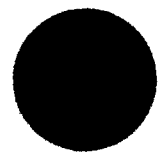


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PLAN FOR
TERMINAL INSTRUMENTATION COMPLEX,
ENIWETOK ATOLL

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ENIWETOK INSTRUMENTATION PLAN

1.0 Introduction

1.1 Impact in the Marshall Islands area of the Pacific is a requirement of present and future missile programs on the Air Force Western Test Range. In the Marshall Islands area, two impact areas are presently being utilized, the Kwajalein Atoll and the Eniwetok Atoll.

1.2 The Kwajalein Atoll was instrumented to support the development of an anti-missile missile system (Nike Zeus & Nike-X), and to support project PRESS. At the present time, the Kwajalein Complex does not have a recovery capability. Furthermore, impacts into the Kwajalein area places a stringent range safety requirement on the AFWTR due to the overflight of native populated islands.

1.3 The present capability at Eniwetok are scoring, recovery, and terminal trajectory optical coverage. For impacts into the Eniwetok Atoll, the range safety requirement is less stringent than for impacts into the Kwajalein area.

1.4 Future programs are requiring terminal area instrumentation which does not presently exist. The Advanced Minuteman Program is scheduled to impact into the Eniwetok Lagoon and requires stringent terminal instrumentation coverage, scoring, and recovery. Therefore, it is required to instrument the Eniwetok Atoll to meet present and future program requirements. Also, this instrumentation complex can support other programs due to the overloaded impact schedule for the Kwajalein area, and due to the range safety advantages of impacts into the Eniwetok area.

1.5 This report discusses the site location, problem areas, program requirement, and instrumentation systems to satisfy the requirements.

The total cost of the instrumentation complex is estimated to be \$9.8 million dollars. and the estimated operational readiness date is May 1967.

2.0 Site Selection

2.1 The Eniwetok Atoll is composed of approximately 40 islands surrounding an oval lagoon approximately 23 miles long by 18 miles wide, as shown in Figure 1. Three of these, Parry Island (ELMER), Eniwetok Island (FRED), and Engebi Island (JANET), are suitable for use as a major instrumentation site as far as the size and location of the islands. The remaining islands are either too small or too difficult to support logistically. The islands west of the South Channel (Grinem, Libiron, Bogan, Buganegan, and Igurin) are controlled by the Atomic Energy Commission (AEC) and are not available for the instrumentation complex.

2.2 Eniwetok Island is presently congested and sufficient area is not available for the planned instrumentation complex.

2.3 Parry Island is located 3 miles from Eniwetok Island, therefore the support facilities presently available on Eniwetok can be utilized and the personnel can be transported to and from Parry Island by water taxi. Parry Island has a deep water pier, although the pier is presently in need of repair. The pier was capable of berthing ships as large as 17,000 tons. Eniwetok does not presently have a deep water pier. A deep water pier would be required for logistics, and the off-loading and on-loading of equipment.

2.4 Engebi Island is located approximately 20 miles from Eniwetok Island and is presently abandoned. The use of this island would require the use of air taxi service or a build-up of personnel and base support facilities on Engebi Island.

2.5 Parry Island is recommended for the instrumentation complex, due to the advantages previously discussed. The instrumentation plans presented in this document are based on the use of Parry Island.

