TM 11-5820-469-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR'S MANUAL

RADIO TERMINAL SET AN/TRC-80

10, 67, 72, 0-937

HEADQUARTERS, DEPARTMENT OF THE ARMY

25 JANUARY 1963

WARNING

Be careful when working on the 200-volt dc high-voltage circuits, or on the 120- and 208-volt ac line connections

DON'T TAKE CHANCES!

DANGEROUS RF VOLTAGES ARE EXPOSED ON THE ANTENNA

EXTREMELY HIGH VOLTAGES EXIST IN THE FOLLOWING UNITS:

Klystron drawer . . . . . 7,700 volts
Amplifier-Converter AM-3303/TRC-80 . . . . . 1,600 volts

GASOLINE HANDLING

Do not refuel the power unit and do not handle or leave open gasoline containers or plastic gasoline containers in the vicinity of the radio set while the transmitter is on. Do NOT smoke or light open fires within 25 feet of the gasoline containers of the engine generator.

RF BURNS

Do not stand on the roof of the shelter or in the path of radiation from the radio set while the transmitter is on. Turn off the power amplifier before climbing to shelter roof.

WIND WARNING

Do not assemble or disassemble the antenna when wind gusts exceed 60 mph or sustained winds exceed 40 mph.

RADIATION HAZARD



Co60

Ni63

Tube-types OA2WA and OB2 are used in this equipment and contain radioactive material (para 4). These tubes are potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes. Use extreme care in replacing these tubes and follow safe procedures in their handling, storage, and disposal (para 87).

Never place radioactive tubes in your pocket.

Use extreme care not to break radioactive tubes while handling them.

Never remove radioactive tubes from cartons until ready to use them.

Refer to paragraph 87 on handling, storage, and disposal of radioactive material.

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *1 October 1969*

mk 12-9-69

Operator's Manual

RADIO TERMINAL SET AN/TRC-80B

TM 11-5820-469-10, 25 January 1963, is changed as follows:

1. Title is changed as shown above.
2. Line 8, page 2 of cover, Warning, change Amplifier-Converter AM-3303/TRC-80 to Amplifier-Converter AM-4917/TRC.
3. This change reflects equipment modifications on the AN/TRC-80A incorporated by MWO 11-5820-469-50/1.
4. Remove old pages and insert new pages as indicated below.

Remove pages –	*Insert pages –*
1 through 4.2	1 through 4.1
5 through 14.4, 15 through 16.2	5 through 16.1
19 through 22.2, 23 through 28.2, 29 and 30	19 through 32
33 and 34	33 and 34
37 through 38.2	37 through 38
39 through 40.2, 41 through 42.2, 44 through 44.2	39 through 44
47 and 48	47 and 48
49 and 50	49 and 50
53 and 54	53 and 54
55 and 56	65 through 72.1
85 through 90.2	85 through 90.2
91 and 92	91 and 92
95 and 96	95 and 96
103 through 104.2, 105 through 106.2	103 and 104
109 and 110	105 and 106

5. File this change sheet in the front of the manual for future reference.

94 pp

TECHNICAL MANUAL
No. 11–5820–469–10

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *25 January 1963*

Operator's Manual
RADIO TERMINAL SET AN/TRC–80B

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*This manual supersedes TM 11–5820–469–10, 11 April 1962, including C 1, 15 July 1962.

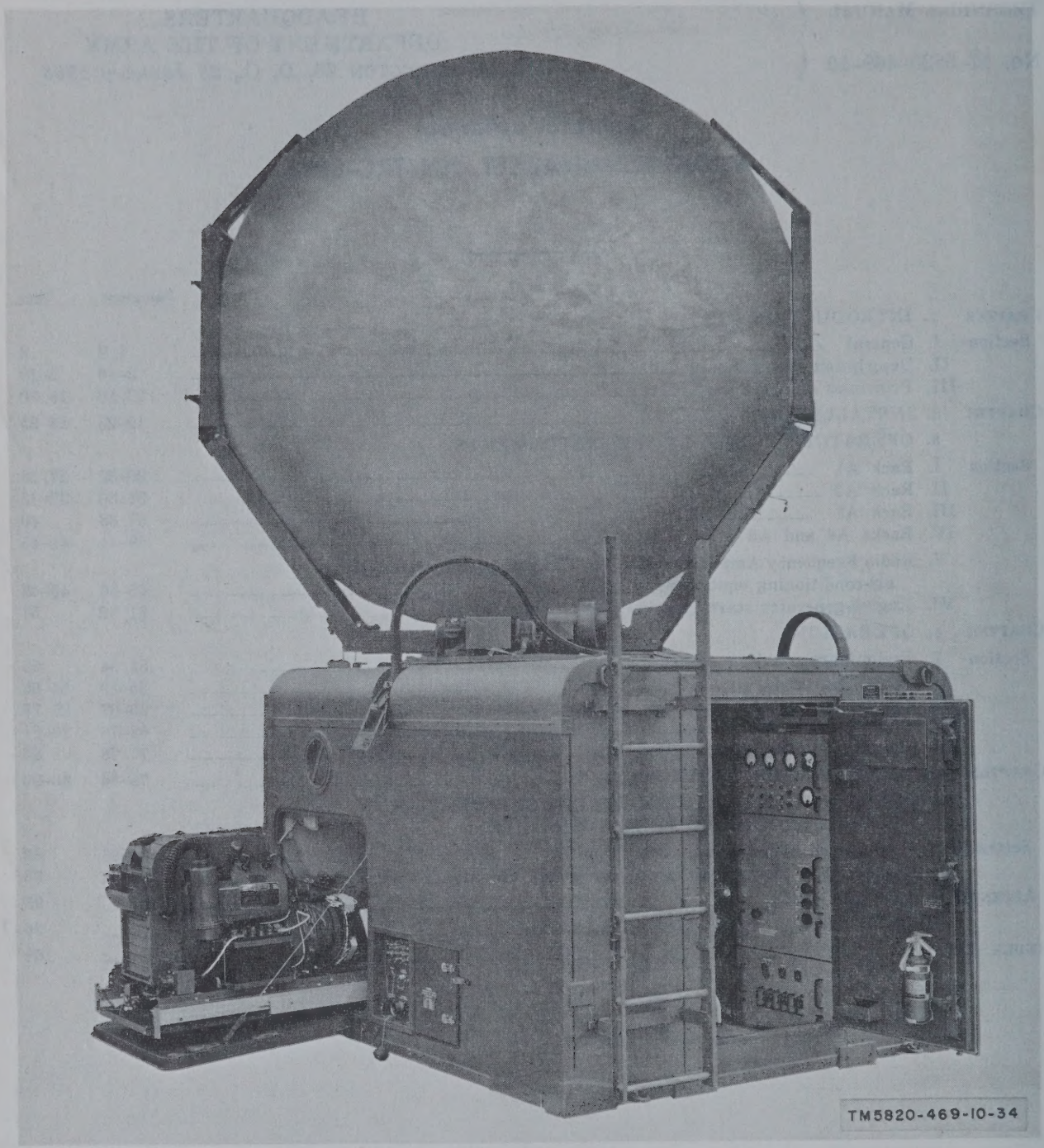


Figure 1. Radio Terminal Set AN/TRC–80B.

CHAPTER 1

INTRODUCTION

Note. **The old term "cycles" and the new term "hertz" appear in this manual. Both terms are synonymous.**

Section 1. GENERAL

1. Scope

a. This manual describes Radio Terminal Set AN/TRC–80B (fig. 1) and contains instructions for operation and operator's maintenance. The manual includes instructions for on-site preparation of the AN/TRC–80B for operation, and instructions for cleaning, inspection, and replacement of parts authorized for operator's maintenance.

b. The maintenance allocation appears in TM 11–5820–469–20.

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38–750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR–700–58 (Army), NAVSUP Publication 378 (Navy), AFR 71–4 (Air Force), and MCO P4610–5 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55–38 (Army), NAVSUP Pub 459 (Navy), AFM 75–34 (Air Force), and MCO P4610.9 (Marine Corps).

d. Reporting of Equipment Manual Improvements. Reporting of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL–ME–NMP–AD, Fort Monmouth, N.J., 07703.

e. Indexes of Publications. Refer to the latest issue of DA Pam 310–4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment, and to DA Pam 310–7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

Radio Terminal Set AN/TRC–80B (fig. 1) is a transportable radio communication facility capable of transmitting and receiving radio signals in the 4.4-gigahertz (GHz) to 5.0-GHz spectrum. Full duplex transmission and reception of four voice channels and one order wire channel are provided. The order wire channel contains one voice frequency circuit and one radio teletypewriter circuit. The AN/TRC–80B contains facilities for wire communications between the radio terminal set operator and two remote sites, and the transmission and reception of four two-wire/four-wire multiplexed telephone circuits. The AN/TRC–80B provides reliable communication up to 160 kilometers (km) (100 statute miles). The AN/TRC–80B contains an air-inflatable parabolic antenna and an engine generator for primary power. The complete radio set is transportable by either air or ground transport facilities. The AN/TRC–80B is designed for use with the Pershing Weapons System.

4. Technical Characteristics

Warning

Tube types OA2WA and OB2 are used in this equipment. These tubes contain radioactive material and are potentially hazardous when broken. The type and quantity of radioactivity are listed below:

Tube type	Where used	Isotope	Quantity (microcuries)
0B2	Monitor and multiplexer	Co60	0.0067
0A2WA	Power control panel of power amplifier.	Ni63	0.01–.05
		Co60	0.0067

a. General.

Range:
- Nondiversity operation: 112 km (70 miles)
- Diversity operation: 160 km (100 miles).
- Low-power operation: Line of sight.

Azimuth:
- Coverage: 6,400 mils (360°).
- Determination: Relative, from scale on antenna platform.

Operational reliability: Better than 99.9-c/o at distances up to 160 km (diversity of operation)

Elevation:
- Coverage: +10° to −5° relative to shelter roof.
- Determination: Relative, from scale on antenna platform.

Shelter:
- Size (overall): 69 in. high, 80 in. wide, 100 in. deep.
- Weight: Approximately 4,800 lb.
- Primary power: 208/120 volts, 4 wire, 3 phase, 400 cps.

Temperature range:
- Operating: −25°F to +125°F (−31.7°C to +51°C).
- Operating (with winterization kit): Down to −65°F (53.8°C).
- Storage: −65°F to +160°F (−53.8°C to 71.1°C).

Minimum frequency separation: 100 mc between transmit/receive.

Transmission line: Flexible waveguide equivalent to Radio Frequency Line RG–49/U rigid waveguide.

b. Transmitting System.

Frequency: 4.4 to 5.0 GHz

Frequency stability: ±1 part in 10^6 in 6 months for any channel.

Tube type	Where used	Isotope	Quantity (microcuries)

Channels: 12,000 at 50-kHz interval.

Type of modulation: Fm.

Power output: 1,000 watts.

Duty cycle: Continuous.

Low power output: 1 watt, approx.

c. Receiving System.

Frequency range: 4.4 to 5.0 GHz.

Receiver type: Fm dual conversion superheterodyne with dual diversity capability.

Intermediate frequencies: 70 mc and 8 mc.

Bandwidth: 160 to 750 kHz.

Sensitivity for 30 db signal to noise: −93 dbm.

Noise figure: Better than 6 db.

Input impedance: 50 ohms, unbalanced.

Local oscillator:
- Type: Frequency synthesizer.
- Frequency range: 1,082.5 to 1,232.4875 MHz.

d. Local Oscillator Frequency Generating System.

Oscillator type: Voltage controlled with crystal oscillator reference.

Output:
- Frequency synthesizer: 1,082.5 to 1,232,4875 MHz in 12.5-KHz steps.
- Level: 675 mw (minimum).
- Frequency stability: ±1 part in 10^6 in six months for any channel.
- Frequency separation between channels: 12.5 kc.

Rejection:
- Harmonics of output: 40 db, minimum
- Other frequencies: 80 db, minimum

d. 1 Telephone Terminal Frequency Generating System.

Oscillator type: Voltage adjustable with crystal oscillator reference.

Output: 8-kHz pulse, 4-kHz square wave.

Level: 8-volts peak-to-peak into 1500 ohms.

d. 2 Telephone Terminal Signaling Frequency System.

Oscillator: Low frequency.

Output: 1600 Hz.

Level: 0 db across 300 ohms.

Multivibrator: Square wave.

Output: 20 Hz.

Level: 90 volts rms across 2000 ohms.

Tube type	Where used	Isotope	Quantity (micro-curies)

e. Antenna System.

Type ..... Inflatable parabolic reflector.

Support ..... Pressurized peripheral ring and collapsible aluminum frame and feedhorn support arms.

Air pressure and source:

- Peripheral ring ..... 13 to 15 psi, from motor-driven compressor.
- Paraboloid bag ..... 4 psi from motor-driven blower.

Dimensions:

- Paraboloid reflector diameter. 96 inches.
- Diameter including side-support frame. 10 feet.
- Elevation above top of shelter. 10 feet.

Antenna feed polarity ..... Horizontal and vertical.

Positioning (manual):

- Azimuth ..... 6,400 mils in 100-mil increments from shelter roof; through 100-mil range from operator's compartment.
- Elevation ..... +10° to −5° relative to roof of shelter.

Wind:

- Storage and transport: 80 mph with gusts to 120 mph.
- Assembly, disassembly, and safe operation: 40 mph with gusts to 60 mph.

Radiation pattern ..... 35 mils (2°) nominal in either E or H plane.

Directive gain ..... 36 db minimum throughout frequency range.

Radiating element ..... Bipolarized feed horn.

Reflector ..... Paraboloid.

Beam width ..... 35 mils (2°).

Attenuation of lobes relative to main beam:

- Front (±90° from main beam). 16 db.
- Rear ..... 28 db.

f. Communication Capabilities.

Teletype circuits:

2-wire dc:

AN/TRC-80B operator, army, and programer test station in 3-party loop.

Receive radio teletypewriter output to programer test station.

AN/TRC–80B operator and programer test station in 2-party loop.

Voice frequency:

2-wire/4-wire, programer test station to AN/TRC–80B radio facilities.

4-wire, AN/TRC-80B operator and Army.

4-wire duplex, AN/TRC-80B operator and AN/TRC-80B radio facilities.

Speech circuits:

2-wire intercom, programer test station and AN/TRC–80B radio facilities or AN/TRC–80B operator.

2-wire intercom, programer test station and AN/TRC–80B operator.

2-wire/4-wire telephone, army and AN/TRC–80B operator.

4-wire plus keying line to a vehicular-mounted radio set.

2-wire spare.

4-wire between AN/TRC–80B operator and AN/TRC–80B radio facilities.

Multiplex telephone circuits:

Four, 2-wire/4-wire telephone, between AN/TRC–80B radio facilities and AN/TRC–80B subscriber.

g. Power Unit.

Type.....Gasoline engine driver alternator.

Output.....10 kw, 208/120-volt, 3-phase, 400-cps 4-wire.

Start method.....Battery driven crank.

Control.....Frequency and voltage control from operator's compartment.

Fuel consumption..2½ gallons per hour.

5. Table of Components

a. Components. The components of the AN/TRC–80B are listed in the basic items list (app. II). The major components are illustrated in figures 1, 2, and 5 through 12. The minor components are illustrated in figures 3 and 3.1.

b. Running Spares. The running spares for the AN/TRC–80B are listed in the basic issue items list (app. II).

6. Common Names

The nomenclature and common name assignments for the components of the radio set are listed below.

Nomenclature	Common name
Radio Terminal Set AN/TRC–80B	Radio set
Electrical Equipment Shelter S–254/TRC–80	Shelter
Monitor, Audio Frequency-Radio Frequency MX–8383/TRC–80B	Monitor
Amplifier-Converter AM–4917/TRC	Transmit converter
Modulator-Multiplier MD–465/TRC–80	Modulator-multiplier
Demultiplexer-Multiplexer TD–550/TRC–80	Multiplexer
Cooler, Air, Electronic Equipment HD–545/TRC–80	Blower
Power Distribution Panel SB–1565/TRC–80	Switch panel
Communication Control Panel SB–1564/TRC–80	Control panel
Electrical Frequency Synthesizer 0–1462A/TRC	Synthesizer
Amplifier-Converter AM–4916–TRC	Receive converter
Amplifier, Intermediate Frequency AM–6028/TRC–80B	IF amplifier
Power Supply PP–3313/TRC–80	IF power supply
Power Supply PP–4936/TRC	Converter power supply
Power Supply PP–6290/TRC	Mux power supply
Radio Frequency Amplifier AM–3308/TRC–80	Power amplifier
Antenna AS–1270/TRC–80	Antenna
Air Conditioner, Self-Contained, CE–6A–400	Air conditioner
Telegraph Terminal TH–5A/TG, or TH–22/TG	Telegraph terminal
Teletypewriter Set TT–335/TG	Teletypewriter
Terminal, Telephone TA–833/TRC	Telephone terminal

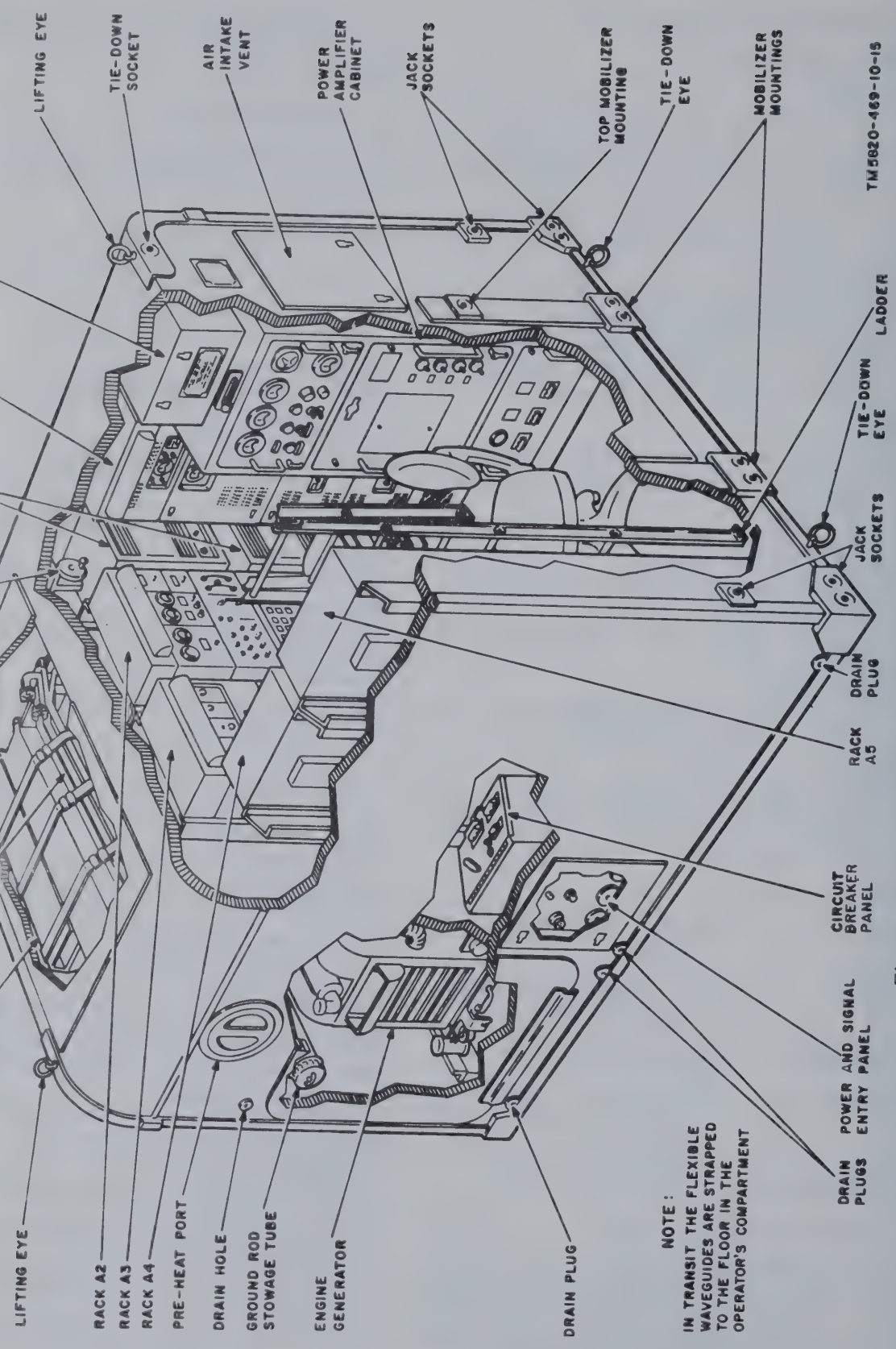


Figure 2. Radio Terminal Set AN/TRC–80B, major component location.

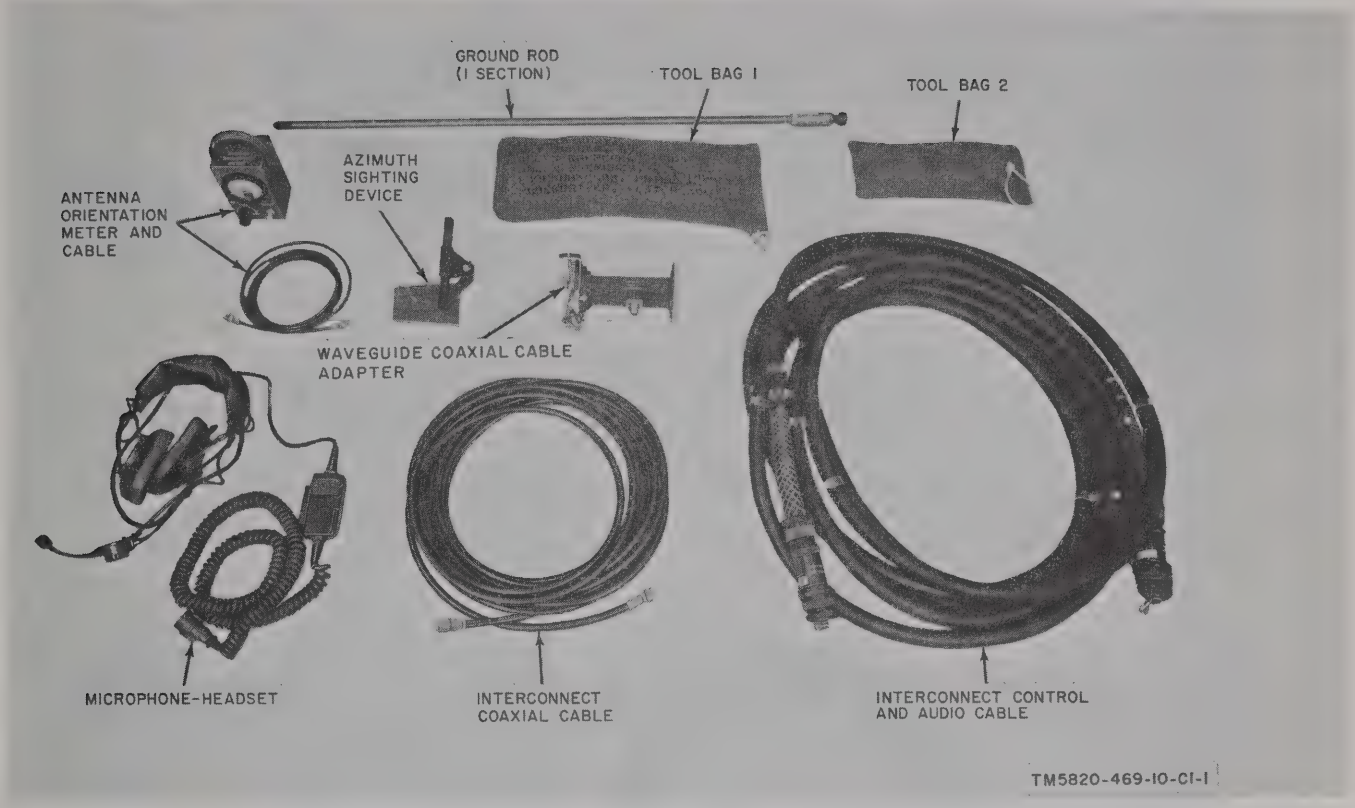


Figure 3. Radio Terminal Set AN/TRC–80B, minor components.

7. Description
(fig. 2)

The components of the AN/TRC–80B are installed in a weatherproof shelter that is divided into three main areas, the operating compartment, the engine-generator compartment, and the antenna storage compartment space. The radio, telephone terminal and operating equipments are rack mounted in five standard 19-inch relay racks along the side and rear walls of the operating compartment. Two of the racks and the klystron drawer of the power amplifier cabinet are equipped with blowers to provide the required forced-air cooling. Illumination is provided by lamp-reflector assemblies installed at the tops of the racks. Power from the engine generator is brought into a circuit breaker panel installed in the left-rear corner of the operating compartment. The associated air-conditioner condenser units are installed at one end of the engine-generator compartment and are vented to the outside air. In transit, the inflatable antenna, feedhorn, and collapsible support arms are stored in the antenna compartment; the flexible waveguide transmission lines are strapped to the floor in the operator's compartment. In operation, the antenna platform is raised to the level of the roof of the shelter and locked in place. The support arms are then unfolded, the bag is inflated, and the feedhorn and flexible waveguide transmission lines are installed. The major equipment areas of the AN/TRC–80B consist of the following:

a. Circuit control and operating equipment.

b. Local oscillator frequency generation equipment.

c. Monitor, modulator-multiplier, and multiplexer equipment.

d. Power amplifier.

e. Receiving equipment.

f. Telephone terminal equipment.

g. Primary power equipment.

h. Air-conditioning equipment.

i. Antenna.

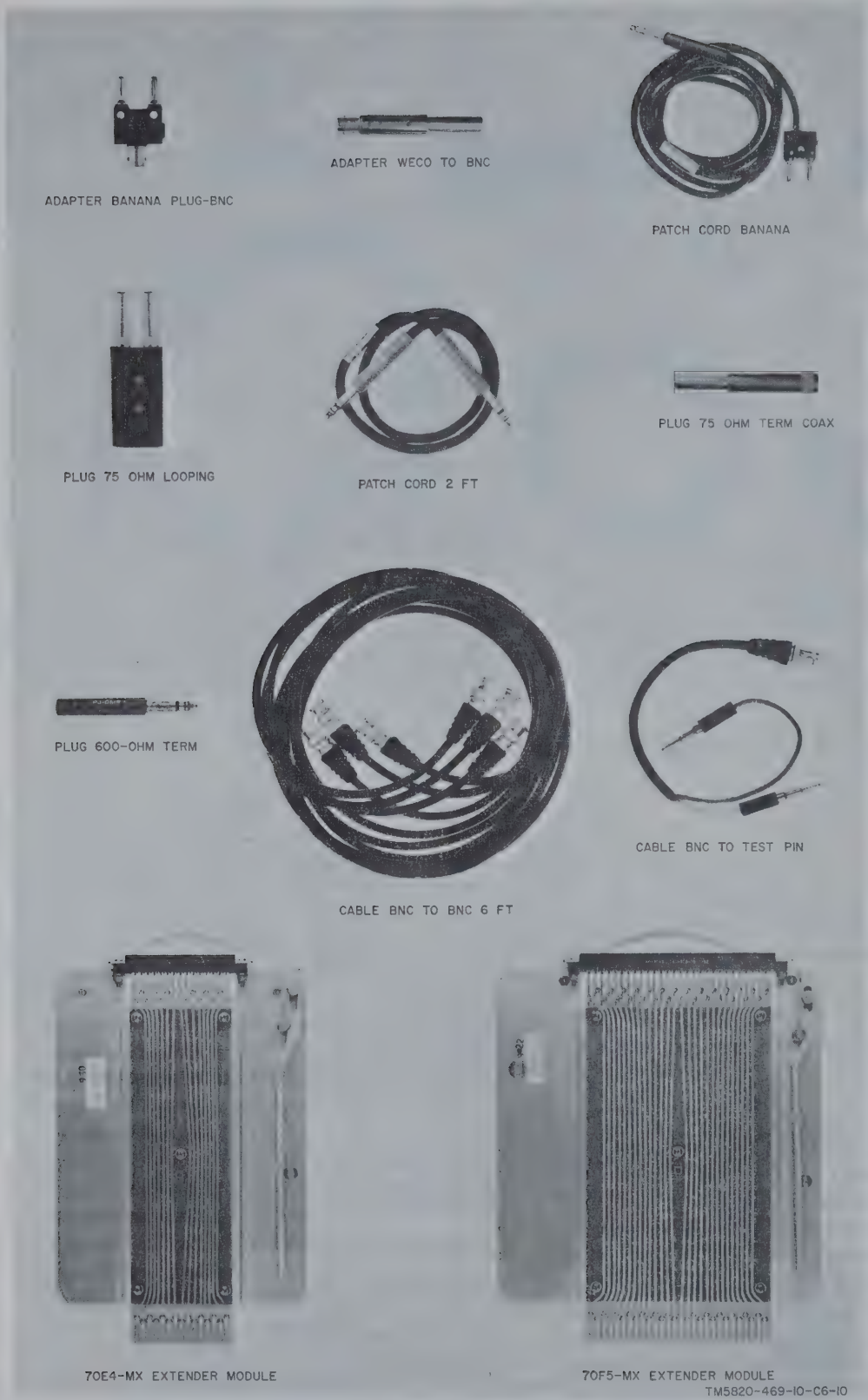


Figure 3.1 Telephone Terminal, TA-833/TRC minor components.

Figure 4. **Deleted.**

8. Circuit Control and Operating Equipment

The circuit control and operating equipment consists of the engine-generator control panel, Power Distribution Panel SB–1565/TRC–80, Communication Control Panel SB–1564/TRC–80, Teletypewriter Set TT–335/TG, teletypewriter switch panel, Telegraph Terminal TH–5A/TG, or TH-22/TG, and a circuit breaker panel (fig. 2). With the exception of the circuit breaker panel, all the components are mounted in rack A2 (fig. 5).

Note

If a new TH–22/TG is installed, notify higher category of maintenance that a jumper must be installed between pin 6 of S5A and pin 3 of S3A in the TH–22/TG, used in some AN/TRC–80B and that this jumper must be removed when the TH–22/TG is removed from the AN/TRC–80B and returned to depot.

a. Engine-Generator Control Panel. The engine-generator control panel controls and monitors the operation of the engine-generator. Front panel controls permit frequency and voltage adjustments and a means to turn the engine generator off in an emergency. A separate panel, located on the engine generator, is used to start and stop the engine-generator.

b. Power Distribution Panel SB–1565/TRC–80. The SB–1565/TRC–80 (switch panel) provides two distinctly separate functions. One section of the switch panel controls rack power. The other section selects diversity or nondiversity operation.

(1) The switch panel contains switches for controlling power to the five racks, flushing blower, hut lights, and the three rack blowers. Panel indicators provide indication of the condition of these circuits as well as loss of forced-air cooling in the racks. Indicator-type fuses for the flushing blower circuit and the 28-volt direct current (dc) supply are mounted in the center of the panel.

(2) The switch panel is used to switch the various circuits for diversity or nondiversity operation. Two selector switches and two coaxial cable patchboards permit setting up the radio set to function as a control station, a slave station, or a tie-slave station when operating in the diversity mode (paras 18*b* and 69*b*).

(3) The switch panel is mounted directly above the control panel and is provided with swing-out hinges for maintenance.

c. Communication Control Panel SB–1564/TRC–80. The SB–1564/TRC–80 (control panel) permits the operator to control circuit application, and provides a means of circuit switching and routing functions. The control panel is mounted on hinges just above the operator's table. The chassis swings out for maintenance and provides access to the two connecting cables and seven plug-in printed circuit modules. The control panel mounts 17 circuit-switching pushbuttons, 3 level controls, and 3 indicator-type fuses. The pushbuttons are back lighted by white or colored lamps to provide indication of existing circuit conditions. A self-contained transistorized power supply furnishes the required operating voltages. Controls for maintenance personnel are mounted on the rear panel. A panel-mounted loudspeaker and a headset connector facilitate operator monitoring of voice communication.

d. Teletypewriter Set TT–335/TG. The teletypewriter is a standard keyboard model that is operated from a 400-cycle-per-second (cps), 120-volt source. The teletypewriter is mounted on a swivel stand that may be pushed out of the way to provide access to the control panel.

e. Teletypewriter Switch Panel. The teletypewriter switch panel is mounted on a shelf directly below the teletypewriter. The teletypewriter switch panel contains a hybrid transformer for two- to four-wire transformation of the voice-frequency (vf) teletypewriter (tty) line from the programer test station (pts) facility. A mode selector switch provides selection of voice frequency or dc teletypewriter operation. A toggle switch is provided to bypass (on) or include (off) the pts facility in the two-wire dc teletypewriter circuit. Two 120-volt, 400-cps convenience outlets for the teletypewriter and the telegraph terminal are provided at the bottom of the panel. Six front panel test jacks are provided for maintenance personnel use.

f. Telegraph Terminal TH–5A/TG. The telegraph terminal is mounted alongside the teletypewriter switch panel (*e* above). The telegraph terminal converts the tty dc signals to audiofrequency (af) signals, and the af signals to dc. Front panel controls permit variations in operating modes. The telegraph terminal operates from the 400-cps, 120-volt source.

f. 1 *Telegraph Terminal TH–22/TG.* Telegraph Terminal TH–22/TG (fig. 26.1), when used, is mounted in place of the TH–5A/TG

(*f* above) and performs the same functions. Front panel controls permit a greater variation of operating modes. The telegraph terminal operates from the 400-cps, 120-volt source.

g. Generator Auxiliary Panel. This panel contains protective relays associated with the engine-generator.

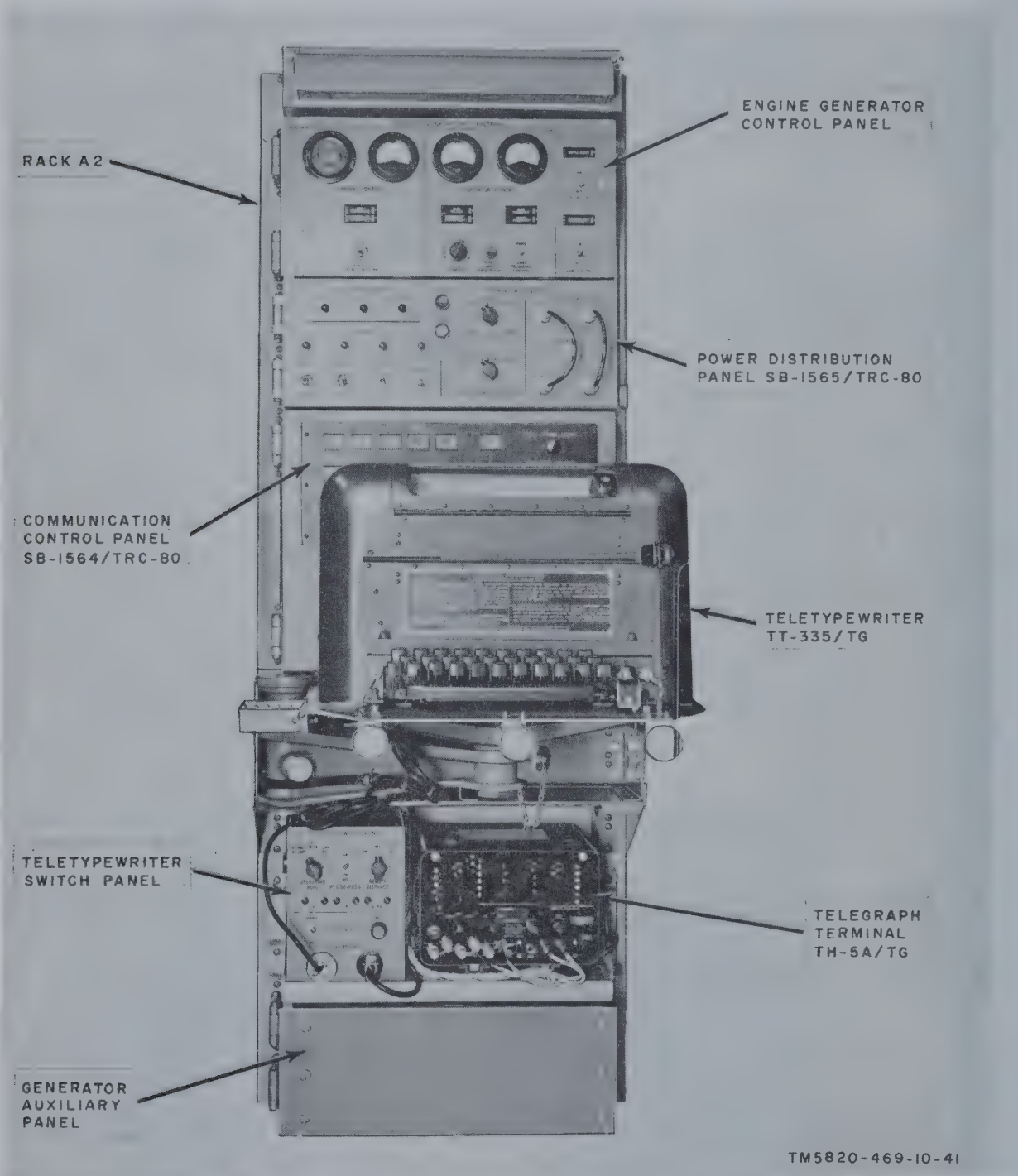


Figure 5. Rack A2, control equipment.

9. Local Oscillator Frequency Generation Equipment

(fig. 6)

a. The frequency generating equipment consists of three Electrical Frequency Synthesizer O–1462A/TRC units. The synthesizers are mounted in the upper half of rack A3. The upper synthesizer supplies the local oscillator signal to receive converter No. 1 in rack A5; the bottom synthesizer supplies the local oscillator signal to receive converter No. 2 in rack A4. The center synthesizer supplies the carrier signal to the transmit converter in rack A1.

b. Each synthesizer (type O–1462A/TRC) consists of a main chassis that mounts 14 plug-in cards and modules. The 14 plug-in modules include the switching panel, fault panel, power supply, and RF module. The switching panel contains five thumbwheel switches for setting up proper operating channels. The fault panel contains the POWER indicator and OUT OF LOCK indicator. The power supply panel contains the POWER switch and fuseholder. The RF module contains a tuning knob and associated dial window for setting up proper operating channels. A panel meter indicates the proper tuning of the voltage-controlled oscillator. A POWER OUTPUT control adjusts the output power of the frequency synthesizer. The remaining circuit cards are mounted behind a hinged panel and are accessible by loosening a thumbscrew on each side of the panel.

10. Monitor, Transmit Converter, Modulator-Multiplier, and Multiplexer Equipment

(fig. 7).

Rack A1 contains the equipment illustrated in figure 7. All the units are hinge-mounted to facilitate cable connection and maintenance. Forced-air cooling is provided by a blower installed in the bottom of the rack. The operator controls are recessed in cutouts in the dust covers. The tuning and alignment controls are made accessible when the front covers are removed.

a. Audio Frequency-Radio Frequency Monitor MX–8383/TRC–80B. The monitor contains a front panel meter and two selector switches that permit visual monitoring of incoming and outgoing voice and teletypewriter signals. The monitor is used during initial alignment for adjustment of the various signal levels.

b. Amplifier-Converter AM–4917/TRC. The transmit converter receives a modulated signal from the modulator-multiplier and a carrier signal from the synthesizer in rack A3 (para 9*a*), and supplies output frequency driving power to the power amplifier. A front panel meter and a selector switch permit monitoring of circuit conditions within the transmit converter. The tuning controls for the varactor multiplier and tunable filter are accessible when the front dust cover is removed.

c. Modulator-Multiplier MD–465/TRC–80. The modulator multiplier receives modulating signals from both the multiplexer that is mounted directly below and the telephone terminal that is mounted below the synthesizers in rack 3, and delivers a modulated output to the transmit converter (*b* above). The front panel contains one switch that turns on a self-contained transistorized power supply. The dust cover conceals three fuses and a carrier switch.

d. Demultiplexer-Multiplexer TD–550/TRC–80. The multiplexer combines the vf tty tones and the order wire speech signals into a composite transmit signal in the transmit section; and it separates the order-wire speech and vf tty signals in the receive section. The operating control and indicators are mounted on the front panel. Two power supply indicator-type fuses are mounted on the chassis and are accessible when the dust cover is removed. A self-contained power supply furnishes regulated high voltage for all circuits.

11. Power Amplifier

(fig. 8)

Radio Frequency Amplifier AM–3308/TRC–80 develops the required radiofrequency (RF) power output. The power amplifier consists of three drawer assemblies containing the control circuits, the klystron, and the klystron power supply. The control circuit drawer assembly is equipped with drawer slides and may be extended from the cabinet for maintenance. The klystron and klystron power supply drawer assemblies are mounted on friction-type slides and may be extended from the cabinet for maintenance. All three drawers are electrically interlocked, removing high-voltage dc when any drawer is opened.

a. Control Panel Drawer. The control panel drawer is secured by two twist-lock latches and

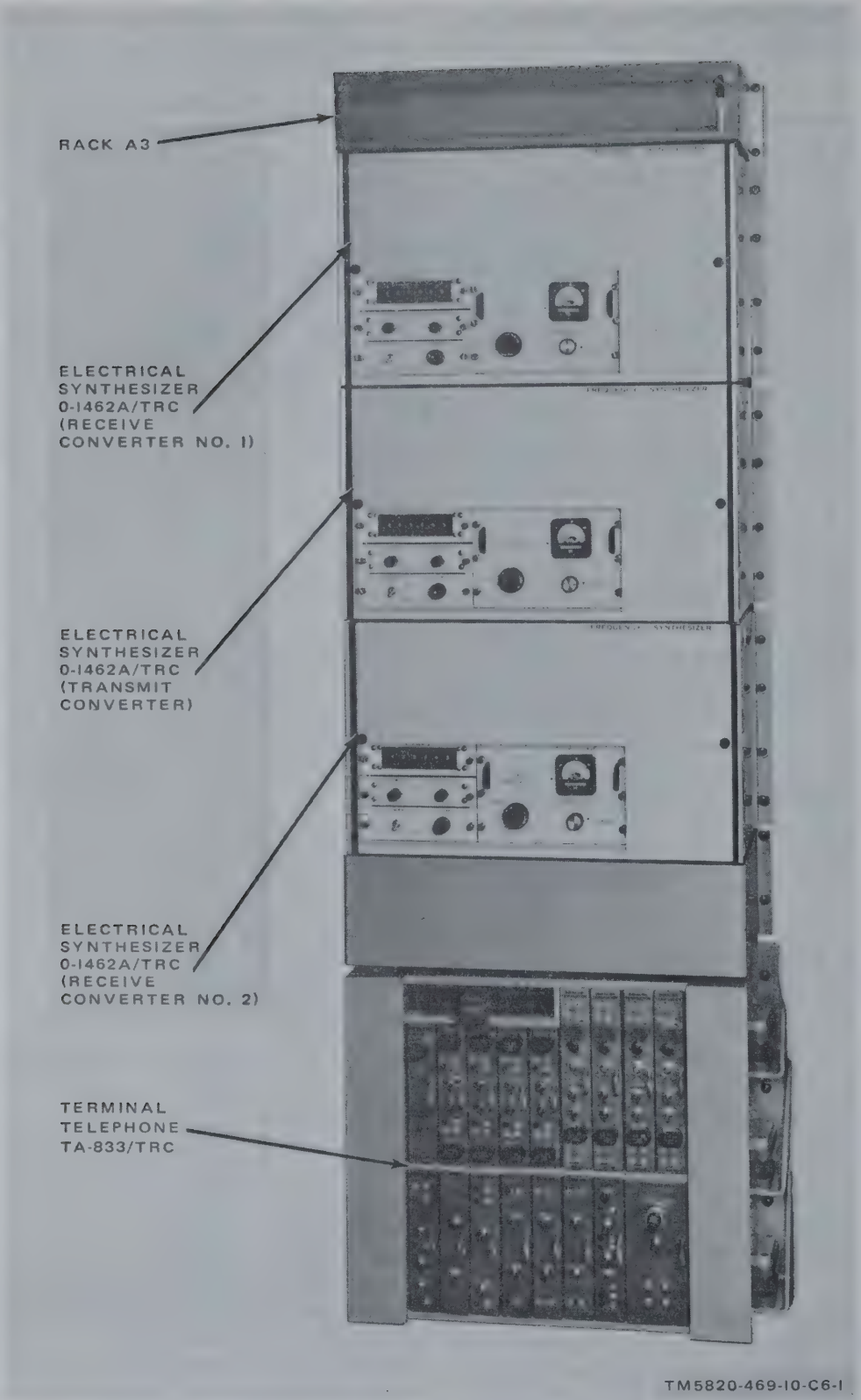


Figure 6. Rack A3, local oscillator frequency generation and telephone terminal equipment.

is provided with two handles for drawer removal. The front panel contains five meters for monitoring klystron filament, beam (plate) voltage, beam current, and RF power in and power out. Six indicators monitor the time delay, airflow, drawer interlock, RF alarm, filament voltage, and klystron beam voltage circuits. Beam voltage momentary-contact on-and-off pushbutton switches are located under the beam voltage indicator. A filament voltage on-off toggle switch and a filament voltage adjust control are located under the filament indicator. Two two-position selector switches, a tune-operate, and an RF input power meter selector are mounted on the lower right portion of the panel. Filament and line voltage indicator-type fuses are located in the center of the panel.

b. Klystron Drawer. The klystron drawer is secured by two twist-lock latches and is provided with two handles for drawer removal. The front panel contains an access door that can be removed to provide shelter heating from the forced-air heat dissipated by the klystron. An input drive level control is mounted directly below this door. A tuning chart is mounted in the upper right corner of the front panel. Four tuning knobs and associated cavity counter windows are located along the right side of the panel. The klystron-cooling blower is mounted above the klystron, behind the control panel drawer.

c. Power Supply Drawer. The power supply drawer is mounted on friction slides at the bottom of the cabinet. It is secured by two twist-lock latches. A high voltage interlock switch is associated with the right-hand latch. This insures removal of high voltage before the drawer is withdrawn. The front panel contains a six-position switch for controlling beam voltage, two total-hour meters and three circuit breakers for the blower, klystron, and main power circuits.

12. Receiving Equipment
(figs. 9 and 10)

The receiving equipment consists of two radio receiver groups and a circulator to provide a connection to the antenna. The two receivers are housed in racks A4 and A5 and consist of the components illustrated in figures 9 and 10 with the exception of the mux power supply (PP–6290/TRC). The receiver housed in rack A4 is designated as receiver No. 2. The receiver housed in rack A5 is designated as receiver No. 1. To provide room for a blower in rack A4, the converter power supply (PP–4936/TRC) for receiver No. 2 is installed in rack A5. The blower in the bottom of rack A4 provides forced-air cooling for both receiver racks. All receiver group components, except the converter power supplies, are hinge-mounted and swing out for maintenance and access to the connector cables.

a. Amplifier-Converter AM–4916/TRC and Power Supply PP–4936/TRC. The AM–4916/-TRC (receive converter) chassis consists of ten subassemblies. The main chassis functions as a mounting frame and contains interunit wiring and signal circuits. Three subassemblies contain tuning controls used for changing the operating frequency. Access to these controls requires removal of the dust cover. The input signal is brought in by waveguide from the circualtor that is mounted at the side of rack A4. The output of the receive converter is connected by coaxial cable to the switch panel in rack A2, from which point it is cabled back to the input of the intermediate frequency (IF) amplifier mounted directly below the receive converter. The B+ requirements of the receive converter are supplied by the PP–4936/TRC (converter power supply). Two converter power supplies are used, one for each receive converter. Each converter power supply contains a front panel on-off switch, a panel indicator, and a fuse.

b. Intermediate Frequency Amplifier AM–6208/TRC–80B and Power Supply PP–3313/TRC–80. The AM–6208/TRC IF amplifier chassis consists of five plug-in modules and a main frame. Each IF amplifier is rack-mounted directly below the associated receive converter from which the IF amplifier receives the signal input through the switch panel in rack A2. There are no tuning controls in the IF amplifier. A meter and an associated switch are provided to permit operational checks. Two pushbutton switches are provided for circuit testing. Access to these switches requires removal of a dust cover. The outputs of both IF amplifiers are combined, and the resultant signal is then routed to the multiplexer in rack A1 and the telephone terminal in rack A3. The B+ requirements of the IF amplifier are supplied by the PP–3313/TRC–80 (IF power supply). Two IF

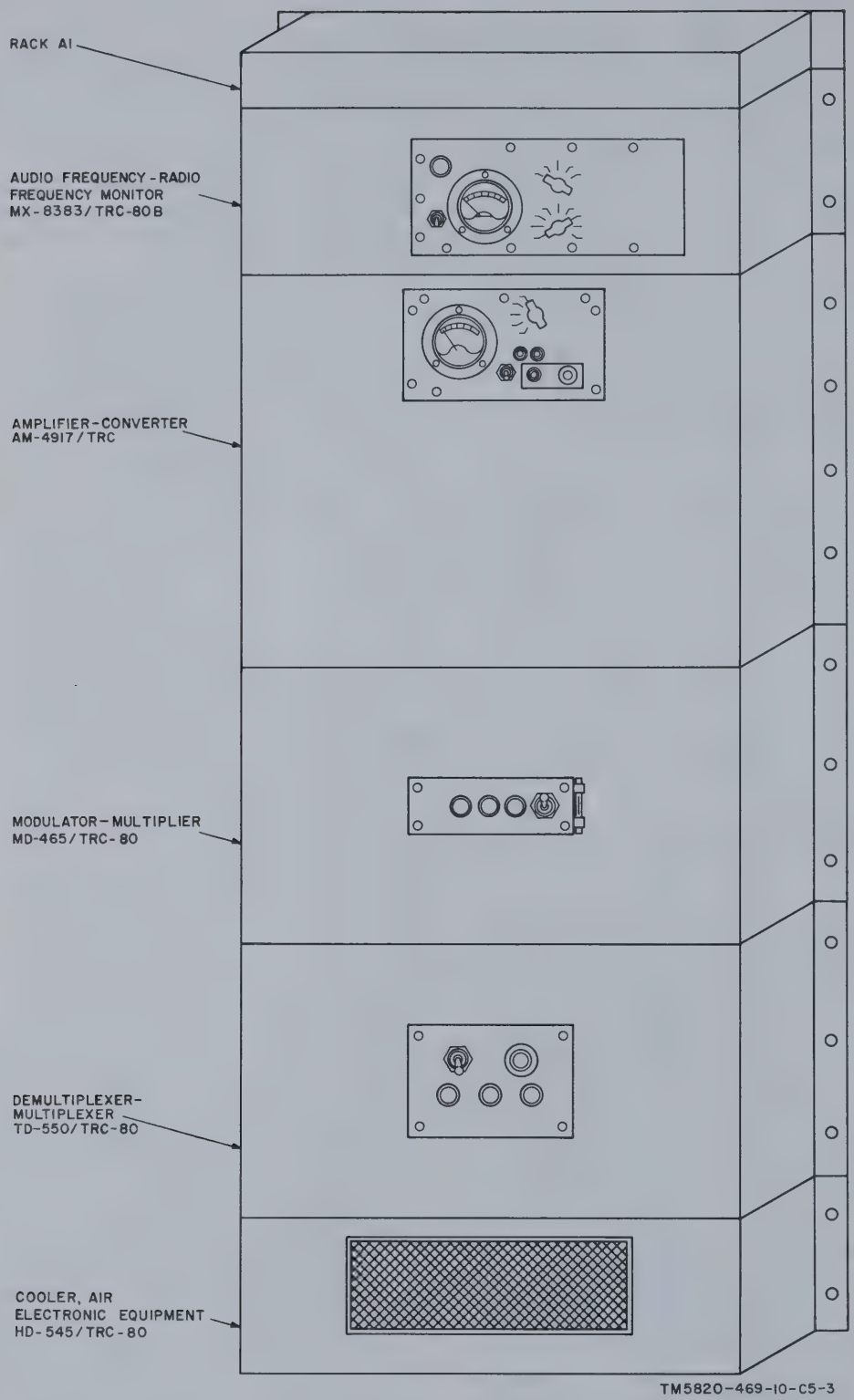


Figure 7. Rack A1, modulating and multiplexing equipment.

power supplies are used, one for each IF amplifier chassis. Each IF power supply contains a front panel on-off switch, panel indicators, and fuses.

c. Circulator. The circulator is mounted at the side of rack A4. It has a waveguide input flange for connection to the receive waveguide from the antenna. Two output waveguide flanges provide connections to the two receive converters.

12.1 Telephone Terminal Equipment (figs. 6 and 10)

The telephone terminal equipment consists of a Telephone Terminal TA-833/TRC and a Power Supply PP-6290/TRC. The telephone terminal is mounted in the lower section of rack A3, and consists of the components illustrated in figure 27.1. The power supply is installed in rack A5.

a. Telephone Terminal TA-833/TRC. The telephone terminal (four-channel, single sideband, synchronous multiplex system) consists of seventeen plug-in modules, an audio/RF jackfield, and a main chassis. The telephone terminal is mounted below the synthesizers in rack A3. The main chassis functions as a mounting frame and contains interunit wiring and rear panel connectors for external power and signal circuits. All fuses, indicators, operating controls, and service adjustments are accessible from the front of the unit. The power requirements of the telephone terminal are supplied by Power Supply PP-6290/TRC.

b. Power Supply PP-6290/TRC. The mux power supply is similar to the PP-4936/TRC. The power supply contains a front panel on-off switch, a panel indicator, and an indicating fuse.

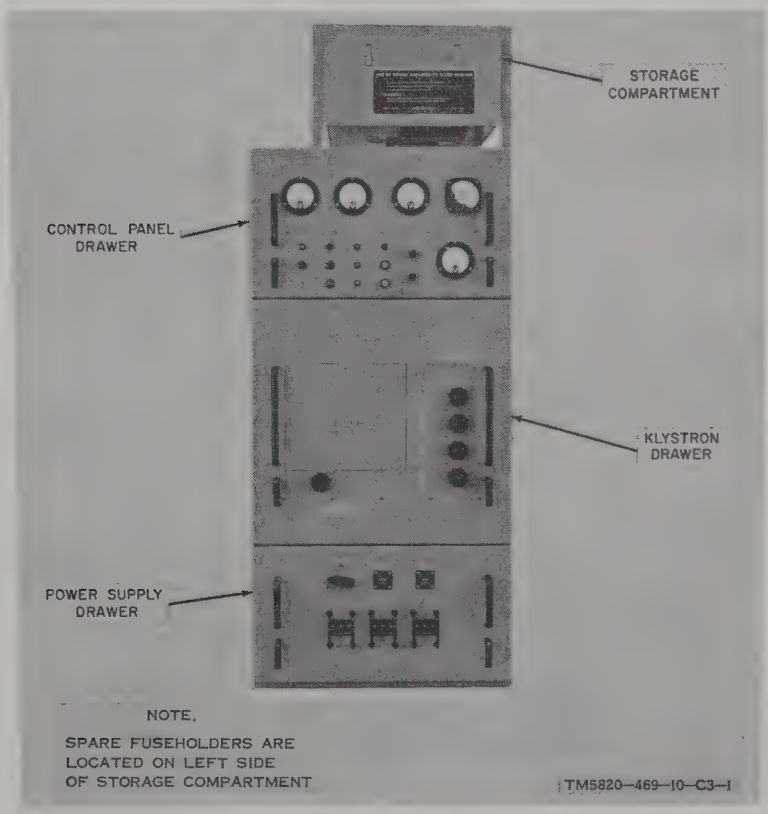


Figure 8. Radio Frequency Amplifier AM-3308/TRC-8J, major components.

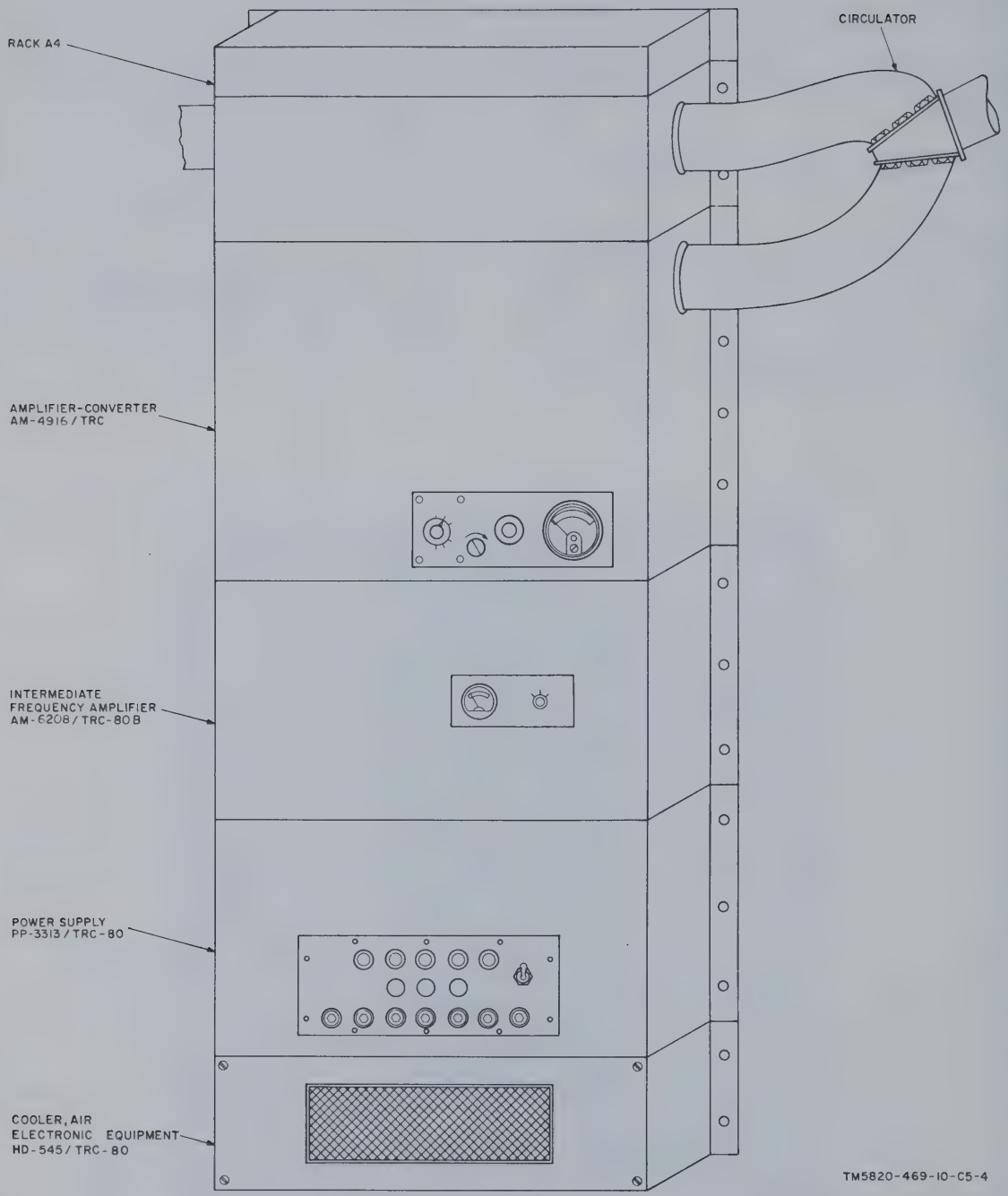


Figure 9. Rack A4, receiving equipment and circulator.

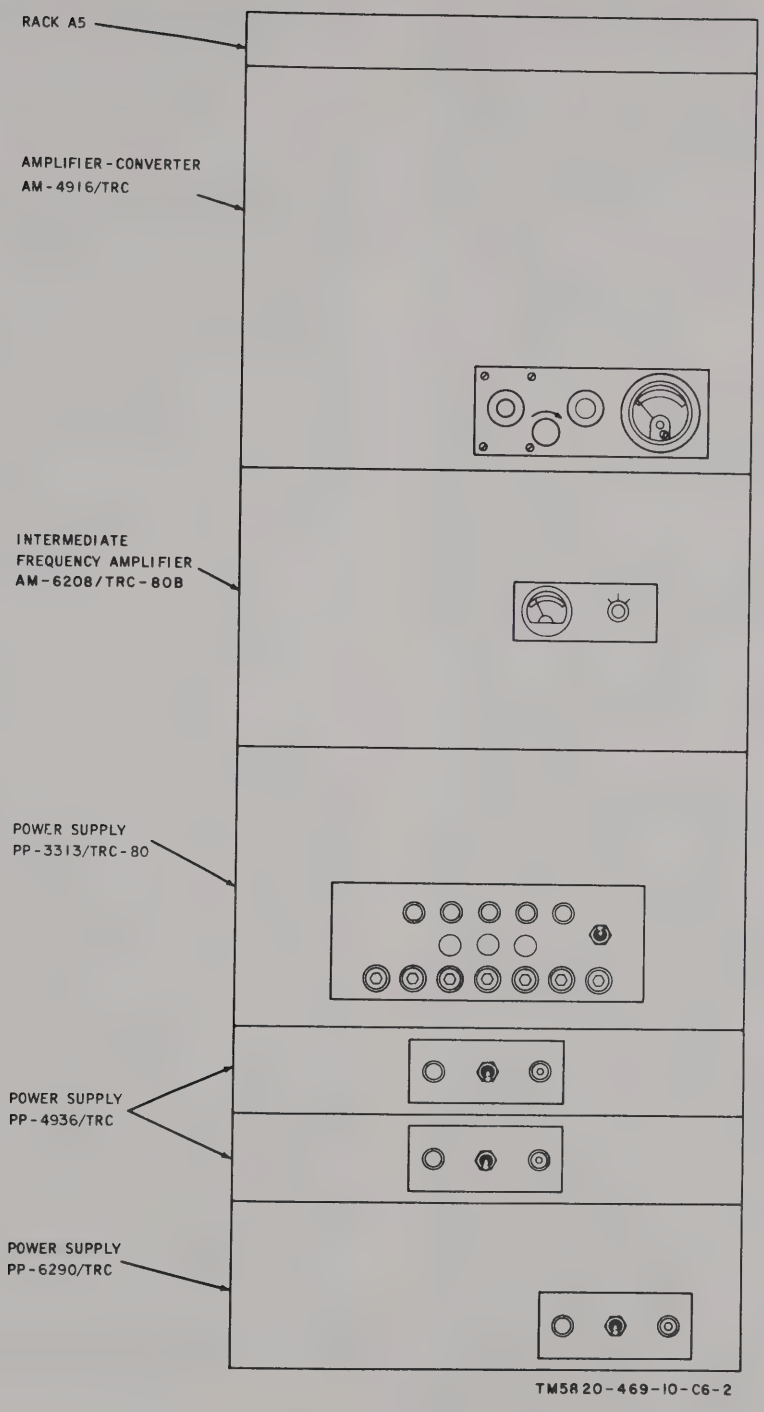


Figure 10. Rack A5, receiving equipment.

13. Primary Power Equipment
(fig. 11)

a. The primary power equipment consists of the gasoline engine-generator set, a starting panel, and the engine-generator control panel (para 8*a*). The engine-generator is mounted on slide rails, and is pulled out for operation and servicing. In shipment, the sliderails are locked into the retracted position with captivated quick-release lockpins. Access to the engine-generator compartment is accomplished by opening the hinged door, which is held in a horizontal open position by two support cables. A circuit breaker is mounted on the

screws is rotated by the handcrank. When raised to the operating position, the platform is locked into place at the four corners.

15. Air-Conditioning Equipment (fig. 2)

Two air-conditioning units are installed in the shelter. These units provide both heating and cooling of the operator's compartment. The operating controls are mounted on the evaporator units which are installed inside the operator's compartment. The condenser units are mounted on the inside of the louvered door that seals one end of the engine-generator compartment. Access to the condenser units for maintenance is obtained by lowering the door, which is hinged along the bottom and held in a horizontal position by two support cables.

16. Minor Components (fig. 3)

The following minor components are contained in the AN/TRC–80B:

a. Microphone headset assembly.

b. Three ground rods consisting of three 3-foot sections.

c. Interconnect control and audio cable (35-foot), which connects the audio and control circuits of two AN/TRC–80B's in diversity operation. This cable connects to PACK 1 TO 2 INTERCONNECT connector J4 (fig. 33) on the two power and signal entry panels.

d. Interconnect coaxial cable (35-foot), which connects the 70-megacycle (mc) intermediate frequency from the slave AN/TRC–80B to the control AN/TRC–80B in diversity operation. This cable connects to RECEIVER INTERCONNECT jack J8 (fig. 33) on the two power and signal entry panels.

e. Azimuth sighting device, used in the sighting procedure (paras 22 and 58).

f. Compass, used for antenna orientation.

g. Two coaxial patch cables (fig. 5), used on the switch panel for connecting the converter outputs to the IF assembly inputs.

h. Ladder.

i. Fire extinguisher.

j. Bipolarized feedhorn (fig. 12). The feedhorn has two input-output flanges equipped with snap-on connectors to which the flexible transmit and receive wave-guide sections connect.

k. Antenna orientation meter used for proper orientation of the antenna.

l. A waveguide-coaxial cable adapter is used during line-of-sight operation when power is reduced (para 77*a*).

16.1 Telephone Terminal Minor Components (fig. 3.1)

The following minor components are supplied with the telephone terminal TA–833/TRC:

a. Two adapters, banana plug to BNC connector, for connecting coaxial cable to plug-in terminals.

b. Two adapters, coaxial slip-fit to BNC connector, for connecting coaxial test or patch cables to the slip-fit jacks MOD IN, TX LINE, DEMOD IN or RX LINE.

c. Two patchcords, phone plug to banana plug, for connecting MOD or DEM jacks to test equipment.

d. Plug, looping (75-ohm) slip-fit to slip-fit, for patching the transmit and receive through the jackfield during normal operation or patching the telephone terminal in a back-to-back configuration for testing.

e. Four patchcords, phone plug to phone plug, for cross patching telephone terminal.

f. Plug, slip-fit, 75-ohm termination, for terminating equipment during test.

g. Four plug, phone, 600-ohm termination, for terminating (loading) the telephone line at the EQ DEM jack to prevent ringing when the remote subscriber line is not connected.

h. Three coaxial cables, BNC to BNC, for use during tests and alignment.

i. Two cables, BNC to test pins, for use during test and alignment.

j. Module extender (70E4–MX) for extending modules 30P2–( )MX, 12D5–MX, 60F1–MX, 62Y1–MX, 61A2–( )MX, 34F1–MX, 45M1–MX, and 33H1–MX during tests.

k. Module extender (70E5–MX) for extending the 20H1–MX modules for testing.

Section III. PRINCIPLES OF OPERATION

17. Introduction

a. General. Radio Terminal Set AN/TRC–80B functions primarily as a radio circuit terminal and as a communications center for wire-con-

nected area communication facilities. The AN/-TRC-80B is capable of transmitting and receiving speech and voice-frequency radio teletypewriter signals simultaneously by use of the tropospheric scatter method of radio propagation. A radio circuit may be set up by use of one AN/TRC-80B at each of two geographic locations separated by distances of approximately 110 km (70 miles). The maximum distance will be dependent on the horizon angle (*b* below) and the degree of reliability desired. The range can be increased to approximately 160 km (100 miles) by use of diversity operation (para 18*b*).

b. Tropospheric Scatter (fig. 13). The AN/-TRC-80B radiates a narrow beam of superhigh frequency (shf)energy which, under ideal siting conditions, is directed toward the horizon at a zero or negative horizon angle. The horizon angle is the angle formed by the intersection of the centerline of the beam and a line perpendicular to a gravity or plumbline. In figure 13, angle h_1 is negative and angle h_2 is positive. The beam of shf energy travels in a straight line into the troposphere. Because of humidity, temperature, and density variations in the troposphere, the velocity of propagation undergoes continuous changes, resulting in some of the radiated beam energy being refracted (bent) back to earth. The refraction is random in nature. Only that portion of the beam energy that is refracted toward the distant radio receiver is useful energy. The region in the troposphere surrounding the point of intersection of the two shf beams is referred to as the common scattering volume. The energy refracted toward the distant station from within the common scattering volume constitutes the major portion of useful received signal at the distant station. The total of all the scattered beam energy is a small percentage of the total radiated. The portion of the scattered energy that is directed toward the distant-station antenna is likewise a small percentage of the total scattered. The energy received at the distant station antenna is approximately one-millionth of the total energy that would be received on a line-of-sight path of the same length. The level of the received signal also depends on the total distance traveled (A0 plus 0B in fig. 13). By establishing a small horizon angle (zero or negative, if possible), the total distance and scatter angle r are a minimun, and the received energy level is maximum. Figure 13 distorts the size of scattering angle r, which is normally only a few degrees. Signal loss increases rapidly as this angle increases.

c. Fading. Variations in the received signal level are the result of variations in temperature, humidity, and the density of the scattering volume. The received signal is a composite of many small signals, all of which have traveled slightly different path lengths in arriving at the receiving antenna. The amplitude of each of these small signals is constantly changing. The signals combine in random phase relation, sometimes combining in an overall reenforcement, and other times combining in an overall cancellation. This type of signal level variation is called short-term fading. This short-term fad-

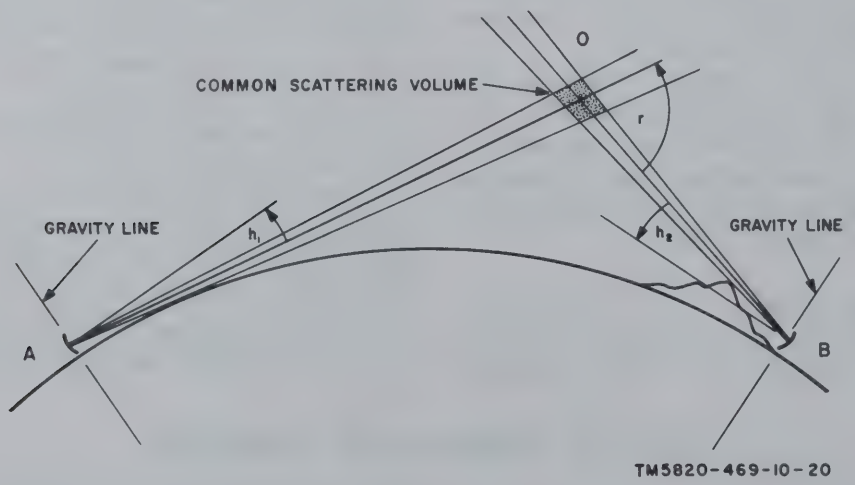


Figure 13. Geometry of tropospheric scatter.

ing will usually occur at a few cycles per second. Another type of fading is called long-term fading and is the result of daily and seasonal change in the atmosphere. Fading has a pronounced effect on circuit reliability when the received signal level at the peak of the fade cycle approaches the minimum usable level of the receiver. Diversity operation provides a definite improvement in circuit reliability because two main signal paths are used. The probability of the peaks of the fade cycles of the two paths occurring at the same time is extremely small. Since the receiver outputs in diversity operation are combined, circuit reliability is greatly improved.

18. System Application

System application of the AN/TRC–80B involves two general areas. One area pertains to the use of the AN/TRC–80B in the nondiversity or diversity type of operation. The other area pertains to the use of the communication facilities and switching functions that the AN/-TRC–80B is capable of providing.

a. Nondiversity Operation (fig. 14). One AN/TRC–80B is used at each end of the radio link. The radio sets transmit on different frequencies, F1 and F2, and only one receiver in each AN/TRC–80B is used. Either receiver may be used. In nondiversity operation, reliable communication up to 110 km (70 miles) may be obtained. For operation in a communication circuit where the line-of-sight path is less than 30 km (19 miles) refer to paragraph 77.

b. Diversity Operation (fig. 15). In diversity operation, one AN/TRC–80B is used at one end of the radio circuit (battery terminal) and two AN/TRC–80B's are used at the other end of the circuit (battalion terminal). All three radio

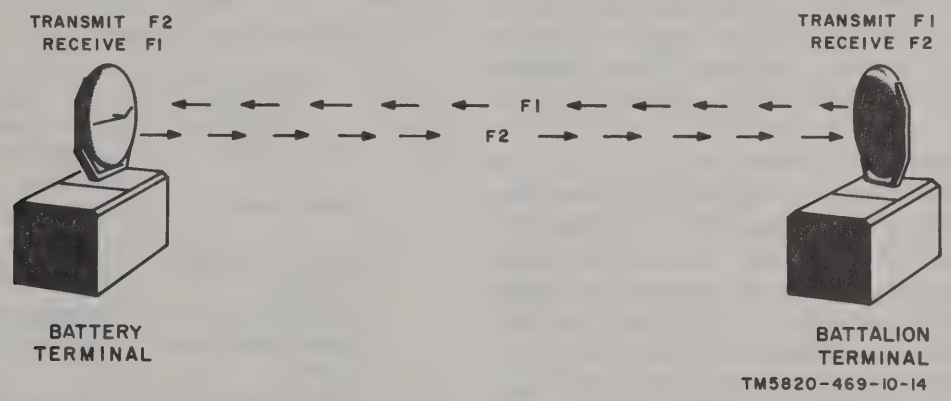


Figure 14. Radio Terminal Set AN/TRC–80B, nondiversity operation.

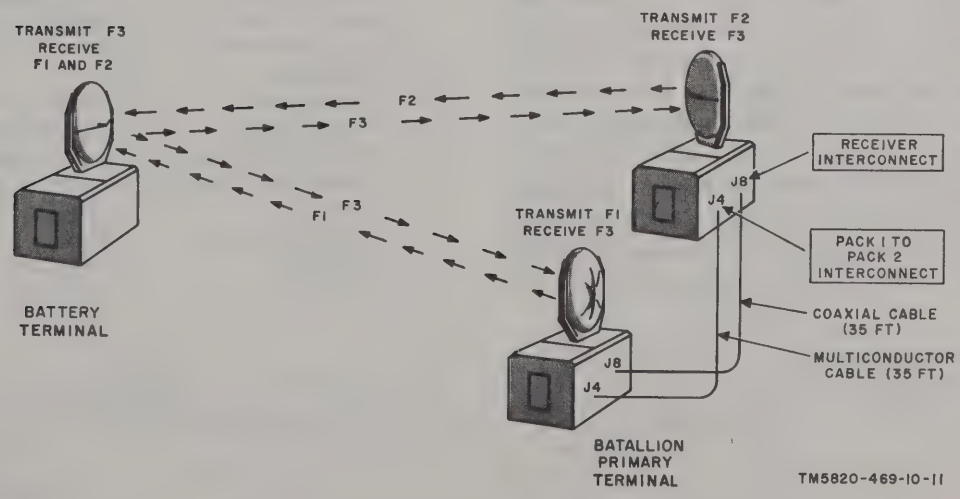


Figure 15. Radio Terminal Set AN/TRC–80B, diversity operation.

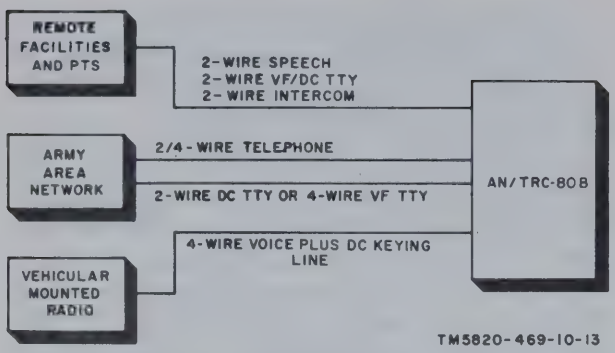


Figure 16. Communication facilities, block diagram.

sets transmit on different frequencies. The battery terminal radio set uses both receivers, one tuned to frequency F1, the other tuned to frequency F2. At the battalion terminal, either radio set can be used as the control unit, the other operating unattended (slave). After setup, control can be transferred to the other radio set if this becomes desirable. In performing the transfer of control, it is not necessary to disconnect remote tty and telephone cabling or connections to army facilities. These circuits can remain connected to the original control radio set.

c. Communication Facilities (figs. 16 and 16.1). In addition to the capability of operating as a complete radio station, the AN/TRC–80B can function simultaneously as a communications center, controlling the routing of traffic to and from the pts facility, army area net, and a vehicular-mounted radio set. Communication with these areas is by wire line. The circuit connections are made to designated connectors on the power and signal entry panel (figs. 2 and 33). The control panel and the teletypewriter switch panel in rack A2 (fig. 5) perform the circuit switching functions involved in setting up the various circuits. The four telephone terminal voice frequency circuits, applied through the telephone terminal to the radio equipment of the AN/TRC–80B terminal, can be optionally cross-patched at the telephone terminal jackfield. Radio communications with the AN/TRC–80B at the other end of the circuit can be accomplished from the local operating position within the shelter or from the remote pts facility. Radio communication from either operating position can be by speech or vf tty, or a combination of both. Throughout this manual, the following terminology will be used:

Term	Refers to —
Command[a]	Radio transmit and receive circuits of the AN/TRC–80B.
Army[a]	Army area net.
Pts[a]	Programer test station (or remote facilities).
Vehicle[a]	Vehicular radio set.
Operator[a]	Operating facilities (tty and speech) of the AN/TRC–80B.
Telephone	2-wire or 4-wire telephone terminal voice frequency circuits.

[a]These terms correspond with the panel markings used on the control panel.

d. Communications Center Functions (figs. 16 and 16.1). The following tty, speech, and signaling facilities are provided:

Item	Type of service or facility	Between —
1	4-wire vf tty	Operator and command radio.
2	4-wire speech	Operator and command radio.
3	2-party half-duplex dc tty.	Operator and pts.
4	3-party dc tty	Operator, pts, and army[a].
5	2-wire speech intercom.	Operator and pts.
6	2-wire speech intercom (discrete line).	Operator and pts, or pts and army, or pts and command radio.
7	2-wire vf tty	Pts and command radio[b].
8	4-wire vf tty	Operator and army.
9	2- or 4-wire telephone.	Operator and army.
10	4-wire speech	Operator and vehicle[c].
11	2-wire circuit	Operator and spare[d].
12	Radio teletypewriter monitoring facility.	Operator can monitor received radio teletypewriter traffic[e].
13	Outgoing ringing signals.	Operator to army, pts, command radio, and spare circuit.



Figure 16.1 Telephone terminal communication facilities, block diagram.

Item	Type of service or facility	Between —
14	Incoming ringing signals.	From army, pts, command radio, and spare circuit to operator.
15	Ringing facilities	Any interconnected parties can ring each other without aid from Operator.
16	Speech monitoring facility.	Operator can monitor speech from pts, vehicle, intercom, and spare circuits.
17	Teletypewriter priority facility.	When local terminal is transmitting tty signals, the presence of an incoming signal causes priority network to switch local printer to print incoming tty information.
18	2- or 4-wire voice frequency (20-hz signaling).	Remote facility and distant remote facility through AN/TRC–80B.
19	2- or 4-wire voice frequency (no signaling).	Remote facility and distant remote facility through AN/TRC–80B.

[a]Use of the 3-party dc tty circuit necessitates disruption of radio teletypewriter operation with the AN/TRC–80B at the other end of the radio link.

[b]This circuit uses the same pair that is used in the dc tty circuit in item 3.

[c]The vehicle radio transmitter keying circuit is extended to the operator's press-to-talk circuit.

[d]A spare 2-wire circuit is provided between the operator and the SPARE binding posts (J21 and J22) on the power and signal entry panel and the spare pins on PROGRAMMER TEST STATION jack J3. The spare binding posts on the signal entry panel and the spare pins of J3 are connected in parallel.

[e]Monitoring cannot be performed when the circuit is connected as in item 3.

