JSC-11174

Space Shuttle Systems Handbook

Volume III - Sections 16 through 20

Mission Operations Directorate
Systems Division

Revision E
December 21, 1990

NASA
National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

SPACE SHUTTLE SYSTEMS HANDBOOK

REVISION E

PREFACE

This three-volume book contains systems level drawings for the space shuttle. These drawings were prepared by Flight Controllers for use during space shuttle flight operations. Caution should be exercised when using these systems drawings for other purposes.

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The symbols and nomenclature used in these drawings are defined and explained in the MOD Drafting Standards, Revision C, PCN-1, January 15, 1989. An asterisk (*) after the drawing number in the table of contents indicates that the drawing is carried onboard during flight operations. In sections 16 and 17, a letter on the drawing number means that the drawing is to be used only for particular vehicles (B = 102, C = 103, D = 104, E = 105).

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REV E

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Item	Title	REV/DCN	Signoff date
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DWG 14.11 (Sheet 2 of 4)	NEW MCIU DETAILED FIRMWARE	REV E	11/27/90
DWG 14.11 (Sheet 3 of 4)	NEW MCIU DETAILED FIRMWARE	REV E	11/27/90
DWG 14.11 (Sheet 4 of 4)	NEW MCIU FIRMWARE MEMORY MAP	REV E	11/27/90
DWG 14.12 (Sheet 1 of 3)	ROEU ELECTRICAL	REV E	11/27/90
DWG 14.12 (Sheet 2 of 3)	REMOTELY OPERATED ELECTRICAL UMBILICAL MECHANICAL OVERVIEW	REV E	11/27/90
DWG 14.12 (Sheet 3 of 3)	ROEU MECHANICAL	REV E	11/27/90
TBL 14-I	VENDOR DRAWING REFERENCES	REV E	10/23/90
	SECTION 15 MECHANICAL SUPPORT SYSTEMS		
DWG 15.1 (Sheet 1 of 4)	ACTIVE VENT SYSTEM VENT 1 AND 2	REV E	8/24/90
DWG 15.1 (Sheet 2 of 4)	ACTIVE VENT SYSTEM VENTS 3, 4, 5 & 7	REV E	8/24/90
DWG 15.1 (Sheet 3 of 4)	ACTIVE VENT SYSTEM VENTS 6, 8, AND 9	REV E	8/24/90
DWG 15.1 (Sheet 4 of 4)	VENT DOOR SOFTWARE	REV E	9/5/90
DWG 15.2* (Sheet 1 of 4)	ORBITER/ET UMBILICAL CLOSEOUT DOORS	REV E	8/20/90
DWG 15.2* (Sheet 2 of 4)	ORB/ET UMBILICAL CLOSEOUT DOORS (ELECT)	REV E	5/4/90
DWG 15.2 (Sheet 3 of 4)	ET DOOR SOFTWARE PASS AND BFS OI8D AND OI8F	REV E	8/24/90
DWG 15.2 (Sheet 4 of 4)	ET DOOR SOFTWARE PASS AND BFS OI20	REV E	8/23/90
DWG 15.3 (Sheet 1 of 3)	ORBITER ET SEPARATION MECHANICAL	REV E	8/28/90

Item	Title	REV/DCN	Signoff date
	SECTION 15 MECHANICAL SUPPORT SYSTEMS - Concluded		
DWG 15.3 (Sheet 2 of 3)	ORBITER ET SEPARATION MECHANICAL	REV E	9/5/90
DWG 15.3 (Sheet 3 of 3)	ORBITER ET SEPARATION MECHANICAL	REV E	8/28/90
DWG 15.4	(RESERVED)		
DWG 15.5 (Sheet 1 of 2)	HATCHES (SIDE)	REV E	8/9/90
DWG 15.5 (Sheet 2 of 2)	HATCHES (AIRLOCK AND SPACELAB)	REV E	10/24/90
DWG 15.6 (Sheet 1 of 2)	CREW SEATS	REV E	10/25/90
DWG 15.6 (Sheet 2 of 2)	CREW SEATS MECHANICAL/ELECTRICAL	REV E	10/25/90
DWG 15.7* (Sheet 1 of 2)	KU-BAND ANTENNA DEPLOY/STOW/ JETTISON	REV E	10/29/90
DWG 15.7* (Sheet 2 of 2)	KU-BAND MECHANICAL	REV E	10/26/90
DWG 15.8 (Sheet 1 of 2)	MECHANICAL/SOFTWARE OVERVIEW (PASS ONLY) OI8D AND OI8F	REV E	9/17/90
DWG 15.8 (Sheet 2 of 2)	MECHANICAL/SOFTWARE OVERVIEW (PASS ONLY) OI8D AND OI8F	REV E	11/5/90
TBL 15-I	VENDOR DRAWING REFERENCES	REV E	11/5/90
	Volume III - Sections 16 through 20		
	SECTION 16 COMMUNICATIONS SYSTEMS		
DWG 16.1* (Sheet 1 of 6)	COMM OVERVIEW S-BAND	REV E	10/29/90
DWG 16.1B* (Sheet 2 of 6)	COMM OVERVIEW AUDIO	REV E	9/12/90
DWG 16.1C,D* (Sheet 3 of 6)	COMM OVERVIEW AUDIO	REV E	10/17/90
DWG 16.1* (Sheet 4 of 6)	COMM OVERVIEW KU BAND	REV E	10/23/90
DWG 16.1 (Sheet 5 of 6)	COMM OVERVIEW CCTV	REV E	10/18/90

Item	Title	REV/DCN	Signoff date
	SECTION 16 COMMUNICATIONS SYSTEMS - Continued		
DWG 16.1 (Sheet 6 of 6)	PAYLOAD SYSTEM OVERVIEW	REV E	10/23/90
DWG 16.2 (Sheet 1 of 3)	S-BAND PM TRANSPONDER	REV E	8/21/90
DWG 16.2 (Sheet 2 of 3)	S-BAND PM AMPLIFIER SYSTEM	REV E	8/21/90
DWG 16.2 (Sheet 3 of 3)	S-BAND PM/FM SWITCH BEAM ANTENNA SYSTEM	REV E	8/21/90
DWG 16.3 (Sheet 1 of 3)	NETWORK SIGNAL PROCESSOR RETURN LINK	REV E	10/16/90
DWG 16.3 (Sheet 2 of 3)	NETWORK SIGNAL PROCESSOR FORWARD LINK	REV E	11/2/90
DWG 16.3 (Sheet 3 of 3)	COMSEC 1/2	REV E	11/5/90
DWG 16.4 (Sheet 1 of 2)	TEXT AND GRAPHICS SYSTEM	REV E	9/12/90
DWG 16.4 (Sheet 2 of 2)	SECURE TEXT & GRAPHICS SYSTEM TELEVISION INTERFACES	REV E	9/12/90
DWG 16.5 (Sheet 1 of 2)	KU-BAND SYSTEM	REV E	10/10/90
DWG 16.5 (Sheet 2 of 2)	KU-BAND SYSTEM	REV E	10/10/90
DWG 16.6 (Sheet 1 of 1)	TELEPRINTER	REV E	10/23/90
DWG 16.7B (Sheet 1 of 1)	ORBITER EXPERIMENTS SUPPORT SYSTEM FOR OEX	REV E	10/18/90
DWG 16.8 (Sheet 1 of 1)	S-BAND FM SYSTEM	REV E	10/10/90
DWG 16.9 (Sheet 1 of 2)	UHF ORBITER TRANSCEIVER	REV E	10/23/90
DWG 16.9 (Sheet 2 of 2)	OPERATIONAL UHF EVC BACKPACK TRANSCEIVER	REV E	11/26/90
DWG 16.10 (Sheet 1 of 7)	AUDIO PANEL/ATU PLT, CDR	REV E	9/12/90
DWG 16.10 (Sheet 2 of 7)	AUDIO PANEL/ATU MS, PS, AND OS SMU	REV E	10/23/90
DWG 16.10C,D,E (Sheet 3 of 7)	AUDIO PANEL/ATU MID DECK SMU AND CCU	REV E	11/26/90

Item	Title	REV/DCN	Signoff date
	SECTION 16 COMMUNICATIONS SYSTEMS - Continued		
DWG 16.10 (Sheet 4 of 7)	AUDIO PANEL/ATU AIRLOCK	REV E	9/12/90
DWG 16.10B (Sheet 5 of 7)	AUDIO PANEL/ATU AIRLOCK 1 BACKUP	REV E	11/5/90
DWG 16.10B (Sheet 6 of 7)	AUDIO PANEL/ATU MID DECK AUDIO/ AIRLOCK 2 BACKUP	REV E	9/12/90
DWG 16.10B (Sheet 7 of 7)	AUDIO PANEL/ATU OS AND OS SMU	REV E	9/12/90
DWG 16.11 (Sheet 1 of 2)	AUDIO/ACCU	REV E	11/26/90
DWG 16.11 (Sheet 2 of 2)	AUDIO/ACCU	REV E	10/26/90
DWG 16.12 (Sheet 1 of 1)	TV CONTROL	REV E	10/26/90
DWG 16.13 (Sheet 1 of 4)	TV/CAMERA MONITOR	REV E	10/2/90
DWG 16.13 (Sheet 2 of 4)	TV/CAMERA MONITOR	REV E	10/2/90
DWG 16.13 (Sheet 3 of 4)	TV/EMU	REV E	10/2/90
DWG 16.13 (Sheet 4 of 4)	AIRBORNE DIGITIZER UNIT SECURE TELEVISION SYSTEM	REV E	10/2/90
DWG 16.14 (Sheet 1 of 2)	S-BAND PAYLOAD INTERROGATOR	REV E	10/26/90
DWG 16.14 (Sheet 2 of 2)	S-BAND PAYLOAD INTERROGATOR	REV E	10/26/90
DWG 16.15 (Sheet 1 of 1)	PAYLOAD SIGNAL PROCESSOR	REV E	10/23/90
DWG 16.16 (Sheet 1 of 1)	SRB DFI FLIGHT RECORDER	REV E	9/12/90
DWG 16.17 (Sheet 1 of 1)	GROUND COMMAND INTERFACE LOGIC (GCIL) CONTROLLER	REV E	9/12/90
DWG 16.18 (Sheet 1 of 1)	OPS RECORDERS	REV E	10/23/90
DWG 16.19 (Sheet 1 of 1)	P/L RECORDER	REV E	10/23/90
DWG 16.20 (Sheet 1 of 2)	WIRELESS CREW COMM SYS AUDIO INTERFACE UNIT	REV E	10/2/90

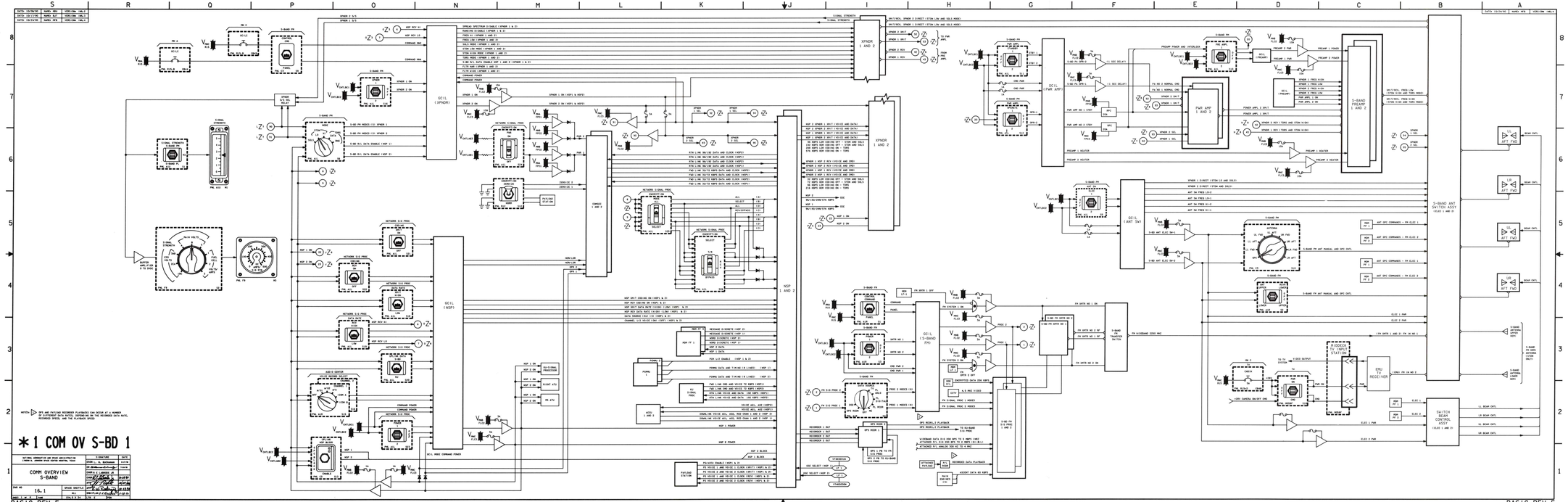
Item	Title	REV/DCN	Signoff date
	SECTION 16 COMMUNICATIONS SYSTEMS - Concluded		
DWG 16.20 (Sheet 2 of 2)	WIRELESS CREW COMM SYS CREW REMOTE UNIT	REV E	10/16/90
DWG 16.21	(RESERVED)		
DWG 16.22 (Sheet 1 of 3)	COMMUNICATIONS INTERFACE EQUIPMENT (CONTROL)	REV E	10/26/90
DWG 16.22 (Sheet 2 of 3)	COMMUNICATIONS INTERFACE EQUIPMENT (COMMAND)	REV E	10/23/90
DWG 16.22 (Sheet 3 of 3)	COMMUNICATIONS INTERFACE EQUIPMENT (TELEMETRY)	REV E	10/26/90
DWG 16.23	(RESERVED)		
DWG 16.24 (Sheet 1 of 1)	INTERIM VIDEO TAPE RECORDER	REV E	10/26/90
DWG 16.25 (Sheet 1 of 1)	COMM SYSTEM POWER DISTRIBUTION	REV E	10/2/90
DWG 16.26 (Sheet 1 of 1)	COMM MDM I/F	REV E	10/23/90
TBL 16-I	VENDOR DRAWING REFERENCES	REV E	11/21/90
	SECTION 17 INSTRUMENTATION		
DWG 17.1 (Sheet 1 of 3)	OPERATIONAL INSTRUMENTATION DSC'S AND MDM'S	REV E	10/23/90
DWG 17.1 (Sheet 2 of 3)	OI DEDICATED SIGNAL CONDITIONERS	REV E	10/23/90
DWG 17.1 (Sheet 3 of 3)	OI INST MDM	REV E	10/23/90
DWG 17.2 (Sheet 1 of 1)	OI PCM MASTER UNIT	REV E	10/10/90
DWG 17.3 (Sheet 1 of 3)	PAYLOAD DATA INTERLEAVER	REV E	10/2/90
DWG 17.3 (Sheet 2 of 3)	PAYLOAD DATA INTERLEAVER	REV E	10/23/90
DWG 17.3 (Sheet 3 of 3)	PAYLOAD DATA INTERLEAVER	REV E	10/2/90
DWG 17.4	(RESERVED)		
DWG 17.5	(RESERVED)		
DWG 17.6	(RESERVED)		

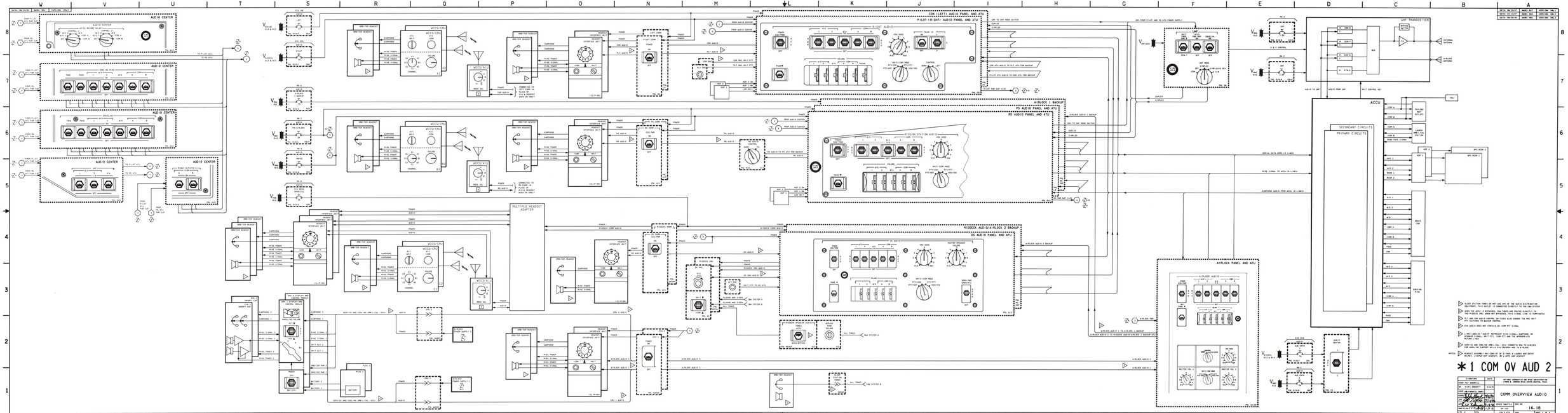
Item	Title	REV/DCN	Signoff date
	SECTION 17 INSTRUMENTATION - Concluded		
DWG 17.7	(RESERVED)		
DWG 17.8	(RESERVED)		
DWG 17.9	(RESERVED)		
DWG 17.10 (Sheet 1 of 1)	BIO MEDICAL INSTRUMENTATION	REV E	10/10/90
DWG 17.11 (Sheet 1 of 1)	MADS EQUIP	REV E	10/10/90
DWG 17.12C,D (Sheet 1 of 1)	MODULE AUXILIARY DATA SYSTEM RECORDER/CONTROLLER SUBSYSTEM	REV E	10/2/90
TBL 17-I	VENDOR DRAWING REFERENCES	REV E	11/2/90
	SECTION 18 ESCAPE SYSTEM		
DWG 18.1* (Sheet 1 of 1)	ESCAPE PANEL	REV E	9/13/90
DWG 18.2 (Sheet 1 of 1)	POLE CREW ESCAPE SYSTEM	REV E	9/28/90
DWG 18.3 (Sheet 1 of 1)	EMERGENCY EGRESS SLIDE/SKYGENIE	REV E	10/15/90
DWG 18.4 (Sheet 1 of 1)	LAUNCH AND ENTRY SUIT/HELMET RETENTION ASSEMBLY	REV E	9/13/90
DWG 18.5 (Sheet 1 of 3)	SURVIVAL GEAR	REV E	9/13/90
DWG 18.5 (Sheet 2 of 3)	SURVIVAL GEAR	REV E	9/13/90
DWG 18.5 (Sheet 3 of 3)	SURVIVAL GEAR	REV E	9/13/90
DWG 18.6 (Sheet 1 of 1)	PERSONAL PARCHUTE ASSEMBLY (PPA)	REV E	11/6/90
TBL 18-I	VENDOR DRAWING REFERENCES	REV E	9/13/90
	SECTION 19 STRUCTURES		
DWG 19.1 (Sheet 1 of 6)	PAYLOAD BAY OVERVIEW 1307 BULKHEAD LOOKING AFT	REV E	9/7/90
DWG 19.1 (Sheet 2 of 6)	PAYLOAD BAY OVERVIEW 582/576 BULKHEAD LOOKING AFT	REV E	9/7/90

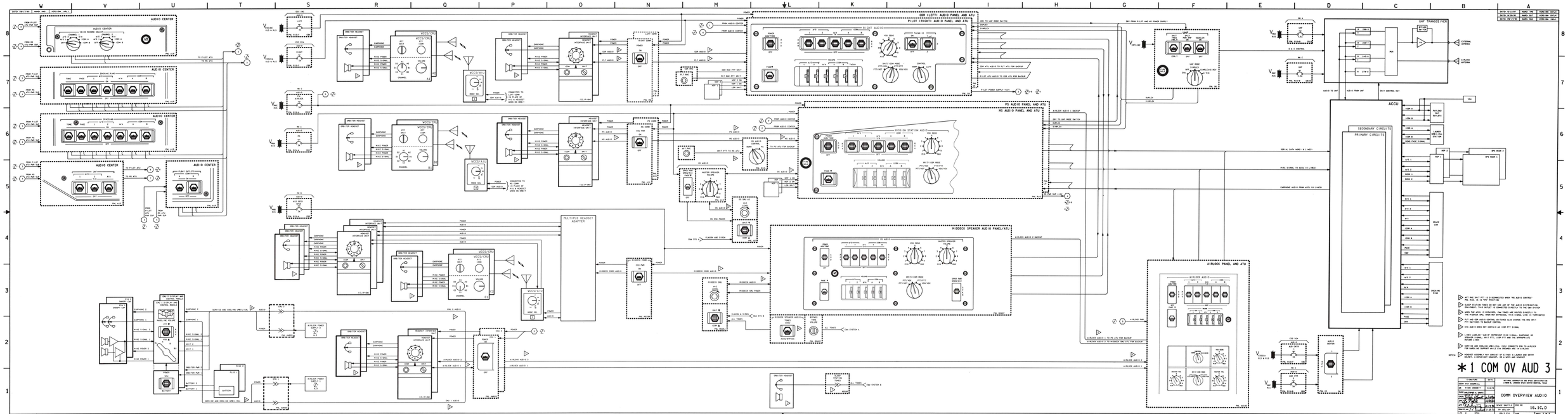
Item	Title	REV/DCN	Signoff date
	SECTION 19 STRUCTURES - Concluded		
DWG 19.1* (Sheet 3 of 6)	STRUCTURES AND SYSTEMS LOCATION	REV E	9/26/90
DWG 19.1* (Sheet 4 of 6)	STRUCTURES AND SYSTEMS LOCATIONS	REV E	10/17/90
DWG 19.1* (Sheet 5 of 6)	STRUCTURES AND SYSTEMS LOCATIONS	REV E	10/3/90
DWG 19.1* (Sheet 6 of 6)	STRUCTURES AND SYSTEMS LOCATIONS	REV E	9/7/90
DWG 19.2 (Sheet 1 of 1)	SRB/ET CONFIGURATION	REV E	8/24/90
DWG 19.3 (Sheet 1 of 3)	PAYLOAD BAY OVERVIEW (LOOKING INBOARD AND DOWN)	REV E	9/6/90
DWG 19.3 (Sheet 2 of 3)	PAYLOAD BAY OVERVIEW PORT SIDE	REV E	9/6/90
DWG 19.3 (Sheet 3 of 3)	PAYLOAD BAY OVERVIEW STARBOARD SIDE	REV E	9/6/90
DWG 19.4* (Sheet 1 of 3)	EXTERNAL SIDE VIEWS	REV E	9/6/90
DWG 19.4* (Sheet 2 of 3)	EXTERNAL VIEWS TOP/BOTTOM	REV E	9/6/90
DWG 19.4* (Sheet 3 of 3)	EXTERNAL PENETRATIONS/ TILE (AFT)	REV E	9/6/90
	SECTION 20 DISPLAYS AND CONTROLS		
DWG 20.1 (Sheet 1 of 4)	DISPLAYS AND CONTROLS FORWARD STATIONS	REV E	10/9/90
DWG 20.1 (Sheet 2 of 4)	DISPLAYS AND CONTROLS FORWARD STATIONS	REV E	10/19/90
DWG 20.1 (Sheet 3 of 4)	DISPLAYS AND CONTROLS FORWARD STATIONS	REV E	10/9/90
DWG 20.1 (Sheet 4 of 4)	DISPLAYS AND CONTROLS FORWARD STATIONS	REV E	10/9/90
DWG 20.2 (Sheet 1 of 3)	DISPLAYS AND CONTROLS AFT STATIONS	REV E	10/12/90
DWG 20.2 (Sheet 2 of 3)	DISPLAYS AND CONTROLS AFT STATIONS AND MISSION UNIQUE PANELS	REV E	10/18/90

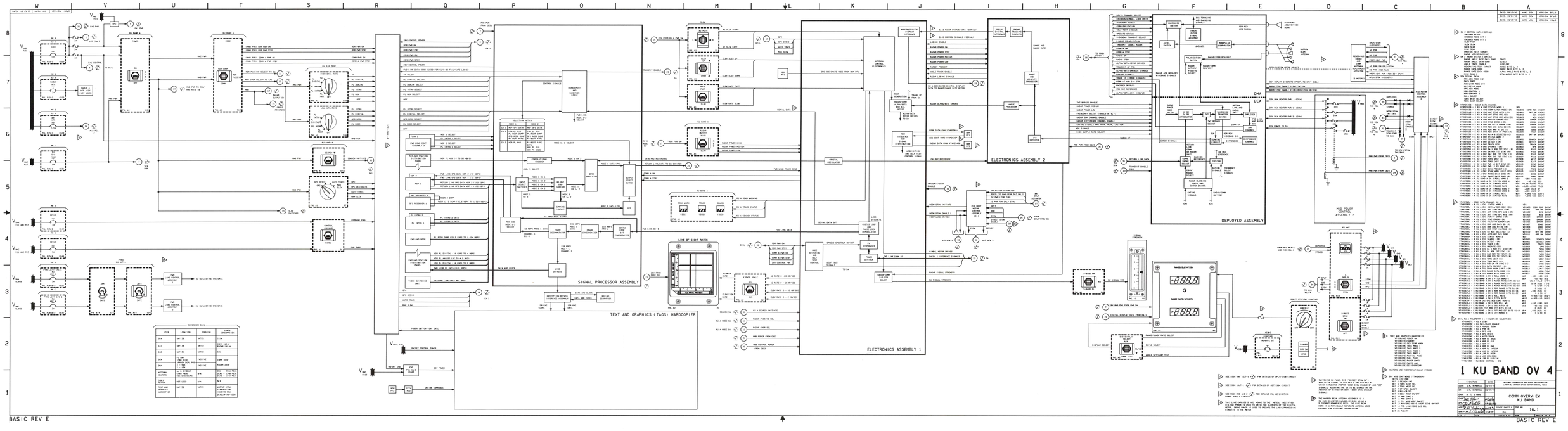
Item	Title	REV/DCN	Signoff date
	SECTION 20 DISPLAYS AND CONTROLS - Concluded		
DWG 20.2 (Sheet 3 of 3)	DISPLAYS AND CONTROLS AFT STATIONS	REV E	10/12/90
DWG 20.3 (Sheet 1 of 1)	DISPLAYS AND CONTROLS MID DECK STATIONS	REV E	10/17/90
DWG 20.4 (Sheet 1 of 1)	DISPLAYS AND CONTROLS AIRLOCK	REV E	10/9/90
TBL 20-I	VENDOR DRAWING REFERENCES	REV E	11/5/90

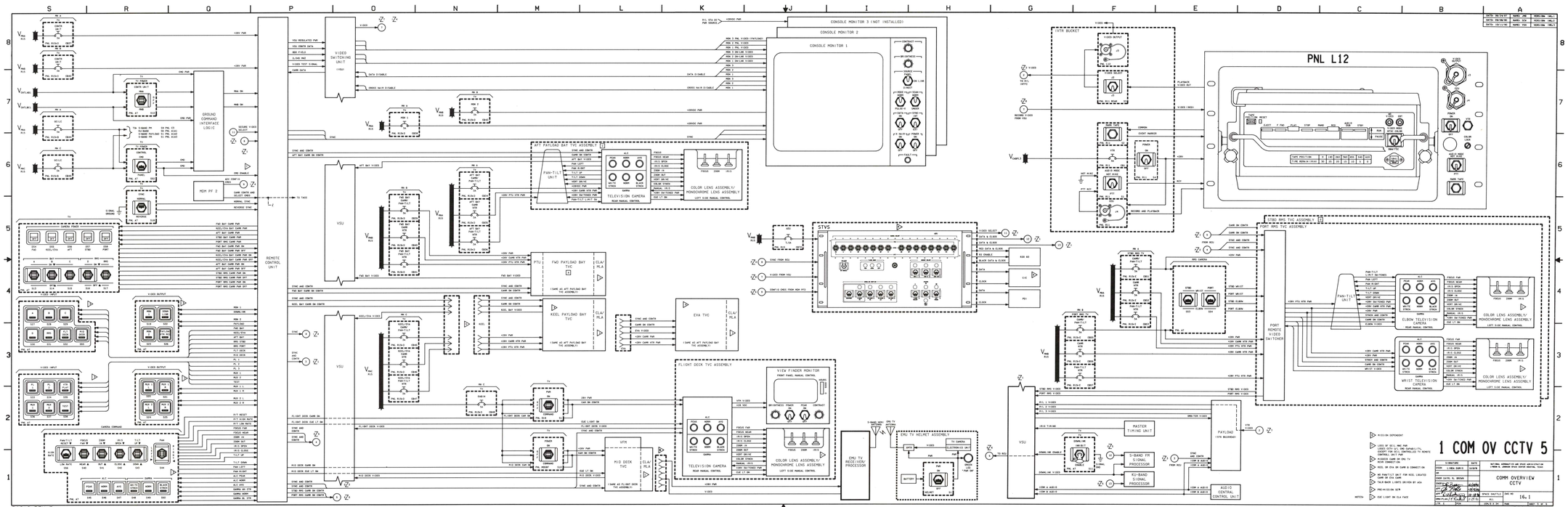
16. COMMUNICATIONS SYSTEMS

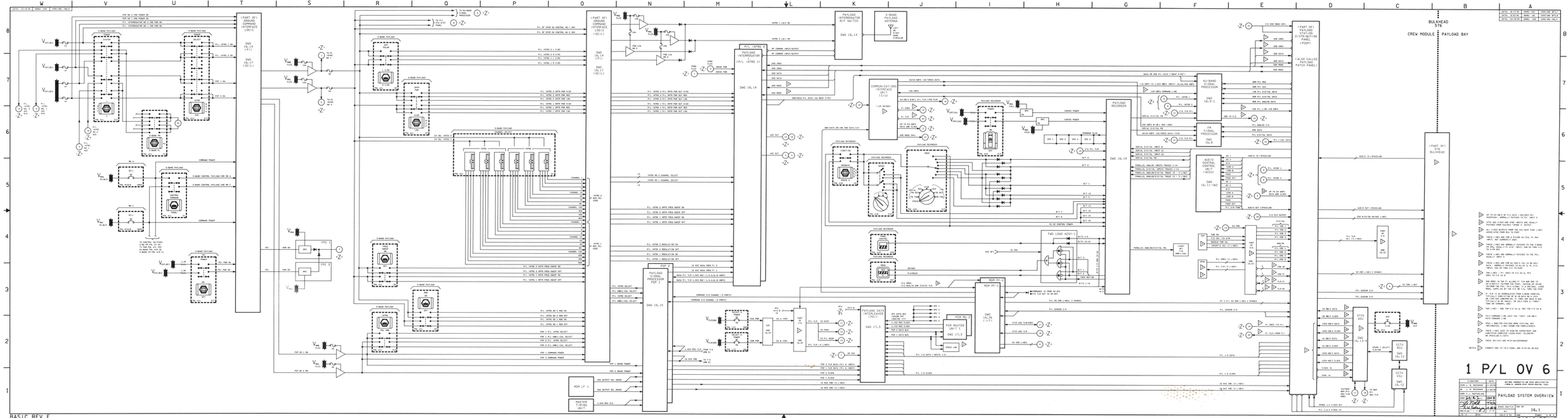

* 1 COM OV S-BD 1
COMM OVERVIEW S-BAND
16.1
BASIC REV E
BASIC REV E

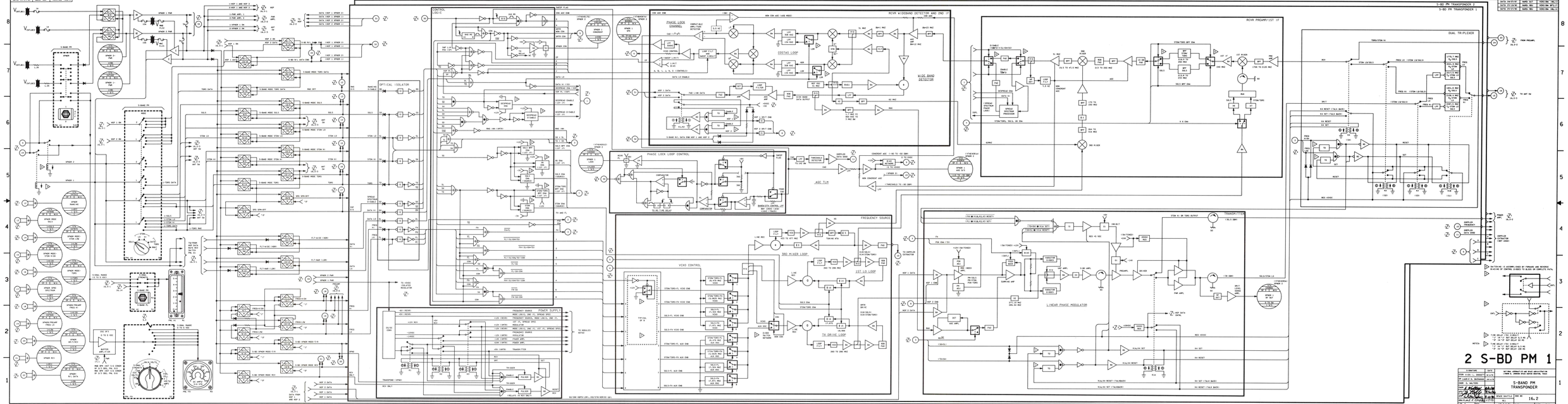

AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
COM 1 (LEFT) AUDIO PANEL AND ATU
PILOT (RIGHT) AUDIO PANEL AND ATU
P5 AUDIO PANEL AND ATU
P5 AUDIO PANEL AND ATU
W1000EX AUDIO/AIRLOCK 2 BACKUP
P5 AUDIO PANEL AND ATU
W1000EX AUDIO/AIRLOCK 3 BACKUP
P5 AUDIO PANEL AND ATU
AIRLOCK PANEL AND ATU
MULTIPLE HEADSET ADAPTER
ACCU
SECONDARY CIRCUITS
PRIMARY CIRCUITS
UHF TRANSCEIVER
* 1 COM OV AUD 2
COMM OVERVIEW AUDIO
16.18
BASIC REV E

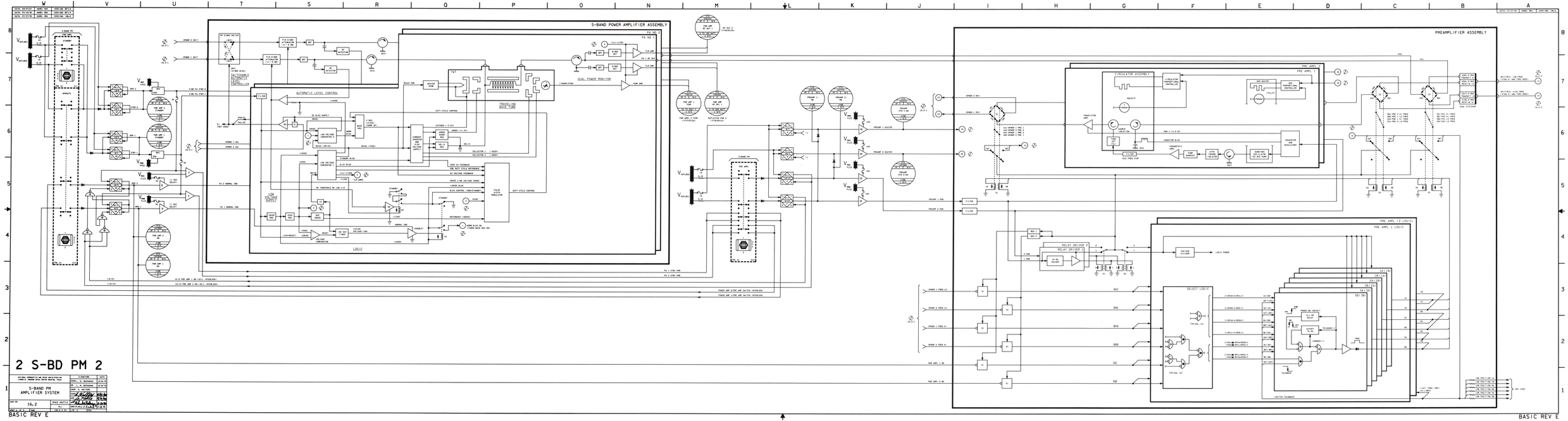

AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
AUDIO CENTER
COM 1 (LEFT) AUDIO PANEL AND ATU
PILOT (RIGHT) AUDIO PANEL AND ATU
P5 AUDIO PANEL AND ATU
P6 AUDIO PANEL AND ATU
MIDDECK SPEAKER AUDIO PANEL/ATU
AIRLOCK PANEL AND ATU
UHF TRANSCEIVER
ACCU
SECONDARY CIRCUITS
PRIMARY CIRCUITS
MULTIPLE HEADSET ADAPTER
WCCS/CRU
WCCS/ATU
*1 COM OV AUD 3
COMM OVERVIEW AUDIO
BASIC REV E
BASIC REV E

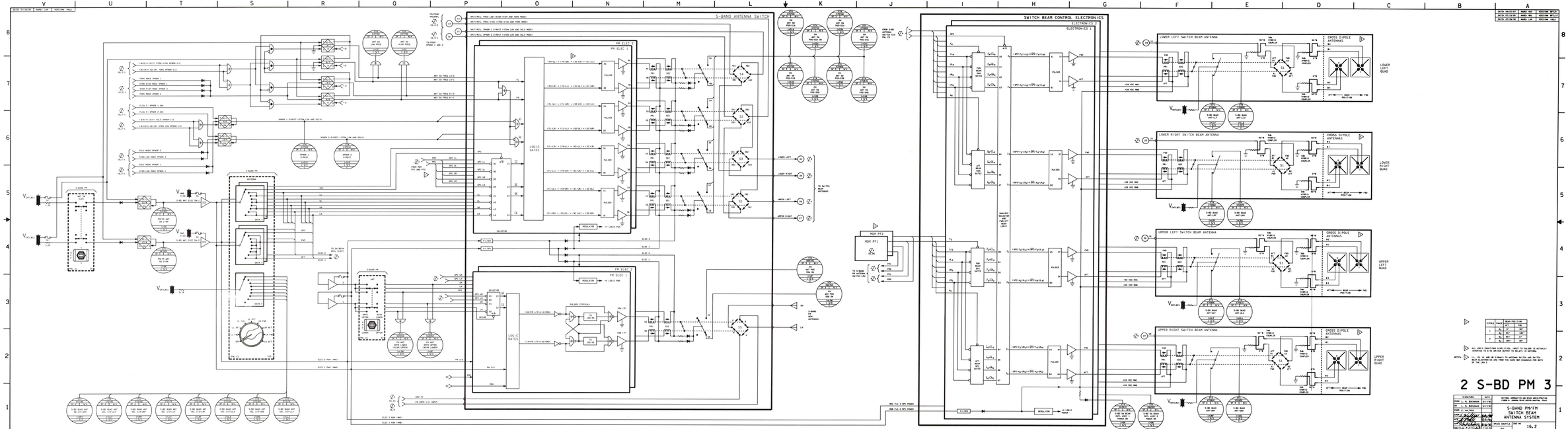

1 KU BAND OV 4
COMM OVERVIEW KU BAND
SIGNAL PROCESSOR ASSEMBLY
TEXT AND GRAPHICS (TAGS) HARDCOPIER
ELECTRONICS ASSEMBLY 1
ELECTRONICS ASSEMBLY 2
DEPLOYED ASSEMBLY
DHA
MID POWER CONTROL ASSEMBLY 2
REFERENCE DATA
BASIC REV E

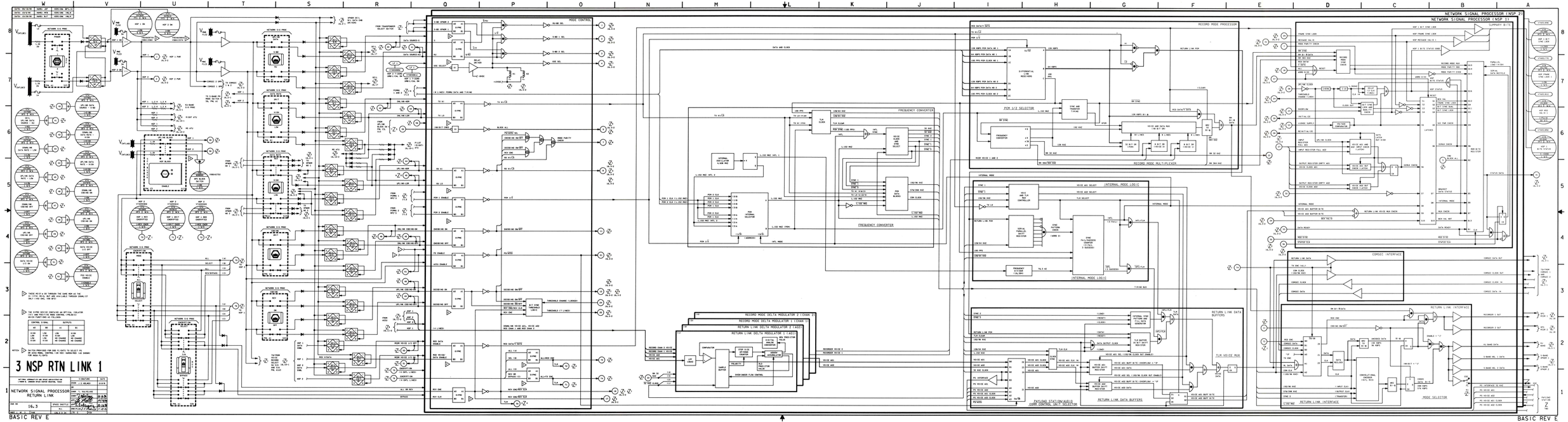

REMOTE CONTROL UNIT
GROUND COMMAND INTERFACE LOGIC
MDM PF 2
VIDEO SWITCHING UNIT
VSU
PTU
FWD PAYLOAD BAY TVC
KEEL PAYLOAD BAY TVC
EVA TVC
MID DECK TVC
FLIGHT DECK TVC ASSEMBLY
VIEW FINDER MONITOR
TELEVISION CAMERA
COLOR LENS ASSEMBLY/ MONOCHROME LENS ASSEMBLY
CONSOLE MONITOR 3 (NOT INSTALLED)
CONSOLE MONITOR 2
CONSOLE MONITOR 1
STBD BUCKET
PNL L12
STVS
EMU TV HELMET ASSEMBLY
EMU TV RECEIVER-PROCESSOR
MASTER TIMING UNIT
S-BAND FM SIGNAL PROCESSOR
KU-BAND SIGNAL PROCESSOR
AUDIO CENTRAL CONTROL UNIT
PORT REMOTE VIDEO SWITCHER
PAN-TILT UNIT
ELBOW TELEVISION CAMERA
WRIST TELEVISION CAMERA
1 COM OV CCTV 5
COMM OVERVIEW CCTV
BASIC REV E

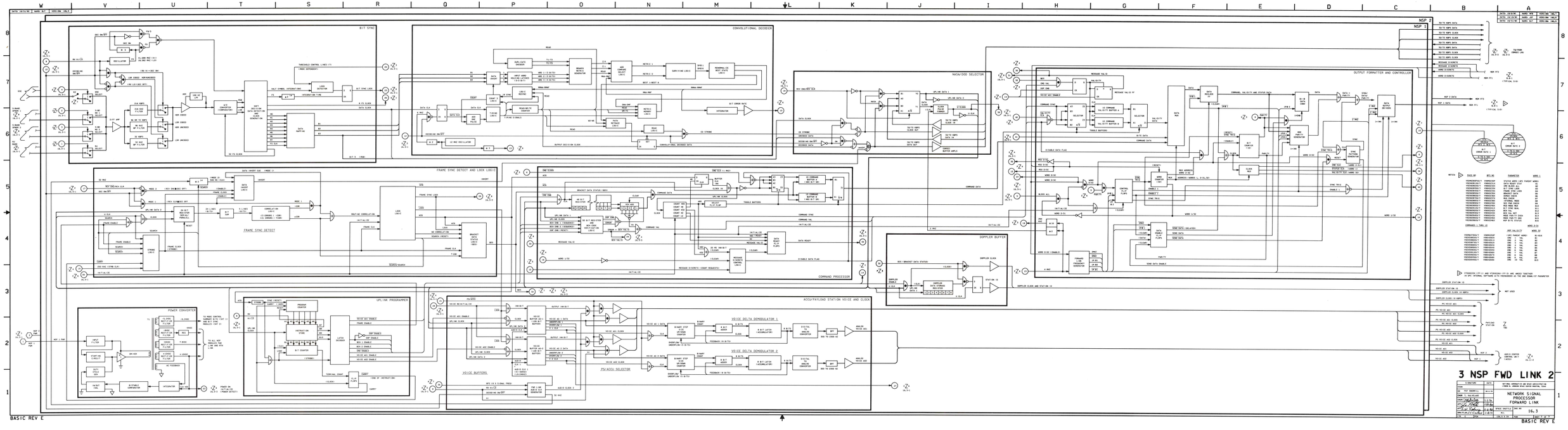

BULKHEAD S76
CREW MODULE
PAYLOAD BAY
1 P/L OV 6
PAYLOAD SYSTEM OVERVIEW
16-1
BASIC REV E

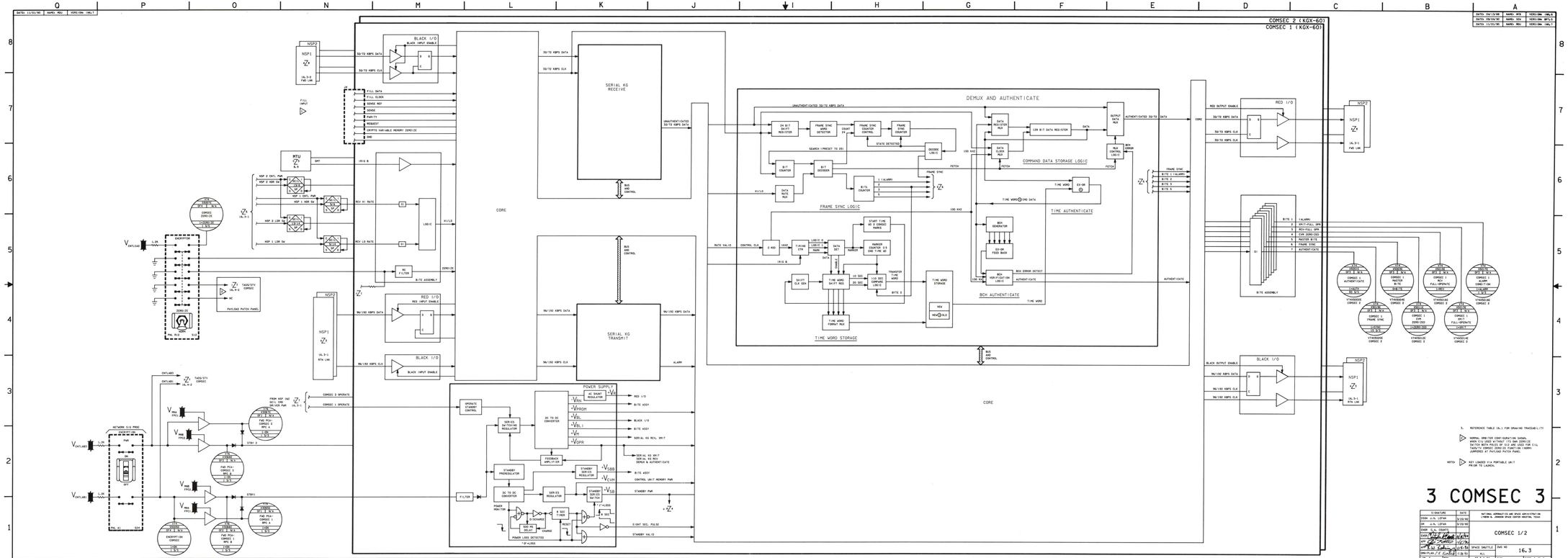

2 S-BD PM 1
S-BD PM TRANSPONDER
S-BAND PM TRANSPONDER
RCVR WIDEBAND DETECTOR AND IND 17
RCVR PREAMP/1ST IF
DUAL TRIPLEXER
TRANSMITTER
FREQUENCY SOURCE
PHASE LOCK LOOP CONTROL
VCXO CONTROL
POWER SUPPLY
OPTICAL ISOLATOR
CONTROL LOGIC
3RD MIXER LOOP
1ST LO LOOP
TX DRIVE LOOP
LINEAR PHASE MODULATOR
PHASE LOCK CHANNEL
COSTAS LOOP
WIDE BAND SELECTOR
AGC TLM
SPARE 1
SPARE 2
SPARE 3
SPARE 4
SPARE 5
SPARE 6
SPARE 7
SPARE 8
SPARE 9
SPARE 10
SPARE 11
SPARE 12
SPARE 13
SPARE 14
SPARE 15
SPARE 16
SPARE 17
SPARE 18
SPARE 19
SPARE 20
SPARE

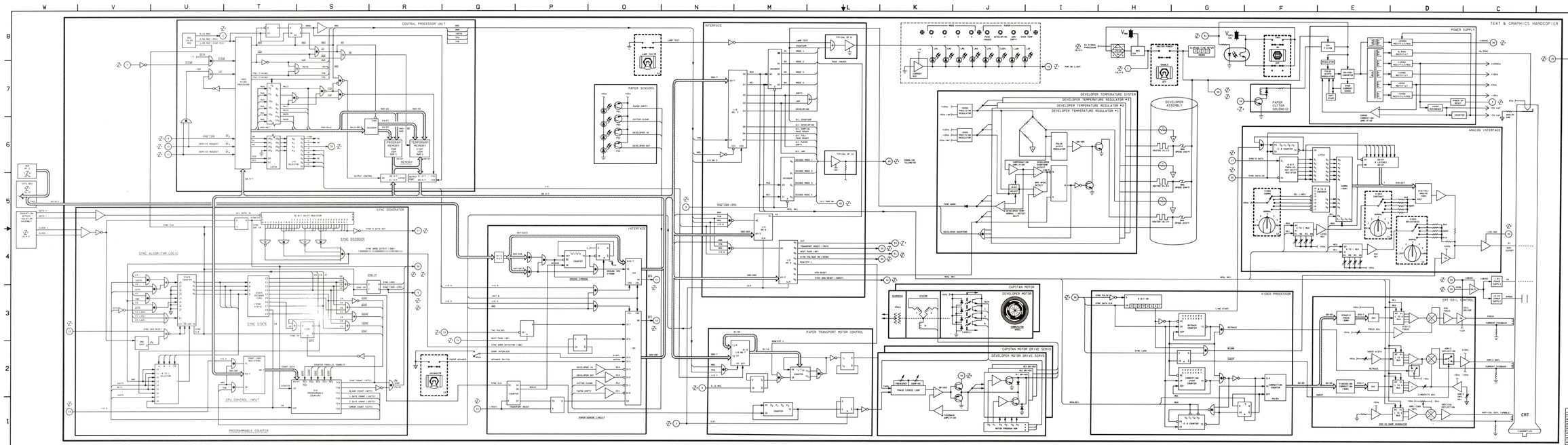

S-BAND POWER AMPLIFIER ASSEMBLY
PREAMPLIFIER ASSEMBLY
2 S-BD PM 2
S-BAND PM AMPLIFIER SYSTEM
BASIC REV E
BASIC REV E


S-BAND ANTENNA SWITCH
SWITCH BEAM CONTROL ELECTRONICS
ELECTRONICS 1
ELECTRONICS 2
PM ELEC 1
PM ELEC 2
LOWER LEFT SWITCH BEAM ANTENNA
LOWER RIGHT SWITCH BEAM ANTENNA
UPPER LEFT SWITCH BEAM ANTENNA
UPPER RIGHT SWITCH BEAM ANTENNA
CROSS DIPOLE ANTENNAS
LOWER LEFT QUAD
LOWER RIGHT QUAD
UPPER LEFT QUAD
UPPER RIGHT QUAD
2 S-BD PM 3
S-BAND PM/FM SWITCH BEAM ANTENNA SYSTEM
16.2
BASIC REV E


NETWORK SIGNAL PROCESSOR (NSP 3)
NETWORK SIGNAL PROCESSOR (NSP 1)
3 NSP RTN LINK 1
NETWORK SIGNAL PROCESSOR
RETURN LINK
MODE CONTROL
RECORD MODE PROCESSOR
RECORD MODE MULTIPLEXER
FREQUENCY CONVERTER
INTERNAL MODE LOGIC
RETURN LINK DATA BUFFERS
RETURN LINK INTERFACE
COMSEC INTERFACE
MODE SELECTOR
PAYLOAD STATION/AUDIO CONTROL UNIT SELECTOR
BASIC REV E


BIT SYNC
CONVOLUTIONAL DECODER
NASA/DOD SELECTOR
OUTPUT FORMATTER AND CONTROLLER
FRAME SYNC DETECT AND LOCK LOGIC
FRAME SYNC DETECT
COMMAND PROCESSOR
DOPPLER BUFFER
UPLINK PROGRAMMER
POWER CONVERTER
ACCU/PAYLOAD STATION VOICE AND CLOCK
VOICE BUFFERS
PSI-ACCU SELECTOR
VOICE DELTA DEMODULATOR 1
VOICE DELTA DEMODULATOR 2
3 NSP FWD LINK 2
NETWORK SIGNAL PROCESSOR FORWARD LINK
16.3


COMSEC 2 (KGX-60)
COMSEC 1 (KGX-60)
CORE
SERIAL KG RECEIVE
SERIAL KG TRANSMIT
BLACK I/O
RED I/O
DEMUX AND AUTHENTICATE
FRAME SYNC LOGIC
COMMAND DATA STORAGE LOGIC
TIME AUTHENTICATE
BCH AUTHENTICATE
TIME WORD STORAGE
POWER SUPPLY
MTU
NSP1
NSP2
PAYLOAD PATCH PANEL
ENCRYPTION
NETWORK SIG PROC
3 COMSEC 3
COMSEC 1/2
SPACE SHUTTLE
16,3
BASIC REV E


CENTRAL PROCESSOR UNIT
INTERFACE
PAPER SENSORS
LAMP TEST
LAMP DRIVER
PAPER TRANSPORT MOTOR CONTROL
DEVELOPER TEMPERATURE SYSTEM
DEVELOPER TEMPERATURE REGULATOR #3
DEVELOPER TEMPERATURE REGULATOR #2
DEVELOPER TEMPERATURE REGULATOR #1
DEVELOPER ASSEMBLY
CAPSTAN MOTOR
DEVELOPER MOTOR
CAPSTAN MOTOR DRIVE SERVO
POWER SUPPLY
TEXT & GRAPHICS HARDCOPIER
ANALOG INTERFACE
VIDEO PROCESSOR
CRT CONTROL
SYNC GENERATOR
SYNC ALGORITHM LOGIC
SYNC DECODER
SYNC STATE
PROGRAMMABLE COUNTER
CPU CONTROL INPUT
PROGRAM MEMORY FOR MPU
TEMPORARY MEMORY FOR MPU
MEMORY
CRT
4 TAGS/OHC 1
TEXT AND GRAPHICS SYSTEM
16.4
BASIC REV E

DATE: 08/09/89	NAME: BCH	VERSION: BPT.2
DATE: 05/25/90	NAME: SEV	VERSION: INK.5
DATE: 8/28/90	NAME: VSH	VERSION: INK.6

V76X 4388E OF1 N/A — MNA FPC1 POWER — 1=ON 1 S/S

V76X 4389E OF3 N/A — MNC FPC3 POWER — 1=ON 1 S/S

V_{MNA} FPC1

V_{MNC} FPC3

CONTROL VOLTAGES FROM "ENCRYPTION POWER" SWITCH PANEL A1L-S24 — 0Z3 16.3-3

CNTL AB1 — RPC 5A

CNTL AB3 — RPC 5A

V74X 8112E OF3 N/A — TAGS COMSEC ALARM — 1=ALARM 1 S/S

V74X 8113E OF3 N/A — TAGS COMSEC RECEIVE FULL-OPERATE — 1=RFO 1 S/S

V74X 8114E OF3 N/A — TAGS COMSEC TRANSMIT FULL-OPERATE — 1=TFO 1 S/S

FILL CONNECTOR

PAYLOAD PATCH PANEL — 0Z4 16.3-3 — (2)

POWER

ZEROIZE

ZEROIZE RETURN

OPERATE

RCV HI DATA

TAGS COMSEC KGX-60 — (2)

ENCRYPTOR (TRANSMIT)

DECRYPTOR (RECEIVE)

SECURE TV CLEAR DATA IN

SECURE TV CLEAR CLOCK IN

SECURE TV ENCRYPTED DATA OUT

SECURE TV ENCRYPTED CLOCK OUT

DATA IN — CLOCK IN — DATA OUT — CLOCK OUT

SECURE TELEVISION AIRBORNE DIGITIZER UNIT — 0Z4 16.13-4

+28VDC

BYPASS

KG ENABLE

1Z4 16.5-1 KU CONTROL POWER

TAGS DATA

ENCRYPTED

CLEAR

A1U — S18

BYPASS

+5VDC

ENCRYPTION BYPASS ISOLATION ASSY (EBIA)

