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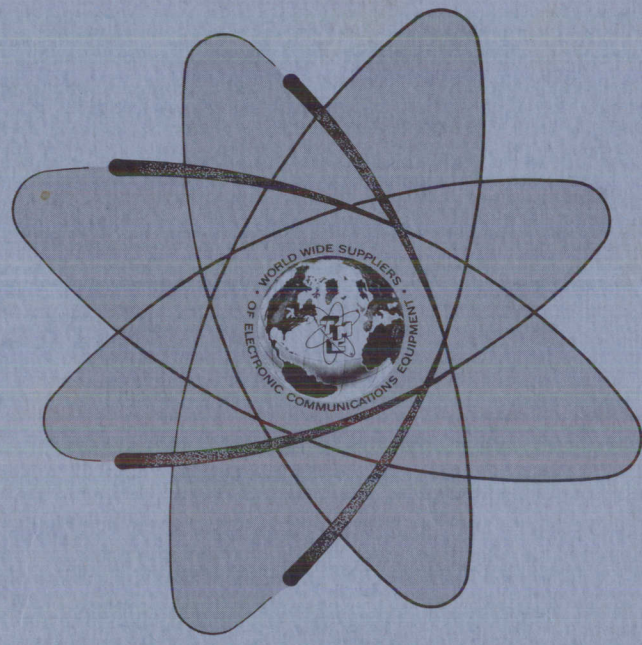
for

RADIO RECEIVING SYSTEM MODEL COR-4B

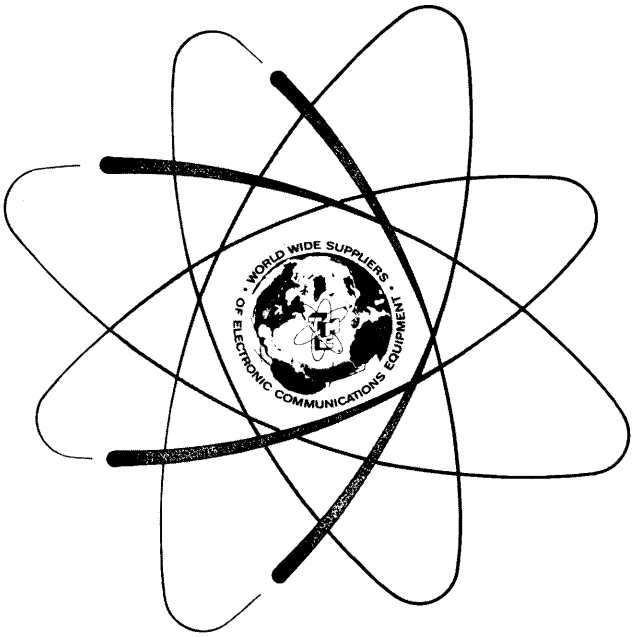


THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, ONTARIO

TECHNICAL MANUAL

for

RADIO RECEIVING SYSTEM MODEL COR-4B



THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, ONTARIO

Printed in U.S.A.

IN 3024 Issue Date: FEB 1971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THE TECHNICAL MATERIEL CORPORATION
COMMUNICATIONS ENGINEERS
700 FENIMORE ROAD MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes*furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

CHANGE NO. 1

INSTRUCTION BOOK CHANGE NOTICE

Date October 28, 1971

Manual affected: Radio Receiving System Model COR-4B( ) IN 3024

Please make the following pen and ink corrections:

1. On page 6-1/6-2 change:

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1	Resistor, Wirewound, Fixed: 25 ohms, 20 watts	RW110-6

2. On figure 7-1 change the value of R1

   from 50 ohm, 25 W TMC number RW111-7

   to 25 ohm, 20 W TMC number RW110-6

3. All references to HFD-1S in the technical manual should be read as HFD-3.

SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, New York

Attn.: Director of Eng. Services.

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

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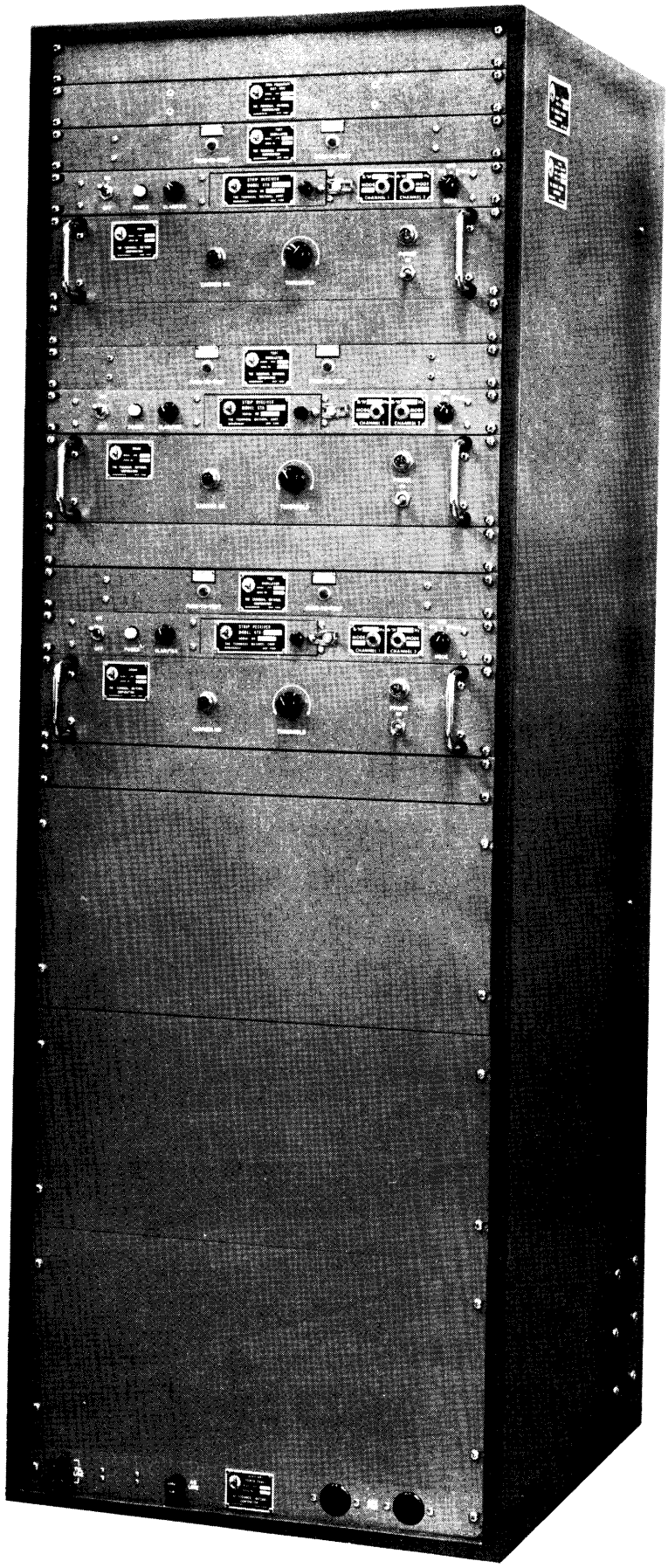


Figure 1-1. Codan Operated Receiver, Model COR-4B( )

SECTION 1

GENERAL INFORMATION

1-1. GENERAL DESCRIPTION

The CODAN Operated Receiver, Model COR-4B( ) (figure 1-1), is a transistorized, multi-channel, fixed tuned, 2 to 16 MHz (extended range to 32.0 MHz available on special order) receiving system designed for use in radio-telephone communications systems where received-signal quality is of prime importance. The COR-4B(1) is a single channel system. Each channel is independently operated and comprised of a receiver (STR), an anti-noise device (CDN), a test oscillator (RTO-1A) and part of an antenna distribution unut (HFD); refer to figure 1-2. The COR-4B(2) is a two channel system. The Antenna Distribution Unit Model HFD-1S will feed 1, 2, 3 or 4 channels. A COR-4B(4) requires one HFD-1S, four RTO-1A's, four STR-5A/U's, four CDN-3A's. Test circuitry incorporated in the COR allows the operator to check each channel's performance from a remote location (operator's site) or at the COR, if desired. Remote panel lamps may display power failure and channel activity; dry-contact keying circuitry (compatible with existing radio-telephone equipment) may be wired for remote indication. The COR operates on 115/230 vac power; in the event of ac failure, automatic and instantaneous conversion to battery power is achieved without interruption of service. It is recommended that a separate battery be used for each channel. The battery connections may be paralleled, if the battery supply is capable of handling the required current drain for the system. During ac operation, the battery supply is trickle charged.

CAUTION

TO PREVENT DAMAGE TO THE EQUIPMENT, DISCONNECT THE PARALLEL CONNECTIONS BETWEEN EACH CHANNEL WHEN REMOVING THE BATTERY SUPPLY AND WHEN THE SYSTEM IS TO BE OPERATED WITHOUT A BATTERY SUPPLY.

The COR-4B( ) system may be mounted in a standard 19 inch rack or mounted in a weatherproof fiberglass case designed for outdoors. When mounted in the weatherproof case, a thermostatically controlled fan ventilates the fiberglass case to prevent overheating due to absorption of heat from the sun. A COR-4B(1) requires 8-3/4 inches of rack height. Since one HFD-1S will feed up to four channels, each additional receiver channel requires an additional 7 inches of rack height. The maximum depth of the units is 24 inches.

A Model APP-14 may be supplied for use as an interconnect and accessory power panel. A Model FX-254, narrow bandpass filter, is installed on each output of the HFD-1S feeding the antenna input of each STR-5A/U.