CHAPTER 2
INSTALLATION

19. General

Installation of Radio Terminal Set AN/TRC-80B requires some preliminary planning. To obtain maximum communication range and reliability, the terrain surrounding the proposed operating site and the orientation of the shelter relative to the azimuth location of the AN/TRC-80B at the other end of the circuit must be considered. For diversity operation, placement of the two battalion terminal shelters (fig. 15) requires consideration of the shelter separation in addition to orientation of the shelters with respect to the distant terminal.

20. Terrain

When using tropospheric scatter propagation, the transmitted beam of super-high-frequency energy is directed toward the horizon. Best operation is obtained with a low horizon angle or, if possible, a negative horizon angle (para 17*b*). A low or negative horizon angle is most easily obtained when a high-altitude or elevated operating site is available. Whenever possible, do *not* locate the AN/TRC-80B in a ravine or valley. Operation of the AN/TRC-80B from a depression will cause the transmitted beam to be directed over a high horizon angle thereby increasing the overall signal loss. Avoid locations near powerlines or other sources of manmade noise.

21. Shelter Orientation (fig. 17)

Position the shelter so that the longitudinal centerline of the shelter forms a 45° angle with the desired transmission path (bearing). This will allow the operator to stand on the shelter roof in a convenient spot while using the sighting device which is mounted on the antenna support arm. In diversity operation, where two shelters are used at one terminal, beam separation should be a minimum of 25 feet. Maximum separation is limited by the 35-foot length of the interconnecting cables.

22. Initial Azimuth Adjustment (fig. 17)

Normally, an advance siting team will select the site and install two markers (near and far markers in figure 17), designating the desired bearing. However, the procedure in *a* through *f* below is provided for use when the operator must perform the siting. A compass is supplied with the AN/TRC-80B for use when the operator must install the markers.

a. Refer to a topographical map and determine the desired bearing.

b. Use the compass to install the two markers along the desired bearing.

c. The near marker must be located at least 25 feet away from the set. The far marker must be located at least 175 feet away from the near marker (fig. 17).

Note: The following procedure is performed *after* the antenna has been erected and inflated (para 57).

d. To orient the antenna, the operator must climb to the shelter roof, look through the sighting device, and line up on the near and far markers.

***Warning:* Be sure that the power amplifier is off before climbing to the shelter roof.**

e. Repeat steps *a* through *d* to orient the antenna on the slave set.

f. Final azimuth adjustment is performed after initial communications have been established (para 58 and 67).

23. Grounding of Shelter (fig. 17 and 18)

The AN/TRC-80B is grounded by one 9-foot ground stake that is driven into the ground approximately 20 feet away from the shelter. The ground rod consists of three 3-foot sections. The ground rods are stored in the engine-generator compartment (fig. 2). Locate the ground rod

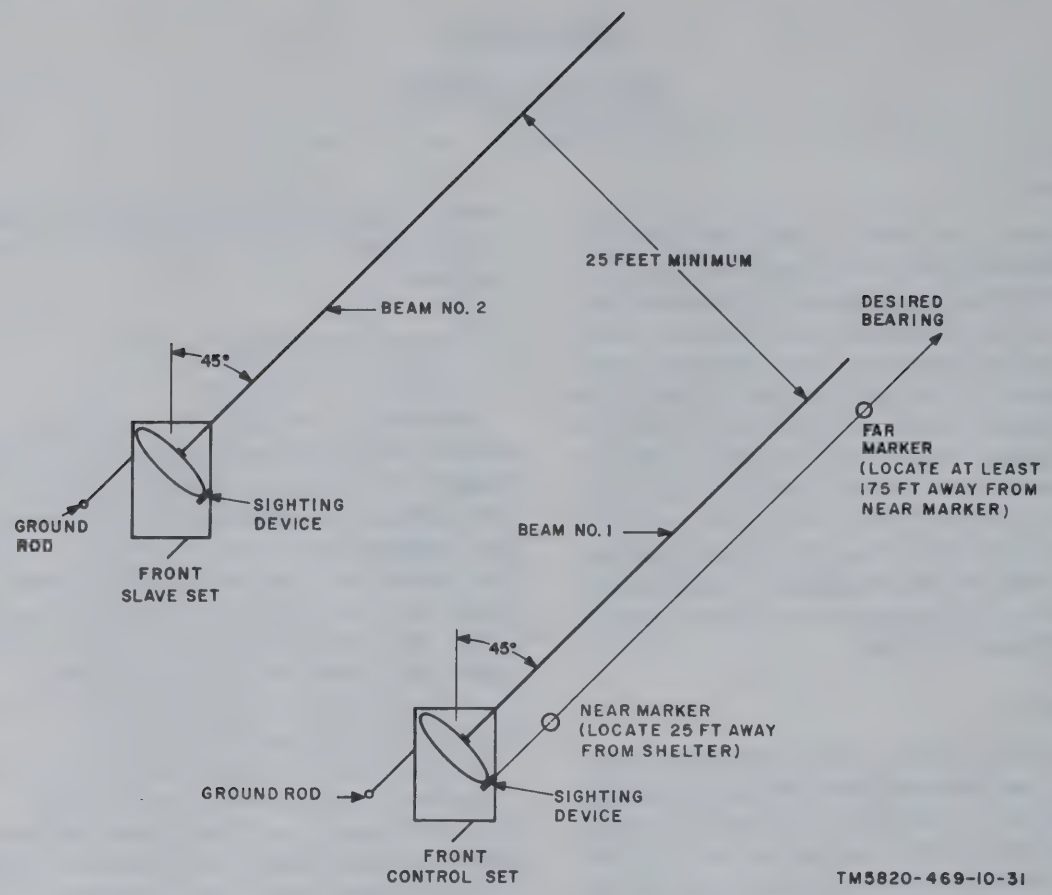


Figure 17. Shelter orientation.

as shown in figure 17 and install the ground rod as follows:

a. Attach the threaded driving nut to the bottom section and use the sledge hammer to drive the section into the ground.

b. Remove the threaded driving nut and attach the second section to the union. Attach the driving nut to the second section and drive the two sections into the ground.

c. The third section is connected in the same manner, and the three sections are driven into the ground.

d. Remove the driving nut.

e. Install a ground clamp on the ground rod.

f. In poor ground or sandy soil install another ground rod 20 feet away from the first ground rod. Connect the 20-foot ground rod interconnect cable (same connector on both ends) to the two ground rods.

g. Connect the 20-foot connector cable between one ground rod and the TO GRD STAKE terminal on the shelter power and signal entry panel.

h. Connect the metal strap on the TO GRD STAKE jack J6 to the ELECTRICAL NEUTRAL connector (fig. 33).

24. Connections

a. Fuel Line Connections. The gasoline hose connection must be made to the engine generator. Two gasoline supply connections and an associated manually operated fuel selector switch are located at the bottom center of the engine generator, directly below the louver (fig. 11). The two fuel lines and a gas can adapter are stored inside the engine generator compartment.

b. Engine Generator. The engine generator is factory installed and connected. To use the engine generator, set the POWER SOURCE SELECTOR switch on the circuit-breaker panel to GEN and perform the starting procedure (para 53).

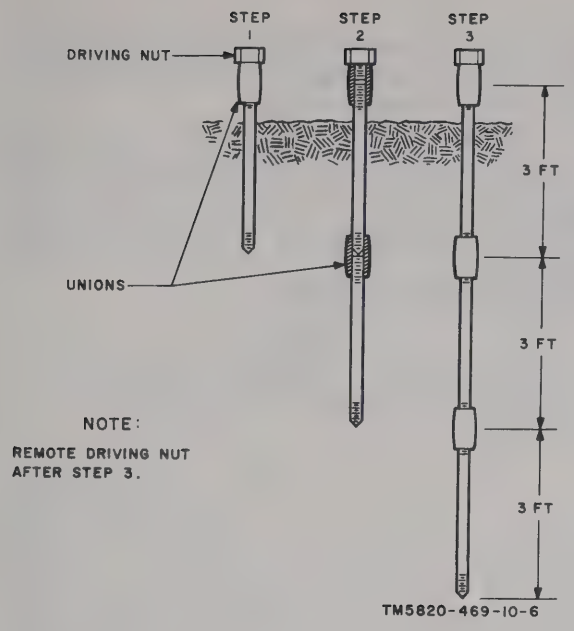


Figure 18. Ground rod installation procedures.

c. Auxiliary Power Connections (fig. 33). When auxiliary power is used instead of the engine generator, a 3-phase, 400-cps, 208 voltage source must be connected to AUX POWER 3PH–400 CPS–208V connector J15 on the power and signal entry panel. Set the POWER SOURCE SELECTOR switch on the circuit breaker panel (fig. 32) to AUX.

d. Diversity Connections. At the battalion terminal where two radio sets are used, the coaxial interconnect cable is connected to RECEIVER INTERCONNECT jack J8 at each power and signal entry panel (fig. 33). The multiconductor interconnect control and audio interconnect cable is connected between power and signal entry PACK 1 TO 2 INTERCONNECT jacks J4.

e. Vehicular Radio Connection (fig. 33). Wire connections between the vehicular-mounted radio set are made through J7 on the power and signal entry panel.

f. Programer Test Station Teletypewriter Connection (fig. 33). Wire connections (for telephone or vf tty) from the pts site are made through J31 and J32 on the power and signal entry panel.

g. Programer Test Station Intercom Connection. Intercom connections from the pts site are made through J29 and J30 on the power and signal entry panel (fig. 33).

h. Programer Test Station Discrete Connection (fig. 33). A two-wire line connection for telephone is made by connecting the two-wire line to J27 and J28 on the power and signal entry panel.

i. Spare Line Connection (fig. 33). Facilities for a spare wire line for telephone communication is provided by SPARE binding posts J21 and J22.

j. Army Area Net Communications (fig. 33).

(1) *Telephone connections.* For two-wire operation, connections are made to J17 and J18. In four-wire operation, input connections are made to J17 and J18, and output connections are made at J19 and J20.

(2) *Teletypewriter connections*

(a) Two-wire vf operation. For two-wire vf operation, connections are made to J23 and J24.

(b) Two-wire dc operation. For two-wire dc operation, connections are made to J25 and J26.

(c) Four-wire teletypewriter operation. In four-wire teletypewriter operation, the input connections are made to J24 and J26. The output connections are made at J23 and J25.

k. Telephone Terminal Connections. Four telephone circuits, available on lines 1 through 4, may be used in either two-wire or four-wire operation, or in any combination thereof. For two-wire operation, the two-wire line is connected to one of four pairs of REC terminals on the power and signal entry panel. For four-wire operation, connections from the output of the external equipment are made at one of the four pairs of SEND terminals on the power and signal entry panel; and connections to the input of the external equipment are made at the corresponding REC terminals.

Note

When one of the four telephone circuits is not connected to an external load, the 4W–2W NO SIG/4W/2W SIG switch on the signaling/termination unit of the unloaded line must be set to a 4W position, or a 600-ohm dummy load plug must be inserted in the corresponding EQ DEM jack on the patch-panel.

25. Shelter Handling

(fig. 2)

Warning

Do not forklift the shelter.

a. Four lifting eyes are located on top of the shelter for lifting the shelter with a 5-ton

wrecker or transporting the shelter by helicopter. When lifting the shelter, the lifting cable must be long enough so that the angle formed by the cable and shelter roof *is not less than 45°*. The four lifting eyes can be removed from the roof and installed in the tiedown sockets when it is necessary to secure the shelter to a truck bed.

b. Twelve jack sockets are provided, three at each corner, located on the front and rear faces of the shelter. The Allen-head screws for protecting the socket threads must be removed when the jack mechanism is provided. (Allen-head wrenches are located in the power amplifier stowage compartment.)

c. Twelve mobilizer mounting sockets are provided for mounting wheel assemblies. The Allen-head screws for protecting the socket threads must be removed to install the wheel assemblies.

Caution

When not in use, sockets must be protected with the Allen-head screws.

CHAPTER 3

OPERATOR'S CONTROLS AND INSTRUMENTS

Section 1. RACK A1

26. General

Rack A1 contains the monitor, the transmit converter, modulator-multiplier, multiplexer, and blower. The complete rack is illustrated in figure 7. Paragraphs 27 through 30 describe the controls and indicators, and figures 19 through 21 and figure 52 illustrate the individual controls.

27. Monitor, Audio Frequency-Radio Frequency MX-8383/TRC-80B (fig. 19)

Control or indicator	Function
PWR ON-OFF switch.	Controls application of primary power.
POWER indicator ..	When lighted, indicates application of primary power.
Attenuator switch S1 (position A).	Introduces proper amount of attenuation for meter SET POINT indication. Switch positions B, C, D, and E are not used.
Selector switch S2 ..	Selects circuit to be monitored as indicated by panel SWITCHING DATA CHART. Position J is used only by higher category of maintenance personnel.
Meter	Provides visual indication of signal selected by switch S2.

28. Amplifier-Converter AM-4917/TRC (fig. 52)

The AM-4917/TRC (transmit converter) consists of a meter panel, a tunable filter, a varactor multiplier, and a main chassis. The front panel controls of these units are described in *a*, *b*, and *c* below.

a. Meter Panel.

Control or indicator	Function
POWER ON switch	Controls application of primary power.
BEAM PUSH TO START pushbutton switch.	Controls application of high voltage to traveling wave tube.
Meter function selector switch.	Connects meter to any one of 5 circuits.
	Sw pos — Causes meter to indicate
	G ..... Diode current of varactor multiplier.
	H ..... Output of varactor multiplier.
	HELIX ..... Helix current of traveling wave tube.
	COLLECTOR .. Collector current of traveling tube.
	OUTPUT ..... Output of traveling wave tube.
Meter	Indicates current within circuit selected by meter function selector switch.
FIL indicator	Indicates application of power to filaments.
TIME DELAY indicator.	Indicates that 3-minute time delay relay contacts have closed and primary power is available to B+ and high voltage supplies.
BEAM indicator	Indicates application of high voltage to traveling wave tube.

b. Varactor Multiplier.

Control	Function
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes output cavity of varactor multiplier.

c. Tunable Filter.

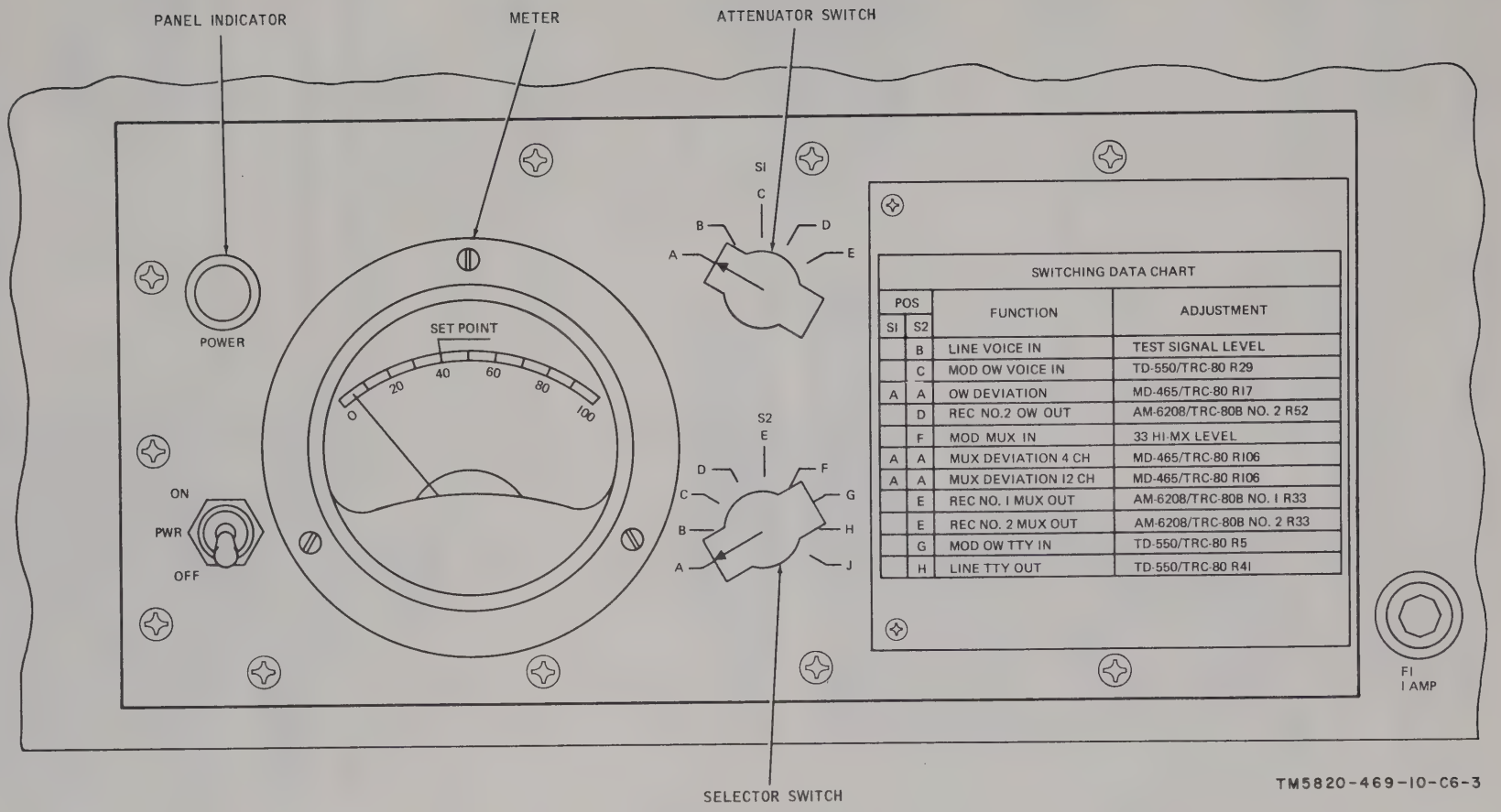
Control	Function
TUNABLE FIL J	Selects desired upper sideband frequency.

29. Modulator-Multiplier MD-465/TRC-80 (fig. 20)

Control or indicator	Function
POWER OFF switch	Controls application of primary power.
FIL indicator	When lighted, indicates that power is applied to filaments.
TIME DELAY indicator	When lighted, indicates that the 30-second time delay relay contacts have closed and primary power is available to 200-volt power supply.
B+ indicator	When lighted, indicates that B+ is available from 200-volt supply.
CARRIER SWITCH pushbutton.	When pressed, disables 70-mc carrier.

30. Demultiplexer-Multiplexer TD-550/TRC-80 (fig. 21)

Control or indicator	Function
ON-OFF switch	Controls application of primary power.
FILAMENT indicator	When lighted, indicates that primary power is applied to filament circuits.
TIME DELAY indicator	When lighted, indicates that the 30-second time delay relay contacts have closed and power is available to circuit.
B+ indicator	When lighted, indicates that B+ is available from B+ supply.
SIGNAL pushbutton switch.	For use by higher category of maintenance personnel.



SWITCHING DATA CHART

POS		FUNCTION	ADJUSTMENT
S1	S2		
	B	LINE VOICE IN	TEST SIGNAL LEVEL
	C	MOD OW VOICE IN	TD-550/TRC-80 R29
A	A	OW DEVIATION	MD-465/TRC-80 R17
	D	REC NO.2 OW OUT	AM-6208/TRC-80B NO. 2 R52
	F	MOD MUX IN	33 HI-MX LEVEL
A	A	MUX DEVIATION 4 CH	MD-465/TRC-80 R106
A	A	MUX DEVIATION 12 CH	MD-465/TRC-80 R106
	E	REC NO. 1 MUX OUT	AM-6208/TRC-80B NO. 1 R33
	E	REC NO. 2 MUX OUT	AM-6208/TRC-80B NO. 2 R33
	G	MOD OW TTY IN	TD-550/TRC-80 R5
	H	LINE TTY OUT	TD-550/TRC-80 R41

Figure 19. Monitor, Audio Frequency-Radio Frequency MX-9393/TRC-80B.

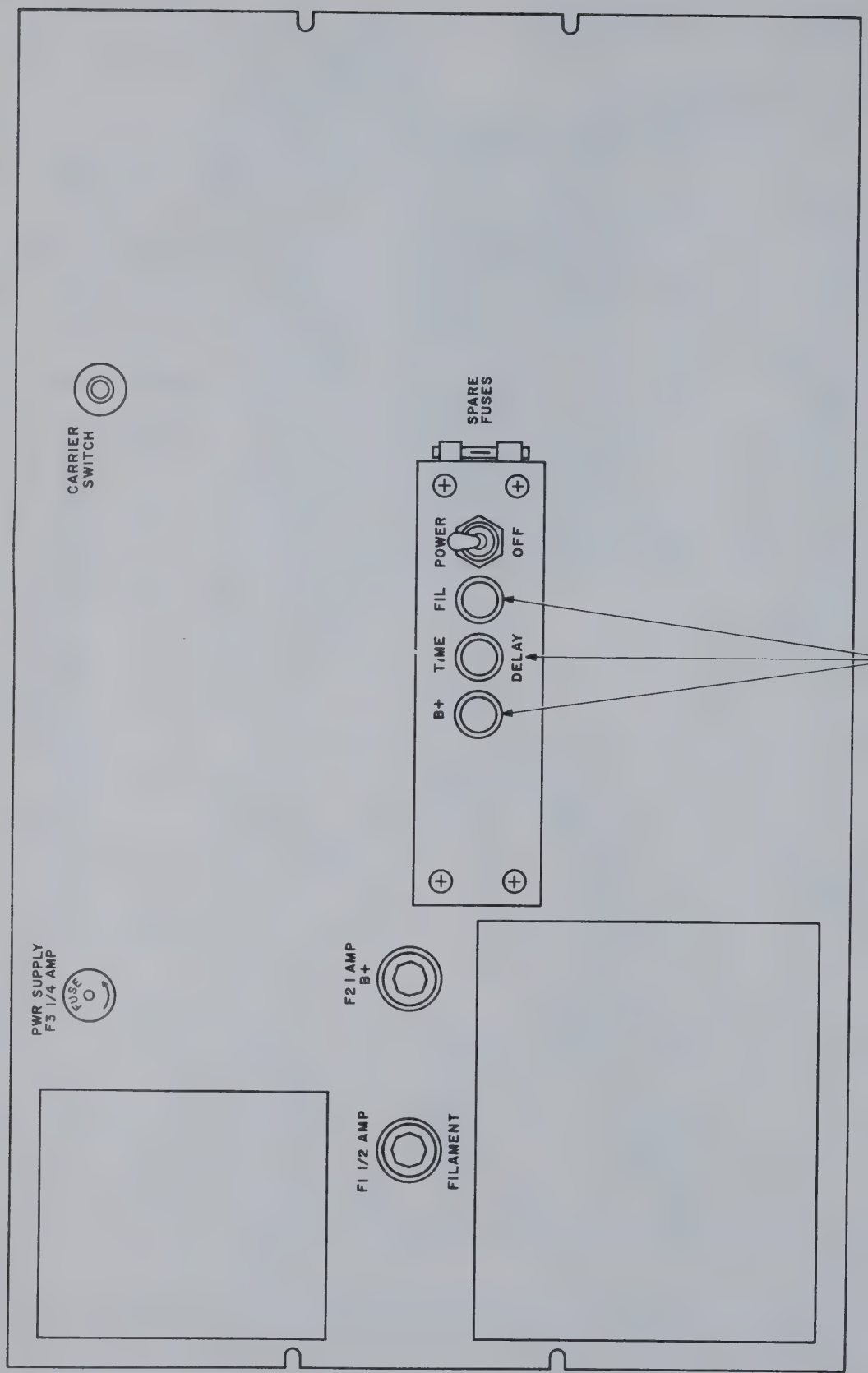


Figure 20. Modulator-Multiplier MD-465/TRC-80, controls and indicators.

Control or indicator	Function
FLUSHING BLOWER switch -------	Controls application of power to flushing blower.
HUT LIGHTS switch ----------	Controls application of power to hut lights. *Note:* Hut lights will not light unless the shelter door is closed or door INTERLOCK BY PASS switch (fig. 35) is placed in the BY PASS position.
DEMULT-MULT-MOD SELECTOR switch S1.	*Sw pos* / *Function* LOCAL -------- Used in nondiversity operation to connect modulator-multiplier to transmit output of multiplexer. PARALLEL----- Used in diversity operation. In this switch position, the multiplexer in the control radio set drives the modulator-multipliers of both radio sets. (In the slave radio set, this switch must be at REMOTE when S1 in the control radio set is at PARALLEL.) REMOTE ------- Used in diversity operation to connect the multiplexer output from the control set to the modulator-multiplier of the slave set (fig. 48).
LOCAL-REMOTE COM CONTROL SELECTOR switch S2.	CONTROL ------ Activates circuits in control panel and teletypewriter equipment. TIE ---------- Used in diversity operation to transfer incoming wire line facilities to the control radio set. SLAVE -------- Used in diversity operation to activate circuits in control panel and teletypewriter equipment in the control radio set when incoming wire line facilities are connected to the tie-slave radio set (fig. 49).
RACK POWER indicator----------	When lighted, indicates that power is applied to rack-mounted equipment.
RACK BLOWERS indicator --------	When lighted, indicates that power is applied to rack blowers.
FLUSHING BLOWER indicator ------	When lighted, indicates that power is applied to flushing blower.
HUT LIGHTS indicator ----------	When lighted, indicates that power is applied to hut lights.
AIR FAILURES indicators: RACK 1, RACK 3 and RACK 4 and 5.	When lighted, indicate air failures of respective rack blower.
RECEIVER connector jacks J8 through J12.	When connected as shown in figure 23, output of receive converter No. 1 is fed to if. amplifier No. 1, and output of receive converter No. 2 is fed to if. amplifier No. 2. In diversity operation, signals are routed as illustrated in figures 48 and 49.

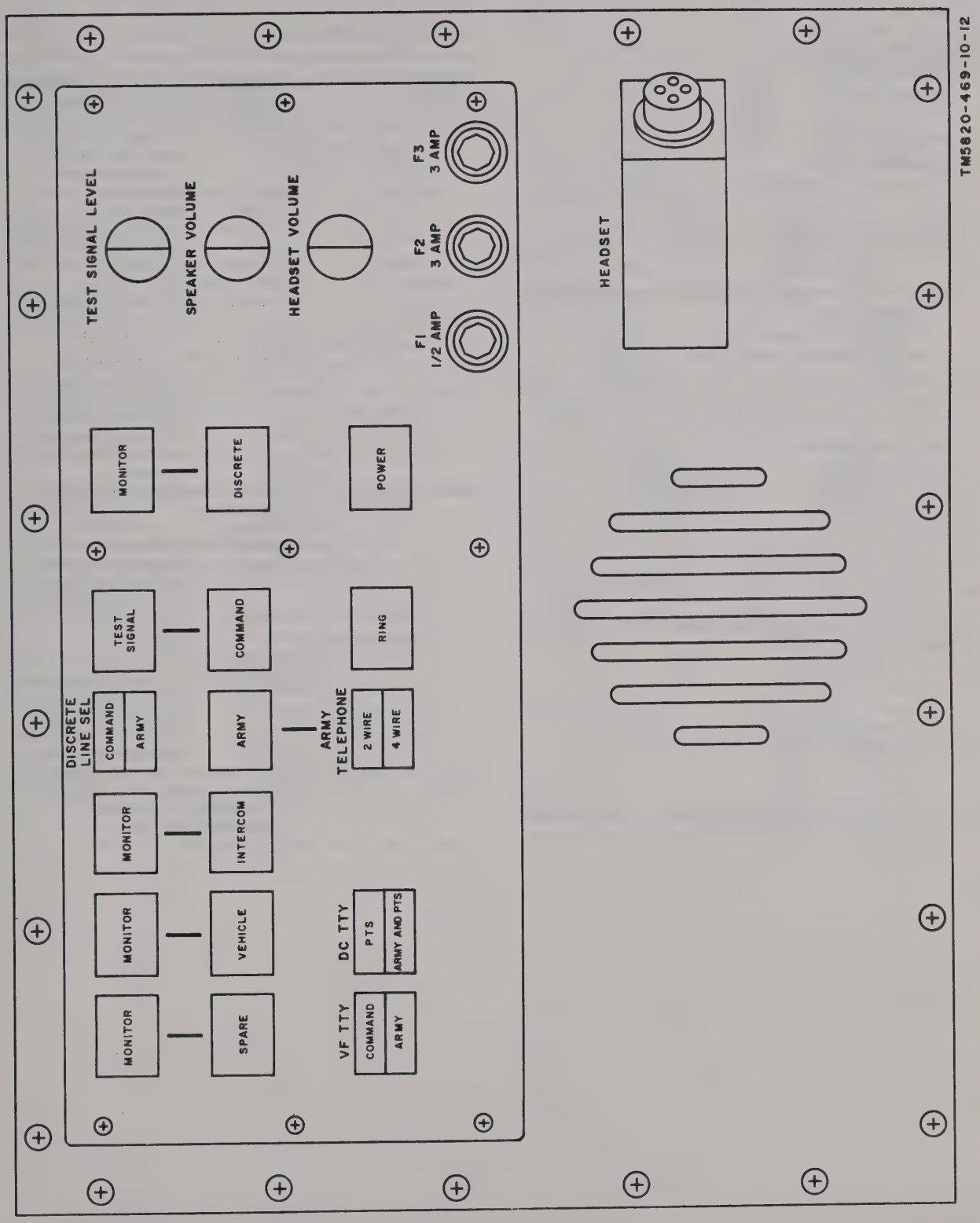
34. Communication Control Panel SB-1564/TRC-80 (fig. 24)

Control or indicator	Function
POWER pushbutton switch (white) --------	Alternate action. Turns primary ac power to control panel on and off. Backlighted brightly when on.
MONITOR pushbutton switches (4) (white)--	Alternate action. Provides monitoring, by use of loudspeaker of any combination of following parties: DISCRETE, INTERCOM, VEHICLE, and SPARE. Backlighted dimly when off, brightly when on.
RING pushbutton switch (white) ----------	Momentary action. Connects ringing signals to selected party. Backlighted dimly when off, flashes brightly when operated.
TEST SIGNAL pushbutton switch (alternate amber or green). *Note:* Disables 1,600-cps detector when on.	Alternate action. Provides continuous 1,600-cps, 0-dbm test tone. Backlighted dimly when off, brightly when on. Backlighted amber when COMMAND line is available to pts DISCRETE line. Backlighted green when COMMAND line is available to operator.
DISCRETE pushbutton switch (alternate amber or green).	Momentary action. Releases any previously engaged pushbuttons and connects DISCRETE line and local operator to one another; interlocks in-out signaling. Backlighted amber when pts or operator is connected to selected party. Backlighted green when local operator is connected to DISCRETE line.
DISCRETE LINE SEL COMMAND ARMY pushbutton (amber).	Alternate action. Selects either COMMAND or ARMY line so that it will be available for connection to DISCRETE line. At the same

Control or indicator	Function
	time, makes the line that is not connected to DISCRETE line available to local operator.
COMMAND pushbutton switch (alternate amber or green).	Momentary action. Connects COMMAND line to either DISCRETE line or local operator, depending on DISCRETE LINE SEL position. Backlighted dimly when off. Backlighted brightly amber when connected to DISCRETE line. Backlighted brightly green when connected to local operator.
ARMY pushbutton switch (alternate amber or green).	Momentary action. Connects ARMY line to either DISCRETE line or local operator, depending on DISCRETE LINE SEL position. Backlighted amber when connected to DISCRETE line. Backlighted green when connected to local operator.
ARMY TELEPHONE pushbutton switch:	Alternate action.
2 WIRE (white)	Provides 2-wire telephone operation to army net.
4 WIRE (white)	Provides 4-wire telephone operation to army net.
DC TTY pushbutton switch:	Alternate action.
PTS (white)	Connect pts 2-wire dc teletypewriter loop in series with local dc receive teletypewriter loop.
ARMY AND PTS (white)	Connects army 2-wire dc teletypewriter loop into a half-duplex loop in series with AN/TRC-80[illegible] operating facilities and pts facilities, disabling normal local teletypewriter capabilities.
VF TTY pushbutton switch:	Alternate action.
COMMAND (white)	Provides 4-wire voice-frequency teletypewriter loop through AN/TRC-80[illegible] radio circuit.
ARMY (white)	Provides 4-wire voice-frequency teletypewriter loop to ARMY line.
INTERCOM pushbutton switch (green)	Momentary action. Connects INTERCOM line to local operator. Backlighted dimly when off, brightly when on.
VEHICLE pushbutton switch (green)	Momentary action. Connects vehicle radio set line to local operator. Backlighted dimly when off, brightly when on.
SPARE pushbutton switch (green)	Momentary action. Connects SPARE line to local operator. Backlighted dimly when off, brightly when on.
TEST SIGNAL LEVEL control	Adjusts level of test signal.
SPEAKER VOLUME control	Adjusts audio level to panel-mounted speaker.
HEADSET VOLUME control	Adjusts audio level to headset receiver.
HEADSET connector	Provides connection for operator's headset.

35. Teletypewriter Switch Panel (fig. 25)

Control or indicator	Function
OPERATING MODE switch:	
NORMAL DC LOOP	Provides normal 2-wire dc tty loop.
VF 2W/4W	Provides for connecting vf tty from pts facility to AN/TRC-80[illegible] radio circuits.
LINE TEST position	Used by higher echelon maintenance personnel for adjusting line balance in conjunction with 3 positions of the REMOTE DISTANCE switch.
PTS-BY PASS switch	At ON, permits AN/TRC-80[illegible] operator to bypass pts teletypewirter.
REMOTE DISTANCE switch	Selects proper hybrid balance network for line in use. SHORT: less than 1/2 mile. MED: 1/2 to 1 mile. LONG: 1 mile and over.
LIGHTS NORMAL-DIM switch	Provides either NORMAL or DIM shelter lighting.
120V 400 CPS outlets	Provide 120-volt ac power for the TH-5A/TG and the teletypewriter set.


TEST SIGNAL LEVEL
SPEAKER VOLUME
HEADSET VOLUME
F1 1/2 AMP
F2 3 AMP
F3 3 AMP
HEADSET
MONITOR
DISCRETE
POWER
TEST SIGNAL
COMMAND
RING
DISCRETE LINE SEL
COMMAND
ARMY
ARMY
ARMY TELEPHONE
2 WIRE
4 WIRE
MONITOR
INTERCOM
MONITOR
VEHICLE
DC TTY
PTS
ARMY AND PTS
MONITOR
SPARE
VF TTY
COMMAND
ARMY
TM5820-469-10-12

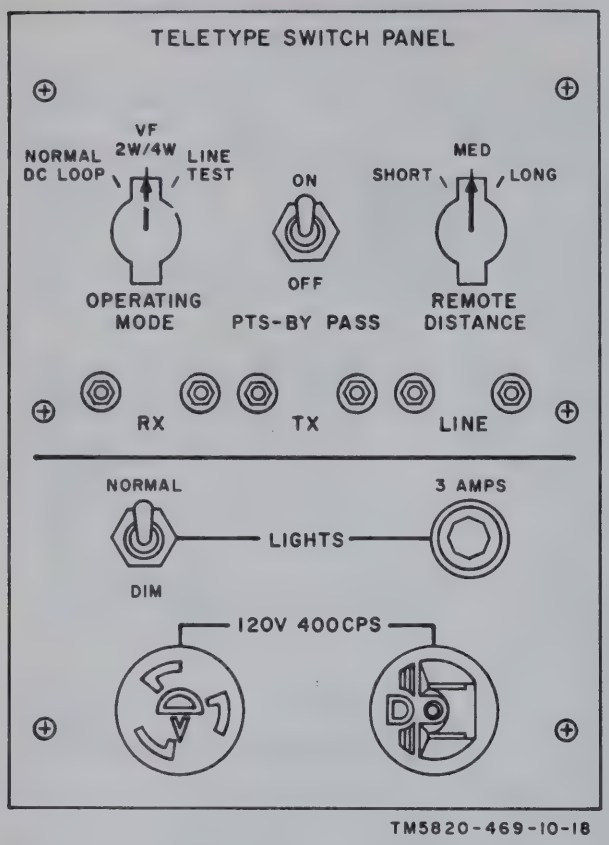


Figure 25. Teletypewriter switch panel, controls.

36. Telegraph Terminal TH-5A/TG (fig. 26)

Note: When the TH-5A/TG is used with the AN/TRC-80 the NORM-REC-SEND switch is always set in the NORM position and the 4W-2W-TEL switch should be set in the 4W position.

Control or indicator	Function
NORM-REC-SEND switch.	**Arranges TH-5A/TG for operation on either wire or radio circuits:** *Sw pos* — *Arranges* NORM ---- For transmitting or receiving over 2- or 4-wire circuits. REC------ For receiving over radio link. SEND ---- For transmitting over radio link.
4W-2W-TEL switch.	**Arranges TH-5A/TG for type of line circuit used in either teletypewriter or telephone operation.** *Sw pos* — *Arranges* 4W------- For operation on 4-wire line circuit. 2W------- For operation on 2-wire line circuit. TEL------ For talking and signaling over telephone circuits.
RING switch ----	**Controls signaling and buzzer equipment.** *Sw pos* — *Arranges* Operated (down) — Connects power to ringing generator and applies 20-cps signal to either 2W or 4W-S binding posts. Unoperated (vertical) — Connects buzzer circuit and receiver-disabling circuit (REC. jack) across either 2W or 4W-R binding posts.
Panel indicator --	**Provides visual indication (2W operation only) that TH-5A/TG is prepared to transmit teletypewriter impulses.**

36.1. Telegraph Terminal TH-22/TG (fig. 26.1)

Note. When the TH-22/TG is used with the AN/TRC-80 B, set the NORM-REC-SEND switch to NORM and the 4W-2W-TEL switch to 4W.

Control, indicator, or fuse	Function
THRESHOLD indicator lamp.	Lights to indicate low signal or no signal present at 4WS/TEL or 2W/4WR terminal.
BOOST (spring-return toggle) switch.	When set to the up position, boosts output break-in signal amplitude.
BREAK IN (spring-return rotary) switch.	Initiates break-in function during telegraph communication over 2-wire line facility.
RESET (spring-return toggle) switch.	Silences the break-in aural tone and also stops the local and remote teltypewriters from running open.
RING (spring-return rotary) switch.	Initiates vf or 20-cps ringing signal.
115VAC-230VAC-26VDC (3-position screwdriver) switch.	Selects one of three operating voltages.
Power indicator lamp	Lights to indicate that power is applied to the unit.
ON/OFF (2-position toggle) switch.	Controls application of power to the unit.
NORM-REC-SEND (3-position rotary) switch.	Arranges unit for either wire or for radio operation. When set to: (1) NORM, unit is set for operation over wire lines. (2) SEND, unit is set for transmitting over radio circuits. (3) REC, unit is set for receiving over radio circuits.
4W-2W-TEL (3-position screwdriver) switch.	Arranges unit for type of line facility (2-wire or 4-wire) telegraph operation or for telephone operation.
VF-20 (2-position) switch	Produces output signal frequency at 1,232.5 cps (VF position) or cps (20 position).
MODE ONE/MODE TWO (2-position rotary) switch.	Arranges the unit for one of two output word rates. When set to: (1) MODE ONE, output rate of 60, 75, or 100 words per minute is produced. (2) MODE TWO, output rate of 200 words per minute is produced.
115/230VAC 1/4A fuse	Protects the parts in TH-22/TG from overload during 115- or 230-volt ac operation.
26VDC (2A) fuse	Protects the parts in TH-22/TG from overload during 26-volt dc operation.

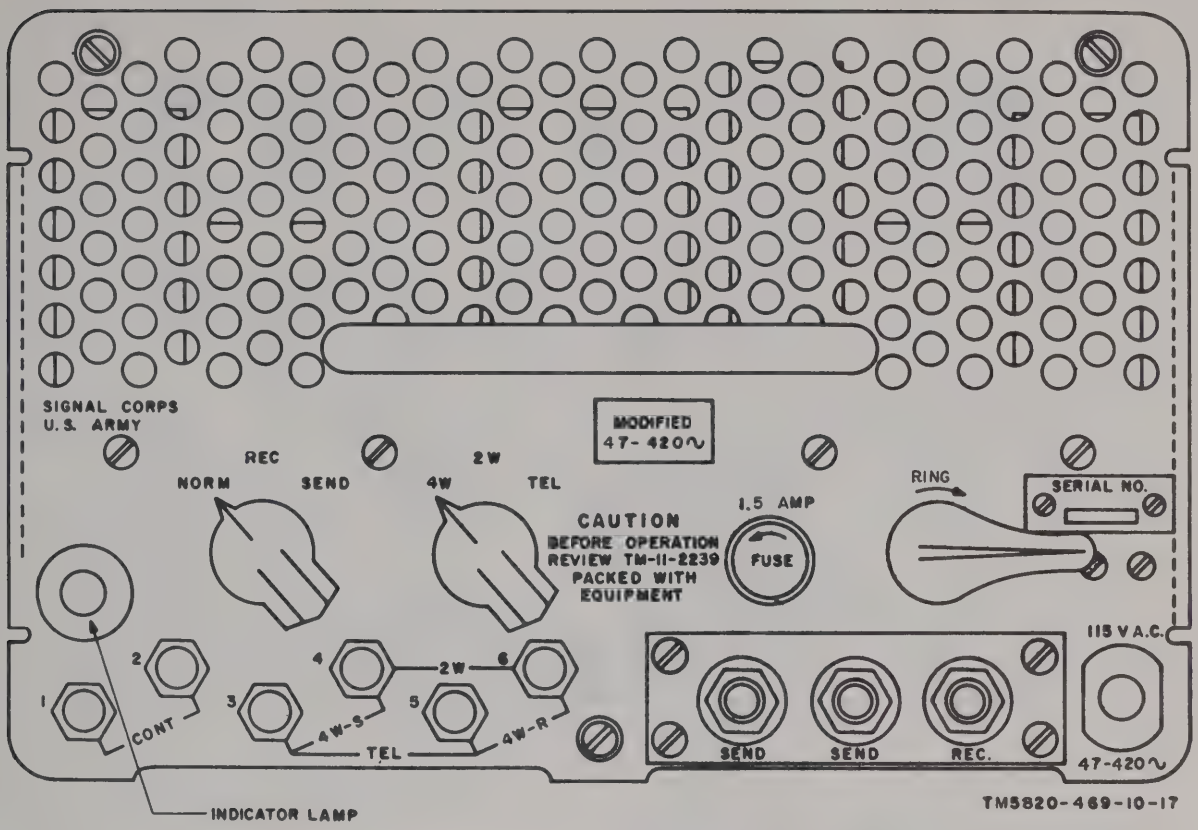


Figure 26. Telegraph Terminal TH–5A/TG, controls and indicators.

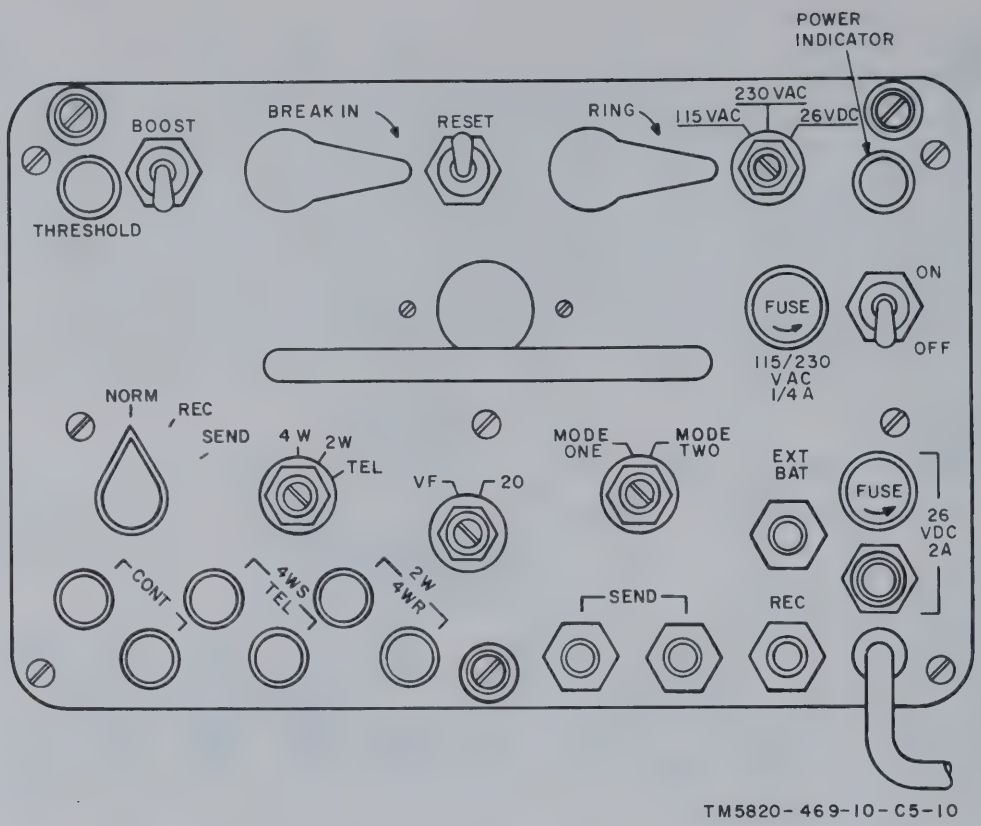


Figure 26.1 TH-22/TG front panel.

Section III. RACK A3

37. General

Rack A3 contains three Electrical Frequency Synthesizers 0-1462A/TRC (fig. 6). One synthesizer is used with the transmitting equipment. The other two are used with the two receivers. Front panels of all three units are identical. The only other equipment mounted in this rack is the telephone terminal equipment (four-channel multiplex). This equipment, located at the base of the rack, contains controls for the selection of operating mode. The unit is automatically turned on when power is applied to the mux power supply in rack A5.

38. Electrical Frequency Synthesizer 0-1462A/TRC (fig. 27)

a. Switch Panel.

Control or indicator	Function
MEGAHERTZ selector switches (from left to right):	
First	Fixed indicator, always indicates 4 (thousands).
Second	Selects second digit of selected frequency (hundreds).
Third	Selects third digit of selected frequency (tens).
Fourth	Selects fourth digit of selected frequency (units).
Fifth	Selects fifth digit of selected frequency (tenths).
Sixth	Selects sixth digit of selected frequency (hundredths).

b. Fault Panel.

Indicators	Function
POWER indicator	When lighted, indicates primary power is applied.
OUT OF LOCK indicators	Indicates a phase difference (error voltage) between output and reference frequencies.

c. Power Panel.

Switch	Function
POWER ON-OFF switch ..	Controls application of primary power.

d. RF Module Front Panel.

Controls or indicator	Function
MHZ tuning control	Tunes synthesizer output.
TUNING VOLTAGE meter.	Indicates level of loop voltage (tune to midscale).
POWER OUTPUT-INCREASE.	Adjusts the level of the synthesizer output.

38.1 Telephone Terminal TA-833/TRC (fig. 27.1)

The TA-833/TRC (telephone terminal) consists of a jackfield, a power regulator, four channel modems, four signaling/termination units, a subgroup modulator, a filter, a subgroup demodulator, three carrier selectors, a primary frequency supply, an oscillator, and a main chassis. The front panel controls and indicators of these units are described in *a* through *j* below.

a. Power Regulator 12D5-MX.

Indicator	Function
Fuse	When lighted, indicates that fuse is open.

b. Channel Modem 30P2-(1-4)MX.

Control	Function
MOD BAL control	Balances the modulator for maximum carrier suppression.
DEMOD LEVEL control	Adjusts the output level of the demodulator.

c. Signaling/Termination Unit 20H1-MX.

Control	Function
TONE TX pushbutton switch.	When pressed, keys on the 1600 Hz in the unit so that the signaling level can be set.
4W-2W NO SIG/4W-2W SIG switch.	Selects mode of operation to correspond to the subscriber line.
TONE LEVEL control	Adjusts the 1600-Hz signaling tone from the signaling oscillator to the desired level.
TONE SENSITIVITY	Adjusts the 1600-Hz signaling tone from channel modems to the desired signaling threshold.

d. Subgroup Modulator 33H1-MX.

Control	Function
CARR BAL control	Balances the modulator for maximum carrier suppression.
PILOT LEVEL control	Not used in AN/TRC-80B configuration.
LEVEL control	Adjusts modulator output.

e. Filter 45M1-MX.

Control	Function
MASTER-SLAVE switch ..	Provides appropriate connections for master or slave operation.
PILOT LEVEL ADJ control.	Adjusts the level of pilot signal input bridged into the transmit line.

f. Subgroup Demodulator 34F1-MX.

Control	Function
CARR BAL control	Balances the demodulator for maximum carrier suppression.
LEVEL control	Adjusts demodulator output.

g. Carrier Selector 61A2-(1,2 and 10)MX.

Control	Function
LEVEL ADJ control	Adjusts the output level of the carrier signal.

h. Primary Frequency Supply 62Y1-MX.

Controls and indicator	Function
ACTIVE indicator	Indicates unit in use (when used in main and standby configuration only).
PILOT ADJ control	Adjusts the level of the pilot output.
FREQ ADJ control	Adjusts oscillator frequency.
SYNC DISABLE switch	When pressed, disables the phase detector from regulating the phase of the pilot signal.

i. Oscillator 60F1-MX.

Control and indicator	Function
FUSE ALARM	When lighted, indicates that the fuse is open.
1600-Hz LEVEL ADJ	Adjusts the output level of the 1600-Hz signal.

j. Jackfield.

Jacks	Function
MOD-EQ J1, J3, J7, and J9	Permits patching into the signaling/termination units and opening the 4W SEND lines.
DEM-EQ J2, J4, J8 and J10	Permits patching into the signaling/termination units and opening the 4W REC (2W/4W REC) lines.
MOD-LINE J11, J13, J17 and J19.	Permits patching into the 4W SEND lines and opening the lines to the signaling/termination units.
DEM-LINE J12, J14, J18 and J20.	Permits patching into the 4W REC lines and opening the lines to the signaling/termination units.
MOD OUT J5	Permits patching the subgroup modulator output to TX LINE jack J6 for normal operations or to DEMOD IN jack J15 for back-to-back testing of the telephone terminal subgroup.
DEMOD IN J15	Permits patching of the demodulator input from RX LINE jack J16 for normal operation.
TX LINE J6	See MOD OUT J5 above.
RX LINE J16	See DEMOD IN J15 above.

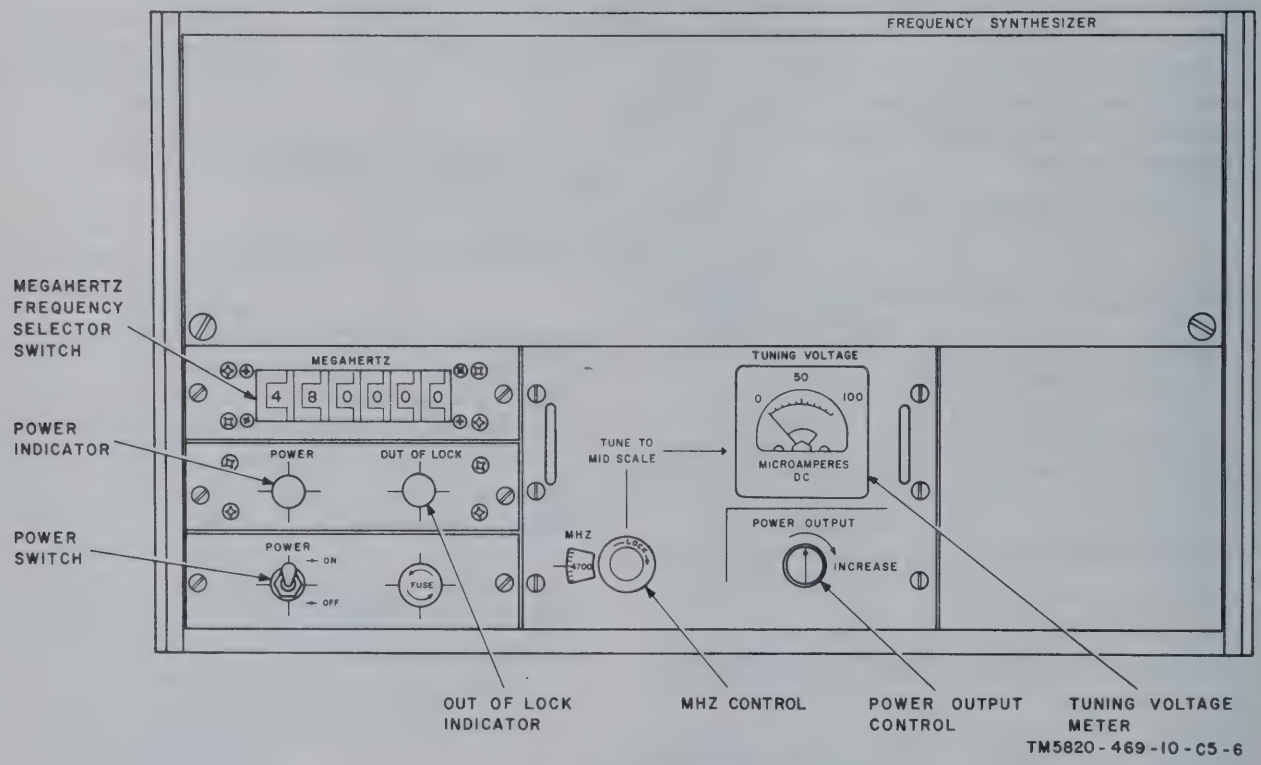


Figure 27. Electrical Synthesizer 0-1462A/TRC, controls and indicators.

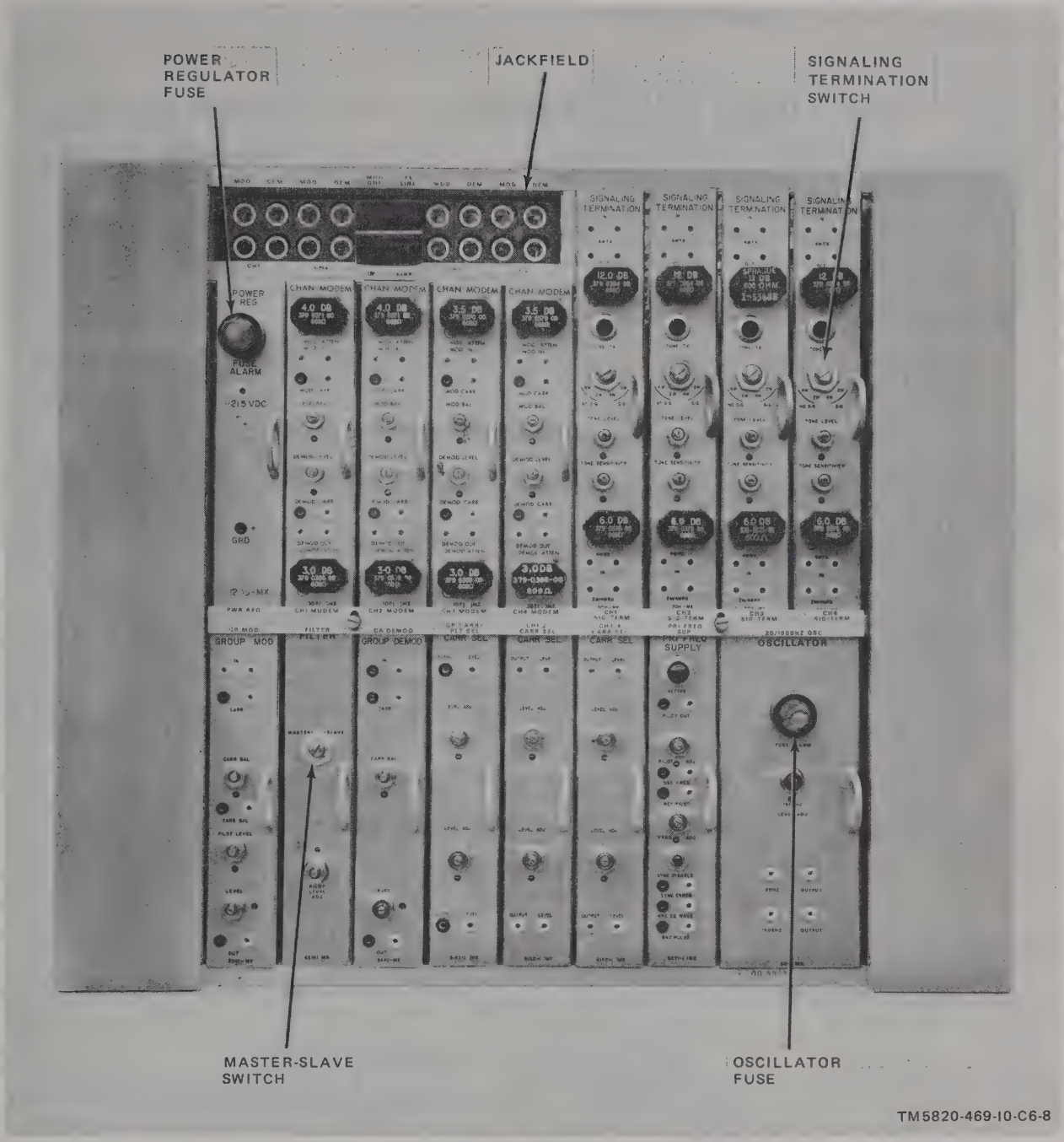


Figure 27.1 Telephone Terminal TA–833/TRC, controls and indications.

Section IV. RACKS A4 AND A5

39. General

The two receivers and all associated controls are identical. The only difference between the two racks is that rack A4 contains a blower (provides cooling for both racks) and rack A5 contains a converter power supply for the receive converter located in rack A4, and a mux power supply for the four-channel telephone terminal located in rack A3. The controls for the receivers are described in paragraphs 40 through 44.

40. Amplifier-Converter AM–4916/TRC (fig. 53)

The AM–4916/TRC (receive converter) consists of a meter panel, a varactor multiplier, a postselector, a preselector, an shf preamplifier, an RF preamplifier, a tuneup oscillator/mixer, and a main chassis. Of these units only the meter panel, varactor multiplier, postselector, and preselector contain operator controls. The control on these units are described in *a* and *b* below.

a. Meter Panel.

Control	Function
TUNEUP SIGNAL pushbutton switch.	Applies B+ to 70-mc oscillator for application of tuneup signal.
TUN. DET METER ADJUST control.	Controls sensitivity of meter when METER FUNCTION SELECTOR switch is at J–TUN. DET.
METER FUNCTION SELECTOR switch.	Connects meter to any one of 6 circuits.

Sw pos	*Causes meter to indicate*
G	Diode current of varactor multiplier.
H-XTAL CUR.	Crystal current.
J-TUN. DET.	Output IF signal level.
70 MC	Crystal current of tuneup mixer.
B+	SET POINT.
RECEIVE SIG DET.	Combiner control voltage of IF amplifier.
Meter	Indicates levels of signals selected by METER FUNCTION SELECTOR switch.

b. Varactor Multiplier, Postselector, and Preselector.

Control	Function
Varactor multiplier:	
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes output cavity of varactor multiplier.
Postselector:	
Tuning control J	Tunes postselector cavity.
Preselector:	
Tuning control	Tunes preselector cavity to select desired frequency.

41. Amplifier, Intermediate Frequency AM–6208/TRC–80B (fig. 28)

The AM–6208/TRC–80B (IF amplifier) contains no operating controls. The IF amplifier is turned on when the IF amplifier power supply (para 42) is turned on.

Caution

Meter M1 and meter selector switch S1 are used by the operator *only* to check operating conditions. The operator is authorized to perform only the adjustments specified in paragraph 63*b*.

Control or indicator	Function
Meter selector switch S1	RCVR GAIN 6 — Signal level of IF stages. COMB. V. — Level of combiner control voltage applied to IF amplifier module. Used in conjunction with TUNEUP SIGNAL S2, located on receive converter.
Meter M1	XTAL CURRENT 6–14. Current in balanced crystal mixer of receive converter. Indicates circuit conditions within circuit selected by selector switch S1.

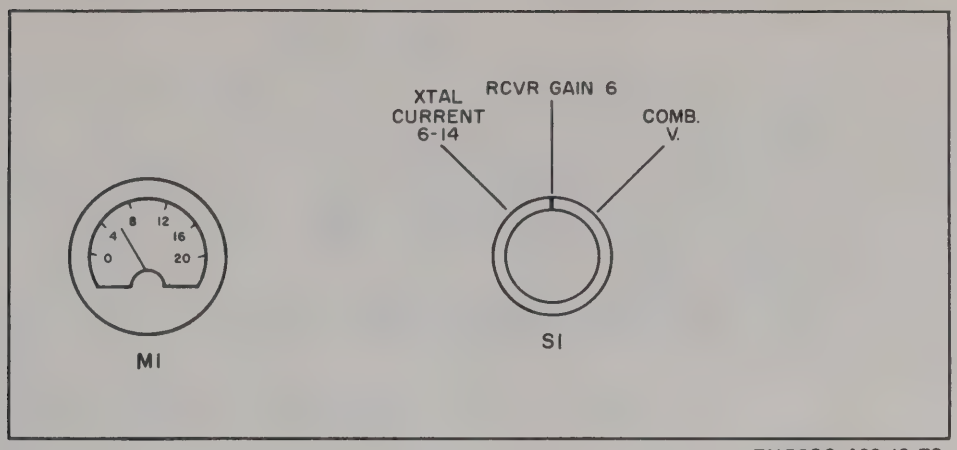


Figure 28. IF amplifier, front panel meter and switch.

42. Power Supply PP–3313/TRC–80 (fig. 29)

Two PP–3313/TRC–80's (IF power supplies) are used. Each IF power supply applies operating potentials to its respective IF amplifier panel.

Control or indicator	Function
POWER ON-OFF switch	Controls application of primary power to power supply.
POWER indicator	When lighted, indicates primary power is applied to power supply.
TIME DELAY (amber) panel indicator.	When lighted, indicates that 30-second time delay relay contacts have closed and primary power is available to B+ supplies (A1, A2, A3).
POWER SUPPLIES indicators A1, A2, and A3.	When lighted, indicate that B+ is available from respective dc supply.

43. Power Supply PP–4936/TRC (fig. 30)

Two PP–4936/TRC (receive converter power supplies) are used. Each converter power supply applies operating potentials to its respective receive converter.

Control or indicator	Function
PWR ON-OFF switch	Controls application of primary power.
PWR indicator	When lighted, indicates application of primary power.

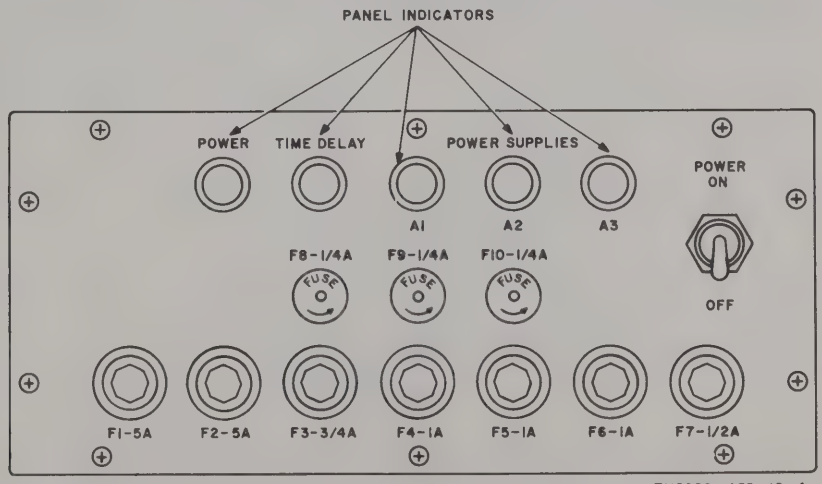


Figure 29. IF power supply, control and indicators.

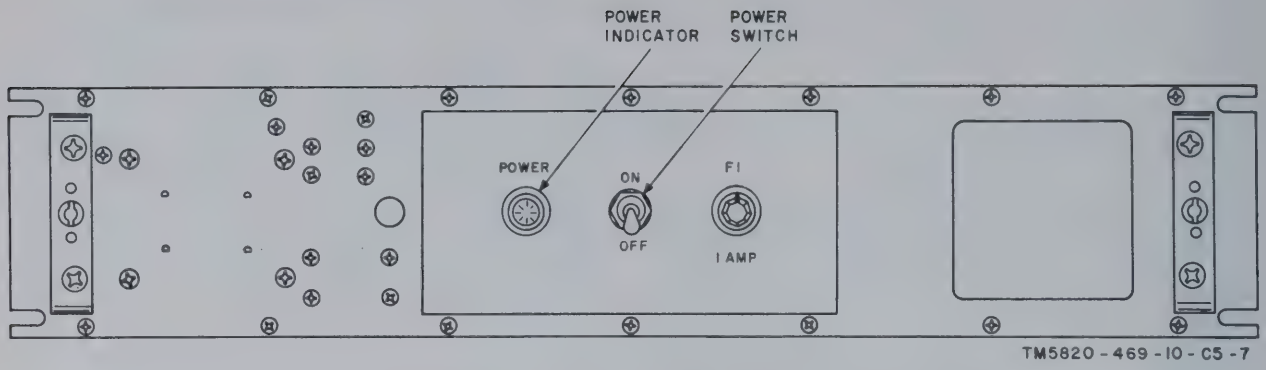


Figure 30. Converter Power Supply PP-4936/TRC, control and indicators.

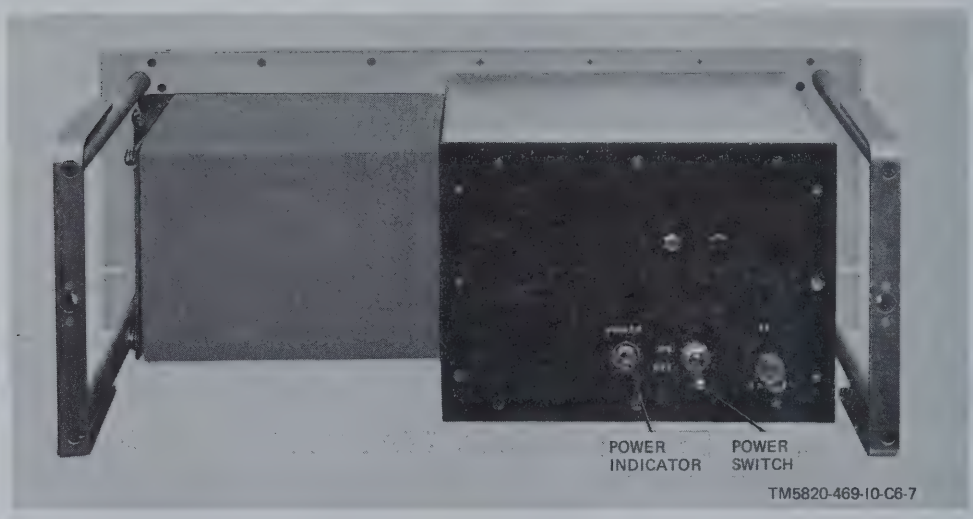


Figure 30.1 Mux power supply, controls and indicators.

43.1 Power Supply PP-6290/TRC (fig. 30.1)

One PP-6290/TRC (mux power supply) is used. The mux power supply applies operating potential to the telephone terminal.

Control or indicator	Function
Power ON-OFF switch	Controls application of primary power.
POWER indicator	When lighted, indicates application of primary power.

Control	*Function*
AUX	Selects primary power from auxilary power source.
MAIN BREAKER circuit breaker	Controls application of primary power to all circuits of radio set.
AUX OUTLET circuit breaker	Controls application of primary power to auxiliary outlet.
RACK POWER circuit breaker	Controls application of primary power to equipment racks.
ANTENNA circuit breaker	Controls application of primary power to antenna.
AIR COND circuit breaker	Controls application of primary power to air conditioner.
FLUSHING BLOWER circuit breaker	Controls application of primary power to flushing blower.
Indicator lamp	Indicates that the LOAD CONTROL switch on the engine generator control panel is in the ON position.

47.1. Phase Lamp Panel

(fig. 32.1)

Control or indicator	*Function*
PHASE lamp	Indicates when the three-phase input power is out of phase.
TEST pushbutton switch	Tests PHASE lamp.

48. Power and Signal Entry Panel

(fig. 33)

Connector	*Function*
Jacks J17 through J20	Army area net telephone connection jacks for two- or four-wire use: Two-wire: J17 and J18. Four-wire: Input connection — J17 and J18. Output connection — J19 and J20.
Jacks J23 through J26	Army area net teletypewriter connection for two-wire vf, two-wire dc, and four-wire tty use: Two-wire vf: J23 and J24. Two-wire dc: J25 and J26. Four-wire tty: Input connection — J24 and J26. Output connection — J23 and J25.
Jack J7	Connection for vehicle-mounted radio set.
RECEIVER INTERCONNECT J8	Used in diversity operation. Connection to J8 of other radio set.
TO GRD STAKE jack J6	Connection to ground stake.
ELECTRICAL NEUTRAL connector	Binding post for strap on J6. Disconnect when using Pershing Weapons System power station for primary power source.
SPARE jacks J21 and J22	Connection for spare telephone line.
DISCRETE (PTS) jacks J27 and J28	Connection for discrete telephone (or vf tty) to pts.
INTERCOM (PTS) jacks J29 and J30	Connection for voice intercom connection to pts.
TTY (PTS) jacks J31 and J32	Connection for pts tty (vf or tty).
PROGRAMMER TEST STATION jack J3	Cable connection to pts.
AUX POWER 3 PH–400 CPS–208V connector J15.	Power connection for use with auxiliary power source.
PACK 1 TO 2 INTERCONNECT J4	Cable connector for shelter-to-shelter connection during diversity operation.
LINE 1 through LINE 4	Telephone terminal connection jacks for 2-wire or 4-wire use.
SEND pair	Connection for external voice send line (4W) to associated LINE MOD jack on the telephone terminal jackfield.
REC pair	Connection for external voice receive line (4W) or 2-wire operation line to associated LINE DEM jack on the telephone terminal jackfield.

49. Air Conditioner, Self-Contained, CE-6A-400

(fig. 34)

Control or indicator	*Function*
SW-1 OFF-ON switch	Controls application of power to air-conditioner evaporator fan and switch SW-3.
SW-2 switch:	
Sw pos	*Function*
HEAT	Controls application of power to heater coils for heating.
VENT	Provides for normal air circulation; forced-air circulation is provided when evaporator fan has been turned on by SW-1.
COOL	Applies power to condenser fan and compressor for cooling.
SW-3 FRESH AIR 0-100% switch	Mechanically controls mixture of fresh and return air that is supplied to the top evaporator through the dampers.
SW-4 COOLER switch	Thermostatically controls heating and cooling elements of air-conditioning system.

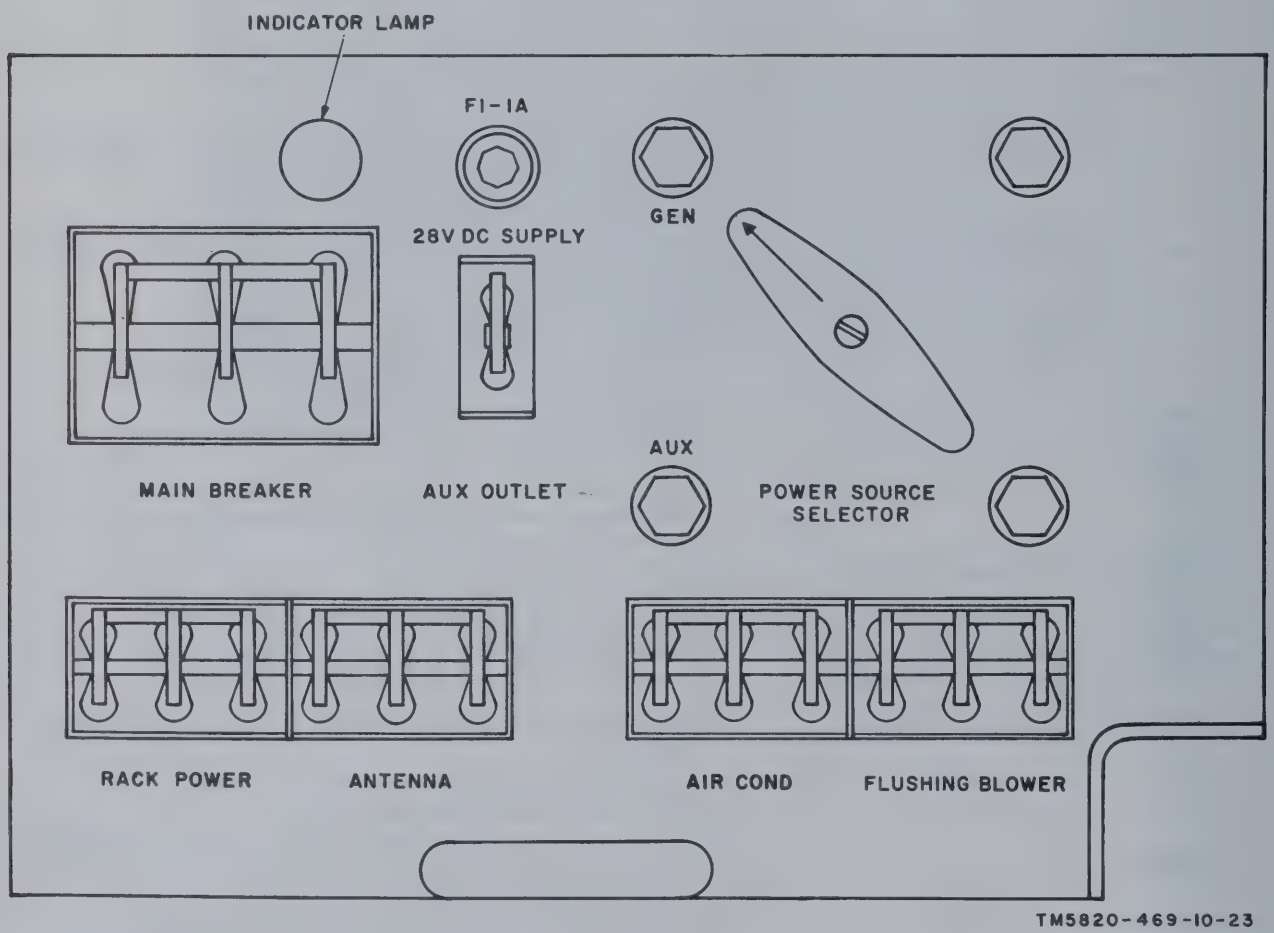
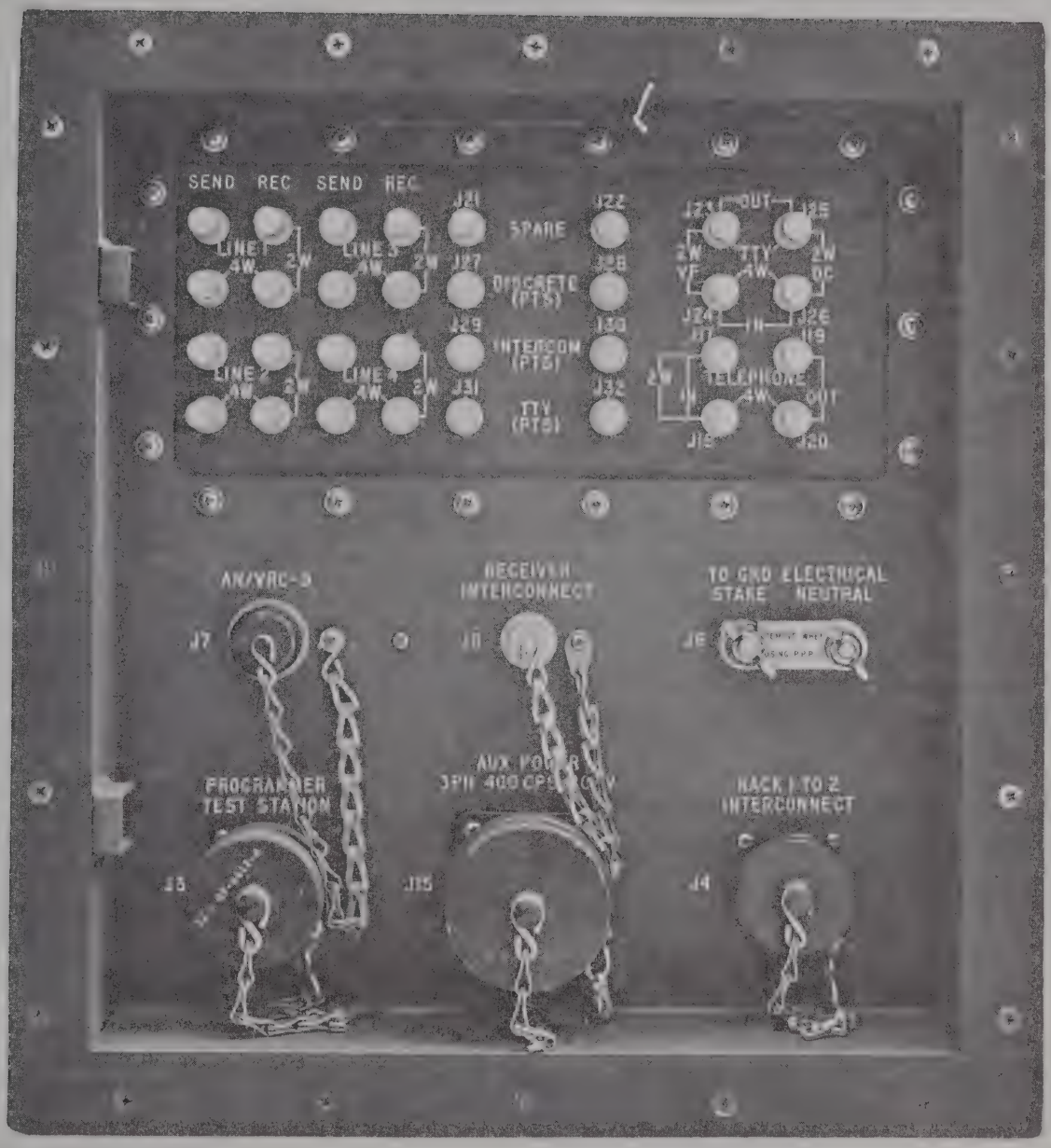


Figure 32. Circuit-breaker panel, controls.



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Figure 33. Power and signal entry panel connectors.

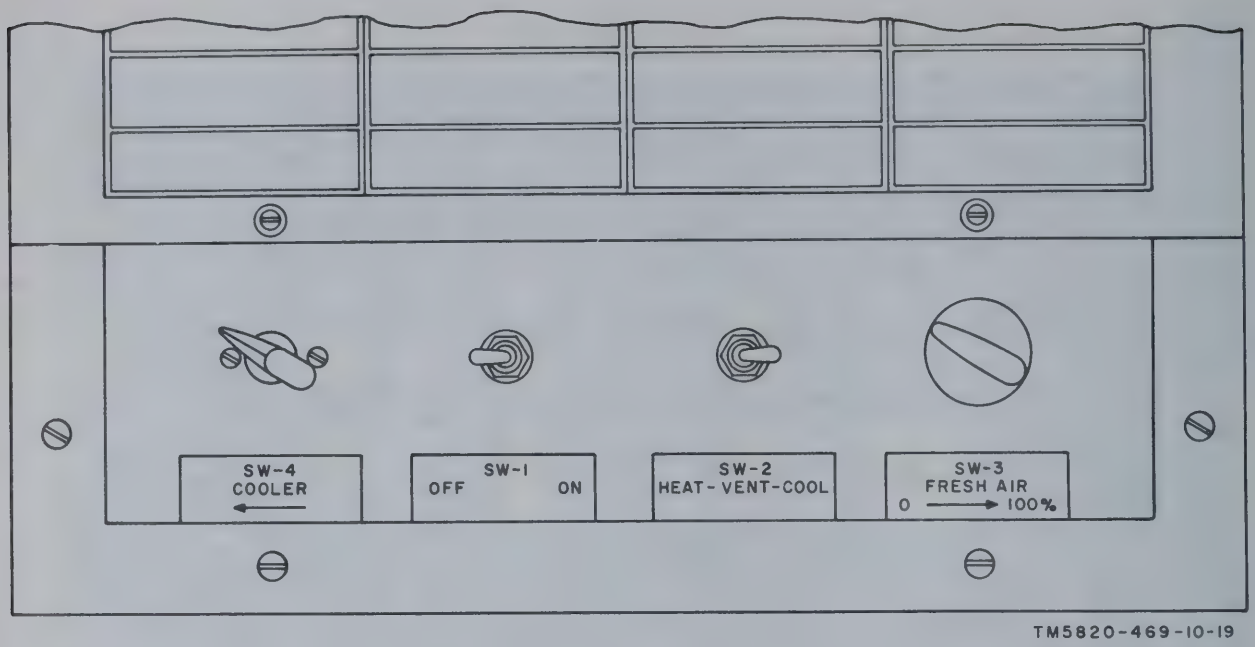


Figure 34. Air conditioner, front panel controls.