KU BAND SIGNAL PROCESSING ASSY — 2Z5 16.5-1

128 KHZ DATA

128 KHZ CLOCK

1Z8 16.4-1 (1)

FILTER

SWITCHING REGULATOR

5VDC "B" SUPPLY

5VDC "R" SUPPLY

(1)

ENABLE

MUX

1A 1B 1Y 2A 2B 2Y SELECT

128 KHZ CLOCK

128 KHZ DATA

TEXT AND GRAPHICS SYSTEM ONBOARD HARDCOPIER — 4Z5 16.4-1

"B" SIDE "R" SIDE

4. REFER TO TABLE 16.1 FOR DRAWING TRACEABILITY LIST

(2) MISSION DEPENDENT CONFIGURATION OF THE TAGS COMSEC ZEROIZE AND ZEROIZE RETURN LINES IS PERFORMED AT THE PAYLOAD PATCH PANEL. THIS CONFIGURATION VARIES DEPENDING UPON WHETHER OR NOT A CIU THAT IS PERFORMING DECRYPTION IS PRESENT ON A SPECIFIC FLIGHT. IF THE CIU IS NOT PRESENT THEN THE ZEROIZE LINES ARE ROUTED TO THE ORBITER COMSEC ZEROIZE SWITCH ON PANEL R12L AND THE ZEROIZE FUNCTION ON THE TAGS COMSEC IS INITIATED AT THE SAME TIME AS AN ORBITER COMSEC ZEROIZE (SEE DRAWING 16.3-3 ZONE O-4). IF THE CIU IS PRESENT THEN THE TAGS COMSEC ZEROIZE LINES ARE JUMPERED TOGETHER AT THE PAYLOAD PATCH PANEL. IN THIS JUMPERED CONFIGURATION, IF A ZEROIZE OF THE TAGS COMSEC IS REQUIRED, "ENCRYPTION POWER", SWITCH S24 ON PANEL A1L MUST BE TURNED OFF FOR AT LEAST 8 SECONDS. THE EXACT CONFIGURATION OF THE TAGS COMSEC ZEROIZE FUNCTION ON DOD MISSIONS IS CLASSIFIED

(2) THE TAGS COMSEC LRU IS IDENTICAL TO THE ORBITER COMSEC LRU. ONLY THOSE INTERFACES SHOWN ARE REQUIRED FOR TAGS/STV OPERATION. SEE DRAWING 16.3-3

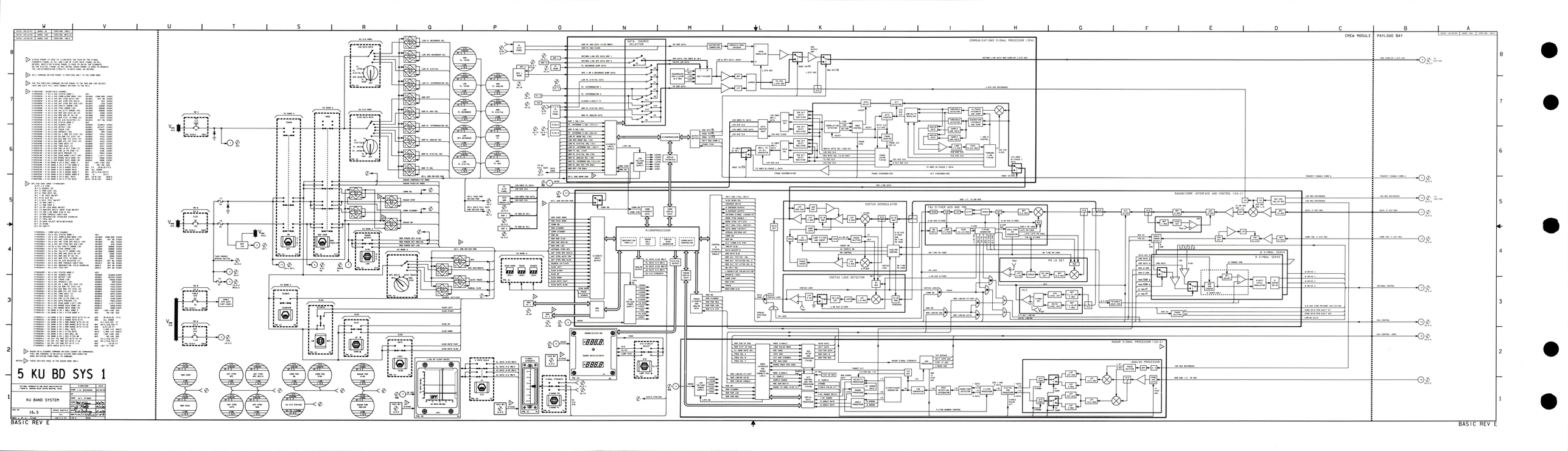
NOTES: (1) "B" SUPPLY PROVIDES POWER TO THE INPUT (LEFT) HALF OF THE EBIA. "R" SUPPLY PROVIDES POWER TO THE OUTPUT (RIGHT) HALF OF THE EBIA. THIS IS NOT A REDUNDANT SUPPLY. FAILURE OF EITHER SUPPLY CAUSES LRU FAILURE

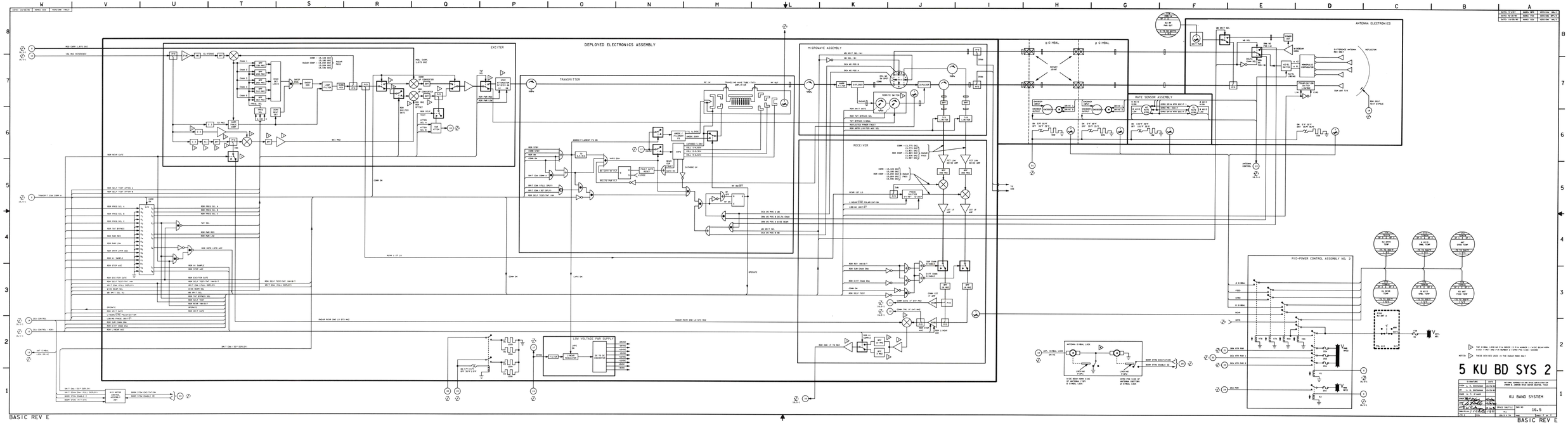
4 SECURE TAGS/TV 2

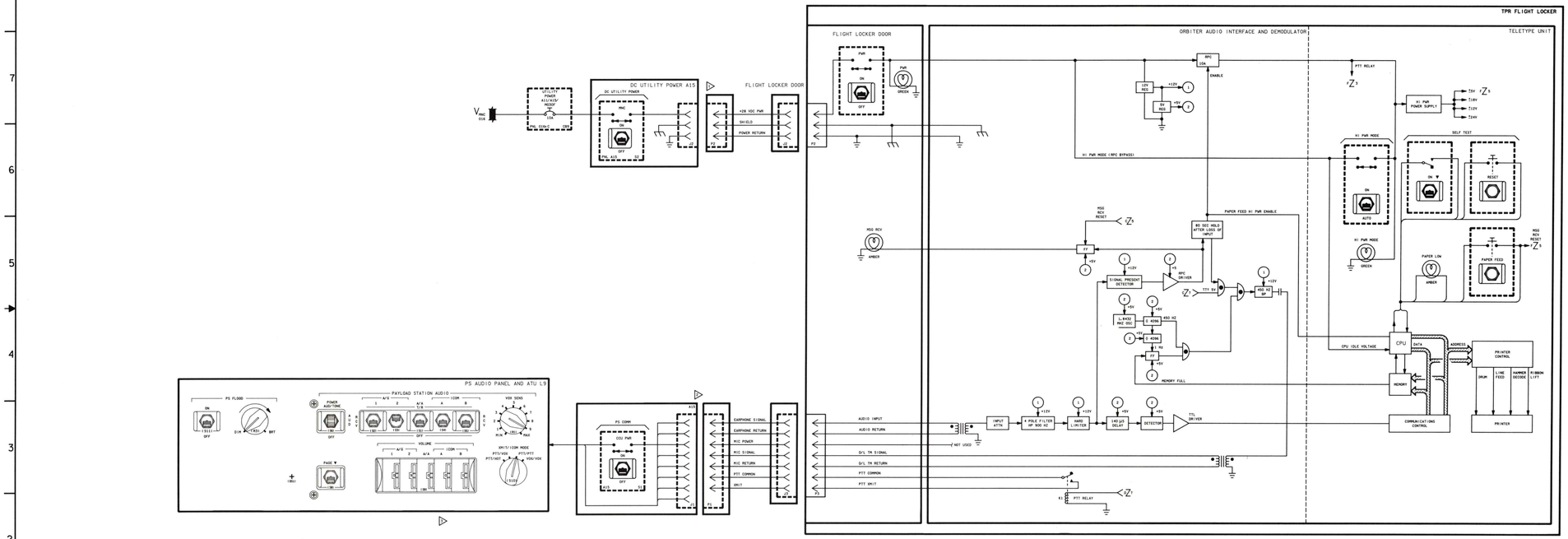
SIGNATURE		DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS	
DSGN	J. A. NEELY	1/13/87		
DR	J. A. NEELY	1/13/87		
ENGR	C. A. COUNTS		SECURE TEXT & GRAPHICS SYSTEM TELEVISION INTERFACES	
ENGR				
APP				
APP		9-12-90	SPACE SHUTTLE	DWG NO 16.4
OMNIPLAN			ALL	
LTR E	PCN		44 X 34	PAGE SHEET 2 OF 2

BASIC REV E

BASIC REV E


5 KU BD SYS 1
KU BAND SYSTEM
CREW MODULE
PAYLOAD BAY
COMMUNICATIONS SIGNAL PROCESSOR (CSP)
RADAR/COMM INTERFACE AND CONTROL (EA-1)
RADAR SIGNAL PROCESSOR (EA-2)
DATA SOURCE SELECTOR
MICROPROCESSOR
COSTAS DEMODULATOR
COSTAS LOCK DETECTOR
PN LK DET
TAU DITHER ACQ AND TRK
ANALOG PROCESSOR
STATE
AZ GIMBAL SERVO
EL GIMBAL SERVO
RADAR CONTROL PROCESSOR
RADAR SIGNAL STRENGTH
TARGET SET
RANGE/VELOCITY/TGA
RANGE RATE VELOCITY
RANGE
VELOCITY
TGA
BASIC REV E
BASIC REV E


DEPLOYED ELECTRONICS ASSEMBLY
EXCITER
TRANSMITTER
MICROWAVE ASSEMBLY
RECEIVER
LOW VOLTAGE PWR SUPPLY
GIMBAL
ANTENNA ELECTRONICS
RATE SENSOR ASSEMBLY
MID-POWER CONTROL ASSEMBLY NO. 2
5 KU BD SYS 2
KU BAND SYSTEM
BASIC REV E



▷ A/G LOOP BEING USED BY TELEPRINTER SHOULD BE CONFIGURED FOR RCV ONLY ON ALL OTHER AUDIO PANELS

▷ NORMALLY CONNECTED TO PS CDU OUTLET, MAY BE CONNECTED TO ANY CDU OUTLET, CABLE LENGTH PERMITTING

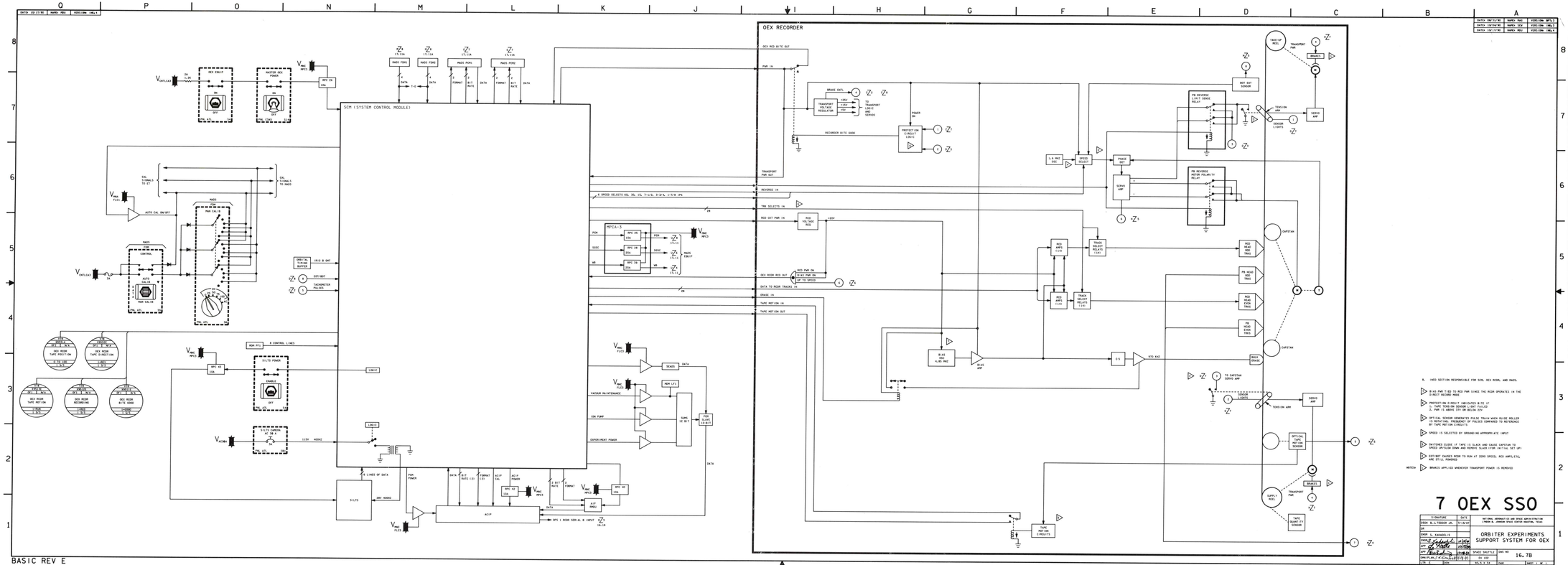
NOTES: ▷ NORMALLY CONNECTED TO A1S DC UTILITY OUTLET, MAY BE CONNECTED TO ANY DC UTILITY OUTLET, CABLE LENGTH PERMITTING

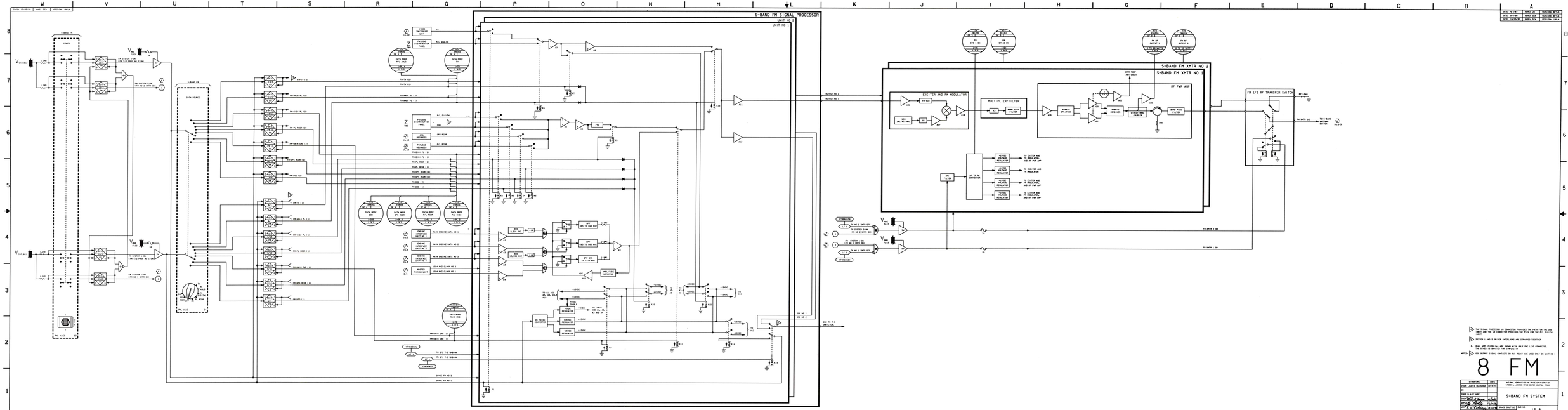
6 TPR

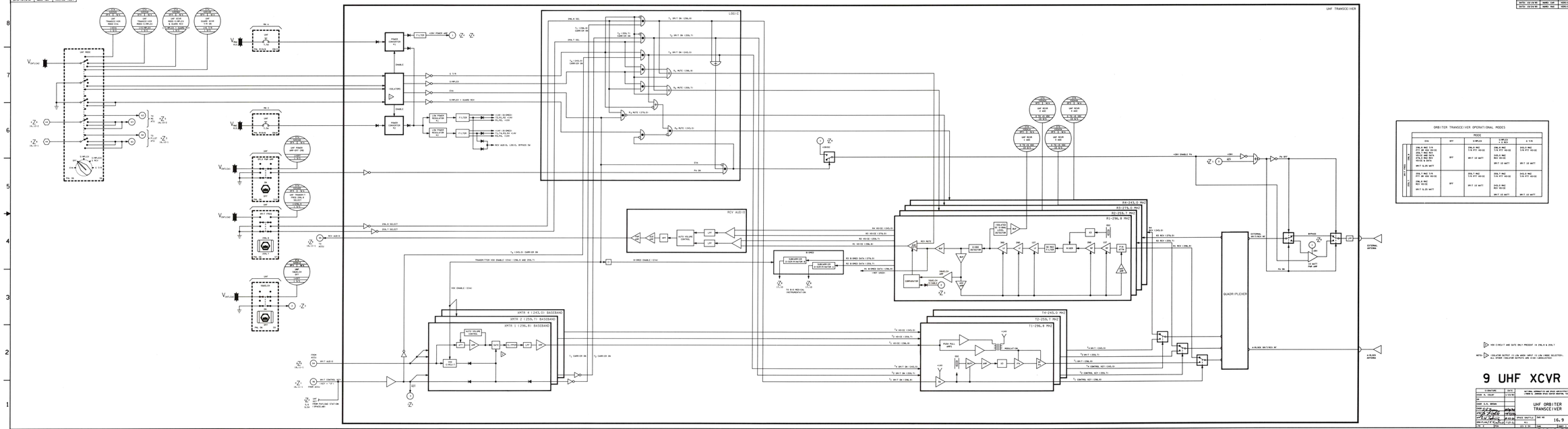
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN VICKI DODGETT	3/31/88	LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR		
ENGR A. MORRISON		TELEPRINTER
CHIEF J. Thomas 10-27-88		
APP CCO Field 10-31-88		
APP P.U. Kelly 4-11-89		SPACE SHUTTLE DWG NO 16.6
DRFTS/ILTR/CADD/		ALL
LTR 1 DCN		SIZE D SCH DWG NO 1 OF 1

BASIC REV E

BASIC REV E

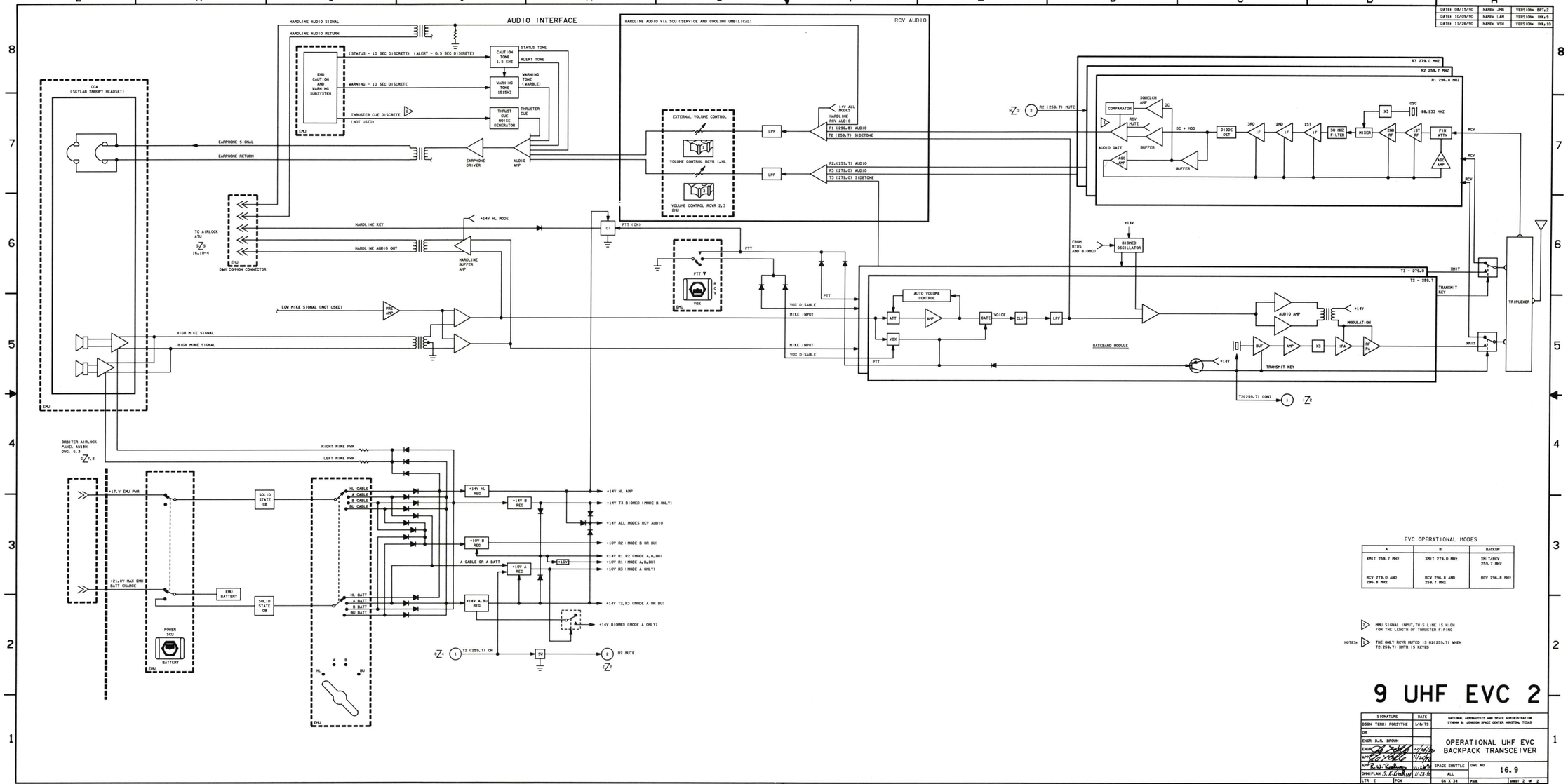

OEX RECORDER
SCM (SYSTEM CONTROL MODULE)
OEX ROM BITE OUT
PWR IN
TRANSPORT PWR OUT
REVERSE IN
8 SPEED SELECTS 60, 30, 15, 7-1/2, 3-3/4, 1-7/8 IPS
TRK SELECTS IN
ROS CAT PWR IN
PCM
SSSC
MR
OEX ROM ROS OUT
DATA TO ROM TRACKS
ERASE IN
TAPE MOTION IN
TAPE MOTION OUT
ROS PWR ON
B+U PWR ON UP TO SPEED
BRAKE CNTL
TRANSPORT VOLTAGE REGULATOR
+32V
+22V
+12V
+5V
TO TRANSPORT LOGIC & SERVO
POWER ON
PROTECT ON BITE LOGIC
RECORDER BITE GOOD
+5 VDC REG
SPEED TRIM
PHASE ADJ
SERVO AMP
PB REVERSE LIMIT SENSE RELAY
PB REVERSE MOTOR POLARITY RELAY
TAKE-UP REEL
TRANSPORT PWR
BRAKES
BOT EOT SENSOR
TENSION ARM
TENSION ARM LIGHTS
SERVO AMP
CAPSTAN
PB HEAD 500 TRKS
ROS HEAD 500 TRKS
FB HEAD 1000 TRKS
CAPSTAN
BULK ERASE
OPTICAL CAPSTAN SERVO SENSOR
SERVO AMP
BRAKES
SUPPLY REEL
TAPE QUANTITY SENSOR
TAPE MOTION SENSOR
ROS AMPS (14)
TRACK SELECT RELAYS (14)
ROS AMPS (14)
TRACK SELECT RELAYS (14)
B+U OSC 4.85 MHZ
B+U AMP
÷ 5
STU ASC
MAGS PCM1
MAGS PCM2
MAGS PCM3
MAGS PCM4
DATA
FORMAT
BIT RATE
MPC 39 15A
MPC 40 15A
MPC 41 15A
MPC 42 15A
MPC 43 15A
MPC 44 15A
MPC 45 15A
MPC 46 15A
MPC 47 15A
MPC 48 15A
MPC 49 15A
MPC 50 15A
MPC 51 15A
MPC


S-BAND FM SIGNAL PROCESSOR
UNIT NO 2
S-BAND FM XMTR NO 2
S-BAND FM XMTR NO 1
EXCITER AND FM MODULATOR
MULTIPLIER/FILTER
RF PWR AMP
FM S/Z RF TRANSFER SWITCH
S-BAND FM SYSTEM
8 FM
16.8
BASIC REV E


UHF TRANSCEIVER
LOGIC
R1-296.8 MHZ
R2-259.0 MHZ
R3-276.0 MHZ
R4-243.0 MHZ
T1-259.7 MHZ
T2-259.0 MHZ
T3-276.8 MHZ
T4-243.0 MHZ
SYNTH 1 (296.8) BASEBAND
SYNTH 2 (259.7) BASEBAND
SYNTH 3 (243.0) BASEBAND
QUADRIPLEXER
EXTERNAL ANTENNA
9 UHF XCVR 1

ORBITER TRANSCEIVER OPERATIONAL MODES
MODE
SIMPLEX
DUPLEX
S/G
ANTENNA
OMNI A
OMNI B
OMNI C
OMNI D
259.7 MHZ T/R PTT 16/32
259.0 MHZ RCV 16/32
WAIT 15 WATT
243.0 MHZ T/R PTT 16/32
276.8 MHZ RCV 16/32
276.0 MHZ T/R PTT 16/32
296.8 MHZ RCV 16/32

BASIC REV E



DATE: 08/15/90	NAME: JMB	VERSION: BPT2
DATE: 10/09/90	NAME: LAM	VERSION: INR.9
DATE: 11/26/90	NAME: VSH	VERSION: INR.10

EVC OPERATIONAL MODES

A	B	BACKUP
XMIT 259.7 MHz	XMIT 279.0 MHz	XMIT/RCV 259.7 MHz
RCV 279.0 AND 296.8 MHz	RCV 296.8 AND 259.7 MHz	RCV 296.8 MHz

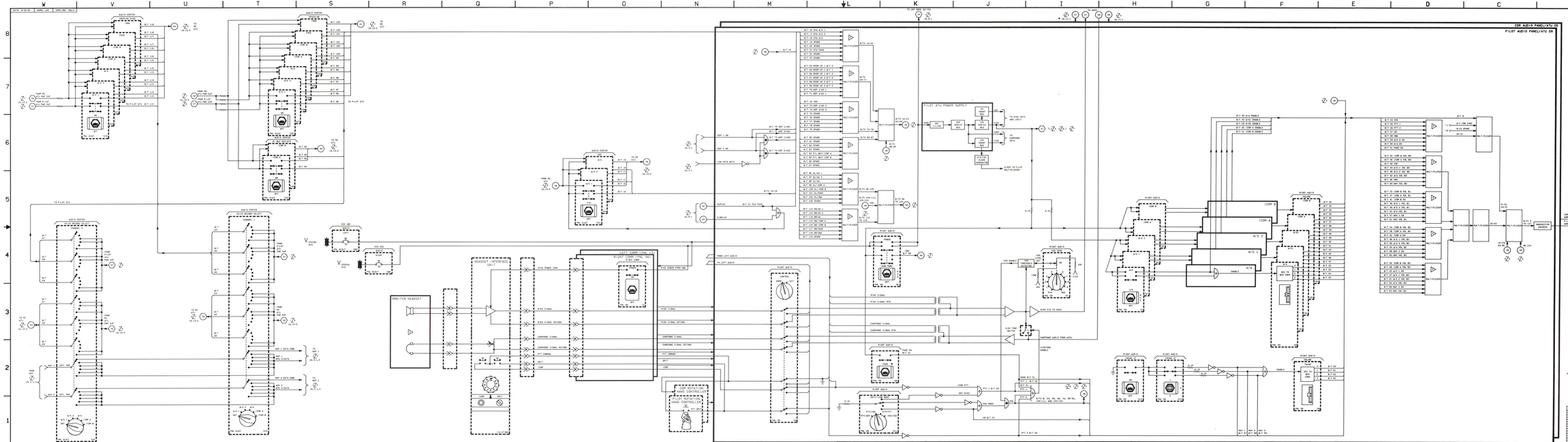
NOTES:
1. MMU SIGNAL INPUT, THIS LINE IS HIGH FOR THE LENGTH OF THRUSTER FIRING
2. THE ONLY RCVR MUTED IS R2(259.7) WHEN T2(259.7) XMTR IS KEYED

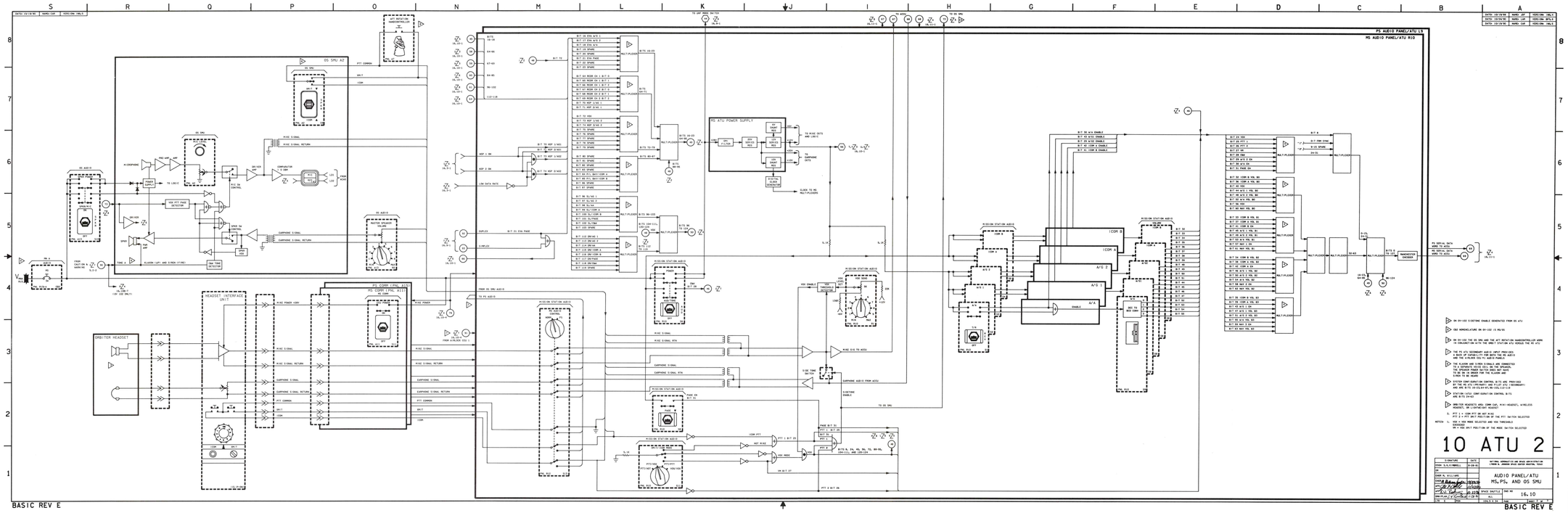
9 UHF EVC 2

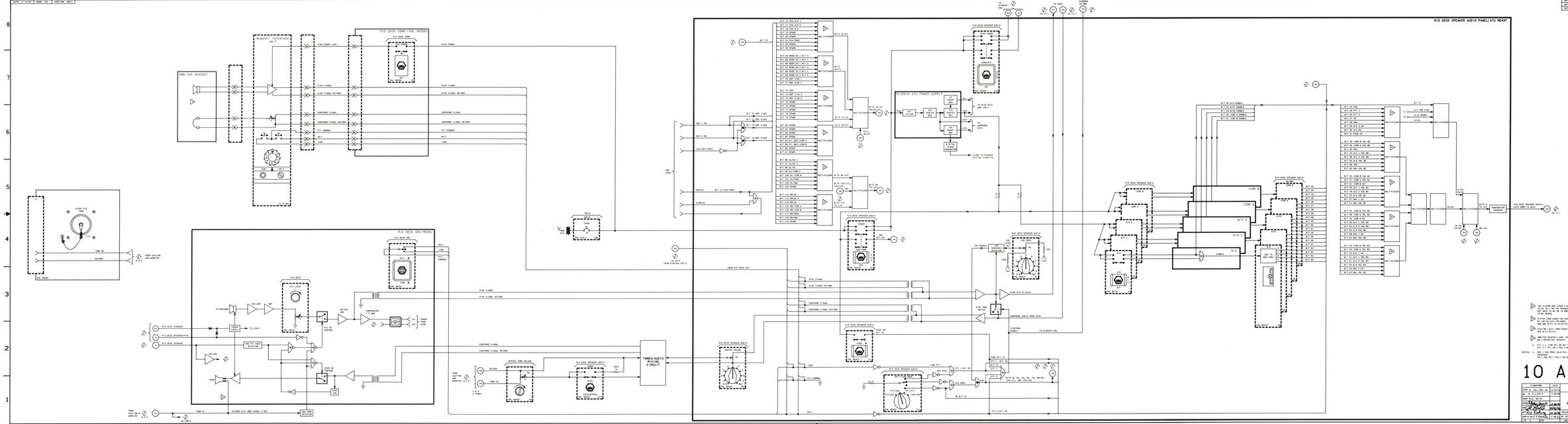
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN TERRI FORSYTHE	1/8/79	
DR		
ENGR D.R. BROWN		OPERATIONAL UHF EVC BACKPACK TRANSCEIVER
ENGR		
APP		
APP		
OMNIPLAN		SPACE SHUTTLE / ALL / DWG NO 16.9
LTR E	PCN	66 X 34 / PAPR / SHEET 3 OF 3

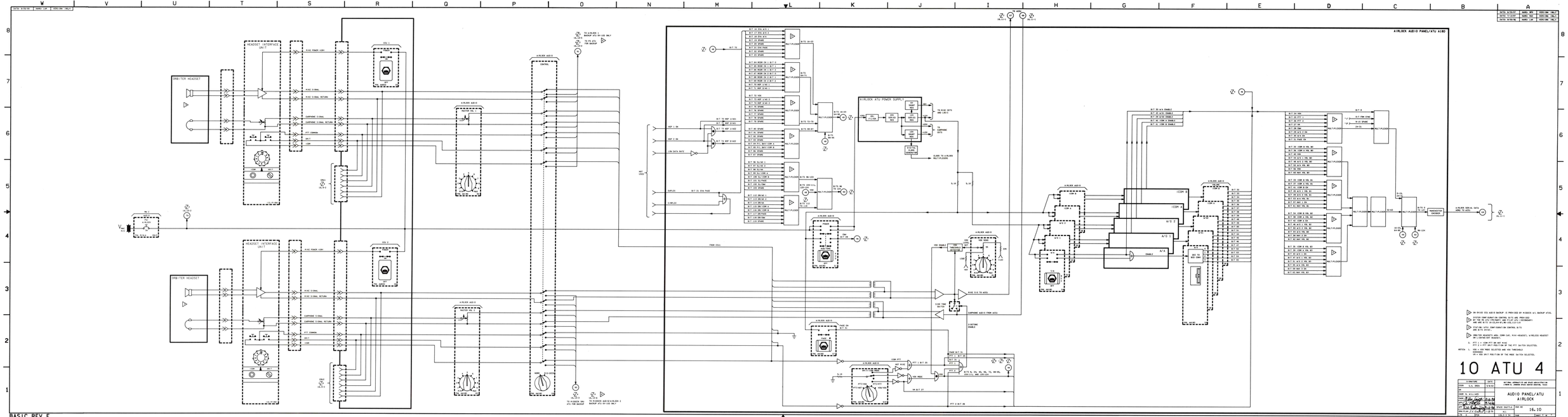
BASIC REV E

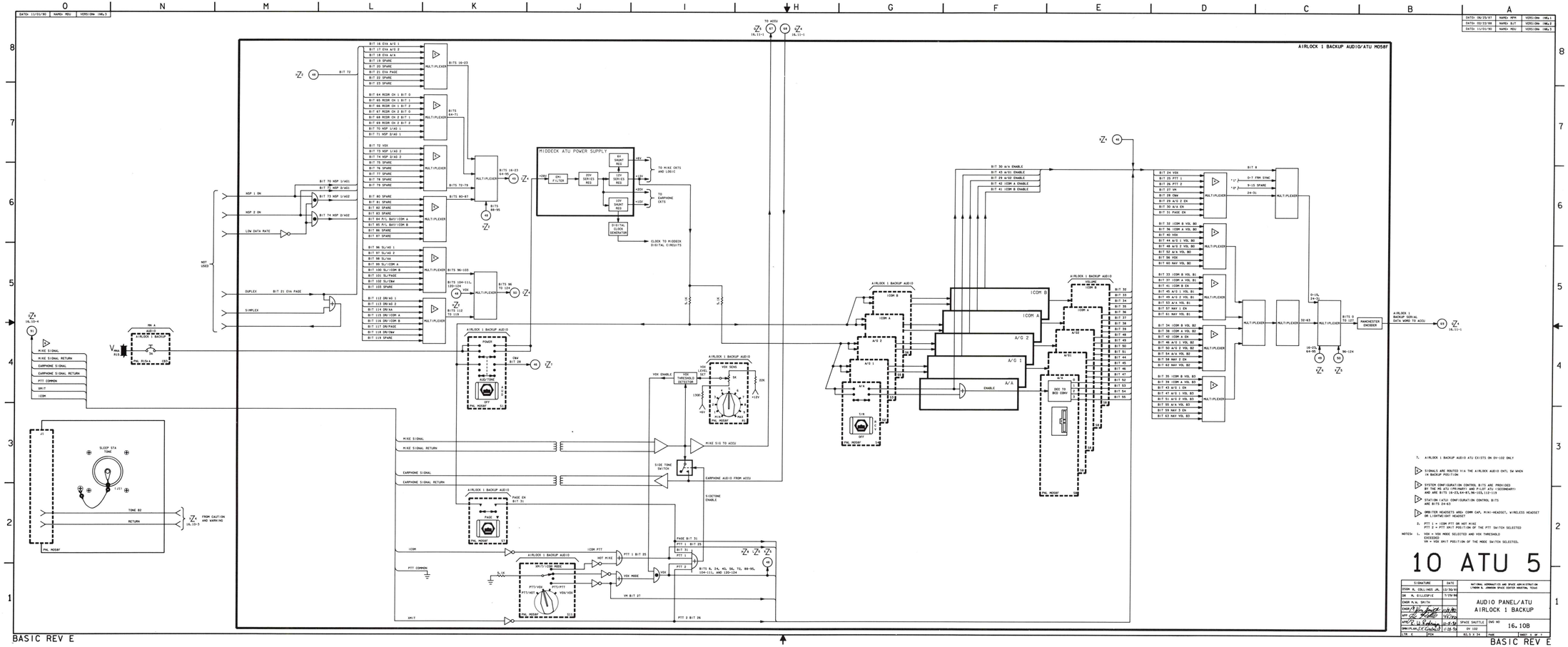
BASIC REV E

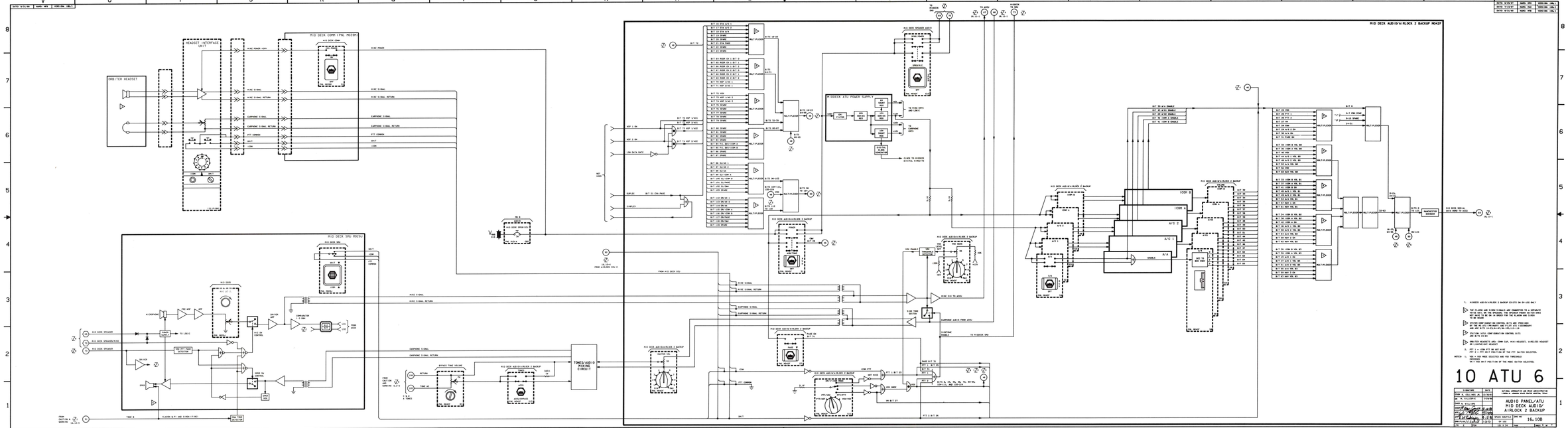

AUDIO CENTER
CDR AUDIO PANEL/ATU 09
PILOT AUDIO PANEL/ATU 09
PILOT ATU POWER SUPPLY
HEADSET INTERFACE UNIT
LEFT CDR ROTATION HAND CONTROLLER
RIGHT CDR ROTATION HAND CONTROLLER
10 ATU 1
AUDIO PANEL/ATU PLT, CDR
16.10
BASIC REV E

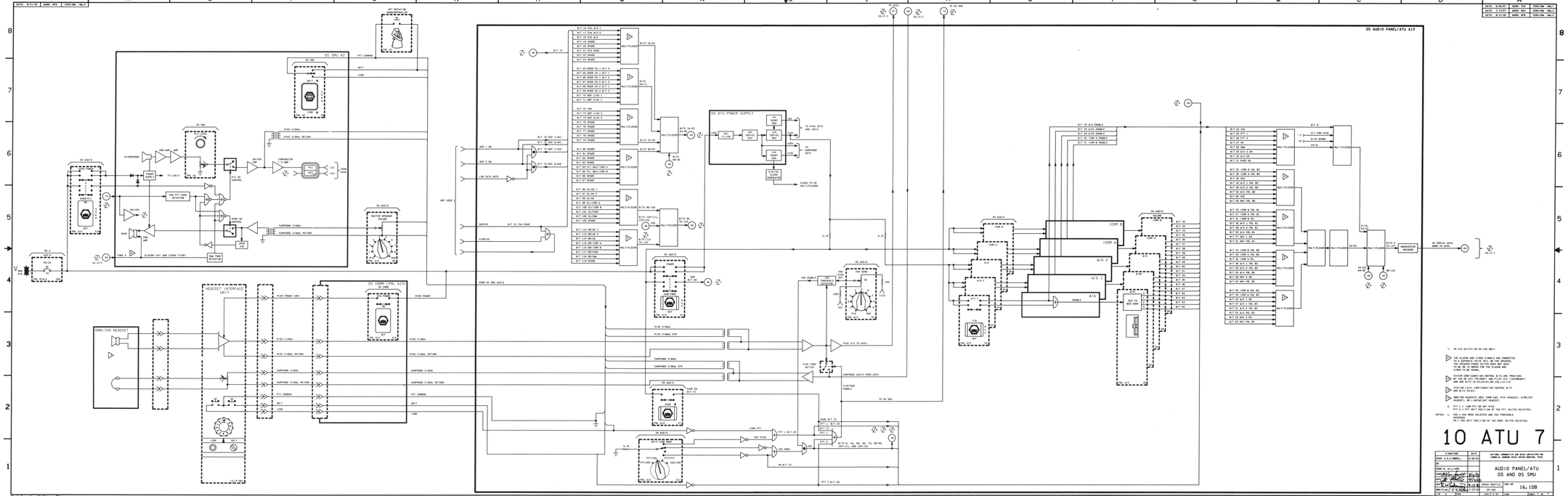

PS AUDIO PANEL/ATU L9
MS AUDIO PANEL/ATU R10
OS SMU A2
PS ATU POWER SUPPLY
PS (COMM 1 PNL A11)
MS COMM 1 PNL A11
ORBITER HEADSET
HEADSET INTERFACE UNIT
OS AUDIO
PS AUDIO
MS AUDIO
PTT COMMON
MIKE SIGNAL
MIKE SIGNAL RETURN
EARPHONE SIGNAL
EARPHONE SIGNAL RETURN
10 ATU 2
AUDIO PANEL/ATU
MS, PS, AND OS SMU
BASIC REV E

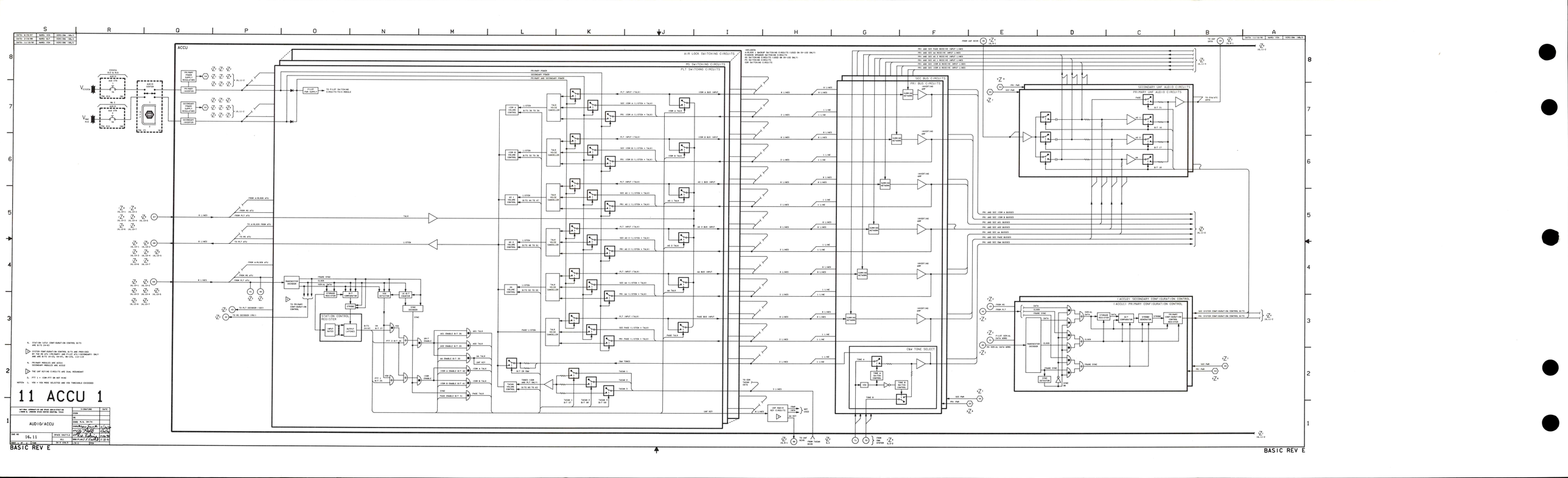

MID DECK SPEAKER AUDIO PANEL/ATU M042F
MID DECK COMM PANEL M039F
MID DECK SMU M029J
ORBITER HEADSET
HEADSET INTERFACE UNIT
SLEEP STA
TONE B2
RETURN
TONE B
ALARM (LFT) AND SONOA (CTR)
MID DECK SPEAKER
MID DECK SPEAKER/MIC
MID DECK SPEAKER
MID DECK SPEAKER AUDIO
MID DECK SPEAKER AUDIO PANEL/ATU M042F
M-DECK ATU POWER SUPPLY
TONES/ AUDIO MIXING CIRCUIT
BYPASS TONE VOLUME
AUDIO BYPASS
TONE ADJ
M-DECK ATU CONTROL
PTT/COM
MIC/SPKR
MID DECK SMU
MID DECK SPEAKER SERIAL DATA WIRES TO ATU
MULTIPLEXER
DEMULTIPLEXER
TO M-DECK ATU
TO M-DECK SMU
FROM M-DECK CCU
TO M-DECK CCU
FROM CAUTION AND WARNING
TO CAUTION AND WARNING
TO PAYLOAD
FROM PAYLOAD
TO M-DECK SMU
FROM M-DECK SMU
TO M-DECK ATU
FROM M-DECK ATU
TO M-DECK CCU
FROM M-DECK CCU
TO M-DECK SPEAKER
FROM M-DECK SPEAKER
TO M-DECK SPEAKER/MIC
FROM M-DECK SPEAKER/MIC
TO M-DECK SPEAKER AUDIO PANEL/ATU M042F
FROM M-DECK SPEAKER AUDIO PANEL/ATU M042F

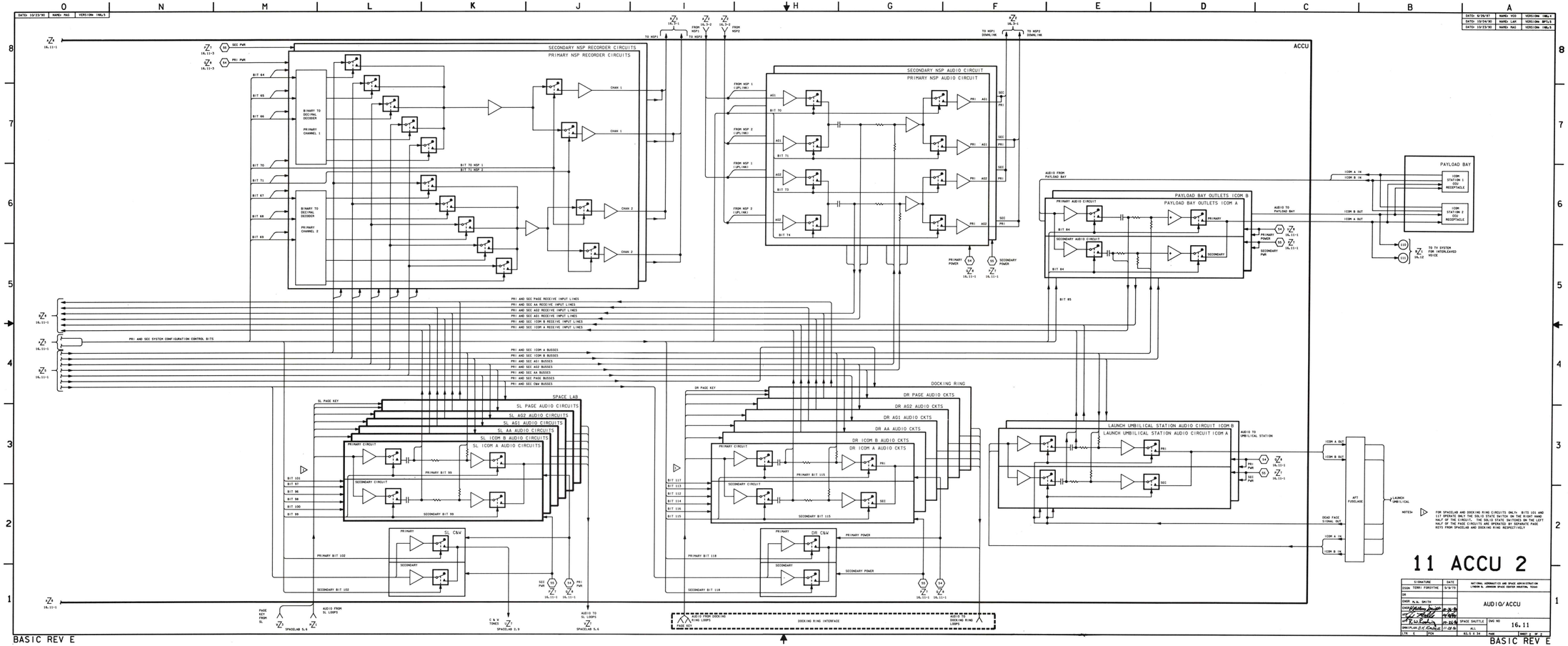

ORBITER HEADSET
HEADSET INTERFACE UNIT
AIRLOCK AUDIO CONTROL
AIRLOCK AUDIO MASTER VOL 1
AIRLOCK AUDIO MASTER VOL 2
AIRLOCK AUDIO POWER SUPPLY
AIRLOCK AUDIO PANEL/ATU A18D
MULTIPLEXER
DEMULTIPLEXER
PROCESSOR ENCODER
COMM
MIC
PTT
ICOM
A/G 1
A/G 2
A/G 3
ENABLE
TO AIRLOCK AUDIO BACKUP ATU 84-V05 ONLY
TO PRI ATU FOR BACKUP
TO PLUGGED INTO ATU FOR BACKUP
TO PLUGGED INTO AIRLOCK AUDIO BACKUP ATU 84-V05 ONLY
FROM CCU
AIRLOCK AUDIO PANEL/ATU A18D
10 ATU 4
AUDIO PANEL/ATU
AIRLOCK
16.10
BASIC REV E

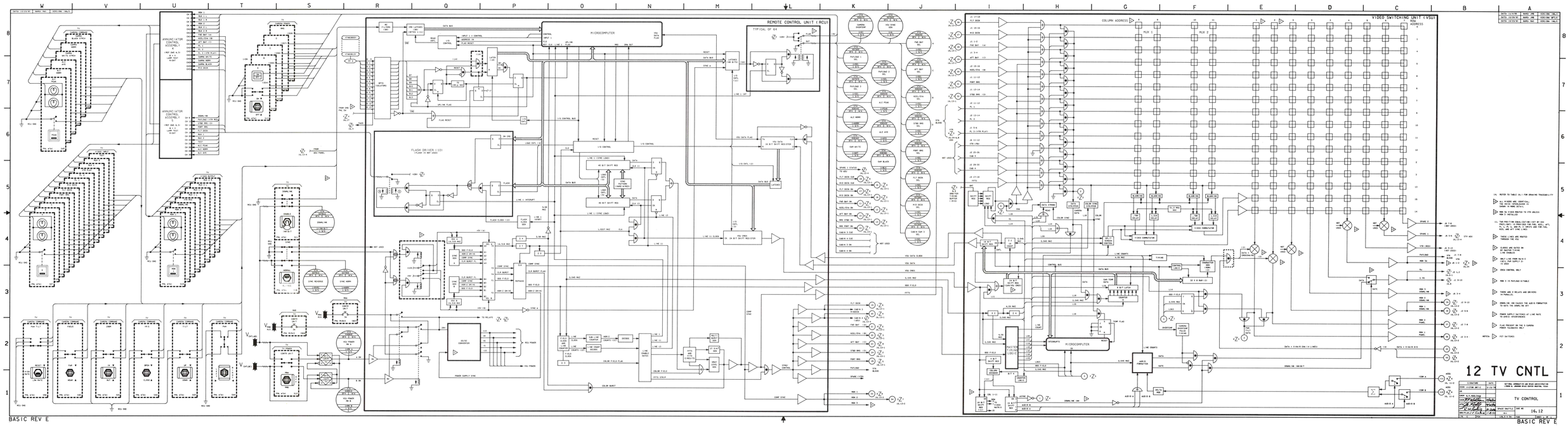

AIRLOCK I BACKUP AUDIO/ATU MOD8F
MIDDECK ATU POWER SUPPLY
AIRLOCK I BACKUP AUDIO
AUDIO/TONE
VOX
PAGE
ICOM
A/G 1
A/G 2
A/A
ENABLE
MIKE SIGNAL
MIKE SIGNAL RETURN
EARPHONE SIGNAL
EARPHONE SIGNAL RETURN
PTT COMMON
XMIT
ICOM
SLEEP STA TONE
TONE B2
RETURN
FROM CAUTION AND WARNING
MIKE S/O TO ACCU
EARPHONE AUDIO FROM ACCU
SIDE TONE SWITCH
SIDETONE ENABLE
TO MIKE CKTS AND LOGIC
TO EARPHONE CKTS
CLOCK TO MIDDECK DIGITAL CIRCUITS
MSP 1 ON
MSP 2 ON
LOW DATA RATE
DUPLEX
SIMPLEX
NOT USED
BIT 72
BIT 21 EVA PASE
BITS 16-23
BITS 64-71
BITS 72-79
BITS 80-87
BITS 88-95
BITS 96-103
BITS 104-111, 120-124
BITS 112 TO 119
BITS 16 TO 23
BITS 0 TO 127
MANCHESTER ENCODER
AIRLOCK I SERIAL DATA WORD TO ACCU
DEC TO BCD CONV
VOX ENABLE
VOX MODE
PTT 1
PTT 2
HOT MIKE
PTT/VOX
VOX/VOX
VM BIT 27
PTT 1 BIT 25
PTT 2 BIT 26
PAGE BIT 31
PAGE EN BIT 31
CNA BIT 28
BIT 30 A/A ENABLE
BIT 42 A/G1 ENABLE
BIT 29 A/G2 ENABLE
BIT 41 ICOM A ENABLE
BIT 40 ICOM B ENABLE
BIT 0
0-7 FRM SYNC
9-15 SPARE
24-31
32-63
64-95
96-124
0-15, 24-31
16-23, 64-95
+5V
+12V
-12V
+28V
8V SHUNT REG
12V SERIES REG
20V SERIES REG
12V SHUNT REG
EMI FILTER
DIGITAL CLOCK GENERATION
PNL MOD8F
PNL 9184
PNL MOD8AT
PNL MOD8F
PNL MOD8F
PNL MOD8F

