FIELD MANUAL
NO. 24-24

HEADQUARTERS
DEPARTMENT OF THE ARMY
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SIGNAL DATA REFERENCES:
SIGNAL EQUIPMENT

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Preface

Purpose and Scope

This publication will assist personnel involved with signal planning and operations in a combat environment. It contains general information and technical characteristics of telephone, telecommunications, multiplex, single-channel, multichannel, and mobile subscriber equipment (MSE) normally deployed throughout a theater of operations.

User Information

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 directly to Commander, United States Army Signal Center and Fort Gordon, ATTN: ATZH-DTL, Fort Gordon, Georgia 30905-5075. Key comments and recommendations to pages and lines of text to which they apply. If DA Form 2028 is not available, a letter is acceptable. Provide reasons for your comments to ensure understanding and proper evaluation.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.
## Chapter 1 Telephone Equipment

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Section I. Telephones

TA-1/PT
Telephone Set

NSN: 5805-00-521-1320
Reference: TM 11-5805-243-12

General Information

The TA-1/PT is a lightweight, weatherproof, sound-powered telephone intended for use on field wire lines in forward areas. It can be used for communications with any local battery field telephone or local battery switchboard. It includes a generator for producing a 20-Hz ringing current.

Technical Characteristics

Range ........................................... Approximately 6 km (3.7 mi) using Field Wire WD-1/TT (10 dB working limit)
Type of Operation .............................................................. Local battery
Signaling Voltage ............................................................... 65 to 80 V AC, 20 Hz
Type of Signaling
Visual ................................................................. Nonadjustable Maltse cross
Audible ................................................................. Buzzer, adjustable from LOUD to OFF
Power Requirement .......................................................... Sound-powered
Weight:
    Telephone ......................................................... 1.25 kg (2.75 lb)
    Carrying Case ..................................................... 3.97 kg (14 oz)
TA-1/PT
Telephone Set

- Carrying Strap
- Case
- Moisture-Preventing Diaphragms
- Generator Lever
- Receiver
- Transmitter
- Handset
- Binding Posts
- Connector
- Visual Indicator
- Press-to-Talk Switch
- Handset Cord
General Information

The TA-236/FT is a general purpose, common-battery telephone (manual or dial), and is compatible with all common-battery dial pulse equipment.

Technical Characteristics

Range ........................................... Approximately 8 km (5 mi) from central office (36 dB working limit)
Type of Operation .................................. Common battery
Signaling (outgoing) ................................. Dial pulse
Signaling (Incoming) ................................. 90 V AC, 20 Hz
Type of Signal ..................................... Bell with adjustable volume
Power Requirement ................................. Supplied by central office
Weight ............................................. 2.27 kg (5 lb)
TA-236/FT
Telephone Set

TRANSMITTER
NUMBER PLATE
ASSEMBLY

DESK STAND
CORD

RECEIVER

HANDSET
CORD

HOUSING
ASSEMBLY

DIAL
WHEEL

NUMBER PLATE
ASSEMBLY

FINGER
STOP
TA-312/PT and TA-43/PT
Telephone Sets

NSN: 5805-00-543-0012 (TA-312/PT)
       6805-00-503-2775 (TA-43/PT)

Reference: TM 11-5805-201-12 (TA-312/PT)
            TM 11-5805-256-13 (TA-43/PT)

General Information

The TA-312/PT and the TA-43/PT are two-wire, battery-operated field telephones. They may be used in a point-to-point wire system or in any two-wire ring-down subscriber position of a telephone communications system. The Handset H-60 contains a push-to-talk switch which connects power for talking. The TA-312/PT has a built-in Receptacle Connector U-79/U for use with a headset and an associated EXT-INT switch; the TA-43/PT does not. The TA-43/PT is being replaced by the TA-312/PT. The TA-955 dual tone multifrequency (DTMF) adapter allows push button operational interface with automatic analog switches.

Technical Characteristics

Range:
- Wet .................................................. Approximately 22.5 km (14 mi) on WD-1/TT
  (36 dB working limit)
- Dry .................................................. Approximately 36.4 km (22 mi) on WD-1/TT
  (36 dB working limit)

Type of Operation:
- Common Battery ................................. Voice transmission and signaling
  power supplied by switchboard
- Local Battery ...................................... Voice transmission power supplied
  by two BA-30s, signaling power
  supplied by a hand-crank generator
- Common-Battery Signaling ..................... Signaling power supplied by
  switchboard, voice transmission
  provided by two BA-30s
- Signaling (Outgoing) ......................... Hand generated, 90 to 100 V AC, 20 Hz
- Signaling (Incoming) .......................... Audible tone, adjustable volume
TA-312/PT and TA-43/PT Telephone Sets

- Hook Switch
- TA-312/PT and TA-43/PT Telephone Sets
- External Battery Terminal
- Battery Compartment Latch
- Battery Compartment Cover
- Selector Switch
- Carrying Strap
- Handset Retaining Cradle
- Telephone Set Case CY-1277A/PT
- Handset Retaining Springs
- Handset Mounting Cradle
- Line 1-2 Binding Posts
- Receptacle Connector U-79/U
- Deicing Screen
- Push-To-Talk Switch
- Receptacle Cover
- Handset H-60/PT
- Ext-Int Switch
- Buzzer Volume Control
- Handset Retaining Cradle
- Ta-312/PT
- Ta-43/PT
The TA-341/TT is a four-wire, transistor, local-battery telephone intended for use in sheltered areas. It is designed for use with tactical automatic switches but also can be used in a point-to-point mode. Up to four sets can be bridged across a single four-wire line for extension service. DTMF tones activated by a push-button key sender are used for signaling.

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Range</td>
<td>3 km (2 mi) from AN/TTC-38 under worst conditions</td>
</tr>
<tr>
<td>Type of Operation</td>
<td>Local or common battery</td>
</tr>
<tr>
<td>Signaling (Outgoing)</td>
<td>900 to 3400 Hz DTMF</td>
</tr>
<tr>
<td>Signaling (Incoming)</td>
<td>90 V AC, 20 Hz</td>
</tr>
<tr>
<td>Type of Signal</td>
<td>Audible tone, adjustable volume</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>6 V DC (four BA-42s or equivalent)</td>
</tr>
<tr>
<td>Weight</td>
<td>3.2 kg (7 lb)</td>
</tr>
</tbody>
</table>
TA-341/TT
Telephone Set

(CASE SLING) A1MP2

(TELEPHONE SET) A1A1
General Information

The TA-838/TT is a rugged, solid-state, field telephone designed for use with switchboards SB-3614/TT and SB-3614/AT or with the Tactical Automatic Switches AN/TTC-25, AN/TTC-38, AN/TTC-39, and AN/TTC-39A and is capable of compatible interoperation with TA-341/TT and C-6709 net radio interface (NRI) equipment. It is a two or four-wire local or common-battery set using DTMF tones for signaling and will work with any DTMF semiautomatic or automatic circuit. Using the TA-838/TT, up to three extensions may be added in the four-wire mode and only one extension maybe used in the two-wire mode.

Technical Characteristics

Range ....................... 3.2 km (2 mi) from SB-3614/TT under worst conditions
Type of Operation .................. Local or common battery
Signaling (Outgoing) .................. 900 to 3400 Hz DTMF
Signaling (Incoming) .................. 90 V AC, 20 Hz
Type of Signal .................. Audible tone, adjustable volume
Power Requirement .................. 6 V DC (four BA-42s or BA-2042s)
Weight ........................... 3.6 kg (8 lb)
TA-838/TT
Telephone Set
**General Information**

The TA-938/G is a two-wire common-battery telephone set intended for use in sheltered areas. The telephone uses DTMF signaling. Two sets can be bridged across a single two-wire line for extension service.

**Technical Characteristics**

- **Range**: Approximately 8 km (5.0 mi) from central office
- **Type of Operation**: Common battery
- **Signaling Voltage**: 90 V AC, 20 Hz
- **Type of Signal**: Bell
- **Power Requirement**: Supplied by central office
- **Weight**: 1.8 kg (4 lb)
TA-938/G
Telephone Set
The digital nonsecure voice terminal (DNVT) TA-954/TT is a four-wire terminal contained in a ruggedized case, which transmits and receives conditioned diphase-modulated digitized voice and loop signaling information at 16 or 32 kb/s. The DNVT has a 16-key push button keyboard, receiver and ring volume controls, an incoming call/off-hook indicator light, and writing pad. It contains built-in protection from nuclear energy electromagnetic pulses and lightning. Handset H-350/U is issued with the DNVT. The microphone element is activated when the handset is removed from the cradle (hot mike). The push-to-net radio interface switch is only pressed to key the C-6709. The DNVT provides a digital communications interface with Tri-Service Tactical Communications (TRI-TAC) and Mobile Subscriber Equipment (MSE) circuit switches.

### Technical Characteristics

- **Channel Interface-Field Wire**: 4-wire field cable
- **Transmission Range**: 4 km (2.4 mi) max
- **Input Power-Power Drain**:
  - On Hook: 300 mW, max
  - Off Hook: 1.5 W, max
- **Power Requirement**: +24 to +56 V DC
- **Current Drain**:
  - On Hook: 12.5 mA, +24 V DC
  - Off Hook: 62 mA, +24 V DC
- **Weight**: 2.7 kg (5.8 lb)
TA-954/TT
Digital Nonsecure Voice Terminal
TSEC/KY-68
Digital Subscriber Voice Terminal

NSN: 5810-01-082-8404
Reference: TM 11-5810-329-10

General Information

The digital subscriber voice terminal (DSVT) KY-68 is used for encrypting/decrypting voice traffic and provides secure digitized data traffic. It operates as a full-duplex or half-duplex voice/data subscriber terminal at 16 to 32 kb/s. The KY-68 provides secure and nonsecure access to the switched networks and secure access to non-switched networks. Handset H-350/U is normally issued with the DSVT and includes a push-to-talk switch which is used when the DSVT is operating in the half-duplex mode to allow for voice transmission. The terminal consists of a five-position function switch, audio and ring volume controls, ring/busy, extension, and nonsecure warning indicators. The DSVT provides a digital communications interface with TRI-TAC and MSE circuit switches.

Technical Characteristics

<table>
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<tr>
<th>Parameter</th>
<th>Specification</th>
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<tr>
<td>Channel Interface - Field Wire</td>
<td>4-wire field cable</td>
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<tr>
<td>Power Requirement</td>
<td>-21 to -56 V DC (DC voltage is provided by the auxiliary power supply HYF-71/TSEC)</td>
</tr>
<tr>
<td>Weight</td>
<td>6.3 kg (13.8 lb)</td>
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TSEC/KY-68
Digital Subscriber Voice Terminal
As a prime subscriber terminal, the TA-1035/U provides full-duplex, conditioned, diphasic digital voice and loop signaling information with wire and mobile access equipment. It also provides supervisory, clock, plain text, and voltage reference signals with data devices. The TA-1035/U provides a data port for interfacing the communications terminal (CT) and AN/UXC-7 data devices to the echelons corps and below (ECB) network. The TA-1035/U operates in a common-battery power mode, deriving its power from the switch line termination circuit.

**Technical Characteristics**

Cables:
- Channel interface ............... 4 conductor field wire, 1,000 ft max (305)
- Data device interface ................. Signal cable

Power Requirements:
- Input power (power drain)
  - On-hook .............................................. 300 mW, max
  - Off-hook ............................................. 1.5 W, max
- Input power (voltage) .................. +24 to +56 V DC
- Input power (current drain)
  - On-hook .............................................. 12.5 mA @ +24 V DC
  - ............................ 5.0 mA @ +56 V DC
  - Off-hook ............................................. 62 mA @ +24 V DC
  - ............................................. 25 mA @ +56 V DC

Weights and Dimensions:
- Length ............................................. 10 in (257.0 mm)
- Width ............................................. 7-3/8 in (185.9 mm)
- Height ............................................. 4-5/8 in (118.9 mm)
- Weight ............................................. 5-3/4 lb (2.6 kg)
TA-1035/U
Digital Nonsecure Voice Telephone

RED BINDING POSTS
(1 RCV 2)

BLACK BINDING POSTS
(1 XMT 2)

DATA

ROTATED 90°

DATA DEVICE CONNECTOR COVER

GREEN WIRES

BROWN WIRES

GREEN WIRES CROSS SECTION

BROWN WIRES CROSS SECTION
TM 11-5805-780-12&P

General Information

The digital nonsecure voice terminal (DNVT) is a ruggedized field telephone. It is operable as a tabletop device in tents, shelters, and office environments. It also may be operated outdoors while strapped to a tree or pole. The DNVT is designed for durability to exposure of the elements during operation and transportation. Voice communication is accomplished through the handset. Digital data from an external device interfaces through the TA-1042A/U’s digital data port (DDP). The DNVT transmits and receives full duplex, conditioned diphasic digital voice and loop signaling information at 16 or 32 kb/s rates. The DNVT is a nonsecure telephone with no encryption capability. It digitizes voice information using continuously variable slope delta (CVSD) modulation. Digital communication transmissions, both to and from the DNVT, are accomplished using a conditioned diphasic (CDP) data transmission method. This is accomplished by using the DDP. The DNVT operates in both common battery mode and local battery point-to-point mode, but not simultaneously.

Technical Characteristics

Overall Dimensions:
- Width ............................................................... 7 in
- Height ............................................................. 4.25 in
- Length ............................................................ 9.75 in
- Weight ............................................................ 4.5 lb(approx)

Temperature Range:
- Normal Operating ........................................... -30 C(-22 F) to +52 C (+125 F)
- Storage ............................................................ -57 C (-70 F) to +71C (+160F)

Humidity Range .................................................. Up to 98%
TA-1042/U
Digital Nonsecure Voice Terminal
Section II. Switchboards

SB-22/PT and SB-22A/PT
Manual Telephone Switchboards

NSN: 5805-00-257-3602 (SB-22/PT)
      5805-00-715-6171 (SB-22A/PT)

Reference: TM 11-5805-262-12

General Information

The SB-22/PT and the SB-22A/PT are tactical, manual switchboards that can be rapidly installed to provide field facilities for interconnecting 12 local-battery telephone circuits, remote controlled radio circuits, or voice frequency (VF) teletypewriter circuits. Two SB-22/PTs may be stacked to provide a 29-circuit capability by removing one TA-221/PT (operator’s pack) and inserting five TA-222/PTs (line packs). Replacing a line pack with a trunk pack permits one-way ring-down, and one-way automatic trunk circuits between the SB-22A/PT and any other switchboard with common-battery signaling. The Tone-Signaling Adapter TA-977/PT provides the operator with a two-wire push-button tone-signaling capability for interfacing automatic switches without operator intervention.

Technical Characteristics

Type of Operation .......... Manual with local battery
Line Capacity .................. 12
Signaling (Outgoing) ............ 90 to 100 V AC, 20 Hz
Signaling (Outgoing) with adapter ................ DTMF
Signaling (Incoming) .............. 90 V AC, 20 Hz
Type of Signal ................. Audible or visual alarm
Power Requirement:
   Operator’s Talking Circuit ........ 3 V DC (two BA-30s)
   Night Alarm and Panel Light ........ 3 V DC (two BA-30s)
Weight .................. 15.4 kg (34 lb)
SB-22/PT and SB-22A/PT Manual Telephone Switchboards
SB-3614(V)/TT and SB-3614A(V)/TT Telephone Switchboards

NSN: 5805-01-032-1694 (SB-3614(V)/TT)
      5805-01-216-0887 (SB-3614A(V)/TT)

Reference: TM 11-5805-695-12 (SB-3614(V)/TT)
            TM 11-5805-749-12 (SB-3614A(V)/TT)

General Information

The SB-3614 is a tactical, ruggedized, 30-terminal automatic switchboard. It provides rapid, cordless service to various interfaces. It may operate as a 30-terminal, single-switching facility or maybe connected with additional switchboards to form a 60- or 90-line system. The switchboard operator can monitor, answer, initiate, extend, preempt, and release calls using the four-by-four key sender and other functional push buttons. Any connection can be broken down manually, through operator intervention and action, or automatically, through a subscriber going to an on-hook condition. A maximum of 18 terminals may be connected as either four-wire DTMF signaling trunks, or DC closure dial pulse or DTMF trunks, ear and mouth (E&M) dial pulse or DTMF lines or trunks. The switchboards provide fully automatic operation with touch tone subsets and two- and four-wire trunks and limited service with rotary dial pulse subsets. The SB-3614(V)/TT requires manual tandem dialing when dialing outside of your local switchboard. The SB-3614A(V)/TT automatically routes the call through the network using primary or alternate routes. For common-battery signaling or ring-down lines and trunks without DTMF capability, the switchboard provides call extension service. DTMF subscribers have direct distant dialing (7-, 10-, and 13-digit) and Defense Switching Network (DSN), Dial Central Office (DCO), and commercial access capabilities. Other features of the SB3614A(V)/TT include facsimile service, call forwarding, preemption by precedence, conference calling, and subscriber (loop) hunting.

Technical Characteristics

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>Manual or automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirement</td>
<td>24 V DC, 5 amp (max)</td>
</tr>
<tr>
<td>Terminals</td>
<td>30 in each switchboard</td>
</tr>
<tr>
<td></td>
<td>60 or 90 in expanded mode</td>
</tr>
<tr>
<td>Simultaneous Conversations</td>
<td>15 for one switchboard</td>
</tr>
<tr>
<td></td>
<td>30 for expanded operation</td>
</tr>
<tr>
<td>Precedence Levels</td>
<td>SB-3614(V)/TT: routine and priority</td>
</tr>
<tr>
<td></td>
<td>SB-3614A(V)/TT: routine, priority, immediate, flash, and flash override</td>
</tr>
</tbody>
</table>
### Technical Characteristics

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<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
<th>Type VI (SB-3614A(V)/TT only)</th>
<th>Type XI (SB-3614A(V)/TT only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SB-3614(V)/TT
Telephone Switchboard

SB-3614A(V)/TT
Telephone Switchboard
Section III. Auxiliary Telephone Equipment

CV-1918A(V)/G
Telephone Signal Converter

NSN: 5805-00-504-9103 (CV-1918A(V)1/G)
      5805-00-137-7674 (CV-1918A(V)3/G)

Reference: TM 11-5805-553-13

General Information

The CV-1918A(V)/G is a transistorized, eight-channel telephone signal converter designed to interface between automatic and manual telephone central offices. The CV-1918A(V)/G and the automatic telephone central office communicate with each other using electronic signal tones. The operator’s actions are translated into signal tone commands by the CV-1918A(V)/G. When installed on either the SB-249TT/C or SB-1398/GTA-14(V) switchboard, the converter provides two-wire to four-wire and four-wire to two-wire telephone signal compatibility. In addition to establishing a voice path between the two different telephones, the CV-1918A(V)/G generates the tones required to activate the automatic telephone central office switching functions. The manual switchboard operator can dial into the automatic switch using the DTMF dialing capability on the CV-1918A(V)/G. The three CV-1918A(V)/G models differ only in the quantities of components used in their configuration.

Technical Characteristics

Transmission Range ........................................... 3.2 km (2mi)
Circuit Capacity ............................................... 8 channels
Voice Frequency Range ...................................... 300 to 3500 Hz
Operating Power:
    Internal .................................................. 6 and-3 V DC
    External .................................................. 48 V DC
Type of signal .............................................. Audible night alarm with adjustable volume
Weight ....................................................... 55.4 kg (122 lb) (CV-1918A(V)1/G)
     ....................................................... 36 kg (80 lb) (CV-1918A(V)2/G)
     ....................................................... 33.1 kg (73 lb) (CV-1918A(V)3/G)
CV-1918A(V)/G
Telephone Signal Converter

CV-1918 COMPONENT QUANTITIES

<table>
<thead>
<tr>
<th>SYSTEM COMPONENTS</th>
<th>CV-1918A(V)1/G</th>
<th>CV-1918A(V)2/G</th>
<th>CV-1918A(V)3/G</th>
</tr>
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<tbody>
<tr>
<td>Electronics Units</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Universal Mounting Plate</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Trunk Unit</td>
<td>9</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Key Call Pedestal</td>
<td>9</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Distribution Box</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CX-2584/U Signal Cable</td>
<td>18</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Power Cable</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
J-1077A/U and J-2317A/U
Signal Distribution Panels

NSN:  6110-00-985-7574 (J-1077A/U)
       6110-00-937-4964 (J-2317A/U)

Reference:  TM 11-6110-201-12P (J-1077A/U)
             TM 11-6110-243-14P (J-2317A/U)

General Information

The J-1077A/U is a hard-wired (normal through) distribution box. It is used for interconnecting field wire or any other wire lines which are accessible for binding post connection traffic capability using 26, two-wire lines. Two J-1077A/U’s are required for use during field expedient patching. The J-2317A/U has four 26-pair connectors. Each connector terminates on respective binding post strips A, B, C, or D. The primary use of the J-2317A/U is field expedient patching or main frame distribution. All circuits used must be internally patched with jumper wires.
J-1077A/U and J-2317A/U
Signal Distribution Panels
TA-248/TT
Static Ringing Generator

NSN: 5805-00-503-1482
Reference: TM 11-5805-298-15

General Information

The TA-248/TT produces a 90 V AC, 20-Hz ringing voltage for telephone switchboards.

Technical Characteristics

Power Requirement ........................................ 110 V AC, 50 to 60 Hz
Output ........................................................... 90 V AC, 20 Hz
Weight .............................................................. 3.4 kg (7.5 lb)
The TM-184 is a block of insulating material on which 28 insulation-piercing binding posts and four mounting holes are mounted. This terminal strip can terminate seven pairs of wires. The TA-125/GT is a small, lightweight terminal. It is used at signal centers and test points where weatherproof terminations are essential for uninterrupted service. The terminal box is used wherever rapid installation of field wire or cable circuits is required. It also may be used as a main distributing frame for small manual telephone switchboards.
TM-184 Terminal Strip
and TA-125/GT Terminal Box
### Chapter 2 Telecommunications Equipment

#### Section I. Teletypewriter Equipment

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<tr>
<td>MOD-40/8B Data Terminal</td>
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<th>Equipment</th>
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</thead>
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<td>2-16</td>
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</table>
Section 1. Teletypewriter Equipment

AN/UGC-74A(V)3
Communications Terminal

NSN: 5815-01-062-8194
Reference: TM 11-5815-602-10

General Information

The AN/UGC-74A(V)3 is a message communications terminal used to compose, edit, store, transmit, receive, and print Army record traffic communications. The AN/UGC-74A(V)3 will interface/operate with existing and post-1980 communications security (COMSEC) equipment. It can communicate bit serial data represented in ITA-2 (Baudot) or American standard code for information interchange (ASCII) codes. The mode of transmission shall be asynchronous or synchronous depending on the data rate. The AN/UGC-74A(V)3 is designed to replace current tactical electromechanical teletypewriter equipment.

Technical Characteristics

Method of Transmitting . . . . . . . . . . . . . . . . . . . . . . Standard four-row keyboard plus four special keys
Method of Receiving . . . . . . . . . . . . . . . . . . . . . . Page copy only, single or multi-ply (three-ply max) roll paper
Type of Signal . . . . . . . . . . . . . . . . . . . . . . . . . . . . 20 or 60 mA neutral operation and Lo Data
Operation Mode . . . . . . . . . . . . . . . . . . . . . . . . . . . Full or half duplex
Speed Option . . . . . . . . . . . . . . . . . . . . . . . . . . . . 60 to 1,600 wpm
Power Requirement . . . . . . . . . . . . . . . . . . . . . . . . . 22 to 30 V DC (DC power to maintain memory only in the event of AC power loss), 115 V AC ± 15%, 50, 60, or 400 Hz ± 5% 230 V AC ± 15%, 50, 60, or 400 Hz ± 5%
Power Consumption . . . . . . . . . . . . . . . . . . . . . . . . . 100 W max
Weight . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 45.4 kg (100 lb) two-man carry
AN/UGC-74A(V)3 Communications Terminal
AN/UGC-144
Communications Terminal

NSN: 5815-01-262-4611
Reference: TM-11-7025-267-12

General Information

The AN/UGC-144 provides single subscriber operation. When in a network, the unit has a full-duplex asynchronous communications capability. It operates at signaling speeds of 45.5 to 32,000 b/s at ASCII data transfer rates. The single subscriber terminal (SST) can compose, edit, display, refile, store, transmit, and receive messages. It can monitor narrative message traffic in the R, U, and Y communities and can provide terminal-to-terminal voice communications if needed. ASCII or BAUDOT modes are available with normal input keying capability. The companion printer is a portable 85 column (or optional 136 column) serial, dot matrix line printer/plotter. It is a medium speed device that includes interface data, power supply, paper supply, and control mechanisms. It produces an alphanumeric printout at 50 to 240 characters per second depending on character font and number of characters per line selected.

Technical Characteristics

TERMINAL:
Data Transfer Rate ............................................. DACB rates: 2,400 to 32,000 b/s
Non DACB rates: 75X2n to 9,600,
16,000, and 32,000 b/s
BAUDOT rates: 45.5, 50, and 75

Access Time .......................................................... 10 msec
Primary Voltage Input ............................................ 100/130 V AC, 48/63 HZ or 200/260 V AC, 48/63 HZ
Consumption ......................................................... 93W
Dissipation ............................................................ 15 W ± 10%
Battery ................................................................. Four 1.5-V Ni-CAD, C-size
Height (Closed) ...................................................... 25 cm (10.0 in)
Height (Open) ....................................................... 43 cm (17.0 in)
Width ................................................................. 51 cm (20.0 in)
Depth ................................................................. 56 cm (22.0 in)
Weight ............................................................... 25 kg (55 lb)
Technical Characteristics
(Cont.)

PRINTER:
Speed .................................................. 150/240 cps
Primary Voltage Input .................................. 100/130 V AC, 48/63 Hz or
200/260 V AC, 48/63 Hz
Consumption ........................................... 13 W average
Height (Closed) ........................................ 15 cm (6.0 in)
Height (Open) ........................................... 19 cm (7.5 in)
Width .................................................... 38 cm (15.0 in)
Depth ...................................................... 36 cm (14.0 in)
Weight ................................................... 6 kg (13.2 lb) without paper
AN/UGC-144
Communications Terminal

NOTE: Printer is separate.
**MOD-40/8B**

**Data Terminal**

**NSN:** Not available

**Reference:** Not available

## General Information

The MOD-40/8B airport surveillance radar (ASR) terminal provides interactive data communications with a central message processor or other similarly equipped terminals. It includes a keyboard/display (KD) and also may be equipped with up to three cassette-drive units for storage and retrieval. The message being prepared locally or being received may be displayed on the computer terminal cathode ray tube (CRT) for editing prior to transmission or to storage on cassette. It also is equipped with an 80-column tractor-feed printer. The MOD-40/8B can be interfaced with automated message media equipment (AMME), automatic digital network (AUTODIN), and the AN/TYC-39.

## Technical Characteristics

- **Method of Transmitting:** Standard four-row keyboard plus special keys
- **Method of Receiving:** Screen display, magnetic tape, and page printer
- **Operation Mode:** Full duplex
- **Input-Output Speed:** 2,400 b/s using the (ITA-2) Baudot or (ITA-5) ASCII codes
- **Power Requirement:** 115 V AC ± 10% at 48/52 or 58/62 Hz
- **Power Consumption:** 2,885 W
MOD-40/8B
Data Terminal
Section II. Facsimile Equipment and Tactical Computer Systems

AN/GXC-7A
Tactical Facsimile Set

NSN: 5815-01-067-4655
Reference: TM 11-5895-1079-14-1

General Information

The AN/GXC-7A is a lightweight, rugged, portable, low power system capable of operating from standard and vehicular power. It enables electronic transmission/reception of typed or handwritten record traffic, maps, overlays, drawings, photographs, and other types of documents containing black and white, color, or gray shades. The tactical facsimile will operate over existing and proposed standard voice radios and wire circuits.

Technical Characteristics

Printing ........................................ Any paper, using carbon paper transfer, including single copy sets, multiple copy sets, transparencies, map overlays, and view graphs
Power Requirement .................... 115/230 V AC, 47/400 Hz or 22/32 V DC, 50 W
Weight ......................................... 24 kg (53 lb) including carrying case
## AN/GXC-7A
### Tactical Facsimile Set

<table>
<thead>
<tr>
<th>MEDIA</th>
<th>CONNECTION</th>
<th>INTERFACE</th>
<th>COPYTIME MINUTES (FULL PAGE)</th>
<th>GRAY SHADES</th>
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<td>Field Wire</td>
<td>WD-1</td>
<td>TA-312</td>
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<td>8</td>
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<tr>
<td>Phone Network</td>
<td>Autovon DDD</td>
<td>Acoustic or Direct Coupled</td>
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<td>X-Mode (wideband)</td>
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<td>KG-27 AN/TRA-145</td>
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<td>MIL-STD-188 or RS-232C/24</td>
<td>2400 B/S 4800 B/S</td>
<td>4,6</td>
<td>Black and White</td>
</tr>
</tbody>
</table>

2-10
**AN/UXC-7**

**Tactical Digital Facsimile Set**

**NSN:** 5815-01-187-7844

**Reference:** TM 11-5815-615-10

**General Information**

The AN/UXC-7 is a lightweight digital facsimile (LDF) set, rugged, waterproof, low power system capable of operating from standard alternating current (AC) and vehicle direct current (DC) power. It enables electronic transmission/reception of typed or handwritten record traffic, view graphs, map overlays, transparencies, and hand-drawn copies in black and white and eight shades of gray. The LDF will operate over existing and proposed voice radios and wire circuits; full digital or analog data/voice capability. Its brief transmission (burst) reduces the chance of detection by the enemy. The LDF set can store data in memory, and then can send in a short, high-speed transmission requiring 7 to 15 seconds to transmit a full page.

**Technical Characteristics**

- **Printing** .................................... Prints on any paper, using carbon paper transfer. Receives on single or multiple copy sets.
- **Power Requirements** .................. 115/230 V AC, 47/420 Hz; 22/32 V DC
- **Power Consumption** ................. 55 W AC standby; 98 W AC operating
- **50 W DC standby; 90 W DC operating**
- **Weight** ................................. 24.9 kg (55 lb) including carrying case
AN/UXC-7
Tactical Digital Facsimile Set
Section III. Computer Equipment

AN/TYQ-33(V)
Tactical Army Combat Service Support Computer System

NSN: Not available

Reference: TM 11-7010-213-12

General Information

The ANTYQ-33(V) system is a small portable computer designed to process data in the field. The Tactical Army Combat Service Support (CSS) Computer System (TACCS) is used to support the CSS missions in supply, maintenance, medical, and personnel areas. TACCS is available in two basic versions and can be expanded to a full cluster with five workstations. Version V1 consists of the master workstation and version V2 consists of V1 plus one remote workstation. The expanded cluster consists of one master workstation and up to five remote workstations.

Major Components

Master Workstation:
1 Logic Module
1 Monitor
1 Keyboard
1 Printer
3 Transit Cases

Remote Workstation:
1 Remote Logic
1 Monitor
1 Keyboard
1 Transit Case
Technical Characteristics

Monitor: Cathode Ray Tube
Display Format: 29 lines of 80 characters
Character Format: 9 x 12 dot matrix
Character Set: Soft font (stored in a software file) consisting of 256 characters (including standard ASCII set, graphic symbols, and other selected characters)

Keyboard: 98 keys in 6 groups with QWERTY standard layout

Printer: Tabletop, bidirectional, dot matrix, impact printer, tractor feed

Logic Module:
Hard Drive: 85 Mbytes, Disk Type Rigid, non-removable
Flexible Disk Drive: 1 Mbyte double-sided, double density, 5 1/4 inch floppy; 630,784 bytes formatted
Tape Cartridge Drive: Cartridge type: 30M-DC600A industry standard, 24 Mbytes (formatted)
Electronics: Central processor, main memory, data communications, video generator for monitoring FM radio interface or telephone line connections with automatic/manual dial, two modems, (150, 300, 600 or 1,200 Baud), and connection to DSVT. 1 Mbyte RAM, 1 Mbyte RAM each remote.

Power Requirement:
Single Phase: 120 V AC ± 12 V AC, 60 Hz ± 3 Hz
or 120 V AC ± 22 V AC, 50 Hz ± 2.5 Hz
AN/TYQ-33(V)
Tactical Army Combat Service Support Computer System
AN/UYQ-43(V)1 and AN/UYQ-43(V)2
Tactical Computer Processor

NSN: (V1) 5895-01-211-9821  
         (V2) 5895-01-246-8276

Reference: TM 11-5895 -1348-12-1

General Information

The AN/UYQ-43(V)1 and AN/UYQ-43(V)2 tactical computer processor (TCP) is a portable, general-purpose data processing display, and communications control equipment used to provide automated assistance to the Army maneuver commanders. The TCP can generate new tactical data, or update stored data in memory. The data can be in either alphanumeric, graphic, or combined alphanumeric/graphic form. An equipment interface for two-way communications over wire or radio links with other Army tactical units is provided.

Major Components

1 Display Unit 1P-1512/UYQ
1 Processing Unit Central CP-1712/UYQ
1 Power Conversion Unit PU-787/UYQ
1 Printer TT-815/UYQ
1 Recorder-Disk Tape RO-575/UYQ
1 Interface Unit J-4324/UYQ

Technical Characteristics

Power Source .................................................. 28 V DC or 115/230 V AC
Character Data Rate ........................................ 75, 150, 300, 600, 1,200, 2,400, 4,800, 8,000, 9,600, 16,000, and 32,000 b/s
Memory Media .................................................. Fixed Disk---152 Mbytes
Tape Cassette---67.1 Mbytes
Flexible Disk---360 Kbytes
Display unit .................................................. Color. 48 Lines. 130 Columns max
Technical Characteristics  
(Cont.)

Weight:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Weight Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Display Unit IP-1512/UYQ</td>
<td>65.9 kg (1451 lb)</td>
</tr>
<tr>
<td>1 Central Processing Unit CP-1712/UYQ</td>
<td>53.6 kg (118 lb)</td>
</tr>
<tr>
<td>1 Power Conversion Unit PU-787/UYQ</td>
<td>70.0 kg (154 lb)</td>
</tr>
<tr>
<td>1 Printer TT-815/UYQ</td>
<td>44.5 kg (98 lb)</td>
</tr>
<tr>
<td>1 Recorder-Disk/Tape RO-575/UYQ</td>
<td>73.2 kg (161 lb)</td>
</tr>
<tr>
<td>1 Interface Unit J-4324/UYQ</td>
<td>55.4 kg (122 lb)</td>
</tr>
</tbody>
</table>

Total Weight: 362.6 kg (798 lb)
AN/UYQ-43(V)1 and AN/UYQ-43(V)2
Tactical Computer Processor
Chapter 3 Multiplex Equipment

Section I. Time Division Multiplexing Equipment

AN/FCC-98(V) Multiplexer Set
MD-1023( )/G Low Speed Cable Driver Modem
MD-1024( )/G High Speed Cable Driver Modem
MD-1025( )/G Remote Loop Group Multiplexer/Cable Driver Modem
MD-1026( )(P)/G Digital Data Group Modem
MD-1065( )(P)/G (103 Modem) Digital Data Modem
TD-202/U Multiplexer
TD-204/U and TD-754/G Multiplexer
TD-660/G, TD-660A/G and TD-660B/G Multiplexer
TD-976/G Asynchronous Digital Combiner
TD-1065/G High Speed Serial Data Buffer
TD-1069/G Multiplexer
TD-1233( )/TTC Remote Loop Group Multiplexer
TD-1234( )/TTC Remote Multiplexer Combiner
TD-1235( )/TTC Loop Group Multiplexer
TD-1236( )/G Trunk Group Multiplexer
TD-1237( )/G Master Group Multiplexer
TD-1337(V)/G Multiplexer/Demultiplexer

Section II. Auxiliary Multiplex Equipment

AN/PTM-7 Telephone Test Set with CX-11230/G or CX-4245/G Special Purpose
  Electrical Cable and TD-206B/G Pulse Form Restorer
CV-1548/G and CV-1548A/G Telephone Signal Converters
TS-3647( )/G Telephone Test Set Cable Orderwire Unit with
  TD-1218( )/G Pulse Form Restorer (Low Speed) and
  TD-1219( )/G Pulse Form Restorer (High Speed)
Section I. Time Division Multiplexing Equipment

AN/FCC-98(V)
Multiplexer Set

NSN: 5820-01-072-0560 (AN/FCC-98(V)1)
      5820-01-086-6217 (AN/FCC-98(V)1X)
      5820-01-074-5186 (AN/FCC-98(V)2)
      5820-01-086-6218 (AN/FCC-98(V)2X)
      5820-01-071-6403 (AN/FCC-98(V)3)
      5820-01-087-1808 (AN/FCC-98(V)3X)

Reference: TM 11-5805-711-13 (AN/FCC-98(V)1 and (V)1X)
      MWO 11-5805-711-30-1 (AN/FCC-98(V)2, (V)2X, (V)3, and (V)3X)

General Information

The AN/FCC-98(V) uses analog-to-digital (AD) conversion and pulse code modulation (PCM) techniques to multiplex and demultiplex nominal 4 kHz analog VF channels for transmission over digital communications systems. It provides data interweaving by replacing VF channel modules with selected data interleaving modules. It features full-frame acquisition and monitoring and performs AD conversions and time division multiplexing (TDM). This set provides AD conversion on 3-, 4-, 8-, 12-, and 24-channel increments of 24-analog VF channels. Digital data is interweaved into an output bit stream in time slots assigned to replace VF channels. Demultiplexer circuit modules demultiplex received digital data and perform digital-to-analog conversion required to reconstruct the original analog signal. Digital data is extracted from the input data stream and distributed to digital channels which replace VF channels. Built-in test equipment (BITE) is an integral test module that measures, tests, and monitors signals in and out of channel modules and of operation of various internal circuits. It also is used to isolate faulty channel modules and for alignment of replaced modules. Monitor and alarm circuitry give audible and visible alarm indications when there is a loss of frame or timing or failure to receive or transmit data for a nominal 100 milliseconds or more.
Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>(V)</th>
<th>(V)1X</th>
<th>(V)2</th>
<th>(V)2X</th>
<th>(V)3</th>
<th>(V)3X</th>
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<tr>
<td>Electrical Equipment Cabinet: CY-7703</td>
<td>1</td>
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<td>CY-7786</td>
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<td>Test Module TS-3693</td>
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<tr>
<td>Transmit-Receive Data Timing Group: OB-88</td>
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<tr>
<td>OB-91</td>
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<tr>
<td>Power Supply Group: OP-124 (AC Power Group)</td>
<td>1</td>
<td>1</td>
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<tr>
<td>OP-125 (DC Power Group)</td>
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<tr>
<td>Voice Frequency Channel Module PL-1411</td>
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<tr>
<td>Module PL-1412*</td>
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<tr>
<td>Module PL-1413*</td>
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<tr>
<td>Module PL-1414*</td>
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</tbody>
</table>

* Issued only if required for operations.

