TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS)

FOR

PLUG-IN UNIT, RINGDOWN CONVERTER CV-3250/FTC
(Stelma RDC-4A)
(NSN 6625-00-602-5159)
EXTENDER, PRINTED-WIRING BOARD MX-9664/FTC
(NSN 6625-00-602-5151)

AND

UNIVERSAL SHELF 90409000-000
(LINE CONDITIONING EQUIPMENT)

This copy is a reprint which includes current pages from Changes 1 and 2.

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
OCTOBER 1975

WARNING

DANGEROUS VOLTAGE

DEATH or SERIOUS INJURY may result from accidental contact with -48 volt dc power present in the equipments.

WARNING

The fumes of trichloroethane used r cleaning purposes are toxic. Provide thorough ventilation whenever used. Do not use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 9 November 1978

Operator's, Organizational, Direct Support and
General Support Maintenance Manual
For
PLUG-IN UNIT, RINGDOWN CONVERTER
CV-3250/FTC (STELMA RDC-4A)
(NSN 6625-00-602-5129)
EXTENDER, PRINTED-WIRING BOARD MX-9664/FTC
(NSN 6625-00-602-5151)
AND
UNIVERSAL SHELF 90409000-000
(LINE CONDITIONING EQUIPMENT)

TM 11-5805-676-14&P, 31 October 1975, is changed as follows:
1. The title is changed as noted above.
2. A vertical bar appears opposite changed material.
3. Remove old pages and insert new pages as indicated below.

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Inside front cover	Inside front cover
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
5-1 and 5-2	5-1 and 5-2
A-1(A-2 blank)	A-1(A-2 blank)
B-1 through B-10	B-1 through B-5
C1 through C8	None

4. File this sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

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Chief of Staff

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USAICS (3)	29-136 (1)
MAAG (1)	

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

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C 30 July 1976

Operator's, Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) For PLUG-IN UNIT, RINGDOWN CONVERTER CV-3250/FTC (Stelma RDC-4A) (NSN 6625-00-602-5129) EXTENDER, PRINTED-WIRING BOARD MX-9664/FTC (NSN 6625-00-602-5151) AND UNIVERSAL SHELF 90409000-000 (LINE CONDITIONING EQUIPMENT)

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USAES (2)
USAICS (3)
MAAG (1)
USARMS (1)
Instl (2) except
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Fort Gordon (10)
Fort Huachuca (10)
Fort Carson (5)
Ft. Richardson (ECOM)(2)
LBAD (14)
SAAD (30)
TOAD (14)
SHAD (3)
Sig FLDMS (1)
USAERDMAA (1)
USAERDAW (1)
Unit org under fol TOE:
(1 cy to each unit)
11-500(AA-AC)
29-134
29-136

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

WARNING

The fumes of TRICHLOROETHANE are toxic. Provide thorough ventilation whenever it is used; avoid prolonged or repeated breathing of vapor. Do not use near an open flame or hot surface; trichloroethane is nonflammable but heat converts the fumes to a highly toxic phosgene gas the inhalation of which could result in serious injury or death. Prolonged or repeated skin contact with trichloroethane can cause skin inflammation. When necessary, use gloves, sleeves and aprons which the solvent cannot penetrate.

TECHNICAL MANUAL

No. 11-5805-676-14 & P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 31 October 1975

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR PLUG-IN UNIT, RINGDOWN CONVERTER CV-3250/FTC (Stelma RDC-4A) (NSN 6625-00-602-5129) EXTENDER, PRINTED-WIRING BOARD MX-9664/FTC (NSN 6625-00-602-5151) AND UNIVERSAL SHELF 90409000-000 (LINE CONDITIONING EQUIPMENT)

List of Illustrations

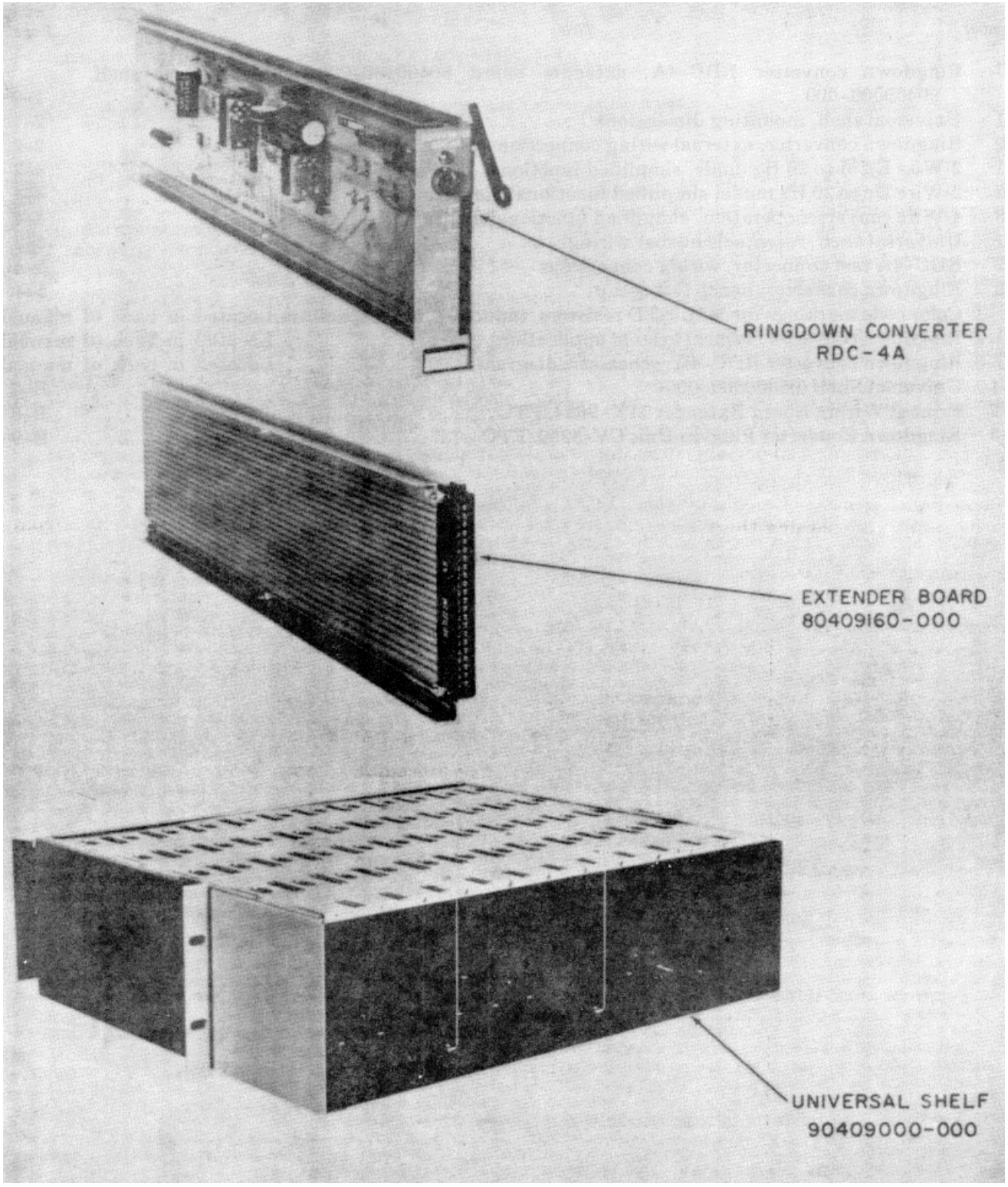


Figure 1-1. Ringdown converter RDC-4A, extender board 80409160-000, and universal shelf 90409000-000.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains information and instructions for installation, operation, and maintenance of Plug-in Unit, Ringdown Converter CV-325 FTC; Extender, Printed-wiring Board MX-966 FTC; and Universal Shelf 90409000-000 (fig. 1-1 The maintenance coverage includes on-site and off-site maintenance as authorized by the maintenance allocation chart (app B). The official nomenclature/item name, National Stock Number (NSN), and assigned common name of the: equipments are given in paragraph 1-9. The official nomenclature does not appear anywhere on the items, therefore, the common name is use throughout this manual.

1-2. Indexes of Publications

a. DA Pa m 3104. Refer to the latest issue of D Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.
b. DA Pam 310-7. Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to th equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed and prescribed by TM 38-750.
b. Report Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.
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 4610.33B/AFR 75-18/ MCO P4610.19C, and DLAR 4500.15.

1-4. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.

1-5. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using Standard Form 368 (Quality Deficiency Report). Instructions for pre-paring EIR's are provided in TM 38-750, the Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-6. Administrative Storage

Before and after administrative storage (1 to 45 days), perform the procedures in paragraph 3-3.

1-6.1. Destruction of Army Electronics Materiel Destruction of Army electronics materiel to pre-vent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

The ringdown converter, an interface device used in a Communications Center, provides ringdown signal conversion in voice-frequency (vf transmission circuits. Depending on internal module strap ping and external wiring, the module can operate on 2-wire and 4-wire lines in hybrid or nonhybrid applications The module functions as an "E&M" to-20 Hz and 20 Hz-to-"E&M" converter; and de-to-20 Hz and 20 Hz-to-dc converter.

1-8. Technical Characteristics

a. Ringdown Converter Characteristics.
Ringdown circuits Serviced..Up to 12 per universal shelf.

Ringdown Functions Performed

fo ..... 20 Hz to separate E&Mleads (i.e., E&M/20 Hz conversion), or 20 Hz to a common lead (SG), (i.e., Dd20-Hz conversion).

Line Terminating Impedance 620 ohms, in series with a 1 mf capacitor.

Power Requirements

Dc .....-48 volts, at 20ma (plus as required for external equipment.
Ac ring .....Up to 120 volts, at 20 Hz.
b. Environment Conditions.
Nonoperating (storage)
Air temperature Minus 40”F to *155”F.
Relative humidity
(percent) 95% RH mix including condensation due to temperature changes.

Operating
Air temperature +32F to +126°F

Relative humidity

(percent) 95% RH mix including condensation due to temperature changes.

1-9. Items Comprising an Operable Equipment

The official nomenclature/item name, National Stock Number (NSN), and assigned common name of the equipment covered in this manual are listed in the following chart and illustrated in figure 1-1.

