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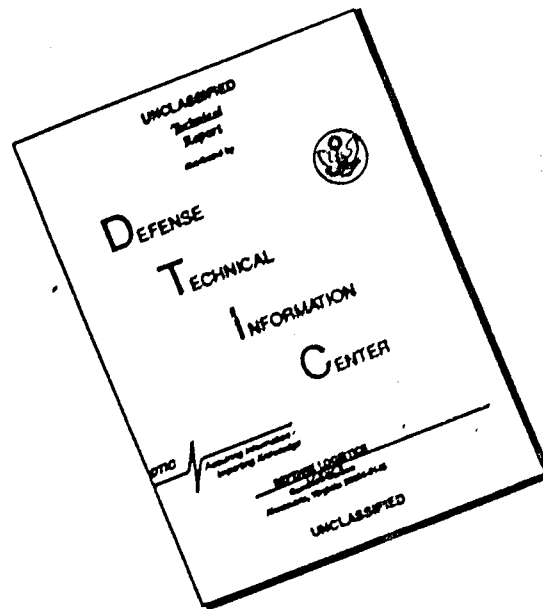
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REPORT NO. ZL 7-028B

DATE 9-8-58

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CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

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FACILITY DESIGN CRITERIA

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SQUADRON MAINTENANCE AREA
FRANCIS E. WARREN AIR FORCE BASE
CHEYENNE, WYOMING

REPORT NO. ZL 7-028

REVISION B

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INTRODUCTION

The technical criteria in this document represent those standards of WS 107A-1 for which the operational support facilities are to be designed. This report is submitted in response to Technical Directive No. 58-0112, "Participation in Design of WS 107A-1 Facilities".

The facility criteria, as set forth in this report, is intended to provide sufficient detail for design of the Squadron Maintenance Area at Warren AFB, Wyoming. Information contained herein is based on requirements for support of three squadrons, two for Series "D" missiles and the third for Series "E". This information includes inputs from North American Aviation/Rocketdyne, Sundstrand Turbo, General Electric at Syracuse, Burroughs and American Bosch Arma Corp. A. D. Little and General Electric at Philadelphia have no definite area or GSE requirements within the scope of this document. Consequently there are no inputs from those associate contractors.

The GSE listed is not a complete Figure "A" listing. Only items requiring special SMA space or facilities are indicated.

Revision "B" incorporates the changes recommended by all associate contractors for their respective areas, in addition to AFBMD/STL configuration changes insofar as they are known.

Specific authorization for this document has been submitted by TWX (A-1 Program Director's Office, Ramo-Wooldridge Corp. to Convair-Astronautics - Ref. INGL 7380, dated 10-28-58).

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REPORT ZL 7-028B

PAGE iii

TABLE OF CONTENTS

	<u>PAGE</u>
Title and Signature	i
Introduction	ii
1. DESIGN OBJECTIVES	1
1.1 Concept	1
1.2 Support Requirements	1
1.3 Maintenance Requirements	2
1.4 References	3
2. SITING	5
3. CIVIL REQUIREMENTS	5
3.1 Access Roads and Parking Areas	5
3.2 Security Fence	5
4. ARCHITECTURAL REQUIREMENTS	7
4.1 Squadron Maintenance Building	7
4.2 Space Requirements	36
4.3 Detail Requirements	36
5. STRUCTURAL REQUIREMENTS	42
5.1 General	42
6. ELECTRICAL REQUIREMENTS	43
6.1 General	43
6.2 Grounding Requirements	45-1
7. MECHANICAL REQUIREMENTS	46
7.1 Air Conditioning and Ventilating	46

	<u>PAGE</u>
7.2 Compressed Air	47
7.3 Ducting and Exhaust	47
7.4 Stubups	48
7.5 Steam	50-1
7.6 Water	50-1
7.7 Plumbing and Heating Requirements	50-2
8. SPECIAL FACILITY REQUIREMENTS	51
8.1 Overhead Cranes	51
8.2 Noise Suppression	52
8.3 Liquid Disposal	52
8.4 Communications	53
9. EQUIPMENT DESCRIPTION	58
9.1 Missile Assembly Area	58
9.2 Engine Maintenance Area	67
9.3 Accessory Power Supply Area	69
9.4 Cleaning Area	69
9.5 Hydraulic-Pneumatic Area	70
9.6 Electronic Component Test Area	70
9.7 Airborne Guidance Test Area	72
9.8 Ground Guidance Maintenance Area	72
9.9 IGS Maintenance Area	72-1
9.10 Power Room	72-1

LIST OF ILLUSTRATIONS

<u>FIGURE</u>		<u>PAGE</u>
1	Site - Squadron Maintenance Area	6
2	Plan - Squadron Maintenance Building	8
3	Equipment Layout - Missile Assembly Area (Deleted)	9
4	Checkout Equipment Platform	10
4A	Series "E" Checkout Equipment Platform	10-1
5	Equipment Layout - Engine Maintenance Area (Deleted)	11
6	Equipment Layout - APS Area (Deleted)	13
7	Equipment Layout - Cleaning Area (Deleted)	14
8	Missile Component Ready Supply Area (Deleted)	16
8A	GSE Supply Area (Deleted)	17
9	Equipment Layout-Hydraulic-Pneumatic Area (Deleted)	18
10	Equipment Layout - Electronic (Deleted)	19
	Component Test Area	
11	Instrument Repair Area (Deleted)	20
12	Equipment Layout - Airborne (Deleted)	21
	Guidance Test Area	
13	Ground Guidance Maintenance Area (Deleted)	23
14	Ground Guidance Storage Area (Deleted)	24
15	Equipment Layout - Electrical Shop (Deleted)	25
16	Equipment Layout - Welding, Paint, and Battery Rooms (Deleted)	26
17	Equipment Layout - GSE Maintenance Area (Deleted)	28
18	Power Room (Deleted)	29

<u>FIGURE</u>		<u>PAGE</u>
19	Boiler and Utilities Room (Deleted)	30
20	Equipment Layout - Wood Shop (Deleted)	31
21	Equipment Layout - Sheet Metal Shop (Deleted)	32
22	Equipment Layout - Machine Shop (Deleted)	33
23	Shop Administration Area (Deleted)	34
24	Tool Crib (Deleted)	35
25	Checkout Equipment Cabinet	37
26	Cabinet Mounting	38
26A	Cabinet Mounting	38A
27	Trenching Requirements - Sectional	40
27A	Location of Collimator Trunnion (Vertical Plane)	41-2
27B	Location of Collimator Trunnion (Lateral Plane)	41-3
27C	Broadband Conducted Interference	44-2
27D	Broadband Radiated Interference	44-3
27E	Grid Matrix Details	45-3
27F	Grounding System Concept	45-4
28	Helium and GN ₂ Storage Area	49
29	Communication System	55
29A	Communication System	56
29B	Communication System	57

1. DESIGN OBJECTIVES

1.1 Concept

The Squadron Maintenance Area shall consist of facilities for the direct support of 3 squadrons at Warren AFB, Wyoming. Activities carried out at the SMA will include:

- 1.1.1 Maintenance and storage of missiles and ground support equipment (GSE).
- 1.1.2 Functional checkout of missiles, GSE, and nosecones.
- 1.1.3 Routine supply functions (including storage).
- 1.1.4 Maintenance management & Squadron administration command.

1.2 Support Requirements

- 1.2.1 The Squadron Maintenance Building shall provide a facility for receipt, assembly, checkout, and maintenance of missiles and GSE.

The Squadron Maintenance Building shall also house the general shops (welding, painting, etc.). Shop storage (cabinets, racks) shall be provided in the building. Ready supply shall provide storage space for a minimum number of common replaceable modules and hardware.

- 1.2.2 Munitions Section of a Strategic Missile Squadron (MSSMS)

The MSSMS shall provide a facility for maintenance and storage of re-entry vehicles (nosecone/warhead). Criteria for this building are a General Electric responsibility and are not included in this report.

- 1.2.3 Storage Building(s)

The Storage Building shall provide a facility for storage and routine supply functions. This building is expected to be a standard Air Force type with no peculiar GSE items. Truck doors shall be manually operated, standard steel, roll up type. A loading

dock of truck bed height shall be provided to facilitate material handling.

Estimated area requirements are 40,000 sq. ft. The Storage Building will be adjacent to the Squadron Maintenance Building. A steel fabricated structure will be satisfactory for this use. Office space of approximately 2,000 sq. ft. shall be provided.

Ceiling height shall be 16 ft. for a double deck type storage bin with an integrated expanded metal floor at the 8 ft. level.

Office ceiling shall be suspended gypsum board on metal runners, with applied acoustic tile. Floor shall be finished with rubber based asphalt tile.

- 1.2.4 Paint and Combustible Storage facilities shall be provided for all flammable mixtures, including the ethylene-oxide tankage assembly.

1.3 Maintenance Requirements

Squadron area maintenance shall include the replacement of malfunctioning modules, components, plug-in units, and assembly and disassembly of components or units. Alignments and calibrations required to support the above will also be accomplished. SMA facilities shall include provisions for the maintenance of missiles and ground support equipment. Maintenance operations to be performed will include inspection, checkout, storage, troubleshooting, isolation of malfunctions to component level, a degree of component repair, and bench maintenance.

1.3.1 Maintenance Plan

A detailed maintenance plan is presented in Convair Report no. ZL 7-002. This report includes a description of individual maintenance tasks, the frequency at which the tasks will be performed, and the area in which bench maintenance will be accomplished.

1.4

References

Principal items of GSE are identified in Figures and in the text by reference to:

Convair-Astronautics Report No. ZM 7-357 Operational Ground Support Equipment (SM-65). (Figure "A" List)

North American-Rocketdyne Division Report No. R-525 Ground Support Equipment for WS 107A-1. (Figure "A" List)

Sundstrand-Turbo Division Report No. 1058 Recommended Ground Support Equipment List Model 411 Accessory Power Supply

General Electric-Heavy Military Equipment Department Report No. USR-EL-1 Ground Support Equipment List for USAF Weapons System WS 107A-1

GM-TR-0165-0110 Operational Data Summary (STL)

Abbreviations used in Figures are as follows:

General Electric Syracuse	- GEAG or GE
Rocketdyne	- NAA/R or R
Sundstrand Turbo Division	- S/TD or S
Convair-Astronautics	- CV-A or C

Items not yet in the Figure "A" List are identified by "X" or "NP".

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REPORT ZL 7-028B

PAGE 4

D E L E T E D

2. SITING

The Squadron Maintenance Area shall be located within the boundaries of Warren AFB. All associated buildings (storage, administration, etc.) shall be located within close proximity to the Squadron Maintenance Building (see figure 1). Siting of these buildings shall be such as to minimize conflict with existing underground service lines.

3. CIVIL REQUIREMENTS

3.1 Access Roads and Parking Areas

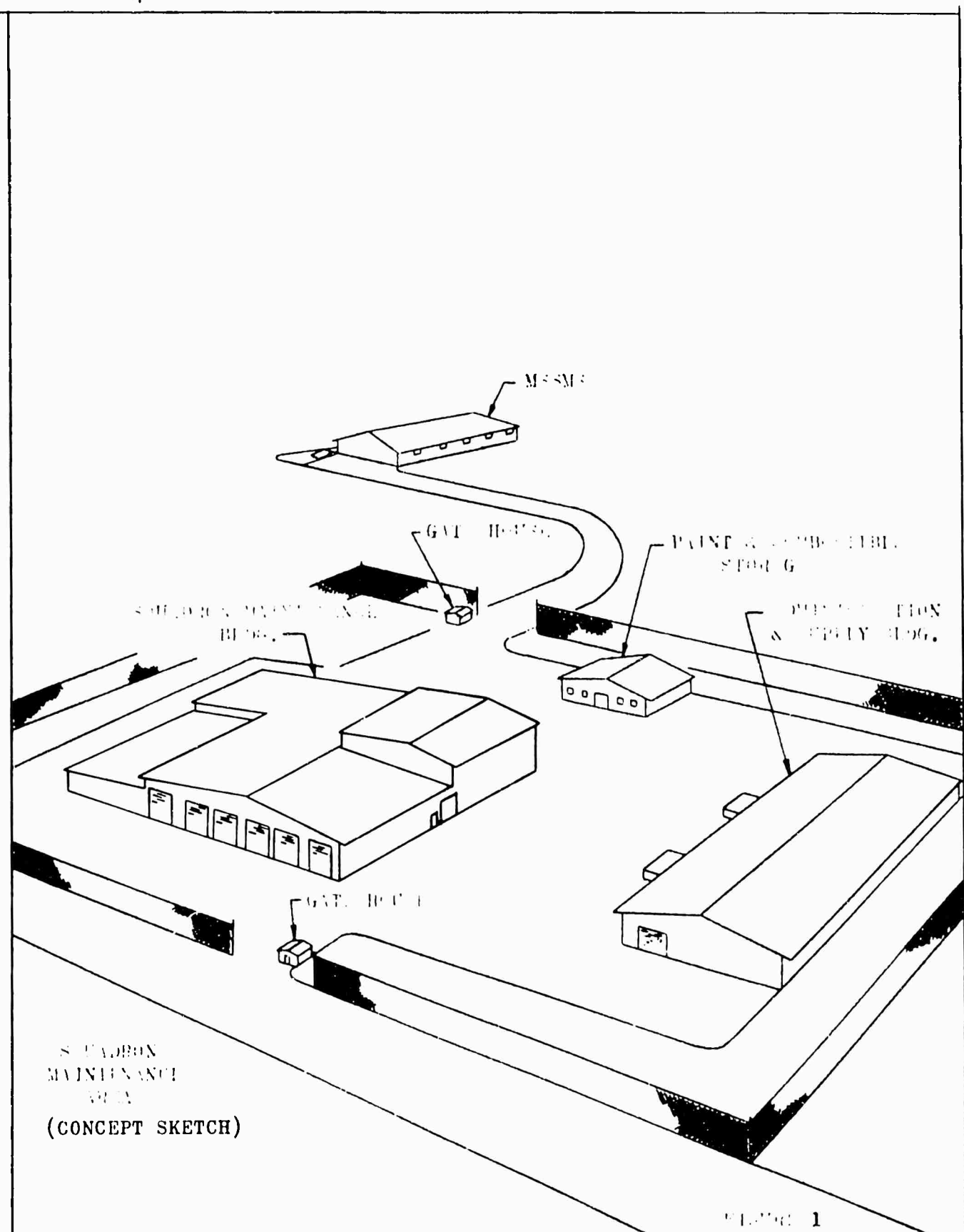
3.1.1 Bituminous paving shall be provided around Squadron Maintenance Building.

3.1.2 Parking space for 50 automobiles, area for maintenance work, and loading and unloading of trucks shall be provided.

3.1.3 An outside storage area of approx. 7000 sq. ft. will be provided close to the GSE Maintenance Area for long duration storage of miscellaneous heavy material and equipment. The paving shall support 250 psf.

3.2 Security Fence

The entire area shall be enclosed by chain link fence providing required security measures. Necessary gates shall be provided.



4. ARCHITECTURAL REQUIREMENTS

4.1 Squadron Maintenance Building

The Squadron Maintenance Building shall contain six missile bays which will be used for checkout and maintenance operations. Sufficient building capacity is required to include, in addition to the missile and component checkout areas, all shops and facilities necessary to provide the operational backup support functions for three missile squadrons (see figure 2).

The following areas shall be incorporated in Squadron Maintenance Building design:

4.1.1 Missile Assembly Area

Space shall be provided within the six missile bays which comprise the Missile Assembly Area to accommodate three checkout equipment platforms. Each platform will contain the electronic equipment required for systems checkout of one missile, and the necessary switching and cabling to enable checkout of a missile on either side of the checkout equipment platform (see figures 4 and 4A).

Additional mobile or portable GSE items are located in the Missile Assembly Area, as shown in figures 2 and 3.

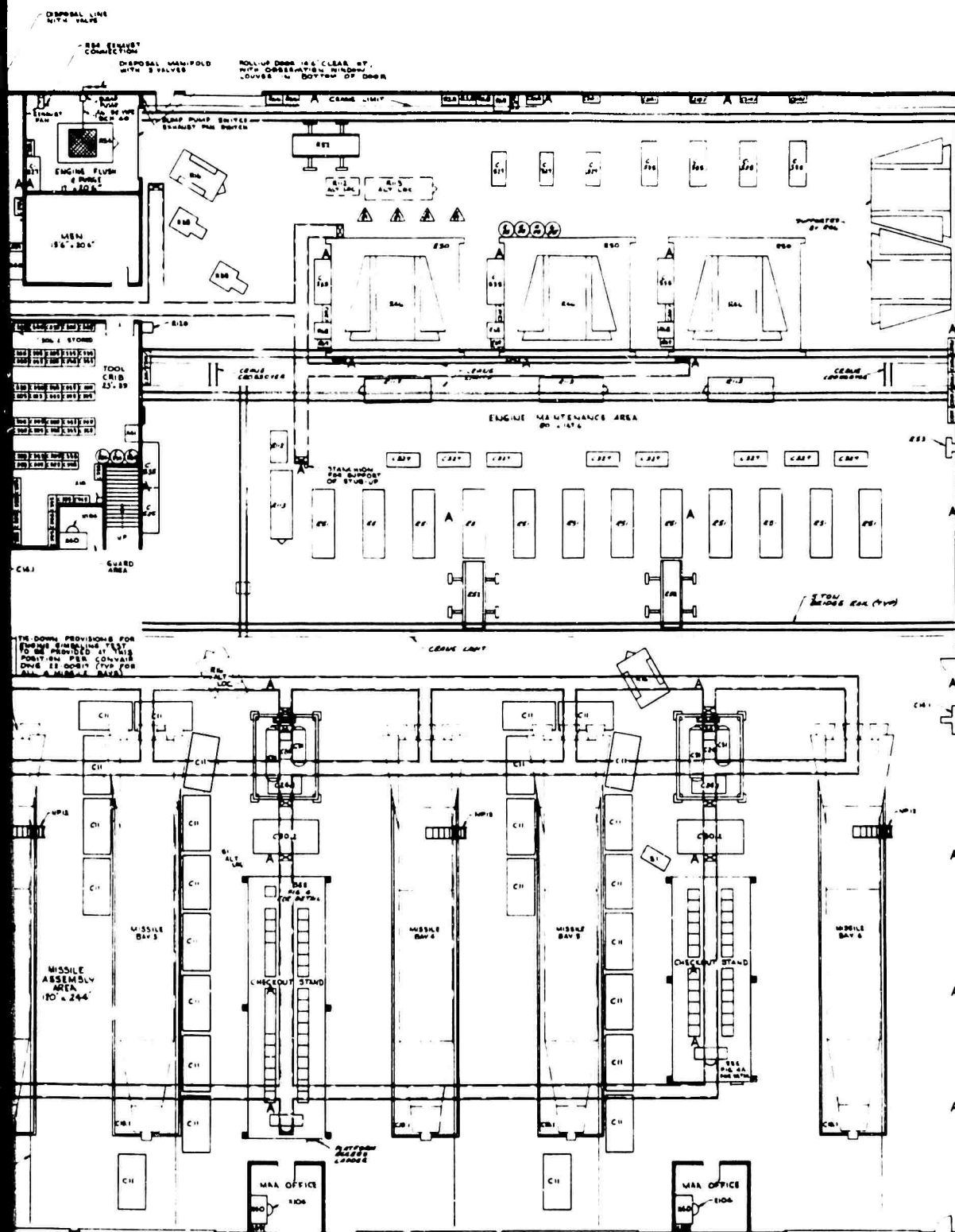
4.1.2 Engine Maintenance Area

Booster, sustainer, and vernier engine maintenance will be performed in the Engine Maintenance Area. Spare thrust section assemblies and related components will be stored in this area.