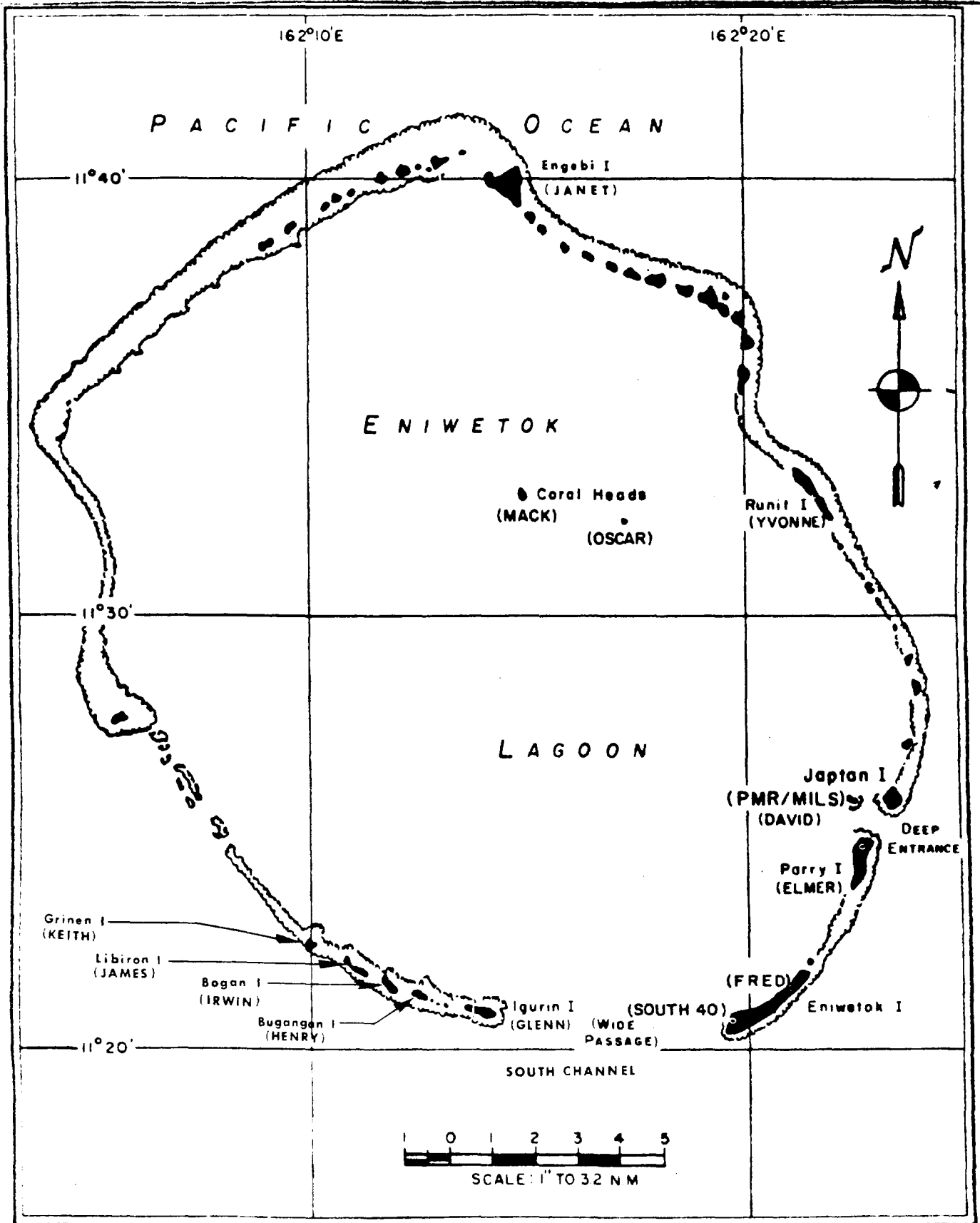


Figure 1. Eniwetok Atoll

3.0 Site Location

3.1 The primary purpose of this site will be to provide terminal instrumentation coverage of re-entry vehicles (R/Vs) which would be launched from VAFB. These vehicles will approach the lagoon impact area from a north easterly direction and will pass approximately 3 miles north of Parry Island. Therefore, it is desirable that the instrumentation site have an unobstructed view as possible from 0° to 90° azimuth. The proposed site on Parry Island is located approximately 500 ft. south-east of the center of an existing 1250 ft. runway as shown in Figures 2 and 3. From this site, there is an unobstructed view from approximately 16° to 200° in azimuth. The maximum obstruction in the remaining area does not exceed 4° elevation and is probably less than 2° elevation over 90° of this area. The various instrumentation antennas which will be located on a line which has a bearing of 135° . The instrumentation complex will be designed so that terminal area coverage will be provided to the maximum capabilities of the system with minimum interference between systems.

