

★  
UNCLASSIFIED

TECHNICAL MANUAL  
for  
LF/MF COMMUNICATIONS RECEIVER  
MODEL VLRB-1

*BI-114-2.  
PILOT LIGHTS*



THE TECHNICAL MATERIEL CORPORATION  
MAMARONECK, N.Y.

OTTAWA, ONTARIO

★

★  
UNCLASSIFIED

TECHNICAL MANUAL  
for  
LF/MF COMMUNICATIONS RECEIVER  
MODEL VLRB-1



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

COPYRIGHT 1965  
THE TECHNICAL MATERIEL CORPORATION

## NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.



# 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





TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
<u>SECTION 1 - GENERAL INFORMATION</u>		
1-1	Purpose and Description . . . . .	1-1
1-2	Transistor and Diode Complement . . .	1-5
<u>SECTION 2 - INSTALLATION</u>		
2-1	Initial Inspection . . . . .	2-1
2-2	Power Requirements . . . . .	2-1
2-3	Installation . . . . .	2-3
2-4	Initial Adjustments . . . . .	2-9
<u>SECTION 3 - OPERATOR'S SECTION</u>		
3-1	General . . . . .	3-1
3-2	Preliminary Control Settings . . . .	3-5
3-3	AM and MCW Reception, Synthesized . .	3-6
3-4	CW and FSK Reception, Synthesized . . . . .	3-7
3-5	SSB and ISB Reception, Synthesized . . . . .	3-7
3-6	AFC Operation . . . . .	3-8
3-7	AM and MCW Reception, Unsynthesized . . . . .	3-9
3-8	SSB and ISB Reception, Unsynthesized . . . . .	3-9
3-9	Stopping Procedure . . . . .	3-10
3-10	Operator's Maintenance . . . . .	3-10

(cont)



TABLE OF CONTENTS (CONT)

<u>Paragraph</u>		<u>Page</u>
<u>SECTION 4 - TROUBLESHOOTING</u>		
4-1	Overall Functional Description . . . . .	4-1
4-2	RF100-2 Band Module . . . . .	4-7
4-3	Local Oscillator . . . . .	4-9
4-4	6.5 Megacycle Oscillator Module . . . . .	4-9
4-5	6.4 Megacycle I-F, AGC, and Noise Silencer Module . . . . .	4-10
4-6	100 Kilocycle I-F Module . . . . .	4-13
4-7	BFO Product Detector and Line Amplifier Module. . . . .	4-14
4-8	Power Supply and Audio Amplifier Module . . . . .	4-15
<u>SECTION 5 - MAINTENANCE</u>		
5-1	Preventive Maintenance . . . . .	5-1
5-2	Repair of Printed Circuits . . . . .	5-2
<u>SECTION 6 - PARTS LIST</u>		
<u>SECTION 7 - SCHEMATIC DIAGRAMS</u>		

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
<u>SECTION 1 - GENERAL INFORMATION</u>		
1-1	LF/MF Communications Receiver, Model VLRB-1 . . . . .	1-0
<u>SECTION 2 - INSTALLATION</u>		
2-1	Transformer Wiring . . . . .	2-2

LIST OF ILLUSTRATIONS (CONT)

<u>Figure</u>		<u>Page</u>
	<u>SECTION 2 - GENERAL INFORMATION (CONT)</u>	
2-2	VLRB Receiver, Rear View . . . . .	2-8
	<u>SECTION 3 - OPERATOR'S SECTION</u>	
3-1	VLRB, Front Panel Operating Controls . . . . .	3-2
	<u>SECTION 4 - TROUBLESHOOTING</u>	
4-1	VLRB Block Diagram . . . . .	4-2/4-3
	<u>SECTION 7 - SCHEMATIC DIAGRAMS</u>	
7-1	RF100-2, Schematic Diagram . . . . .	7-2/7-3
7-2	Local Oscillator, Schematic Diagram . . . . .	7-4/7-5
7-3	6.5 Osc. - 6.37 - 5.8 MC IF102, Schematic Diagram . . . . .	7-6/7-7
7-4	AGC-Noise Silencer-6.4 MC-IF, Schematic Diagram. . . . .	7-8/7-9
7-5	100 KC - IF101, Schematic Diagram . . .	7-10/7-11
7-6	BFO Product Detector, Schematic Diagram . . . . .	7-12/7-13
7-7	Power Supply and Audio Amplifier, Schematic Diagram . . . . .	7-14/7-15

LIST OF TABLES

<u>Table</u>		<u>Page</u>
	<u>SECTION 1 - GENERAL INFORMATION</u>	
1-1	Technical Specifications . . . . .	1-3
1-2	Transistor and Diode Complement . . .	1-5

LIST OF TABLES (CONT)

<u>Table</u>		<u>Page</u>
	<u>SECTION 2 - INSTALLATION</u>	
2-1	Rear Panel Operating Controls . . . .	2-5
	<u>SECTION 3 - OPERATOR'S SECTION</u>	
3-1	Controls, Jacks, and Indicators . . .	3-1
	<u>SECTION 4 - TROUBLESHOOTING</u>	
4-1	VLRB Tuning Range . . . . .	4-7

6412.16-1



Figure 1-1. LF/MF Communications Receiver, Model VLRB-1



## SECTION I

### GENERAL INFORMATION

#### 1-1. PURPOSE AND DESCRIPTION.

The VLRB (figure 1-1) continuously covers the frequency range of 30 to 600 kilocycles for the reception of AM, AME, CW, MCW, FAX, FSK, DSB, ISB and SSB signals. The frequency range is divided into five front panel selectable tuning ranges of 30 to 55, 55 to 100, 100 to 180, 180 to 330, and 330 to 600 kilocycles. The VLRB is a double-conversion super-heterodyne receiver with a first i-f frequency of 6.4 kilocycles and a second i-f frequency of 100 kilocycles. The first i-f frequency bandwidth is 8 kilocycles; the second i-f frequency has a selectable bandwidth of 0.5, 2, 4, and 8 kilocycles. The rf bandwidth is a minimum of 2 kilocycles on the lower band (30 to 55 kilocycles) and 8 kilocycles on all other bands.

An i-f type noise silencer circuit controllable from the front panel mutes the receiver during periods of impulse noise. An agc circuit maintains the output signal constant within  $\pm 3$  db for a 100 db change in input signal from 0.3 microvolts. The agc has a fast attack time and a front panel adjustable decay time from 3.3 to 16.5 seconds. The agc controlled stages can be manually controlled either from the front panel or from external remote equipment. The receiver contains two audio channels. One channel provides an audio output of 0 DBM across a 600-ohm balanced centertapped line. The channel output can be monitored by a front panel meter. The other audio channel provides 1/2 watt

(average power) across a 4-ohm impedance for connection to a loudspeaker. A front panel mounted jack provides the means to monitor the audio signal applied to the loudspeaker. The internal power supply requires 115/230 volts, 47 to 400 cycles per second, single phase power and provides dc output voltages of plus and minus 12 volts. In the event of ac power failure, the receiver will automatically switch over to battery power (with the connection of an external 24 volts battery supply).

The VLRB can be synthesized (with external synthesizer equipment such as the Synthesizer TMC Model LFSB-1 and Frequency Standard TMC Model CSS-2) over the complete tuning range in increments of ten cycles. The lower frequencies (30 to 99.999 kilocycles) can be synthesized in increments of one cycle. When operated continuously, the VLRB is stable to 0.01% of the operating frequency after warmup. When operated synthesized, the VLRB is as stable as the synthesizer equipment it is used with. The VLRB provides output signals of 6.5 megacycles and a bandpass signal of 5.8 to 6.37 megacycles for application to the external synthesizer unit.