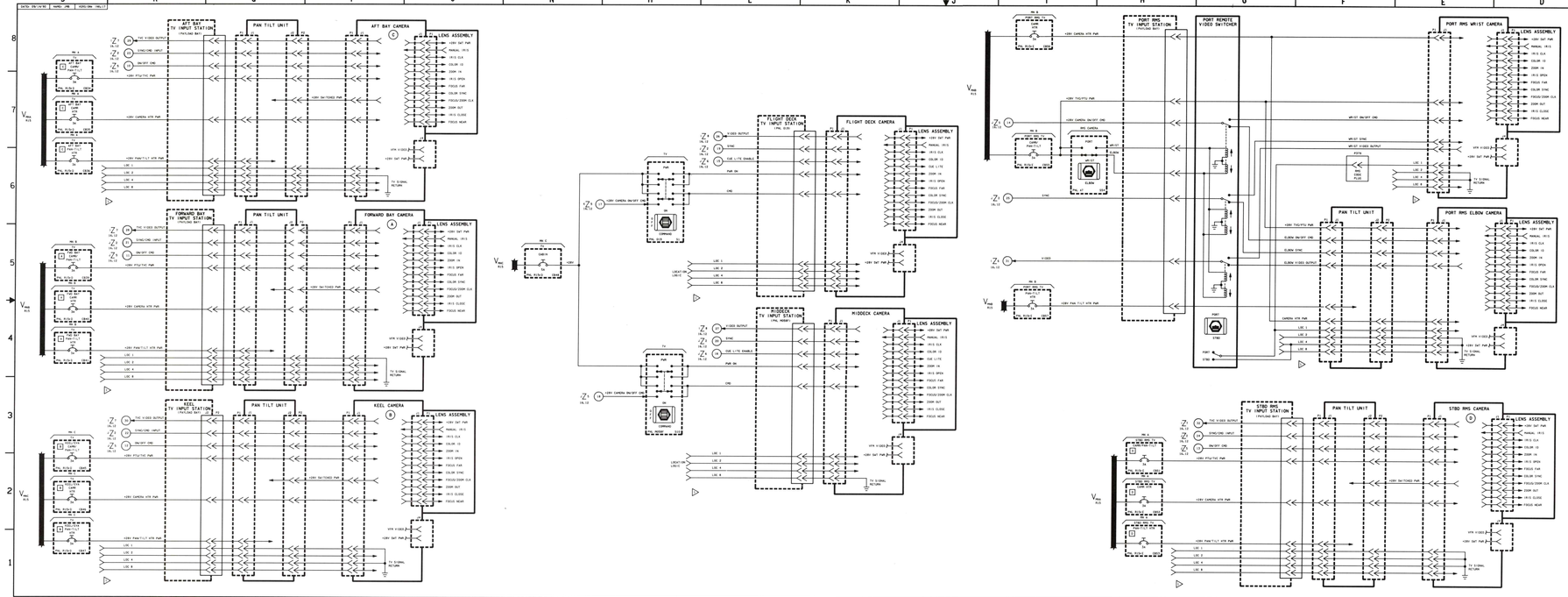

MID DECK AUDIO/AILBLOCK 2 BACKUP MD42F
MID DECK COMM I PNL MD39J
MID DECK CMU MD29J
HEADSET INTERFACE UNIT
ORBITER HEADSET
TONES/AUDIO MIXING CIRCUIT
MID DECK SPEAKER AUDIO
MID DECK SPEAKER
MID DECK SPEAKER/MIKE
MID DECK MIKE
MID DECK CMU
MID DECK COMM
MID DECK AUDIO/AILBLOCK 2 BACKUP
MID DECK AUDIO/AILBLOCK 2 BACKUP
MID DECK AUDIO/AILBLOCK 2 BACKUP


OS AUDIO PANEL/ATU A13
OS SMU #2
OS SMU
OS AUDIO
OS ATU POWER SUPPLY
OS COMM (FNL A13)
HEADSET INTERFACE UNIT
ORBITER HEADSET
PTT ROTATION OS COMM
MULTIPLEXER
DEMULTIPLEXER
10 ATU 7
AUDIO PANEL/ATU OS AND OS SMU
16.10B
BASIC REV E


ACCU
AIR LOCK SWITCHING CIRCUITS
PRIMARY POWER
SECONDARY POWER
PRIMARY AND SECONDARY POWER
PRIMARY POWER RECEPTACLE
SECONDARY POWER RECEPTACLE
PRIMARY POWER SUPPLY REGULATORS
SECONDARY POWER SUPPLY REGULATORS
PRIMARY VALVES
SECONDARY VALVES
PILOT PWR. SUPPLY
TO PILOT SWITCHING CIRCUITS-PILOT MODULE
PRIMARY POWER RECEPTACLE
SECONDARY POWER RECEPTACLE
PRIMARY POWER SUPPLY REGULATORS
SECONDARY POWER SUPPLY REGULATORS
PRIMARY VALVES
SECONDARY VALVES
PRIMARY POWER SUPPLY REGULATORS
SECONDARY POWER SUPPLY REGULATORS
PRIMARY VALVES
SECONDARY VALVES
PRIMARY POWER RECEPTACLE
SECONDARY POWER RECEPTACLE


ACCU
SECONDARY NSP RECORDER CIRCUITS
PRIMARY NSP RECORDER CIRCUITS
SECONDARY NSP AUDIO CIRCUIT
PRIMARY NSP AUDIO CIRCUIT
PAYLOAD BAY
PAYLOAD BAY OUTLETS ICOM B
PAYLOAD BAY OUTLETS ICOM A
LAUNCH UMBILICAL STATION AUDIO CIRCUIT ICOM B
LAUNCH UMBILICAL STATION AUDIO CIRCUIT ICOM A
SPACE LAB
SL PAGE AUDIO CIRCUITS
SL AG2 AUDIO CIRCUITS
SL AG1 AUDIO CIRCUITS
SL AA AUDIO CIRCUITS
SL ICOM B AUDIO CIRCUITS
SL ICOM A AUDIO CIRCUITS
DOCKING RING
DR PAGE AUDIO CKTS
DR AG2 AUDIO CKTS
DR AG1 AUDIO CKTS
DR AA AUDIO CKTS
DR ICOM B AUDIO CKTS
DR ICOM A AUDIO CKTS
PRI AND SEC SYSTEM CONFIGURATION CONTROL BITS
DOCKING RING INTERFACE
11 ACCU 2
AUDIO/ACCU
BASIC REV E


12 TV CNTL
TV CONTROL
16.12
VIDEO SWITCHING UNIT (VSU)
REMOTE CONTROL UNIT (RCU)
TYPICAL OF 64
MICROCOMPUTER
FLASH DRIVER (10)
(FLASH IS NOT USED)
ANNUNCIATOR CONTROL ASSEMBLY
MASTER TIMING LOGIC
SPACE SHUTTLE
BASIC REV E



NOTES:
1. REFER TO TABLE 16.1 FOR DRAWING TRACEABILITY
2. LOCATION BIT 16 IS ALWAYS OPEN

13 TV 1

SIGNATURE	DATE
ENGR. ELEC. DESIGN	5/9/78
QA	
CHIEF S/A ENGINEERING	
PROGRAM INTEGRATION	5-9-80
MISSION MANAGEMENT	5-9-80
DIRECTOR, FLT CONTROL & DYNAMICS	5-9-80

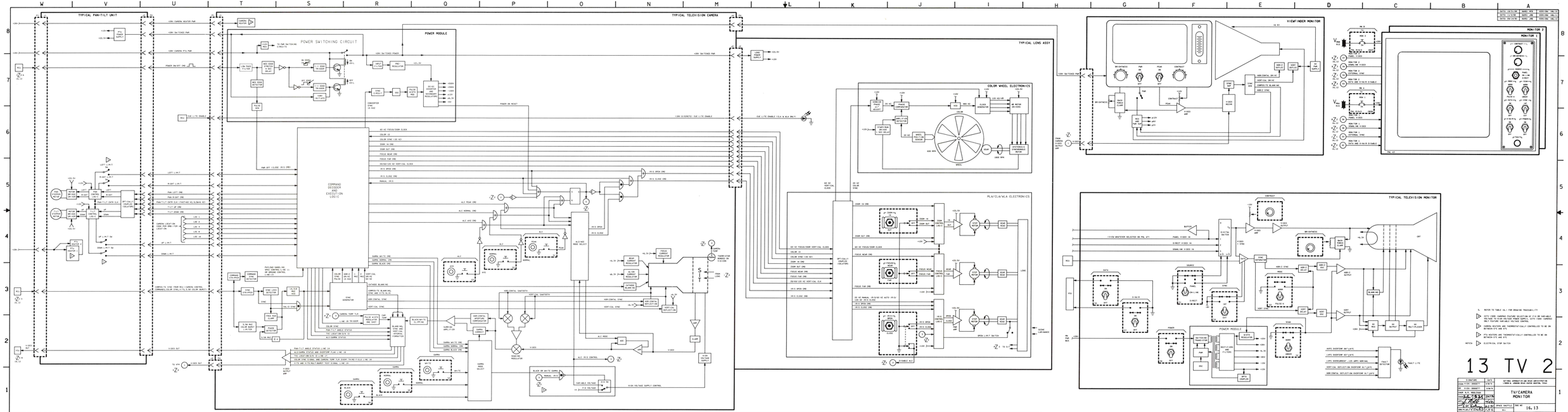
NOTICE: THIS DRAWING CONTAINS INFORMATION AND DETAILS WHICH ARE PROPRIETARY TO ROCKWELL INTERNATIONAL AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR EQUIPMENT WITHOUT WRITTEN PERMISSION.

TV/CAMERA MONITOR

SPACE SHUTTLE | DWG NO. 16.13 | REV.

SCALE: NONE | SHEET 1 OF 1

BASIC REV E



DATE	SECTION	MODEL	VERSION
DATE: 10/31/89	MODEL: PTC	VERSION: VALID
DATE: 11/6/89	MODEL: JRB	VERSION: VALID
DATE: 05/16/91	MODEL: JRB	VERSION: VALID

NOTES:
1. REFER TO TABLE 16.1 FOR DRAWING TRACEABILITY.
2. CCTV STEP: CAMERAS FOLLOWING SELECTION OF F1 OR VARIABLE SHUTTER SPEEDS WILL AUTOMATICALLY SET TO 1/60 (1/50) CAMERAS ONLY FEATURE VARIABLE SHUTTER CONTROL.
3. CAMERA HEATERS ARE THERMOSTATICALLY CONTROLLED TO BE ON BETWEEN 0°C AND 5°C.
4. PTU HEATERS ARE THERMOSTATICALLY CONTROLLED TO BE ON BETWEEN 0°C AND 5°C.
5. ELECTRICAL STOP SECTION

13 TV 2

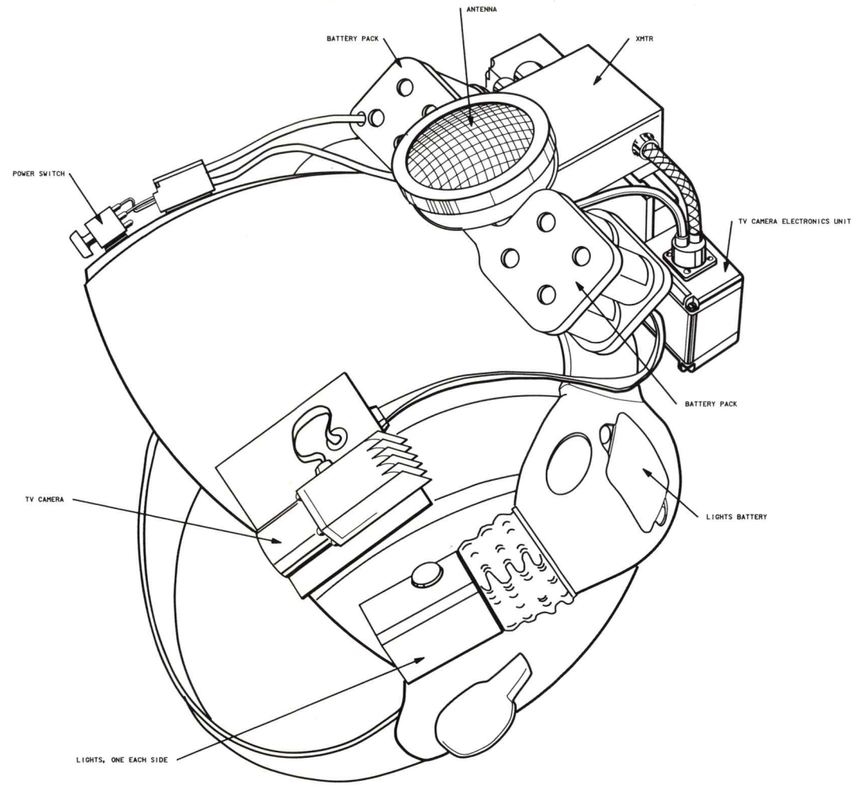
SIGNATURE	DATE	MATERIAL CONTAINED ON THESE DRAWINGS IS THE PROPRIETARY PROPERTY OF PELCO, AND IS LOANED SUBJECT TO RETURN ON DEMAND. IT IS NOT TO BE REPRODUCED, COPIED OR USED IN ANY MANNER DETRIMENTAL TO THE INTEREST OF PELCO.
DRAWN: 10/31/89	10/31/89	
ENGR: M. MACKENZIE		
PROJECT MGR:		
QUALITY ASSURANCE:		
MFG PLANT APPROVAL:		

TV/CAMERA MONITOR

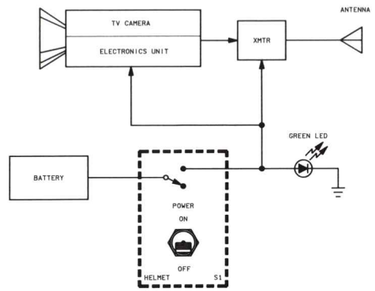
SIZE	DRAWING NUMBER	REV
D	SPARC 0600752	16.13

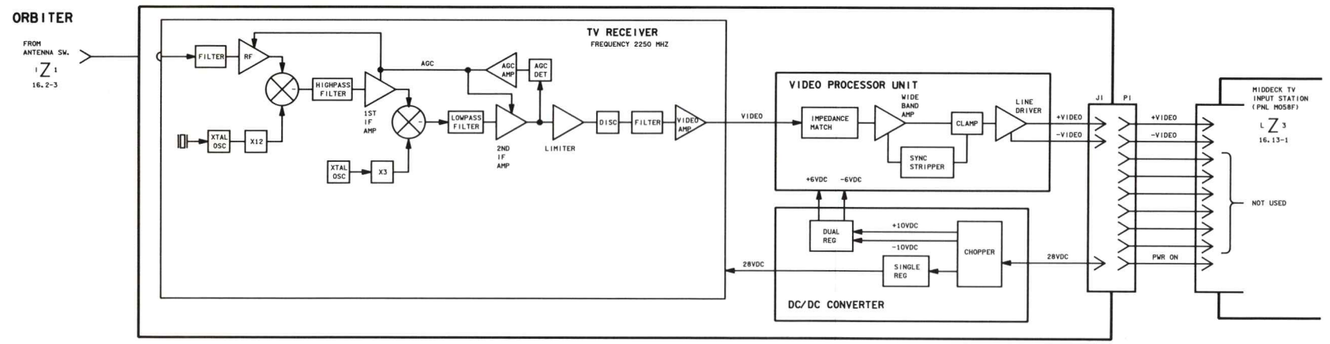
SCALE: NONE | SHEET 1 OF 1

DATE	NAME	VERSION
DATE: 6/1/87	NAME: VCO	VERSION: INK # 5
DATE: 8/1/87	NAME: MFB	VERSION: INK # 6
DATE: 09/14/90	NAME: JMB	VERSION: INK # 7



EMU TV HELMET ASSEMBLY





TV/EMU

SIGNATURE		DATE
DSGN	H. BLATCH	11/21/80
DR		
ENGR	R. MOOLCHAN	
ENGR		10-2-90
APP		10/2/90
APP		10-2-90
OMNIPLAN	S.A. Kimbrell	11/29/90
LTR	E	PCN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

TV/EMU

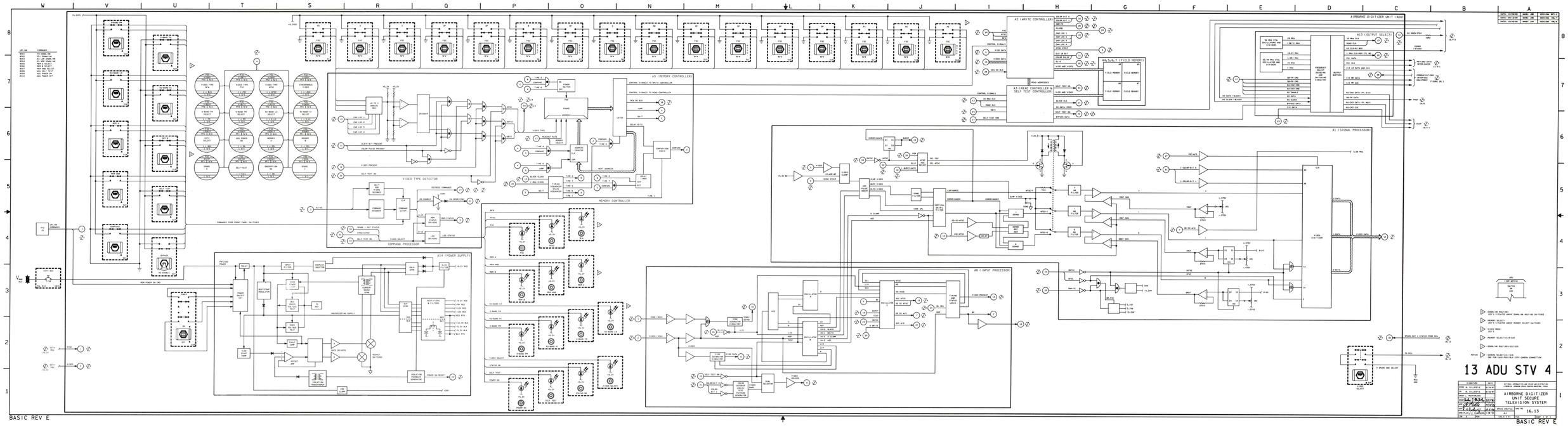
SPACE SHUTTLE | DWG NO 16.13

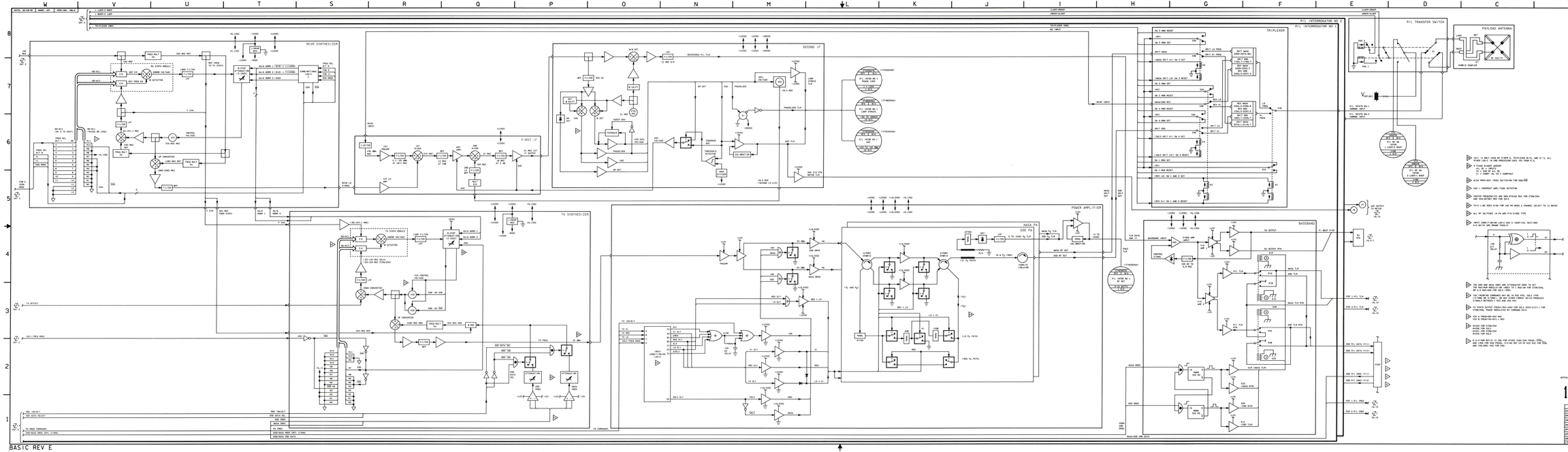
ALL

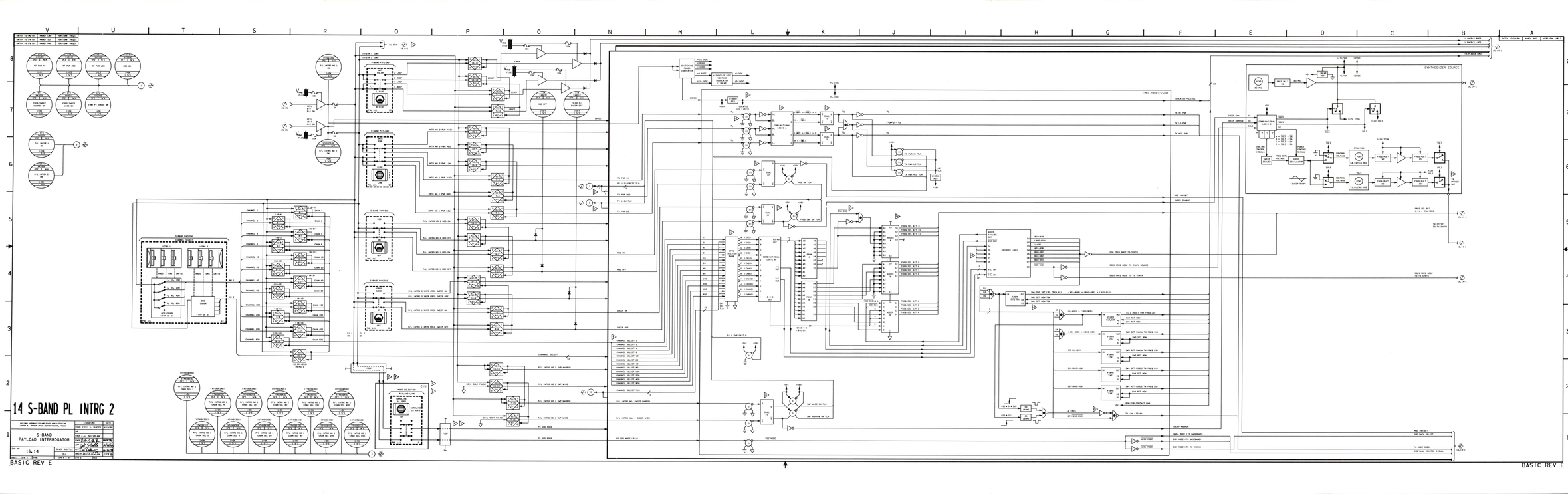
44 X 34 | PAGE | SHEET 3 OF 4

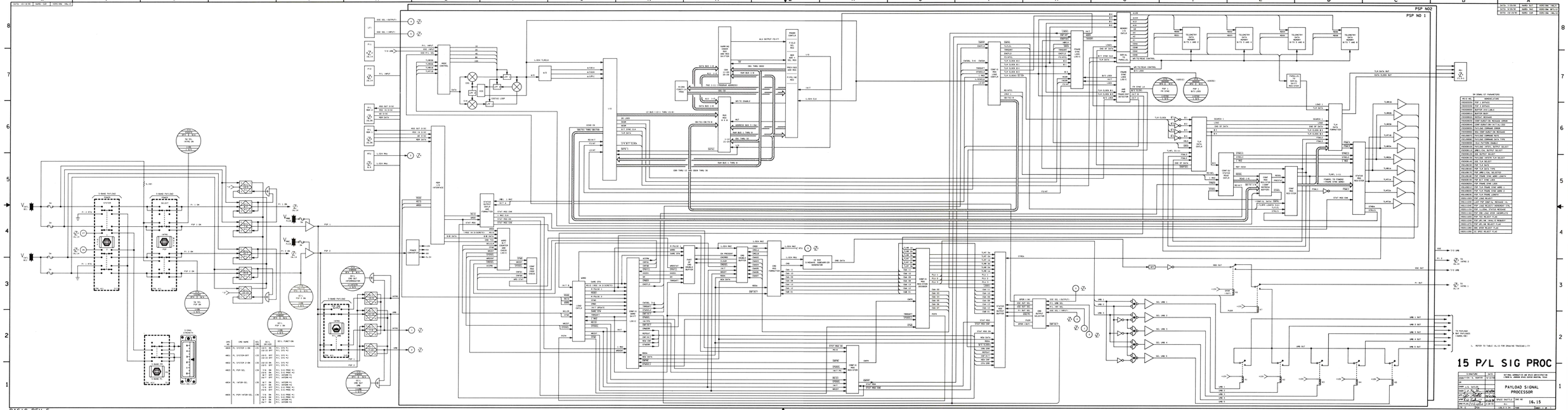
BASIC REV E

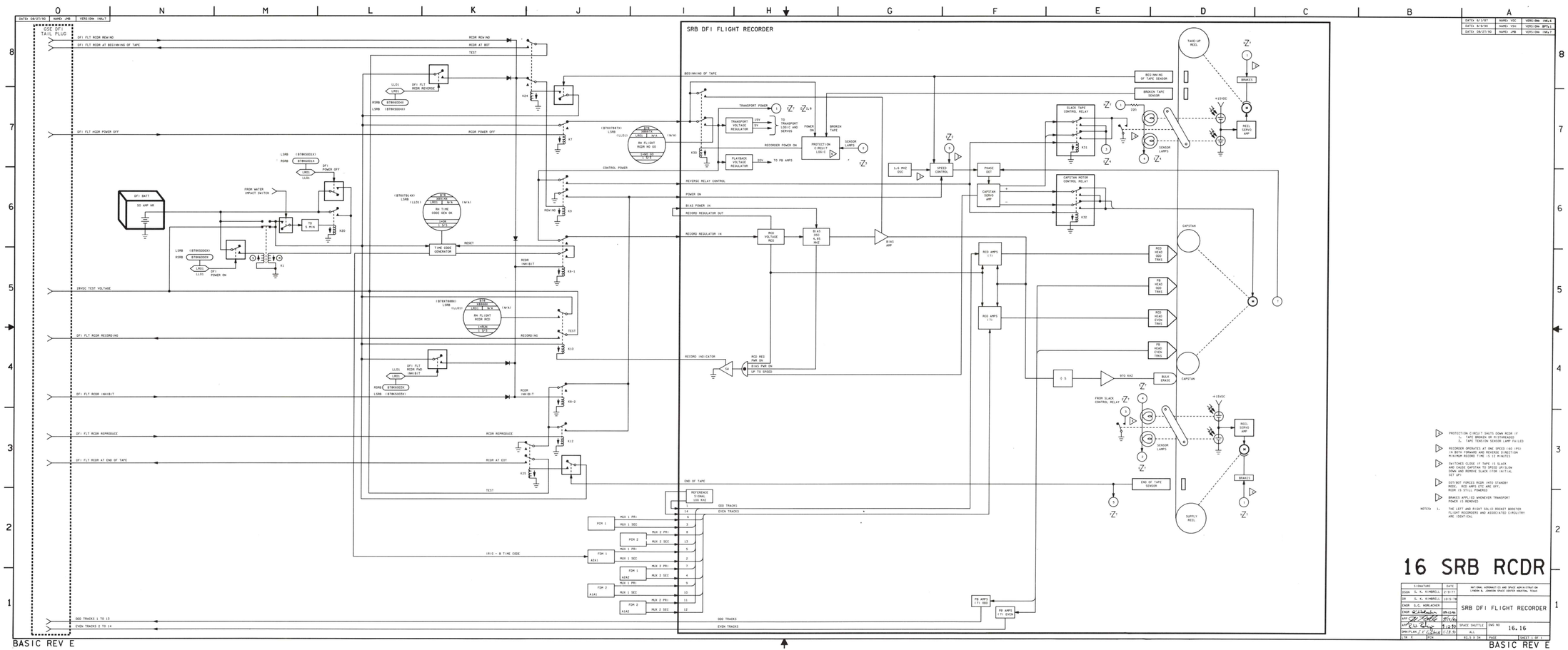
BASIC REV E


A14 (POWER SUPPLY)
A13 (MEMORY CONTROLLER)
A8 (INPUT PROCESSOR)
A1 (SIGNAL PROCESSOR)
A2 (WRITE CONTROLLER)
A3 (READ CONTROLLER & SELF TEST CONTROLLER)
A4,5,6,7 (FIELD MEMORY)
AIRBORNE DIGITIZER UNIT (ADU)
A13 (OUTPUT SELECT)
COMMAND PROCESSOR
MEMORY CONTROLLER
VIDEO TYPE DETECTOR
13 ADU STV 4
AIRBORNE DIGITIZER UNIT SECURE TELEVISION SYSTEM
SPACE SHUTTLE
16.13
BASIC REV E


RCVR SYNTHESIZER
SECOND LO
SECOND IF
FIRST IF
TX SYNTHESIZER
POWER AMPLIFIER
TRIPLEXER
P/L INTERROGATOR NO 2
P/L TRANSFER SWITCH
PAYLOAD ANTENNA
BASEBAND
14 S-BAND PL INTRG 1
S-BAND
PAYLOAD INTERROGATOR
BASIC REV E


14 S-BAND PL INTRG 2
S-BAND PAYLOAD INTERROGATOR
16.14
BASIC REV E
BASIC REV E
CMD PROCESSOR
SYNTHESIZER SOURCE
S-BAND PAYLOAD
TX PWR HI
TX PWR MED
TX PWR LO
MOD ON
MOD OFF
SWSP ON
SWSP OFF
CHANNEL SELECT 1
CHANNEL SELECT 2
CHANNEL SELECT 4
CHANNEL SELECT 8
CHANNEL SELECT 16
CHANNEL SELECT 32
CHANNEL SELECT 64
CHANNEL SELECT 128
CHANNEL SELECT 256
CHANNEL SELECT 512
P/L INTRG NO 1 SWSP MARKER
P/L INTRG NO 1 SWSP M/DE
P/L INTRG NO 2 SWSP MARKER
P/L INTRG NO 2 SWSP M/DE
PS DDS MODE
PS DDS MODE (PCL)
SELF TEST


PSP NO2
PSP NO 1
15 P/L SIG PROC
PAYLOAD SIGNAL PROCESSOR
16.15
BASIC REV E

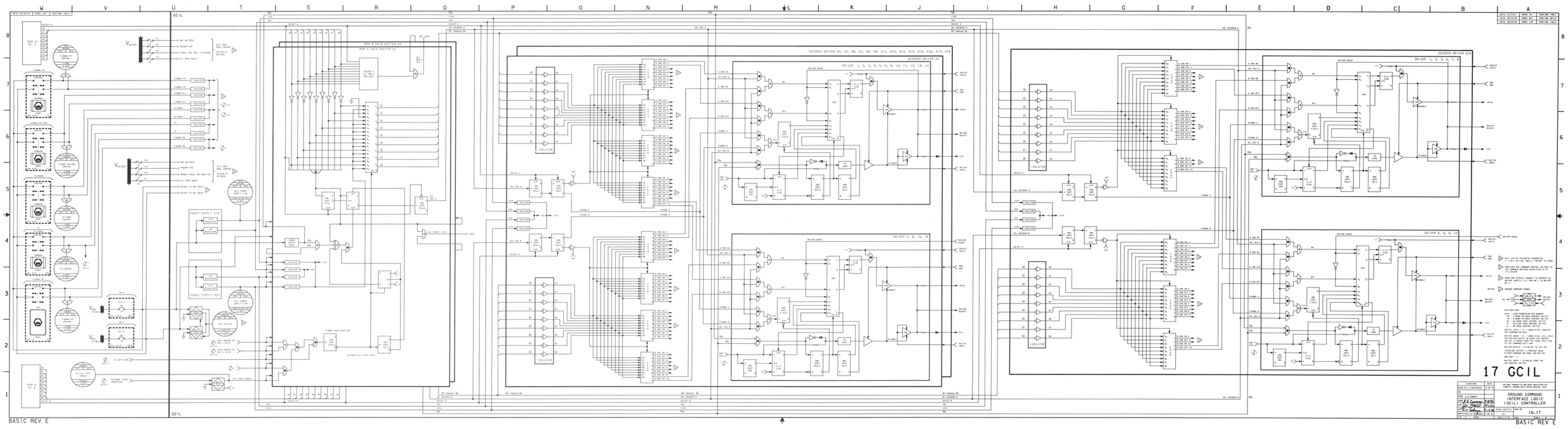


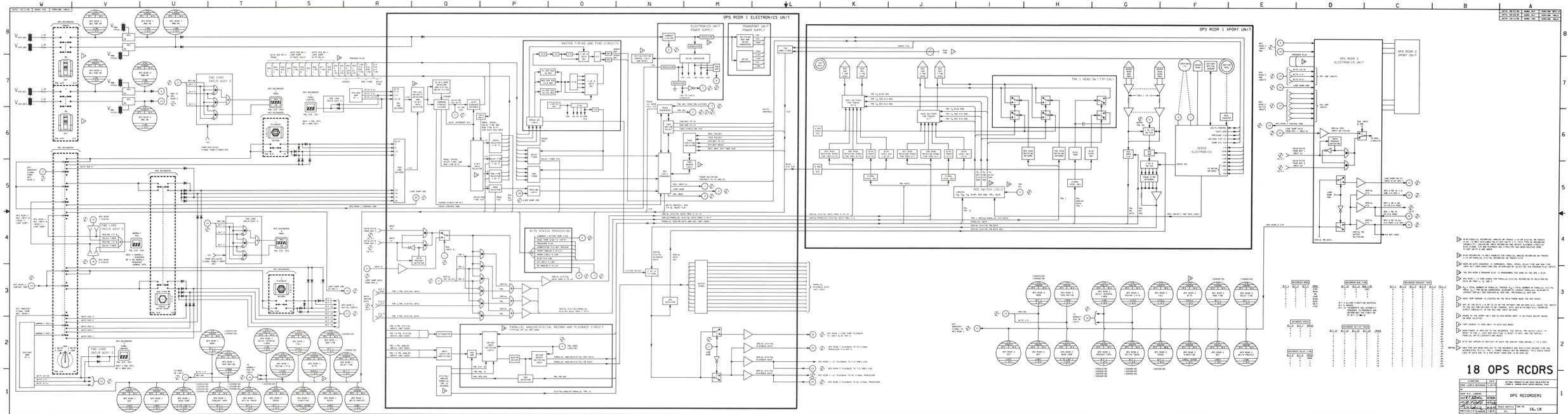
16 SRB RCDR

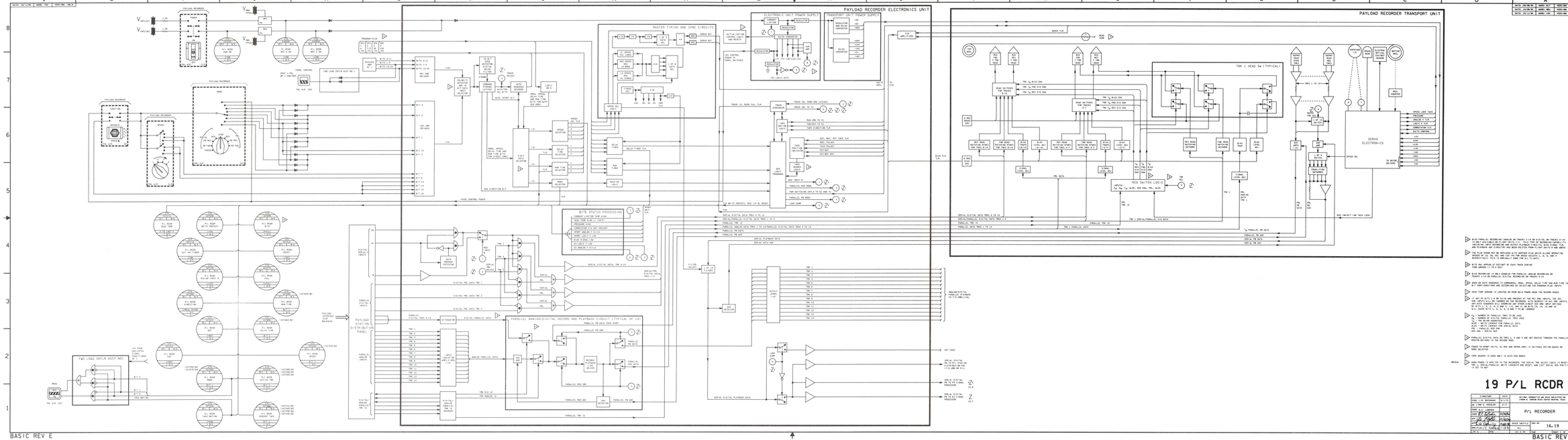
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN S. K. KIMBRELL	2-9-77	LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR S. K. KIMBRELL	10-5-78	
ENGR G.C. MORLACHER		SRB DFI FLIGHT RECORDER
ENGR [illegible]	09-10-96	
APP [illegible]	9/16/96	
APP [illegible]	9-20-96	SPACE SHUTTLE DWG NO 16.16
DRAFTSMAN [illegible]	10-80	SIZE D
CHK [illegible]		SCALE NONE PAGE SHEET 1 OF 1

BASIC REV E

BASIC REV E

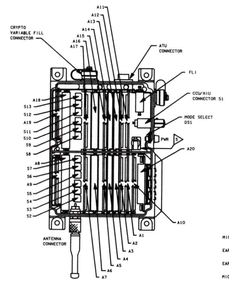

DATA IN/OUT
HIGH ACT
LOW ACT
DATA IN/OUT
MARK BUF
MARK LAT
HIGH/ON (WILL)
HIGH/ON (WILL)
HIGH/ON (WILL)
GCIL
MCM A
P/O 1
MCM B
P/O 2
SELECT A
SELECT B
MCM B DATA BUFFER A2
P/O M DATA BUFFER A1
DECODER DRIVER A4, A5, A6, A7, A8, A9, A11, A12, A13, A14, A15, A16, A17, A18
DECODER DRIVER A7
DRIVER 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14
DRIVER 7, 8, 15, 16
DECODER DRIVER A10
DRIVER 1, 2, 3, 4, 7, 8
DRIVER 4, 5, 8, 10
SEL DECODER A
SEL DECODER B
SEL DECODER C
SEL DECODER D
SEL DECODER E
SEL DECODER F
SEL DECODER G
SEL DECODER H
SEL DECODER J
SEL DECODER K
SEL DECODER L
SEL DECODER M
SEL DECODER N
SEL DECODER P
SEL DECODER Q
SEL DECODER R
SEL DECODER S
SEL DECODER T
SEL DECODER U
SEL DECODER V
SEL DECODER W
POWER SUPPLY A19
POWER SUPPLY A20
ISOLATOR
DRIVER SENSE
DECODER OUTPUT
SWITCH INPUT
17 GCIL
GROUND COMMAND INTERFACE LOGIC (GCIL) CONTROLLER
16.17
BASIC REV E


OPS RCDR 1 ELECTRONICS UNIT
OPS RCDR 1 XPORT UNIT
OPS RCDR 2 ELECTRONICS UNIT
OPS RCDR 2 XPORT UNIT
MASTER TIMING AND SYNC CIRCUITS
ELECTRONICS UNIT POWER SUPPLY
TRANSPORT UNIT POWER SUPPLY
SERVO ELECTRONICS
BITE STATUS PROCESSING
PARALLEL ANALOG/DIGITAL RECORD AND PLAYBACK CIRCUIT
FWD LOAD CNTLR ASSY 2
OPS RECORDERS
PLAYBACK
RECORD
18 OPS RCDRS
OPS RECORDERS
SPACE SHUTTLE
16.18
BASIC REV E


PAYLOAD RECORDER ELECTRONICS UNIT
PAYLOAD RECORDER TRANSPORT UNIT
MASTER TIMING AND SYNC CIRCUITS
ELECTRONIC UNIT POWER SUPPLY
TRANSPORT UNIT POWER SUPPLY
BITE STATUS PROCESSING
PARALLEL ANALOG/DIGITAL RECORD AND PLAYBACK CIRCUIT (TYPICAL OF 14)
PAYLOAD STATION DISTRIBUTION PANEL
FWD LOAD CNTLR ASSY NO1
PAYLOAD RECORDER
PANEL CONTROL
PROGRAM PLUG
TRK 1 HEAD SW (TYP)(CAL)
SERVO ELECTRONICS
ROD SWITCH LOGIC
PAYLOAD RECORDER ELECTRONICS UNIT
PAYLOAD RECORDER TRANSPORT UNIT
19 P/L RCDR
P/L RECORDER
16.19

BASIC REV E

DATE= 6/8/88	NAME= JDF	VERSION= INAL3
DATE= 6/18/88	NAME= MAS	VERSION= INAL4
DATE= 09/15/90	NAME= JMB	VERSION= INAL5

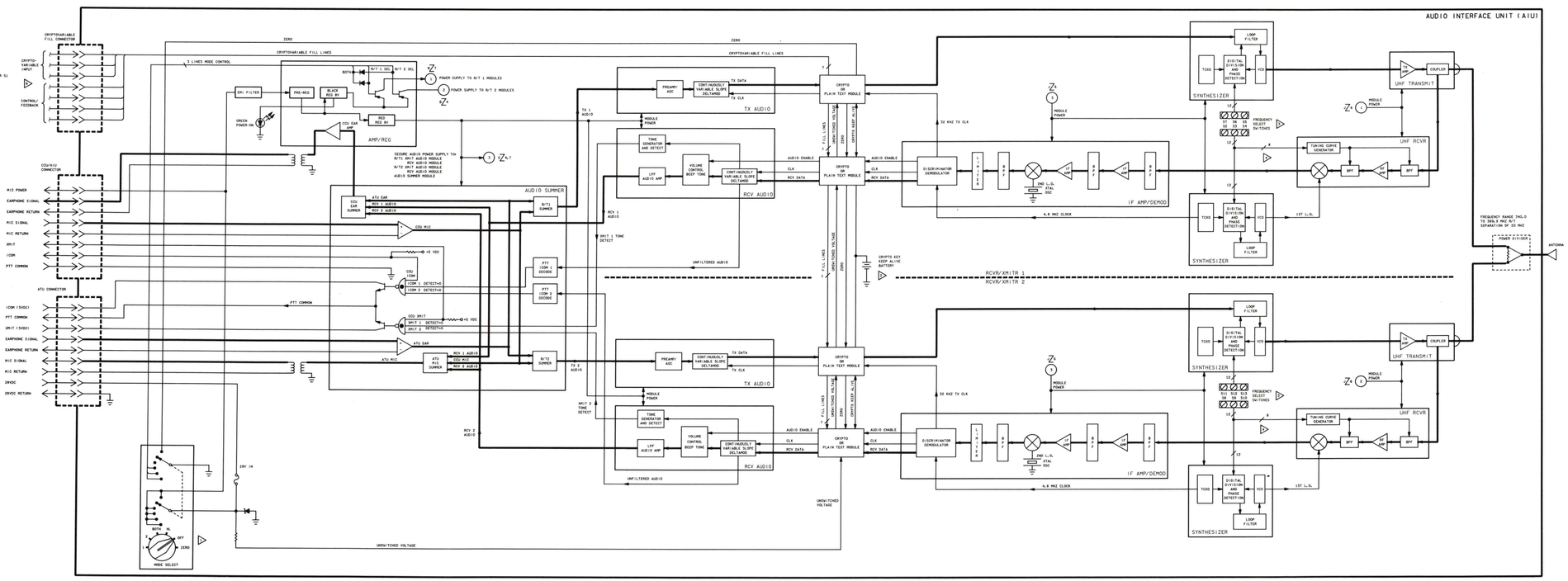


AIU ASSEMBLY

A/T 1
- A1 XMIT AUDIO MODULE
- A2 RCV AUDIO MODULE
- A3 AMP/REG MODULE
- A4 CDMSEC MODULE
- A5 IF AMP/DEMOD MODULE
- A6 SYNTHESIZER MODULE
- A7 UHF XMTR MODULE
- A8 UHF RCVR MODULE
- A9 UHF TRANSMIT MODULE

A/T 2
- A11 XMIT AUDIO MODULE
- A12 RCV AUDIO MODULE
- A13 AMP/REG MODULE
- A14 CDMSEC MODULE
- A15 IF AMP/DEMOD MODULE
- A16 SYNTHESIZER MODULE
- A17 UHF XMTR MODULE
- A18 UHF RCVR MODULE
- A19 UHF XMIT MODULE

A10 AUDIO SUMMER MODULE
A20 AMP/REGULATOR MODULE



THE CRYPTO FILL EQUIPMENT IS USE AND IS ONLY USED DURING CRYPTOVARIABLE KEY LOADING PROCEDURE PRELAUNCH.

THE CRYPTO KEY KEEP ALIVE POWER SOURCE IS INSTALLED + POLARITY DOWN AS SHOWN BY THE ASSEMBLY VIEW

TUNING CURVE GENERATOR 1 YIELD FREQUENCY CONTROL INFORMATION FOR THE VCO'S OF THE UHF TRANSMIT AND UHF RCVR SYNTHESIZERS. THE 8 LINES SHOWN ARE THE BCD REPRESENTATION OF THE TENS AND ONES UNITS OF THE SELECTED FREQUENCY IN MHZ

THE ROTARY SWITCHES PROVIDE FREQUENCY SELECTION INDICATIONS AS SHOWN IN THE TABLE BELOW

FREQUENCY (MHZ)	HUNDREDS	TENS	UNITS	TENTHS
RCV 1	HARDWIRED 3	52	53	54
XMIT 1	HARDWIRED 3	55	56	57
RCV 2	HARDWIRED 3	58	59	510
XMIT 2	HARDWIRED 3	511	512	513

EXAMPLE: FOR A TRANSMIT CHANNEL 1 FREQUENCY OF 374.2 MHZ THE SWITCHES S5, S6 AND S7 INDICATE THE FREQUENCY, THE HUNDREDS DIGIT IS HARDWIRED 300
SWITCH S6 IS SELECTING THE 70 MHZ 70
SWITCH S8 IS SELECTING 4.0 MHZ 4.0
SWITCH S9 IS SELECTING 2.0LS 1 MHZ 2.0LS 1
374.2 MHZ

THE CRYPTO KEY KEEP ALIVE POWER SOURCE IS A STACK OF THREE 3.0 VOLT DEVICE CELLS CONNECTED IN SERIES, (REQUIRED ONLY FOR CRYPTO OPERATIONS)

THE ROTARY SWITCH MUST BE PULLED OUT AND TURNED TO THE POSITION LABELED "ZERO" TO CLEAR THE CDMSEC VARIABLE KEY

20 WCCS AIU 1

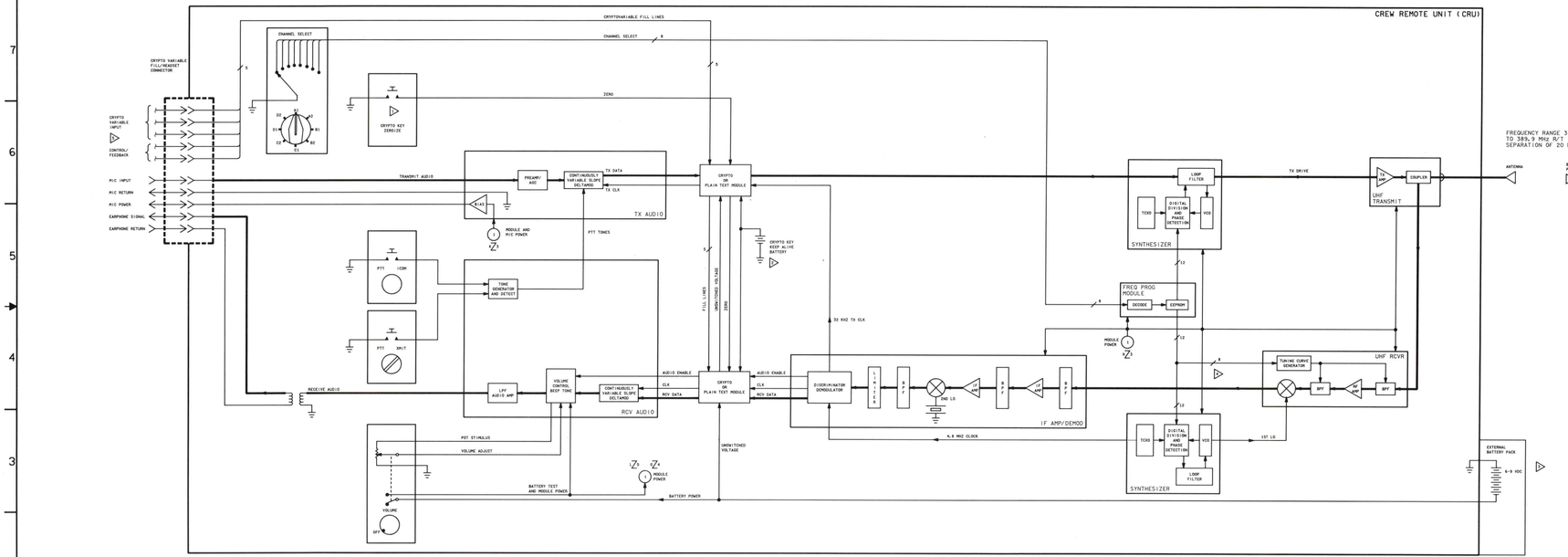
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS		SIGNATURE	DATE
	DSGN	V ORTIZ	4/29/87
WIRELESS CREW COMM SYS AUDIO INTERFACE UNIT	DR		
	CHKR	L. HORLACHER	
	ENGR	G. Workman	10/6/90
	APP	G. Tirko	10/16/90
DWG NO 16.20	SPACE SHUTTLE	APP	R.W. Talkington 10-23-90
	ALL	DMH/PLANNING	10-23-90
SHEET 1 OF 1 SIZE B	83.5 X 34	LTR C	DSN

BASIC REV E

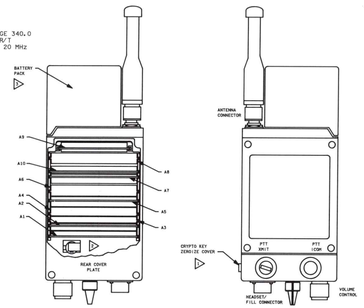
BASIC REV E

DATE	NAME	VERSION
10/19/90	JDF	VER1.004

DATE	NAME	VERSION
09/22/90	JRL	VER1.004
10/05/90	JDF	VER1.004
10/19/90	JDF	VER1.004



FREQUENCY RANGE 340.0 TO 389.9 MHz R/T SEPARATION OF 20 MHz



CRU ASSEMBLY

A1 UNIT AUDIO MODULE
A2 RCV AUDIO MODULE
A3 COMSEC MODULE/PLAIN TEXT
A4 COMSEC MODULE/PLAIN TEXT
A5 SYNTHESIZER MODULE
A6 SYNTHESIZER MODULE
A7 UHF RCVR MODULE
A8 SYNTHESIZER MODULE
A9 UHF TRANSMIT MODULE
A10 FREQUENCY PROGRAMMING MODULE

NOTES:

1. THE CRYPTO FILL EQUIPMENT IS USE AND IS ONLY USED DURING CRYPTOVARIABLE KEY LOADING/PROCEDURE PRELAUNCH.
2. THE TUNE/HE CURVE GENERATOR FREQUENCY CONTROL INFORMATION FROM THE FREQUENCY PROGRAMMING MODULE IS PASSED AS AN INTEGER. THE EIGHT LINES SHOWN ARE THE BCD REPRESENTATION OF THE TENS AND ONES UNITS OF THE SELECTED FREQUENCY IN MHZ
3. THE BATTERY PACK ASSEMBLY IS MADE UP OF FIVE PARALLEL STACKS OF 4 IN SERIES AND IS REPLACEABLE IN FLIGHT. TYPICAL LIFETIME IS 30-32 HOURS IN THE PLAIN TEXT MODE
4. THE CRYPTO KEY KEEP ALIVE POWER SOURCE IS A STACK OF THREE SILVER OXIDE CELLS ARRANGED IN SERIES. THEY ARE INSTALLED + POLARITY DOWN AS SHOWN BY THE REAR ASSEMBLY VIEW. RECHARGED ONLY FOR CRYPTO OPERATION!

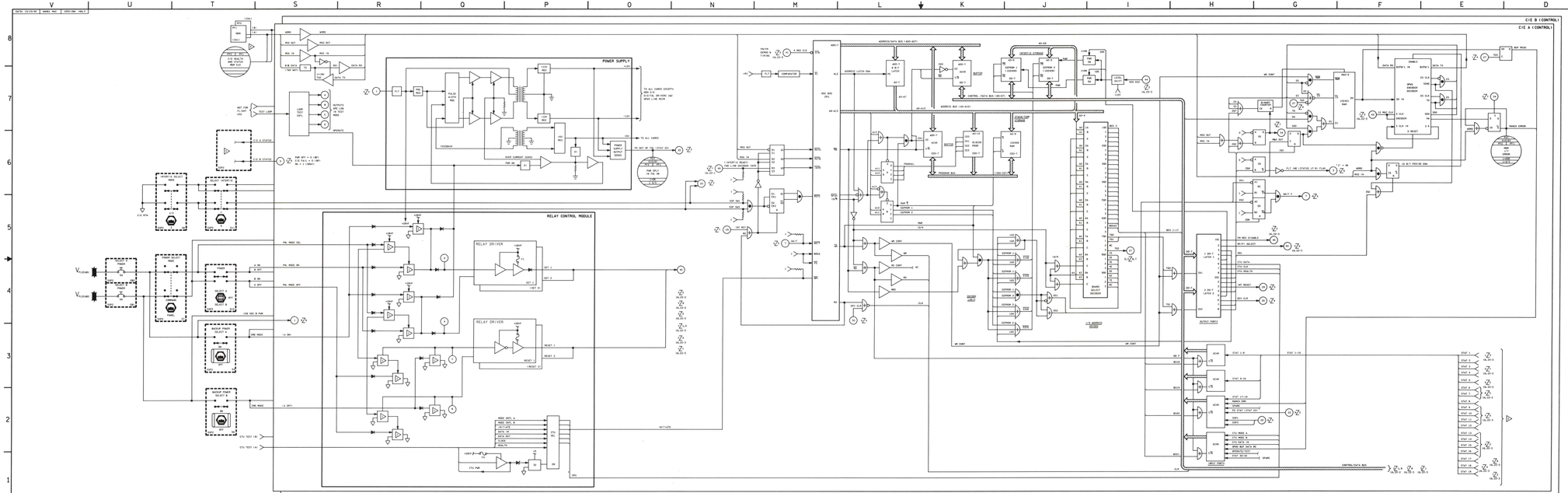
NOTE(S): 4. THE CRYPTO KEY ZERO-IZE PUSHBUTTON HAS A SPRING-LOADED COVER LOCATED ON THE LEFT SIDE OF THE CASE.