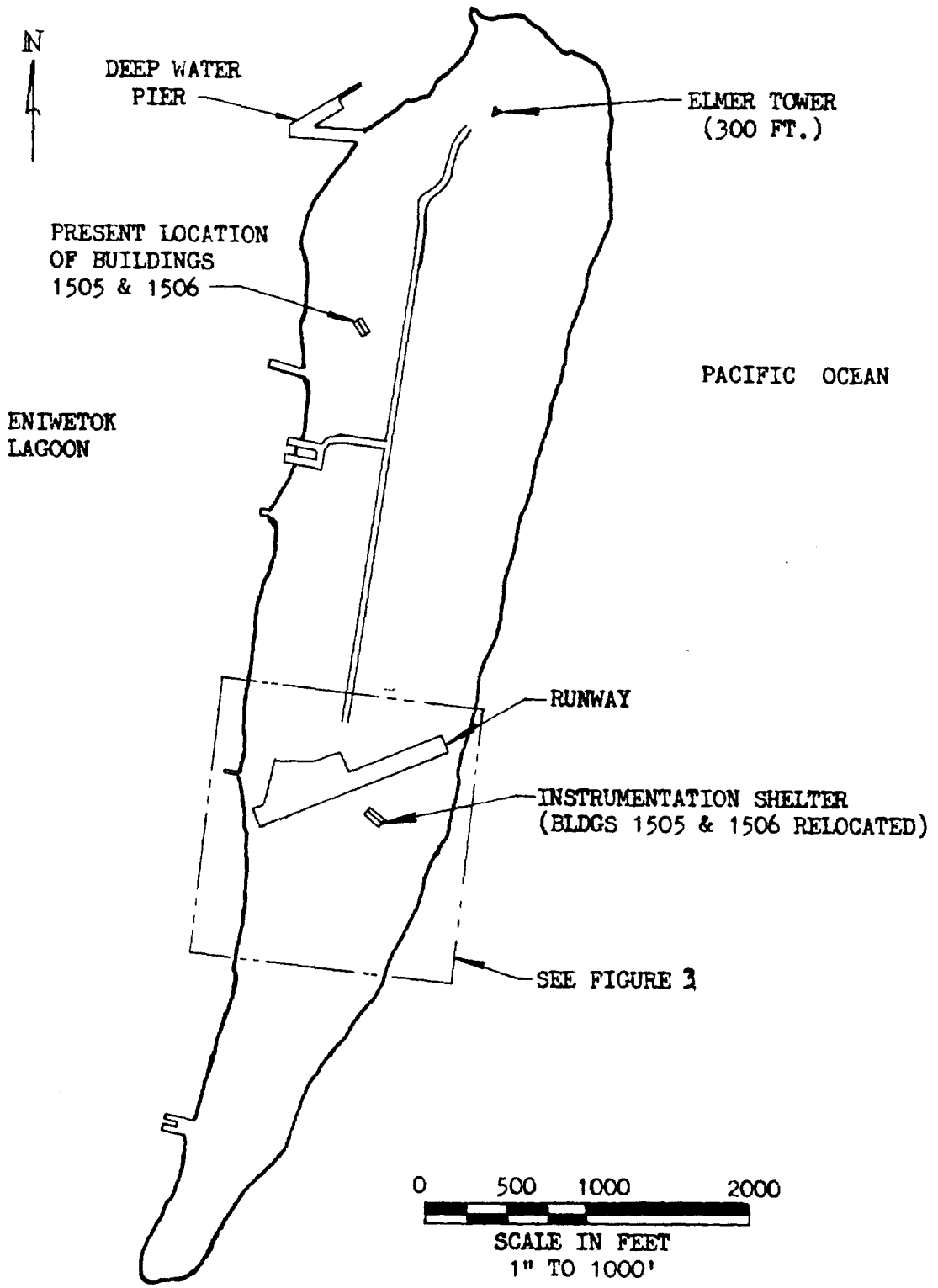


FIGURE 2. PARRY ISLAND

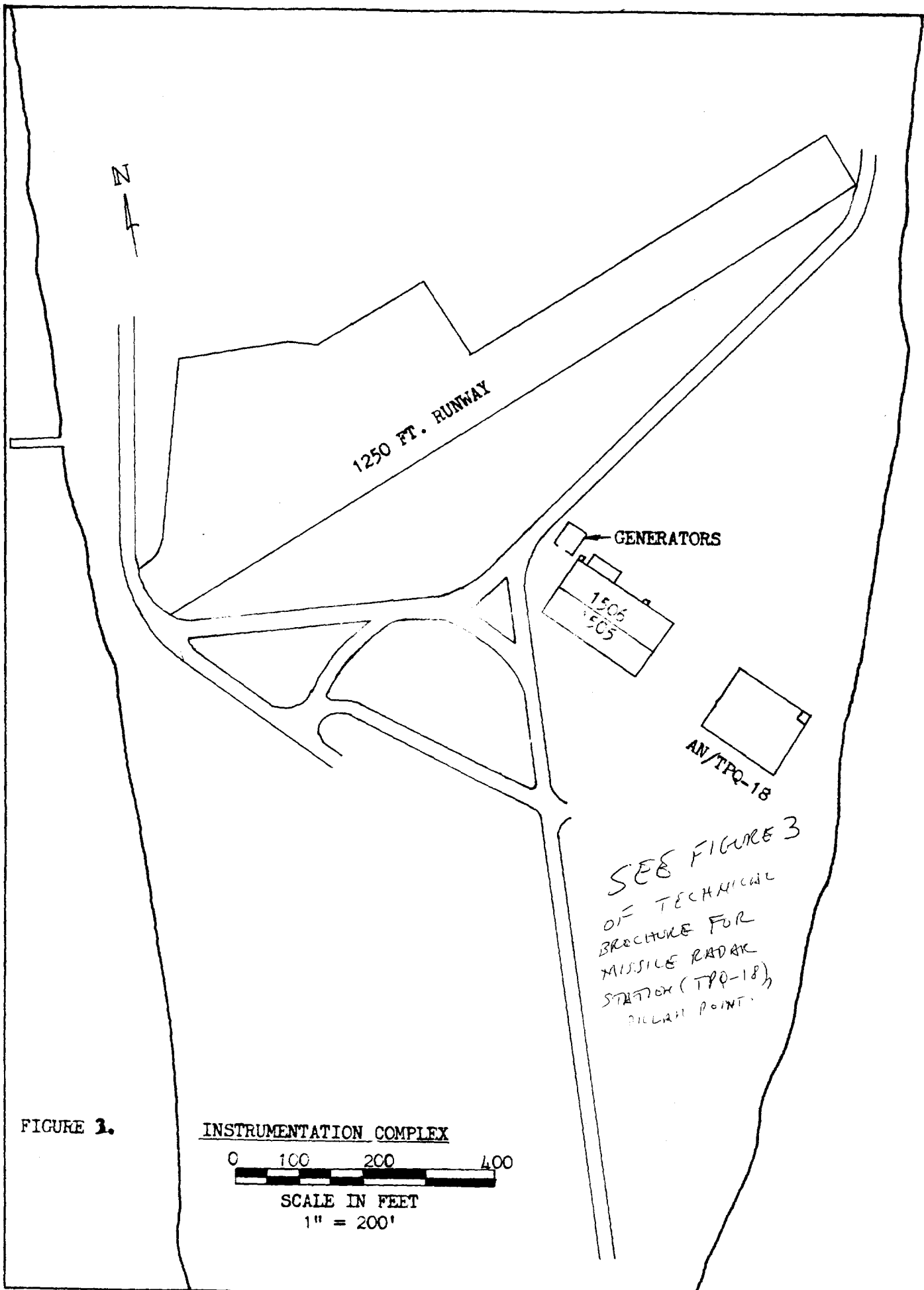
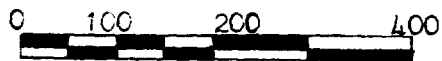


FIGURE 1.

INSTRUMENTATION COMPLEX



SCALE IN FEET

1" = 200'

4.0 Problem Areas

4.1 Several problems will be encountered for the planned terminal instrumentation complex in the Eniwetok Atoll. These problems are the very marginal base support available, the lack of a usable deep water pier, and water taxi service between Eniwetok Island and Parry Island.

4.2 The present primary problem is the Base Support Operation and Maintenance (O&M) contract which is held by Global Associates. Due to the transfer of the range from the Navy to the Air Force, the existing base support O&M contract is presently administered by the Army at Huntsville, Alabama and is not sufficiently funded to provide even a marginal base support capability. The AFWTR, as the host of the Eniwetok Atoll, must also support the tenant organizations. Therefore, the base support O&M contractor must also support the Coast Guard, the Marine Biological Lab of the Atomic Energy Commission, the Southwest Pacific Survey Team (AST-7), the Navy Airborne Press Operations Group (NAPOG), Military Air Transport Service (MATS), the Military Sea Transport Service (MSTS) and the Weather Bureau. Additional funds would be required for the base support O&M contract in order to adequately support the planned instrumentation complex.

4.3 A second major problem is that there is not available sufficient quarters to support the additional contractor personnel which would be required to prepare the sites, and install and operate the instrumentation system which will be proposed therein. The present messing facilities could be expanded to support the additional personnel. However, additional recreational facilities would probably be required.

4.4 Another problem area is that there is not, at the present time, a usable deep water pier in the Eniwetok Atoll. The supplies must be transported to Eniwetok by barges, lighters or similar small crafts from an anchorage in the lagoon. This would present some difficulties in the case of loading and off-loading some of the proposed instrumentation. Presently, there is a deep water pier on Parry Island which is in need of repair. The cost of repairing is estimated at \$200,000 and it is proposed that this pier be repaired to facilitate the installation and support of the installation complex on Parry Island.

