TM 11-5805-367-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

MULTIPLEXERS TD-202/U (NSN 5805-00-884-2176), TD-203/U (NSN 5805-00-884-2177), TD-204/U (NSN 5805-00-900-8200), TD-352/U (NSN 5805-00-900-8199), TD-353/U (NSN 5805-00-985-9153), RESTORERS, PULSE FORM, TD-206/G (NSN 5805-00-868-8078) AND TD-206B/G (NSN 5805-01-020-2251), AND CONVERTERS, TELEPHONE SIGNAL CV-1548/G (NSN 5805-00-069-8795), AND CV-1548A/G (NSN 5805-00-069-8795)

This copy is a reprint which includes current pages from Changes 1 through 9.

HEADQUARTERS, DEPARTMENT OF THE ARMY

30 AUGUST 1966

WARNING

HIGH VOLTAGE

DEATH ON CONTACT

may result if safety precautions

are not observed.

DANGEROUS VOLTAGES ARE PRESENT

IN THE FOLLOWING UNITS:

Multiplexer TD-204/U ----------1,100 volts
Restorer, Pulse Form TD-206/G ----------1,100 volts

DON'T TAKE CHANCES!

CAUTION

Do not make screwdriver adjustments in this equipment unless specifcally directed. Indiscriminate adjustment will render this equipment inoperable.

Change
No. 9

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 June 1986

Operator's and Organizational Maintenance Manual
MULTIPLEXERS TD-202/U (NSN 5805-00-884-2176), TD-203/U (NSN 5805-00-884-2177), TD-204/U (NSN 5805-00-900-8200), TD-352/U (NSN 5805-00-900-8199), AND TD-353/U (NSN 5805-00-985-9153), RESTORERS, PULSE FORM TD-206/G (NSN 5805-00-868-8078), AND TD-206B/G (NSN 5805-01-020-2251), AND CONVERTERS, TELEPHONE SIGNAL CV-1548/G AND CV-1548A/G (NSN 5805-00-069-8795)

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Remove pages	*Insert pages*
i through iv	i through iv
1-1 and 1-2	1-1 and 1-2
1-9 through 1-10.2	1-2 through 1-10.2
2-17 and 2-18	2-17 and 2-18
3-5 and 3-6	3-5 and 3-6
4-19 through 4-26	4-19 through 4-26
A-1/(A-2 blank)	A-1 and A-2
C-3 through C-10	C-3 through C-10
C-13 and C-14	C-13 and C-14
C-17 and C-18	C-17 and C-18
C-21 through C-28	C-21 through C-28
C-31 through C-34	C-31 through C-34

2. File this change sheet in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-51 literature requirements for TD-202/U, TD-203/U, TD-204/U, TD-206/U, TD-206B, TD-352/U, and TD-353/U.

CHANGE

No. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 14 May 1984

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL MULTIPLEXERS TD 202/U (NSN 5805-00-884-2176), TD-203/U (NSN 5805-00-884-2177), TD-204/U (NSN 5805-00-900-8200), TD-352/U (NSN 5805-00-900-8199), AND TD-353/U (NSN 5805-00-985-9153); RESTORERS, PULSE FORM TD-206/G (NSN 5805-00-868-8078) AND TD-206B/G (NSN 5805-01-020-2251); AND CONVERTERS, TELEPHONE SIGNAL CV-1548/G AND CV-1548A/G (NSN 5805-00-069-8795)

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Remove pages	*Insert pages*
1-1 and 1-2	1-1 and 1-2
3-27 through 3-30	3-27 through 3-30
4-1 through 4-8.2	4-1 through 4-6
A-1	A-1/(A-2 Blank)

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General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-51C, Operator Maintenance, requireme for TD-202/U.

CHANGE
No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *29 January 1983*

Operator's and Organizational Maintenance Manual
MULTIPLEXERS TD-202/U (NSN 5805–00–884–2176), TD-203/U (NSN 5805–00–884–2177), TD-204/U (NSN 5805–00–900–8200), TD-352/U (NSN 5805–00–900–8199), and TD-353/U (NSN 5805–00–985–9153); RESTORERS, PULSE FORM TD-206/G (NSN 5805–00–868–8078) and TD-206B/G (NSN 5805–01–020–2251); and CONVERTERS, TELEPHONE SIGNAL CV–1548/G and CV–1548A/G (NSN 5805–00–069–8795)

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None	A through D
i and ii	i and iv
1-1 and 1-2	1-1 and 1-2
1-9 through 1-10.2	1-9 through 1-10.1 (1-10.2 Blank)
2-1 and 2-2	2-1 and 2-2
2-11 and 2-12	2-11 and 2-12
2-17 and 2-18	2-17 and 2-18
3-5 and 3-6	3-5 and 3-6
3-13 and 3-14	3-13 and 3-14
3-21 and 3-22	3-21 and 3-22
3-27 and 3-28	3-27 and 3-28
4-1 through 4-8	4-1 through 4-8.2
4-21 and 4-22	4-21 and 4-22
4-25 through 4-28	4-25 through 4-28
6-41	6-41
6-43	6-43
6-49	6-49
A-1	A-1
C-1 through C-12	C-1 through C-34
None	D-1 and D-2

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CHANGE
No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC *10 April 1979*

Operator's and Organizational Maintenance Manual MULTIPLEXERS TD-202/U (NSN 5805-00-884-2176), TD-203/U (NSN 5805-00-884-2177), TD-204/U (NSN 5805-00-900-8200), TD-352/U (NSN 5805-00-900-8199), AND TD-353/U (NSN 5805-00-985-9153), RESTORERS, PULSE FORM TD-206/G (NSN 5805-00-868-8078), AND TD-206B/G (NSN 5805-01-020-2251), AND CONVERTERS, TELEPHONE SIGNAL CV-1548/G (NSN 5805-00-069-8795) AND CV-1548A/G (NSN 5805-00-069-8795)

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Remove	*Insert*
i and ii	i through iii
1-1 and 1-2	1-1 and 1-2
1-5 through 1-8	1-5 through 1-8
	1-8.1/(1-8.2 blank)
1-9 through 1-10.3	1-9 through 1-10.4
2-1 and 2-2	2-1 and 2-2
2-7 and 2-8	2-7 and 2-8
3-1 and 3-2	3-1 and 3-2
4-23 through 4-26	4-23 through 4-26
6-1	None
A-1	A-1
C-7 and C-8	C-7 and C-8
	C-8.1/(C-8.2 blank)
C-9 and C-10	C-9 through C-12
	DA Form 2028-2 (insert in rear of manual)
6-41 (FO) and 6-43 (FO)	6-41 (FO) and 6-43 (FO)

4. File this sheet in front of publication for reference purposes.

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General, United States Army
Chief of Staff

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USACC-SO (2)
USACC-A (2)
Ft Gordon (10)
Ft Huachuca (10)
Ft Carson (5)
Army Dep (1) except
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  SAAD (30)
  TOAD (14)
  SHAD (3)
Ft Gillem (10)
USA Dep (1)
Sig Sec USA Dep (1)
Ft Richardson (CERCOM Ofc) (2)
Units org under fol TOE:
  29-207 (2)
  29-610 (2)
  7 (1)
11-15 (1)
11-17 (1)
11-18 (1)
11-19 (1)
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11-215 (1)
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11-225 (1)
11-227 (1)
11-228 (1)
11-237 (1)
11-302 (1)
11-327 (1)
11-345 (1)
11-347 (1)
11-357 (1)
11-367 (1)
11-368 (1)
11-377 (1)
11-500 (AA-AC) (1)
17 (1)
29-134 (1)
29-136 (1)
32-52 (1)
32-56 (1)
32-78 (1)
32-500 (1)
37 (1)
39-51 (1)
44-235 (1)
44-236 (1)
44-535 (1)
44-536 (1)

NG: None
USAR: None
For explanation of abbreviations used, see AR 310-50.

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNINGS

Do not touch installed Restorer, Pulse Form TD-206/G during electrical storms or wet weather conditions. A lightning strike can cause a dangerous high voltage condition in a pcm cable link. Serious injury or death may result from contact with these circuits.

Operate the CABLE POWER switch of the TD-204/U or other cable current source to OFF at both ends of the cable link before disconnecting or connecting cables to the TD-206/G. If the CABLE POWER switch is at ON, dangerous voltages up to 1,100 volts can be present at cable connectors.

TD-202 and TD-203/U weigh 50 pounds. Be *careful* when moving. Two person lift required.

The following components are *heavy!* Be *careful* when moving!

Item	*Weight*
TD-202/U, TD-203/U	50
TD-204/U	56
TD-352/U	102
TD-353/U	131
CV-1458/G	54

Two person lift required for TD-202/U, TD-203/U, and CV-1458/G. Four person lift required for TD-352/U and TD-353/U.

Prevent injury when applying or removing steel strapping by wearing heavy gloves and a face shield or goggles (NSN 4240-00-542-2048). Do not handle packing cartons by the steel strapping.

Compressed air shall not be used for cleaning purposes except where reduced to less than 29 pounds per square inch (psi) and then only with effective chip guarding and personnel protective equipment. Do not use compressed air to dry parts when TRICHLOROTRIFLUOROETHANE has been used. Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent chip or particle (of whatever size) from being blown into the eyes or unbroken skin of the operator or other personnel.

Adequate ventilation should be provided while using TRICHLOROTRIFLUORO-ETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

Technical Manual

No. 11-5805-367-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 30 August 1966

Operator's and Organizational Maintenance Manual

MULTIPLEXERS TD-202/U (NSN 5805-00-884-2176),
TD-203/U (NSN 5805-00-884-2177),
TD-204/U (NSN 5805-00-900-8200),
TD-352/U (NSN 5805-00-900-8199),
AND TD-353/U (NSN 5805-00-985-9153),
RESTORERS, PULSE FORM TD-206/G (NSN 5805-00-868-8078)
AND TD-206B/G (NSN 5805-01-020-2251)
AND CONVERTERS, TELEPHONE SIGNAL
CV-1548/G AND CV-1548A/G (NSN 5805-00-069-8795)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5007.

In either ease, a reply will be furnished direct to you.

LIST OF ILLUSTRATIONS

FOLD-OUT ILLUSTRATIONS-Located at back of the manual

CHAPTER 1
INTRODUCTION

Section I. GENERAL

NOTE

Converter, Telephone Signal CV-1548A/G is similar to Converter CV-1548/G, except that the TEST ALIGN meter, meter selector switch, and associated wiring and front panel marking are deleted. In this manual CV-1548/G applies to both sets unless otherwise specified. Restorer, Pulse Form TD-206/G is issued in two configurations which interface with two different cable types. Restorer TD-206B/G is similar to Restorer TD-206/G except for end cap configuration. Differences are summarized as follows:

Restorer, Pulse Form	*Intefaces With Cable, Special Purpose Electrical*
TD-206/G with 7A2 end cap	CX-4245/G
TD-206 55/G with 7A4 end cap	CX-11230/G
TD-206BIG	CX-11230/G

In this manual, the designation TD-206/G applies to all sets unless otherwise specified.

1-1. Scope

This manual describes Multiplexers TD-202/U, TD-203/U, TD-204/U, TD-352/U, and TD-353/U; Restorer, Pulse Form TD-206/G; and Converter, Telephone Signal CV-1548/G. It includes instructions for installation, operation, and organizational maintenance. Simplified instruction charts for each of these components are provided in figures 6-20 through 6-25.

1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additonal publications pertaining to the equipment.

1-3. Maintenance Forms, Records and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Army Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-3.1. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey 07703-5023. We'll send you a reply.

1-3.2. Administrative Storage

Administrative storage or equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in TM740-90-l.

1-3.3. Destruction of Army Electronics Materiel

Destruction of Army electronics material to prevent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

The TD-202/U, TD-203/U, TD-204/U, TD-206/U, TD-352/U, TD-353/U, and CV-1548/G provide voice frequency (vf) channel multiplexing-demultiplexing and telephone signal conversion in multichannel communication systems. Typical multichannel communication systems, using the components mentioned, above, are illustrated in figures 6-1 through 6-4.

a. Multiplexer TD-202/U (fig.1-1). The TD-202/U is a 12- or 24-channel, pulse code modulation (pcm), radio transmission interface unit. Its transmit section accepts time division mulitplex (tdm) pcm outputs from one or two TD-352/U's, a TD-204/U or from another TD-202/U, and processes these outputs for radio transmission. The receive section accepts a pcm signal from a radio receiver, processes and retimes it, and extracts the order wire signal.

b. Multiplexer TD-203/U (fig. 1-1.1). The TD-203/U is a 48- or 96-channel pcm radio transmission interface unit which performs the same function described above for the TD-202/U, except that it operates with the TD-353/U, TD-204/U, or another TD-203/U.

c. Multiplexer TD-204/U (fig. 1-2). The TD-204/U is a 12-, 24-, or 48-channel pcm cable transmission interface unit. Its transmit section accepts tdm-pcm output signals from a TD-353/U, from one or two TD-352/U's, from another TD-204/U, a TD-203/U, or TD-202/U, and processes these signals for cable transmission. The receive section accepts a pcm signal from the transmission cable, processes and retirees it. In addition, the TD-204/U provides power for up to 39 TD-206/G's in the transmission cable, and contains an order wire facility.

d. Multiplexer TD-352/U (fig. 1-3). The TD-352/U converts 12 four-wire voice-frequency channels to a tdm-pcm signal in its transmit section, and vice versa in its receive section. Two TD-352/U's are used with a TD-202/U or TD-204/U to provide a 24-channel capacity.

e. Multiplexer TD-353/U (fig. 1-4). The TD-353/U performs the same function described above for the TD-352/U, except that it has a 48-channel capacity. Two TD-353/U's are used with a TD-203/U to provide 96-channel capacity. One TD-353/U is used with one TD-204/U to provide 48-channel capacity.

f. Restorer, Pulse Form TD-206/G (fig. 1-5) and (fig. 1-5.1), and Restorer, Pulse Form TD-206B/G (fig. 1-5.2). The TD-206/G is a two-way unattended

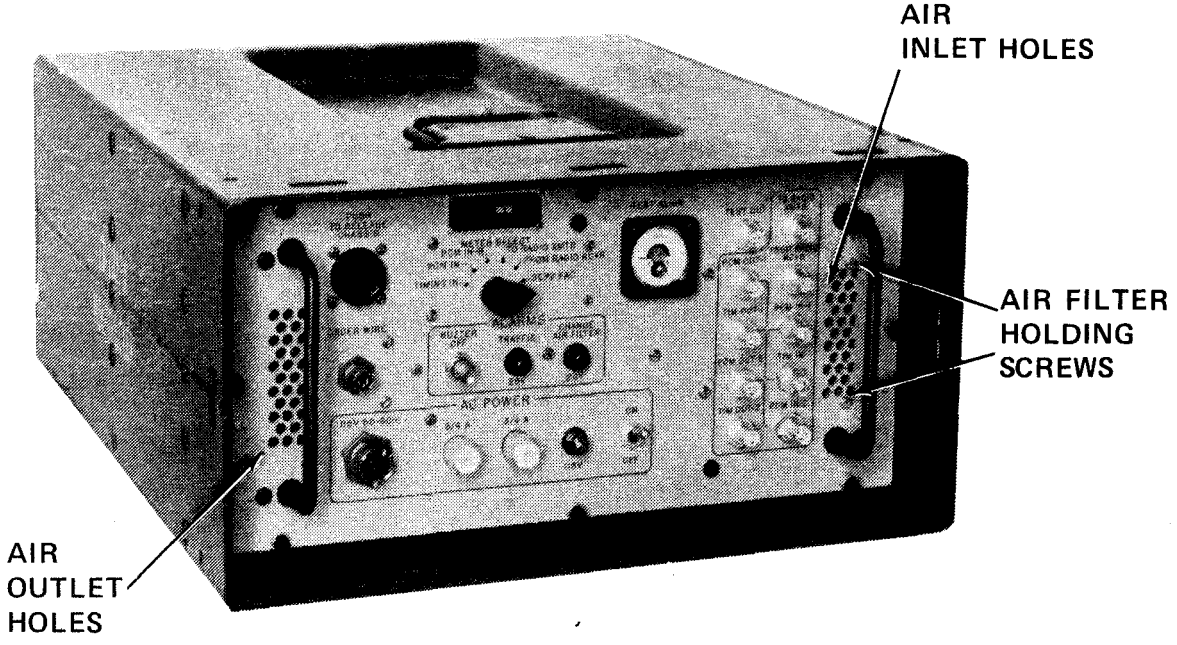


Figure 1-1. Multiplexer TD-202/U.

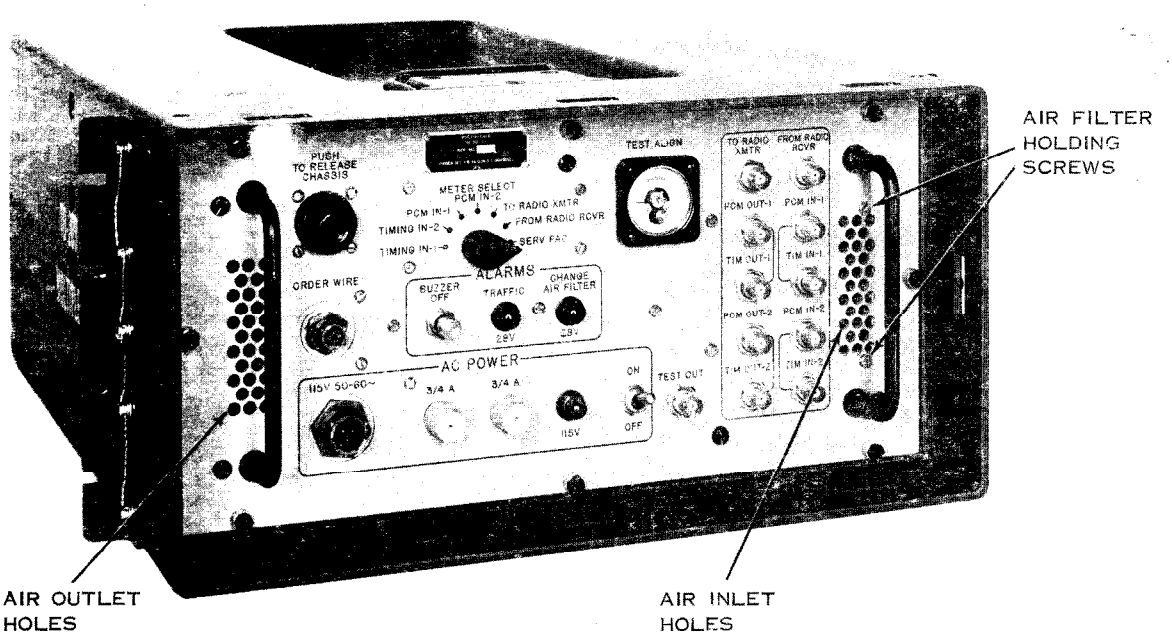


Figure 1-1.1 Multiplexer TD-203/U.

repeater for pcm cable systems. It is installed at 1-mile intervals in the transmission cable to restore pcm pulse form and timing.

g. Converter, Telephone Signal CV-1548/G (fig. 1-6). The CV-1548/G provides telephone signal conversion and hybrid facilities for 12 multiplex channels. Each channel contains one-way supervision and ringdown signaling conversion facilities, a hybrid for converting between 2-wire and 4-wire circuits, 4-wire straight-through patching, and switching for selecting combinations of these functions.

1-5. Technical Characteristics

a. TD-202/U or TD-203/U.

Channel capacity:
- TD-202/U ---------- 12 or 24.
- TD-203/U ---------- 48 or 96.

Power consumption ---- 30 watts

Input voltage and operating temperature. ---- *f* below.

Pcm input or output signal:
- Impedance ---------- 91 ohms.
- Amplitude ---------- Pulses go positive to approximately 0 volt from a baseline of approximately -2 volts.

Pulse type ---------- Binary (full width).

Pulse rate and interval:
- 12-channel ---------- 576 kc; 1.736 μsec.
- 24-channel ---------- 1,152 kc; 868 nsec.
- 48-channel ---------- 2,304 kc; 434 nsec.
- 96-channel ---------- 4,608 kc; 217 nsec.

Timing input or output signal:
- Impedance ---------- 91 ohms
- Amplitude ---------- Positive-going pulses, 2-volts amplitude.
- Pulse type ---------- Sharp spike.
- Repetition rate:
  - TD-202/U ---------- 576 kc.
  - TD-203/U ---------- 2,304 kc.
- Pulse width ---------- 150 nsec (max).

Radio input or output signal:
- Impedance ---------- 51ohms.
- Amplitude:
  - Recieve ---------- 0.5 to 3 volts pp.
  - Transmit ---------- Pulses go positive to approximately 0 volt from a baseline which is adjustable from -1 to -2.0 volts

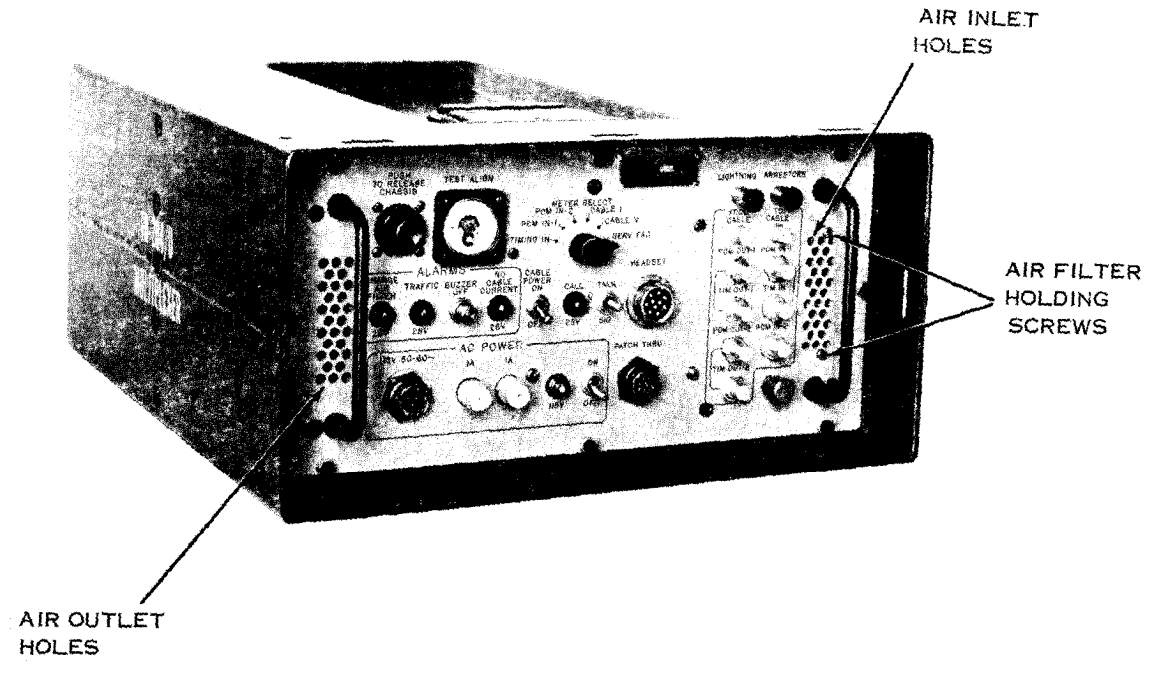


Figure 1-2. Multiplexer TD-204/U.

Pulse type:
Receive:
12- or 48-channel. Binary (full width).
24- or 96-channel. Biternary (full width).
Transmit -------- Binary (full width).
Rate and interval ----- Same as pcm input or output signal.
Required radio bandwidth (at 3-db point) :
12- or 24-channel ------ 240 kc.
48- or 96-channel ----- 935 kc.
Order wire:
Facility ---------- Provides detection for radio baseband order wire channel.
Impedance ---------- 600 ohms.
Level (test tone) -------- -4 dbm.

b. *TD-204/U*

Channel capacity ---------- 12, 24, or 48.
Power consumption --------- 62 watts maximum.
Input voltage and operating temperatures. *f* below.
Pcm input or output signal:
Impedance ---------- 91 ohms.
Amplitude ---------- Pulses go positive to approximately 0 volt from a baseline of approximately -2 volts.
Pulse type ---------- Binary (full width).
Pulse rate and interval:
12-channel ------- 576 kc; 1,736 µsec.
24-channel ------- 1,152 kc; 868 nsec.
48-channel ------- 2,304 kc; 434 nsec.
Timing input or output signal:
Impedance, amplitude, and pulse type. Same as in TD-202/U or TD-203/U.
Repetition rate:
12- or 24-channel --------- 576 kc.
48- channel ---------- 2,304 kc.
Pulse width ---------- 150 nsec (max).

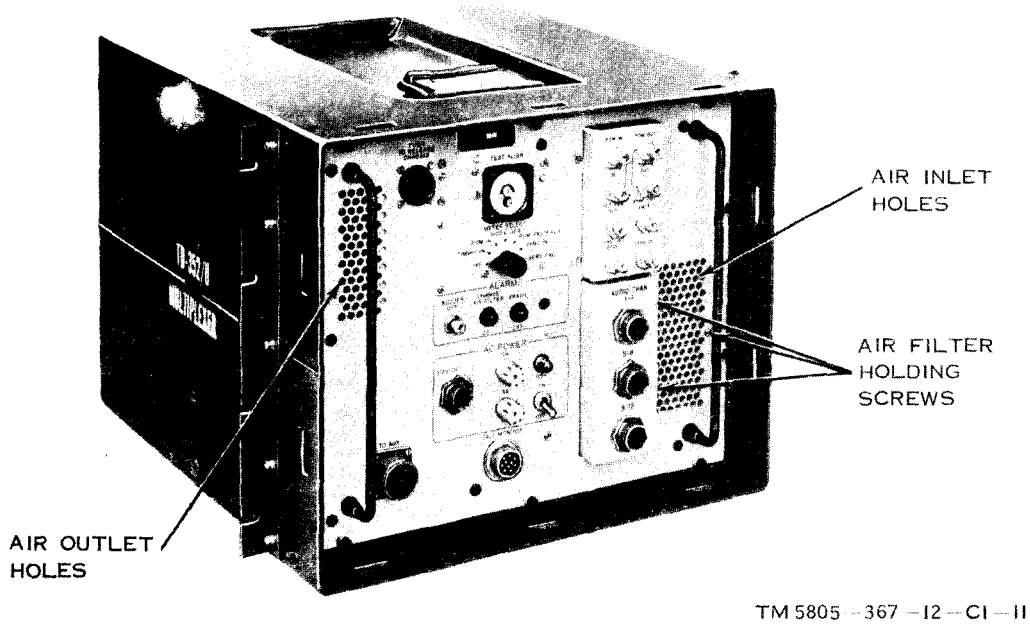


Figure 1-3. Multiplexer TD-352/U.

Cable input or output signal:
- Impedance ---------- 62 ohms.
- Amplitude:
  - To-cable signal ------- Leading edge of pulse swing 2 volts from zero to peak.
  - From-cable signal. 30 mv pp nominal.
- Type ---------- Binary dipulse.
- Bite rate ---------- 2,304 kc.
- Pulse width ---------- 180-230 nsec.

Order wire:
- Facility ---------- Baseband channel independent of pcm traffic.
- Frequency response --- 300 to 1,700 cps.
- Signaling frequency --- 1,600 cps.
- Transmit level --------- 9 volts rms min at 880 ohms (at cable transmit amplifier output).
- Receive level --------- Adjustable 150 mv rms to 16 volts rms across 880 ohms (at cable receive amplifier input).

c. TD-206/G.

Input or output signal:
- Impedance ---------- 62 ohms.

Amplitude:
- Input signal---------- 30 mv pp max, 10 mv pp min.
- Output signal---------- Leading edge of pulses swing 2 volts from zero to peak.
- Pulse type Binary dipulse.
- Pulse rate ---------- 2,304 kc.
- Pulse width ---------- 205 nsec.

Power requirements ------- 38-ma constant current supply (from TD-204/U at either end).

Operating temperature +125° F to -60° F.

d. TD-352/U and TD-353/U.

VF channels:
- Type ---------- 4 wire.
- Number:
  - TD-352/U----------12.
  - TD-353/U----------48.

Channel sampling rate ----- 8 kc.

Type of multiplexing -------- Time division.

Type of modulation ---------- Pulse code.

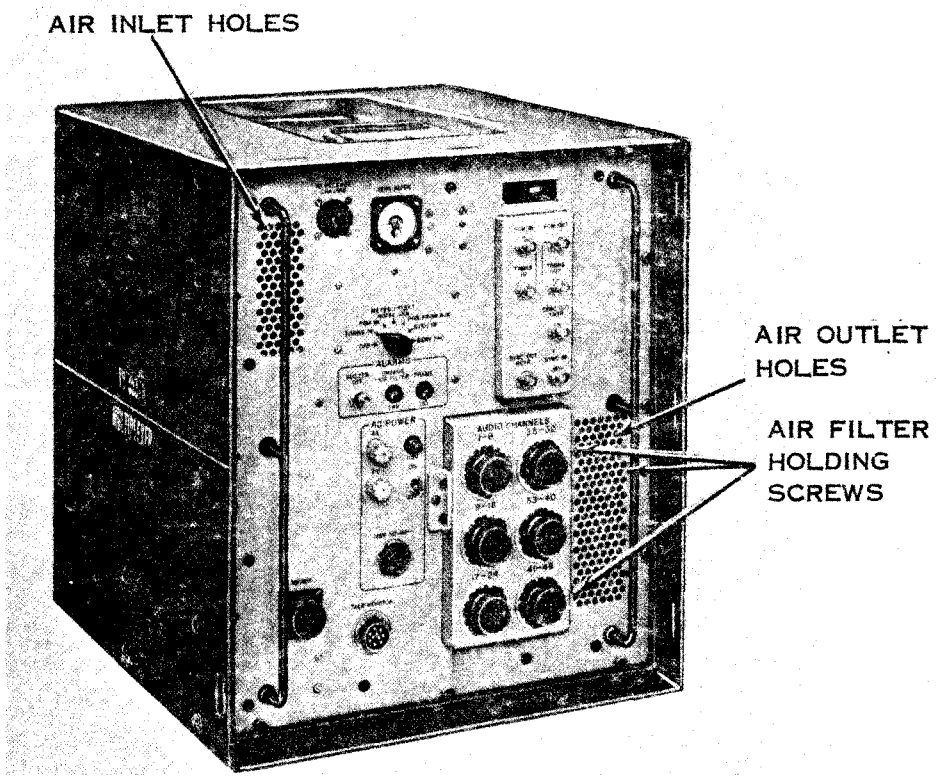


Figure 1-4. Multiplexer TD-353/U.

No. of pcm digits per channel sample.	6.
Channel interval:	
TD-352/U ---------	10.4 µsec (96 kc).
TD-353/U ---------	2.6 µsec (384 kc).
Frame interval ---------	125 µsec,
Addressing ----------	2- or 4- kc binary pattern (uses the last digit position of the last channel in each frame).
Power consumption:	
TD 352/U ---------	136 watts.
TD-353/U ---------	185 watts.
Input voltage and operating temperatures.	*f* below.
Channel characteristics.	
Modulating bandwidth.	300 to 3,500 cps.
Input for full modulation.	-4-dbm test tone.
Output for full modulation.	-4 dbm (4-wire), +1 dbm. (2-wire) (output is adjustable from -6 to +4 dbm).
Input and output impedance.	6000 ohms (balanced).
Signal-to-noise ratio plus crosstalk ratio.	More than 53 db.
Signal-to-noise ratio (FIA).	More than 55 db.
Signal-to-total distortion ratio.	More than 30 db (24 on last channel).
Pcm input or output signal:	
Impedance----------	91 ohms.
Amplitude----------	Pulses go positive to approximately 0 volt from a baseline of -2 volts.
Pulse type ----------	Binary.
Pulse rate and interval.	

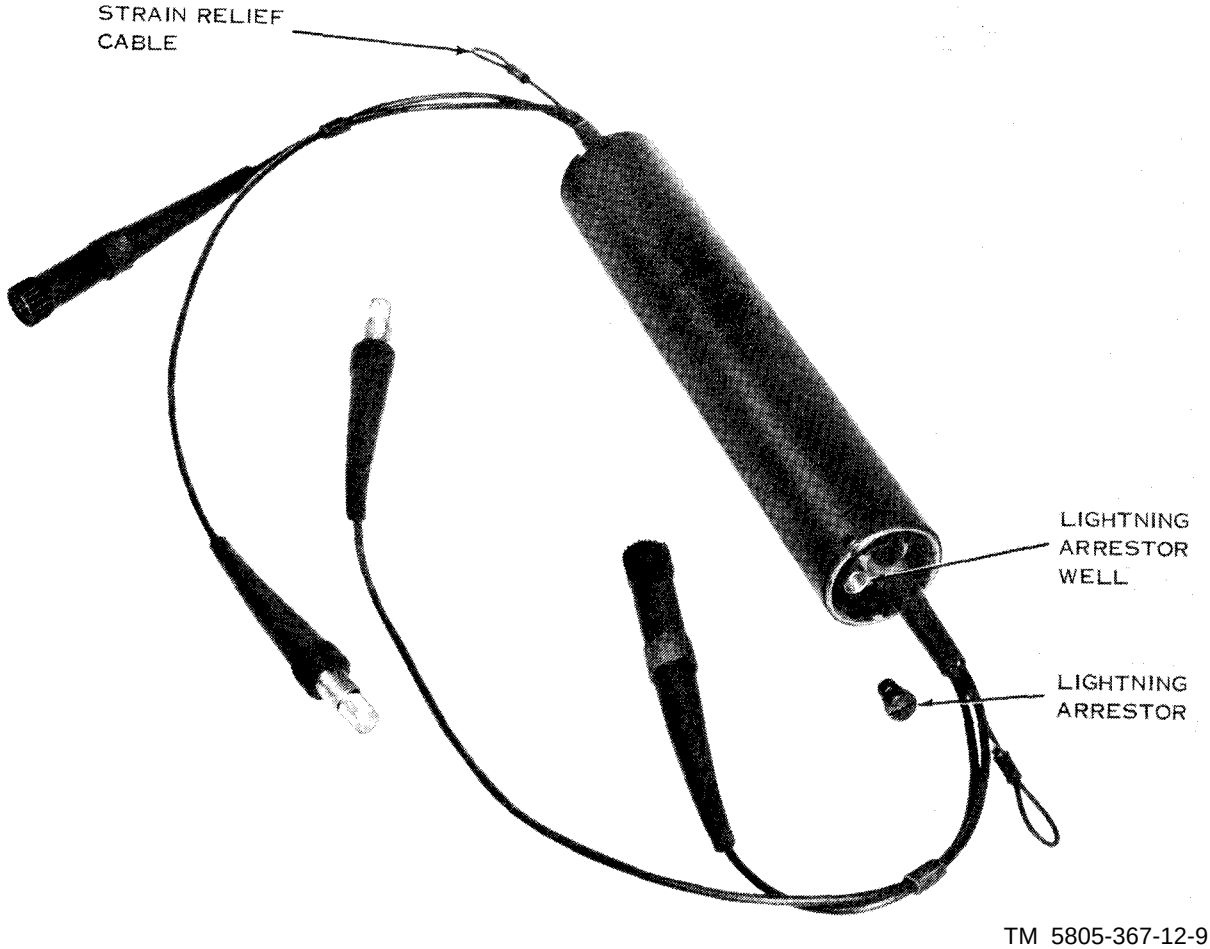


Figure 1-5. Restorer, Pulse Form TD-206/G **with 7A2 end cap.**

Pcm input signal:

TD-352/U:

12-channel.	576 kc; 1.736 µsec.
Interleaved 24 channel.	1,152 kc; 868 nsec.

TD-353/U:

48-channel.	2,304 kc; 434 nsec.
Interleaved 96 channel.	4,608 kc; 217 nsec.

Pcm output signal:

TD-352/U	Same as for 12-channel pcm input signal given above.
TD-353/U	Same as for 48-channel pcm input signal given above.

Timing input or output signal:

Impedance and amplitude.	Same as pcm input or output signal.
Pulse type	Sharp spike.
Repetition rate and interval:	
TD-352/U	576 kc; 1.736 µsec.
TD-353/U	2,304 kc; 434 nsec.
Pulse width	150 nsec (max).

e. CV-1548/G.

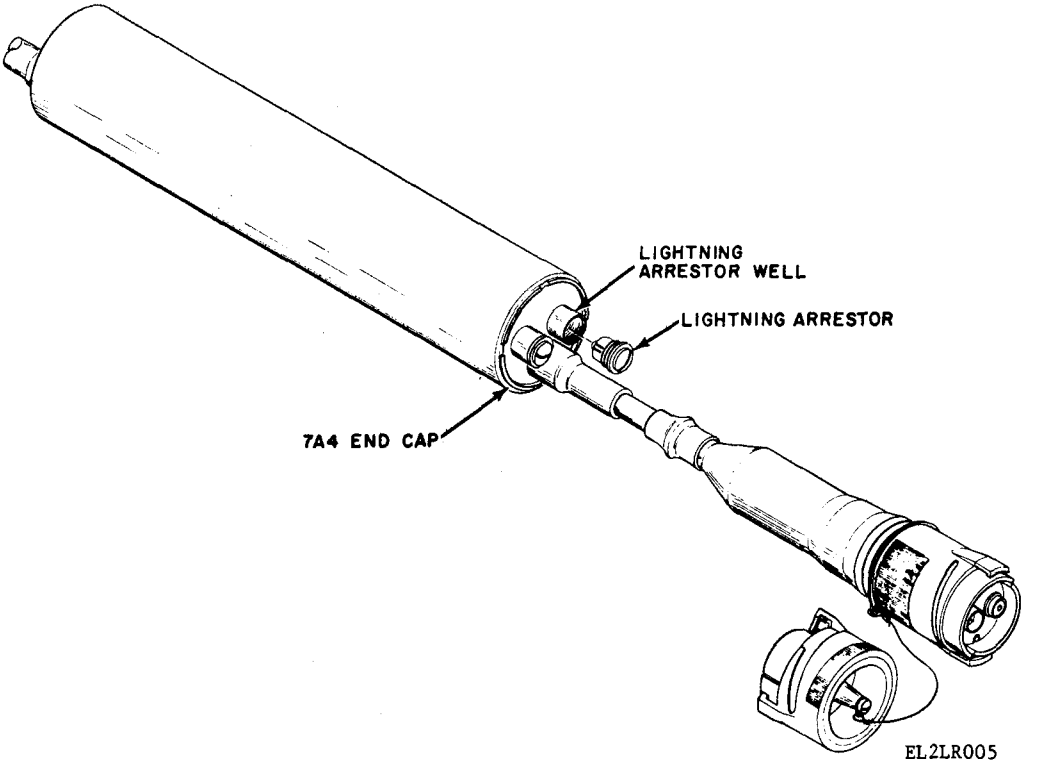


Figure 1-5.1. Restorer, Pulse Form TD-206/G With 7A4 End Cap.

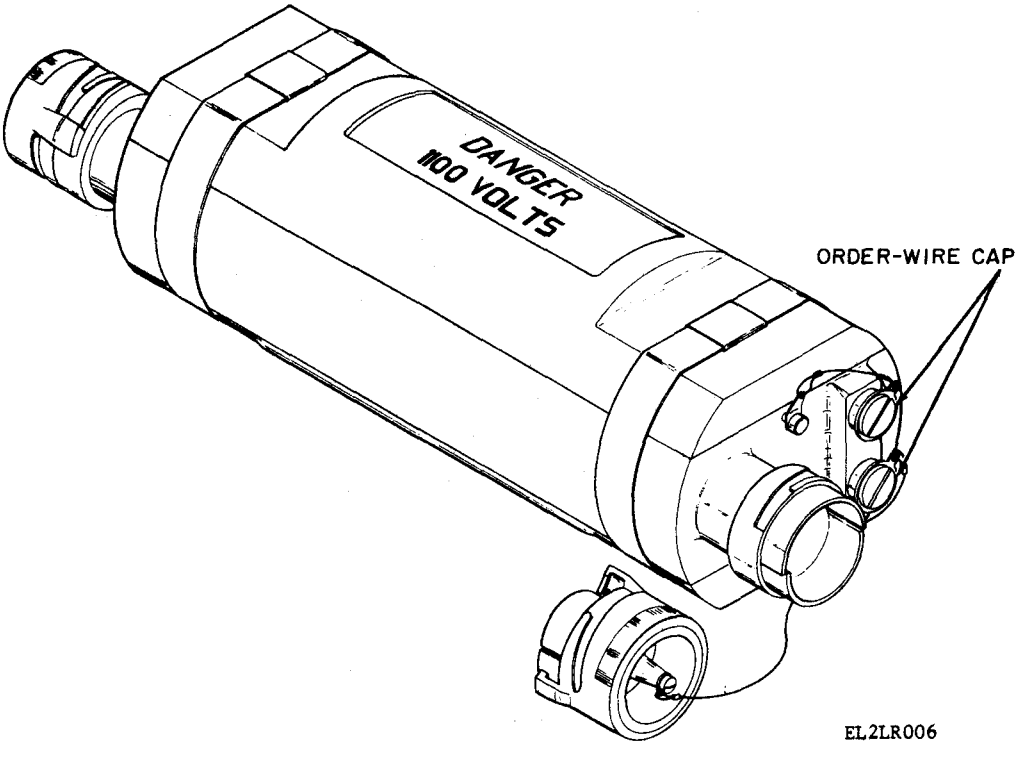


Figure 1-5.2. Restorer, Pulse Form TD-206B/G.

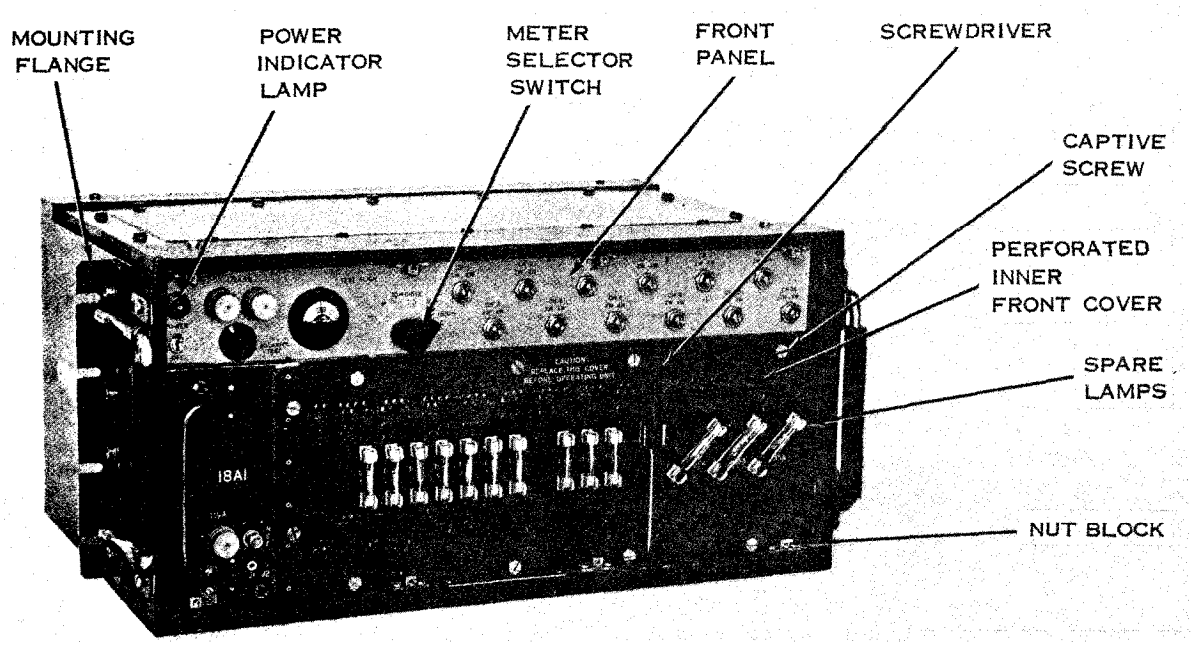


Figure 1-6. Converter, Telephone Signal CV-1548/G.

No. of channels	12.
Operating modes (selected independently in each channel).	20-cps signaling, 2-wire, Plug supervision signaling, 2-wire (one-way from originator to terminator). No signaling, 2-wire (hybrid only in use). No signaling, 4-wire (channel patched straight through).
20-cps signaling, 2-wire:	
From subscriber	20-cps ringing voltage at 21 volts (panel 18A3A) or 16 volts (panel 18A3B) rms minimum.
To subscriber	20-cps ringing voltages at 75 volts rms minimum (across four lines simultaneously).
Plug supervision signaling, 2-wire modes:	
Originate (OR)	Switchboard trunk opens or closes T (tip) and R (ring) lead circuit in 18A3A or 18A3B panel.
Terminate (TE)	18A3A or 18A3B panel opens or closes T (tip) and R (ring) lead circuit in switchboard trunk.
Plug supervision:	
One way	18A3A and 18A3B.
Two way	18A4.
Multiplex terminal inputs and outputs, 4-wire (all signaling modes):	
From multiplex terminal.	No tone or 1,600-cps inband tone between - 25 . and 0 dbm.
To multiplex terminal.	No tone or 1,600-cps inband tone at - 15 dbm (adjustable ±5 db).
Channel characteristics (2-wire):	
Insertion loss	4.5 db maximum (250 to 3,500 cps).
Input and output impedance.	600 ohms (balanced to ground).
Power requirements	109 to 121 volts, 47 to 420

cps, 17 watts (idle), 60 watts (all channels ringing).

Operating temperature limits ±125° to -25° F.

f. Common Characteristics (Except TD-206/G and CV-1548/G).

Input voltage . . . . . 109 to 121 volts, 47 to 63 cps.
Operating temperature . . . . . ±125° F to -20° F.

g. System Capabilities and Limitations.

Transmission medium:
12-, 24-, or 48-channel. . . . Single two-way radio or cable.
96-channel . . . . . Single two-way radio or dual two-way cable (48 channels each).

Drop and insert (D/I) . . . . . Available with 24- or 96-channel systems.

Cable transmission:
Maximum length . . . . . 240 miles.
Repeater intervals:

Attended:

Maximum length . . . . . 40 miles of transmission cable.
Minimum length . . . . . One reel of transmission cable.

Unattended . . . . . 1 mile (1-, ¼-, ½-, or ¾-mile option to attended repeater)

Remote D/I terminal distance. 0.25 mile minimum, 5 miles maximum.

h. Dimensions and Weights.

Components	Dimemsions (in.)			Weight (lb)
	Height	Width	Depth	
TD-202/U or TD-203/U	8½	17	20	50
TD-204/U	8½	17	20	56
TD-206/G or TD-206B/G	See note below.	See note below.	See note below.	4½ or 7½
TD-352/U	13¾	17	20	102
TD-353/U	19	17	20	131
CV-1548/G	8½	17¼	12	54

Note. Cylindrical, 2-9/32 inch diameter by 12 inches long or 4 inch diameter by 14 inches long.

1-6 Components Comprising the Operable End Item

NSN	QTY	Nomenclature, Part No., and MFR Code-Card Slot No.	Fig. No.
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708 42 and used to identify manufacturer, distributor, or Govermncnt agency, etc.	
5805-00-884-2176		Multiplexer TD-202/U, SM-E-527001, 80063 (This item is nonexpendable) which includes:	1-1
5795-00-892-9742	1	Case, Standardized Components, Electrical CY-4713/TCC, SM-D527072GR1, 80063	
5120-00-933-6286		Screwdriver, Flat Tip, 5/64 in. blade, SM-B-528695, 80063 (Mounted)	
5805-00-926-2627		Case, Electronic Equipment Maintenance Kit CY-6097/U: SM-E-526824GR3. 80063 (Authorized for the transporting and storing of the following spare Multiplexer subassemblies. (This item is nonexpendable)	
		NOTE The Case CY-6097/U is listed herein for information purposes only. The quantity of these cases and the spare multiplexer subassemblies therein. are determined by the AACOMS Medium or High (Capacity subsystem assemblages to which they are part of.	
5805-00-945-1021	1	Multiplexer Subassembly, SM-D-527010. 80063 (5A2)	3-2
5805-00-177-6017	1	Multiplexer Subassembly, SM-D-A301089, 80063 (5A2A)	3-2
5805-00-945-1186	1	Multiplexer Subassembly, SM-D-529513, 80063 (5A3)	3-2
5805-01-177-6018	1	Multiplexer Subassembly, SM-A-3010732, 80063 (5A3A)	3-2
5805-00-945-3825	1	Multiplexer Subassembly, SM-D-529516, 80063 (5A4)	3-2
5805-01-177-6019	1	Multiplexer Subassembly, SM-A-3010739, 80063 (5A4A)	3-2
5805-00-945-1185	1	Multiplexer Subassembly, SM-D-529519, 80063 (5A5)	3-2
5805-01-177-6020	1	Multiplexer Subassembly, SM-A-3010747, 80063 (5A5A)	3-2

NSN	QTY	Nomenclature, Part No., and MFR Code-Card Slot No.	Fig. No.
5805-00-945-1020	1	Multiplexer Subassembly, SM-D-527022, 80063 (5A6)	3-2
5805-01-177-6021	1	Multiplexer Subassembly, SM-A-3010742, 80063 (5A6A)	3-2
5805-00-945-1019	1	Multiplexer Subassembly, SM-D-529507, 80063 (5A7)	3-2
5805-01-177-6023	1	Multiplexer Subassembly, SM-A-3010803, 80063 (5A7A)	3-2
5805-00-945-1207	1	Multiplexer Subassembly, SM-D-529510, 80063 (5A8)	3-2
5805-01-177-6024	1	Multiplexer Subassembly, SM-A-3010806, 80063 (5A8A)	3-2
5805-00-929-3587	1	Component Board, Spares, Fuses and Lamps, SM-D-529124, 80063 (See note below for authorization). (This item is nonexpendable)	
		NOTE	
		The Component Board for spare fuses and lamps is the same for the TD-202/U, TD-203/U, TD-204/U and TD-352/U and TD353/U. There will be a quantity of one with each Case CY-6097/U.	1-8
5120-00-198-5401	1	Key, Sockethead Screw, 0.050 in. hex allen type, SM-B-529134-1, 80063	
5120-00-224-2504	1	Key, Socketbead Screw, 5/64 in. hex allen type. SM-B-529134-2, 80063	
5805-00-884-2177		Multiplexer TD-203/U, SM-E-529501, 80063 (This item is nonexpendable) which includes:	1-1
5975-00-892-9742	1	Case, Standardized Components Electrical, CY-4713/TCC, SM-D-527072GR2. 80063	1-1
5120-00-933-6286	1	Screwdriver, Flat Tip, 5/16 in. blade, SM-B-528695, 80063 (Mounted)	3-3
5805-00-926-2627		Case, Electronic Equipmemt Maintenance Kit CY-6097/U. SM-E-526824CIR4, 80063 (This item is nonexpendable)	
5805-00-948-6473	1	Multiplexer Subassembly, SM-D-529504, 80063 (4A2)	3-3
5805-00-948-6444	1	Multiplexer Subassembly, SM-D-527013, 80063 (4A3)	3-3
5805-00-948-6427	1	Multiplexer Subassembly, SM-D-527016, 80063 (4A4)	3-3
5805-00-948-6442	1	Multiplexer Subassembly, SM-D-527019, 80063 (4A5)	3-3
5805-00-945-1020	1	Multiplexer Subassembly, SM-D-527022, 80063 (4A6)	3-3
5805-00-945-1019	1	Multiplexer Subassembly, SM-D-529507, 80063 (4A7)	3-3
5805-01-177-6023	1	Multiplexer Subassembly, SM-A-3010803, 80063 (4A7A)	3-3
5805-00-945-1019	1	Multiplexer Subassembly, SM-D-529510, 80063 (4A8)	3-3
5805-01-177-6024	1	Multiplexer Subassembly, SM-A-3010806, 80063 (4A8A)	3-3
5805-00-948-6426	1	Multiplexer Subassembly, SM-D-527025, 80063 (4A9)	3-3
5805-00-029-3587		Component Board, Spares. Fuses and Lamps	
5805-00-900-8200		Multiplexer TD-204/G: SM-F-527501, 80063 (This item is nonexpendable) which includes:	1-2
5995-00-913-0470	1	Cable Assembly, Special Purpose, Electrical CX-7874/TCC (5 ft lg) SM-D-531009, 80063 (Not mounted)	1-7
5975-00-892-9742	1	Case, Standardized Components, Electrical CY-4713/TCC,SM-D-527072GR3. 80063	1-2
5965-00-669-6871	1	Headset H-91A/U (Not mounted)	6-6
5120-00-933-6286	1	Screwdriver, Flat Tip, 5/64 in. blade, SM-D-528695. 80063 (Mounted)	3-6
5805-00-926-2627		Case, Electronic Equipment Maintenance Kit CY-6097/U, SM-F-526824GR5. 80063 (This term is nonexpendable)	
5805-00-944-8142	1	Multiplexer Subassembly, SM-D-527522, 80063 (6A2)	3-6
5805-00-944-8932	1	Multiplexer Subassembly, SM-D-527525, 80063 (6A3)	3-6
5805-00-926-0264	1	Multiplexer Subassembly, SM-D-527537, 80063 (6A4)	3-6
5805-00-944-8159	1	Multiplexer Subassembly, SM-D-527528, 80063 (6A5)	3-6
5805-00-944-8153	1	Multiplexer Subassembly, SM-D-527531, 80063 (6A6)	3-6
5805-00-944-8401	1	Multiplexer Subassemb]y, SM-E-527534, 80063 (6A7)	3-6
5805-00-929-3587		Component Board, Spares, Fuses and Lamps	
5805-00-900-8199		Multiplexer TD-352/U, SM-E-526501 , 80063 (This item is nonexpendable) which includes:	1-3
5995-00-913-0471	3	Cable Assembly, Special Purpose, Elcctrical CX-7870/TCC. (5 ft lg) SM-D-531003. 80063 (Not Mounted)	1-7

NSN	QTY	Nomenclature, Part No., and MFR Code-card Slot No.	Fig. No.
5280-00-064-5449	1	Case, Standardized Components, Electrical CY-2429/GRC, SM-D-423851 GR2, 80063	1-3
5120-00-933-6286	1	Screwdriver, Flat Tip, 5/64 in. blade SM-B-528695; 80063 (Mounted)	3-12
5805-00-926-2627		Case, Electronic Equipment Maintenance Kit CY-6097/U, SM-E-526824GR1, 80063 (This item is nonexpendable)	
5805-00-944-8942	1	Multiplexer Subassembly, SM-D-526539, 80063 (2A3)	3-10
5805-00-944-8144	1	Multiplexer Subassembly, SM-D-526557, 80063 (2A5)	3-10
5805-00-945-1182	1	Multiplexer Subassembly, SM-D-526545, 80063 (2A6)	3-10
5805-01-184-6893	1	Multiplexer Subassembly, SM-D-A3010745, 80063 (2A6A)	3-10
5805-00-945-1180	1	Multiplexer Subassembly, SM-D-526560, 80063 (2A7)	3-10
5805-00-945-3824	1	Multiplexer Subassembly, SM-D-526563, 80063 (2A8)	3-10
5805-00-916-5963	1	Multiplexer Subassembly, SM-D-526566, 80063 (2A9)	3-10
5805-00-945-1094	1	Multiplexer Subassembly, SM-D-526569, 80063 (2A10)	3-10
5805-00-945-1130	1	Multiplexer Subassembly, SM-D-526551, 80063 (2A12)	3-12
5805-00-944-8874	1	Multiplexer Subassembly, SM-D-526572, 80063 (2A13)	3-12
580540-945-1121	1	Multiplexer Subassembly, SM-D-526554, 80063 (2A14)	3-12
5805-00-944-8885	1	Multiplexer Subassembly, SM-D-526575; 80063 (2A15)	3-12
5805-00-974-9941	1	Multiplexer Subassembly, SM-D-526584, 80063 (2A16)	3-12
5805-00-929-3587		Component Board, Spares, Fuses and Lamps	
5805-00-985-9153		Multiplexer TD-353/U. SM-E-529001, 80063 (This item is nonexpendable) which includes:	1-3
5995-00-947-8440	6	Cable Assembly, Special Purpose, Electrical, Branched, CX-7873/TCC (51-7 ft lg) SM-D-531008, 80063 (Not mounted)	
5805-00-911-6350	1	Case, Standardized Components, Electrical, CY-2430/GRC, SM-D-529229, 80063	
5120-00-933-6286	1	Screwdriver, Flat Tip, 5/64 in. blade, SM-B-528695. 80063	1-13
5805-00-926-2627		Case, Electronic Equipment Maintenance Kit CY-6097/U, SM-E-526824GR2, 80063 (This item is nonexpendable)	1-13
5805-00-944-8942	1	Multiplexer Subassembly, SM-D-526539, 80063 (1A3)	3-11
5805-00-916-5960	1	Multiplexer Subassembly, SM-D-529097, 80063 (1A5)	3-11
5805-00-945-1182	1	Multiplexer Subassembly, SM-D-526545, 80063 (1A6)	3-11
5805-01-184-6893	1	Multiplexer Subassembly, SM-D-A3010745 (1A6A)	3-11
5805-00-916-5961	1	Multiplexer Subassembly, SM-D-529100, 80063 (1A7)	3-11
5805-00-944-1990	1	Multiplexer Subassembly, SM-D-529103, 80063 (1A8)	3-11
5805-00-945-6146	1	Multiplexer Subassembly, SM-D-529106, 80063 (1A9)	3-11
5805-00-945-6145	1	Multiplexer Subassembly, SM-D-529109, 80063 (1A10)	3-11
5805-00-945-1130	1	Multiplexer Subassembly, SM-D-526551, 80063 (1A12)	3-13
5805-00-944-1030	1	Multiplexer Subassembly, SM-D-529112, 80063 (1A13)	3-13
5805-00-945-1121	1	Multiplexer Subassembly, SM-D-526554, 80063 (1A14)	3-13
5805-00-945-9890		Multiplexer Subassembly, SM-D-529115, 80063 (1A15)	3-13
5805-00-974-9941	1	Multiplexer Subassembly, SM-D-526584, 80063 (1A16)	3-13
5805-00-929-3587		Component Board, Spares, Fuses and Lamps	
5805-00-868-8078		Restorer, Pulse Form TD-206/G:SM-E-530001, 80063	1-5, 1-5.1
*5805-01-020-2251	1	Restorer, Pulse Form TD-206B/G: SM-D-538516, 80063	1-5.2
5805-00-069-8795		Converter, Telephone Signal CV-1548/G, SM-E-528501, 80063 (This item is nonexpendable) which includes:	1-6
5805-00-930-4838	1	Electronic Components Assembly, SM-D-528511, 80063	3-14
5805-00-952-9834		Printed Wiring Board, Extender, SM-E-528518, 80063 (For information only. Authorized for DS, GS, and Depot only.) (Not installed)	
5120-00-933-6286	1	Screwdriver, Flat Tip, 5/16 in. blade, SM-D-528606, 80063 (Mounted)	1-6

1-7. Description

All major components are illustrated in figures 1-1 through 1-6. Power and signal cable used with PCM components are illustrated in figure 1-7.

