TECHNICAL MANUAL

for

REMOTE CONTROLLED RECEIVER SYSTEM

MODEL DDRR-506/LRCC-1

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

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MAMARONECK, N.Y. **OTTAWA, CANADA**

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NOTICE

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

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

FOREWORD

DDRR-506/LRCC-1 Remote Controlled Receiver System is made up two separately located major components as follows:

DDRR-506 TechniMatiC* Receiver

LRCC-1 Receiver Control

Sub-component modular units of the DDRR-506, with quantities included, are as listed below:

Qty	Model	Title
8	LRCB-1	Control Terminator
8	HFRR-2A	Radio Frequency Tuner
8	HFSR-1	Reference Signal Generator
8	AFCR-3	Automatic Frequency Control
8	MCGA-1	Multiplex Carrier Generator
8	MSAA-1	Multiple Sideband Adapter
12	HFP-1	Power Supply
1	AX-559	Power Supply Control

This manual consists of system and modular unit manuals as listed below:

DDRR-506/LRCC-1 System Manual

LRCC-1 Modular Manual

DDRR-506 System Manual**

LRCB-1 Modular Manual

HFR-2 Modular Manual (w/addendum describing HFRR-2A)

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*Trademark applied for.
**Includes description of AX-559

FOREWORD (CONT)

HFS-1 Modular Manual (w/addendum describing HFSR-1)

AFC-2A,3 Modular Manual (w/addendum describing AFCR-3)

MCG-1 Modular Manual (w/addendum describing MCGA-1)

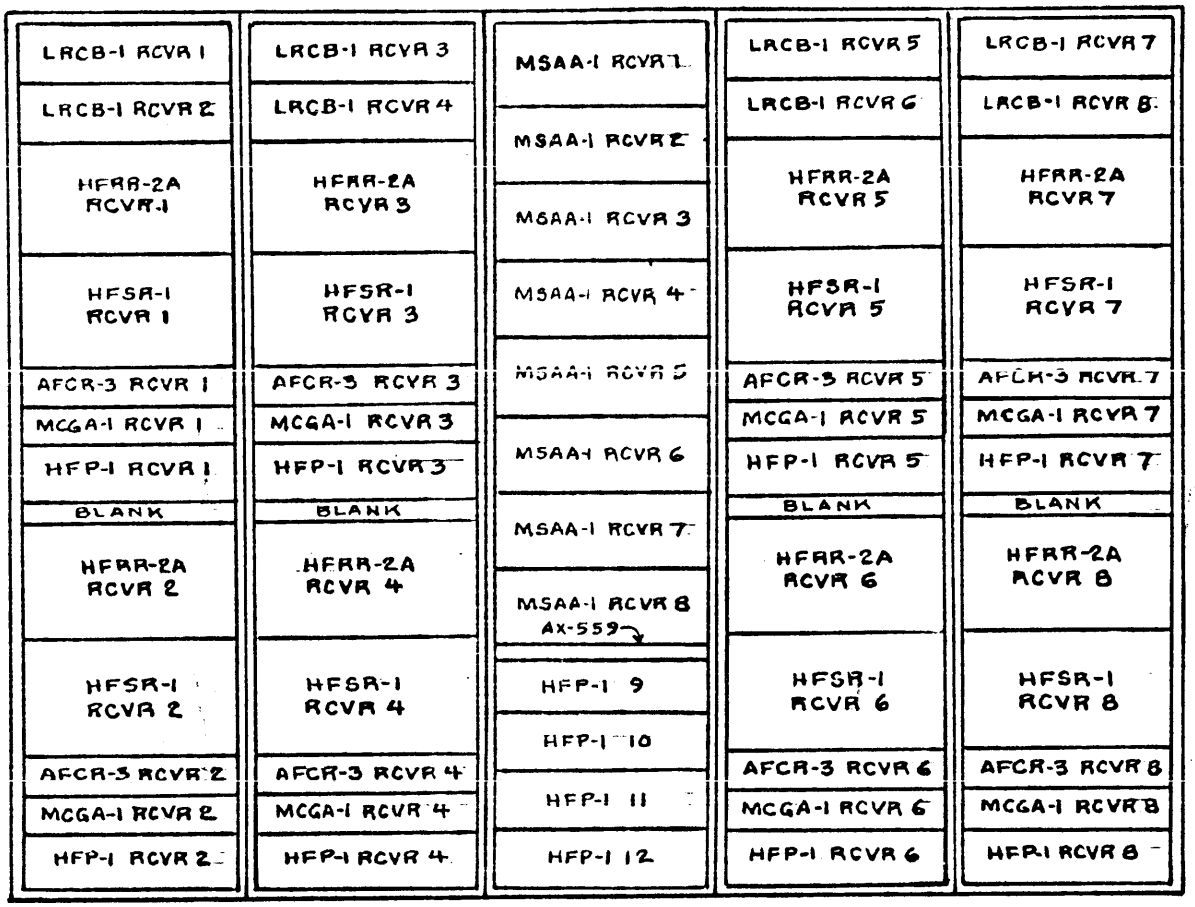
MSA-1 Modular Manual (w/addendum describing MSAA-1)

HFP-1 Modular Manual

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES



DDRR-506 TECHNIMATIC RECEIVER

RCVR 1	RCVR 5
RCVR 2	RCVR 6
RCVR 3	RCVR 7
RCVR 4	RCVR 8

LRCC-1
RECEIVER
CONTROL

FIGURE 1-1. REMOTE CONTROLLED RECEIVER SYSTEM, DDRR-506/LRCC-1

SECTION 1

GENERAL INFORMATION

1-1. GENERAL DESCRIPTION.

Remote Controlled Receiver System, Model DDRR-506/LRCC-1, (Figure 1-1) is composed of one 5-rack, 8-receiver Model DDRR-506 TechniMatiC* Receiver system and one Receiver Control, LRCC-1, containing 8 remote control panels. Each of the 8 receivers in the DDRR-506 is identical and is capable of receiving 2-32 mc (in 100 cps steps) in ISB transmissions of up to 4 discrete 3-kc width channels. Each receiver may be tuned manually or by a remote operator at a panel in the LRCC-1 through TMC's TechniMatiC tuning. Remote control from the LRCC-1 is by means of wire transmission.

Each of the ISB channels may contain voice, a combination of voice frequency tone telegraph channels, a combination of FAX channels, data transmission or any type of transmission that can be contained within 100 cps to 3,100 cps. The output of each channel has an individually adjustable AGC decay and squelch feature to suit that particular type of signal. Front panel controls enable local tuning of the receivers, if desired.

