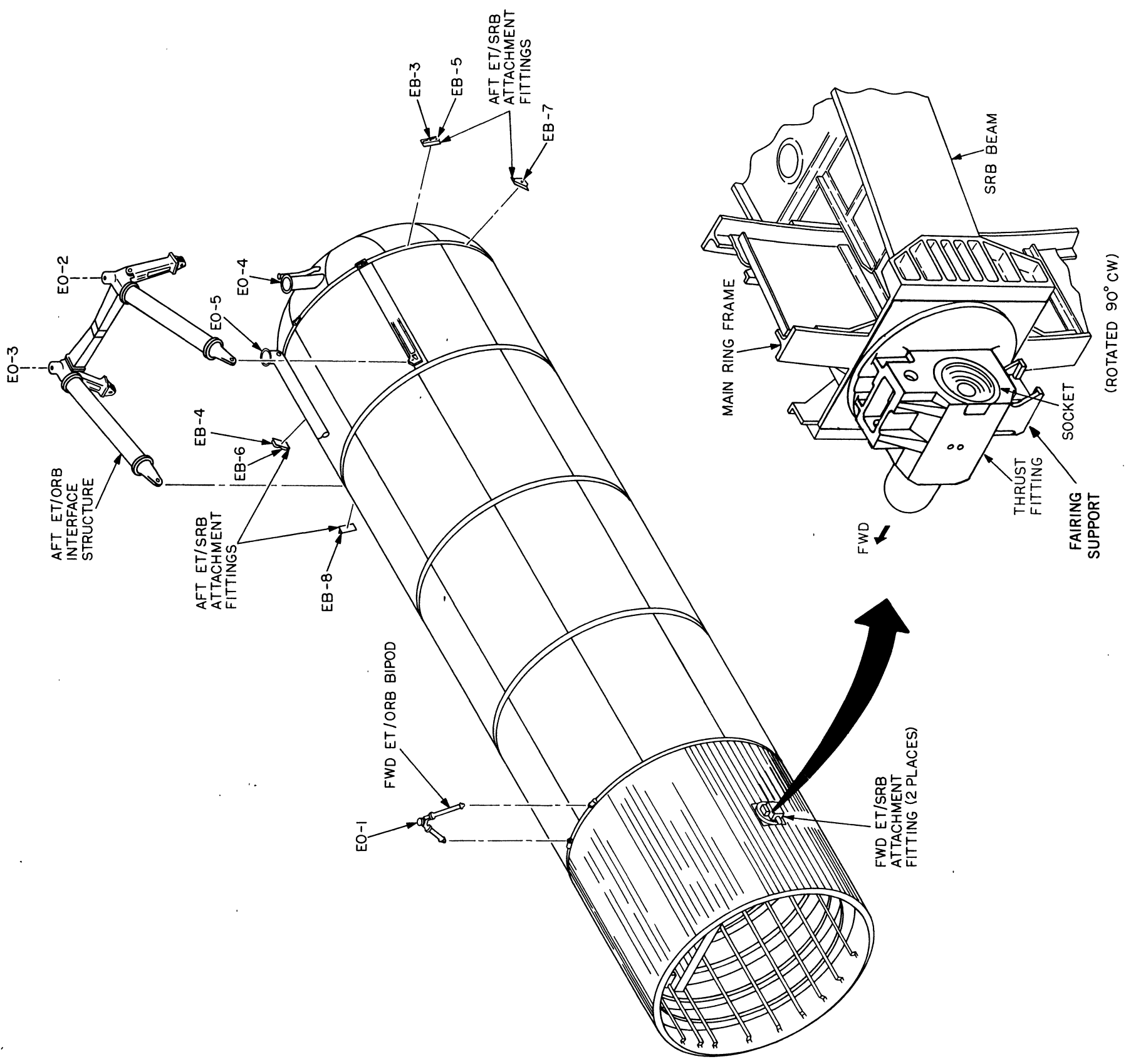
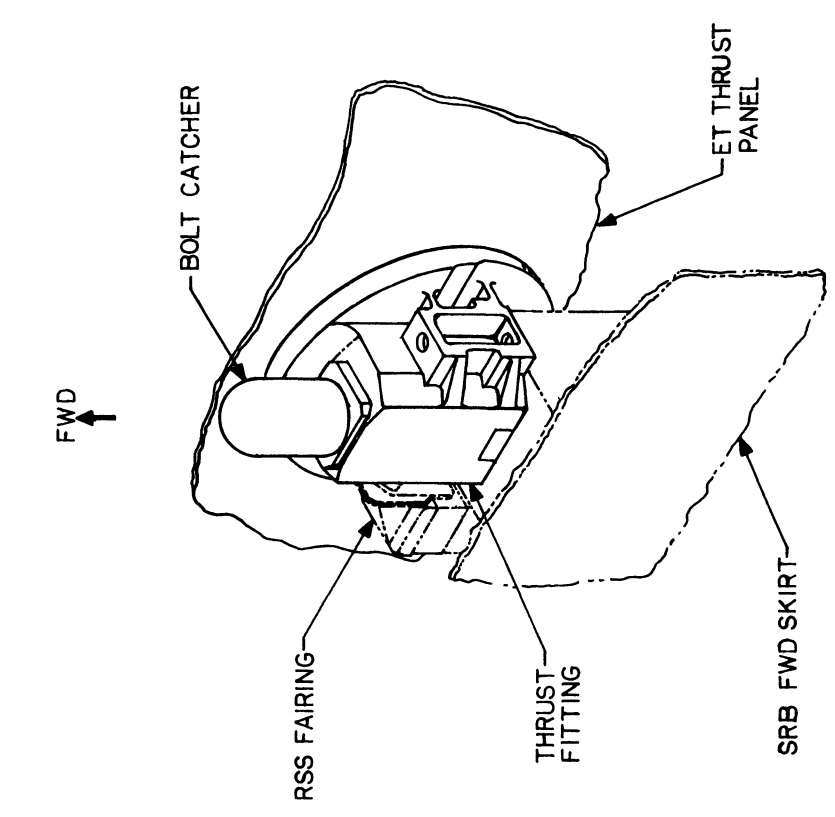
INDICATES RIB LOCATION
INDICATES FLANGED RIB

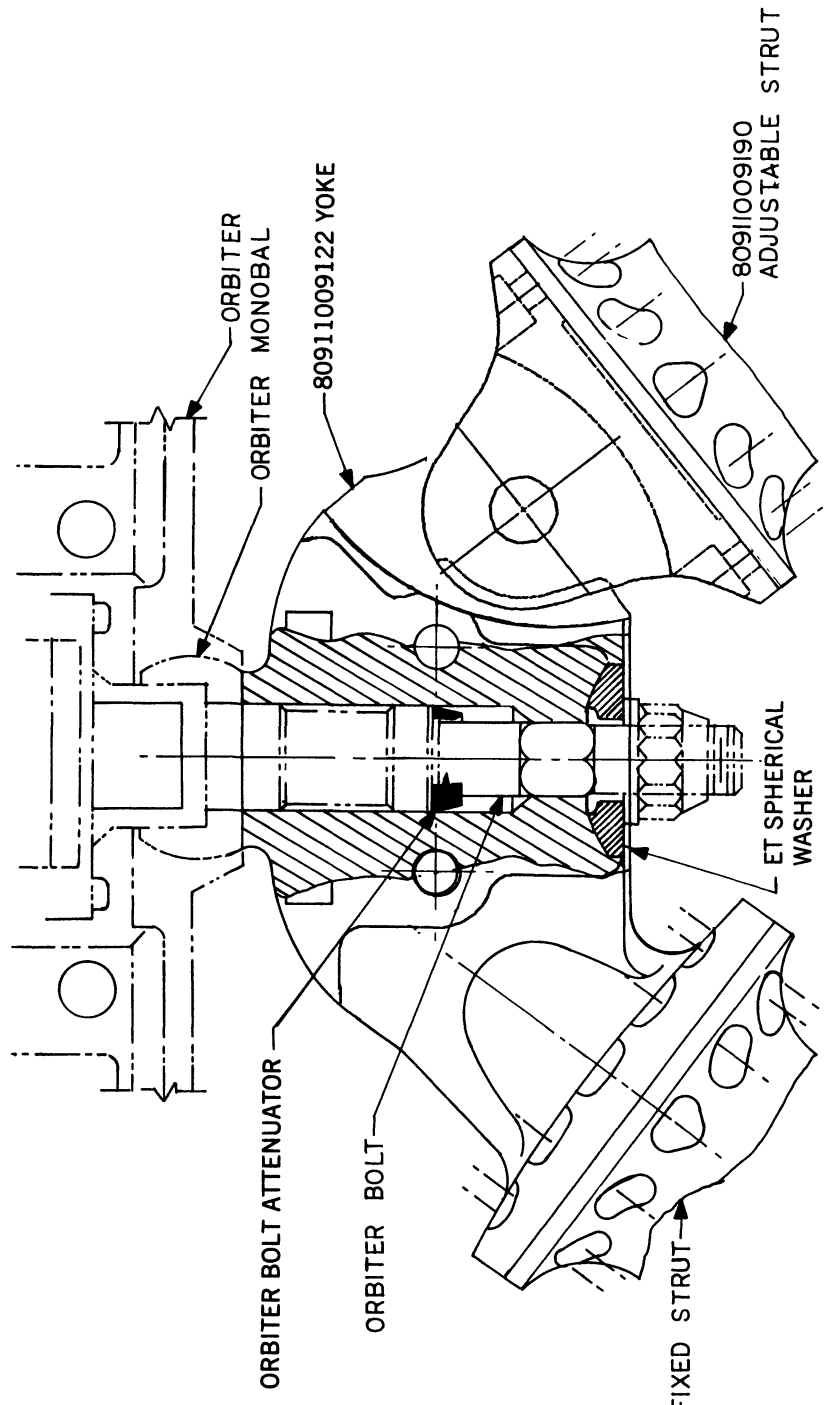
PANEL DEPTH IN INCHES, TYP

KEEL

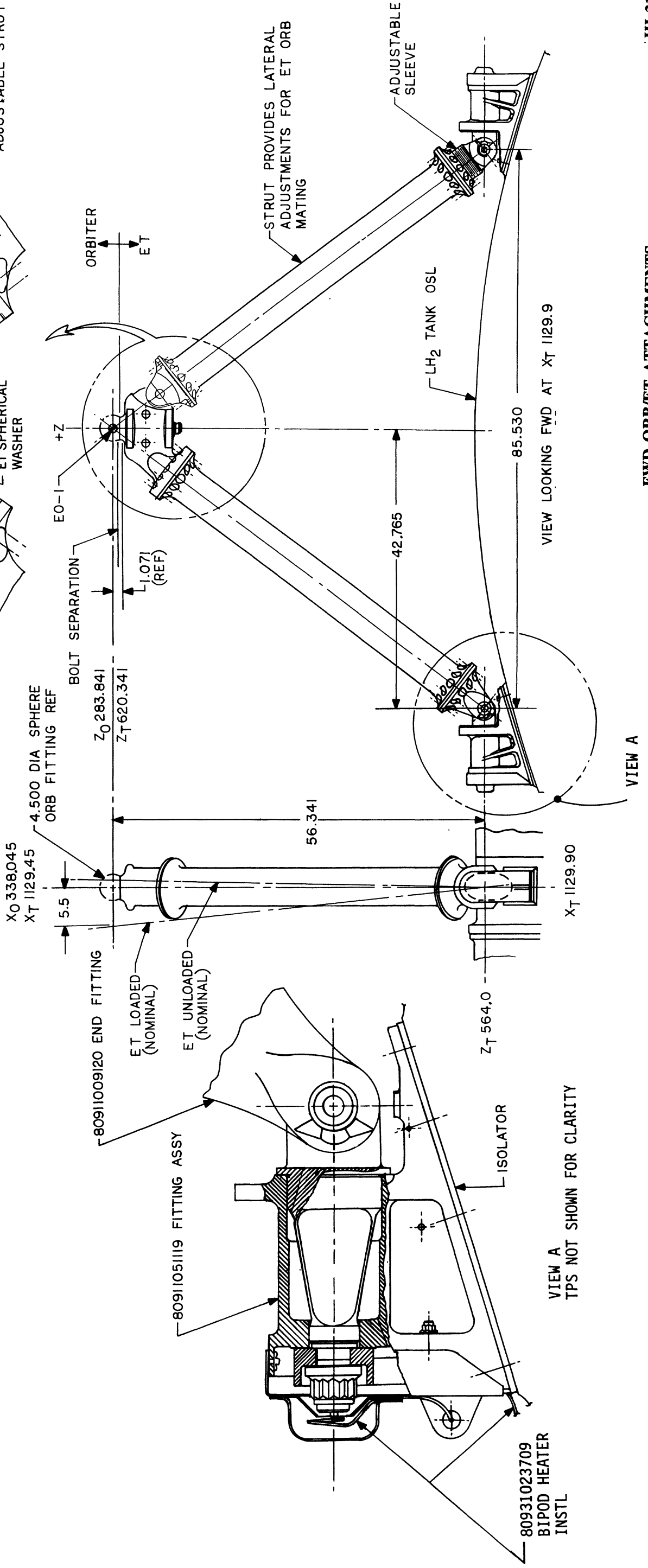


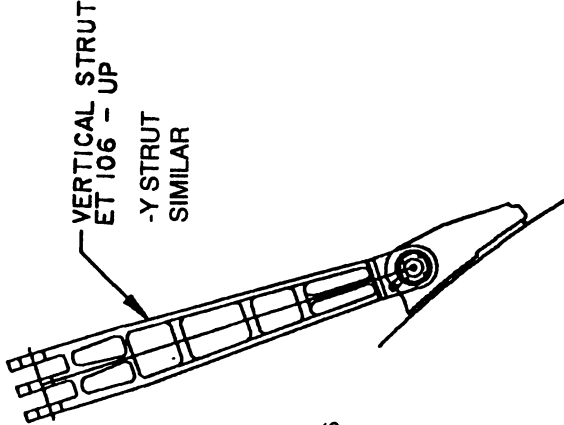
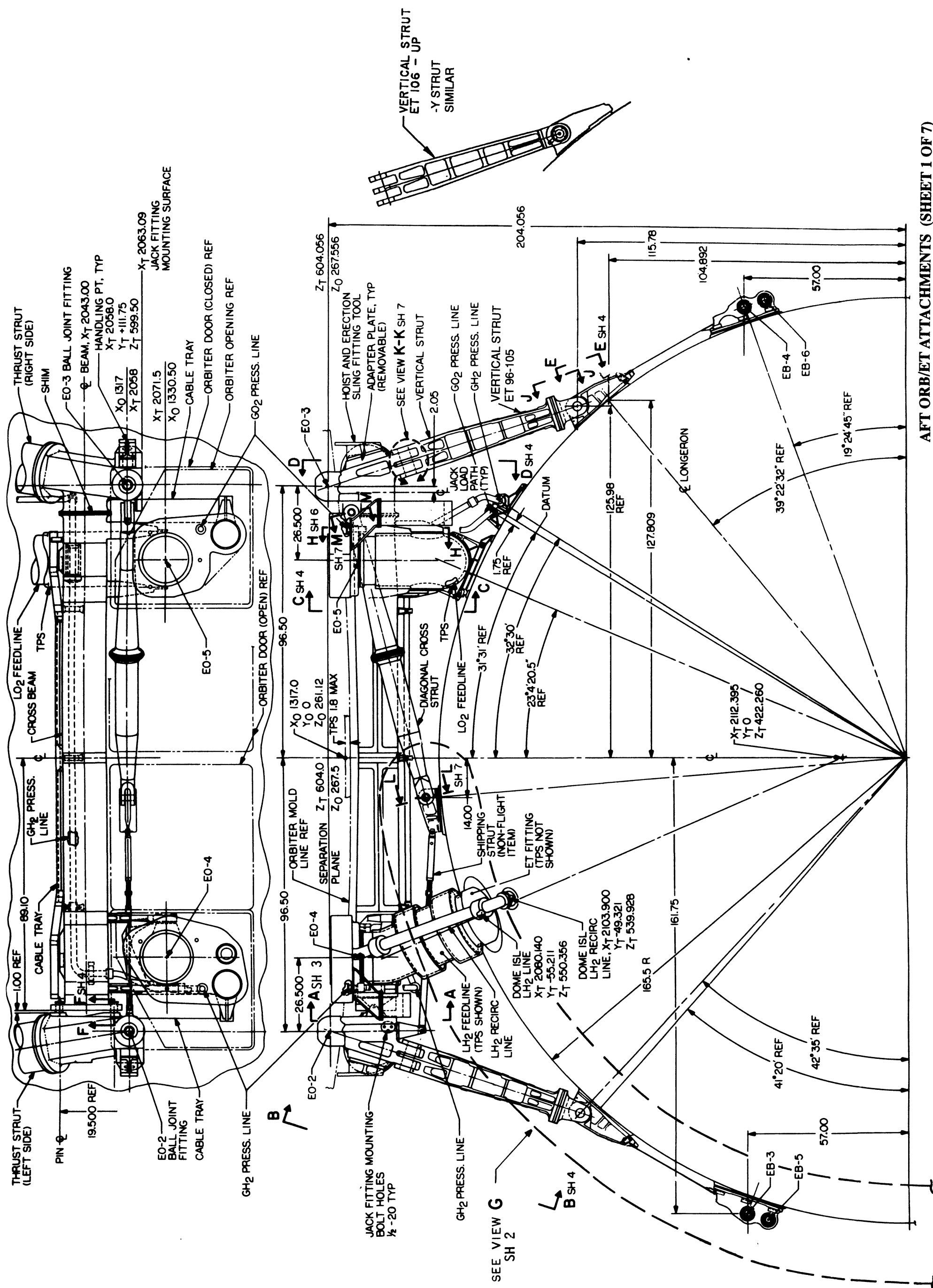
FLANGED RIB SECTION K-K



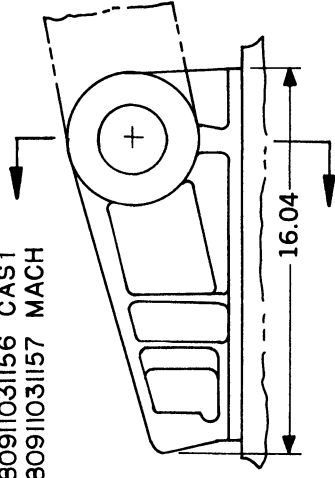


8091009190 FIXED STRUT

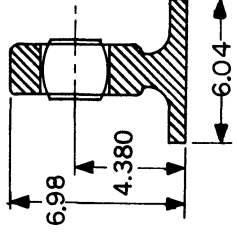




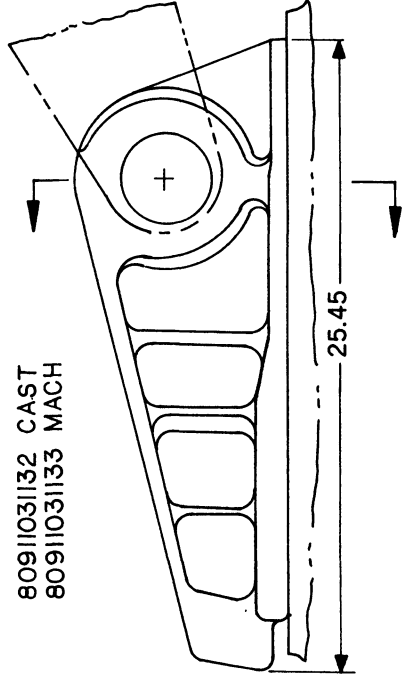
80911031156 CAST
80911031157 MACH



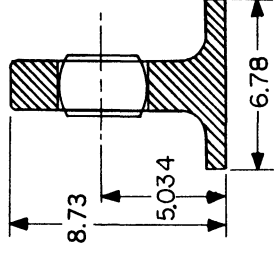
VIEW P



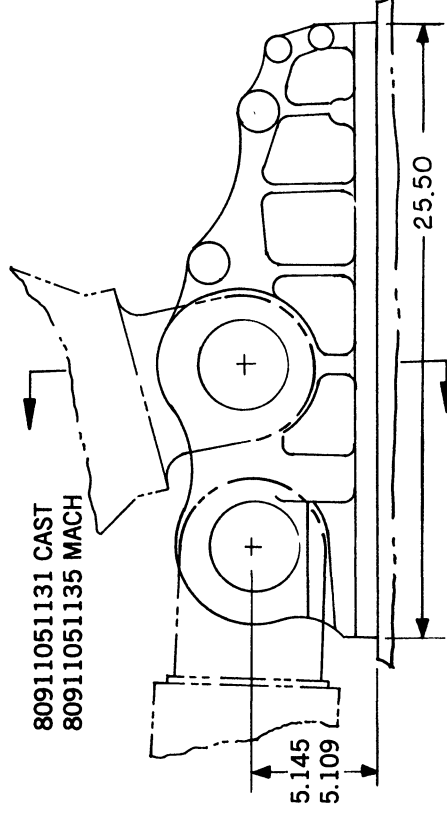
80911031132 CAST
80911031133 MACH



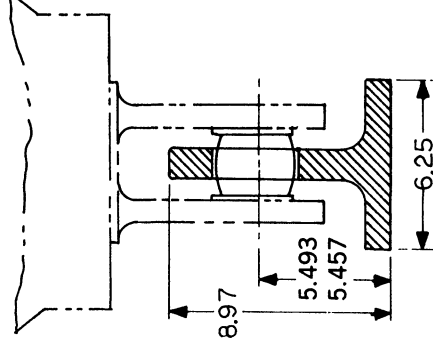
VIEW Q



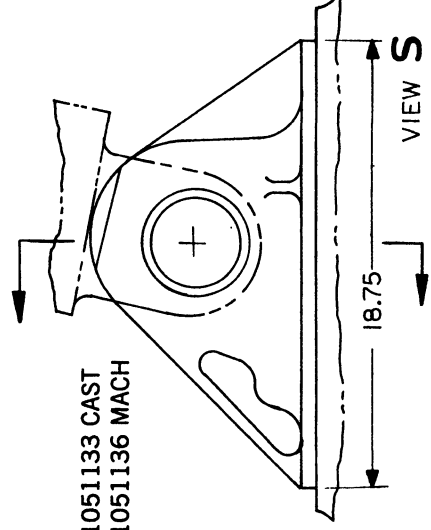
80911051131 CAST
80911051135 MACH



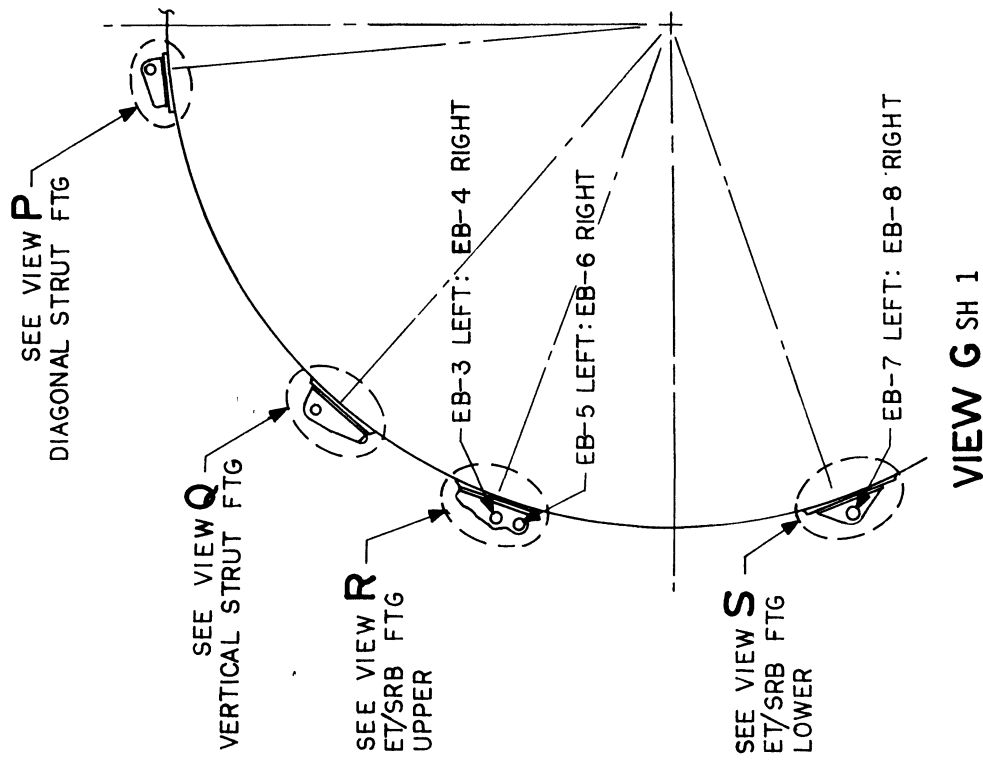
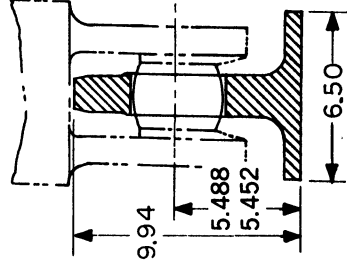
VIEW R LWT 23-UP