1-2. DESCRIPTION OF MODULAR UNITS

a. General - Paragraphs b through f below give a brief description of the modular units which comprise the COR-4B( ). For more detailed information pertaining to any of these units, refer to the individual modular-unit manual.

b. Strip Receiver, Model STR-5A/U - Strip Receiver STR is a transistorized, double-conversion, superheterodyne communications receiver that utilizes a fixed-tuned, plug-in module (Model TTRR) for its rf section. A crystal filter, when supplied, is employed in the antenna input to the rf modules and provides a 6 kHz bandpass at the customer-selected frequency. A change in operating frequency must be accompanied by a corresponding change in the crystal filter. A RECEIVER CLARIFIER control (located on front panel of TTRR) provides fine-tuning of the crystal controlled local oscillator. The STR produces two IF outputs and two separate audio outputs. The audio outputs are: one SSB and one AM/AME output each with up to +10 VU output at 600 ohms balanced or unbalanced. Additionally there are high impedance outputs (standard phone jacks) for monitoring the audio outputs. A front panel selector switch (MODE) selects the AGC to be used in the system. A squelch circuit is used with the SSB channel and to eliminate reception of noise or of signals below a specific level, thus preventing operator fatigue. A remote indication of SSB reception is provided.

c. Carrier Operated Anti-Noise Device, Model CDN-3A - The CDN is a compact, solid-state, receiver-controlled unit that electronically determines the type of signal being received, SSB or AM/AME, from the STR receiver. The SSB audio is allowed to pass from the unit as long as an AM/AME signal is not being received. When an AM/AME signal is received the Codan relay energizes, shifting from SSB audio to the AM/AME audio. A visual indication of the reception of an AM/AME signal is provided by a front panel CARRIER ON lamp. Remote indications of the type of signal (SSB or AM/AME) being allowed to pass and of ac power failure are provided. The Codan relay also controls the BFO in the STR receiver. When an AM/AME signal is received, and the Codan relay energized, the BFO is cut off. The CDN requires only a sample of the STR IF frequency for operation; this feature allows signal flow to continue through the receiver undisturbed and with no loss of quality.

d. Receiver Test Oscillator, Model RTO-1A - Receiver Test Oscillator, RTO, is a two-channel, crystal-controlled signal generator that provides a modulated signal in the 2 to 4 MHz frequency range. This frequency coverage is compatible with coastal radio-telephone communications systems; extended coverage is available upon special order. A front-panel PUSH-TO-TEST button applies operating voltage to the RTO circuits; operating voltage may also be applied from a remote location. Within the COR receiving system, the output of the RTO (when used) is applied to the antenna of Strip Receiver STR.

e. Antenna Distribution Unit, Model HFD-1S - Antenna Distribution Unit, HFD, is a passive antenna distribution device that provides four outputs from a single antenna input.

f. Auxiliary Power Panel, Model APP-14 - Auxiliary Power Panel, APP, is comprised of two fused power receptacles, two telephone jacks, and one fuse. The power receptacles facilitate connection of external test or repair equipment to the ac source. The telephone jacks facilitate connection of a telephone headset to an external telephone line.

1-3. TECHNICAL SPECIFICATIONS

Technical specifications for the COR are listed in Table 1-1.

TABLE 1-1. TECHNICAL SPECIFICATIONS

Frequency Range	A customer selected frequency in the 2 to 16 MHz range (extended range to 32.0 MHz available on special order). Frequency coverage is dependent upon rf module (TTRR) employed in Strip Receiver STR.
Sensivity	SSB: 1 microvolt, 15 db signal-plus-noise to noise ratio. AM/AME: 3 microvolts, 10 db signal-plus-noise to noise ratio.
Frequency Control	Crystal controlled oscillators are used throughout (1 part in 10^6).
Types of Reception	AM (6A3), AME (A3H), SSB (A3A, A3J).
IF Bandwidth	AM: 6 kHz ±2 db. SSB: 3 kHz ±2 db.
Image Rejection	a. With the Antenna Filter: 120 db or greater. b. Without Filter: mimimum of 50 db from 2 to 28 MHz; a minimum of 40 db from 28 to 32 MHz.
AGC	No more than 10 db increase in output for input variations from 1 uv to 100,000 uv.
Antenna Input Impedance	50 ohms unbalanced receiver input with antenna coupler high impedance.
Audio Output	1. One output adjustable up to +10 VU into 600 ohm line (balanced or unbalanced). 2. SSB and AM/AME high impedance monitor jacks on front panel. 3. The 600 ohm audio output is SSB audio until an AM or AME signal is received, causing the CDN to switch to the AM or AME audio.
Power Requirements	24 vdc or 115 vac ±10%, 50-60 cps, single phase. 12 vdc required for remote control of test oscillators.
Emergency Batteries	Case provided for customer supplied 24 volt battery supply. COR provides 100 ma charging current during ac operation; each receiver channel draws approximately 300 ma inactive and approximately 400 ma active, when receiving a signal.
Environmental Conditions	Operable from $0^{\circ}C$ ($32^{\circ}F$) to $50^{\circ}C$ ($122^{\circ}F$) with relative humidity up to 95%.

TABLE 1-1. TECHNICAL SPECIFICATIONS (continued)

Dimensions	19 inch panel height per unit: STR-5A/U 1.75 inches RTO-1A 1.75 inches CDN-3A 3.50 inches HFD-1S 1.75 inches APP-14 1.75 inches
Remote Controls	1. SSB test oscillator. 2. AM test oscillator.
Remote Indications	1. Reception of AM signal. 2. Reception of SSB signal. 3. AC power failure.

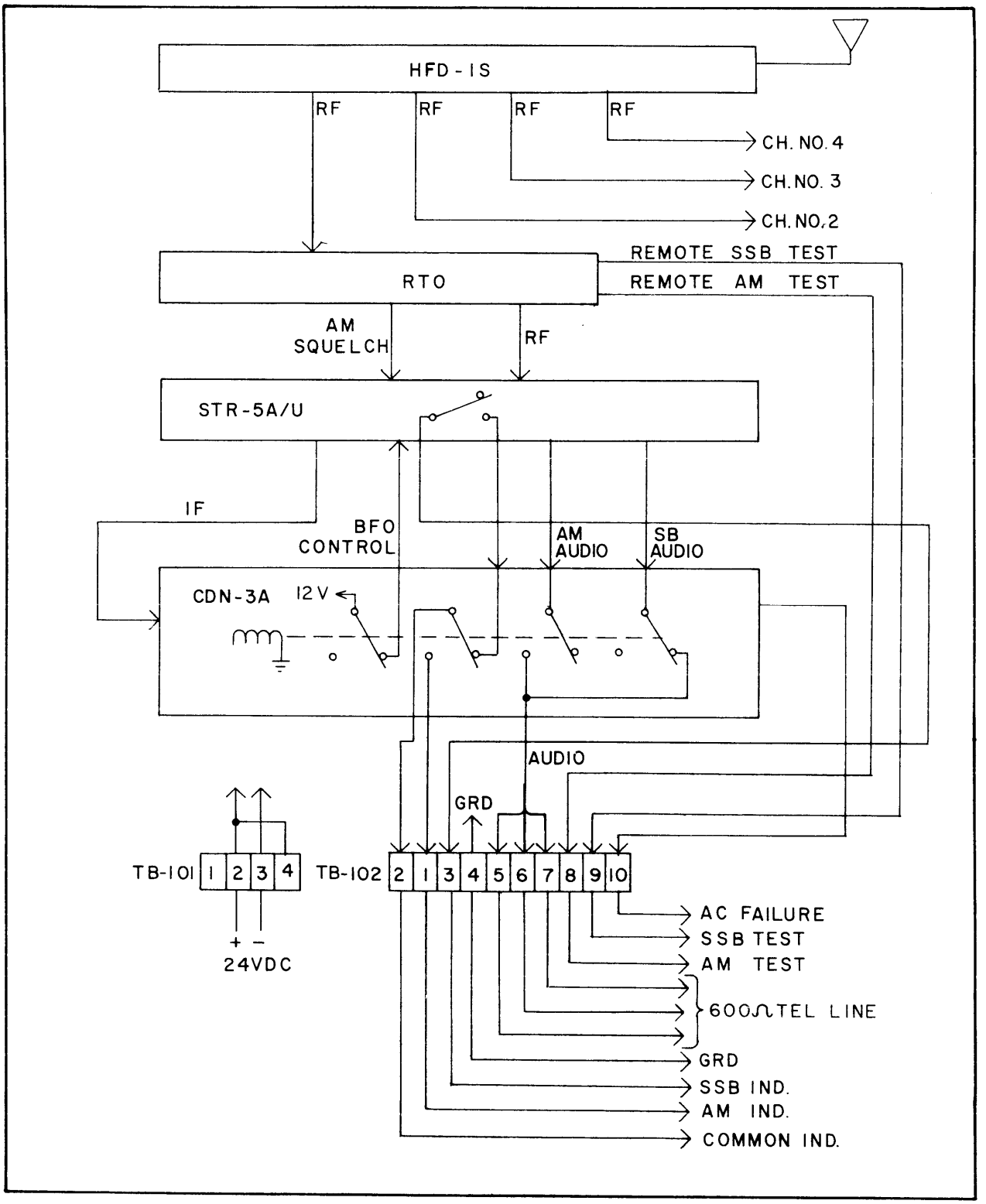


FIGURE 1-2: SIMPLIFIED BLOCK DIAGRAM COR-4B( )

SECTION 2

INSTALLATION

2-1. UNPACKING AND HANDLING

Each COR has been calibrated and tested at the factory before shipment. When the equipment is received at the operating site, inspect the packing cases and their contents immediately for possible damage; unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as "loose items" (technical manuals, connectors, mounting hardware, etc.). With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. POWER REQUIREMENTS

The COR is designed for either 115 volt ±10%, 50 to 60 cps single phase ac power or 24 volt dc battery power. An additional 12 volt dc supply is required for remote control of Receiver Test Oscillators.

2-3. INSTALLATION

The weather proofed COR and battery case are designed for outside installation as shown in figure 2-1.

NOTE

The Rack mounted units are installed as shown in figure 1-1.

When determining ultimate location, two factors are important:

(1) The COR must be located so that front-panel controls and rear-panel connections are readily accessible.

(2) The area around the air-intake port (in the base of the cabinet) should be kept clear of obstructions.

a. To install the weather proof COR, proceed as follows:

NOTE

All item numbers given in this procedure are referenced to figure 2-2.