For sideband signals transmitted without carrier, the 2-32 mc tuning range of the DDRR-506 is covered in 100-cps steps with stability to within 1 part in 10^8. For receiving signals from a relatively

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* Trademark applied for.

unstable transmitter, accompanied by a partial (30 db below PEP*, maximum) carrier, an AFC circuit provides compensation for transmitter/receiver drift to produce precise audio to within 1 cps.

Other additional features include highly accurate r-f tuning dial calibration signals (with stability within 1 part in 10^8) at the receiver, together with carrier level drift and carrier level monitoring and alarms on the receiver's AFC unit panels.

1-2. REFERENCE DATA.

Reference data for the DDRR-506/LRCC-1 is the same as that for the DDRR-506 and LRCC-1 combined. Refer to the individual manuals for this information. Since the LRCC-1 is a passive unit, containing no power supply, and since the remote control circuitry has been designed for a 100-foot cable without line loss, the electrical characteristics of the DDRR-506/LRCC-1 are the same as that for the DDRR-506.

1-3. OVERLOAD PROTECTION.

When specified in contract, the DDRR-506/LRCC-1 shipment includes four Collins Radio Model 651G-1 Receiver Filters and eight Collins Radio Model 914B-3 Filter Control units. One 651G-1 Filter consists of two Model 635V-1 Band-Pass Filters and two Model 636C-1 Power Supplies (one for each filter) mounted on a

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* Peak envelope power. See DDRR-506 stability specifications in DDRR-506 Technical Manual.

19-inch rack module shelf, Model 499L-9. Each 635V-1 Filter is to be installed between the antenna and the input of each receiver. The filter provides the following features:

a. Permits operation of a nearby transmitter on operating frequency more than 10 percent removed from the receiver frequency without receiver overload.

b. Provides on-frequency protection against r-f input overloads to the receiver.

The 914B-3 Filter Control is a remote control unit for tuning the 635V-1 Filter in the same manner as the LRCC-1 tunes the DDRR-506. For further particulars on performance, installation and operation, see the Collins Radio instruction manuals accompanying the shipment of the filters.

SECTION 2

INSTALLATION

2-1. GENERAL

Install the DDRR-506 TechniMatiC Receiver as outlined in Section 2 of the DDRR-506 Technical Manual. This manual also describes connection of the DDRR-506 to a panel identical to the LRCC-1 Receiver Control. Install the LRCC-1 unit into a standard 19-inch rack or console as described in the LRCC-1 Technical Manual.

Loose items included in shipment for the installation of the DDRR-506 and its connection to antennas, audio lines and the control panel are listed in the DDRR-506 manual; items for the LRCC-1 unit installation are listed in the LRCC-1 manual.

2-2. CHECKOUT PROCEDURE

a. INTRODUCTION. - The DDRR-506/LRCC-1 checkout procedure checks the operation of the DDRR-506 Receiver against a previously checked LRCC-1 Receiver Control. The LRCC-1, a passive unit containing no power, is checked out by performing a wiring continuity check against the LRCC-1 wiring schematic found in the LRCC-1 manual. The checkout procedure of the DDRR-506, as contained in Table 2-1, is for one receiver system and is typical for each of the eight systems.

b. EQUIPMENT REQUIRED. - The following standard laboratory equipment (or its equivalent) is required:

(1) Signal Generator, Hewlett-Packard Model 606A

(2) Headset - 600-ohm impedance

TABLE 2-1. DDRR-506/LRCC-1 CHECKOUT PROCEDURE

STEP	OPERATION	
1	Preset the following controls to positions as indicated:	
	Control	Position
	LRCC-1 RF GAIN knob	fully ccw
	LRCC-1 CHANNEL ENABLE buttons, B2, B1, A1 and A2	lights on
	LRCC-1 TUNE OVERRIDE switch (on rear of panel)	OFF
	LRCC-1 MC switch	2
	LRCC-1 100KC switch	0
	LRCC-1 10KC switch	0
	LRCC-1 1KC switch	0
	LRCC-1 .1KC switch	0
	LRCC-1 AFC switch	OFF
	LRCC-1 METER LEVEL/AFC switch	LEVEL
	LRCB-1 POWER ON/OFF switch	ON
	LRCB-1 REMOTE/LOCAL switch	REMOTE
	HFRR-2A NOISE SILENCER/OFF/ ALIGNMENT SIGNAL switch	OFF
	HFRR-2A TUNE/SYNC/OPERATE switch	OPERATE
	*HFRR-2A TUNE knob	any position except 2 MC
	HFRR-2A BAND knob	any position except for 2 MC band
	HFSR-1 MC knob	any position except 2 MC
	HFSR-1 100KC knob	any position except 0
	HFSR-1 10KC knob	any position except 0
	HFSR-1 1KC knob	any position except 0
	HFSR-1 .1KC knob	any position except 0
	MSAA-1 CHANNELS A1, A2, B1 and B2 AGC DECAY knobs	mid-position
	MSAA-1 CHANNELS A1, A2, B1, and B2 LINE LEVEL knobs	set per step 3 of Table 3-2
	MSAA-1 CHANNELS A1, A2, B1 and B2 SQUELCH ADJUST knobs	fully ccw
	MSAA-1 MONITOR LEVEL knobs	fully ccw

*Tighten LOCK control on TUNE knob.

TABLE 2 - 1. DDRR-506/LRCC-1 CHECKOUT PROCEDURE (Cont.)

STEP	OPERATION	
1 (Cont.)	Control	Position
	MONITOR SELECT knob----------	optional
	INT/AFC/SYN switch----------	SYN
	AFCR-3 CARRIER switch----------	OSC
	AFCR-3 TUNING KCS knob----------	0
	AFCR-3 SENSITIVITY knob----------	fully cw
	HFP-1 MAIN POWER STANDBY/OFF switch (located on rear chassis)----------	STANDBY*
	AX-559 STDBY/OPERATE switch (See Figure 3-1)----------	STANDBY*
	MSAA-1 STDBY/ON switch----------	STDBY*
2	Set MSAA-1 STDBY/ON to ON. On appropriate HFP-1 (See Figure 3-1), STANDBY lamp should go out and TIME DELAY lamp should come on. After 60 seconds, TIME DELAY lamp should go out and OPERATE lamp should come on.	
3	Depress LRCC-1 TUNE/SYNC button and the following events should occur in that order:	
	(a) The HFSR-1 MC, 100KC, 10KC, 1KC and .1KC switches should position themselves for 2.0000 MC, with 2.0000 MC appearing on the digital display.	
	(b) The HFRR-2A BAND switch and revolving dial should position themselves for 2 MC.	