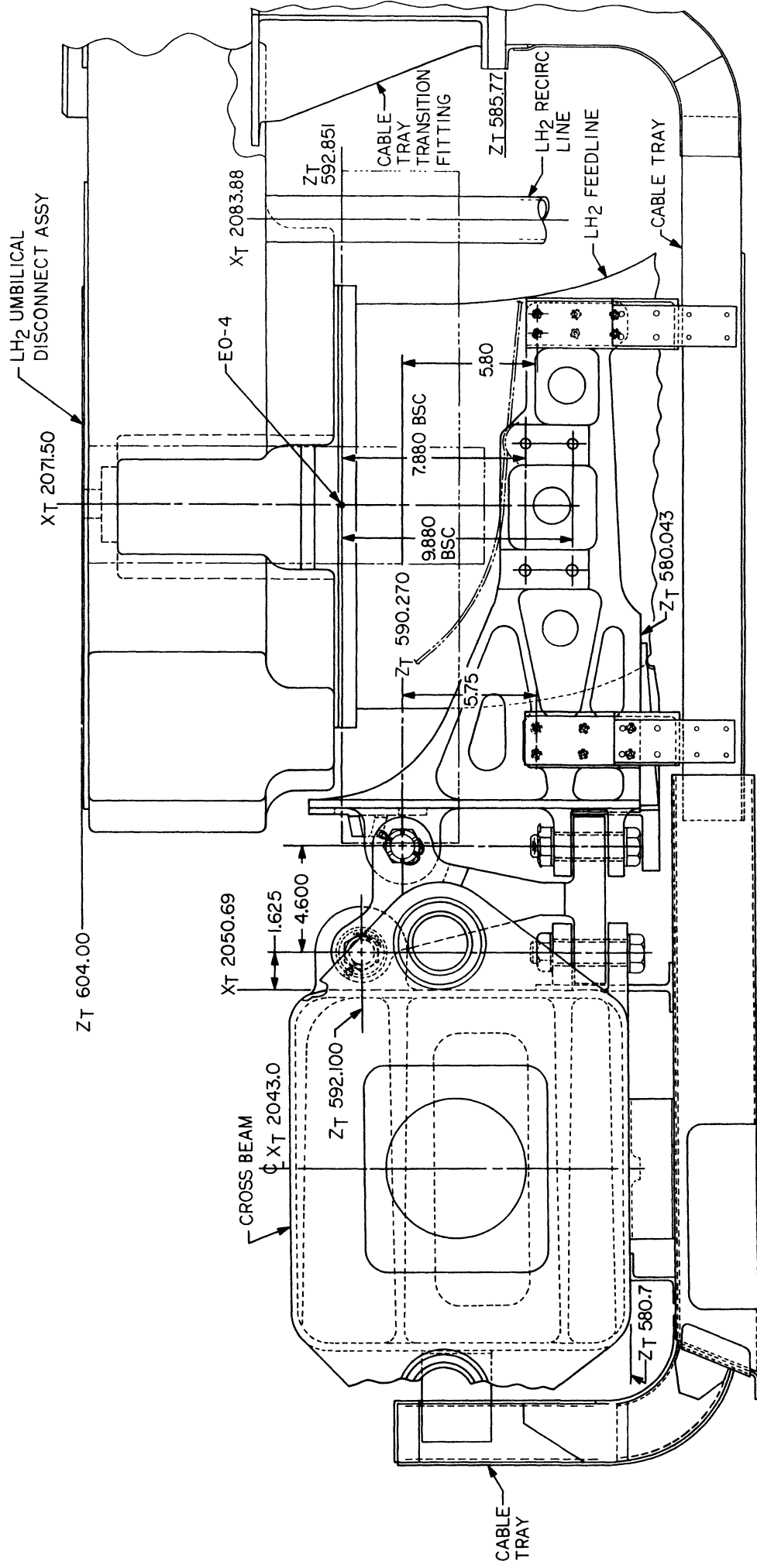
80911051133 CAST
80911051136 MACH



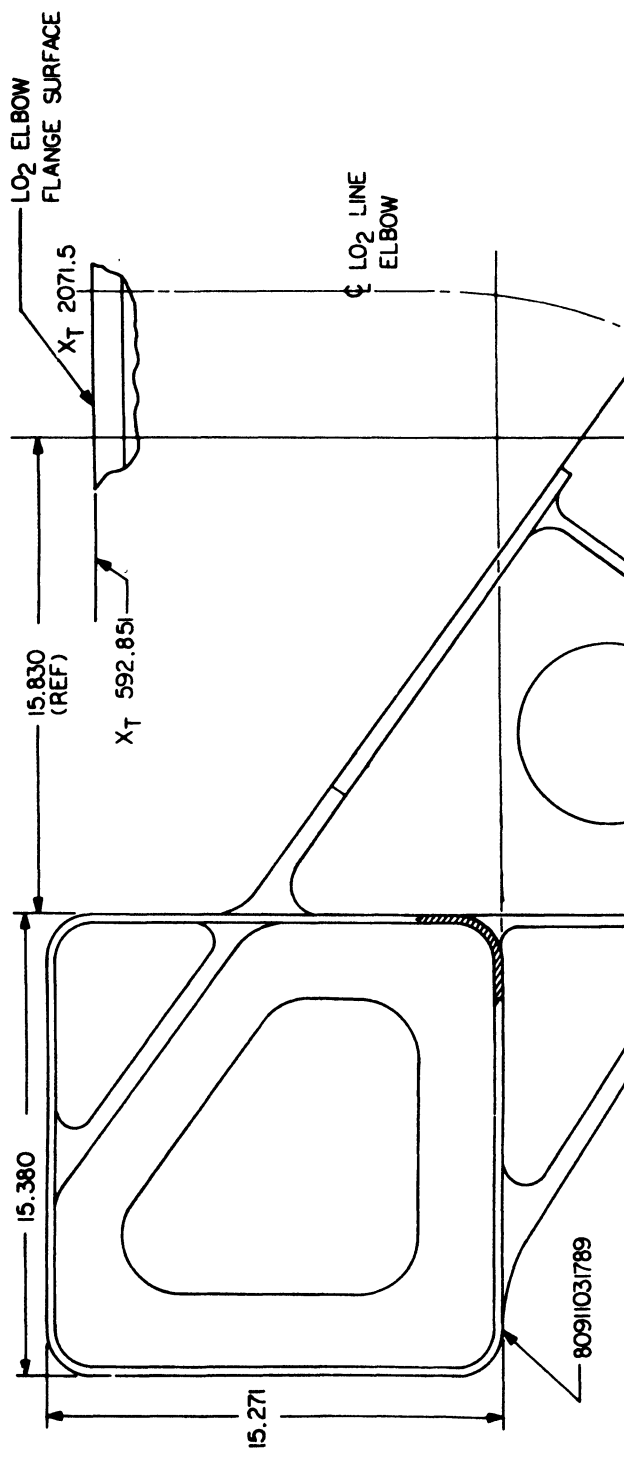
VIEW S



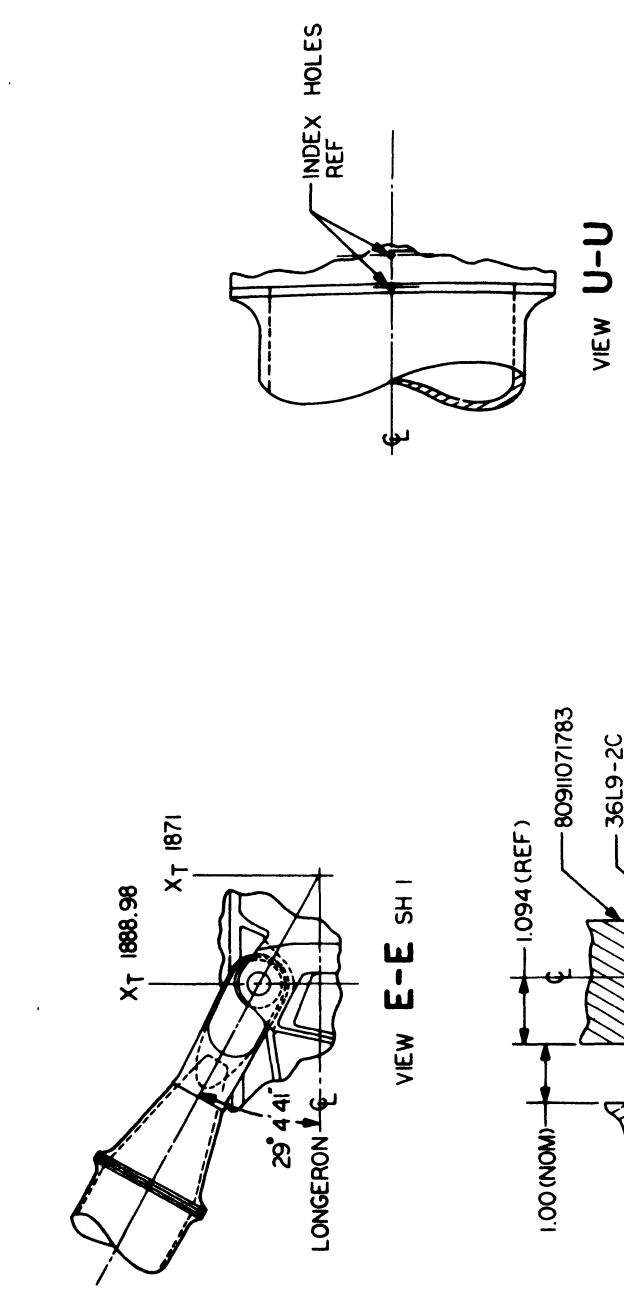
VIEW G SH 1



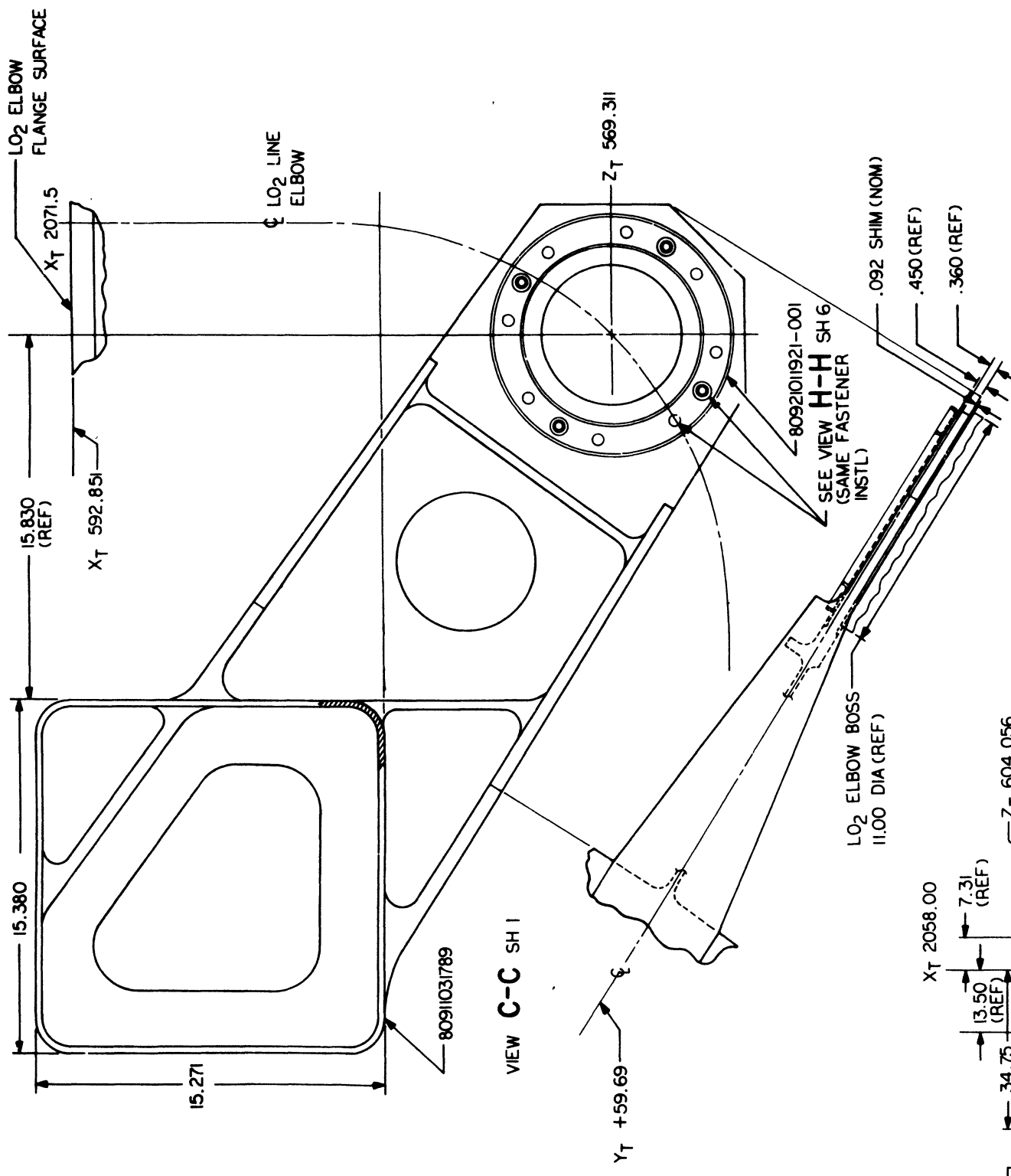
SECTION A-A SH 1
(BALL JOINT FITTING NOT SHOWN)