(1) Release clamping catches and remove front and rear covers.

(2) Refer to figures 2-2 and 2-3. At bottom of case install feed-through insulator (item 1). Inside case, connect cable CA480-129-13 to insulator.

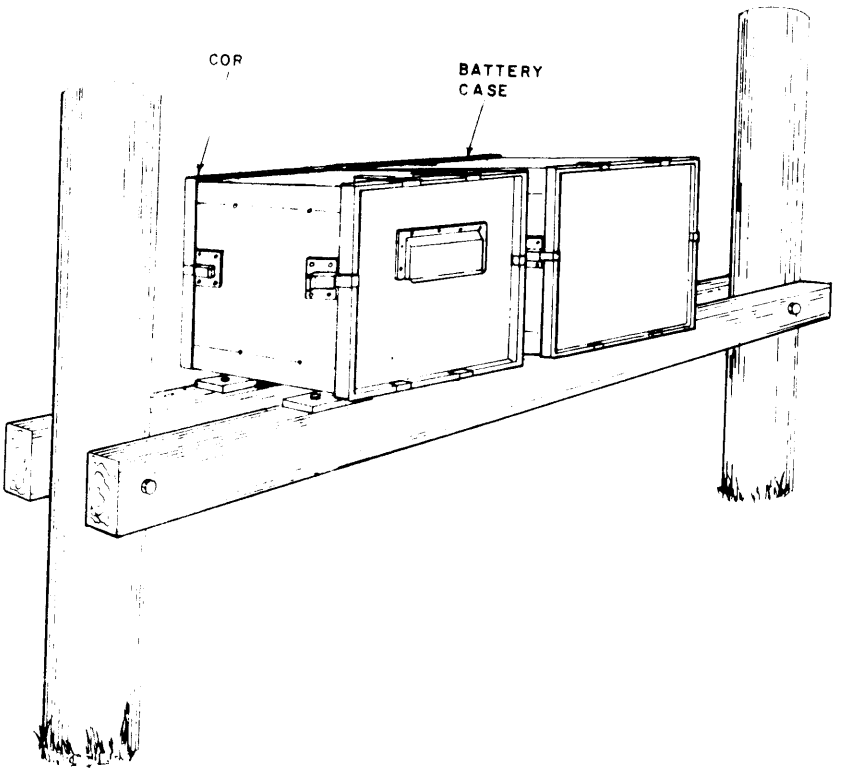
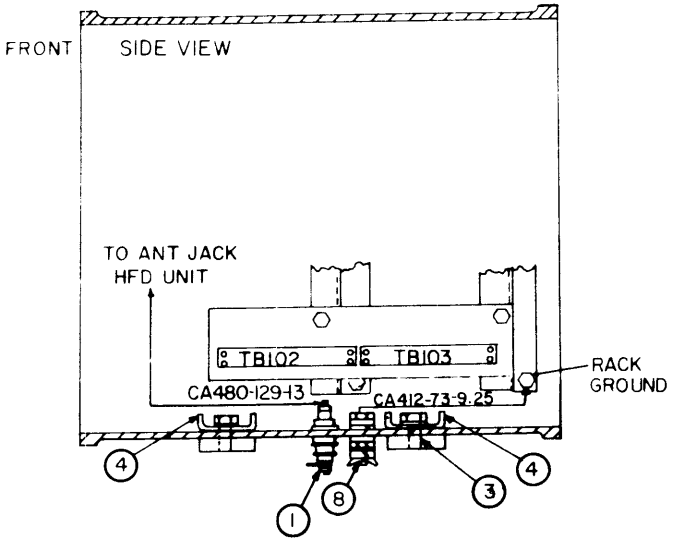
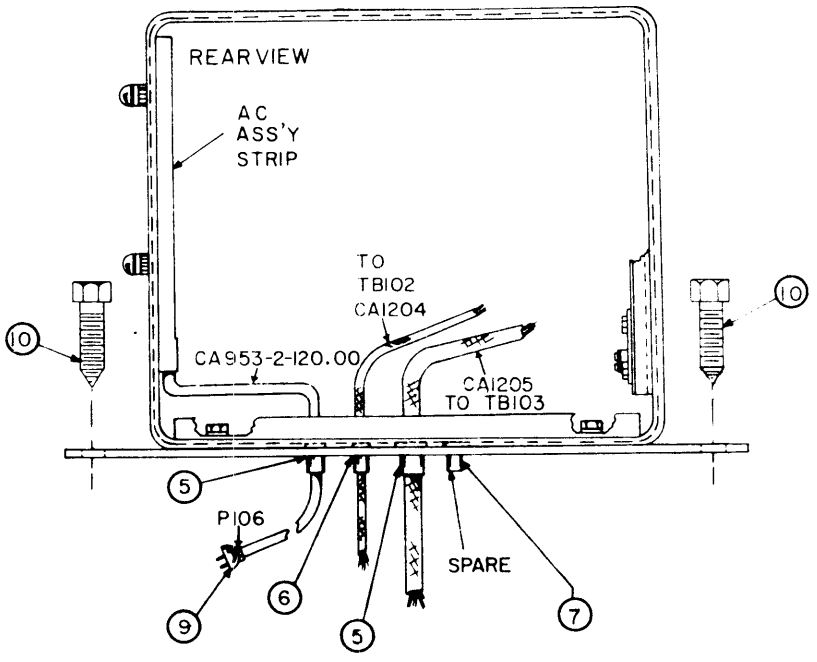
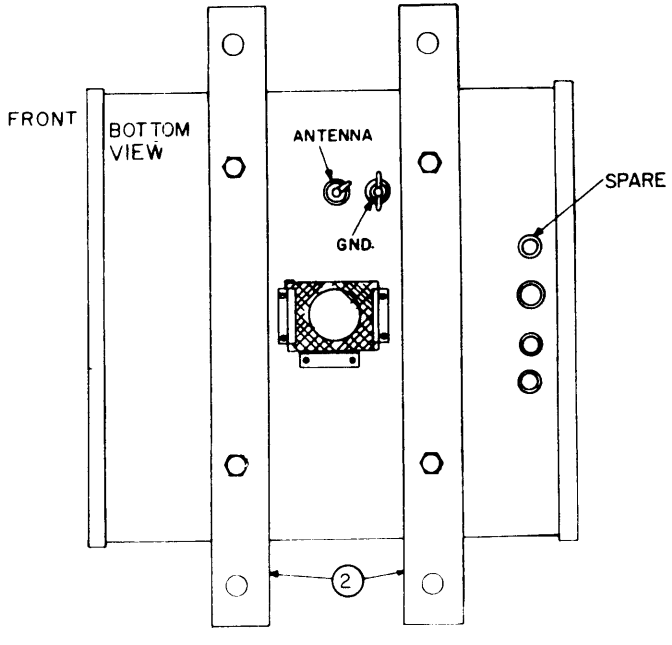


Figure 2-1. Typical Weather Proof Installation, COR-4B( )





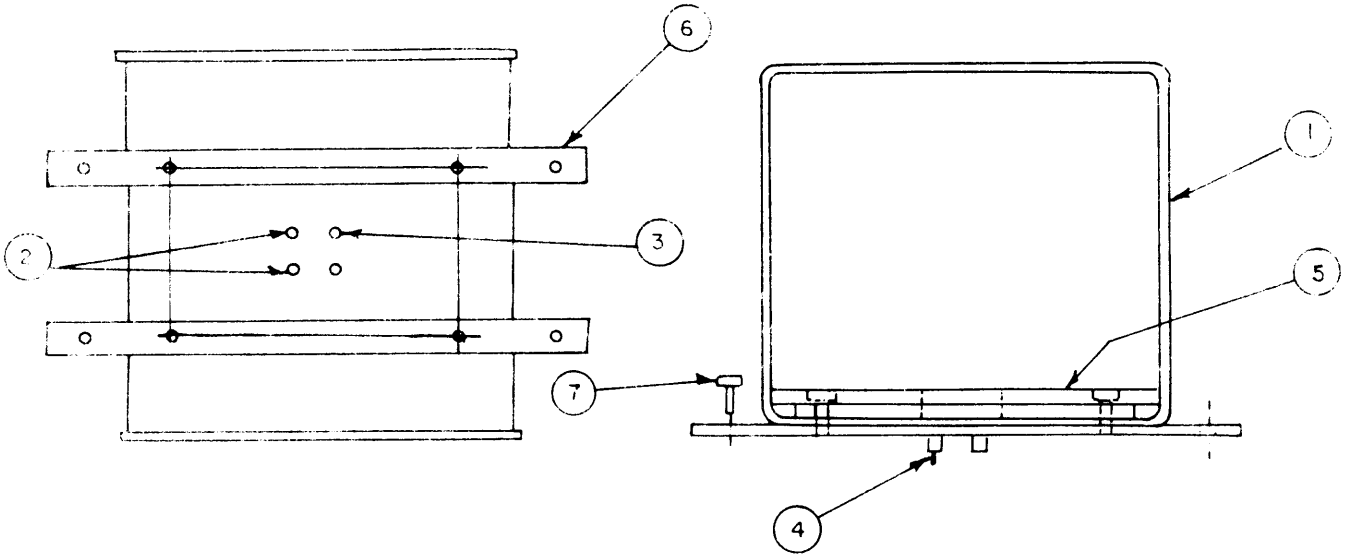


ITEM NO.	QTY	ITEM	TMC PART NO.
1	1	Insulator, Feed Through	A5490
2	2	Plate Mounting Unit	PM1287
3	4	Bolt, Machine with lockwasher	SCHH3118BN12/LW-S31MRN
4	2	Stiffener, Case	PM1301
5	2	Stuffing Tube with 2 flat washers and 2 round gaskets	PO-206-2/FW100-10AE/GA140-BN4
6	1	Stuffing Tube with 2 flat washers and 2 round gaskets	PO-206-3/FW100-9AE/GA140-10N4
7	1	Stuffing Tube with 2 flat washers and 2 round gaskets	PO-2-6-1/FW100-24-AE/GA140-12N4
8		*Ground Hardware	
9	2	AC Connector (P106)	PL218
10	4	Bolts, Lag	SC111-7
	2	**Plug, Telephone	PJ055B
	1	***Serv Ext. Module	AX436

* Shipped as part of COR case.
** Used for connection to PHONES jack on STR.
*** Used to test modules in STR.

