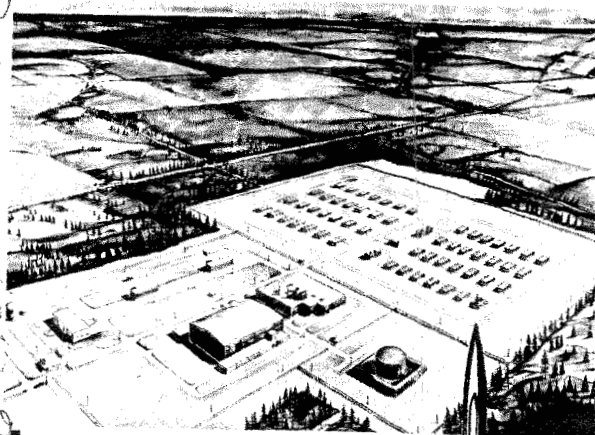


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B-99A BASES MANUAL

BOEING SEATTLE, WASHINGTON
PILOTLESS AIRCRAFT DIVISION

ISSUE NO. 174
ISSUED TO J. C. Bogart
DATE OF PUBLICATION 12-3-59

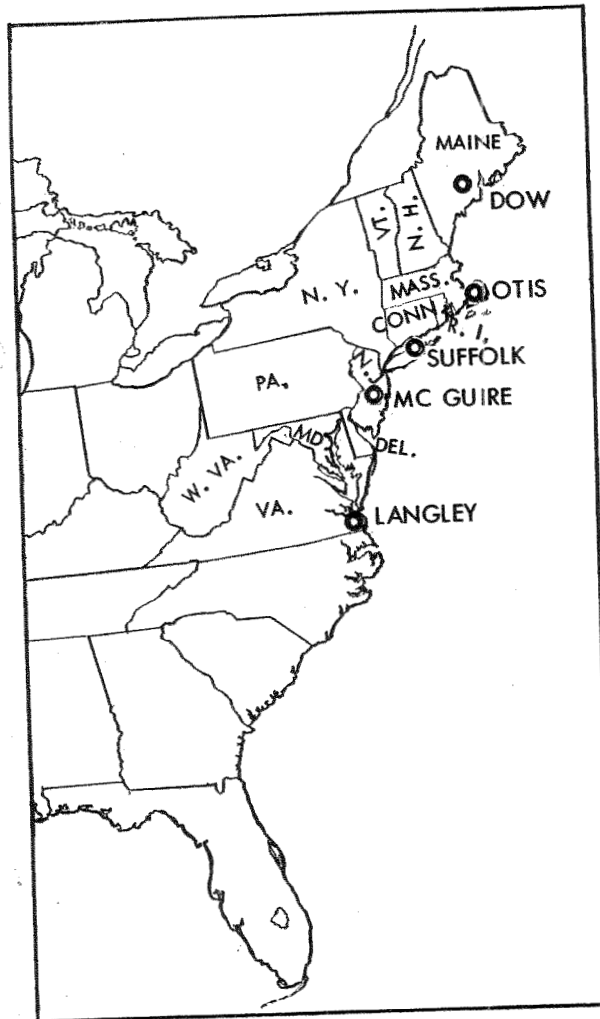
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1. BASES

SECTION 1 BASES

- McGUIRE - BASE NO. 1
- SUFFOLK - BASE NO. 2
- OTIS - BASE NO. 3
- DOW - BASE NO. 4
- LANGLEY - BASE NO. 5

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NORTHEASTERN UNITED STATES
SHOWING LOCATIONS OF IM-99A BASES

BOEING D5-4684 C

SECURITY AND RELEASE INFORMATION

This document is unclassified; however, the release to the public of any information contained herein is not authorized.

Information contained herein is considered accurate at the time of publication. Official data available in the referenced technical orders, drawings, and specifications has been summarized here as a convenience. Existing rules regarding indiscriminate or unauthorized dissemination of military information are still applicable.

B | D5-4684 BOEING

Introduction

The purpose of this book is to familiarize Boeing and Air Force personnel—WSPO, ADC, OOAMA, etc.—with the five IM-99A bases. The first section orients the reader to each base, with information on travel, geography, weather and housing. Maps of base locations and base layouts are included.

The second section covers the principal buildings on the bases, including layout of rooms and a functional description. Sections 3 through 5 contain illustrations and descriptions of all important items of equipment and their functions. Section 6 contains General Information on base systems, recycling, etc.

CONTENTS

Locations of IM-99A Bases

Introduction

SECTION 1. Bases

SECTION 2. Buildings

SECTION 3. Support Equipment

SECTION 4. Launch Equipment

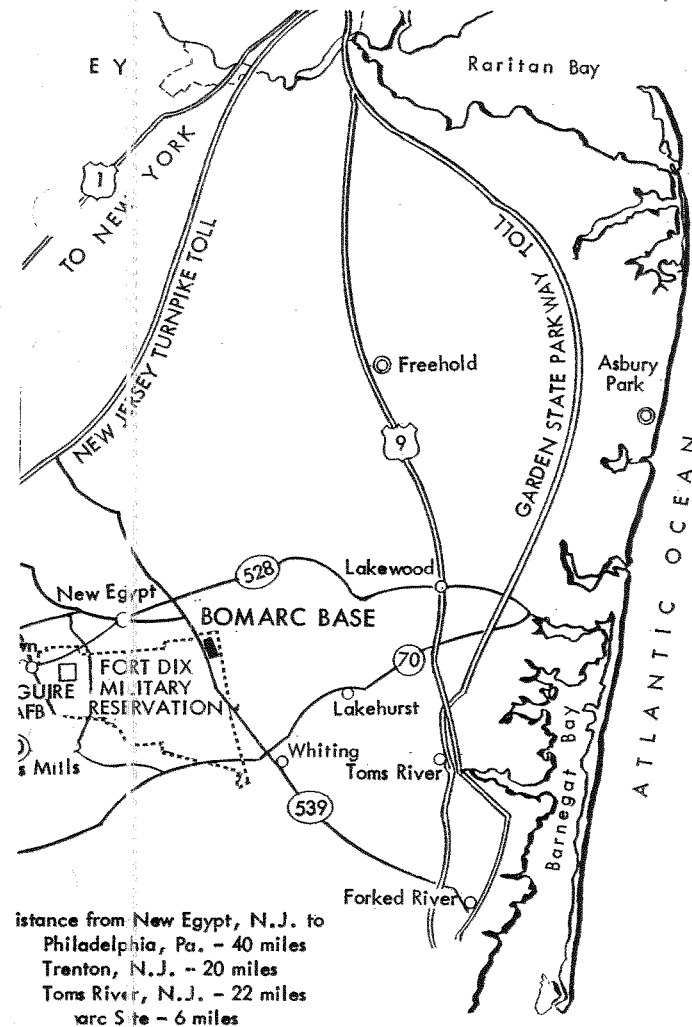
SECTION 5. Handling Equipment

SECTION 6. General Information



REGIONAL MAP: N

BD



Distance from New Egypt, N.J. to
 Philadelphia, Pa. - 40 miles
 Trenton, N.J. - 20 miles
 Toms River, N.J. - 22 miles
 Base Site - 6 miles

McGuire - Base No. 1

McGuire

GENERAL ENVIRONMENT

The launch site at McGuire AFB is located approximately six miles east of New Egypt, New Jersey. Major cities around New Egypt are New York, N. Y. and Newark, New Jersey, seventy miles to the north; Camden, New Jersey and Philadelphia, Pennsylvania, forty miles southwest; and Trenton, New Jersey, twenty miles northwest. The population of New Egypt is approximately 2500. The immediate area around New Egypt is heavily populated with military personnel from Fort Dix, McGuire Air Force Base, and the Naval Air Station at Lakehurst, all within a ten-mile radius of the launch site. The Atlantic Ocean is approximately thirty miles east of New Egypt. Toms River, a town lying twenty-five miles east of New Egypt, is important because it is used for overnight accommodations as well as being on the bus route from New York to New Egypt. This is also true of Lakewood, fifteen miles east of New Egypt.

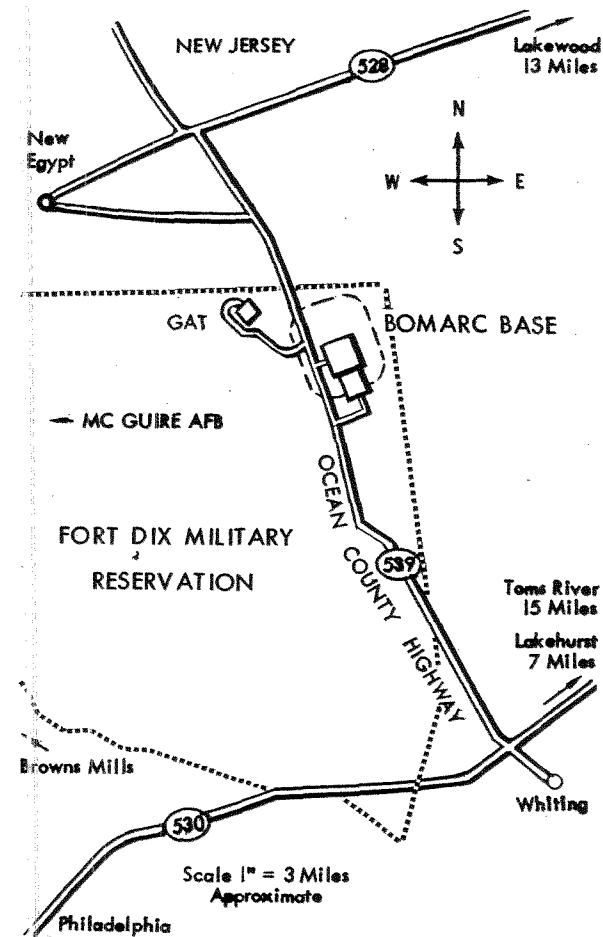
TRANSPORTATION

Seattle to New York City

United Air Lines Flight Number 792 leaves Seattle daily, except Monday, at 8:45 a.m., and arrives in New York at approximately 8:25 p.m. Northwest Airlines Flight Number 10 leaves Seattle each evening at 10:00 p.m. and arrives in New York at 9:40 a.m. Both of these are first class non-stop flights. To downtown New York by limousine is approximately a one-hour trip.

New York City to Lakewood, New Jersey and Toms River, New Jersey

Public service buses leave Port Authority Terminal (West side of Manhattan) every hour on the hour starting at 8:00 a.m. The last trip is at 12:01 a.m. Running time is one and one-half hours to Lakewood and two hours to Toms River.



GENERAL VICINITY OF MC GUIRE: BASE NO. 1

Levittown, Pennsylvania, will offer the best and most modern rental housing. At this time housing in the smaller rural communities surrounding the base offers limited and inadequate facilities. Rentals are comparable to those in the Seattle area, with furnished units from \$90 to \$165 a month and unfurnished units from \$85 to \$150. Utilities are usually in addition to the above rates. Temporary housing can be found in the hotels and motels in Trenton, twenty miles northwest, or Toms River and Lakewood approximately twenty-five and fifteen miles east of New Egypt.

Hotels and Motels

The Riverview Hotel in Toms River, the Manhattan Hotel and the Crest Motel in Lakewood are the suggested suitable places to stay in these respective towns. It is recommended that reservations be made in advance.

WEATHER

The following normals for the Trenton, New Jersey area, including the site at McGuire AFB, are based on records covering the period 1921-1950 inclusive. Extreme temperatures and snowfalls are based on records through 1957. Generally, the summer months are warm and humid and winters are cold with several heavy snows and some icing. The roads to and from the site are hard surfaced and are kept clear in the winter months. Winds are generally mild in this area.

Monthly Normals

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Temp.	33°	33°	41°	51°	62°	71°
Precip.	4.1"	4.6"	3.7"	2.6"	2.9"	2.8"
	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Temp.	75°	73°	67°	56°	46°	35°
Precip.	3.2"	2.7"	3.2"	3.0"	3.5"	3.9"
	<u>Nov.</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	
Snowfall	1.2"	4.4"	6.5"	7.4"	3.5"	

BOEING D3-4684 | 1.5

Alternate Route: New York City to New Egypt, New Jersey

Public service buses leave Port Authority Terminal (west side of Manhattan) every hour on the hour starting at 8:00 a.m. Transfer at Lakewood to the Asbury Park, Philadelphia bus to New Egypt. Running time is approximately two and one-half hours. Upon arrival at New Egypt, Boeing personnel may call the Boeing office and request transportation.

Alternate Route: Seattle to Philadelphia

Non-stop flights to Chicago leave Seattle daily at 9:45 a.m. and arrive in Chicago at 5:25 p.m., United - Flight Number 740. Transfer to United - Flight 714 which leaves Chicago at 6:10 p.m. and arrives in Philadelphia at 9:30 p.m. (10:22 p.m. Saturday).

Philadelphia To New Egypt, New Jersey

The Asbury Park bus leaves approximately every two hours starting at 7:35 a.m. Running time is approximately one hour and forty-five minutes. (Upon arrival at New Egypt, Boeing personnel may call the Boeing office and request transportation.)

New Egypt to Launch Site

In driving from New Egypt to the launch site drive east out of New Egypt on U. S. Spur 528 for approximately three and one-half miles until you reach U.S. 539. Turn right on U. S. 539 and drive for approximately another two and one-half miles and to a point where a road into the site will be indicated by a sign. Turn left here and drive into the area, approximately two blocks from the highway.

HOUSING

Housing within thirty-five miles of McGuire Air Force Base is available, although it may require considerable searching. Two to three weeks should be allowed for finding a suitable place. It appears that the towns of Toms River, Mount Holly, Hightstown and

1.4 | D5-4684 **BOEING**

IM-99A BASES

McGuire: Base No. 1

McGuire: Base No. 1

IM-99A BASES

Seasonal Normal

	<u>Jan</u>	<u>July</u>
Temp. - <u>Min</u>	29°F	68°F
<u>Max</u>	42°F	79°F
Humidity - <u>Min</u>	62%	55%
<u>Max</u>	73%	77%
Winds -	11.2 mph	8.7 mph

Annual Normals

Temp. - 51.7°F
Precip. - 41.77"
Snowfall - 2' 5"

Recorded Extremes

Temp. - High 104°F
 -Low -9°F

Snowfall (24 hours) 2' 3"

Winds - 73 mph

BOEING

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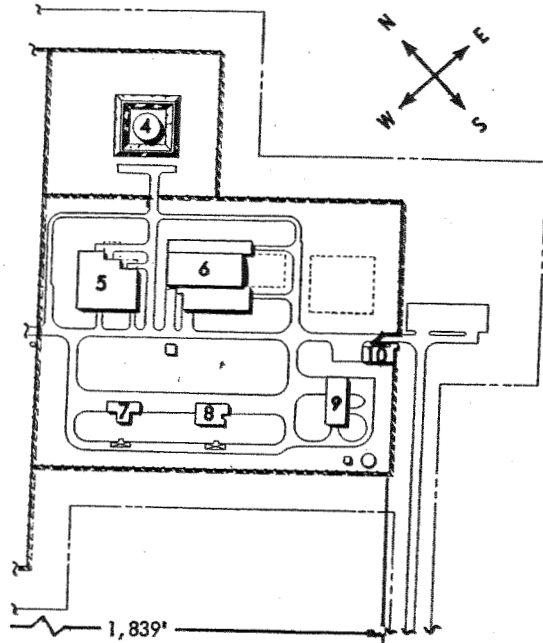
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BOEING

IM-99A BASES

McGuire: Base No. 1

McGuire Base



MISSILE SUPPORT AREA

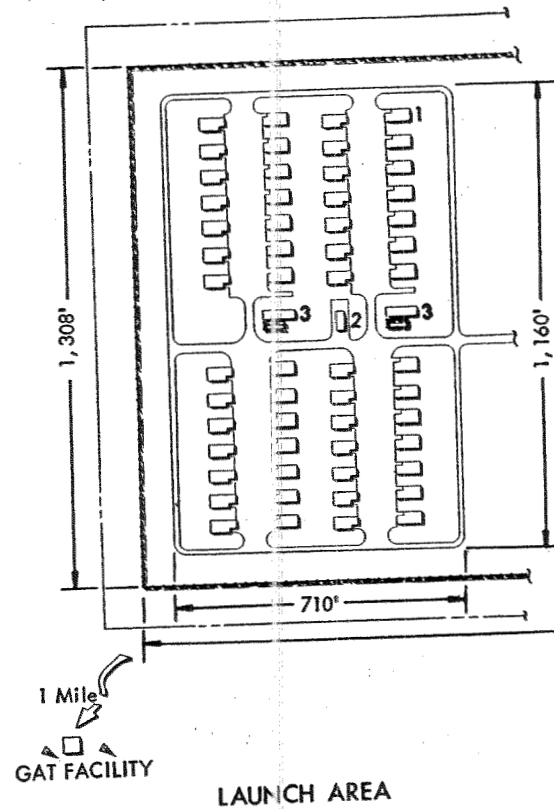
- 4 Diesel Fuel Storage
- 5 Heat and Power Building
- 6 Assembly and Maintenance Shop
- 7 Propellant Acid Facility
- 8 Propellant Fuel Facility
- 9 Vehicle Storage
- 10 Security Control and Identification

BOEING D5-4684 | 1.9

McGuire: Base No. 1

IM-99A BASES

Layout -



LAUNCH AREA

- 1 Model II Launcher Shelter
(56 shelters - 2 flights)
- 2 Ordnance Facility
- 3 Compressor Building (2)

1.8 | D5-4684 BOEING

AIR FORCE PERSONNEL

Base Commander:
 Col. Robert H. Stuart 210 Barnegat Street
 Tel: RAYmond 4-2100 Toms River, New Jersey
 Ext. 3352 Tel: TO 8-2201

Base Executive Officer:

Bomarc Squadron Commander:
 Lt. Col. Ernest B. Sheppard
 Tel: PLateau 8-2286

Director of Materiel:

OOAMA Representative: Boeing Airplane Company
 Capt. W. H. Scott P. O. Box 368
 Tel: PLateau 8-2286 New Egypt, New Jersey

Base Directory

MC GUIRE - BASE NO. 1

Pilotless Aircraft Division
 Boeing Airplane Company
 P. O. Box 368
 New Egypt, N. J.
 Tel: PLateau 8-2286
 TWC: New Egypt, New Jersey 1131

BOEING PERSONNEL

Base Manager:
 Harry Shirley 808 Central Avenue
 Tel: DIAMond 9-6295 Toms River, New Jersey

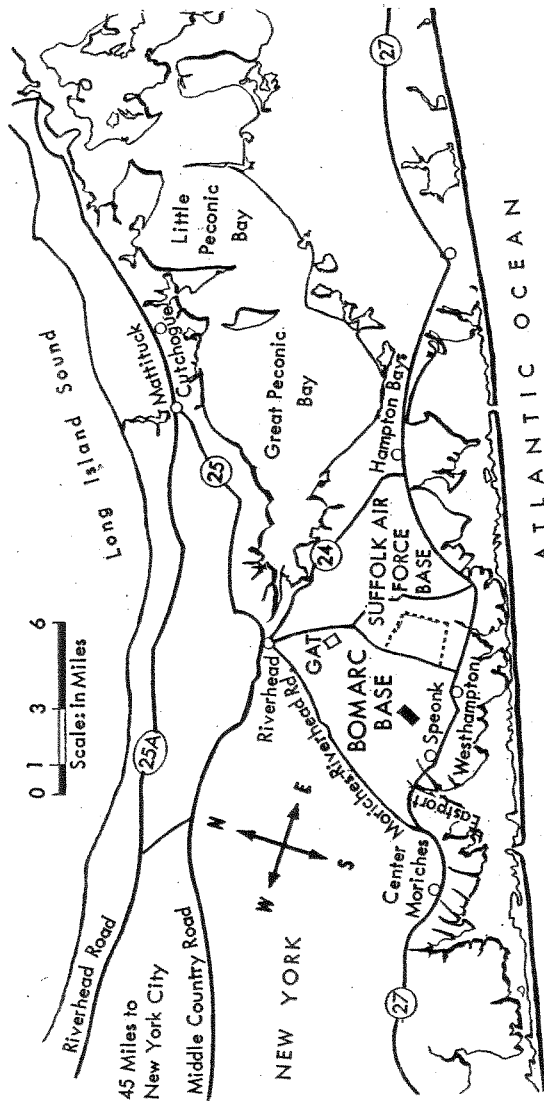
Administrative:
 R. E. Gagnat 225 Compass Avenue
 Tel: DIAMond 9-0425 Beachwood, New Jersey

Field Engineer:
 A. M. Ehrens 807 Central Avenue
 Tel: DIAMond 9-9061 Toms River, New Jersey

Engineering Liaison:
 C. B. Campbell 116 Hooper Avenue
 Tel: DIAMond 9-9142 Toms River, New Jersey

Base Service Manager:
 Albert E. Irice 10 Fairwood Drive
 Tel: DIAMond 9-0223 Toms River Shore, N. J.
 (Mailing Address: Box 507, Pine Beach, N. J.)

Senior Technical Representative:
 John Doig



REGIONAL MAP: SUFFOLK - BASE NO. 2

AFIR

North Atlantic Region
 Federal Office Bldg.
 Room 1205
 90 Church Street
 New York, New York
 Tel: REctor 2-9100
 Ext. 8252

Col. Miles Thompson
 449 George Street
 Ridgewood, New Jersey
 Tel: Gilbert 5-8733
 AFIR Ext. 225

GENERAL ENVIRONMENT

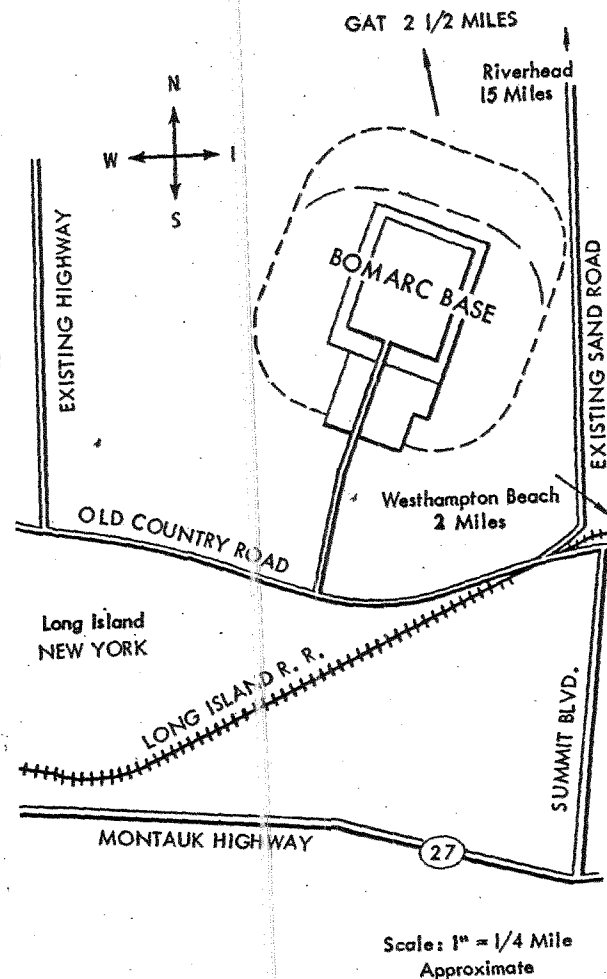
Suffolk Air Force Base is located in the relatively isolated eastern half of Long Island approximately seventy-five miles from New York City. The Boeing office is located in Riverhead, a town about six miles north of the base. The Great Peconic Bay is six miles northeast of the base. The Bomarc site is located four and one-half miles west of the base by an existing road; however, a new road being built will reduce this distance to two miles. The road between Riverhead and Suffolk Air Force Base is a paved two-lane highway. Public transportation is not available to either of the installations.

The general area surrounding the base is made up of low flat inshore lands which are largely undeveloped with the exception of a few small farms. The soil is of a sandy texture supporting trees averaging about twelve feet in height and surrounded by thick underbrush. Top soil is used at the base and at the site. Tourists consider this area a resort site and consequently the summer population is almost double that of the rest of the year.

The major cities and towns in the area are: Riverhead, county seat of Suffolk County is considered more of an agricultural center than a resort town. Several national stores have branches here and four banking institutions are represented. Transportation facilities consist of bus line and railroad service.

Moriches and The Hamptons, communities along the southern coast of Long Island, are basically resort towns. Each is broken into sections, i.e., East, West, North and South. Southampton, fifteen miles from the air base, is the greatest distance from the Bomarc site. Railroad facilities are not available to these communities.

Mattichuk, located on a bay seven miles east of Riverhead, is the leading resort community in the area.



GENERAL VICINITY OF SUFFOLK; BASE NO. 2

rentals, by their standards, are expensive but not critical. The rental fees for year-around housing generally are comparable with those of the Seattle area. The Air Base is constructing 350 units of Capehart housing scheduled for completion by December, 1959. One hundred of these units were completed in February, 1959, helping considerably to alleviate the housing shortage in the area.

There are no housing developments in the Riverhead area. However, local realtors indicate that houses, cottages, and apartments, both furnished and unfurnished, are available throughout the year at rates of \$80 to \$125, plus utilities. Houses and cottages range from five to eight rooms and apartments from one to three bedrooms. Lighting and heating facilities consist of electricity and oil with monthly bills ranging from \$35 to \$60. Bottled gas is available to those with gas appliances; however, it is much more expensive than the other facilities. The majority of rentals in The Hamptons and Moriches areas consist of large cottages and apartments which are available for year around rental with a price range equivalent to that of Riverhead. Because it is primarily a resort community, Mattichuk does not have many year around rental accommodations. However, the ones that are available are in the same price range as Riverhead, Moriches, and The Hamptons. Some rentals are available on a six to nine month basis. The Base Personnel Office maintains a file of available rental housing in the area.

Hotels and Motels

Recommended quarters for transients are the Henry Perkins Hotel and the Hilltop House in Riverhead, and the Lindenmore in Center Moriches.

WEATHER

Long Island is considered to have a milder climate than that of the New York mainland, with average temperatures varying several degrees from those of New York City. Summer temperatures normally range in the 70° to 80° area with the hottest days being tempered by cool and refreshing breezes. January and February are the most severe winter months with temperatures holding below freezing, particularly during the evenings, for periods of up to two weeks.

TRANSPORTATION

Seattle to New York

Morning flights via United Air Lines Flight Number 792 leaving Seattle at 8:45 a.m. and arriving in New York at approximately 7:40 p.m. are available daily except Monday. Evening flights via Northwest Air Lines Flight Number 10 leaving Seattle at 10:00 p.m. and arriving in New York at 8:40 a.m. are available each day. Both of these flights are first class, non-stop. Limousine service to downtown New York takes about one hour.

New York to Riverhead

The Long Island Railroad has trains leaving New York City at 8:37 a.m. and 4:41 p.m. for Riverhead. Running time is approximately two and one-half hours.

Riverhead to Suffolk Air Force Base and Bomarc Site

Transportation will be provided to the base by the Base Manager. No public transportation facilities are available.

The Riverhead area is served by good roads; however, due to the absence of local area bus service, provisions for normal personal transportation between the nearby towns must be provided. Hertz and Avis service is available in Riverhead. There are no scheduled airlines serving Eastern Long Island.

HOUSING

The availability of housing and accommodations is seasonal and is particularly critical during the period between Memorial Day and Labor Day. Rentals on a yearly basis vary upwards from \$110 per month plus utilities for a two-bedroom house. There is a considerable amount of vacant and unimproved property in the immediate area. Riverhead to the north and a few small communities to the south provide centers for shopping and a few recreational activities. Realtors in the area indicate that housing

Suffolk: Base No. 2 IM-99A BASES

Recorded Extremes

Temp. - High 103°F
 - Low -28°F

Snowfall (24 hours) 21"

Winds - 113 mph

Suffolk: Base No. 2 IM-99A BASES

Frost depth varies from six to ten inches. Early spring and fall are the wet seasons, with rain falling at about an average of four inches per month during this time. Strong breezes are characteristic of the area and high winds are not infrequent throughout the year. Drifting sand at times has complicated highway and road travel in the area.