NSN	Nomenclature/item name	Common name	Qty.	Dimensions (in.)			Unit	
				Height	Depth	Width	Weight (oz.)	Volume (cu in.)
6625-00-602-5129	Plug -in Unit, Ringdown Converter CV-3250/TFC	Ringdown Converter RDC-4A	1	4-5/8	14-1/2	1-1/4	14	83-7/8
6625-00-602-5151	Extender, Printed Wiring Board MX-9664/FTC	Extender board	1	4-5/8	15	7/8	11	60-3/4
	Universal Shelf 90409000-000	Universal shelf	1	5-1/4	16-1/2	19	15.5 lbs.	1645-7/8

1-10. Description

a. Ringdown Converter. The ringdown converter is a compact, solid-state, plug-in module, consist of a PC card that is fastened to a front panel reinforcing bracket is riveted along the upper a lower edges of the PC card. The front pa contains a ballast lamp, and a cutout that permits access to four test points. Internal strapping options, provided on the PC-card, permit 2- 4-wire operation, selection of the converter mod operation (i.e., E&M/20 Hz or Dc/20 Hz). Fourteen of the rear-mounted card-edge connector tabs mate with a connector in the rear of the universal shelf A pivoted extractor arm, fastened to front of the PC card, facilitates removal of module from the universal shell

b. Extender Board. The extender board enables electrical connection of the ringdown converter the universal shelf wiring, while exposing module component parts for maintenance purposes.

c. Universal Shelf The universal shelf, which is front-mounted in standard 19inch rack, can receive a maximum of 12 ringdown converters. The top and bottom cover plates are equipped with PC card guides to facilitate installation and removal of the ringdown converters. Vent holes in the top and bottom cover plates permit the circulation of cooling air. Two stiffener plates, riveted between the top and bottom cover plates provide additional rigidity. Twelve 22-pin receptacles at the rear of the universal shelf provide electrical connection for the ringdown converters with which they mate. A cover plate, screw-fastened to two brackets on the rear of the universal shelf protects the electrical receptacles.

CHAPTER 2

SERVICE UPON RECEIPT AND INSTALLATION

Section I. SYSTEMS PLANNING, SITE AND SHELTER REQUIREMENTS

2-1. Systems Planning

The ringdown converter RDC-4A provides ringdown signal conversion in voice frequency (v: and 4-wire transmission circuits in both hybrid and nonhybrid applications. Each ringdown converter is installed in any one of 12 module locations (22-pin receptacles) in the universal shelf Typical system application of the ringdown converter is shown in figure FO-2. Placement associated module elements of a vf communications conditioning string in adjacent slots of universal shelf simplifies installation and maintenance troubleshooting. The universal shelf mounting dimensions are shown in figure 2-1. low at least a 30-inch clearance at the front of universal shelf for insertion, removal and maintenance of each ringdown converter.

A similar clearance of 24 inches should be allowed at the rear of the universal shelf for ease of wiring connections and maintenance. If the universal shelf is to be mounted in Universal Rack 90409001-000 refer to TM 11-5805-666-14 & P for additional systems planing information. Input signal power, terminating impedance, and environmental conditions are listed in paragraph 1-8.

2-2. Site And Shelter Requirements

The ringdown converter and universal shelf are to be installed in predetermined, fixed rack or cabinet locations, therefore, no detailed in- formation is required for site and shelter considerations. However, all requirements stated under system planning (para 2-1) are also applicable to shelters.

Section II. SERVICE UPON RECEIPT OF MATERIEL

2-3. Unpacking

The ringdown converter, extender board, and universal shelf are crapped in greaseproof, waterproof covering, and shipped from the fac-

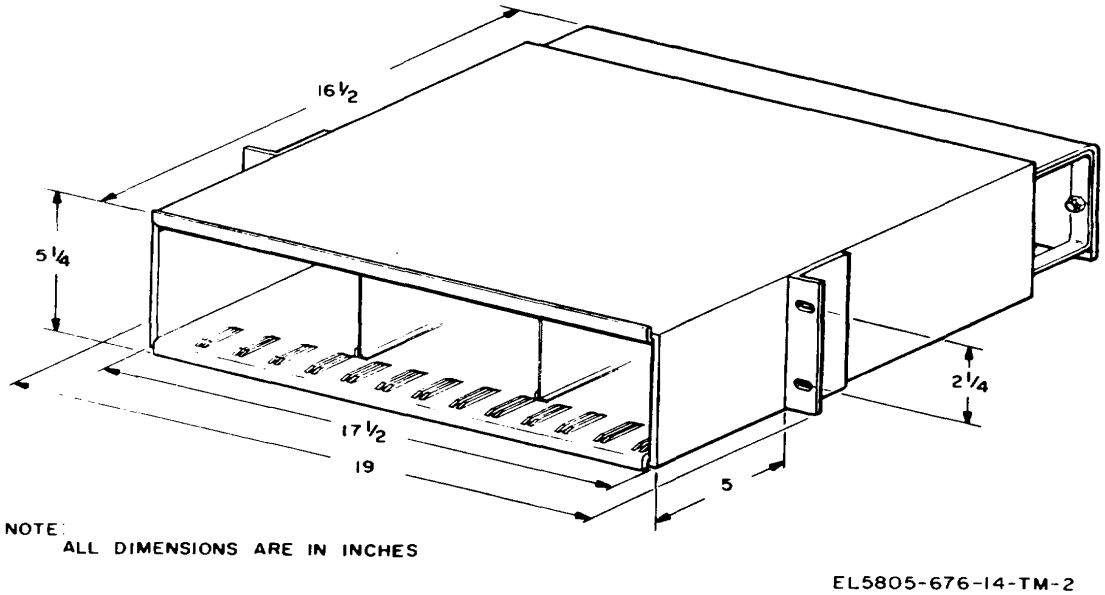


Figure 2-1. Universal shelf mounting dimensions.

tory in fiberboard boxes, prepared with cellulosic cushioning material. Other than exercising normal care in handling, no special precautions m required in unpacking the equipment. Similarly no special preparations are required of the installation area to receive the equipment.

2-4. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3b).

b. Check equipment against the packing slip 1 see if the shipment is complete. If a packing slip not available, check the equipment against t items comprising an operable equipment list (para 1-9). Report al discrepancies in accordance with paragraph 1-3 c. The equipment should be placed in service even though a minor assembly or part, that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number on the front panel, near the silk screened nomenclature.) Check also to see whether all currently applicable MWO's have been applied. (Current MWO's applicable to the equipment are listed in DA Pam 310-7.)

d. For dimensions, weight and volume of packaged items, see paragraph 1-9.

Section III. INSTALLATION

2-5. Tools, Test Equipment and Materials

Required for Installation

No special tools or materials are required f installation of the ringdown converter and universal shelf. The extender board is provide for use by direct support personnel in the performance of the initial check, following installation, and maintenance. Table 2-1 lists t test equipment required in performance preliminary checks and adjustment of the equipment.

Table 2-1. Tools and Test Equipment

Items	Purpose	Common name
1. Generator, Signal AN/USM-264	Initial checks.	Signal Generator.
2. Multimeter AN/USM-223	Initial checks.	Multimeter.
3. Tool Kit, Electronic Equipment TK-105/G	Perform strapping options on module.	Tool Kit
4. Voltmeter Electronic AN/USM-265 (2 ea)	Initial checks.	Ac voltmeter.
5. Resistor, Fixed Film 600 ohm, 1%, 1/2w, RN70B6000F, MIL-R-10509	Initial checks.	Termination Resistor.

2-6. Installation Instructions

a. Place universal shelf into the desired rack or cabinet mounting position.

b. Align mounting bracket slots (fig. 2-1) with rack or cabinet mounting holes, and secure universal shelf with mounting hardware.

c. Strap the desired option (2- or 4-wk E&M/20 Hz or Dc/20 Hz) on the associated ringdown converter as described in paragraph 2-7a.

d. Insert ringdown converters (maximum 12) into universal shelf and check to see that all ringdown converter connectors firmly engage shelf receptacles.

e. Connect wires from universal shelf rear connector for each ringdown converter (2- or 4-wire, as applicable) directly to a terminal block the top of the rack or cabinet. Perform the associated jumper connections at the terminal boards for the associated system modules and main distribution frame connections, as required. Figure FO-2 shows typical signal wiring jumper connections. Figure 2-2 shows external wiring connections for a universal shelf that will receive a ringdown converter.

NOTE

In the nonhybrid mode (2-wire operation) the send in lines T_1R_1 (contacts A and B) are connected to a ringdown trunk or cable link, and the send out lines TR (contacts C and D) are connected to a 2-wire facility.

In the hybrid mode, (2-wire operation) lines T_1R_1 are connected to the A-B terminals of a termination set or repeat coil and the send out lines TR, are connected to an external TR line.

f. Color coding of cable wire-pairs facilitates wire connections without the need for checking wire continuity. The color-coding permits installation personnel to identify, in any cable, the first wire-pair through the last wire-pair. A mate- color, color-coding system is used to distinguish among the different groups, and pairs, within the groups. By means of the mate-wire, the various groups in a cable may be distinguished from one another (i.e., the mate-wire of every pair, in a particular group will be the same color). The color-wire distinguishes the pairs that make up

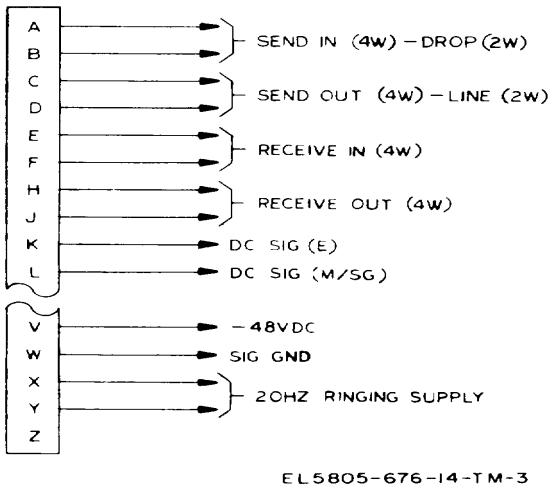


Figure 2-2. Ringdown Converter, external wiring connections.

each group.

g. Wherever possible, identify the line which the ringdown converter services. An insert is provided on the front panel of each ringdown converter for this purpose.

h. Perform initial checks of paragraph 2-7b

2-7. Preliminary Checks and Adjustment

These operations are the responsibility of direct support maintenance personnel.

a. Strapping Options. The ringdown converter incorporates strap options which permit E&M/20 Hz signaling or dc/20 Hz signaling o either 2-wire or 4-wire circuits. Refer to the component location diagram provided in figure B-3 which illustrates the strapping terminal locations. 2-wire hybrid or nonhybrid operation is accomplished, via wiring connections, external to the module as described in the note of paragraph 2-6e.

(1) 2-Wire Operation. Strap terminals: 2-3 4-5, 7-8, 9-10.

(2) 4-Wire Operation. Strap terminals: 1-2 3-4, 6-7, 8-9.

(3) E&M/20 Hz Operation.

