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STANDARD ENGINEERING INSTALLATION PACKAGE, TERMINAL VHF OMNIDIR--ETC(U)
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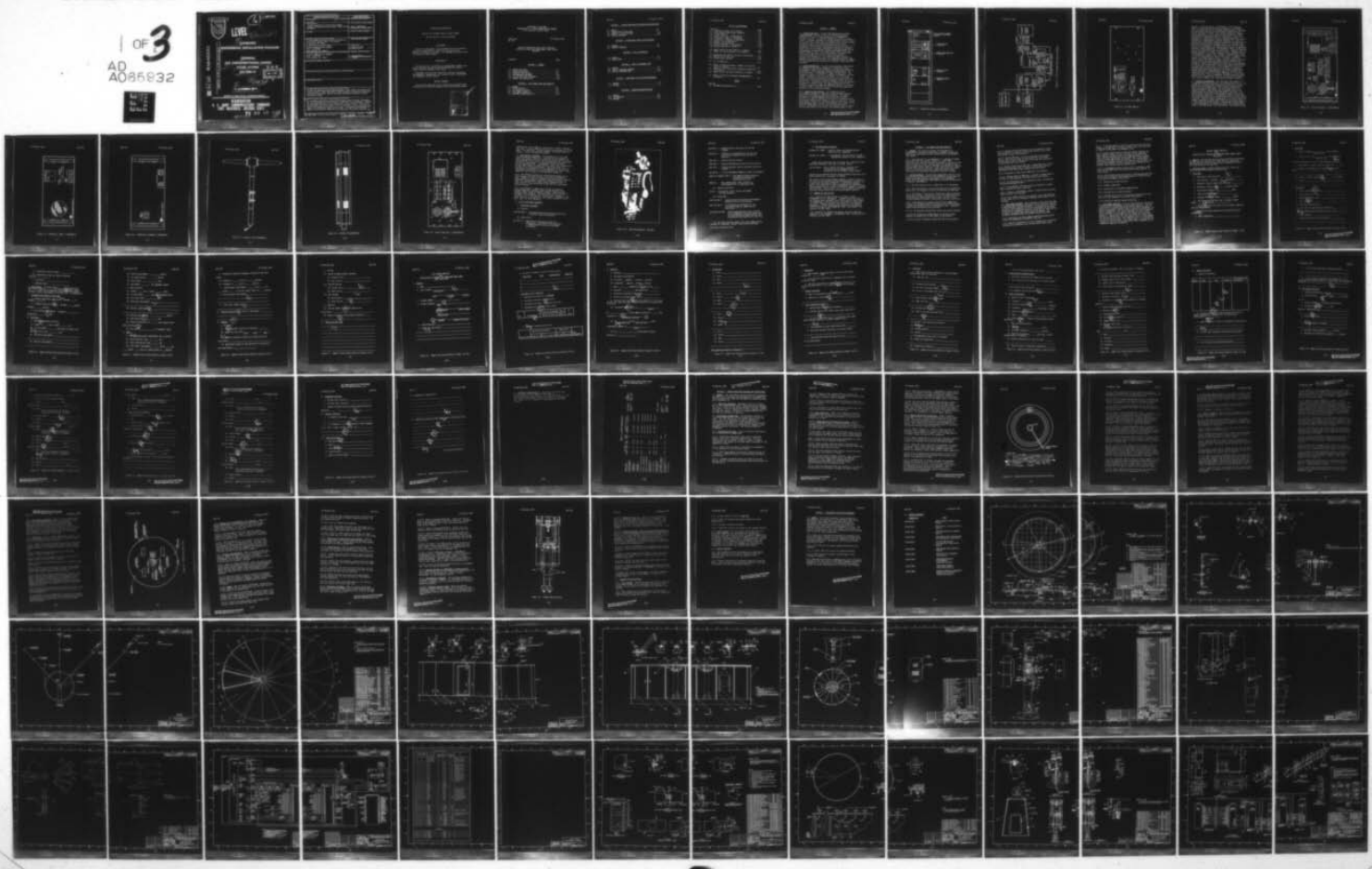

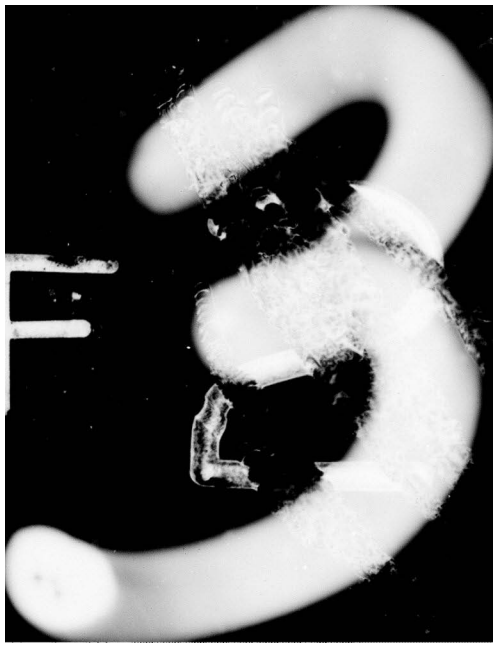

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STANDARD ENGINEERING INSTALLATION PACKAGE

TERMINAL VHF OMNIDIRECTIONAL RANGE (TVOR) SYSTEM AN/FRN-41

VOICE OF THE ARMY

150p.

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HEADQUARTERS
U. S. ARMY COMMUNICATIONS COMMAND
FORT HUACHUCA, ARIZONA 85613

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This Standard Engineering Installation Package (SEIP) provides information for the engineering and installation of TVOR facilities worldwide. Information provided consists of site survey data, siting criteria, installation specifications and instructions, a bill of materials, quality assurance procedures and completion certification format. Information provided must be adapted to the specific TVOR facility/location by the project engineer.

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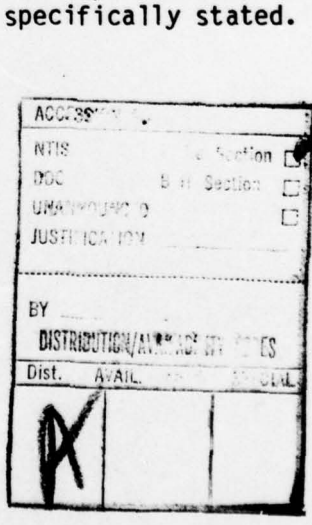
NEUTRAL LANGUAGE

The word "he" when used in this publication represents both the masculine and feminine genders, unless specifically stated.



DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY COMMUNICATIONS COMMAND
Fort Huachuca, Arizona 85613

USACC SEIP
No. 012

16 February 1979

Standard Engineering Installation Package
TERMINAL VHF OMNIDIRECTIONAL RANGE (TVOR) SYSTEM
AN/FRN-41

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SECTION 1. GENERAL

1.1 PURPOSE AND SCOPE. Terminal VHF Omnidirectional Range (TVOR) equipment is used at Army Airfields/Army Heliports (AAF/AHP) to provide a radio navigational aid (NAVAID) to enrouted aircraft. A transmitted composite signal whose phase differs in azimuth, provides an infinite number of course radials which enable the aircraft crew to determine their course relative to magnetic north. The TVOR system also provides voice transmission and automatic identification of the facility. It is the purpose of this standard engineering installation package (SEIP) to provide guidance and standard engineering data for the development of an engineering installation package (EIP) for a specific TVOR facility. This SEIP provides site survey data, installation specifications and instructions, typical installation drawings, a bill of materials (BOM), quality assurance (QA) procedures, test and acceptance procedures, and completion certification format. The information will be adapted for the engineering and installation of specific TVOR facilities worldwide.

1.2 SYSTEM DESCRIPTION. The solid state AN/FRN-41 TVOR system is comprised of four basic components: Transmitter Group, OT-117/FRN-41 (electronics assembly), Detector, Radio Frequency, DT-603/FRN-41 (field detector), Antenna, AS-3323/FRN-41, and Control-Indicator, C-10526/FRN-41 (remote control unit). The transmitter group is installed in Shelter, S-597/FRN-41, and the antenna is mounted on the flat roof housed in a fiber glass radome. The roof of the shelter serves as the counterpoise for the antenna with the field detectors mounted on the rim of the shelter roof. Transmitter Group, OT-117/FRN-41 units are modular and mount in a 19-inch rack. All units associated with the electronics assembly, except the TVOR power monitor, are mounted on drawer slides. Each unit has built-in test and calibration features and a self-contained supply.

1.2.1 Functional description. The Transmitter Group, OT-117/FRN-41, figure 1-1, operates in the frequency range of 108-118 MHz with channels spaced every 50 kHz. The course information is omnidirectional and provides the aircraft a bearing to or from the TVOR facility relative to magnetic north. A functional system block diagram is shown in figure 1-2. The RF power monitor, figure 1-3, is a panel-mounted unit located at the top of Equipment Rack, MT-6011, and contains three power sensors. The purpose of this unit is to measure both the forward and reflected power of the carrier and sidebands going to the

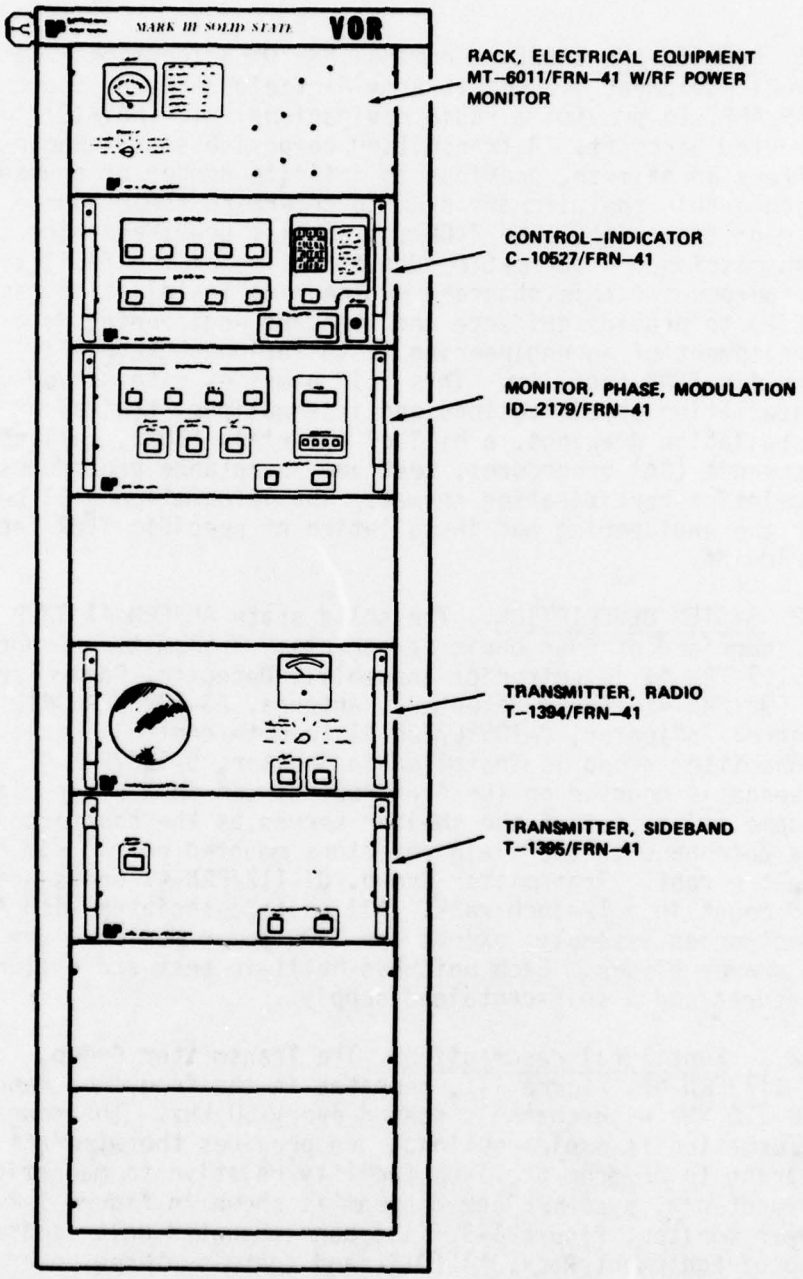


Figure 1-1. Transmitter Group, OT-117/FRN-41.

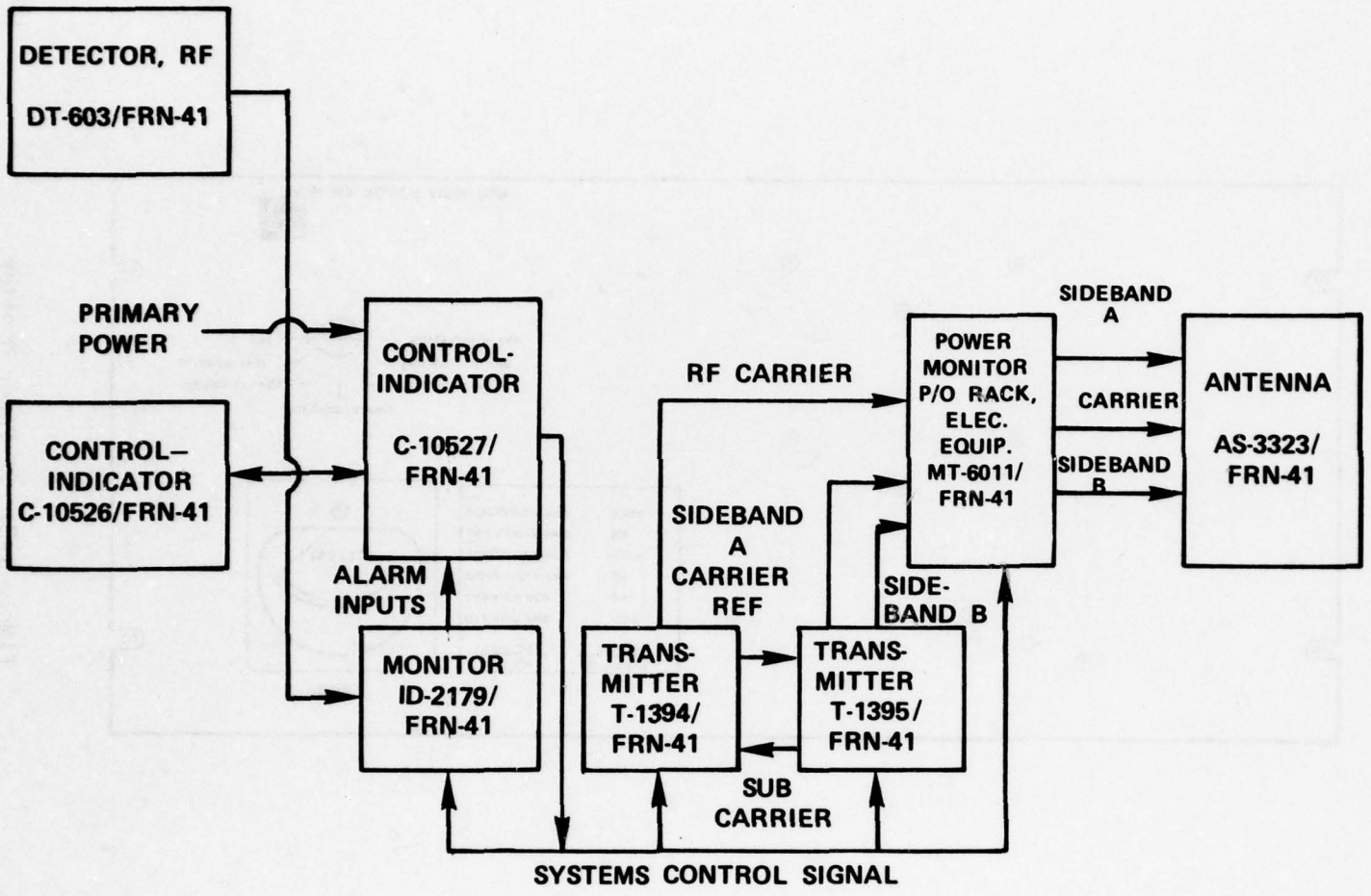


Figure 1-2. Block Diagram TVOR System, AN/FRN-41.

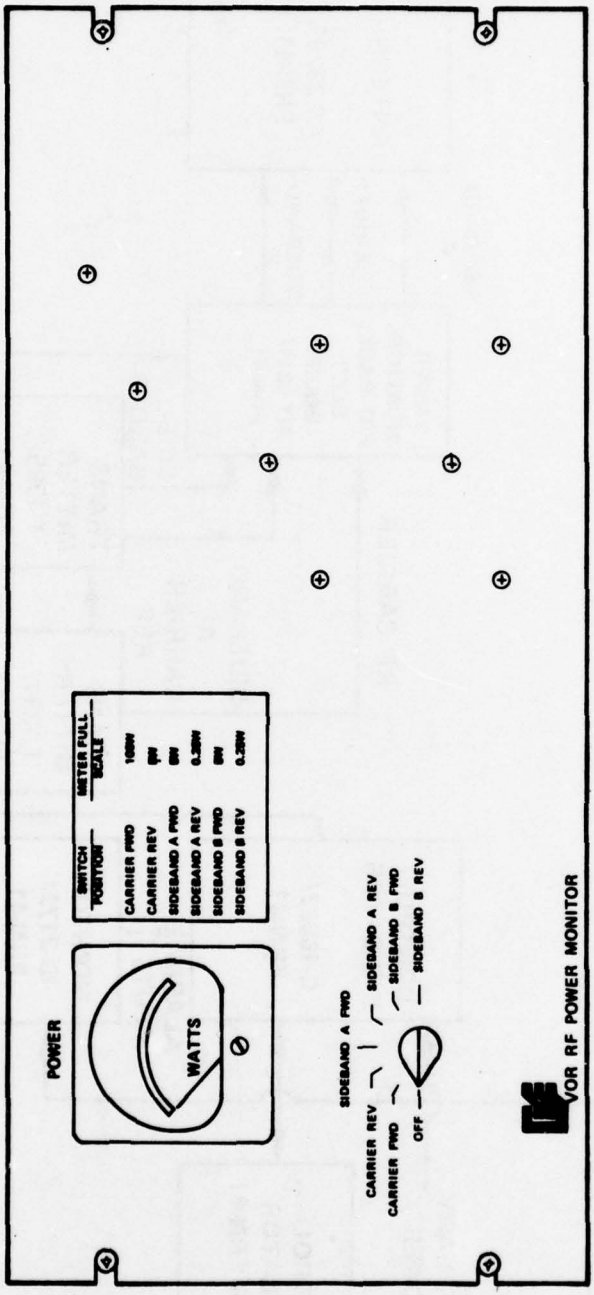


Figure 1-3. RF Power Monitor.

antenna. Control-Indicator, C-10527/FRN-41 (local control), figure 1-4, provides the interface and controls for complete local and remote control of all TVOR system functions. All power for the various units of the TVOR system is applied through Control-Indicator, C-10527. Also, alarm information, transfer and shutdown action is evaluated and controlled by this unit. Transmitter, T-1394/FRN-41 (carrier transmitter), figure 1-5, generates the carrier signal for the composite TVOR signal while Transmitter, T-1395/FRN-41 (sideband transmitter), figure 1-6, replaces the conventional mechanical goniometer and generates two suppressed carrier double sideband signals. The system's four most critical parameters: the 9960 Hz reference, 30 Hz variable signals, and the bearing and identification signals are monitored by Monitor, Phase Modulation, ID-2179/FRN-41. When a malfunction occurs, the ID-2179 initiates an alarm signal. However, when all system parameters are within tolerance, this is indicated by the illumination of a green light. Detector, DT-603/FRN-41, figure 1-7, continuously monitors the radiated signal. A sample of the signal, at a predetermined radial, is fed back to Monitor, ID-2179, where the reference signal, variable signal, modulation levels, bearing accuracy, and identification parameters are evaluated. Antenna, AS-3323/FRN-41, figure 1-8, is a stationary cylindrical slot antenna that radiates two figure-eight patterns at right angles to each other. The two patterns are fed with sidebands that are modulated and this results in a rotating figure-eight pattern that generates the rotating TVOR pattern. Control-Indicator, C-10526/FRN-41, figure 1-9, provides the interfacing and controls for remote operation of all the TVOR system functions. Control-Indicator, C-10526, permits the TVOR facility to be unmanned and remotely controlled via telephone lines using a 2-digit code to activate the command functions.

1.3 TECHNICAL DESCRIPTION. The input power requirements for Transmitter Group, OT-117/FRN-41, is 210-260 Vrms, 47-63 Hz. The assembly has a normal power consumption of 600 watts; however, operational requirements may cause this power consumption to reach a maximum of 1200 watts. The system operates in the frequency range of 108-118 MHz with a frequency stability of 0.002 percent and effective radiated power of 50 watts. The system azimuth and ground check azimuth accuracy are $\pm$2.0 and $\pm$0.75 degrees respectively. The AN/FRN-41 TVOR is an amplitude modulated system that has a maximum modulation distortion rate of 1 percent. Carrier harmonic suppression is -60 dB and subcarrier harmonic suppression ranges from -30 dB for the second harmonic to -60 dB for the fourth harmonic. The maximum sideband power is 5 watts (adjustable) and Antenna, AS-3323, can be continuously tuned to any TVOR channel from 108-118 MHz. The antenna voltage

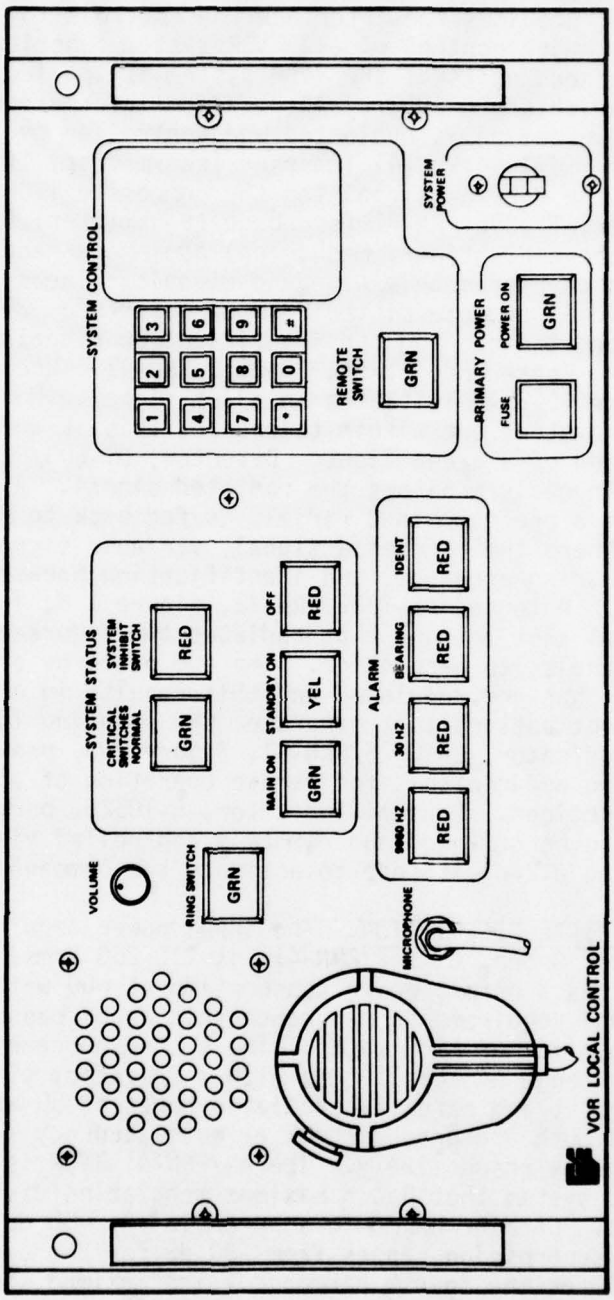


Figure 1-4. Control-Indicator, C-10527/FRN-41.

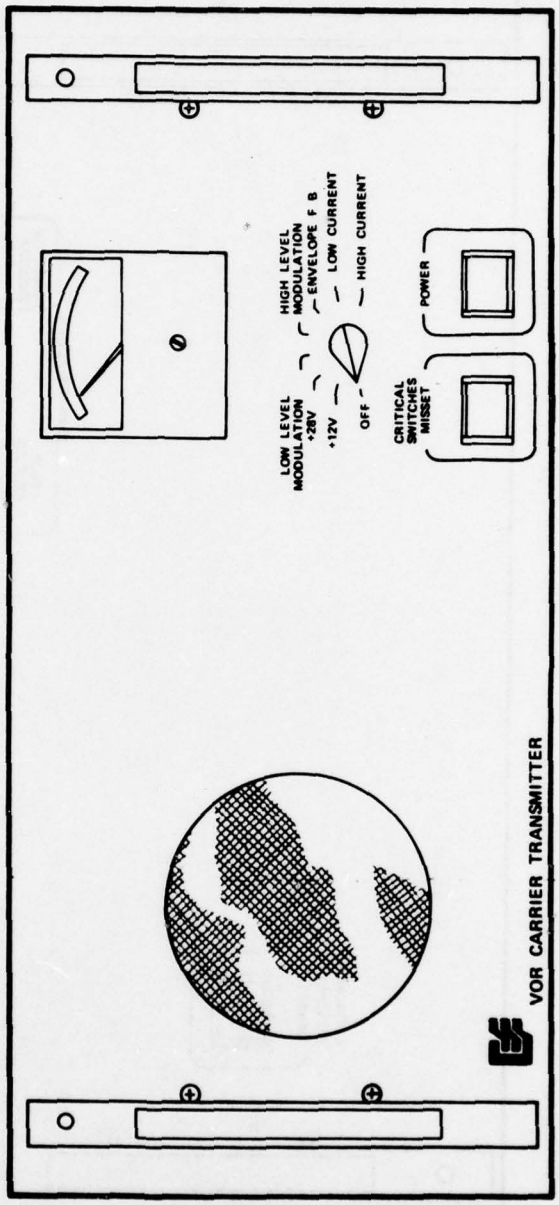


Figure 1-5. Transmitter, Radio, T-1394/FRN-41.

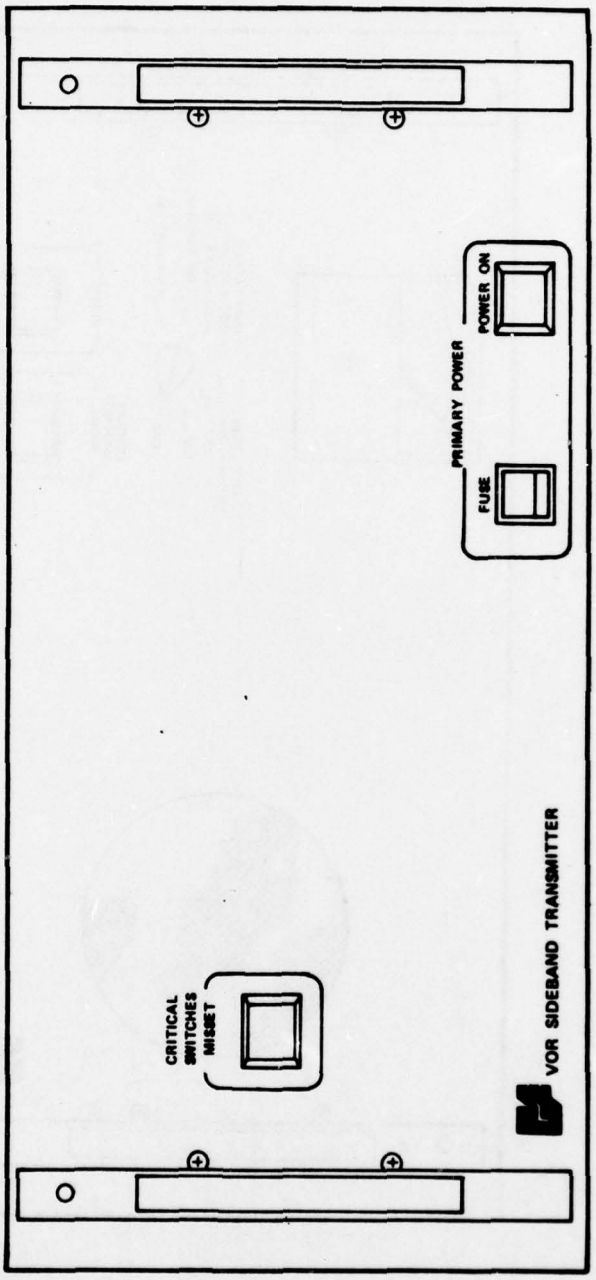


Figure 1-6. Transmitter, Sideband, T-1395/FRN-41.

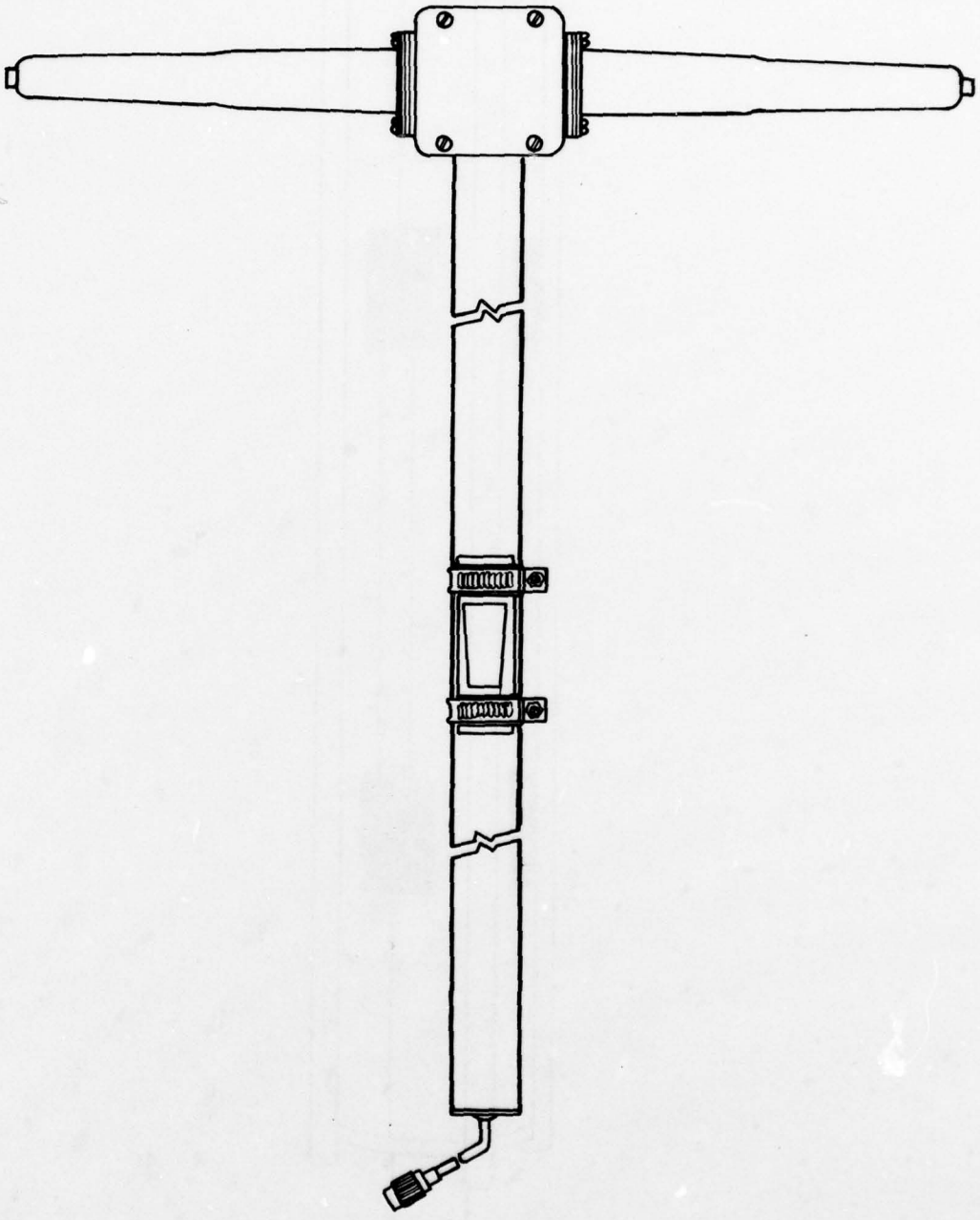


Figure 1-7. Detector, RF, DT-603/FRN-41.

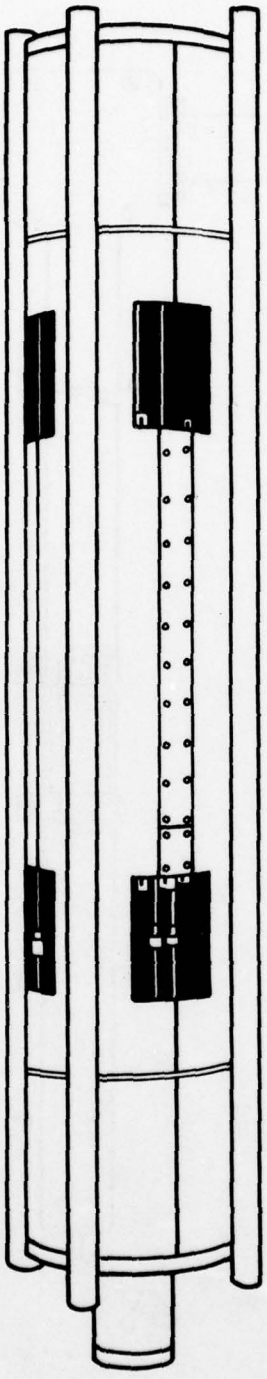


Figure 1-8. Antenna, AS-3323/FRN-41.

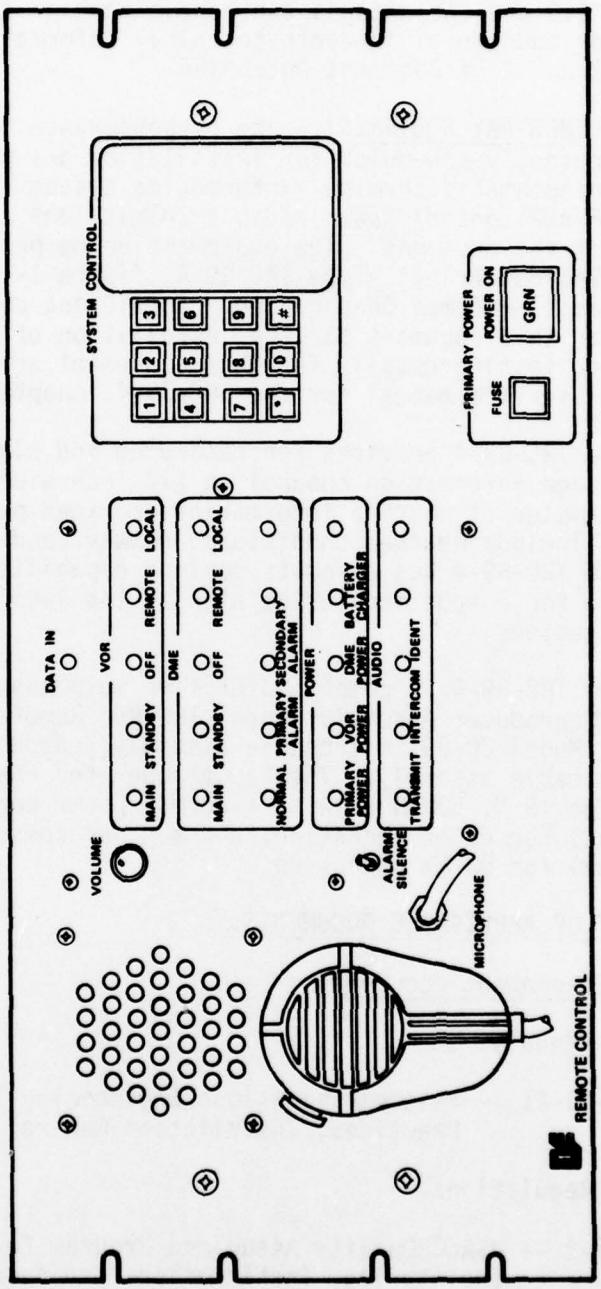


Figure 1-9. Control-Indicator, C-10526/FRN-41.

standing wave ratio (VSWR) for the carrier or either sideband is less than 1.1 and the antenna can handle carrier powers up to 200 watts. For additional in-depth technical information refer to chapters 1 and 4 of Document No. CM106.

1.4 SUPPLEMENTARY EQUIPMENT. The preponderance of the TVOR systems presently scheduled for installation are programed to receive an automatic terminal information system (ATIS) to tape record AAF/AHP control tower radio transmissions and repetitively rebroadcast the messages. The equipment being provided is Recorder-Reproducer Set, Type TRC-89-4, figure 1-10, manufactured by the Stancil-Hoffman Corporation. Sufficient detail is provided in this document for the installation of the TRC-89-4. Performance testing details for this equipment are found in the commercial service manual for the TRC-89-4, chapter 5.

1.4.1 The TRC-89-4 provides for recording and playback of an audio message information channel on 1/4-inch wide magnetic tape. Examples of routine information provided pilots using this equipment include weather conditions, runway conditions, and time. The TRC-89-4 has a remote control capability with provisions for output monitoring at both the local and remote control stations.

1.4.2 The TRC-89-4 is comprised of five main assemblies: Recorder/Reproducer Assembly, Model TRC-89; Remote Control Assembly, Model CU-89; microphone assembly; cassette assembly; and power cable assembly. The input power for the ATIS is 115/230 Vac +5 V, 50/60 Hz with a normal power consumption of 40 watts (max) for 60 Hz operation, and a power consumption of 60 watts (max) for 50 Hz operation.

1.5 LIST OF APPLICABLE DOCUMENTS.

a. Government documents.

(1) Manuals.

CCTM 105-50-21 -- Telecommunications Engineering-Installation Practices, Installation General.