383-4

Figure 2-2. Weather Proof Installation Data, COR-4B( )



ITEM NO.	QTY	ITEM	TMC PART NO.
1	1	Stuffing Tube with 2 flat washers and 2 round gaskets	PO206-1 FW100-24-AE GA140-12N4
2	1	Stuffing Tube with 4 flat washers and 4 round gaskets	PO206-2 FW100-10-AE GA140-8N4
3	1	Button, Plug, Vent	HB103
4	1	Rubber Stopper	RY114-77700
5	1	Tray, Battery Mount with 4 flat washers and 4 machine bolts and 4 lock, split, washers	WD143 FW31HBN SC-HH3118BN26 LWS31-MRN
6	2	Plate Mounting Unit	PM1267
7	4	Bolt, Lag	SC111-7

Figure 2-3. Weather Proof Installation, Battery Case

(3) Install two plate mounting units (items 2 and 3) and case stiffeners (item 4).

(4) Install four stuffing tubes (items 5, 6 and 7).

(5) Inside case, remove nut on bolt at bottom of rack; connect free end of cable CA412-73-9.25 (other end of cable is connected to ground, item 8) to bolt. Replace and tighten nut.

(6) Feed power cable CA953-2-120.00 through its associated stuffing tube until cable extends to its full length. If required, connect plug P106 (item 9) to free end of cable.

(7) Feed cables CA1204 and CA1205 through associated stuffing tubes; connect cables to their associated equipments as shown in figures 2-4 and 2-5.

(8) Connect antenna to feedthrough insulator (item 1); connect shield if used to ground (item 8).

(9) The two Tel Line jacks and convenience outlets located on Auxliary Power Panel APP are provided for customer convenience and should be wired in accordance with station requirements.

(10) Connect plug P106 (item 9), if used, to ac power source. If P106 is not used, connect ends of cable CA953-2-120.00 to ac power source.

(11) Using four lag bolts (item 10) bolt COR to supporting structure.

b. To install the weather proof battery case, proceed as follows:

NOTE

All item numbers given in this procedure are referenced to figure 2-3.

(1) Release clamping catches securing cover; remove cover.

(2) Install stuffing tubes (items 1 and 2).

(3) Install button plug vent (item 3) and rubber stopper (item 4).

(4) Install battery mount tray (item 5) and two plate mounting units (item 6).

(5) Install 24 volt battery supply into battery case.

(6) Connect cable CA1204 from COR to 24 volt battery supply (black wire is connected to positive terminal).

(7) Using four lag bolts (item 7) bolt battery case to supporting structure.

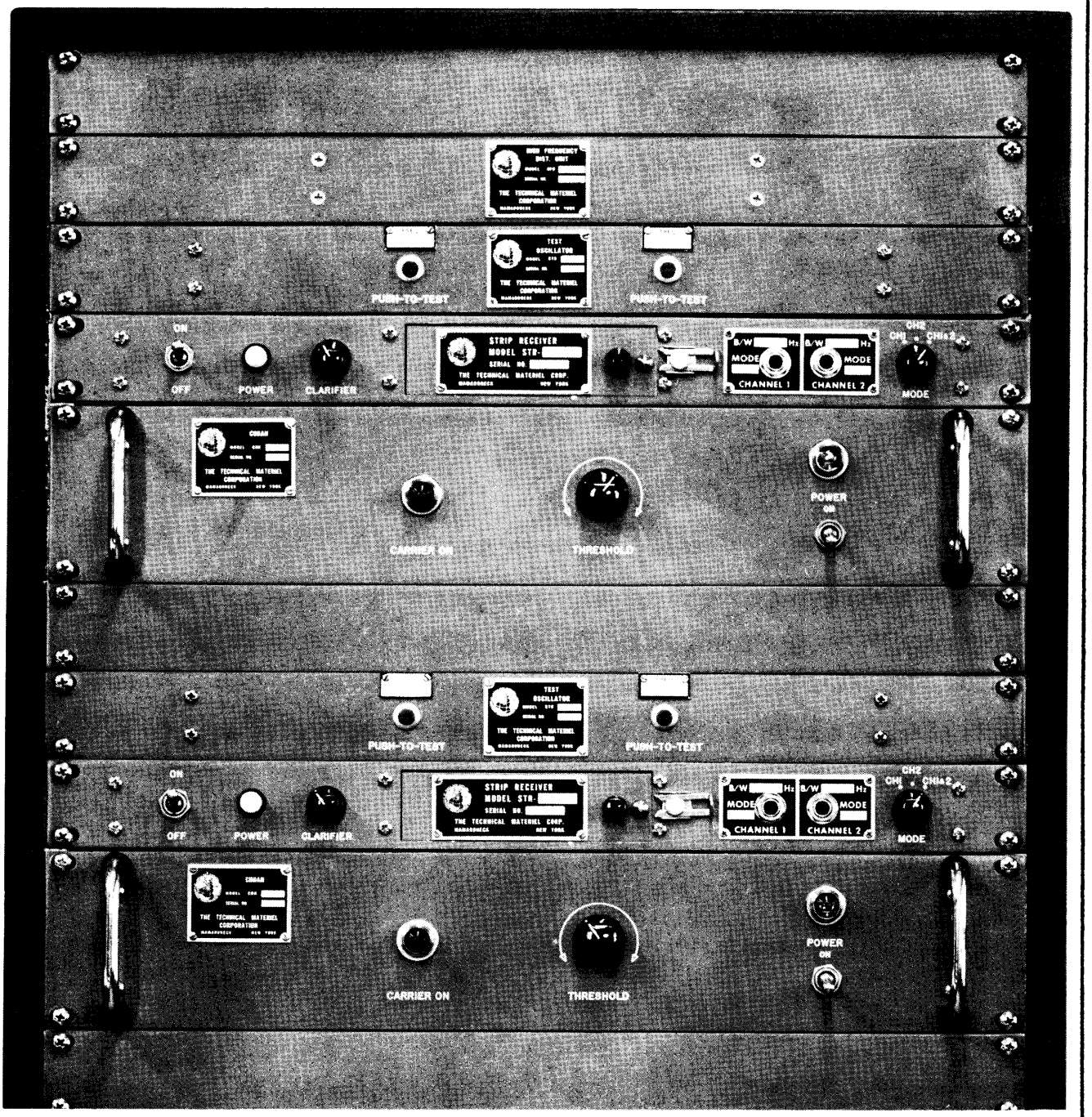


Figure 2-4. Typical Rack Installation, COR-4B( )

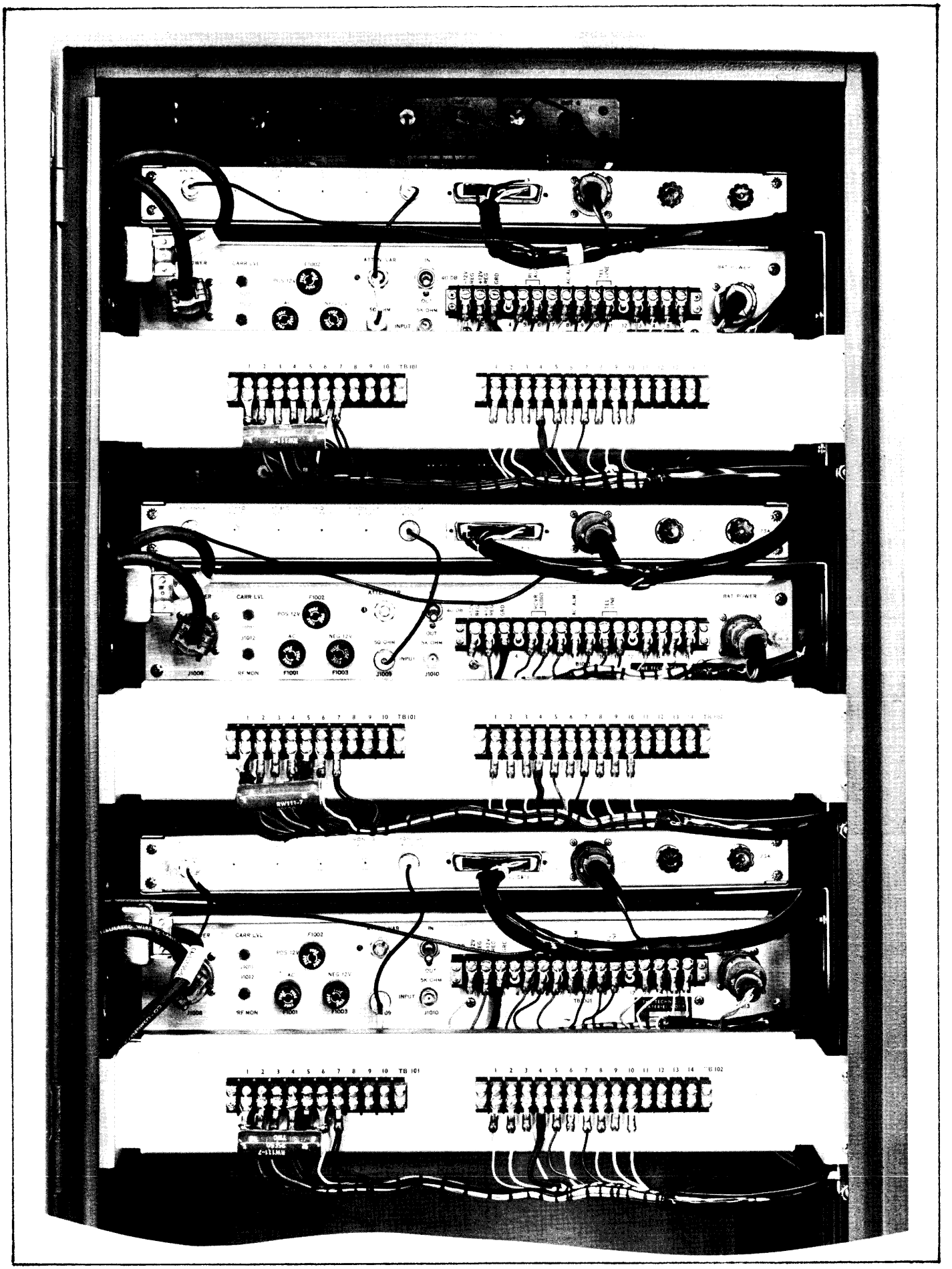


Figure 2-5. Interconnect Cabling Pictorial

c. To install the rack mounted units proceed as follows:

(1) The rack is to be fastened to a solid base and connected to the stations main ground system.