* These switches should be in STANDBY for at least 24 hours before performing checkout.

TABLE 2-1. DDRR-506/LRCC-1 CHECKOUT PROCEDURE (Cont)

STEP	OPERATION
3 (Cont.)	(c) HFRR-2A TUNE knob and needle on band dial should move to 2.0000 mc and LRCC-1 SYNC light should light within 15 seconds. If so, skip Step 4.
4	If the events in Step 3 do not occur, after 30 seconds, LRCC-1 FAULT lamp should light. If this happens, pushing the LRCC-1 RESET button should make the events occur.
5	Detune the HFRR-2A TUNE knob from 2.0000 mc. The LRCC-1 SYNC lamp should go out and the LRCC-1 FAULT lamp should come on. Press the LRCC-1 RESET button and release. Within 20 seconds, the FAULT lamp should go out and the SYNC lamp should come on.
6	Connect the signal generator to the ANTENNA connector of RL-139 - 2.24 DC relay located on the rack ceiling. Set the generator for 2.000 mc at 1 microvolt output, modulated 50% by 1 kc. The LRCC-1 LEVEL meter should remain at 0.
7	Increase the signal generator output 20 db to 10 microvolts. The LRCC-1 LEVEL meter should indicate 20 db.
8	Increase the signal generator output 40 db, then 60 db. The LRCC-1 LEVEL meter should indicate these amounts. Reset the signal generator to 20 db at 10 microvolts.
9	With LRCC-1 AFC switch in the OFF position the MCGA-1 SYN/AFC/INT switch should be in SYN position. Plug headset into MSAA-1 MONITOR jack. Turn up MONITOR LEVEL knob.
10	Set MSAA-1 MONITOR SELECT switch at A1 and readjust signal generator for 2.0015 mc. A 1-kc tone should be heard at the headset. Set switch to A2, B1 and B2, adjusting generator to 2.0045 mc, 1.9985 mc and 1.9955 mc, respectively. The 1-kc tones should be apparent for each channel. Using the generator frequencies and switch settings, test the response of the LRCC-1 RF GAIN control for each channel.

TABLE 2-1. DDRR-506/LRCC-1 CHECKOUT PROCEDURE (Cont.)

STEP	OPERATION
11	Reset the signal generator for 2.000 mc. Set the LRCC-1 AFC switch at ODB. The SYN/AFC/INT switch on the MCGA-1 should position itself to AFC. Set the LRCC-1 METER switch at AFC. If the AFCR-3 TUNING /KCS knob is at O, the LRCC-1, AFC METER should read 0. If not, hold the LRCC-1 AFC SCAN switch to the right; when the LRCC-1 METER reads maximum + KCS, adjust R2004 potentiometer, located on the rear panel of AX-567 panel in LRCC-1, for full scale deflection. Hold the LRCC-1 AFC SCAN switch to the left to bring some value between 0 and - 3 KC on LRCC-1 METER. Compare METER reading with AFCR-3 TUNING/KCS knob pointer position; they should be the same.
12	By alternating the LRCC-1 AFC SCAN switch, it should be possible to reach a position that causes the LRCC-1 AFC UNLOCK lamp to go out, signifying a capture of the one of the 3 tones (1.9, 2.0 or 2.1 mc) by the AFCR-3. At the same time, the AFCR-3 FADE lamp should extinguish and the AFCR-3 LEVEL meter increase and remain steady. Manipulate the LRCC-1 AFC SCAN switch towards the left and right to ascertain the location of the upper and lower sideband tones in relation to the carrier (2 mc). The carrier will be indicated by a higher level reading on the AFCR-3 LEVEL meter.
13	Set TUNE OVERRIDE switch, on rear of LRCC-1 panel, to ON. Readjust LRCC-1 MC, 100KC, 10 KC, 1 KC and .1KC switches each to some figure. As each switch is moved, the corresponding HFSR-1 switch should move to the same position. Within 15 seconds, after the final adjustment, the LRCC-1 SYNC lamp should come on.

SECTION 3

OPERATOR'S SECTION

3-1. INTRODUCTION

Figure 1-1 is a front panel view of the entire DDRR-506 5-rack array, identifying components of receiver systems #1 through #8. The 8 associated AX-567 modular panels in the LRCC-1 are represented as located at the remote control station.

Each receiver system is independent and may be tuned remotely by its associated AX-567 panel or locally. This section describes remote and local tuning procedures for one receiver system as typical.

3-2. RECEIVER CAPABILITIES

Refer to Figure 3-2, Functional Block Diagram, together with the text in section 4 of the DDRR-506 manual to become familiar with functions of the components and their controls. The panel controls on the DDRR-506 receiver that are operated from the AX-567 panel are symbolized as Ⓡ; the other controls are preset locally and generally remain in that position.

The receiver is capable of receiving up to 4 discrete voice channels symmetrical about one carrier and contained in the two sidebands of an ISB transmission. Each channel may contain any form of audio intelligence: voice, code, teletype, etc. In two-channel ISB transmission, the intelligence will appear at the direct channel outputs, A1 and B1.

In four-channel multiplexed ISB, in addition to A1 and B1, the translated channels will appear at A2 and B2 outputs. A single AM or MCW transmission signal may be received by using the output of A1 or A2, whichever sideband gives the best reception. A SSB transmission will result in an A1 output, for an upper sideband transmission, or a B1 output for a lower sideband transmission. A single FSK or FAX transmission, (without a carrier component) requires that the receiver be tuned to the r-f center frequency plus or minus the a-f center frequency in order to have the mark and space frequencies emerge at channel A1 or B1, respectively. The one or more FSK or FAX transmissions sent in on a SSB or ISB transmission, however, will appear at the channel output similar to its channel origin at the transmitter. The one or more MCW codes sent as keyed tones appearing in the sidebands of a SSB or ISB transmission will appear as keyed audio tones in the channel or channels as originated at the transmitter end. In all SSB and ISB transmissions with a partial carrier (suppressed no lower than 30 db below PEP) and in all single AM or MCW transmissions, the carrier component in the signal may be used in the AFCR-3 Automatic Frequency Control unit to compensate for transmitted signal drift. In SSB and ISB transmissions with no carrier component present, the AFCR-3 unit cannot be used; the same is true of the single FSK or FAX signal transmission with the receiver tuned to the center frequency, since there is no carrier

component to lock onto. In most cases, if the transmitter is synthesized (with a correction loop for its oscillator similar to the HFSR-1) the incoming signal remains stable enough that (using the HFSR-1) the AFC is not required. In all remote tuning operations, the HFSR-1 Synthesizer is used to relay the frequency figure to the HFRR-2A. Therefore, remote tuning coverage is in the 100-cps steps since this is the synchronizing adjustment points of the HFSR-1. In local tuning, the HFSR-1 may be used or not, as transmitting stability conditions require. When the HFSR-1 is not used, the HFRR-2A has continuous tuning coverage.