When the VLRB is operated together with a sideband converter (such as TMC Model LFCA-1) for the reception of DSB, ISB, or SSB signals, connection facilities are provided for automatic frequency control of the receiver local oscillator.

The VLRB is a completely transistorized modular constructed unit consisting of a main chassis that houses the following:

- (1) Four RF 100-2 Band Modules.
- (2) One Local Oscillator Module.
- (3) One 6.5 Megacycle Oscillator Module.
- (4) One 6.4 Megacycle I-F, AGC, and Noise Silencer Module.
- (5) One 100 Kilocycle I-F Module.
- (6) One BFO Product Detector & Line Amplifier Module.
- (7) One Power Supply and Audio Amplifier Module.

TABLE 1-1. TECHNICAL SPECIFICATIONS

RF Frequency Range	30 to 600 kcs continuously in tuning ranges of 30 to 55, 55 to 100, 100 to 180, 180 to 330, and 330 to 600 kcs.
Local Oscillator Frequency Range	130 to 700 kcs.
Modes of Reception	AM, AME, CW, MCW, FAX, FSK, DSB, ISB, and SSB.
Frequency Stability	0.01% of the operating frequency after warm-up. When the receiver is synthesized, the stability is equal to the stability of the external synthesizer equipment.
Input Impedance	50 ohms nominal.
Sensitivity	With a bandwidth of 500 cycles, a 0.3 microvolt signal at the antenna terminals will produce a 15 db signal plus noise-to-noise ratio at the output of the audio amplifier.



TABLE 1-1. TECHNICAL SPECIFICATIONS (CONT)

Tuning	Continuous tuned with magnetic cores to give stable smooth tuning.
Bandpass:	
RF	A minimum of 2 kc on the lower band (30 to 55 kcs); a minimum of 8 kc on the other bands.
First I-F	8 kcs at a center frequency of 6.4 megacycles.
Second I-F	0.5, 2, 4, and 8 kilocycles at 3 db points, selectable from the front panel; the second i-f center frequency is 100 kilocycles.
I-F Noise Silencer	A highly effective I-F type noise silencer is included to remove impulse noise.
Image Ratio (In accordance with CCIR specifications)	At least 80 db down when referenced to 0.3 microvolt input signal.
AGC Characteristics	With a 100 db increase from the .3 uv input signal, the output remains constant within <u>±3</u> db.
Audio Distortion	On standard two tone test, audio distortion will be at least 40 db down.
Signal Output:	
100 kcs I-F	1 millivolt across 50 ohms available at a BNC connector.
Audio	0 DBM across a 600-ohm balanced centertapped line; 1/2 watt (average power) across 4 ohms. Headset monitoring provided at front panel.

TABLE 1-1. TECHNICAL SPECIFICATIONS (CONT)

To External Synthesizer	6.5 megacycles at a level of approximately 9 millivolts across 50 ohms available at a BNC connector. A spectrum signal of 5.8 to 6.37 megacycles at a level of approximately 15 millivolts across 50 ohms available at a BNC connector.
Hum Level	Power supply hum at least 50 db below full audio output.
Environmental Conditions	Operates in any ambient temperature of 0°C to 50°C and any value of humidity up to 90%.
Dimensions	7" high x 19" wide x 16" deep.
Weight	Approximately 15 lbs.
Power Supply	115/230v, 47-400 cps, single phase primary power, approximately 15 watts.
Battery Power (Optional)	A 24-volt battery supply such as the TMC Model BPSA-1 to furnish power to the receiver for at least 6 hours. The battery supply is kept in a charged condition by a built-in "trickle" charger.

1-3. TRANSISTOR AND DIODE COMPLEMENT.

Table 1-2 lists the transistor and diode complement of the VLRB receiver.

TABLE 1-2. TRANSISTOR AND DIODE COMPLEMENT

REFERENCE SYMBOL	TYPE	FUNCTION
	RF 100-2 BAND MODULE	
Q1, Q3, Q5	2N384	RF Amplifier

TABLE 1-2. TRANSISTOR AND DIODE COMPLEMENT (CONT)

REFERENCE SYMBOL	TYPE	FUNCTION
RF 100-2 BAND MODULE		
Q7	2N384	Emitter Follower
Q2, Q4, Q6	2N863	Variable Impedance
CR1	VR-103-1B	AGC Limiter
LOCAL OSCILLATOR		
Q901	2N706	Band 1 Oscillator
Q902	2N706	Band 2 Oscillator
Q903	2N706	Band 3 Oscillator
Q904	2N706	Band 4 Oscillator
Q905	2N706	Band 5 Oscillator
Q906	2N706	Emitter Follower
CR901	1N961	+10 Volt Reference Zener
CR902, CR903, CR904 CR905, CR906		Varicaps
6.5 MEGACYCLE OSCILLATOR MODULE		
Q501, Q502	2N706	6.5 Megacycle Oscillator
Q503	2N384	Current Source
Q504, Q505	2N384	Balanced Mixer
Q506, Q507	2N384	Amplifier
Q508	2N384	Emitter Follower

TABLE 1-2. TRANSISTOR AND DIODE COMPLEMENT (CONT)

REFERENCE SYMBOL	TYPE	FUNCTION
6.4 MC IF, AGC, AND NOISE SILENCER MODULE		
Q601, Q602	2N384	Balanced Mixer
Q605	2N384	Current Source
Q603, Q604	2N384	Balanced Amplifier
Q606	2N706	Gate
Q607	2N863	Variable Impedance
Q608	2N706	Noise Silencer Amplifier
Q609	2N384	Noise Silencer Amplifier
Q610	2N706	P/o Noise Detector
Q611	2N706	Emitter Follower
Q612, Q613, Q617	2N706	Schmitt Circuit
Q614	2N706	Amplifier
Q615, Q616	2N863	DC Amplifier
CR601	1N34A	Protective Diode
CR602, CR603 CR607, CR608	1N34A	Noise Detector
CR604	1N34A	AGC Rectifier
CR605	1N463	Protective Diode
CR606	VR103-1-A	Bias Diode
CR609	1N957B	Zener Diode
CR610	1N961	10 Volt Reference Zener

TABLE 1-2. TRANSISTOR AND DIODE COMPLEMENT (CONT)

REFERENCE SYMBOL	TYPE	FUNCTION
100 KILOCYCLE I-F MODULE		
Q401	2N706	Mixer
Q408, Q409, Q410	2N706	Amplifier
Q402, Q403 Q404, Q405	2N706	Buffer Amplifier
Q406, Q407	2N706	"Q" Multiplier
BFO PRODUCT DETECTOR AND LINE AMPLIFIER MODULE		
Q301, Q302	2N706	Amplifier
Q303	2N396A	Mixer
Q304, Q305	2N396A	Amplifier
Q306	2N706	BFO
Q307	2N396A	Amplifier
Q308, Q309	2N396A	Balanced Amplifier
CR301	1N34A	AM Detector
CR302	1N961	10 volt Reference Zener
CR304, CR305	1N34A	Full-wave Rectifier
POWER SUPPLY AND AUDIO AMPLIFIER MODULE		
Q201		
Q202	2N396A	Audio Amplifier
Q203, Q204	2N1370	Push-Pull Audio Amplifier
CR201, CR202 CR203, CR204	1N2484	Bridge Rectifiers

TABLE 1-2. TRANSISTOR AND DIODE COMPLEMENT (CONT)

REFERENCE SYMBOL	TYPE	FUNCTION
POWER SUPPLY AND AUDIO AMPLIFIER MODULE (CONT)		
CR205	1N2484	Isolator
CR206	1N961B	+10 Volt Reference Zener
MAIN CHASSIS		
Q101	2N2143	Series Regulator
CR101	VR101-24-S51	-12 Volt Reference Zener
CR102	1N2976B	+12 Volt Reference Zener
Q102, Q103	2N2143	Balanced Audio Amplifier
CR103	1N2978RB	-12 Volt Reference Zener
CR104	1N2484	Short circuits battery charging resistor when battery is used to power the VLRB.