4.5 It would be necessary to implement a regularly scheduled water taxi service between Eniwetok and Parry Islands in order to provide the necessary support for the technical and base support personnel. The trip would take approximately 10 minutes.

4.6 A possible problem area from time to time is that on each MATS flight there are 11 seats available for all persons going to and from Eniwetok Atoll.

4.7 The problem areas discussed in paragraphs 4.2, 4.3, 4.4, and 4.5 must be resolved prior to the installation of the instrumentation complex.

5.0 Program Requirements

5.1 The AFWTR mission is to provide range support for launch operations, and provide tracking and data collection facilities for missile and space vehicles programs to the Range Users. In carrying out this mission, the AFWTR provides the Range Users with services involving precise instrumentation (trajectory, telemetry, etc.), data handling and processing, and instrumentation systems for Range Safety as well as logistic support in certain locations where other military or government resources do not suffice. These various range services directly support the development and evaluation of satellite, space vehicles, and ballistic missiles as well as operational training of SAC missile crew.

5.2 Present programs on the WTR require stringent terminal data. Future programs will also require stringent data in the terminal area.

The Kwajalein Atoll is the only long-range impact area which is instrumented to handle programs which require terminal data other than scoring. The Kwajalein complex must support the development of an anti-missile missile and project PRESS, and will be unable to support all programs requiring terminal instrumentation coverage. The Kwajalein complex presently does not have a recovery capability.

The Advanced Minuteman program is scheduled to impact into the Eniwetok Lagoon and requires stringent terminal data, and recovery of the R/V. These requirements are Class I. Therefore, the Eniwetok Atoll must be properly instrumented to perform the mission of the WTR and to support the Advanced Minuteman program. Also, this instrumentation complex would support programs which cannot be supported by the Kwajalein complex due to its workload or for range safety reasons.

5.3 The Advanced Minuteman Program, based on the Planning Estimate of 30 March 1965, requires at Eniwetok;

Metric Tracking,
R/V Telemetry,
Impact Location,
R/V Recovery, and
Meteorological Support.

The above terminal requirements are given in Appendix A.

5.4 The BSD Minuteman LGM-30F Program is scheduled to impact in the Eniwetok area and possibly the Kwajalein area. Under this program, the BSD Minuteman LGM-30F/Mark 12 series will require recovery at Eniwetok and/or Kwajalein. The Mark 12 series, based on the Program Requirements Document (PRD) 6102 of 15 March 1965, with revisions 01 and 02, requires at the impact area;

Metric Tracking,
R/V Telemetry,
Engineering Sequential Data,
Radar Cross-Section,
Radiant Energy Observables,
Impact Location
R/V Recovery, and
Meteorological Support

The above terminal requirements are given in Appendix B.

The BSD Minuteman LGM-30F/Mark 12 is scheduled to be completed approximately 9 to 12 months prior to the scheduled start of the Advanced Minuteman Program.

5.5 It is assumed that the Advanced Minuteman Program will be a follow-on of the BSD Minuteman LGM-30F PRD. The Mark 12 R/V was originally part of the Advanced Minuteman PE and is now incorporated in the BSD Minuteman

LGM-30F PRD. Until additional information is received on the Advanced Minuteman Program, the requirements in the Advanced Minuteman PE of 30 March 1965 and the BSD Minuteman LGM-30F PRD with revision 02 of 12 April will be used as the basic requirements for the Instrumentation Complex at Eniwetok Atoll.

6.0 Plan for Instrumentation Complex

6.1 The existing instrumentation capabilities on the Eniwetok Atoll consist of the Optical and Photographic coverage, the All Weather Impact Location System (AWILS), the SPN-8A Radar, and the GMD-1B.

The Optical and Photographic coverage consist of three Mobile Optical Tracking Units (MOTU), three Askania Anetheodolites, and Optical and Photographic MILS (Missile Impact Location System). The Optical and Photographic MILS consist of a series of 35mm cameras and transits on Runit Island, Parry Island, and Eniwetok Island. These systems are presently operational in fair weather and daylight hours.

The AWILS consist of seven hydrophones which are anchored at the bottom of the lagoon and attached to buoys at the surface. This system is installed and presently undergoing evaluation.

The AN/SPN-8A Radar was installed on Elmer Tower (Parry Island) as an interim impact location system to meet an operational requirement. This system is installed and is presently undergoing evaluation.

The GMD-1B provides data on the upper atmosphere. Data from the GMD-1B is raw and involves lengthy computations before it can be used. This system is presently operational.

In addition to the existing instrumentation capabilities, a recovery capability does exist at Eniwetok.

6.2 Systems planned for the Eniwetok Atoll in FY 66 consists of the installation of a Meteorological Sounding Rocket Facility and the conversion of the GMD-1B to a GMD-4. Prior to FY 67 a payload for the meteorological rocket which is compatible with the GMD-4 is expected to be developed. Therefore, a radar to track this payload would not be required.

6.3 The Instrumentation Complex will be implemented initially to support the Advanced Minuteman Program. In addition to supporting the very basic requirements of the Advanced Minuteman Program, the instrumentation complex will initially have some additional capabilities and will have a growth potential to meet future program requirements. In order to support the requirements given in Appendices A and B, and to provide the basis for a general purpose terminal impact area instrumentation complex, the following instrumentation is needed at Eniwetok:

- a. Metric Tracking
- b. Telemetry
- c. Acquisition Aid
- d. Timing
- e. Operations Control Center
- f. Command Control
- g. Computer
- h. Meteorological Facility
- i. Intra-site Communication

Figure 4 is the System Data Flow Diagram for the Eniwetok Instrumentation Complex. The support for Radar Cross-section, Radiant Energy Observables and Ballistic Cameras could be supplied by other means, such as the ARIS ships, aircraft, etc. The estimated readiness date of the instrumentation complex is May 1967.