In summation, each receiver is designed primarily to simultaneously receive 4 channels of an assortment of intelligence from one ISB transmission. The economy of this communication system is the large saving in transmitter power over separate transmissions. In addition, it is also capable of receiving all the other types of transmission, as previously outlined. For simplicity, the following operating instructions in Table 3-1 and 3-2 are in terms of receiving a 4-channel multiplexed ISB signal, with and without the AFC. Following the table are notes on tuning-in other types of signals.

3-3. REMOTE TUNING

a. INITIAL PRESETTING OF CONTROLS. - Before tuning the receiver by remote control, preset the controls as described in Table 3-1.

CAUTION

All HFSR-1 knobs and the MCGA-1 SYN/AFC/INT knob are continuous revolution controls and turn clockwise only. Do not attempt to force counterclockwise.

TABLE 3-1. CONTROL PRESETTINGS, REMOTE TUNING

COMPONENT	CONTROL	POSITION
LRCB-1	POWER ON/OFF switch	ON
LRCB-1	REMOTE/LOCAL switch	REMOTE
HFRR-2A	NOISE SILENCER/OFF/ ALIGNMENT SIGNAL switch	OFF
HFRR-2A	TUNE/SYNC/OPERATE switch	OPERATE
HFRR-2A	TUNE knob	optional*
HFRR-2A	BAND knob	optional
HFSR-1	MC knob	optional
HFSR-1	100 KC knob	optional
HFSR-1	10 KC knob	optional
HFSR-1	1 KC knob	optional
HFSR-1	.1 KC knob	optional
MSAA-1	CHANNELS A1, A2, B1, and B2 AGC DECAY knobs	These are initially set against type of signal and load in step 3 of Table 3-2.
MSAA-1	CHANNELS A1, A2, B1, and B2 LINE LEVEL knobs	
MSAA-1	CHANNELS A1, A2, B1, and B2 SQUELCH ADJUST knobs	

*Tighten LOCK control on TUNE knob.

TABLE 3-1. CONTROL PRESETTINGS, REMOTE TUNING (CONT)

COMPONENT	CONTROL	POSITION
MSAA-1	MONITOR LEVEL knob	fully ccw
MSAA-1	MONITOR SELECT knob	optional
MCGA-1	INT/AFC/SYN	optional
AFCR-3	CARRIER SELECTOR switch	OSC
AFCR-3	TUNING/KCS knob	0
AFCR-3	SENSITIVITY knob	fully cw
HFP-1 (both units)	MAIN POWER, STANDBY/OFF SWITCH (located on rear chassis)	STANDBY*
AX-559	Appropriate receiver STDBY/ OPERATE switch (See Figure 3-1)	OPERATE**
MSAA-1	STDBY/ON knob	ON**

*Both HFP-1 units are left in STANDBY at all times, with their STANDBY lights ignited. On initial use of receiver, allow 24 hours to elapse before setting AX-599 and MSAA-1 power switches on, in order to stabilize crystal ovens.

**On appropriate HFP-1, STANDBY light will go out and TIME DELAY light will come on. After 60 seconds TIME DELAY light will go out and OPERATE light will come on, signifying that receiver is ready for operation.

b. REMOTE TUNING PROCEDURE

(1) 4-CHANNEL ISB. - Table 3-2 is the procedure for tuning one receiver in the DDRR-506 for a 4-channel multiplexed ISB transmission.

TABLE 3-2. REMOTE TUNING FOR 4-CHANNEL ISB

STEP	OPERATION (AT LRCC-1 PANEL)
1	Set TUNE OVERRIDE switch to ON, RF GAIN knob fully counterclockwise and AFC switch to OFF. Then set MC, 100 KC, 10 KC, 1 KC and .1 KC CARRIER FREQUENCY switches for carrier frequency. (Example: for 10.0951 mc carrier, set MC switch to 10, 100 KC switch to 0, 10 KC switch to 9, 1 KC switch to 5 and .1 KC switch to 1).
2	Allow about 30 seconds to elapse. When receiver has become tuned and locked for that carrier frequency, SYNC lamp will light. *
3	Set A1, A2, B1 and B2 CHANNEL ENABLE switches to ON (as indicated by extinguished lamps). Monitoring the 4 channels start turning RF GAIN knob clockwise. When signal commences, have local receiver operator adjust the four MSAA-1 channel LINE LEVEL knobs to obtain "0VU" readings on the LINE LEVEL meters, AGC DECAY knobs for clearest signals and SQUELCH ADJUST knobs for point just before the CHANNEL light goes out. (NOTE: These settings may be left for subsequent tuning for ISB). Then hold METER momentary switch at LEVEL position and observe METER reading. Note this RF GAIN setting figure for future ISB tuning.
4	If the AFC feature is desired, set AFC master switch to -20DB PILOT CARRIER (for a -20 db carrier) or 0DB PILOT CARRIER (for a full carrier). Set the METER switch at AFC and observing METER and AFC UNLOCK lamp, actuate AFC SCAN switch in one direction and another until AFC UNLOCK lamp goes out. The METER reading gives a readback of the AFCR-3 TUNING control position in relation to the + or - side of 0KC. This aids the remote operator in determining the next direction to push the AFC SCAN switch. When the AFC UNLOCK lamp has been extinguished in this way, the AFCR-3 unit has locked onto the carrier component in the signal.

*If SYNC lamp does not light after 30 seconds, FAULT lamp will. In this case, press RESET button and wait another 30 seconds for SYNC lamp to light.

NOTE

If a momentary carrier fade should occur while the receiver is operating, the AFC UNLOCK lamp will come on and remain on for the duration of the fade only. No adjustment is required, however, since the AFCR-3 is equipped with a memory circuit to maintain injection frequencies during fades. If the AFC UNLOCK remains on and wavering tones are noticed in the output, however, this indicates an "unlock" condition and retuning the AFC is necessary.