## SECTION 2

### INSTALLATION

#### 2-1. INITIAL INSPECTION.

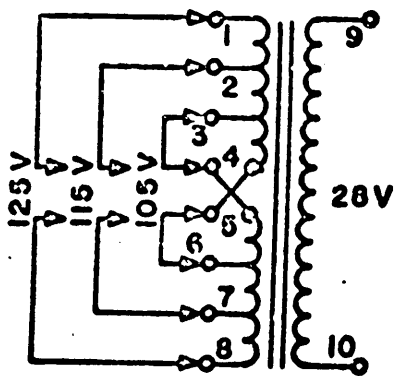
The VLRB is calibrated and tested at the factory prior to shipment. When it arrives at the operating site, inspect the packing case and contents for possible damage. Inspect all packing material for parts which may have been shipped as "loose items". With respect to damage to the equipment for which the carrier is liable, the Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

The equipment is shipped with all modules and other components installed. Check that all such components are properly positioned.

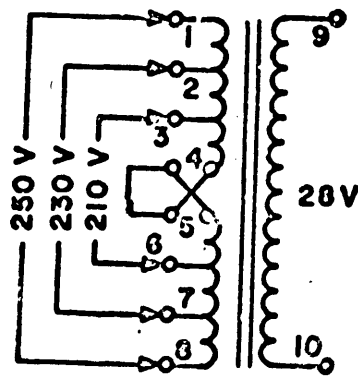
#### 2-2. POWER REQUIREMENTS.

The VLRB unit is designed for 105, 115, 125/210, 230, 250 volt, 47 to 400 cycles per second, single phase power. Unless specifically ordered, the unit is shipped wired for 115 volt operation. Figure 2-1 shows the power transformer primary winding connections for all of the designated power voltages. When 210, 230, or 250 volt operation is used, change AC fuse F101 located on the rear panel from 1/8 ampere to 1/16 ampere.





115V, 47-400 CPS



230V, 47-400 CPS

Figure 2-1. Transformer Wiring

## 2-3. INSTALLATION.

a. MECHANICAL. - The VLRB is designed for both cabinet and rack installation. In either case, adequate ventilation, sufficient clearance in back of the synthesizer for access to rear-panel connections, and sufficient space for withdrawal of the synthesizer from the cabinet for servicing are prime considerations when determining the synthesizer's ultimate location. The VLRB is equipped with a standard 19 inch wide front panel, and is 7 inches high and approximately 16 inches deep.

When intended for rack installation, the VLRB is equipped with slide mechanisms. To install the VLRB in a rack, proceed as follows:

- (1) Set the VLRB chassis slide mechanism in tracks.
- (2) Slide chassis in tracks until rearward release finger engages holes in track.
- (3) Press forward release fingers and slide chassis into cabinet; secure front-panel of VLRB to rack with screws.
- (4) Make the necessary cable and electrical connections as described in paragraph b below.

b. ELECTRICAL. - All external connections are made to the jacks located on the rear panel (see figure 2-2). Table 2-1 lists rear panel controls and jacks and the function of each. External connections to the VLRB are made as follows:

- (1) Check that the POWER switch S108 is set to its off position (down); then, connect 115 volt a-c power to the MAIN AC jack J111 pins A and C.

(2) Connect the 50-ohm antenna to the ANTENNA IN jack J217 mounted on the Low Pass Filter.

(3) Connect the loudspeaker to E101 terminals 1 and 2 (SPEAKER 4 OHM).

(4) For FSK signal reception, connect the input circuits of the external signal frequency converter to E101 terminals 3, 4, and 5. (600 OHM LINE).

(5) For ISB and SSB signal reception, connect the input circuits of an external sideband converter to the 100 KC jack J116.

(6) For synthesized operation connect the associated circuits of an external synthesizer unit to the 6.5 MC jack J115 and to the 5.8 MC jack J116; also, connect the synthesizer d-c correction voltage output to the SYN DC jack J113.

(7) For automatic frequency control operation connect the external sideband converter d-c correction voltage to the SSB DC jack J114.

(8) For remote AGC control, connect the d-c voltage from the external remote equipment to the REMOTE jack J117.

(9) For automatic power switching, ensure that the BAT. switch S108 mounted on the power supply inside the VLRB is set to OUT; then, connect the external 24-volt battery supply to the BATTERY jack J112 pins A and D (pin A is the positive terminal connection).

TABLE 2-1. REAR PANEL OPERATING CONTROLS

<u>REFERENCE DESIGNATION Figure 2-2</u>	<u>PANEL AND COMPONENT DESIGNATION</u>	<u>FUNCTION</u>
1	MAIN AC jack J111	Input receptacle for 115/230 volt ac power.
2	BATTERY jack J112	Input receptacle for external 24-volt battery.
4	SYN DC jack J113	Input jack for d-c correction voltage from external synthesizer unit.
5	SSB DC jack J114	Input jack for d-c correction voltage from external sideband converter unit.
7	6.5 MC jack J115	Permits connection of 6.5 megacycle signal at a level of approximately 9 millivolts across 50 ohms to external synthesizer unit.
8	100 KC jack J116	Permits connection of 100 kilocycle i-f signal at a level of approximately 1 millivolt across 50 ohms to external sideband converter unit.
10	REMOTE jack J117	Permits connection of external dc voltage (plus 3 to 10 volts) from remote equipment.
11	5.8 MC jack J118	Permits connection of 5.8 to 6.37 megacycle spectrum signal at a level of approximately 15 millivolts across 50 ohms to external synthesizer unit.

TABLE 2-1. REAR PANEL OPERATING CONTROLS (CONT)

<u>REFERENCE DESIGNATION Figure 2-2</u>	<u>PANEL AND COMPONENT DESIGNATION</u>	<u>FUNCTION</u>
13	RF OUT jack J119	Not used.
15	SYN RF jack J120	Permits monitoring the d-c correction voltage applied from the external synthesizer. Parallel-connected with jack J113.
18	AC fuse F101	Protects power supply components from internal short circuits.
17	B- fuse F102	Protects -12 volt power supply components from overloads.
12	B+ fuse F103	Protects +12 volt power supply components from overloads
16	E101, SPEAKER 4 OHM	Terminals 1 and 2 provide screw terminal connections for external 4-ohm loud-speaker to receiver audio amplifier. Terminal 2 is ground.
14	E101, 600 OHM LINE	Terminals 3, 4, and 5 provide screw terminal connections for external equipment to receiver line amplifier. Terminal 4 is the centertap.
	BAT. switch S109 (mounted on power supply inside VLRB)	A 2-position switch. In IN position connects external 24-volt battery to receiver power supply. In OUT position disconnects 24-volt battery from power supply.

TABLE 2-1. REAR PANEL OPERATING CONTROLS (CONT)

REFERENCE DESIGNATION Figure 2-2	PANEL AND COMPONENT DESIGNATION	FUNCTION
3	ANTENNA IN jack J1 (mounted on low pass filter network)	Input jack for 50 ohm antenna.
9	TEST CARD	Permits module components to be tested using the receiver internal power supply.
6	ANTENNA OUT jack J2 (mounted on low pass filter network)	Permits connection of low pass filter to rf module input circuits.