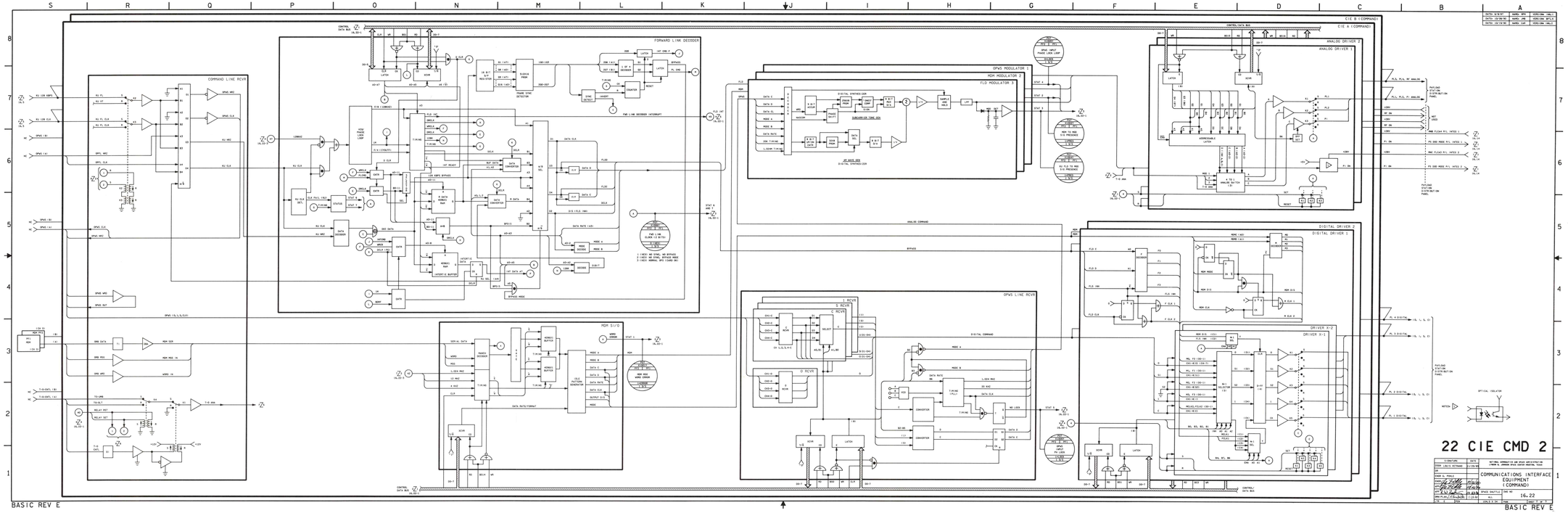
20 WCCS CRU 2

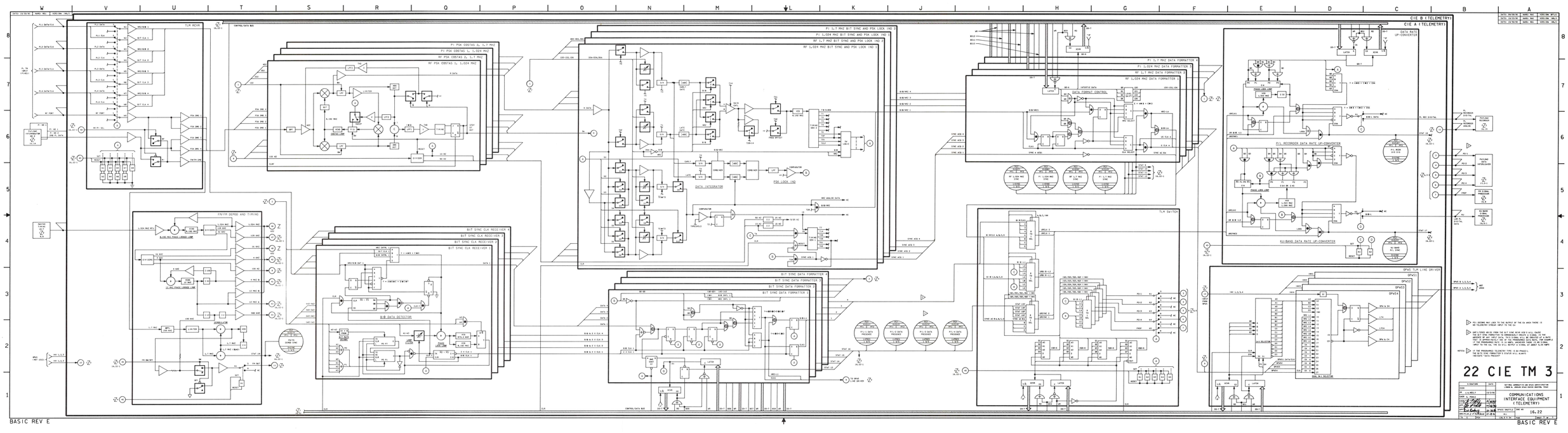
SIGNATURE		DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN	VIC SMITZ	4/23/87	
DR			
CHKR	G.C. HOHLACHER		WIRELESS CREW COMM SYS CREW REMOTE UNIT
CHKR		10/19/90	
APP		10/19/90	
APP		10/19/90	
APP		10/19/90	SPACE SHUTTLE / DWG NO 16.20
DRAFTSMAN		11/26/90	ALL
LTR	ECN		REVISIONS / SHEET 1 OF 2

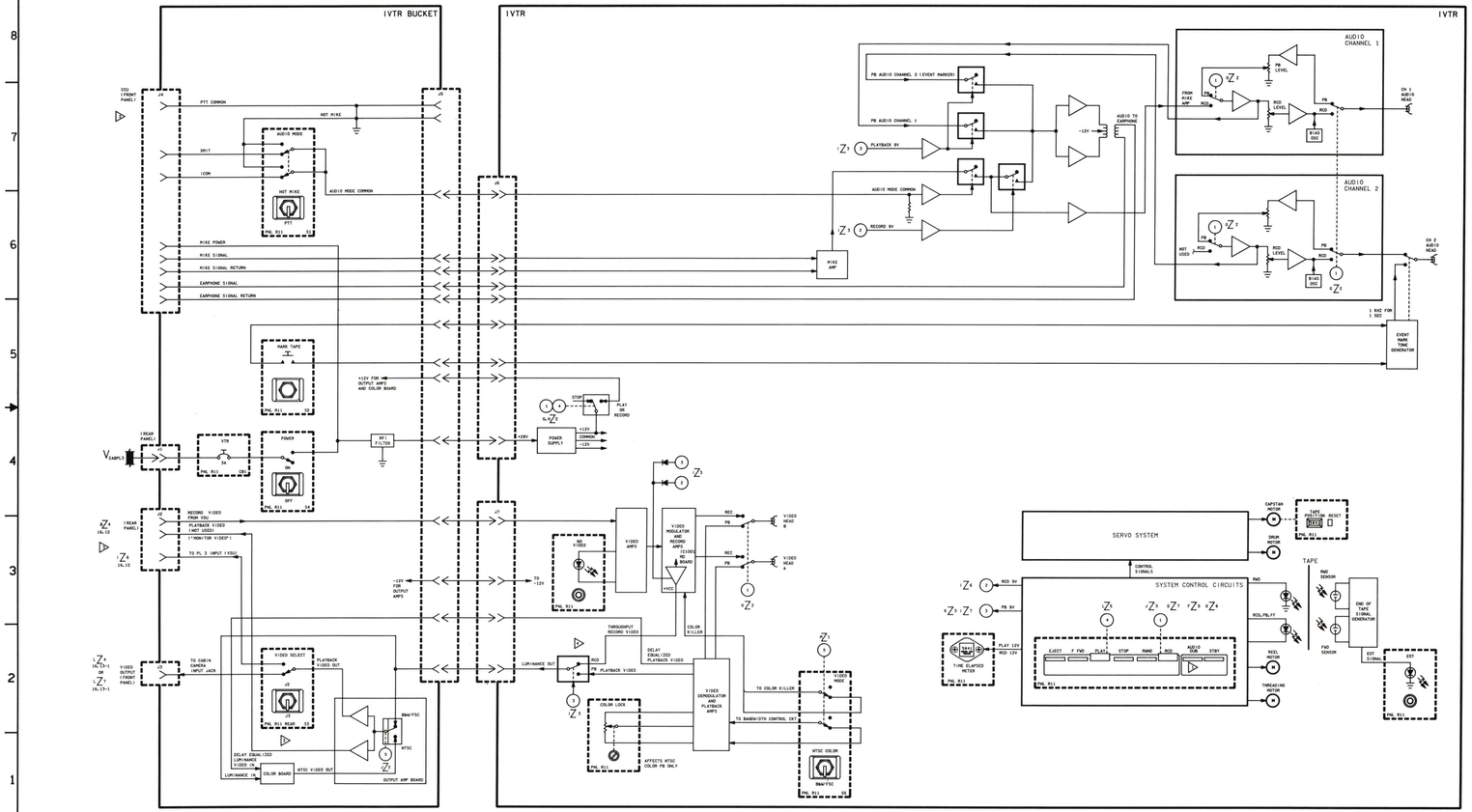
BASIC REV E

BASIC REV E

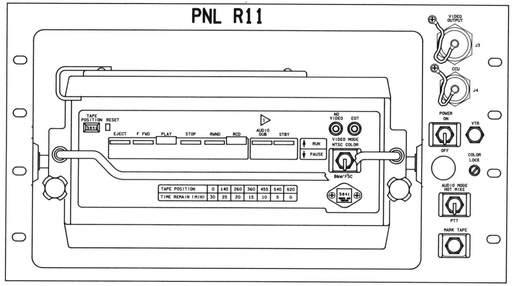

POWER SUPPLY
RELAY CONTROL MODULE
C/E B CONTROL
C/E A CONTROL
22 CIE CNTL 1
COMMUNICATIONS INTERFACE EQUIPMENT (CONTROL)
16.22
BASIC REV E


22 CIE CMD 2
COMMUNICATIONS INTERFACE EQUIPMENT (COMMAND)
FORWARD LINK DECODER
COMMAND LINE RCVR
OPWS LINE RCVR
HDR S/U
OPWS MODULATOR 1
FLD MODULATOR 3
MDM MODULATOR 2
CIE B (COMMAND)
CIE A (COMMAND)
ANALOG DRIVER 1
ANALOG DRIVER 2
DIGITAL DRIVER 1
DIGITAL DRIVER 2
DRIVER X-2
BASIC REV E


TLM RCVR
P1: PSK COSTAS f_0 1.7 MHZ
P1: PSK COSTAS f_0 1.024 MHZ
RF PSK COSTAS f_0 1.7 MHZ
RF PSK COSTAS f_0 1.024 MHZ
P1: 1.7 MHZ BIT SYNC AND PSK LOCK IND
P1: 1.024 MHZ BIT SYNC AND PSK LOCK IND
RF 1.7 MHZ BIT SYNC AND PSK LOCK IND
RF 1.024 MHZ BIT SYNC AND PSK LOCK IND
DATA INTEGRATOR
PSK-LOCK IND
BIT SYNC CLK RECEIVER 4
BIT SYNC CLK RECEIVER 3
BIT SYNC CLK RECEIVER 2
BIT SYNC CLK RECEIVER 1
B/B DATA DETECTOR
FM/PM DEMOD AND TIMING
BIT SYNC DATA FORMATTER 4
BIT SYNC DATA FORMATTER 3
BIT SYNC DATA FORMATTER 2
BIT SYNC DATA FORMATTER 1
P1: 1.7 MHZ DATA FORMATTER
P1: 1.024 MHZ DATA FORMATTER
RF 1.7 MHZ DATA FORMATTER
RF 1.024 MHZ DATA FORMATTER
DATA FORMAT CONTROL
DATA RATE UP-CONVERTER
P/L RECORDER DATA RATE UP-CONVERTER
KU-BAND DATA RATE UP-CONVERTER
TLM SWITCH
OPWS TLM LINE DRIVER
CIE B (TELEMETRY)
CIE A (TELEMETRY)
22 CIE TM 3
COMMUNICATIONS INTERFACE EQUIPMENT (TELEMETRY)
16.22
BASIC REV E



PNL R11

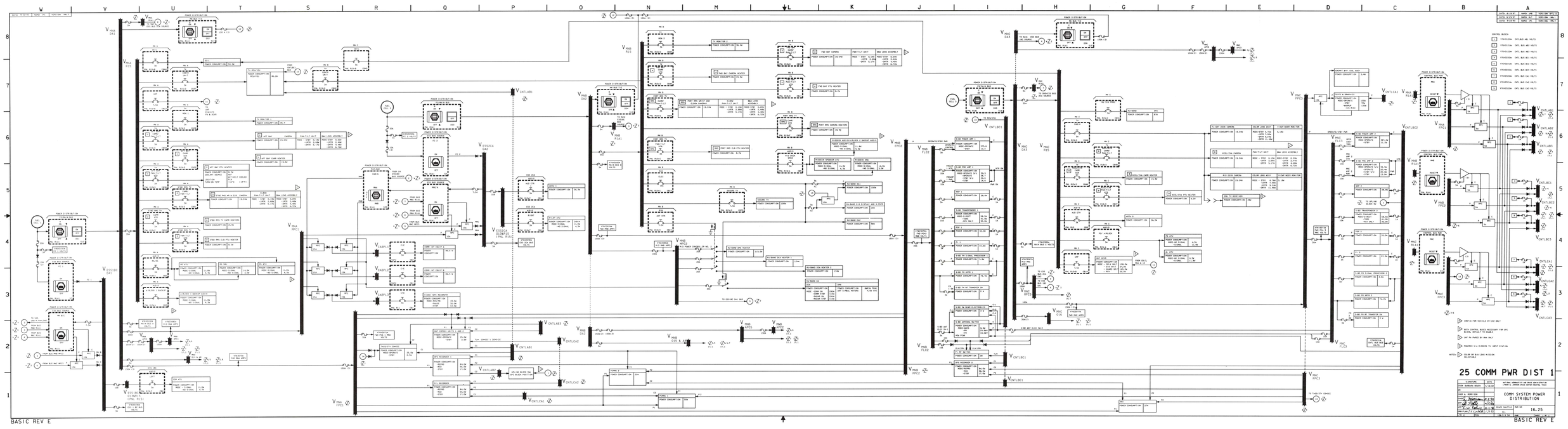


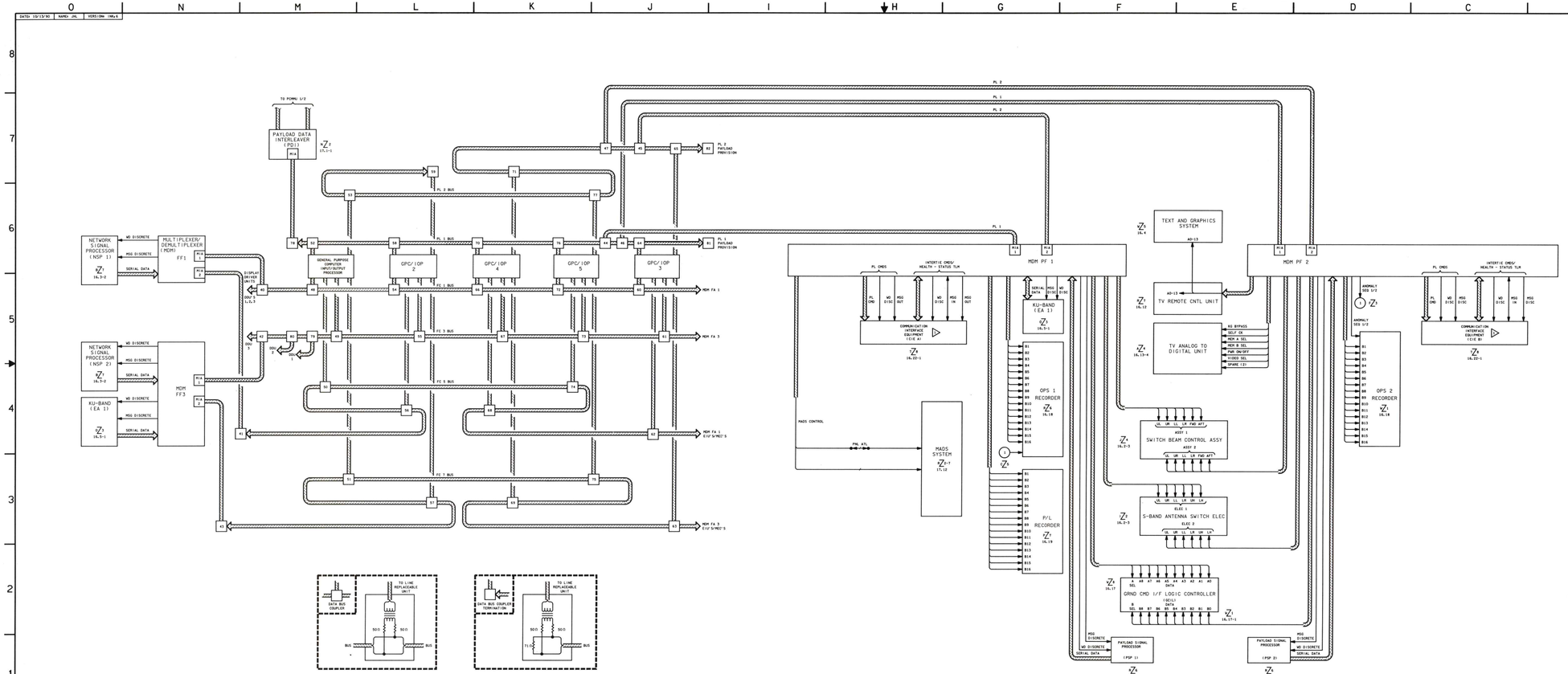
NOTES:
- IVTR THROUGHPUTS VIDEO IN THE RECORD MODE ONLY
- J2 AND J3 ARE LOCATED AT THE REAR OF THE RECORDER
- USE STANDARD HEADSET AND W1U OR ADS-VTR CABLE TO ATU
- AUDIO DUB ALLOWS VOICE ANNOTATION OF A PREVIOUSLY RECORDED TAPE. IT ERASES PREVIOUSLY RECORDED AUDIO BUT DOES NOT AFFECT THE VIDEO

24 IVTR

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN V/CR: DOGGETT	10/89/76	
CHKR: F.L. MACFARLANE		INTERIM VIDEO TAPE RECORDER
CHKR: [signature]	10/89/76	
MFG: [signature]	10/89/76	SPACE SHUTTLE
CM: [signature]	10/89/76	DWG NO 16.24
DRN: PLAN, T.F. Hunter	11-08-84	ALL
LTR	PCN	REV SHT # 24

BASIC REV E


25 COMM PWR DIST 1
COMM SYSTEM POWER DISTRIBUTION
16.25
BASIC REV E



DATE: 10/13/90	NAME: JAL	VERSION: 1Ma.6

DATE: 10/13/90	NAME: JDF	VERSION: BFLS
DATE: 10/9/90	NAME: YSH	VERSION: BFLS
DATE: 10/13/90	NAME: JAL	VERSION: 1Ma.6

D. REFER TO TABLE 16.1 FOR DRAWING TRACEABILITY

DBC			LRU			DATA BUS
MD	ID	LOCATION	NAME	ID	LOCATION	
40	B1V72A41A1	F AV BAY 1	PF 1	B1V72A3	F AV BAY 1	FC 1
41	B2V72A41A13	F AV BAY 2				FC 5
42	S0V72A58A5	*LT DK	PF 3	B3V72A5	F AV BAY 3	FC 7
43	S0V72A58A6	FLT DK				FC 7
44	B1V72A43A22	F AV BAY 1	PF 1	B1V72A38	F AV BAY 1	PL 1
45	B2V72A43A24	F AV BAY 2				PL 2
46	B1V72A43A23	F AV BAY 1	PF 2	B2V72A34	F AV BAY 2	PL 1
47	B2V72A43A23	F AV BAY 2				PL 2
48	B1V72A42A1	F AV BAY 1	IOP 1	B1V72A16	F AV BAY 1	FC 1
49	B2V72A42A25	F AV BAY 2				FC 5
50	B2V72A45A26	F AV BAY 2				FC 5
51	B2V72A45A6	F AV BAY 2				FC 5
52	B2V72A45A25	F AV BAY 2				FC 5
53	B1V72A44A25	F AV BAY 1				PL 1
54	B1V72A42A2	F AV BAY 1	IOP 2	B2V72A17	F AV BAY 2	FC 1
55	B1V72A42A25	F AV BAY 1				FC 5
56	B2V72A45A25	F AV BAY 2				FC 5
57	B2V72A45A5	F AV BAY 2				FC 5
58	B1V72A44A19	F AV BAY 1				PL 1
59	B2V72A44A19	F AV BAY 2				PL 2
60	S0V72A53A20	(CLAS	IOP 3	B3V72A18	F AV BAY 3A	FC 3
61	S0V72A53A6	SIFIED				FC 5
62	S0V72A53A5	DISCLO				FC 5
63	S0V72A53A27	SURE)				FC 7
64	S0V72A53A28	(UNCLAS				FC 7
65	S0V72A53A8	SIFIED				PL 3
66	B1V72A42A3	F AV BAY 1	IOP 4	B1V72A19	F AV BAY 1	FC 1
67	B1V72A43A20	F AV BAY 1				PL 1
68	B2V72A45A18	F AV BAY 2				FC 5
69	B1V72A44A20	F AV BAY 1				PL 1
70	B1V72A43A20	F AV BAY 1				PL 1
71	B2V72A45A22	F AV BAY 2				PL 2
72	B1V72A43A4	F AV BAY 1	IOP 5	B2V72A20	F AV BAY 2	FC 1
73	B1V72A42A31	F AV BAY 1				FC 1
74	B1V72A42A27	F AV BAY 1				FC 1
75	B1V72A42A7	F AV BAY 1				FC 1
76	B1V72A43A21	F AV BAY 1				PL 1
77	B1V72A44A21	F AV BAY 1				PL 1
78	B1V72A43A3	F AV BAY 1	PDI	B1V7A8	F AV BAY 1	PL 1
79	S0V72A53A4	FLT DK	DDU 1	S0V73A1	FLT DK	FC 3
80	S0V72A53A3	FLT DK	DDU 2	S0V73A2	FLT DK	FC 3
81	4DV72A347	MID FUSE	P/L 1 PROV		MID FUSE	PL 1
82	4DV72A348	MID FUSE	P/L 2 PROV		MID FUSE	PL 2

NOTES: ▷ CIC INSTALLATION MISSION DEPENDENT

26 COMM MDM I/F

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN TERRI FORSYTHE	6/6/92	LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR		
CHKR S. KAKADELIS		COMM MDM I/F
ENGR		
ENGR		
ENGR		
ENGR		
DMWP/PLAN		SPACE SHUTTLE / DWG NO: 16.26
CTR / PGM		ALL / SIZE: D / REV:
		SCALE: NTS / SHEET 1 OF 1

BASIC REV E

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.1 (SHEET 1)	COMM OVERVIEW S-BAND						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: S-BAND PM TRANSPONDER, 16.2-1 S-BAND PM AMPLIFIER SYSTEM, 16.2-2 S-BAND PM/FM SWITCH BEAM ANTENNA SYSTEM,16.2-3 NETWORK SIGNAL PROCESSOR RETURN LINK, 16.3-1 NETWORK SIGNAL PROCESSOR FORWARD LINK, 16.3-2 NETWORK SIGNAL PROCESSOR COMSEC 1/2 , 16.3-3
16.1B (SHEET 2) 16.1C,D (SHEET 3)	COMM OVERVIEW AUDIO (102) COMM OVERVIEW AUDIO (103/104)						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: AUDIO PANEL/ATU PLT, CDR, 16.10-1 AUDIO PANEL/ATU MS, PS AND OS SMU, 16.10-2 AUDIO PANEL/ATU MIDDECK SMU & CCU, 16.10-3 AUDIO PANEL/ATU AIRLOCK, 16.10-4 AUDIO PANEL/ATU MIDDECK, 16.10-5 AUDIO PANEL/MIDDECK SMU, 16.10-6 AUDIO PANEL/ATU OS AND SMU, 16.10-7 AUDIO/ACCU, 16.11-1,2
16.1 (SHEET 4)	COMM OVERVIEW KU-BAND						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS KU-BAND SYSTEM, 16.5-1,2:
16.1 (SHEET 5)	COMM OVERVIEW CCTV						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: TV CONTROL, 16.12 TV/CAMERA MONITOR, 16.13-1,2 TV/EMU, 16.13 TV/SECURE, 16.13-4
16.1 (SHEET 6)	PAYLOAD SYSTEM OVERVIEW						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: S-BAND PAYLOAD INTERROGATOR, 16.14 S-BAND PAYLOAD SIGNAL PROCESSOR, 16.15

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
16.1-1	ENGR R. E. LABRODE		16.1-5	ENGR D. BROWN	
	ENGR R. E. LaBrode Jr	11.5.90		ENGR D. Brown	
16.1B-2	ENGR C. A. COUNTS		16.1-6	ENGR F. J. MACFARLANE	
16.1C,D-3	ENGR Christopher A Counts	11/5/90		ENGR	5NOV90
	ENGR			APP	
16.1-4	ENGR F. J. MACFARLANE			APP	
	ENGR	5NOV90		OMNIPLAN	
	ENGR			LTR E	PCN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 16-I
ALL	
	PAGE 16.I-1

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.2 (SHEET 1)	S-BAND PM TRANSPONDER						ORBITER SCHEMATIC LIST
		R. I.	VS70-740129		E	9/18/84	SCHEMATIC DIAGRAM, C&T NETWORK S-BAND TRANSPONDER
		R. I.	VS70-240299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL
							LRU SCHEMATIC LIST
							TRIPLEXER ASSEMBLY TRANSPONDER PWR CONVERTER
		TRW	D292167				INPUT SWITCH
		TRW	D292029				SGLS BPF
		TRW	D292096				STDN/TDRS BPF
		TRW	D292197				OUTPUT SWITCH
		TRW	D292099				AGC NETWORK
		TRW	D292104				POST AGC BPF
		TRW	D292091				SECOND AND THIRD MIXER
		TRW	D292093				NONCOHERENT AGC
		TRW	D292087				POWER AMP AND SWITCH
		TRW	D292089				X6 AND X7 MULTIPLIER
		TRW	D292111		NC	1-19-77	INTERCONNECT DIAGRAM
		TRW	D292117				SSPI AND COHERENT AGC
		TRW	D292119				31 MHz BPF
		TRW	D292121				PHASE DETECTOR AND CAD
		TRW	D292123m				REFERENCE SOURCE
		TRW	D292107				WIDEBAND DETECTOR
		TRW	D292109				62 MHz BPF
		TRW	D292595				31 MHz AMPLIFIER
		TRW	D292126		B	12-19-77	COSTAS AND PHASELOCK
		TRW	D293658		NC	1-23-78	INTERCONNECT DIAGRAM - DUAL DUPLEXER
		TRW	D292003		B	11-21-77	INTERCONNECT DIAGRAM - S-BAND TRANSPONDER
		TRW	D292131		A	7-26-77	INTERCONNECT DIAGRAM - FREQ SOURCE
		TRW	D292139				300 MHz ANALOG CIRCUIT
		TRW	D292142				500 MHz ANALOG CIRCUIT
		TRW	D292145				REGULATOR AND SWITCH
		TRW	D292148				500 MHz DIGITAL CIRCUIT
		TRW	D292136				300 MHz DIGITAL ÷ 15/16 CIRCUIT
		TRW	D292635				300 MHz DIGITAL ÷ 14/15 CIRCUIT
		TRW	D292161		A	7-26-77	INTERCONNECT DIAGRAM SPREAD SPEC
		TRW	D292171				RF SECTION
		TRW	D292174				CODE ACQUISITION AND PN GENERATOR
		TRW	D292177				TRACKING AND ACQUISITION CHANNEL
		TRW	D292181		A	1-23-78	INTERCONNECT DIAGRAM
		TRW	D292199				INTERFACE AND LOGIC NO. 1
		TRW	D292202				INTERFACE AND LOGIC NO. 2
		TRW	D292188				CAD CHANNEL
		TRW	D292191				WIDEBAND CHANNEL
		TRW	D292071				X2 MULTIPLIER
		TRW	D292061		A	7-26-77	INTERCONNECT DIAGRAM, MODULATOR MULTIPLIER
		TRW	D292067				UHF BUFFER, LINEAR PHASE MOD, X4 MULTIPLIER
		TRW	D292069				AMPLIFIER, BUFFER, S-BAND
		TRW	D292076				RANGING TONE AMP AND AGC
		TRW	D292079				MODULATOR BASEBAND
		TRW	D292081		A	7-8-77	FIRST IF
		TRW	D292050				PREAMPLIFIER
		TRW	D292045				DRIVER
		TRW	D292047				POWER AMPLIFIER
		TRW	D292031				POWER AMPLIFIER
		TRW	D292059				TLS AMPLIFIER
		TRW	D292056				CONTROL/REGULATOR
16.2 (SHEET 2)	S-BAND PM AMPLIFIER SYSTEM						ORBITER SCHEMATIC LIST
		R. I.	VS70-740139		E	2/19/88	SCHEMATIC DIAGRAM, C&T POWER AMP SUBSYSTEM
		R. I.	VS70-740299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL
							LRU SCHEMATIC LIST
		WATKINS JOHNSON	701271		E	12-30-77	SCHEM DIAG, LOW VOLTAGE
		WATKINS JOHNSON	701252		F	11-30-77	SCHEM DIAG, S-BAND AMPLIFIER
		WATKINS JOHNSON	701287		E	8-1-84	SCHEM DIAG, HIGH VOLTAGE
		WATKINS JOHNSON	701255		C	11-17-77	WIRE LIST, EMI FILTER

DWG	SIGNATURE		DATE
6.2-1,2	ENGR E. B. WALTERS		
	ENGR E. B. Walters		11/1/90
	ENGR		
	ENGR		
	APP		
	APP		
	OMNIPLAN		
	LTR E	PCN	

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LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 16-I
ALL	

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.2 (SHEET 3)	S-BAND PM/FM SW BEAM ANT SYS						ORBITER SCHEMATIC LIST
		R. I	VS70-740259		H	5/6/88	SCHEMATIC DIAGRAM, S-BAND ANTENNA SWITCH SUBSYSTEM
		R. I.	VS70-740299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL
							LRU SCHEMATIC LIST
		TELEDYNE MICROWAVE	2701349		A	4/4/77	S-BAND SWITCH ASSY SCHEMATIC
		TELEDYNE MICROWAVE	2701349		NC	10/28/77	S-BAND SWITCH ASSY LOGIC CIRCUITRY TRUTH TABLE
		TELEDYNE MICROWAVE	2702502		NC	1/12/81	SCHEMATIC, SWITCH BEAM CNTL, MODEL 4292
16.3 (SHEET 1)	NETWORK SIGNAL PROCESSOR RETURN LINK	R. I.	VS70-740229		F	4/29/88	ORBITER SCHEMATIC LIST SCHEMATIC DIAGRAM, C&T NETWORK SIGNAL PROCESSOR
16.3 (SHEET 2)	NETWORK SIGNAL PROCESSOR FORWARD LINK	R. I.	VS70-740299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL LRU SCHEMATIC LIST NSP LRU
16.3 (SHEET 3)	NETWORK SIGNAL PROCESSOR COMSEC 1/2	TRW	29299	1-9	NC	9/18/88	RETURN LINK PROCESSOR
		TRW	292311	1-8	NC		RECORD MODE PROC.
		TRW	292301	1-10	NC		RETURN LINK PROC.
		TRW	292281	1-9	NC		CONVOLUTION A DEC.
		TRW	292341	1-6	NC		BIT SYNC ANALOG
		TRW	292351	1-8	NC		PHASE DET. (ETC.)
		TRW		1-8	NC		MODE CNTL & SUM. BITE
		TRW	292321	1-8	NC		FRM DET. & DELTA DEMOD
		TRW	292291	1-9	NC	12/16/76	FWD LINK PROC
		TRW					NSP INTERCONNECT DIAG
							COMSEC LRU
		MOTOROLA					ELWELL 11 PRELIMINARY DESIGN REVIEW, JANUARY 29-31, 1980

DWG	SIGNATURE		DATE
16.2-3	ENGR E. B. WALTERS		
	ENGR E. B. Walters		11/5/90
16.3-1,2,3	ENGR T. A. KALVELAGE		
	ENGR T. A. Kalvelage		11/5/90
	APP		
	APP		
	OMNIPLAN		
	LTR E	PCN	

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VENDOR DRAWING REFERENCES

SPACE SHUTTLE | TBL NO 16-I

ALL

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.4 (SHEET 1)	TAGS SYS HARDCOPIER	NAVAL AVIONICS CTR	AV14424	1		TBS	BOARD, LED LARGE 1A1A1A1
		NAVAL AVIONICS CTR	AV14426	1		TBS	BOARD, LED SMALL 1A1A1A2
		NAVAL AVIONICS CTR	AV14443	1-4	E	TBS	SLIP RING ASSEMBLY
		NAVAL AVIONICS CTR	AV14451	1-2		TBS	BULKHEAD, REAR INTERMEDIATE POWER COMPONENTS
		NAVAL AVIONICS CTR	AV14453	1-16	H	TBS	UPLINK TEXT AND GRAPHICS HARDCOPIER FINAL ASSEMBLY 1A1
		NAVAL AVIONICS CTR	AV14459	1		TBS	HEATER, FLEXIBLE, ETCHED FOIL WITH THERMOMETERS
		NAVAL AVIONICS CTR	AV14463	1-8	E	TBS	DRIVE ASSEMBLY, ELECTRO/MECHANICAL
		NAVAL AVIONICS CTR	AV14465	1-8	D	TBS	POWER SUPPLY, MODULAR, +28 VDC INPUT TO +1.2 kV OUTPUT
		NAVAL AVIONICS CTR	AV14469	1-9	B	TBS	POWER SUPPLY, MODULAR, +28 VDC INPUT TO +17.5 kV OUTPUT
		NAVAL AVIONICS CTR	AV14474	1-11		TBS	MICROCIRCUIT, DIGITAL, CMOS, HEX OPEN DRAIN N-CHANNEL BUFFER
		NAVAL AVIONICS CTR	AV14475	1-13		TBS	MICROCIRCUIT, DIGITAL, CMOS, 8 BIT INPUT/OUTPUT PORT
		NAVAL AVIONICS CTR	AV14476	1-15		TBS	MICROCIRCUIT, DIGITAL, 8192 BIT, SCHOTTKY, BIPOLAR, ROM
		NAVAL AVIONICS CTR	AV14477	1-11		TBS	MICROCIRCUIT, DIGITAL, QUAD 2-INPUT NAND GATE, CMOS
		NAVAL AVIONICS CTR	AV14478	1-24		TBS	MICROCIRCUIT, DIGITAL, COSMAC MICROPROCESSOR CPU
		NAVAL AVIONICS CTR	AV14479	1-12		TBS	MICROCIRCUIT, DIGITAL, TYPE D FLIP-FLOP, DUAL, CMOS
		NAVAL AVIONICS CTR	AV14480	1-12		TBS	MICROCIRCUIT, DIGITAL, BCD TO DECIMAL DECODER,
		NAVAL AVIONICS CTR	AV14481	1-12		TBS	MICROCIRCUIT, DIGITAL, QUAD D LATCH, MOS
		NAVAL AVIONICS CTR	AV14482	1-12		TBS	MICROCIRCUIT, DIGITAL, CMOS, STATIC RAM, 1024 x 4 BIT
		NAVAL AVIONICS CTR	AV14483	1-11		TBS	MICROCIRCUIT, DIGITAL, CMOS, QUAD 2-INPUT OR GATE
		NAVAL AVIONICS CTR	AV14484	1-11		TBS	MICROCIRCUIT, DIGITAL, CMOS, 3 STATE HEX NON-INVERT BUFFER
		NAVAL AVIONICS CTR	AV14485	1-11		TBS	MICROCIRCUIT, DIGITAL, 3 STATE HEX INVERT BUFFER
		NAVAL AVIONICS CTR	AV14486	1-12		TBS	MICROCIRCUIT, DIGITAL, 8-BIT, D-TYPE LATCH, 3-STATE OUTPUT
		NAVAL AVIONICS CTR	AV14487	1-13		TBS	MICROCIRCUIT, DIGITAL, TTL 8 TO 3 LINE PRIORITY ENCODER
		NAVAL AVIONICS CTR	AV14488	1-11		TBS	MICROCIRCUIT, DIGITAL, QUAD 2-INPUT POSITIVE-AND GATE, OC OUTPUT
		NAVAL AVIONICS CTR	AV14500	1-5	B	TBS	CIRCUIT CARD ASSEMBLY, SYNC GENERATOR 1A1A8A1
		NAVAL AVIONICS CTR	AV14502	1-4	A	TBS	CIRCUIT CARD ASSEMBLY, CPU 1A1A8A2
		NAVAL AVIONICS CTR	AV14504	1-4		TBS	CIRCUIT CARD ASSY, VIDEO PROCESSING INTERFACE 1A1A8A3
		NAVAL AVIONICS CTR	AV14506	1-3	E	TBS	CIRCUIT CARD ASSEMBLY, ANALOG VIDEO 1A1A8A4
		NAVAL AVIONICS CTR	AV14508	1-9	C	TBS	CIRCUIT CARD ASSEMBLY, MDM AND FRONT INT 1A1A8A5
		NAVAL AVIONICS CTR	AV14510	1-5	D	TBS	CIRCUIT CARD ASSEMBLY, CRT CONTROL 1A1A8A6
		NAVAL AVIONICS CTR	AV14512	1-4	D	TBS	CIRCUIT CARD ASSEMBLY, HEATER CONTROL
		NAVAL AVIONICS CTR	AV14514	1-3	F	TBS	CIRCUIT CARD ASSEMBLY, MOTOR CONTROL 1A1A8A8
		NAVAL AVIONICS CTR	AV14516	1-3	C	TBS	MOTHER BOARD ASSEMBLY 1A1A8
		NAVAL AVIONICS CTR	AV14525	1-12		TBS	MICROCIRCUIT, DIGITAL, 8-INPUT NAND GATE, CMOS
		NAVAL AVIONICS CTR	AV14527	1-12		TBS	MICROCIRCUIT, DIGITAL, 8-INPUT NOR GATE, CMOS
		NAVAL AVIONICS CTR	AV14528	1-7		TBS	MICROCIRCUIT, DIGITAL, DUAL MONOSTABLE MULTIVIBRATOR
		NAVAL AVIONICS CTR	AV14529	1-14		TBS	MICROCIRCUIT, DIGITAL, CMOS SEVEN STAGE BINARY RIPPLE COUNTER

DWG	SIGNATURE		DATE
16.4-1	ENGR	C.A. COUNTS	
	ENGR		11/5/90
	ENGR		
	ENGR		
	APP		
	APP		
	OMNIPLAN		
	LTR E	PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE | TBL NO 16-I
ALL

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.4 (SHEET 1) (CONT'D)	TAGS SYS HARDCOPIER	AV14530 AVIONICS CTR	1-11			TBS	MICROCIRCUIT, DIGITAL, CMOS HEX NON-INVERTING BUFFER
		NAVAL AVIONICS CTR	AV14531	1-11		TBS	MICROCIRCUIT, DIGITAL, HEX INVERTER, CMOS
		NAVAL AVIONICS CTR	AV14532	1-13		TBS	MICROCIRCUIT, DIGITAL, SHIFT REGISTER, 4-BIT, BIDIRECTIONAL
		NAVAL AVIONICS CTR	AV14533	1-13		TBS	MICROCIRCUIT, DIGITAL, 4-BIT BINARY COUNTER W/SYNCHRONOUS CLOCK
		NAVAL AVIONICS CTR	AV14535	1-11		TBS	MICROCIRCUIT, DIGITAL, CMOS DUAL 4-INPUT NOR GATE
		NAVAL AVIONICS CTR	AV14538	1-12		TBS	MICROCIRCUIT, DIGITAL, 8-CHANNEL DATA SELECTOR, 3-STATE OUTPUT
		NAVAL AVIONICS CTR	AV14539	1-12		TBS	MICROCIRCUIT, DIGITAL, DUAL 4-BIT STATIC SHIFT REGISTER, CMOS
		NAVAL AVIONICS CTR	AV14540	1-12		TBS	MICROCIRCUIT, DIGITAL, CMOS HEX INVERTING BUFFER
		NAVAL AVIONICS CTR	AV14541	1-3	C	TBS	SWITCH, THERMOSTATIC
		NAVAL AVIONICS CTR	AV14543	1	A	TBS	BOARD, LED LARGE ASSY 1A1A1A1
		NAVAL AVIONICS CTR	AV14544	1		TBS	BOARD, LED SMALL ASSY 1A1A1A2
		NAVAL AVIONICS CTR	AV14550	1-18		TBS	MICROCIRCUIT, DIGITAL, PHASE-LOCKED LOOP, MICROPOWER, CMOS
		NAVAL AVIONICS CTR	AV14551	1-11		TBS	MICROCIRCUIT, LINEAR, QUAD OPERATIONAL AMPLIFIER, HIGH PERFORMANCE
		NAVAL AVIONICS CTR	AV14552	1-11		TBS	MICROCIRCUIT, LINEAR, OPERATIONAL AMPLIFIER, HIGH VOLTAGE
		NAVAL AVIONICS CTR	AV14553	1-12		TBS	MICROCIRCUIT, DIGITAL, BINARY TO 1 OF 4 DECODER/DEMUX, DUAL
		NAVAL AVIONICS CTR	AV14554	1-12		TBS	MICROCIRCUIT, DIGITAL, HEX SCHMITT TRIGGER, CMOS
		NAVAL AVIONICS CTR	AV14555	1-12		TBS	MICROCIRCUIT, DIGITAL, 8-BIT ADDRESSABLE LATCH, CMOS
		NAVAL AVIONICS CTR	AV14556	1-13		TBS	MICROCIRCUIT, LINEAR, TRANSISTOR ARRAY, NPN, SILICON, QUAD
		NAVAL AVIONICS CTR	AV14559	1-13		TBS	MICROCIRCUIT, LINEAR, 8-BIT MULTIPLYING D/A CONVERTER
		NAVAL AVIONICS CTR	AV14560	1-12		TBS	MICROCIRCUIT, DIGITAL, CMOS, DUAL 4-CHANNEL ANALOG MULTIPLEXER
		NAVAL AVIONICS CTR	AV14562	1-12	A	TBS	MICROCIRCUIT, DIGITAL, ANALOG SWITCH, QUAD, SPST, CMOS
		NAVAL AVIONICS CTR	AV14563	1-14		TBS	MICROCIRCUIT, LINEAR, CONTROL, SWITCH MODE REGULATOR
		NAVAL AVIONICS CTR	AV14564	1-12		TBS	MICROCIRCUIT, LINEAR, CURRENT AMPLIFIER, THICK FILM HYBRID
		NAVAL AVIONICS CTR	AV14565	1-13	A	TBS	MICROCIRCUIT, DIGITAL, CMOS HEX SCHMITT TRIGGER
		NAVAL AVIONICS CTR	AV14567	1-14		TBS	MICROCIRCUIT, DIGITAL, CMOS QUAD R/S LATCH W/3-STATE OUTPUTS
		NAVAL AVIONICS CTR	AV14569	1-3	D	TBS	CIRCUIT CARD ASSEMBLY, POWER SUPPLY 1A1A7A1
		NAVAL AVIONICS CTR	AV14572	1-3	B	TBS	CIRCUIT CARD ASSEMBLY, POWER REGULATOR 1A1A7A2
		NAVAL AVIONICS CTR	AV14573	1-6	B	TBS	ELECTRICAL SCHEMATIC INTERCONNECTION & WIRING DIAGRAM
		NAVAL AVIONICS CTR	AV14579	1-12		TBS	MICROCIRCUIT, LINEAR, DUAL CHANNEL OPTOCOUPLER
		NAVAL AVIONICS CTR	AV14580	1-11		TBS	MICROCIRCUIT, LINEAR, HERMETICALLY SEALED, 4-CHANNEL, OPTOCOUPLER
		NAVAL AVIONICS CTR	AV14582	1-11		TBS	MICROCIRCUIT, LINEAR, OPERATIONAL, AMPLIFIER, THICK FILM HYBRID
		NAVAL AVIONICS CTR	AV14583	1-20		TBS	MICROCIRCUIT, LINEAR, SWITCHMODE REGULATOR CONTROL
		NAVAL AVIONICS CTR	AV14584	1-11		TBS	MICROCIRCUIT, LINEAR, PRECISION VOLTAGE REFERENCE, +5 VDC
		NAVAL AVIONICS CTR	AV14592	1-11		TBS	MICROCIRCUIT, LINEAR, POSITIVE VOLTAGE REGULATOR, ADJUSTABLE
		NAVAL AVIONICS CTR	AV14593	1-11		TBS	MICROCIRCUIT, LINEAR, NEGATIVE VOLTAGE REGULATOR, ADJUSTABLE
		NAVAL AVIONICS CTR	AV14620	1-4	B	TBS	ASSEMBLY, POWER SUPPLY :A1A7

DWG	SIGNATURE		DATE
16.4-1	ENGR	A. COUNTS	
	ENGR		11/5/90
	ENGR		
	ENGR		
	APP		
	APP		
	OMNIPLAN		
	LTR E	PCN	

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VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 16-I
ALL	

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.4 (SHEET 1) (CONC'D)	TAGS SYS HARDCOPIER	AV14633 AVIONICS CTR	1-11			TBS	MICROCIRCUIT, DIGITAL, HMOS, STATIC RAM, 1024 x 4 BIT
		NAVAL AVIONICS CTR	AV14660	1-12		TBS	MICROCIRCUIT, TRANSISTOR ARRAY, DARLINGTON, 7-CHANNEL
		NAVAL AVIONICS CTR	AV14661	1-11		TBS	MICROCIRCUIT, INTERFACE, 8-CHANNEL DRIVER
		NAVAL AVIONICS CTR	AV14669	1	B	TBS	CIRCUIT CARD ASSEMBLY, TRANSFORMER MOUNT
		NAVAL AVIONICS CTR	AV14680	1-4		TBS	CIRCUIT CARD ASSY, VIDEO PROCESSING INTERFACE 1A1A8A11
		NAVAL AVIONICS CTR	AV14696	1-4		TBS	CIRCUIT CARD ASSEMBLY, CPU 1A1A8A2
		NAVAL AVIONICS CTR	AV14698	1-3	B	TBS	FILTER ASSEMBLY, UPLINK GRAPHIC HARDCOPIER 1A1A9
		NAVAL AVIONICS CTR	AV14732	1		TBS	CAPSTAN/DEVELOPER MOTOR ASSY
		NAVAL AVIONICS CTR	AV14733	1-2	A	TBS	CRT ASSY
		NAVAL AVIONICS CTR	AV14740	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U27
		NAVAL AVIONICS CTR	AV14741	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U28
		NAVAL AVIONICS CTR	AV14742	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U29
		NAVAL AVIONICS CTR	AV14743	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U30
		NAVAL AVIONICS CTR	AV14744	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U1
		NAVAL AVIONICS CTR	AV14745	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U2
		NAVAL AVIONICS CTR	AV14746	1-2		TBS	PROGRAM MEMORY SPECIFICATION, U3
		NAVAL AVIONICS CTR	AV14747	1	A	TBS	PROGRAM MEMORY SPECIFICATION, MOTOR CONTROL, U11-U12
		NAVAL AVIONICS CTR	AV14776	1-3		TBS	CIRCUIT CARD ASSEMBLY, MOTOR CONTROL, 1A1A8A8
		NAVAL AVIONICS CTR	AV14778	1-3	A	TBS	CIRCUIT CARD ASSEMBLY, ANALOG VIDEO 1A1A8A4
16.4 (SHEET 2)	SECURE TAGS/TV I/F	R. I.-DOWNEY	VS70-740199	1-2	D	3/11/88	SCHEMATIC DIAGRAM TEXT AND GRAPHICS SUBSYSTEM
		R.I.-ANAHEIM DEFENSE ELECTRONICS OPERATIONS	25851-514	1		11/5/85	SCHEMATIC-ENCRYPTION BYPASS ISOLATION ASSY

DWG		SIGNATURE	DATE	DWG		SIGNATURE	DATE
16.4-1	ENGR	CHRISTOPHER A. COUNTS			ENGR		
	ENGR	Christopher A. Counts	11/13/90		ENGR		
16.4-2	ENGR	CHRISTOPHER A. COUNTS			ENGR		
	ENGR	Christopher A. Counts	11/13/90		ENGR		
	ENGR				APP		11/21/90
	ENGR				APP		11-21-90
	ENGR				OMNIPLAN		
					LTR E	PCN	

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VENDOR DRAWING REFERENCES

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	PAGE 16.I-6 SHEET 6 OF 13

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.5 (SHEETS 1 & 2)	KU-BAND SYSTEM						ORBITER SCHEMATIC LIST
		R. I.	VS70-740102		J	2/16/88	SCHEMATIC, KU-BAND COMM (OV102)
		R. I.	VS70-740109		E	2/15/88	SCHEMATIC, KU-BAND COMM (OV103/4)
		R. I.	VS70-590119		B	11/18/85	SCHEMATIC, KU-BAND ANTENNA DEPLOYMENT MMCA 2 & 4
		R. I.	VS70-740299		F	4/29/88	SCHEMATIC, C&T GCIL
		R. I.	VS70-764359		C	11/03/87	SCHEMATIC, MID POWER CONTROL ASSY-2
		R. I.	VS70-763362		K	10/29/88	SCHEMATIC, FWD POWER CONTROL ASSY-3
							LRU SCHEMATIC LIST
							SIGNAL PROCESSOR ASSEMBLY
		HUGHES	3526150-410				SIGNAL PROC. ASSY I/F DIAGRAM
		HUGHES	3582632				LVPS (SPA) SCHEMATIC
		HUGHES	3582651				LINEAR REG/LOGIC SCHEMATIC
		HUGHES	3555411				CONVOLUTIONAL ENCODER SCHEMATIC
		HUGHES	3555441				MGT./HANDOVER SCHEMATIC
		HUGHES	3555431				FM SWITCH/GENERATOR SCHEMATIC
		HUGHES	3555080				FM MODULE INTERCONNECT
		HUGHES	3555461				QPSK MODULATOR INTERCONNECT
		HUGHES	3555451				BIT SYNC SCHEMATIC
		HUGHES	3555561				BIT SYNC SCHEMATIC
		HUGHES	3555571				BIT/FRAME/DECOMM SCHEMATIC
							ELECTRONIC ASSEMBLY NO. 1
		HUGHES	3555131				SERVO LOOP SHAPING SCHEMATIC
		HUGHES	3555141				RATE INTEGRATING GYRO SCHEMATIC
		HUGHES	3555151				MOTOR DRIVER SCHEMATIC
		HUGHES	3555161				MDM INTERFACE SCHEMATIC
		HUGHES	3555171				PN DESPREADER (BD #2) SCHEMATIC
		HUGHES	3555181				PN DESPREADER (BD #1) SCHEMATIC
		HUGHES	3555191				PSK DEMODULATOR (BD #1) SCHEMATIC
		HUGHES	3555201				PSK DEMODULATOR (BD #2) SCHEMATIC
		HUGHES	3555231				GYRO HTR/LOOP ELECTRONICS
		HUGHES	3582672				LVPS SCHEMATIC
		HUGHES	3582685				LINEAR REG/LOGIC SCHEMATIC
		HUGHES	3680761				I/O PROCESSOR (BD #1) SCHEMATIC
		HUGHES	3680750				I/O PROCESSOR (BD #2) SCHEMATIC
		HUGHES	3680755				MICROCOMPUTER (BD #2) SCHEMATIC
		HUGHES	3707579				MICROCOMPUTER (BD #1) SCHEMATIC
		HUGHES	3680767				MDM INTERFACE (BD #2) SCHEMATIC
		HUGHES	3680799				MDM INTERFACE (BD #1) SCHEMATIC
		HUGHES	3526101-410				EA-1 BLOCK DIAGRAM
							ELECTRONIC ASSEMBLY NO. 2
		HUGHES	3526140-210				EA-2 SCHEMATIC
		HUGHES	3555692				LVPS (EA-2) SCHEMATIC
		HUGHES	3582615				LINEAR REG/LOGIC SCHEMATIC
		HUGHES	3555615				ANALOG PROC. SCHEMATIC
		HUGHES	3555625				PREPROCESSOR SCHEMATIC
		HUGHES	3555635				MASTER TIMING/CONTROL SCHEMATIC
		HUGHES	3555645				FILTER PROC. SCHEMATIC
		HUGHES	3555655				PDI & SEQUENCE DATA SCHEMATIC
		HUGHES	3555665				DETECTION/AGC SCHEMATIC
		HUGHES	3555675				RANGE/VELOCITY SCHEMATIC
		HUGHES	3555685				ANGLE/SERIAL DATA SCHEMATIC
							DEPLOYED ASSEMBLY
		HUGHES	3526180-310				DEA SCHEMATIC
		HUGHES	3561952				LVPS SCHEMATIC
		HUGHES	3561962				LINEAR REG/LOGIC SCHEMATIC
		HUGHES	3555811				STANDBY CONTROL LOGIC SCHEMATIC
		HUGHES	3555821				PULSE WIDTH MODULATOR SCHEMATIC
		HUGHES	3555831				RF ENABLE LOGIC SCHEMATIC
		HUGHES	3555841				MICROWAVE LOGIC SCHEMATIC
		HUGHES	3555851				PWM REG SCHEMATIC
		HUGHES	3555861				FILAMENT REG/CONVERTER SCHEMATIC
		HUGHES	3555871				D.C. MOTOR DRIVE SCHEMATIC
		HUGHES	3555881				TRANSMITTER PWR/REG SCHEMATIC
		HUGHES	3555891				HIGH VOLTAGE RECT/REG SCHEMATIC
		HUGHES	3561801				EXCITER SCHEMATIC
		HUGHES	3561811				HARMONIC PHASE COMPARATOR SCHEMATIC
		HUGHES	3561826				SELF TEST LOGIC I/F SCHEMATIC
		HUGHES	3561831				BUFF/DIV/27dB AMPL SCHEMATIC
		HUGHES	3561841				FREQ SYNTHESIZER SCHEMATIC
		HUGHES	3561851				FET LIMITING AMPL SCHEMATIC
		HUGHES	3561891				GUNN VLT. REG. SCHEMATIC
		HUGHES	3561868				RCVR BLANKING LOGIC SCHEMATIC

DWG	SIGNATURE		DATE
16.5-1, 2	ENGR MARTIN T. O'HARE		
	ENGR		
	ENGR		
	ENGR		
	APP		11/21/90
	APP		11-21-90
	OMNIPLAN		
	LTR E	PCN	

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VENDOR DRAWING REFERENCES

SPACE SHUTTLE ALL

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BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.5 (SHEETS 1 & 2)		HUGHES	3599951				ECL LOGIC I/F SCHEMATIC
		HUGHES	3599961				ML LOGIC I/F SCHEMATIC
		HUGHES	3555901				MICROWAVE ASSY SCHEMATIC
		HUGHES	3574801				RECEIVER SCHEMATIC
		HUGHES	3574811				IF AMPL (COMM) SCHEMATIC
		HUGHES	3574821				IF AMPL (RADAR) SCHEMATIC
		HUGHES	3574831				2ND IF AMPL (RADAR) SCHEMATIC
		HUGHES	3574841				BUFFER AMPL (RADAR) SCHEMATIC
		HUGHES	3574851				RECEIVE TRK LOGIC SCHEMATIC
		HUGHES	3555802				TRANSMITTER INTERCONNECTION
		HUGHES	3561589				DMA WIRING DIAGRAM
		HUGHES	3561601				DA WIRING DIAGRAM
		HUGHES	3555788				DEA BLOCK DIAGRAM
16.6	INTERM TELEPRINTER SYSTEM						ORBITER SCHEMATIC LIST TBD LRU SCHEMATIC LIST TBD
16.7B	ORBITER EXPERIMENTS SUPPORT SYSTEM FOR OEX	JSC				9/82	SSO ICD LEVEL III (OEX SCM MODULE INTERFACES)
		LEMSCO			PRELIM	6/87	PRELIMINARY SCM INTERFACE DRAWINGS
16.8	S-BAND FM SYSTEM						ORBITER SCHEMATIC LIST
		R. I.	VS70-740262		D	9/13/84	SCHEMATIC, S-BAND FM SIGNAL PROCESSOR (OV102)
		R. I.	VS70-740269		B	9/13/84	SCHEMATIC, S-BAND FM SIGNAL PROCESSOR (OV103 & SUBS)
		R. I.	VS70-740272		D	9/13/84	SCHEMATIC, S-BAND FM TRANSMITTER (OV102)
		R. I.	VS70-740279		D	11/13/84	SCHEMATIC, S-BAND FM TRANSMITTER (OV103 & SUBS)
							LRU SCHEMATIC LIST
		TELEDYNE	SK2008736				FM TRANSMITTER
		TELEDYNE	SK2008748				MODULATOR/EXCITER
		TELEDYNE	SK2008750				POWER SUPPLY
		TELEDYNE	SK2008763				TLM PROCESSOR
		TELEDYNE	SK2008925				RF POWER AMPLIFIER INTERCONNECTION DIAGRAM
		CONRAC	7905345				FM SIGNAL PROCESSOR
		CONRAC	7905348				POWER SUPPLY
		CONRAC	7905351				LOGIC TV, ANLG & ME OUTPUT
		CONRAC	7905354				MAIN ENGINE PROCESSING
		CONRAC	7905360				INTERCONNECTION DIAGRAM DIGITAL DATA PROCESSING
16.9 (SHEETS 1 & 2)	UHF TRANSCEIVER EVC TRANSCEIVER						ORBITER SCHEMATIC LIST
		R. I.	VS70-740119		A	12/18/81	SCHEMATIC DIAGRAM, UHF EVA/ATC TRANSCEIVER
		R. I.	WS330-102-74-5				WIRNG DIAGRAM UHF EVA/ATC TRANSCEIVER
		R. I.	VS70-740112		E	11/18/82	SCHEMATIC DIAGRAM - COMM & TRACK UHF EVA/ATC TRANSCEIVER
		R. I.	VS70-760802		K	4/5/82	SCHEMATIC DIAGRAM - PAYLOAD SUBSYSTEM INTERFACE
							LRU SCHEMATIC LIST
		RCA	ICD-3-0061-03		A		UHF CDR NO. 552-1021 SHUTLE ORBITER EVA ATC TRANSCEIVER