(2) 2-CHANNEL ISB. - For tuning in a 2-channel non-multiplexed ISB signal, follow the same procedure as that in Table 3-2. Outputs will appear on channels A1 (for the upper sideband) and B1 (for the lower sideband) instead of A1, A2, B1 and B2.

(3) TUNING FOR AM OR MCW. - For tuning in a conventional AM or MCW signal, follow the same procedure as that in Table 3-2. Use the AFC feature with the AFC switch set at 0DB PILOT CARRIER. The intelligence will appear both at channel A1 and channel B1 outputs. Select the output that gives the clearest reception.

(4) TUNING FOR SSB. - For tuning in a single sideband signal, follow the same procedure as that in Table 3-2. Upper sideband intelligence will appear at channel A1 output; lower sideband intelligence will appear at channel B1.

(5) TUNING FOR A SINGLE FSK OR FAX TRANSMISSION. - When tuning for a conventional single FSK or FAX transmission (unaccompanied by a carrier), use the same system for tuning in single sideband without a carrier component. Instead of setting the LRCC-1 unit CARRIER FREQUENCY switches for the carrier frequency, set them for the r-f center frequency plus (or minus) the required a-f center frequency at the FSK (or FAX) audio-to-pulse converter. Tuning for r-f center frequency plus audio center frequency will cause signal to appear at channel A1 output; tuning for r-f center minus a-f center will cause signal to appear at A2. If teletypewriter or FAX equipment fails to operate on first try, it may be necessary to reset the CARRIER FREQUENCY .1 KC switch to some adjacent digit to get proper adjustment. The AFC feature cannot be used for this type of reception since no carrier component is present.

(6) USE OF TUNE BUTTON FEATURE. - To delay the automatic tuning action in the receiver until the complete frequency figure has been set up on the CARRIER FREQUENCY switches, first set the TUNE OVERRIDE switch to OFF. Set the CARRIER FREQUENCY switches and then press the TUNE button. The TUNE button activates the receiver automatic tuning mechanism.

c. PLACING RECEIVER IN STANDBY. - After operating a receiver system, that system may be placed in "standby condition." In this condition, the receiver draws line current for its oscillator oven heating

elements and HFO filament only, in order to maintain oscillator frequency stabilities. To place a receiver system in standby, refer to Figure 3-1 for location of the MSAA-1 and two HFP-1 units for that receiver. Set the MSAA-1 STDBY/ON switch to STDBY and the appropriate HFP-1 unit of units #9 through #12 to STDBY by its STANDBY/OPERATE switch on panel AX-559. The OPERATE lamp will go out and the STDBY lamp will light on both HFP-1 units.

3-4. LOCAL TUNING

a. INITIAL PRESETTING OF CONTROLS. - Before tuning the receiver locally, preset the controls as described in Table 3-3.

TABLE 3-3. CONTROL PRESETTINGS, LOCAL TUNING

COMPONENT	CONTROL	POSITION
LRCB-1	POWER ON/OFF switch	OFF
LRCB-1	REMOTE/LOCAL switch	LOCAL
HFRR-2A	NOISE SILENCER/OFF/ ALIGNMENT SIGNAL switch	OFF
HFRR-2A	TUNE/SYNC/OPERATE switch	TUNE
HFRR-2A	BAND switch	optional
HFRR-2A	TUNE knob	optional

TABLE 3-3. CONTROL PRESETTINGS, LOCAL TUNING (CONT)

COMPONENT	CONTROL	POSITION
HFSR-1	MC switch*	optional
HFSR-1	100 KC switch*	optional
HFSR-1	10 KC switch*	optional
HFSR-1	1 KC switch*	optional
HFSR-1	.1 KC switch*	optional
MCGA-1	SYN/AFC/INT switch*	SYN
AFCR-3	TUNING/KCS knob	0
AFCR-3	CARRIER SELECTOR switch	OSC
AFCR-3	SENSITIVITY knob	fully cw
MSAA-1	A1, A2, B1, B2 LINE LEVEL knobs	fully cw
MSAA-1	A1, A2, B1, B2 AGC DECAY knobs	fully cw
MSAA-1	A1, A2, B1, B2 SQUELCH ADJUST knobs	fully ccw
MSAA-1	MONITOR LEVEL knob	mid-position
MSAA-1	STDBY/ON switch	ON**
AX-559	Appropriate receiver STDBY/ OPERATE switch (see Figure 3-1)	OPERATE**

*Rotary switch turns clockwise only.

**On both appropriate HFP-1 units, STANDBY light will go out and TIME DELAY light will come on. After 60 seconds TIME DELAY light will go out and OPERATE light will come on, signifying that receiver is ready for operation.

TABLE 3-3. CONTROL PRESETTINGS, LOCAL TUNING (CONT)

COMPONENT	CONTROL	POSITION
LRCC-1	CHANNEL ENABLE switches for A1, A2, B1 and B2.	ON
LRCC-1	RF GAIN knob	fully cw
LRCC-1	TUNE OVERRIDE switch	OFF
LRCC-1	AFC	OFF

b. LOCAL TUNING PROCEDURE

(1) 4-CHANNEL ISB. - Table 3-4 is the procedure for tuning one receiver in the DDRR-506 for a 4-channel multiplexed ISB transmission.

TABLE 3-4. LOCAL TUNING FOR 4-CHANNEL ISB

STEP	COMPONENT	OPERATION
1	HFRR-2A & MSAA-1	Using MSAA-1 MONITOR output to monitor the 4 channels in turn, search for incoming signal with HFRR-2A BAND switch and TUNE knob. When the receiver is tuned to the carrier, sampling with the MSAA-1 MONITOR SELECT switch will produce the 4 signals on A1, A2, B1 and B2.*
2	HFSR-1 & HFRR-2A	If HFSR-1 stabilization is not to be used, set MC, 100 KC, 10 KC, 1 KC and .1 KC knobs to bring zeros on digital display and HFRR-2A TUNE/SYNC/OPERATE switch to OPERATE. If HFSR-1 stabilization is to be used, set knobs to bring the same frequency on digital display to within the nearest .1 KC increment. Set HFRR-2A TUNE/SYNC/OPERATE switch to SYNC. Observe SYNC IND

*Care should be taken to avoid picking up the suppressed carrier component, if one is present, in one of the audio channel outputs. It will be recognized by its lower amplitude in relation to the intelligence tones.