Monthly Normals

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Temp.	31.8°	32.3°	39.2°	48.8°	59.4°	68.4°
Precip.	3.7"	3.1"	3.9"	3.4"	3.6"	3.1"
	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Temp.	73.7°	72.8°	66.6°	56.7°	46.1°	35.4°
Precip.	3.2"	4.3"	2.6"	3.0"	4.6"	3.6"
	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	
Snowfall	.7"	6.2"	5.7"	5.8"	4.1"	

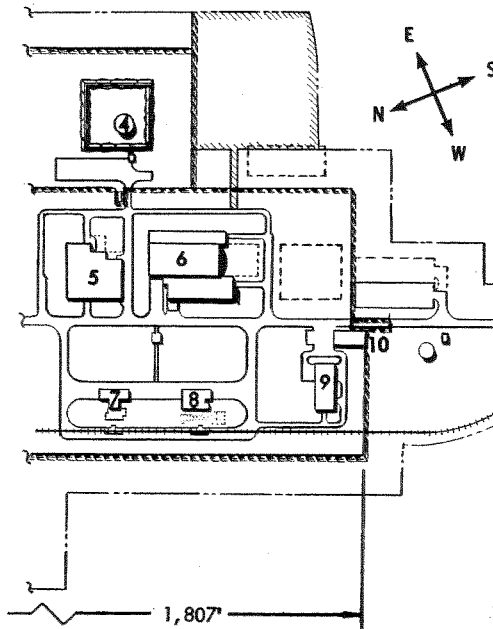
Seasonal Normals

	<u>Jan</u>	<u>July</u>
Temp. - <u>Min.</u>	27°F	68°F
<u>Max</u>	37°F	79°F
Humidity - <u>Min</u>	62%	56%
<u>Max</u>	68%	75%
Winds	16.4 mph	12.1 mph

Annual Normals

Temp. - 52.6°F
 Precip. - 42.6"
 Snowfall - 23.3"

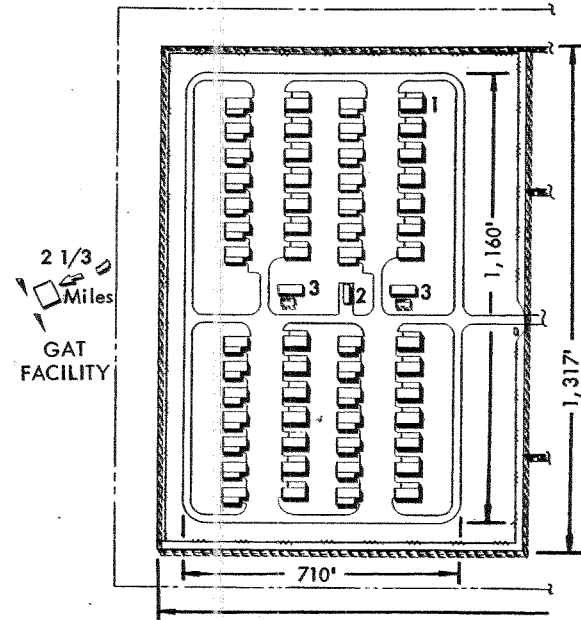
Suffolk Base



MISSILE SUPPORT AREA

- 4 Diesel Fuel Storage
- 5 Heat and Power Building
- 6 Assembly and Maintenance Shop
- 7 Propellant Acid Facility
- 8 Propellant Fuel Facility
- 9 Vehicle Storage
- 10 Security Control and Identification

Layout -



LAUNCH AREA

- 1 Model II Launcher Shelter
(56 shelters - 2 flights)
- 2 Ordnance Facility
- 3 Compressor Building (2)

AIR FORCE PERSONNEL

Base Commander:
Col. Fred G. Hook Jr.

Base Executive Officer:

Bomarc Squadron Commander:
Lt. Col. Robert E. Kaempfer

Director of Materiel:

OOAMA Representative:
Major M. E. Young

Base Directory

SUFFOLK - BASE NO. 2

Pilotless Aircraft Division
Boeing Airplane Company
P. O. Box 1587
Westhampton Beach, New York
Tel: Westhampton 4-3000 Ext. 27-28-50
TWX: Westhampton, New York 1829

BOEING PERSONNEL

Base Manager:
John D. Monroe

Administrative:

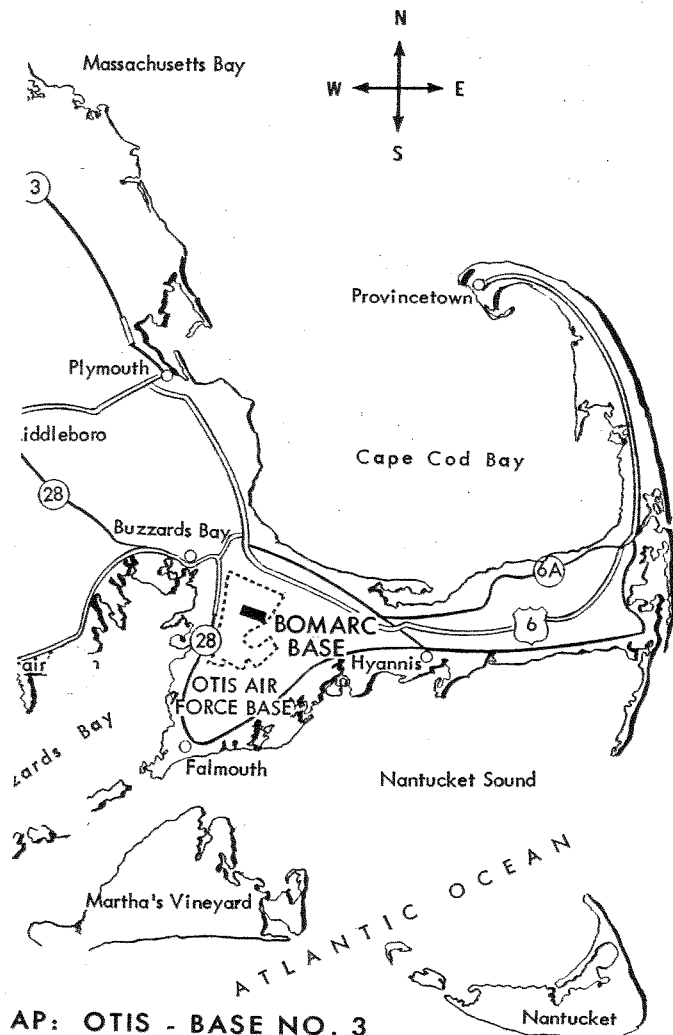
Field Engineer:

Engineering Liaison:
D. L. Davis Speonk Shore Rd.
Tel: East Port 5-0459M Remsenberg, New York

Base Service Manager:

Senior Technical Representative:

Otis: Base No. 3



AP: OTIS - BASE NO. 3

BOEING

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Suffolk: Base No. 2 IM-99A BASES

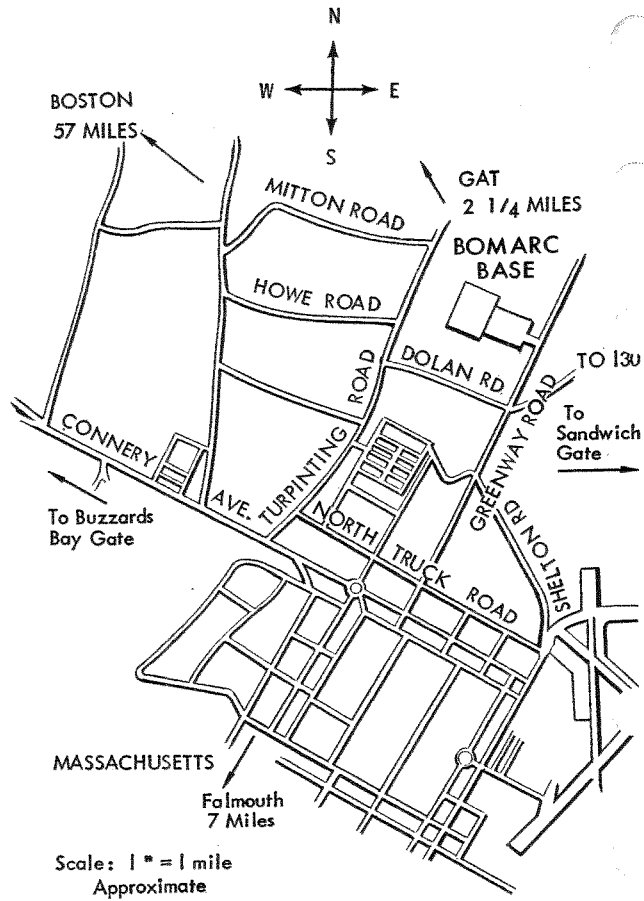
AFIR

North Atlantic Region
Federal Office Bldg.
Room 1205
90 Church Street
New York, New York
Tel: REctor 2-9100
Ext. 8252

Col. Miles Thompson
449 George Street
Ridgewood, New Jersey
Tel: Gilbert 5-8733
AFIR Ext. 225

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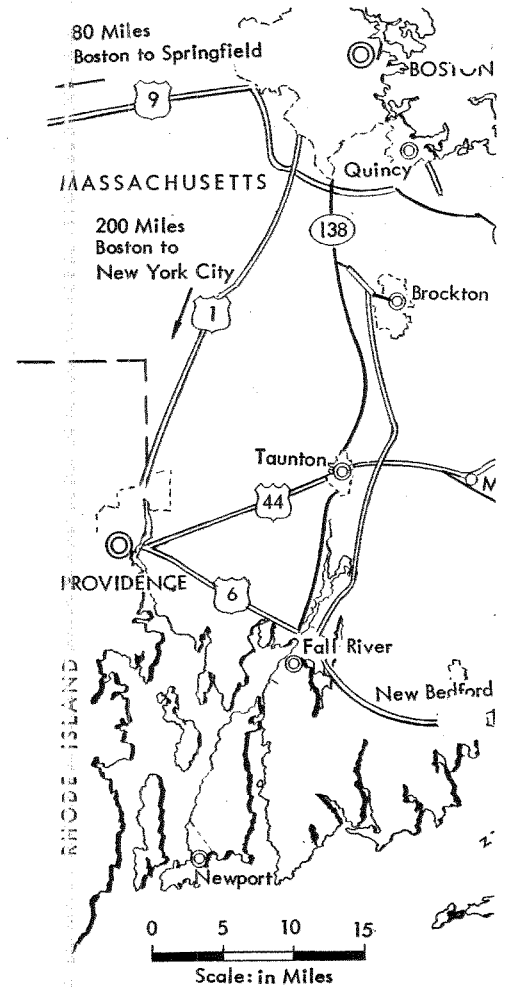
BOEING



Scale: 1" = 1 mile
Approximate

GENERAL VICINITY OF OTIS: BASE NO. 3

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REGIONAL M

Boston to Hyannis and Buzzards Bay

Northeast Airlines operates a regularly scheduled DC-3 flight from Boston to Hyannis. Regular railroad passenger service is available from Boston to Buzzards Bay. The Almeida Bus Lines operate regular bus service from Boston to Buzzards Bay; approximate travel time is two hours. Highways between Boston and Otis are excellent.

Hyannis and Buzzards Bay to Otis AFB

There is no public transportation available between Hyannis or Buzzards Bay and the base. It will be necessary to rent a car or taxi to get to Otis. Personal vehicles, Hertz or Avis, are available at both Hyannis and Buzzards Bay. It is therefore important that car rental be authorized when traveling to Otis.

HOUSING

The availability of housing and accommodations near Otis depends largely upon the season, the period between Memorial Day and Labor Day being particularly critical due to summer tourists. Rentals on a yearly basis vary upward from \$115 per month, plus utilities, for a two-bedroom house. Being primarily a resort area, summer rentals are extremely high. For example, a four-bedroom home near the shore would rent for approximately \$5,000 from June 1 to September 1. Because much of the housing is intended for summer occupancy only, heating arrangements have not been provided for many of the houses. Careful attention should be given to locating adequate year-around housing that is sufficiently insulated, windproof, and preferably has oil heat. The same house rented on an annual basis would rent for approximately \$125.00 per month which is the way many of the owners prefer to rent their homes in order to reduce maintenance costs. Year-around rentals will become more available upon completion of the 1150 Capehart housing units on the base. This will move much of the military personnel out of residential areas and alleviate the shortage considerably. Unfurnished houses range from \$60 to \$140 and furnished houses, which are very limited, range from \$75 to \$160 per

GENERAL ENVIRONMENT

Otis Air Force Base, formerly Camp Edwards, is located near the Cape Cod extremity of Massachusetts approximately seventy miles southeast of Boston. Nearby major communities are Buzzards Bay, eight miles northwest of the base; Falmouth, four miles south on State Highway No. 28, a four-lane divided parkway; Hyannis, twenty-four miles east, the largest city near the base. Rail, airline, and an excellent highway system offer convenient access to Boston. The area surrounding the base is a popular recreational spot during the summer and residents usually find themselves outnumbered as much as ten to one by visitors at that time. The beach lands in the area are largely consumed by private homes and resorts; the bulk of the remaining lands are either undeveloped with small tree and brush coverage, or devoted to scattered residences and truck gardening. The soil texture is generally light, loose and sandy.

The Bomarc site is located approximately one and one-half miles from the center of the base and is connected by direct road; the Sandwich Gate entrance to the base adjoins the site.

TRANSPORTATIONSeattle to Boston

United Air Lines Flight Number 792 leaves Seattle daily, except Monday, at 8:45 a.m. and arrives in New York at 8:25 p.m. (EST) non-stop; from New York it goes on to Hartford and arrives in Boston at 10:45 p.m. (EST). There is no changing of planes in New York.

Northwest Air Lines Flight Number 8 leaves Seattle each evening at 10:35 p.m. and arrives in Chicago at 7:15 a.m. (CST) non-stop. After leaving Chicago at 8:00 a.m., it arrives in Boston at 11:55 a.m. (EST) non-stop.

Monthly Normals

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Temp.	31.7°	30.7°	36.3°	45.0°	55.1°	63.8°
Precip.	4.1"	3.4"	4.3"	3.6"	3.0"	3.3"
	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Temp.	70.5°	70.1°	63.7°	54.5°	44.7°	34.6°
Precip.	2.4"	3.7"	4.2"	3.6"	3.3"	3.5"
	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	
Snowfall	1.9"	3.4"	6.3"	8.3"	4.4"	

Seasonal Normals

	<u>Jan</u>	<u>July</u>
Temp. - <u>Min</u>	28°F	72°F
<u>Max</u>	36°F	84°F
Humidity - <u>Min</u>	73%	74%
<u>Max</u>	81%	90%
Winds -	14.8 mph	11.8 mph

Annual Normals

Temp. - 50.1°F
 Precip. - 42.99"
 Snowfall - 22.9"

Recorded Extremes

Temp. - High 100°F
 - Low -12°F
 Snowfall (24 hours) 29"
 Winds - 91 mph

1.30 | D5-4684 **BOEING**

month. Apartment rentals range from \$50 to \$100 for unfurnished quarters and \$60 to \$125 for furnished ones. Electricity and natural gas are both expensive. The rates approximate about twice the rates in Seattle.

Recommended locations are: the Falmouth area; Pocasset; Bourne; Buzzards Bay; Onset; Cotuit; and Manetem Mills. Accommodations are also available at Hyannis, the largest community in the area, but which caters more to seasonal rentals. These areas are all within a twenty-five mile radius of the base. There also is considerable vacant and unimproved property in the immediate area.

Hotels and Motels

Hotel, motel and trailer park facilities in this area and neighboring communities are limited.

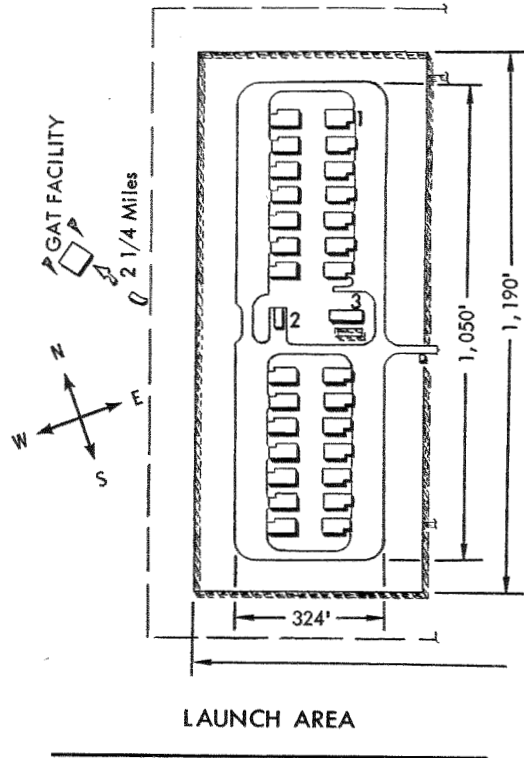
The Boeing Industrial Relations Supervisor assigned to Otis will assist in finding suitable housing facilities. It is recommended that advance notice of housing be made to him before arrival, so that he can prepare listings available.

WEATHER

The yearly range of weather conditions is only slightly more severe than Seattle. Being located adjacent to the Atlantic Ocean, Cape Cod is somewhat warmer than inland areas and during the winter the bulk of the precipitation is in the form of rain. Snowfall and freezing conditions do occur, of course; however, they are not as frequent as in the interior parts of New England. A typical winter day is windy and cold with periodic rain. During the summer, Cape Cod is cooler than the surrounding area and it is because of this that the area has become a popular summer resort. The weather generally remains bright and sunny, though somewhat humid during the summer months. Following is a detailed weather summary of the area.

BOEING D5-4684 | 1.29

Layout -



- 1 Model II Launcher Shelter
(28 shelters - 1 flight)
- 2 Ordnance Facility
- 3 Compressor Building

Base Directory

OTIS - BASE NO. 3

Pilotless Aircraft Division
 Boeing Airplane Company
 P. O. Box 277
 Buzzards Bay, Mass.
 Tel: LOCust 3-6811
 TWX: Cataumet 1024

BOEING PERSONNEL

Base Manager:
 G. M. Beall

Administrative:

Field Engineer:

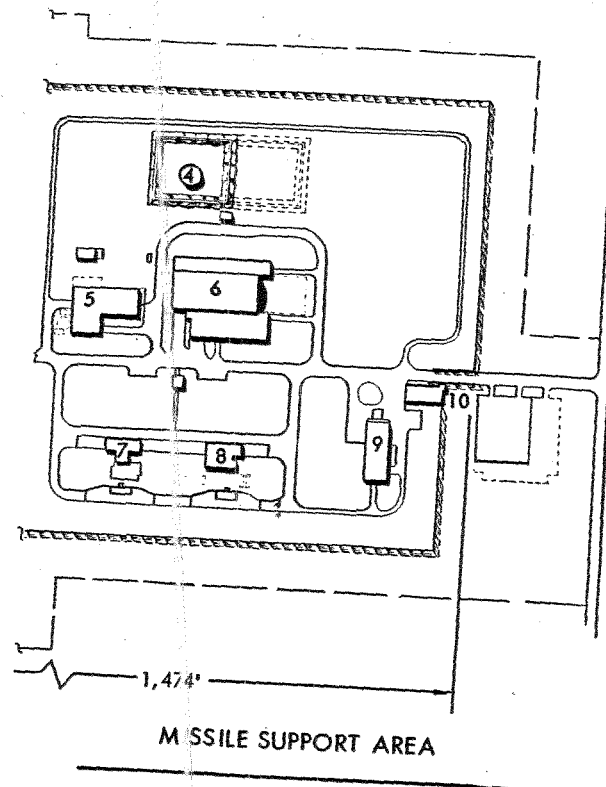
Engineering Liaison:
 J. C. Clausen

Seacoast Shores
 E. Falmouth, Mass.

Base Service Manager:

Senior Technical Representative:

Otis Base



- 4 Diesel Fuel Storage
- 5 Heat and Power Building
- 6 Assembly and Maintenance Shop
- 7 Propellant Acid Facility
- 8 Propellant Fuel Facility
- 9 Vehicle Storage
- 10 Security Control and Identification

Otis: Base No. 3

IM-99A BASES

AIR

New England Region
424 Trapelo Road
Waltham 54, Mass.
Tel: TWINbrook 4-2400

Col. Roland H. Cipola
11 Stratford Road
Boston, Mass.
Tel: NO 7-4067
AFIR Ext. 305

1.36 | D5-4684

BOEING

IM-99A BASES

Otis: Base No. 3

AIR FORCE PERSONNEL

Base Commander:

Base Executive Officer:

Bomarc Squadron Commander:

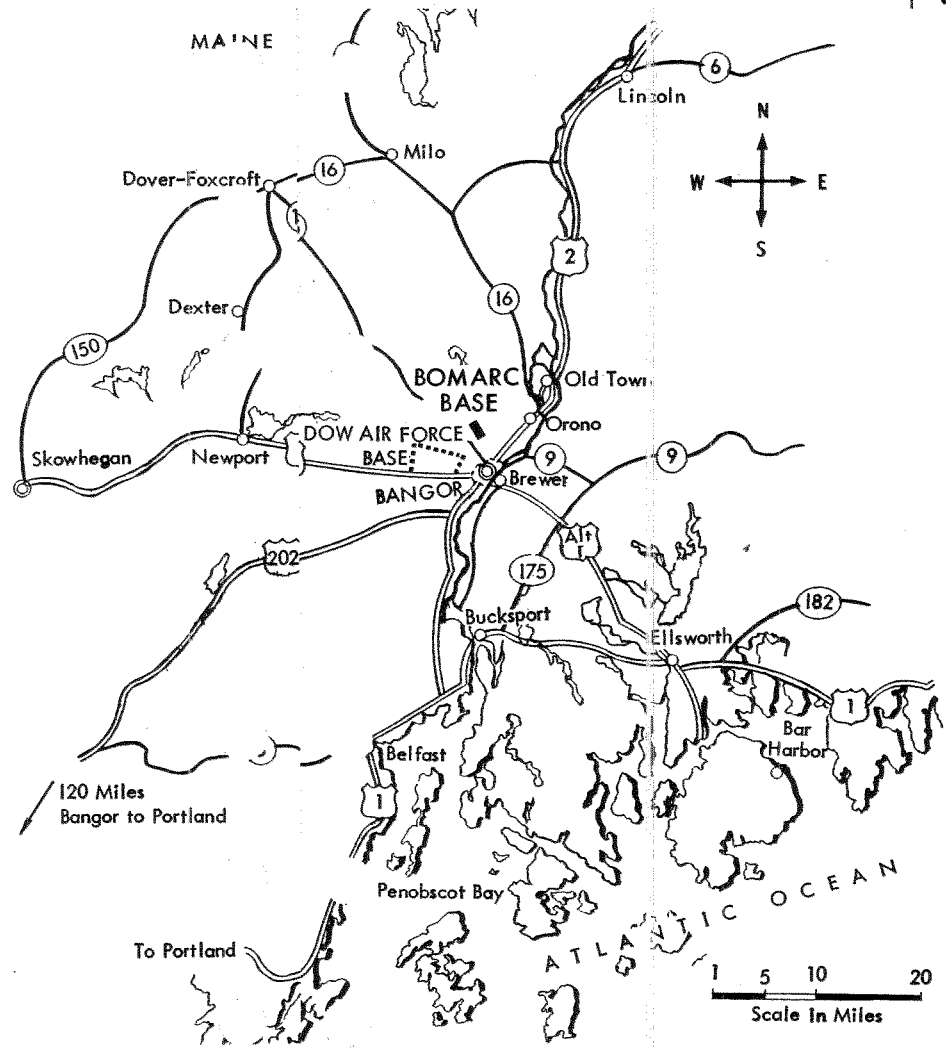
Maj. William B. Gerlitz Wild Harbor & Cove Roads
Tel: LOcust 3-5511 North Falmouth, Mass.
Ext. 2523 Tel: LOcust 3-6239

Director of Materiel:

OOAMA Representative:
Major W. P. Weigle

BOEING

D5-4684 | 1.35



REGIONAL MAP: DOW - BASE NO. 4

BOEING

D5-4684 | 1.37

GENERAL ENVIRONMENT

The Bomarc site, near Dow Air Force Base, is located approximately four air miles north of Bangor, the third largest city in Maine and the banking and medical center for the northern and northeastern part of the state. Including the military, the population of Bangor is 38,000. Typical of its sister cities in the New England area, Bangor is a blend of the very old with a touch of the new. The business district lies in a compact area along the Penobscot River at the junction of the Kenduskeag Stream. Within a radius of fifteen miles of Bangor, there are a number of small communities, including Brewer just across the Penobscot; Crono, location of the University of Maine; and Old Town, which is famous for its canoes. The principal industrial activities in addition to farming are paper pulp and shoe manufacturing.

Dow Air Force Base itself lies approximately two and one-half miles northwest of Bangor. The Bomarc Base is approximately two and one-half air miles or about four and one-half road miles northeast of Dow Air Force Base.

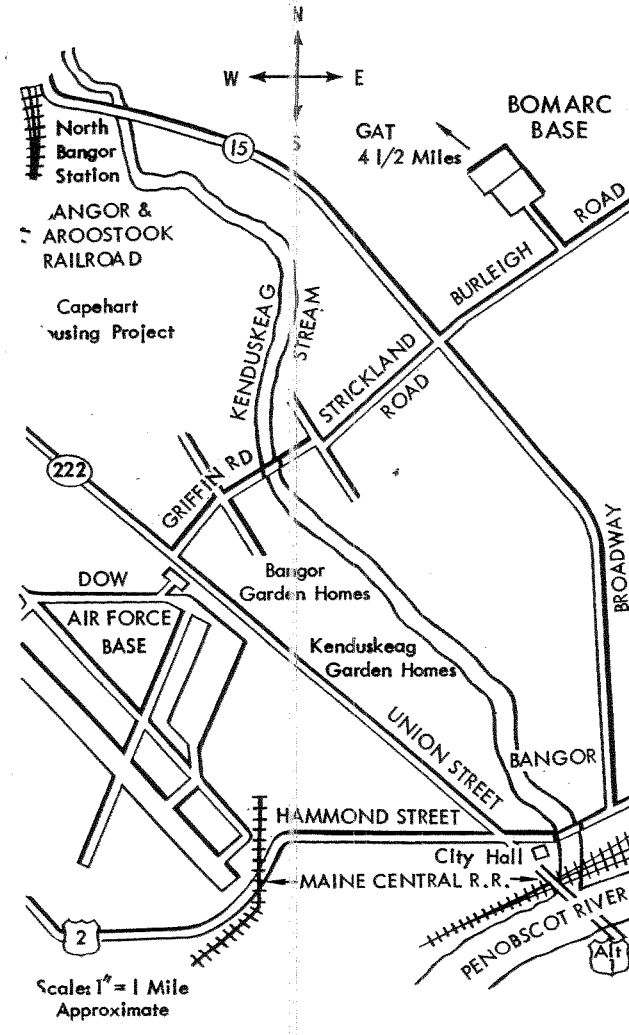
TRANSPORTATION

Seattle to Boston

United Airlines Flight Number 792 leaves Seattle at 8:45 a.m. daily except Monday, and arrives in Boston at 10:45 p.m. Northwest Flight Number 10 leaves Seattle at 10:00 p.m. and arrives at Idlewild in New York at 9:40 a.m. American Airlines leaves LaGuardia at 11:50 a.m. and arrives in Boston at 12:55 p.m.

Boston to Bangor

There is only a twenty-minute layover between the above United Seattle-Boston flight and Northeast Flight Number 484, which leaves Boston at 11:10 p.m. and arrives in Bangor at 12:57 a.m. Northeast Flight Number 714 leaves Boston at 9:10 a.m. and arrives in Bangor at 10:20 a.m.



GENERAL VICINITY OF DOW: BASE NO. 4

The Bangor area has severe icing conditions which set in rapidly during the winter months. Although there are excellent ice and snow removal facilities, any long distance driving is discouraged. Ordinarily, through the winter months the area will experience six to seven snow storms with snow ranging from eighteen to twenty inches per snowfall. The following is a detailed weather summary of the area.

Monthly Normals

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Temp.	24.2°	22.5°	32.9°	46.1°	57.6°	67.1°
Precip.	1.8"	2.0"	2.5"	3.3"	3.3"	3.6"
	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Temp.	71.8°	71.1°	62.1°	52.0°	38.5°	26.6°
Precip.	2.4"	2.2"	3.8"	3.3"	3.7"	2.7"
	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>
Snowfall	4.3"	11.6"	18.3"	22.9"	11.6"	6.0"

Seasonal Normals

	<u>Jan</u>	<u>July</u>
Temp. - <u>Min</u>	20°F	64°F
<u>Max</u>	30°F	80°F
Humidity - <u>Min</u>	71%	77%
<u>Max</u>	74%	85%
Winds	13.5 mph	7.5 mph

Annual Normals

Temp. - 47.7°F
 Precip. - 35.1"
 Snowfall - 56.1"

Recorded Extremes

Temp. - High 104°F
 Low -32°F
 Snowfall (24 hour) 37"
 Winds - 83 mph

Bangor to Launch Site

Upon arrival in Bangor, contact the base and request transportation, or contact the local car rental agency, either Hertz or Avis, and make arrangements for a vehicle.

HOUSING

The availability of housing and accommodations is limited at this time. The new Capehart military housing project, scheduled for completion in the summer of 1959, will alleviate the situation somewhat, but will not lessen the over-all picture. Probable openings at two existing projects may be found with rent averaging from approximately \$85 to \$95 per month.

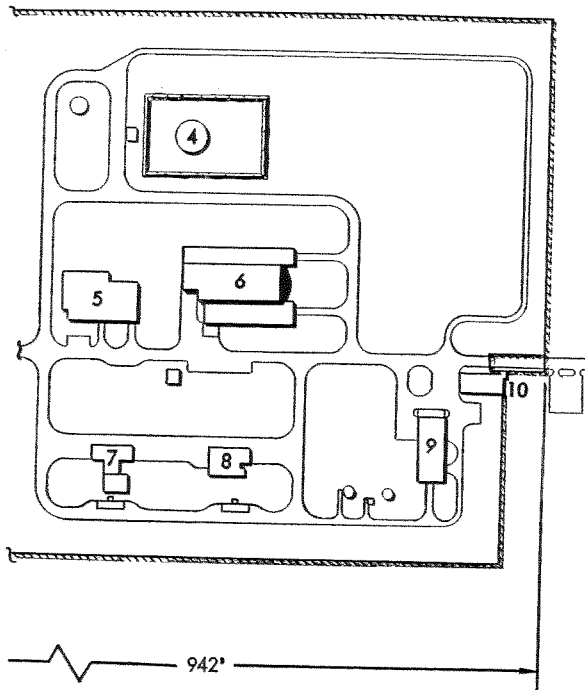
Hotels and Motels

Two principal hotels provide limited accommodations. There are motel and trailer park facilities in the immediate Bangor area and some are extremely desirable; however, their availability is limited. House-keeping rooms are available, but not too desirable, since they are in older homes which have been reconditioned for single or small family occupancy.