1-8. Additional Equipment Required

a. Ground Rod MX-148/G. Ground rod MX-148/G and a ground strap are required for use with the TD-204/U.

b. Cable, Special Purpose Electrical CX-4245/G or CX-11230/G. Quantities of Cable, Special Purpose, Electrical CX4245/G or CX-11230/G (transmission cable) are required for cable link transmission (figs. 6-1 through 6-4). Adapter, Cable Assembly CX-10734/G is required when connecting the CX-11230/G to the TD-206/G with the 7A2 end cap. The CX-10734/G is also required when connecting the CX-4245/G to either the TD-206/G with the 7A4 end cap or the TD-206B/G.

c. Radio Equipment. Radio relay sets are required for radio link transmission as follows:

12- or 24 channel	Radio Set AN/GRC-50, AN/GRC-66, or equivalent.
48- or 96 channel systems	Radio Set AN/GRC-66 or equivalent.

1-9. Differences Between Models/Silicon Versions

This paragraph contains information covering redesigned multiplexer subassemblies used on the TD-202/U, TD-203/U, TD-352/U, and TD-353/U multiplexer. These redesigned subassemblies use silicon semiconductors in lieu of germanium devices. Subassemblies equipped with silicon subassemblies have a black anodized frame and are identified by the suffix letter "A". For example, 5A5A denotes a silicon version and 5A5 denotes a germanium version of the same multiplexer subassembly. It is possible that multiplexer in field use might be equipped with a combination of germanium and silicon subassemblies. The germanium subassemblies and the silicon subassemblies can be used interchangeably. The following subassemblies contain silicon subassemblies:

Panels 5A2A through 5A8A . . . . . .Multiplexer TD-202/U
Panels 4A7A and 4A8A . . . . . .Multiplexer TD-203/U
Panels 2A2A and 2A6A . . . . . .Multiplexer TD-352/U
Panel 1A6A . . . . . .Multiplexer TD-353/U

NOTE

Unless otherwise noted in this manual, data relating to the subassemblies containing the germanium semiconductors apply to the subassemblies containing silicon semiconductors.

NOTE:
CX–11173/U IS SUPPLIED AS SHOWN ABOVE WITH THE SERIAL NUMBERED COMPONENTS LISTED BELOW.
CX–11173/U WITHOUT ADAPTER AND ONE CONNECTOR IS SUPPLIED WITH ALL OTHER SERIAL NUMBERS.

COMPONENT	SERIAL NUMBERS
TD–202/U	0 THROUGH 12
TD–203/U	0 THROUGH 6
TD–204/U	0 THROUGH 38
TD–352/U	0 THROUGH 24
TD–353/U	0 THROUGH 6
CV–1548/U	0 THROUGH 48

TM5805–367–12–11

Figure 1-7. Power and signal interconnecting cables.

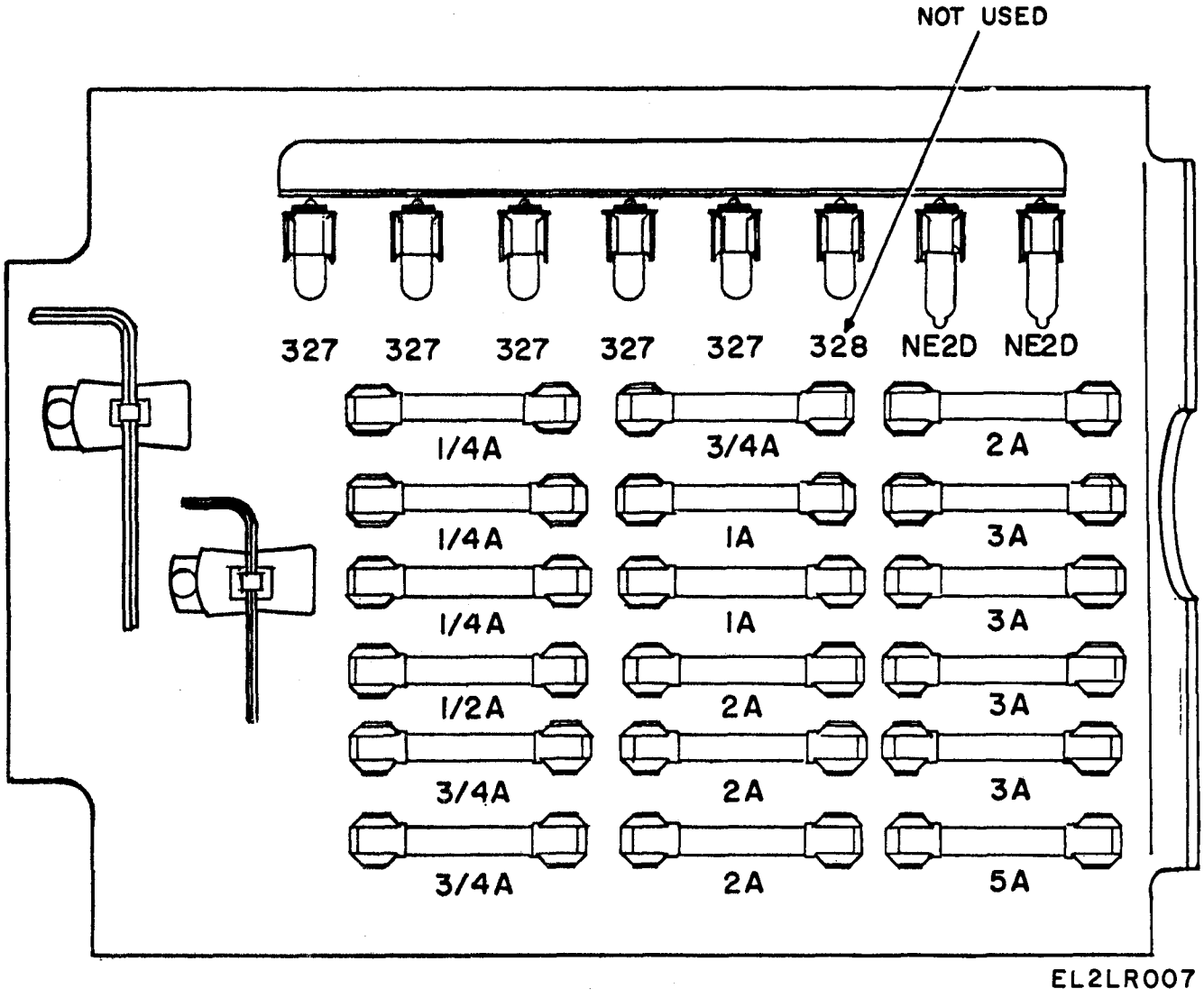


Figure 1-8. Spare fuses and lamps component board.

CHAPTER 2
INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking (fig 6-5)

When packaged for shipment, each component is packaged in a wooden case. Use the typical packaging diagram (fig 6-5) and the following procedures to unpack a component:

a. Locate the wooden case near the installation

b. Cut and fold back the steel straps.

WARNING

Prevent injury when applying or removing steel strapping by wearing heavy gloves and a face shield or goggles (NSN-4240-00-542-2048). Do not handle the packing cartons by the steel strapping.

CAUTION

Do not attempt to pry off the wooden cover; the equipment may become damaged.

c. Remove the nails from the top of the wooden case with a nailpuller and remove the wooden cover.

d. Remove the fiber padding.

e. Remove the package from the wooden case.

f. Unwrap the moisture-resistant paper and the heavy kimpak and remove the plastic bag.

g. Open the corrugated fiberboard box and remove the corrugated fiberboard pads, the felt pads, and the desiccant.

h. Unwrap the kimpak and remove the component from the corrugated fiberboard box.

i. Check the component (para 2-2) and place the component in the desired location.

NOTE

The packaging material may be saved for repacking for shipment or limited storage.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage. If the equipment has been damaged, fill out and forward SF 364.

b. See that the equipment is complete as listed on the packing slip. Report all discrepancies in accordance with TM 38-750.

c. If the equipment has been reconditioned, ascertain if it has been modified. If the equipment has been modified, the modification work order (MWO) number will appear on the front panel near the nomenclature plate. Check to see whether appropriate notations concerning modifications have been written into the manual on the equipment.

Section II. INSTALLATION

2-3. Siting

a. General Considerations. When components are installed in a shelter facility as part of an assemblage, consider the following when siting the assemblage:

(1) Locate the assemblage near the associated equipment to allow interconnection with the supplied cables.

(2) Avoid sites near sources of electrical interference such as powerlines, radar sets, and field hospitals.

b. Restorer, Pulse Form TD-206/G. The system plan determines the general location of each TD-206/G along the cable route. When selecting the exact location, observe the following precautions:

(1) *Do not* submerge a TD-206/G in over 3 feet of water.

(2) Avoid difficult to reach, swampy, or thickly overgrown areas.

2-4. Installing

WARNING

The components are heavy! Be *careful* when moving. Two person lift required for the TD-202/U, TD-203/U, and CV-1458. Four person lift required for TD-352/U and TD-353/U.

Conveniently stack the components or mount them in a standard 19-inch rack. No special stacking or mounting arrangements are required. The only arrangement limitation is determined by the lengths of the interconnecting cables. Provide adequate space for interconnecting cables on the rear of the CV-1548/G. Install the components as follows:

a. Stack or rack mount the components.

b. Remove and store the front cover of each component.

NOTE

The procedures given in *c* through *e* and *g* below do not apply to the CV-1548/G.

c. Loosen the front panel screws that secure the components in their cases.

WARNING

When a component is pulled out of its case to the stops, the case will topple forward if not secured in place. Securely fasten the case before extending a component to this position. DO NOT attempt to lift the front of the component when extended to its stops. If the front of the component is lifted, the component may be released from its case.

d. Grasp the front panel handles, depress the PUSH TO RELEASE CHASSIS button, and pull the component out of its case. The PUSH TO RELEASE CHASSIS button may be released when the component is withdrawn 2 inches.

e. Check to see that the power supply assemblies, the plug-in panels, and the plug-in panel retaining bars are secure.

f. Check to see that the correct fuse is installed in each fuseholder (front panels and power supply subchassis).

g. Replace the components in their cases, but do not fasten the front panel screws.

h. Operate the AC POWER switch on each component to OFF.

2-5. Connecting

The signal connections for each terminal or repeater depend on the circuit requirements of the communication system. Each terminal or repeater connection must be properly identified and maintained on DA Form 1441 (Circuit Record). Refer to figures 2-1 through 2-10 and figures 6-6 through 6-18 and make the required connections.

NOTE

Adapter, Cable Assembly CX-10734/G is required for connecting Cable, Special Purpose Electrical CX-11230/G to the TD-206/G with the 7A2 end cap. The CX-10734/G is also required when connecting the CX-4245/G to either the TD-206/G with the 7A4 end cap or to the TD-206B/G.

2-6. Preliminary Operation of Controls

a. TD-202/U, TD-203/U, TD-204/U, TD-352/U, and TD-353/U.

Component	Control		Position or action
	Front panel	Service facility panel	
TD-203/U or TD-202/U.	PUSH TO RELEASE CHASSIS button.	.....	Loosen front panel screws, depress button, and pull TD-203/U or TD-202/U out far enough to expose service facility panel.
		SERV SEL switch	+10
		TRAFFIC SEL switch	Operate to position corresponding with the terminal traffic capacity or repeater application.
		OPR-TEST switch	OPR
	PUSH TO RELEASE CHASSIS button.		Depress button and slide TD-203/U or TD-202/U into case.
	METER SELECT switch		SERV FAC
	AC POWER switch.		OFF

Component	Control		Position or action
	Front panel	Service facility panel	
TD-204/U	PUSH TO RELEASE CHASSIS button.		Depress button and pull TD-204/U out far enough to expose service facility panel.
		SERV SEL switch	+10
		TRAFFIC SEL switch	Operate to position corresponding with the terminal traffic capacity or repeater application.
		NORM OPR-ZERO SET-READ switch	NORM OPR
		MILE switches[a] (on panel 6A4 and panel 6A5).	Operate both MILE switches to position corresponding to length of transmission cable (¼, ½, ¾, or 1 mile) between TD-204/U and first TD-206/G.
		TONE OFF switch (on panel 6A2).	OFF
		MILES switches	Operate to O
	PUSH TO RELEASE CHASSIS button.		Depress button and slide TD-204/U into case.
	METER SELECT switch		SERV FAC
	AC POWER switch		OFF
	CABLE POWER switch		OFF
	TALK-OFF-SIG switch		OFF
TD-352/U or TD-353/U	PUSH TO RELEASE CHASSIS button.		Depress button and pull TD-352/U or TD-353/U out far enough to expose service facility panel.
		CHAN 1-12 switch (TD-352/U only).	OFF
		EVEN CHAN switch (TD-353/U only).	2
		ODD CHAN switch (TD-353/U only).	1
		MEASURE-PHONE ODD-PHONE EVEN switch (TD-353/U only).	MEASURE
		SERV SEL switch	+25
		ADDRESS MASTER-SLAVE switch.	Operate to correct position (If the TD-352/U or

[a]Both MILE switches (on panel 6A4 and panel 6A5) in a TD-204/U must be at the same position at any given time when one or more TD-206/G's are used in the cable link. If two TD-204/U's are connected with one mile or less of transmission cable, operate the panel 6A4 MILE switches on both TD-204/U's to the position corresponding to the transmission cable length (1/4, 1/2, 3/4, or 1 mile) and the panel 6A5 MILE switches on the TD-204/U's to the 1-mile position.

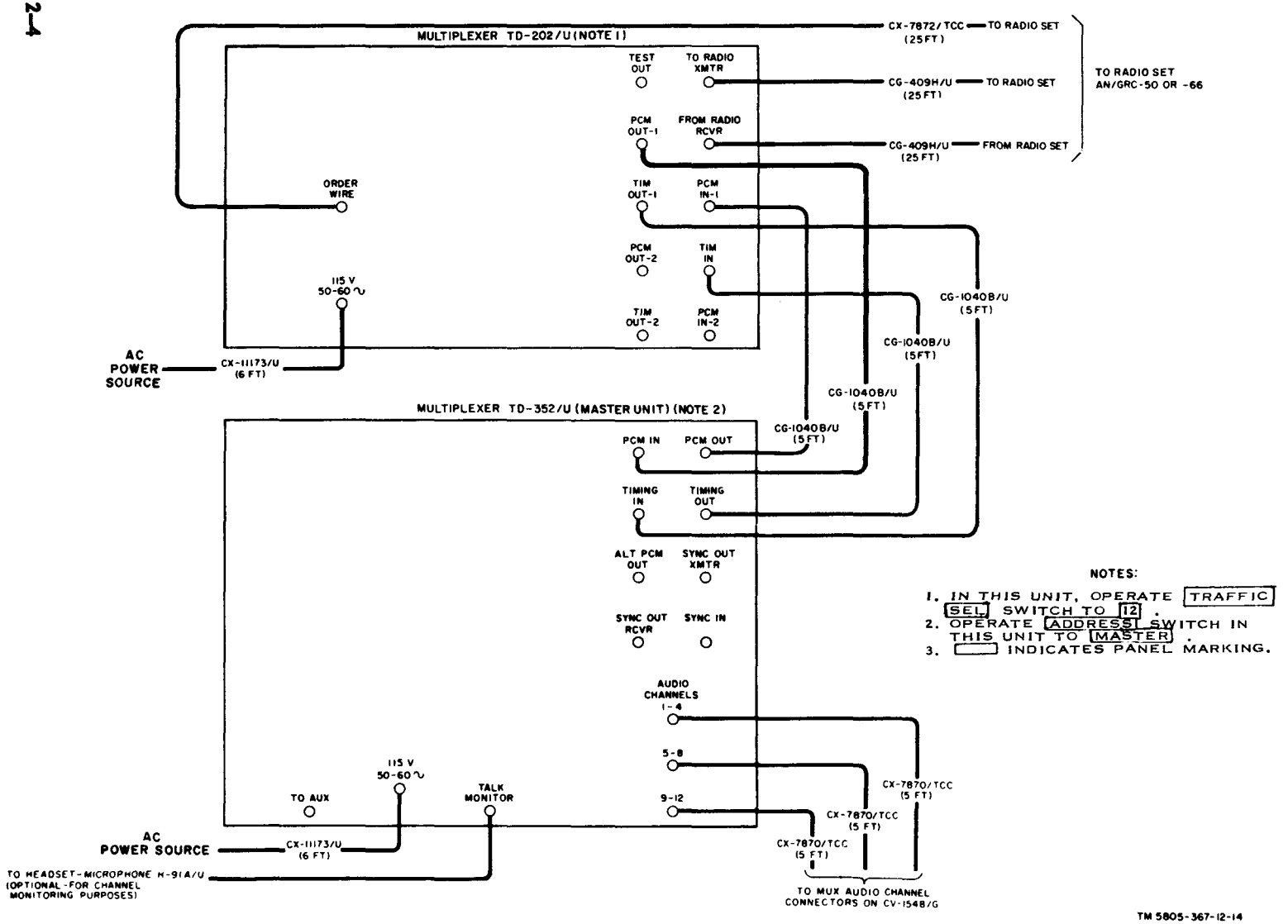


Figure 2-1. Radio terminal, 12 channels, interunit connection diagram.

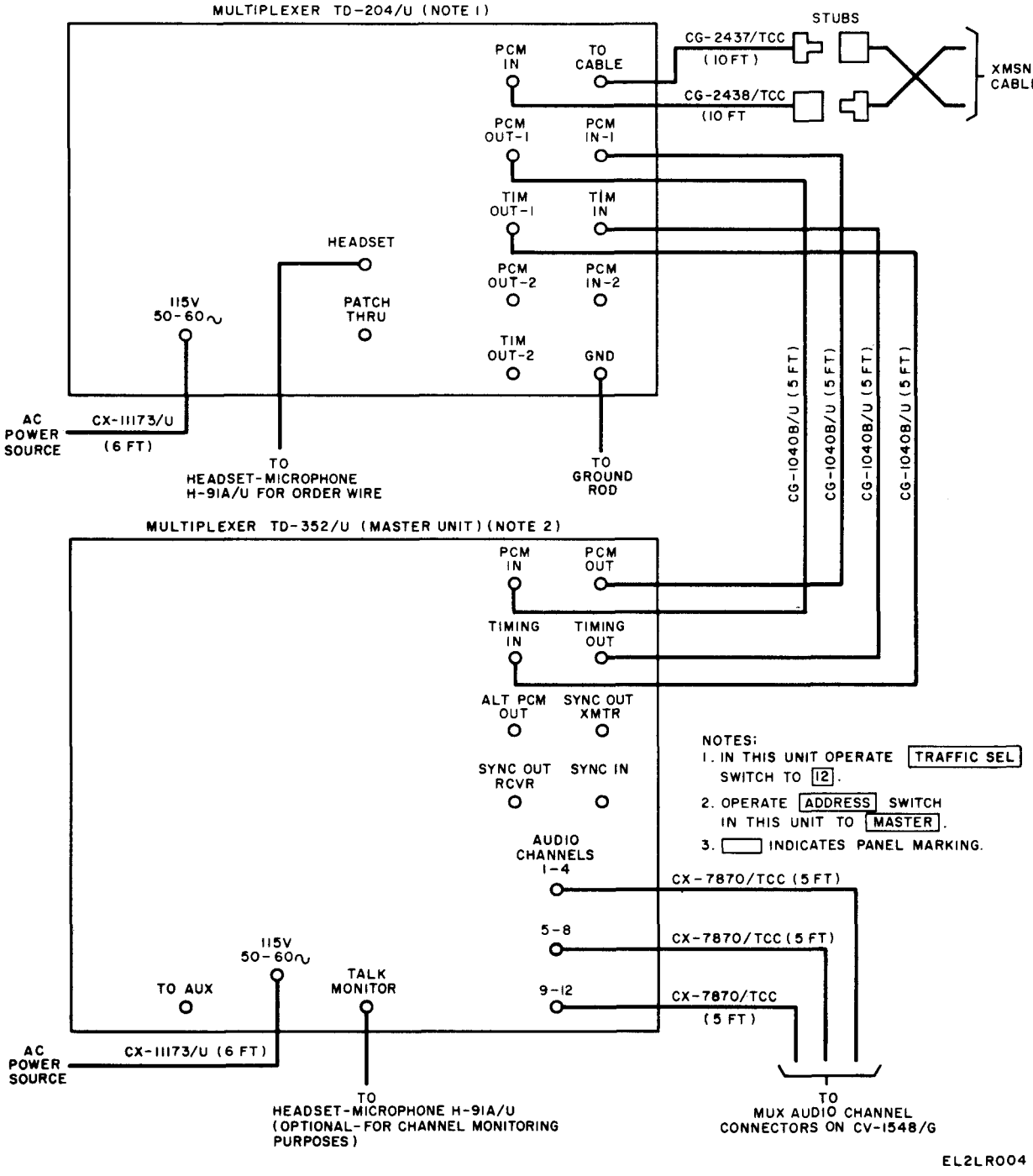


Figure 2-2. Cable terminal, 12 channels, interunit connection diagram.

Component	Control		Position or action
	Front panel	Service facility panel	
			TD-353/U is used as a master unit, set to MASTER; if used as a slave unit, set to SLAVE.
		AUX switch	OUT, if security equipment is not used; IN, if used.
	PUSH TO RELEASE CHASSIS button.		Depress button and slide TD 352/U or TD-353/U into case.
	METER SELECT switch		OFF
	AC POWER switch		OFF

b. CV-1548/G and Associated Equipment. Operate the POWER switch of the CV-1548/G to OFF and the meter selector switch to-.

Type of channel line connection	CV-1548/G operating mode to be used	CV-1548/G switches		AN/TTC-7 type of relay case to be used	SB-86/P	
		CH 2W 4W switch	18A3A or 18A3B signaling mode switch		Line selector switch	CIV TRKS switch
2-wire civilian trunk from SB-86/P [a] switchboard or 2-wire trunk from AN/TTC-7 central office.	Plug supervision, originate[d]	2W	OR	TA-226/TTC only.	M	ON
2-wire trunk from SB-86/P switchboard or common battery (CB) line circuit from AN/TTC-7 central office.	Plug supervision, terminate[d]	2W	TE	TA-224/TTC or TA-223/TTC in CB mode only.	C	See [b] below
2-wire magneto line from SB-86/P, 2-wire local-battery (LB) line from AN/TTC-7, or a direct field telephone (TA-43/PT or TA-312/PT) over field wire.	20 cps ringing.....	2W	AC	TA-223/TTC only in the LB mode.	M	See [b] below
4-wire voice frequency equipment.	No signaling (channel patched straight through).	4W	OFF	na [c]	na	na
2-wire voice frequency equipment.	No signaling (hybrid only in use).	2W	OFF	na	na	na

[a] When using SB-86/P switchboard, the plug supervision originate mode can be used *only* with the civilian trunks (CIV TRKS).
[b] If a civilian trunk circuit is used with this operating mode, set the associated CIV TRKS switch to OFF.
[c] Not applicable.
[d] 18A4 panel provides two-way plug supervision and automatic signaling (both terminals for a given channel must have compatible panels).

2-7. Preliminary Checks and Adjustments

a. Power Supplies. Partially pull each component, except the CV-1548/G, from its case to operate the controls on the right-hand side panel and perform the following:

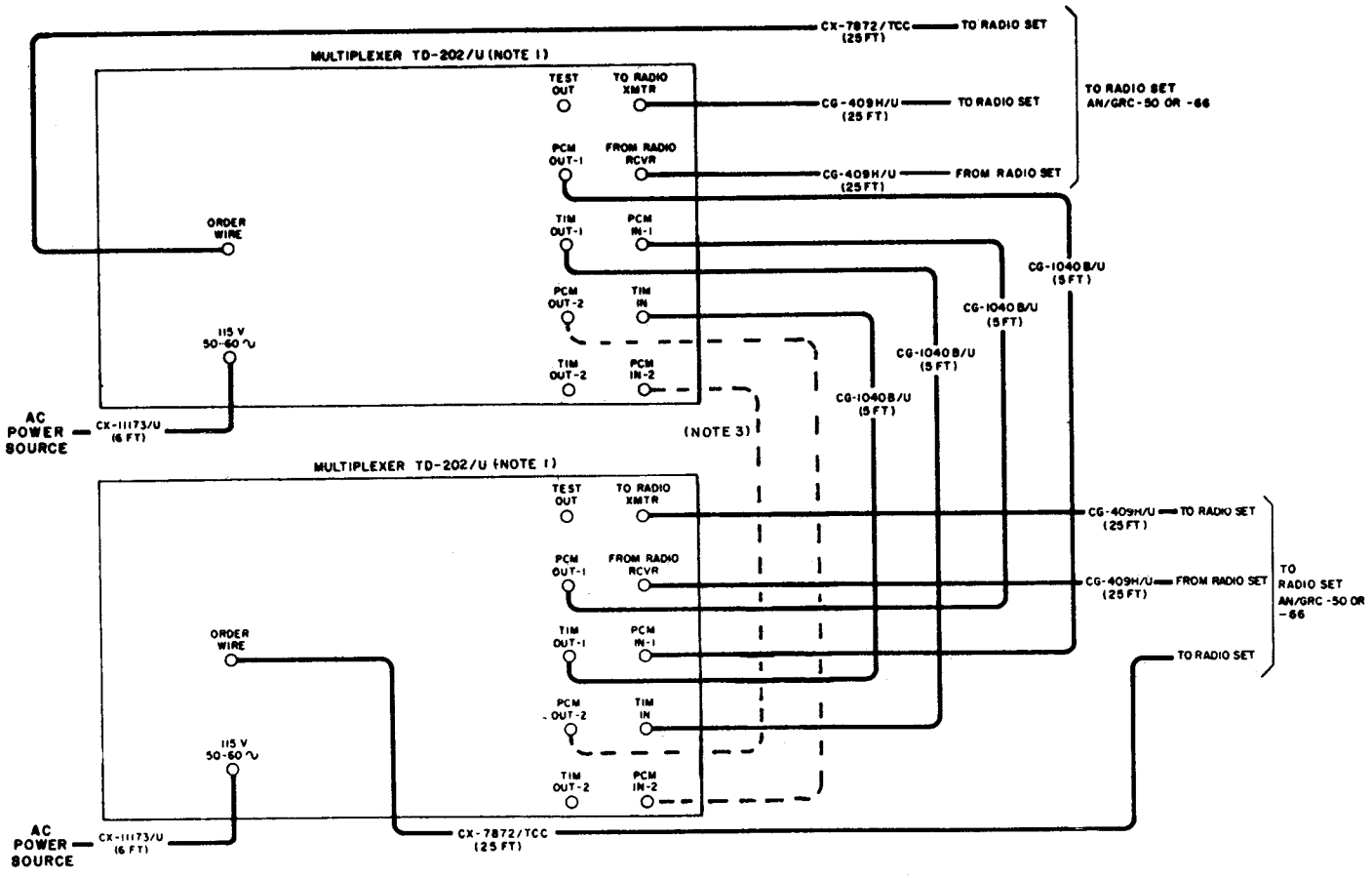
NOTE

If the buzzer sounds while making the following checks, press the ALARMS BUZZER OFF switch to silence the buzzer.

(1) Operate the AC POWER switch on each component to ON. The AC POWER indicater on each component and the TD-204/U ALARMS NO CABLE CURRENT indicator will light.

(2) Operate the TD-204/U CABLE POWER switch to ON. The ALARMS NO CABLE CURRENT indicator will extinguish.

(3) Operate the TD-204/U METER SELECT switch to CABLE 1 and check for a yellow indication on the TEST ALIGN meter.



NOTES:

1. OPERATE [TRAFFIC SEL] SWITCH TO [12] IN 12 CHANNEL OPERATION, AND TO [24R] FOR 24 CHANNEL OPERATION.
2. [ ] INDICATES PANEL MARKING.
3. USING TWO 5 FT. LENGTHS OF CG-1040B/U, MAKE THESE CONNECTIONS FOR 24 CHANNEL OPERATION.

EL2LR008

Figure 2-3. Radio repeater, 12/24 channels, interunit connection diagram.

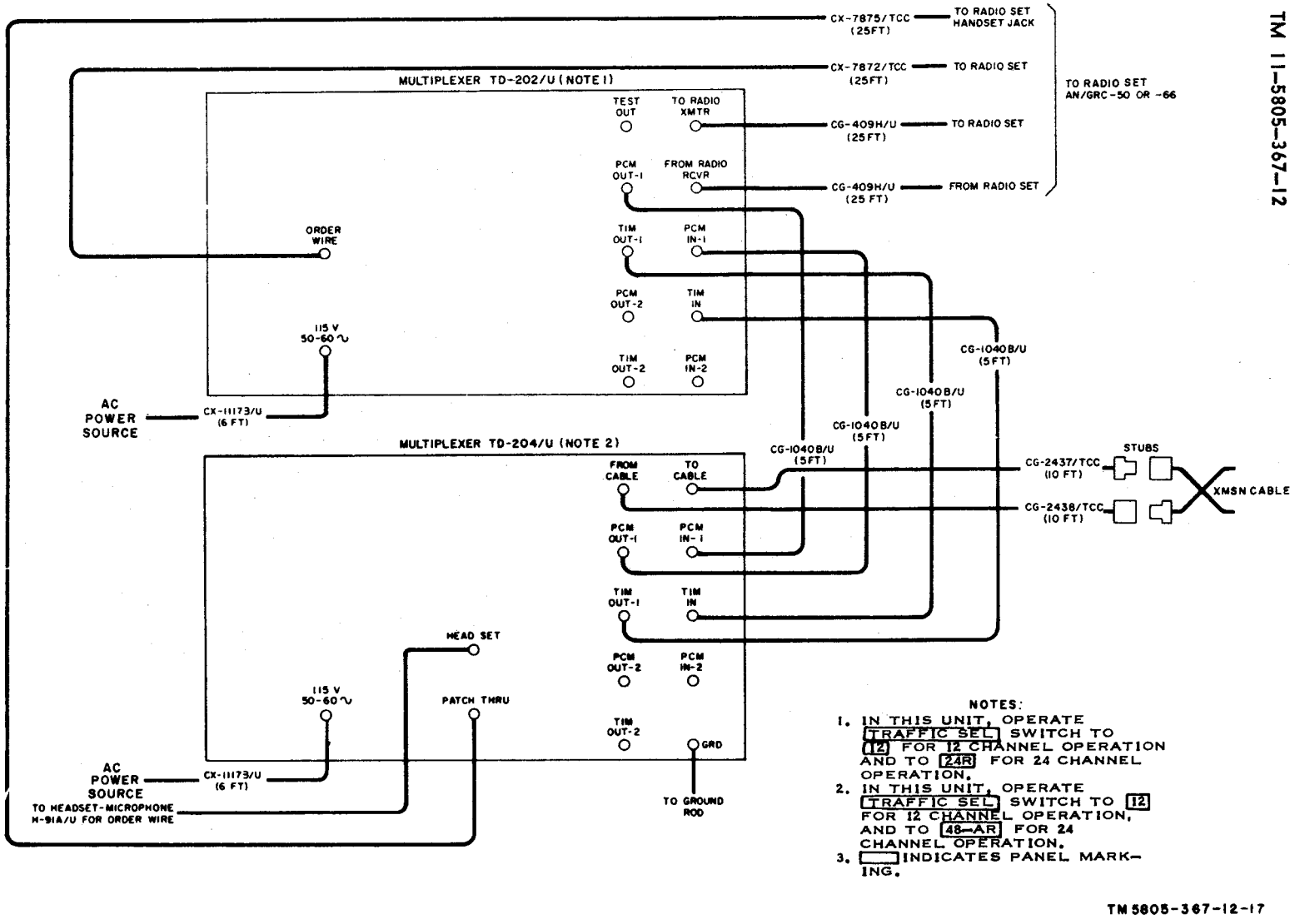


Figure 2-4. Radio to/from cable conversion, 12/24 channels, interunit connection diagram.

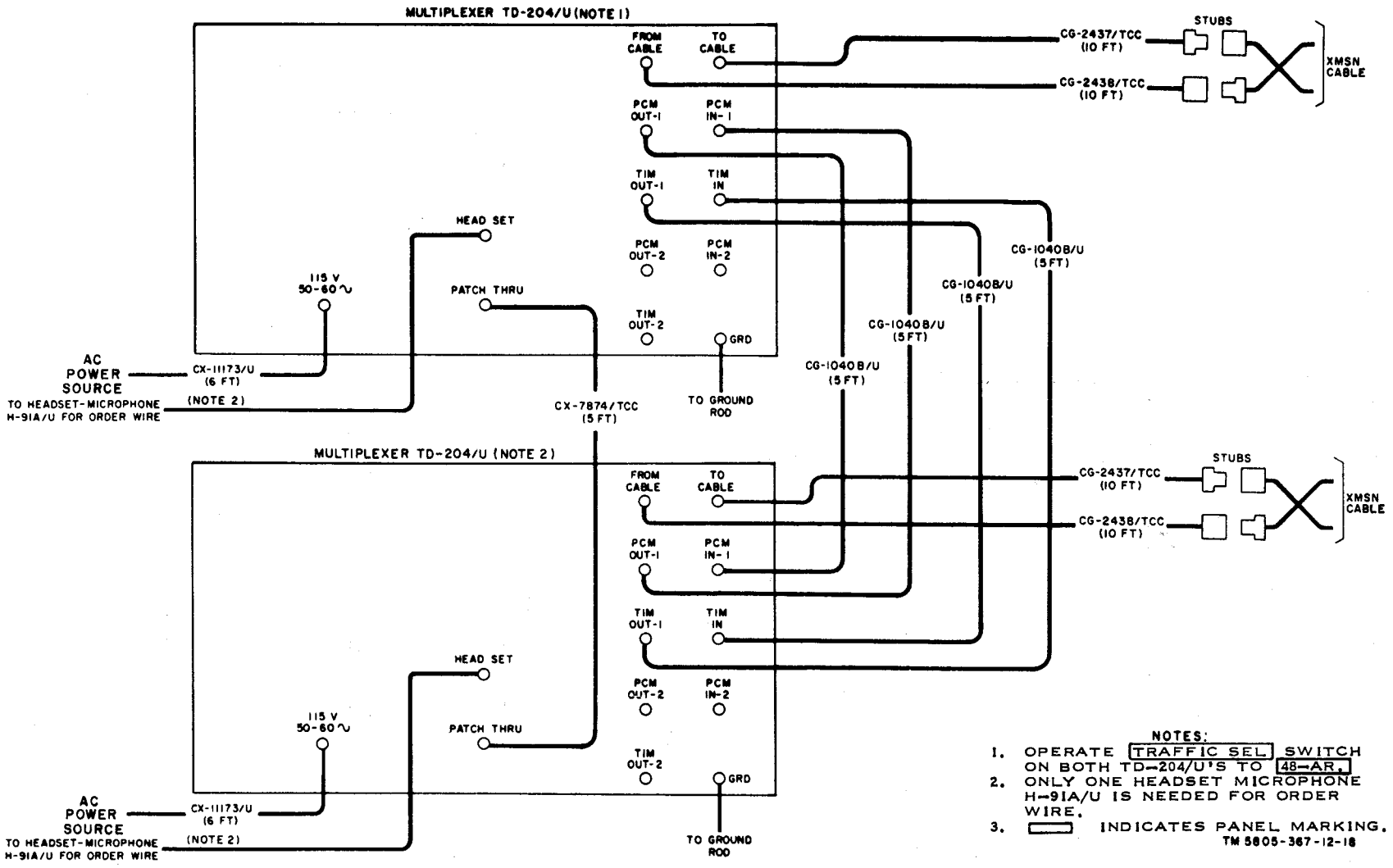


Figure 2-5. Attended cable repeater, 12/24/48 channels, interunit connection diagram.

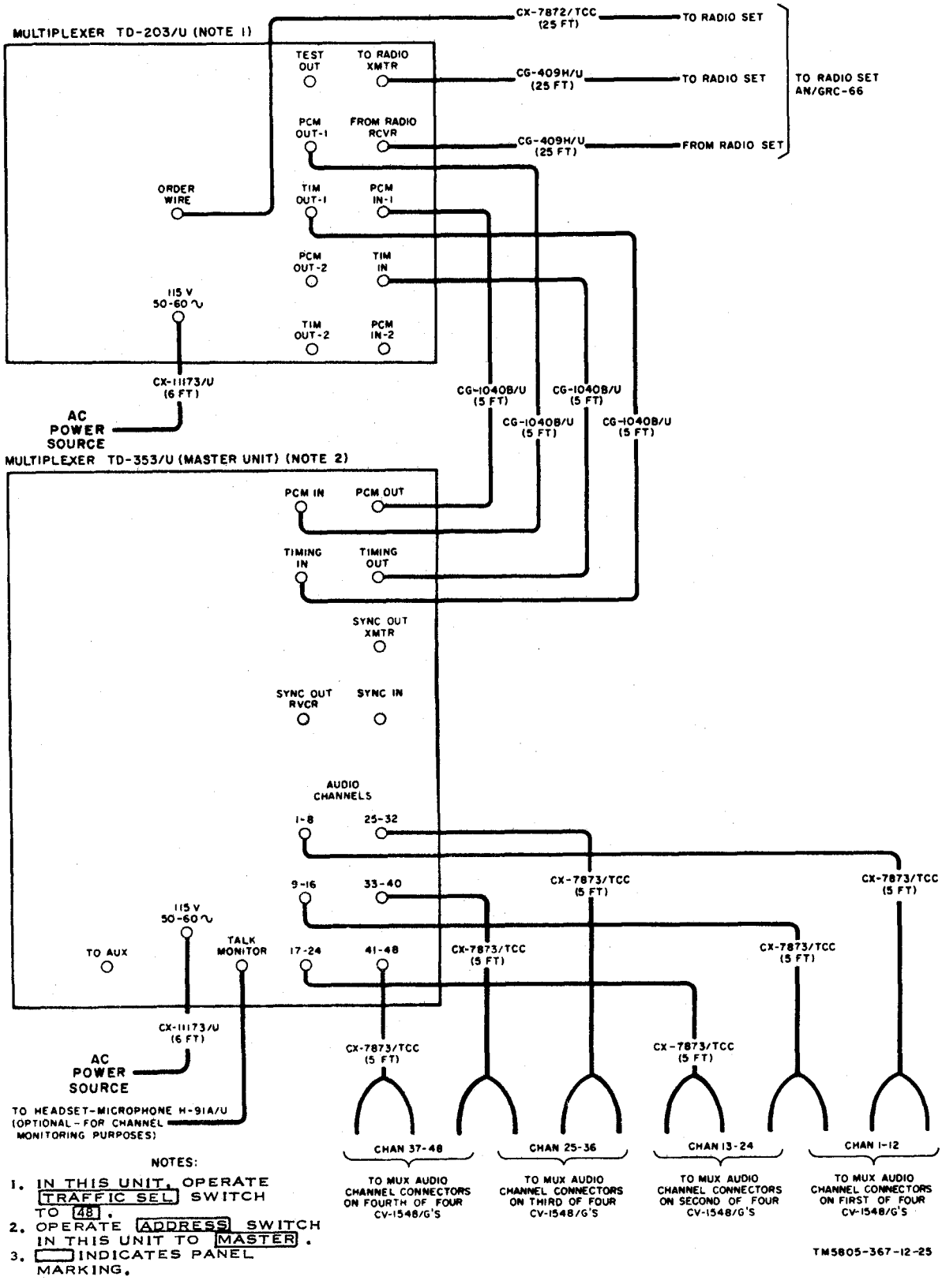


Figure 2-6. Radio terminal, 48 channels, interunit connection diagram.

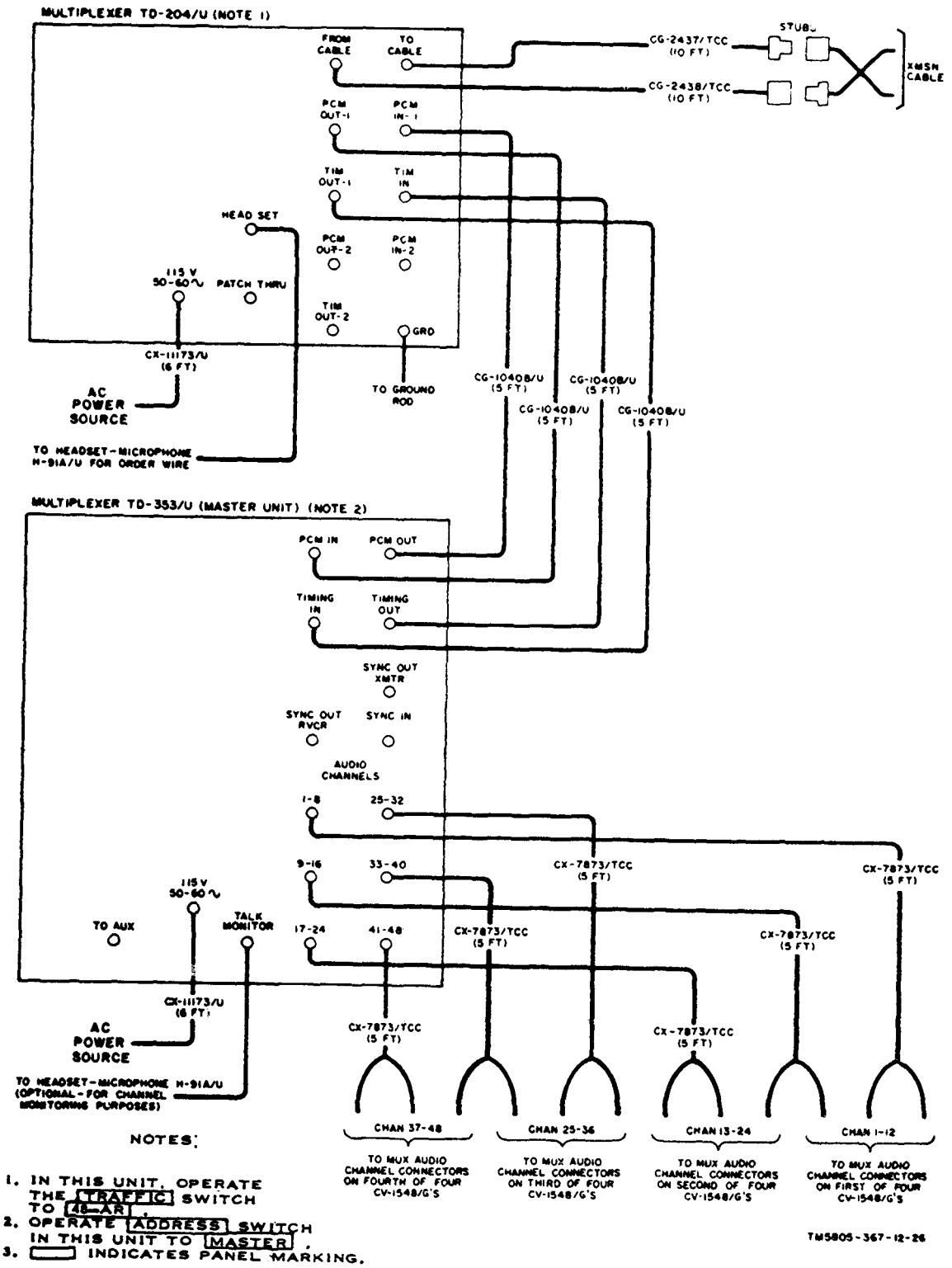


Figure 2-7. Cable terminal, 48 channels, interunit connection diagram.

(4) Operate the TD-204/U METER SELECT switch to CABLE V and check to see that the TEST ALIGN meter indicated 10.8 times the number of TD-206/G's in the cable link plus 13.

(5) Operate the METER SELECT switch of each component to SERV FAC.

(6) Operate the TD-202/U (TD-203/U) SERV SEL switch through positions +10, +4.5 and -4.5 and check for a yellow area indication on the TEST ALIGN meter.

(7) Operate the TD-202/U (TD-203/U) SERV SEL switch to -12 and check for a green area indication on the TEST ALIGN meter.

(8) Operate the TD-204/U SERV SEL switch through positions -10, +10, SUM ±3 and BAL and check for a yellow indication on the TEST ALIGN meter.

(9) Operate the TD-204/U SERV SEL switch to RCC and check for a green area indication on the TEST ALIGN meter.

(10) Operate the TD-352/U (TD-353/U) SERV SEL switch through positions +25, +10, +4.5, -4.5 and -12 and check for a yellow area indication on the TEST ALIGN meter.

(11) Operate the TD-352/U (TD-353/U) SERV SEL switch to -5.2 and check for a green area indication on the TEST ALIGN meter.

b. CV-1548/G. Loosen the captive screws, remove the perforated inner front cover, and perform the following

(1) General Tests.

NOTE

Steps *(b)* and *(c)* below apply to CV-1548/G with power supply 181A1 only.

(a) Check to see that the 20 ~ indicator on panel 18A2 is lighted.

(b) Operate the meter selector switch and check the indication on the TEST ALIGN meter as follows:

Position	*Indication*
–	Yellow area
+	Yellow area
20~ DRIVE	Yellow area
20~	Yellow area
300~	Green area

(c) If a green area indication is not obtained on the TEST ALIGN meter with the meter selector switch at 1600 ~ ,adjust the ADJ 1600 control on panel 18A2 for a center indication in the green area.

(2) *Line polarity checks between CV-1548/G and AN/TTC-7.*

(a) Local battery (LB) line. In each panel 18A3 of the CV-1548/G, connected to an LB line, press the TEST switch. If an incoming call does not register at the local switchboard for the associated line, interchange the tip and ring wires.

(b) Common battery (CB) line (terminate (TE) only). For each panel 18A3 of the CV-1548/G connected to a terminate CB line, disconnect the CX-7870/TCC (CX-7873/TCC) cables between the CV-1548/G and the TD-352/U (TD353/U). This will simulate an incoming call on the CB line. The incoming call should light the associated local 18A3A or 18A3B panel lamp. If not, interchange the tip and ring wires.

NOTE

Tip and ring wire polarity is not significant between AN/TTC-7 originate (OR) trunks and the CV-1548/G.

(3) Line polarity checks between CV-1548/G and SB-86/P.

(a) On each panel 18A3 of the CV-1548/G connected to an SB-86/P circuit, operate the signaling mode switch to OR. Operate the line selector switch to T in each line of the SB-86/P connected to the CV-1548/G, and pull down all cords on the SB-86/P.

(b) Interchange the tip and ring wires on each line that shows a white line indicator on the SB-86/P.

(c) Operate the signaling mode switch on each panel 18A3 of the CV-1548/G and the switches of the SB-86/P as in in paragraph *2-6b.*

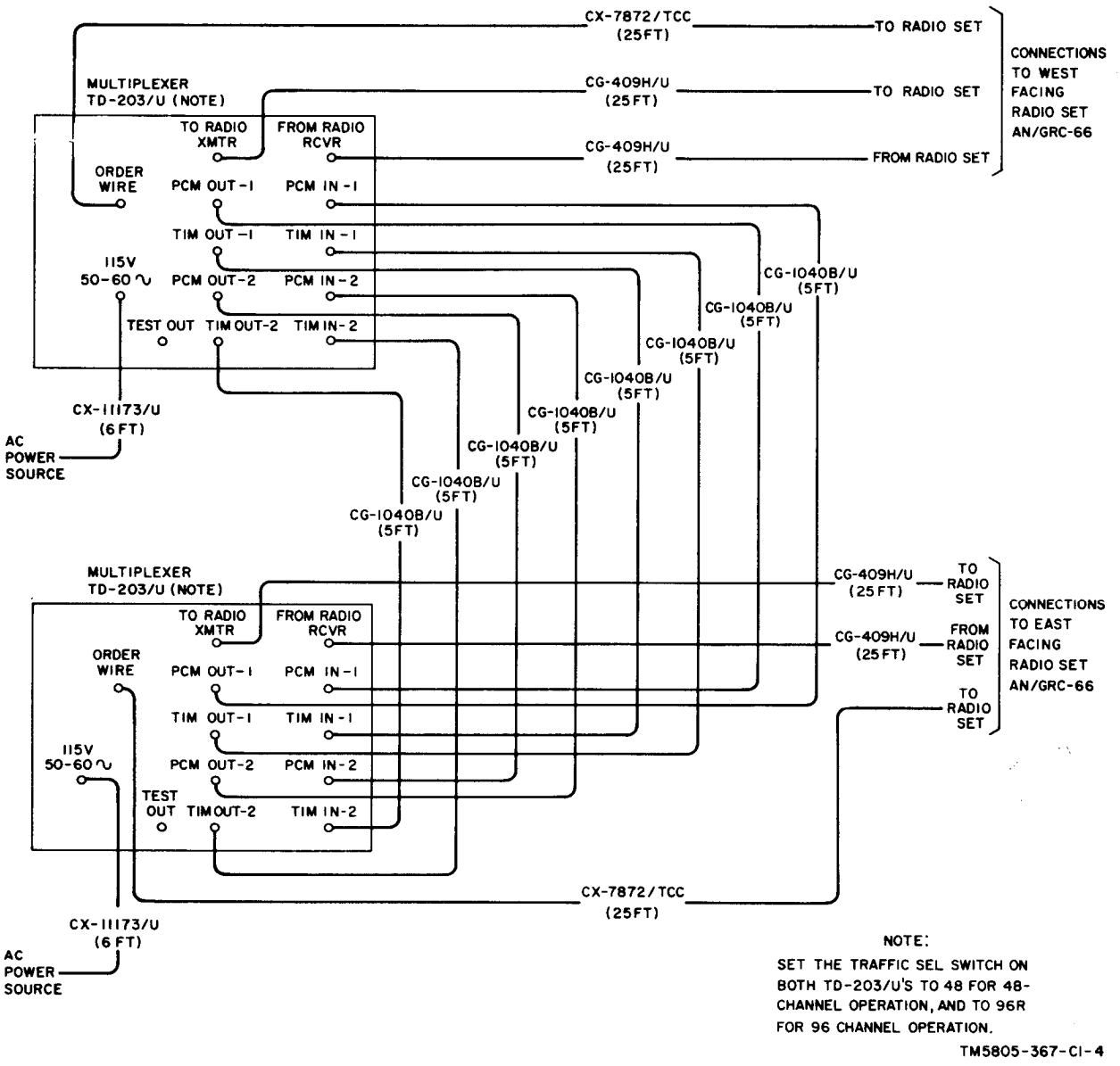


Figure 2-8. Radio Repeater, 48/96 chunnds, interunit connection diagram.

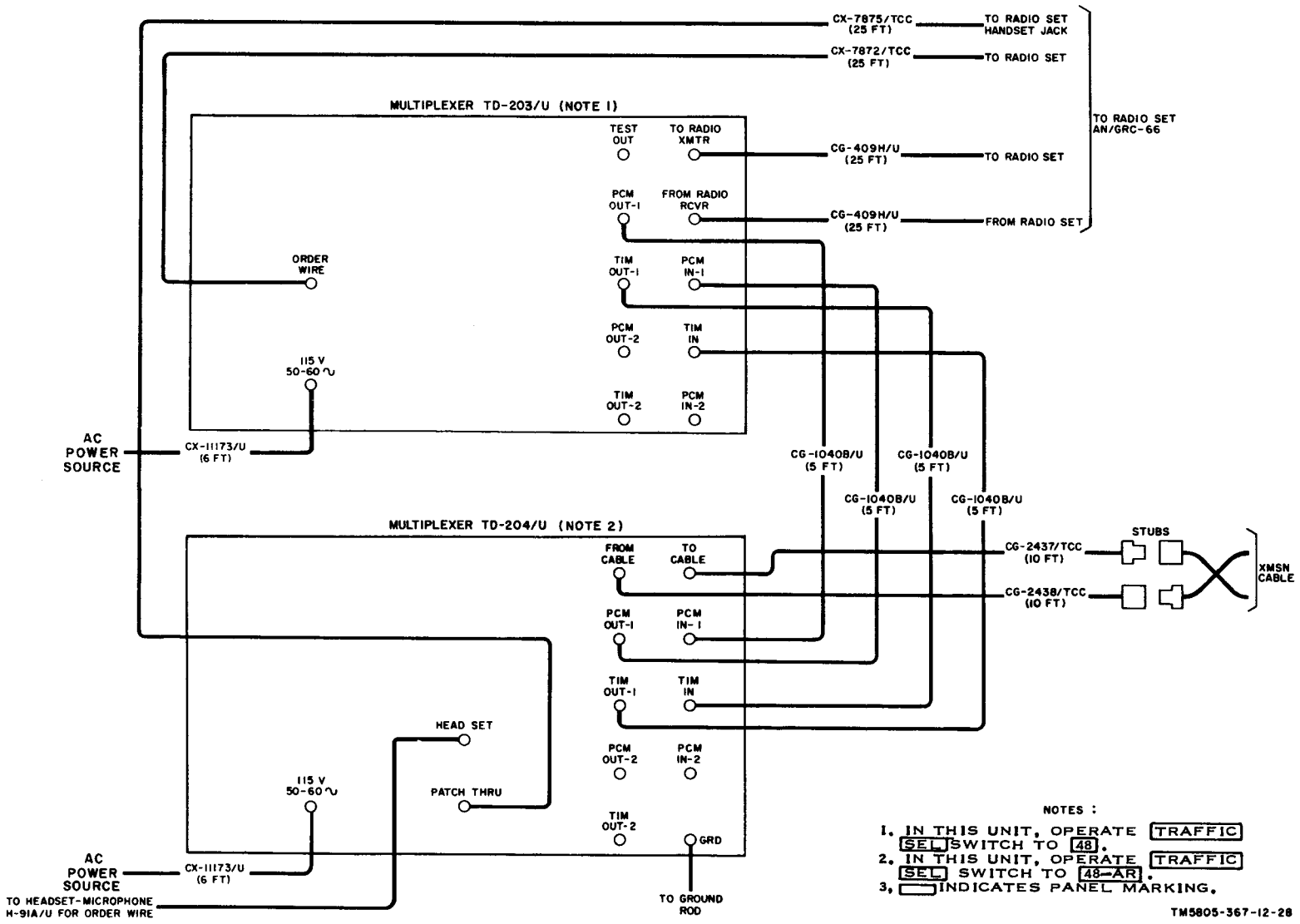


Figure 2–9. Radio to/from cable conversion, 48 channels, interunit connection diagram.