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
16.5-1, 2	ENGR MARTIN T. O'HARE		16.8	ENGR MARTIN T. O'HARE	
	ENGR Martin T. O'Hare	11/21/92		ENGR Martin T. O'Hare	11/21/92
16.6	ENGR S. M. KAKADELIS		16.9-1,2	ENGR D. R. BROWN	
	ENGR S. Kakadelis	11-21-92		ENGR	
16.7B	ENGR S. M. KAKADELIS			APP	11/21/92
	ENGR S. Kakadelis	11 21 92		APP Richard W. Rodney	11-21-90
	ENGR			OMNIPLAN	
	ENGR			LTR E PCN	

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VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 16-I
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FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.10 (SHEETS 1 - 7)	AUDIO PANEL						ORBITER SCHEMATIC LIST
		R. I.	VS70-740242		H	11/14/86	SCHEMATIC, AUDIO C&T SUBSYSTEM (OV102)
		R. I.	VS70-740249		D		SCHEMATIC, AUDIO C&T SUBYSTEM (OV103/104)
							LRU SCHEMATIC LIST
							AUDIO CENTRAL CONTROL UNIT
		TELEPHONICS	480G101-2				SCHEMATIC, 20 VDC REGULATOR & CLOCK
		TELEPHONICS	480G106-3				SCHEMATIC, STATION AUDIO
		TELEPHONICS	480G111-2				SCHEMATIC, STATION CONTROL PWR & AUDIO INPU
		TELEPHONICS	480G116-4				SCHEMATIC, DR OR AP OR (LU,PBS,IRAM,IRFM)
		TELEPHONICS	480G121-3				SCHEMATIC, NSP & OIC
16.11 (SHEETS 1 & 2)	AUDIO/ACCV	TELEPHONICS	480G126-2				SCHEMATIC, C&W, EIC, PAGE & NAV
		TELEPHONICS	480G131-2				SCHEMATIC, CONFIGURATION & A/A
		TELEPHONICS	480G136-3				SCHEMATIC, EVA,AG1,AG2,RELAYS & EXP RCDR
		TELEPHONICS	480G141-2				SCHEMATIC, MAIN POWER REGULATOR & KEYLINE
		TELEPHONICS	480G146-2				SCHEMATIC, AMPLIFIER & RECTIFIER (A33 & A34)
							AUDIO TERMINAL UNIT
		TELEPHONICS	480D221-2				SCHEMATIC, PWR STAGES, PWR SUPPLY & EARPHONE DRIVER
		TELEPHONICS	480H226-2				SCHEMATIC, DIGITAL "B"
		TELEPHONICS	480G231-2				SCHEMATIC, DIGITAL "A"
		TELEPHONICS	480G236-4				SCHEMATIC, ANALOG MIC & DIGITAL "C"
		TELEPHONICS	480D241-4				SCHEMATIC, PWR SUPPLY & EARPHONE DRIVER
							SPEAKER/MICROPHONE UNIT
		TELEPHONICS	480D325-1				CKT CARD ASSY, SPEAKER DRVR AND PWR SUPPLY
		TELEPHONICS	480D330-2				CKT CARD ASSY, LOGIC & I/O INTERFACE
		TELEPHONICS	480D335-1				CKT CARD ASSY, MIC CKT AMP
							MULTIPLE HEADSET ADAPATER
		TELEPHONICS	480C1211-3				SCHEMATIC
16.12	TV CONTROL						ORBITER SCHEMATIC LIST
		R. I.	VS70-740189		F	5/24/88	SCHEMATIC, TV COMM & TRACKING SUBSYSTEM
							LRU SCHEMATIC LIST
		RCA	2297157		A		RCU A8
		RCA	2297160		A		RCU A11
		RCA	2297161		A		RCU A5
		RCA	2297195		A		RCU SCHEMATIC
		RCA	2297250		C		RCU A1
		RCA	2297252		D		RCU A2
		RCA	2297254		F		RCU SCHEMATIC
		RCA	2297256		B		RCU A4
		RCA	2297261		B		RCU A7
		RCA	2297402		J		VSU SCHEMATIC
		RCA	2297404		C		VSU A2
		RCA	2297427		L		VSU A3
		RCA	2297430		B		VSU A4/A5
		RCA	2297432		C		VSU A6/A7
		RCA	2297434		C		VSU A9
		RCA	2297159		-		RCU A10
		RCA	2297263		C		RCU A12
16.13 (SHEETS 1 - 3)	TV/CAMERA MONITOR						ORBITER SCHEMATIC LIST
		R. I.	VS70-740189		F	5/24/88	SCHEMATIC, TV COMM & TRACKING SUBSYSTEM
		R. I.	K200-793010		NC	10/17/80	EMU TV KIT
		R. I.	K200-893010		NC	10/17/80	EMU TV KIT
		R. I.	ICD-3-0050-01			2/19/80	SHUTTLE ORBITER CCTV SYSTEM (PART 1)
		R. I.	ICD-3-0050-01			2/19/80	SHUTTLE ORBITER CCTV SYSTEM (PART 2)
							LRU SCHEMATIC LIST
		R. I.	MCR 7475 2293179		2	7/21/82	ADDITION OF EMU-TV CABLE
		RCA	2293180				
		RCA	2293292		B		
		RCA	2294841		A		
		RCA	2295434		A		
		RCA	2306439		B		

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
6.10, 1-7	ENGR M. W. SMITH		6.12	ENGR R. MOOLCHAN	
	ENGR M. Williams Smith	11/13/90		ENGR R. Moolchan	11/21/90
6.11-1, 2	ENGR M. W. SMITH		6.13, 1-3	ENGR R. MOOLCHAN	
	ENGR M. Williams Smith	11/13/90		ENGR R. Moolchan	11/21/90
	ENGR			APP C. F. Lobb	11/21/90
	ENGR			APP Richard W. Kelley	11-21-90
	ENGR			OMNIPLAN	
				LTR E	PCN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE | TBL NO 16-I
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BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.13 (SHEET 4)	TV/SECURE						ORBITER SCHEMATIC LIST
		RCA				9/10/85	SECURE TELEVISION SYSTEM (STV) CRITICAL DESIGN REVIEW DATA PACKAGE
		RCA	2623127	1-6		2/2/85	SCHEMATIC ADU A1 SIGNAL PROCESSOR
		RCA	2623147	1-21		2/12/85	LOGIC DIAGRAM ADU A2 WRITE CONTROLLER
		RCA	2623143	1-14		4/2/85	LOGIC DIAGRAM ADU A3 BOARD READ CONTROLLER AND OUTPUT MUX
							LRU SCHEMATIC LIST
		R.I.	V738-740002	1-3	B	4/15/88	SCHEMATIC DIAGRAM- CCTV AIRBORNE DIGITIZER UNIT SUBSYSTEM
		R.I.	NAS9-14000 IRD-TM453C WBS 5.9.68	1-73		5/30/85	SECURED CCTV SYSTEM (STVS) INTEGRATION HARDWARE PDR DATAPACK
16.14	S-BAND PAYLOAD INTERROGATOR						ORBITER SCHEMATIC LIST
		R.I.	VS70-740239	1-4	D	5/10/88	SCHEMATIC DIAGRAM, C&T PAYLOAD INTERROGATOR
		R.I.	VS70-740299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL
							LRU SCHEMATIC LIST
		TRW	700651		A	3/11/82	INTERCONNECT DRAWING, POWER AMP
		TRW	700673		A	2/24/81	SCHEMATIC DIAGRAM, DETECTOR, DOD (A10)
		TRW	700677		B	9/22/81	SCHEMATIC DIAGRAM, FINAL AMP A&B (DOD)
		TRW	700681		B	9/22/81	SCHEMATIC DIAGRAM, FINAL AMP A&B (NASA)
		TRW	700688		A	2/24/81	SCHEMATIC DIAGRAM, DETECTOR NASA (A9)
		TRW	700691		B	10/12/81	SCHEMATIC DIAGRAM, WIDEBAND PREAMP & SWITCH PWR AMP MODULE
		TRW	700694		A	8/12/80	SCHEMATIC DRAWING, TLM & SWITCH DRIVER
		TRW	700711		A	10/8/81	SCHEMATIC DIAGRAM, FIRST LO DRIVER
		TRW	700719		A	12/11/81	SCHEMATIC DIAGRAM, 1ST BAND PASS FILTER
		TRW	700723		A	1/14/81	SCHEMATIC DIAGRAM, RCVR AGC NETWORK
		TRW	700727		A	12/3/81	SCHEMATIC DIAGRAM, 2ND BAND PASS FILTER
		TRW	700731		A	3/13/80	SCHEMATIC DIAGRAM, SECOND MIXER
		TRW	700735		A	5/13/81	SCHEMATIC DIAGRAM, AGC AMPLIFIER
		TRW	700739		B	1/14/81	SCHEMATIC DIAGRAM, IF AMP
		TRW	700743		A	4/25/80	SCHEMATIC DIAGRAM, 184 MHz BPF
		TRW	700747		A	12/1/80	SCHEMATIC DIAGRAM, X5, X2 MULTIPLIER
		TRW	700751		C	4/6/82	INTERCONNECT DIAGRAM, 2ND IF
		TRW	700761		B	8/31/81	SCHEMATIC DIAGRAM, VCX0 2ND IF MODULE
		TRW	700765		B	3/11/81	SCHEMATIC DIAGRAM, PHASE DETECTOR AND COHERENT AMPLITUDE DETECTOR
		TRW	700769		A	6/10/80	SCHEMATIC DIAGRAM, REFERENCE SOURCE
		TRW	700773		A	5/16/80	SCHEMATIC DIAGRAM, RCVR W/B DETECTOR
		TRW	700781		C	2/4/81	SCHEMATIC DIAGRAM, PHASELOCK & TLM
		TRW	700793		C	9/16/81	SCHEMATIC DIAGRAM, AGC/TLM
		TRW	700815		B	10/5/81	SCHEMATIC DIAGRAM, X3/X5 MULTIPLIER BOARD FREQ SOURCE MODULE
		TRW	700843		A	8/28/80	SCHEMATIC DIAGRAM, GAIN NORMALIZER & FILTER RCVR SYNTHESIZER MODULE
		TRW	700851		A	8/4/81	INTERCONNECT DIAGRAM, RCVR SYNTHESIZER
		TRW	700861		A	11/21/80	SCHEMATIC DIAGRAM, RX SYNTHESIZER BOARD
		TRW	700865		B	1/6/81	SCHEMATIC DIAGRAM, REF X2 & PWR DIVIDER
		TRW	700873		A	2/5/81	SCHEMATIC DIAGRAM, RF AMP & DN CONVERTER
		TRW	700881		C	1/13/82	SCHEMATIC DIAGRAM, RCVR OFFSET, X2
		TRW	700885		A	1/12/81	SCHEMATIC DIAGRAM, UP CONVERTER AMP
		TRW	700888		A	1/29/81	SCHEMATIC DIAGRAM, LOOP IF AMP & FILTER
		TRW	700891		B	11/26/80	SCHEMATIC DIAGRAM, UP CONVERTER, X4
		TRW	700901		B	10/5/81	INTERCONNECT DIAGRAM, XMTR SYNTHESIZER MODULE
		TRW	700911		A	11/25/81	SCHEMATIC DIAGRAM, XMTR SYN MODULE
		TRW	700915		C	1/16/82	SCHEMATIC DIAGRAM, BASEBAND BOARD
		TRW	700920		B	12/7/81	SCHEMATIC DIAGRAM, XMTR LOOP VCO & POWER DIVIDER
		TRW	700927		A	3/13/80	SCHEMATIC DIAGRAM, LOOP IF AMP & FILTER
		TRW	700931		B	10/21/80	SCHEMATIC DIAGRAM, LINEAR PHASE MODULATOR
		TRW	700939		B	11/25/80	SCHEMATIC DIAGRAM, UPCONVERTER, X4
		TRW	700948		A	10/5/81	SCHEMATIC DIAGRAM, GAIN NORMALIZER & FILTER
		TRW	700961			1/30/80	SCHEMATIC DIAGRAM, CMD PROCESSOR (A1)
		TRW	700965		A	8/22/80	SCHEMATIC DIAGRAM, CMD PROCESSOR (A2)
		TRW	700969		A	12/3/80	SCHEMATIC DIAGRAM, CMD PROCESSOR (A3)
		TRW	700973		B	2/16/81	SCHEMATIC DIAGRAM, CMD PROCESSOR (A4)
		TRW	700982		C	3/22/82	SCHEMATIC DIAGRAM, RCVR LOOP VCO & PWR DIVIDER
		TRW	701001		A	9/27/82	INTERCONNECT DIAGRAM, PI
		TRW	701006		D	5/1/80	SCHEMATIC DIAGRAM, TRIPLEXER/SWITCH-SRU
		TRW	701043		A	1/14/81	SCHEMATIC DIAGRAM, VOLT REG (+5.1v/+12v)
		TRW	701034		A	4/29/80	SCHEMATIC DIAGRAM, RF PWR SWITCH (DOD)

DWG	SIGNATURE		DATE
6.13-4	ENGR F. MACFARLANE		
	ENGR		5NOV90
6.14	ENGR F. MACFARLANE		
	ENGR		5NOV90
	APP		
	APP		
	OMNIPLAN		
	LTR E	PCN	

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	PAGE 16.I-10 SHEET 10 OF 13

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.14 (CONC'D)		TRW	701037		A	4/29/80	SCHEMATIC DIAGRAM, RF PWR SWITCH (NASA)
		TRW	701051		A	11/4/80	SCHEMATIC DIAGRAM, PWR CONVERTER
		TRW	701086		B	1/15/81	INTERCONNECT DIAGRAM, BASEBAND MODULE
		TRW	701094		C	6/8/81	SCHEMATIC DIAGRAM, VIDEO AMP & SWITCHES
		TRW	701100		C	3/10/81	SCHEMATIC DIAGRAM, AGC ASSEMBLY
		TRW	709176		A	11/9/81	SCHEMATIC DIAGRAM, REF TCXO FREQ SOURCE
		TRW	709184		A	11/9/81	SCHEMATIC DIAGRAM, STDN VCXO ASSY
		TRW	709191		A	11/9/81	SCHEMATIC DIAGRAM, SGLS VCXO ASSY
		TRW	709195		A	10/5/81	SCHEMATIC DIAGRAM, LOOP IF AMP & FILTER
		TRW	709199		A	1/14/81	SCHEMATIC DIAGRAM, TCXO X2
		TRW	709206		B	4/9/81	SCHEMATIC DIAGRAM, DOD X2 STDN X2
		TRW	709227		A	11/24/80	SCHEMATIC DIAGRAM, OUTPUT AMP "A"
		TRW	709235		A	11/21/80	SCHEMATIC DIAGRAM, OUTPUT AMP "B"
		TRW	709509			12/4/80	SCHEMATIC DIAGRAM, UPCONVERTER AMP
		TRW	709516			4/9/81	SCHEMATIC DIAGRAM, FET SWITCH PRESET
16.15	PAYLOAD SIGNAL PROCESSOR						ORBITER SCHEMATIC LIST
		R. I.	VS70-740239	1-4	D	5/10/88	SCHEMATIC DIAGRAM, C&T PAYLOAD INTERROGATOR
		R. I.	VS70-740299		F	4/29/88	SCHEMATIC DIAGRAM, C&T GCIL
							LRU SCHEMATIC LIST
							LABELED SNEAK CIRCUIT ANALYSIS
		TRW	704231			2/24/81	SCHEMATIC DIAGRAM, PSP CMD PROCESSOR A
		TRW	704241			5/2/79	SCHEMATIC DIAGRAM, PSP CMD PROCESSOR B
		TRW	704162			6/20/79	SCHEMATIC DIAGRAM, PSP GENERAL, BOX
		TRW	704164			NO DATE	INTERCONNECT DIAGRAM, PSP
		TRW	704211			2/28/79	SCHEMATIC DIAGRAM, PSP TLM PROC A
		TRW	704221			3/1/79	SCHEMATIC DIAGRAM, PSP TLM PROC B
		TRW	704191			NO DATE	SCHEMATIC DIAGRAM; PSP BIT SYNC A
		TRW	704201			NO DATE	SCHEMATIC DIAGRAM, PSP BIT SYNC B
		TRW	704181			1/11/79	SCHEMATIC DIAGRAM, PSP PSK DEMODULATOR
16.16		SRB DFI FLIGHT					ORBITER SCHEMATIC LIST
	RECORDER	MSFC	16A10242		L		LSRB DFI CABLE INTERCONNECT
		MSFC	16A10243		F		LSRB DFI ELECT SCHEMATIC
		MSFC	16A10244		L		RSRB DCI CABLE INTERCONNECT
							LRU SCHEMATIC LIST
		BELL & HOWELL	PN 533001			5/77	BASIC RECORDER/TAPE TRANSPORT, TECHNICAL MANUAL
		MSFC	19A01050				FLIGHT TAPE RECORDER (19A02050)
16.17	GROUND COMMAND INTERFACE LOGIC						ORBITER SCHEMATIC LIST
		R. I.	VS70-740299		F	4/29/88	SCHEMATIC, C&T GROUND COMMAND INTERFACE LOGIC CONTROLLER
							LRU SCHEMATIC LIST
		CONRAC, INC.	7954927-001		A		WIRE RUN LIST
		CONRAC, INC.	7102889		A	9/30/82	GCIL CONTROLLER DRIVER BOARD PARTITIONING TABLE DOCUMENT
		CONRAC, INC.	7906817		A	7/7/81	LOGIC DIAGRAM, MDM A DATA BUFFER A1
		CONRAC, INC.	7906819		A	7/6/81	LOGIC DIAGRAM, MDM B DATA BUFFER A2
		CONRAC, INC.	7906821		A	7/7/81	LOGIC DIAGRAM, DECODER DRIVER A3 THRU A9, A11 THRU A18
		CONRAC, INC.	7906823		A	7/6/81	LOGIC DIAGRAM, COMPLEX DECODER DRIVER A10
		CONRAC, INC.	7906825		A	7/7/81	SCHEMATIC DIAGRAM POWER SUPPLY A19 & A20
16.18	OPS RECORDERS						ORBITER SCHEMATIC LIST
		R. I.	VS70-750119		E	4/11/83	SCHEMATIC DIAGRAM, RECORDERS - OPS1/OPS2
							LRU SCHEMATIC LIST
		ODETICS, INC.	4410651		E	5/12/77	INTERMEDIATE AMP SCHEMATIC
		ODETICS, INC.	4410701	2	E	5/10/77	INTERCONNECT DIAGRAM, ELECTRONICS UNIT
		ODETICS, INC.	4410941	2	C	6/30/76	PARALLEL/SERIAL REPRO AMP SCHEMATIC
		ODETICS, INC.	4410961		C	6/30/79	SERVO POWER SUPPLY SCHEMATIC
		ODETICS, INC.	4410971	2	C	3/2/76	DIGITAL REPRO SCHEMATIC
		ODETICS, INC.	4410976	6	C	5/3/76	SERIAL DATA REPRO PWR SUPPLY/TLMY SCHEMATIC
		ODETICS, INC.	4411016		C	4/26/76	ERASE OSCILLATOR SCHEMATIC
		ODETICS, INC.	4411034	3	C	5/7/79	TRANSPORT UNIT SERVO SCHEMATIC
		ODETICS, INC.	4411056			6/10/76	DIRECTION SENSOR SCHEMATIC
		ODETICS, INC.	4411716		C	5/9/78	BIAS OSCILLATOR SCHEMATIC
		ODETICS, INC.	4411721		B	11/2/77	RECORD HEAD SWITCHER SCHEMATIC
		ODETICS, INC.	4410709			3-5-76	7 CHANNEL PREAMPLIFIER (TRKS 1-7)
		ODETICS, INC.	4411051			1/15/76	7 CHANNEL PREAMPLIFIER (TRKS 8-14)
		ODETICS, INC.	4411111		A	6/12/85	DIGITAL RECORD COMPENSATION SCHEMATIC
		ODETICS, INC.	4411916		B	7/15/85	DIGITAL REPRO SCHEMATIC

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
16.14	ENGR F. MACFARLANE		16.17	ENGR J. CONNER	
	ENGR [signature]	5NOV90		ENGR [signature]	11-5-90
16.15	ENGR J. O. SAYLER		16.18	ENGR R. E. LABRODE	
	ENGR [signature]	5NOV 90		ENGR [signature]	11.5.90
16.16	ENGR MARTIN T. O'HARE			APP	
	ENGR [signature]	11/5/90		APP	
	ENGR			OMNIPLAN	
	ENGR			LTR E	PCN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

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SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.19	P/L RECORDERS						ORBITER SCHEMATIC LIST
		R. I.	VS70-750142		K	4/9/83	SCHEMATIC DIAGRAM, PAYLOAD RECORDER SUBSYSTEM
							LRU SCHEMATIC LIST
							RECORDER COMPONENTS SCHEMATIC
		ODETICS, INC.	4410651		E	5/12/77	INTERMEDIATE AMP SCHEMATIC
		ODETICS, INC.	4410701	2	E	5/10/77	INTERCONNECT DIAGRAM, ELECTRONICS UNIT
		ODETICS, INC.	4410941	2	C	6/30/76	PARALLEL/SERIAL REPRO AMP SCHEMATIC
		ODETICS, INC.	4410961		C	6/30/79	SERVO POWER SUPPLY SCHEMATIC
		ODETICS, INC.	4410971	2	C	3/2/76	DIGITAL REPRO SCHEMATIC
		ODETICS, INC.	4410976	6	C	5/3/76	SERIAL DATA REPRO PWR SUPPLY/TLMY SCHEMATIC
		ODETICS, INC.	4411016		C	4/26/76	ERASE OSCILLATOR SCHEMATIC
		ODETICS, INC.	4411034	3	C	5/7/79	TRANSPORT UNIT SERVO SCHEMATIC
		ODETICS, INC.	4411056			6/10/76	DIRECTION SENSOR SCHEMATIC
		ODETICS, INC.	4411716		C	5/9/79	BIAS OSCILLATOR SCHEMATIC
		ODETICS, INC.	4411721		B	11/2/77	RECORD HEAD SWITCHER SCHEMATIC
		ODETICS, INC.	4410709			3/5/76	7 CHANNEL PREAMPLIFIER (TRKS 1-7)
		ODETICS, INC.	4411051			1/15/76	7 CHANNEL PREAMPLIFIER (TRKS 8-14)
		ODETICS, INC.	4411111		A	6/12/85	DIGITAL RECORD COMPENSATION SCHEMATIC
		ODETICS, INC.	4411916		B	7/15/85	DIGITAL REPRO SCHEMATIC
16.20 (SHEET 1)							ORBITER SCHEMATIC LIST
							NONE - SEE 16.10-1 THRU 7 FOR AUDIO INTERFACE
							LRU SCHEMATIC LIST
	WIRELESS CCU AIU	GTE GOV SYS	00-1388301		-	1/16/86	INTERCONNECT DIAGRAM - AIU
		GTE GOV SYS	00-1380321		C	7/25/83	SCHEMATIC UHF RECEIVER MODULE
		GTE GOV SYS	00-1388111		A	11/14/85	SCHEMATIC UHF TRANSMIT MODULE
		GTE GOV SYS	00-1388141		B	11/14/85	SCHEMATIC IF AMP/DEMOD MODULE
		GTE GOV SYS	00-1388151		A	11/14/85	SCHEMATIC RECEIVE AUDIO MODULE
		GTE GOV SYS	00-1388161		-	11/14/85	SCHEMATIC TRANSMIT AUDIO MODULE
		GTE GOV SYS	00-1388191		B	11/14/85	SCHEMATIC AUDIO SUMMER MODULE
		GTE GOV SYS	00-1388351		-	7/27/85	SCHEMATIC AMP/REG MODULE
16.20 (SHEET 2)	WIRELESS CCU CRU	GTE GOV SYS	00-1388201		-	1/16/86	INTERCONNECT DIAGRAM - CRU
		GTE GOV SYS	00-1380321		C	7/25/83	SCHEMATIC UHF RECEIVER MODULE
		GTE GOV SYS	00-1388111		A	11/14/85	SCHEMATIC UHF TRANSMIT MODULE
		GTE GOV SYS	00-1388141		B	11/14/85	SCHEMATIC IF AMP/DEMOD MODULE
		GTE GOV SYS	00-1388151		A	11/14/85	SCHEMATIC RECEIVE AUDIO MODULE
		GTE GOV SYS	00-1388161		-	11/14/85	SCHEMATIC TRANSMIT AUDIO MODULE
		GTE GOV SYS	00-1388171		-	11/14/85	SCHEMATIC FREQUENCY PROGRAMMING MODULE
16.22 (SHEETS 1 - 3)	COMMUNICATION INTERFACE EQUIPMEN	R.I.	V708-740002		D	10/27/86	ORBITER SCHEMATIC LIST
							SCHEMATIC DIAGRAM, COMMUNICATIONS INTERFACE EQUIPMENT SUBSYSTEM
							LRU SCHEMATIC LIST
							ROCKWELL COLLINS RADIO
			643-5035	1-3	NC		CONTROL I/O CARD
			643-5037	1-3	NC		TIMING SEC/FM/FM DEMOD CARD
			643-5039	1-3	NC		BIT SYNC CLOCK RECOVERY
			643-5041	1-3	NC		DATA FORMAT CONVERTER
			643-5043	1-3	NC		TLM SWITCH
			643-5045	1-2	NC		DATA RATE UP CONVERTER
			643-5047	1-3	NC		PSK COSTAS 1-
			643-5049	1-3	NC		OPWS LINE DRIVER
			643-5051	1-2	NC		TLM RCVR
			643-5053	1-2	NC		CMD LINE RCVR
			643-5055	1-4	NC		FWD LINK DECODER #1
			643-5057	1-3	NC		MDM SEIAL I/O
			643-5059	1-4	NC		CMD MODULATOR
			643-5061	1-4	NC		CENTRAL PROCESSOR UNIT
			643-5063	1-4	NC		RELAY CONTROL
			643-5065	1-3	NC		DIGITAL DRIVER
			643-5067	1-3	NC		POWER SUPPLY
			643-5068				MODULATOR
			643-5105	1-3	NC	3/22/83	WIRING DIAGRAM, CIE LRU
			643-5353	1-4	NC		BIT SYNC FORMATTER
			643-5357	1-3	NC		ANALOG LINE DRIVER
			643-5361	1-3	NC		OPWS LINE RCVR
			643-5397				BIT SYNC
			643-5406	1-3	NC		FWD LINK DECODER #2
			643-5661	1-3	NC		PSK LOCK INDICATOR

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
16.19	ENGR R. E. LABRODE		16.22, 1-3	ENGR G. E. POHLE	
	ENGR R.E. Labrode	11-13-90		ENGR G E Pohle	11/13/90
16.20-1,2	ENGR G. C. HORLACHER			ENGR	
	ENGR G C Horlacher	11-13-90		ENGR	
	ENGR			APP G E Pohle	11/21/90
	ENGR			APP Robert W. Pooley	11-21-90
	ENGR			OMNIPLAN	
	ENGR			LTR E PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
16.24	INTERIM VIDEO TAPE RECORDER	R. I.	VS70-740182			10/31/84	ORBITER SCHEMATIC LIST SCHEMATIC DIAGRAM, TV COMM AND TRACKING SUBSYSTEM LRU SCHEMATIC LIST
		NASA JSC	SID16101765	1-2	B		WIRING DIAGRAM, SWITCHBOX, VTR
		NASA JSC	SED16101767	1-2	B		CABLE ASSEMBLY, INTERCONNECTION DIAGRAM, VTR/SWITCHBOX - VTR HOUSING
		NASA JSC	SID16101769	1-2	B		INTERCONNECTION WIRING DIAGRAM, VTR
		NASA JSC	SID16101772	1	B		SCHEMATIC DIAGRAM, SIDETONE AMPLIFIER, VTR
		NASA JSC	SID16101775	1	NO REV		SCHEMATIC DIAGRAM, SY-10 BOARD, VTR
		NASA JSC	SID16101776	1	A		SCHEMATIC DIAGRAM, COL BOARD, VTR
		NASA JSC	SID16101798	1	NO REV		SCHEMATIC DIAGRAMS, LM-3/BS BOARD, VTR
		NASA JSC	SID16101777	1	A		SCHEMATIC DIAGRAM, SV-2A BOARD VTR
		NASA JSC	SID16101779	1	B		DRAWING TREE, VTR HOUSING
		NASA JSC	SID16101780	1	A		DRAWING TREE, RECORDER ASSEMBLY, VTR
		NASA JSC	SID16101782	1	B		SCHEMATIC, MD BOARD, VTR
		NASA JSC	SID16101786	1	B		SCHEMATIC, VIDEO OUTPUT AMPLIFIER, VTR HOUSING
		NASA JSC	SID16101791	1	B		SCHEMATIC, VIDEO INTERFACE/AUDIO-AGC-COLOR, VTR
		NASA JSC	SID16101797	1	A		SCHEMATIC DIAGRAM, AV BOARD, VTR
		NASA JSC	SID16101799	1	NO REV		SCHEMATIC DIAGRAMS, PD/FR/MA-1/RL BOARDS, VTR
		NASA JSC	SID16101801	1	A		SCHEMATIC, CO BOARD
16.25	COMM POWER DISTRIBUTION						REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: S-BD PM TRANSPONDER, 16.2-1 S-BD PM AMPLIFIER SYS, 16.2-2 S-BD PM/FM SW BEAM ANT SYS, 16.2-3 NSP RTN LINK, 16.3-1 NSP COMSEC 1/2, 16.3-3 TAGS/SECURE TAGS, 16.4-1,2 KU-BD SYSTEM, 16.5-1,2 S-BD FM SYS, 16.8-1 UHF XCVR, 16.9-1 AUDIO PANEL, 16.10-1,2,3,4,5,6,7 AUDIO/ACCU, 16.11-2 TV CONTROL, 16.12-1 TV/CAMERA MONITOR, 16.13-1,2 TV/SECURE, 16.13-4 S-BD PI, 16.14-1 PSP, 16.15-1 GCIL, 16.17-1 OPS RCDRS, 16.18-1 P/L RCDR, 16.19-1 CIE, 16.22-1 IVTR, 16.24-1 OI PCMMU, 17.2-1 PDI, 17.3-1
16.26	COMM MDM I/F	RI	VS70-720569		A	5/18/81	ORBITER SCHEMATIC LIST DP&S DATA BUSES, FC 1-8
		RI	VS70-720599			11/14/80	DATA BUS PLB01 AND PLB02 REFERENCE SSSHB SCHEMATIC TRACEABILITY LIST FOR THE FOLLOWING DRAWINGS: NSP FWD LINK, 16.3-2 KU-BD SYS, 16.5-1 OI DSC/MDM, 17.1-1 CIE CNTL, 16.22-1 MADS RCDR, 17.12 OPS RCDRS, 16.18 P/L RCDR, 16.19 P/L SIG PROC, 16.15 GCIL, 16.17 S-BD PM, 16.2-3 TV CNTL, 16.12 ADU STV, 16.3-4 TAGS/OHC, 16.4-1

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
16.24	ENGR F. J. MACFARLANE		16.26	ENGR S. M. KAKADELIS	
	ENGR	5NOV90		ENGR S. Kakadelis	11-5-90
16.25	ENGR A. MORRISON			ENGR	
	ENGR	11/5/90		ENGR	
	ENGR			APP	
	ENGR			APP	
	ENGR			OMNIPLAN	
	ENGR			LTR E PCN	

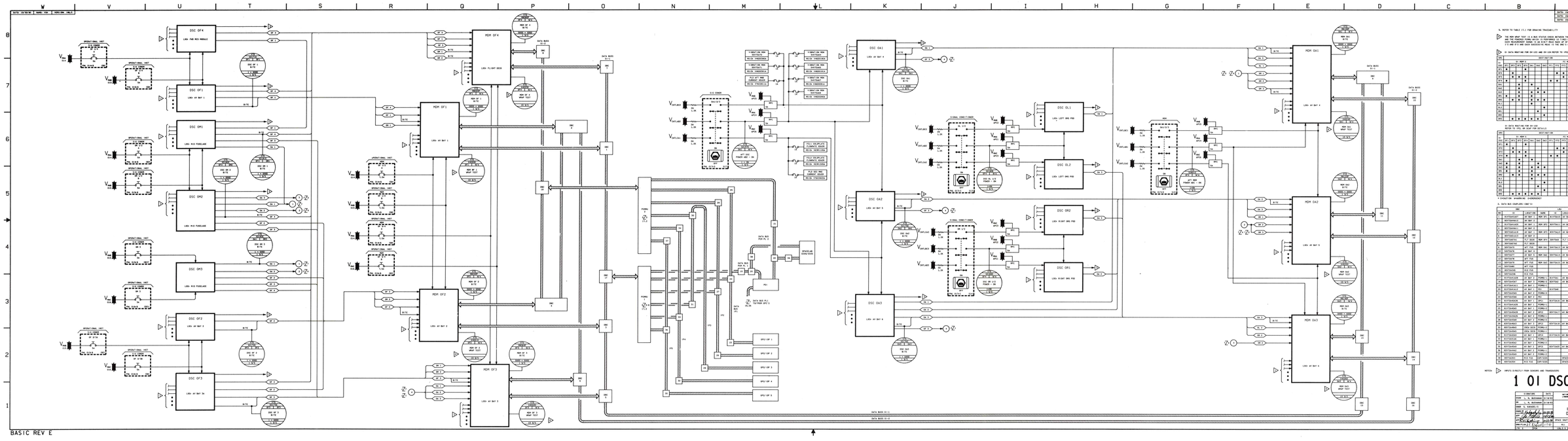
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

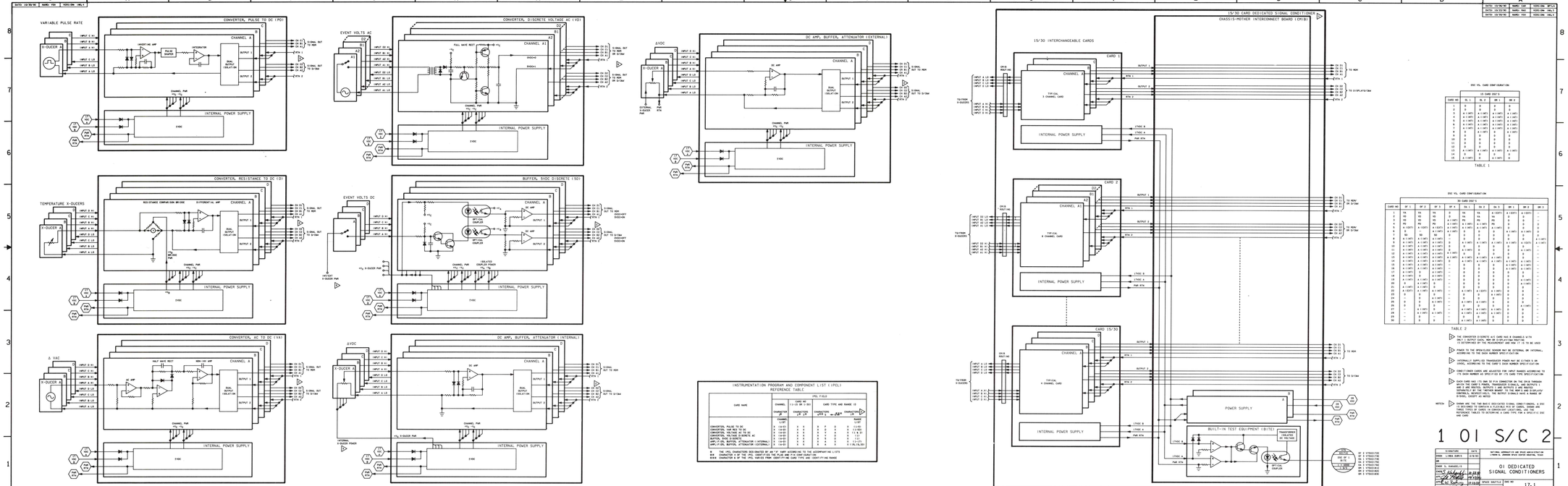
SPACE SHUTTLE	TBL NO 16-I
ALL	
	PAGE 16.I-13 SHEET 13 OF 13

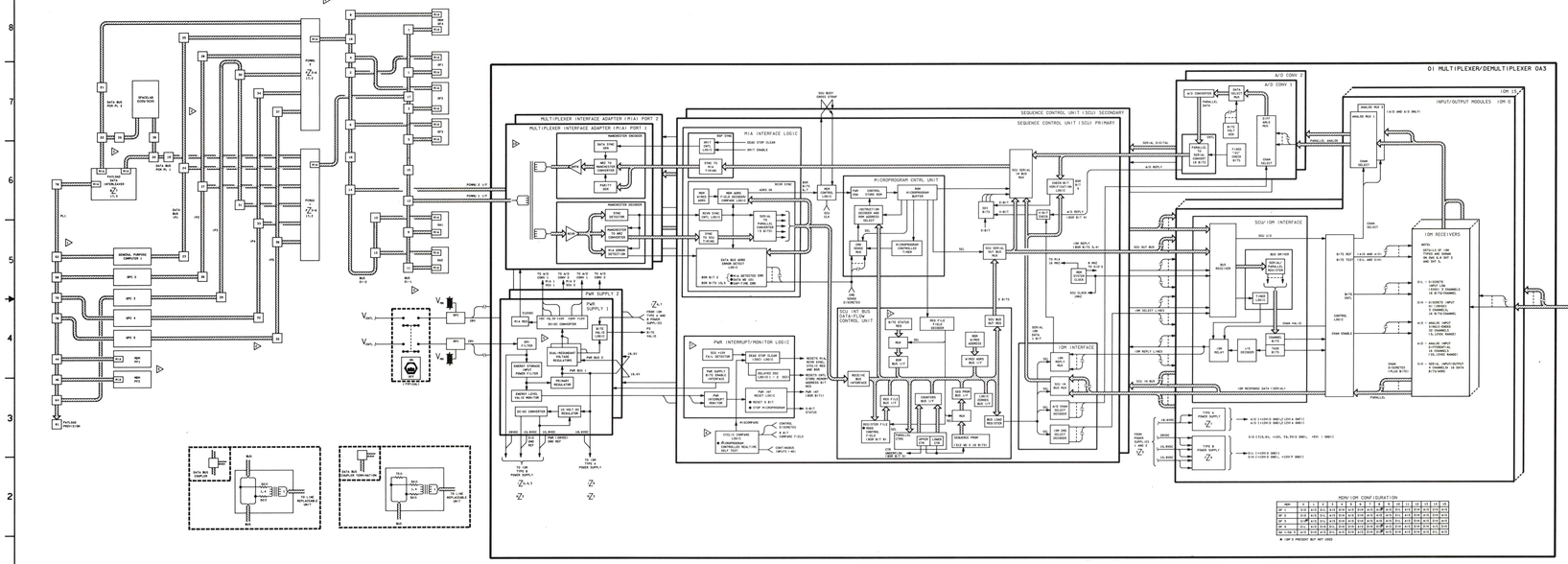
*U.S.GOVERNMENT PRINTING OFFICE:1990-561-057/20068

BASIC REV E


DSC OF4
LOAD FWD MID MODULE
DSC OF1
LOAD AFT BAY 1
DSC OM1
LOAD MID PORT MODULE
DSC OM2
LOAD MID PORT MODULE
DSC OM3
LOAD MID STBD MODULE
DSC OF2
LOAD AFT BAY 2
DSC OF3
LOAD AFT BAY 3A
MDM OF4
LOAD FLIGHT DECK
MDM OF1
LOAD AFT BAY 1
MDM OF2
LOAD AFT BAY 2
MDM OF3
LOAD AFT BAY 3
DSC OA1
LOAD AFT BAY 4
DSC OA2
LOAD AFT BAY 5
DSC OA3
LOAD AFT BAY 6
DSC OL1
LOAD LEFT OMS POD
DSC OL2
LOAD LEFT OMS POD
DSC OR1
LOAD RIGHT OMS POD
DSC OR2
LOAD RIGHT OMS POD
MDM OA1
LOAD AFT BAY 4
MDM OA2
LOAD AFT BAY 5
MDM OA3
LOAD AFT BAY 6
1 01 DSC/MDM 1
OPERATIONAL INSTRUMENTATION DSC'S AND MDM'S
17.1

BASIC REV E


NOTE: (X) NO W1 MARK: YES VOES ONLY
VARIABLE PULSE RATE
CONVERTER, PULSE TO DC (PD)
X-DUCER A
INPUT A HI
INPUT A LO
CHANNEL A
ISOLATION AMP
PULSE SHAPER
INTEGRATOR
DUAL OUTPUT ISOLATOR
OUTPUT 1
OUTPUT 2
CHANNEL PWR +15V +15V
INTERNAL POWER SUPPLY
SVDC
+15 V
+5 V
PWR RTN
EVENT VOLTS AC
CONVERTER, DISCRETE VOLTAGE AC (VD)
A1
A2
FULL WAVE RECT
+15V
-15V
CHANNEL PWR
TEMPERATURE X-DUCERS
CONVERTER, RESISTANCE TO DC (TD)
RESISTANCE COMPARISON BRIDGE
DIFFERENTIAL AMP
EXCITATION +5V DC
EVENT VOLTS DC
BUFFER, SVDC DISCRETE (SD)
ISOLATED CHANNEL PWR +15V -15V
2. YAC
CONVERTER, AC TO DC (VAD)
HALF WAVE RECT
NON-INT AMP
AC AMP
&VDC
DC AMP, BUFFER, ATTENUATOR (-EXTERNAL)
DC AMP
INTERNAL X-DUCER PWR
INSTRUMENTATION PROGRAM AND COMPONENT LIST (IPCL)
REFERENCE TABLE
IPCL FIELD
CARD NAME
CARD NO. (1-15 OR 1-30)
CHANNEL
CHARACTER 1
CHARACTERS 2 & 3
CHARACTERS 4 & 5
CARD TYPE AND RANGE (S)
CHANNEL 1 OR 2
CHANNEL 3 OR 4
CHANNEL 5 OR 6
CHANNEL 7 OR 8
RANGE 1 OR 2
CONVERTER, PULSE TO DC
CONVERTER, VAR RES TO DC
CONVERTER, DISCRETE VOLTAGE DC
CONVERTER, VOLTAGE DISCRETE AC
CONVERTER, AC TO DC
AMPLIFIER, BUFFER, ATTENUATOR (-EXTERNAL)
AMPLIFIER, BUFFER, ATTENUATOR (+EXTERNAL)
A (=1)
B (=2)
C (=3)
D (=4)
E (=5)
F (=6)
G (=7)
H (=8)
I (=9)
J (=10)
K (=11)
L (=12)
M (=13)
N (=14)
O (=15)
P (=16)
Q (=17)
R (=18)
S (=19)
T (=20)
U (=21)
V (=22)
W (=23)
X (=24)
Y (=25)
Z (=26)
0 (=27)
1 (=28)
2 (=29)
3 (=30)
4 (=31)
5 (=32)
6 (=33)
7 (=34)
8 (=35)
9 (=36)
NOTES:
A THE IPCL CHARACTERS DESIGNATED BY (ALT KEY) ARE ACCORDING TO THE ACCUPOINT NO. 1 (CP1).
B-E CHARACTER 4 OF THE IPCL IDENTIFIES THE PLUG AND P/A DIAGRAM/DRAWING.
B-E CHARACTER 5 OF THE IPCL VARIES FROM IDENTIFYING CARD TYPE AND IDENTIFYING RANGE.
15/30 CARD DEDICATED SIGNAL CONDITIONER
CHASSIS-MOTHER INTERCONNECT BOARD (CMIB)
15/30 INTERCHANGEABLE CARDS
CARD 1
CARD 2
CARD 15/30
TYPICAL 2 CHANNEL CARD
TYPICAL 8 CHANNEL CARD
TYPICAL 4 CHANNEL CARD
INTERNAL POWER SUPPLY
POWER SUPPLY
BUILT-IN TEST EQUIPMENT (BITE)
TO/FROM X-DUCERS
TO HDR
TO SVDC
TO D/SPLAYS/DM
DISC I/O CARD CONFIGURATION
15 CARD DISC'S
CARD NO.
DF 1
DF 2
DF 3
DF 4
DF 5
DF 6
DF 7
DF 8
DISC I/O CARD CONFIGURATION
30 CARD DISC'S
DF 9
DF 10
DF 11
DF 12
DF 13
DF 14
DF 15
TABLE 1
TABLE 2
THE CONVERTER D-DISCRETE A/C CARD HAS 8 CHANNELS WITH ONLY 1 OUTPUT EACH, NOW OR EVENTUALLY MEETING
IS DETERMINED BY THE REQUIREMENT AND HOW IT IS TO BE USED
ENABLE TO THE INTERFACE DESIGN MAY BE EXTERNAL OR INTERNAL, ACCORDING TO THE DASH NUMBER SPECIFICATION
INTERNALLY SUPPLIED TRANSDUCER POWER MAY BE EITHER 5.0V OR 10VDC, ACCORDING TO THE CARD'S DASH NUMBER SPECIFICATION
CONDITIONED CARDS ARE ADJUSTED FOR INPUT RANGES ACCORDING TO ITS DASH NUMBER AS SPECIFIED BY ITS CARD TYPE SPECIFICATION
EACH CARD HAS ITS OWN 50 PIN CONNECTION ON THE SPLIT THROUGH WHICH THE CARD'S POWER, TRANSDUCER SIGNALS, AND OUTPUTS ARE ROUTED. THE CARD'S INPUT/OUTPUT CONFIGURATION IS DETERMINED BY THE MATING BOARD TO THE PART'S AND EITHER HARDWIRED, REPROGRAMMED, THE OUTPUT SIGNALS HAVE A RANGE OF 0-10VDC, EXCEPT AS NOTED.
SHOWN ARE THE TWO BASIC DEDICATED SIGNAL CONDITIONERS, A DISC I/O CARD AND A SVDC CARD. THE DISC I/O CARD HAS THE MOST CHOICE TYPES OF CARDS IN CONFIGURATION, AND THE REFERENCE TABLES TO DETERMINE A CARD TYPE FOR A SPECIFIC DISC I/O CARD.
WITCH
DF 1 9170G1720
DF 2 9170G1730
DF 3 9170G1740
DF 4 9170G1750
DF 5 9170G1760
DF 6 9170G1770
DF 7 9170G1780
DF 8 9170G1790
DF 9 9170G1800
DF 10 9170G1810
DF 11 9170G1820
DF 12 9170G1830
DF 13 9170G1840
DF 14 9170G1850
DF 15 9170G1860
1 01 S/C 2
SIGNATURE DATE
DRAWN L.VIRA DORIS 2/8/93
CHK
MGR/ CH. ENGINEER
APPROVED
MGR/ PROJECT
MGR/ PROJECT ENGR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
01 DEDICATED SIGNAL CONDITIONERS
SPACE SHUTTLE
DWG NO
17.1
SIZE
CODE I.D. NO.
SCALE
SHEET 1 of 1
BASIC REV E



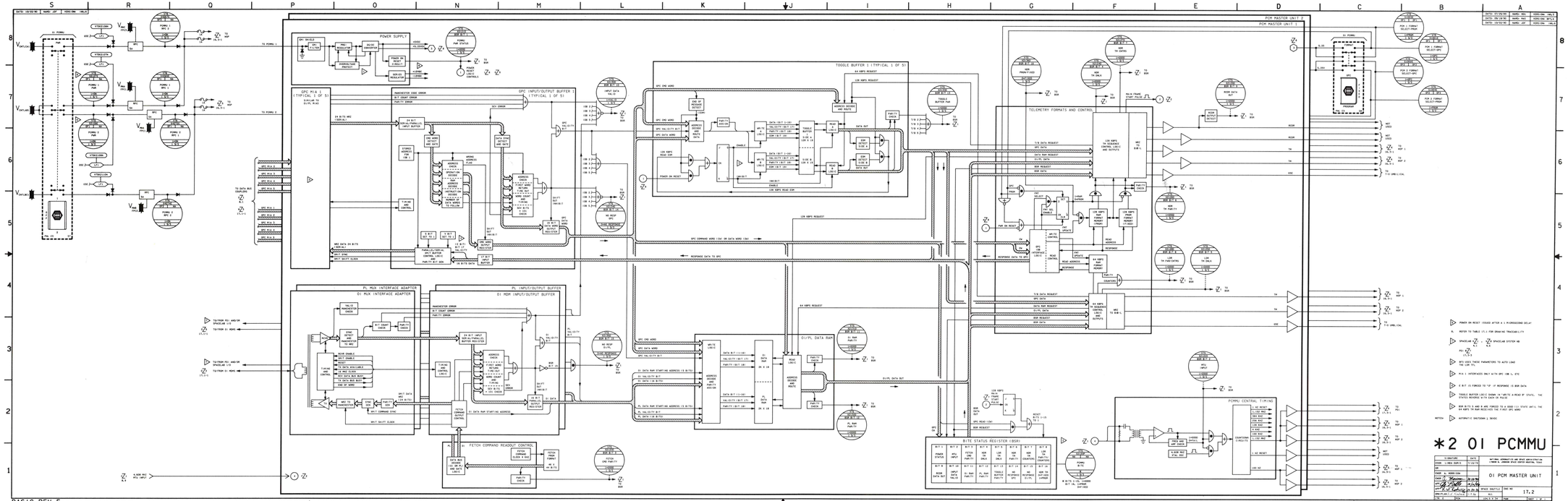
1 INST MDM 3

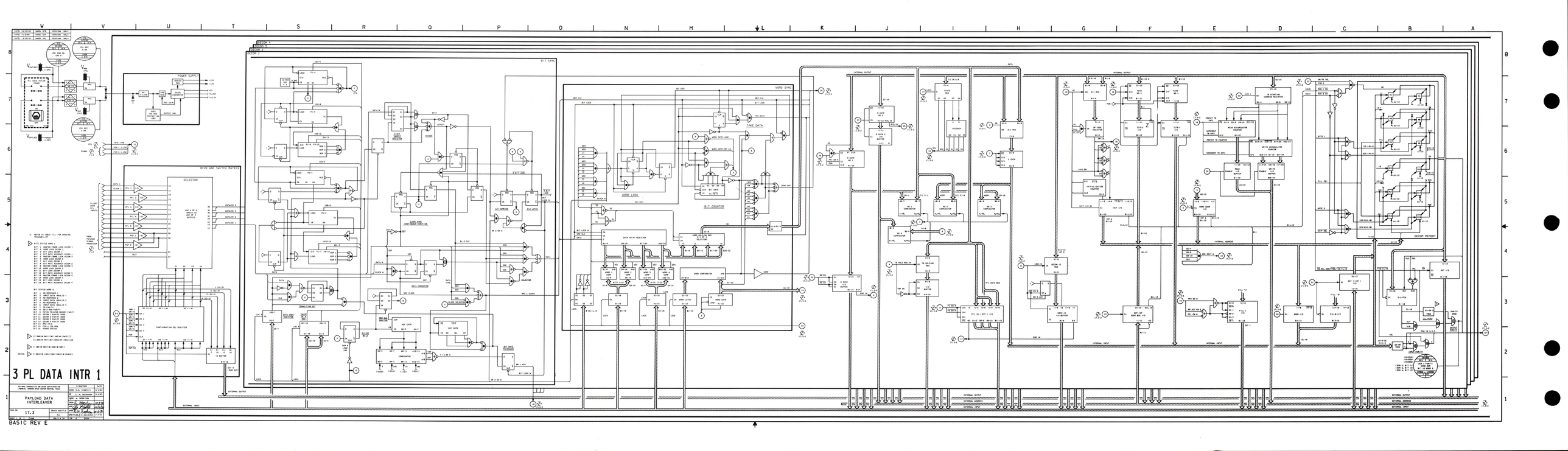
DRAWN	
CHECKED	
APPROVED	
PROJECT MANAGER	
PROJECT ENGINEER	
PROJECT OFFICE	

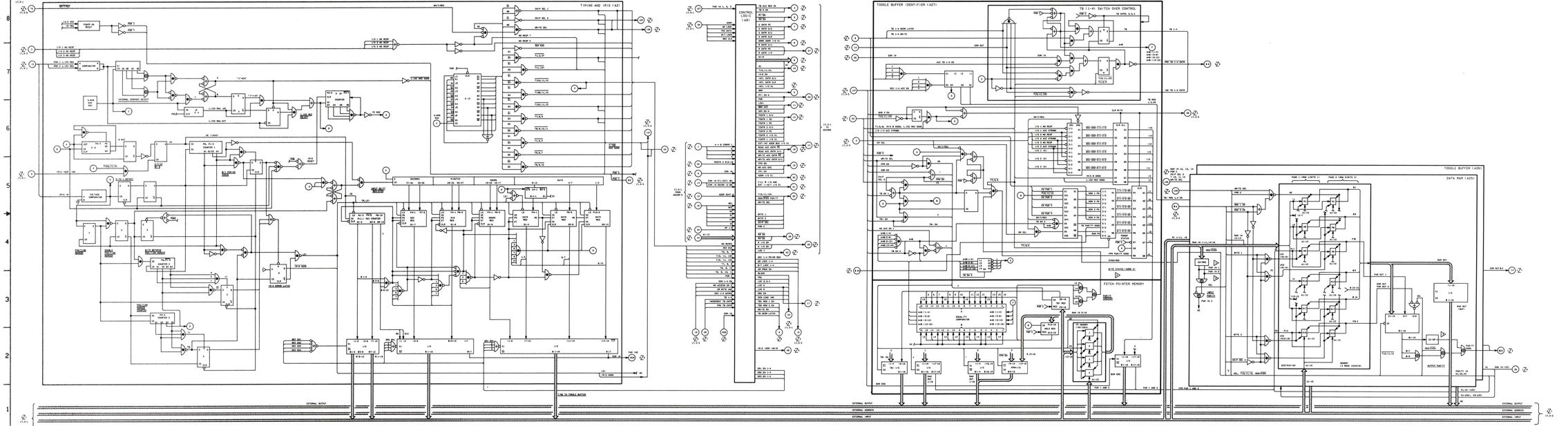
0/I INST MDM

SPACE SHUTTLE PROGRAM

17, 1

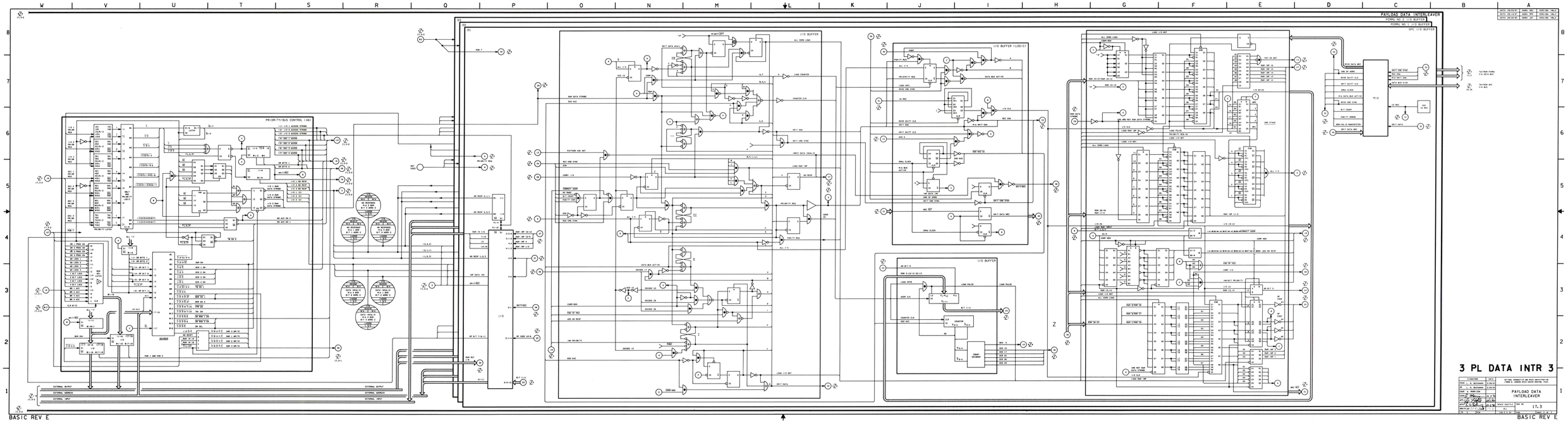

PCM MASTER UNIT 2
PCM MASTER UNIT 1
POWER SUPPLY
TOGGLE BUFFER (1 TYPICAL 1 OF 5)
GPC MIA 1 (TYPICAL 1 OF 5)
GPC INPUT/OUTPUT BUFFER (TYPICAL 1 OF 5)
PL MDM INTERFACE ADAPTER
DI MDM INTERFACE ADAPTER
PL INPUT/OUTPUT BUFFER
DI MDM INPUT/OUTPUT BUFFER
PL FETCH COMMAND READOUT CONTROL
PL/DI DATA RAM
TELEMETRY FORMATS AND CONTROL
BITE STATUS REGISTER (BSR)
PCMMU CENTRAL TIMING
*2 OI PCMMU
OI PCM MASTER UNIT
BASIC REV E