WEATHER

Due to the northern location and the absence of a warm oceanic stream near enough to affect the state's climate, Maine has extreme temperature variations. However, the northern interior part of the state has significantly more severe weather than do the southern coastal areas. The Bangor winter temperature, November through March, averages around 22°F. Bangor has only four months of frost-free weather during the summer months. Rainfall is about forty inches per year.

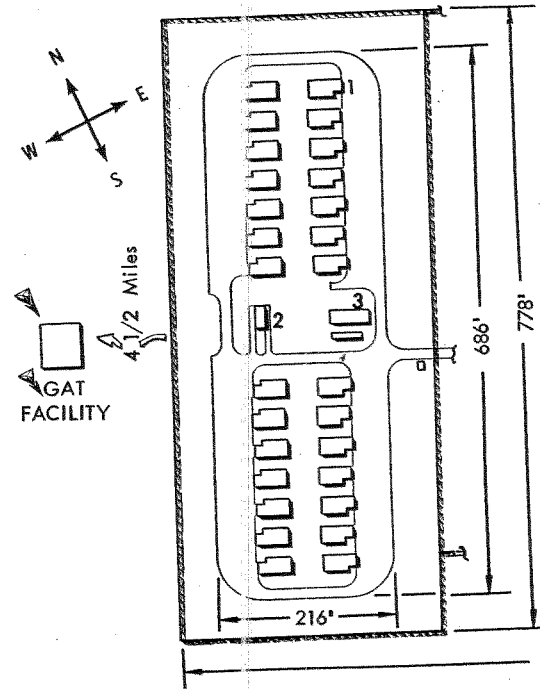
Dow Base



MISSILE SUPPORT AREA

- 4 Diesel Fuel Storage
- 5 Heat and Power Building
- 6 Assembly and Maintenance Shop
- 7 Propellant Acid Facility
- 8 Propellant Fuel Facility
- 9 Vehicle Storage
- 10 Security Control and Identification

Layout -



LAUNCH AREA

- 1 Model II Launcher Shelter
(28 shelters - 1 flight)
- 2 Ordnance Facility
- 3 Compressor Building

IM-99A BASES

Dow: Base No. 4

AIR FORCE PERSONNEL

Base Commander:

Base Executive Officer:

Bomarc Squadron Commander:
Col. William Crawford

Director of Materiel:

OOAMA Representative:

BOEING D5-4684 | 1.45

Dow: Base No. 4

IM-99A BASES

Base Directory

DOW - BASE NO. 4

Pilotless Aircraft Division
Boeing Airplane Company
P. O. Box 803
Bangor, Maine
Tel: Bangor 2-6718 - 2-6719
TWX: Bangor BG 80 or BU 80

BOEING PERSONNEL

Base Manager:
Norman Peterson

Administrative:

Field Engineer:

Engineering Liaison:

Base Service Manager:

Senior Technical Representative:

1.44 | D5-4684 **BOEING**

Dow: Base No. 4

IM-99A BASES

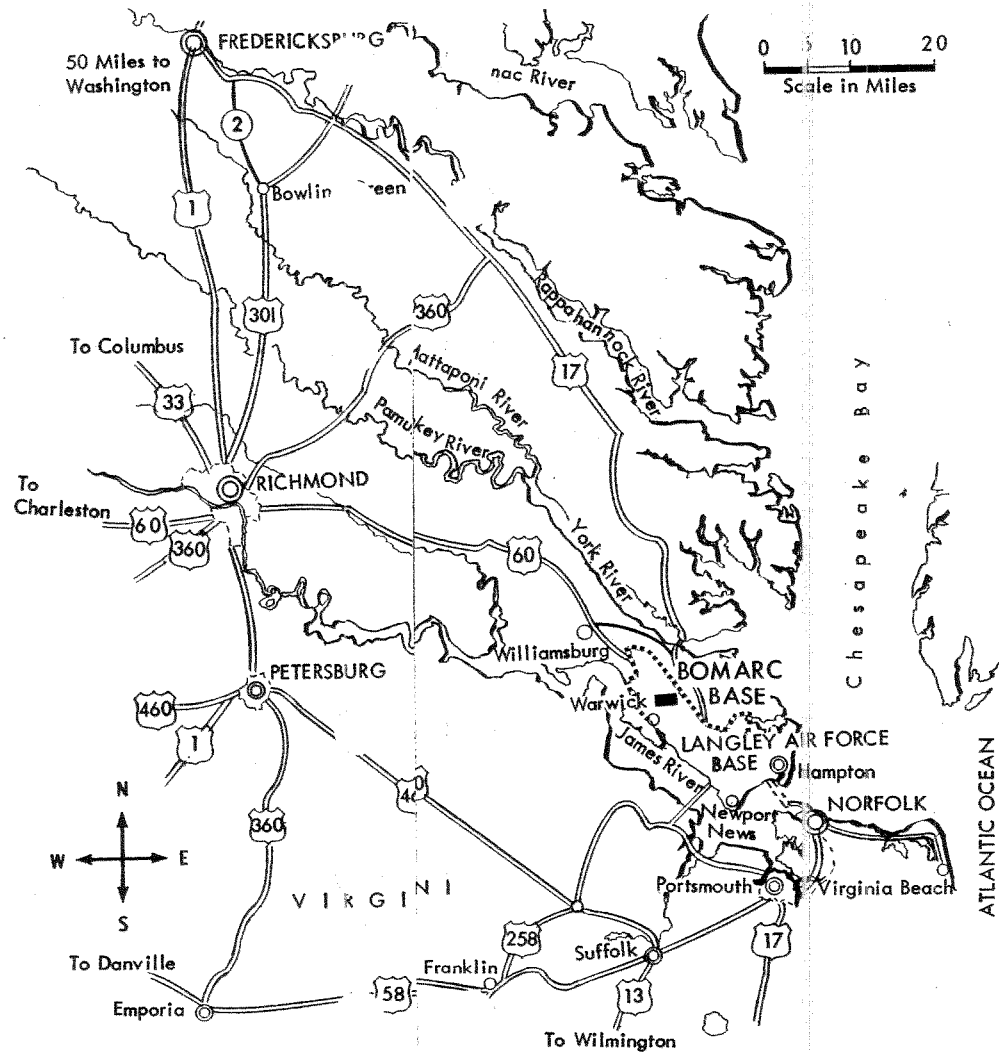
IR

New England Region
424 Trapelo Road
Waltham 54, Mass.
Tel: TWInbrook 4-2400

Col. Roland H. Cipola
11 Stratford Road
Boston, Mass.
Tel: NO 7-4067
AFIR Ext. 305

1.46 | D5-4684

BOEING



REGIONAL MAP LANGLEY - BASE NO. 5

BOEING

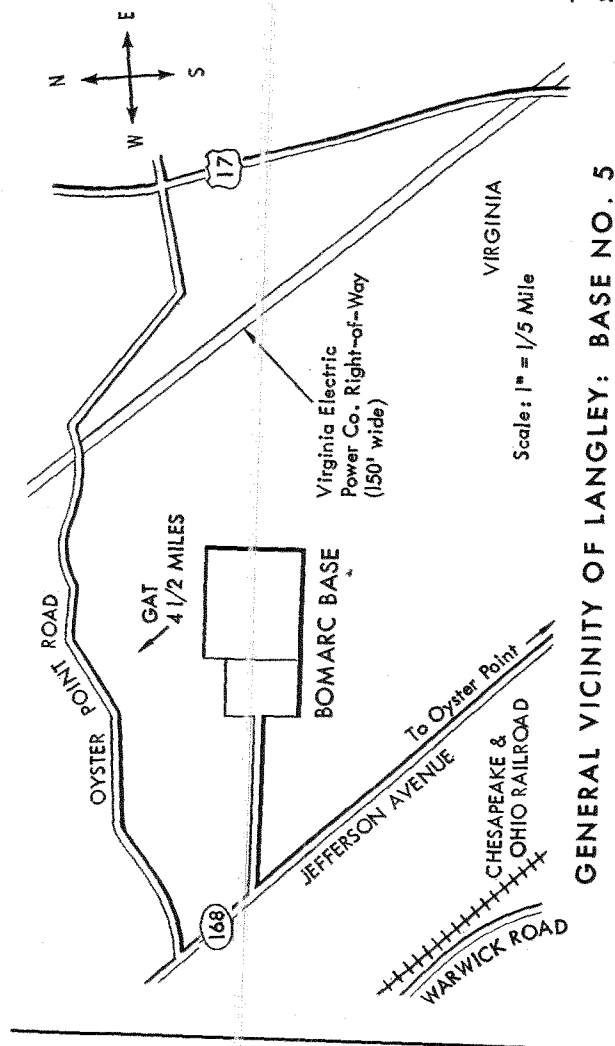
GENERAL ENVIRONMENT

Langley Air Force Base, Headquarters of the Tactical Air Command, is located in Warwick County on the Virginia peninsula near the communities of Hampton, Warwick, and Newport News, which have a combined population of 140,000. Although each of these communities is a separate municipality they are incorporated as one. Newport News boasts one of the world's biggest modern shipbuilding industries. The NASA's flight research laboratories and other important military centers are also located on this historical peninsula.

The Bomarc Base is located west of Langley Air Force Base, and at a distance of approximately thirteen road miles over typical county roads. The Base is in the northern portion of 1380 acres of government-owned property known as the Air Forces Oyster Point Bulk Ammo Storage area; the property is adjacent to State Primary Highway No. 168.

The average ground elevation of the property varies between thirty and forty feet above sea level and is relatively flat with a gentle slope to the east and south. The area is thickly wooded with trees eighty to one hundred feet high. The land in the site area is of soft clay layers, low density sands, and is subjected to a high water table and because of this, and the relative flatness of the terrain, natural drainage of the site is considered poor.

Points of interest in the area are: Jamestown, the first English-speaking settlement in the Americas; Williamsburg, whose restoration depicts the political, social and cultural aspects of early America; Yorktown and the reconstructed battlefield upon which Lord Cornwallis surrendered his British forces to George Washington; and Fort Monroe, built in 1609 on Old Point Comfort at the entrance to Hampton Roads—scene of the first ironclad naval engagement between the Monitor and the Merrimac.



Hotels and Motels

A recommended hotel in the area is the Hotel Chamberlain in Fort Monroe. Newport News, Warwick, and Hampton are all considered popular convention centers and during such times hotel, motel, and even trailer park facilities are extremely scarce. It is therefore important that reservations be made in advance of visiting the base.

WEATHER

The weather on the Virginia peninsula is somewhat similar to Seattle in temperature and rainfall. The relative humidity is generally high. Winds prevail from the southwest. Tropical storms (hurricanes) develop or originate in the West Indies from May through November and move up the Atlantic coast. On the average, about two hurricanes per year pose threats to the area; about one hurricane a year passes within 250 miles, producing significant effect on tides and climatological conditions. The area is subject to coastal northeast storms, particularly from October through April, in which moderate to gale winds and abnormally high tides in coastal waters may occur and occasionally persist for several days. This area is not generally subject to earthquakes, tornadoes, smog or air pollution. The following is a detailed weather summary of the area.

Monthly Normals

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Temp.	42.0°	44.9°	48.8°	57.3°	67.2°	75.4°
Precip.	2.9"	3.2"	3.3"	2.6"	3.3"	3.8"
	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Temp.	78.9°	77.8°	72.7°	62.2°	51.4°	42.5°
Precip.	6.0"	5.9"	3.7"	2.5"	3.7"	2.8"
	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	
Snowfall	.6"	3.0"	.9"	1.5"	1.3"	

BOEING D5-4684 | 1.51

TRANSPORTATIONSeattle to Newport News via Chicago and Washington D.C.

United Airlines Flight Number 138 leaves Seattle daily at 8:00 a.m., makes one stop in Chicago and arrives in Washington D.C. at 8:30 p.m. (EDST); this is a custom coach flight. From Washington D.C. board National Airlines Flight Number 315 which leaves at 9:00 p.m. (EDST) and arrives in Newport News at 8:45 p.m. (EST).*

United Airlines Flight Number 738 leaves Seattle each evening at 10:45 p.m., makes one stop in Chicago and arrives in Washington D.C. at 11:30 a.m. (EDST); this is a first-class flight. From Washington D.C. board Capitol Airlines Flight Number 404 which leaves Washington D.C. at 12:15 p.m. (EDST) and arrives in Newport News at 12:10 p.m. (EST).*

Newport News to Langley Air Force Base and Bomarc Site

The local Intercity Bus Company's Citizens Rapid Transit serves the communities of Newport News, Hampton, and Warwick, including service to Langley. Taxi service is available in all three communities. Car rental, Hertz and Avis, is also available at each of the three communities.

HOUSING

There is a housing shortage on the Virginia peninsula at this time due to a heavy concentration of military installations and personnel in the area. The problem is increased twofold during the tourist season as tourists are attracted in great numbers to this historical location and its many attractions. Rental costs in the Warwick County area are approximately 7% less than those of the Seattle area and this figure also applies to the sale price on homes.

* This difference in time is applicable when Washington D.C. is on daylight saving time and Newport News is on standard time.

1.50 | D5-4684 **BOEING**

IM-99A BASES

Langley: Base No. 5

Langley: Base No. 5

IM-99A BASES

Seasonal Normals

	<u>Jan</u>	<u>July</u>
Temp. - <u>Min</u>	32°F	70°F
- <u>Max</u>	48°F	89°F
Humidity - <u>Min</u>	61%	60%
- <u>Max</u>	79%	81%
Winds	11.9 mph	9.5 mph

Annual Normals

Temp. -	59.8°F
Precip. -	43.4"
Snowfall -	7.2"
Humidity - High	89%
Low	53%
Winds -	Average velocity 11 mph

Recorded Extremes

Temp. - High 105°F
Low 2°F

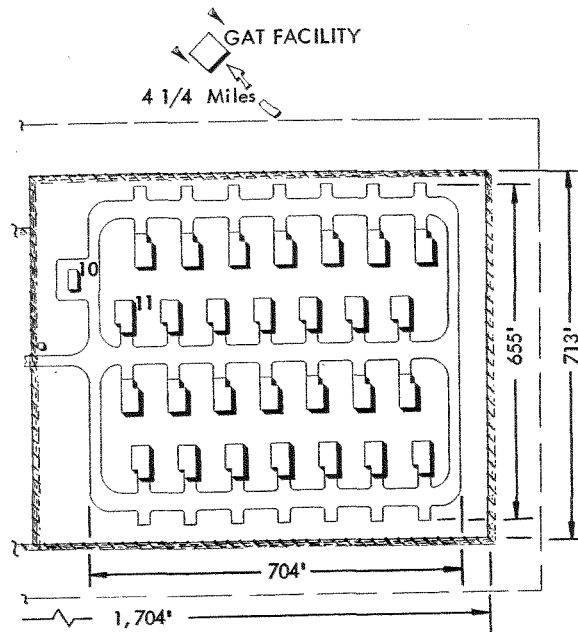
Snowfall (24 hour) 2.2"

Winds - 80 mph (June 1525)

BOEING D5-4684 | 1.53

1.52 | D5-4684 BOEING

Langley Base



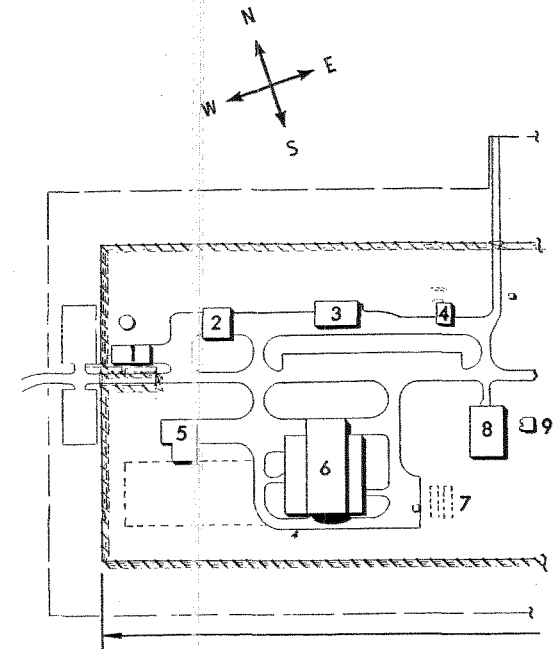
LAUNCH AREA

- 10 Ordnance Facility
 11 Model II Launcher Shelter
 (28 shelters - 1 flight)

NOTE: Differences in the Langley Base layout are due to planning for accommodation of the advanced missile system with the IM-99A system. The layout is being revised as of June, 1959 (see BAC Drawing 55-7405).

BOEING D5-4684 | 1.55

Layout -



MISSILE SUPPORT AREA

- 1 Security Control and Identification
 2 Vehicle Storage
 3 Propellant Fuel Facility
 4 Propellant Acid Facility
 5 Weapon Support Equipment
 6 Assembly and Maintenance Shop
 7 Fuel Oil Handling and Storage
 8 Heat and Power Building
 9 Cooling Tower

1.54 | D5-4684 BOEING

AIR FORCE PERSONNEL

Base Commander:

Lt. Col. D. J. M. Blakeslee (Acting)

Base Executive Officer:

Lt. Col. E. W. O'Neill

Bombardier Squadron Commander:

Director of Materiel:

Lt. Col. E. R. Richter

OOAMA Representative:

BOEING D5-4684 | 1.57**Base Directory**

LANGLEY - BASE NO. 5

Pilotless Aircraft Division
 Boeing Airplane Company
 P. O. Box 128
 Denbigh Station
 Newport News, Virginia
 Tel: TRinity 7-1311
 Ext: 23166 - 21281

BOEING PERSONNEL

Base Manager:

Administrative:

Field Engineer:

Engineering Liaison:

L. A. Yost

Base Service Manager:

Senior Technical Representative:

1.56 | D5-4684 **BOEING**

Langley: Base No. 5 IM-99A BASES

AFIR

North Atlantic Region
Federal Office Bldg.
Room 1205
90 Church Street
New York, New York
Tel: REctor 2-9100
Ext. 8252

Col. Miles Thompson
449 George Street
Ridgewood, New Jersey
Tel: GILbert 5-8733
AFIR Ext. 225

SECTION 2

BUILDINGS

ASSEMBLY & MAINTENANCE SHOP

MODEL II LAUNCHER SHELTER

ORDNANCE FACILITY

COMPRESSOR BUILDING

PROPELLANT ACID FACILITY

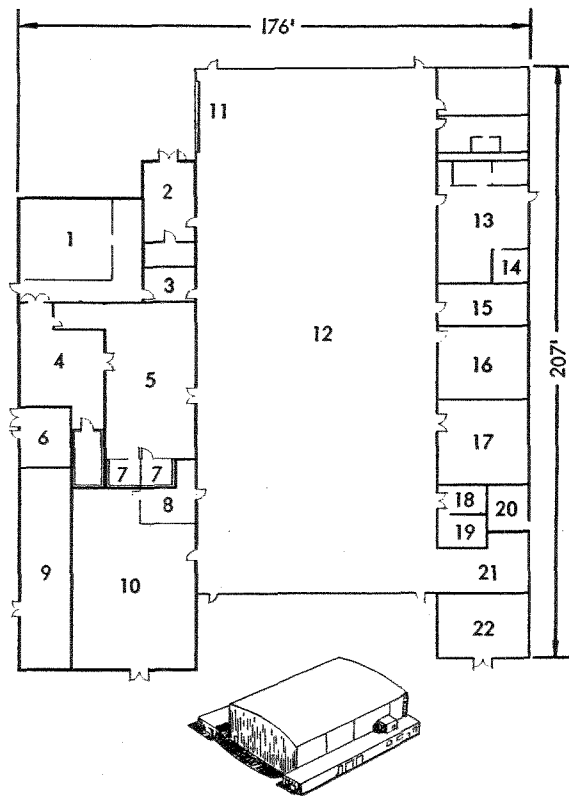
PROPELLANT FUEL FACILITY

HEAT & POWER BUILDING

GAT FACILITY

2. BUILDINGS

Assembly and Maintenance Shop



missile batteries at $-3.67 (\pm 2.2)^{\circ}\text{C}$ ($26 (\pm 4)^{\circ}\text{F}$). The ramjet testing area is located external to the main shop and provided with explosion panels, to minimize damage in the event of an explosion.

Assembly and Maintenance Shop

General

The A & M shop houses the fixed facilities and equipment required for the assembly, operational testing and servicing of recycled, malfunctioning or newly received missiles.

The design of the building is based upon a production line arrangement with an overhead handling system and fixed missile "cradles" at each of four testing stations and a missile actuator at the functional checkout station. The piping and test cables to the test stations in the main shop area are installed in floor trenches with removable access plates.

The missile entry area is isolated from the main shop area by a folding partition. Here, by means of an overhead crane and slings, the missile components are lifted from their shipping containers or the missile is taken from the missile trailer or the aircraft loading trailer.

The main shop area includes a receiving station, an assembly and disassembly station, a propulsion test station, a hydraulic test station and a functional checkout station. At each of these stations, except at the functional checkout station, work platforms and fixed cradles for the missile are provided. At the functional checkout station the missile is installed on the missile actuator and the subsequent test performed. Also located at the functional checkout station is a roped off area which contains the target and masks required for the missile target seeker test.

In addition to the main shop testing areas, three assembly testing and servicing areas are provided. These are the major assembly test sets area, the battery storage and testing rooms, and the ramjet testing and storage areas. In addition to the major assembly test sets themselves, the major assembly test sets area includes an r-f copper-screened area for testing of the command and beacon systems and the masks and spongewall required for radar tests. The battery storage area is an insulated room containing the refrigeration equipment required to keep charged

The air equipment area contains the energy producing components of the high and low pressure air system. The high and low pressure air systems provide a supply of regulated dry air for use at the propulsion system test set, functional checkout set, missile actuator, ammonia fill and drain system and the shop air connections. Following are the two major operations conducted in the A & M shop:

Base Implementation

For this operation the above facilities are utilized for receiving inspection and assembly of missiles and their unattached components after arrival at a base. Upon completion of assembly, the missiles are transported to launcher shelters, where they are fueled, have warheads installed, are run through completed confidence checks and secured in a ready-storage condition.

Periodic Recycle (6 months & 2 years)

To accomplish the recycling operation the above facilities are utilized as follows: after decontamination, the missile is transported to the A & M shop where the ramjet engines are removed and transferred to the ramjet test facility. Replaceable components of the missile are then removed, inspected, and replaced according to the current replacement schedule, and certain major assemblies are removed, tested and reinstalled. Upon completion of recycle assembly, the missile is moved through the maintenance shop test stations. (See Sec. 3.) At propulsion test, the propellant and helium system components are electro-mechanically tested, and the propellant and helium tanks and associated plumbing are leak tested. The missile is then moved to hydraulic test and the hydraulic system and components are operationally tested for functional performance. Then it is moved to functional checkout where a functional checkout of the electrical and mechanical systems is completed. When the missile has successfully completed the functional checkout, it is returned to the launcher shelter area and secured in a ready-storage condition as was done in base implementation (above).

A breakdown of equipment used in the A & M shop, including illustrations and brief descriptions of equipment function, can be found in Section 3.

- 1 Mobile Test Vehicle Storage
- 2 Battery Test Room
- 3 Technical Inspection
- 4 Service Checkout Room
- 5 Major Assembly Test Room
- 6 Ammonia Room
- 7 Radio Frequency Room
- 8 Repairable Parts Storage
- 9 Compressor Room
- 10 Parts Storage
- 11 Missile Entry
- 12 Main Shop Area
- 13 Records Office
- 14 Maintenance & Supply Office
- 15 Telco Room
- 16 Squadron Operations Center
- 17 Ramjet Test Set Installation
- 18 Control Room
- 19 Target Simulator Alcove
- 20 Pump Room
- 21 Ramjet Storage
- 22 Mechanical Equipment Room

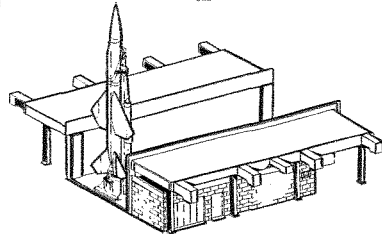
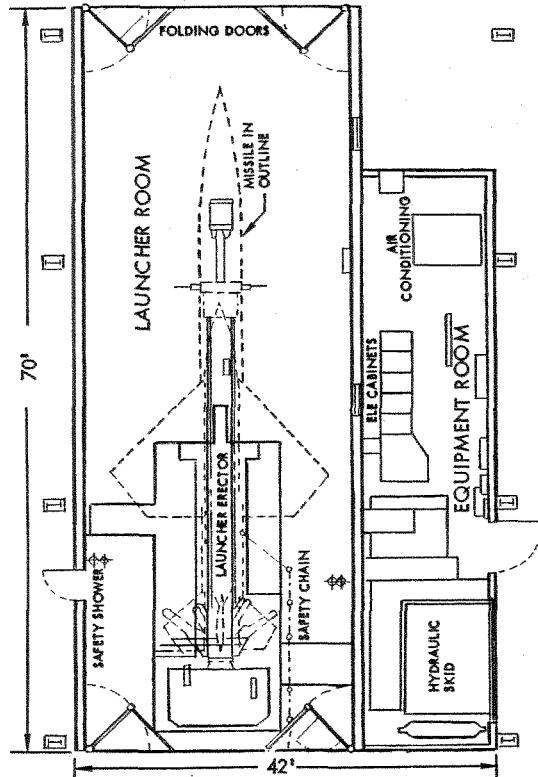
Other A & M shop areas include the parts storage area, the service checkout area, the mobile inspection unit area and the ammonia, air, and electric equipment areas.

The parts storage area, located adjacent to the major assembly test sets area, stores all new or reserviced assemblies and parts for use as required.

The service checkout area contains the equipment needed to test and calibrate all of the testing equipment on the line, in the major assembly test sets areas, and in the mobile test units.

The mobile inspection unit storage area is a heated garage provided for the efficient maintenance of the mobile units.

Model II Launcher Shelter



Model II Launcher Shelter

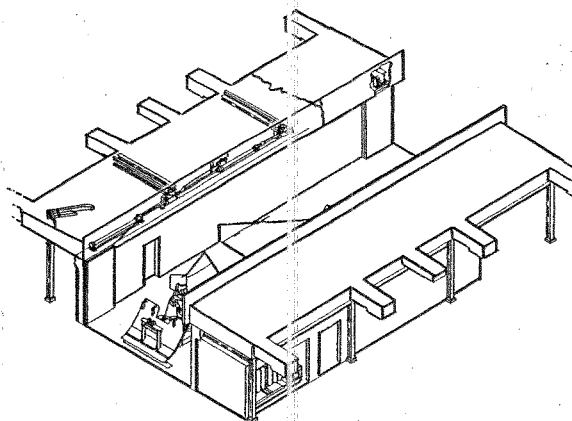
The purpose of the launcher shelter is to house, protect and support the missile over extended periods of time in such condition as to allow automatic launching within two minutes. At the time of missile launching the shelter opens and sustains all functions necessary to launching. In addition, the shelter houses and protects auxiliary launching systems.

The launcher shelter is composed of a launcher room and an equipment room. The launcher room contains the launcher erector which supports the missile during ready storage, provides service connections for the missile, positions the missile in its launching attitude, and lowers the missile in the event of a cancellation or malfunction.

The equipment room contains the air conditioning equipment, nose cooling skid, electrical launching equipment, low-pressure, air system control cubicle, high-pressure air system cubicle, helium system control cubicle and hydraulic skid. Access to the mobile inspection equipment external connector panel is from the outside of the equipment room forward wall. The equipment room also contains wall mounted electrical panels and cabinets utilized for lighting, power distribution, telephone and fire alarm and alert systems.

The launcher room is covered by a movable roof divided along its longitudinal center line. The two halves of the roof, wheel-mounted on transverse "I-beams," separate from the center to permit erection of the missile. Folding doors at each end of the room open automatically when the roof opens or manually to permit entry or removal of equipment. Four personnel doors, three of which are located in the main room, open outwards from the shelter. The doors are equipped with panic hardware. The main room floor is sloped so that all spillage drains away from the erector pit. Fire detection and warning systems are located throughout the launcher and equipment room and are so connected that when activated an audible warning is given to both rooms. The fire detection device also shuts off the shelter air conditioning through the electrical launching equipment. Air conditioning is of the chilled water type and maintains a controlled temperature and humidity within the launcher shelter.

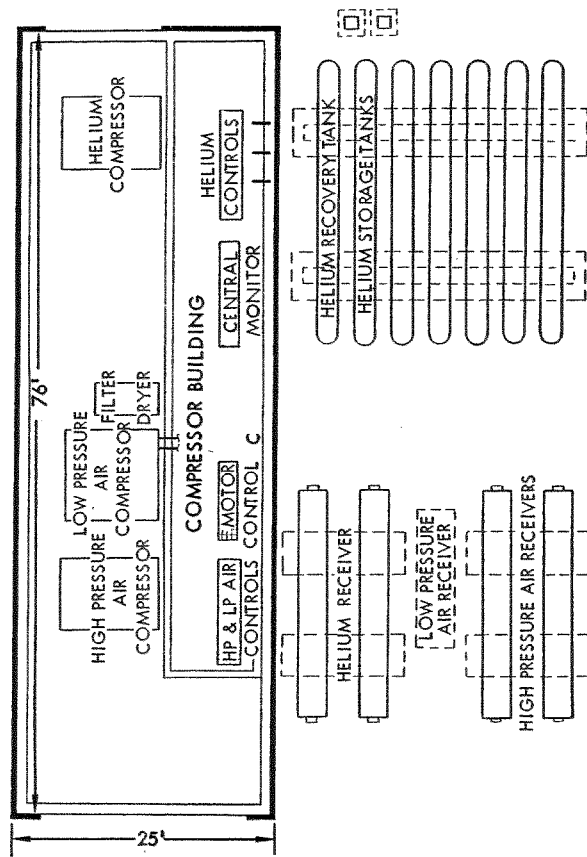
mounted in line with each end of the hydraulic cylinders. As the lower pinion rotates, power is transferred to the roof rack by means of a vertical pinion shaft and a second gear. The driven racks attached to the roof are located at right angles to the walls of the shelter. Thus, a linear motion parallel to the wall is transferred to a linear motion parallel to the movement of the roof.