6.4 METRIC TRACKING

The Class I metric tracking requirements given in Appendices A and B necessitate the procurement and installation of an AN/TPQ-18 Radar in the terminal area. Due to its operational angle accuracies, an AN/FPS-16 Radar will not meet the position requirements. This radar is capable of

providing the required position and velocity accuracies to approximately 1,000,000 ft depending in the R/V trajectory. The refraction uncertainties will be corrected and considerably reduced.

During the terminal phase, a beacon tracking problem is definitely anticipated. This problem basically involves polarization mismatch and antenna pattern nulls which degrades the radar's tracking performance. Therefore, this radar will be provided with Polarization Diversity Reception (PDR) and Polarization Alternation of Transmission (PAT). The PDR provides the capability for simultaneous reception of two orthogonal polarizations and the PAT provides the capability for transmissions which have successive pulses (or successive coded pulse groups) that alternate between two orthogonal polarizations so as to provide essentially the same benefits at a radar beacon having only a single receiver and a single antenna (or antenna array) which PDR by that beacon would provide. In other words, the PAT solves the problem at the radar beacon's receiving antenna and the PDR solves the problem at the radar's receiving antenna.

Acquisition will be accomplished by the use of pointing information which will be computed from the launch and midcourse metric data. This information will be transmitted to Eniwetok by teletype. A VHF telemetry acquisition aid will be required for the radar as an acquisition back-up.

6.5 TELEMETRY

One VHF PCM/FM/FM link is required for receiving and recording from 300,000 ft to impact as stated in Appendix A. The interval given in Appendix B is from 600,000 ft thru impact. The proposed telemetry

system will be capable of receiving and recording VHF PCM/FM/FM and VHF PCM/FM from 600,000 ft thru impact. A telemetry aircraft may be required to receive and record thru impact. The telemetry antenna will be used as the acquisition aid for the radar.

6.6 TIMING

A timing center will be required for radar and other data information such as the required time correlation between the telemetry and radar data. An Atomic Clock will be included in the timing center and will be used to synchronize the timing codes. This timing center will provide IRIG Standard Time Code Formats A, B, and C (Reference IRIG Document 104-60). It is assumed that all timing requirements will conform to the IRIG Standards when this instrumentation complex becomes operational.

6.7 OPERATIONS CONTROL CENTER

The Operations Control Center is the nerve center of the instrumentation complex. Here all of the required data are displayed and all decisions are made. Included in the Operations Control Center will be a minimum of three plotting boards and real-time telemetry displays. The plotting boards are for real-time display of analog and digital present position and impact prediction data. The real-time telemetry displays would be used primarily for range safety purposes. Roll, pitch, yaw, etc. will be displayed in real-time.

6.8 COMMAND CONTROL

Although the Command Control System is not required to support the Advanced Minuteman Program, this system would be required for future programs, such as the Maneuverable Ballistic Re-entry Vehicles (MBRV). This system is required for a basic terminal area instrumentation

complex.

The Command Control System is required to transmit frequency modulated command or destruct signals maneuverable re-entry vehicles. The antenna will be positioned automatically by data from the Synchro Bus or manually by the transmitter operator.

6.9 COMPUTER

A digital computer, in addition to the AN/TPQ-18 Radar computer, is required for impact prediction, command control, conversion of trajectory information to orbital or ballistic parameters, acquisition computation, refraction corrections, and reduction of meteorological data. A computer which is modular in construction is desired, so that it can be tailored to meet specific system requirements and provides the capability for easy expansion. The RCA 4101 computer in the AN/TPQ-18 Radar can edit and smooth the data, convert from geocentric coordinates to local polar coordinates and vice versa, and correct for the system errors.

6.10 METEOROLOGICAL FACILITY

As previously mentioned in paragraph 6.2, a meteorological launch facility will be installed and the GMD-1B will be converted to a GMD-4 in FY 66. Assuming that these plans are completed, the required meteorological measurements will be provided.

6.11 INTRA-SITE COMMUNICATIONS

The Intra-site Communications will provide the distribution of data and operational voice communication between systems, as required. The distribution of the voice communication will be controlled at the Communication Center. A communication link must be provided from the

Communication Center for the instrumentation complex to the Communication Center on Eniwetok Island.

6.12 INSTRUMENTATION VANS

The instrumentation for the complex will be mounted in 40 foot vans, with the exception of the AN/TPQ-18, and the telemetry and command control antennas. Each van will have a quick-disconnect air conditioning unit, in order to allow easy and rapid substitution of units in the event of an air conditioning failure. In the event that it is necessary to select another impact area because of the peculiar program requirements or for range safety reasons, this transportable configuration would permit the moving of this instrumentation complex to the new impact area at a minimum cost for this type of instrumentation complex and reduce the range's reaction time to support these operations.

It is proposed to relocate Building 1505 and 1506 as shown in figure 2. The instrumentation vans will be housed in these buildings, as shown in figure 5, to reduce the effects of the very corrosive salt spray atmosphere and coral sand on the instrumentation vans. Although the vans will be designed for protection against the corrosive atmosphere, past experience has shown that it is highly desirable to house the instrumentation vans when economically feasible.

6.13 SITE PREPARATION AND UTILITIES

The site preparation will primarily consist of: the preparation of the required area; the construction of a pad and antenna pedestal for the AN/TPQ-18 Radar; the construction of personnel facilities (required office space & sanitary facilities), the foundation for Buildings 1505

and 1506, and pedestals for the telemetry and command control antennas; the relocation of Buildings 1505 and 1506; and the required cable ducts, utilities, etc.

The utilities will consist of adequate generator power, power control panel, power distribution systems, lighting, water, etc. The power system will be separated into "Critical Power" and "Industrial Power".

6.14 PRELIMINARY COST ESTIMATE

The preliminary cost estimate for the proposed Terminal Instrumentation Complex at the Eniwetok Atoll is \$9.8 million dollars. Appendix C is the Secretary of Defense Memorandum for Secretaries of Army, Navy, Air Force of 26 October 1962 on the National Range Program Planning and Related Funding Policy. This memorandum provides the guidelines for the "program planning and the planning for related resources, including funds, for National Missile Ranges, within the framework of applicable DoD administrative procedures and those of the military departments."