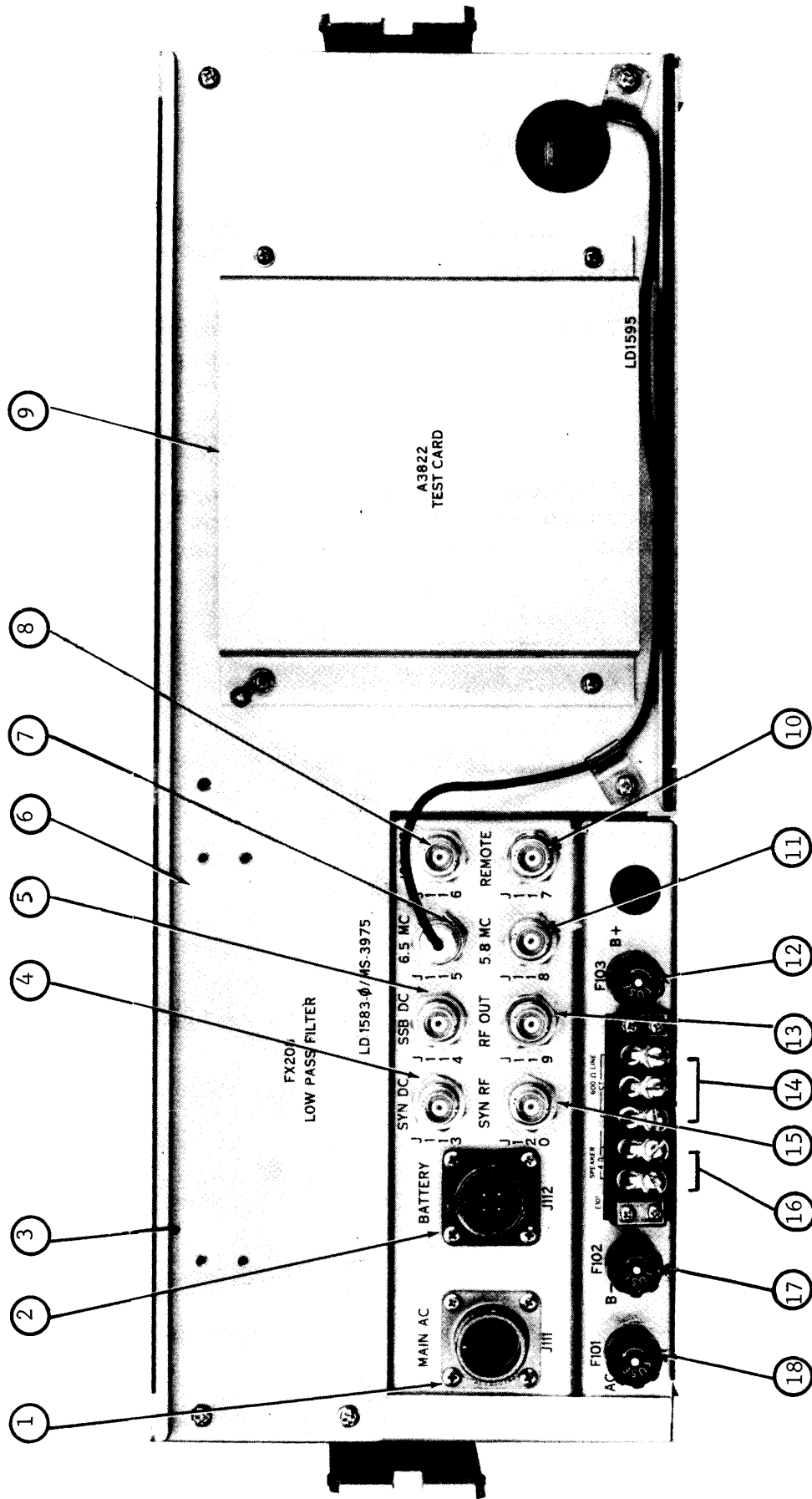


Figure 2-2. VLRB Receiver, Rear View

#### 2-4. INITIAL ADJUSTMENTS.

Before any VLRB receiver is shipped, it is aligned and thoroughly checked against the manufacturer's specifications. Hence, the receiver is operable after it is properly installed.





SECTION 3  
OPERATOR'S SECTION

3-1. GENERAL.

The VLRB may be operated synthesized or unsynthesized. When operated synthesized, the VLRB is as stable as the external synthesizer equipment it is used with. When operated unsynthesized, the VLRB has a frequency stability of  $\pm 0.1\%$  of the operating frequency, long term, after a 1/2 hour warm up. The operator should first familiarize himself with the front panel controls and indicators shown in figure 3-1 and listed in table 3-1.

TABLE 3-1. CONTROLS, JACKS, AND INDICATORS

<u>REFERENCE DESIGNATION Figure 3-1</u>	<u>PANEL DESIGNATION</u>	<u>FUNCTION</u>
19	BAND switch S105	Rotates illuminated KILOCYCLE dial to the desired rf band. The rf band tuning ranges are as follows:  <div style="margin-left: 100px;">           BAND 1 30-55 kc            BAND 2 55-100 kc            BAND 3 100-180 kc            BAND 4 180-330 kc            BAND 5 330-600 kc         </div>
2	KILOCYCLES	Displays rf band selected by BAND switch S105.
1	LOCK	Locks TUNING control in position.

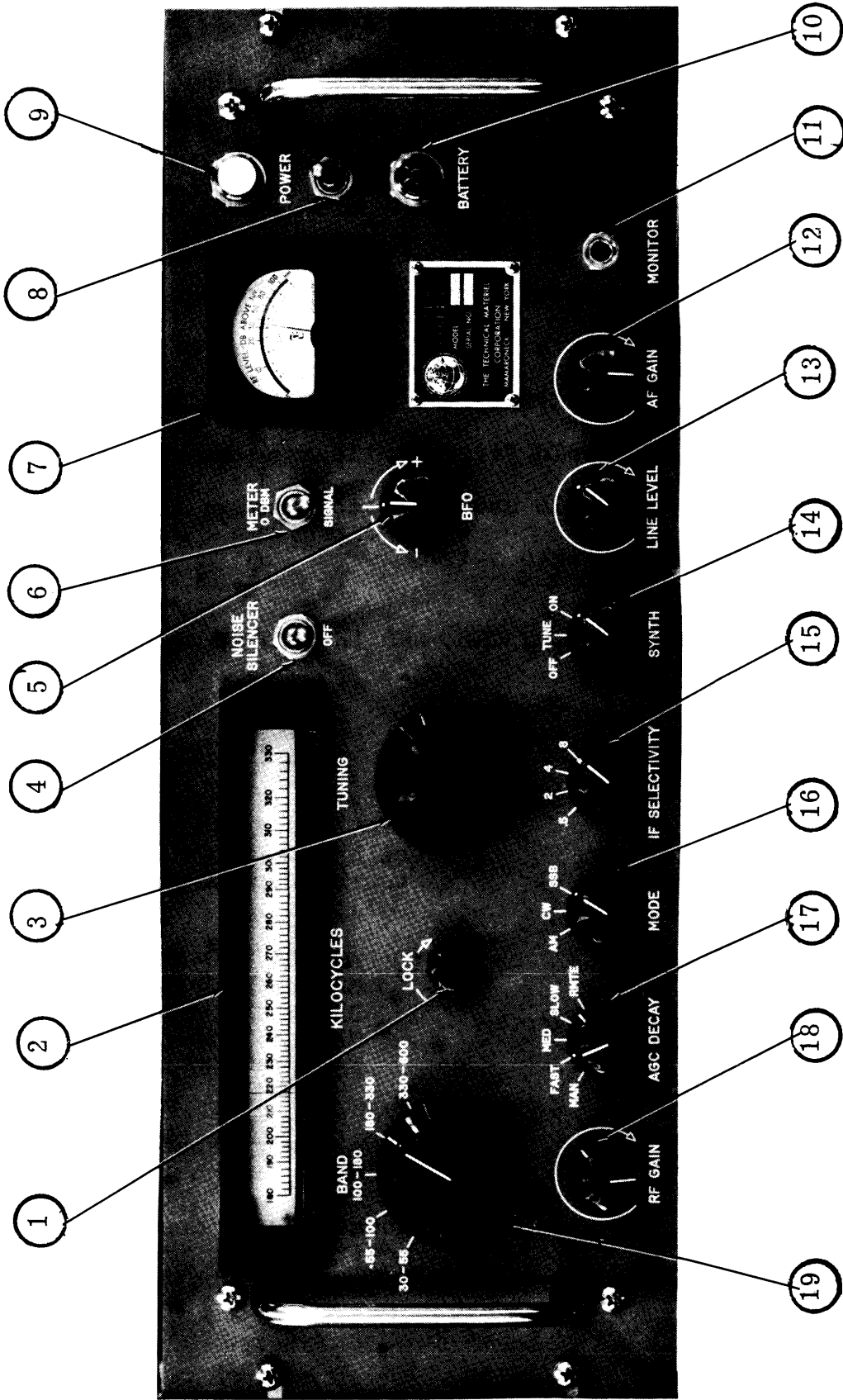


Figure 3-1. VLRB, Front Panel Operating Controls

TABLE 3-1. CONTROLS, JACKS, AND INDICATORS (CONT)