The shelter is constructed of concrete masonry and structural steel of sufficient strength to absorb missile take-off rocket blast loads and environmental loading caused by high velocity wind or heavy snow. The shelter is fire resistant to prevent the spread of fire to adjacent shelters and the interior is impervious to corrosion resulting from condensation of water vapor and fumes of hydrocarbon and fuming nitric acid. Shelter facilities provide heating, air conditioning and lighting; separate fire fighting equipment is installed in both the launcher room and equipment room.

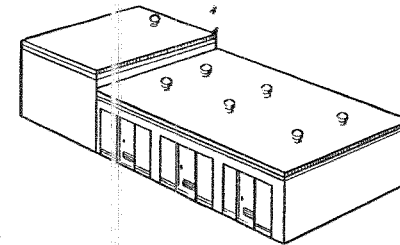
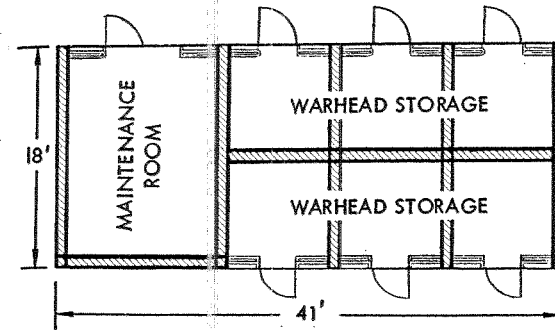
The Model II roof actuating system is composed of mechanical, hydraulic and electrical components which provide a positive means of opening and closing the shelter roof halves. The roof is unlatched and moved to a fully open position within a maximum time limit of five seconds. It is maintained in the open position by hydraulic pressure. The complete roof actuating system for the shelter is composed of two identical systems, one for each roof half, which are interlocked to operate simultaneously. Hydraulic fluid transmits the power required to actuate the system; the fluid is transmitted through suitable hydraulic control valves to double rod-end hydraulic cylinders. Drive racks attached to each end of the hydraulic cylinders impart rotary motion to pinions

Compressor Building



The purpose of the Compressor Building facilities is to provide a source of external supply for the gas systems for a number of individual launcher shelters. (There is one Compressor Building for each flight of missiles.)

Ordnance Facility



The Ordnance Building is used for storage of warheads and provides maintenance facilities for warheads or other pyrotechnics common to a Bomarc base.

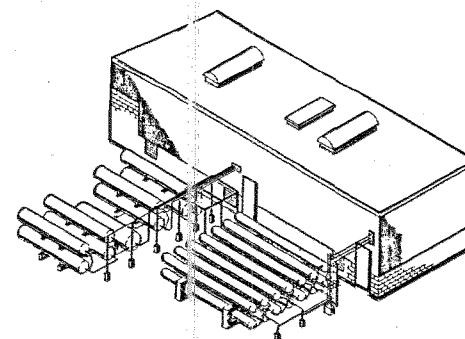
PROPELLANT FACILITIES AND DECONTAMINATION EQUIPMENT

The propellant facilities (and the decontamination equipment, which is part of the propellant fuel facility) provide for fueling, defueling, and decontaminating the interceptor missile in accordance with the concept of shelter fueling.

In shelter fueling, mobile propellant servicing equipment is serviced at the propellant facilities and used to transport the propellants to the missiles on the launcher erectors. The procedure is reversed for defueling. The propellants removed from the missile are taken to the propellant facilities for transfer to special tanks where they are tested for reuse or disposal. The missiles are then brought to the decontamination facility for decontamination prior to being transported to the A & M shop.

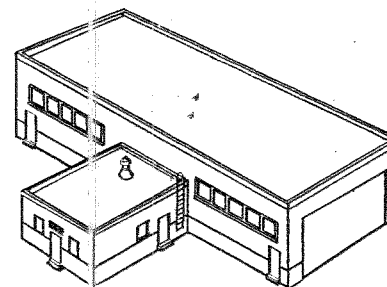
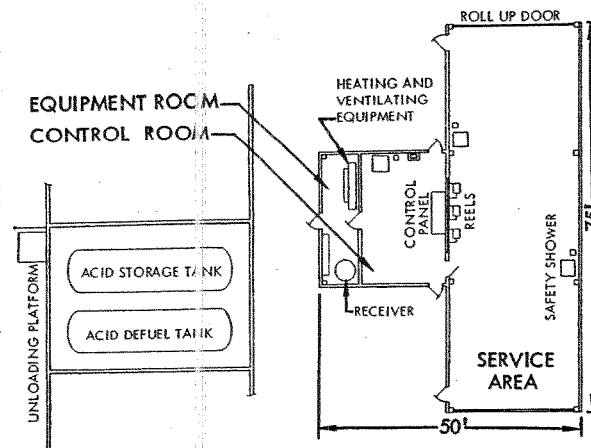
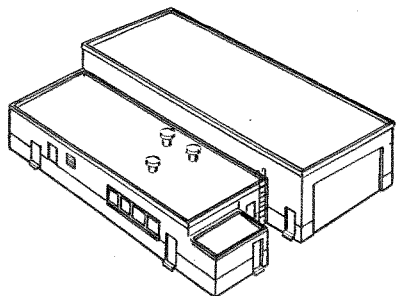
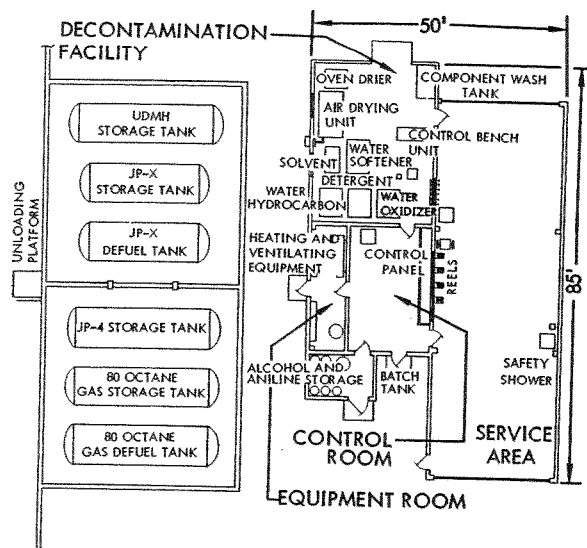
Propellant Acid Facility

The propellant acid facility includes unloading equipment, fresh and defuel oxidizer storage tanks, a nitrogen pressurization system, control equipment, and servicing equipment. The unloading equipment includes a swing joint unloading arm and a reel-mounted nitrogen-vent hose for imposing pressure on the oxidizer to be expelled into the acid storage tank. In the storage tanks, the acid is held under pressure by a nitrogen pressurization system which is initially supplied nitrogen under pressure from the Heat and Power Building. The system includes a receiver, located in the equipment room; pressure reducing equipment; and distribution equipment which includes the reel-mounted hose at the unloading platform and another in the service area. In addition to the nitrogen receiver and controls, the equipment room houses the heating and ventilating equipment for the facility and an instrument panel, liquid level gages and pressure gages for the storage tanks. The control room houses panel-mounted control valves, switches and meters and one of three safety showers and eyebaths, the other two being located in the service area. The controls operator is isolated from the service area by a wire glass observation window.



The Compressor Building, consisting of one large room, includes equipment for the low-pressure air system, the high-pressure air system, the helium system, and the external storage facilities for these systems. In addition, there is an electrical power distribution system and a monitor system in the building. The location of the equipment, the external location of the storage tanks and the three entry doors are shown in the illustration.

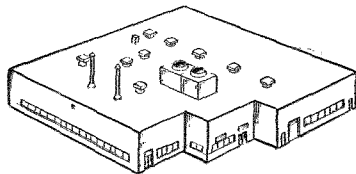
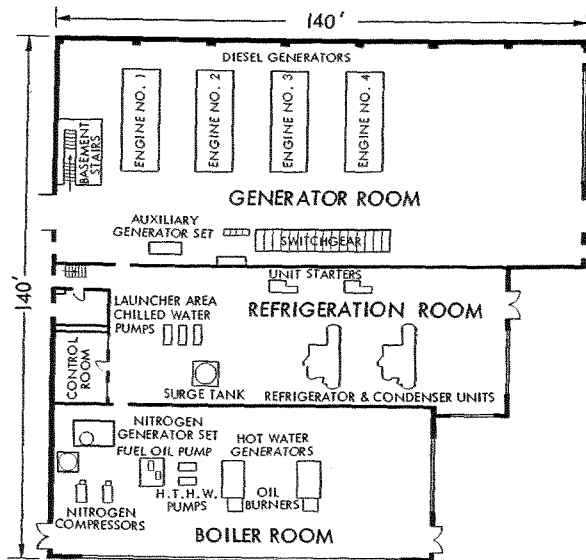
Propellant Fuel Facility



The service area is equipped with roll-up doors at each end to permit straight through servicing of the mobile propellant servicing trailer or the missile on a trailer. Adapter couplings are provided to match the nitrogen hose reel, the acid fueling hose reel, and the acid defueling hose reel on fueling trailers.

The entire facility is adequately equipped with a fire protection system, a fume collection and washing system, and other equipment required for personnel and equipment safety.

Heat and Power Building



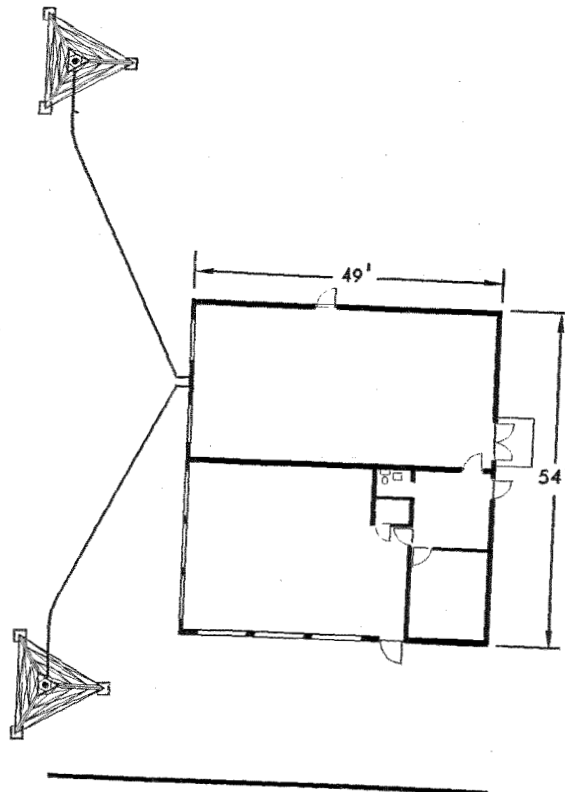
The Heat and Power Building houses the equipment required to generate the heat, electrical power, chilled water, and nitrogen required to supply the missile support and launch areas. The building consists of a main floor, basement and mezzanine. The main floor is divided into three rooms containing equipment as shown. The basement contains the condenser water res-

The propellant fuel facility includes unloading equipment, propellant and ANFA storage areas, a nitrogen pressurization system, control equipment, servicing and decontamination equipment. At the unloading platform, a swing joint pipe and reel-mounted nitrogen hose are provided to pressurize and discharge propellants into the storage tanks. The propellant storage area includes tanks for storage of UDMH and JP-4 before they are mixed to form JP-X; a JP-X storage and a JP-X defuel tank; an 80-octane gas storage tank and an 80-octane defuel tank. The propellants are stored under nitrogen pressure by means of a system which includes a nitrogen receiver, located in the equipment room, pressure reducing equipment and distribution equipment. The receiver is supplied with pressurized nitrogen from the Heat and Power Building.

In addition to the nitrogen receiver, the equipment room houses an instrument panel and liquid level gages for the storage tanks. The ANFA storage area provides room for storage of drums of aniline and furfuryl alcohol before they are mixed and an ANFA batch tank for storage of the mixture. The hypergolic fuel servicing cart is itself serviced from the batch tank. The control room houses a JP-X blender, an ANFA blender and their controls as well as the panel-mounted valves, switches, and meters required for control of the servicing equipment. The controls operator is isolated from the service area by a wire glass observation window. The service area is equipped with roll-up doors at each end to permit straight-through servicing of the mobile propellant equipment. Adapter couplings are provided to match the JP-X hose reel, the JP-X and gas defuel hose reel, the gas fueling hose reel, and the nitrogen-vent hose reel on fueling trailers. The facility is equipped with a fire protection system, a fume collection system, and other equipment required for personnel and equipment safety.

Decontamination equipment includes a water oxidizing unit, an air drying unit, a detergent flushing unit, a water flushing unit for hydrocarbon, a solvent flushing unit, and a control bench unit.

GAT Facility



The building at the GAT Facility houses the ground-to-air transmitter equipment which changes the mid-course guidance commands from the form in which they leave the direction center into the correct form for RF transmission. All operating equipment in the GAT Facility is duplexed. Either portion is completely capable of transmitting midcourse guidance commands

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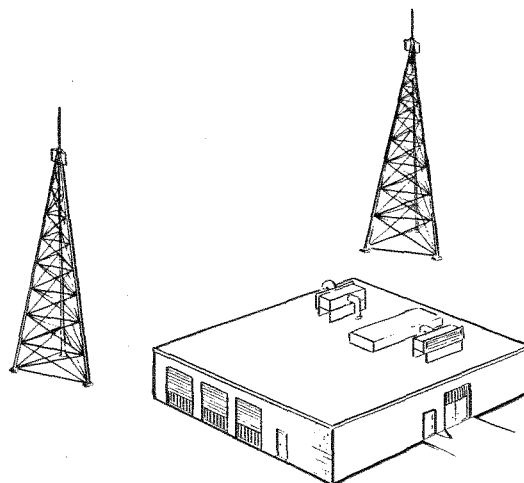
BOEING*

ervoir for the water chilling unit condenser water pumps, lube oil storage tank, fuel oil drain pump, engine lube oil reservoir, filter, auxiliary and pre-lube pump, expansion tank, and jacket water pump. The mezzanine area, above the diesel generator room contains locker, storage and shower facilities.

Two radiant-type forced circulation hot-water generators produce the heat required. The oil-fired, tube-type generators circulate heated water to a single expansion tank from which it is pumped through the distribution mains. At the points of demand for heat, some heating units are supplied directly with this water at 380°F. At other points, the high temperature water is passed through heat exchangers which provide medium temperature hot water for heating the buildings.

With the exception of the GAT Facility which generates its own power, all electrical power is generated in the Heat and Power Building. The electrical equipment includes four 1000-KW Class A diesel generator sets for Bases 1 and 2, three 1000 KW sets for Bases 3 and 4, two 750 KW sets for Base 5 plus a 2000 KVA substation on commercial power, and appropriate distribution equipment. Primary power is fed underground to substations located at the Compressor Building and the A & M shop.

The nitrogen generating system provides pressurized nitrogen for purging and blanketing tanks and lines and for pressure transferring fuel and oxidizer at the propellant facilities. The major components of the system are a combustion chamber, compressor, and receiver. A hydrocarbon fuel is burned in the combustion chamber in the presence of air, converting the oxygen in the air into water and carbon dioxide. The water is removed by cooling and the carbon dioxide is removed by an absorbing fluid. The resultant product, nitrogen, is then compressed for storage in the receiver.



to all the missiles on the base. Each portion contains a demultiplexer group, a multiplexer group, a transmitter, high power RF amplifier, and an antenna. An RF dummy load is provided to permit tuning and adjustment without RF omission. With the exception of the antennas, this equipment is housed in the transmitter building. The terminal receives multiplexed information originated by the command computer in the direction center and demultiplexes the information into the proper form for keying the subchannel oscillators of the multiplexer. The output of the multiplexer group is used to amplitude modulate the high power RF amplifier.

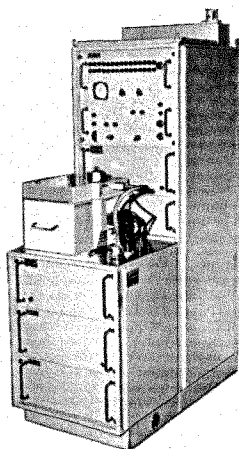
Electrical power for the ground-to-air transmitter facility is supplied by three 150 KVA diesel driven generators housed in the GAT building with provisions for outside power, if available. All GAT buildings, exclusive of any special equipment cooling, are provided ventilation cooling only. No provisions are made for air conditioning.

Equipment used in the GAT Facility is described in Section 4 and schematic operation of the facility is shown in Section 6, page 6.12.

BATTERY TEST EQUIPMENT

Servo Battery Test Set

The servo battery test set is specifically designed to test and charge new and in-service IM-99A servo batteries. The batteries are pre-loaded and load



SERVO BATTERY TEST SET

Instl. No.:	50-81405
BAC Part No.:	55-10811
T.O. No.:	33D9-36-2-22
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50661

tested for compliance with proper operating tolerances of the batteries when installed in the missile.

The test set is made up of two cabinets connected to form one functional unit as shown. The test set houses five removable drawers which contain the bulk of the equipment. Additional equipment is mounted in the lower portion of the vertical cabinet which is accessible through the rear door. Battery mounting fixtures and connectors are on top of the desk cabinet.

SECTION 3

SUPPORT
EQUIPMENT

BATTERY TEST EQUIPMENT

FUNCTIONAL CHECKOUT EQUIPMENT

MOBILE INSPECTION EQUIPMENT

SERVICE CHECKOUT EQUIPMENT

MAJOR ASSEMBLY TEST SETS EQUIPMENT

SERVICING EQUIPMENT

MECHANICAL TEST SETS EQUIPMENT

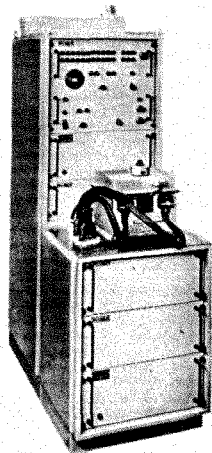
RAMJET TEST EQUIPMENT

MISSILE ACTUATOR EQUIPMENT

3. SUPPORT
EQUIPMENT

Power Battery Test Set

The power battery test set charges and checks new and in-service IM-99A power batteries. A power battery contains two separate sections; an inverter section, and a heater section. The test set simul-



POWER BATTERY TEST SET

Instl. No.:	50-81405
BAC Part No.:	55-10801
T.O. No.:	33D9-36-3-2
Instl. Test Req'm't No.:	D5-2308
Procurement Spec. No.:	D10-50540

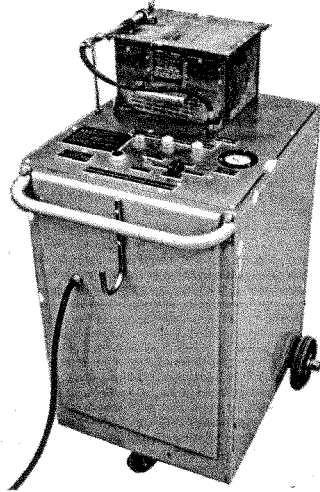
taneously performs identical tests on each section of the power battery. It is capable of performing the following operations: self-check, formation charge (new unformed batteries only), discharge, charge, preload, load, recharge. Except for self-check, each operation is performed on the battery and is complete and automatic within itself. Cell and terminal voltages are checked at various intervals to determine

For ease of servicing, the drawers are composed of subchassis and modules where practical. To facilitate trouble shooting, the drawer chassis and subchassis are equipped with component and module input and output test points.

The wiring has enough capacity so that auxiliary equipment such as the power supply calibration cart may be connected to the convenience outlet on the side of the set.

Battery Auxiliary Service Set

The purpose of the battery auxiliary service set is to increase battery life by reducing self-discharging effects and general cell deterioration.



BATTERY AUXILIARY SERVICE SET

Instl. No.:	50-81405
BAC Part No.:	55-10813
T.O. No.:	33D9-36-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50664

The equipment is housed in a desk-high cabinet that has a mounting jig for the battery and a control panel to initiate operation of the service set. Both the mounting jig and control panel are located on the top surface of the cabinet.

The components of the battery auxiliary service set include a nitrogen bottle, vacuum pump, solenoid valves, and pressure switches.

BOEING D5-4684 | 3.5

3.4 | D5-4684 **BOEING**

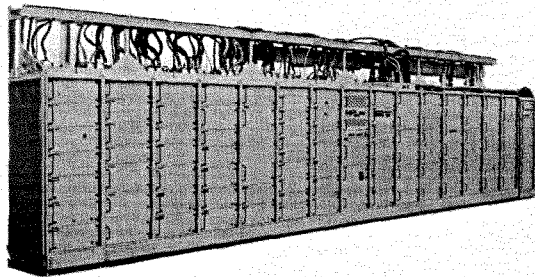
the condition of the battery. Out-of-tolerance voltages are indicated by the cell-malfunction lights or terminal-voltage reject lights and will cause the test set to shut down after the completion of the discharge or charge operations. If all voltages are within tolerance, the test set will advance from operation to operation and shut down at the end of the load test.

The power battery test set is housed in a standard vertical rack cabinet and a desk cabinet connected to form a single unit. The set is composed of six removable drawers which house the majority of the equipment. Additional equipment is mounted in the lower half of the vertical rack cabinet. Battery mounting fixture and connectors are on top of the desk cabinet.

FUNCTIONAL CHECKOUT EQUIPMENT

Functional Checkout Set

The primary purpose of the test set is to check out the completely assembled missile and thereby to ensure confidence in the operational readiness of the missile. The test is performed in the A & M shop with the missile installed on the missile actuator. The test set isolates faults to major assemblies in a manner facilitating service by replacement.



FUNCTIONAL CHECKOUT SET

Instl. No.:	55-5692
BAC Part No.:	55-12885
T.O. No.:	33D9-30-3-12
Instl. Test Req'm't. No.:	D5-2308
Procurement Spec. No.:	D10-50637

The components of the functional checkout set include a test and control unit, auxiliary signal generator cabinet, missile junction box, servo power supply, heater and inverter power supply, high voltage power supply, target seeker radar transponder, auxiliary components, and an air blower cabinet.

The test and control unit generates signals and provides monitoring and programming for the tests. The unit consists of eight cabinets: a miscellaneous function cabinet, a flight control cabinet, a test controller cabinet, an evaluator cabinet, a command

The battery auxiliary service set evacuates the air from the battery with the vacuum pump until the pressure is reduced to 5 psia. The battery is then purged with nitrogen to a pressure of 2 psig. This treatment increases battery life by approximately 50%.

operation of the set before testing begins. The self-check is manually initiated, but after its successful completion, the missile checkout is automatically sequenced.

Lights on the control console indicate to the operator that all preparatory requirements for test conditions have been met, that a test is in progress, or that the test sequence has been stopped. Other lights indicate that the test has established complete confidence in the missile or identify faulty major assemblies. A counter on the console indicates the total time spent in testing the missile. Another counter indicates the step being performed.

system cabinet, a control console, a beacon and a fuze cabinet. The unit monitors and programs these tests:

- | | |
|--------------------------|--------------------------------------|
| (1) Command system test | (7) Power test |
| (2) Flight timer test | (8) Ramjet test |
| (3) Flight control test | (9) Cooling system test |
| (4) Guidance beacon test | (10) Hydraulic system test |
| (5) Fuze test | (11) Nose pressurization system test |
| (6) Destruct system test | (12) Self-test |

The auxiliary signal generator cabinet contains the coordinate converter starter which provides the signals required for the coordinate converter test. In addition, the cabinet provides the instrument pressure simulation required for the flight control test.

The missile junction box provides a centralized termination of essentially all wiring between the functional checkout set and the missile at the A & M shop.

The test equipment power supplies include the servo power supply, heater power supply, high voltage power supply and inverter power supply. The power supplies perform the same functions during tests that the missile batteries do in flight.

The target seeker radar transponder cabinet generates the r-f signals which simulate target motion, target range, and target rate as necessary to check the target seeker radar. It also provides for testing of the radar's anti-jamming capabilities.

The auxiliary components are those items which are needed for complete utilization of the functional checkout set. These components include the following:

- | | |
|--|-----------------------------------|
| (1) Command system calibrated r-f link | (6) Fuze r-f assembly |
| (2) Beacon calibrated r-f link | (7) Dummy flares |
| (3) Fixed target backstop and antenna assembly | (8) Dew pointer assembly |
| (4) T-S radar nose mask | (9) FCO cabling |
| (5) T-S radar beam mask | (10) First motion switch actuator |
| | (11) Operator's table |

The functional checkout set incorporates automatic self-check provisions that ensure confidence in the

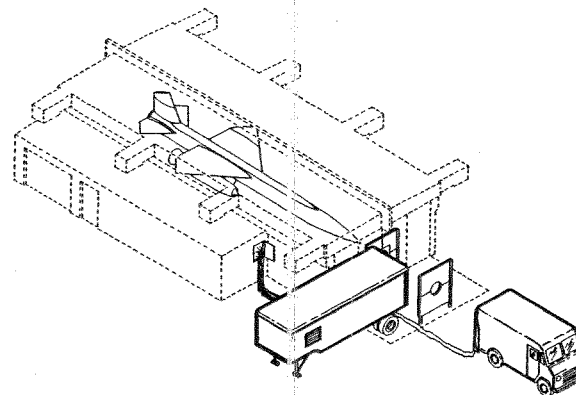
a functional checkout set, an air conditioned semi-trailer van for transporting the LECS and TCU, a mobile radar target, and a truck for transporting the mobile radar target.

The test equipment contained in the MIE van includes a test and control unit of a functional checkout set, a test and control console for the functional checkout set, a launching equipment checkout set control console, a launching equipment checkout set, an MIE junction box, a servo power supply, a cable storage rack, and related accessory equipment and tools.

The test equipment contained in the mobile radar target (MRT) truck includes a hydraulically driven cable reel, target horn assembly, antenna backstop, radar transponder, radar window assembly, power distribution panel, fuze system R-F assembly, nose scavenging assembly, dew pointer, two beam masks and related accessory equipment.

**MOBILE INSPECTION EQUIPMENT
MIE Van and MRT Truck**

The mobile inspection equipment (MIE) is used at the missile launcher area to perform various tests on the missile and the missile launching equipment. The MIE,



MOBILE INSPECTION EQUIPMENT

	Inspection Unit	Radar Target
Instl. No.:	50-81408	50-81408
BAC Part No.:	55-13233	55-13234
T.O. No.:	33D9-41-2-1	33D9-41-2-2
Instl. Test Reqm't. No.:	D5-2308	D5-2308
Procurement Spec. No.:	D10-50660	D10-50667

by means of self-check sequences (1) checks itself, (2) performs, (in the order programmed), electrical and mechanical tests of the missile launching equipment, electrical and mechanical tests of the missile, and (3) initiates and controls a simulated launch of the missile. These tests are automatically programmed to permit, in as short a time as possible, a launching equipment checkout, a missile checkout, and a simulated launch. In the event of a malfunction during the checkout, the mobile inspection equipment isolates the fault to a missile major assembly or a replaceable assembly of the launching equipment.

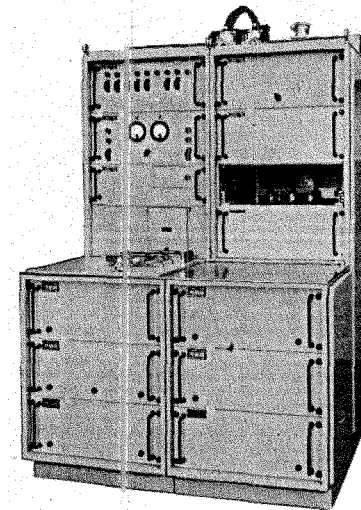
The MIE consists in general of a launching equipment checkout set (LECS), a test and control unit (TCU) of

into the design of the beacon test set to isolate malfunctions to replaceable components.

The beacon test set is a bench and cabinet assembly containing the necessary components and accessories needed to test the guidance beacon of the IM-99A missile. Controls are provided on the front panels of various components, and test results are displayed visually on the monitor and control panel. The left-hand portion of the bench top supports the holding fixture in which the missile beacon is placed for testing.

**MAJOR ASSEMBLY TEST SET EQUIPMENT
Beacon Test Set**

The beacon test set is one of the major assembly test sets comprising part of the operational test equipment of the IM-99A Weapon Support Equipment. The beacon test set is used to adjust the receiver and transmitter frequencies in the missile beacon assembly. The test set interrogates the beacon assembly



BEACON TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10802
T.O. No.:	33D9-44-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50641

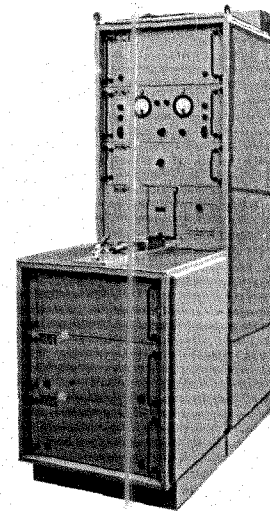
with various interrogation codes and pulse-repetition frequencies to evaluate the major assembly response as to frequency, reply code, peak power, and number of replies. A self-check feature is incorporated

the types of tactics to be performed. During testing operations the test set simulates the transmitted signal of the ground base guidance system and evaluates the receiver's response. The receiver under test receives the signal, removes the amplitude modulated carrier and filters the remaining frequency for acceptance of the proper signal to which it alone will respond. The testing sequence determines if the receiver is tuned to the correct frequency, if the output levels are within tolerance, if the receiver noise level is not excessive, and if digital output levels have been correctly adjusted during the test sequence. The operation of the command receiver test set provides self-checking features to establish confidence in the command receiver test set operation. The self-check and the command receiver test are manually sequenced following a time delay required to bring the command receiver and test set crystals to their correct operating temperatures. The command receiver test set is primarily designed for maintenance at organizational level and provides performance standards and calibrations that are within the specified tolerances to ensure efficient missile operations.