Paragraph three on page C-2 states; "When requirements for additional range resources are generated subsequent to the normal programming and budget preparation cycles (established for purposes of range user and range planning, as one year before the beginning of the fiscal year in which work must start to meet the requirement), the following guidance will be applicable:

For new, amended, incomplete, redirected or additional expression of range requirements by a range user, the military department or other agency sponsoring the test program shall be responsible to arrange for the necessary resources, including funds, to be made available to the Range Management Service in accordance with established procedures."

The cost breakdown for the Terminal Instrumentation Complex is as follows:

<u>PRELIMINARY COST ESTIMATE</u>			
System	Instrumentation Cost (\$ Million)	Technical O&M Manpower Requirements	Technical O&M Costs (\$ Thousand)
AN/TPQ-18	4.4	7	112
Telemetry & Acq Aid	1.4	5	80
Timing & Ops. Control	0.3	2	32
Command Control	*	2	32
Computer	1.0	4	64
Met Facility	**	**	**
Intra-site Comm	0.4	2	32
Instrumentation Vans	0.2	-	-
Site Prep & Utilities	1.3	2	32
Site Engr & Admin	<u>-</u>	<u>3</u>	<u>52</u>
TOTAL	\$9.0	27	\$436

TOTAL COST ESTIMATE (Preliminary)

(\$ Millions)

EQUIPMENT	9.0
Technical O&M	0.4
Logistic O&M	<u>0.4</u>
TOTAL	<u>\$9.8</u>

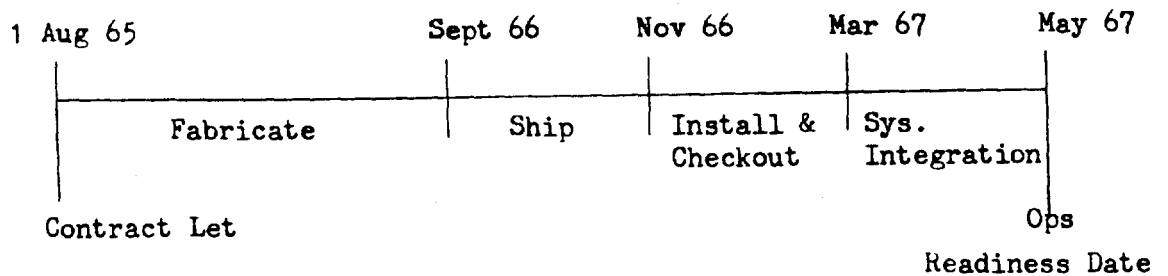
* No cost is shown since one is available from ETR.

** This system should be operational prior to installation of the Instrumentation Complex.

6.14 SCHEDULE

The longest lead time item is considered to be the AN/TPQ-18 Radar. The site preparation and utilities portion will be completed prior to the arrival of the instrumentation. The other systems will be installed and checked-out during the installation and checkout time period of the radar. The integration for all of the systems will occur during the time period noted for the radar.

AN/TPQ-18 Radar Schedule



Due to the schedule, FY 66 funds must be provided for the procurement of the systems.