3 PL DATA INTR 1
PAYLOAD DATA INTERLEAVER
17.3
BASIC REV E
DECOM 4
DECOM 3
DECOM 2
DECOM 1
BIT SYNC
WORD SYNC
MDM AND SWITCH MATRIX
SELECTOR
POWER SUPPLY
DECOM MEMORY
INTERNAL OUTPUT
INTERNAL INPUT
INTERNAL ADDRESS
EXTERNAL OUTPUT
EXTERNAL INPUT
EXTERNAL ADDRESS
BIT LOCK
WORD LOCK
BIT COUNTER
WORD COUNTER
DATA SHIFT REGISTER
CONFIGURATION SEL REGISTER
MAJOR FRAME COUNTER
MINOR FRAME COUNTER
MINOR FRAME ACCUMULATOR
MAJOR FRAME ACCUMULATOR
WRITE ADDRESS COUNTER
READ ADDRESS COUNTER
DATA SYNCHRONIZER
WORD COMPARATOR
BIT RATE ACCUMULATOR
DECOM MEMORY



BASIC REV E

BASIC REV E


PAYLOAD DATA INTERLEAVER
PCMMU NO 1 I/O BUFFER
PCMMU NO 2 I/O BUFFER
GPC I/O BUFFER
I/O BUFFER
I/O BUFFER (LOGIC)
I/O BUFFER
PRIORITY/BUS CONTROL (1&2)
3 PL DATA INTR 3
PAYLOAD DATA INTERLEAVER
17.3
BASIC REV E
BASIC REV E

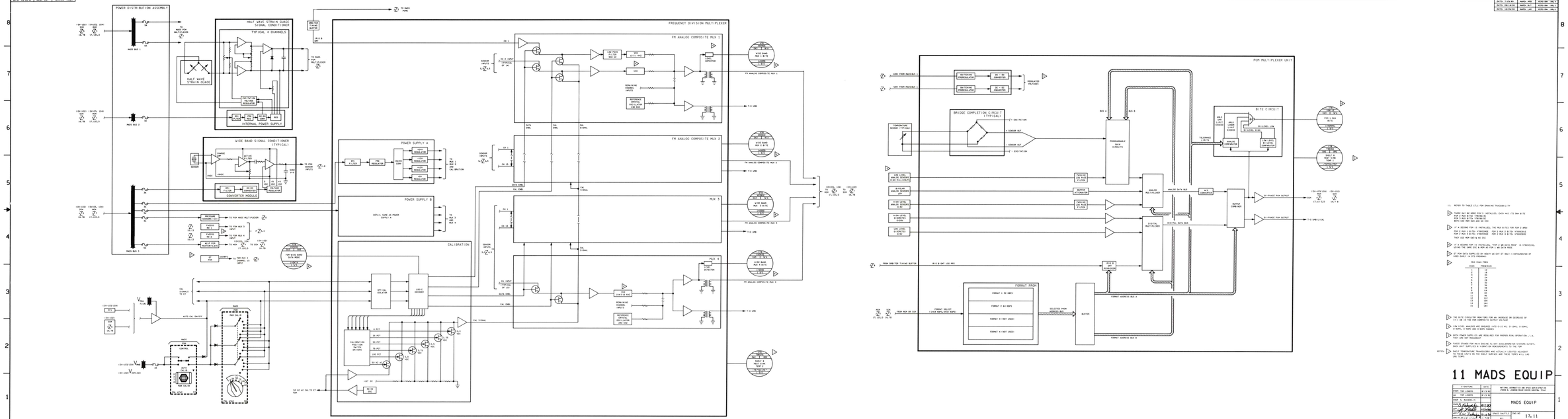
DATE= 08/25/87	NAME= MPM	VERSION= IMU7
DATE= 05/23/87	NAME= MDU	VERSION= IMU8
DATE= 09/18/90	NAME= SEV	VERSION= IMU9

10 BIO MED INST

SIGNATURE	DATE	
DSGN DOUG SNELL	6/4/79	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR DOUG SNELL	5/23/79	
ENGR		BIO MEDICAL INSTRUMENTATION
ENGR		
APP		
APP		SPACE SHUTTLE / DWG NO 17.10
CPN/PLAN		ALL
LTR E	PCN	66 X 34 / PAGE / SHEET 1 OF 1

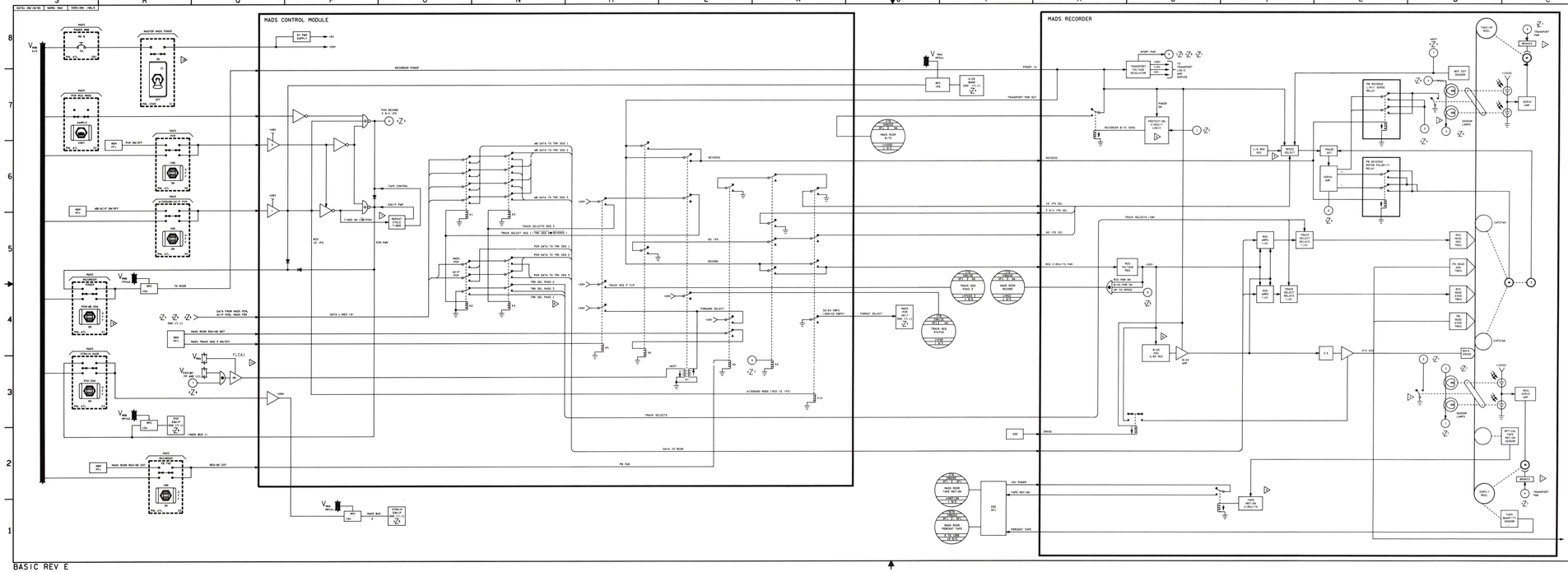
BASIC REV E

BASIC REV E



BASIC REV E

BASIC REV E



DATE/ INITIALS	HARD/ SOFT REV	VERS/DIM ONLY
DATE: 08/20/87	HARD: 1AM	VERS/DIM: ONLY
DATE: 09/04/90	HARD: REV	VERS/DIM: ONLY
DATE: 09/18/90	HARD: REV	VERS/DIM: ONLY

- LOSS OF $-V_{REG}$ FLIES OR E501BC BUBBLE WILL CAUSE LOSS OF RECORDED RECORD/AE CAPABILITY
- POWER TO THE ACIP INSTRUMENT PACKAGE IS CONTROLLED V/A OPLINK COMMAND ONLY
- RECORDER POWER IS CONTROLLED V/A MDH ONLY IN THE PDH/AE DSN POSITION
- THIS RELAY SELECTS DRIVEN CT OF THE PERIPTERN SEQUENCE NO 0 TRACKS. THE DRIVEN CT TRACKS ARE SELECTED BY RELAY K4 IN MADS AUX PC BOARD. THE SELECTED TRACKS ARE ENERGIZED WHEN THE RELAY IS ENERGIZED AND ARE DESELECTED WHEN THE RELAY IS DE-ENERGIZED. THE DRIVEN CT IS SELECTED BY THE RELAY K5 IN MADS AUX PC BOARD. THE DRIVEN CT TRACKS ARE SELECTED WHEN THE RELAY IS ENERGIZED AND ARE DESELECTED WHEN THE RELAY IS DE-ENERGIZED. THE DRIVEN CT IS SELECTED BY CMD
- THE REPEAT CYCLE TIMER CONTROLS SAMPLE MODE OPERATIONAL THE TIMER IS ENABLED BY A MDH CMD AND DISABLED BY A MDH CMD. THE COMMANDS MUST BE 2 SEC APART. ON POR (2 SECONDS, 66.7% TO 33 SECONDS), POWERS OFF THE SSA/PHOT THEN 66.7% BOD SECONDS AND REPEATS THE SEQUENCE
- B14S PWR T/OD TO MOD PWR SINCE THE MDDR RECORD MODE
- PROTECTION CIRCUIT INDICATES BITE IF:
  1. TAPE TENSION SENSOR LIGHT FAILED
  2. PWR IS ABOVE 37V OR BELOW 33V
- OPTICAL SENSOR GENERATES PULSE TRAIN WHEN ECCO ROLLER IS ROTATING. FREQUENCY OF PULSES COMPARED TO REFERENCE BY TAPE MOTION CIRCUITS
- SPEED IS SELECTED BY GROUND-ING APPROPRIATE INPUT
- SWITCHES CLOSE IF TAPE IS SLACK AND CAUSE CAPSTAN TO SPEED UP/SLOW DOWN AND RUNNING SLACK (TOP/ALL SET UP).
- BRAKES APPLIED WHENEVER TRANSPORT POWER IS REMOVED

12 MADS RCDR

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN'L. A. BUCKMAN	8/26/82	GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND
DR. L. A. BUCKMAN	8/26/82	MODULE AUXILLARY DATA SYSTEM RECORDER/ CONTROLLER SUBSYSTEM
CHKR. R. RANDO	8/26/82	
APPR. R. Randolph	10/2/82	
APPR. [illegible]	10/2/82	
APPR. [illegible]	10/2/82	
APPR. [illegible]

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
17.1 (SHEET 1)	OI DSC'S AND MDM'S	RI					SIGNAL CONDITIONER ASSEMBLY
			V070-751061-003		C/C3	10/20/82	Forward RCS Oper
			V070-753261-007	1 OF 1	C/C3	10/22/82	Fwd Av Bay
			V070-753261-009	1 OF 1	C/C3	10/22/82	Fwd Av Bay
			V070-753261-010	1 OF 1	C/C3	10/22/82	Fwd Av Bay
			V070-753262-003	2 OF 2	C/C3	10/22/82	Fwd Av Bay
			V070-753262-005	2 OF 2	C/C3	10/22/82	Fwd Av Bay
			V070-753263-007	3 OF 3	C/3D	11/76	Fwd Av Bay
			V070-753263-008	3 OF 3	C/3D	11/76	Fwd Av Bay
			V070-754161-002		D	6/16/87	Fuel-Cell A Mid1
			V070-754163-010		D	6/16/87	Fuel-Cell B Mid2
			V070-755261-005		C	4/29/83	Avionics Bay4-AFT
			V070-755261-009		C/3D	12/76	Avionics Bay4-AFT
			V070-755262-005		C/3D	12/76	Avionics Bay6-AFT
			V070-755262-008		C/3D	12/76	Avionics Bay6-AFT
			V070-755263-005		C/3D	12/76	Avionics Bay 6-AFT
			V070-755263-008		C/3D	12/76	Avionics Bay6-AFT
		SCAP/Shuttle Data Tape					LH OMS Pod-1
							RH OMS Pod-1
							LH OMS Pod-2
							RH OMS Pod-2
17.1 (SHEET 2)	OI DED. SIG. COND.	ELDEC LYNNWOOD WASH.	S7-040300		-	1/4/75	POWER CONDITIONER/CMIB
			S7-040400		-	10/15/74	BITE CMIB
			S7-043		-	11/13/74	Converter Pulse to DC
			S7-044		-	10/16/74	Concerter Variable Res. to DC
			S7-047		-	12/03/74	Converter AC to DC
			S7-049		-	04/07/75	Converter Voltage Discrete AC
			S7-051		-	10/23/74	Buffer 5 VDC Discrete
			S7-052		-	08/10/74	DC Amplifier, Buffer, Attenuator
17.1 (SHEET 3)	TBD						
17.2	OI PCM MASTER UNIT	ROCKWELL	VS70-750129	1 - 3	F	6/8/88	SCHEMATIC DIAGRAM PCM MASTER, VEH 103/104
			VS70-750122	1 - 3	H	5/24/88	SCHEMATIC DIAGRAM PCM MASTER, VEH 102

DWG	SIGNATURE		DATE
17.1-1,2	ENGR S. M. KAKADELIS		
	ENGR S. Kakadelis		11.15.90
17.2	ENGR A. MORRSION		
	ENGR		11/15/90
	APP		11.15.90
	APP		
	OMNIPLAN		
	LTR E	PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE | TBL NO 17-I

ALL

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
17.3	PAYLOAD	ROCKWELL	VS70-750169		H	5/24/88	PAYLOAD DATA INTERLEAVER
(SHEETS 1-3)	DATA	Harris	619105	1	A	9/14/76	Logic Diagram, Electrical-I/O Buffer Decoder,Chip 5
	INTERLEAVER	Harris	620341	1	A	9/14/76	I/O Buffer, First Stage I/O, Chip 1
		Harris	620342	1	A	9/14/76	I/O Buffer, Second Stage I/O, Chip 2
		Harris	620343	1	A	9/14/76	I/O Buffer, First Stage I/O, Chip 3
		Harris	620344	1	A	9/14/76	I/O Buffer Control, Chip 4
		Harris	622141	1	N/C	7/20/78	Schematic Diagram, Electrical-Power Supply
		Harris	622143	1	N/C	7/20/78	Logic Diagram, Electrical-I/O Buffer
		Harris	622146	1	A	4/13/78	Logic Diagram, Electrical-Memory Module
		Harris	622147	1-4	N/C		Logic Diagram, Electrical-Priority, Buss Control
		Harris	622148	1-4	N/C		Logic Diagram, Electrical-Timing & Irig
		Harris	622149	1-2	N/C	2/12/79	Logic Diagram, Electrical-Rcvr & Scom
		Harris	622150	1-5	N/C	2/26/79	Logic Diagram, Electrical-Bit/Word Sync
		Harris	622151	1-4	N/C	2/26/79	Logic Diagram, Electrical-Decom T-1
		Harris	622152	1-4	N/C	2/26/79	Logic Diagram, Electrical-Decom Control - Type II
		Harris	622153	1-3	N/C	2/26/79	Logic Diagram, Electrical-Decom Control, Type 3
		Harris	622154	1-4	N/C	2/26/79	Logic Diagram, Electrical-Decom Type 4
		Harris	622155	1-5	N/C	2/26/79	Logic Diagram, Electrical-Fpm, Tb Cont
		Rockwell	VS70-750169	1-2	H	5/24/88	Schematic Diagram - Payload Data Interleaver
		Harris	138693	1-304	N/C	5/16/79	Run List, PDI Motherboard
17.4							
THRU	RESERVED						
17.9							
17.10	BIO MEDICAL INSTRUMENTATION	R.I.	VS70-974099	31	A-13	11/17/86	COMM. 7 TRACKING INTEGRATED SCHEMATICS PART I
17.11	TBD						
17.12C, D	TBD						

DWG	SIGNATURE		DATE
17.3	ENGR	A. MORRSION	
	ENGR		11/2/90
17.10	ENGR	C. COUNTS	
	ENGR		11/2/90
	APP		11/2/90
	APP		11/2/90
	OMNIPLAN		
	LTR E	PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 17-I
ALL	
	PAGE 17.I-2 SHEET 2 OF 2

*U.S.GOVERNMENT PRINTING OFFICE:1990-561-057/20055

EGRESS WINDOW DANGER NOMENCLATURE

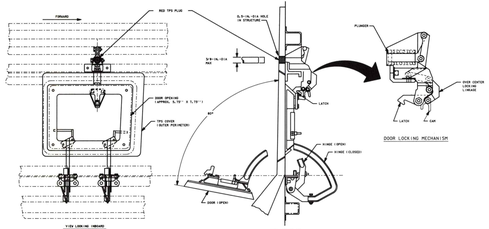
OBITER ESCAPE SYSTEM EXTERIOR MARKINGS

ALL DIMENSIONS IN INCHES

BACKGROUND: ORANGE YELLOW NO. 13533
BORDER AND LETTERS: BLACK NO. 17038

RED NO. 11136

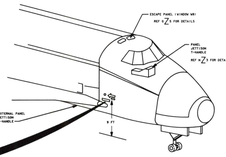
EXTERIOR PANEL JETTISON T-HANDLE DOOR/RESCUE MARKINGS/LAYOUT

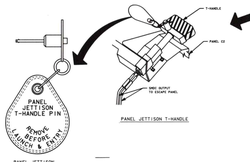


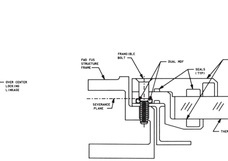
DOOR LOCKING MECHANISM

EXTERNAL PANEL JETTISON T-HANDLE ACCESS DOOR OPERATION:

- TO OPEN DOOR, PUSH RED (TAG) PLUG B/B (OR THROUGH RED TPS PLUG (APT)) ACCESS DOOR RELEASE BUTTON IS DEPRESSED
- LOCKING MECHANISM (LINKAGE) ROTATES CAMS/LATCH LINK
- LATCH RELEASES DOOR AND SAM BREAKS SEAL AND PUSHES DOOR OPEN







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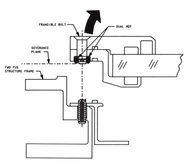
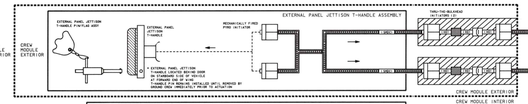
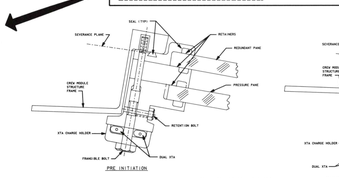


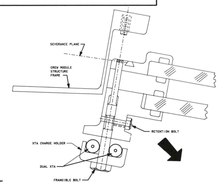
POST SEVERANCE

OUTER WINDOW SEVERANCE SYSTEM



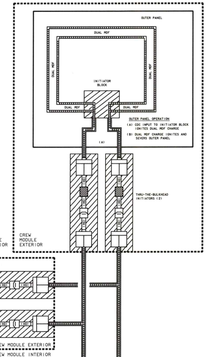


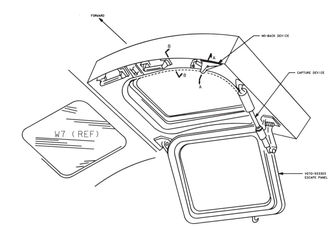
PRE INITIATION



POST SEVERANCE

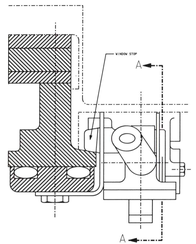
INNER WINDOW SEVERANCE SYSTEM





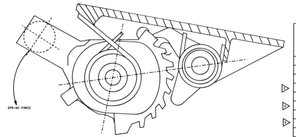
INNER WINDOW OPERATION

- WHEN CABIN TO ATMOSPHERIC DP IS 0.35 PSI/D, THE NO-BACK DEVICE ENGAGES TO PREVENT WINDOW FULL OPEN FOR CONTROL.
- WHEN CABIN TO ATMOSPHERIC DP IS 0.35 PSI/D, AND THE WINDOW IS OPENED TO THE SECOND NO-BACK DEVICE ENGAGES TO PREVENT SUBSEQUENT WINDOW CLOSING DUE TO CABIN PRESSURE EQUALIZATION.
- WHEN CABIN TO ATMOSPHERIC DP IS 0.44 PSI/D, AND THE WINDOW IS OPENED TO THE SECOND NO-BACK DEVICE, THE WINDOW CANNOT BE CLOSED. WINDOW OPEN TO ENSURE THE NO-BACK DEVICE ENGAGES FOR CABIN PRESSURE EQUALIZATION.
- AFTER CABIN PRESSURE EQUALIZATION, THE WINDOW MUST BE OPENED OR WILL SPEED THE WINDOW.

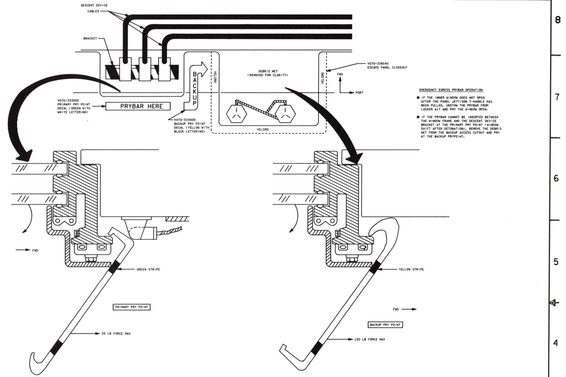


NO-BACK DEVICE

SECTION A-A



SECTION B-B



EMERGENCY EGRESS PRYBAR OPERATION:

- IF THE HANDLE WINDOW DOES NOT OPEN WITH THE PANEL JETTISON T-HANDLE PIN REMOVED, THE PRYBAR MAY BE USED TO LEVER OUT AND PRY THE WINDOW OPEN.
- IF THE PRYBAR CANNOT BE INSERTED BETWEEN THE WINDOW AND THE PANEL, THE PRYBAR MAY BE BRACED AT THE PRYBAR PRY PILOT (YELLOW WITH BLACK LETTERING) WHICH IS LOCATED NOT FROM THE BACKUP ACCESS OUTLET AND PRY AT THE BACKUP PRY PILOT.

INNER WINDOW OPENING

MAX PPLM CABIN TO ATMOSPHERIC DP (PSID)	FORCE OPPOSING WINDOW OPENING (LB)	WINDOW OPENING (IN.)	NO-BACK TOOTH ENGAGED	PRYBAR FORCES (LB) PRYBAR END	BACKUP END	CABIN BLEED RATE (SEC)
0.25	155	FULL OPEN	NA	NA	NA	NA
0.29	180	0.57	2	NA	NA	2
0.44	272	0.18	1	NA	NA	5
1.14	706	0.57	2	19	42	8
1.14	706	0.18	1	19	42	12
2.35	1455	0.57	2	39	86	13
2.35	1455	0.18	1	39	86	24
3.3	2043	0.57	2	55	120	23
3.3	2043	0.18	1	55	120	34

● WINDOW OPENING BEYOND THE SECOND TOOTH OF THE NO-BACK DEVICE CANNOT BE ACHIEVED WITH THE PRYBAR AND WOULD NOT APPRECIABLY REDUCE THE TIME REQD FOR CABIN PRESSURE EQUALIZATION.

△ NIOSHOT PRODUCED AT 47 MSN, STD'S AT MSN 50 TO 53

△ NIOSHOT PRODUCED AT AT ODN, STD'S L.L.A.'S AT 3 RADIUS FROM L.12 TO L.76 PD.ID

△ NIOSHOT PRODUCED AT AT KSC

△ THE FOLLOWING ACRONYMS ARE USED ON THIS DRAWING:
N.S. = NOT SHO
SMSC = SM-ELEVHS MLD DETONATING CHARGE (18.0.0)
CDC = CONFINED DETONATING CHARGE (15.0.0-18.0)
XTA = EXPLOSIVE TIME ASSEMBLY
MDF = MILD DETONATING FUSE

△ ARROWS ⟶ INDICATE DIRECTION OF FLOW OF FORCE WHEN SYSTEM HAS BEEN ACTUATED

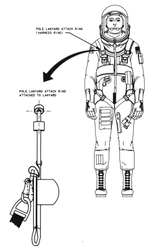
NOTES: FOR DETAILED COMPONENT AND LOCAL INFORMATION SEE TABLE 18-1

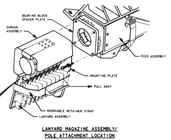
1 ESC PNL

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRAW. PATSY G. HUNTER (LMSC)		LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEXAS
DES.		
CHKR. J. ARMSTRONG		ESCAPE PANEL
CHKR.		
APP.		
APP.		SPACE SHUTTLE DWG NO.
PROJECT ENGINEER		18.1
CM 'A'	2/74	SHEET 1 OF 1

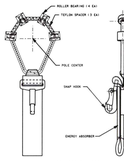
BASIC REV E

BASIC REV E

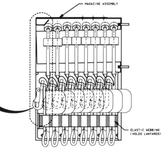




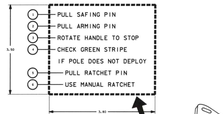
LANYARD MAGAZINE ASSEMBLY/ POLE ATTACHMENT LOCATION



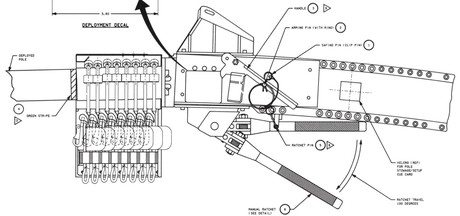
LANYARD ASSEMBLY DETAIL



LANYARD MAGAZINE ASSEMBLY

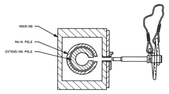


DEPLOYMENT DECAL

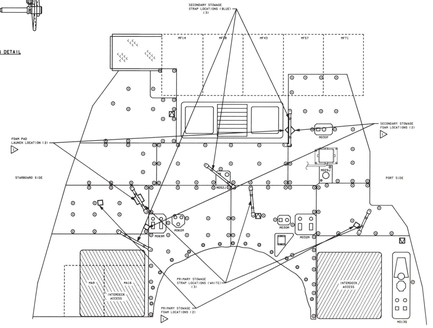


CONTINGENCY RATCHET OPERATION
- PULL RATCHET PIN
- ROTATE HANDLE FROM HALF-MAST POLE (6 TO UP AND DOWN 1.2 2) POSITION
- AFTC FULLY DEPLOYED (GREEN STRIPE 1/2 INCH ON POLE)
- MANUAL RATCHET DEPLOYS POLE 4"/COMPLETE UPSTROKE

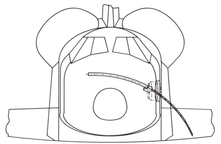
DEPLOYMENT MECHANISM (LOOKING FORWARD)



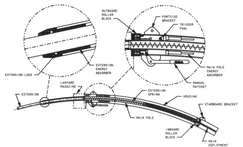
ARMING PIN DETAIL



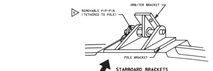
ON-ORBIT POLE STOWAGE INSTALLATION (FACING AFT, LOOKING UP)



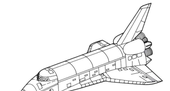
DEPLOYED POLE (LOOKING AFT)



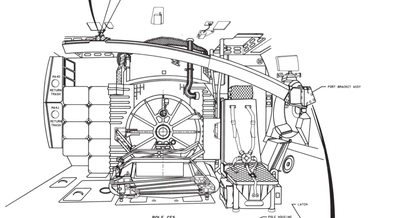
DEPLOYED POLE ASSY (LOOKING FORWARD)



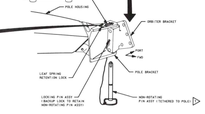
STARBOARD BRACKETS (POLE-TO-ORBITER MATE)



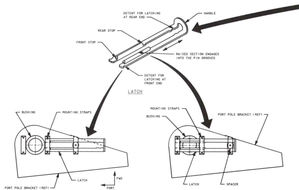
CREW EGRESS/WING CLEARANCE



POLE CES LAUNCH/ENTRY INSTALLATION MIDDECK LOOKING AFT

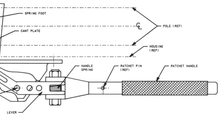


POST BRACKETS (POLE-TO-ORBITER MATE)



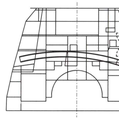
UNLATCHED POSITION

LATCHED POSITION

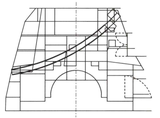


TRIGGER SCHEMATIC

MANUAL RATCHET DETAIL



PRIMARY



SECONDARY

1. PIN/PUP HANDLE TRAVEL TO RELEASE FOLD: 22°
2. RATCHET PIN: 13 5/16" (.188") OUTER DIAMETER AND 1.4" LONG
3. NON-ROTATING PIN ASSEMBLY: (1.156"-.162" OUTER DIAMETER AND 6.400" LONG (SEE INCLUDING LATCH DRAWING AND MPM)
4. REMOVABLE PIP PIN: (1 5/8" OUTER DIAMETER AND 8.39" LONG
5. REFER TO TABLE 18.1.5 FOR DRAWING TRACEABILITY
6. PHYSICAL DATA: MASS OF POLE ASSY=287 LB
   MOMENTS OF INERTIA: IXX=1,000 SLUG-FT2 WHEN DEPLOYED, (LOY 76 SLUG-FT2 WHEN POLE EXTEND (25° FROM MAGAZINE WHEN DEPLOYED, (LY 76 SLUG-FT2
   MAGAZINE: 40 LBS (BACK OF MAGAZINE TO THE END OF HOUSING)
7. GREEN STRIPE SIGNIFIES POLE IS FULLY DEPLOYED. (IF NO GREEN STRIPE AFTER DEPLOYMENT, MANUALLY RATCHET POLE UNTIL GREEN STRIPE APPEARS)
8. SPRING DEPLOYMENT OF POLE TAKES 2.1 SEC AT A MAXIMUM OF 275 LBS

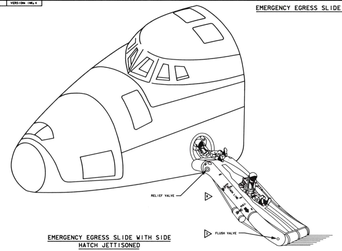
NOTES:
1. THERE ARE 3 FOAM PADS (ICD) AS SEEN ON STARBOARD WING STRAP-ON POLE TO CEILING. THERE ARE 3 DIFFERENT POSITIONS THE PADS CAN BE CONFIGURED IN: DEPLOYED POSITION, PRIMARY STOWAGE POSITION AND SECONDARY STOWAGE POSITION

2 PCES

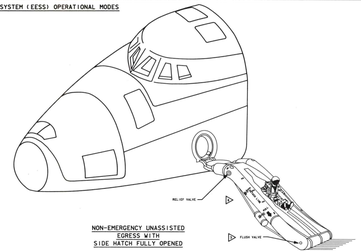
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER, TEXAS
ENGR: R.L.TOLLISS JR.	8/6/93	
DES:		
ENGR: R. TOLLISS		
ENGR:		POLE CREW ESCAPE SYSTEM
APP:		
APP:		
APP:		SPACE SHUTTLE DWG NO. 18.2
APP:		REV
CM:		SHEET 1 OF 1

BASIC REV E

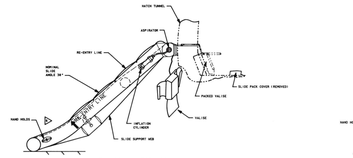
EMERGENCY EGRESS SLIDE SYSTEM (EESS) OPERATIONAL MODES



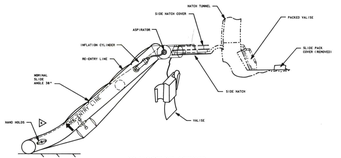
EMERGENCY EGRESS SLIDE WITH SIDE HATCH JETTISONED



NON-EMERGENCY UNASSISTED EGRESS WITH SIDE HATCH FULLY OPENED



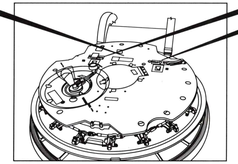
VIEW LOOKING FORWARD
ASSISTANT DEPLOYMENT CONFIGURATION



VIEW LOOKING FORWARD
PRIMARY DEPLOYMENT CONFIGURATION

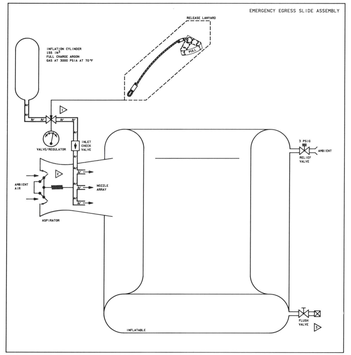
CAUTION
LOAD LIMIT
2 MEN

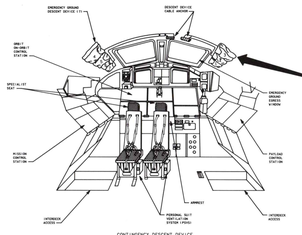
SLIDE ATTACH



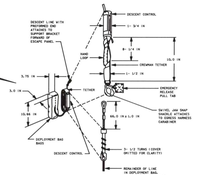
OUTER HATCH (SHOWN OPEN)

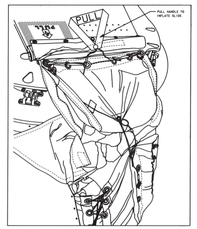
EMERGENCY EGRESS SLIDE ASSEMBLY



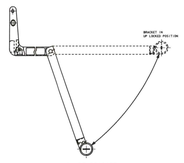


CONT/INGENCY DESCENT DEVICE (SKYGENIE)

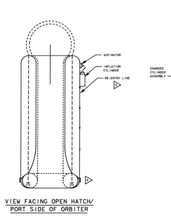




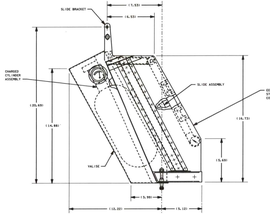
PACKED VALISE HANGING OFF SIDE HATCH PRIOR TO SLIDE DEPLOYMENT



SLIDE BRACKET

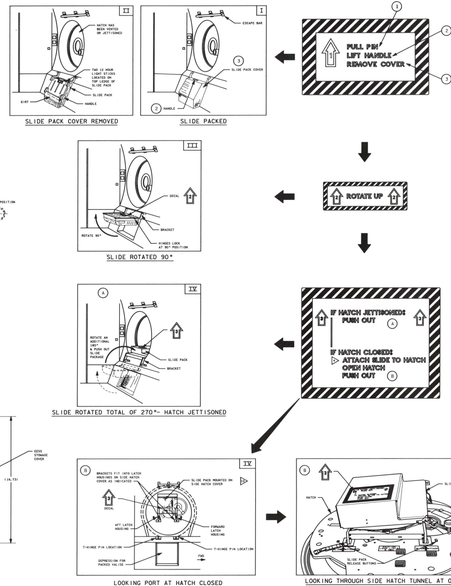


VIEW FACING OPEN HATCH/ PORT SIDE OF ORBITER

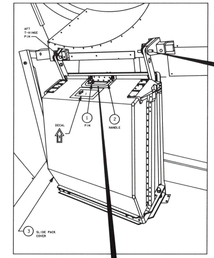


PACKED EESS

EMERGENCY EGRESS SLIDE DEPLOYMENT SEQUENCE



EMERGENCY EGRESS SLIDE (PACKED)



EMERGENCY EGRESS SLIDE ACTIVATION

SLIDE HATCH OPENING AND SLIDE INFLATION
- PULL PIN/ HANDLE REMOVE COVER
- ROTATE HATCH HANDLE TO VENT POSITION
- IF HATCH IS JETTISONED, PUSH OUT, PERFORM HATCH STS IF T-HAZ PRESENT TO VENT HATCH
- IF HATCH IS CLOSED, OPEN HATCH HANDLE AND LIFT HANDLE
- PULL HANDLE AND REMOVE COVER
- ROTATE SLIDE PACK UP 90 DEGREES FIRST TO LOCK SLIDE PACK IN PLACE AND THEN ROTATE HANDLE AWAY FROM HATCH
- LIFT SLIDE AND INSERT BRACKETS INTO LATCH HOOKS AND ROTATE HANDLE TO DOWN POSITION
- ROTATE HATCH HANDLE TO OPEN POSITION AND OPEN HATCH
- PUSH SLIDE PACK OUT OUTBOARD DOOR SILL
- IF HATCH IS JETTISONED, ROTATE HATCH HANDLE MARKED "IF HATCH JETTISONED PUSH OUT" TO THE OUT BUT IS NOT RELEASED OR JETTISONED
- IF THE AIR JAM IN TUNNEL DOES NOT PERMIT HATCH STS, CONSIDER HATCH JETTISON

CAUTION
DO NOT JETTISON SLIDE WITH CREW MEMBERS ON IT

WARNING
NEVER ARM HATCH PYRO UNTIL SLIDE PACK LOADING

AFTER HATCH IS JETTISONED
- PULL PIN TO RELEASE SLIDE HANDLE AND LIFT HANDLE
- ROTATE HANDLE TO OPEN POSITION
- ROTATE SLIDE PACK UP 90 DEGREES FIRST TO LOCK SLIDE PACK IN PLACE AND THEN ROTATE TUNNEL TOTAL OF 270°+- PUSH SLIDE OUT OUTBOARD
- INFLATE SLIDE BY PULLING LANYARD RELEASE HANDLE MARKED "PULL TO INFLATE SLIDE" THE HAT BUT IS FIRST RELEASED OR JETTISONED

NOTES:
1. SLIDE PACK AFTER COVER REMOVED 40 LBMS ± 40LBS
2. T-HANDLE PINS (7) IF PLUG USED TO CONNECT SLIDE PACK TO SLIDE PACK COVER, PULL PLUG AND PIN TO REMOVE COVER IS 5 LBS. FORWARD PULSE OF LOADS IS 4 LB
3. DETACH LINE IS USED BY CREWMAN ONCE TO RELEASE SLIDE FROM ORBITER, SHALL WITHSTAND FULL INFLATION LOAD TO DETACH FROM ORBITER, DETACH OF TUNNEL IS REQUIRED FOR SLIDE
4. REFER TO TABLE 24-1 FOR OPERATING TROUBLE(S)??
5. PROVISIONS (HANDHOLDS) ARE LOCATED AT BOTTOM OF INFLATABLE FOR CREWMEN TO MAINTAIN A GRIP OF SLIDE/RAFT AND STILL ALLOW ACCESS OF NON-ACTIVE PERSONNEL
6. NO HOOKS, LATCHES, OR LITTER'S ALLOWED AROUND THE SLIDE BACK OF INFLATABLE
7. TO REMOVE PINS AND PULLED WITH FULL FORCE OF THE ARM TO BE TURNED TO ALLOW PINS TO ATTACHMENT OF SLIDE TO HATCH FROM CLOSED STATE
8. FLOOR VALVE IS USE INTERFACE BRIDE ALLOWS EVACUATION OF CREWMEN FROM ORBITER AFTER THE INFLATABLE, THEREBY FACILITATING REMOVAL
9. VALVE FLAPPERS CLOSE ANDWORDS POSITIVE PRESSURE IS DETECTED BY THE VALVE TO CLOSED DESIGNATION WITHIN THE ASPIRATOR, UPSTREAM OF THE VALVE'S AREA?
10. ALL PROVISIONS INCLUDED IN THE EMERGENCY PRESSURE INITIALLY AT APPROXIMATELY ONE PSI AFTER ACTIVATION, SUBSEQUENT TO FULL INFLATION OF THE SLIDE, THE PRESSURE IS REGULATED TO 0.5 PSI WITHIN THE BOTTLE BUILDING, THE PRESSURE DROPS TO 0.4 PSI, OPEN SETTING AND REMAINS THAT WAY, THE SLIDE CONTINUES TO DEFLATE AT A RATE OF 0.1 PSI PER MINUTE UNTIL IT REACHES APPROXIMATELY THE SAME TIME AS THE GROUND BOTTLE EVACUATION. THE RELIEF VALVE PREVENTS ANY ANY ADDITIONAL SLIDE PRESSURE GREATER THAN 2 PSI IF NECESSARY

3 EES 1

SIGNATURE	DATE	TITLE
DSNY: MARY HEBLE	04/19/95	EMERGENCY EGRESS SLIDE/SKYGENIE
MP MARTIN, ELLIOTT		
DSNY: N. TRUJILLO		SIZE: A
DSNY: [illegible]	04/19/95	DWG NO: 18.3
APP: [illegible]	04/19/95	
APP: [illegible]	04/19/95	SCALE: NONE
SHEET NO. 3 OF 3 SHEETS		

BASIC REV E

BASIC REV E

HRA

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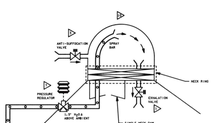
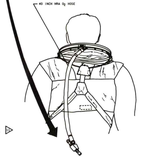


HELMET RETENTION ASSEMBLY (HRA) O2 MANIFOLD
(CAN BE USED AS BACKUP TO O2 MANIFOLD)

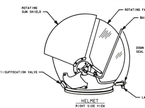
HELMET RETENTION ASSEMBLY



COMMUNICATION CARRIER ASSY (COMM CAP)
FRONT VIEW

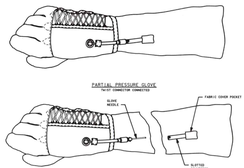
HELMET
FRONT VIEW

HELMET
LEFT SIDE VIEW
(VISOR UP)

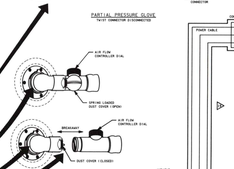


HELMET
RIGHT SIDE VIEW

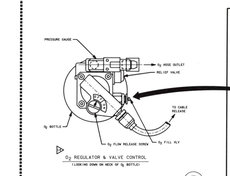
EXHALATION VALVE (FILTER SCREEN REMOVED)
(SHOWING DOME INTO MOUNTING P BASE)



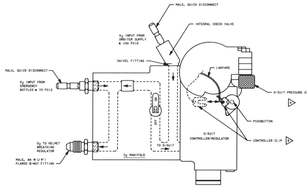
PARTIAL PRESSURE GLOVE
TWIST CONNECTOR DISCONNECTED



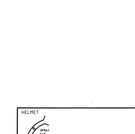
PARTIAL PRESSURE GLOVE
TWIST CONNECTOR DISCONNECTED



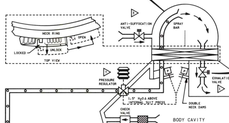
O2 REGULATOR & VALVE CONTROL
(CAN BE USED AS BACK UP TO O2 BOTTLE)



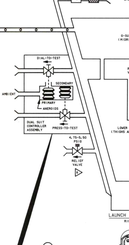
O2 MANIFOLD AND G-SUIT CONTROLLER ASSEMBLY
CONNECTED TO LEFT LEG OF SUIT



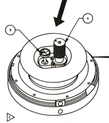
BREATHING/ SPEAKING INTERFACE
(CONFIGURATION MUST FOR BOTH MICES)



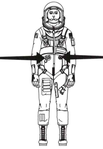
O2 MANIFOLD

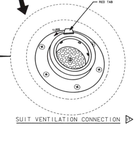


LAUNCH AND ENTRY SUIT
RIGHT SIDE VIEW

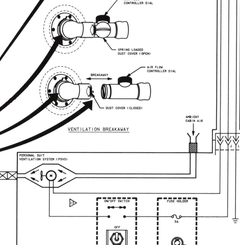


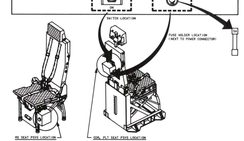
DUAL SUIT CONTROLLER ASSEMBLY
A ADJUSTABLE DIAL-TO-TEST CONTROL
B MANUAL PRESS-TO-TEST BUTTON





SUIT VENTILATION CONNECTION




MK 80 SEAT-PAN LOCATION
SUIT VENTILATION CONTROLLER
SUIT VENTILATION CONTROLLER
SEAT-PAN LOCATION
SUIT HOSE ASSEMBLY (SEAT-PAN TO PSVS CONNECTOR)
SUIT HOSE ASSEMBLY (SEAT-PAN TO PSVS CONNECTOR)
SEAT-PAN LOCATION
SEAT-PAN LOCATION
SEAT-PAN LOCATION

DATE: 9-8-90	NAME: SKK	VERSION: Rev E

DATE: 08/28/90	NAME: PMS	VERSION: BPS-9
DATE: 9-8-90	NAME: SKK	VERSION: Rev E
DATE: 11/16/90	NAME: RJT	VERSION: Rev F

EMERGENCY OXYGEN SYSTEM ACTIVATION (GREEN APPLE)

PRESSURE GUAGE (2)

EMERGENCY OXYGEN BOTTLE (HARNESS COVER REMOVED)

LPU INNER VOL ORAL INFLATION TUBE

EOS BOTTLE (2)

INFLATED LPU

FLO-9 (CO2 CARTRIDGE) MANUAL OR WATER ACTIVATION

EMERGENCY DRINKING WATER PACK

LPU INFLATION KNOB

LPU OUTER VOL ORAL INFLATION TUBE

INFLATED LIFE PRESERVER UNIT (LPU)

UPPER FROST FITTING (2) (PARACHUTE ATTACHMENT)

LOWER FROST FITTING (2) (HARNESS ATTACHMENT)

SEAWATER ACTIVATION RELEASE SYSTEM (SEAKARS)

CARABINER (CYCLONE COVER OPENER)

HARNESS DETAIL 1

SEE HARNESS DETAIL 1

OPENED

CLOSED

EJECTOR SNAPS (LOWER PARACHUTE ATTACH FITTINGS)

LPU

EOS

EMERGENCY WATER PACK REMOVED

BACK VIEW

FRONT VIEW

CREW WORN EQUIPMENT (WITHOUT PARACHUTE PACK)

MANUAL RAFT INFLATION KNOB

PARACHUTE PACK (FRONT VIEW)

PILOT CHUTE - 18"

DROGUE CHUTE - 4.5'

MAIN CANOPY - 28' CONICAL CHUTE + ANTI-OSCILLATION WINDOWS

RAFT

URT-33 RADIO BEACON (LOCATED IN RAFT PACK)

CREW WORN EQUIPMENT (SEATING ASSEMBLY - BACK VIEW, BACK FLAP REMOVED FOR CLARITY)

BAILING CUP (LOCATED & TETHERED TO INSIDE OF RAFT)

FLO-1 (CO2 CARTRIDGE) MANUAL OR WATER ACTIVATION OF VOL 1

FLO-1 (CO2 CARTRIDGE) MANUAL ACTIVATION OF VOL 2

SURVIVAL RAFT (10' TETHER TO PARACHUTE PACK)

SPRAY SHIELD

LIFE RAFT WITH SPRAY SHIELD VELCROED CLOSED

ORAL INFLATION TUBES (LOCATED INSIDE RAFT & OPPOSITE SIDE FROM CO2 CARTRIDGES)

FLEXIPAK EMERGENCY DRINKING WATER

FOR USE ANYWHERE ANYTIME EMERGENCY WATER IS NEEDED

U.S. COAST GUARD APPROVAL FOR LIFE RAFTS

CONTAINS 1 QT. U.S. (946 ml) PURE WATER

ACR ELECTRONICS, INC. CLEARWATER, FL 34622

EMERGENCY DRINKING WATER PACK OF 16 BAGS (1 LITERS TOTAL) VELCROED AND TETHERED TO BACK OF HARNESS WITH 10 FT TETHER

ON/OFF ROCKER SW

BATTERY PACK

FRONT

LANYARD PLUG

FLEXIBLE ANTENNA (TWIST CONNECTOR TO REMOVE)

TELESCOPING ANTENNA (UNSCREW TO DEPLOY NUT TO REMOVE) #3 BASE FOR MAX TRANSMISSION)

BEACON SET, RADIO AN/URT-33C/M

ACR ELECTRONICS, INC. SERIAL NO. [redacted] FL-ML/FS-1410SE CONTACT NO. [redacted]

NSN 5826-00-240-6043

INSTRUCTION FOR OPERATION SEE REVERSE SIDE

BACK

MODE SWITCH

RED LIGHT

GREEN LIGHT

BOTTOM

SIGNAL BEACON - AN/URT - 33C/M (STOWED (UNTETHERED IN POUCH) IN MAIN CANOPY PORTION OF PARACHUTE PACK)

SEA ANCHOR/SEA DYE MARKER (LOCATED IN RAFT - 12" TETHER CONNECTED TO OUTSIDE HEAD OF RAFT)

BAILING PUMP (LOCATED & TETHERED TO INSIDE OF RAFT)

RAFT MATERIAL IS POLYURETHANE COATED NYLON WHICH IS PERMEABLE TO CO2. AFTER RAFT HAS BEEN INFLATED MORE THAN 4 HOURS, THE PRESSURE IN THE RAFT COULD BE LOW FROM SEEPAGE AND REQUIRE MANUAL INFLATION USING THE ORAL INFLATION TUBES

GREEN APPLE PULL FORCE REQUIRED TO ACTIVATE BOTH EOS BOTTLES IS 25 lbf

EMERGENCY OXYGEN SYSTEM CONSISTS OF TWO 11.3 INCH BOTTLES WITH AN OUTER DIAMETER OF 3 INCHES. IT IS 3000 PSIG FULL CHARGE AT 70°F. 60 CUBIC INCHES PER BOTTLE AND APPROX. 1.2 LBM PER BOTTLE. UNDER A MODERATE WORK LOAD OF 36 LITERS PER MINUTE THE BOTTLE WILL LAST APPROX 10 MINUTES AT SEA LEVEL.

SIGNAL BEACON IS ACTIVATED WHEN MAIN CANOPY OF PARACHUTE IS DEPLOYED, THE BATTERY IS A 9V ALKALINE PACK AND HAS A LIFE OF 8 HOURS CONTINUOUS TRANSMISSION. BEACON CAN CONTINUE AFTER 8 HOURS BUT THE SIGNAL RANGE WILL SHORTEN. 4 HOURS CONTINUOUS TRANSMISSION IF OPERATING AT TEMP 0°C)

LPU IS COMPOSED OF TWO INFLATABLE VOLUMES, AN INNER VOLUME COMPLETELY SURROUNDED BY AN OUTER VOLUME (WHEN FULLY INFLATED). THE INNER VOLUME CAN BE INFLATED BY THE FLO-9, MANUALLY OR WATER ACTIVATION, OR BY THE RIGHT ORAL INFLATION TUBE. THE OUTER VOLUME CAN BE INFLATED BY THE FLO-1 OR BY THE LEFT ORAL INFLATION TUBE. THE CREW CAN MANUALLY INFLATE OR DEFLATE THE OUTER VOL. THE TWO TUBES CAN BE CONFIGURED TO HOLD LPU FRONT LOBES TOGETHER BY LOOPING THE LEFT ORAL INFLATION TUBE THROUGH A LOOP ON THE RIGHT ORAL INFLATION TUBE

THE SEA DYE MARKER IS ATTACHED TO THE SEA ANCHOR. ONCE TAB IS PULLED ON THE MARKER, AN ORANGE DY FLUORESCENT MATERIAL WILL BE RELEASED. IN CALM SEAS AND AT AN ALTITUDE OF 2000 FT, THE DYE SEGMENTS TO 80 TO 20 MINUTES. MARKER IS AN INEFFECTIVE TARGET AFTER 1 TO 3 HOURS DEPENDING ON THE CONDITIONS OF THE SEA

BAILING PUMP IS USED TO BAIL WATER OUT OF RAFT, TAPERED END STATE IN RAFT (WHILE PUMPING) AND STUBS ARE USED TO BE POSITIONED OUT OF RAFT. HOSE LENGTH IS 17 INCHES, HOSE INSIDE DIAMETER IS 1/4 INCH AND OUTSIDE DIAMETER IS 1/2 INCH

SPRAY SHIELD CAN BE USED TO BAIL WATER OUT OF RAFT AND CAN BE VELCROED CLOSED FOR WARMTH AND TO PREVENT WATER FROM ENTERING RAFT

ORAL INFLATION TUBES ARE USED TO MANUALLY INFLATE/DEFLATE VOL 1 AND VOL 2 OF THE LIFE RAFT. TUBES ARE LOCATED ON THE OPPOSITE SIDE FROM CO2 FOR VOL 1. TO USE, UNSCREW & DEPRESS FITTING AND ORALLY INFLATE OR DEFLATE RAFT. TIGHTEN FITTING AFTER USE TO PREVENT UNINTENTIONAL DEFLATION

VOLUME 1 OF RAFT CONSISTS OF RINGS 3,5 AND 4 (FROM TOP) VOLUME 2 OF RAFT CONSISTS OF RINGS 1,5 - ALL (FROM TOP)

CARABINER CAN BE USED DURING POSTLANDING EGRESS OR WATER RESCUE

SEAKARS WILL AUTOMATICALLY RELEASE THE PARACHUTE FROM THE HARNESS WHEN SUBMERGED IN SALT WATER ONLY

MANUAL RAFT INFLATION KNOB WILL ACTIVATE THE RAFT'S FLO#9 (CO2 CARTRIDGE) WHICH WILL INFLATE VOLUME 1 OF RAFT (UPPER PORTION OF RAFT).

TWO EJECTOR SNAPS AND TWO FROST FITTING ASSY'S, RELEASE THE PARACHUTE FROM THE HARNESS

NOTE(S): BENEATH THE PRESSURE BLADDERS AND SORTEX LINER ARE THE THERMAL PROTECTIVE COVERS AND A URINE COLLECTION DEVICE OR DISPOSABLE ABSORPTION GARMENT

5 SG 1

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN MONKS & ELLIOTT	09/28/90	
DR MONKS & ELLIOTT	09/28/90	
CHKR A. TRUJILLO		SURVIVAL GEAR
ENGR [signature]	9-28-90	
APP [signature]	10/1/90	
APP [signature]	10/1/90	SPACE SHUTTLE / DWG NO 18.5
DPM/PLAN [signature]	10/1/90	ALL FLIGHTS
LTR C / PCN		SIZE D / FSCM / SHEET 1 OF 1

BASIC REV E

BASIC REV E

DATE= 9-9-90 | NAME= SAX | VERSION= IML1

DATE= 08/28/90 | NAME= BJT | VERSION= BPT1.2
DATE= 9-9-90 | NAME= SAX | VERSION= IML1

SIGNAL KIT, ILLUMINATION
MK 79 MOD 0
CONSISTING OF
7 SIGNALS, HAND FIRED MK 60 MOD 0
1 PROJECTOR, SIGNAL, SURFACE MK 31 MOD 0

PEN GUN FLARE KIT ▷

SIGNAL KIT OPERATING INSTRUCTIONS (LOCATED INSIDE KIT PACK)

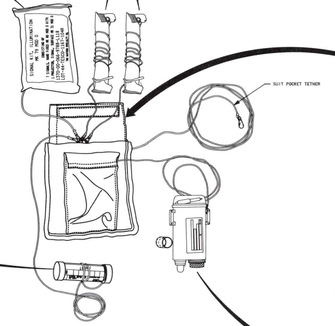
1. PULL TRIGGER SCREW INTO ANGULAR (SAFETY) SLOT.
2. REMOVE PROTECTIVE TAB AWAY FROM SIGNAL IN BANDOLIER TO ALLOW ATTACHMENT OF PROJECTOR.
3. MATE PROJECTOR WITH SIGNAL AND ROTATE TO RIGHT UNTIL SIGNAL IS SEATED.
4. HOLD PROJECTOR, ARM FULLY EXTENDED, OVERHEAD.
5. GRIP PROJECTOR FIRMLY, WITH SNAPPING THUMB ACTION, PULL TRIGGER FROM SAFETY SLOT AND RELEASE INTO FIRING SLOT.
6. IF SIGNAL MISFIRES, AT LEAST ONE MORE ATTEMPT SHOULD BE MADE TO FIRE IT.
7. UNDERW MISFIRED OR SPENT SIGNAL.