(2) Install the rack in a location so that approximately a two foot clearance is maintained; in the front to remove the units for maintenance, and in the rear in order to open the rear door for access to the rear of the units and terminal strips when the units are installed in the rack.

(3) If the units have been removed from the rack for shipment, reinstall them in accordance with figure 1-1 and 2-4.

(4) Interconnect the units in accordance with figure 2-5 and 7-1.

(5) A mating plug for the ac power input to the rack is supplied as a loose item (PL134). This should be used to make up a power cable (customer furnished) for the rack. The unit is shipped wired for 115 vac at 50/60 Hz.

CAUTION

INSURE THAT THE AC GROUND IS CONNECTED TO THE CORRECT TERMINAL. BEFORE CONNECTING AC POWER TO THE RACK, INSURE THAT ALL ON/OFF SWITCHES ON THE CDN'S and STR'S ARE IN THE "OFF" POSITION.

(6) Connect ac power to the rack.

(7) Connect an antenna to the ANT (J1) input of the HFD-1S. A plug (UG88/U) is furnished as a loose item to be used if needed for making the correct connection to the customer furnished cable.

(8) Make external connections, as required, for each receiving channel as follows (refer to figure 2-6):

FUNCTION	TO
(a) 600 ohm balanced or unbalanced audio output:	TB-102 term 5, 6, 7
(b) Common Ground:	TB-102 term 4
(c) Type of reception indicator: (a relay contact closure is furnished between pins. A indicator supply voltage is required depending on type of indicator being used)	
AM:	TB-102 term 1 and 2
SSB:	TB-102 term 2 and 3
(d) AM/AME and SSB test oscillators: (-12 vdc must be supplied to the appropriate terminal to activate the test oscillator)	
AM/AME:	TB-102 term 8
SSB:	TB-102 term 9

FUNCTION	TO
(e) AC power failure: (units operating on battery). NOTE: A contact closure to ground is furnished when ac power is lost.	TB-102 term 10
(f) A 24 volt wet cell battery may be connected if the automatic change-over from ac power to battery power is to be utilized. Connect the battery between terminals 2 (+12) and 3 (-12).	TB-101 term 2 and 3

NOTE

It is recommended that a separate battery be used for each receiving channel since each CDN furnishes a trickle charge to the connected battery.

CAUTION

DO NOT CONNECT TWO BATTERIES TO THESE TERMINALS WITH ONE TERMINAL OF EACH BATTERY GROUNDED. IF TWO 12 VOLT BATTERIES ARE TO BE USED, CONNECT THEM IN SERIES.

c. If a model APP-14 is to be used, it must be connected as per customer requirements (refer to figure 2-7).

2-4. INSTALLATION CHECKOUT PROCEDURE

Although each modular unit of the COR has been aligned and thoroughly checked against the manufacturer's specifications prior to shipment, it is necessary to insure correct installation (paragraph 2-3) and proper operating conditions for the COR by performing the following checkout procedure. Refer to Section 3 for the location and function of all operating controls and indicators.

Set controls as indicated below on each receiving channel:

1. Throw CDN POWER switch to ON position.

2. Throw STR ON/OFF switch to ON position.

NOTE

POWER lamp is disconnected (will not light).

With a dc voltmeter check between the following terminals and ground for the indicated voltages.

			TERMINAL	VOLTAGE
1.	Interconnect	TB-101	1	OV
			2	+12 vdc
			3	-12 vdc
			4	+12 vdc
			5	OV
			6	approximately 20 vdc
			7	OV
2.	CDN	TB-1001	1	-12 vdc
			2	+12 vdc
3.	STR	Power lamp is disconnected to conserve power when battery power is used.		
4.	RTO-1A	TB-101	1	+12 vdc
			2	OV
			3	-12 vdc

(a) Have remote operator cause AM/AME test oscillator to operate; -12 vdc should appear at TB-101 term 4 when it is operated.

(b) Have remote operator cause SSB test oscillator to operate: -12 vdc should appear at TB-101 term 5 when it is operated.

(c) Check TB-101 term 6 for a -12 vdc when the remote operator operates the SSB test oscillator.

c. Check each receiving channel for the test oscillator tone by inserting a pair of high impedance ear phones into the correct jack on the front panel of the STR while depressing the test oscillator button on the appropriate RTO.

d. Check to insure that the remote indicators (SSB and AM/AME) operate when the test oscillator buttons are depressed.

e. Check to insure that the remote ac power indicator operates when the ac plug on the CDN is removed from the rack power strip.