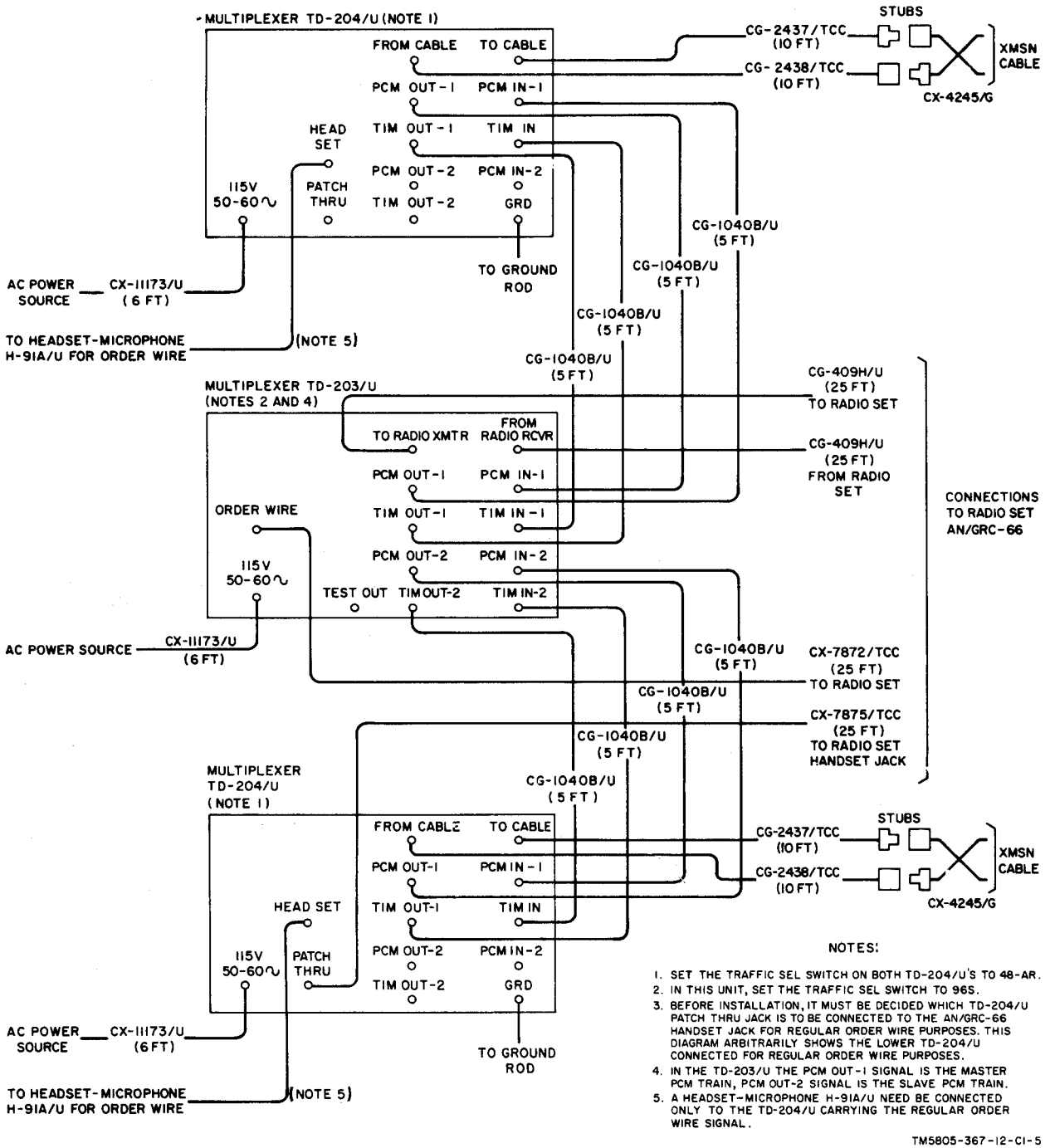


Figure 2-10. Radio to/from cable conversion, 96 channels, interunit connection diagram.

(4) Replacing inner front cover

(a) Seat the lower edge of the cover inside the nut blocks (fig. 1-6) and make sure the lower edge of the cover is firmly against the floor of the case.

(b) Swing the upper edge of the cover forward, pressing it firmly against the plug-in panels.

(c) Tighten the captive screws.

Section III. SYSTEM LINEUP

Note. Perform the preliminary operation of controls (para 2-6) and the preliminary checks and adjustments (para 2-7) before perfoming the system lineup (paras 2-8 through 2-10).

2-8. Adjusting Order Wire Level

a. Radio Links.

(1) Establish communications with the distant terminal or repeater through the radio equipment orderwire facility.

(2) Use the radio equipment test tone and establish the proper level for the test tone as indicated in the radio equipment technical manual.

(3) Operate the TD-202/U (TD-203/U) SERV SEL switch to 0.

(4) Adjust the TD-202/U (TD-203/U) ORDER WIRE LEVEL control at both terminals or repeaters for a center hairline indication on the TEST ALIGN meter.

(5) Turn off the test tone of the radio equipment and check the orderwire communication through the link for satisfactory volume.

(6) Operate the TD-202/U (TD-203/U) SERV SEL switch at both terminals or repeaters to +10.

b. Cable Links.

(1) Connect the H-91A/U to the TD-204/U HEADSET connector at both terminals or repeaters.

(2) Momentarily, operate the TD-204/U TALK-OFF-SIG switch to SIG and then to TALK.

(3) When communication is established through the cable link, operate the TD-204/U METER SELECT switch to SERV FAC and the SERV SEL switch to Q.

(4) Operate the TONE/OFF switch on TD-204/U panel 6A2 to TONE.

(5) Instruct the distant terminal or repeater to adjust the CRL control on the distant TD-204/U panel 6A2 for a center hairline indication on the TEST ALIGN meter.

(6) Operate the TONE/OFF switch on TD-204/U panel 6A2 to OFF and instruct the distant terminal or repeater to send the test tone (TONE/OFF switch of panel 6A2 at distant TD-204/U at TONE).

(7) Adjust the CRL control on the local TD-204/U panel 6A2 for a center hairline indication on the TEST ALIGN meter.

(8) Instruct the distant terminal or repeater to stop the test tone (TONE/OFF switch of distant TD-204/U panel 6A2 at OFF) and check the order wire communication for satisfactory volume.

(9) Operate the TD-204/U SERV SEL switch to +10.

2-9. Adjusting Video Level

a. Output.

(1) Operate the TD-202/U (TD-203/U) METER SELECT switch at

both terminals or repeaters to TC RADIO XMTR.

(2) Adjust the OL control on panel 5A2 of the TD-202/U or panel 4A2 of the TD-203/U at both terminals or repeaters for a center hairline indication in the yellow area on the TEST ALIGN meter.

b. Input.

(1) Operate the TD-202/U (TD-203/U) METER SELECT switch at both terminals or repeaters to FROM RADIO RCVR.

(2) Adjust the RL control on panel 5A3 of the TD-202/U or panel 4A3 of the TD-203/U at both terminals or repeaters for a center hairline indication in the yellow area on the TEST ALIGN meter.

NOTE

Perform the procedures in (3) through (5) below for 24- or 96-channel operation only.

(3) Operate the TD-202/U (TD-203/U) METER SELECT switch to SERV FAC and the SERV SEL switch to C.

(4) Adjust the CL control on TD-202/U panel 5A3 or TD-203/U panel 4A3 for a maximum (peak) indication on the TEST ALIGN meter.

(5) Operate the TD-202/U (TD-203/U) SERV SEL switch at both terminals or repeaters to + 10.

2-10. Adjusting Channel Gain

NOTE

Each panel 1A2/2A2 or 1A2/2A2A in the TD-352/U (TD-353/U) contains two channels. The channel numbers assigned to a panel are located on the frame below each panel. The lower number channel and its associated controls are physically located on the bottom half of the panel.

a. TD-352/U's.

(1) Establish order-wire communications through the link (para 3-6).

(2) Adjust the TD-352/U OSC ADJUST control at both terminals for a center hairline indication on the TEST ALIGN meter.

(3) Operate the TD-352/U SERV SEL switch at both terminal to CHAN 1-12 (vertical up).

NOTE

The procedures given in (4) through (7) below must be performed simultaneously at both terminals. This is necessary because the signal used for the adjustment at one end of the link is generated at the other end of the link.

(4) Operate the TD-352/U2 WIRE-4 WIRE switch at both terminals to the position corresponding to the type of line or trunk (2- or 4-wire) connected to channel 1.

(5) Operate the TD-352/U CHAN 1-12 switch at both ends of the link to 1.

(6) Adjust the TD-352/U AG control for channel 1 at both ends of the link for a center hairline indication on the TEST ALIGN meter.

(7) Perform the procedures given in (4) through (6) above for each channel of the TD-352/U's.

(8) Perform cross-talk check in paragraph *2-11b* through *f.*

(9) Operate the TD-352/U CHAN 1-12 switch at both ends of the link to OFF and the SERV SEL switch to + 25.

b. TD-353/U's.

(1) Establish order-wire communications through the link (para 3-6).

(2) Operate the TD-353/U SERV SEL switch at both ends of the link to OSC.

(3) Adjust the TD-353/U OSC ADJUST control at both ends of the link for a center hairline indication on the TEST ALIGN meter.

(4) Operate the TD-353/U SERV SEL switch at both ends of the link to EVEN CHAN (vertical up).

NOTE

The procedures given in (5) through (10) below must be performed simultaneously at both ends of the link. This is necessary because the signal used for the adjustment at one end of the link is generated at the other end of the link.

(5) Operate the TD-353/U 2 WIRE-4 WIRE switch at both ends of the link to the position corresponding to the type of line or trunk (2- or 4-wire) connected to channel 2.

(6) Operate the TD-353/U EVEN CHAN selector switch at both ends of the link to 2.

(7) Adjust the TD-353/U AG control for channel 2 at both ends of the link for a center hairline indication on the TEST ALIGN meter.

(8) Perform the procedures given in (5) through (7) above for each even channel of the TD-353/U's at both ends of the link.

(9) Operate the TD-353/U SERV SEL switch at both ends of the link to ODD CHAN (vertical down).

(10) Perform the procedures given in (5) through (7) above for each odd channel of the TD-353/U's at both ends of the link.

(11) Operate the TD-353/U SERV SEL switch at both ends of the link to + 25.

(12) Operate the MEASURE-PHONE ODD-PHONE EVEN switch to PHONE ODD or PHONE EVEN.

2-11. Cross-Talk Check

This check is performed on the TD-352/U after each installation, prior to any operation, once each 24 hours of operation and immediately after replacement of panel assemblies,

a. Perform procedures in paragraph 2-10a(1) through (7) prior to proceeding to next step.

b. Operate the TD-352/U CHAN 1-12 switch at both ends of link to 1.

c. Listen for clear test tone on channel 1 and no test tone on other channels at both terminals.

d. Perform the procedures in *b* and *c* above for each channel of the TD-352/U.

e. If cross-talk is heard, loosen plug-in panel retaining bars (fig. 3-10 and 3-11), reseat all plug-in panels, then tighten plug-in panel retaining bars.

f. Repeat procedures in *b* and *c* above. If cross-talk is still present, remove the TD-352/U from the system and return to higher lever maintenance.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. CONTROLS, INDICATORS, AND CONNECTORS

3-1. Multiplexer TD-202/U or TD-203/U

a. Front Panel **(fig. 3-1 or 3-1.1).**

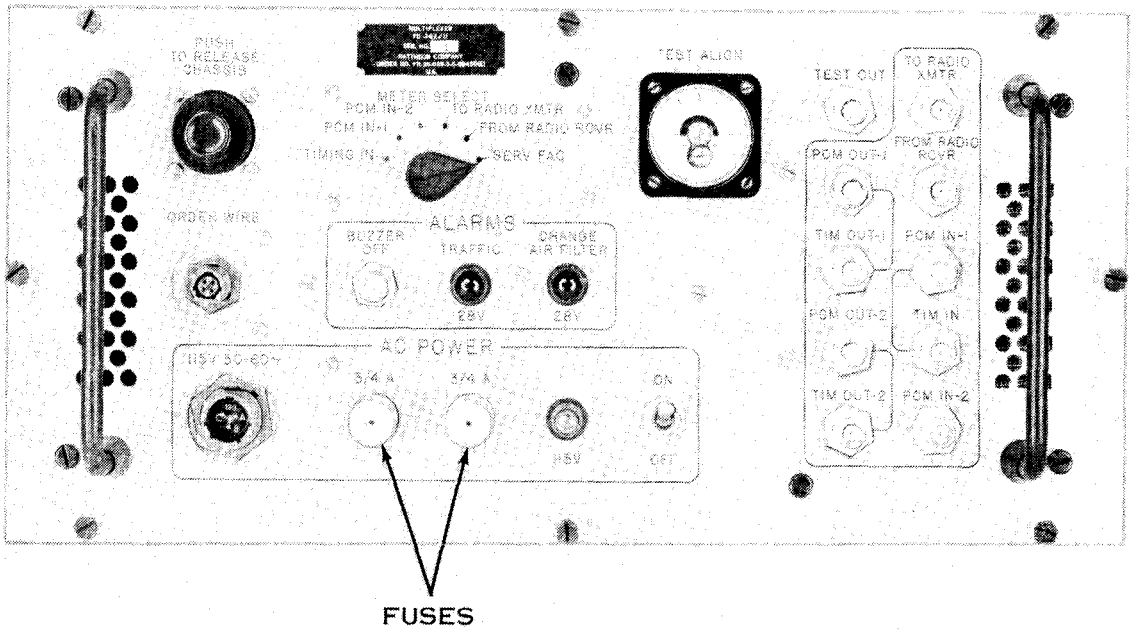
Control, indicator, or connector	Function
PUSH TO RELEASE CHASSIS button	Allows chassis withdrawal when front panel screws are loose.
TEST ALIGN meter	Monitors fault locating and alignment circuit selected by METER SELECT switch.
METER SELECT switch (six-position rotary)	Connects TEST ALIGN meter to monitor following signals:
	Position — **Signal**
	TIMING IN (TD-202/U). — Timing at TIM IN connector.
	TIMING IN-1 (TD-203/U). — Timing at TIM IN-1 connector.
	TIMING IN-2 (TD-203/U). — Timing at TIM IN-2 connector.
	PCM IN-1 — Pcm at PCM IN-1 connector.
	PCM IN-2 — PCM at PCM IN-2 connector.
	TO RADIO XMTR — Pcm video at TO RADIO XMTR connector.
	FROM RADIO RCVR — Pcm video at FROM RADIO RCVR connector.
	SERV FAC — Determined by service facility switches on right-hand side panel.
ALARMS:	
BUZZER OFF switch	Silences buzzer.
TRAFFIC indicator (red)	Lights (accompanied by buzzer) with no signal present at FROM RADIO RCVR connector.
CHANGE AIR FILTER indicator (red)	Lights when power supply overheats.
AC POWER 115V 50-60 connector	Provides ac power connection.
AC POWER switch	Applies and removes ac power.
AC POWER indicator (amber)	Lights with ac power present and good fuse.
ORDER WIRE connector	Provides order wire connection to associated radio equipment.

Control, indicator, or connector	Function
TEST OUT connector	Provides loopback connection for testing pcm video signal (band-limited to simulate signal after radio relay).
TO RADIO XMTR connector	Provides output connection to radio equipment.
FROM RADIO RCVR connector	Provides input connection from radio equipment.
PCM OUT-1 connector	Provides output connection for pcm out-1 signal.
TIM OUT-1 connector	Provides output connection for timing signal related to pcm out-1 signal.
PCM OUT-2 connector	Provides output connection for pcm out-2 signal.
TIM OUT-2 connector	Provides output connection for timing signal related to pcm out-2 signal.
PCM IN-1 connector	Provides input connection for pcm in-1 signal.
PCM IN-2 connector	Provides input connection for pcm in-2 signal.
TIM IN connector (TD-202/U)	Provides input connection for timing signal related to pcm in signals.
TIM IN-1 connector (TD-203/U)	Provides input connection for timing signal related to pcm in-1 signal.
TIM IN-2 connector (TD-203/U)	Provides input connection for timing signal related to pcm in-2 signal.

b. Internal Right-Hand Side (figs. 3-2 and 3-3).

Control	Function
SEW SEL switch (18-position rotary)	Selects signal applied to TEST ALIGN meter as follows: ***Note.*** Lettered switch positions correspond to letters on frame above panel being monitored. **Position** — **Signal** A — Positive and negative decision levels (panel 4A3 or 5A3). TEST ALIGN meter should indicate in green area if TEST ALIGN meter reads green for FROM RADIO RCVR signal monitoring. B — Crystal filter drive (panel 4A4 or 5A4). C — Crystal filter drive (panel 4A5 or 5A5); this position is also used during CL control adjustment in 24- or 96-channel lineup. D — Traffic alarm (panel 4A5 or 5A5). E — Countdown timing level (panel 4A5 or 5A5). F — Decision timing level (panel 4A5 or 5A5). G — Recovered pcm level (panel 4A3 or 5A3). H — 91-ohm termination required at TIM OUT-1 connector (panel 4A9 or 4A6/5A6).

Control	Function
	Position / Signal J — 91-ohm termination required at TIM OUT-2 connector (pad 4A9 or 4A6/5A6). K — 8-kc address No. 1 level (panel 4A6/5A6). L — 8-kc address No. 2 level (panel 4A6/5A6). M — 91-ohm termination required at PCM OUT-1 connector (panel 4A8/5A8). N — 91-ohm termination required at PCM OUT-2 connector (panel 4A8/5A8). O — Order wire output level (panel 4A7/5A7) (TEST ALIGN meter indicates in yellow area only if a -4-dbm audio tone is present and terminated in 600 ohms). +10 — +10-volt supply level. +4.5 — +4.5-volt supply level. -4.5 — -4.5-volt supply level. -12 — -12-volt supply level.
TRAFFIC SEL switch (4-position rotary)	Selects required operating mode as follows: **Position** / **Function** 24I or 96I — Provides interleaved pcm signal for 24- or 96-channel radio terminal. 24S or 96S — Provides two separate pcm signals for 24- or 96-channel D/I radio repeater. 24R or 96R — Provides restoration of interleaved pcm signal for 24- or 96-channel radio repeater. 12 or 48 — Provides one pcm signal for 12- or 48-channel terminal or restoration of pcm signal for radio repeater.
ORDER WIRE LEVEL control	Adjusts order wire audio output level.
OPR-TEST switch	**Position** / **Function** OPR — Provides normal operation. TEST — Connects band-limiting filter in transmit section output at TEST OUT connector for loopback test.



TM 5805-367-12-36

Figure 3-1. Multiplexer TD-202/U, removed from case, front panel details.

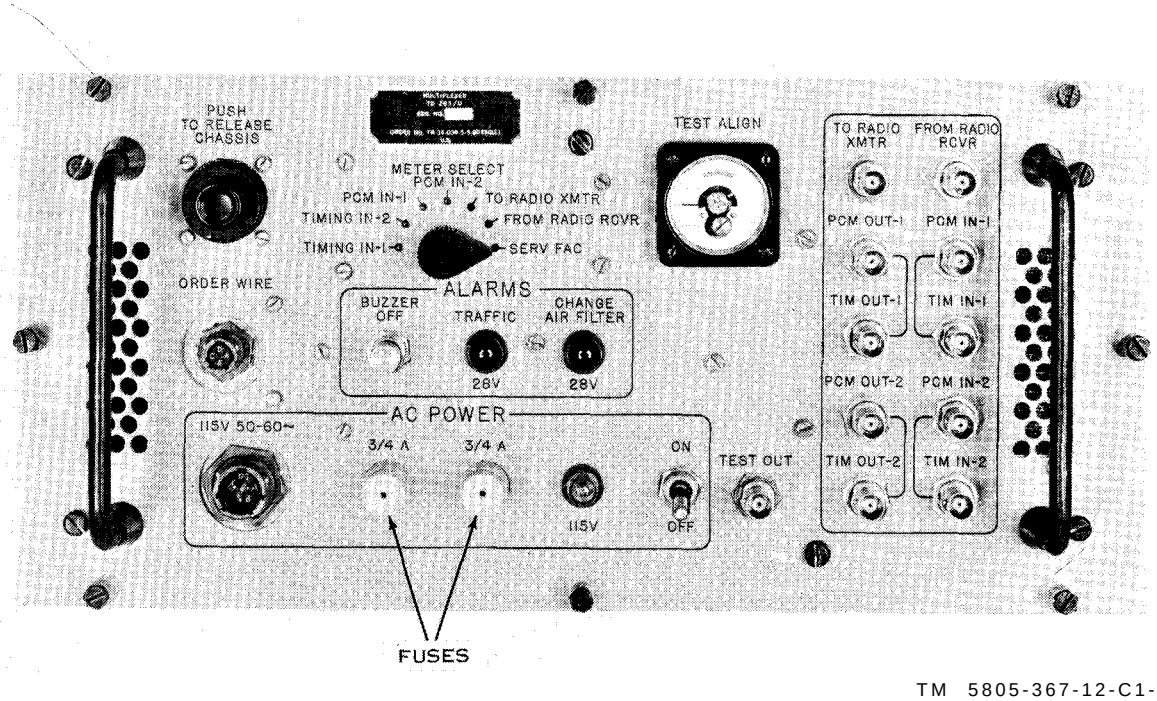


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Figure 3-1.1 Multiplexer TD-203/U removed from case, front panel details.

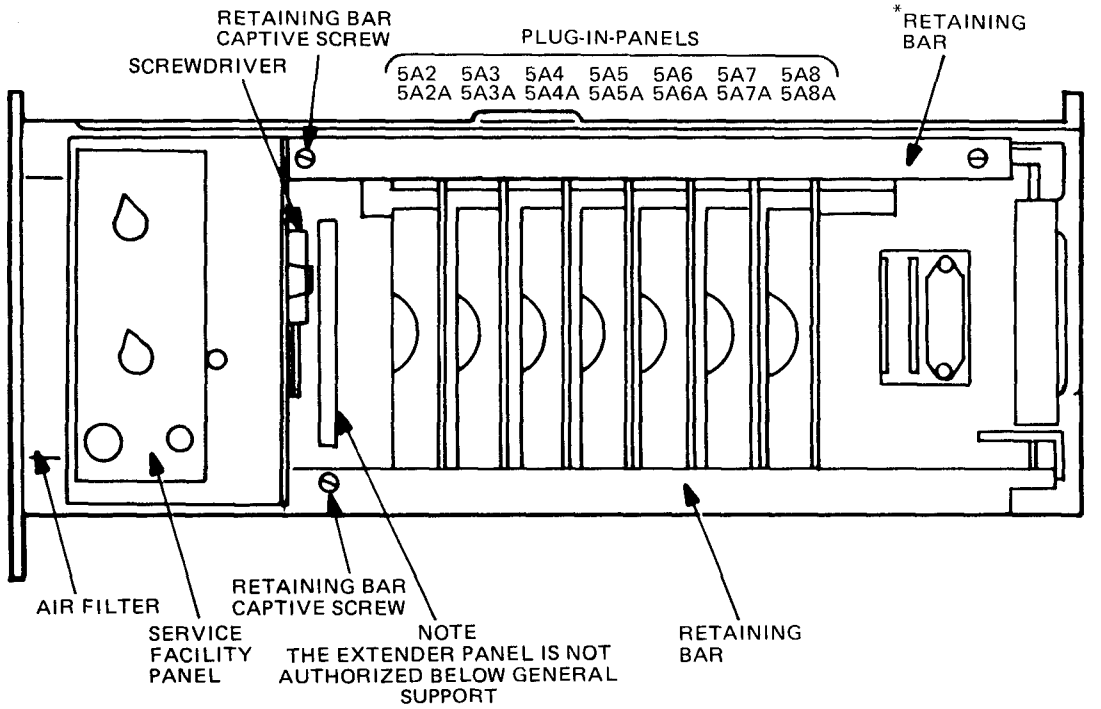

Figure 3-2. Multiplexer TD-202/U removed from case, right-hand side view.

c. Panels (figs. 3-2 and 3-3).

Control	Function
OL control (screwdriver-adjusted) (panel 4A2 or 5A2).	Permits video output level adjustment.
CL control (screwdriver-adjusted) (panel 4A3 or 5A3).	Permits center ternary level adjustment (24- or 96-channel operation).
RL control (screwdriver-adjusted) (panel 4A3 or 5A3).	Permits video receive level adjustment.

d. Internal Left-Hand Side (fig. 3-4).

Control (screwdriver-adjusted)	Function
VOLTAGE ADJUSTMENTS	
+10V ----------	Permits +10-volt supply level adjustment.
+4.5V ----------	Permits +4.5-volt supply level adjustment.
-4.5V ----------	Permits -4.5-volt supply level adjustment.

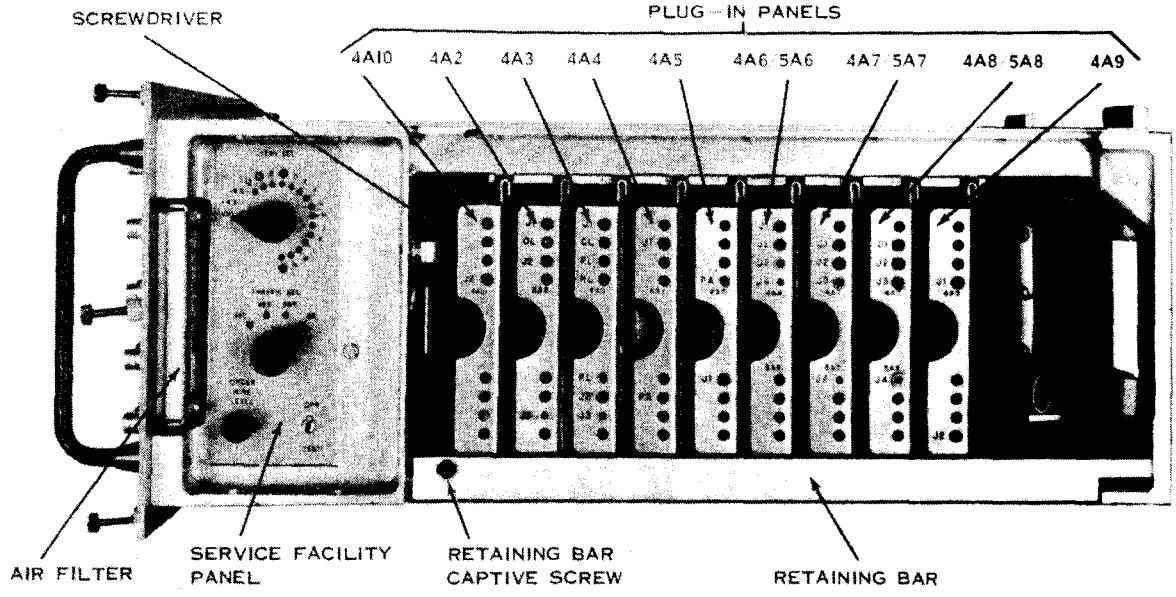

Figure 3-3. Multiplexer TD-203/U removed from case, right-hand side view.

3-2. Multiplexer TD-204/U

a. Front Panel (fig 3-5).

Control, indicator, or connector	Function
PUSH TO RELEASE CHASSIS button	Allows chassis withdrawal.
TEST ALIGN meter	Monitors fault locating and alignment circuit signals as selected by METER SELECT switch.
METER SELECT switch (6-position rotary).	Connects TEST ALIGN meter to monitor following signals:

Position	*Signal*
TIMING IN	Timing at TIM IN connector.
PCM IN-1	Pcm at PCM IN-1 connector.

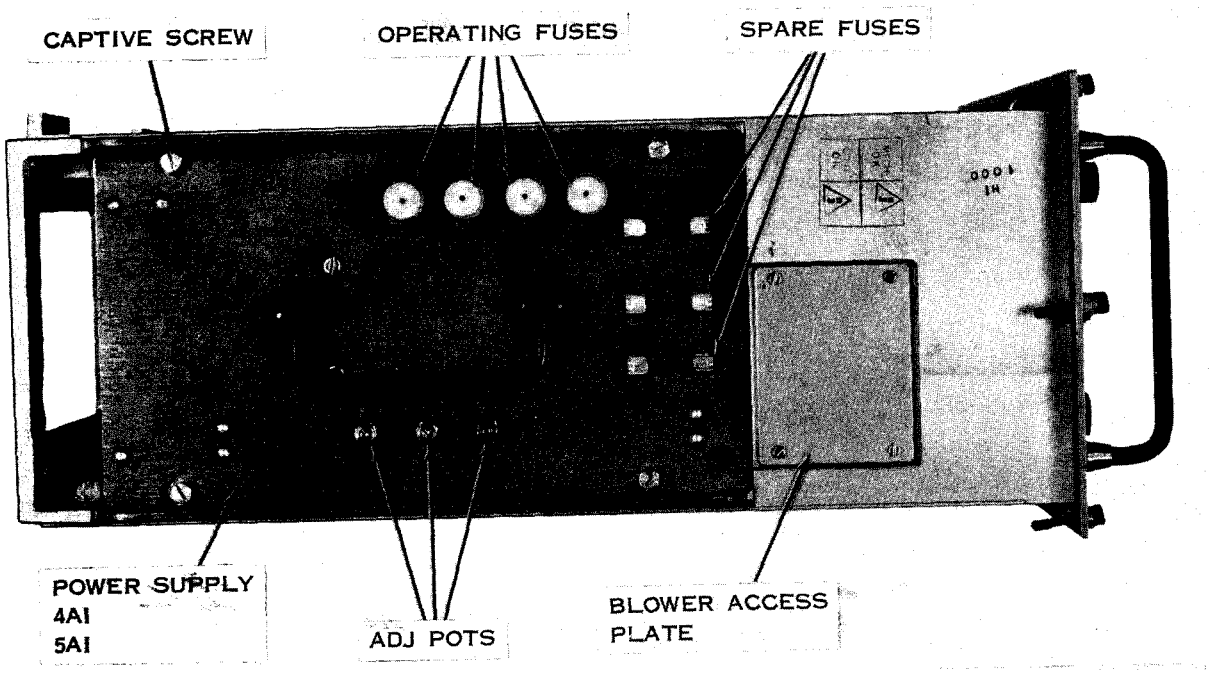

Figure 3-4. Multiplexer TD-202/U or TD-203/U removed from case, left-hand side view.

a. Front Panel-Continued.

Control, indicator, or connector	Function
	PCM IN-2 ---------- Pcm at PCM IN-2 connector.
	CABLE I ---------- Transmission cable transmit current level.
	CABLE V ---------- Transmission cable transmit voltage level.
	SERV FAC ------- Determined by service facility switches on right-hand side panel.
ALARMS:	
CHANGE AIR FILTER indicator (red) ---	Lights when power supply overheats.
TRAFFIC indicator (red) ----------	Lights (accompanied by buzzer) with no signal present at FROM CABLE connector.
NO CABLE CURRENT indicator (red) ----	Lights (accompanied by buzzer) with no outgoing cable current at TO CABLE connector.
BUZZER OFF switch----------	Silences buzzer.
CABLE POWER switch ----------	Provides cable power and reset function for automatic turnoff circuit in cable power supply.
AC POWER 115V 50-60 ~ connector -------	Provides ac power connection.
AC POWER switch----------	Applies and removes ac power.
AC POWER indicator (amber)----------	Lights with ac power present and good fuse.
CALL indicator----------	Lights for incoming order-wire call and buzzer sounds.
TALK-OFF-SIG switch (3-position toggle) --	Used to signal and communicate on order-wire circuit as follows: *Position* — *Function* TALK ---------- Connects Headset-Microphone H-91A/U to order-wire circuit. OFF ---------- Disables order-wires circuit. SIG ---------- Connects signaling to order–wire circuit.
GRD connector ----------	Provides chassis ground connection.
HEADSET connector ----------	Provides connection for H-91A/U.
PATCH THRU connector ----------	Provides connection for order-wire patch through at cable repeaters or radio-to-cable conversion points.
LIGHTNING ARRESTERS (2)----------	Protect equipment from high voltage surges.
TO CABLE connector----------	Provides output connection to transmission cable.
FROM CABLE connector ----------	Provides input connection from transmission cable.
PCM OUT-1 connector----------	Provides output connection for pcm, out-1 signal.

a. Front Panel-Continued.

Control, indicator, or connector	Function
PCM OUT-2 connector	Provides output connection for pcm out-2 signal.
TIM OUT-1 connector	Provides output connection for timing signal related to pcm out-1 signal.
TIM OUT-2 connector	Provides output connection for timing signal related to pcm out-2 signal.
TIM IN connector	Provides input connection for timing signal related to pcm in signals.
PCM IN-1 connector	Provides input connection for pcm in-1 signal.
PCM IN-2 connector	Provides input connection for pcm in-2 signal.

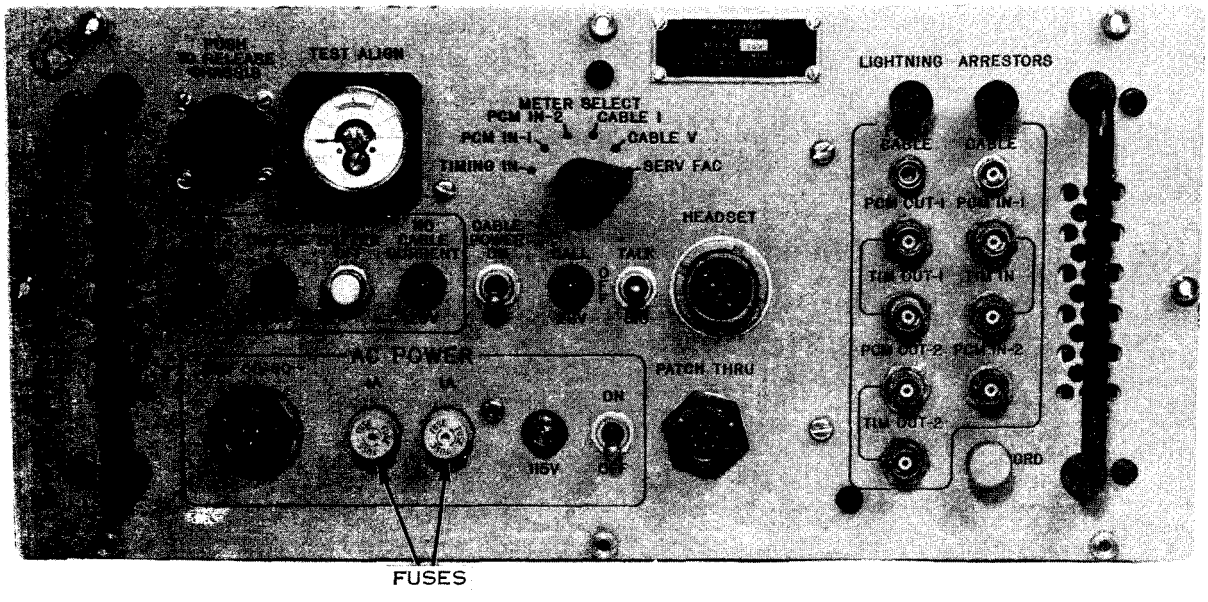

Figure 3-5. Multiplexer TD-204/U removed from case, front panel details.

b. Internal Right-Hand Side (fig 3-6).

Control	Function
TRAFFIC SEL switch (3-position rotary).	Selects required operating mode as follows: *Position* — *Function* 12 — Used at 12-channel cable terminal.

b. Internal Right-Hand Side-Continued.

Control	Function
	Position — *Function* 24 — Used at 24-channel cable terminals. 48-AR — Used at 48-channel cable terminal, or attended repeaters for 12-, 24-, or 48- channel.
SERV SEL switch (23-position rotary).	Selects signals applied to TEST ALIGN meter as follows: *Note.* Lettered switch positions correspond to letters on frame above panel being monitored. *Position* — *Signal* A — Incoming p c m signal from cable (panel 6A4). B — Extracted incoming timing (panel 6A4). C — Timing out-1 signal into 91-ohm cable (panel 6A7). D — Timing out-2 signal into 91-ohm cable (panel 6A7). E — Pcm out-1 signal into 91-ohm cable (panel 6A7). F — Pcm out-2 signal into 91-ohm cable (panel 6A7). G — Blocking oscillator bias (panel 6A7). H — Transmit pcm (panel 6A5). J — Transmit timing (panel 6A5). K — Mixer in-1 for 12- or 24-channel operation (panel 6A6). L — Mixer in-2 for 12- or 24-channel operation (panel 6A6). M — Mixer output for 12- or 24-channel operation (panel 6A6). N — Reset t i m i n g (panel 6 A 6).

b. Internal Right-Hand Side-Continued.

Control	Function
	Position — *Signal* O — Cable transmit order-wire level (panel 6A3) (TEST ALIGN meter indicates in green area with 100 mv into microphone amplifier and 880-ohm cable load). P — Radio transmit order-wire level (panel 6A3) (TEST ALIGN meter indicates in green area with 100 mv into microphone amplifier and 50-ohm load at PATCH THRU connector). Q — Phone amplifier output (panel 6A2) (TEST ALIGN meter gives center hairline indication for 162-mv 1-kc audio tone into 275-ohm load at headset connector). R — Fault-locating circuits as selected by SYSTEM FAULT LOCATOR switches. S — Receive activity (panel 6A7). -10 — -10-volt supply level. +10 — +10volt supply level. SUM +3 — +3- and -3-volt supply level. BAL — -3-volt supply level. RCC — Received cable current level (38 ma).
SYSTEM FAULT LOCATOR MILES switches (4-position rotary and 10-position rotary).	Sum of switch positions indicates number of consecutive good restorers to faulty restorer.
NORM OPR-ZERO SET-READ switch (3-position rotary).	Selects required operating mode of fault-locating circuits as follows: *Position* — *Function* NORM OPR — Provides normal operation.

b. Internal Right-Hand Side-Continued.

Control	Function
ZERO SET control	*Position* — *Function* ZERO SET — Allows ZERO SET adjustment for fault locating circuits. READ — Allows fault locating circuit indications. Provides center hairline adjustment for fault-locating circuits.

c. Panels (fig 3-6).

Control	Function
TONE OFF switch (2-position toggle, panel 6A2).	Applies 1,100-cps output to transmission cable for order-wire level adjustment.
CRL control (screwdriver adjustment, panel 6A2).	Receive cable amplifier output level adjustment.
MILE switch (4-position rotary, panel 6A4).	Provides proper receive attenuation for ¼-, ½-, ¾-, or 1-mile length of transmission cable.
MILE switch (4-position rotary, panel 6A5).	Provides proper transmit attenuation for ¼-, ½-, ¾-, or 1-mile length of transmission cable.

d. Internal Left-Hand Side (fig 3-7).

Control	Function
CABLE CURRENT ADJ control (screwdriver adjustment, 6A1 assembly).	Permits transmission cable transmit current adjustment.
OVER CURRENT ADJ control (screwdriver adjustment, 6A1 assembly).	Permits transmission cable transmit current dropout adjustment.
VOLTAGE ADJ controls (screwdriver adjustments, 6A1 assembly).	Provides following adjustments:
+10V	+10-volt supply level adjustment.
-10V	-10-volt supply level adjustment.
±3V	6-volt sum level adjustment of +3-volt and -3-volt supplies.
∓3V BAL	Establishes ground reference for ±3V control.

3-3. Multiplexer TD-352/U or TD-353/U

a. Front Panel (fig 3-8 or 3-9).

Control, indicator, or connector	Function
PUSH TO RELEASE CHASSIS button	Allows chassis withdrawal.
TEST ALIGN meter	Monitors fault-locating and alignment circuit signals as selected by METER SELECT switch.
METER SELECT switch (7-position rotary).	Connects TEST ALIGN meter to monitor following signals *Position* — *Signal* OFF — None. TIMING IN — Timing at TIMING IN connector.

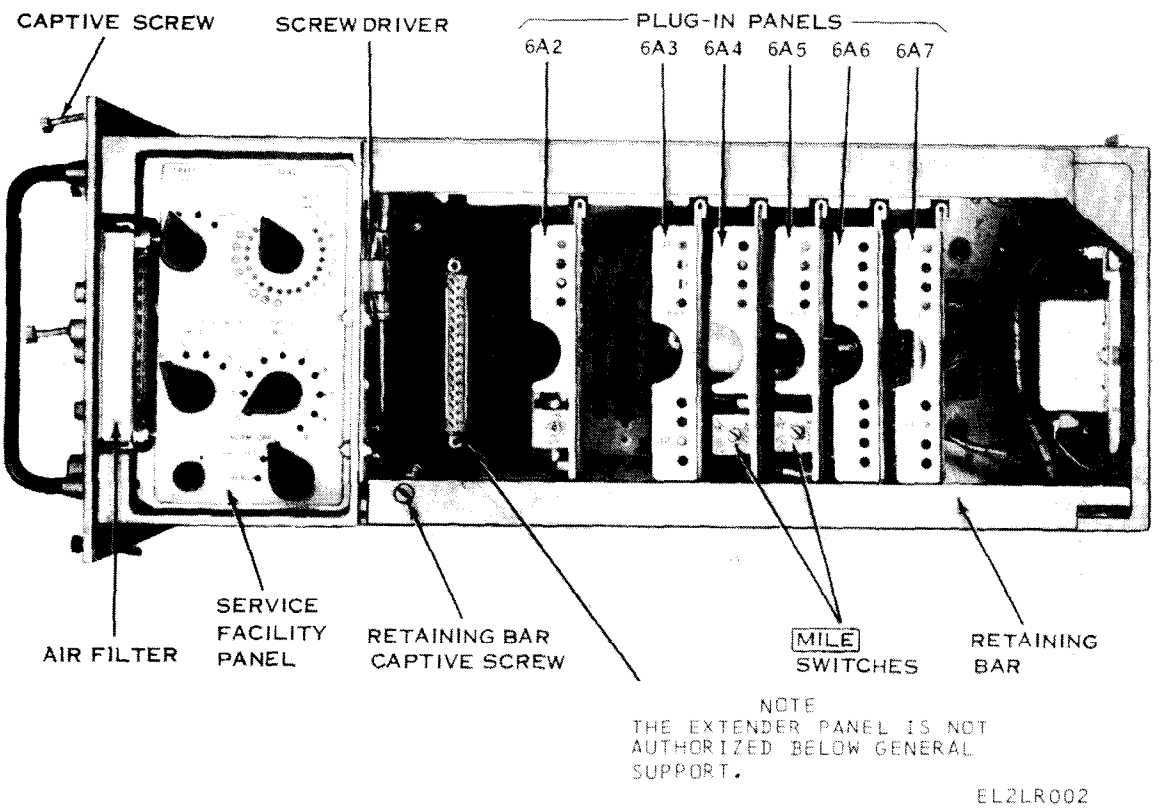

Figure 3-6. Multiplexer TD-204/U removed from case, right-hand side view.

a. Front Panel-Continued.

Control, indicator, or connector	Function
	Position — *Signal* PCM IN ---------- Pcm at PCM IN connector. NOISE GEN ---------- Noise generator output level (panel 1A11/2A11). PCM FROM AUX --------- Pcm from auxiliary unit. SYNC IN ---------- Sync pulse train at SYNC IN connector. SERV FAC ---------- Determined by service facility switches on right-hand side panel.
ALARMS	
BUZZER OFF switch ----------	Silences buzzer.
FRAME indicator (red) ----------	Lights (accompanied by buzzer) when receive section is out of frame and searching.
CHANGE AIR FILTER indicator (red).	Lights when power supply overheats.
AC POWER 115V 50-60 ~ connector.	Provides ac power connection.

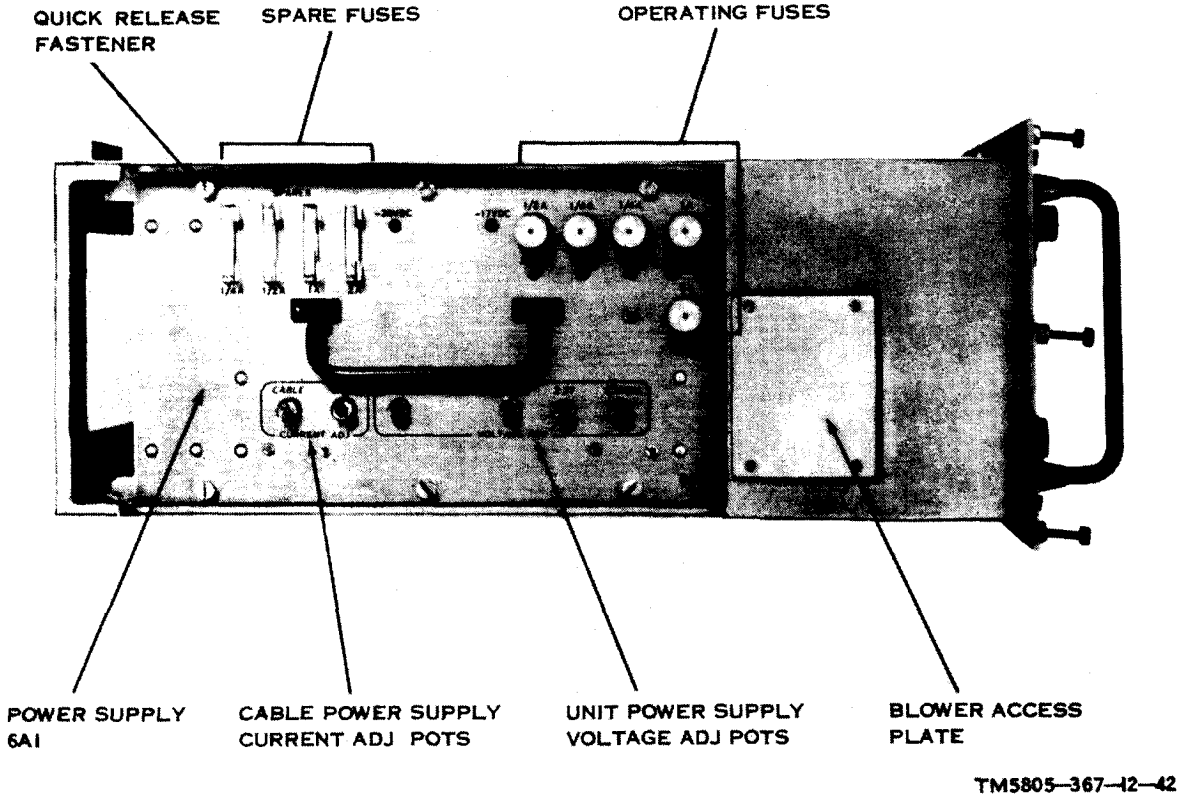

Figure 3–7. Multiplexer TD-204/U removed from case, left-hand side view.

a. Front Panel-Continued.

Control, indicator, or connector	Function
AC POWER switch	Applies and removes ac power.
AC POWER indicator (amber)	Lights with ac power present and good fuse.
TALK MONITOR connector	Provides connection for H-91A/U for talking over or monitoring any channel.
PCM IN connector	Provides input connection for pcm signal.
PCM OUT connector	Provides output connection for pcm signal.
TIMING IN connector	Provides input connection for timing signal.
TIMING OUT connector	Provides output connection for timing signal.
ALT PCM OUT connector (TD-352/U only).	For 24-channel operation, provides alternate 12-channel pcm output extracted from signal at PCM IN connector for drop and insert repeaters.
SYNC OUT XMTR connector	Provides output connection for timing signal to SYNC IN connector of slave TD-352/U or TD-353/U, in 24- or 96-channel terminals.
SYNC OUT RCVR connector	Provides output connection for timing signal to SYNC IN connector of slave TD-352/U or TD-353/U in D/I repeater or remote D/I terminal.
SYNC IN connector	Provides input connection for synchronizing signal from master or slave TD-352/U or TD-353/U.
AUDIO CHAN connectors 1-4, 5-8, or 9-12 (TD-352/U only).	Provide connection for four audio channels (input and output) with channels identified by connector numbers.
AUDIO CHANNELS connectors 1-8, 9-16, 17-24, 25-32, 33-40, or 41-48 (TD-353/U only).	Provide connection for eight audio channels (input and output) with channels identified by connector numbers.
TO AUX connector	Provides input and output connections for security equipment.

b. Internal Right-Hand Side (fig 3-10 or 3-11).

Control, indicator, or connector	Function
CHAN 1-12 switch, TD-352/U only (14-position rotary) (fig 3-10).	Selects channel for audio gain adjustment or monitoring.
SERV SEL switch, TD-352/U only (24-position rotary).	Selects signal applied to TEST ALIGN meter as follows: *Note.* Lettered switch positions correspond to letters on frame above panel being monitored. *Position* — *Signal* A — TFF-2 and $\overline{\text{TFF-2}}$ (panel 2A8).

b. Internal Right-Hand Side-Continued.

Control, indicator, or connector	Function
	Position — *Signal* B — T F F-2 (panel 2A10) (plug-in panel for transmit section of unit). C — Shift No. 2 and decision pulses (panel 2A8), D — 8 kc aux and address pulse (panel 2A9). E — Coder pam (panel 2A7) (one or more outgoing channels to the

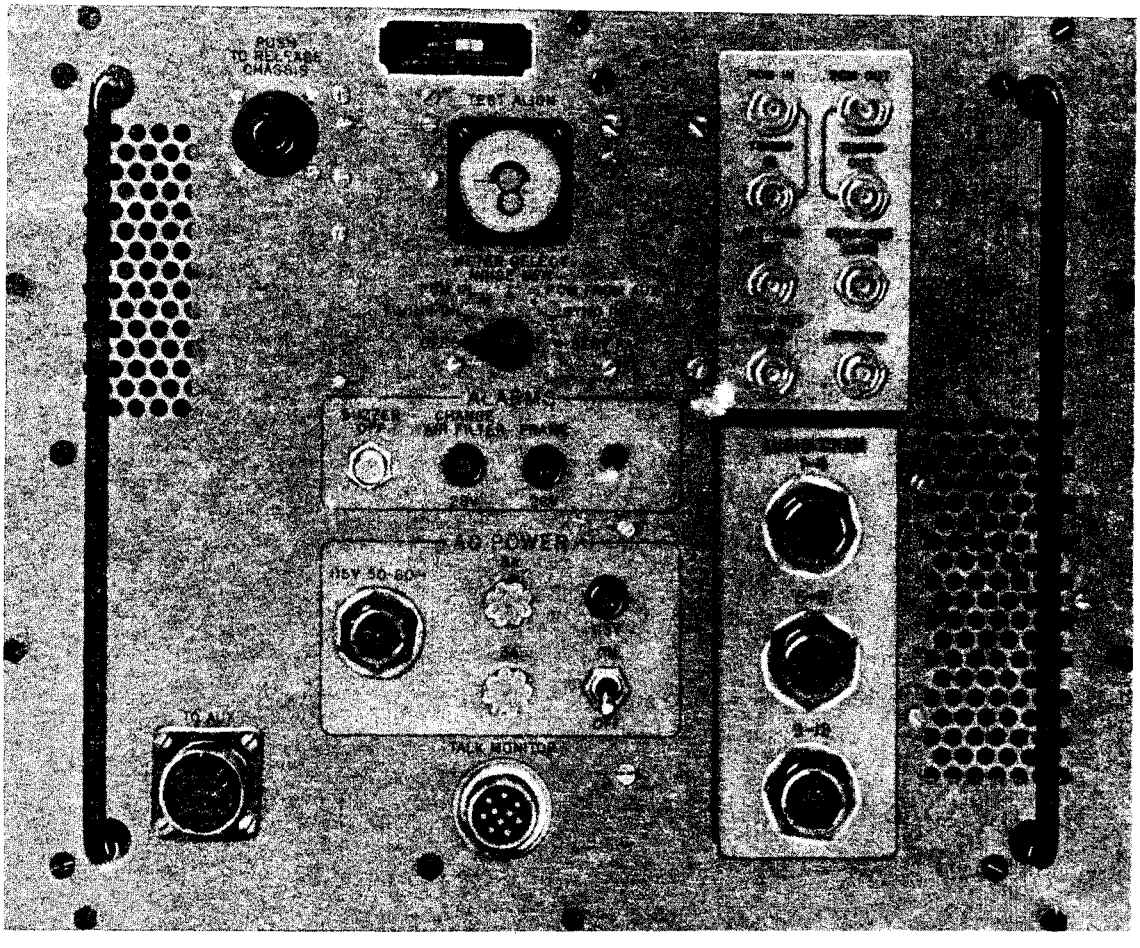

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Figure 3-8. Multiplexer TD-352/U removed from case, front panel details.

b. Internal Right-Hand Side-Continued.

Control, indicator, or connector	Function	
	Position	*Signal*
		transmission link must have modulation on it).
	F	Pcm output (panel 1A3/2A3).
	G	First - digit monitoring signal (panel 1A6/2A6) for adjustment of CCL control on panel 1A6/2A6.

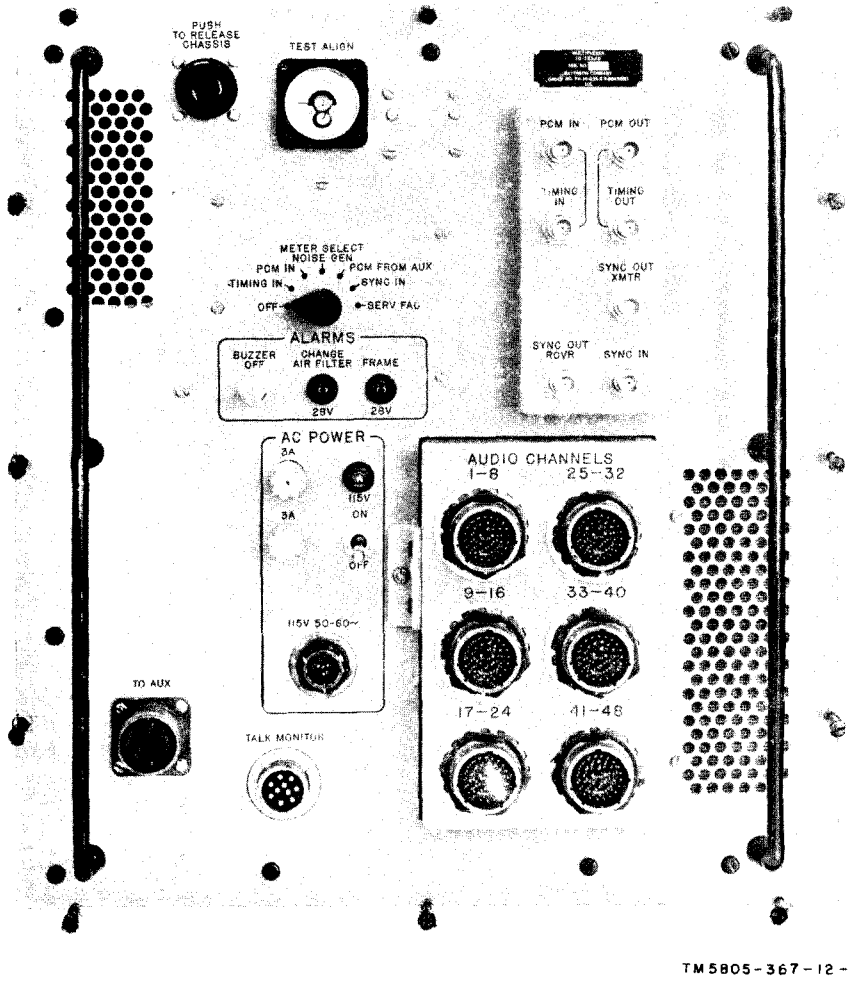

Figure 3-9. Multiplexer TD-353/U removed from case, front panel details.

b. Internal Right-Hand Side-Continued.

Control, indicator, or connector	Function
	Position — *Signal* H — Timing A and timing B (panel 2A13). PHONE — Connects H-91A/U at TALK MONITOR receptacle to monitor channel selected b y CHAN 1-12 selector. CHAN 1-12 — 1,100-cps test tone from demodulator section of channel selected b y CHAN 1-12 switch. OSC — 1,100-cps test tone oscillator output. J — RFF-9 (pane 1 2A10) (plug-in panel for receive section of unit). K — Timing C and address digit gate (panel 2A13). L — Skip pulse (panel 1A12/ 2A12) (unit must be out-of-frame and searching). M — Timing blank (panel 2A13) (unit must be out-of-frame and searching). N — Alt pcm out and pcm to a u x (panel 1A12/ 2A12) . -5.2 — -5.2-volt supply level. +25 — +25-volt supply level. +10 — +10-volt supply level. +4.5 — +4.5 volt supply level. -4.5 — -4.5-volt supply level. -12 — -12-volt supply level.
EVEN CHAN switch, TD-353/U only (24-position rotary) (fig 3-11).	Selects even-numbered channels for audio gain adjustment or monitoring.
ODD CHAN switch, TD-353/U only (24-position rotary).	Selects odd-numbered channels for audio gain adjustment or monitoring.
MEASURE-PHONE ODD-PHONE EVEN switch, TD-353/U only (3-position rotary).	Selects built-in alignment or monitoring function as follows:

b. Internal Right-Hand Side-Continued.