The command receiver is mounted in an upright desk-type cabinet. The equipment is mounted in drawers made up of replaceable modules. A holding jig that holds the command receiver during testing is mounted atop the desk.

Command Receiver Test Set

The command receiver test set provides the necessary means to test and adjust the command receiver used in the IM-99A missile. The test set will ensure that



COMMAND RECEIVER TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10803
T.O. No.:	33D9-43-2-12
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50642

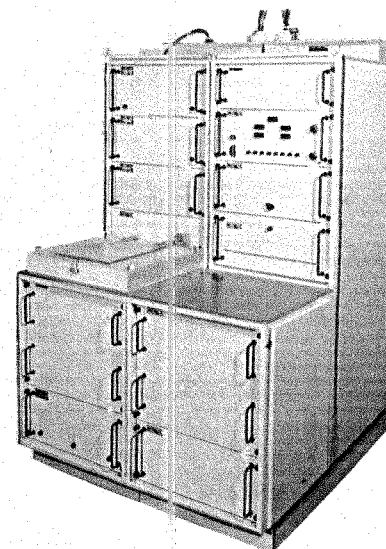
the command receiver is tuned to the correct intolerance frequency and the output levels are adjusted correctly. During missile flight, the command receiver receives radio transmitted data from the ground-based guidance system. The received transmitted data is reduced into a coded form called a message. This message instructs the missile as to

During missile operation, the major assembly receives a digital message and a sync-pulse from the command receiver. The message contains information to differentiate between missiles, to select which missile controls system is to receive the signal and to determine how large a signal it will receive. Therefore, the command decoder and servo test set must simulate the messages that are sent to the major assembly from the command receiver and check the outputs to ensure that the correct control loop is receiving the commands at the proper magnitude. The testing sequence also determines the aliveness, speed of response and accuracy of position of the resolvers and transducers; speed of coincidence; operation of the relays; switch positions; correctness of address, and whether the power that is supplied to the major unit is correct. The test set also has self-checking features to ensure the correct operation of the test set before major assembly testing.

The command decoder and servo test set drawers are mounted in two upright desk-type cabinets. The equipment is mounted in drawers which are made up of replaceable modules. A holding fixture is mounted atop cabinet No. 1 (left) for holding the major assembly during test.

Command Decoder and Servo Test Set

The command decoder and servo test set provides the necessary means of testing and adjusting the command decoder and its servo intelligence. The test set will ensure that the major assembly, (command decoder and servo controls) accepts correct in-tolerance digital messages and converts them into the desired outputs.



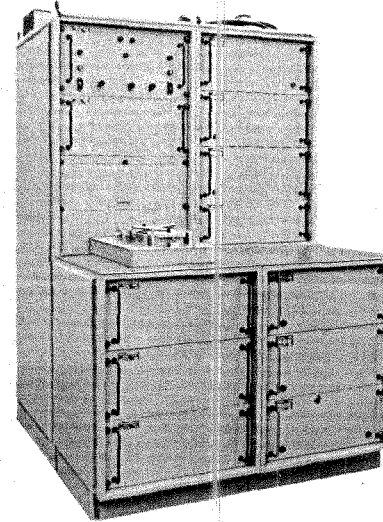
COMMAND DECODER AND SERVO TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10812
T.O. No.:	33D9-3-40-2
Instl. Test Requir. No.:	D5-2308
Procurement Spec. No.:	D10-50662

its isolation amplifiers, relays, transformers, pre-amplifiers and magnetic amplifiers, and for various ground, relay contact, and continuity resistances and connections. When a reject indication is received on a particular test, the fault can normally be isolated to a single replaceable component. In addition, the test set is provided with a self-check test sequence which can normally isolate a malfunction in the test set to one replaceable component. During the self-check, the proper operation of the stepping switches and function relays, the three rectifiers, the comparator, the two-phase detectors, and the power supplies is checked. The actual operation of the electronic portion of the coordinate converter is tested further by the missile checkout equipment.

Coordinate Converter Electronics Test Set

The coordinate converter electronics test set is one of the major assembly test sets comprising part of the operational test equipment of the Bomarc IM-99A Interceptor Missile Weapon Support Equipment. The



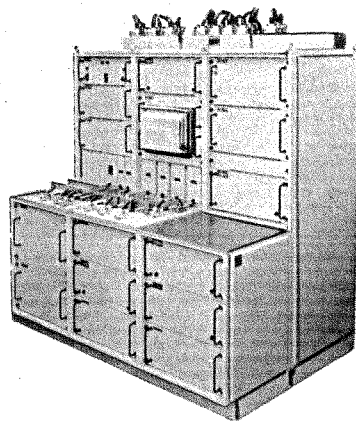
COORDINATE CONVERTER ELECTRONICS TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-14298
T.O. No.:	33D9-35-2-22
Instl. Test Reqmt. No.:	D5-2308
Procurement Spec. No.:	D10-50643

purpose of the coordinate converter electronics test set is to help ensure the reliability and proper operation of the electronics portion of the missile coordinate converter. To accomplish this, the coordinate converter is tested for the proper operation of

Flight Control Test Set

The flight control test set provides for confidence checking the following major missile assemblies: pitch control system, roll bulkhead servo, yaw control system, surface effectiveness servo, elevation error corrector, transverse error corrector, range rate servo, altitude servo, and the flight timer.



FLIGHT CONTROL TEST SET

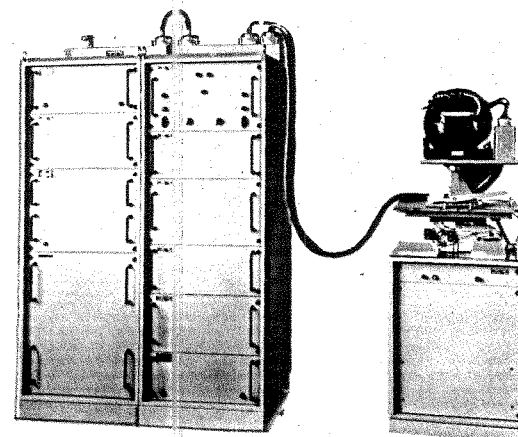
Instl. No.:	50-81409
BAC Part No.:	55-10806
T.O. No.:	33D9-7-15-22
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50645

The test set is capable of testing each of the flight control system major assemblies and of a self-check test to establish confidence in the test set prior to performing a test of a major assembly.

The flight control test set consists of: (1) function generators to provide input signals for the

Coordinate Converter Stable Platform Test Set

The coordinate converter stable platform test set is designed to verify electrically the satisfactory operation of the coordinate converter stable platform of the Bomarc IM-99A missile. While the test set



COORDINATE CONVERTER STABLE PLATFORM TEST SET

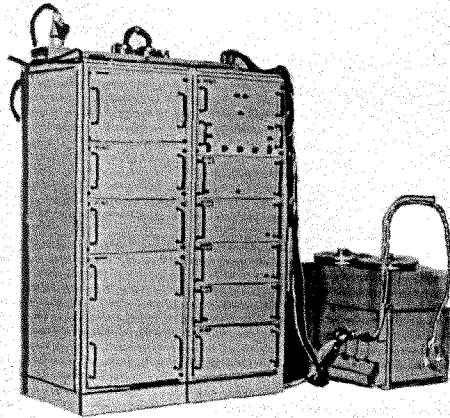
Instl. No.:	50-81409
BAC Part No.:	55-14299
T.O. No.:	33D9-35-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50644

performs this function, visual indications of the test results are automatically displayed on the test set control panel.

The test set consists of two rack-type metal cabinets and a Scoresby motion table. Cabinet No. 1 contains three removable drawers and the blower assembly housing that provides cooling air for the equipment in both cabinets. Cabinet No. 2 houses six removable drawers. The base of the Scoresby table provides space for the table-drive mechanism.

Control Instruments Test Equipment

The control instruments test equipment provides for bench testing the control instruments of the missile, which consists of a mechanical instruments test set and a pneumatic instruments test set. The mechanical instruments test set consists of a test rack contain-



MECHANICAL INSTRUMENTS TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10807
T.O. No.:	33D9-33-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50647

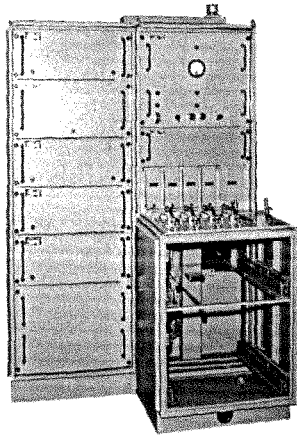
ing power supplies, comparator circuits, go/no-go indicators, and test switches, and a spin table for mounting the instruments and supplying the proper accelerations and rotations to the various instruments.

The mechanical instruments test set is capable of testing the flight control instruments consisting of tachometers, rate gyros, and linear accelerometers. It also provides self-check features and includes a

major assembly under test, (2) output loads, output monitoring devices, and input switching devices, and (3) power sources and input signals for the major assembly and the test equipment.

Power Test Sets

The power test sets provide the equipment required to test the missile power systems. The power test sets consist of a power supply and regulator test set and an inverter test set.

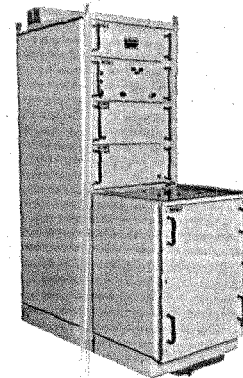


POWER SUPPLY AND REGULATOR TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-13684
T.O. No.:	33D9-6-9-12
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50650

The power supply and regulator test set is used to test all of the necessary electrical functions of the power supply and regulator major assemblies contained in the Bomarc missile. The applicable missile major assemblies tested are the plus 150-volt and plus 250-volt regulators, the minus 250-volt regulated power supply, the 900-cycle power supply, and the instrumentation transformer package.

manually operated self-check test switch. A test switch is provided on the set which is rotated through its test positions to select the various tests for each of the missile instruments tested and to select the proper mode of operation of the spin table.



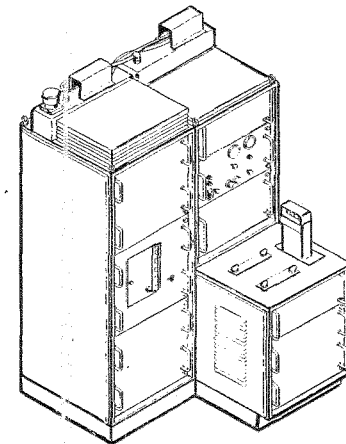
PNEUMATIC INSTRUMENTS TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10808
T.O. No.:	33D9-31-2-12
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50648

The pneumatic instruments test set consists of a bench-type cabinet and rack-type cabinet containing power supplies, comparator circuits, go/no-go indicators, test switches and a vacuum pump to provide the proper test pressures. The pneumatic instruments test set is capable of testing the missile altitude transmitter and the missile pitot pressure transducer. It also provides self-check features and shall be equipped with a manually rotated self-check switch. The set is provided with a manually rotated test switch for selecting the correct input pressure and comparator circuit for testing.

left vertical cabinet contains the 28-volt d-c power supply. The desk-type cabinet contains a load bank and also serves as a mounting for the inverter under-going test. The blower for the load bank is located in the right vertical cabinet. The blower for the 28-volt d-c power supply is self-contained.

The power supply and regulator test set is a rack-and-bench-type cabinet assembly containing the necessary components, controls, and accessories to measure test parameters and indicate the results in the form of accept or reject indications. In addition, the test set has a self-check feature designed to isolate a malfunction in the test set to a replaceable component.



INVERTER TEST SET

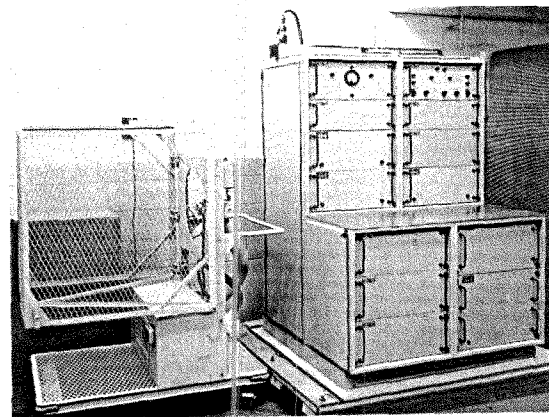
Instl. No.:	50-81409
BAC Part No.:	55-10809
T.O. No.:	33D9-37-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50649

The inverter test set provides voltage, frequency, and phase rotation tests on the Bomarc missile inverter. The equipment is housed in two vertical rack-type cabinets and one desk-type cabinet. The desk-type cabinet is fastened to the right vertical cabinet to form a unit. This vertical cabinet contains the +150-volt d-c (precision) reference power supply and the evaluator and control chassis. The

The radar antenna test stand provides a mount for the antenna during testing and supplies cooling air which simulates missile cooling conditions. Interconnecting cables are provided to connect the antenna to the stand and the stand to the test site. For the safety of the operator, the antenna is enclosed by a wire cage which is equipped with interlock switches to ensure closure prior to operation in various phases of test.

Target Seeker Radar Antenna Test Set

The target seeker radar antenna test set is specifically designed to perform confidence and trouble isolation tests on the IM-99A missile target seeker antenna assembly. It is capable of (1) verifying its own operating conditions, (2) performing static tests on the antenna components, (3) initiating operating signals to the antenna which simulate normal search operations, and (4) monitoring the return signal from each antenna component for proper phase and amplitude.



TARGET SEEKER RADAR ANTENNA TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10573
T.O. No.:	33D9-46-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50651

The test set is made up of two rack-and-desk cabinet assemblies which are connected to form one functional unit, and a target seeker antenna test stand. The left cabinet assembly houses three step-down transformers and a meter monitor and power supply equipment. The right cabinet assembly contains six drawers for control, antenna control, power distribution, power rectifier, and power supply equipment.

IM-99A BASES Support Equipment

The set also provides a means of checking the radar on any one of several frequencies as specified by the transmitting frequency of the radar under test.

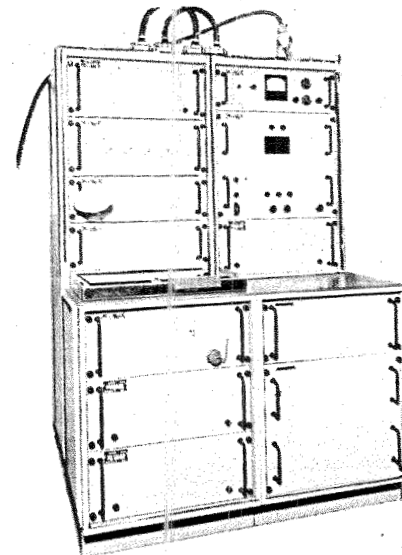
BOEING

D5-4684 | 3.31

Support Equipment IM-99A BASES

Target Seeker Radar Transmitter-Receiver Test Set

The target seeker radar transmitter-receiver test set consists of power supplies for the test equipment and



**TARGET SEEKER RADAR
TRANSMITTER-RECEIVER TEST SET**

Instl. No.:	50-81409
BAC Part No.:	55-10575
T.O. No.:	33D9-47-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50653

the T-R unit under test; go/no-go comparators, microwave noise generators, reference adjust circuits, test selectors, self-check circuits, air blower for the test set and for the T-R unit under test, receiver, signal generator, servo control power supply, sequencers, and test jigs and fixtures.

3.30 | D5-4684 **BOEING**

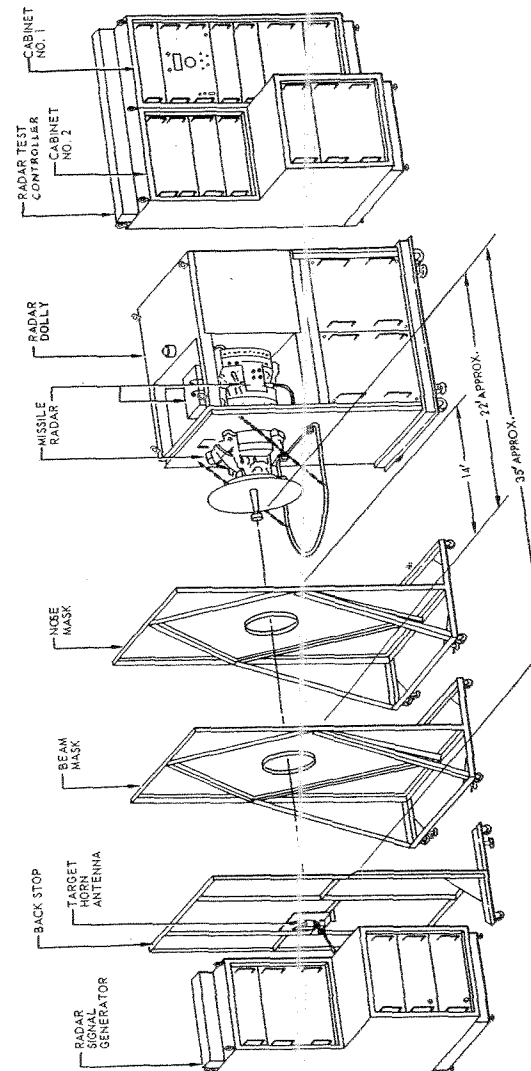
Target Seeker Radar System Test Set

The target seeker radar system test set is used to perform tests to verify that the three assemblies of the target seeker radar system AN/DPN-34 of the IM-99A missile operate satisfactorily as a system. The radar set functions as the automatic search and track radar for the IM-99A Interceptor Missile.

The major assemblies of the test set are: two cabinets comprising the test controller, the radar dolly, the radar signal generator, and the radar target assembly, which consists of the beam and nose masks, the backstop, and the target horn antenna. The radar system test unit distributes power voltages and sends command signals to all parts of the test set and to the radar. It contains a low frequency signal source for disturbing the radar servo loops and circuitry for evaluating the radar output signals. All the controls and indicators used in the test set are located on the monitor panel of the test unit. The test set goes through a period of self-checks while the radar is warming up.

Cabinet No. 1 of the test unit contains a signal adjust drawer, monitor drawer, power control drawer, and two power supply drawers. The signal adjust drawer contains a low frequency generator module, cathode follower module, two operational amplifier modules, peak detector module, servo amplifier, an electromechanical module, and rectifier module. The low frequency signal generator provides a signal which is used to disturb the radar servo loops. The radar signal generator provides simulated target echoes of the proper frequency and time for use in checking the response of the radar to actual target echoes. It consists of a range delay generator drawer, microwave signal generator drawer, and the associated power supplies. The radar dolly consists of a separate cabinet, frame for supporting the missile radar, and power supply for the radar.

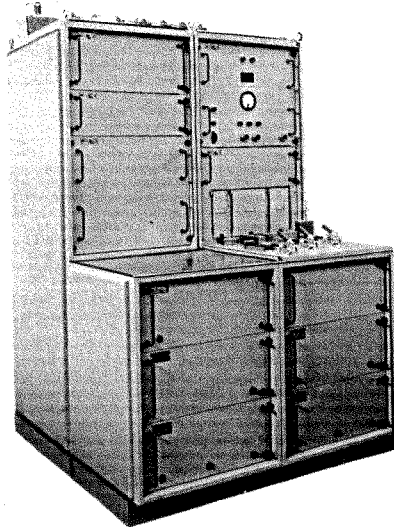
Instl. No.:	50-81409
BAC Part No.:	55-10576
T.O. No.:	33D9-42-2-2
Instl. Test Reqmt. No.:	D5-2308
Procurement Spec. No.:	D10-50654



TARGET SEEKER RADAR SYSTEM TEST SET

Fuze Test Set

The purpose of the fuze test set is to permit rapid and accurate testing of the IM-99A missile fuze systems by operating personnel of minimum special



FUZE TEST SET

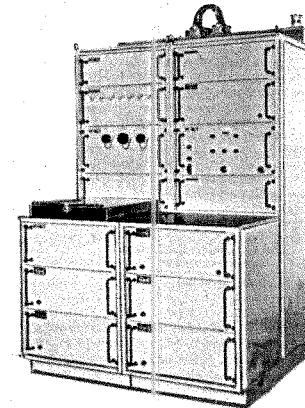
Instl. No.:	50-81409
BAC Part No.:	55-10674
T.O. No.:	33D9-20-7-2 2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50646

training. The test set provides operating voltage, test signals, the cooling air for a fuze system and performs a sufficient number of tests on each fuze to verify satisfactory fuze operation by visual indications displayed on the control panel.

BOEING D5-4684 | 3.35

Target Seeker Radar Control Unit Test Set

The target seeker radar control unit test set provides the necessary means to test the radar control unit of the AN/DPN-34 (target seeker) of the IM-99A missile. The test set will ensure that the target



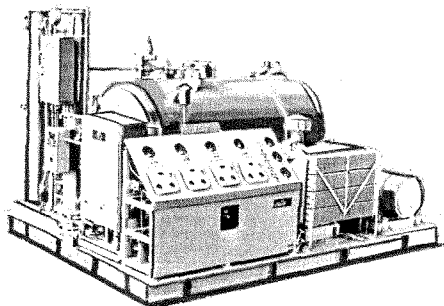
TARGET SEEKER RADAR CONTROL UNIT TEST SET

Instl. No.:	50-81409
BAC Part No.:	55-10574
T.O. No.:	33D9-17-3-12
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50652

seeker radar control unit is operating within the minimum performance standards. The radar control unit test set simulates signals similar to those provided during actual missile flight operation. The operations of the radar control unit test set provide self-checking features to establish confidence within its operation. The test steps are sequenced automatically or manually and the test set is equipped with a reset set switch which will reset the test set to the home position.

3.34 | D5-4684 **BOEING**

SERVICING EQUIPMENT

**A & M Shop Low-Pressure
Air System Equipment****A & M SHOP
LOW-PRESSURE AIR SYSTEM EQUIPMENT**

Instl. No.:	55-5717
BAC Part No.:	10-50627
T.O. No.:	35E15-5-1
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50627

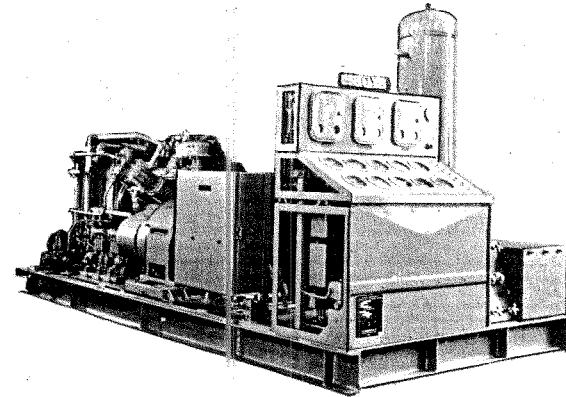
The low-pressure air system equipment is installed in the compressor room of the A & M shop. The system automatically supplies clean, dry, compressed air to the functional checkout test set (dew pointer and junction box), missile actuator, six missile sustaining-air connections, and various shop-air connections. The system can deliver simultaneously the minimum quantities required. The skid-mounted equipment consists of a compressor, storage equipment, distribution equipment, coolers, regulators, desiccators, filters, valves and piping.

The test set consists of three test chassis, power supply monitoring chassis, microwave chassis, fuze mounting fixtures, and power supplies with regulators. The desk top of the right cabinet supports the holding fixture in which the fuze package is placed for the actual test. The power supplies are housed in the two desk cabinets and the remaining chassis are housed in the two rack cabinets.

includes the intake filter, compressor, motor, coolers, moisture traps, oil prefilter, and necessary valves, gages and controls for automatic operation. The dryer section removes moisture from the system air by means of automatically handled chemical desiccant without interruption of the system air before discharging it to the receiver section. The receiver section provides storage for clean, dry air from the dryer section and eliminates pressure surges between the compressor and reducing section. The receiver section also supplies control air to the dryer section and reducing station. The pressure reducing station takes 2375 to 3000 psi air from the receiver section and supplies it to the A & M shop at pressures of 2000, 1000 and 475 psi simultaneously.

A & M Shop High-Pressure Air System Equipment

The high-pressure air system equipment in the A & M shop supplies clean, dry, compressed air to the pneumatic components test set, ramjet test control



A & M SHOP HIGH-PRESSURE AIR SYSTEM EQUIPMENT

Instl. No.:	55-5717
BAC Part No.:	10-50626
T.O. No.:	35E15-3-11
Instl. Test Eqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50626

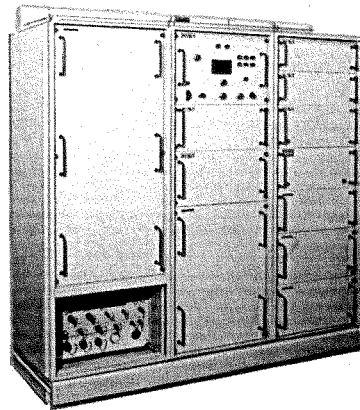
console, propulsion system test set and missile actuator. All the equipment except the central monitor panel and warning horns is mounted on a structural steel skid.

The central monitoring equipment provides visual and audible warnings of six malfunctions within the high pressure air system. Push buttons serve to silence the horns but only the correction of all malfunctions can eliminate the visual signal. The central monitoring equipment is designed to be fail-safe and contains a self-checking feature. The compressor section

MECHANICAL TEST SET EQUIPMENT

Propulsion System Test Set

The propulsion system test set provides for checkout of the missile propulsion system to determine that

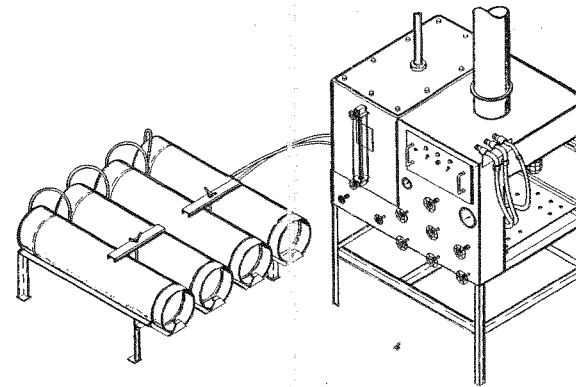
**PROPULSION SYSTEM TEST SET**

Instl. No.:	55-5694
BAC Part No.:	55-10975
T.O. No.:	33D9-5-7-12
Instl. Test Req'm't. No.:	D5-2308
Procurement Spec. No.:	D10-50658

the system will function properly and that the system leakage is within acceptable limits. The set consists of gages, regulators, valves, interconnection equipment, and switches required for transferring air under pressure from an input source to the missile under test, and to the control equipment and monitoring devices required to initiate and observe results of the tests.

Ammonia Fill and Drain System

The ammonia fill and drain system, located in the A & M shop, fills the ammonia tank of the missile nose cooling package with liquid anhydrous ammonia prior to installation in the missile. The system

**AMMONIA FILL AND DRAIN SYSTEM**

Instl. No.:	55-5882
BAC Part No.:	55-5769
T.O. No.:	35E15-2-1
Instl. Test Req'm't. No.:	D5-2308
Procurement Spec. No.:	(Dwg. No.)

also provides a means for draining the ammonia and purging the ammonia tank with dry air. The system can also be used to pressure test the cooling package heat exchanger for leaks. This system is composed of the ammonia supply (four 50-pound commercial anhydrous ammonia bottles) and the fill and drain cabinet.

Hydraulic System Test Set

The hydraulic system test set is the bench test equipment required to test the missile hydraulic system and to bench test hydraulic components of the missile.

It consists of (1) a test bench which provides the hydraulic power, flow meters, relief valves, filters, cooling equipment and control valves for conducting hydraulic tests, (2) a servo valve test cabinet which will provide the necessary signals and monitor systems to check the assembled missile hydraulic system, (3) servo valve control unit to test the missile servo valves as components, (4) preservative oil supply bench for filling components with preservative oil prior to shipping or for storage, and (5) a servo power supply to operate the missile pump during flushing and bleeding operations as well as to power the hydraulic system during dynamic tests with the servo valve test unit.

This set is capable of testing missile hydraulic components including actuators, pressure switches, reservoirs, pumps and motors, accumulators, and gear drive assemblies. It also provides the jigs and fixtures to hold hydraulic system components undergoing test, and power supplies for activating the missile servo valves.

Instl. No.:	55-5694
BAC Part No.:	55-12637
T.O. No.:	33D9-4-4-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50656

The set is also capable of testing the following missile propulsion system components: (a) pressure regulators, (b) pressure switches, and (c) electrically and pneumatically controlled valves. It is capable of testing the entire system for external leakage, and the valves and burst diaphragms for internal leakage.