Technical Characteristics

- **Power Requirement**: 117 or 230 V AC ± 10%, 47 to 420 Hz single phase, or -44 to -56 V DC, +4 V DC, -8 V DC
- **Power Consumption**: 130 W
- **Weight**: 45.4 kg (100 lb)
- **Channels**: 24, full duplex
- **Voice Frequency Response**: 180 to 3450 Hz
AN/FCC-98(V)
Multiplexer Set

- Transmit-Receive Data Timing Group
  OB-91/FCC-98(V)

- Test Module Multiplexer Set
  TS-3993/FCC-98(V)

- Power Supply Group
  OP-124/FCC-98(V)
  OR OP-125/FCC-98(V)
  (4 units, 2 internal)

- Cabinet, Electrical Equipment
  CY-7703/FCC-98(V)
  OR CY-7786/FCC-98(V)

- Data Interleaving Channel Module
  PL-1413/FCC-98(V)

- Voice Frequency Channel Module
  PL-1411/FCC-98(V)

- Turret Type Test Cables
  (3)

- Bantam Type Test Cables
  (3)

- Front Cover
MD-1023( )/G
Low Speed Cable Driver Modem

NSN: 5820-01-0145-4940
Reference: TM 11-505-699-12

General Information

The MD-1023( )/G is a member of the digital group multiplexer (DGM) family. The low speed cable driver modem (LSCDM) is used as an extension facility to provide repeater cable transmissions. It replaces TD-754. The LSCDM accepts nonreturn to zero (NRZ) group input from 72 to 2,048 kb/s and transmits on cable as conditioned diphase group outputs at 2,304 kb/s and vice versa. It also provides power for the unattended low speed pulse restorer (LSPR) up to 64 km (40 mi). The LSCDM provides full duplex digital and analog orderwire facilities. It is used in conjunction with the loop group multiplexer (LGM), trunk group multiplexer (TGM), LSPR, cable orderwire unit (COU), trunk encryption device (TED), master group multiplexer (MGM), communications nodal control element (CNCE), LSCDM, group modem (GM), remote loop group multiplexer/cable driver (RLGM/CD), and shortwave wideband radio (SRWBR).

Technical Characteristics

Number of Groups ................................................................. 1
Cable .............................................................. CX-11230 or CX-4245/G coax
Maximum Distance ........................................ 1.6 km (1.0 mi) without restorers
                                                      64.4 km (40 mi) with restorers
Orderwire Transmission ........................................ 1.6 km (1.0 mi)
Input Power Voltage .................. 115 V AC ±10%, 47 to 63 Hz or 22 to 32 V DC
Power Consumption .................................................... 92 W
Size .................................................. 21.6 cm high by 30.5 cm deep by 43.8 cm wide
                                            (8.5 in by 12 in by 17.25 in)
Weight .......................................................... 16.8 kg (37 lb)
MD-1023( /G
Low Speed Cable Driver Modem
MD-1024( )/G
High Speed Cable Driver Modem

NSN: 5820-01-145-4902
Reference: TM 11-5805-700-24P

General Information

The MD-1024( )/G is a member of the DGM family. It is used in nodal radio facilities to provide repeat cable transmissions. The high speed cable driver modem (HSCDM) accepts input master group rates of 4,096 and 4,608 kb/s; 9.36 and 18.72 rob/s and converts them to conditioned diphase signals at fixed output rates of 19.2 rob/s. It also provides power for the high speed pulse restorer (HSPR) in a repeater cable system up to 8 km (5 mi). The HSCDM is used in conjunction with HSPR, MGM, TGM, COU, TED, SRWBR, and CNCE.

Technical Characteristics

Number of Groups (or Master group) ........................................... 1
Cable Side Interface:
  Modulation ................................................................. Conditioned diphase
  Cable ................................................................. CX-11230 or CX-4245/G coax
  Maximum Distance ............................................. 8 km (.5 mi) without restorers,
  ................................................................. 8 km (5.0 mi) with restorers
Orderwire Transmission ......................................................... 1.6 km (1.0 mi)
Input Power Voltage ......................................................... 115 V AC ± 10%, 47 to 63 Hz
Power Consumption .......................................................... 110 W
Size ................................................................. 21.6 cm high by 30.5 cm deep by 43.8 cm wide
  ................................................................. (8.5 in by 12 in by 17.25 in)
MD-1024(/G)
High Speed Cable Driver Modem
MD-1025(/)G
Remote Loop Group Multiplexer/
Cable Driver Modem

NSN: 5820-01-145-4905
Reference: TM 11-5805-704-12

General Information

The MD-1025(/)G is a member of the DGM family. It provides interface between the RLGM, TGM, MGM, and AN/TTC-39A, Automatic Telephone Central Office. The RLGM/CD converts 72 or 144 kb/s NRZ data to conditioned diphase for transmission over CX-11230 or 4245/G cable at lengths up to 3.2 km (2 mi) without repeaters. It contains two full duplex moderns and provides power via cable to operate two RLGMs and their associated DSVT. It is used in conjunction with the RLGM, MGM, TGM, and COU.

Technical Characteristics

Number of Groups .................. Max 2
Cable Side Interface:
  Cable ................................ CX-11230 or CX-4245/G coax
  Maximum Distance ........................ 3.2km(2mi)
  Voltage supplied to the TD-1233/TTC .......... 180 V DC
Input Power Voltage .................. 115 V AC ± 10%, 47 to 440 Hz
Power Consumption ........................ 173 W
Size ................................ 21.6 cm high by 30.5 cm deep by 43.8 cm wide (8.5 in by 12 in by 17.25 in)
Weight ................................ 15 kg (33 lb)
MD-1025( )/G
Remote Loop Group Multiplexer/
Cable Driver Modem
General Information

The MD-1026( )/(P)/G is a part of the DGM family. It has three module types that perform three different functions. These functions convert balanced NRZ group signals and timing to conditioned diphase, dipulse, or bipolar for transmission on unbalanced coaxial. The GM will contain up to four GM modules. The GM converts balanced NRZ group signals from sheltered DGM functions into conditioned diphase, conditioned dipulse, and bipolar signals. Conditioned diphase signals are for operation with TRI-TAC transmission equipments. Conditioned dipulse signals are for interoperation with Multiplexer TD-754 and the Army Tactical Communications Systems (ATACS). Bipolar signals are for interoperation with Digital Combiner Asynchronous TD-976 and the ATACS. The GM provides secure and nonsecure orderwire operation for telemetry, data, and voice.

Technical Characteristics

Number of Groups .......................................................... Max 6
Bit Rates:
   Conditioned Diphase ...................... 128, 256, 512, 1,024, 15.36, 2,048, 4,096 kb/s
                                          72, 144, 288, 576 1)152, 2,304, 4,608 kb/s
   Dipulse ......................................................... 288, 576, 1,152, 2,304 kb/s
   Bipolar ................................................................. 1,536.2 kb/s
Equipment Side Interface:
   Signals .............................................................. NRZ data plus square wave timing
   Cable ................................................................. RG-108, 30.48 m (100 ft)
Cable Side Interface
   Cable ................................................................. CX-11230 or CX-4245/G coax
   Maximum Distance .............................................. Conditioned diphase, 3.2 km (2 mi)
                                            Dipulse, 1.6 km (1 mi)
                                            Bipolar, 0.8 km (.5 mi)

Orderwires (Per Group):
   Conditioned Diphase ...................... 2 kb/s and 16, 3,2 km (2.0 mi) or
                                           1 analog 1.6 km (1.0 mi)
Technical Characteristics (Cont.)

Dipulse .................................................. 1 analog, 0.8 km (.5 mi)
Bipolar .................................................... 1 analog, 0.8 km (.5 mi)
Input Power Voltage ......................... 115 V AC ± 10%, 47.5 to 440 Hz
Power Consumption ................................. 90 W
Size .............................................. 21.6 cm high by 30.5 cm deep by 43.8 cm wide
                                             (8.5 in by 12 in by 17.25 in)
Weight .................................................. 16 kg (35.2 lb)

MD-1026( ) (P)/G
Digital Data Group Modem
MD-1065( )(P)/G (103 Modem)
Digital Data Modem

NSN: 5820-01-145-8507
Reference: TM 11-5805-725-12

General Information

The MD-1065( )(P)/G modem is required to interface the DGM equipment with the
AN/GRC-103 (Bands I through IV) radio and to accommodate the TRI-TAC digital voice
orderwire (DVOW) and telemetry systems. Functionally, the MD-1065( )(P)/G combines the
encrypted group traffic and encrypted orderwires for transmission over the AN/GRC-103 radio
system. The MD-10650(P)/G will contain up to three modem modules.

Technical Characteristics

Power Input ................................................................. 115 V AC, 60 Hz
Power Consumption ....................................................... 60 W
Weight ................................................................. 15 kg (33 lb)

NOTE 1: Distance between MD-1065( )(P)/G and another device must not exceed
30.5 m (100 ft).
MD-1065( )(P)/G (103 Modem)
Digital Data Modem
TD-202/U
Multiplexer

NSN: 5805-00-884-2176

Reference: TM 11-5805-367-12

General Information

The TD-202/U is a 12- or 24-channel PCM radio transmission interface unit. The transmit section accepts TDM/PCM outputs from one or two TD-352/Us or a TD-204/U, or from another TD-202/U. It processes the input/output (I/O) into compatible output for radio transmission. The receiving section accepts a PCM signal from the radio receiver and processes it for interface with another TD-202, TD-204, or one or more TD-352/Us.

Technical Characteristics

Number of Channel ............................................................... 12 or 24  
Type of Operation ............................................................... Full duplex  
Type of Multiplexing ......................................................... Time division  
Type of Modulation ............................................................. Pulse code  
Required Bandwidth ............................................................ 240 kHz  
Pulse Rate:  
12-channel ............................................................ 576 kHz  
24-channel ............................................................ 1152 kHz  
Loop Impedance ............................................................... 91 ohms, send and receive  
Line Impedance ............................................................... 51 ohms, send and receive  
Power Requirement ......................................................... 109 to 121 V AC, 47 to 63 Hz  
Power Consumption .......................................................... 30 W  
Weight ............................................................... 22.6 kg (50 lb)
TD-202/U
Multiplexer
TD-204/U and TD-754/G
Multiplexers

NSN: 5805-00-900-8200 (TD-204/U)
      5820-00-930-8078 (TD-754/G)

Reference: TM 11-5805-367-12 (TD-204/U)
            TM 11-5805-383-12 (TD-754/G)

General Information

These cable interface units permit processing of 6-, 12-, 24-, or 48-channel multiplexing for transmission via cable. This unit processes signals from a video cable for transmission over a radio system via the TD-202/U (radio interface unit). Two of these (like items) may be crosshatched and used as a cable repeater. The TD-204/U and the TD-754/G may be used to provide power for as many as 39 pulse form restorers in the cable link.

Technical Characteristics

Number of Channels ............................................ *6, 12, 24, or 48
Type of Operation ............................................ Full duplex
Type of Multiplexing ........................................... Time division
Type of Modulation ............................................ Pulse code
Pulse Rate Input:
   *6-channel .................................................. 288 kHz
   12-channel .................................................. 576 kHz
   24-channel .................................................. 1152 kHz
   48-channel .................................................. 2304 kHz
Loop Impedance ................................................. 91 ohms, send and receive
Line Impedance .................................................. 62 ohms
Power Requirement ............................................ 109 to 121 V AC, 47 to 63 Hz
Power Consumption:
   TD-204/U ................................................... 62 W
   TD-754/G ................................................... 35 W
Weight:
   TD-204/U .................................................. 25.37 kg (56 lb)
   TD-754/G .................................................. 20.38 kg (45 lb)
Cable ........................................................... CX-11230 or CX-4245/G coax

* Using TD-660 in 6-channel mode of operation.
TD-204/U and TD-754/G Multiplexers

AIR INLET

AIR FILTER HOLDING SCREWS

TD-204/U

AIR OUTLET

TD-754/G
TD-660/G, TD-660A/G and TD-660B/G
Multiplexers

NSN:  
- 5805-00-930-8079 (TD-660/G)
- 5805-00-928-3382 (TD-660A/G)
- 5805-00-928-3382 (TD-660B/G)

Reference: TM 11-5805-382-12

General Information

The TD-660/G converts six or twelve 4-wire VF channels to a TDM/PCM signal and vice versa. The TD-660/G is used in nonsecure communications systems and is being replaced by attrition with the TD-660A/G or TD-660B/G. All three models are electrically and physically interchangeable, except when used with COMSEC equipment. The TD-660A/G and TD-660B/G have additional shielding and filtering provisions and are equipped with coaxial cable connectors on the rear panel for connection to the security equipment.

Technical Characteristics

Number of Channels ................................................. 6 or 12
Type of Operation .................................................. 4-wire, full duplex
Type of Multiplexing ............................................... Time division
Type of Modulation .................................................. Pulse code
Channel Bandwidth .................................................. 300 to 3500 Hz
Pulse Rate:
- 6-channel ....................................................... 288 kHz
- 12-channel ...................................................... 576 kHz
Loop Impedance ...................................................... 600 ohms, send and receive
Line Impedance ...................................................... 900 ohms, send and receive
Power Requirement ................................................. 109 to 121 V AC, 50 or 60 Hz
Power Consumption .................................................. 45 W
Weight ................................................................. 22.2 kg (49 lb)
TD-660/G
Multiplexor

TOP COVER
FRONT COVER
MOUNTING BRACKET
**TD-976/G**  
**Asynchronous Digital Combiner**

**NSN:** 7025-01-048-9678  
**Reference:** TM 11-7025-202-12

### General Information

The TD-976/G provides the capability to combine the 12-channel outputs of various multiplexer into a single 48/96-channel super group for transmission over a cable system to another TD-976/G or to radio set AN/GRC-144. It also provides the power for cable systems up to 8 km (5 mi) long and a fault location system to determine the defective restorer in the cable system.

### Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Channels</td>
<td>Eight 12-channel groups</td>
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<tr>
<td>Type of Operation</td>
<td>4-wire</td>
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<tr>
<td>Type of Multiplexing</td>
<td>Time division</td>
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<tr>
<td>Type of Modulation</td>
<td>Pulse code</td>
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<tr>
<td>Pulse Rate</td>
<td>4,9152 megabits</td>
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<tr>
<td>Loop Impedance</td>
<td>91 ohms</td>
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<tr>
<td>Line Impedance</td>
<td>56 ohms</td>
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<tr>
<td>Power Requirement</td>
<td>15 V AC, 50 or 60 Hz</td>
</tr>
<tr>
<td>Weight</td>
<td>34 kg (75 lb)</td>
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</tbody>
</table>
TD-976/G
Asynchronous Digital Combiner
**TD-1065/G**

**High Speed Serial Data Buffer**

NSN: 5805-01-028-8364

Reference: TM 11-5805-637-12

**General Information**

The TD-1065/G can insert and remove digital data from the 576-kilobit stream of Multiplexer TD-660/G or TD-352/U. The TD-1065/G senses if the input to a channel is analog or digital and switches analog signals to the TD-660/G or TD-352/U. If the input to the channel is digital (for example, TD-1069), the TD-1065/G processes it and inserts the signal in the PCM bit stream in the position normally occupied by the same numbered audio channel of the multiplexer.

**Technical Characteristics**

Number of Channels .................................................. 12
Type of Operation ..................................................... 4-wire
Type of Multiplexing .................................................. Time division
Type of Modulation ..................................................... Pulse code
Digital Input Rates ................................................... 16 or 32 kb/s
Pulse Rate ............................................................... 576 kHz
Loop Impedance ......................................................... 600 ohms
Line Impedance ......................................................... 91 ohms
Power Requirement .................................................. 115 V AC, 50 or 60 Hz
Power Consumption .................................................. 30 W
Weight ................................................................. 18 kg (39 lb)
TD-1065/G
High Speed Serial Data Buffer
General Information

The TD-1069/G will multiplex and demultiplex up to 12 separate digital data and/or teletypewriter traffic streams into a serial bit stream whose rate is 32 kb/s. The sum of all data/teletypewriter streams applied to the input channels of the time division digital multiplexer (TDDM) cannot exceed 30 kb/s. The TDDM provides subscribers with the means to multiplex digital data and/or teletypewriter traffic for transmission over cable or through the ATACS trunking facilities.

Technical Characteristics

Number of Channels .......................................................... Max 12
Channel Rates:
   Data ................................................................. 600, 1,200, 2,400, 4,800,9,600 b/s
   Teletypewriter ...................................................... 45.5, 50, 75, 150 b/s
Type of Operation ......................................................... 4-wire
Type of Multiplexing ..................................................... Time division
Type of Modulation ....................................................... Conditioned diphase
Power Requirement ....................................................... 115 V AC, 50 to 400 Hz
Power Consumption ..................................................... 125 W
Weight ................................................................. 27.3 kg (60 lb)
TD-1069/G
Multiplexer
Remote Loop Group Multiplexer

NSN: 5820-01-145-2462

Reference: TM 11-5805-706-12

General Information

The TD-1233( )/TTC is a member of the DGM family. It provides digital and analog subscribers of military facilities access to the tactical automatic digital network. The RLGM multiplexes up to four 16 or 32 kb/s (four-wire) digital channels into a single group output of 72 or 144 kb/s. Digital loop modems are provided on each channel to transmit and receive conditioned diphasic signals via field wire to interconnect DSVTs or DNVTs. An analog applique unit (AAU) card also may be used as a substitute for digital modem cards to provide AD conversion of four-wire analog telephones. A modem on the group side allows transmission of conditioned diphasic signals via coaxial cable to RMC, GM, or RLGM/CD units. Power for the RLGM is provided locally or from the interconnecting RMC or RLGM/CD. The RLGM provides power to each interconnecting DSVT and DNVT. The RLGM is used in conjunction with the RLGM/CD, remote multiplexer combiner (RMC), GM, COU, DSVT, and DNVT.

Technical Characteristics

Number of Digital Loops ............................................. Max 4
Field Wire .......................................................... WF-16, 3.2 km (2 mi)
Cable Interface .................................................... CX-11.230/G or CX-4245/G coax
Input Power Voltage ............................................. 115 V AC ± 10%, 47 to 440 Hz or 22 to 32 V DC, or 180 V DC (through coax cable)
Power Consumption ............................................... 40 W
Power Feed to Subscriber Set ..................................... 55 V DC
Size ................................................................. 25.1 cm high by 45 cm deep by 48 cm wide (9.9 in by 17.75 in by 18.9 in wide)
Weight ............................................................. 17.2 kg (37.8 lb)
TD-1233( )/TTC
Remote Loop Group Multiplexer

MULTIPLEXER ASSEMBLY

SUMMARY
FAULT
INDICATOR

POWER
OUT INDICATOR

AC POWER INDICATOR

180 V ON/OFF SWITCH

180 V AC/DC ON/OFF SWITCH
General Information

The TD-1234( )/TTC is a member of the DGM family. It provides digital and analog subscribers of military facilities access to the tactical automatic digital network. The RMC combines up to eight 16/32 kb/s loops with a group from an RLGM or another RMC into an output group rate from 128 kb/s to 576 b/s. An AAU card also may be used as a substitute for digital modem cards to provide AD conversion of four-wire analog telephones. It also provides transmission of a maintenance orderwire. The RMC is powered locally and in turn provides power to interconnecting DNVT/DSVT units and RLGM. The RMC is used in conjunction with the GM, RLGM, COU, and DSVT.

Technical Characteristics

Input Interface:
- Loops ................................................................. 8
- Field Wire .......................................................... WF-16, 3.2 km (2 mi)
- Group (Modulation) ........................................... Conditioned diphase
- Group (Cable) ..................................................... CX-11230 or CX-4245/G coax, 3.2 km (2.0 mi) max

Output Group Rate ................................. 128, 144, 256, 288, 512, or 576 kb/s
Power Requirement ......................... 115 V AC, 47 to 440 Hz ± 10% or 22 to 32 V DC
Power Consumption ................................. 140 W
Power Provided to Loop Instruments
- DSVT, DNVT ......................................................... 56 V DC
TD-1234( )/TTC
Remote Multiplexer Combiner
TD-1235( )/TTC
Loop Group Multiplexer

NSN: 5820-01-145-2460
Reference: TM 11-5805-696-12

General Information

The TD-1235( )/TTC is a member of the DGM family. It provides subscribers of military extension facilities access to modern military automatic switches and digital systems and vice versa. This unit time division multiplexes/demultiplexes 7-, 8-, 15-, or 16-digital subscriber channels (16 or 32 kb/s) into an output group of 256, 288, 512, or 576 kb/s depending on the type and mix of input rates. One channel is designated overhead. Modulation is conditioned diphasic, NRZ balanced. The LGM also can handle four-wire analog channels when its internal digital loop modem is replaced with an AAU. The LGM is used in conjunction with the TGM, MGM, GM, LSCDM, DSVT, and TED. It provides power via field wire to the DSVT/DNVT.

Technical Characteristics

Number of Channels .............................................. 7, 8, 15, or 16
Channel Interface:
   Modulation ................................................. Conditioned diphasic
   Field Wire .................................................. WF-16, 3.2 km (2.0 mi) max
Input Power Voltage ........................................... 115 V AC ± 10%, 47 to 440 Hz
Power Consumption ............................................ 162 W
Power Supplied to Subscriber Instrument ...................... 55 V DC
Size ............................................................... 21.6 cm high by 30.5 cm deep by 43.8 cm wide (8.5 in by 12 in by 17.25 in)
Weight ......................................................... 17 kg (37.4 lb)
TD-1236()/G
Trunk Group Multiplexer

NSN: 5820-01-145-2461

Reference: TM 11-5805-697-12

General Information

The TD-1236()/G is a member of the DGM family. It combines 2, 3, or 4 full duplex group inputs of various rates into a super group. The TGM combines into and from balanced NRZ groups (up to 4 groups). It uses three separate rate structures so that I/O rates must be in the same rate family. The TGM also can provide single group operation when the group input is 576 kb/s or lower. The TGM is used in conjunction with the LGM, RLGM/CD, MGM GM, CDM, and TED.

Technical Characteristics

Number of Groups ................................................................. Max 4
Input Power Voltage ............................................................ 115 V AC ± 10%, 47 to 63 Hz
Power Consumption .............................................................. 90 W
Size ................................................................. 21.6 cm high by 30.5 cm deep by 43.8 cm wide (8.5 in by 12 in by 17.25 in)
Weight ................................................................. 16 kg (35.2 lb)
TD-1236( )/G
Trunk Group Multiplexer
**TD-1237( )/G**  
**Master Group Multiplexer**

**NSN:** 5820-01-145-2459

**Reference:** TM 11-508-5805-698-12

**General Information**

The TD-1237( )/G is a member of the DGM family. It provides low power digital transmission capability for the up-the-hill link by a synchronous combining of 12 group or super group inputs into a master group output. The TD-1237( )/G time division multiplexes up to 12 digital input group signals ranging from 72 to 4915.2 kb/s into a master group of either 9.36 or 18.72 rob/s. It can accept, on its input side, any TRI-TAC group or super group signal and group outputs from TD-660 and TD-976. On the master side it interfaces with HSCDM and the SRWBR. It also synchronously multiplexes two 16 or 32 kb/s channels carrying either DVOW or telemetry. It is used in conjunction with the LGM, RLGM/CD, TGM, GM, HSCDM, LSCDM, TED, SRWBR, and CNCE.

**Technical Characteristics**

- **Number of Groups**: Up to 12
- **Input Power Voltage**: 115 V AC ± 10%, 47 to 440 Hz
- **Power Consumption**: 187 W
- **Size**: 35.6 cm high by 30.5 cm deep by 43.8 cm wide (14 in by 12 in by 17.25 in)
- **Weight**: 28.3 kg (62.3 lb)
TD-1237(/G)
Master Group Multiplexer

- POWER OUT INDICATOR
- POWER ON INDICATOR
- GROUP RATE SELECTOR ASSEMBLY
- Summary Fault Indicator
- Power Supply Mgm
- Multiplexer Assembly
The TD-1337(V)/G is a synchronous TDM set compatible with ATACS and TRI-TAC operations. Synchronous data input from eight to 1,152 kb/s of mixed rates are combined and transmitted at a composite rate output ranging from 16 to 4,664 kb/s. Timing is internal or may be provided externally. TD-1337(V)/G provides three orderwires consisting of 16 kb/s secure, nonsecure, and 2.4 kb/s orderwire interfacing with an advance narrow band digital voice terminal (ANDVT). The four configurations of the TD-1337(V)/G used for nodal or non-nodal application are determined through printed circuit board replacement. The TD-1337(V)/G can perform the TD-754 multiplexer (MUX) and demultiplexer (DEMUX) functions when interfacing the TD-660s.

**Technical Characteristics**

- **Synchronous Data Input**: Select up to 8 of a possible 13 group inputs
- **User Interface Ports of Entry**: 8
- **Unbalanced NRZ Ports of Entry**: 4
- **Conditioned Diphasic**: 1
- **Group Modem Port of Entry**: 1
- **Loop Modem Port of Entry**: 1
- **Speed Interface (MUX I/O) Ports of Entry**:
  - **MUX**: 1
  - **DEMUR**: 4
- **Power Requirement**: 115 V AC, 47 to 63 Hz
- **Power Consumption**: 140 W

Reference: TM 11-7025-221-10
## TD-1337(V)/G
### Multiplexer/Demultiplexer

**Functional Differences Between Models**

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<th>(V)2</th>
<th>(V)3</th>
<th>(V)4</th>
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<td><strong>Group Interfaces</strong></td>
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<tr>
<td>Maximum number of active ports (group inputs/outputs)</td>
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<td>2</td>
<td>8</td>
<td>4</td>
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<td>Number of unbalanced NRZ interfaces</td>
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<tr>
<td>Number of conditioned diphase (group modem) interfaces</td>
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<td>8</td>
<td>4</td>
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<td><strong>Super Group Interfaces</strong></td>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td><strong>Orderwires</strong></td>
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<td>16 kb/s nonsecure digital voice (H-250 handset)</td>
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<td>16 kb/s secure digital voice (VINSON)</td>
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<td>yes</td>
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<tr>
<td>24 kb/s digital voice (ANDVT)</td>
<td>no</td>
<td>no</td>
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<td>yes</td>
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<td><strong>Miscellaneous</strong></td>
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<tr>
<td>16/32 kb/s dedicated user conditioned diphase interface (loop modem)</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>CESE telemetry reporting function</td>
<td>no</td>
<td>yes</td>
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<td>TD-754 DEMUX function</td>
<td>yes</td>
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<td>TD-754 MUX function</td>
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<td>TD-976 mode capability</td>
<td>yes</td>
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Section II. Auxiliary Multiplex Equipment

AN/PTM-7 Telephone Test Set with CX-11230/G or CX-4245/G Special Purpose Electrical Cable and TD-206B/G Pulse Form Restorer

NSN: 6625-00-902-7574 (AN/PTM-7)
      5995-00-133-9126A (CX-11230/G or CX-4245/G)
      5805-01-020-2251 (TD-206B/G)

Reference: TM 11-6625-648-12 (AN/PTM-7)
            TM 11-5995-208-10 (CX-11230/G or CX-4245/G)
            TM 11-5805-367-12 (TD-206B/G)

General Information

The AN/PTM-7 locates faults in a PCM cable link that consists of Pulse Form Restorer TD-206B/G and Special Purpose Electrical Cable CX-11230/G or CX-4245/G. The AN/PTM-7 determines the location of an open or short circuit in a cable link up to 1.6 km (1 mi) away in one of the two circuit paths. Communication is possible with attended points by connecting AN/PTM-7 to the restorer or at a cable rupture. The cable is used to transmit video signals via two internal coaxial cables between attended points in full-duplex mode. Each cable is 4 km (.25 mi) long and interfaces another cable, or TD-206B/G or attended point. The TD-206B/G is an unattended restorer which receives distorted input signals and restores them to the originally generated form.

Technical Characteristics

AN/PTM-7:
Orderwire ................................................................. 300 to 1700 Hz
Signaling Frequency .................................................. 1600 Hz
Power Requirement .................................................. 7.5 and 14.5 V DC
Weight ........................................................................... 10.4 kg (23 lb)

CX-11230/G or CX-4245/G:
Channel Capacity ......................................................... 6, 12, 24, or 48
Weight with Reel ......................................................... 52.2 kg (115 lb)
Maximum Span without Support ................................. 30.5 m (100 ft)

WARNING: DO NOT PUT UNSUPPORTED CONNECTORS IN SPAN.
TD-206 B/G:
Power Requirement .................................................. 11.3 V DC supplied by TD-204/U or
TD-754/G via CX-11230 or CX-4245/G cable
Weight ................................................................. 93 g (2.04 lb)

AN/PTM-7 Telephone Test Set with CX-11230/G
or CX-4245/G Special Purpose Electrical Cable
and TD-206B/G Pulse Form Restorer
**General Information**

The CV-1548/G and the CV-1548A/G convert two-wire telephone circuits to four-wire circuits for transmission over multiplex systems. A straight-through patch is provided in the four-wire mode. These converters provide three signaling options. They convert a 20-Hz ringing signal to 1600 Hz, and 1600 Hz to 20 Hz for two-way ringing. The CV-1548/G and the CV-1548A/G convert a DC closure to 1600 Hz and 1600 Hz to a DC closure for originate and terminate plug supervision on one-way ringdown trunks. They provide the option of no-ringing signal conversion. These telephone signal converters are used with Multiplexer TD-352/U, TD-353/U, and TD-660/U. The CV-1548A/G does not contain the test align meter, the meter selector switch, or 1600-Hz reference level adjust on power supply.

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Number of Channels</td>
<td>12</td>
</tr>
<tr>
<td>(each channel operates independently)</td>
<td></td>
</tr>
<tr>
<td>Loop Impedance</td>
<td>600 ohms</td>
</tr>
<tr>
<td>Line Impedance</td>
<td>600 ohms</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>109 to 121 V AC, 47 to 63 Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>60 W</td>
</tr>
<tr>
<td>Weight</td>
<td>24.5 kg (54 lb)</td>
</tr>
</tbody>
</table>
CV-1548/G and CV-1548A/G
Telephone Signal Converters

- MOUNTING FLANGE
- POWER INDICATOR LAMP
- METER SELECTOR SWITCH
- FRONT PANEL
- SCREWDRIVER
- CAPTIVE SCREW
- PERFORATED INNER FRONT COVER
- SPARE LAMPS
- NUT BLOCK
TS-3647( )/G Telephone Test Set Cable
Orderwire Unit with TD-1218( )/G Pulse Form
Restorer (Low Speed) and TD-1219( )/G Pulse Form Restorer (High Speed)

NSN: 6625-01-145-2463 (TS-3647( )/G)
      5820-01-145-4938 (TD-1218( )/G)
      5820-01-145-4939 (TD-1219( )/G)

Reference: TM 11-5805-703-14 (TS-3647( )/G)
            TM 11-5805-701-12 (TD-1218( )/G)
            TM 11-5805-702-12 (TD-1219( )/G)

General Information

The TS-3647( )/G is a member of the DGM family. It provides field maintenance of the high speed and low speed cable systems and is field portable. The COU allows access to the cable system maintenance orderwires, monitors low and high speed conditioned diphase signals, and performs measurement of the power feed current. It is used in conjunction with the CDM, RLGM, RMC, RLGM/CD, GM, LSPR, and HSPR.

The TD-1218( )/G is a member of the DGM family. It is used with the LSCDM to regenerate the cable signal at 1.6 km (1 mi) intervals. The LSPR is a two-way unit which detects and regenerates conditioned diphase signals at 2,304 kb/s. It carries orderwire circuits and will provide loading and access to the orderwire signals. It is used in conjunction with the LSCDM and COU.

The TD-1219( )/G is a member of the DGM family. It is used in repeater cable systems in conjunction with the HSCDM to regenerate the cable signal each .4 km (.25 mi) in the system. The HSPR is a two-way unit which detects and regenerates conditioned diphase signals at 19,200 kb/s. It carries orderwire circuits and operates in conjunction with the HSCDM and COU.
Technical Characteristics

Capability (TS-3647/G) ................................................. Field measurement of cable link parameters and internal battery condition. Cable links consist of up to 64.3 km (40 mi) of Special Purpose Electrical Cable CX-11230/G or CX-4245/G and TD-1218/Gs, TD-1219/Gs, MD-1023/Gs, and MD-1024/Gs in various quantities. Access to cable link analog orderwire; half duplex voice and signaling.

Signal (TD-1218/G and TD-1219/G) .......................... Group traffic riding on analog orderwire and pulse form restorer power feed

Interfacing Cable:
(TD-1218/G and TD-1219/G) .......................... Special Purpose Electrical Cable CX-11230/G or CX-4245/G

Cable Voltage (TS-3647/G) .......................... 0 to 1,000 V DC range

Cable Current:
TD-1218/G (LSPR) ................................................. 40 mA
TD-1219/G (HSPR) ................................................. 90 mA

Input Signal:
TD-1218/G ................................................. 30 mV, peak-to-peak
TD-1219/G ................................................. 30 mV, peak-to-peak

Output Signal:
TD-1218/G ................................................. 2 V, peak-to-peak
TD-1219/G ................................................. 1.5 V, peak-to-peak

Analog Orderwire:
TD-1218/G and TD-1219/G .......................... Passive transmission of voice for maintenance, independent of group traffic

Prime Power (TS-3647/G):
Type .......................................................... Two batteries (BA-5599/U), 9 V
Voltage ......................................................... 18 V DC

Power Requirements:
TD-1218/G ................................................. 40 mA constant current supplied over the cable link from MD-1023/Gs
TD-1219/G ................................................. 90 mA constant current supplied over the cable link from MD-1024/Gs

Weight:
TS-3647/G .......................................................... 11.3 kg (24.2 lb)
TD-1218/G and TD-1219/G .................................. 3.04 kg (6.7 lb)
TS-3647(  )/G Telephone Test Set Cable
Orderwire Unit with TD-1218(  )/G Pulse Form Restorer (Low Speed) and TD-1219(  )/G Pulse Form Restorer (High Speed)
Chapter 4 Single-Channel Radios

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Section I. Frequency Modulated Radio Sets

AN/PRC-25
Radio Set

NSN: 5820-00-857-0759
Reference: TM 11-5820-398-12

General Information

The AN/PRC-25 is a short-range, manpack, portable frequency modulated (FM) transceiver that provides two-way voice communication. The RT-505 and RT-505A transceiver radios are similar components. Both case modules are identical; however, the internal module circuits of the RT-505A are micro-modularized. The modules of the two radios are physically and electrically interchangeable. The RT-505 and the RT-505A are part of the AN/PRC-25. They can be used as part of vehicular Radio Sets AN/VRC-53 and AN/GRC-125.