<u>REFERENCE DESIGNATION Figure 3-1</u>	<u>PANEL DESIGNATION</u>	<u>FUNCTION</u>
3	TUNING control	Moves KILOCYCLE dial pointer along dial of selected band to the desired frequency. This control is fitted with a lock.
4	NOISE SILENCER switch S107	In ON position activates noise silencer circuits; in OFF position disables noise silencer circuits.
6	METER switch S106	In 0 DBM position connects line amplifier audio output signal to front panel meter. In SIGNAL position connects AGC circuit to front panel meter.
7	Meter M301	Operates together with METER 0 DBM-SIGNAL switch S106. In 0 DBM switch position measures level of line amplifier audio-signal in dbm across a 600 ohm line. In SIGNAL position utilizes AGC signal to measure relative strength of incoming rf signal.
5	BFO control R350	Adjusts BFO signal output frequency $\pm 3$ kilocycles from center frequency of 100 kilocycles.
9	POWER lamp DS101	Indicates when AC power is applied to receiver internal power supply.
8	POWER switch S108	Connects AC power to receiver internal power supply.
10	BATTERY lamp DS102	Indicates when the external 24-volt battery is used to power the receiver circuits.

TABLE 3-1. CONTROLS, JACKS, AND INDICATORS (CONT)

<u>REFERENCE DESIGNATION Figure 3-1</u>	<u>PANEL DESIGNATION</u>	<u>FUNCTION</u>
11	MONITOR jack J21	Permits headset monitoring of audio signal applied to loudspeaker.
12	AF GAIN control R230	Controls amplitude of audio signal applied to loudspeaker.
13	LINE LEVEL control R229	Controls amplitude of audio signal applied across 600 OHM terminals.
14	SYNTH switch S103	A 3-position switch. In ON position connects dc loop from external synthesizer unit to receiver local oscillator circuit. In TUNE position connects dc loop from external synthesizer to receiver audio circuits. In OFF position connects dc loop of external sideband converter to receiver local oscillator circuit.
15	IF SELECTIVITY switch S102	A 4-position switch; selects bandwidth of 100 kilocycle second i-f signal. Bandwidths may be selected as follows: 0.5, 2, 4, or 8 kilocycles.
16	MODE switch S101	A 3-position switch. In AM position connects diode detector audio output signal to audio amplifier channels. In CW position connects product detector audio output signal to audio amplifier channels. In SSB position disconnects audio signals to audio amplifier channels and connects dc loop from external sideband converter unit to receiver SYNTH switch S103.

TABLE 3-1. CONTROLS, JACKS, AND INDICATORS (CONT)

<u>REFERENCE DESIGNATION Figure 3-1</u>	<u>PANEL DESIGNATION</u>	<u>FUNCTION</u>
17	AGC DECAY switch S104	A 5-position rotary switch. In MAN position disconnects AGC circuit and permits RF GAIN control R537 to control gain of AGC controlled stages. In FAST, MED, and SLOW positions, permits AGC circuit to control the gain of the rf and i-f stages. Also, permits selection of time constants that change the decay time of the AGC voltage as follows:  <div style="margin-left: 40px;">                     FAST     3.3 seconds                      MED      9.9 seconds                      SLOW     16.5 seconds                 </div> In REMOTE position disconnects AGC circuit and permits external equipment to control gain of AGC controlled stages.
18	RF GAIN control R537	Operates when AGC DECAY switch is in the MAN position. Controls the gain of the AGC controlled stages.

3-2. PRELIMINARY CONTROL SETTINGS

Refer to figure 3-1 and set controls as follows:

<u>CONTROL</u>	<u>POSITION</u>
NOISE SILENCER switch 4	OFF
METER switch 6	0 DBM
POWER switch 8	Up
BAND switch 19	At range that includes desired operating frequency.
LOCK knob 1	Fully counterclockwise

PRELIMINARY CONTROL SETTINGS (CONT)

<u>CONTROL</u>	<u>POSITION</u>
TUNING control 3	For indication of desired operating frequency on KILOCYCLES dial 3.
RF GAIN control 18	Mid-range
AGC DECAY switch 17	MAN
IF SELECTIVITY switch 15	8
LINE LEVEL control 13	Fully counterclockwise
AF GAIN control 12	Mid-range
*BAT. switch (inside VLRB)	IN

\*The BAT. switch is set to the OUT position only when an external 24-volt battery is not supplied or it is desired to turn the system off.

3-3. AM AND MCW RECEPTION, SYNTHESIZED . - Refer to figure 3-1.

- a. Make sure that controls are set according to paragraph 3-2.
- b. Set MODE switch 16 at AM.
- c. Set SYNTH switch 14 at TUNE. An audio tone should be heard from the loudspeaker. Adjust TUNING control 3 to zero beat the tone.
- d. Set SYNTH switch 14 at ON.
- e. Adjust RF GAIN control 18 and AF GAIN control 12 for minimum distortion and comfortable listening level.
- f. If AGC (automatic gain control) is desired, set the AGC DECAY switch 17 at FAST, MED or SLOW. With AGC DECAY switch at FAST, the decay time is 3.3 seconds; at MED, decay time is 9.9 seconds; and at SLOW, decay time is 16.5 seconds.

g. If noise silencing is desired, set NOISE SILENCER switch 4 at ON.

h. Adjust LINE LEVEL control 13 for desired audio output to external equipment.

3-4. CW AND FSK RECEPTION, SYNTHESIZED. - Refer to figure 3-1.

a. Make sure thtt the controls are set according to paragraph 3-2.

b. Set MODE switch 16 at CW.

c. Set SYNTH switch 14 at TUNE. An audio tone should be heard from the loudspeaker. Adjust TUNING control 3 to zero beat the tone.

d. Adjust BFO control 5 for desired tone of received signal.

e. Perform steps e through h paragraph 3-3.

3-5. SSB AND ISB RECEPTION, SYNTHESIZED. - Refer to figure 3-1.

a. Make sure that all controls are set accor ding to paragraph 3-2.

b. Set MODE switch 16 at SSB.

c. Set SYNTH switch 14 at TUNE. One audio tone should be heard from the loudspeaker. Adjust TUNING control 3 to zero beat the tone.

d. Adjust RF GAIN control 18 for minimum distortion; at the external sideband converter adjust audio controls for comfortable listening pleasure.

e. If AFC (automatic gaincontrol) is desired, set AGC DECAY switch 17 at FAST, MED, or SLOW. With AGC DECAY switch



at FAST, decay time is 3.3 seconds; at MED, decay time is 9.9 seconds; and at SLOW, decay time is 16.5 seconds.

f. If noise silencing is desired, set NOISE SILENCER switch 4 at ON.

g. At the external sideband converter adjust necessary controls for desired audio output.