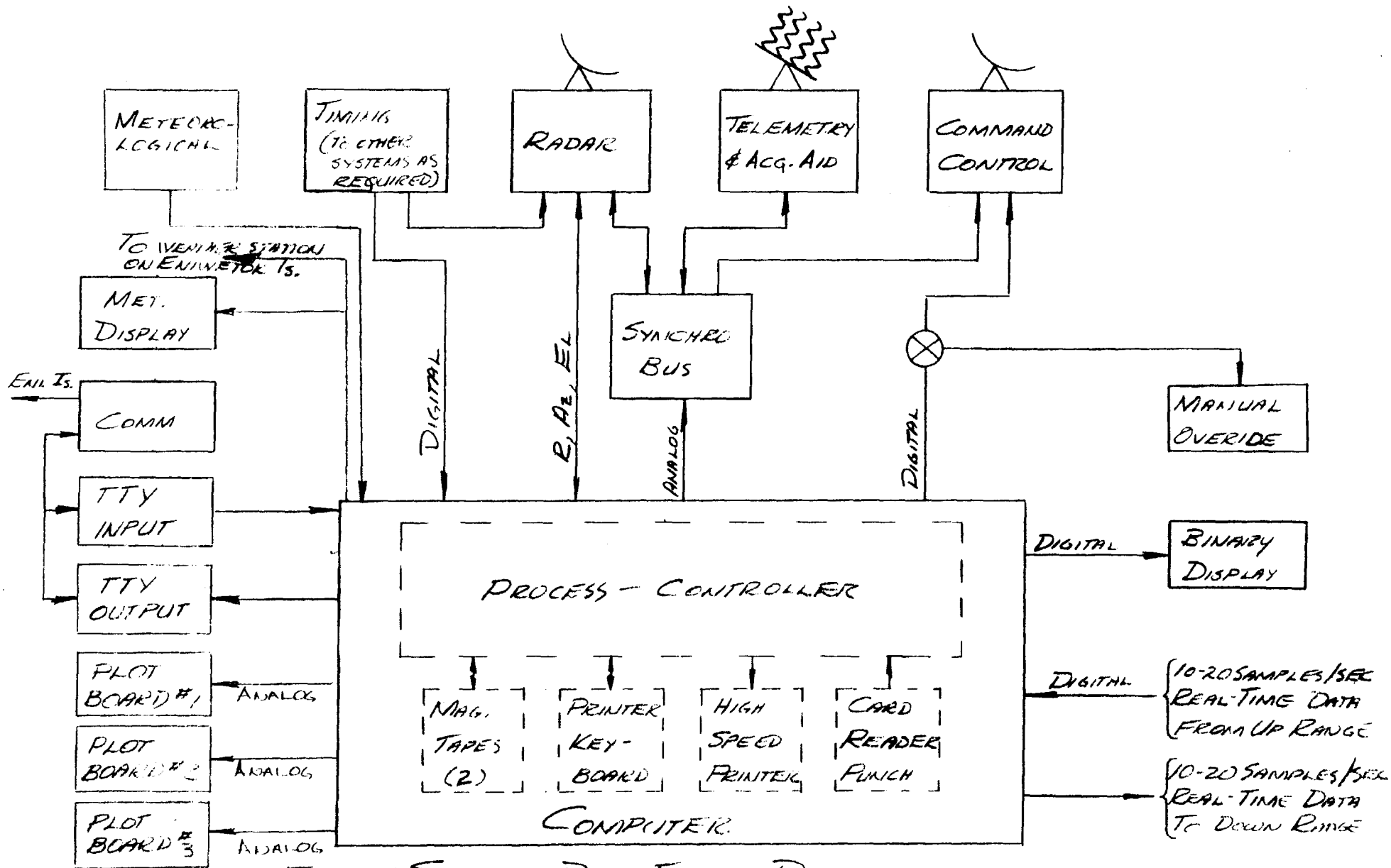


FIGURE A SYSTEM DATA FLOW DIAGRAM

ENIWETA INSTRUMENTATION COMPLEX

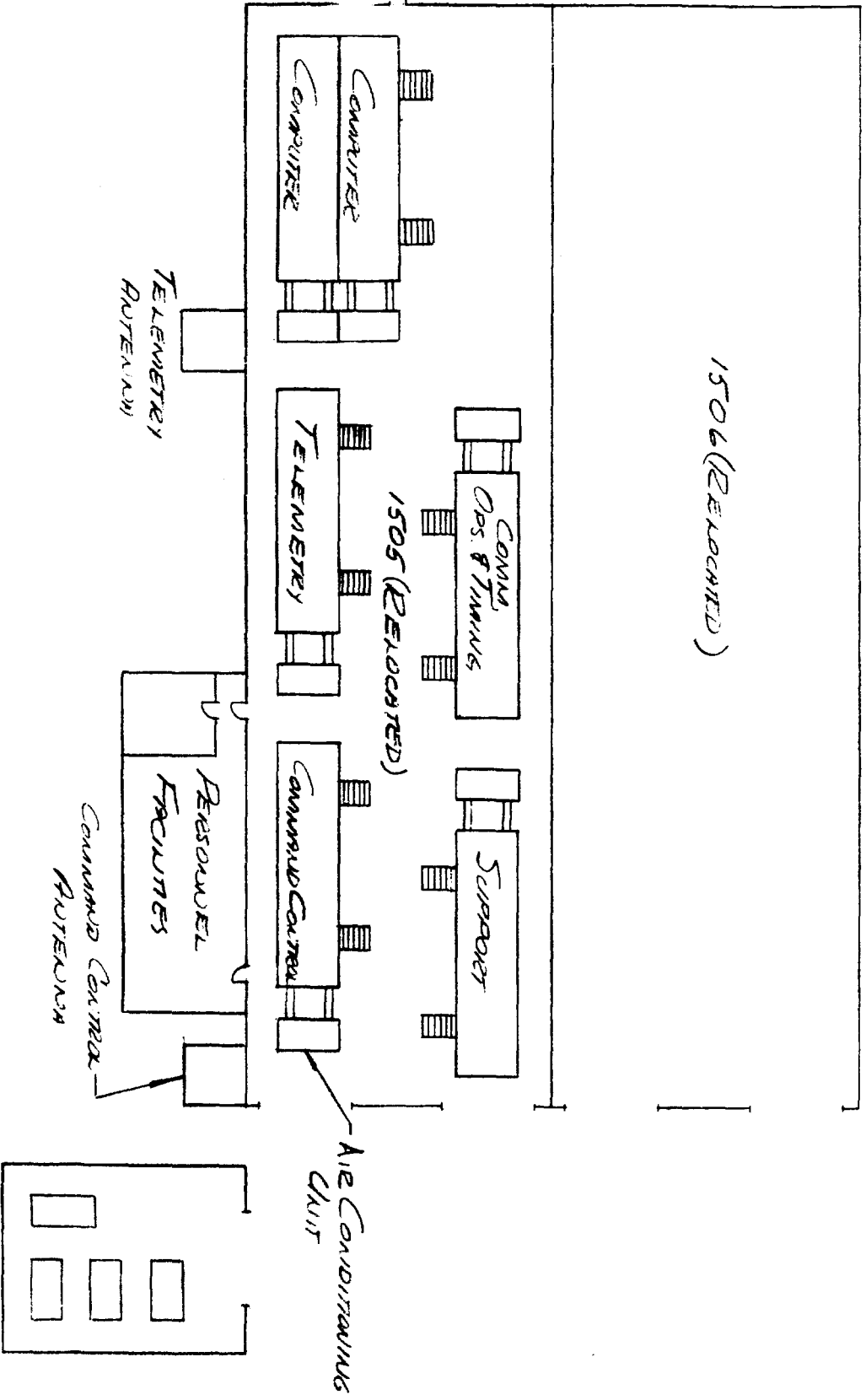


FIGURE 5. PROPOSED LAYOUT
ENVIETOK INSTRUMENTATION COMPLEX

SCALE - 3/8" = 10'

7.0 Future Instrumentation and Facilities For The Eniwetok Atoll

7.1 The following is a brief summary of the instrumentation and facilities which are programmed for the Eniwetok Atoll in the NRD Range Package Plan (RPP).

7.2 FY-66 Instrumentation

The instrumentation which is programmed in NRD RPP for the Eniwetok Atoll in FY-66 are the installation of the Meteorological Sounding Rocket Facility and the conversion of the GMD-1B to a GMD-4, as discussed in paragraph 6.2. In addition, the Shallow Water Impact Location System is programmed for FY 66.