(a) E Lead Grounded Strap terminals 11-12, 13-14, 15-16, 17-18, 19-20, 22-23, 25-26

28-29, 30-31.

(b) E Lead Open Strap terminals: 11-13, 12-14, 15-17, 16-18, 19-21, 22-23, 25-26, 28-29

30-31.

(4) Dc/20 Hz Operation. Strap terminals: 11-13, 12-14, 15-17, 16-18, 19-21, 23-24, 25-27,

29-31.

b. Initial Checks. The ringdown converter has no adjustments nor alignment procedures associated with it. However, the module must be tested to insure proper strapping and installation. The module must be extended, via the extender board from the appropriate shelf receptacle and -48v dc power available in the system. Prior to performing this test, the vf and signaling (E&M) lines, that operate in conjunction with the converter module, must be disconnected. This is accomplished by removing the associated modules or by disconnecting the appropriated jumpers (fig. 2-1) on the terminal boards at the top of the rack. The tests are given below for the appropriately strapped mode of operation.

(1) E&M/20 Hz Mode (E Lead Grounded).

(a) Connect ac voltmeter, terminated with 600 ohm resistor, across TP5 and TP6. Check that 20 Hz ring supply is available across TP5 and TP6.

(b) Connect multimeter between TP3 (-) and terminal 31 (+). Check that -48 volts dc is obtained on multimeter.

(c) Jumper terminal 25 to 27 and check that 20 Hz supply is removed from ac voltmeter.

(d) Connect signal generator and second ac voltmeter across contacts E and F (4-wire operation) or contacts C and D (2-wire operation). Adjust signal generator for 1000 Hz at 0 dbm level.

(e) Check that ac voltmeter across TP5-TP6 indicates 0 dbm +0.25 db.

(f) Remove jumper. Check that ac voltmeter, monitoring signal generator output, indicate -6 dbm ±0.5 db. Replace jumper across terminals 25 and 27.

(g) Disconnect ac voltmeter from TP5-TP6 and connect across TP1 and TP2.

(h) If 2-wire operation is in effect, proceed to step (i). For 4-wire operation, disconnect signal generator and ac voltmeter from contacts E and F and connect to contacts C and D.

(i) Maintaining signal generator output at 1000 Hz and 0 dbm, check that ac voltmeter across TP1-TP2 indicates 0 dbm ±0.25 db.

(j) Disconnect signal generator and ac voltmeter from contacts C and D.

(k) Disconnect ac voltmeter across TP1-TP2, and jumper terminals 12 to 4 and 16 to 9.

(l) Repeat multimeter connections of step (b) and check that 0 volts (ground) is obtained.

(m) Reconnect signal generator and ac

voltmeter across contacts C and D and check that voltmeter indicates -6 dbm ±0.5 db. (n) Disconnect jumper and test equipment. Remove module from extender board an' replace module in shelf.

(2) E&M/20 Hz Mode (E Lead Open).

(a) Connect ac voltmeter, across TP5 and TP6.
(b) Connect multimeter between TP3 (-) and terminal 31 (+). Check that -48 volts dc is obtained on multimeter.
(c) Connect signal generator and second ac voltmeter across contacts E and F (4-wire operation) or contacts C and D (2-wire operation) Adjust signal generator for 1000 Hz at 0 dbm level.
(d) Check that ac voltmeter across TP5-TP6 indicates 0 dbm ±0.25 db.
(e) Jumper terminals 25 and 27. Check that ac voltmeter (TP5-TP6) indicates presence of 20 Hz ring supply.
(f) Check that ac voltmeter, monitoring signal generator output, indicates -6 dbm ±0.5 db. Disconnect jumper across terminals 25 and 27.
(g) Disconnect ac voltmeter from TP5 TP6 and connect across TP1 and TP2.
(h) If 2-wire operation is in effect, proceed to step (i). For 4-wire operation, disconnect signal generator and ac voltmeter from contacts E and F and connect to contacts C and D.
(i) Maintaining signal generator output at 1000 Hz and 0 dbm, check that ac voltmeter across TP1-TP2 indicates 0 dbm ±0.25 db.
(j) Disconnect signal generator and a voltmeter from contacts C and D.
(k) Disconnect ac voltmeter across TP1-TP2, and jumper terminals 12 to 4 and 16 to 9.
(l) Repeat multimeter connections of step (b) and check that 0 volts (ground) is obtained.
(m) Reconnect signal generator and a voltmeter across contacts C and D and check that voltmeter indicates -6 dbm ±0.5 db.
(n) Disconnect jumper and test equipment. Remove module from extender board and replace module in shelf.

(3) Dc/20 Hz Mode.

(a) Connect ac voltmeter across TP5 and TP6.
(b) Connect multimeter between TP3 and terminal 30. Check that 0 volts dc (ground) is obtained on multimeter.
(c) Connect signal generator and second ac voltmeter across contacts E and F (4-wire operation) or contacts C and D (2-wire operation). Adjust signal generator for 1000 Hz at 0 dbm level.
(d) Check to see that ac voltmeter across TP5-TP6 indicates 0 dbm ±0.25 db.
(e) Jumper terminals 28 and 31. Check to see that ac voltmeter (TP5-TP6) indicates presence of 20 Hz ring supply.
(f) Check to see that ac voltmeter, monitoring signal generator output, indicates -6 dbm ±0.5 db. Disconnect jumper across terminals 28 and 31.
(g) Disconnect ac voltmeter from TP5-TP6 and connect across TP1 and TP2.
(h) If 2-wire operation is in effect, proceed to step (i). For 4-wire operation, disconnect signal generator and ac voltmeter from contacts E and F and connect to contacts C and D.
(i) Maintaining signal generator output at 1000 Hz and 0 dbm, check that ac voltmeter across TP1-TP2 indicates 0 dbm ±0.25 db.
(j) Disconnect signal generator and ac voltmeter from contacts C and D.
(k) Disconnect ac voltmeter across TP1-TP2, and jumper terminals 12 to 4 and 16 to 9.
(1) Repeat multimeter connections of step (b) and check that -48 volts dc is obtained.
(m) Reconnect signal generator and ac voltmeter across contacts C and D and check that voltmeter indicates -6 dbm ±0.5 db.
(n) Disconnect jumper and test equipment. Remove module from extender board and replace module in shelf.

CHAPTER 3

OPERATING INSTRUCTIONS

3-1. Operating Controls and Instructions

Once installed, the operation of the ringdown converter is automatic, requiring no operator attention. Consequently there are no preoperational control settings, starting procedures operating procedures, or stopping procedures associated with this equipment.

3-2. Operation Under Unusual or Emergency Conditions

Since the equipment operation is automatic, and maintains its technical characteristics over a wide temperature and humidity range (para 1-8), no change occurs to the equipment operation due to

unusual environmental conditions or emergency communication conditions.

3-3. Preparation for Movement

Since the equipment is installed in a communication facility, movement to a new location involves dismantling and where necessary repacking. These functions are performed by direct support maintenance personnel; therefore, no operator instructions are involved.

CHAPTER 4

FUNCTION OF EQUIPMENT

4-1. Introduction

This chapter contains the theory of operation ringdown converter RDC-4A. The discussion include a typical system application and a circuit analysis description based on the mode operation for the module.

4-2. Typical System Application

The RDC-4A converter, an interface device provides ringdown signal conversion between local ringdown signals (E&M or dc) and 20 signals, for transmission over 2-wire or 4-v circuits. The module can operate in 2-wire circuits with, and without, hybrid (or repeat coil) termination. In nonhybrid circuits, the converter provides normal-through connection in the circuit path. For hybrid applications, the mod bridges the vf circuit.

4-3. Circuit Analysis

(Fig. FO-3)

a. 2-Wire E&M to 20 Hz Mode (E L Grounded). When used as an E&M to 20 converter, the module interconnects two signal circuits employing separate E&M leads and 20 signaling. In this mode, relay K2 normally energized.
   (1) Nonhybrid Application (A, fig. 4-1). In this application, the module provides the voice ringdown-receive, and ringdown transmit circuit paths described below.
      (a) Voice. With no ringdown signal present, ground (plus side of -48 volt dc) is plied to the E lead, energizing relay K2 a thereby providing through-connection between the voice lines (R_1 T_1 and TR). Application o ringdown signal causes relay K2 to be deenergized, opening the voice path, and terminating the TR line with RC network R1-C2.

      (b) Ringdown Receive. When a ringdown signal is received, ground is removed by the signaling unit from the E lead, deenergizing relay K2. Deenergized K2:

         1. Opens the T_1 R_1 line to TR line through-connection.
         2. Terminates the TR line with RC network R1-C2.
         3. Disconnects the ring detector from the TR line and connects the 20 Hz ring supply the T_1 R_1 line.

      (c) Ringdown Transmit. Upon receipt of a 20 Hz ring signal over the T_1R_1 line (K2 is energized), the ring detector energizes relay K1. Energized K1 removes -48 volt dc from, and applies ground (+48 volt dc) to the M lead, thereby transmitting a ringdown signal to the signaling unit. At this time, the TR line is terminated by RC network C3-R3.
   (2) Hybrid Application (B, fig. 4-1). In the hybrid E&M to 20 Hz application, the module provides the ringdown-receive and ringdown-transmit circuit paths described below.
      (a) Ringdown Receive. Upon receipt of a ringdown signal, the signaling unit removes ground from the E lead, deenergizing relay K2. Deenergized K2:
         1. Disconnects the ring detector from, and connects the 20 Hz ring supply through the T_1R_1 line to the hybrid AB line.
         2. Terminates the TR line with RC network R1-C2.
      (b) Ringdown Transmit. Receipt of a 20 Hz ring signal on the T. R line (via the hybrid AB line) causes the ring detector to energize relay K1. Energized K1 removes -48 volt dc from, and applies ground (+48 volt dc) to, the M lead, transmitting a ringdown signal to the signaling unit. At this time, the TR line is terminated by RC network C3-R3.

b. 2- Wire E&M to 20 Hz Mode (E Lead Open). The operation of the converter module in this mode is identical to that described in a above with the exception that the state of relay K2 is reversed in order to obtain the stated functions. This operation is accounted for by the reversal of strapping (para 2-7a) at relay K2. (See figure FO-2.)

c. 2-Wire Dc to 20 Hz Mode. In the dc to 20 Hz mode, the module interconnects two signaling circuits employing a common E&M lead (SG) and 20 Hz signaling.
   (1) Non-hybrid Application (A, fig. 4-2). In this application, the unit provides the voice, ringdown-receive, and ringown-transmit circuit paths described below.
      (a) Voice. With no ringdown signals present, deenergized relay K2 provides through-connection between the voice lines (T. R1 and TR). Application of a ringdown signal causes relay K2 to be energized, opening the voice path,