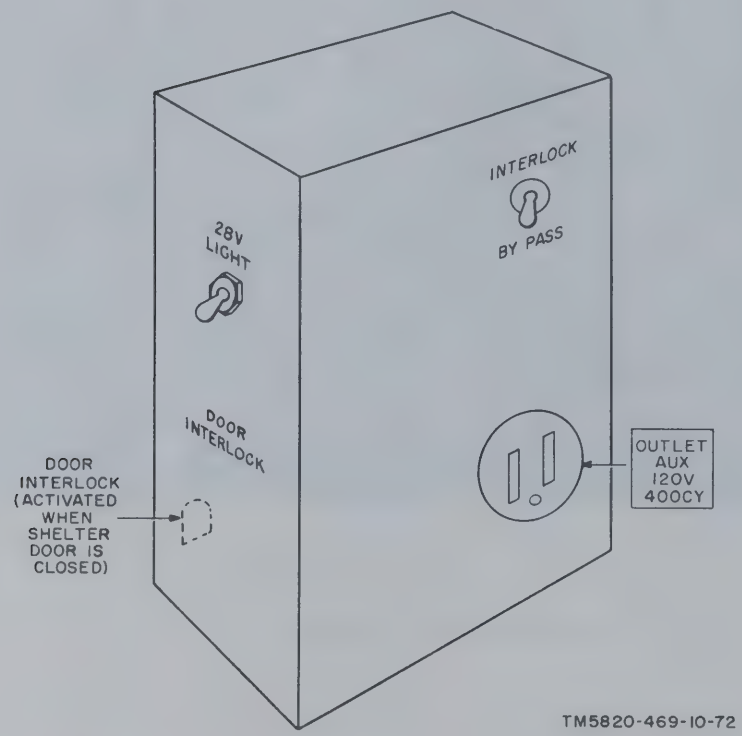


Figure 35. Interlock bypass switchbox controls.

CHAPTER 4
OPERATION

Section I. PRELIMINARY STARTING PROCEDURE

53. Initial Procedure Using Internal Power

Warning: **Do not check fuel in gas cans in presence of transmitter rf energy. Never leave open gas cans near this equipment.**

The following operating procedures apply to both nondiversity and diversity operation of the AN/TRC–80B. When procedure variations are required for diversity operation, appropriate notes are provided.

a. Open the personnel door, the engine-generator door, and the power amplifier shelter air vents.

b. Remove the T-handle locking pin from each side of the engine-generator track and slide the engine generator out of its compartment

c. Inspect the engine-generator compartment for evidence of oil or fuel leaks.

d. Check the cables for loose connections.

e. Check the engine-generator oil level with the dipstick located on the oil filter tube.

f. Turn the fuel selector valve (fig. 11) to SUPPLY NO. 1 and attach the fuel line between the fuel selector valve and a fuel can (not supplied with the equipment) containing regular-grade gasoline. Do not use aviation or high test fuel.

Note. Fuel is consumed at the rate of 2½ gallons per hour. Check fuel level before operation.

g. Place the circuit breaker on the engine generator to the ON position, depress the overspeed reset switch (fig. 11), and place the OFF-ON-START switch on the engine generator starting panel (fig. 36) in the ON position.

h. Remove flexible waveguides from floor of operator's compartment and place on shelter roof.

i. Unstow the ladder and mount it on the front of the shelter.

j. Remove grounding equipment from the engine generator compartment.

53.1. Initial Procedure Using Auxiliary Power

Auxiliary power can be used providing the power meets the requirements specified in paragraph 4. Connect an external power cable to AUX POWER 3PH–400–CPS–208V connector on the power and signal entry panel. The AUX POWER 3PH–400–CPS–208V connector is a four-pin connector. Pin A must be connected to phase A, pin B to phase B, pin C to phase C, and pin D to neutral. Incorrect phase connections will cause the PHASE lamp (fig. 32.1) to light.

54. Preliminary Power Control Settings

a. Lighting. Enter the shelter and turn on the 28V LIGHT switch located at the upper left side of the entrance.

b. Rack Power Controls.

(1) *Rack A1* (fig. 7).

Unit	*Fig. No.*	*Control*	*Position*
Monitor	19	PWR switch	OFF
Modulator-multiplier	20	POWER switch	OFF
Transmit converter	52	POWER ON switch	OFF
Multiplexer	21	Power ON-OFF switch	OFF

(2) *Rack A2* (fig. 5)

Unit	*Fig. No.*	*Control*	*Position*
Engine-generator control panel.	22	EMERGENCY ENGINE SHUTDOWN switch.	RUN
		VOLTAGE CONTROL	Fully ccw
		BATTLE SHORT switch	OFF
Switch panel	23	HUT LIGHTS switch	OFF
		FLUSHING BLOWER switch	OFF
		RACK BLOWERS switch	OFF
		RACK POWER switch	OFF
		DEMULT-MULT-MOD SELECTOR switch	LOCAL
		LOCAL-REMOTE-COM CONTROL SELECTOR switch.	CONTROL

Note. For diversity operation, refer to paragraph 69*b*.

Unit	Fig. No.	Control	Position
Switch panel	23	Patch cable	Connected between RECEIVER OUT NO. 1 jack J8 and IF IN NO. 1 jack J9.
		Patch cable	Connected between RECEIVER OUT NO. 2 jack J10 and IF IN NO. 2 jack J11.
Teletypewriter	5	MOTOR ON-OFF switch	OFF
Teletypewriter switch panel.	25	OPERATING MODE switch	NORMAL DC LOOP
		PTS-BY PASS switch	ON
		REMOTE DISTANCE switch	SHORT
		LIGHTS NORMAL-DIM switch	NORMAL
Telegraph Terminal	26 or 26.1	NORM-REC-SEND switch	NORM
TH-5A/TG, or TH-22/TG.		4W-2W-TEL switch	4W

(3) *Rack A3* (fig. 6). This rack contains the three synthesizers. Turn the POWER switch (fig. 27) to OFF.

(4) *Rack A4* (fig. 9). Place the if. power supply POWER switch (fig. 29) to OFF.

(5) *Rack A5* (fig. 10).

Unit	Fig. No.	Control	Position
If. power supply	29	POWER switch	OFF
Converter power supply (both units)	30	POWER switch	OFF
Mux power supply	30.1	POWER switch	OFF

(6) *Unracked units.*

Unit	Fig. No.	Control	Position
Air-conditioner evaporator (both units).	34	SW-1 OFF-ON switch	OFF
Circuit-breaker panel	32	MAIN BREAKER circuit breaker	OFF
		RACK POWER circuit breaker	OFF
		ANTENNA circuit breaker	OFF
		AUX OUTLET circuit breaker	OFF
		AIR COND circuit breaker	OFF
		FLUSHING BLOWER circuit breaker	OFF
		POWER SOURCE SELECTOR switch	GEN
Power amplifier:	8		
Control panel	54	FILAMENT switch	OFF
		TUNE-OPERATE switch	TUNE
		FILAMENT ADJUST control	Fully ccw.
		REFLECTED-INCIDENT switch	INCIDENT
Klystron panel	54	DRIVE LEVEL control	Fully ccw.
Power supply panel	54	MAIN circuit breaker	OFF
		BEAM circuit breaker	OFF
		BLOWER circuit breaker	OFF
		BEAM VOLTAGE selector switch	Fully ccw.

check for oil leaks and for proper oil level.

(4) After at least one minute, slowly push the THROTTLE control completely in to allow the engine to come to operating speed.

(1) *Indications.*

Instrument or indicator	*Indication*	*Remarks*
Frequency meter	400 cycles	If not 400 cycles, adjust with FREQUENCY CONTROL switch. (Move switch to RAISE to increase frequency, and to LOWER to reduce frequency.) Release switch when meter indicates 400 cycles.
Voltmeter	208 volts	Adjust VOLTAGE CONTROL for desired indication.
Battery ammeter	Slight charge	
Hour meter	Running	
HEAD TEMPERATURE light.	Out	If HEAD TEMPERATURE light is on, shut down engine generator and check for faults.
OIL PRESSURE light	Out	If OIL PRESSURE light is on, shut down engine generator and check for oil leaks. Check oil level.
OVER VOLTAGE light	Out	If the light is not out, depress the RESET AND FIELD FLASH pushbutton.
UNDER VOLTAGE light	Out	Same as above.
OVER FREQUENCY light	Out	Same as above.
UNDER FREQUENCY light	Out	Same as above.

(2) *Procedure.* Set the LOAD CONTROL switch to ON. The POWER ON indicator should light. The 28V DC SUPPLY indicator lamp on the circuit breaker panel (fig. 32) should light. Power is now available for application to the circuit breaker panel.

55.1. Auxiliary Pow

Apply power to the external cable connected in paragraph 53.1. If the PHASE lamp (fig. 32.1) lights, turn the auxiliary power source off. Reverse any two pins (except pin D) in the power connector or at the power source. Reapply power to the shelter. The PHASE lamp should be off.

b. Engine-Generator Control Panel (fig. 22). Enter the shelter. Depress the RESET AND FIELD FLASH pushbutton on the engine-generator control panel. The engine-generator control panel instruments should indicate as follows:

56. Equipment Turn-On Procedure

Note. Perform the preliminary starting procedures (para 53 and 54) and the engine-generator starting procedures (para 55) before applying power to the radio equipment. In an emergency, or when this equipment has been pretuned, refer to paragraph 68 for a rapid emplacement procedure.

Step	*Component*	*Rack*	*Control*	*Action*	*Indication*
1	Circuit-breaker panel (fig. 32).	Unracked	MAIN BREAKER circuit breaker.	Set to ON	None.
			RACK POWER circuit breaker.	Set to ON	None.
			FLUSHING BLOWER circuit breaker.	Set to ON	None.
			AIR COND circuit breaker.	Set to ON (if air conditioner is to be used).	None.
2	Switch panel (fig. 23)	A2 (fig. 5)	HUT LIGHTS switch	Turn on	HUT LIGHTS indicator lights and rack lights come on. (The 28-volt red light is no longer required and may be turned off.)
			FLUSHING BLOWER switch.	Turn on	FLUSHING BLOWER indicator lights.
			RACK POWER switch	Turn on	AIR FAILURES indicator lights.
			RACK BLOWERS switch.	Turn on	Blowers go on and, after slight delay, AIR FAILURES indicator lights go off.

Step	Component	Rack	Control	Action	Indication
3	Communications control panel (fig. 24).	A2	POWER pushbutton	Depress	Panel pushbutton lamps will light.
4	Monitor (fig. 19)	A1 (fig. 7)	PWR ON-OFF switch	Set to ON	Panel indicator lights.
5	Transmit converter (fig. 52).	A1 (fig. 7)	POWER switch	Set to ON	FIL indicator lights. After approximately 3 minutes, TIME DELAY indicator lights.
6	Modulator-multiplier (fig. 20).	A1	POWER switch	Turn on	FIL indicator lights. After approximately 30 seconds, TIME DELAY and B+ indicators light
7	Multiplexer	A1	ON-OFF switch	Set to ON	FILAMENT indicator lights. After approximately 30 seconds, TIME DELAY and B+ indicators light.
8	Synthesizers (three units, fig. 6).	A3	POWER ON-OFF	Set to ON	POWER indicator on fault panel lights and the OUT OF LOCK indicator may flash.
9	If. power supply (fig. 29).	A4 (fig. 9)	POWER ON-OFF switch.	Set to ON	POWER indicator lights. After 30 seconds, TIME DELAY and POWER SUPPLIES A1, A2, and A3 indicators light.
10	Converter power supply (two units fig. 30).	A5 (fig. 10)	Power ON-OFF switch	Set to ON	POWER indicator lights.
10.1	Mux power supply (fig. 30.1)	A5 (fig. 10)	Power ON-OFF switch.	Set to ON	POWER indicator lights.



Figure 39. Support arms before attachment of antenna bag.

rotating the feedhorn connector ⅛ turn in the opposite direction to lock in place

ah. Turn the LOW PRESSURE switch to ON.

Cautions

1. During low-pressure inflation, check that the feedhorn connector is properly secured to the feedhorn.

2. Make the waveguide connections listed in *ai* and *aj* below; be extremely careful to prevent damage to the teflon covers.

ai. Connect a flexible waveguide to the horizontal or vertical (marked H and V, fig. 45) feedhorn (see note below). Connect the other end of the flexible wave to the XMTR ANT CONNECT jack located on the shelter roof (fig. 12).

Note

If the transmitting waveguide is connected to the vertical (V) feedhorn, the transmitting waveguide of the AN/TRC–80B at the other end of the communication circuit *must be* connected to the horizontal (H) feedhorn.

aj. Connect the other flexible waveguide between the other feedhorn connection and the RCVR ANT CONNECT jack (fig. 12) on the shelter roof.

ak. The mounting bracket for the antenna sight device is located on the left support arm of the antenna. Mount the antenna sighting device (stowed in the storage box above the power amplifier) on the mounting bracket (fig. 45).

58. Azimuth Orientation

To initially orient the shelter in azimuth, follow the instructions given in paragraphs 21 and 22. To complete the antenna orientation, perform the procedures given in *a* through *c* below:

a. Pull out the coarse azimuth locking pin (fig. 43) and rotate the antenna until the azimuth sight is in line with the far marker. De-



Figure 40. Attaching antenna bag to center section of left support arm.

press the BRAKE pedal (fig. 43) to lock the antenna in place.

Note

Personnel can vary the pressure on the brake as the antenna is rotated during windy conditions, or apply full pressure and lock the antenna platform in any position.

b. Release the coarse azimuth locking pin and turn the fine azimuth adjust handle (located inside the shelter, fig. 2) until the pin engages.

c. Depress the BRAKE RELEASE pedal.

59. Elevation Adjustment (fig. 43)

a. Loosen the wingnut on the elevation angle indicator and set the elevation pointer to 0. Tighten the wingnut.

b. Turn the elevation crank until the spirit-level bubble is centered.

c. Loosen the wingnut and set the desired elevation angle. Tighten the wingnut.

d. Turn the elevation crank until the bubble is again centered.

Note

Final antenna adjustment is performed after the transmitter and receivers are tuned (para 67).

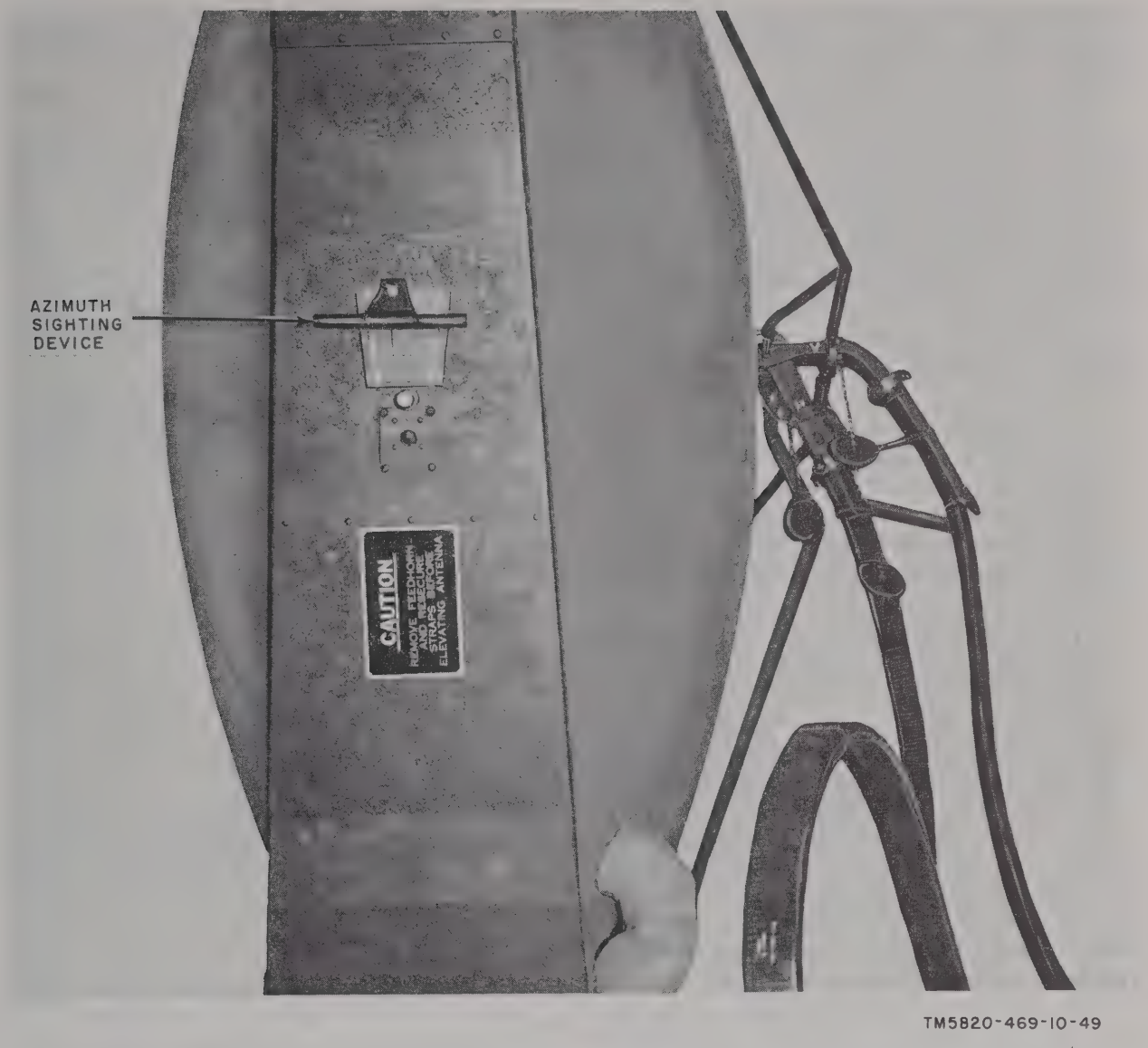


Figure 45. Feedhorn assembly with flexible waveguides connected.

Section III. TUNING PROCEDURE

60. Frequency Considerations (fig. 46)

a. General. Operation of the AN/TRC–80B in diversity or nondiversity modes requires certain frequency considerations to be observed to prevent undesired interference. Assume a diversity system similar to that illustrated in figure 15, where F1 and F2 are the two receive frequencies at the battery terminal and F3 is the transmission frequency at the battery terminal. The frequencies that should be avoided during frequency selection are covered in *b* through *d* (below).

b. F1 to F2 Frequency Considerations. The frequency relationship between two receive frequencies at the battery terminal (or the two transmit frequencies at the battalion terminal) is illustrated in A of figure 46. Note that frequencies that are within F1 ±40 mc, and the frequency bands of F1 —70 mc (±10 mc) and F1 + 70 mc (±10 mc) are not suitable for F2. (The prohibitive bands are shaded in fig. 46.)

(1) *F1 ±40 mc.* Assume that F1 is 4,795 mc. Frequency F2 should not be located closer than 4,755 mc (on the low side) or closer than 4,835 mc (on the high side). This frequency

separation prevents F1 and F2 from causing interference to one another at the battery terminal.

(2) *F1 ±70 mc.* The two receive frequencies (F1 and F2) must not be separated by 70 mc (±10 mc). Therefore, if a frequency selection of 4,795 mc is made for F1, F2 should not fall within the bands of 4,855 mc through 4,875 mc. This frequency restriction prevents the two receive frequencies from heterodyning to produce a 70-mc signal. Since this equipment uses a 70-mc IF system, severe interference would be introduced by a 70-mc interference signal.

c. Transmitter Frequency Considerations. The transmitter frequency (F3 in figure 15) should not be located within the restricted frequency bands illustrated in B of figure 46. The frequency considerations between F3 and the two receive frequencies (F1 and F2) are listed below.

(1) *F1 or F2 ±80 mc.* Frequency F3 must not be within 80 mc of either F1 or F2. This provides isolation between the vertically and horizontally polarized feeds on the common antenna, and also avoids the development of a 70-mc signal that would cause interference in the receiver 70-mc IF system.

(2) *F1 or F2 ±105 mc.* Frequency F3 must not be separated by 105 mc (±5 mc) from either F1 or F2. If the transmit and receive frequencies were separated by 105 mc, interaction with the local oscillator signal would produce *birdies* in the received signal.

(3) *F1 or F2 ±140 mc.* Frequency F3 must not be separated by 140 mc (±5 mc) from either F1 or F2. If the transmit and receive frequencies were separated by 140 mc (±5 mc), a 70-mc interference signal could result because of interaction between the local oscillator and the transmitter frequency.

d. Example of Frequency Selection.

(1) Assume that the frequency selection for F1 is 4,795 mc. In A of figure 46, it is shown that F2 should not be located within the following bands:

(a) 4,715 through 4,735 mc (F1 −70 mc (±10 mc)).

(b) 4,755 through 4,835 mc (F1 ±40 mc).

(c) 4,855 through 4,875 mc (F1 +70 mc (±10 mc)).

(2) Assume that a frequency selection of 4,642 mc is made for F2. Note that this frequency does not fall within any of the restricted bands listed in (1) above.

(3) In the frequency selection of F3, the restrictive bands developed by the selection of F1 *and* F2 must be considered. The following frequency selections must be avoided because F1 is 4,795 mc:

(a) 4,650 through 4,660 mc (F1 −140 mc (±5 mc)).

(b) 4,685 through 4,695 mc (F1 −105 mc (±5 mc)).

(c) 4,715 through 4,875 mc (F1 ±80 mc).

(d) 4,895 through 4,905 mc (F1 +105 mc (±5 mc)).

(e) 4,930 through 4,940 mc (F1 +140 mc (±5 mc)).

(4) The following frequency selections must not be made for F3 when F2 is 4,642 mc:

(a) 4,497 through 4,507 mc (F2 −140 mc (±5 mc)).

(b) 4,532 through 4,542 mc (F2 −105 mc (±5 mc)).

(c) 4,652 through 4,722 mc (F2 ±80 mc).

(d) 4,742 through 4,752 mc (F2 +105 mc (±5 mc)).

(e) 4,777 through 4,787 mc (F2 +140 mc (±5 mc)).

(5) The frequency selection of F3 may be made within any band of frequencies that does not fall into the bands specified in (3) and (4) above.

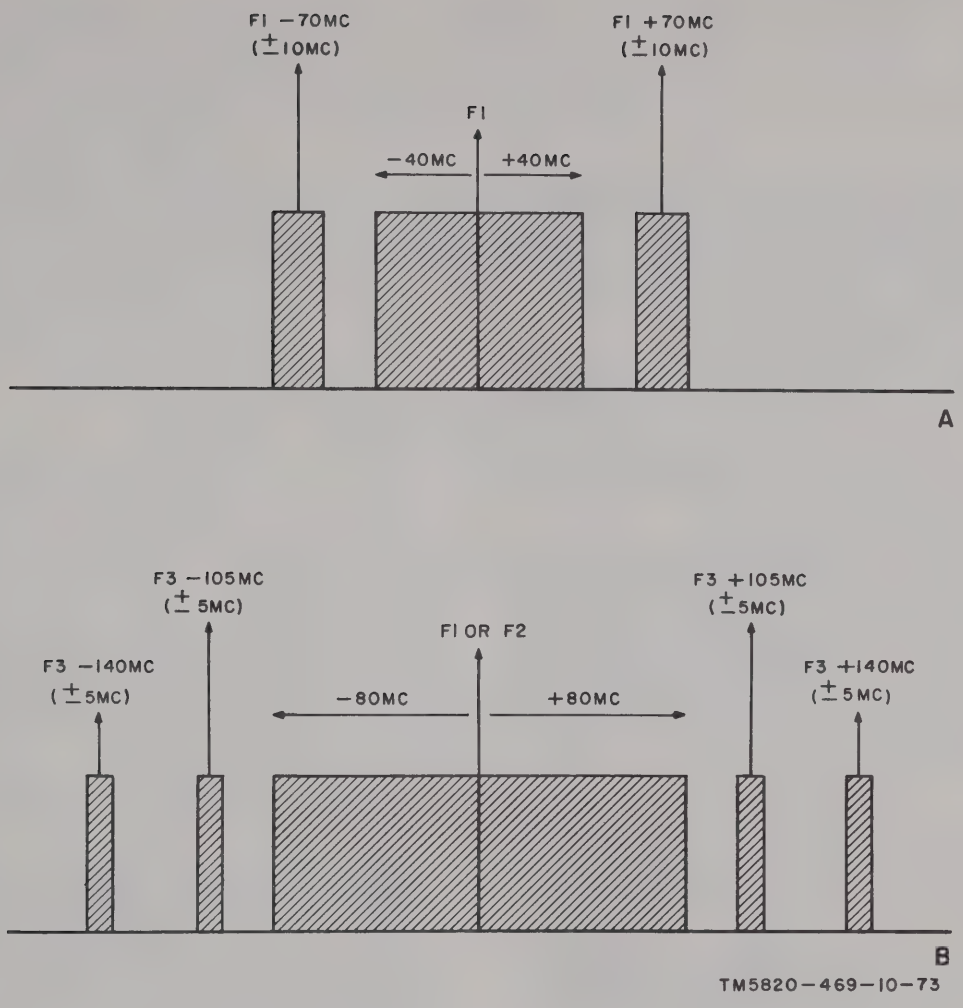


Figure 46. Example of frequency considerations.

61. Synthesizer Tuning

Any frequency in the 4,400.00- to 4,999.95-MHz range that is in increments of 0.05 MHz can be used for tuning, providing the frequency considerations discussed in paragraph 60 are observed.

62. Receiver Initial Tuning Control Settings

Select the desired frequency (para 61) and perform the procedures listed below.

a. Receiver No. 1.

Unit	Control	Set or adjust to
Synthesizer (upper unit in rack A3). *Note.* Upper unit drives receive converter No. 1 in rack A5; lower unit drives receive converter No. 2 in rack A4.	MEGAHERTZ selector switches (from left):	
	First	Fixed indicator, always indicates 4.
	Second	Indicates second digit of selected frequency.
	Third	Indicates third digit of selected frequency.
	Fourth	Indicates fourth digit of selected frequency.
	Fifth	Indicates fifth digit of selected frequency.

Unit	Control	Set or adjust to
	Sixth	Indicates sixth digit of selected frequency.
	MHZ tuning control	Midscale indication on TUNING VOLTAGE meter while indicating approximate desired frequency.
Receive converter (rack A5):	Tuning control G	Approximate desired frequency.
Varactor multiplier	Tuning control H	Approximate desired frequency.
Postselector	Tuning control J	Approximate desired frequency.
Preselector	Preselector	Approximate desired frequency. *Note.* Tune preselector of unused receive converter to at least 100 MHz from receive frequency.
Meter Panel	INCREASE TUN, DET METER ADJUST control.	Fully clockwise.
	Position METER FUNCTION SELECTOR switch.	Position G.
Synthesizer	POWER OUTPUT	Synthesizer power output to 50 (set point) on receive converter meter.

b. Receiver No. 2. The initial adjustments for receiver No. 2 are identical with those performed for receiver No. 1 (*a* above). Observe the frequency considerations (para 60) in the selection of receiver No. 2 operating frequency.

63. Tuning Receiver No. 1

Note

Perform the receiver initial tuning control settings (para 62) before performing this procedure.

a. Synthesizer No. 1 (Upper Unit, Rack A3). Determine that the synthesizer is operating by observing that the OUT OF LOCK indicator is off. This indicator should flash momentarily when a frequency selector switch is operated. If the OUT OF LOCK indicator remains lighted, adjust the MHZ tuning control very slowly until the OUT OF LOCK indicator goes off and a midscale indication is obtained on the TUNING VOLTAGE meter.

b. Receive Converter No. 1 (Rack A5).

Note

Unless otherwise indicated, the adjustments listed in the *Adjust for* column are correctly made when the peak or desired reading occurs at the same time the dial or knob being adjusted indicates approximately the desired operating frequency.

Step	Unit	Meter Function Selector switch setting	Control	Adjust for
1	Varactor multiplier.	G	G	Maximum meter indication while maintaining an onscale reading with synthesizer POWER OUTPUT control.
2	Varactor multiplier.	H-XTAL CUR	H	Maximum meter indication (maintain on-scale reading).
3	Synthesizer	H-XTAL CUR	POWER OUTPUT	Approximately 50 (set point).
4	Varactor multiplier.	H-XTAL CUR	G	Maximum meter indication.
5	Varactor multiplier.	H-XTAL CUR	H	Maximum meter indication.
6	Synthesizer	H-XTAL CUR	POWER OUTPUT	50 (set point).
Note. Press TUNEUP pushbutton while performing steps 7 through 11.				
7	Meter panel	J-TUN. DET	TUN. DET METER ADJUST.	Meter indication of 50 or fully clockwise for approximately midscale reading.
8	Preselector	J-TUN. DET	Preselector tuning	Peak meter indication. *Note 1.* Meter indication must peak when control/dial indicates the approximate frequency desired. *Note 2.* If necessary, vary TUN, DET METER ADJUST control ccw to maintain on-scale meter indication.
9	Preselector	J-TUN. DET	J	Maximum meter indications. *Note.* If necessary, vary TUN. DET. METER/ ADJUST control ccw to maintain on-scale indication.

Step	Unit	Meter Function Selector switch setting	Control	Adjust for
Note.	Repeat steps 7 through 9.			
10	Meter panel	J-TUN. DET	TUN. DET METER ADJUST.	Meter indication of 80. Use this as a reference level for the following steps:
11	Preselector	J-TUN. DET	Preselector tuning	*a.* Rotate counterclockwise until meter indicates 30 or less. *b.* Rotate clockwise until meter indicates 50. Note dial setting (frequency). *c.* Continue rotating clockwise until meter indication passes through a peak and decreases to 50. Note dial setting. *d.* Rotate counterclockwise until meter indications again pass through the peak and decrease to 50. Check dial setting (step *b* above). *e.* Rotate clockwise to a dial setting halfway between settings noted in *b* and *c* above. Meter indicates greater than 75.
12	IF amplifier No. 1	Any position	Set selector S1 (fig. 28) on 8 MC IF NO. 2 module to RCVR GAIN 6.	RCVR GAIN control R1 of 12 channel auto bandwidth cont for an indication of 6 meter M1 of 8 MC IF NO. 2.

Figure 47. **Deleted.**

64. Tuning Receiver No. 2

Receiver No. 2 is tuned in the same manner as receiver No. 1 (para 63).

a. Check the synthesizer (lower unit, rack A3) for proper operation by observing that the OUT OF LOCK indicator is off. This indicator should flash momentarily when a frequency selector switch is operated. If the OUT OF LOCK indicator remains lighted, adjust the MHZ tuning control very slowly until the OUT OF LOCK indicator turns off a midscale indication is obtained on the TUNING VOLTAGE meter.

b. Tune the converter in rack A4 by following the procedures given in paragraph 63*b*.

65. Transmitting Equipment Initial Tuning Control Settings

Note

The general instructions given in paragraph 62 also apply to this tuning procedure.

a. General. The transmitting equipment is tuned by first presetting the controls on the synthesizer, transmit converter, and power amplifier.

Caution

Insure that neither receive converter preselector is tuned to within 100 mc of the selected transmission frequency. Never tune the power amplifier through the receiver frequency.

b. Initial Settings.

Step	Unit	Control	Set or adjust control to
1	Synthesizer (rack A3)	MEGAHERTZ selector switches (from left):	
		First	Fixed indicator, always indicates 4.
		Second	Indicates second digit of selected frequency.
		Third	Indicates third digit of selected frequency.

Step	Unit	Control	Set or adjust control to
		Fourth	Indicates fourth digit of selected frequency.
		Fifth	Indicates fifth digit of selected frequency.
		Sixth	Indicates sixth digit of selected frequency.
		Mc tuning control	Midscale indication on TUNING VOLTAGE meter while indicating approximate desired frequency.
2	Transmit converter:		
	Varactor multiplier	Tuning control G	Approximate desired frequency.
		Tuning control H	Approximate desired frequency.
	Tunable filter	J TUNABLE FIL	Approximate desired frequency.
3	Power amplifier:		
	Klystron unit	FIRST, SECOND, and FOURTH CAVITY.	Desired operating frequency by use of TUNING CHART on front panel.
		THIRD CAVITY	100 digits higher than first cavity.
		DRIVE LEVEL control	Fully ccw.
	Power supply panel	BEAM VOLTAGE selector switch.	Position 1.
4	Synthesizer (rack A3)	POWER OUTPUT	Synthesizer power output to 30 on transmit-converter meter.

66. Transmitter Tuning Procedure

(fig. 7 and 53)

Caution

When there is no significance to the choice of frequencies, use frequencies in the midrange section. Do *not* excurse from one frequency end to the other while tuning the klystron cavities. At least 100 digits from either extreme end (during tuning practice) should be the maximum of the tuning excursion.

Notes

1. Refer to paragraph 60 for frequency considerations in a diversity system.
2. Complete the initial tuning procedures (para 65) before starting this procedure.
3. Unless otherwise indicated, the adjustments listed in the *Adjust for* column are correctly made when the peak or desired reading occurs at the same time the dial or knob being adjusted indicates the desired operating frequency.

a. Transmit Converter. On the transmit converter, preset the G, H, and TUNABLE FIL J controls to the desired transmit frequency. Do not depress the BEAM PUSH TO START pushbutton.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for —
1	Varactor multiplier.	G	G	Peak indication on meter. (Keep meter indication on-scale by turning synthesizer POWER OUTPUT control ccw.)
2	Varactor multiplier.	H	H	Peak indication on meter. (Keep meter indication on-scale by turning synthesizer POWER OUTPUT control ccw).
3	Synthesizer (middle synthesizer in rack A3).	H	POWER OUTPUT	Approximately midscale reading on the transmit-converter meter.
4	Varactor multiplier.	G	G	Peak indication on meter.
5	Varactor multiplier.	H	H	Peak indication on meter.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for —
6	Synthesizer (middle synthesizer in rack A3).	H	POWER OUTPUT	Approximately midscale reading on the transmit converter meter.
7	Meter panel	HELIX	Momentarily depress BEAM PUSH TO START.	(BEAM panel indicator should light.) Meter should indicate 80 or less. Refer to higher category of maintenance if meter indication exceeds 80.
8	Meter panel	COLLECTOR	None	Meter should indicate 80 or less. Refer to higher category of maintenance if meter indication exceeds 80.
9	Tunable filter	OUTPUT	Depress CARRIER SWITCH (on-modulator-multiplier, fig. 20).	Adjust TUNABLE FILTER for maximum meter indication. (TUNABLE FILTER should indicate 70 mc below the operating frequency.)
10	Tunable filter	OUTPUT	Release CARRIER SWITCH.	Adjust TUNABLE FILTER control for maximum meter indication at a point 70 mc higher than step 9. The TUNABLE FILTER should indicate approximately the correct frequency.
11	Tunable filter	OUTPUT	Depress CARRIER SWITCH.	*Note.* Meter indication should drop to approximately zero. If indication is not zero, repeat steps 9 and 10.
12	Synthesizer	H	POWER OUTPUT	Adjust POWER OUTPUT control for a transmit-converter meter indication of 5 to 10 microamperes.
13	TUNABLE FIL	OUTPUT	J	Carefully adjust for peak meter indication. Maximum meter indication should not exceed 15 microamperes. If meter indication is greater, reduce synthesizer POWER OUTPUT and retune TUNABLE FIL control J for maximum indication. *Note.* After TUNABLE FIL control J is repeaked under low drive conditions (steps 12 and 13), do not readjust this control again.
14	Synthesizer	OUTPUT	POWER OUTPUT	Readjust for meter indication of 50, midscale, or as required for proper klystron drive.

b. Power Amplifier Tuning (fig. 54).

Step	Control	Adjustment	Remarks
1	MAIN circuit breaker	Set to ON.	
2	BLOWER circuit breaker	Set to ON.	
3	FILAMENT ON-OFF switch.	Set to ON	DRAWER indicator lights. Klystron blower goes on. When blower reaches operating speed, AIR indicator lights.
4	FILAMENT ADJUST control.	Adjust for meter indication of 6.5 volts.	FILAMENT indicator lights, FILAMENT hours indicator begins to run, and TIME DELAY indicator lights.
5	DRIVE LEVEL control	Turn cw until POWER IN meter indicates 50.	
6	REFLECTED-INCIDENT switch.	Set to REFLECTED.	

Step	Control	Adjustment	Remarks
7	FIRST CAVITY tuning control.	Adjust for minimum reading on POWER IN meter.	
8	SECOND and FOURTH CAVITY controls.	Set counters to indicate same readout as the FIRST CAVITY counter.	
9	THIRD CAVITY tuning control.	Set control to indicate 30 digits higher than FIRST CAVITY counter.	
10	BEAM circuit breaker	Set to ON.	
11	BEAM ON pushbutton	Depress	BEAM indicator lights, BEAM hours elapsed time meter runs. BEAM VOLTAGE meter indicates approximately 6,600 volts. BEAM CURRENT meter indicates .6 amp. If there is no meter indication on the INCIDENT KW section of the POWER OUT meter, increase input power (rotate DRIVE LEVEL control cw) to obtain a maximum of 250 milliwatts on the output meter. *Caution:* **It is necessary that the INCIDENT power out be less than 300 watts while cavities are being tuned. Reduce INCIDENT power in (by rotating DRIVE LEVEL control ccw) as often as required to insure this level.**
12	SECOND and FOURTH CAVITY tuning controls.	Adjust for maximum indication on POWER OUT meter.	Reduce drive level as required to keep incident power out less than 300 watts.
13	THIRD CAVITY tuning control.	Depress BEAM OFF pushbutton and adjust control so that counter reading is 100 digits higher than the FIRST CAVITY counter.	
14	DRIVE LEVEL control	Turn cw for meter indication of 50 milliwatts on the POWER IN meter.	
15	THIRD CAVITY tuning control.	Press BEAM ON pushbutton and lower counter readout for a maximum indication on POWER OUT meter.	
16	SECOND and FOURTH CAVITY controls.	Adjust for maximum indication on INCIDENT scale of POWER OUT meter.	
17	FOURTH CAVITY tuning control.	Adjust slightly for maximum indication on INCIDENT scale of POWER OUT meter.	If incident power is below 1,000 watts— *a.* Press the BEAM OFF pushbutton. *b.* Set the BEAM VOLTAGE switch to position 2 and press the BEAM ON pushbutton. *c.* Repeak THIRD, SECOND, and FOURTH CAVITY tuning

Step	Control	Adjustment	Remarks
			controls for a maximum indication on INCIDENT scale of POWER OUT meter. *Note.* If the incident power is still below 1,000 watts repeat steps *a* through *c* (above) using positions 3, 4, and 5 of the BEAM VOLTAGE switch until an incident power output of 1,000 watts is obtained. When incident power of 1,000 watts is obtained repeat steps 7 and 8.

Step	Control	Adjustment	Remarks
18	SECOND FOURTH and THIRD CAVITY tuning controls.	Set REFLECTED-INCIDENT switch to INCIDENT and slowly peak controls for maximum indication on INCIDENT scale of POWER OUT meter.	Lock all tuning controls. Place TUNE-OPERATE switch in the OPERATE position.

67. Final Antenna Adjustment

a. Place the METER FUNCTION SELECTOR switch of the receive converter in use to the RECEIVE SIG DET position.

Note. For exceptionally weak signals, place the METER FUNCTION SELECTOR switch on the receive converter in the J-TUN. DET. position.

b. Turn the fine azimuth adjustment handle (fig. 2) for a maximum indication on the receive converter meter.

Note. The fine azimuth adjustment mechanism may have reached the travel limit for the particular coarse azimuth setting. Therefore, it may be necessary to climb on the shelter roof and move the antenna to the next 100-mil increment setting.

Warning: **Turn off power amplifier before climbing to shelter roof.**

c. Remove the antenna orientation meter and cable from the paper storage compartment. Climb on the shelter roof and connect the antenna orientation meter cable to the connector located in the external shelter compartment that houses the receive waveguide connector (fig. 12).

d. Set the meter RESPONSE TIME control to the center of its range.

Note. As the control is turned toward the FAST position, meter sensitivity increases and is more susceptible to fluctuations due to fading and other propagation effects. The best setting is that which enables the operator to distinguish between meter fluctuation due to propagation effects and those due to antenna movement. Under no-signal conditions, the meter should indicate 24.

e. Turn the elevation crank (fig. 43) for a maximum meter indication.

f. Instruct the AN/TRC-80B operator at the other end of the circuit to perform final azimuth and elevation adjustments.

g. Repeat the procedures given in *a*, *b*, *d* and *f* above.

h. Disconnect the antenna orientation meter and cable and replace in the paper storage compartment.

Section IV. OPERATING PROCEDURE

68. Rapid Emplacement Procedure

The preliminary starting procedures (para 53) and the receiver and transmitter tuning (paras 55-66) must be performed when an AN/TRC-80B is to be turned on for the first time, or if the equipment has not been pretuned to the operating frequencies. However, if the AN/TRC-80B has been pretuned, trained operators can inflate the antenna and turn on the equipment within 10 minutes after the AN/TRC-80B arrives at a selected site. To place a pretuned AN/TRC-80B on the air, proceed as follows:

Note. The *Paragraph* reference column in the chart refers to the paragraph where the step is explained in detail.

Step	Action	Pargaraph
1	Open shelter door	53
2	Turn on emergency light (28V LIGHT)	54
3	Open engine generator compartment door and pa air vents	
4	Unstow flexible waveguides and place on shelter roof. Install ladder	53
5	Open antenna compartment door and unlatch platform	57*b*
6	Remove antenna feedhorns and replace straps	57*d-g*
7	Crank antenna platform to operating height	57*h*, *i*
8	Lock antenna platform in place and replace crank	57*k*
9	Start engine generator	55*a*

Step	Action	Pargaraph
10	Remove straps, unfold antenna support arms, fasten antenna bag to antenna support arms, and lock antenna support arms.	57*l-x*
11	Set engine generator voltage and frequency	55*b*
12	Depress LOAD CONTROL switch to ON	55*b*(2)
13	Turn on rack lights and rack blowers	56
14	Turn on power equipment racks	56
15	Close DUMP VALVE	57*y*
16	Turn on power amplifier filaments and adjust filament voltage	66*b*, step 4
17	Energize antenna compressor	57*z-ab*
18	Engage feedhorn side-supports and attach rf antenna window to feedhorn	57*ad-af*
19	Turn LOW PRESSURE switch to ON, and attach flexible waveguides	57*ag-aj*
20	Depress BEAM PUSH TO START on transmit converter.	
21	Make azimuth and elevation check from roof	58 and 59
22	Apply beam voltage to klystron	66*b*, steps 5-18
24	Install ground stake	23
24	Establish communications with distant station. After 5 minutes repeak pa tuning cavities	
25	Perform final azimuth adjustment from inside operator's compartment	67

69. Switch Panel Connections

A radio circuit using the AN/TRC-80B can be operated in either the nondiversity or diversity mode of operation. The choice of operating mode depends on circuit reliability requirements. For distances up to 160 km (100 miles), diversity operation increases circuit reliability to 99.9 percent.

a. *Nondiversity Operation.* When nondiversity operation is used, only one receiver and two synthesizers in each radio set are used. The preselector of the unused receiver converter must be detuned a minimum of 100 mc from the transmitter frequency. The unused synthesizer and receiver must be turned off. Refer to figure 23 and set up the switch panel as follows:

Item	Switch position
DEMULT-MULT-MOD SELECTOR switch S1.	LOCAL position.
LOCAL-REMOTE COM CONTROL SELECTOR switch S2.	CONTROL position.
Coaxial patch cable. (Use one cable only.)	Connect patch cables as shown in figure 23.

Note: In nondiversity operation, either receiver may be used. The selected receiver may be patched to either if. amplifier IF IN jack.

b. *Diversity Operation.*

(1) *General.* In diversity operation, one AN/TRC-80B is used at the battery site and two AN/TRC-80B's are used at the battalion terminal. The AN/TRC-80B at the battery site uses both receivers and the transmitter. At the battalion terminal, two receivers and two transmitters are used (one receiver in each radio set is not used). The two radio sets at the battalion terminal may be set up with either AN/TRC-80B in control ((3) and (4) below).

(2) *Battery terminal.* Operation of the radio set at the battery terminal requires the use of all units of the equipment within the AN/TRC-80B. Selector switches S1 and S2 are positioned as shown in figure 23. Coaxial patch cables are connected between the RECEIVER OUT jacks and the corresponding IF IN jacks.

(3) *Battalion terminal, pack 1 in control.* Figure 48 shows the coaxial patch cable connections and selector switches S1 and S2 correctly positioned when pack 1 functions as the control station and pack 2 is the slave station. Note that the output from RECEIVER OUT NO. 1 jack J8 in the slave station is cabled through REMOTE jack J12 and through the receiver interconnect coaxial cable to REMOTE jack J12 in the control station. At the control station the signal from the slave station is cabled to IF IN NO. 2 jack J11.

(4) *Battalion terminal, pack 2 in control.* Figure 49 shows the coaxial patch cable connections and selector switch (S1 and S2) positions of the switch panel with pack 2 functioning as the control station and pack 1 as the tie-slave station. The term *tie-slave* denotes that although the set functions as the slave station, the remote teletypewriter and telephone connections are tied to its power and signal entry panel. These connections are *not* changed when control is switched from one set to another. With pack 2 in control, the rf signals received by pack 1 are cabled through the REMOTE jacks of IF IN NO. 2 jack J11 in pack 2.

70. Communication Facilities

a. To activate the various communication circuits, the switches and controls on the control panel, switch panel, teletypewriter switch panel, and telegraph terminal are set in the positions described in paragraphs 71 through 74. When the indication listed for a particular procedure is not normal, refer to paragraphs 79 through 84. If no corrective measures are listed, or if the measures recommended do not restore normal operating conditions, higher echelon repair is required.

b. The procedures described in paragraphs 71 through 74 apply to both diversity and nondiversity operation. Refer to paragraph 18 for an explanation of the terminology used in these procedures.

71. Originating Calls

a. AN/TRC-80B Radio Circuit. To set up a combined speech and teletypewriter circuit between the AN/TRC-80B operating facilities and the distant AN/TRC-80, proceed as follows:

Step	Action	Fig. No.	Normal indication
1	Press control panel DISCRETE pushbutton	24	DISCRETE pushbutton illuminates green.
2	Press DISCRETE LINE SEL pushbutton	24	ARMY (lower) portion of pushbutton illuminates.
	Note: This permits DISCRETE line to be connected to army area net.		
3	Press COMMAND pushbutton	24	COMMAND pushbutton illuminates green.
4	Press VF TTY pushbutton	24	COMMAND (upper) portion of pushbutton illuminates.
5	Place telegraph terminal switches at NORM and 4W.	26	None.
6	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP.	25	None.
7	Place PTS-BY PASS switch to ON[a]	25	None.
8	Press control panel RING pushbutton. (This action signals distant AN/TRC-80 operator.)	24	RING pushbutton flashes white.
9	Push headset push-to-talk button to talk; release to listen.	..	Distant AN/TRC-80 operator's voice clearly audible.
10	Operate teletypewriter equipment	..	Teleprinter prints either transmit or receive copy.

a The programmer test station facility can be included in the radio teletypewriter receive circuit for monitoring purposes by placing the teletypewriter switch panel OPERATING MODE switch in the NORMAL DC LOOP position and the PTS-BY PASS switch in the OFF position.

b. Local Pts and Distant Pts Circuit. To set up a combined speech and teletypewriter circuit between the local pts facility and the distant pts (through the local and distant AN/TRC-80B facilities), operate the controls at *both* AN/TRC-80B's to the positions indicated below.

Step	Action	Fig. No.	Normal indication
1	Press DISCRETE LINE SEL pushbutton.	24	COMMAND (upper portion of pushbutton illuminates.
2	Press COMMAND pushbutton.	24	COMMAND (amber) light becomes brighter.
3	Press VF TTY pushbutton.	24	COMMAND (upper) portion of pushbutton illuminates.
4	Place telegraph terminal switches at NORM and 4W.	26	None.
5	Place teletypewriter switch panel OPERATING MODE switch at VF 2W/4W, and PTS-BY PASS switch at ON.	25	None.

b.1. Pts Radio Circuit. To set up a combined speech and teletypewriter circuit between the local pts facilities and the distant AN/TRC-80B (through the facilities of the local AN/TRC-80B), operate the controls at the local and distant AN/TRC-80B's as indicated below:

(1) *Local AN/TRC-80B control settings.* Operate the controls at the local AN/TRC-80B as indicated in *b* above.

(2) *Distant AN/TRC-80B control settings.* Operate the controls at the distant AN/TRC-80B as indicated below:

Step	Action	Fig. No.	Normal indication
1	Press DISCRETE LINE SEL pushbutton.	24	ARMY (lower) portion of pushbutton illuminates.
2	Press COMMAND pushbutton.	24	COMMAND (green) light becomes brighter.
3	Press VF TTY pushbutton.	24	COMMAND (upper) portion of pushbutton illuminates.
4	Place telegraph terminal switches at NORM and 4W.	26	None.
5	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP, and PTS-BY PASS switch at ON.	25	None.

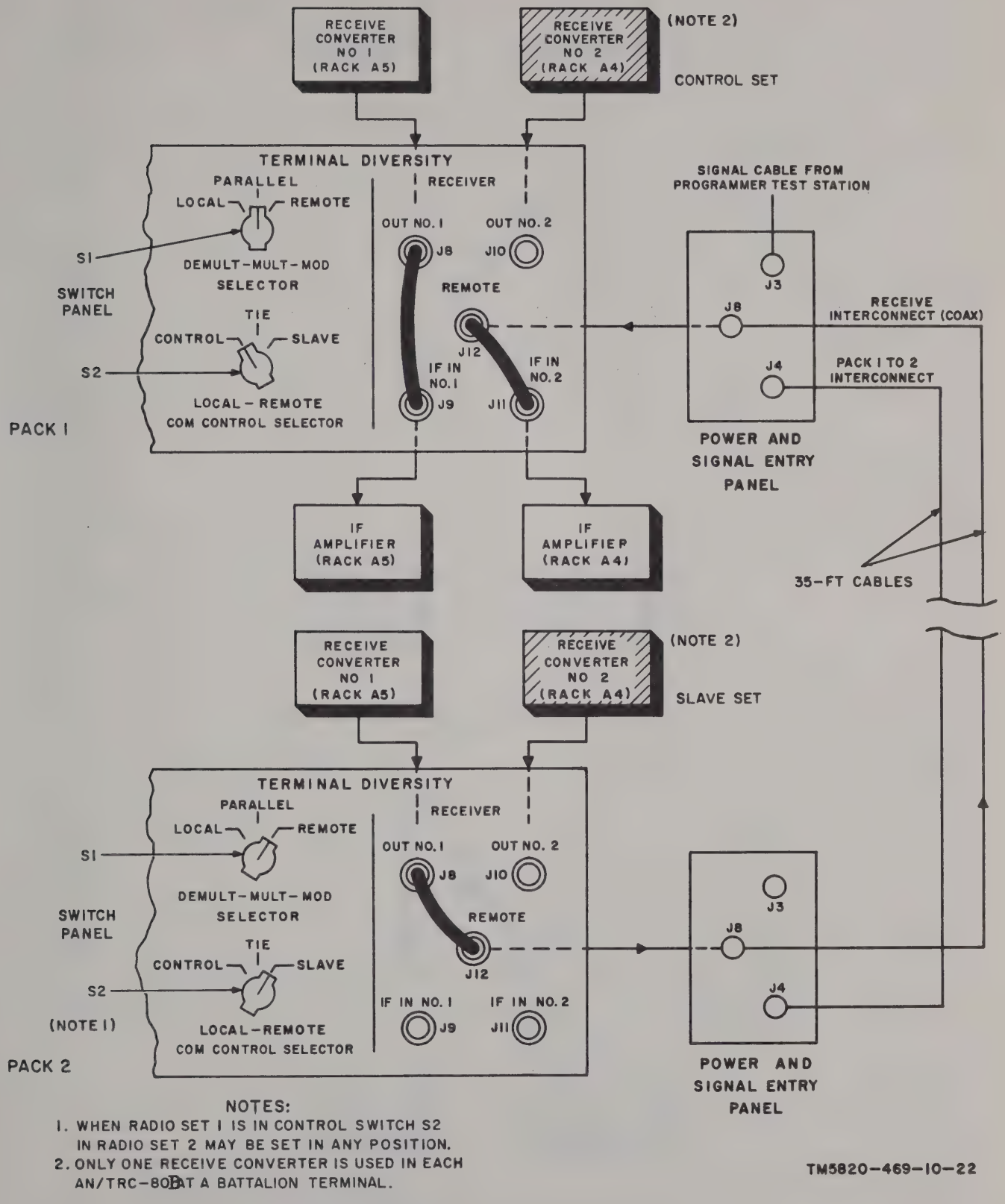
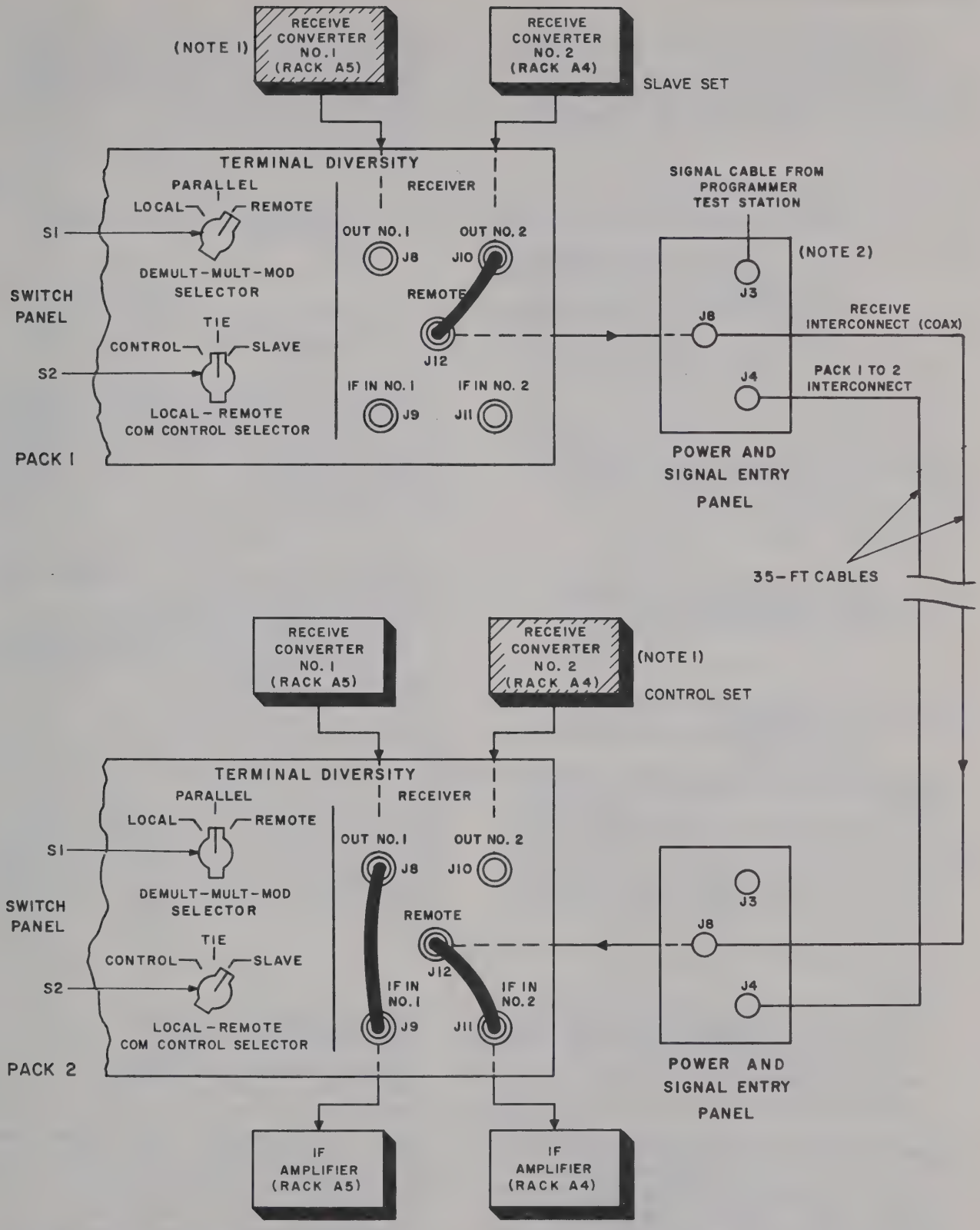


Figure 48. Battalion terminal switch panels, pack 1 in control.



NOTES:

1. ONLY ONE RECEIVE CONVERTER IS USED IN EACH AN/TRC-88B AT A BATTALION TERMINAL.
2. PTS SIGNAL CONNECTION TO J3 REMAINS UNCHANGED WHEN THE SET THAT WAS USED AS THE CONTROL STATION FUNCTIONS AS THE TIE-SLAVE STATION.

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Figure 49. Battalion terminal switch panels, pack 2 in control.

c. Dc Teletypewriter Circuit. To set up a three-party (army area net, pts, and local operator) dc tty circuit, operate the controls in the chart below to the position indicated. (The dc tty loop can be limited to just army and operator by placing the teletypewriter switch panel PTS-BY PASS switch in the ON position.)

Step	Action	Fig. No.	Normal indication
1	Press DC TTY pushbutton ----------	24	ARMY AND PTS (lower portion of pushbutton lights.
2	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP, and PTS-BY PASS switch at OFF.	25	None.
3	Place telegraph terminal switches at NORM and 4W.	26	None.

Note: Setting up the three-party dc tty circuit necessitates disruption of the radio teletypewriter operation.

d. Army Four-Wire-Two-Wire Vf Tty Circuit. To set up the army area net vf tty circuit, press the control panel VF TTY pushbutton, illuminating the ARMY (lower) portion of the pushbutton.

e. Army-Operator Telephone Circuit. To establish the telephone circuit between the army area net and the local operator, set the pushbuttons on the control panel (fig. 24) as follows:

Step	Action	Normal indication
1	Press DISCRETE LINE SEL pushbutton ---------	COMMAND (upper) portion of pushbutton lights.
2	Press ARMY pushbutton ----------	ARMY (green) light becomes brighter.
3	Press ARMY TELEPHONE pushbutton --------	Lamp lights on portion of pushbutton that corresponds to type of connections made at the power and signal entry panel (fig. 33). Normally this pushbutton is preset.
4	Press RING pushbutton. (This action signals the army operator.)	RING pushbutton flashes white.
5	Press headset push-to-talk button to talk; release to listen.	Army operator's voice clearly audible.

Note: The above circuit can be established at the same time the DISCRETE line is connected to the command radio.

f. Operator-Pts Speech Circuit. This circuit performs a function that is similar to the operator-pts intercom circuit described in *g* below. The circuit enables the pts and AN/TRC-80 operator to converse without disrupting any existing teletypewriter circuits. To set up the operator-pts speech circuit, set the pushbuttons on the control panel (fig. 24) as follows:

Step	Action	Normal indication
1	Press control panel DISCRETE pushbutton ------	DISCRETE pushbutton lights green.
2	Press RING pushbutton. (This action signals the pts operator.)	RING pushbutton flashes white.
3	Press headset push-to-talk button to talk; release to listen.	Pts operator's voice clearly audible.

g. Pts-Local Operator Intercom Circuit. To establish the pts intercom circuit, press the INTERCOM pushbutton on the control panel (fig. 24). The INTERCOM (green) light will become brighter, which indicates that the circuit is complete. Press the headset push-to-talk button to talk; release to listen.

Note: This intercom circuit does not interrupt the speech circuit between the pts discrete line and command radio, or between the pts and the army area net.

h. Vehicle Speech Circuit. To use this circuit, the vehicular-mounted radio set must be connected to connector J7 on the power and signal entry panel (fig. 33).

This circuit enables the AN/TRC-80B operator to communicate by radio with distant stations by use of the vehicular-mounted radio set. The AN/TRC-80B radio teletypewriter circuits are not affected when this circuit is in use. The speech circuits between the pts discrete line and command radio or the pts discrete line and army area net are not affected when this circuit is in use. To set up the circuit, proceed as follows:

Step	Action	Normal indication
1	Press VEHICLE pushbutton.	VEHICLE (GREEN) light becomes brighter.
2	Press VEHICLE MONITOR pushbutton.	VEHICLE MONITOR (white) light becomes brighter.
3	Press handset push-to-talk button to talk; release to listen.	Distant operator's voice is clearly audible in headset and over monitor speaker.

i. Spare Circuit. This two-wire circuit is wired to the SPARE binding posts on the power and signal entry panel (fig. 33) and the spare pins on PROGRAMMER TEST STATION J3. The use of this spare circuit will be determined by local requirements. The SPARE pushbutton on the control panel must be pressed when this circuit is to be used.

j. Telephone Terminal Circuits. These two-wire/four wire circuits are wired to the 2W or 4W SEND REC binding posts on the power and signal entry panel (fig. 33), LINE 1 through LINE 4. The use of these circuits will be determined by the local and distant telephone subscriber requirements. These circuits enable the local AN/TRC-80B telephone subscriber to communicate directly with the distant AN/TRC-80B telephone subscriber. These circuits do not affect, nor are they affected by other AN/TRC-80B circuits.

72. Answering Calls (fig. 24)

a. General. Incoming calls can originate at the distant AN/TRC-80B (COMMAND), army area net (ARMY), programmer test station (DISCRETE), programmer test station (INTERCOM), and vehicle radio circuit (VEHICLE). Incoming calls from the vehicle radio circuit or pts intercom circuit are by voice call if the associated MONITOR pushbutton is operated. Incoming calls from the army, the pts DISCRETE line circuit, or from the distant AN/TRC-80B result in flashing of the associated pushbutton and an audible 1,600-cps signal in the monitor loudspeaker.

b. Answering Calls. To answer a call, proceed as follows:

(1) Press the control panel pushbutton (INTERCOM, VEHICLE, ARMY, COMMAND, or DISCRETE) indicated by a flashing pushbutton or a voice call.

(2) Press the headset press-to-talk button to talk; release to listen.

73. Monitoring Facilities

The AN/TRC-80B operator can monitor received speech on the INTERCOM, VEHICLE, ARMY, or DISCRETE circuits by depressing the associated MONITOR pushbuttons. The monitored speech is heard in the monitor loudspeaker. Any one circuit, or a combination of circuits, may be monitored simultaneously.

74. Supplementary Operational Procedures

a. To illustrate the procedure required when a caller is requesting a particular circuit, the following conditions are assumed to exist when army calls to require that the three-party dc tty circuit be established:

(1) Pts has control of the AN/TRC-80B radio circuits.

(2) The DISCRETE pushbutton is illuminated amber.

(3) The COMMAND portion of the DISCRETE LINE SEL pushbutton is illuminated amber.

(4) The COMMAND pushbutton is illuminated amber.

(5) The COMMAND portion of the VF TTY pushbutton is illuminated white.

(6) The teletypewriter switch panel OPERATING MODE switch is in the VF 2W/4W position, and the PTS-BY PASS switch is in the ON position.

(7) The telegraph terminal switches are in the NORM and 4W positions.

b. When a call is received from army, the ARMY pushbutton flashes and the 1,600-cps ring tone is heard in the loudspeaker. The AN/TRC-80B operator must answer the call as follows:

Step	Action	Normal indication
1	Press ARMY pushbutton ----------	ARMY (green) light becomes brighter. Flashing stops. Ring tone stops.
2	Press ARMY TELEPHONE pushbutton --------	Lamp lights on portion of pushbutton that corresponds to type of connections made at the power and signal entry panel (fig. 33). Normally this button is preset.
3	Press headset press-to-talk button to talk; release to listen.	Army operator's voice clearly audible.

c. To set up the requested three-party dc tty circuit, the AN/TRC-80B should proceed as follows:

Step	Action	Normal indication
1	Press INTERCOM pushbutton ----------	INTERCOM (green) light becomes brighter.
2	Inform pts operator of army's request ---------	None.
3	Pts operator informs distant AN/TRC-80B operator that tty circuit is to be interrupted.	None.
4	Press DISCRETE MONITOR pushbutton to monitor pts conversation. When arrangements are firm, proceed to step 5.	DISCRETE MONITOR (white) light becomes brighter.
5	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP and PTS-BY PASS switch at OFF.	None.
6	Operate tty equipment ----------	Teleprinter prints either receive or transmit copy.

d. The control panel is equipped with a teletypewriter priority circuit that automatically switches the teletypewriter printer to the incoming radio teletypewriter signals when the local printer is being used to monitor transmitted radio teletypewriter signals. This circuit feature is inoperative when a dc tty circuit is operating.

e. No special instructions are required for operation of the heater-air conditioner (fig. 34). The function of the operating controls is listed in paragraph 49. Adjust the controls for the most comfortable operating temperature.

75. Stopping Procedures

a. Standby. To place the radio set in standby, press the BEAM OFF pushbutton on the power amplifier control panel (fig. 54).

b. Normal Stopping Procedure. When the radio set is to be off the air for only a few hours, perform steps (1) through (7) only. When the equipment will remain turned off for an indefinite period perform the complete stopping procedure.

(1) Inform distant station that turn off will be commencing.

(2) Press the BEAM OFF switch on the pa control panel.

(3) Set the LOAD CONTROL switch on engine generator control panel to OFF.

(4) Pull the engine generator THROTTLE control completely out to bring the engine generator to idle speed.

(5) Climb to shelter roof and stow antenna (para 76).

(6) Rotate the OFF-ON-START switch on the engine generator starting panel to the OFF position.

(7) Place all circuit breakers on the power amplifier and the circuit breaker panel to OFF. Set all power and light switches on the switch panel to OFF.

Note: If the frequency of operation is to be changed before the radio set is turned on again, place all the individual power switches on the i.f. power supplies, the converter power supplies, and the three synthesizers, to the OFF positions.

(8) Close pa air vents and disconnect ground cables.

(9) Secure teletypewriter table, operator's chair and all loose items in the operator's compartment.

(10) Push engine generator into compartment, stow fuel lines, secure rail locking pins, and close engine generator compartment door.

(11) Disconnect all cables and wires attached to connectors on the power and signal entry panel.

(12) Remove ladder from shelter and stow.

(13) Strap flexible waveguides to floor in operator's compartment.

(14) Close operator compartment door.

(15) Inspect shelter and surroundings.

c. Emergency Stopping Procedure.

(1) Place the MAIN BREAKER on the circuit breaker panel (fig. 32) in the OFF position.

(2) Place the EMERGENCY ENGINE SHUTDOWN switch on the engine generator control panel (fig. 22) in the STOP position.

76. Antenna Stowage

The antenna is placed in its stowed position whenever the AN/TRC-80B is to be completely turned off. The stowage procedure includes positioning the antenna (*a* below) before performing the antenna stowage procedure (*b* below).

a. Positioning.

(1) Rotate the antenna to line up the azimuth pointer with the 0 mil indication.

(2) Adjust the elevation crank until the antenna base is parallel to the shelter roof.

b. Stowage Procedure (fig. 50).

(1) Place the HIGH PRESSURE compressor switch and the LOW PRESSURE blower switch at the OFF positions.

(2) Turn the DUMP VALVE control counterclockwise to release air from the support ring and open the heating ducts to release air from the antenna bag (fig. 44).

(3) Remove the waveguides, feedhorn, and sighting device from the antenna assembly and place them on the shelter roof. Be sure to replace all waveguide and feedhorn covers.

(4) As the support ring collapses, guide it down so that it hangs between the reflector and the cover (A, fig. 50).

(5) Turn the air release valve (fig. 42) located on top of the antenna bag, to the open position.

(6) Disengage the locking pin on the lower section of the left support arm from the platform and allow the support arm to fold inward.

(7) Disengage the locking pins attaching the support tube to the left support arm.

(8) Lay the left support arm back to rest on the lower hinge.

(9) Adapt the procedures given in (6) through (8) above for the right support arm.

(10) Position the antenna as shown in A, figure 50.

(11) Lay all of the antenna bag material toward one support arm and start folding the support section on the platform between the support arms, making the first fold at the edge of the inner hole (near the center of the platform) (B, fig. 50).

(12) Move the second fold to position the lower section locking pin at the inner hole. Press the locking pin down into the hole.

(13) Make the third fold to position the center section locking pin at the outer hole and place the locking pin down into the hole.

(14) Make a fourth fold to place the top locking pin on the lower section of the support arm. Position this pin so that it *faces upward* (B, fig. 50).

(15) Repeat this folding procedure for the other side.

(16) Fold down the top sections of the support arms and strap them to the center sections.
(17) Disengage the locking pins of the lower sections from the center sections, and fold the center sections down against the lower section.
(18) Fold down the right folded support arm (facing the antenna from front of the shelter) on top of the antenna. Be careful not to pinch the material at the hinge (C, fig. 50). Lean or kneel on the arm to squeeze remaining air out of the support tube.
(19) Roll the cover side of the antenna into a *tight* roll and place the roll behind the elevation adjusting screw (D, fig. 50).

Caution: **Lift the support while placing this roll in position. Make sure that the antenna feedhorn connector is flat and is parallel with the shelter roof.**

(20) Roll the reflector side of the antenna carefully in loose folds to approximately a 6-inch diameter and place the roll against the support arm. Position the roll on top of the motor and compressor.
(21) Press down on the support arm to squeeze out all air. *Be careful not to pinch or jam the fabric.*
(22) Fold the left support arm down on top of the right support arm.
(23) Fasten the three tiedown straps on top of the support arms.
(24) Turn the four antenna platform locking handles to UNLOCK.

Caution: **Check to see that the fine azimuth adjust crank inside the shelter is in the retracted position.**

(25) Lower the antenna platform by turning the crank counterclockwise.

Caution: **Check that the bag and support arm are clear of the antenna compartment walls while lowering the platform.**

(26) After the antenna platform has been lowered into the antenna compartment, turn the four antenna platform locking handles to LOCK and replace the crank in its mounting clips.
(27) Release the three straps, place the feedhorn into the antenna compartment, and clamp it in place on top of the antenna support arms.
(28) Fasten the three straps.
(29) Raise the antenna compartment cover and release the spring-loaded latch buttons.
(30) Close and lock the compartment cover.
(31) Store the flexible waveguides and the sighting device inside the operator's compartment.

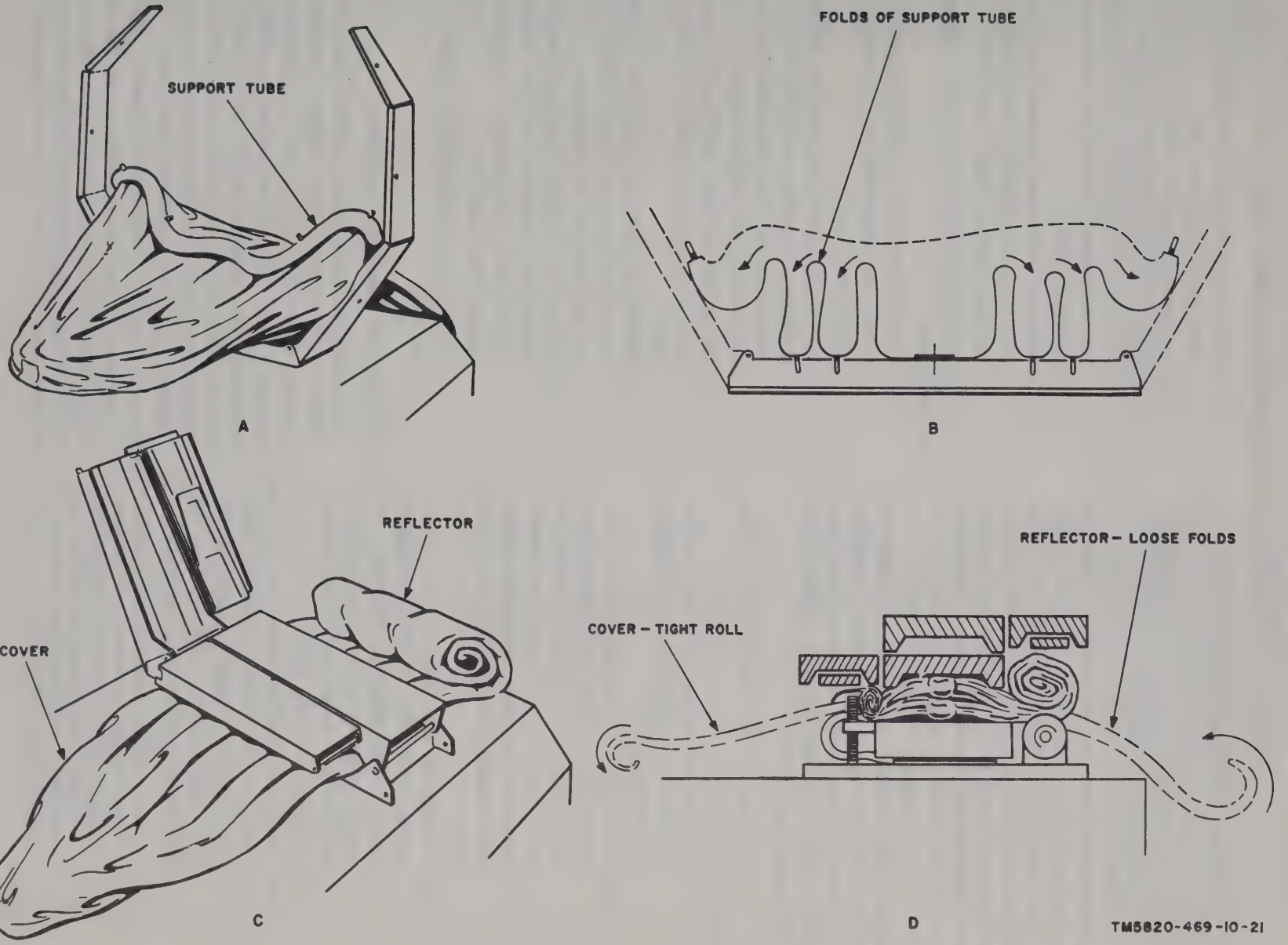


Figure 50. Antenna folding procedure.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

77. Operation Over Line-of-Sight Paths

When the line-of-sight path between two AN/TRC-80B sites is 50 kilometers (30 miles) or less, line-of-sight communication instead of troposcatter should be used. This mode of communication can be achieved by applying the output of the transmit converter direct to the antenna (*a* below), thereby bypassing the power amplifier. Line-of-sight communication can also be achieved by operating the complete transmitter without the use of the antenna bag. The feedhorn is then pointed in the direction of the distant station (*b* below). Although either method will provide satisfactory line-of-sight operation, the method described in *a* below is preferable because of the power saving achieved by not using the klystron tube in the power amplifier.

a. Line-of-Sight Operation Without Using Power Amplifier.

(1) Perform the normal antenna erection procedures described in paragraph 57*a* through *ah*.

(2) Connect the waveguide-coaxial cable adapter (fig. 3) to the XMTR ANT CONNECT jack (fig. 12) located on the shelter roof. Orient the coaxial connector on the waveguide-coaxial cable adapter toward the front of the shelter.

(3) Remove the connector cap from the coaxial connector on the waveguide-coaxial cable adapter. Connect the coaxial pendant cable (located adjacent to the waveguide) to the coaxial connector on the adapter.

(4) Connect a flexible waveguide to the horizontal or vertical (marked H or V (fig. 45)) feedhorn (see note below). Connect the other end of the flexible waveguide to the adapter.

Note. If the transmitting waveguide is connected to the vertical (V) feedhorn, the transmitting waveguide of the AN/TRC-80B at the distant end of the communication circuit *must be* connected to the horizontal (H) feedhorn.

(5) Perform the procedures described in paragraph 57 *aj* and *ak*.

(6) Disconnect plug P2 from jack J3 on top of the power amplifier cabinet.

(7) Connect plug P2 to jack J35 located on the bulkhead, above the power amplifier cabinet.

(8) Perform the normal transmitter turn-on procedure (para. 65 and 66*a*). Do not turn on the power amplifier.

b. Line-of-Sight Operation Without Using Antenna bag.

(1) Perform the normal antenna erection procedures described in paragraph 57*a* through *p*.

(2) Unfold and latch in place the bottom and center sections of both antenna support arms. Do not unfold the top sections of the support arms.

(3) Mount the feedhorn and feedhorn support struts to the antenna support arms.

(4) Rotate the antenna platform until the feedhorn points *direct toward* the desired path of transmission.

(5) Connect the flexible waveguides between the feedhorn and the shelter transmitter and receiver connectors (paras. 57*ai* and *aj*).

(6) Turn on the transmitter (paras. 65 and 66).

78. Extreme Weather Conditions

a. Operation of Equipment Under Low Temperature Conditions. When ambient temperatures are from —25° F. to —65° F., the engine generator must be warmed before operating. A winterization system supplied with the engine generator (not part of the AN/TRC-80B consists of a metal air distribution chamber, a canvas cover, and a flexible heat duct. The source of heat is a 150,000 BTU heater. Specific instructions for the operation and maintenance of the winterization kit will be contained in the manuals packed with the kit. The procedures given in (1) and (2) below prepare the

the power amplifier klystron drawer.

(c) Close both outside power amplifier air vents.

Warning

When the power amplifier is operated with the outside vent doors closed, the fresh air intake on the air conditioner must remain fully open.

b. Operation in High Winds. The Antenna can be assembled, disassembled, and operated in winds up to 40 mph and gusts up to 60 mph. Erecting or stowing the antenna when the wind velocity exceeds a sustained 40 mph may cause damage to the antenna and injury to personnel.

CHAPTER 5

MAINTENANCE INSTRUCTIONS

79. Scope of Operator's Maintenance

The following maintenance duties are normally performed by the operator of the AN/TRC–80B. These procedures do not require special tools or test equipment.

a. Preventive maintenance (para 80).
b. Cleaning (para 81).
c. Operational checks (para 82).
d. Fuse replacement (para 83).
e. Lamp replacement (para 84).

80. Preventive Maintenance

Preventive maintenance is the systematic care, servicing and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in *c* below and in paragraphs 81 and 82 cover systematic care essential to proper upkeep and operation of the equipment. The cleaning operations (para 81) should be performed once a day. If the equipment is not used daily, however, the cleaning operations must be performed before operation after any extended shutdown, or once a week while the equipment is kept in standby condition. The other items should be checked daily if the equipment is in continuous operation or whenever the equipment is placed in operation after a shutdown.

b. Maintenance Service and Inspection. The maintenance service and inspection chart (*c* below) outlines inspections to be made daily. These inspections and the operational checks (para 82) are made to determine combat serviceability. The chart indicates what to inspect, how to inspect, and what the normal conditions are; the *Reference* column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these inspections must be made in accordance with TM 38–750.

c. Maintenance Service and Inspection Chart. The items listed below should be checked on a daily basis. The equipment must be reinspected and serviced immediately before going on a mission and as soon after completion of the mission as possible.