4.1.2.1 An Engine Clean and Purge room, located within the Engine Maintenance Area, will be used for decontamination of all engine subsystems during maintenance operations. The following features shall be included in room design:

- (a) Floor pit 5 ft. x 5 ft. to hold a minimum of 50 gallons liquid. Depth will depend on sump pump pipe accessibility. Pit shall be lined with concrete and covered with a stainless steel grating capable of holding a concentrated load of 1500# with a maximum deflection of 1/2 inch.
- (b) Observation window approximately 4 ft. wide x 1.5 ft. high.





LEGEND:

- FLUSH ELECTRICAL CONDUIT OPENING IN FLOOR
- FLOOR DRAIN
- TRICHLOR DRAIN FITTING
- ROLL-UP DOOR OR SHUTTER
- 4" STUD WALL
- 8" REINFORCED CONCRETE WALL
- HOSE BIB ON WALL
- TRENCH (SEE FIGURE 21 FOR DETAILS)
- A COMPRESSED AIR OUTLETS

REV B
OPERATIONS ENGINEERING SKETCH #3
EQUIPMENT
LAYOUT
SQUADRON MAINTENANCE BLDG
FOR WYOMING AFB, WYOMING

NOTES:
1. DOOR TO BE 14'6\"/>

FIGURE 2

B.

D E L E T E D

FIGURE 3

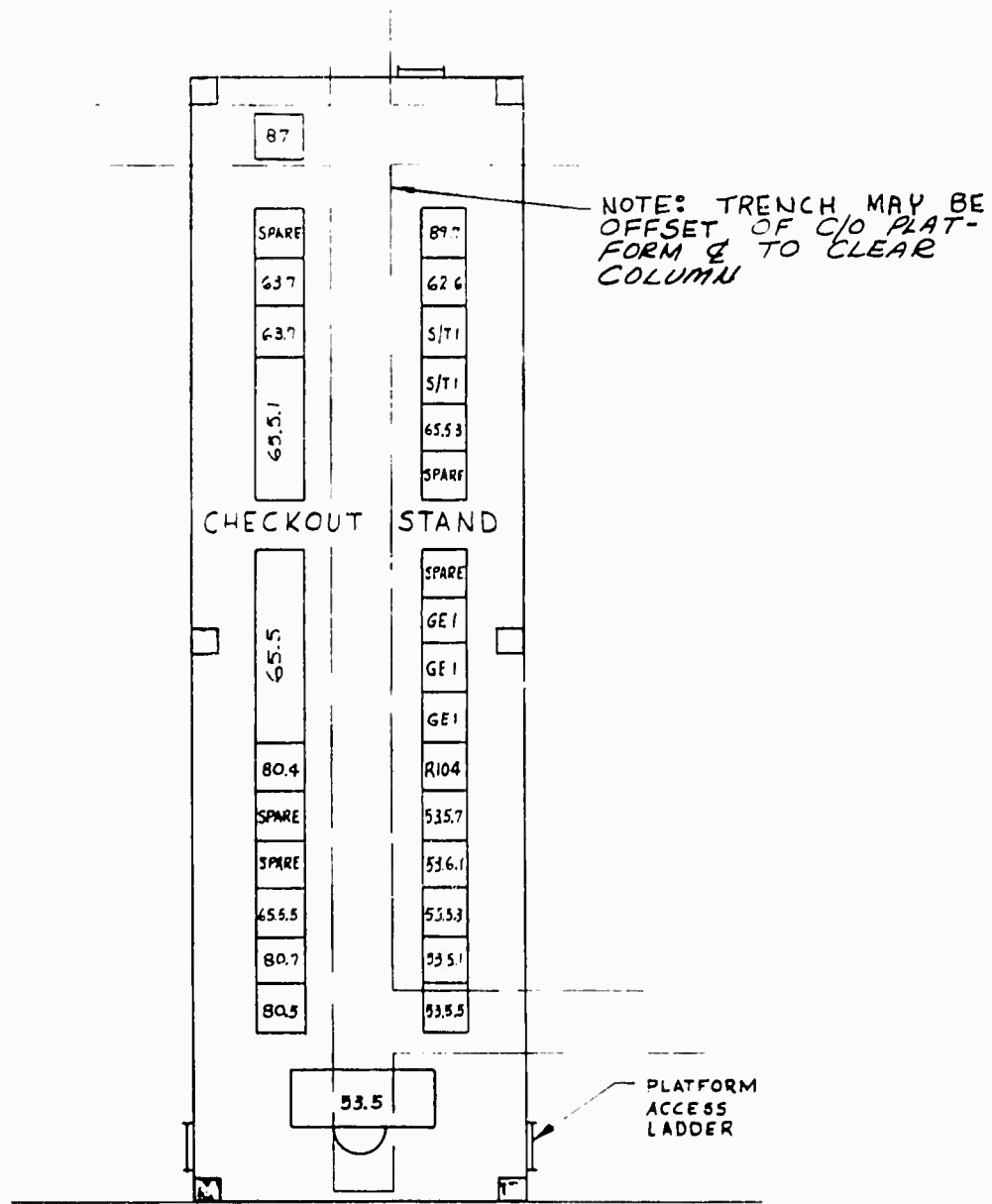
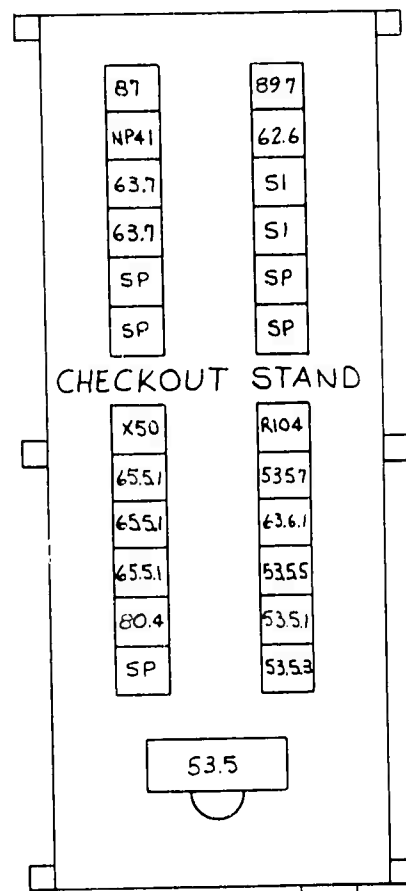


FIGURE 4



SERIES "E" MISSILE CHECKOUT

FIGURE 4A

D E L E T E D

FIGURE 3

SQUADRON	MAINTENANCE	BUILDING	GSE
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

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[illegible]

SQUADRON MAINTENANCE BUILDING GSE

MOBILE OR PORTABLE
PERSONNEL TO OPERATE

REV.	FIG. ALIUT ITEM NO.	NOMENCLATURE	NO. REQ'D	WEIGHT LBS.	SIZE L x W x H	INST. NO.	EST. NO.	COILS AIR, 100/1000 PSI/1000 PSI/1000 PSI	HEATING PSI/1000 PSI/1000 PSI	WATER PSI/1000 PSI/1000 PSI	REMARKS
		ENGINE MAINT. AREA									
	R-120	Rectifier, 24Vdc, 5 KVA	1	500	3x2x2						
	R-112	Pumping Unit, Hydraulic	1	1200	5x3x4	3.6				60/10	
	R-113	Stand, Test, Elec. Pres., Hyd. Sys.	4		12x4x4	2.64		3200 1000 PSI			Water usage = 2 hr Gals = 15 min, H ₂ O 5 min.
	R-50	Thrust Section Work Stand	3		25x21x5						
	C-260	Pedestal Grinder	1	200	3x2x3						
	R-16	Service Unit, Tube Purge	1	3400	9x6x4.5			2500 1000 PSI			Gals duration = 10 min.
A-B	R-52	R.E. Transportation Trailer	2-3		12x6x3.25						
	R-46	Cradle, Booster Handling	5								
A	R-34	Stand, Maint., Rocket Engine	1		7x12						
A-B	C-327	Steel Top Work Table	10-12		6x2.5x2.5	1.2					Power for one table
A-B	C-335	Elec. Maint. Work Table	7-9		8x3x3.6	1.2					Power for one table
A-B	C-210.1	Storage Cabinet - 2 door	14-16		1.3x2.5x6.3						
A-B	R-66	Storage Cabinet, Flammable	2		3x2.5						
A-B	R-51	Work Stand	9-12		12.5x4.5						
B	R-38	Tow Tractor	1-2		4x3.5						
	R-28	Storage Cabinet - Kit	3								
	R-69	File Cabinet	4								
	R-68	Shop Desk	4								
A-B	R-55	Vernier Container	3-4								
A-B	R-57	Vernier Engine Maint. Stand	3-4								
	R-53	Adapter, Power Pack Hoist	1								
B	Facility	Bridge Crane - 9 1/2 ton 5 Ton	1								

(c) Door one side of room covering opening 12 ft. wide x 14 ft. 6 inches clear height. Observation window may be incorporated in door.

(d) Exhaust fan with connection for R-54 exhaust.

4.1.3 Inertial Guidance System (IGS) Maintenance Area

Component checkout of the Missile Guidance Set, consisting of the inertial guidance sensing platform, missile guidance computer, and missile guidance set control, will be performed in the IGS Maintenance Area. The room shall be air conditioned and dust-free. Any power equipment shall be sufficiently isolated from the locale of this area to prevent possible vibration interference to the collimator trunnion assembly when it is being used for component tests.

IGS Component Storage requiring approximately 380 sq. ft. will be integrated into the IGS Maintenance Area.

4.1.4 Accessory Power Supply (APS) Area

APS maintenance and cold run tests will be performed in the APS Area. The cold run test area shall have reinforced walls (3000# masonry, 9 inches thick), 4 inch thick reinforced masonry ceiling 8 ft. high, and a self-closing, blast proof, air tight, sliding door to protect personnel and equipment should part disintegration occur. Floors shall be resistant to ethylene-oxide.

4.1.5 Cleaning Area

The Cleaning Area will be used for cleaning hydraulic, pneumatic, fuel, LO_2 , and other system components, both missile and facility. The room shall have forced air ventilation, using 2 inch thick commercial filters, and shall have a slight positive pressure to provide a relatively dust-free environment. Ultrasonic cleaning equipment will require a vertical hard cleaning tank capable of handling 20 ft. lengths of large diameter pipe, and a horizontal soft cleaning tank used for handling valves and small parts.

D E L E T E D

FIGURE 6

D E L E T E D

FIGURE 7

4.1.6 Supply Areas

4.1.6.1 A Missile Component Ready Supply Area will contain spare canisters, fittings and parts needed for rapid replacement in malfunctioning missile systems. Only a minimum number of such spares will be stored in this area, on a ready-issue basis.

4.1.6.2 A GSE Supply Area will be used for storage of components, on a small quantity basis, to support the normal maintenance functions within the building.

4.1.7 Hydraulic-Pneumatic Area

The Hydraulic-Pneumatic Area will be used for precision maintenance and proof-pressure tests of hydraulic and pneumatic components. Maintenance of engine, APS, and missile and GSE components will be performed in this area. The room shall be under a slight positive pressure.

4.1.8 Electronic Component Test Area

The Electronic Component Test Area will be used for missile and GSE electrical component tests and general electronic maintenance (circuit repair, etc.). Equipment contained in this area will include oscilloscopes, VTVM's, signal generators, etc. The room shall be air conditioned and under a slight positive pressure.

4.1.9 Instrument Repair Area

Meter replacement, precision adjustment or calibration of small components and delicately balanced parts, etc. will be accomplished in the Instrument Repair Area. Maintenance equipment will include work benches, jeweler's laths, and calibration and secondary frequency standard items. The room shall be air conditioned and under a slight positive pressure.

4.1.10 Airborne Guidance Test Area

Checkout of the missile guidance canisters will be performed in the Airborne Guidance Test Area. The room shall be air conditioned and under a slight positive pressure.

D E L E T E D

FIGURE 8

D E L E T E D

FIGURE 8A

D E L E T E D

FIGURE 9

D E L E T E D

FIGURE 10

DELETED

FIGURE 11

D E L E T E D

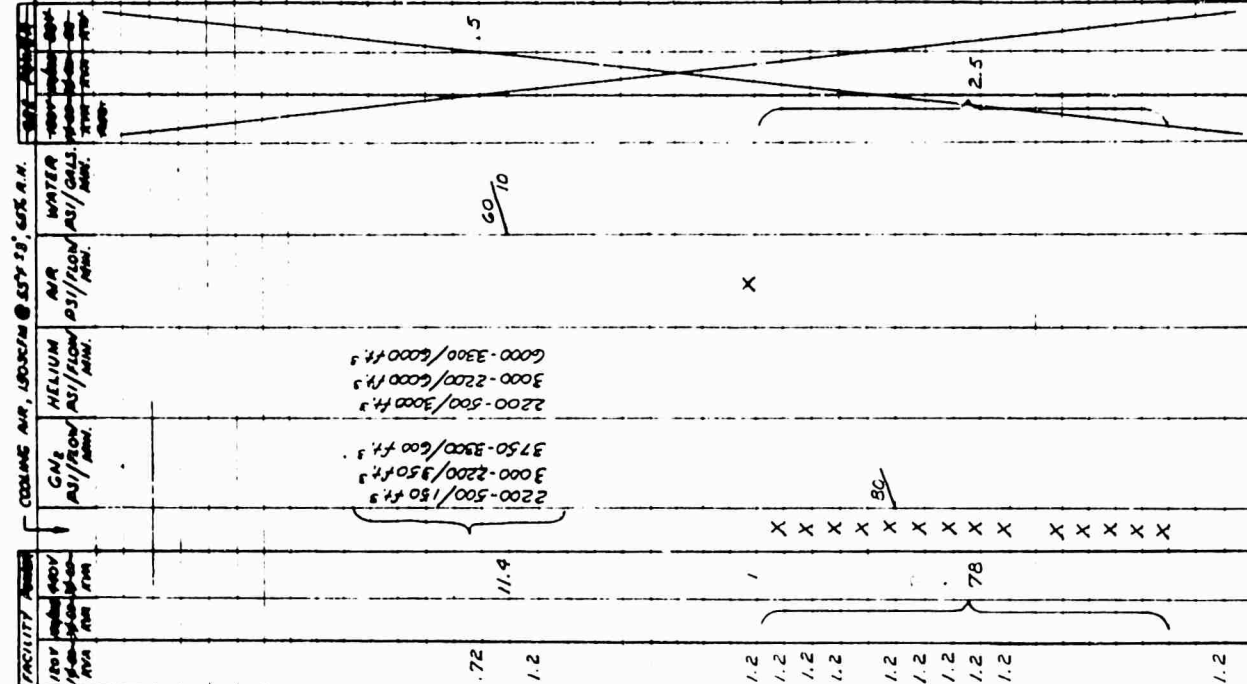
FIGURE 12

SQUADRON MAINTENANCE BUILDING GSE

CONVAIR
SAN DIEGO

FORM 73

REV.	FIG. LIST ITEM NO.	NOMENCLATURE (See Equip. Layout)	NO. REQ'D	WEIGHT LBS.	SIZE L x W x H	100% TESTED BY	100% TESTED DATE	COOLING AIR, LB/HR @ 13, 45% R.H.	HELIUM PSI/1000 MIN.	AIR PSI/1000 MIN.	WATER GAL/HR MIN.	REMARKS
SUPPLY AREAS												
	X-100	Steel Storage Rack			3x9x7.3							
	X-101	Steel Storage Rack			15x9x2.3							
	X-102	Steel Storage Rack			15x9x2.3							
	X-103	Bin, Storage & Display			1x3x7							
	X-104	Office Chair										
	X-39	File Cabinet										
	X-40	Office Desk										
HYDRAULIC - PNEUMATIC AREA												
A, B	R-137	Stand, Test, Elec., Pneu. Comp.	2	3500	12x5x6	.72						
A	R-112	Pumping Unit, Hydraulic	1									
	C-327	Steel Top Work Table	10		6x2.5x2.5	1.2						
B	C-210.1	Storage Cabinet - 2 door	5		13x2.5x4.3							
	X-40	Office Desk	1									
	X-104	Office Chair	1									
	X-39	File Cabinet	1									
ELECTRONIC COMPONENT TEST AREA												
A	C-33.9	Bench Instl. - Comp. Press. & Prgc.	1	500	3x6x2.4	1.2						
A	C-39	Harness Check-out Unit	1	400	3x5	1.2						
A	C-44	Servo Camisten Check-out Unit	1	1000	7x9	1.2						
A	C-44.1	Gyro Cam. Component q/c Unit	1	1000	7x9	1.2						
	C-44.2	Multi-Made Gyro T.T. Aux. q/c Unit	1	350	2x2							
A	C-44.3	Prp. Utiliz. Check-out Unit	1	1050	7x7	1.2						
A	C-44.4	Servo Cyl. Assy q/c Unit	1	700	5x7	1.2						
A	C-44.5	Amplifier Network q/c Unit	1	500	5x7	1.2						
A	C-44.7	Electro-Mech. Relay q/c Unit	1	500	5x7	1.2						
A	C-44.8	Elect. Sys. Component q/c Unit	1	1050	5x7	1.2						
	C-44.8	Control & Readout Aux. Unit	1	20	2x1.5x1							
	C-44.9	Power Supply, Aux.	1		8x2x6							
	C-45.1	Comp. A/P q/c Equip. Console	2	600	5x13							
	C-50.4	Propellant Exerciser Unit	1		2x2x6							
	C-51	Amplifier, Line Programming	2									
	R-26.7	Rocket Eng. q/c Programmer	2									
	C-210.1	Storage Cabinet - 2 door	8		13x2.5x4.3							
B	C-535	Electrical Bench	2		8x3x3.6	1.2						
A		(cont.)										



MOBILE OR PORTABLE
PERSONNEL TO OPERATE

SEE PAGE 1

COOLING AIR, LB/HR @ 13, 45% R.H.

HELIUM
PSI/1000
MIN.

AIR
PSI/1000
MIN.

WATER
GAL/HR
MIN.

REMARKS

Space provisioning only

Space provisioning only

Power req. for and bench

4.1.11 Ground Guidance Maintenance Area

The Ground Guidance Maintenance Area will be used for routine maintenance functions pertaining to radio-inertial type guidance equipment. Maintenance of guidance computer equipment (Burroughs) will also be accomplished in this area. The room shall be air conditioned and under a slight positive pressure.