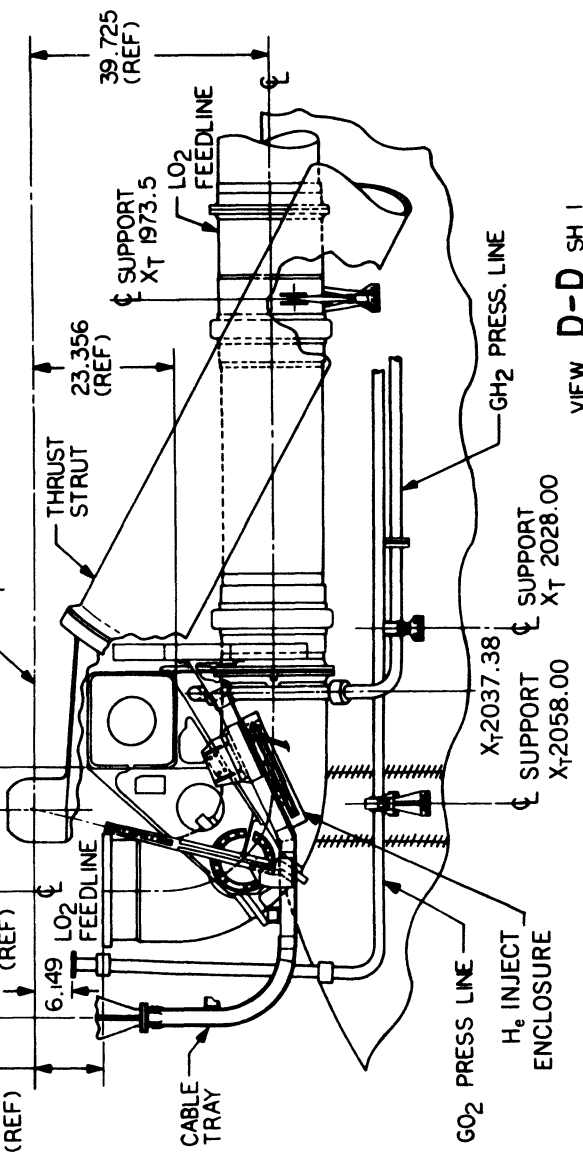
VIEW C-C SH 1



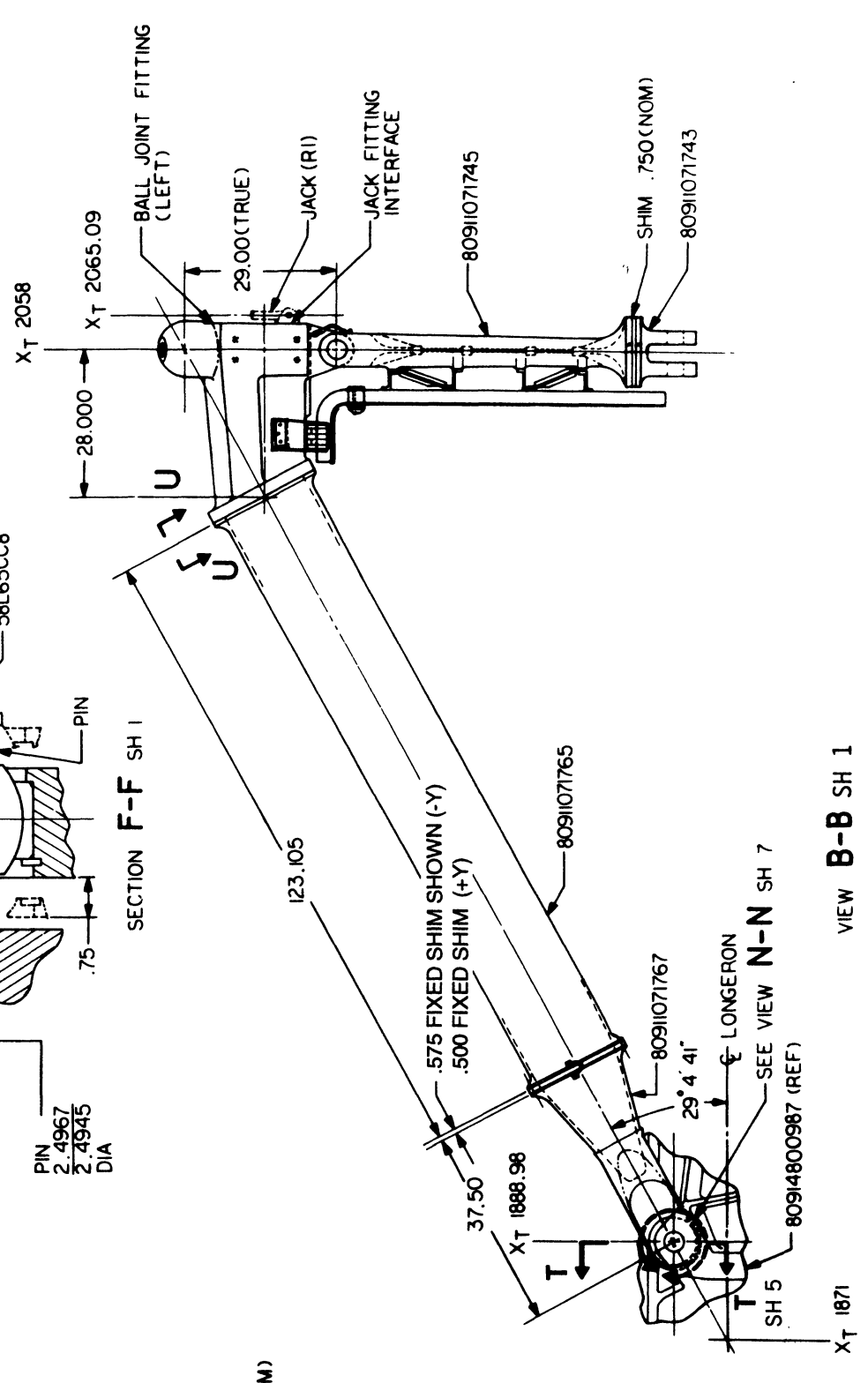
VIEW U-U



SECTION F-F SH 1

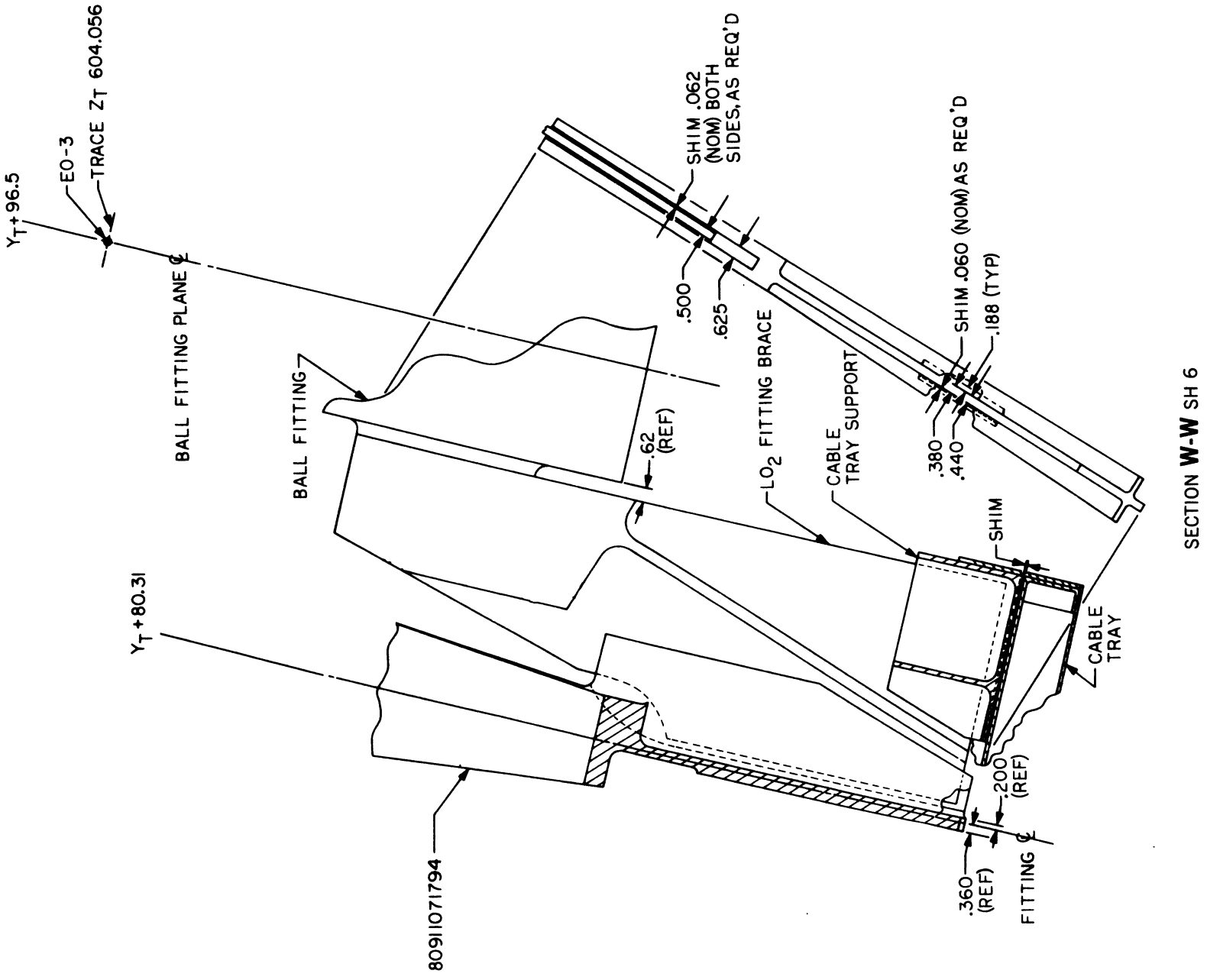


VIEW D-D SH 1

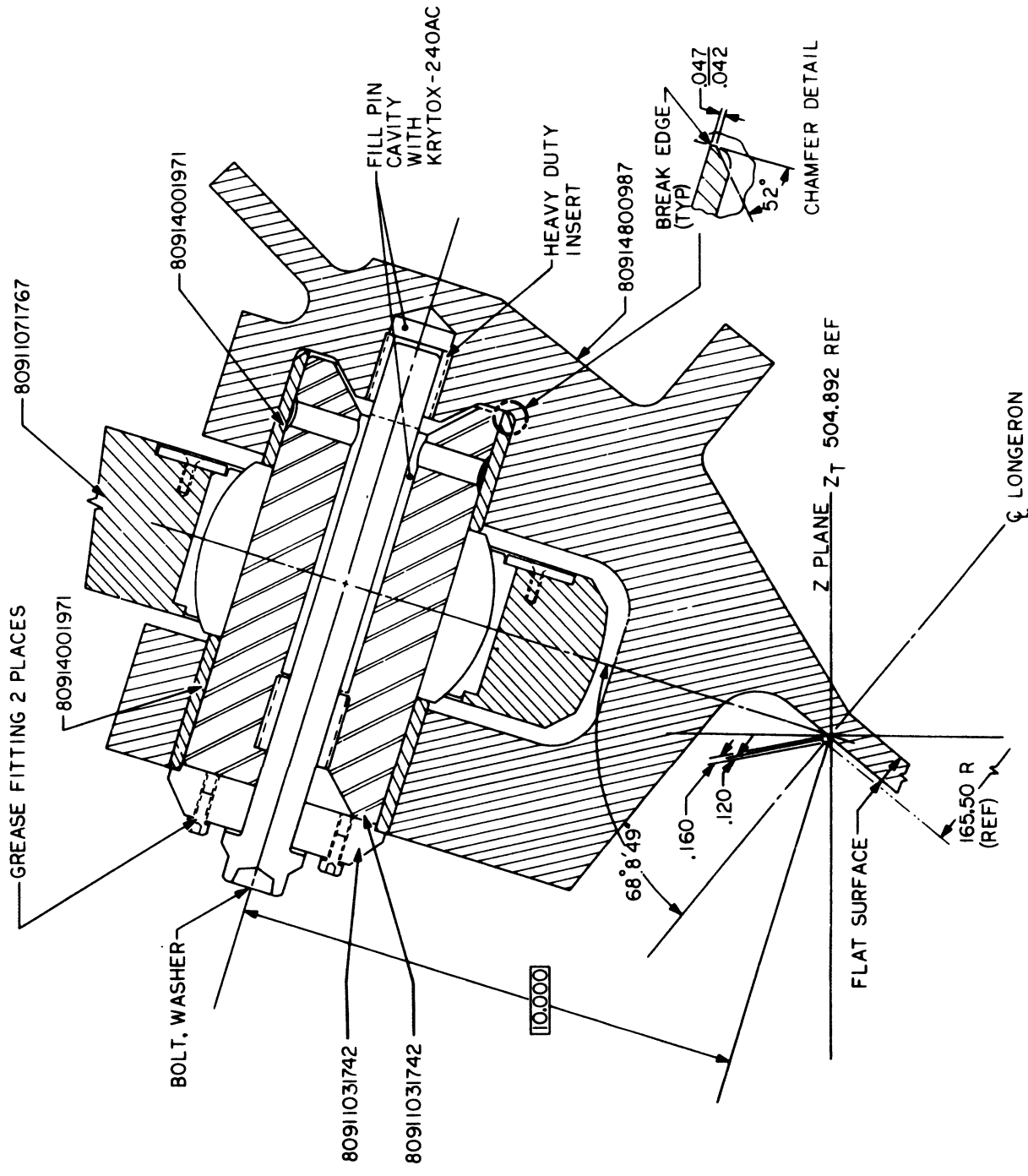


VIEW B-B SH 1

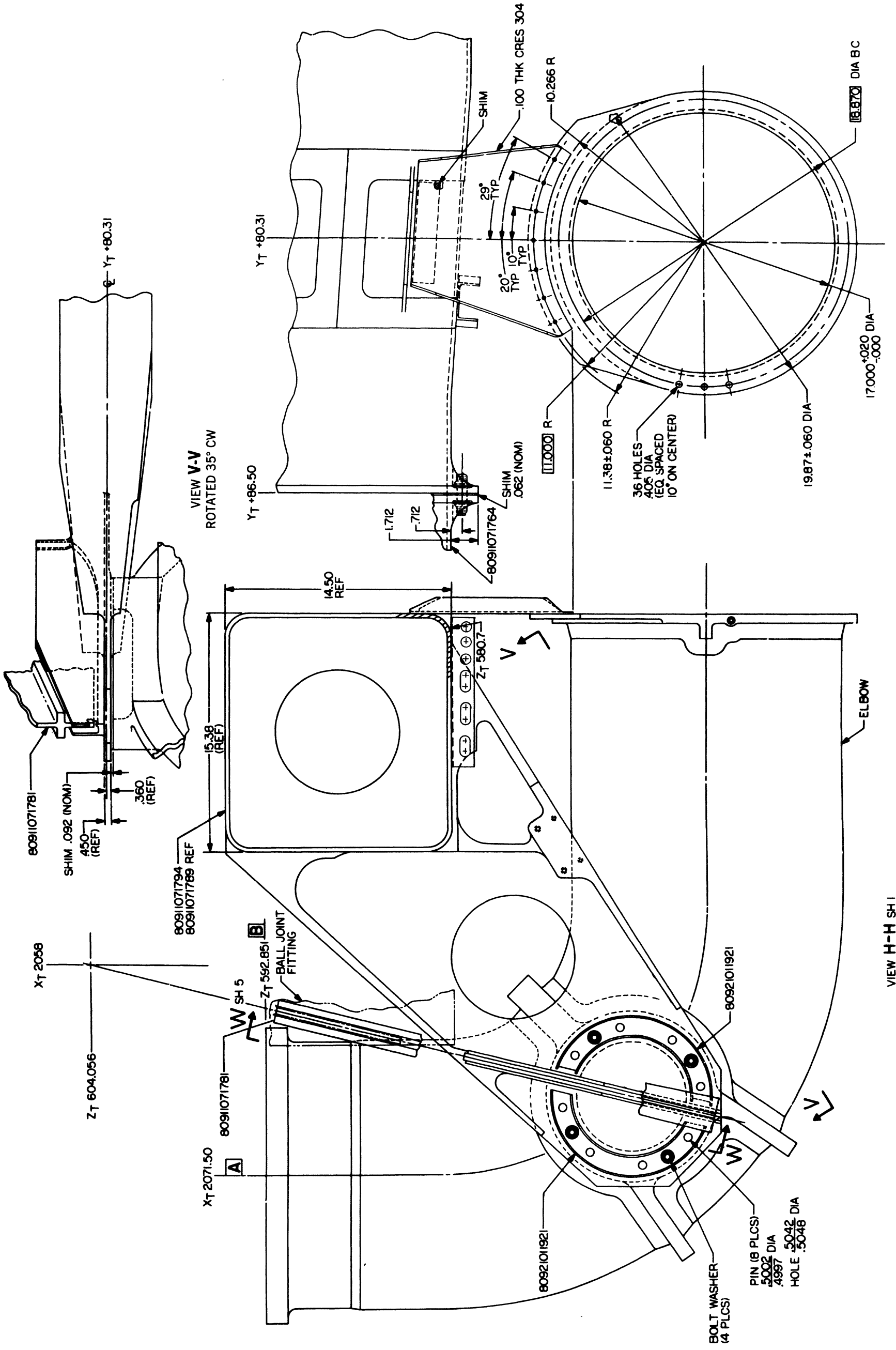
AFT ORBIT ATTACHMENTS (SHEET 4 OF 7)



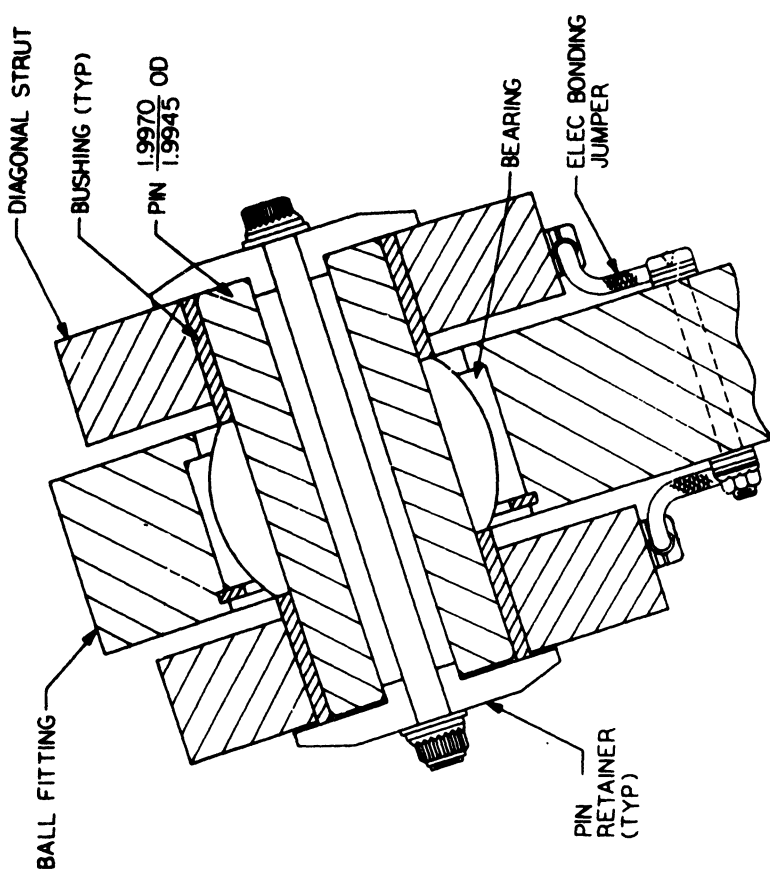
SECTION W-W SH 6



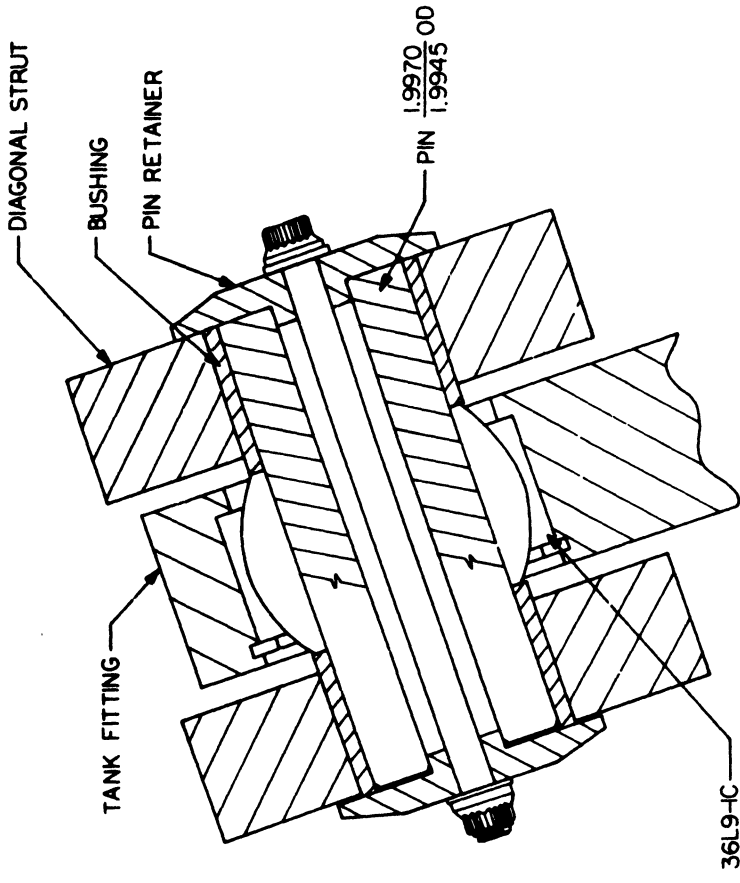
SECTION T-T SH 4



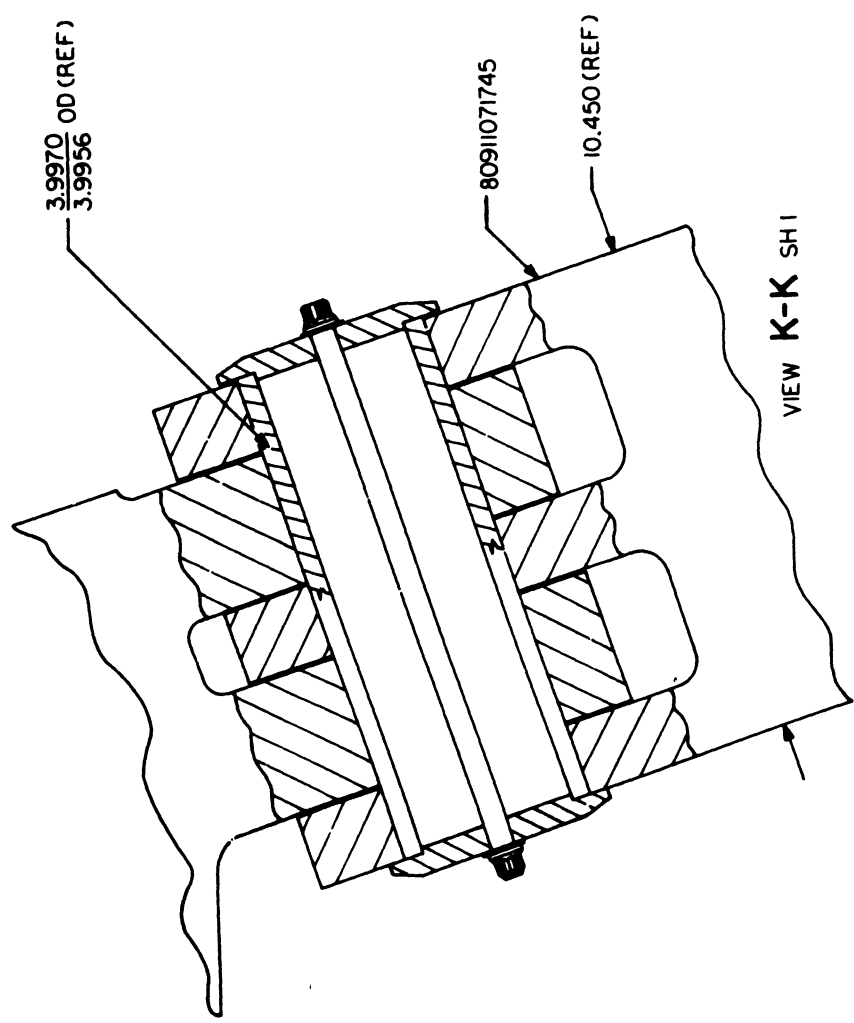
AFT ORB/ET ATTACHMENTS (SHEET 6 OF 7)