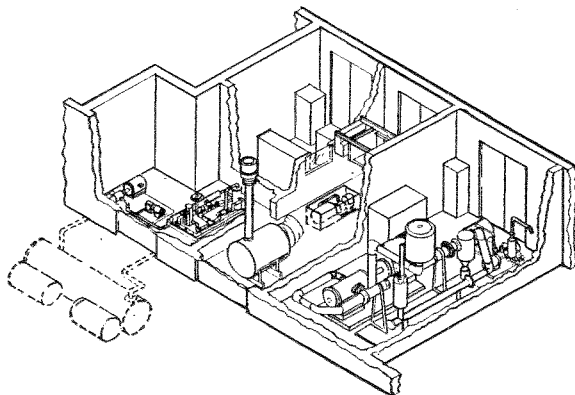
The propulsion system test set is capable of pressurizing the boost system to 200 psi to check for leaks. The test set, by means of connection to the missile wiring, energizes all electrical boost system components to check electrical continuity and component operation.

Self-check features monitor the input and regulated pressure within the test set, and fail-safe features automatically vent all pressure on the missile system in the event of power failure or a missile component malfunction.

RAMJET TEST EQUIPMENT

Ramjet Test Set Installation

The ramjet test facility in the A & M shop establishes tactical confidence in the ramjet engine without firing up the engine. The facility ensures



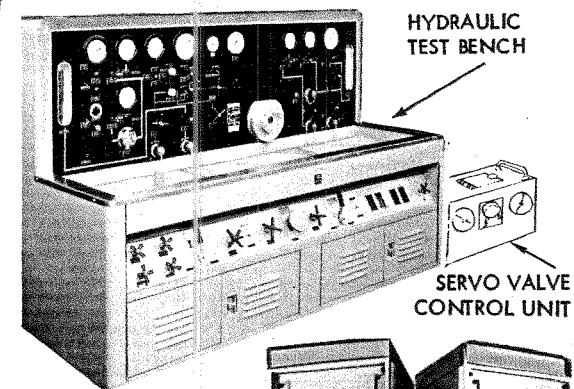
RAMJET TEST SET INSTALLATION

Instl. No.:	55-1897
BAC Part No.:	55-12956
T.O. No.:	33D9-5-7-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50659

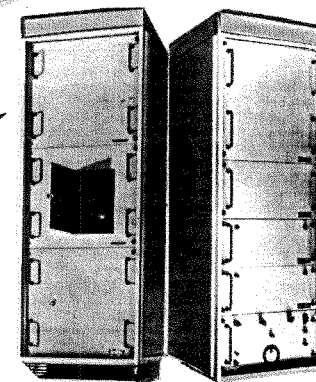
component compatibility, maximum dependability, and a high degree of accuracy in determining the condition of the engine prior to use.

Major components of the ramjet test facility include a ramjet control console, an air regulating system, a fuel pumping and control system, an oil pumping and control system, an air compression system, and an air vacuum system.

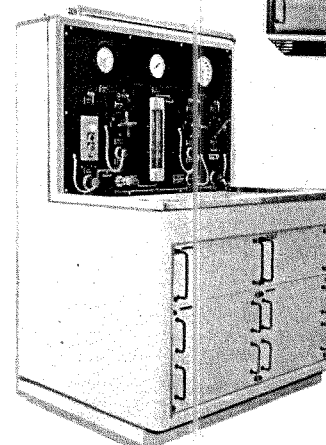
The control console is a manned console at which the



SERVO VALVE TEST UNIT



SERVO POWER SUPPLY



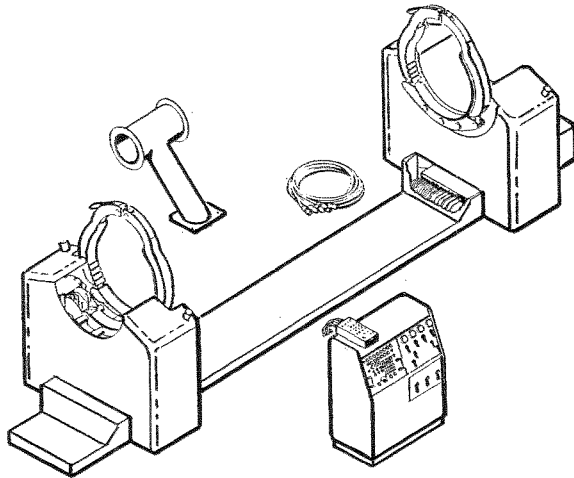
PRESERVATIVE OIL BENCH

HYDRAULIC SYSTEM TEST SET

MISSILE ACTUATOR

Missile Actuator

The actuator assembly is a unit of the operational test equipment which is an integral part of the IM-99A support equipment. It imparts motion to a



MISSILE ACTUATOR EQUIPMENT

Instl. No.:	55-1304
BAC Part No.:	55-1303
T.O. No.:	33D9-34-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	(Dwg. No.)

mounted missile for generation of output signals which are evaluated by the functional checkout set. Motion is imparted around the yaw, pitch, and roll axes of the missile. The actuator is normally operated in conjunction with the functional checkout set. Provision is made, however, for manually controlled checks.

The actuator is composed of a control console, a test box, a front actuator assembly, a rear actuator assembly, a cable stanchion, pneumatic system, and

following tests may be initiated by a selector switch. The sequence of tests is in the order given:

- | | |
|---------------------------|--------------------------|
| (1) Test set self-check | (6) Lean limit fuel test |
| (2) Pneumatic leak test | (7) Rich limit fuel test |
| (3) Fuel leak test | (8) Engine preservation |
| (4) Mach-senser test | (9) Flare test |
| (5) Shock positioner test | |

Indicator gages and lights on the control permit the operator to monitor the tests as they proceed.

NOTE: The above description holds for the CFE test set which is used on Bases 1 and 3. A GFE test set will be furnished for Bases 2, 4, and 5 which does not suit this description.

various cable assemblies. The pneumatic system consists of a console reservoir, four tanks (one being of structural use only), four actuation bags, two rotation cylinders, and various solenoid valves, manual valves, and gages.

The control console is located between the functional checkout set and the front actuator assembly with the console control panels facing the functional checkout set. Four electrical receptacles in the rear of the console provide for connections to power, the front actuator assembly, the functional checkout set and for internal connection with pneumatic items in the console. The console contains all relays used to control the actuator. Various lights on the console control panel provide indication of step number, self-check, type of motion, etc. The console also has the pressure gages for the various bags and tanks.

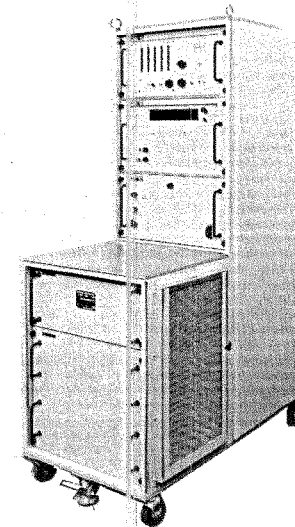
The actuator consists of two assemblies mounted on a common axis. Two springs (or bags) are located in the base of each assembly just above the pneumatic tanks. Each assembly has a clamp consisting of two arms and a locking device. The saddle is mounted to the base by various linkages attached to the springs and with a set of pneumatic locks. A rotation cylinder mounted on each subsaddle and connected to its saddle provides the means to tilt the mounted missile for yaw motion.

The test box is a separate assembly used to provide individual checks upon the actuator pneumatic components.

service checkout equipment for certain specialized calibrations on these components. The calibration cart is a mobile vertical rack-type and desk-type cabinet combined in a single assembly. All chassis are mounted in drawers. The standard power supply calibration cart consists of the following major components: frequency counter panel, digital volt-meter panel, control panel, load box, storage drawer, cooling system, and power and test cables.

SERVICE CHECKOUT EQUIPMENT
**Standard Power Supply
 Calibration Cart**

The standard power supply calibration cart is used as a general maintenance facility for servicing major electronic components of the operational test equip-



STANDARD POWER SUPPLY CALIBRATION CART

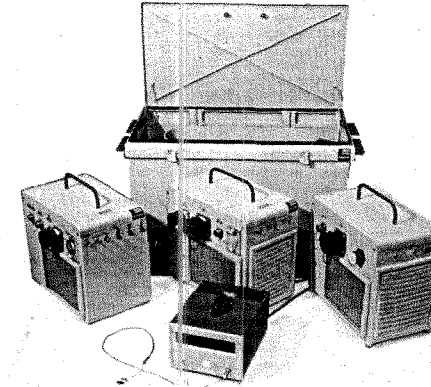
Instl. No.:	55-10814
BAC Part No.:	10-50667
T.O. No.:	33D9-39-2-32
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50667

ment and the electrical launching equipment. The cart provides the necessary power, loads, and test instruments required for servicing such major components. It is also used in conjunction with other

signals, and test instruments required for servicing such major components. It is also used in conjunction with other service checkout equipment for certain specialized calibrations in these components.

High Current Power Supply Calibration Equipment

The high current power supply calibration equipment, part of the service checkout equipment, is a portable test set used for calibrating high current power supplies, under conditions of minimum and maximum



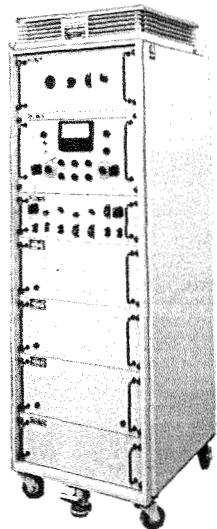
HIGH CURRENT POWER SUPPLY CALIBRATION EQUIPMENT

Instl. No.:	50-81407
BAC Part No.:	55-10818
T.O. No.:	33D9-39-2-52
Instl. Test Regm't. No.:	D5-2308
Procurement Spec. No.:	D10-50720

load, in the operational test equipment and electrical launching equipment. The testing is all manual, but is of such a nature that a minimum judgment and evaluation by the operator is necessary. The general arrangement of the equipment is as shown. This equipment provides the necessary power, loads, signals, and test instruments required for servicing such major components. It is also used in conjunction with other service checkout equipment for certain specialized calibrations in these components.

Resolver Calibration Cart

The resolver calibration cart provides for (a) precision positioning of all resolvers used in the operational test equipment, (b) checking gain set-



RESOLVER CALIBRATION CART

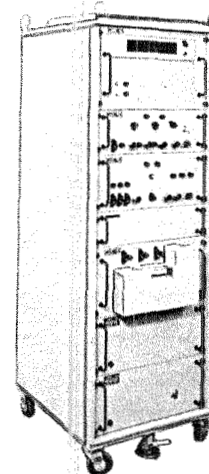
Instl. No.:	50-81407
BAC Part No.:	55-10820
T.O. No.:	33D9-39-2-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50670

tings of the servo amplifiers used with the resolvers, and (c) furnishing precision phase reference voltage for calibration of phase discriminators used in operational test equipment. The unit is manually operated and provides a meter for indicating test results. Self-check of the phase references is provided.

BOEING D5-4684 | 3.54

Evaluator and Reference Voltage Calibration Cart

The evaluator and reference voltage calibration cart is part of the test equipment required for the maintenance of the coordinate converter stable platform test set. The cart checks the comparator memory and evaluator chassis.



EVALUATOR AND REFERENCE VOLTAGE CALIBRATION CART

Instl. No.:	55-10819
BAC Part No.:	55-13394
T.O. No.:	33D9-39-2-22
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50669

The cart is also used to perform calibration tests and to isolate malfunctioning modules in various drawers of the operational test equipment.

3.53 | D5-4684 **BOEING**

RF Calibration Equipment

The r-f calibration equipment consists of the following carts as shown on page 3.19:

Three guidance system calibration carts (Command, Beacon and Radar)

One two-rack r-f common calibration cart

One mobile oscilloscope and time mark generator cart

One mobile oscilloscope cart

The guidance system calibration carts are used as a general maintenance facility for servicing equipment and the electrical launching equipment. The carts provide the necessary signals and test instruments required for servicing such major components. They are also used in conjunction with other SCE for certain specialized calibrations on these components.

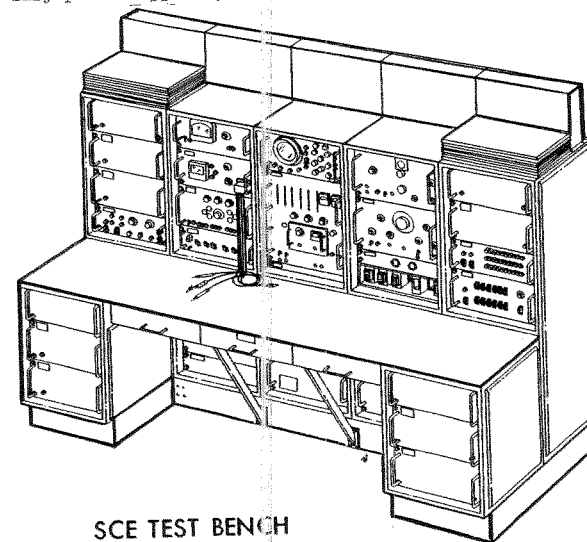
The command system calibration cart components are the r-f voltmeter, the peak-to-peak voltmeter, the distortion analyzer, the command system receiver, the pulse generator with its associated plus 150-volt d-c power supply, and the control panel. The beacon system calibration cart components are the beacon encoder and transmitter, the beacon receiver, the control panel, the plus 450-volt d-c power supply, and the minus 150-volt d-c power supply. The radar system calibration cart components are the SHF (Super High Frequency) test set, the radar receiver including the klystron power supply, the 30 mc generator, the control panel including the plus 150-volt d-c power supply and the minus 150-volt d-c power supply, and the line voltage regulator.

The r-f common calibration cart is used in the maintenance of the r-f calibration mobile oscilloscope

Instl. No.:	50-81407
BAC Part No.:	55-10822
T.O. No.:	33D9-39-2-12, 62, 72, & 82
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50672

SCE Test Bench

The service checkout equipment test bench consists of a rack-mounted test unit combined with the necessary power supplies, cables, switches, jigs and test



SCE TEST BENCH

Instl. No.:	55-10821
BAC Part No.:	55-13290
T.O. No.:	33D9-30-3-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50671

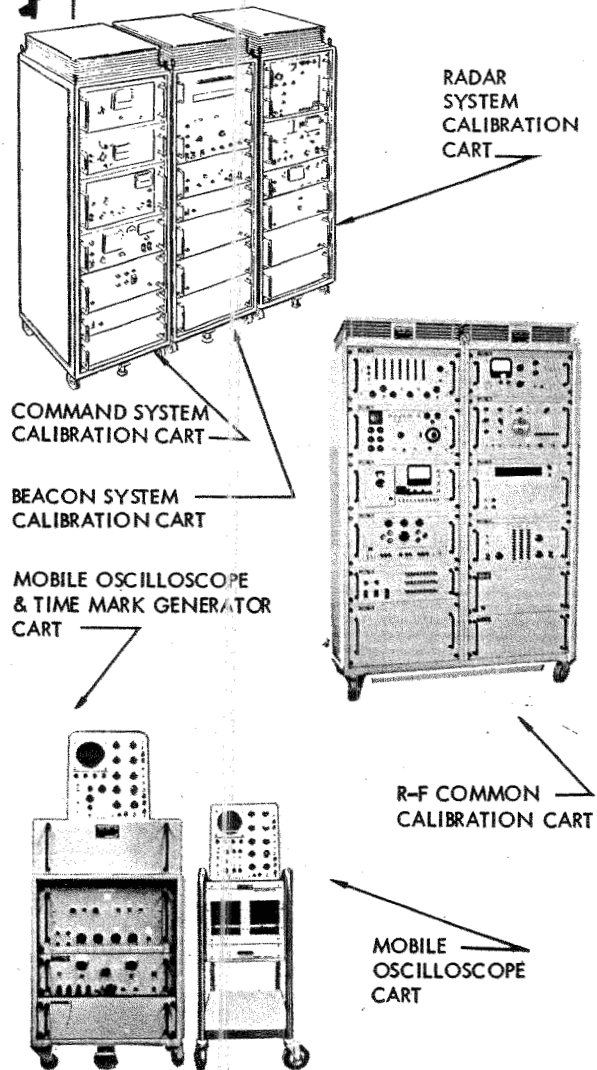
points. The test bench provides the signals necessary to simulate "in-service operation" of any major chassis and locate malfunctions within a chassis under test. Only major chassis of the operational test equipment and electrical launching equipment that are removable from the site of operations can be tested by the test bench. In addition, the test bench calibrates and maintains other service checkout equipment, operational test equipment, and launching equipment.

IM-99A BASES Support Equipment

carts to measure frequencies and monitor voltages. It also is part of the service checkout equipment required for the maintenance of the radar control unit test set, and is used to calibrate and adjust the target signal generator and video pulse generator.

The purpose of the two r-f mobile oscilloscope carts is to provide a means of observing output voltage wave forms from components of operational test equipment (OTE).

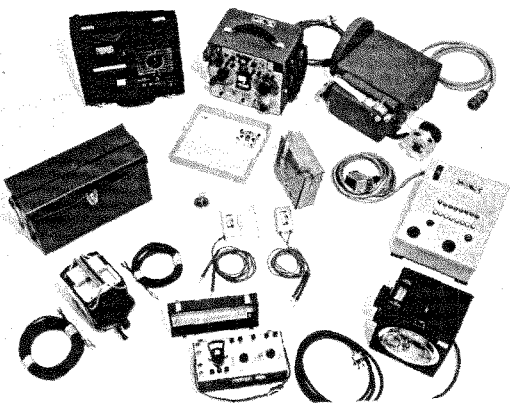
Support Equipment IM-99A BASES



RF CALIBRATION EQUIPMENT

SCE Auxiliary Equipment

The service checkout equipment (SCE) together with the auxiliary equipment and the flight hardware test equipment comprise the operational test equipment for the IM-99A Bomarc Interceptor Missile Weapon Support



SCE AUXILIARY EQUIPMENT

Instl. No.:	50-81407
BAC Part No.:	55-10825
T.O. No.:	33D9-30-3-22
Instl. Test Reqmt. No.:	D5-2308
Procurement Spec. No.:	D10-50675

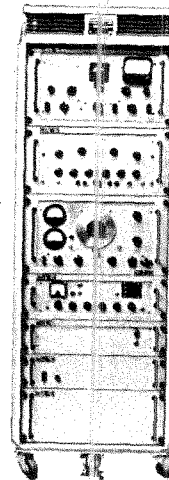
Equipment. The auxiliary equipment is used for the maintenance and calibration of the operational test equipment and the electrical launching equipment. It is also used in conjunction with other SCE for certain specialized calibrations.

BOEING

D5-4684 | 3.60

Frequency Standard Calibration Cart

The frequency standard calibration cart is part of the service checkout equipment required for the maintenance of the radar control unit test set, and is used as a distortion analyzer for checking the distortion of the a-c power supplies.



FREQUENCY STANDARD CALIBRATION CART

Instl. No.:	55-10823
BAC Part No.:	10-50673
T.O. No.:	33D9-40-2-2
Instl. Test Reqmt. No.:	D5-2308
Procurement Spec. No.:	D10-50673

The frequency standard calibration cart is also part of the test equipment required for inspection, calibration and maintenance of the standard power supply calibration cart, and is used to calibrate the digital voltmeter.

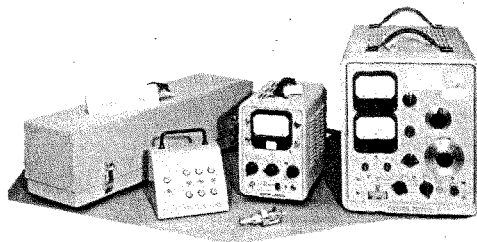
3.59 |

D5-4684

BOEING

ELE Calibration Equipment

The ELE calibration equipment (r-f link calibration equipment) is part of the operational test equipment

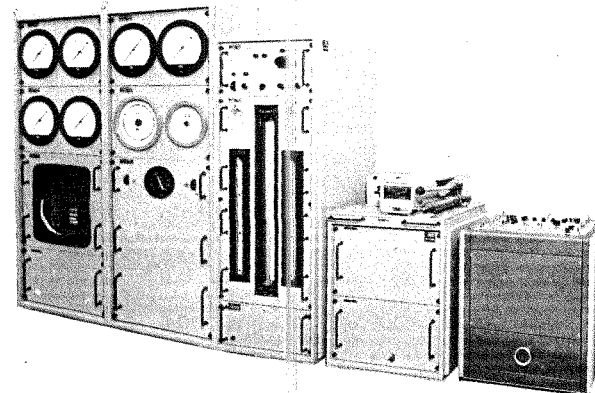
**ELE CALIBRATION EQUIPMENT**

Instl. No.:	50-81407
BAC Part No.:	55-10824
T.O. No.:	35E4-8-2-6 & 6A
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50674

the IM-99A, and is used to calibrate the radio frequency links in the electrical launching equipment for proper attenuation and acceptable standing wave ratio. The r-f link calibration equipment is composed of hand portable components of various sizes and accessories.

Mechanical Calibration Equipment

The mechanical calibration equipment consists of a mobile facility for calibration of all mechanical

**MECHANICAL CALIBRATION EQUIPMENT**

Instl. No.:	50-81407
BAC Part No.:	55-10826
T.O. No.:	33D9-39-2-42
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50676

and electromechanical test parameters which affect the accuracy of the mechanical test sets. Calibration of pressure, flow, temperature and humidity are provided by the test set. A stroboscopic tachometer, timer, gauges and meters indicate test results. The test set is manually operated and programmed.

Components are a mobile calibration cart, electrical control cart, hydraulic hand pump cart, and mobile recorder cart.

SECTION 4

LAUNCH
EQUIPMENT

SQUADRON OPERATIONS CENTER
EQUIPMENT

GROUND-TO-AIR TRANSMITTER
(GAT) EQUIPMENT

LAUNCHER ERECTOR INSTALLATION

SHELTER HIGH-PRESSURE AIR EQUIPMENT

SHELTER LOW-PRESSURE AIR EQUIPMENT

SHELTER HELIUM EQUIPMENT

ELECTRICAL LAUNCHING EQUIPMENT

SHELTER AIR CONDITIONING AND COOLING
EQUIPMENT

COMPRESSOR BUILDING HIGH-PRESSURE
AIR SYSTEM EQUIPMENT

COMPRESSOR BUILDING LOW-PRESSURE
AIR SYSTEM EQUIPMENT

COMPRESSOR BUILDING HELIUM SYSTEM
EQUIPMENT

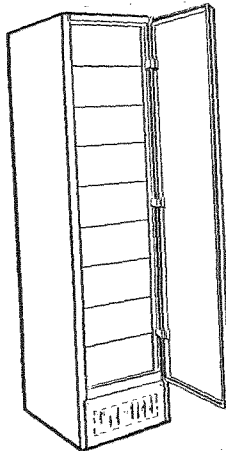
COMPRESSOR BUILDING MONITOR SYSTEM
EQUIPMENT

PROPELLANT SERVICING EQUIPMENT

4. LAUNCH
EQUIPMENT

Launcher Status and Summarizer

The launcher status and summarizer equipment in the Squadron Operations Center provides for receipt of the various missile status signals from the launcher shelters and in response to such signals, controls the status display panels in the squadron supervisor station and originates equivalent information for transmittal to the weapon control equipment.



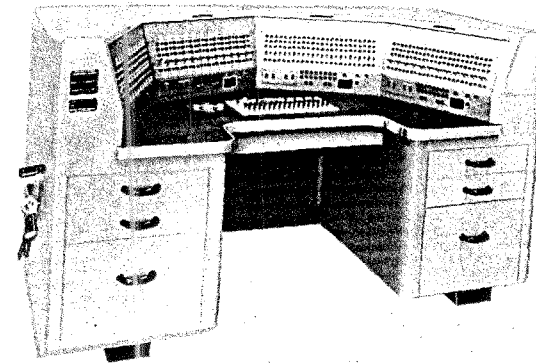
LAUNCHER STATUS AND SUMMARIZER

Instl. No.:	55-5766
BAC Part No.:	10-50745
T.O. No.:	31WL-4-37-22
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50745

The launcher status and summarizer cabinet contains status control relay assemblies, a status summarizer relay assembly and a flashing and signal transfer switching unit.

SQUADRON OPERATIONS CENTER EQUIPMENT Squadron Supervisor's Station

The squadron supervisors station is the manned control console at a Squadron Operations Center. The station receives and acknowledges alert orders and



SQUADRON SUPERVISOR'S STATION

Instl. No.:	55-5766
BAC Part No.:	10-50745
T.O. No.:	31P4-4-4-22
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50745

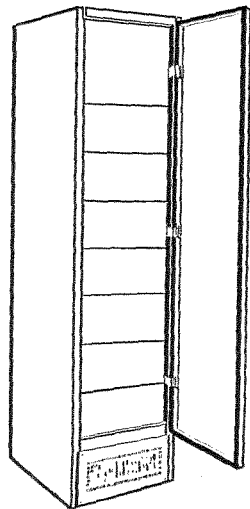
other commands from the weapon control equipment and controls the warm-up of each missile at the squadron. The station displays the detail status of each missile at the squadron and the summarized status of the missiles in each of several flights.

The station includes a desk-type console arranged for operator convenience in observing the status displays and operating the manual controls.

MUSEUM OF FLIGHT LIBRARY
SEATTLE, WA 98106 206-5700

Common Power Supply Group

The common power supply group provides all power for relay operations of the squadron supervisory and control equipment which is located at the Squadron Operations Center.



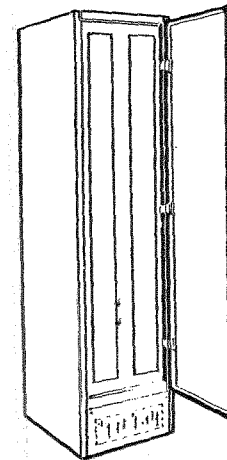
COMMON POWER SUPPLY GROUP

Instl. No.:	55-5766
BAC Part No.:	10-50745
T.O. No.:	31P4-4-4-12
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50745

The common power supply group consists of cabinets containing necessary power supply equipment.

Flight Terminal Cabinet

The flight terminal cabinet is located at the Squadron Operations Center and provides termination of all status lines between the Squadron Operations Center and the individual launcher shelters.

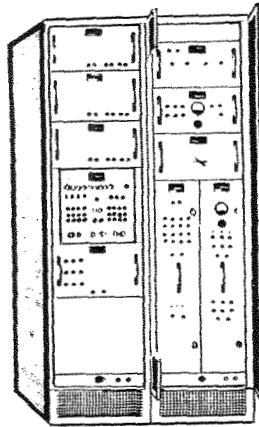


FLIGHT TERMINAL CABINET

Instl. No.:	55-5766
BAC Part No.:	10-50745
T.O. No.:	31P4-4-4-2
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	D10-50745

Pre-Launch Status Simulator

The pre-launch status simulator simulates the pre-launching functions of the missile and electrical launching equipment in combination. The status simulator provides dynamic statuses that are essential to



PRE-LAUNCH STATUS SIMULATOR

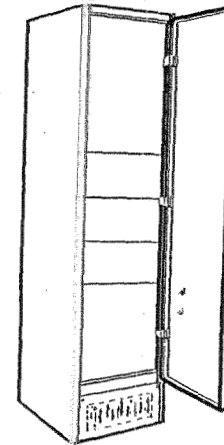
Instl. No.:	55-5718
BAC Part No.:	10-50790
T.O. No.:	31X-24-4-1
Instl. Test Req'm't. No.:	D5-2308
Procurement Spec. No.:	D10-50790

the closed loop test of the SAGE system and which are routed to the Squadron Operations Center and thence to the SAGE direction center.

The pre-launch status simulator consists of a control panel, a status signal generator, and a fire status control. Interconnection equipment consisting of cables, cable connectors, and junction boxes are also provided.

Launcher Status Multiplexer

The launcher status multiplexer provides scanning and encoding equipment required for conveying missile status and flight identity to the weapon control equipment (defined in BAC Document D-15378-1) via digital data transmitting equipment.



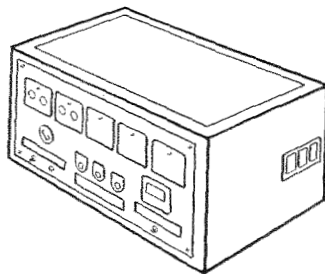
LAUNCHER STATUS MULTIPLEXER

Instl. No.:	55-5766
BAC Part No.:	10-50745
T.O. No.:	31W1-4-37-12
Instl. Test Req'm't. No.:	D5-2308
Procurement Spec. No.:	D10-50745

The launcher status multiplexer consists of a cabinet containing an electrical synchronizer, a status pulse generator and a power supply and regulator.

Monitor Panel Cabinet

The Compressor Building monitor panel located in the Squadron Operation Center receives status signals from the central monitor in the Compressor Building to indicate when Compressor Building equipment is not operating within limits.

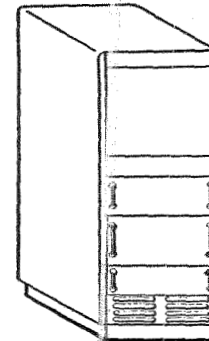


MONITOR PANEL CABINET

Instl. No.:	55-7224
BAC Part No.:	50-80514
T.O. No.:	NA
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	(Dwg. No.)

Frequency Division Data Link Test Message Generator

The frequency division data link test message generator simulates the Semi-Automatic Ground Environment (SAGE) outputs to the demultiplexer group of the AN/GKA-4. The test message generator is designed to be used both for installation checkout, and periodic maintenance or test of the data link and pre-launch distribution systems of the IM-99A Weapon System.