DAY/NIGHT FLARE ▷

DAY/NIGHT FLARE DECAL
(AROUND FLARE CYLINDER)

IMPORTANT: KEEP SEALED IN FOIL WRAPPER UNTIL READY FOR USE. DO NOT PUNCTURE. THE INGREDIENTS IN CYALUME® LIGHTSTICK ARE NON-TOXIC. IN CASE OF EYE CONTACT, THOROUGHLY RINSE WITH WATER. INGREDIENTS WILL NOT CAUSE INJURY TO THE EYE, BUT MAY CAUSE TEMPORARY DISCOMFORT

CHEMICAL LIGHTSTICK (2)
12 HR HIGH INTENSITY - GREEN LIGHT

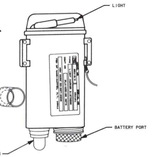


SURVIVAL PACK A
(STOWED AND TETHERED IN SUIT LEG POCKET)
PEN GUN FLARE KIT
DAY/NIGHT FLARE
SIGNAL MIRROR
CHEMICAL LIGHTSTICK

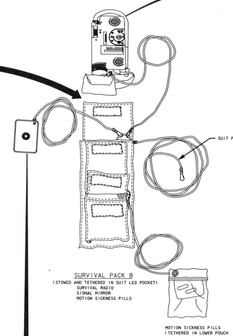
SHROUD LINE CUTTER
(TETHERED TO INNER LEG POCKET)

EXPOSURE MITTEN
(STOWED BEHIND SURVIVAL PACK A)

EXPOSURE MITTEN
(STOWED BEHIND SURVIVAL PACK B)

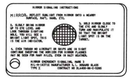


STROBE LIGHT ▷
(TETHERED IN OUTER POUCH
OF SURVIVAL PACK A)

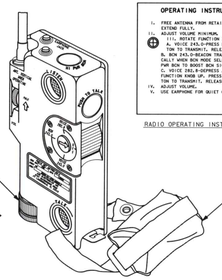


SURVIVAL PACK B
(STOWED AND TETHERED IN SUIT LEG POCKET)
SURVIVAL RADIO
SIGNAL MIRROR
MOTION SICKNESS PILLS

MOTION SICKNESS PILLS
(TETHERED IN LOWER POUCH
ON SURVIVAL PACK B



SIGNAL MIRROR ▷
(TETHERED IN UPPER POUCH
IN SURVIVAL PACK B)



SURVIVAL RADIO AN/PRC-90-2 ▷

OPERATING INSTRUCTIONS

I. FREE ANTENNA FROM RETAINING CLIP AND EXTEND FULLY.
II. ADJUST VOLUME RH/LH/BL.
III. ROTATE FUNCTION KNOB TO DESIRED MODE.
A. VOICE (VO.)-PRESS PUSH-TO-TALK BUTTON TO TRANSMIT. RELEASE TO RECEIVE.
B. BCN (VO.)-BEACON TRANSMITS AUTOMATICALLY WHEN BCN MODE SELECTED. PUSH HI BCN TO TRANSMIT MANUALLY.
C. VOICE (VO.)-DEPRESS ARROW AND ROTATE FUNCTION KNOB UP. PRESS PUSH-TO-TALK BUTTON TO TRANSMIT. RELEASE TO RECEIVE.
IV. ADJUST VOLUME.
V. USE EARPHONE FOR QUIET OPERATION.

RADIO OPERATING INSTRUCTIONS DECAL

▷ DAY/NIGHT FLARE CONSISTS OF A DAY SMOKE FLARE AND A NIGHT ILLUMINATION FLARE.
NIGHT FLARE ENDS RED CAP WITH 3 PROTRUSIONS - RED FLARE IS VISIBLE FOR 30 SECONDS AND 30 MILES.
DAY FLARE ENDS ORANGE CAP - ORANGE SMOKE BURNS 20 SECONDS AND IS VISIBLE FOR 7 MILES.

▷ PEN GUN FLARE KIT HAS SEVEN SIGNALS, EACH WITH A MINIMUM DURATION OF 4.5 SECONDS. THEY CAN BE LAUNCHED UP TO 200 FEET

▷ STROBE LIGHT USES A 4.5-V MERCURY BATTERY AND HAS A LIFE OF 6-9 HOURS CONTINUOUS USE AND APPROXIMATELY 18 HOURS INTERMITTENT. LIGHT IS VISIBLE FOR 50 MILES

▷ SIGNAL MIRROR CAN BE VISIBLE OVER 40 MILES, ON A CLEAR SUNNY DAY, THE MIRROR REFLECTS THE EQUIVALENT OF 6 MILLION CANDLEPOWER

NOTES▷ SURVIVAL RADIO USES A 14V MERCURY BATTERY AND HAS A LIFE OF 7 HOURS CONTINUOUS TRANSMISSION. RADIO CAN CONTINUE AFTER 7 HOURS BUT THE SIGNAL RANGE WILL SHORTEN. 12 HOURS CONTINUOUS TRANSMISSION IF OPERATING AT 70°F (7°C)

5 SG 2

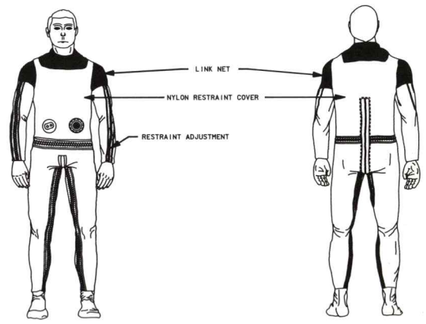
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DSGN: G.TORRES, G.BRUELLES	8/28/90	LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR: A.ELLEPSIS, S.SIMPSON	8/28/90	
CHKR: R. TRUJILLO		SURVIVAL GEAR
CHKR: K.Tyrrell	9-10-90	
APP		
APP: Ronald	10/1/90	SPACE SHUTTLE DWG NO 18.5
DWG/PLAN: J.F.Gruber	10/1/90	ALL
STA: E PCN		83.5 X 34 SHEET 2 OF 2

BASIC REV E

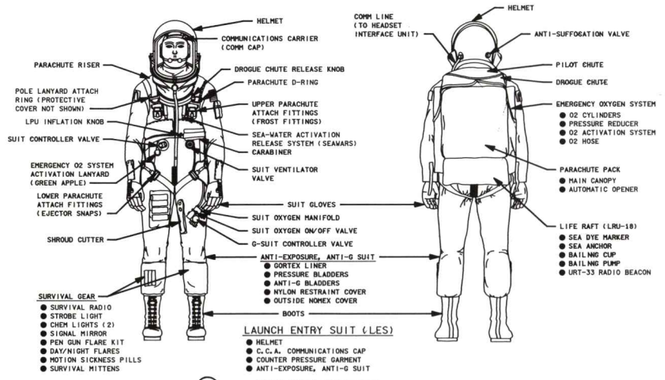
BASIC REV E

DATE: 9-8-90 | NAME: SKK | VERSION: INK 1

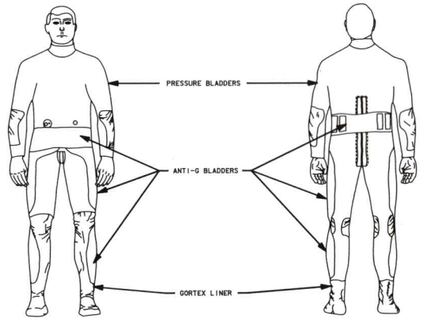
CREW WORN EQUIPMENT BREAKDOWN



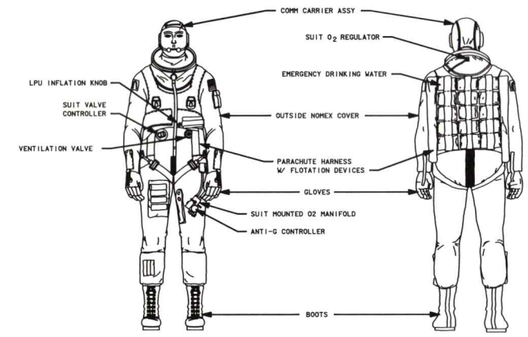
(D) CREW WORN EQUIPMENT
(WITHOUT OUTSIDE NOMEX COVER OF SUIT)



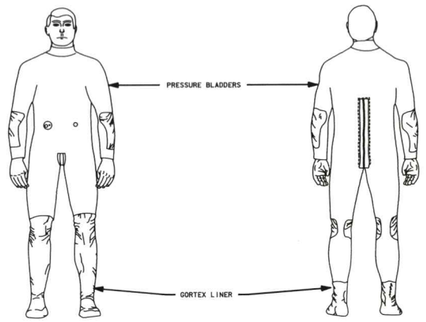
(A) CREW WORN EQUIPMENT
(ENTIRE ASSEMBLY)



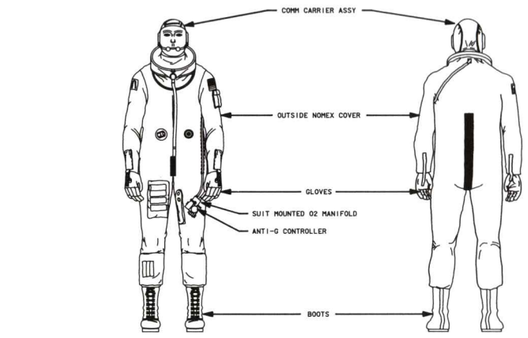
(E) CREW WORN EQUIPMENT
(WITHOUT OUTSIDE NOMEX COVER OF SUIT OR NYLON RESTRAINT ASSEMBLY)



(B) CREW WORN EQUIPMENT
(WITHOUT PARACHUTE PACK, HELMET OR WATER PACK COVER)



(F) CREW WORN EQUIPMENT
(WITHOUT OUTSIDE NOMEX COVER OF SUIT, NYLON RESTRAINT ASSEMBLY OR ANTI-G BLADDERS)

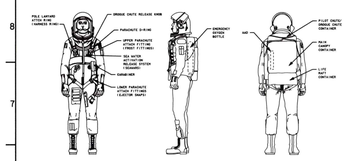


(C) CREW WORN EQUIPMENT
(WITHOUT PARACHUTE PACK, HARNESS OR HELMET)

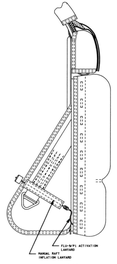
5 SG 3

SIGNATURE		DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN	MICHAEL A. GILLESPIE	08/27/90	
DR	MICHAEL A. GILLESPIE	08/27/90	
ENGR	K. TRUJILLO		SURVIVAL GEAR
ENGR	K. Trujillo	9/13-90	
APP		9/14/90	
APP		9/14/90	SPACE SHUTTLE / ALL FLIGHTS — DWG NO 18.5
OMNIPLAN	S.K. Kadavil	11-14-90	
LTR E	PCN		44 X 34 — PAGE — SHEET 3 OF 3

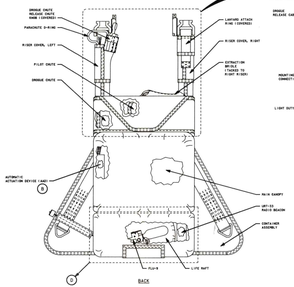
BASIC REV E

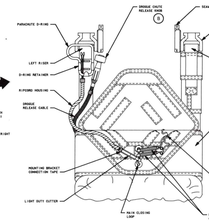


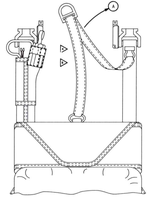
LAUNCH/ENTRY SUIT WITH PARACHUTE PACK AND HARNESS

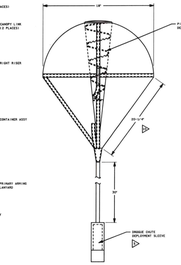


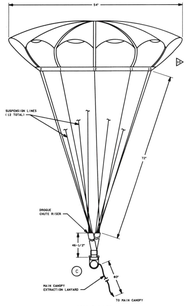
PARACHUTE PACK

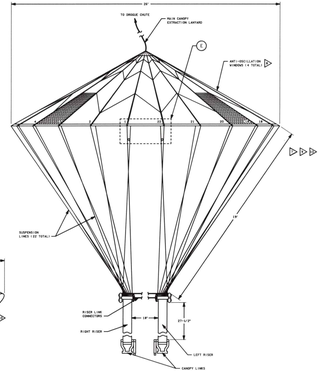








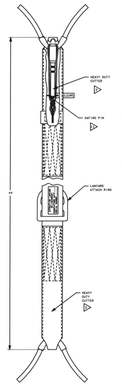




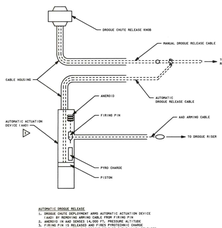
MAIN CANOPY

AUTOMATIC DEGRADE
1. DROGUE CHUTE DEPLOYMENT ARMS AUTOMATIC ACTUATION DEVICE
2. AUTOMATIC ACTUATION DEVICE (AAD) ARMS AT 10,000 FEET
3. AAD(S) (1 OR BOTH) SENSES 14,000 FT. PRESSURE ALTITUDE
4. F-2018 PIN (S) RELEASED AND F-2012 PYROTECHNIC CHARGE (S) FIRED (DEPENDING ON WHICH AAD(S) SENSED ALTITUDE)
5. THREE R-RING ASSEMBLY
6. R-RING RETAINS DROGUE AND DEPLOYS MAIN CANOPY

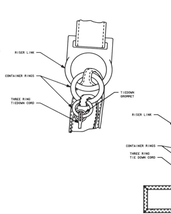
MANUAL DROGUE RELEASE
1. CREWMEMBER PULLS DROGUE CHUTE RELEASE HAND WHICH IS ATTACHED TO MANUAL DROGUE RELEASE CABLE
2. MANUAL DROGUE RELEASE CABLE PULLS THREE R-RING ASSEMBLY
3. DROGUE CHUTE IS RELEASED AND DEPLOYS MAIN CANOPY



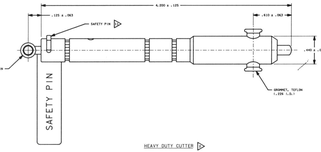
A EXTRACTION BRIDLE



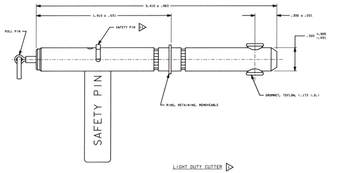
B AAD/MANUAL DROGUE CHUTE RELEASE KNOB



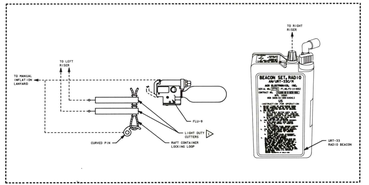
C THREE RING RELEASE ASSEMBLY



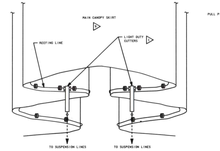
HEAVY DUTY CUTTER



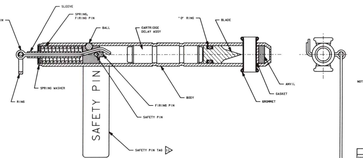
LIGHT DUTY CUTTER



C LIFE RAFT CONTAINER DETAIL



D REEFING LINE CUTTERS



LIGHT DUTY CUTTER

- SAFETY PIN INSTALLED ONLY DURING REMOVAL AND INSTALLATION OF PYROTECHNIC CUTTERS
- DROGUE RATED: 2,000 LBS
  MAIN CANOPY (REEFED): 42,000 LBS
  MAIN CANOPY (DISREEFED): 204,000 LBS
  DESCENT RATE: 16.7 FPS
- REEFED MAIN CANOPY 15 TO 19 FULLY OPEN, 40 FPS DESCENT RATE
- ANTI-OSCILLATION WINDOWS REDUCE OSCILLATION DURING DESCENT
- MAIN CANOPY 12 @ 81.65 GORE, NYLON CONSTRUCTED CONICAL CANOPY WITH 24 KEVLAR REINFORCEMENT
- BRIDLE SEPARATES FROM PARACHUTE PACK BY THE HEAVY DUTY CUTTERS, DEPLOY AND LANYARD ASSEMBLY PULLS AWAY FROM ORBITER
- PILOTS CHUTE PACKED IN DEPLOYMENT SLEEVE TO ENSURE 1:1 DEPLOYMENT VELOCITY. PILOT CHUTE AND DROGUE DEPLOYMENT SLEEVE PULL AWAY AFTER DROGUE CHUTE DEPLOYMENT
- 20 LBF, MINIMUM FORCE REQUIRED TO SYSTEM BRIDLE AND RELEASE SYSTEM
- ADS SHALL ACTIVATE AT 14,000 FT., ± 1000 FT., BASED ON ATMOSPHERIC CONDITIONS (STANDARD DAY, TEMPERATURE AND 10 TO 15KT WIND SHEAR TEMPERATURE, 15°C MAX TO 0.5 PSIA AMBIENT PRESSURE.
- DOT CLASS 1.4 (EXPLOSIVE)
  ■ CUTTING CAPACITY: 750 POUND NYLON LINE OR 2000 POUND REEFLIFT LINE
- DOT CLASS 1.4 (EXPLOSIVE)
  ■ CUTTING CAPACITY: 750 POUND NYLON LINE OR 2000 POUND REEFLIFT LINE
  ■ DELAY TIME: 1.5 SECONDS

NOTES:

6 PPA

ENGINEERING	DATE	MILITARY, AERONAUTICAL AND SPACE ADMINISTRATION
DRAW. NO. 10-100000 AA	04/14/78	LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
APP.		
DRAWN: N. PRUSSELIS		PERSONAL PARACHUTE ASSEMBLY (PPA)
APP. Kenneth Bell	04/14/78	
APP. Jerry Lee	04/14/78	
APP. [illegible]	04/14/78	SPACE SHUTTLE | DWG NO. 18.0
APP. [illegible]	04/14/78	10-100
SCALE: NONE		SHEET 1 OF 1

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
18.1	ESCAPE PANEL	ROCKWELL	V070-553303	ALL	C	10-12-84	WINDOW INSTL-CM, EMERG EGRESS SYSTEM

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
18.1	ENGR J. KREYKES				
	ENGR Jennifer Kreykes	11-6-90		ENGR	
	ENGR			ENGR	
	ENGR			ENGR	
	ENGR			APP Paul Hyde	8 Nov 90
	ENGR			APP R T Neal	11/9/90
	ENGR			OMNIPLAN	
	ENGR			LTR E PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE ALL

TBL NO 18-I

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
18.2	POLE CREW ESCAPE SYSTEM	NASA/JSC (LOCKHEED)	SID 27101410ALL	ALL	D	7-11-88	DRAWING TREE, POLE CREW ESCAPE SYSTEM
18.3	EMERGENCY EGRESS SLIDE/SKYGENIE	INFLATABLE SYSTEMS INTER-NATIONAL	D102900	ALL	D	3-11-88	EGRESS SLIDE TOP ASSEMBLY
		ROCKWELL	V651-000002	ALL	D	3-88	MISSION KIT
		NASA	JSC-12770	3.5-10	B	8-14-87	SHUTTLE FLIGHT OPERATIONS MANUAL VOL 12
18.4	LAUNCH AND ENTRY SUIT	NASA/JSC (DAVID CLARK)	SED 39120495	ALL	D	9-22-88	LAUNCH & ENTRY SUIT ASSEMBLY/CREW ESCAPE SYSTEM
		(AIRLOCK, INC.)	SED 39120496			10-27-88	PERSONAL SUIT VENTILATION SYSTEM ASSEMBLY
18.5 (SHEETS 1-3)	SURVIVAL GEAR	NASA-JSC	S88-37773				
			S88-37775				
			S88-37778				
			S88-39725				
			S88-39751				
			S88-39753				
			S88-39754				
			S88-44404				
			S88-53741				
			S88-53742				
18.6	PERSONAL PARACHUTE ASSEMBLY	NAVAL AIR SYSTEMS COMMAND	SX 1102410187	ALL		6-89	DRAWING TREE, PERSONAL PARACHUTE ASSEMBLY

DWG	SIGNATURE	DATE	DWG	SIGNATURE	DATE
18.2	ENGR K. TRUJILLO		18.6	ENGR K. TRUJILLO	
	ENGR Kenneth D Trujillo	11-07-90		ENGR Kenneth D Trujillo	11-07-90
18.3	ENGR K. TRUJILLO			ENGR	
	ENGR Kenneth D Trujillo	11-07-90		ENGR	
18.4	ENGR K. TRUJILLO			APP	7 Nov 90
	ENGR Kenneth D Trujillo	11-07-90		APP	11/9/90
18.5,1-3	ENGR K. TRUJILLO			OMNIPLAN	
	ENGR Kenneth D Trujillo	11-07-90		LTR E	PCN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

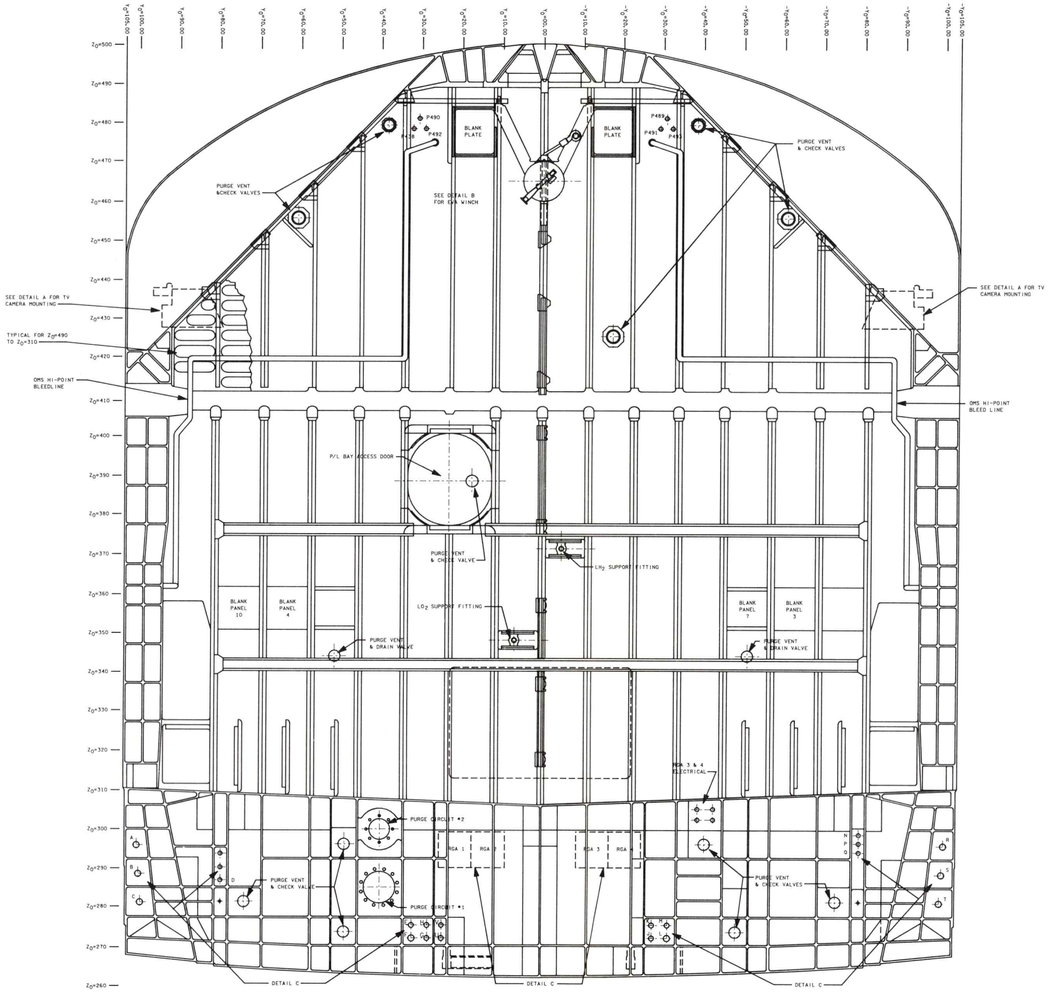
VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 18-I
ALL	
	PAGE 18.1-2 SHEET 2 OF 2

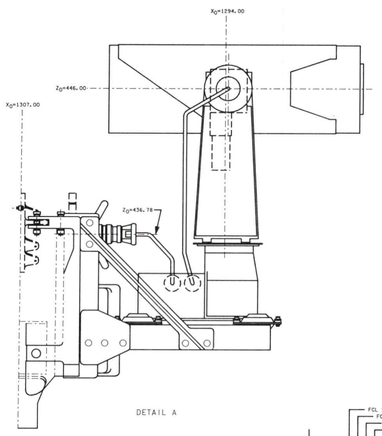
*U.S.GOVERNMENT PRINTING OFFICE:1990-561-057/20057

BASIC REV E

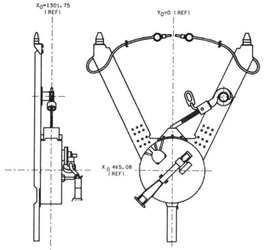
A	
DATE= 09/11/87	NAME= VCO	VERSION= INR= 1
DATE= 10/09/87	NAME= TMV	VERSION= INR= 2
DATE= 08/22/90	NAME= MDU	VERSION= INR= 3



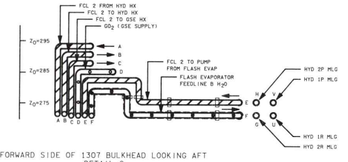
1307 BULKHEAD LOOKING AFT



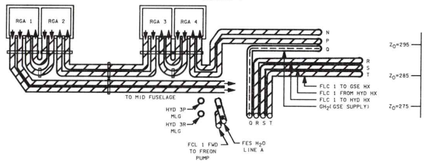
DETAIL A

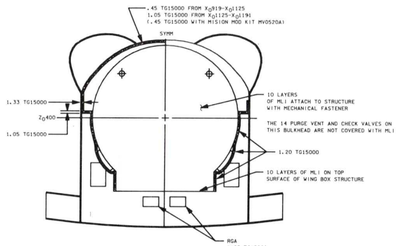


DETAIL B



FORWARD SIDE OF 1307 BULKHEAD LOOKING AFT
DETAIL C





1307 INSULATION DETAIL
LOOKING AFT FROM 1191 TO 1307
SCALE 1/20

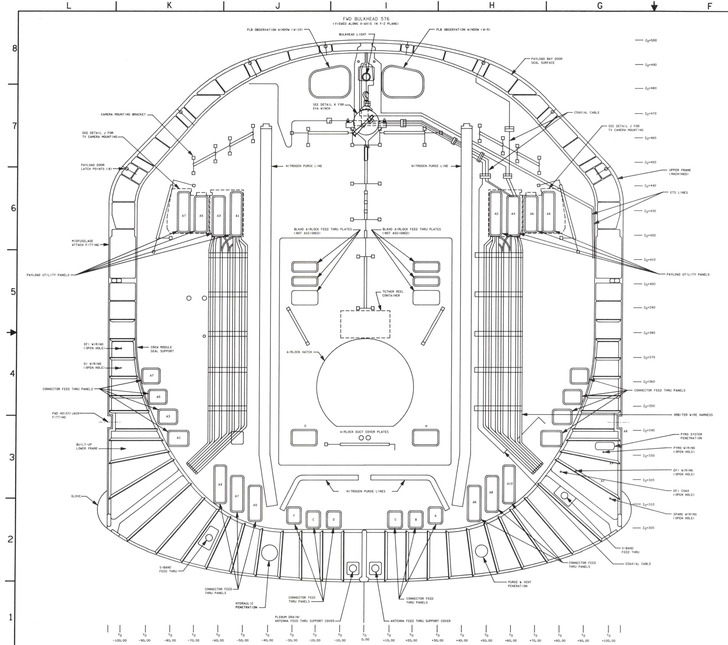
NOTES: THIS DRAWING IS ONLY APPROXIMATE

PLV OV 1

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN MICHAEL MURPHY	7/25/83	
DR		PAYLOAD BAY OVERVIEW 1307 BULKHEAD LOOKING AFT
ENGR H.K. POHL		
ENGR	9/1/90	
APP	9-4-90	
APP	9-7-90	
DMS/PLAN		SPACE SHUTTLE / DWG NO 19.1
LTR C / PCN		ALL / SHEET 1 OF 6
		66 X 34 / PAGE

BASIC REV E

BASIC REV E



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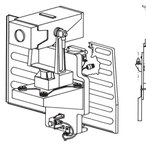
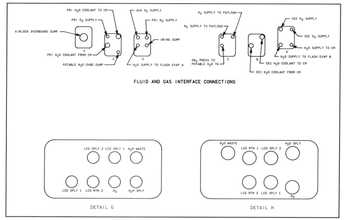
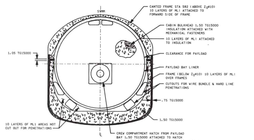






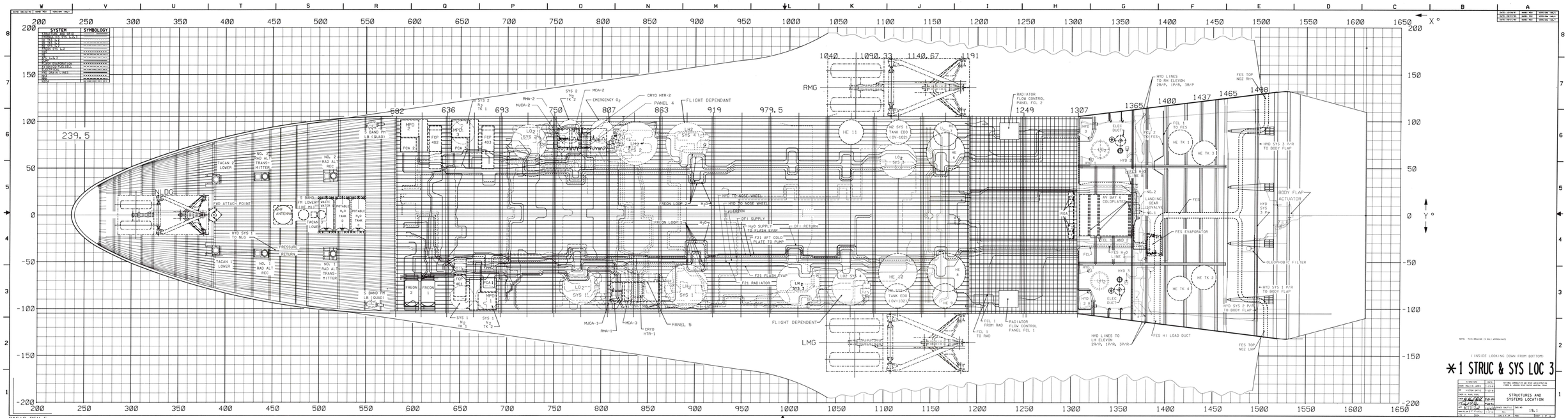
582 INSULATION DETAIL

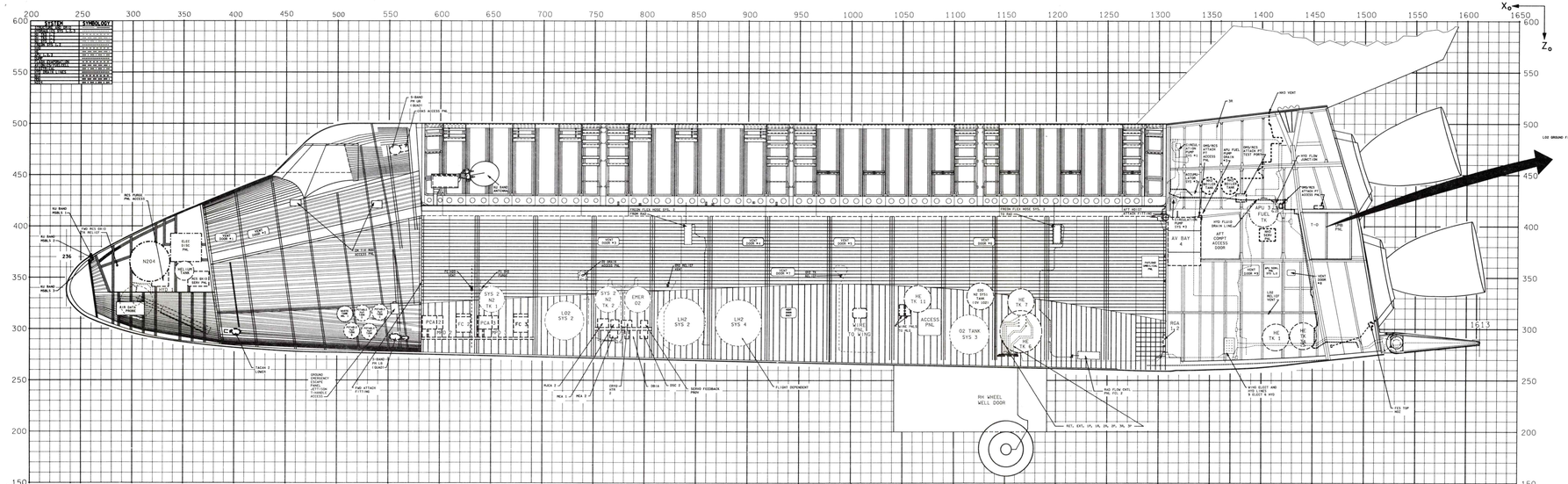
LOW ON FWD BT 582 W CONTROL SYS BUNDLE (-Z)

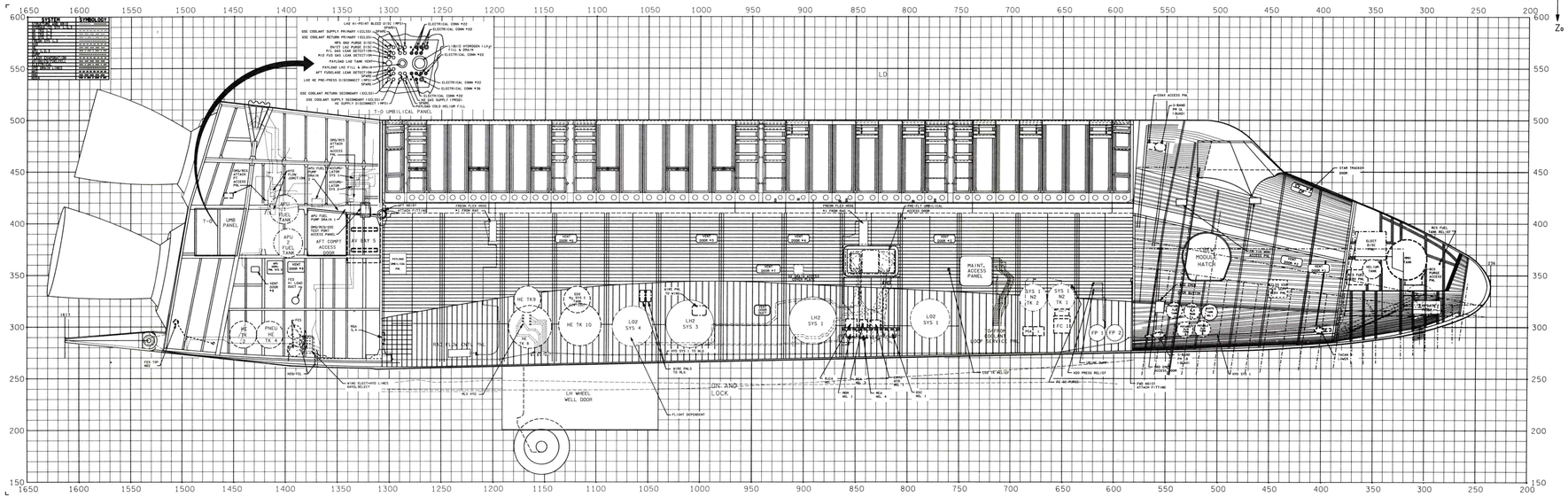
NOTES: 1. THIS DRAWING IS ONLY APPROXIMATE

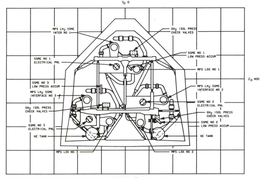
SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DAVID THOMAS HUGHES	8/3/77	NATIONAL SPACE TRANSPORTATION SYSTEM
for MICHAEL MURPHY	8/3/77	
CHIEF, SYS. ENGR.		PAYLOAD BAY OVERVIEW
CHIEF, SYS. ENGR.	8/3/77	582/576 BULKHEAD
CHIEF, SYS. ENGR.	8/3/77	LOOKING AFT
CHIEF, SYS. ENGR.	8/3/77	
CHIEF, SYS. ENGR.	8/3/77	SPACE SHUTTLE DWG NO 19.1
SIZE		SCALE
TN	REVS	SHEET 19 OF 19

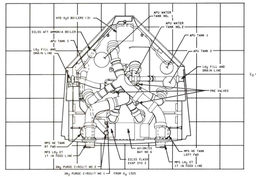
BASIC REV E

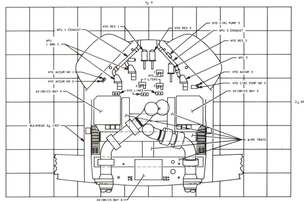

SYSTEM
SYMBOLOGY
239.5
NLG DR
NLG
NO. 2 RAD ALT TRANSMITTER
NO. 2 RAD ALT REC
TACAN 2 LOWER
S BAND PM LB (QUAD)
MPD 2
FCA 21
FCP 402
FCP 403
LO2 SYS 2
LH2 SYS 2
LO2 SYS 4
LH2 SYS 4
RMG
HE 11
HE 12
HE 13
N2 SYS TANK EDO (V-102)
LO2 SYS 3
LH2 SYS 3
RADIATOR FLOW CONTROL PANEL FCL 2
RADIATOR FLOW CONTROL PANEL FCL 1
HYD LINES TO RH ELEVON 2W/P, 1P/R, 3R/P
FES TOP NOZ RH
ELEC DUCT
FCL 1 TO FES
FCV 2 TO FES
HE TK 1
HE TK 3
HYD SYS 3 P/R TO BODY FLAP
BODY FLAP ACTUATOR
HYD SYS 3 P/R
AV BAY 4 COLDPLATE
NO. 2 LANDING GEAR LOVALVE NO. 1
FES EVAPORATOR
FES H2O LINE
OLEO-HOBIC FILTER
HE TK 2
HE TK 4
HYD SYS 2 P/R TO BODY FLAP
FES TOP NOZ LH
HYD LINES TO LH ELEVON 2W/P, 1P/R, 3P/R
FES HI LOAD DUCT
LMG
FCL 1 FROM RAD
FCL 1 TO RAD
FLIGHT DEPENDANT
MCA-1
RMA-1
MCA-3
CRYO HTR-1
PANEL 5
CRYO HTR-2
PANEL 4
MCA-2
RMA-2
EMERGENCY O_2
SYS 2 N_2 TK 2
SYS 1 N_2 TK 1
SYS 2 N_2 TK 1
SYS 1 N_2 TK 2
FREON LOOP 2
FREON LOOP 1
H_2O
HYD TO NOSE WHEEL
FREON
H_2O SUPPLY TO FLASH EVAP
F21 AFT COLD PLATE TO ZERO
F21 FLASH EVAP
F21 RADIATOR
LH_2 SYS 1
LO2 SYS 1
HYD SYS TO NLG
PRESSURE
RETURN
NO. 1 RAD ALT REC
NO. 1 RAD ALT TRANSMITTER
S BAND PM LB (QUAD)
TACAN 1 LOWER
TACAN 3 LOWER
S BAND FM LOWER ANTENNA
FM WASTE H2O
POTABLE H_2O TANK 3
POTABLE H_2O TANK 4
NLG ATTACH POINT
582
636
693
750
807
863
919
979.5
1040
1090.33
1140.67
1191
1249
1307
1365
1400
1437
1465
1498
X°
Y°
(INSIDE LOOKING DOWN FROM BOTTOM)
*1 STRUC & SYS LOC 3
STRUCTURES AND SYSTEMS LOCATION
19.1
BASIC REV E

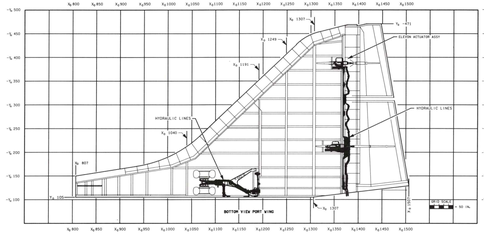

SYSTEM SYMBOL/DEF
X_o
Z_o
FROM FLEX HOSE SYS. 1
FROM FLEX HOSE SYS. 2
TO FLEX HOSE SYS. 2
TO FLEX HOSE SYS. 1
RH WHEEL WELL DOOR
ACCESS PNL
AFT COMPT ACCESS DOOR
AV BAY 4
APU 1 TK
APU 2 TK
APU 3 TK
FUEL TK
T-0
HE TK 1
HE TK 2
HE TK 3
HE TK 4
HE TK 5
HE TK 6
O2 TANK SYS 3
LO2 SYS 2
LH2 SYS 2
LH2 SYS 4
SYS 2 N2 TK 2
SYS 1 N2 TK 1
EMER O2
RCS PODS
RCS PODS
RCS PODS


SYSTEM
SYMBOLOGY
T-0 UMBILICAL PANEL
LH WHEEL WELL DOOR
DOCKING MODULE HATCH
MAINT. ACCESS PANEL
AFT COMPT ACCESS DOOR
LPRP PANEL
HE TK 9
HE TK 10
LO2 SYS 4
LH2 SYS 3
LH2 SYS 1
LO2 SYS 1
SYS 3 N2 TK 2
SYS 3 N2 TK 1
FP 1
FP 2
STAR TRACKER DOOR
ODS ACCESS PN
MPS FUEL RELIEF
MPS LO2 RELIEF
MPS LH2 RELIEF
MPS HE PRESS RELIEF
MPS HE PRESS REG
MPS HE PRESS ISOL
MPS LO2 FILL & DRAIN
MPS LH2 FILL & DRAIN
MPS LO2 ULLAGE PRESS
MPS LH2 ULLAGE PRESS
MPS LO2 PRESS REG
MPS LH2 PRESS REG
MPS LO2 PRESS ISOL
MPS LH2 PRESS ISOL
MPS LO2 PRESS RELIEF
MPS LH2 PRESS RELIEF
MPS LO2 PRESS REG RELIEF
MPS LH2 PRESS REG RELIEF
MPS LO2 PRESS ISOL RELIEF
MPS LH2 PRESS ISOL RELIEF
MPS LO2 FILL & DRAIN
MPS LH2 FILL & DRAIN
MPS LO2 ULLAGE PRESS
MPS LH2 ULLAGE PRESS
MPS HE PRESS REG
MPS HE PRESS ISOL
MPS HE PRESS REG RELIEF
MPS HE PRESS ISOL RELIEF
MPS HE PRESS RELIEF

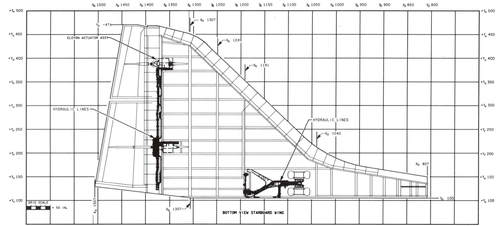




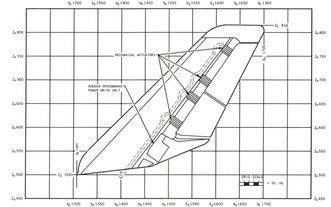


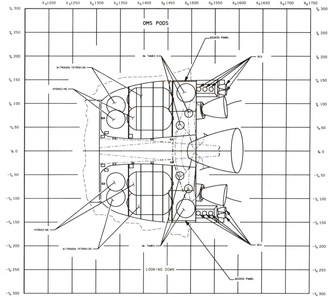


LEFT WING (LOOKING UP)



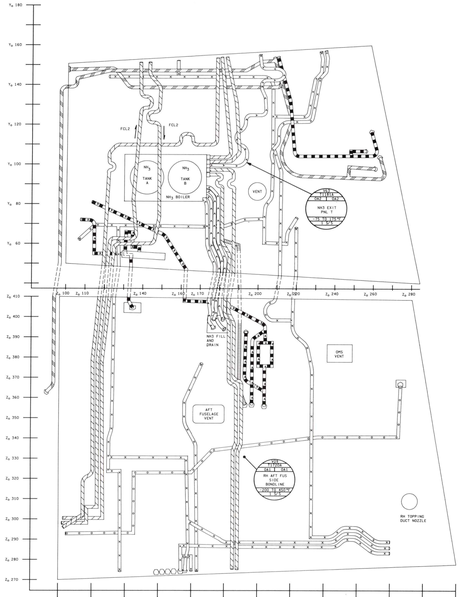
RIGHT WING (LOOKING UP)





AFT FUSELAGE SECTIONS

LEGEND



AFT FUSELAGE RIGHT SIDE LOOKING OUT

NOTES: 1. THIS DRAWING IS ONLY APPROXIMATE

1 WINGS/AFT 6

SIGNATURE	DATE
DOWN SYSTEM ART'S	
QA	
CHIEF N.A. PANEL	
CHIEF ENGINEER	10/26
MGR. SYSTEMS INTEGRATION	10/26
MGR. ENGINEERING	10/26
MGR. PROJECT ENGINEERING	
TM +	DATE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEXAS

STRUCTURES AND SYSTEMS LOCATION

19.1

SPACE SHUTTLE ORB VEH

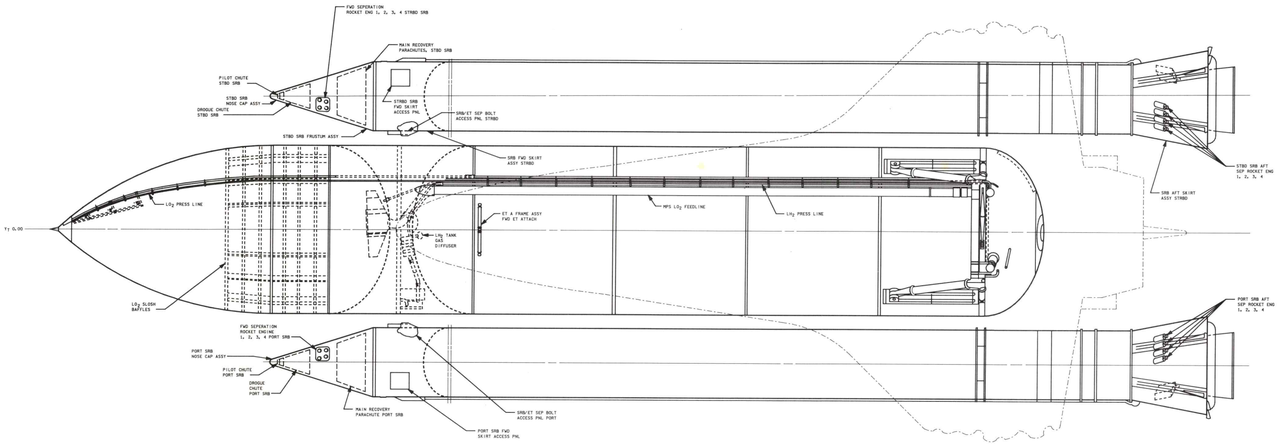
CODE IDENT NO.	SIZE	DRAWING NO.
73142	B	SD72-SH-0001

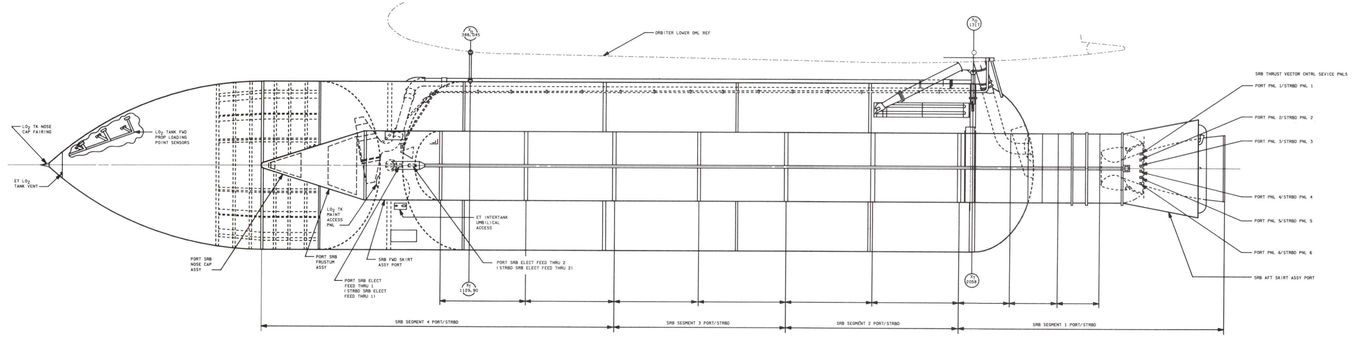
SCALE NONE | SHEET 1 OF 1

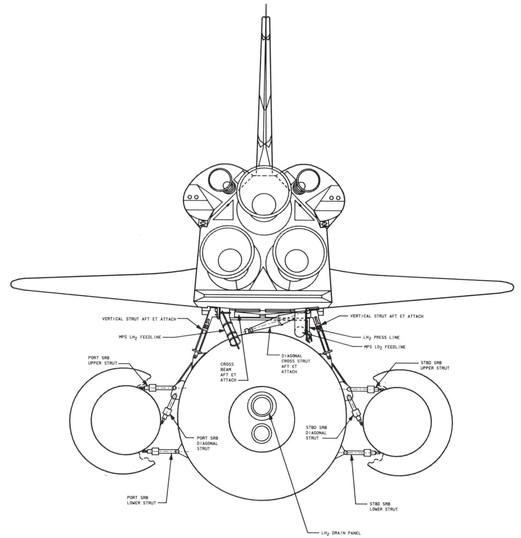
BASIC REV.E

DATE	NAME	VERSION
DATE: 08/17/90	NAME: VSH	VERSION: IWA.2

DATE	NAME	VERSION
DATE: 11/16/87	NAME: BJT	VERSION: IWA.1
DATE: 08/09/90	NAME: JMB	VERSION: BFTA.2
DATE: 08/17/90	NAME: VSH	VERSION: IWA.2







NOTES: 1. THIS DRAWING IS ONLY APPROXIMATE

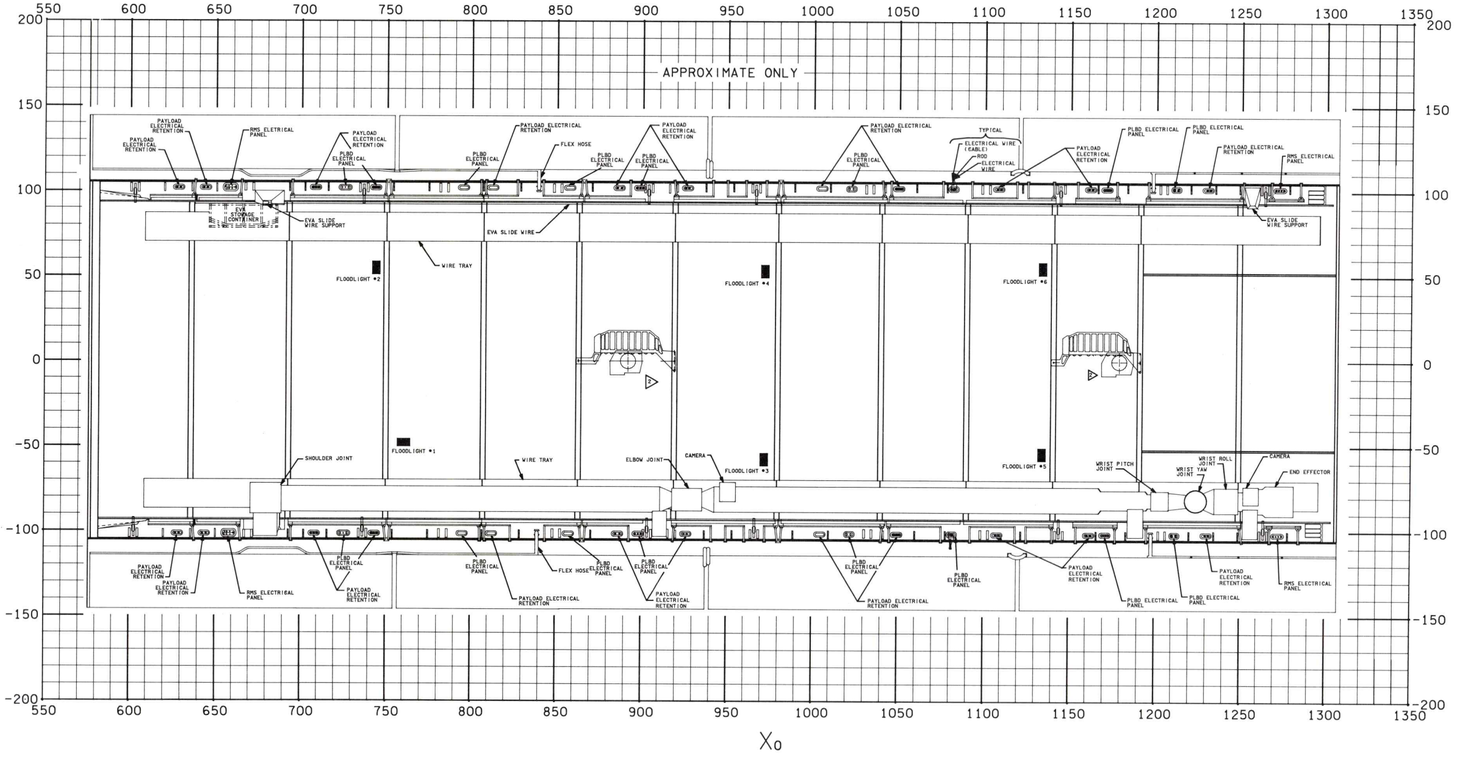
2 SRB/ET

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSN		
DR VICTOR A. HEIDELMEYER	1/9/90	
CHKR N.G. KNIGHT		SRB/ET CONFIGURATION
APP		
APP		
DRW/PLAN. E / D.W.G/SKD	SPACE SHUTTLE	DWG NO 19.2
LTR E	SPEN	ALL SIZE A3 X 34 PAGE SHEET 1 OF 1

BASIC REV E

BASIC REV E

DATE= 09/05/87	NAME= MFB	VERSION= Rev E
DATE= 09/24/87	NAME= MPM	VERSION= Rev B
DATE= 08/22/90	NAME= MDU	VERSION= Rev D



▷ TYPICAL PAYLOAD KEEL FITTING CONFIGURATION. A PAYLOAD KEEL FITTING CAN BE INSERTED BETWEEN SUCCESSIVE FRAMES AS PARTICULAR FLIGHT DICTATES.