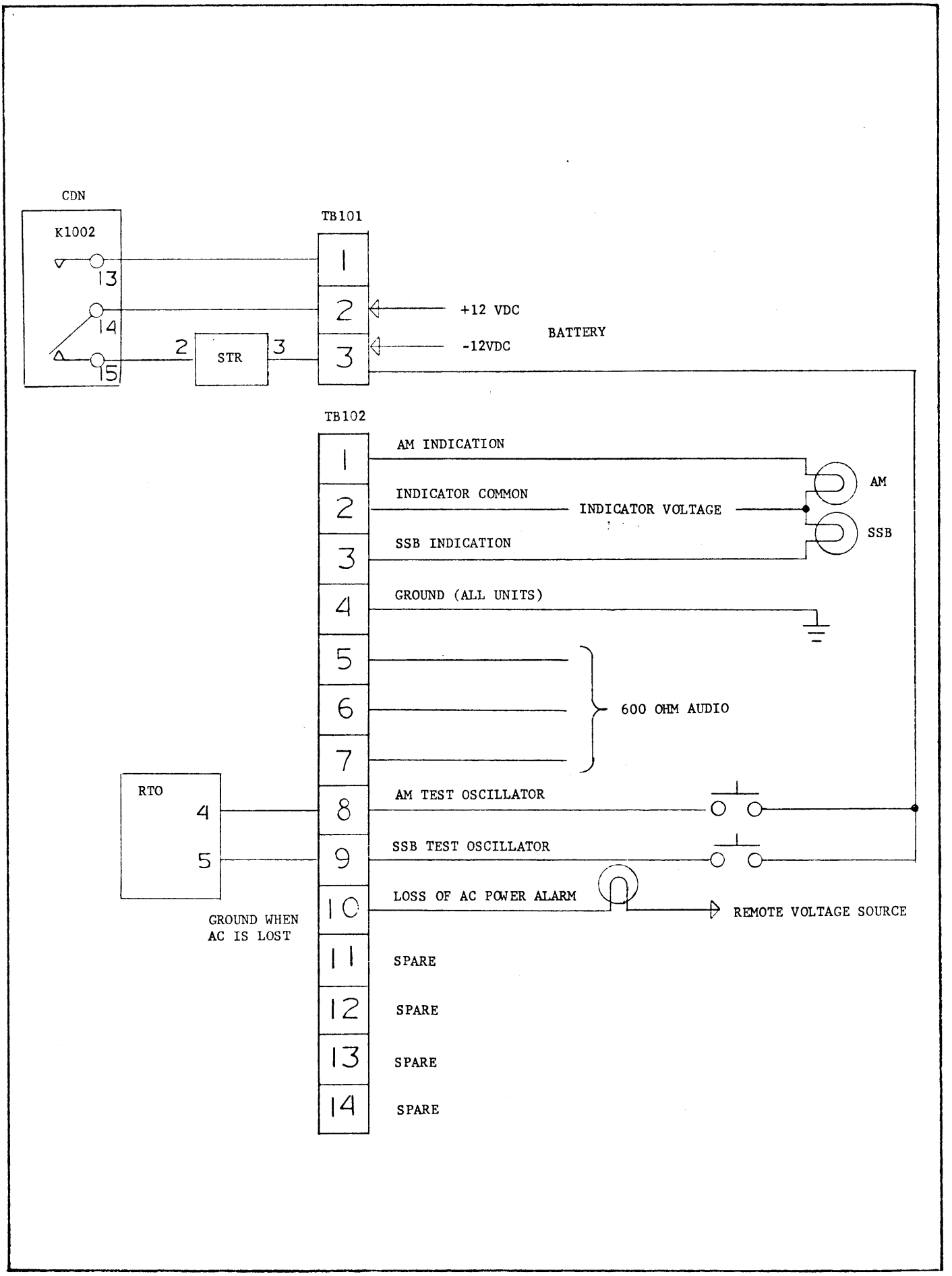


Figure 2-6. External Connections

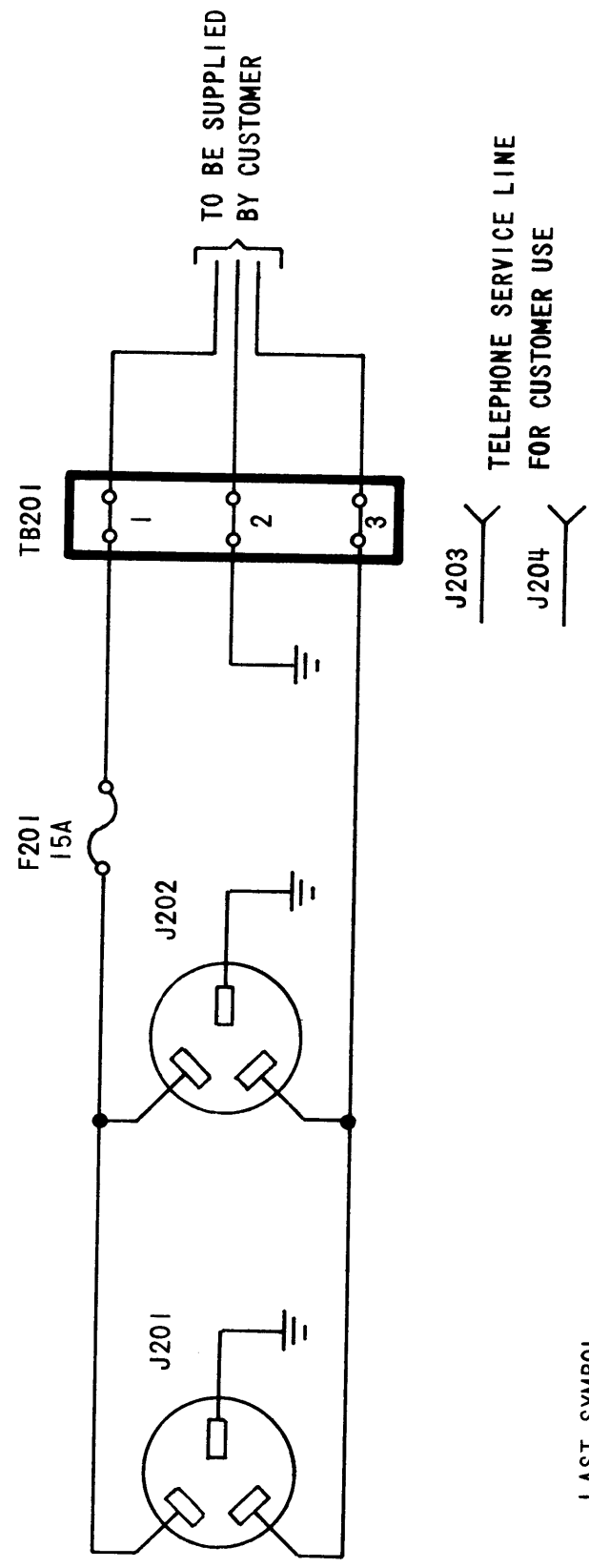


Figure 2-7. Schematic Diagram, APP-14

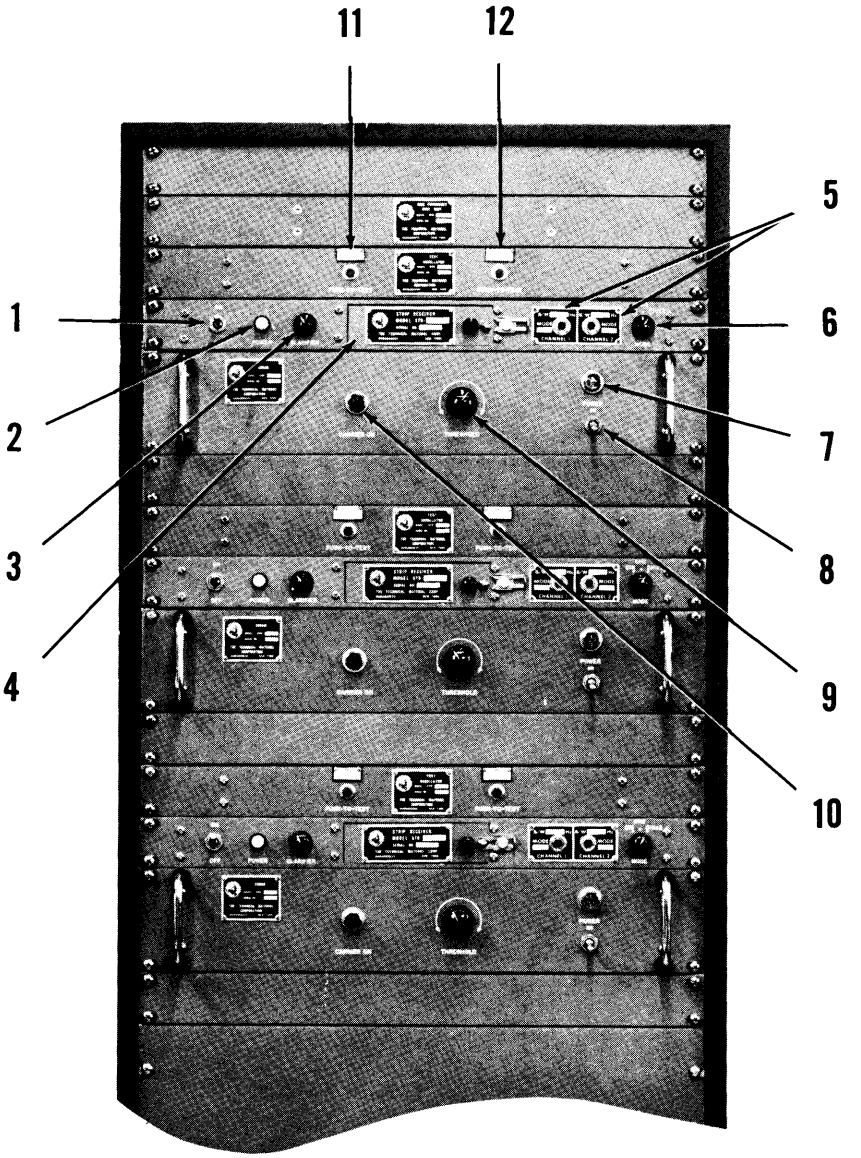


Figure 3-1. Controls and Indicators

SECTION 3

OPERATOR'S SECTION

3-1. OPERATING CONTROLS

The operating controls and indicators for the COR are listed in table 3-1 and are referenced to the callouts on figure 3-1.

NOTE

Because the controls and indicators of each channel are the same, only channel 1 call-outs are described on Table 3-1.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS

Item No. (Figure 3-1)		Panel Designation	Function
STR	1	Power ON/OFF switch	Applies power to STR when ON.
	2	POWER indicator	When lit, indicates application of ac power, but non-operative when the STR is used in the COR system.
	3	CLARIFIER	Used for SSB mode, changes frequency of HF oscillator.
	4	SSB squelch control R2 located behind door on left side (screwdriver adjustment)	Used to squelch noise and/or signals below the required signal.
	5	CHANNEL 1 and CHANNEL 2 phone jacks	Standard phone jacks for earphone connection. The line output is not affected.
	6	MODE (AGC control)	Selects the AGC to be used in front end of STR (Should be kept in CH1/CH2 position for COR operation).
CDN	7	POWER lamp	Lights when the unit is operated from the 115 volt ac power line.
	8	POWER ON switch	Applies ac power to CDN and in turn provides power for one channel in COR.
	9	THRESHOLD control	Determines carrier plus noise to noise ratio threshold of the AM/AME signals

TABLE 3-1. OPERATING CONTROLS AND INDICATORS (continued)

Item No. (Figure 3-1)		Panel Designation	Function
	10	CARRIER ON lamp	Lights to indicate presence of carrier. When off indicates the absence of a carrier or that noise level is of such magnitude that no intelligence can be received.
RTO	11	PUSH-TO-TEST switch S101(AM)	When depressed, simultaneously disconnects antenna signals and connects a modulated test signal to STR at the receiver frequency.
	12	PUSH-TO-TEST switch S102(SSB)	When depressed, simultaneously disconnects antenna signals and connects a test signal to STR at the redeiver frequency.
	Not shown	AUX PWR receptacle	Permits connection of external test equipment to 115 volt ac power source.
	Not shown	AC LINE fuse	Protective device connected between the AUX PWR receptacles and the ac power source.
	Not shown	TEL LINE jacks	Permits connection to external telephone line.

3-2. OPERATING PROCEDURE

Once the COR system has been properly installed in accordance with procedures outlined in section 2, it is self operating and becomes activated upon receiving signals of acceptable quality. Therefore, the only operating procedure is a local or remote equipment operational check. It may be necessary to touch up the squelch and threshold controls to compensate for the local noise and signal conditions. Make these adjustments as follows:

a. With the antenna to be used connected, adjust each STR squelch (behind door) control to quiet the SSB noise and/or signals below the desired signal.

b. Have transmitting station send AM test signal and adjust CDN threshold control to cause it to shift from SSB operation to AM/AME.

NOTE

Setting the THRESHOLD control fully counterclockwise will render the system insensitive to all signals but those whose signal-to-noise ratio is in excess of 20 to 25 db. Setting the THRESHOLD control fully clockwise will make the unit sensitive to any incoming signal. Normal operation will be at some intermediate setting.

SECTION 4

PRINCIPLES OF OPERATION

4-1. BLOCK DIAGRAM ANALYSIS

Refer to figure 4-1. The COR-4B may be a four channel receiver system operating within the frequency range of 2 to 32 MHz. Each channel is independently operated and comprises a receiver (STR), an anti-noise device (CDN), a test oscillator (part of RTO), and part of an antenna distribution unit (HFD). Since the four channels are identical in operation, only Channel 1 will be fully discussed in the following paragraphs.

RF Signals from the antenna are applied to Strip Receiver STR No. 1 via the associated OUTPUT jack of Antenna Distribution Unit HFD and the ANT and RCVR jacks of Receiver Test Oscillator RTO.

Two crystal-controlled oscillators contained in Receiver Test Oscillator RTO are used for testing. Each oscillator generates an RF signal which is applied to the associated receiver. Normally, the test oscillators are deenergized and the signals received by the antenna are routed directly to the receiver. When a PUSH-TO-TEST button is depressed or when 12 volts dc is applied to relay K101 or K102, the associated test oscillator is energized, the operate contacts of relay K101 or K102 open the signal path from the antenna, and the RF signal from the RTO is routed via the RCVR jack to the associated receiver. The RTO is powered by the 12 volts dc it receives from the CDN.

Within the STR, incoming signals are coupled to the TTRR module where they are amplified and mixed with the output of a local oscillator which is tuned 1.75 MHz above the carrier of the received signal. The 1.75 MHz output of the TTRR module is amplified and applied to the STR channels 1 (SSB) and 2 (AM) simultaneously.