3-6. AFC OPERATION. - AFC (automatic frequency control) may be employed when receiving SSB or ISB signals that includes a pilot carrier that is reduced no more than 25 db.

a. Make sure that controls are set according to paragraph 3-2.

b. Set MODE switch 16 at SSB.

c. Set SYNTH switch 14 at OFF.

d. Adjust RF GAIN control 18 for comfortable listening level. At the external sideband converter adjust audio controls for comfortable listening pleasure.

e. Adjust TUNING control 3 to zero beat the received pilot carrier.

f. If AGC (automatic gain control) is desired set AGC DECAY switch 17 at FAST, MED, or SLOW. With AGC DECAY switch at FAST, decay time is 3.3 seconds; at MED, decay time is 9.9 seconds; and, at SLOW, decay time is 16.5 seconds.

g. If noise silencing is desired, set NOISE SILENCER switch 4 at ON.

h. At the external sideband converter adjust the necessary controls for desired audio output.

3-7. AM AND MCW, RECEPTION, UNSYNTHESIZED. - Refer to figure 3-1.

a. Make sure that controls are set according to paragraph 3-2.

b. Set MODE switch 16 at AM.

c. Set SYNTH switch 14 at OFF

d. Perform steps e. through h., paragraph 3-3.

3-8. SSB AND ISB RECEPTION, UNSYNTHESIZED. - Refer to figure 3-1.

It may be necessary to operate the VLRB unsynthesized for the reception of SSB and ISB signals. If the desired signal includes a pilot carrier that is reduced no more than 25 db, AFC should be employed as given in paragraph 3-6. Unsynthesized operation for the reception of SSB and ISB signals may require frequency re-tuning to maintain intelligibility.

a. Make sure that controls are set as given in paragraph 3-2.

b. Set MODE switch 16 at SSB.

c. Set SYNTH switch 14 at OFF.

d. Adjust RF GAIN 18 for minimum distortion; at the external sideband converter adjust audio controls for comfortable listening level.

e. Adjust TUNING control 3 for maximum intelligibility.

f. If AGC (automatic gain control) is desired, set AGC DECAY switch 17 at FAST, MED, or SLOW. With AGC DECAY switch at FAST, decay time is 3.3 seconds; at MED, decay time is 9.9 seconds; and at SLOW, decay time is 16.5 seconds.

g. At the external sideband converter, adjust the associated sideband and audio controls for best reception.

### 3-9. STOPPING PROCEDURE.

To stop the VLRB receiver set the POWER switch 8 to its off position (down). If an external 24 volt battery is connected to the BATTERY jack set the BAT. switch to OUT.

### 3-10. OPERATOR'S MAINTENANCE.

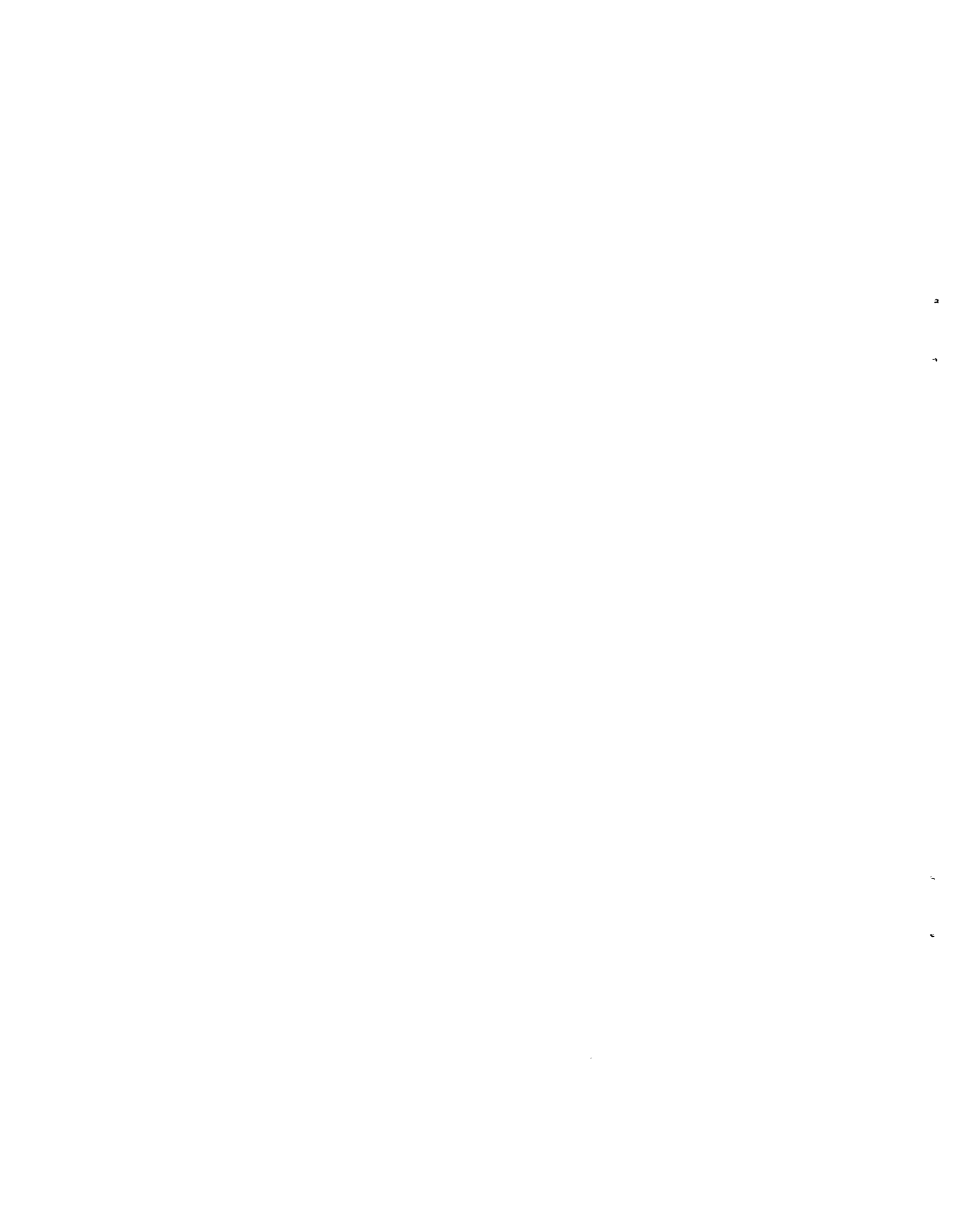
The operator may, at times, be required to perform some aspects of maintenance. Generally, this consists of ascertaining that all controls and indicators are functioning properly, insuring equipment cleanliness, and replacing defective fuses.