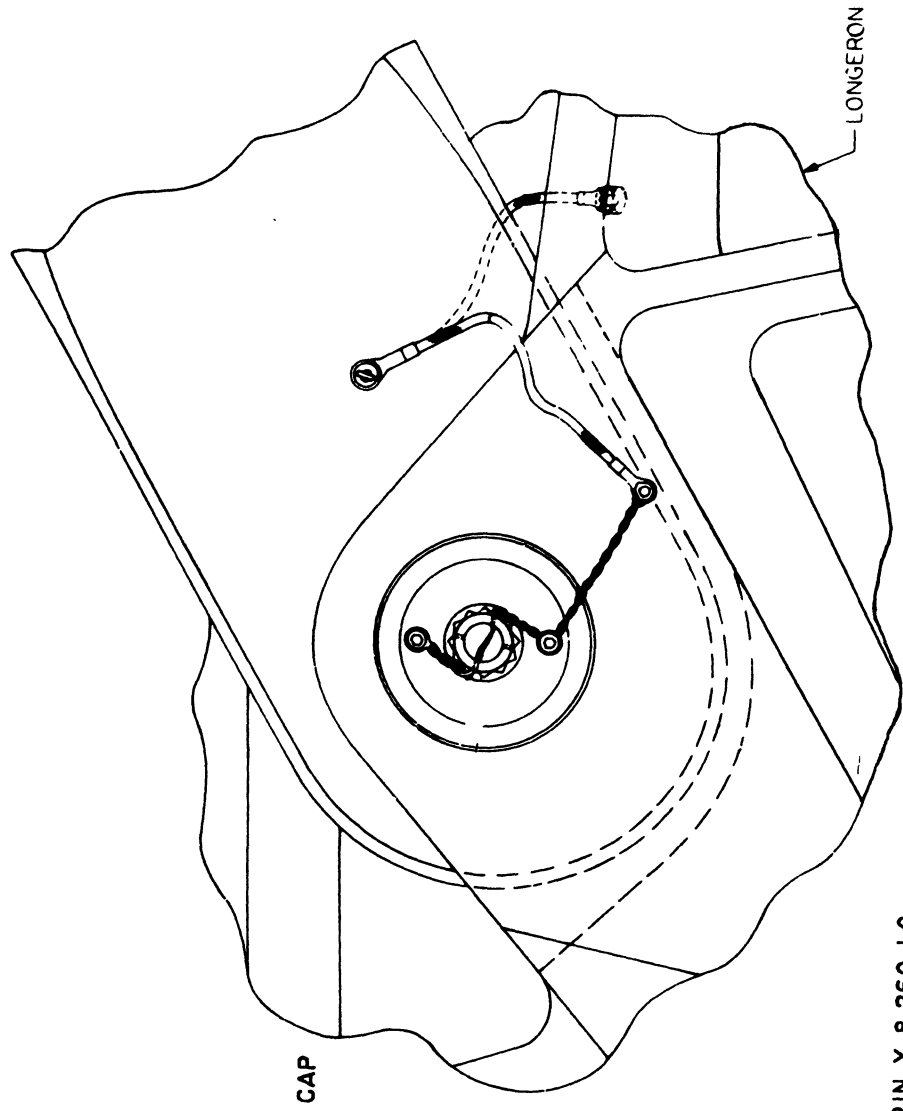
SECTION M-M SH 1



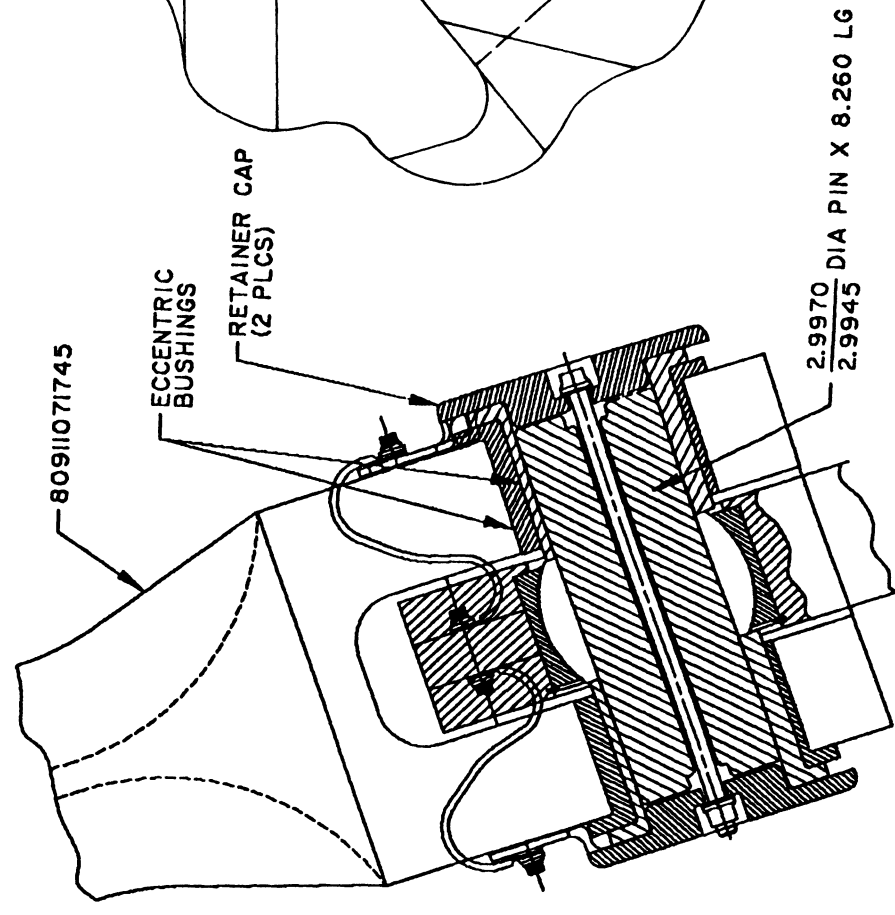
SECTION L-L SH 1



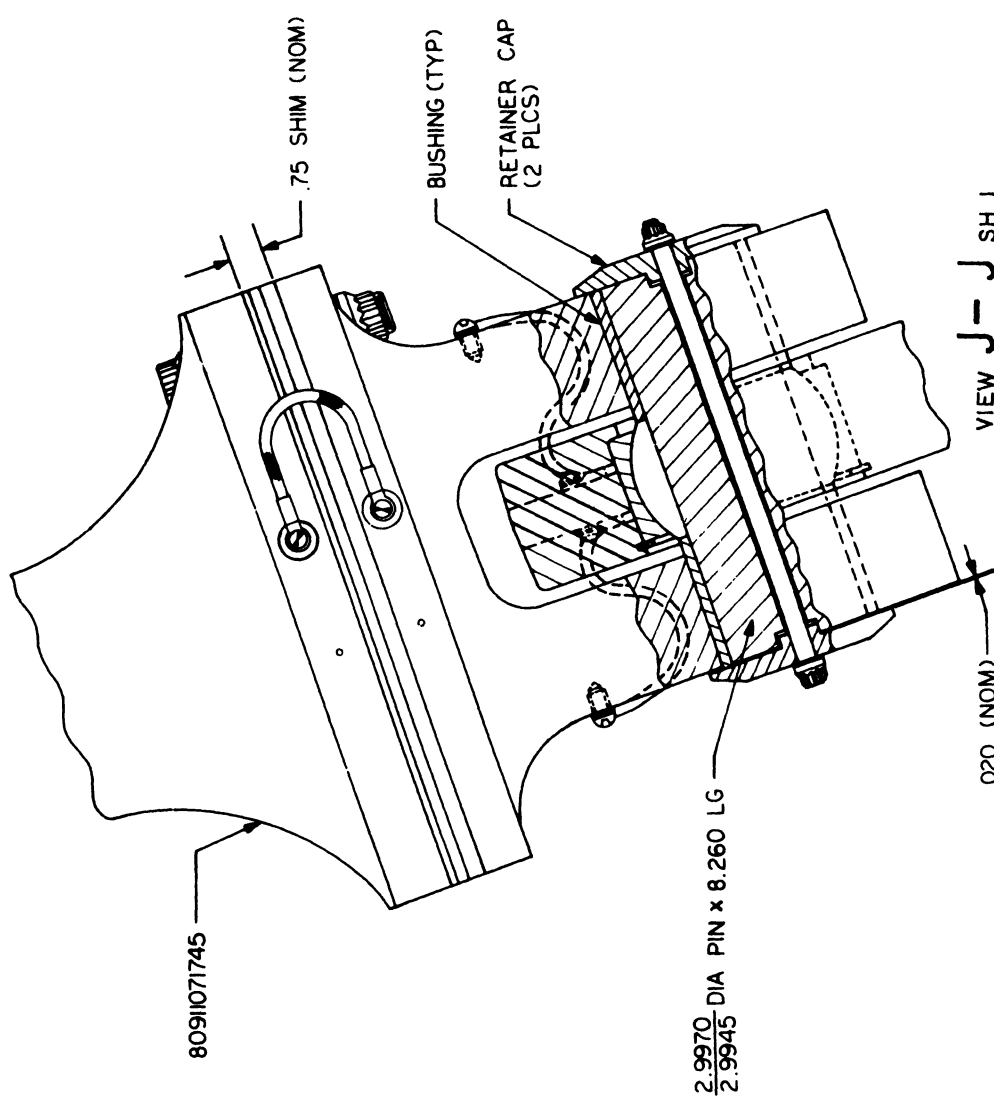
VIEW K-K SH 1



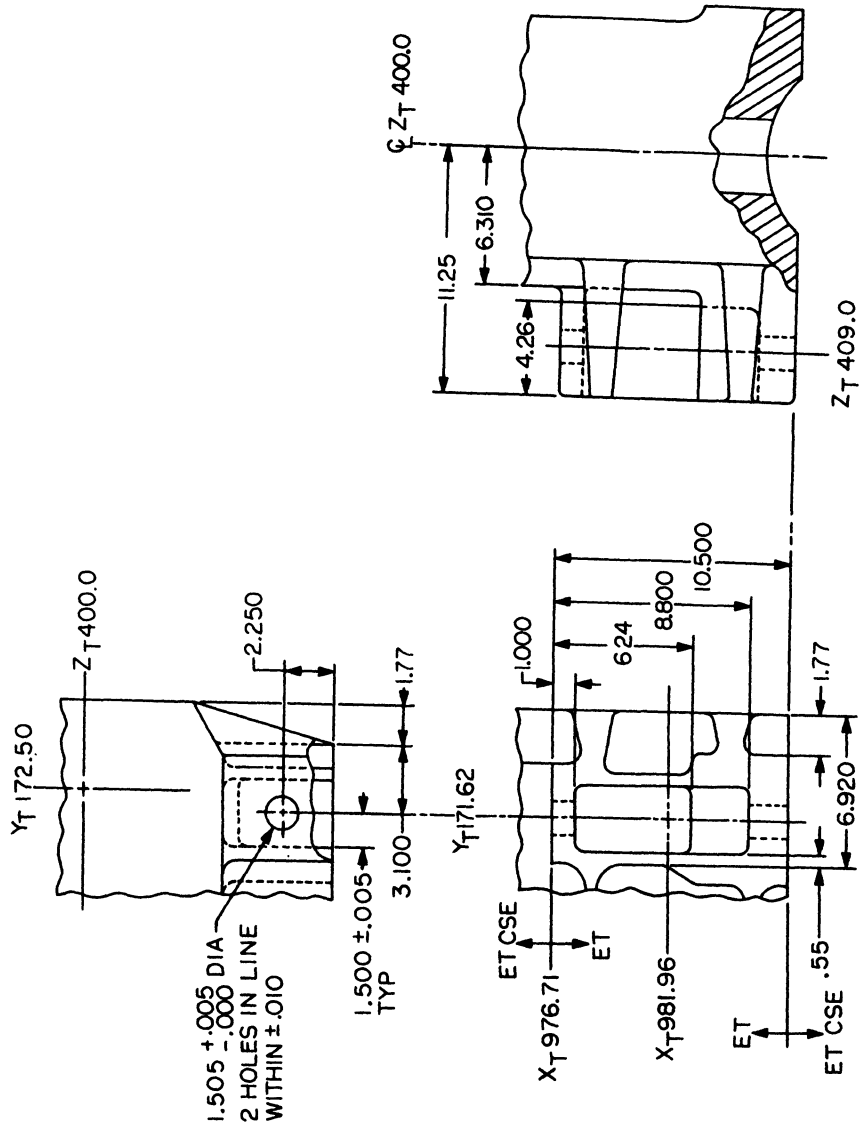
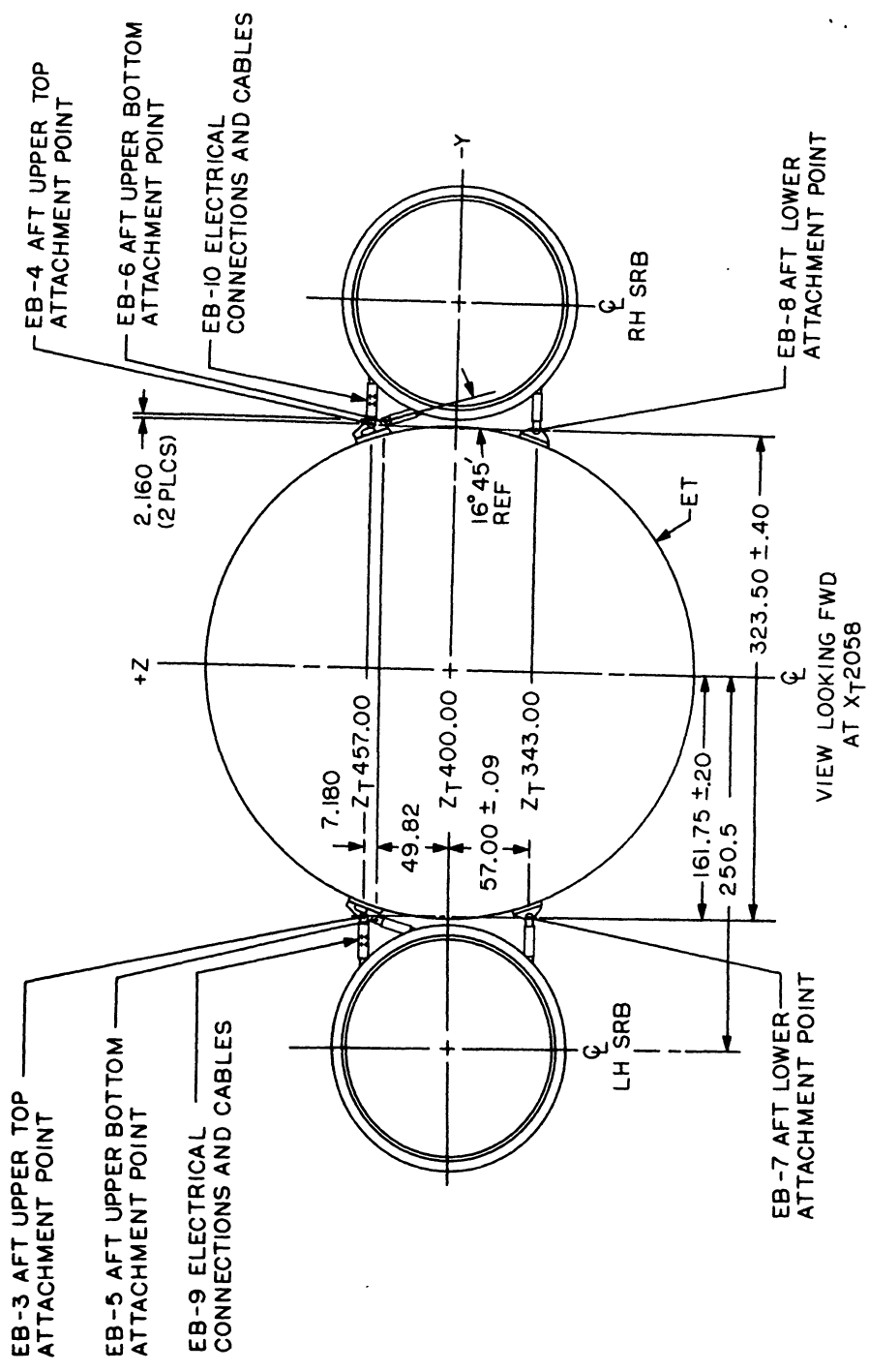
VIEW N-N SH 4



VIEW J-J SH 1

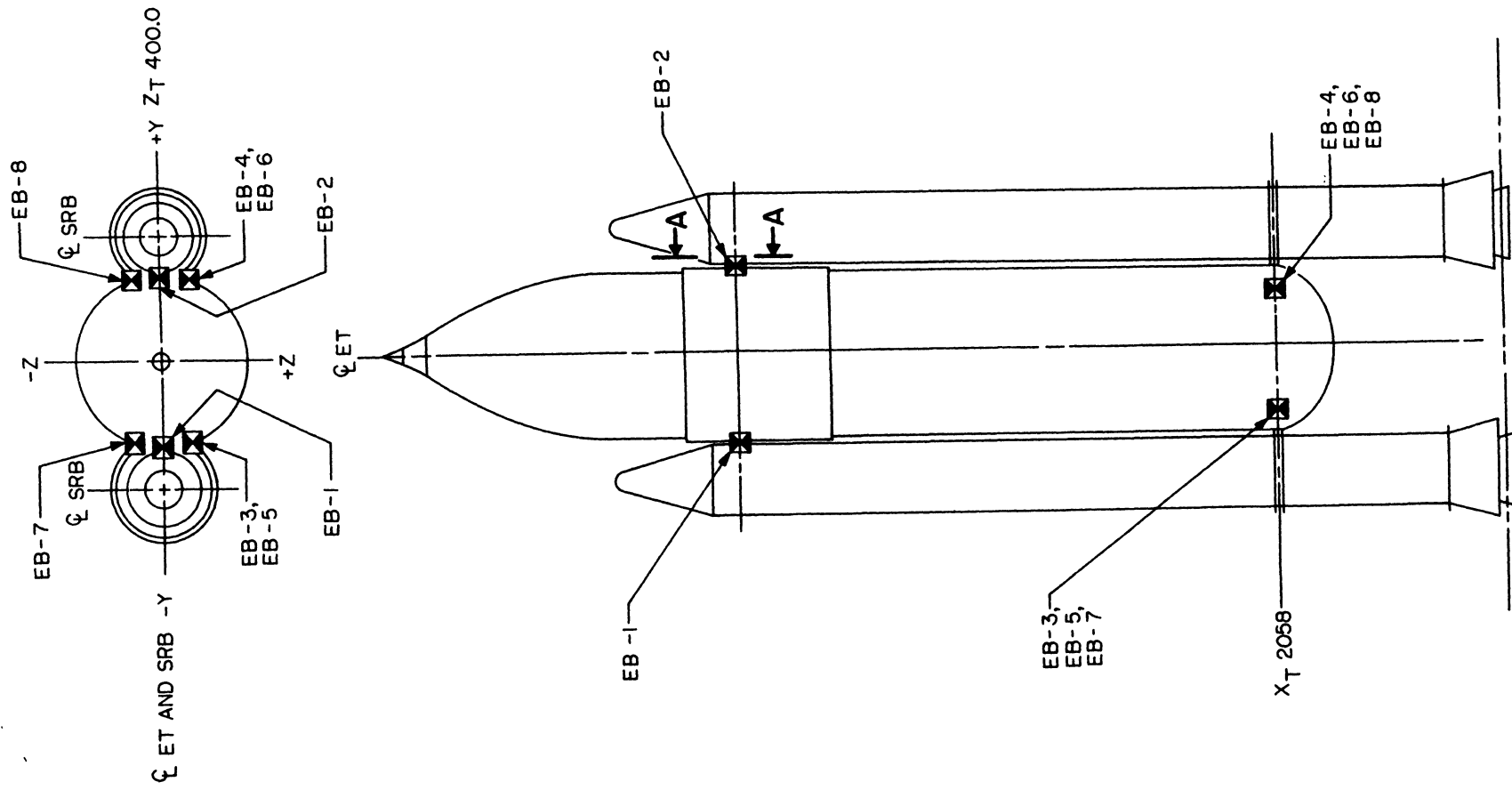


VIEW J-J SH 1



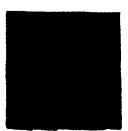
VIEW A-A TYP BOTH SIDES
 (SRB NOT SHOWN FOR CLARITY)

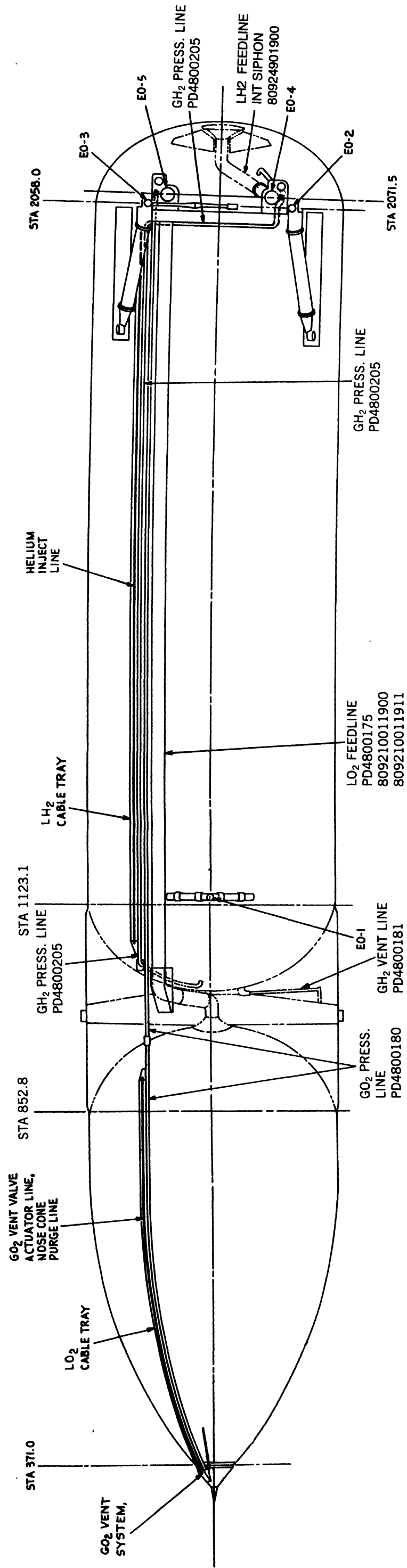
FACILITY/ET ATTACHMENT



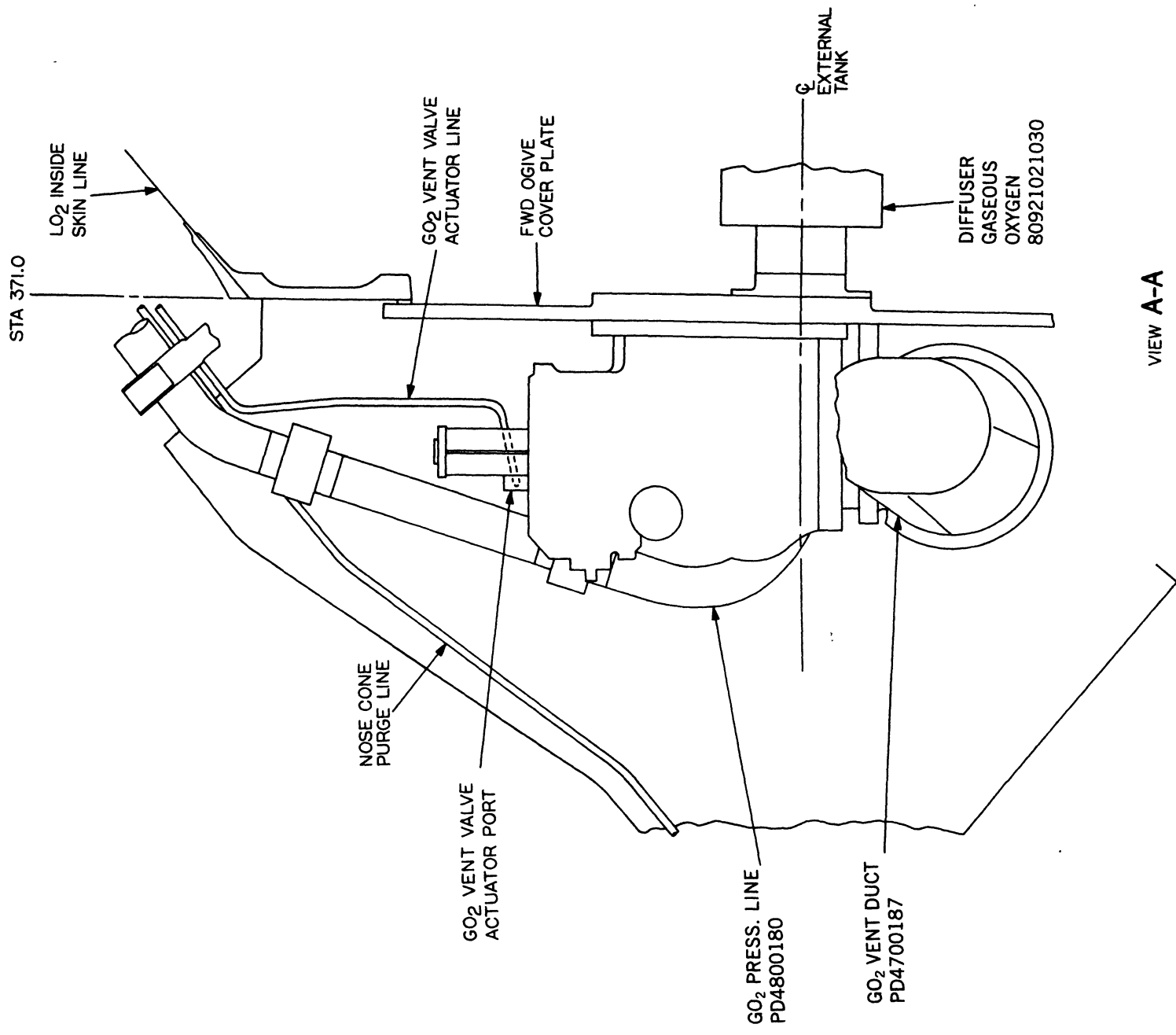
IV. PROPULSION ARRANGEMENT

CHART NO.	TITLE	PAGE
	Contents	IV-1 thru IV-6
1.	System Configuration	IV-2
2.	Nose Cone	IV-3
3.	Intertank Pneumatic Tubing	IV-4
4.	Aft LH2 and Orb/ET	IV-5
5.	LH2 Internal Feed System	IV-6