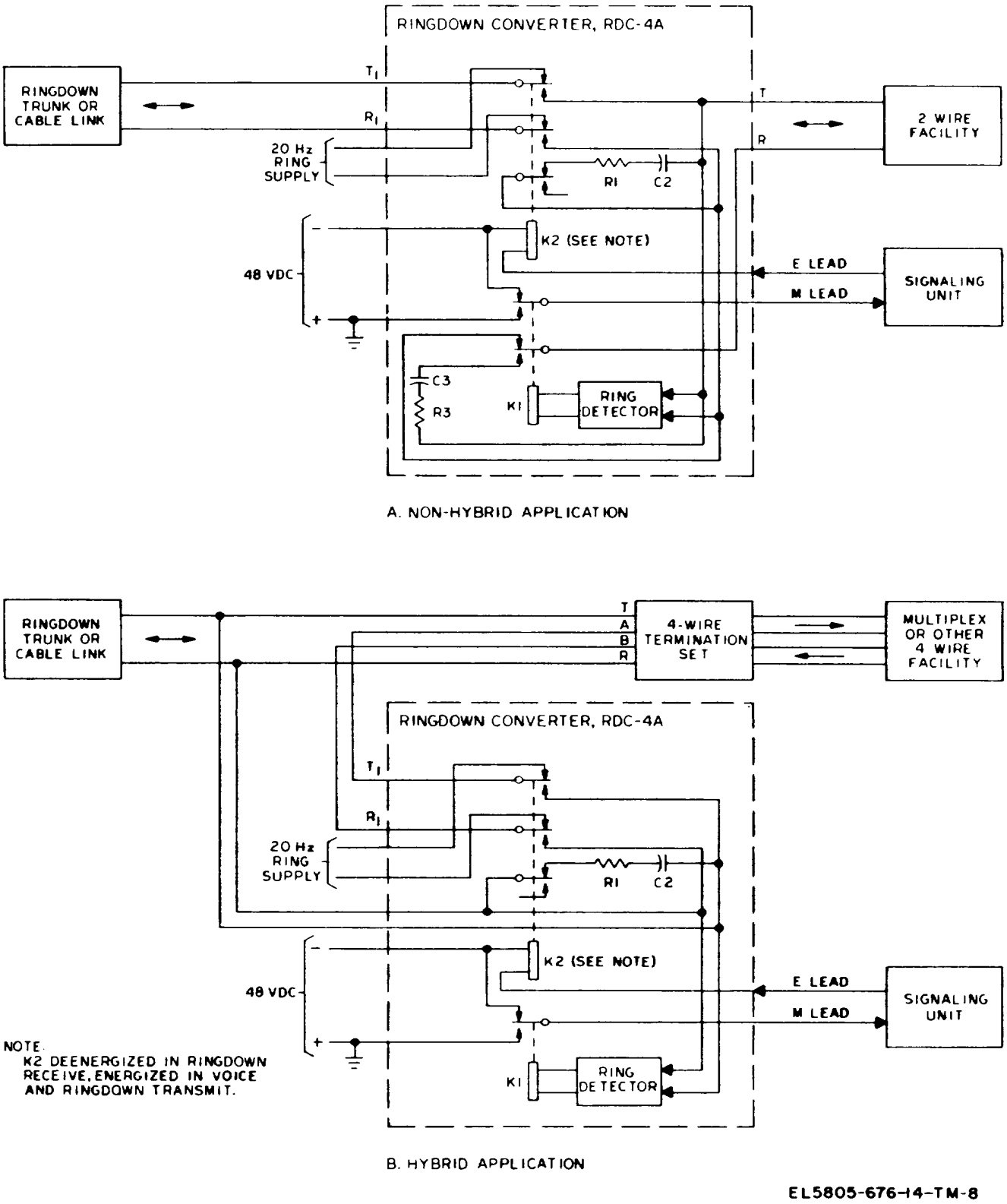


Figure 4-1. 2-wire E&M to 20 HZ mode, simplified functional diagram.

and terminating the TR line with RC network C2.

(b) Ringdown-Receive. When a ringdown signal is received, the signaling unit applies volt dc to the (SG) signal lead, energizing K2. Energized K2:
1. Opens the T_1R_1 line to TR line through-connection.
2. Terminates the TR line with RC network R1-C1.
3. Connects the 20 Hz ring supply to the T_1R_1 line.

(c) Ringdown-Transmit. On receipt 20 Hz ring signal over the T,R1 line (K deenergized), the ring detector energies relay Energized K1 applies -48 volt dc to the signal lead, transmitting a ringdown signal the signaling unit.

(2) Hybrid Application (B, fig. 4-2). In hybrid dc to 20 Hz application, the unit provides the ringdown-receive and ringdown-transmit circuit paths described below.

(a) Ringdown Receive. Upon receipt of a ringdown signal, the signaling unit applies volt dc to the (SG) lead, energizing relay Energized K2:

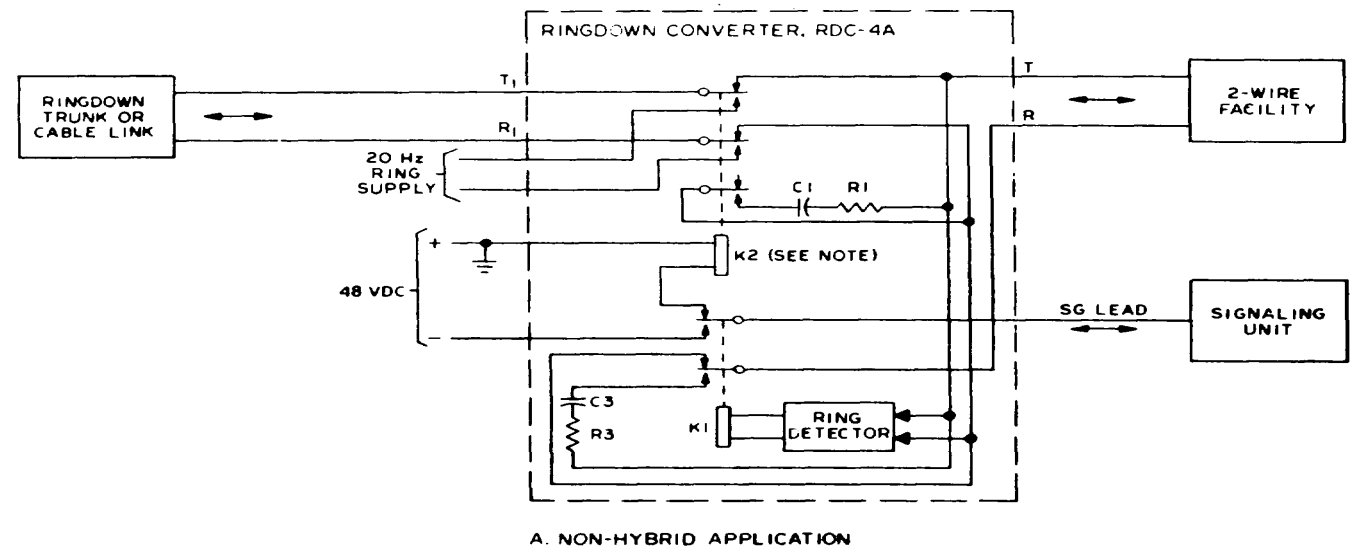
1. Disconnects the ring detector from and connects the 20 Hz supply through the T line to the hybrid AB line.
2 Terminates the TR line with network R1-C2.

(b) Ringdown Transmit. Receipt a 20Hz ringdown signal on the T_1R_1 line (via hybrid AB causes the ring detector to energize relayK1. Energized K1 disconnects relay K2 from, connects -48 volt dc to, the (SG) signal lead transmitting a ringdown signal to the sign unit.

d. 4-Wire E&M to 20 Hz Mode (E Grounded). In this mode, the module a interconnects two signaling circuits employ separate E&M leads and 20 Hz signaling. For application, the converter provides the voice -ringrown receive and ringdown transmit cir (A fig. 4-3) described below:
   (1) Voice. With no ringdown signal present, ground (plus side of -48 volt d) is applied to the E lead, energizing relay K2 and thereby providing through-connection between the 4W receive in/receive out voice lines (R_1T_1). Application of a ringdown signal causes relay K2 to deenergized, opening the voice path, and terminating the T_1R_1 line with RC network R1-C2.
   (2) Ringdown Receive. With a ringdown signal is received, ground is removed by signaling unit from the E lead, deenergizing relay K2. Deenergized K2:
      (a) Opens the 4W receive in (T_1R_1 line) to 4W receive out line through-connection.
      (b) Terminates the 4W receive in line (T_1R_1) with RC network R1-C2.
      (c) Connects the 20 Hz ring supply to the 4W receive out (T_1R_1) line.
   (3) Ringdown Transmit Upon receipt of a 20 Hz ring signal over the 4W send in (TR) line, the ring detector energizes relay K1. Energized K1 removes -48 volt dc from, and applies ground w48 volt dc) to the M lead, thereby transmitting a ringdown signal to the signaling unit. At this time, the 4W send out (TR) line is terminated by RC network C3-R3.

e. 4- Wire E&M to 20 Hz Mode (E Lead Open). The operation of the converter in this mode is identical to that described in d above with the exception that the activation of relay K2 is reversed in order to obtain the stated function. This operation is accounted for by the reversal of strapping (para 2-7a) at relay K2. (See figure FO-2.)

f. 4-WireDc to20 Hz Mode. In the dc to 20 Hz mode, the module interconnects two signaling circuits employing a common E&M lead (SG) and 20 Hz signaling. In this application (B, fig. 4-3), the unit provides the voice, ringdown-receive, and ringdown-transmit circuit paths described below.
   (1) Voice. With no ringdown signals present, deenergized relay K2 provides through-connection between the 4W receive in/receive out voice lines (T_1R_1). Application of a ringdown signal causes relay K2 to be energized, opening the voice path, and terminating the T_1R_1 line with RC network R1-C2.
   (2) Ringdown-Receive. When a ringdown signal is received, the signaling unit applies -48 volt dc to the (SG) signal lead, energizing relay K2. Energized K2:
      (a) Opens the 4W receive in (T_1R_1 line) to 4W receive out line through-connection.
      (b) Terminates the T_1R_1 line with RC network R1-C1.
      (c) Connects the 20 Hz ring supply to the 4W receive out (T_1R_1) line.
   (3) Ringdown-Transmit. On receipt of a 20 Hz ring signal over the 4W send in (TR) line, the ring detector energizes relay K1. Energized K1 applies -48 volt dc to the (SG) signal lead, transmitting a ringdown signal to the signaling unit. At this time the 4W send out (TR) line is terminated by RC network C3-R3.