Technical Characteristics

Frequency Range ........................................... Low band, 30.00 to 52.95 MHz; High band, 53.00 to 75.95 MHz
Power Output ................................................. 1.1 to 2.0 W
Power Source ................................................. Batteries, dry BA-4386/U and BA-398/U
Distance Range .............................................. 5 to 8 km (3 to 5 mi)
Antenna ....................................................... AT-892 semirigid tape,
                                          AT-271A multisection whip,
                                          RC-292 ground plane,
                                          OE-254

Type of Service ............................................. 30 K0F3E
Weight ......................................................... 10.7 kg (23.5 lb) with battery
Limitation ..................................................... Nonsecure operation
FM 24-24

AN/PRC-77
Radio Set

NSN: 5820-00-930-3724
Reference: TM 11-5820-667-12

General Information

The AN/PRC-77 is a manpack, portable FM transceiver used to provide short-range, two-way radiotelephone voice communication. It can provide secure voice (X-mode) transmission with the TSEC/KY-57. The radio consists of RT-841/PRC-77 transceiver and minor components. The RT-841 also is used as part of Radio Sets AN/VRC-64 and AN/GRC-160.

Technical Characteristics

Frequency Range ............................................. Low band, 30.00 to 52.95 MHz; High band, 53.00 to 75.95 MHz
Planning Range ............................................. 8 km (5 mi)
Power Output .................................................. 0 to 4.0 W
Power Source .................................................. BA-4386/U, BA-398/U or BA55984
Antenna .......................................................... AT-892/PRL-24, at 271A/PRC multisection whip or doublet
Type of Service ................................................ 30K0F3E
Weight ......................................................... 10.7 kg (23.5 lb)
AN/PRC-77
Radio Set
AN/VRC-12 Series
Radio Sets

NSN: 5820-00-223-7412
Reference: TM 11-5820-401-10-1
TM 11-5820-401-10-2

General Information

The radio sets in the AN/VRC-12 series are short-range, vehicular, aircraft, and fixed-station mounted units. They provide FM radiotelephone communication and can be used with speech security or digital data equipment TSEC/KY-8, or TSEC/KY-57 by connection through the X-mode facility of the radio sets. Transceivers RT-246 and RT-524 and Receiver R-442 make up the major components of the AN/VRC-12 series radio configuration. The RT-246 has 10 automatic presets and remote select/power capability. The RT-524 is equipped with a built-in loudspeaker.

Technical Characteristics

Frequency Range .......................... 30.00 to 52.95 (A-Band); 53.00 to 75.95 (B-Band)
Planning Range ................................ 8 to 41 km (5 to 25.5 mi)
Power Input ............................... Low power: 0.5 to 8 W, 25 V DC operating power; 0.5 to 10 W, 30 V DC operating power; High power: 35 W minimum, 25 V DC operating power
Power Output .................................. Low, 8W; high, 35 W
Power Source .............................. Vehicular power or Power Supply PP-2953 and Power Supply PP-665
NRI Operation ............................. Using AN/GSA-7, AN/GRA-39, or C-6709/G Antenna -- AT-912 or AS-1729, 3.05 m (10 ft) vehicular whip; OE-254/GRC or fixed RC-292 for installation; and AB-15 or AB-558, 3.35 m (11 ft) whip is used with R-442/VRC
Tuning ........................................ Detent
Squelch ...................................... 150 Hz tone and noise
Type of Service ............................ 30K0F3E
Weight ...................................... 25.5 kg (56 lb), RT-246; 23 kg (51 lb), RT-524; 8.2 kg (18 lb), R-442
AN/VRC-12 Series
Radio Sets

AN/VRC-12

AN/VRC-43

AN/VRC-44
AN/VRC-12 Series
Radio Sets (Cont.)

AN/VRC-45

AN/VRC-46

AN/VRC-47
AN/VRC-12 Series
Radio Sets (Cont.)

EQUIPMENT CONFIGURATIONS

<table>
<thead>
<tr>
<th>NOMEN</th>
<th>RT-246</th>
<th>RT-442</th>
<th>RT-524</th>
<th>C-2299</th>
<th>AT-912 OR AS-1729</th>
<th>AB-15 OR AB-558 WITH ANTENNA ELEMENTS</th>
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*When Radio Sets AN/VRC-45 and AN/VRC-49 are equipped with VINSON installation kits, the C-2299 is replaced by the C-10374/VRC.
AN/VRC-53, AN/VRC-64, AN/GRC-125, and AN/GRC-160
Radio Sets

NSN:  
5820-00-223-7467 (AN/VRC-53)  
5820-00-223-7475 (AN/VRC-64)  
5820-00-223-7411 (AN/GRC-125)  
5820-00-223-7473 (AN/GRC-160)  

Reference  TM 11-5820-498-12

General Information

The AN/VRC-53 and the AN/VRC-64 are vehicular mounted. The AN/GRC-125 and the AN/GRC-160 can be used for vehicular and manpack operations. Both variations of the radio sets provide short range, two way, FM radiotelephone communication between vehicles and crew served weapons (tanks, armored personnel carriers). The radio sets are compatible with other FM radio sets in 30.00 to 75.95 MHz range.

Technical Characteristics

Frequency Range.  Low band, 30.00 to 52.95 MHz;  
High band, 53.00 to 75.95 MHz

Power Output.  1 to 3 W

Power Source.  Batteries, dry BA-4386/U and BA-5598/U

Distance Range.  5 to 8 km (3 to 5 mi)

Antenna.  Vehicular-mounted AS-1729/VRC, manpacked AT-892 semirigid tape, AT-271A multisection whip

Vehicular Operation  24 V DC

Type of Service  30 K0F3E

Weight  15.5 kg (33.5 lb)
AN/VRC-53 and AN/VRC-64
Radio Sets
FM 24-24

AN/PRC-119(V)1, AN/VRC-87(V)2, AN/VRC-88(V)3, AN/VRC-89(V)4, AN/VRC-90(V)5, AN/VRC-91(V)6, and AN/VRC-92(V)7
SINCGARS Radio Sets

NSN: 5820-01-151-9915 (AN/PRC-119(V)1)
      5820-01-151-9916 (AN/VRC-87(V)2)
      5820-01-151-9917 (AN/VRC-88(V)3)
      5820-01-151-9918 (AN/VRC-89(V)4)
      5820-01-151-9919 (AN/VRC-90(V)5)
      5820-01-151-9920 (AN/VRC-91(V)6)
      5820-01-151-9921 (AN/VRC-92(V)7)

Reference: TM 11-5820-890-10-1
            TM 11-5820-890-20-2

General Information

Single-Channel Ground and Airborne Radio Systems (SINCGARS) is a family of VHF-FM radio sets designed to meet the Army’s tactical communications requirements under the new Army operations doctrine. SINCGARS is replacing the AN/PRC-77 and the AN/VRC-12 series radio sets. It is designed for simple, quick operation using a 16-element keypad for push-button tuning. SINCGARS is capable of short-range or long-range operation for voice, frequency shift-keying (FSK), or digital data communications. It can be used for single-channel operation or in a jam-resistant, frequency hopping mode which can be changed as needed. SINCGARS has a built-in self test with visual and audio read back. Major components and equipment configurations are shown in the chart on the following page.

Technical Characteristics

Frequency Range .......................................................... 30 to 88 MHz
Number of Channels ................................. 2,320 (spaced every 25 kHz) includes eight channels that can be preset for single-channel operation or eight that can be preset for frequency hopping operation
Power Input ......................... 12 V DC, manpack; 28 V DC, vehicular/aircraft
Power Output ......................... 5 W, and up to 50 W with power amplifier
Antenna ................................................................. See the following chart
**SINCGARS Radio Sets**

### SINCGARS Components

<table>
<thead>
<tr>
<th>Version</th>
<th>Nomenclature</th>
<th>Function</th>
<th>Components</th>
<th>Replaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V1)</td>
<td>AN/PRC-119</td>
<td>Manpack</td>
<td>1</td>
<td>1 1 1 1 AN/PRC-25, AN/PRC-77</td>
</tr>
<tr>
<td>(V2)</td>
<td>AN/VRC-87</td>
<td>Vehicle, Short Range</td>
<td>1 1 1 1</td>
<td>AN/VRC-53, AN/VRC-64</td>
</tr>
<tr>
<td>(V3)</td>
<td>AN/VRC-88</td>
<td>Vehicle, Short Range/ Dismount</td>
<td>1 1 1 1 1</td>
<td>AN/GRC-125, AN/GRC-160</td>
</tr>
<tr>
<td>(V4)</td>
<td>AN/VRC-89</td>
<td>Vehicle, Long Range/ Vehicle, Short Range</td>
<td>2 1 2 1</td>
<td>AN/VRC-12, AN/VRC-47</td>
</tr>
<tr>
<td>(V5)</td>
<td>AN/VRC-90</td>
<td>Vehicle, Long Range</td>
<td>1 1 1 1 1</td>
<td>AN/VRC-43, AN/VRC-46</td>
</tr>
<tr>
<td>(V6)</td>
<td>AN/VRC-91</td>
<td>Vehicle, Long Range/ Vehicle, Short Range/ Dismount</td>
<td>2 1 2 1 1</td>
<td>AN/VRC-46 and AN/GRC-160</td>
</tr>
<tr>
<td>(V7)</td>
<td>AN/VRC-92</td>
<td>Dual/Vehicle, Long Range</td>
<td>2 1 2 1 2</td>
<td>AN/VRC-45, AN/VRC-49</td>
</tr>
</tbody>
</table>

Ancillary Items:
- Receiver-Transmitter RT-1439(P)/VRC
- Data Adapter Mx-10506(J)/VRC
- Electronic Counter-Countermeasure Module C-11290(J)/VRC
- Intervehicular Remote Control Unit C-11291(J)/VRC
Section II. Amplitude Modulated Radio Sets

AN/GRC-106 and AN/GRC-106A Radio Sets

NSN: 5820-00-402-2263 (AN/GRC-106)
      5820-00-223-7548 (AN/GRC-106A)

Reference: TM 11-5820-520-10

General Information

The AN/GRC-106 is an HF-single sideband (SSB) radio set used primarily as a mobile link in a communications network. It also may be used in fixed and semifixed applications, and it has an AM mode to make it compatible with standard AM radio sets. The AN/GRC-106 is now being used as the basic radio set with all of the newer SSB radio teletypewriter (RATT) configurations. The AN/GRC-106 and AN/GRC-106A are identical except that the AN/GRC-106 uses an RT-662/GRC, and the AN/GRC-106A uses an RT-834/GRC. The KY-99 is compatible with the AN/GRC-106 for secure operation.

Technical Characteristics

Frequency Range ................. 2.0 to 29.999 MHz (AN/GRC-106);
                                2.0 to 29.9999 (AN/GRC-106A)
Planning Range ................ Ground wave, 80 km (50 mi) (frequency depends on
                                 antenna and terrain); sky wave, 160 to 2,400 km
                                 (100 to 1,491 mi)
Number of Channels ............... RT-662: 28,000, spaced every 1 kHz;
                                 RT-834: 280,000, spaced every 100 Hz
Power Input ....................... 27 V DC
Power Source ...................... Vehicle power system; to operate from 115 V AC,
                                 Power Supply PP-4763A must be used to provide
                                 the required 27 V DC
Power Output ...................... 3K00R3E, 3K00J3E: 400 W PEP 1K10A1A,
                                 100HA1A: 200 W
Antenna .................. 4.57 m (15 ft) whip or doublet AN/GRA-50 Tuning,
                          Digital receiver also has a ± 600 Hz vernier
Squelch ....................... Noise
Security Device ................ TSEC/KY-65
Type of Service ................ 3K00J3E, 3K00R3E, 1K0013A1A, 1K10A1A
Weight ......................... 58.1 kg (128 lb)
AN/GRC-106 and AN/GRC-106A
Radio Sets

RT-662/GRC

RT-834/GRC

AM-3349/GRC-106
**AN/GRC-109 Radio Set**

**NSN:** 5820-00-892-0881

**Reference:** TM 11-5820-474-14

### General Information

The AN/GRC-109 is a compact, portable high frequency (HF) radio set used for continuous wave (CW) communications under a wide range of climatic conditions. Transmissions can be made using the built-in hand key, an external hand key, or an external, high-speed automatic keyer such as Coder-Burst Transmission Group AN/GRA-71. Two power supplies and a voltage regulator permit operation from a variety of power sources. Current tactical speech security equipment is not compatible with the AN/GRC-109; therefore, secure voice is not a mode of operation.

### Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>Transmit, 3 to 22 MHz; receive, 3 to 24 MHz</td>
</tr>
<tr>
<td>Planning Range</td>
<td>121 km (75mi)</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>24, crystal controlled</td>
</tr>
<tr>
<td>Power Input</td>
<td>75 to 260 V AC, 40 to 400 Hz or 6 V DC</td>
</tr>
<tr>
<td>Power Source</td>
<td>Any appropriate AC power source, generator</td>
</tr>
<tr>
<td></td>
<td>DC G-43/G, 6 V DC wet or dry battery</td>
</tr>
<tr>
<td>Power Output</td>
<td>10 to 15 W</td>
</tr>
<tr>
<td>Antenna</td>
<td>Inverted-L, length depending on the frequency</td>
</tr>
<tr>
<td>Tuning</td>
<td>Transmitter, crystal controlled; receiver,</td>
</tr>
<tr>
<td></td>
<td>crystal controlled or continuous</td>
</tr>
<tr>
<td>Squelch</td>
<td>None</td>
</tr>
<tr>
<td>Type of Service</td>
<td>Transmit, 100HA1A</td>
</tr>
<tr>
<td>Weight</td>
<td>25.2 kg (55.5 lb)</td>
</tr>
</tbody>
</table>

![POWER OPTIONS Diagram](image-url)
AN/GRC-109
Radio Set

PP-2684/GRC-109
POWER SUPPLY

T-784/GRC-109
RADIO TRANSMITTER

R-1004/GRC-109
RADIO RECEIVER
AN/GRC-193
High Frequency Radio Set

NSN: 5820-01-133-4195
Reference: 11-5820-924-12

General Information

The AN/GRC-193 is a medium/high-power vehicular configuration of the Improved High Frequency Radio (IHFR) system. It will satisfy those mission requirements which need an HF radio capability greater than the low power/IHFR system. The high-power vehicular/airborne adaptive configuration consists of a basic receiver-transmitter with required coupling device, amplifier, and other ancillary devices for CW voice or teletype operation; near vertical incidence sky wave (NVIS) antenna, whip antenna, data I/O device, and external power sources. The radio will have the capability of selectable power (100 W, 400 W). Normal operation will be below 400 W. The AN/GRC-193 uses the KY-99 for securing voice traffic and the TSEC/KG-84 for securing data traffic. The antenna may be remoted up to 61 m (200 ft) from the radio set, using the antenna siting bit which is part of the basic configuration.

Technical Characteristics

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>2 to 29.999 MHz, 100 Hz channel separation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Range</td>
<td>2,500 miles (4,023.3 km)</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>280,000</td>
</tr>
<tr>
<td>Power Input</td>
<td>115 V AC, 50 to 60 Hz, 24 V DC and 26.5 V DC, vehicular</td>
</tr>
<tr>
<td>Power Output</td>
<td>Selectable power, 100 W, 400 W</td>
</tr>
<tr>
<td>Antenna</td>
<td>AT-1011, 4.88 m (16 ft) whip, doublet, long-wire, AN/GRA-50, AS-2259 NVIS</td>
</tr>
<tr>
<td>Tuning</td>
<td>Automatic digitally controlled remote</td>
</tr>
<tr>
<td>Remote Operation</td>
<td>Up to 2 km (1.2 mi) using AN/GRA-39</td>
</tr>
</tbody>
</table>
AN/GRC-193
High Frequency Radio Set

AN/GRC-193A
AM-6879 AMPLIFIER-CONVERTER
RT-1209 RECEIVER-TRANSMITTER
CU-2064 COUPLER, ANTENNA

AN/GRC-193B
AM-6879 AMPLIFIER-CONVERTER
H-189 HANDSET
MT-( ) GRC-193 MOUNT, ELECTRICAL EQUIPMENT
AN/GRC-213
High Frequency Radio Set

NSN: 5820-01-128-3935
Reference: TM-11-5820-923-12

General Information

The AN/GRC-213 is a low-power manpack/vehicular configuration of the IHFR system. It provides a much needed, reliable, full HF coverage capability of 2 to 29,9999 MHz to tactical commanders. It has a requirement to pass secure, command and control information over medium to long distances and over varying degrees of terrain features which would normally preclude the use of very high frequency (VHF)/FM combat net radios (CNR). Use of broadband or NVIS antennas enhances the communication capability of IHFR. The AN/GRC-213 consists of AN/PRC-104A (complete), audio amplifier and power conditioner, antenna switch (for use with long-wire antennas), and vehicular mounting tray to allow its installation in Army combat vehicles (tracked and wheeled). It gives the commander a complete low-power communications system.

Technical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>2 to 29.9999 MHz</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>280,000 spaced at 100 Hz</td>
</tr>
<tr>
<td>Power Input</td>
<td>Battery or 20 to 32 V DC power supply</td>
</tr>
<tr>
<td>Power Output</td>
<td>20W</td>
</tr>
<tr>
<td>Antenna</td>
<td>Whip AN/GRA-50, AS-2259</td>
</tr>
<tr>
<td>Tuning</td>
<td>Automatic antenna tuning</td>
</tr>
<tr>
<td>Modes of Operation</td>
<td>Voice, data, CW, LSB, USB</td>
</tr>
<tr>
<td>Weight</td>
<td>13.6 kg (30lb)</td>
</tr>
<tr>
<td>Secure Device</td>
<td>KY-99, future COMSEC</td>
</tr>
</tbody>
</table>
AN/GRC-213
High Frequency Radio Set

FM 24-24
AN/PRC-41 and AN/PRC-41A
Radio Sets

NSN: 5820-00-889-3997 (AN/PRC-41)
      5820-00-104-0351 (AN/PRC-41A)
Reference: TM 11-5820-510-12 (AN/PRC-41)
            TM 11-5820-510-12-1 (AN/PRC-41A)

General Information

The AN/PRC-41 is a lightweight, portable VHF/ultra high frequency (UHF)-AM
receiver-transmitter which permits manpack, fixed-station, or vehicular operation. The
AN/PRC-41 and AN/PRC-41A are identical except that the AN/PRC-41A can provide secure
voice (X-mode) operation when used in conjunction with Speech Security Equipment
TSEC/KY-38. The X-mode operation is possible due to circuitry modifications made on the
AN/PRC-41A model. The Special Cable CX-10831 is required to connect the TSEC/KY-38 to
the AN/PRC-41A. The AN/PRC-41 uses RT-695, and the AN/PRC-41A uses RT-695A.

Technical Characteristics

Frequency Range ................................................... 225.0 to 399.9 MHz
Planning Range ...................................................... LOS
Number of Channels ............................................... 1,750, spaced every 100 kHz
Power Input .......................................................... 24 V DC
Power Source ....................................................... Portable BA-451/U, vehicle power system,
aircraft power system, any AC power source
          (PP-3700/PRC-41 is required to convert the
          AC voltage to 24 V DC) power
Power Output ........................................................... 3W
Antenna .............................................................. AS-1404 or AS-1405
Tuning ................................................................. Detent, crystal controlled
Squelch ............................................................... Carrier
Type of Service ...................................................... AN/PRC-41, 6K00A3E AN/PRC-41A, 80K0A3E
          (secure or nonsecure)
Weight ............................................................... 20 kg (44.6 lb)
Security Device .................................................... TSEC/KY-38
AN/PRC-41 and AN/PRC-41A
Radio Sets
AN/PRC-47
Radio Set

NSN: 5820-00-861-3539
Reference: TM 11-5820-509-12

General Information

The AN/PRC-47 is an HF-SSB radio set which provides CW and upper sideband (USB) voice communications. It also provides FSK communication when operated with an FSK converter. The AN/PRC-47 may be used in portable, vehicular, or fixed-station applications. Current tactical speech security equipment is not compatible with the AN/PRC-47; therefore, secure voice is not a mode of operation.

Technical Characteristics

- Frequency Range: 2.0 to 11.999 MHz
- Planning Range: Refer to short and intermediate distance ground wave and sky wave propagation charts (FM 11-486-6)
- Number of Channels: 10,000, spaced every 1 kHz
- Power Input: 24 V DC, 26.5 V DC or 115 V AC, 400 Hz
- Power Source: BB-451/U, vehicle power system, any appropriate AC power source
- Power Output: High, 100 W PEP; low, 20 W PEP
- Antenna: AS-1320/PRC-47, whip; AS-1321/PRC-47, long-wire vehicular whip
- Tuning: Digital
- Type of Service: 3K00J3E, 1K00A1A
- Weight: 86.3 kg (190 lb)
AN/PRC-47
Radio Set
The AN/PRC-74 is a low-power, transistorized, SSB radio set used for voice and CW communications. It is designed primarily as a manpack set in areas where direct line of sight (LOS) communications are not possible. Except for the difference in the frequency range of the AN/PRC-74B and AN/PRC-74C, all models are essentially the same. Current tactical speech security equipment is not compatible with the AN/PRC-74; therefore, secure voice is not a mode of operation. Coder-Burst Transmission Group AN/GRA-71 can be used with all lettered models.

Technical Characteristics

Frequency Range .................................. 2.0 to 11.999 MHz (AN/PRC-74 and AN/PRC-74A); 2.0 to 17.999 MHz (AN/PRC-74B and AN/PRC-74C)
Planning Range ................................. 40 km (25 mi) ground wave; refer to sky wave propagation chart to determine medium range, FM 11-486-6
Number of Channels ............................. 10,000 spaced every 1 kHz (AN/PRC-74 and AN/PRC-74A); 16,000 spaced every 1 kHz (AN/PRC-74B and AN/PRC-74C)
Power Input ...................................... 10.5 to 17 V DC, 12 to 31 V DC or 110/220 V AC
Power Source .................................... Battery (BA-30, 70 each or BB-418/U, 10 each); vehicle power system (requires PP-4514/PRC-74); any appropriate AC power source (requires use of PP-4514/PRC-74)
Power Output ..................................... 15 W PEP
Antenna ............................................ AS-1887/PRC-74, slanted wire and dipole
Tuning ............................................. Detent
Type of service .................................. -3 K00J3E, 100HA1A
Weight ............................................ 18.8 kg (41.5 lb) with dry Battery BA-4386/U, two each; 13.4 kg (29.5 lb) with wet Battery BB-418/U, 10 each; 22.7 kg (50 lb) with PP-4514/PRC-74
AN/PRC-74
Radio Set
AN/PRC-104A
High Frequency Radio Set

NSN: 5820-01-141-7953
Reference: TM 11-5820-919-12

General Information

The AN/PRC-104A is a low-power vehicular configuration of the IHFR system. It provides a much needed, reliable, full HF coverage capability of 2 to 29.9999 MHz to tactical commanders. It has a requirement to pass secure, command and control information over medium to long distances and over varying degrees of terrain features which would normally preclude the use of VHF/FM CNR. Use of broadband or NVIS antennas enhance the communication capability of IHFR. The AN/PRC-104A consists of a receiver-transmitter with up to 20 watts of power, the associated accessories (microphone, antenna, battery, backpack), and the appropriate secure device. The AN/PRC-104A has a frequency range of 2 to 29.9999 MHz in 100 Hz steps yielding 280,000 channels and operates in the USB, lower sideband (LSB), and CW modes. It provides the tactical commander with a complete low-power communications system.

Technical Characteristics

Frequency Range .......................... 2 to 29.999 MHz
Number of Channels .......................... 280,000 spaced at 100 Hz
Power Input ................................ Battery or 20 to 32 V DC power supply
Power Output ................................ 20 W
Antenna ..................................... AN/GRA-50, AS-2259 NVIS
Tuning ....................................... Automatic antenna tuning
Mode of Operation .......................... Voice, Data, CW, LSB, USB
Weight ....................................... 6.36 kg (14 lb)
Secure Device ................................ KY-99
AN/PRC-104A
High Frequency Radio Set
AN/PRC-112
Multi-Transmission Transceiver

* This radio is an over-the-counter commercial purchase obtained by the US Army.

NSN: 5820-01-279-5450

Reference: TM 11-5820-1037-13NP

General Information

The AN/PRC-112 is a technologically advanced, multi-transmission transceiver weighing only 28 ounces and can fit in the palm of your hand. The radio acts as a transponder, supplying ranging and personnel identification information. It also performs beacon and air-to-ground voice functions. Combined with an interrogator equipped avionics system, a user location can be accurately determined in range and bearing, out to 100 nm.

Technical Characteristics

Frequency Range ........................ 121.5 MHz
225 MHz to 299.975 MHz

Available Channels .......................... 3000 in 25 kHz steps

Frequency Stability ........................ +/-5 ppm

Modulation Modes ........................ AM voice AM swept-tone beacon
Transpond mode: BPSK/OOK

Operating Modes ............................ Voice: any channel
Swept-tone beacon: 121.5 MHz and 243 MHz
DME transpond: any UHF channel

Weight ........................................ 28 ounces or 0.79 kg with battery
AN/PRC-112
Multi-Transmission Transceiver
AN/PRC-112A(C)
Multi-Transmission Radio with Embedded Communications Security

* This radio is an over-the-counter commercial purchase obtained by the US Army.

NSN: 5820-01-280-2117

Reference: Not available

General Information

The AN/PRC-112A(C) provides full voice encryption using Motorola’s field proven INDICTOR module. Designed for covert and hostile environment operations, the AN/PRC-112A(C) provides interoperability with key COMSEC devices including the Sunburst II Processor (AN/CSZ-1A) and VINSON (KY-57). Slightly larger than the standard AN/PRC-112, the AN/PRC-112A(C) will slip easily into uniform pockets, rucksacks and other transport compartments. The AN/PRC-112A(C) is an NSA endorsed, Type I secure voice, ground-to-air communications radio. A mode control switch selects between two key variables for secure voice, a zeroize-key function and a clear “plain text” voice mode. This radio will automatically receive and process clear “plain text” voice transmissions even when configured in a secure voice mode. The built-in transponder beacon supplies ranging and personnel identification information via the airborne AN/ARS-6 interrogator system.

Technical Characteristics

Frequency Range .................................................. 121.5 MHz
.................................................. 225 to 299,975 MHZ
Available Frequencies ........................................... 3000 in 25 kHz steps
Frequency Stability .............................................. +/−5 ppm
Modulation Modes .............................................. Secure--AM, 16 kb/s CVSD AM voice
AM swept-tone beacon
Transponder-BPSK/OOK
Operation Modes .............................................. Secure voice--2 selectable key variables
Key variable zeroize switch Voice: clear
Sweep-tone beacon: 121.5 MHz and 243 MHz
DME transpond: any UHF channel
Weight ................................................... 36.5 ounces or 1.0 kg (with battery)
AN/PRC-112A(C)
Multi-Transmission Radio with Embedded Communications Security
The AN/TRC-133A is a transportable, tactical HF, nonsecure SSB radio terminal set mounted in an S-280A type shelter. The shelter contains five radio positions which can be connected to separate doublet antennas provided as part of the radio terminal. Positions 1 and 2 can be operated with separated 15-foot whip antennas, which are used when the radio terminal set is needed for mobile operation and powered from the 28-volt DC vehicular electrical system. In addition, Radio Frequency Amplifier AM-3979/FRC-93 is provided to allow any one of the five positions to transmit on increased output power to extend the operating range of the position so selected. Current tactical speech security equipment is not compatible with the AN/TRC-133A; therefore, secure voice is not a mode of operation.

**Technical Characteristics**

- **Type of Service**: 3K00J3E (selectable USB or LSB), 100HA1A, 1K10A1A
- **Frequency Range**: 3.4 to 5.0 MHz and 6.5 to 30 MHz
- **Planning Range**: Ground wave, 80 km (50 mi); sky wave, see intermediate sky wave propagation chart
- **Number of Channels**: 130, crystal controlled
- **Power Input**: 110 V AC, 60 V, single phase and 28 V DC (max) for mobile mode
- **Power Source**: 10 kW, Power Supply PU-619
- **Power Output**: RT-718, 100 W PEP; RT-718 with AM-3979, 1,000 W PEP
- **Antenna**: Quarter-wave whip or doublet antenna
- **Tuning**: Continuous in 200 kHz bands using CK-31
- **Weight**: 2,272.2 kg (5,000 lb)
- **Limitation**: Nonsecure operation
AN/TRC-133A
Radio Terminal Set
AN/TRQ-35(V)
Tactical Frequency Sounding System

NSN: Not available
Reference: Not available

General Information

The AN/TRQ-35(V) is an ionospheric sounding system that produces easy to understand ionospheric propagation statistics on a real-time basis. The system is used to minimize outages related to unpredictable changes of ionospheric characteristics and conditions. It is intended to improve frequency management and assignments of frequencies for HF communications systems, result in more effective and efficient use of the HF spectrum, and produce more reliable HF communications with improved grade of service. The AN/TRQ-35(V) system consists of the following stand-alone components.

Major Components

1 Receiver R-2081/TRQ-35(V)
1 Transmitter T-1373/TRQ-35(V)
1 Spectrum Monitor R-2093/TRQ-35(V)

Technical Characteristics

Frequency Range ......................................................... 2 to 30 MHz
or 2 to 16 MHz coverage after selection
Number of Channels ................................................... 9,333
Channel Spacing ....................................................... 3.0 kHz
Power Input ............................................................. 115/230 V AC ± 10%, 47 to 440 Hz
Transmitted Power ..................................................... 0.2 W and 2 W from diplexer,
± 3 dB selectable by front panel switch;
10 W and 100 W nondiplexed output power, ± 3 dB
Weight ................................................................. Transmitter 113.4 kg (250 lb) in case,
Receiver 79.4 kg (175 lb) in case,
Spectrum Monitor 79.4 kg (175 lb) in case
AN/TRQ-35(V)
Tactical Frequency Sounding System

R-2081/TRQ-35(V)

R-2093/TRQ-35(V)

T-1373/TRQ-35(V)
**FM 24-24**

**AN/VRC-24A and AN/TRC-68A Radio Sets**

**NSN:**
- 5820-00-223-7413 (AN/VRC-24A)
- 5820-00-892-3723 (AN/TRC-68A)

**Reference:** TM 11-5820-222-10

**General Information**

The AN/VRC-24A and the AN/TRC-68A are VHF/UHF-AM radio sets used for communications with aircraft in close support of ground operations. The AN/VRC-24A is designed for vehicular installation, and the AN/TRC-68A is designed for fixed installation. These radio sets will provide secure voice (X-mode) service when used in conjunction with Speech Security Equipment TSEC/KY-99.

**Technical Characteristics**

- **Frequency Range:** 225.0 to 399.9 MHz
- **Planning Range:** Approximately 50 km (31 mi) with aircraft at 305 m (1,000 ft)
- **Number of Channels:** 1,750 with a channel every 100 kHz
- **Power Input:** 24 V DC or 115/230 V AC, 50 to 60 Hz
- **Power Source:** Vehicle power system, any appropriate AC power source
- **Power Output:** 16 W
- **Antenna:** AN/VRC-24A, AT-803/VR (center-fed, broadband vertical dipole) AN/TRC-68A, AT-197/GR (discone with two radiator assemblies)
- **Tuning:** Detent
- **Squelch:** Noise or carrier
- **Type of Service:** 6K00A3E or 30K0A3E, X-mode operation
- **Weight:** AN/VRC-24A, 28.1 kg (62 lb), AN/TRC-68A, 70.4 kg (155 lb)
AN/VRC-24A and AN/TRC-68A
Radio Sets
Section III. Auxiliary Radio Equipment

AB-903/G
Mast

NSN 5985-00-933-2197
Reference: TM 11-5985-263-15

General Information

The AB-903/G is a cable-driven, lightweight, telescopic mast assembly. A crank handle attached to the winch assembly is used to raise or lower the mast. The mast raises antennas, such as Antenna AS-1729/VRC used for the AN/VRC-122 radio series, 30 feet above ground level. The mast may be setup on the ground or mounted on vehicles.

Technical Characteristics

Height Extended .................................................. 8.9 m (29 ft, 3 in)
Number of Tubular Segments .................................. 6
Weight .......................................................... 18.16 kg (40lb)
AB-903/G
Mast

COUNTERPOISE
ADAPTER ASSEMBLY

UPPER
GUY
RING

LOWER
GUY
RING

WINCH
ASSEMBLY

BASE PLATE

BASE CAP
(UNDER MAST)
General Information

The AN/GRA-6 provides local and remote control facilities for various push-to-talk radio sets. The control group has the means for controlling and operating a radio set using one or two transceiver amplifiers of the push-to-talk type from a position approximately 3.2 km (2 mi) away. The control group provides local control of the radio set through a continuous DC circuit. It provides two-way telephone communication and ringing between the remote and local control operators.

Technical Characteristics

Frequency Range .................................................. 300 to 3500 HZ
Planning Range .................................................... 3.2 km (2 mi), using WD-1/TT
Power Input ....................................................... 6 V DC and 45V DC
Power Source ...................................................... Battery BA-414/U (one each) and BA-30 (four each)
Type of Service .................................................... 30K0F3E
Weight .............................................................. 7.9 kg (17.5 lb)
AN/GRA-6
Receiver-Transmitter Control Group

REMOTE OPERATION

C-433

WD-1

AN/GRA-6

AUDIO CONNECTOR

C-434

LINE BINDING POSTS

LINE BINDING POSTS

RT-524

MIKE CONNECTOR

HANDSET

CX-7474/U
AN/GRA-39, AN/GRA-39A, and AN/GRA-39B
Radio Set Control Groups

NSN: 5820-00-889-3860 (AN/GRA-39)
      5820-00-082-3998 (AN/GRA-39A)
      5820-00-949-9909 (AN/GRA-39B)

Reference: TM 11-5820-477-12

General Information

The AN/GRA-39 is a transistorized, battery-operated remote control system. It enables an operator to transmit and receive voice communication through a radio set from a distance up to 3.2 km (2 mi). A push-to-talk circuit permits the radio in the system to be operated by a local battery switchboard and the telephones connected to a local battery switchboard which permits NRI. The difference in models is the displayed call lamp, located on the front panel; the AN/GRA-39 model does not have this feature.

Technical Characteristics

Frequency Range .......................................................... 300 to 3500 Hz
Planning Range .......................................................... 3.2 km (2 mi) using WD-1/TT
Power Input ............................................................... 6.6 to 9.0 V DC
Power Source ............................................................. Battery BA-30, six each for C-2328 and C-2329
Type of Service .......................................................... 30K0F3E
Weight ................................................................. 9.6 kg (21.25 lb)
AN/GRA-39, AN/GRA-39A, and AN/GRA-39B
Radio Set Control Groups

BINDING CALL LAMP (NOT PROVIDED IN PLAIN MODEL)

C-2329

BINDING CALL LAMP (NOT PROVIDED IN PLAIN MODEL)

C-2328

REMOTE OPERATION

C-2329

C-2328
FM 24-24

AN/GRA-50

Antenna Group

NSN: 5985-00-892-0758

Reference: TM 11-5820-467-15

General Information

The AN/GRA-50 is a doublet antenna assembly designed to increase the communications distance of HF radio sets when in fixed or semifixed installation. The AN/GRA-50 can be used with any HF radio set that has the proper frequency range and a transmitter output power of less than 500 W and an output impedance of approximately 50 ohms.

Technical Characteristics

Frequency Range .......................................................... 1.5 to 30 MHz
Antenna Type .......................................................... Half-wave doublet
Weight ................................................................. 5.3 kg (11.75 lb)
AN/GRA-71
Coder-Burst Transmission Group

NSN: 5820-00-056-6856

Reference: TM 11-5835-224-12

General Information

The AN/GRA-71 is composed of an electromechanical Morse-code generator that enables an operator to record messages (in Morse-code characters) on magnetic recording tape. It has a keyer device to convert the tape-recorded Morse-code characters into equivalent electrical impulses for keying an associated transmitter and a keyer adapter device that contains the electronic circuitry for supplying power to the keyer unit and adapting its output to the transmitter.

Technical Characteristics

Power Input ........................................ Spring motor drive Keyer KY-468
and 6.3 V AC from transmitter to MX-4498
Power Output ................................. Electrical signals for keying transmitter for 300 wpm
Weight ............................................. 4.3 kg (9.5 lb)
General Information

The AN/GSA-7 is a small, lightweight, electronic switching device used to integrate FM radio equipment with local, push-to-talk, telephone circuits NRI. It permits the AN/GSA-7 operator to key the transmitter, and it automatically converts a 20-Hz telephone ringing signal to a 1600-Hz radio ringing signal and vice versa.