(2) Regulations.

CCR 702-1-2 -- USACC Quality Assurance Program for Engineering, Installation, and Acceptance of Communications Electronics Equipment and Systems.

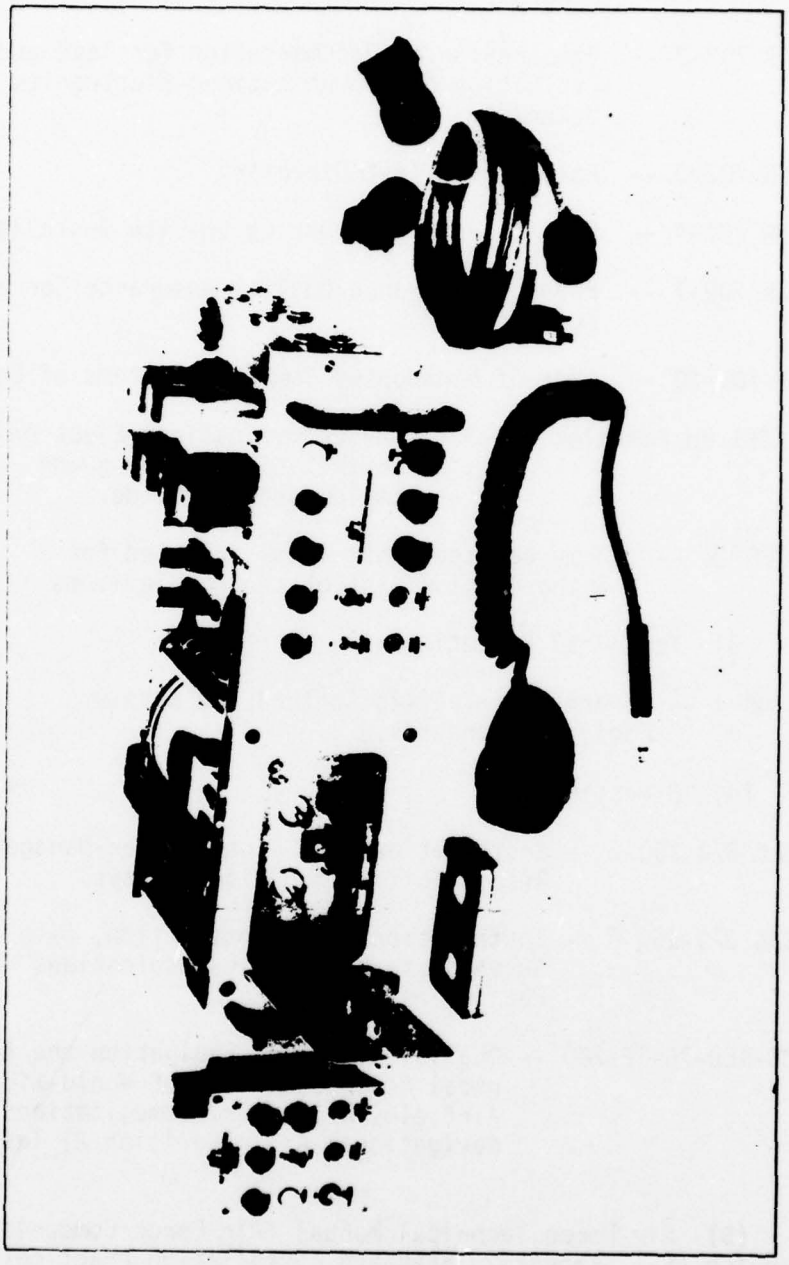


Figure 1-10. Recorder-Reproducer, TRC-89-4.

CCCR 702-1 -- USACEEIA Quality Assurance and Testing Program.

CCCR 702-2 -- Preparation of Documentation for Test and Evaluation of Communications-Electronics Materiel.

CCCR 702-3 -- Role of the Test Director

CCCR 702-4 -- Quality Assurance During On-Site Installation.

CCCR 702-7 -- Product Assurance Quality Assurance Corrective Actions

CCP 700-20 -- List of Nonadopted Commercial Items of Equipment.

USACEI Bn Pamphlet 105-3 -- The Communications-Electronics Installation Planning and Implementation Guide.

SB700-20 -- Army adopted/other items selected for authorization/list of reportable items

(3) Technical Bulletins.

TB 95-1 -- US Army Air Traffic Control and NAVAID Facility Standards.

(4) Directives.

DCAC 370-160-2 -- Installations and Construction-Management Responsibility for Site Surveys.

DCAC 370-160-3 -- Installations and Construction, Site Survey Data Book for Communications Facilities.

CCC-TED-75-TP-200 -- Quality Assurance Evaluation and Technical Acceptance Test of World-Wide Army Airfields/Heliports Communications and Navigational Aids (Revision 2) Test Plan.

(5) Air Force Technical Manual (Air Force Communications Service (E-1 Standard), Standard Installation Practices).

TO 31-10-2 through 31-10-29

b. Non-Government documents.

Document No. CM106 -- Technical Manual for VOR Navigational System Part No. 136060-100.

Document No. CM016-1 -- Supplementary Technical Manual for VOR Navigational System Part No. 136060-100.

(Copies may be obtained from E-Systems Inc., Montek Division, 2268 South 3270 West, Salt Lake City, Utah 84119)

Service Manual-- Service Manual and Circuit Diagrams with Illustrated Part Breakdown Recorder-Reproducer Part No. 10-003-4, Type TRC-89-4.

(Copies can be obtained from The Stancil-Hoffman Corporation, 921 North Highland Ave., Hollywood, CA 90038)

Two copies of each non-Government document or manual listed in this section are provided with Recorder-Reproducer, TRC-89-4 and Transmitting Set, Radio, AN/FRN-41. A government technical manual, TM 11-5825-266-14, Radio Transmitting Set (AN/FRN-41) is being prepared and will replace the AN/FRN-41 commercial document when available. Additionally, all Air Force technical orders are available through normal publication procurement channels.

1.6 COMMENTS ON PUBLICATION.

1.6.1 Users of this publication are invited to submit recommendations for improvement. Comments should be keyed to the drawing, page, paragraph, and line of the text where change is recommended. A mailing card for convenience is bound with this SEIP. Comments should be sent directly to the Commander, Headquarters, US Army Communications-Electronics Engineering Installation Agency, (HQ, USACEEIA), ATTN: CCC-CED-SEP, Fort Huachuca, Arizona 85613.

1.6.2 Requests for USACEEIA regulations and forms should be addressed to the Commander, HQ, USACEEIA, ATTN: CCC-SPT-RM, Fort Huachuca, Arizona 85613.

SECTION 2. SITE SURVEY DATA AND CHECKLIST

2.1 GENERAL. This section provides the information to accomplish the preliminary engineering, equipment layout, and site surveys associated with the installation of the AN/FRN-41 TVOR system.

2.1.1 Site selection for the AN/FRN-41 is a compromise between ideal conditions and practical necessity. Under ideal conditions, the installation would be located on flat terrain and devoid of metallic fences, overhead power and telephone lines, heavily wooded areas, hangars, and other obstructions for several thousand feet from the facility. Since ideal sites are seldom found in areas where operational conditions require these facilities to be installed, a practical criteria is needed.

2.2 SITING CRITERIA. The following requirements are the siting criteria for the installation of the AN/FRN-41 and pertinent to obtaining optimum technical performance of the equipments. Unless otherwise specified, measurements are made from the center of Shelter, S-597/FRN-41.

2.2.1 The land should be flat to 3000 feet in all directions.

2.2.2 There should be no rise to the ground the first 200 feet; beyond this, no downgrade in excess of 4 percent to 1000 feet.

2.2.3 The contour of the terrain should be as even as possible around the facility. Undulations in the first 1000 feet should not exceed the average grade by more than 1 percent of the distance between the center of the shelter and such undulations.

2.2.4 There should be no object within the first 3000 feet; however, the maximum height of any object within 3000 feet must be below the horizontal plane of the shelter roof. Compromises within these limitations are as follows:

2.2.4.1 No structure elevated more than 5 feet within 750 feet.

2.2.4.2 No structure to extend above a 2^{o} vertical angle measured at ground level at the center of the shelter.

2.2.4.3 No aerial conductors within 750 feet of the shelter.

2.2.4.4 Between 750 and 1200 feet, no aerial conductors unless they continue on a straight line from the shelter on one radial and undulate no more than necessary.

2.2.4.5 Beyond 2000 feet, no aerial conductors should extend above a 1.5° vertical angle, or extend more than 0.5° above the horizontal plane of the shelter roof unless they continue on a line within ±5° of one radial.

2.2.5 No wire fences within 500 feet. Beyond 500 feet, no wire fences extending more than 0.5° above the horizontal plane of the shelter roof unless they continue along one radial.

2.2.6 No groves of trees within 1000 feet of the shelter.

2.2.6.1 Between 1000 and 2000 feet, no groves to extend above a 2° vertical angle measured at ground level at the shelter.

2.2.6.2 An occasional tree not exceeding 35 feet in height may be tolerated beyond 750 feet.

2.2.7 At the AAF/AHP, buildings should be located on a radial that is parallel to their long side.

2.2.7.1 Shelter, S-597/FRN-41, should be located away from areas where aircraft stand and park.

2.2.7.2 The shelter should not be located closer than 400 feet to the center line of a runway or 200 feet to the center line of taxiways.

2.3 SITE SURVEY CRITERIA. When selecting a site, the first step is to make a preliminary field survey or site survey as required by DCAC 370-160-2 and DCAC 370-160-3. The survey should include an actual field inspection of the entire prospective site area noting general topographic features, accessibility, availability of power, and obstructions which cannot be removed. The following information must be obtained during the survey:

2.3.1 Coordinates and other adequate identifying means which furnish the geographical location of the site.

2.3.2 Data for preparation of a site drawing shall include the following three sketches and a horizon profile polar plot:

2.3.2.1 A location sketch to show the location of the site with respect to any AAF/AHP, air base, or town in the vicinity as well as adjacent roads, power and telephone lines.

2.3.2.2 A plot layout sketch to show the natural features and other important details of the site such as plot dimensions, trees, fences, drainage ditches, existing buildings, utility lines, and other obstructions within 2000 feet of the proposed location of the TVOR shelter and antenna. This sketch should also show the proposed location of the access road and power line terminal pole together with the routing of the underground and overhead lines running from the terminal pole.

2.3.2.3 A topographic sketch of the area out a minimum of 1000 feet from the TVOR shelter and antenna which shows contours at 1-foot levels.

2.3.2.4 The horizon profile polar plot to show how mountains and hills affect coverage at the minimum approach altitudes and out to the service volume of the facility.

2.3.3 Direction of prevailing wind.

2.3.4 Climatic conditions.

2.3.5 Availability of telephone communications.

2.3.6 Availability of electrical power.

2.3.7 Availability of civil fire and police protection if the facility is not located on a military installation.

2.3.8 Protection required against vandalism.

2.4 SITE SURVEY CHECKLIST. Prior to conducting the site survey, a checklist will be prepared by the project engineer. The site survey checklist establishes guidelines for the survey team to ensure all pertinent technical data is identified, assembled, and properly documented. The survey team must also have a complete set of drawings to assist them in the conduct of the survey. Figures 2-1 and 2-2 are sample presite survey and site survey checklists, respectively, for the installation of a TVOR system. The site survey checklist, when completed, will aid in preparing the official survey report. The survey report is required as an inclosure to the site concurrence letter (SCL) forwarded to the responsible agencies for approval.

PRESITE SURVEY CHECKLIST
FOR
INSTALLATION OF TERMINAL VHF OMNIDIRECTIONAL RANGE (TVOR)
FACILITIES

1. General. This presite survey is being conducted to determine the most suitable location for a TVOR facility. Worksheets provided by the site survey team contain supplementary data for the installation of this facility.

2. Facility layout. Provide proposed facility layout with specifications and equipment characteristics.

3. Site data.

a. Site name or identification: _____.

b. Site location: Latitude: _____ Longitude: _____.

c. Azimuth of control tower from true north: _____.

d. Distance to control tower: _____ nautical miles.

e. Anticipated frequency: _____ MHz.

f. Type of emission (symbol): _____.

g. Proposed transmitter power: _____ watts.

h. The horizon profile polar plot is shown on sheet number _____ of drawing _____.

i. Obstruction points and other critical points requiring detailed investigation.

j. Accuracy to which elevations and locations must be determined.

k. Other information: _____.

Figure 2-1. Sample Presite Survey Checklist (sheet 1 of 6).

4. Surveying.

a. Baseline azimuth: _____ order required.
(1st, 2d, 3d)

b. Length of base line: _____ order required.
(1st, 2d, 3d)

(3d order accuracy for a and b unless otherwise specified).

c. Site marker elevation accuracy required is: ± ____ft.

d. Amount of topographic data required from survey team: _____

_____.

e. Contour interval required _____ ft minimum.

f. Other: _____

_____.

5. Isolation.

a. Other transmitter stations: _____.

b. Radio receiver stations: _____.

c. Ammunition storage area: _____.

d. POL storage area: _____.

e. Airfields and glide paths:

(1) For general communication transmitting: _____.

(2) For aeronautical transmitting at air field: _____.

f. Main highways: _____.

g. High-tension power lines (overhead): _____

_____.

Figure 2-1. Sample Presite Survey Checklist (sheet 2 of 5).

(1) Transmitter station feeders: _____.

(2) Transmission lines and large transformer stations: _____.

h. Railroads: _____.

i. Shipping lanes: _____.

6. Real estate. A minimum area of _____ acres having an approximate width of _____ feet and an approximate length of _____ feet will be required to accommodate the proposed facility. Define requirements by drawings, etc., as appropriate.

7. Equipment environmental conditions.

a. Allowable operating temperature: Maximum: ____° F. Minimum: _____° F.

b. Allowable operating humidity: Maximum: _____percent. Minimum: _____percent.

c. RF shielding requirements: Frequency: _____. Attenuation: _____dB.

8. Buildings.

a. Electronic equipment building:

(1) Length: _____ feet x width: _____ ft.

(2) Ceiling height: _____ feet above finished floor.

(3) Live floor load: _____ psf.

(4) Shielding requirements: _____

_____.

(5) Acoustic requirements:_____

_____.

Figure 2-1. Sample Presite Survey Checklist (sheet 3 of 6).

(6) Heating requirement: _____ Btu/hr.

(7) Air-conditioning: _____ Btu/hr.

(8) Ventilating: _____ cfm.

(9) See sketch _____ for equipment layout.

b. Power building.

(1) Length: _____ feet x width: _____ feet.

(2) Ceiling height: _____ feet above finished floor.

(3) Live floor load: _____ psf.

(4) Shielding requirements: _____

_____.

(5) Acoustic requirements: _____

_____.

(6) Heating requirements: _____ Btu/hr.

(7) Ventilating: _____ cfm.

(8) Physical separation of _____ feet required from other buildings.

(9) See sketch _____ for equipment layout.

9. Power.

a. The anticipated power requirements are as follows:

(1) Total technical load: _____ kW.

(2) Total nontechnical load: _____ kW.

(3) Total power requirements: _____ kW at _____ Hz, _____ phase, _____ volts at a power factor of ___ percent.

Figure 2-1. Sample Presite Survey Checklist (sheet 4 of 6).

b. Allowable voltage and frequency deviations from rated values:

(1) Voltage: ± _____ volts or ± _____ percent.

(2) Frequency: ± _____ Hz or ± _____ percent.

c. Standby power requirements: _____ Kw at _____ Hz, _____ phase, _____ volts at a power factor of _____ percent.

d. No-break power requirements: _____

_____

_____.

e. Local power company contact: _____

_____

10. Physical security. List special requirements: _____

_____

_____.

11. Support.

a. Personnel.

(1) Total personnel required for operation: _____.

(2) Number for each shift: _____ (1st) _____ (2d) _____ (3d).

(3) Number of personnel required for construction and installation: _____.

(4) Approximate length of time required for construction and installation: _____

Figure 2-1. Sample Presite Survey Checklist (sheet 5 of 6)

b. Storage.

(1) Inside storage (heated, secured):

(a) Binned (sq ft): _____.

(b) Bulk (sq ft): _____.

(2) Outside storage:

(a) Closed (sq ft): _____.

(b) Open (sq ft): _____.

(3) POL storage:

(a) Bulk (gals): _____.

(b) Drum (sq ft): _____.

c. Vehicles.

(1) Type and number of vehicles required for installation: _____.

(2) Special cranes or hoists required (specify): ___

_____.

12. Other pertinent data.

_____

_____

_____

_____

_____

_____

_____

_____

Figure 2-1. Sample Presite Survey Checklist (sheet 6 of 6).

SITE SURVEY CHECKLIST
FOR
INSTALLATION OF TERMINAL VHF OMNIDIRECTIONAL RANGE
(TVOR) FACILITIES

1. General.

a. Date: _____.

b. Site location: _____.
Installation

_____.
City State Country

c. Project number: _____.

d. Project engineer: _____.
Name

_____.
Organization Office symbol

_____.
Installation

_____.
AUTOVON Commercial Tel No.

e. Classification: _____.

f. Brief task description: _____

_____

_____

_____.

Figure 2-2. Sample Site Survey Checklist (sheet 1 of 15).

g. Personnel contacted or present during survey:

	Name/Grade	Title	Organization	Phone No.
(1)				
(2)				
(3)				
(4)				

2. Equipment to be installed:

a. Contactor furnished and installed.

b. Government furnished and installed.

c. Government furnished, contractor installed.

d. Equipment physical description chart.

Qty	Nomenclature	Overall dimensions (in)			wt (lbs)
		Height	Width	Depth	

e. Equipment characteristic chart.

Nomenclature	Operating Conditions		Input Power		Power Consumption
	Temperature	Relative Humidity	Voltage	Frequency	

Figure 2-2. Sample Site Survey Checklist (sheet 2 of 15).

3. Profiles.

a. Location: _____.

b. Site marker coordinates:

(1) Latitude: __ degrees __ minutes __ seconds.

(2) Longitude: __ degrees __ minutes__ seconds.

c. Date: _____ Temperature: _____ Visibility: _____.

d. Recorder: _____ Instrument man: _____.

e. Elevation of ground at instrument: _____.

f. Height of instrument above ground: _____.

g. The true north used to determine azimuths for the horizon profile data sheet was obtained using reference line established as follows:

(1) Corrected compass north on _____ (date)

by _____ using compass reading of _____ and

variation of _____ (degrees, minutes) east west.

(2) By _____ (surveying firm) using _____ (1st, 2d, 3d) order

trigonometric points on _____ (date).

(3) By _____ using celestial observations on _____.

Figure 2-2. Sample Site Survey Checklist (sheet 3 of 15).

4. Photographs.

a. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____

_____.

b. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____

_____.

c. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____.

d. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____

_____.

(Add additional sheets if necessary.)

Figure 2-2. Sample Site Survey Checklist (sheet 4 of 15).

5. Topography.

a. Make complete topographic map of site with the contour interval of _____ feet.

b. Give narrative description of topography and the degree of natural slope.

c. Are there any natural or manmade objects which will lie in the radiation field? If so, provide location and estimated size.

6. Ground resistance.

a. What is the measured ground resistance? _____ ohms

b. Where was it obtained? _____

_____.

7. Soil characteristics.

a. Indicate type of geological formation: _____.

b. Indicate type of soil (sand, clay, loam, rock, etc.):

_____.

c. Is soil uniform over site? If variations exist, make sketch showing location of different types of soil.

_____.

d. Indicate depth of water table below grade: _____.

e. Are there seasonal variations in the water table?

_____

f. Does the water table vary over the area? _____.

If so, make sketch.

_____

Figure 2-2. Sample Site Survey Checklist (sheet 5 of 15).

8. Isolation.

a. From radio receiving stations or radio astronomy installations, mark on area map:

(1) Type and size: _____

_____.

(2) Distance and direction: _____.

(3) Are their antennas beamed? _____.

(4) Do any of the beams cover this site? _____

_____.

b. From airfields, mark on area map:

(1) Type and size: _____

_____.

(2) Distance and direction: _____.

(3) Type of aircraft operating from: _____

_____

_____.

(4) Is this site within the airfield's:

(a) Glide path? _____.

(b) Holding pattern? _____.

(c) Airway? _____.

c. From populated areas, mark on area map:

(1) Extent and population: _____

_____.

(2) Distance and direction: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 6 of 15).

(3) Do TV and broadcasts cover area? _____.

9. Interconnecting communications.

a. Distance from associated communications station: _____.

b. Will right-of-way be necessary for landline cables?

_____.

c. Are leased lines available? _____.

d. Is telephone service available? _____.

10. Radio interference.

a. Radio or radar transmitters.

(1) Distance: _____ miles.

(2) Direction (azimuth): _____ degrees.

(3) Frequency: _____ (kHz, MHz, or GHz).

(4) Type of emission (symbol): _____.

(5) Power: _____ kW.

(6) Antenna pattern. (Attach radiation pattern where applicable.)

b. Radio receiving stations.

(1) Distance: _____ miles.

(2) Direction (azimuth): _____ degrees.

(3) Receiving frequencies: _____ (kHz, MHz, or GHz). (Attach sheets if required.)

(4) Receiver sensitivity or type and model: _____

_____.

(5) Type of station or operating organization: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 7 of 15).

c. Distance from power lines, railroads, or highways:

_____

d. Distance from high-tension power lines: _____.

(1) Number, type of wire, and voltage: _____.

(2) Height of wire from ground: _____.

(3) Type, height, and spacing of towers: _____

_____.

e. Distance from ordnance areas: _____.

f. Distance to airways: _____.

g. Existence of airways or traffic patterns in antenna quadrant: _____.

h. Average number of flights per day: _____.

i. Type of aircraft:

(1) Preponderantly jet: _____.

(2) Preponderantly propeller: _____.

(3) Commercial airline: _____.

(4) Private light plane: _____.

j. Anticipated industrial noise level: _____.

high: _____ low: _____.

k. Other: _____.

(1) Distance: _____.

(2) Direction: _____.

(3) Frequency: _____.

(4) Power: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 8 of 15).

11. Towers (existing).

a. General information.

Number	Type	Use	Height	For location see drawing No.

b. Do any of the existing towers appear to be able to support supplementary equipment for the system being investigated? _____.
(yes, no)

c. Name and address of tower and foundation design agency:

_____

_____.

d. List of tower foundation design drawings obtained:

_____

_____.

e. List of tower design drawings obtained: _____

_____

_____.

Figure 2-2. Sample Site Survey Checklist (sheet 9 of 15).

f. List of tower fabrication drawings obtained: _____

_____

_____.

g. If the drawings requested in paragraphs 9d, e, or f cannot be obtained during the site survey, where can drawings be obtained? _____

_____.

12. Buildings (existing).

a. Indicate probable use: _____.

b. Available area: _____ sq ft, length: ____ft x width: _____ft.

c. Ceiling height: ____ ft above finished floor.

d. Allowable floor load: _____ psf.

Source of information: _____

_____.

e. Existing shielding: _____

_____.

f. Existing acoustic treatment: _____

_____.

g. Available heating capacity: _____ Btu/hr.

h. Available air-conditioning capacity: _____ Btu/hr.

Figure 2-2. Sample Site Survey Checklist (sheet 10 of 15).

i. Available ventilating capacity: _____ cfm.

j. List of as-built drawings obtained:

(1) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(2) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(3) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(4) Title: _____ Date: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 11 of 15).

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

13. Power building (existing).

a. Available area: ____ sq ft, length: ___ ft x width: _____ ft.

b. Ceiling height: _____ ft above finished floor.

c. Allowable floor load: _____ psf.

Source of information: _____

_____.

d. Existing shielding: _____

_____.

e. Existing acoustic treatment: _____

_____.

f. Available heating capacity: _____ Btu/hr.

g. Available ventilating capacity: _____ cfm.

h. Existing power building: List of as-built drawings obtained.

_____

_____

_____.

Figure 2-2. Sample Site Survey Checklist (sheet 12 of 15).

(1) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(2) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(3) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

(4) Title: _____ Date: _____.

Drawing number: _____ Issue: _____.

(a) Type: _____.
(site, architectural, structural, mechanical, electrical, equipment)

(b) Design agency: _____.

(c) Source: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 13 of 15).

14. Expandable building.

a. On base (give location): _____.

b. Off base (give location): _____.

c. Sketch or marked drawing showing proposed method of expansion: _____.

15. Physical security.

a. If adequate, describe: _____

_____.

b. If inadequate, list steps necessary to make adequate (i.e., fence, lights, alarms, guards, etc.): _____

_____

_____.

16. Fence enclosures.

a. Area enclosed: _____.

b. Owner: _____.

c. Type and heights: _____.

d. Identification: _____.

e. Shown in drawing number: _____.

Figure 2-2. Sample Site Survey Checklist (sheet 14 of 15).

17. Projection or obstructions.

18. Remarks and pertinent data not covered by preceding sheets.

Site Survey Team Chief

Figure 2-2. Sample Site Survey Checklist (sheet 15 of 15).

2.5 EQUIPMENT CHARACTERISTICS. The physical and electrical characteristics of the AN/FRN-41 TVOR system and Recorder/Reproducer Set, TRC-89-4, are listed in table 2-1. This table provides the project engineer assistance in determining size, power, and heat dissipation requirements for the TVOR facility.

TABLE 2-1. EQUIPMENT CHARACTERISTICS

NOMENCLATURE	Dimensions (in) Height	Width	Depth	Weight (lbs)	Operating Conditions Temperature	Humidity	Input Power	Power Consumption
Transmitting Set, Radio, AN/FRN-41:	-	-	-	*	-	-	210-260 Vrms 47-63 Hz	600W, Normal 1200 W, Max
Transmitter, T-1394/FRN-41	8-3/4	19	19-3/4	*	-100 to 500 C	95 percent	-	-
Transmitter, T-1395/FRN-41	8-3/4	19	19-3/4	*	-100 to 500 C	95 percent	-	-
Monitor, ID-2179/FRN-41	8-3/4	19	19-3/4	*	-100 to 500 C	95 percent	-	-
Detector, DT-603/FRN-41	-	-	-	*	-550 to 750 C	95 percent	-	-
Antenna, AS-3323/FRN-41	-	-	-	*	-550 to 750 C	95 percent	-	-
Control-Indicator, C-10527/FRN-41	8-3/4	19	19-3/4	*	-100 to 500 C	95 percent	-	-
RF Power Monitor	8 3/4	19	19 3/4	*	-100 to 500 C	95 percent	-	-
Control-Indicator, C-10526/FRN-41	8 1/2	19	19 3/4	*	*	*	120Vac 50/60Hz	*
Environmental Control Unit, P/O S-597/FRN-41	-	-	-	236	*	*	208/230 Vac 60 Hz	10.7 kw
Recorder/Reproducer Set, Type TRC-89-4	5 1/4	19	15 1/2	37-1/2	*	*	115/230 Vac 50/60 Hz	40 W (60Hz) 60 W (50Hz)

* Not available

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 GENERAL. The installation specifications and instructions outlined in this section provide guidance for the engineering and installation of a TVOR facility employing Transmitting Set, Radio, AN/FRN-41 (V).

3.1.1 Applicable documents. Documents listed in 1.5 form a part of this installation package. Unless otherwise indicated, the issue in effect on the date of publication of this document shall apply. When the requirements of these documents conflict, the SEIP shall govern. Further, all drawings referred to in this SEIP are available in Section 4.

3.2 INSTALLATION INSTRUCTIONS. The procedures required to install the TVOR facility will be accomplished in a definite order. This will ensure that all work is completed as represented on the installation drawings ensuring all specifications are adhered to. Minor changes to the installation sequence may be made in consideration of manpower, time, equipment, material and safety. The following steps are recommended:

3.2.1 Preinstallation steps. Prior to starting installation, the following must be accomplished:

3.2.1.1 Coordinate installation tasks with the operating agencies and/or other cognizant organizations. This will include clearance to proceed, logistics, review of support requirements, and request of any other support necessary for the completion of tasks.

3.2.1.2 Verify that all support requirements are complete or will be completed in time to prevent delays.

3.2.1.3 Brief team members on particular hazards that may be encountered. Emphasize safety by reviewing safety procedures and practices.

3.2.1.4 Inventory the BOM to ensure all items are on hand. Missing items or shortages must be noted prior to the arrival of the team onsite.

3.2.1.5 Arrange for the transportation of personnel and equipment; determine the methods for control and storage of BOM items, tools, and other required equipment.

3.2.1.6 Review all specifications and drawings to ensure no additional engineering assistance is required prior to the start of installation.

3.2.1.7 Coordinate all outages that may be required for the installation and/or cutover of this facility.

3.2.2 Site preparation. Prior to the erection of Shelter, S-597/FRN-41 and the installation of Transmitting Set, Radio AN/FRN-41 (V) and supplementary equipment, the site must be prepared as follows:

3.2.2.1 Establishing site bearing and trenches. Refer to drawing STD-AF-0125, sheet 3. Drive the ground rod, as a reference stake for positioning the transit, at the center of the selected shelter site leaving approximately 16 inches of the rod above ground.

3.2.2.2 Center the transit over the reference stake, site in the direction of the power source, and place a reference stake for the terminal pole 750 feet from the center of the shelter.

NOTE: Unless otherwise specified, ALL measurements are taken from the center of the selected shelter site.

3.2.2.3 Place a second reference stake 75 feet beyond the terminal pole reference stake, and a third reference stake along this radial 12 feet from the transit.

3.2.2.4 The three reference stakes plotted locate the radial that the power line trench will follow.

3.2.2.5 With the transit properly centered, site on magnetic north and locate reference stakes out 55- and 100-feet respectively. Next, repeat this procedure placing two additional reference stakes on a radial 45 degrees counterclockwise (CCW) from magnetic north.

3.2.2.6 The four reference stakes just located will be used for the orientation of the shelter, radome, and antenna system.

3.2.2.7 When Control-Indicator, C-10526/FRN-41 (remote control unit) is not located in the same direction as the power source, establish a radial to the remote site location using the procedures outlined for locating the power line trench radial. This establishes the radial for the remote control lines trench.

3.2.2.8 The trench from the terminal pole need be no deeper than 24 inches to avoid interference with the TVOR signal. Further, if power and control lines are on the same radial, the power line is placed at the bottom of the trench, the trench is filled with 12 inches of dirt, the control lines are placed in the trench and the remainder of the trench (12 inches) is filled with dirt. This procedure will prevent mutual coupling.

3.2.3 Shelter foundation construction. Refer to drawing STD-AF-0125, sheet 3. Using the reference stake at the center of the site, lay out a circle having a radius of 10 feet, 10 inches. With the circumference of circle as the center line, dig a circular trench 1 foot wide to a minimum depth of 24 inches. This trench must be deep enough to place the bottom of the concrete footings below the frost line.

3.2.3.1 Refer to figure 3-1. Prepare a depression for the centering ring by digging out a circular area around the reference stake 36 inches in diameter, with a minimum depth of 1.5 inches. Bevel the edges of the depression.

3.2.3.2 Ready a depression for the facility sidewalk by marking a circle with a 14-foot radius on the ground and removing 4 inches of soil between this circle and the footing trench.

3.2.3.3 Using the radial established for the power and control line trench, dig a trench outward to accommodate the required conduit(s). Ensure the trench slopes downward toward the outside and terminates several feet from the sidewalk depression.

3.2.3.4 Prior to pouring the concrete footing, block off that portion(s) of the footing trench through which the power and control line conduit(s) will pass.

3.2.3.5 Concrete shall be structural grade with a minimum compression strength after 28 days of curing. Recommended richness of mixture by volume is one part cement to two parts fine aggregate to three parts coarse aggregate. Refer to TO 31-10-5 for methods and other information to ensure standardization of installations, and as a reference for verification and QA procedures.

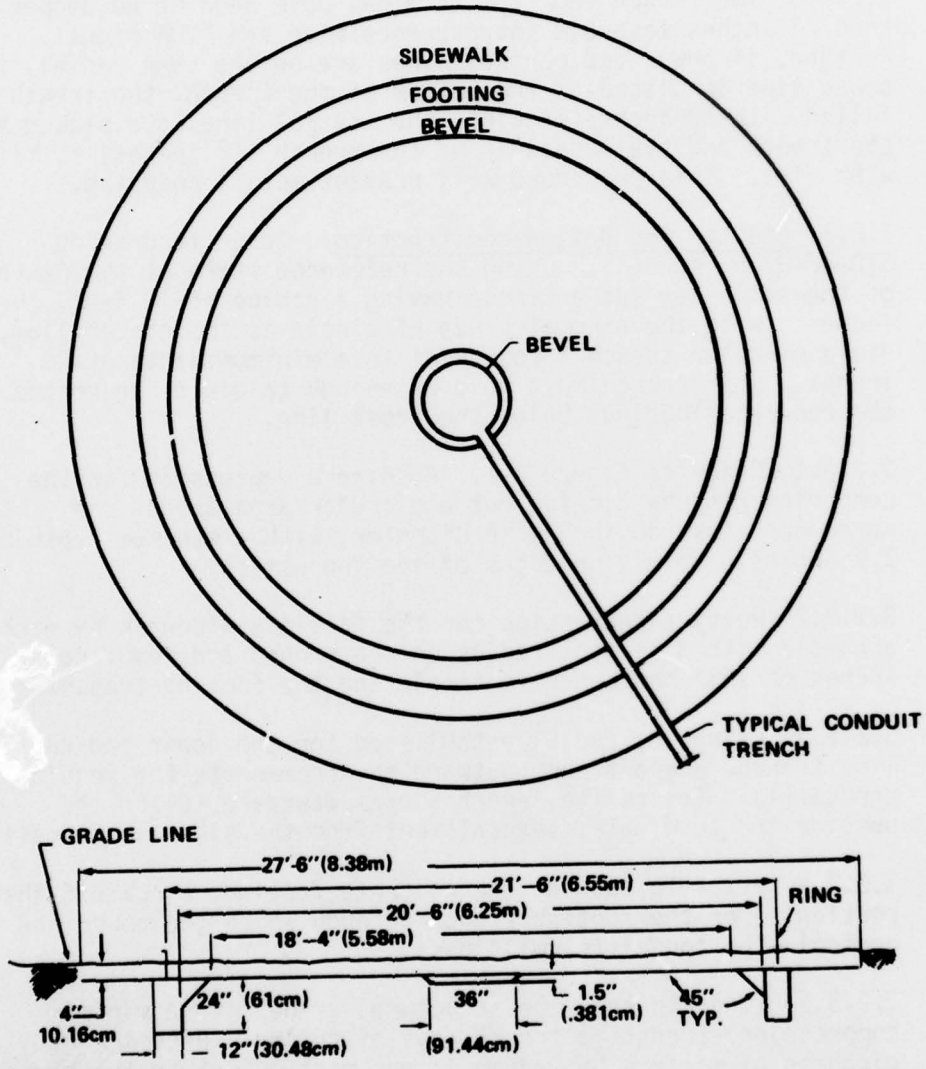


Figure 3-1. Twenty-one Foot Shelter Excavation and Footing.

3.2.3.6 Pour the concrete footing, keeping it as level as possible, to whatever level is necessary to place the top of the foundation form 4.5 inches below the grade line.

3.2.3.7 Refer to drawing STD-AF-0125, sheet 1. Establish the location of the shelter door ensuring a foundation ring seam is located approximately in the center of the area selected.

3.2.3.8 Refer to drawing STD-AF-0125, sheet 2, section C-C. Assemble the 14 foundation ring staves to construct a form for the shelter floor.

3.2.3.9 Refer to drawing STD-AF-0125, sheet 1. With the foundation form seams positioned so the wall seams will not fall at the same points, determine the radials of the seven foundation form centering straps will occupy when the form is installed. Remove sufficient soil along the seven radials to allow clearance for the centering straps and permit the foundation form to set solidly on top of the footing.

3.2.3.10 Refer to drawing STD-AF-0125, sheet 2, section D-D. Install the seven centering straps. At points where the centering straps are attached, install a leveling bolt as shown in section B-B; thereafter, fasten the centering straps to the anchor bolt centering ring as shown in section F-F.

3.2.3.11 With the foundation form on top of the footing, ensure the form and center anchor ring are as level as possible and that the foundation form will remain circular within $\pm$ 1/4-inch during the concrete pour.

3.2.3.12 The ends of the conduit, which terminate inside the shelter, must be as close as possible to the ground rod and extend approximately 3 inches above the finished floor. When the conduits are in the same trench they may be bound together a major portion of their length. The conduits must be securely fastened in the trenches and to the ground rod so they will not move out of position when the concrete floor is poured.

3.2.3.13. Cover the conduit trench with earth, compact the area within the foundation form, and prepare the area as shown in drawing STD-AF-0125, sheet 1, section A-A. After the area is properly prepared, pour the concrete into the form evenly, ensuring the form remains circular within prescribed limits.

3.2.3.14 After sufficient curing time, pour the sidewalk as shown in section A-A of the aforementioned drawing.

3.2.4 Power and control lines. Lay the power and control lines in their trenches up to the shelter foundation. Pull the power and control lines through their conduit allowing a minimum of 6 feet of power line and 8 feet of control line to extend from the ends of the conduits.

3.2.4.1 Coil the lines to the proper size and shape to easily fit through the hole in the base of the shelter pedestal.

3.2.4.2 Backfill the trenches with earth.

3.2.5 Shelter assembly. Refer to drawing STD-AF-0125, sheet 2, section E-E. Remove the nuts and washers from the bolts in the pedestal anchor ring.

3.2.5.1 Reference drawing STD-AF-0126, sheet 3, section A-A. Orientate the antenna pedestal so the openings are opposite the door location, and carefully place the power and control lines in the pedestal's hollow base.

3.2.5.2 Install the pedestal on its base being careful not to damage the power and control lines.

3.2.5.3 Replace the nuts and washers removed from the pedestal anchor ring and hand tighten the nuts so they may be adjusted during the later stages of the shelter assembly.