Control, indicator, or connector	Function
SERVE SEL switch, TD-353/U only (24-position rotary).	***Position*** ***Function*** MEASURE ------- Connects 1,100-cps test tone from demodulator section of channel selected by EVEN CHAN or ODD CHAN switches to TEST ALIGN meter. PHONE ODD ----- Allows H-91A/U to monitor odd-numbered channel selected by ODD CHAN switch. PHONE EVEN---- Allows H-91A/U to monitor even numbered channel selected by EVEN CHAN switch. Selects signal applied to TEST ALIGN meter as follows: *Note.* Lettered switch positions correspond to letters on frame above panel being monitored. *Position* *Signal* A -------- Transmit timing No. 1 (panel 1A8). B -------- Modem timing (panel 1A9). C -------- TFF-9 (panel 1A10) (plug-in panel for transmit section of unit). D -------- Address timing (panel 1A9). E -------- Coder pam (panel 1A7) (one or more outgoing channels to the transmission link must have modulation on it). F -------- Pcm output (panel 1A3/2A3). G -------- First - digit monitoring signal (panel 1A6/2A6) for adjustment of CCL control on panel 1A6/2A6. H -------- Receive and decoder timing (panel 1A13).

b. Internal Right-Hand Side-Continued.

Control, indicator, or connector	Function
	Position — *Signal* J — RFF-9 (panel 1A10) (plug-in panel receive section of unit). EVEN CHAN — Even-numbered channel selected by EVEN CHAN switch to MEASURE - PHONE ODD-PHONE EVEN switch for level adjustment or monitoring. OSC — 1,100-cps test tone oscillator output. K — Receive address and matrix FF timing (panel 1A13). L — Skip pulse (panel 1A12/2A12) (unit must be out-of-frame and searching). M — Timing blanking (panel 1A13) (unit must be out - of - frame and searching). N — Pcm to aux (panel 1A12/2A12) . -5.2 — -5.2-volt supply level. +25 — +25-volt supply level. +10 — +10-volt supply level. +4.5 — +4.5-volt supply level. ODD CHAN — Odd - numbered channel selected by ODD CHAN switch to MEASURE - PHONE ODD-PHONE EVEN switch for level adjustment or monitoring. -4.5 — -4.5-volt supply level. -12 — -12-volt supply level.
OSC ADJUST control (fig 3-10 or 3-11)	Adjusts 1,100-cps test tone amplitude.
2 WIRE-4 WIRE switch	Selects metering sensitivity for 2- or 4-wire channel for audio level adjustment.
ADDRESS switch	Selects transmit and receive address to correspond with master or slave operation.
AUX switch	Allows auxiliary unit operation.

c. Panels (figs 3-10 through 3-13).

Control (screwdriver-adjusted)	Function
AG screwdriver control (two per modem, one per channel, panel 1AX/2A2).	Provides audio gain adjustment of demodulator section of that channel.
Voltage controls, screwdriver adjusted (panel 1A1/2A1):	Provides following adjustment:
+25V	+25-volt supply level.
+10V	+10-volt supply level.
+4.5V	+4.5-volt supply level.
-4.5V	-4.5-volt supply level.
-12V	-12-volt supply level.

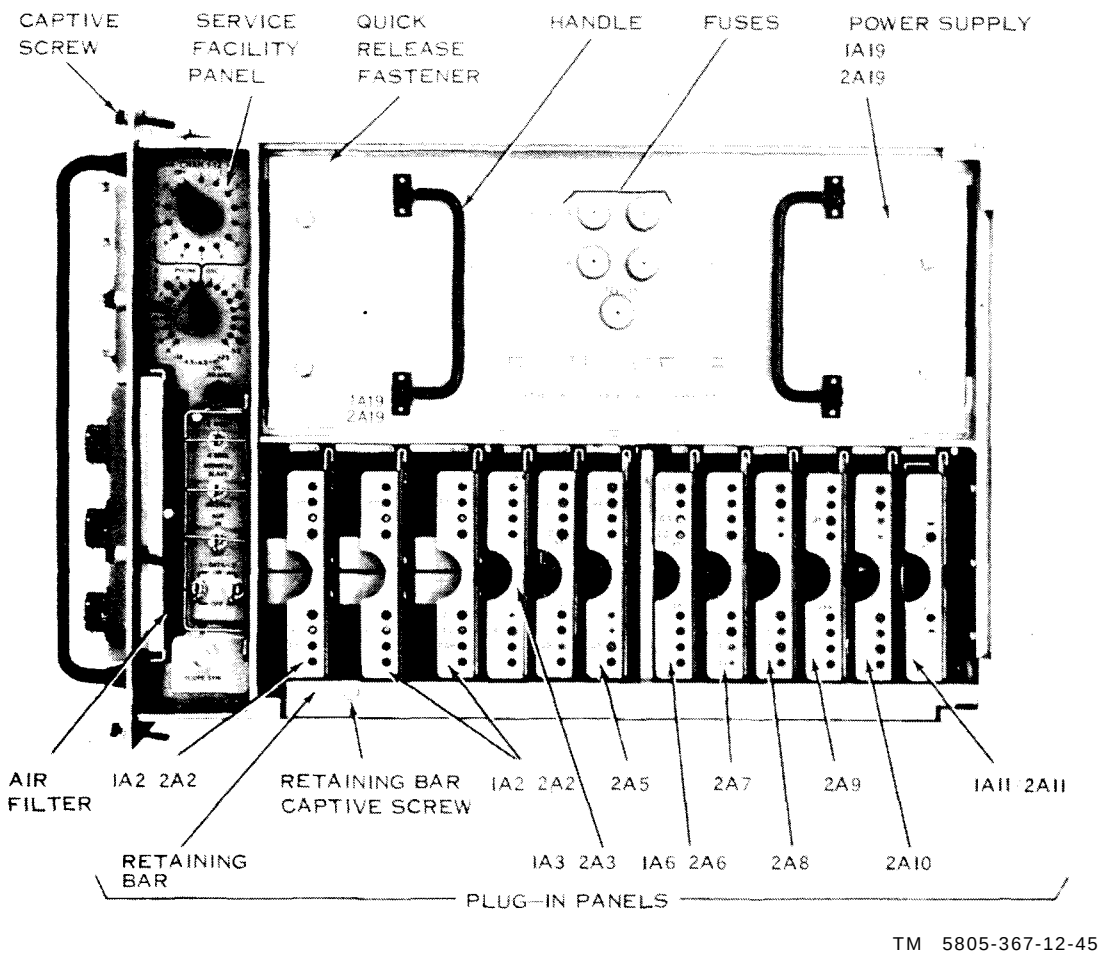

Figure 3-10. Multiplexer TD-352/U removed from case, right-hand side view.

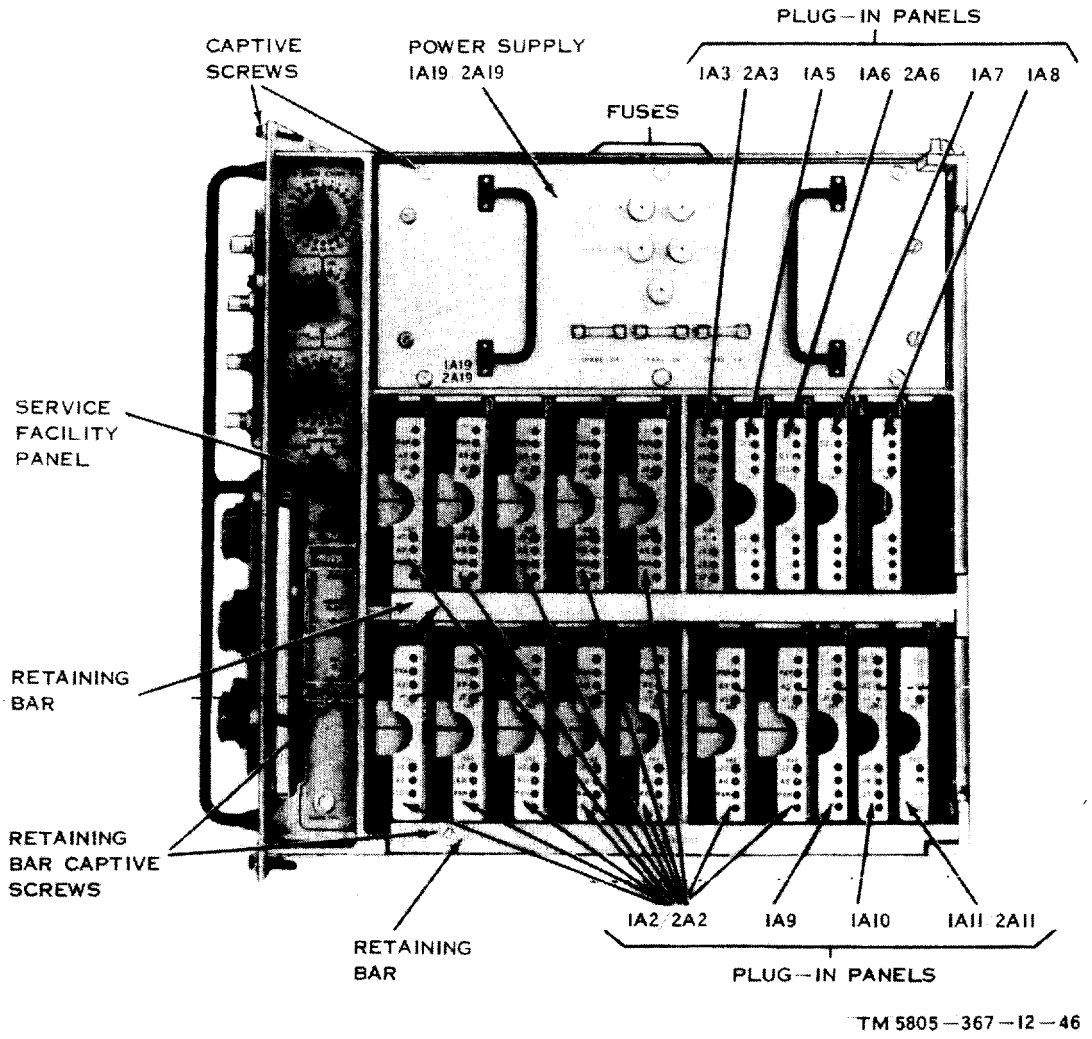

Figure 3-11. Multiplexer TD-353/U removed from co-se, right-hand side view.

3-4. Converter, Telephone Signal CV-1548/G

NOTE

The TEST ALIGN meter, meter selector switch, and associated panel markings are used with CV-1548/G with power supply 18A1 only.

a. *Front Panel (fig 3-14).*

Control or indicator	Function
POWER switch	Applies and removes ac power.
POWER indicator (amber)	Light with ac power present, and good fuse.
Meter selector switch (5-position rotary)	Connects TEST ALIGN meter to monitor following functions

a. Front Panel-Continued.

Control or indicator	Function	
	Position	*Function*
	–	Monitors both negative supply output voltages.
	+	Monitors +24-volt supply output voltage.
	20~ DRIVE	Monitors 20-cps driver output.

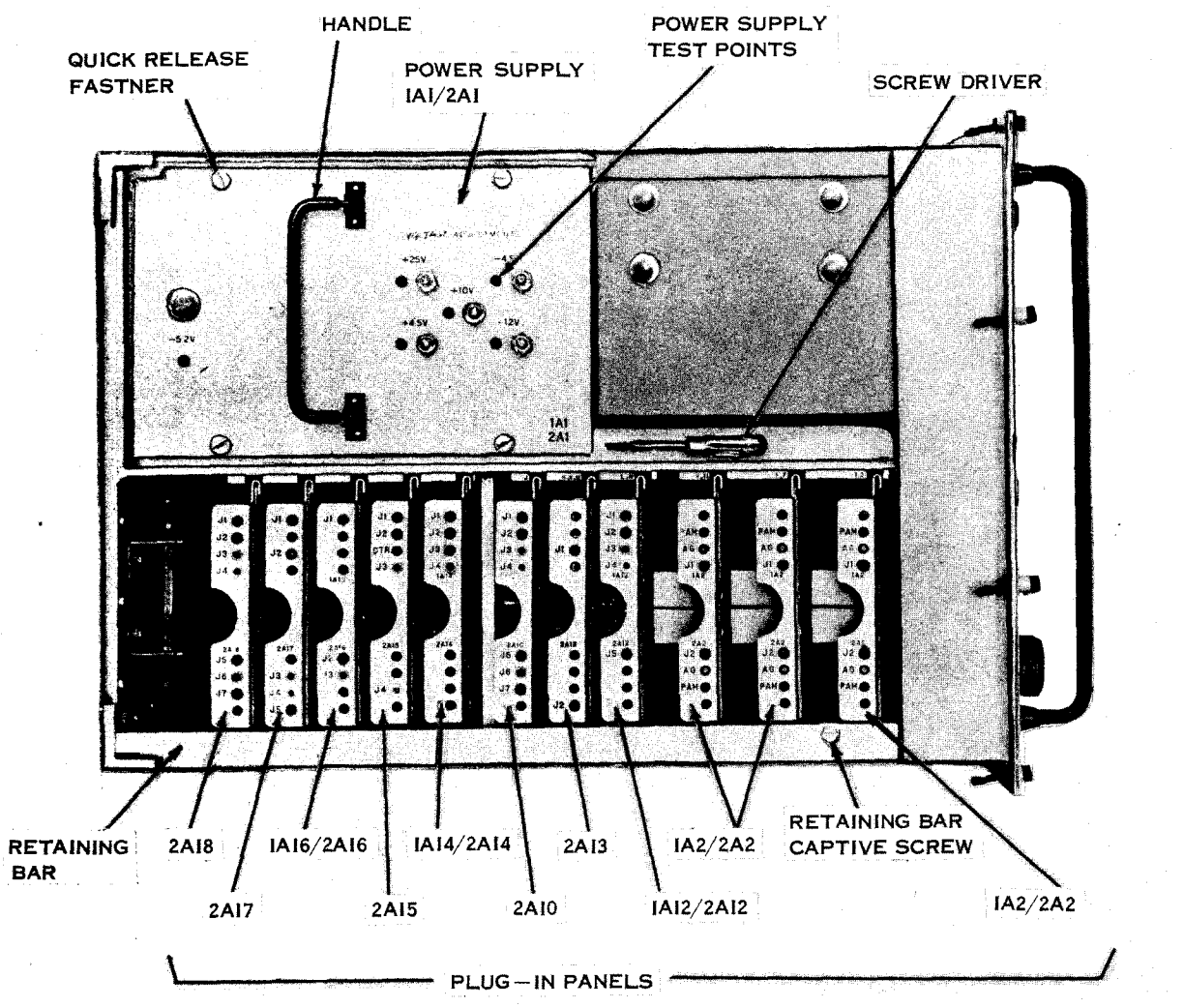

Figure 3-12. Multiplexer TD–352/U removed from case, left-hand side view.

a. Front Panel-Continued.

Control or indicator	Function	
	Position	*Function*
	20 ~	Monitors 20-cps oscillator output.
	1600 ~	Monitors 1600-cps oscillator output.
TEST ALIGN meter		Monitors signals as selected by meter selector switch.
CH1 through CH12 2W-4W switches		2W position provides 2-wire operation; 4W position provides straight-through 4-wire connection.

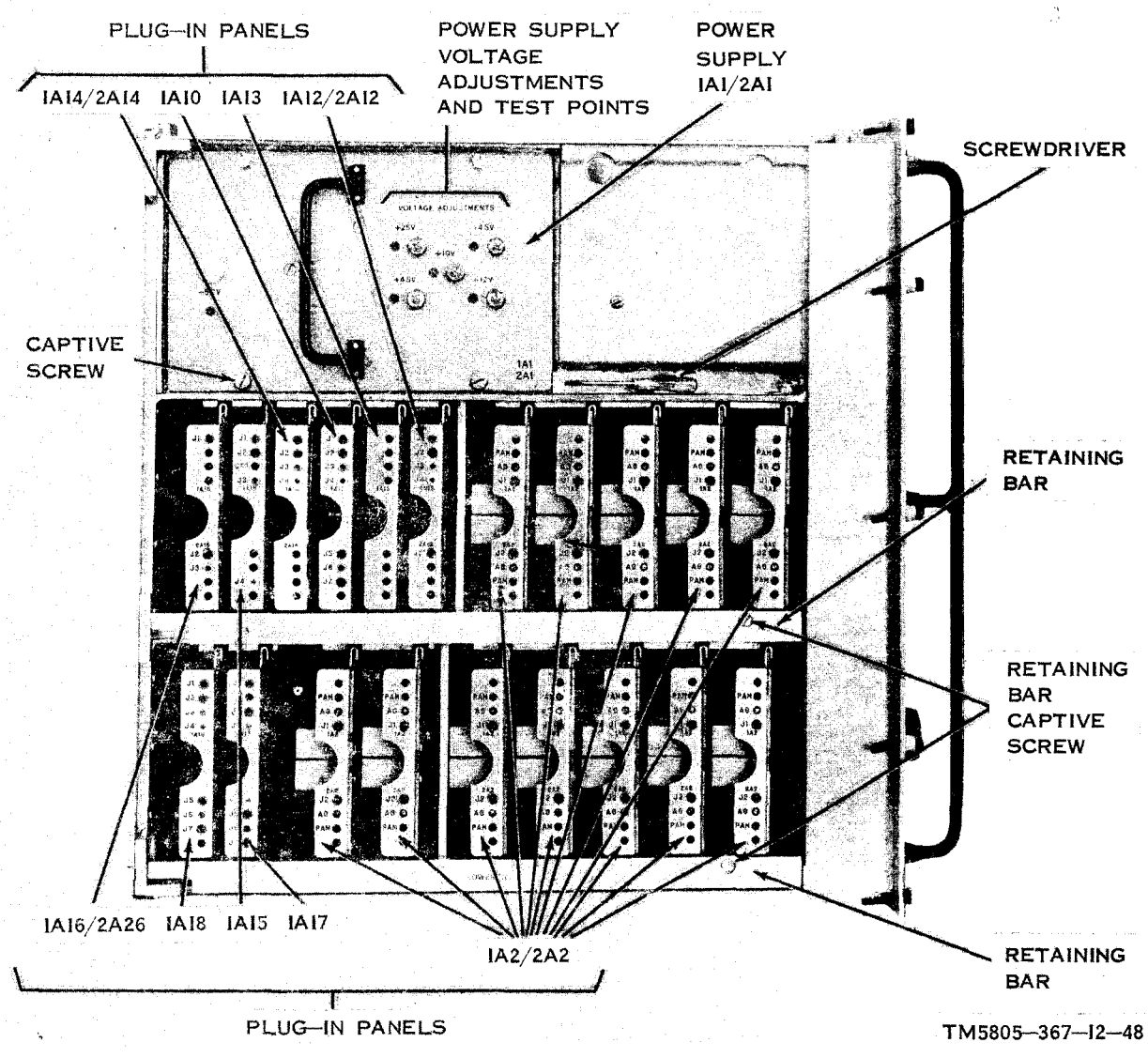

Figure 3-13. Multiplexer TD-353/U removed from case, left-hand side view.

b. Channel Unit 18A3 (fig 3-14).

Control	Function
Signaling mode switch (4-position rotary).	Selects 2-wire operating modes as follows: *Position* — *Function* AC ---------- Allows 20-cps signaling for direct telephone or switchboard.

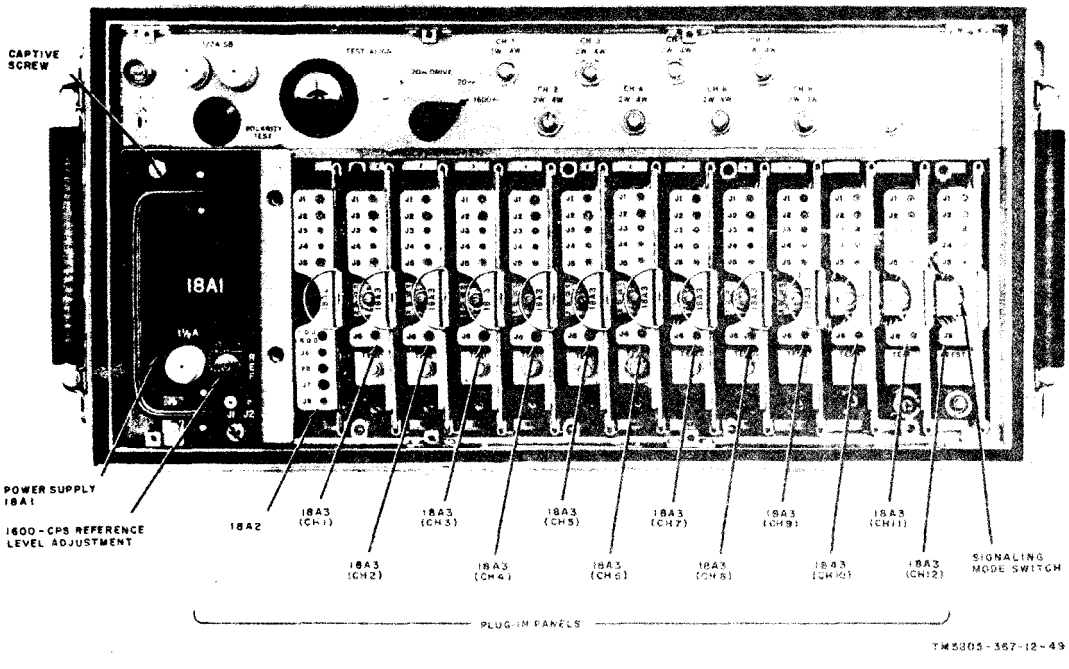

Figure 3-14. Converter, Telephone Signal CV-1548/G outer and inner front cover removed, front view details.

b. Channel Unit-Continued

Control	Function
TEST button ----------	*Position* / *Function* OR — Allows originate plug supervision. TE — Allows terminate plug supervision. OFF — Provides hybrid transformer with no signaling. With signaling mode switch at AC, checks 1,600-cps signaling detector. With signaling mode switch at OR, checks ballast lamp; with sgnaling mode switch at TE, checks receiving plug supervision when CX-7870/TCC (CX-7873/TCC) cables are disconnected.

c. 20- and 1,600-Cps Generators 18A2 (fig 3-14).

Control or indicator	Function
ADJ 1600 screwdriver control _____	Adjusts 1,600-cps oscillator output level.
20 ~ neon lamp _____	Indicates 20-cps oscillator output available.

d. Rear Panel (fig 3-15).

Connector	Function
115 VAC 50-400 ~ POWER OUT _____	Unswitched convenience outlet for ac power to second unit.
MUX AUDIO CHANNELS 1-4, 5-8, or 9-12.	Connects four multiplex channels (input and output) with the channels identified by the connector numbers.
SWBD AUDIO CHANNELS 1-4, 5-8, or 9-12.	Connects four 2- or 4-wire circuits.
115 VAC 50-400 ~ POWER IN _____	Provides ac power connection.

e. Channel Unit 18A4. The channel unit 18A4. test button indicates the proper connection to the SB-86/P.

Section II. OPERATING PROCEDURES

3-5. Starting Procedures

The pcm equipment is normally installed and operated as part of a system. When turned over to an operator, the equipment is operating as an integral part of the system. If the equipment is turned off for any reason, perform the following procedures:

Note. When performing the following procedures, silence the alarms buzzer by pressing the ALARMS BUZZER OFF switch.

a. Operate the AC POWER switch on each component to ON. The AC POWER indicator on each component and the ALARMS NO CABLE CURRENT indicator on the TD-204/U will light.

b. Operate the CABLE POWER switch on the TD-204/U to ON. The ALARMS NO CABLE CURRENT indicator will extinguish.

c. Operate the METER SELECT switch of TD-202/U and TD-203/U to the following positions and check for correct indications on TEST ALIGN meter:

Position	*Indication*
TIMING IN (TB202/U)	Green
TIMING IN-1 (TD-203/U)	Green
TIMING IN-2 (TD-203/U)	Green
PCM IN-1	Green
PCM IN-2	Green (24- or 96-channel operation only).
TO RADIO XMTR	Yellow
FROM RADIO RCVR	Yellow

(1) Operate to SERV FAC.

d. Operate the METER SELECT switch of TD-204/U to the following positions and check for correct indications on TEST ALIGN meter:

Position	*Indication*
TIMING IN	Green
PCM IN-1	Green
PCM IN-2	Green (24-channel operation only).
CABLE I	Yellow
CABLE V	10-8 times No. TD-206/U's plus 13.

Note. If CABLE V position is checked with loss of timing in signal, use 14.8 times No. of TD-106/U's plus 13.

(1) Operate to SERV FAC.

e. Operate the METER SELECT switch of TD-352/U and TD-353/U to the following positions and check for correct indication on TEST ALIGN meter:

Position	*Indication*
TIMING IN	Green
PCM IN	Green
NOISE GEN	Green
PCM FROM AUK	Green (only with security equipment).
SYNC IN	Green (only when used as slave).

(1) Operate to SERV FAC.

f. Operate the meter selector switch of CV-1548/G on CV-1548A/G to the following positions and check for correct indication on TEST ALIGN meter:

Position	*Indication*
−	Yellow
+	Yellow
20 DRIVE	Yellow
20	Yellow
1600	Green

3-6. Operating Order Wire

NOTE

For order-wire operation at sites using radio equipment, refer to the appropriate radio equipment technical manual (app. A). The following procedures apply only to the order-wire facility of the TD-204/U.

a. Initiating Calls.

(1) operate the TD-204/U TALK-OFF-SIG switch to TALK.

(2) Listen to the receiver of the H-91A/U to determine whether the order-wire circuit is in use.

(3) When it has been determined that the order-wire circuit is not in use, hold the TALK-OFF-SIG switch of' the TD-204/ U to SIG for approximately 2 seconds.

NOTE

When identification codes are assigned to each terminal or repeater in the system, operate the TALK-OFF-SIG switch between SIG and OFF in accordance with the identification code of the called terminal or repeater.

(4) Operate the TALK-OFF-SIG switch to TALK to converse with the called terminal or repeater.

(5) When the call is completed, operate the TALK-OFF-SIG switch to OFF.

b. Answering Calls.

(1) When the CALL indicator on the TD-204/U lights and the buzzer sounds, operate the TALK-OFF-SIG switch to TALK to converse with the calling terminal or repeater.

NOTE

When identification codes are assigned to each terminal or repeater in the system, answer only when the indication corresponds to the terminal or repeater identification assignment.

(2) When the call is completed, operate the TALK-OFF-SIG switch to OFF.

3-7. Monitoring Channels of TD-352/U or TD-353/U

a. TD-352/U.

(1) Connect the H-91A/U to the TALK MONITOR connector (fig 3-6).

(2) Operate the SERVE SEL switch (fig 3-10) to PHONE.

CAUTION

Never operate the CHAN 1-12 switch from the OFF position if the SERV SEL switch is at CHAN 1-12 (vertical up) when the system is in operation. If the SERV SEL switch is at CHAN 1-12 and the CHAN 1-12 switch is operated to a channel, a 1,100-cps tone is sent out on that channel.

(3) Operate the CHAN 1-12 switch to the desired channel.

(4) Listen to the receiver of the H-91A/U.

(5) If another channel is to be monitored, operate the CHAN 1-12 switch as requried and listen to the receiver of the H-91A/U.

(6) Operate the CHAN 1-12 switch to OFF.

(7) Operate the SERV SEL switch to +25.

(8) Disconnect the H-91A/U from the TALK MONITOR connector.

b. TD-353/U.

(1) Connect the H-91A/U to the TALK MONITOR connector (fig 3-9).

(2) Operate the MEASURE-PHONE ODD-PHONE EVEN switch to PHONE EVEN or PHONE ODD as determined by the channel to be monitored.

CAUTION

Never operate the SERVE SEL switch to EVEN CHAN (vertical up) or ODD CHAN (vertical down) if the MEASURE-PHONE ODD-PHONE EVEN switch is at MEASURE. If the MEASURE-PHONE ODD-PHONE EVEN switch is at MEASURE and the SERV SEL switch is operated to EVEN CHAN or ODD CHAN, a 1,100-cps tone is sent out on the channel associated with the position of the EVEN CHAN or ODD CHAN switch.

(3) Operate the SERV SEL switch (fig 3-11) to EVEN CHAN (vertical up) or ODD CHAN (vertical down) as determined by the channel to be monitored.

(4) Operate the EVEN CHAN or ODD CHAN switch to the required position.

(5) Listen to the receiver of the H-91A/U.

(6) If another channel is to be monitored, operate the SERV SEL, the MEASURE-PHONE ODD-PHONE EVEN, and the EVEN CHAN or ODD CHAN switches as required and listen to the receiver of the H-91A/U.

(7) Operate the SERV SEL switch to +25.

(8) Operate the MEASURE-PHONE ODD-PHONE EVEN switch to ODD PHONE or EVEN PHONE.

(9) Disconnect the H-91A/U from the TALK MONITOR connector.

3-8. Stopping Procedure

Perform the following procedures only during an authorized downtime or an emergency.

a. Operate the CABLE POWER switch of the TD-204/U to OFF. The ALARMS NO CABLE CURRENT indicator will light and the buzzer will sound.

b. Operate the AC POWER switch on each component to OFF. The AC POWER indicator on each component and the ALARMS NO CABLE CURRENT indicator on the TD-204/U will extinguish.

3-9. Operation Under Unusual Conditions

Operation of the equipment may be difficult in regions where conditions of extreme cold, heat, humidity, dust, dirt, sand, etc., prevail. Although every precaution is taken in the design of the equipment to maintain its technical characteristic over a wide temperature and humidity range, extreme weather conditions may cause poor performance unless precautions are taken. The precautions in a through c below should be observed. In the event of an order-wire failure, emergency order-wire procedures may be used at terminal locations *(d* below) if there is no pcm signal failure.

NOTE

When equipment is not to be used for extended periods, disconnect the cables from the front panel and fasten the front cover to the equipment to prevent moisture condensation and dust accumulation.

a. Arctic Climates.

(1) Extreme cold causes field wire and cables to become hard and brittle and difficult to handle be careful when handling and connecting so that kinks and unnecessary loops will not result in permanent damage.

(2) Keep the components as warm and dry as possible.

(3) When equipment that has been exposed to the cold is brought into a warm room, moisture will gather on the equipment this condition may cause a change in operating characteristics. When the equipment temperature reaches room temperature, dry it thoroughly.

b. Tropical Climates. When the major components are operated in tropical climates, they may be installed in tents, huts, shelter facilities, or, when necessary, in underground dugouts. When equip ment is installed below ground or when it is set up in swampy areas in the tropics, moisture conditions are more acute than normal. Ventilation is usually very poor the high relative humidity causes condensation on the equipment when its surface temperature becomes lower than that of the surrounding air. To minimize this condition, provide the beat possible ventilation. Dry the equipment thoroughly before operating it.

NOTE

Front (rain) cover, (NSN 5805-00-859-8438), may be ordered and used to protect CV-1548/G when it is removed from its shelter.

c. Desert Climates.

(1) The huge amount of dust, dirt, and sand that collects on moving parts of the equipment is the main problem with equipment operation in the desert. Be sure to keep the equipment as free from dust as possible.

(2) Frequently check the air filters in the components for dust and clean them when necessary.

Note. **If the air filter in a component becomes excessively dirty, the red ALARMS CHANGE AIR FILTER indicator will light. Check and clean the air filter during normal preventive maintenance (para 4-11).**

d. Emergency Order-Wire Operation for Terminals. If the pcm signal is maintained during an order-wire failure, emergency order-wire communications may be established between terminals as follows:

(1) Contact the local switchboard operator by the local communication facility.
(2) Request the local switchboard operator to contact the distant switchboard operator over a vacant pcm channel and to notify the distant terminal operator of the call and channel number.
(3) Follow the channel monitoring procedures (para 3-7) and converse with the distant terminal operator over the vacant pcm channel.

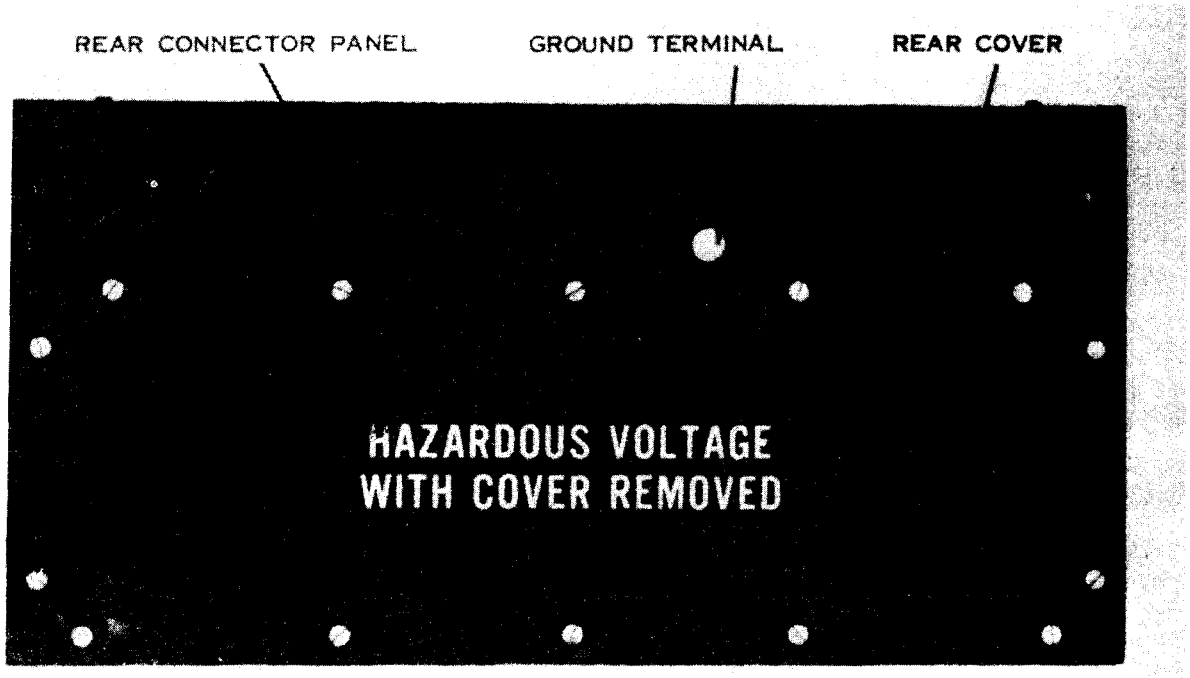

Figure 3-15. Converter, Telephone Signal CV-1548/G, rear view.

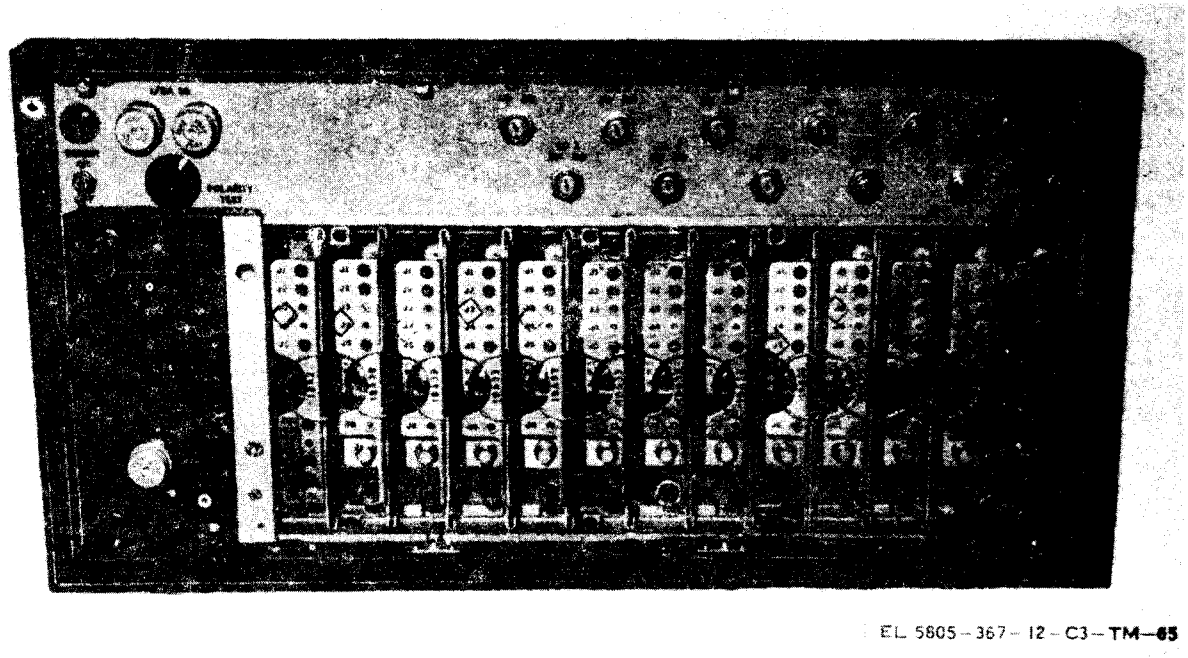

Figure 3-16. Converter, Telephone Signal CV-1548A/G, front view.

CHAPTER 4
MAINTENANCE

Section I. OPERATOR/CREW AND ORGANIZATIONAL MAINTENANCE

4-1. Scope of Maintenance

The maintenance duties assigned to the operator of the equipment are listed in *a* below. The maintenance duties assigned to the organizational maintenance personnel are listed in *b* below.

a. Operator. Operator's maintenance consists of the following

(1) Preventive maintenance checks and services defined in paragraph 4-4.

(2) Cleaning (c below).

b. Organizational. Organizational maintenance consists of the following

(1) Preventive maintenance checks and services in accordance with paragraph 4-4.1.

(2) Troubleshooting (para 4-5, 4-6, and 4-7).

(3) Repairs and adjustment (para 4-8 through 4-12).

(4) Touchup painting *(d* below).

c. Cleaning.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

(1) Use a dry, clean, lint-free cloth or brush to remove dust or dirt. If necessary, moisten the cloth or brush with TRICHLOROTRIFLUOROETHANE (NSN 6850-00-105-3084). After cleaning, wipe dry with a clean cloth.

WARNING

Compressed air shall not be used for cleaning purposes except where reduced to less than 29 pounds per square inch (PSI) and then only with effective chip guarding and personnel protection equipment. Do not use compressed air to dry parts when TRICHLOROTRIFLUOROETHANE has been used. Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent chip or particle (of whatever size) from being blown into the eyes or unbroken skin of the operator or other personnel.

(2) Dry, compressed air may be used to remove dirt and dust from inaccessible places, but not air filters.

d. Touchup Painting. Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in SB 11-573 and TB 43-0118.

4-2. Preventive Maintenance

NOTE

Refer to TM 750-244-2 for proper procedures for destruction of this equipment to prevent enemy use.

a. Operator/crew preventive maintenance is the systematic care, servicing and inspection of equipment. to prevent the occurrence of trouble, to reduce downtime, and to maintain equipment in serviceable condition. To be sure that your equipment is always ready for your mission, you must do scheduled preventive maintenance checks and services (PMCS).

(1) BEFORE OPERATION, perform your B PMCS to be sure that your equipment is ready to go.

(2) DURING OPERATION, perform your D PMCS. This should help you to spot small troubles before they become big problems.

(3) WEEKLY PMCS are important checks to keep serious problems from suddenly happening. Perform WEEKLY as well as BEFORE OPERATION PMCS if:

(a) You are the assigned operator and have not operated the item since the last WEEKLY.

(b) You are operating the item for the first time.

(4) When an item of equipment is reinstalled after removal, for any reason, perform the necessary B PMCS (para 4-4) to be sure the item meets the readiness reporting criteria,

(5) Use the ITEM NO. column in the PMCS table to get the number to be used in the TM ITEM NO. column on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) when you fill out the form.

b. Organizational preventive maintenance procedures are designed to help maintain equipment in serviceable condition. They include items to be checked and how to check them, These checks and services, described in paragraph 4-4.1, outline inspections that are to be made at specific monthly (M) and quarterly (Q) intervals. A month is defined as approximately 30 calendar days of an 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals.

c. Routine checks like CLEANING, DUSTING, WASHING, CHECKING FOR FREE OPERATION OF DIALS AND KNOBS, CHECKING FOR FRAYED CABLES, STOWING ITEMS NOT IN USE, COVERING UNUSED RECEPTACLES, CHECKING FOR LOOSE NUTS AND BOLTS AND CHECKING FOR COMPLETENESS are not listed as PMCS checks. They are things that you should do any time you see they must be done. If you find a routine check like one of those listed in your PMCS, it is because other operators reported problems with this item.

NOTE

When you are doing any PMCS or routine checks, keep in mind the warnings and cautions.

WARNINGS

- Never operate the generator or shelter until it has been properly grounded. Electrical defects in the load lines or equipment can cause death by electrocution when contact is made with an ungrounded system.
- Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE, Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.
- Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent a chip or particle (of whatever size) from being blown into the eyes or unbroken skin of the operator or other personnel. Goggles must be worn at all times while cleaning with compressed air. Compressed air shall not be used for cleaning purposes except where reduced to less than 29 pounds per square inch gage (psig) and then only with effective chip guarding and personnel protective equipment. Do not use compressed air to dry parts when trichlorotrifluoroethane has been used.

NOTES

The PROCEDURES column in your PMCS charts instruct how to perform the required checks and services. Carefully follow these instructions and, if tools are needed or the chart so instructs, get organizational maintenance to do the necessary work.

If your equipment must be in operation all the time, check those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

d. Deficiencies that cannot be corrected must reported to higher category maintenance personnel. Records and reports of preventive maintenance must be made in accordance with procedures given in TM 38-750.

4-3. Operator/Crew Preventive Maintenance Checks and Services

Perform weekly as well as before operation PMCS if:

a. You are the assigned operator and have not operated the item since the last weekly.

b. You are operating the item for the first time.

NOTE

The checks in the interval column are to be performed in the order listed.

4-4. Operator/Crew Preventive Maintenance Checks and Services Chart

B - Before D - During W - Weekly

Item No.	Interval B	Interval D	Interval W	Item to be inspected	Procedure - Check for and have repaired or adjusted es necessary.	Equipment is not Ready/Available if:
1	•			Mission Essential Equipment	Check for completeness and satisfactory condition of the equip ment. Report missing items.	Available equipment is insufficient to support the combat misson.
2		•		CHANGE AIR FILTER indicators (except CV-1548/G)	Monitor to see that indicators are extinguished.	Indicators are lighted.
3		•		TRAFFIC indicator (TD-202/U, TD-203/U, TD-204/U and TD-206/U) (if used)	Monitor to see that indicators are extinguished.	Indicators are lighted.
4		•		FRAME indicator (TD-352/U and TD-353/U only	Monitor to see that indicators are extinguished.	Indicators are lighted.
5			•	Grounding system	Insure that equipment grounding meets safety standards (See TB 43-0125).	Equipment fails to meet electrical safety standards for grounding.
6	*			Multiplexers and Converters	Perform operational checks as described in Chapter 3, Section II.	Equipment fails to meet performance check criteria.

*] Do this check before each deployment to a mission location. This will permit any existing problems to be corrected before the mission starts. The check does not need to be done again until redeployment.

4-4.1 Organizational Preventive Maintenance Checks and Services Chart

M - Monthly Q - Quarterly

Item No.	Interval M	Interval Q	Item to be inspected	Procedures
1	•		Grounding system.	Insure that equipment grounding procedure is correct and maintains proper electrical safety standards (TB 43-0125).
2		•	Air filter (except CV-1548/G).	Remove, clean, and lubricate as described in paragraph 4-11.
3		•	Power supply cooling fins.	Remove dust and dirt.
4	•		SERV SEL switch of TD-202/U or TD-203/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for +10, +4.5, and -4.5, and in green area for all other positions (position C used on 24- or 96-channel operation only).
5	•		SERV SEL switch of TD-204/U and TD-206/G (if used).	Operate through each position; TEST ALIGN meter indicates in yellow area for -10, +10, SUM ±3, BAL, and RCC, and green area for all other positions except as follows: *Position* — *Exception* K, L and M . . . . . 12- or 24-channel operation only. O . . . . . Only with TONE/OFF switch of panel 6A2 at Tone. P . . . . . Only with order wire patched through. R . . . . . Only with SYSTEM FAULT LOCATOR MILES switches positioned to correspond to number of TD-206/U's in transmission cable.
6	•		SERV SEL switch of TD-352/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for +25, +10, +4.5, -4.5 and -12, and green area for all other positions except as follows: *Position* — *Exception* E . . . . . Only with one or more channels modulated. L and M . . . . . Only with TD-352/U out of frame. Note: DO NOT put TD-352/U out of frame in operating system. When trouble-shooting, put TD-352/U out of frame by removing PCM IN signal. PHONE . . . . . Used only to monitor channels. CHAN 1-12 . . . . . Used only to adjust channel gain.

4-4.1 Organizational Preventive Maintenance Checks and Services Chart (Cont.)

M - Monthly Q - Quarterly

Item No.	Interval M	Interval Q	Item to be inspected	Procedures
7	•		SERV SEL switch to TD-353/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for +25, +10, +4.5, -4.5 and -12, and in green area for all other positions except as follows: *Position* — *Exception* E . . . . . Only with one or more channels modulated. L and M . . . . . Only with TD-353/U out of frame. Note. DO NOT put TD-353/U out of frame in operating system. When trouble-shooting, put TD-353/U out of frame by removing PCM IN signal. EVEN CHAN . . . . . Used only to monitor channels-with MEASURE-PHONE ODD-PHONE EVEN switch at PHONE EVEN or to send out 1,100 cps tone with MEASURE-PHONE ODD-PHONE EVEN switch at MEASURE. ODD CHAN . . . . . Same as EVEN CHAN position except MEASURE-PHONE ODD-PHONE EVEN switch at PHONE ODD or MEASURE.

Section II. TROUBLESHOOTING

4-5. System Troubleshooting

System troubleshooting is based on symptoms that may occur at any type of terminal or repeater in a system. When a symptom occurs, refer to the appropriate chart for the type of terminal or repeater in which the symptom occurs to determine the probable trouble and corrective measure to be taken. Refer to the chart in a below for radio terminals, *b* below for radio repeaters, *c* below for cable terminals, and *d* below for cable repeaters, The same charts *(a b, c* and *d* below) are also used for troubleshooting radio or cable repeaters with drop and insert capabilities and radio-to-cable conversion points. Use the chart that best describes that part of the repeater or conversion point causing the symptom. The loopback checks *(e* below) may be used to verify isolation of troubles in the system.

a. Radio Terminal Troubleshooting Chart.

Item No	Symptom	Possible trouble	Corrective measure
1	ALARMS FRAME indicator of TD-352/U (TD-353U) lights, buzzer sounds, and TEST ALIGN meter indicates in green area with METER SELECT switch at PCM IN and TIMING IN	Defective TD-352/U (TD-353/U)	Troubleshoot TB-352/U (TD-353/U (para 4-7d).
2	ALARMS FRAME indicator (of TD-352/U (TD-353/U) lights, buzzer sounds, and TEST ALIGN meter does not indicate in green area with	*a.* Defective CG-1040B/U cable between TD-352/U (TD-353/U) and TD-202/U (TD-203/U).	*a.* Check and replace if necessary

a. Organizational Preventive Maintenance Checks and Services Chart for TD-202/U - Continued.

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
3	x		Power supply cooling fins.	Remove accumulated dust and dirt each time filters are cleaned.
4	x		SERV SEL switch of TD-202/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for +10, +4.5, and -4.5, and in green area for all other positions (position C used on 24- or 96-channel operation only).

b. Organizational Preventive Maintenance Checks and Services Chart for TD-203/U.

NOTE

Within designated interval, these checks are to be performed in the order listed.

M-Monthly Q-Quarterly

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
			TD-203/U	
1		x	Modification work orders	Check DA Pam 310-1 to see whether any MWO's are required for components. Check equipment to see if applicable MWO's have been applied and MWO number stamped as required. Perform modification or request modification as applicable. All URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.
2	x		Air filter,	Remove, clean, and lubricate.
3	x		Power supply cooling fins.	Remove accumulated dust and dirt each time filters are cleaned.
4	x		SERV SEL switch of TD-203/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for + 10, +4.5, and -4.5, and in green area for all other positions (position C used on 24– or 96-channel operation only).

c. Organizational Preventive Maintenance Checks and Services Chart for TD-204/U and TD-206/G.

NOTE

Within designated interval, these checks are to be performed in the order listed.

M-Monthly Q-Quarterly

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
			TD-204/U *and TD-206/G (if used)*	
1		x	Modification work orders.	Check DA Pam 310-1 to see whether any MWO's are required for components. Check equipment to see if applicable MWO's have been applied and MWO number stamped as required. Perform modification or request modification as applicable. ALL URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.
2	x		Air filter (TD-204/U only).	Remove, clean, and lubricate.
3	x		Power supply cooling fins. (TD-204/U only).	Remove accumulated dust and dirt each time filters are cleaned.
4	x		SERV SEL switch of TD-204/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for -10, + 10, SUM +3, BAL, and RCC, and green area for all other positions execpt as follows: *Position* — *Exception* K, L, and M ---------- 12- or 24-channel operation only. O ---------- Only with TONE/OFF Switch of panel 6A2 TONE.

c. Organizational Preventive Maintenance Checks and Services Chart for TD-204/U and TD-206/G - Continued.

	Interval		Item to be inspected	Procedures
	M	Q		
				P ---------- Only with order-wire patched through. R ---------- Only with SYSTEM FAULT LOCATOR MILES switches positioned to correspond to number of TD-206/G's in transmission cable.

d. Organizational Preventive Maintenance Checks and Services Chart for TD-352/U.

NOTE

Within designated interval, these checks are to performed in the order listed.

M-Monthly Q-Quarterly

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
			TD-352/U	
1		X	Modification work orders.	Check DA Pam 310-1 to see whether any MWO's are required for components. Check equipment to see if applicable MWO's have been applied and MWO number stamped as required. Perform modification or request modification as applicable. ALL URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.
2	x		Air filter,	Remove, clean, and lubricate.
3	x		Power supply cooling fins.	Remove accumulated dust and dirt each time filters are cleaned.
4	x		SERV SEL switch of TD-352/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for + 25, + 10, + 4.5, -4.5 and -12, and green area for all other positions except as follows: *Position* *Exception* E ---------- Only with one or more channels modulated. L and M ---------- Only with TD-352/U out of frame. NOTE DO NOT put TD-352/U out of frame in operating system. When troubleshooting, put TD-352/U out of frame by removing PCM in signal. *Position* *Exceptional* PHONE ---------- Used only to monitor channels. CHAN 1 through 12 -- Used only to adjust channel gain.

e. Organizational Preventive Maintenance Checks and Services Chart for TD-353/U.

NOTE

Within designated interval, these checks are to be performed in the order listed.

M-Monthly Q-Quarterly

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
			TD-353/U	
1		X	Modification work orders	Check DA Pam 310-1 to see whether any MWO's are required for components. Check equipment to see if applicable MWO's have been applied and MWO number stamped as required. Perform modification or request modification as applicable. ALL URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.
2	x		Air filter.	Remove, clean, and lubricate.
3	x		Power supply cooling fins.	Remove accumulated dust and dirt each time filters are cleaned.
4	x		SERV SEL switch of TD-353/U.	Operate through each position; TEST ALIGN meter indicates in yellow area for +25, +10, +4.5, -4.5 and -12, and in green area for all other positions except as follows: ODD CHAN ---------- Same as EVEN CHAN position except MEASURE-PHONE ODD-PHONE EVEN switch at PHONE ODD or MEASURE.

f. Organizational Preventive Maintenance Checks and Services Chart for CV-1548/G and CV-1548A/G.

NOTE

Within designated interval, these checks are to be performed in the order listed.

M-Monthly Q-Quarterly

Item No.	Interval		Item to be inspected	Procedures
	M	Q		
			CV-1548/G or CV-1548A/G	
1		X	Modification work orders.	Check DA Pam 310-1 to see whether any MWO's are required for components. Check equipment to see if applicable MWO's have been applied and MWO number stamped as required, Perform modification or request modification as applicable. All URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.

Section II. TROUBLESHOOTING

4-5. System Troubleshooting

System troubleshooting is based on symptoms that may occur at any type of terminal or repeater in a system. When a symptom occurs, refer to the appropriate chart for the type of terminal or repeater in which the symptom occurs to determine the probable trouble and corrective measure to be taken. Refer to the chart in *a* below for radio terminals, *b* below for radio repeaters, *c* below for cable terminals, and *d* below for cable repeaters. The same charts (*a, b, c* and *d* below) are also used for troubleshooting radio or cable repeaters with drop and insert capabilities and radio-to-cable conversion points. Use the chart that best describes that part of the repeater or conversion point causing the symptom. The loopback checks (*e* below) may be used to verify isolation of troubles in the system.

a. Radio Terminal Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	ALARMS FRAME indicator of TD-352/U (TD-353/U) lights, buzzer sounds, and TEST ALIGN meter indicates in green area with METER SELECT switch at PCM IN and TIMING IN.	Defective TD-352/U (TD-353/U):	Troubleshoot TD-352/U (TD-353/U) (para 4-7 *d).*
2	ALARMS FRAME indicator of TD-352/U (TD-353/U) lights, buzzer sounds, and TEST ALIGN meter does not indicate in green area with	a. Defective CG-1040B/U cable between TD-352/U (TD-353/U) and TD-202/U (TD-203/U).	a. Check and replace if necessary.