A. NON-HYBRID APPLICATION

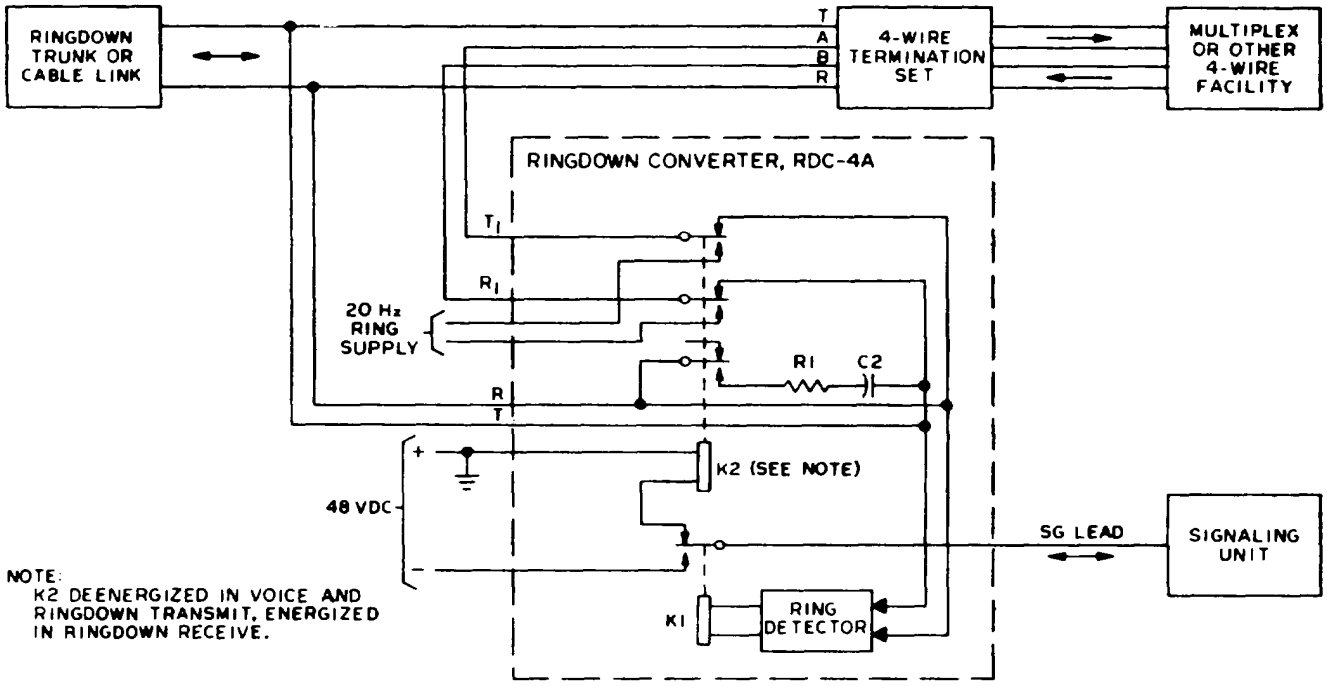


Figure 4-2. 2-wire dc to 20Hz mode, simplified functional diagram.

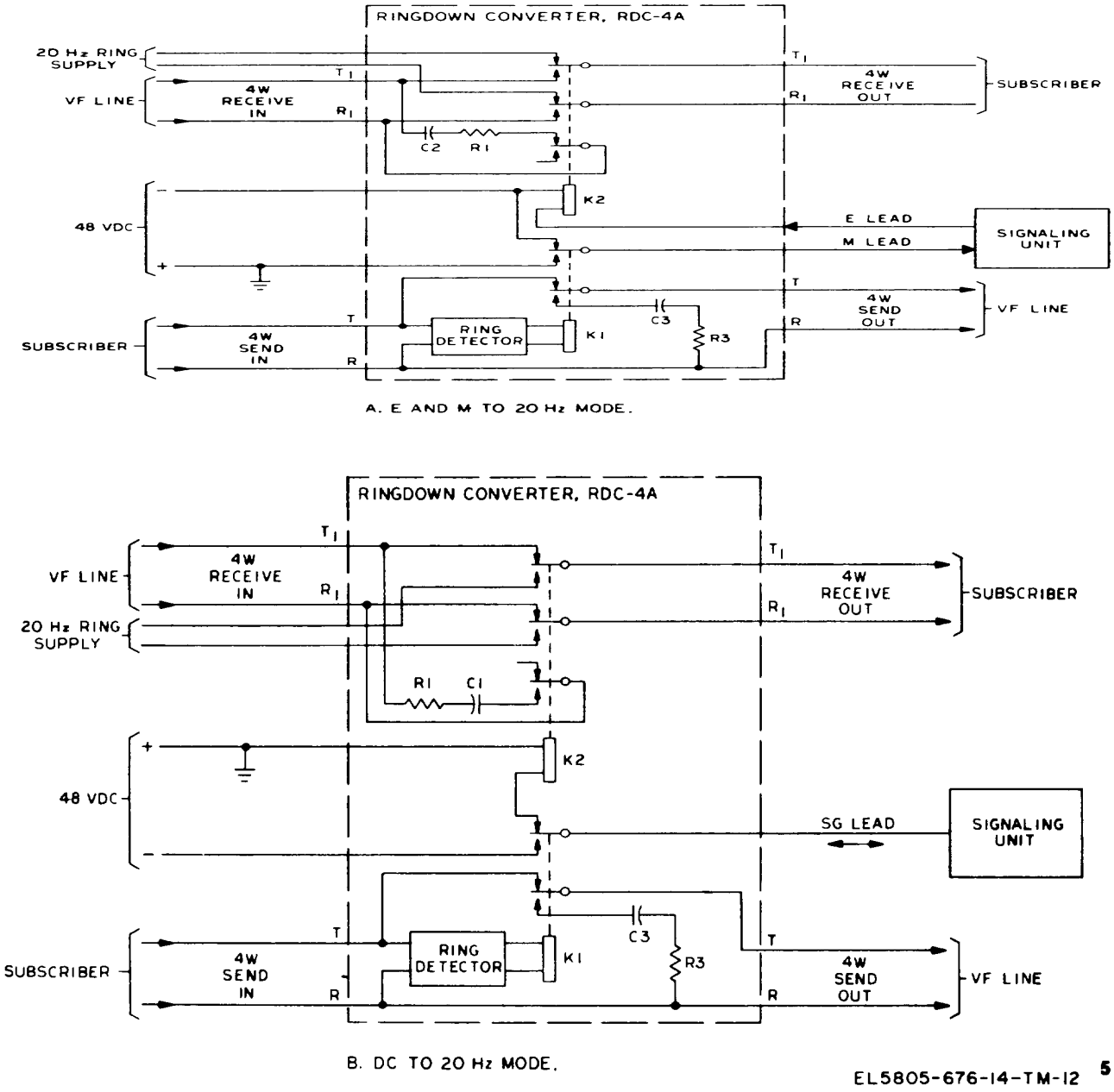


Figure 4-3. 4-Wire converter operation simplified functional diagram.

CHAPTER 5
ON-SITE MAINTENANCE

WARNING

DANGEROUS VOLTAGE: DEATH or SERIOUS INJURY may result from accidental contact with -48 volt dc power present in the equipment.

5-1. Scope of On-Site Maintenance

This chapter contains instructions for performing on-site preventive and corrective maintenance procedures, and the associated testing procedures Instructions are included for inspection, cleaning refinishing, performance testing, and localizing malfunction to a faulty ringdown converter universal shell If the performance of authorized corrective maintenance procedures does not result in a serviceable equipment, off-site maintenance required. The responsibility and scope of maintenance is assigned by the maintenance allocation chart (MAC) app B).

5-2. Tools, Test Equipment, and Materials Required

a. The tools and test equipment required maintenance, including performance testing a listed in paragraph 5-7a.

b. The materials required for preventive maintenance are listed below.
   (1) Cleaning cloth (NSN 830-00-267-3015).
   (2) Brush, paint, 1/2nch width.
   (3) Trichloroethane (N SN 6810-00-664-0273)

5-3. Preventive Maintenance

a. General Preventive maintenance is the systematic care, inspection, and servicing equipment to maintain it in serviceable condition prevent break-downs, and insure maximum ope tional capability. Preventive maintenance includes the inspection, testing, and replacement parts that inspection and test indicate would probably fail before the next scheduled periodic service.

b. Preventive Maintenance Checks and Services Periods. Tables 5-1 and 5-2 list the preventive maintenance checks and services for the equipment. These checks and services must be per- formed during the specified periods. Records and reports of the preventive maintenance checks and services must be made in accordance with the requirements set forth in TM 38-750.

c. Cleaning.
   (1) Remove accumulated dust and dirt from the equipment using a vacuum cleaner with plastic hose nozzle and dust brush or a clean, dry, lint-free cloth.

WARNING

The fumes of TRICHLOROETHANE are toxic. Provide thorough ventilation whenever it is used; avoid prolonged or repeated breathing of vapor. Do not use near an open flame or hot surface; trichloroethane is nonflammable but heat converts the fumes to a highly toxic phosgene gas the inhalation of which could result in serious injury or death. Prolonged or repeated skin contact with trichloroethane can cause skin inflammation. When necessary, use gloves, sleeves and aprons which the solvent cannot penetrate.

   (2) Remove smudges or stubborn dirty surface areas by wiping with a clean, lint-free cloth moistened with trichloroethane. Wipe dry with a clean, dry cloth.

d. Refinishing. Remove rust and corrosion from metal surfaces. Refer to the applicable cleaning and refinishing practices specified in TB 746-10.

Table 5-1. Organizational Weekly Preventive Maintenance Checks and Services

Seq No.	Item	Procedure	Reference
1	Module front panel condition	Clean front panel exterior surfaces,	para 5-3.
2	Cable assemblies	a. Clean cable insulation. *b.* See that cable insulation is not cut, cracked, or abraded; repair insulation cuts, cracks, and abrasions with electrical insulation tape as necessary c. Remove kinks and strains. d. Tighten loose connections, on terminal board, if necessary.	para 5-3c.
3	Equipment surfaces	Clean any buildup of dirt.	para *5-3.*

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

Table 5-2. Organizational Monthly and Quarterly Preventive Maintenance Checks and Services

Seq No.	Item	Procedure	Reference
1	Refinishing	Examining module front panel and exterior surfaces for corrosion or need of refinishing.	par 5-
2	Checking publications.	See that a publications are complete and current.	app A
3	Ringdown converter, extender board, and universal shelf.	Check for evidence of overheating, burned Parts, or breaks in printed circuit wiring.	
4	Extender board.	Perform continuity check using multimeter connected between A-A, B-A etc.	fig. B-2
5	Modifications.	Check DA Pam 3107 to determine if new, applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	DA Pam 317 and TM 38-750

5-4. Troubleshooting

On-site maintenance troubleshooting includes isolating a communications line malfunction to the ringdown converter RDC-4A and replacing the faulty assembly. hen a malfunction is suspected the RD-4A module should first be removed the universal shelf, and the strapping (para should be examined to assure that the module is operating in the proper mode. The appropriate (operating mode) initial check procedures of paragraph 2-7b should then be performed to deter if the RDC-4A module is faulty and must be replaced. If external equipment is not at fault if replacement of the ringdown converter doe correct the malfunction, perform continuity checks to isolate a continuity malfunction printed-circuit wiring or a connector on universal shelf These continuity tests are formed using a multimeter (fig. 5-1) with extender board inserted in the associated connector of the universal shell If the continuity test indicates an open circuit, replace the faulty connector.