3.2.5.4 Refer to details C and L. Prior to erecting the shelter wall sections, install the strip gasket and bolts on the foundation flange. Overlap the gasket two holes and tapercut the edge.

3.2.5.5 Refer to section D-D. Before placing a wall section on the foundation flange, install the vertical strip gasket, bolt retainer channel, and bolts on the wall section.

3.2.5.6 Refer to drawing STD-AF-0126, sheet 2, sections H-H, J-J, and K-K. Starting with the door wall section, place it on the foundation flange, align the bolts and holes, install the nuts, and hand tighten. Continue CCW from the inside of the shelter assemblying the wall sections using alternate orange and white wall sections as shown on drawing STD-AF-0126, sheet 1.

3.2.5.7 Locate the white wall section with the air conditioner stave between two orange wall sections on the northeast side of the shelter.

3.2.5.8 Refer to drawing STD-AF-0126, sheet 3, section A-A. Install the flanged roof support ring on the pedestal, seven support angle braces, and roof landing ring. Do not tighten the roof landing ring nuts since it may require adjustment to position of the roof sections.

3.2.5.9 Refer to drawing STD-AF-0126, sheet 1. The 14 wedge-shaped roof section assembly details are provided in the aforementioned drawing. Prior to raising the first roof section, install bolt retainers, strip gasket, stiffeners, and bolts. Raise the roof section with the small end resting on the pedestal flange and the large end resting on the wall section. Position the roof section edge with the bolts, stiffners, and gaskets in the center of the wall section to ensure the roof seams will not align with the wall seams.

3.2.5.10 Raise the second roof section after installing the bolt retainers, strip gasket, bolts, and deck stiffeners. Place it to the right side (looking from inside the shelter) of the first section. Apply caulking to the entire length of the roof seam before putting the roof section in place.

3.2.5.11 Align the bolt holes in the left edge of the second section with the captive bolts in the right edge of the first section to form an overlapping seam. Repeat this procedure for the remaining roof sections.

3.2.5.12 With all bolts around the pedestal and landing ring flange inserted from inside the shelter, fasten the roof sections to the pedestal flange. Tighten the flange bolts securely.

3.2.5.13 Fasten the overlapping edges of the roof sections. Tighten the nuts on the captive bolts; however, do not install bolts where roof seams rest on the wall seams and landing ring.

3.2.5.14 Refer to drawing STD-AF-0126, sheet 3, section D-D. Permanently bolt the wall sections together at the seams. Fasten the roof to wall sections as shown in detail G and tighten all bolts securely.

3.2.5.15 Fasten the wall sections to the foundation form as shown on drawing STD-AF-0126, sheet 2, detail L and sheet 3, detail C. Tighten all bolts securely.

3.2.5.16 Inside and outside the shelter, caulk all joints formed by roof sections, overlapping wall sections and the foundation forms.

3.2.6 Environmental equipment. Refer to drawing STD-AF-0128. Install the air conditioning/heating unit as indicated. Also, install the thermostat at a point on the shelter wall approximately 60 inches from the floor and close to the 315-degree radial. The thermostat bracket is installed by removing the two bolts which secure the shelter sidewall joints and installing it between the shelter wall and bolt retainer. The thermostat is then mounted on the bracket. The antenna blower is installed as shown in view A-A.

3.2.7 Electrical. Refer to drawing STD-AF-0129, sheet 1. This is a detailed layout of the shelter power distribution system. Install the electrical wiring as follows:

3.2.7.1 Install the circuit breaker box using the two mounting straps. Install the junction box and flexible conduit between the power conduit in the concrete slab and the circuit breaker box.

3.2.7.2 Install the connecting boxes for the four light fixtures. (Refer to figure 3-2.)

3.2.7.3 Install the environmental unit power conduit on the exterior of the shelter as shown on sheet 2.

3.2.7.4 Install the convenience outlet box on the junction box mounting board.

3.2.7.5 Run the flexible conduit for the four light fixtures, antenna blower assembly and obstruction lights. Attach the conduit with clips and screws to the roof flange.

3.2.7.6 Install the flexible conduit from the circuit breaker box for the electronics assembly and environmental units as shown, attaching the conduits to the deck stiffeners with a clamp. The conduit for the electronics assembly will be attached to the shelter roof and terminate in the approximate location of the electronics assembly as indicated on drawing STD-AF-0550, sheet 1.

3.2.7.7 Install the flexible conduit from the input power line, using the connection box to the circuit breaker as shown on drawing STD-AF-0129.

3.2.7.8 Refer to drawing STD-AF-0551. Using the interconnecting information on this drawing, run wires through the conduits installed and leave enough wire at each terminal to permit proper connection.

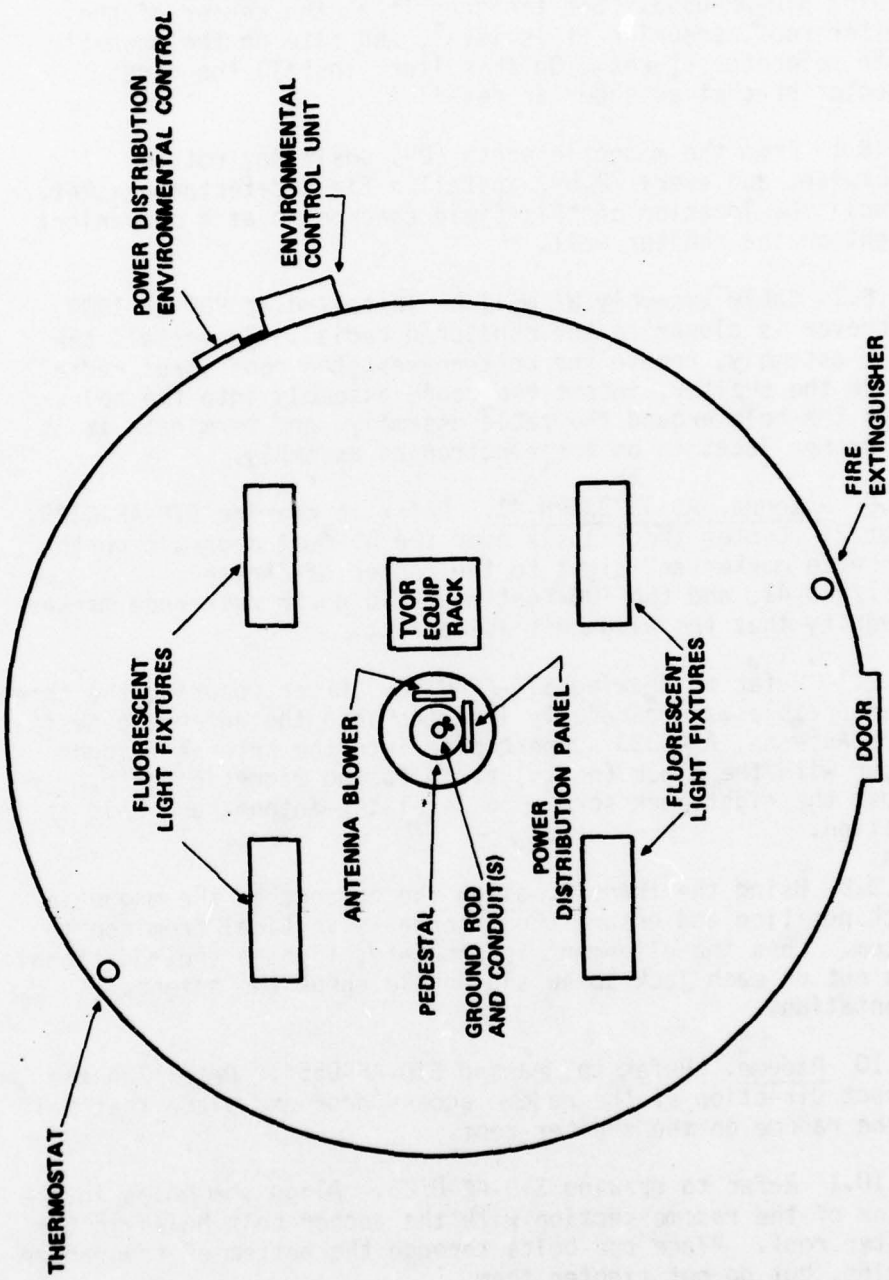


Figure 3-2. TVOR Facility Floor Plan.

3.2.8 Detector, RF, DT-603/FRN-41 (field detector). Refer to drawing STD-AF-0553. Set the transit at the center of the shelter roof, ensuring it is level, and site on the magnetic north reference stakes. On this line, install the first detector bracket as shown in detail A.

3.2.8.1 From the magnetic north (0°) position, rotate clockwise, and every 22.5°, install a field detector bracket. Stencil the location of this field checkpoint at a convenient height on the shelter wall.

3.2.8.2 Cable assembly W1 will be installed at 90° or 180°, whichever is closer to the monitored radial. To install the cable assembly, remove the bolt nearest the roof strut radial inside the shelter, insert the cable assembly into the hole, caulk the hole around the cable assembly, and terminate it at the proper location on the electronics assembly.

3.2.9 Antenna, AS-3323/FRN-41. Refer to drawing STD-AF-0125, sheet 3. Center the transit over the 55-foot magnetic north reference marker and sight to the center of Shelter, S-597/FRN-41, and the 100-foot magnetic north reference marker to verify that the alignment is correct.

3.2.9.1 Refer to drawing STD-AF-0126. After ensuring the three antenna cables are carefully inserted into the antenna pedestal, place Antenna, AS-3323 support pipe into the antenna flanged holder with the black (north) strip facing magnetic north. Adjust the eight jack screws to level the antenna and hold it in position.

3.2.9.2 Using the transit, align the antenna to the magnetic north position and ensure the antenna is vertical from top to bottom. When the alignment is complete, tighten the additional lock nut on each jack screw and double check the antenna orientation.

3.2.10 Radome. Refer to drawing STD-AF-0554. Determine the correct direction of the radome access door and place that half of the radome on the shelter roof.

3.2.10.1 Refer to drawing STD-AF-0128. Align the holes in the bottom of the radome section with the anchor bolt holes in the shelter roof. Place the bolts through the bottom of the radome section, but do not tighten them.

3.2.10.2 Install the rubber gasket on the radome flange, vertical seams, and around the access door.

3.2.10.3 Place the other radome half-section in position and insert the bolts through the radome flange and the roof. Do not tighten the bolts.

3.2.10.4 Bolt the radome halves together.

3.2.10.5 Raise the radome and caulk a full bead under the radome flange. Tighten the bolts securing the radome and caulk the seam between the radome flange and the roof.

3.2.10.6 Install a rubber gasket on the radome cap flange. Place the radome top cap in position and secure it to the radome.

3.2.11 Photo cell and obstruction light assembly. Refer to drawing STD-AF-0554. Install the photo cell and obstruction light assembly as shown. Install the wiring for this assembly in accordance with drawing STD-AF-0551.

3.2.12 Insulation kit. Refer to drawing STD-AF-0130. After all electrical wiring and environmental kits have been installed, the insulation kit for the shelter can be installed.

3.2.12.1 Attach the stick clips to the roof sections and wall panels. Let the adhesive cure 6 to 8 hours before installing the insulation.

3.2.12.2 Install the ceiling panels, cutting around the light fixtures as required. The ceiling panels are cut to the proper size prior to shipment.

3.2.12.3 Starting at the left hand side of the door, set the end of the 48-inch wide roll of insulation flush with the door jam and install the wall section insulation.

3.2.12.4 Apply the white vinyl tape to all seams between ceiling sections over the door and around the environmental units and thermostat.

3.2.12.5 Push all stick clips approximately 1 inch onto the nail and trim the nail flush to the clip.

3.2.13 Electronic equipment. Refer to drawing STD-AF-0552. Remove the electrical equipment rack from the shipping container and install it as shown. A recommended floor plan for the TVOR facility is shown in figure 3-2.

3.2.13.1 Refer to drawing STD-AF-0551. Connect the 120 Vac power to the terminal block at the top of the rack. Connection of all power plugs, terminal strips, and coaxial cables are shown in this diagram.

3.2.13.2 Refer to drawing STD-AF-0552. Connect the field detector cable to the terminal block at the top of the rack.

3.2.13.3 Install the three RF cable assemblies between the antenna system and equipment rack to the proper connectors in the antenna, figure 3-3. Route the cable assembly down through the center of the antenna, into the pedestal mount, and out the access hole.

3.2.13.4 All units of the TVOR system, with the exception of the RF power monitor, are mounted in the equipment rack with drawer slides. The RF power monitor is a panel-mounted unit that is an integral part of the equipment rack.

3.2.13.5 Install Transmitter, Sideband, T-1395/FRN-41; Transmitter, Radio, T-1394/FRN-41; Monitor, Phase Modulation, ID-2179/FRN-41; and Control-Indicator, C-10527, in their designated location in Equipment Rack MT-6011, as shown on drawing STD-AF-0552. Make all power plug, terminal strip and coaxial cable connections as shown on drawing STD-AF-0551.

3.2.13.6 Install an electrical ground system for the equipment rack. Refer to drawing STD-AF-0552.

3.2.14 Control-Indicator, C-10526/FRN-41 (remote control). This remote control unit can be located at any facility up to 20 miles using a 16 AWG twisted pair. Refer to drawing STD-AF-0551 for interconnection details.

3.2.15 Supplementary equipment. The following supplementary equipment is optional. However, if a requirement exists for the particular equipment it will be installed using the following standard procedures:

3.2.15.1 Protector terminal block. Affix the required protector terminal block to a blank panel as shown in drawing STD-AF-0552, detail C. Mount the panel in the equipment rack in its designated location and install the wiring as also shown in detail C.

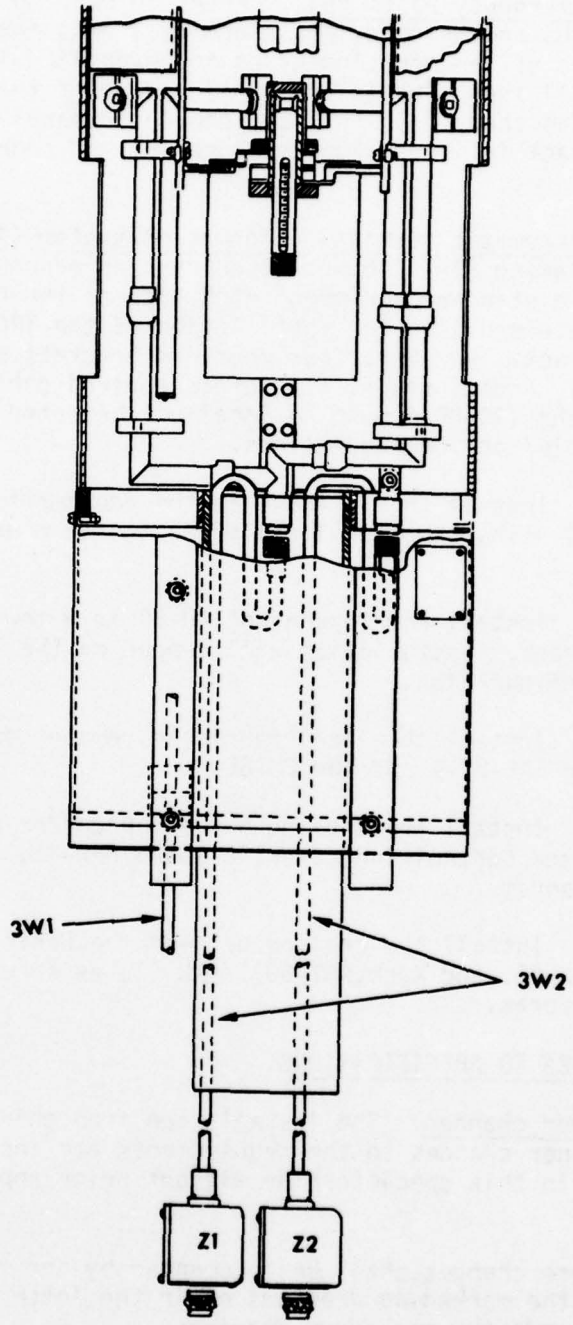


Figure 3-3. Antenna Cable Location.

3.2.15.2 Emergency alarm bell. Refer to drawing STD-AF-0552, detail D. Using the relay and alarm bell as a template, mark the location of the mounting holes to be drilled in the blank panel. Drill the holes in the panel and mount the relay and alarm bell as shown. Install the completed panel in the equipment rack in its designated location and connect the wiring as shown.

3.2.15.3 Automatic terminal information system (ATIS) TRC-89-4. Refer to drawing STD-AF-0580. Recorder/Reproducer, TRC-89-4, is mounted in a standard equipment rack such as the CY-597. A set of slides are provided for installation of the TRC-89-4 in the equipment rack. However, four mounting brackets must be fabricated. Additionally, the remote control cable between the CU-89 and the TRC-89-4 must be locally fabricated to conform to local console/rack configurations.

3.2.15.3.1 Install the TRC-89-4 in the equipment rack as shown in detail B using the four locally fabricated mounting brackets, detail C.

3.2.15.3.2 Install remote control CU-89 in a tower console or equipment rack. Installation will depend on the local rack/ console configuration.

3.2.15.3.3 Install the local fabricate remote control cable between the TRC-89-4 and the CU-89.

3.2.15.3.4 Install the cabling between Recorder/Reproducer Set, TRC-89-4, and Control-Indicator, C-10526/FRN-41, as shown in the cabling diagram.

3.2.15.3.5 Install the cabling between the Control-Indicator, C-10526/FRN-41, and Rack, MT-6011/FRN-41, as shown in the cabling diagram.

3.3 CHANGES TO SPECIFICATIONS.

3.3.1 Minor changes. The installation team chief is authorized to make minor changes to the requirements and instructions contained in this specification without prior approval of the engineer.

3.3.2 These changes shall be documented by the team chief either on the marked-up drawings or in the letter of transmittal which forwards the marked-up drawings.

3.3.3 A minor change is one which DOES NOT:

3.3.3.1 Alter the intended operational capability of the specification.

3.3.3.2 Violate a mandatory standard.

3.3.3.3 Alter the intent or end-result of the required testing.

3.3.4 Major changes. The installation team chief shall not make major changes to the requirements and instructions contained in the specification without the specific approval of the project engineer. Request for an approval of a major change may be made by telephone; however, a followup message or letter is required. These changes shall be documented by the team chief either on the marked-up drawings or in the letter of transmittal. In all cases, the document which authorizes the change shall be included with the marked-up drawings.

3.4 AS-BUILT DRAWINGS.

3.4.1 Upon completion of the installation, the installation team chief shall mark up two sets of drawings to show the "as-built" condition of the facility covered by this specification.

3.4.2 As-built drawings will be prepared using red and yellow pencil. Red for additions and yellow for deletions. Drawings will conform with basic engineering practices.

SECTION 4. ENGINEERING INSTALLATION DRAWINGS

4.1 GENERAL. The standard drawings in this section are applicable to the installation of the AN/FRN-41 TVOR system. The engineer must ensure the system meets operational requirements, while being cognizant of local conditions; therefore, the drawings furnish guidance and standard engineering data to be used ir the development of an EIP. The drawings furnished are 10-1/2 by 16 inches, foldout type, and are not in scale format. The scale referenced on these drawings refer to the "D" size drawings only.

4.1.1 Three sets of engineering drawings are furnished to an installation team. One set is used as "working drawings" while a record of approved changes and work completed will be made on the remaining two sets. Information will be recorded on the drawings as follows:

4.1.1.1 Red lines will be used to denote additions and work completed.

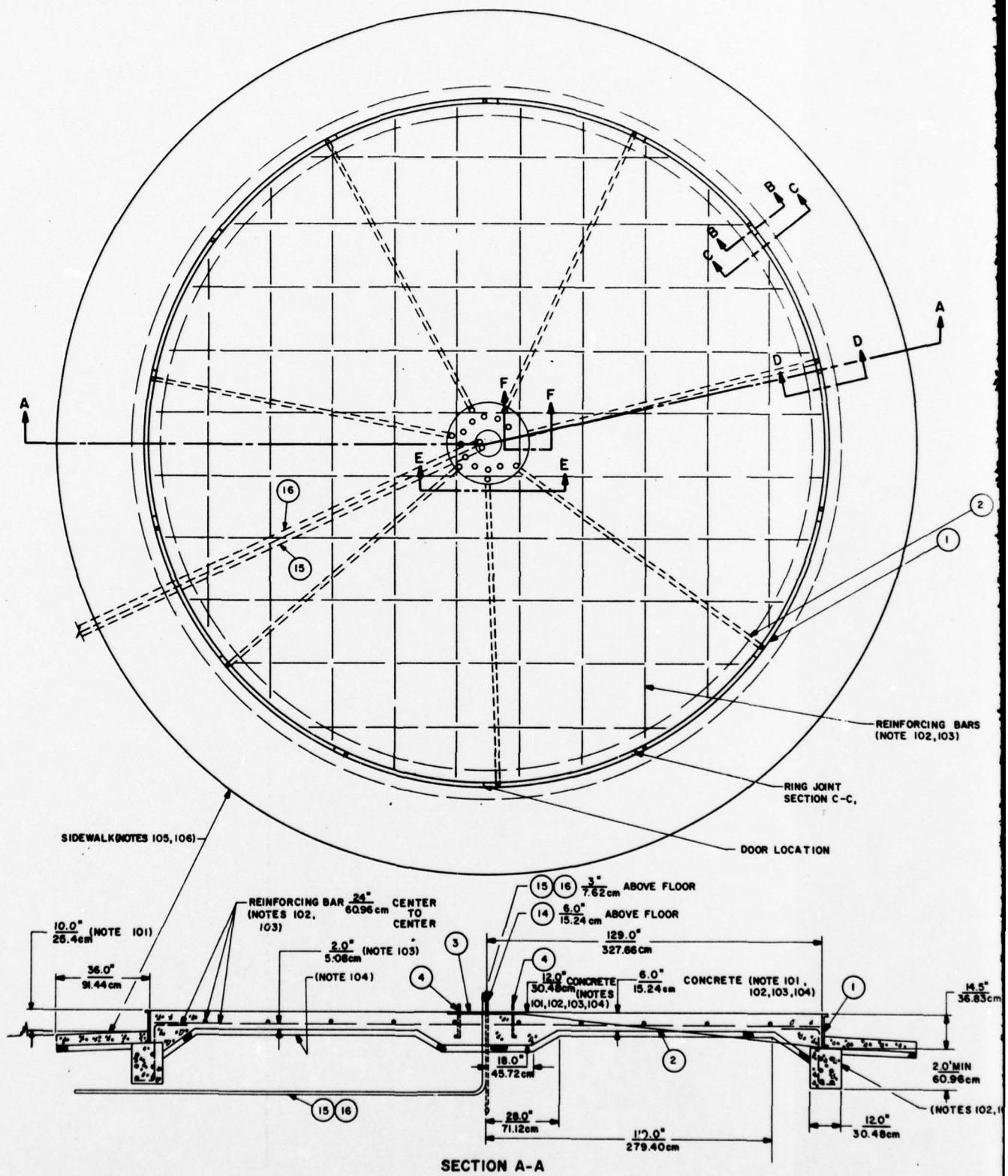
4.1.1.2 Yellow lines will be used to indicate deletions.

4.1.1.3 Blue lines will be used to provide notes to the draftsman or engineer.

4.1.2 When the installation is completed, one set of "marked-up" drawings will be left with the local USACC Commander and another "marked-up" set of drawings will be forwarded to the project engineer for review and preparation of "as-installed" drawings.

4.2 USACEEIA DRAWINGS.

DRAWING NO.	TITLE
STD-AF-0125	TVOR Foundation Plan 21-Foot Shelter
STD-AF-0126	TVOR Shelter, 21-Foot Erection Details
STD-AF-0128	TVOR System Shelter Assembly Details
STD-AF-0129	TVOR System Power Distribution and Lighting Kit Installation
STD-AF-0130	21-Foot TVOR Shelter Insulation Kit Installation Details
STD-AF-0551	TVOR System Interconnection Diagram
STD-AF-0552	TVOR Electronic Equipment Installation
STD-AF-0553	TVOR System Detector, DT-603/FRN-41 Installation Detail
STD-AF-0554	TVOR Radome Assembly Installation Details
STD-AF-0580	Automatic Terminal Information System (ATIS) TRC-89-4 Installation Details


REINFORCING BARS (NOTE 102, 103)
RING JOINT SECTION C-C,
DOOR LOCATION
SIDEWALK (NOTES 105, 106)
REINFORCING BAR (NOTES 102, 103)
24" 60.96 cm CENTER TO CENTER
15 16 3" 7.62 cm ABOVE FLOOR
14 6.0" 15.24 cm ABOVE FLOOR
10.0" 25.4cm (NOTE 101)
2.0" 5.08cm (NOTE 103)
(NOTE 104)
36.0" 91.44 cm
129.0" 327.66cm
12.0" 30.48cm CONCRETE (NOTES 101, 102, 103, 104)
6.0" 15.24 cm CONCRETE (NOTE 101, 102, 103, 104)
14.5" 36.83cm
18.0" 45.72cm
2.0' MIN 60.96cm
(NOTES 102,
28.0" 71.12cm
110.0" 279.40cm
12.0" 30.48cm
SECTION A-A

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
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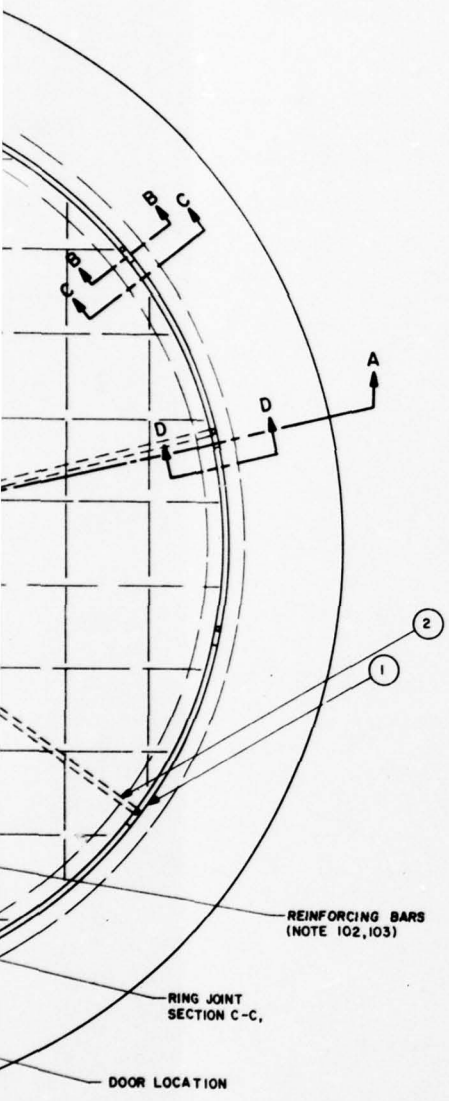
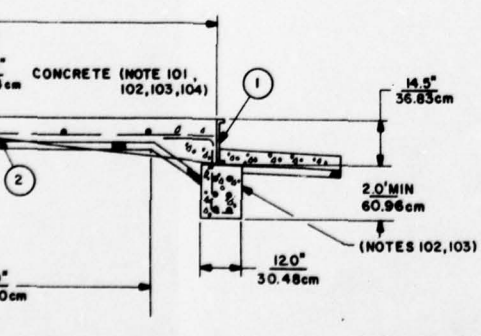
	B	ADDED METRIC TO SHEET 2	17 OCT 78	





GENERAL NOTES:

1. ITEMS NUMBER 1-14 ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS P/O THE TVOR SHELTER.

NOTES:

101. SHELTER FINISHED FLOOR SHALL BE 10" (25.4 cm) MINIMUM ABOVE SIDEWALK AND GRADE TO SIDEWALK.

102. REINFORCING BAR FOR CONCRETE SHALL BE MILD STEEL, DEFORMED BAR, NO. 2 (12 mm) MINIMUM DIAMETER. SPLICED AT INTERSECTIONS AND CONFORM TO ASTM-A-615, GRADE 40

103. REINFORCING BAR FOR CONCRETE SHALL HAVE A 2" (5.08 cm) CLEARANCE FROM SIDE, BOTTOM OR TOP OF CONCRETE.

104. THE FLOOR SHALL BE DEPTH SPECIFIED OVER 2" CRUSHED ROCK AND MOISTURE BARRIER OF 6MIL POLYETHYLENE FILM WITH LAPPED JOINTS OF 6" MINIMUM.

105. THE SIDEWALK IS CONSTRUCTED OF 4" (10.16 cm) WIRE MESH REINFORCED CONCRETE OVER 4" OF CRUSHED ROCK.

106. WIRE MESH SHOULD BE 3/16" DIAMETER WIRE MESH, NO GREATER THAN 6" BETWEEN WIRE.

METRIC

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
15	22792Z	CONDUIT, PVC 1"	NSNR	FT	A/R
15	22791J	CONDUIT, PVC 1 1/4"	NSNR	FT	A/R
14	22790K	STAKE, GROUNDING	NSNR	EA	1
13	22789H	1.25 DIA x .56 +D x 1/8 SPACER, GALV	NSNR	EA	8
12	08354Y	3/4" FLAT WASHER, GALV	5310-00-285-1497	EA	15
11	22780J	3/4"-10 HEX NUT, GALV	NSNR	EA	30
10	22788G	PLATE WASHER, PAINTED	NSNR	EA	12
9	00493K	1/2"-13 HEX NUT, GALV	5310-00-768-0318	EA	85
8	16680N	1/2" FLAT WASHER, GALV	5310-00-088-7647	EA	40
7	22787F	1/2"-13 x 1" SQUARE HEAD BOLT, GALV	NSNR	EA	55
6	22786E	1/2"-13 x 9" ANCHOR BOLT STRAIGHT, GALV	NSNR	EA	14
5	22785D	3/4"-10 x 14" ANCHOR BOLT STRAIGHT, GALV	NSNR	EA	4
4	22784C	3/4"-10 x 10" ANCHOR BOLT BENT, GALV	NSNR	EA	8
3	22783B	RING LOCATION ANCHOR BOLT	NSNR	EA	1
2	22782A	CENTERING TIE STRAP	NSNR	EA	7
1	22781Z	FOUNDATION RING STAVE	NSNR	EA	14

LIST OF MATERIALS

SHEET NUMBER	1	2	3	4	5	6	7	8	9	10
REVISION STATUS OF SHEETS	B	A	–							
	A	–	–							

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

IDENT NO: STD-AF-0125 SHEET 1 OF 3

ORGANIZATION: U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

DESIGNED BY	J. TOWSLEY	DATE 8 MAR 78
DRAWN BY	B. ROBINSON	8 MAR 78
CHECKED BY		
APPROVED BY		

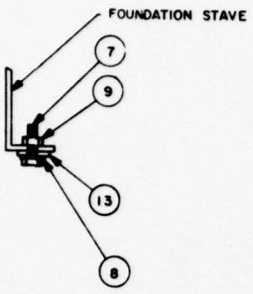
TVOR FOUNDATION PLAN
21 FOOT SHELTER

DESIGN ACTIVITY: CCC-CED-SWA

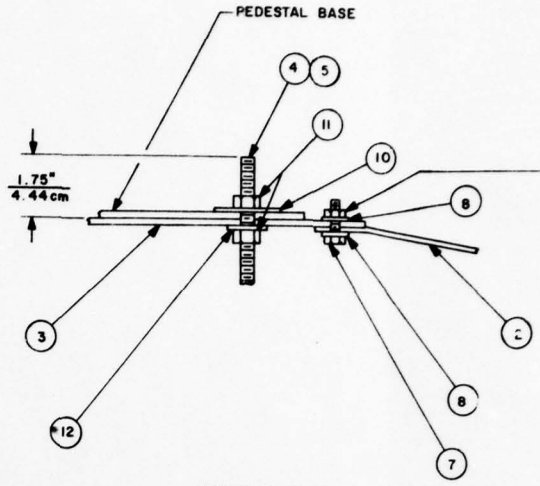
SIZE: D | FSCM NO: 50470 | DRAWING NO

SCALE: NONE | SHEET OF

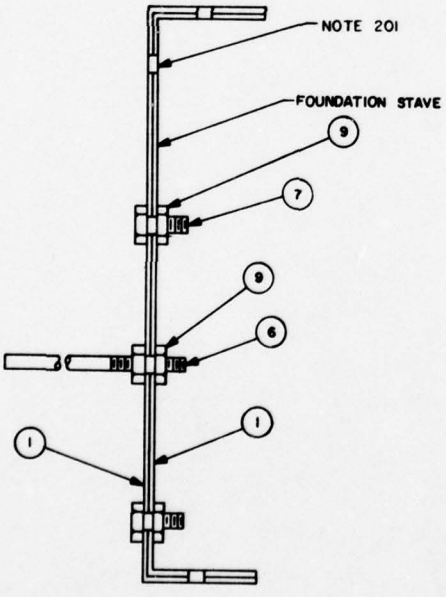
2



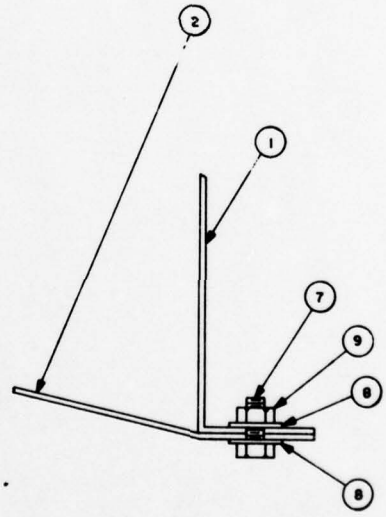
SECTION B-B
LEVELING BOLT
(7 PLACES)



SECTION F-F



SECTION C-C
FOUNDATION STAVE JOINT
(14 PLACES)



SECTION D-D
CENTERING TIE STRAP
(7 REQD)

REVISION				
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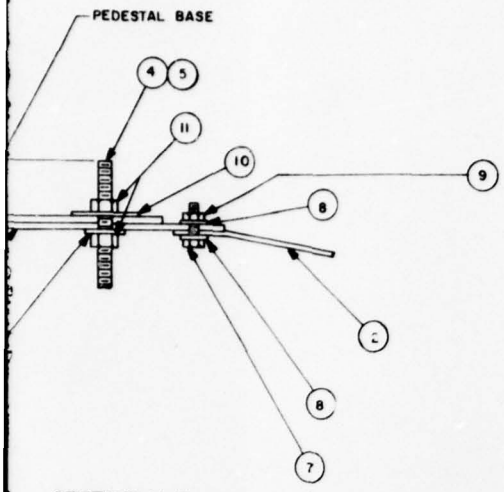
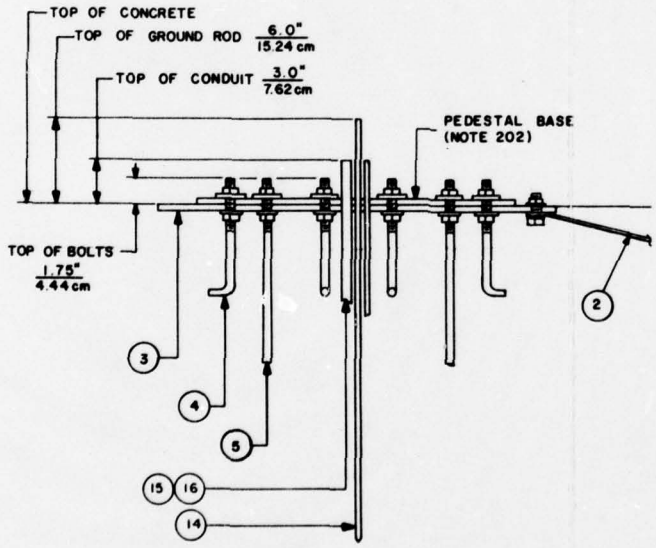


SECTION F-F

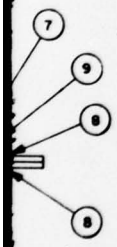
NOTES:

201. DO NOT USE TOP HOLE.

202. PEDESTAL INSTALLED WITH SHELTER AFTER CONCRETE CURES.



SECTION E-E
LOCATING RING



D-D
TIE STRAP

METRIC

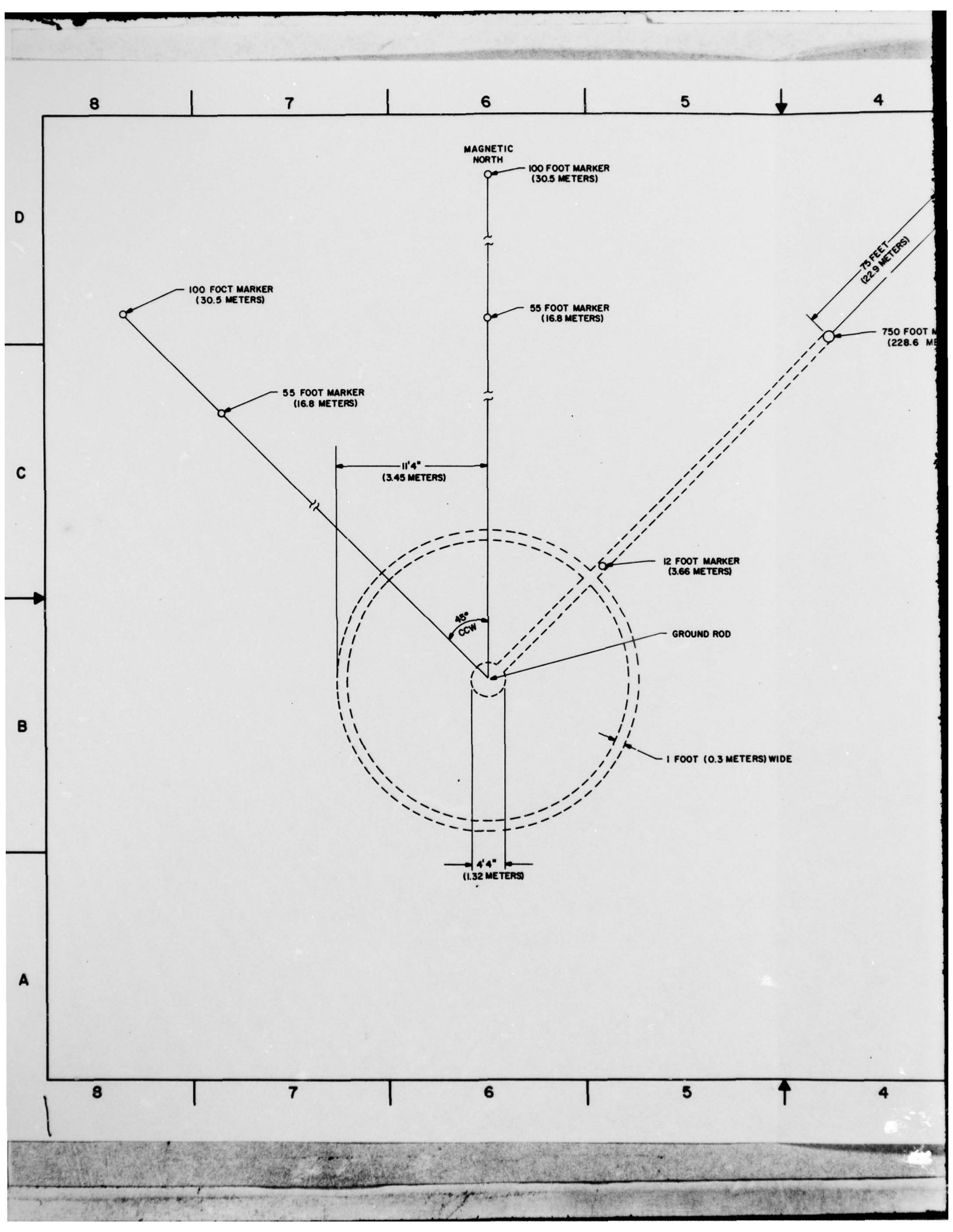
TVOR FOUNDATION PLAN
21 FOOT SHELTER

IDENT NO STD-AF-0125
SHEET 2 OF 3
DRAWN BY B. KILGORE
APPROVED BY

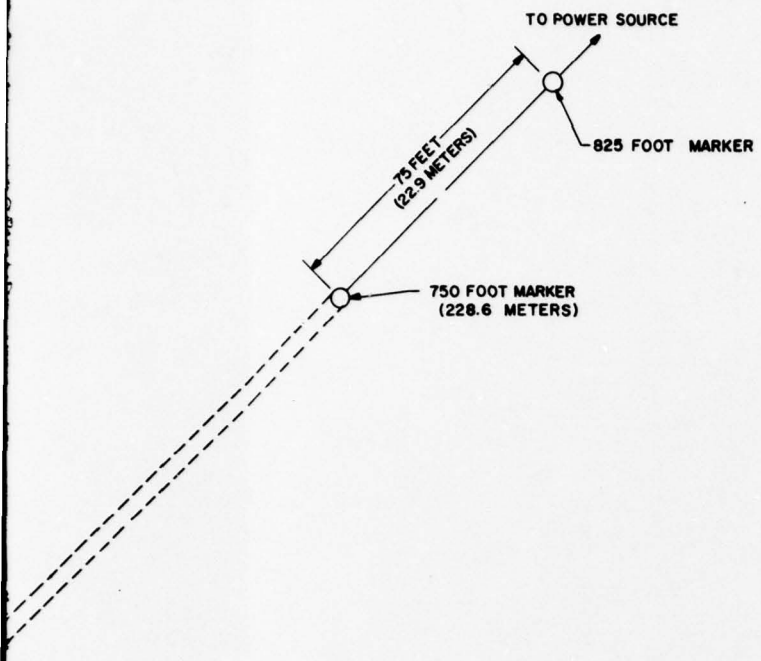
SIZE D | FSCM NO 50470 | DRAWING NO

SCALE NONE | 1" | SHEET OF

2


8
7
6
5
4
D
C
B
A
MAGNETIC NORTH
100 FOOT MARKER (30.5 METERS)
100 FOOT MARKER (30.5 METERS)
55 FOOT MARKER (16.8 METERS)
55 FOOT MARKER (16.8 METERS)
75 FEET (22.9 METERS)
750 FOOT M
(228.6 ME
11'4" (3.45 METERS)
12 FOOT MARKER (3.66 METERS)
45° CCW
GROUND ROD
1 FOOT (0.3 METERS) WIDE
4'4" (1.32 METERS)

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



LEGEND:

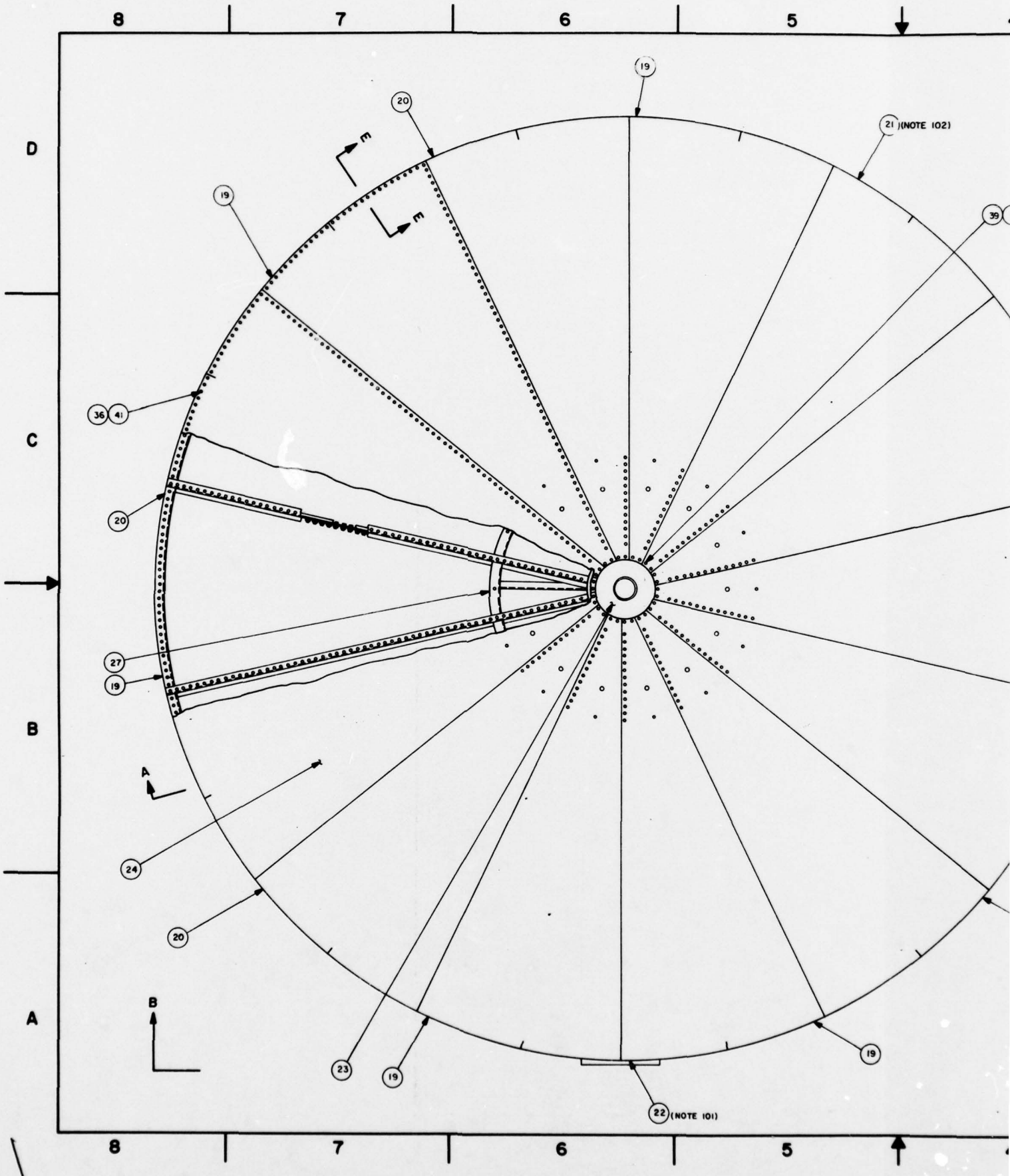
INDICATES TRENCHING

METRIC

TVOR FOUNDATION PLAN
21 FOOT SHELTER

IDENT NO	SIZE	FSCM NO	DRAWING NO
STD-AF-0125 SHEET 3 OF 3	D	50470	
DRAWN BY S. ROBINSON	SCALE NONE	1"	SHEET OF
APPROVED [illegible]			

2


8
7
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21 (NOTE 102)
39
19
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27
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24
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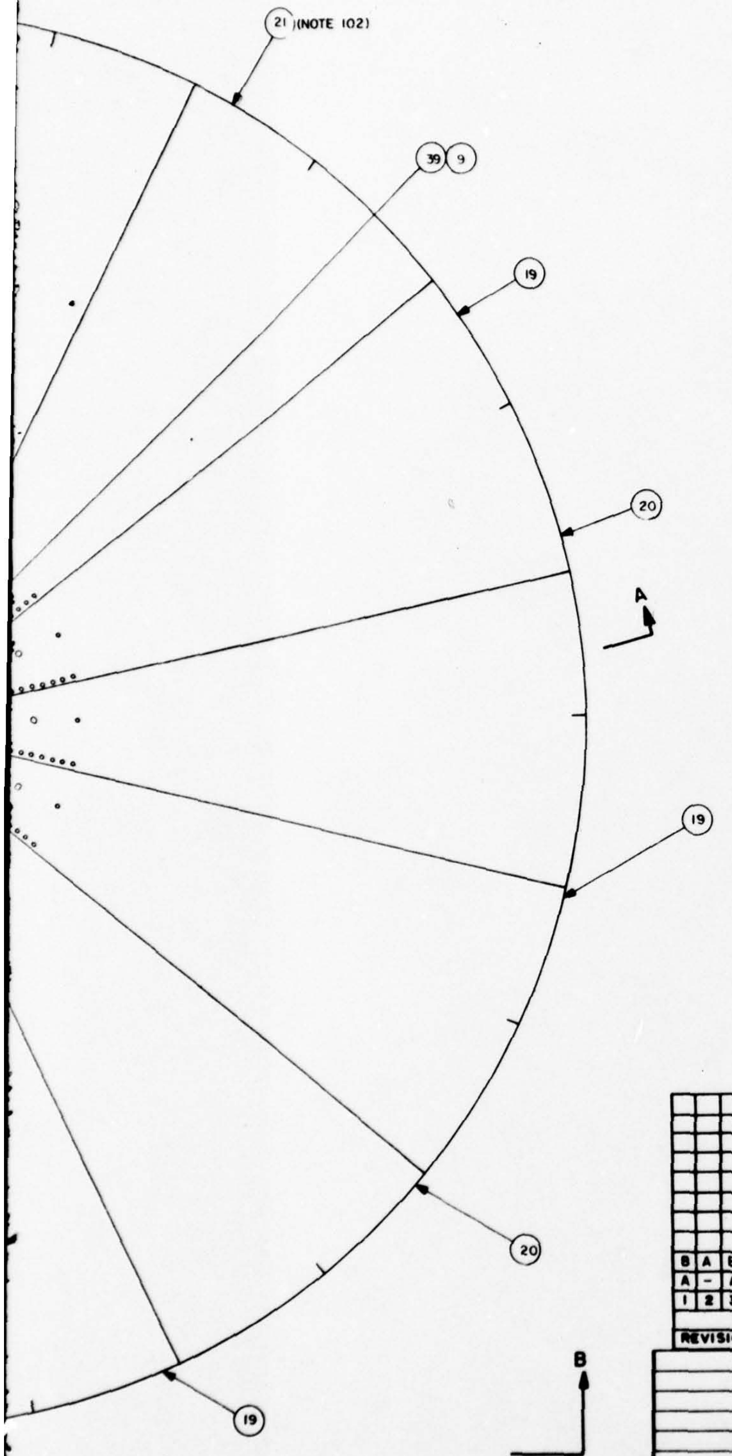
B
23
19
19
22 (NOTE 101)

5 | 4 | 3 | 2 | 1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	CHANGED DESCR. OF ITEMS 17 AND 19	8 MAY '78	[illegible]
	B	DELETE ITEM 44, CHANGE ITEMS 24 - 27	17 OCT 78	[illegible]

D



GENERAL NOTES:

1. ALL ITEMS ON THE LIST OF MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS PART OF THE TVOR SHELTER.

NOTES:

101. LOCATE DOOR OPENING TO LEEWARD SIDE.

102. OPTIONAL LOCATION SHOWN; LOCATE AIR CONDITIONER STAVE BETWEEN TWO ORANGE BOTTOM STAVES BETWEEN NORTH AND EAST SIDE OF SHELTER.

C

ITEM	AEL	DESCRIPTION	PART NO./NSN	UI	QTY
209	23353Z	SCREW, SET 1/2"-13X2 1/2	NSNR	EA.	8
201	23342Z	CLIP, STAVE	NSNR	EA.	14
200	23341J	CLIP, LANDING RING	NSNR	EA.	14
46	22823W	SUPPORT BRACE	NSNR	EA.	7
45	22822H	WASHER, FLAT 1/2 GALV.	NSNR	EA.	28
43	22820F	GASKET CHIME LAP	NSNR	EA.	AR
42	22819F	EPOXY ADHESIVE	NSNR	EA.	AR
41	22818F	GASKET STRIP NEOP. 3/32 X1.50 WIDE	NSNR	EA.	AR
40	22817D	STEEL-BACKED NEOP. RING WASHER	NSNR	EA.	1900
39	22816C	SQ. HD. BOLT 1/2-13X2.00 LG GALV.	NSNR	EA.	30
38	22815B	SQ. HD. BOLT 1/2-13X1.50 LG GALV.	NSNR	EA.	30
37	22814A	SQ. HD. BOLT 1/2-13X1.25 LG GALV.	NSNR	EA.	1820
36	22813Z	SQ. HD. BOLT 1/2-13X1.00 LG GALV.	NSNR	EA.	1680
35	22812W	BOLT RETAINER (CEILING "L")	NSNR	EA.	14
34	22811H	BOLT RETAINER (CEILING "L")	NSNR	EA.	14
33	22810G	BOLT RETAINER (CEILING "U")	NSNR	EA.	14
32	22809G	BOLT RETAINER (CEILING "U")	NSNR	EA.	14
31	22808F	BOLT RETAINER (DOOR FRAME L & R)	NSNR	EA.	2
30	22807E	BOLT RETAINER (DOOR FRAME T & B)	NSNR	EA.	2
29	22806D	BOLT RETAINER (SIDE STAVE)	NSNR	EA.	14
28	22805C	REINFORCEMENT ANGLE (ENVIRONMENTAL)	NSNR	EA.	2
27	22803A	LANDING RING	NSNR	EA.	1
26	22802Z	DECK STIFFENER (SHORT)	NSNR	EA.	14
25	22801W	DECK STIFFENER (LONG)	NSNR	EA.	14
24	22800H	DECK SEGMENT	NSNR	EA.	14
23	22799G	FLANGED HOLDER (ANTENNA)	NSNR	EA.	1
22	22798F	DOOR OPENING STAVE	NSNR	EA.	1
21	22797E	AIR CONDITIONING STAVE	NSNR	EA.	1
20	22796D	RING STAVE STANDARD (WHITE BOTTOM)	NSNR	EA.	5
19	22795C	RING STAVE STANDARD (ORANGE BOTTOM)	NSNR	EA.	7
18	22794B	PEDESTAL ASSY.	NSNR	EA.	1
17	22793A	SHELTER, 21' DIA.	NSNR	EA.	1
9	00493K	NUT, HEX, 1/2" X13 GALV.	5310-00-768-0318	EA.	3350

LIST OF MATERIALS

B

B	A	B							
A	-	A							
1	2	3	4	5	6	7	8	9	10

SHEET NUMBER

REVISION STATUS OF SHEETS

IDENT NO: STD-AF-0126 SHEET 1 OF 3

ORGANIZATION: US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

DESIGNED BY	J. TOWSLEY	3 MAR 78
DRAWN BY	H. SPORE JR	4 MAR 78
CHECKED BY	[illegible]	[illegible]
APPROVED BY	[illegible]	[illegible]

DESIGN ACTIVITY: CCC-CED-SWA

TVOR SHELTER, 21 FOOT ERECTION DETAILS

SIZE: D FSCM NO: 50470 DRAWING NO:

SCALE: NONE SHEET OF

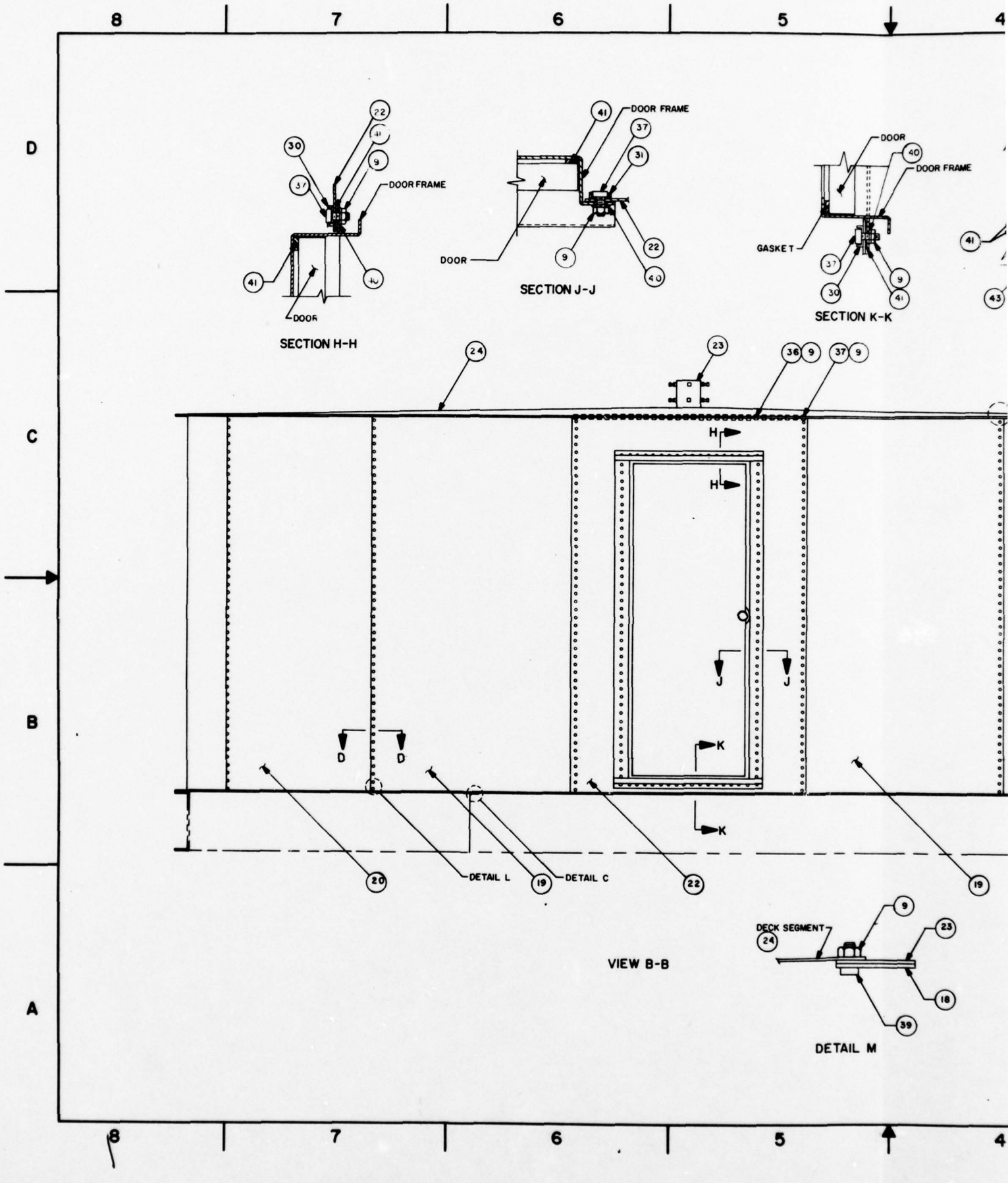
NEXT ASSEMBLY | USED ON

DWG INDEX NO:

A

5 | 4 | 3 | 2 | 1

2


8
7
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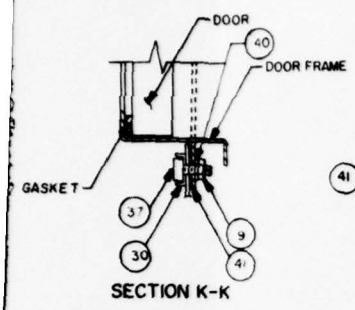
5
4
D
C
B
A
DOOR FRAME
DOOR
SECTION H-H
DOOR FRAME
DOOR
SECTION J-J
DOOR
DOOR FRAME
GASKET
SECTION K-K
H
H
J
J
K
K
D
D
DETAIL L
DETAIL C
VIEW B-B
DECK SEGMENT
DETAIL M

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MINOR REVISIONS	19 OCT 78	



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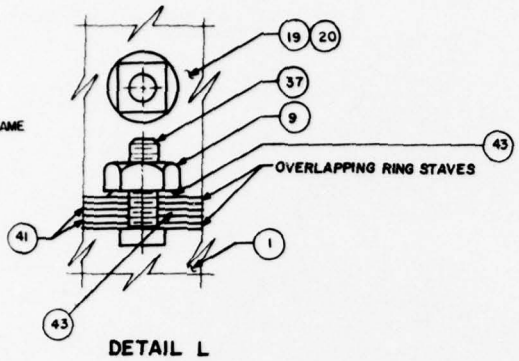
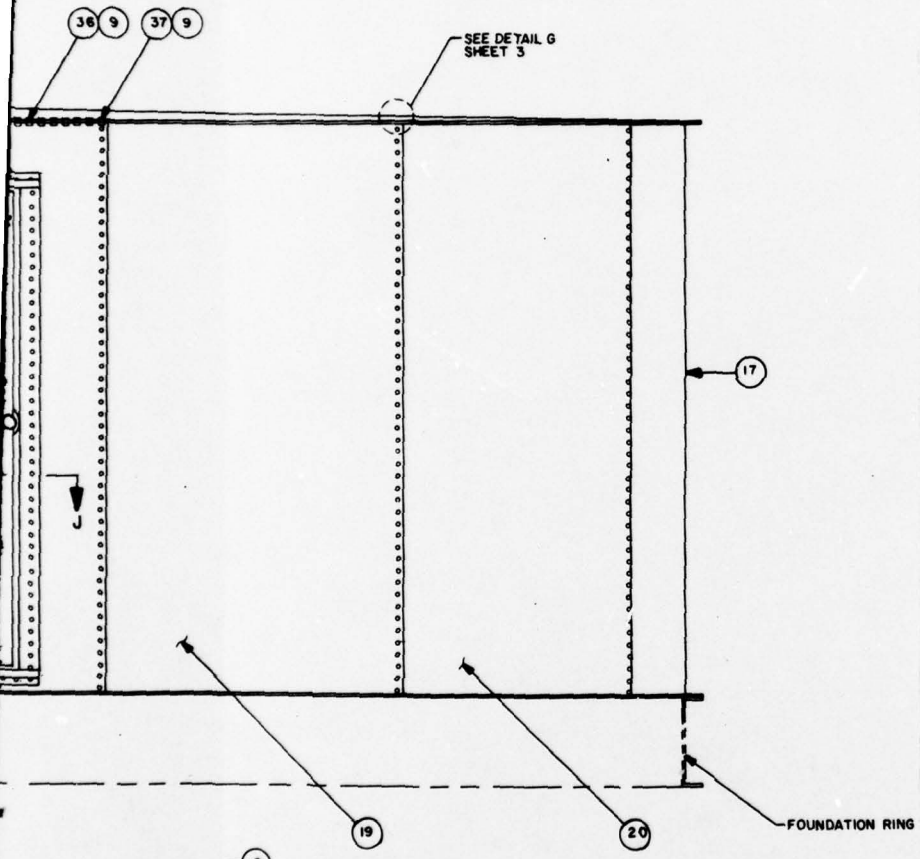
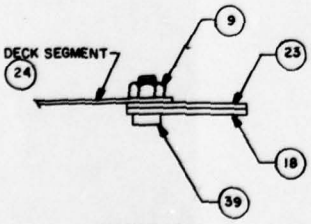


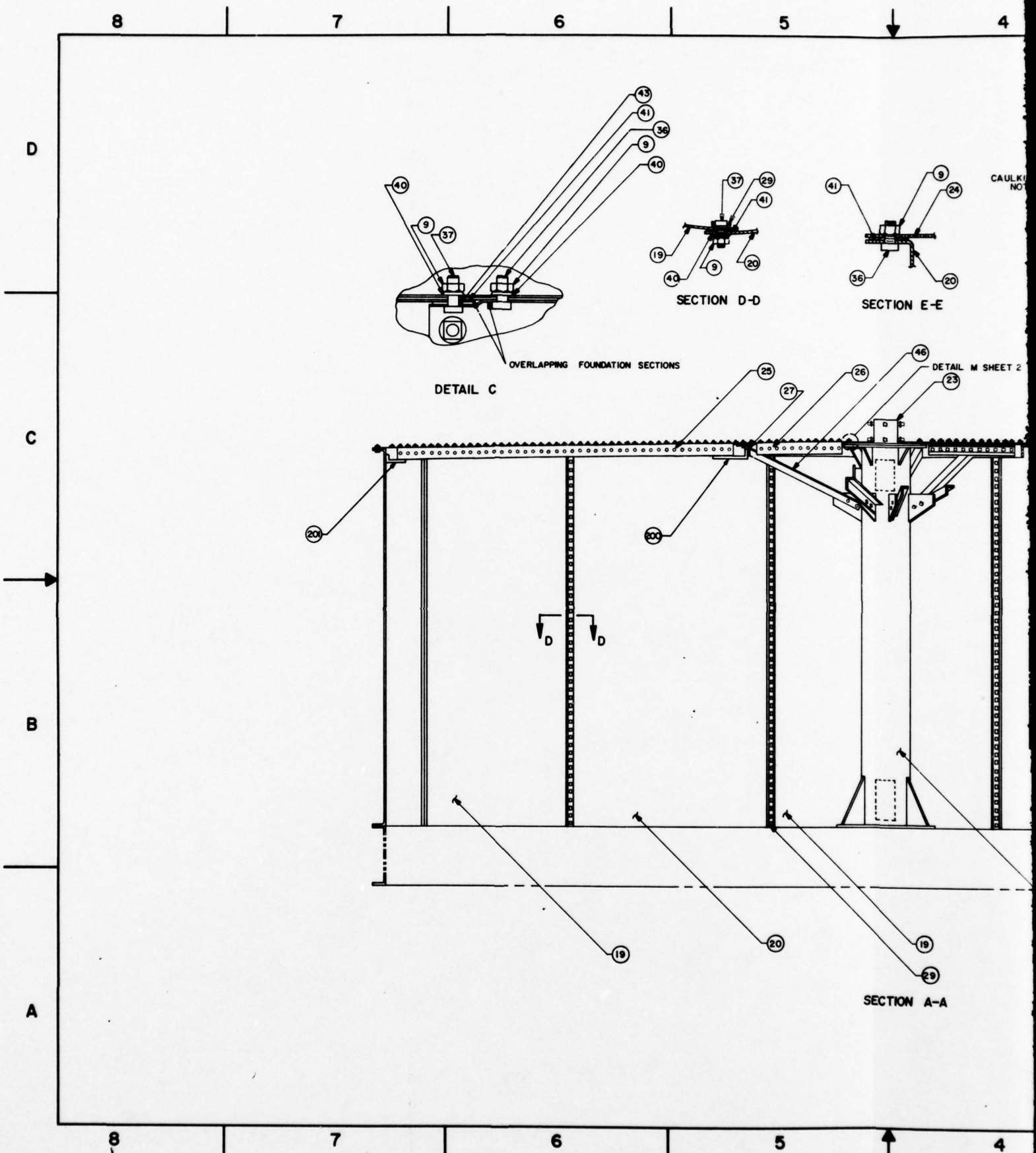
DETAIL L





DETAIL M

IDENT NO STD-AF-0126 SHEET 2 OF 3		TVOR SHELTER, 21 FEET ERECTION DETAILS	
DRAWN BY M GUNNING	SIZE D	FSCM NO 50470	DRAWING NO
APPROVED	SCALE NONE	1"	SHEET OF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OVERLAPPING FOUNDATION SECTIONS
DETAIL C
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29
41
19
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SECTION D-D
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20
SECTION E-E
CAULKI
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46
DETAIL M SHEET 2
25
27
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23
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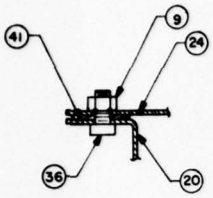
29
SECTION A-A

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	CHANGED BOLT RETAINER DETAIL	8 MAY 78	
	B	MINOR REVISIONS	17 OCT 78	

N D-D



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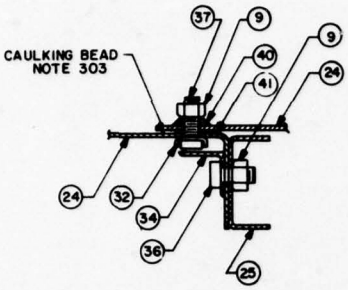

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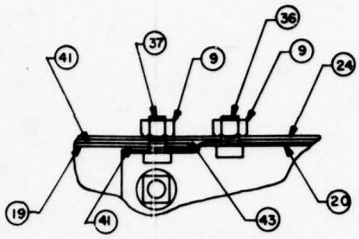
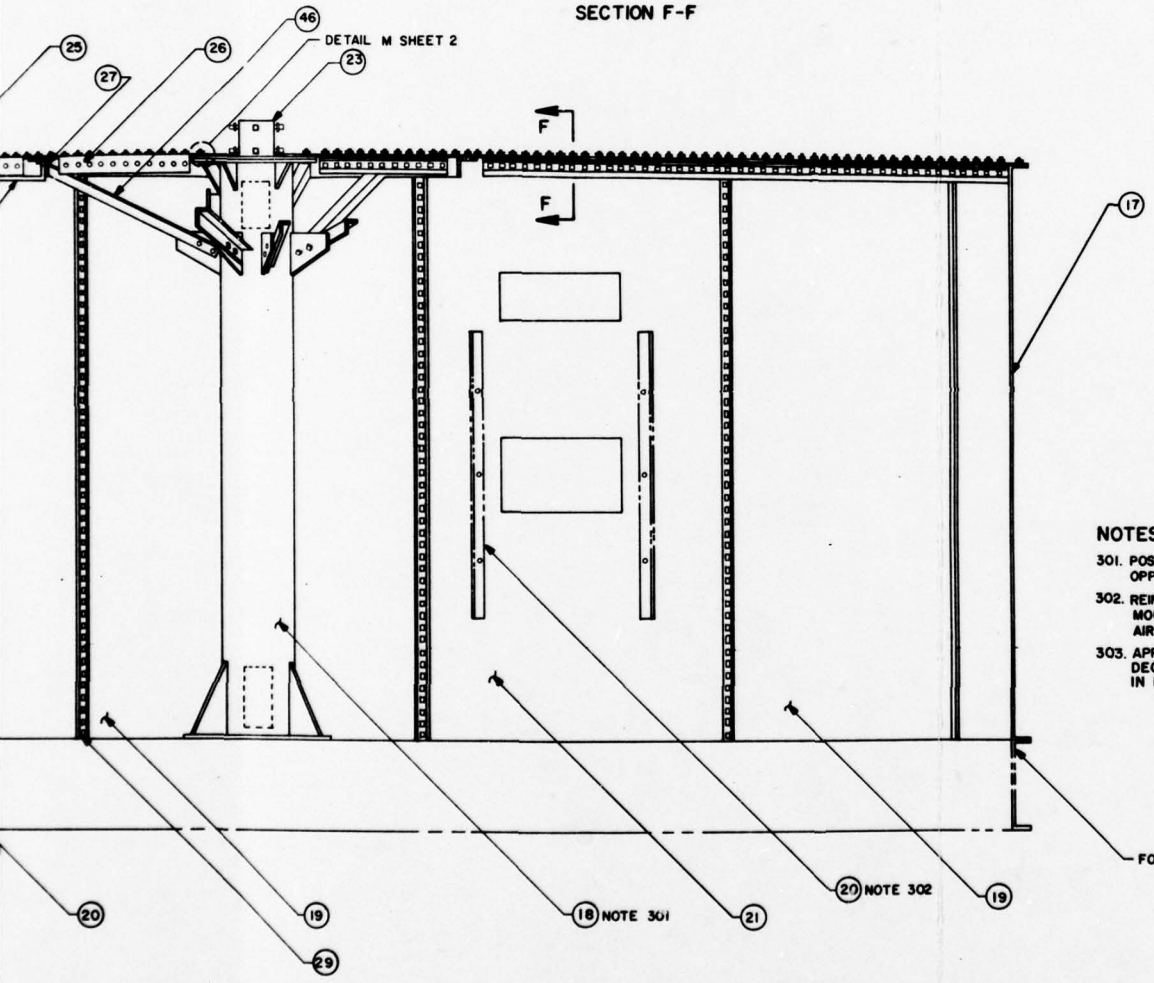


DETAIL G



SECTION A-A

NOTES:

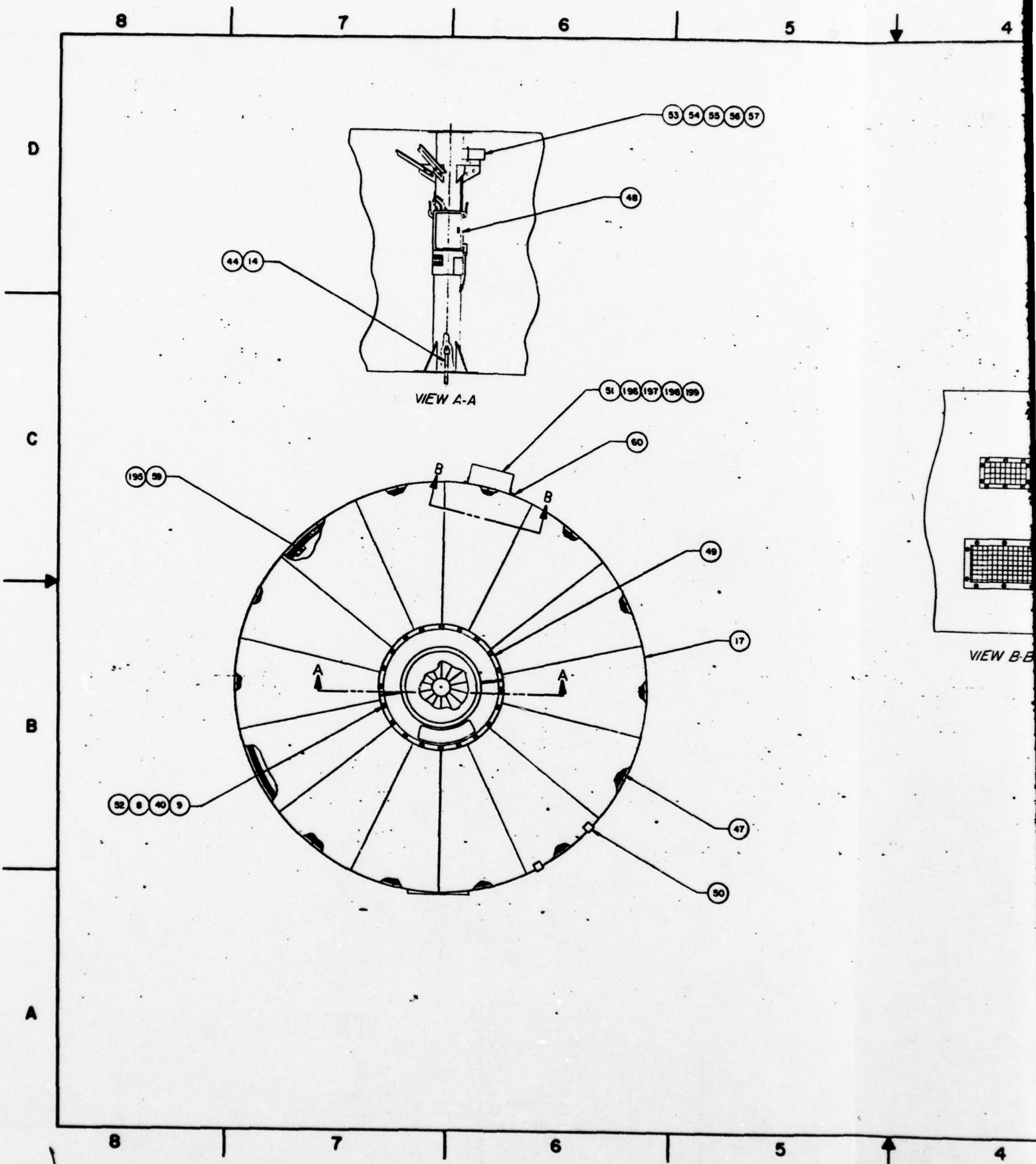
301. POSITION PEDESTAL SO OPENINGS ARE OPPOSITE DOOR.