Item No.	Symtom	Possible trouble	Corrective measure
	METER SELECT switch at PCM IN, and/or TIMING IN. TD-202/U (TD-203/U) and radio equipment operate normaly.	*b.* Defective TD-202/U (TD-203/U).	*b.* Troubleshoot TD-202/U (TD-203/U) (pars *4-7b).*
3	ALARMS FRAME indicator of TD-352/U (TD-353/U) and ALARMS TRAFFIC indicator of TD-202/U (TD-203/U) light, buzzer sounds, TEST ALIGN meter of TD-202/U (TD-203/U) does not indicate in green area with METER SELECT switch at FROM RADIO RCVR. Radio equipment operates normally; order wire normal.	Defective pcm component at distant terminal or repeater.	Request distant terminal or repeater troubleshooting.
4	Order wire very noisy or no reception, but all other indications on TD-352/U (TD-353/U), TD-202/U (TD-203/U), and radio equipment are normal.	*a.* Defective CX-7872/TCC cable between TD-202/U (TD-203/U) and radio equipment.	*a.* Check and replace if necessary.
		b. Defective TD-202/U (TD-203/U).	*b.* Troubleshoot TD-202/U (TD-203/U) (para *4-7b).*
5	ALARMS FRAME indicator of TD-352/U (TD-353/U) and ALARMS TRAFFIC indicator of TD-202/U (TD-203/U) light and TEST METER does not indicate in green area with METER SELECT switch at FROM RADIO RCVR; all indications on radio equipment are normal except for noisy or no order wire.	*a.* Defective CG-409H/U cable between radio equipment and TD-202/U (TD-203/U).	*a.* Check and replace if necessary.
		c. Defective radio receiver ----	*b.* Troubleshoot radio receiver (app. A).
6	ALARMS FRAME indicator of TD-352/U (TD-353/U), ALARMS TRAFFIC indicator of TD-202/U (TD-203/U), and radio equipment alarms light, buzzer sounds, and no order wire.	*a.* Defective antenna cable------	*a.* Check and replace if necessary.
		b. Defective antenna----------	*b.* Check and replace if necessary.
		c. Defective radio receiver----	*c.* Troubleshoot radio receiver (app *A).*
	Note. In 24- or 96- channel operation, both TD-352/U's (TD-353/U's) have this symptom.	*d.* Defective radio equipment at distant terminal or repeater.	*d.* Keep radio equipment operating on assigned frequency. Periodically try order wire and wait response. Send man to distant terminal or repeater.
7	Distant terminal or repeater indicates loss of pcm, no indication on TEST ALIGN meter of local TD-202/U (TD-203/U) with METER SELECT switch at TO RADIO XMTR.	Defective TD-202/U (TD-203/U).	Troubleshoot TD-202/U (TD-203/U) (para *4-7b).*

a. Radio Terminal Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
8	Distant terminal or repeater indicates loss of pcm, no indication on TEST ALIGN meter of local TD-202/U (TD-203/U) with METER SELECT switch at TIMING IN, PCM IN-1 or TO RADIO XMTR. (Also TIMING IN-2 for TD-203/U.)	*a.* Defective CG-1040B/U cables between TD-352/U (TD-353/U) and TD-202/U (TD-203/U). *b.* Defective TD-352U (TD-353/U). *Note.* In 24- or 96- channel operation, if TEST ALIGN meter of TD-202/U (TD-203/U) indicates loss of either pcm or timing signals, check associated TD-352/U (TD-353/U) and interconnecting CG-1040B/U cables.	*a.* Check and replace if necessary. *b.* Troubleshoot TD-352/U (TD-353/U) (para *4-7d)*.
9	Distant terminal or repeater indicates loss of pcm. Local radio transmitter indicates loss of pcm input. All indications on local TD-352/U (TD-353/U) and TD-202/U (TD-203/U) are normal.	Defective CG-409H/U cable between TD-202/U (TD-203/U) and radio equipment	Check and replace if necessary.
10	Switchboard operator indicates loss of a specific channel or only one way communication on a specific channel. All other indications are normal.	*a.* Defective TD-352/U (TD-353/U). *b.* Defective CV-1548/G---------- *c.* Defective CX-7870/TCC (CX-7873/TCC) between CV-1548/G and TD-352/U (TD-353/U). *d.* Defective field wire in line. *e.* Defective TD-352/U (TD-353/U) or CV-1548/G al distant terminal.	*a.* Troubleshoot TD352/U (TD-353/U) (para *4-7d)*. *b.* Troubleshoot CV-1548/G (para *4-7e)*. *c.* Check and replace if necessary. *d.* Check and repair as required. *e.* Request distant terminal troubleshooting.
11	Switchboard operator reports high noise level, distortion or hum on all channels, but all other indications are normal.	*a.* Defective TD-352/U (TD-353/U). *b.* Distant TD-352/U (TD-353/U) or TD-202/U (TD-203/U) defective. Note: To isolate trouble to local or distant terminal, disconnect audio cables from TD-352/U's (TD-353/U's) at both terminals, note direction of noise (send and recieve) and perform loopback check (e below).	*a.* Troubleshoot TD-352/U (TD-353/U) (para *4-7d)*. *b.* Request distant terminal or repeater troubleshooting.
12	Order wire garbled and noisy, but all other indications are normal.	*a.* Defective TD-202/U (TD-203/U). *b.* Defective radio equipment.	*a.* Troubleshoot TD-202/U (TD-203/U) (para *4-7b)* *b.* Troubleshoot radio equipment (app. A).
13	No indication on TEST ALIGN meter of TD-352/U (TD-353/U) with METER SELECT switch at PCM FROM AUX (secure operation only).	*a.* Defective cables between security equipment and TD-352/U (TD-353/U). *b.* Defective security equipment.	*a.* Check and replace if necessary. *b.* Troubleshoot security equipment.
14	All channels are noisy and all other indications are normal (secure operation only).	Defective security equipment.	Troubleshoot security equipment.
15	No indication on TEST ALIGN meter of slave TD-352/U (TD-353/U) with METER SELECT switch at SYNC IN (24- or 96-channel operation).	*a.* Defective CG-1040/U cable between master and slave TD-352/U (TD-353/U). *b.* Defective master TD-352/U (TD-353/U).	*a.* Check and replace if necessary. *b.* Troubleshoot master TD-352/U (TD-353U) (para *4-7d)* .

a. Radio Terminal Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
		c. Defective slave TD-352/U (TD-353/U).	c. Troubleshoot slave TD-352/U (TD-353/U) (para *4-7d)*.
16	Switchboard operator indicates that no signaling is available on any 2-wire channel.	Defective CV-1548/G.	Troubleshoot CV-1548/G (para *4-7e)*.
17	Incorrect indication on TEST ALIGN meter of TD-202/U (TD-203/U) with METER SELECT switch at TO RADIO XMTR.	*a.* Video level adjustment required on TD-202/U (TD-203/U).	*a.* Adjust OL control on panel 5A2 (TD-202/U) or 4A2 (TD-203/U) (para *2-9a)*.
		b. Defective TD-202/U (TD-203/U.	*b.* Troubleshoot TD-202/U (TD-203/U) (para 4-7b).
18	Incorrect indication on TEST ALIGN meter of TD-202/U (TD-203/U) with METER SELECT switch at FROM RADIO XMTR.	*a.* Video level adjustment required on TD-202/U (TD-203/U)	*a.* Adjust RL control on panel 5A3 (TD-202/U) or 4A3 (TD-203/U) (para *2-9b)*.
		b. Defective TD-202/U (TD-203/U).	*b.* Troubleshoot TD-202/U (TD-203/U) (para *4-7b)*.
19	Switchboard operator reports high noise level on all channels, but all other indications are normal.	Defective TD-202/U (TD-203/U).	Troubleshoot TD-202/U (TD-203/U) (para *4-7b)*.
20	ALARM FRAME indicator on slave TD-352/U (TD-353/U) alternately lights and extinguishes (24- or 96-channel operation).	*a.* Defective CG-1040B/U cable from master TD-352/U (TD-353/U) to slave TD-352/U (TD-353/U).	*a.* Check and replace if necessary.
		b. Defective master or slave TD-352/U (TD-353/U) at distant terminal.	*b.* Request distant terminal troubleshooting.

b. Radio Repeater Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	ALARMS TRAFFIC indicator of TD-202/U (TD-203/U) lights. No indication on TEST ALIGN meter with METER SELECT switch at FROM RADIO RCVR. Radio equipment operates normally and order wire is normal.	Defective pcm component at distant terminal or repeater.	Request distant terminal or repeater troubleshooting.
2	ALARMS TRAFFIC indicator of TD-202/U (TD-203/U) lights. No indication on TEST ALIGN meter with METER SELECT switch at FROM RADIO RCVR. Radio equipment operates normally except for noisy order wire.	*a.* Defective CX-409H/U cable between radio equipment and TD-202/U (TD-203/U).	*a.* Check and replace if necessary.
		b. Defective radio equipment.	*b.* Troubleshoot radio equipment (app. A).
3	ALARMS TRAFFIC indicator of TD-202/U (TD-203/U) lights. Radio equipment alarms light, buzzer sounds, and no order wire.	*a.* Defective antenna cable.	*a.* Check and replace if necessary.
		b. Defective antenna.	*b.* Check and replace if necessary.

b. Radio Repeater Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
		c. Defective radio receiver.	*c.* Troubleshoot radio receiver (app. A).
		d. Defective radio equipment at distant terminal or repeater.	*d.* Keep radio equipment operating on assigned frequency. Periodically try order wire and wait for response. Send man to distant terminal or repeater.
4	Distant terminal or repeater indicates loss of pcm. No indication on TEST ALIGN meter of local TD-202/U (TD-203/U) with METER SELECT switch at TIMING IN, PCM IN-1 or TO RADIO XMTR (Also TIMING IN-2 for TD203/U) Other TD-202/U (TD-203/U) has no alarms.	*a.* Defective CG-1040B/G cable between TD-202/U's (TD-203/U's). **Note. In 24- or 96- channel operation, if TEST ALIGN meter of TD-202/U (TD-203/U) indicates loss of either pcm or timing signals check associated CG-1040B/U cable. At a drop and insert repeater, cheek associated TD-352/U (TD-353/U).**	*a.* Check and replace if necessary.
		b. Defective TD-202/U (TD-203/U) (no output in radio equipment).	*b.* Troubleshoot TD-202U (TD-203/U) (para *4-7b).*
		c. Other TD-202/U (TD-203/U) defective (no pcm or timing out).	*c.* Troubleshoot TD-202U (TD-203/U) (para *4-7b).*
5	No order-wire communication available in one radio link, all other indications are normal.	*a.* Defective CX-7872/TCC between associated TD-202/U (TD-203/U) and radio equipment.	*a.* Check and replace if neceseary.
		b. Defective associated TD-202/U (TD-203/U) .	*b.* Troubleshoot TD-202U (TD-203/U) (para *4-7b).*
		c. Defective associated radio equipment.	*c.* Troubleshoot radio equipment (app. A).
6	Distant terminal reports high noise level. All other indications are normal.	Defective TD-202/U (TD-203/U).	Troubleshoot TD-202/U (TD-203/U) (para 4-7 *b).*
7	Order wire garbled and noisy. All other indications are normal.	*a.* Defective TD–202/U (TD-203/U).	*a.* Troubleshoot TD-202/U (TD-203/U) (para 4-7 *b).*
		b. Defective radio equipment.	*b.* Troubleshoot radio equipment (app. A).
		c. Defective CX-7872/TCC between associated TD-202/U (TD-203/U) and radio equipment.	*c.* Check and replace if necessary.
8	Incorrect indication of TEST ALIGN meter of TD-202/U (TD-203/U) with METER SELECT switch at TO RADIO XMTR.	*a.* Video level adjustment required on TD-202/U (TD-203/U).	*a.* Adjust OL control on panel 5A2 (TD-202/U) or 4A2 (TD-203/U) (para 2-*9a).*
		b. Defective TD-202/U (TD-203/U).	*b.* Troubleshoot TD-202/U (TD-203/U) (para *4-7b).*
9	Incorrect indication on TEST ALIGN meter of TD-202/U (TD-203/U) with METER SELECT switch at FROM RADIO XMTR. Order wire noisy.	*a.* Video level adjustment required on TD-202/U (TD-203/U).	*a.* Adjust RL control on panel 5A3 (TD-202/U) or 4A3 (TD-203/U) (para *2-9b).*
		b. Defective TD-202/U (TD-203/U).	*b.* Troubleshoot TD-202/U (TD-203/U) (para *4-7b).*

b. Radio Repeater Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
10	ALARMS FRAME indicator of TD-352/U (TD-353/U) alternately lights and extinguishes (drop and insert only).	*a*. Defective CG-1040B/U cable from master TD-352/U (TD-353/U) to slave TD-352/U (TD-353/U).	*a* .Check and replace if necessary.
		b. Defective master or slave TD-352/U (TD-353/U) at distant terminal.	*b* .Request distant terminal troubleshooting.

c. Cable Terminal Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	ALARMS FRAME indicator of TD-352/U (TD-353/U) lights, buzzer sounds, and TEST ALIGN meter indicates in green area with METER SELECT switch at PCM IN and TIMING IN.	*a*. Defective TD-352/U (TD-353/U).	*a*. Troubleshoot TD-352/U (TD-353/U) (para *4-7d).*
		b. Distant TD-204/U generating dummy pcm train due to missing pcm signal input.	*b*. Request distant terminal or repeater troubleshooting.
2	ALARMS FRAME indicator of TD-352/U (TD-353/U) lights, buzzer sounds, and TEST ALIGN meter does not indicate in green area with METER SELECT switch at PCM IN and/or TIMING IN. TD-204/U operates normally. Order wire normal.	*a*. Defective CG-1040B/U cable between TD-352/U (TD-353/U) and TD-204/U.	*a*. Check and replace if necessary.
		b. Defective TD-204/U----------	*b*. Troubleshoot TD-204/U (para *4-7c).*
3	ALARMS FRAME indicator of TD-352/U (TD-353/U) and ALARM TRAFFIC indicator at TD-204/U light, buzzer sounds, and order wire normal.	*a*. Defective pcm component at distant terminal or repeater.	*a*. Request distant terminal or repeater troubleshooting.
		b. Defective TD-206/G in cable link.	*b*. Troubleshoot cable link (para 4-6).
4	No order wire, but all other indications on TD-352/U (TD-353/U) and TD-204/U are normal.	*a*. Defective TD-204/U----------	*a*. Troubleshoot TD-204/U.
		b. Defective TD-204/U at distant terminal or repeater.	*b*. Keep TD-204/U operating. Periodically try order wire and wait response. Send man to distant terminal or repeater.
5	ALARMS FRAME indicator of TD-352/U (TD-353/U) and ALARMS TRAFFIC indicator of TD-204/U light, buzzer sounds, and no order wire.	*a*. Defective TD-206/G in cable link.	*a*. *Troubleshoot* cable link (para 4-6).
		b. Defective transmission cable in cable link.	*b*. Troubleshoot cable link (para 4-6).
		c . Defective TD-204/U----------	c. Troubleshoot TD-204/U (para *4-7c).*
		d. Defective TD-204/U at distant terminal or repeater.	*d*. Keep TD-204/U operating. Periodically try order wire and wait response. Send man to distant terminal or repeater.

c. Cable Terminal Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
6	ALARMS FRAME indicator of TD-352/U (TD-353/U), ALARMS TRAFFIC indicator of TD-204/U, ALARMS NO CABLE CURRENT indicator light and buzzer sounds. No order wire available.	Open transmission cable (both directions) in cable link.	Troubleshoot cable link (para 4-6).
7	ALARMS NO CABLE CURRENT indicator on TD-204/U lights and buzzer sounds. Order wire normal.	*a.* Momentary overcurrent or undercurrent in cable link.	*a.* Operate CABLE POWER switch to OFF and then to ON.
		b. Defective TD-204/U -------	*b.* Troubleshoot TD-204/U (para *4-7c).*
8	ALARMS NO CABLE CURRENT indicator of TD-204/U lights. No order wire transmission.	Open transmission cable (send side) in cable link.	Troubleshoot cable link (para 4-6) .
9	Distant terminal indicates loss of pcm. All local indications are normal.	Defective TD-206/G in cable link.	Troubleshoot cable link (para 4-6).
10	Switchboard operator indicates loss of a specific channel or only one-way communication on a specific channel. All local indications are normal.	*a.* Defective TD-352/U (TD-353/U).	*a.* Troubleshoot TD-352/U (TD-353/U) (para *4-7d).*
		b. Defective CV-1548/G-------	*b.* Troubleshoot CV-1548/G (para *4-7e).*
		c. Defective CX-7870/TCC (CX-7873/TCC) between CV-1548/G and TD-352/U (TD-353/U).	*c.* Check and replace if necessary.
		d. Defective field wire in line -	*d.* Check and repair as required.
		e. Defective TD-352/U (TD-353/U), or CV-1548/G at distant terminal.	*e.* Request distant terminal troubleshooting.
11	Switchboard operator reports high noise level, distortion or hum on all channels, but all local indications are normal.	*a.* Defective TD-352/U (TD-353/U.	*a.* Troubleshoot TD-352/U (TD-353/U) (para *4-7d).*
		b. Distant TD-352/U (TD-353/U) at distant terminal.	*b.* Request distant terminal troubleshooting.
12	Order wire garbled and noisy, but all other indications are normal.	Defective TD-204/U----------	Troubleshoot TD-204/U (para *4-7c).*
13	No indication on TEST ALIGN meter of TD-352/U (TD-353/U) with METER SELECT switch at PCM FROM AUX (secure operation only).	*a.* Defective cables between security equipment and TD-352/U (TD-353/U).	*a.* Check and replace if necessary.
		b. Defective security equipment.	*b.* Troubleshoot security equipment.
14	All channels are noisy and all other indications are normal (secure operation only).	Defective security equipment _	Troubleshoot security equipment.
15	No indication on TEST ALIGN meter of slave TD–352/U (TD-353/U) with METER SELECT switch at SYNC IN (24- or 96- channel operation).	*a.* Defective CG-1040B/U cable between master TD-352/U (TD-353/U) and slave TD-352/U (TD-353/U).	a. Check and replace if necessary.
		b. Defective master TD-352/U (TD-353/U).	b. Troubleshoot master TD-352/U TD-353/U) (para *4-7d)* .
		c. Defective slave TD-352/U (TD-353/U).	*c.* Troubleshoot slave TD-352/U (TD-353/U) (para *4-7d)* .

c. Cable Terminal Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
16	Switchboard operator indicates that no signaling is available on any 2-wire channel.	Defective CV-1548/G----------	Troubleshoot CV-1548/G (para *4-7e).*
17	High noise level on all channels but all other indications are normal.	*a.* Defective TD-204/U----------	*a.* Trouble shoot TD-204/U (para *4-7c).*
		b. Defective TD-206/G in cable link.	***b.*** Troubleshoot cable link (para 4-6).
		c. Defective TD-204/U at distant terminal or repeater.	c. Request distant terminal or repeater troubleshooting.
18	ALARMS FRAME indicator on slave TD-352/U (TD-353/U) alternately lights and extinguishes (24- or 96-channel operation).	*a.* Defective CG-1040B/U cable from master TD-352/U (TD-353/U) to slave TD-352/U (TD-353/U).	a. Check and replace if necessary.
		b. Defective master or slave TD-352/U (TD-353/U) at distant terminal.	b. Request distant terminal troubleshooting.
19	Incorrect indication on TEST ALIGN meter of TD-204/U with METER SELECT switch at SERV FAC and SERV SEL switch at RCC.	Cable current adjustment required at distant terminal or repeater.	Request cable current adjustment at distant terminal or repeater.
20	Distant terminal or repeater request cable current adjustment. TEST ALIGN meter of local TD-204/U does not indicate in yellow area with METER SELECT switch at CABLE I.	Cable current adjustment required.	Adjustable CURRENT ADJ control for center hairline indication in yellow area of TEST ALIGN Meter.
21	TEST ALIGN meter does not give correct indication with METER SELECT switch at CABLE V (para 2-7 d (4)).	Shorted transmission cable in cable link.	Troubleshoot cable link (para 4-6).

d. Cable Repeater Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measresre
1	ALARMS TRAFFIC indicator on TD-204/U lights, buzzer sounds, and order wire is normal.	*a.* Defective TD-206/G in cable link.	*a.* Troubleshoot cable link (para 4-6).
		b. Defective TD-204/U	*b.* Troubleshoot TD-204/U (para *4-7c)* .
		c. Defective pcm component at distant terminal or repeater.	*c.* Request distant terminal or repeater troubleshooting.
2	Distant terminal or repeater indicates loss of pcm. No indication on TEST ALIGN meter of local TD-204/U with METER SELECT switch at TIMING IN. Other TD-204/U has no alarms.	*a.* Defective CG-1040B/U cable between TD-204/U's *Note.* In 24-channel operation if TEST ALIGN meter of TD-204/U indicates loss of either PCM IN-1 or PCM IN-2, check associated CG-1040B/U cable. At 24-channel drop and insert repeater, check asaociated TD-352/U.	*a.* Check and replace if necessary.
		b. Other TD-204/U defective (no timing out).	*b.* Troubleshoot TD-204/U (para *4-7c).*

d. Cable Repeater Troubleshooting Chart-Continued.

Item No.	Symptom	Possible trouble	Corrective measure
3	Distant terminal indicates out of frame pcm. No indication on TEST ALIGN meter of local TD-204/U with METER SELECT switch at PCM IN-1. Othcr TD-240U has no alarms.	*a.* Defective CG-1040B/U cable between TD-204/U's.	*a.* Check and replace if necessary.
		b. Other TD-204/U defective (no pcm out).	*b.* Troubleshoot TD-204/U (para 4-6) .
4	ALARMS TRAFFIC indicator of TD-204/U lights, buzzer sounds, and no order wire.	a. Defective TD-206/G in cable link.	*a.* Troubleshoot cable link (para 4-6).
		b. Defective transmission cable in cable link.	*b.* Troubleshoot cable link (para 4-6).
		c. Defective TD-204/U----------	*c.* Troubleshoot TD-204/U (para *4-7c).*
		d. Defective TD-204/U at distant terminal or repeater.	*d.* Keep TD-204/U operating. Periodically try order wire and wait response. Send man to distant terminal or repeater.
	ALARMS TRAFFIC indicator of TD-204/U and ALARMS NO CABLE CURRENT indicator light and buzzer sounds. No order wire available.	Open transmission cable (both directions) in cable link.	Troubleshoot cable link (para 4-6) .
6	ALARMS NO CABLE CURRENT indicatnr on TD-204/U lights and buzzer sounds. Order wire is normal.	*a.* Momentary overcurrent or undercurrent in cable link.	*a.* Operate CABLE POWER switch to OFF and then to ON.
		b. Defective TD-204/U----------	***b.*** Troubleshoot TD-204/U (para *4-7c).*
7	ALARMS NO CABLE CURRENT indicator on TD-204/U light. No order wire transmission.	Open transmission cable (send side) in cable link.	Troubleshoot cable link (para 4-6) .
8	Distant terminal or repeater indicates loss of pcm. All local indications are normal.	Defective TD-206/G in cable link.	Troubleshoot cable link (para 4-6).
9	Switchboard operator at distant terminal reports high noise level, but all local indications are normal.	Defective TD-204/U--------	Troubleshoot TD-204/U (para *4-7c)* .
10	Order wire garbled and noisy, but all other indications are normal.	Defective TD-204/U --------	Troubleshoot TD-204/U (para *4-7c).*
11	Through order wire communications not available, but all other indication are normal.	Defective CX-7872/TCC cable between TD-204/U's.	Check and replace if necessary.
12	Under wire not available but all other indications are normal.	*a.* Defective associated TD-204/U.	*a* . Troubleshoot TD-204/U (para *4-7c).*
		b. Defective distant TD-204/U.	*b* . Request distant terminal or repeater troubleshooting.
13	Distant terminal indicates out of frame pcm and all local indications are normal.	*a.* Defective TD-206/G in cable link.	*a* . Troubleshoot cable link (para 4-6).
		b. Defective TD-204/U----------	*b* . Troubleshoot TD-204/U (para *4-7c).*

d. Cable Repeater Troubleshooting Chart-Continued

Item No.	Symptom	Possible trouble	Corrective measure
14	ALARMS FRAME indicator of TD-352/U (TD-353/U) alternately lights and extinguishes (drop and insert only.	*a.* Defective CG-1040B/U cable from master TD-352/U (TD-353/U) to slave TD-352/U (TD-353/U). *b.* Defective master or slave TD-352/U (TD-353/U) at distant terminal.	*a.* Check and replace if necessary. *b.* Request distant terminal troubleshooting.
15	Incorrect indication on TEST ALIGN meter of TD-204/U with METER SELECT switch at SERV FAC and SERV SEL switch at RCC.	Cable current adjustment required at distant terminal or repeater.	Request cable current adjustment at distant terminal or repeater.
16	Distant terminal or repeater. request cable current adjustment. TEST ALIGN meter of local TD-204/U does not indicate in yellow area with METER SELECT switch at CABLE I.	Cable current adjustment required.	Adjust CABLE CURRENT ADJ control for center hairline indication in yellow area of TEST ALIGN meter.
17	TEST ALIGN meter does not give correct indication with METER SELECT switch at CABLE V (para 2-7 d (4)).	Shorted transmission cable in cable link.	Troubleshoot cable link (para 4-6).

e. Loopback Checks. Output circuits of the pcm components may be looped back to the input circuits to verify isolation of troubles in a system The loopback checks must be coordinated with the distant terminal or repeater Whenever possible. Determine which side of the component to check, perform the special conditions, and connect the cables as required. Check the component by operating the METER SELECT witch through its positions (para 4-2) and observing the various indications. When the loopback checks are complete, reconnect the cables for the system requirements.

Component	Special side	Special conditions	Connections	
			From--	To-
TD-202/U or TD-203/U.	Pcm	**None**	PCM OUT-1 PCM OUT-2 TIM OUT-1	PCM IN-1 PCM IN-2 TIM IN
	Radio	OPR-TEST switch at TEST	FROM RADIO RCVR	TEST OUT
TD-204/U	Pcm	None	PCM OUT-1 TIM OUT-1	PCM IN-1 TIM IN
	Cable	MILES switches at ½ CABLE POWER switch at OFF CX-2437/TCC and CX-2438 connected together instead of the transmission cable	TO CABLE	FROM CABLE
TD-352/U or TD-353/U.	Pcm	None.	PCM OUT TIMING OUT	PCM IN TIMING IN

4-6. Cable Link Troubleshooting

a. Order Wire Available With No Pcm or Shorted Transmission Cable.

(1) Disconnect the CG-1040B/U cable from the PCM IN connectors of the TD-204/U.

(2) Operate the METER SELECT switch of the TD-204/U to SERV FAC.

(3) Loosen the front panel screws on the TD-204/U, press the PUSH TO RELEASE CHASSIS button, and pull the front panel forward.

(4) Operate the SERV SEL switch of the TD-204/U to R.

(5) Operate the NORM OPR-ZERO SET-READ switch of the TD-204/U to ZERO SET.

(6) Adjust the ZERO SET control for a center hairline indication on the TEST ALIGN meter.

(7) Operate the NORM OPR-ZERO SET-READ switch of the TD-204/U to READ.

(8) Operate the SYSTEM FAULT LOCATOR MILES switches of the TD-204/U for a center hairline indication on the TEST ALIGN meter (as close as possible).

(9) From the positions of the SYSTEM FAULT LOCATOR MILES switches determine the number of good TD-206/G's between the TD-204/U and the defective cable section or TD-206/G.

(10) Operate the SYSTEM FAULT LOCATOR MILES switches of the TD-204/U to 0 and the NORM OPR-ZERO SET–READ switch to NORM OPR.

(11) Slide the front panel of the TD-204/U back until it locks into place and tighten the front panel screws.

(12) Operate the CABLE POWER switch of the TD-204/U at each end of the cable link to OFF.

(13) Send a lineman out to troubleshoot with the AN/PTM-7.

Warning: **Do not operate the CABLE POWER switch of the TD-204/U to ON at either end of the** cable link unless requested by the lineman. If the CABLE POWER switch is at ON, voltages as high as 1,100 volts may be present in the transmission cable.

(14) Coordinate with the lineman to troubleshoot and make the necessary replacement (cable section or TD-206/G).

b. Order Wire Available With Pcm Out of Frame or Noise on All Channels.

(1) Operate the CABLE POWER switch of the TD-204/U at each end of the cable link to OFF.

(2) Send a lineman out to the TD-206/G at the midpoint in the cable link with the AN/PTM-7 and instruct him to connect into the cable link,

(3) When order wire is established with the lineman, instruct him to perform the loopback check with the AN/PTM-7.

Warning: **Do not operate the CABLE POWER switch of the TD-204/U to ON at either end of the cable link unless requested by the lineman. It the CABLE POWER switch is operated to ON, voltages as high as** 1,100 **volts may be present in the transmission cable.**

(4) Operate the CABLE POWER switch to ON at both ends of the cable link and check to see which end of the cable link has an ALARMS FRAME indicator lighted on the TD-352/U (TD-353/U) or noise on all channels.

(5) When the indications are obtained, operate the CABLE POWER switch of the TD-204/U at each end of the link to OFF.

(6) Instruct the lineman to substitute another TD-206/G in the cable link. When the substitution is complete, ,operate the CABLE POWER switches to ON and check to see if the trouble still exists.

(7) If the trouble is not corrected, instruct the lineman to replace the original TD-206/G in the cable link

and proceed to a TD-206/G halfway between his position and the end of the cable link that reported a frame alarm or noise on all channels during the first loopback check ((4) above).

(8) Perform the procedures given in (3) through (6) above at the next TD-206/G. If the trouble is not corrected, instruct the lineman to replace the original TD-206/G and continue the troubleshooting procedures until the defective TD-206/G is located.

c. No Order Wire or Pcm Available.

Note. If the ALARMS NO CABLE CURRENT indicator of the TD-204/U remains extinguished after the CABLE POWER switch is operated to OFF and then to ON, the transmission cable is shorted. Perform the procedures given in a above to locate the defective cable section. When the ALARMS NO CABLE CURRENT indicator of the TD-204/U immediately lights after the CABLE POWER switch is operated to OFF and then to ON, the transmission cable is open. Perform the procedures given in (1) through (5) below to locate the defective cable section.

(1) Operate the CABLE POWER switch of the TD-204/U to OFF.

(2) Disconnect the cable from the TO CABLE connector of the TD-204/U and connect it to Test Set TS-27B/TSM.

(3) Measure the capacitance of the cable with the TS-27B/TSM and translate the indication into the distance to the fault (fig 4-1).

(4) If the indicated distance exceeds 10 miles, send a lineman out to the 10-mile point to repeat the measurement.

(5) Instruct the lineman to use the AN/PTM-7 at the cable connection nearest the fault to locate the distance to the fault.

Note. When the fault is located in a section of the cable link where two cable sections join, use the AN/PTM-7 order wire facility to determine which cable section is at fault.

(6) When the fault is located, replace the cable section.

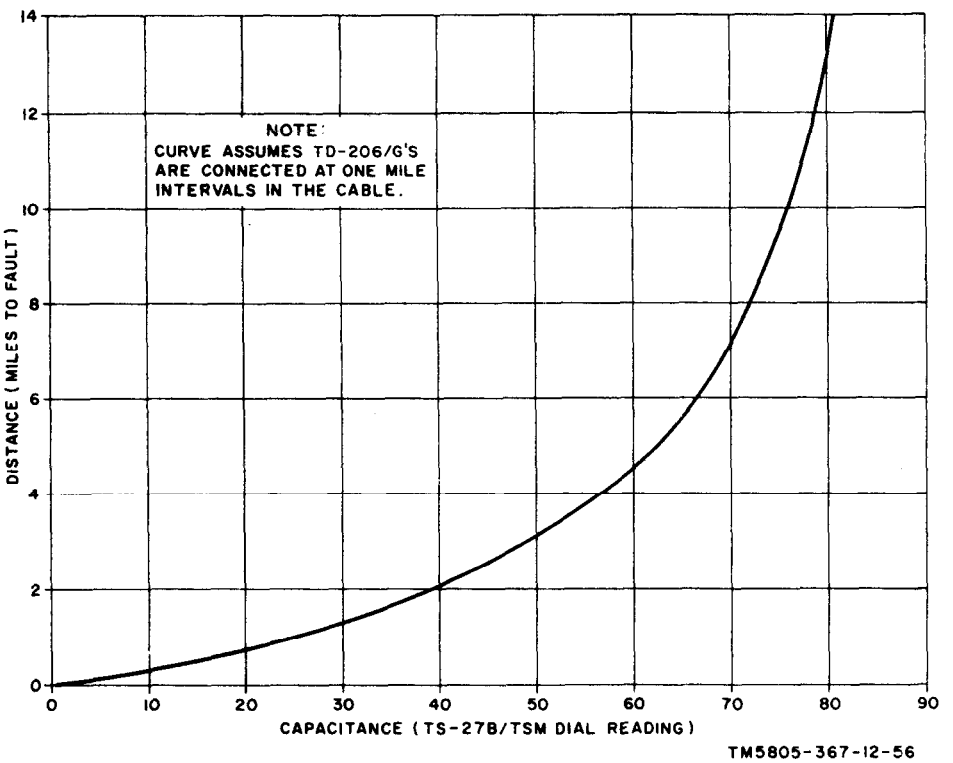

Figure 4-1. Test Set TS-27B/TSM, CX-4245/G, transmission cable capacitance-distance curve.

4-7. Component Troubleshooting

a. General. Replacement and repair of components and parts for the equipment covered in this manual are authorized for the various levels of maintenance personnel as indicated in section II of the maintenance allocation chart (app. C). The tools and test equipment required are listed in section III of the maintenance allocation chart. The troubleshooting information in the component troubleshooting charts (b through e below) is based on symptoms that would be obtained while performing the operator's daily preventive maintenance checks and services (para 4-2) and organizational monthly preventive maintenance checks and services (para 4-4). When an abnormal symptom is obtained, locate the symptom in the troubleshooting chart and perform the corrective measure indicated, as authorized in the maintenance allocation chart. If the corrective measure does not correct the trouble, replace the component and refer the defective component to higher level maintenance.

b. TD-202/U and TD-203/U Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	AC POWER indicator does not light and blower is not heard when AC POWER switch is operated to ON.	*a.* Defective power cable -----	*a.* Check and repair or replace as required.
		b. Defective ¾ A fuse --------	*b.* Replace ¾ A fuse (fig. 3-1).
		c. Defective power supply assembly 4A1/5A1.	c. Replace power supply assembly 4A1/5A1 (fig. 3-4).
2	Incorrect indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at-	Adjustment of following VOLTAGE ADJUSTMENTS control required:	Adjust following VOLTAGE ADJUSTMENTS (fig. 3-4) control for hairline indication in yellow area of TEST ALINE meter (see note):
	a. +10. ----------	*a.* + 10V. ----------	*a.* +10V.
	b. +4.5. ----------	*b.* +4.5V. ----------	*b.* +4.5V.
	c. 4.5. ----------	*c.* -4.5V. ----------	*c.* -4.5V.
3	No indication on TEST ALIGN meter with METER SELECT switch at-	Defective fuse indicated below:	Replace with SPARES fuse (fig.3-4) indicated below:
	a. +10. ----------	*a.* ¾A +10V. ----------	*a.* ¾A.
	b. +4.5. ----------	*b.* ¾A +4.5V. ----------	*b.* ¾ A.
	c. -4.5. ----------	*c.* 2A -4.5V. ----------	*c.* 2 A.
	d. -12. ----------	*d.* ¼A -12V. ----------	*d.* ¼A.
4	No order wire communications; all other indications are normal.	Defective panel 4A7/5A7 ---------	Replace panel 4A7/5A7 (fig. 3-2 or 3-3).
5	Incorrect or no indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at +10, +4.5, -4.5, or -12, adjustment or fuse replacement does not correct trouble.	Defective power supply assembly 4A1/5A1.	Replace power supply assembly 4A1/5A1 (fig. 3-4).
6	ALARMS CHANGE AIR FILTER indicator lighted.	*a.* Dirty or clogged air filter.	a. Clean or replace (para 4-11 and fig. 3-2 or 3-3).
		b. Power supply assembly 4A1/5A1 overheating.	b. Replace power supply assembly 4A1/5A1 (fig. 3-4).

b. TD-202/U and TD-203/U Troubleshooting Chart.-Continued

Item No.	Symptom	Possible trouble	Corrective measure
7	Incorrect indication on TEST ALIGN meter with METER SELECT switch at TO RADIO XMTR; cannot be corrected with OL adjustment.	Defective panel 5A2 (TD-202/U) 4A2 (TD-203/U).	Replace panel 5A2 (TD-202/U) (fig. 3-2) or 4A2 (TD-203/U) (fig.3-3).
8	Incorrect indication on TEST ALIGN meter with METER SELECT switch at FROM RADIO RCVR; cannot be corrected with RL adjustment.	Defective panel 5A3 (TD-202/U) 4A3 (TD-203/U).	Replace panel 5A3 (TD-202/U) (fig. 3-2) 4A3 (TD-203/U) (fig.3-3).
9	Incorrect indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at following position:	Following panel defective:	Replace following panel:
	a. A ----------	*a.* 5A3 (TD-202/U) or 4A3 (TD-203/U)	*a.* 5A3 (TD-202/U) (fig. 3-2) or 4A3 (TD-203/U) (fig. 3-3).
	b. B ----------	*b.* 5A4 (TD-202/U) or 4A4 (TD-203/U).	*b.* 5A4 (TD-202/U) (fig. 3-2) or 4A4 (TD-203/U) (fig. 3-3).
	c. C ----------	*c.* 5A5 (TD-202/U) or 4A5 (TD-203/U).	*c.* 5A5 (TD-202/U) (fig. 3-2) or 4A5 (TD-203/U) (fig. 3-3).
	d D ----------	*d.* 5A5 (TD-202/U) or 4A5 (TD-203/U).	*d.* 5A5 (TD-202/U) (fig. 3-2) or 4A5 (TD-203/U) (fig. 3-3).
	e. E ----------	*e.* 5A5 (TD-202/U) or 4A5 (TD-203/U).	*e.* 5A5 (TD-202/U) (fig. 3-2) or 4A5 (TD-203/U) (fig. 3-3).
	f. F ----------	*f.* 5A5 (TD-202/U) or 4A5 (TD-203/U).	*f.* 5A3 (TD-202/U) (fig, 3-2) or 4A5 (TD-203/U) (fig. 3-3).
	g. G ----------	*g.* 5A3 (TD-202/U) or 4A3 (TD-203/U).	*g.* 5A3 (TD-202/U) (fig. 3-2) or 4A3 (TD-203/U) (fig. 3-3).
	h. H ----------	*k.* 4A6/5A6, or 4A9 (TD-203/U).	*h.* 4A6/5A6 (fig. 3-2 or 3-3).
	i. J ----------	*i.* 4A6/5A6, 4A9 (TD-203/U).	*i.* 4A6/5A6 (fig. 3-2 or 3-3).
	j. K ----------	*j.* 4A6/5A6 ----------	*j.* 4A6/5A6 (fig. 3-2 or 3-3).
	k. L ----------	*k.* 4A6/5A6 ----------	*k.* 4A6/5A6 (fig. 3-2 or 3-3).
	l. M ----------	*l.* 4A8/5A8 ----------	*l.* 4A8/5A8 (fig. 3-2 or .3-3).
	m. N ----------	*m.* 4A8/5A8 ----------	*m.* 4A8/5A8 (fig. 3-2 or 3-3).
	n. O ----------	*n.* 4A7/5A7 ----------	*n.* 4A7/5A7 (fig,. 3-2 or 3-3).

NOTE

When adjusting the TEST ALIGN meter, meter shall be tapped lightly with the eraser end of a pencil.

c. TD-204/U Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	AC POWER indicator does not light	a. Defective power cable ----------	*a.* Check and repair or replace as required

c. TD-204/U Troubleshooting Chart. -Continued

Item No.	Symptom	Possible trouble	Corrective measure
	when AC POWER switch is operated to ON.	*b.* Defective 1A fuse c. Defective power supply assembly 6A1.	*b.* Replace 1A fuse (fig. 3-5). *c.* Replace power supply assembly 6A1 (fig. 3-7).
2	Incorrect indication TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at-	Adjustment of following VOLTAGE ADJ control required:	Adjust following VOLTAGE ADJ control (fig. 3-7) for hairline indication in yellow area of TEST ALINE meter (see note):
	a. -10. *b.* +10 *c.* SUM ±3 *d.* BAL.	*a* . -10V. *b* . +10V. *c* . ±3V. *d* . ±3V BAL.	*a.* -10V. *b.* +10V. *c.* ±3V. *d.* ±3V BAL
3	No indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at-	Defective fuse indicated below:	Replace with SPARES fuse (fig. 3-7) indicated below
	a. -10. *b.* +10. *c.* SUM ±3.	*a.* ¼A-10V. *b.* ¼A+10V. *c.* 1A+3V-3V.	*a.* ¼A. *b.* ¼A. *c.* 1A.
4	No order wire communications all other indications normal.	Defective panel 6A2	Replace panel 6A2 (fig. 3-6).
5	Incorrect or no indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at -10, + 10, SUM ±3, or BAL; adjustment or fuse replacement does not correct trouble.	Defective power supply assembly 6A1.	Replace power supply assembly 6A1 (fig. 3-7).
6	ALARMS CHANGE AIR FILTER indicator lighted.	*a.* Dirty or clogged air filter. *b.* Power supply assembly 6A1 overheating.	*a.* Clean or replace (para 4-11 and fig. 3-6). *b.* Replace power supply assembly 6A1 (fig. 3-7).
7	ALARMS NO CABLE CURRENT indicator light and buzzer sounds with CABLE POWER switch at ON. Resetting does not correct trouble.	*a.* Defective 2A CABLE I fuse. *b.* Defective TO CABLE LIGHTNING ARRESTOR. *c.* Overcurrent adjustment required. *d.* Defective power supply assembly 6A1.	*a.* Replace with SPARES 2A (fig. 3-7). *b.* Replace lightning arrestor (fig. 3-5) *c.* Adjust overcurrent (para 4-12). *d.* Replace power supply assembly 6A1 (fig. 3-7).
8	Incorrect indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at following position:	Following panel defective:	Replace following panel (fig. 3-6):
	a. A *b.* B *c.* C *d.* D	*b.* 6A4 *b.* 6A4 c. 6A7 *d.* 6A7	*a.* 6A4 *b.* 6A4 *c.* 6A7 *d.* 6A7

c. TD-204/U Troubleshooting Chart.-Continued

Item No.	Symptom	Possible trouble	Corrective measure
	e. E	*e.* 6A7	*e.* 6A7
	f. F	*f.* 6A7	*f.* 6A7
	g. G	*g.* 6A7	*g.* 6A7
	h. H	*h.* 6A5	*h.* 6A5
	i. K	*i.* 6A6	*i.* 6A6
	j. L	*j.* 6A6	*j.* 6A6
	k. M	*k.* 6A6	*k.* 6A6
	f. N	*l.* 6A6	*l.* 6A6
	m. O	*m.* 6A3	*m.* 6A3
	n. P	*n.* 6A3	*n.* 6A3
	o. Q	*o.* 6A2	*o.* 6A2
	p. S	*n.* 6A7	*p.* 6A7

d. TD-352/U or TD-353/U Troubleshooting Chart.

Item No.	Symptom	Possible trouble	Corrective measure
1	AC POWER indicator does not light and blower is not heard when AC POWER switch is operated to ON.	*a.* Defective power cable	*a.* Check and repair or replace as required.
		b. Defective 3A fuse	*b.* Replace 3A fuse (fig. 3-8 or 3-9).
		c. Defective power supply assembly 1A19/2A19.	*c.* Replace power supply assembly 1A19/2A19 (fig. 3-10 or 3-11).
2	Incorrect indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at-	Adjustment of following VOLTAGE ADJUSTMENTS control required:	Adjust following VOLTAGE ADJUSTMENT control (fig. 3-12 or 3-13) for hairline indication in yellow area of TEST ALINE meter (see note).
	a. +25.	*a.* +25V	*a.* +25V.
	b. +10.	*b.* +10V	*b.* +10V.
	c. +4.5.	*c.* +4.5V	*c.* +4.5V.
	d. -4.5.	*d.* -4.5V	*d.* -4.5V.
	e. -12.	*e.* -12V	*e.* -12V.
3	TEST ALIGN meter does not indicate in green area with METER SELECT switch at SERV FAC and SERV SEL switch at -5.2.	Defective power supply panel 1A1/2A1.	Replace power supply panel 1A1/2A1 (fig. 3-12 or 3-13).
4	No indication on TEST ALIGN meter with METER SELECT switch at SERV FAC and SERV SEL switch at-	Defective fuse indicated below:	Replace with SPARES fuse (fig. 3-10 or 3-11) indicated below:
	a. +25.	*a.* 2A +25V	*a.* 2A
	b. +10.	*b.* 3A +10V	*b.* 3A
	e. +4.5.	*c.* 2A +4½V	*c.* 2A
	d. -4.5.	*d.* 5A -4½V	*d.* 5A
	e. -12	*e.* 3A -12V	*e.* 3A
5	Excessive noise or distortion or only one-way communication on a specific channel,	Defective panel 1A2/2A2 associated with channel.	Replace associated panel 1A2/2A2 (fig. 3-12 or 3-13).
6	Excessive hum on all channels but all other indications are normal.	*a.* Defective power supply assembly 1A19/2A19.	*a.* Replace power supply assembly 1A19/2A19 (fig. 3-10 or 3-11).
		b. Defective power supply assembly 1A1/2A1.	*b.* Replace power supply assembly 1A1/2A1 (fig. 3-12 or 3-13)
7	Distant TD-352/U (TD-353/U) reports distortion and high noise level on all channels with ALARMS TRAFFIC indicator extinguished. All indications on local TD-352/U (TD-353/U) are normal.	Defective panel 1A6/2A6 in local TD-352/U (TD-353/U).	Replace panel 1A6/2A6 (fig. 3-10 or 3-11).

d. TD-352/U or TD-353/U Troubleshooting Chart. -Continued

Item No.	Symptom	Possible trouble	Corrective measure
8	High noise level and distortion on all receive channels with ALARMS TRAFFIC indicator extinguished.	Defective panel 1A14/2A14 -----	Replace panel 1A14/2A14 (fig. 3-12 or 3-13).
9	Distant TD-352/U (TD-353/U) reports loss of pcm with ALARMS TRAFFIC indicator extinguished, All indications on local TD-352/U (TD-353/U) are normal.	Defective panel 1A6/2A6 in local TD-352/U (TD-353/U).	Replace panel 1A6/2A6 (fig. 2-10 or 3-11).
10	TEST ALIGN meter does not indicate in green area with METER SELECT switch at NOISE GEN.	Defective panel 1A11/2A11 -------	Replace panel 1A11/2A11 (fig. 3-10 or 3-11).
11	ALARMS CHANGE AIR FIL. TER indicator lighted.	*a.* Dirty or clogged air filter.	*a.* Clean or replace (para 4-11 and fig. 3-10 or 3-11).
		b. Power supply assembly 1A19/2A19 overheating.	*b.* Replace power supply assembly 1A19/2A19 (fig. 3-10 or 3-11).
		c. Power supply assembly 1A1/2A1 overheating.	*c.* Replace power supply assembly 1A1/2A1 (fig. 3-12 or 3-13).
12	Incorrect indication on TEST ALIGN meter of TD-352/U with METER SELECT switch at SERV FAC and SERV SEL switch at-	Following panel defective:	Replace following panel:
	a. A ----------	*a.* 2 A 8 ----------	*a.* 2A8 (fig. 3-10).
	b. B ----------	*b.* 2A10 ----------	*b.* 2A10 (fig. 3-10) .
	c. C ----------	*c.* 2 A 8 ----------	*c.* 2A8 (fig. 3-10) .
	d. D ----------	*d.* 2 A 9 ----------	*d.* 2A9 (fig. 3-10).
	e. E ----------	*e.* 2 A 7 ----------	*e.* 2A7 (fig. 3-10).
	f. F ----------	*f.* 1A3/2A3 ----------	*f.* 1A3/2A3 (fig. 3-10).
	g. G ----------	*g.* 1A6/2A6 ----------	*g.* 1A6/2A6 (fig. 3-10).
	h. H ----------	*h.* 2A13 ----------	*h.* 2A13 (fig. 3-12).
	i. J ----------	*i.* 2 A 1 0 ----------	*i.* 2A10 (fig. 3-12).
	j. K ----------	*j.* 2 A 1 3 ----------	*j.* 2A13 (fig. 3-12).
	k. L ----------	*k.* 1A12/2A12 ----------	*k.* 1A12/2A12 (fig. 3-12).
	l M ----------	*l.* 2 A 1 3 ----------	*l.* 2A13 (fig. 3-12).
	m. N ----------	*m.* 1A12/2A12 ----------	*m.* 1A12/2A12 (fig. 3-12).
13	Incorrect indication on TEST ALIGN meter of TD-353/U with METER SELECT switch at SERV FAC and SERV SEL switch-	Following panel defective:	Replace following panel:
	a. A ----------	*a.* 1A8 ----------	*a.* 1A8 (fig. 3-11).
	b. B ----------	*b.* 1A9 ----------	*b.* 1A9 (fig. 3-11).
	c. C ----------	*c.* 1A10 ----------	*c.* 1A10 (fig. 3-11).

d. TD-352/U or TD-353/U Troubleshooting Chart. -Continued.

Item No.	Symptom	Possible trouble	Corrective measure
	d. D	d. 1A9	d. 1A9 (fig. 3-11).
	e. E	e. 1A7	e. 1A7 (fig. 3-11).
	f. F	f. 1A3/2A3	f. 1A3/2A3 (fig. 3-11).
	g. G	g. 1A6/2A6	g. 1A6/2A6 (fig. 3-11).
	h. H	h. 1A13	h. 1A13 (fig. 3-13).
	i. J	i. 1A10	i. 1A10 (fig. 3-13).
	j. K	j. 1A13	j. 1A13 (fig. 3-13).
	k. L	k. 1A12/2A12	k. 1A12/2A12 (fig. 3-13).
	l. M	l. 1A13	l. 1A13 (fig. 3-13).
	m. N	m. 1A12/2A12	m. 1A12/2A12 (fig 3-13).

e. CV-1548/G Troubleshooting Chart (fig. 3-4).

NOTE

Item No's 6, 7, 8, 9 and 10 apply to CV-1548/G with power supply 18A1 only.

Item No.	Symptom	Possible trouble	Corrective measure
1	POWER indicator does not light when POWER switch is operated to ON.	a. Defective power cable	*a*. Check and repair or replace as required.
		b. Defective ½A SB fuse	*b*. Replace ½A SB fuse.
2	No channel provides proper signaling.	*a*. Defective power supply assembly 18A1.	*a*. Replace power supply assembly 18A1.
		b. Defective panel 18A2	*b*. Replace panel 18A2.
3	No communications through a specific channel.	*a*. Defective line connections	*a*. Check and replace or repair as required.
		b. Defective associated panel 18A3 or 18A4.	*b*. Replace associated panel 18A3 or 18A4.
4	Specific channel does not indicate incoming call signal.	Defective associated panel 18A3 or 18A4.	Replace associated panel 18A3 or 18A4.
5	Distant terminal indicates that a specific channel does not indicate incoming call signal.	Defective associated panel 18A3 or 18A4.	Replace associated panel 18A3 or 18A4.
6	Incorrect or no indication on TEST ALIGN meter with meter selector switch at -.	*a*. Defective ½A SB fuse	a. Replace ½A SB fuse.
		b. Defective power supply assembly 18A1.	*b*. Replace power supply assembly 18A1.
7	Incorrect or no indication on TEST ALIGN meter with meter selector switch at +.	*a*. Defective 1½ A fuse *b*. Defective power supply assembly 18A1.	*a*. Replace 11/2 A fuse *b*. Replace power supply assembly 18A1.
8	Incorrect or no indication on TEST ALIGN meter with meter selector switch at 20 ~ DRIVE.	Defective panel 18A2	Replace panel 18A2.
9	Incorrect or no indication on TEST ALIGN meter with meter switch at 20 ~.	Defective panel 18A2	Replace panel 18A2.
10	Incorrect or no indication on TEST ALIGN meter with meter selector switch at 1600 ~. .	*a*. 1600 cps adjustment required.	a. Adjust ADJ 1600 control on panel 18A2 for center hairline indication on TEST ALIGN meter (see note).
		b. Defective panel 18A2	*b*. Replace panel 18A2.

Section III. REPAIRS AND ADJUSTMENTS

4-8. Replacement of Plug-in Panels

CAUTION

Turn power off (both CABLE and AC) before removing or inserting panels of equipments listed below.

NOTE

Each type of plug-in panel is keyed to prevent insertion into the wrong slot. If a panel will not slide all the way into the track, do not force it.

a. TD-202/U, TD-203/U, TD-204/U, TD-352/U, or TD-353/U.

(1) Loosen the front panel screws, press the PUSH TO RELEASE CHASSIS button, and slide the component out of the case until the rear stops are reached.

(2) Loosen the retaining bar captive screw and remove the retaining bar. (TD-202/U units prepared under Order No. DAAB07-82-C-C031 have two retaining bars.)

(3) Pull out the defective panel.

(4) Slide the replacement panel into the component, making sure that the connector at the rear of the panel is securely seated.

(5) Replace the retaining bar and secure it in place with the captive screw. Be sure that the bar is pressing against all of the panels.

(6) Slide the component back into its case and secure the front panel screws.

b. CV-1548/G (fig 3-14).

(1) Loosen the captive screws and remove the perforated inner front cover.

(2) Pull out the defective panel.

(3) Slide the replacement panel into the component, making sure that the connector on the rear of the panel is securely seated.

(4) Replace the perforated inner front cover and secure it in place with the captive screws.

4-9. Replacement of Power Supply Assemblies

a. TD-202/U, TD-203/U, TD-204/U, TD-352/U, or TD-353/U.

(1) Operate the AC POWER switch to OFF.

(2) Loosen the front panel screws, press the PUSH TO RELEASE CHASSIS button and pull the component from its case until the rear stops are reached.

(3) Loosen the captive screws on the power supply assembly and, with the assembly handle, pull the assembly out of the component.

(4) Slide the replacement assembly into the component until it is firmly seated.

(5) Secure the assembly in place by tightening the captive screws.

(6) Slide the component into its case and secure the front panel screws.

(7) Operate the AC POWER switch to ON and check the operation of the replacement assembly by performing the proper sequences in the organizational monthly preventive maintenance checks and services paragraph (para 4-4).

b. CV-1548/G.

(1) Operate the POWER switch to OFF.

(2) Loosen the captive screws and remove the perforated inner front cover.

(3) Loosen the captive screws on power supply assembly 18A1 and pull it out of the CV-1548/G.

(4) Slide the replacement assembly into the slot, making sure that the connector on the rear of the assembly mates properly with the receptacle in the CV-1548/G.

(5) Tighten the captive screws on the assembly.

(6) Replace the perforated inner front cover and secure it with the captive screws.

4-10. Replacement of Lightning Arresters (TD-204/U)

WARNING

Voltages as high as 1,100 volts may be present in the lightning arrester socket. DO NOT remove the lightning arresters until the AC POWER and CABLE POWER switches are operated to OFF.

a. Operate the AC POWER and the CABLE POWER switches to OFF.

b. Unscrew the lightning arrester from its socket and remove it.

CAUTION

The screwcap is an integral part of the lightning arrester; replace the entire assembly as a unit. Use only 1,300-volt lightning arresters as replacements.

c. Screw the replacement lightning arrester into the socket.

4-11. Servicing Air Filters

a. Removal.

(1) Loosen the front panel screws, press the PUSH TO RELEASE CHASSIS button, and slide the component a few inches out of its case.

(2) Loosen the air filter holding screws and remove the filter.

(3) Check the condition of the filter. If the filter element is damaged or the metal fibers are frayed, replace the filter. If the element is in good condition, clean it *(b* below).

b. Cleaning

(1) Clean the filter with cleaning compound.

(2) Dry the filter thoroughly with dry compressed air, not to exceed 30 pounds per square inch.

(3) Dip the filter in oil, general purpose preservative (PL Special) and drain the excess with the filter lying face down.

c. *Replacement.* Replace the filter element in the holding frame and install the filter and frame in the slot behind the front panel. Tighten the captive screws to secure it in place.

4-12. TD-204/U Overcurrent Dropout Adjustment

a. Operate the AC POWER switch and CABLE POWER switch to OFF; disconnect Cable Assemblies CG-2437/TCC and CG-2438/TCC from the transmission cable connectors. Connect the loose ends of the CG-2437/TCC and the CG-2438/TCC together.

b. Loosen the front panel screws, press the PUSH TO RELEASE CHASSIS button, and pull out the TD-204/U from its case until the rear stops are reached.

c. Operate the MILE switches on panels 6A4 and 6A5 to ½.

d. Operate the AC POWER and CABLE POWER switches to ON.

e. Operate the METER SELECT switch to CABLE I.

f. Operate the OVER CURRENT ADJ control on assembly 6A1 fully clockwise.

g. Operate the CABLE CURRENT ADJ control for an indication of 355 on the TEST ALIGN meter.

h. Adjust the OVER CURRENT ADJ control until the ALARMS NO CABLE CURRENT indicator lights and the buzzer sounds.

i. Operate the CABLE CURRENT ADJ control to its orginal position (approx). Operate the CABLE POWER switch to OFF and then to ON. The ALARMS NO CABLE CURRENT indicator should extinguish.

j. Adjust the CABLE CURRENT ADJ control for a center hairline indication on the TEST ALIGN meter.

k. Operate the AC POWER switch and the CABLE POWER switch to OFF.

l. Operate the MILE switches on panels 6A4 and 6A5 to their proper positions.

m. Slide the TD-204/U into its case, secure the front panel screws, and reconnect the CG-2437/TCC and CG-2438/TCC to the transmission cable.

CHAPTER 5
BASIC PULSE CODE MODULATION THEORY

Section I. INTRODUCTION

5-1. General

a. The TD-202/U, TD-203/U, TD-204/U, TD-206/U, TD-352/U, and TD-353/U are pulse code modulation (pcm) components used as part of multichannel communications systems. These systems use radio or cable, or combinations of both as a transmission medium. The pcm components provide 12, 24, 48, or 96 audio channels in a single transmission channel.

b. In 12 or 48 channel systems, 12 or 48 separate telephone signals are converted to time-division-multiplex, pulse-code-modulation (tdm-pcm) pulse trains. These pulse trains are reshaped and retimed at repeater points in the system, and reconverted to telephone signals at a distant terminal. In 24- or 96-channel systems, the 24 or 96 telephone channels are converted into two tdm-pcm pulse trains. For radio transmission or 24-channel cable transmission, the two pulse trains are interleaved and transmitted over a single radio channel or single cable. For 96-channel cable transmission, the two pulse trains are transmitted over separate cables.

c. The 24- and 96-channel systems provide the capability for intermediate terminals along the transmission path. One pulse train is repeated from the local terminal to the distant terminal, while the second pulse train terminates at the intermediate point, and a new pulse train is inserted in its place. The intermediate point (drop and insert repeater) can therefore communicate in both directions, and with both terminals. The drop and insert repeater points contain both repeater and terminal equipment.

5-2. Principals of Multiplexing

a. General. Multiplexing is a technique used to simultaneously transmit several channels of voice or data over a radio or cable link. The frequency division multiplexer (fdm) equipment utilizes a subcarrier frequency for each voice or data channel. In time division multiplexer equipment, each voice or data channel shares the transmission time and is intermittently transmitted.

b. Time Division Multiplexing.

(1) In time division multiplexing, each voice channel is assigned a time interval in sequence with all other channels being multiplexed. These intervals are short and repeated at a high frequency. The samples taken from each channel are then converted to a form suitable for transmission in the selected medium. At the receiving terminal, the samples are demodulated and separated into their proper channels by a timing signal from the transmitting terminal.