Technical Characteristics

- Frequency Range: 300 to 3500Hz
- Planning Range: 16 km (10 mi), using WD-1/TT
- Power Input: 22 to 30 V DC or 115/230 V AC, 50 to 400 Hz
- Power Source: Vehicle power or AC power source
- Type of Service: 30K0F3E
- Weight: 12.5 kg (27.5 lb)
AN/GSA-7
Radio Set Control
General Information

The AT-784/PRC is a direction finder device which is used in conjunction with FM Radio Sets AN/PRC-77, AN/VRC-12 series, or their equivalents. It enables the operator to determine the direction of a transmitted radio signal. The AT-784/PRC is used for reception only.

Technical Characteristics

Frequency Range .......................................................... 30 to 76 MHz covered in five bands
Planning Range ........................................................... Depends on radio set used
Weight .............................................................................. 1.1 kg (2.5 lb)
AT-784/PRC
Loop Antenna

AT-1082/PRC ANTENNA

CW-922/GRC CAP, ELECTRICAL
KNOBS AND SCREWS

RG-558/U
UG-88E/U

CG-3344/PRC CABLE ASSEMBLY RADIO FREQUENCY (5FT)

UG-89C/U
RG-55/U

UG-88E/U

CG-3344/PRC CABLE ASSEMBLY RADIO FREQUENCY (5FT)

CW-445/PRC BAG, COTTON DUCK
AT-984A/G
Long-Wire Antenna

NSN: 5820-00-926-0201

Reference: TM 11-5820-398-12

General Information

The AT-984A/G is a multiple-wavelength long-wire antenna. It is used to extend the normal transmission and reception range of radio sets equipped with Receiver-Transmitters RT-505/PRC-25 and RT-841/PRC-77.

Technical Characteristics

Frequency Range: 30 to 76 MHz
Planning Range: 19 km (12 mi), long-wire to whip antenna; 28 km (17 mi), long-wire to long-wire antenna
Weight: 4.5 kg (10 lb)
C-6709/G
Control, Radio Set

NSN: 5820-00-930-3597

Reference: TM 11-5820-615-12

General Information

The C-6709/G is a single channel, solid-state NRI. The operator at the C-6709/G receives requests either from the radio link or the switchboard and establishes the interconnection. The C-6709/G can be used with automatic switchboards such as the AN/TTC-41(V), enabling a DTMF telephone subscriber to key and unkey the radio using the key sender on the telephone.

Technical Characteristics

Frequency Range ............................................. 300 to 7000 Hz
Planning Range ............................................... 4 km (2.5 mi)
Power Input ................................................. 22 to 30V DC
Power Source ................................................ Vehicle power
Type of Service ............................................. 30K0F3E
KY-90
Secure Digital Net Radio Interface Unit

NSN: 5895-01-166-3931
Reference: TB 11-5820-890-10-7

General Information

The secure digital net radio interface unit (SDNRIU) will permit calls between single-channel radios and telephone subscribers using either existing or programmed equipment. The SDNRIU is a replacement for the AN/GSA-7 presently used as an NRI unit.

Technical Characteristics

Components: Half-duplex to full-duplex converters
signaling equipment with COMSEC

Weight: 40 lb (18 kg)
Mounting: Shelter and Vehicle

KY-90
Secure Digital Net Radio Interface Unit
**OE-254()/GRC**

**Antenna Group**

NSN: 5985-01-063-1574

Reference: TM 11-5985-357-13

### General Information

The OE-254 is a general purpose, stationary, broadband, omnidirectional antenna used to extend the range of tactical FM radio sets. Under normal field conditions, the antenna will be mast mounted. Once installed, the OE-254 does not have to be taken down for adjustment when a new frequency band is assigned to the radio net.

### Technical Characteristics

- **Frequency Range**: 30 to 88 MHz
- **Planning Range**: 57.9 km (36 mi), average terrain; 48.3 km (30 mi), difficult terrain
- **RF Power Capability**: 35 W nominal
- **Antenna Erection Time (one person)**: 15 minutes
- **Height Erected**: 12.8 m (42 ft)
- **Input Impedance to Radio**: 50 ohms
- **Weight**: 20.4 kg (45 lb)
OE-254( )/GRC
Antenna Group

41 FT 9 IN (12.7 M)

33 FT 8 IN (10.3 M)

25 FT MAX (7.5 M)

- MAST SECT. A8-24
- MAST SECT. MS117A
- MAST SECT. MS116A
- ANTENNA ASSY AS-3166/GRC
- MAST ASSEMBLY AB-1244/ GRC
- CABLE ASSY, RF CG-1889A/U 80 FT (24 M)
- CONNECTOR ADAPTER UG-349B/U
OE-303
Half-Rhombic Very High Frequency Antenna

NSN: 5985-01-152-5845

Reference: TM 11-5985-370-12

General Information

The OE-303 is a high gain, lightweight, directional antenna that can operate over the frequency range of 30 to 88 MHz without having to be physically tuned by the operator. The antenna and all the ancillary equipment (guys, stakes, tools, mast sections, compass) are contained in two carrying bags for manpack or vehicular transportation. The antenna is oriented in the direction of desired transmission by using a compass and the appropriate map sheet as required. The Mast Assembly AB-1244 is the primary antenna support structure used with the Half-Rhombic VHF Antenna OE-303. Connections to the antenna and radio sets are made with connectors and cables provided with the antenna.

Technical Characteristics

Frequency Range .................................................. 30 to 88 MHz
Antenna Erection Time (two people) ...................... 20 minutes
Height Erected ................................................... 9.1 m (30ft)
Weight ............................................................ 20.4 kg (45 lb)
OE-303
Half-Rhombic Very High Frequency Antenna

DIRECTION OF DESIRED TRANSCEIVER STATION

MATCHING TRANSFORMER

HIGH IMP CONN
CONN SHIELD TO
GND LUG

CONN TO 50 Ω FEED LINE

CABLE SHIELD IS GND RETURN

WD-1 ANTENNA WIRE

MATCHING TRANSFORMER

HIGH IMP CONN
GND LUG
COAX CABLE Conn

ANTENNA ERECTED

NOTE: MATCHING TRANSFORMER CASE ACTS AS INSULATOR.
RC-292
Antenna Equipment

NSN: 5985-00-497-8554
Reference: TM 11-5820-348-15

General Information

The RC-292 is a general purpose, stationary, ground-plane antenna used to increase the transmission/reception range of tactical FM radio sets. The radiating and ground plane elements must be adjusted to the proper length for a particular operating frequency.

Technical Characteristics

Frequency Range ......................................................... 20 to 76 MHz
Planning Range ........................................... Approximately twice the planning range of a radio set using a quarter-wave whip antenna
Height Erected ................................................... 11.28 to 12.56 m (37 to 41.2 ft)
Weight .......................................................... Approximately 19.5 kg (43 lb)
**RC-292**

**Antenna Equipment**

![Antenna Diagram](image)

<table>
<thead>
<tr>
<th>Operating Frequency (MHz)</th>
<th>Antenna Sections Required</th>
<th>Type of Antenna Sections Used</th>
<th>Ground Plane Sections Required</th>
<th>Type of Ground Plane Sections</th>
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<tbody>
<tr>
<td>20-27.9</td>
<td>6</td>
<td>AB-21/GR 3/1/1/1</td>
<td>18</td>
<td>AB-21/GR 3/1/1/1</td>
</tr>
<tr>
<td>27.9-38.9</td>
<td>4</td>
<td>AB-22/GR 1/1/1/1</td>
<td>15</td>
<td>AB-22/GR 1/1/1/1</td>
</tr>
<tr>
<td>38.9-54.4</td>
<td>3</td>
<td>AB-23/GR 0/1/1/1</td>
<td>12</td>
<td>AB-23/GR 1/1/1/1</td>
</tr>
<tr>
<td>54.4-75.95</td>
<td>2</td>
<td>AB-24/GR 0/1/0/1</td>
<td>9</td>
<td>AB-24/GR 0/1/1/1</td>
</tr>
</tbody>
</table>
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</thead>
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<td>AN/GRC-143 Radio Set</td>
<td>5-4</td>
</tr>
<tr>
<td>AN/GRC-144 Radio Set</td>
<td>5-6</td>
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<tr>
<td>AN/GRC-163 Radio Terminal Set</td>
<td>5-8</td>
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<tr>
<td>AN/GRC-222 Radio Set</td>
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</table>
AN/GRC-103(V)
Radio Set

NSN:
5820-00-935-4931 (AN/GRC-103(V)1)
5820-00-116-6029 (AN/GRC-103(V)2)
5820-00-116-6030 (AN/GRC-103(V)3)
5820-01-081-8866 (AN/GRC-103(V)4)

Reference: TM 11-5820-540-12

General Information

The AN/GRC-103(V) is a compact, transportable UHF-FM radio set which provides facilities for multichannel transmission and reception of PCM signals. It will accommodate up to 24 telephone channels when used with appropriate PCM multiplex equipment. The multichannel radio system can be secured by using electronic key generator TSEC/KG-27. In various configurations, the AN/GRC-103(V) can be employed as radio terminals or repeater stations. The difference between the models is the frequency range of bands I, II, III, and IV.

Technical Characteristics

Frequency Range
- Band I, 220 to 404.5 MHz
- Band II, 394.5 to 705 MHz
- Band III, 695 to 1000 MHz
- Band IV, 1350 to 1850 MHz

Frequency Separation:
- Transmit to Receive: 16.5 MHz
- Planning Range: 80 km (50mi)

Number of Channels
- Band I, 369
- Band II, 621
- Band III, 610
- Band IV, 1,000

Power Input: 115 V AC, 47 to 420 Hz
Power Output: 15 to 25 W

Antenna: Combination of Mast AB-952/GRC-103 and either the AS-1852/GRC-103, Band I; AS-1853/GRC-103, Band II; AS-1854/GRC-103, Band III; or AS-3047(/)/GRC-103, Band IV

Tuning: Continuous
Type of Service: 500KF9W (designed for use with multichannel PCM equipment only)

Weight: 212.5 kg (468 lb)
AN/GRC-103(V)
Radio Set
FM 24-24

AN/GRC-143
Radio Set

NSN: 5820-00-926-7355
Reference: TM 11-5820-595-12

General Information

The AN/GRC-143 is a general purpose, FM tactical radio set which provides duplex operations. The radio set can be used for diffraction and tropospheric scatter modes of propagation at ranges to 161 km (100 mi), when used with a suitable antenna. The AN/GRC-143 is compatible with PCM multiplex equipment for 12 or 24 channel full-duplex operation.

Technical Characteristics

Frequency Range ...................... 4400 to 5000 MHz
Power Output ................................................................. 1 kw
Power Requirement .......................... 115/230 V AC, 47 to 63 Hz, 5.37 kW
Planning Range .............................. 161 km (100mi)
Antenna .............................................. AN/TRA-37 (not included)
Type of Service ............................... 3200KF9W (PCM equipment only)
Weight ...................................................... 326.4 kg (719 lb)
AN/GRC-143
Radio Set

TRANSMITTER, RADIO
T-961/GRC-143

AMPLIFIER, RADIO FREQUENCY
AM-6090/GRC-143

RECEIVER, RADIO
R-1287/GRC-143
The AN/GRC-144 is a general purpose FM tactical radio set which provides duplex operations. The radio set is primarily intended for use in a multichannel LOS communications system where difficult terrain or other considerations prevent the use of cable. The radio set is compatible with standard PCM multiplex equipment. The AN/GRC-144 can be used as a radio terminal or as a radio repeater.

**Technical Characteristics**

- Frequency Range: 4400 to 5000 MHz
- Power Output: 25 W
- Power Requirement: 120 V AC, 50 to 60Hz
- Planning Range: 80km (50mi)
- Type of service: 3000KF9W (PCM equipment only)
- Weight: 136kg (299 lb)
AN/GRC-144
Radio Set
**AN/GRC-163**

*Radio Terminal Set*

**NSN:** 5820-00-832-5617

**Reference:** TM 11-5820-713-15

**General Information**

The AN/GRC-163 is a compact, transportable, multichannel VHF-FM radio terminal set used in point-to-point radio circuits. It can provide four voice and two teletypewriter channels plus an orderwire circuit. Four telephone ringers are built into the AN/TCC-70. Although the RT-524 can provide a secure single voice channel, current tactical bulk encryption devices are not compatible with the AN/TCC-70; therefore, this system cannot be operated in a secure mode.

**Technical Characteristics**

- **Frequency Range:** 30.00 to 75.95 MHz
- **Frequency Separation:** Transmit to receive vehicular whips, 10 MHz; fixed, with antennas 30.50 m (100 ft) apart, 3 MHz
- **Planning Range:** 8 to 41 km (5 to 25.5 mi)
- **Number of Channels:** 920
- **Power Input:** 115 V AC, 50, 60, or 400 Hz or 230 V AC, 50 to 60 Hz
- **Power Source:** 15kW Generator Set, SF-15-MD
- **Power Output:** Low, 3 W; High, 35 W
- **Antenna:** Log periodic AS-2169/G (two each) or 3.05 m (10 ft) Whip AS-1729 (two each)
- **Tuning:** Detent
- **Squelch:** 150 Hz tone and noise
- **Type of Service:** 40 K0F9W (multichannel system)
- **Weight:** 105.1 kg (231 lb)
AN/GRC-163
Radio Terminal Set
General Information

The AN/GRC-222 is designed as a short range wideband digital radio. The transmitter and receiver are tunable in 100 kHz steps over the 4.4 to 5.0 GHz frequency range. The modular design of the radio set reduces the amount of time necessary to troubleshoot and return the radio set to full service. If a problem occurs in a module, the procedure is to replace that module with an identical spare module. The faulty module is then returned to the factory for repair. The power supply module provides the DC power required to operate the radio set.

Technical Characteristics

Frequency Range .......................................................... 4.4 to 5.0 GHz
Power Input ............................................................... 115/230 V AC 60 Hz
Power Output .............................................................. +15 V, +5 V, -5.2 V, and -20 V DC
Planning Range ............................................................ 40 km (25 mi) LOS mode
8 km (5 mi) SRWBR mode
Antenna ................................................................. AS-1425/GRC and AB-1309 (V)/TRC
Weight ................................................................. 44.9 kg (99 lbs)
AN/GRC-222
Radio Set
Chapter 6 Shelter Configurations

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- AN/PSC-7 Lightweight Satellite Transceiver
- AN/PSC-5 Enhanced Manpack Ultra High Frequency Terminal
- TSQ-190(V) Special Purpose Integrated Remote Intelligence Terminal (SPIRIT II)
- MILSTAR SCAMP
- AN/PSN-11 Precision Lightweight Global Positioning System Receiver

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Section I. Switch

AN/TTC-39A(V)1
Automatic Telephone Central Office

NSN: 5805-01-241-9710
Reference: TM 11-5805-747-12-1

General Information

The AN/TTC-39A(V) is modular/transportable switching communications and nodal control equipment that provides secure automatic switching and technical control for both digital and analog communications. It is a hybrid circuit switch, with a 744-line capacity (96 analog and 648 digital). The facility provides technical control functions including channel reassignment and multiplexing, line testing, engineering orderwire, atomic timing standard, and analysis or trouble reports, alarms, and system data. It signals and supervises analog and digital trunks and lines. This includes 20 Hz/1600 Hz ringdown, DC closure, dial pulse, DTMF, and 6-wire E&M using tone burst, confirmation, non-confirmation, common channel, and digital in-band-trunk signaling (DIBITS).

Major Components

1 Switching Module Assembly S-280B/G (Modified)
1 Master Power Distribution Unit ON-224/T
2 PU/406 Electric Power Units (30 kW) AN/MJQ-10A
1 Storage Shelter S-640
1 Maintenance Shelter S-639

Technical Characteristics

Total External Lines .......................................................... 744
Digital Matrix ..................................................................... 648
Analog Matrix .................................................................... 96
Maximum local Loops/Trunks (within this total) ..................... 240
Digital Local Loops ............................................................ 144
Analog local Loops/Trunks .................................................. 96
Maximum Analog Loops via Digital Transmission Group (DTGs) .... 60
Switch Rate ........................................................................ 16/32 kb/s
Total DTGs ......................................................................... 30
### Technical Characteristics (cont.)

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<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
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<td>Maximum Channels Per DTG</td>
<td>144</td>
</tr>
<tr>
<td>In-Band Digital Trunks (Loops)</td>
<td>200</td>
</tr>
<tr>
<td>Call Rate</td>
<td>7,500 (calls per busy hour)</td>
</tr>
<tr>
<td>Analog Bandwidth</td>
<td>108 kHz</td>
</tr>
<tr>
<td>Numbering Plan</td>
<td>TRI-TAC NATO, 13 digits military tactical, 7 digits</td>
</tr>
<tr>
<td></td>
<td>Automatic Voice Network (AUTOVON), 10 digits</td>
</tr>
<tr>
<td>Power</td>
<td>120/208 V AC 50, 60, 400 Hz, three-phase</td>
</tr>
<tr>
<td>Vehicle Requirements</td>
<td>One 5-ton truck (TTC-39A)</td>
</tr>
<tr>
<td></td>
<td>two 2 1/2-ton trucks (S-640) (S-639)</td>
</tr>
</tbody>
</table>
AN/TTC-39A(V)1
Automatic Telephone Central Office
General Information

The AN/TTC-39D is a modular and transportable nodal control mobile subscriber access circuit switch designed to provide secure and nonsecure automatic switching and technical control for analog, digital, and mobile subscriber traffic for the US Army. The AN/TTC-39D is a product improvement of the AN/TTC-39A. The AN/TTC-39D is an all digital circuit switch with the capacity to terminate 712 lines (both analog and digital). The AN/TTC-39D also has flood search capability and is totally compatible/interchangeable with fielded MSE. The facility retains minimum essential technical control functions including channel reassignment, multiplexing, line testing, and engineering orderwire. The facility also retains minimum essential technical control functions for atomic timing standards, analysis of trouble reports, alarms, and system data.

Major Components

1 Switching Module Assembly S-280B/G (Modified)
2 PU/406 Electric Power Plants AN/MJQ-10 (30 kW)
1 Storage Shelter S-640
1 Master Power Distribution Unit ON-224/T
1 Maintenance Shelter S-639
1 Master Power Distribution

Technical Characteristics

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total External Terminations</td>
<td>712</td>
</tr>
<tr>
<td>Digital Switch Matrix</td>
<td>2</td>
</tr>
<tr>
<td>DTG Total (648 channels)</td>
<td>30</td>
</tr>
<tr>
<td>Group Modem (GPMMDM) (41/2-144 channels)</td>
<td>28</td>
</tr>
<tr>
<td>Digital NATO Group Modem (DNGPM) (16 channels)</td>
<td>2 (DTG 15, 30)</td>
</tr>
<tr>
<td>Single-Channel Digital (N1)</td>
<td>240 (max)</td>
</tr>
<tr>
<td>Analog (N2)</td>
<td>240 (max)</td>
</tr>
<tr>
<td>Total</td>
<td>N1 + N2 = 240</td>
</tr>
</tbody>
</table>
Technical Characteristics (Cont.)

Analog on TDMX ............................................................... 240
TED ................................................................. 15
Loop Key Generator (LKG) .................................................. 32
Switch Rate ............................................................. 16 kb/s
Total DTGs ............................................................... 30
Maximum Channels Per DTG ........................................... 144
In-Band Digital Trunks (Long Loops) .......................... 200
Numbering Plan ......................................................... TRI-TAC NATO, 13 digits;
                                           military tactical, 7 digits;
                                           AUTOVON, 10 digits;
                                           Standardization Agreement (STANAG) NATO
                                           Deducible Numbering Plan
Power ............................................................... 115/208 V AC 50, 60, 400 Hz, three phase
Vehicle Requirements ................................................ One 5-ton (AN/TTC-39D);
                                           Two 2 1/2-ton trucks (S-640) (S-639)
AN/TTC-39D
Automatic Telephone Central Office

**ROADSIDE ELEVATION**
- (2) INTERCOM
- (2) MAG TYPE
- POWER BAY
- CHARGER
- CIRCUIT BREAKER PANEL
- 56 VDC POWER SUPPLIES

**CURB SIDE ELEVATION**
- (2) HGX-84 CONTROLLER
- (9) TED KG-94
- (3) HGF-94
- CENTRAL PROCESSOR GROUP
  - CONTROLLER NEST
  - CPU 1 & 2
- (2) CPG POWER SUPPLIES
- POWER PROCESSORS
- RSS-D ROUTING UNIT (AN/TTC-39D ONLY)
- RSS-D MODULAR POWER SUPPLY (AN/TTC-39D ONLY)

*= HGF-87 COSMEC rack is in 39D circuit switch
FM 24-24

AN/TTC-41()
Automatic Telephone Central Office

NSN:
5805-01-028-8393 (AN/TTC-41(V)1)
5805-01-028-8394 (AN/TTC-41(V)2)
5805-01-028-8392 (AN/TTC-41(V)3)
5805-01-044-8869 (AN/TTC-41(V)4)
5805-01-044-8870 (AN/TTC-41(V)5)
5805-01-045-3157 (AN/TTC-41(V)6)
5805-01-044-8871 (AN/TTC-41(V)7)

Reference: TM 11-5805-693-12 (V1-V4) and 12-1 (V5-V7)

General Information

The AN/TTC-41( ) is an air- or vehicular-transportable assemblage used to provide rapid automatic switching to tactical units in an area type communications system. The AN/TTC-41( ) provides cordless service to two-wire common-battery signaling lines, 20-Hz ringdown lines or trunks, common-battery dial pulse or DTMF lines, and four-wire tone signaling trunks. The AN/TTC-41(V)1 provides 30 lines of service in a shelter configuration. The AN/TTC-41(V)2 and AN/TTC-41(V)5 provide 60 lines of service. The AN/TTC-41(V)3 and AN/TTC-41(V)6 provide 90 lines of service. The AN/TTC-41(V)4 and AN/TTC-41(V)7 provide 120 lines of service in a shelter configuration. The (V)1 through (V)4 models are shelter configurations and (V)5 through (V)7 are trailer configurations.

Major Components

1 Shelter S-561 TTC-41( ) (Modified Shelter S-250/G) (V)1-(V)4 models)
1 Push Button Telephone Set TA-938/G (all models)
1 through 5 Switchboards SB-3614(V)/TT or SB-3614A(V)/TT and Headset H-182/PT (depending on the model)
1 Headset Switch Box (all models)
1 Trailer Assembly V-498/TTC-41(V), (Modified Trailer M-569) (V)5-(V)7 models)
1 Intercommunications Station LS-147F/FI (all models)
1 or 2 Power Supplies PP-6224/U (depending on the model)
Technical Characteristics

Power Requirement ........................................ 115 V AC, 60 Hz, single phase

Power Consumption:

<table>
<thead>
<tr>
<th>(V)1</th>
<th>(V)2</th>
<th>(V)3</th>
<th>(V)4</th>
<th>(V)5</th>
<th>(V)6</th>
<th>(V)7</th>
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<tbody>
<tr>
<td>5.1 kW</td>
<td>5.2 kW</td>
<td>5.3 kW</td>
<td>6.5 kW</td>
<td>2.1 kW</td>
<td>2.2 kW</td>
<td>3.5 kW</td>
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</tbody>
</table>

Vehicular Requirement ................................. One 1/4 truck, 1/4-ton truck, and 3/4-ton truck

Weight:

<table>
<thead>
<tr>
<th>(V)1</th>
<th>(V)2</th>
<th>(V)3</th>
<th>(V)4</th>
<th>(V)5</th>
<th>(V)6</th>
<th>(V)7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,031 kg (2,270 lb)</td>
<td>1,058 kg (2,330 lb)</td>
<td>1,090 kg (2,400 lb)</td>
<td>1,167 kg (2,570 lb)</td>
<td>945 kg (2,080 lb)</td>
<td>963 kg (2,120 lb)</td>
<td>1,050 kg (2,310 lb)</td>
</tr>
</tbody>
</table>
AN/TTC-41( )
Automatic Telephone Central Office

SB-3614
PATCH BOARD
SB-3614
8-DAY CLOCK
AN/TYC-39(V)
Automatic Message Switch

NSN: 5805-01-123-1851
Reference: TM 11-5805-683-12-1

General Information

The AN/TYC-39(V) switch provides secure, automatic message switching of narrative record and data traffic at major corps and theater Army nodes in conjunction with multichannel LOS and demand assign multiple access (DAMA). The switch also includes tactical satellite communications (TACSATCOM), and tropospheric scatter communications media. This sheltered, tactically mobile equipment will be collocated with the AN/TTC-39 to provide circuit switching on data traffic as required. The difference between the models is in their cryptographic equipment. The (V)3 uses only integral TRI-TAC COMSEC equipment. The other models can operate with TRI-TAC or inventory COMSEC equipment. The (V)3 is not in general field use because of the tactical need to interoperate with available terminal equipment. The 400 Hz design of the (V)4 fits it for use in aircraft or at US Air Force installations. The 50-line switch consists of two shelters: the communications interface shelter (CIS) and the message processing shelter (MPS). The 25-line switch has both elements in a single shelter.

Technical Characteristics

The AN/TYC-39(V) automatically accepts, processes, stores, delivers, and accounts for narrative and data traffic through 50 lines, in ACP 127 and ACP 127 modified or JANAP 128 and JANAP 128 modified format only. Capabilities include processing multiple and collective addressed messages; mode, code, speed, and format conversions; handling six levels of precedence; message retrieval for retransmission; and message accountability and service functions. The AN/TYC-39(V) provides COMSEC for trunking and subscribers. Its interfaces include currently fielded record traffic terminals, modular record traffic terminals (MRTTs), modular tactical communications centers (MTCCs), unit level message switches (ULMSs), Automatic Telephone Central Offices AN/TTC-39, and DCS AUTODIN I. The AN/TTC-39(V) can interface with data adapters and the communications nodal control element (CNCE).
Power Requirement ............... 115/208 V AC, 3-phase, 50/60 Hz (400 Hz (V4 only)
Weight:
  CIS ................................................................. 3,086 kg (6,799 lb)
  MPS ................................................................. 3,172 kg (6,986 lb)
Vehicle Requirements:
  CIS, MPS, OX-54 .............................................. Three 5-ton trucks
  Storage and Maintenance Shelter ......................... Two 2 1/2-ton trucks
AN/TYC-39(V)
Automatic Message Switch
(Message Processing Shelter)
AN/TYC-39(V)
Automatic Message Switch
(Communications Interface Shelter)
AN/TYC-39(V)
Automatic Message Switch
(25-Line Single Shelter)
Section II. Teletypewriter

AN/MSC-29 and AN/MSC-29A

Telegraph Terminal

NSN: 5805-00-943-6762 (AN/MSC-29)
      5805-01-095-6233 (AN/MSC-29A)

Reference: TM 11-5805-312-14

General Information

The AN/MSC-29 and the AN/MSC-29A function as a terminal for two full-duplex or four half-duplex secure teletypewriter circuits. The terminal set also provides 16 lines for switching teletypewriter transmissions from other components in an area type communications system or from local subscribers. Four of the 16 lines are equipped with telegraph-telephone signal converters and filter assemblies for speech-plus, half-duplex operation. Teletypewriter traffic is secured using the TSEC/KW-7. The AN/MSC-29 and AN/MSC-29A are used at division and corps. This item is being replaced by the AN/TSC-58.

Major Components

<table>
<thead>
<tr>
<th>AN/MSC-29</th>
<th>AN/MSC-29A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telegraph-Telephone Signal Converter:</td>
<td>8 8</td>
</tr>
<tr>
<td>TA-182/U</td>
<td></td>
</tr>
<tr>
<td>CV-425/U</td>
<td></td>
</tr>
<tr>
<td>Filter Assembly:</td>
<td>4 4</td>
</tr>
<tr>
<td>F-98/U</td>
<td></td>
</tr>
<tr>
<td>F-316/U</td>
<td></td>
</tr>
<tr>
<td>Reperforator-Transmitter TT-76B/GGC</td>
<td>8 8</td>
</tr>
<tr>
<td>Telephone Switchboard SB-22/PT</td>
<td>1 1</td>
</tr>
<tr>
<td>Telephone Set TA-312/PT</td>
<td>1 1</td>
</tr>
<tr>
<td>Teletypewriter TT-4/TG</td>
<td>4 4</td>
</tr>
<tr>
<td>Communications Terminal AN/UGC-74A(V)3</td>
<td></td>
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<tr>
<td>Telegraph Terminal:</td>
<td>12 12</td>
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<tr>
<td>TH-5/TG</td>
<td></td>
</tr>
<tr>
<td>TH-22/TG</td>
<td></td>
</tr>
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</table>

6-18
Major Components (Cont.)

AN/MSC-29 AN/MSC-29A

<table>
<thead>
<tr>
<th>Item</th>
<th>AN/MSC-29</th>
<th>AN/MSC-29A</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMSEC Equipment TSEC/KW-7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Shelter S-176/MSC-29</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Technical Characteristics

- **Power Requirement**: 5 V AC, 50 to 60 Hz single phase
- **Power Consumption**: 4,634 W
- **Weight**: 2,451.6 kg (5,400 lb)
- **Vehicular Requirement**: One 2 1/2-ton truck
AN/MSC-29 and AN/MSC-29A
Telegraph Terminal
AN/TSC-58 and AN/TSC-58A
Telegraph Terminal

NSN: 5805-00-010-5287

Reference: TM 11-5805-574-15

General Information

The AN/TSC-58 is an air- or vehicular-transportable assemblage that serves as a VF teletypewriter terminal. It contains facilities for three VF full-duplex or six VF half-duplex circuits in either the secure or nonsecure modes. Circuits are secured with the TSEC/KW-7. The AN/TSC-58 has an SB-22/PT which provides 12 lines for switching teletypewriter transmissions from other components in an area communications system or from local subscribers. It is used at corps and division. The difference between the two models is the AN/TSC-58 uses the Teletypewriter TT-98( )/FG, and the AN/TSC-58A uses the Communications Terminal AN/UGC-74A(V)3.

Major Components

6 COMSEC Equipment TSEC/KW-7 (not a basic issue item)
6 Low Level Keying Devices TT-523
8 Telegraph Terminals TH-22/TG
1 Distribution Box J-1077A/U
1 Manual Switchboard SB-22/PT
1 Telephone Set TA-312/PT
2 Air Conditioners, 9,000 BTU
6 Reperforator-Transmitters TT-76B/GGC
1 Shelter S-348/TSC-58 (modified S-280/G)
6 Teletypewriters TT-98B/FG or Communications Terminal AN/UGC-74A(V)3
1 Intercommunications Station LS-147F/FI

Technical Characteristics

Power Requirement .................................................. 115 V AC, 50 to 60 Hz
Power Consumption ................................................. 7,176W
Weight ................................................................. 2,429 kg (5,350 lb)
Vehicular Requirement ................................. One 2 1/2-ton truck
AN/TSC-58 and AN/TSC-58A
Telegraph Terminal
Section III. Multichannel

AN/TCC-60 and AN/TCC-69 Telephone Terminals

NSN: 5805-00-877-8740 (AN/TCC-60)
      5805-00-089-6253 (AN/TCC-69)

Reference: TM 11-5805-358-14-2

General Information

The AN/TCC-60 and the AN/TCC-69 operate primarily as cable terminals or repeaters although they may be used with equipment such as Radio Repeater Set AN/TRC-110(V) for radio terminal applications. They are air- or vehicular-transportable assemblages. They provide nonsecure or secure multiplex cable terminal or repeater facilities for corps or above PCM communications systems.

Major Components

1. Shelter S-300/TCC-60 (modified AN/TCC-69, S-318/G)
2. Voltage Regulator CN-514/GRC
3. COMSEC Equipment TSEC/KG-27 (not a basic issue item)
4. Converters CV-1548/G
5. Multiplexer TD-204/U or TD-754/G
6. Intercommunications Station LS-147F/FI
7. Multiplexer TD-352/U

Configurations

Terminal Arrangements:

Two — 12-channel; secure or nonsecure terminals.
One — 24-channel; secure or nonsecure cable terminal facility with the two equipment sets combined.

Repeater Arrangements:

12-, 24-, 48-channel cable repeater transmission.
Technical Characteristics

Power Requirement . . . . . . . . . . . . . . . . . 115 V AC, 50 to 60 Hz
Power Consumption:
   AN/TCC-60 ...................................................... 2,700 W
   AN/TCC-69 ..................................................... 2,770 W
Weight:
   AN/TCC-60 ..................................................... 613 kg (1,350lb)
   AN/TCC-69 ..................................................... 857 kg (1,887 lb)
Vehicular Requirement:
   AN/TCC-60 ..................................................... One 1 1/4-ton truck
   AN/TCC-69 ..................................................... One 1 1/2-ton truck
AN/TCC-60 and AN/TCC-69 Telephone Terminals

Roadside

Curbside
AN/TCC-65
Telephone Terminal

NSN: 5805-00-156-4368
Reference: TM 11-5805-371-14-2

General Information

The AN/TCC-65 is an air- or vehicular-transportable PCM telephone terminal. It provides four 12-channel or two 24-channel two-wire/four-wire voice secure/nonsecure telephone systems. The AN/TCC-65 will be modified to integrate the TD-1065 high speed serial data buffer and the TD-1069 TDDM as part of the system. This adds the ability to transceiver high speed data in addition to radio. Due to space restrictions, two of the four TD-754 cable combiners will be deleted. The TD-1065 will occupy the same space as the existing CV-1548s. Therefore, the new ability will be two 12-channel two-wire/four-wire voice; or two 12-channel four-wire voice/data; or two 24-channel two-wire/four-wire voice; or two 24-channel four-wire voice/data. The AN/TCC-65 is used in the division and corps area communications systems.

Major Components

1 Shelter S-333/TCC-65 (modified S-250/G)
1 Intercommunications Station LS-147F/FI
4 Converters CV-1548/G
4 High Speed Serial Data Buffers TD-1065/G (not a basic issue item)
4 Multiplexer TD-204/U
4 Multiplexer TD-660A/G
1 Telephone Set TA-312/PT
2 TDDMs TD-1069/G (not a basic issue item)
4 COMSEC Equipment TSEC/KG-27 (not a basic issue item)

Technical Characteristics

Power Requirement ........................................... 115 V AC, 50 to 60 Hz
Power Consumption ........................................... 4,090 W
Weight ...................................................... 591 kg (1,302 lb)
Vehicular Requirement ...................................... 1 1/4-ton truck
AN/TCC-65
Telephone Terminal
AN/TCC-72
Telephone Terminal

MN: 5805-00-155-5599
Reference: TM 11-5805-479-14-2

General Information

The AN/TCC-72 is an air- or vehicular-transportable PCM telephone terminal. It provides one 24-channel telephone terminal; or two 6- or 12-channel telephone terminals; or one 6-, 12-, 24-, or 48-channel telephone cable repeater; or one 24-channel telephone cable repeater with a nonsecure 6- or 12-channel drop-and-insert capability. Each 6- or 12-channel group can be secured with a TSEC/KG-27. The AN/TCC-72 is used in division and corps area communications systems. The AN/TCC-72 will be modified to integrate the TD-1065 and the TD-1069 as part of the system and will provide for the addition of high speed data access and wideband secure voice facilities.

Major Components

1. Shelter S-412/TCC-72 (modified S-250/G)
2. High Speed Serial Data Buffers TD-1065/G (not a basic issue item)
2. Converters CV-1548/G
2. Multiplexers TD-204/U
1. TDDM TD-1069/G (not a basic issue item)
2. Multiplexer TD-660A/G
1. Telephone Set TA-312/PT
1. Intercommunications Station LS-147F/FI

Technical Characteristics

Power Requirement ........................................... 115 V AC, 50 to 60 Hz
Power Consumption ........................................... 4,168 W
Weight ........................................................ 72 kg (1,700 lb) approx
Vehicular Requirement ........................................ 1 1/4-ton truck
AN/TCC-72
Telephone Terminal
FM 24-24

**AN/TCC-73(V)1, AN/TCC-73(V)2, AN/TCC-73A(V)1, AN/TCC-73A(V)2**

Telephone Terminals

**NSN:**
- 5805-00-134-5405 (AN/TCC-73(V)1)
- 5805-00-134-5404 (AN/TCC-73(V)2)
- 5805-01-102-0185 (AN/TCC-73A(V)1)
- 5805-01-135-7070 (AN/TCC-73A(V)2)

**Reference:** TM 11-5805-585-14-1

**General Information**

The AN/TCC-73 is an air- or vehicular-transportable assemblage that provides secure or nonsecure multiplex terminal or repeater facilities for Army area communications systems using PCM/TDM. Though mainly a cable terminal, it is used with other equipment for radio terminal applications. The AN/TCC-73 terminates up to four 12-channel or four 24-channel cable systems. The AN/TCC-73 may change to a (V)1 or a (V)2 configuration by installing or removing the TD-976/G. The AN/TCC-73A(V)1 contains all equipment specified for an AN/TCC-73A(V)2 plus two TD-976/Gs. An additional TD-976/G increases channel capacity from four 12-channel or four 24-channel cable systems ((V)2 model) to one 96-channel or two 48-channel cable systems ((V)1 model). The AN/TCC-73A(V)1 and the AN/TCC-73A(V)2 can install up to eight TD-1065/Gs and two TD-1069/Gs.