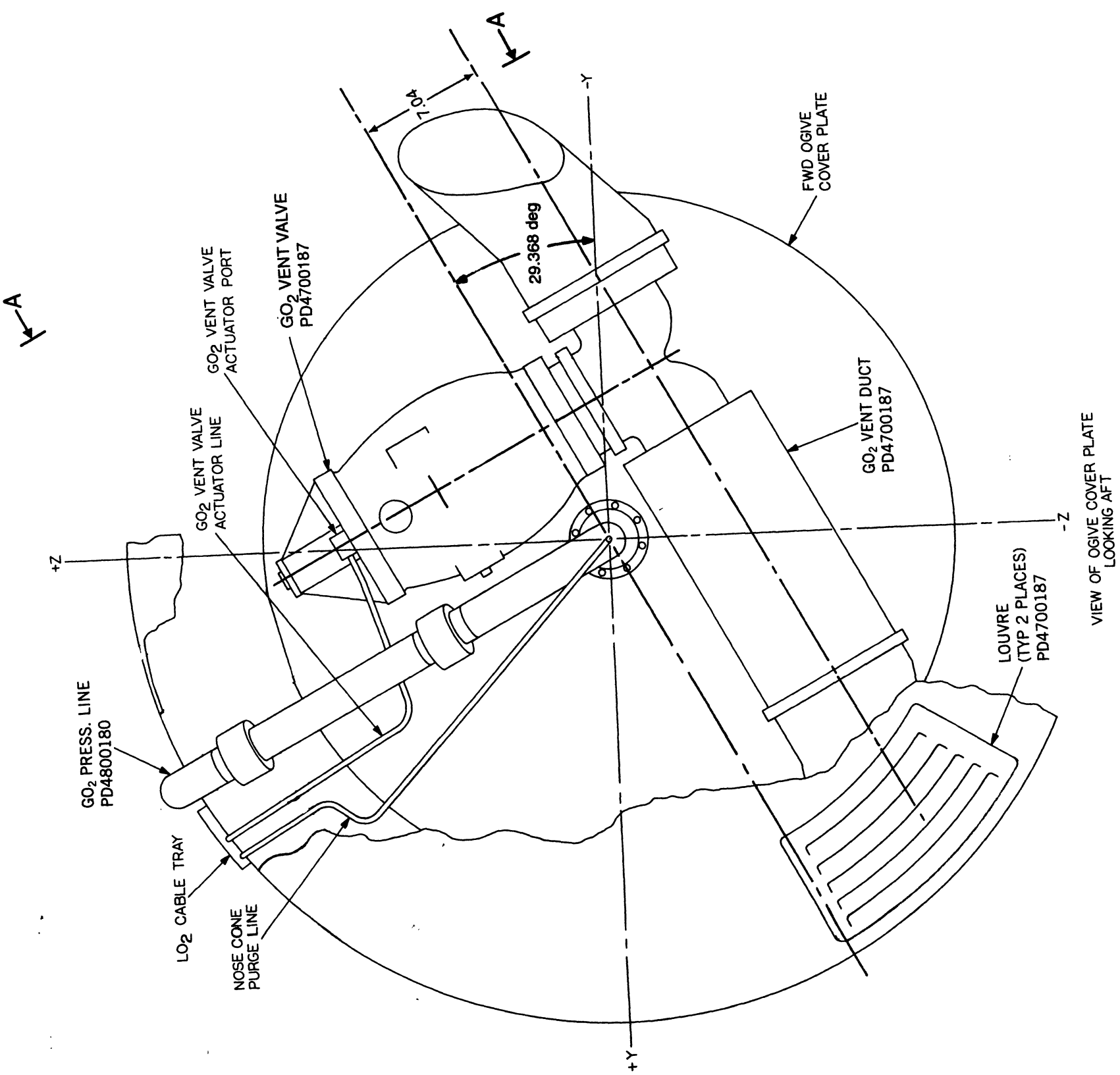




SYSTEM CONFIGURATION

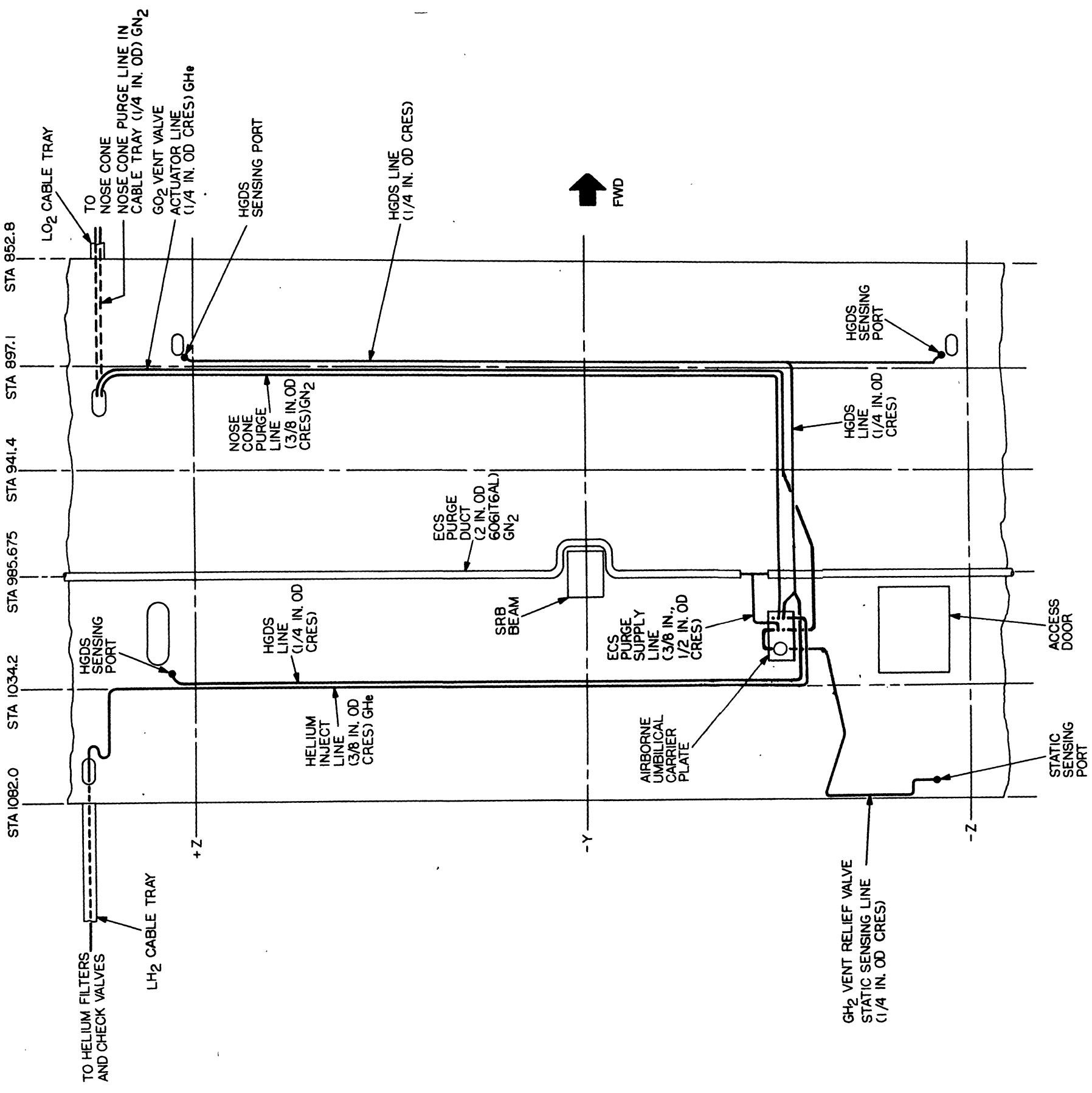


VIEW A-A

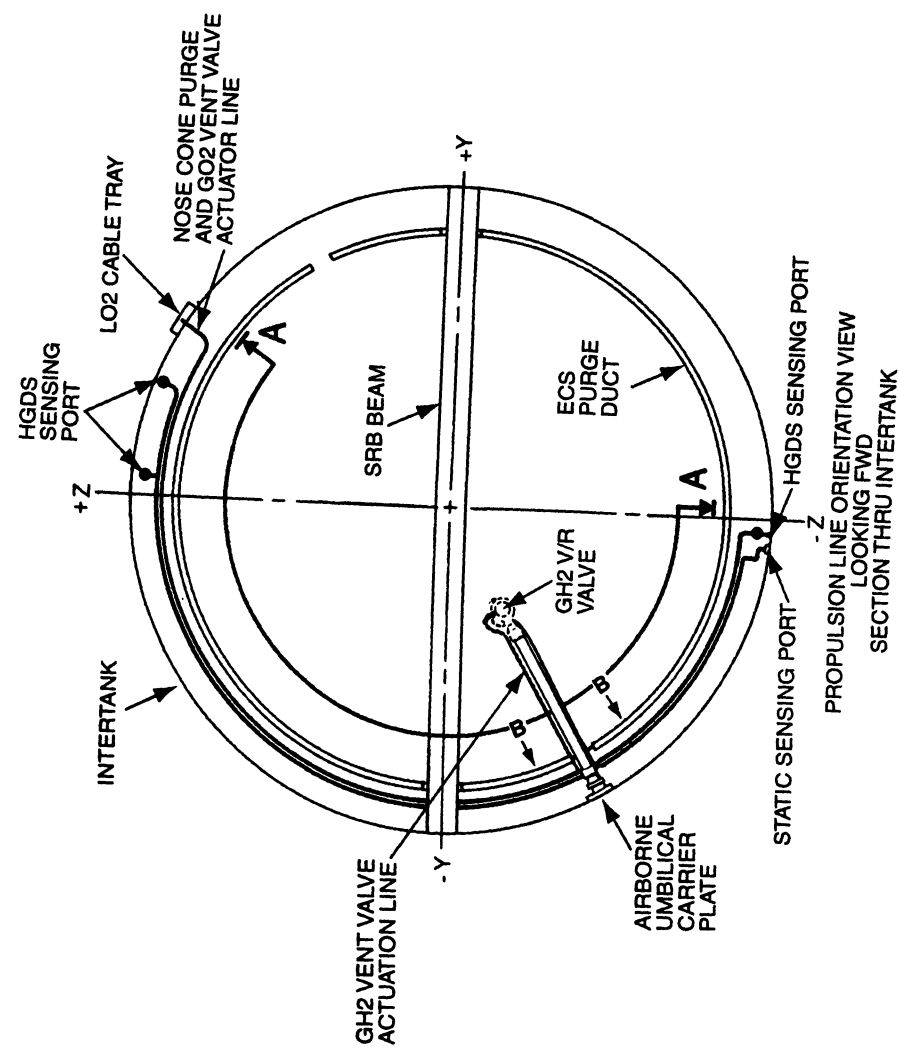


VIEW OF OGIVE COVER PLATE
LOOKING AFT

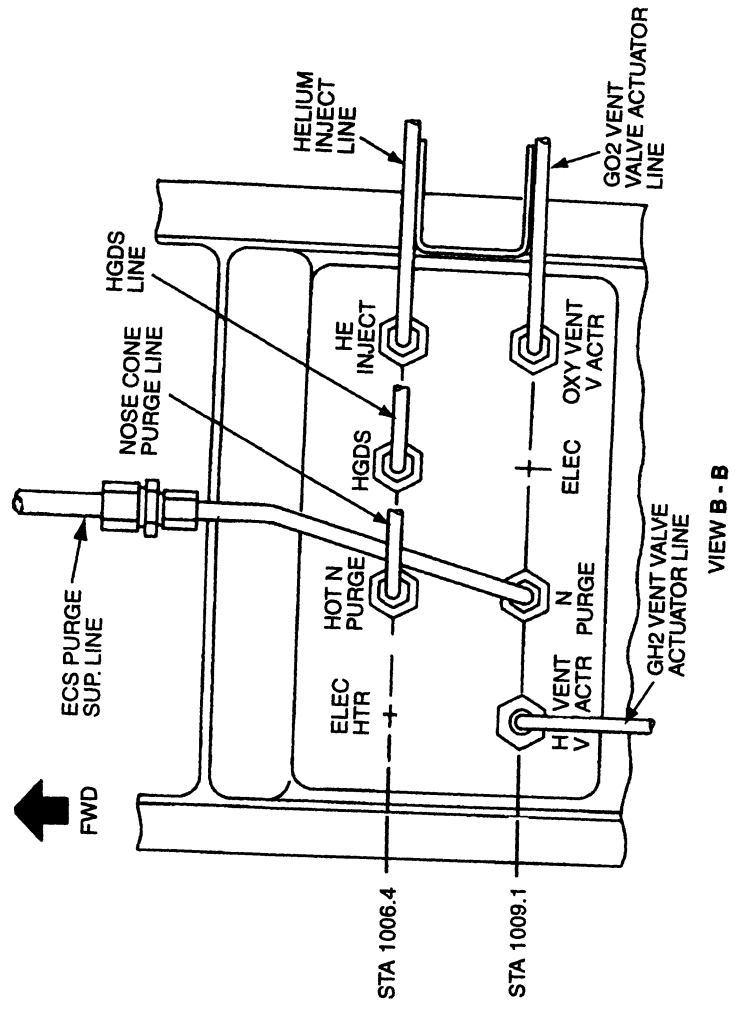
NOSE CONE



VIEW A-A

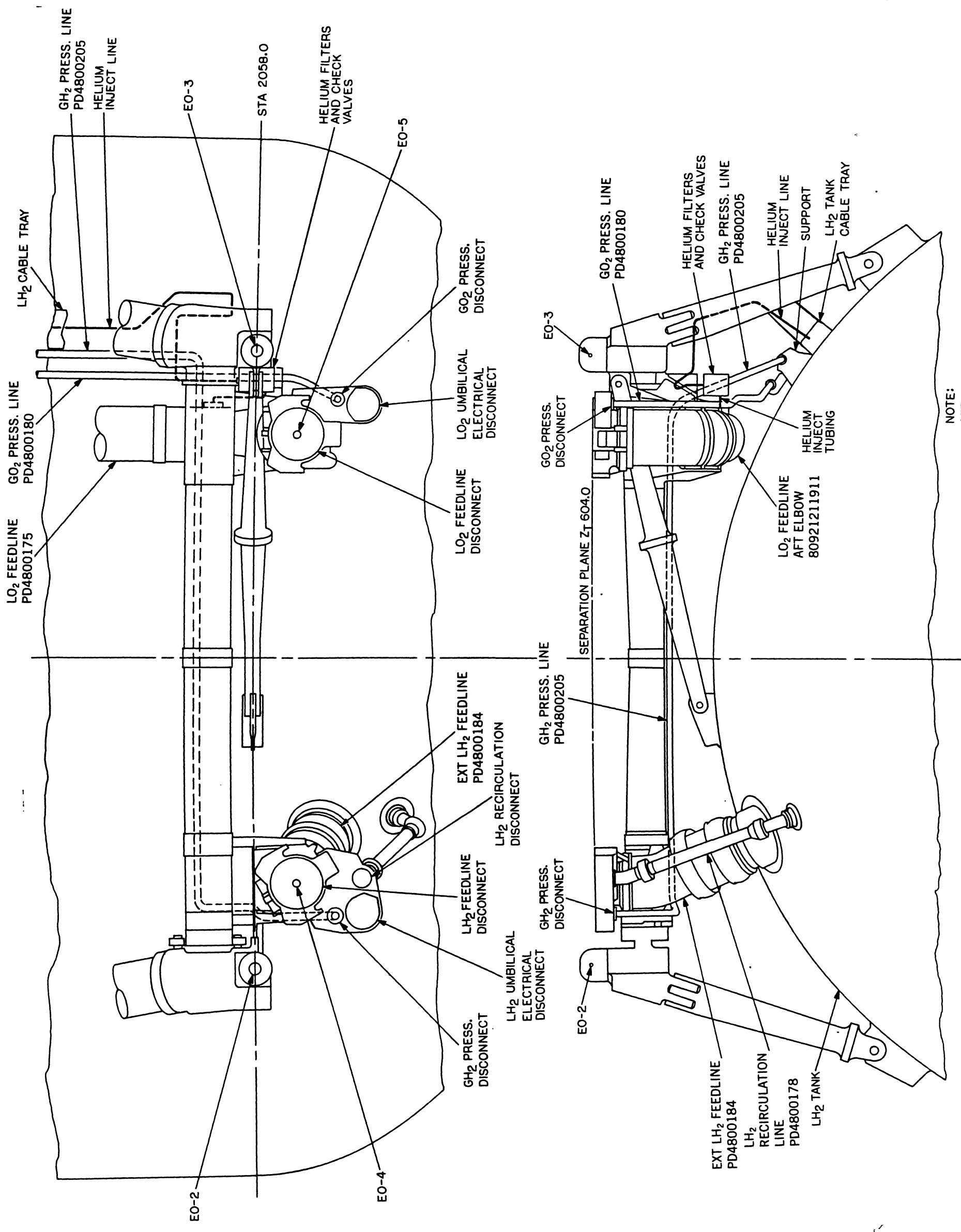


PROPULSION LINE ORIENTATION VIEW
LOOKING FWD
SECTION THRU INTERTANK



VIEW B - B

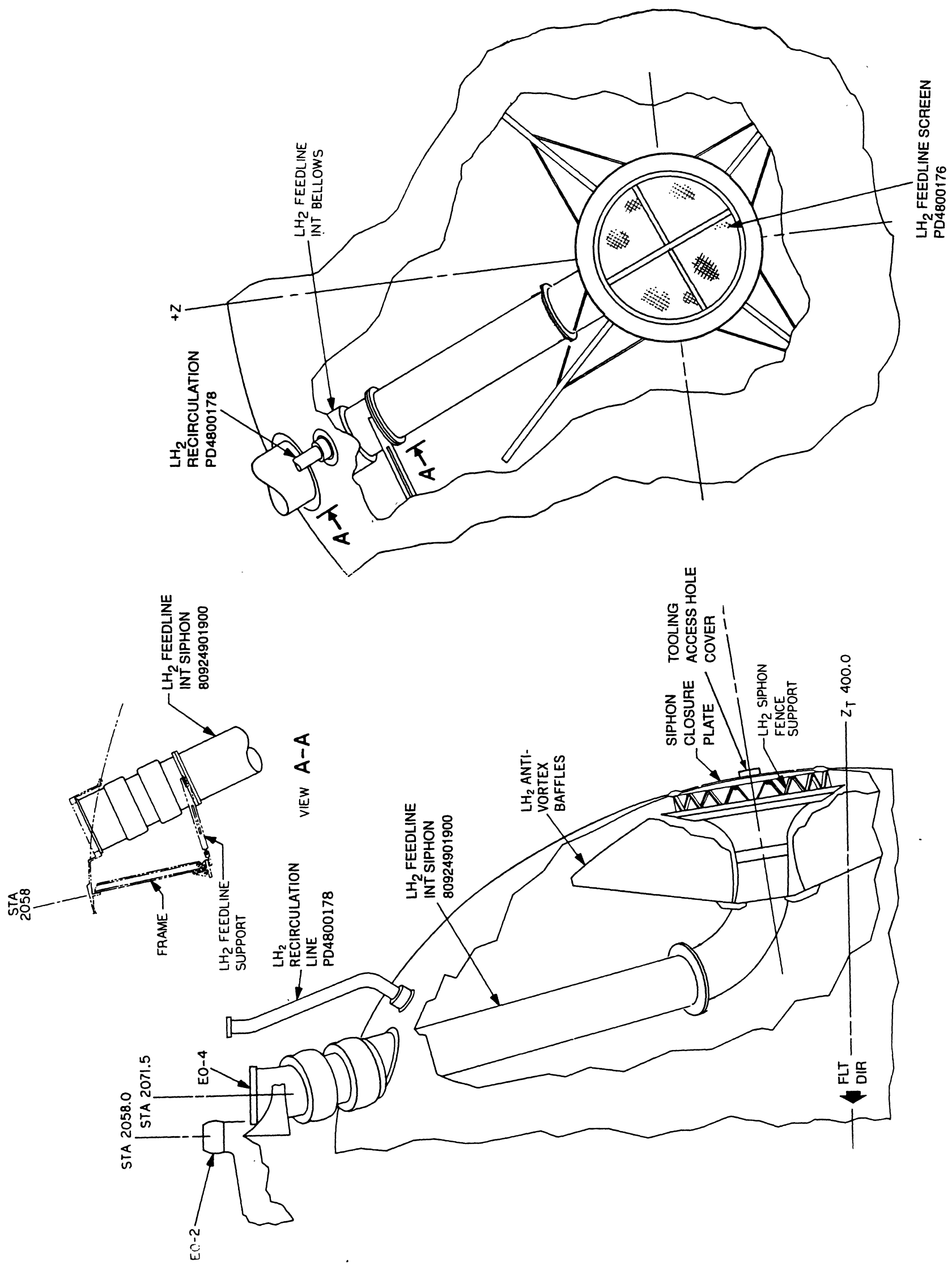
INTERTANK PNEUMATIC TUBING



VIEW LOOKING FWD

NOTE:
AFT CABLE TRAYS NOT SHOWN FOR CLARITY.