In STR channel 1 (SSB), the IF is amplified and sent to the sideband bandpass filter. The output of the sideband filter is amplified by an IF amplifier and fed to a mixer amplifier. The BFO signal is also fed to the mixer amplifier. The audio output from the mixer amplifier is fed simultaneously to an audio amplifier and an AGC amplifier. The SSB audio leaves the STR and is routed to the CDN. The AGC amplifier amplifies the audio signal and feeds it to a detector where the signal is converted to a dc level. This dc voltage is amplified and fed through an emitter follower to S2 and the SSB squelch circuit. The squelch circuit will compare the AGC dc voltage from the SSB channel with a dc voltage determined by the setting of the SQUELCH control (R2) and will determine if the signal is strong enough to be allowed to pass from the STR as audio. If the AGC signal is not strong enough, the SSB audio will be squelched. The level of squelching depends upon the setting of the SQUELCH control (R2). When the squelch circuit is not operating (signal passing) a contact closure from K1 on A10967 is sent to the CDN to be used for a remote indication of SSB audio reception.

In STR channel 2 (AM) the IF is amplified and fed, via a bandpass filter and two amplifierss, to an envelope detector, an AGC amplifier and to J14,

which is connected to the CDN. From the envelope detector the audio is fed to the front panel monitor phone jack L15) and to the CDN. The IF from the AGC amplifier is detected (converted to a dc level), and the dc level is amplified and sent to S2 to be used in the TTRR.

The 1.75 mc signal from the STR is routed through three mixer stages with in the CDN. It is mixed with the output signal of a 1295 kc oscillator and a 355 kc oscillator to produce a 355 kc signal that has the frequency stability of the 355 kc oscillator and the amplitude characteristics of the 1.75 mc input signal. This 355 kc signal is applied to both the carrier and noise channels of CDN no. 1.

The carrier channel, consisting basically of an amplifier, a filter, and a carrier detector, provides a positive going voltage which is applied to the Schmitt trigger circuit. The noise channel, comprising an envelope detector, a low pass filter, an AF rectifier, a gated amplifier, a carrier reject filter, and a noise detector provides a negative going voltage which is also applied to the Schmitt trigger circuit. The positive-going signals tend to turn the Schmitt trigger circuit "on"; the negative going signals keep the Schmitt trigger circuit in the "off" state. When the Schmitt trigger is "on", a relay driver circuit energizes CODAN relay K-1002, and the AM audio signal output of Strip Receiver STR in lieu of the STR's SSB audio, is routed to external 600 ohm telephone lines. The STR SSB audio is squelched if a SSB RF signal is not present or strong enough to unsquelch the SSB channel. When the Schmitt trigger is "off" the CODAN relay is deenergized, and the audio output signal to the telephone lines is squelched.

Relay K-1001 provides a contact closure to ground if the power to the CDN fails. This contact closure to ground may be used for a remote indication of power failure.

When relay K-1002 is deenergized (no AM signal being received) it will route the SSB audio to the output, furnish +12 vdc to the BFO in the STR, and furnish a relay contact closure for a remote indication of SSB audio being received. Note that the SSB remote indication line is routed through the squelch relay in the STR. The SSB channel must not be squelched for the remote SSB indication to receive a contact closure from the CDN.

When K-1002 is energized (an AM signal being received) the SSB audio is disconnected and the AM audio is connected to the output, the BFO in the STR is deenergized, the remote indicator is shifted to the remote AM indicator and the CARRIER ON lamp will light.

The COR is designed for either ac operation (115 volts ±10%, 50 to 60 cps, single phase) or for dc operation (24 volts). An additional 12 volts dc supply is required for remote control of the test oscillators in Receiver Test Oscillator RTO. Depending upon customer requirements, power must be supplied for remote indication for SSB AM due to a contact closure being furnished for customer use. During ac operation, the 115 volts is applied to the CDN. The ±12 volt dc output of the CDN is used to power its own operating circuits and also that of the associated STR. The -12 volt dc output of the CDN is used to power Receiver Test Oscillator RTO.

The COR system can also be operated with both ac and dc power applied. During this method of operation, the ac supply of the CDN provides operating power for the COR and charging current for the batteries. Upon failure of ac power, the batteries will provide operating power for the system with no interruption of service.

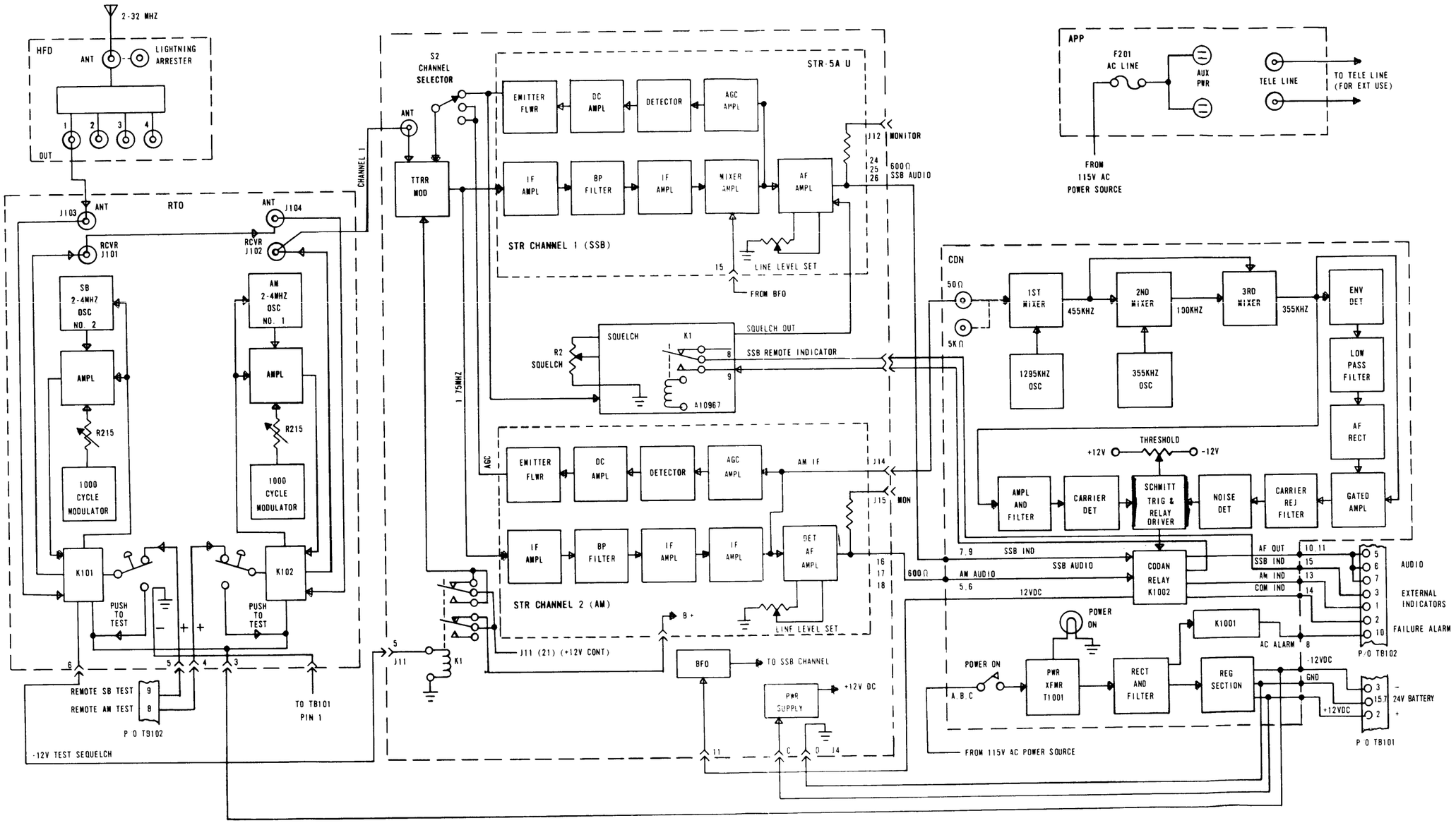


Figure 4-1. Block Diagram, COR-4B

SECTION 5

MAINTENANCE AND TROUBLESHOOTING

5-1. PREVENTIVE MAINTENANCE.

a. General - The COR has been designed to provide long term, trouble free operation under continuous duty conditions. However, in order to prevent failure of the equipment due to corrosion, dust, or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring or grease. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease from other parts with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform may be used, providing the necessary precautions are observed.

WARNING

WHEN USING TOXIC SOLVENTS, MAKE CERTAIN THAT ADEQUATE VENTILATION EXISTS. AVOID PROLONGED OR REPEATED BREATHING OF THE VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. FLAMMABLE SOLVENTS SHALL NOT BE USED ON ENERGIZED EQUIPMENT OR NEAR ANY EQUIPMENT FROM WHICH A SPARK MAY BE RECEIVED. SMOKING, "HOT WORK", ETC. IS PROHIBITED IN THE IMMEDIATE AREA.

CAUTION

WHEN USING TRICHLORETHYLENE, AVOID CONTACT WITH PAINTED SURFACES DUE TO ITS PAINT REMOVING EFFECTS.

b. Battery Maintenance - When batteries are being used with the system they should be checked weekly to ensure that they have enough water and that they are being kept in a charged state by the CDN trickle charge. The battery terminals are to be kept clean. The area around the battery storage is to be cleaned weekly.

c. Modular Unit Maintenance - The individual modules; HFD, RTO, STR, and CDN should be removed and tested in accordance with their technical manuals and then the system tested and adjusted in accordance with the system test procedures in paragraph 5-1, e.

d. Test Equipment Required - Test equipment required to test and align the system is listed below:

(1) One Signal Generator, HP-606B or equivalent.

(2) One VTVM, Ballantine Model 314 or equivalent.

(3) One VOM, Simpson 260 or equivalent.

(4) One synthesized RF generator with the capability of AM, AME, and SSB operation.