**Major Components**

<table>
<thead>
<tr>
<th>Nomenclature</th>
<th>73(V)1</th>
<th>73(V)2</th>
<th>73A(V)1</th>
<th>73A(V)2</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD-1065/G</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSEC/KG-27*</td>
<td>8*</td>
<td>8*</td>
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<tr>
<td>CV-1548/G</td>
<td>8*</td>
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<td>8*</td>
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<tr>
<td>TD-660/AG</td>
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<tr>
<td>TD-754/G or TD-204/U</td>
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<tr>
<td>TD-976/G</td>
<td>2*</td>
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<td>TD-1069/G*</td>
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<td>TA-3121PT</td>
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<td>LS-147C/Fl</td>
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<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Additional authorized components. Upon the installation of these components, removal of existing components may be necessary.
Technical Characteristics

Power Requirements ........................................ 115 V AC, 50 to 60 Hz single phase

Power Consumption (max):

- 73(V)1 ....................................................... 6,072 W
- 73(V)2 ....................................................... 5,772 W
- 73A(V)1 ....................................................... 6,124 W
- 73A(V)2 ....................................................... 5,824 W

Weight:

- 73(V)1 ....................................................... 2,068 kg (4,555 lb)
- 73(V)2 ....................................................... 2,406 kg (5,300 lb)
- 73A(V)1 ....................................................... 2,406 kg (5,300 lb)
- 73A(V)2 ....................................................... 2,156 kg (4,749 lb)

Prime Mover ..................................................... One 2 1/2-ton truck
AN/TCC-73(V)1, AN/TCC-73(V)2, AN/TCC-73A(V)1 and AN/TCC-73A(V)2
Telephone Terminals
AN/TRC-113(V)1
Radio Repeater Set

NSN: 5820-00-868-8211
Reference: TM 11-5820-562-14

General Information

The AN/TRC-113 is an air- or vehicular-transportable radio repeater set which provides radio repeater or radio terminal facilities for LOS systems in forward areas. It can be used as a 6- or 12-channel PCM radio repeater; or as three 12-channel PCM radio terminals; or as one 12- or 24-channel PCM cable repeater. A telephone terminal such as the AN/TCC-65 is required when the AN/TRC-113 is used in split terminal configuration. The radio antennas are carried on the generator trailer.

Major Components

<table>
<thead>
<tr>
<th>Nomenclature</th>
<th>113(V)1</th>
<th>113(V)2</th>
<th>113(V)3</th>
<th>113A(V)1</th>
<th>113A(V)2</th>
<th>113A(V)3</th>
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<tbody>
<tr>
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<tr>
<td>AN/GRC-103(V)1</td>
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<tr>
<td>AN/GRC-103(V)2</td>
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<tr>
<td>Multiplexer</td>
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<td>TD-204/U</td>
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<td>TD-754/G</td>
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<td>Telephone Set</td>
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<tr>
<td>TA-312/PT</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

6-33
Technical Characteristics

Frequency and Power Output:
Band 1 .......................................................... 220 to 404.5 MHz; 25 W
Band 2 .......................................................... 94.5 to 705.0 MHz; 15 W
Band 3 .......................................................... 695.0 to 1000 MHz; 15 W
Power Requirement ........................................... 115 V AC, 50 to 60 Hz
Power Consumption ........................................... 5,000 W
Weight .......................................................... 579 kg (1,275 lb)
Vehicular Requirement ...................................... One 1 1/4-ton truck

AN/TRC-113(V)1
Radio Repeater Set
AN/TRC-121
Radio Terminal Set

NSN: 5820-00-168-1562
Reference: TM 11-5820-602-15

General Information

The AN/TRC-121 is an air-or vehicular-transportable radio terminal which provides a tropospheric scatter capability in corps and above command systems. It terminates two 12- or 24-channel PCM voice systems when used in conjunction with telephone terminals such as AN/TCC-60 or AN/TCC-61. An AN/GRC-106 radio provides for alignment of the AN/GRC-143 system and for communications while mobile.

Major Components

1 Shelter S-338/TRC-121 (modified S-280/G)
1 Radio Set AN/GRC-106
1 Telephone Set TA-312/PT
2 Radio Sets AN/GRC-143
2 Antenna Groups AN/TRA-37
1 Power Supply PP-4763A/GRC
1 Intercommunications Station LS-147F/FI
2 Converters CV-425/U

Technical Characteristics

Power Requirement ............................................. 115 or 230 V AC, 50 to 60 Hz
Power Consumption .................................................. 23,400 W
Weight ................................................................. 2,338 kg (5,150 lb)
Vehicular Requirement .......................... One 2 1/2-ton truck (AN/TRC-121), One 2 1/2-ton truck (AN/TRA-37)
AN/TRC-121
Radio Terminal Set

- Exhaust Ant-Dummy
- Blower Load Directional Waveguide
- Sharpener Duct Switch Coupler CV-425/U Assembly
- Low Temperature Control Thermostat
- Work Desk
- Air Filter Amplifier
- Circular Heating Elements
- Storage Drawers
- Filter Band Pass Preselector
- Waveguide Assembly
- T-961/GRC-143
- R-1287/GRC-143
- AM-6090/GRC-143
AN/TRC-138
Radio Repeater Set

NSN: 5820-00-133-8841

Reference: TM 11-5820-773-15

General Information

The AN/TRC-138 is an air- or vehicular-transportable radio repeater which provides LOS capability in the corps area communications system. It terminates three 48-channel PCM voice systems when used in conjunction with telephone terminals such as the AN/TCC-61 or AN/TCC-73(V)1. The AN/TRC-138 is often used in 12/24-channel mode. The operating procedures are the same for Mast Assembly AB-621/G and Antenna AS-1425/GRC. The components for the antenna systems are stored in the shelter and Power Unit PU-631/G. The AN/TRC-138 is modified to install Radio Set AN/VRC-465 and Power Supply PP-2953/U which are table(s) of organization and equipment (TOE) components not supplied with the assemblage.

Major Components

1 Shelter S-393/TRC-138 (modified S-280/G)
3 Radio Sets AN/GRC-144
1 Telephone Set TA-312/PT
3 Converters CV-425/U
1 Intercommunications Station LS-147F/FI

Technical Characteristics

Power Requirement .......................... 115 V AC, 50 to 60 HZ
Power Consumption .................................. 5 kW
Weight ........................................ 2,009 kg (4,425 lb)
Vehicular Requirement ............................ One 2 1/2ton truck
AN/TRC-138
Radio Repeater Set

Diagram of the AN/TRC-138 Radio Repeater Set showing various components and their locations.
AN/TRC-138A
Radio Repeater Set

NSN: 5820-01-161-9419
Reference: TM 11-5820-926-12-1

General Information

The AN/TRC-138A is a tactical communications assemblage with multiple system deployment. The primary purpose is to provide a 576-channel system SRWBR link between the radio park (top of the hill) and the Radio Terminal Set AN/TRC-175 (bottom of the hill). It also is used as a radio repeater to provide LOS a (40 km (25 mi) maximum) microwave link (24/144 channel) between two external AN/TRC-138As, and is used as a radio/cable terminal to terminate up to 72/144 low-speed channel systems (30 mi maximum). The AN/TRC-138A can terminate three PCM or DGM systems, or eleven PCM/DGM systems. It is compatible with TRI-TAC.

Major Components

3 Radio Sets AN/GRC-222
1 DSVT TSEC/KY-68
1 Cable Modem Driver MD-1024/G
1 Multiplexer TD-1237(P)/G
1 Loop Encryption Device TSEC/KG-84
3 Digital Data Modems MD-1026 (P)/G
1 Intercommunications Station LS-147F/F1
1 Voice Encryption Device TSEC/KY-57
1 Shelter S-667/TRC-138A
## Technical Characteristics

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>4.4 to 5.0 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Range:</td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>Up to 40 km (25 mi)</td>
</tr>
<tr>
<td>SRWBR</td>
<td>8 km (5 mi)</td>
</tr>
<tr>
<td>Cable Driver Modem</td>
<td>8 km (5 mi) with repeaters</td>
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<tr>
<td>RF Output</td>
<td>250 mW</td>
</tr>
<tr>
<td>Channelization</td>
<td>TDM</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>SRWBR 576 channel link (from AN/TRC-175)</td>
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<tr>
<td></td>
<td>24/144 channel link (node-to-node) from another AN/TRC-138A or AN/TRC-175</td>
</tr>
<tr>
<td>Orderwires:</td>
<td></td>
</tr>
<tr>
<td>Digital Voice</td>
<td>16 kbls</td>
</tr>
<tr>
<td>Analog Voice</td>
<td>300 to 1800 Hz at 3 dB bandwidth points</td>
</tr>
<tr>
<td>Weight</td>
<td>2,424 kg (5,340 lb) including shelter</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>115 V AC ± 6 volts, 50/60/400 Hz, 3-phase</td>
</tr>
<tr>
<td>Power Unit</td>
<td>PU-631</td>
</tr>
<tr>
<td>Mounting</td>
<td>S-667 Shelter</td>
</tr>
</tbody>
</table>
AN/TRC-138A
Radio Repeater Set

Roadside
AN/TRC-138A
Radio Repeater Set

Curbside
AN/TRC-145(V)
Radio Terminal Set

NSN: 5820-00-451-5523 (AN/TRC-145(V)1 and AN/TRC-145A(V)1)
5820-00-451-5590 (AN/TRC-145(V)2 and AN/TRC-145A(V)2)
5820-00-451-5618 (AN/TRC-145(V)3 and AN/TRC-145A(V)3)
5820-01-104-4748 (AN/TRC-14513(V)1)
5820-01-099-3578 (AN/TRC-145B(V)2)
5820-01-099-3577 (AN/TRC-145B(V)3)

Reference: TM 11-5895-453-14-2

General Information

The AN/TRC-145 is an air- or vehicular-transportable assemblage. It is normally used in division and forward area PCM communications systems for cable, radio terminal, or repeater applications. The two equipment sets of the AN/TRC-145 may be arranged for normal use as a terminal, a repeater, or a radio cable conversion facility as indicated below.

Terminal Arrangement:

2 6- or 12-channel secure or nonsecure radio terminal facilities
2 6- or 12-channel secure or nonsecure cable terminal facilities
1 24-channel secure or nonsecure cable terminal facility
2 Separate 12-channel groups of data or teletype over one secure or nonsecure channel of the Multiplexer TD-660 System 1 or 2 (channel 7 dedicated) (on AN/TRC-145B model only)

Repeater Arrangements:

1 12- or 24-channel cable repeater facility
1 24-channel secure or nonsecure cable repeater with 6- or 12-channel drop-and-insert facility
1 Radio repeater facility
2 12-channel radio-to-cable conversion
Technical Characteristics

Power Requirement ........................................... 115 V AC ± 6 V, 50 to 60 Hz
Power Consumption ........................................... 3,000 W (approx)
Weight .......................................................... 670 kg (1,475 lb)
Vehicular Requirement ........................................ 1 1/4-ton truck (antenna assembly transported on power unit trailer normally a PU-625/G, 3 kW)

AN/TRC-145(V)
Radio Terminal Set
AN/TRC-145(V)
Radio Terminal Set (Cont.)
**General Information**

The AN/TRC-151(V) is an air- and ground-transportable assembly. It provides multichannel radio and cable tactical communications systems using PCM and TDM for Army and corps headquarters. The AN/TRC-151 (V) may be used as a 12- or 24-channel radio or cable terminal, as a remote drop-and-insert facility, or as a radio or cable repeater. The AN/TRC-151(V) is equipped with Radio Set AN/GRC-103(V)4 using Band IV heads and antennas. The basic equipment provides VF service for both voice telephone and teletype circuits. The option to install the High Speed Serial Data Buffer TD-1065/G will enable the equipment to handle 16- or 32-kilobit serial digital data. Another option, TDDM TD-1069/G, provides an additional 12 channels for digital data inputs. The AN/TRC-151(V) is equipped with rack space and cabling for optional equipment including TSEC/KG-27 for secure operation. The typical planning range using radio links is 48 km (30 mi) LOS; however, when using Band IV, the radio range may be affected by tall trees and dense foliage.

**Major Components**

1. Shelter S-583(*)/TRC-151
2. High Speed Serial Data Buffers TD-1065/G*
3. Radio Sets AN/GRC-103(V)4
4. High Speed Digital Multiplexer*
5. Multiplexer TD-660/G
6. Multiplexer TD-754/G
7. Key Generators TSEC/KG-27*
8. Telephone Signal Converters CV-1548(*)/G

*Optional equipment, not supplied with AN/TRC-151(V).
### Technical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirement</td>
<td>115 V AC, 50-60 Hz, single phase</td>
</tr>
<tr>
<td>Power Consumption operating, one heater, blower, with flourescent lights</td>
<td>3,500 W</td>
</tr>
<tr>
<td>Frequency Range (Band IV)</td>
<td>1350 to 1850 MHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>FM</td>
</tr>
<tr>
<td>Transmitter Power Output</td>
<td>15 W minimum</td>
</tr>
<tr>
<td>Pulse Type</td>
<td>binary pulse</td>
</tr>
<tr>
<td>Pulse Rate</td>
<td>12-channel: 576 Hz</td>
</tr>
<tr>
<td></td>
<td>24-channel: 1152 kHz</td>
</tr>
<tr>
<td>Prime Mover</td>
<td>2 1/2-ton vehicle</td>
</tr>
</tbody>
</table>
AN/TRC-151(V)
Radio Terminal Set
AN/TRC-151(V)
Radio Terminal Set (Cont.)
FM 24-24

AN/TRC-170(V)
Radio Terminal Set

NSN: 5820-01-148-3977

Reference: TM 11-5820-934-13-1-1

General Information

The AN/TRC-170(V) provides tactical multichannel digital troposcatter or LOS systems for transmission of analog and digital traffic. It can terminate one system. It is deployed at hybrid nodes for internodal and extended range (skip node) communications. The AN/TRC-170(V)2 replaces the AN/TRC-132 troposcatter radio set. The AN/TRC-170(V)3 replaces the AN/TRC-11 2/121 troposcatter radio sets.

Major Components

1. Radio Set AN/GRC-197
2. DSVT KY-68
3. Digital Data Group Modem MD-10260(P)/G
4. VINSON TSEC/KY-58
5. Electronic Transfer Device (ETD) KYK-13
6. Loop Group Multiplexer TD-1235( )/TTC
7. (or QRA) Antenna System 3 meters
8. Trunk Group Multiplexer TD-1236( )/G
9. Voice Orderwire Control Unit C-10602/TRC-170
10. Low Speed Cable Driver Modem MD-1023()/G
11. High Power Amplifiers (2 kW) ((V)2)
12. High Power Amplifier (2 kW) ((V)3
13. Environmental Control Unit
14. Tropospheric Scatter Modem OM-61/TRC-170
15. Trunk Encryption Devices TSEC/KG-81
16. Synthesizers SN-531/TRC-170 ((V)2
17. Synthesizer SN-531/TRC-170 ((V)3
18. Dedicated Loop Encryption Devices TSEC/KG-84
19. High Wind Kit 951-211-1
Technical Characteristics

Number of Channels ................................. 8 to 144
Data Rates .......................................... 128 to 4,096 kb/s
Frequency Range ................................. 4 to 5.0 GHz
Power Output ........................................ 2 kW
Diversity .............................................. (V)2: Quad or Dual
(V)3: Dual Bandwidth
(V)2: 3.5 or 6 MHz
(V)3: 3.5 or 7 MHz
Range ................................................. (V)2: 241 km (150 mi)
(V)3: 161 km (100 mi)
Power Requirement ............................... 120/208 V AC, 50/60/400 Hz
Weight ................................................ (V)2: 3,859 kg (8,500 lb) (with shelter)
(V)3: 2,656 kg (5,850 lb) (with shelter)
Shelter ................................................... (V)2: Modified S-280
(V)3: Modified S-250
AN/TRC-170(V)
Radio Terminal Set
AN/TRC-173
Radio Terminal Set

NSN: 5820-01-161-9422

Reference: TM 11-5820-865-12-1

General Information

The AN/TRC-173 operates as a radio or cable terminal and can terminate up to two 18/36 digital multichannel LOS systems. The AN/TRC-173 replaces the AN/TRC-117 and AN/TRC-151 and is used in extension applications.

Major Components

1. Shelter S-589
2. VINSON TSEC/KY-58
3. Radio Sets AN/GRC-103(V)4
4. Power Supply 28 V DC
5. Trunk Encryption Devices TSEC/KG-81
6. Antennas AS-3047/GRC-103
7. Masts AB-57
8. Trunk Group Multiplexer TD-1236()/G
9. Mast Extension Kits MK-806
10. Intercommunications Station LS-147F/FI
11. Remote Multiplexer Combiners TD-1234()/TTC
12. Frequency Electronic Converter CV-2500
13. Remote Loop Group Multiplexer Cable Driver Modems MD-1025()/G
14. Dummy Loads DA-437/GRC-103
15. Low Speed Cable Driver Modems MD-1023()/G
16. TA-312/PT
17. Headset H-182/PT
18. Digital Data Group Modems MD-1026()(P)/G (up to four modems per case)
19. DSVT KY-68
20. Electronic Transfer Device (ETD) KYK-13
21. Net Control Device KYK-l5/TSEC
22. Digital Data Modem MD-1065()(P)/G (103 modem) (two radio modems per case)
23. Fill cable ancillary components and spares
24. Tape Reader KOI-18
25. Dedicated Loop Encryption Device TSEC/KG-84
26. SINCgars Radio
27. Power Unit AN/MJQ-19
28. Orderwire Control Unit C-10716
Technical Characteristics

Frequency Range ......................... Range 1.35 to 1.85 GHz (Band IV)
Power Output .......................................................... 15W (Band IV)
Range ................................................................. 64 km (40mi)
Power Requirement ................................. 115 V AC, single phase
Weight ................................................................. 2,179 kg (4,800 lb)
Shelter ................................................................. S-589
AN/TRC-173
Radio Terminal Set
GENERAL INFORMATION

The AN/TRC-174 operates as a radio repeater or split radio terminal and can terminate up to three 18/36 digital multichannel LOS systems. It will be deployed in hybrid (analog/digital) integrated tactical communications system (INTACS) nodes and extension systems during the transitional period. In split terminal operation it connects to the CNCE by CX-11230 or SRWBR. The AN/TRC-174 replaces the AN/TRC-110 and AN/TRC-152.

MAJOR COMPONENTS

3 Radio Sets AN/GRC-103(V)4
3 Masts AB-577
3 Low Speed Cable Driver Modems MD-1023()/G
3 Mast Extension Kits CY-4507
1 Intercommunications Station LS-147F/FI
1 Digital Data Group Modem MD-1026()(P)/G (up to four modems per case)
1 Frequency Electronic Converter CV-2500
1 Digital Data Modem MD-1065()(P)/G (103 Modem) (three radio modems per case)
3 Dummy Loads DA-437/GRC-103
1 Telephone TA-312/PT
1 Headset H-182/PT
2 Dedicated Loop Encryption Devices TSEC/KG-84
1 Power Unit AN/MJQ-19 ancillary components and spares
1 Olderwire Control Unit C-10716 (OCU Type 1)
1 DSVT KY-68
1 ETD KYK-13
1 VINSON TSEC/KY-58
1 Fill Cable
1 Power Supply 28 V DC
1 Tape Reader KOI-18
3 Antennas AS-3047/GRC-103
1 SINCGARS Radio
## Technical Characteristics

- **Frequency Range**: 1.35 to 1.85 GHz (Band IV)
- **Power Output**: 15 W (Band IV)
- **Range**: 48 km (30mi)
- **Power Requirement**: 115 V AC, single phase
- **Weight**: 2,134 kg (4,700 lb)
- **Shelter**: S-590
AN/TRC-174
Radio Repeater
AN/TRC-175
Radio Terminal Set

NSN: 5820-01-161-9421

Reference: TM 11-5820-931-12-1

General Information

The AN/TRC-175 is a transportable, secure radio/cable tactical communications assemblage, capable of multiple system deployment. It provides SRWBR transmission facilities for bottom-of-hill nodes. It operates as a SRWBR terminal or cable terminal for high speed cable systems and can terminate up to two 576 digital channel systems. The AN/TRC-175 is employed at the bottom-of-the-hill node to provide a SRWBR link up to 8 km (5 mi) with the AN/TRC-138A located at the top-of-the-hill radio park. The AN/TRC-175 is compatible with TRI-TAC.

Major Components

1 Shelter S-591
1 Alarm Status Indicator ID-2324(V)4TRC
2 Radio Sets AN/GRC-144(V)3
2 Multiplexer TD-1237(P)/G
1 Loop Encryption Device TSEC/KG-84
2 Cable Modem Drivers MD-1024/G
4 Digital Data Modems MD-1026(P)/G
1 Voice Encryption Device TSEC/KY-57
1 Orderwire Control Unit C-10717/TRC
1 Intercommunications Station LS-147F/FI

Technical Characteristics

Frequency Range AN/GRC-144(V)3 . . . . . . . . . . . . . . . . . . . . 4.4 to 5.0 GHz
Transmission Range AN/GRC-144(V)3 . . . . . . . . . . . . . . . . . . . . 8 km (5 mi) at 18.72 mb/s;
24 km (15 mi) at 9.36 mb/s
Cable Driver Modem . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8 km (5 mi) (with repeaters)
RF Output . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 250 mW
Channelization . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . TDM
Number of Channels . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . SRWBR 576-channel link (with AN/TRC-138A)
Orderwires:
  Digital Voice . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 16 kb/s
  Analog Voice . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 300 to 1800 Hz at 3 dB bandwidth points
  Power Requirement . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 115 V AC, ± 6 volts, 50, 60, 400 Hz, 3-phase
  Weight . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2,338 kg (5,150 lb)

6-59
AN/TRC-175
Radio Terminal Set
Roadside
AN/TRC-175
Radio Terminal Set

Curbside
Section IV. Auxiliary Equipment

AB-1309(V)/TRC MAST

NSN: 5985-01-156-0572

Reference: Not Available

General Information

The AB-1309(V)/TRC consists of a towable trailer and a 34-m (114-ft) nested (telescoping) tower. One to three antenna reflectors may be mounted on top of the tower. The AB-1309(V)/TRC antenna mast trailer also has two 10-kW generators providing power for the tower and supported assemblage. The AB-1309(V)/TRC can be used to support the AN/TRC-173/174/175/138A DGM assemblages.

Major Components

Telescoping Tower (114 ft)
Antenna Reflector (stored position)
Hydraulic Controls
Towable Trailer
Batteries
Power Distribution Box
Generator Set MEP-003A
Control Box
Guy Cable Reels

Technical Characteristics

Height Extended ......................................................... 34 m (114 ft)
Number of Sections ..................................................... 7
On Board Power .......................................................... 10 kW generator
AB-1309(V)/TRC
Mast
Section V. Multichannel Satellite Communication Terminals

General Information

Satellite communications (SATCOM) systems have been used since 1967 to provide vital communications service to United States forces throughout the world. SATCOM has advantages which are not found in other systems:

- SATCOM can provide reliable service without gaps in range or need for more than one ground relay station.
- The SATCOM site does not have to be situated on high terrain or within LOS of the distant terminal.
- SATCOM can provide thousands of voice and data channels originating at many ground terminals simultaneously.
- SATCOM is multimodal. The ground station can transmit and receive numerous RF carriers simultaneously. Each carrier may be independent in source and in distribution from other carriers.
- Set-up time for a new terminal, tactical or contingency, is very fast. Often, within one-half of an hour of arrival at a site, the terminal will be fully operational and communicating.

SATCOM consists of ground terminals and of one or more satellites. The satellite acts essentially as a repeater in the sky. It employs a transponder which receives, amplifies, and retransmits communications signals. Although a single ground terminal can only communicate with one satellite at a time, it normally has the capability to change from one satellite to another as required. The Army is currently involved in two major SATCOM programs:

- The Defense Satellite Communications System (DSCS) program will provide global, strategic, multichannel communications to support the DCS.
- The Ground Mobile Forces (GMF) program which is designed to provide single-channel and multichannel communications for combat forces within a theater Army.

The chapter also discusses satellites and ground terminals currently in use or being developed to support the two programs discussed above.
Defense Satellite Communications System Program

The DSCS’s mission is to provide global communications capability to support the National Command Authority (NCA)/Joint Chief of Staff (JCS) under the operational control of Defense Information Systems Agency (DISA). The US Army has the responsibility for the acquisitions and fielding of both ground terminals and SATCOM control equipment.

Modulation techniques include time division multiple access (TDMA), frequency division multiple access (FDMA), and spread spectrum multiple access (SSMA). Future modulation techniques will include demand assigned multiple access (DAMA).

The DSCS radio frequency portions are undergoing many upgrades to support its mission well into the 21st century. Some of the upgrades include:

- **Heavy/Medium Terminal Modification**: This upgrade affects the AN/FSC-78 and AN/GSC-39 terminals. These terminal’s RF components will be replaced with solid state devices for the transmitters and receive amplifiers. Included will be computer monitor, test and measurement, and control of the terminal functions.

- **Super High Frequency (SHF) Tri-band Range Extension Terminal (STAR-T)**: This developmental terminal will replace AN/TSC-85B/93B terminals at echelons above corps (EAC). The terminal will be mounted on a HMMWV. Its primary mission is to provide multiband communications and interface with commercial and military assets (dial central and satellite); DGM; TRI-TAC terminals at EAC; and with MSE terminals and ECB.

The DSCS Operational Control System (DOCS) controls all DSCS user terminals operating on DSCS spacecraft. This system also is undergoing upgrades that will allow higher control capability using less equipment and manpower resources.

The ground mobile forces (GMF) will use the DSCS II and DSCS III spacecraft to fulfill multichannel SHF initial system worldwide operational requirements. The DSCS II and III satellites are positioned in geostationary orbits and are continuously available for use by earth terminals located within 5,000 nautical miles of their subsatellite points. The SKYNET IV satellite will be available for GMF use in Europe.

**DSCS II**: These satellites have two transponders, each having a bandwidth constrained by the nominal 2009 MHz bandwidth of the total usable bandwidth of 410 MHz. Each transponder is subdivided by filters in the RF diplexers to provide two operational channels, for example, four operational channels for each satellite. Four antennas are mounted on the despun platform. Two of them are earth coverage horn (ECH) antennas, one for uplink and one for downlink. The remaining two are parabolic dish type antennas. A single biconical horn is used to support the dedicated S-band telemetry and control link. It is mounted on the lower end of the spinning section of the satellite.
DSCS III: The DSCS III program is a vital part of the comprehensive plan meeting national military communications needs. A six-channel communications transponder with each channel operating through its own RF amplifier serves the users. This allows compatible grouping of users for efficient use of the SHF frequency spectrum of 7.9 to 8.4 GHz. The DSCS III satellite carries two communications payload packages. The primary payload is at SHF, satisfying the space link requirements of standard military communications networks. The secondary payload is an US Air Force SATCOM UHF single transponder used to transmit emergency action messages between military command posts (CPs) and force elements. The communications system is supported by one receive multibeam antenna (MBA), two receive ECH antennas, two transmit MBA’s, two transmit ECH antennas, and a gimballed dish antenna (GDA). Each of the six independent repeaters operates in the SHF region to relay telephone, data, wideband imagery, and secure digital voice signals using FM, BPSK, quadrature phase shift keying (QPSK), staggered quadrature phase shift keying (SQPSK) and frequency hopping pseudo noise (PN) spread spectrum modulation. Each terminal has access to any channel and each channel can relay, with minimum performance degradation, signal transmissions consisting of FDMA, TDMA, and spread spectrum multiple access (SSMA) via the PN carrier modulation technique. Linear, quasi linear, and saturated modes of operation are provided by means of selectable gain steps. The MBA with the beam forming the network can shape antenna patterns to arbitrary selected coverage areas.
DSCS Phase II Satellite
DSCS Phase III Satellite

- Solar Array
- Gimballed Dish Antenna
- Solar Reflectors
- Multiple Beam Antenna - Transmit
- SCT Antennas
- Earth Coverage Antenna
- Multiple Beam Antenna - Receive
AN/FSC-9
Satellite Communications Terminal

NSN: To be determined
Reference: To be determined

General Information

The AN/FSC-9 terminals have been used since the earliest days of military SATCOM. Two of these terminals were built and much of the research leading to the development of all present SATCOM systems (commercial and military) was conducted using these two terminals. The AN/FSC-9 terminal at Camp Roberts, California, is the only AN/FSC-9 terminal in operation and provides communications via satellite from the Pacific area to the continental United States (CONUS).

Technical Characteristics

Type of Service ............................................. 500000KF9W (multilink, multivoice, and data)
Frequency Range:
    Transmit .............................................. 7.9 to 8.4 GHz
    Receive .............................................. 7.25 to 7.75 GHz
Planning Range ........................................... 16.093 km (10,000 mi)
Power Input ............................................. 115/230 V AC, 50 to 60 Hz
Power Source ........................................... Any appropriate AC power source
Power Output ............................................ Up to 20 kW
Antenna System ................................. Paraboloid surface, 18.29 m (60 ft)
                                 in diameter, weight 172.3 MT (190 t)
FM 24-24

AN/FSC-9
Satellite Communications Terminal
AN/FSC-78 and AN/GSC-39
Satellite Communications Terminals

NSN:
5895-01-007-9401 (AN/FSC-78)
5895-01-070-5685 (AN/GSC-39(V)1)
5895-01-077-6249 (AN/GSC-39(V)2)

Reference:
TM 11-5895-1050-12
TM 11-5895-1043-12

General Information

The AN/FSC-78 has an 18.29-m (60-ft) parabolic antenna and can transmit up to nine carriers and receive 18 carriers. The components of the AN/FSC-78 are installed in an associated electronic equipment building. This terminal was designed for fixed station application only. The AN/GSC-39 differs from the AN/FSC-78 only in using an 11.6-m (38-ft) diameter, DE-222/G, parabolic dish.

Technical Characteristics

Type of Service .......................... 50000KF9W (multilink, multivoice, and data)
Frequency Range:
  Transmit .......................................................... 7.9 to 8.4 GHz
  Receive .......................................................... 7.25 to 7.75 GHz
Planning Range ............................. 16,093 km (10,000 mi)
Power Input ........................................... 115/230 V AC, 50 to 60 Hz
Power Source ....................................... Commercial power and two 500 kW back-up generators using UPS technology
Power Output ........................................ 10 kW max
Antenna System ................................. Parabolic, 18.29-rn (60-ft) diameter
AN/FSC-78
Satellite Communications Terminal

AN/GSC-39
Satellite Communications Terminal
AN/GSC-40(V) and AN/MSC-64(V)  
Special Communications Systems

NSN:  
5895-01-088-9270 (AN/GSC-40)  
5895-01-146-3875 (AN/GSC-40A(V)1)  
5895-01-146-3874 (AN/GSC-40A(V)2)  
5895-01-112-5836 (AN/MSC-64(V)1)  
5895-01-088-2769 (AN/MSC-64(V)2)  
5895-01-112-5838 (AN/MSC-64(V)3)

Reference:  
TM 11-5895 -1104-10-1 (AN/MSC-64(V))  
TM 11-5895 -1104-10-2 (AN/MSC-64(V))

General Information

The Special Communications System (SCS) is a UHF SATCOM system operated and maintained by the Army, Navy, and Air Force and consists of SATCOM Terminals AN/GSC-40, AN/GSC-40A(V) and AN/MSC-64(V). The terminals are normally deployed in a network configuration. The AN/GSC-40, AN/GSC-40A(V)1, and AN/GSC-40A(V)2 are CP terminals configured to provide the specific SCS network command and control functions and the means for disseminating highly specialized critical user information. The AN/MSC-64(V) is referred to as the mobile terminal since it predominately supports users requiring rapid redeployment.

Technical Characteristics

AN/GSC-40/40A(V):  
Frequency Range .................................................. 225 to 400 MHz  
Security Device ...................................................... one TSEC/KG-31  
................................................................. two TSEC/KG-34s  
................................................................. three TSEC/KN-2s  
Power Input ......................................................... 115/230 V AC, 50/60Hz  
Power Output ....................................................... 100 W  
Antenna ................................................................. AN/GSC-40: two high-gain AS-3060/G  
................................................................. AN/GSC-40A(V)1/2: four high-gain AS-3060/G

AN/MSC-64(V):  
Type of Service ...................................................... UHF half-duplex AFSAT mode (includes TDM 3, TDM 1/2, and random modes of operation)  
Frequency Range .................................................... 225 to 399.975 MHz  
Number of Channels .................................................. 7,000
Technical Characteristics
(Cont.)

Security Device .................................. TSEC/KN-2
Power Input ....................................... Mobile, 28 V DC at 100 amp;
                                          stationary, 115/230 V AC,
                                          50/60 Hz at 10 kw
Power Output ...................................... 10 to 100 W
Antenna ............................................ Low-gain AS-3439/G, omnidirectional
                                          high-gain AS-3438/G, directional
Weight ............................................. 1,697 kg (3,738 lb) (approximately)

AN/GSC-40(V)
Special Communications System

TYPICAL SCS NET CONFIGURATION
SCS Functional Block Diagram
AN/MSC-64(V)
Satellite Communications Terminal

Roadside
AN/MSC-64(V)
Satellite Communications System
Curbside

NOTE
LADDER STORED ON TRUCK TAIL GATE
**AN/GSC-49**

**Jam-Resistant Satellite Communications Terminal**

**NSN:**
- 5895-01-126-9198 (AN/GSC-49(V)1)
- 5895-01-121-9558 (AN/GSC-49(V)2)
- 5895-01-355-8167 (AN/GSC-49(V)3)

**Reference:** TM 11-5895-1162-10

**General Information**

The AN/GSC-49 SATCOM terminal provides jam-resistant secure communications. The terminals are provided in either a fixed or transportable configuration. All transportable terminals can be transported by truck, railroad, ship, and fixed- and rotary-wing aircraft. The terminals are designed specifically to support the Worldwide Military Command and Control System, jam-resistant secure communications point to point, secure voice and graphics conferencing, and Air Force tactical warning and attack assessment data transmission requirement.

**Technical Characteristics**

- Type of Service: 50000KF9W (single-channel voice and FSK)
- Frequency Range:
  - Transmit: 7.29 to 8.4 GHz
  - Receive: 7.25 to 7.775 GHz
  - Planning Range: 6,093 km (10,000 mi)
- Power Input: 120/208 V AC, 50/60 Hz
- Power Source: Two generators (30 kW)
- Power Output: 3.2 kW max
- Antenna System: One quick-reaction, 8-ft parabolic, one 20-ft parabolic that can transmit multiple carriers
- Set-up Time: Approximately 1 hour to satellite acquisition with small antenna; within 12 hours for large dish
AN/GSC-49
Jam-Resistant Satellite Communications Terminal
AN/GSC-52
Medium Satellite Communications Terminal

NSN:  5895-01-168-9607 (AN/GSC-52(V)1)
      5895-01-174-0272 (AN/GSC-52(V)2)

Reference:  TM 11-5894-1196-13-1
            TM 11-5894-1197-13-1

General Information

The AN/GSC-52 is a high-capacity, SHF SATCOM system capable of simultaneous transmission/reception of up to 18 transmit and receive carriers. Each carrier can accommodate CW, pulse modulated (PM), FM, FDMA or SSMA signals. The terminals are provided in either a fixed or mobile configuration.

Technical Characteristics

Frequency Range:
  Transmit .................................................. 7.9 to 8.4 GHz
  Receive .................................................. 7.25 to 7.75 GHz

Power input ................................................. 120/208 V AC 50/60 Hz
Power Source ................................................. Commercial or two 50kW backup generators using UPS technology

Power output ................................................ 1 kw
Antenna System ............................................. Parabolic 11.6 m (38 ft) in diameter OE-371/G Antenna
AN/GSC-52
Medium Satellite Communications Terminal
General Information

The AN/MSC-46 is the first satellite terminal specifically designed for a military SATCOM system. It is completely air transportable in three C-130 cargo aircraft. The total terminal weight is 56.7 MT (62.5 t) and requires site preparation prior to installation and use. The terminal operates via the DSCS satellite with a compatible ground terminal to provide multilink, multivoice, and data channel service.