5-5. Removal and Installation

Removal and installation of the ringdown converter and universal shelf is accomplished by performing the applicable portion of paragraph 2 reverse. The extender board is installed ii universal shelf in the receptacle vacated b. ringdown converter. The ringdown convert then inserted in the extender board receptacle. Removal of the extender board is accomplished in the reverse order of installation. If an extender board is determined faulty, via continuity measurements, the board is replaced.

5-6. Disassembly of the Universal Shelf

Removal and replacement of a faulty receptacle from the universal shelf is accomplished as outlined below:

a. Unscrew 2 screws, lockwashers and nuts which secure receptacle to the PC card.

b. Unsolder receptacle pin connections from the PC card. Remove receptacle.

c. Assemble a replacement receptacle to the PC card by reversing the procedure given in a and b above.

5-7. Direct Support Performance Tests

Bench type test procedures which can be used to determine if a repaired ringdown converter is capable of performing its assigned mission are given below: This performance test checks ringdown transmit/receive functions.

a. Test Equipment.
   (1) Generator, Signal AN/USM-264, 2 ea.
   (2) Voltmeter, Electronic AN/USM-265, 2 ea.
   (3) Power Supply PP-6547/U.
   (4) Resistor, 600 ohm ½ watt ±1%.
   (5) 22-pin connector.
   (6) 22-terminal, terminal board.
b. Test Connections and Conditions. Fabricate a test connector layout, wired to a test terminal board, as shown in figure 5-2.
c. Procedure. Perform the procedure of table 53 in the order given.

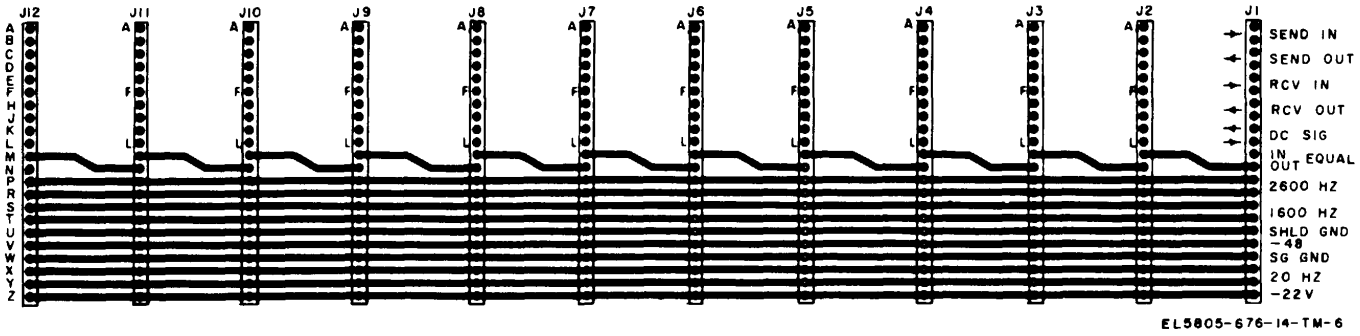


Figure 5-1. Universal shelf, receptacle busbar wiring

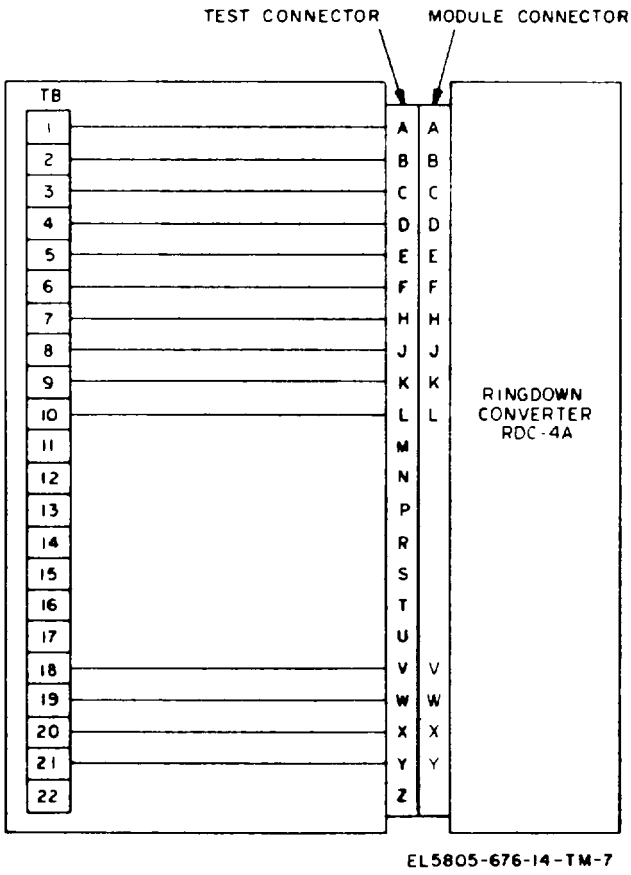


Figure 5-2. RDC-4A test connector, wiring connections.

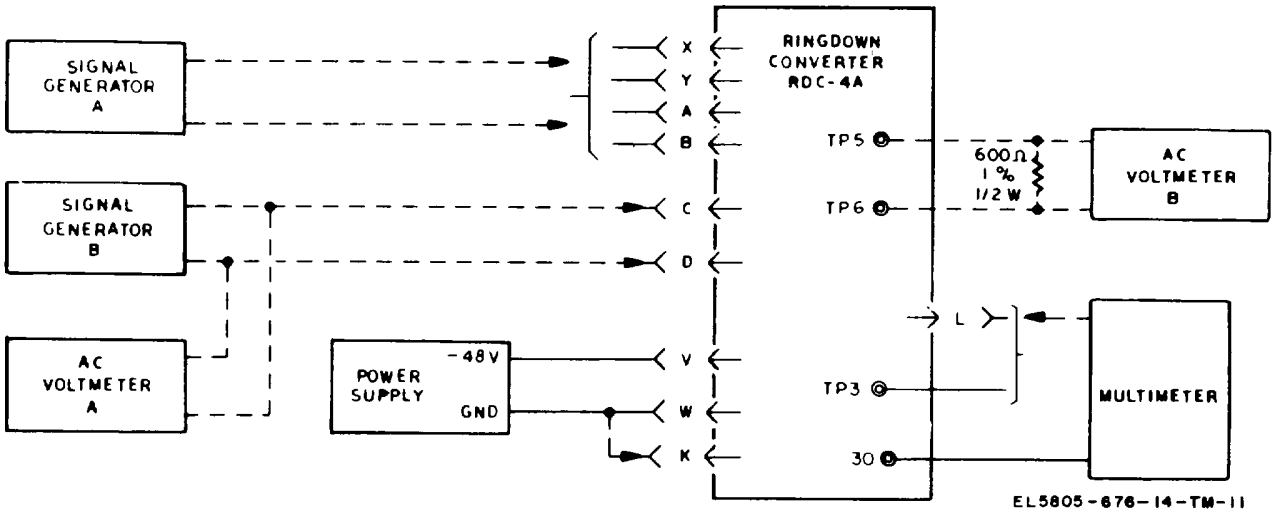


Figure 5-3. Ringdown converter, bench test setup.

Table 5-3. Ringdown Transmit/Receive Performance Test

Test conditions	Meter connections	Performance standards
a. Check forward/back resistance of diodes CR1-CR4. Forward resistance should be approx 750 ohms. Reverse resistance should be 4500 ohms (ratio is approximately 1 to 6).		
b. Remove existing strapping on the module and strap the following terminals: 2-3, 4-5, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 22-23, 25-26, 28-29, and 30-31.	None	N/A
NOTE If applicable, record operational strapping to facilitate restrapping at the completion of testing.		
c. Connect test setup as shown figure 5-3 with Signal generator A connected to pin X and Y, power supply only connected to pins V and W. Adjust signal generator for 20 Hz at 2 vrms.	(1) Ac voltmeter B, without termination resistor, across TP5 and TP6.	(1) 2 vrms.
d. Jumper pin W (gnd) to pin K, and check that 20 Hz (2 vrms) source removed from TP5-TP6.	(2) Multimeter connected between pin L (-) and terminal 30 (+). Ac voltmeter B, without termination resistor, across TP5 and TP6.	(2) -48 volts dc. Voltage reading of appro 0.5 volts
e. Disconnect signal generator A from pins X and Y.	None.	N/A
f. Connect signal generator B to pins C and D. Adjust signal generator B for 1000 Hz output at 0 dbm level. Maintain this level for remainder of test.	(1) Ac voltmeter A across pins C and D. (2) Ac voltmeter B across TP5 and TP6.	(1) 0 dbm 0 dbm ±0.6 db
g. Connect 600 ohm termination resistor acrossTP5 and TP6.	Ac voltmeter A across pins C and D.	-6 dbm
h. Disconnect jumper from pin K.	(1) Ac voltmeter A across pins C and D.	(1) -6 dbm ±0.5 db
C2) Ac voltmeter B across TP5 and TP6.	(2) 0 dbm	
i. Disconnect ac voltmeter A, 600 ohm terminal-. tion resistor, and signal generator B.	None	N/A
j. Connect signal generator A to pins A and B and adjust for 20 Hz at 2 vrms output.	Ac voltmeter B across TP5 and TP6.	2 vols rms
k. Jumper pin W (gnd) to pin K.	None.	N/A
l. Connect multimeter across diode bridge CR1-CR4 with positive lead connected to the cathodes of CR1 and CR4 and negative lead connected to anodes of CR2 and CR3.	Multimeter across junction CR2-CR3 (-) and CR1-CR4(+)	Approximately +0.55 volts dc
m. Disconnect multimeter from bridge, and apply-48 volt power across diode bridge (+) to junction of cathodes of CR1-CR4 and (-) to junction of anodes of CR2-CR3.	Multimeter connected between TP3 (-) and terminal 30 (+).-	0 vdc
n. Reconnect signal generator B across pins C and D.	Ac voltmeter A across pins C and D.	-6 dbm ±0.5 db
o. Disconnect power and test equipment from module.	None.	N/A

CHAPTER 6

OFF-SITE MAINTENANCE

6-1. Scope of Off-Site Maintenance This chapter contains troubleshooting and maintenance procedures for fault isolation to a faulty part on the ringdown converter and repair of PC card. These procedures are performed by general support maintenance personnel as directed the maintenance allocation chart (app C).