Item No.	Procedure		References
	Item	Normal condition or result	
1	AN/TRC–80B: Inspect the equipment.	Equipment must be complete (app. II), clean, and installed for operation.	Paras 19 through 24, 81, and app. II.
10	CONNECTIONS: Check fuel line connections. All connections to power and signal entry panel.	Connections to engine generator and fuel line correctly made. Connections to remote facilities and army area net correct for type of operation used.	Para 24.
11	KNOBS, DIALS, SWITCHES: Check for proper mechanical action by setting each control to each of its possible settings. *Note.* Do not rotate tuning controls if these controls are preset for operation at a specific frequency.	Action is positive without backlash or scraping.	Paars 26 through 52.

Item No.	Procedure		References
	Item	Normal condition or result	
13	ENGINE GENERATOR: Turn on engine generator.	OIL PRESSURE light is out on starting panel. All meter indications on engine generator control panel normal.	Para 55*a* and *b*.
14	POWER and LIGHTS: Turn on all lighting and power switches.	Circuit breakers do not trip, hut lights come on, filament and B+ indicators remain on.	Para 56.
Note. Antenna must be erected and inflated before the next step is performed. Refer to paragraph 57 for antenna erection and inflation procedures.			
15	OPERATIONAL PRESET, RECEIVER: Set controls as indicated in chart in para 62.	All controls must set properly	Para 62.
16	OPERATIONAL PRESET, TRANSMITTER: Set controls as indicated in chart in para 65.	All controls must set properly	Para 65.
17	RECEIVER TUNING: Set controls for desired operating frequency.	All indications normal	Paras 63 and 64.
18	TRANSMITTER TUNING: Set controls for desired operating frequency.	All indications normal	Para 66.
19	OPERATIONAL CHECK: Check equipment with rack-mounted monitor.	All indications normal	Para 82.

81. Cleaning

Inspect the radio equipment in the operator's compartment, the engine generator compartment, and the antenna compartment. The equipment should be clean, free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth. If necessary, wet the cloth with cleaning compound (Fed stock No. 7930-395-9542) and wipe the parts; then wipe with a dry cloth.

Warning

Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation.

b. Remove dust or dirt from plugs, jacks, and connectors with a brush.

Caution

Do not press on the meter faces (glass) when cleaning; the meter may be damaged.

c. Clean the front panels, meters, and control knobs; use a soft clean cloth. If difficulty in removing dirt occurs, dampen the cloth with water; mild soap may be used to make the cleaning more effective.

d. Inspect the flexible waveguides and connectors for dirt or sand.

Caution

Do *not* polish gold- or silver-plated waveguides or connectors.

82. Operation Checks

a. General. The operator of the AN/TRC-80B will be able to determine quickly if the equipment is not operating normally by following the procedure detailed in *c* below. This checklist supplements the starting procedures (paras 53 through 59) and the tuning operation (paras 62 through 66) where normal indications are listed for each step. When abnormal indications are obtained, refer to the operator's repair procedures (paras 83 and 84). Before performing the checklist (*c* below), inspect the following:

(1) Indicator-type fuses (para 83*c*). A blown fuse is indicated if the fuse holder is illuminated.

(2) Front panel indicators (para 84*c*) for proper condition (illuminated or extinguished).

(3) Antenna bag for proper inflation. If tears or cuts are observed notify higher category of maintenance personnel.

Warning

Turn off power to check (4) and (5) below.

(4) Nonindicating-type fuses (para 83*c*).

(5) Fuel supply.

b. Use of Monitor (fig. 19). The monitor is used to check equipment operation by observing the meter indications with meter selector switch S2 in the various positions. (Switch S1 on the monitor is always set in position A.) *By becoming familiar with the meter indications when equipment operation is normal,* the monitor meter indications can be used to assist the operator in determining the cause of abnormal operation. *For example;* during normal operation, the meter needle fluctuates when switch S2 is in position D and speech is being received over the radio circuit. Feeble fluctuations of the meter needle indicate poor receiver operation or poor transmitter operation in the AN/TRC–80B at the other end of the circuit. Similarly, feeble fluctuations of the meter needle with switch S2 in position A, indicate improper operation of the modulator-multiplier. The chart in *c* below provides a quick check of equipment operation.

c. Checklist. Set monitor switch S1 in position A. Set switch S2 in the positions listed below and observe the meter indications. If the corrective measures do not restore normal operation, or if no corrective measure is listed, higher echelon maintenance is required.

Step	Switch S2 position	Normal indication	Corrective measure
1	A	Meter needle fluctuates when talking into microphone-headset. When not talking, but radio tty signals are being transmitted, meter indication is approximately 20-meter dial divisions.	Check connection to control panel Check switch panel and tty equipment switch positions.
2	B	Same as step 1	Same as step 1.
3	C	Same as step 1	Same as step 1.
4	D	Meter needle fluctuates when distant AN/TRC–80B is transmitting speech. When just tty signal is being received, meter indication is approximately 20.	Check receiver tuning (para 62 and 63). Ask distant AN/TRC–80B to check transmitter operation.
5	E	Meter needle fluctuates when distant terminal is transmitting voice over any channel of the telephone terminal.	
6	F	Meter needle fluctuates during voice transmission over any channel of the telephone terminal.	
7	G	When transmitting tty only, meter needle fluctuates near SET POINT.	
8	H	When receiving tty, meter needle fluctuates slightly above and below SET POINT.	

83. Fuse Replacement

a. General. All fuses, except those associated with the output circuit of the 200-volt power supply assemblies and the telegraph terminal fuse, have blown-fuse indicator lamps that light when a fuse blows. All fuses are cartridge type and are accessible from the front of the equipment. The fuses are mounted on the unit control panels or on the chassis under the dust covers. On some units, spare fuses are mounted in clips alongside the associated fuses. Other spare fuses are mounted in clips on the fuseholder attached to the left side of the storage box above the power amplifier cabinet. Other spare fuses are stored in the storage box above the power amplifier cabinet. Always replace a blown fuse with an identically rated spare. Some fuse values come in standard and time-lag type. Do not interchange standard-type fuses with time-lag fuses of the same value.

b. Replacing Fuses.

Warning

Never replace a fuse with the equipment power *on*.

(1) Press in the fuse holder cover and turn counterclockwise to unlock.

(2) Pull out the cover; the fuse will come with it.

(3) Remove the defective fuse and insert

a new fuse in the cover.

(4) Replace the fuse cover by pressing inward and turning it clockwise.

c. Fuses Replaced by Operator.

(1) *Synthesizer* (fig. 27).

Panel marking	Fuse rate	Function
None	125 volt, 1.5 amp	Protects power supply transformer and power supply circuits.

(2) *IF power supply* (fig. 29).

Panel marking	Fuse rating	Function
F1 5A	250 volt, 5 amp	Protects 6.3-volt filament circuits.
F2 5A	250 volt, 5 amp	Protects 200-volt power supplies A1, A2 and A3.
F3 ¾A	250 volt, ¾ amp, time-lag	Protects 6.3-volt ac filament supply.
F4 1A	250 volt, 1 amp	Protects 200-volt power supply A1.
F5 1A	25 volt, 1 amp	Protects 200-volt power supply A2.
F6 1A	250 volt, 1 amp	Protects 200 volt power supply A3.
F7 ½A	250 volt, ½ amp, time-lag	Protects 6.3-volt dc filament supply.
F8 ¼A	250 volt, ¼ amp (nonindicating).	Protects 200-volt power supply A1 from short circuits in load.
F9 ¼A	250 volt, ¼ amp (nonindicating).	Protects 200-volt power supply A2 from short circuits in load.
F10 ¼A	250 volt, ¼ amp (nonindicating).	Protects 200-volt power supply A3 from short circuits in load.

(3) *Converter power supply* (fig. 30).

Panel marking	Fuse rating	Function
F1 1 AMP	250 volt, 1 amp	Protects power supply transformer and circuit from current overload.

(3.1) *Mux power supply* (fig. 30.1).

Panel marking	Fuse rating	Function
F1 3 AMP	250 volt, 3 amp	Protects power and supply circuit from current overload.

(4) *Modulator-multiplier* (fig. 20).

Panel marking	Fuse rating	Function
F1 ½ AMP FILAMENT	250 volt, ½ amp, time-lag	Protects filament and crystal oven circuits.
F2 1 AMP B+	250 volt, 1 amp	Protects 200-volt power supply.
F3 ¼ AMP PWR SUPPLY	250 volt, ¼ amp, (nonindicating)	Protects 200-volt power supply from short circuits in load.

(5) *Multiplexer* (fig. 21). The multiplexer panel contains two fuses. Fuse F1 1A is a 250-volt, 1-ampere fuse that protects the filament circuit. Fuse F2 ½A is a 250-volt, ½-ampere fuse that protects the power supply circuit.

(6) *Monitor* (fig. 19). The monitor front panel contains one fuse. Fuse F1 1 AMP is a 250-volt, 1-ampere fuse that protects the filament and power supply circuits.

(7) *Switch panel* (fig. 23). The switch panel contains two fuses. The 28V DC 3 AMP fuse is a 125-volt, 3-ampere, time-lag-type that protects the 28-volt circuit. The FLUSHING BLOWER .125 AMP fuse is a 250-volt, ⅛-ampere fuse that protects the flushing blower.

(8) *Blower* (fig. 31).

Panel marking	Fuse rating	Function
F1 1 AMP	250 volt, 1 amp, time-lag	Protects air pressure switch and relay.
F2 1.5 AMP	125 volt, 1½ amp, time-lag	Protects blower motor.
F3 .125 AMP	250 volt, ⅛ amp	Protects air failure indicator circuit.

(9) *Control panel* (fig. 24).

Panel marking	Fuse rating	Function
F1 ½ AMP	250 volt, ½ amp	Protects transistorized supply circuit.
F2 3 AMP	250 volt, 3 amp	Protects relay supply circuit.
F3 3 AMP	125 volt, 3 amp, time-lag	Protects power supply circuit.

(10) *Teletypewriter switch panel* (fig. 25). The teletypewriter switch panel contains one fuse only. The 3 AMPS fuse is a 125-volt, 3-ampere, time-lag-type that protects the lighting circuit.

(1) *Telegraph terminal* (fig. 26). The telegraph terminal contains only one fuse. The 1.5 AMP fuse is a 250-volt, 1½-ampere fuse that protects the power supply and filament circuit.

(11.1) *Telegraph Terminal TH–22/TG* (fig. 26.1). The TH–22/TG has two fuses. The 115/230 vac ¼A fuse which protects the parts in the TH–22/TG from overload during 115- or 230-vac operation, and the 26-vdc 2 AMP fuse which protects the parts during 26-vdc operation.

(12) *Power amplifier* (fig. 54). The power amplifier contains two fuses. The F101 2 AMP is a 250-volt, 2-ampere fuse that protects the power supply. The F102 ¾ AMP is a 250-volt ¾-ampere, time-lag fuse that protects the filament circuit.

(13) *Transmit converter* (fig. 52).

Panel marking	Fuse rating	Function
F1 1 AMP	250 volt, 1 amp	Protects filament circuit.
F3 3 AMP	250 volt, 3 amp	Protects traveling wave tube power supply.

(14) *Circuit breaker panel* (fig. 32).

Panel marking	Fuse rating	Function
F1–1A	250 volt, 1 amp time-lag type	Protects 28-volt dc power supply circuit.

(15) *Phase lamp panel* (fig. 32.1).

Panel marking	Fuse rating	Function
¼ AMP (3 each)	250 volt, ¼ amp	Protects 3-phase power to PHASE lamp panel.

(16) *Telephone Terminal TA–833/TRC* (fig. 30.1).

Panel marking	Fuse rating	Function
FUSE ALARM (POWER REG).	250 volt, 3 amp	Protects telephone terminal from overload.
FUSE ALARM (OSCILLATOR).	250 volt, ¾ amp	Protects oscillator circuits.

84. Lamp Replacement

a. Replacing Indicator Lamps. All lamps in the radio set, whether of the neon or filament type, have identical base and envelope size. To replace an indicator lamp, the lens assembly is screwed out of the holder by a counterclockwise (ccw) rotation. The lamp is held in place by a pressure fit. To remove the lamp from the lens assembly, grasp the base with the fingernails and pull the lamp clear.

b. Replacing Control Panel Lamps (fig. 51). To replace the pushbutton switch indicator lamps in the control panel, proceed as follows:

(1) Pull out the lamp assembly until resistance is felt; use the fingernail grooves in the sides of the lens.

(2) Rotate the lamp assembly 90° in either direction.

(3) Push in slightly to allow the locking pin to retract.

(4) Remove the assembly.

(5) Grasp the lamp base with the fingernails and pull the lamp clear of the socket.

(6) Insert the new lamp; make sure it is firmly seated in the friction socket.

(7) Insert the lamp assembly in the lamp housing; make sure that the slot is on the same side as the key in the housing.

(8) Push the lamp assembly in until resistance is felt.

(9) Rotate the lens 90° so that the lens legend is correctly positioned.

(10) Push the lamp assembly in until it seats properly in the lamp housing.

c. Lamps Replaced by Operator. With the exception of the control panel pushbutton switch lamps, all indicator lamps are type NE–2D neon. The pushbutton switch lamps are filament-type lamps, type 327. All lamp replacement is performed by the operator. The illuminated condition is normal for all indicator lamps except those listed below:

Note

The synthesizer OVEN indicators are illuminated intermittently as the oven thermostats respond to changes in oven temperature.

(1) AIR FAILURE indicators on switch panel.

(2) Engine-generator starting panel EMERGENCY SWITCH ON indicator.

(3) Engine-generator starting panel OIL PRESSURE indicator.

(4) The following indicators on the engine-generator control panel:

(a) HEAD TEMPERATURE.
(b) OIL PRESSURE.
(c) OVER FREQUENCY.
(d) UNDER FREQUENCY.
(e) OVER VOLTAGE.
(f) UNDER VOLTAGE.
(g) BATTLE SHORT.

(5) Power amplifier ALARM indicator.

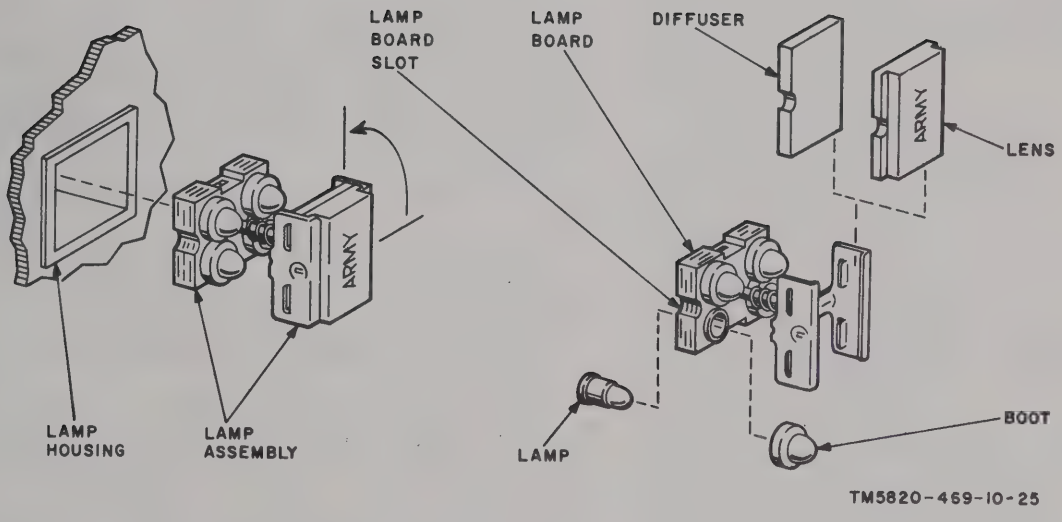


Figure 51. Lamp assembly, exploded view.

CHAPTER 6
PREPARATION OF EQUIPMENT FOR SHIPMENT AND DEMOLITION TO PREVENT ENEMY USE

Section I. PREPARATION OF EQUIPMENT FOR SHIPMENT

85. General

The AN/TRC–80B is normally shipped as a complete unit and may be transported by air, rail, or motor vehicle. The preparations for local shipment and limited storage are the same. For oversea shipment, detailed instructions are contained in Specification JAN–P–100. The following instructions are concerned with shipping the AN/TRC–80–B to a new location or leaving the radio set unused for a short period of time.

86. Preparation of Shelter for Relocation

a. Perform the normal stopping and antenna stowing procedures listed in paragraphs 75 and 76.

b. Check that all loose items are securely strapped in place (operator's chair, flexible waveguides, etc).

c. Check that the four lifting eyes are mounted on *top* of the shelter (para 25).

Warning

Never attempt to lift the shelter with the lifting eyes mounted in the tiedown sockets (fig. 2).

d. Close the fresh air intake in the rear of shelter.

e. Close the ventilator in the operator's compartment door.

f. Remove all bulkhead drain plugs.

87. Handling, Storage, and Disposal of Radioactive Material

Follow the procedures for safe handling, storage, and disposal of radioactive materials as directed by TB SIG 750–237 and AR 755–15.

88. Lifting and Loading AN/TRC–80B

The procedure below is primarily concerned with lifting and transporting the AN/TRC–80B by truck. For truck transportation, observe the procedures given in *a* through *j* below. If the AN/TRC–80B is to be airlifted, the procedures in *a* through *d* are applicable. Refer to figure 2 for the location of tiedown eyes and lifting eyes.

a. Obtain a sling assembly with four cables attached to a central lifting ring.

b. Place the sling assembly on top of the shelter.

c. Connect the four sling hooks to the four lifting eyes.

Warning

Never lift the shelter with the lifting eyes mounted in the tiedown sockets (fig. 2).

d. Place the lifting ring over the hook of the 5-ton wrecker or helicopter hoist.

e. Connect tag lines to both of the lower tiedown eyes located at the front of the shelter. The tag lines should be at least 15 feet long and are used to guide the shelter onto the truck bed.

f. Clear the truck bed of any articles before the shelter is lifted over or onto the truck. Lower the truck tailgate.

Warning

To avoid injury to personnel, only those actually engaged in the loading should be near the truck when the shelter is suspended by the sling assembly.

g. Slowly lift the shelter from the ground to a position high enough to clear the body of the truck.

h. Back the truck into position under the suspended shelter.

i. With a man positioned at each tag line at enough distance to clear the shelter, lower and

guide the shelter on the truck bed. The shelter must be oriented so that the shelter entrance door is at the rear of the truck and the rear of the shelter is up against the front of the truck bed.

j. Disconnect the lifting ring from the hoist hook. Remove the sling hooks from the shelter lifting eyes and the tag lines from the tiedown eyes.

k. Secure the shelter with heavy rope or cable attached to the tiedown eyes and the truck body.

l. Raise and fasten the truck tailgate.

Note

These instructions are specifically for loading the shelter on a 6 by 6 truck. When other vehicles are used for transportation, adapt these instructions accordingly.

Section II. DEMOLITION OF EQUIPMENT TO PREVENT ENEMY USE

89. Authority for Demolition

The demolition procedures given in paragraph 91 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

90. Destruction Plan

If a destruction plan is not provided by higher authority, one should be prepared by the organization using the equipment. In this plan, personnel should be assigned specific destruction tasks, but all personnel in the using organization should be familiar with all aspects of the complete destruction plan. The plan must be adequate and easily carried out in the field and must provide for as complete a destruction as available time, equipment, and personnel will permit. Because the time required for complete destruction may not always be available, the destruction plan must establish priorities so that essential parts of the equipments will be destroyed in the order of their importance. Systematic destruction of the same important units of equipment of a given type will prevent the enemy from learning the important features of the equipment or assembling a complete equipment by cannibalization of partially destroyed equipments. Adequate destruction of some units of the equipment should always be accomplished rather than partial destruction of all units. Which of the methods of destruction listed in paragraph 91 is to be used depends on the time available for destruction.

91. Methods of Destruction

a. Destruction Priority. Any or all methods of destruction given in *b* through *f* below may be used. The time available will be the major determining factor for the method to be used. When time prevents complete destruction, establish the following priority for equipment destruction:

(1) All front panel metering.
(2) Klystron drawer in power amplifier.
(3) Flexible waveguides and circulator.
(4) Synthesizers (all three units).
(5) Traveling wave tube in transmit converter.
(6) Control panel.
(7) Remaining equipment.

b. Smash. Smash the control panels of all equipment of the radio set; use sledges, axes, hammers, crowbars, and other heavy tools available. Smash the tuning indicators, meters, controls, and connectors; use the heaviest tool on hand if time does not permit removing rack-mounted equipment.

c. Cut. Cut engine-generator power cables, flexible waveguides, antenna bag, and wiring, cut all cables in a number of places. Use axes, machettes, and similar tools.

d. Burn. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrowers, or similar tools. Burn the instruction literature first. Pour gasoline on the cut cables and internal shelter wiring and ignite it. Use a flamethrower to burn minor components and spare parts. Use incendiary grenades to complete the destruction of the shelter interior.

Warning

Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

e. Explode. Use explosives to complete demolition or to cause maximum destruction when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Most effective location is against the two receive converters. Incendiary grenades usually are most effective if destruction of small parts and wiring is desired.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

APPENDIX I

REFERENCES

Following is a list of applicable references that are available to the operator of Radio Terminal Set AN/TRC-80B.

AR 700-52	Licensing and Control of Sources of Ionizing Radiation.
AR 755-15	Disposal of Unwanted Radioactive Material.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9) Supply Bulletins, Lubrication Orders
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TM 5-4120-225-15	Operator, Organizational, Field and Depot Maintenance Manual: Air Conditioner: Floor Mounting; Electric Motor Driven, 1 HP, AC, 208 V, 3 Phase, 400 Cycle; 6,000 BTU Cooling; 4,500 BTU Heating per hour (Redmanson Model CE-6A-400) FSN 4120-062-8578; (Keco Model F-6000) FSN 4120-977-8504; (Therm-Air Model CE-6A-400) FSN 4120-062-8578.
TM 5-6115-299-10	Operator's Manual: Generator Set, Gasoline Engine: 10 KW, AC, 120/208 V, 3 Phase, 400 Cycle, Skid Mounted (Bogue Electric Model 15380A) FSN 6115-855-9572.
TM 11-5805-246-10	Operator's Manual, Terminal, Telegraph, TH-5/TG.
TM 11-5815-206-12	Organizational Maintenance Manual: Teletypewriter Set AN/PGC-1 and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/G, and TT-537/G.
TM 11-5820-469-20	Organizational Maintenance Manual: Radio Terminal Set AN/TRC-80 B.
TM 38-750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes parts and material issued as *part of* the major end item, and all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by Model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

e. Unit of Issue. The unit of issue unless otherwise indicated is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares Items", the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

h. Illustrations. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

Section II. FUNCTIONAL PARTS LIST

(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations: Figure No.	(9) Illustrations: Item No.
	5820-892-3470		Radio Terminal Set AN/TRC-80: 4,400 to 5,000 mc freq. range; 333 channels, 1.8 mc separation. Oper. power rqmt: ac 208V, 380 to 420 cps, 3 ph, 4 wire. Collins part No. 522-6560-00.		NX		1	
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	Ord thru AGC		Technical Manual TM 11-5820-469-10			2		
	5820-856-4923		Amplifier-Converter, AM-3303/TRC-80: radio freq.		NX	1	7	

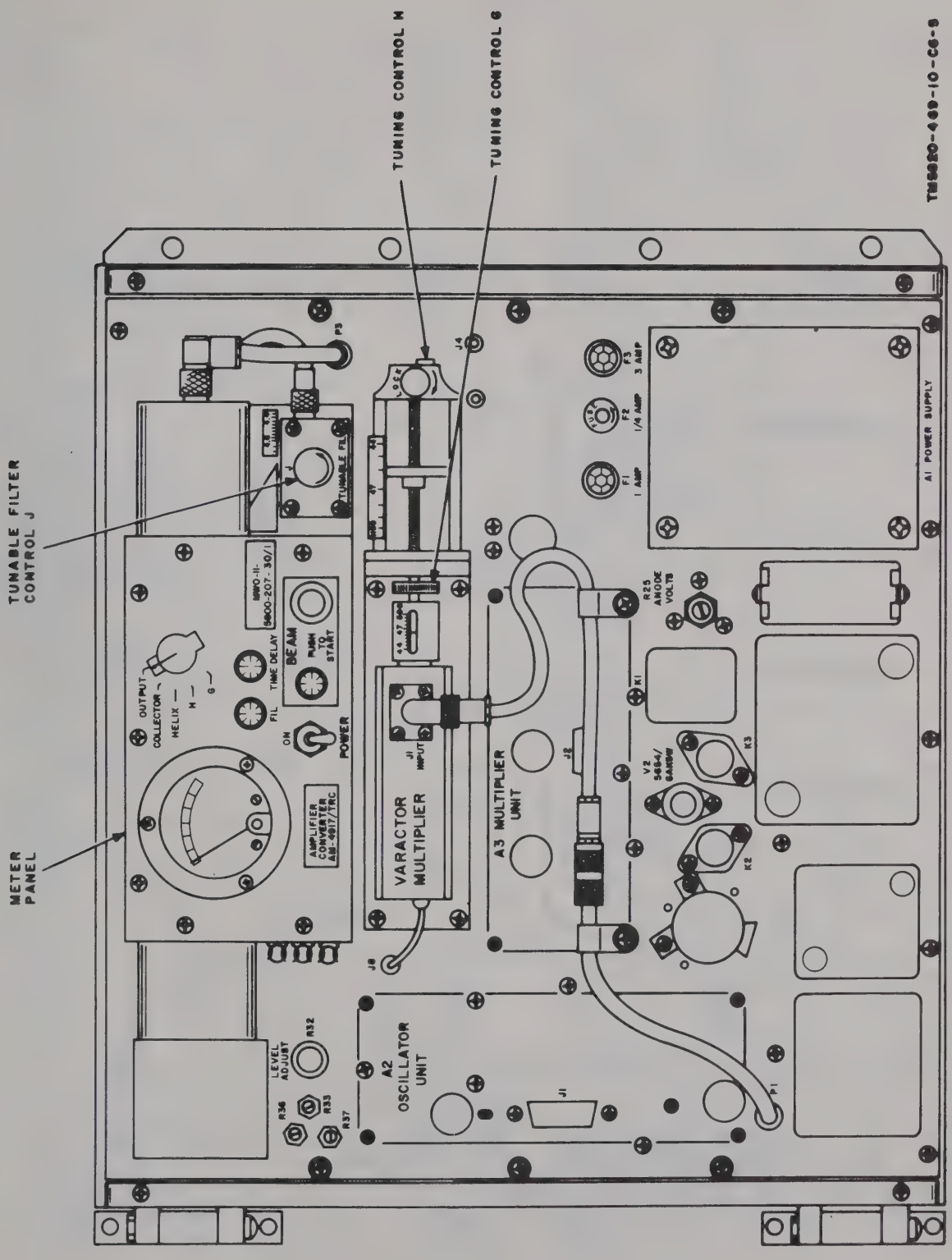


Figure 52. Transmit converter controls and indicators.

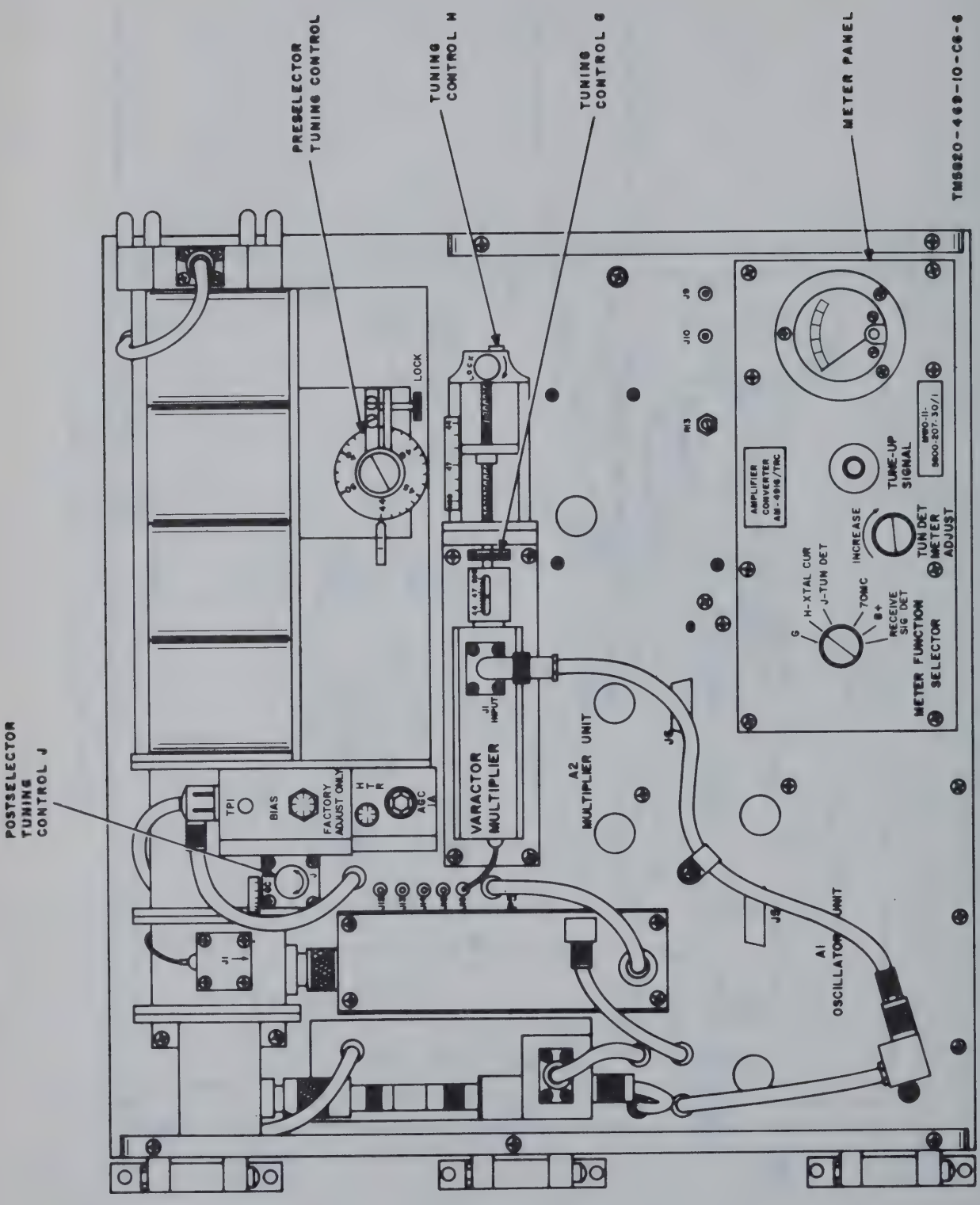


Figure 53. Receive converter, controls and indicators.

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By Order of the Secretary of the Army:

W. C. WESTMORELAND
General, United States Army,
Chief of Staff.

Official
KENNETH G. WICKHAM,
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Operator's Manual

RADIO TERMINAL SETS AN/TRC–80 AND AN/TRC–80A

TM 11–5820–469–10, 25 January 1963, is changed as follows:

1. Title is changed as shown above.

2. This change includes the necessary information to adapt the operator's manual to Radio Terminal Sets AN/TRC–80 and AN/TRC–80A after those modifications required by MWO 11–5800–207–30/1 (Synthesizer Modification) have been performed on Amplifier-Converter AM–3303/TRC–80.

3. Remove old pages and insert new pages as indicated below.

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5 and 6	5 and 6
7 through 14	7 through 14.3
----------	16.1 and 16.2
----------	22.1
27 and 28	27 through 28.1
----------	38.1
39 through 44	39 through 40.2
	41 through 44.2
53 and 54	53 through 54.1
55 and 56	55 through 56.1
67 through 71	67 through 72.8
89 and 90	89 and 90.1
95 and 96	95 and 96
----------	104.1
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TM 11-5820-469-10, 25 January 1963, is changed as follows:

1. This change inserts caution notices on use of antenna compressor HIGH PRESSURE switch; adds improved antenna elevation adjustment procedure; provides data on power phase connections when commercial power is used; and adds additional references.

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79 through 84	79 through 84
87 through 90	87 through 90
95 and 96	95 and 96
99 and 100	99 and 100
107	107

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* This change supersedes C 2, 23 June 1964.

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To be distributed in accordance with DA Form 12-32, Section II unclassified requirements for Organizational Maintenance applicable to Pershing missile system.

*** This change supersedes C 2, 23 June 1964.**

TECHNICAL MANUAL
No. 11–5820–469–10

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WASHINGTON 25, D. C., *25 January 1963*

Operator's Manual
RADIO TERMINAL SETS AN/TRC–80 AND AN/TRC–80A

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*This manual supersedes TM 11–5820–469–10, 11 April 1962, including C 1, 15 July 1962.



Figure 1. Radio Terminal Set AN/TRC–80.

CHAPTER 1

INTRODUCTION

Note. Radio terminal Set AN/TRC–80A is similar to Radio Terminal Set AN/TRC–80. Information in this manual applies to both radio terminal sets unless otherwise specified.

Section I. GENERAL

1. Scope

a. This manual describes Radio Terminal Set AN/TRC–80 (fig. 1) and contains instructions for operation and operator's maintenance. The manual includes instructions for on-site preparation of the AN/TRC–80 for operation, and instructions for cleaning, inspection, and replacement of parts authorized for first echelon maintenance.

b. The maintenance allocation appears in TM 11–5820–469–20.

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38–750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700–58 (Army), NAVSUP Publication 378 (Navy), AFR 71–4 (Air Force), and MCO P4610–5 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55–38 (Army), NAVSUP Pub 459 (Navy,) AFM 75–34 (Air Force), and MCO P4610.9 (Marine Corps).

d. Reporting of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL–ME–NMP–AD, Fort Monmouth, N.J., 07703.

e. Indexes of Publications. Refer to the latest issue of DA Pam 310–4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment, and to DA Pam 310–7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

Radio Terminal Set AN/TRC–80 (fig. 1) is a transportable radio communication facility capable of transmitting and receiving radio signals in the 4.4-kilomegacycle (kmc) to 5.0-kmc spectrum. Duplex transmission and reception of one voice channel and one radioteletypewriter circuit are provided. The AN/TRC–80 contains facilities for wire communications between the equipment operator and two remote sites. The AN/TRC–80 provides reliable communication up to 160 kilometers (km) (100 statute miles). The AN/TRC–80 contains an air-inflatable parabolic antenna and an engine generator for primary power. The complete radio set is transportable by

either air or ground transport facilities. The AN/TRC–80 is designed for use with the Pershing Weapons System.

4. Technical Characteristics

Warning: **Tube types OA2WA and OB2 are used in this equipment. These tubes contain radioactive material and are potentially hazardous when broken. The type and quantity of radioactivity are listed below:**

Tube type	Where used	Isotope	Quantity (microcuries)
0B2	Monitor and multiplexer	Co60	0.0067
0A2WA	Power control panel of power amplifier.	Ni63	0.01–.05
		Co60	0.0067

a. General.

Range:
- Nondiversity operation: 112 km (70 miles)
- Diversity operation: 160 km (100 miles).
- Low-power operation: Line of sight.

Azimuth:
- Coverage: 6,400 mils (360°).
- Determination: Relative, from scale on antenna platform.

Operational reliability: Better than 99.9-c/o at distances up to 160 km (diversity operation).

Elevation:
- Coverage: +10° to –5° relative to shelter roof.
- Determination: Relative, from scale on antenna platform.

Shelter:
- Size (overall): 69 in. high, 80 in. wide, 100 in. deep.
- Weight: Approximately 4,800 lb.
- Primary power: 208/120 volts, 4 wire, 3 phase, 400 cps.

Temperature range:
- Operating: –25°F. to +125°F. (–31.7°C. to +51°C).
- Operating (with winterization kit): Down to –65°F. (53.8°C).
- Storage: –65°F. to +160°F. (–53.8°C. to 71.1°C).

Minimum frequency separation: 100 mc between transmit/receive.

Transmission line: Flexible waveguide equivalent to Radio Frequency Line RG–49/U rigid waveguide.

b. Transmitting System, AN/TRC–80 Only.

Frequency: 4.4 to 5.0 kmc.
Frequency stability: ±2.5 parts in 10^6 in 2 months for any channel.
Channels: 333 at 1.8-mc intervals.
Type of modulation: Fm.
Power output: 1,000 watts.
Duty cycle: Continuous.
Low power output: 1 watt, approx.

b. 1. Transmitting System, AN/TRC–80A Only.

Frequency: 4.4 to 5.0 kmc.
Frequency: ±1 part in 10^6 in 6 months for any channel.
Channels: 12,000 at 50-kc interval.
Type of modulation: Fm.
Power output: 1,000 watts.
Lower power out: 1 watt, approx.
Duty cycle: Continuous.

c. Receiving System, AN/TRC–80 only.

Frequency range: 4.4 ot 5.0 kmc.
Receiver type: Fm dual conversion superheterodyne with dual diversity capability.
Intermediate frequencies: 70 mc and 8 mc.
Bandwidth: 120 kc.
Sensitivity for 30 db signal to noise: –98 dbm.
Noise figure: Better than 10 db.
Input impedance: 50 ohms, unbalanced.
Local oscillator:
- Type: Frequency synthesizer.
- Frequency rnage: 22.6375 mc to 35.1250 mc.

c. 1. Receiving System, AN/TRC–80A Only.

Frequency range: 4.4 to 5.0 kmc.
Receiver type: Fm dual-conversion superheterodyne with dual-diversity capability.
Intermediate frequencies: 70 and 8 mc.
Bandwidth: 120 kc.
Sensitivity for 30 db signal to noise: –98 dbm.
Noise figure: Better than 10 db.
Input impedance: 50 ohms, unbalanced.
Local oscillator:
- Type: Frequency synthesizer
- Frequency range: 1,082.5 to 1,232.4875 mc.

d. Frequency Generating System, AN/TRC–80 Only.

Oscillator type: Three crystal-controlled oscillators.

Output:
- Frequency synthesizer: 22.6375 mc to 35.1250 mc, separated by 12.5 kc.

Level ---------- 50 milliwatts.
Frequency stability ---- ±2.5 parts in 10^6 in two months for any channel.
Frequency separation between channels. 12.5 kc.
Rejection:
Harmonics of output -- 40 db minimum.
Other frequencies ----- 80 db minimum.

d. 1. Frequency Generating System, AN/TRC–80A Only.

Oscillator type ---------- Voltage controlled with crystal oscillator reference.
Output:
Frequency synthesizer - 1,082.5 to 1,232.4875 mc, separated by 12.5-kc interval.
Level ---------- 675 mw (minimum).
Frequency stability -------- ±1 part in 10^6 in 6 months for any channel.
Frequency separation between channels. 12.5 kc.
Rejection:
Harmonics of output -- 40 db, minimum.
Other frequencies ----- 80 db, minimum.

e. Antenna System.

Type ---------- Inflatable parabolic reflector.
Support ---------- Pressurized peripheral ring and collapsible aluminum frame and feedhorn support arms.
Air pressure and source:
Peripheral ring -------- 13 to 15 psi, from motor-driven compressor.
Paraboloid bag -------- 4 psi from motor-driven blower.
Dimensions:
Paraboloid reflector diameter. 96 inches.
Diameter including side-support frame. 10 feet.
Elevation above top of shelter. 10 feet.
Antenna feed polarity ----- Horizontal and vertical.
Positioning (manual):
Azimuth ---------- 6,400 mils in 100-mil increments from shelter roof; through 100-mil range from operator's compartment.
Elevation ---------- +10° to –5° relative to roof of shelter.
Wind:
Storage and transport - 80 mph with gusts to 120 mph.
Assembly, disassembly, and safe operation. 40 mph with gusts to 60 mph.
Radiation pattern --------- 35 mils (2°) nominal in either E or H plane.
Directive gain ---------- 36 db minimum throughout frequency range.
Radiating element -------- Bipolarized feed horn.
Reflector ---------- Paraboloid.
Beam width ---------- 35 mils (2°).
Attenuation of lobes relative to main beam:
Front (±90° from main beam). 16 db.
Rear ---------- 28 db.

f. Communication Capabilities.

Teletype circuits:
- 2-wire dc:
  - AN/TRC–80 operator, army, and programmer test station in 3-party loop.
  - Receive radio teletypewriter output to programer test station.
  - AN/TRC–80 operator and programmer test station in 2-party loop.
- Voice frequency:
  - 2-wire/4-wire, programmer test station to AN/TRC–80 radio facilities.
  - 4-wire, AN/TRC–80 operator and army.
  - 4-wire duplex, AN/TRC–80 operator and AN/TRC–80 radio facilities.

Speech circuits:
- 2-wire between programmer test station and AN/TRC–80 radio facilities or AN/TRC–80 operator.
- 2-wire intercom, programmer test station and AN/TRC–80 operator.
- 2-wire/4-wire telephone, army and AN/TRC–80 operator.
- 4-wire plus keying line to a vehicular-mounted radio set.
- 2-wire spare.
- 4-wire between AN/TRC–80 operator and AN/TRC–80 radio facilities.

g. Power Unit.

Type	Gasoline engine driven alternator.
Output	10 kw, 208/120-volt, 3-phase, 400-cps 4-wire.
Start method	Battery driven crank.
Control	Frequency and voltage control from operator's compartment.
Fuel consumption	2 1/2 gallons per hour.

5. Table of Components

a. Components. The components of the AN/TRC–80 are listed in the basic items list (app II). The major components are illustrated in figures 1, 2, and 5 through 12. The minor components are illustrated in figure 3.

b. Running Spares. The running spares for the AN/TRC–80 are listed in the basic issue items list (app II) and illustrated in figure 4.

6. Common Names

The nomenclature and common name assignments are for the components of the radio set are listed below:

Nomenclature	Common name
Radio Terminal Set AN/TRC–80	Radio set
Electrical Equipment Shelter S–254/TRC–80.	Shelter
Audio Frequency-Radio Frequency Monitor MX–4039/TRC–80.	Monitor
Amplifier-Converter AM–3303/TRC–80 or AM–4917/TRC.	Transmit converter
Modulator-Multiplier MC–465/TRC–80.	Modulator-multiplier
Demultiplexer-Multiplexer TD–550/TRC–80.	Multiplexer
Cooler, Air, Electronic Equipment HD–545/TRC–80.	Blower
Power Distribution Panel SB–1565/TRC–80.	Switch panel
Communication Control Panel SB–1564/TRC–80.	Control panel
Electrical Frequency Synthesizer 0–937/TRC–80 or 0–1462A/TRC.	Synthesizer
Amplifier-Converter AM–3302/TRC–80 or AM–6099/TRC–80A.	Receive converter
Intermediate-frequency amplifier.	If. amplifier
Power Supply PP–3313/TRC–80.	If. power supply
Power Supply PP–3314/TRC–80 or PP–4936/TRC.	Converter power supply
Radio Frequency Amplifier AM—3308/TRC–80.	Power amplifier
Antenna AS–1270/TRC–80	Antenna
Air Conditioner, Self-Contained, CE–6A–400.	Air conditioner
Telegraph Terminal TH–5A/TG or Teletypewriter Set TT–335/TG	Telegraph terminal Teletypewriter

7. Description (fig. 2)

The components of the AN/TRC–80 are installed in a weatherproof shelter that is divided into three main areas. the operating compartment, the engine-generator compartment, and the antenna storage compartment space. The radio and operating equipments are rack mounted in five standard 19-inch relay racks along the side and rear walls of the operating compartment. Three of the racks and the klystron drawer of the power amplifier cabinet are equipped with blowers to provide the required forced-air cooling. Illumination is provided by lamp-reflector assemblies installed at the tops of the racks. Power from

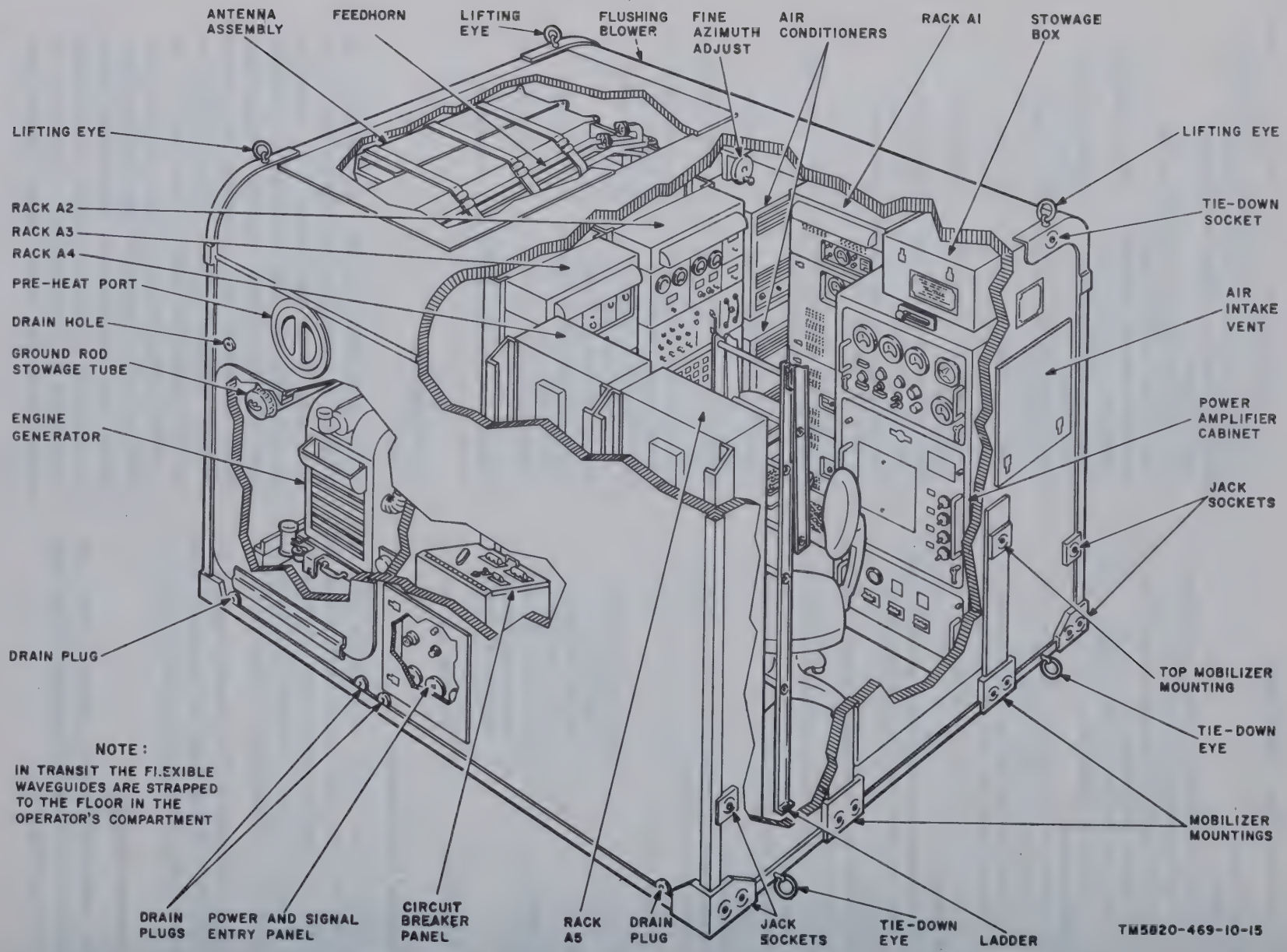


Figure 2. Radio Terminal Set AN/TRC-80, major component location.

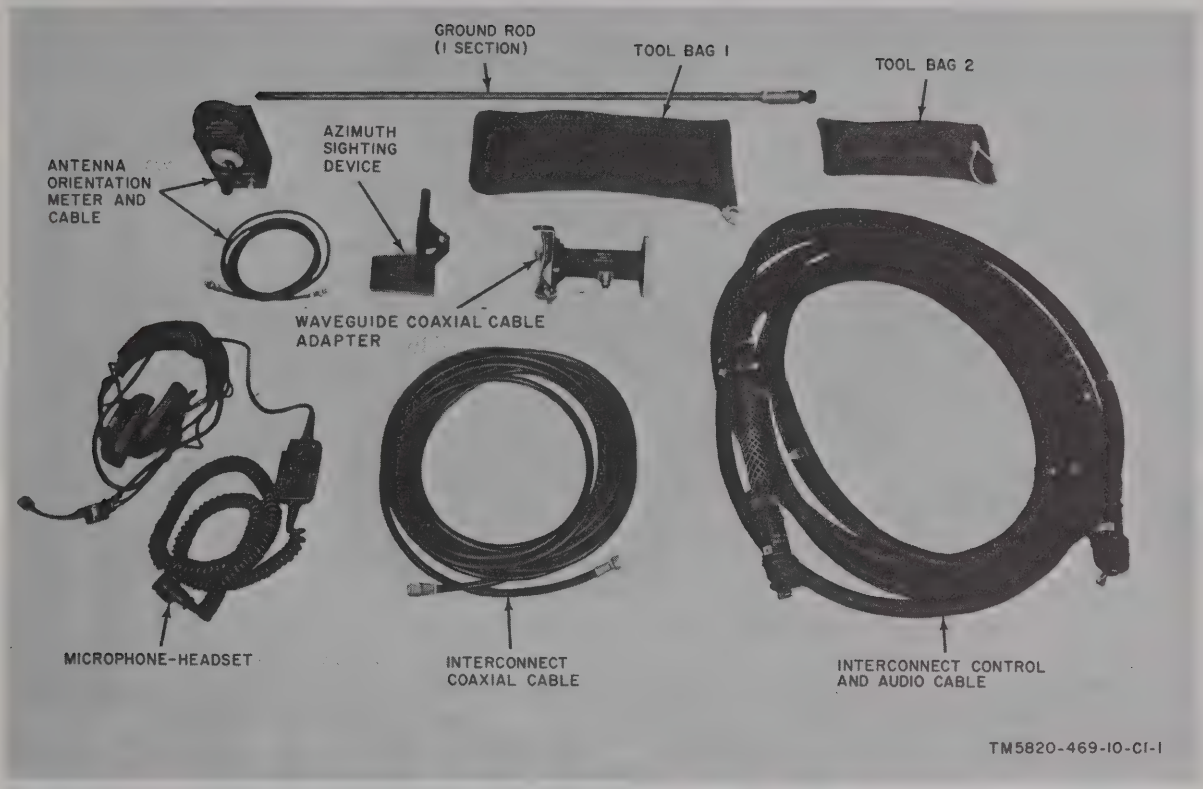


Figure 3. Radio Terminal Set AN/TRC–80, minor components.

the engine generator is brought into a circuit-breaker panel installed in the left-rear corner of the operating compartment. The associated air-conditioner condenser units are installed at one end of the engine-generator compartment and are vented to the outside air. In transit, the inflatable antenna, feedhorn, and collapsible support arms are stored in the antenna compartment; the flexible waveguide transmission lines are strapped to the floor in the operator's compartment. In operation, the antenna platform is raised to the level of the roof of the shelter and locked in place. The support arms are then unfolded, the bag is inflated, and the feedhorn and flexible waveguide transmission lines are installed. The major equipment areas of the AN/TRC–80 consist of the following:

a. Circuit control and operating equipment.
b. Frequency generation equipment.
c. Monitor, modulator, and multiplexing equipment.
d. Power amplifier.
e. Receiving equipment.
f. Primary power equipment.
g. Air-conditioning equipment.
h. Antenna.

8. Circuit Control and Operating Equipment (fig. 5)

The circuit control and operating equipment consists of the engine-generator control panel, Power Distribution Panel SB–1565/TRC–80, Communication Control Panel SB–1564/TRC–80, Teletypewriter Set TT–335/TG, teletypewriter switch panel, Telegraph Terminal TH–5A/TG, or TH–22/TG, and a circuit breaker panel (fig. 2). With the exception of the circuit-breaker panel, all the components are mounted in rack A2 (fig. 5).

Note. If a new TH–22/TG is installed, notify higher category maintenance that a jumper must be installed between pin 6 of S5A and pin 3 of S3A in the TH–22/TG used in the AN/TRC–80A, and that this jumper must be removed when the TH–22/TG is removed from the AN/TRC–80A and returned to depot.

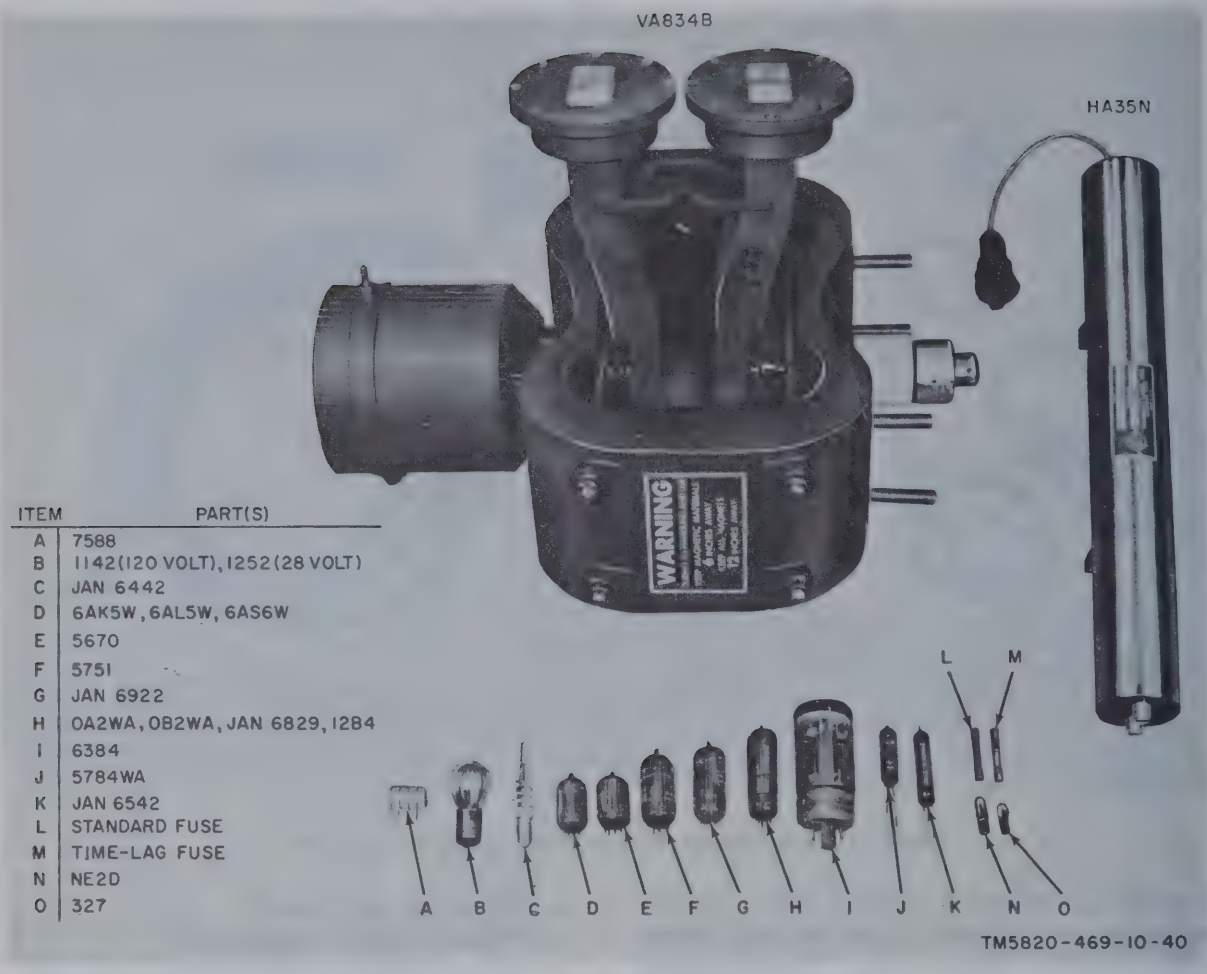


Figure 4. Running spares, AN/TRC–80.

a. Engine-Generator Control Panel. The engine generator control panel controls and monitors the operation of the engine generator. Front panel controls permit frequency and voltage adjustments and a means to turn the engine generator off in an emergency. A separate panel, located on the engine generator, is used to start and stop the engine generator.

b. Power Distribution Panel SB–1565/TRC–80. The SB–1565/TRC–80 (switch panel) provides two distinctly separate functions. One section of the switch panel controls rack power. The other section selects diversity or nondiversity operation.

(1) The switch panel contains switches for controlling power to the five racks, flushing blower, hut lights, and the three rack blowers. Panel indicators provide indication of the condition of these circuits as well as loss of forced-air cooling in the racks. Indicator-type fuses for the flushing blower circuit and the 28-volt direct current (dc) supply are mounted in the center of the panel.

(2) The switch panel is used to switch the various circuits for diversity or nondiversity operation. Two selector switches and two coaxial cable patchboards permit setting up the radio set to function as a control station, a slave station, or a tie-slave station

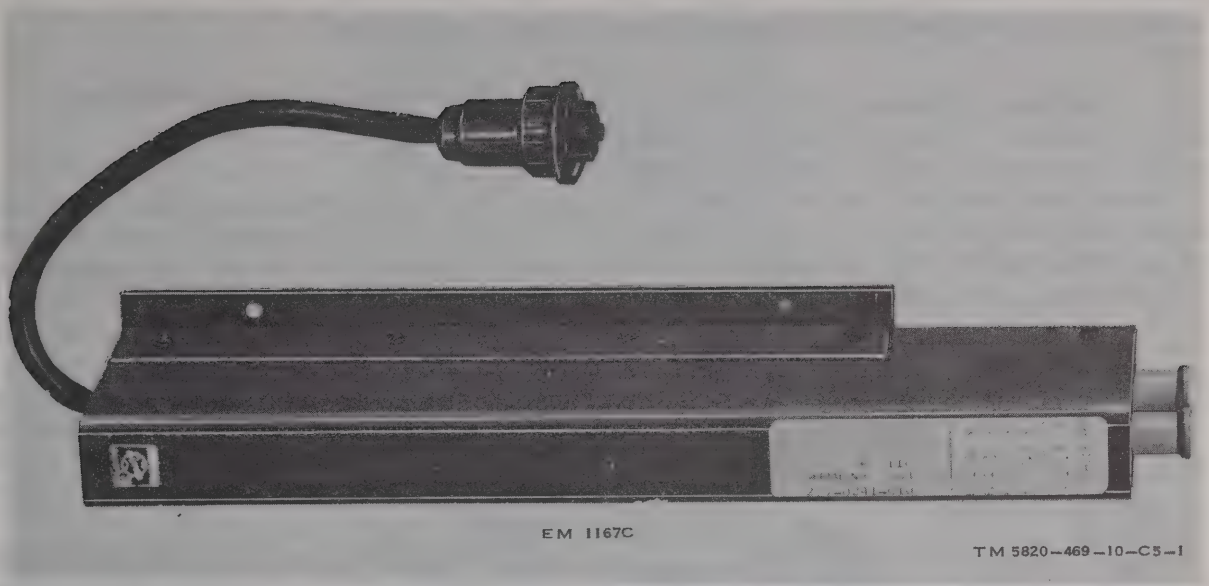


Figure 4.1. Running spares, AN/TRC–80A.

when operating in the diversity mode (para 18*b* and 69*b*).

(3) The switch panel is mounted directly above the control panel and is provided with swing-out hinges for maintenance.

c. Communication Control Panel SB–1564/TRC–80. The SB–1564/TRC–80 (control panel) permits the operator to control circuit application, and provides a means of circuit switching and routing functions. The control panel is mounted on hinges just above the operator's table. The chassis swings out for maintenance and provides access to the two connecting cables and seven plug-in printed circuit modules. The control panel mounts 17 circuit-switching pushbuttons, 3 level controls, and 3 indicator-type fuses. The pushbuttons are back lighted by white or colored lamps to provide indication of existing circuit conditions. A self-contained transistorized power supply furnishes the required operating voltages. Controls for maintenance personnel are mounted on the rear panel. A panel-mounted loudspeaker and a headset connector facilitate operator monitoring of voice communication.

d. Teletypewriter Set TT–335/TG. The teletypewriter is a standard keyboard model that is operated from a 400-cycle-per-second (cps), 120-volt source. The teletypewriter is mounted on a swivel stand that may be pushed out of the way to provide access to the control panel.

e. Teletypewriter Switch Panel. The teletypewriter switch panel is mounted on a shelf directly below the teletypewriter. The teletypewriter switch panel contains a hybrid transformer for two- to four-wire transformation of the voice-frequency (vf) teletypewriter (tty) line from the programer test station (pts) facility. A mode selector switch provides selection of voice frequency or dc teletypewriter operation. A toggle switch is provided to bypass (on) or include (off) the pts facility in the two-wire dc teletypewriter circuit. Two 120-volt, 400-cps convenience outlets for the teletypewriter and the telegraph terminal are provided at the bottom of the panel. Six front panel test jacks are provided for maintenance personnel use.

f. Telegraph Terminal TH–5A/TG. The telegraph terminal is mounted alongside the teletypewriter switch panel (*e* above). The telegraph terminal converts the tty dc signals to audiofrequency (af) signals, and the af signals to dc. Front panel controls permit

variations in operating modes. The telegraph terminal operates from the 400-cps, 120-volt source.

f. 1. *Telegraph Terminal TH–22/TG.* Telegraph Terminal TH–22/TG (fig. 26.1), when used, is mounted in place of the TH–5A/TG (*f* above) and performs the same functions. Front panel controls permit a greater variation of operating modes. The telegraph terminal operates from the 400-cps, 120-volt source.

g. Generator Auxiliary Panel. This panel contains protective relays associated with the engine generator.

9. Frequency Generation Equipment, AN/TRC–80 only (fig. 6)

a. The frequency generation equipment consists of three Electrical Frequency Synthesizer 0–937/TRC–80 units. The synthesizers are hinge mounted in the upper half of rack A3, and are forced-air-cooled by Cooler, Air, Electronic Equipment HD–545/TRC–80 installed in the bottom of the rack. The upper synthesizer supplies the local oscillator signal to receive converter No. 1 in rack A5; the bottom synthesizer supplies the local oscillator signal to receive converter No. 2 in rack A4. The center synthesizer supplies the carrier signal to the transmit converter in rack A1. The synthesizers swing out for maintenance and access to the connecting cables.

b. Each synthesizer consists of a main chassis which mounts a self-contained power supply, a control panel, and five plug-in modules. The plug-in modules contain three oscillators and two mixers. Tuning knobs and associated dial windows are used for setting up operating channels. The tens and hundreds oscillator modules are equipped with oven heating circuit indicators and indicator-type fuses. An auxiliary metering and control panel is mounted below the plug-in modules. This panel contains a meter and associated selector switch for checking module operation, a power control switch, and indicators for the filament, time delay, and B+ circuits. A fuse panel to the left of the metering panel contains three fuses for the power supply circuits. For spare fuses mount in clips on the left side of the metering panel.

9.1. Frequency Generating Equipment AN/TRC–80A (fig. 6.1)

a. The frequency-generating equipment consists of three Electrical Frequency Synthesizer 0–1462A/TRC units. The synthesizers are mounted in the upper half of rack A3. The upper synthesizer supplies the local oscillator signal to receive converter No. 1 in rack A5; the bottom synthesizer supplies the local oscillator signal to receive converter No. 2 in rack A4. The center synthesizer supplies the carrier signal to the transmit converter in rack A1.

b. Each synthesizer (type 0–1462A/TRC) consists of a main chassis that mounts 14 plug-in cards and modules. The 14 plug-in modules contain the switching panel, fault panel, power supply, and rf module. The switching panel contains five thumbwheel switches for setting up proper operating channels. The fault panel contains the POWER indicator and OUT OF LOCK indicator. The power supply panel contains the POWER switch and fuseholder. The rf module contains a tuning knob and associated dial window for setting up proper operating channels. A panel meter indicates the proper tuning voltage for the voltage-controlled oscillator. A POWER OUTPUT control adjusts the output power of the frequency synthesizer. The remaining circuit cards are mounted behind a hinged panel and are accessible by loosening a thumbscrew each side of the panel.

10. Monitor, Amplifier, Modulator, and Multiplexing Equipments (fig. 7 and 7.1)

Rack A1 contains the equipment illustrated in figure 7 or 7.1. All the units are hinge-mounted to facilitate cable connection and maintenance. Forced-air cooling is provided by a blower installed in the bottom of the rack. The operator controls are recessed in cutouts in the dust covers. The tuning and alignment controls are made accessible when the front covers are removed.

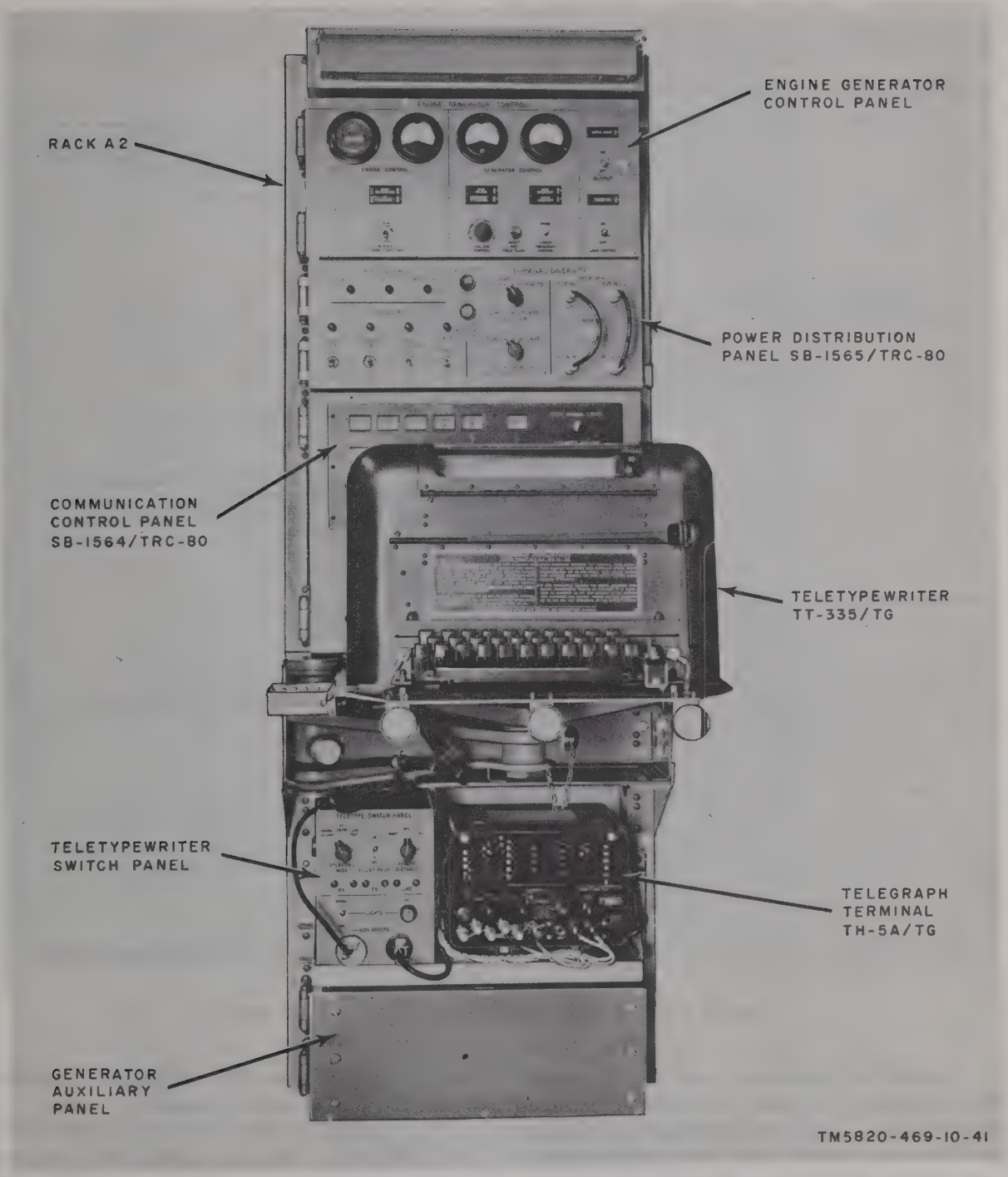


Figure 5. Rack A2, control equipment.

a. Audio Frequency-Radio Frequency Monitor MX–4039/TRC–80. The monitor contains a front panel meter and two selector switches that permit visual monitoring of incoming and outgoing voice and teletypewriter signals. The monitor is used during initial alignment for adjustment of the various signal levels.

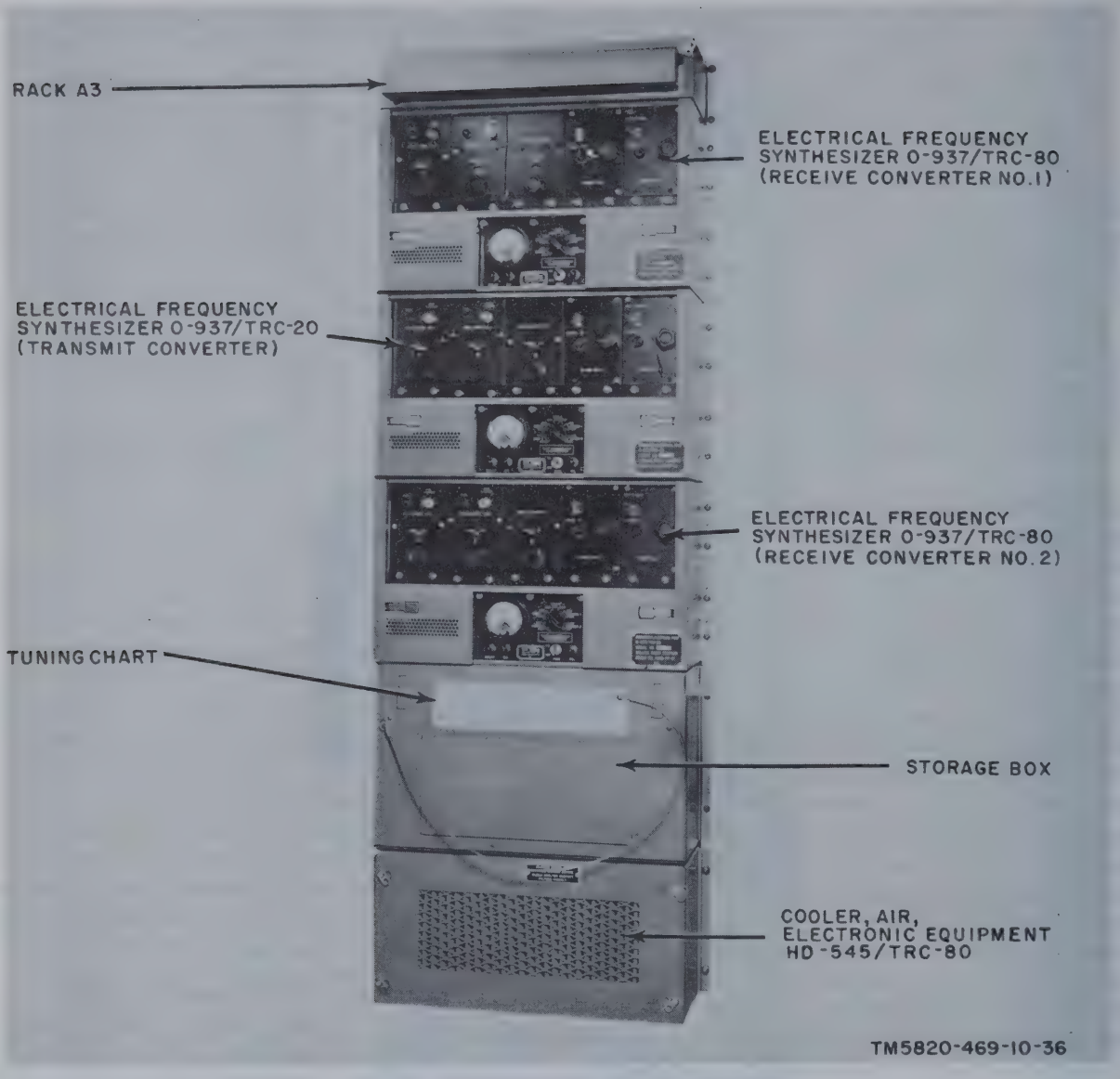


Figure 6. Rack A3, frequency generation equipment, AN/TRC–80.

b. Amplifier-Converter AM–3303/TRC–80. The transmit converter receives modulated signals from both the modulator-multiplier and a carrier signal from the synthesizer in rack A3 (para 9*a*), and supplies output-frequency driving power to the power amplifier. A front panel meter and a selector switch permit monitoring of circuit conditions within the transmit converter. The tuning controls for the oscillator unit, multiplier unit, varactor multiplier, and tunable filter are accessible when the dust cover is removed.

b. 1. *Amplifier-Converter AN–4917/TRC, AN/TRC–80A.* The AM 4917/TRC transmit converter is similar to the AM–3303/TRC–80 (*b* above) and performs a similar function. Subassemblies A1, A2, and A3 (power supply, oscillator, and multiplier) have been removed in the modified transmit converter. A front panel meter and a selector switch permit

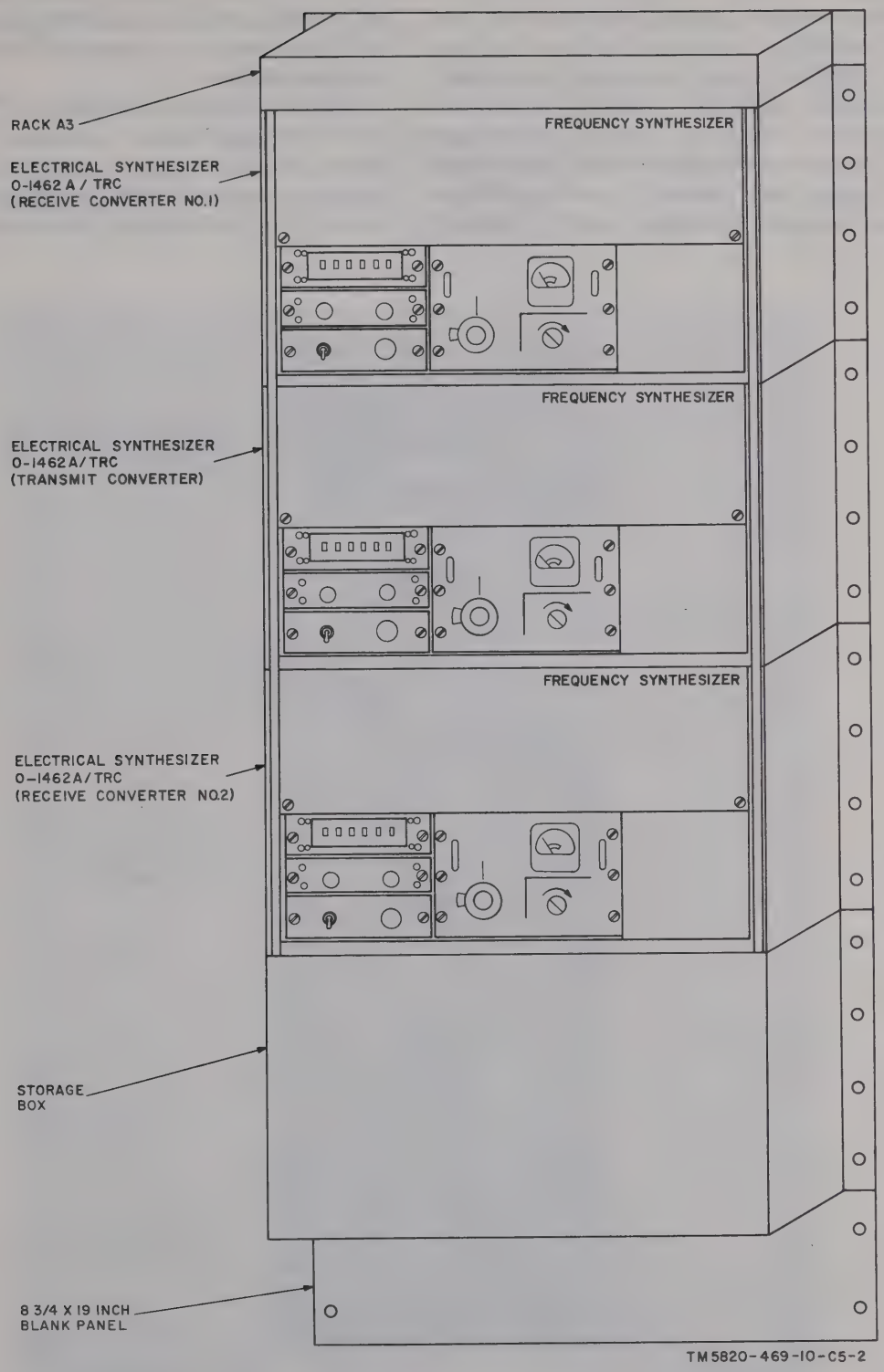


Figure 6.1. Rack A3, frequency generation equipment, AN/TRC–80A.

monitoring of circuit conditions within the transmit converter. Tuning controls for the varactor multiplier and tunable filter are accessible when the front dust cover is removed.

c. Modulator-Multiplier MD–465/TRC–80. The modulator multiplier receives modulating signals from the multiplexer which is mounted directly below, and delivers a modulated output to the transmit converter (*b* or *b*.1 above). The front panel mounts one switch that turns on a self-contained transistorized power supply. The dust cover conceals three fuses and a carrier switch.

d. Demultiplexer-Multiplexer TD–550/TRC–80. The multiplexer combines the vf tt tones and the speech signals into a composite transmit signal. In the receive portion of the circuit, the multiplexer separates the speech

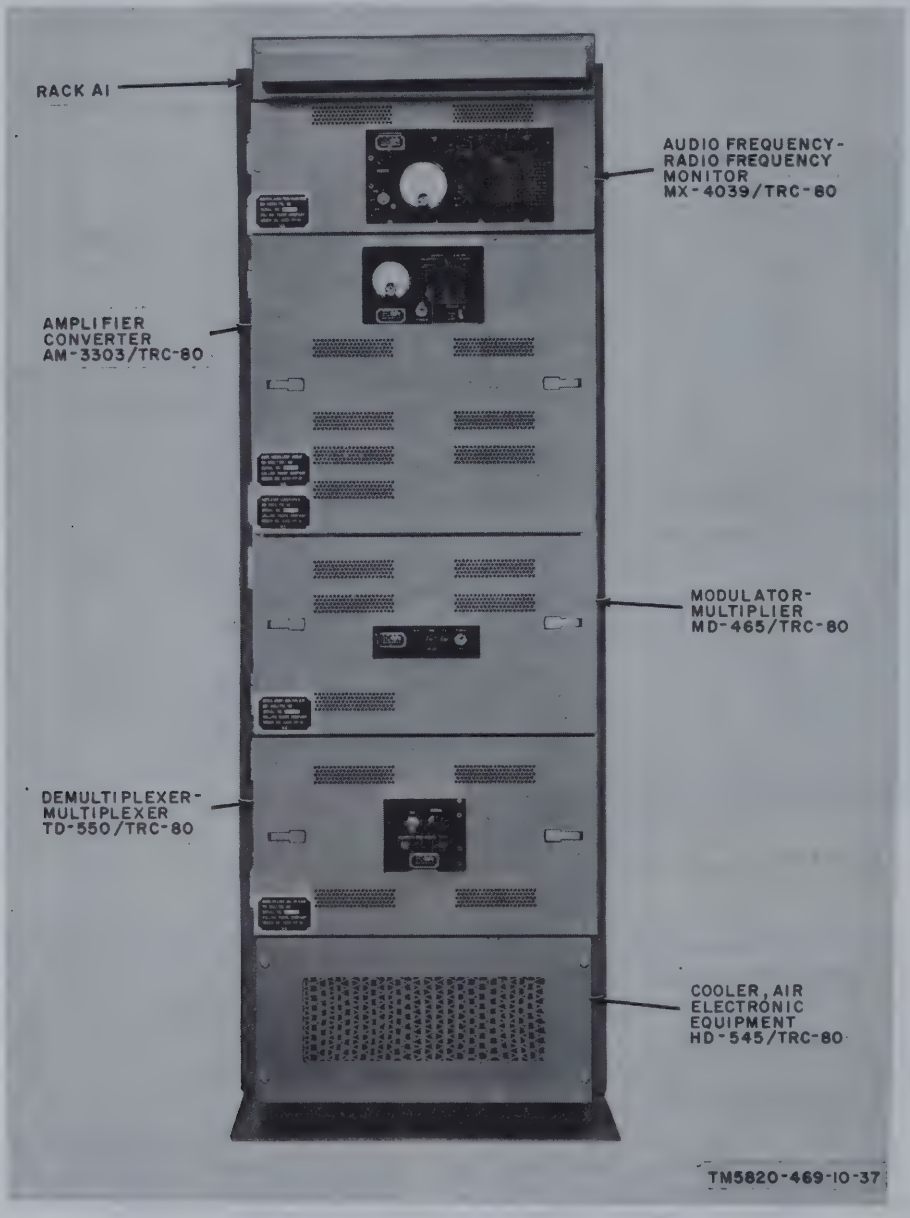


Figure 7. Rack A1, modulating and multiplexing equipment, AN/TRC–80.