302. REINFORCEMENT ANGLE TO BE MOUNTED WITH HARDWARE SUPPLIED WITH AIR CONDITIONING UNIT.

303. APPLY CAULKING BEAD ALONG ENTIRE LENGTH OF DECK SECTION PRIOR TO PLACING NEXT SECTION IN PLACE.

TVOR SHELTER, 21 FEET
ERECTION DETAILS

IDENT NO STD-AF-0126 SHEET 3 OF 3
DRAWN BY B. SLAVICK
APPROVED
SIZE D | FSCM NO 50470 | DRAWING NO
SCALE NONE | SHEET OF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VIEW A-A
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196
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59
49
17
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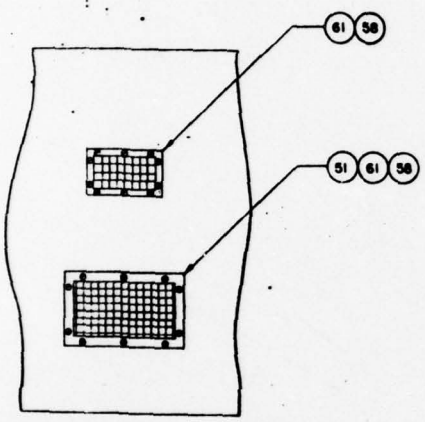
VIEW B-B

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
D 6	A	DELETED CABLES EXITING FR DISTR PANEL	8 MAY '78	
	B	REVISED ITEM NO 52	17 OCT 78	



VIEW B-B

GENERAL NOTE:

1. ALL ITEMS ON THE LIST OF MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS PART OF THE TVOR SHELTER.

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
199	23340K	NUT, HEX 5/16 - 18UNC, GALV	NSNR	EA	6
198	23339H	WASHER, RING 5/16ID	NSNR	EA	6
197	08131R	WASH, FLAT 5/16IG	5310-00-579-2074	EA	6
196	23338G	BOLT, SQ. HD., 5/16 - 18 UNC X 1 3/4	NSNR	EA	6
195	23337F	SCREW, SM, PH #6 - 5/8 LG	NSNR	EA	4
61	22838C	FILTER, AIR	NSNR	EA	1
60	22837B	SPACER, WOOD	NSNR	EA	2
59	22836A	BRACKET, THERMOSTAT	NSNR	EA	1
58	22835Z	SCREW, SHEET METAL, NO.10 - 3/4 LG, GALV	NSNR	EA	24
57	22834W	NUT, REG, HEX, 1/4 X 20UNC, GALV	NSNR	EA	4
56	22833H	WASHER, LOCK, 1/4ID, GALV	NSNR	EA	4
55	22832G	WASHER, FLAT, 1/4ID, GALV	NSNR	EA	4
54	22831F	BOLT, HEX HEAD, 1/4 - 20 X 1" LG, GALV	NSNR	EA	4
53	22830E	BLOWER	NSNR	EA	1
52	22829E	BOLT, SQUARE HEAD, 1/2 - 13X 1 3/4 GALV	NSNR	EA	34
51	22828D	ENVIRONMENTAL CONTROL	NSNR	EA	1
50	22827C	KIT, FIELD DETECTOR, MOUNTING	NSNR	EA	1
49	22826B	RADOME ASSEMBLY	NSNR	EA	1
48	22825A	POWER DISTRIBUTION SYSTEM	NSNR	EA	1
47	22824Z	KIT, INSULATION	NSNR	EA	1
44	22821G	CLAMP, GROUNDING	NSNR	EA	1
40	22817D	WASHER, RING, STEEL BACKED NEOP	NSNR	EA	34
17	22793A	SHELTER, 21' DIA.	NSNR	EA	1
14	22790K	STAKE, GROUNDING	NSNR	EA	1
9	00493K	NUT, HEX, 1/2 - 13UNC, GALV	5310-00-768-0318	EA	34
8	16880N	WASHER, FLAT, 1/2ID, GALV	5310-00-088-7647	EA	34

LIST OF MATERIALS

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

IDENT NO: STD-AF-0128
SHEET 1 OF 1

ORGANIZATION: US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

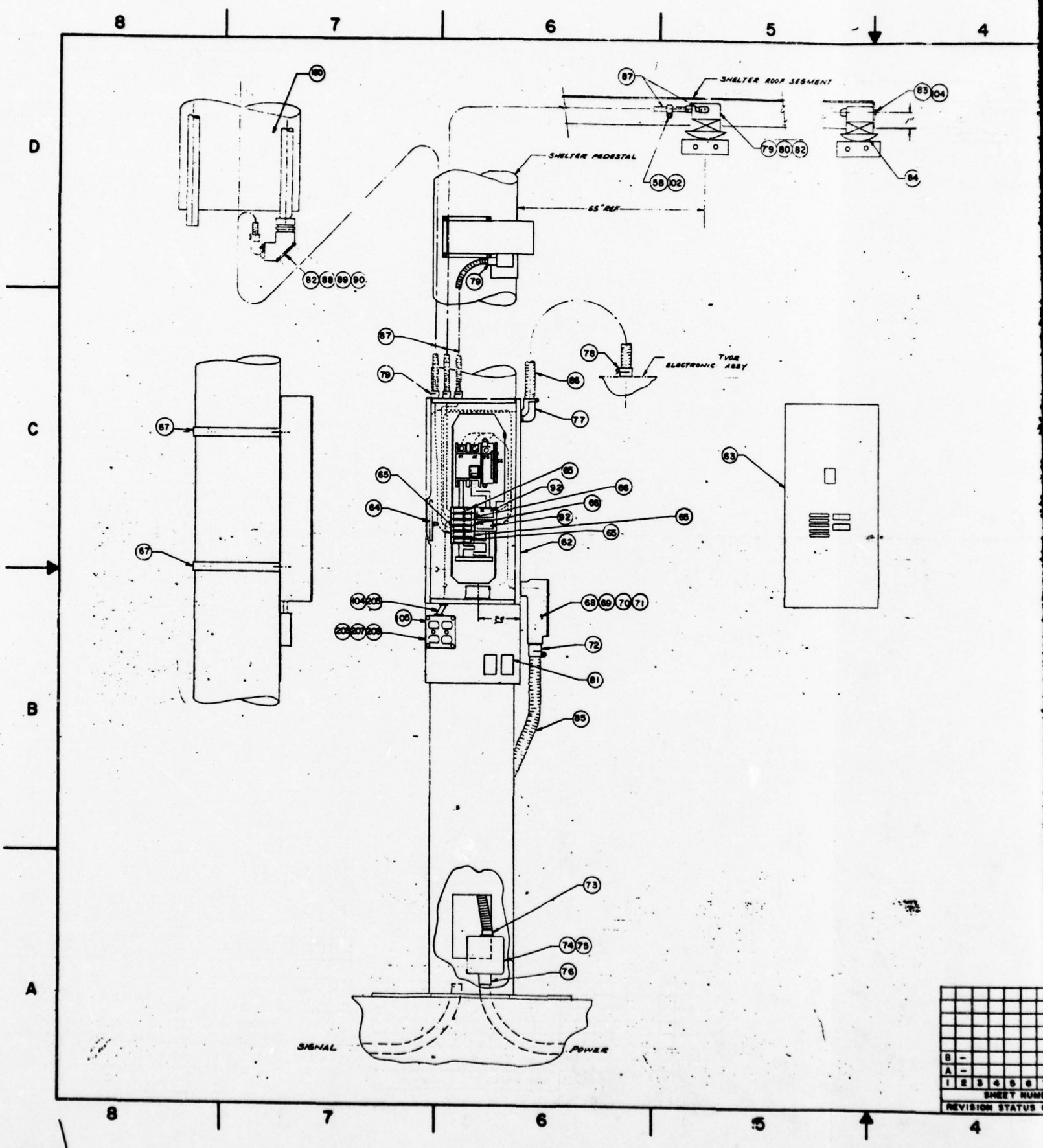
DESIGNED BY: [illegible] DATE: 13 Mar 78
DRAWN BY: RK DATE: 9 Mar 78
CHECKED BY: RK DATE: 9 Mar 78
APPROVED BY: [illegible] DATE: 9 Mar 78

DESIGN ACTIVITY: CCC-CED-SWA

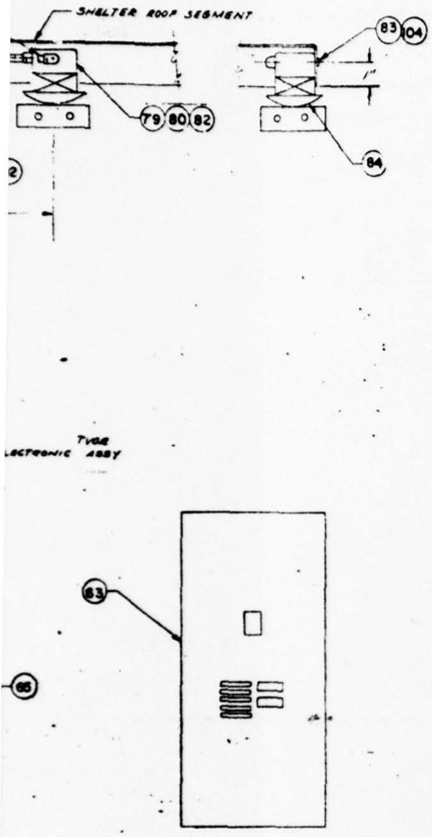
TVOR SYSTEM SHELTER ASSEMBLY INSTALLATION DETAILS

SIZE: D | FSCM NO: 50470 | DRAWING NO:
SCALE: NONE | SHEET OF

2


SHELTER ROOF SEGMENT
SHELTER PEDESTAL
65" REF
TVOR ELECTRONIC ASSY
SIGNAL
POWER

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ADDED CABLE CLAMP AND NOTE 12	8 MAY 78	
	B	GENERAL REVISIONS	17 OCT 78	



GENERAL NOTES:

1 ALL ITEMS ON THE LIST OF MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS P/O THE TVOR SHELTER.

ITEM	AEL	DESCRIPTION	PART NO./NSN	UI	QTY
208	14091J	RECEPTACLE 5272	NSNR	EA	2
207	12156A	COVER 5371	5975-00-299-0021	EA	2
206	025156	BOX 45 1/2	5975-00-284-5627	EA	1
205	23346C	NIPPLE OFN-50	NSNR	EA	1
160	22935A	ANTENNA AS-3323/FRN-41	NSNR	EA	1
105	22905D	SCREW, SM, S.T. 1/4 X 3/4" LG	NSNR	EA	3
104	P2904C	NUT, LOCK BL50	NSNR	EA	4
103	22903B	CLAMP 1"	NSNR	EA	3
102	22902A	CLAMP 1/2"	NSNR	EA	24
101	22901Z	CONDUIT, L.T.	NSNR	FT	AR
100	22900W	CONNECTOR	NSNR	EA	1
99	22899H	CONNECTOR	NSNR	EA	1
.	22898G	CONNECTOR	NSNR	EA	3
97	22897F	CONNECTOR	NSNR	EA	1
96	22887G	NUT, LOCK	NSNR	EA	2
95	22886F	PIPE, RIGID TBE	NSNR	EA	1
94	22885E	CONNECTOR	NSNR	EA	1
93	22884D	HUB	NSNR	EA	1
92	22883C	BREAKER (60A) (CB107, CB108)	NSNR	EA	2
91	22882B	BOX	NSNR	EA	1
90	22881A	BUSHING	NSNR	EA	1
89	22880Z	ELBOW	NSNR	EA	1
88	22879Z	CONNECTOR	NSNR	EA	1
87	22878W	CONDUIT, FLEX 1/2, ALUM	NSNR	FT	AR
86	22877H	CONDUIT, FLEX 1, ALUM	NSNR	FT	AR
85	22876G	CONDUIT, FLEX 1 1/4, ALUM	NSNR	FT	AR
84	22875F	FIXTURE, FLUORESCENT	NSNR	EA	4
83	22874E	NIPPLE	NSNR	EA	4
82	22873D	CONNECTOR	NSNR	EA	6
81	22872C	LIGHTNING ARRESTOR	NSNR	EA	2
80	22871B	BOX	NSNR	EA	4
79	22870A	CONNECTOR	NSNR	EA	8
78	22869A	CONNECTOR	NSNR	EA	3
77	22868Z	CONNECTOR	NSNR	EA	1
76	22867W	CONNECTOR	NSNR	EA	1
75	22866H	COVER	NSNR	EA	1
74	22865G	BOX	NSNR	EA	1
73	22864F	CONNECTOR	NSNR	EA	1
72	22863E	CONNECTOR	NSNR	EA	1
71	22862D	GASKET	NSNR	EA	1
70	22861C	COVER	NSNR	EA	1
69	22860B	NIPPLE	NSNR	EA	1
68	22859B	ELBOW	NSNR	EA	1
67	22858A	STRAP	NSNR	EA	2
66	22857Z	BREAKER (CB103, CB102)	NSNR	EA	2
65	22856W	BREAKER (CB101, CB104-CB105)	NSNR	EA	4
64	22855H	GROUND KIT	NSNR	EA	1
63	22854G	COVER	NSNR	EA	1
62	22839D	BOX, W/BREAKER	NSNR	EA	1
58	22835Z	SCREW, S.M. S.T. NO. 10 X 3/4 LG	NSNR	EA	24

LIST OF MATERIALS

IDENT NO: STD-AF-0129
SHEET 1 OF 2

ORGANIZATION: U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

DESIGNED BY: R. Tewksbury — DATE: 14 Mar 78
DRAWN BY: RK — 9 Mar 78
CHECKED BY: — 14 Mar 78
APPROVED BY: — 19 Mar 78
DESIGN ACTIVITY: CCC-CED-SWA

TVOR SYSTEM POWER DISTRIBUTION AND LIGHTING KIT INSTALLATION

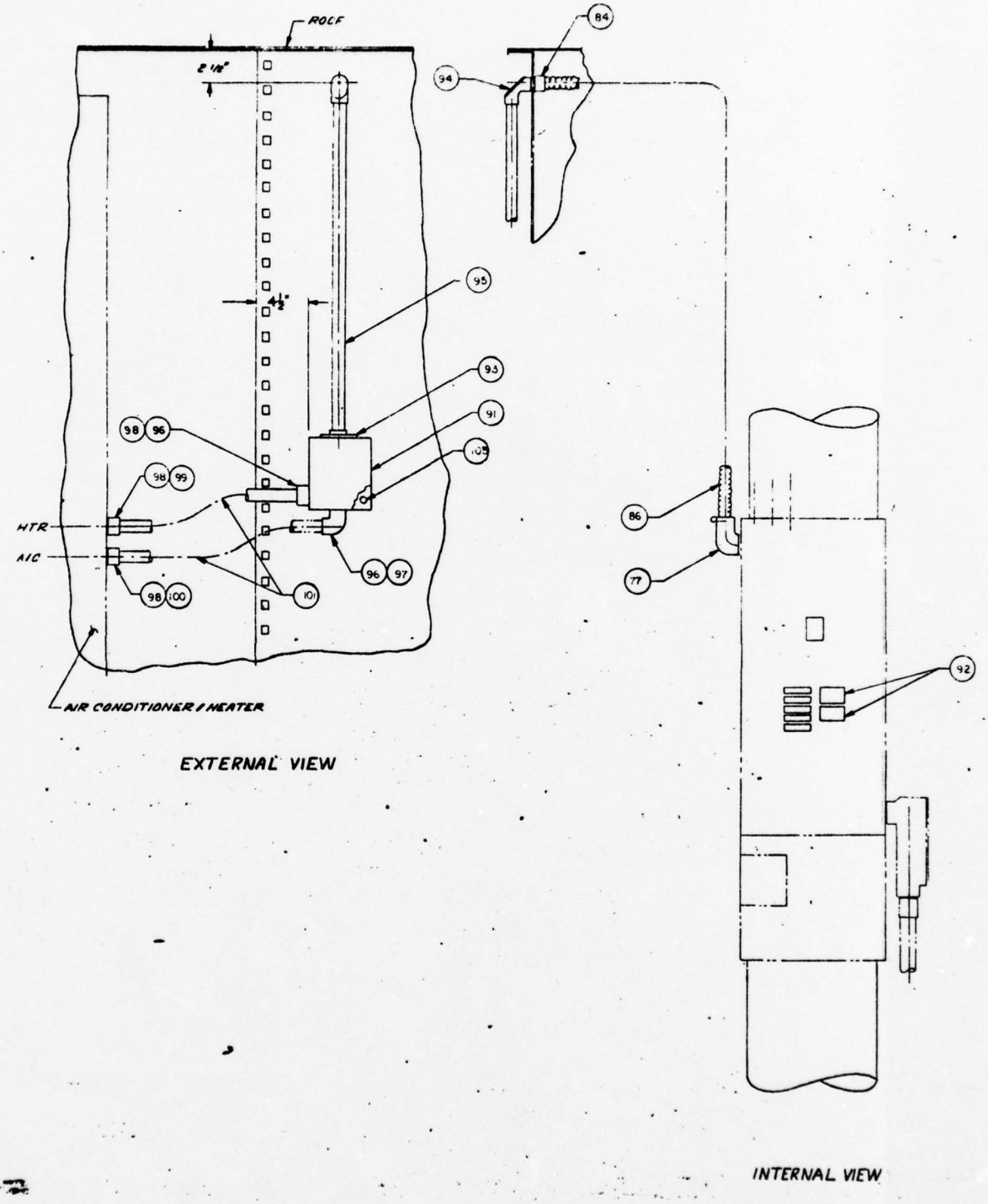
SIZE: D — FSCM NO: 50470 — DRAWING NO — SCALE — SHEET — OF

B	–								
A	–								
1	2	3	4	5	6	7	8	9	10

SHEET NUMBER
REVISION STATUS OF SHEETS

NEXT ASSEMBLY — USED ON
DWG INDEX NO:

2


ROOF
2 1/8"
4 1/2"
HTR
AIC
AIR CONDITIONER / HEATER
EXTERNAL VIEW
INTERNAL VIEW
84
94
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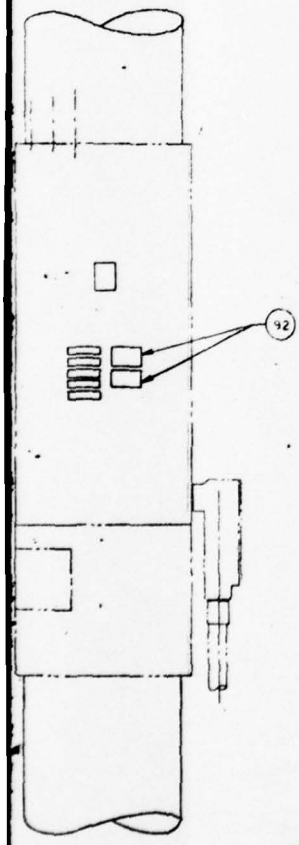
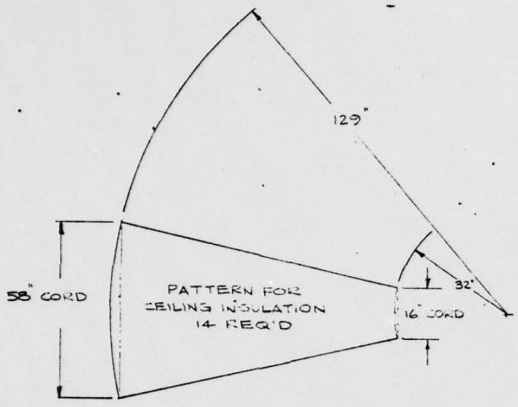
REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

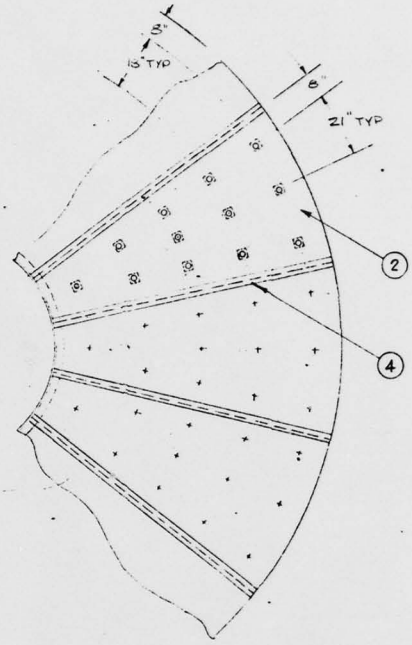


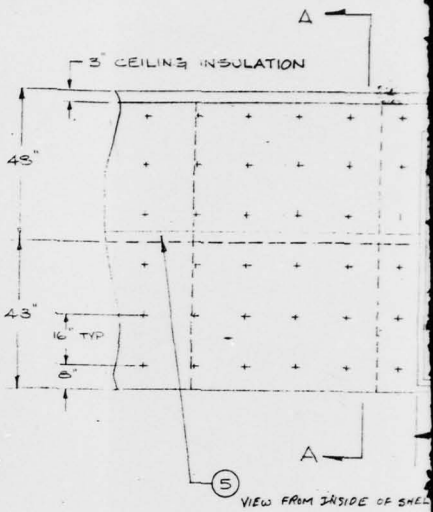
INTERNAL VIEW

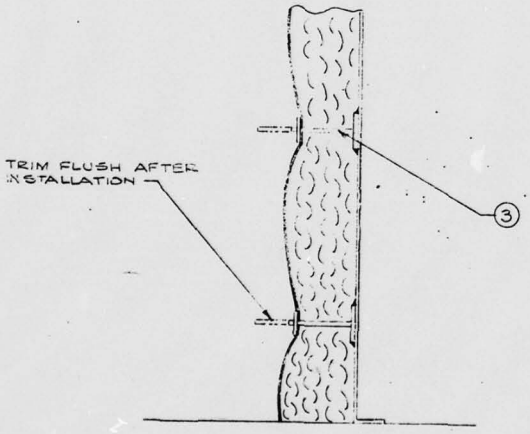
IDENT NO STD-AF-0129 SHEET 2 OF 2	TVOR SYSTEM POWER DISTRIBUTION AND LIGHTING KIT INSTALLATION		
DRAWN BY	SIZE D	FSCM NO 50470	DRAWING NO
APPROVED BY	SCALE AS SHOWN	1"	SHEET OF

2

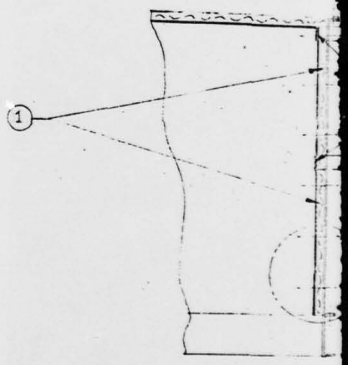






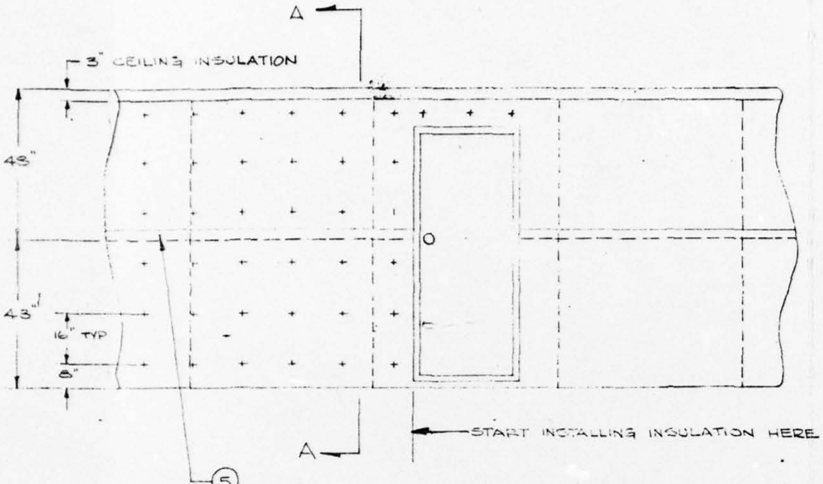


DETAIL A

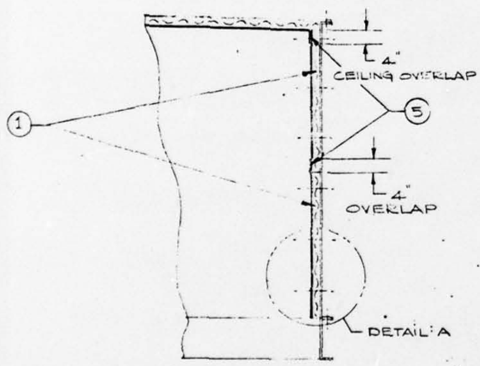


SECTION A

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	CHANGED NOTE TO GENERAL NOTE	17 OCT 78	[signature]



VIEW FROM INSIDE OF SHELTER FACING DOOR.



SECTION A-A

GENERAL NOTE:

1 ALL ITEMS ARE PART OF BOM ITEM 47, KIT, INSULATOR PART NO. 136132-100.

	ITEM	AEL	DESCRIPITION	NSN	41	QTY.
(NOTE 101)	5		TAPE, BONDING, DBL. SIDED	NSNR	RL	2
	4		TAPE, JOINT, 150' ROLL	NSNR	RL	2
	3		CLIPS, 2 PC., SELF STICK	NSNR	EA	700
	2		CEILING SECTION	NSNR	EA	14
(NOTE 101)	1		WALL SECTION 4' X 100'	NSNR	RL	2

LIST OF MATERIALS

IDENT NO STD-AF-0130 SHEET 1 OF 1

ORGANIZATION U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

	DATE
DESIGNED BY [signature]	14 MAR 78
DRAWN BY RK	9 MAR 78
CHECKED BY RK	9 MAR 78
APPROVED BY [signature]	19 MAR 78

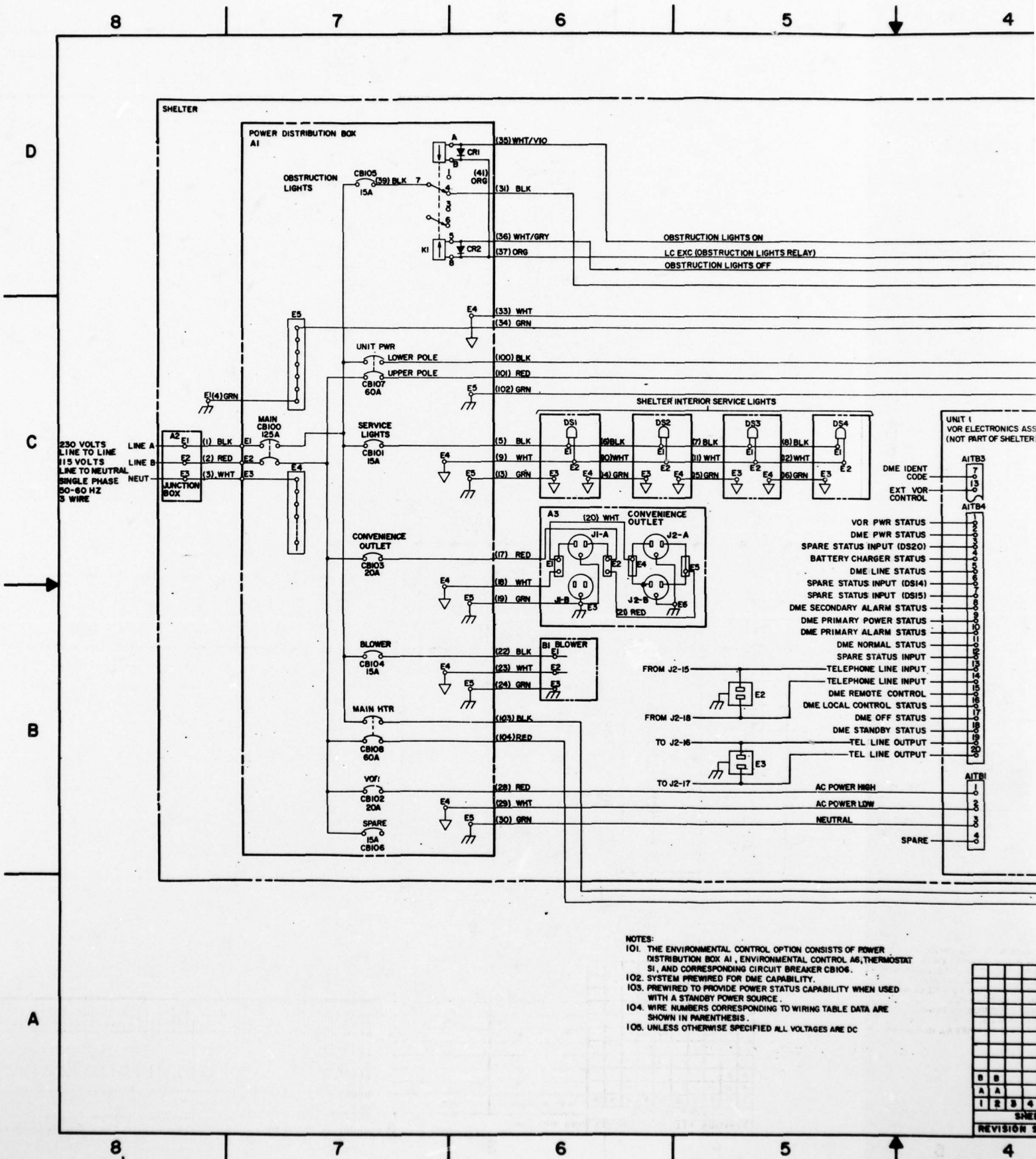
21 FT TVOR SHELTER
INSULATION KIT
INSTALLATION DETAILS

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

DESIGN ACTIVITY CCC-CEO-SWA

SIZE D FSCM NO 50470 DRAWING NO

SCALE AS SHOWN SHEET OF

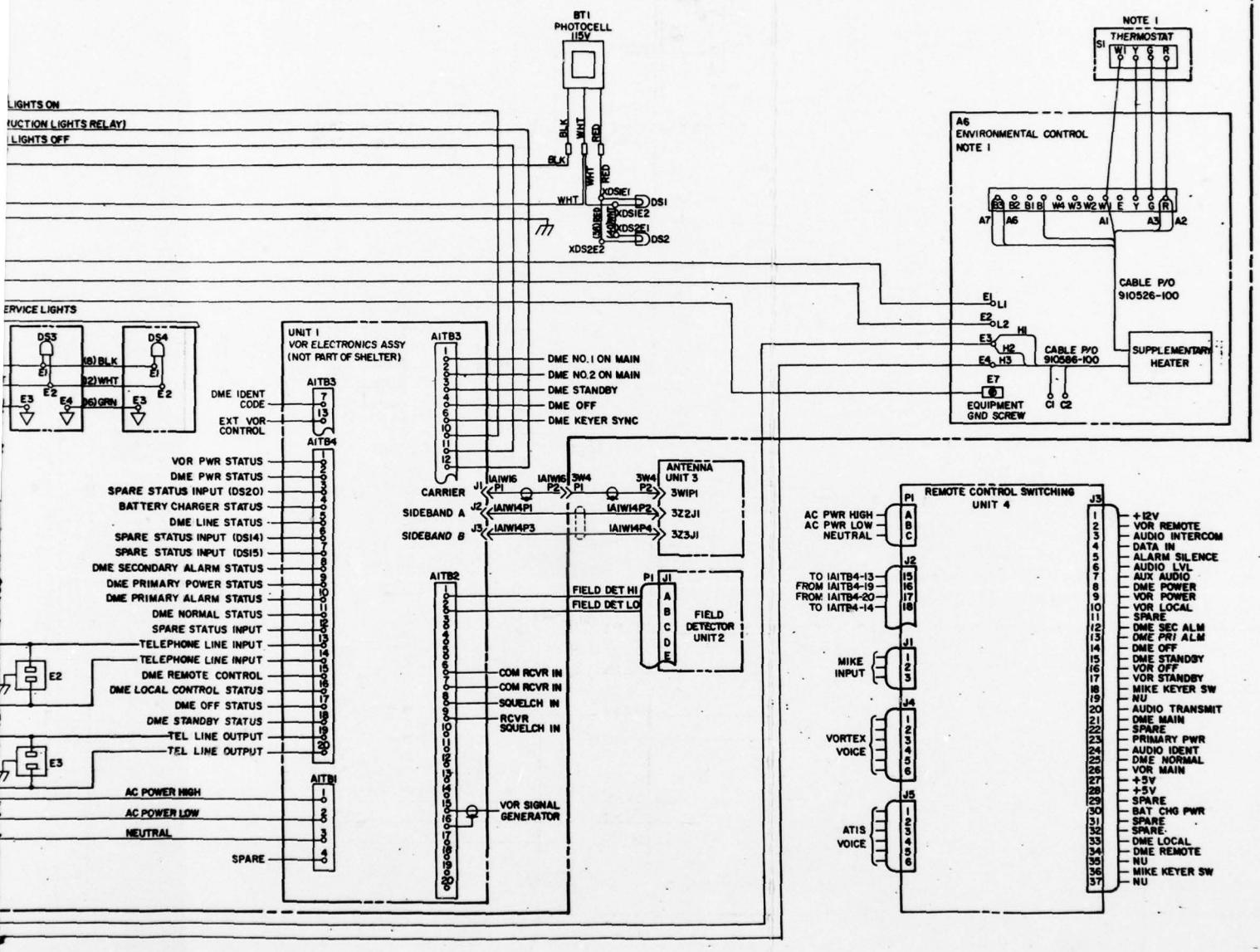


NOTES:

101. THE ENVIRONMENTAL CONTROL OPTION CONSISTS OF POWER DISTRIBUTION BOX A1, ENVIRONMENTAL CONTROL A6, THERMOSTAT S1, AND CORRESPONDING CIRCUIT BREAKER CB106.
102. SYSTEM PREWIRED FOR DME CAPABILITY.
103. PREWIRED TO PROVIDE POWER STATUS CAPABILITY WHEN USED WITH A STANDBY POWER SOURCE.
104. WIRE NUMBERS CORRESPONDING TO WIRING TABLE DATA ARE SHOWN IN PARENTHESIS.
105. UNLESS OTHERWISE SPECIFIED ALL VOLTAGES ARE DC

REVISION

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REMOVED NOTE 6	2 OCT 78	
	B	REVISED SHEET 2	17 OCT 78	



TAL CONTROL OPTION CONSISTS OF POWER
X A1, ENVIRONMENTAL CONTROL A6, THERMOSTAT
PONDING CIRCUIT BREAKER CB106.
ED FOR DME CAPABILITY.
OVIDE POWER STATUS CAPABILITY WHEN USED
POWER SOURCE.
ORRESPONDING TO WIRING TABLE DATA ARE
THESIS.
SE SPECIFIED ALL VOLTAGES ARE DC

REVISION STATUS OF SHEETS										
SHEET NUMBER	1	2	3	4	5	6	7	8	9	10
	A	A							B	B

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

IDENT NO	STD-AF-0551
	SHEET 1 OF 2
DESIGNED BY	R. Townsley
DRAWN BY	RK 9 Mar 78
CHECKED BY	RK 9 Mar 78
APPROVED BY	19 MAR 78
DESIGN ACTIVITY	CCC-CED-SWA

ORGANIZATION
U S ARMY COMMUNICATIONS-ELECTRONICS
ENGINEERING INSTALLATION AGENCY

TVOR SYSTEM INTERCONNECTION DIAGRAM

SIZE	FSCM NO	DRAWING NO
D	50470	

SCALE: NONE | SHEET OF

2

TVOR POWER DISTRIBUTION WIRING LIST							
WIRE NO.	MAKE FROM BOM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	MATERIAL ITEM NO.	CIRCUIT POINT	MATERIAL ITEM NO.	
1			Customer furnished				P/O support construction
2			Customer furnished				P/O support construction
3			Customer furnished				P/O support construction
4	177	7	E1		2A1E5		
5	173	12	2A1CB101		2XDS1E1	182	Include blk wire from XDS1 and wire 6 in splice
6	173	12	2XDS1E1		2XDS2E1	182	Include blk wire from XDS2 and wire 7 in splice
7	173	12	2XDS2E1		2XDS3E1	182	Include blk wire from XDS3 and wire 8 in splice
8	173	12	2XDS3E1		2XDS4E1	182	Include blk wire from XDS4 in splice
9	174	12	2A1E4		2XDS1E2	182	Include wht wire from XDS1 and wire 10 in splice
10	174	12	2XDS1E2		2XDS2E2	182	Include wht wire from XDS2 and wire 11 in splice
11	174	12	2XDS2E2		2XDS3E2	182	Include wht wire from XDS3 and wire 12 in splice
12	174	12	2XDS3E2		2XDS4E2	182	Include wht wire from XDS4 in splice
13	177	12	2A1E5		2XDS1E3		
14	177	12	2XDS1E4		2XDS2E3		
15	177	12	2XDS2E4		2XDS3E3		
16	177	12	2XDS3E4		2XDS4E3		
17	176	2	2A1CB103		2A3E2		Silver colored mtg screw
18	174	2	2A1E4		2A3E1		Gold colored mtg screw
19	177	2	2A1E5		2A3E3		Grn colored mtg screw
20	174	1	2A3E1		2A3E4		Silver colored mtg screw
21	176	1	2A3E2		2A3E5		Gold colored mtg screw
22	173	6	2A1CB104		2B1E1	182	Splice with blk wire from B1
23	174	6	2A1E4		2B1E2	182	Splice with wht wire from B1
24	177	6	2A1E5		2B1E3		Connect to B1 frame
25							
26							
27							
28	176	12	2A1CB102		1A1TB1-1	194	
29	174	12	2A1E4		1A1TB1-2	194	
30	177	12	2A1E5		1A1TB1-3	194	
31	173	13	2A1XK1-4	194	2A48T1	182	Splice in base of XDS1/XDS2
32							
33	174	20	2A1E4		2A4XDS1E2	194	Include wht wire from BT1 in splice
34	177	20	2A1E5		2A4E1	194	Connect to A4 frame
35	177	13	2A1XK1-A	194	1A1TB3-10	194	
36	179	13	2A1XK1-5	192	1A1TB3-11	192	
37	178	13	2A1XK1-8	192	1A1TB3-12	192	
38	176	2	2A4DS1E1	194	2A4XDS2E2	194	Include RED wire from BT1
39	174	6	2A1CB105		2A1XK1-7	192	
40	174	4	2A4XDS1E2		2A4XDS2E2		Silver colored mtg screw
41	178	2	2A1XK1-B	192	2A1XK18	192	Splice with wire 37 using item 54
101 CONFIGURATION							
100	173	240	2A1CB107		2A6E1		
101	176	240	2A1CB107		2A6E2		
102	177	240	2A1E5		2A6E7		
103	173	240	2A1CB108		2A6E3		
104	177	240	2A1CB108		2A6E4		