6-2. Tools and Equipment

Refer to appendix B for a list of the repair parts authorized for general support maintenance of the ringdown converter and universal shelf. Tools test equipment required for off-site maintenance are listed, including performance testing, in paragraph 5-7a. One exception to this list of equipment is that Tool Kit, Electronic Equipment TK-100/G is required for general support maintenance.

6-3. Troubleshooting

On-site troubleshooting consists of isolating the malfunction on a ringdown converter to a replaceable part. After placing a faulty part, the performance test of paragraph 6-6 must be per- formed to determine if the performance of the repaired ringdown converter is satisfactory before it is returned to stock. Refer to table 6-1 for a detail troubleshooting procedure.

Table 6-1. Troubleshooting

Test conditions	Meter connections	Performance standards	Corrective action
a. Check forward/back resistance of diodes CR1-CR4.	Multimeter connected across each diode CR1-CR4 inturn	750 ohms forward 4500 ohms reverse.	Replace diode
b. Remove existing strapping on the module and strap the following terminals: 2-3, 4-5, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 22-23, 25-26, 28-29, and 30-31. **NOTE** If applicable, record operational strapping to facilitate restrapping at the completion of testing.	None	N/A	N/A
c. Connect test setup as shown in figure 5-3 with signal generator A connected to pins X and Y power supply only connected to pins V and W. Adjust signal generator for 20 Hz and 2vrms output.	(1) Ac voltmeter B without termination resistor, across TP5 and TP6. (2) Multimeter connected between pin L(-) and terminal 30 (+).	(1) 2 vrms (2) -48 volts dc	Check ballast lamp DS1. If lamp is not faculty, replace relay K2. Check resistor R2. If resistor is not faulty, replace relay K1.
d. Jumper pin W (gnd) to pin K, and check that 20 Hz (2vrms) source is removed from TP5-TP6.	Ac voltmeter B, without termination resistor, across TP5 and TP6.	Approx .05 volts ac.	Replace faulty relay K2.
e. Disconnect signal generator A from pins X and Y.	None	N/A	N/A
f. Connect signal generator B to pins C and D. Adjust signal generator B for 1000 Hz output at 0 dbm level. Maintain this level for remainder of test.	(1) Ac voltmeter A across pins C and D. (2) Ac voltmeter B across TP5 and TP6.	(1) 0dbm 0dbm ±0.25 db.	N/A Check diodes CR1-CR4 and capacitor C1. Replace faulty part.
g. Connect a600 ohm termination resistor across TP5 and TP6.	Ac voltmeter A across pins C and D.	-6dbm	N/A
h. Disconnect jumper from pin k.	(1) Ac voltmeter A across pins C and D. (2) Ac voltmeter B across TP5 and TP6.	(1) -6 dbm ±0.5 db (2) 0dbm	(1) Check resistor R1 and capacitor C2. Replace faulty part. (2) N/A
i. Disconnect ac voltmeter A, 600 ohm termination resistor, and signal generator B.	None	N/A	N/A
j. Connect signal generator A to pins A and B. Adjust signal generator A for 20 Hz at 2 vrms output	Ac voltmeter B across TB5 and TP6.	2vrms	N/A
k. Jumper pin W 9gnd) to pin K.	None	N/A	N/A
l. Connect multimeter across diode bridge CR1-Cr4 with positive lead connected to the cathodes of CR1 and CR4 and negative lead connected to anodes of CR2 and CR3.	Multimeter across junction of CR2-Cr3 (-) and CR1-CR4 (+).	Approx +0.55 volts dc	Check diodes CR-1CR4 and capacitor C1. Replace faulty part.

Test conditions	Meter connections	Performance standards	Corrective actions
m. Disconnect multimeter from bridge, and apply -48 volt power across diode bridge (+) to junction of cathodes of CR1-CR4 and (-) to junction of anodes of CR2-Cr3.	Multimeter connected between TP3 (-) and terminal 30 (+)	0 vdc	Replace relay K1
n. Reconnect signal generator B across pins C and D.	Ac voltmeter A across pin C and D.	-6 dbm ±0.5 db	Check resistor R3 and capacitor C3. Replace faulty part.
o. Disconnect power and test equipment from module.	None	N/A	N/A

6-4. Maintenance Of The Ringdown Converter

Upon removal of the ringdown converter from the universal shelf all parts on the module (fig. B-3 are readily accessible. Replacement of part determined faulty by troubleshooting are the responsibility of off-site maintenance. When replacing any detail part, use standard precautionary procedures, such as low-voltage soldering iron heat-sink, etc., as described in TB Sig 222 to avo8 damage to the part or printed-circuit wiring.

6-5. Maintenance Of The Universal Shelf

Continuity testing of the universal shelf is performed to isolate a faulty connector or printed-circuit wiring. Once a connector on the universal shelf has been determined faulty, replacement of the connector or repair of the PC card is accomplished as described in paragraph 5-6 and TB Sig 222, respectively.

6-6. Ringdown Converter, General Support Testing Procedures

The performance test given in paragraph 5-7 is also applicable to general support maintenance.

APPENDIX A
REFERENCES

The following publications contain information applicable to the operation and maintenance of the equipment

DA Pam 310-4	Index of Technical Publications: Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
U.S. Army Equipment Index of Modification Work Orders.	
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.
Solder and Soldering.	
TM 11-5805-6614&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Pats and Special Tools Lists) for Universal Rack 90409001-00, and Panel, Fuse SB-3800/FTC. (Stelma FP-15/30) (NSN 59200-598-0469) (Line Conditioning Equipment).
The Army Maintenance Management System (TAMMS).	
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for CV-3250/FTC, MX-9664/FT and Universal Shelf. It authorizes categories maintenance for specific maintenance function 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.

B-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of item by comparing its physical, mechanical, and/ electrical characteristics with established standards through examination.
b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical electrical characteristics of an item and comparing those characteristics with prescribed standards.
c. Service. Operations required periodically keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, 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 setting the operating characteristics to the specified parameters.
e. Align. To adjust specified variable elements an item to bring about optimum or desire performance.
f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used precision measurements. Consists of comparison 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 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.

B-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, assemblies, 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 specifies, by the listing of a “worktime” 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 “worktime” figures will be shown for each category. Th number of task-hours specified by the “worktime” 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 condition 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
D- Depot

e. Column 5, Tools and Equipment. Column specifies by code, those common tool sets (no individual tools) and special tools, test, and support equipment required to perform the designate function.

f: Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark ii section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (sec III)

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.

B-5. Remarks (sec IV)

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

PLUG-IN UNIT, RINGDOWN CONVERTER CV-3250/FTC, EXTENDER, PRINTED WIRING BOARD MX-9664/FTC, AND UNIVERSAL SHELF 90409000-000

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
00	UNIVERSAL SHELF (90409000-000)	Replace			0.1			8	
		Inspect	0.2						
		Test	0.5					3	
		Service	0.2						
		Repair			0.8			3,8	A
		Repair				1.5		3,7	
00	PLUG-IN NIT, RIN N CERR CV-3250/FTC (RDC-4A)	Inspect		0.1					
		Test			0.5			1 thru 6, 8,9	
		Replace			0.1				
		Overhaul				0.5		1 thru 7,	
		Repair		0.2					B
00	EXTENDER, PRINTED WIRING BOARD MX-9664/FTC (80409160-000)	Inspect		0.1				3	
		Test		0.1					
		Replace			0.1				
		Repair				1.5		3,7	
	NOTE DIRECT SUPPORT (F) LEVL MAINTENANCE OPERTIONS FOR FIXED PLANT EQUIPMENT LOCATED OCONUS, WILL BE PERFORMED BY OFF SITE (AMSF) PERSONNEL.								

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
PLUG-IN UNIT, RINGDOWN CONVERTER CV-3250/FTC, EXTENDER, PRINTED-WIRING BOARD MX-9664/FTC, AND UNIVERSAL SHELF 904000-000

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	F,H	CONNECTOR RECEPTACLE, ELECTRICAL 22 PIN (WINCHESTER HBD22WO-4080)		
2	F,H	GENERATOR, SIGNAL AN/USM-264 (HP-652A) (2 EA)	6625-00-935-4214	
3	F,H	MULTIMETER AN/USM-223 (SIMSON 260)	6625-00-999-7465	
4	F,H	POWER SUPPLY PP-6547/U 9HP-6206B)	6625-00-823-5359	
5	F,H	RESISTOR, FIXED FILM, 600 OHMS, 1%, 1/2W, RN70B600F, MIL-R-10509	5905-00-542-9532	
6	F.H	TERMINAL BOARD, 22 TERMINALS (KULKA ELECTRIC JN113062-138)	5940-00-433-0846	
7	H	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
8	F	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
9	F,H	VOLTMETER, ELECTRONIC AN/USM-265 (HP-400EL02) (2 EA)	6625-00-935-4294	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	REPLACE CONNECTOR ON PC BOARD
B	REPLACE LAMPS