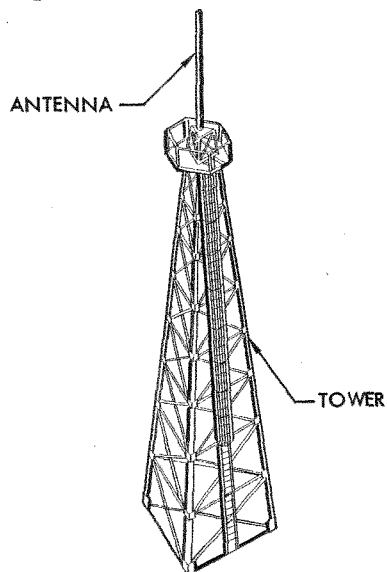
FREQUENCY DIVISION DATA LINK TEST MESSAGE GENERATOR

Instl. No.:	55-5718
BAC Part Part No.:	55-7688
T.O. No.:	NA
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	(Dwg. No.)

The frequency division data link test message generator consists of a cabinet containing a switch matrix, signal generator and dipulse modulator, time distribution section, and a power supply. (Also used in GAT, see page 4.11.)

GAT Antenna—GAT Tower

The ground-to-air transmitter antenna broadcasts the r-f signals provided by the ground-to-air transmitter amplifier. The antenna consists of an omni-directional radiator housed in a dielectric cylinder installed upon a self-supporting type antenna tower. A pressurized coaxial cable interconnects the antenna with the amplifier.



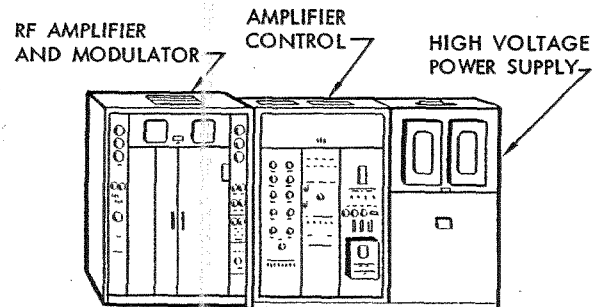
GAT ANTENNA—GAT TOWER

Instl. No.:	55-5880
BAC Part No.: [Antenna]	10-50749
BAC Part No.: [Tower]	10-50778
T.O. No.:	NA
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	NA

GAT Duplex RF Amplifier

The ground-to-air transmitter duplex r-f amplifier provides amplification and modulation of output signals from the AN/GCA-4 flight control group.

The ground-to-air transmitter duplex r-f amplifier consists of two high powered UHF klystron amplifiers including power supplies, modulators, and a monitor system with automatic change feature including one local monitor control panel and one remote monitor control (transfer) panel. Test equipment is also provided for fundamental measurements of radio frequency power output, modulation index, voltage standing wave ratio, voltage and current.



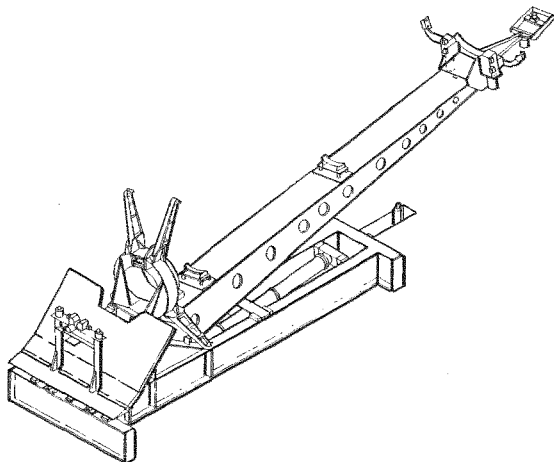
GROUND-TO-AIR TRANSMITTER GAT EQUIPMENT

Instl. No.:	55-5880
BAC Part No.:	10-50747
T.O. No.:	31X-4-2-2
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50747

The ground-to-air transmitter equipment provides transmitting facilities required for conveying command data to the missile from the SAGE subsystem and data processing equipment. The ground-to-air transmitter equipment consists of a duplex r-f amplifier, antenna system, antenna interconnect equipment, and towers and foundations.

LAUNCHER ERECTOR
Launcher Erector

The launcher-erector supports the missile during propellant servicing and ready-storage; erects the missile prior to launch; provides service connections



LAUNCHER ERECTOR

Instl. No.:	55-2246
BAC Part No.:	50-81307
T.O. No.:	35E4-8-2-5
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	(Dwg. No.)

with the missile; provides for disconnection of service connections prior to and at launching; provides support for the ejected monitor plug and the chilled water supply fittings; retracts the boom to ensure adequate clearance between the missile and launcher during launching; restrains the missile in the launching position until first motion occurs, and lowers the missile in the event of cancellation or malfunction.

The antenna towers consist of 60-foot high, self-supporting structures designed to provide a supporting standard for the antennas.

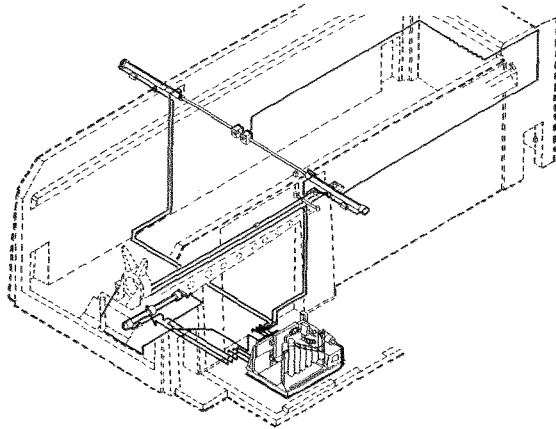
**Frequency Division Data
 Link Test Message Generator**

Instl. No.:	55-5880
BAC Part No.:	55-7688
T.O. No.:	NA
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	NA

(NOTE: Refer to the description and illustration of this equipment under Squadron Operations Center equipment, see page 4.7.)

Hydraulic Skid

The launcher shelter hydraulic system supplies hydraulic pressure from accumulator banks to open and



HYDRAULIC SKID

Instl. No.:	55-2246
BAC Part No.:	50-81319
T.O.No.:	35E4-8-2-5
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	(Dwg. No.)

close the movable roof and operate the launcher erector. Pressure is maintained in the accumulators by a hydraulic pump. Twenty-eight volt d-c signals automatically supplied by the roof and erector control panel of the electrical launching equipment activate control valves on the skid which in turn operate system actuators in the roof and on the launcher erector.

The hydraulic skid on which the system is mounted can be divided, for descriptive purposes, into four functional assemblies: the pump unit, the accumulator banks, the valve manifolding, and the panel assembly.

4.14 | D5-4684 **BOEING**

The structural portion of the launcher-erector consists of an erector base, an erector carriage, an erector boom, wind restraint arms and a blast deflector. The structural portion is of fabricated steel construction, except the wind restraint arms. The erector base supports a trunnion to which is attached the boom and carriage which rotate about the trunnion. The carriage which supports the aft end of the missile provides a platform for missile launching. The boom incorporates two saddles and a nose clamp for support of the missile. The wind restraint arms are of aluminum forgings attached to the carriage and support the missile prior to first motion. The deflector is attached to the erector base and deflects the rocket exhaust away from and out of the shelter.

The mechanical portion of the launcher-erector consists of the hydraulic power package, and the hydraulic actuators and locks. The hydraulic power package is located in the mechanical equipment room and consists of an electric motor, a hydraulic pump, filters, accumulators, flow limiters and control valves. The hydraulic actuators and locks include the erecting cylinder which erects and removes the boom from the vicinity of the missile after erection, the locking cylinder between the carriage support and carriage, the locking cylinder between the boom and the carriage, the nose clamp cylinders which open and close the nose clamp, the wind restraint arm cylinders which, when actuated by missile first motion, unlock the spring loaded restraint arm, and the chilled water line disconnect cylinders which actuate the chilled water quick disconnects.

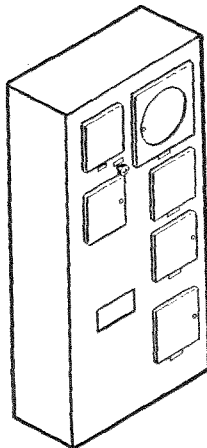
The launcher-erector operations are automatically controlled by the electrical launching equipment.

BOEING D5-4684 | 4.13

SHELTER HIGH-PRESSURE AIR EQUIPMENT

**Shelter High-Pressure
Air System Control Cubicle**

The launcher shelter high-pressure air control cubicle regulates and monitors the air pressure in the reservoir during the missile ready-storage period.



**SHELTER HIGH-PRESSURE AIR SYSTEM
CONTROL CUBICLE**

Instl. No.:	55-2241
BAC Part No.:	10-50117
T.O. No.:	35B4-8-2-4
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50117

During the warmup and fireup periods and until launch, both the shelter reservoir and the missile nose air bottle are kept charged by the external supply. Air bottle pressure is controlled by the electrical launching equipment.

The high pressure air is stored in an accumulator when the missile is in the ready storage condition. This air supply serves as an emergency source of air for the shelter low pressure air system.

4.16 | D5-4684 **BOEING**

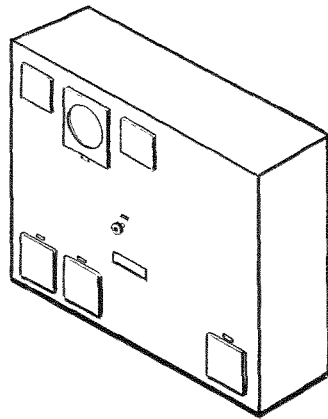
The pump unit consists of a 150-gallon oil reservoir and the components mounted on it. The dual function of the panel assembly is to monitor and provide manual control over the two accumulator banks. Mounted on the upper left of the panel assembly is the junction box which interconnects the skid electrical circuits with the roof and erector controls panel in the electrical equipment room. The hydraulic pump motor starter control box is located on the left end of the panel assembly.

BOEING | D5-4684 | 4.15

SHELTER HELIUM EQUIPMENT

Shelter Helium System Control Cubicle

The shelter helium system control cubicle located in the mechanical equipment room contains various devices that regulate and monitor the flow of helium to the missile storage tanks.



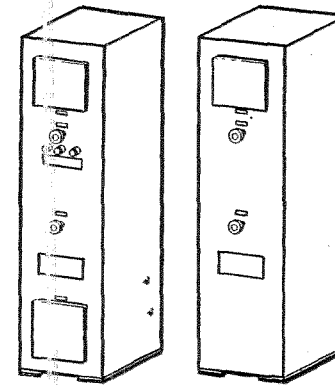
SHELTER HELIUM SYSTEM CONTROL CUBICLE

Instl. No.:	55-2240
BAC Part No.:	10-50118
T.O. No.:	35E4-8-2-4
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50118

SHELTER LOW-PRESSURE AIR EQUIPMENT

Shelter Low-Pressure Air System Control Cubicle

The launcher shelter low-pressure air control cubicle contains switches, valves, and controls that regulate, monitor and reduce to lower pressures the initial air



SHELTER LOW-PRESSURE AIR SYSTEM CONTROL CUBICLE

Instl. No.:	55-2242
BAC Part No.:	10-50114
T.O. No.:	35E4-8-2-4
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50114

pressure entering the cubicle from the Compressor Building. This air is supplied to the missile electronics section during the ready-storage period and operates all pneumatic devices in the shelter.

Launch Equipment

IM-99A BASES

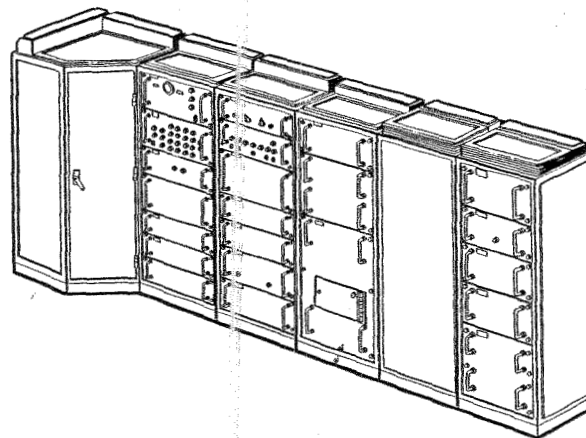
launching control and monitoring equipment, (2) heater and inverter power supply, (3) high-voltage power supply, (4) electrical launching junction cabinet, (5) electrical launching boxes, and (6) electrical launching cabling.

IM-99A BASES

Launch Equipment

ELECTRICAL LAUNCHING EQUIPMENT Electrical Launching Equipment

The electrical launching equipment (ELE) is located in the launcher shelter equipment room. It provides the electrical support equipment installed and operated within the launcher shelter for initiating, controlling and monitoring the launching operation.



ELECTRICAL LAUNCHING EQUIPMENT

Instl. No.:	55-2143
BAC Part No.:	55-13488
T.O. No.:	35E4-8-2-6
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50634

It monitors all functions that automatically launch the missile or return it to a safe storage condition in the event of a malfunction or receipt of the proper command signal. It also provides the circuitry required for checkout of the missile and launching equipment, using the mobile inspection equipment.

The equipment components are drawer-mounted in upright steel cabinets, and includes (1) electrical

4.20 | D5-4684

BOEING

BOEING

D5-4684 | 4.19

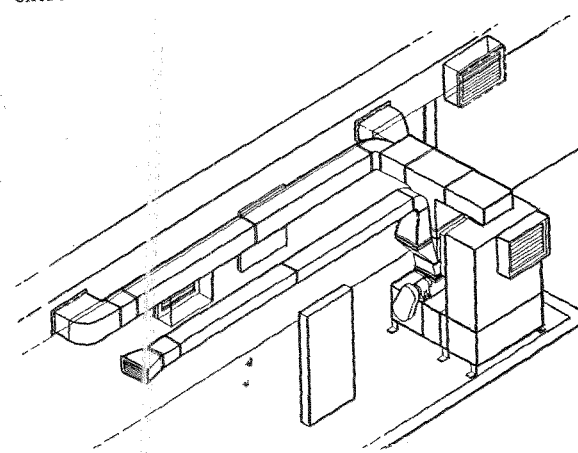
The air conditioning and heating system is composed of one system servicing the launcher room and equipment room. The system is a water evaporative cooling unit, with heat coils located in the air ducts, and associated duct work and control equipment. Major components of the equipment are located in the equipment room.

Control and monitoring components for the air conditioning system are mounted on the equipment room air conditioning control panel, the launcher room air conditioning system control panel and the electrical launching equipment shelter facilities control drawer located in the equipment room. Controls are provided on the air conditioning system control panels to place the air conditioning components in the positions necessary for in-shelter fueling of the missile. Lights in the electrical launching equipment shelter facilities control drawer are utilized to monitor critical air conditioning system functions.

SHELTER AIR CONDITIONING AND COOLING EQUIPMENT

Shelter Air Conditioning Unit

The purpose of the shelter air conditioning and heating system is to maintain the launcher and equipment rooms at a specific environmental condition thereby protecting the missile and servicing equipment from extremes of humidity and temperature. The system



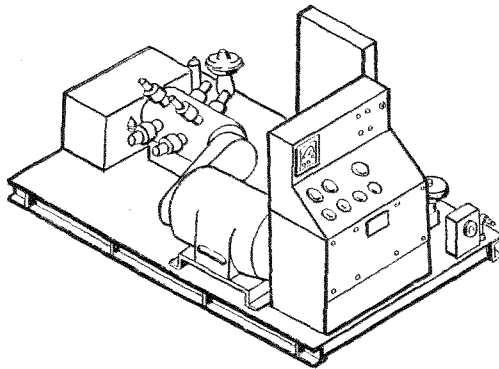
SHELTER AIR CONDITIONING UNIT

Instl. No.:	55-4032
BAC Part No.:	10-50336
T.O. No.:	35E4-8-2-3
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	D10-50336

maintains launcher room temperature between +60°F and +90°F and relative humidity between +0% and 50%. In addition, the system filters the shelter air and serves as a means of ventilation to remove noxious gases from the launcher room. The system also maintains the equipment room temperature between +40° and +110°F and relative humidity between 0% and 50%.

Compressor Building High-Pressure Air System Equipment

The Compressor Building high-pressure air system provides at the launch site the continuous supply of high pressure air used to charge the missile nose



HIGH-PRESSURE AIR COMPRESSOR SKID

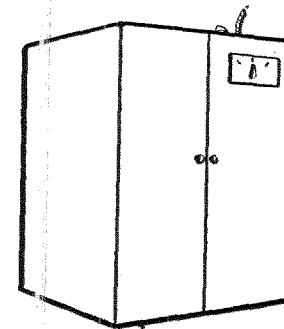
Instl. No.:	55-5505
BAC Part No.:	10-50127
	10-50128
T.O. No.:	35E14-3-11
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50127
	D10-50128

air bottle and the launcher shelter air reservoir. The system consists of a skid-mounted compressor, receivers, control valves, filters, and plumbing required to provide the high-pressure air required by a flight of missiles. This system is capable of delivering 6 lbs of air to each missile within 90 seconds and maintains this air at 3000 ± 100 psig. The delivered air has a dewpoint of -65°F when expanded to atmospheric pressure.

4.24 | D5-4684 **BOEING**

Shelter Nose-Cooling Skid

The nose cooling skid consists of a cabinet containing the components and controls necessary to circulate chilled water to the missile nose. The nose



SHELTER NOSE-COOLING SKID

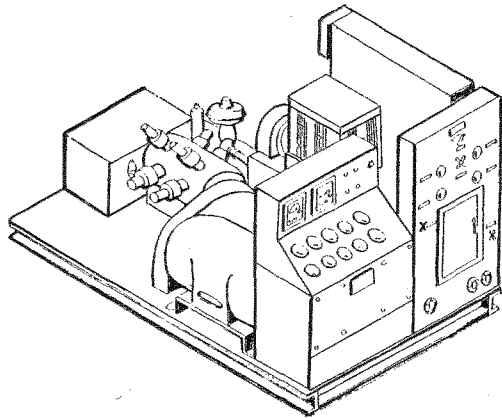
Instl. No.:	55-4032
BAC Part No.:	10-50324
T.O. No.:	35E4-8-2-3
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	D10-50324

cooling skid contains a filter, pump and valves required to automatically deliver chilled water to the missile nose upon receipt of a signal from the electrical launching equipment. The nose cooling skid control panel provides a selector switch for manual or automatic operation.

BOEING | D5-4684 | 4.23

Compressor Building Helium System Equipment

The Compressor Building high-pressure helium equipment provides, at the launch site, storage of compressed helium gas, automatically controlled transfer of 55 lbs of helium at 4300 ± 100 psig to each missile, and recovery of the helium gas in the event of missile



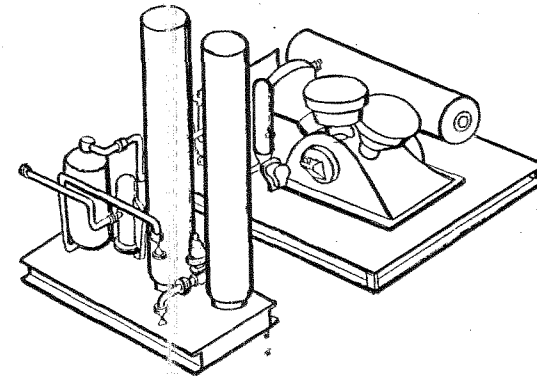
HELIUM SYSTEM COMPRESSOR SKID

Instl. No.:	55-5507
BAC Part No.:	10-50132
	10-50133
	10-50128
	10-50136
T.O. No.:	35E14-3-1
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	D10-50132
	D10-50133
	D10-50128
	D10-50136

depressurization. The equipment consists of a skid-mounted compressor, manifolded high-pressure helium storage and recovery cylinders, ready-storage receiver tanks, and the necessary control valves, filters and plumbing.

Compressor Building Low-Pressure Air System Equipment

The Compressor Building low-pressure air system equipment provides, at the launch site, a ready source of low-pressure air for missile sustaining purge scavenging and for launching equipment pneumatic requirements. The system consists of a skid-mounted



LOW-PRESSURE AIR COMPRESSOR AND DRYER

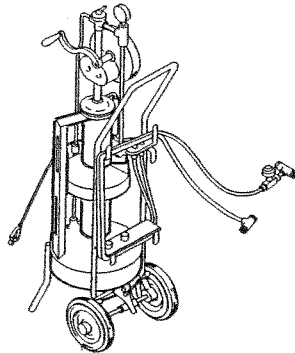
Instl. No.:	55-5506
BAC Part No.:	10-50130
	10-50131
	10-50129
T.O. No.:	35E14-3-11
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	D10-50130
	D10-50131
	D10-50129

compressor, receivers, control valves, filters, de-siccators and plumbing required to provide the low-pressure air requirements of a flight of missiles. At the shelter the system provides 80 cfm of free air for 10 minutes at 10 psig for scavenging the missile nose section, and 3 cfm of free air at $1/2 \pm 1/4$ psig to continuously purge missile nose sections. Air is delivered at $+40^{\circ}\text{F}$ to $+110^{\circ}\text{F}$ and a dewpoint of -65°F or lower when expanded to atmosphere. This system provides 100 psig air to the intake of the high pressure air compressor.

PROPELLANT SERVICING EQUIPMENT

Hypergolic Fuel Servicing Equipment

The hypergolic fuel servicing cart provides all the equipment needed to perform fueling operations with aniline and furfuryl alcohol (ANFA). The cart is a



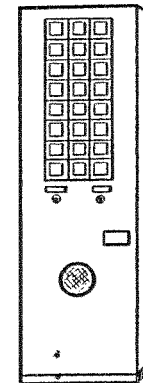
HYPERGOLIC FUEL SERVICING EQUIPMENT

Instl. No.:	55-5720
BAC Part No.:	50-80402
T.O. No.:	35D3-6-14-11
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	(Dwg. No.)

self-contained, hand-operated unit which fuels and defuels the missile boost motor. It will store and transport approximately five gallons of a 30 to 70 mixture by weight of aniline and furfuryl alcohol. The cart is transported on the JP-X and 80-octane servicing trailer.

Monitor System Equipment

The electrical monitor equipment provides monitoring functions in the Compressor Building. The monitor panel cabinet consists of the central monitor housed in a cabinet, and electrical conduit and cabling located in the Compressor Building.



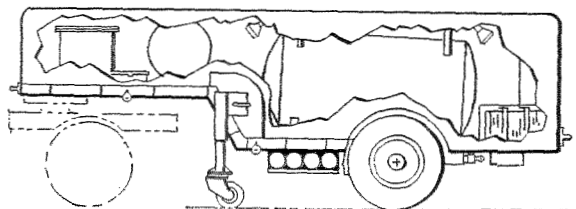
MONITOR PANEL CABINET

Instl. No.:	55-5504
BAC Part No.:	50-81477
T.O. No.:	35E14-3-11
	35E14-3-1
Instl. Test Reqm't. No.:	D5-2307
Procurement Spec. No.:	(Dwg. No.)

The central monitor furnishes a status signal from each Compressor Building to a monitor panel at the Squadron Operations Center if Compressor Building equipment is not operating within limits. An annunciator panel on the central monitor gives warning of improper equipment conditions.

Oxidizer Servicing Trailer

The oxidizer servicing trailer is the equipment required to transport oxidizer between the propellant acid facility and the launcher shelters, and to fuel and defuel the missile boost motor system with oxidizer (inhibited red fuming nitric acid). The trailer also transports a pressurized emergency water supply.



OXIDIZER SERVICING TRAILER

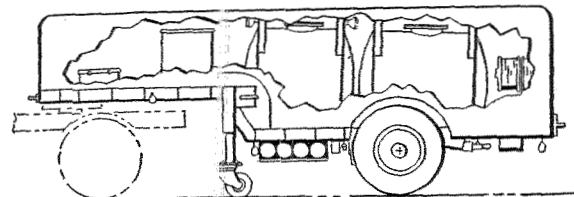
Instl. No.:	55-5720
BAC Part No.:	10-50774
T.O. No.:	35D3-6-14-31
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	D10-50774

The transfer of fluids is accomplished by a pressure-regulated supply of nitrogen utilizing nitrogen gas bottles on the trailer.

The oxidizer servicing trailer consists of a 520 gallon oxidizer tank and flow system, a 135 gallon flushing water tank and flow system, a pressurized nitrogen fluid transfer system, and fume-scrubber. The trailer also includes plumbing, servicing hoses, personnel deluge showers, flushing hose, an electrical system, and operating controls. The equipment also includes suitable safety devices for protection of personnel and flow operations.

JP-X and 80-Octane Fuel Servicing Trailer

The JP-X and 80-octane fuel servicing trailer is the equipment required to transport JP-X (JP-4 jet fuel and unsymmetrical dimethylhydrazine) and 80-octane fuel, and to fuel and defuel the missile boost motor system and the ramjet fuel tanks.



JP-X AND 80-OCTANE FUEL SERVICING TRAILER

Instl. No.:	55-5720
BAC Part No.:	10-50775
T.O. No.:	35D3-6-14-1
	35D3-6-14-21
Instl. Test Req'm't. No.:	D5-2307
Procurement Spec. No.:	D10-50775

The transfer of propellants is accomplished by a pressure-regulated supply of nitrogen, utilizing nitrogen gas bottles on the trailer. The nitrogen forms an inert gaseous atmosphere for fuel transfer and storage. In the case of the 80-octane fuel only, the missile is defueled by a mechanical pump instead of nitrogen.

The JP-X and 80-octane fuel servicing trailer consists of a 270 gallon JP-X storage tank and flow system, a 320 gallon 80-octane storage tank and flow system, a pressurizing nitrogen fluid transfer system, a JP-X fume-scrubber, plumbing, servicing hoses, electrical system, and operating controls. The equipment also includes suitable safety devices for protection of personnel and flow operations. The trailer includes provisions for storage and transportation of the hypergolic fuel servicing equipment.

SECTION 5
HANDLING
EQUIPMENTMISSILE HANDLING AND TRANSPORT
EQUIPMENT**Propellant Weight Equipment**

The propellant weighing equipment provides for fuel to be measured into the JP-X and 80-octane servicing trailer and for acid to be measured into the oxidizer servicing trailer within an accuracy of $\pm 0.10\%$. The

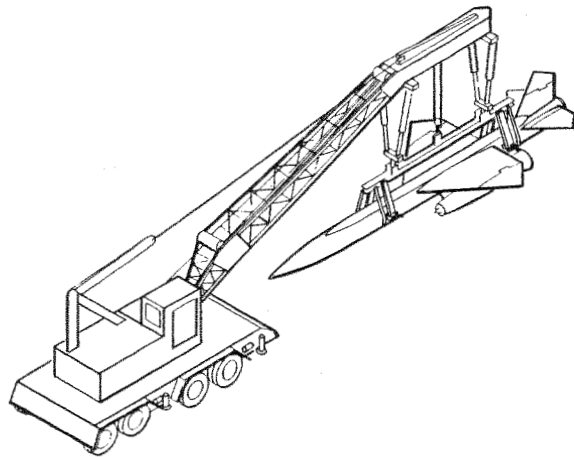
PROPELLANT WEIGHT EQUIPMENT

Instl. No.:	55-5720
BAC Part No.:	10-50776
T.O. No.:	
Instl. Test Requ't. No.:	D5-2307
Procurement Spec. No.:	D10-50776

propellant weighing equipment consists of the propellant weighing mechanism, control console, and calibration equipment. A propellant weighing mechanism and a control console are located at both the propellant fuel and propellant acid facilities. One set of calibration equipment will be provided for calibrating both fuel and acid propellant weighing equipment.

Missile Mobile Loader

The missile loader is used to handle the missile between the missile trailer and launcher-erector in the



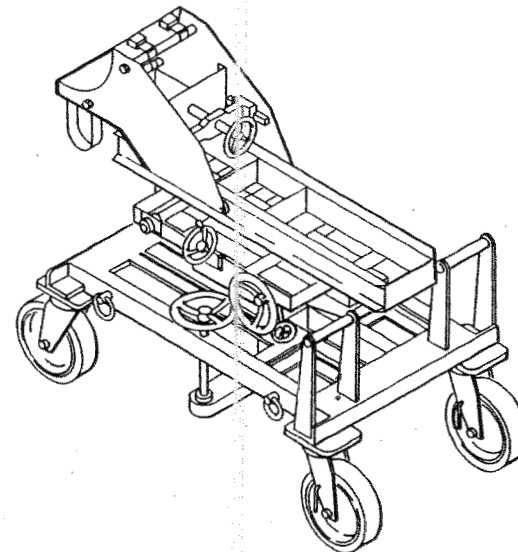
MISSILE MOBILE LOADER

Instl. No.:	55-5719
BAC Part No.:	10-50856
T.O. No.:	35E4-8-2-2
Instl. Test Req'm't. No.:	NA
Procurement Spec. No.:	D10-50856

launcher shelter. The missile loader consists of a pneumatic-tired carrier, a revolving, self-powered crane, and a heel-type boom equipped with special hoisting and restraining devices. A remote control device is provided to control the movements of the crane from the launching shelter floor. Slings of padded braided steel strap are attached to the missile loader crane during missile transfer operations.