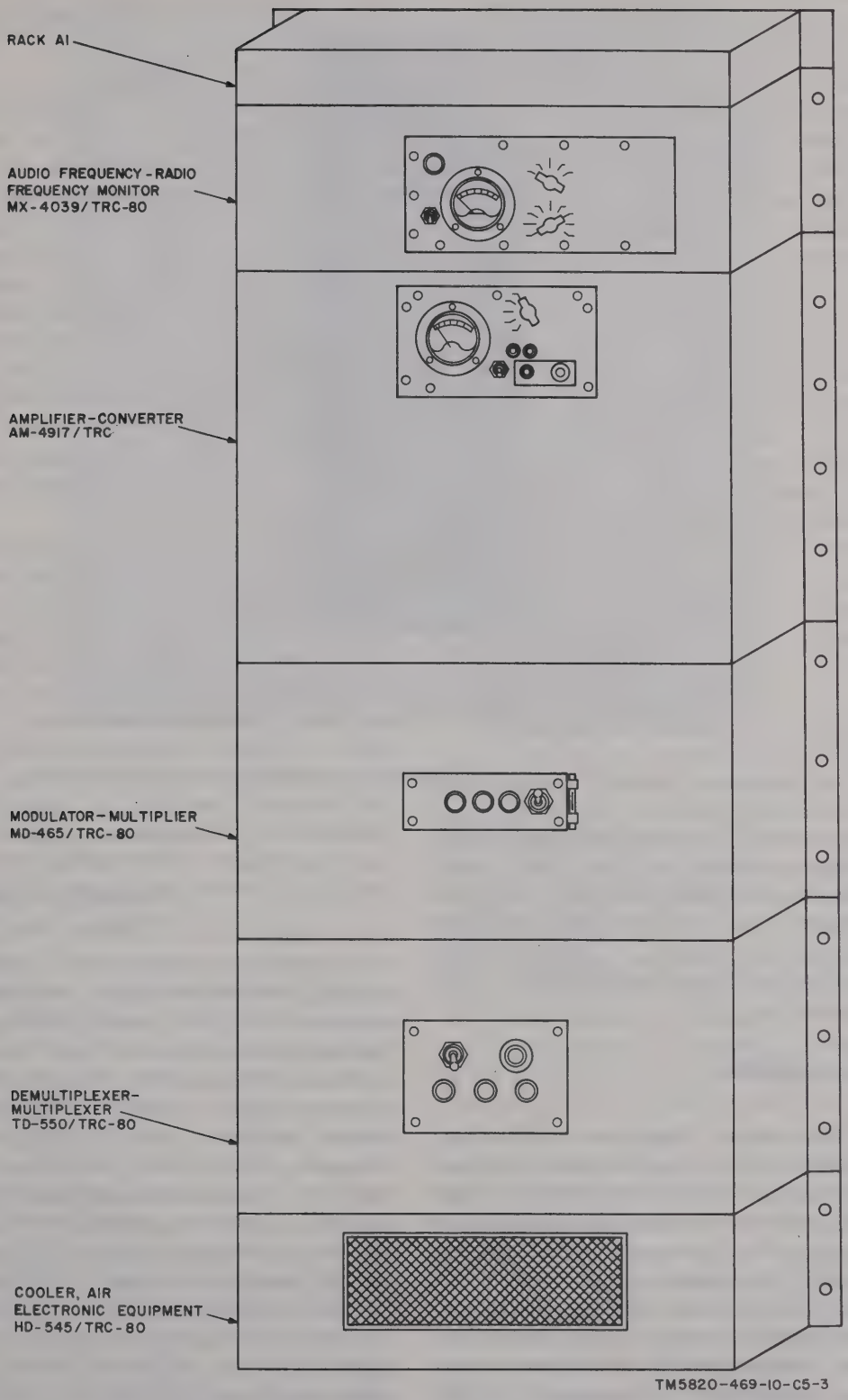


Figure 7.1. Rack A1, modulating and multiplexing equipment, AN/TRC–80A.

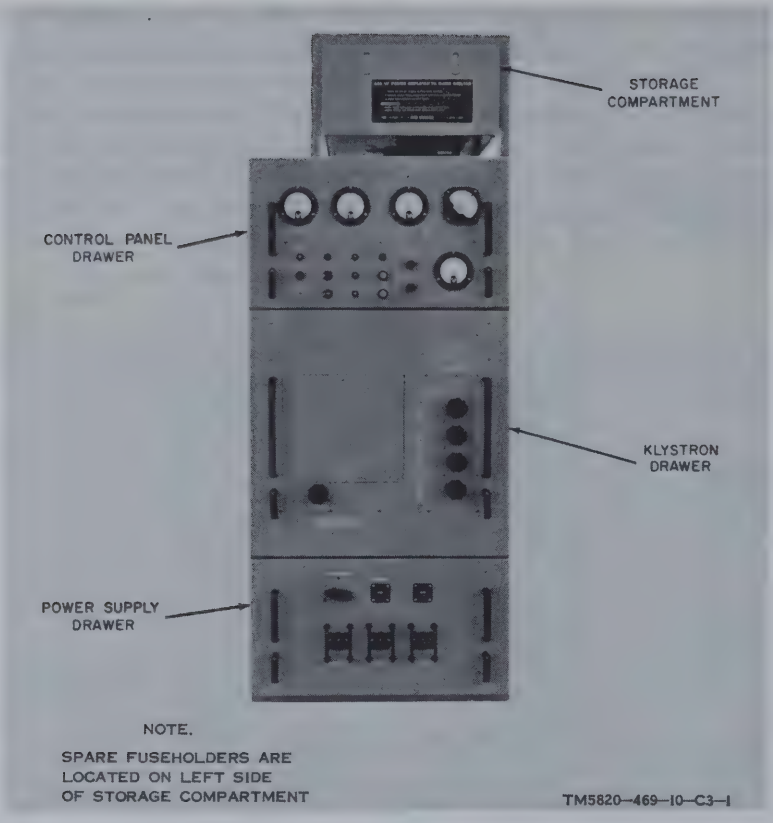


Figure 8. Radio Frequency Amplifier AM-3308/TRC-80, major components.

and vf tty signals. The operating controls and indicators are mounted on the front panel. Two power supply indicator-type fuses are mounted on the chassis and are accessible when the dust cover is removed. A self-contained power supply furnishes regulated high voltage for all circuits.

11. Power Amplifier
(fig. 8)

Radio Frequency Amplifier AM-3308/TRC-80 develops the required radiofrequency (rf) power output. The power amplifier consists of three drawer assemblies containing the control circuits, the klystron, and the klystron power supply. The control circuit drawer assembly is equipped with drawer slides and may be extended from the cabinet for maintenance. The klystron and klystron power supply drawer assemblies are mounted on friction-type slides and may be extended from the cabinet for maintenance. All three drawers are electrically interlocked, removing high-voltage dc when any drawer is opened.

a. Control Panel Drawer. The control panel drawer is secured by two twist-lock latches and is provided with two handles for drawer removal. The front panel contains five meters for monitoring klystron filament, beam (plate) voltage, beam current, and rf power in and power out. Six indicators monitor the time delay, airflow, drawer interlock, rf alarm, filament voltage, and klystron beam voltage circuits. Beam voltage momentary-contact on-and-off pushbutton switches are located under the beam voltage indicator. A filament voltage on-off toggle switch and a filament voltage adjust control are located under the filament indicator. Two two-position selector switches, a tune-operate, and an rf input power meter selector are mounted on the lower right portion of the panel. Filament and line voltage

indicator-type fuses are located in the center of the panel.

b. Klystron Drawer. The klystron drawer is secured by two twist-lock latches and is provided with two handles for drawer removal. The front panel contains an access door that can be removed to provide shelter heating from the forced-air heat dissipated by the klystron. An input drive level control is mounted directly below this door. A tuning chart is mounted in the upper right corner of the front panel. Four tuning knobs and associated cavity counter windows are located along the right side of the panel. The klystron-cooling blower is mounted above the klystron, behind the control panel drawer.

c. Power Supply Drawer. The power supply drawer is mounted on friction slides at the bottom of the cabinet. It is secured by two twist-lock latches. A high-voltage interlock switch is associated with the right-hand latch. This insures removal of high voltage before the drawer is withdrawn. The front panel contains a six-position switch for controlling beam voltage, two total-hour meters and three circuit breakers for the blower, klystron, and main power circuits.

12. Receiving Equipment
(fig. 9, 9.1, 10, and 10.1)

The receiving equipment consists of two Radio Receiver Group OA–3831/TRC–80 units and a circulator to provide a connection to the antenna. The two receivers are housed in racks A4 and A5 and consist of the components illustrated in figures 9 or 9.1 and 10 or 10.1. The receiver housed in rack A4 is designated as receiver No. 2. The receiver housed in rack A5 is designated as receiver No. 1. To provide room for a blower in rack A4, the converter power supply (Power Supply PP–3314/TRC–80 or PP–4936/TRC) for receiver No. 2 is installed in rack A5. The blower in the bottom of rack A4 provides forced-air cooling for both receiver racks. All components are hinge-mounted and swing out for maintenance and access to the connector cables.

a. Amplifier-Converter AM–3302/TRC–80 and Power Supply PP–3314/TRC–80. The AM–3302/TRC–80 (receive converter) chassis consists of nine subassemblies. The main chassis functions as a mounting frame and contains interunit wiring and rear panel connectors for external power and signal circuits. Five of the subassemblies contain tuning controls used for changing the operating frequency. Access to many of these controls requires removal of the dust cover. The input signal is brought in by waveguide from the circulator which is mounted at the side of rack A4. The output of the receive converter is connected by coaxial cable to the switch panel in rack A2, from which point it is cabled back to the input of the intermediate-frequency (if.) amplifier mounted directly below the receive converter. The B+ requirements of the receive converter are supplied by the PP–3314/TRC–80 (converter power supply). Two converter power supplies are used, one for each receive converter. Each converter power supply contains front panel on-off switches, panel indicators, and fuses.

a.1. Amplifier-Converter AM–6099/TRC–80A and Power Supply PP–4936/TRC. The AM–6099/TRC–80A (receive converter) is similar to the AM–3302/TRC–80 (*a* above). Subassemblies A1 and A2 have been removed in the modified receive converters. The B+ requirements of the receive converter are supplied by Power Supply PP–4936/TRC. Two power supplies are used, one for each receive converter, and are mounted in rack 5 in place of Power Supply PP–3314/TRC–80.

b. Intermediate Frequency Amplifier AM–3288/TRC–80 and Power Supply PP–3313/TRC–80. The AM–3288/TRC–80. The if. amplifier chassis consists of five plug-in modules and a main frame. Each if. amplifier is rack mounted directly below the associated receive converter from which the if. amplifier receives input signal through the switch panel in rack A2. There are no tuning controls in the if. amplifier. A meter and an associated switch are provided to permit operational checks. Two pushbutton switches are provided for circuit testing. Access to these switches requires removal of a dust cover. The outputs

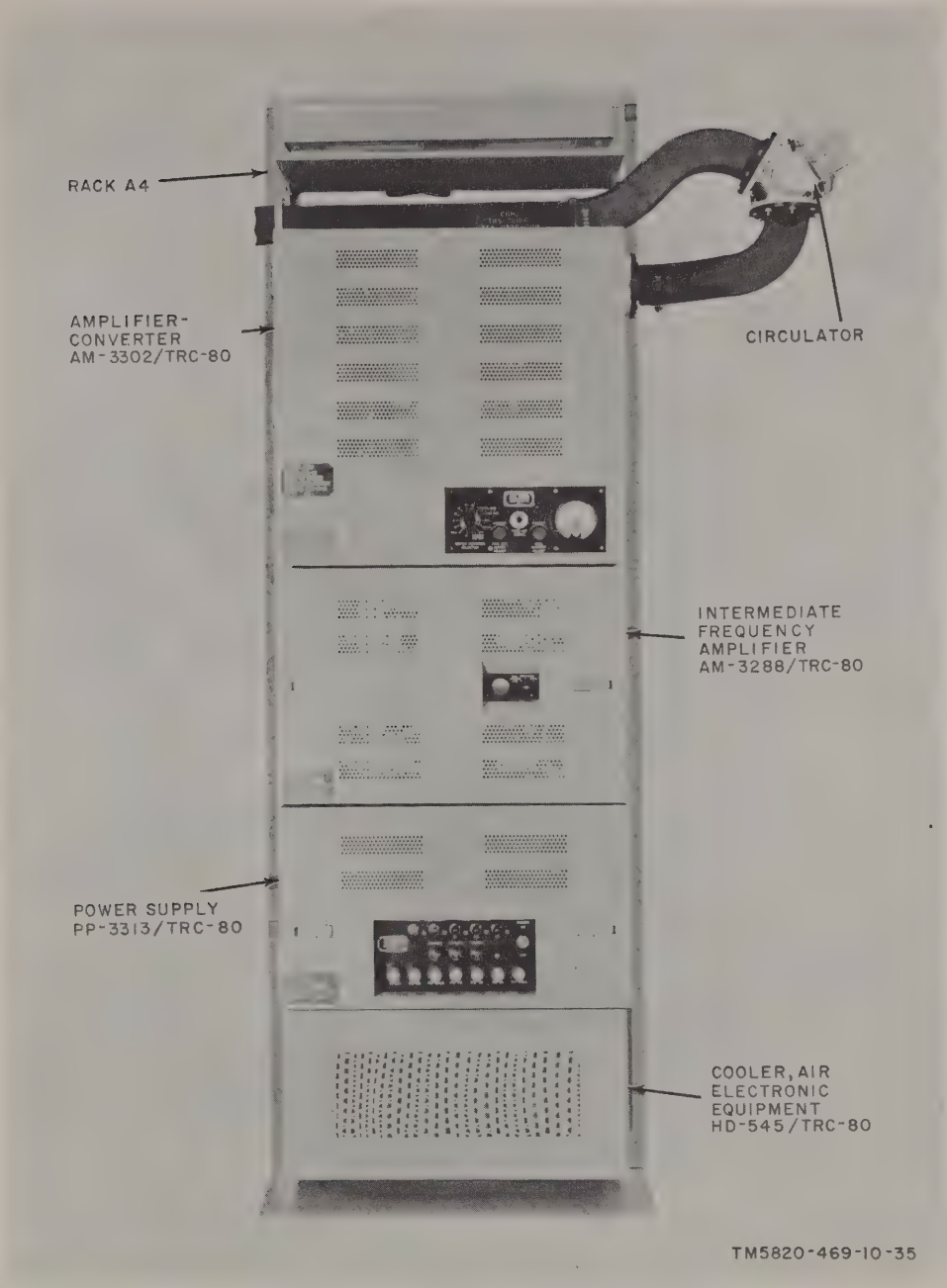


Figure 9. Rack 4 receiving equipment and circulator.

of both if. amplifiers are combined, and the resultant signal is then routed to the multiplexer in rack A1. The B+ requirements of the if. amplifier are supplied by the PP-3313/TRC-80 (if. power supply). Two if. power supplies are used, one for each if. amplifier chassis. Each if. power supply contains a front panel on-off switch, panel indicators, and fuses.

c. Circulator. The circulator is mounted at the side of rack A4. It has a waveguide input flange for connection to the receive waveguide from the antenna. Two output waveguide flanges provide

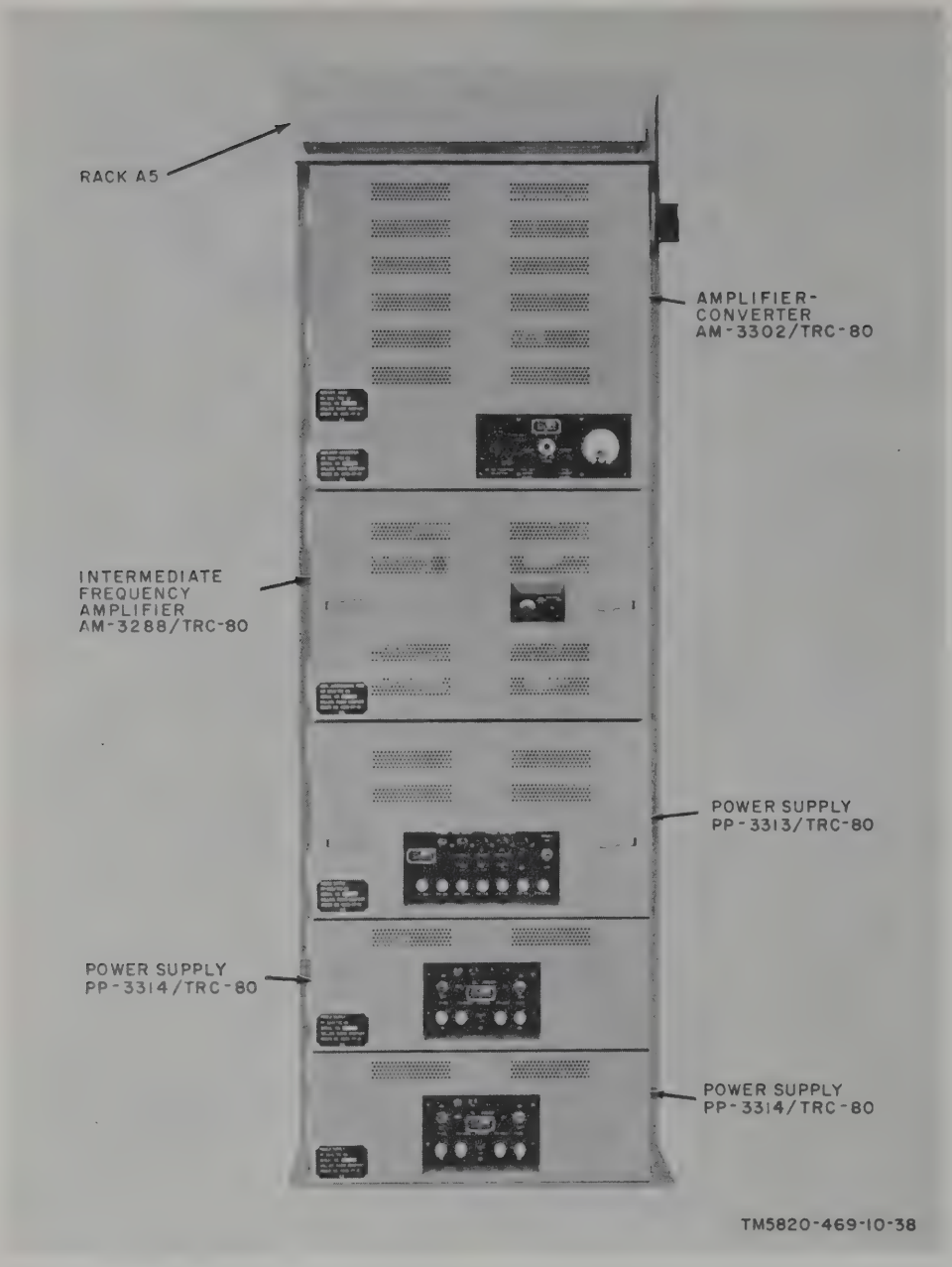


Figure 10. Rack 5 receiving equipment.

connections to the two receive converters.

13. Primary Power Equipment (fig. 11)

a. The primary power equipment consists of the gasoline engine-generator set, a starting panel, and the engine generator control panel (para 8a). The engine generator is mounted on slide rails, and is pulled out for operation and servicing. In shipment, the slide rails are locked into the retracted position with captivated quick-release lockpins. Access to the engine-generator compartment is accomplished by opening the hinged door, which is held in a horizontal open position by two support cables. A circuit breaker is mounted on the

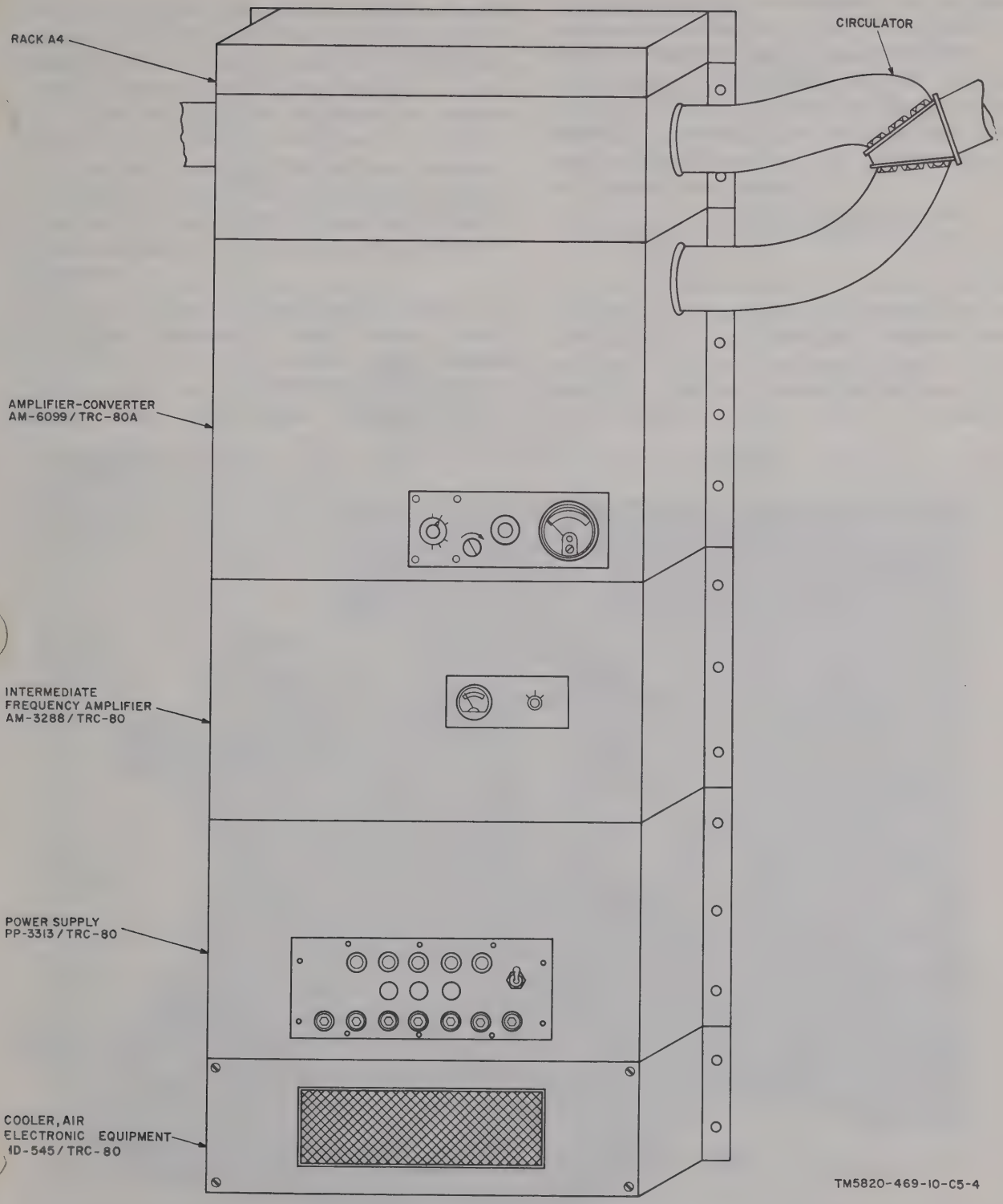


Figure 9.1. Rack A4, receiving equipment, AN/TRC–80A.

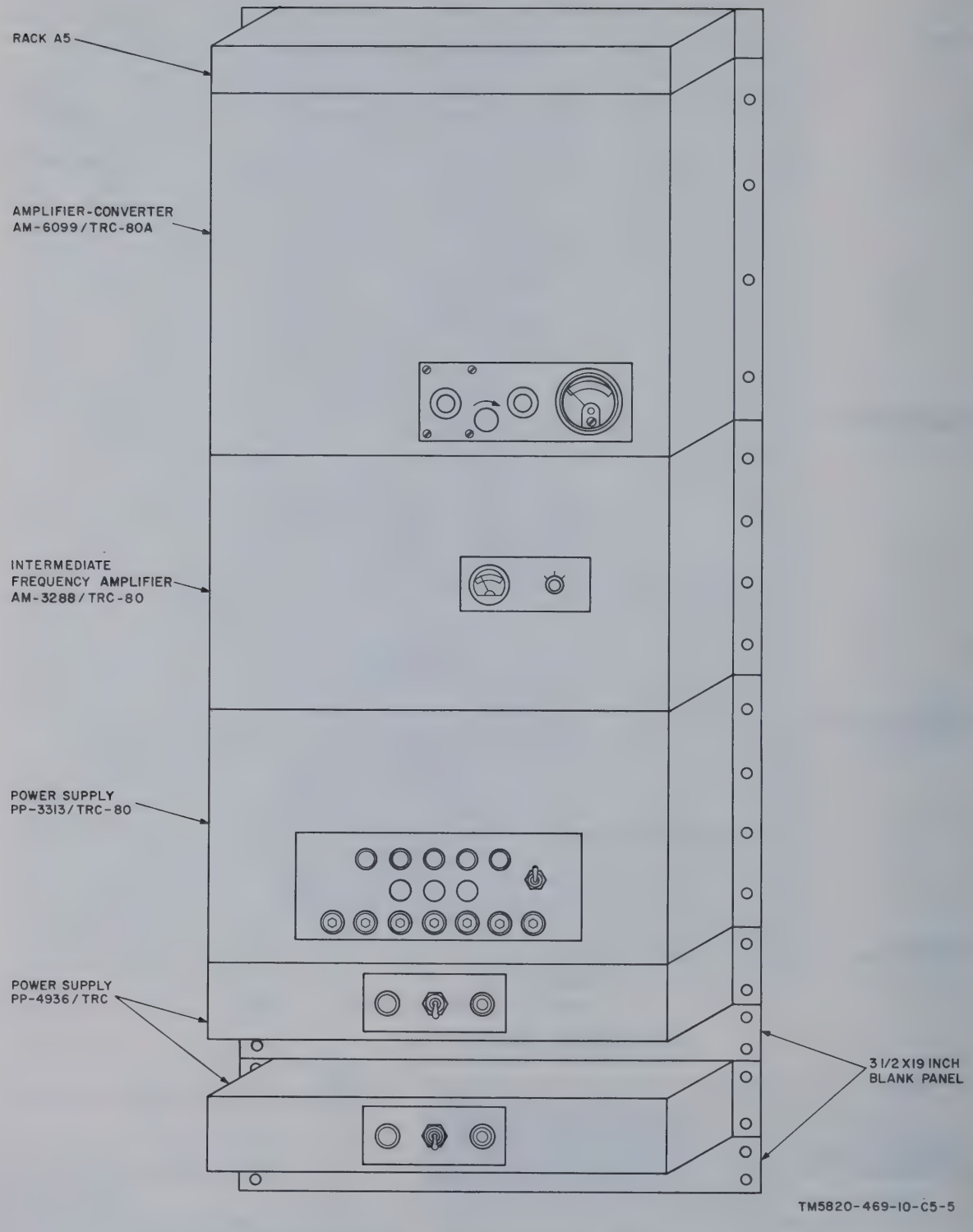


Figure 10.1. Rack A5, receiving equipment, AN/TRC–80A.

left side of the engine-generator set. The engine generator is provided with an engine control starting panel which contains the controls necessary for starting and operation of the engine.

b. Two fuel lines are provided for connection to the fuel supply containers.

c. During operation of the engine generator, the flushing blower, which is mounted on the rear wall of the engine compartment, maintains circulation of fresh air through the compartment.

Caution: **When auxiliary power (instead of the engine generator) is used, caution must be observed when the primary power connection is made to AUX POWER connector J15 on the power and signal panel (fig. 33). Jack J15 is a four-pin connector. Pin A must be connected to phase A, pin B to phase B, pin C to phase C, and pin D to neutral. Incorrect phase connections at J15 will cause activation of klystron thermal air interlock S201, improper operation of the air conditioner unit, and immediate damage to the carbon vanes in the antenna compressor.**

14. Antenna AS-1270/TRC-80

(fig. 12)

a. The antenna assembly consists of an inflatable fabric bag having one metalized inner surface that forms a parabolic reflector when the bag is inflated. Peripheral support is provided by a doughnut-shaped high-pressure ring and collapsible support arms. A bipolarized

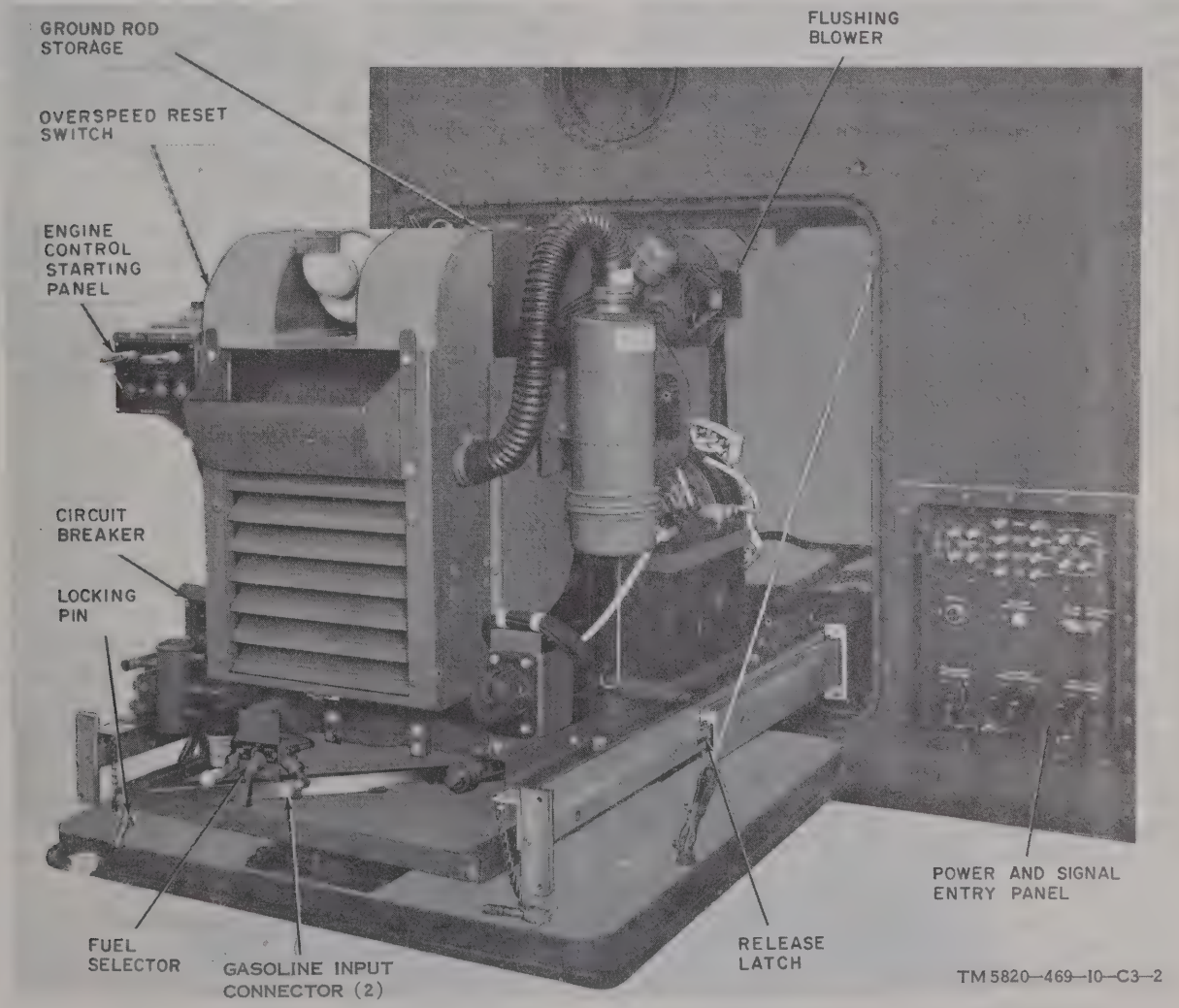


Figure 11. Engine generator and power and signal entry panel.

feedhorn, located at the focal point of the parabolic reflector, has connectors for the transmit and receive flexible waveguide sections. The feedhorn is provided with support struts that snap into detents in the antenna support arms when assembled. When the antenna assembly is retracted, the feedhorn and collapsible support frames are stored in the antenna compartment. The flexible waveguides are strapped to the floor in the operator's compartment.

b. Bag inflation is maintained by a motor-driven blower. The blower and the compressor for the peripheral support ring are mounted on the antenna platform on one side of the lower support platform. Power switches for the blower and compressor, a power reset switch, a dump valve for support ring deflation, and the antenna elevation handcrank and elevation indicator are located on the opposite side of the lower support platform. An air release valve is installed at the top of the antenna support ring when stowing the antenna. Two 9-inch heating ducts (fig. 44) are located in the nonreflecting surface of the antenna bag. These ducts permit introduction of warm air into the antenna bag to assist in stowage of the antenna in cold weather.

c. An azimuth marker strip, calibrated in hundreds of mils, is located around the base of the azimuth platform. Azimuth is indicated relative to a projection of the centerline of the shelter. Antenna azimuth may be changed manually in 100-mil increments. A footbrake and brake release permit the operator to retain control of the antenna while changing azimuth in a high wind. Fine azimuth adjustment is controlled from inside the shelter.

d. The antenna platform is manually raised and lowered on four lifting screws at the corners of the platform. A chain-drive system at the bases of the lifting screws results in uniform turning of all four lifting screws when one of the lifting

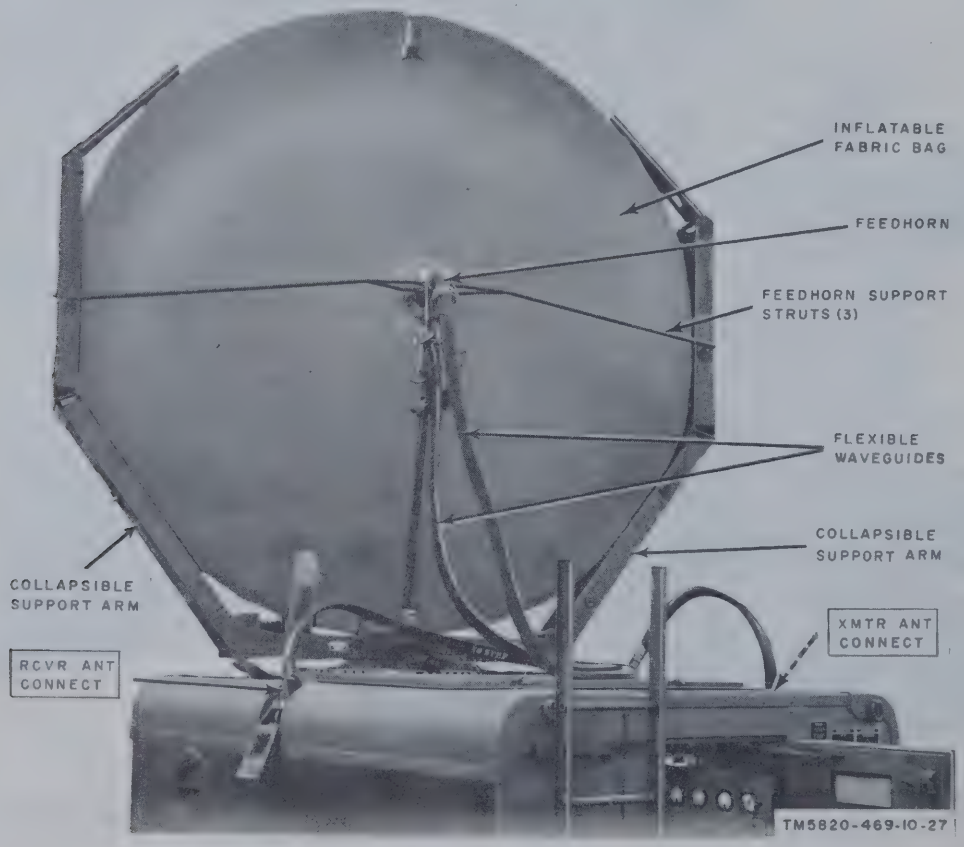


Figure 12. Antenna AS-1270/TRC-80, major component location.

screws is rotated by the handcrank. When raised to the operating position, the platform is locked into place at the four corners.

15. Air-Conditioning Equipment (fig. 2)

Two air-conditioning units are installed in the shelter. These units provide both heating and cooling of the operator's compartment. The operating controls are mounted on the evaporator units which are installed inside the operator's compartment. The condenser units are mounted on the inside of the louvered door that seals one end of the engine-generator compartment. Access to the condenser units for maintenance is obtained by lowering the door, which is hinged along the bottom and held in a horizontal position by two support cables.

16. Minor Components (fig. 3)

The following minor components are contained in the AN/TRC-80:

a. Microphone headset assembly.

b. Three ground rods consisting of three 3-foot sections.

c. Interconnect control and audio cable (35-foot), which connects the audio and control circuits of two AN/TRC-80's in diversity operation. This cable connects to PACK 1 TO 2 INTERCONNECT connector J4 (fig. 33) on the two power and signal entry panels.

d. Interconnect coaxial cable (35-foot), which connects the 70-megacycle (mc) intermediate frequency from the slave AN/TRC-80 to the control AN/TRC-80 in diversity operation. This cable connects to RECEIVER INTERCONNECT jack J8 (fig. 33) on the two power and signal entry panels.

e. Azimuth sighting device, used in the sighting procedure (para 22 and 58).

f. Compass, used for antenna orientation.

g. Two coaxial patch cables (fig. 5), used on the switch panel for connecting the converter outputs to the if. assembly inputs.

h. Ladder.

i. Fire extinguisher.

j. Bipolarized feedhorn (fig. 12). The feedhorn has two input-output flanges equipped with snap-on connectors to which the flexible transmit and receive waveguide sections connect.

k. Antenna orientation meter used for proper orientation of the antenna.

l. A waveguide-coaxial cable adapter is used during line-of-sight operation when power is reduced (para. 77*a*).

Section III. PRINCIPLES OF OPERATION

17. Introduction

a. General. Radio Terminal Set AN/TRC-80 functions primarily as a radio circuit terminal and as a communications center for wire-connected area communication facilities. The AN/TRC-80 is capable of transmitting and receiving speech and voice-frequency radio teletypewriter signals simultaneously by use of the tropospheric scatter method of radio propagation. A radio circuit may be set up by use of one AN/TRC-80 at each of two geographic locations separated by distances of approximately 110 km (70 miles). The maximum distance will be dependent on the horizon angle (*b* below) and the degree of reliability desires. The range can be increased to approximately 160 km (100 miles) by use of diversity operation (para 18*b*).

b. Tropospheric Scatter (fig. 13). The AN/TRC-80 radiates a narrow beam of superhigh-frequency (shf) energy which, under ideal siting conditions, is directed toward the horizon at a zero or negative horizon angle. The horizon angle is the angle formed by the intersection of the centerline of the beam and a line perpendicular to a gravity or plumbline. In figure 13, angle h_1 is negative and angle h_2 is positive. The beam of shf energy travels in a straight line into the troposphere. Because of humidity, temperature, and density variations in the troposphere, the velocity of propagation undergoes continuous changes, resulting in some of the

radiated beam energy being refracted (bent) back to earth. The refraction is random in nature. Only that portion of the beam energy that is refracted toward the distant radio receiver is useful energy. The region in the troposphere surrounding the point of intersection of the two shf beams is referred to as the common scattering volume. The energy refracted toward the distant station from within the common scattering volume constitutes the major portion of useful received signal at the distant station. The total of all the scattered beam energy is a small percentage of the total radiated. The portion of the scattered energy that is directed toward the distant-station antenna is likewise a small percentage of the total scattered. The energy received at the distant station antenna is approximately one-millionth of the total energy that would be received on a line-of-sight path of the same length. The level of the received signal also depends on the total distance traveled (A0 plus 0B in figure 13). By establishing a small horizon angle (zero or negative, if possible), the total distance and scatter angle r are a minimun, and the received energy level is maximum. Figure 13 distorts the size of scattering angle r, which is normally only a few degrees. Signal loss increases rapidly as this angle increases.

c. Fading. Variations in the received signal level are the result of variations in temperature, humidity, and the density of the scattering volume. The received signal is a composite of many small signals, all of which have traveled slightly different path lengths in arriving at the receiving antenna. The amplitude of each of these small signals is constantly changing. The signals combine in random phase relation, sometimes combining in an overall reenforcement, and other times combining in an overall cancellation. This type of signal level variation is called short-term fading. This short-term fading will usually occur at a few cycles per second. Another type of fading is called long-term fading and is the result of daily and seasonal change in the atmosphere. Fading has a pronounced effect on circuit reliability when the received signal level at the peak of the fade cycle approaches the minimum usable level of the receiver. Diversity operation provides a definite improvement in circuit reliability because two main signal paths are used. The probability of the peaks of the fade cycles of the two paths occurring at the same time is extremely small. Since the receiver outputs in diversity operation are combined, circuit reliability is greatly improved.

18. System Application

System application of the AN/TRC-80

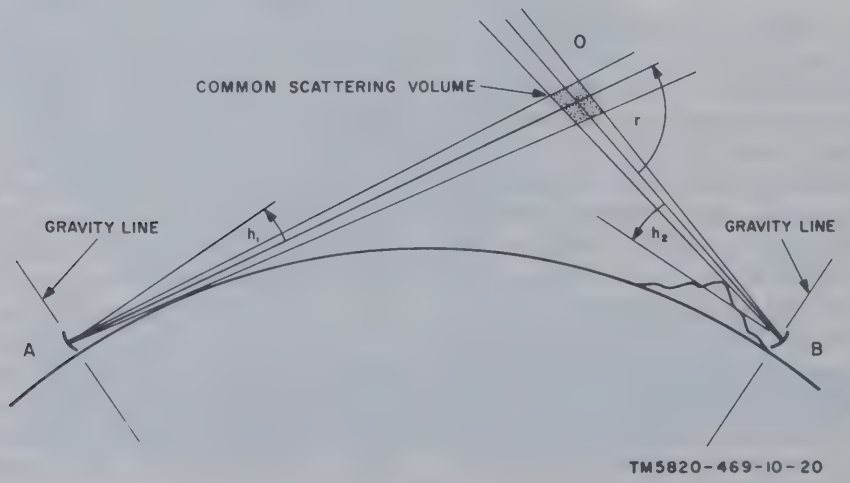


Figure 13. Geometry of tropospheric scatter.

involves two general areas. One area pertains to the use of the AN/TRC-80 in the nondiversity or diversity type of operation. The other area pertains to the use of the communication facilities and switching functions that the AN/TRC-80 is capable of providing.

a. Nondiversity Operation (fig. 14). One AN/TRC-80 is used at each end of the radio link. The radio sets transmit on different frequencies, F1 and F2, and only one receiver in each AN/TRC-80 is used. Either receiver may be used. In nondiversity operation, reliable communication up to 110 km (70 miles) may be obtained. For operation in a communication circuit where the line-of-sight path is less than 30 km (19 miles) refer to paragraph 77.

b. Diversity Operation (fig. 15). In diversity operation, one AN/TRC-80 is used at one end of the radio circuit (battery terminal) and two AN/TRC-80's are used at the other end of the circuit (battalion terminal). All three radio sets transmit on different frequencies. The battery terminal radio set uses both receivers, one tuned to frequency F1, the other tuned to frequency F2. At the battalion terminal, either radio set can be used as the control unit, the other operating unattended (slave). After setup, control can be transferred to the other radio set if this becomes desirable. In performing the transfer of control, it is not necessary to disconnect remote tty and telephone cabling or connections to army facilities. These circuits

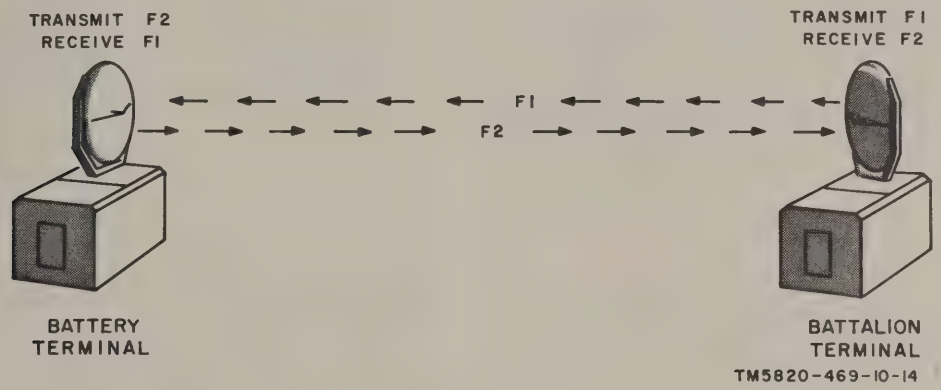


Figure 14. Radio Terminal Set AN/TRC-80, nondiversity operation.

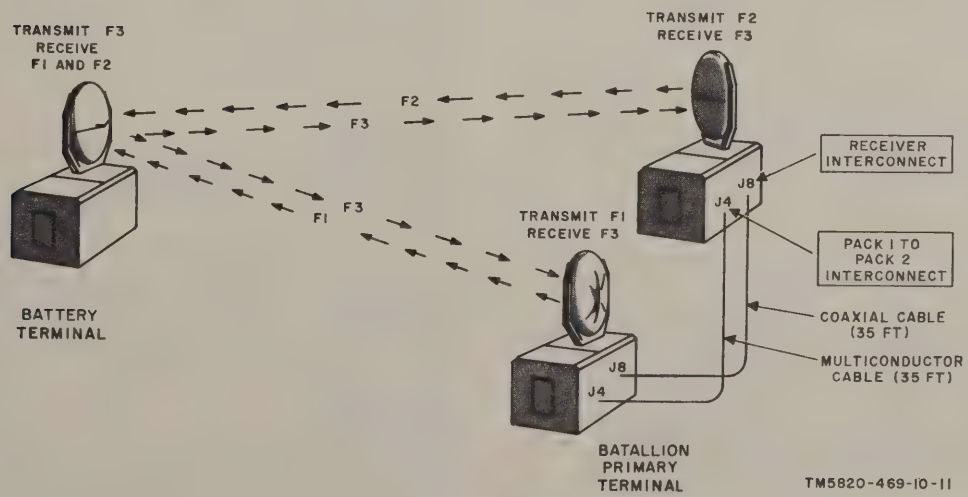


Figure 15. Radio Terminal Set AN/TRC-80, diversity operation.

can remain connected to the original control radio set.

c. Communication Facilities (fig. 16). In addition to the capability of operating as a complete radio station, the AN/TRC-80 can function simultaneously as a communications center, controlling the routing of traffic to and from the pts facility, army area net, and a vehicular-mounted radio set. Communication with these activities is by wire line. The circuit connections are made to designated connectors on the power and signal entry panel (fig. 2 and 33). The control panel and the teletypewriter switch panel in rack A2 (fig. 5) perform the circuit switching functions involved in setting up the various circuits. Radio communications with the AN/TRC-80 at the other end of the circuit can be accomplished from the local operating position within the shelter or from the remote pts facility. Radio communication from either operating position can be by speech or vf tty, or a combination of both. Throughout this manual, the following terminology will be used:

Term[a]	Refers to
Command-----	Radio transmit and receive circuits of the AN/TRC-80.
Army --------	Army area net.
Pts ----------	Programmer test station (or remote facilities).
Vehicle-------	Vehicular radio set.
Operator -----	Operating facilities (tty and speech) of the AN/TRC-80.

[a]These terms correspond with the panel markings used on the control panel.

d. Communications Center Functions (fig. 16). The following tty, speech, and signaling facilities are provided:

Item	Type of service or facility	Between
1	4-wire vf tty -------	Operator and command radio.
2	4-wire speech------	Operator and command radio.
3	2-party half-duplex dc tty.	Operator and pts.
4	3-party dc tty ------	Operator, pts, and army[a].
5	2-wire speech intercom.	Operator and pts.
6	2-wire speech intercom (discrete line).	Operator and pts, or pts and army, or pts and command radio.
7	2-wire vf tty -------	Pts and command radio[b].
8	4-wire vf tty -------	Operator and army.
9	2- or 4-wire telephone.	Operator and army.
10	4-wire speech------	Operator and vehicle[c].
11	2-wire circuit------	Operator and spare[d].
12	Radio teletypewriter monitoring facility.	Operator can monitor received radio teletypewriter traffic[e].
13	Outgoing ringing signals.	Operator to army, pts, command radio, and spare circuit.
14	Incoming ringing signals.	From army, pts, command radio, and spare circuit to operator.
15	Ringing facilities ---	Any interconnected parties can ring each other without aid from operator.
16	Speech monitoring facilitiy.	Operator can monitor speech from pts, vehicle, intercom, and spare circuits.
17	Teletypewriter priority facility.	When local terminal is transmitting tty signals, the presence of an incoming signal causes priority network to switch local printer to print incoming tty information.

[a]Use of the 3-party dc tty circuit necessitates disruption of radio teletypewriter operation with the AN/TRC-80 at the other end of the radio link.

[b]This circuit uses the same pair that is used in the dc tty circuit in item 3.

[c]The vehicle radio transmitter keying circuit is extended to the operator's press-to-talk circuit.

[d]A spare 2-wire circuit is provided between the operator and the SPARE binding posts (J21 and J22) on the power and signal entry panel and the spare pins on PROGRAMMER TEST STATION jack J3. The spare binding posts on the signal entry panel and the spare pins of J3 are connected in parallel.

[e]Monitoring cannot be performed when the circuit is connected as in item 3.

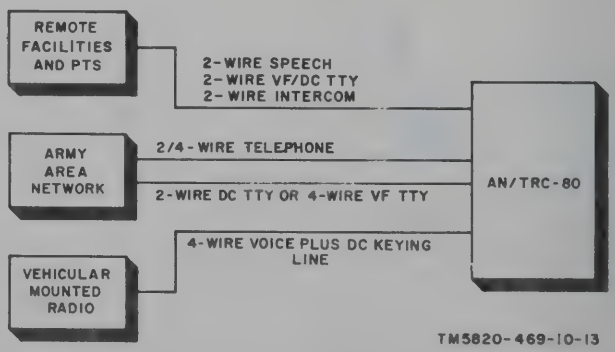


Figure 16. Communication facilities, block diagram.

18.1. Difference in Models

Radio Terminal Set AN/TRC–80A differs from Radio Terminal Set AN/TRC–80 in the following details:

a. Amplifier-Converter AM–4917/TRC, used in the AN/TRC–80A, differs from Amplifier-Converter AM–3303/TRC–80 in the following details:

(1) Oscillator unit A2, multiplier unit A3, and power supply A1 are deleted (para 10*b*(1)).

(2) Varactor multiplier A4 receives an injection signal, ranging from 1,082.5 to 1,232.4875 mc, direct from Frequency Synthesizer O–1462A/TRC (para 9.1).

(3) After MWO 11–5800–207–30/1 (Synthesizer Modification) has been performed on Amplifier-Converter AM–3303/TRC–80, it interchanges with Amplifier-Converter AM–4917/TRC.

b. Amplifier-Converter AM–6099/TRC–80A differs from Amplifier-Converter AM–3302/TRC–80 in the following details:

(1) Oscillator unit A1 and multiplier unit A2 are deleted (para 12*a*.1).

(2) Power Supply PP–3314/TRC–80 is replaced by Power Supply PP–4936/TRC (para 12*a*.1).

(3) 70-mc tuneup oscillator/mixer A4 and RF preamplifier A9 are replaced by a transistorized 70-mc tuneup oscillator/mixer and RF preamplifier (para 12*a*.1).

c. Frequency Synthesizer O–1462A/TRC differs from Frequency Synthesizer O–937/TRC–80 in the following details:

(1) O–1462A/TRC is completely transistorized with integrated circuits (para 9.1).

(2) Increased frequency and power output (para 9.1).

CHAPTER 2
INSTALLATION

19. General

Installation of Radio Terminal Set AN/TRC-80 requires some preliminary planning. To obtain maximum communication range and reliability, the terrain surrounding the proposed operating site and the orientation of the shelter relative to the azimuth location of the AN/TRC-80 at the other end of the circuit must be considered. For diversity operation, placement of the two battalion terminal shelters (fig. 15) requires consideration of the shelter separation in addition to orientation of the shelters with respect to the distant terminal.

20. Terrain

When using tropospheric scatter propagation, the transmitted beam of super-high-frequency energy is directed toward the horizon. Best operation is obtained with a low horizon angle or, if possible, a negative horizon angle (para 17*b*). A low or negative horizon angle is most easily obtained when a high-altitude or elevated operating site is available. Whenever possible, do *not* locate the AN/TRC-80 in a ravine or valley. Operation of the AN/TRC-80 from a depression will cause the transmitted beam to be directed over a high horizon angle thereby increasing the overall signal loss. Avoid locations near powerlines or other sources of manmade noise.

21. Shelter Orientation (fig. 17)

Position the shelter so that the longitudinal centerline of the shelter forms a 45° angle with the desired transmission path (bearing). This will allow the operator to stand on the shelter roof in a convenient spot while using the sighting device which is mounted on the antenna support arm. In diversity operation, where two shelters are used at one terminal, beam separation should be a minimum of 25 feet. Maximum separation is limited by the 35-foot length of the interconnecting cables.

22. Initial Azimuth Adjustment (fig. 17)

Normally, an advance siting team will select the site and install two markers (near and far markers in figure 17), designating the desired bearing. However, the procedure in *a* through *f* below is provided for use when the operator must perform the siting. A compass is supplied with the AN/TRC-80 for use when the operator must install the markers.

a. Refer to a topographical map and determine the desired bearing.

b. Use the compass to install the two markers along the desired bearing.

c. The near marker must be located at least 25 feet away from the set. The far marker must be located at least 175 feet away from the near marker (fig. 17).

Note: The following procedure is performed *after* the antenna has been erected and inflated (para 57).

d. To orient the antenna, the operator must climb to the shelter roof, look through the sighting device, and line up on the near and far markers.

***Warning:* Be sure that the power amplifier is off before climbing to the shelter roof.**

e. Repeat steps *a* through *d* to orient the antenna on the slave set.

f. Final azimuth adjustment is performed after initial communications have been established (para 58 and 67).

23. Grounding of Shelter (fig. 17 and 18)

The AN/TRC-80 is grounded by one 9-foot ground stake that is driven into the ground approximately 20 feet away from the shelter. The ground rod consists of three 3-foot sections. The ground rods are stored in the engine-generator compartment (fig. 2). Locate the ground rod

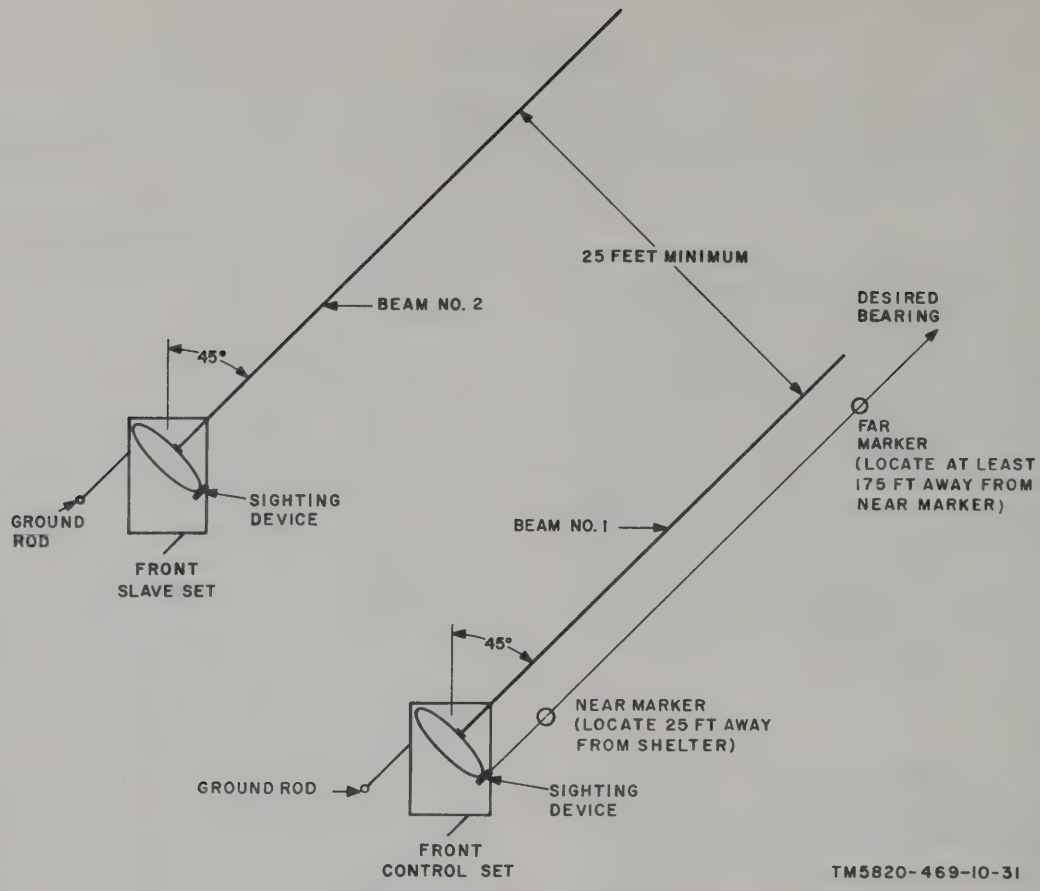


Figure 17. Shelter orientation.

as shown in figure 17 and install the ground rod as follows:

a. Attach the threaded driving nut to the bottom section and use the sledge hammer to drive the section into the ground.

b. Remove the threaded driving nut and attach the second section to the union. Attach the driving nut to the second section and drive the two sections into the ground.

c. The third section is connected in the same manner, and the three sections are driven into the ground.

d. Remove the driving nut.

e. Install a ground clamp on the ground rod.

f. In poor ground or sandy soil install another ground rod 20 feet away from the first ground rod. Connect the 20-foot ground rod interconnect cable (same connector on both ends) to the two ground rods.

g. Connect the 20-foot connector cable between one ground rod and the TO GRD STAKE terminal on the shelter power and signal entry panel.

h. Connect the metal strap on the TO GRD STAKE jack J6 to the ELECTRICAL NEUTRAL connector (fig. 33).

24. Connections

a. Fuel Line Connections. The gasoline hose connection must be made to the engine generator. Two gasoline supply connections and an associated manually operated fuel selector switch are located at the bottom center of the engine generator, directly below the louver (fig. 11). The two fuel lines and a gas can adapter are stored inside the engine generator compartment.

b. Engine Generator. The engine generator is factory installed and connected. To use the engine generator, set the POWER SOURCE SELECTOR switch on the circuit-breaker panel to GEN and perform the starting procedure (para 53).

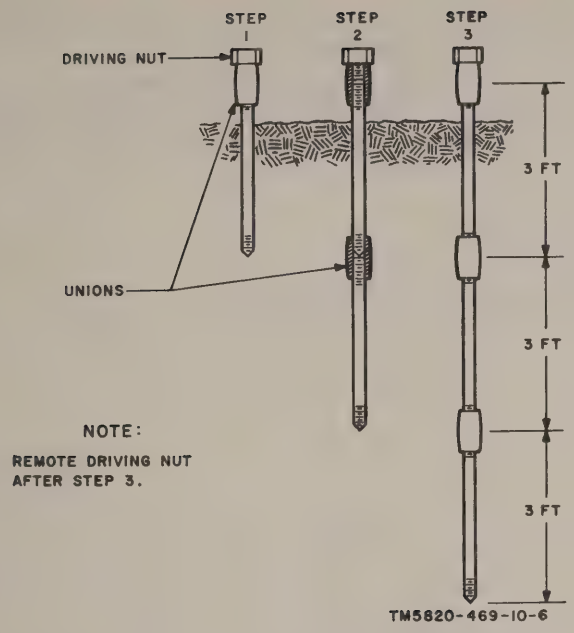


Figure 18. Ground rod installation procedures.

c. Auxiliary Power Connections (fig. 33). When auxiliary power is used instead of the engine generator, a 3-phase, 400-cps, 208 voltage source must be connected to AUX POWER 3PH-400 CPS-208V connector J15 on the power and signal entry panel. Set the POWER SOURCE SELECTOR switch on the circuit-breaker panel (fig. 32) to AUX.

d. Diversity Connections. At the battalion terminal where two radio sets are used, the coaxial interconnect cable is connected to RECEIVER INTERCONNECT jack J8 at each power and signal entry panel (fig. 33). The multiconductor interconnect control and audio interconnect cable is connected between power and signal entry PACK 1 TO 2 INTERCONNECT jacks J4.

e. Vehicular Radio Connection (fig. 33). Wire connections between the vehicular-mounted radio set are made through J7 on the power and signal entry panel.

f. Programmer Test Station Teletypewriter Connection (fig. 33). Wire connections (for telephone or vf tty) from the pts site are made through J31 and J32 on the power and signal entry panel.

g. Programmer Test Station Intercom Connection. Intercom connections from the pts site are made through J29 and J30 on the power and signal entry panel (fig. 33).

h. Programmer Test Station Discrete Connection (fig. 33). A two-wire line connection for telephone is made by connecting the two-wire line to J27 and J28 on the power and signal entry panel.

i. Spare Line Connection (fig. 33). Facilities for a spare wire line for telephone communication is provided by SPARE binding posts J21 and J22.

j. Army Area Net Communications (fig. 33).

(1) *Telephone connections.* For two-wire operation, connections are made to J17 and J18. In four-wire operation, input connections are made to J17 and J18, and output connections are made at J19 and J20.

(2) *Teletypewriter connections.*

(a) Two-wire vf operation. For two-wire vf operation, connections are made to J23 and J24.

(b) Two-wire dc operation. For two-wire dc operation, connections are made to J25 and J26.

(c) Four-wire teletypewriter operation. In four-wire teletypewriter operation, the input connections are made to J24 and J26. The output connections are made at J23 and J25.

25. Shelter Handling (fig. 2)

***Warning:* Do not fork-lift the shelter.**

a. Four lifting eyes are located on top of the shelter for lifting the shelter with a five-ton wrecker or transporting the shelter by helicopter. When lifting the shelter, the lifting cable must be long enough so that the angle formed by the cable and shelter roof *is not less than 45°*. The four lifting eyes can be removed from the roof and installed in the tie-down sockets when it is necessary to secure the shelter to a truck bed.

b. Twelve jack sockets are provided, three at each corner, located on the front and rear faces of the shelter. The Allen-head screws for protecting the socket

threads must be removed when the jack mechanism is provided. (Allen-head wrenches are located in the power amplifier stowage compartment.)

c. Twelve mobilizer mounting sockets are provided for mounting wheel assemblies. The Allen-head screws for protecting the socket threads must be removed to install the wheel assemblies.

Caution: **When not in use, sockets must be protected with the Allen-head screws.**

CHAPTER 3

OPERATOR'S CONTROLS AND INSTRUMENTS

Section I. RACK A1

26. General

Rack A1 contains the monitor, the transmit converter, modulator-multiplier, multiplexer, and blower. The complete rack is illustrated in figure 7 or 7.1. Paragraphs 27 through 30 describe the controls and indicators, and figures 19 through 21 and figure 52 illustrate the individual controls.

27. Audio Frequency-Radio Frequency Monitor MX-4039/TRC-80 (fig. 19)

Control or indicator	Function
PWR ON-OFF switch.	Controls application of primary power.
POWER indicator	When lighted, indicates application of primary power.
Attenuator switch S1 (position A).	Introduces proper amount of attenuation for meter SET POINT indication. Switch positions B, C, D, and E are not used.
Selector switch S2	Selects circuit to be monitored as indicated by panel SWITCHING DATA CHART. Position J is used only by higher echelon personnel.
Meter	Provides visual indication of signal selected by switch S2.

28. Amplifier-Converter AM-3303/TRC-80 (fig. 52)

The AM-3308/TRC-80 (transmit converter) consists of a meter panel, oscillator unit, tunable filter, varactor multiplier, multiplier unit, and main chassis. The front panel controls of these units are described in *a* through *e* below:

a. Meter Panel.

Control or indicator	Function
POWER ON switch	Controls application of primary power.
BEAM PUSH TO START pushbutton switch.	Controls application of high voltage to traveling wave tube.
Meter function selector switch.	Connects meter to any one of 12 circuits.

Sw pos	Causes meter to indicate
XTAL NULL	
A (not used).	
A INPUT (not used).	
B	Output of crystal detector of oscillator unit.
C	Cathode current of V2 of multiplier unit.
D	Cathode current of V3 of multiplier unit.
E	Cathode current of V4 of multiplier unit.
F	Output of tripler cavity.
G	Diode current of varactor multiplier.
H	Output of varactor multiplier.

Control or indicator	Function	
	Sw pos	Causes meter to indicate
	HELIX	Helix current of traveling wave tube.
	COLLECTOR	Collector current.
	J. OUTPUT	Output of traveling wave tube.
Meter	Indicates current within circuit selected by meter function selector switch.	
FIL indicator	Indicates application of power to filaments.	
B+ indicator	Indicates availability of B+ voltage.	
TIME DELAY indicator.	Indicates that 3-minute time delay relay contacts have closed and primary power is available to B+ and high-voltage supplies.	
BEAM indicator	Indicates application of high voltage to traveling wave tube.	

b. Oscillator Unit.

Note. Panel marking B alongside the controls indicates the position in which the meter function selector switch (on the meter panel) must be placed to measure the circuit affected by the control. (The REF marking alongside the knob is used to align the knob after removal.)

Control or indicator	Function
EXT-INT switch (normally locked in EXT position):	Selects either external or internal oscillator.
C1 A (not used)	
C2 B	Tunes plate circuit of V2.
C3 B	Tunes plate circuit of V3.
C4 B	Tunes plate circuit of V4.

c. Multiplier Unit.

Note. Panel markings C, D, and E alongside the controls correspond to the meter function selector switch positions.

Control or indicator	Function
C3-C	Tunes input cathode tank circuit of V1.
C6-C	Tunes plate tank circuit of V1.
C14-D	Tunes plate tank circuit of V2.
C22-E	Tunes plate tank circuit of V3.
Tuning control F	Tunes tripler cavity.

d. Varactor Multiplier.

Control	Function
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes input cavity of varactor multiplier.

e. Tunable Filter and Main Chassis.

Control	Function
TUNABLE FIL J	Selects desired upper sideband frequency.
LEVEL ADJUST control	Sets drive signal level to traveling wave tube.

28.1. Amplifier-Converter AM–4917/TRC, AN/TRC–80A Only (fig. 52.1)

The AM–4917/TRC (transmit converter) consists of a meter panel, tunable filter, varactor multiplier, and main chassis. The front panel controls of these units are described in *a*, *b*, and *c* below.

a. Meter Panel.

Control or indicator	Function	
POWER ON switch.	Controls application of primary power.	
BEAM PUSH TO START push-button switch.	Controls application of high voltage to traveling wave tube.	
Meter function selector switch.	Connects meter to any one of five circuits.	
	Sw pos	Causes meter to indicate
	G	Diode current of varactor multiplier.
	H	Output of varactor multiplier.
	HELIX	Helix current of traveling wave tube.
	COLLECTOR	Collector current of traveling wave tube.
	OUTPUT	Output of traveling wave tube.

Control or indicator	Function
Meter	Indicates current within circuit selected by meter function selector switch.
FIL indicator	Indicates application of power to filaments.
TIME DELAY indicator.	Indicates that 3-minute time delay relay contacts have closed and primary power is available to B+ and high-voltage supplies.
BEAM indicator	Indicates application of high voltage to traveling wave tube.

b. Varactor Multiplier.

Control	Function
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes output cavity of varactor multiplier.

c. Tunable Filter.

Control	Function
TUNABLE FIL J	Selects desired upper sideband frequency.

29. Modulator-Multiplier MD–465/TRC–80 (fig. 20)

Control or indicator	Function
POWER OFF switch	Controls application of primary power.
FIL indicator	When lighted, indicates that power is applied to filaments.
TIME DELAY indicator	When lighted, indicates that the 30-second time delay relay contacts have closed and primary power is available to 200-volt power supply.
B+ indicator	When lighted, indicates that B+ is available from 200-volt supply.
CARRIER SWITCH pushbutton.	When pressed, disables 70-mc carrier.

30. Demultiplexer-Multiplexer TD–550/TRC–80 (fig. 21)

Control or indicator	Function
ON-OFF switch	Controls application of primary power.
FILAMENT indicator	When lighted, indicates that primary power is applied to filament circuits.
TIME DELAY indicator	When lighted, indicates that the 30-second time delay relay contacts have closed and power is available to circuit.
B+ indicator	When lighted, indicates that B+ is available from B+ supply.
SIGNAL pushbutton switch.	For use by higher echelon personnel.

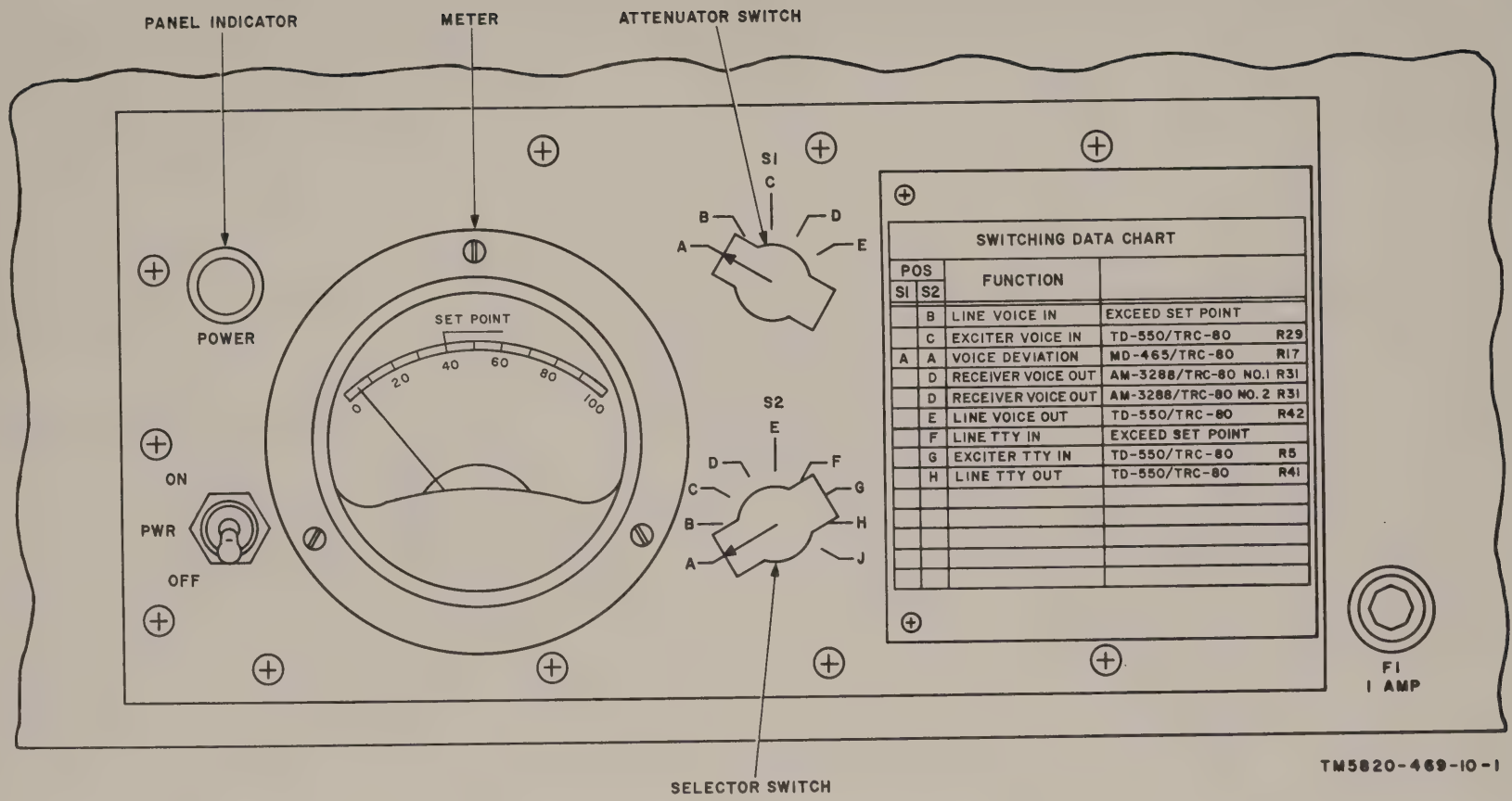


Figure 19. Audio Frequency-Radio Frequency Monitor MX-4039/TRC-80, controls and indicators.

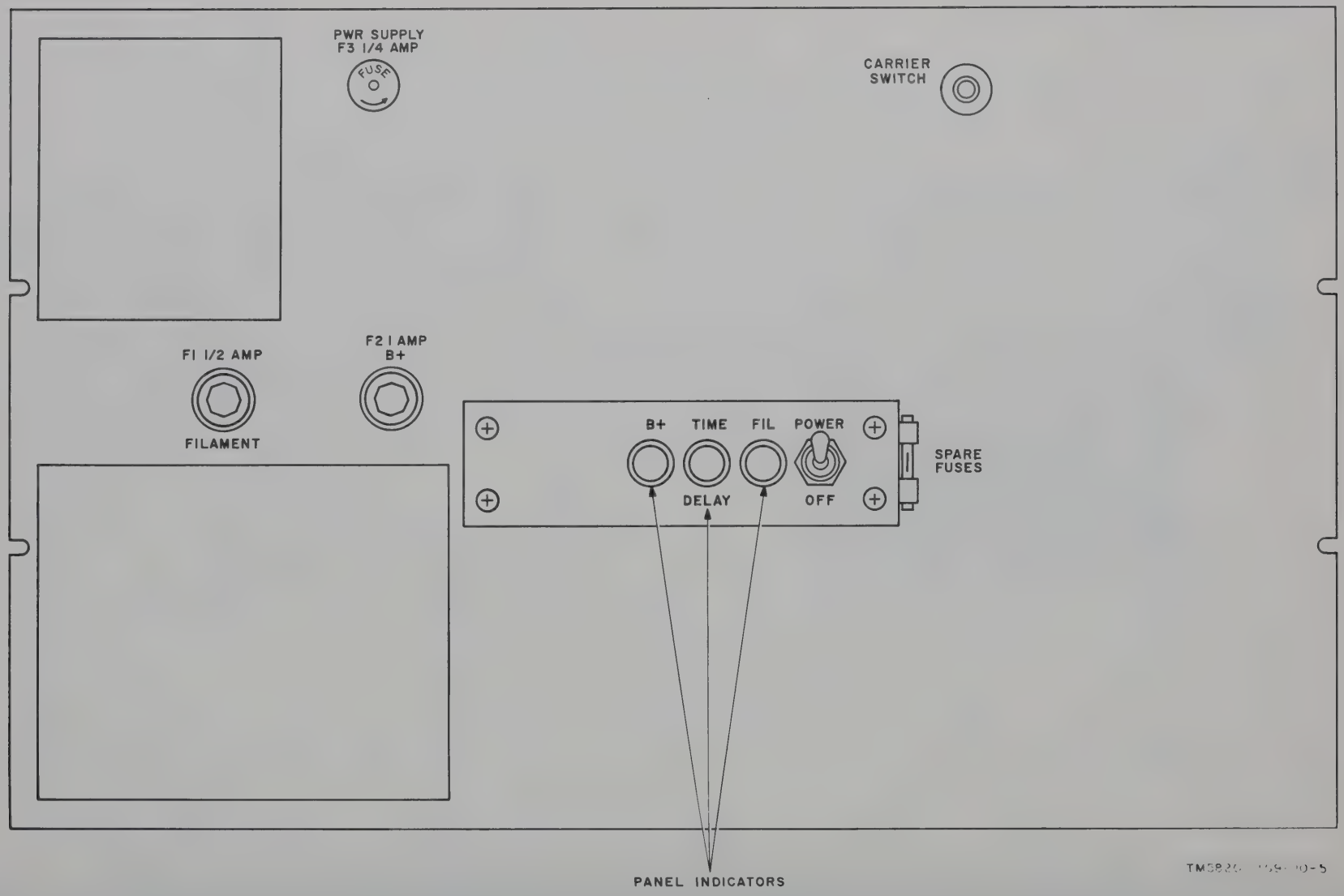


Figure 20. Modulator-Multiplier MD-465/TRC-80, controls and indicators.