Technical Characteristics

Type of Service .................................................. 500000KF9W (multilink, multivoice, and data) on low power amplifier
125000KF9W on high power amplifier

Frequency Range:
Transmit ......................................................... 7.9 to 8.4 GHz
Receive ......................................................... 7.25 to 7.75 GHz

Planning Range .................................................. 16,093 km (10,000 mi)

Power Input ..................................................... 120/208 V AC, 50/60 Hz, three phase

Power Source .................................................... Uses three generator sets (100 kW) to supply the required 175 kW (50% backup)
or two generator sets (500 kW)

Power Output .................................................... 5 kW

Antenna System ................................................ Parabolic, 12.19m (40 ft) in diameter, in either an inflatable or rigid radome
AN/MSC-46
Satellite Communications Terminal
AN/MSQ-114
Satellite Communications Control

NSN: 5895-01-102-6307
Reference: TM 11-5895-1136-10

General Information

The AN/MSQ-114 is part of the GMF Satellite Communications Control System which is used to manage the satellite communication capability assigned to the satellite terminals operating within the tactical network. The primary function of the AN/MSQ-114 is to continuously monitor the transmission of the communications satellite to assure that all GMF network terminals are operating within the proper limits of frequency, power output, and bandwidth.

Technical Characteristics

Type of Service ......................... Orderwire communications with all network terminals for control and monitoring of terminals

Frequency Range:
Transmit ........................................... 7.9 to 8.4 GHz
Receive ............................................. 7.25 to 7.75 GHz

Power Input ......................................... 120/208 V AC, 50/60 HZ
Power Source ....................................... two generators (60 kw)
Power Output ....................................... 400 W max
Antenna System .................................. 120-ft parabolic
Set-up Time ...................................... 24 hours
AN/MSQ-114
Satellite Communications Control
AN/TSC-54
Satellite Communications Terminal

NSN: 5895-00-937-4993
Reference: TM 11-5895-389-12

General Information

The AN/TSC-54 is a satellite terminal originally designed for quick-reaction use with a military SATCOM system. It is completely transportable in two C-130 cargo aircraft. The AN/TSC-54 requires only a few hours for assembly, installation, and the initiation of operations. Terminal elements break down into packages, none weighing more than 2.7 MT (3 t), for helicopter airlift; total weight is 10.2 MT (11.2 t). The terminal also is usable in a fixed mode and uses additional multiplexing equipment in this mode. The AN/TSC-54 is considered obsolete as a mobile terminal.

Technical Characteristics

Type of Service .............................................. 50000KF9W (single-channel voice and FSK for tactical mode; strategic mode has capabilities similar to the AN/TSC-86

Frequency Range:
Transmit ....................................................... 7.9 to 8.4 GHz
Receive ....................................................... 7.25 to 7.75 GHz
Planning Range .............................................. 16,093 km (10,000 mi)
Power Input ................................................... 1 20 V AC, 400 Hz
Power Output .................................................. 5 kW
Antenna System .............................................. Cloverleaf made up of four individual parabolic surfaces 3.05 m (10 ft) in diameter
AN/TSC-54
Satellite Communications Terminal
FM 24-24

AN/TSC-85A, AN/TSC-85B(V)1 and AN/TSC-85B(V)2
Satellite Communications Terminals

NSN: 5895-01-113-5343 (AN/TSC-85A)
5895-01-284-8308 (AN/TSC-85B)

Reference: TM 11-5895-845-14 (AN/TSC-85(V)2)

General Information

The AN/TSC-85 contains equipment to receive, transmit, and process low, medium and high capacity multiplexed voice, data, and teletypewriter signals. Using encryption devices, they will process secure and nonsecure traffic. The terminals are intended for either point-to-point or multipoint operation in tactical communications systems. They can transmit one and receive up to four high data rate carriers. The AN/TSC-85(V)2 requires an external multiplex shelter to terminate the circuits. The AN/TSC-85A has its own multiplex equipment in the shelter, however, it may use an external multiplex shelter (for 96-channel capability) if the mission requires it. The terminals include modulation and demodulation equipment and a specialized PCM signal processor. The terminals have external connections for an intercommunications set, field telephones, wideband 70 MHz, and chemical, biological, radiological (CBR) alarm.

Major Components

<table>
<thead>
<tr>
<th>85A</th>
<th>85(V)2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver-Transmitter Orderwire RT-1287/TSC</td>
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</tr>
<tr>
<td>Radio Frequency Amplifier AM-6701/TSC</td>
<td>2</td>
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<tr>
<td>Power Supply PP-7086/TSC</td>
<td>2</td>
</tr>
<tr>
<td>Power Supply PP-7712(V)2/TSC</td>
<td>2</td>
</tr>
<tr>
<td>Frequency Converter CV-3198A/TSC</td>
<td>2</td>
</tr>
<tr>
<td>Multiplexer/Demultiplexer Tactical Satellite Signal Processor (TSSP) TD-1147/TSC</td>
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<tr>
<td>Multiplexer/Demultiplexer TSSP</td>
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<td>TD-1337/(V)1/G</td>
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<td>Frequency Converter CV-3201/TSC</td>
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<td>Digital Data Modem MD-945/TSC</td>
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<td>Telephone Set TA-312/PT</td>
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<tr>
<td>Intercommunications Station LS-147F/FI 1</td>
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</tr>
<tr>
<td>Antenna AS-3036A/TSC</td>
<td>1</td>
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<tr>
<td>Antenna Control C-10237/TSC</td>
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<tr>
<td>Antenna Control C-10348/TSC</td>
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6-88
Major Components (Cont.)

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</thead>
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<tr>
<td>Multiplexer TD-1069/G (not basic issue)</td>
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</tr>
<tr>
<td>Security Device TSEC/KG-27 (not basic issue)</td>
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</tr>
<tr>
<td>Echo Suppressor MX-9635A/TSC</td>
<td>4</td>
</tr>
<tr>
<td>Fault Alarm BZ-236A/TSC</td>
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<tr>
<td>Multiplexer TD-660B/G</td>
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<tr>
<td>High Speed Data Buffer TD-1065</td>
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<tr>
<td>Group Modem MD-1026</td>
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</tr>
<tr>
<td>Telephone Signal Converter CV-1548A/G</td>
<td>4</td>
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<tr>
<td>Shelter S-250</td>
<td>1</td>
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<tr>
<td>Shelter S-280</td>
<td></td>
</tr>
</tbody>
</table>

Technical Characteristics

Frequency Range:
- Receive .................................................. 7250 to 7750 MHz
- Transmit .................................................. 7900 to 8400 MHz

Power Output ........................................... 500 W (nominal) at antenna

Operation:
- Single Channel (digital voice) ...................... 16/32 kb/s
- Multichannel ........................................... 6, 12, 24, 18-96 channels (48 kb/s per channel at true multiplex data rates)

Power Requirements:
- AN/TSC-85(V)2 ........................................ 115 V AC 10%, 50/60 Hz, single phase
- AN/TSC-85A .............................................. V AC 10%, 50/60 Hz, 3-phase, 5-wire

NOTE: Major Technical Characteristics exist between Satellite Communications Terminals AN/TSC-85B(V)1 and AN/TSC-85B(V)2. Consult TM 11-5895-1433-12-1 for additional information.
AN/TSC-85A
Satellite Communications Terminal
AN/TSC-85(V)2
Satellite Communications Terminal

ROADSIDE WALL
AN/TSC-85(V)2
Satellite Communications Terminal (Cont.)

CURBSIDE WALL
AN/TSC-86
Satellite Communications Terminal

NSN: 5895-01-083-6891
5895-01-051-9427

Reference: 11-5895-846-14

General Information

The AN/TSC-86 can provide simultaneous communications with up to four other terminals. Included in the terminal is modulation, demodulation, multiplexing, and signal conditioning equipment necessary for processing multiple, medium-, wideband-digital voice, data, and teletype signals. The electronics are housed in an S-280 shelter with mobilizer. A power pallet containing two 30 kW generators is employed as part of the terminal. The terminal also consists of two antenna groups: the 8-ft group, AS-3036 and the 20-ft group, AS-3199.

The communications subsystem accepts VF, teletypewriter, and baseband digital signals from external cable transmission networks and combines them with on board teletype and voice orderwire signals to form a composite, multiplexed, digital signal called the mission bit stream. This bit stream is applied to a bulk encryption device before routing to the digital data modem by the modulated 70-MHz panel for conversion to SHF and transmission. Received signals are processed in a similar manner, except in the reverse order.

Technical Characteristics

Type of Service ................................................................. Multichannel
Frequency Range:
  Transmit ................................................................. 7.25 to 8.4 GHz
  Receive ................................................................. 7.25 to 7.75 GHz
Planning Range ......................................................... 16,093 km (10,000 mi)
Power Input .............................................................. 120/208 V AC, 50/60 Hz
Power Source ........................................................... 30-kW generator (two each)
Power Output ............................................................ 1 kW max
Antenna System .......................................................... One quick-reaction, 8 ft parabolic
tone 20-foot parabolic that can transmit and receive multiple carriers
Set-Up Time ............................................................... Approximately one hour to satellite
t acquisition with small antenna; within 12 hours for large dish
AN/TSC-86
Satellite Communications Terminal

TERMINAL
8-FT ANTENNA CONFIGURATION

POWER PALLET
S-280 SHELTER

TERMINAL
20-FT ANTENNA CONFIGURATION

POWER PALLET
S-280 SHELTER

8-FT ANTENNA

20-FT ANTENNA
AN/TSC-93A and AN/TSC-93B
Satellite Communications Terminals

NSN: 5895-01-113-5344 (AN/TSC-93A)
      5895-01-284-8307 (AN/TSC-93B)

Reference: 11-5895-1127-10 (AN/TSC-93A)
        11-5895-1434-12-1 (AN/TSC-93B)

General Information

The AN/TSC-93A and AN/TSC-93B terminals contain equipment to receive, transmit, and process medium and high capacity multiplexed voice, data, and teletypewriter circuits. Using encryption equipment, they will process secure and nonsecure traffic. The terminals are intended for point-to-point operation in tactical communications systems. They can simultaneously transmit and receive a single high data-rate carrier. The terminals include modulation and demodulation equipment and a specialized PCM signal processor. Digital interfaces are set up using external connections for an intercommunications set, field telephones, wideband 70 MHz, and CBR alarm. These terminals are used as a communications link via satellite with the AN/TSC-85A, or another AN/TSC-93A.

Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>AN/TSC-93A</th>
<th>AN/TSC-93B</th>
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<tr>
<td>Receiver-Transmitter Orderwire RT-1287/TSC</td>
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<td>Frequency Converter CV-3201/TSC</td>
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<td>Digital Data Modern MD-945/TSC</td>
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<td>Radio Frequency Amplifier AM-6701/TSC</td>
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<td>Power Supply PP-7087</td>
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<td>Power Supply PP-7712(V)/2/TSC</td>
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<td>Frequency Converter CV-3189/TSC</td>
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<td>Multiplexer/Demultiplexer (TSSP) TD-1147/TSC</td>
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<td>Multiplexer/Demultiplexer (TSSP) TD-1337(V)/2/TSC</td>
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<td>Multiplexer TD-754/G</td>
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<td>Multiplexer TD-660/G</td>
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<td>High-Speed Data Buffer TD-1065/G</td>
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<td>Echo Suppressor MX-9635A/TSC</td>
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<td>Converter CV-1548/G</td>
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<td>Security Device TSEC/KY-57 (not basic issue)</td>
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6-95
Major Components
(Cont.)

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<th>93B</th>
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<td>Multiplexer TD-1069/G (not basic issue)</td>
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<tr>
<td>Telephone Set TA-312/PT</td>
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<td>Intercommunications Station LS-147F/FI</td>
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<td>Antenna AS-3036/TSC</td>
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<tr>
<td>Antenna Control C-10348/TSC</td>
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<tr>
<td>Shelter S-250</td>
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</tr>
</tbody>
</table>

Technical Characteristics

Frequency Range:
- Receive ................................................................. 7250 to 7750 MHz
- Transmit ................................................................. 7900 to 8400 MHz

Power Output .............................................................. 500 W (nominal) at antenna

Single Channel Operation:
- (Digital Voice) .......................................................... 16/32 kb/s

Multichannel Operation:
- AN/TSC-93 ................................................................. 6, 12, 24 channels
- AN/TSC-93A .............................................................. 6, 12, 24, 18-96 channels (48 kb/s per channel at true multiplex data rate)

Power Requirements:
- AN/TSC-93 ................................................................. 115 V AC 10%, 50/60 Hz 5% single phase
  1380 W (nominal)
- AN/TSC-93A .............................................................. 115 V AC 10%, 50/60 Hz 5% 3-phase
  5-wire, 5500 W (nominal)

Organic Power:
- AN/TSC-93 ................................................................. PU-619 (modified)
- AN/TSC-93A .............................................................. 2 1/2 ton truck (two each)
AN/TSC-93A
Satellite Communications Terminal

Roadside
AN/TSC-93A
Satellite Communications Terminal
Curbside
AN/TSC-93B(V)1
Satellite Communications Terminal

Roadside
AN/TSC-93B(V)1
Satellite Communications Terminal
Curbside
AN/TSC-93B(V)2
Satellite Communications Terminal

Roadside
AN/TSC-93B(V)2
Satellite Communications Terminal

Curbside
MILSTAR Ground Command Post

NSN: To be determined
Reference: To be determined

General Information

The MILSTAR ground command post (GNDCP) terminals are designed for high capacity CP operations. This includes a mission control segment interface, force direction, CINCNET operation, and full-beam management capability. Depending on the configuration (and branch of service) the terminal can be fixed or transportable by aircraft, ship, or truck. The terminals use an extremely high frequency (EHF) uplink and a SHF downlink. Fielded terminals will use the Fleet Satellite (FLTSAT) EHF packages on FLTSAT 7 and 8 until the MILSTAR satellites are launched and operational.

Technical Characteristics

Communications Capability:

• Throughput: Can transmit on four EHF channels at 75-2400 bp/s, four EHF channels at 75-300 bp/s; and receiving sixteen SHF channels at 75-2400 bp/s and sixteen UHF DAMA channels crossbanded to SHF.

Security:

• KG-84A and KGV-11A COMSEC encryption.

Antenna:

• Fixed: 90 inch parabolic with ground fixed radome.
• Transportable: 96 inch with no radome (carried on a five-ton truck).

Shelter:

• Fixed: Housed in operational center
• Transportable: S280 transported by a five-ton truck.

Power:

• Fixed: Commercial power
• Transportable: Two 30 kW generators
MILSTAR Ground Command Post

AN/FRC-181 (EHF/UHF FIXED GNDCP)

AN/TRC-194 (EHF/UHF TRANSPORTABLE GNDCP)
**MILSTAR SMART-T**

NSN: To be determined

Reference: To be determined

**General Information**

The Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) is a HMMWV mounted, EHF terminal that provides multichannel range extension for MSE at division and corps. The terminal operates at T-1 (1.544 Mb/s) over the MILSTAR satellite (it also can operate over EHF packages on FLTSAT and UFO. It provides LPI/D, built-in transmission security (TRANSEC) with over-the-air rekeying (OTAR), and a capability to interface and control certain aspects of the satellite such as resource control and antenna pointing. SMART-T will replace the multichannel GMF terminal for hard core and core users.

**Technical Characteristics**

**Communications Capabilities:**

- Throughput: Can support multiple, simultaneous, low data rate (LDR) and medium data rate (MDR) data streams up to an aggregate data rate of 2.240 Megabits (million) per second Mb/s.
- Data Rates: Four data streams at 128, 256, 512, or 1024, One data stream at T-1.

**Frequency:**

- Uplink: 43.5 - 45.5 GHz (Q Band) with 2 GHz Bandwidth
- Downlink: 20.2 - 21.2 GHz (K Band) with 1 GHz Bandwidth
- Security: TRANSEC only integrated GPS

**Block of Instruction Presentation (BOIP):** ECB
MILSTAR SMART-T
STAR-T

NSN: To be determined

Reference: To be determined

General Information

The SHF Tri-Band Advanced Range Extension Tactical Terminal (STAR-T) is a HMMWV mounted multichannel satellite terminal. It has a tri-band capability in the SHF range. The STAR-T terminal will operate over commercial and military SHF systems and will interface with both commercial and military switching systems. It will provide the required range extension for TRI-TAC systems at EAC and non-terrestrial communications connectivity between EAC and ECB.

Technical Characteristics

Frequency Range:

- 3.9 GHz-6.2 GHz (C Band)
- 6.2 GHz-10.9 GHz (X Band)
- 15.25 GHz-17.25 GHz (Ku BAND)

Characteristics:

- Four T-1 (1.54 Mb/s) circuits or four E-1 (2.048 Mb/s)
- Circuits for a total aggregate of 8.192 M/bs

BOIP:

- EAC

Milestones:

- To be determined
Section VI. Single-Channel Tactical Satellite Communications Radios

AN/CSZ-1A
Sunburst II Processor

* This radio is an over-the-counter commercial purchase obtained by the US Army.

NSN: To be determined

Reference: To be determined

General Information

The AN/CSZ-1A Sunburst II processor provides high grade half-duplex secure voice and data communications over wideband and narrowband communications links. The Sunburst II supports both secure voice and secure data at 12 and 16 kb/s over wideband radio links. The unit also provides narrowband secure voice (LPC-10E) and secure data at 2.4 kb/s for radio or wire line transmission. The Sunburst II incorporates the indicator COMSEC module, and has been endorsed by the National Security Agency to encrypt voice and data up to the TOP SECRET level. Key features include ANDVT compatibility and the capability to receive OTAR in both narrowband and wideband modes. The Sunburst II provides the user with the capability to communicate to a host of existing COMSEC equipment such as KY-57/58 VINSON, ANDVT/KYV-5, KG-84 A/C, SINCGARS, Fascinator, STICS, and Sunburst I.

Technical Characteristics

Operating Modes ......................................................... Wire line/Telephone
2.4 kb/s voice/data
9.6 kb/s data radio
2.4 kb/s voice/data
12 kb/s voice/data
16 kb/s voice/data

Power Source ............................................................. BA-5590/U
BB-590/U
LSAD-100 AC/DC Power Supply

Weight ................................................................. 6.3 lbs
Technical Characteristics
(Cont.)

Interfaces:
Radio ......................................................... MIL-STD-188C
Wire line ..................................................... CCITT V.27
Data ............................................................. RS-232
Voice ......................................................... H-189/H250 handset

AN/CSZ-1A
Sunburst II Processor
AN/PSC-3 and AN/VSC-7
Tactical Satellite Communications Radio Sets

NSN: 5820-01-145-4943
5820-01-090-5449

Reference: TM 11-5895-1180-10
TM 11-5895-1181-10

General Information

The AN/PSC-3 and AN/VSC-7 equipment is compact, lightweight, and deployable in quick-reaction situations where extended communication range is essential to mission effectiveness. The equipment can operate on-the-move/LOS at 2 W, or in the at-halt/satellite mode at 35 W and can transmit or receive in voice or data formats in both modes. The equipment can be used with Speech Security Equipment TSEC/KY-57 or TSEC/KY-99. The AN/VSC-7 is used as a net control station (NCS) and is mounted in a 1/4 ton vehicle or an S-280 communications shelter. It can serve up to 15 AN/PSC-3 terminals in a communications net with the selection of conference or individual call-codes available at the control converter C-1119()/VSC-7, front panel.

Technical Characteristics

Bandwidth .......................... Transmit/receive on 5 to 25 kHz
Frequency Range ........................ 225 to 399.995 MHz;
also 16-kb/s emergency voice communications over a 5 and 25-kHz satellite channel
Power Input ......................... 22 -32 V DC
Power Output ........................ SAT, 35 W; LOS, 2 W
Power Source ....................... AN/PSC-3: Two BB-590/U NI-CAD batteries,
two BA-5590/U lithium batteries,
PP-6148()/U power supply
or G-76 (V)1/G DC generator AN/VSC-7:
Vehicular power system or 110/220 V AC 50 to 400 Hz
Antenna .......................... Omnidirectional whip antenna for LOS;
medium-gain, collapsible antenna for at-halt communications satellite
Technical Characteristics
(Cont.)

Weight .................. RT-1402()/G with Battery Box CY-8006()/PSC-3, 7.27 kg (16 lb);
Control Converter C-1119()/VSC-7, 17.73 kg (39 lb);
Digital Message Device Group OA-8990()/P, 3.98 kg (8.75 lb)

AN/PSC-3
Tactical Satellite Communications Radio Set
AN/PSC-3
Tactical Satellite Communications Radio Set (Cont.)
AN/VSC-7
Tactical Satellite Communications Radio Set

AN/VSC-7
(AN/PSC-3( ) WITH CONTROL CONVERTER)
HST-4A
Satellite Communications or Line-of-Sight Radio

NSN: 5895-01-293-3579

Reference: To be determined

General Information

The HST-4A provides satellite or LOS communication in data or voice modes. The small, lightweight transceiver operates in the UHF band from 225 to 400 MHz. A two-card modern is built in providing 1200 or 2400 bp/s data capability as well as up to 16 kb/s FSK for both transmit and receive.

Technical Characteristics

Bandwidth ........................................ Transmit/Receive on 5 and 25 kHz
Frequency Range .................................. 225 to 399.995 MHz
Tuning Increments ............................... 5 kHz: FM, X, D1.2 or D2.4 data mode
Preset Channels .................................. 4 preset, 1 manual
Receive Offset Frequency ....................... 0 to +/- 174.995 MHz offset from the transmit frequency
Frequency Stability ............................. +/- 1 PPM over temperature and supply voltage for one year
Guard Channel .................................. 243.000 MHz AM
Signal Strength .................................. Five-light display indicates receive signal strength and relative indication of transmit power in all modes
Data Rates:
With Built-In Modem ........................... 1200 bp/s 2400 bp/s; BPSK, DBPSK
Wideband Secure Voice ......................... 16 kb/s; FM-FSK and AM-ASK with KY-57
Remote Control ................................. All models, presets, and frequencies can be remotely controlled through the X mode-connector serial input
Weight ............................................ 3.1 kg (7 lb)
Input voltage .................................... +24 V DC nominal (20 to 30 V DC without degradation)
Technical Characteristics (cont.)

Current consumption ........................................ 22A receive, 3.5 A transmit
Power sources ................................................... BB-590/U Rechargeable Nickel-Cadmium Battery, BA-5590/U Lithium Battery
Antenna .............................................................. Omnidirectional whip antenna, for LOS; medium-gain, collapsible antenna for at-halt communications

HST-4A
Satellite Communications or Line-of-Sight Radio
**LST-5B and LST-5C**

**Lightweight Satellite/Line-of-Sight Terminal**

*This radio is an over-the-counter commercial purchase obtained by the US Army.*

**NSN:** To be determined

**Reference:** To be determined

**General Information**

The LST-5B and LST-5C can be configured as manpack, vehicular, shipboard, or airborne and can be operated by remote control via dedicated hardware or personal computer based software through X-mode connector. It modulates in AM and FM voice, cipher, data, and beacon.

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>Transmit/receive on 5 kHz and 25 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>225-399.995 MHz</td>
</tr>
<tr>
<td>Channel Spacing</td>
<td>5 kHz and 25 kHz</td>
</tr>
<tr>
<td>Frequency Accuracy</td>
<td>1 ppm over operating temperature and for one year</td>
</tr>
<tr>
<td>Modulation</td>
<td>AM and FM, voice, cipher, data and beacon</td>
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<tr>
<td></td>
<td>1200 BPSK, 2400 SBPSK data, non-differential or differential encoded data</td>
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<td>Operating Modes</td>
<td>BPSK, SBPSK,</td>
</tr>
<tr>
<td></td>
<td>(1) Plain text: AM, FM</td>
</tr>
<tr>
<td></td>
<td>(2) Cipher text AM, FM</td>
</tr>
<tr>
<td></td>
<td>(3) T-R: Transmit/receive on any of nine preset channels</td>
</tr>
<tr>
<td></td>
<td>(4) Beacon; transmit swept tone on selected frequencies</td>
</tr>
<tr>
<td></td>
<td>(5) SELCALL: 75 selective call codes, one conference call code</td>
</tr>
<tr>
<td>Power Output</td>
<td>FM, PM: adjustable in 2 W steps from 2 to 18 W AM: low 2 W, high 5 W</td>
</tr>
<tr>
<td>Weight</td>
<td>8.4 lbs</td>
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</tbody>
</table>
Equipment Compatibility

LST-5B

AN/CSZ-1
ANDVT
KY-57/58
AM-717/URC
PTPE-100, 101
DMDG
AN/URC-101/104/110
AN/PSC-3
HST-4
Grid Computer

LST-5C

AN/CSZ-1, 1a, 11, Packet
ANDVT/KYV-5
KY-57/58/65, KG-84
AM-7175/URC, 200 W PA
PTPE 100/101 Pre-amp
Grid, DMDG, Most RS-232 Devices
AN/URC-101/104/110
AN/PSC-3, ARC-171
HST-4/AN/PSC-3/AN/VDC-7, VGIU
FAX, still & slow scan video

LST-5B and LST-5C
Lightweight Satellite/Line-of-Sight Terminal
AN/PSC-7
Lightweight Satellite Transceiver

NSN: 5820-01-366-8919
Reference: To be determined

General Information

The AN/PSC-7 is exclusively for use in the Commanders WarFighter Network. This radio is an improved version of the HST-4A and includes improvements of increased power output, 30 percent more efficient, better off-frequency noise rejection and compatibility to the KY-99. It provides satellite or LOS communication in data or voice modes. The small, lightweight transceiver operates in the UHF band from 225 to 400 MHz. A two-card modem is built in providing 1200 or 2400 bp/s data capability as well as up to 16 kb/s FSK to transmit and receive.

Technical Characteristics

- Frequency Range: 225 to 399.995 MHz
- Tuning Increments: 5 kHz; FM, X, D1.2, or D2.4 data mode 25 kHz; AM modes
- Power Output-(variable): <1 to 22 W (SAT) continuously from 1 W to max output, <1 to 2 W (LOS) continuously from 1 W to max output
- Preset Channels: 4 preset, one manual
- Receive Offset Frequency: 0 to +/- 174.995 MHz offset from the transmit frequency
- Frequency Stability: +/-1 ppm over temperature and supply voltage for one year
- Guard Channel: 243,000 MHz AM
- Signal Strength: Five-light display and indicates receive signal strength and relative indication of transmit power in all modes
- Data Rates:
  - With Built-In Modem: 1200 bp/s, 2400 bp/s; BPSK, DBPSK
  - Wideband Secure Voice: 16 kb/s; FM-FSK and AM-ASK with KY-57
- Remote Control: All models, presets, and frequencies can be remotely controlled through the X-mode connector serial input
- Weight: 3.1 kg (7 lb)
Technical Characteristics
(Cont.)

Input Voltage ......................................................... +24 V DC nominal
(20 to 30 V DC without degradation)

Current Consumption .............................................. 22 A receive, 3.5 A transmit

Power Source ......................................................... BB-590/U Rechargeable Nickel-
Cadmium Battery
BA-5590/U Lithium Battery

Antenna ............................................................... Omnidirectional whip antenna.
For LOS; medium-gain, collapsible antenna for at-halt communications

AN/PSC-7
Lightweight Satellite Transceiver
AN/PSC-5
Enhanced Manpack Ultra High Frequency Terminal

NSN: To be determined

Reference: To be determined

General Information

The terminals contain multiservice, nondevelopmental item (NDI), small lightweight, man-portable, single channel, UHF SATCOM radio. The terminals include embedded COMSEC, narrowband voice, 5/25 kHz AMA as well as LOS communications (voice and data).

Technical Characteristics

- 5 and 25 kHz channelization
- KG-84, KY-57/-58 Embedded COMSEC
- KYV-5 narrow and compatible
- Less than 15 lbs and 450 cubic in (radio only)
- DAMA capability for 5 and 25 kHz
AN/PSC-5
Enhanced Manpack Ultra High Frequency Terminal
TSQ-190(V) Special Purpose Integrated Remote Intelligence Terminal (SPIRIT II)

General Information

SPIRIT II is a mobile SHF communications system for the dissemination of secondary imagery and operation with the TROJAN network. The system will be deployed in three versions: V1 is the basic C/Ku-band configurable; V2 adds the capability for configuration for DSCS operations; and V3 which will add a UHF single channel radio to the basic V1 system option.

Technical Characteristics

- Configurable for C/Ku-band satellite communications, and X-band in some cases
- Max data rate 512 kb/s; nominal 64 to 512 kb/s
- Primary shelter, spare equipment module, and mobile antenna platform
- 2.4 meter mobile antenna for V1/3 systems, and 5.5 meter antennas for X-band operations
- BOIP: Field to division through theater MI brigades
TSQ-190(V) Special Purpose Integrated Remote Intelligence Terminal (SPIRIT II)

- Primary Hardware Shelter
- Spare Equipment and Maintenance Shelter
- Mobile Antenna Platform
- X-band 5.5 Meter Antenna
MILSTAR SCAMP

NSN: To be determined

Reference: To be determined

General Information

SCAMP is a manpackable, single channel terminal that is designed to interface with the MILSTAR low data rate (LDR) payload (it also can operate over EHF packages on FLTSAT and UFO). The terminal will operate in point-to-point and broadcast modes providing voice and data service at a maximum data rate of 2.4 kb/s. SCAMP Block I will be used for critical command and control communications between headquarters elements and their major subordinate commands. SCAMP Block II will provide point-to-point and CNR range extension for conventional and special operations forces.

Technical Characteristics

Communications Capabilities:

- Throughput: 2.4 kb/s (voice or data)
- Modes of operation: point-to-point or broadcast

Frequency:

- Uplink: 43.5 -45.5 GHz (Q Band) with two GHz Bandwidth

Security

- Embedded COMSEC

Weight:

- Block I: 30 lbs
- Block II: 12-15 lbs

Power:

- Primary Power: BA-5590 or BA-6590
- Alternate Power: 22-33 V DC from a tactical vehicle power integrated GPS

BOIP (Block I/II):

- CINC, theater, joint task force (JTF), corps, division, and brigade
MILSTAR SCAMP
AN/PSN-11
Precision Lightweight Global Positioning System Receiver

NSN: To be determined
Reference: To be determined

General Information

The precision lightweight global positioning system (PLGR) is a self-contained, handheld (man-portable or vehicle mounted) passive GPS receiver. It provides eight-digit grid coordinates with accuracy of 16 meters or less, elevation, velocity and direction of movement. It is used for targeting, reconnaissance, enroute and terminal navigation, surveying and tactical approach landing.

Technical Characteristics

Frequency:
- L1: 1575.42 MHz
- L2: 1227.6 MHz

Spread Spectrum Techniques:
- Coarse/acquisition (C/A): 1.023 MHz (L1 only)
- Precision (P) Code: 10.23 MHz (L1 & L2)

Weight:
- 275 lbs

Size:
- 70 cubic inches (9.5 x 4.1 x 2.6)

Power:
- BA-5800 (disposable lithium battery)
- Rechargeable NICAD battery
- 110/220 AC
- 9-32 V DC

BOIP:
- Down to squad level
AN/PSN-11
Precision Lightweight Global Positioning System Receiver
Section VII. High Frequency Radio

AN/GRC-122, AN/GRC-142, AN/VSC-2 and AN/VSC-3 Radio Teletypewriter Sets

NSN:
- 5815-00-401-9270 (AN/GRC-142)
- 5815-00-168-1556 (AN/GRC-142A)
- 5815-00-443-5511 (AN/GRC-142B)
- 5815-01-100-6815 (AN/GRC-142C)
- 5815-01-104-7264 (AN/GRC-142D)
- 5815-01-095-6258 (AN/GRC-142E)
- 5815-00-401-9719 (AN/GRC-122)
- 5815-00-401-9719 (AN/GRC-122A)
- 5815-00-443-5511 (AN/GRC-122B)
- 5815-00-937-5295 (AN/GRC-122C)
- 5815-01-095-1211 (AN/GRC-122D)
- 5815-01-095-1212 (AN/GRC-122E)
- 5815-00-069-8914 (AN/VSC-2)
- 5815-00-224-8130 (AN/VSC-3)

Reference:
- TM 11-5815-334-10 (AN/GRC-122/142 Series)
- TM 11-5815-331-14 (AN/VSC-2)
- TM 11-5815-332-15 (AN/VSC-3)

General Information

The AN/GRC-122 family consists of medium-power, vehicular-mounted HF-SSB radio sets used primarily for RATT operations; however, they are capable of AM and SSB voice and CW operation. With the addition of a Navy standard one kW Radio Frequency Amplifier AM-3924/URT and Antenna Coupler AN/URA-38A, the AN/GRC-122 becomes an AN/GRC-122(V)2. This modified version provides the capability for long-range communications of 3,862 km (2,400 mi). The AN/GRC-122 and the AN/GRC-142 are both shelter mounted. The AN/VSC-2 is mounted in a jeep and the AN/VSC-3 in an armored personnel carrier, The TSEC/KY-65 (Parkhill) and the ANDVT (minimum term KY-99) will be used for secure-voice operation with the AN/GRC-106.

NOTE: The only difference between the AN/GRC-122 and the AN/GRC-142 is that the AN/GRC-122 has an additional receiver-transmitter and teletypewriter set allowing duplex operation.
Technical Characteristics

Frequency Range ........................................... 2 to 29.999 MHz
Planning Range ........................................... Use short and intermediate distance groundwave and sky wave propagation charts (FM, 11-486-6)
Number of Channels .............................. RT-662, 28,000 with a channel every 1 kHz
RT-834, 280,000 with a channel every 100 Hz
Power Input ....................................... 28.5 V DC (115 V AC for TT-4, TT-76, TT-98, and UGC-74 is supplied through the control box and inverter)
Power Source ................................... AN/GRC-122/142, vehicle power system or Generator PU-620
AN/VSC-2, vehicle power system or Generator PU-675( )
AN/VSC-3, vehicle power system or auxiliary power unit
Power Output .................................. 3A3A, 3A3J, 400 W peak-envelope power
0.1A1, 1.1A1, 200 W
Antenna ........................................ 4.57 m (15 ft) whip, or doublet AN/GRA-50
Tuning ........................................... Digital
Squelch .......................................... Noise
Type of Service ................................ 3K00J3E (USB), 3K00R3E (USB), 100HA1A, 1K10A1A, and double-sideband AM (receive only)
AN/GRC-122
Radio Teletypewriter Set
AN/GRC-122
Radio Teletypewriter Set (Cont.)

FRONT CURBSIDE VIEW
AN/VSC-2
Radio Teletypewriter Set
AN/VSC-3
Radio Teletypewriter Set
Section VIII. Communications Centers and Operations Centers

AN/GSQ-80, AN/GSQ-80A, and AN/GSQ-80B Message Centers

NSN: 9999-00-018-6793 (AN/GSQ-80)
      9999-00-245-1840 (AN/GSQ-80A, AN/GSQ-80B)

Reference: TM 11-5895-365-15

General Information

The AN/GSQ-80 is an air- or vehicular-transportable message center. It contains facilities for the receiving, sorting, distributing, and temporary storage of messages, dispatches and packages.

Major Components

1 Shelter S-280/G (modified)
1 Intercommunications Station LS-147F/FI
1 Telephone Set TQA-312/PT

Technical Characteristics

Power Requirement .................................................. 115 V AC, 50 to 60 Hz
Power Consumption ............................................... 2,000 W
Weight ................................................................. 1,180 kg (2,600 lb)
Vehicular Requirement .......................................... One 2 1/2-ton truck
AN/GSQ-80, AN/GSQ-80A, and AN/GSQ-80B Message Centers
AN/MSC-25
Communications Operations Center

NSN: 5895-00-021-2088
Reference: TM 11-5895-227-15

General Information

The AN/MSC-25 is an air- or ground-transportable operations center. It provides facilities for local telephone circuits, telephone switching, teletypewriter circuits, and intercommunications within the local area. Provisions are available for the optional installation of radio equipment. The AN/MSC-25 includes display boards and overlay screens required by the signal officer to plan, engineer, and control area type communications systems.