5 4 3 2 1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED BOM	29SEP78	[illegible]
	B	REVISED MATERIAL ITEM NO'S.	17 OCT 78	[illegible]

D

C

B

A

splice

em 54

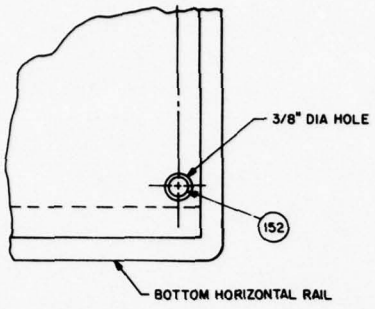
TVOR SYSTEM
INTERCONNECTION DIAGRAM

IDENT NO STD-AF-0551 SHEET 2 OF 2	SIZE D	FSCM NO 50470	DRAWING NO		
DRAWN BY RK					
APPROVED BY	SCALE NONE	1"		SHEET	OF

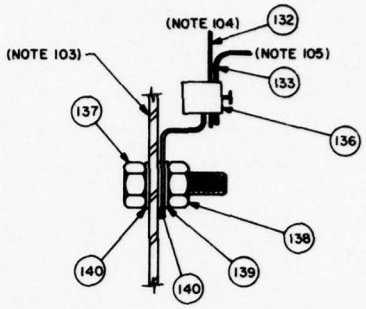
ENTERED IN GRACESTA

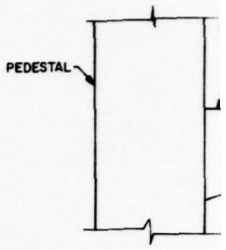
5 4 3 2 1

2

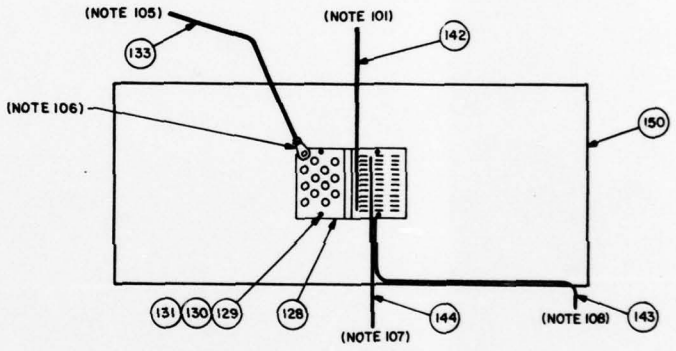


DETAIL A
ELECTRICAL EQUIPMENT RACK
ANCHORING





DETAIL B
ELECTRICAL EQUIPMENT RACK
GROUNDING



DETAIL C
PROTECTOR TERMINAL BLOCK MOUNTING PANEL
(REAR VIEW)

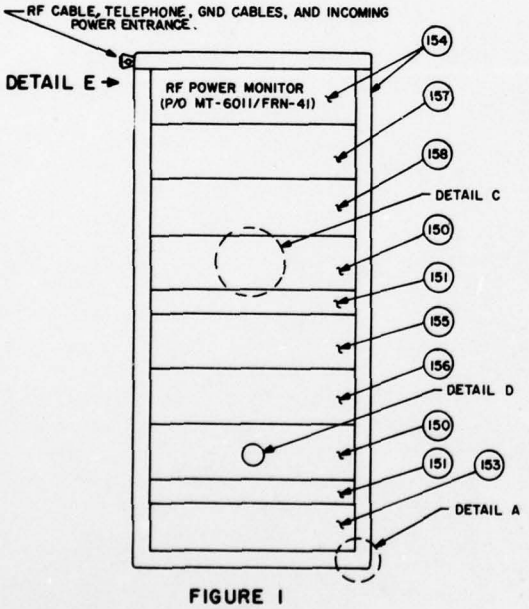
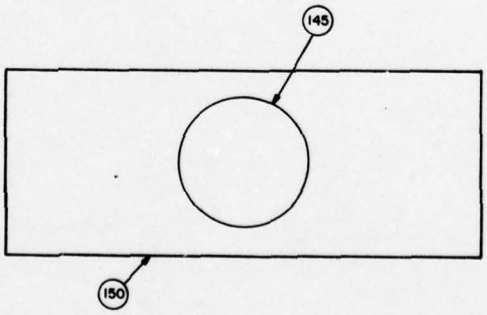
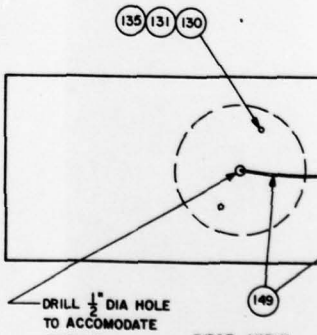


FIGURE 1
TVOR
ELECTRICAL EQUIPMENT RACK



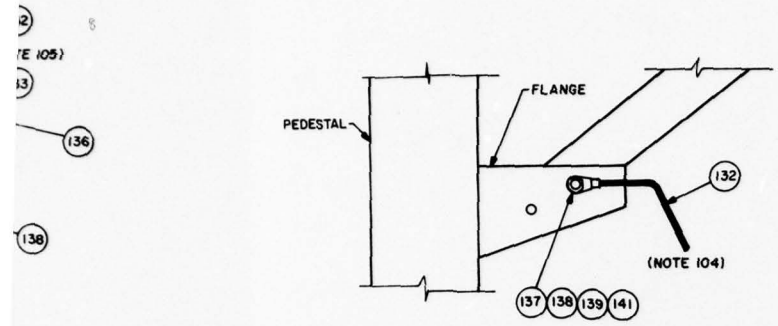
FRONT VIEW



REAR VIEW

DETAIL D
EMERGENCY ALARM BELL PANEL

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ADDED DETAIL E	31 JAN 79	



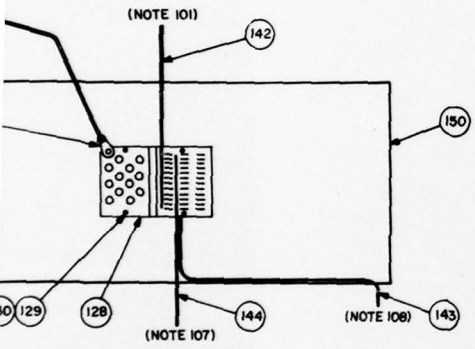
DETAIL B
ELECTRICAL EQUIPMENT RACK
GROUNDING

GENERAL NOTES:

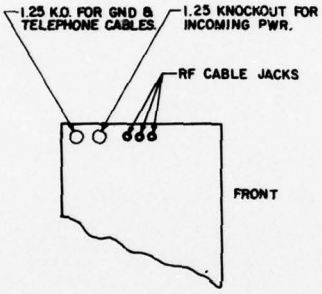
1. ITEMS 153-160 ON THE LIST OF MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS P/O THE TVOR SYSTEM. THE REMAINING ITEMS MUST BE SUPPLIED BY THE EQUIPMENT INSTALLATION AGENCY / CONTRACTOR.

NOTES:

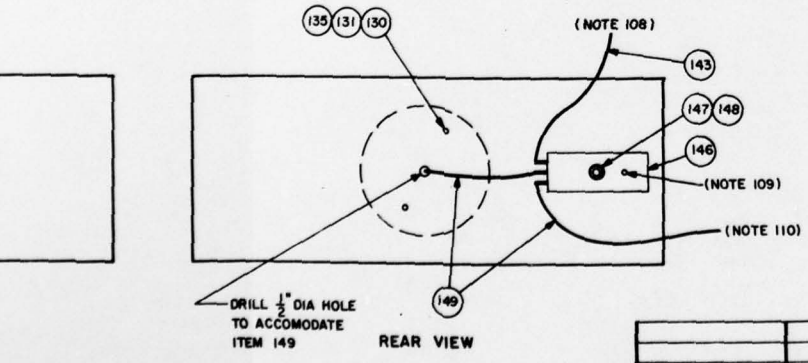
101. TELEPHONE CABLE VIA UPPER PEDESTAL OPENING.
102. GROUND WIRE TO PEDESTAL.
103. DRILL A 15/16" DIA HOLE IN THE TERMINAL MOUNTING PLATE TO ATTACH GROUND LUG.
104. GROUND WIRE FROM GROUND LUG TO ANTENNA PEDESTAL.
105. GROUND WIRE FROM GROUND LUG TO PROTECTOR BLOCK.
106. TERMINAL LUG P/O PROTECTOR BLOCK.
107. TO A1TB4 IN THE ELECTRONIC EQUIPMENT RACK. REFER TO DRAWING STD-AF-0551.
108. INTERCONNECT FROM PROTECTOR BLOCK TO EMERGENCY ALARM PANEL.
109. ALIGNMENT PIN.
110. HARDWIRE TO AC SOURCE; TERMINAL BLOCK A1TB1; SEE STD-AF-0551, SHEET 1 OF 2.



DETAIL C
TOR TERMINAL BLOCK MOUNTING PANEL
(REAR VIEW)



DETAIL E
VOR CABINET-TOP LEFT SIDE
CABLE INTERFACE POINTS



DETAIL D
MERGENCY ALARM BELL PANEL

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
160	22935A	ANTENNA, AS-3323/FRN-41	NSNR	EA	1
158	22933W	MONITOR, PHASE, MOD ID-2179/FRN-41	NSNR	EA	1
157	22932H	CONTROL-INDICATOR, C-10527/FRN-41	NSNR	EA	1
156	22931G	TRANSMITTER, T-1395/FRN-41	NSNR	EA	1
155	22930F	TRANSMITTER, T-1394/FRN-41	NSNR	EA	1
154	22929F	RACK, MT-6011/FRN-41	NSNR	EA	1
153	22922W	PANEL BLANK, PART NO. 135922-001	NSNR	EA	1
152	19255Y	SHIELD, EXPANSION, 3/8" RAWL NO. 6006	NSNR	EA	AR
151	22500E	PANEL BLANK, ALUMINUM, 19"X11/2"X1/8"	5975-00-056-3984	EA	2
150	02406H	PANEL BLANK, ALUMINUM, 19"X7"X1/8"	5970-00-685-9791	EA	2
149	14886J	CABLE, POWER, ELEC, 3C16 AWG	6145-00-542-6068	FT	AR
148	00487C	WASHER, FLAT, NO. 8	5310-00-167-0833	HD	AR
147	10425H	NUT, HEX, NO. 8-32	5310-00-619-2480	EA	24
146	22928E	RELAY, POTTER-BRUMFIELD ABC7DY48	NSNR	EA	1
145	07966B	BELL, 117V AC, EDWARDS 340-6N5	6350-00-276-8912	EA	1
144	22503H	CABLE, TELE, 4C 22 AWG, INSULATED	6145-00-977-8061	FT	AR
143	22504W	CABLE, TELE, 2C 22 AWG, INSULATED	6145-00-635-1195	FT	AR
142	21872D	CABLE, TELE, 6 PR, BURIAL / DUCT	6145-00-528-2710	FT	AR
141	11526W	TERMINAL LUG, MECHANICAL COMPRESSION	5940-00-225-8860	EA	1
140	10231A	WASHER, LOCK, F/U/W 1/4" BOLT	5310-00-808-5381	EA	25
139	10290Y	WASHER, FLAT, .266 ID	5310-00-819-4696	EA	24
138	00558H	NUT, HEX, 1/4-20	5310-00-285-1650	HD	AR
137	00398F	BOLT, 1/4-20 X 1 1/4" LG	5306-00-141-2883	EA	AR
136	07452Y	TERMINAL LUG, CLAMP TYPE, 2-8 AWG	5940-00-549-8075	PG/10	1
135	07472Q	SCREW, MACHINE, NO. 10-32 X 3/4" LG	5305-00-993-1848	HD	AR
134	02359E	BOX CONNECTOR, CLAMP	5975-00-152-1144	EA	1
133	05285Y	WIRE, COPPER, INS, 10 AWG, GREEN	6145-00-191-2569	FT	AR
132	03360Q	WIRE, ELEC, BARE, 6 AWG	6145-00-129-9320	FT	AR
131	00488D	WASHER, FLAT NO. 10	5310-00-167-0834	HD	AR
130	00560J	NUT, HEX, NO. 10-32	5310-00-840-0530	EA	24
129	10113D	SCREW, MACHINE, NO. 10-32 X 1 1/2" LG	5305-00-995-3441	HD	AR
128	19851M	PROTECTOR BLOCK, 8 PR, RELIABLE R66C1-6P	5940-00-089-7802	EA	1

LIST OF MATERIALS

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

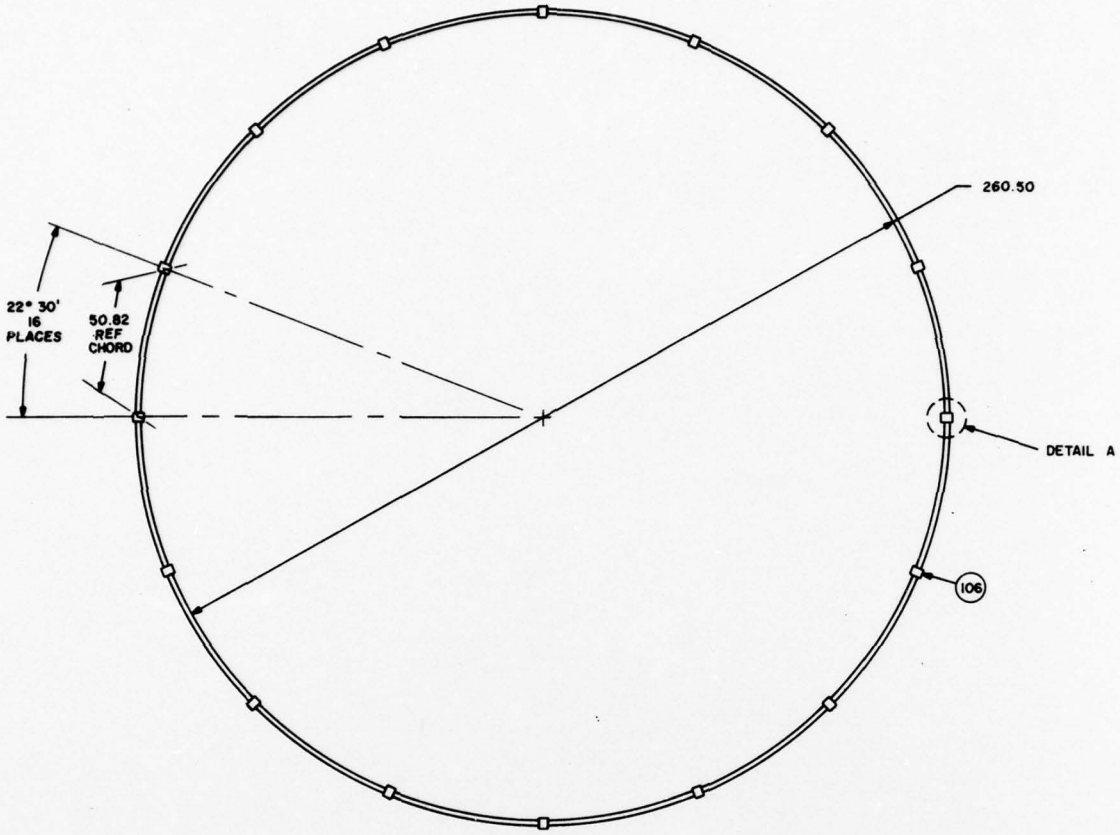
IDENT NO: STD-AF-0552
SHEET 1 OF 1

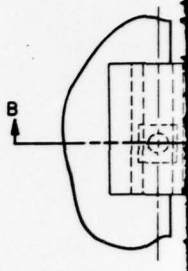
ORGANIZATION: U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

DESIGNED BY W. BESS	DATE 3 OCT 78
DRAWN BY M. BOLLACK	9 OCT 78
CHECKED BY	2 Nov 78
APPROVED BY	3 Nov 78
DESIGN ACTIVITY CCC-CED-SEP	

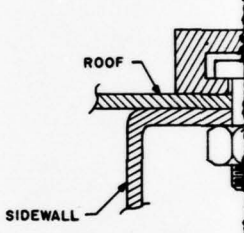
TVOR
ELECTRICAL EQUIPMENT INSTALLATION

SIZE D | FSCM NO 50470 | DRAWING NO
SCALE NONE | 1" | SHEET OF

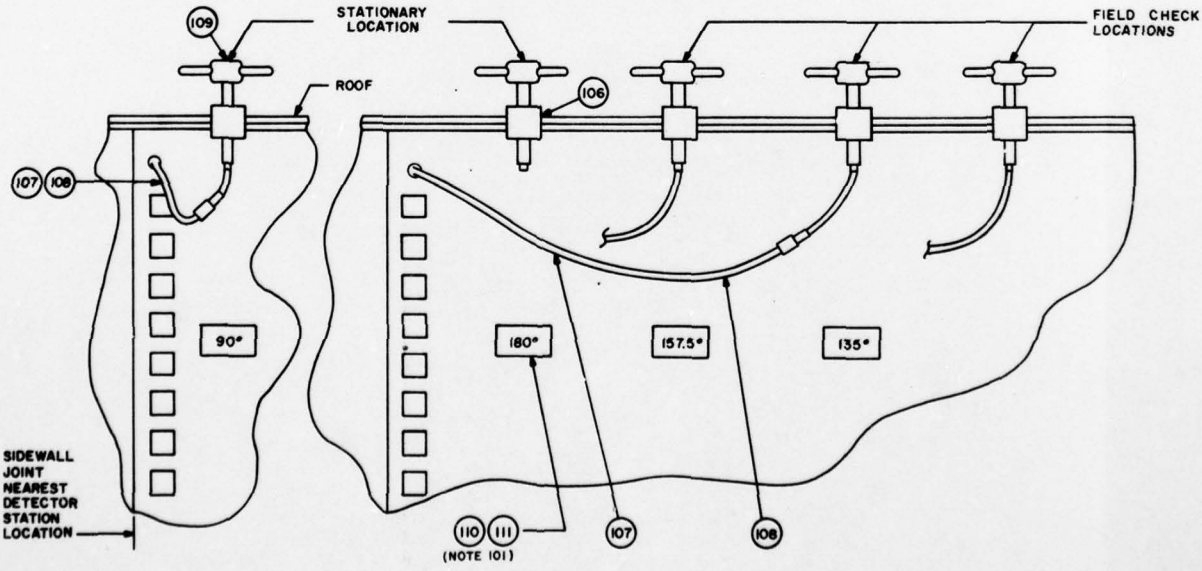




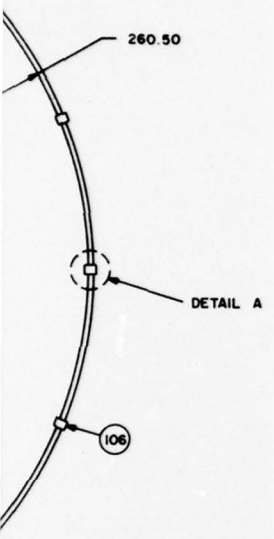
DETAIL A

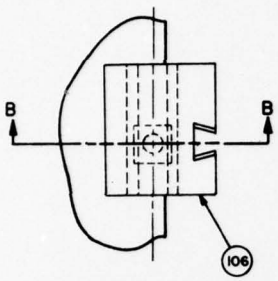


SECTI

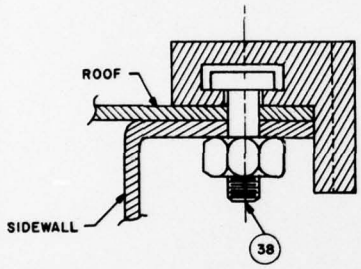


REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MINOR REVISION	17 OCT 78	
	B	CHANGED PICTURE-BOLT DETAIL	31 JAN 79	

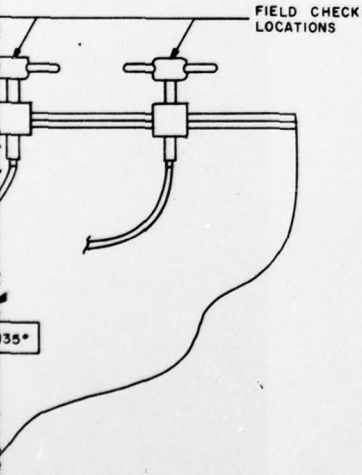




DETAIL A



SECTION B-B



GENERAL NOTES:

1. ALL ITEMS ON THE LIST MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS P/O THE TVOR SYSTEM.

NOTES:

101. ITEM 111 IS USED WITH ITEM 110 TO STENCIL THE FIELD DETECTOR BRACKET LOCATIONS ON THE SIDE OF THE SHELTER.

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
111	22911W	PAINT, SPRAY, BLACK	NSNR	EA	AR
110	22910H	MARKING TEMPLATE KIT	NSNR	EA	1
109	22909H	FIELD DETECTOR ASSEMBLY	NSNR	EA	1
108	22908G	CABLE ASSEMBLY W3	NSNR	EA	1
107	22907F	CABLE ASSEMBLY W1	NSNR	EA	1
106	22806E	BRACKET, FIELD DETECTOR	NSNR	EA	17
38	22815B	BOLT, SQHD, 1/2 - 13 X 1.50 LG	NSNR	EA	17

LIST OF MATERIALS

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

IDENT NO: STD-AF-0553 SHEET 1 OF 1

ORGANIZATION: U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

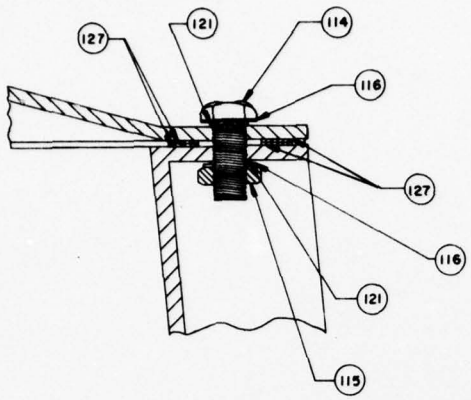
DESIGNED BY W. BESS	DATE 10/10/78
DRAWN BY S. GILL	10/10/78
CHECKED BY	
APPROVED BY	

TVOR SYSTEM DETECTOR
DT-603/FRN-41
INSTALLATION DETAIL

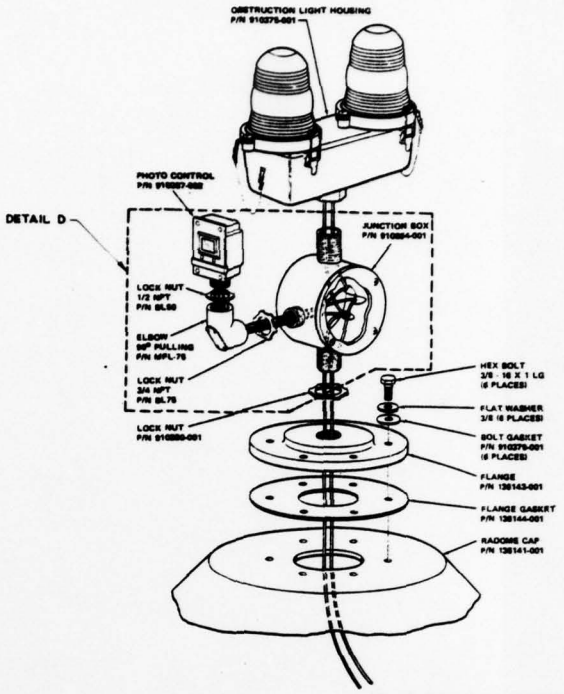
DESIGN ACTIVITY: CCC-CED-SEP

SIZE D | FSCM NO 50470 | DRAWING NO

SCALE NONE | SHEET OF



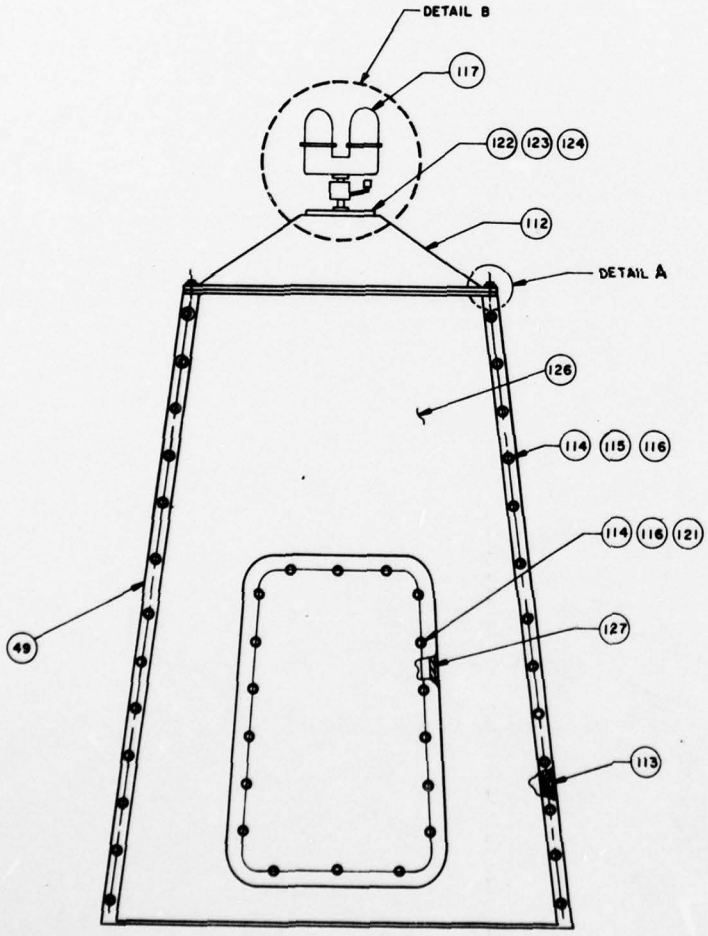
DETAIL A

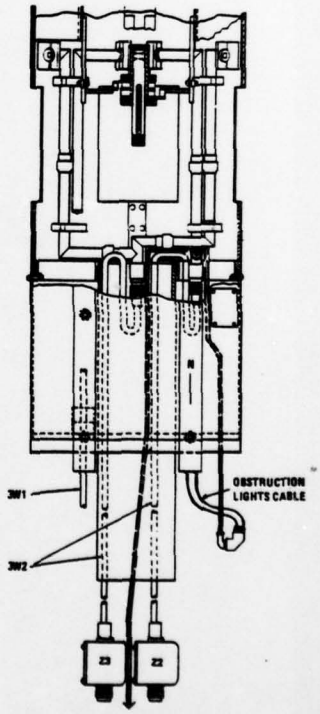


TO AC SOURCE BY CONDUIT ON OUTSIDE OF ANTENNA. DETAIL C.

DETAIL B

OBSTRUCTION LIGHTS ASSEMBLY



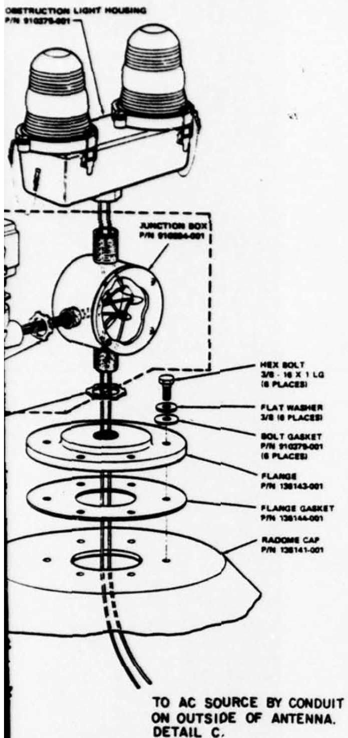


OBSTRUCTION LIGHT WIRES TO RELAY (SEE ADDITIONAL DWGS)

DETAIL C

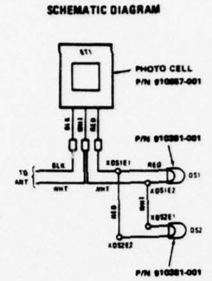
OBSTRUCTION LIGHT ROUTING

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ADDED DETAILS	1 FEB 79	[illegible]

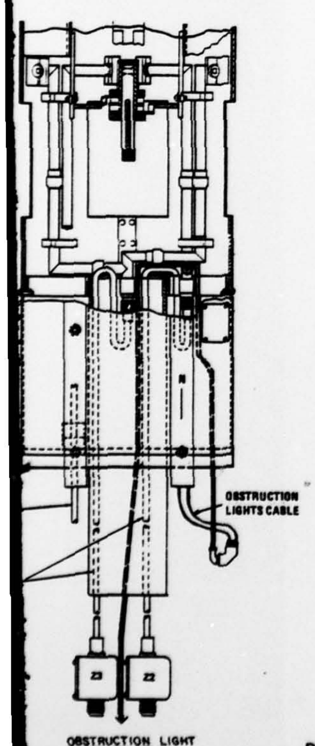


DETAIL B
OBSTRUCTION LIGHTS ASSEMBLY

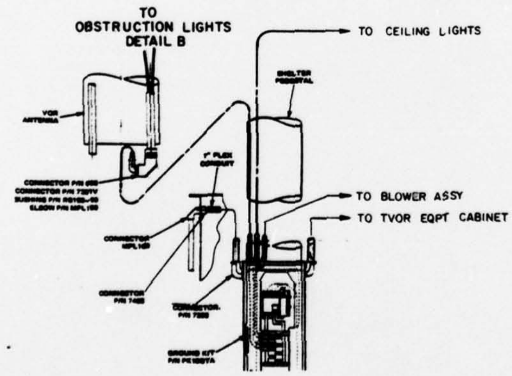
PHOTO CELL
SCHEMATIC DIAGRAM



DETAIL D



DETAIL C
OBSTRUCTION LIGHT ROUTING



GENERAL NOTES:

1. ALL ITEMS ON THE LIST OF MATERIALS ARE SUPPLIED BY THE EQUIPMENT MANUFACTURER AS P/O THE TVOR RADOME ASSEMBLY.

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
127	22927D	GASKET, 1/8X1/2	NSNR	EA	2
126	22926C	SHELL, RADOME	NSNR	EA	1
124	22924A	GASKET, BOLT, NEOPRENE	NSNR	EA	6
123	08766J	WASHER, FLAT 3/8	5310-00-579-2071	EA	6
122	06237Z	BOLT, HEX 3/8-16X1" LG	5306-00-579-1451	EA	6
121	22921H	O-RING, GASKET	NSNR	EA	118
117	22917E	PHOTO CELL AND OBSTRUCTION LIGHT	NSNR	EA	1
116	22916D	WASHER, FLAT, NYLON 1/2	NSNR	EA	118
115	22915C	NUT, NYLON, 1/2-13	NSNR	EA	48
114	22914B	BOLT, NYLON, 1/2-13X1 1/2 LG	NSNR	EA	70
113	22913A	GASKET 1/8X2"	NSNR	EA	1
112	22912Z	CAP, RADOME	NSNR	EA	1
49	22826B	RADOME ASSEMBLY	NSNR	EA	1

LIST OF MATERIALS

IDENT NO: STD-AF-0554
SHEET 1 OF 1

ORGANIZATION: U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

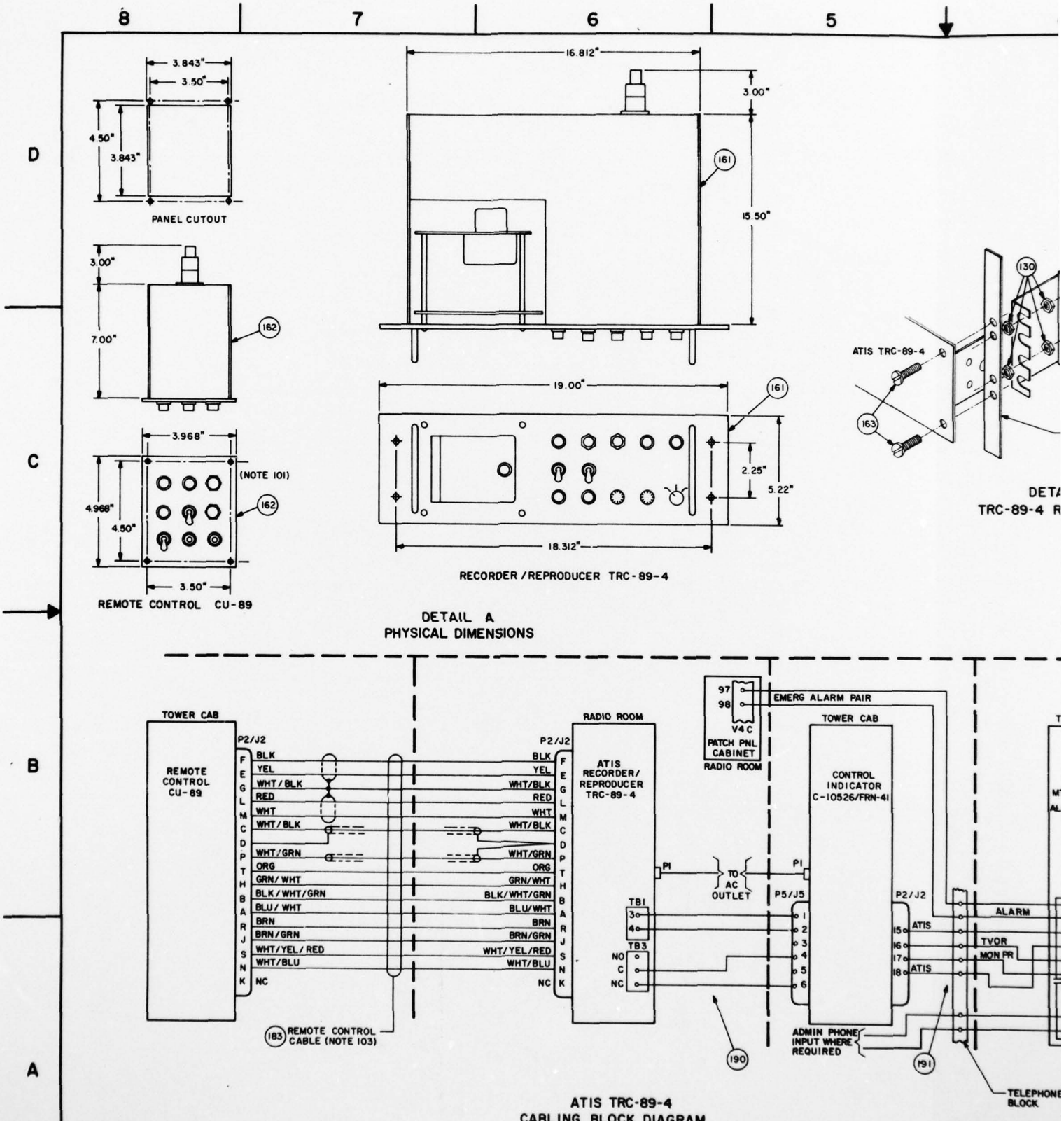
DESIGNED BY: W. BESS
DRAWN BY: S. GILL — DATE: 10/11/78
CHECKED BY: [illegible] — 2 Nov 78
APPROVED BY: [illegible] — 9 Nov 78
DESIGN ACTIVITY: CCC-CED-SEP

TVOR RADOME ASSEMBLY
INSTALLATION DETAILS

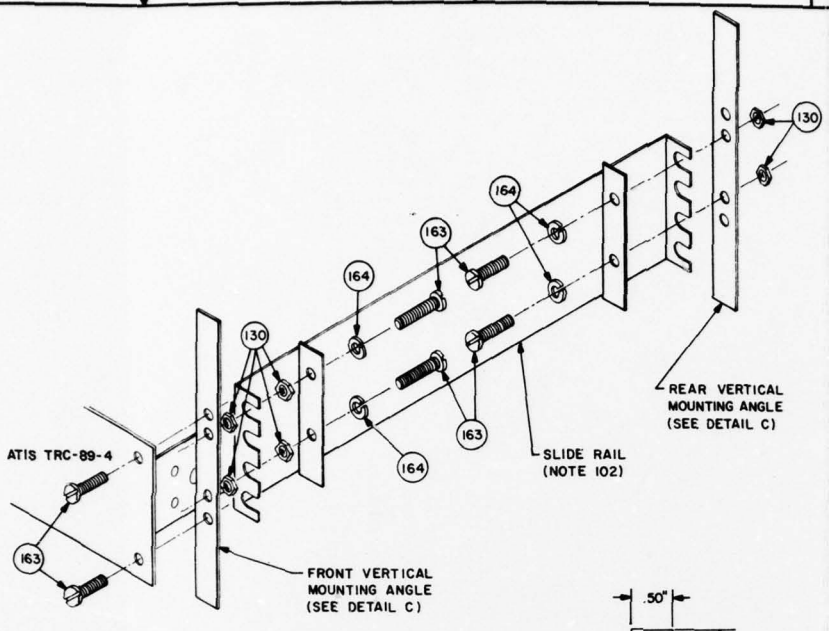
SIZE: D — FSCM NO: 50470 — DRAWING NO:
SCALE: NONE — SHEET — OF

NEXT ASSEMBLY	USED ON

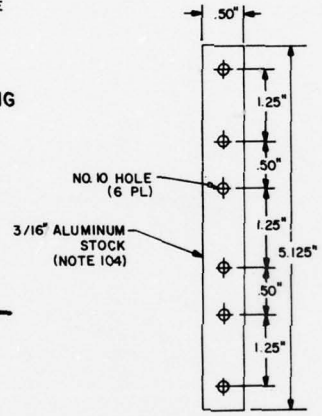
DWG INDEX NO:


8
7
6
5
D
C
B
A
3.843"
3.50"
4.50"
3.843"
PANEL CUTOUT
16.812"
3.00"
161
15.50"
3.00"
7.00"
162
19.00"
161
2.25"
5.22"
18.312"
RECORDER / REPRODUCER TRC-89-4
3.968"
(NOTE 101)
4.968"
4.50"
162
3.50"
REMOTE CONTROL CU-89
ATIS TRC-89-4
130
163
DETAIL A
PHYSICAL DIMENSIONS
TOWER CAB
REMOTE CONTROL CU-89
P2/J2
FEGLMCDPTHBARJSNK
BLK
YEL
WHT/BLK
RED
WHT
WHT/BLK
WHT/GRN
ORG
GRN/WHT
BLK/WHT/GRN
BLU/WHT
BRN
BRN/GRN
WHT/YEL/RED
WHT/BLU
NC
183 REMOTE CONTROL CABLE (NOTE 103)
RADIO ROOM
ATIS RECORDER/ REPRODUCER TRC-89-4
P1
TB1
TB3
NO
C
NC
97
98
EMERG ALARM PAIR
V4C
PATCH PNL CABINET
RADIO ROOM
TO AC OUTLET
TOWER CAB
CONTROL INDICATOR C-10526/FRN-41
P5/J5
P2/J2
ALARM
ATIS
TVOR
MON PR
ATIS
ADMIN PHONE INPUT WHERE REQUIRED
190
191
TELEPHONE BLOCK
ATIS TRC-89-4
CABLING BLOCK DIAGRAM

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REV CABLING DIAGRAM. ADD WIRING DIAGRAM	31JAN79	



DETAIL B
TRC-89-4 RACK MOUNTING



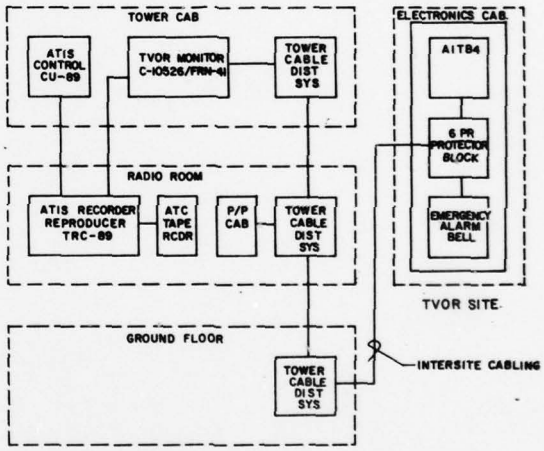
DETAIL C
TRC-89-4
MOUNTING BRACKETS

GENERAL NOTES:

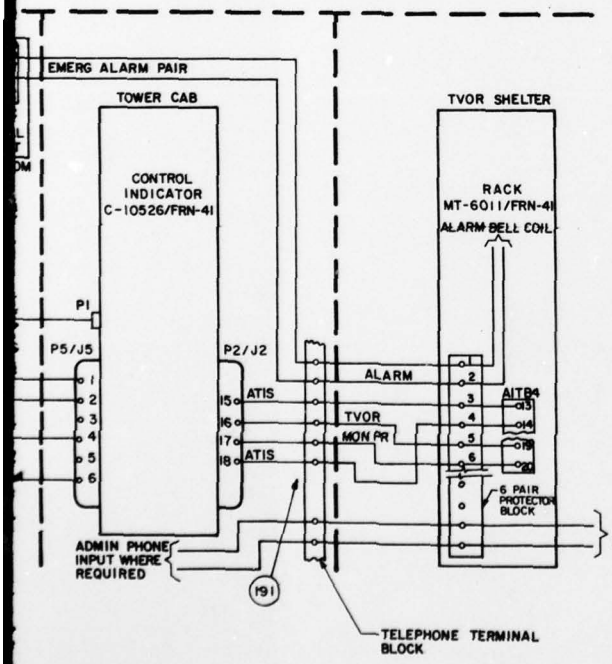
1. ALL ITEMS ON THE LIST OF MATERIALS MUST BE SUPPLIED BY THE EQUIPMENT INSTALLATION AGENCY/CONTRACTOR SINCE THEY ARE NOT P/O THE TVOR SYSTEM.