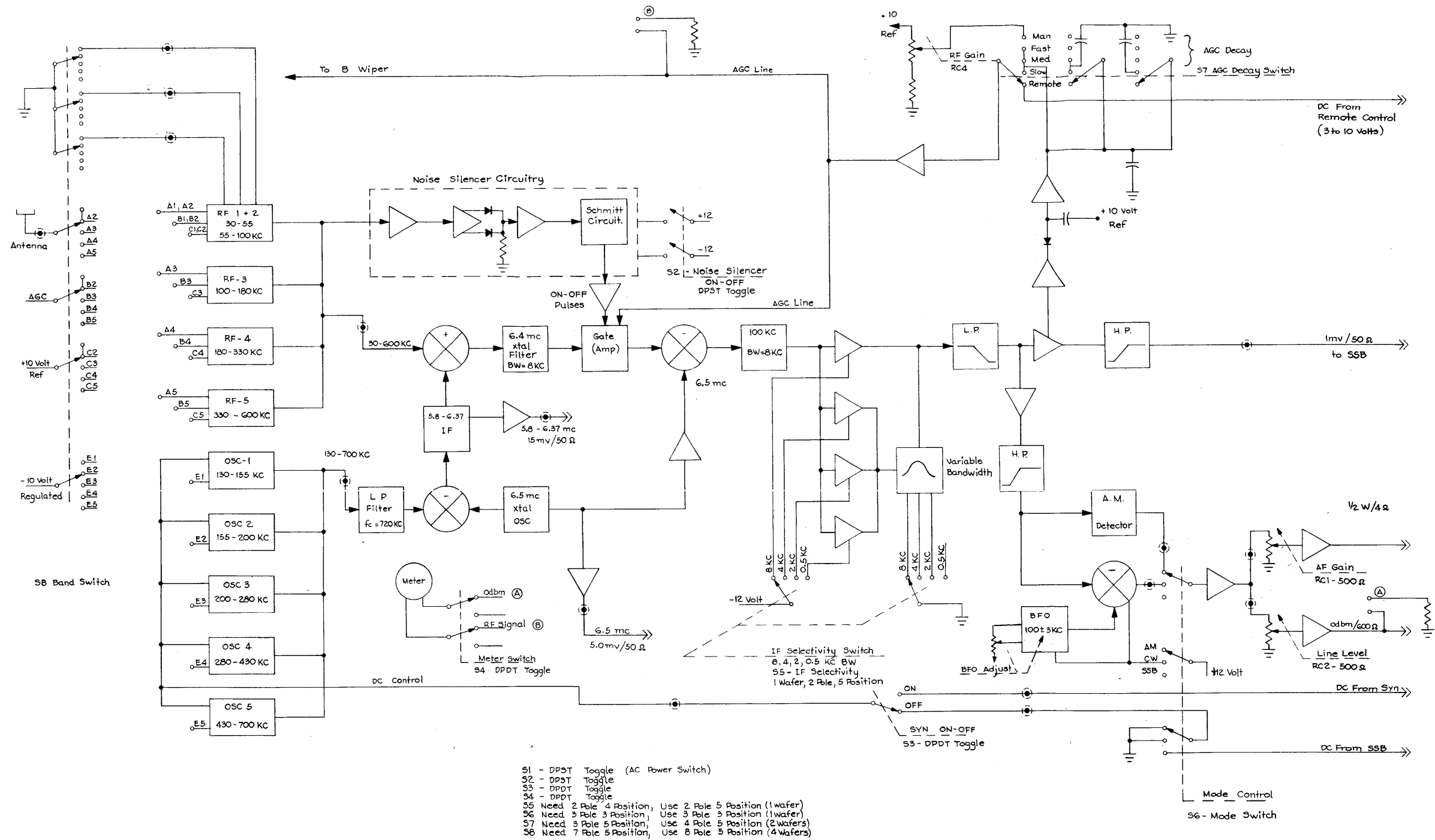
SECTION 4  
TROUBLESHOOTING

4-1. OVERALL FUNCTIONAL DESCRIPTION.

Refer to figure 4-1. The VLRB receiver utilizes five rf bands to provide continuous coverage over the frequency range of 30 to 600 kilocycles. An incoming rf signal received by the antenna is applied through the low pass filter and the BAND switch contacts to a selected rf band module. The amplified rf signal output is then mixed with a 5.8 to 6.37 megacycle i-f signal. This produces an upconverted 6.4 megacycle first i-f signal with an 8 kilocycle bandwidth. The 5.8 to 6.37 megacycle i-f signal is produced by mixing the local oscillator signal of 130 to 700 kilocycles with a 6.5 megacycle oscillator signal. The 6.4 megacycle i-f signal is filtered, amplified, and then mixed with the 6.5 megacycle signal; this produces a downconverted second i-f signal of 100 kilocycles with a variable bandwidth selected by the IF SELECTIVITY switch of either 0.5, 2, 4, or 8 kilocycles.

The variable bandwidth 100 kilocycle i-f signal is amplified and applied through low and high pass filters to either an external signal sideband converter or to the receiver processing and audio amplifiers circuits. The i-f signal applied to the sideband converter is at a level of 1 milliwatt across an impedance of 50 ohms. In AM and MCW operation the 100 kilocycle i-f signal is routed through a





CK-8010

Figure 3-1. VLRB Block Diagram

conventional diode AM detector to the receiver audio and line amplifiers. In CW and FSK operation the 100 kilocycle i-f signal is mixed with a variable BFO signal. The BFO signal has a center frequency of 100 kilocycles and is adjustable from 97 to 103 kilocycles. The mixer audio output signal is applied simultaneously to the audio and line amplifiers. The gain of the audio and line amplifiers is such that full power output is attained with a 30% modulated 0.3 microvolt rf input signal. The power output of the audio amplifier is approximately 1/2 watt across an impedance of four ohms. The power output of the line amplifier is 0 DBM across an impedance of 600 ohms. Metering of the line amplifier is provided. With the METER switch S106 in the 0 DBM position the power output of the line amplifier is indicated on the front panel meter.

The noise silencer circuitry receives an rf signal with impulse noise pulses. The signal is amplified and applied to a noise detector. The noise detector converts all impulse noise pulses to positive pulses. The positive pulses are used to trigger a Schmitt circuit. The Schmitt circuit output pulse turns off the gate amplifier which prevents noise pulses from appearing in the receiver output signal. The noise silencer circuit is turned on and off by the front panel NOISE SILENCER ON/OFF switch.

The AGC voltage is obtained by rectifying the 100 kilocycle i-f signal. This provides a dc voltage which is referenced to plus 10 volts. The dc voltage is amplified and routed

to the automatic gain controlled stages. The AGC DECAY switch inserts capacitors into the agc circuit in the FAST, MED, and SLOW switch positions. These capacitors determine the rise and decay time of the agc voltage. In the MAN switch position the RF GAIN control manually sets the level of the dc voltage applied to the agc controlled stages. In the REMOTE switch position, an external dc voltage (3 to 10 volts) can be used to control the agc controlled stages. Metering of the agc control voltage is provided. With the METER switch in the SIGNAL position, the agc control voltage measured on the front panel meter indicates the relative strength of the rf signal.

The receiver local oscillator can be controlled by either one of two external equipments. A synthesizer unit such as the TMC Model LFSB-1, or a sideband converter unit such as the TMC Model LFCA-1. When the external synthesizer is used, the receiver can be synthesized over the entire tuning range in increments of ten cycles. The lower frequencies (30 to 99.999 kilocycles) can be synthesized in increments of one cycle. The VLRB supplies a 6.5 megacycle signal and an i-f bandpass signal of 5.8 to 6.37 megacycles to the external synthesizer. In turn, with the SYNTH switch in the ON position, the receiver local oscillator receives a d-c control signal from the external synthesizer. This control voltage maintains the local oscillator over its entire range of 130 to 700 kilocycles to a high stability. With the SYNTH switch



in the TUNE position, the control signal applied to the receiver local oscillator is also applied to the receiver audio amplifier. This provides the means of tuning the receiver with the aid of an audible signal. When the audible signal is at its minimum level (zero beat) the receiver is properly tuned to the incoming signal frequency.

When the external sideband converter is used, automatic frequency control is accomplished as follows: The receiver supplies the external converter with a 100 kilocycle i-f carrier signal. At the external converter this carrier signal is compared with a 100 kilocycle crystal oscillator signal; the resultant d-c control is fed back through the SSB position of the MODE switch and the OFF position of the SYNTH switch to the receiver local oscillator. When the r-f carrier signal is within 5 cycles of the 100 kilocycle crystal oscillator frequency the system is locked. After the system is in lock, the 100 kilocycle carrier i-f signal and the receiver local oscillator frequency may change as much as  $\pm 0.15\%$  of the local oscillator frequency before the system loses lock. When the synthesizer is used while receiving SSB signals, the receiver local oscillator is locked to the synthesizer rather than to the sideband converter unit.