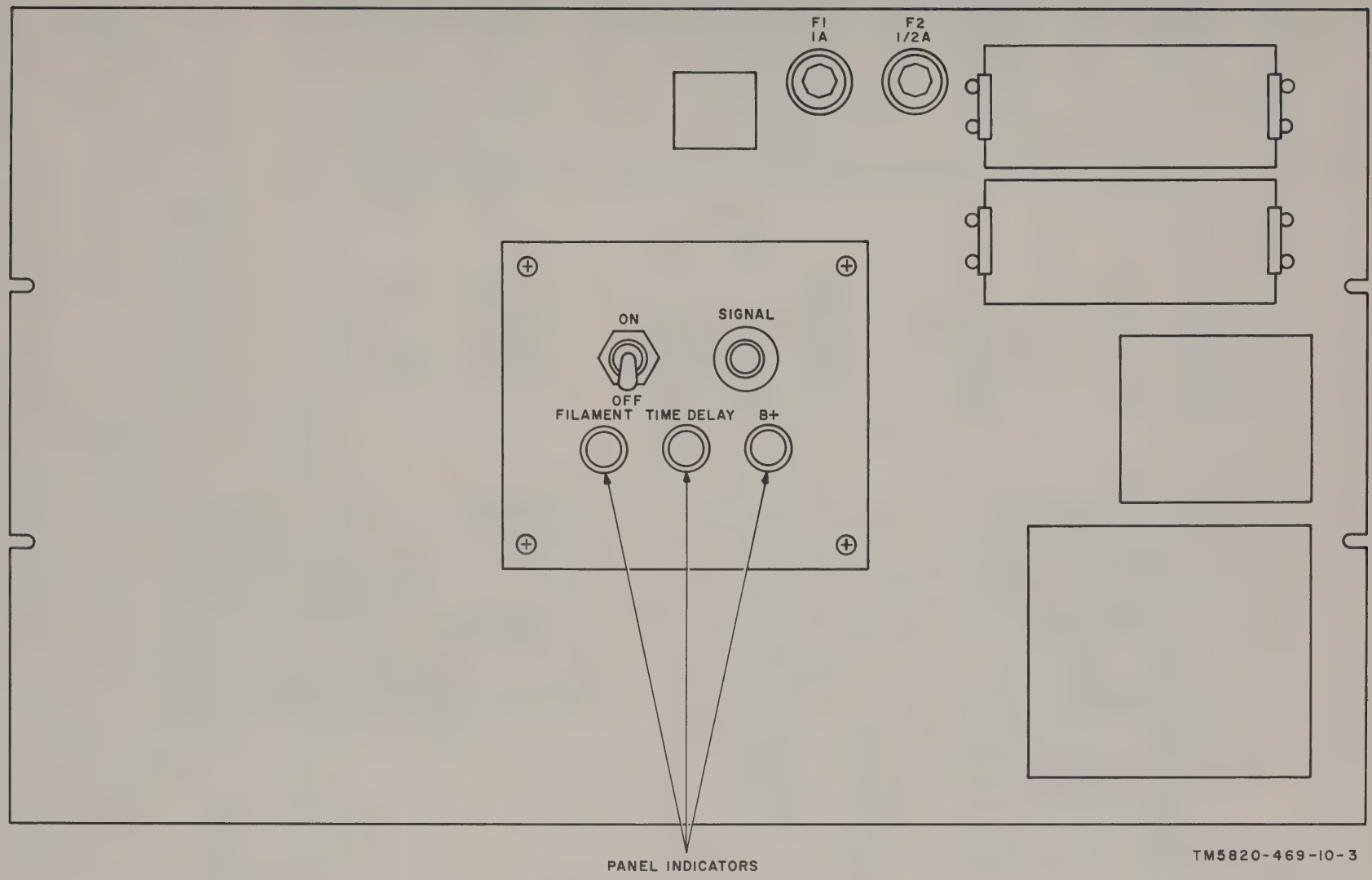


Figure 21. Demultiplexer-Multiplexer TD-550/TRC-80, controls and indicators.

31. General

Rack A2 contains most of the control equipment. This equipment consists of the engine-generator control panel, the power distribution panel, communication control panel, teletypewriter, teletypewriter switch panel, the telegraph terminal and the generator auxiliary panel. The complete rack is illustrated in figure 5. Paragraphs 32 through 36 describe the controls and indicators, and figures 22 through 26 illustrate the individuals panels.

32. Engine-Generator Control Panel (fig. 22)

Note: The engine-generator control panel is used for monitoring primary power. This panel may be used to make voltage and frequency adjustments on the engine generator. The starting panel (fig. 36) for the engine is located on the engine generator.

Control or indicator	Function
Engine running hour-meter.	Indicates accumulated operating time of engine generator.
Battery ammeter ---	Zero-center meter indicates whether battery is charging or discharging. Normally indicates slight charge when engine generator is operating at rated speed.
Voltmeter----------	Indicates line-to-line voltage of generator. Normally indicates 208 volts.
Frequency meter ---	Indicates engine-generator output frequency.
HEAD TEMPERATURE indicator.	When lighted, indicates that engine cylinder temperature exceeds 500° F.
OIL PRESSURE indicator.	When lighted, indicates that engine lubricating pressure is below normal pressure.
OVER FREQUENCY indicator.	When lighted, indicates that engine-generator output frequency exceeds 440 cycles.
UNDER FREQUENCY indicator.	When lighted, indicates that engine-generator output frequency is below 360 cycles.
OVER VOLTAGE indicator.	When lighted, indicates that voltage exceeds 292 volts for more than 180 milliseconds.
UNDER VOLTAGE indicator.	When lighted, indicates that voltage between line-to-neutral is below 75 volts.
BATTLE SHORT indicator.	When lighted, indicates that BATTLE SHORT switch is at ON.
POWER ON indicator	When lighted, indicates that main load contactor is energized by LOAD CONTROL switch at ON.
EMERGENCY ENGINE SHUTDOWN switch.	Normally at RUN. When at STOP, provides operator with emergency shutdown capability and turns on EMERGENCY SWITCH ON light on the starting panel.
VOLTAGE CONTROL rheostat.	Provides adjustment of line voltage after engine reaches operating speed.
RESET AND FIELD FLASH pushbutton switch.	Removes power from engine-generator safety circuits momentarily for reset, and simultaneously applies battery power to flash (polarize) generator field to obtain line voltage.
FREQUENCY CONTROL switch.	Permits fine adjustment of engine generator output frequency.
BATTLE SHORT switch.	Bypasses all safety circuits except engine generator overspeed.
LOAD CONTROL switch.	Provides means to energize (ON) and deenergize (OFF) main load contactor.
Main generator circuit breaker (located on engine generator).	Protects engine generator from external short circuit.

33. Power Distribution Panel SB-1565/TRC-80 (fig. 23)

Control or indicator	Function
RACK POWER switch ----------	Controls application of power to racks.
RACK BLOWERS switch ----------	Controls application of power to rack blowers.

Control or indicator	Function
FLUSHING BLOWER switch	Controls application of power to flushing blower.
HUT LIGHTS switch	Controls application of power to hut lights. *Note:* Hut lights will not light unless the shelter door is closed or door INTERLOCK BY PASS switch (fig. 35) is placed in the BY PASS position.
DEMULT-MULT-MOD SELECTOR switch S1.	*Sw pos* / *Function* LOCAL — Used in nondiversity operation to connect modulator-multiplier to transmit output of multiplexer. PARALLEL — Used in diversity operation. In this switch position, the multiplexer in the control radio set drives the modulator-multipliers of both radio sets. (In the slave radio set, this switch must be at REMOTE when S1 in the control radio set is at PARALLEL.) REMOTE — Used in diversity operation to connect the multiplexer output from the control set to the modulator-multiplier of the slave set (fig. 48).
LOCAL-REMOTE COM CONTROL SELECTOR switch S2.	CONTROL — Activates circuits in control panel and teletypewriter equipment. TIE — Used in diversity operation to transfer incoming wire line facilities to the control radio set. SLAVE — Used in diversity operation to activate circuits in control panel and teletypewriter equipment in the control radio set when incoming wire line facilities are connected to the tie-slave radio set (fig. 49).
RACK POWER indicator	When lighted, indicates that power is applied to rack-mounted equipment.
RACK BLOWERS indicator	When lighted, indicates that power is applied to rack blowers.
FLUSHING BLOWER indicator	When lighted, indicates that power is applied to flushing blower.
HUT LIGHTS indicator	When lighted, indicates that power is applied to hut lights.
AIR FAILURES indicators: RACK 1, RACK 3 and RACK 4 and 5.	When lighted, indicate air failures of respective rack blower.
RECEIVER connector jacks J8 through J12.	When connected as shown in figure 23, output of receive converter No. 1 is fed to if. amplifier No. 1, and output of receive converter No. 2 is fed to if. amplifier No. 2. In diversity operation, signals are routed as illustrated in figures 48 and 49.

34. Communication Control Panel SB-1564/TRC-80 (fig. 24)

Control or indicator	Function
POWER pushoutton switch (white)	Alternate action. Turns primary ac power to control panel on and off. Backlighted brightly when on.
MONITOR pushbutton switches (4) (white)	Alternate action. Provides monitoring, by use of loudspeaker of any combination of following parties: DISCRETE, INTERCOM, VEHICLE, and SPARE. Backlighted dimly when off, brightly when on.
RING pushbutton switch (white)	Momentary action. Connects ringing signals to selected party. Backlighted dimly when off, flashes brightly when operated.
TEST SIGNAL pushbutton switch (alternate amber or green). *Note:* Disables 1,600-cps detector when on.	Alternate action. Provides continuous 1,600-cps, 0-dbm test tone. Backlighted dimly when off, brightly when on. Backlighted amber when COMMAND line is available to pts DISCRETE line. Backlighted green when COMMAND line is available to operator.
DISCRETE pushbutton switch (alternate amber or green).	Momentary action. Releases any previously engaged pushbuttons and connects DISCRETE line and local operator to one another; interlocks in-out signaling. Backlighted amber when pts or operator is connected to selected party. Backlighted green when local operator is connected to DISCRETE line.
DISCRETE LINE SEL COMMAND ARMY pushbutton (amber).	Alternate action. Selects either COMMAND or ARMY line so that it will be available for connection to DISCRETE line. At the same

Control or indicator	Function
	time, makes the line that is not connected to DISCRETE line available to local operator.
COMMAND pushbutton switch (alternate amber or green).	Momentary action. Connects COMMAND line to either DISCRETE line or local operator, depending on DISCRETE LINE SEL position. Backlighted dimly when off. Backlighted brightly amber when connected to DISCRETE line. Backlighted brightly green when connected to local operator.
ARMY pushbutton switch (alternate amber or green).	Momentary action. Connects ARMY line to either DISCRETE line or local operator, depending on DISCRETE LINE SEL position. Backlighted amber when connected to DISCRETE line. Backlighted green when connected to local operator.
ARMY TELEPHONE pushbutton switch:	Alternate action.
2 WIRE (white)	Provides 2-wire telephone operation to army net.
4 WIRE (white)	Provides 4-wire telephone operation to army net.
DC TTY pushbutton switch:	Alternate action.
PTS (white)	Connect pts 2-wire dc teletypewriter loop in series with local dc receive teletypewriter loop.
ARMY AND PTS (white)	Connects army 2-wire dc teletypewriter loop into a half-duplex loop in series with AN/TRC-80 operating facilities and pts facilities, disabling normal local teletypewriter capabilities.
VF TTY pushbutton switch:	Alternate action.
COMMAND (white)	Provides 4-wire voice-frequency teletypewriter loop through AN/TRC-80 radio circuit.
ARMY (white)	Provides 4-wire voice-frequency teletypewriter loop to ARMY line.
INTERCOM pushbutton switch (green)	Momentary action. Connects INTERCOM line to local operator. Backlighted dimly when off, brightly when on.
VEHICLE pushbutton switch (green)	Momentary action. Connects vehicle radio set line to local operator. Backlighted dimly when off, brightly when on.
SPARE pushbutton switch (green)	Momentary action. Connects SPARE line to local operator. Backlighted dimly when off, brightly when on.
TEST SIGNAL LEVEL control	Adjusts level of test signal.
SPEAKER VOLUME control	Adjusts audio level to panel-mounted speaker.
HEADSET VOLUME control	Adjusts audio level to headset receiver.
HEADSET connector	Provides connection for operator's headset.

35. Teletypewriter Switch Panel (fig. 25)

Control or indicator	Function
OPERATING MODE switch:	
NORMAL DC LOOP	Provides normal 2-wire dc tty loop.
VF 2W/4W	Provides for connecting vf tty from pts facility to AN/TRC-80 radio circuits.
LINE TEST position	Used by higher echelon maintenance personnel for adjusting line balance in conjunction with 3 positions of the REMOTE DISTANCE switch.
PTS-BY PASS switch	At ON, permits AN/TRC-80 operator to bypass pts teletypewirter.
REMOTE DISTANCE switch	Selects proper hybrid balance network for line in use. SHORT: less than 1/2 mile. MED: 1/2 to 1 mile. LONG: 1 mile and over.
LIGHTS NORMAL-DIM switch	Provides either NORMAL or DIM shelter lighting.
120V 400 CPS outlets	Provide 120-volt ac power for the TH-5A/TG and the teletypewriter set.

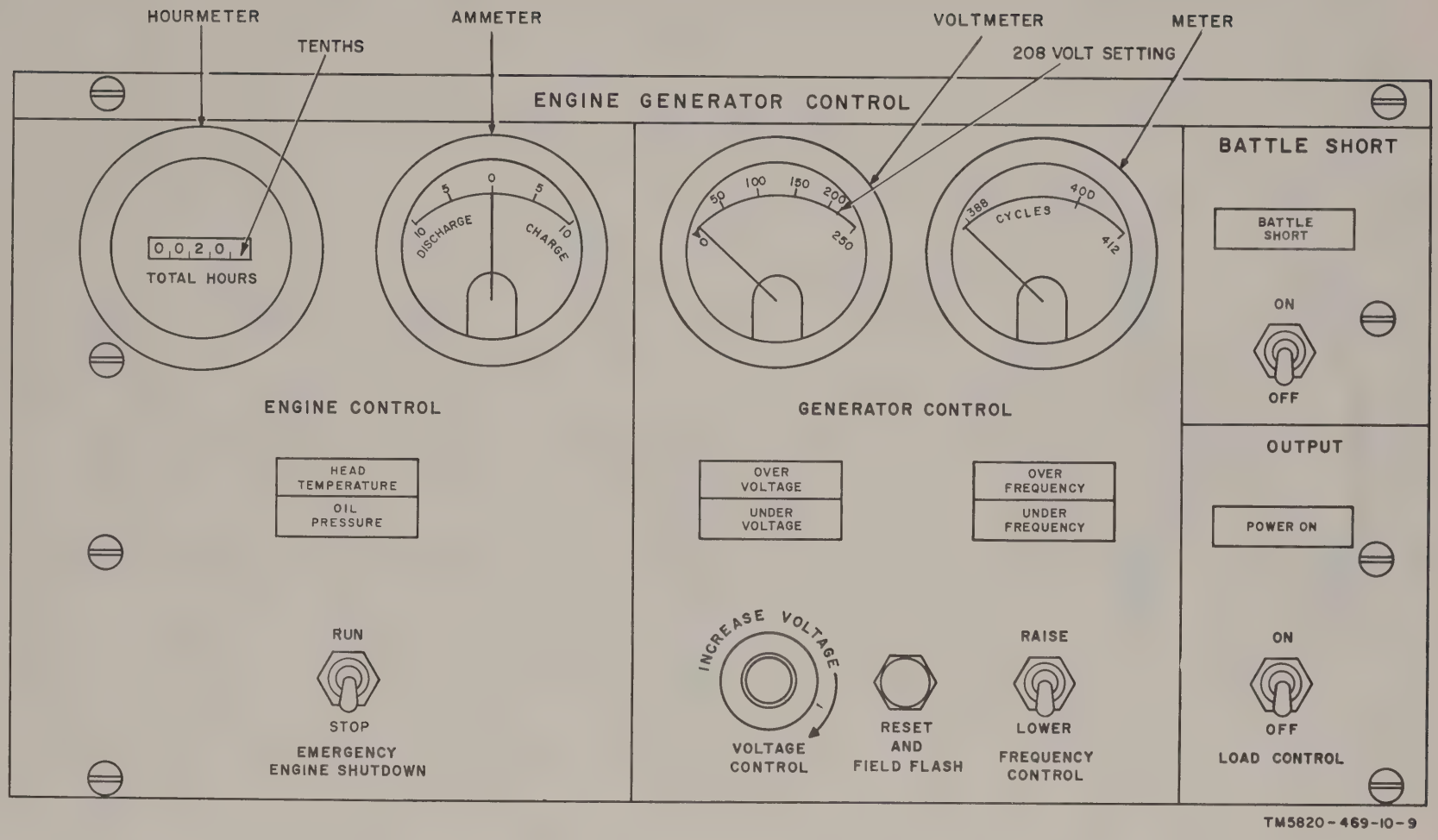


Figure 22. Engine-generator control panel, controls and indicators.

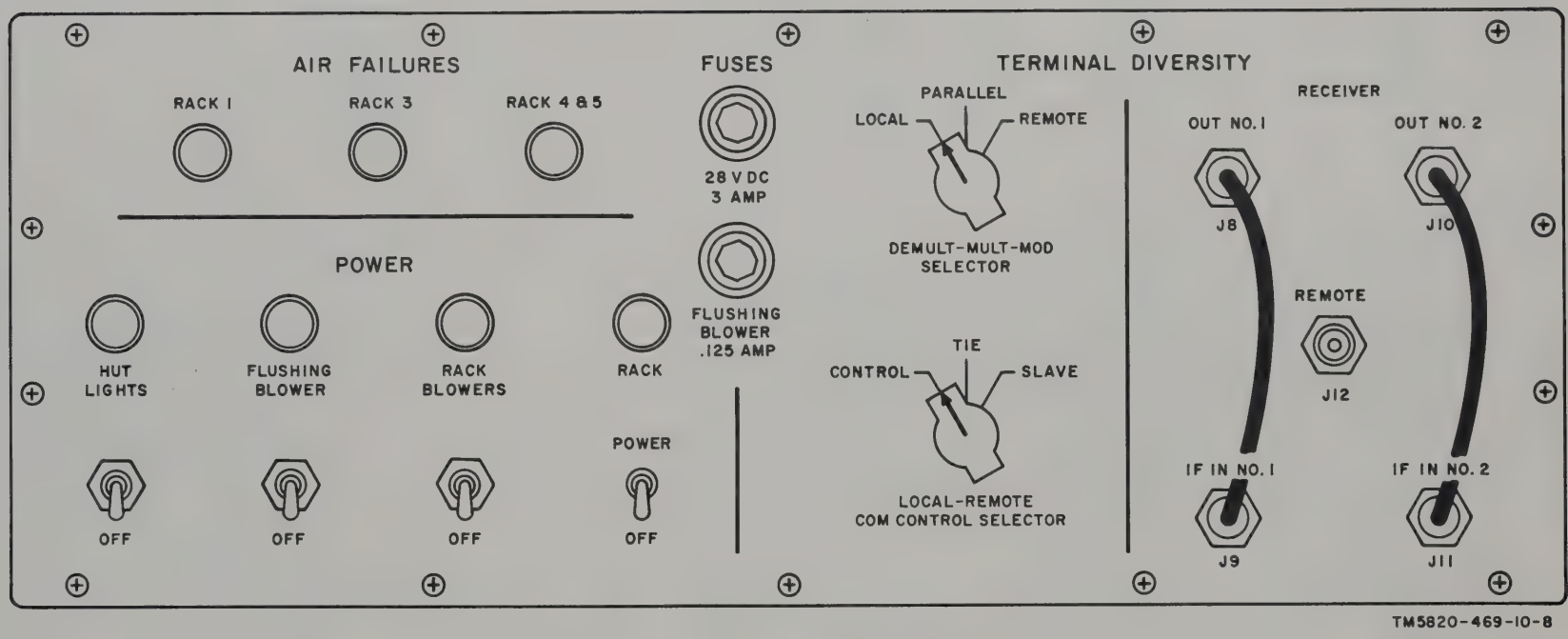


Figure 23. Power Distribution Panel SB-1565/TRC-80, controls and instruments.

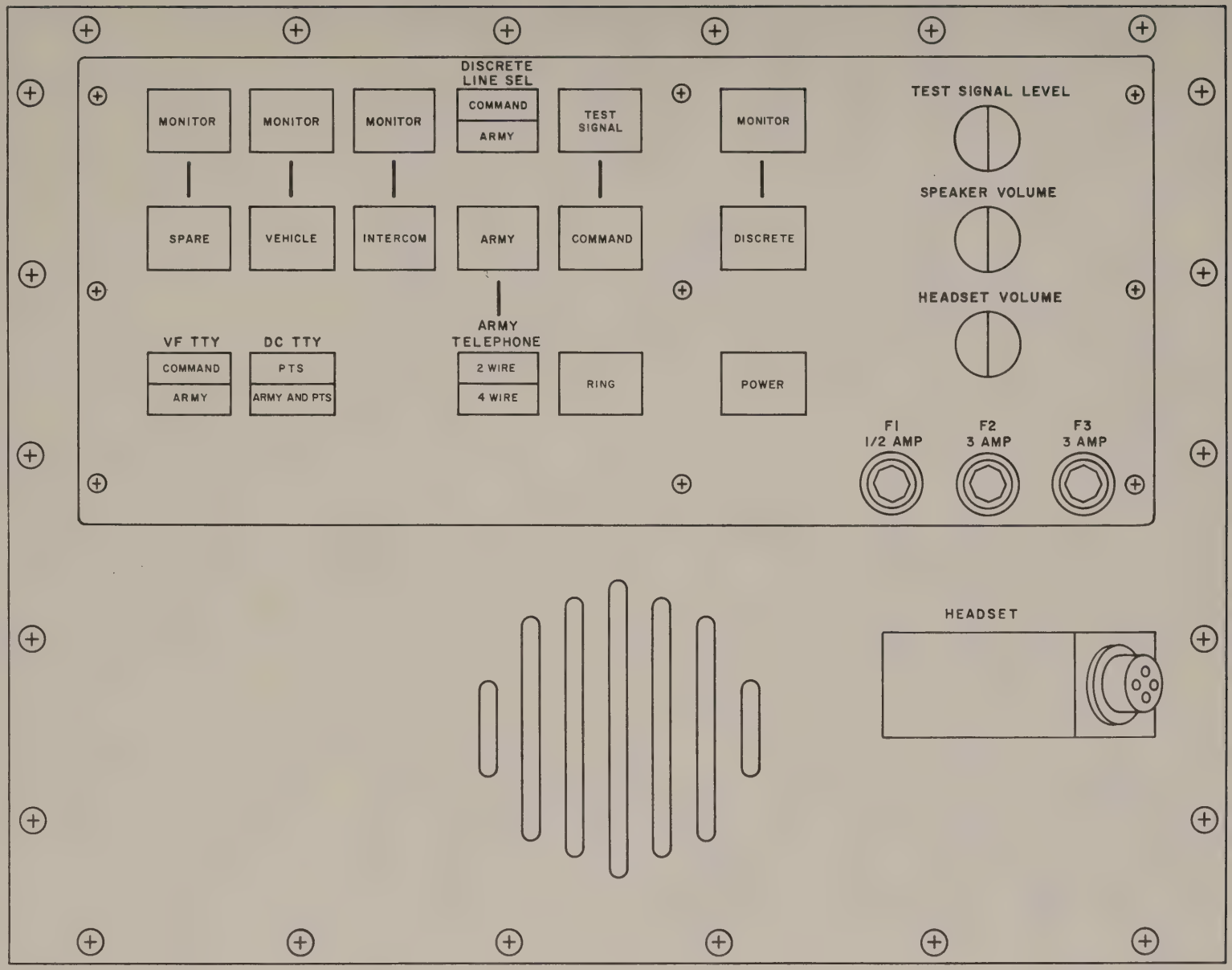


Figure 24. Communication Control Panel, SB-1564/TRC-80 controls and indicators.

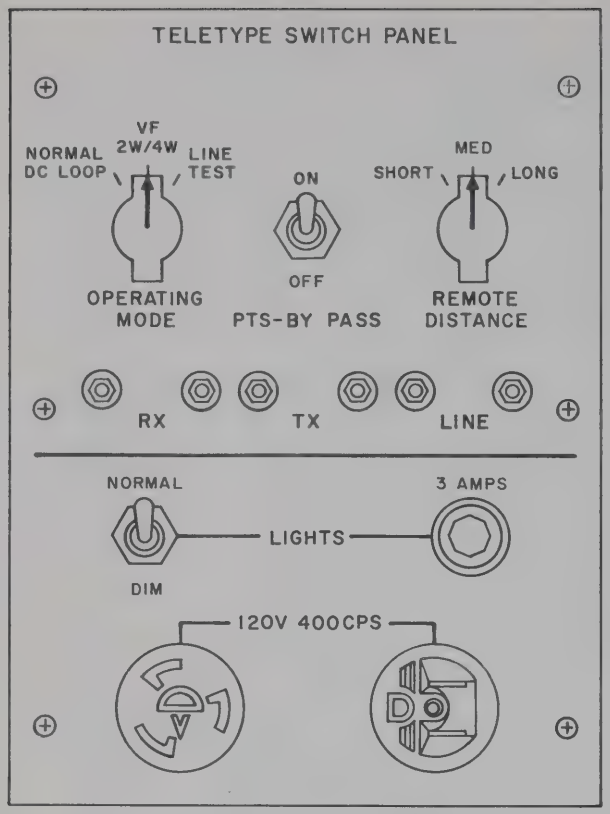


Figure 25. Teletypewriter switch panel, controls.

36. Telegraph Terminal TH-5A/TG (fig. 26)

Note: When the TH-5A/TG is used with the AN/TRC-80 the NORM-REC-SEND switch is always set in the NORM position and the 4W-2W-TEL switch should be set in the 4W position.

Control or indicator	Function
NORM-REC-SEND switch.	**Arranges TH-5A/TG for operation on either wire or radio circuits:** *Sw pos* — *Arranges* **NORM ---- For transmitting or receiving over 2- or 4-wire circuits.** **REC------ For receiving over radio link.** **SEND ---- For transmitting over radio link.**
4W-2W-TEL switch.	**Arranges TH-5A/TG for type of line circuit used in either teletypewriter or telephone operation.** *Sw pos* — *Arranges* **4W------- For operation on 4-wire line circuit.** **2W------- For operation on 2-wire line circuit.** **TEL------ For talking and signaling over telephone circuits.**
RING switch ----	**Controls signaling and buzzer equipment.** *Sw pos* — *Arranges* **Operated (down) — Connects power to ringing generator and applies 20-cps signal to either 2W or 4W-S binding posts.** **Unoperated (vertical) — Connects buzzer circuit and receiver-disabling circuit (REC. jack) across either 2W or 4W-R binding posts.**
Panel indicator--	**Provides visual indication (2W operation only) that TH-5A/TG is prepared to transmit teletypewriter impulses.**

36.1. Telegraph Terminal TH–22/TG (fig. 26.1)

Note. When the TH–22/TG is used with the AN/TRC–80 or –80A, set the NORM-REC-SEND switch to NORM and the 4W-2W-TEL switch to 4W.

Control, indicator, or fuse	Function
THRESHOLD indicator lamp.	Lights to indicate low signal or no signal present at 4WS/TEL or 2W/4WR terminal.
BOOST (spring-return toggle) switch.	When set to the up position, boosts output break-in signal amplitude.
BREAK IN (spring-return rotary) switch.	Initiates break-in function during telegraph communication over 2-wire line facility.
RESET (spring-return toggle) switch.	Silences the break-in aural tone and also stops the local and remote teletypewriters from running open.
RING (spring-return rotary) switch.	Initiates vf or 20–cps ringing signal.
115VAC–230VAC–26VDC (3-position screwdriver) switch.	Selects one of three operating voltages.
Power indicator lamp	Lights to indicate that power is applied to the unit.
ON/OFF (2-position toggle) switch.	Controls application of power to the unit.
NORM-REC-SEND (3-position rotary) switch.	Arranges unit for either wire or for radio operation. When set to: (1) NORM, unit is set for operation over wire lines. (2) SEND, unit is set for transmitting over radio circuits. (3) REC, unit is set for receiving over radio circuits.
4W-2W-TEL (3-position screwdriver) switch.	Arranges unit for type of line facility (2-wire or 4-wire) telegraph operation or for telephone operation.
VF-20 (2-position) switch	Produces output signal frequency at 1,232.5 cps (VF position) or cps (20 position).
MODE ONE/MODE TWO (2-position rotary) switch.	Arranges the unit for one of two output word rates. When set to: (1) MODE ONE, output rate of 60, 75, or 100 words per minute is produced. (2) MODE TWO, output rate of 200 words per minute is produced.
115/230VAC 1/4A fuse	Protects the parts in TH–22/TG from overload during 115- or 230-volt ac operation.
26VDC (2A) fuse	Protects the parts in TH–22/TG from overload during 26-volt dc operation.

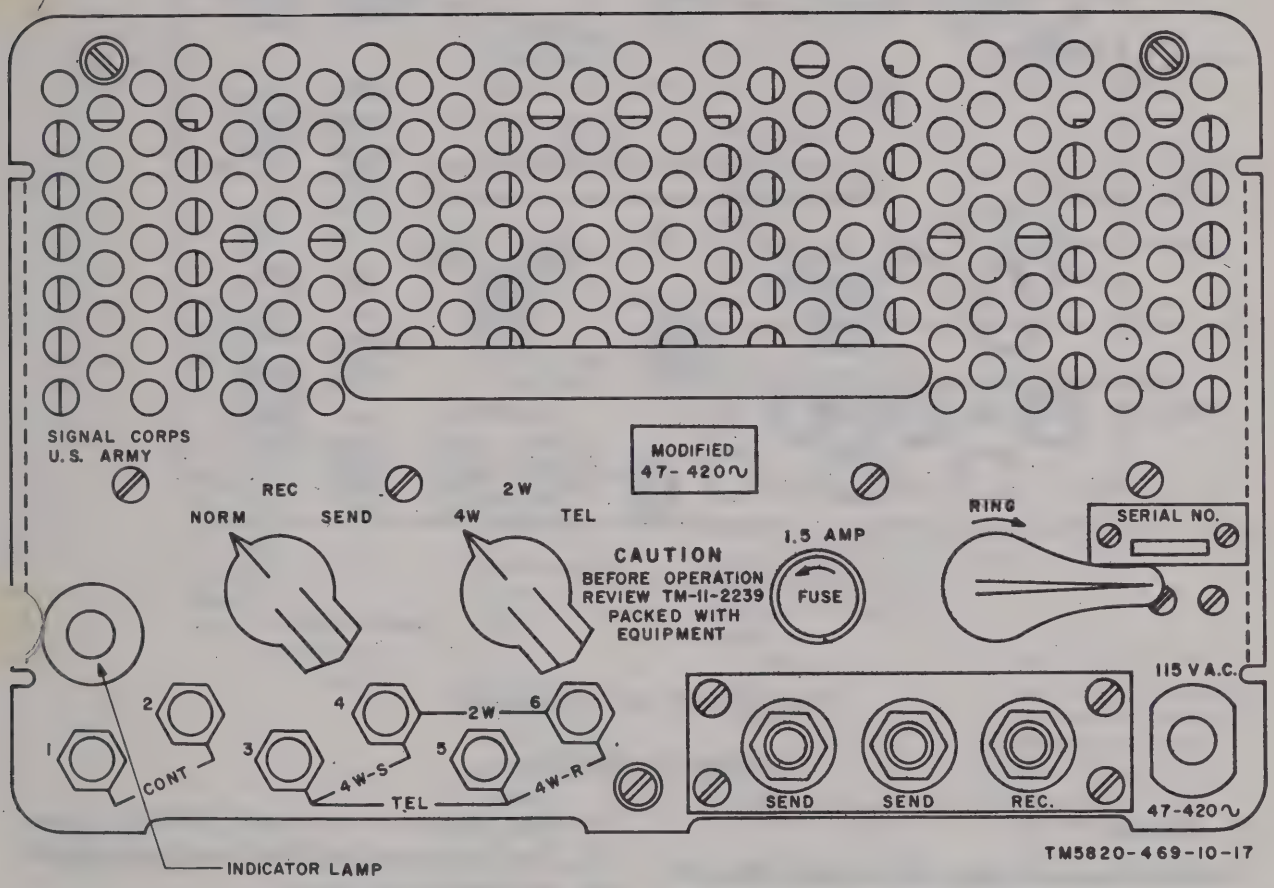


Figure 26. Telegraph Terminal TH-5A/TG, controls and indicators.

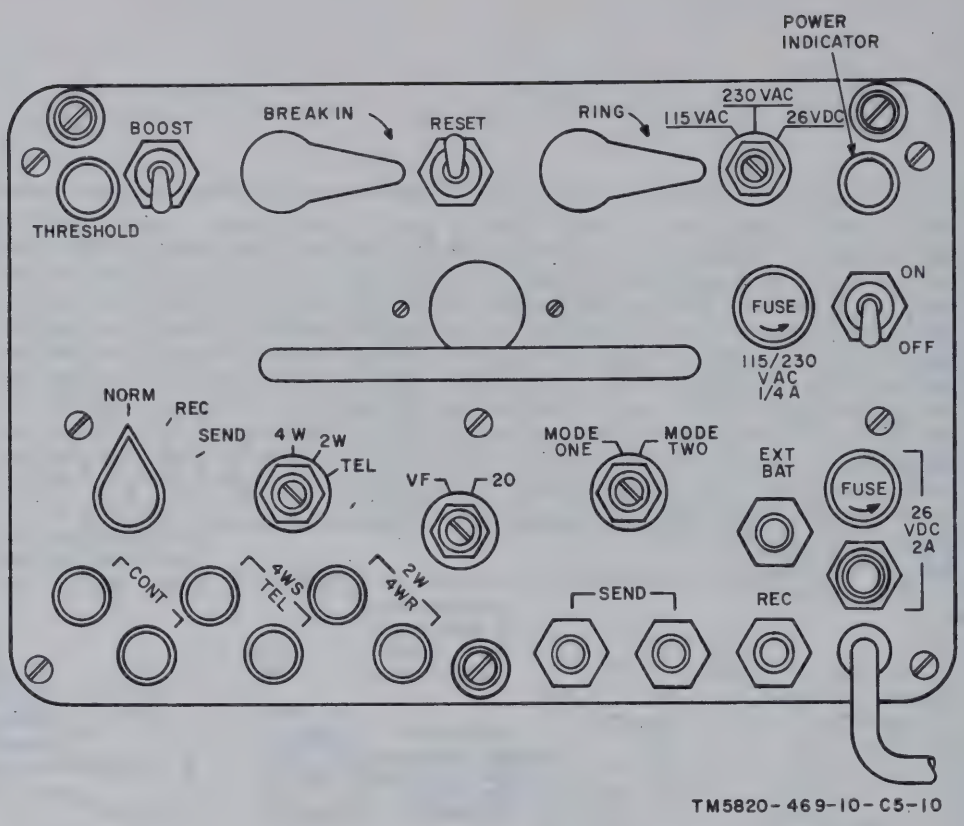


Figure 26.1. TH–22/TG front panel.

Section III. RACK A3

37. General

Rack A3 contains three Electrical Frequency Synthesizers 0–937/TRC–80 (fig. 6). One synthesizer is used with the transmitting equipment. The other two synthesizers are used with the two receivers. The front panels of all three units are identical. The only other equipment mounted in this rack is the blower. This blower, located at the base of the rack, contains no controls and is turned on automatically when power is applied to the synthesizers.

37.1. Rack A3, AN/TRC–80A Only

(fig. 6.1)

Rack A3 of the AN/TRC–80A contains three Electrical Frequency Synthesizers 0–1462A/TRC, a storage cabinet, and a blank panel. The frequency synthesizers are used in the same manner as the 0–937/TRC–80 (para 37). The front panels of the three synthesizers are identical.

38. Electrical Frequency Synthesizer 0–937/TRC–80

(fig. 27)

a. Meter Panel.

Control or indicator	Function
PWR ON-OFF switch.	Controls application of primary power.
Meter	Indicates circuit conditions selected by meter selector switch.
Meter selector switch.	Connectes meter to any one of 10 circuits.

Sw pos	Causes meter to indicate
OSC 3:	
AGC	Agc voltage applied to oscillator No. 3.

Control or indicator	Function	
	Sw pos	Causes meter to indicate
	OUT	Output voltage of oscillator No. 3.
	OSC 2:	
	AGC	Agc voltage applied to oscillator No. 2.
	OUT	Output voltage of oscillator No. 2.
	OSC 1:	
	AGC	Agc voltage applied to oscillator No. 1.
	OUT	Output voltage of oscillator No. 1.
	MIXER 1:	
	AGC	Agc voltage applied to mixer No. 1.
	OUT	Output voltage of mixer No. 1.
	MIXER 2:	
	AGC	Agc voltage applied to mixer No. 2.
	OUT	Output voltage of mixer No. 2.
FIL indicator	When lighted, indicates power is applied to filaments.	
B+ indicator	When lighted, indicates B+ is available from dc power supply.	
DELAY indicator.	When lighted, indicates that 30-second time delay relay contacts have closed and primary power is applied to 200-volt dc power supply.	
OVEN indicators	When lighted, indicate that power is applied to crystal ovens.	

b. Tuning Controls.

Control or indicator	Function
OSCILLATOR NO. 1 CHANNEL NO. UNITS switch.	Selects last digit of channel number.
OSCILLATOR NO. 2 CHANNEL NO. TENS switch.	Selects second digit of channel number.
OSCILLATOR NO. 3 CHANNEL NO. HUNDREDS switch.	Selects first digit of channel number.
MIXER NO. 1 LAST 2 DIGITS OF CHANNEL NO. switch.	Selects last two digits of channel number.
MIXER NO. 2 CHANNEL NO. switch.	Selects hundreds digits of channel number.
Dial LOCK (on mixer No. 1 and mixer No. 2 panels).	Locks tuning controls on mixers.

38.1. Electrical Frequency Synthesizer 0,1462A/TRC, AN/TRC-80A Only (fig. 27.1)

a. Switch Panel.

Control or indicator	Function
MEGAHERTZ selector switches (from left to right):	
First	Fixed indicator, always indicates 4 (thousands).
Second	Selects second digit of selected frequency (hundreds).
Third	Selects third digit of selected frequency (tens).
Fourth	Selects fourth digit of selected frequency (units).
Fifth	Selects fifth digit of selected frequency (tenths).
Sixth	Selects sixth digit of selected frequency (hundredths).

b. Fault Panel.

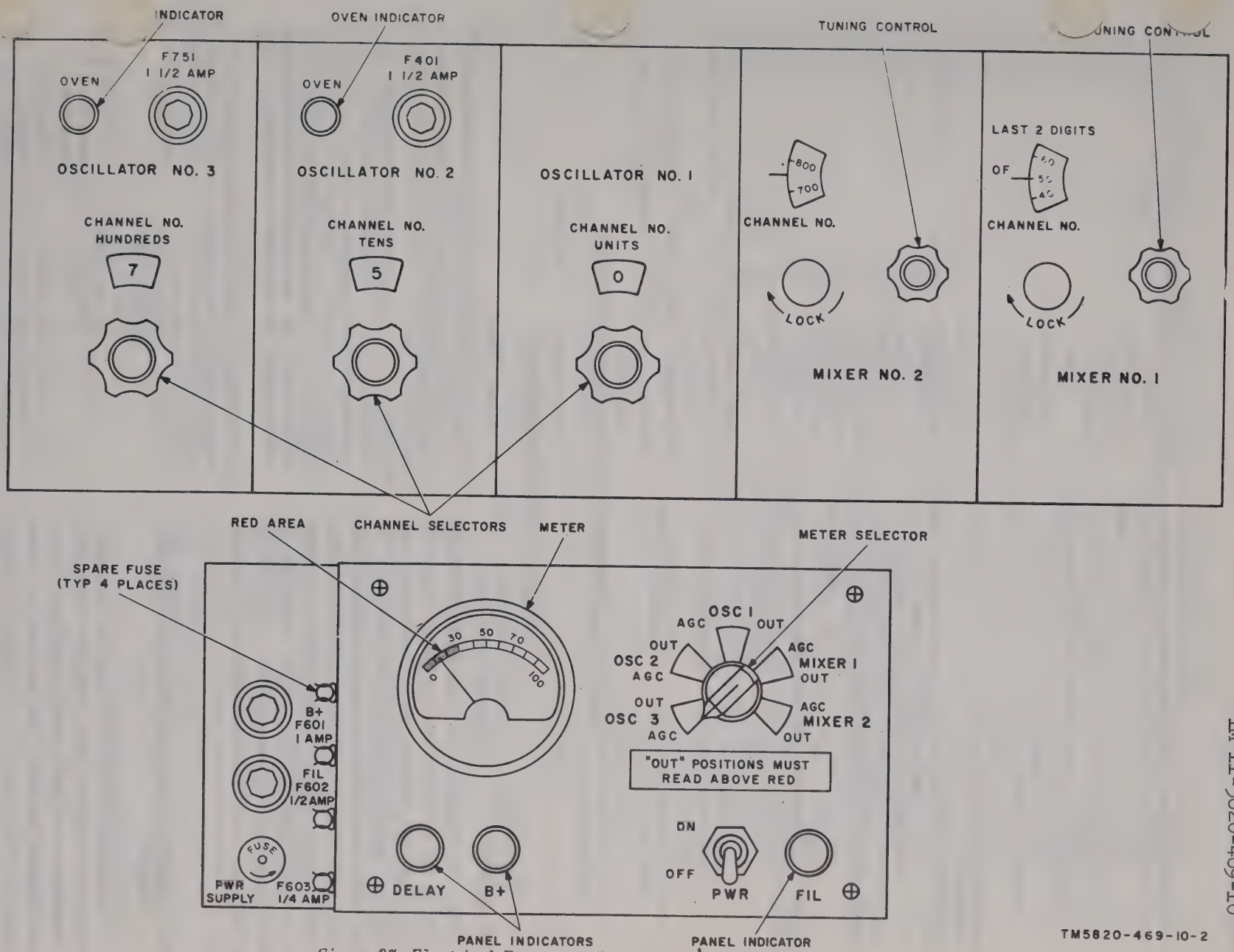
Indicators	Function
POWER indicator	When lighted, indicates primary power is applied.
OUT OF LOCK indicators	Indicates a phase difference (error voltage) between output and reference frequencies.

c. Power Panel.

Switch	Function
POWER ON-OFF switch	Controls application of primary power.

d. Rf Module Front Panel.

Controls or indicator	Function
MHZ tuning control	Tunes synthesizer output.
TUNING VOLTAGE meter.	Indicates level of loop voltage (tune to midscale).
POWER OUTPUT-INCREASE.	Adjusts the level of the synthesizer output.



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Figure 27. Electrical Frequency Synthesizer O-937/TRC-80, controls and indicators.

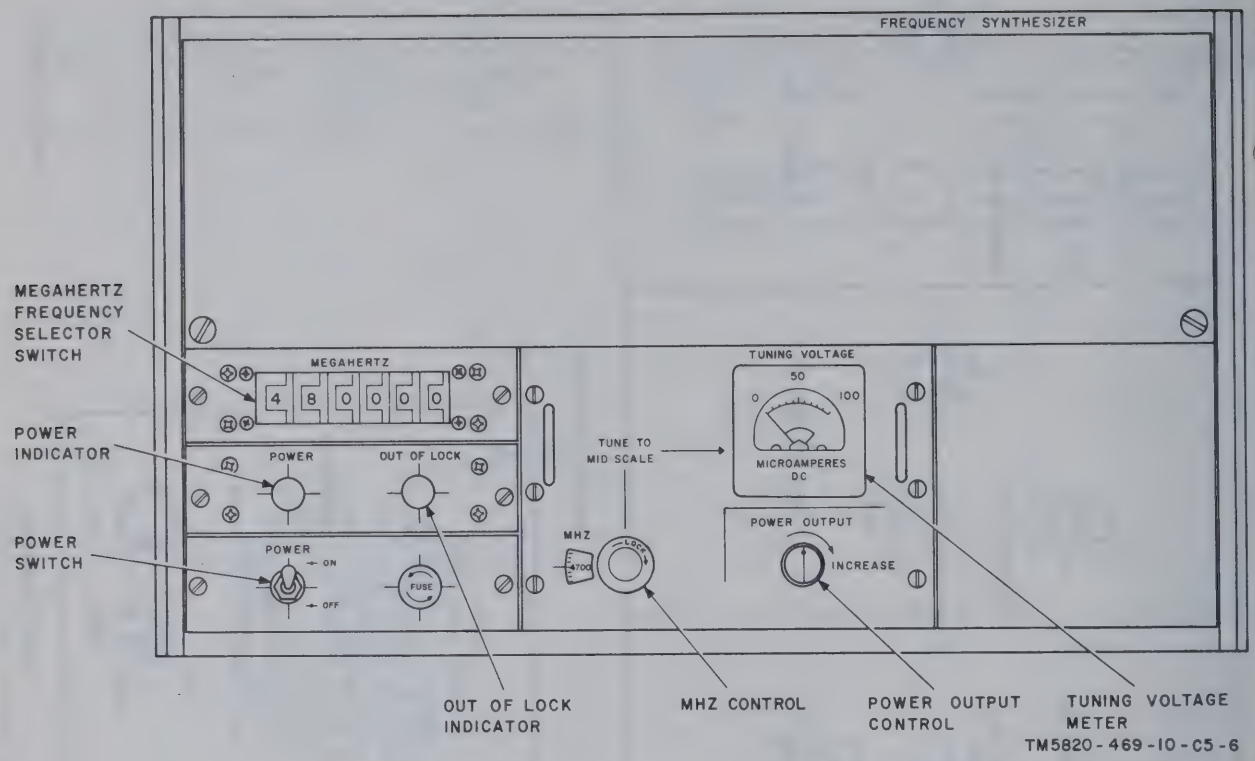


Figure 27.1. Electrical Synthesizer 0–1462A/TRC, AN/TRC–80A.

Section IV. RACKS A4 AND A5

39. General

The two receivers in either configuration (fig. 9, 10 AN/TRC–80, or 9.1, 10.1 AN/TRC–80A) are similar, and all associated controls for each configuration are identical. The only difference between the two racks is that rack A4 contains a blower (provides cooling for both racks) and rack A5 contains a converter power supply for the receive converter located in rack A4. The controls for both receivers are described in paragraphs 40 through 44.

40. Amplifier-Converter AM–3302/TRC–80 (fig. 53)

The AM–3302/TRC–80 (receive converter) consists of a meter panel, varactor multiplier, preselector, oscillator unit, multiplier unit, and a phase shifter. The controls on these units are described in *a* through *d* below:

a. Meter Panel.

Control	Function
XTAL CURRENT ADJUST control.	Adjusts crystal current.
TUNE-UP SIGNAL pushbutton switch.	Applies B+ to 70-mc oscillator for application of tuneup signal.
TUN. DET METER ADJUST control.	Controls sensitivity of meter when METER FUNCTION SELECTOR switch is at J-TUN. DET.
METER FUNCTION SELECTOR switch.	Connects meter to any one of 14 circuits.

Sw pos	Causes meter to indicate
A (not used).	
NULL A (not used).	
B	Output of crystal detector of oscillator unit.

Control	Function
	Sw pos — Causes meter to indicate
	C — Cathode current of V2 of multiplier unit.
	D — Cathode current of V3 of multiplier unit.
	E — Cathode current of V4 of multiplier unit.
	F — Output of tripler cavity.
	G — Diode current of varator multiplier.
	H-XTAL CUR. — Crystal current.
	J-TUN. DET. — Output if signal level.
	AGC — Agc control voltage.
	70 MC — Crystal current of tuneup mixer.
	B+ — SET POINT.
	RECEIVE SIG DET. — Combiner control voltage of if. amplifier.
Meter	Indicates levels of signals selected by METER FUNCTION SELECTOR switch.

b. Oscillator Unit.

Note. The panel marking B alongside the controls indicates the position in which the METER FUNCTION SELECTOR switch must be placed to measure the circuit affected by the control. (The REF marking is used to align the knob after removal.)

Control	Function
EXT-INT switch	Selects either external of internal oscillator. (Normally locked in EXT position.)
C1 A (not used)	
C2 B	Tunes plate circuit of V2.
C3 B	Tunes plate circuit of V3.
C4 B	Tunes plate circuit of V4.

c. Multiplier Unit.

Note. Panel markings C, D, E, and F correspond to the METER FUNCTION SELECTOR switch positions.

Control	Function
C3 C	Tunes input cathode tank circuit of V1.
C6 C	Tunes plate tank circuit of V1.
C14 D	Tunes plate tank circuit of V2.
C22 E	Tunes plate tank circuit of V3.
Tuning control F	Tunes tripler cavity.

d. Varactor Multiplier, Phase Shifter, and Preselector.

Control	Function
Varactor multiplier:	
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes output cavity of varactor multiplier.
Phase shifter	Adjusts phase of rf input signal for best mixer operation.
Preselector	Tunes preselector cavities to select desired frequency.

40.1 Amplifier-Converter AM 6099/TRC 80A, AN/TRC–80A (fig. 53.1)

a. Meter Panel.

Control	Function
TUNE-UP SIGNAL pushbutton switch.	Applies B+ to 70-mc oscillator for application of tuneup signal.
TUN. DET METER ADJUST control.	Controls sensitivity of meter when METER FUNCTION SELECTOR switch is at J-TUNE. DET.
METER FUNCTION SELECTOR switch.	Connects meter to any one of six circuits.
	Sw pos — Causes meter to indicate
	G — Diode current of varactor multiplier.
	H-XTAL CUR. — Crystal current.
	J TUN. DET. — J TUN. DET. level.

Control	Function
	Sw pos — Causes meter to indicate
	70 MC — Crystal current of tuneup mixer.
	B+ — SET POINT
	RECEIVE SIG DET. — Combiner control voltage of if. amplifier.

b. Varactor Multiplier, Phase Shifter, and Preselector.

Control	Function
Varactor multiplier:	
Tuning control G	Tunes input cavity of varactor multiplier.
Tuning control H	Tunes output cavity of varactor multiplier.
Phase shifter	Adjusts phase of rf input signal for best mixer operation.
Preselector	Tunes preselector cavities to select desired frequency.

41. Intermediate Frequency Amplifier AM–3288/TRC–80 (fig. 28)

The AM–3288/TRC–80 (if. amplifier) contains no operating controls. The if. amplifier is turned on when the if. amplifier power supply (para 42) is turned on.

Caution: **Meter M1 and meter selector switch S1 are used by the operator *only* to check operating conditions. The operator is authorized to perform only the adjustments specified in paragraph 63*b*.**

Control or indicator	Function	
Meter selector switch S1 ----------	*Sw pos*	*Causes meter to indicate*
	RCVR GAIN 6 ----	Signal level of if. stages.
	COMB. V. -------	Level of combiner control voltage applied to if. amplifier module. Used in conjunction with TUNE-UP SIGNAL S2, located on receive converter.
	XTAL CURRENT 6-14.	Current in balanced crystal mixer of receive converter.
Meter M1 ----------	Indicates circuit conditions within circuit selected by selector switch S1.	

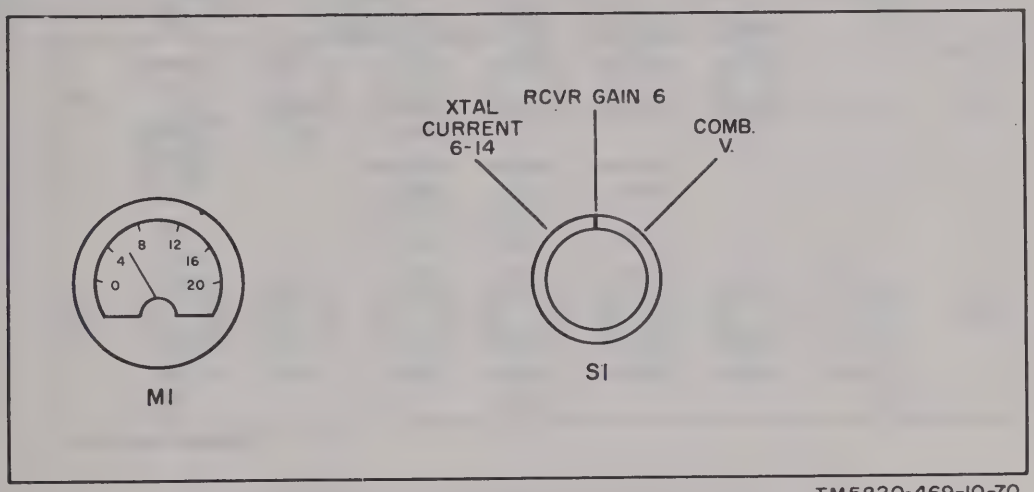


Figure 28. If. amplifier, front panel meter and switch.

42. Power Supply PP-3313/TRC-80 (fig. 29)

Two PP-3313/TRC-80's (if. power supplies) are used. Each if. power supply applies operating potentials to its respective if. amplifier panel.

Control or indication	Function
POWER ON-OFF switch----------	Controls application of primary power to power supply.
POWER indicator ----------	When lighted, indicates primary power is applied to power supply.
TIME DELAY (amber) panel indicator.	When lighted, indicates that 30-second time delay relay contacts have closed and primary power is available to B+ supplies (A1, A2, A3).
POWER SUPPLIES indicators A1, A2, and A3.	When lighted, indicate that B+ is available from respective dc supply.

43. Power Supply PP-3314/TRC-80 (fig. 30)

Two PP-3314/TRC-80's (converter power supplies) are used. Each converter power supply applies operating potentials to its respective receive converter panel.

Control or indicator	Function
PWR ON-OFF switch ----------	Controls application of primary power.
INJ ON-OFF switch ----------	Controls application of B+ to injection oscillator in receive converter. [a]
PWR indicator ----------	When lighted, indicates application of primary power.
TD indicator ----------	When lighted, indicates that 0-30-second time delay relay contacts have closed and primary power is applied to 200-volt supply.

[a] Spring-return switch; returns automatically to ON position.

Control or indicator	Function
PWR SUP indicator INJ indicator	When lighted, indicates that B+ is available from 200-volt supply. Flashes on and off while INF switch is held in the OFF position. Remains continuously lighted when INJ switch is set to ON.

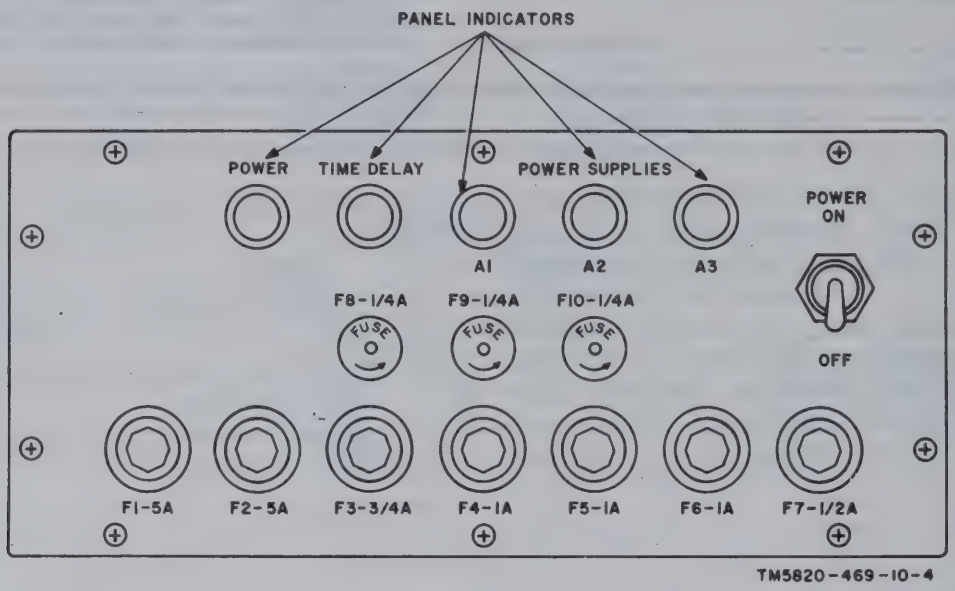


Figure 29. If. power supply, control and indicators.

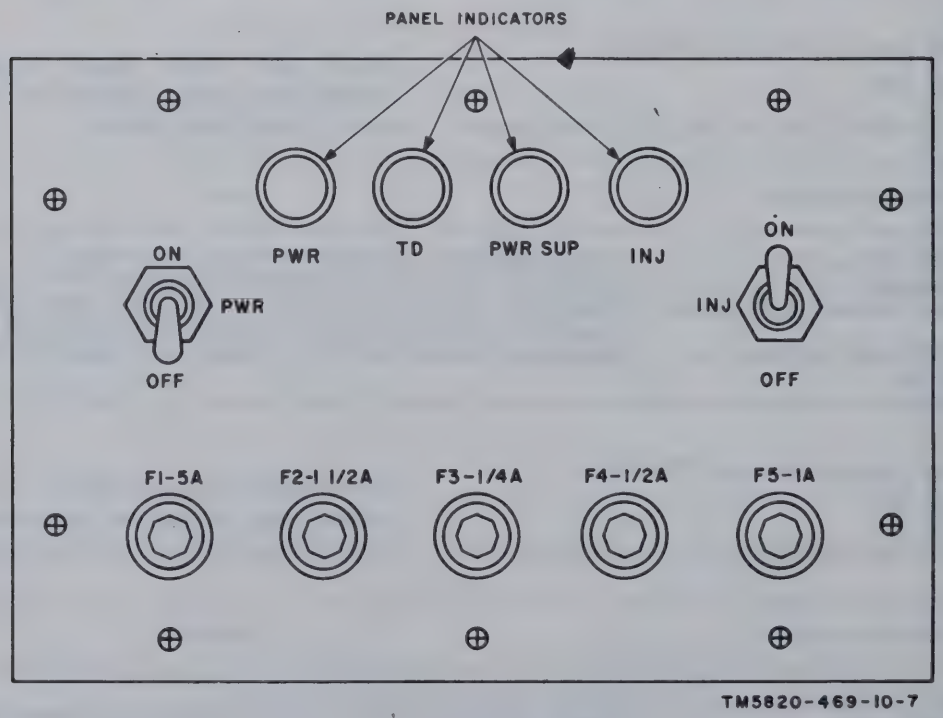


Figure 30. Converter power supply, controls and indicators.

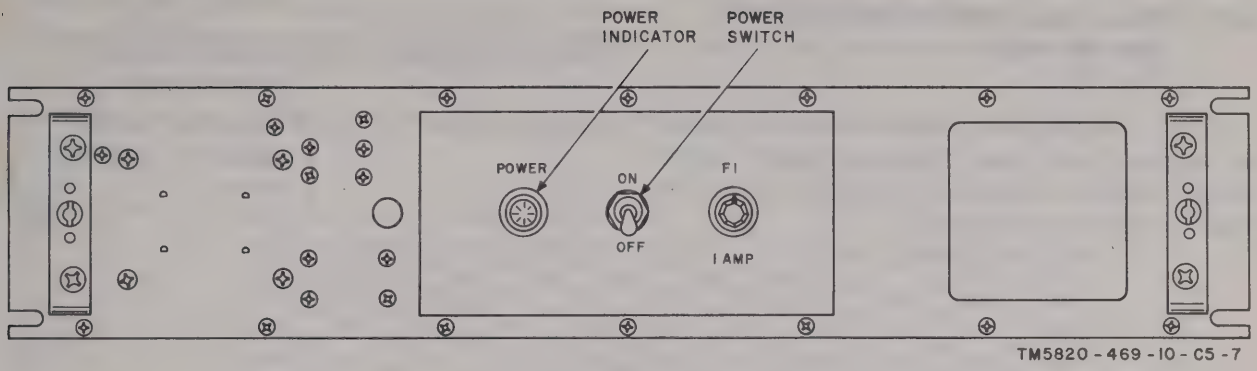


Figure 30.1. Converter Power Supply PP–4936/TRC, AN/TRC–80A.

43.1. Power Supply PP–4936/TRC, AN/TRC–80A (fig. 30.1)

Two PP–4936/TRC (receive converter power supplies) are used. Each converter power supply applies operating potentials to its respective receive converter.

Control or indicator	Function
Power ON-OFF switch	Controls application of primary power.
POWER indicator	When lighted, indicates application of primary power.

44. Air Cooler, Electronic Equipment HD-545/TRC-80 (fig. 31)

Figure 31 shows the location of the HD-545/TRC-80 (blower) fuses. There are no operating controls on the blower.

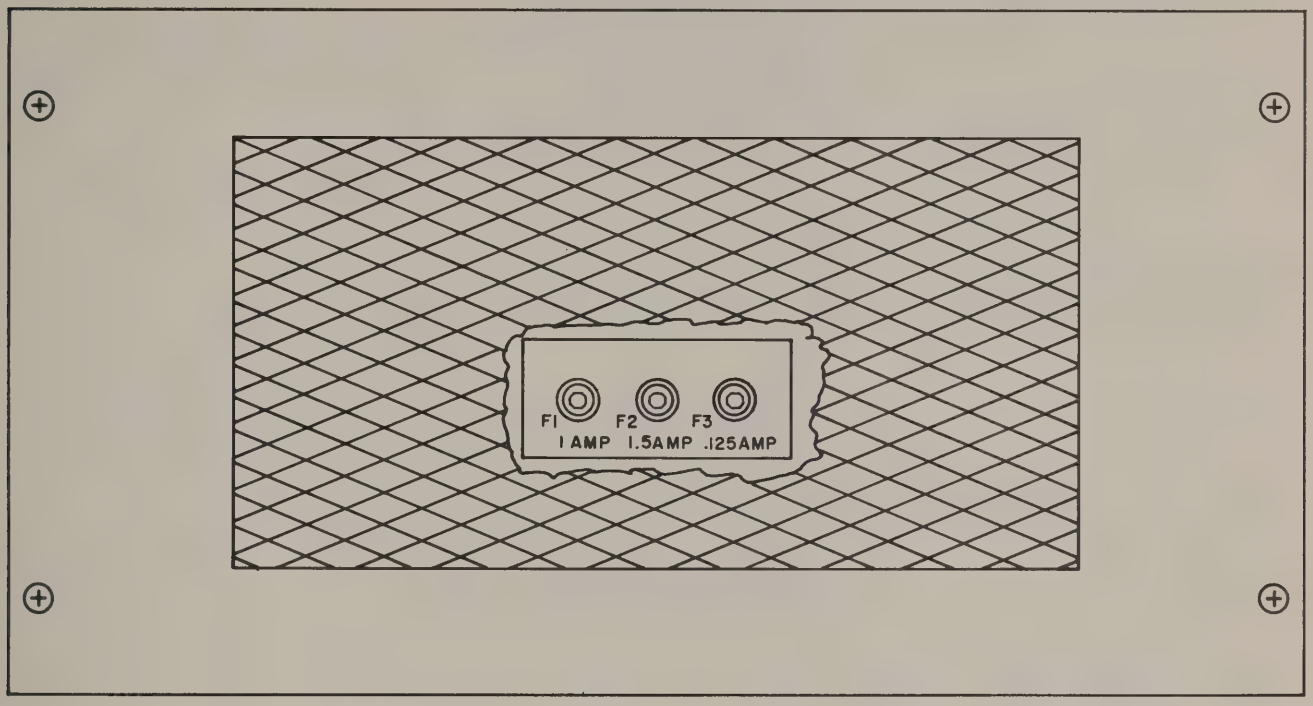


Figure 31. Blower, fuse location.

Section V. RADIO FREQUENCY AMPLIFIER AM-3308/TRC-80 POWER CONTROL AND AIR-CONDITIONING EQUIPMENT

45. General

With the exception of the AM-3308/TRC-80 (power amplifier), the remaining equipment is not rack mounted. The circuit-breaker panel and the associated power and signal entry panel (fig. 2) are located by the left shelter wall, the air-conditioner unit is wall mounted in the right-rear corner of the shelter, and the interlock bypass switchbox (for the shelter lighting) is located alongside the shelter door. The function of the controls and indicators on all these units is described in paragraphs 46 through 50.

46. Radio Frequency Amplifier AM-3308/TRC-80 (fig. 54)

The power amplifier consists of the control panel, the klystron panel, and the power supply panel. The controls and indicators of these panels are described in *a* through *c* below:

a. Control Panel.

Control or indicator	Function
FILAMENT VOLTAGE meter	Measures klystron filament voltage.
BEAM CURRENT meter	Measures klystron beam current.
BEAM VOLTAGE meter	Measures klystron beam voltage.
POWER OUT meter	Measures direct and reflected power from output transmission line simultaneously. Voltage standing wave ratio of output system is also indicated on POWER OUT meter.
POWER IN meter	Measures either reflected or incident input signal power to klystron.
FILAMENT ADJUST MIN-MAX control.	Adjusts klystron filament voltage.
FILAMENT indicator	Indicates application of power to control circuits and to klystron filament circuit.
FILAMENT ON-OFF switch	Controls application of power to blower, control circuits, and klystron filament circuit.
BEAM ON pushbutton switch	Controls application of beam voltage to klystron tube.
BEAM OFF pushbutton switch	Removes beam voltage from klystron tube.
TUNE-OPERATE switch	When at TUNE, disables audio alarm during tuning procedures.
REFLECTED-INCIDENT switch	Selects either reflected or incident input signal power to klystron for monitoring.
ALARM indicator	When lighted, indicates low-incident power to (less than 800 watts), or high-reflected power from (more than 80 watts), output transmission line.
Buzzer indicator	When buzzing, indicates low-incident power (less than 800 watts), or high-reflected power from (more than 80 watts), output transmission line. Buzzer is disabled when TUNE-OPERATE switch is at TUNE.
BEAM indicator	Indicates application of beam voltage to klystron tube.
TIME DELAY indicator	Indicates that 3-minute time delay relay contacts have closed and beam voltage is available.
DRAWER indicator	When lighted, indicates that three pa drawers are closed and locked.
AIR indicator	When lighted, indicates sufficient cooling air.

b. Klystron Panel.

Control or indicator	Function
KLYSTRON TUNING controls labeled FIRST CAVITY, SECOND CAVITY, THIRD CAVITY, and FOURTH CAVITY.	Permit tuning of four klystron cavities. Four digital counters associated with controls indicate relative position of cavity tuning. TUNING CHART on front panel relates counter reading with frequency in kilomegacycles.
Control locks	Lock tuning controls in desired positions.
DRIVE LEVEL control	Controls amount of rf input power to klystron.

c. Power Supply Panel.

Control or indicator	Function
MAIN circuit breaker	Controls application of primary to power amplifier.
BEAM circuit breaker	Controls application of primary power to klystron beam supply.
BLOWER circuit breaker	Controls application of primary power to klystron cooling blower.
BEAM VOLTAGE selector switch	Varies the beam voltage in six steps.
FILAMENT hours elapsed time indicator.	Indicates number of hours that filament voltage is applied to the klystron.
BEAM hours elapsed time indicator	Indicates number of hours that BEAM voltage is on.

47. Circuit-Breaker Panel (fig. 32)

Control	Function
POWER SOURCE SELECTOR switch:	
GEN	Selects primary power from local generator.

Control	*Function*
AUX	Selects primary power from auxilary power source.
MAIN BREAKER circuit breaker	Controls application of primary power to all circuits of radio set.
AUX OUTLET circuit breaker	Controls application of primary power to auxiliary outlet.
RACK POWER circuit breaker	Controls application of primary power to equipment racks.
ANTENNA circuit breaker	Controls application of primary power to antenna.
AIR COND circuit breaker	Controls application of primary power to air conditioner.
FLUSHING BLOWER circuit breaker	Controls application of primary power to flushing blower.
Indicator lamp	Indicates that the LOAD CONTROL switch on the engine generator control panel is in the ON position.

47.1. Phase Lamp Panel

(fig. 32.1)

Control or indicator	*Function*
PHASE lamp	Indicates when the three-phase input power is out of phase.
TEST pushbutton switch	Tests PHASE lamp.

48. Power and Signal Entry Panel

(fig. 33)

Connector	*Function*
Jacks J17 through J20	Army area net telephone connection jacks for two- or four-wire use: Two-wire: J17 and J18. Four-wire: Input connection — J17 and J18. Output connection — J19 and J20.
Jacks J23 through J26	Army area net teletypewriter connection for two-wire vf, two-wire dc, and four-wire tty use: Two-wire vf: J23 and J24. Two-wire dc: J25 and J26. Four-wire tty: Input connection — J24 and J26. Output connection — J23 and J25.
Jack J7	Connection for vehicle-mounted radio set.
RECEIVER INTERCONNECT J8	Used in diversity operation. Connection to J8 of other radio set.
TO GRD STAKE jack J6	Connection to ground stake.
ELECTRICAL NEUTRAL connector	Binding post for strap on J6. Disconnect when using Pershing Weapons System power station for primary power source.
SPARE jacks J21 and J22	Connection for spare telephone line.
DISCRETE (PTS) jacks J27 and J28	Connection for discrete telephone (or vf tty) to pts.
INTERCOM (PTS) jacks J29 and J30	Connection for voice intercom connection to pts.
TTY (PTS) jacks J31 and J32	Connection for pts tty (vf or tty).
PROGRAMMER TEST STATION jack J3	Cable connection to pts.
AUX POWER 3 PH–400 CPS–208V connector J15.	Power connection for use with auxiliary power source.
PACK 1 TO 2 INTERCONNECT J4	Cable connector for shelter-to-shelter connection during diversity operation.

49. Air Conditioner, Self-Contained, CE–6A–400

(fig. 34)

Control or indicator	*Function*
SW–1 OFF-ON switch	Controls application of power to air-conditioner evaporator fan and switch SW–3.
SW–2 switch:	*Sw pos* — *Function*
HEAT	Controls application of power to heater coils for heating.
VENT	Provides for normal air circulation; forced-air circulation is provided when evaporator fan has been turned on by SW–1.
COOL	Applies power to condenser fan and compressor for cooling.
SW–3 FRESH AIR 0-100% switch	Mechanically controls mixture of fresh and return air that is supplied to the top evaporator through the dampers.
SW–4 COOLER switch	Thermostatically controls heating and cooling elements of air-conditioning system.

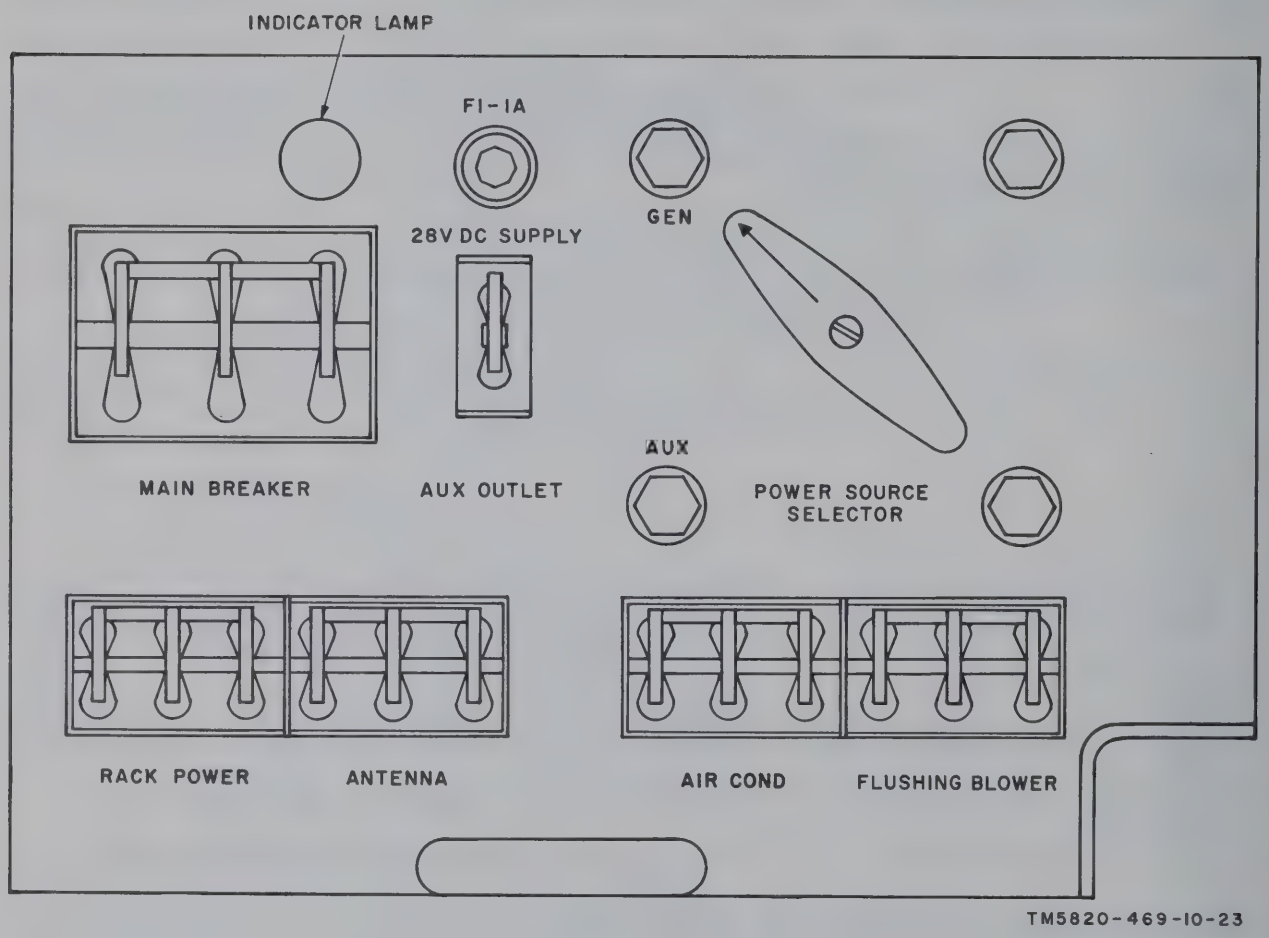


Figure 32. Circuit-breaker panel, controls.

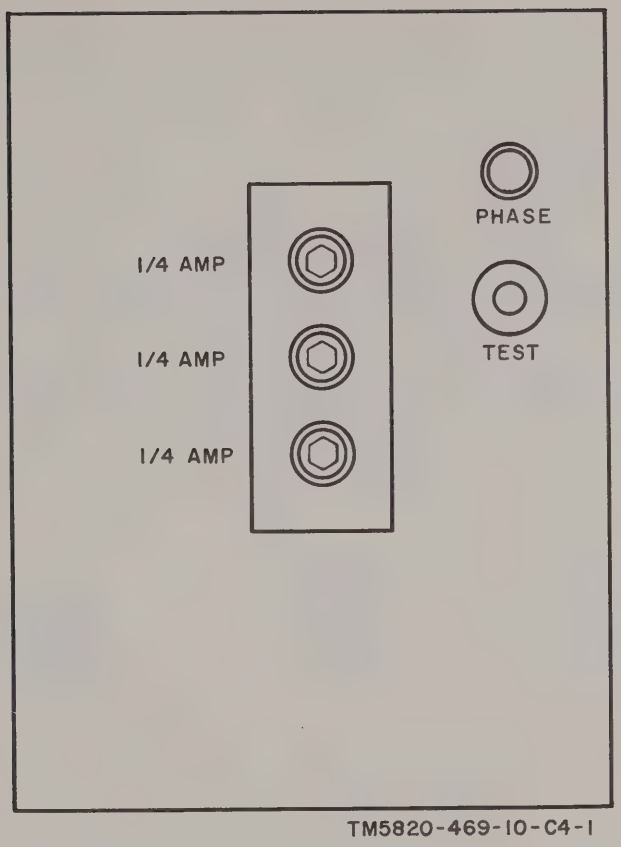


Figure 32.1. Phase lamp panel.

50. Interlock Bypass Switchbox

(fig. 35)

Control	*Function*
INTERLOCK BY PASS	Momentary action switch. When set at BY PASS position, bypasses door interlock lighting circuit and applies power to shelter lights.
Door interlock	Depressed automatically when shelter door is closed. When activated, power is applied to shelter lighting circuit. (The HUT LIGHTS switch, located on the switch panel, must be turned on before the lights will come on.)
28V LIGHT switch	Lights 28-volt red light bulb in rack A2.

Note. One of the shelter lamps is connected to the 28-volt (battery) dc source. This lamp may be turned on when the OFF-ON-START switch on the engine generator starting panel (fig. 36) is at ON.

OUTLET AUX 120V 400CY	Auxiliary outlet for 120-volt, 400-cps power source.

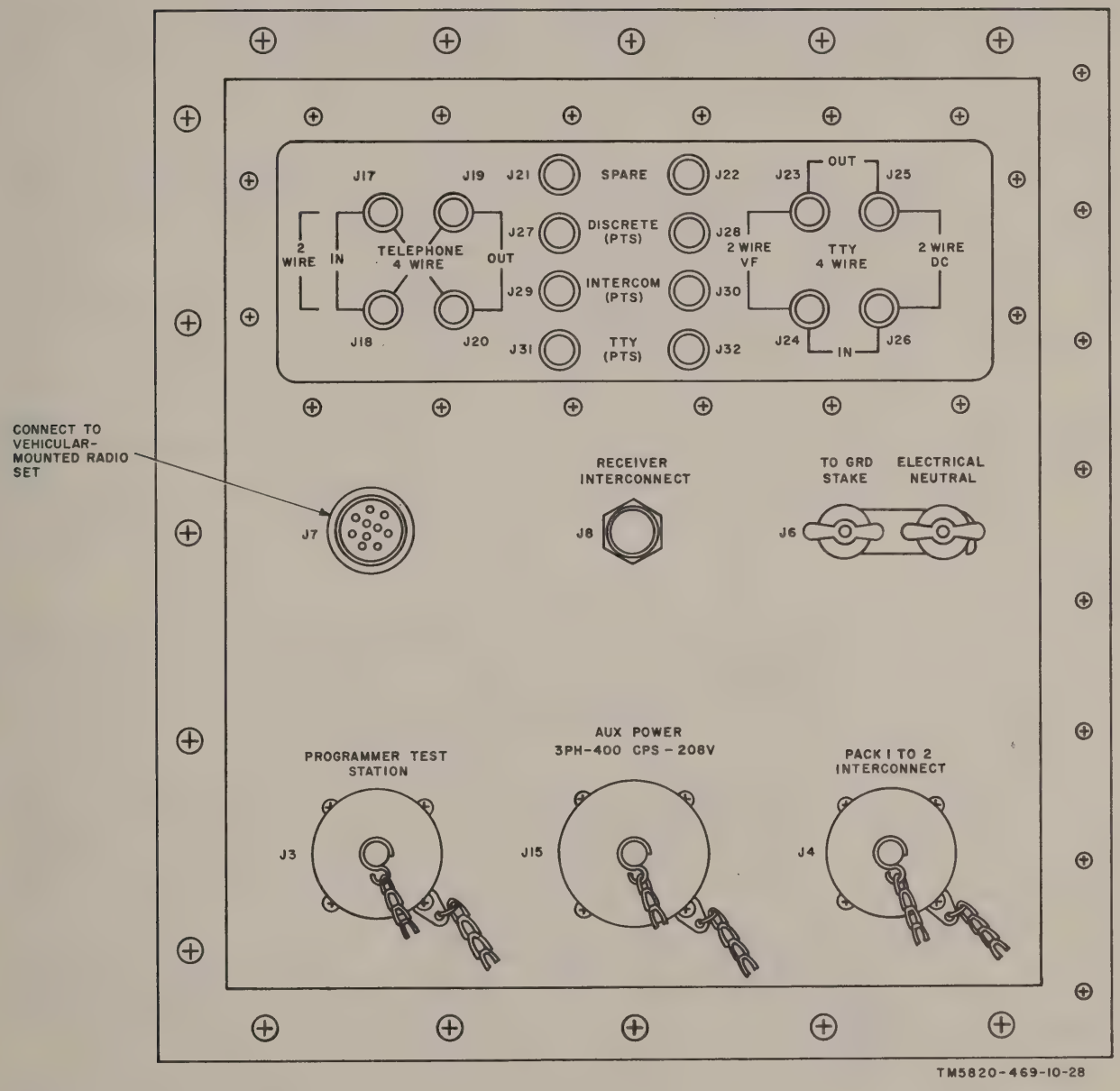


Figure 33. Power and signal entry panel connectors.