4.1.12 Ground Guidance Storage Area

The Ground Guidance Storage Area will contain the spare components, modules, etc necessary for routine maintenance of the radio-inertial guidance equipment. Ready access to this area shall be provided from the Ground Guidance Maintenance Area. This room shall be air conditioned and under a slight positive pressure.

4.1.13 Electrical Shop

The Electrical Shop will be used to repair GSE and facility electrical, air conditioning, and refrigeration components.

4.1.14 Welding Shop

The Welding Shop will contain arc and acetylene welding equipment for fabrication and/or repair of missile components, GSE, and facility items. It will also contain the necessary portable equipment for work capability outside the area.

4.1.15 Paint Shop

The Paint Shop will be used for general upkeep of GSE items. A spray booth will be required in this shop.

4.1.16 Battery Room

The Battery Room will store airborne batteries and electrolyte. Batteries will be filled in this room immediately prior to their use. GSE batteries will also be charged and maintained here.

4.1.17 GSE Maintenance Area

The GSE Maintenance Area will be used for general repair and periodic maintenance of mobile GSE and facility

D E L E T E D

FIGURE 13

D E L E T E D

FIGURE 14

D E L E T E D

FIGURE 15

D E L E T E D

FIGURE 16

SQUADRON MAINTENANCE BUILDING GSE

NAME OR PORTAL

PERSONNEL TO OPERATE

FIG LIST ITEM NO.	NOMENCLATURE	NO. REQ'D	WEIGHT LBS.	SIZE L x W x H	FACILITY ROOM						REMARKS
					100% AVAIL	90% AVAIL	80% AVAIL	70% AVAIL	60% AVAIL	50% AVAIL	
	<u>BATTERY ROOM</u>										
X-187	Battery Charger	1									
C-326	Table, Comp. Top	2		6x25x25, 1/2							
C-210.1	Storage Cabinet - 2 door	6		13x23x6.3							

equipment. This will include automotive submotor pool requirements. A hydraulic automotive hoist shall be provided.

Tubing fabrication for missile, GSE, and facilities will also be accomplished in this area.

4.1.18 Power Room

The Power Room will house the 400 cycle motor generators, and an ultrasonic generator to provide power to ultrasonic cleaning transducers. Approximately 250 sq. ft., including maintenance access, will be required for these units.

4.1.19 Utilities and Boiler Room

The Utilities and Boiler Room will contain a water heater, compressed air tank, and related facility equipment.

4.1.20 Wood Shop

The Wood Shop will be used for manufacture of shipping crates for return of components to depot, fabrication of shop aids, and general facility maintenance.

4.1.21 Sheet Metal Shop

The Sheet Metal Shop will be used for routine type maintenance of missile, GSE, and facility equipment.

4.1.22 Machine Shop

The Machine Shop will be used for special parts fabrication, running gear maintenance and repair, and routine machining operations.

4.1.23 Shop Administration Area

Office space will be required for maintaining routine records, log books, etc.

4.1.24 Tool Crib

The Tool Crib will store generally-used hand tools for maintenance mechanics. Also, a dead weight tester will be kept in this crib for checking torque wrenches.

D E L E T E D

FIGURE 17

D E L E T E D

FIGURE 18

D E L E T E D

FIGURE 19

D E L E T E D

FIGURE 19

D E L E T E D

FIGURE 20

D E L E T E D

FIGURE 21

D E L E T E D

FIGURE 22

D E L E T E D

FIGURE 23

D E L E T E D

FIGURE 24

SQUADRON MAINTENANCE BUILDING GSE

FORM 71
CORVIR
SAN DIEGO

ITEM NO.	NOMENCLATURE	NO. REQ'D	WEIGHT LBS.	SIZE L x W x H	FACILITY NUMBER	COOLING AIR, LB/HR @ 55°F, 65°F, 75°F, 85°F				REMARKS
						CH ₂ FLOW	HELIUM FLOW	AIR FLOW	WATER FLOW	
	GSE MAINTENANCE AREA									
C-216	Air Compressor, Portable	1		5 x 3.5	1					X
C-218	Reciproc. Compressor, Power	1		6 x 8						X
C-224.5	Lubricating Unit	2		5 x 2.5						X
C-310	Hand Truck - 2 Wheeled	2		2 x 2						X
C-312	Platform, Hand Truck	2		4.6 x 2.5						X
C-324	Pipe Storage Rack	2		3.2 x 4.6 x 8						X
C-308	Platform Trailer, Warehouse	2		10 x 4						X
C-210.1	Storage Cabinet - 2 door	8		13.2 x 5.6 x 3						X
C-327	Table, Steel Top	8		6 x 2.5 x 2.5						
C-326	Table, Comp. Top	3		1.7 x 1.5						
C-322	Storage Cabinet	1								
X-43	Tube-bender, Stor. Table	1								
X-42	Tube-bender, Small	1		2 x 2 x 2	1.1					
X-15	Double Flare Machine	1		3 x 2	1.1					
X-18	Flare Burr Machine	1			1					
C-259	Bench Grinder	1								
C-204	Tube-bender, Large	1								
X-104	Office Chair	1								
X-40	Office Desk	1								
X-39	File Cabinet	1								
	Facility Manacal Crane - 5 Ton	1			5					Space provisioning only
	POWER ROOM									
C-85	Motor Generator - 400 cps	2	200	5 x 4 x 5	7.5					
X-84	Ultrasonic Generator	1	5800	37 dia x 6.5	131					
B-32	Motor Generator - 400 cps	1		3.5 x 3.5	1.6					
NP-50	Motor Generator - 400 cps	1		5 x 4 x 5	7					
	BOILER & UTILITIES ROOM									
	Facility Equipment									
	WOOD SHOP									
C-300	Circular Saw, 16"	1	500	5 x 4 x 3						
NP-15	Jointer, 6"	1	100	3 x 1 x 3						
C-210.1	Storage Cabinet - 2 door	2		13.2 x 5.6 x 3						
C-326	Table, Comp. Top	3		6 x 2.5 x 2.5						

SQUADRON MAINTENANCE BUILDING GSE GSE

[illegible]

4.2 Space Requirements

Adequate aisle space, ceiling height, and door openings shall be provided in facility design to permit removal and replacement of any item of equipment. Consideration has also been given to the equipment layout shown in figure 2 for personnel access, and to the maximum line lengths allowable for certain GSE items.

4.3 Detail Requirements

4.3.1 Checkout Equipment Platform

The Checkout Equipment Platform shall be designed to hold all electronic GSE required for system checkout of the missile. This platform should be 14 ft. wide x 46 ft. long, with a roof at 15 ft. height to hold the air conditioning unit required for equipment cooling and missile pod cooling. The checkout platform floor shall be of removable grating or rough-surface solid plates for safety purposes. Facility design shall incorporate provisions for isolating any possible vibration transfer from the air conditioning equipment to the missile checkout equipment on the platform.

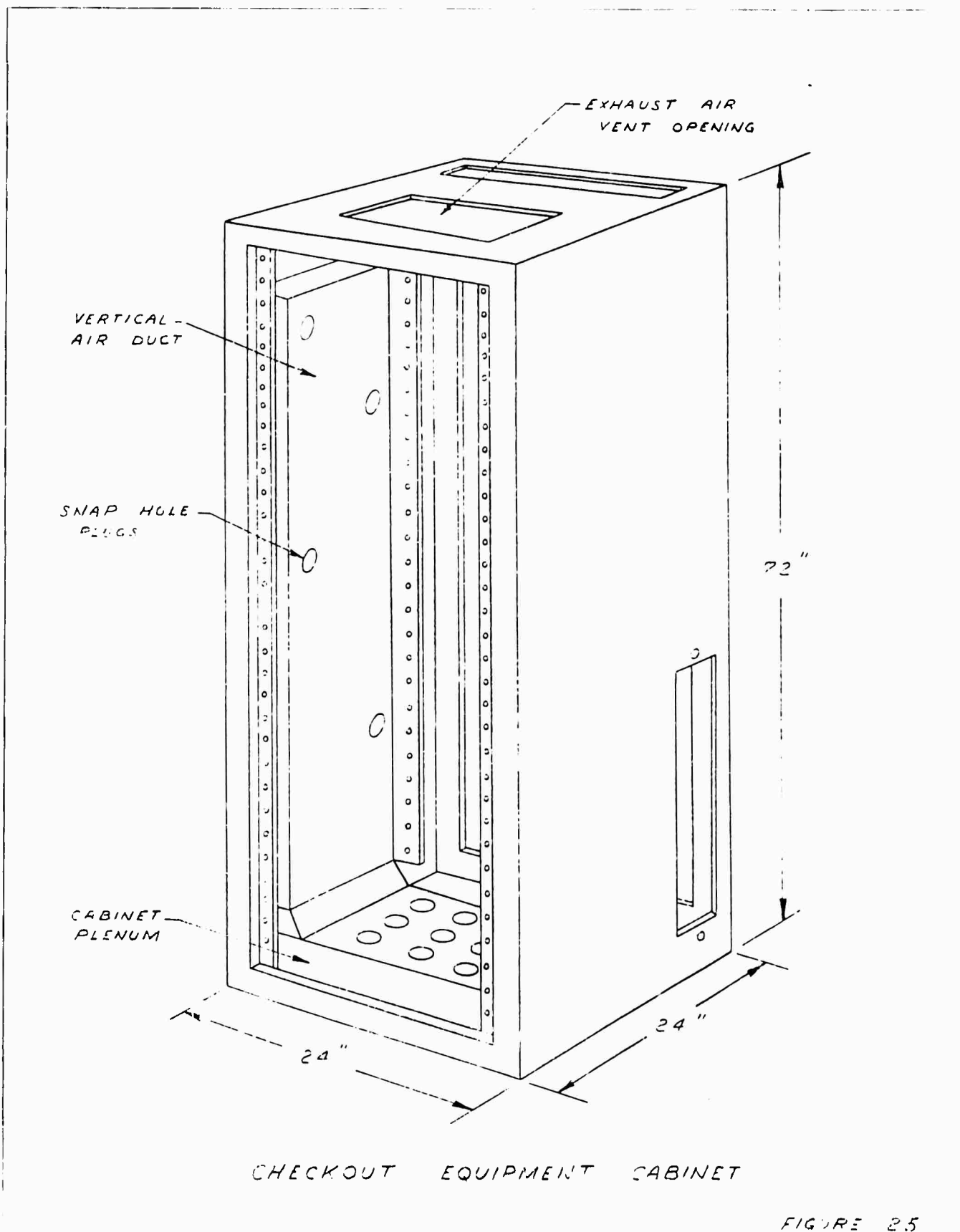
4.3.2 Equipment Mounting

The checkout equipment cabinets (figure 25) are designed for cable and cooling air entrance through the bottom, with exhaust air vent openings at the top. Mounting provisions shall be as shown in figures 26 and 26A.

4.3.3 Ceiling Height

Ceilings shall be 28 ft. high in the Engine Maintenance Area and 20 ft. high in the Missile Assembly Area. Shops under the mezzanine offices shall have minimum 10 ft. ceiling heights. A 25 ft. high bay, 3 ft. x 8 ft. shall be provided for the ultrasonic vertical cleaning tank.

4.3.3.1 Provisions shall be made for mounting a one ton electric hoist, centered over the vertical ultrasonic tank.



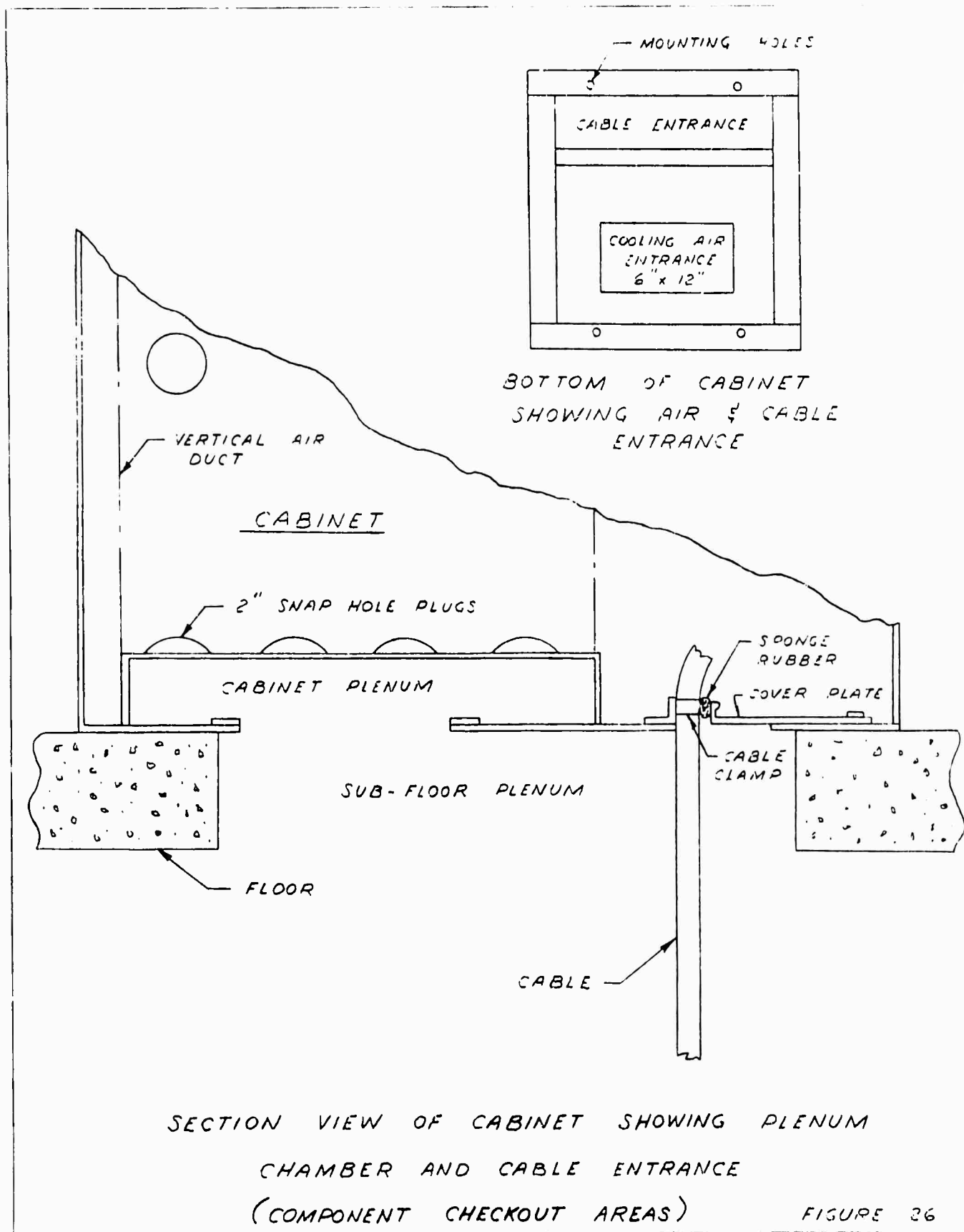
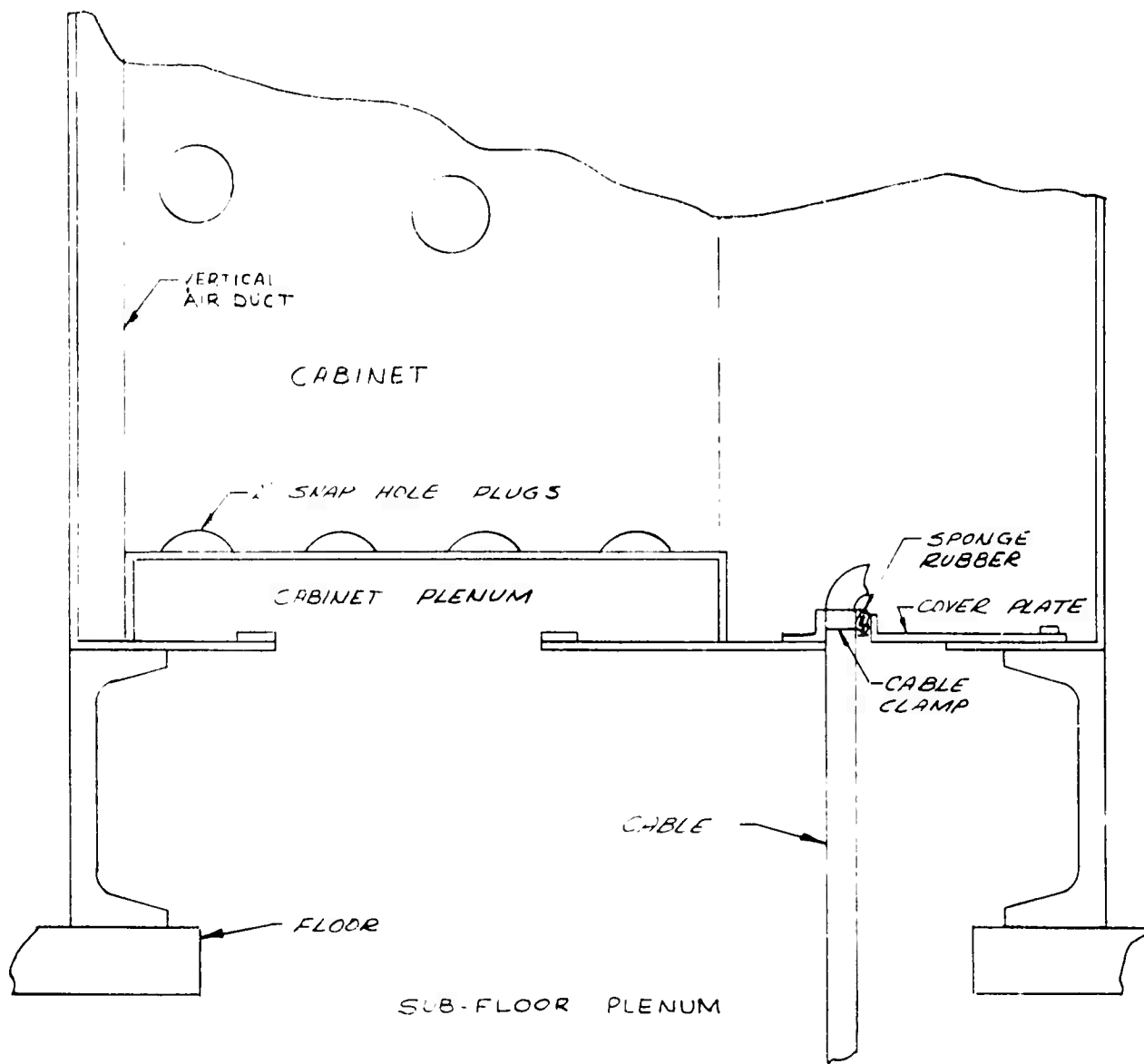


FIGURE 26



SECTION VIEW OF CABINET SHOWING PLENUM CHAMBER & CABLE ENTRANCE (CHECKOUT PLATFORM AREA)

FIGURE 26A

4.3.4 Trenches and Cable Trays

Trenches shall be located as shown in figure 2. They shall be 2 ft. 6 inches wide x 2 ft. deep in the Missile Bay Area, and 2 ft. wide x 1 ft. 6 inches deep in the Component Test Areas. They will be used for carrying high pressure pneumatic pipes, electrical cables, and air conditioning ducts (in Electronic Component Test Area).