(2) The simplified telephone circuit in figure 5-1 illustrates the time division principle. Switches S1 and S2 are synchronized such that both are in position A at the same time, and in position B at the same time. A telephone call made on line A is completed only when the switches are in position A. The telephone calls made on line B are completed only when the switches are in position B. When both lines are in use, the switches alternate between position A and position B. If the switching rate is low, both conversations will be garbled and unintelligible. If the rate is increased, the signals will be more

intelligible. When the switching rate is higher than voice frequencies, the switching is not detectable.

(3) The circuit shown in figure 5-2 is a simplified 12-channel tdm system. The two switches are rotated in synchronism and each channel is sampled once during each revolution, Very little distortion occurs and the 12 conversations are intelligible when the rotation speed is rapid enough. Electronic switching is used in the pcm components described in this manual, and either 12 (TD-352/U) or 48 (TD-353/U) samples are taken in each time frame.

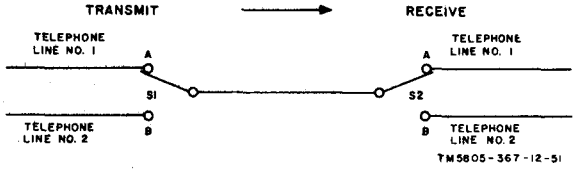

Figure 5-1. Simplified telephone system showing simple tdm.

Section II. PRINCIPLES OF PULSE CODE MODULATION

5-3. General

Pulse code modulation is a communication technique in which voice, data, or facsimile signals are converted into a series of digital pulse codes. Each pulse code represents signal amplitude at a particular instant and a series of pulse codes represents a complete waveform. Since the transmitted signal is in digital form, it is less susceptible to noise and distortion buildup over long distant lines, and may be regenerated at repeaters along the route without introducing additional distortion.

5-4. Voice Transmission by Pulse Code Modulation

(fig 5-3)

In the pcm process, standard amplitude levels are assigned and are represented by

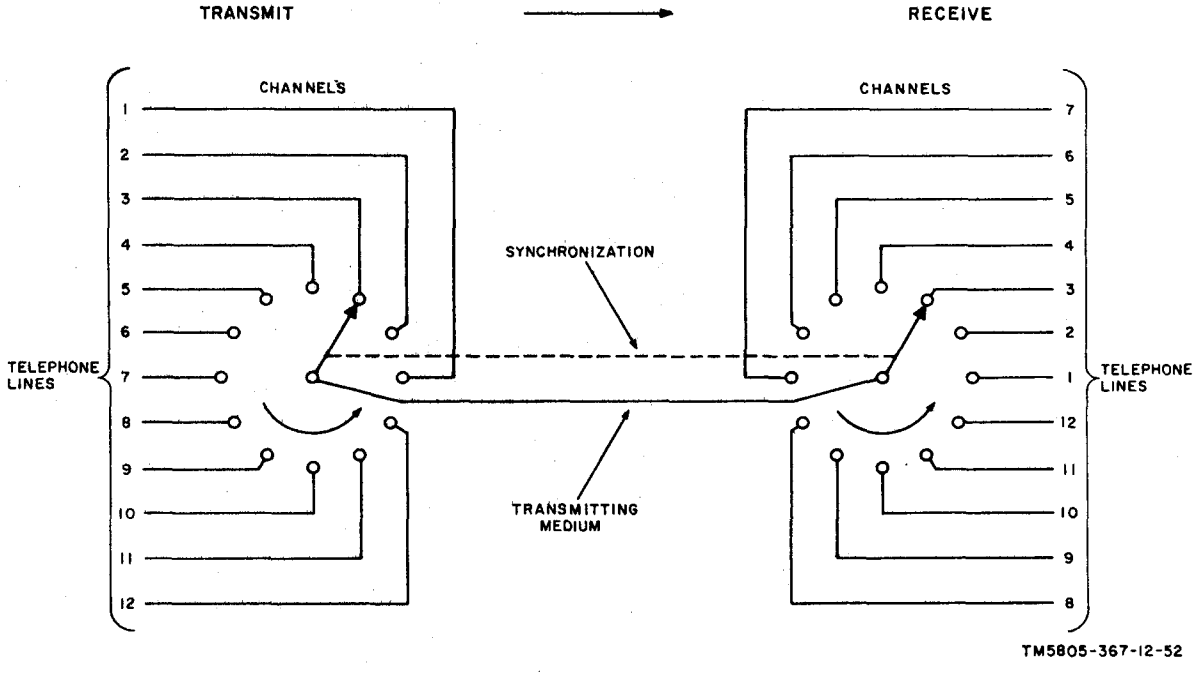

Figure 5-2. Simplified 12-channel tdm system.

digital codes. The incoming voice waveform is sampled at a high rate, and each sample is converted to a pulse at the closet standard amplitude, producing a pulse amplitude modulated (pam) waveform. The standard amplitude pulses developed are then measured and converted to a binary pulse code for transmission. The pulse codes are decoded at the receiving station and reconverted to a pam waveform, which is then demodulated to produce approximately the original waveform. As the sampling frequency is increased, the waveform generated at the receiver more accurately resembles the original waveform.

5-5. Pulse Code Modulation in TD-352/U and TD-353/U

a. In the TD-352/U and TD-353/U, the amplitude range of the incoming voice signals is divided into 64 levels which are then converted to 6-digit binary pulse codes. Companding (compression-expansion) circuits are used at the voice inputs to improve the fidelity of very high-level or very low-level signals. These circuits provide a nonlinear amplification which compresses high-level signals to the amplitude range required for conversion to the 64-level range of the encoder and decoder, and expands very low-level signals to provide more accurate coding. The low-level signals must be expanded because they would cover only a few pulse code levels and would be more distorted than the higher level signals. A complimentary commanding circuit is incorporated in the receiver circuits to restore the signals to their original levels after decoding and demodulating.

b. Each channel in the TD-352/U or TD-353/U is pulse-code sampled once each 125 microseconds (8,000 times each second). In the TD-352/U, each pulse code occupies an interval of 10.4 microseconds (12 channels) and in the TD-353/U, each pulse code occupies 2.6 microseconds (48 channels). The system shown in figure 6-19 illustrates the operation of a 12-channel tdm-pcm system. Each of the modulator outputs is sampled in turn to produce one pulse code in the frame (12 pulse codes make up one frame). A frame sync pulse is added in place of the last digit in the last pulse code of each frame to synchronize the receiving equipment with the transmitting equipment. The frame sync pulse is identical with the other pulses in the train and is distinguished from the receiver by its repetition pattern.

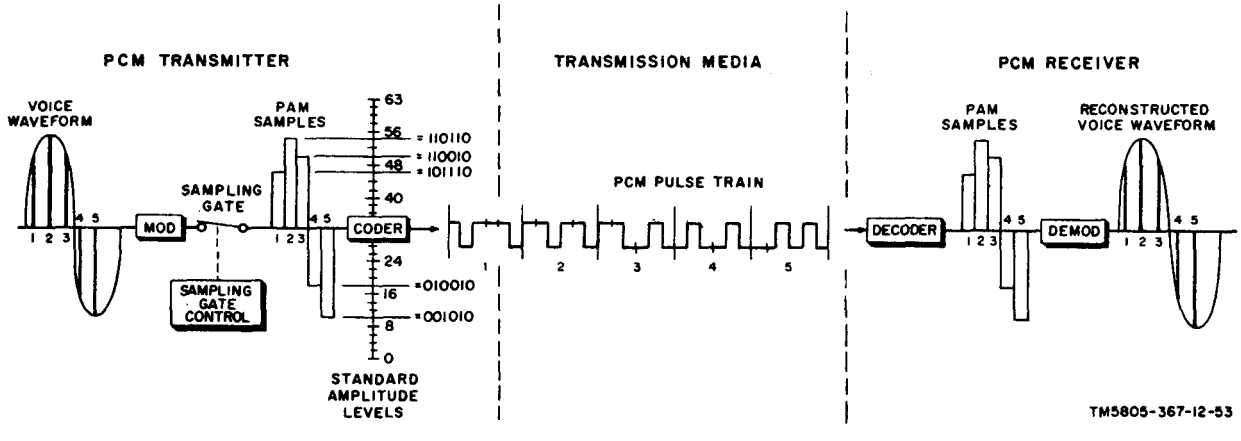

Figure 5-3. Voice transmission by pulse code modulation.

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APPENDIX A
REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
DA Pam 738-750	The Army Maintenance Management System (TAMMS).
SB 11-573	Painting and Preservation of Supplies Available for Field Use for Electronics Command Equipment.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-664	Theory and Use of Electronic Test Equipment.
TM 11-2057A	Test Set TS-27B/TSM.
TM 11-2134	Manual Telephone Switchboard SB-86/P; Installation and Operation (NSN 5805-00-503-2660).
TM 11-2146	Central Office, Telephone Manual AN/TTC-7 (NSN 5805-00-395-9422), and AN/TTC-7A (NSN 5805-00-820-9549); Telephone Central Office Group Manual AN/GTA-14(V) (NSN 5805-00-892-1081), and Telephone Circuit Trunk Relay TA-276/TTC (NSN 5805-00-503-3347)
TM 11-5805-201-12	Operator's and Organizational Maintenance Manual: Telephone Set TA-312/PT (NSN 5805-00-543-0012).
TM 11-5805-255-24P	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Telephone Set TA-263/PT (FSN 5805-503-2778).
TM 11-5805-256-13	Operator's, Organizational, and Direct Support Maintenance Manual: Telephone Set TA-43/PT (NSN 5805-00-503-2775).
TM 11-5820-461-12	Operator's and Organizational Maintenance Manual: Radio Sets AN/GRC-50(V)1 (NSN 5820-00-892-3851), AN/GRC-50(V)2 (NSN 5820-00-892-3852), AN/GRC-50(V)3 (NSN 5820-00-892-3853, AN/GRC-50(V)4 (NSN 5820-00-892-3854), AN/GRC-50(V)5 (NSN 5820-00-892-3855), AN/GRC-50A(V)1 (NSN 5820-00-933-6193), AN/GRC-50A(V)2 (NSN 5820-00-933-6192), AN/GRC-50A(V)3 (NSN 5820-00-933-6191), AN/GRC-50A(V)4 (NSN 5820-00-933-6,190), AN/GRC-50A(V)5 (NSN 5820-00-933-6189), AN/GRC-50A(V)6 (NSN 5820-00-936-5840), AN/GRC-50A(V)7 (NSN 5820-00-936-5481, AN/GRC-50A(V)8 (NSN 5820-00-935-0089, AN/GRC-50A(V)9 (NSN 5820-00-878-8635), AN/GRC-50A(V)10 (NSN 5820-00-878-8634), AN/GRC-50A(V)11 (NSN 5820-00-136-4996).
TM 11-5820-538-12	Operator's and Organizational Maintenance: Mast AB-577/GRC (NSN 5820-00-892-3862) and Extension Kit, Mast MK-806/GRC (NSN 5895-00-691-2344).
TM 11-5965-206-14P	Operator's, Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Headset-Microphone H-91A/U (FSN 5965-669-6871); Handset-Headset H-144/U; H-144A/U, H-144B/U, H-144C/U (FSN 5965-682-2769); and Headset-Microphone H-210/G (FSN 5965-892-1068).
TM 11-5995-208-10	Operator's Manual for Cable Assembly, Special Purpose, CX-11230/G Electronic (H mile) (NSN 5995-00-133-9126) CX-11230/G (100 foot) (NSN 5995-00-1133-9127, CX-11230A/G (1320 feet) (NSN 5995-01-121-6623, CX-11230A/G (100 foot) (NSN 5995-01-125-6781), CX-10734/G (NSN 5995-00-133-9125).

TM 11-5995-208-24&P	Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Cable Assembly, Special Purpose CX-11230/G (NSN 5995-00-133-9126) and Cable Assembly, Adapter CX-10734/G (NSN 5995-00-133-9125).
TM 11-6625-648-12	Operator's and Organizational Maintenance Manual: Test Set, Telephone AN/PTM-7 (NSN 6625-00-902-7574).
TM 740-90-1	Administrative Storage of Equipment
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX C
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for Multiplexer TD-202, 203, 204, 352, and 353/U; Restorers, Pulse Form TD-206 and 206B/U; and Converters, Telephone Signal CV-1548 and 1548A/G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assem-

blies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specified, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown or each category. The number of task-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew

O - Organizational

F - Direct Support

H - General Support

L - Specialized Repair Activity

D - Depot

NOTE

If the SRA in your geographical area does not have the capability for the "L" maintenance functions listed in the MAC, or if there is no SRA in your geographical area, utilize existing procedures for obtaining depot accomplishment of the "L" maintenance functions.

e. Column 5, Tool and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in sections IV, VII, X, XIII, XVI, and XXIII, Remarks, which is pertinent to the item opposite the particular code.

C–4. Tool and Test Equipment Requirements (Sect. III, VI, IX, XII, XV, XVIII, XXI and XXIV)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

C-5. Remarks (Sect. IV, VII, X, XIII, XVI, XIX, XXII, and XXV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

Section II. MAINTENANCE ALLOCATION CHART FOR MULTIPLEXER TD-202/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H L	D		
00	MULTIPLEXER TD-202/U	Inspect		0.2					
		Test	0.3						A
		Test		0.5					B
		Test				0.8		1 thru 7, 11 thru 15	C
		Service	0.3						D
		Service		0.5				8	
		Adjust	0.2						E
		Adjust		0.3					B
		Adjust		0.4	0.4			3,5,6	F
		Adjust			0.6	0.6		3,5,6,11,12,14,15	C
		Repair		0.5				8	G
		Repair				0.5		9,10	C
		Overhaul					20.0		H
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test		0.5					A
		Test				0.5		3 thru 7,13	C
		Replace		0.5				8	
		Repair				1.0		3 thru 8,10,13	C
0101	CIRCUIT CARD ASSY (A1A1)	Inspect				0.3			
		Test				0.5			A
		Test					0.5	3 thru 7,13	C
		Adjust				0.2		4,8	
		Replace				0.4		9,10	
		Repair					1.0	3 thru 10,13	C
02	CIRCUIT CARD ASSY (A2), (A2A)	Inspect		0.2					C
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J
		Replace		0.3				8	
	*A2A not repairable	Repair				1.0		1,3 thru 11,14	C,M
03	CIRCUIT CARD ASSY (A3), (A3A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		5,7,11,15	C
		Adjust			0.2			4,8	K
		Replace		0.3				8	
	*A3A not repairable	Repair *				1.0		4,5,7,8,11,15	C,M
04	CIRCUIT CARD ASSY (A4), (A4A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		place		0.3				9,10	
	*A4A not repairable	Repair				1.0		1,3 thru 11,14	C,M
05	CIRCUIT CARD ASSY (A5), (A5A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A5A not repairable	Repair				1.0		1,3 thru 11,14	C,M

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
06	(A6A) CARD ASSY (A6), (A6A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A6A not repairable	Repair				1.0		1,3 thru 11,14	C,M
07	CIRCUIT CARD ASSY (A7), (A7A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3,7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A7A not repairable	Repair				1.0		1,3 thru 11,14	C,M
08	CIRCUIT CARD ASSY (A8), (A8A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A8A not repairable	Repair				1.0		1,3 thru 11,14	C,M

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MULTIPLEXER TD-202/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	COUNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	F,L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	O,F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-242-5023	
5	F,L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	5625-00-987-6603	
6	F,L,D	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
7	F,L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
8	O	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
9	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
10	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	581	
11	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
12	L,D	VOLTMETER TS-443/U	6625-00-193-7187	
13	L,D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-870-2264	
14	F,L,D	VOLTMETER ME-30/U	6625-00-643-1670	
15	L,D	CONVERTER CV-1548/G (SHOP SUPPORT, 2 EA REQUIRED)	5805-00-069-8795	

Section IV. REMARKS MULTIPLEXER TD-202/U.

REFERENCE CODE	REMARKS
A	FAULT LOCATIONS USING BUILT-IN FACILITIES
B	CENTER SLICING LEVEL.
C	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
D	PREVENTIVE MAINTENANCE.
E	POWER SUPPLY, REF AND PCM OUTPUT.
F	POSITIVE-NEGATIVE SLICING (DURING 24 OR 96 CHANNEL OPERATION).
G	REPAIR BY REPLACEMENT OF CIRCUIT CARD ASSEMBLIES.
H	TOOLS AND TEST EQUIPMENT AS REQUIRED.
I	EQUIPMENT OPERATION, USING BUILT-IN BYTE.
J	PCM OUTPUT LEVEL (4AZAZ, 5AZ).
K	CENTER LEVEL, RECEIVE LEVEL.
L	PHASING 4A4, 5A4, 4A5, 5A5).
M	CIRCUIT CARD ASSEMBLIES WITH THE SUFFIX LETTER "A" CONTAIN SILICON SEMICONDUCTORS AND ARE TO BE CONSIDERED NONREPAIRABLE AND SHOULD BE RETURNED TO DEPOT FOR FINAL DISPOSITION.

Section V. MAINTENANCE ALLOCATION CHART FOR MULTIPLEXER TD-203/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	MULTIPLEXER TD-203/U	Inspect		0.2					
		Test	0.3						A
		Test		0.5					B
		Test				0.8		1 thru 7, 7, 11 thru 15	C
		Service	0.3						D
		Service		0.5				8	
		Adjust	0.2						E
		Adjust		0.3					B
		Adjust			0.4			3,5,6	F
		Adjust				0.6		3,5,6,11,12,14,15	
		Repair		0.5				8	G
		Repair				0.5		9,10	C
		Overhaul					20.0		H
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test		0.5					A
		Test				0.5		3 thru 7,13	C
		Replace		0.5				8	
		Repair				1.0		3 thru 8,10,13	C
0101	CIRCUIT CARD ASSY (A1A1)	Inspect				0.3			
		Test		0.5					A
		Test				0.5		3 thru 7,13	C
		Adjust		0.2				4,8	
		Replace				0.4		9,10	
		Repair					1.0	3 thru 10,13	
02	CIRCUIT CARD ASSY (A2)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J
		Replace		0.3				8	
		Repair				1.0		1,3 thru 11,14	C
03	CIRCUIT CARD ASSY (A3)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		5,7,11,15	C
		Adjust			0.2			4,8	K
		Replace		0.3				8	
		Repair				1.0		4,5,7,8,11,15	C
04	CIRCUIT CARD ASSY (A4)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
		Repair				1.0		1,3 thru 11,14	C
05	CIRCUIT CARD ASSY (A5)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
		Repair				1.0		1,3 thru 11,14	C

(1) GROUP NUMBEI	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
06	CIRCUIT CARD ASSY (A7), (A7A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A7A not repairable	Repair				1.0		1,3 thru 11,14	C,M
07	CIRCUIT CARD ASSY (A8), (A8A)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
	*A8A not repairable	Repair				1.0		1,3 thru 11,14	C,M
08	CIRCUIT CARD ASSY (A9)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
		Repair				1.0		1,3 thru 11,14	C
09	CIRCUIT CARD ASSY (A10)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
		Repair				1.0		1,3 thru 11,14	C
10	CIRCUIT CARD ASSY (A11)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1,3 thru 7,11,14	C
		Adjust		0.2				4,8	J,L
		Replace		0.3				9,10	
		Repair				1.0		1,3 thru 11,14	C

Section VI. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MULTIPLEXER TD-203/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	COUNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	F,L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	O,F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-242-5023	
5	F,L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	5625-00-987-6603	
6	F,L,D	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
7	F,L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
8	O	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	51	
9	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
10	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
11	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
12	L,D	VOLTMETER, TS-443/U	6625-00-193-7187	
13	L,D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-870-2264	
14	F,L,D	VOLTMETER ME-30/U	6625-00-643-1670	
15	L,D	CONVERTER CV-1548B/G (SHOP SUPPORT, 2 EACH REQUIRED)	5805-00-069-8795	

Section VII. REMARKS MULTIPLEXER TD-203/U

REFERENCE CODE	REMARKS
A	FAULT LOCATIONS USING BUILT-IN FACILITIES
B	CENTER SLICING LEVEL.
C	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
D	PREVENTIVE MAINTENANCE.
E	POWER SUPPLY, REF AND PCM OUTPUT.
F	POSITIVE-NEGATIVE SLICING (DURING 24 OR 96 CHANNEL OPERATION).
G	REPAIR BY REPLACEMENT OF CIRCUIT CARD ASSEMBLIES.
H	TOOLS AND TEST EQUIPMENT AS REQUIRED.
I	EQUIPMENT OPERATION, USING BUILT-IN BYTE.
J	PCM OUTPUT LEVEL (4AZAZ, 5AZ).
K	CENTER LEVEL, RECEIVE LEVEL.
L	PHASING 4A4, 5A4, 4A5, 5A5).
M	CIRCUIT CARD ASSEMBLIES WITH THE SUFFIX LETTER “A” CONTAIN SILICON SEMICONDUCTORS AND ARE TO BE CONSIDERED NONREPAIRABLE AND SHOULD BE RETURNED TO DEPOT FOR FINAL DISPOSITION.

Section VIII. MAINTENANCE ALLOCATION CHART FOR MULTIPLEXER TD-204/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H L	D	(5) TOOLS AND EQPT.	(6) REMARKS
00	MULTIPLEXER TD-204/U	Inspect		0.2					A
		Test	0.3						B
		Test		0.5				4	C
		Test				0.8		1 thru 9,13,16,17	D
		Service	0.3						A
		Service		0.5				14	
		Adjust		0.3					E
		Adjust			0.4			3,4	F
		Repair		0.5				10	G
		Repair				0.5		11,12	D
		Overhaul					20.0		H
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test		0.5				3,4,5,9	I
		Test				0.8		3,4,5,9,15	D
		Adjust		0.2					J
		Replace		0.5				10	
		Repair		0.3				11,12	K
		Repair				1.0		3,4,5, 9 thru 12,15	D
0101	CIRCUIT CARD ASSY (A1A1)	Inspect				0.3			
		Test		0.5				3,4,5,9	I
		Test				0.5		3,4,5,9,15	D
		Adjust		0.2				4,10	J
		Replace				0.4		10,11	D
		Repair					1.0	3,4,5, 9 thru 12,15	
02	CIRCUIT CARD ASSY (A2)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D
03	CIRCUIT CARD ASSY (A3)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D
04	CIRCUIT CARD ASSY (A4)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARK
			C	O	F	H L	D		
05	CIRCUIT CARD ASSY (A5)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D
06	CIRCUIT CARD ASSY (A6)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D
07	CIRCUIT CARD ASSY (A7)	Inspect		0.2					
		Test		0.5					I
		Test				0.5		1 thru 7,9,13,14,17	D
		Adjust			0.2			4,10	L
		Replace		0.3				10	
		Repair				1.0		1 thru 7, 9 thru 14,17	D

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
MULTIPLEXER TD-204/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	Counter Electrical, Digital Readout AN	6625-00-911-6368	
2	L,D	Multimeter ME-26/U	6625-00-646-9409	
3	F,L,	Meter Audio Level ME-	6625-00-498-3469	
4	O,	Multimeter TS (will be replaced by AN 223)	6625-00-242-5023	
5	F,L,	Oscilloscope AN	6625-00-987-6603	
6	F,L,	Signal Generator SG	6625-00-669-0255	
7	L,D	Spectrum Analyzer TS-723/U	6625-00-668-9418	
8	L,D	Test Set TS-140/PCM	6625-00-243-4888	
9	F,L,	Test Set, Transistor TS-1	6625-00-893-2628	
10	O	Tool Equipment TE-123	5180-00-408-1881	
		or		
		Tool Kit, Electronic Equipment TK	5180-00-064-5178	
11	L,D	Tool Kit Electronic Equipment TK	5180-00-605-0079	
12	F,L,	Tool Kit, Electronic Equipment TK	5180-00-610-8177	
13	L,D	Transmission Test Set TS-762/U	6625-00-519-2629	
14	L,D	Voltmeter TS-443/U	6625-00-193-7187	
15	L,D	Voltmeter Digital AN/GSM-	6625-00-870-2264	
16	L,D	Voltmeter ME-	6625-00-043-1670	
17	L,D	Converter CV- (Shop Support 2 ea required)	5805-00-069-8795	

Section X. REMARKS MULTIPLEXER TD-204/U

REFERENCE CODE	REMARKS
A	PREVENTIVE MAINTENANCE.
B	FAULT LOCATIONS USING BUILT-IN FACILITIES.
C	POWER SUPPLY.
D	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
E	POWER SUPPLY, CABLE CURRENT, OVER CURRENT RECEIVED ORDER WIRE BUILT-IN
F	CURRENTS, ORDER WIRE, TEST TONE.
G	REPAIR BY REPLACEMENT OF CARD ASSEMBLIES
H	TOOLS AND TEST EQUIPMENT AS REQUIRED.
I	USE BUILT-IN FACILITIES.
J	CABLE CURRENT, OVER CURRENT.
K	EXCEPT PCB.
L	TEST TONE, ORDER WIRE.

Section XI MAINTENANCE ALLOCATION CHART
FOR
RESTORER, PULSE FORM TD-206/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	RESTORER, PULSE FORM TD-206/G	Inspect		0.3					
		Test		0.5				9,17	A
		Test				1.0		1 thru 8,10, 14 thru 17	B.C
				0.3					
		Adjust					1.0	2,4,6,14	
		Repair				0.5		2,6,12,13,30	C
		Overhaul					40.0	1 thru 45	
01	ELECTRONIC COMPONENTS ASSY (A1)	Inspect		0.2					
		Test				0.5		2,6,30	C
		Test					1.0	16,18 thru 37	
		Replace				0.5			
		Repair					2.0	1,6,12,31	
02	CABLE ASSY (A2)	Inspect		0.2					
		Test			0.3			4	
		Repair			0.5			12	

Section XII TOOL AND TEST EQUIPMENT REQUIREMENTS FOR RESTORER, PULSE FORM TD-206/G

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	COUNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-242-5023	
5	L,D	OSCILLATOR, AUDIO TS-421A/U	6625-00-669-0228	
6	L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	6625-00-987-6603	
7	L,D	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
8	L,D	SPECTRUM ANALYZER TS-723/U	6625-00-668-9418	
9	O,F,L,D	TEST SET, TELEPHONE AN/PTM-7	6625-00-902-7574	
10	L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
11	O	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
12	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
13	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TD-105/G	5180-00-610-8177	
14	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
15	L,D	VOLTMETER TS-443/U	6625-00-193-7187	
16	L,D	VOLTMETER ME-30/U	6625-00-643-1670	
17	O,L,D	CONVERTER CV-1548/G (SHOP SUPPORT, 2 EA REQUIRED)	5805-00-069-8795	
18	D	OSCILLOSCOPE OS-261/U	6625-00-127-0079	
19	D	MULTIMETER AN/USM-223	6625-00-999-7465	
20	D	RANDOM WORD GENERATOR AND ERROR DETECTOR (RAYTHEON P/N SM-E-955736)		
21	D	TEST SET, CABLE SINGAL (RAYTHEON P/N SM-D-955737)		
22	D	COUNTER, FREQUENCY CP-772/U (HP 5245L)	5625-00-973-4837	
23	D	MULTIMETER, DIGITAL, J. FLUKE 8120A	6625-00-322-8664	
24	D	SIGNAL GENERATOR, HIGH FREQUENCY (HP 606B)	6625-99-494-8565	
25	D	DC POWER SUPPLY (CONTANT CURRENT), HP 6029B	6625-00-458-4585	
26	D	SPECTRUM ANALYZER, DISPLAY SECTION, HP141T	6625-00-424-4370	
27	D	RF SECTION, SPECTRUM ANALYZER PLUG-IN, HP 8553B	6625-00-632-5055	
28	D	IF SECTION, SPECTRUM ANALYZER PLUG-IN, CV-3287/U (HP 8552B)	6625-00-431-9339	
29	D	TRACKING GENERATOR/COUNTER HP 8443A	6625-00-155-5990	
30	L,D	MULTIPLEXER TD-754/G	5820-00-930-8078	
31	D	MULTIPLEXER TD-204/U	5805-00-900-8200	
32	O,D	CABLE, SPECIAL PURPOSE CX-11230/G (2 MILES)	5995-00-133-9126	
33	D	HEADSET/MICROPHONE H-156/U	5820-00-892-3850	
34	L,D	CABLE ASSEMBLY, RADIO FREQUENCY CG-2437/TCC (2 REQUIRED)	5995-00-916-2252	
35	L,D	CABLE ASSEMBLY, RADIO FREQUENCY CG-2438/TCC (2 REQUIRED)	5995-00-913-0510	
36	D	CABLE ASSEMBLY, RADIO FREQUENCY CG-1040B/U (4 REQUIRED)	5995-00-913-0509	
37	O,D	ADAPTER, CABLE ASSEMBLY CX-10734/G	5995-00-133-9125	
38	D	HOLDING FIXTURE, RESTORER, (RATHEON P/N USA 13258008)		

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
39	D	STRAPPING TOOL, PNEUMATIC, SIGNODE PNSC-58	3540-00-197-1305	
40	D	AIR LINE FILTER, PRESSURE REGULATOR AND LUBRICATOR ASSY, SIGNODE P-8559		
41	D	PRESSURE TEST GAUGE, 0-15 PSI, WEKSLER INSTR. TA1-4		
42	D	THICKNESS FEELER GUAGE, 0.005" STANDARD		
43	D	BENCH TOP REPAIR FACILITY FOR CIRCUIT CARD ASSEMBLIES, PACE PRC-150-A		
44	D	LIGHT ASSEMBLY, ELECTRIC MX-1292/PAQ	6695-00-378-5449	
45	L,D	TEST SET, TELEPHONE TS-278/TSM	6625-00-188-3232	

Section XIII. REMARKS RESTORER, PULSE FORM TD-206/G

REFERENCE CODE	REMARKS
A	VISUAL INSPECTION AND EQUIPMENT OPERATION.
B	EQUIPMENT OPERATION AND METER TEST.
C	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.

Section XIV. MAINTENANCE ALLOCATION CHART
FOR
RESTORER, PULSE FORM TD-206B/G

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	RESTORER, PULSE FORM TD-206B/G	Inspect		0.3					A
		Test		0.5				2	B
		Test				1.0		2,5 thru 13, 15 thru 26	C
		Service		0.3				34	
		Repair				1.5		5, 27 thru 32	C
		Overhaul					2.5	1 thru 34	
01	REPEATER CCA: A1,A2	Inspect				0.2			C
		Test				1.0		6 thru 26	C
		Adjust				0.4		5 thru 26	C
		Replace				0.5		5	C
		Repair					1.0	5, 27 thru 32	
02	CABLE ASSY	Inspect		0.2					
		Test			0.3			1	
		Replace		0.5				1,34	
		Repair			0.5			4	

Section XV TOOL AND TEST EQUIPMENT REQUIREMENTS FOR RESTORER, PULSE FORM TD-206B/G

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O,F,L,D	MULTIMETER TD-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-5023	
2	O,F,L,D	TEST SET, TELEPHONE AN/PTM-7	6625-00-902-7574	
3	D	TEST SET, TELEPHONE TS-27B/TSM	6625-00-188-3232	
4	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
5	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
6	F,L,D	VOLTMETER, METER ME-30/U	6625-00-669-0742	
7	L,D	OSCILLOSCOPE 03-261/U	6625-00-999-7465	
8	L,D	MULTIMETER AN/USM-223	6625-00-999-7465	
9	L,D	RANDOM WORD GENERATOR AND ERROR DETECTOR (RAYTHEON P/N SM-E-955736)		
10	L,D	TEST SET, CABLE SIGNAL (RAYTHEON P/N SM-D-955737)		
11	L,D	COUNTER, FREQUENCY CP-772/U (HP 5245L)	5625-00-973-4837	
12	L,D	MULTIMETER, DIGITAL J. FLUKE 8120 A	6625-00-322-8664	
13	L,D	SIGNAL GENERATOR, HIGH FREQUENCY (HP 606B)	6625-00-494-8565	
14	L,D	DC POWER SUPPLY (CONSTANT CURRENT), (HP 6209B)	6625-00-458-4585	
15	L,D	SPECTRUM ANALYZER, DISPLAY SECTION, (HP 141T)	6625-00-424-4370	
16	L,D	RF SECTION, SPECTRUM ANALYZER PLUG-IN, (HP 8553B)	6625-00-432-5055	
17	L,D	IF SECTION, SPECTRUM ANALYZER PLUG-IN, CV-3287/U (HP 8552B)	6625-00-431-9339	
18	L,D	TRACKING GENERATOR/COUNTER (HP 8443A)	6625-00-155-5990	
19	L,D	MULTIPLEXER TD-754/G	5820-00-930-8078	
20	L,D	MULTIPLEXER TD-204/U	5805-00-900-8200	
21	O,L,D	CABLE, SPECIAL PURPOSE CX-11230/G (2 MILES)	5995-00-133-9126	
22	L,D	HEADSET/MICROPHONE H-156/U	5820-00-892-3850	
23	L,D	CABLE ASSEMBLY, RADIO FREQUENCY CG-2437/TTC (2 REQUIRED)	5995-00-916-2252	
24	L,D	CABLE ASSEMBLY, RADIO FREQUENCY CG-2438/TTC (2 REQUIRED)	5995-00-913-0510	
25	L,D	CABLE ASSEMBLY, RADIO FREQUENCY CG-1040B/U (4 REQUIRED)	5995-00-913-0509	
26	O,L,D	ADAPTER, CABLE ASSEMBLY CX-10734/G (4 REQUIRED)	5995-00-133-9125	
27	L,D	HOLDING FIXTURE, RESTORER, (RATHEON P/N USA 13258008)		
28	L,D	STRAPPING TOOL PNEUMATIC, (SIGNODE PNSC-58)		
29	L,D	AIR LINE FILTER, PRESSURE REGULATOR AND LUBRICATOR ASSY, (SIGNODE P-8559)		
30	L,D	PRESSURE TEST GAUGE, 0-15 PSI, WEKSLER INSTR. TA1-4		
31	L,D	THICKNESS FEELER GAUGE, 0.005" STANDARD		
32	L,D	BENCH-TOP REPAIR FACILITY FOR CIRCUIT CARD ASSEMBLIES, PADE PRC-150A		
33	D	LIGHT ASSEMBLY, ELECTRIC MX-1292/PAQ	6695-00-378-5449	
34	O,F,L,D	TOOL EQUIPMENT TD-123 OR TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-408-1881 51	

Section XVI. REMARKS RESTORER, PULSE FORM TD-206B/G

REFERENCE CODE	REMARKS
A	VISUAL INSPECTION AND EQUIPMENT OPERATION.
B	METER TEST AND EQUIPMENT OPERATION.
C	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.

Section XVII. MAINTENANCE ALLOCATION CHART
FOR
MULTIPLEXER TD-352/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	MULTIPLEXER TD-352/U	Inspect		0.2					A
		Test		0.5					B
		Test			0.5			3 thru 6,8,9	C
		Test				1.0		1 thru 7,9 13 thru 17 thru 7,9 13 thru 17	D
		Service	0.3						A
		Service		0.5				10	
		Adjust		0.4					E
		Adjust			0.5			3 thru 6,8	F
		Adjust					0.5		
		Repair		0.5				10	H
		Repair			1.0			10,12	I
		Repair				1.0		1 thru 10,12,13,17	D
		Overhaul					20.0		J
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test			0.5			3,4,5,9	K
		Test				1.0		1,3,4,5,9,13,17	D
		Replace		0.5				10	
		Repair				1.0		1,3,4,5,9,11,12,13,17	D
0101	CIRCUIT CARD ASSY (A1A1)	Inspect				0.3			D
		Test					1.0		D
		Replace				0.5		11	D
		Repair					1.0	11	
0102	CIRCUIT CARD ASSY (A1A2)	Inspect				0.3			D
		Test					1.0		
		Replace				0.5		11	D
		Repair					1.0	11	
02	POWER SUPPLY (A19)	Inspect		0.2					
		Test			0.5			3,4,5,9	K
		Test				1.0		1,3,4,5,9,13,17	D
		Replace		0.5				10	
		Repair				1.0		1,3,4,5,9,11,12,13,17	D
03	CIRCUIT CARD ASSY (A2) (A2A)*	Inspect		0.2					
		Test			0.5			5,6	L
		Test				1.0		1,3,5,6,9,13,17	D
		Adjust			0.5			5	L
		Replace		0.3				10	
	*A2A not repairable	Repair *				1.0		11,12	D,P
04	CIRCUIT CARD ASSY (A3)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
05	CIRCUIT CARD ASSY (A5)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
06	CIRCUIT CARD ASSY (A6), (A6A)	Inspect		0.2					
		Test			0.5			3,5,6,8	M
		Test				1.0		1,3,5,6,8,9,13,17	D
		Adjust			0.5			5,8	N
		Adjust				5.0		5,8	D,G
		Replace		0.3				10	
	*A6A not repairable	Repair*				1.0		11,12	D,P
07	CIRCUIT CARD ASSY (A7)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
08	CIRCUIT CARD ASSY (A8)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
09	CIRCUIT CARD ASSY (A9)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
10	CIRCUIT CARD ASSY (A10)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
11	CIRCUIT CARD ASSY (A11)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
12	CIRCUIT CARD ASSY (A12)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
13	CIRCUIT CARD ASSY (A13)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
14	CIRCUIT CARD ASSY (A14)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
15	CIRCUIT CARD ASSY (A15)	Inspect		0.2					
		Test			0.5			5,6	L
		Test				1.0		1,3,5,6,9,13,17	D
		Adjust			0.5			5,6	O
		Replace		0.3				10	
		Repair				1.0		11,12	D
16	CIRCUIT CARD ASSY (A16)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
17	CIRCUIT CARD ASSY (A17)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
18	CIRCUIT CARD ASSY (A18)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
19	CIRCUIT CARD ASSY (A20)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D

Section XVIII. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MULTIPLEXER TD-352/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	COUNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	F,L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223	6625-00-242-5023	
5	F,L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	6625-00-987-6603	
6	F,L,D	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
7	L,D	SPECTRUM ANALYZER TS-723/U	6625-00-668-9418	
8	F,L,D	TEST PANEL, CODER/DECODER	5805-00-057-7801	
9	F,L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
10	O	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
11	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
12	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	51	
13	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
14	L,D	VOLTMETER TS-443/U	6625-00-193-7187	
15	L,D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-870-2264	
16	L,D	VOLTMETER ME-30/U	6625-00-643-1670	
17	L,D	CONVERTER CV-1548/G (SHOP SUPPORT, 2 EA REQUIRED)	5805-00-069-8795	

SECTION XIX. REMARKS MULTIPLEXER TD-352/U

REFERENCE CODE	REMARKS
A	PREVENTIVE MAINTENANCE.
B	CODER, DECODER, POWER SUPPLY.
C	PAM, COMMON LEVEL POWER SUPPLY, CHASSIS PARTS.
D	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
E	CODER, DECODER - USE BUILT-IN FACILITIES.
F	PAM, COMMON LEVEL COMPRESSOR.
G	PHASE, 5.2 V.
H	REPAIR BY REPLACEMENT OF CARD ASSEMBLIES.
I	POWER SUPPLY EXCEPT PCB; CHASSIS PARTS EXCEPT 31 PIN CONNECTORS.
J	TOOLS AND TEST EQUIPMENT AS REQUIRED.
K	1A1/2A1, 1A19/2A19 ONLY.
L	PAM LEVEL.
M	PAM REST, COMMON LEVEL, COMPRESSOR LEVEL.
N	COMMON AND COMPRESSOR LEVELS.
O	PAM CENTER ON 1A15 AND 2A15, EVEN CHANNEL PAM ON 1A7.
P	CIRCUIT CARD ASSEMBLIES WITH THE SUFFIX LETTER “A” CONTAIN SILICON SEMICONDUCTORS AND ARE TO BE CONSIDERED NONREPAIRABLE AND RETURNED TO DEPOT FOR FINAL DISPOSITION,

Section XX. MAINTENANCE ALLOCATION CHART FOR MULTIPLEXER TD-353/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	MULTIPLEXER TD-353/U	Inspect		0.2					A
		Test		0.5					B
		Test			0.5			3 thru 6,8,9	C
		Test				1.0		1 thru 7,9, 13 thru 17	D
		Service	0.3						A
		Service		0.5				10	
		Adjust		0.4					E
		Adjust			0.5			3 thru 6,8	F
		Adjust				0.5			D,G
		Repair		0.5				10	G
		Repair			1.0		10,12		I
		Repair				1.0		1 thru 10,12,13,17	D
		Overhaul					20.0		J
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test			0.5			3,4,5,9	K
		Test				1.0		1,3,4,5,9,13,17	D
		Replace		0.5				10	
		Repair				1.0		1,3,4,5,9,11,12,13,17	D
0101	CIRCUIT CARD ASSY (A1A1)	Inspect				0.3			D
		Test					1.0		
		Replace				0.5		11	D
		Repair					1.0	11	
0102	CIRCUIT CARD ASSY (A1A2)	Inspect				0.3			D
		Test					1.0		
		Replace				0.5		11	
		Repair					1.0	11	
02	POWER SUPPLY (A19)	Inspect		0.2					
		Test			0.5			3,4,5,9	K
		Test				1.0		1,3,4,5,9,13,17	D
		Replace		0.5				10	
		Repair				1.0		1,3,4,5,9,11,12,13,17	D
03	CIRCUIT CARD ASSY (A2)	Inspect		0.2					
		Test			0.5			5,6	L
		Test				1.0		1,3,5,6,9,13,17	D
		Adjust			0.5			5	L
		Replace		0.3				10	
		Repair				1.0		11,12	D
04	CIRCUIT CARD ASSY (A3)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
05	CIRCUIT CARD ASSY (A5)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
06	CIRCUIT CARD CARD ASSY(A6),(A6A)	Inspect		0.2					
		Test			0.5			3,5,6,8	M
		Test				1.0		1,3,5,6,8,9,13,17	D
		Adjust			0.5			5,8	N
		Adjust				0.5		5,8	D,G
		Replace		0.3				10	
	*A6A not repairable	Repair *				1.0		11,12	D,P
07	CIRCUIT CARD ASSY (A7)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
08	CIRCUIT CARD ASSY (A8)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
09	CIRCUIT CARD ASSY (A9)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
10	CIRCUIT CARD ASSY (A10)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
11	CIRCUIT CARD ASSY (A11)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
12	CIRCUIT CARD ASSY (A12)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
13	CIRCUIT CARD ASSY (A13)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
14	CIRCUIT CARD A (A14)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	
15	CIRCUIT CARD ASSY (A15)	Inspect		0.2					
		Test			0.5			5,6	L
		Test				1.0		1,3,5,6,9,13,17	D
		Adjust			0.5			5,6	O
		Replace		0.3				10	
		Repair				1.0		11,12	D
16	CIRCUIT CARD ASSY (A16)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
17	CIRCUIT CARD ASSY (A17)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
18	CIRCUIT CARD ASSY (A18)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.0		11,12	D
19	CIRCUIT CARD ASSY (A20)	Inspect		0.2					
		Test				1.0		1,3,5,6,9,13,17	D
		Replace		0.3				10	
		Repair				1.9		11,12	D

Section XXI. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MULTIPLEXER TD-353/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	COUNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	F,L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-242-5023	
5	F,L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	6625-00-987-6603	
6	F,L,D,	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
7	L,D	SPECTRUM ANALYZER TS-723/U	6625-00-668-9418	
8	F,L,D	TEST PANEL, CODER/DECODER	5805-00-057-7801	
9	F,L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
10	0	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
11	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	51	
12	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
13	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
14	L,D	VOLTMETER TS-443/U	6625-00-193-7187	
15	L,D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-870-2264	
16	L,D	VOLTMETER ME-30/U	6625-00-643-1670	
17	L,D	CONVERTER CV1548/G (SHOP SUPPORT, 2 EA REQUIRED)	5805-00-069-8795	

SECTION XXII. REMARKS MULTIPLEXER TD/353/U

REFERENCE CODE	REMARKS
A	PREVENTIVE MAINTENANCE.
B	CODER, DECODER, POWER SUPPLY.
C	PAM, COMMON LEVEL POWER SUPPLY, CHASSIS PARTS.
D	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
E	CODER, DECODER - USE BUILT-IN FACILITIES.
F	PAM, COMMON LEVEL COMPRESSOR.
G	PHASE ,5.2 V.
H	REPAIR BY REPLACEMENT OF CARD ASSEMBLIES.
I	POWER SUPPLY EXCEPT PCB; CHASSIS PARTS EXCEPT 31 PIN CONNECTORS.
J	TOOLS AND TEST EQUIPMENT AS REQUIRED.
K	1A1/2A1, 1A19/2A19 ONLY.
L	PAM LEVEL.
M	PAM REST, COMMON LEVEL, COMPRESSOR LEVEL.
N	COMMON AND COMPRESSOR LEVELS.
O	PAM CENTER ON 1A15 AND 2A15, EVEN CHANNEL PAM ON 1A7.
P	CIRCUIT CARD ASSEMBLIES WITH THE SUFFIX LETTER “A” CONTAIN SILICON SEMICONDUCTORS AND ARE TO BE CONSIDERED NONREPAIRABLE AND RETURNED TO DEPOT FOR FINAL DISPOSITION.

SECTION XXIII. MAINTENANCE ALLOCATION CHART
FOR
CONVERTER, TELEPHONE SIGNAL CV-1548/G and CV-1548A/G

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H L	D		
00	CONVERTER, TELEPHONE SIGNAL CV-1548/G and CV-1548A/G	Inspect		0.2					A
		Test		0.3					B
		Test			0.4			4,7,11,17	C
		Test				1.0		1 thru 10,15,16,17	D
		Service		0.3				12	A
		Adjust			0.5			17	E
		Repair		0.5				12	F
		Repair			0.5			13	G
		Repair				0.5		13,14	D
		Overhaul					20.0	1 thru 17	
01	POWER SUPPLY (A1)	Inspect		0.2					
		Test			0.5			4,7,11,17	H
		Test				1.0		1,3 thru 10,15,16,17	D
		Replace		0.3				12	F
		Repair			0.5			14	I
		Repair				0.5		13,14	D
0101	CIRCUIT CARD ASSY (A1A1)	Inspect			0.3				
		Test				0.5		1,3 thru 10,15,16,17	D
		Replace			0.5			12	
		Repair				1.0		13,14	D
02	CIRCUIT CARD ASSY (A2)	Inspect		0.2					
		Test				1.0		1,3 thru 10,15,16,17	D
		Replace		0.3				12	
		Repair				1.0		13,14	D
03	CIRCUIT CARD ASSY (A3A,B)	Inspect		0.2					
		Test				1.0		1,3 thru 10,15,16,17	D
		Replace		0.3				12	
		Repair				1.0		13,14	D
04	CIRCUIT CARD ASSY (A4)	Inspect		0.2					
		Test				1.0		1,3 thru 10,15,16,17	D
		Replace		0.3				12	
		Repair				1.0		13,14	D

Section XXIV. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
CONVERTER, TELEPHONE SIGNAL CV-1548/G AND CV-1548A/G

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	L,D	UNTER ELECTRICAL, DIGITAL READOUT AN/USM-207	6625-00-911-6368	
2	L,D	MULTIMETER ME-26/U	6625-00-646-9409	
3	F,L,D	METER, AUDIO LEVEL ME-22/U	6625-00-498-3469	
4	O,F,L,D	MULTIMETER TS-352B/U (WILL BE REPLACED BY AN/USM-223)	6625-00-242-5023	
5	L,D	OSCILLATOR, AUDIO TS-421A/U	6625-00-669-0228	
6	F,L,D	OSCILLOSCOPE AN/USM-140 (INCD DELAY SWEEP)	5625-00-987-6603	
7	F,L,D	SIGNAL GENERATOR SG-71/FCC	6625-00-669-0255	
8	L,D	SPECTRUM ANALYZER TS-723/U	6625-00-668-9418	
9	F,L,D	TEST PANEL, CODER/DECODER	5805-00-057-7801	
10	L,D	TEST SET TS-140/PCM	6625-00-243-4888	
11	F,L,D	TEST SET, TRANSISTOR TS-1836/U	6625-00-893-2628	
12	O	TOOL EQUIPMENT TE-123	5180-00-408-1881	
		OR		
		TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
13	L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
14	F,L,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
15	L,D	TRANSMISSION TEST SET TS-762/U	6625-00-519-2629	
16	L,D	VOLTMETER TS-443/U	6625-00-192-7183	
17	F,L,D	VOLTMETER, ME-30/U	6625-00-669-0742	

Section XXV. REMARKS

REFERENCE CODE	REMARKS
A	PREVENTIVE MAINTENANCE.
B	FAULT LOCATIONS USING BUILT-IN FACILITIES.
C	1600 CYCLE, POWER SUPPLY, CHASSIS PARTS.
D	TO BE PERFORMED BY SPECIALIZED REPAIR ACTIVITY (SRA) OR HIGHER.
E	1600 CYCLE, REFERENCE VOLTAGE.
F	REPAIR BY REPLACEMENT OF CIRCUIT CARD ASSEMBLIES.
G	POWER SUPPLY EXCEPT PCB: CHASSIS PARTS EXCEPT 31 PIN CONNECTORS.
H	POWER SUPPLY.
I	18A1 EXCEPT PCB.

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists additional items you are authorized for the support of the CV-1548/U and CV-1548/U.

D-2.

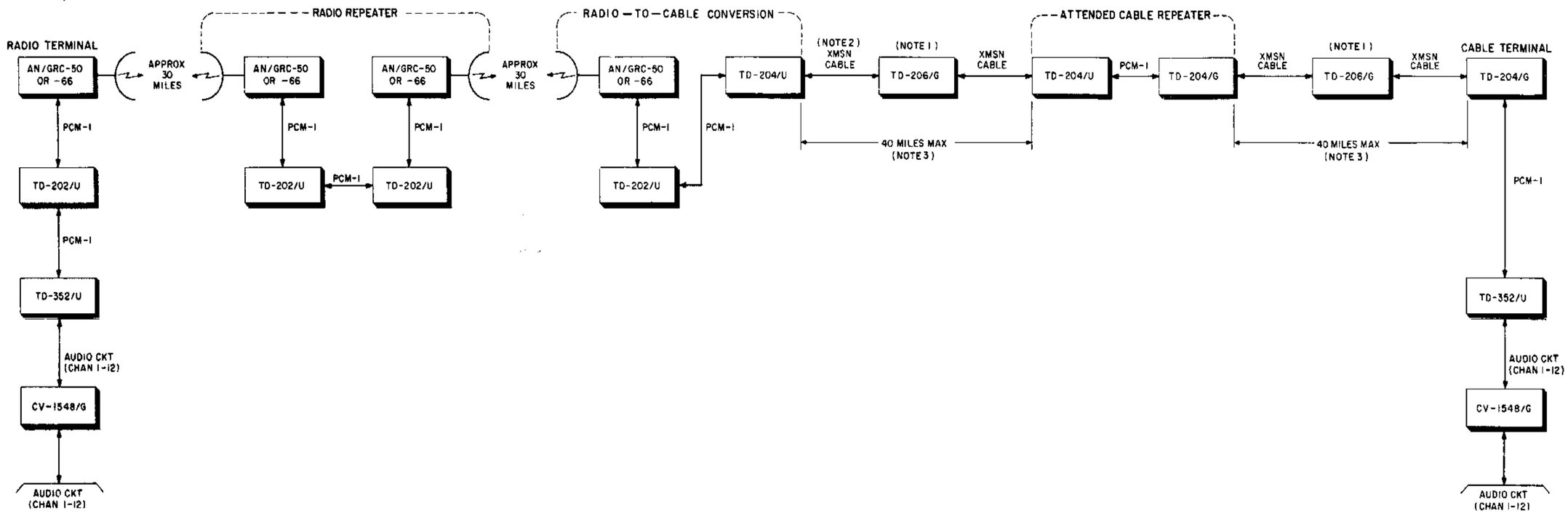
This list identifies items that do not have to accompany the CV-1548/U and CV-1548A/U and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. Explanation of Listing

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
5805-00-859-8436	COVER, FRONT (OUTER) SMC-528566-1, 80063		EA	1

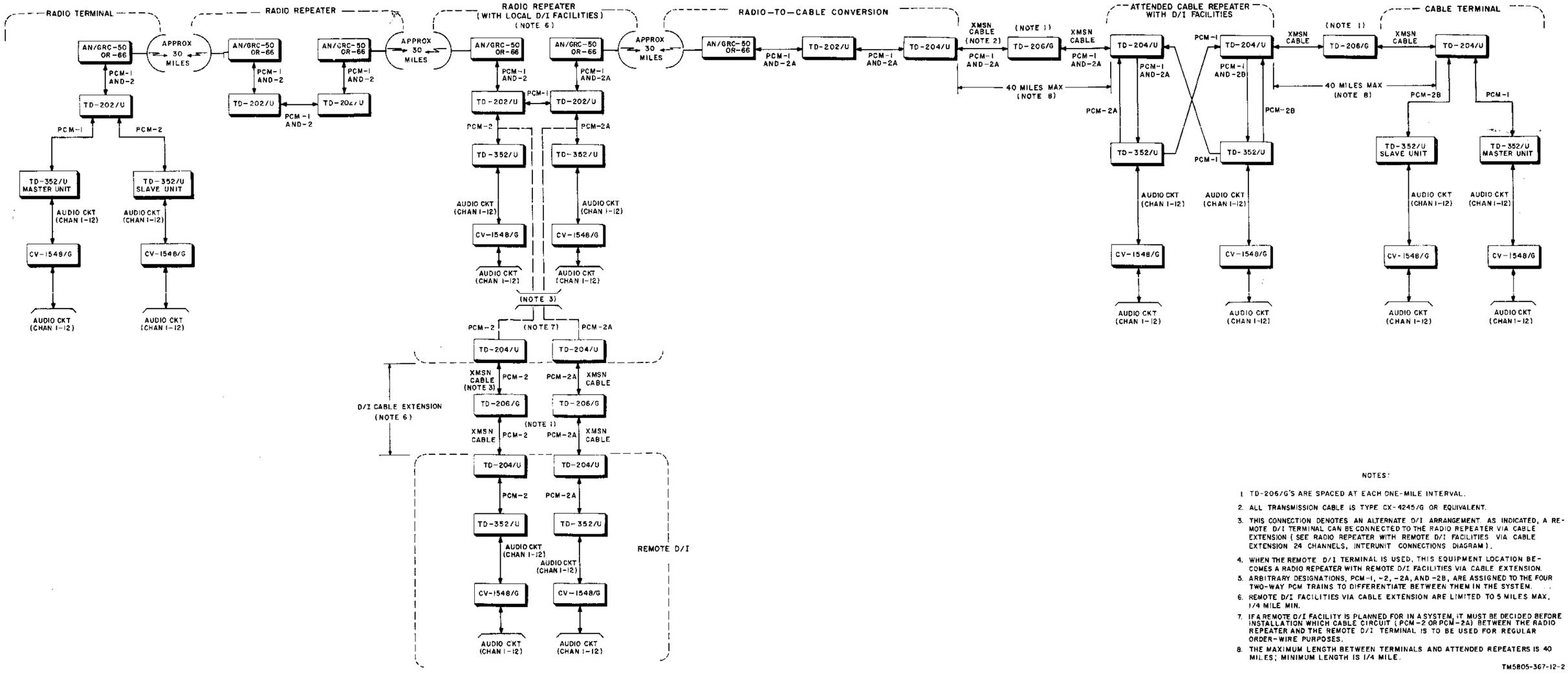


NOTES:

1. TD-206/G'S ARE SPACED AT EACH ONE-MILE INTERVAL.
2. ALL TRANSMISSION CABLE IS TYPE CX-4245/G OR EQUIVALENT.
3. THE MAXIMUM LENGTH BETWEEN TERMINALS AND ATTENDED REPEATERS IS 40 MILES; MINIMUM LENGTH IS 1/4 MILE.

TM5805-367-12-1

Figure 6-1. Typical 12-channel pcm system.