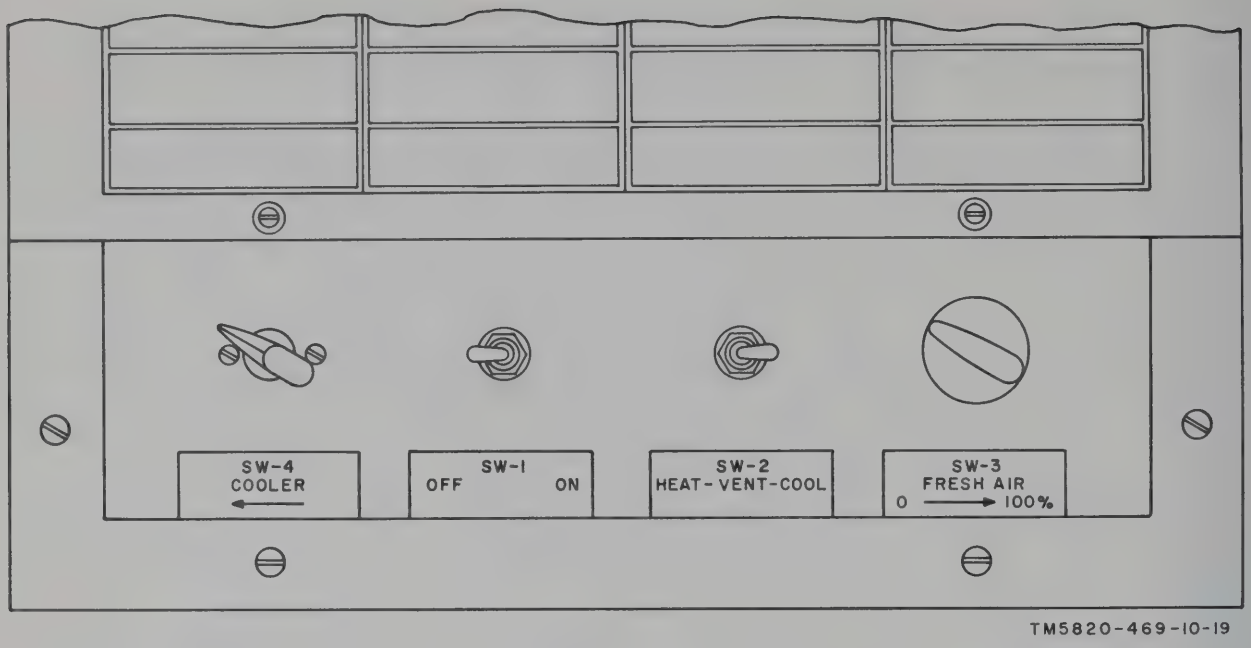


Figure 34. Air conditioner, front panel controls.

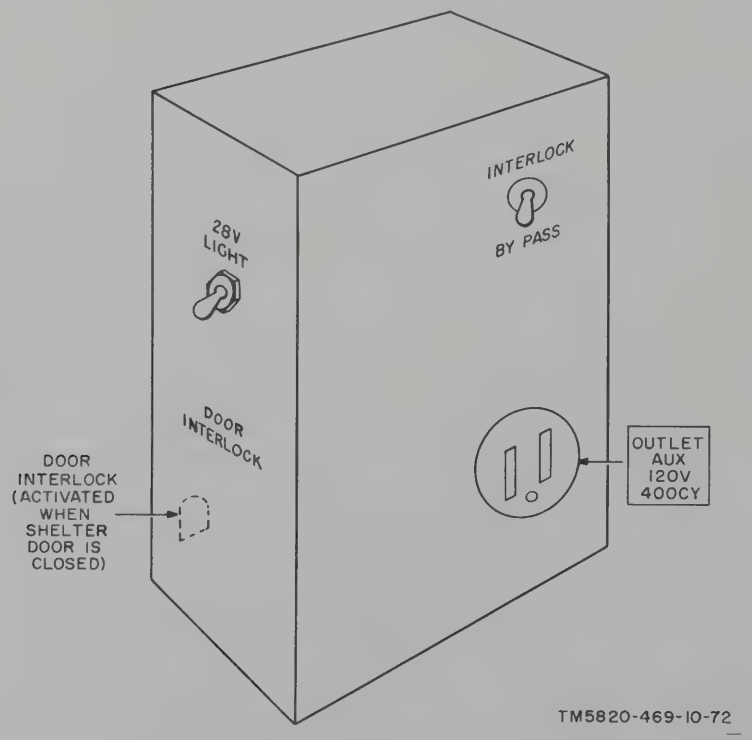


Figure 35. Interlock bypass switchbox controls.

Section VI. ENGINE-GENERATOR STARTING PANEL AND ANTENNA CONTROLS

51. Engine-Generator Starting Panel (fig. 36)

The engine-generator starting panel is located on the engine generator (fig. 11) and is used for starting and stopping the engine generator. All other controls and instrumentation are located on the engine-generator control panel (para 32), on rack A2 within the shelter.

Control	Function
Manual THROTTLE control	Overrides governor control to allow engine idling.
Manual CHOKE control	Permits manual choking of engine when starting.
ENGINE CONTROL switch:	
ON-OFF	Controls application of power to control circuits, turns on engine HOURMETER and energizes OIL PRESSURE indicator.
START	Momentary position for cranking engine. When switch is released, it returns to ON to allow engine to operate.
EMERGENCY SWITCH ON indicator	Indicates whether EMERGENCY ENGINE SHUTDOWN STOP switch (located on engine-generator control panel, fig. 22) has been activated If this light is on, engine will *not* start.
OIL PRESSURE indicator	When lighted, indicates low engine oil pressure.

52. Antenna AS-1270/TRC-80 Controls

The antenna controls for the AS-1270/TRC-80 are located inside the shelter, on the antenna base, and on the antenna bag. Figures 37 through 45 illustrate the antenna and all associated controls.

Control	Fig. No.	Function
Antenna crank	37	Used to raise or lower antenna platform.
Antenna platform locking handles	43	Spring-loaded positive detent handles that lock platform in place (either in raised or lowered position).
Air-release valve	42	Releases *trapped* air in antenna support ring when collapsing and stowing antenna.
DUMP VALVE	42	Releases air from antenna support ring when collapsing and stowing antenna.
Antenna bag zipper	42	Releases air from antenna bag when collapsing and stowing antenna.
Coarse azimuth locking pin	43	Locks antenna platform in desired coarse azimuth bearing.
Elevation crank	43	Adjusts antenna elevation angle (+10° to -5° from horizontal).
Elevation angle indicator	43	Indicates elevation angle *when the spirit level is centered.*
Azimuth bearing indicator strip	43	Indicates azimuth from 0 to 6,400 mils.
BRAKE	43	Prevents rotation of antenna azimuth ring when coarse azimuth lock is disengaged.
BRAKE RELEASE	43	Releases brake for antenna platform azimuth rotation.
Fine azimuth adjustment crank	2	Provides fine azimuth adjustment from shelter interior.
ANTENNA circuit breaker	32	Controls application of power to antenna.
POWER RESET switch	43	Controls application of power to antenna inflation equipment.
LOW PRESSURE switch	43	Controls application of power to antenna blower moter.
HIGH PRESSURE switch:	43	
OFF		Removes power from the antenna compressor unit.
MAN. ON		Applies power continuously to the antenna compressor unit.
AUTO ON		Applies power to the antenna compressor unit only when the antenna bag air pressure falls below 11 pounds per square inch (psi). Removes power when the antenna bag pressure rises above 13 psi.

Caution: Do not leave the HIGH PRESSURE switch in the MAN. ON position.

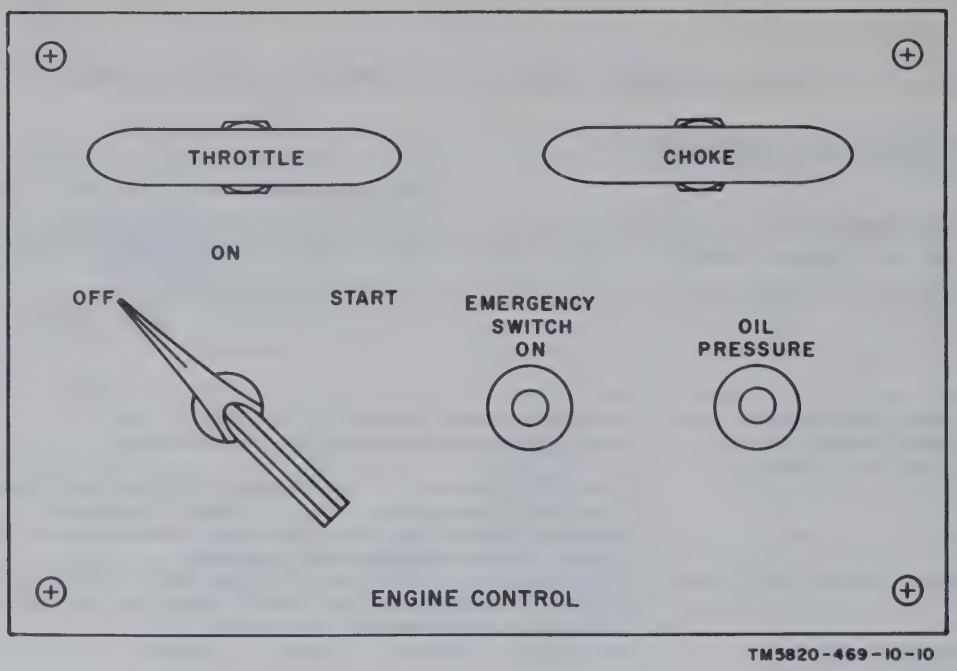


Figure 36. Engine control starting panel controls and indicators.

CHAPTER 4
OPERATION

Section I. PRELIMINARY STARTING PROCEDURE

53. Initial Procedure Using Internal Power

Warning: **Do not check fuel in gas cans in presence of transmitter rf energy. Never leave open gas cans near this equipment.**

The following operating procedures apply to both nondiversity and diversity operation of the AN/TRC–80. When procedure variations are required for diversity operation, appropriate notes are provided.

a. Open the personnel door, the engine-generator door, and the power amplifier shelter air vents.

b. Remove the T-handle locking pin from each side of the engine-generator track and slide the engine generator out of its compartment.

c. Inspect the engine-generator compartment for evidence of oil or fuel leaks.

d. Check the cables for loose connections.

e. Check the engine-generator oil level with the dipstick located on the oil filter tube.

f. Turn the fuel selector valve (fig. 11) to SUPPLY NO. 1 and attach the fuel line between the fuel selector valve and a fuel can (not supplied with the equipment) containing regular-grade gasoline. Do not use aviation or high test fuel.

Note. Fuel is consumed at the rate of 2½ gallons per hour. Check fuel level before operation.

g. Place the circuit breaker on the engine generator to the ON position, depress the overspeed reset switch (fig. 11), and place the OFF-ON-START switch on the engine generator starting panel (fig. 36) in the ON position.

h. Remove flexible waveguides from floor of operator's compartment and place on shelter roof.

i. Unstow the ladder and mount it on the front of the shelter.

j. Remove grounding equipment from the engine generator compartment.

53.1. Initial Procedure Using Auxiliary Power

Auxiliary power can be used providing the power meets the requirements specified in paragraph 4. Connect an external power cable to AUX POWER 3PH–400–CPS–208V connector on the power and signal entry panel. The AUX POWER 3PH–400–CPS–208V connector is a four-pin connector. Pin A must be connected to phase A, pin B to phase B, pin C to phase C, and pin D to neutral. Incorrect phase connections will cause the PHASE lamp (fig. 32.1) to light.

54. Preliminary Power Control Settings

a. Lighting. Enter the shelter and turn on the 28V LIGHT switch located at the upper left side of the entrance.

b. Rack Power Controls.

(1) *Rack A1* (fig. 7 or 7.1).

Unit	*Fig. No.*	*Control*	*Position*
Monitor	19	PWR switch	OFF
Modulator-multiplier	20	POWER switch	OFF
Transmit converter	52 or 52.1	POWER ON switch	OFF
Multiplexer	21	Power ON-OFF switch	OFF

(2) *Rack A2* (fig. 5)

Unit	*Fig. No.*	*Control*	*Position*
Engine-generator control panel.	22	EMERGENCY ENGINE SHUTDOWN switch.	RUN
		VOLTAGE CONTROL	Fully ccw
		BATTLE SHORT switch	OFF
Switch panel	23	HUT LIGHTS switch	OFF
		FLUSHING BLOWER switch	OFF
		RACK BLOWERS switch	OFF
		RACK POWER switch	OFF
		DEMULT-MULT-MOD SELECTOR switch.	LOCAL
		LOCAL-REMOTE-COM CONTROL SELECTOR switch.	CONTROL

Note. For diversity operation, refer to paragraph 69*b*.

Unit	Fig. No.	Control	Position
Switch panel	23	Patch cable	Connected between RECEIVER OUT NO. 1 jack J8 and IF IN NO. 1 jack J9.
		Patch cable	Connected between RECEIVER OUT NO. 2 jack J10 and IF IN NO. 2 jack J11.
Teletypewriter	5	MOTOR ON-OFF switch	OFF
Teletypewriter switch panel.	25	OPERATING MODE switch	NORMAL DC LOOP
		PTS-BY PASS switch	ON
		REMOTE DISTANCE switch	SHORT
		LIGHTS NORMAL-DIM switch	NORMAL
Telegraph Terminal	26 or 26.1	NORM-REC-SEND switch	NORM
TH-5A/TG, or TH-22/TG.		4W-2W-TEL switch	4W

(3) *Rack A3* (fig. 6 or 6.1). This rack contains the three synthesizers. Turn the PWR switch (fig. 27) or POWER switch (fig. 2.1) to OFF.

(4) *Rack A4* (fig. 9). Place the if. power supply POWER switch (fig. 29) to OFF.

(5) *Rack A5* (fig. 10).

Unit	Fig. No.	Control	Position
If. power supply	29	POWER switch	OFF
Converter power supply (both units).	30	PWR switch	OFF
		INJ switch	OFF

(5.1) *Rack A5, AN/TRC-80A only* (fig. 10.1).

Unit	Fig. No.	Control	Position
If. power supply	29	POWER switch	OFF
Converter power supply (both units).	20.1	Power switch	OFF

(6) *Unracked units.*

Unit	Fig. No.	Control	Position
Air-conditioner evaporator (both units).	34	SW-1 OFF-ON switch	OFF
Circuit-breaker panel	32	MAIN BREAKER circuit breaker	OFF
		RACK POWER circuit breaker	OFF
		ANTENNA circuit breaker	OFF
		AUX OUTLET circuit breaker	OFF
		AIR COND circuit breaker	OFF
		FLUSHING BLOWER circuit breaker	OFF
		POWER SOURCE SELECTOR switch	GEN
Power amplifier:	8		
Control panel	54	FILAMENT switch	OFF
		TUNE-OPERATE switch	TUNE
		FILAMENT ADJUST control	Fully ccw.
		REFLECTED-INCIDENT switch	INCIDENT
Klystron panel	54	DRIVE LEVEL control	Fully ccw.
Power supply panel	54	MAIN circuit breaker	OFF
		BEAM circuit breaker	OFF
		BLOWER circuit breaker	OFF
		BEAM VOLTAGE selector switch	Fully ccw.

Section II. STARTING PROCEDURE

55. Engine Generator (fig. 11)

a. Engine Control Starting Panel (fig. 36).

(1) Pull the THROTTLE control completely out.

(2) Set the ENGINE CONTROL switch to the START position (the engine will crank), and hold until the engine starts and the OIL PRESSURE light goes out.

(3) Choke the engine with the manual CHOKE as required until the engine generator starts and reaches idle speed.

Caution: **Make sure that the OIL PRESSURE light on the engine-control starting panel is out. If the OIL PRESSURE light does light, shut down the engine immediately by turning the ENGINE CONTROL switch to OFF, and**

check for oil leaks and for proper oil level.

(4) After at least one minute, slowly push the THROTTLE control completely in to allow the engine to come to operating speed.

(1) *Indications.*

b. Engine-Generator Control Panel (fig. 22). Enter the shelter. Depress the RESET AND FIELD FLASH pushbutton on the engine-generator control panel. The engine-generator control panel instruments should indicate as follows:

Instrument or indicator	*Indication*	*Remarks*
Frequency meter	400 cycles	If not 400 cycles, adjust with FREQUENCY CONTROL switch. (Move switch to RAISE to increase frequency, and to LOWER to reduce frequency.) Release switch when meter indicates 400 cycles.
Voltmeter	208 volts	Adjust VOLTAGE CONTROL for desired indication.
Battery ammeter	Slight charge	
Hour meter	Running	
HEAD TEMPERATURE light.	Out	If HEAD TEMPERATURE light is on, shut down engine generator and check for faults.
OIL PRESSURE light	Out	If OIL PRESSURE light is on, shut down engine generator and check for oil leaks. Check oil level.
OVER VOLTAGE light	Out	If the light is not out, depress the RESET AND FIELD FLASH pushbutton.
UNDER VOLTAGE light	Out	Same as above.
OVER FREQUENCY light	Out	Same as above.
UNDER FREQUENCY light	Out	Same as above.

(2) *Procedure.* Set the LOAD CONTROL switch to ON. The POWER ON indicator should light. The 28V DC SUPPLY indicator lamp on the circuit breaker panel (fig. 32) should light. Power is now available for application to the circuit breaker panel.

55.1. Auxiliary Power

Apply power to the external cable connected in paragraph 53.1. If the PHASE lamp (fig. 32.1) lights, turn the auxiliary power source off. Reverse any two pins (except pin D) in the power connector or at the power source. Reapply power to the shelter. The PHASE lamp should be off.

56. Equipment Turn-On Procedure

Note. Perform the preliminary starting procedures (para 53 and 54) and the engine-generator starting procedures (para 55) before applying power to the radio equipment. In an emergency, or when this equipment has been pretuned, refer to paragraph 68 for a rapid emplacement procedure.

Step	*Component*	*Rack*	*Control*	*Action*	*Indication*
1	Circuit-breaker panel (fig. 32).	Unracked	MAIN BREAKER circuit breaker.	Set to ON	None.
			RACK POWER circuit breaker.	Set to ON	None.
			FLUSHING BLOWER circuit breaker.	Set to ON	None.
			AIR COND circuit breaker.	Set to ON (if air conditioner is to be used).	None.
2	Switch panel (fig. 23)	A2 (fig. 5)	HUT LIGHTS switch	Turn on	HUT LIGHTS indicator lights and rack lights come on. (The 28-volt red light is no longer required and may be turned off.)
			FLUSHING BLOWER switch.	Turn on	FLUSHING BLOWER indicator lights.
			RACK POWER switch	Turn on	AIR FAILURES indicator lights.
			RACK BLOWERS switch.	Turn on	Blowers go on and, after slight delay, AIR FAILURES indicator lights go off.

Step	Component	Rack	Control	Action	Indication
3	Communications control panel (fig. 24).	A2	POWER pushbutton	Depress	Panel pushbutton lamps will light.
4	Monitor (fig. 19)	A1 (fig. 7)	PWR ON-OFF switch	Set to ON	Panel indicator lights.
5	Transmit converter (fig. 52) (AN/TRC-80 only).	A1	POWER switch	Set to ON	FIL indicator lights. After approximately 30 seconds, TIME DELAY and B+ indicators light.
5.1	Transmit converter (AN/TRC-80A) (fig. 52.1).	A1 (fig. 7.1)	POWER switch	Set to ON	FIL indicator lights. After approximately 3 minutes, TIME DELAY indicator lights.
6	Modulator-multiplier (fig. 20).	A1	POWER switch	Turn on	FIL indicator lights. After approximately 30 seconds, TIME DELAY and B+ indicators light.
7	Multiplexer	A1	ON-OFF switch	Set to ON	FILAMENT indicator lights. After approximately 30 seconds, TIME DELAY and B+ indicators light.
8	Synthesizers (three units, fig. 27) (AN/TRC-80 only).	A3 (fig. 6)	PWR ON-OFF switch	Set to ON	FIL indicator lights and OVEN indicators on oscillators No. 2 and No. 3 light. After approximately 30 seconds, TIME DELAY and B+ indicators light. OVEN indicators start cycling on and off after reaching operating temperature.
8.1	Synthesizers (three units, fig. 27.1).	A3 (fig. 6.1)	POWER ON-OFF	Set to ON	POWER indicator on fault panel lights and the OUT OF LOCK indicator may light.
9	If. power supply (fig. 29).	A4 (fig. 9)	POWER ON-OFF switch.	Set to ON	POWER indicator lights. After 30 seconds, TIME DELAY and POWER SUPPLIES A1, A2, and A3 indicators light.
10	Converter power supply (2) (fig. 30).	A5 (fig. 10)	PWR ON-OFF switch	Set to ON	PWR indicator lights. After 30 seconds, TD and PWR SUP indicators light. (The INJ switch is normally locked in the ON position and, at this time, the INJ lamp will light. If the INJ switch is held at OFF, the INJ lamp flashes on and off.)
10.1	Converter power supply (two units, fig. 30.01).	A5 (fig. 10.1)	Power ON-OFF switch.	Set to ON	POWER indicator lights.

Step	Component	Rack	Control	Action	Indication
11	If. power supply	A5	POWER ON-OFF switch.	Set to ON	POWER indicator lights. After 30 seconds, TIME DELAY and POWER SUPPLIES A1, A2, and A3 indicators light.

57. Antenna Erection and Inflation

Note. left and *right* in this procedure refers to view of antenna from front of shelter.

a. Climb the ladder to the top of the shelter.

b. Release the antenna compartment door locks by pressing the two lock button fasteners.

c. Raise the antenna compartment door to expose the antenna storage compartment (fig. 37). Press the lock buttons on the door back in place before lowering the door to the roof of the shelter.

d. Unfasten the three straps that secure the feedhorn assembly and antenna arms.

e. Open the feedhorn assembly clamps (fig. 37) by loosening the clamp wingnuts. Remove the feedhorn from the antenna compartment and place it out of the way on top of the shelter.

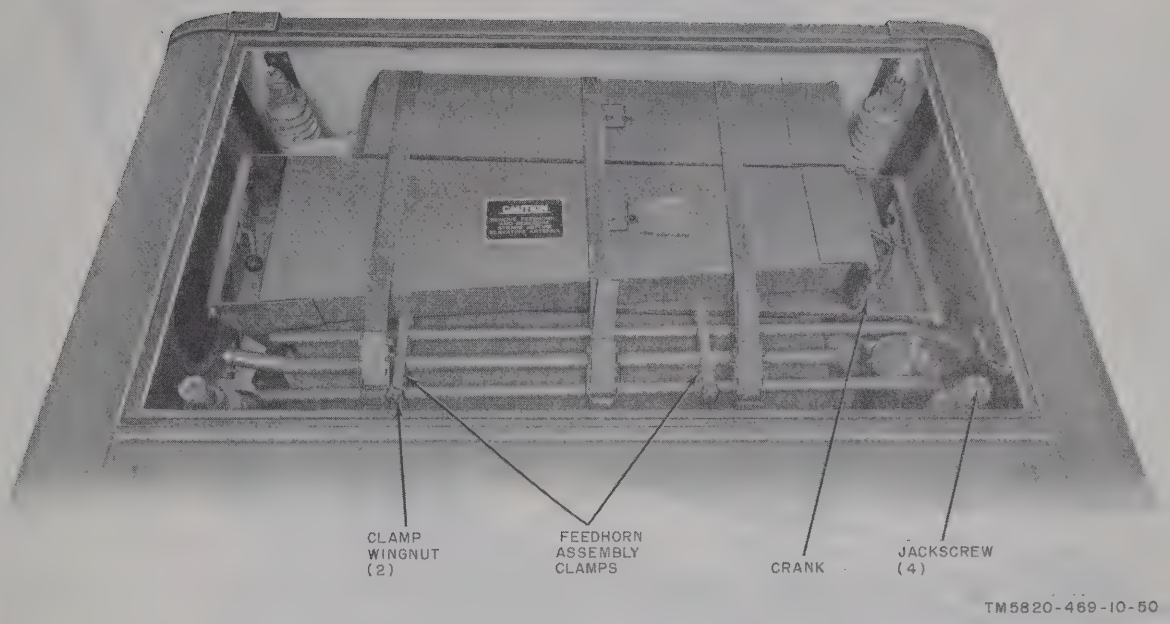


Figure 37. Antenna storage compartment.

f. Close the feedhorn clamps and tighten the wingnuts.

g. Replace and fasten the three straps that were unfastened in the procedure given in *d* above.

h. Lift and turn the four platform locking handles to the UNLOCK position (fig. 43).

Warning: **Do not stand on the platform when it is unlocked.**

i. Remove the antenna crank from the mounting clips on the support arm, and place it on a jackscrew (fig. 37).

j. Raise the antenna platform by turning the crank clockwise.

k. When the antenna platform has been raised into place, set the four corner handles on the platform to the LOCK position. Replace the antenna crank in its mounting clips.

l. Unfasten the three straps that secure the support arms, and place the straps out of the way.

m. Raise the left support arm (fig. 38). Do not engage the locking pins of the lower section to the base at this time.

n. Unfold the center section of the left support arm and latch it to the lower section with the locking pins.

o. Release the securing strap (fig. 38) that secures the upper section of the left support arm.

p. Raise the right support arm, but do not engage the locking pins of the lower section to the base at this time.

q. Unfold the center section of the right support arm and engage it to the lower section with the locking pins as instructed in *n* above. Do not release the upper section of the right support arm at this time.

r. Unroll the antenna bag.

s. Turn the air-release valve on the top of the antenna bag to the closed position (fig. 42).

t. Lean the left support arm (the one with the released upper section) against the right support arm (fig. 39).

u. Insert the three antenna locking pins into the receiving holes on the left support arm (fig. 40).

v. Swing the left support arm back into place and engage the lower section of the left support arm to the antenna base (fig. 41).

w. Release the top section of the right support arm and lean the arm against the left support arm.

x. Adapt the procedures given in *u* and *v*

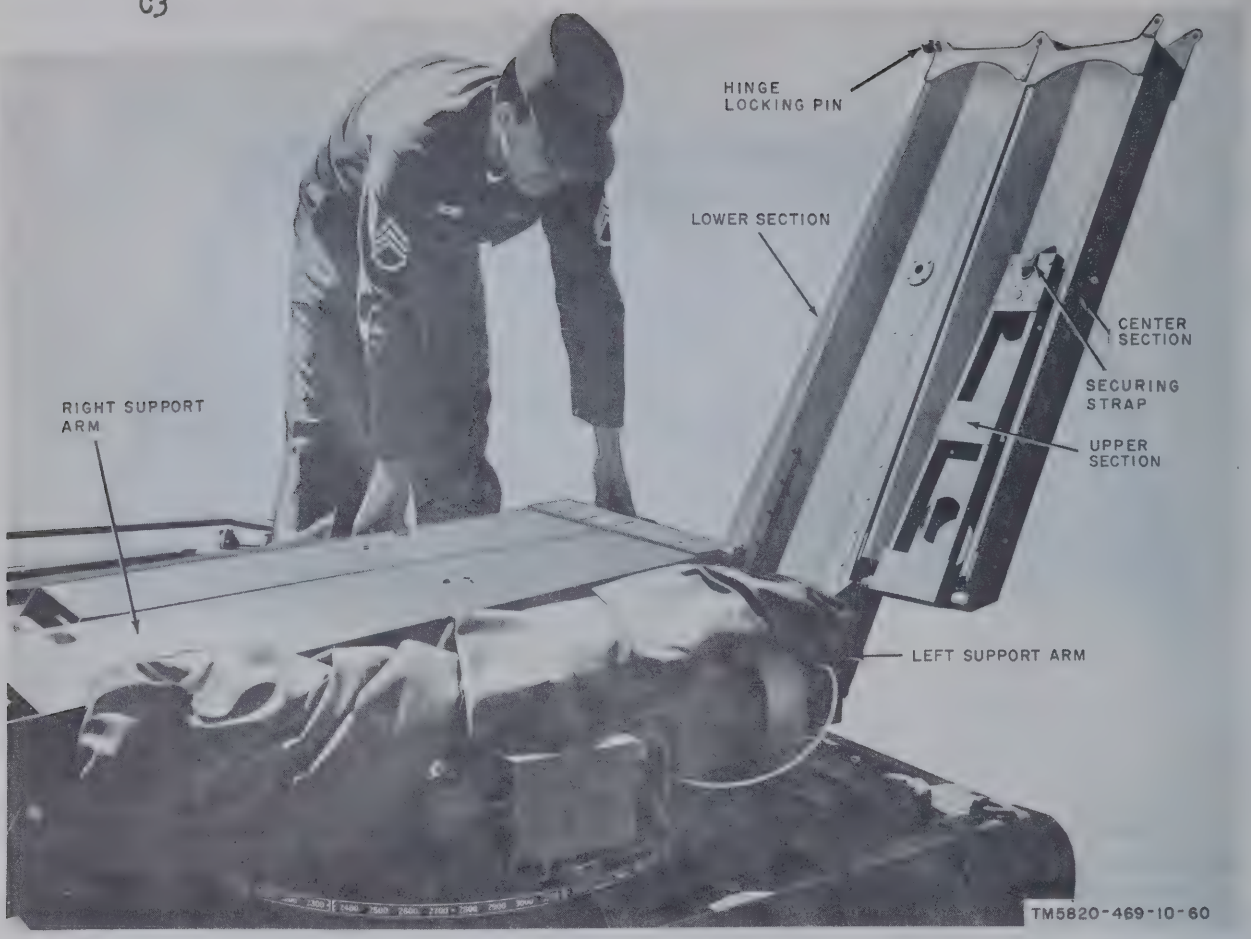


Figure 38. Left support arm in raised position.

above to attach the pins on the right side of the antenna bag to the right support arm. The antenna should now appear as shown in figure 42.

y. Close the DUMP VALVE by turning the valve handle fully clockwise (fig. 42).

z. Turn on the ANTENNA circuit breaker on the circuit breaker panel (fig. 32).

aa. Place the HIGH PRESSURE compressor switch (located on the antenna base, fig. 43) in the AUTO ON position.

Caution: During normal operation, the HIGH PRESSURE compressor switch must be in the AUTO ON position. Extended operation with this switch in the MAN. ON position results in excessive wear of the compressor unit.

ab. Place the POWER RESET switch (fig. 43) in the RESET position. This position is momentary; the switch will return to its normal position. The outer support ring will now begin to inflate.

Caution: **Irreparable damage to the cover and reflector fabric of the antenna bag will result if an erected antenna is allowed to remain uninflated and unprotected from the wind.**

ac. Make sure that the LOW PRESSURE blower switch located on the antenna base is set to OFF.

ad. Holding the feedhorn assembly by the two side support struts (fig. 44), engage the center support strut in the locking pad eyehole located in the antenna base.

ae. Place the feedhorn side support struts in the locking pad eyeholes in the center section of both support arms (fig. 44). Engage the left side support strut by striking it with the hand. Engage the right side support strut to the center section of the right support arm in a similar manner.

af. Attach the antenna feedhorn connector (fig. 42) to the feedhorn by rotating the feedhorn connector 1/8 turn, slipping the feedhorn connector over the feedhorn, and



Figure 39. Support arms before attachment of antenna bag.

rotating the feedhorn connector 1/8 turn in the opposite direction to lock in place

ah. Turn the LOW PRESSURE switch to ON.

Cautions:

1. During low-pressure inflation, check that the feedhorn connector is properly secured to the feedhorn.

2. Make the waveguide connections listed in ai and aj below; be extremely careful to prevent damage to the teflon covers.

ai. Connect a flexible waveguide to the horizontal or vertical (marked H and V, fig. 45) feedhorn (see note below). Connect the other end of the flexible wave to the XMTR ANT CONNECT jack located on the shelter roof (fig. 12).

Note: If the transmitting waveguide is connected to the vertical (V) feedhorn, the transmitting waveguide of the AN/TRC-80 at the other end of the communication circuit *must be* connected to the horizontal (H) feedhorn.

aj. Connect the other flexible waveguide between the other feedhorn connection and the RCVR ANT CONNECT jack (fig. 12) on the shelter roof.

ak. The mounting bracket for the antenna sight device is located on the left support arm of the antenna. Mount the antenna sighting device (stowed in the storage box above the power amplifier) on the mounting bracket (fig. 45).

58. Azimuth Orientation

To initially orient the shelter in azimuth, follow the instructions given in paragraphs 21 and 22. To complete the antenna orientation, perform the procedures given in *a* through *c* below:

a. Pull out the coarse azimuth locking pin (fig. 43) and rotate the antenna until the azimuth sight is in line with the far



Figure 40. Attaching antenna bag to center section of left support arm.

marker. Depress the BRAKE pedal (fig. 43) to lock the antenna in place.

Note: Personnel can vary the pressure on the brake as the antenna is rotated during windy conditions, or apply full pressure and lock the antenna platform in any position.

b. Release the coarse azimuth locking pin and turn the fine azimuth adjust handle (located inside the shelter, fig. 2) until the pin engages.

c. Depress the BRAKE RELEASE pedal.

59. Elevation Adjustment (fig. 43)

a. Loosen the wingnut on the elevation angle indicator and set the elevation pointer to 0. Tighten the wingnut.

b. Turn the elevation crank until the spirit-level bubble is centered.

c. Loosen the wingnut and set the desired elevation angle. Tighten the wingnut.

d. Turn the elevation crank until the bubble is again centered.

Note: Final antenna adjustment is performed after the transmitter and receivers are tuned (para 67).

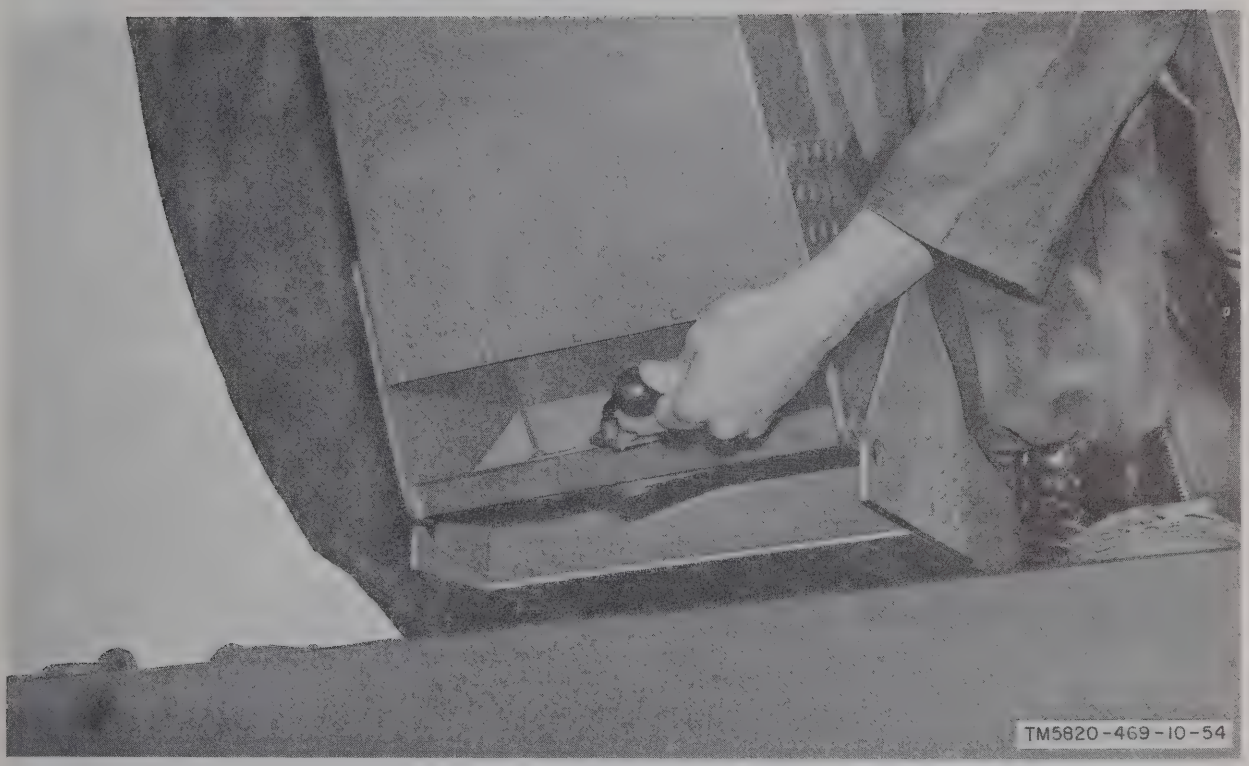


Figure 41. *Engaging lower section of left support arm to antenna base.*

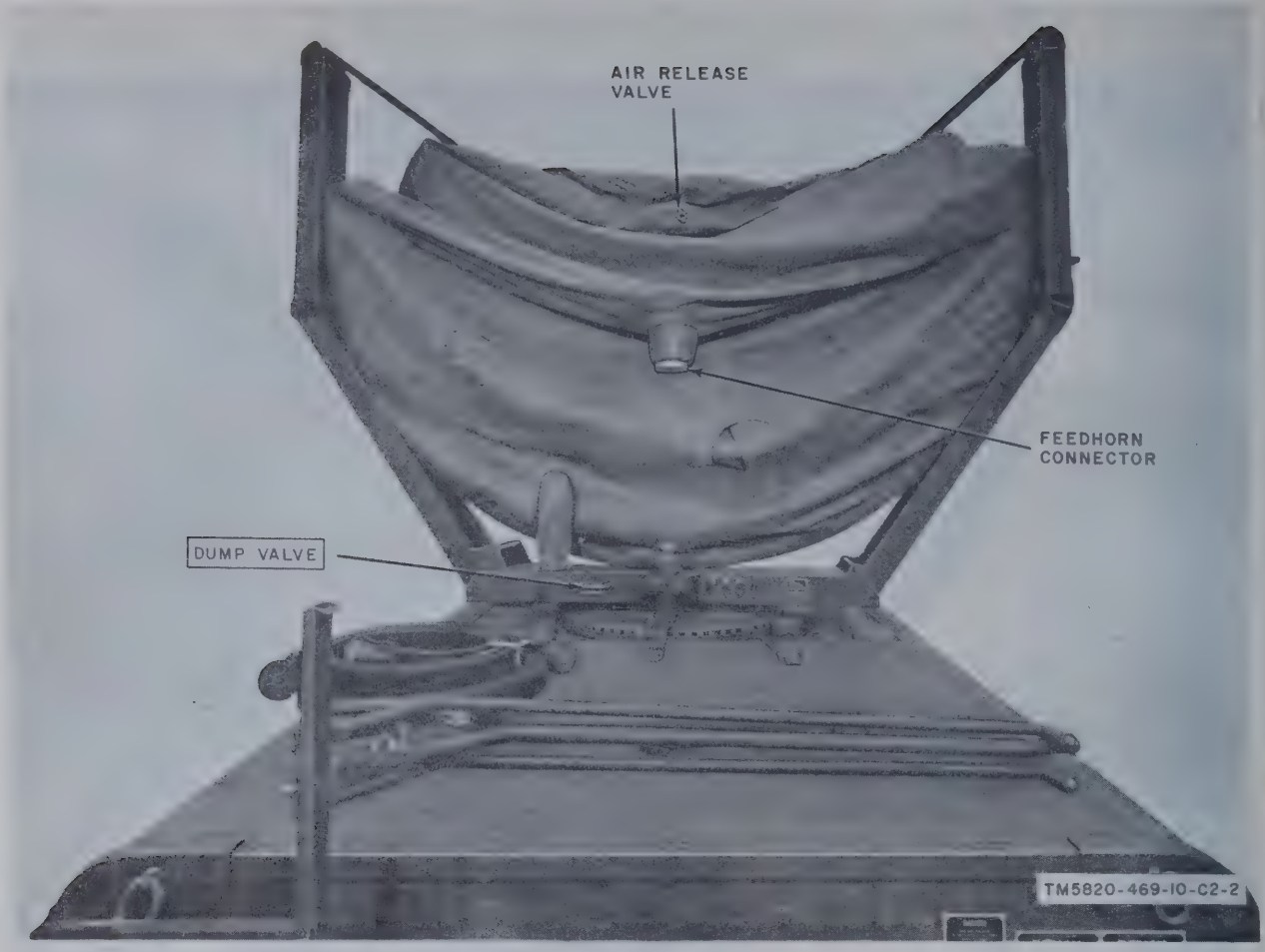


Figure 42. Antenna bag attached and both support arms in place.

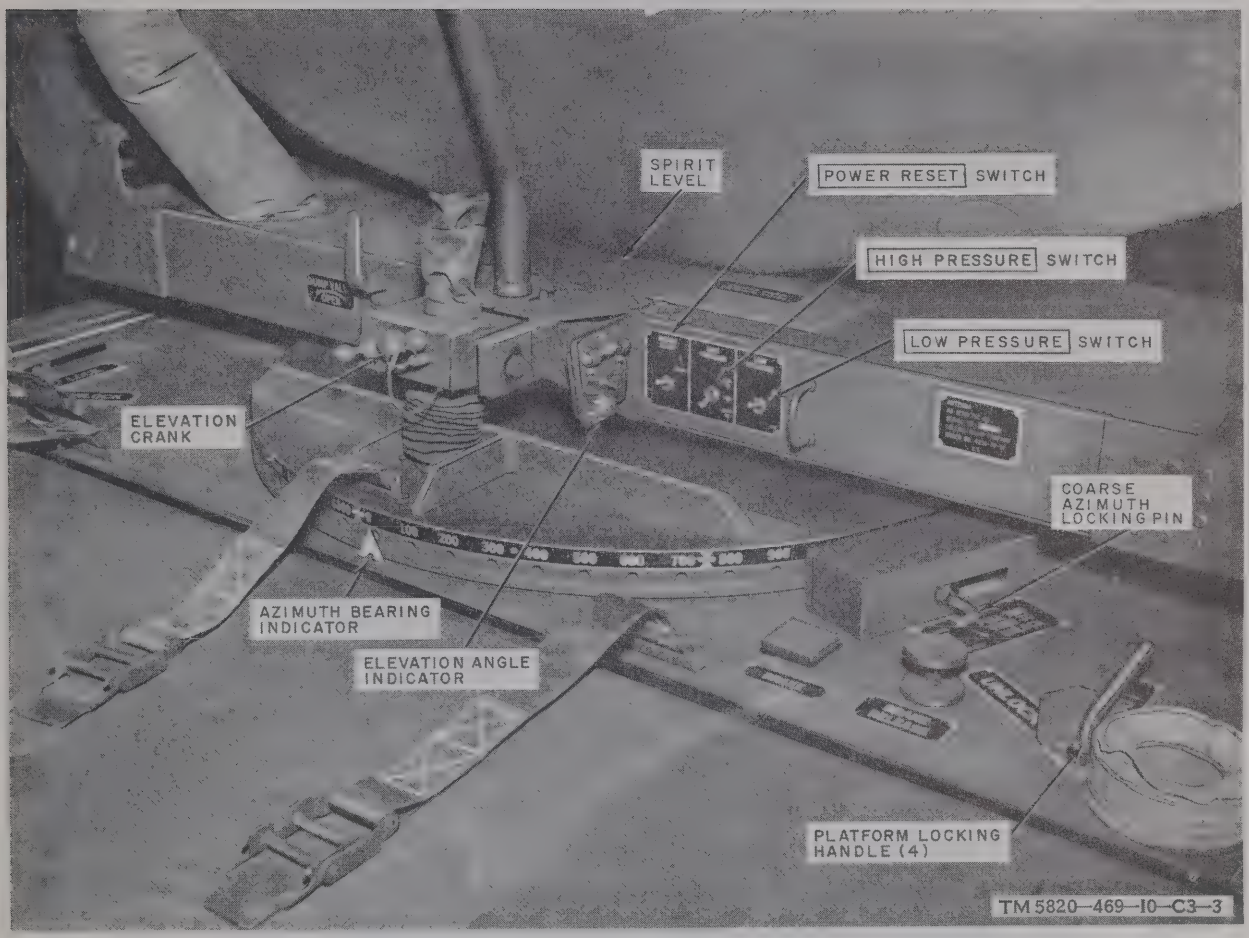


Figure 43. Antenna base, controls and indicators.

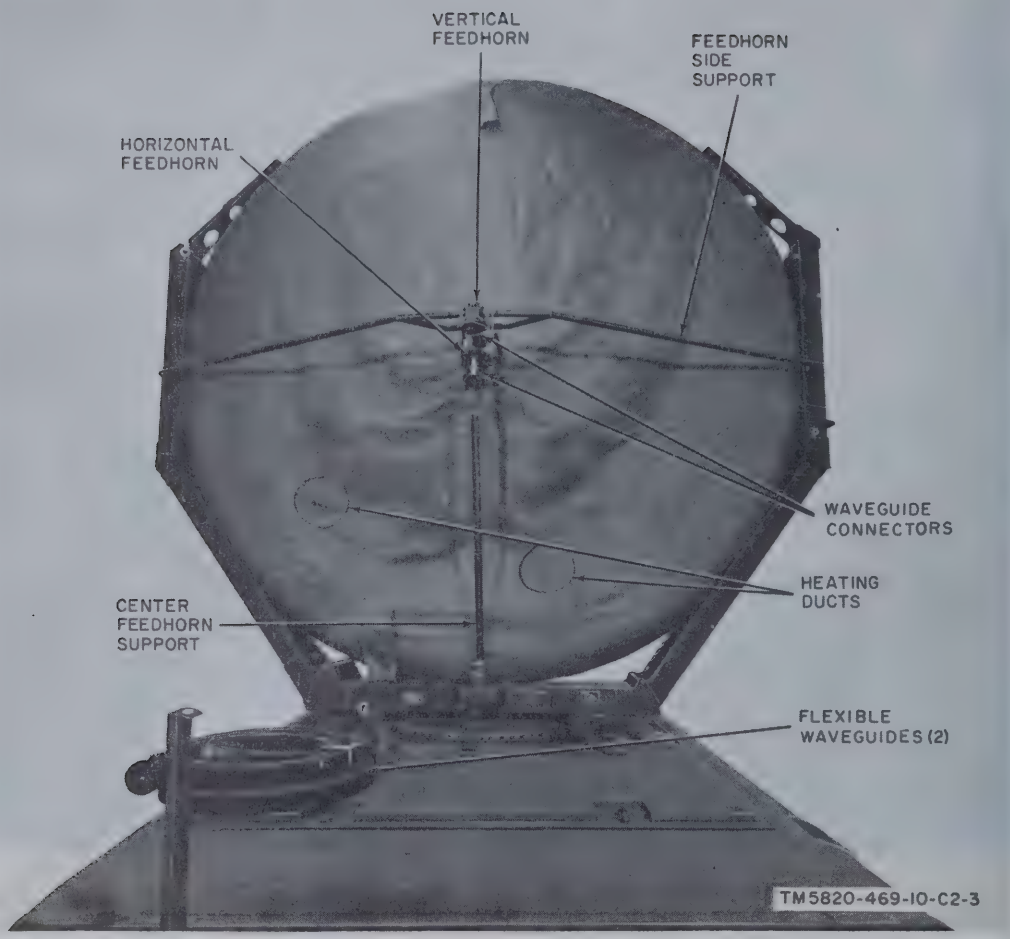


Figure 44. Antenna with feedhorn assembly in place.



Figure 45. Feedhorn assembly with flexible waveguides connected.

Section III. TUNING PROCEDURE

60. Frequency Considerations (fig. 46)

a. General. Operation of the AN/TRC-80 in diversity or nondiversity modes requires certain frequency considerations to be observed to prevent undesired interference. Assume a diversity system similar to that illustrated in figure 15, where F1 and F2 are the two receive frequencies at the battery terminal and F3 is the transmission frequency at the battery terminal. The frequencies that should be avoided during frequency selection are covered in *b* through *d* (below).

b. F1 to F2 Frequency Considerations. The frequency relationship between two receive frequencies at the battery terminal (or the two transmit frequencies at the battalion terminal) is illustrated in A of figure 46. Note that frequencies that are within F1 ±40 mc, and the frequency bands of F1 -70 mc (±10 mc) and F1+70 mc (±10 mc) are not suitable for F2. (The prohibitive bands are shaded in figure 46.)

(1) *F1 ±40 mc.* Assume that F1 is 4,795 mc. Frequency F2 should not be located closer than 4,755 mc (on the low side) or closer than 4,835 mc (on the high side). This frequency separation prevents F1 and F2 from causing interference to one another at the battery terminal.

(2) *F1 ±70 mc.* The two receive frequencies (F1 and F2) must not be separated by 70 mc (±10 mc). Therefore, if a frequency selection of 4,795 mc is made for F1, F2 should not fall within the bands of 4,855 mc through 4,875 mc. This frequency restriction prevents the two receive frequencies from heterodyning to produce a 70-mc signal. Since this equipment uses a 70-mc if. system, severe interference would be introduced by a 70-mc interference signal.

c. Transmitter Frequency Considerations. The transmitter frequency (F3 in figure 15) should not be located within the restricted frequency bands illustrated in B of figure 46. The frequency considerations between F3 and the two receive frequencies (F1 and F2) are listed below:

(1) *F1 or F2 ±80 mc.* Frequency F3 must not be within 80 mc of either F1 or F2. This provides isolation between the vertically and horizontally polarized feeds on the common antenna, and also avoids the development of a 70-mc signal that would cause interference in the receiver 70-mc if. system.

(2) *F1 or F2 ±105 mc.* Frequency F3 must not be separated by 105 mc (±5 mc) from either F1 or F2. If the transmit and receive frequencies were separated by 105 mc, interaction with the local oscillator signal would produce *birdies* in the received signal.

(3) *F1 or F2 ±140 mc.* Frequency F3 must not be separated by 140 mc (±5 mc) from either F1 or F2. If the transmit and receive frequencies were separated by 140 mc (±5 mc), a 70-mc interference signal could result because of interaction between the local oscillator and the transmitter frequency.

d. Example of Frequency Selection.

(1) Assume that the frequency selection for F1 is 4,795 mc. In A of figure 46, it is shown that F2 should not be located within the following bands:

(a) 4,715 through 4,735 mc (F1 -70 mc (±10 mc)).

(b) 4,755 through 4,835 mc (F1 ±40 mc).

(c) 4,855 through 4,875 mc (F1 +70 mc (±10 mc)).

(2) Assume that a frequency selection of 4,642 mc is made for F2. Note that this frequency does not fall within any of the restricted bands listed in (1) above.

(3) In the frequency selection of F3, the restrictive bands developed by the selection of F1 *and* F2 must be considered. The following frequency selections must be avoided because F1 is 4,795 mc:

(a) 4,650 through 4,660 mc (F1 -140 mc (±5 mc)).

(b) 4,685 through 4,695 mc (F1 -105 mc (±5 mc)).

(c) 4,715 through 4,875 mc (F1 ±80 mc).

(d) 4,895 through 4,905 mc (F1 +105 mc (±5 mc)).

(e) 4,930 through 4,940 mc (F1 +140 mc (±5 mc)).

(4) The following frequency selections must not be made for F3 when F2 is 4,642 mc:

(a) 4,497 through 4,507 mc (F2 -140 mc (±5 mc)).

(b) 4,532 through 4,542 mc (F2 -105 mc (±5 mc)).

(c) 4,652 through 4,722 mc (F2 ±80 mc).

(d) 4,742 through 4,752 mc (F2 +105 mc (±5 mc)).

(e) 4,777 through 4,787 mc (F2 +140 mc (±5 mc)).

(5) The frequency selection of F3 may be made within any band of frequencies that does not fall into the bands specified in (3) and (4) above.

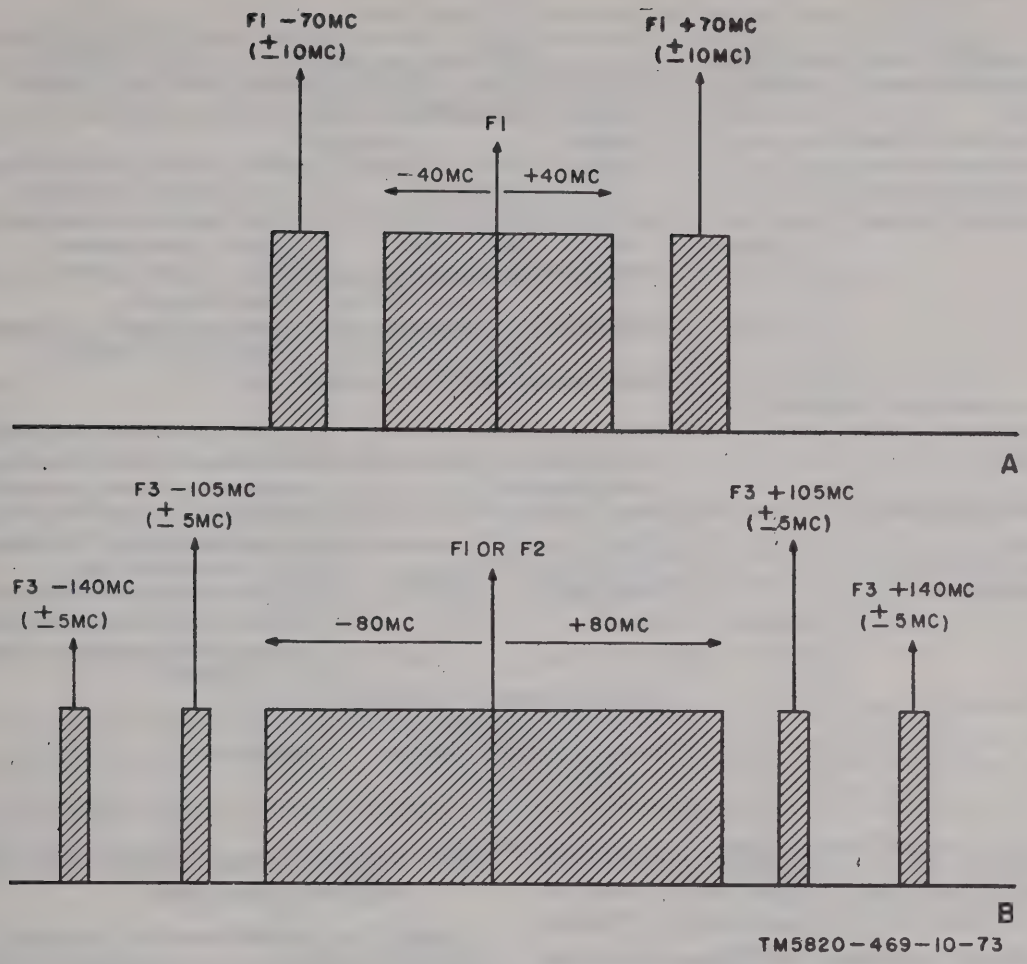


Figure 46. Example of frequency considerations.

61. Synthesizer Tuning Chart AN/TRC–80 Only
(fig. 47)

The synthesizer tuning chart is located below the three synthesizers on the front of rack A3 (fig. 6). Any frequency in the 4,400.8 mc to 4,998.4 mc range that is in increments of 1.8 mc may be used for tuning providing the frequency considerations listed in paragraph 60 are observed. Refer to the synthesizer tuning chart to find the channel number for the desired transmitting the receiving frequencies.

61.1. Synthesizer Tuning, AN/TRC–80A

Any frequency in the 4,400.00- to 4,999.95-mc range that is in increments of 0105 mc can be used for tuning if the frequency considerations discussed in paragraph 60 are observed.

62. Receiver Initial Tuning Control Settings, AN/TRC–80 Only

Select a receiving frequency (para 61) and perform the procedures listed below:

a. Receiver No. 1.

Unit	Fig.	Control	Set or adjust to
Synthesizer (upper unit in rack A3).	6 and 27	OSCILLATOR NO. 3 CHANNEL NO. HUNDREDS switch.	Indicate first digit of selected channel number in dial window.
Note. Upper unit drives receive converter No. 1 in rack A5; lower unit drives receive converter No. 2 in rack A4.		OSCILLATOR NO. 2 CHANNEL NO. TENS switch.	Indicate second digit of selected channel number in dial window.
		OSCILLATOR NO. 1 CHANNEL NO. Units switch.	Indicate last digit of selected channel number in dial window.
		MIXER NO. 2 tuning knob	Indicate channel number in hundreds in dial window.
		MIXER NO. 1 tuning knob	Indicate last 2 digits of channel number in dial window.
		Meter selector switch	OSC 1 OUT.
Receive converter:	53		
Oscillator unit		C2, C3, and C4 controls	Approximate desired frequency.
Multiplier unit		C3, C6, C14, and C22 controls	Approximate desired frequency.
		Tuning control F	Approximate desired frequency.
Varactor multiplier unit.		Tuning control G	Approximate desired frequency.
		Tuning control H	Approximate desired frequency.
Phase shift unit		PHASE SHIFTER	Fully counterclockwise.
Preselector unit		Preselector	Approximate desired frequency. *Note.* Tune preselector of unused receiver to at least 100 mc from receive frequency.
Meter panel		XTAL CURRENT ADJUST	Fully cw.
		TUN. DET METER ADJUST	Fully cw.
		METER FUNCTION SELECTOR switch.	Position B.

b. Receiver No. 2. The initial adjustments for receiver No. 2 are identical with those performed for receiver No. 1 (*a* above). Observe the frequency considerations (para 60) in the selection of the receiver No. 2 operating frequency.

62.1. Receiver Initial Tuning Control Settings, AN/TRC-80A Only

Select the desired receive frequency (para 61.1) and perform the procedures listed below:

a. Receiver No. 1, AN/TRC-80A.

Unit	Control	Set or adjust to
Synthesizer (upper unit in rack 3).	MEGAHERTZ selector switches (from left):	
Note. Upper unit drives received converter No. 1 in rack A5; lower unit drives received converter No. 2 in rack A4.	First	Fixed indicator, always indicates 4.
	Second	Indicates second digit of selected frequency.
	Third	Indicates third digit of selected frequency.
	Fourth	Indicates fourth digit of selected frequency.
	Fifth	Indicates fifth digit of selected frequency.
	Sixth	Indicates sixth digit of selected frequency.
	Mc tuning control	Midscale indication on TUNING VOLTAGE meter while indicating approximate desired frequency.

Unit	Control	Set or adjust to
Receive converter (rack A5):		
Varactor multiplier	Tuning control G	Approximate desired frequency.
	Tuning control H	Approximate desired frequency.
Phase shift unit	PHASE SHIFTER	Fully counterclockwise.
Preselector unit	Preselector	Approximate desired frequency. *Note.* Tune preselector of unused receiver converter to at least 100 mc from receive frequency.
	INCREASE TUN. DET METER ADJUST control.	Fully clockwise.
Meter panel	Position METER FUNCTION SELECTOR switch.	Position G.
Synthesizer	POWER OUTPUT	Synthesizer power output to 50 (set point) on receive converter meter.

b. Receiver No. 2. The initial adjustments for receiver No. 2 are identical with those performed for receiver No. 1 (*a* above). Observe the frequency considerations (para 60) in the selection of receiver No. 2 operating frequency.

63. Tuning Receiver No. 1 AN/TRC 80 Only

Note. Perform the receiver initial tuning control settings (para 62) before performing this procedure.

a. Receive Synthesizer No. 1 (Upper Unit, Rack A3 (fig. 6 and 27)).

Step	Control	Action	Indication
1	Meter selector switch	Rotate through OUT positions of OSC 1, OSC 2, and OSC 3.	Meter pointer above red area on all positions.
2	Meter selector switch	Set to MIXER 1 AGC	None.
3	Mixer No. 1 tuning control.	Tune for maximum meter indication.	Peak meter reading occurs at approximately correct setting of last two digits of selected channel.
4	LOCK knob	Turn maximum cw	None.
5	Meter selector switch	Set to MIXER 2 AGC	None.
6	Mixer No. 2 tuning control.	Tune for maximum meter indication.	Peak meter reading occurs at approximately correct selected channel hundreds setting.
7	LOCK knob	Turn maximum cw	None.
8	Meter selector switch	Set to MIXER 2 OUT position	Above red area of meter scale.

b. Receive Converter No. 1 (Rack A5) (fig. 10 and 53).

Note. Unless otherwise indicated, the adjustments listed in the *Adjust for* column are correctly made when the peak or desired reading occurs at the same time the dial or knob being adjusted indicates approximately the desired operating frequency.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
1	Oscillator	B	C2, C3, and C4	Maximum meter indication.
2	Multiplier	C	C3 and C6	Maximum meter indication.
3	Multiplier	D	C14	Maximum meter indication.
4	Multiplier	E	C22	Maximum meter indication.
5	Multiplier	F	Tuning control F	Maximum or full-scale meter indication.
6	Varactor multiplier.	G	G	Maximum or full-scale indication.
7	Varactor multiplier.	H-XTAL CUR	H	Maximum or full-scale indication.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
8	Oscillator	H-XTAL CUR	C4	Approximately 50 (set point).
9	Multiplier	H-XTA1 CUR	F	Maximum meter indication.
10	Varactor multiplier.	H-XTA1 CUR	G and H	Maximum indication on both positions.
11	Oscillator	B	C4	Maximum meter indication.
12	Meter panel	H-XTAL CUR	XTAL CURRENT ADJUST.	50 (set point). *Note.* Make this adjustment very slowly.
Note. Depress TUNE-UP SIGNAL pushbutton while performing steps 13 through 16.				
13	Meter panel	J-TUN. DET	TUN. DET METER ADJUST control.	Meter indication of 50.
14	Preselector	J-TUN. DET	Preselector tuning control.	Peak meter indication. *Notes:* 1. Meter indication must peak when control dial approximately indicates desired frequency. 2. If necessary, vary TUN. DET METER ADJUST control ccw to maintain on-scale meter indication.
15	Phase shifter	J-TUN. DET	PHASE SHIFT control.	Maximum meter indication. (Turn control cw through complete tuning range and set control at point of peak meter indication.) *Note.* If necessary, turn TUN. DET METER ADJUST control ccw to maintain on-scale meter indication.
16	Repeat steps 13 through 15.		Release TUNE-UP SIGNAL pushbutton when adjustment is completed.	
17	If. amplifier No. 1.	Any position	Set selector switch S1 (fig. 28) located on if. amplifier to RCVR GAIN 6.	Place INJ switch to OFF and adjust RCR GAIN control (on bandwidth module) for indication of 6 on meter M1 (fig. 28).

63.1. Tuning Receiver No. 1, AN/TRC–80A Only

a. Synthesizer No. 1 (Upper Unit, Rack A3). Determine that the synthesizer is operating by observing that the OUT OF LOCK indicator is off. This indicator should flash momentarily when a frequency selector switch is operated. If the OUT OF LOCK indicator remains lighted, adjust the mc tuning control very slowly until the OUT OF LOCK indicator is extinguished and a midscale indication is obtained on the TUNING VOLTAGE meter.

b. Receive Converter No. 1 (Rack A5), AN/TRC–80A.

Note. Unless otherwise indicated, the adjustments listed in the *Adjust for* column are correctly made when the peak or desired reading occurs at the same time the dial or knob being adjusted indicates approximately the desired operating frequency.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
1	Varactor multiplier	G	G	Maximum meter indication, while maintaining an on-scale reading with synthesizer POWER OUTPUT control.
2	Varactor multiplier.	H-XTAL CUR	H	Maximum meter indication. (Maintain on-scale reading.)

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
3	Synthesizer	H-XTAL CUR	POWER OUTPUT	Approximately 50 (set point).
4	Varactor multiplier.	X-XTAL CUR	G	Maximum meter indication.
5	Varactor multiplier.	H-XTAL CUR	H	Maximum meter indication.
6	Synthesizer	H-XTAL CUR	POWER OUTPUT	50 (set point).
Note. Depress TUNE-UP pushbutton while performing steps 7 and 8.				*Note.* Make this adjustment very slowly.
7	Meter panel	J-TUN. DET	TUN. DET METER ADJUST.	Meter indication of 50 or fully clockwise for approximately midscale reading.
8	Preselector	J-TUN. DET	Preselector tuning	Peak meter indication. *Notes:* 1. Meter indication must peak when control dial indicates that approximate frequency desired. 2. If necessary, vary TUN. DET METER ADJUST control ccw to maintain on-scale meter indication.
9	If. amplifier No. 1 (rack 5) 8 MC IF NO. 2 module (meter) M1. BANDWIDTH CONTROL module.		Switch S1 (COMB. V position). RCVR GAIN R4	With switch S1 at COMB. V, adjust RCVR GAIN control R4 for a 13-ma indication on meter M1.
Note 1. Release TUNE-UP pushbutton. *Note 2.* Make sure that no signal is being received.				
10	Meter panel	J-TUN. DET	TUN. DET METER ADJUST.	Set control fully clockwise.
11	Phase Shifter	J-TUN. DET	PHASE SHIFT	Adjust the PHASE SHIFT control clockwise through its entire tuning range while observing the receive converter meter. Meter indicator will pass through several minimal indications as the control is tuned. Note the magnitude of the minima and readjust the control to the minima that gave the lowest meter indication.
12	If amplifier No. 1 (rack 5) 8 MC IF NO. 2 module (meter) M1 BANDWIDTH control module.		Switch S1 (COMB. V position). RCVR GAIN R4	Reset RCVR GAIN R4 for 13 ma (step 9 above).
Note 1. Repeat steps 7 through 12.				

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
Note 2. Depress TUNE-UP pushbutton while performing steps 13 and 14.				
13	Meter panel	J-TUN. DET	TUN. DET METER	Meter indication of 80. Use this as a reference level for the following steps:
14	Preselector	J-TUN. DET	Preselector tuning	*a.* Rotate counterclockwise until meter indicates 30. *b.* Rotate clockwise until meter indicates 50. Note dial setting (frequency). *c.* Continue rotating clockwise until meter indication passes through a peak and decreases to 50. Note dial setting. *d.* Rotate counterclockwise until meter indications again pass through the peak and decrease to 50. Check dial setting (step *b* above). *e.* Rotate clockwise to a dial setting halfway between settings noted in *b* and *c* above. Meter indicates greater than 75.
15	If. amplifier No. 1.	Any position	Set selector switch S1 (fig. 28) on 8 MC IF NO. 2 module to RCVR GAIN 6.	RCVR GAIN control R4 (bandwidth module) for an indication of 6 on meter M1.)
Note. Make sure no signal is being received during this adjustment.				

64. Tuning Receiver No. 2, AN/TRC–80A Only

Receiver No. 2 is tuned in the same manner that receiver No. 1 is tuned (para 63). Refer to paragraph 60 for frequency considerations in a diversity system.

a. Tune the synthesizer (lower unit, rack A3); follow the procedures listed in paragraph 63*a*.

b. Tune the receive converter (rack A4); follow the procedures listed in paragraph 63*b*.

64.1. Tuning Receiver No. 2, AN/TRC–80A Only

Receiver No. 2 is tuned in the same manner as receiver No. 1 (para 63.1).

a. Check the synthesizer (lower unit, rack A3) for proper operation by observing that the OUT OF LOCK indicator is off. This indicator should flash momentarily when a frequency selector switch is operated. If the OUT OF LOCK indicator remains lighted, adjust the FREQUENCY MHz control very slowly until the OUT OF LOCK indicator turns off a midscale indication is obtained on the TUNING VOLTAGE meter.

b. Tune the converter in rack A4 by following the procedures given in paragraph 63.1*b*.

65. Transmitter Initial Tuning Controls Settings, AN/TRC–80A Only

Note. The general instructions in paragraph 62*a* apply to this tuning procedure also.

a. General. The transmitter is tuned by first presetting the controls on the synthesizer, transmit converter and power amplifier.

Caution: **Insure that neither receiver preselector is tuned to within 100 mc of the selected transmitter frequency. Never tune the transmitter through the receiver frequency.**

SYNTHESIZER TUNING CHART

CHANNEL NO.	FREQ	CHANNEL NO.	FREQ	CHANNEL NO.	FREQ	CHANNEL NO.	FREQ	CHANNEL NO.	FREQ	CHANNEL NO.	FREQ	CHANNEL NO.	FREQ
595	4400.8	643	4487.2	691	4573.6	739	4660.0	787	4746.4	835	4832.8	883	4919.2
596	4402.6	644	4489.0	692	4575.4	740	4661.8	788	4748.2	836	4834.6	884	4921.0
597	4404.4	645	4490.8	693	4577.2	741	4663.6	789	4750.0	837	4836.4	885	4922.8
598	4406.2	646	4492.6	694	4579.0	742	4665.4	790	4751.8	838	4838.2	886	4924.6
599	4408.0	647	4494.4	695	4580.8	743	4667.2	791	4753.6	839	4840.0	887	4926.4
600	4409.8	648	4496.2	696	4582.6	744	4669.0	792	4755.4	840	4841.8	888	4928.2
601	4411.6	649	4498.0	697	4584.4	745	4670.8	793	4757.2	841	4843.6	889	4930.0
602	4413.4	650	4499.8	698	4586.2	746	4672.6	794	4759.0	842	4845.4	890	4931.8
603	4415.2	651	4501.6	699	4588.0	747	4674.4	795	4760.8	843	4847.2	891	4933.6
604	4417.0	652	4503.4	700	4589.8	748	4676.2	796	4762.6	844	4849.0	892	4935.4
605	4418.8	653	4505.2	701	4591.6	749	4678.0	797	4764.4	845	4850.8	893	4937.2
606	4420.6	654	4507.0	702	4593.4	750	4679.8	798	4766.2	846	4852.6	894	4939.0
607	4422.4	655	4508.8	703	4595.2	751	4681.6	799	4768.0	847	4854.4	895	4940.8
608	4424.2	656	4510.6	704	4597.0	752	4683.4	800	4769.8	848	4856.2	896	4942.6
609	4426.0	657	4512.4	705	4598.8	753	4685.2	801	4771.6	849	4858.0	897	4944.4
610	4427.8	658	4514.2	706	4600.6	754	4687.0	802	4773.4	850	4859.8	898	4946.2
611	4429.6	659	4516.0	707	4602.4	755	4688.8	803	4775.2	851	4861.6	899	4948.0
612	4431.4	660	4517.8	708	4604.2	756	4690.6	804	4777.0	852	4863.4	900	4949.8
613	4433.2	661	4519.6	709	4606.0	757	4692.4	805	4778.8	853	4865.2	901	4951.6
614	4435.0	662	4521.4	710	4607.8	758	4694.2	806	4780.6	854	4867.0	902	4953.4
615	4436.8	663	4523.2	711	4609.6	759	4696.0	807	4782.4	855	4868.8	903	4955.2
616	4438.6	664	4525.0	712	4611.4	760	4697.8	808	4784.2	856	4870.6	904	4957.0
617	4440.4	665	4526.8	713	4613.2	761	4699.6	809	4786.0	857	4872.4	905	4958.8
618	4442.2	666	4528.6	714	4615.0	762	4701.4	810	4787.8	858	4874.2	906	4960.6
619	4444.0	667	4530.4	715	4616.8	763	4703.2	811	4789.6	859	4876.0	907	4962.4
620	4445.8	668	4532.2	716	4618.6	764	4705.0	812	4791.4	860	4877.8	908	4964.2
621	4447.6	669	4534.0	717	4620.4	765	4706.8	813	4793.2	861	4879.6	909	4966.0
622	4449.4	670	4535.8	718	4622.2	766	4708.6	814	4795.0	862	4881.4	910	4967.8
623	4451.2	671	4537.6	719	4624.0	767	4710.4	815	4796.8	863	4883.2	911	4969.6
624	4453.0	672	4539.4	720	4625.8	768	4712.2	816	4798.6	864	4885.0	912	4971.4
625	4454.8	673	4541.2	721	4627.6	769	4714.0	817	4800.4	865	4886.8	913	4973.2
626	4456.6	674	4543.0	722	4629.4	770	4715.8	818	4802.2	866	4888.6	914	4975.0
627	4458.4	675	4544.8	723	4631.2	771	4717.6	819	4804.0	867	4890.4	915	4976.8
628	4460.2	676	4546.6	724	4633.0	772	4719.4	820	4805.8	868	4892.2	916	4978.6
629	4462.0	677	4548.4	725	4634.8	773	4721.2	821	4807.6	869	4894.0	917	4980.4
630	4463.8	678	4550.2	726	4636.6	774	4723.0	822	4809.4	870	4895.8	918	4982.2
631	4465.6	679	4552.0	727	4638.4	775	4724.8	823	4811.2	871	4897.6	919	4984.0
632	4467.4	680	4553.8	728	4640.2	776	4726.6	824	4813.0	872	4899.4	920	4985.8
633	4469.2	681	4555.6	729	4642.0	777	4728.4	825	4814.8	873	4901.2	921	4987.6
634	4471.0	682	4557.4	730	4643.8	778	4730.2	826	4816.6	874	4903.0	922	4989.4
635	4472.8	683	4559.2	731	4645.6	779	4732.0	827	4818.4	875	4904.8	923	4991.2
636	4474.6	684	4561.0	732	4647.4	780	4733.8	828	4820.2	876	4906.6	924	4993.0
637	4476.4	685	4562.8	733	4649.2	781	4735.6	829	4822.0	877	4908.4	925	4994.8
638	4478.2	686	4564.6	734	4651.0	782	4737.4	830	4823.8	878	4910.2	926	4996.6
639	4480.0	687	4566.4	735	4652.8	783	4739.2	831	4825.6	879	4912.0	927	4998.4
640	4481.8	688	4568.2	736	4654.6	784	4741.0	832	4827.4	880	4913.8		
641	4483.6	689	4570.0	737	4656.4	785	4742.8	833	4829.2	881	4915.6		
642	4485.4	690	4571.8	738	4658.2	786	4744.6	834	4831.0	882	4917.4		

NOTE: (1) Frequency is in MC.

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Figure 47. Synthesizer tuning chart.

b. Initial Settings.

Step	Unit	Fig.	Control	Set or adjust control to:
1	Synthesizer (center unit, rack A3, *transmit* frequency).	6	OSCILLATOR NO. 3 CHANNEL NO. HUNDREDS switch.	Indicate first digit of selected channel number in dial window.
			OSCILLATOR NO. 2 CHANNEL NO. TENS switch.	Indicate second digit of selected channel number in dial window.
			OSCILLATOR NO. 1 CHANNEL NO. UNITS switch.	Indicate last digit of selected channel number in dial window.
			MIXER NO. 2 tuning control.	Indicate channel number in hundreds in dial window.
			MIXER NO. 1 tuning control.	Indicate last 2 digits of channel number in dial window.
			Meter selector switch	OSC 1 OUT.
2	Transmit converter:	7		
	Oscillator unit	52	C2, C3, and C4 controls	Approximate desired frequency.
	Multiplier unit	52	C3, C6, C14, and C22 controls.	Approximate desired frequency.
			Tuning control F	Approximate desired frequency.
	Varactor multiplier unit.	52	Tuning control G	Approximate desired frequency.
			Tuning control H	Approximate desired frequency.
	Tunable filter	52	J TUNABLE FIL control.	Approximate desired frequency.
	Main chassis	52	LEVEL ADJUST control.	Maximum clockwise.
3	Power amplifier	54	KLYSTRON TUNING FIRST, SECOND, and FOURTH CAVITY controls.	Desired operating frequency by use of TUNING CHART on front panel.
			THIRD CAVITY control.	100 digits higher than FIRST CAVITY.
			DRIVE LEVEL control	Fully counterclockwise.
			BEAM VOLTAGE switch.	Position 1.

65.1. Transmitting Equipment Initial Tuning Control Settings, AN/TRC–80A

Note. The general instructions given in paragraph 62.1*a* also apply to this tuning procedure.

a. General. The transmitting equipment is tuned by first presetting the controls on the synthesizer, transmit converter, and power amplifier.

Caution: **Insure that neither receive converter preselector is tuned to within 100 mc of the selected transmission frequency. Never tune the power amplifier through the receiver frequency.**

b. Initial Settings, AN/TRC–80A.

Step	Unit	Control	Set or adjust control to
1	Synthesizer (rack A7)	MEGAHERTZ selector switches (from left):	
		First	Fixed indicator, always indicates 4.
		Second	Indicates second digit of selected frequency.
		Third	Indicates third digit of selected frequency.
		Fourth	Indicates fourth digit of selected frequency.

Step	Unit	Control	Set or adjust control to
		Fifth	Indicates fifth digit of selected frequency.
		Sixth	Indicates sixth digit of selected frequency.
		Mc tuning control	Midscale indication on TUNING VOLTAGE meter when selector switches approximate desired frequency.
2	Transmit converter:		
	Varactor multiplier	Tuning control G	Approximate desired frequency.
		Tuning control H	Approximate desired frequency.
	Tunable filter	J TUNABLE FIL	Approximate desired frequency.
3	Power amplifier:		
	Klystron unit	FIRST, SECOND, and FOURTH CAVITY.	Desired operating frequency by use of TUNING CHART on front panel.
		THIRD CAVITY	100 digits higher than first cavity.
		DRIVE LEVEL control	Fully ccw.
	Power supply panel	BEAM VOLTAGE selector switch.	Position 1.
4	Synthesizer (rack A7)	POWER OUTPUT	Synthesizer power output to 30 on transmit-converter meter.

66. Transmitter Tuning Procedure
(fig. 7 and 53 or 7.1 and 53.1)

Caution: **When there is no significance to the choice of frequencies, use frequencies in the midrange section. Do *not* excurse from one frequency end to the other while tuning the klystron cavities. At least 100 digits from either extreme end (during tuning practice) should be the maximum of the tuning excursion.**

Note 1. Refer to paragraph 60 for frequency considerations in a diversity system.

Note 2. Complete the initial tuning procedures (para 65, or 65.1) before starting this procedure.

Note. 3. Unless otherwise indicated, the adjustments listed in the *Adjust for* column are correctly made when the peak or desired reading occurs at the same time the dial or knob being adjusted indicates the desired operating frequency.

a. Transmit Converter, AN/TRC–80 Only.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
1	Oscillator	B	C2, C3, and C4	Maximum meter indication.
2	Multiplier	C	C3 and C6	Maximum meter indication.
3	Multiplier	D	C14	Maximum meter indication.
4	Multiplier	E	C22	Maximum meter indication.
5	Multiplier	F	Tuning control F	Maximum meter indication. (Keep meter indication on scale by turning LEVEL ADJUST control ccw.)
6	Varactor multiplier.	G	Tuning control G	Maximum or full-scale meter indication. (Keep meter indication on scale by turning LEVEL ADJUST control ccw.)
7	Varactor multiplier.	H	Tuning control H	Maximum meter indication; then use LEVEL ADJUST control to set meter to 50.
8	Meter panel	HELIX	BEAM PUSH TO START (depress) momentarily.	80 or less. (BEAM panel indicator should light.) Refer to higher echelon if meter indication exceeds 80.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
9	Meter panel	COLLECTOR	None	80 or less. Refer to higher echelon maintenance if meter indication exceeds 80.
10	Tunable filter	OUTPUT	Depress CARRIER SWITCH (on-modulator-multiplier, fig. 20).	Adjust TUNABLE FILTER for maximum meter indication. (TUNABLE FILTER should indicate 70 mc below the operating frequency.)
11	Tunable filter	OUTPUT	Release CARRIER SWITCH.	Adjust TUNABLE FILTER control for maximum meter indication at a point 70 mc higher than step 10. The TUNABLE FILTER should indicate approximately the correct frequency.
12	Tunable filter	OUTPUT	Depress CARRIER SWITCH.	*Note.* Meter indication should drop to approximately zero. If indication is not zero, repeat steps 10 and 11.
13	Main chassis	OUTPUT	LEVEL ADJUST	Meter indication of 50. Adjust tuning controls F, G, and H for maximum meter indication.
14	Main chassis	OUTPUT	LEVEL ADJUST	Readjust for indication of 50.

*a.*1. *Transmit Converter, AN/TRC–80A Only.* On the transmit converter, preset the G, H, and TUNABLE FIL J controls to the desired transmit frequency. Do not depress the BEAM PUSH TO START pushbutton.