4.3.4.1 Pneumatic pipes shall be routed through lower portion of trenches.

4.3.4.2 Control and analog signal cables shall be routed on cable trays (preferably expanded metal type for moisture drainage) along upper sides of trenches. Care must be exercised to isolate high and low level signal cables.

4.3.4.3 Floor drains shall be provided in trenches to maintain them in a dry condition (see figure 27).

4.3.4.4 Trench covers shall be solid steel plate with anti-slip pattern, or open grill. Plates shall be reinforced with stiffeners where subject to traffic. Flush lifting handles shall be provided.

4.3.5 Tie-Down Provisions

4.3.5.1 Missile and trailer tie-downs for engine gimbaling tests shall be provided in all missile bays, per Convair Dwg. 27-00817. Alignment marks (one inch wide white stripes) shall be placed on the floor, 64 inches left of centerline of trailer from door, continuing for 75 ft.

4.3.5.2 Tie-down provisions for the IGS collimator trunnion assembly in the series "E" missile bays (#5 and #6) will be the responsibility of the installation contractor. This assembly will be located within the following limits:

(a) Vertical Plane (see figure 27A)

Angle from collimator trunnion to poro-prism in missile pod to be 26° nominal $\pm 2^{\circ}$.

(b) Lateral Plane (see figure 27B)

As near to the longitudinal axis of the poro-prism as possible, but not to exceed angle of 5° . This axis is parallel to the longitudinal axis of the missile.

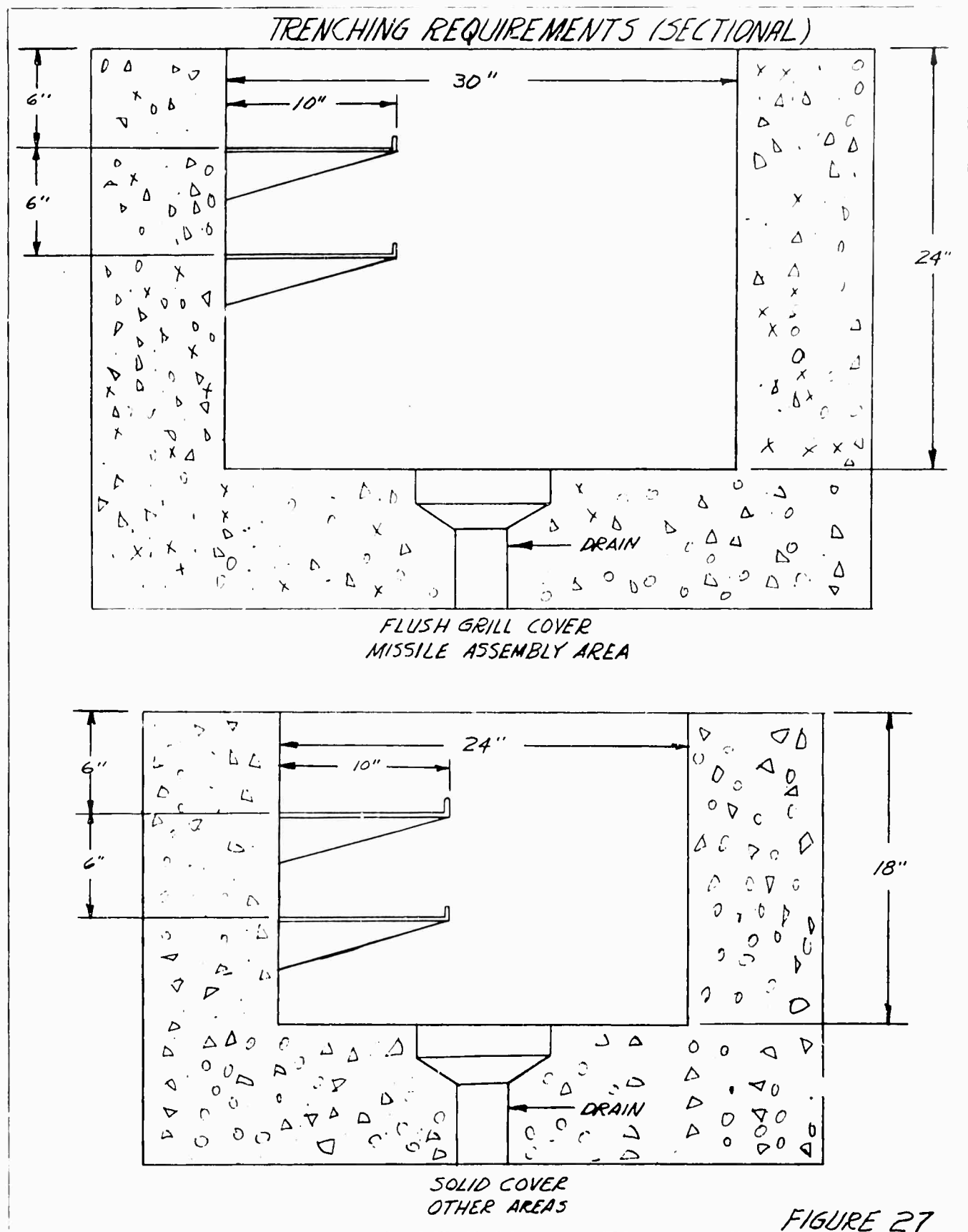


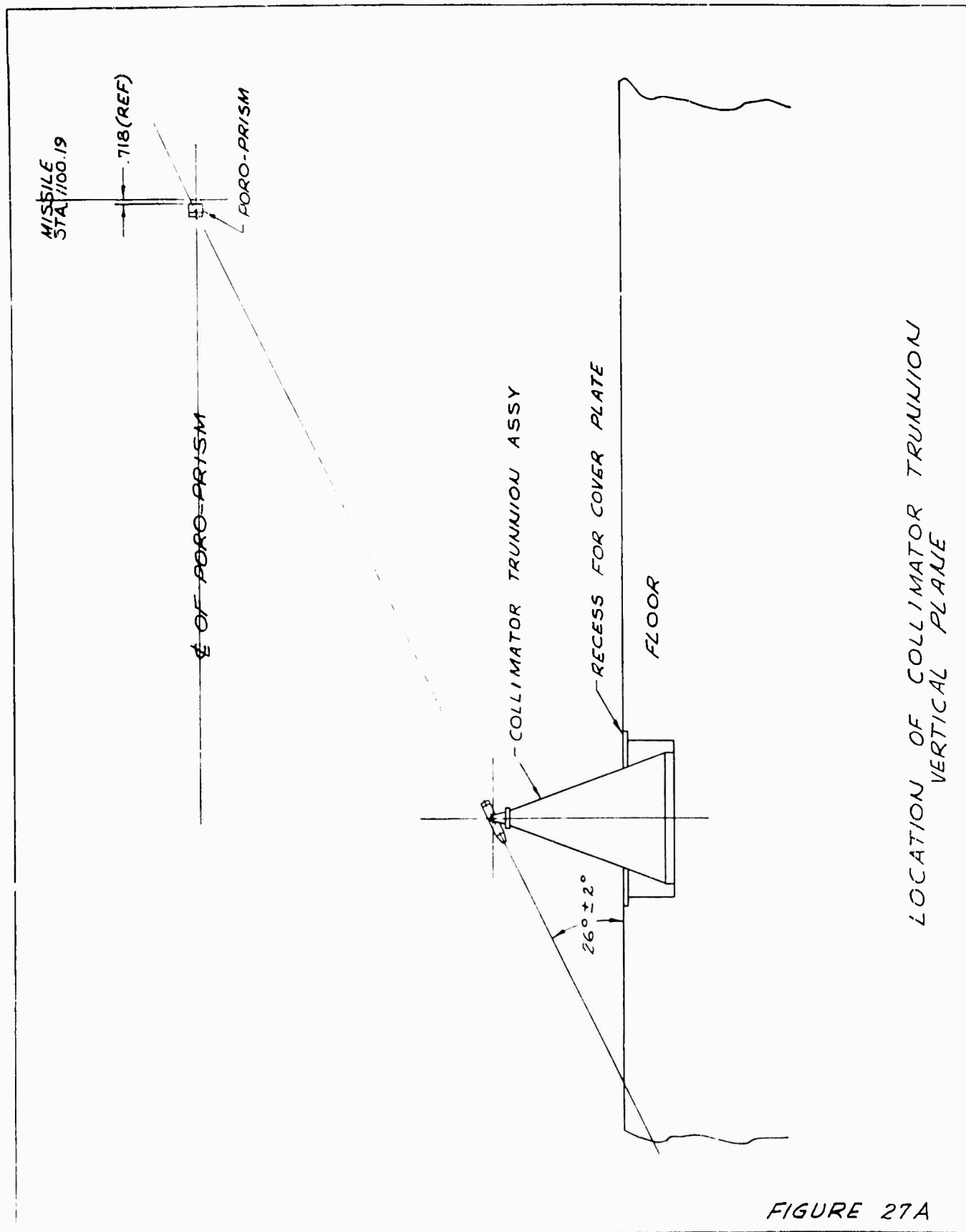
FIGURE 27

- (c) Provisions will be made to locate the missile both laterally and longitudinally (possibly by means of a plumb-bob arrangement) in order to provide a fixed location for the collimator trunnion (floor mounted). A bench mark assembly, consisting of a 1 ft. housing which contains a poro-prism, will be located in a fixed position within 50° above and 25° below the collimator, at any point on a 360° lateral plane. This bench mark will provide a ready reference for the optical line of sight requirements.

4.3.6 Doorways

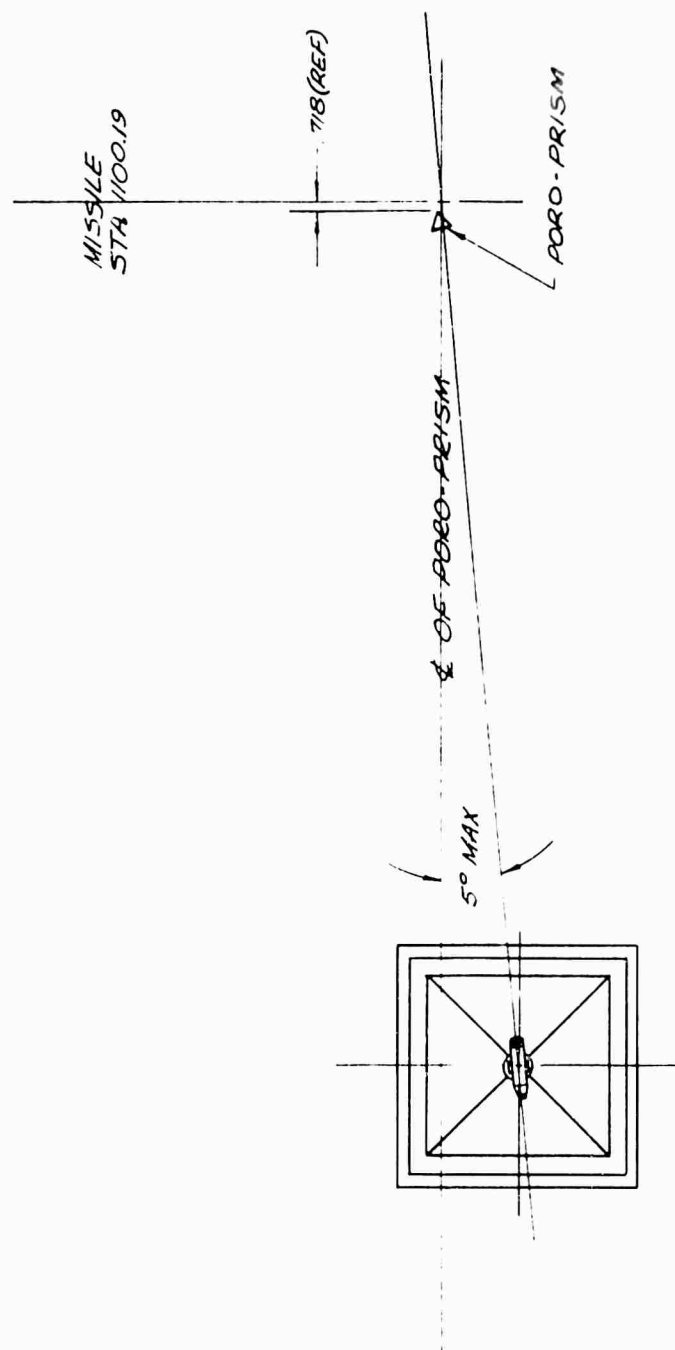
- 4.3.6.1 Interior doors to all rooms, except rest rooms, dispatch, administration, engine clean and purge, and MAA office, shall be double, with a minimum opening width of 5 ft.
- 4.3.6.2 Exterior doors, except to Utility and Power rooms, shall be roll up type. A clear vertical opening of 18 ft. is required for the Missile Bays. Other exterior roll up type doors shall have clear vertical openings of 14 ft. Three 10. personnel access doors shall also be provided to the Engine Maintenance and Missile Bay areas.
- 4.3.6.3 Exterior doors to Utility and Power rooms shall be double, with a minimum opening width of 5 ft.

4.3.7	Building Interiors	Walls		Ceiling		Floor	
		½" Gypsum Board Exposed	Acoustical Tile	½" Gypsum Board Exposed	Concrete	Ethylene-Oxide Resistant Asphalt Tile	
	Missile Assembly Office	X			X		
	GSE Maintenance Area		X		X		
	Cleaning Area	X		X	X		
	Mezzanine	X	X				X
	Missile Assembly Area		X	X	X		
	Engine Maintenance Area		X	X	X		
	APS Area			X		X	
	Electronic Component Test Area	X		X	X		
	Airborne Guidance Area	X		X	X		
	Ground Guidance Area	X		X	X		
	Hydraulic-Pneumatic Area	X		X	X		
	Power Room		X		X		
	Utility & Boiler Room		X		X		
	Tool Crib		X		X		
	Supply		X		X		
	Machine, Sheet Metal, Wood Shops		X		X		
	Weld Shop	X		X	X		
	Paint Shop	X		X	X		
	Instrument Repair Area	X		X	X		
	Electrical Area		X	X	X		
	Administrative Office	X	X				X



LOCATION OF COLLIMATOR TRUNNION
VERTICAL PLANE

FIGURE 27A



LOCATION OF COLLIMATOR TRUNNION
LATERAL PLANE

FIGURE 27B

5. STRUCTURAL REQUIREMENTS

5.1 General

The Squadron Maintenance Building foundation shall be of reinforced concrete spread footings. If corrugated metal siding is used, translucent plastic panels should be provided in the east and west walls for natural daylighting in shop areas.

5.1.1 The floor of the building shall be exposed concrete unless otherwise noted, the thickness of which shall be based on a loading to 250 psf.

5.1.2 Interior partitions in the shop areas, where practicable, should be constructed with light metal studs and cement-asbestos sandwich panels for ready removal and re-use in other locations.

5.1.3 The boiler room walls and ceiling shall be protected with gypsum materials to provide a one hour fire resistive rating.

5.1.4 The checkout equipment platforms in the missile bay area shall be vibration-free structures to eliminate any possible interference with electronic equipment operation.

5.1.5 Floors shall be treated to inhibit dust.

6. ELECTRICAL REQUIREMENTS

6.1 General

The entire power and lighting systems shall utilize exposed conduits, installed along the inside walls of the buildings. This will afford the greatest degree of future flexibility and rearrangement potential. Zinc coated rigid steel conduit shall be used when imbedded in concrete. Exposed conduit runs shall be electrical metallic tubing.

Outside lighting shall be provided over entrance doors and on corners of buildings. Standard 120V outlet locations shall be the responsibility of the A-E.

6.1.1 Design Standards

6.1.1.1 A Supply of 440V, 3-phase power shall be available for machine tool motors and power receptacles in the Squadron Maintenance Building, as well as for power and lighting in the Storage Building.

6.1.1.2 Standard 120V outlets shall be provided for battery chargers supplying power to emergency lights and exit lights.

6.1.1.3 Conductors operating at 440V or less shall, in general, be solid copper in sizes 12 to 8 AWG. Larger conductors shall be stranded copper. All conductors shall have insulation of type R, RH-RW, or TW depending on locations. Wire size #2 or larger shall be RH-RW. Minimum wire size shall be #12 AWG with the exception of communication and control circuits, which may use smaller commercial standard sizes.

6.1.1.4 The maximum voltage drop for the combined load in the Squadron Maintenance Building should not exceed approximately 8%.

6.1.1.5 The Storage Building shall be provided with a 120/208V, 3-phase, 60 cycle, 4-wire distribution system for lights and receptacles.

13

6.1.2 Squadron Maintenance Building Requirements

- 6.1.2.1 Primary power cables to the Electronic Component Test Area shall be routed through overhead conduit. Control and analog signal cables shall be routed in floor trench.
- 6.1.2.2 Power cables to the Airborne Guidance Test Area, other than 120V utility, shall be terminated at a power panel located within the area. This will eliminate individual stubup requirements to the GSE.
- 6.1.2.3 The spray booth in the Paint Shop shall be provided with explosion proof electrical fittings and accessories.
- 6.1.2.4 R.F. interference-free lighting shall be provided in the Missile Checkout and Electronic Component Test Areas. Interference limits are shown in figures 27C and 27D. All lighting fixtures shall be arranged to provide illumination at both front and back of each cabinet.
- 6.1.2.5 Electrical conduits shall have flush access floor openings in Machine Shop, Sheet Metal Shop, and Wood Shop areas.
- 6.1.2.6 Convenience outlets in checkout cabinet bases shall be provided per ZM-7-461.
- 6.1.3 Critical Power
 - 6.1.3.1 Type of System: 120/208V, 3-phase, 4-wire, 60 cps, Y-connected, neutral grounded at one point; 440V, 3-phase, 4-wire, 60 cps.
 - (a) Phase to phase voltage unbalance shall not exceed 3%. Maximum deviation from nominal including phase to phase unbalance shall not exceed 8%.
 - (b) Any deviation of the voltage which exceeds a rate of change of 1% per second will be considered a transient. The maximum transient shall not exceed $\pm 5\%$ from the nominal voltage value $\pm 8\%$ immediately preceding the start of the transient, and shall recover to within $\pm 1\%$ of this value within one second.

- (c) Frequency: 60 cps $\pm$ 1.67% (1 cps). Maximum rate of change shall not exceed one cycle per second per sec. Transient Response: Maximum deviation of one cycle per second with a recovery to within $\pm$ 1% in one sec.
- (d) The departure in the AC waveform from a pure sine wave shall not exceed 4% under rated load and voltage.
- (e) Load Requirements: Power Factor 0.85 minimum. Load Balance: Loads on the 3 phases shall be balanced within 16%.