Major Components

1. Van V-189/MSC-25 (modified M-348A2)
2. Telegraph Terminals TH-5/TG
3. Telephone Sets TA-312/PT
4. Switchboard SB-22/PT
5. Intercommunications Station LS-147F/FI
6. Teletypewriter TT-76/GGC
7. Teletypewriter TT-4A/TG

Technical Characteristics

Power Requirement ........................................... 115 V AC, 50 to 60 Hz
Power Consumption ........................................... 10,652 W
Weight ...................................................... 5,902 kg (13, lb) approx
Vehicular Requirement ................................. One 5-ton tractor
AN/MSC-25
Communications Operations Center

- TIE-DOWN BAR
- SPEAKING TUBE
- AIR CONDITIONER DISTRIBUTION DUCT
- TOOL PANEL
- PENCIL BOX
- MAP 1 JACK BOX
AN/MSC-31 and AN/MSC-31A
Communications Operations Centers

NSN: 5895-00-167-7931 (AN/MSC-31)
      5895-00-168-1569 (AN/MSC-31A)

            TM 11-5895-463-15 (AN/MSC-31A)

General Information

The AN/MSC-31 and AN/MSC-31A are air or vehicular-transportable field communications offices. Each includes a telephone switchboard, intercommunications equipment, and local telephone circuits. Drafting and display board facilities, required by the operations officer to plan, engineer, and control area type communications systems are provided. The AN/MSC-31 or AN/MSC-31A also provides for the optional installation of radio equipment. The AN/MSC-31 or AN/MSC-31A normally is used with operations Center AN/MSC-32A at corps and above signal centers.

Major Components

1 Shelter S-183/MSC-31 (modified S-141/G) or Shelter S-371/MSC-31A (modified S-280/G)
1 Radio Set AN/VRC-47 (AN/MSC-31A as required)
1 Radio Set AN/GRR-5 (AN/MSC-31A as required)
1 Switchboard SB-22/PT
1 Intercommunications Station LS-147F/FI
4 Telephone Sets TA-312/PT
1 Air Conditioner (AN/MSC-31A)

Technical Characteristics

Power Requirement ................................................. 115 V AC, 50 to 60 Hz
Power Consumption:
      AN/MSC-31 .................................................. 3,542 W
      AN/MSC-31A .................................................. 4,639W
Weight:
      AN/MSC-31 .................................................. 1,198 kg (2,639 lb)
      AN/MSC-31A .................................................. 1,398 kg (3,080 lb)
Vehicular Requirement ................................. One 2 1/2 ton truck
AN/MSC-31 and AN/MSC-31A
Communications Operations Center

- Display Boards
- Radio Set AN/GRR-5
- Loudspeaker LS-454/U
- Receiver Transmitter RT-524/VRC
- Receiver R-442/VRC
- Switchboard Telephone Manual SB-22A/PT
- Power Supply PP-2953/U
- Receptacle
- Cabinet
- Roadside

Heater 1 Electric
Drawer Assembly
Basket Waste Paper
Chair Folding
Portable Typewriter
Basket Waste Paper
Safe
Power Supply PP-2953/U

Drawer Assembly
Basket Waste Paper
Chair, Folding
Portable Typewriter
Basket Waste Paper
Safe
Power Supply PP-2953/U

Roadside
AN/MSC-32 and AN/MSC-32A
Operations Centers

NSN: 5895-00-167-7932 (AN/MSC-32)
      5895-00-168-1571 (AN/MSC-32A)

            TM 11-5895-464-15 (AN/MSC-32A)

General Information

The AN/MSC-32 and AN/MSC-32A are air- or vehicular-transportable field communications operations offices. Each contains a telephone switchboard, a teletypewriter, and local telephone circuits. Display board facilities, required by the operations officer to plan, engineer, and control an area type communications system, are provided. The AN/MSC-32A provides optional installation of radio equipment. The AN/MSC-32 or AN/MSC-32A is used with Operations Center AN/MSC-31 at corps and above signal centers. The AN/TYQ-31 replaces the AN/MSC-32 or AN/MSC-32A in units identified to receive the AN/TYQ-30 or AN/TYQ-31, CSCE.

Major Components

<table>
<thead>
<tr>
<th></th>
<th>-32</th>
<th>-32A</th>
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<tbody>
<tr>
<td>Shelter S-184/MSC-32</td>
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<td>Shelter S-372/MSC-32A</td>
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<tr>
<td>Switchboard SB-22/PT</td>
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<tr>
<td>Teletypewriter TT-4/TG</td>
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<tr>
<td>Teletypewriter TT-76/GGC</td>
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<td>Telephone Set TA-312/PT</td>
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<td>Intercommunications Station LS-147F/FI</td>
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<tr>
<td>Telegraph Terminal TH-22/TG</td>
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<td>Air Conditioner, 9,000 BTU</td>
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</tbody>
</table>
Technical Characteristics

Power Requirement:
AN/MSC-32 ........................................ 115 V AC, 50 to 60 Hz
AN/MSC-32 ........................................ 115 V AC, 50 to 60 Hz

Power Consumption:
AN/MSC-32 ........................................ 4,292 W
AN/MSC-32A .................................... 5,149 W

Weight:
AN/MSC-32 ........................................ 1,253 kg (2,761 lb)
AN/MSC-3A .................................... 1,398 kg (3,080 lb)

Vehicular Requirement ............................... One 2 1/2 ton truck

AN/MSC-32 and AN/MSC-32A
Operations Centers
AN/TYQ-30(V) and AN/TYQ-31
Communications System Control Elements

NSN: 5895-01-280-3568 AN/TYQ-30(V)1
      5895-01-280-3567 AN/TYQ-30(V)2
      5895-01-281-6861 AN/TYQ-31

Reference: TM 11-5895-1392-12

General Information

The AN/TYQ-30(V) and AN/TYQ-31 Communications System Control Elements (CSCE) provide automated management/systems control of TRI-TAC networks. The CSCE gives the EAC network manager automated management facilities for planning the allocation, user, and operation of the deployed tactical communications network. An extensive network database monitors the network’s status through reports received from subelements. The CSCE provides an automated facility for preparing and disseminating operation orders, telecommunications service orders, contingency plans, and other documents. The AN/TYQ-31(V)1 supports a signal brigade with an ADP shelter, an operations shelter, and a remote terminal cluster. The AN/TYQ-30(V)2 (single shelter) with a remote terminal cluster supports a signal battalion. The AN/TYQ-31 (single shelter) will be deployed with the AN/TIC-39A to be used by nodal management and technical control personnel. The CSCE will replace the AN/MSC-31 and AN/MSC-32.

Major Components

<table>
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<tr>
<th>Component</th>
<th>TYQ-30(V)1</th>
<th>TYQ-30(V)1</th>
<th>TYQ-30(V)2</th>
<th>TYQ-31</th>
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<td>Micro VAX II Computer</td>
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<td>175-MB Disk Drives</td>
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<td>KY-68 DSVT</td>
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</table>

6-143
Major Components
(Cont.)

TYQ-30(V)1 TYQ-30(V)1 TYQ-30(V)2 TYQ-31
(ADP) (Operations)

Shelter S-280(C)/G 1 1 1 1
Remote Terminal Cluster 1 1
Orderwire Control Unit 1

Technical Characteristics

Power Requirement:
- Shelter 120/208 V AC, +6% to -12%, 50/60 Hz 3% 3-phase
- Portable 115 V AC, 50/60 Hz

Organic Power:
- AN/TYQ-30(V)1 AN/MJQ-10 (20 each 30 kw)
- AN/TYQ-30(V)2 PU-406 (30 kW)
- AN/TYQ-31 PU-406 (30 kW)
- AN/TYQ-32 Provided by the user

Prime Mover:
- AN/TYQ-30(V)1 2 each 5-ton M-923
- AN/TYQ-30(V)2 1 each 5-ton M-923
- AN/TYQ-31 1 each 5-ton M-923
- AN/TYQ-32 Man-carried

Weight:
- AN/TYQ-30(V)1 2,863 kg (6,300 lb) (ADP shelter)
- 2,727 kg (6,000 lb) (operations shelter)
- AN/TYQ-30(V)2 2,818 kg (6,200 lb)
- AN/TYQ-31 2,636 kg (5,800 lb)
AN/TYQ-30(V)1
Shelter Layout (Automatic Data Processing Shelter)
AN/TYQ-30(V)1
Shelter Layout (Operations Shelter)
AN/TYQ-30(V)2 and AN/TYQ-31
Shelter Layout
Section IX. Patch

AN/TSC-76

Communications Patching Center

NSN: 5895-00-168-1574

Reference: TM 11-5805-583-15

General Information

The AN/TSC-76 is an air- or vehicular-transportable communications patching center used to provide an audio technical control facility for use in a division communications system. The AN/TSC-76 provides facilities for patching, testing, and monitoring telephone circuits and VF teletypewriter circuits. It can handle 572 two-wire circuits. It is used at division level in an area communications system.

Major Components

1 Electrical Equipment Shelter S-403/TSC-76 (modified S-250/G)
1 Teletypewriter TT-98/FG
1 Telegraph Terminal TH-22/TG
1 Intercommunications Station LS-147F/F1
1 Manual Telephone Switchboard SB-22A/PT
2 Distribution Boxes J-1077A/U
1 Telephone Set TA-312/PT

Technical Characteristics

Power Requirement ........................................... 115 V AC, 50 to 60 Hz
Power Consumption ........................................... 3,500 W
Weight ................................................................. 999 kg (2,200 lb)
Vehicular Requirement ........................................ One 1 1/4 ton-truck
AN/TSC-76
Communications Patching Center

Patching Panel Closed for Operation

Patching Panel Center Bay Open for Maintenance
FM 24-24
AN/TSQ-84
Communications Technical Control Center
NSN:

5895-01-007-4788

Reference: TM 11-5895-799-14
General Information
The AN/TSQ-84 is an air- or vehicular-transportable technical control center used to
interconnect, test, and interface various types of communications systems. It can terminate,
interface, patch, and test both voice and digital circuits. The AN/TSQ-84 has line
conditioning equipment to permit interconnections with the DCS and the commercial
systems. It also has the capability of 432 four-wire circuits. It will perform all functions of
the SB-675/MSC, plus the additional functions inherent in its design.
Major Components
1 Electrical Equipment Shelter S-538/TSQ-84 (modified S-280/G)
2 Manual Switchboards SB-22/PT
1 Telegraph Test Set AN/GGM-15
1 Telephone Set TA-312/PT
2 Air conditioners
1 Telephone Set TA-341/TT
20 Line Amplifiers AM-6120/TSC-62
1 Telegraph Terminal TH-22/TG
1 Telephone Test Set AN/USM-181A
9 Line Equalizers TA-957/G
1 Teletypewriter TT-119/FG
1 Oscilloscope AN/USM-296A
2 Intercommunications Stations LS-147F/FI
1 Reperforator-Transmitter TT-178/FG
Technical Characteristics
Power Requirement . . . . . . . . . . . . . . . . . . . . . . 115 and 230 V AC, 50 to 60 Hz
Power Consumption . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8,100 W
Weight . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2,633 kg (5,800 lb)
Vehicular Requirement . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . One2 1/2ton truck

6-150


AN/TSQ-84
Communications Technical Control Center
AN/TSQ-84
Communications Technical Control Center
(Cont.)

CURBSIDE
AN/TSQ-84
Communications Technical Control Center
(Cont.)

OUTSIDE REAR VIEW
SB-675/MSC and SB-675A/MSC
Communications Patching Panels

NSN: 5805-00-167-7882 (SB-675/MSC)
      5805-00-168-1548 (SB-675A/MSC)

            TM 11-5895-225-15-1 (SB-675A/MSC)

General Information

The SB-675/MSC and SB-675A/MSC are air- or vehicular-transportable communications patching facilities used to provide a circuit control facility for use in the corps area communications system. Each provides facilities for patching, testing, and monitoring telephone circuits and VF or DC teletypewriter circuits. Each can handle 468 two-wire circuits.

Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>SB-675</th>
<th>SB-675A</th>
</tr>
</thead>
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<td>Electrical Equipment Shelter S-189/MSC (modified S-141/G)</td>
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<tr>
<td>Electrical Equipment Shelter S-404/MSC (modified S-280/G)</td>
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</tr>
<tr>
<td>Manual Telephone Switchboard SB-22()/PT</td>
<td>1</td>
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</tr>
<tr>
<td>Telegraph Terminal TH-5/TG or TH-22/TG</td>
<td>1</td>
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<tr>
<td>Telegraph Terminal TH-22/TG</td>
<td>1</td>
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</tr>
<tr>
<td>Telephone Set TA-312/PT</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Teletypewriter TT-4A/TG</td>
<td>1</td>
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</tr>
<tr>
<td>Teletypewriter-98/FG</td>
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</tr>
<tr>
<td>Test Set TS-140/PCM consisting of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal Generator SG-15/PCM and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decibel Meter ME-22/PCM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Air Conditioner, 9,000 BTU</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Intercommunications Station LS-147F/FI</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Technical Characteristics

Power Requirement ............................... 115 V AC, 50 to 60 Hz

Power Consumption:
SB-675/MSC ........................................ 3,832 W
SB-675A/MSC ...................................... 6,325 W

Weight:
SB-675/MSC ........................................ 1,200 kg (2,644 lb)
SB-675A/MSC ...................................... 1,725 kg (3,800 lb)

Vehicular Requirement ............................. One 2 1/2 ton truck
SB-675/MSC and SB-675A/MSC Communications Patching Panels
# Chapter 7 Mobile Subscriber Equipment

## General Information

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<td>Subscriber Terminal Equipment</td>
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<td>VII</td>
<td>Mobile Subscriber Equipment Contingency Communications</td>
<td>7-45</td>
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### Section I. System Control Center-2
- OL-490/TYQ-46(V) Management/Planning Shelter
- OL-489/TYQ-46(V) Technical Shelter

### Section II. Node Center
- AN/GRC-224(P) Radio Set
- AN/TRC-191 Radio Access Unit
- AN/TSQ-154 and AN/TSQ-154A(V)1 Node Management Facility
- AN/TTC-47 Node Center Switch

### Section III. Large Extension Node
- AN/TTC-46, AN/TTC-46A(V)1, AN/TTC-46B(V)1 and AN/TTC-46C(V)1 Large Extension Node Switches

### Section IV. Small Extension Node
- AN/TTC-48(V) Small Extension Node Switch

### Section V. Subscriber Terminal Equipment
- AN/VRC-97 Mobile Subscriber Radiotelephone Terminal

### Section VI. Line-Of-Sight Multichannel Radio Terminals
- AN/TRC-190(V) Line-of-Sight Multichannel Radio Terminal

### Section VII. Mobile Subscriber Equipment Contingency Communications
- AN/TTC-50 Communications Central
- AN/TTC-51 Communications Switching Set
- AN/TRC-198(V)1 and AN/TRC-198(V)2 Line-of-Sight Multichannel Radio Terminal
**General Information**

MSE provides rapid, secure communications and has replaced the existing mix of INTACS and ATACS communications equipment in the corps and division. It is designed to meet the requirements of a five division corps for a mobile, flexible, reliable, and survivable common-user area communications system. MSE system features meet the needs of the commander who conducts operations in war and operations other than war. MSE’s six functional areas provide a self-organizing network that includes automatic affiliation, deducible telephone numbering, and flood search routing techniques. These six functional areas are:

- **Subscriber terminal**—consisting of telephones, facsimile terminals, and interface for data subscribers.

- **Mobile subscriber access**—consisting of a mobile subscriber radio telephone terminal (MSRT) that is equipped with a telephone terminal, a VHF radio, a data interface capability, and possibly with a facsimile terminal.

- **Wire subscriber access**—consisting of large extension node (LEN) switches and small extension node (SEN) switches to be deployed at a call service position (CPS) to service static (wire) subscribers.

- **Area coverage**—consisting of a node center (NC) switch, a radio access unit (RAU), and associated LOS assemblages which provide a tandem switched network and the interface between the mobile subscriber access and wire subscriber access functional areas.

- **System control**—consisting of an automatic planning and management capability for MSE (including current system status).

- **Packet network**—consisting of packet switches in a system control center-2 (SCC-2), NCS, LEN, and SEN for data distribution.

MSE communications assemblages are in an S-250( )/G shelter mounted on an M-1037 high mobility multipurpose wheeled vehicle (HMMVW). The HMMVW can be transported by rail, ship, or air. All ancillary equipment (such as antennas, masts, cables, or reels) is mounted in or on the shelters or associated trailers.

A communications assemblage’s 30-minute set-up tear-down time enhances the mobility of MSE. Using back-up batteries provided in every shelter to power the systems for 10 to 15 minutes can reduce this time. The batteries are charged/recharged by the generator or the 200-amp kit contained in the HMMVW.
Section I. System Control Center-2

OL-490/TYQ-46(V)
Management/Planning Shelter

NSN: 5805-01-326-7331

Reference: TM 11-5895-1498-12-1

General Information

The OL-490/TYQ-46(V) consists of an S-250E shelter transported on an M-1037 HMMWV. The management/planning shelter contains two workstations that provide computer assisted tools to aid in network management and is identical at corps and division. The corps SCC-2, however, includes two management/planning shelters, while the division SCC-2 has only one.

Major Components

1 Shelter S-250/G
2 SCS Workstations AN/UYK-86
1 Environmental Control Unit
2 DNVTs TA-1035/U
1 Intercommunications Station LS-147
1 Printer
1 Cargo Trailer
2 Transceivers*
1 Generator PU-751/M, 5 kw

*III Corps TYQ-46’s are equipped with three transceivers

Technical Characteristics

Power Requirements .................................................. 117 V AC, 60 Hz, single phase
........................................................................ 28 V DC (batteries or vehicle alternator)
OL-490/TYQ-46(V)
Management/Planning Shelter

CURBSIDE

ROADSIDE
OL-489/TYQ-46(V)  
Technical Shelter

NSN: 5805-01-326-6539

Reference: TM 11-5895-1498-12-1

General Information

The OL-489/TYQ-46(V) consists of an S-250E shelter transported on an M-1037 HMMWV. It includes the processing suite (processor, memory, disk memory, magnetic tape, drives, and control unit) and the network communications interface equipment. The technical shelter provides all of the processor functions required of the SCC-2. This shelter will be deployed at both corps and division SCC-2s.

Major Components

1 Shelter S-250( )/G  
1 Intercommunications Station LS-147  
1 Environmental Control Unit  
1 Communications Switching Set AN/TYC-20  
1 DNVT TA-1035/U  
1 SCS Workstation AN/UYK-86  
4 Transceivers  
1 Communications Modem MD-1270  
2 Node Management Center (NMC) Workstations AN/UYK-86  
1 Load Disk  
1 Printer  
1 Generator PU-753/M, 10 kW

Technical Characteristics

Power Requirement . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 117 V AC, 60 Hz, single phase
28 V DC (batteries or vehicle alternator)
OL-489/TYQ-46(V) Technical Shelter

Workstation Monitor

Workstation Trackball

Intercom

DVVT

Communication Modem

Curbside Keyboard

Workstation Processor

Transceiver (4)

Workstation Printer

Packet Switch

Roadside
Section II. Node Center

AN/GRC-224(P) Radio Set

NSN: 5820-01-250-6254

Reference: TM 11-5820-1024-13

General Information

The AN/GRC-224(P) consists of an RF unit and a control unit. The RF unit includes a receiver and transmitter mounted on the two feet diameter parabolic reflector antenna. The control unit is a throw-on-the-ground component or can be mounted in the AN/TRC-190(V), (V)1, (V)3, (V)4, and MSE switching assemblages. The radio set provides intra-nodal connectivity between the switch and LOS assemblages and reduces the RF signature at the command post (CP) location by using down-the-hill (DTH) application. The radio set offers convenient flexibility for simple and efficient network planning and frequency management. The operating frequency range is 14.50 to 15.35 GHz divided into ten subbands. Transmit and receive frequencies in each subband can be selected independently from between 29 (C/F Band) to 49 (L/M Band) possible radio channels, depending on the chosen frequency plan.

Major Components

1 Control Module Subassembly C-11826/GRC-224
1 Antenna Mast AB-1342/GRC-224, 9 meters
1 RF Module/Antenna Subassembly RT-1540/GRC-224
1 Signal Cable Assembly
1 DC Power Cable Assembly
1 High Voltage Amplifier (HVA)
1 AC Power Cable Assembly

Technical Characteristics

Power Requirements .......................................................... 28 V DC
Frequency Range ............................................................... 14.50 to 15.35 GHz
Transmission Range .......................................................... 2 to 5 km or 1.2 to 3.1 miles
TDM Data Rates .............................................................. 256, 512, 1024 and 4096 kb/s

NOTE: This radio set is at the LEN, SEN, and NC.
AN/GRC-224(P) Radio Set

RF MODULE/ANTENNA SUBASSEMBLY

MAST SUBASSEMBLY

NOTE:
FOR INSTALLATION IN A SHELTER,
SIGNAL CABLE IS ROUTED TO
SHELTER SIGNAL ENTRY PANEL.

POWER SUPPLY SUBSYSTEM

115/230 V AC
47-400 HZ POWER

21-29 VDC POWER
V AC
V DC

GROUND WIRE

CONTROL MODULE
TX
RX
LINE

BASEBAND SUBSYSTEM

DATA CABLE

GROUND POST (🪖)

SIGNAL CABLE

FM 24-24

7-8
The AN/TRC-191 consists of an S-250/G shelter transported on an M-1037 HMMWV. It has a capacity of eight simultaneous calls via the eight radios which are elements of the assemblage. The RAU is an automatic interface between the mobile subscribers and the network. It does not include any switching element but ensures full management of the radio channels including traffic load controls from radio to network. The RAU also interfaces to an NC switch of the MSE system using either LOS radio links or direct cable connection.

**Major Components**

1. Shelter S-250/G
2. Group Modem MD-1026
3. Electronic Transfer Device KYK-13
4. Generator PU-751/M, 5 kW
5. Trunk Encryption Device KG-194A
6. VINSON COMSEC Equipment KY-57
7. RF Fill Device
8. Group Logic Unit C-11865
9. Antenna Cable
10. RF Antenna Multicoupler CU-2391
11. Junction Box J-4534 (III Corps)
12. Radio Transceivers RT-1539
13. Antenna Mast Mounted AS-4225 (used with 15 meter mast)
14. AC Power Cable, 15 feet
15. AC Power Cable, 35 feet
16. Vehicular Antenna AS-3885 (whip)
17. DC Power Cable
18. MSRT Power Cable
19. DSVT KY-68
20. MSRT Mode Cable
21. Whip Antenna (W6) Cable
Major Components
(Cont.)

1 Digital Data Modem MD-1231, (III Corps Only)
1 Orderwire Control Unit C-11878, (III Corps Only)
1 Loop Group Multiplexer TD-1426 (III Corps Only)
1 Antenna Mast AB-1339/G, 15 meters

Technical Characteristics

Power Requirements .................................................. 115 V AC, 50 or 60 Hz, single phase, or 28 V DC
Frequency Range* ...................................................... 30 to 35 MHz (low band, training)
40 to 50 MHz (high band, training)
30 to 51 MHz (low band, operational)
50 to 88 MHz (high band, operational)
Transmission Range (Planning) ................................. 15 km or 9.3 mi

* The RAU transmits in high band and receives in low band.
AN/TRC-191
Radio Access Unit

DURING TRANSIT, THE DSVT IS LOCATED IN THE RAU TRANSIT DRIVERS COMPARTMENT.
AN/TSQ-154 and AN/TSQ-154A(V)l
Node Management Facility

NSN: 5895-01-247-0963
Reference: TM 11-5895-1375-13

General Information

The AN/TSQ-154 node management facility (NMF) provides the equipment and space required by the node commander to manage the communications resources of the node, both NC and LEN. The management facility assemblage is housed in an S-250E Shelter and transport on an M-1037 HMMWV. For nodal intercommunication, the intercoms and secure device for voice and FM communications (VINSON) handsets are provided. Network access is provided by the DNVT TA-1035(U). Provisions are available for the node commander to remote the DSVT KY-68 of his AN/VRC-97 into the management shelter.

Major Components

1. Shelter S-250E
2. Handset H-350( )/V
3. Display Electroluminescent AN/TSQ-154A(V)l
4. Keyboard AN/TSQ-154A(V)l
5. Environmental Control Unit
6. Intercommunications Station LS-147
7. Desk
8. Map Boards
   1. DNVT TA-1035/U
9. Generator PU-753/M, 10 kW
10. AC Power Cable, 15 feet
11. Signal Cable, 10-pair
12. AC Cable, 35 feet
13. Teletypewriter AN/UGC-74B(V)3 (AN/TSQ-154)

Technical Characteristics

Power Requirements ...................................... 115 V AC, 50 or 60 Hz, single phase

NOTE: The management facility is used at the LEN and the NC.
AN/TSQ-154 and AN/TSQ-154A(V)1 Node Management Facility
General Information

The AN/TTC-47 is configured in two S-250( )/G shelters, a Switching Group ON-306/TTC-47 and an Operations Group OL-413/TTC-47, each transported on an M-1037 HMMWV. The NC switch is the hub of the MSE node providing network interface for the subscriber access elements. The switching group provides the external interface, circuit switching, and associated functions. The operations group provides the central processing and operator interface functions. The NC switch provides automatic subscriber finding features which allow permanent subscriber address assignment and negates the need for knowledge of subscriber geographical location and switch affiliation at the subscriber level. Power to both assemblages is provided by a PU-753/M, 10 kW, trailer-mounted, diesel generator set.

NOTE: The following six configurations show the shelter layouts for all four versions.
AN/TTC-47A(V)1
Node Center Operations Shelter

- Control Panel
- Communications Modem
- Intercom
- KY-57
- Dow Patch Panel
- Teletypewriter
- Shutter Blower
- Switching Processor
- +5V Power Supply
- SHF Radio Set
- Control Module Mount (2)
- Magnetic Tape Transport (2)

- Power Control Panel
- Power Entry Panel
- Circuit Breaker Panel
- Regulator/Battery Charger
- Battery Bank

- Environmental Control Unit
- DOWSizing Routing Subsystem
- Call Service Position
- Visual Display Unit
- Controller Nest
- Signal Entry Panel (A4)
- Digital Nonsecure Voice Telephone
AN/TTC-47B(V)1
Node Center Operations Shelter
AN/TTC-47C(V)1
Node Center Operations Shelter

- CONTROL/ALARM PANEL
- COMMUNICATIONS MODEM
- INTERCOM
- KY-57
- DVM/PATCH PANEL
- PRINTER
- POWER ENTRY PANEL
- CIRCUIT BREAKER PANEL
- BATTERY BANK
- PATCH PANEL
- INTERCOM
- KY-S7
- SHF RADIO SET
- CONTROL MODULE MOUNT (2)
- DVM/PATCH PANEL
- SWITCHING PROCESSOR
- +5 V POWER SUPPLY
- FLOPPY DRIVE
- EL DISPLAY AND KEYBOARD
- CSP HEADSET CONTROL
- CURBSIDE
- ROADSIDE
- POWER CONTROL PANEL
- SIGNAL ENTRY PANEL (A4)
- CONTROLLER NEST
- POWER ENTRY PANEL
- CIRCUIT BREAKER PANEL
- REGULATOR/BATTERY CHARGER
AN/TTC-47 and AN/TTC-47A(V)1
Node Center Switching Shelter
AN/TTC-47B(V)1 and AN/TTC-47C(V)1
Node Center Switching Shelter

SHELTER BLOWERS
TIME DIVISION SWITCHING GROUP
-56V POWER SUPPLY
POWER PROCESSOR
TRANSCIEVER (2)

SIGNAL ENTRY PANEL (A8)
PATCH PANEL
TRUNK ENCRYPTION DEVICE (7)
TRUNK ENCRYPTION DEVICE (2)
DUAL LOOP KEY GENERATORS (8)
AKDC
GATEWAY
 PACKET SWITCH
HEATER

POWER CONTROL PANEL
POWER ENTRY PANEL
CIRCUIT BREAKER PANEL
REGULATOR/BATTERY CHARGER
BATTERY BANK

SIGNAL ENTRY PANEL (A5)
TIMING STANDARD
INTERCOM
TRUNK ENCRYPTION DEVICE (6)

CURBSIDE
ROADSIDE
Section III. Large Extension Node

AN/TTC-46, AN/TTC-46A(V)l, AN/TTC-46B(V)l and AN/TTC-46C (V)l

Large Extension Node Switches

NSN: 5805-01-253-6850 (AN/TTC-46)
      5805-01-310-2541 (AN/TTC-46A(V)l)
      5805-01-323-6458 (AN/TTC-46B(V)l)
      5805-01-329-4803 (AN/TTC-46C(V)l)

Reference: TM 11-5805-765-12

General Information

The AN/TTC-46 LEN is configured in two S-250s, the Switching Group ON-305/TTC-46 and the Operations Group OL-412/TTC-46. Each shelter is transported on an M-1037 HMMWV. The LEN is configured basically the same as the NC switch with basic differences in termination configuration for trunks and the LEN is not a tandem switch. The switching shelter provides the external interface, circuit switching and associated functions. The operations shelter provides the central processing and operator interface functions. The LEN performs all access switching and control functions for an MSE network. Power to both assemblages is provided by a PU-753/M, 10 kW, trailer-mounted, diesel generator set towed by the operation shelter’s prime mover.

NOTE: The following six configurations show the shelter layouts for all four versions.
AN/TTC-46
Large Extension Node Switch Operations Shelter

FM 24-24

7-22
AN/TTC-46A(V)1
Large Extension Node Switch Operations Shelter

- **Environmental Control Unit**
- **Downsize Routing Subsystem**
- **Call Service Position**
- **Visual Display Unit**
- **Secure Digital Radio Interface Unit Mount**
- **Signal Entry Panel**
- **Digital Nonsecure Voice Telephone**
- **Power Control Panel**
- **Power Entry Panel**
- **Circuit Breaker Panel**
- **Regulator/Battery Charger**
- **Controller Nest**
- **Communications Modem**
- **Intercom**
- **KY-57**
- **Black Junction Box**
- **Central Alarm Panel**
- **Switching Processor**
- **+5V Power Supply**
- **Shelter Blower**
- **Combat Net Radio Mount**
- **Magnetic Tape Transport (2)**
- **Shelter**
- **Front**
- **Rear**
- **Curbside**
- **Roadside**
AN/TTC-46B(V)1
Large Extension Node Switch Operations Shelter

ENVIRONMENTAL CONTROL UNIT
DOWNSIZE ROUTING SUBSYSTEM
CALL SERVICE POSITION
VISUAL DISPLAY UNIT

CURBSIDE
SECURE DIGITAL RADIO INTERFACE UNIT MOUNT
SIGNAL ENTRY PANEL (A4)
DIGITAL NONSECURE VOICE TELEPHONE
POWER CONTROL PANEL
POWER ENTRY PANEL
CIRCUIT BREAKER PANEL
REGULATOR/BATTERY CHARGER
BATTERY BANK

CONTROLLER NEST

ROADSIDE
SWITCHING PROCESSOR
+SV POWER SUPPLY
SHF RADIO SET CONTROL MODULE MOUNT (2)
COMBAT NET RADIO MOUNT
MAGNETIC TAPE TRANSPORT (2)

INTERCOM
KY-57
BLACK JUNCTION BOX
TELETYPETWRITER

ENGLISH CONTROL PANEL
COMMUNICATIONS MODEM

FM 24-24
AN/TTC-46C(V)1
Large Extension Node Switch Operations Shelter
AN/TTC-46 and AN/TTC-46A(V)1
Large Extension Node Switch Operations Shelter
AN/TTC-46B(V) 1 and AN/TTC-46C(V) 1
Large Extension Node Switch Operations Shelter
Section IV. Small Extension Node

AN/TTC-48(V)
Small Extension Node Switch

NSN:  
5805-01-245-9058 (AN/TTC-48(V)1)
5805-01-244-4257 (AN/TTC-48(V)2)
5805-01-309-4650 (AN/TTC-48A(V)1)
5805-01-310-2539 (AN/TTC-48A(V)2)
5805-01-324-0861 (AN/TTC-48B(V)1)
5805-01-324-0862 (AN/TTC-48B(V)2)
5805-01-329-4802 (AN/TTC-48C(V)1)
5805-01-329-4808 (AN/TTC-48C(V)2)
5805-01-329-4809 (AN/TTC-48C(V)3)
5805-01-329-4810 (AN/TTC-48C(V)4)

Reference: TM 11-5805-764-13

General Information

The SEN switch consists of an S-250()E shelter transported on an M-1037 HMMWV. The SEN switch contains switching, multiplexing, and COMSEC equipment which supports the secure digital communications of a CP. The SEN switch is provided in ten versions. The (V)1 provides 26-digital lines and 10-digital trunks and the (V)2 provides 41-digital lines and 13-digital trunks. Both versions provide 2 DC closure commercial office interfaces and a Secure Digital Net Radio Interface KY-90. The SEN switch can interface with a LEN switch or an NC switch directly via CX-11230/G cable, via LOS or via TACSAT Terminal AN/TSC-85A or AN/TSC-93A. Power is provided by a PU-753/M, 10 kW, trailer-mounted, diesel generator set.

NOTE The following five configurations show the shelter layouts for all ten versions.
AN/TTC-48(V)1 and AN/TTC-48(V)2
Small Extension Node Switch
AN/TTC-48A(V)1 and AN/TTC-48A(V)2
Small Extension Node Switch

- POWER BAY
- POWER CONTROL PANEL
- POWER ENTRY PANEL
- CIRCUIT BREAKER PANEL
- REGULATOR/BATTERY CHARGER
- ROADSIDE
- BATTERY BANK
- BLOWER
- DNVT
- ENVIRONMENTAL CONTROL UNIT
- TRUNK ENCRYPTION DEVICE
- KY-57
- COMMUNICATIONS MODEM
- H-350/U
- SIGNAL ENTRY PANEL/PATCH PANEL
- CNR
- KY-90
- SWITCHBOARDS (2)
- SHF RADIO CONTROL UNIT
- CURBSIDE
AN/TTC-48B(V)1 and AN/TTC-48B(V)2
Small Extension Node Switch
AN/TTC-48C(V)1 and AN/TTC-48C(V)2
Small Extension Node Switch

- Packet Switch
- KY-57 Communications Modem
- Three Row Signal Entry Panel/Patch Panel
- One Row SEP
- Transceivers
  - SHF Radio Control Unit (Optional)
  - Signal Data Converter (SDC)
- CNR (User Provided)
- KY-90
- Switchboard SB-4303(P)/G (2)
- Trunk Encryption Device
- Power Bay
- Power Control Panel
- Power Entry Panel
- Circuit Breaker Panel
- Regulator/Battery Charger
- Battery Bank
- Blower
- DINVT

Curbside

Roadside
AN/TTC-48C(V)3 and AN/TTC-48C(V)4
Small Extension Node Switch

- Packet Switch
- \( \text{H-350U} \)
- \( \text{KY-57} \)
- \( \text{OUC} \)
- Three Row Signal Entry Panel/Patch Panel
- One Row SEP
- CNR (User Provided)
- KY-90
- SWITCBOARD SB-4300(P)/G (2)
- SHF Radio (Optional)
- Signal Data Converter (SDC)
- Regulator/Battery Charger
- Battery Bank
- Power Bay
- Power Control Panel
- Power Entry Panel
- Circuit Breaker Panel
- TRUNK ENCRIPTION DEVICE
- Multiplexer
- Modem
- BLOWER

\( \text{DNVT} \)

\( \text{CURBSIDE} \)

\( \text{ROADSIDE} \)
Section V. Subscriber Terminal Equipment

AN/VRC-97
Mobile Subscriber Radiotelephone Terminal

NSN: 5820-01-246-6818
Reference: TM 11-5820-1021-10

General Information

The AN/VRC-97 MSRT consists of a VHF radio and DSVT. Depending on the mission, the AN/VRC-97 can be installed in one of nine US Army vehicles or used in stand-alone tripod configuration. Both the radio and the DSVT are designed to operate on the ground without protection from the environment. The radio transmits in the low band and receives in the high band and interfaces at 16 kb/s to the DSVT which provides secure discrete addressability. The radio front panel is accessible to the user for inserting COMSEC crypto variable and frequency fill. Inserting the personal code and the directory number is completed by using the keypad on the DSVT. Since the radio operates automatically, all subsequent calls, both initiating and answering, need only use the DSVT.

Major Components

1 VHF Radio RT-1539(P)
1 VHF Antenna (30 to 88 MHz)
1 DSVT KY-68
1 Electronic Transfer Device KYK-13
1 High Voltage Amplifier (HVA)-9
1 Universal Power Supply (UPS)

Technical Characteristics

Power Requirement ........................................... -110 V AC, 220 V AC, or 28 V DC
Power Consumption ....................................... -50 W (standby) 240 W (max call in process)
Frequency Range* ......................................... 30 to 35 MHz (low band, CONUS)
40 to 50 MHz (high band, CONUS)
30 to 51 MHz (low band, OCONUS)
59 to 88 MHz (high band, OCONUS)

Transmission Range (Planning) ............................ 15 km

* MSRT transmits in low band and receives in high band.
Section VI. Line-of-Sight Multichannel Radio Terminals

AN/TRC-190(V)

Line-of-Sight Multichannel Radio Terminal

NSN: 5820-01-247-0981 (AN/TRC-190(V)1)
      5820-01-247-0979 (AN/TRC-190(V)2)
      5820-01-247-0982 (AN/TRC-190(V)3)
      5820-01-247-0980 (AN/TRC-190(V)4)

Reference: TM 11-5820-1023-13-1

General Information

There are four versions of the AN/TRC-190(V) LOS multichannel radio assemblage. The differences between the versions are the MSE assemblage they support and the number of LOS radios and antenna masts they contain, as shown below. All versions of the LOS radio assemblage consist of an S-250/G shelter transported on an M-1037 HMMWV.