7.3 FY-67 Instrumentation

The instrumentation which is programmed in the NRD RPP for the Eniwetok Atoll in FY-67 are the procurement of a Multiple Target Conversion Radar and an Ionospheric Sounder. The Multiple Target Conversion Radar would have provided a limited multiple tracking capability. However, it appears that the Re-entry System Evaluation Radar (RESER) may be installed at Eniwetok and will fulfill this requirement. Therefore, the Multiple Target Conversion Radar will not be required if the RESER is installed at Eniwetok.

7.4 FY 68 Instrumentation

The instrumentation which is programmed in the NRD RPP for the Eniwetok Atoll in FY-68 is the procurement of an Opto-Radiometer Complex. This system will be used to obtain opto-radiometric re-entry data on R/V's impacting in the Eniwetok area.

7.5 FY-69 Instrumentation

The instrumentation which is programmed in the NRD RPP for the

down-range stations in FY-69 are an Advanced Trajectory Measurement System and mobile telemetry. The Advanced Trajectory Measurement System is programmed from FY-69 thru FY-71 for the Mid-Pacific and the down-range mobile telemetry from FY-69 thru FY-70 for Down-range Stations.

7.6 Future Support Facilities

Future support facilities for the Eniwetok Atoll are programmed in the current Military Construction Program (MCP) for funding from FY 67 thru FY 70. The following MCP items were submitted by the AFWTR for Eniwetok; an Airmen Dormitory, Airmen Dining Hall, Water Storage Tank, Dispensary, Administrative Office, Officers Quarters, and a Deep Water Cargo Pier. The Deep Water Cargo Pier would have been for the Eniwetok Island. A summary of the current MCP items are shown in figure 6.

Figure 6

Future Support Facilities For Eniwetok Atoll In Military Construction Program

Facility	Hq. AFSC Approval	Capacity	Cost Estimate	FY Funding	BOD
Airmen Dormitory	Yes	250 men	\$962,000	67	July 1967
Airmen Dining Hall	Yes	Seating 160 People	\$550,000	68	July 1968
Water Storage Tank	Yes	84,000 Gal	\$45,000	68	
Dispensary	Yes	6 Beds	\$398,000	69	July 1969
Administrative Office	Yes	60 People	\$307,000	69	July 1969
Officer Quarters	Yes	48 People	\$712,000	70	July 1970
Cargo Pier	No	Berth ships up to 17,000 Tons	\$800,000		

8. Recommendations

a. Although this instrumentation complex will initially support the Class I requirements for the Advanced Minuteman Program, this complex should have the basic capability to support other programs. Once a capability exists at Eniwetok, other programs would like to utilize this terminal instrumentation complex shortly after it becomes operational. These systems should have more than a marginal capability when economically feasible, in order to reduce the major modifications to or replacement of these systems for future programs. These modifications and replacements would be very costly at Eniwetok, if done on a continual basis.

It must be clearly understood that an AN/TPQ-18 Radar is required to meet the Class I requirements of the Advanced Minuteman Program.

b. Section 7 shows those items which were included in the NRD RPP and the current Military Construction Program (MCP). As a result of this instrumentation complex, reprogramming of these funds may be required to meet future program requirements. Some of the items in the MCP may be required sooner than when they are currently programmed.

In addition to the items in Section 7, funds for telemetry at Kokee Park were programmed for FY 68 thru FY 70. These funds could be reprogrammed for future improvements to the instrumentation complex.

c. In the planning and site selection for this instrumentation complex, the installation of the Re-entry System Evaluation Radar

(RESER) must be considered. Once the site selection of the RESER is established, it should be forwarded to NRD as the recommended WTR site location for the RESER.

Appendix C

unds to other purposes), the Range Management Service shall be responsible for arranging for resources, including funds, to support approved range requirements when funds are available to the Range Management Service.

c. Range liability for replacing range instrumentation, facilities and equipment lost by accident or disaster incident to range operations shall be the responsibility of the Range Management Service. Similarly, repair or replacement of ground support equipment shall be the responsibility of the agency having property accountability for such equipment at the time of loss. In the event of substantial losses which cannot be corrected by revised planning or re-allocation of available resources by the responsible agencies, the specific problem shall be outlined and submitted to the Secretary of Defense for consideration via established administrative channels.

d. In the event that the cognizant management agency (program or range) cannot provide resources, including funds, for approved program or range requirements resulting from program changes within the above guidance, the specific problem shall be brought to the attention of the Secretary of Defense via regular departmental channels.

Programs will be planned on the basis that there will be no reimbursement for range services to support the valid range requirements activities by air force users. Except as otherwise specified herein, these range services include:

a. Operation and maintenance of range instrumentation as defined by reference (d).

b. Reduction of data collected by range instrumentation (reduction of data collected by other instrumentation may be provided without reimbursement, as range data reduction facilities permit, on a non-reimbursable basis).

c. Photographic services. (At the discretion of the range commander, reproduction may be required for reproduction of excessive quantities of documentary type photographs. The provisions of reference (d) are applicable).

d. Recovery services to accomplish location and retrieval of ejectable components, re-entry vehicles and instrumentation packages.

e. Ground safety and flight safety services.

f. Meteorological services.

g. Communications services. (At the discretion of the range commander, additional personnel circuits required for administrative purposes may be provided, on a reimbursable basis. The provisions of reference (d) are applicable).

h. Transportation services, other than by MARS and MSTS, between the Range Command and other stations, if available.

2. The user shall be responsible for all facilities (except when provided by the Government in accordance with a special agreement).

(c) Base support services of a military installation.

3. Utilities, including electrical power and other similar services which may be provided by the range user in accordance with a special agreement).

4. Tertiary and secondary standards and calibration services, as available at the range.

5. Other government services or facilities which are needed in connection with range operations and which are mutually arranged through special agreements.

The following additional guidance is provided:

a. Exercise costs of range operations scheduled at the convenience of a range user shall be subject to reimbursement by the range user.

b. The range user shall normally operate and maintain ground support equipment as defined by reference (d).

c. Arrangements for target services shall be made by the range user in accordance with separate agreements covering such target services between the departmental agencies involved.

/s/Rosell L. Gilchrist
Deputy