6.1.4 Utility Power

6.1.4.1 Type of System: 120/208V, 3-phase, 4-wire, 60 cps, Y-connected, neutral grounded at one point.

- (a) Maximum deviation from 208V including phase to phase unbalance shall not exceed 8%.
- (b) Deviations shall not exceed 208V $\pm$ 30% and shall recover to 208V $\pm$ 8% within two seconds.
- (c) Frequency: 60 cps $\pm$ 3%. Maximum rate of change shall not exceed one cycle per second per second. Transient Response: Maximum deviation of two cycles per second with a recovery to within $\pm$ 1% in two seconds.

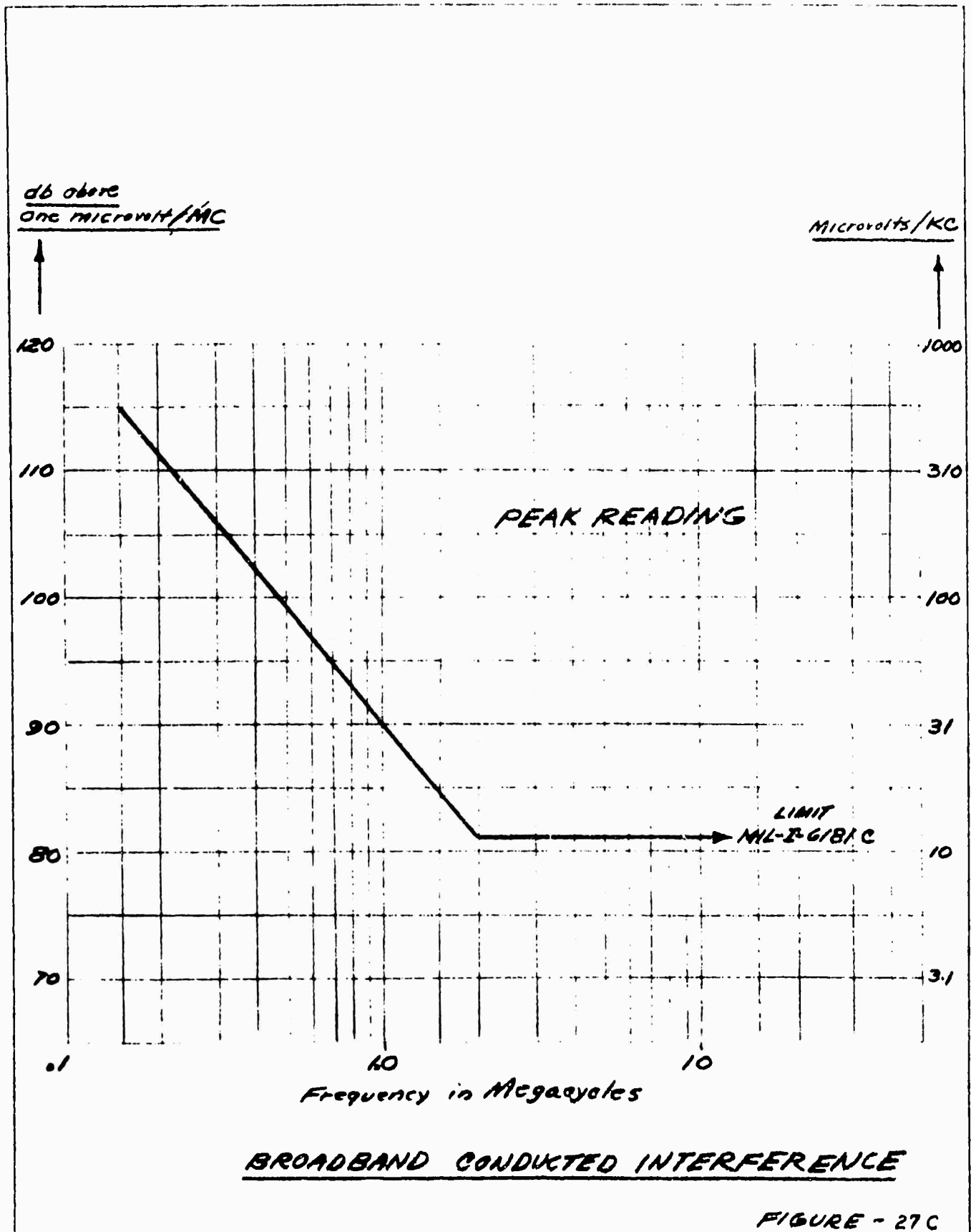
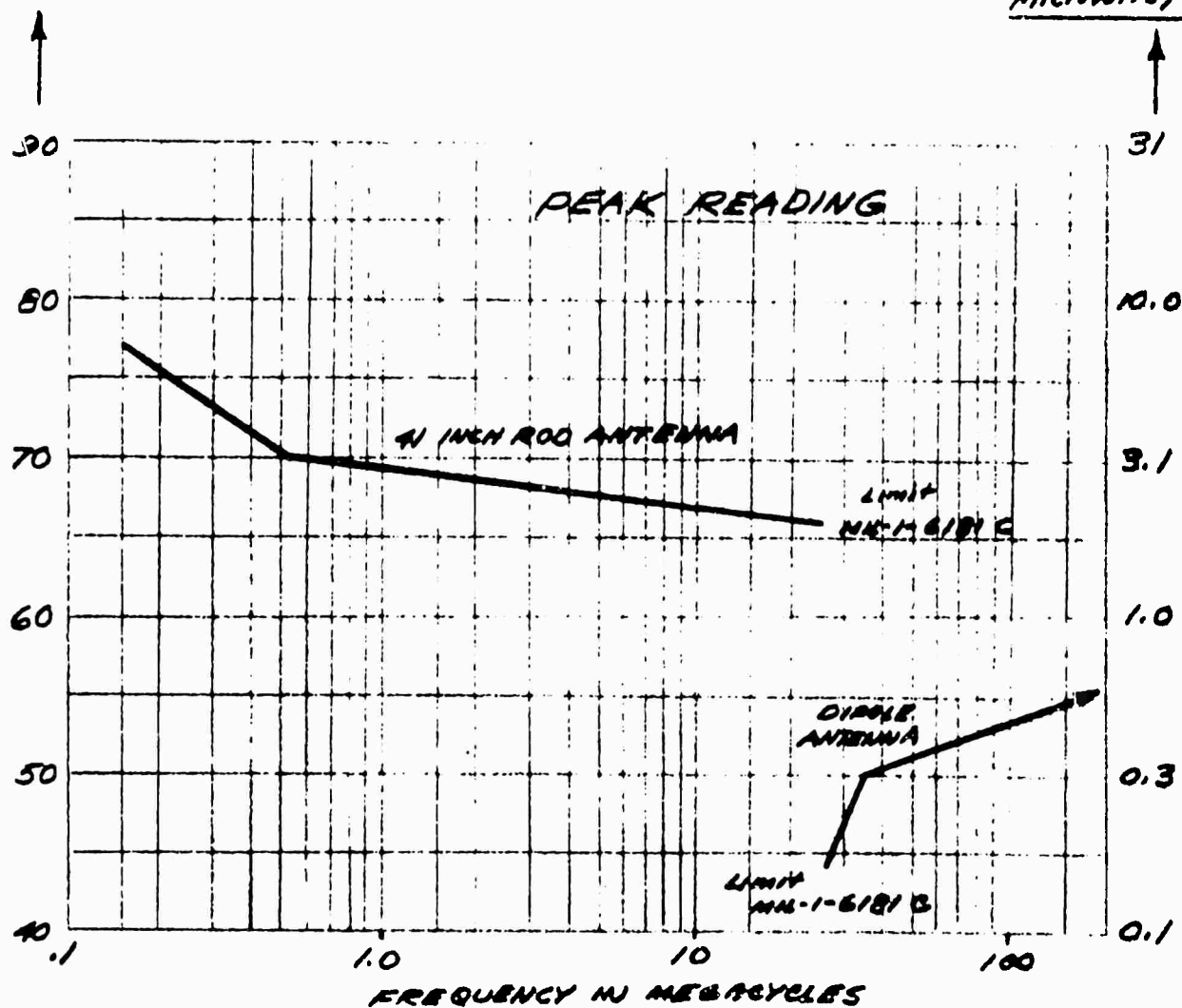


FIGURE - 27C

db Above
One Microvolt/MC

Microvolts/KC



BROADBAND RADIATED INTERFERENCE

FIGURE-27D

6.1.5 Lighting Intensities

All checkout and shop areas shall be lighted to an average intensity of 30 foot-candles at 3 ft. floor level except as follows:

	<u>Foot-Candles</u>
(a) Airborne Guidance Test Area	50
(b) Ground Guidance Maint. Area	50
(c) Machine Shop	50
(d) Battery Room	20
(e) Welding Shop	20
(f) Toilet	10
(g) Corridor	10
(h) Storage	10

- 6.1.5.1 Air Force hangar bay lighting standards shall apply to the Missile Assembly Area.

6.1.6 Total Utility Requirements

The facility requirements for the total GSE connected load are presented below. Nominal usage will be approximately 40%. Bench power, hand tool, and general housekeeping requirements are not included:

Commercial Standard

(a) 120V, single phase, 60 cps	247.4 KVA
(b) 120/208V, 3-phase, 60 cps	132.1 KVA
(c) 440V, 3-phase, 60 cps	910.3 KVA

- 6.1.6.1 Special power (DC, 400 cps AC, and AC regulated beyond commercial standard) will be provided by rectifiers, motor generators, and self-contained power supplies. These special power supplies are GSE items.

6.2 Grounding Requirements

A grid matrix under the Squadron Maintenance Building is recommended as the basic element of the grounding system (see figure 27E). All equipment, structures, and power and signal systems would then be commonly grounded to the grid matrix.

6.2.1 Grid Matrix

6.2.1.1 Structure

- (a) Grid shall be No. 4/0 bare copper conductors.
- (b) Matrix spacing shall not exceed 12 feet.
- (c) Intersection joints shall be brazed (silver brazed, cadweld, or similar).
- (d) Copper clad steel rods, 3/4 inch minimum diameter and 10 ft. minimum length, shall be driven around the grid at periphery joint intersections and connected (brazed) to the grid.

6.2.1.2 Grid Extensions

Flush ground connectors for grounding portable equipment, tools, etc. shall be installed in the floors or walls inside the building. These grid extensions are to provide readily accessible ground points which should be located so as not to interfere with the architectural features of the building (see figure 27F).

The ground grid connections to the grid matrix shall utilize No. 4/0 bare copper conductors.

6.2.1.3 Grid Location

The grid shall be a minimum of 18 inches below the floor of the building. Spacing between a vertical wall and the grid shall be no less than 6 inches.

The periphery of the grid shall include the area bounded by the outside walls of the Squadron Maintenance Building. The grid shall be covered with earth fill.

6.2.2 Power Distribution System Grounds

The neutrals of the power distribution systems shall be grounded to the same point on the grid to avoid circulating currents. If a water well is used, this point should be as close to the well as practicable.

6.2.3 Metal Work Bonding and Grounding

Large metal objects such as frames, metal doors, gratings, conduit, ducts, cable trays, structural steel (excluding reinforcing rods), etc. shall be provided continuous electrical paths to ground. This is necessary to insure proper functioning of the electronic equipment in the building. All such metal work shall be bonded in accordance with good construction practice and ultimately connected to the ground grid system.

Bonding and grounding of the instrumentation consoles and equipment will be the responsibility of the installation contractor.

6.2.4 Ground Plane

Copper busses, 1/4 in. x 2 in. shall be provided in the cable trays serving the checkout platforms in the Missile Assembly Area. Cabinet ground busses will be connected to the plane formed by these busses.

6.2.5 Lightning Ground

General lightning protection for the Squadron Maintenance Building, if necessary, shall be the responsibility of the A-E.

6.2.6 Power Equipment Grounding

Grid extensions shall be provided in the Power Room as outlined in para. 6.2.1.2 for grounding the 400 cycle MG chasses. Interconnecting 1/0 cables to these ground points will be the responsibility of the installation contractor.

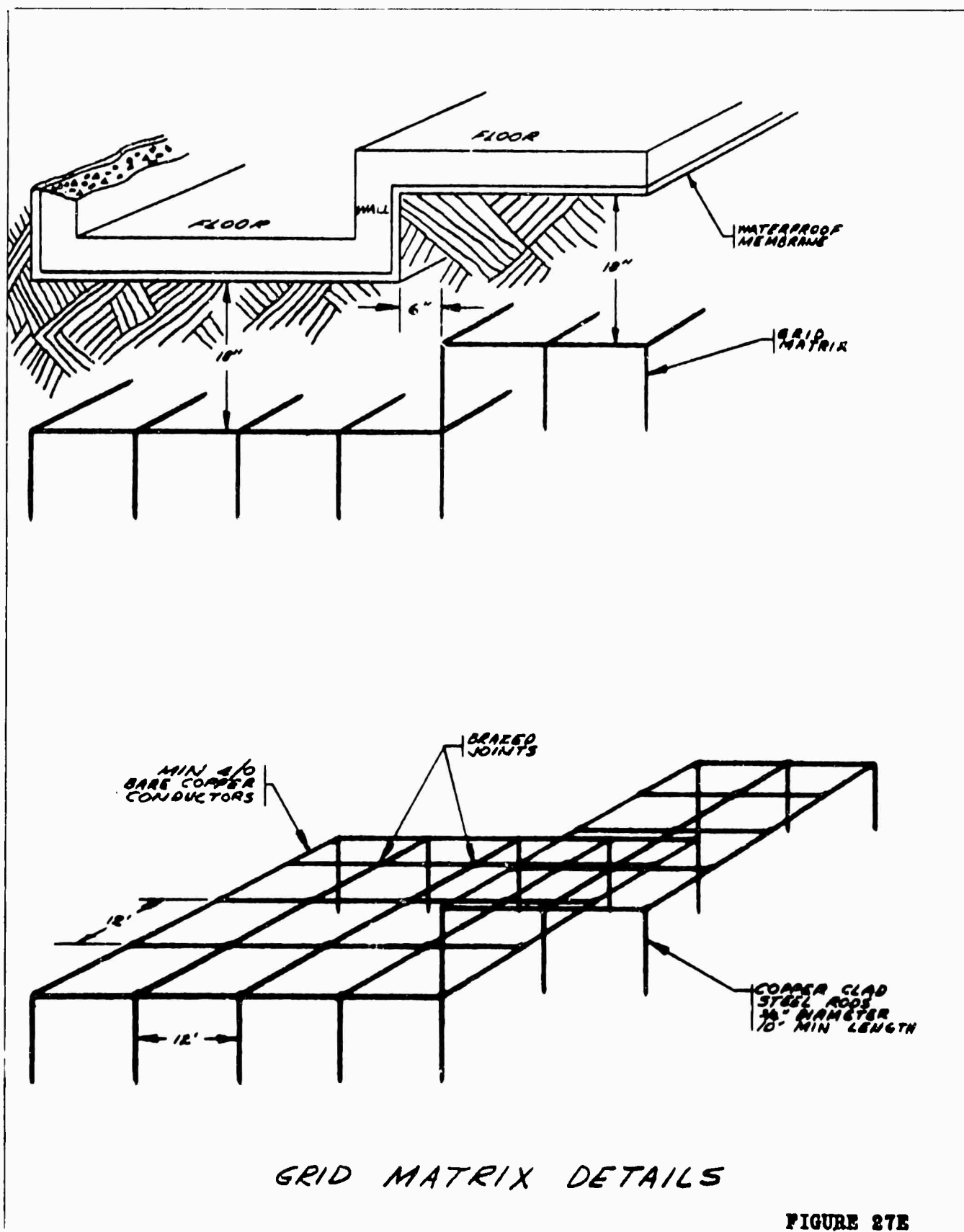


FIGURE 27E

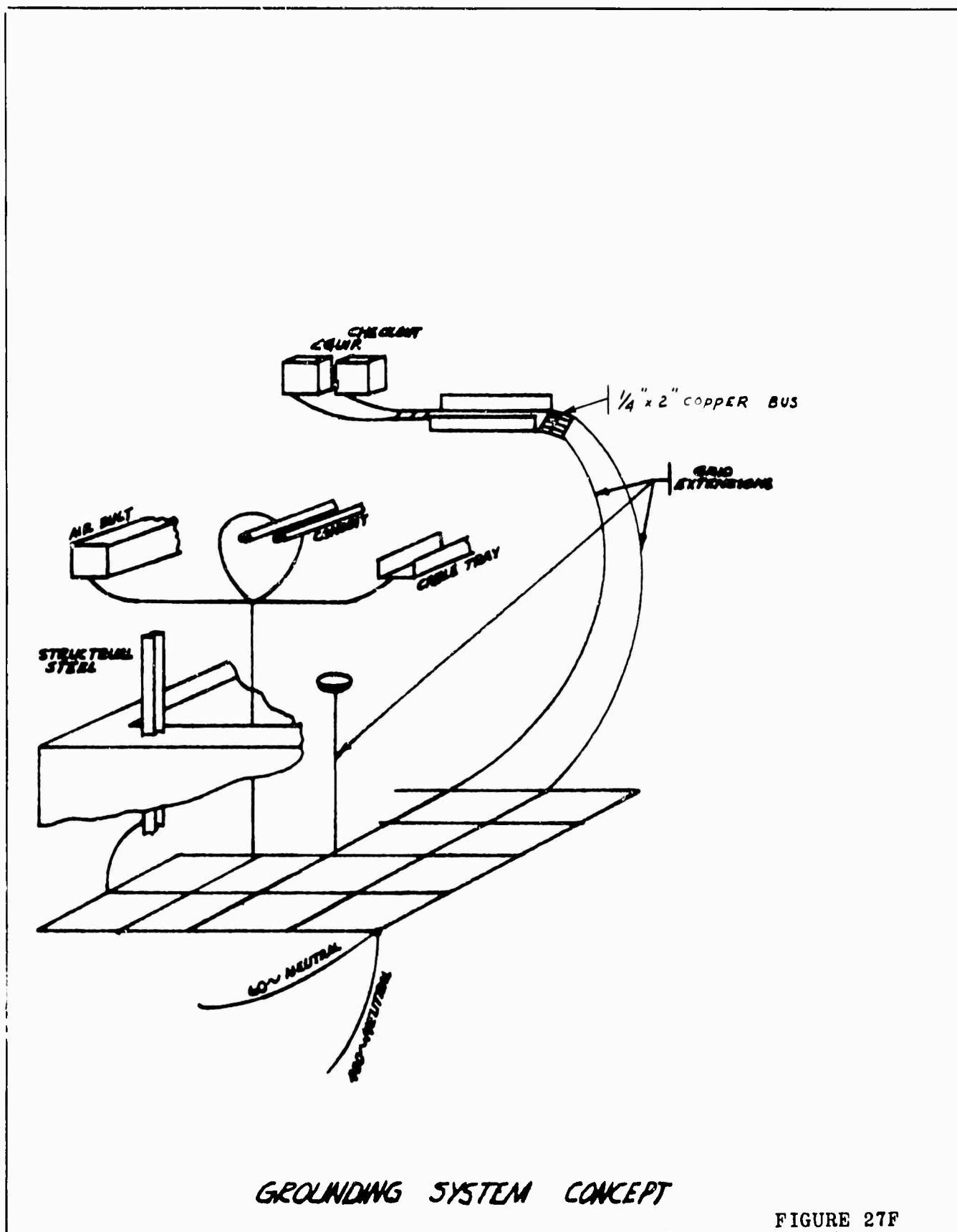


FIGURE 27F

TABLE I

Area Utility Requirements:

	<u>120V-1ϕ</u> <u>KVA</u>	<u>120-208V-3ϕ</u> <u>KVA</u>	<u>440V-3ϕ</u> <u>KVA</u>
Missile Assembly Area	46.4	72	535
Engine Maintenance Area	39.4		60.4
APS Area	8.6		
Cleaning Area			4.0
Hydraulic-Pneumatic Area	12.7		11.4
Electronic Component Test Area	20.4		79
Instrument Repair Area	6.0		
Airborne Guidance Test Area	20.8 (15.2 critical)	48	
Ground Guidance Maintenance Area	2.2	8.1	
Electrical Shop	7.2		1.0
Welding Shop			23.9
Paint Shop	1.8	1.0	
Battery Room	2.4		2.0
GSE Maintenance Area	4.2		5.0
Power Room			154.6
Sheet Metal Shop	6.0		3.0
Machine Shop	8.3		18.5
IGS Maintenance Area	61	3.0	12.5

7. MECHANICAL REQUIREMENTS

7.1 Air Conditioning and Ventilating

The following rooms in the Squadron Maintenance Building shall be air conditioned and under positive pressure:

- (a) Instrument Repair
- (b) Airborne Guidance Test
- (c) Electronic Component Test
- (d) Ground Guidance Maintenance
- (e) Ground Guidance Storage
- (f) IGS Maintenance

The following rooms require positive pressure only:

- (a) Hydraulic-Pneumatic
- (b) Cleaning

7.1.1 Pressurization shall be 0.25 inches of water (minimum static pressure). Temperature shall be maintained between 65°F - 75°F with 50-60% relative humidity. Two inch thick commercial filters shall be used to maintain rooms in a relatively dust-free atmosphere.