MISSILE HANDLING AND TRANSPORT EQUIPMENT Ordnance Dolly

The ordnance dolly and its adapter carriages provide for transporting, installing and removing (1) the



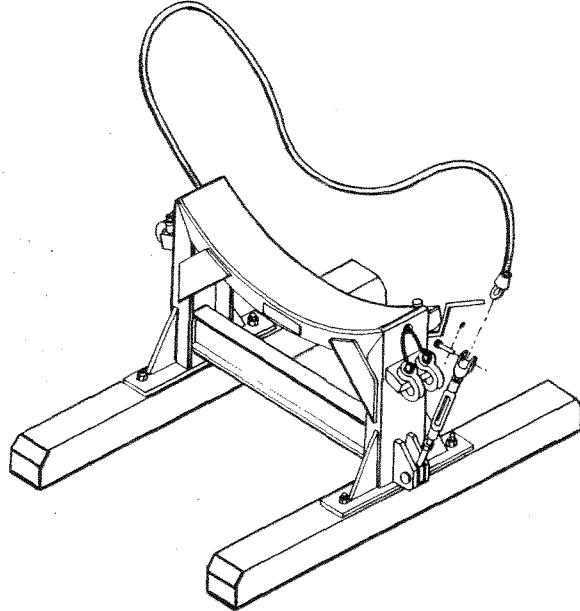
ORDNANCE DOLLY

Instl. No.:	55-5719
BAC Part No.:	55-11209
T.O. No.:	35E4-8-2-2
Instl. Test Req'm't. No.:	NA
Procurement Spec. No.:	(Dwg. No.)

missile warhead within the launcher shelter, (2) the servo batteries and hydraulic doors within the A & M shop and the launcher shelters, and (3) the target seeker antenna assembly within the A & M shop and the launcher shelter.

Missile Cradle

Missile cradles of welded steel on wooden base pieces, when positioned in an airplane, support the missile with missile rings for air transport. The missile



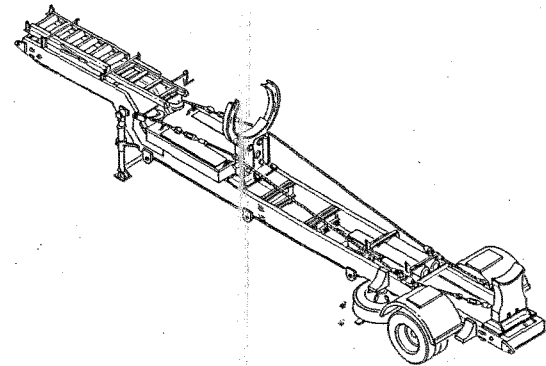
MISSILE CRADLE

Instl. No.:	55-5719
BAC Part No.:	55-2710
T.O. No.:	35D13-2-4-1
Instl. Test Reqm't. No.:	NA
Procurement Spec. No.:	(Dwg. No.)

cradles are equipped with provisions for tie down of the load to the transport aircraft. A spring-loaded detent located on the left side of each cradle will lock the missile ring in any of five rotated positions.

Missile Trailer

The missile trailer shown is used to transport the missile between the A & M shop and the launcher



MISSILE TRAILER

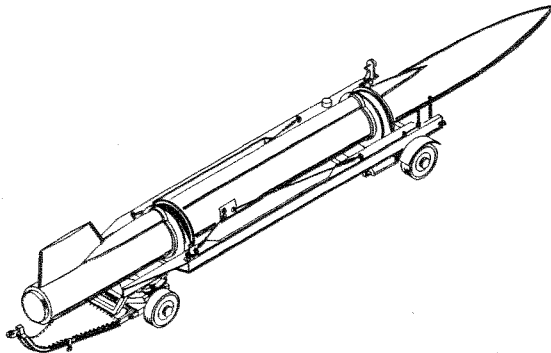
Instl. No.:	55-5719
BAC Part No.:	50-6279
T.O. No.:	35D3-11-6-1
Instl. Test Reqm't. No.:	NA
Procurement Spec. No.:	(Dwg. No.)

shelter. It is a spring-mounted commercial type semi-trailer with a single axle and dual wheels suitable for hookup to a standard military prime mover. The trailer is provided with vertical supports, front and rear saddles and clamps, an intermediate jack, longitudinal tie downs and a ladder.

The missile trailer is equipped with a protective cover to provide protection of external missile surfaces from the elements.

Aircraft Loading Trailer

The aircraft loading trailer is a special purpose, four-wheel vehicle designed to transport the missile to and from the transport airplane. The trailer is air transportable with a missile fuselage load.

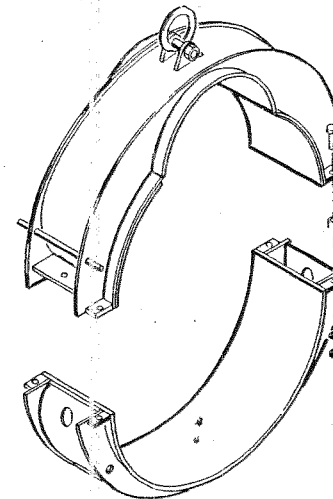


AIRCRAFT LOADING TRAILER

Instl. No.:	55-5719
BAC Part No.:	55-2225
T.O. No.:	35D13-2-4-1
Instl. Test Reqm't. No.:	NA
Procurement Spec. No.:	(Dwg. No.)

Missile Rings

Missile rings are padded, welded-steel structures formed in two half-sections (upper and lower) which



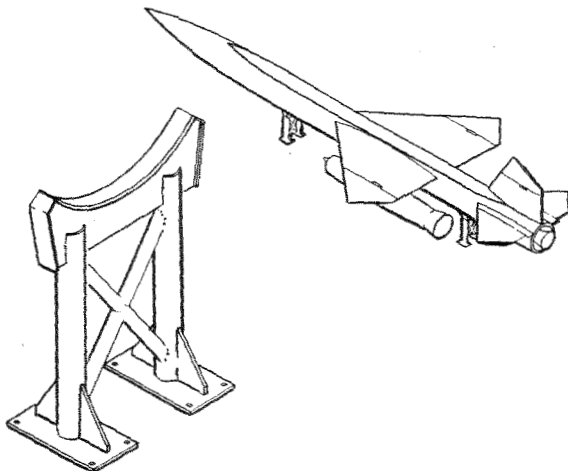
MISSILE RINGS

Instl. No.:	55-5719
BAC Part No.:	55-2711
T.O. No.:	35D13-2-4-1
Instl. Test Reqm't. No.:	NA
Procurement Spec. No.:	(Dwg. No.)

are bolted together to fit the contour of the missile. The outer circumference of the rings incorporates the track to accommodate the trailer rollers, tie down ropes and, in the case of the forward ring, the worm gear drive chain. Detent catches are located on the circumference of the rings to fix them in any of several rotational positions on their cradles. Missile rings provide for attachment to hoisting equipment.

Missile Shop Cradles

The missile shop cradles provide support of the missile in the A & M shop during inspection, assembly, and operational test. The cradles also support the complete missile or missile fuselage during inside storage.



MISSILE SHOP CRADLES

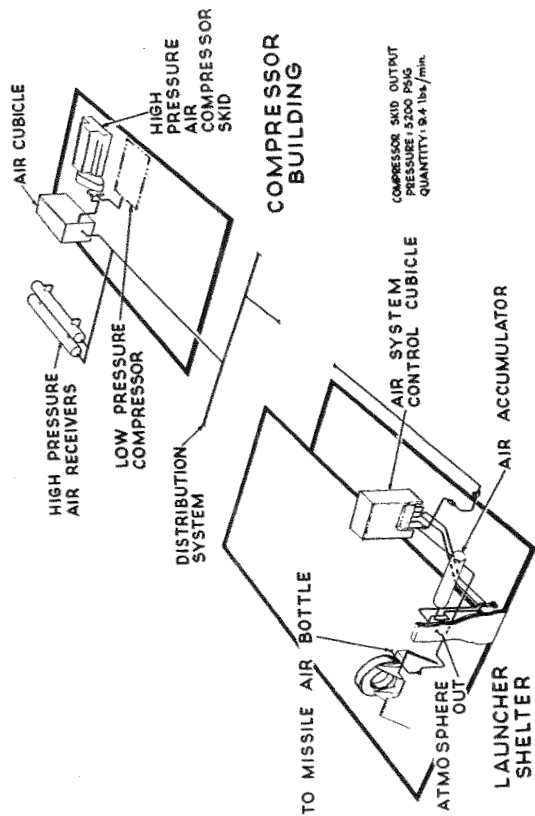
Instl. No.:	55-5699
BAC Part No.:	59-3106
T.O. No.:	35D3-11-9-1
Instl. Test Reqm't. No.:	D5-2308
Procurement Spec. No.:	(Dwg. No.)

The missile shop cradles consist of a set of two steel fabricated support stands contoured to the missile diameter. Pads are provided to distribute the missile load to protect the fuselage exterior from damage.

Special Tools and Fixtures

Boeing Document D5-1477, "Special Tools and Fixtures," defines one set of equipment designated as special tools and fixtures. The special tools and fixtures defined therein are those items used at an IM-99A base for purposes of installation, assembly, protection, alignment, special handling, and maintenance of IM-99A missiles and for the assembly and maintenance of certain items of weapon support equipment.

COMPRESSOR BUILDING
HIGH-PRESSURE AIR SYSTEM



COMPRESSOR BUILDING HIGH-PRESSURE AIR SYSTEM

SECTION 6
GENERAL
INFORMATION

SYSTEMS

COMPRESSOR BUILDING HIGH-PRESSURE AIR SYSTEM

COMPRESSOR BUILDING LOW-PRESSURE AIR SYSTEM

COMPRESSOR BUILDING HELIUM SYSTEM

LAUNCHER SHELTER HYDRAULIC SYSTEM

LAUNCHER SHELTER AIR CONDITIONING SYSTEM

A & M SHOP CHILLED WATER SYSTEM

BASE CHILLED WATER SYSTEM

BASE HOT WATER SYSTEM

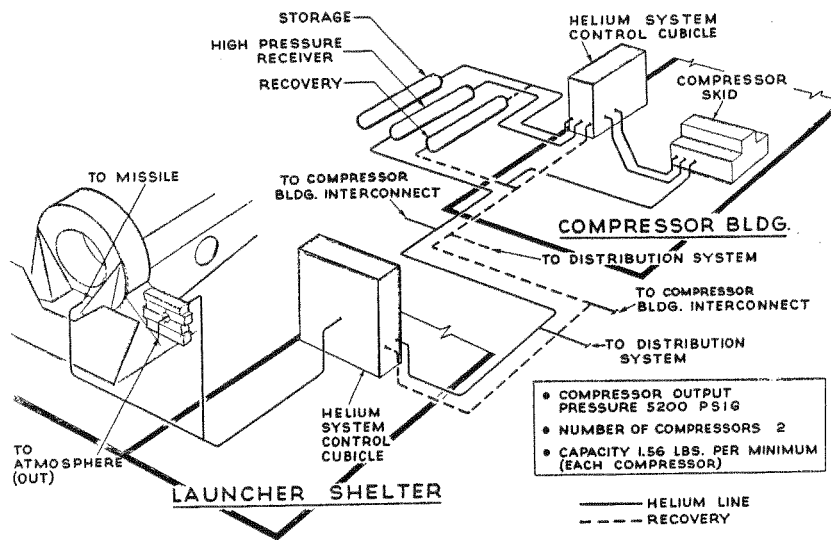
BASE ELECTRICAL POWER DISTRIBUTION

LAUNCH CONTROL SYSTEM

BASE WEAPON CONTROL SYSTEM

MISSILE RECYCLING DIAGRAM

6. GENERAL
INFORMATION

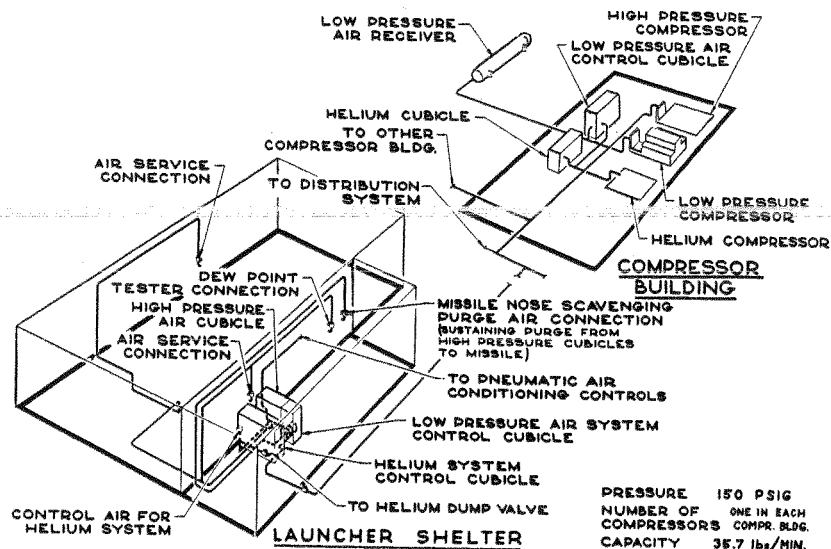


- COMPRESSOR OUTPUT PRESSURE 5200 PSIG
- NUMBER OF COMPRESSORS 2
- CAPACITY 1.56 LBS. PER MINIMUM (EACH COMPRESSOR)

— HELIUM LINE
- - - RECOVERY

COMPRESSOR BUILDING HELIUM SYSTEM

BOEING D5-4684 6.3



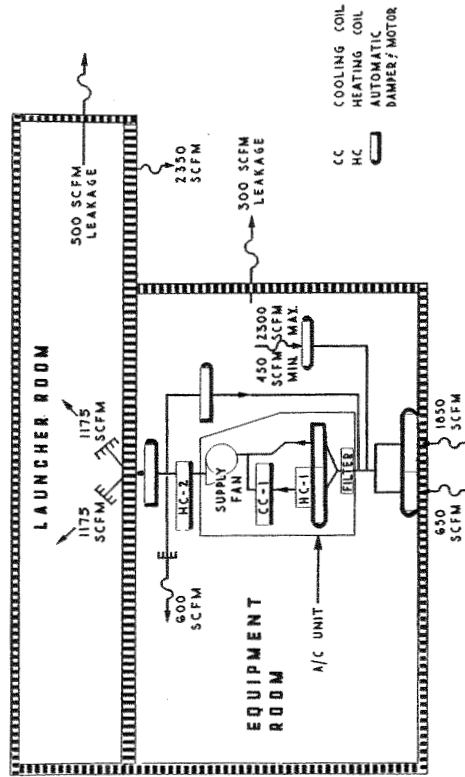
- PRESSURE 150 PSIG
- NUMBER OF COMPRESSORS ONE IN EACH COMPR. BLDG.
- CAPACITY 35.7 lbs./MIN.

COMPRESSOR BUILDING LOW-PRESSURE AIR SYSTEM

BOEING D5-4684 6.2



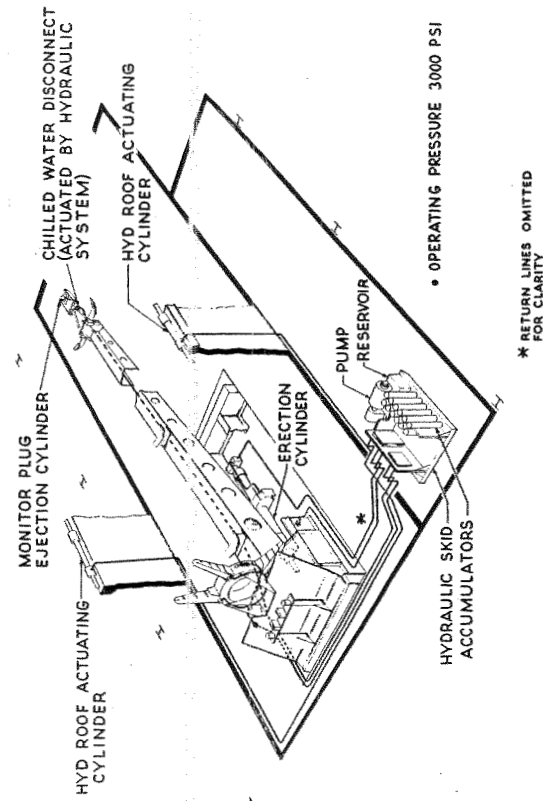
LAUNCHER SHELTER
AIR CONDITIONING SYSTEM



LAUNCHER SHELTER AIR CONDITIONING SYSTEM

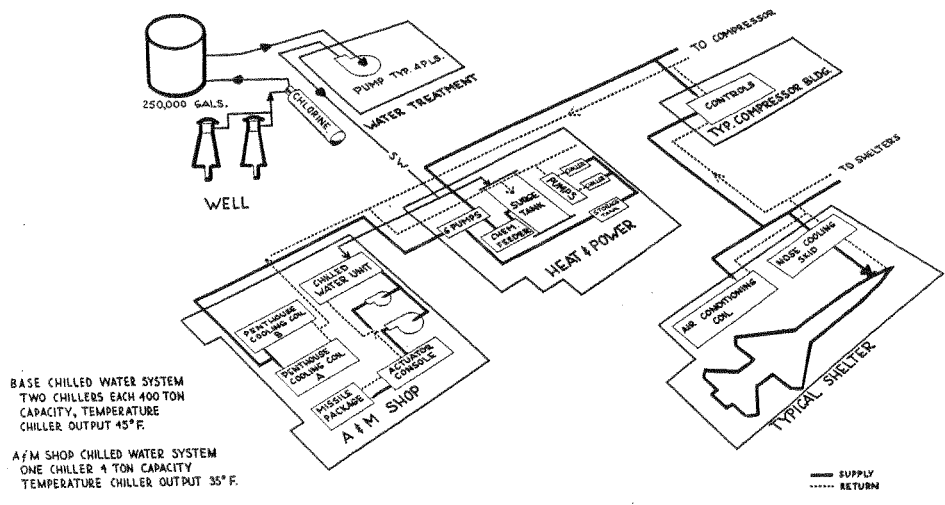


LAUNCHER SHELTER
HYDRAULIC SYSTEM



LAUNCHER SHELTER HYDRAULIC SYSTEM

BASE CHILLED WATER SYSTEM



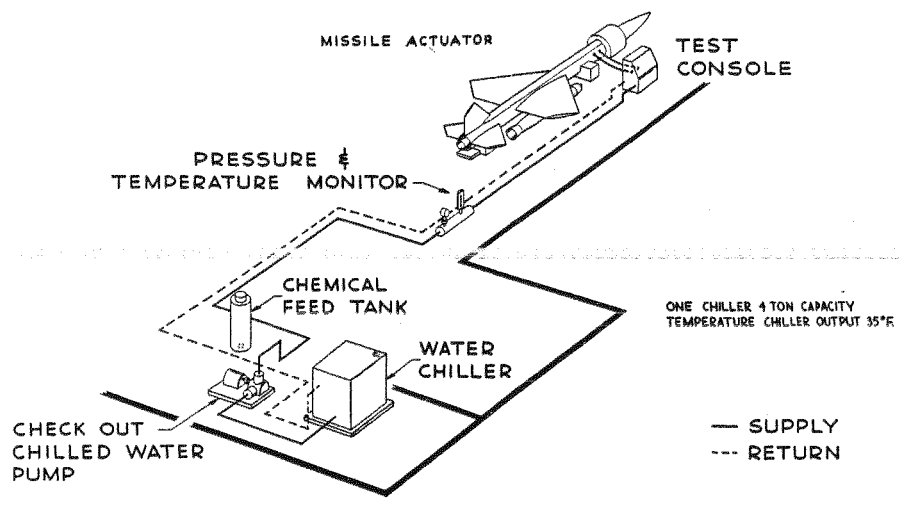
BASE CHILLED WATER SYSTEM
TWO CHILLERS EACH 400 TON
CAPACITY, TEMPERATURE
CHILLER OUTPUT 45°F

A/M SHOP CHILLED WATER SYSTEM
ONE CHILLER 4 TON CAPACITY
TEMPERATURE CHILLER OUTPUT 35°F

BASE CHILLED WATER SYSTEM

BOEING D5-4684 6.7

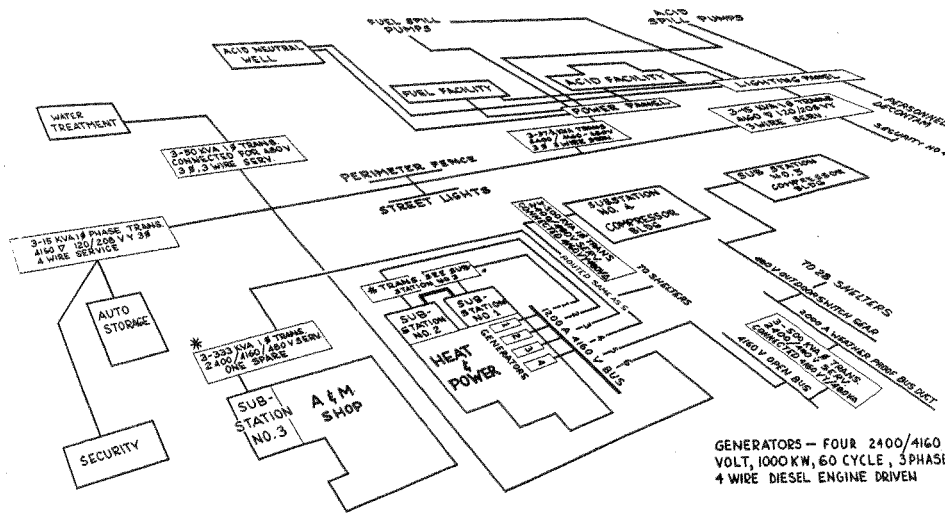
A & M SHOP CHILLED WATER SYSTEM



A & M SHOP CHILLED WATER SYSTEM

BOEING D5-4684 6.6

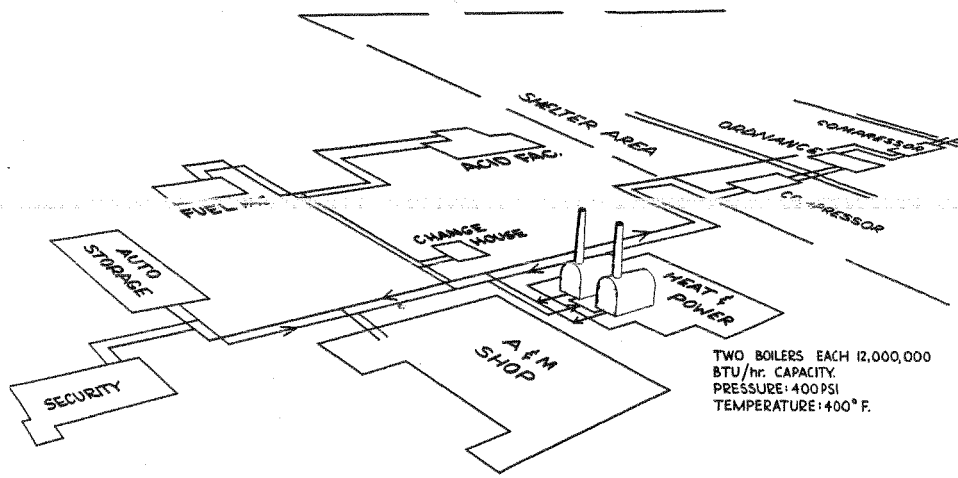
BASE ELECTRICAL POWER DISTRIBUTION



BOEING D5-4684 | 6.9

BASE ELECTRICAL POWER DISTRIBUTION

BASE HOT WATER SYSTEM



BOEING D5-4684 | 6.8

BASE HOT WATER SYSTEM

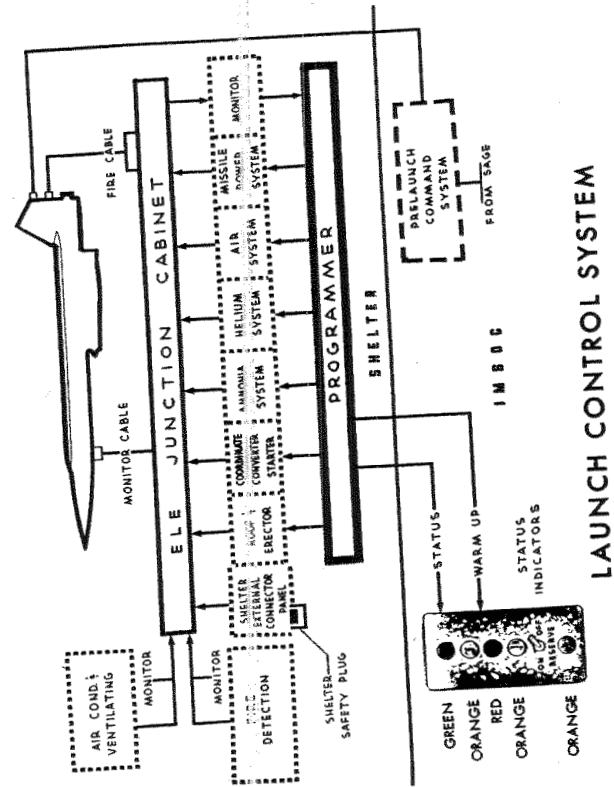
General Information IM-99A BASES

BASE WEAPON CONTROL SYSTEM

The following two diagrams define the base weapon control system.

IM-99A BASES General Information

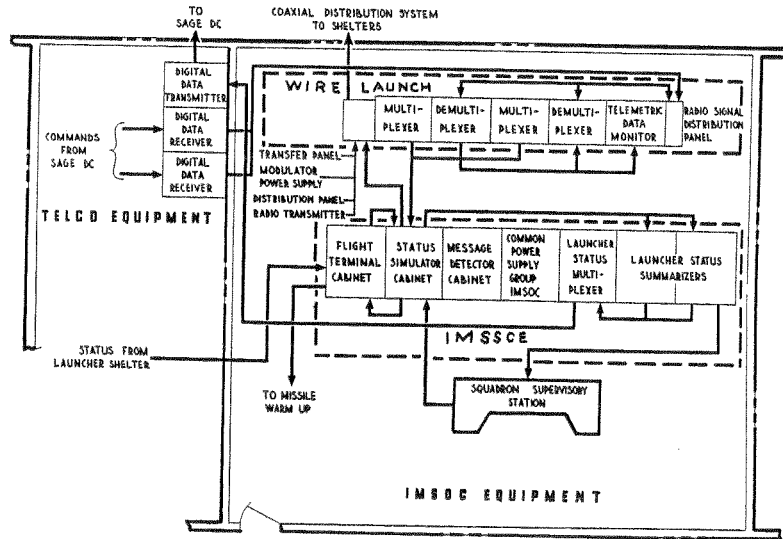
LAUNCH CONTROL SYSTEM



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BOEING

D5-4684 6.13

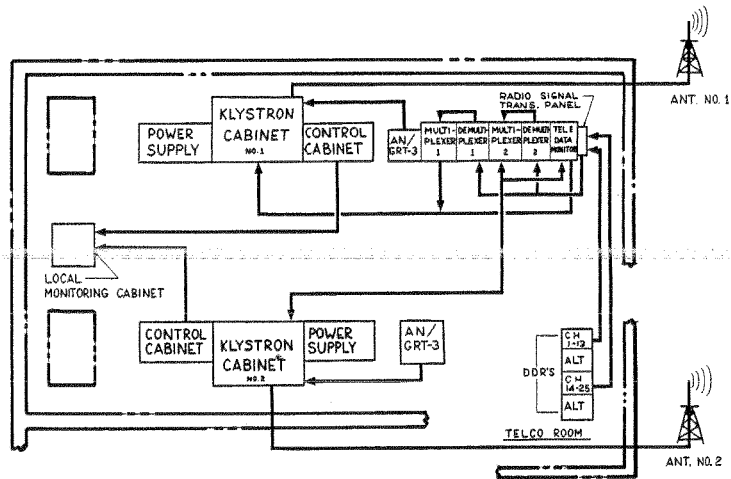


BASE WEAPON CONTROL SYSTEM - A & M SHOP

IM-99A BASES General Information

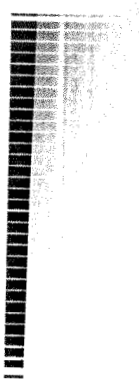
BOEING

D5-4684 6.12

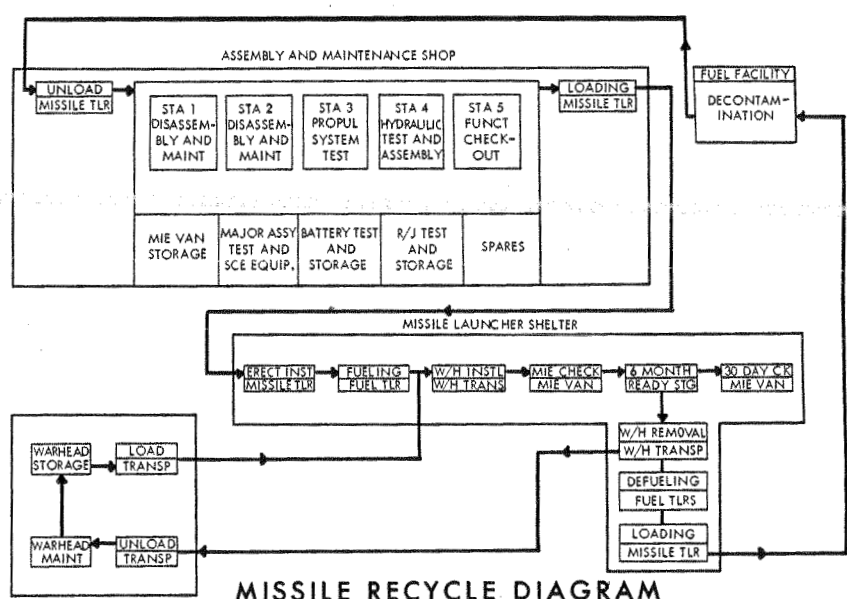


BASE WEAPON CONTROL SYSTEM - GAT FACILITY

IM-99A BASES General Information



BOEING D5-4684 6.14



MISSILE RECYCLE DIAGRAM

IM-99A BASIS General Information MISSILE RECYCLING