Versions

(V)1 Supports RAU/SEN switch—consists of 2 radios, 1 antenna mast.
(V)2 Supports NATO analog interface (NAI)—consists of 2 radios, 1 antenna mast.
(V)3 Supports NC switch—consists of 4 radios, 3 antenna masts.
(V)4 Supports LEN switch—consists of 2 radios, 2 antenna masts.

Technical Characteristics

Power Requirements ........................................... 115 V AC, 50 or 60 Hz, single phase or 28 V DC
Frequency Range .......................... 225 to 400 MHz or 1350 to 1850 MHz LOS; 14.50 to 15.35 DTH
Transmission Range (Planning) ................. 30 km or 183 mi LOS; 2 to 5 km 1.2 to 3.1 mi DTH
Type of Modulation Group Data ......................... FSK
Major Components

AN/TRC-190(V)1

1 Utility Truck M-1037
1 Generator PU-751M, 5 kW
1 AC Power Cable, 15 feet
1 AC Power Cable, 35 feet
1 Shelter S-250/G
1 DC Power Cable
1 Antenna Mast AB-1339, 15 meters
1 Antenna, Band I
1 Antenna, Band III
1 Antenna Feed Horn, Band III
2 Antenna Cables, 45 feet
1 Antenna Cable, 65 feet
1 CX-11230 Cable, 1/4 mile
1 COMSEC TSEC/KY-57
1 Communication Modem MD-1270

or

Digital Data Modem MD-1231 (III Corps Only)

and

1 Orderwire Control Unit C-11878/T (III Corps Only)
1 Electronic Transfer Device KYK-13
2 RF Amplifiers AM-7345/GRC-226
1 SHF Radio Set GRC-224 (if equipped)
1 RF Unit, Band I RT-1537/GRC-225
1 RF Unit, Band III RT-1538/GRC-226
2 Intermediate Frequency (IF) Cable Assemblies
2 Data Cable Assemblies

AN/TRC-190(V)2

1 Utility Truck M-1037
1 Generator PU-751M, 5 kW
1 AC Power Cable, 15 feet
1 AC Power Cable, 35 feet
1 Electrical Shelter S-250
1 DC Power Cable
1 Antenna Mast AB-1339, 15 meters
1 Antenna, Band I
1 Antenna, Band III
1 Feed Horn Antenna, Band III
2 Antenna Cables, 45 feet
Major Components
(Cont.)

1 Antenna Cable, 65 feet
1 26-Pair NAI Cable, 250 feet
1 NATO Analog Interface CV-4002
1 Communications Modem MD-1270
  or
1 Multiplexer TD-1426 (HI Corps Only)
  and
1 Orderwire Control Unit C-11878/T (III Corps only)
1 COMSEC TSEC/KY-57
1 Trunk Encryption Device TSEC/KG-194A
1 Electronic Transfer Device KYK-13
2 RF Amplifier AM-7345/GRC-226
1 RF Unit, Band I RT-1537/GRC-226
2 IF Cable Assembly
2 Data Cable Assembly
1 RF Unit, Band III RT-1538/GRC-226

AN/TRC-190(V)3

1 Utility Truck M-1037
1 Generator PU-751/M, 5 kW
1 AC Power Cable, 15 feet
1 AC Power Cable, 35 feet
1 Electrical Shelter S-250
1 DC Power Cable
3 Antenna Mast AB-1339, 15 meters
2 Feed Horn Antennas, Band III
2 Antenna, Band I AS-3875/GRC-226
2 Antenna, Band III AS-3876/GRC-226
6 Antenna Cable, 45 feet
3 Antenna Cable, 65 feet
1 CX-11230 Cable, 1/4 mile
1 Transmission Group Multiplexer/Demultiplexer (TC-MD)
1 Power Supply, +5 V
1 COMSEC, TSEC/KY-57
FM 24-24

Major Components
(Cont.)

1 Communications Modem MD-1270
or
1 Orderwire Control Unit C-11878/T (III Corps Only)
3 RF Amplifier AM-7345/GRC-226
1 SHF Radio Set GRC-224 (if equipped)
1 Electronic Transfer Device KYK-13
2 RF Unit, Band I RT-1537/GRC-226
2 RF Unit, Band III RT-1538/GRC-226
3 IF Cable Assembly
3 Data Cable Assembly

AN/TRC-190(V)4

1 Utility Truck M-1037
1 Generator PU-751/M, 5 kW
1 AC Power Cable, 15 feet
1 AC Power Cable, 35 feet
1 Electrical Shelter S-250
1 DC Power Cable
2 Antenna Mast, 15 meters
4 Antenna Cable, 45 feet
1 Antenna, Band I AS-3875/GRC-226
1 Antenna, Band III AS-3876/GRC-226
2 Antenna Cables, 65 feet
2 CX-11230 Cables, 1/4 mile
1 Communication Modem MD-1270
or
1 Digital Data Modem MD-1231 (III Corps Only)
and
1 Orderwire Control Unit C-11878/T (III Corps Only)
1 Electronic Transfer Device KYK-13
2 RF Amplifiers AM-7345/GRC-226
2 SHF Radios AN/GRC-224
1 COMSEC TSEC/KY-57
1 RF Unit, Band I RT-1537/GRC-226
1 RF Unit, Band III RT-1538/GRC-226
2 IF Cable Assembly
2 Data Cable Assembly
AN/TRC-190(V)1
Multichannel Radio Terminal

ESD GROUND POINT
ORDERWIRE CONTROL UNIT
GROUP MODEM MD-1231
COMMUNICATIONS SECURITY EQUIPMENT KY-57
HANDSET H 350/U
SIGNAL ENTRY PANEL (SEP) / PATCH PANEL
ACCESS PANEL
RADIO SET AN/GRC-224(V)
CURBSIDE
HEATER
RADIO SET AN/GRC-224(P)

POWER CONTROL PANEL
CIRCUIT BREAKER PANEL
POWER ENTRY PANEL
REGULATOR/ BATTERY CHARGER
BATTERY BANK
ROADSIDE
AN/TRC-190(V)2
Multichannel Radio Terminal

- Communications Security Equipment KY-57
- Handset H 350/U
- Signal Entry Panel (SEP) / Patch Panel
- Access Panel
- ESD Ground Point
- Orderwire Control Unit
- Loop Group Multiplexer TC-1426 (P/Y)
- Heater
- Trunk Encryption Device KG-94A
- Curbside
- Power Control Panel
- Circuit Breaker Panel
- Power Entry Panel
- Regulator/Battery Charger
- Battery Bank
- Roadside
AN/TRC-190(V)3
Multichannel Radio Terminal

- Communications Security Equipment KY-57
- Handset H 350/1
- Signal Entry Panel (SEP) / Patch Panel
- Access Panel
- Orderwire Control Unit
- CURBSIDE
- RADIO SET AN/GRC-226(V)
- +5 V TGMD Power Supply
- HEATER
- POWER CONTROL PANEL
- Circuit Breaker Panel
- Power Entry Panel
- POWER CONTROL PANEL
- TGMD Status and Control Panel
- TGMD Card Set Unit
- BATTERY BANK
- ROADSIDE

FM 24-24
7-43
AN/TRC-190(V)4
Multichannel Radio Terminal

COMMUNICATIONS SECURITY EQUIPMENT KY-57
HANDSET / H 350/4U
SIGNAL ENTRY PANEL (SEP) / PATCH PANEL
ACCESS PANEL

RADIO SET AN/GRC-226(V)

ESD GROUND POINT
ORDERWIRE CONTROL UNIT
LOOP GROUP MULTIPLEXER TD-1426 (P)/T
HEATER
TRUNK ENCRYPTION DEVICE KG-94A
CURBSIDE

POWER CONTROL PANEL
CIRCUIT BREAKER PANEL
POWER ENTRY PANEL
REGULATOR/ BATTERY CHARGER
BATTERY BANK
ROADSIDE
Section VII. Mobile Subscriber Equipment Contingency Communications

AN/TTC-50 Communications Central

NSN: 5895-01-349-8064
Reference: TM 11-5805 -786-12-2

General Information

The AN/TTC-50 Communications Central (CC) is a part of the communications parent switch (CCPS) and the contingency communications extension switch (CCES). It can perform as an originating affiliation, disaffiliation, duplication, and automatic subscriber finder. It also provides nodal control. While in transit, the CC can operate as an MSRT via one of four RT-1539A radio sets and associated equipment installed in the shelter. The radio set also provides full-duplex, encrypted radio transmissions between mobile subscribers within proximity of each other or a fixed or mobile subscriber in the network through a CC. The CC is comprised of an extended S-250E electrical equipment shelter mounted on a heavy HMMWV. It tows two PU-753/M, 10 kW, trailer-mounted, diesel generator set, which provides power when the CC is emplaced and operating as a switch.

Major Components

1. Shelter S-250E/G
2. Junction Box J-1077A/U
3. Generator PU-753/M, 10 kW
4. Electronic Transfer Device KYX-15/TSEC
5. RF Multicoupler CV-2391/TRC-191
6. Electronic Transfer Device KYK-13/TSEC
7. Radio Sets RT-1539
8. Group Logic Unit C-11865/TRC-191
10. VINSON COMSEC Unit TSEC/KY-57
11. Antenna Mast AB-1339/G, 15 meters
12. Automatic Key Distribution Center, TSEC/KGX-93A
13. Data Processing Terminal AN/TSQ-154A
14. Switching Processor OL-386/TTC-39A
15. Frequency Oscillator O-1838/TTC-39A
16. Printer
17. Intercommunications Station LS-147
FM 24-24

Major Components
(Cont.)

4 Trunk Encryption Device TSEC/KG-194
1 Digital Computer AN/UYK-86(V)3
1 EL Display
1 RSS-D CP-1997
1 Keyboard
1 Packet Switch AN/TYC-20
1 TUNA, TSEC/HGF-96
8 Dual Loop Key Generators (LKG) KG-112
1 Environmental Control Unit
1 DNVT TA-1035/U
3 ThinLan Transceivers
1 VHF Whip Antenna AS-3885/TRC-191
1 CPS Headset Control

Parent Switch—4-Line Termination Units (LTUs)
Extension Switch—2-Line LTUs

Technical Characteristics

Power Requirements ...................... Primary — 115 V AC, 60 Hz, single Phase
Alternate — 28 V DC
Emergency — 24 V DC

Data Rates ................................. 16 kb/s to 256 kb/s
CCPS ........................................ 105 digital terminations (3 LTUs)
12 digital terminations (J-1077)
8 AUTOVON trunks
8 Commercial trunks (1 LTU)

CCES ........................................ 35 digital terminations (1 LTU)
12 digital terminations (J-1077)
8 AUTOVON trunks
8 Commercial trunks (1 LTU)
AN/TTC-50
Communications Central

Diagram of AN/TTC-50 Communications Central with various components labeled, including:
- Power Panel
- Communications Central
- Display
- Switch
- Breaker Panel
- Battery Charger
- Digital Computer
- Route Processor
- Patch Panel
- TDSG
- Power Processors (PS1, PS2)
- Switch Matrix
- TOD
- RF Multicoupler
- Lantern
- First Aid Kit
- Printers
- Switching Processor
- AKDC
- Timing Standard
AN/TTC-51
Communications Switching Set

NSN: 5895-01-349-8065
Reference: TM 11-5895-1527-13P

General Information

The AN/TTC-51 Communications Switching Set (CSS) is a portable, automatic communications switching system. It provides automatic switching for local subscribers, commercial office access, and ten digital encrypted trunks. The CSS also provides an operator position, combat net radio interface (CNRI), and I/O computer interfaces. CSS connects to the CC AN/TTC-50, or other MSE parent nodes via LOS radio links or cable. The CSS is comprised of a communication modem, a trunk encryption device, a VINSON COMSEC device, and an electronic transfer device mounted in the CSS transit case. The CSS also is comprised of a UPS, switchboard, an optional signal data converter, and all associated cabling and-grounding equipment.

Major Components

1 Transit Case, including
   1 Communication Modem
   1 Trunk Encryption Device KG-194A
   1 Electronic Transfer Device KYK-13
   1 VINSON COMSEC KY-57
   1 Handset H-350/U
   1 DNVT TA-1035/U

1 I/O Assembly Panel, including
   1 HVA
   1 Commercial ESA
   1 Commercial Filter

Internal Cable Set:
   1 UPS (28 V, 10 amp)

1 Storage Bag, including
   1 Remote Commercial Office Interface Assembly
**Major Components (Cont.)**

External Cable Assemblies:

- 1 Signal Cable, Switchboard to Communications Modem
- 1 Signal Cable, Switchboard to I/O Panel
- 1 DC Power Cable, UPS to I/O Panel
- 1 AC Power Cable, 25 feet, AC source to UPS
- 1 Signal Cable, Commercial Office to I/O Panel
- 1 AC Power Cable, AC source to Switchboard

**Technical Characteristics**

- **Power Requirements**: 115 V AC, 60 Hz, single phase
- **Performance Data-Switching Group**: 10-digital trunks, 16-digital loops (wire subscribers), 2 analog loops for commercial interphase I/O interface
- **CNRI**: 7-49
AN/TTC-51
Communications Switching Set

Switchboard

KY-57 Handset

TED

Communication Modem

Transit Case (Front View Cover Removed)

DNVT

Pressure Relief Valve

UPS
AN/TRC-198(V)1 and AN/TRC-198(V)2
Line-of-Sight Multichannel Radio Terminal

NSN: 5820-01-349-9241 (AN/TRC-198(V)1)
      5820-01-349-9240 (AN/TRC-198(V)2)

Reference: TM 11-5820-1114-13-1

General Information

The AN/TRC-198(V)1 and the AN/TRC-198(V)2 LOS Multichannel Radio Terminal is part of the contingency communications package (CCP) and is used with the contingency communications parent switch (CCPS). The AN/TRC-198(V)1 is a transportable radio communications link between other CCPSs, contingency communications extension switches (CCESs) and other MSE nodes. The AN/TRC-198(V)1 uses a maximum of three UHF radio sets which can be dismounted and used separately. The dismounted radio set is the AN/TRC-198(V)2. The shelterized version uses a standard S-250/G electrical equipment shelter transported on an M-1097, heavy shelter carrier HMMWV. A 200-amp alternator in the HMMWV provides DC power to the shelter, as an alternative to the primary power source, a PU-753/M, trailer-mounted, 10 kW, diesel generator.

Technical Characteristics

Power Requirements: Primary input power—115 V AC, 50 to 60 Hz, single phase
Alternate DC power — 28 V DC

Radio Transmission Data
UHF — 225 to 400 MHz (Band I)
       1350 to 1850 MHz (Band III)

Transmission Capacity Up to three simultaneous UHF transmissions

Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>AN/TRC-198(V)1</th>
<th>AN/TRC-198(V)2</th>
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<td>S-250/G shelter</td>
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<td>Generator PU-753/M, 10 kW</td>
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<td>VINSON COMSEC Unit KY-57</td>
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<td>Electronic Transfer Device KYK-13</td>
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<td>Baseband Unit</td>
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AN/TRC-198(V)1 and AN/TRC-198(V)2
Mounted

COMMUNICATIONS MODERN
MD-1270(P)/T

SIGNAL ENTRY PANEL
(SEP) / PATCH PANEL

UHF RADIO SET
AN/GRC-226

RADIO HANDSET

UHF RADIO SET
AN/GRC-226

HEATER

COMMUNICATIONS SECURITY
EQUIPMENT KY-57 AND
HANDSET H-350/U

COMMUNICATIONS SECURITY
EQUIPMENT KY-57 AND
HANDSET H-350/U

CURBESIDE

POWER CONTROL PANEL

CIRCUIT BREAKER PANEL

POWER ENTRY PANEL

REGULATOR/BATTERY CHARGER

BATTERY BANK

ROADSIDE

COMMUNICATIONS MODERN
MD-1270(P)/T

CE2NV003
AN/TRC-198(V)1 and AN/TRC-198(V)2
Dismounted

UHF RADIO SET
AN/GRC-26

COMMUNICATIONS SECURITY
KY-57

COMMUNICATIONS MODEM
MD-1270(P)/T

RADIO HANDSET

HANDSET
H-350/U

UNIVERSAL POWER SUPPLY
# Glossary

## Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AAU</td>
<td>analog applique unit</td>
</tr>
<tr>
<td>AC</td>
<td>alternating current</td>
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<tr>
<td>ACP</td>
<td>Allied Communication Publication</td>
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<td>ACT</td>
<td>automatic continuous tuning</td>
</tr>
<tr>
<td>AD</td>
<td>analog-to-digital</td>
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<tr>
<td>ADC</td>
<td>analog digital combiner</td>
</tr>
<tr>
<td>ADF</td>
<td>automatic direction finder</td>
</tr>
<tr>
<td>ADM</td>
<td>atomic demolition munitions</td>
</tr>
<tr>
<td>ADP</td>
<td>automatic data processor</td>
</tr>
<tr>
<td>AFSAT</td>
<td>Air Force satellite</td>
</tr>
<tr>
<td>AHIP</td>
<td>advance helicopter improvement program</td>
</tr>
<tr>
<td>AI</td>
<td>airborne intercept</td>
</tr>
<tr>
<td>ALCG</td>
<td>analog line conditioner group</td>
</tr>
<tr>
<td>AM</td>
<td>amplitude modulated</td>
</tr>
<tr>
<td>AME</td>
<td>amplitude modulation equivalent</td>
</tr>
<tr>
<td>AMME</td>
<td>automated message media equipment</td>
</tr>
<tr>
<td>amp</td>
<td>ampere</td>
</tr>
<tr>
<td>amp-hr</td>
<td>ampere-hour</td>
</tr>
<tr>
<td>ANDVT</td>
<td>advance narrow-band digital voice terminal</td>
</tr>
<tr>
<td>ant</td>
<td>antenna</td>
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<td>AR</td>
<td>Army regulation</td>
</tr>
<tr>
<td>ASCII</td>
<td>American Standard Code for Information Interchange</td>
</tr>
<tr>
<td>ASI</td>
<td>alarm status indicator</td>
</tr>
<tr>
<td>ASR</td>
<td>airport surveillance radar</td>
</tr>
<tr>
<td>assy</td>
<td>assembly</td>
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<tr>
<td>ATACS</td>
<td>Army Tactical Communications Systems</td>
</tr>
<tr>
<td>ATC</td>
<td>air traffic control</td>
</tr>
<tr>
<td>ATCSS</td>
<td>Air Traffic Control Signaling System</td>
</tr>
<tr>
<td>attn</td>
<td>attention</td>
</tr>
<tr>
<td>auto</td>
<td>automatic</td>
</tr>
<tr>
<td>AUTODIN</td>
<td>Automatic Digital Network</td>
</tr>
<tr>
<td>AUTOSEVOCOM</td>
<td>automatic secure voice communications</td>
</tr>
<tr>
<td>AUTOVON</td>
<td>automatic voice network</td>
</tr>
<tr>
<td>AWG</td>
<td>American wire gauge</td>
</tr>
<tr>
<td>az</td>
<td>azimuth</td>
</tr>
<tr>
<td>BFO</td>
<td>beat frequency oscillator</td>
</tr>
<tr>
<td>BITE</td>
<td>built in test equipment</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>BP</td>
<td>binding post</td>
</tr>
<tr>
<td>bp/s</td>
<td>bits per second</td>
</tr>
<tr>
<td>BTU</td>
<td>British thermal unit</td>
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<tr>
<td>CBR</td>
<td>chemical, biological, radiological (also see NBC)</td>
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<tr>
<td>CCA</td>
<td>circuit card assembly</td>
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<tr>
<td>CD</td>
<td>cable driver</td>
</tr>
<tr>
<td>CDM</td>
<td>cable driver modem</td>
</tr>
<tr>
<td>CE</td>
<td>communications-electronics</td>
</tr>
<tr>
<td>CEG</td>
<td>common equipment group</td>
</tr>
<tr>
<td>CEP</td>
<td>circular error probable</td>
</tr>
<tr>
<td>CESE</td>
<td>communications equipment support element</td>
</tr>
<tr>
<td>ch</td>
<td>channel</td>
</tr>
<tr>
<td>CICM</td>
<td>communications interface controller module</td>
</tr>
<tr>
<td>CIP</td>
<td>communications interface processor</td>
</tr>
<tr>
<td>CIS</td>
<td>communications interface shelter</td>
</tr>
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<td>civ</td>
<td>civilian</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter</td>
</tr>
<tr>
<td>CN</td>
<td>command network</td>
</tr>
<tr>
<td>CNCE</td>
<td>communications nodal control element</td>
</tr>
<tr>
<td>CNR</td>
<td>combat net radio</td>
</tr>
<tr>
<td>CNRI</td>
<td>combat net radio interface</td>
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<tr>
<td>coax</td>
<td>coaxial</td>
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<td>COMMZ</td>
<td>communications zone</td>
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<td>COMSEC</td>
<td>communications security</td>
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<tr>
<td>CONUS</td>
<td>continental United States</td>
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<tr>
<td>COU</td>
<td>cable orderwire unit</td>
</tr>
<tr>
<td>CP</td>
<td>command post</td>
</tr>
<tr>
<td>CPG</td>
<td>central processor group</td>
</tr>
<tr>
<td>CPS</td>
<td>contractor plant services</td>
</tr>
<tr>
<td>CPU</td>
<td>central processing unit</td>
</tr>
<tr>
<td>CSCE</td>
<td>communications system control element</td>
</tr>
<tr>
<td>CSLA</td>
<td>communications security logistics activity</td>
</tr>
<tr>
<td>CSP</td>
<td>call service position</td>
</tr>
<tr>
<td>CSS</td>
<td>combat service support</td>
</tr>
<tr>
<td>CW</td>
<td>continuous wave</td>
</tr>
<tr>
<td>DA</td>
<td>Department of the Army</td>
</tr>
<tr>
<td>DACB</td>
<td>data adapter control block</td>
</tr>
<tr>
<td>DAMA</td>
<td>demand assign multiple access</td>
</tr>
<tr>
<td>dB</td>
<td>decibel</td>
</tr>
<tr>
<td>dBm</td>
<td>decibels above (or below) one milliwatt</td>
</tr>
<tr>
<td>DCO</td>
<td>dial central office</td>
</tr>
<tr>
<td>DC</td>
<td>direct current</td>
</tr>
<tr>
<td>DCA</td>
<td>Defense Communications Agency</td>
</tr>
<tr>
<td>DCS</td>
<td>Defense Communications System</td>
</tr>
<tr>
<td>DCSI</td>
<td>data channel status indicators</td>
</tr>
<tr>
<td>DD</td>
<td>data devices</td>
</tr>
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</table>
DDD  direct distance dial
demux  demultiplexer
DG  directional gyro
DGM  digital group multiplexer
DIBITS  digital in-band trunk signaling
div  division
DLED  digital line encryption device
DLTM  digital line terminating module
DME  distance measuring equipment
DNVT  digital nonsecure voice telephone
DOCS  Defense Operational Control System
DOW  data orderwire
DSCS  defense satellite communications system
DSDI  digital simple data interface
DSN  Defense Switching Network
DSVT  digital secure voice terminal
DTG  digital transmission group
DTH  down-the-hill
dTMF  dual tone multifrequency
DVOW  digital voice orderwire
ea  each
EAC  echelons above corps
EAM  emergency action message
ECB  echelons corps and below
ECU  environmental control unit
EHF  extremely high frequency
el  elevation
EOW  engineering orderwire
ETD  electronic transfer device
ext  exterior
FC  field circular
FCC  Flight Coordination Center
FDM  frequency division multiplex
FDMA  frequency division multiple access
FM  frequency modulated; field manual when used with a number
FN  force network
FOC  flight operations center
FSK  frequency shift keying
FSN  Federal stock number
ft  feet
g  gram
gal  gallon
GCA  ground controlled approach
GHz  gigahertz
GM  group modern
GMF  ground mobile forces
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>GMFSC</td>
<td>ground mobile forces satellite communications</td>
</tr>
<tr>
<td>GS</td>
<td>glide slope</td>
</tr>
<tr>
<td>HF</td>
<td>high frequency</td>
</tr>
<tr>
<td>HMMWV</td>
<td>high mobility multipurpose wheeled vehicle</td>
</tr>
<tr>
<td>HQ</td>
<td>headquarters</td>
</tr>
<tr>
<td>HSCDM</td>
<td>high speed cable driver modem</td>
</tr>
<tr>
<td>HSPR</td>
<td>high speed pulse restorer</td>
</tr>
<tr>
<td>Hz</td>
<td>hertz</td>
</tr>
<tr>
<td>I/O</td>
<td>input/output</td>
</tr>
<tr>
<td>ICU</td>
<td>interface control unit</td>
</tr>
<tr>
<td>IHFR</td>
<td>improved high frequency radio</td>
</tr>
<tr>
<td>ILS</td>
<td>instrument landing system</td>
</tr>
<tr>
<td>imp</td>
<td>impedance</td>
</tr>
<tr>
<td>in</td>
<td>inch</td>
</tr>
<tr>
<td>int</td>
<td>interior</td>
</tr>
<tr>
<td>INTACS</td>
<td>Integrated Tactical Communications System</td>
</tr>
<tr>
<td>IWCS</td>
<td>Integrated Wideband Communications Systems</td>
</tr>
<tr>
<td>JANAP</td>
<td>Joint Army-Navy-Air Force Publication</td>
</tr>
<tr>
<td>kb/s</td>
<td>kilobit per second</td>
</tr>
<tr>
<td>kc</td>
<td>kilocycles (superseded by kilohertz)</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram</td>
</tr>
<tr>
<td>kHz</td>
<td>kilohertz</td>
</tr>
<tr>
<td>km</td>
<td>kilometer</td>
</tr>
<tr>
<td>kw</td>
<td>kilowatt</td>
</tr>
<tr>
<td>l</td>
<td>liter</td>
</tr>
<tr>
<td>lb</td>
<td>pound(s)</td>
</tr>
<tr>
<td>LCSP</td>
<td>local call service position</td>
</tr>
<tr>
<td>LDF</td>
<td>lightweight digital facsimile</td>
</tr>
<tr>
<td>LEN</td>
<td>large extension node</td>
</tr>
<tr>
<td>LENS</td>
<td>large extension node switch</td>
</tr>
<tr>
<td>LF</td>
<td>low frequency</td>
</tr>
<tr>
<td>LGM</td>
<td>loop group multiplexer</td>
</tr>
<tr>
<td>loc</td>
<td>localizer</td>
</tr>
<tr>
<td>LOS</td>
<td>line-of-sight</td>
</tr>
<tr>
<td>LSB</td>
<td>lower sideband</td>
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<tr>
<td>LSCDM</td>
<td>low speed cable driver modem</td>
</tr>
<tr>
<td>LSI</td>
<td>large-scale integration</td>
</tr>
<tr>
<td>LSPR</td>
<td>low speed pulse restorer</td>
</tr>
<tr>
<td>m</td>
<td>meter</td>
</tr>
<tr>
<td>mA</td>
<td>milliampere</td>
</tr>
<tr>
<td>MACOM</td>
<td>major Army command</td>
</tr>
<tr>
<td>max</td>
<td>maximum</td>
</tr>
<tr>
<td>MB</td>
<td>marker beacon</td>
</tr>
<tr>
<td>mb/s</td>
<td>megabits per second</td>
</tr>
<tr>
<td>mc</td>
<td>megacycles</td>
</tr>
<tr>
<td>MCW</td>
<td>modulated continuous wave</td>
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**Glossary-4**
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>MECI</td>
<td>mission essential contingency items</td>
</tr>
<tr>
<td>MF</td>
<td>medium frequency</td>
</tr>
<tr>
<td>MGM</td>
<td>master group multiplexer</td>
</tr>
<tr>
<td>MHz</td>
<td>megahertz</td>
</tr>
<tr>
<td>mi</td>
<td>mile</td>
</tr>
<tr>
<td>MIL-STD</td>
<td>military standard</td>
</tr>
<tr>
<td>mist</td>
<td>miscellaneous</td>
</tr>
<tr>
<td>mod</td>
<td>modified</td>
</tr>
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<td>MPS</td>
<td>message processing shelter</td>
</tr>
<tr>
<td>MPU</td>
<td>message processing unit</td>
</tr>
<tr>
<td>MRTT</td>
<td>modular record traffic terminal</td>
</tr>
<tr>
<td>MSA</td>
<td>mobile subscriber access</td>
</tr>
<tr>
<td>MSE</td>
<td>mobile subscriber equipment</td>
</tr>
<tr>
<td>msec</td>
<td>millisecond</td>
</tr>
<tr>
<td>MSRT</td>
<td>mobile subscriber radiotelephone terminal</td>
</tr>
<tr>
<td>MT</td>
<td>metric ton</td>
</tr>
<tr>
<td>MTCC</td>
<td>modular tactical communications center</td>
</tr>
<tr>
<td>mtg</td>
<td>mounting</td>
</tr>
<tr>
<td>MTT</td>
<td>magnetic tape transport</td>
</tr>
<tr>
<td>MTU</td>
<td>magnetic tape unit</td>
</tr>
<tr>
<td>mux</td>
<td>multiplexer</td>
</tr>
<tr>
<td>mV</td>
<td>millivolt</td>
</tr>
<tr>
<td>mw</td>
<td>milliwatt</td>
</tr>
<tr>
<td>N/A</td>
<td>not applicable</td>
</tr>
<tr>
<td>NATO</td>
<td>North Atlantic Treaty Organization</td>
</tr>
<tr>
<td>NBC</td>
<td>nuclear, biological, chemical (also see CBR)</td>
</tr>
<tr>
<td>NC</td>
<td>node center</td>
</tr>
<tr>
<td>NCS</td>
<td>net control station</td>
</tr>
<tr>
<td>NICAD</td>
<td>nickel cadmium</td>
</tr>
<tr>
<td>NICS</td>
<td>NATO Integrated Communications System</td>
</tr>
<tr>
<td>ns</td>
<td>number</td>
</tr>
<tr>
<td>nomen</td>
<td>nomenclature</td>
</tr>
<tr>
<td>norm</td>
<td>normal</td>
</tr>
<tr>
<td>NRI</td>
<td>net radio interface</td>
</tr>
<tr>
<td>NRZ</td>
<td>nonreturn to zero</td>
</tr>
<tr>
<td>NSK</td>
<td>narrow-frequency shift keying</td>
</tr>
<tr>
<td>NSN</td>
<td>national stock number</td>
</tr>
<tr>
<td>NTIA</td>
<td>National Telecommunications and Information Administration</td>
</tr>
<tr>
<td>NVIS</td>
<td>near vertical incidence skywave</td>
</tr>
<tr>
<td>OCONUS</td>
<td>outside continental United States</td>
</tr>
<tr>
<td>OCU</td>
<td>orderwire control unit</td>
</tr>
<tr>
<td>OW</td>
<td>orderwire</td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
</tr>
<tr>
<td>PCM</td>
<td>pulse code modulation</td>
</tr>
<tr>
<td>PEP</td>
<td>peak-envelope power</td>
</tr>
<tr>
<td>PM</td>
<td>pulse modulated</td>
</tr>
</tbody>
</table>
pos | position
---|---
PPI | plan position indicator
PPM | pulse position modulation
PPS | pulses per second
pr | pair
PS | power supply
pwr | power
QRA | quick reaction antenna
qty | quantity
RADAR | radio detection and ranging
RASU | random access storage unit
RATT | radio teletypewriter
RAU | radio access unit
rcvr | receiver
rec | receive
RF | radio frequency
RIW | reliability improvement warranty
RLGM | remote loop group multiplexer
RMC | remote multiplexer-combiner
RP | rapid patch
RT | receiver-transmitter
RWI | radio wire integration
SAM | surface-to-air missile
SAT | satellite
SATCOM | satellite communication(s)
SCC-2 | system control center-2
SCS | Special Communications System
SCT | single channel transponder
SDNRIU | secure digital net radio interface unit
SDSG | space division switching group
SEN | small extension node
SENS | small extension node switch
SEP | signal entry panel
SHF | super high frequency
SIF | selective identification feature (used with IFF)
sig | signal
SIÑCGARS | Single-Channel Ground and Airborne Radio Systems
sp | spare
SRWBR | shortwave wideband radio
SSB | single sideband
SST | single subscriber terminal
STANAG | Standardization Agreement
std | standard
SVT | subscriber voice terminals
sync | synchronize
sys | system

Glossary-6
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>ton</td>
</tr>
<tr>
<td>TACAN</td>
<td>tactical air navigation</td>
</tr>
<tr>
<td>TACSAT</td>
<td>tactical satellite</td>
</tr>
<tr>
<td>TACSATCOM</td>
<td>tactical satellite communications</td>
</tr>
<tr>
<td>TAS</td>
<td>tactical automatic switch</td>
</tr>
<tr>
<td>TB</td>
<td>technical bulletin</td>
</tr>
<tr>
<td>TCP</td>
<td>tactical computer processor</td>
</tr>
<tr>
<td>TD</td>
<td>transmitter distributor</td>
</tr>
<tr>
<td>TDDM</td>
<td>time division digital multiplexer</td>
</tr>
<tr>
<td>TDF</td>
<td>tactical digital facsimile</td>
</tr>
<tr>
<td>TDM</td>
<td>time division multiplexing</td>
</tr>
<tr>
<td>TDSG</td>
<td>time division switching group</td>
</tr>
<tr>
<td>TED</td>
<td>trunk encryption device</td>
</tr>
<tr>
<td>tel</td>
<td>telephone (also see tp)</td>
</tr>
<tr>
<td>tg</td>
<td>telegraph</td>
</tr>
<tr>
<td>TGM</td>
<td>trunk group multiplexer</td>
</tr>
<tr>
<td>TM</td>
<td>technical manual</td>
</tr>
<tr>
<td>TOE</td>
<td>table(s) of organization and equipment</td>
</tr>
<tr>
<td>tp</td>
<td>telephone (also see tel)</td>
</tr>
<tr>
<td>TR</td>
<td>transmit receive</td>
</tr>
<tr>
<td>TRADOC</td>
<td>Training and Doctrine Command</td>
</tr>
<tr>
<td>TRI-TAC</td>
<td>Tri-Service Tactical Communications</td>
</tr>
<tr>
<td>TSSP</td>
<td>tactical satellite signal processor</td>
</tr>
<tr>
<td>TTY</td>
<td>teletypewriter</td>
</tr>
<tr>
<td>UHF</td>
<td>ultra high frequency</td>
</tr>
<tr>
<td>ULMS</td>
<td>unit level message switch</td>
</tr>
<tr>
<td>UPS</td>
<td>uninterrupted power system</td>
</tr>
<tr>
<td>US</td>
<td>United States (of America)</td>
</tr>
<tr>
<td>USA</td>
<td>United States Army</td>
</tr>
<tr>
<td>USB</td>
<td>upper sideband</td>
</tr>
<tr>
<td>UTM</td>
<td>universal transverse Mercator (grid)</td>
</tr>
<tr>
<td>v</td>
<td>volt</td>
</tr>
<tr>
<td>VA</td>
<td>volt-ampere</td>
</tr>
<tr>
<td>VDU</td>
<td>visual display unit</td>
</tr>
<tr>
<td>VF</td>
<td>voice frequency</td>
</tr>
<tr>
<td>VHF</td>
<td>very high frequency</td>
</tr>
<tr>
<td>VINSON</td>
<td>secure device for voice and FM communications</td>
</tr>
<tr>
<td>VOR</td>
<td>VHF omnidirectional range</td>
</tr>
<tr>
<td>W</td>
<td>watt</td>
</tr>
<tr>
<td>wpm</td>
<td>words per minute</td>
</tr>
<tr>
<td>yd</td>
<td>yard</td>
</tr>
</tbody>
</table>
References

READINGS RECOMMENDED

These readings contain relevant supplemental information.

Technical Manuals (TM)

11-2138  Terminal Box, TA-125/GT; Telephone Repeating coil Assembly, TA-145/GT; Maintenance Kit, MX-842/GT and Switchboard Signal, TA-123/GT. December 1983.


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By Order of the Secretary of the Army:

Official:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army

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