7.1.2 Air Conditioning shall be provided to all Checkout Equipment Platforms in the Missile Assembly Area in a volume equal to an average of 150 cu. ft./min. at a static head of 1/2 inch water. Any one unit will not exceed 300 cu. ft./min. requirement. Air temperature at entrance of each unit shall be 55°F ± 3°F, with 65% maximum relative humidity.

7.1.3 Unit air conditioning shall be provided to Airborne Guidance and Electronic Component Checkout equipment per 7.1.2. Outlets shall be provided to each checkout position, including benches. Cooling air supply ducts shall be installed in floor trench. Exhaust ducts shall be overhead (see figures 25 and 26). Bench cooling air will exhaust to the room.

- 7.1.4 Cooling air shall be provided to the Static-Dynamic Tester Control Consoles in the APS Area at $55^{\circ}\text{F} \pm 3^{\circ}\text{F}$, supplied at 300 SCFM, with 65% maximum relative humidity. Ducts shall be provided to the bottom of these units; exit air will exhaust to the room. Units will be located 24 in. (minimum) from the wall for maintenance of gear through back access hinged doors. 13
- 7.1.5 Cooling air shall be supplied to the missile equipment pods at $40^{\circ}\text{F} \pm 5^{\circ}\text{F}$ during checkout operations. Quantity shall be 125# or 1670 SCFM per missile. 50% maximum relative humidity control will be required for the missile guidance set (MGS) in the missile pod. Approximately 2 psi air pressure will be required. 13
- 7.2 Compressed Air
- Compressed air shall be supplied to all areas where actual electrical, mechanical, and cleaning functions are accomplished (see figure 2). Locations of outlets may be varied slightly to follow columns.
- 7.2.1 Air filters shall be provided with drain pet-cocks at each supply outlet. Valves, nipples, and caps for future connections shall be supplied.
- 7.2.2 Total compressed air requirements for 100% usage are 290 SCFM, supplied at 100 psi; however, nominal use will average approximately 20% of total.
- 7.3 Ducting and Exhaust
- Exhaust fans shall be provided in the Cleaning Area, Engine Clean and Purge room, and the APS Test Area for removal of toxic fumes. Proper manifolding and connections to these fans shall be provided.
- All ducts and outlets shall be provided with shut-off valves when not in use.
- 7.3.1 Provisions shall be made for removing trichlor vapors at top of tank and from floor level in Engine Purge and Cleaning, and Cleaning Areas. Dampers shall be provided to maintain room pressurization.

- 7.3.2 Stainless steel piping shall be used for sump pump lines in Engine Clean and Purge room. Trichlor will be dumped into drums located outside the building. Dump manifold shall be located 3 ft. 6 inches above ground level, valves spaced 2 ft. 6 inches apart, and one ft. flexible hose lead provided from each valve.

Exhaust duct intake shall be approximately 2 ft. above floor level, and exit at approximately 12 ft. above floor, through wall.

- 7.3.3 Exhaust duct in the APS Test Area shall be 12 inch diameter with 24 inch hood, located 5 ft. above floor and a minimum of 30 in. from wall to remove gaseous nitrogen used for cold run.

- 7.3.4 Exhaust duct in the paint booth shall be capable of handling a 24 inch fan for vapor removal.

7.4 Stubups

- 7.4.1 Stubups shall be supported by walls, stationary equipment, or stanchions.

- 7.4.2 A gaseous nitrogen stubup shall be provided in the Airborne Guidance Test Area for canister pressurization.

- 7.4.3 A gaseous nitrogen stubup shall be provided in the Cleaning Area for drying parts. Pressure required is 60 psi.

- 7.4.4 A Helium and Gaseous Nitrogen Tank Farm shall be provided adjacent to the Squadron Maintenance Building, as shown in figure 28. Stubup locations shall be as indicated. Environmental protection shall be provided for all valves, gages, etc. They must also be accessible for maintenance purposes.

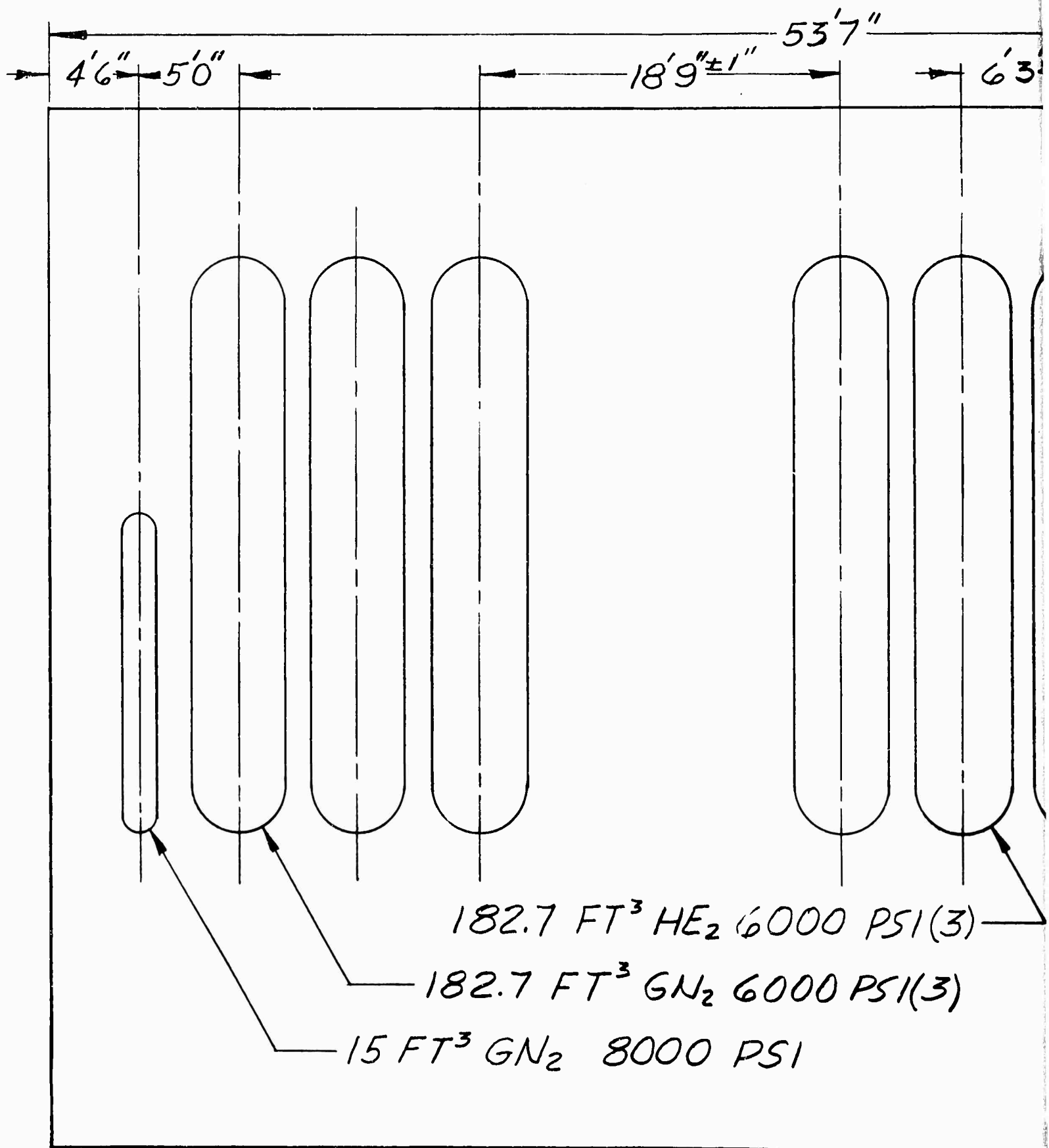
GN₂ (stored at 8000 psi)

125.4 lbs. for Hydraulic Supply Unit

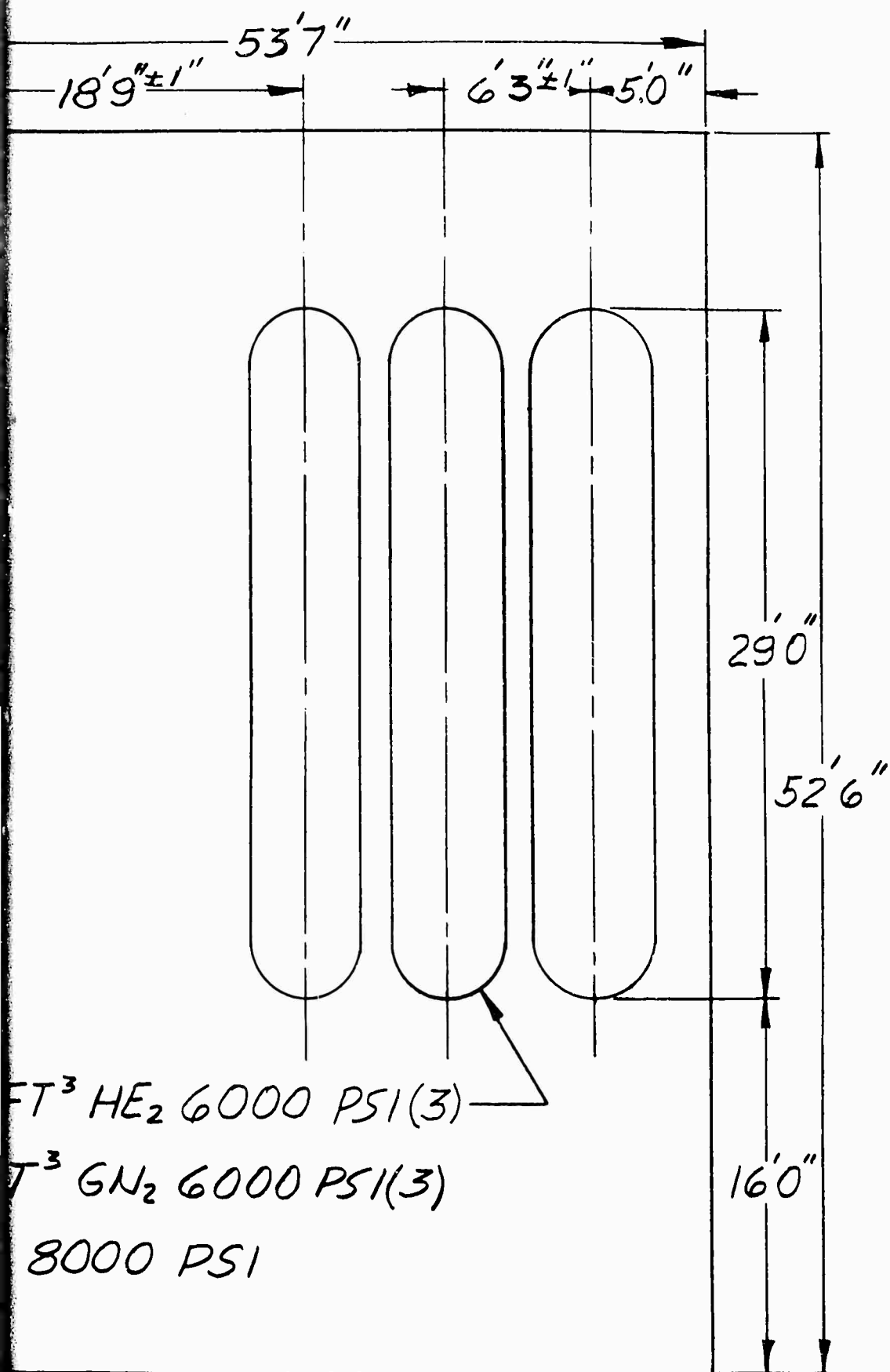
GN₂ (stored at 6000 psi)

157.3 lbs. used at 3300 psi for engine checkout

17.21 " " " " " " component c/o (Hydraulic)



1.



B.

FIGURE 28

13
↓

200 lbs.	used	at	3300	psi	for	component	c/o	(Pneumatic)
426.7	"	"	"	"	"	"	"	(Rocketdyne)
4.0	"	"	"	"	"	Nitrogen	Control	Panel (Hydraulic)
67.0	"	"	"	"	"	Nitrogen	Control	Panel (Propulsion)
1200	"	"	"	"	"	Nitrogen	Control	Panel (SCU)
144.1	"	"	"	2200	"	Component	c/o	(Hydraulic)
50	"	"	"	"	"	"	"	(Pneumatic)
1.3	"	"	"	"	"	Hydraulic-Pneumatic	Unit	
235.7	"	"	"	"	"	Service	Unit	(Rocketdyne)
400	"	"	"	"	"	APS		
1443	"	"	"	"	"	Purge	Box	(Propulsion)
140	"	"	"	500	"	component	c/o	(Pneumatic)
Helium (stored at 6000 psi)								
355 lbs.	used	at	3300	psi	for	component	checkout	
80	"	"	"	"	"	DCU		
17	"	"	"	"	"	Engine	c/o	Cart
167	"	"	"	2200	"	component	c/o	
433	"	"	"	500	"	"	"	
240	"	"	"	"	"	missile	breathing	
80	"	"	"	"	"	missile	leakage	
30	"	"	"	"	"	purging		

All gas requirements are based on a 10 day recharge period and include a safety factor of 50%.

7.5 Steam

Sufficient steam shall be provided to heat 500 gallons of water to 180°F in 4 hours, and to maintain 1300 gallons of water at 180°F.

7.6 Water

Water filters (50 micron) shall be provided at all ultrasonic and water rinse tanks.

7.6.1 Minimum building water supply pressure shall be 65 psi.

7.6.2 Total equipment connected load requirements (does not include use of water from hose bibs or building plumbing requirements) are as follows:

12 GPM @ 180°F

123 GPM @ ambient

The following areas will require water:

- (a) Missile Assembly Area
- (b) Engine Maintenance Area
- (c) Hydraulic-Pneumatic Area
- (d) Cleaning Area
- (e) Paint Shop
- (f) Battery Room

7.7 Plumbing and Heating Requirements

	Hot Water	Cold Water	Drain to Sewer	Steam	Floor Drain	Hose Bib	Shower	Eye Washbowl
Hydraulic Supply Unit		X	X					
Hydraulic Pumping Unit		X	X					
Ultrasonic Cleaning Units		X	X					
Water Rinse Tank		X	X	X				
Trichlor Tank		X	X	X				
Horizontal Ultrasonic Tank		X	X	X				
Vertical Ultrasonic Tank		X	X	X				
Quench Tank		X	X					
Trenches					X			
Paint Spray Booth		X			X	X		
Battery Room	X	X	X		X	X	X	X

TABLE II

Area Utility Requirements:

Facility Requirements for
Equipment Cooling Air @ 55°F ± 3°
SCFM

(Peak Reqmts)

Missile Assembly Area	
(Series "D" Missile c/o Platform)	1950 ea.
(Series "E" Missile c/o Platform)	1225
APS Area	150
Electronic Component Test Area	2700
IGS Maintenance Area	200

8. SPECIAL FACILITY REQUIREMENTS

8.1 Overhead Cranes

8.1.1 A 5 ton bridge crane shall be provided in the Engine Maintenance Area. This shall be accomplished by a set of bridge crane electrified rails with 45 ft. limits. Bridge monorails shall have interlocking capability for transfer of monotractor hoist from one area to the other.

8.1.2 A 5 ton monorail shall serve the GSE Maintenance Area.

8.1.3 Control shall be "floor pendant control" to provide lateral, longitudinal, and vertical motion for bridge cranes, and vertical motion for the monorail crane.

8.1.4 All crane travel speeds shall be variable within the following limits:

	Minimum (ft/min)	Maximum (ft/min)
Trolley	1.5	50
Bridge	1.5	50
Hoist	1.5	25

8.1.4.1 A variable speed hand controller shall be provided to operate the cranes at any selected speed within the operating speed range. The hand controller shall be capable of regulating the acceleration of the cranes to 20 ft/min/sec or less.