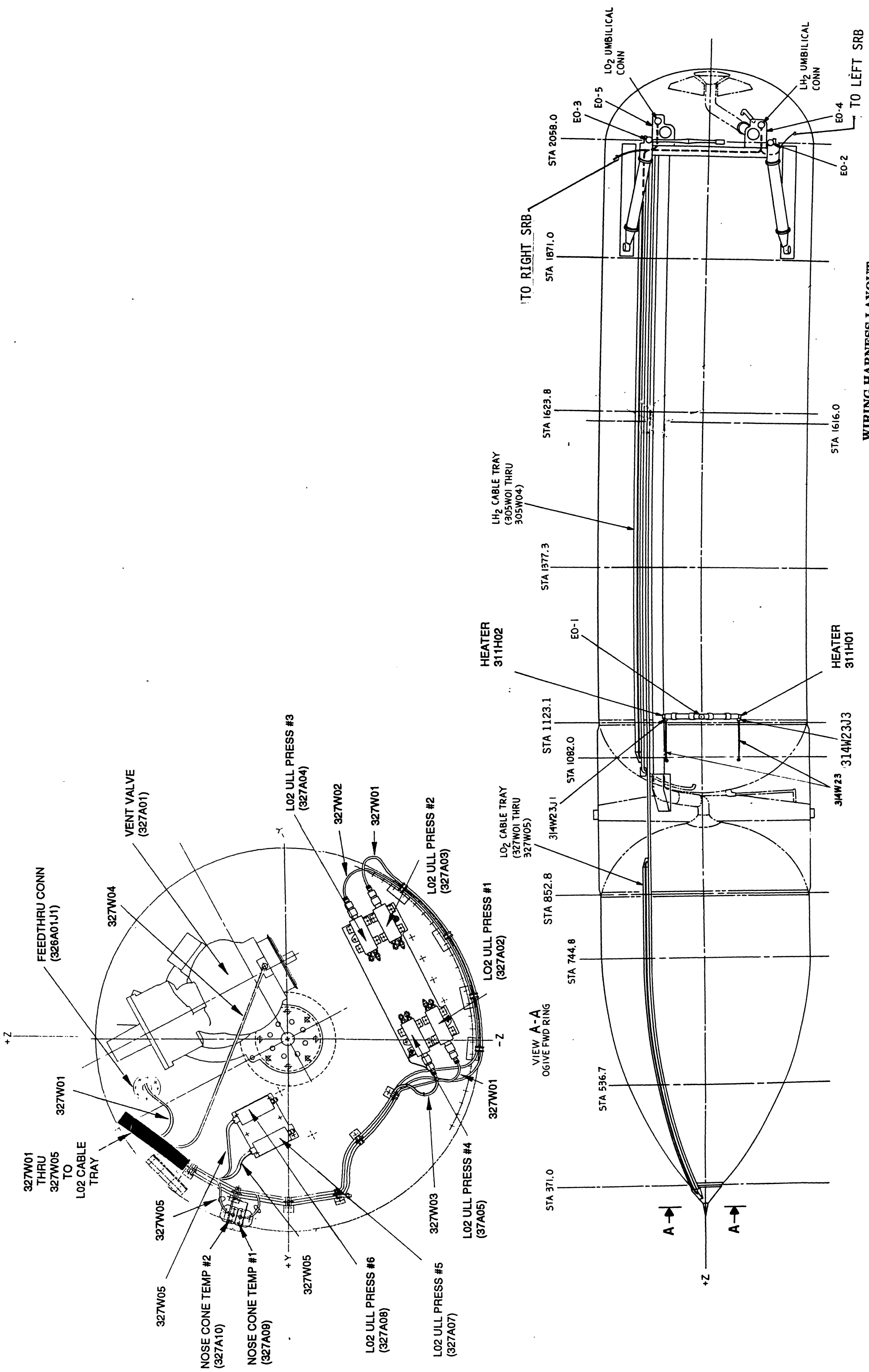
AFT LH₂ AND O₂ ORB/ET



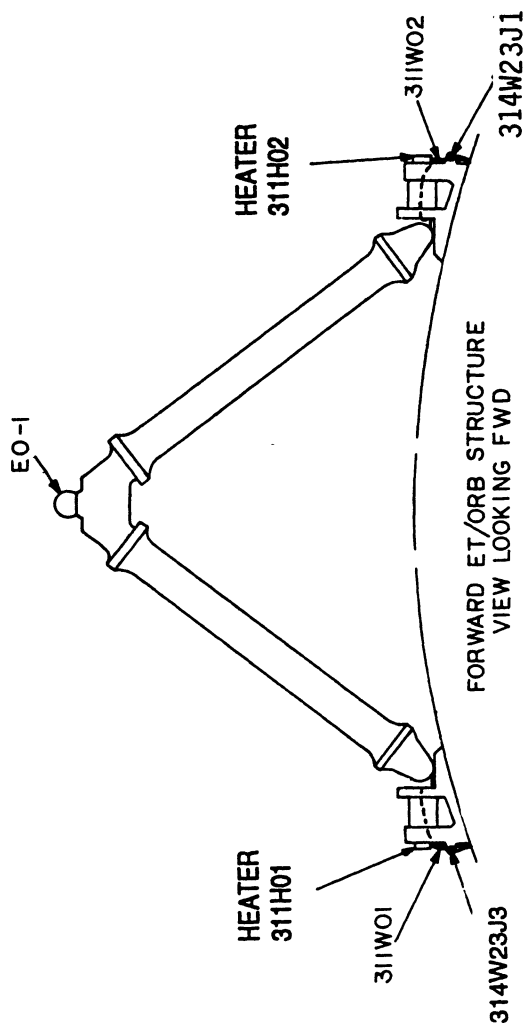
LH₂ INTERNAL FEED SYSTEM

V. ELECTRICAL ARRANGEMENT

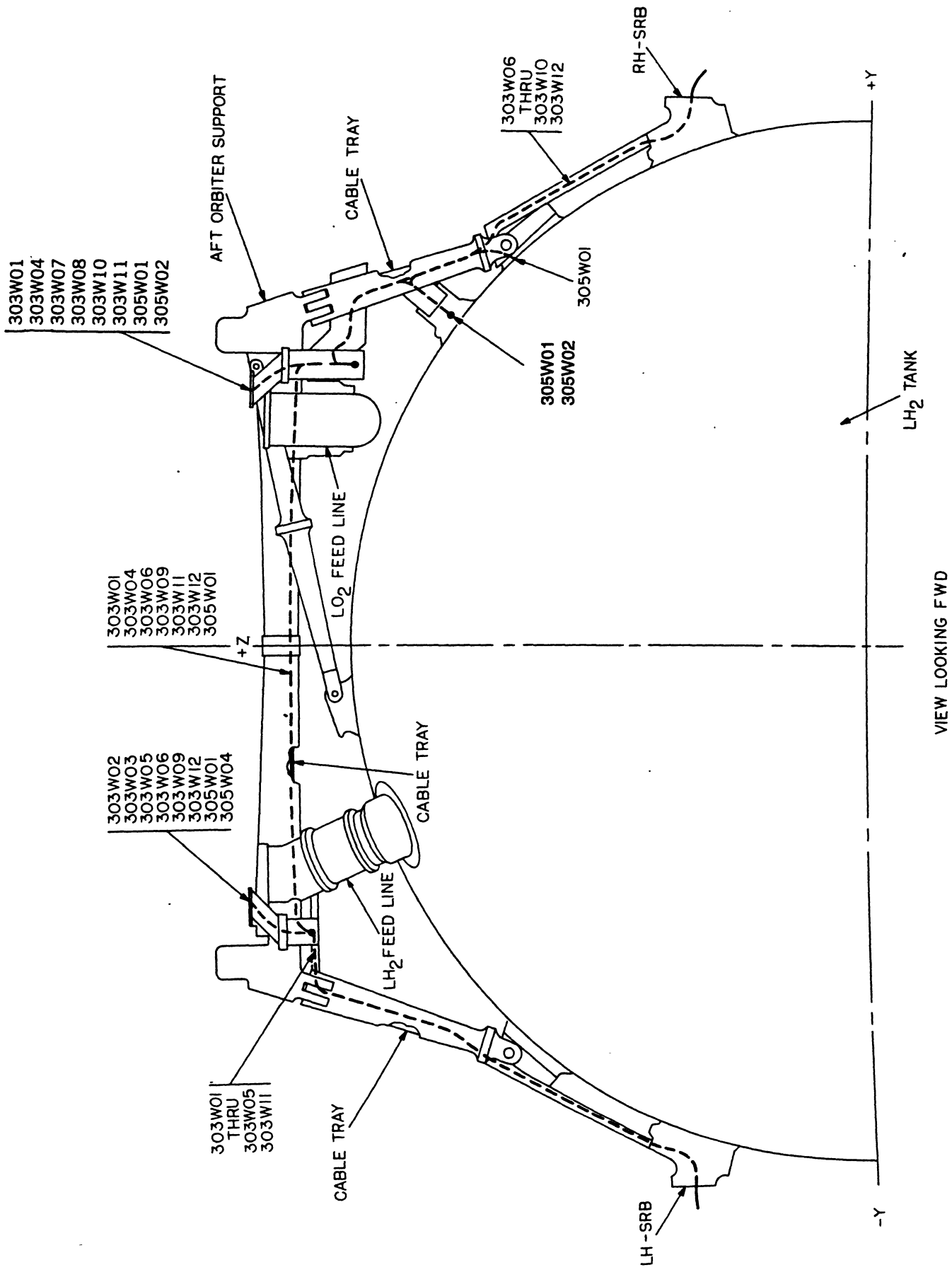
CHART NO.	TITLE	PAGE
	Contents	V-1 thru V-8
1.	Wiring Harness Layout	V-2
2.	Fwd Orb/ET Attachments and Ice/Frost Heaters	V-3
3.	OI Final and SRB Cables	V-4
4.	LO2 Tank - Internal	V-5
5.	Intertank - Internal	V-6
6.	Intertank Internal Sensors and Wiring Harness	V-7
7.	LH2 Tank - Internal	V-8



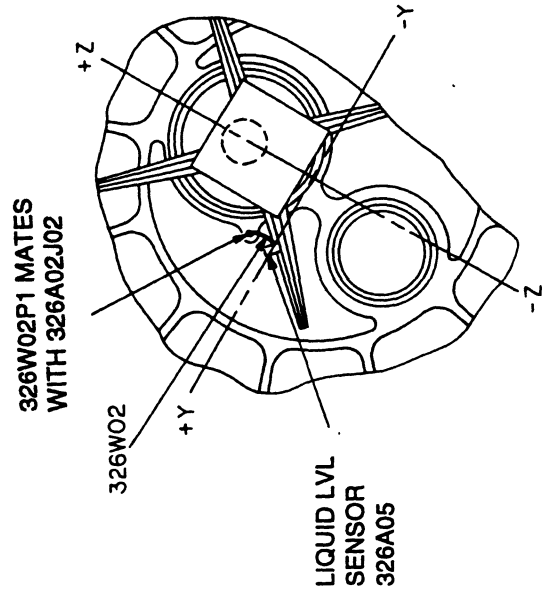
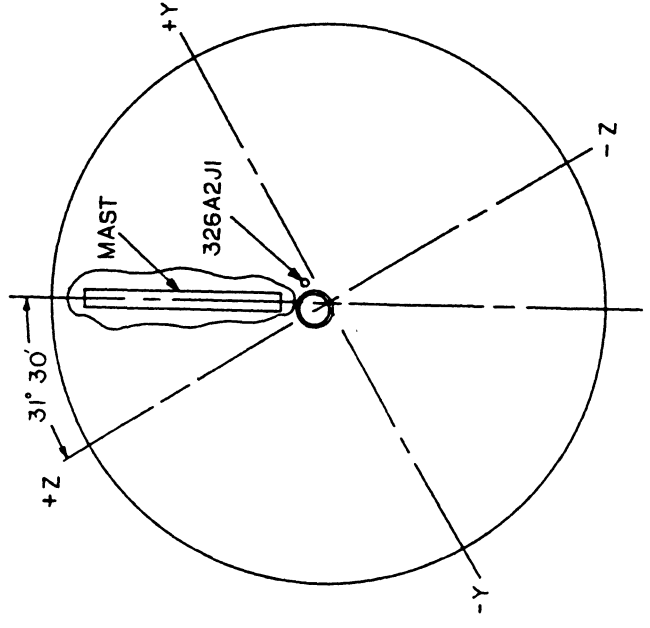
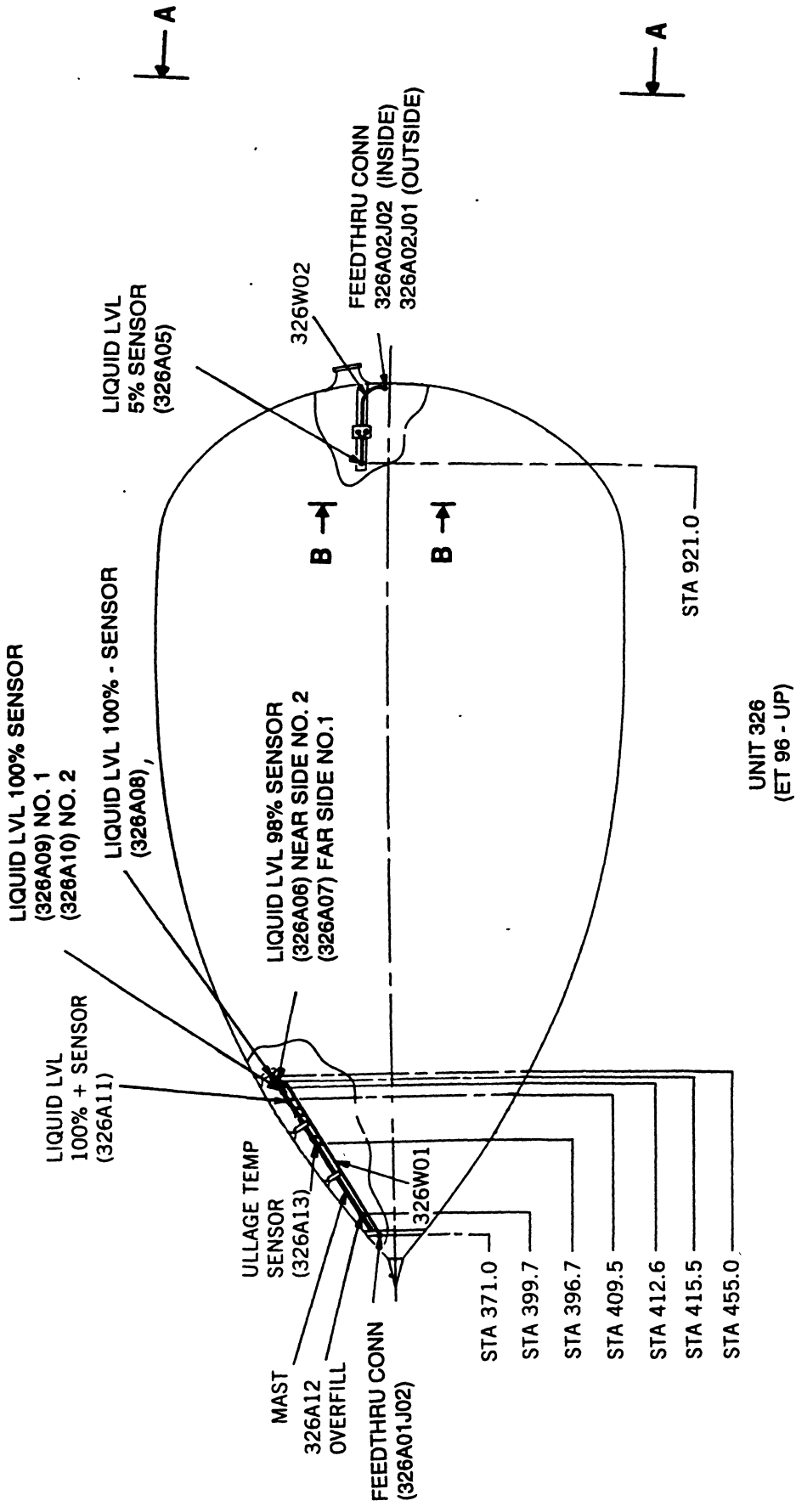
WIRING HARNESS LAYOUT



FWD ORB/ET ATTACHMENT AND ICE/FROST HEATERS



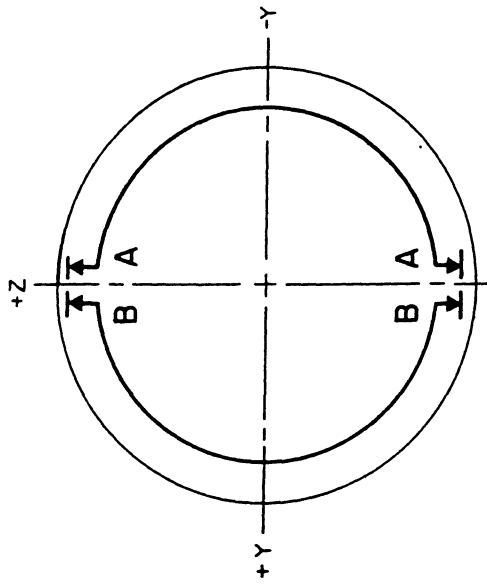
OI FINAL AND SRB CABLES



VIEW B-B

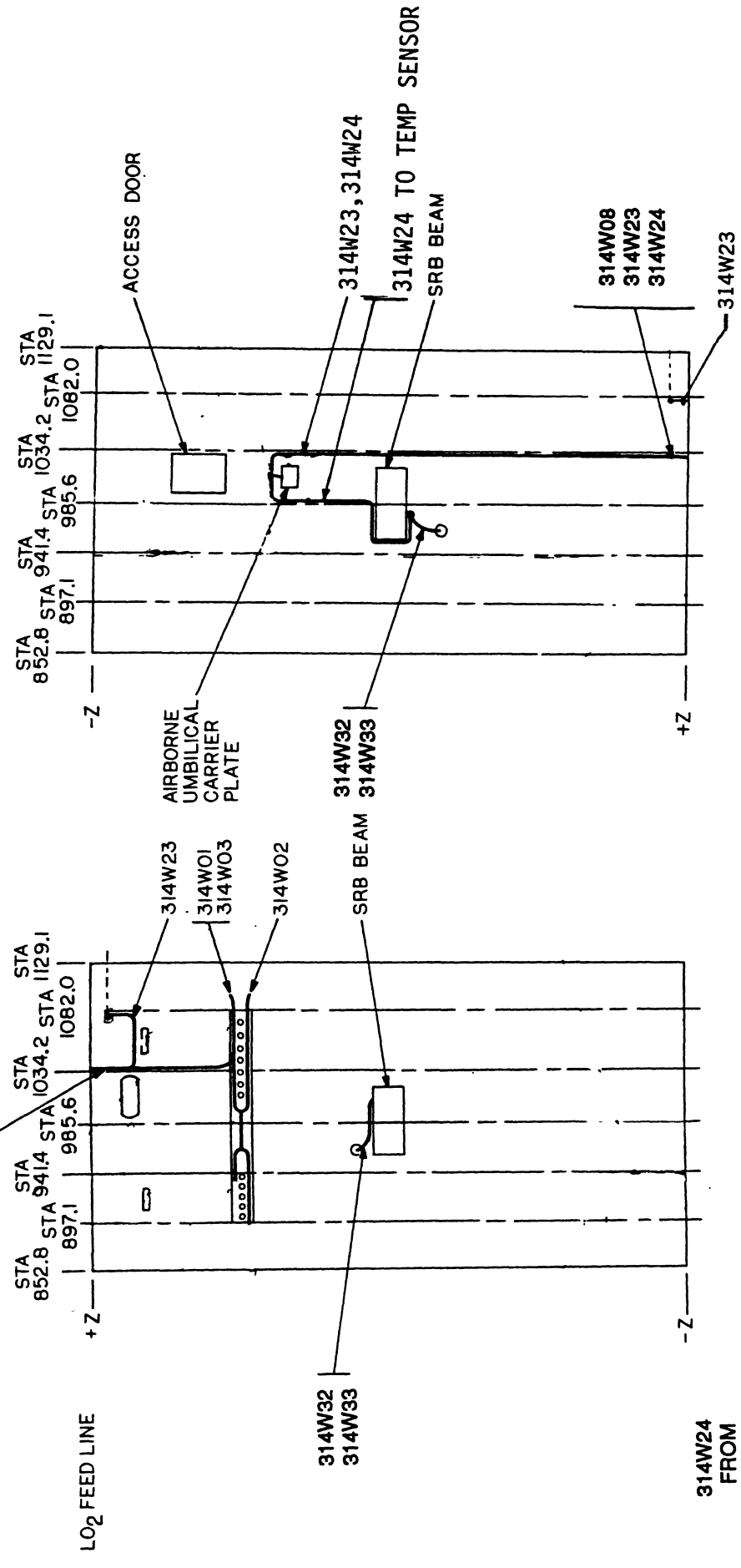
VIEW A-A

LO₂ TANK - INTERNAL



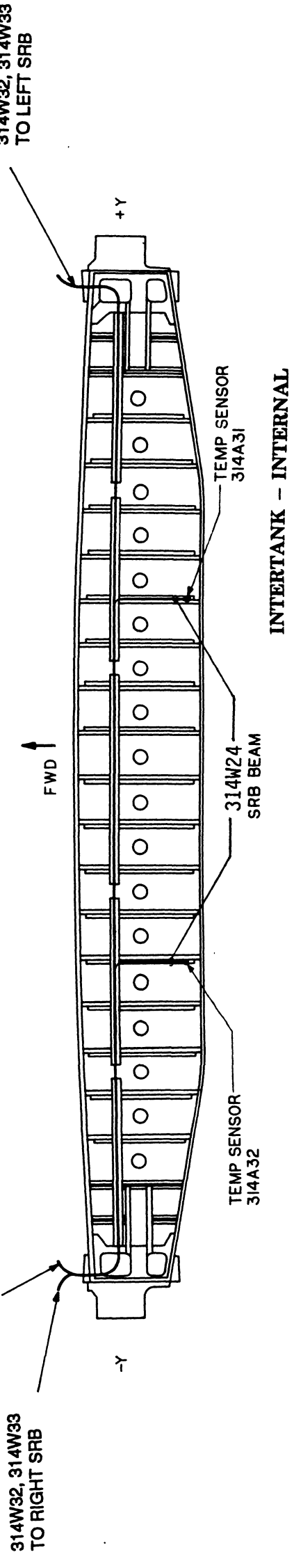
ORIENTATION VIEW
LOOKING AFT

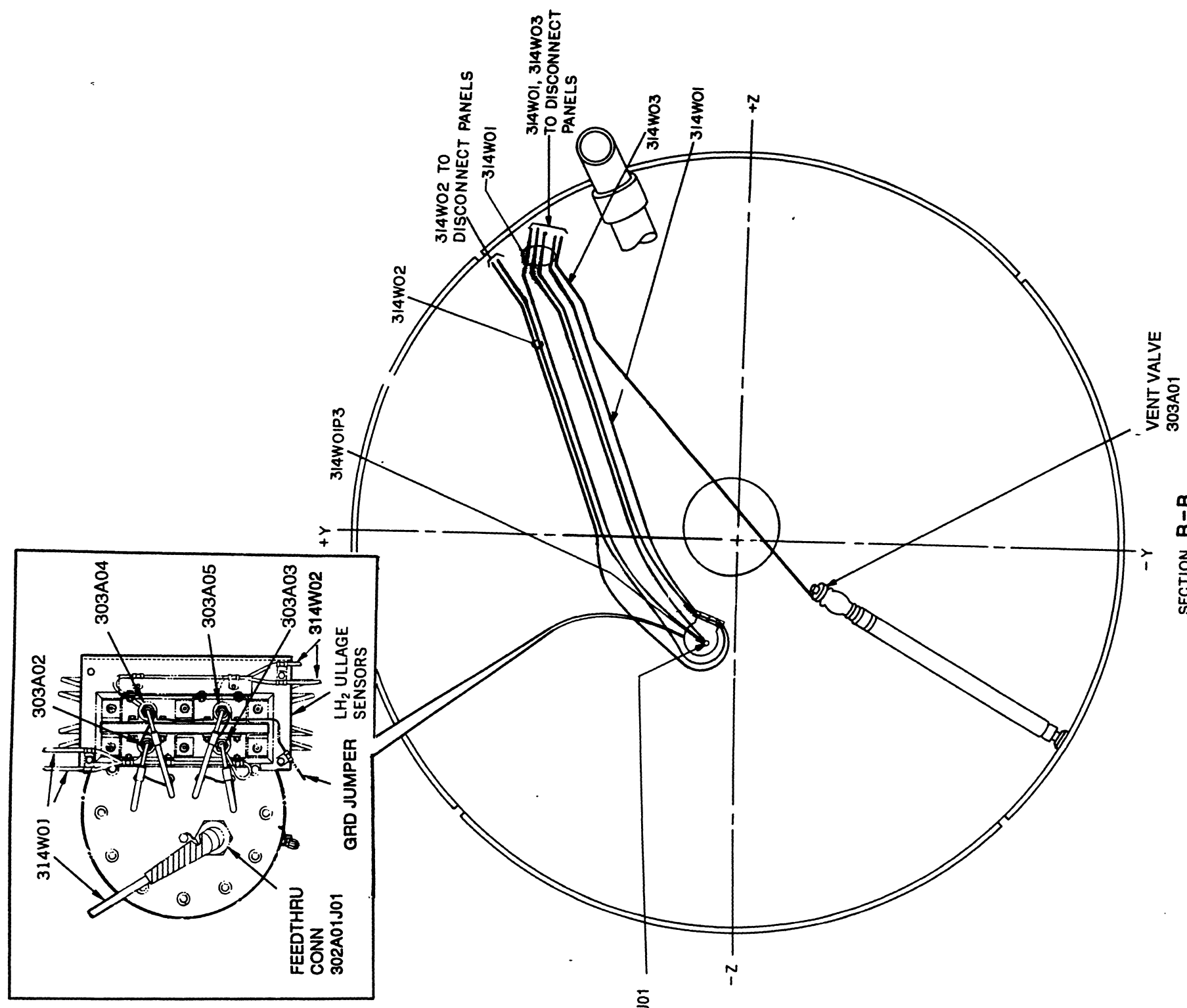
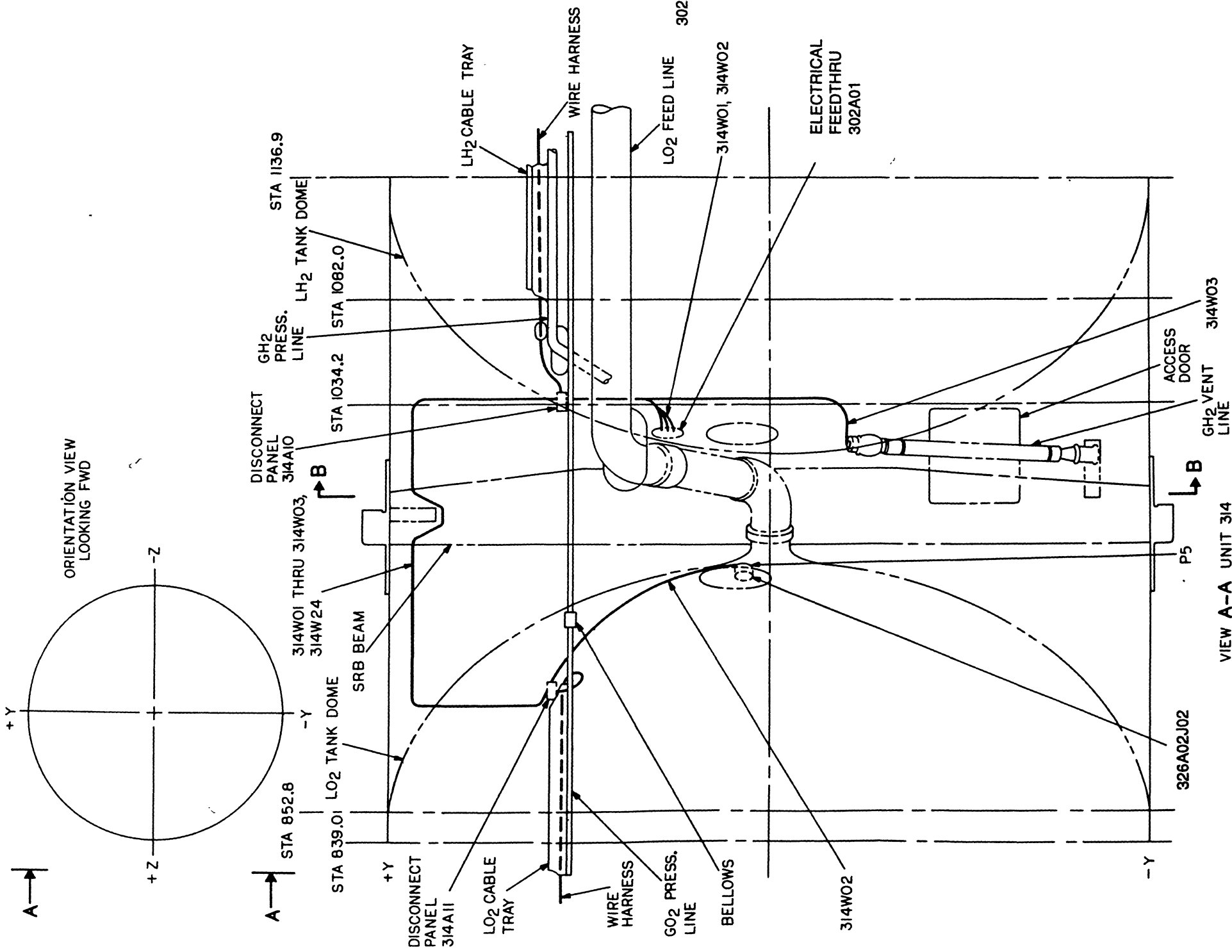
314W23
314W24