NOTES:

101. PART OF RECORDER/REPRODUCER SET TRC-39-4
102. THE TRC-89-4 IS SHIPPED WITH RACK MOUNTING SLIDES ATTACHED; HOWEVER, THE MOUNTING BRACKETS, DETAIL C, MUST BE FABRICATED.
103. REMOTE CONTROL CABLE BETWEEN THE REMOTE CONTROL UNIT AND THE RECORDER/REPRODUCER MUST BE LOCALLY FABRICATED.
104. USE LOM ITEM 204 AS ALUMINUM STOCK.



BLOCK WIRING DIAGRAM



ITEM	AEL	DESCRIPTION	NSN	UI	QTY
204	11356D	PANEL, ALUMINUM, 19" X 5 3/4" X 3/16"	NSNR	EA	AR
191	22503H	CABLE, 4C, 22 AWG	6145-00-577-8061	FT	AR
190	17398M	CABLE, 1 PR, BELDEN	6145-00-080-1486	FT	AR
189	14549G	CABLE, 18C(9PR), 22 AWG	6145-00-957-8516	FT	AR
164	00483J	WASHER, LOCK SPLIT, NO. 10	5310-00-045-3296	HD	AR
163	00337G	SCREW, MACHINE, NO. 10-32 X 1/2" LG	5305-00-989-7434	HD	AR
162	22937C	REMOTE CONTROL, CU-89	NSNR	EA	1
161	22936B	RECORDER/REPRODUCER, TRC-89-4	NSNR	EA	1
130	00560J	NUT, HEX, NO. 10-32	5130-00-840-0530	EA	AR

LIST OF MATERIALS

NEXT ASSEMBLY	USED ON
DWG INDEX NO:	

IDENT NO: STD-AF-0580 SHEET 1 OF 1

		DATE
DESIGNED BY	W. BESS	
DRAWN BY	M. POLLACK	9 OCT 78
CHECKED BY		2 Nov 78
APPROVED BY		3 Nov 78
DESIGN ACTIVITY	CCC-CED-SEP	

ORGANIZATION: US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY

(ATIS) TRC-89-4 AUTOMATIC TERMINAL INFORMATION SYS INSTALLATION DETAILS

SIZE: D | FSCM NO: 50470 | DRAWING NO:

SCALE: NONE | SHEET: OF

AD-A065 932 ARMY COMMUNICATIONS COMMAND FORT HUACHUCA ARIZ F/G 17/7
STANDARD ENGINEERING INSTALLATION PACKAGE. TERMINAL VHF OMNIDIR--ETC(U)
FEB 79

UNCLASSIFIED ACC-SEIP-012 NL

2 OF 3
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DATE FILMED
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CONT


F

SECTION 5. BILL OF MATERIALS

5.1 GENERAL. This section identifies major items of equipment and materials necessary to install the TVOR system. The items identified are intended as a guide for preparing a BOM associated with a particular EIP. Items may be added or deleted as required to meet the requirements of a specific installation.

5.2 MAJOR ITEMS. The major items are listed on DA Form 3071R, Bill of Materials, shown in figure 5-1. The authorized equipment list (AEL) identification and national stock numbers are provided when available; however, when these numbers are not available the nomenclature will include the manufacturer's part number.

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

Per use of this form, see AR 105-32; the proponent agency is the United States Army Communications Command.

LOCATION				UNIT IDENT CODE			
TELER NUMBER				DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED	
		NOTES *The following BOM items are P/O E-Systems Inc., VHF Omnidirectional Range System, Part #136060-100, designated as Transmitting Set, Radio AN/FRN-41(V)1; therefore, they do not have to be procured separately when the entire system is required: 1-14, 17-127, 153-160, 170-182, 190-203 and 205-211. **(162) P/O item 161 ***(165) Items 165 & 166 to be used in accordance with installation instructions contained in section 3. ****(167) Items 167-194 and 204 to be used at the discretion of the engineer, in order to satisfy local engineering requirements.					
1*	NSNR (22781Z)	Foundation Ring Stave Part #136197-001	ea	14			
2	NSNR (22782A)	Centering Tie Strap Part #136198-001	ea	7			
3	NSNR (22783B)	Ring Location Anchor Bolt Part #136199-001	ea	1			
4	NSNR (22784C)	3/4"-10x10" Anchor Bolt Bent, Galv	ea	8			
5	NSNR (22785D)	3/4"-10x14" Anchor Bolt Straight Galv	ea	4			

DA FORM 1 APR 70 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 1 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
6	NSNR (22786E)	1/2"-13x9" Anchor Bolt Straight, Galv	ea	14		
7	NSNR (22787F)	1/2"-13x1" Square Head Bolt, Galv	ea	55		
8	5310-00-088-7647 (16880N)	1/2" Flat Washer, Galv	ea	40		
9	5310-00-768-0318 (00493K)	1/2"-13 Hex Nut, Galv	ea	3350		
10	NSNR (22788G)	Plate Washer, Painted, Part #136196-001	ea	12		
11	NSNR (22780J)	3/4"-10 Hex Nut, Galv	ea	30		
12	5310-00-285-1497 (08354Y)	3/4" Flat Washer, Galv Part #78051-2	ea	15		
13	NSNR (22789H)	1.25 Dia x .56 x 1/8 Spacer Galv	ea	8		
14	NSNR (22790K)	Stake, Grounding Part #910917-001	ea	1		
15	NSNR (22791J)	Conduit, PVC 1-1/4"	ft	AR		
16	NSNR (22792Z)	Conduit, PVC 1"	ft	AR		

DA FORM 1 APR 79 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 2 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-23; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT IDENTITY CODE

TELER NUMBER | DATE | WORK NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE ON HAND	REQUIRED
17	NSNR (22793A)	Shelter 21' Dia Part #136131-130	ea	1		
18	NSNR (22794B)	Pedestal Assembly Part #136180-001	ea	1		
19	NSNR (22795C)	Ring Stave Standard, Orange Bottom Part #136185-001	ea	7		
20	NSNR (22796D)	Ring Stave Standard, White Bottom, Part #136165-002	ea	5		
21	NSNR (22797E)	Air Conditioning Stave, Part #136183-001	ea	1		
22	NSNR (22798F)	Door opening Stave, Part #136184-001	ea	1		
23	NSNR (22799G)	Flanged Holder, Antenna Part #136186-001	ea	1		
24	NSNR (22800H)	Deck Segment Part #136187-001	ea	14		
25	NSNR (22801W)	Deck Stiffener, Long, Part #136188-001	ea	14		
26	NSNR (22802Z)	Deck Stiffener, Short, Part #136188-002	ea	14		
27	NSNR (22803A)	Landing Ring, Part #136189-001	ea	1		

DA FORM 1 APR 76 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 3 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-32; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT IDENT CODE

TELEA NUMBER | DATE | PAGE NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
28	NSNR (22805C)	Reinforcement Angle, Environmental, Part #136178-001	ea	2		
29	NSNR (22806D)	Bolt Retainer, Side Stave Part #136191-005	ea	14		
30	NSNR (22807E)	Bolt Retainer, Door Frame (top and bottom), Part #136191-002	ea	2		
31	NSNR (22808F)	Bolt Retainer, Door Frame (left and right) Part #136191-003	ea	2		
32	NSNR (22809G)	Bolt Retainer, Ceiling "U", Part #136191-004	ea	14		
33	NSNR (22810G)	Bolt Retainer Part #136191-001	ea	14		
34	NSNR (22811H)	Bolt Retainer, Ceiling "L", Part #136195-001	ea	14		
35	NSNR (22812W)	Bolt Retainer, Part #136195-002	ea	14		
36	NSNR (22813Z)	Square Head Bolt 1/2"-13x1" Lg, Galv	ea	1650		
37	NSNR (22814A)	Square Head Bolt 1/2"-13x1.25" Lg, Galv	ea	1820		
38	NSNR (22815B)	Square Head Bolt 1/2"-13x1.50" Lg, Galv, Part #91465A716	ea	30		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 4 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-32; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT ISSUE CODE

TELER NUMBER | DATE | PAGE NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
39	NSNR (22816C)	Square Head Bolt 1/2"-13x2" Lg, Galv #91465A720	ea	30		
40	NSNR (22817D)	Washer, Ring, Steel-Backed Neoprene	ea	1000		
41	NSNR (22818E)	Gasket Strip, Neoprene, 3/32x1.5" Wide	ft	AR		
42	NSNR (22819F)	Epoxy Adhesive	ea	AR		
43	NSNR (22820F)	Gasket, Chime Lap	ea	AR		
44	NSNR (22821G)	Clamp, Grounding Part #910918-001	ea	1		
45	NSNR (22822H)	Washer 1/2" ID, Galv #90108A033	ea	28		
46	NSNR (22823W)	Support Brace Part #136194-001	ea	7		
47	NSNR (22824Z)	Kit, Insulation Part #136132-100	ea	1		
48	NSNR (22825A)	Power Distribution System Part #136133-100	ea	1		

DA FORM 1 APR 70 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 5 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-72; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
49	NSNR (22826B)	Radome Assembly Part #136140-101	ea	1		
50	NSNR (22827C)	Kit, Field Detector MTG Part #136871-100	ea	1		
51	NSNR (22828D)	Environmental Control Part #930093-001	ea	1		
52	NSNR (22829E)	Bolt, Square Head, 1/2"-13x13/4" Lg, Galv #91465A718	ea	34		
53	NSNR (22830E)	Blower, Part #910476-001	ea	1		
54	NSNR (22831F)	Bolt, Hex Head, 1/4"-20x1" Lg, Galv #91469A542	ea	4		
55	NSNR (22832G)	Washer, Flat 1/4" ID Galv #90108A029	ea	4		
56	NSNR (22833H)	Washer, Lock, 1/4" ID, Galv	ea	4		
57	NSNR (22834W)	Nut, Reg Hex, 1/4" x 20UNC, Galv #91841A029	ea	4		
58	NSNR (22835Z)	Screw, Sheet Metal, No. 10x3/4" Lg, Galv, PH #90053A245	ea	24		
59	NSNR (22836A)	Bracket, thermostat Part #136988-001	ea	1		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 6 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
60	NSNR (22837B)	Spacer, Wood, Part #136989-001	ea	2		
61	NSNR (22838C)	Filter-Air, Part #919019-002	ea	1		
62	NSNR (22839D)	Box, Breaker Part #0016-24MW125	ea	1		
63	NSNR (22855G)	Cover, Part #COC20MW2255	ea	1		
64	NSNR (22855H)	Ground Kit Part #PK15GTA	ea	1		
65	NSNR (22856W)	Breaker, 120/240V Single Pole Part #00115	ea	4		
66	NSNR (22857Z)	Breaker, 120/240V Single Pole Part #00120	ea	2		
67	NSNR (22858A)	Strap Part #136031-002	ea	2		
68	NSNR (22859B)	Elbow 1-1/4" Flat Back Part #LB125M	ea	1		
69	NSNR (22860B)	Nipple Part #CN125	ea	1		
70	NSNR (22861C)	Cover Part #K125	ea	1		

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Figure 5-1. Bill of Materials (sheet 7 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
71	NSNR (22862D)	Gasket Part #GK125	ea	1		
72	NSNR (22863E)	Connector Part #7484	ea	1		
73	NSNR (22864F)	Connector Part #7384	ea	1		
74	NSNR (22865G)	Box Part #45JD-1-1/4"	ea	1		
75	NSNR (22866H)	Cover Part #8487-K	ea	1		
76	NSNR (22867W)	Connector SNTC-125	ea	1		
77	NSNR (22868Z)	Connector 7383	ea	1		
78	NSNR (22869A)	Connector 7483	ea	3		
79	NSNR (22870A)	Connector 7481V	ea	9		
80	NSNR (22871B)	Box 4QD1/2	ea	4		
81	NSNR (22872C)	Lighting Arrestor Part #910925-001	ea	2		

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Figure 5-1. Bill of Materials (sheet 8 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS
For use of this form, see AR 105-23; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
82	NSNR (22873D)	Connector 7381V	ea	5		
83	NSNR (22874E)	Nipple CN-50	ea	4		
84	NSNR (22875F)	Fixture Fluorescent KL240	ea	4		
85	NSNR (22876G)	Conduit, Flex, 1-1/4" Alum	ft	AR		
86	NSNR (22877H)	Conduit, Flex, 1", Alum	ft	AR		
87	NSNR (22878W)	Conduit, Flex, 1/2", Alum	ft	AR		
88	NSNR (22879Z)	Connector 605	ea	1		
89	NSNR (22880Z)	Elbow MFL150	ea	1		
90	NSNR (22881A)	Bushing R8150-50	ea	1		
91	NSNR (22882B)	Box RS-1	ea	1		
92	NSNR (22883C)	Breaker Q0260, 120/240 Vac, two pole common trip	ea	2		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 9 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
93	NSNR (22884D)	Hub 6100	ea	1		
94	NSNR (22885E)	Connector MFL 100	ea	1		
95	NSNR (22886F)	Pipe, Rigid TBE, 1'x2' Lg	ea	1		
96	NSNR (22887G)	Nut, Lock BL100	ea	2		
97	NSNR (22897F)	Connector, 1" 90° Angle, ST90100	ea	1		
98	NSNR (22898G)	Connector, 1" Straight, ST100	ea	3		
99	NSNR (22899H)	Connector ME75-100	ea	1		
100	NSNR (22900W)	Connector RB125-100	ea	1		
101	NSNR (22901Z)	Conduit, L.T., 1" DA	ft	AR		
102	NSNR (22902A)	Clamp 1/2" Part #1211	ea	24		
103	NSNR (22903B)	Clamp 1" Part #US403	ea	3		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 10 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
104	NSNR (22904C)	Nut Lock BL50 1/2"	ea	4		
105	NSNR (22905D)	Screw, SM, S.T. 1/4x3/4" Lg	ea	3		
106	NSNR (22906E)	Bracket, Field Detector Part #136100-001	ea	17		
107	NSNR (22907F)	Cable Assembly W1 Part #136111-102	ea	1		
108	NSNR (22908G)	Cable Assembly W3 Part #136112-100	ea	1		
109	NSNR (22909H)	Field Detector Assembly Part #136861-100	ea	1		
110	NSNR (22910H)	Marking Template Kit Part #136107-001	ea	1		
111	NSNR (22911W)	Paint, Spray Black Krylon 1601	ea	AR		
112	NSNR (22912Z)	Cap, Radome Part #136141-001	ea	1		
113	NSNR (22913A)	Gasket 1/8"x2" Part #910371-001	ea	1		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 11 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
114	NSNR (22914B)	Bolt, Nylon, 1/2"-13x1-1/2' Lg Part #910372-001	ea	70		
115	NSNR (22915C)	Nut, Nylon 1/2-13 Part #910373-001	ea	48		
116	NSNR (22916D)	Washer, Flat, Nylon 1/2" Part #910374-001	ea	118		
117	NSNR (22917E)	Photo Cell and Obstruction Light Assembly Part #136151-101	ea	1		
118	(Deleted)					
119	(Deleted)					
120	(Deleted)					
121	NSNR (22921H)	O-Ring Gasket Part #2-204	ea	118		
122	5306-00-579-1451 (C6237Z)	Bolt, Hex Head Machine Steel 3/8"-16x1" Lg	ea	6		
123	5310-00-579-2071 (58766J)	Washer, Steel, flat 3/8" I.D. 13/21, OD 12/16	ea	6		
124	NSNR (22924A)	Gasket, Bolt, Neoprene Part #910379-001	ea	6		
125	(Deleted)					

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 12 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS
For use of this form, see AR 105-72; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
126	NSNR (22926C)	Shell Radome Part #136142-003	ea	1		
127	NSNR (22927D)	Gasket 1/8"x1/2" Part #910371-002	ea	2		
128	5940-00-089-7802 (19851M)	Protector Block, 6 pr, Reliable R66C1-6P	ea	1		
129	5305-00-995-3441 (10113D)	Screw, Machine 10-32x1-1/2"	hd	AR		
130	5310-00-840-0530 (00560J)	Nut, Hex #10-32	ea	24		
131	5310-00-167-0834 (00488D)	Washer, flat #10	hd	AR		
132	6145-00-129-9320 (03300Q)	Wire, Elect, Bare, 6AWG	ft	AR		
133	6145-00-131-2569 (05285Y)	Wire, Copper, Tr, 10AWG, Green	ft	AR		
134	(Deleted)					
135	5305-00-[illegible]-1948 (07472Q)	Screw, Machine #10-32x3/4" Lg	[illegible]	AR		
136	5940-00-[illegible]-8075 (07452Y)	Lug, Terminal Clamp Style	pkg	AR		

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Figure 5-1. Bill of Materials (sheet 13 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS
For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
137	5306-00-141-2883 (00358F)	Bolt 1/4"-20x1-1/4" Lg	ea	AR		
138	5310-00-285-1650 (00558H)	Nut, Hex 1/4"-20	hd	AR		
139	5310-00-819-4698 (10290Y)	Washer, flat .266" ID	ea	24		
140	5310-00-808-5381 (10231A)	Washer, Lock FUW 1/4" Bolt	ea	24		
141	5940-00-225-8860 (11526W)	Lug, Terminal Mechanical Compression	ea	1		
142	6145-00-526-2710 (21872D)	Cable, Tel, 6 pr, 22 AWG	ft	AR		
143	6145-00-635-1195 (22504W)	Cable, Tel, 2C22 AWG, Insul	ft	AR		
144	6145-00-577-8061 (22503H)	Cable, Tel, 4C22 AWG, Insul	ft	AR		
145	6350-00-276-8912 (07996B)	Bell, 117 Vac, Edwards 340-6N5	ea	1		
146	NSNR (22928E)	Relay, Potter & Brumfield, ABC7DY48	ea	1		

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Figure 5-1. Bill of Materials (sheet 14 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
147	5310-00-619-2480 (10425H)	Nut, Hex #8-32	ea	24		
148	5310-00-167-0833 (00487C)	Washer, flat #8	ea	AR		
149	6145-00-542-6068 (14486J)	Cable, Power Elect 3C16AWG	ft	AR		
150	5975-00-685-9791 (02406H)	Panel, Blank, Alum, 19"x7"x1/8"	ea	2		
151	5975-00-056-3984 (22500E)	Panel, Blank, Alum, 19"x1-1/2"x1/8"	ea	2		
152	NSNR (19255Y)	Shield, Expansion 3/8" Rawls #6006	ea	AR		
153	NSNR (22922W)	Panel, Blank Part #135922-001	ea	1		
154	NSNR (22929F)	Rack MT-6011/FRN-41 Part #136320-102	ea	1		
155	NSNR (22930F)	Transmitter, Radio, T-1394/FRN-41 Part #136490-101	ea	1		
156	NSNR (22931G)	Transmitter, Sideband T-1395/FRN-41 Part #136645-100	ea	1		
157	NSNR (22932H)	Control-Indicator C-10527/FRN-41 Part #136740-101	ea	1		

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Figure 5-1. Bill of Materials (sheet 15 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS
For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT IDENT CODE

TELER NUMBER | DATE | PAGE NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
158	NSNR (22933W)	Monitor, Phase, Modulation ID-2179/FRN-41 Part #136500-102	ea	1		
159	NSNR (22934Z)	Control-Indicator C-10526/FRN-41 Part #136815-101	ea	1		
160	NSNR (22935A)	Antenna AS-3323/FRN-41 Part #136202-100	ea	1		
161	NSNR (22936B)	Recorder/Reproducer TRC-89-4 Part #10-003-4	ea	1		
162**	NSNR (22937C)	Remote Control Part #10-007-2	ea	1		
163	5305-00-989-7434 (00337G)	Screw, Machine 10-32x1/2"	hd	AR		
164	5310-00-045-3296 (00483J)	Washer, Lock Split #10	hd	AR		
165***	NSNR (22938D)	Compound, Caulking Bulylflex 12 9407T14-White	ea	AR		
166***	NSNR (22939E)	Gun, Caulking Part #58105	ea	1		
167****	3439-00-273-2536 (00015D)	Solder, 60/40 Rosen Center	lb	AR		
168	5975-00-906-2414 (09206J)	Ty-rap, TY-35M	ea	AR		

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Figure 5-1. Bill of Materials (sheet 16 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT IDENT CODE

YEL5R NUMBER | DATE | PAGE NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
169	5975-00-944-1499 (07572P)	Ty-rap, TY-46M-0	ea	AR		
170	6145-00-479-7178 (22940E)	Wire, 600V, 90° Temp, 4AWG, CU, Blk, Str, Type THHN 06CG1-4TPJ0	ft	AR		
171	NSNR (22941F)	Wire, 4AWG, CU, Wht, Str, Type THHN	ft	AR		
172	6145-00-479-7173 (22942G)	Wire, 4AWG, CU, Red, Str, Type THHN 06CG1-4TPJ2	ft	AR		
173	6145-00-290-1752 (22943H)	Wire, 12AWG, CU, Bk, Str, Type	ft	AR		
174	6145-00-290-1755 (22944W)	Wire, 12AWG, CU, Wht, Str, Type THHN	ft	AR		
175	(Deleted)					
176	6145-00-290-1753 (22946A)	Wire, 12AWG, CU, Red, Str, Type THHN	ft	AR		
177	6145-00-290-1756 (22947B)	Wire, 12AWG, CU, Grn, Str, Type THHN	ft	AR		
178	6145-01-017-9694 (22945Z)	Wire, 22AWG, Orn, Stran, Plastic Jacket 600V, 200° MIL-W-16878/4	ft	AR		
179	NSNR (22948C)	Wire, 26AWG, W/Gray, MIL-W-16878/4	ft	AR		

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Figure 5-1. Bill of Materials (sheet 17 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS
For use of this form, see AR 105-23; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
180	NSNR (22949D)	Wire, 26AWG, W/Violet, MIL-W-16878/4	ft	AR		
181	NSNR (22950D)	Wire 26AWG, W/Grn, MIL-W-16878/4	ft	AR		
182	NSNR (22951E)	Splice, 12AWG Part #30-451	ea	AR		
183	6145-00-957-8516 (14549G)	Cable 18c (9 pr) #22AWG	ft	AR		
184	5970-00-740-2972 (12844G)	Tubing, Shrinkable, Alpha Wire, FIT-221-1/16"	ft	AR		
185	5970-00-914-3117 (09372J)	Tubing, Shrinkable, Alpha Wire, FIT-221-3/4"	ft	AR		
186	5305-00-282-9498 (11939F)	Screw, Machine 1/4"-28x19/32"	hd	AR		
187	5305-00-206-5122 (00251K)	Screw, Machine 12-24x1/2"RHS	hd	AR		
188	5305-00-775-5140 (08228Z)	Screw, Machine 10-32x3/4"RHS	hd	AR		
189	5305-00-944-5655 (11339W)	Screw, Machine 8-32x1/2"	hd	AR		
190	6145-00-080-1486 (17398M)	Cable, 1 pr Shielded, Belden 8450	ft	AR		

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Figure 5-1. Bill of Materials (sheet 18 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-32; the proponent agency is the United States Army Communications Command.

LOCATION			UNIT IDENT CODE			
TELER NUMBER			DATE		PAGE NO.	NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
191	6145-00-577-8061 (22503N)	Cable, 4c, 22AWG	ft	AR		
192	5940-00-144-1536 (08248K)	Terminal Lug #22-26 AWG	ea	AR		
193	5940-00-557-1629 (07504A)	Terminal Lug 18-22AWG	hd	AR		
194	5940-00-143-4775 (07503A)	Terminal Lug 10-12AWG	ea	AR		
195	NSNR (23337F)	Screw, SM, PH 6x5/8 Lg, Galv	hd	AR		
196	NSNR (23338G)	Bolt, Sq Hd, 5/16"-18UNCx1-3/4" Lg	ea	AR		
197	5310-00-579-2074 (08131R)	Washer, flat 5/16" I.D. W/Nut	ea	AR		
198	NSNR (23339H)	Washer, Ring 5/16" I.D. Steel-backed, Neoprene	ea	AR		
199	NSNR (23340K)	Nut, Hex 5/16"-18 UNC, Galv	ea	AR		
200	NSNR (23341J)	Clip, Landing Ring Part #136176-001	ea	AR		
201	NSNR (23342Z)	Clip, Stave Part #136177-001	ea	AR		

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Figure 5-1. Bill of Materials (sheet 19 of 20).

TELECOMMUNICATIONS DEVELOPMENT PROJECT -- BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION | UNIT IDENT CODE

TELER NUMBER | DATE | PAGE NO. | NO. OF PAGES

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
202	NSNR (22343A)	Punch, Gasket 7/16" Part #910170-001	ea	1		
203	NSNR (23344B)	Clamp, Part #910516-001	ea	AR		
204	NSNR (11356D)	Panel, Aluminum 19"x5-3/4"x3/16"	ea	AR		
205	NSNR (23345C)	Nipple OFN-50	ea	AR		
206	5975-00-284-5827 (02515G)	Box 45-1/2	ea	1		
207	5975-00-296-0021 (12156A)	Cover 5371	ea	1		
208	NSNR (14091J)	Receptacle 5262	ea	1		
209	NSNR (23353Z)	Screw, Set 1/2"-13x2-1/2"	ea	AR		
210	8010-00-527-3192 (04094R)	Paint, international orange	gl	AR		
211	8010-00-290-4049 (04087N)	Paint, White	ea	AR		

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Figure 5-1. Bill of Materials (sheet 20 of 20).

SECTION 6. QUALITY ASSURANCE PLAN

6.1 GENERAL. The quality assurance (QA) program for the AN/FRN-41 TVOR has been developed in CCR 702-1-2, chapter 5. The QA program is to be implemented in accordance with this and the following two sections and will provide the assurance to all concerned that the specified equipment and facilities have been installed in accordance with the requirements and criteria of this SEIP as supplemented through individual engineering installation packages (EIP) and are acceptable for turnover to and use by the operating agency. The requirements and criteria specified here and in sections 7 and 8 constitute the quality assurance plan for the specified AN/FRN-41 TVOR. Individual EIP's will be used to supplement, expand, modify, or otherwise adapt the requirements and criteria to unique situations and circumstances applicable to each site location.

6.2 QUALITY ASSURANCE PROGRAM.

6.2.1 The QA program consists of a planned and systematic approach for assessing the quality during the installation and acceptance testing of project implementation and correcting at the earliest time any discrepancies, deficiencies, or shortcomings revealed through inspection and test efforts. The QA and quality control (QC) planning and functions will begin at the earliest stages of project implementation and end after all possible corrective action efforts are completed and the AN/FRN-41 TVOR are released to the operating or user agency. Quality assurance and QC functions are to be performed by personnel operating independently from those charged with the engineering of the installation or involved in the process of installing the AN/FRN-41 TVOR. Under the program, these functions are divided among three participating organizations: (1) the test agency, (2) the installation agency, and (3) the operating agency.

6.2.2 Test agency. As the manager and implementor of the QA program and acceptance testing efforts for the AN/FRN-41 TVOR, the test agency will commence project planning as soon as tasked. The test agency quality assurance representative (QAR)/Test Director is responsible for periodic in-process QA checks, final QA inspections, and acceptance tests in accordance with management provisions of CCCR 702-3 and this SEIP. Quality assurance inspections will be performed at the discretion of this Agency for the purpose of assessing the effectiveness of the QC effort by the installation agency; initiating corrective actions as appropriate; and determining the extent to which the installation effort adheres to the quality requirements. Acceptance testing is conducted in accordance with section 7 and for the purpose of determining if the installed AN/FRN-41 TVOR complies with the technical requirements of this SEIP as amended by individual

EIP's and the AN/FRN-41 TVOR is suitable for the intended application. At the earliest stages of project initiation, the test agency is to identify a QAR/Test Director. For project continuity and effective management, a single individual should be assigned both roles. This will assure that the QA and test efforts are fully integrated and accomplished in the following manner and sequence to:

a. Implement the QA concepts and requirements identified. Participate in the development of individual EIP's incorporating site particular requirements.

b. Assure that the participating elements and organizations are thoroughly familiar with their respective roles in support of QA, QC, and testing and have been properly tasked.

c. Validate through the use of project oriented reports, formal and informal contacts, project status reviews, onsite inspections, etc., the QC, and installation efforts to assure compliance with the stated requirements and criteria of this SEIP. When an inadequacy is found to exist in the installation agency QC effort, the procedures of CCCR 702-7 will be applied. Follow-up actions will be monitored and those discrepancies or differences which cannot be resolved in a timely manner will be brought to the attention of higher authority.

d. Facilitate responsibilities by identifying and recording this information and data as required by USACEEIA Form 113R (figure 6-1). This form becomes a part of the project files and will be updated to assure orderly project execution. The dissemination of this information with the participants in the QA program is encouraged.

e. Perform a final QA inspection using USACEEIA Form 112R (figure 6-2), tailored to the specifics of this effort. When the installation effort and checkout of the AN/FRN-41 TVOR, this SEIP, individual EIP, and the AFTO series shall be the evaluation criteria for the site inspection efforts. This inspection will consist of thorough visual and mechanical observations of the installed materiel, QC records, onsite inspection, and other factors to evaluate the quality of the work performed and its acceptability.

f. Conduct acceptance tests in accordance with the provisions of section 7, the subsidiary documents specified, and CCCR 702-3, to determine the acceptability of the AN/FRN-41 TVOR, as installed. If the results of any portion of acceptance tests are not satisfactory, corrective action efforts are to be initiated through onsite engineering, installation, and operational participants and in the absence of such representation, through channels. The QAR/Test Director may retest to verify that corrective action efforts have been implemented and that the efforts will preclude recurrence.

COGNIZANT AGENCY, COMMAND, AND
FACILITY QA POINTS OF CONTACT
(CCCR 702-2)

	Individual POC	Bldg. No.	Rm. No.	Phone No.	Name of Agency
Installation:					
Team Leader					
Assistant Team Leader					
Quality Control					
Quality Assurance Agency:					
Representative					
Testing Activity					
Operating Agency:					
Representative					
Site Commander					

USACEEIA FM 113-R
1 Jan 79

Figure 6-1. USACEEIA Form 113-R

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 1 OF 11 PAGES
	DATE (Day, Mo, Year)
SITE	LOCATION
PROJECT NAME	TASK NO.

REFERENCED T.O. FOR QUALITY OBSERVATIONS FOLLOW MAIN PARAGRAPHS	YES	NO	NA
A. Drawings and Specifications (AFTO 31-10-3, 31-10-9, 31-10-27, 31-10-29)			
1. Are floor plan drawings available?			
2. Are equipment location drawings available?			
3. Are face layout drawings of equipment in bays available?			
4. Are drawings for distribution frame block assignments available?			
5. Are pin connections on terminal blocks shown on drawings?			
6. Is stenciling of terminal blocks shown on drawings?			
7. Are drawings of power distribution equipment available?			
8. Are wire sizes indicated on drawings?			
9. Are schematic diagrams of circuit types to be installed included in drawings?			
10. Are drawings of site grounding systems available?			
11. Are drawings showing arrangement of cable racks, ducts, and trenches available?			
12. Do specifications contain list of reference material required by installers?			
13. Do specifications contain cable running list for power distribution?			
14. Do specifications contain cable running list for signal cabling?			

USACEEIA FM 112-R
1 Jan 79

Figure 6-2. USACEEIA Form 112-R.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 2 OF 11 PAGES

	YES	NO	NA
15. Do specifications contain cable running list for RF cabling?			
16. Do specifications contain detailed information on grounding?			
17. Do specifications contain details on all special instructions for installers?			
18. Do drawings reference all applicable items on BOM?			
B. Tools and Equipment (AFTO 31-10-29)			
1. Is equipment damaged or unserviceable?			
2. Are all installation materials on hand and serviceable?			
3. Are all tools necessary for completion of the job on hand?			
4. Is all test equipment needed for test and checkout of installation available?			
C. General Safety Practice (AFTO 31-10-29)			
1. Are goggles being worn when drilling and grinding?			
2. Are sharp edges left on frame or duct work?			
3. Are all hand tools properly used?			
4. Are electric power tools properly grounded?			
D. Floor Plan Layout (AFTO 31-10-9, 31-10-29)			
1. Are equipment layout plans in accordance with drawings?			
2. Was layout plan completed before equipment was moved into area?			
E. Erecting and Mounting (AFTO 31-10-29)			
1. Is equipment laid out in accordance with floor plan drawing?			

USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 3 OF 11 PAGES

	YES	NO	NA
2. Are equipment bays level and plumbed within tolerances?			
3. Has proper spacing been provided between equipment racks?			
4. Are base angles of frames secured to floor in proper location?			
5. Are all cabinets flush mounted and plumbed?			
6. Has finish of equipment, cabinets, and racks been touched up?			
7. Are bolts and screws free from stripped threads and defaced heads?			
8. Have sufficient clearances been provided between apparatus for heat dissipation?			
9. Are terminal blocks aligned on distribution frames?			
10. Has equipment been installed in cabinets or racks in accordance with face layouts?			
11. Are all nuts and bolts securely tightened?			
12. Are exposed or cut ends of metal filed smooth and painted?			
13. Have lock and flat washers been used?			
14. Is the C-E equipment BOM available at the facility?			
15. Has the C-E equipment been inventoried and discrepancies posted?			
16. Is all required C-E equipment at the site?			
17. Is all C-E equipment installed?			
F. Cable Racks (AFTO 31-10-6)			
1. Location of cable racks:			
a. Are cable racks located in accordance with cable plan drawing?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 4 OF 11 PAGES		
	YES	NO	NA
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?			
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?			
d. Are cable racks located so cables are not subject to damage or exposure or other detrimental conditions?			
2. Assembly of cable racks:			
a. Are long sections of cable racks used where possible?			
b. Have clamping details been altered other than where necessary to avoid interference?			
c. Are open ends of cable racks properly closed?			
d. Are vertical cable racks properly terminated on floors?			
3. Support of cable racks:			
a. Are cable racks properly supported and fastened?			
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?			
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?			
d. Has support been provided within 3 feet of free end of cable rack?			
e. Are cable racks braced where necessary to prevent sway?			
G. Running Cable (AFTO 31-10-13)			
1. Are cable runs made in accordance with cable running list?			
2. Are cables twisted or crossed on cable rack?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 5 OF 11 PAGES		
	YES	NO	NA
3. Do cables at turns or bends conform to the bending radii and position?			
4. Is protection provided where cable sheaths contact rough or sharp edges or metal?			
5. Are cables which are turned off over side of cable racks formed with minimum allowable radii?			
6. Are cables turned off rack horizontally and then up?			
7. Do cables to the distribution frame enter on the vertical side?			
8. Are cables serving the horizontal side of a distribution frame secured to the transverse arms near the vertical upright?			
9. Are cable tags properly prepared and in accordance with the cable running list?			
10. Are cable tags secured at each end of cable run?			
11. Have cable tags been removed upon completion of verification and termination?			
12. Are cable butts located as near as practicable to the point where the first wires turn out?			
13. Are cable butts properly treated?			
14. Is insulation of wires undamaged at butt location?			
15. Are unused and spare wires protected at butt location?			
H. Securing Cable (AFTO 31-10-2, 31-10-13)			
1. Is starting stitch properly made and placed?			
2. Is required Kansas City stitch properly made?			
3. Are first and succeeding layers of cable properly secured?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 6 OF 11 PAGES

	YES	NO	NA
4. Are cables secured at every cable rack cross strap?			
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?			
6. Are lock stitches properly made and spaced?			
7. Are splices in twine properly made?			
I. Sewed Forms (AFTO 31-10-13)			
1. Is proper size twine used for the diameter of the form?			
2. Are proper number of strands used?			
3. Are stitches properly spaced?			
J. Butting and Stripping (AFTO 31-10-13)			
1. Are proper tools used for butting and stripping of cable?			
2. Are cable butts properly dressed?			
3. Is proper distance maintained from cable butt to fanning strip?			
K. Fanned Forms (AFTO 31-10-2)			
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?			
2. Are conductors in fanned forms twisted and bunched?			
3. Are fanned forms straight and taut from butt location to fanning strip?			
4. Is length of skinners correct?			
5. Has color code been properly followed?			
6. Are spare wires disposed of properly?			
L. Stenciling (AFTO 31-10-27, 31-10-29)			
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 7 OF 11 PAGES

	YES	NO	NA
2. Are designations located correctly?			
3. Are correct size designations used on particular types of apparatus or equipment?			
M. Strapping (AFTO 31-10-16)			
1. Are straps properly placed?			
2. Is correct type of strap wire used?			
3. Does insulation extend to terminal?			
4. Are straps placed so as not to interfere with operation of apparatus?			
5. Is removal of apparatus blocked?			
6. Are designations of apparatus obscured?			
N. Connecting and Soldering (AFTO 31-10-7)			
1. Is soldering clamp used when connecting wires?			
2. Are connections made on terminal blocks in proper manner?			
3. Is all soldering done with standard rosin core solder?			
4. Are connections secure and free of foreign substances?			
5. Has all unsightly flux and excess globules of solder been removed?			
6. Is insulation on skinners burnt or otherwise damaged?			
7. Do skinners on connected terminals exceed 1/16 in?			
8. Are all conductors given a continuity test after connection is made?			
O. Wrapped Connections (AFTO 31-10-7)			
1. Are wrapped connections applied only on suitable terminals?			
2. Are connections essentially straight and free of angular bends or crimps?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 8 OF 11 PAGES

	YES	NO	NA
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?			
4. Are wrapped connectors soldered where applicable?			
P. Cross Connections (AFTO 31-10-11)			
1. Are jumpers properly routed at distribution frame?			
2. Do jumpers have sufficient slack after connection?			
3. Are conductors twisted between fanning strip and terminal?			
4. Does twist remain in conductors beyond rear of fanning strip?			
5. Are jumpers properly dressed?			
6. Has excess solder been removed from terminals?			
Q. Equipment and Signal Grounds (AFTO 31-10-24, 31-10-29)			
Are equipment and signal grounds installed in accordance with applicable codes and standards and in accordance with installation drawings?			
R. Conduit (AFTO 31-10-12)			
1. Are burrs removed from conduit after cutting?			
2. Is bending radii of conduit adequate?			
3. Are there more than four 90-degree bends in a single conduit run?			
4. Does number of conductors in conduit conform?			
5. Are conduits supported at intervals not exceeding 6 feet?			
6. Have all fittings been tightened after installation?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 9 OF 11 PAGES

	YES	NO	NA
S. Ducts (RF Shieldings) (AFTO 31-10-12, 31-10-13)			
1. Are hangers for overhead ducts mounted first?			
2. Is proper type mallet used in assembly?			
3. Are flange sections cleaned before installation?			
T. Coaxial Cables (AFTO 31-10-14)			
1. Is cable inspected for possible damage prior to installation?			
2. Where required, is cable sewed in same manner as signal cable?			
3. Is butting and stripping done in same manner as signal cable?			
4. Do cable tags remain on coaxial cable from antenna to RF patch or equipment?			
5. Is support spacing of cables installed as prescribed (3 ft for cable 1-5/8 in or smaller and 5 ft for cables 1-11/16 in or greater)?			
6. Does bending radii of cables meet prescribed standards of the T.O.?			
U. Waveguides and Antennas (AFTO 31R-10-5, CEEIA PAM 105-3)			
1. Are waveguides stored in a horizontal manner and away from heavy objects?			
2. Are waveguides inspected for possible damage prior to installation?			
3. Are waveguides cleaned in the proper manner prior to installation?			
4. Are hangers installed every 5 feet as prescribed?			
5. Do waveguide bends conform to T.O. criteria?			
6. Are antennas and reflectors mounted as prescribed heights?			
7. Are antennas oriented to the prescribed azimuth?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 10 OF 11 PAGES

	YES	NO	NA
V. Outside Plant Inspection (AFTO 31R-10-5, 31-10-5, 31-10-3, 31-10-10, 31-10-21, 31-10-24, 31-10-28)			
1. Are antenna tower locations proper?			
2. Are footings or pads prepared prior to concrete pour?			
3. Have concrete pours for footings and pads been accomplished in accordance with specified criteria?			
4. Has proper cure time been achieved prior to mounting steel?			
5. Is the tower constructed in accordance with the specified criteria, drawings, etc?			
6. Are the antenna supports, anchors, pedestals, etc., properly installed in accordance with established criteria?			
7. Are supporting structures, guy wires, tower lighting kits (when required), termination boxes, and baluns included and properly installed in accordance with established criteria?			
8. Are antennas properly mounted and aligned?			
9. Were antenna reflectors properly aligned prior to mounting the feed horn?			
10. Are antenna curtains for rhombic and log periodics properly installed?			
11. Are transmission lines, coaxial cables, waveguides, etc., properly installed?			
12. Has tower and supporting structure been painted in accordance with established criteria?			
13. Are waveguides, cable runs, etc., properly installed and protected?			
W. Power Buildings (AFTO 31-10-3, 31-10-29)			
1. Are power buildings and pads properly located and installed?			

Figure 6-2. USACEEIA Form 112-R Continued.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 11 OF 11 PAGES

	YES	NO	NA
2. Are generators and power distribution panels properly located and installed?			
3. Are oil pans properly installed?			
4. Are generators properly vented from the buildings?			
5. Has all required wiring been installed?			
6. Are fuel tanks installed above ground; if so, are they located at the proper distance from generator building?			
7. If fuel tanks were installed underground, was it accomplished in accordance with established procedures?			
8. Is safety equipment located in generator building?			
X. Installation Drawings (AFTO 31-10-29)			
Have drawings been reviewed to assure "as built" accuracy?			

TEST ENGINEER/QUALITY ASSURANCE REPRESENTATIVE (QAR)

Figure 6-2. USACEEIA Form 112-R Continued.

After satisfactory resolution, he may subsequently resume acceptance tests. If these items cannot be resolved by onsite personnel, the QAR/Test Director will take either of the following actions: (1) Reject the AN/FRN-41 TVOR and terminate testing until the matter is corrected or resolved, or (2) Attempt to complete the acceptance tests noting the discrepancies, deficiencies, or shortcomings, as exceptions on the Technical Acceptance Recommendation (TAR), Form 98R at section 8. The participating agencies and organizations will be notified of these discrepancies, deficiencies, and shortcomings at the earliest practical date.

g. Record and analyze test results, determine acceptability of the installed AN/FRN-41 TVOR, record the data and findings on the TAR, and coordinate the data with the designated participants, prepare a final test report and make distribution with the guidance, direction, and format of CCCR 702-2. Project tasking documents must be consulted for modification of the distribution requirements. The acceptance test report will note outstanding installation and operational exceptions, and will recommend corrective actions to be taken by the responsible and participating agency(s). The report will document project completion with correction of the exceptions being documented by correspondence or supplemental test reports as determined by the QAR/Test Director or test agency.

6.2.3 Installation agency. In accordance with the provisions and authority of CCCR-702-4, the installation agency will establish and maintain a QC system. The QC system will assure that assessments of quality are conducted in accordance with the published procedures and that the results of the agency's QC inspections and follow-up actions are adequately recorded. USACEEIA Form 111R (figure 6-3) may be used for this purpose. The records are to be made available for review and evaluation by the test agency's QAR/Test Director. The shakedown checkouts are to be completed and corrections made prior to offering the AN/FRN-41 TVOR for acceptance testing. The installation activities QC system must meet all procedures contained in USACEI Bn Pamphlet 105-3. The installation agency will designate a quality control representative (QCR), who will assure the following actions are performed:

a. Assure that QC procedures are applied on this installation and establish the reporting requirements consistent with this project, the EIP, and all policies. Assure that the corrective action efforts related to the installation are resolved and corrected at the earliest possible point in the installation effort.

b. Assure the availability of test equipment for shakedown in conjunction with participating elements and checkout and acceptance testing. Reliance is to be placed upon the operating agency to supply test equipment when it is common to operations and maintenance functions.

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QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 1 OF 7 PAGES DATE (Day, Mo, Year)
SITE	LOCATION	QUALITY CONTROL REPRESENTATIVE (QCR)
PROJECT NAME		TASK NO.

	YES	NO	NA
A. General Safety Practice			
1. Are goggles being worn when using grinding machines?			
2. Are sharp edges left on frame or duct work?			
3. Are all hand tools properly used?			
4. Are electric power tools properly grounded?			
5. Are ground wires securely attached?			
B. Floor Plan Layout			
1. Are layout plans in accordance with drawings?			
2. Was layout plan completed before equipment was moved into area?			
C. Erecting and Mounting			
1. Is equipment laid out in accordance with floor plan drawing?			
2. Are equipment bays leveled and plumbed within tolerances?			
3. Has proper spacing been provided between equipment racks?			
4. Are base angles of frames secured to floor in proper location?			
5. Are all cabinets flush mounted and plumbed?			
6. Has finish of equipment, cabinets, and racks been touched up?			
7. Are bolts and screws free from stripped threads and defaced heads?			

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1 Jan 79

Figure 6-3. USACEEIA Form 111-R.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 2 OF 7 PAGES

	YES	NO	NA
8. Have sufficient clearances been provided between apparatus for heat dissipation?			
9. Are terminal blocks aligned on distributing frames?			
10. Has equipment been installed in cabinets or racks in accordance with face layouts?			
11. Are all nuts and bolts securely tightened?			
12. Are exposed or cut ends of metal filed smooth and painted?			
D. Cable Racks			
1. Location of cable racks:			
a. Are cable racks located in accordance with cable plan drawing?			
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?			
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?			
d. Are cables located so they are not subject to damage due to exposure or other detrimental conditions?			
2. Assembly of cable racks:			
a. Are long sections of cable racks used where possible?			
b. Have clamping details been altered other than where necessary to avoid interference?			
c. Are open ends of cable racks properly closed?			
d. Are vertical cable racks properly terminated on floors?			
3. Support of cable racks:			
a. Are cable racks properly supported and fastened?			
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?			

Figure 6-3. USACEEIA Form 111-R Continued.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 3 OF 7 PAGES

	YES	NO	NA
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?			
d. Has support been provided within 3 feet or free end of cable rack?			
e. Are cable racks braced where necessary to prevent sway?			
E. Running Cable			
1. Are cable runs made in accordance with cable running list?			
2. Are oval shaped switchboard cables placed on edge?			
3. Are cables twisted or crossed on cable rack?			
4. Do cables conform to the bending radii and position at turns or bends?			
5. Is protection provided where cable sheaths contact rough or sharp edges or metal?			
6. Are cables turned off over side of cable racks formed with minimum allowable radii?			
7. Are cables turned off rack horizontally and then up?			
8. Do cables to the distributing frame enter on the vertical side?			
9. Are cables serving the horizonal side of a distributing frame secured to the transverse arms near the vertical upright?			
10. Are cable tags properly prepared and in accordance with the cable running list?			
11. Are cable tags secured at each end of cable run?			
12. Have cable tags been removed upon completion of verification and termination?			
13. Are cable butts located as near as practicable to the point where the first wires turn out?			
14. Are cable butts properly treated?			

Figure 6-3. USACEEIA Form 111-R Continued.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 4 OF 7 PAGES

	YES	NO	NA
15. Is insulation of wires undamaged at butt location?			
16. Are unused and spare wires protected at butt location?			
F. Securing Cable			
1. Is starting stitch properly made and placed?			
2. Is required Kansas City stitch properly made?			
3. Are first and succeeding layers of cable properly secured?			
4. Are cables secured at every cable rack cross strap?			
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?			
6. Are lock stitches properly made and spaced?			
7. Are splices in twine properly made?			
G. Sewed Forms			
1. Is proper size twine used for the diameter of the form?			
2. Are proper number of strands used?			
3. Are stitches properly spaced?			
H. Butting and Stripping			
1. Are proper tools used for butting and stripping of cable?			
2. Are cable butts properly dressed?			
3. Is proper distance maintained from cable butt to fanning strip?			
I. Fanned Forms			
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?			
2. Are conductors in fanned forms not twisted and bunched?			

Figure 6-3. USACEEIA Form 111-R Continued.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 5 OF 7 PAGES

	YES	NO	NA
3. Are fanned forms straight and taut from butt location to fanning strip?			
4. Is length of skinners correct?			
5. Has color code been properly followed?			
6. Are spare wires disposed of properly?			
J. Stenciling			
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?			
2. Are designations correctly located?			
3. Are corrected size designations used on particular types of apparatus or equipment?			
K. Strapping			
1. Are straps properly placed?			
2. Is correct type of strap wire used?			
3. Does insulation extend to terminal?			
4. Are straps placed so as to not interfere with operation of apparatus?			
5. Is removal of apparatus not blocked?			
6. Are designations not obscured?			
L. Connecting and Soldering			
1. Is soldering clamp used when connecting wires?			
2. Are connections made on terminal in proper manner?			
3. Is all soldering done with standard resin core solder?			
4. Are connections secure and free of foreign substances?			
5. Have all unsightly flux and excess globules of solder been removed?			
6. Is insulation on skinners not burnt or otherwise damaged?			

Figure 6-3. USACEEIA Form 111-R Continued.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 6 OF 7 PAGES

	YES	NO	NA
7. Do skinners on connected terminals not exceed 1/16 in?			
8. Are all conductors given a continuity test after connection is made?			
M. Transistor Soldering Techniques			
1. Is caution exercised to assure that excessive heat does not destroy transistors?			
2. Are safeguards in effect to prevent leakage current at the end of an electrical soldering iron from destroying transistors?			
N. Wrapped Connections			
1. Are wrapped connections applied only on suitable terminals?			
2. Are connections essentially straight and free of angular bends or cramps?			
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?			
4. Are wrapped connectors soldered where applicable?			
O. Cross Connections			
1. Are jumpers properly routed at distribution frame?			
2. Do jumpers have sufficient slack after connection?			
3. Are conductors not twisted between fanning strip and terminal?			
4. Does twist remain in conductors beyond rear of fanning strip?			
5. Are jumpers properly dressed?			
6. Has excess solder been removed from terminals?			

Figure 6-3. USACEEIA Form 111-R Continued.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 7 OF 7 PAGES

	YES	NO	NA
P. Equipment and Signal Grounds			
Are equipment and signal ground installed in accordance with applicable codes and standards and in accordance with installation drawings?			
Q. Conduit			
1. Are burrs removed from conduit after cutting?			
2. Is bending radii in accordance with AFTO 31-10-12?			
3. Are there no more than four 90 degree bends in a single conduit run?			
4. Does number of conductors in conduit conform to AFTO 31-10-12?			
5. Are conduits supported at proper intervals?			
6. Have all fittings been tightened after installation?			
R. Ducts (RF Shieldings)			
1. Are hangers for overhead ducts mounted first?			
2. Is proper type mallet used in assembly?			
3. Are flange sections cleaned before installation?			
S. Coaxial Cables			
Is cable inspected for possible damage prior to installation?			

Figure 6-3. USACEEIA Form 111-R Continued.

c. Assure that shakedown is accomplished as specified and any corrective action is completed prior to acceptance testing.

d. Advise the QAR/Test Director of the anticipated completion date at the earliest time. This notice should be given not less than 10 days prior to the scheduled completion to permit efficient and expeditious transportation of test personnel and equipment.

e. Assure that an adequate complement of personnel remain onsite to assist in the final QA inspection and acceptance test.

f. Assure the QC inspection records and installation documentation are maintained onsite and readily available to the QAR/Test Director. When the onsite effort is completed, the QC documentation shall be placed in the project files and maintained for one year.

6.2.4 Operating agency. The operating agency will be the site or location cognizant organization element and will be so identified in all project documentation and individual EIP's. Tasking to support the USACEEIA QA and acceptance test effort will be accomplished through command channels. The operating agency will designate a representative early in the project but no later than the start of installation. He will assure the following actions are taken and completed.

a. Provide administrative and typing support.

b. Serve as interface between the installation, quality assurance, and test personnel and the operating agency.

c. Assist in resolution of discrepancies, deficiencies, and shortcomings.

d. Make operating and maintenance personnel available to assist on an as-required basis.

e. Provide a representative to witness the acceptance test and sign the TAR.

6.3. SPECIAL CONSIDERATIONS.

6.3.1 Interruptions. Quality assurance inspections and tests may be interrupted at any point if disrupted by an equipment or system malfunction. They may also be interrupted at a compatible breaking point to permit scheduled duty breaks. Any inspection that is interrupted because of equipment malfunction shall be restarted at a point determined by the QAR/Test Director.

6.3.2 Substitutions. Spare equipment may be substituted for malfunctioning equipment with the approval of the QAR/Test Director. Any equipment which has been replaced shall be repaired and retested. During acceptance tests, any piece of equipment, including cables, conduit, etc., may not be changed or adjusted without the approval of the QAR/Test Director.

6.3.3 Corrections or modifications of documentation. Site plans, specifications, EIP's, drawings, etc., are to be acquired by QA, QC, and test personnel prior to commencement of the specified work effort. At this time the QAR/Test Director will have identified the applicable and non-applicable observation items on USACEEIA Form 112R and will delete the mark "non-applicable" (N/A) those items inappropriate for his QA inspection observation items. These documents shall be used as master documents to mark, record, and identify discrepancies. Any discrepancies noted shall be recorded using yellow markings to record deletions of equipment, cables, or changes in schematic diagrams. All additions shall be noted with red markings. Notes to the draftsman will be in blue. Site documentation will be marked in the same manner. The designated installation agency representative will deliver a copy of the marked-up drawings to the onsite USACEEIA installation engineering element and in the absence of an engineer to Commander, USACEEIA, ATTN: CCC-CED, Fort Huachuca, Arizona 85613 or as amended by the EIP. In all cases a complete set of marked drawings will be left onsite and maintained by the operating agency.

SECTION 7. ACCEPTANCE TEST PLAN AND PROCEDURES

7.1 GENERAL. This section contains the test procedures and states the special conditions which apply to shakedown, checkout, and acceptance tests for the installed AN/FRN-41 TVOR. Onsite tests are performed to determine if the designated AN/FRN-41 TVOR has been installed correctly, performs in accordance with the technical requirements of this SEIP and subsidiary documents, and is operationally suitable for the intended application.

7-2 TESTING.

7.2.1 Shakedown test and checkout. Functional tests will be conducted by the installation agency for the purpose of assuring that the equipment is aligned and operable and the installation is in accordance with the engineering documentation. These tests and checkouts will be conducted in coordination with personnel of the operating agency using the test plan identified in paragraph 7.2.2 and applicable technical bulletins and technical manuals available to the operating agency (the user). These tests will be conducted prior to the installation agency offering the installation for acceptance tests. As stated in section 6, the installation agency is to anticipate the installation completion date and notify the test agency of this completion not less than 10 days of scheduled date.

7.2.2 Onsite acceptance tests. Onsite acceptance testing will be accomplished in accordance with USACEEIA technical publication number CCC-TED-75-TP-200. These tests will be preceded by a thorough QA inspection in accordance with the requirements of section 6. Tests will be conducted in a normal operating environment, as stated in TB 95-1. Abnormal ambient conditions (e.g., temperature, humidity, or barometric pressure) during any test will be noted in the test log with detailed remarks included with the test results. The Test Director will determine if any retesting is required. The operating agency will provide personnel to operate and maintain the equipment during tests. Installation agency will provide personnel to assist the Test Director in the conduct of tests and measurements.

7.2.3 Flight checks. Operational flight checks will be performed by Federal Aviation Administration (FAA) qualified Air Traffic Control (ATC) personnel in conjunction with the acceptance tests and under the direction of the Test Director. Flight checks will determine whether or not the installed AN/FRN-41 TVOR functions correctly and performs in accordance with individual equipment and system mission requirements. This flight check is documented by the FAA. Copies of this report will be furnished participating agencies and included in the test report and retained in project files.

7.2.4 Test equipment. A complete listing of the required test equipment is contained in the appropriate technical manuals. Although the installation agency is responsible for assuring that the required complement of test equipment is available for installation, inspection, and test purposes. This test equipment should be available onsite from the operating agency.

7.2.5 Technical acceptance recommendation. Based on the QA inspections, QC reports and documentation, acceptance test results, and flight check results, the Test Director will determine the acceptability of the work effort. Prior to actual rejection, if the circumstances so warrant, the Test Director will attempt to coordinate his determination with the test agency and other cognizant agencies. The Test Director will prepare and distribute the technical acceptance recommendation (TAR) in accordance with the requirements of section 8. Preparation of the TAR will be accomplished onsite immediately following acceptance tests.

7.2.6 Test results. When one or more tests fail to meet requirements, the Test Director will determine which portion(s) of the test was affected and which portion(s) of the equipment or facility is to be retested. All deficiencies will be corrected, or, if not corrected, the deficiencies will be reported on the TAR and in the final test report.

7.2.7 Final test report. The test agency will prepare and dis tribute a test report in accordance with CCCR 702-2 as amended by the individual EIP and tasking documents. Copies of the completed TAR and flight inspection report will be included.

SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The results of the QA inspections and acceptance tests specified in sections 6 and 7 will be documented onsite by the QAR/Test Director using USACEEIA Form 98R, TAR (figure 8-1). The purpose of this technical document is to record the significant project information to include the scope of the effort, results and conclusions of the requisite inspections and tests, exceptions to the technical requirements, and recommendations regarding acceptance with or without exceptions or rejection of the work effort. The TAR also provides other participants to indicate agreement or disagreement with the inspection and test assessments and for user to state a willingness to technically accept the installed AN/FRN-41 TVOR.

8.2 DISTRIBUTION. A copy of the TAR will be provided to the signing participants and the operating agency. The original copy will be maintained in the test agency project files but copies will be reproduced and included as part of the test report.

8.3 WAIVERS. Waivers to include command approvals for individual installations will be recorded in the TAR and copies attached for the purpose of clarifying deviations from this SEIP, the individual EIP, and Technical Bulletin TB-95-1.

INSTRUCTIONS

TECHNICAL ACCEPTANCE RECOMMENDATION

1. Entries on the data sheets are to be typed whenever possible to ensure legibility and provide a quality, fully legible product when reproduced. If a typewriter is not available, the forms may be completed by printing with black ink in block letters to ensure legibiity. The instructions for completion of this form follow on a block-by-block basis.

2. Pages are to be sequentially numbered to show both the individual page number and the total number of pages constituting the completed TAR. Additionally, each page will be identified by the date, project, and contract number in the appropriate blocks.

3. Instructions for completion of the TAR are delineated in the following subparagraphs and will be completed in accordance with these instructions:

a. DATE: Enter the day, month, and year of completion for this action (e.g., 1/1/79 as the first day of the first month of 1979.)

b. PROJECT/CONTRACT NUMBER: Enter the appropriate project or contract number. If this is a subproject or part of a subproject, provide all necessary information (i.e., IIP milestone number(s), subproject number(s) as well as subdivision(s) to same).

c. TITLE: Enter the project name or title.

d. LOCATION: Enter the geographic location where the project was installed.

e. FACILITY: Enter the name of the facility and other pertinent identifying information.

f. TEST DIRECTOR: Enter the name, title, and grade of the Test Director or QAR assigned to this project.

g. OPERATING AGENCY: Enter the name, symbol, and complete mailing address of the organization having O&M responsibility for this project, system, or equipment installation.

h. ENGINEERING AGENCY: Enter the name, symbol, and complete mailing address of the organization having engineering cognizance and responsibility.

i. INSTALLATION AGENCY: Enter the name, symbol, and complete mailing address of the organization having been tasked to install the TAR materiel.

j. TESTING AGENCY: Enter the name, symbol, and complete mailing address of the QA and testing organization tasked for this project.

k. PROJECT DESCRIPTION: Enter a brief and concise description of the project to which the TAR applies.

l. MAJOR EQUIPMENT INSTALLED/RELOCATED: List the major items of equipment installed or relocated in accordance with the project requirements. Enter the BOM line item number, materiel description, assigned part number or federal stock number, and the quantity of each major item. Components, assemblies, and subassemblies configured into a major item as listed in SB 700-20 or CCP 700-20 should also be recorded. Additional pages, numbered in sequence, may be added as required.

m. DOCUMENTATION: Enter the document identification (i.e., drawing number, technical manual number, etc.), title, and the quantity of each document provided to the operating unit as part of the project.

n. EXCEPTIONS:

(1) Upon completion of installation and testing, any exceptions to the project requirements which require corrective action will be listed. Include complete identification of each missing item. Exceptions must be based on the specified requirements of the project, supportable through the test results or other valid documentation, fully described, and precisely identified.

(2) The appropriate exception block must be annotated and separate sheets should be used for each category of exception.

(3) The Test Director will also enter the suggested action agency for each exception, recognizing that the Test Director may not always be in a position to determine the final action agency.

(4) For facilities that are becoming partially operational, identify installation agency actions remaining for project completion. In this situation, the Materiel Acceptance Record will show the tests that have been made, but will be identified as a partial record. A final Materiel Acceptance Record will be prepared after installation and testing of all remaining project equipment.

o. REMARKS. The remarks section may be used to provide any additional information on or in support of a recommendation, commendation, or criticsm in relation to the project installation, engineering, or testing. Entries may include:

(1) Shortcomings which do not require corrective action (not considered an exception).

(2) Recommendations for improving projects of a similar nature.

(3) Identification of support items that have not been accomplished, and a description of any activity in progress by the operating agency to satisfy the requirement.

(4) A description of test results with the performing agency and date(s) accomplished.

(5) A statement to the effect that the installation agency will forward final "as built" drawings when completed.

(6) A description of the ac power system with identification of source and backup capability.

(7) A statement to indicate that a list of excess material was provided the operating command for final disposition or to identify material that was excess to the project.

p. CERTIFICATION: Enter the signatures and certification that the project was installed, tested, and accepted for operation with or without exceptions as applicable.

TECHNICAL ACCEPTANCE RECOMMENDATION (SUMMARY) (CCCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
FACILITY		TEST DIRECTOR
OPERATING AGENCY		ENGINEERING AGENCY
INSTALLATION AGENCY		TESTING AGENCY

PROJECT DESCRIPTION

This Technical Acceptance Recommendation is executed by the onsite representatives of the installation, test and operating agencies. It does not constitute official acceptance of the project but does certify that the MAJOR ITEMS INSTALLED AND DOCUMENTATION PROVIDED are as stated herein. This document further certifies that the project has been installed and performs satisfactorily in accordance with the requirements listed under REFERENCES except as noted under EXCEPTIONS and REMARKS. Upon execution of this TECHNICAL ACCEPTANCE RECOMMANDATION, USACEEIA considers this project complete except for such follow-on action as may be necessary to clear the EXCEPTIONS stated herein.

USACEEIA FM 98-R
1 Jan 79

Figure 8-1. Technical Acceptance Recommendation.
Replaces HQ USACEEIA CCC-TED-QA FM 98 which is obsolete

TECHNICAL ACCEPTANCE RECOMMENDATION (INSTALLED EQUIPMENT) (CCCR 702-2)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

MAJOR EQUIPMENT INSTALLED/RELOCATED

BOM ITEM NO.	DESCRIPTION	PART NUMBER/FSN	QUANTITY

Figure 8-1. Technical Acceptance Recommendation Continued.

TECHNICAL ACCEPTANCE RECOMMENDATION (DOCUMENTATION) (CCCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
PROJECT DOCUMENTATION PROVIDED		

REFERENCE DOCUMENTATION	TITLE	NO. OF COPIES

Figure 8-1. Technical Acceptance Recommendation Continued.

TECHNICAL ACCEPTANCE RECOMMENDATION (EXCEPTIONS) (CCCR 702-2)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

EXCEPTIONS ENGINEERING ☐ INSTALLATION ☐ OTHER ☐	SUGGESTED ACTION AGENCY

Figure 8-1. Technical Acceptance Recommendation Continued.

TECHNICAL ACCEPTANCE RECOMMENDATIONS (REMARKS) (CCCR 702-2)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

REMARKS:

Figure 8-1. Technical Acceptance Recommendation Continued.

TECHNICAL ACCEPTANCE RECOMMENDATION (CERTIFICATION)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

CERTIFICATION

Acceptance tests and Quality Assurance Inspections are complete for equipment installed under this project.

WITHOUT EXCEPTIONS ☐ WITH NOTED EXCEPTIONS ☐

INSTALLATION AGENCY	SIGNATURE AND TITLE
	PRINTED
OPERATING AGENCY	SIGNATURE AND TITLE
	PRINTED
TEST AGENCY	SIGNATURE AND TITLE
	PRINTED

ACCEPTANCE

Equipment herein certified successfully installed and tested, is accepted for operation.

OPERATING COMMAND	SIGNATURE
	TITLE

Figure 8-1. Technical Acceptance Recommendation Continued.

16 February 1979 SEIP 012

(CC-OPS)

FOR THE COMMANDER:

OFFICIAL:

EUGENE J. VITETTA
Colonel, GS
Chief of Staff

J. HOSTON
LTC, AGC
Adjutant General

DISTRIBUTION:
Special
5 - CC-PA-AMP
10 - CCC-CED-SEP
4 - CCC-CED-SW
4 - CCC-TED
5 - USACEI Bn
10 - USACEEIA-CONUS, ATTN: CCCN-TR, Fort Ritchie, MD 21719
10 - USACEEIA-EUR, APO New York 09056
10 - US Army Signal School, ATTN: ATSN-CD-MS, Fort Gordon, GA 31905
2 - US Army Materiel Development and Readiness Command, ATTN: CCN-PI-P, Washington, DC 20315
5 - 5th Signal Command. APO New York 09056
5 - 7th Signal Command, Fort Ritchie, MD 21719
1 - US Army Communications Command, ATTN: CC-OPS-PT, Fort Huachuca, AZ 85613
2 - US Army Training and Doctrine Command, ATTN: ATCE, Fort Monroe, VA 23351
2 - US Army Forces Command, ATTN: AFCE, Fort McPherson, GA 30330
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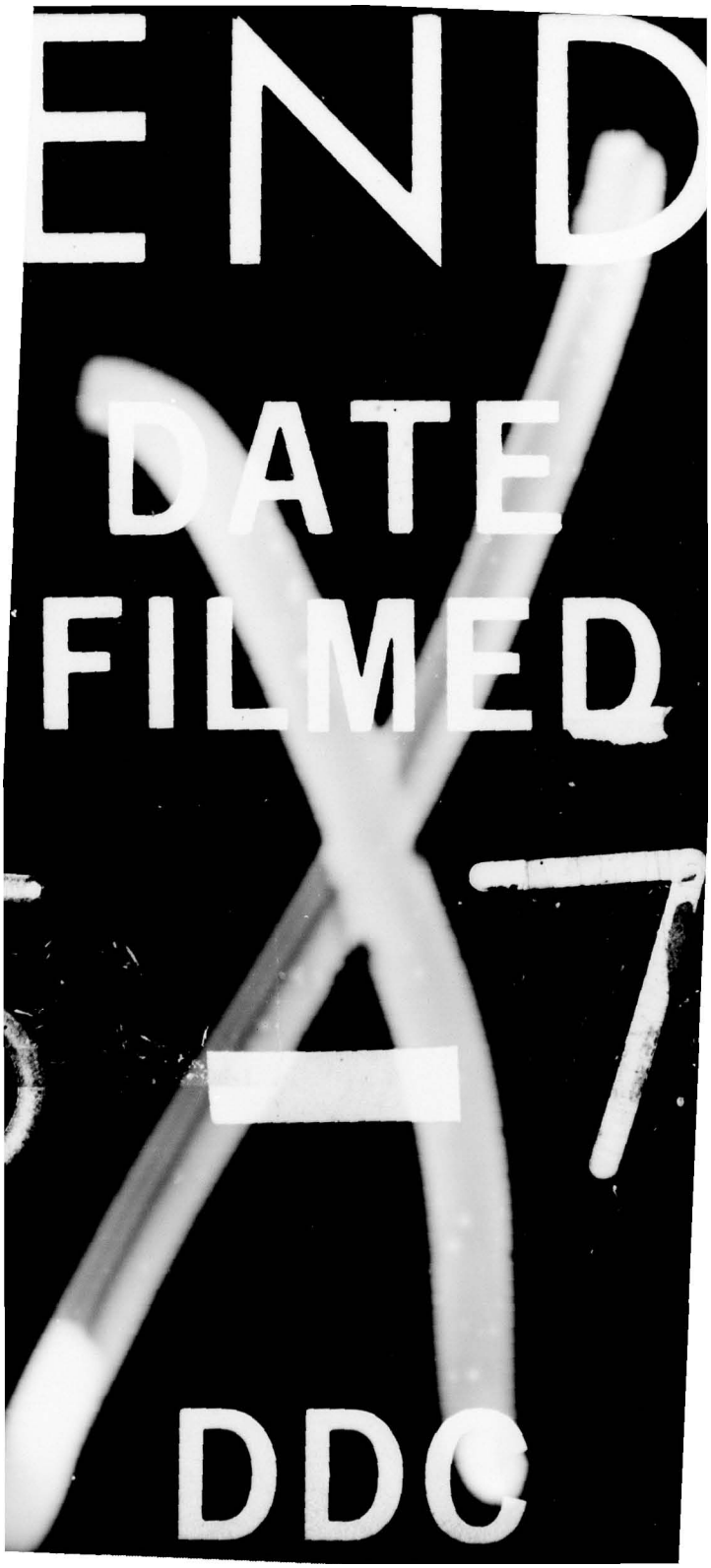
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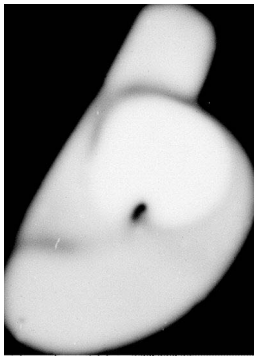

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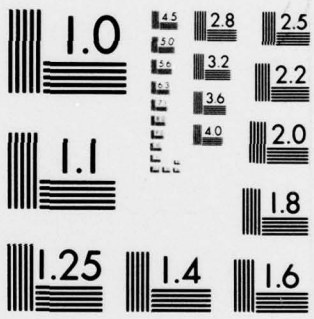

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Change
No. 1

29 July 1983

STANDARD
ENGINEERING INSTALLATION PACKAGE
TERMINAL VHF OMNIDIRECTIONAL RANGE (TVOR)
SYSTEM AN/FRN-41

USACC SEIP 012, 16 February 1979, is redesignated USACEEIA SEIP 012, per USACC Supplement 1 to AR 310-2 is changed as follows:

1. Remove DD Form 1473, Report Documentation Page, and destroy.

2. Make the following pen and ink changes:

a. Page 1-12, paragraph 1.5a(1), delete CCTM 105-50-21. Renumber paragraph 1.5a.

b. Page 1-15, paragraph 1.6.1, line 7, change office symbol ATTN: CCC-CED-STD to CCC-CE-ES.

c. Page 1-15, paragraph 1.6.2, line 2, change office symbol ATTN: CCC-SPT-RM to CCC-DRM-P-R.

d. Page 2-3, paragraph 2.4, line 11, change site concurrence letter (SCL) to project coordination letter (PCL).

e. Page 3-15, paragraph 3.4.1, line 2, change two sets of drawings to three sets of drawings.

f. Page 4-1, paragraph 4.1.2, lines 2 and 3. Change USACC Commander and another "marked-up" to local commander and two "marked-up".

3. After posting this change file the change sheet in front of the basic publication for reference purposes.

FOR THE COMMANDER:

HOWARD C. RICHARDS
Colonel, Signal Corps
Deputy Commander

OFFICIAL:

DENNIS M. WARREN
Lieutenant Colonel, Signal Corps
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