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
1	Varactor multiplier.	G	G	Peak indication on meter. (Keep meter indication on-scale by tuning POWER OUTPUT control ccw.)
2	Varactor multiplier.	H	H	Peak indication on meter. (Keep meter indication on-scale by tuning POWER OUTPUT control ccw.)
3	Meter panel	HELIX	Momentarily depress BEAM PUSH TO START.	(BEAM panel indicator should light.) Meter should indicate 80 or less. Refer to higher category if meter indication exceeds 80.
4	Meter panel	COLLECTOR	None	Meter should indicate 80 or less. Refer to higher category if meter indication exceeds 80.
5	Synthesizer (middle synthesizer in rack A3).	G	POWER OUTPUT	Approxicately midscale reading on the transmit-converter meter.
6	Varactor multiplier.	G	G	Peak indication on meter.
7	Varactor multiplier.	H	H	Peak indication on meter.
8	TUNABLE FIL	OUTPUT	Depress the BEAM PUSH TO START.	(BEAM panel indicator should light.) Adjust TUNABLE FIL control J for maximum meter indication on the first response 70-mc above the varactor multiplier output signal (upper

Step	Unit	METER FUNCTION SELECTOR switch setting	Control	Adjust for
				sideband). TUNABLE FIL control J setting should be the same frequency as the synthesizer MEGAHERTZ thumbwheel switch indicates.
9	TUNABLE FIL	OUTPUT	Depress CARRIER SWITCH (on modulator-multiplier).	Meter indication should drop to zero. If indication is not zero, retune TUNABLE FIL control J to a frequency 70 mc higher.
10	Synthesizer	H	POWER OUTPUT	Adjust POWER OUTPUT control for a transmit-converter meter indication of 5 to 10 microamperes.
11	TUNABLE FIL	OUTPUT	J	Carefully adjust for peak meter indication. Maximum meter indication should not exceed 15 microamperes. If meter indication is greater, reduce synthesizer POWER OUTPUT and retune TUNABLE FIL control J for maximum indication. *Note.* After TUNABLE FIL control J is repeaked under low drive conditions (setps 10 and 11), do not readjust this control again.
12	Synthesizer	OUTPUT	POWER OUTPUT	Meter indication of 50. Adjust G and H for maximum meter indication.
13	Synthesizer	OUTPUT	POWER OUTPUT	Readjust for meter indication of 50, midscale, or as required for proper klystron drive.

b. Power Amplifier Tuning (fig. 54).

Step	Control	Adjustment	Remarks
1	MAIN circuit breaker	Set to ON.	
2	BLOWER circuit breaker.	Set to ON.	
3	FILAMENT ON-OFF switch.	Set to ON	DRAWER indicator lights. Klystron blower goes on. When blower reaches operating speed, AIR indicator lights.
4	FILAMENT ADJUST control.	Adjust for meter indication of 6.5 volts.	FILAMENT indicator lights, FILAMENT hours indicator begins to run, and TIME DELAY indicator lights.
5	DRIVE LEVEL control	Turn cw until POWER IN meter indicates 50.	
6	REFLECTED-INCIDENT switch.	Set to REFLECTED.	
7	FIRST CAVITY tuning control.	Adjust for minimum reading on POWER IN meter.	
8	SECOND and FOURTH CAVITY controls.	Set counters to indicate same readout as the FIRST CAVITY counter.	
9	THIRD CAVITY tuning control.	Set control to indicate 30 digits higher than FIRST CAVITY counter.	
10	BEAM circuit breaker	Set to ON.	

Step	Control	Adjustment	Remarks
11	BEAM ON pushbutton	Depress	BEAM indicator lights, BEAM hours elapsed time meter runs. BEAM VOLTAGE meter indicates approximately 6,600 volts. BEAM CURRENT meter indicates .6 amp. If there is no meter indication on the INCIDENT KW section of the POWER OUT meter, increase input power (rotate DRIVE LEVEL control cw) to obtain a maximum of 250 milliwatts on the output meter. ***Caution*: It is necessary that the INCIDENT power out be less than 300 watts while cavities are being tuned. Reduce INCIDENT power in (by rotating DRIVE LEVEL control ccw) as often as required to insure this level.**
12	SECOND and FOURTH CAVITY tuning controls.	Adjust for maximum indication on POWER OUT meter.	Reduce drive level as required to keep incident power out less than 300 watts.
13	THIRD CAVITY tuning control.	Depress BEAM OFF pushbutton and adjust control so that counter reading is 100 digits higher than the FIRST CAVITY counter.	
14	DRIVE LEVEL control	Turn cw for meter indication of 50 milliwatts on the POWER IN meter.	
15	THIRD CAVITY tuning control.	Press BEAM ON pushbutton and lower counter readout for a maximum indication on POWER OUT meter.	
16	SECOND and FOURTH CAVITY controls.	Adjust for maximum indication on INCIDENT scale of POWER OUT meter.	
17	FOURTH CAVITY tuning control.	Adjust slightly for maximum indication on INCIDENT scale of POWER OUT meter.	If incident power in below 1,000 watts: *a.* Press the BEAM OFF pushbutton. *b.* Set the BEAM VOLTAGE switch to position 2 and press the BEAM ON pushbutton. *c.* Repeak THIRD, SECOND, and FOURTH CAVITY tuning controls for a maximum indication on INCIDENT scale of POWER OUT meter. *Note.* If the incident power is still below 1,000 watts repeat steps *a* through *c* (above) using positions 3, 4, and 5 of the BEAM VOLTAGE switch until an incident power output of 1,000 watts is obtained.

Step	Control	Adjustment	Remarks
			When incident power of 1,000 watts is obtained repeat steps 7 and 8.

Step	Control	Adjustment	Remarks
18	SECOND FOURTH and THIRD CAVITY tuning controls.	Set REFLECTED-INCIDENT switch to INCIDENT and slowly peak controls for maximum indication on INCIDENT scale of POWER OUT meter.	Lock all tuning controls. Place TUNE-OPERATE switch in the OPERATE position.

67. Final Antenna Adjustment

a. Place the METER FUNCTION SELECTOR switch of the receive converter in use to the RECEIVE SIG DET position.

Note. For exceptionally weak signals, place the METER FUNCTION SELECTOR switch on the receive converter in the J-TUN. DET. position.

b. Turn the fine azimuth adjustment handle (fig. 2) for a maximum indication on the receive converter meter.

Note. The fine azimuth adjustment mechanism may have reached the travel limit for the particular coarse azimuth setting. Therefore, it may be necessary to climb on the shelter roof and move the antenna to the next 100-mil increment setting.

Warning: **Turn off power amplifier before climbing to shelter roof.**

c. Remove the antenna orientation meter and cable from the paper storage compartment. Climb on the shelter roof and connect the antenna orientation meter cable to the connector located in the external shelter compartment that houses the receive waveguide connector (fig. 12).

d. Set the meter RESPONSE TIME control to the center of its range.

Note. As the control is turned toward the FAST position, meter sensitivity increases and is more susceptible to fluctuations due to fading and other propagation effects. The best setting is that which enables the operator to distinguish between meter fluctuation due to propagation effects and those due to antenna movement. Under no-signal conditions, the meter should indicate 24.

e. Turn the elevation crank (fig. 43) for a maximum meter indication.

f. Instruct the AN/TRC-80 operator at the other end of the circuit to perform final azimuth and elevation adjustments.

g. Repeat the procedures given in *a*, *b*, *d* and *f* above.

h. Disconnect the antenna orientation meter and cable and replace in the paper storage compartment.

Section IV. OPERATING PROCEDURE

68. Rapid Emplacement Procedure

The preliminary starting procedures (para 53) and the receiver and transmitter tuning (paras 55-66) must be performed when an AN/TRC-80 is to be turned on for the first time, or if the equipment has not been pretuned to the operating frequencies. However, if the AN/TRC-80 has been pretuned, trained operators can inflate the antenna and turn on the equipment within 10 minutes after the AN/TRC-80 arrives at a selected site. To place a pretuned AN/TRC-80 on the air, proceed as follows:

Note. The *Paragraph* reference column in the chart refers to the paragraph where the step is explained in detail.

Step	Action	Pargaraph
1	Open shelter door	53
2	Turn on emergency light (28V LIGHT)	54
3	Open engine generator compartment door and pa air vents	
4	Unstow flexible waveguides and place on shelter roof. Install ladder	53
5	Open antenna compartment door and unlatch platform	57*b*
6	Remove antenna feedhorns and replace straps	57*d-g*
7	Crank antenna platform to operating height	57*h*, *i*
8	Lock antenna platform in place and replace crank	57*k*
9	Start engine generator	55*a*

Step	Action	Pargaraph
10	Remove straps, unfold antenna support arms, fasten antenna bag to antenna support arms, and lock antenna support arms.	57*l-x*
11	Set engine generator voltage and frequency	55*b*
12	Depress LOAD CONTROL switch to ON	55*b*(2)
13	Turn on rack lights and rack blowers	56
14	Turn on power equipment racks	56
15	Close DUMP VALVE	57*y*
16	Turn on power amplifier filaments and adjust filament voltage	66*b*, step 4
17	Energize antenna compressor	57*z-ab*
18	Engage feedhorn side-supports and attach rf antenna window to feedhorn	57*ad-af*
19	Turn LOW PRESSURE switch to ON, and attach flexible waveguides	57*ag-aj*
20	Depress BEAM PUSH TO START on transmit converter.	
21	Make azimuth and elevation check from roof	58 and 59
22	Apply beam voltage to klystron	66*b*, steps 5-18
24	Install ground stake	23
24	Establish communications with distant station. After 5 minutes repeak pa tuning cavities	
25	Perform final azimuth adjustment from inside operator's compartment	67

69. Switch Panel Connections

A radio circuit using the AN/TRC-80 can be operated in either the nondiversity or diversity mode of operation. The choice of operating mode depends on circuit reliability requirements. For distances up to 160 km (100 miles), diversity operation increases circuit reliability to 99.9 percent.

a. *Nondiversity Operation.* When nondiversity operation is used, only one receiver and two synthesizers in each radio set are used. The preselector of the unused receiver converter must be detuned a minimum of 100 mc from the transmitter frequency. The unused synthesizer and receiver must be turned off. Refer to figure 23 and set up the switch panel as follows:

Item	Switch position
DEMULT-MULT-MOD SELECTOR switch S1.	LOCAL position.
LOCAL-REMOTE COM CONTROL SELECTOR switch S2.	CONTROL position.
Coaxial patch cable. (Use one cable only.)	Connect patch cables as shown in figure 23.

Note: In nondiversity operation, either receiver may be used. The selected receiver may be patched to either if. amplifier IF IN jack.

b. *Diversity Operation.*

(1) *General.* In diversity operation, one AN/TRC-80 is used at the battery site and two AN/TRC-80's are used at the battalion terminal. The AN/TRC-80 at the battery site uses both receivers and the transmitter. At the battalion terminal, two receivers and two transmitters are used (one receiver in each radio set is not used). The two radio sets at the battalion terminal may be set up with either AN/TRC-80 in control ((3) and (4) below).

(2) *Battery terminal.* Operation of the radio set at the battery terminal requires the use of all units of the equipment within the AN/TRC-80. Selector switches S1 and S2 are positioned as shown in figure 23. Coaxial patch cables are connected between the RECEIVER OUT jacks and the corresponding IF IN jacks.

(3) *Battalion terminal, pack 1 in control.* Figure 48 shows the coaxial patch cable connections and selector switches S1 and S2 correctly positioned when pack 1 functions as the control station and pack 2 is the slave station. Note that the output from RECEIVER OUT NO. 1 jack J8 in the slave station is cabled through REMOTE jack J12 and through the receiver interconnect coaxial cable to REMOTE jack J12 in the control station. At the control station the signal from the slave station is cabled to IF IN NO. 2 jack J11.

(4) *Battalion terminal, pack 2 in control.* Figure 49 shows the coaxial patch cable connections and selector switch (S1 and S2) positions of the switch panel with pack 2 functioning as the control station and pack 1 as the tie-slave station. The term *tie-slave* denotes that although the set functions as the slave station, the remote teletypewriter and telephone connections are tied to its power and signal entry panel. These connections are *not* changed when control is switched from one set to another. With pack 2 in control, the rf signals received by pack 1 are cabled through the REMOTE jacks of IF IN NO. 2 jack J11 in pack 2.

70. Communication Facilities

a. To activate the various communication circuits, the switches and controls on the control panel, switch panel, teletypewriter switch panel, and telegraph terminal are set in the positions described in paragraphs 71 through 74. When the indication listed for a particular procedure is not normal, refer to paragraphs 79 through 84. If no corrective measures are listed, or if the measures recommended do not restore normal operating conditions, higher echelon repair is required.

b. The procedures described in paragraphs 71 through 74 apply to both diversity and nondiversity operation. Refer to paragraph 18 for an explanation of the terminology used in these procedures.

71. Originating Calls

a. AN/TRC-80 Radio Circuit. To set up a combined speech and teletypewriter circuit between the AN/TRC-80 operating facilities and the distant AN/TRC-80, proceed as follows:

Step	Action	Fig. No.	Normal indication
1	Press control panel DISCRETE pushbutton	24	DISCRETE pushbutton illuminates green.
2	Press DISCRETE LINE SEL pushbutton	24	ARMY (lower) portion of pushbutton illuminates.
	Note: This permits DISCRETE line to be connected to army area net.		
3	Press COMMAND pushbutton	24	COMMAND pushbutton illuminates green.
4	Press VF TTY pushbutton	24	COMMAND (upper) portion of pushbutton illuminates.
5	Place telegraph terminal switches at NORM and 4W.	26	None.
6	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP.	25	None.
7	Place PTS-BY PASS switch to ON[a]	25	None.
8	Press control panel RING pushbutton. (This action signals distant AN/TRC-80 operator.)	24	RING pushbutton flashes white.
9	Push headset push-to-talk button to talk; release to listen.	..	Distant AN/TRC-80 operator's voice clearly audible.
10	Operate teletypewriter equipment	..	Teleprinter prints either transmit or receive copy.

a The programmer test station facility can be included in the radio teletypewriter receive circuit for monitoring purposes by placing the teletypewriter switch panel OPERATING MODE switch in the NORMAL DC LOOP position and the PTS-BY PASS switch in the OFF position.

b. Local Pts and Distant Pts Circuit. To set up a combined speech and teletypewriter circuit between the local pts facility and the distant pts (through the local and distant AN/TRC-80 facilities), operate the controls at *both* AN/TRC-80's to the positions indicated below.

Step	Action	Fig. No.	Normal indication
1	Press DISCRETE LINE SEL pushbutton.	24	COMMAND (upper portion of pushbutton illuminates.
2	Press COMMAND pushbutton.	24	COMMAND (amber) light becomes brighter.
3	Press VF TTY pushbutton.	24	COMMAND (upper) portion of pushbutton illuminates.
4	Place telegraph terminal switches at NORM and 4W.	26	None.
5	Place teletypewriter switch panel OPERATING MODE switch at VF 2W/4W, and PTS-BY PASS switch at ON.	25	None.

b.1. Pts Radio Circuit. To set up a combined speech and teletypewriter circuit between the local pts facilities and the distant AN/TRC-80 (through the facilities of the local AN/TRC-80), operate the controls at the local and distant AN/TRC-80's as indicated below:

(1) *Local AN/TRC-80 control settings.* Operate the controls at the local AN/TRC-80 as indicated in *b* above.

(2) *Distant AN/TRC-80 control settings.* Operate the controls at the distant AN/TRC-80 as indicated below:

Step	Action	Fig. No.	Normal indication
1	Press DISCRETE LINE SEL pushbutton.	24	ARMY (lower) portion of pushbutton illuminates.
2	Press COMMAND pushbutton.	24	COMMAND (green) light becomes brighter.
3	Press VF TTY pushbutton.	24	COMMAND (upper) portion of pushbutton illuminates.
4	Place telegraph terminal switches at NORM and 4W.	26	None.
5	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP, and PTS-BY PASS switch at ON.	25	None.

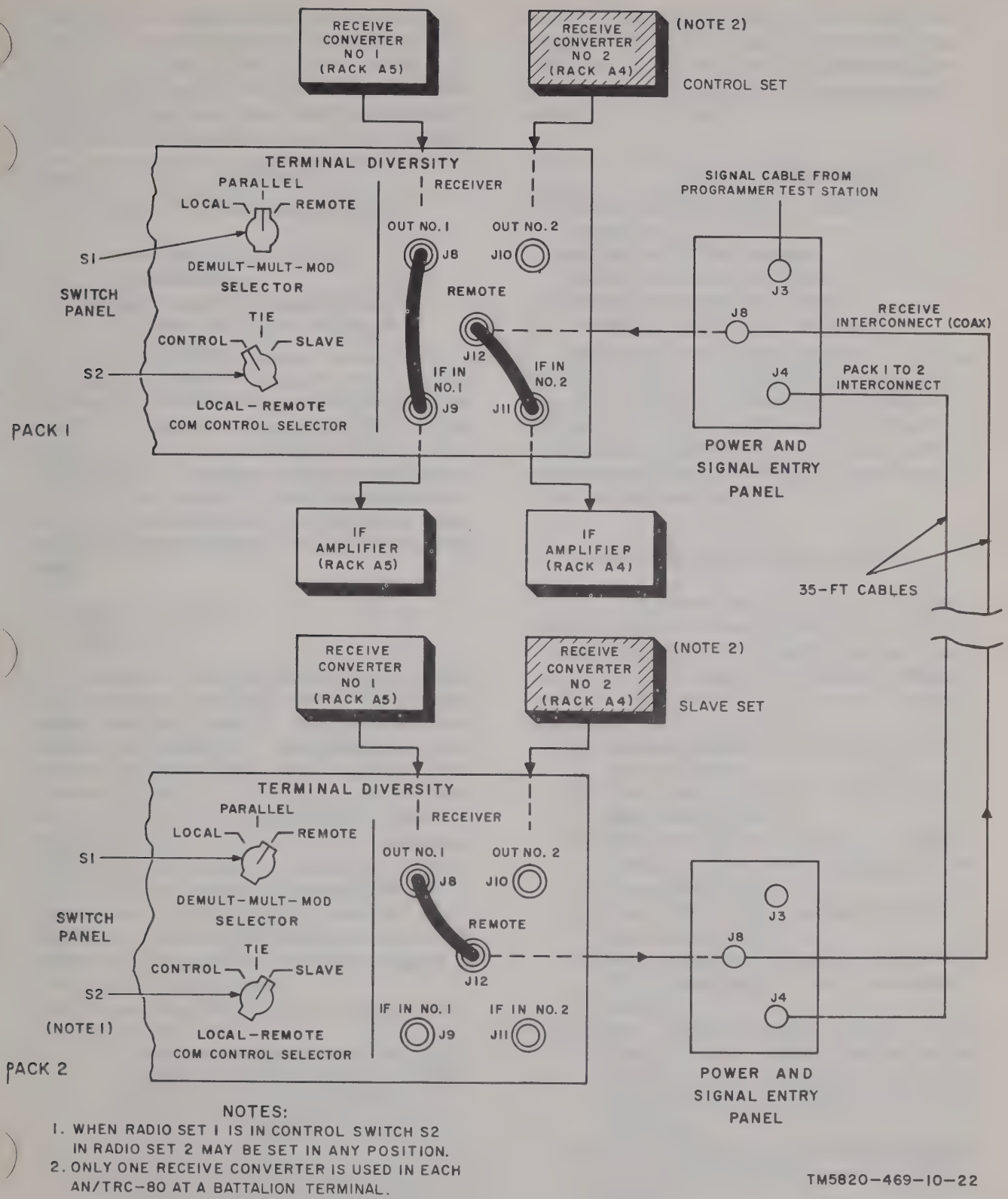


Figure 48. Battalion terminal switch panels, pack 1 in control.

This circuit enables the AN/TRC-80 operator to communicate by radio with distant stations by use of the vehicular-mounted radio set. The AN/TRC-80 radio teletypewriter circuits are not affected when this circuit is in use. The speech circuits between the pts discrete line and command radio or the pts discrete line and army area net are not affected when this circuit is in use. To set up the circuit, proceed as follows:

Step	Action	Normal indication
1	Press VEHICLE pushbutton.	VEHICLE (GREEN) light becomes brighter.
2	Press VEHICLE MONITOR pushbutton.	VEHICLE MONITOR (white) light becomes brighter.
3	Press handset push-to-talk button to talk; release to listen.	Distant operator's voice is clearly audible in headset and over monitor speaker.

i. Spare Circuit. This two-wire circuit is wired to the SPARE binding posts on the power and signal entry panel (fig. 33) and the spare pins on PROGRAMMER TEST STATION J3. The use of this spare circuit will be determined by local requirements. The SPARE pushbutton on the control panel must be pressed when this circuit is to be used.

72. Answering Calls (fig. 24)

a. General. Incoming calls can originate at the distant AN/TRC-80 (COMMAND), army area net (ARMY), programmer test station (DISCRETE), programmer test station (INTERCOM), and vehicle radio circuit (VEHICLE). Incoming calls from the vehicle radio circuit or pts intercom circuit are by voice call if the associated MONITOR pushbutton is operated. Incoming calls from the army, the pts DISCRETE line circuit, or from the distant AN/TRC-80 result in flashing of the associated pushbutton and an audible 1,600-cps signal in the monitor loudspeaker.

b. Answering Calls. To answer a call, proceed as follows:

(1) Press the control panel pushbutton (INTERCOM, VEHICLE, ARMY, COMMAND, or DISCRETE) indicated by a flashing pushbutton or a voice call.

(2) Press the headset press-to-talk button to talk; release to listen.

73. Monitoring Facilities

The AN/TRC-80 operator can monitor received speech on the INTERCOM, VEHICLE, ARMY, or DISCRETE circuits by depressing the associated MONITOR pushbuttons. The monitored speech is heard in the monitor loudspeaker. Any one circuit, or a combination of circuits, may be monitored simultaneously.

74. Supplementary Operational Procedures

a. To illustrate the procedure required when a caller is requesting a particular circuit, the following conditions are assumed to exist when army calls to require that the three-party dc tty circuit be established:

(1) Pts has control of the AN/TRC-80 radio circuits.

(2) The DISCRETE pushbutton is illuminated amber.

(3) The COMMAND portion of the DISCRETE LINE SEL pushbutton is illuminated amber.

(4) The COMMAND pushbutton is illuminated amber.

(5) The COMMAND portion of the VF TTY pushbutton is illuminated white.

(6) The teletypewriter switch panel OPERATING MODE switch is in the VF 2W/4W position, and the PTS-BY PASS switch is in the ON position.

(7) The telegraph terminal switches are in the NORM and 4W positions.

b. When a call is received from army, the ARMY pushbutton flashes and the 1,600-cps ring tone is heard in the loudspeaker. The AN/TRC-80 operator must answer the call as follows:

Step	Action	Normal indication
1	Press ARMY pushbutton ----------	ARMY (green) light becomes brighter. Flashing stops. Ring tone stops.
2	Press ARMY TELEPHONE pushbutton --------	Lamp lights on portion of pushbutton that corresponds to type of connections made at the power and signal entry panel (fig. 33). Normally this button is preset.
3	Press headset press-to-talk button to talk; release to listen.	Army operator's voice clearly audible.

c. To set up the requested three-party dc tty circuit, the AN/TRC-80 should proceed as follows:

Step	Action	Normal indication
1	Press INTERCOM pushbutton ----------	INTERCOM (green) light becomes brighter.
2	Inform pts operator of army's request ---------	None.
3	Pts operator informs distant AN/TRC-80 operator that tty circuit is to be interrupted.	None.
4	Press DISCRETE MONITOR pushbutton to monitor pts conversation. When arrangements are firm, proceed to step 5.	DISCRETE MONITOR (white) light becomes brighter.
5	Place teletypewriter switch panel OPERATING MODE switch at NORMAL DC LOOP and PTS-BY PASS switch at OFF.	None.
6	Operate tty equipment ----------	Teleprinter prints either receive or transmit copy.

d. The control panel is equipped with a teletypewriter priority circuit that automatically switches the teletypewriter printer to the incoming radio teletypewriter signals when the local printer is being used to monitor transmitted radio teletypewriter signals. This circuit feature is inoperative when a dc tty circuit is operating.

e. No special instructions are required for operation of the heater-air conditioner (fig. 34). The function of the operating controls is listed in paragraph 49. Adjust the controls for the most comfortable operating temperature.

75. Stopping Procedures

a. Standby. To place the radio set in standby, press the BEAM OFF pushbutton on the power amplifier control panel (fig. 54).

b. Normal Stopping Procedure. When the radio set is to be off the air for only a few hours, perform steps (1) through (7) only. When the equipment will remain turned off for an indefinite period perform the complete stopping procedure.

(1) Inform distant station that turn off will be commencing.

(2) Press the BEAM OFF switch on the pa control panel.

(3) Set the LOAD CONTROL switch on engine generator control panel to OFF.

(4) Pull the engine generator THROTTLE control completely out to bring the engine generator to idle speed.

(5) Climb to shelter roof and stow antenna (para 76).

(6) Rotate the OFF-ON-START switch on the engine generator starting panel to the OFF position.

(7) Place all circuit breakers on the power amplifier and the circuit breaker panel to OFF. Set all power and light switches on the switch panel to OFF.

Note: If the frequency of operation is to be changed before the radio set is turned on again, place all the individual power switches on the if. power supplies, the converter power supplies, and the three synthesizers, to the OFF positions.

(8) Close pa air vents and disconnect ground cables.

(9) Secure teletypewriter table, operator's chair and all loose items in the operator's compartment.

(10) Push engine generator into

compartment, stow fuel lines, secure rail locking pins, and close engine generator compartment door.
(11) Disconnect all cables and wires attached to connectors on the power and signal entry panel.
(12) Remove ladder from shelter and stow.
(13) Strap flexible waveguides to floor in operator's compartment.
(14) Close operator compartment door.
(15) Inspect shelter and surroundings.

c. Emergency Stopping Procedure.

(1) Place the MAIN BREAKER on the circuit breaker panel (fig. 32) in the OFF position.
(2) Place the EMERGENCY ENGINE SHUTDOWN switch on the engine generator control panel (fig. 22) in the STOP position.

76. Antenna Stowage

The antenna is placed in its stowed position whenever the AN/TRC-80 is to be completely turned off. The stowage procedure includes positioning the antenna (*a* below) before performing the antenna stowage procedure (*b* below).

a. Positioning.

(1) Rotate the antenna to line up the azimuth pointer with the 0 mil indication.
(2) Adjust the elevation crank until the antenna base is parallel to the shelter roof.

b. Stowage Procedure (fig. 50).

(1) Place the HIGH PRESSURE compressor switch and the LOW PRESSURE blower switch at the OFF positions.
(2) Turn the DUMP VALVE control counterclockwise to release air from the support ring and open the **heating ducts to release air from the antenna bag (fig. 44).**
(3) Remove the waveguides, feedhorn, and sighting device from the antenna assembly and place them on the shelter roof. Be sure to replace all waveguide and feedhorn covers.
(4) As the support ring collapses, guide it down so that it hangs between the reflector and the cover (A, fig. 50).
(5) Turn the air release valve (fig. 42) located on top of the antenna bag, to the open position.
(6) Disengage the locking pin on the lower section of the left support arm from the platform and allow the support arm to fold inward.
(7) Disengage the locking pins attaching the support tube to the left support arm.
(8) Lay the left support arm back to rest on the lower hinge.
(9) Adapt the procedures given in (6) through (8) above for the right support arm.
(10) Position the antenna as shown in A, figure 50.
(11) Lay all of the antenna bag material toward one support arm and start folding the support section on the platform between the support arms, making the first fold at the edge of the inner hole (near the center of the platform) (B, fig. 50).
(12) Move the second fold to position the lower section locking pin at the inner hole. Press the locking pin down into the hole.
(13) Make the third fold to position the center section locking pin at the outer hole and place the locking pin down into the hole.
(14) Make a fourth fold to place the top locking pin on the lower section of the support arm. Position this pin so that it *faces upward* (B, fig. 50).
(15) Repeat this folding procedure for the other side.
(16) Fold down the top sections of the support arms and strap them to the center sections.
(17) Disengage the locking pins of the lower sections from the center sections, and fold the center sections down against the lower section.
(18) Fold down the right folded support arm (facing the antenna from front of the shelter) on top of the antenna. Be careful not to pinch the material at the hinge (C, fig. 50). Lean

or kneel on the arm to squeeze remaining air out of the support tube.

(19) Roll the cover side of the antenna into a *tight* roll and place the roll behind the elevation adjusting screw (D, fig. 50).

Caution: **Lift the support while placing this roll in position. Make sure that the antenna feedhorn connector is flat and is parallel with the shelter roof.**

(20) Roll the reflector side of the antenna carefully in loose folds to approximately a 6-inch diameter and place the roll against the support arm. Position the roll on top of the motor and compressor.

(21) Press down on the support arm to squeeze out all air. *Be careful not to pinch or jam the fabric.*

(22) Fold the left support arm down on top of the right support arm.

(23) Fasten the three tiedown straps on top of the support arms.

(24) Turn the four antenna platform locking handles to UNLOCK.

Caution: **Check to see that the fine azimuth adjust crank inside the shelter is in the retracted position.**

(25) Lower the antenna platform by turning the crank counterclockwise.

Caution: **Check that the bag and support arm are clear of the antenna compartment walls while lowering the platform.**

(26) After the antenna platform has been lowered into the antenna compartment, turn the four antenna platform locking handles to LOCK and replace the crank in its mounting clips.

(27) Release the three straps, place the feedhorn into the antenna compartment, and clamp it in place on top of the antenna support arms.

(28) Fasten the three straps.

(29) Raise the antenna compartment cover and release the spring-loaded latch buttons.

(30) Close and lock the compartment cover.

(31) Store the flexible waveguides and the sighting device inside the operator's compartment.

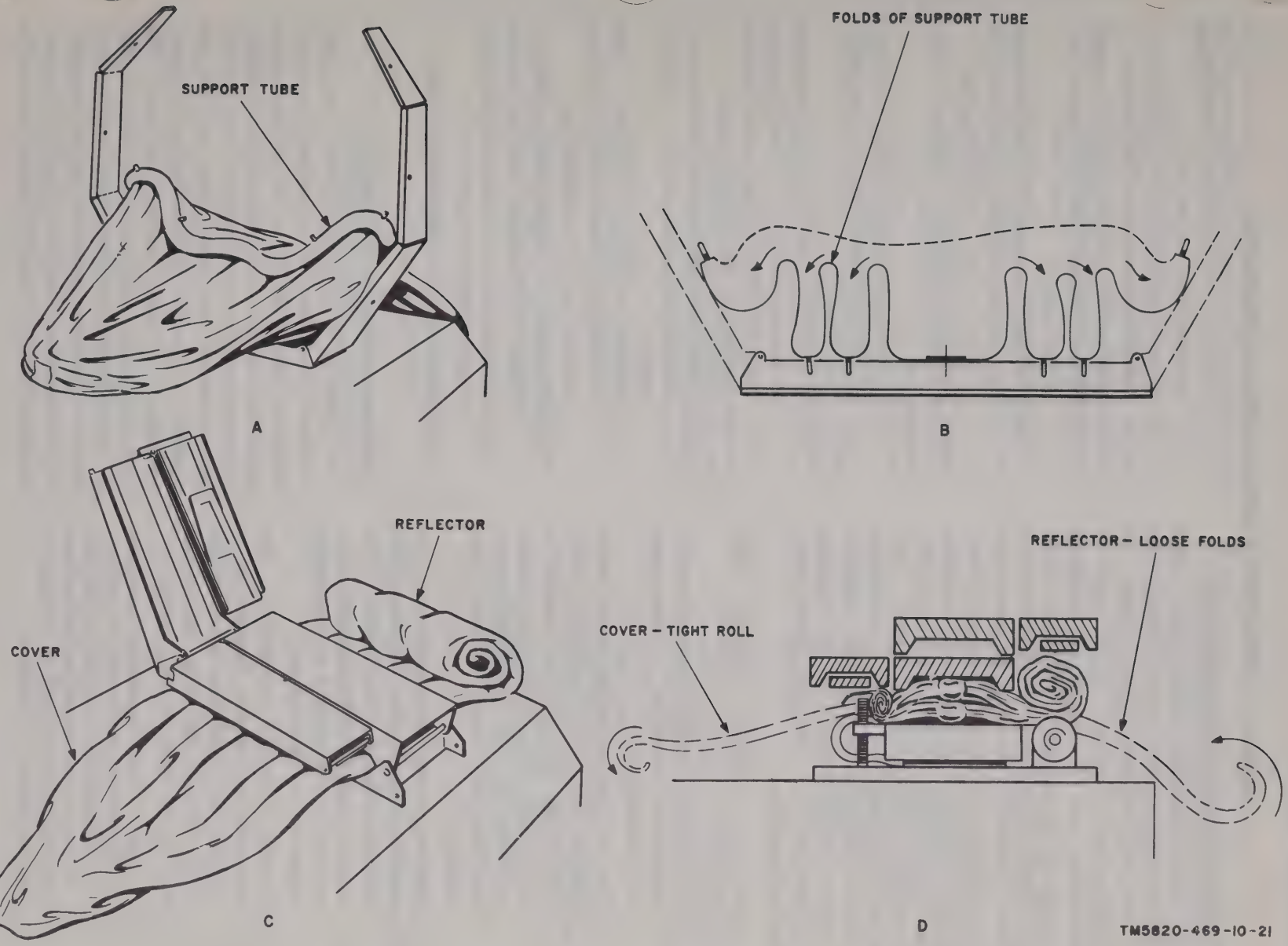


Figure 50. Antenna folding procedure.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

77. Operation Over Line-of-Sight Paths

When the line-of-sight path between two AN/TRC-80 sites is 50 kilometers (30 miles) or less, line-of-sight communication instead of troposcatter should be used. This mode of communication can be achieved by applying the output of the transmit converter direct to the antenna (*a* below), thereby bypassing the power amplifier. Line-of-sight communication can also be achieved by operating the complete transmitter without the use of the antenna bag. The feedhorn is then pointed in the direction of the distant station (*b* below). Although either method will provide satisfactory line-of-sight operation, the method described in *a* below is preferable because of the power saving achieved by not using the klystron tube in the power amplifier.

a. Line-of-Sight Operation Without Using Power Amplifier.

(1) Perform the normal antenna erection procedures described in paragraph 57*a* through *ah*.

(2) Connect the waveguide-coaxial cable adapter (fig. 3) to the XMTR ANT CONNECT jack (fig. 12) located on the shelter roof. Orient the coaxial connector on the waveguide-coaxial cable adapter toward the front of the shelter.

(3) Remove the connector cap from the coaxial connector on the waveguide-coaxial cable adapter. Connect the coaxial pendant cable (located adjacent to the waveguide) to the coaxial connector on the adapter.

(4) Connect a flexible waveguide to the horizontal or vertical (marked H or V (fig. 45)) feedhorn (see note below). Connect the other end of the flexible waveguide to the adapter.

Note. If the transmitting waveguide is connected to the vertical (V) feedhorn, the transmitting waveguide of the AN/TRC-80 at the distant end of the communication circuit *must be* connected to the horizontal (H) feedhorn.

(5) Perform the procedures described in paragraph 57 *aj* and *ak*.

(6) Disconnect plug P2 from jack J3 on top of the power amplifier cabinet.

(7) Connect plug P2 to jack J35 located on the bulkhead, above the power amplifier cabinet.

(8) Perform the normal transmitter turn-on procedure (para. 65 and 66*a*). Do not turn on the power amplifier.

b. Line-of-Sight Operation Without Using Antenna bag.

(1) Perform the normal antenna erection procedures described in paragraph 57*a* through *p*.

(2) Unfold and latch in place the bottom and center sections of both antenna support arms. Do not unfold the top sections of the support arms.

(3) Mount the feedhorn and feedhorn support struts to the antenna support arms.

(4) Rotate the antenna platform until the feedhorn points *direct toward* the desired path of transmission.

(5) Connect the flexible waveguides between the feedhorn and the shelter transmitter and receiver connectors (paras. 57*ai* and *aj*).

(6) Turn on the transmitter (paras. 65 and 66).

78. Extreme Weather Conditions

a. Operation of Equipment Under Low Temperature Conditions. When ambient temperatures are from —25° F. to —65° F., the engine generator must be warmed before operating. A winterization system supplied with the engine generator (not part of the AN/TRC-80) consists of a metal air distribution chamber, a canvas cover, and a flexible heat duct. The source of heat is a 150,000 BTU heater. Specific instructions for the operation and maintenance of the winterization kit will be contained in the manuals packed with the kit. The procedures given in (1) and (2) below prepare the

equipment for operation and (3) below describes procedures to heat the operator's compartment.

(1) *Engine generator.*

(*a*) Check the engine generator oil level for proper level of the specified type of oil for the ambient temperature.

(*b*) Connect the air distribution chamber to the front of the engine generator.

(*c*) Lock the engine air intake louvers in the open position.

(*d*) Place the canvas winterization cover over the engine generator.

(*e*) Connect the duct from the 150,000 BTU heater to the air distribution chamber.

Note. FRESH AIR control SW-3, located on the upper air conditioner evaporator, must be rotated to open the dampers and allow the warm air to enter the operator's compartment.

(*f*) Start the heater.

(*g*) Heat the engine generator for 30 minutes.

(*h*) Disconnect the heater duct from the air distribution chamber.

(*i*) Remove the canvas cover and unlock the air intake louvers.

(*j*) Perform the engine generator starting procedures (para 55).

(*k*) Remove the air distribution chamber from the engine generator.

(2) *Antenna compartment.*

(*a*) Remove the cover from the antenna compartment preheat port (fig. 2).

(*b*) Attach the heat duct to the preheat port.

(*c*) Open the fresh air duct on the air conditioner.

(*d*) Check that the fresh air intake (located on the rear of the shelter) is closed.

(*e*) Heat the antenna compartment until the antenna bag fabric is flexible.

(*f*) Erect antenna (para 57).

(*g*) Remove the heat duct *after* the antenna is erected and turn off the 150,000 BTU heater.

(*h*) Replace the cover on the preheat port.

(2.1) *Antenna stowage.*

(a) Connect the duct from the 150,000 BTU heater to one of the heating ducts on the cover side of the antenna bag.

(b) Start the heater.

(c) Hold the second heat duct open to permit circulation of the hot air until the antenna fabric is pliable.

(d) Remove the heat duct.

(e) Stow the antenna (para 76).

(3) *Operator's compartment.*

(*a*) Move the air-intake handle, located on top of the power amplifier, to its full open position.

(*b*) Remove the access panel from

the power amplifier klystron drawer.

(c) Close both outside power amplifier air vents.

Warning: **When the power amplifier is operated with the outside vent doors closed, the fresh air intake on the air conditioner must remain fully open.**

b. Operation in High Winds. The antenna can be assembled, disassembled, and operated in winds up to 40 mph and gusts up to 60 mph. Erecting or stowing the antenna when the wind velocity exceeds a sustained 40 mph may cause damage to the antenna and injury to personnel.

CHAPTER 5

MAINTENANCE INSTRUCTIONS

79. Scope of Operator's Maintenance

The following maintenance duties are normally performed by the operator of the AN/TRC-80. These procedures do not require special tools or test equipment.

a. Preventive maintenance (para 80).
b. Cleaning (para 81).
c. Operational checks (para 82).
d. Fuse replacement (para 83).
e. Lamp replacement (para 84).

80. Preventive Maintenance

Preventive maintenance is the systematic care, servicing and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in *c* below and in paragraphs 81 and 82 cover systematic care essential to proper upkeep and operation of the equipment. The cleaning operations (para 81) should be performed once a day. If the equipment is not used daily, however, the cleaning operations must be performed before operation after any extended shutdown, or once a week while the equipment is kept in standby condition. The other items should be checked daily if the equipment is in continuous operation or whenever the equipment is placed in operation after a shutdown.

b. Maintenance Service and Inspection. The maintenance service and inspection chart (*c* below) outlines inspections to be made daily. These inspections and the operational checks (para 82) are made to determine combat serviceability. The chart indicates what to inspect, how to inspect, and what the normal conditions are; the *Reference* column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these inspections must be made in accordance with TM 38-750.

c. Maintenance Service and Inspection Chart. The items listed below should be checked on a daily basis. The equipment must be reinspected and serviced immediately before going on a mission and as soon after completion of the mission as possible.

Item No.	Procedure		References
	Item	Normal condition or result	
1	AN/TRC-80: Inspect the equipment	Equipment must be complete (appx II), clean, and installed for operation.	Para 19 through 24, 81, and appx II.
10	CONNECTIONS: Check fuel line connections. All connections to power and signal entry panel.	Connections to engine generator and fuel line correctly made. Connections to remote facilities and army area net correct for type of operation used.	Para 24.
11	KNOBS, DIALS, SWITCHES: Check for proper mechanical action by setting each control to each of its possible settings. *Note:* Do not rotate tuning controls if these controls are preset for operation at a specific frequency.	Action is positive without backlash or scraping.	Para 26 through 52.
13	ENGINE GENERATOR: Turn on engine generator.	OIL PRESSURE light is out on starting panel. All meter indications on engine generator control panel normal.	Para 55*a* and *b*.
14	POWER AND LIGHTS: Turn on all lighting and power switches.	Circuit breakers do not trip, hut lights come on, filament and B+ indicators remain on.	Para 56.
	Note: Antenna must be erected and inflated before thc next step is performed. Refer to paragraph 57 for antenna erection and inflation procedures.		

Item No.	Procedure		References
	Item	Normal condition or result	
15	OPERATIONAL PRESET, RECEIVER: Set controls as indicated in chart in para 62.	All controls must set properly	Para 62.
16	OPERATIONAL PRESET, TRANSMITTER: Set controls as indicated in chart in para 65.	All controls must set properly	Para 65.
17	RECEIVER TUNING: Set controls for desired operating frequency.	All indications normal	Para 63 and 64.
18	TRANSMITTER TUNING: Set controls for desired operating frequency.	All indications normal	Para 66.
19	OPERATIONAL CHECK: Check equipment with rack-mounted monitor.	All indications normal	Para 82.

81. Cleaning

Inspect the radio equipment in the operator's compartment, the engine generator compartment, and the antenna compartment. The equipment should be clean, free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth. If necessary, wet the cloth with Cleaning Compound (Fed stock No. 7930-395-9542) and wipe the parts; then wipe with a dry cloth.

Warning: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation.**

b. Remove dust or dirt from plugs, jacks, and connectors with a brush.

Caution: **Do not press on the meter faces (glass) when cleaning; the meter may be damaged.**

c. Clean the front panels, meters, and control knobs; use a soft clean cloth. If difficulty in removing dirt occurs, dampen the cloth with water; mild soap may be used to make the cleaning more effective.

d. Inspect the flexible waveguides and connectors for dirt or sand.

Caution: **Do *not* polish gold- or silver-plated waveguides or connectors.**

82. Operational Checks

a. General. The operator of the AN/TRC-80 will be able to determine quickly if the equipment is not operating normally by following the procedure detailed in *c* below. This checklist supplements the starting procedures (para 53 through 59) and the tuning operation (para 62 through 66) where normal indications are listed for each step. When abnormal indications are obtained, refer to the operator's repair procedures (para 83 and 84). Before performing the checklist (*c* below), inspect the following:

(1) Indicator-type fuses (para 83*c*). A blown fuse is indicated if the fuseholder is illuminated.

(2) Front panel indicators (para 84*c*) for proper condition (illuminated or extinguished).

(3) Antenna bag for proper inflation. If tears or cuts are observed notify higher echelon maintenance.

Warning: **Turn off power to check (4) and (5) below.**

(4) Nonindicating-type fuses (para 83*c*).

(5) Fuel supply.

b. Use of Monitor (fig. 19). The monitor is used to check equipment operation by observing the meter indications with meter selector switch S2 in the various positions. (Switch S1 on the monitor is always set in position A.) *By becoming familiar with the meter indications when equipment operation is normal*, the monitor meter indications can be used to assist the operator in determining the cause of abnormal operation. For example; during normal operation, the meter needle fluctuates when switch S2 is in position D and speech is being received over the radio circuit. Feeble fluctuations of the meter needle indicate poor receiver operation or poor transmitter operation in the AN/TRC-80 at the other end of the circuit. Similarly, feeble fluctuations of the meter needle with switch S2 in position A, indicate improper

operation of the modulator-multiplier. The chart in c below provides a quick check of equipment operation.

c. Checklist. Set monitor switch S1 in position A. Set switch S2 in the positions listed below and observe the meter indications. If the corrective measures do not restore normal operation, or if no corrective measure is listed, higher echelon maintenance is required.

Step	Switch S2 position	Normal indication	Corrective measure
1	A	Meter needle fluctuates when talking into microphone-headset. When not talking, but radio tty signals are being transmitted, meter indication is approximately 20-meter dial divisions.	Check connection to control panel. Check switch panel and tty equipment switch positions.
2	B	Same as step 1 ----------	Same as step 1.
3	C	Same as step 1 ----------	Same as step 1.
4	D	Meter needle fluctuates when distant AN/TRC-80 is transmitting speech. When just tty signal is being received, meter indication is approximately 20.	Check receiver tuning (para 62 and 63). Ask distant AN/TRC-80 to check transmitter operation.
5	E	Meter needle fluctuates when distant AN/TRC-80 is transmitting. Tty receiption does not affect meter in this position.	
6	F	Meter needle fluctuates slightly beyond SET POINT when transmitting tty.	Check tty equipment control settings. Refer to TM 11-5805-246-10 to check telegraph terminal operation, and to TM 11-5815-206-12 to check teletypewriter set operation.
7	G	When transmitting tty only, meter needle fluctuates near SET POINT.	
8	H	When receiving tty, meter needle fluctuates slightly above and below SET POINT.	

83. Fuse Replacement

a. General. All fuses, except those associated with the output circuit of the 200-volt power supply assemblies and the telegraph terminal fuse, have blown-fuse indicator lamps that light when a fuse blows. All fuses are cartridge type and are accessible from the front of the equipment. The fuses are mounted on the unit control panels or on the chassis under the dust covers. On some units, spare fuses are mounted in clips alongside the associated fuses. Other spare fuses are mounted in clips on the fuseholder attached to the left side of the storage box above the power amplifier cabinet. Other spare fuses are stored in the storage box above the power amplifier cabinet. Always replace a blown fuse with an identically rated spare. Some fuse values come in standard and time-lag type. Do not interchange standard-type fuses with time-lag fuses of the same value.

b. Replacing Fuses.

Warning: **Never replace a fuse with the equipment power on.**

(1) Press in the fuseholder cover and turn counterclockwise to unlock.
(2) Pull out the cover; the fuse will come with it.
(3) Remove the defective fuse and insert a new fuse in the cover.
(4) Replace the fuse cover by pressing inward and turning it clockwise.

c. Fuses Replaced by Operator.

(1) *Synthesizer* (fig. 27).

Panel marking	Fuse rating	Function
F401 1-1/2 AMP.	250-volt, 1-1/2 amp.	Protects oscillator No. 2 oven circuit.
F751 1-1/2 AMP.	250-volt, 1-1/2 amp.	Protects oscillator No. 3 oven circuit.
F601 1 AMP B+.	250-volt, 1 amp.	Protects 200-volt B+ power supply.
F602 1/2 AMP FIL.	250-volt, 1/2 amp, time-lag.	Protects filament circuit.
F603 1/4 AMP	250-volt, 1/4 amp, non-indicating.	Protects 200-volt power supply from short circuits in load.

(1.1) *Synthesizer, AN/TRC–80A only* (fig. 27.1).

Panel marking	Fuse rate	Function
None	125-volt, 1.5 amp	Protects power supply transformer and power supply circuits.

(2) *If. power supply* (fig. 29).

Panel marking	Fuse rating	Function
F1 5A	250-volt, 5 amp	Protects 6.3-volt filament circuits.
F2 5A	250-volt, 5 amp	Protects 200-volt power supplies A1, A2 and A3.
F3 3/4A	250-volt, 3/4 amp, time-lag	Protects 6.3-volt ac filament supply.
F4 1A	250-volt, 1 amp.	Protects 200-volt power supply A1.
F5 1A	25-volt, 1 amp	Protects 200-volt power supply A2.
F6 1A	250-volt, 1 amp	Protects 200-volt power supply A3.
F7 1/2A	250-volt, 1/2 amp, time-lag	Protects 6.3-volt dc filament supply.
F8 1/4A	250-volt, 1/4 amp (nonindicating).	Protects 200-volt power supply A1 from short circuits in load.
F9 1/4A	250-volt, 1/4 amp (nonindicating).	Protects 200-volt power supply A2 from short circuits in load.
F10 1/4A	250-volt, 1/4 amp (nonindicating).	Protects 200-volt power supply A3 from short circuits in load.

(3) *Converter power supply* (fig. 30).

Panel marking	Fuse rating	Function
F1 5A	250-volt, 5 amp	Protects regulated 120-volt ac line and chopper circuit.
F2 1 1/2A	125-volt, 1 1/2 amp, time-lag	Protects time delay and 200-volt power supply circuits.
F3 1/4A	250-volt, 1/4 amp, (nonindicating).	Protects 200-volt power supply.
F4 1/2A	250-volt, 1/2 amp, time-lag	Protects transformer T1 and chopper circuit.
F5 1A	250-volt 1 amp	Protects 200-volt power supply from short circuits in load.

(3.1) *Converter power supply, AN/TRC–80A only* (fig. 30.1).

Panel marking	Fuse rate	Function
F1 1AMP	250-volt, 1-amp	Protects power supply transformer and circuit from current overload.

(4) *Modulator-multiplier* (fig. 20).

Panel marking	Fuse rating	Function
F1 1/2 AMP FILAMENT	250-volt, 1/2 amp, time-lag	Protects filament and crystal oven circuits.
F2 1 AMP B+	250-volt, 1 amp	Protects 200-volt power supply.
F3 1/4 AMP PWR SUPPLY	250-volt, 1/4 amp, (nonindicating).	Protects 200-volt power supply from short circuits in load.

(5) *Multiplexer* (fig. 21). The multiplexer panel contains two fuses. Fuse F1 1A is a 250-volt, 1-ampere fuse that protects the filament circuit. Fuse F2 1/2A is a 250-volt, 1/2-ampere fuse that protects the power supply circuit.

(6) *Monitor* (fig. 19). The monitor front panel contains one fuse. Fuse F1 1 AMP is a 250-volt, 1-ampere fuse that protects the filament and power supply circuits.

(7) *Switch panel* (fig. 23). The switch panel contains two fuses. The 28V DC 3 AMP fuse is a 125-volt, 3-ampere, time-lag-type that protects the 28-volt circuit. The FLUSHING BLOWER .125 AMP fuse is a 250-volt, 1/8-ampere fuse that protects the flushing blower.

(8) *Blower* (fig. 31).

Panel marking	Fuse rating	Function
F1 1AMP	250-volt, 1 amp, time-lag	Protects air-pressure switch and relay.
F2 1.5 AMP	125-volt, 1 1/2 amp, time-lag	Protects blower motor.
F3 .125 AMP	250-bolt, 1/8 amp	Protects air-failure indicator circuit.

(9) *Control panel* (fig. 24).

Panel marking	Fuse rating	Function
F1 1/2 AMP	250-volt, 1/2 amp	Protects transistorized supply circuit.
F2 3 AMP	250-volt, 3 amp	Protects relay supply circuit.
F3 3 AMP	125-volt, 3 amp, time-lag	Protects power supply circuit.

(10) *Teletypewriter switch panel* (fig. 25). The teletypewriter switch panel contains one fuse only. The 3 AMPS fuse is a 125-volt, 3-ampere, time-lag-type that protects the lighting circuit.

(11) *Telegraph terminal* (fig. 26). The telegraph terminal contains only one fuse. The 1.5 AMP fuse is a 250-volt, 1 1/2-ampere fuse that protects the power supply and filament circuit.

(11.1) *Telegraph Terminal TH–22/TG* (fig. 26.1). The TH–22/TG has two fuses. The 115/230 vac 1/4A fuse which protects the parts in the TH–22/TG from overload during 115- or 230-vac operation, and the 26-vdc 2 AMP fuse which protects the parts during 26-vdc operation.

(12) *Power amplifier* (fig. 54). The power amplifier contains two fuses. The F101 2 AMP is a 250-volt, 2-ampere fuse that protects the power supply The F102 3/4 AMP is a 250-volt 3/4-ampere, time-lag fuse that protects the filament circuit.

(13) *Transmit converter* (fig. 52).

Panel marking	Fuse rating	Function
F1 1 AMP	250-volt, 1 amp	Protects filament circuit.
F2 1/4 AMP	250-volt, 1/4 amp. (nonindicating).	Protects 200-volt power supply from short circuits in load.
F3 3 AMP	250-volt, 3 amp	Protects traveling wave tube power supply.

(14) *Circuit-breaker panel* (fig. 32).

Panel marking	Fuse rating	Function
F1–1A	250-volt, 1-amp, time-lag type	Protects 28-volt dc power supply circuit.
1/4 AMP (3 ea)	250-volt, 1/4-amp	Protects 3-phase power to PHASE lamp panel.

84. Lamp Replacement

a. Replacing Indicator Lamps. All lamps in the radio set, whether of the neon or filament type, have identical base and envelope size. To replace an indicator lamp, the lens assembly is screwed out of the holder by a counterclockwise (ccw) rotation. The lamp is held in place by a pressure fit. To remove the lamp from the lens assembly, grasp the base with the fingernails and pull the lamp clear.

b. Replacing Control Panel Lamps (fig. 51). To replace the pushbutton switch indicator lamps in the control panel, proceed as follows:

(1) Pull out the lamp assembly until resistance is felt; use the fingernail grooves in the sides of the lens.
(2) Rotate the lamp assembly 90° in either direction.
(3) Push in slightly to allow the locking pin to retract.
(4) Remove the assembly.
(5) Grasp the lamp base with the fingernails and pull the lamp clear of the socket.
(6) Insert the new lamp; make sure it is firmly seated in the friction socket.
(7) Insert the lamp assembly in the lamp housing; make sure that the slot is on the same side as the key in the housing.
(8) Push the lamp assembly in until resistance is felt.
(9) Rotate the lens 90° so that the lens legend is correctly positioned.
(10) Push the lamp assembly in until it seats properly in the lamp housing.

c. Lamps Replaced by Operator. With the exception of the control panel pushbutton switch lamps, all indicator lamps are type NE–2D neon. The pushbutton switch lamps are filament-type lamps, type 327. All lamp replacement is performed by the operator. The illuminated condition is normal for all indicator lamps except those listed below:

Note. The synthesizer OVEN indicators are illuminated intermittently as the oven thermostats respond to changes in oven temperature.

(1) AIR FAILURE indicators on switch panel.
(2) Engine-generator starting panel EMERGENCY SWITCH ON indicator.
(3) Engine-generator starting panel OIL PRESSURE indicator.
(4) The following indicators on the engine-generator control panel:
  (*a*) HEAD TEMPERATURE.
  (*b*) OIL PRESSURE.
  (*c*) OVER FREQUENCY.
  (*d*) UNDER FREQUENCY.
  (*e*) OVER VOLTAGE.
  (*f*) UNDER VOLTAGE.
  (*g*) BATTLE SHORT.
(5) Power amplifier ALARM indicator.

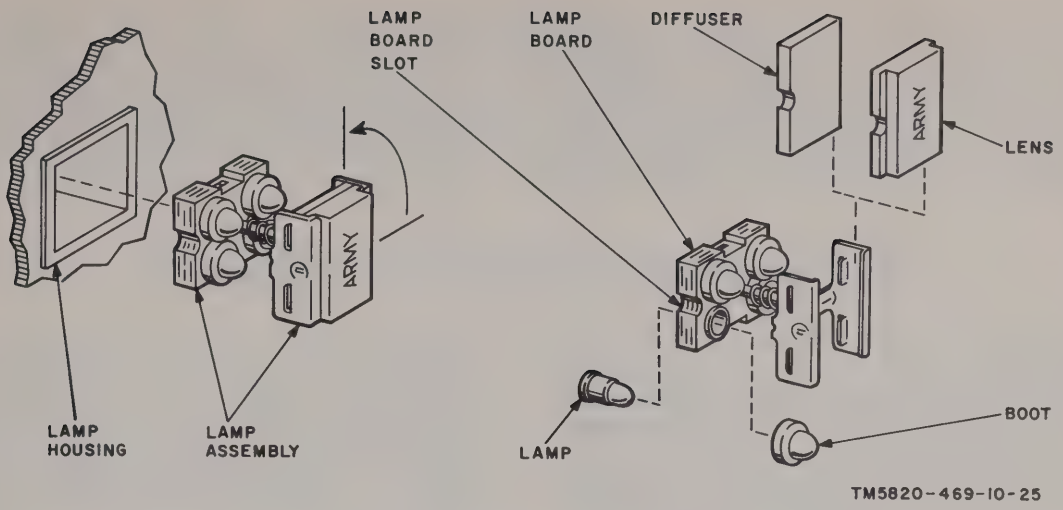


Figure 51. Lamp assembly, exploded view.

CHAPTER 6

PREPARATION OF EQUIPMENT FOR SHIPMENT AND DEMOLITION TO PREVENT ENEMY USE

Section I. PREPARATION OF EQUIPMENT FOR SHIPMENT

85. General

The AN/TRC-80 is normally shipped as a complete unit and may be transported by air, rail, or motor vehicle. The preparations for local shipment and limited storage are the same. For oversea shipment, detailed instructions are contained in Specification JAN-P-100. The following instructions are concerned with shipping the AN/TRC-80 to a new location or leaving the radio set unused for a short period of time.

86. Preparation of Shelter for Relocation

a. Perform the normal stopping and antenna stowing procedures listed in paragraphs 75 and 76.

b. Check that all loose items are securely strapped in place (operator's chair, flexible waveguides, etc).

c. Check that the four lifting eyes are mounted on *top* of the shelter (para 25).

Warning: **Never attempt to lift the shelter with the lifting eyes mounted in the tiedown sockets (fig. 2).**

d. Close the fresh air intake in the rear of shelter.

e. Close the ventilator in the operator's compartment door.

f. Remove all bulkhead drain plugs.

87. Handling, Storage, and Disposal of Radioactive Material

Follow the procedures for safe handling, storage, and disposal of radioactive materials as directed by TB SIG 225, AR 40-580, and AR 755-380.

88. Lifting and Loading AN/TRC-80

The procedure below is primarily concerned with lifting and transporting the AN/TRC-80 by truck. For truck transportation, observe the procedures given in *a* through *j* below. If the AN/TRC-80 is to be airlifted, the procedures in *a* through *d* are applicable. Refer to figure 2 for the location of tiedown eyes and lifting eyes.

a. Obtain a sling assembly with four cables attached to a central lifting ring.

b. Place the sling assembly on top of the shelter.

c. Connect the four sling hooks to the four lifting eyes.

Warning: **Never lift the shelter with the lifting eyes mounted in the tiedown sockets (fig. 2).**

d. Place the lifting ring over the hook of the 5-ton wrecker or helicopter hoist.

e. Connect tag lines to both of the lower tiedown eyes located at the front of the shelter. The tag lines should be at least 15 feet long and are used to guide the shelter onto the truck bed.

f. Clear the truck bed of any articles before the shelter is lifted over or onto the truck. Lower the truck tailgate.

Warning: **To avoid injury to personnel, only those actually engaged in the loading should be near the truck when the shelter is suspended by the sling assembly.**

g. Slowly lift the shelter from the ground to a position high enough to clear the body of the truck.

h. Back the truck into position under the suspended shelter.

i. With a man positioned at each tag line at enough distance to clear the shelter, lower and guide the shelter on the truck bed. The shelter must be oriented so that the shelter entrance door is at the rear of the truck and the rear of the shelter

is up against the front of the truck bed.

j. Disconnect the lifting ring from the hoist hook. Remove the sling hooks from the shelter lifting eyes and the tag lines from the tiedown eyes.

k. Secure the shelter with heavy rope or cable attached to the tiedown eyes and the truck body.

l. Raise and fasten the truck tailgate.

Note: These instructions are specifically for loading the shelter on a 6 by 6 truck. When other vehicles are used for transportation, adapt these instructions accordingly.

Section II. DEMOLITION OF EQUIPMENT TO PREVENT ENEMY USE

89. Authority for Demolition

The demolition procedures given in paragraph 91 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

90. Destruction Plan

If a destruction plan is not provided by higher authority, one should be prepared by the organization using the equipment. In this plan, personnel should be assigned specific destruction tasks, but all personnel in the using organization should be familiar with all aspects of the complete destruction plan. The plan must be adequate and easily carried out in the field and must provide for as complete a destruction as available time, equipment, and personnel will permit. Because the time required for complete destruction may not always be available, the destruction plan must establish priorities so that essential parts of the equipments will be destroyed in the order of their importance. Systematic destruction of the same important units of equipment of a given type will prevent the enemy from learning the important features of the equipment or assembling a complete equipment by cannibalization of partially destroyed equipments. Adequate destruction of some units of the equipment should always be accomplished rather than partial destruction of all units. Which of the methods of destruction listed in paragraph 91 is to be used depends on the time available for destruction.

91. Methods of Destruction

a. Destruction Priority. Any or all methods of destruction given in *b* through *f* below may be used. The time available will be the major determining factor for the method to be used. When time prevents complete destruction, establish the following priority for equipment destruction:

(1) All front panel metering.
(2) Klystron drawer in power amplifier.
(3) Flexible waveguides and circulator.
(4) Synthesizers (all three units).
(5) Traveling wave tube in transmit converter.
(6) Control panel.
(7) Remaining equipment.

b. Smash. Smash the control panels of all equipment of the radio set; use sledges, axes, hammer, crowbars, and any other heavy tools available. Smash the tuning indicators, meters, controls, and connectors; use the heaviest tool on hand if time does not permit removing rack-mounted equipment.

c. Cut. Cut engine-generator power cables, flexible waveguides, antenna bag, and wiring, cut all cables in a number of places. Use axes, machetes, and similar tools.

d. Burn. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrowers, or similar tools. Burn the instruction literature first. Pour gasoline on the cut cables and internal shelter wiring and ignite it. Use a flamethrower to burn minor components and spare parts. Use incendiary grenades to complete the destruction of the shelter interior.

***Warning:* Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

e. Explode. Use explosives to complete demolition or to cause maximum destruction when time does not permit complete

demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Most effective location is against the two receive converters. Incendiary grenades usually are most effective if destruction of small parts and wiring is desired.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

APPENDIX I

REFERENCES

Following is a list of applicable references that are available to the operator of Radio Terminal Set AN/TRC-80 and AN/TRC-80A.

AR 700-52	Licensing and Control of Sources of Ionizing Radiation.
AR 755-15	Disposal of Unwanted Radioactive Material.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9) Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TM 5-4120-225-15	Operator, Organizational, Field and Depot Maintenance Manual: Air Conditioner: Floor Mounting; Electric Motor Driven, 1 HP, AC, 208 V, 3 Phase, 400 Cycle; 6,000 BTU Cooling; 4,500 BTU Heating per hour (Redmanson Model CE-6A-400) FSN 4120-062-8578; (Keco Model F-6000) FSN 4120-977-8504; (Therm-Air Model CE-6A-400) FSN 4120-062-8578.
TM 5-6115-299-10	Operator's Manual: Generator Set, Gasoline Engine: 10 KW, AC, 120/208 V, 3 Phase, 400 Cycle, Skid Mounted (Bogue Electric Model 15380A) FSN 6115-855-9572.
TM 11-5805-246-10	Operator's Manual, Terminal, Telegraph, TH-5/TG.
TM 11-5815-206-12	Organizational Maintenance Manual: Teletypewriter Set AN/PGC-1 and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/G, and TT-537/G.
TM 11-5820-469-20	Organizational Maintenance Manual: Radio Terminal Set AN/TRC-80 and AN/TRC-80A.
TM 38-750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes parts and material issued as *part of* the major end item, and all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by Model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

e. Unit of Issue. The unit of issue unless otherwise indicated is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares Items", the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

h. Illustrations. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

Section II. FUNCTIONAL PARTS LIST

(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations: Figure No.	(9) Illustrations: Item No.
	5820-892-3470		Radio Terminal Set AN/TRC-80: 4,400 to 5,000 mc freq. range; 333 channels, 1.8 mc separation. Oper. power rqmt: ac 208V, 380 to 420 cps, 3 ph, 4 wire. Collins part No. 522-6560-00.		NX		1	
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	Ord thru AGC		Technical Manual TM 11-5820-469-10			2		
	5820-856-4923		Amplifier-Converter, AM-3303/TRC-80: radio freq.		NX	1	7	

(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations Figure No.	(9) Illustrations Item No.
			type; 4,400 to 5,000 mc; 70 mc incoming freq.; 108 to 132 Vac, 47 to 420 cps; single ph; 7-1/4 in x 15-3/4 in x 19-1/4 in o/a. Collins Radio Part No. 522-6769-004.					
	5820-856-4919		Modulator-Multiplier MD-465/TRC-80: 108-132 Vac, 47 to 420 cps, single ph; 7 in x 18-7/8 in x 10-13/32 in o/a. Collins Radio Part No. 522-6576-006.		NX	1	7	
	5820-856-4924		Amplifier-Converter AM-3302/TRC-80: Intermediate freq. type, 70 mc; 4,400 to 5,000 mc incoming freq; 70 mc resultant freq; 108v to 132 vac; 47 to 420 cps. Single ph. 7 in x 12-1/4 in x 19 in o/a. Collins Radio Part No. 522-6772-004.		NX	2	9	
	5820-856-4922		Amplifier, Intermediate Frequency AM-3288/TRC-80: 50 ohms input, 600 ohms output, opr power reqt: ac 6.3v 47 to 420 cps, single ph, dc 200v. 8-1/2 in x 12-1/4 in x 18-7/8 in oa. Collins Radio Part No. 522-6579-004.		NX	2	9	
	5820-823-2984		Power Supply, PP-3313/TRC-80: Metallic type, fullwave, oper power reqt; output dc 200v, oper power reqt; ac 120v ±10%, 47 to 420 cps, single ph. 7 in x 18-7/8 x 10-13/32 in o/a. Collins Radio Part 522-6580-004.		NX	2	9	
	5820-823-2983		Power Supply, PP-3314/TRC-80: Metallic type, output dc 200v -5.0 to -30.0v; oper power reqt; ac 120v ±10% 47 to 420 cps single ph, dc: -0.05 to -0.2v. 7 in x 18-7/8 in x 6-29/32 in o/a. Collins Radio Part No. 522-6581-004.		NX	2	10	
	5720-856-4912		Amplifier, Radio Frequency AM-3308/TRC-80: 4,400 to 5,000 mc freq range; output 1 kw, input 1 mw, 50 ohms impedance.; oper power reqt; ac 188 to 228v, 380 to 420 cps three ph. C/o 1 ea Control Panel		NX	1	8	

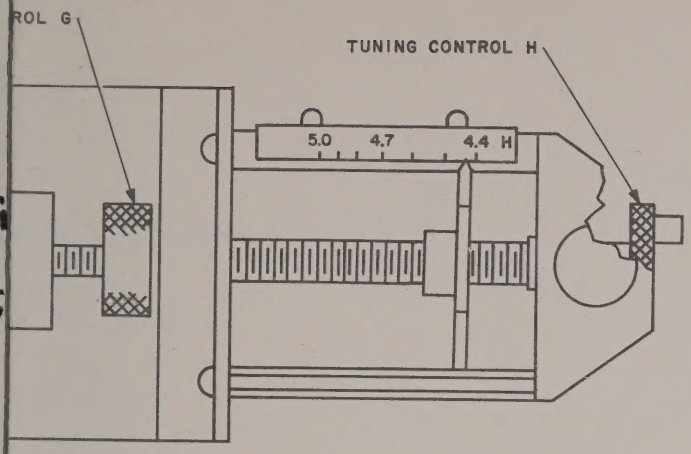
(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations	(9)
							Figure No.	Item No.
			Assy. Part No. 565-4936-006; Klystron Assy. Part No. 565-5028-104; Power Supply, Part No. 565-4937-006. Collins Radio Part No. 522-6770-004.					
	5820-856-4918		Antenna, AS-1270/TRC-80: C/O 1 ea Crank, hand; 1 ea alignment assy; 2 ea Waveguide; 1 ea Antenna Horn and 3 supports. Collins Part No. 522-6601-004.		NX	1	12	
	5820-020-8184		Cooler, Air, Electronic Equipment HD-545/TRC-80: Oper power reqt: ac 108-132v, 380-420 caps, single ph; 8-7/8 in x 18-7/8 in x 11-1/4 in oa. Collins Radio Part No. 522-6568-004.		NX	3	7	
	5820-856-4914		Synthesizer, Electrical Frequency, 0-937/TRC-80: 108-132 vac, 47-420 cps, single ph. 10-13/32 in x 18-7/8 in x 8-21/32 in o/a. Collins Radio Part No. 522-6564-004.		NX	3	6	
	5820-856-4916		Monitor, Audio Frequency-Radio Frequency, MX-4039/TRC-80: 1 channel 70mc, 1 band 300 to 30,000 cps, 108 to 132v, 47 to 420 cps, Single ph.		NX	1	7	
	5820-856-4917		Panel Communication Control SB-1564/TRC-80: Oper power reqt; ac 108-132v, 380-420-cps, single ph; illuminated push buttons. 14 in x 19-1/4 x 7-1/8 in o/a. Collins Radio Part No. 522-6874-004.		NX	1	5	
	5895-888-3055		Panel, Power Distribution SB-1565/TRC-80: 1 panel; 1 input, 208v rms line to line, 12 kw, 380-420 cps, 3 ph; 1 output 28v, 0.350 amp, 1 output, 208v, 20 amp, 1 output 208v, 1.5 amp, 1 output 120v, 3 amp, 1 output 120v 10 amp, 1 output 208v 6 amp, 1 output 208v 10 amp; 380 to 420 cps single ph.		NX	1	5	
	5410-856-8289		Shelter, Electrical Equipment S-254/TRC-80: Designed for ground use; 69 in x 80 in x 100 in o/a, 4 doors, 3 louvers, 3 ventilators; aluminum roof,		NX	1	1	

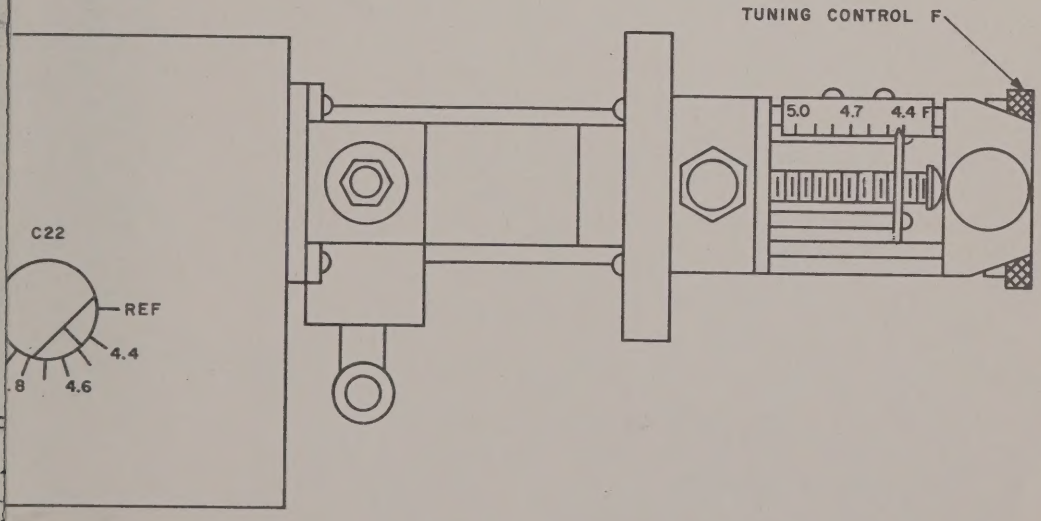
(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations Figure No.	(9) Illustrations Item No.
			walls and floors, electrically shielded. Collins Radio Part No. 565-6809-106.					
	5820-806-1319		Demultiplexer-Multiplexer TD-550/TRC-80: 120v ac ±10%, 47-420 cps, single ph, 10-1/2 in x 18-7/8 x 7 in o/a. Collins Radio Part No. 522-6566-004.		NX	1	7	
	4120-732-1048		Air Conditioner: 6,000 btu/hr, Corp of Engr type CE-6A-400.		NX	2	2	
	5995-856-7694		Cable Assembly, Radio Frequency: diversity receiving; 35 ft lg o/a. Collins Radio Part No. 564-6243-102.		NX	1	3	
	5995-856-7695		Cable Assembly, Special Purpose Electrical: diversity transmitting 35 ft long; Collins Radio Part No. 564-7835-103.		NX	1	3	
	7110-856-7696		Chair, Rotary: for operator, Cramer Posture Chair Co. Part No. A8-2359-FB.		NX	1		
	6605-237-8215		Compass, Magnetic, Corp of Engr item.			1	3	
	6115-806-0034		Engine, Generator: 120/208v, 3 ph, 400 cps, includes Control Panel; Corps of Engrs type 256-B-2 and Panel Auxiliary; Corps of Engr type.		NX	1	11	
	4210-555-8837		Extinguisher, Fire Carbon Dioxide: 2-1/2 lbs; type AN-6045-147. Corp of Engr.			1	1	
	5975-642-8937		Ground Rod: Corp of Engr. No. 380A.			3	3	
	5820-856-7697		Ladder, Folding: aluminum; 6.300 in x 16.750 in x 80.000 in o/a. Aluminim Ladder Co. Part No. J1-1334-I-D-R.			1	1	
	5965-856-7698		Headset-Microphone; Roanwell Corp Part No. 10372.		NX	2	3	
	5820-064-6168		Sight, Level: 3.500 in x 4.000 in x 4.500 in o/a. Collins Radio Part No. 565-8284-103.		NX	1	3	
	5815-878-8449		Teletypewriter TT-335/TG		NX	1	5	

(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations: Figure No.	(9) Illustrations: Item No.
	5805-246-8734		Terminal Telegraph: TH-5A/TG.		NX	1	5	
	5820-064-6213		Waveguide, Assembly: 15 ft lg; UG-407/u flanges both ends; Technicraft Labs Part No. TL-78105.			2	12	
	5960-705-2783		Electron Tube: Mil type JAN 12B4.			1	4	H
	5960-262-1357		Electron Tube: Mil type JAN 5654/6AK5W.			6	4	D
	5960-188-6584		Electron Tube: Mil type JAN 5670.			6	4	E
	5960-237-6917		Electron Tube: Mil type JAN 5725/6AS6W.			1	4	D
	5960-193-5145		Electron Tube: Mil type 575			1	4	F
	5960-262-0207		Electron Tube: Mil type 5784WA			4	4	J
	5960-578-1652		Electron Tube: Mil type 6384.			1	4	I
	5960-617-3541		Electron Tube: Mil type JAN 6442.			3	4	C
	5960-553-7091		Electron Tube: Mil type JAN 6542.			2	4	K
	5960-581-8088		Electron Tube: Mil type JAN 6829.			1	4	H
	5960-676-9016		Electron Tube: Mil type JAN 6922.			4	4	G
	5960-856-4767		Electron Tube: Mil type 7588.			1	4	A
	5960-856-4769		Electron Tube: Traveling wave tube, Huggins Lab. type HA-35N.			1	4	
	5960-503-4880		Electron Tube: Mil type JAN OA2WA			1	4	H
	5920-356-2188		Fuse, Cartridge: 0.125 amp, 250 v max, Mil type MS 90078-4.			10	4	L
	5920-235-8358		Fuse, Cartridge: 1/4 amp; 250 vdc; Mil Type MS 90077-7.			20	4	L
	5920-199-9498		Fuse, Cartridge: 1/2 amp, 250v, Mil type FO2GR 500B.			20	4	L
	5920-284-6804		Fuse, Cartridge: 3/4 amp, 250v, Mil type FO2GR750B.			10	4	L
	5920-280-4465		Fuse, Cartridge: 1 amp, 250 vdc, Mil type MS 90078-2.			20	4	L
	5920-284-9220		Fuse, Cartridge: 1 amp, 250v, time delay, Mil type MS 90078-24.			20	4	M
	5920-296-3779		Fuse, Cartridge: 1.5 amp,			20	4	L
	5960-262-3763		Electron Tube: Mil type JAN OB2WA			1	4	H

(1) Source, maintenance, and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations: Figure No.	(9) Illustrations: Item No.
			250v, Littlefuse No. 310201-5.					
	5920-280-9328		Fuse, Cartridge: 1.5 amp, 125v, time delay, Mil type MS 90078-25.			20	4	M
	5920-280-5062		Fuse, Cartridge: 2 amp, 250v, Littlefuse Part No. 312002.			10	4	L
	5920-356-2199		Fuse, Cartridge: 3 amp, 250v, Littlefuse Part No. 312003.			10	4	L
	5920-131-9821		Fuse, Cartridge: 3 amp, 125v, time delay, Mil Type MS 90078-27.			10	4	M
	5920-296-1519		Fuse, Cartridge: 5 amp, 250v, Mil type MS 90078-14.			10	4	L
	6240-683-0580		Lamp, Glow: Neon type; 110-125v Mil type MS 25252NE2D			6	4	N
	6240-155-8693		Lamp, Incandescent: 12.8 v, 17 w, S-8 type; G.E. Part No. 1142.			4	4	O
	6240-019-0878		Lamp, Incandescent: G-6 type; G.E. Part No. 1252.			1	4	O

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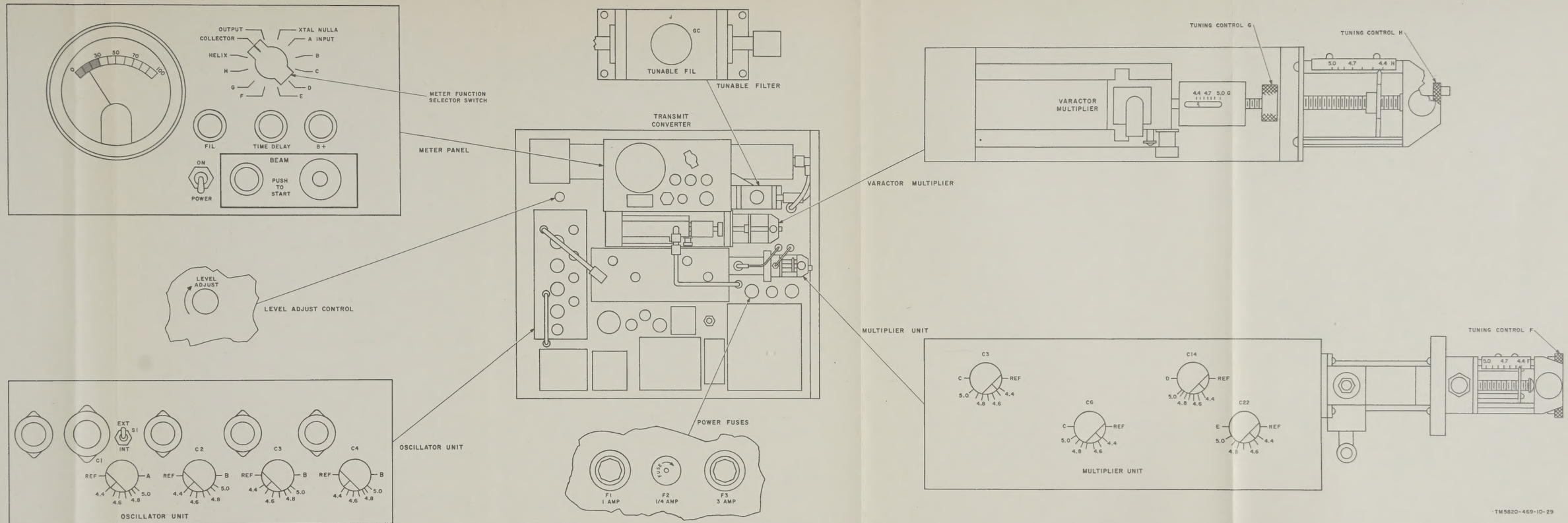


Figure 52. Transmit converter, controls and indicators.