8.1.4.2 All motions shall have magnetic braking to allow for inching control.

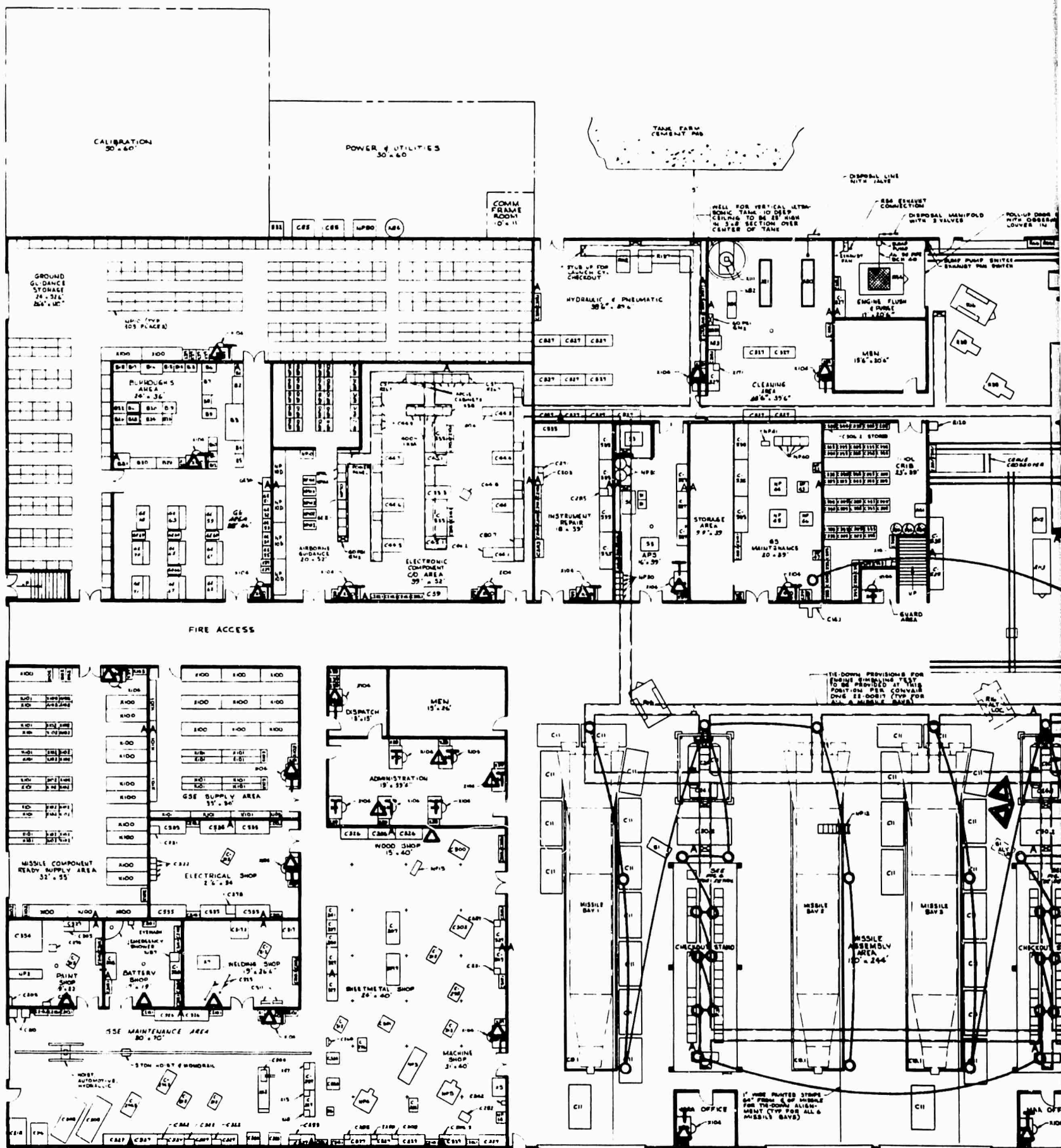
8.1.5 Crane hooks shall be capable of operating from floor to the following distance above floor:

Engine Maintenance Area	23 feet
GSE Maintenance Area	13-1/2 feet
Cleaning Area	23 feet

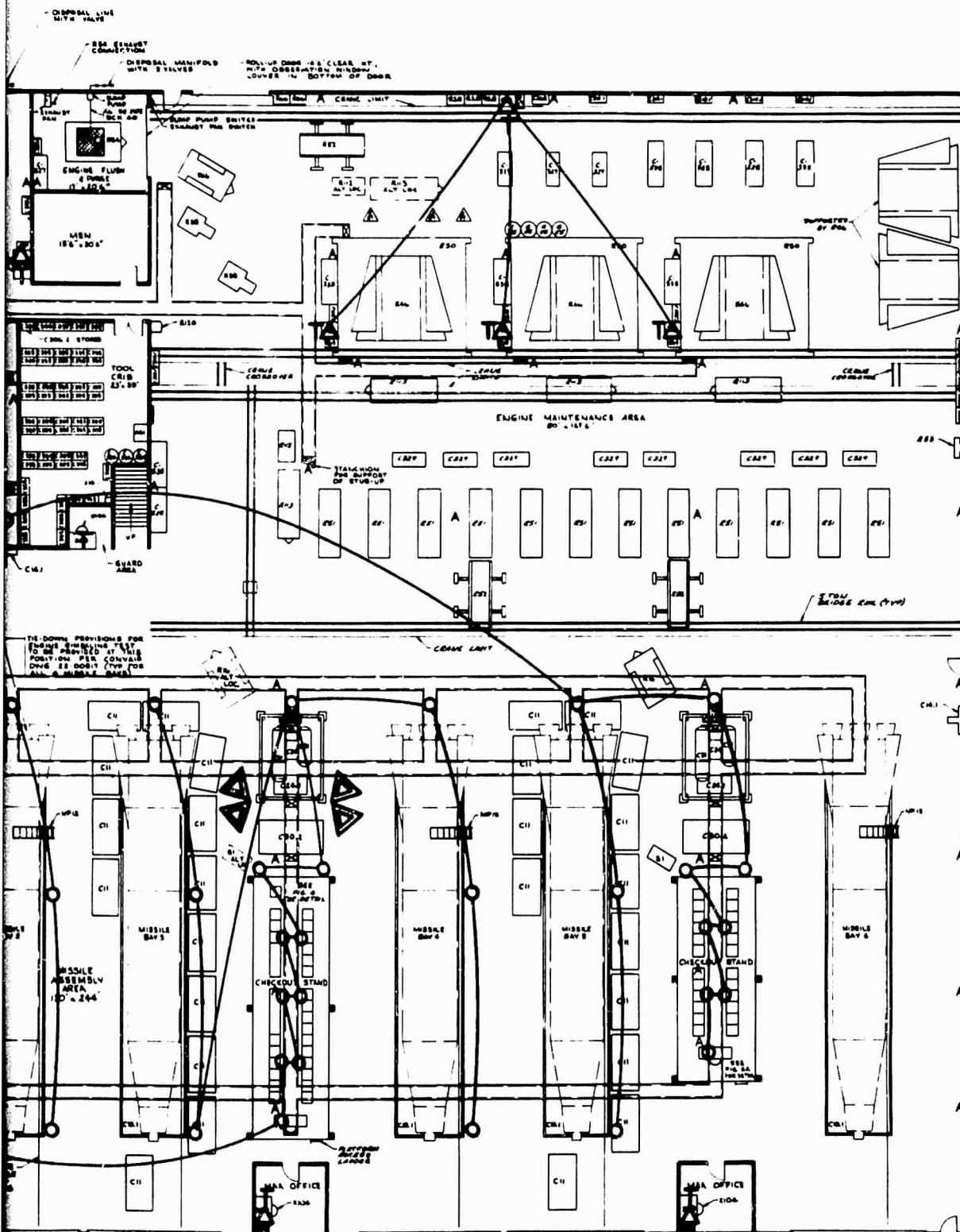
- 8.1.6 When the cranes are carrying their rated capacities, the allowable stresses shall not exceed $1/5$ the ultimate strength of the materials used.
- 8.1.7 All open ends of runway rails shall be provided with stops and limit switches to prevent over-travel of bridge.
- 8.1.8 Bridge and trolley shall have fluid connection between motor and drive to provide smooth action.
- 8.1.9 Hoist shall have adequate braking action to prevent overhauling of the motor in the lowering direction. There shall be a motor brake to quickly stop rotation of the armature and provide inching control. This brake must be capable of sustaining the load.
- 8.1.10 Hoist shall have automatic limit switch arranged to prevent over running of the load block in the hoisting direction by opening the electric hoisting circuit.
- 8.1.11 Lubrication means shall be provided to maintain all moving parts. A ladder shall be provided for servicing.
- 8.1.12 Load blocks for hoist shall be guarded so that objects cannot fall into them. Guards shall eliminate displacement of cables for sheave grooves.
- 8.2 Noise Suppression
- Required on ultrasonic cleaning equipment and Accessory Power Supply Test Room.
- 8.2.1 All units shall be insulated to limit sound pressures to 85 db or less by use of fiberglass or celotex applied to plywood barriers.
- 8.2.2 Covers shall be supplied with ultrasonic cleaning units to suppress sound through top opening.
- 8.3 Liquid Disposal
- Required for disposal of solvent and acid.

- 8.3.1 Stainless steel piping, pump, and valves shall be used for transfer of trichlor from Engine Clean and Purge sump to disposal drums for reclamation.
- 8.3.2 Stainless steel piping and valves shall also be used for transfer of trichlor from the cleaning area vapor degreaser to disposal drums outside of building. Pumping capability will be provided by vapor degreaser recirculating pump.
- 8.3.3 Provisions shall be provided for neutralizing acids before disposal.
- 8.4 Communications
- Several areas of the SMA will require special equipment and service, in addition to the normal complement of standard desk or wall type dial phones required for routine administrative functions.
- 8.4.1 Communications shall be provided to other installations of the complex and base, and to mobile vehicles as required.
- 8.4.2 Communication shall be accomplished by the following means:
- (a) Dial telephones
 - (b) Direct line telephones
 - (c) Intercoms (Job Control and Checkout Equipment Platforms)
 - (d) Non-tactical radio (independently leased by AF)
- 8.4.3 System shall be flexible, i.e. able to incorporate future modifications and layout changes with minimum expense and effort.
- 8.4.4 System shall be easy to maintain, so that trouble shooting and repairs can be accomplished with minimum time and effort.

- 8.4.5 Telephones are required in the Squadron Maintenance Building, located as shown in figure 29. This does not include requirements in the mezzanine AF administrative offices.
- 8.4.6 Dial telephones are required in the storage building office, tied into the base dial system.
- 8.4.7 Direct line service as indicated in figure 29A will handle 30 lines, with provisions for future expansion to 35 lines.
- 8.4.8 Intercom system shall cover the areas indicated in figure 29.
- 8.4.9 Non-tactical radio shall consist of leased commercial fixed station and mobile units. See figure 29B for radio coverage.
- 8.4.10 Communication control center for the Squadron Maintenance Building shall be in the Job Control area located in the mezzanine. This location shall include a communication console, integrated with radio remote controls.
- The console, or dispatcher's turret, shall be wired and equipped for 30 drops, and shall be integrally built with a desk or table. Space for records, cardex, etc. shall be provided in console desk or table. Arrangement for future 2-position operation shall be provided.
- 8.4.11 System shall permit arbitrary conferencing at the option of the operator by depressing appropriate keys.
- 8.4.12 A 52 AW headset (or equivalent) shall be used by the Job Control operator for telephone and radio communication.
- 8.4.13 The Squadron Maintenance Building and Storage Building shall be supplied with Strategic Alerting Sound System (SASS) speakers.



A.



COMMUNICATIONS LAYOUT LEGEND:

- T- TELEPHONE
- Δ- INTERCOMM UNIT, DESK TYPE, SEND-RECEIVE. JOB CONTROL SYSTEM
- O- INTERCOMM UNIT, SEND-RECEIVE. CHECKOUT AREA SYSTEM
- ◁- SPEAKER, JOB CONTROL SYSTEM

LEGEND:

- + FLUSH ELECTRICAL CONDUIT OPENING IN FLOOR
- FLOOR DRAIN
- △ TRICULAR DRAIN FITTING
- ROLL-UP DOOR OR SHUTTER
- 4" STUD WALL
- 8" REINFORCED CONCRETE WALL
- BASE BID ON WALL
- TRENCH (SEE FIGURE 27 FOR DETAILS)
- A COMPRESSED AIR OUTLETS

MY 8
OPERATIONS ENGINEERING SKETCH #3
EQUIPMENT LAYOUT

SQUADRON MAINTENANCE BLDG
FOR WAREHOUSE 28B, WYOMING

NOTE: 1. ALL EQUIPMENT FOR SKETCH #3
SHOWN IN THIS SKETCH IS TO BE LOCATED IN AREA ADJACENT
TO SQUADRON MAINTENANCE BLDG.

MY 8 1964

SCALE 1/4" = 1'

B.

FIGURE 29

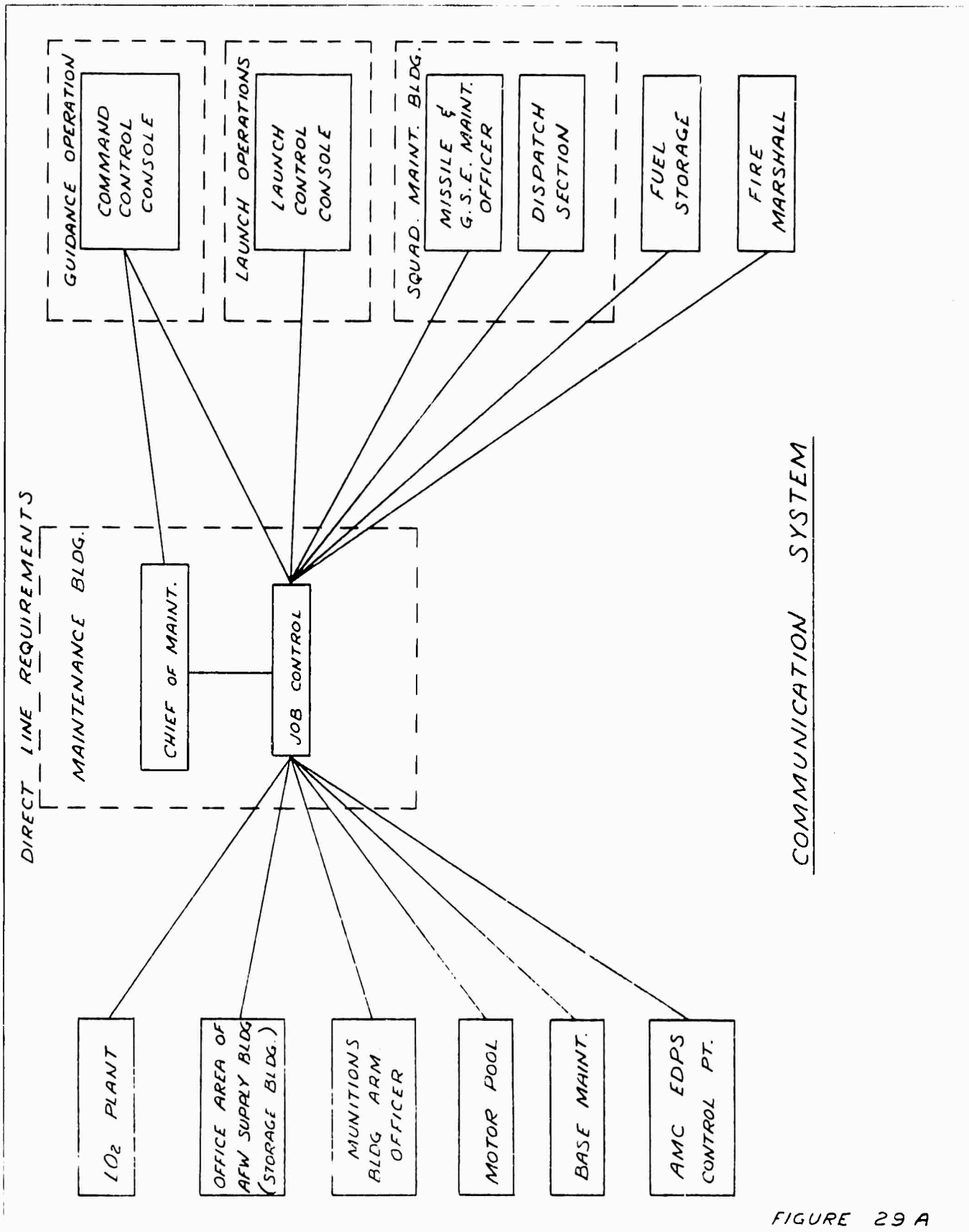


FIGURE 29 A

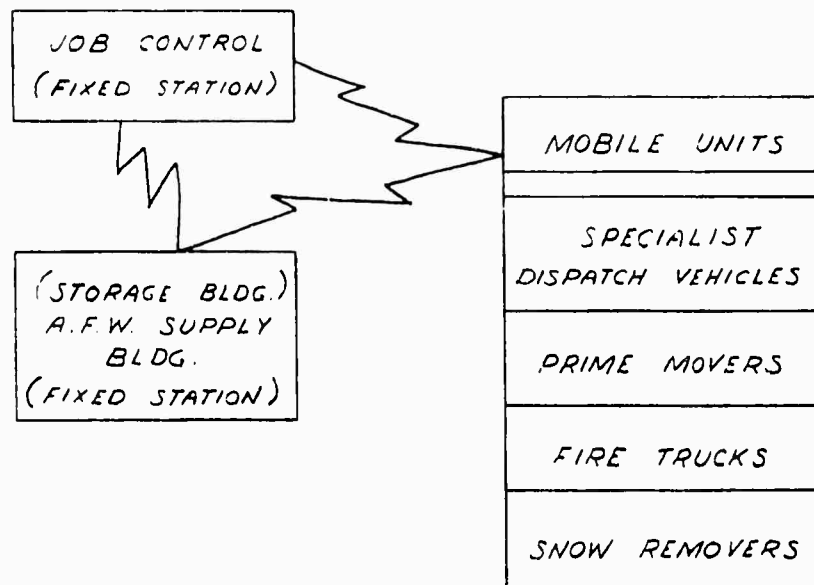
RADIO SYSTEM

FIGURE 29 B

9. EQUIPMENT DESCRIPTION

9.1 Missile Assembly Area

9.1.1 Checkout Equipment Platform

9.1.1.1 Automatic Programmed Checkout Equipment (APChE)

The heart of the checkout system is contained in the APChE. This equipment is intended to perform all electrical tests required during the routine checkout and maintenance period. It will also be used to initiate all sequences required to control the ground equipment, in addition to performing missile tests. The APChE installation includes the following items:

(a) APChE Console - CV-A 53.5

This unit, in console form, contains all APChE components which will normally be used by the operator.

(b) Digital Unit - CV-A 53.5.1

This unit contains a communication panel, relay and transistor logic circuits, timers, counter registers, digital comparators, 2 kc clock, and a 60 cycle clock.

(c) Analog Unit - CV-A 53.5.3

This unit contains the transfer function analyzer, an analog to digital converter, timer, and reference switching.

(d) Auxiliary Switching (LCC) APChE - CV-A 53.5.5

The APChE connects itself to the desired test points via a master-slave switching arrangement. This unit is the master unit, and is similar to the master unit used by the APChE in the Launch Control Center.

(e) Auxiliary Switching (SMA) APChE - CV-A 53.6.1

This is the slave unit to item CV-A 53.5.5 above.

(f) Power Supply APChE - CV-A 53.5.7

This unit supplies the various DC voltages required by APChE electronic circuitry.

9.1.1.2 SMA Ground Equipment Control Unit - CV-A 62.6

This unit will provide relays and contacts required for operating the static and dynamic pneumatic checkout units.