TABLE 3-4. LOCAL TUNING FOR 4-CHANNEL ISB (CONT)

STEP	COMPONENT	OPERATION
2 (cont)	HFSR-1 & HFRR-2A (cont)	light and SYNCHRONIZE meter on HFRR-2A. If SYNC IND lamp does not light and remain steadily lit, readjust HFSR-1 1 KC and .1 KC knobs until SYNC IND lamp lights steadily and SYNCHRONIZE meter reads zero center scale or nearly so. Then set HFRR-2A TUNE/SYNC/OPERATE switch to OPERATE. Carefully readjust TUNE knob to bring SYNCHRONIZE meter needle to zero center scale.
3	MSAA-1	Monitoring channels A1, A2, B1 and B2 at the MONITOR jack, adjust the MSAA-1 AGC DECAY knobs for each channel for the clearest signal. Adjust SQUELCH ADJUST knobs for point just before the CHANNEL lamp goes out. Readjust LINE LEVEL knobs to obtain a "0 VU" reading on the CHANNEL output meter.
4	AFCR-3	If a carrier component is present in the signal with an amplitude over 30 db below PEP, the AFCR-3 unit may be used to compensate for transmitter instability. If using the AFCR-3, proceed with steps 5 and 6; if not using the AFCR-3, skip steps 5 and 6 and proceed to step 7.
5	MCGA-1	Set SYN/AFC/INT switch to AFC (NOTE: knob turns clockwise only).
6	AFCR-3	Check to ensure that TUNING/KCS knob is set at 0, CARRIER SELECTOR switch is at OSC and SENSITIVITY knob is fully clockwise. Observing CARRIER LEVEL meter, hold down RESET button and adjust TUNING/KCS knob* to obtain peak on CARRIER LEVEL meter. Release RESET button. Monitor all signals in all 4 channels, with the MSAA-1, containing changing frequencies (i.e.: voice,

*Use small knob adjacent to the larger knob for a vernier adjustment.

TABLE 3-4. LOCAL TUNING FOR 4-CHANNEL ISB (CONT)

STEP	COMPONENT	OPERATION
6 (cont)	AFCR-3 (cont)	FSK, etc.) while observing the AFCR-3 DRIFT meter. Needle will remain steady through tone frequency variations if the AFCR-3 is locked onto the carrier. If the needle varies with the tone changes, the AFCR-3 is locked onto one of the sidebands and the process should be repeated. If one of the channels contains a keyed (intermittent) tone, monitor this tone with the MSAA-1 and observe the AFCR-3 CARRIER LEVEL meter. If the needle varies with the keying, the AFCR-3 is locked onto the keyed tone and the process should be repeated. CAUTION If there is a steady tone telegraph signal in one of the channels and if Step 1 was not executed properly, it is possible to lock the AFCR-3 onto the tone instead of the carrier. If this has happened, it will show up by a jiggling of the CARRIER LEVEL meter when the tone becomes keyed. In this case, repeat process from Step 1. Back off SENSITIVITY setting, if necessary, to eliminate noise.
7	HFRR-2A & MSAA-1	Monitor all 4 channels at MSAA-1 MONITOR jack. If noise of the impulse type is encountered in any of the channels, try the HFRR-2A NOISE SILENCER/OFF/ALIGNMENT switch in the NOISE SILENCER position to eliminate it.

(2) 2-CHANNEL ISB. - For tuning in a 2-channel non-multiplexed ISB signal, follow the same procedure as that in Table 3-4. Outputs will appear on channels A1 (for the upper sideband) and B1 (for the lower sideband) instead of A1, A2, B1 and B2.

(3) TUNING FOR AM OR MCW. - For tuning in a conventional AM or MCW signal, follow the same procedure as that in Table 3-4. Use the AFCR-3. The intelligence will appear both at channel A1 and channel B1 outputs. Select the output that gives the clearest reception.

(4) TUNING FOR SSB. - For tuning in a single sideband signal, follow the same procedure as that in Table 3-4. Upper sideband intelligence will appear at channel A1 output; lower sideband intelligence will appear at channel B1.

(5) TUNING FOR A SINGLE FSK OR FAX TRANSMISSION. - When tuning for a conventional single FSK or FAX transmission (unaccompanied by a carrier), use the same system for tuning in single sideband without a carrier component. Instead of tuning the receiver to the carrier frequency, tune it for the r-f center frequency plus (or minus) the required a-f center frequency at the FSK (or FAX) audio-to-pulse converter. Tuning for r-f center frequency plus audio center frequency will cause signal to appear at channel A1 output; tuning for r-f center minus a-f center will cause signal to appear at A2. If teletypewriter or FAX equipment fails to operate on first try, it may be necessary to retune the receiver slightly to get proper adjustment. The AFC feature cannot be used for this type of reception since no carrier component is present.