VIEW A-A
ROTATED 180°

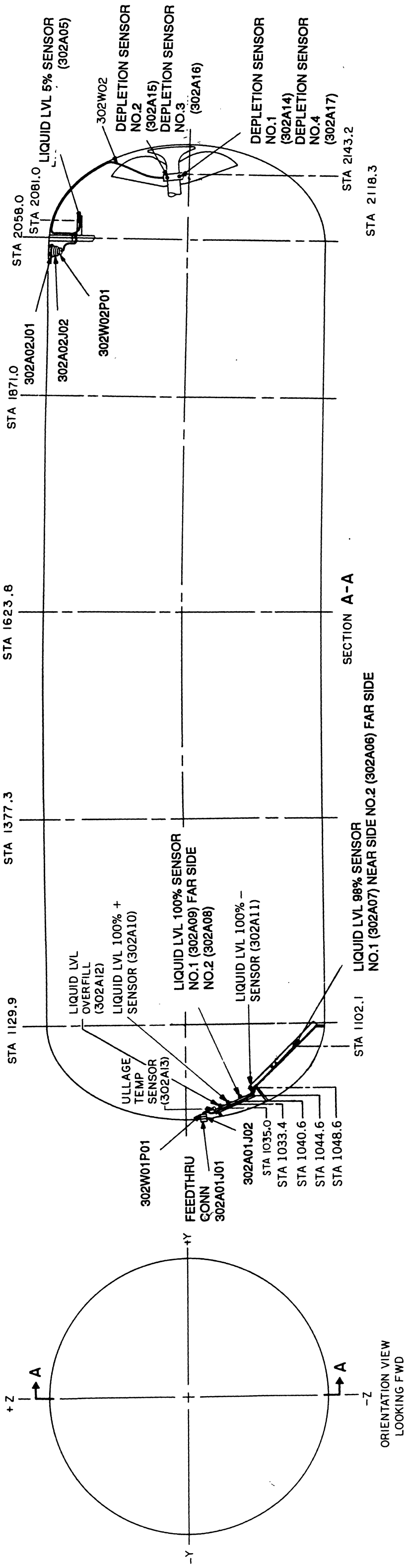
VIEW B-B



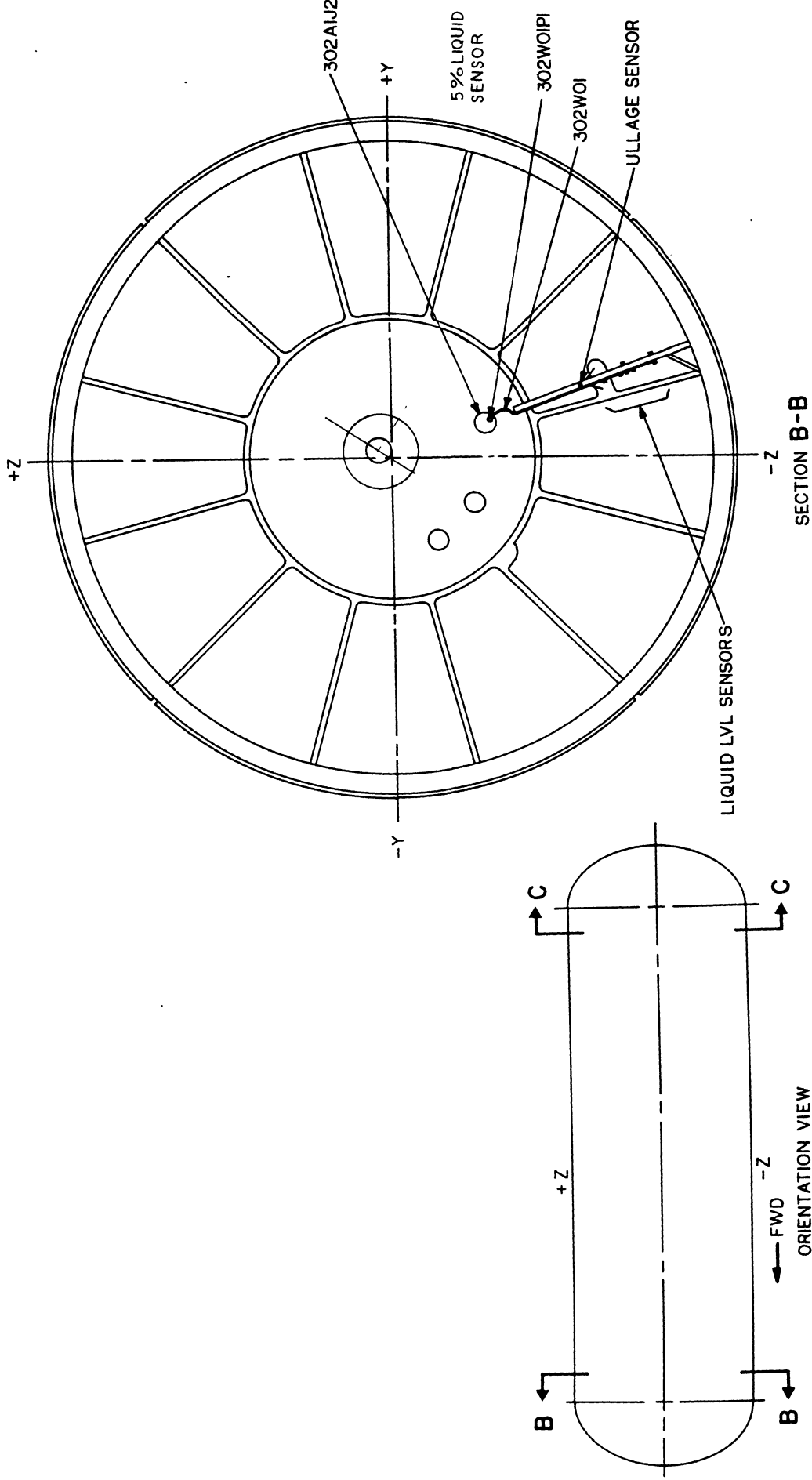


SECTION B-B
INTERTANK INTERNAL SENSORS AND WIRING HARNESS

VIEW A-A UNIT 314



ET 96 - UP

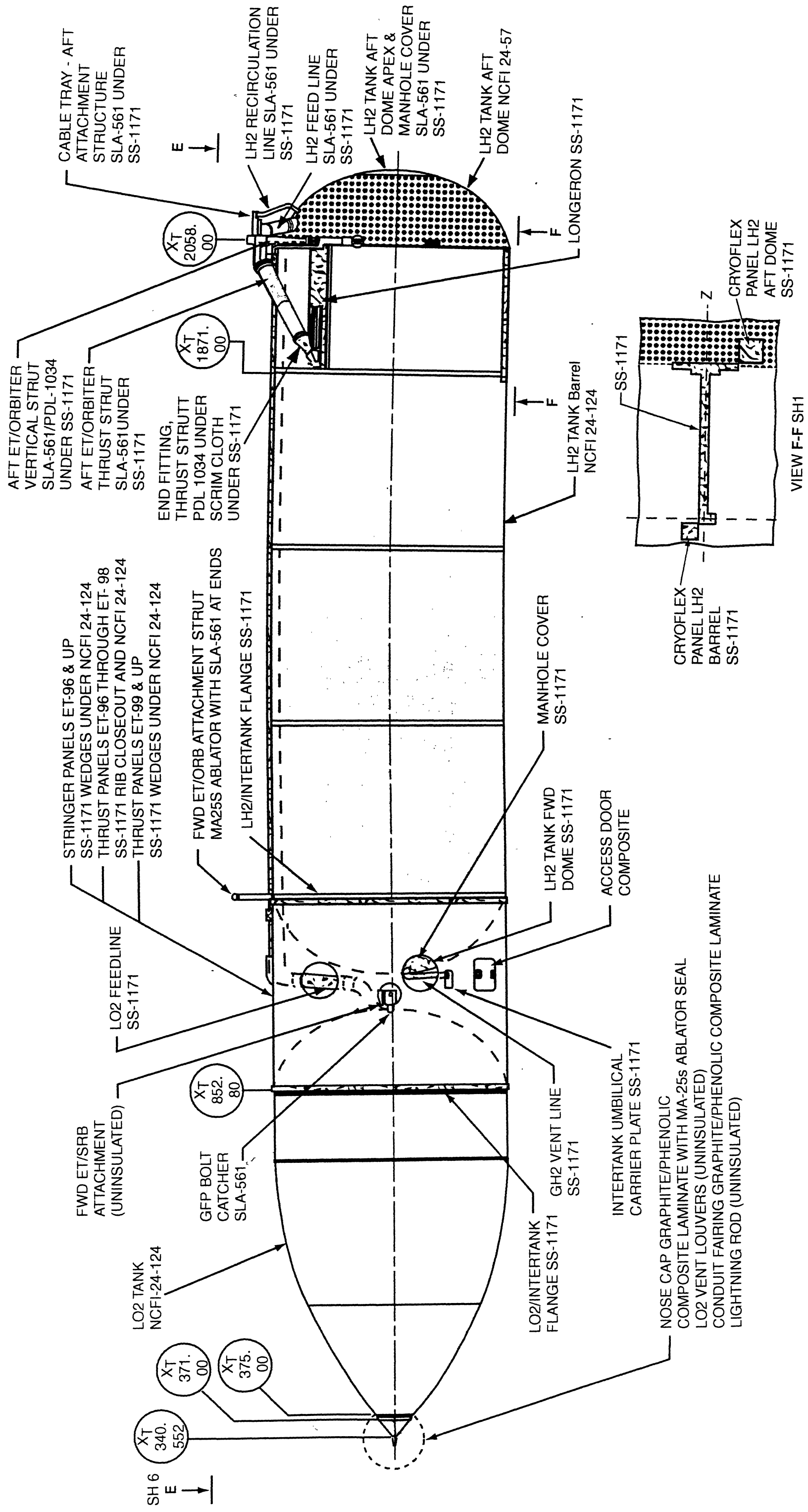


LH₂ TANK - INTERNAL

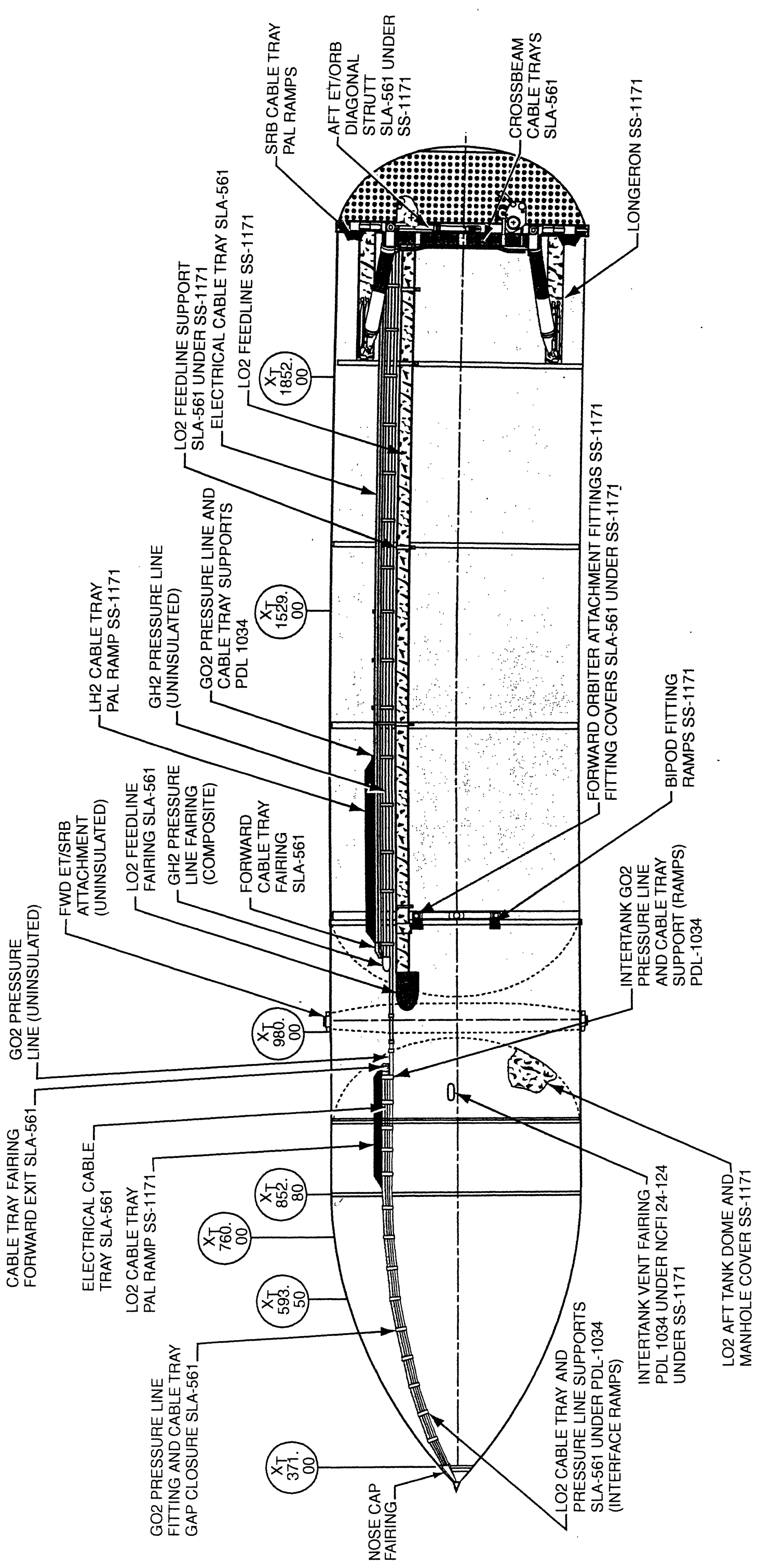
VI. THERMAL PROTECTION ARRANGEMENT

CHART NO.	TITLE	PAGE
	Contents	VI-1 thru VI-3
1.	ET Thermal Protection	VI-2 thru VI-3





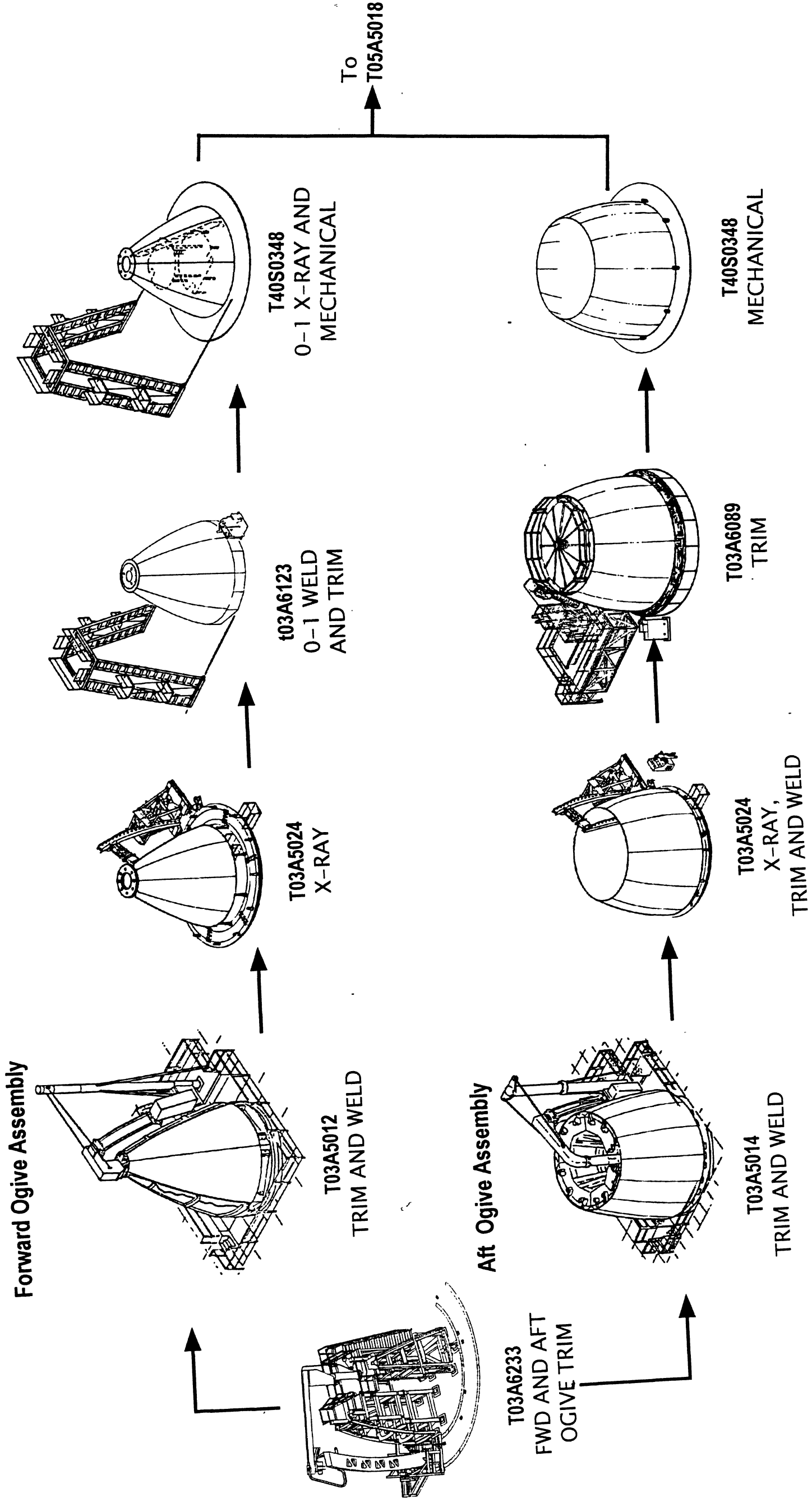
ET THERMAL PROTECTION (SHEET 1 OF 2)

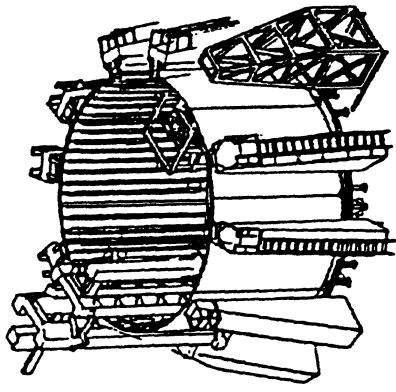


ET THERMAL PROTECTION (SHEET 2 OF 2)

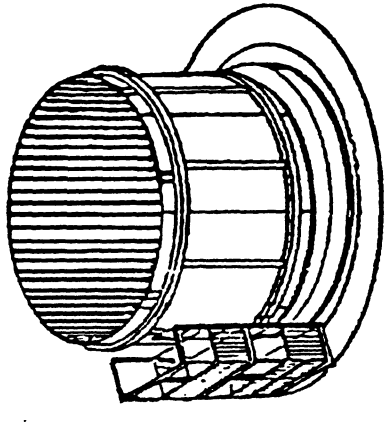
VII. MANUFACTURING SEQUENCE

CHART NO.	TITLE	PAGE
	Contents	VII-1 thru VII-10
1.	Forward and Aft Ogive Assembly	VII-2
2.	LO2 Barrel and Dome Cap Assembly	VII-3
3.	Dome Assemblies	VII-4
4.	Inter tank Assembly	VII-5
5.	Intermediate Ring Assembly	VII-6
6.	LH2 Barrel Assembly	VII-7
7.	Major Weld Proof Test	VII-8
8.	Clean and Thermal Protection	VII-9
9.	External Tank Final Assembly and Ship	VII-10