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

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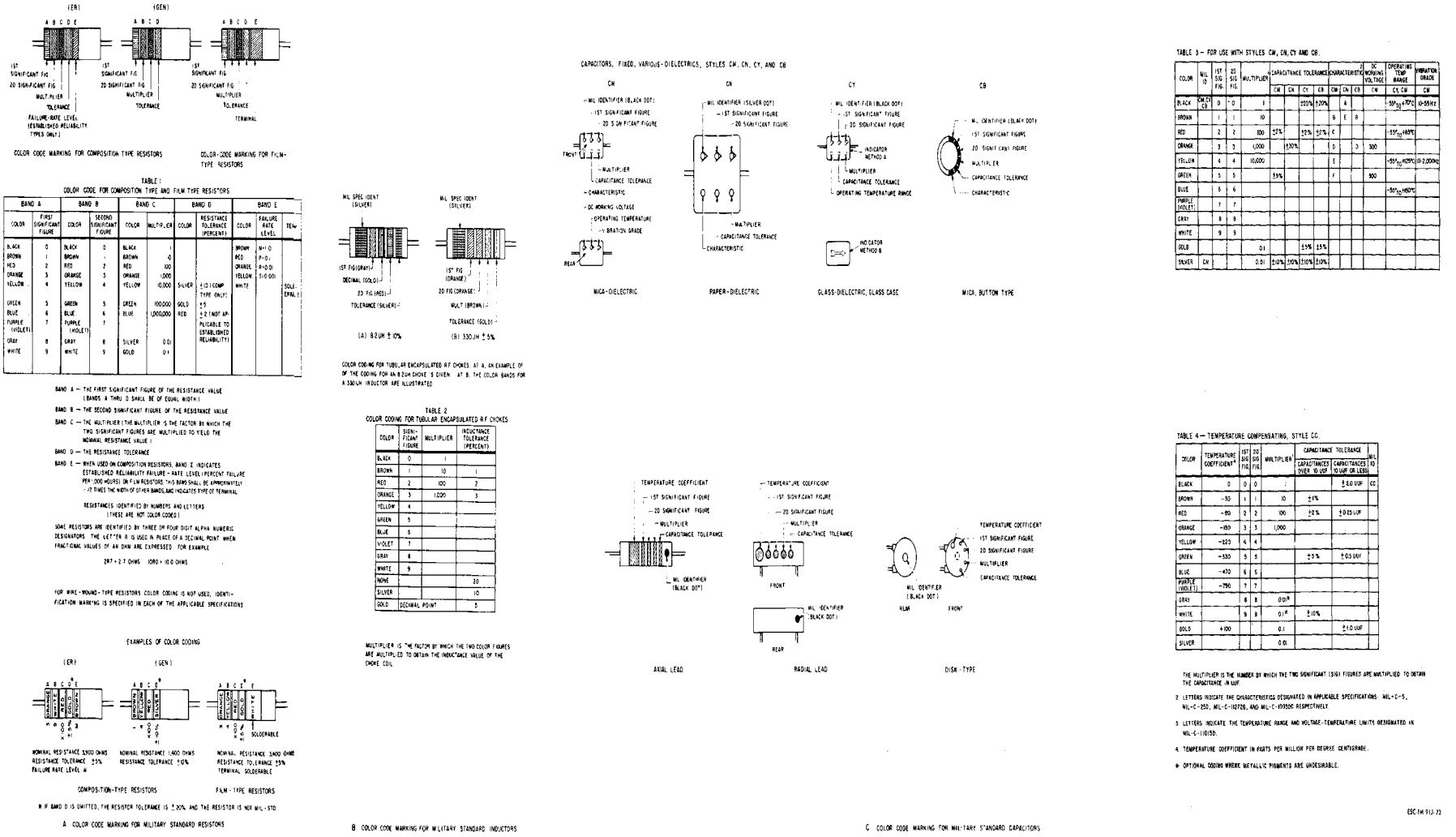

Figure FO-1. Color code markings for MIL-STD resistors, inductors, and capacitors.

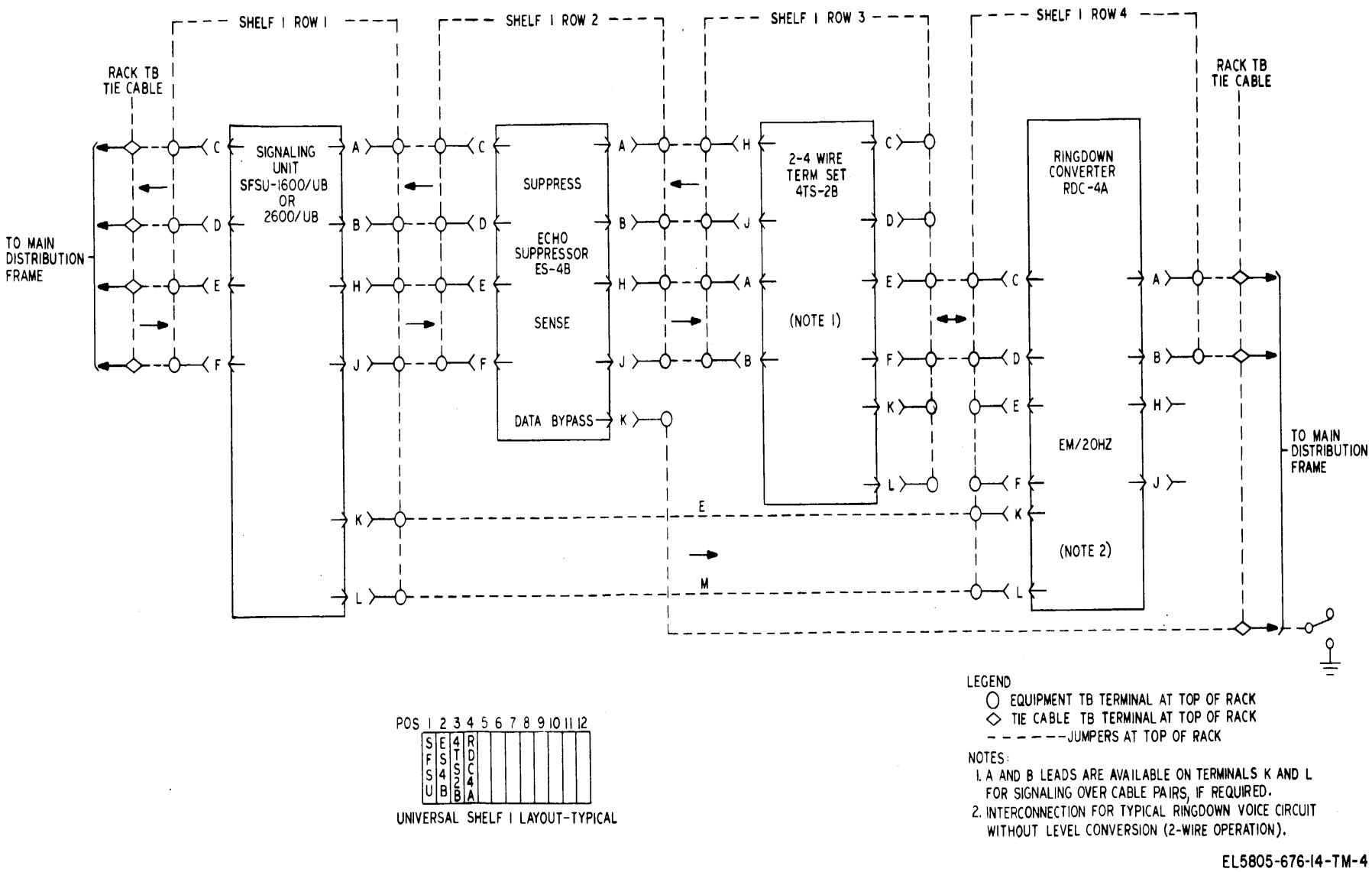

Figure FO-2. Ringdown converter, typical system application

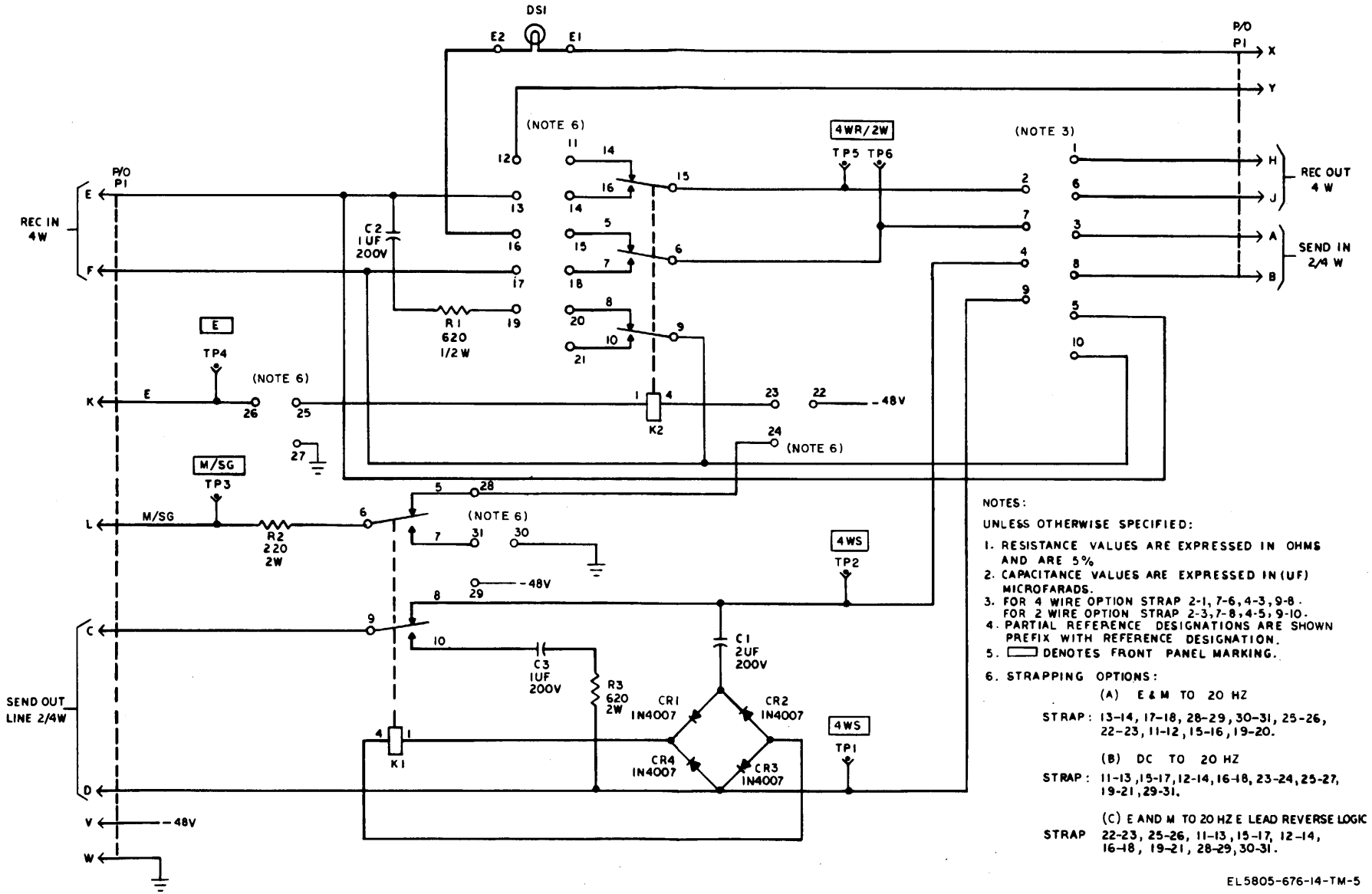

Figure FO-3. Ringdown converter RDC-4A, schematic diagram.

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