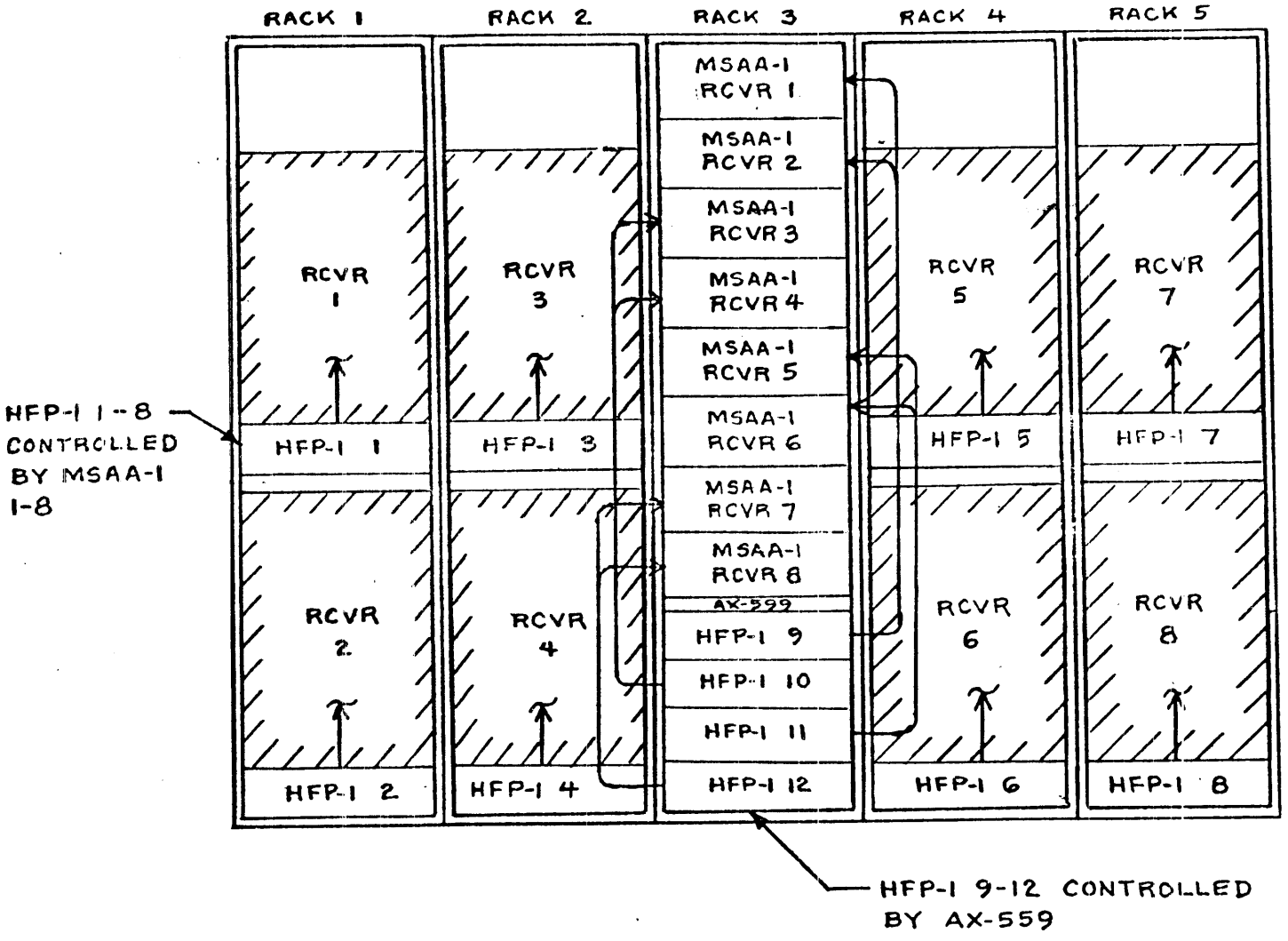


FIGURE 3-1. LOCATION OF RECEIVER POWER SUPPLIES

REMOTE CONTROL SITE — RECEIVER SITE

AX-567 CONTROL PANEL**

LEVEL AFC METER

VLTG (FROM LRCB-1) 120T RF GAIN

CHANNEL ENABLE

BIAS VLTG — B_2 B_1 A_1 A_2

TUNE

OFF ON

TUNE OVERRIDE

RESET

RE-ENERG VLTG (FROM LRCB-1)

FAULT "NO DC CORR." SIGNAL

CW VLTG (FROM LRCB-1) CCW VLTG

AFC-SCAN SYNC

MC 2-31 4-BIT CODE → MC

100KC 0-9 4-BIT CODE → 100KC

10KC 0-9 4-BIT CODE → 10 KC

1KC 0-9 4-BIT CODE → 1 KC

.1KC 0-9 4-BIT CODE → .1KC

MASTER SWITCHES CARRIER FREQUENCY

AFC -20DB PILOT CARRIER 0DB OFF VLTG (FROM LRCB-1) MASTER SW.

AFC UNLOCK

TO HFSR-1 SLAVE SWITCHES

F_c 2-32mc B2 B1 A1 A2

F_c 1.75mc A2 A1 B1 B2

HFRR-2A RF TUNER

NOISE SIL OFF ALIGN SIG

FOUR RF STAGES 2-32 MC FIRST CONV 1.75 MC IF

NOISE SIL IF OUTPUT

AGC/MANUAL GAIN

R BAND R TUNE

3.75-33.75 MC

ISOL AMPL

3.75-33.75 MC

PWR SUPPLY

RF LEVEL

2-32 MC ALIGN. SIGNAL

BAND SWITCH MOTOR HOME SW

TUNING SERVO MOTOR

HFO FIL. VLTG

DC CORR. & AUDIO SYNC TONE

1.75 MC

MIXER BAL MOD

3.75-33.75 MC AUDIO SYNC TONE/DC CORR.

250KC 2 MC

RELAY VLTG

SYNCHRO-NIZE SYNC IND

TUNE SYNC OPER

NOT USED

RF LEVEL READBAC

LRCB-1 CONTROL TERMINATOR

CW/CCW CONTROLS

REMOTE PWR LOCAL

PWR TO RELAYS

RE-ENERG FOR RELAY SEQUENCE

SERVO AMPL

BAND INFO

SEQ RELAYS & DELAY CKTS

RELAYS

DC CORR.

45 SEC TIME DELAY

TRAVEL CONTROL

TO AFC TUNING MOTOR

TO AFC RESET BUTTON

DC CORR.

"DIRECTION OF SEARCH" SIGNAL

HFSR-1 REFERENCE SIGNAL GENERATOR

1 MC INT EXT 1MC INPUT EXT

250KC 250 K

1MC COMP

250 KC GEN

1 MC

1MC STD 1 MC

10:1 DIV 100 KC

1 KC .1KC SYNTH CKTS 0-9

3100 DECK

3.1-4 KC

3200 DECK

1KC 27-36KC BAL MOD

0-9 SYNTH CKTS

30.1-40KC

1KC 10:1 DIV. 10 MC

TO LRCB-1 PWR SUPPLY

HFP-1 POWER SUPPLY (OF UNITS #9 THRU #12)

115/230VAC

OFF STDBY

STDBY XFRMRS

TIME DELAY 60 SEC TIME DELAY RELAY

OPERATE

"OPERATE" SIGNAL

CONTR RELAY

FIL., PLATE & BIAS VLTG TO 2 MSAA-1 UNITS*

115/230 VAC OVEN & FIL VLTGS

TO BLOWERS OF 2 MSAA-1 UNITS* NOT USED

HFP-1 POWER SUPPLY (OF UNITS #1 THRU #8)