NOTES:

1. TD-206/G'S ARE SPACED AT EACH ONE-MILE INTERVAL.
2. ALL TRANSMISSION CABLE IS TYPE CX-4245/G OR EQUIVALENT.
3. THIS CONNECTION DENOTES AN ALTERNATE D/I ARRANGEMENT. AS INDICATED, A REMOTE D/I TERMINAL CAN BE CONNECTED TO THE RADIO REPEATER VIA CABLE EXTENSION (SEE RADIO REPEATER WITH REMOTE D/I FACILITIES VIA CABLE EXTENSION 24 CHANNELS, INTERUNIT CONNECTIONS DIAGRAM).
4. WHEN THE REMOTE D/I TERMINAL IS USED, THIS EQUIPMENT LOCATION BECOMES A RADIO REPEATER WITH REMOTE D/I FACILITIES VIA CABLE EXTENSION.
5. ARBITRARY DESIGNATIONS, PCM-1, -2, -2A, AND -2B, ARE ASSIGNED TO THE FOUR TWO-WAY PCM TRAINS TO DIFFERENTIATE BETWEEN THEM IN THE SYSTEM.
6. REMOTE D/I FACILITIES VIA CABLE EXTENSION ARE LIMITED TO 5 MILES MAX, 1/4 MILE MIN.
7. IF A REMOTE D/I FACILITY IS PLANNED FOR IN A SYSTEM, IT MUST BE DECIDED BEFORE INSTALLATION WHICH CABLE CIRCUIT (PCM-2 OR PCM-2A) BETWEEN THE RADIO REPEATER AND THE REMOTE D/I TERMINAL IS TO BE USED FOR REGULAR ORDER-WIRE PURPOSES.
8. THE MAXIMUM LENGTH BETWEEN TERMINALS AND ATTENDED REPEATERS IS 40 MILES; MINIMUM LENGTH IS 1/4 MILE.

TM5805-367-12-2

Figure 6-2. Typical 24-channel pcm system.

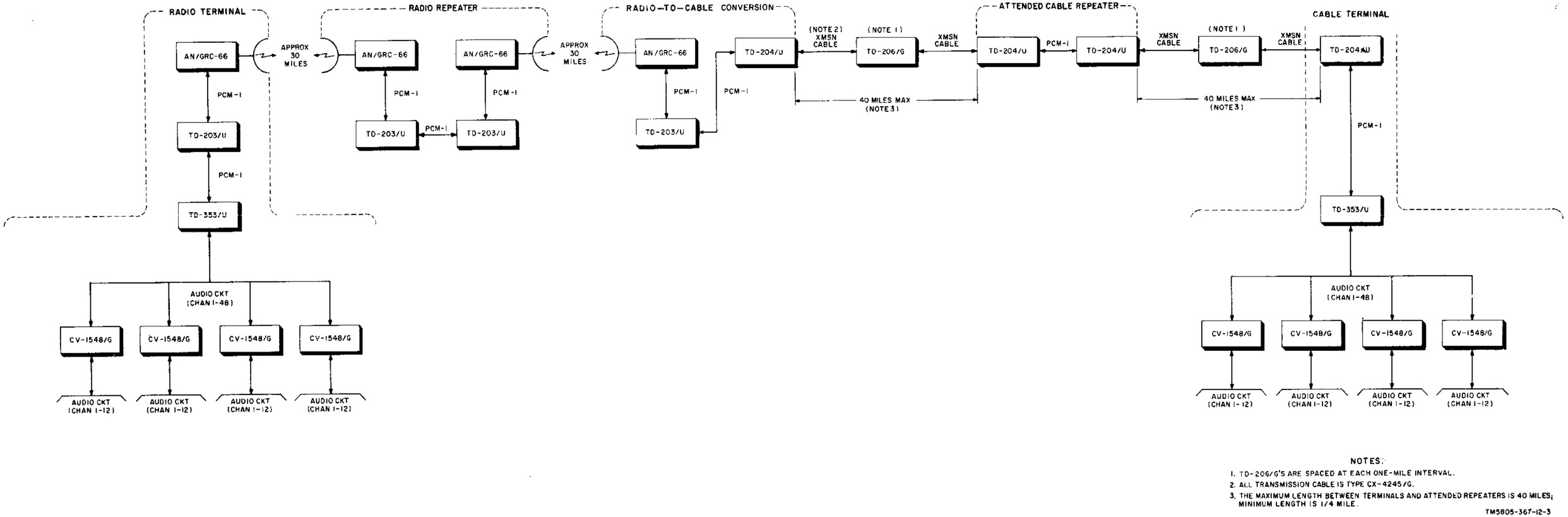
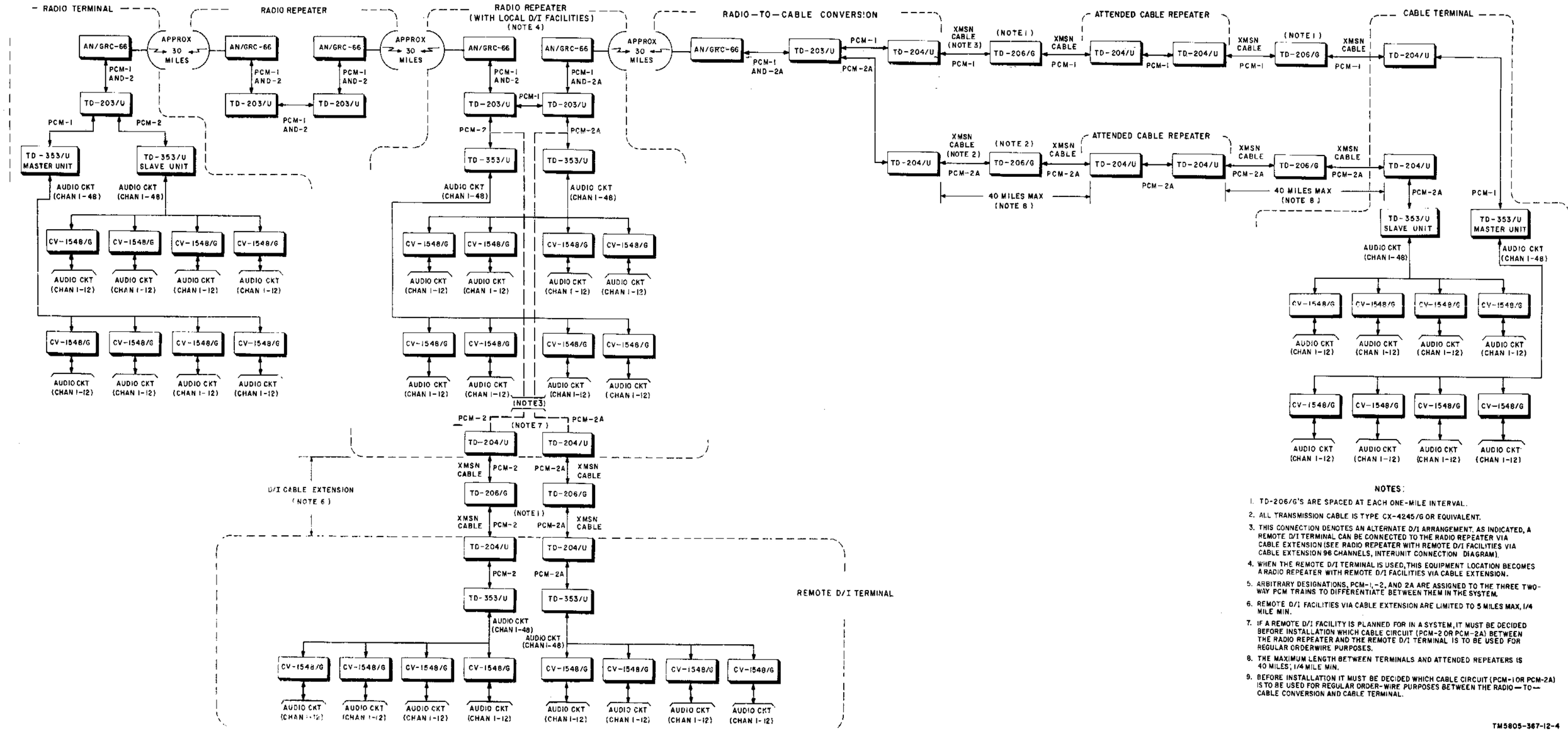


Figure 6-3. Typical 48-channel pcm system.



NOTES:

1. TD-206/G'S ARE SPACED AT EACH ONE-MILE INTERVAL.
2. ALL TRANSMISSION CABLE IS TYPE CX-4245/G OR EQUIVALENT.
3. THIS CONNECTION DENOTES AN ALTERNATE D/I ARRANGEMENT. AS INDICATED, A REMOTE D/I TERMINAL CAN BE CONNECTED TO THE RADIO REPEATER VIA CABLE EXTENSION (SEE RADIO REPEATER WITH REMOTE D/I FACILITIES VIA CABLE EXTENSION 96 CHANNELS, INTERUNIT CONNECTION DIAGRAM).
4. WHEN THE REMOTE D/I TERMINAL IS USED, THIS EQUIPMENT LOCATION BECOMES A RADIO REPEATER WITH REMOTE D/I FACILITIES VIA CABLE EXTENSION.
5. ARBITRARY DESIGNATIONS, PCM-1, -2, AND 2A ARE ASSIGNED TO THE THREE TWO-WAY PCM TRAINS TO DIFFERENTIATE BETWEEN THEM IN THE SYSTEM.
6. REMOTE D/I FACILITIES VIA CABLE EXTENSION ARE LIMITED TO 5 MILES MAX, 1/4 MILE MIN.
7. IF A REMOTE D/I FACILITY IS PLANNED FOR IN A SYSTEM, IT MUST BE DECIDED BEFORE INSTALLATION WHICH CABLE CIRCUIT (PCM-2 OR PCM-2A) BETWEEN THE RADIO REPEATER AND THE REMOTE D/I TERMINAL IS TO BE USED FOR REGULAR ORDERWIRE PURPOSES.
8. THE MAXIMUM LENGTH BETWEEN TERMINALS AND ATTENDED REPEATERS IS 40 MILES; 1/4 MILE MIN.
9. BEFORE INSTALLATION IT MUST BE DECIDED WHICH CABLE CIRCUIT (PCM-1 OR PCM-2A) IS TO BE USED FOR REGULAR ORDER-WIRE PURPOSES BETWEEN THE RADIO—TO—CABLE CONVERSION AND CABLE TERMINAL.

TM5805-367-12-4

Figure 6-4. Typical 96-channel pcm system.

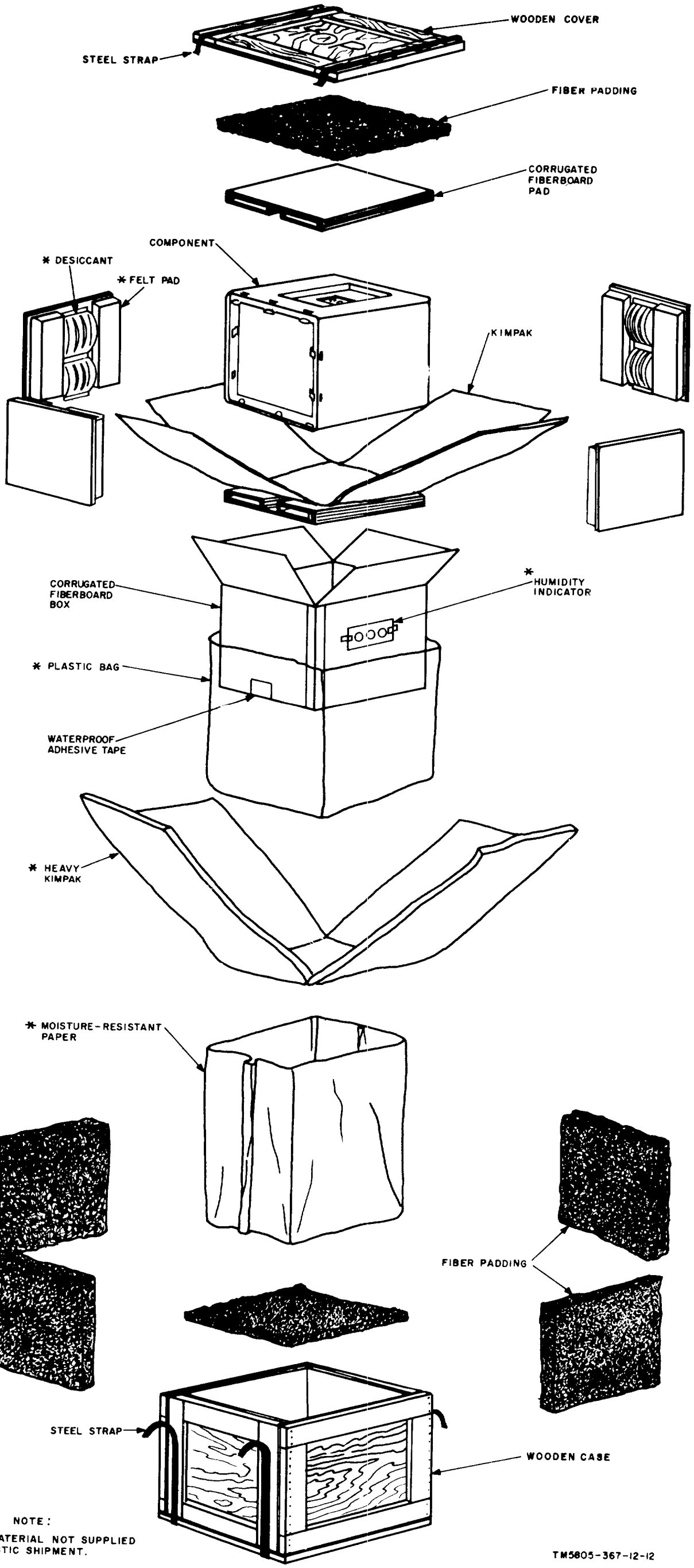


Figure 6-5. Typical packaging diagram.

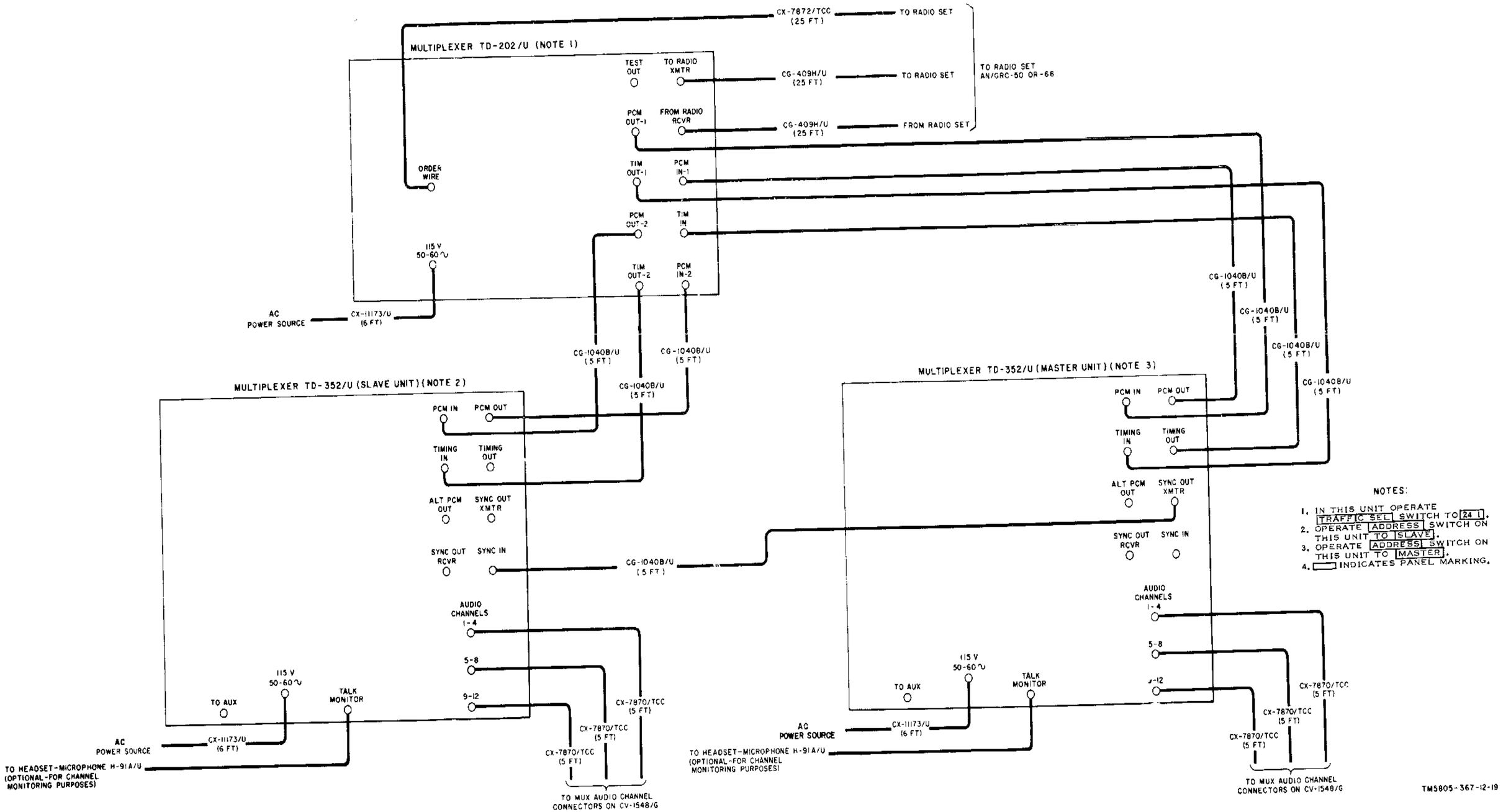


Figure 6–6. Radio terminal, 24 channels, interunit connection diagram.

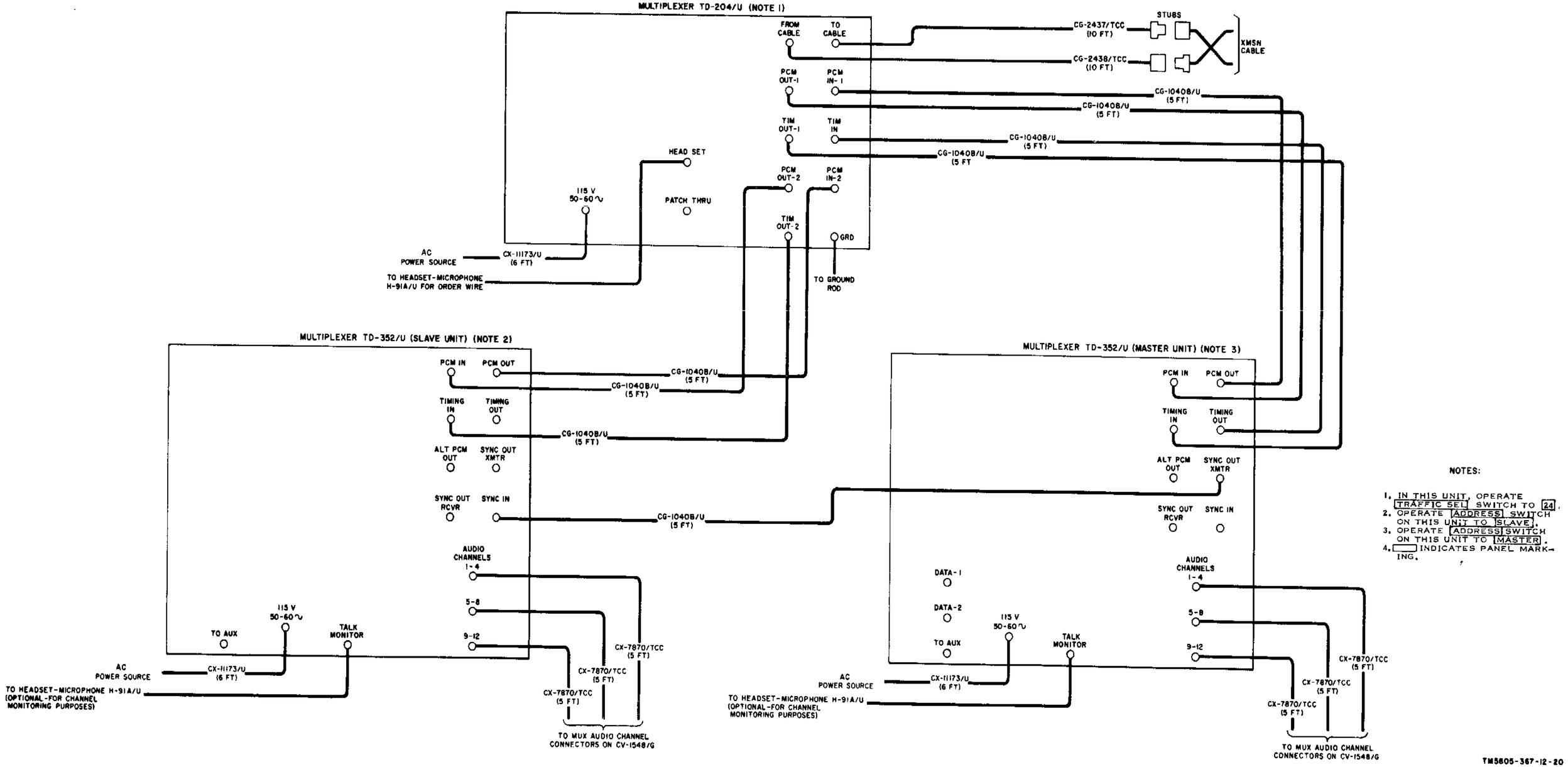


Figure 6-7. Cable terminal, 24 channels, interunit connection diagram.

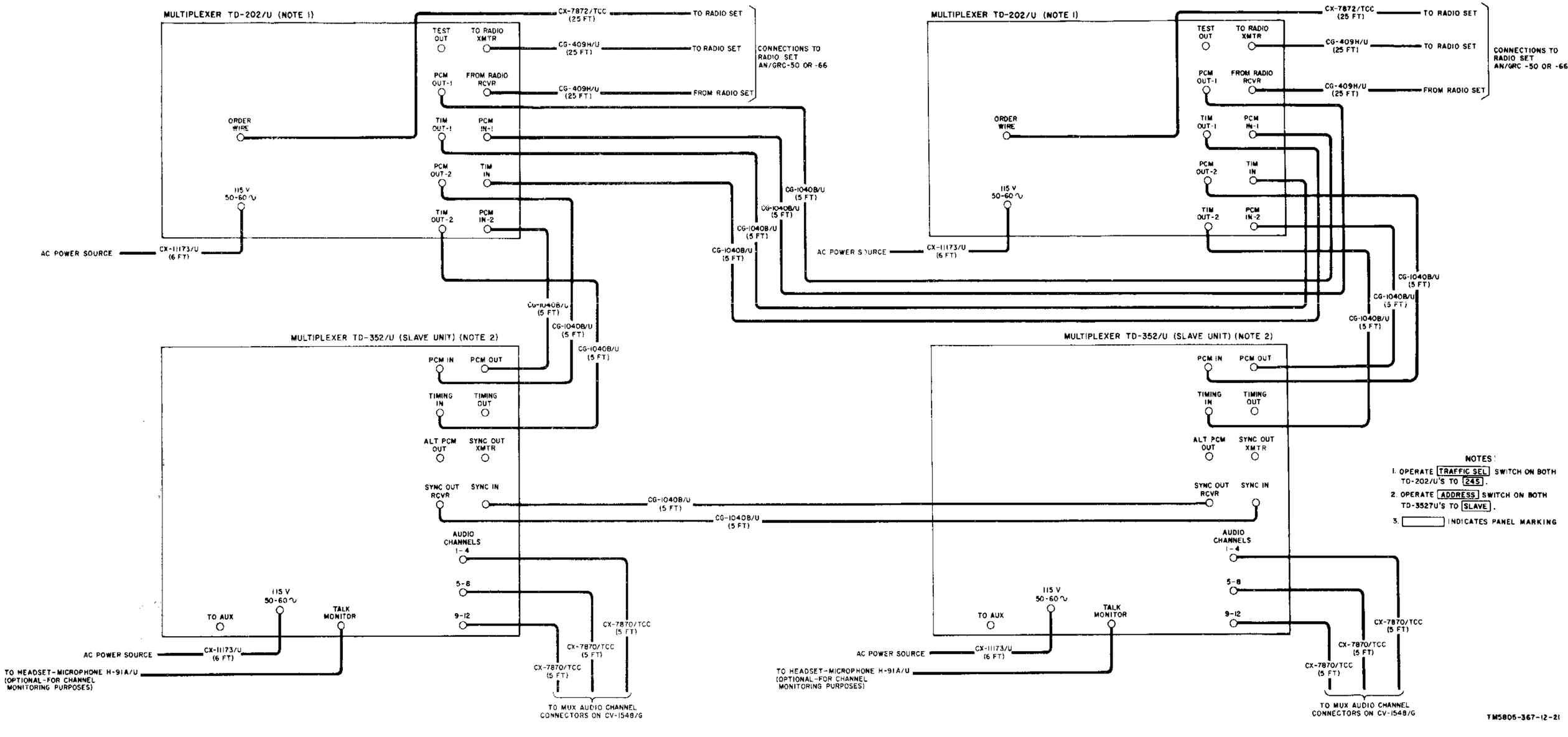


Figure 6-8. Radio repeater with local D/I facilities, 24 channels, interunit connection diagram.

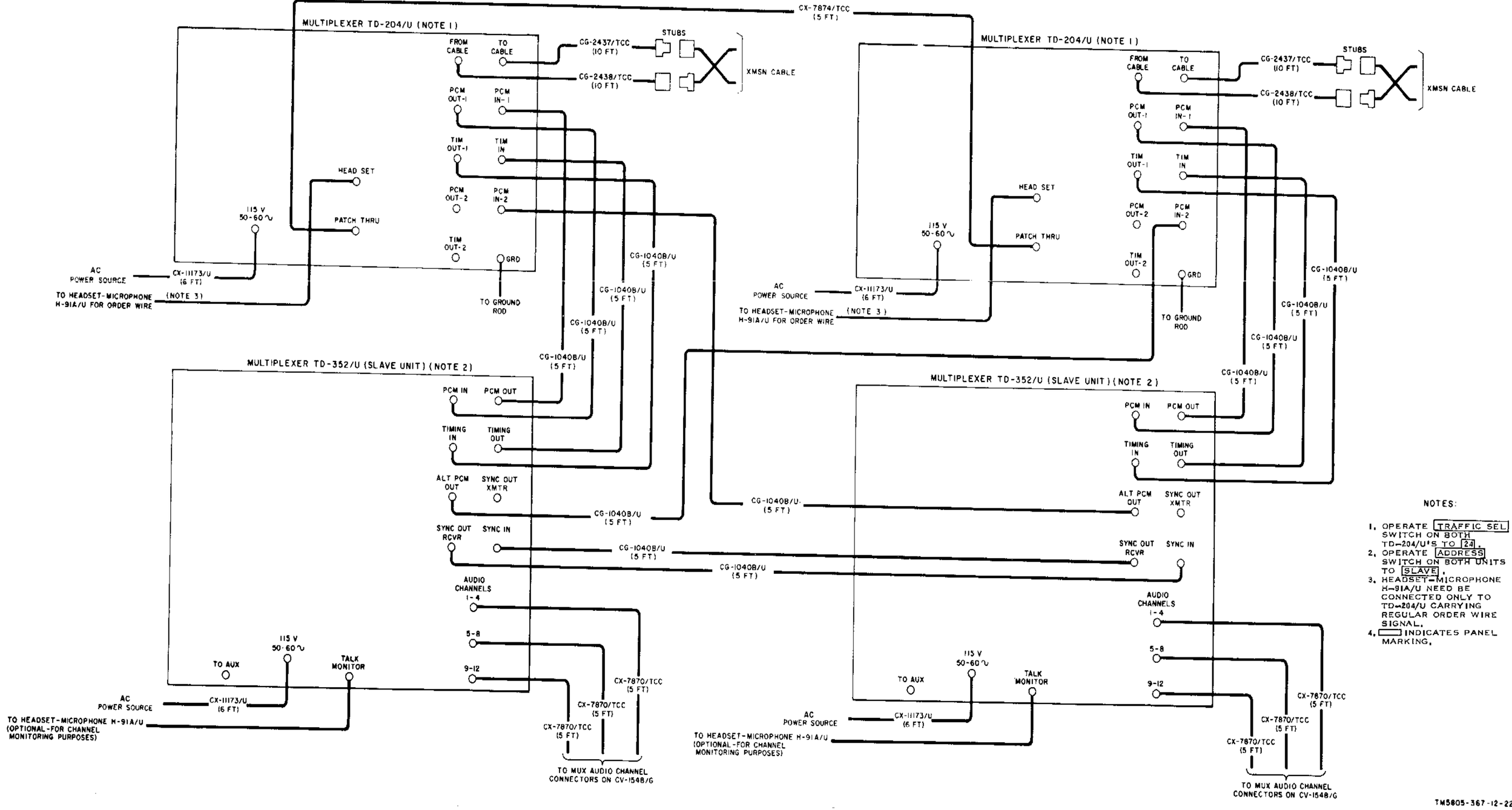


Figure 6-9. Attended cable repeater with D/I facilities, 24-channels, interunit connection diagram.

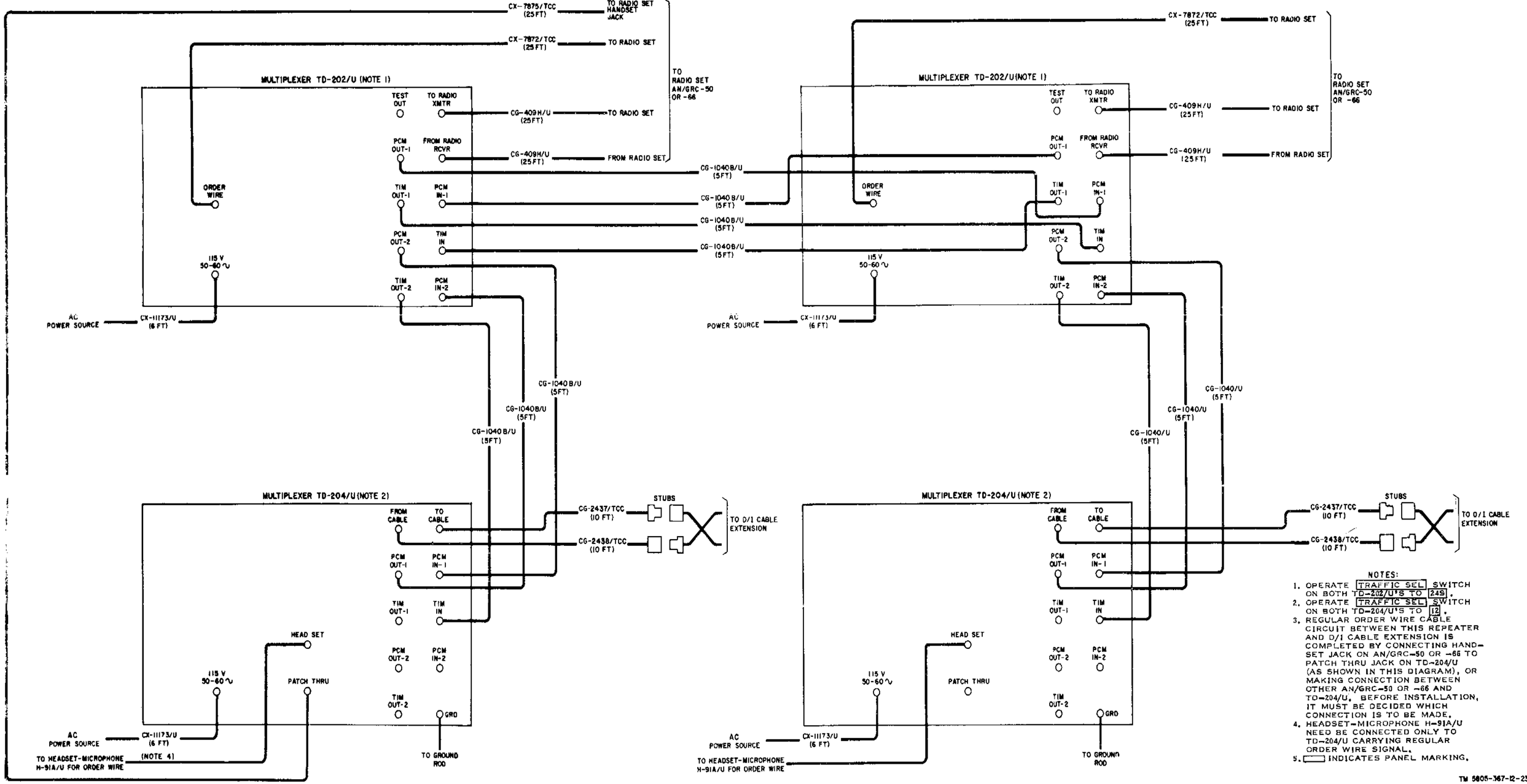


Figure 6-10. Radio repeater with remote D/I facilities via cable extension, 24 channels, interunit connection diagram.

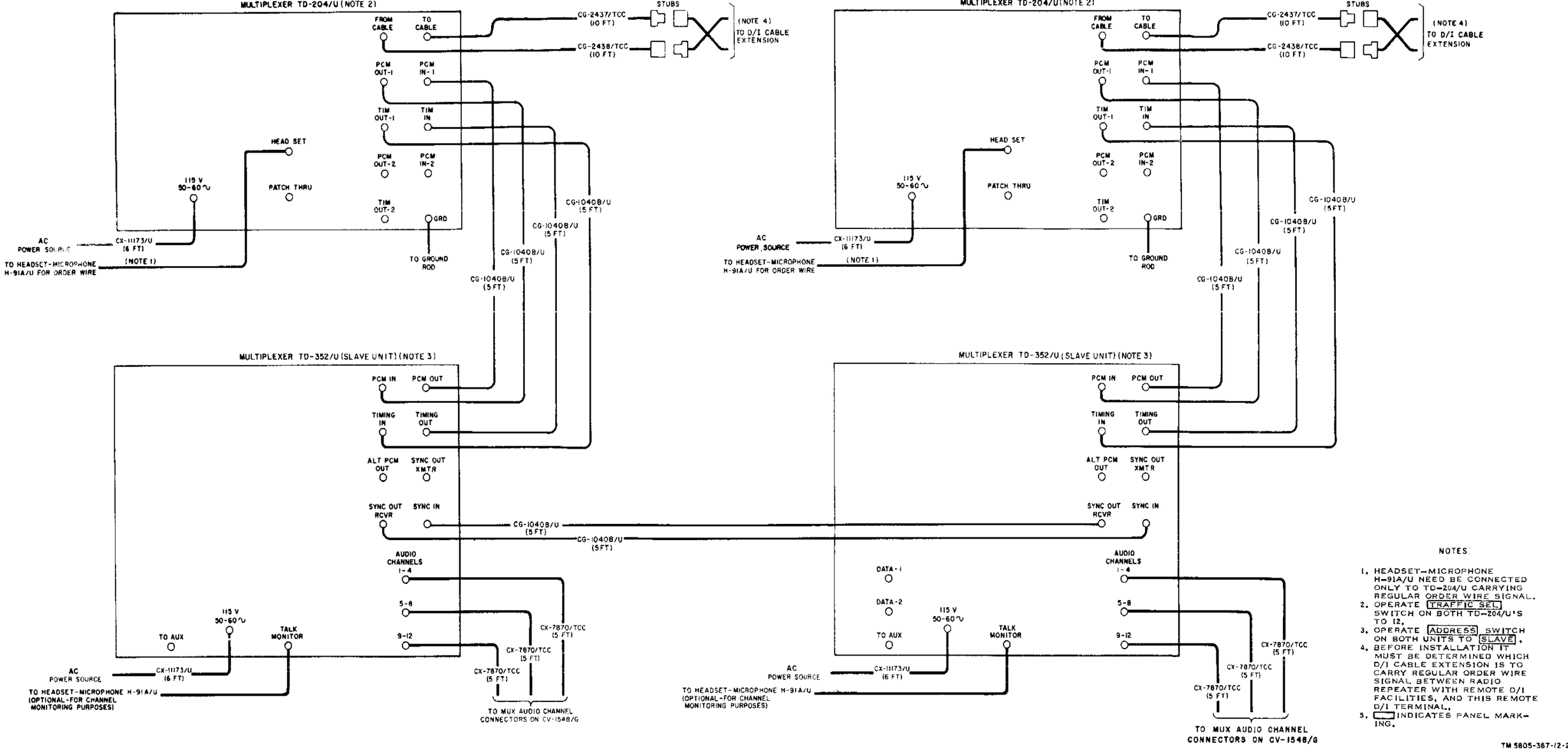


Figure 6–11. Remote D/I terminal, 24 channels, interunit connection diagram.

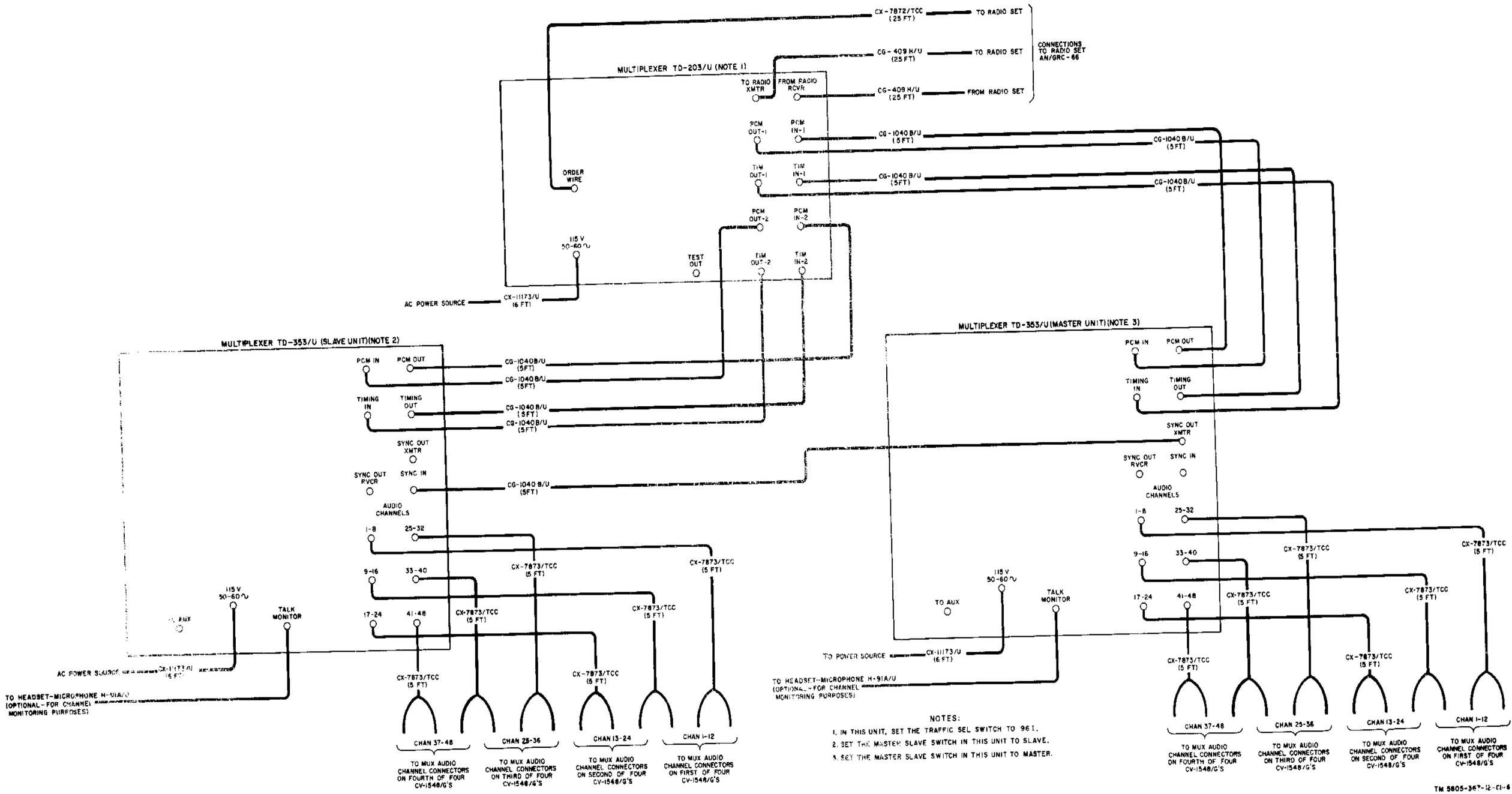


Figure 6-12. Radio terminal, 96 channels, interunit connection diagram.

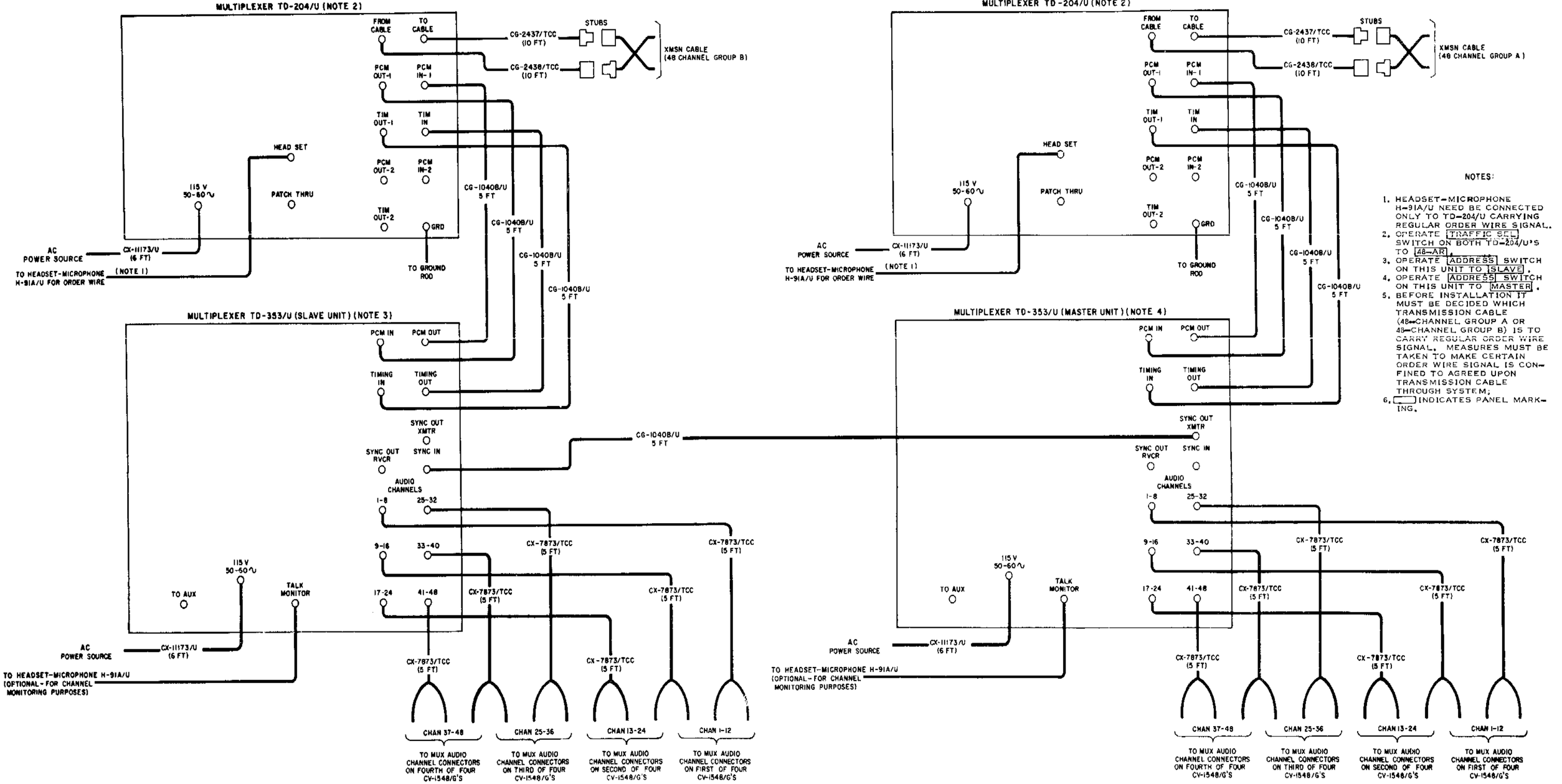


Figure 6-13. Cable terminal, 96 channels, interunit connection diagram.

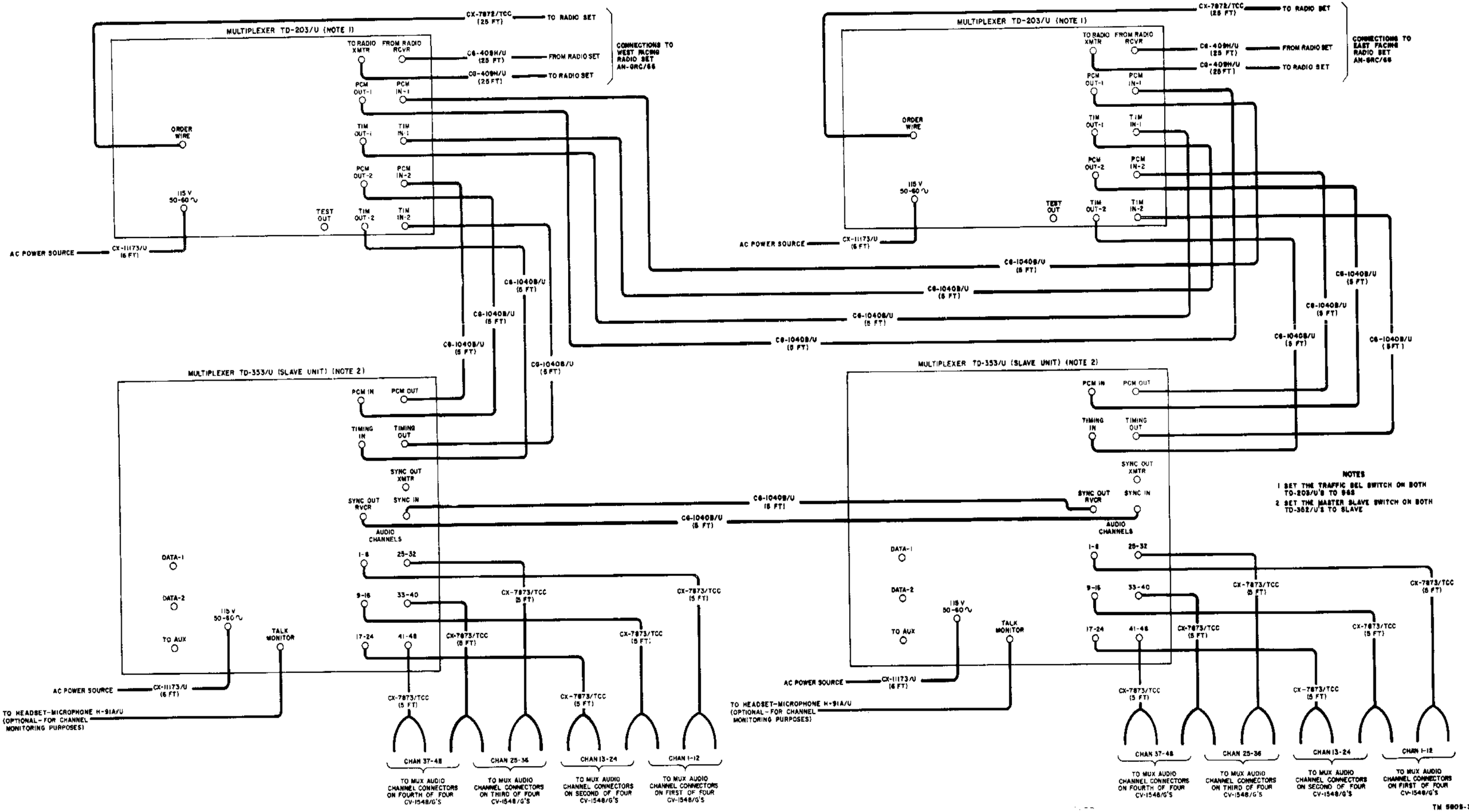


Figure 6–14. Radio repeater with local D/I facilities, 96 channels, interunit connection diagram.

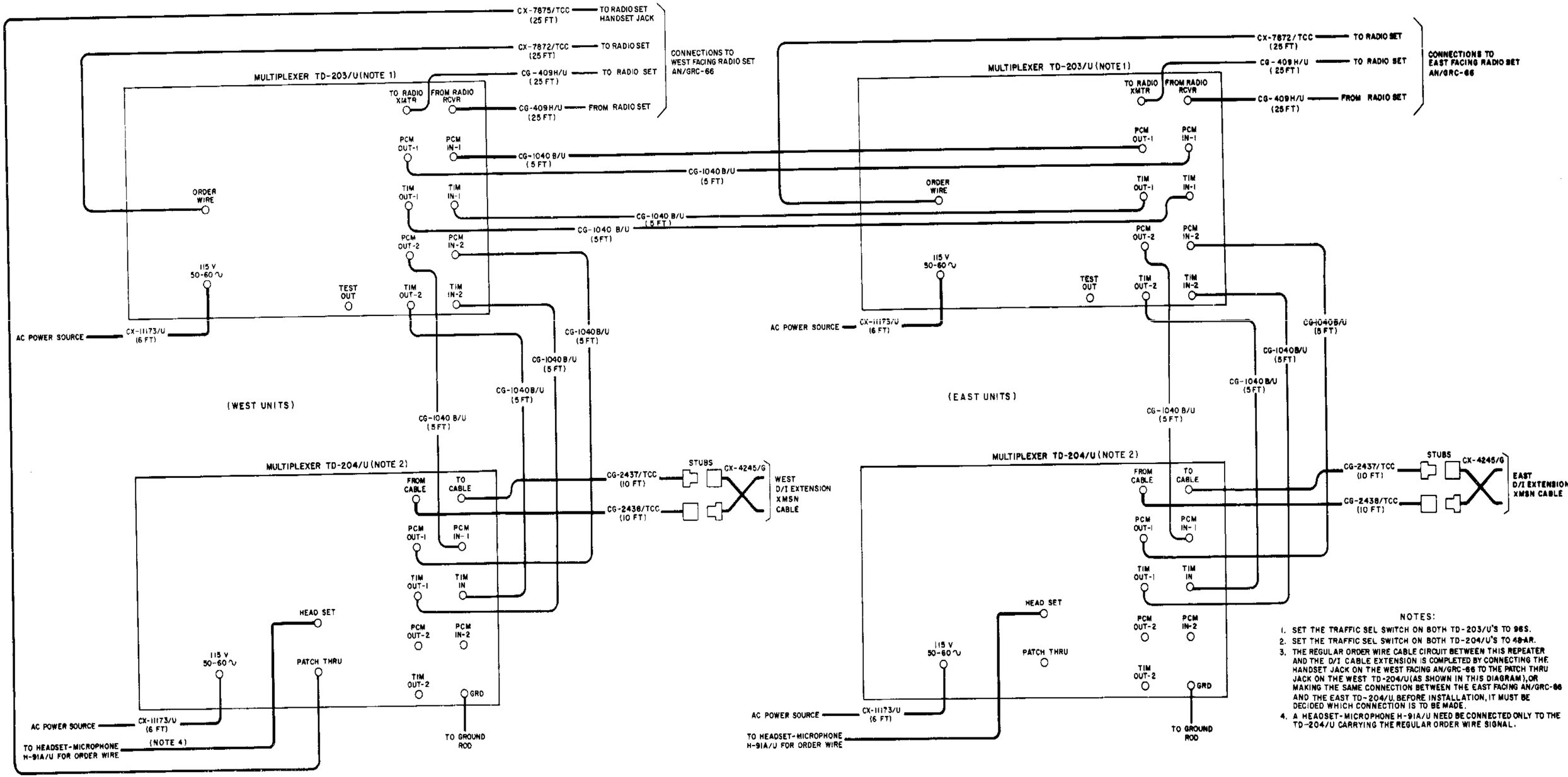


Figure 6-15. Radio repeater with remote D/I facilities via cable extension, 96 channels, intercunit connection diagram.

TM 5805-367-12-CI-6

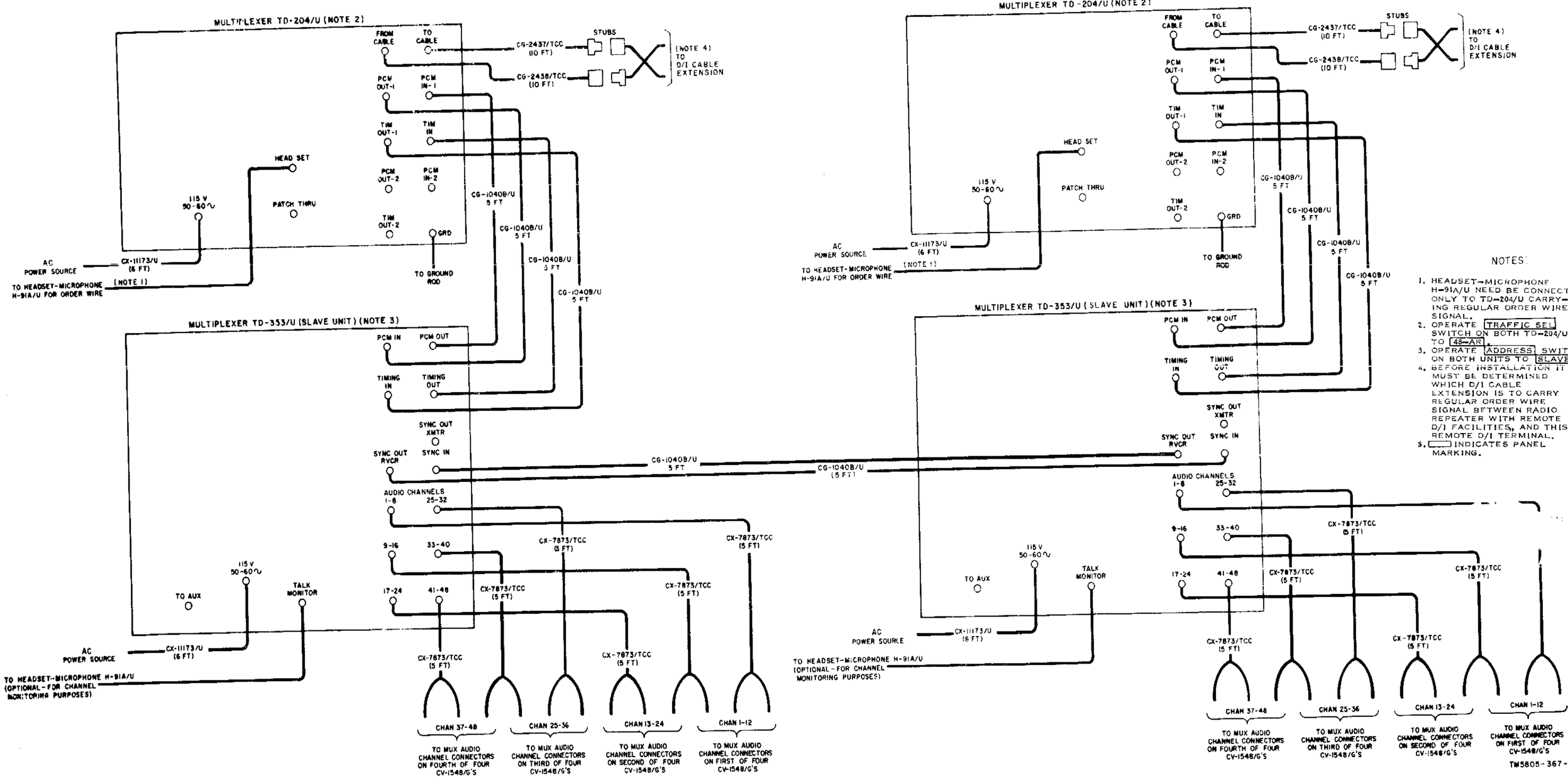
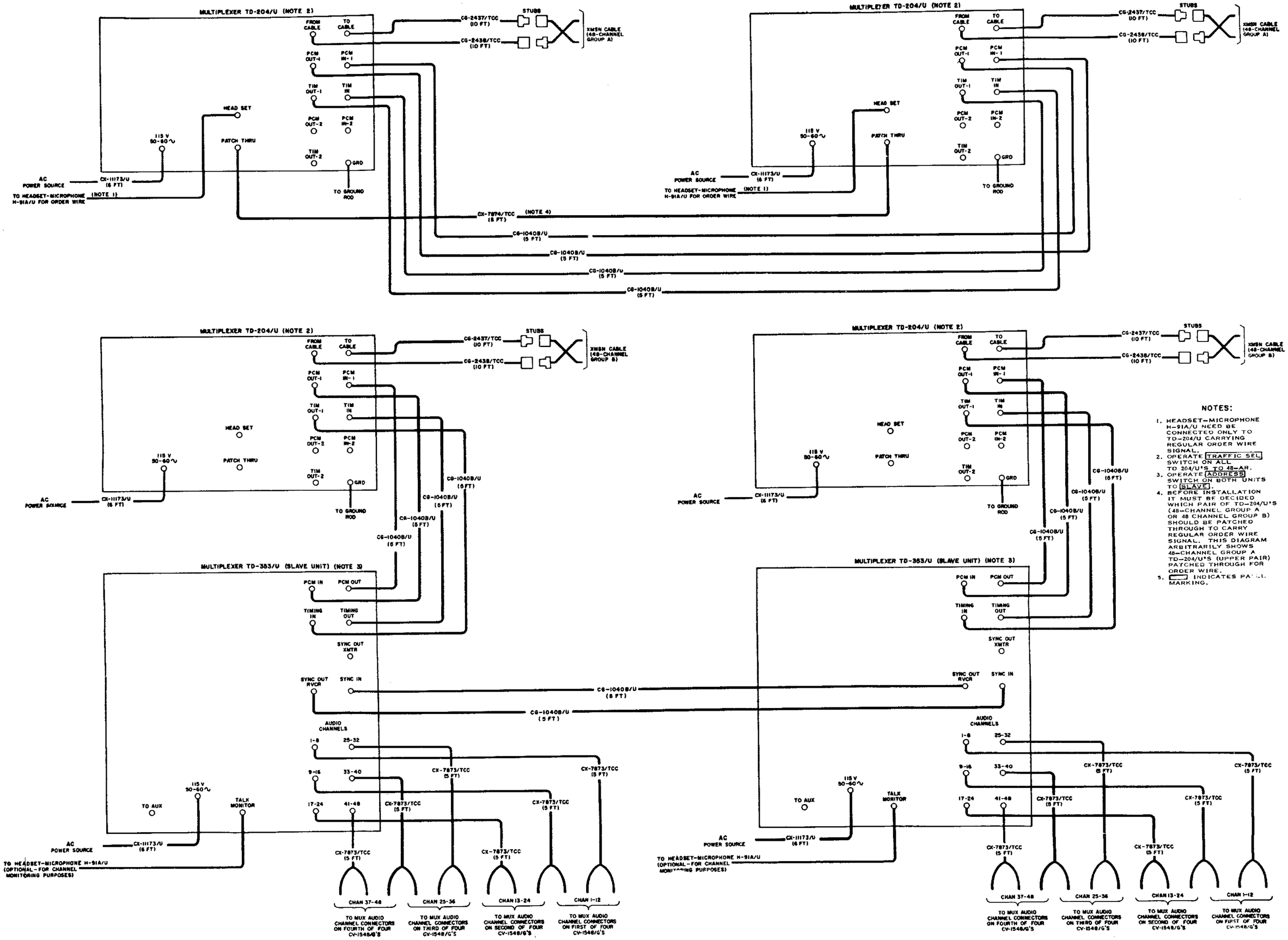


Figure 6-16. Remote D/I terminal, 96 channels, interunit connection diagram.