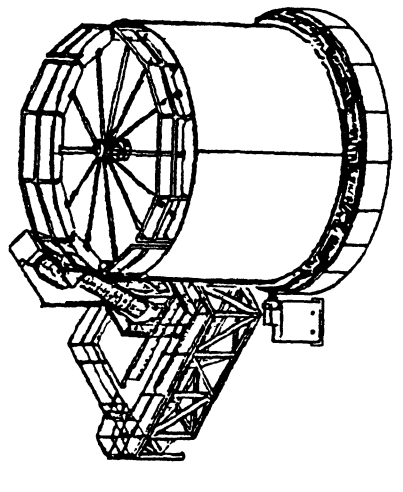




T04A5015
TRIM AND WELD

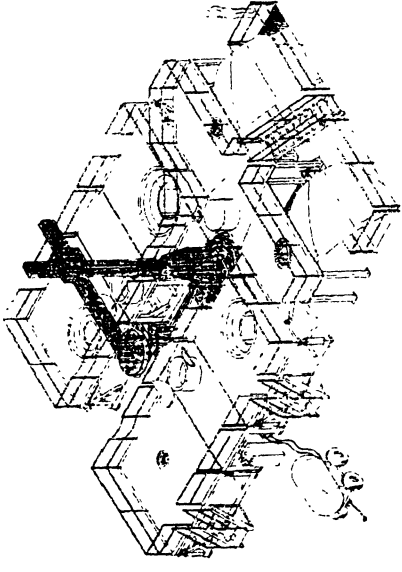


T40S0472
ROLL RING
INSTALL

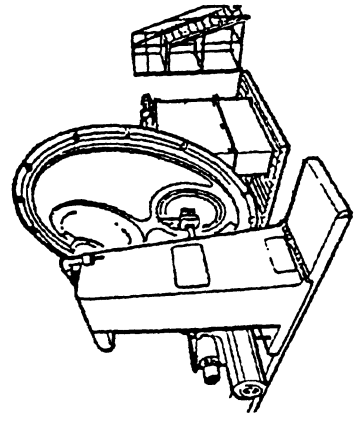


T03A6089
TRIM

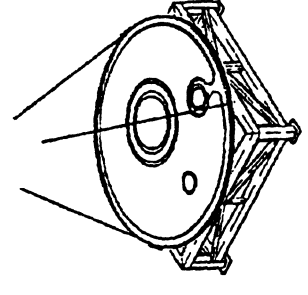
To
T05A5018



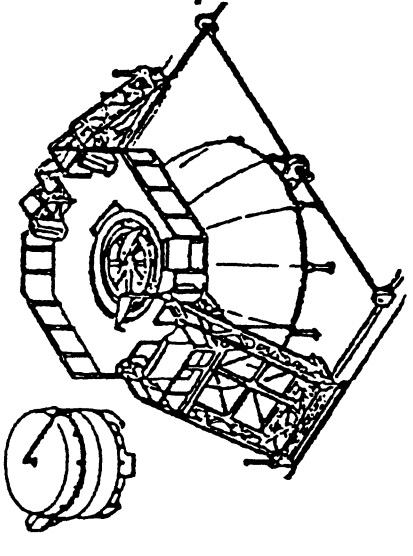
T02A5162
CAP/FITTING
WELDS



T02A6017
BORE, FACE
AND
DRILL FITTINGS



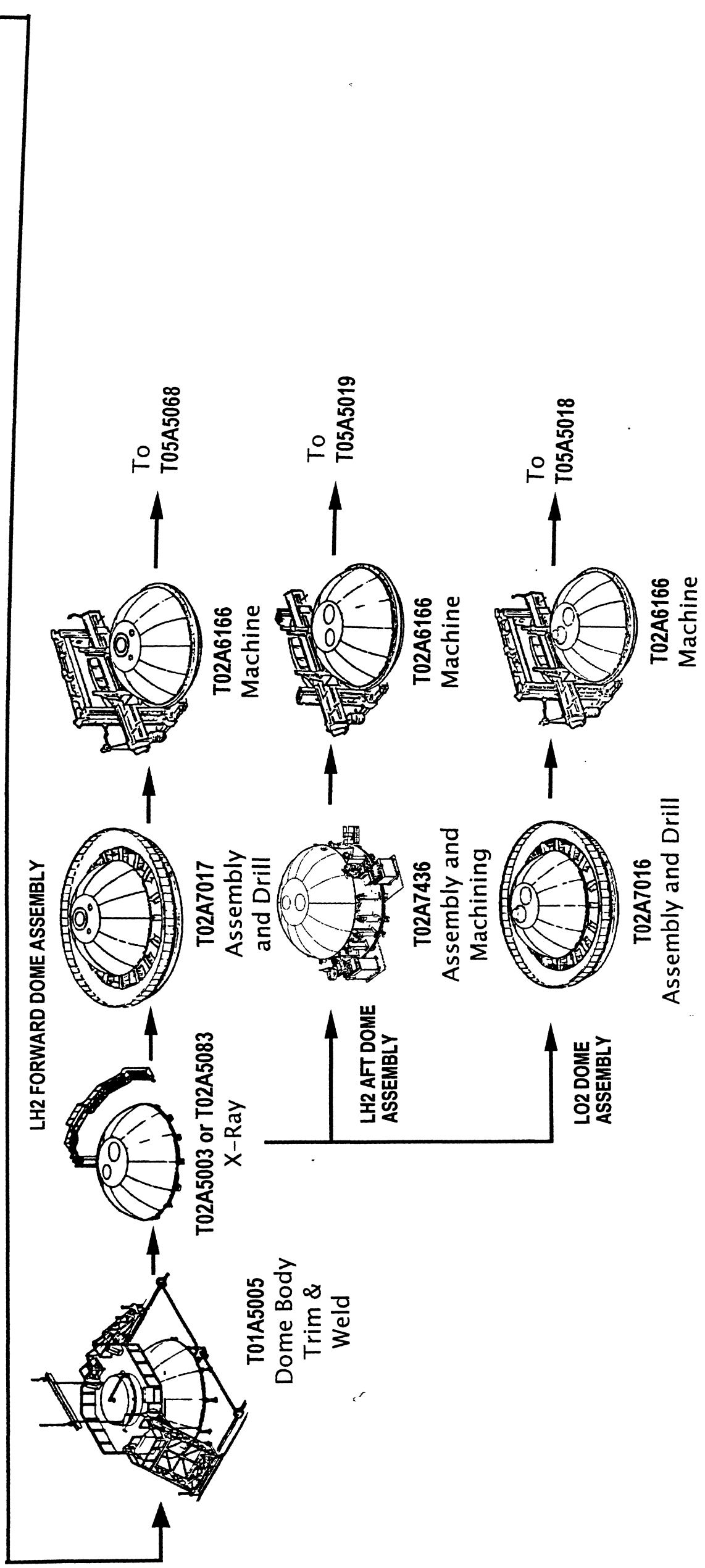
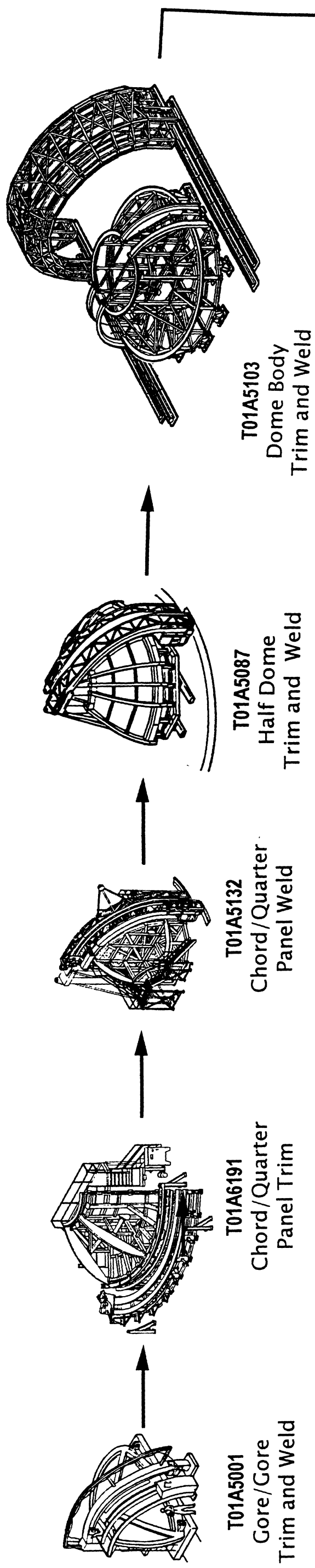
T02A7065
INSTALL
INSERTS

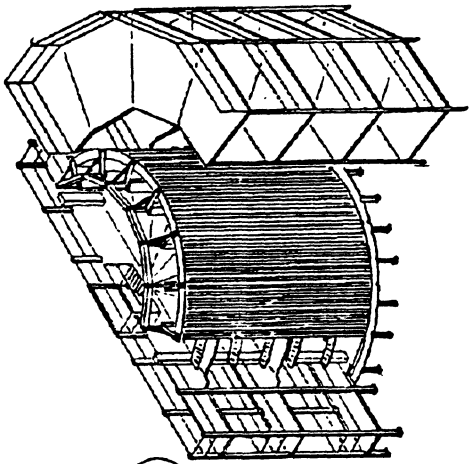
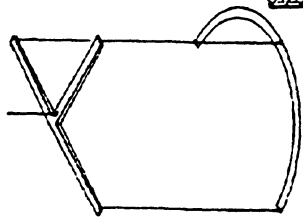


T01A5025
TRIM DOME
CAP

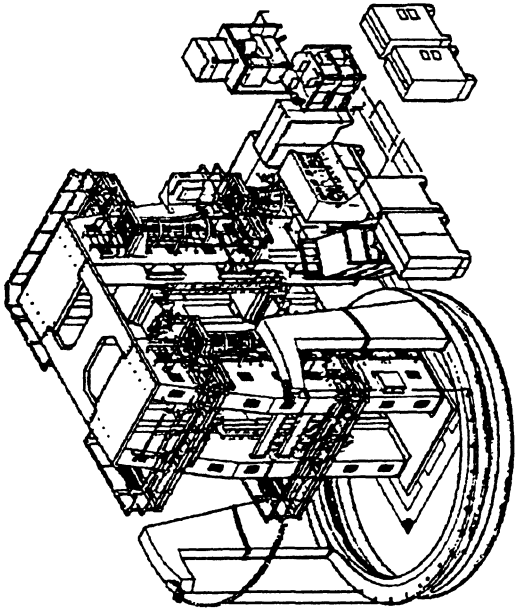
To
T01A5005

MANUFACTURING SEQUENCE LO2 BARREL DOME CAPS

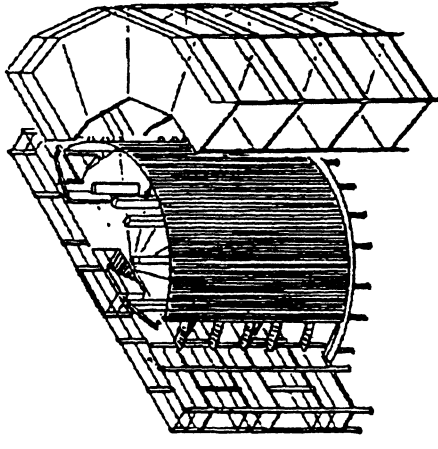




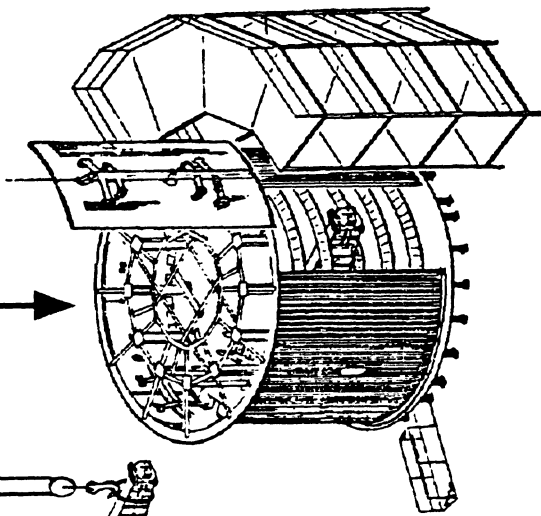
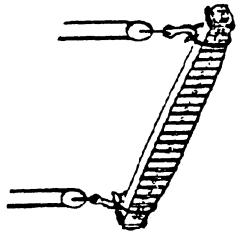
T06A7395
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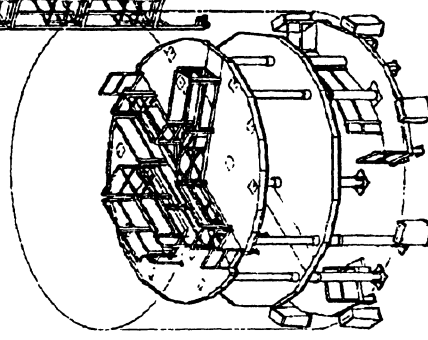
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RIVET



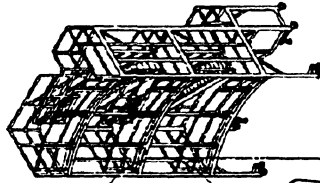
T06A7399
FINISH AND
INSPECT



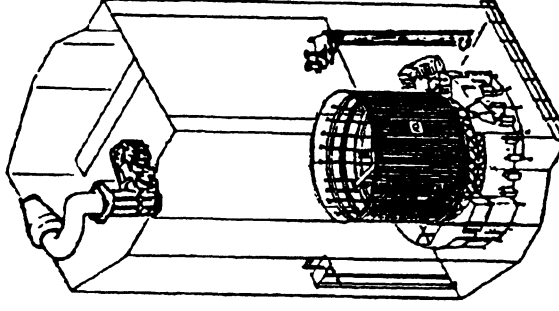
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ASSEMBLY



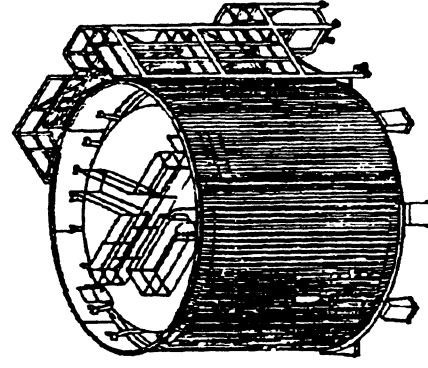
T06A7424
SYS SUPT STRUCT
INSTL



CELL G OR H
SOFI
APPLICATION



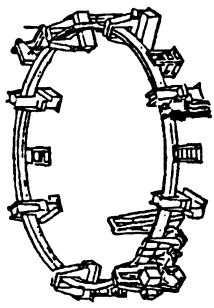
T25L7272
SOFI TRIM



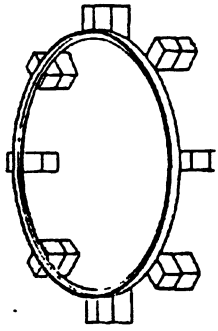
T06A7391
ASSEMBLY

To
Cell J

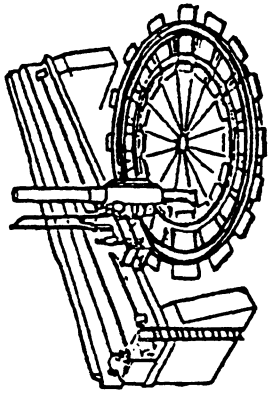
744 , 1377 and 1624 Ring Assemblies



T04A5017
Weld



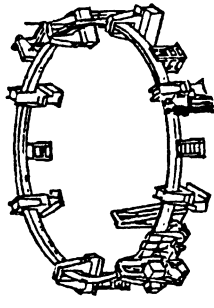
T08A7362
Assembly



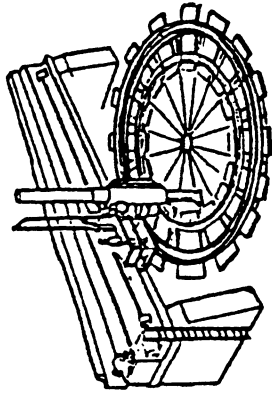
T08A6005
Machine

To
T05A5019

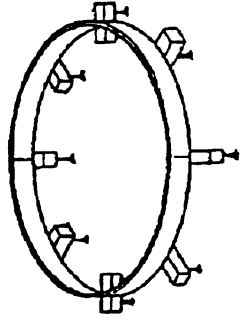
1871 Ring Assembly



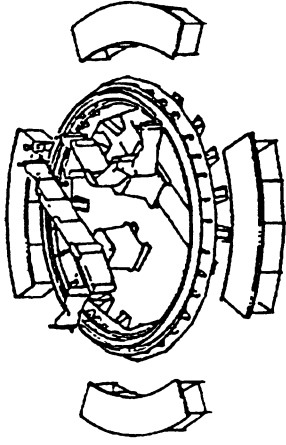
T04A5017
Weld



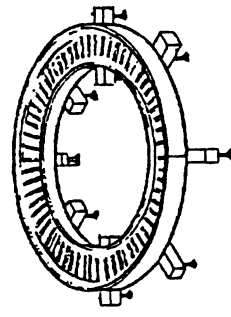
T08A6005
Machine



T02A7047
Preassembly



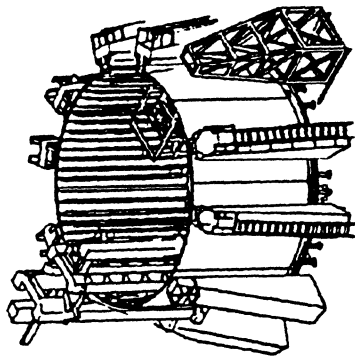
T08A7103
Assembly



T02A7047
Assembly

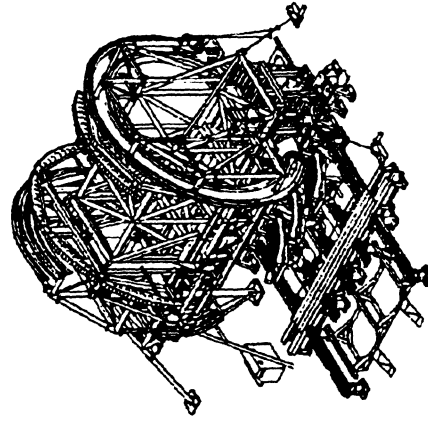
To
T05A5019

LH2 AFT Barrel Assembly

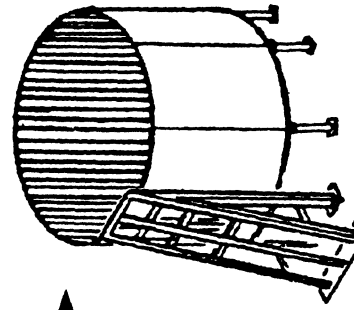


T04A5015
Trim, Weld
and X-Ray

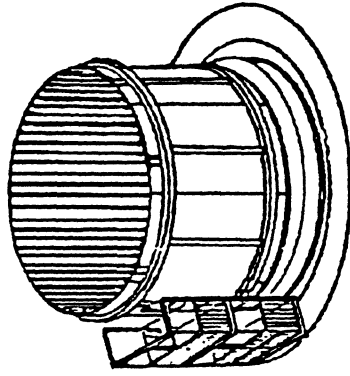
LH2 Forward Barrel Assemblies



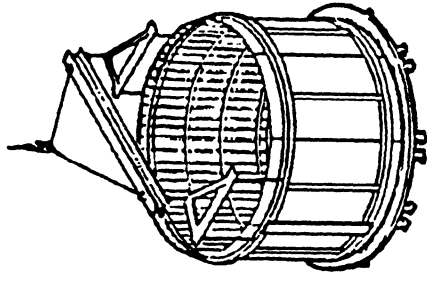
T04A5016
Trim and Weld



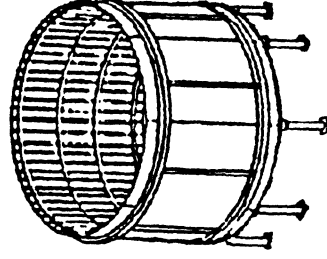
T04A5102
X-Ray



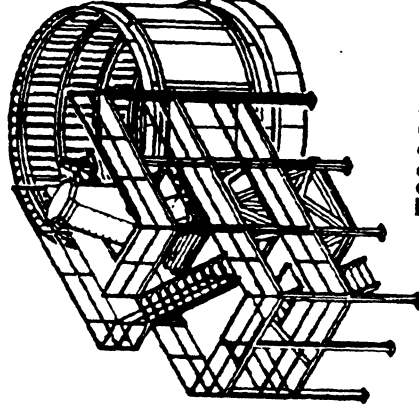
T40S0343
Roll Ring
Install



T04A7086
Frame Install

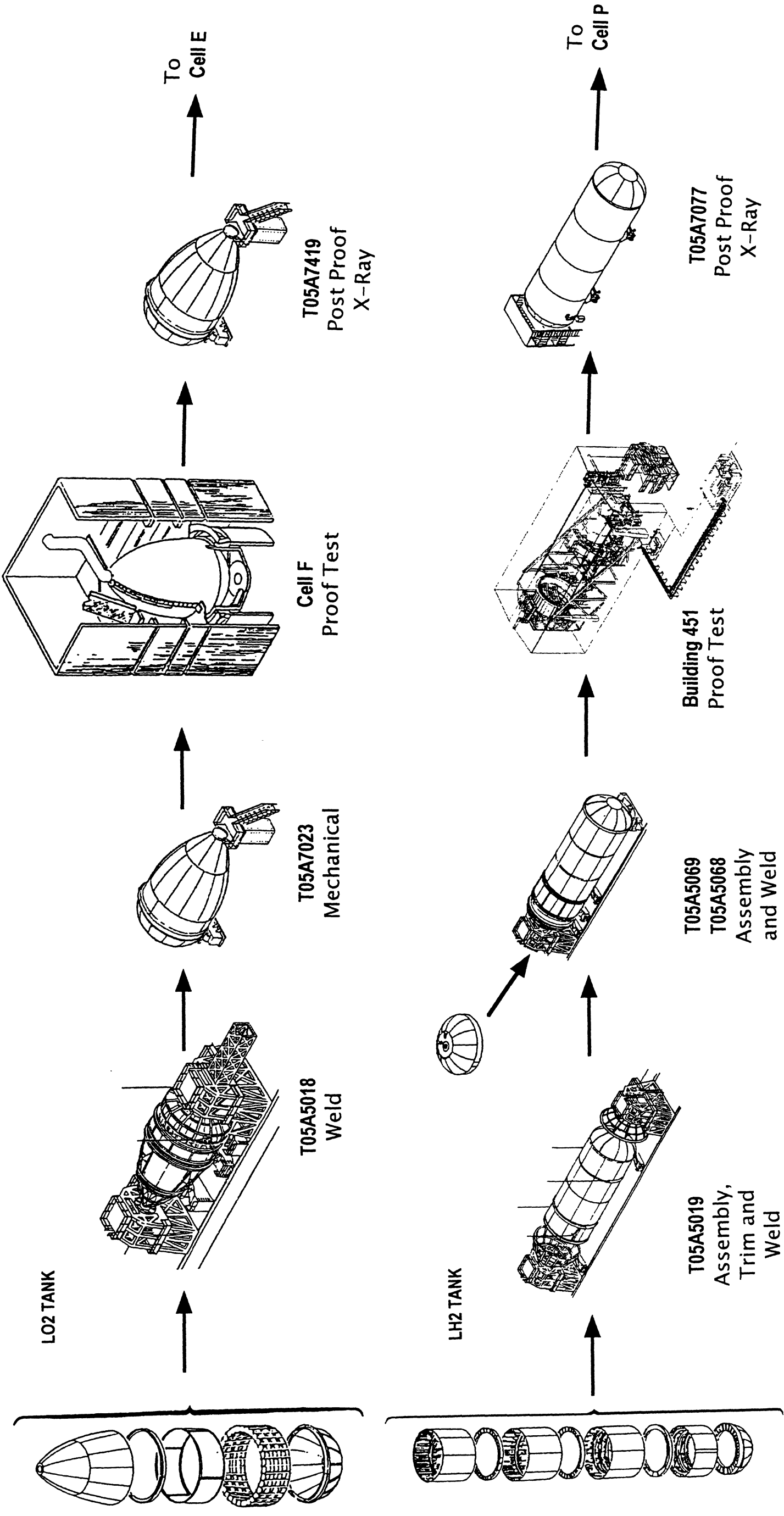


T04A7003
Frame Install



T03A6165
Trim

To
T05A5019



MANUFACTURING SEQUENCE MAJOR WELD AND PROOF TEST