115/230 VAC

AF103 LINE FILTER

115/230 VAC LINE

OFF STDBY

STDBY XFRMRS

TIME DELAY 60 SEC TIME DELAY RELAY

OPERATE

"OPERATE" SIGNAL

CONTR. RELAY

FIL., PLATE & BIAS VLTG TO MCGA-1, HFSR-1, & HFRR-2A FIL & BIAS TO AFCR-3

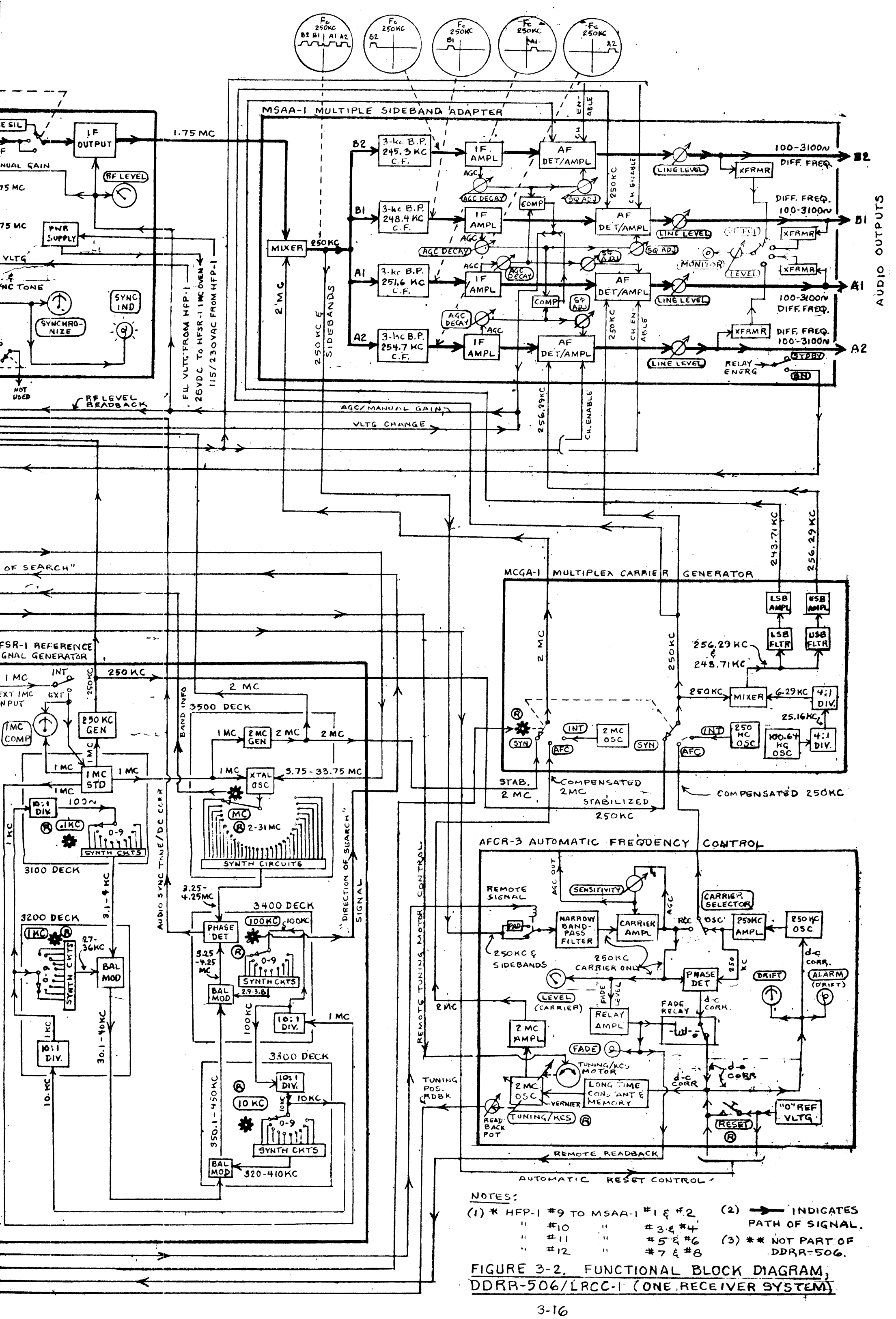
115/230 VAC LINE TO: AFCR-3 OVEN HFRR-2A & RACK BLOWERS

OVEN & FIL VLTGS

OVEN VLTGS TO MCGA-1 & FIL VLTG TO HFRR-2A HFO

AX-559 PANEL

OPERATE RELAY ENERG STANDBY



NOTES:

(1) * HFP-1 #9 TO MSAA-1 #1 & #2
" #10 " #3 & #4
" #11 " #5 & #6
" #12 " #7 & #8

(2) → INDICATES PATH OF SIGNAL.

(3) ** NOT PART OF DDRR-506.

FIGURE 3-2. FUNCTIONAL BLOCK DIAGRAM, DDRR-506/LRCC-1 (ONE RECEIVER SYSTEM)

SECTION 4

TROUBLESHOOTING

4-1. INTRODUCTION

This section is intended as a brief guide in troubleshooting a DDRR-506 Receiver as used with an LRCC-1 Receiver Control; specific separate troubleshooting procedures for the DDRR-506 and LRCC-1 are found in the Technical Manuals for these units.

4-2. FUNCTIONAL ANALYSIS

Figure 3-2 depicts a typical receiver system in a functional block diagram, including all the manual controls. Controls on the DDRR-506 that are local/remote are symbolized as (R).

For a complete functional analysis of the DDRR-506 used with a remote control panel identical to the LRCC-1, refer to Section 4 of the DDRR-506 Technical Manual.

4-3. TROUBLESHOOTING PROCEDURE

Since specific troubleshooting procedures for the DDRR-506 and LRCC-1 are described in their individual Technical Manuals, the following procedure in Table 4-1 is outlined only to determine which section is faulty, i.e.: DDRR-506 or LRCC-1.

TABLE 4-1. TROUBLE VS. SECTION

TROUBLE	SECTION
No response or read-back indications at LRCC-1 Panel.	DDRR-506
No response from CARRIER FREQUENCY switch settings and AFC switch setting on LRCC-1.	LRCC-1
No response from CARRIER FREQUENCY switch settings or TUNE or RESET buttons.	DDRR-506
No LRCC-1 CHANNEL ENABLE lights will come on.	DDRR-506
One LRCC-1 CHANNEL ENABLE light fails to come on.	LRCC-1
No change in LRCC-1 LEVEL METER reading from RF GAIN control manipulation.	LRCC-1
No reading on LRCC-1 METER with METER switch in either AFC or LEVEL position.	LRCC-1
When using AFC, LRCC-1 AFC UNLOCK light will not go out, although AFC METER reading responds from manipulation of AFC SCAN switch.	DDRR-506

It may be seen, from referring to Figure 3-2, that some other troubles cannot be readily attributed to either the DDRR-506 or LRCC-1 alone. In this case, both sections should be checked, first checking the LRCC-1, since this is the relatively simpler unit.

Each individual AX-567 panel is designed to be removed from the LRCC-1 master panel, containing the 8 units, without removing the master panel. Refer to the LRCC-1 Technical Manual for detail wiring and continuity check.