NOTES:

1. HEADSET-MICROPHONE H-91A/U NEED BE CONNECTED ONLY TO TD-204/U CARRYING REGULAR ORDER WIRE SIGNAL.
2. OPERATE TRAFFIC SEL SWITCH ON ALL TD 204/U'S TO 48-AR.
3. OPERATE ADDRESS SWITCH ON BOTH UNITS TO SLAVE.
4. BEFORE INSTALLATION IT MUST BE DECIDED WHICH PAIR OF TD-204/U'S (48-CHANNEL GROUP A OR 48 CHANNEL GROUP B) SHOULD BE PATCHED THROUGH TO CARRY REGULAR ORDER WIRE SIGNAL. THIS DIAGRAM ARBITRARILY SHOWS 48-CHANNEL GROUP A TD-204/U'S (UPPER PAIR) PATCHED THROUGH FOR ORDER WIRE.
5. ▭ INDICATES PANEL MARKING.

TM5805-367-12-87

Figure 6-17. Attended cable repeater with D/I facilities, 96 channels, interunit connection diagram.

TABLE I. CX-9088/U CABLE-ASSEMBLY WIRE IDENTIFICATION

CX-9088/U TWISTED PAIR	TWISTED-PAIR WIRE IDENTIFICATION	ASSOCIATED CV-1548/G CHANNEL
BLACK BROWN	T (TIP) R (RING)	1,5,OR 9
WHITE BROWN	TRANSMIT TRANSMIT	
BLACK RED	T (TIP) R (RING)	2,6,OR 10
WHITE RED	TRANSMIT TRANSMIT	
BLACK ORANGE	T (TIP) R (RING)	3,7,OR 11
WHITE ORANGE	TRANSMIT TRANSMIT	
BLACK YELLOW	T(TIP) R(RING)	4,8,OR 12
WHITE YELLOW	TRANSMIT TRANSMIT	

TABLE II. CV-1548/G CHANNEL CONNECTIONS TO TELEPHONE LINE CIRCUIT BINDING POSTS

CX-9088/U WIRES (ANY CHANNEL)	SB-86/P SWITCHBOARD REAR BINDING POSTS		AN/TTC-7, BINDING POSTS ON OUTSIDE OF SHELTER			TA-43-/PT OR TA-312/PT BINDING POSTS	4-WIRE VF EQUIPMENT BINDING POSTS
	1-WAY PLUG SUPERVISION TRUNK	MAGNETO LINE	COMMON BATTERY (CB) LINE (TERMINATE)	MANUAL TRUNK (ORIGINATE)	LOCAL BATTERY (LB) LINE		
T(TIP) WIRE	T(TIP)	T(TIP)	R(RING)[C]	A	R(RING)[C]	A	RECEIVE BINDING POST
R(RING) WIRE	R(RING)	R(RING)	T(TIP)[C]	A	T(TIP)[C]	A	RECEIVE BINDING POST
TRANSMIT WIRE	NC[B]	NC	NC	NC	NC	NC	TRANSMIT BINDING POST
TRANSMIT WIRE	NC	NC	NC	NC	NC	NC	TRANSMIT BINDING POST

[A] IN THESE APPLICATIONS, CONNECT THE T(TIP) AND R(RING) WIRES FROM THE CV-1548/G EACH TO ONE BINDING POST. POLARITY NEED NOT BE OBSERVED.

[B] NO CONNECTION

[C] T(TIP) AND R(RING) WIRES MUST BE CONNECTED TO THE BINDING POSTS WITH INVERTED POLARITY AS INDICATED.

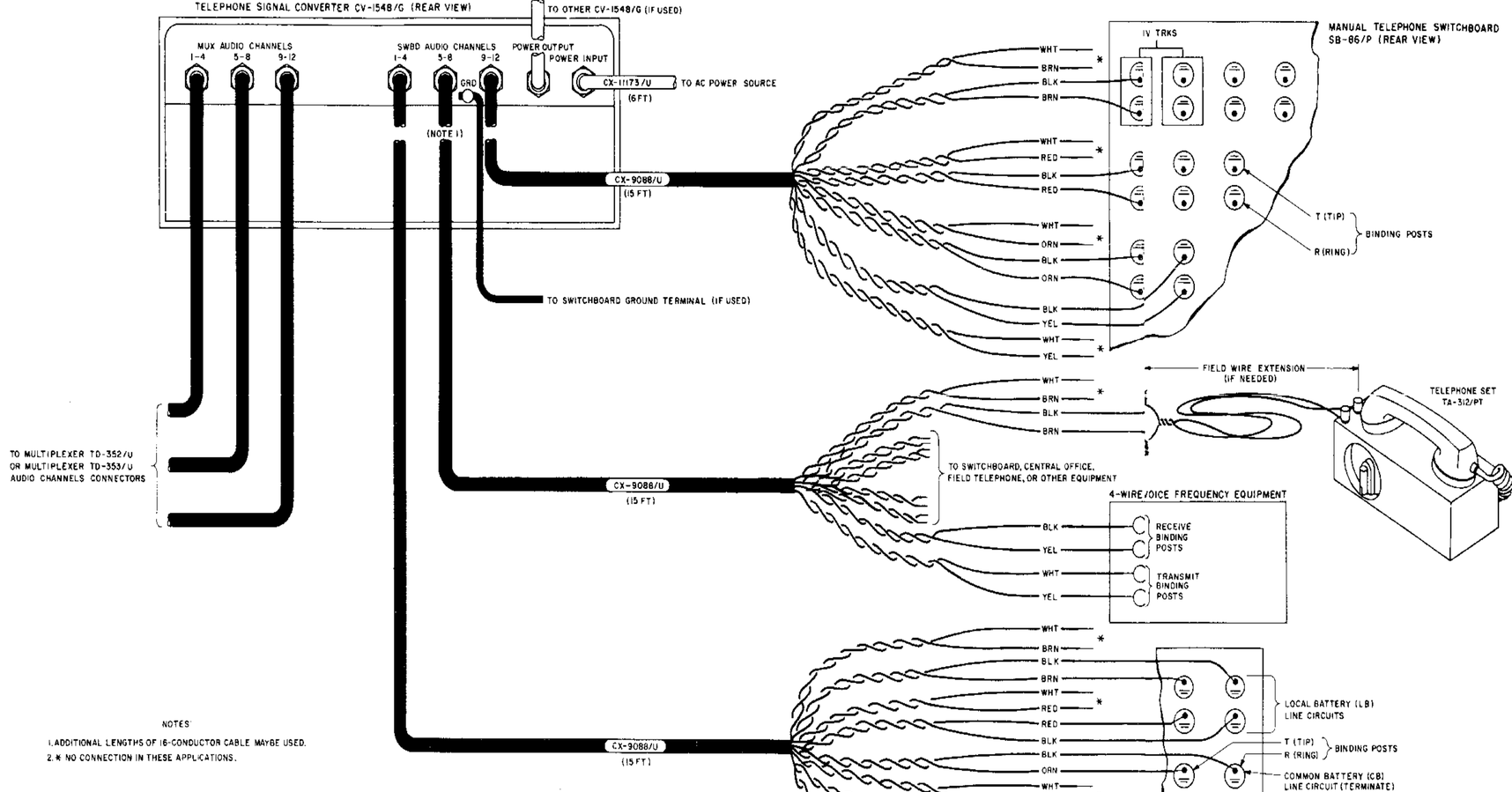


Figure 6-18. Converter, Telephone Signal CV-1548/G, typical interunit connection diagram.

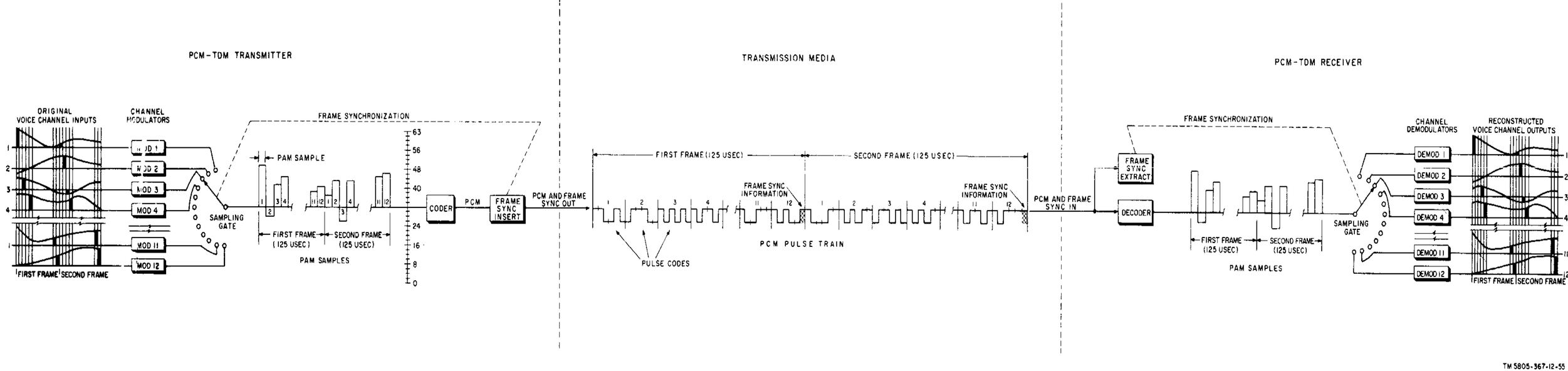
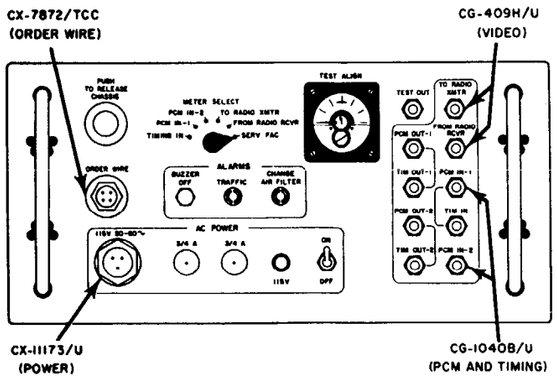


Figure 6-19. Pcm-tdm principle in TD-352/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF TD-202/U IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.



PRELIMINARY PROCEDURES

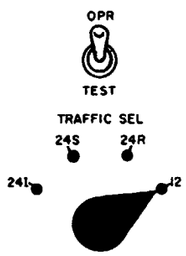
1. Disconnect cables TO RADIO, FROM RADIO and ORDER WIRE between TD-202/U and radio set.

2. Establish radio communications with distant terminal or repeater via radio set order wire, per radio set instructions.

3. Adjust radio set order wire level per radio set instructions.

4. Connect cables between TD-202/U, other PCM equipment, and radio set, per terminal or repeater requirements, as directed in assemblage technical manual.

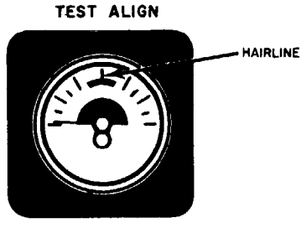
5. Operate switches as follows:



OPR (except when making loop-back checks with connection made between FROM RADIO RCVR and TEST OUT).

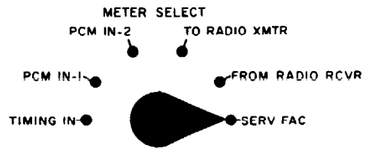
24I- at 24-channel radio terminal
24S- at 24-channel radio repeater with D/I
24R- at 24-channel radio repeater without D/I
12- at all 12-channel terminals or repeaters

TEST ALIGN



OPERATIONAL CHECKS AND ADJUSTMENTS

6. Energize all PCM equipment.



7. Operate METER SELECT switch to following positions and check for green area indications on TEST ALIGN meter:

   TIMING IN
   PCM IN-1
   PCM IN-2 (24-channel operation only)

   Do not continue if proper indications are not obtained. Refer to maintenance manual for necessary corrective action.

8. Operate METER SELECT switch and make following adjustments:
   TO RADIO XMTR
   - ▶ Adjust OL on panel 5A2 for hairline indication on TEST ALIGN meter.
   - ▶ Adjust PCM input level on radio set per radio set instructions.
   - ▶ Instruct operator at next station to adjust RL and CL (step 12 C) on panel 5A3.

   FROM RADIO RCVR
   - ▶ Instruct operator at distant terminal or repeater to adjust OL on panel 5A2 and PCM input level on radio set
   - ▶ Adjust RL on panel 5A3 until TEST ALIGN meter indicates near center of green area.
   - ▶ ADJUST CL (step 12 C) on panel 5A3.

   SERV FAC
   - ▶ This position connects TEST ALIGN meter to SERV SEL switch for use during Order Wire adjustment and for maintenance purposes.

9. ORDER WIRE LEVEL adjustment:

   a. Instruct distant terminal or repeater to turn on radio set TEST TONE, and adjust output to proper level, per radio set instructions.

   b. Operate METER SELECT switch to SERV FAC.

   c. Operate SERV SEL switch to "O".

   d. Adjust ORDER WIRE LEVEL control until TEST ALIGN meter indicates in yellow area. (NOTE: If more than two terminals or repeaters are in system, adjustments must be made sequentially, starting with local terminal or repeater providing TEST TONE and working through to distant terminal.)

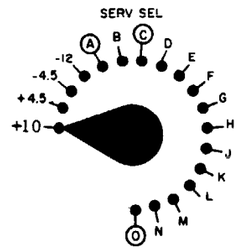
   e. Instruct distant terminal or repeater to turn off radio set TEST TONE.

   f. Turn on local radio set TEST TONE and instruct distant terminal or repeater to make ORDER WIRE LEVEL adjustment.

   g. Turn off TEST TONE upon completion of adjustments.

MAINTENANCE

10. Operate METER SELECT switch to SERV FAC.



11. Operate SERV SEL switch to following positions and check for yellow indication on TEST ALIGN meter. Do not continue until proper indications are obtained. If adjustments are necessary, adjust appropriate control for hairline indication on TEST ALIGN meter.

    +10 Power Supply 5A1 (+10 ADJ)
    +4.5 Power Supply 5A1 (+4.5 ADJ)
    -4.5 Power Supply 5A1 (-4.5 ADJ)

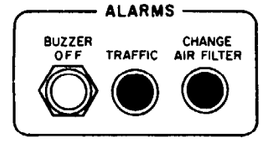
    If proper indications cannot be obtained, replace Power Supply 5A1. (See technical manual.)

12. Operate SERV SEL switch to following positions. If TEST ALIGN meter does not indicate in green area, replace appropriate panel. Do not continue until proper indications are obtained.

    -12 Power Supply 5A1
    Ⓐ Panel 5A3 (Peak Detectors) (Input from radio must be present and RL on panel 5A3 adjusted per Step 8)
    B Panel 5A4 (Crystal Filter Drive)
    Ⓒ Panel 5A5 (Crystal Filter Output)
    -Adjust CL on panel 5A3 for maximum (peak) indication on TEST ALIGN meter for 24-channel operation only. (Meter may not necessarily read in green area in 12-channel operation.)
    D Panel 5A5 (Traffic)
    E Panel 5A5 (Countdown Timing)
    F Panel 5A5 (Decision Timing)
    G Panel 5A3 (Recovered PCM)
    H Panel 4A6/5A6 (TIMING OUT-1)*
    J Panel 4A6/5A6 (TIMING OUT-2)*
    K Panel 4A6/5A6 (8-kc Address-1)
    L Panel 4A6/5A6 (8-kc Address-2)
    M Panel 4A8/5A8 (PCM OUT-1)*
    N Panel 4A8/5A8 (PCM OUT-2)*
    Ⓞ Panel 4A7/5A7 (Order Wire) (See Step 9)

    *For correct indication, front panel jack of same name must be connected to other PCM equipment, or terminated in 91-ohm load.

13. Operate SERV SEL switch to +10 and leave in this position during operation.



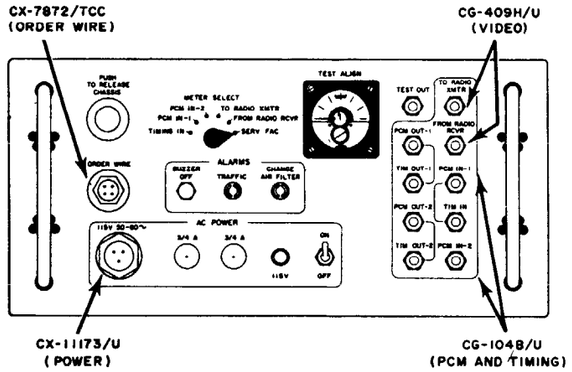
- ▶ If received traffic is lost, TRAFFIC light glows and buzzer sounds. Press BUZZER OFF pushbutton to silence buzzer. When traffic is restored, TRAFFIC light is extinguished and buzzer will sound. Press BUZZER OFF pushbutton to silence buzzer.
- ▶ When TRAFFIC alarm indicates loss of traffic, check FROM RADIO RCVR per step 8; if improper indication is obtained, check for received signal in radio receiver per radio set instructions.
- ▶ When CHANGE AIR FILTER light glows, clean or change air filter. If light remains on, power supply 5A1 is overheating. (See technical manual.)

EL2LR010

Figure 6-20. Simplified instruction chart for mutiplexer TD-202/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF TD—203/U IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.



PRELIMINARY PROCEDURES

1. Disconnect cables TO RADIO, FROM RADIO and ORDER WIRE between TD-203/U and radio set.

2. Establish radio communications with distant terminal operator via radio set order wire, per radio set instructions.

3. Adjust radio set order wire level per radio set instructions.

4. Connect cables between TD-203/U, other PCM equipment, and radio set per terminal or repeater requirements, as directed in assemblage technical manual.

5. Operate switches as follows:

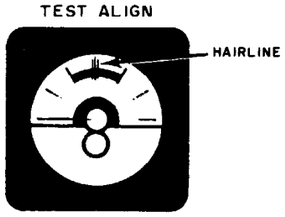
OPR (except when making loopback checks with connection made between FROM RADIO and TEST OUT).

96I- at 96-channel radio terminal

96S- at 96-channel radio repeater with D/I

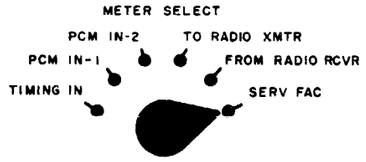
96R- at 96-channel radio repeater without D/I

48- at all 48-channel terminals or repeaters



OPERATIONAL CHECKS AND ADJUSTMENTS

6. Energize all PCM equipment.



7. Operate METER SELECT switch to following positions and check for green area indications on TEST ALIGN meter.

   TIMING IN
   PCM IN-1
   PCM IN-2(96-channel operation only)

   Do not continue if proper indications are not obtained. Refer to maintenance manual for necessary corrective action.

8. Operate METER SELECT switch and make following adjustments:
   TO RADIO XMTR
   ▶ Adjust OL on panel 4A2 for hairline indication on TEST ALIGN meter
   ▶ Adjust PCM input level on radio set per radio set instructions.
   ▶ Instruct operator at next station to adjust RL and CL step 12 C on panel 4A3
   FROM RADIO RCVR
   ▶ Instruct operator at distant terminal or repeater to adjust OL on panel 4A2 and PCM input level on radio set.
   ▶ Adjust RL on panel 4A3 until TEST ALIGN meter indicates near center of green area.
   Adjust CL (step 12 C) on panel 4A3.
   ▶ SERV FAC
   ▶ This position connects TEST ALIGN meter to SERV SEL switch for use during Order Wire adjustment and for maintenance purposes.

9. ORDER WIRE LEVEL adjustment:

   a. Instruct distant terminal or repeater to turn radio set TEST TONE, and adjust output to proper level, per radio set instructions.

   b. Operate METER SELECT switch to SERV FAC.

   c. Operate SERV SEL switch to "0".

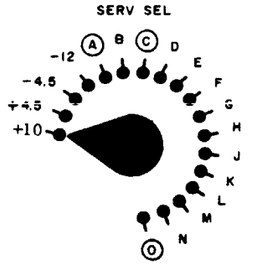
   d. Adjust ORDER WIRE LEVEL control until TEST ALIGN meter indicates in yellow area. (NOTE: if more than two terminals or repeaters are in system, adjustments must be made sequentially, starting with local terminal or repeater providing TEST TONE and working through to distant terminal.)

   e. Instruct distant terminal or repeater to turn off radio set TEST TONE.

   f. Turn on local radio set TEST TONE and instruct distant terminal or repeater to make ORDER WIRE LEVEL adjustment.

   g. Turn off TEST TONE upon completion of adjustments.

10. Operate METER SELECT switch to SERV FAC.



MAINTENANCE

11. Operate SERV SEL switch to following positions and check for yellow indication on TEST ALIGN meter. Do not continue until proper indications are obtained. If adjustments are necessary, adjust appropriate control for hairline indication on TEST ALIGN meter.

+10	Power Supply 4A1 (+10 ADJ)
+4.5	Power Supply 4A1 (±4.5 ADJ)
-4.5	Power Supply 4A1 (-4.5 ADJ)

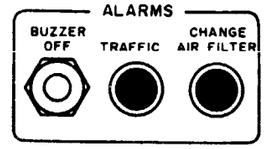
If proper indications cannot be obtained, replace Power Supply 4A1. (See technical manual).

12. Operate SERV SEL switch to following positions. If TEST ALIGN meter does not indicate in green area, replace appropriate panel. Do not continue until proper indications are obtained.

-12	Power Supply 4A1
(A)	Panel 4A3 (Peak Detectors) (Input from radio must be present and RL on panel 4A3 adjusted per Step 8)
B	Panel 4A4 (Crystal Filter Drive)
(C)	Panel 4A5 (Crystal Filter Output) -Adjust CL on panel 4A3 for maximum (peak) indication on TEST ALIGN meter for 96 channel operations only. (Meter may not necessarily read in green area in 48-channel operation)
D	Panel 4A5 (Traffic)
E	Panel 4A5 (Countdown Timing)
F	Panel 4A5 (Decision Timing)
G	Panel 4A3 (Recovered PCM)
H	Panel 4A6/5A6 (TIMING OUT-1)*
J	Panel 4A6/5A6 (TIMING OUT-2)*
K	Panel 4A9 (8-kc Address-1)
L	Panel 4A9 (8-kc Address-2)
M	Panel 4A8/5A8 (PCM OUT-1)*
N	Panel 4A8/5A8 (PCM OUT-2)*
(0)	Panel 4A7/5A7 (Order Wire) (See Step 9)

*For correct indication, front panel jack of same name must be connected to other PCM equipment, or terminated in 91-ohm load.

13. Operate SERV-SEL switch to +10 and leave in this position during operation.



▶ If received traffic is lost, TRAFFIC light glows and buzzer sounds. Press BUZZER OFF pushbutton to silence buzzer. When traffic is restored, TRAFFIC light is extinguished and buzzer will sound. Press BUZZER OFF pushbutton to silence buzzer.

▶ When TRAFFIC alarm indicates loss of traffic, check FROM RADIO RCVR per step 8; if improper indication is obtained, check for received signal in radio receiver per radio set instructions.

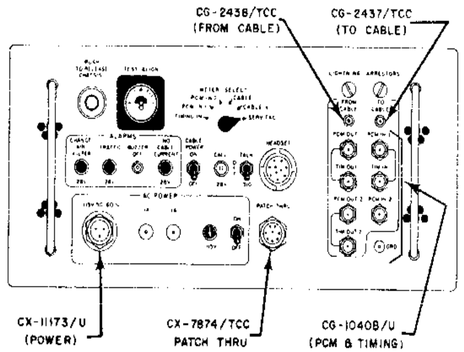
▶ When CHANGE AIR FILTER light glows, clean or change air filter. If light remains on, power supply 4A1 is overheating. (See technical manual)

EL2LR011

Figure 6-21. Simplified instruction chart for multiplexer TD-203/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF TD-204/U IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.



PRELIMINARY PROCEDURES

1. Connect cables between TD-204/U and other equipment as directed in assemblage technical manual.

2. Operate switches as follows:

Front Panel

CABLE POWER ON / OFF — Operate to OFF

TALK OFF SIG — Operate to OFF except to signal or talk to distant terminal or repeater (Step 4). (CALL indicator and buzzer signal incoming calls.

Service Facility Panel

TRAFFIC SEL 12 / 24 / 48-AR

- 12 — For 12-channel cable terminals and radio-to-cable conversion points.
- 24 — For 24-channel cable terminals.
- 48-AR — For 48-channel cable terminals or any 12, 24 or 48-channel attended repeater

NORM OPR / ZERO SET / READ — Operate to NORM OPR except when making fault locator checks (Step 5)

Plug-in Panels

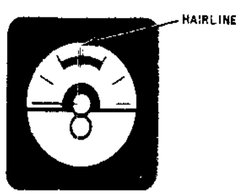
6A2 TONE / OFF — Operate to OFF except when making cable receive level adjustments (Step 4).

6A4 — Operate to position corresponding to length of cable between this unit and nearest TD-206/G in FROM CABLE (receive) direction.

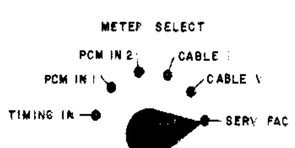
6A5 — Operate to position corresponding to length of cable between this unit and nearest TD-206/G in TO CABLE (transmit) direction

MILES

TEST ALIGN



OPERATIONAL CHECKS AND ADJUSTMENTS



3. Energize all PCM equipment and operate CABLE POWER switch to ON.

Operate METER SELECT switch to following positions and check for proper indications on TEST ALIGN meter:

TIMING IN	(green)
PCM IN-1	(green)
PCM IN-2	(green, 24-channel terminal only)
CABLE I	(yellow, CABLE POWER switch must be ON and NO CABLE CURRENT lamp extinguished)
CABLE V	(Indicates cable voltage on 0 to 600 scale. Meter should indicate approximately 10.8 volts per TD-206/G plus 13 volts.
SERV FAC	(Connects TEST ALIGN meter to SERV SEL switch)

4. ORDER WIRE COMMUNICATIONS

a. Instruct distant terminal or repeater to turn on TONE on panel 6A2 and operate TALK-OFF-SIG switch to OFF.

b. Operate METER SELECT switch to SERV FAC.

c. Operate SERV SEL switch to "Q".

d. With TONE received from distant TD-204/U, and headset connected, adjust CAL on panel 6A2 for hairline indication of TEST ALIGN meter. (START WITH CAL FULLY CCW)

e. Instruct distant terminal or repeater to turn off TONE.

f. Turn on TONE (panel 6A2) and instruct distant terminal or repeater to make CAL adjustment.

g. Turn off TONE upon completion of adjustments

5. LOCATION OF FAULTY TD-206/G. (Perform only when loss of traffic indicates faulty TD-206/G.)

a. Disconnect PCM IN-1 and PCM IN-2.

b. Operate CABLE POWER switch to ON.

c. Operate SERV SEL switch to R.

d. Operate NORM OPR-ZERO SET-READ switch to ZERO SET.

e. Adjust ZERO SET control for hairline indication on TEST ALIGN meter.

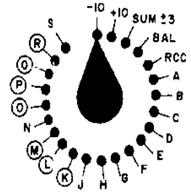
f. Operate NORM OPR-ZERO SET-READ switch to READ.

g. Operate SYSTEM FAULT LOCATOR MILES switches for hairline indication on TEST ALIGN meter.

h. From the two MILES switches, read the number of consecutive good TD-206/G restorers as counted from this unit.

i. Operate NORM OPR-ZERO SET-READ switch to NORM OPR.

SERV SEL



MAINTENANCE

6. Operate METER SELECT switch to SERV FAC.

7. Operate SERV SEL switch to following positions and check for yellow indication on TEST ALIGN meter. Do not continue until proper indications are obtained. If adjustments are necessary, set appropriate control for hairline indication on TEST ALIGN meter.

-10	Power Supply panel 6A1	(-10V ADJ)
+10	Power Supply panel 6A1	(+10V ADJ)
SUM±3	Power Supply panel 6A1	(± 3V ADJ)
BAL	*Power Supply panel 6A1	(± 3V BAL ADJ)

If proper indications cannot be obtained, replace power supply 6A1. (See maintenance manual.)

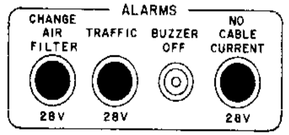
RCC — Panel 6A1 (Received Cable Current-Failure to obtain yellow indication on meter indicates transmission of incorrect cable current by distant TD-206/U, or cable deficiency. No cable current is required for distances of one mile or less between TD-204/U's.)

* START WITH BAL ADJ FULLY CCW.

8. Operate SERV SEL switch to following positions. If TEST ALIGN meter does not indicate in green area, replace appropriate panel. DO not continue until proper indications are obtained.

A	Panel 6A4 (Received PCM)	
B	Panel 6A4 (Received Timing)	
C	Panel 6A7 (TIMING OUT-1)	
D	Panel 6A7 (TIMING OUT-2)	
E	Panel 6A7 (PCM OUT-1)	
F	Panel 6A7 (PCM OUT-2)	
G	Panel 6A7 (Osc Bias)	
H	Panel 6A5 (Transmit PCM)	
J	Panel 6A5 (Transmit Timing)	
K	Panel 6A6 (Mixer In-1)	12/24-channel operation
L	Panel 6A6 (Mixer In-2)	only
M	Panel 6A6 (Mixer Output)	
N	Panel 6A6 (Reset Timing)	
O	Panel 6A5 (Cable Transmit Order Wire) (TONE switch on panel 6A2 must be on and TO CABLE connected.)*	
P	Panel 6A5 (Radio Transmit Order Wire) (TONE switch on panel 6A2 must be on and PATCH THRU connected.)*	
Q	Panel 6A2 (Phone Amplifier) (Used in CAL adjustment, Step 4.)	
R	Fault Locate (Used to locate faulty TD-206/G, Step 5.)	
S	Panel 6A7 (Activity)	

* TALK OFF SIG switch must be in OFF position.



▶ When CHANGE AIR FILTER light glows, clean or change air filter. If light remains on, power supply 6A1 is overheating. (See technical manual).

▶ If received traffic is lost, TRAFFIC light glows and buzzer sounds. Press BUZZER OFF pushbutton to silence buzzer. When traffic is restored, buzzer will sound again, and TRAFFIC light is extinguished. Press BUZZER OFF pushbutton to silence buzzer.

▶ If cable current is lost, NO CABLE CURRENT light glows and buzzer sounds. Press BUZZER OFF pushbutton to silence buzzer. Re-set by operating CABLE POWER switch to OFF, then to ON. When cable current is restored, buzzer will sound again, and NO CABLE CURRENT light is extinguished. Press BUZZER OFF pushbutton to silence buzzer. (If cable current cannot be restored by resetting CABLE POWER switch, see technical manual.)

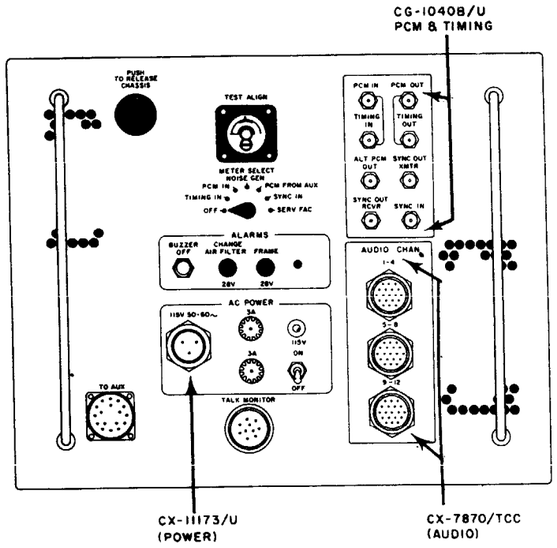
9. Operate SERV SEL switch to +10 and leave in this position during operation.

TM 5805-367-12-59

Figure 6-22. Simplified instruction chart for Multiplexer TD-204/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF TD-352/U IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.



PRELIMINARY PROCEDURES

1. Establish communications with distant terminal via radio set or cable order wire, per radio set or TD-204/U instructions.

2. Connect cables between TD-352/U and other PCM equipment per terminal requirements as directed in assemblage technical manual.

3. Operate switches as follows:

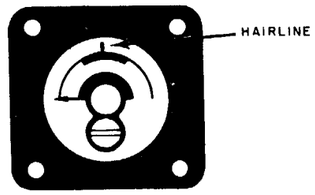
Either position, except for AUDIO GAIN adjustment (Step 6).

SLAVE if this TD-352/U is designated slave. MASTER if this TD-352/U is designated master. Master for one TD-352/U.

IN if TD-352/U is used with Aux Unit.

OUT if no Aux Unit connected.

TEST ALIGN



OPERATIONAL CHECKS AND ADJUSTMENTS

NOTE: TD-202/U or TD-204/U should be aligned and other system equipment operating properly before proceeding with following steps. For "loopback" testing of TD-352/U only, connect PCM IN to PCM OUT and TIMING IN to TIMING OUT.

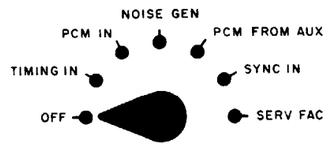
4. Energize all PCM equipment.

5. Operate METER SELECT switch to following positions and check for green area on TEST ALIGN meter:

   TIMING IN
   PCM IN
   NOISE GEN (unless panel 1A11/2A11 is removed or defective)
   PCM FROM AUX (only when AUX is connected) SYNC IN (only when SYNC IN receptacle used)

   NOTE: If proper indications are not obtained, do not continue. Refer to technical manual for necessary corrective action.

METER SELECT



6. AUDIO GAIN adjustment:

NOTE: These adjustments may be made in loopback or normal operation. In normal operation, coordinate over order wire and perform simultaneous adjustment between terminals.

   a. Operate METER SELECT switch to SERV FAC.

   b. Operate SERV SEL switch to OSC.

   c. Adjust OSC ADJUST control for hairline indication on TEST ALIGN meter. (NOTE: This adjusts oscillator output at proper level; do not disturb OSC ADJUST control after this adjustment is completed.)

   d. Operate SERV SEL switch to vertical position (pointing to CHAN 1-12 switch at both terminals.)

   e. Operate CHAN 1-12 switch to 1. (This connects oscillator output to chan 1 modulator, and TEST ALIGN meter to chan 1 demodulator.)

   f. Operate 2 WIRE-4 WIRE switch to:
      2 WIRE, when channel being adjusted is connected for 2-wire operation.
      4-WIRE, when channel being adjusted is connected for 4-wire operation.

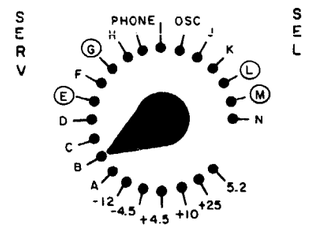
   g. Adjust AG control on Modem (panel 1A2/2A2) for chan 1 to obtain hairline indication on TEST ALIGN meter. (NOTE: Each 1A2/2A2 panel contains two channels. Channel numbers assigned to panel are located below each panel. Lowest numbered channel and controls physically located on lower part of panel 1A2/2A2.)

   h. Repeat steps e, f and g for channels, 2 through 12.

   i. Operate SERV SEL switch to PHONE using headset and CHAN 1-12 switch, talk to operator at distant terminal over each channel to insure satisfactory volume and clarity.

   j. Operate CHAN 1-12 switch to OFF

MAINTENANCE

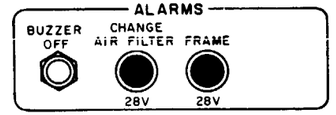


7. Operate SERV SEL switch to following positions and check for yellow or green indication on TEST ALIGN meter, corresponding to colored dot on switch panel. Do not continue until proper indications are obtained. (If adjustments are necessary during power supply checks, adjust power supply panel appropriate control on 1A1/2A1 for hairline indication on TEST ALIGN meter.)

-5.2	*Power Supply Panel 1A1/2A1 (no operator adj)
+25	Power Supply Panel 1A1/2A1
+10	Power Supply Panel 1A1/2A1
+4.5	Power Supply Panel 1A1/2A1
-4.5	Power Supply Panel 1A1/2A1
-12	Power Supply Panel 1A1/2A1
A	*Panel 2A8
B	*Panel 2A10 (transmitter section)
C	*Panel 2A8
D	*Panel 2A9
(E)	*Panel 2A7 (one or more channels must be externally modulated)
F	*Panel 1A3/2A3
(G)	Not a fault-locating position; used during coder alignment.
H	*Panel 2A13
PHONE	Connects TALK-MONITOR phone to channel selected on CHAN 1-12 switch
CHAN 1-12	Used during AUDIO GAIN adjustment (See Step 6d)
OSC	Used during AUDIO GAIN adjustment (See Step 6b)
J	*Panel 2A10 (receiver section)
K	*Panel 2A13 NOTE: To put unit out of frame, remove PCM IN signal.
(L)	*Panel 1A12/2A12 (unit out of frame)
(M)	*Panel 2A13 (unit out of frame)
N	*Panel 1A12/2A12

*If TEST ALIGN meter does not indicate in green area, replace panel indicated.

8. Operate SERV SEL switch to position +25 and leave in this position during operation.



▶ If framing is lost, FRAME light glows and buzzer sounds. Press BUZZER OFF pushbutton to silence buzzer. When framing is restored, FRAME light is extinguished and buzzer will sound. Press BUZZER OFF pushbutton to silence buzzer.

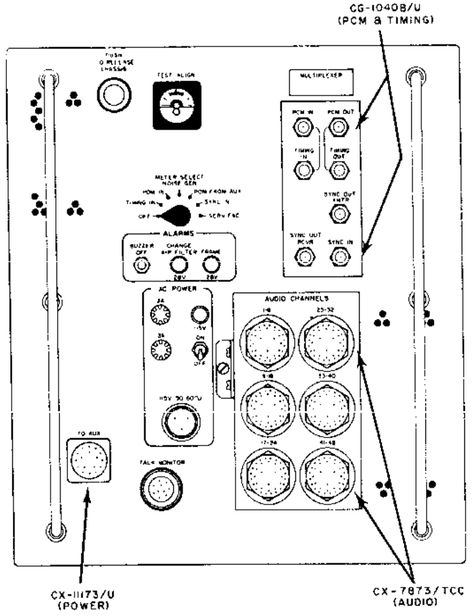
▶ When CHANGE AIR FILTER light glows, clean or change air filter. If light remains on, power supply 1A19/2A19 is overheating. (See technical manual.)

TM 5805-367-12-60

Figure 6-23. Simplified instruction chart for Multiplexer TD-352/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF TD-353/U IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.



PRELIMINARY PROCEDURES

1. Establish communications with distant terminal via radio set or cable order wire, per radio set or TD-204/U instructions.

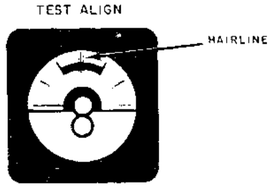
2. Connect cables between TD-353/U and other PCM equipment per terminal requirements as directed in assemblage technical manual.

3. Operate switches as follows:

Either position, except for AUDIO GAIN adjustment (Step 6).

SLAVE if this TD-353/U is designated slave. MASTER if this TD-353/U is designated master. MASTER for one TD-353/U.

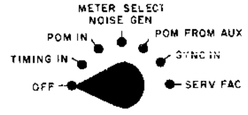
IN if TD-353/U is used with aux unit. OUT if no aux unit connected.



OPERATIONAL CHECKS AND ADJUSTMENTS

NOTE: TD-203/U or TD-204/U should be aligned and other system equipment operating properly before proceeding with following steps. For "loopback" testing of TD-353/U only, connect PCM IN to PCM OUT and TIMING IN to TIMING OUT.

4. Energize all PCM equipment.



5. Operate METER SELECT switch to following positions and check for green area on TEST ALIGN meter:

   TIMING IN

   PCM IN

   NOISE GEN (unless panel 1A11/2A11 is removed or defective)

   PCM FROM AUX (only when aux unit is connected)

   SYNC IN (only when SYNC IN receptacle is used)

   NOTE: If proper indications are not obtained, do not continue, refer to technical manual for necessary corrective action.

6. AUDIO GAIN adjustment:

   NOTE: These adjustments may be made in loopback or normal operation. In normal operation, coordinate over order wire and perform simultaneous adjustments between terminals.

   a. Operate METER SELECT switch to SERV FAC.

   b. Operate MEASURE-PHONE ODD-PHONE EVEN switch to MEASURE and SERV SEL switch to OSC.

   c. Adjust OSC ADJUST control for hairline indication on TEST ALIGN meter (NOTE: This adjusts oscillator output to proper level; do not disturb OSC ADJUST control after this adjustment is completed.)

   d. Operate SERV SEL switch to vertical up position (pointing to EVEN CHAN switch) at both terminals or repeaters.

   e. Operate EVEN CHAN switch to 2. (This connects oscillator output to chan 2 modulator and TEST ALIGN meter to chan 2 demodulator.)

   f. Operate 2 WIRE-4 WIRE switch to:

      2 WIRE, when channel being adjusted is connected for 2-wire operation.

      4 WIRE, when channel being adjusted is connected for 4-wire operation.

   g. Adjust AG control on Modem (panel 1A2/2A2) for chan 2 to obtain hairline indication on TEST ALIGN meter. (NOTE: Each 1A2/2A2 panel contains two channels. Channel numbers assigned to panel are located below each panel. Lowest numbered channel and controls physically located on lower part of panel 1A2/2A2.)

   h. Repeat steps e, f, and g for even channels 4 through 48.

   i. Operate SERV SEL switch to vertical down position (pointing to ODD CHAN switch) at both terminals.

   j. Operate ODD CHAN switch to 1.

   k. Operate 2 WIRE-4 WIRE switch as required (step f).

   l. Adjust AG control on Modem (panel 1A2/2A2) for chan 1 (step g).

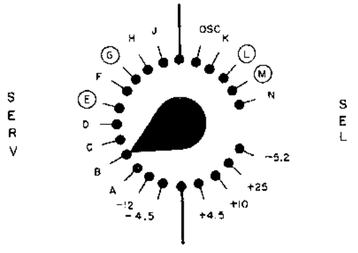
   m. Repeat steps j, k, and l for odd channels 3 through 47.

   n. Operate MEASURE-PHONE ODD-PHONE EVEN switch to PHONE ODD. Using headset and ODD CHAN switch, talk to distant terminal over each odd channel to insure satisfactory volume and clarity.

   o. Operate MEASURE-PHONE ODD-PHONE EVEN switch to PHONE EVEN and SERV SEL switch to vertical up position (pointing to EVEN CHAN switch) at both terminals.

   p. Using headset and EVEN CHAN switch, talk to distant terminal over each even channel to insure satisfactory volume and clarity.

   q. Operate MEASURE-PHONE ODD-PHONE EVEN switch to MEASURE.



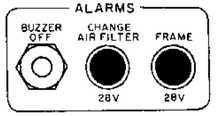
MAINTENANCE

7. Operate SERV SEL switch to following positions and check for yellow or green indication on TEST ALIGN meter, corresponding to colored dot on switch panel. Do not continue until proper indications are obtained. (If adjustments are necessary during power supply checks, adjust appropriate control on Power Supply panel 1A1/2A1 for hairline indication on TEST ALIGN meter.)

-5.2	*Power Supply panel 1A1/2A1 (no operator adj)
+25	Power Supply panel 1A1/2A1
+10	Power Supply panel 1A1/2A1
+4.5	Power Supply panel 1A1/2A1
ODD CHAN	Used during AUDIO GAIN adjustment (step 6i)
-4.5	Power Supply panel 1A1/2A1
-12	Power Supply panel 1A1/2A1
A	*Panel 1A8
B	*Panel 1A9
C	*Panel 1A10 (transmitter section)
D	*Panel 1A9
(E)	*Panel 1A7 (one or more channels must be externally modulated)
F	*Panel 1A3/2A3
(G)	Not a fault location position; used during coder alignment
H	*Panel 1A13
J	*Panel 1A10 (receiver section)
EVEN CHAN	Used during AUDIO GAIN adjustment (Step 6d and o)
OSC	Used during AUDIO GAIN adjustment (step 6b)
K	*Panel 1A13
	NOTE: To put unit out of frame, remove PCM IN signal
(L)	*Panel 1A12/2A12 (unit out of frame)
(M)	*Panel 1A13 (unit out of frame)
N	*Panel 1A12/2A12

*If TEST ALIGN meter does not indicate in green area, replace panel indicated.

8. Operate SERV SEL switch to +25 and leave in this position during operation



▶ If framing is lost, FRAME light glows and buzzer sounds. Press BUZZER OFF switch to silence buzzer. When framing is restored, FRAME light is extinguished and buzzer will sound. Press BUZZER OFF switch to silence buzzer.

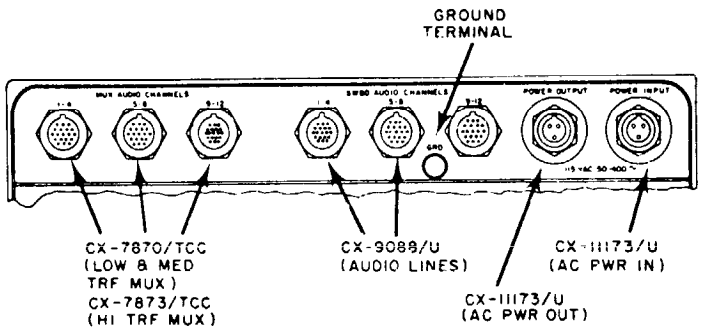
▶ When CHANGE AIR FILTER light glows, clean or change air filter. If light remains on, power supply 1A19/2A19 is overheating. (See technical manual.)

TM 5805-367-12-61

Figure 6-24. Simplified instruction chart for Multiplexer TD-353/U.

SIMPLIFIED INSTRUCTION CHART

NOTE. MAKE CHECKS AND ADJUSTMENTS OF CV-1548/G IN PROPER SEQUENCE, AS DIRECTED IN THIS CHART.

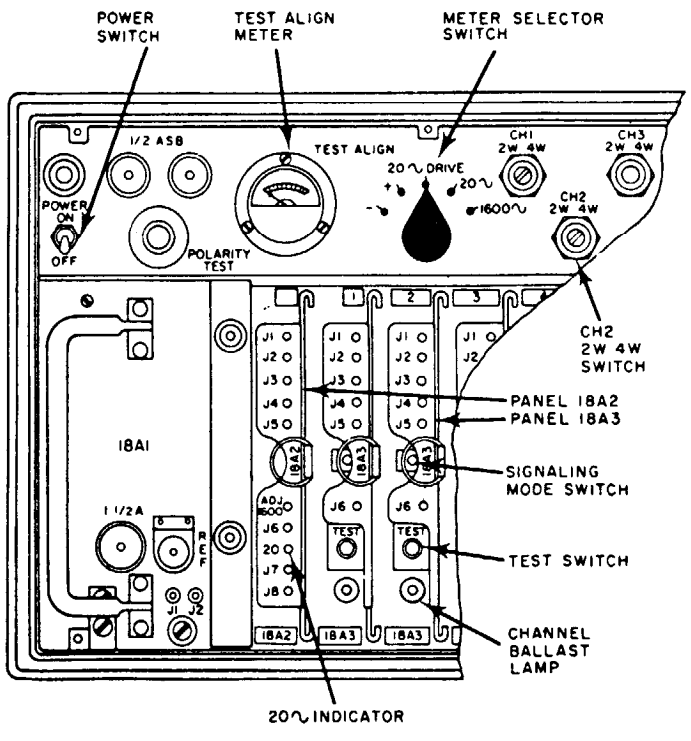


PRELIMINARY PROCEDURES

1. Establish communications with distant terminal or repeater via radio set or cable order wire, per radio set or cable order wire instructions.

2. Connect cables between CV-1548/G, other PCM equipment, and vf lines as directed in assemblage technical manual.

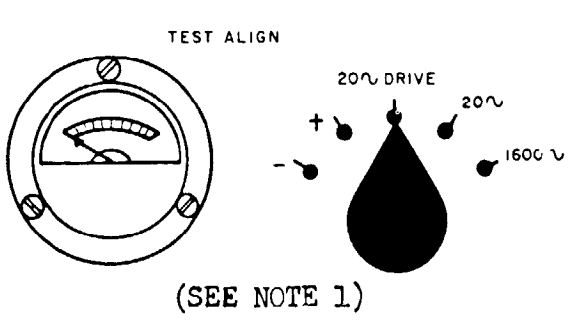
(SEE NOTE 1)



3. Energize all PCM equipment.

4. Operate switches as follows:

Type of channel line connection	Operating mode to be used	CH 2W 4W switch	Signaling mode switch
2-wire civ trk ckt (SB-86/P) or 2-wire trk ckt (AN/TTC-7)	Plug supervision originate	2W	OR
2-wire CB ckt (SB-86/P) or CB trk ckt (AN/TTC-7)	Plug supervision terminate	2W	TE
2-wire magneto trk ckt (SB-86/P), LB trk ckt (AN/TTC-7) or dir fld tel	20-cps ringing	2W	AC
2-wire vf equipment	No signaling (Hybrid only)	2W	OFF
4-wire vf equipment	No signaling (straight through)	4W	OFF



(SEE NOTE 1)

OPERATIONAL CHECKS AND ADJUSTMENTS

(SEE NOTE 2)

4. Operate meter selector switch to following positions and check for correct indication on TEST ALIGN meter:

- (yellow)

+ (yellow)

20∿ DRIVE (yellow)

20∿ (yellow)

*1600∿(green)

* Adjust ADJ 1600 control on panel 18A2 if required.

5. Check line polarity as follows:

LB line (AN/TTC-7) (AC only)	Press TEST switch, if no call registers, interchange tip and ring wires.
CB line (AN/TTC-7) (TE Only)	Disconnect multiplexer cables. If channel ballast lamp on panel 18A3 does not light, and call is not indicated on switchboard, interchange tip and ring wires.
SB-86/P line (OR only)	Operate line selector switches of SB-86/P to T and pull down cords. Interchange tip and ring wires on any line with white line indicator showing.

MAINTENANCE

(SEE NOTE 2)

6. For single channel troubles, check positions of signaling mode switch, CH 2W 4W switch, and vf line wiring. If in 20-cps ringing mode, local fld tel or swbd cannot receive call, push TEST switch on channel unit 18A3 to simulate call. If no call is indicated, replace channel unit 18A3. If in plug supervision mode, local swbd indicates continuous call, push TEST switch on channel unit 18A3. If no disconnect indication appears, replace channel unit 18A3. If outgoing call trouble occurs in either mode, replace channel unit 18A3.

7. For trouble on several channels, operate selector switch through each position. If TEST ALIGN meter does not provide proper indication, perform correction indicated:

- (yellow)	Replace 1/2 ASB fuses or panel 18A1.
+ (yellow)	Replace 1-1/2 A fuse panel 18A1
20∿ DRIVE (yellow)	Replace panel 18A2.
20∿ (yellow)	Replace panel 18A2.
1600∿ (green)	Adjust ADJ 1600 control on panel 18A2 or replace panel 18A2.

NOTES:

1. TEST ALIGN meter, meter selector switch, and associated front panel markings are deleted from model CV-1548A/G.
2. Steps 4 and 7 not applicable to model CV-1548A/G.

TM 5805-367-12-62

Figure 6-25. Simplified instruction chart for Converter, Telephone Signal CV-1548/G.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
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USACDCCBRA (1)
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USACDCCEA (Ft Huachuca) (1)
USACDCOA (1)
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USACDCTA (1)
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USASTRATCOM (4)
USASA (2)
USACDCEC (10)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Comd (4) except
  USAREUR (10)
LOGCOMD (2)
MDW (1)
Armies (2) except
  Seventh US Army (5)
Corps (2)
USAC (3)
Instl (2) except
  Ft Monmouth (70)
  Ft Carson (25)
  Ft Knox (12)
  Ft Gordon (10)
  Ft Huachuca (10)
  WSMR (5)
Army Dep (2) except
  LBAD (14)
  SAAD (30)
  TOAD (14)
  LEAD (7)
  SHAD (3)
  NAAD (5)
  SVAD (5)
  CHAD (3)
  ATAD (10)
Gen Dep (2)
Sig Sec, Gen Dep (5)
Sig Dep (12)
Svc Colleges (2)
Br Svc Sch (2) except
  USASCS (60)
  USASESCS (90)
USACOMZEUR (10)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
WRAMC (1)
Army Pic Cen (2)
Sig FLDMS (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
USACRREL (2)
Units org under fol TOE:
  11-57 (2)
  11-97 (2)
  11-98 (2)
  11-117 (2)
  11-127 (2)
  11-155 (2)
  11-157 (2)
  11-158 (2)
  11-500 (AA-AC) (2)
  11-587 (2)
  11-592 (2)
  11-597 (2)

NG: State AG (3).

USAR: None.

For explanation of abbreviations used see AR 320-50.

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

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Stateside, N.J. 07703

DATE 10 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PPS-76

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 20 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:
SSG I. M. DeSpiritof 999-1776	SSG I. M. DeSpiritof

DA FORM 1 AUG 74 2028-2

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TM-11-5805-367-12	30 Aug 66	Oper & Org Maint Man. TD-202/U, TD-203/U, TD-204/U, TD-352/U, TD-353/U, TD-206/G, TD-206B/G, CV-1548/G, CV-1548A/G

BE EXACT. . .PIN-POINT WHERE IT IS

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REVERSE OF DA FORM 2028-2

THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

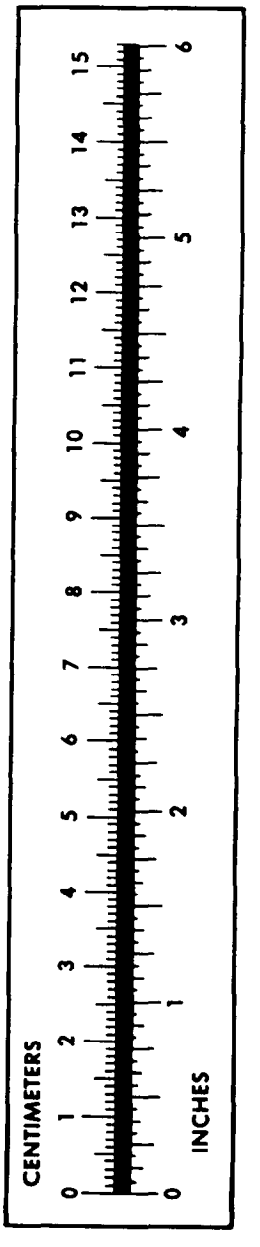
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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