(5) One Frequency Counter, HP-5244L or equivalent.

e. Test and Chekout Procedure - Proceed as outlined below. If the results of any portion of the following procedure is unsatisfactory, isolate the trouble to the particular modular unit and troubleshoot it in accordance with its technical manual. Refer to figure 2-4 for interconnection of units.

(1) Throw POWER ON switch down to off position on CDN.

(2) Disconnect all external lines connected to TB-101 of the channel being tested.

(3) Throw POWER ON/OFF switches to ON on the CDN and STR. Select CH1 and 2 with STR MODE switch.

(4) Check for +12 dc DC on TB-101 between terminal 2 and ground, terminal 1.

(5) Check for -12 volts dc on TB-101 between terminal 3 and ground, terminal 1.

(6) Connect the output of the signal generator to the ANT input on the HFD through a tee connector.

(7) Connect the frequency counter to the tee connector between the signal generator and the HFD.

(8) Tune the signal generator (CW mode) to 1,000 ±1 Hz above the assigned carrier frequency.

(9) Disconnect the frequency counter.

(10) Set the output of the signal generator for 15.0 microvolts.

(11) Turn THRESHOLD control on the front panel of the CDN maximum counterclockwise (CCW).

(12) Using the VOM as a VU meter, connect it and a 600 ohm dummy load across terminals 5 and 7 of System TB-102 (audio out).

(13) Connect the frequency counter across the 600 ohm dummy load.

(14) Adjust the STR SQUELCH control, behind the access door on the front of the STR, until the VOM connected to the output indicates audio.

(15) The frequency counter should indicate 1,000 ±1 Hz. If it doesn't, adjust the STR CLARIFIER until it does.

NOTE

Do not move the CLARIFIER control from this position throughout the rest of the test and alignment.

(16) The VOM should indicate 0 dbm. If it doesn't, adjust R18 on the SSB IF printed circuit board in the STR.

(17) Using the VOM as an ohmmeter, check for a contact closure (short) between terminals 2 and 3 on TB-102.

(18) Decrease the output of the signal generator to approximately 5.0 microvolts and the contact closure should open and the output audio decrease across the 600 ohm dummy load. This completes the test and adjustment of the SSB channel.

(19) Connect the frequency counter to the tee connector between the signal generator and the HFD.

(20) Tune the signal generator to the assigned carrier frequency and modulate it 70% with 1,000 Hz (AM MODE).

(21) Set the signal generator output to 15 microvolts and disconnect the frequency counter.

(22) Using the VOM as an ohmmeter, check for a contact closure (short) between terminals 1 and 2 on TB-102 while adjusting the THRESHOLD on the CDN. Adjust the THRESHOLD control just to the point of closure. It may be necessary to adjust ATTEN VAR R-1003 on the rear of the CDN.

NOTE

Do not readjust the THRESHOLD throughout the rest of this procedure.

(23) Measure the audio voltage with the VOM used as a VU meter across the 600 dummy load connected to TB-102 terminals 5 and 7. It should be 0 dbm, if not adjust R9 on the STR AM IF printed circuit board for 0 dbm. This completes the test and adjustment for the AM channel.

(24) Disconnect the signal generator.

(25) Connect the synthesized RF generator to the HFD antenna input.

(26) Set the output of the RF generator to the assigned frequency and the output to 15 microvolts. If this can not be done directly use an attenuator between the RF generator and the HFD to get the 15 microvolts in the HFD.

(27) Set the RF generator up for 6A3 (AM) mode, modulated approximately 90% with voice.

(28) With the 6A3 (AM) mode being fed into the system the CDN CARRIER ON lamp will be lit, a contact closure will be between terminals 1 and 2 on TB-102, 0 dbm on voice peaks will be across dummy load connected to terminals 5 and 7 on TB-102 and a clear voice signal will be heard if a pair of head phones is inserted into the AM monitor jack on the front of the STR.

(29) Perform the same test as in step (28) and, while modulating the RF generator, press the AM PUSH-TO-TEST button on the RTO. A clear tone should be heard in the AM phone jack; there will be contact closure at terminals 1 and 2 on TB-102 and tone voltage at terminal 5 and 7 on TB-102.

(30) Set the synthesized RF generator to the A3H (AME-SSB full carrier) mode. The same conditions will be observed as in steps (28 and (29).

(31) Set the synthesized RF generator to the A3J (SSB - carrier fully suppressed). The CARRIER ON lamp should go out and the contact closure should shift to terminals 2 and 3. When modulated, audio should be 0 dbm on voice peaks at terminals 5 and 7 of TB-102, and a clear discernable voice signal will be heard when the head phones are inserted into the monitor jack for SSB on the front of the STR. Audio should be squelched when the synthesized RF generator is not being modulated.

(32) Perform the same test as in step (31). While modulating the RF generator press the SSB PUSH-TO-TEST button on the RTO. A clear tone should be heard in the SSB phone jack; there will be contact closure at terminals 2 and 3 on TB-102 and tone voltage at terminal 5 and 7 on TB-102.

(33) Disconnect all test equipment and reconnect external cables.

(34) This completes the test and checkout procedure for a channel in the COR-4B( ) system. This same procedure is to be used for the other channels.

5-3. COMPONENT REPAIR AND REPLACEMENT

Information concerning the repair and replacement of components contained in the modular units that constitute the COR is given in the appropriate modular unit manual. Repair and replacement of cabinet components is obvious upon inspection; detailed procedures are therefore not given in this manual. Although fuse replacement information is given in each modular unit manual, a complete list of COR fuses, including their locations and functions is given in table 5-1 as a matter of convenience.

TABLE 5-1. FUSE REPLACEMENT INFORMATION

MODULAR UNIT	FUSE	RATING	FUNCTION
STR	F1	.25A/115V	Protects CDN power supply and the battery pack when ac fails.
CDN	AC F1001	1/2A, 115V 1/4A, 230V	Protects CDN internal power supply.
	POS 12V F1002	1/2A	In normal operation, protects +12 volt regulated section of CDN power supply. In battery operation, protects external battery.
	NEG 12V F1003	1/2A	In normal operation, protects -12 volt regulated section of CDN power supply. In battery operation, protects external battery.
APP	AC	15A	Protective fuse connected between ac power source and receptacles mounted on APP.

SECTION 6

PARTS LIST

6-1. INTRODUCTION

Reference designations have been assigned to identify electrical parts of the System exclusive of the modular units making up the system. The parts lists for the modular units will be found in the modular unit technical manual.

The system parts designations will be found on the system interconnect wiring diagram. The following is a listing of the parts and their corresponding description. The TMC part number is the number to be used when ordering the part from The Technical Materiel Corporation, 700 Fenimore Road, Mamaroneck, New York, 10543.

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1	RESISTOR, WIREWOUND, FIXED: 25 watts, 50 ohms	RW111-7

SECTION 7

SCHEMATIC DIAGRAM

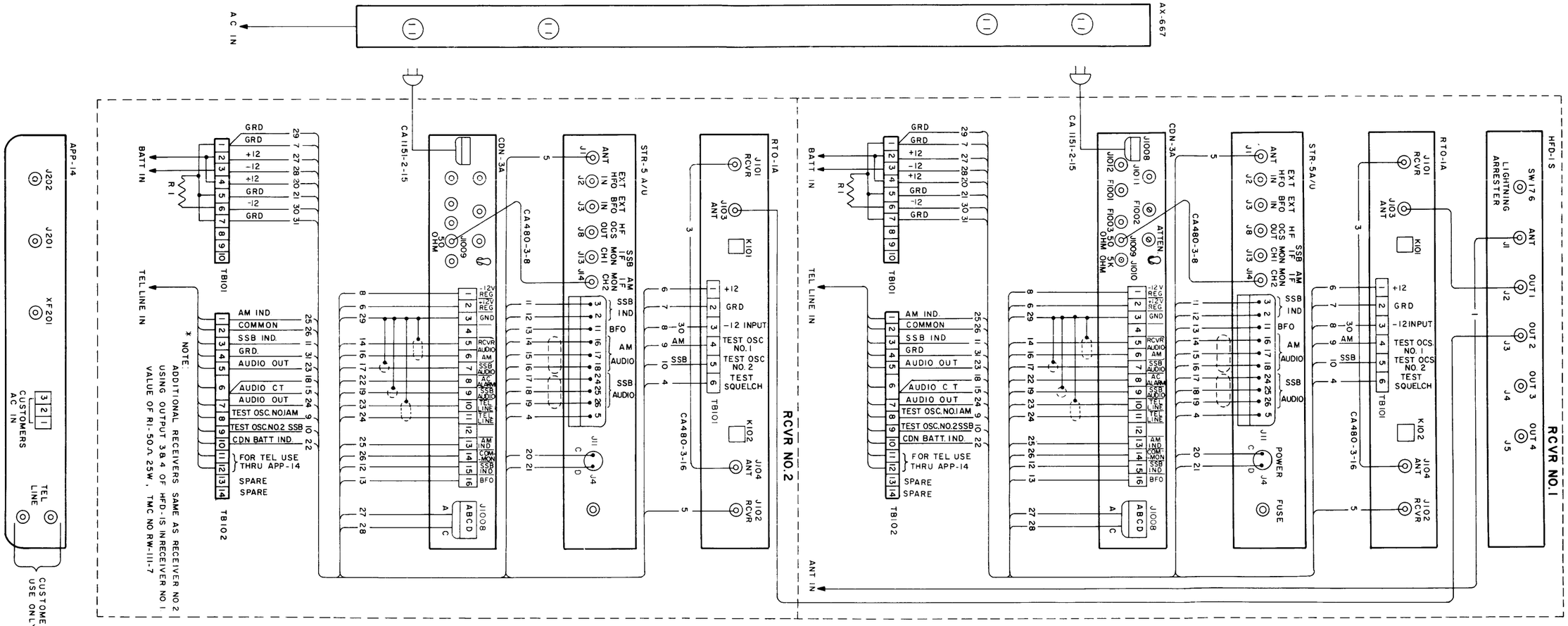


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Figure 7-1

SCHEMATIC DIAGRAM

COR-4B

TYPICAL RAK INTERCONNECT

7-3/7-4