NOTES: 1. THIS DRAWING IS ONLY APPROXIMATE

(TOP LOOKING DOWN)

3 PLB OVERVIEW

SIGNATURE		DATE
DSGN	PAUL KETTLER	5/1/81
DR	PAUL KETTLER	5/1/81
ENGR	H.K. POHL	
ENGR	H. Carl Pohl	9/4/90
APP	[illegible]	[illegible]
APP	P. Kettler	9/1/90
CMN/PLAN	J.F. Costello	10-29-90
LTR	E	PEN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

PAYLOAD BAY OVERVIEW (LOOKING INBOARD AND DOWN)

SPACE SHUTTLE | DWG NO 19.3

ALL

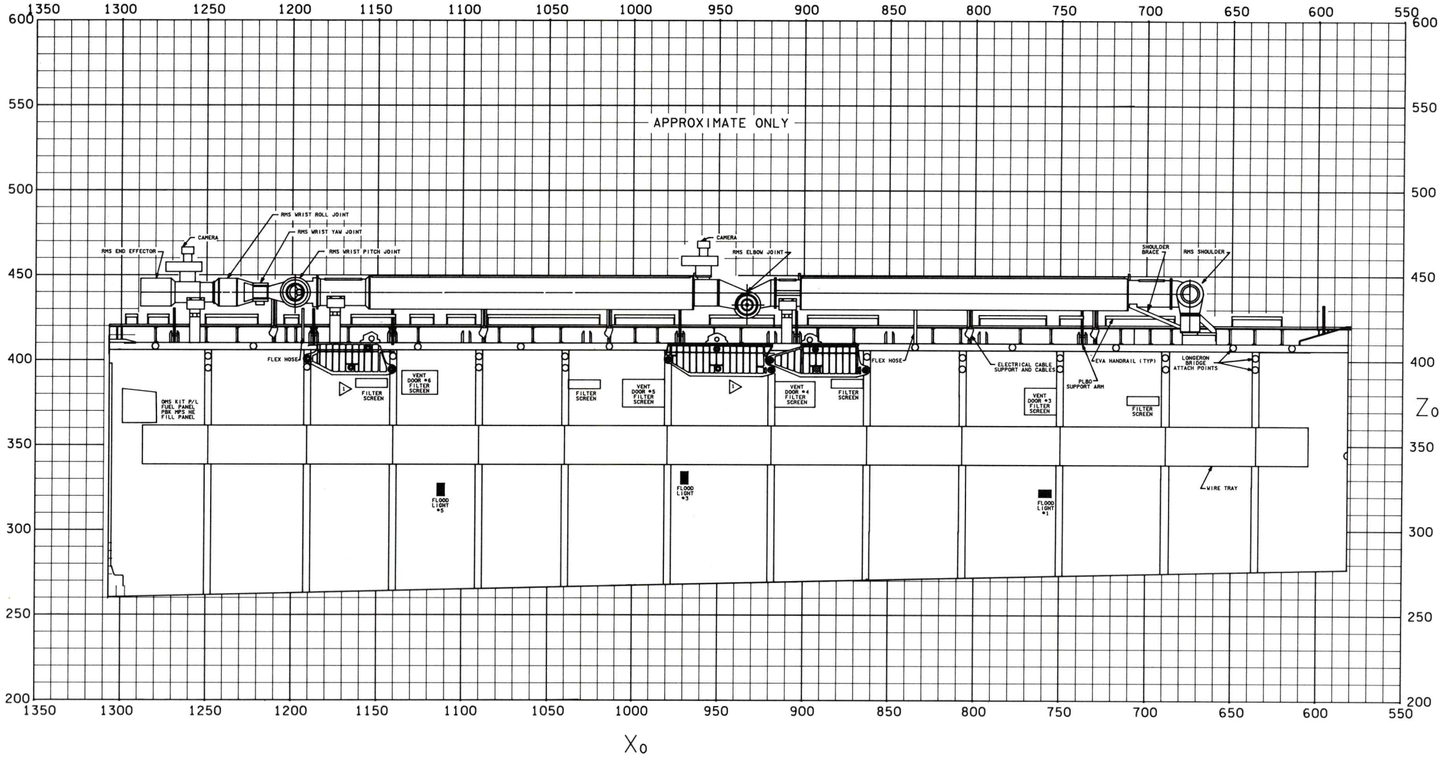
60 X 34 | INCH | SHEET 1 OF 3

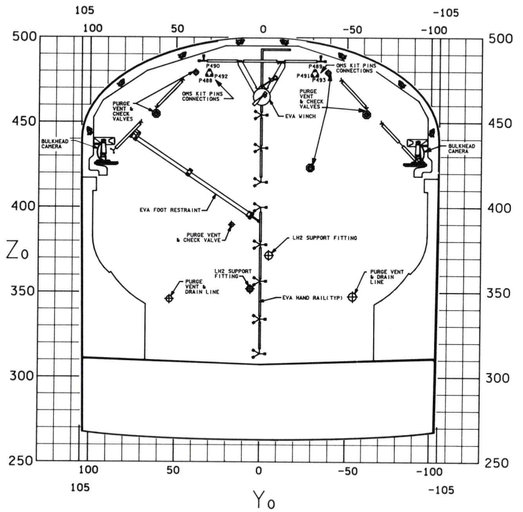
BASIC REV E

BASIC REV E

DATE: 05/04/87	NAME: MDU	VERSION: INK 7
DATE: 05/25/87	NAME: MDU	VERSION: INK 8
DATE: 05/25/87	NAME: MDU	VERSION: INK 9

P/L BAY PORT SIDE
(LOOKING OUTBOARD)





LOOKING AFT
AT X_0 1307

NOTES: ▷ TYPICAL PAYLOAD LONGERON BRIDGE CONFIGURATION. PAYLOAD LONGERON BRIDGES CAN BE LOCATED BETWEEN ADJACENT FRAMES

2. THIS DRAWING IS ONLY APPROXIMATE

PORT SIDE

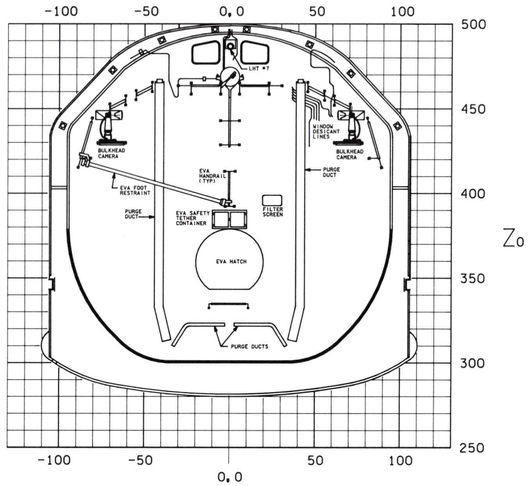
3 P/L BAY 2

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN THOMAS LEWERS	7/13/81	
DR JACK WEBERLIG JR.	7/23/81	PAYLOAD BAY OVERVIEW PORT SIDE
ENGR H. K. PONG		
ENGR [signature]	9/6/82	
APP [signature]	9/7/82	
APP [signature]	9/13/82	SPACE SHUTTLE / DWG NO / 19.3
DRAFTSMAN J. F. GALVEZ	09/23/82	ALL
LTR E / PCN		60 X 34 / PAGE / SHEET 2 OF 3

BASIC REV E

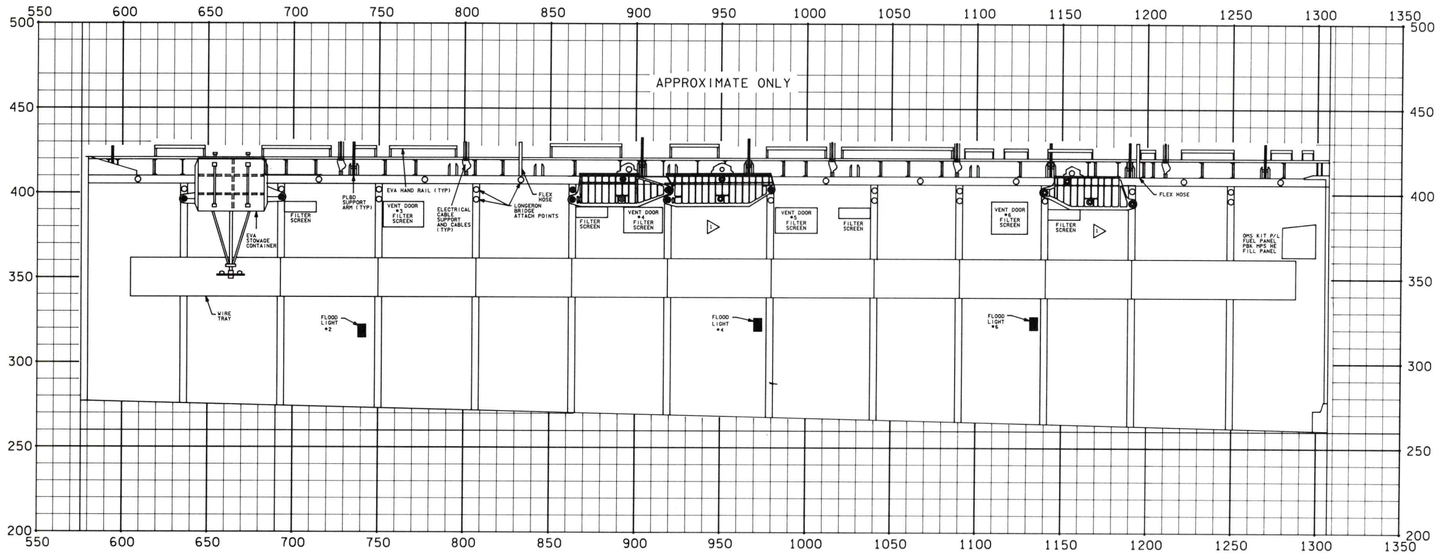
BASIC REV E

DATE: 09/05/87	NAME: MPH	VERSION: INIL 6
DATE: 09/29/87	NAME: MDU	VERSION: INIL 7
DATE: 08/22/90	NAME: MDU	VERSION: INIL 8



582 BULKHEAD
(LOOKING FWD)

P/L BAY STARBOARD SIDE
(LOOKING OUTBOARD)



NOTES:
2. THIS DRAWING IS ONLY APPROXIMATE
▷ TYPICAL PAYLOAD LONGERON BRIDGE CONFIGURATION, PAYLOAD LONGERON BRIDGES CAN BE LOCATED BETWEEN ADJACENT FRAMES

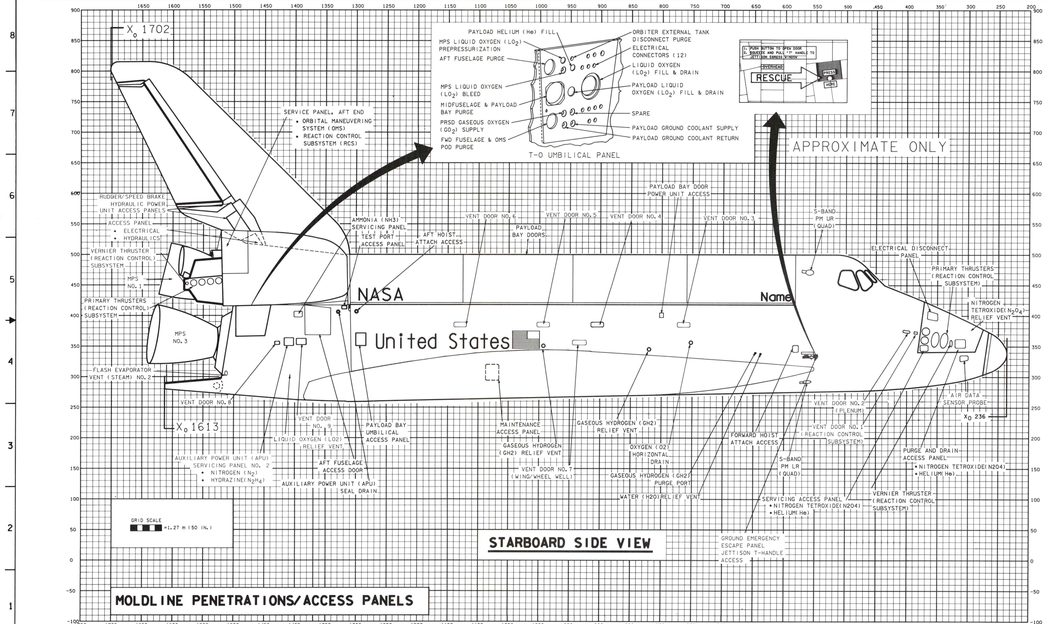
STARBOARD SIDE

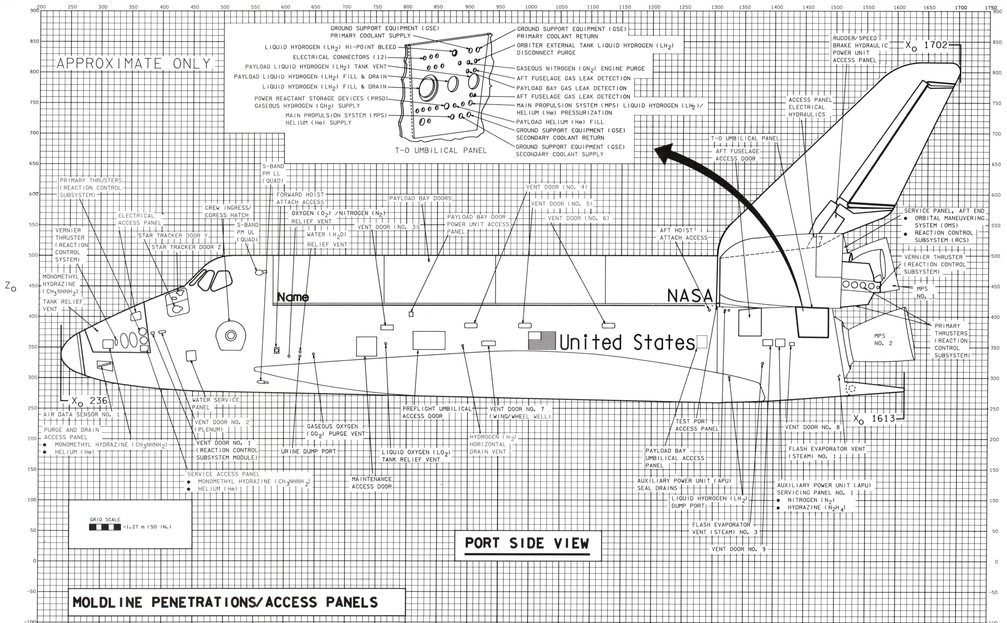
3 PLB OV 3

SIGNATURE	DATE	
DSGN MIKE BECKER	7/6/81	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DR		
ENGR H.K. POHL		PAYLOAD BAY OVERVIEW STARBOARD SIDE
ENGR H.K. Pohl	9/4/90	
APP Mgr P.C. Lee	9 Aug 90	
APP K.T. Neal	9/7/90	SPACE SHUTTLE / DWG NO 19.3
DPM PLAN 2 V. FLIN/MDU	9-7-90	ALL
LTR E / PCN		66 X 34 / PAGE / SHEET 3 OF 3

BASIC REV E

BASIC REV E



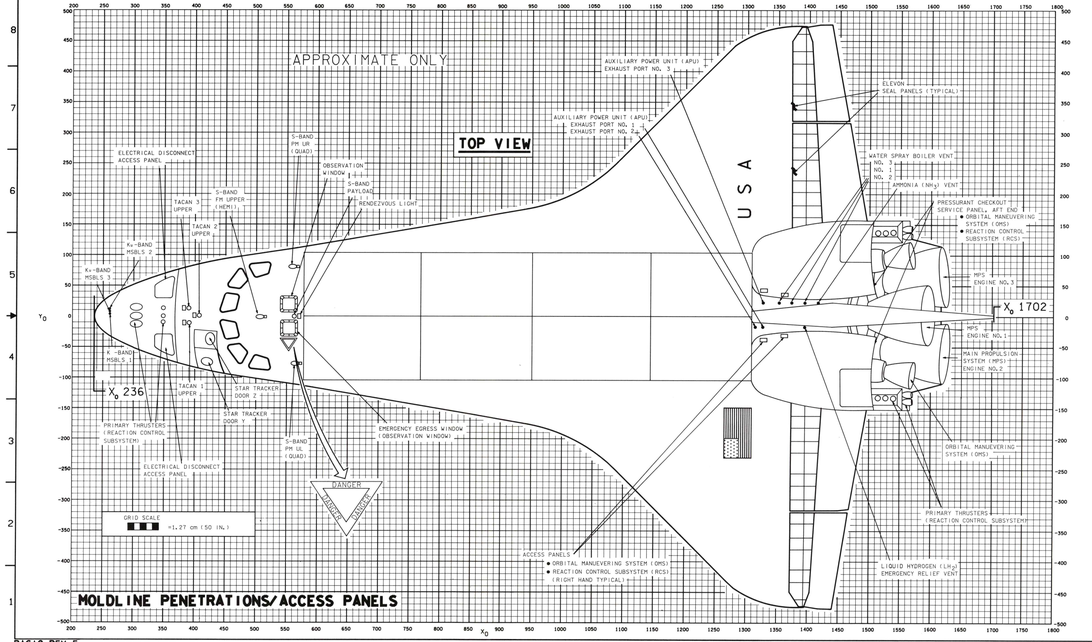


DATE	CHANGE NO.	NAME	ORGANIZATION
DATE 10/19/77	NAME: RGC	ORGANIZATION: EA73	
DATE 10/24/77	NAME: RGC	ORGANIZATION: EA73	
DATE 10/31/77	NAME: JAB	ORGANIZATION: EA73	

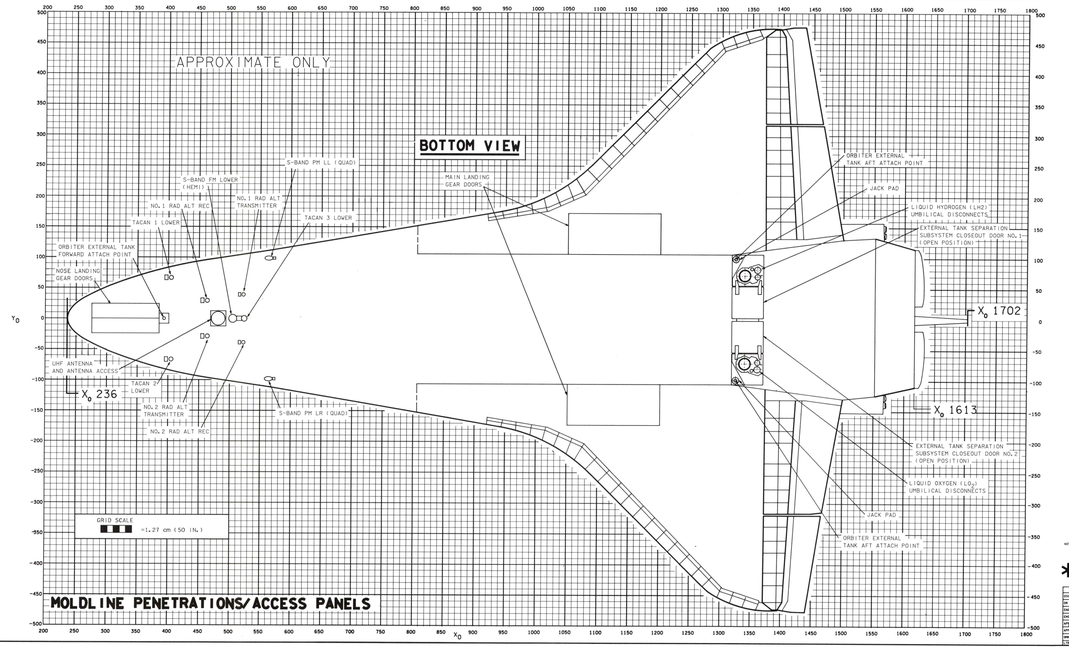
NOTE: THIS DRAWING IS ONLY APPROXIMATE

4 EXT SIDES

SIGNATURE	DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CODE: RICK BROWN	10/19/77	LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEXAS
CM		
CHIEF, S. SYS. PROG.		EXTERNAL SIDE VIEWS
CHIEF, S. SYS. PROG.		
CHIEF, S. SYS. PROG.		
CHIEF, S. SYS. PROG.	



BASIC REV E



BASIC REV E

DATE	NAME	CODE/DWG. REF'S
DATE: 09/30/87	NAME: TOM	CODE/DWG. REF'S:
DATE: 10/30/87	NAME: KEN	CODE/DWG. REF'S:
DATE: 08/15/88	NAME: JIM	CODE/DWG. REF'S:

NOTES: 1. THIS DRAWING IS ONLY APPROXIMATE

*4 TOP/BOTTOM

SIGNATURE	DATE
DAVE TOM LOWERS	09/30/87
JIM	
DAVE G. FOR KEN	
PROJ. ENGR.	DATE
PROJ. ENGR.	DATE
PROJ. ENGR.	DATE
SUPT. OF PROJ. ENGR.	DATE
SUPT. OF PROJ. ENGR.	DATE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

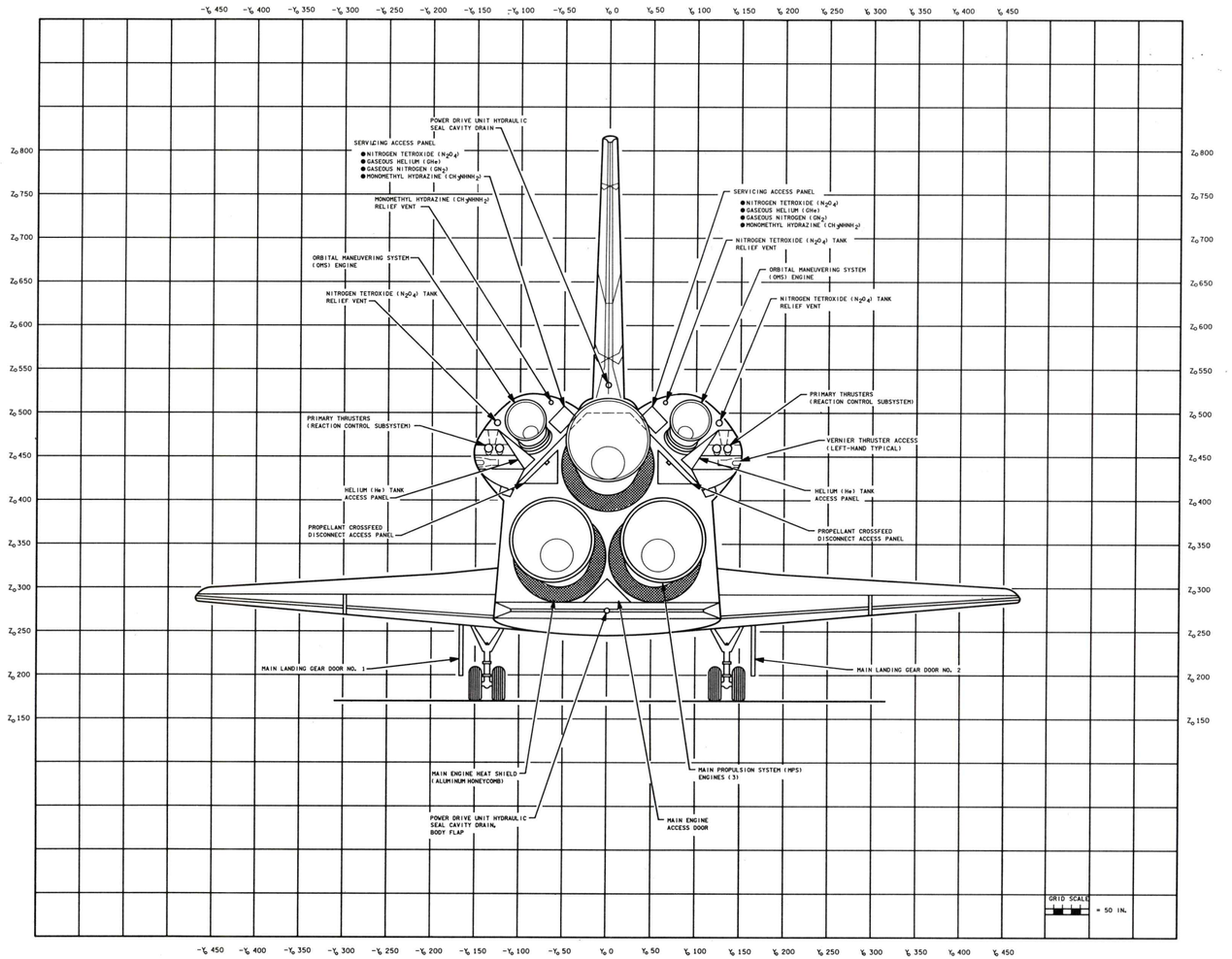
EXTERNAL VIEWS
TOP/BOTTOM

SPACE SHUTTLE		DWG NO.	19.4
SCALE		SHEET	
DATE	09/30/87		

BASIC REV E

DATE> 05/25/87	NAME> MDU	VERSION> INR> 2
DATE> 08/16/90	NAME> JMD	VERSION> INR> 3
DATE> 10/26/90	NAME> BJT	VERSION> INR> 4

APPROXIMATE ONLY



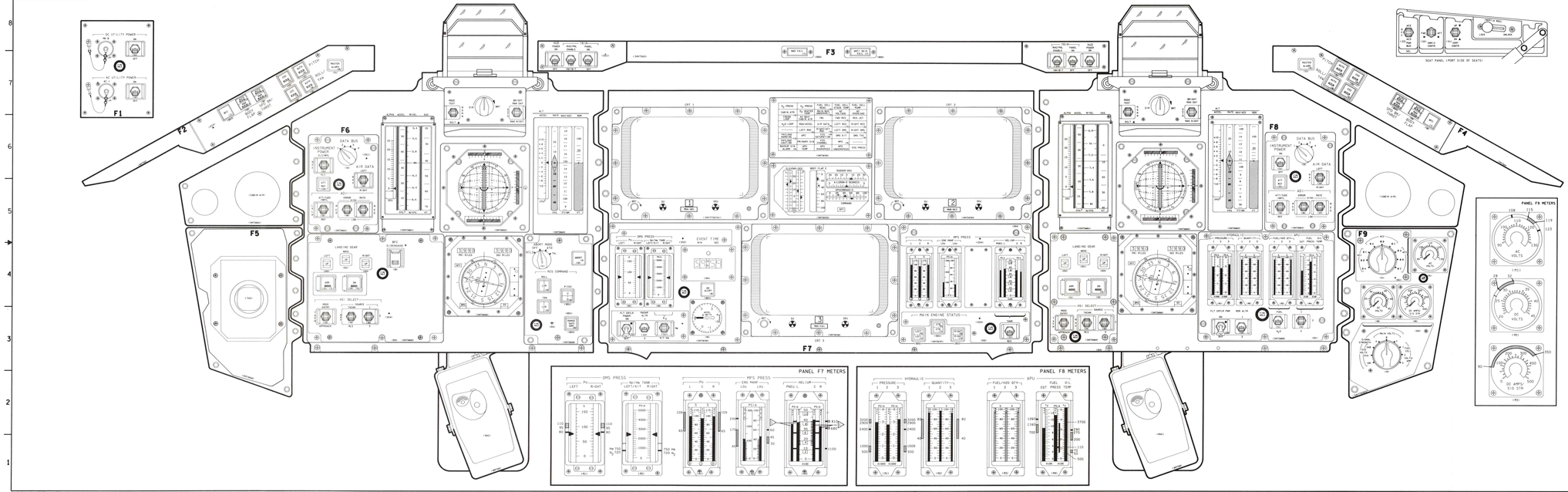
AFT FUSELAGE (LOOKING FWD)

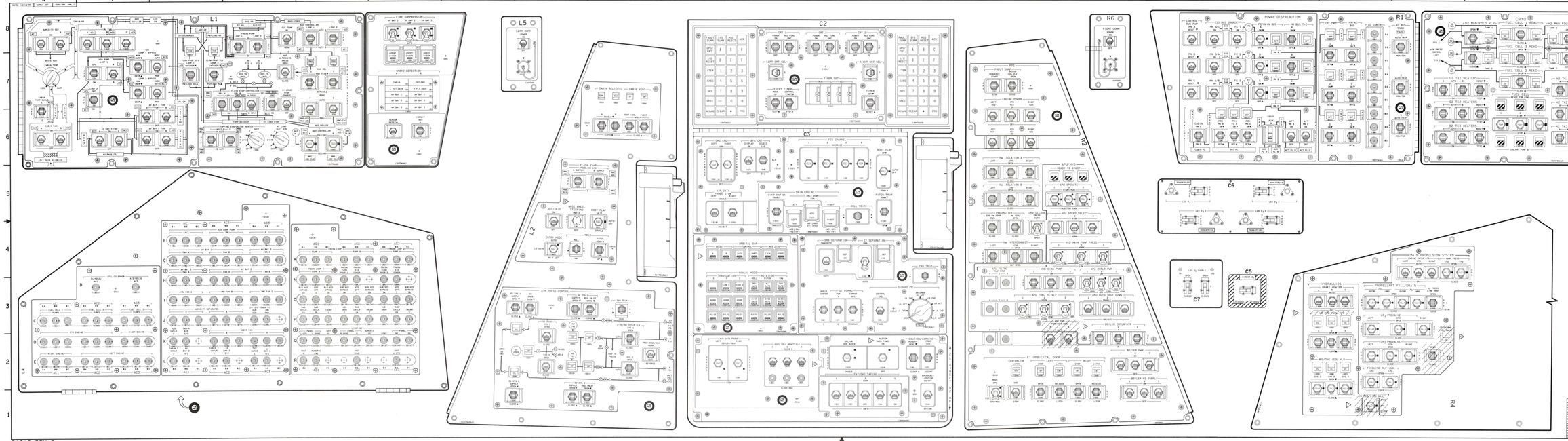
NOTE: THIS DRAWING IS ONLY APPROXIMATE

SIGNATURE		DATE	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
DSGN	Bonita Tinsley	10/31/84	
DR	Bonita Tinsley	10/31/84	
ENGR	N. KARL POHL		EXTERNAL PENETRATIONS/TILE (AFT)
ENGR	[signature]	9-6-90	
APP	[signature]	9-6-90	
APP	[signature]	9/6/90	SPACE SHUTTLE / DWG NO 19.4
ORIG PLAN	S.E. Bishop	10-26-90	ALL
LTR E	PCN	66 X 34	PARE / SHEET 3 OF 3

BASIC REV E

BASIC REV E


F1
F2
F3
F4
F5
F6
F7
F8
F9
SEATS
PANEL F7 METERS
PANEL F8 METERS
PANEL F9 METERS
FLIGHT STATION
AFT STATION
ORBITER PANEL CONFIGURATION
1 D&C FWD 1
DISPLAYS AND CONTROLS
FORWARD STATIONS
20.1
BASIC REV E



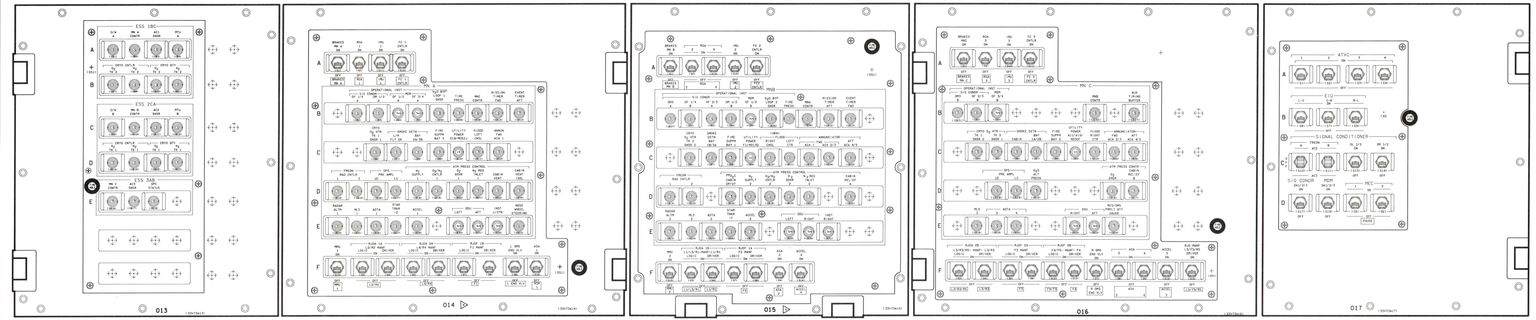
C2
C3
C5
C6
C7
L1
L2
L4
L5
R1A1
R1A2
R2
R4
R6

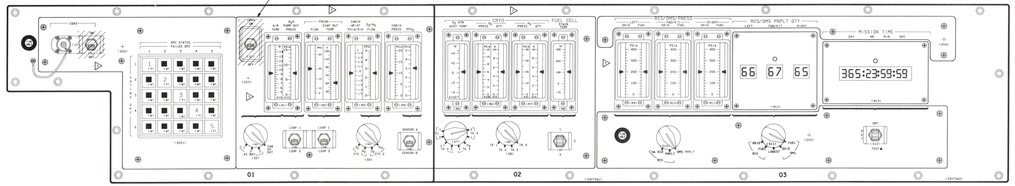
1 D&C FWD 2

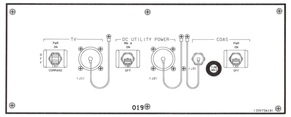
DISPLAYS AND CONTROLS FORWARD STATIONS

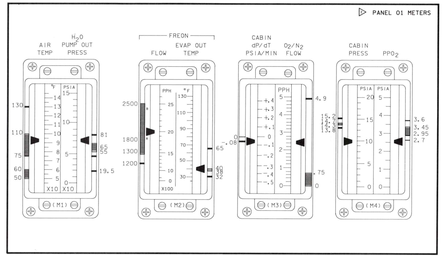
20.1

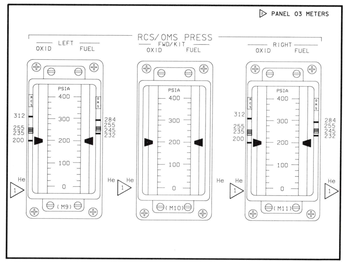
BASIC REV E

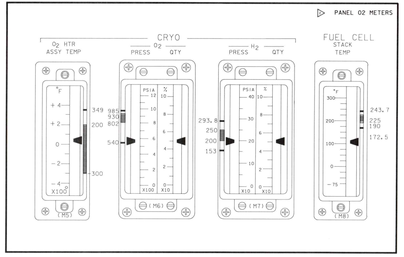












A. REFER TO TABLE 20-1, VENDOR DRAWING REFERENCES

01 MOUNTED FOR DIODE
02 DIODE PANEL (DIFFERENT SHAPE)
03 EXPANDED VIEW ON RIGHT OF SHEET
04 X = GREEN
Y = YELLOW
R = RED
05 NOTES: 1. ON 19 SELECTED AS NO DIODE

1 D&C FWD 3

DISPLAYS AND CONTROLS FORWARD STATIONS

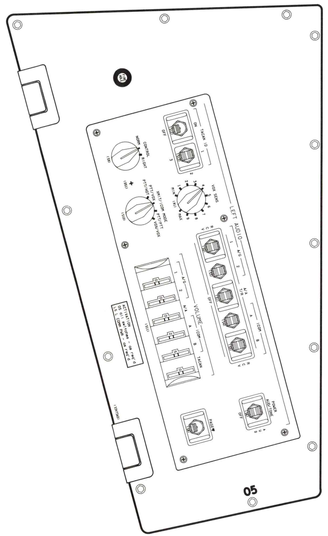
SIGNATURE	DATE
DSGN: L.A. BUZHARDT	12/16/82
DR: L.A. BUZHARDT	12/16/82
CHAP: R.D. HUGHES	12/16/82
CHIEF, Mech Design Integ Br: [illegible]	12/16/82
APP: [illegible]	12/16/82

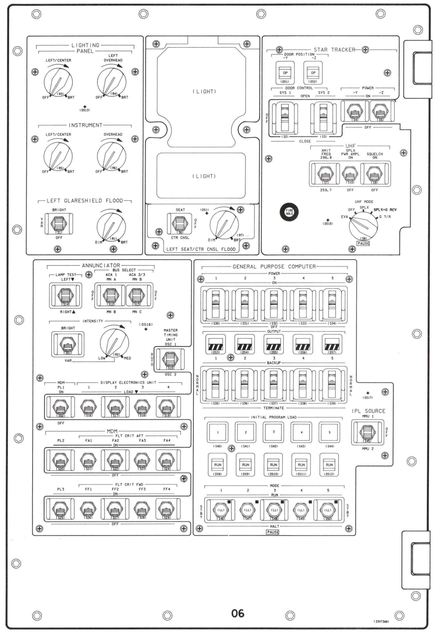
APP			
CHK/PLAN			
ILLUS			

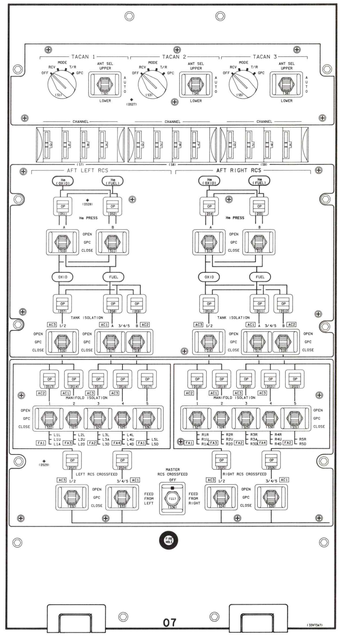
SPACE SHUTTLE	DWG NO.
	20-1
SCALE: NONE	SHEET 1 OF 1

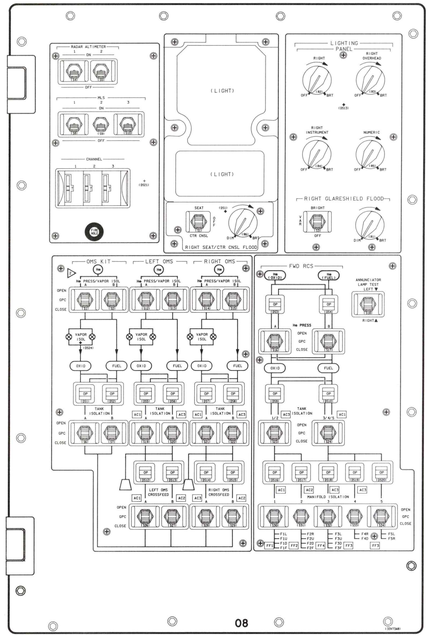
BASIC REV E

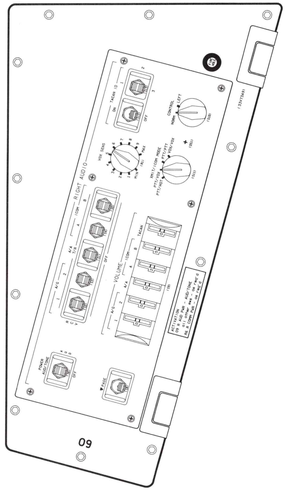
BASIC REV E











05
06
07
08
09

▷ OMS KIT VALVES NOT INSTALLED BUT SWITCHES LEFT IN

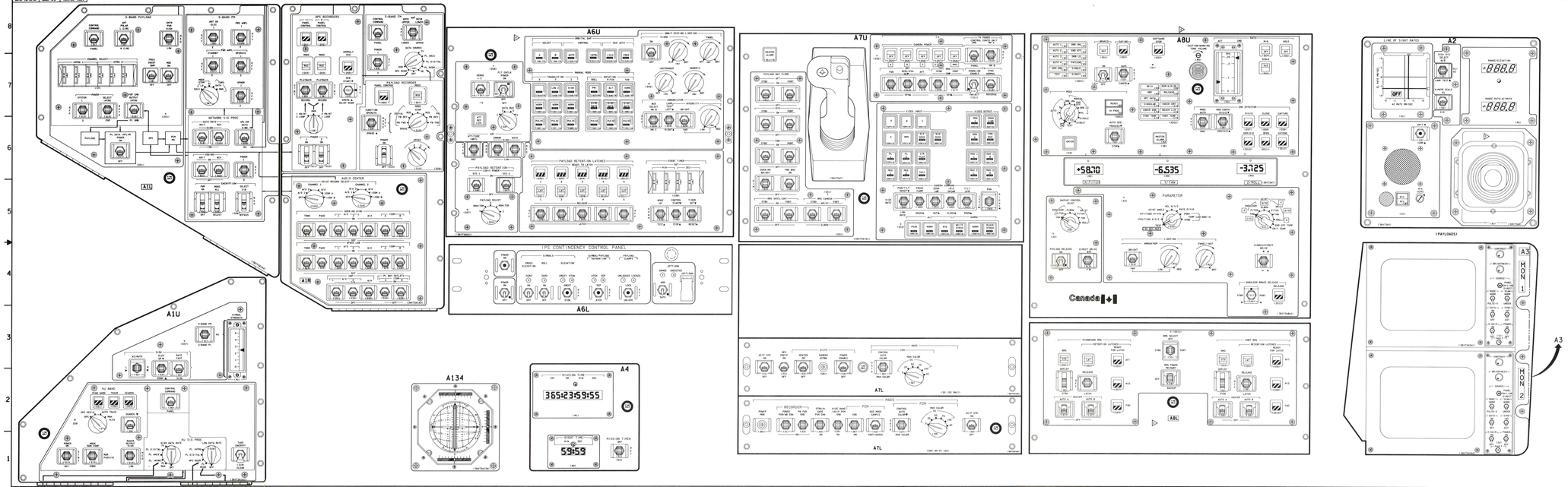
NOTES: 1. REFER TO TABLE 20-1 FOR VENDOR DRAWING REFERENCES

1 D&C FWD 4

SIGNATURE	DATE	NORTH AMERICAN AVIATION, INC. SPACE & INFORMATION SYSTEMS DIVISION DOWNEY, CALIFORNIA
DESIGN		
DR CONNIE M.LEY	7-19-82	DISPLAYS AND CONTROLS FORWARD STATIONS
CHKR M.D. FULTZ		
CHKR [illegible]	11/9/82	
APPROVED [illegible]	11/9/82	
APP		SPACE SHUTTLE DWG NO 20-1
SPEC/PLAN CHK		SCALE SIZE D
CHK	DATE	SHEET 1 OF 1

BASIC REV E

BASIC REV E



A1U (A1A1)
A1L (A1A2)
A1R (A1A3)
A2
A3A1
A3A2
A4
A6U (A6A1)
A6L (A6A2)
A7U (A7A1)
A7L (A7A2)
A8U (A8A1)
A8L (A8A2)
A134

NOTES:
1. REF NOMENCLATURE VAL III-01-00
2. REFER TO TABLE 20-1 FOR VENDOR (three-let) REFERENCES
3. ONLY F1 UNITS USING MPC
4. REFER INC PROCEDURAL NOMENCLATURE BOOK

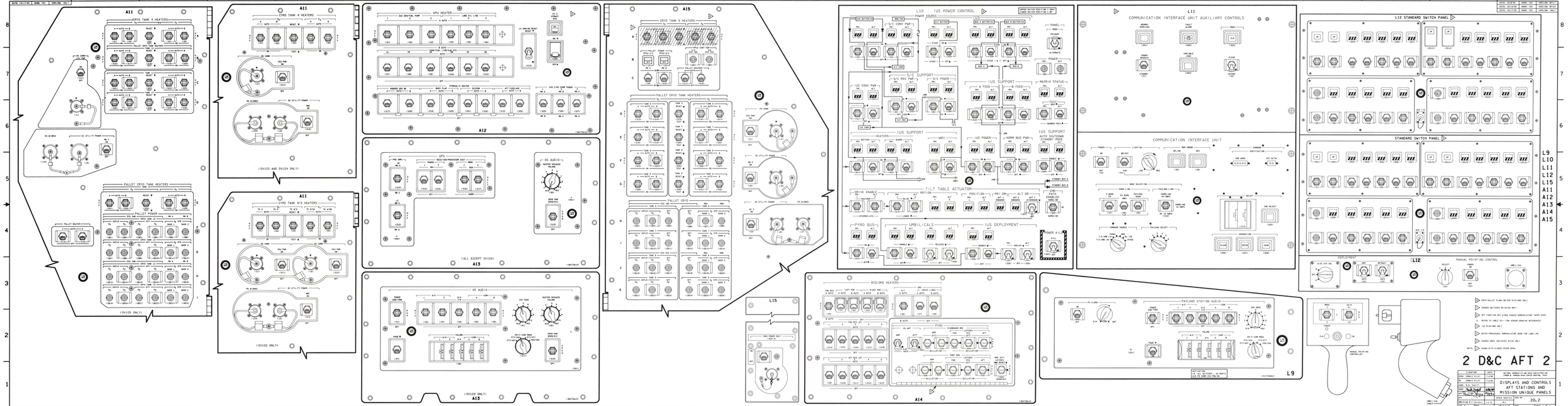
2 D&C AFT 1

SIGNATURE	DATE	NOTICE: UNPUBLISHED WORK AND INFORMATION CONTAIN IN, UNDER SPACE ACT AGREEMENTS WITH NASA. NEITHER THE RECEIPT NOR POSSESSION THEREOF CONVEYS OR TRANSFERS ANY RIGHTS TO USE OR REPRODUCE, OR TO DISCLOSE OR DISTRIBUTE ITS CONTENTS, OR TO MANUFACTURE, USE OR SELL ANYTHING THAT IT MAY DESCRIBE, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF ROCKWELL INTERNATIONAL CORPORATION. VIOLATIONS ARE SUBJECT TO CIVIL AND CRIMINAL PENALTIES.
ORIG: LAYOUTS		
DR: RUSHMAN		
CHKR: M.N. SMITH		
ENGR: M.N. SMITH		
APP:		
PROJ ENGR:		
PROJ:	DATE:	

DISPLAYS AND CONTROLS AFT STATIONS

SPACE SHUTTLE | DWG NO: 2D2 | REV: | SHEET: 1 OF 1

BASIC REV E



CRYO PALLET FUSES ON OV105 ONLY

SHADED SWITCHES ON OV105 ONLY

AFT STATIONS ARE AFT HINGE SHADED NARROW/WIDE TAPED OVER

REFER TO TABLE 20-1 FOR VENDOR DRAWING REFERENCES

IUS POWER ONLY

NOTED PROCEDURAL NARROW/WIDE WORK FOR LABEL MC

SHADED AREA INDICATES OV105 ONLY

NOTES: SHOWN WITH HINGED COVER OPEN

2 D&C AFT 2

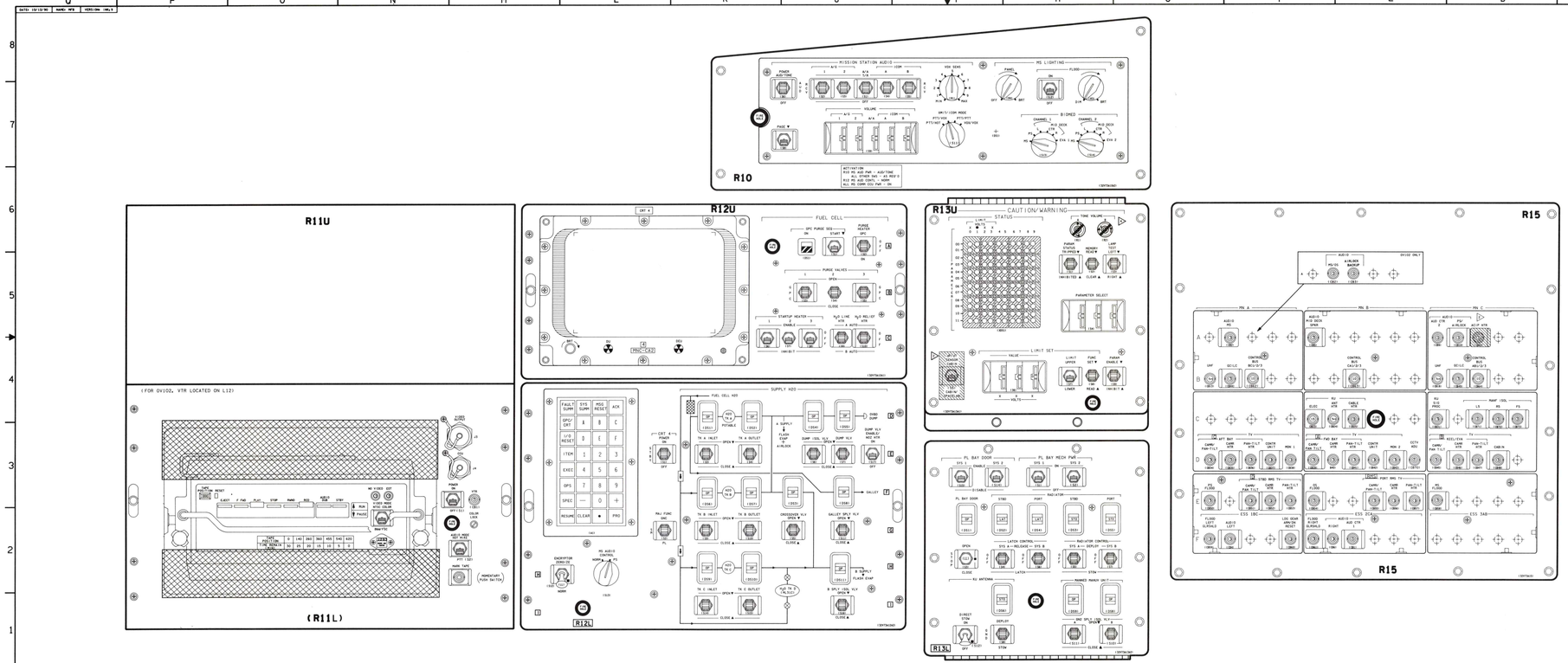
DISPLAYS AND CONTROLS AFT STATIONS AND MISSION UNIQUE PANELS

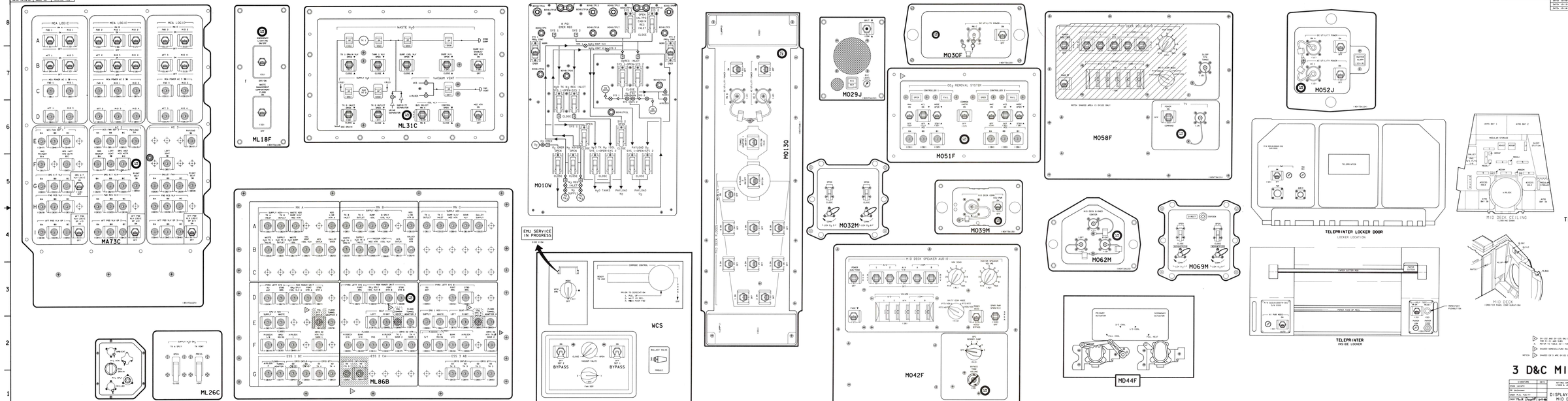
	SIGNATURE	DATE
DSNG	DENNIS R ELLIS	7-12-85
QA	DENNIS R ELLIS	7-12-85
MANF	N/A	
DSNG	Mark Chapel	7/26/85
CHKD		
APVD		

SPACE SHUTTLE	DOC NO
PROGRAM	20.2
	SHEET NO

BASIC REV E

BASIC REV E


R10
R11U
R12U
R13U
R15
R11L
R12L
R13L
(FOR GV102, VTR LOCATED ON L12)
CAUTION/WARNING
MISSION STATION AUDIO
MS LIGHTING
BIOMED
FUEL CELL
SUPPLY H2O
PL BAY DOOR
PL BAY MECH PWR
AUDIO
OV102 ONLY
R7
R10
R11U
R11L
(R12A1) R12U
(R12A2) R12L
(R13A1) R13U
(R13A2) R13L
R15
2 D&C AFT 3
DISPLAYS AND CONTROLS
AFT STATIONS
SPACE SHUTTLE
20.2
BASIC REV E

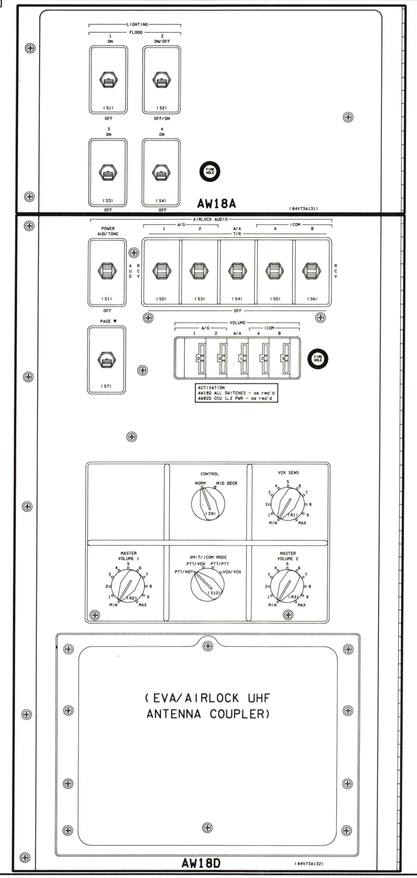


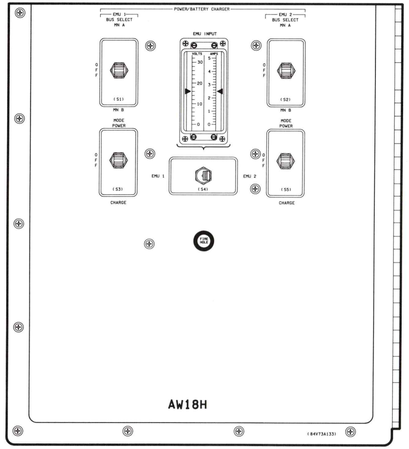
BASIC REV E

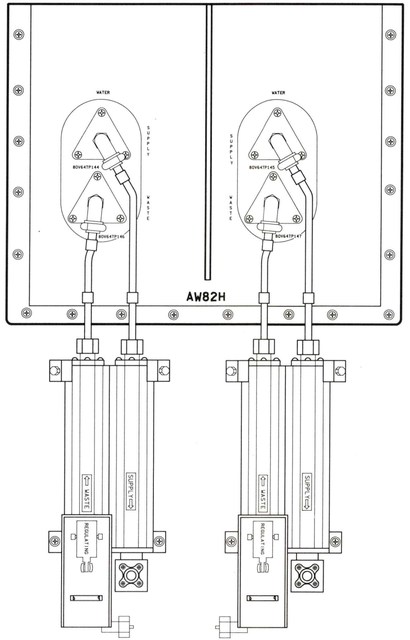
BASIC REV E

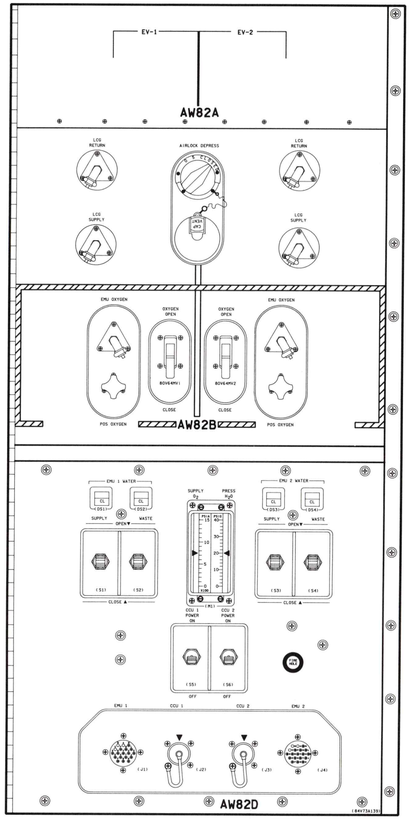
DATE= 10/11/90	NAME= MDU	VERSION= VOL.7

DATE= 11/16/88	NAME= BCH	VERSION= BFTL2
DATE= 10/22/90	NAME= MFD	VERSION= VOL.5
DATE= 10/11/90	NAME= MDU	VERSION= VOL.7









AW18A
AW18D
AW18H
AW82B
AW82D
AW82H

NOTE# 1, REFER TO TABLE 20-II FOR VENDOR DRAWING REFERENCES

4 D&C AIRLOCK

SIGNATURE		DATE	
DSGN	LINDA DUMAS	7/3/73	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS
CH			
ENGR	N.D. FUELITT		DISPLAYS AND CONTROLS AIRLOCK
CHKR			
APP			
APP			
DRFT/DSN			
CB 4	DSN	SPACE SHUTTLE	DWG NO 20.4
		ALL	
		83.5 X 34	SHEET 2 OF 3

BASIC REV E

BASIC REV E

FOR DETAILED COMPONENT AND LOGIC INFORMATION REFER TO:

SSSH DWG NO.	SSSH DWG TITLE	VENDOR NAME	VENDOR DWG NO.	VENDOR SHEET NO.	REV	DATE	VENDOR DRAWING TITLE
20.1 (SHEETS 1-4)	D&C FWD STATIONS	ROCKWELL	VS70-973099	1-13	A/B03	4/25/90	ORB D&C PANEL CONFIG.
20.2 (SHEETS 1-3)	D&C AFT STATIONS	ROCKWELL	VS70-973102	1-13	F/G04	10/1/90	ORB D&C PANEL CONFIG.
20.3	D&C MIDDECK STATIONS						
20.4	D&C AIRLOCK						

DWG	SIGNATURE		DATE
20.1,2,3,4	ENGR M. FUGITT		
	ENGR Mark Fugitt		11-5-90
	ENGR		
	ENGR		
	APP Paul M Joyce		11-5-90
	APP		
	OMNIPLAN		
	LTR E	PCN	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

VENDOR DRAWING REFERENCES

SPACE SHUTTLE	TBL NO 20-I
ALL	
	PAGE 20.1-1 SHEET 1 OF 1

BASIC REV E

Space Shuttle Systems Handbook

Vol. III

Sections 16 through 20

Rev E
December 21, 1990

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MOD
JSC
NASA

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