9.1.1.3 Propellant Utilization System Exerciser - CV-A 80.4

The P.U. Exerciser generates a series of 16 precision pressure groups upon command from APChE. Each specific pressure group will be calibrated to cause specific mass ratio error to be generated at the output of the mass ratio error demodulator. APChE will monitor the error demodulator output from the propellant utilization unit and record error values.

9.1.1.4 Switching and Cable Distribution Unit - CV-A 65.5

This unit will be used to switch checkout equipment racks to any one of four test positions. It will also permit switching the equipment from one checkout platform to the other.

9.1.1.5 Cable Distribution Unit, SMA - CV-A 65.5.1

This unit will provide a common junction point for all of the interconnecting cables between each of the four test positions and one checkout equipment station.

9.1.1.6 Power Distribution Unit - CV-A 65.7

This unit is required for distribution of dc, 400 cps, and 60 cps power to each of the equipment sets. It will provide for switching control, fusing, and distribution of the supply voltages.

9.1.1.7 Autopilot Ground Control Unit - CV-A 80.7

This unit will monitor missile response during guidance/autopilot sub-loop tests, monitor gyro temperature, and provide gyro and integrator nulling when necessary.

9.1.1.8 Missile Ground Power Control Unit - CV-A 89.7

This unit will be used for the purpose of controlling ground power to missiles during test operations. It will also be used for switching ground power to the missile electrical circuits.

9.1.1.9 Power Supply, 28V DC, 300 amp - CV-A 87

This unit is a rectifier and will supply the 28 volts DC ground power to the missile during checkout operations. It will also be used to supply the DC requirements to the test equipment.

9.1.1.10 Guidance Checkout Test Set - GEAG 1

This set will functionally check the guidance system by simulating certain r-f transmissions that occur between the airborne sets and the ground station during flight, and by measuring the resultant responses in the airborne equipment.

9.1.1.11 APS Static-Dynamic Tester (Control Unit) - S/TD 1

This unit will be used to control the APS system during checkout. It will be used in conjunction with the static dynamic tester operational unit (APS cart) which is located near the missile.

9.1.1.12 Power Supply SMA - CV-A 65.5.5

This unit supplies DC voltages required by transistor circuits in the autopilot ground control unit and the target data control unit.

9.1.1.13 Target Data Control Unit - CV-A 80.5

This unit operates in conjunction with the autopilot ground control unit. It applies voltages to the autopilot programmer during checkout operations.

9.1.1.14 RF Switching Unit - CV-A 65.5.3

This unit is used to switch RF and other signals of on-off nature from the missile locations in the SMA to the guidance checkout equipment.

9.1.1.15 Rocket Engine Checkout Programmer - NAA/R 104

This unit is used in conjunction with the APChE for certain tests of engine components.

9.1.1.16 Voltage Regulator - X 50

This unit will regulate the voltage inputs to the APS Static-Dynamic Tester.

9.1.2 Supply Unit Hydraulic - CV-A 30.2

This unit provides an oil supply for filling and bleeding missile hydraulic systems and provides hydraulic power for either hydraulic or autopilot systems checkout.

9.1.3 Nitrogen Charge Panel - CV-A 26.0.3

The nitrogen charge panel regulates the gaseous nitrogen required for charging the NAA/R accumulator, sustainer accumulator, booster accumulator, and hydraulic reservoir.

9.1.4 Checkout Unit, Dynamic, Pneumatic - CV-A 24

This unit provides major checks of: (1) missileborne regulators, (2) missileborne valves, (3) overall leak of components, and (4) emergency dump valves. It is sequenced to simulate an actual firing. It does not contain provisions for engine control checkout.

9.1.5 Checkout Unit, Static, Pneumatic - CV-A 24.1

This unit provides major checks using nitrogen gas of: (1) rise-off disconnects, (2) staging disconnects, and (3) internal leakage of components.

9.1.6 Box Assembly, Control, Propulsion Ground Support System (Purge Box) - X 4

This unit is used for purging engines, valves, and fuel and LO₂ lines during checkout and test operations.

9.1.7 Simulation Assembly, Ullage - CV-A 31

This unit serves to simulate missile fuel and liquid oxygen tanks to permit checkout of the airborne pressurization system, including regulators, control valves, and lines. It also serves to checkout pressurization control units received from the factory or launch complex.

9.1.8 Missile Handling Trailer - 27-91000 - CV-A 19.1

The missile handling trailer is a tubular steel structure with a four wheel steerable bogie at the rear. It is a semi-type trailer. Some of the salient features are as follows:

- (a) Missile stretch equipment
- (b) Pressurization equipment for the missile
- (c) Forward and aft missile attach points
- (d) Aft missile support band
- (e) Power steering facilities for the bogie
- (f) Security cover for the missile
- (g) Booster disconnect carriage
- (h) Removable bogie
- (i) Hydraulic jacks near the four corners of the trailer for facilitating bogie change, supporting the trailer during storage, and changing tires.
- (j) Casters for aligning the trailer during loading into C-133 aircraft and mating the trailer to the launcher.

The missile handling trailer performs the following functions:

- (a) Transports missile from factory to SMA by highway
- (b) Supports missile during checkout, repair, and storage
- (c) Transports missile from SMA to launcher.
- (d) Provides missile stretch and tank pressurization as required

9.1.9 Tie-Down & Support, Trailer, Engine Gimbaling - 27-90001
CV-A 19.2

These tripodal supports are in a set of six with a mechanism at the top of each for attachment to the missile handling trailer. The supports are bolted to the floor of the Missile Assembly Area. These supports are used during engine gimbaling tests to hold the missile in a secure position.

9.1.10 Vernier Engine Access Ladder - NP-12

This ladder is used to gain access to the vernier engine on the missile.

9.1.11 Booster Handling Trailer - 27-93000 - CV-A 18.1

This trailer (with booster disconnect carriage) is used to transport a missile booster section by either highway or air. It may also be used for storage of a spare booster section at the SMA. The trailer without the booster disconnect carriage is used to align with, and receive, the booster section from a missile installed on the missile handling trailer during booster change operation.

The booster handling trailer is a structural steel, four wheel trailer with the front wheels steerable by a towbar and the rear wheels steerable by a hand operated crank mechanism. It is equipped with vertical and horizontal booster supports located upon a movable carriage. It is also equipped with steel framework for supporting the aft booster nacelles. The trailer is equipped with four mechanical screw jacks, one near each corner, for

raising it to a level with the missile handling trailer during booster section transfer.

9.1.12 Sling Assembly, Booster Handling - 7-93053-3 - CV-A 13

The booster handling sling is used for changing missile booster sections in the missile assembly area and for transporting the booster to the engine repair area. The sling is not structurally adequate to lift the aft end of the missile.

The booster handling sling is a C-shaped tubular steel sling with integral adjustable crane attach fittings. The two arms of the sling are equipped with retractable pins. These pins are inserted into the main support bearings located in the thrust structure of the missile booster section.

9.1.13 Service Platform, Demated Booster Section - 7-97075-CV-A 11.0.1

This platform provides a walkway within a demated booster section for maintenance or checkout purposes.

The horizontal demated booster section platform is an aluminum structure which is placed inside a booster section to provide a walkway for maintenance and checkout purposes. It is used only when the booster section is demated from the missile and either resting in the booster handling cradle or booster handling trailer. The platform is handled during removal or installation with a fork lift vehicle. Its floor has removable panels to allow access to the area of the booster section below platform level. The platform fits into the booster section between stations 1165 and 1240.

9.1.14 Sling Assembly, Aft Nacelle - 27-93054 - CV-A 14.1

This sling is used to handle the aft nacelles of the missile booster section during removal and installation of the nacelles. The nacelles must be installed on the booster section upon arrival of the missile at the SMA. They must be removed during removal of major components from the booster section.

The sling is a pivoted tubular structure with two clamps on one end for attaching to the aft booster nacelle in two places at approximately station 1283 and a clamp fitting at the other end for attaching to the launcher kick-strut fitting on the nacelle at approximately station 1226.

9.1.15 Cradle, Canister Handling - 7-91156 - CV-A 5.1.1

The cradle is used to hold the canisters during maintenance operations. It may also be used for interim canister storage. If so, quantities will increase.

The canister handling cradle is a steel pan-like cradle. The canisters lie horizontally in the cradle and are held in place by two web straps which connect to one side of the cradle, extend over the canister, and connect to the other side.

9.1.16 Missile Alignment Gages - 27-90000 - CV-A 1.3.1

This equipment is used to gauge the position of the missile within the handling trailer to assure the missile is aligned to the trailer in the correct relationship with the launcher.

One set of missile alignment gages is required for use at the SMA. Each set consists of three gages, two of which are identical and used in the SMA. The third gage is used at the launcher.

The SMA gages are constructed of an aluminum structure with a circular gage bar 90° to the main structure, and located at the top. In use, the structure is bolted to the missile handling trailer and the gage bar is used to locate the position of the missile within the trailer. One gage is used on each side of the trailer.

9.1.17 Work Stand Installation - SMA - 27-97020 - CV-A 11

The work stand is used in performing missile checkout and maintenance operations in the Squadron Maintenance Building.

The missile work stand installation consists of a series of portable platforms which connect together to encircle the missile installed on the missile handling trailer. The platforms provide access to various parts of the missile for maintenance and checkout purposes. The platforms are constructed of aluminum and are equipped with casters to permit ease of movement. Handrails are provided along the outer edges for personnel safety. Stairways are provided for personnel access. Certain platforms of the stand installation are interchangeable.

9.1.18 Missile and Trailer Weighing Provisions - X 14

The weighing provisions consist of a tripod jack and steel adapter, used at the front of the trailer to mount a load cell. Load cells at the rear of the trailer are placed under hydraulic jacks, which are part of the trailer. Either the combined missile and handling trailer, or the trailer only, can be weighed by this method.

The following GFE items will be supplied to weigh the missile and handling trailer:

- (a) One Type C-1 Aircraft Weighing Kit conforming to Specification MIL-W-7327A
- (b) One aircraft folding tripod jack
- (c) One steel adapter for the missile trailer kingpin

9.1.19 APS Static-Dynamic Tester (Operational Unit) - S/TD 1

This unit is mobile and contains hydraulic, pneumatic, and electrical systems for maintenance of the APS. It is used in conjunction with the APS static-dynamic tester located on the checkout platform.

The operational unit houses the hydraulic lubrication, pneumatic, and electrical systems for the following functions:

- (a) The hydraulic system provides the fluid storage, loading orifices, transducers, and plumbing to provide APS pump loads as a measure of the hydraulic pump.

- (b) The pneumatic system controls the nitrogen required to drive the APS turbine and provides pressurization for the hydraulic and lube sumps.
- (c) The electrical system provides the electrical loads for the AC and DC generators. The control and monitoring cabinet contains all controls for each system in the operational unit, and instrumentation for the critical parameters of the APS, as well as the instrumentation required to determine satisfactory operation of the systems outside the APS.

9.1.20 Trailer, Engine Servicing - NAA/R 16

This unit is used to store, transport, and deliver fluids required for flushing, purging, lubricating and preserving the engine subsystem in preparation for launch or storage.

9.2 Engine Maintenance Area

9.2.1 Rectifier, 28V DC - R 120

This rectifier will supply 28 volts DC to the engine repair and APS repair areas. It is rated at 200 amp.

9.2.2 Pumping Unit, Hydraulic - NAA/R 112

This unit provides 0-5 gpm hydraulic fluid flow at pressures up to 4500 psig and 0-10 gpm flow at 3000 psig for the engine checkout cart (R 113) and the component test stand (R 137).

9.2.3 Stand, Test, Elect., Pneu., Hyd. System - NAA/R 113

This is an air transportable, mobile cart to be used for engine leak and functional testing. It will test:
(1) #1 booster thrust chamber, (2) #2 booster thrust chamber, (3) booster power package, (4) sustainer engine, (5) vernier system, (6) integrated start system, (7) demated boattail section, (8) engine regulators, and (9) head suppression valves.

9.2.4 Work Stand, Thrust Section - R 50

Not yet designed.

9.2.5 Grinder, Pedestal - CV-A 260

This grinder will be used for sharpening tools and routine grinding functions. It is rated at 2 to 3 HP, 440V, and uses a 12 inch diameter wheel.

9.2.6 Service Unit, Lubricating - Purging, Rocket Engine - NAA/R 16

This unit is used to flush, purge, lubricate, and preserve the engine subsystems in preparation for the launcher or for storage.

9.2.7 Trailer, Transportation - NAA/R 51

This trailer is used for local transportation of a rocket engine and its handler.

9.2.8 Cradle, Booster Handling - 7-93086 - NAA/R 46

The cradle is used to provide a supporting device for storage of spare booster sections. The cradle may also be used to support the booster section during maintenance operations.

The cradle consists of a tubular steel framework which connects four vertical plywood support panels. The upper edges of these panels are contoured to fit the shape of the outside of the booster section structure. The booster section is secured to the cradle by means of a locking pin which engages the lower auxiliary support attach fittings on the booster section.

9.2.9 Stand, Maintenance, Rocket Engine - NAA/R 54

This stand supports the sustainer engine and booster thrust chamber in the vertical position for flushing the chamber, injector, LO₂ dome, and fuel jacket, and is also used for preserving the pump.

9.3 APS Area

9.3.1 APS Static-Dynamic Tester (Control Unit) - S/TD 1

Refer to 9.1.1.11

9.3.2 APS Static-Dynamic Tester (Operational Unit) - S/TD 1

Refer to 9.1.20

9.3.3 APS Handling Dolly - S/TD 3

This dolly supports the APS for maintenance and transportation.

9.3.4 Voltage Regulator - X 50

Refer to 9.1.1.16

9.4 Cleaning Area

9.4.1 Ultrasonic Cleaning Tank - X 84

This tank will be used to clean and decontaminate components. It will be horizontally installed.

9.4.2 Ultrasonic Cleaning Tank - X 82

This tank will also be used to clean and decontaminate components. It will be installed in a vertical well at approximately one foot above floor level.

9.4.3 Ultrasonic Control Panel - X 83A

This panel will be used to provide control of electricity to transducers in ultrasonic cleaning tanks.

9.4.4 Water Rinse Tank - X 81

This tank will be used to rinse cleaning agent from parts after cleaning.

9.4.5 Vapor Degreaser - X 80

This tank will be used to wash heavy dirt and grease from components prior to ultrasonic cleaning.

9.5 Hydraulic-Pneumatic Area

9.5.1 Stand, Test, Electrical, Pneumatic Component - NAA/R 137

This stand is used to perform leakage and functional tests of electrical, pneumatic and hydraulic components.

9.5.2 Pumping Unit, Hydraulic - NAA/R 112

Refer to 9.2.2

9.6 Electronic Component Test Area

9.6.1 Harness Checkout Unit - C 39

This unit will be used to test harnesses for: (1) electrical continuity, (2) short circuits, and (3) high voltage insulation breakdown.

9.6.2 Gyro Canister Component Checkout Unit - C 44.2

Multi-Mode Gyro Turntable Checkout Unit - C 44.1

These units will be used with the component automatic programmed checkout equipment (CAPChE) to check: (1) pitch, yaw, and roll displacement gyros, (2) pitch, yaw and roll rate gyros, and (3) heater control group.

9.6.3 Servo Canister Checkout Unit - C 44

This unit will be used with the CAPChE to perform functional operation of the servo canister.

9.6.4 Control and Readout Auxiliary Unit - C 44.8

This unit will be used for remote indication and override of CAPChE during certain adjustment operations.

9.6.5 Propellant Utilization Checkout Unit - C 44.3

This unit will be used with the CAPChE and P.U. exerciser to check functional operation of the P.U. components.

9.6.6 Component Automatic Programmed Checkout Equipment
Console - C 45.1

See 9.1.1.1(a)

9.6.7 CAPChE Cabinets

Part of C 45.1

9.6.8 Electric System Component Checkout - C 44.7

This unit will be used with the CAPChE to functionally test power handling components of the missile electrical system and GSE such as the inverter canister and the interconnecting box and power changeover switch.

9.6.9 Electro-Mech/Relay Checkout Unit - C 44.6

This unit will be used with the CAPChE for functional tests of GSE components, and those containing electrical and electro-mechanical elements, such as card programmers, printers, and timers.

9.6.10 Amplifier/Network Checkout Unit - C 44.5

This unit will be used in conjunction with the CAPChE to perform functional tests of amplifiers, filters, and similar electronic circuit sub-assemblies, including airborne and GSE components.

9.6.11 Power Supply, Auxiliary - C 44.9

This unit provides the necessary power supplies and power supply switching capabilities for interconnecting them to the component checkout units.

9.6.12 Servo Cylinder Assy. Checkout Unit - C 44.4

This unit is used with the CAPChE for functional testing of completed hydraulic servo actuator assemblies. It will also test the pressure control unit, propellant level control unit, and P.U. exerciser.

9.6.13 Adapter and Installation Cable Kit - C 45

This is an interconnecting cabling kit to operate various checkout positions in conjunction with the CAPChE. It will also be used with the harness tester.

9.6.14 Propellant Exerciser Unit - C 80.4

This unit will provide simulated fuel and LO₂ pressures to missile mercury manometers.

9.6.15 Bench Installation - Canister Pressurizing and Purging - C 33.3

This unit is used to leak check, purge, and pressurize canisters. Dry nitrogen and air shall be provided.

9.7 Airborne Guidance Test Area

9.7.1 Guidance Checkout Test Set, Mod III - GEAG 1

Same as 9.1.1.10

9.8 Ground Guidance Maintenance Area

The following items will provide ground guidance component checkout for the General Electric and Burroughs equipment:

- (a) Auto Sequence Tester - GE-60 (GE-61, -62)
- (b) Test Console - B-3
- (c) Packet Test Set - B-6 (B-9)
- (d) Electronic Counter - B-13
- (e) Signal Generator - B-14 (B-15)
- (f) Power Supply Test Set - B-21
- (g) Electro-Mechanical Test Set - B-25
- (h) E.M.T.S. Fixture - B-31

9.9 IGS Maintenance Area

The following items will provide Arma inertial guidance system missile and component checkout:

- (a) Countdown Group - NP-40
- *(b) Amplifier Assembly - NP-41
- *(c) Collimator Electronic Box - NP-42
- *(d) Collimator Assembly - NP-43
- (e) GSE Test Set - NP-48

*Portable items, also used in Missile Assembly Area for missile system checkout.

9.10 Power Room**9.10.1** Motor Generator, 400 cps - CV-A 85

This unit is rated at 5 KVA and will provide 120/208V, 3-phase, 400 cycle power to the missile checkout equipment.

9.10.2 Motor Generator, 400 cps - B-32

This unit is rated at 1.6 KVA (2 HP) and will provide 400 cycle power to the Burroughs component test equipment.

9.10.3 Motor Generator, 400 cps - NP-50

This unit is rated at 7 KVA and will provide 400 cycle power to the IGS equipment.

9.10.4 Ultrasonic Generator - X 84

This unit will provide power to the ultrasonic cleaning transducers. It is rated at 100 KW.