#### 4-2. RF100-2 BAND MODULE.

Refer to figure 4-1 and 7-1. The RF100-2 Band Module is used for the five rf bands. However, the same tuning coils are used for bands 1 and 2 resulting in only four different types of rf modules. The rf module used for bands 1 and 2 is provided with additional capacitors. In the band 1 position, the BAND switch adds these capacitors to the tuned tank circuits thereby effectively lowering the frequency of operation. The five rf modules cover the frequency range of 30 to 600 kilocycles. The frequency range is divided into five bands as listed in table 4-1.

Table 4-1. VLRB Tuning Range

BAND	RF FREQUENCY COVERAGE (KC)	OSCILLATOR FREQUENCY COVERAGE (KC)	RF MINIMUM BANDWIDTH (KC)
1	30 - 55	130 - 155	2
2	55 - 100	155 - 200	8
3	100 - 180	200 - 280	8
4	180 - 330	280 - 430	8
5	330 - 600	430 - 700	8

Each rf module consists of three tuned rf amplifiers Q1, Q3, and Q5 terminated into emitter follower Q7 and variable impedances Q2, Q4, and Q6. The variable impedances are connected into the emitter circuits of the rf amplifiers. The impedance is controlled by the base currents applied to Q2, Q4, and Q6. When no signal is present, the control transistors are operating in a saturated condition and the effective collector-to-emitter impedance is low. As the RF signal increases, the base current to the control transistors is decreased, allowing the effective collector-to-emitter impedance of the control transistors to increase.

The tuned tanks of the rf amplifier stages consists of two adjustable inductors, and an adjustable capacitor. One inductor is the transformer (ANT, RF2, RFC) and the other inductor (L1, L2, L3) is a trimming coil used for setting the end points of the band for a given travel. The transformers are physically located on the tuning chassis assembly. For a setting of the transformer, an increase of the trimming coil inductance decreases the bandsread as the tuning slug is tuned from the end points of the of the tuning assembly. The proper gain of the RF amplifier stages is approximately 70 db. The rf output signal is applied to the mixer and noise silencer circuits in the 6.4 Megacycle I-F, AGC, and Noise Silencer Module.

#### 4-3. LOCAL OSCILLATOR.

Refer to figures 4-1 and 7-2. The Local Oscillator Module contains five oscillators Q901 through Q905 covering the range of frequencies from 130 to 700 kilocycles. Table 4-1 lists the frequency coverage of each oscillator. Each oscillator is essentially a Gouriet-Clapp design having one variable element which, in this case, is the total inductance. The inductance is made up of three elements tuned for geometrical mean tracking. The BAND switch turns on the selected oscillator; the oscillator output is coupled via emitter follower Q906 to the 6.5 Megacycle Oscillator Module. The oscillator output signal appearing across TP1 is approximately 5 millivolts.

When the VLRB is synthesized or when automatic frequency control is employed, a d-c control voltage from the external equipment is applied via the SYNTH switch to the oscillator varicaps CR902 through CR906. This d-c voltage controls the varicap capacitance which maintains the oscillator to a stability equal to that of the external equipment.

#### 4-4. 6.5 MEGACYCLE OSCILLATOR MODULE.

Refer to figures 4-1 and 7-3. The 6.5 Megacycle Oscillator Module contains the circuitry of the 6.5 Megacycle Crystal Oscillator and the 5.8 megacycle bandpass amplifier. This module receives a signal in the frequency range of 130 to 700 kilocycles from the Local Oscillator Module and produces a 6.5 megacycle signal and a 5.8 to 6.37 megacycle bandpass signal.

The 6.5 megacycle oscillator consists of Q501 and Q502. Q501 supplies a 6.5 megacycle signal from its base to the 100 Kilocycle I-F Module, and from its collector to an external synthesizer unit. The 6.5 megacycle signal appearing at the collector of Q502 is coupled via Q503 to balanced mixer Q504 and Q505. Q503 serves as a current source in the emitter circuitry of Q504 and Q505. The balanced mixer also receives a 130 to 700 kilocycle signal from the Local Oscillator Module via a low pass filter network. This filter network eliminates harmonics of the oscillator signal from appearing in the balanced mixer output circuit. The balanced mixer subtracts the signal in the frequency range of 130 to 700 kilocycles from the 6.5 megacycle signal resulting in a 5.8 to 6.37 megacycle bandpass signal. The bandpass signal is amplified by Q506 and Q507 and then applied to a mixer circuit in the 6.4 Megacycle I-F, AFC, and Noise Silencer Module. Emitter follower Q508 provides a 5.8 to 6.37 megacycle bandpass signal at its output for use with an external synthesizer unit.

#### 4-5. 6.4 MEGACYCLE I-F, AGC, AND NOISE SILENCER MODULE.

Refer to figures 4-1 and 7-4. The 6.4 Megacycle I-F, AGC, and Noise Silencer Module contains the 6.4 megacycle mixer and passband circuitry, the noise silencer circuitry, and the AGC circuitry. This module receives a signal in the bandpass range of 5.8 to 6.37 megacycles from the 6.5 Megacycle Oscillator Module, a signal in the frequency range of 30 to 600 kilocycles from one of five

RF100-2 Band Modules, and a 100 kilocycle signal from the 100 kilocycle signal from the 100Kilocycle I-F Module. The 5.8 to 6.37 megacycle bandpass signal and the rf signal in the frequency range of 30 to 600 kilocycles are used to produce a first i-f frequency signal of 6.4 megacycles. The 100 kilocycle signal is used to provide the AGC voltage.

The 5.8 to 6.37 megacycle bandpass signal is applied via Q605 to the balanced mixer Q601 and Q602. Q605 serves as a current source in the emitter circuitry of Q601 and Q602. The balanced mixer also receives a signal in the frequency range of 30 to 600 kilocycles from a selected RF100-2 Band Module. The balanced mixer output consists of a 6.4 megacycle first i-f frequency signal with an 8 kilocycle bandpass which is coupled via the 6.4 megacycle crystal filter to the balanced amplifier consisting of Q603 and Q604. Q607 connected into the emitter circuit of the balanced amplifier serves as a variable impedance. The balanced amplifier output signal of 6.4 megacycles is applied to the 100 Kilocycle I-F Module.

The noise silencer circuitry consists of Q608 through Q613 and Q617. The noise silencer circuitry receives an rf signal with impulse noise from a selected RF100-2 Band Module. This signal is amplified by Q608 and Q609 and routed to a noise detector circuit consisting of diodes CR602, CR603, CR607, CR608, and Q610. The noise detector circuit attenuates the rf signal and converts the impulse noise pulses to positive-

going pulses. These pulses are applied via emitter follower Q611 to the Schmitt circuit consisting of Q612, Q613, and Q617. This produces positive-going pulses at the collector of Q613 which turns on Q606 and effectively turns Q603 and Q604. This action prevents impulse noise from appearing in the 6.4 megacycle first i-f frequency signal. The complete noise silencer circuitry is turned on and off by the front panel NOISE SILENCER switch. The AGC voltage is obtained

The AGC voltage is obtained by rectifying the 100 kilocycle i-f signal. The 100 kilocycle signal is amplified by Q614 and rectified by diode CR604. The rectified dc voltage is referenced to plus 10 volts by zener diode CR610. After rectification, the d-c voltage is amplified by Q615 and Q616 and routed to the automatic gain controlled stages.

The collector circuit of Q615 contains the switched capacitors used in the slow, medium and fast AGC decay positions. Slow decay corresponds to a time constant of 16.5 seconds, medium decay to a time constant of 9.9 seconds and fast decay to a time constant of 3.3 seconds. The slow and medium decay time capacitors are located on the 6.5 Megacycle Oscillator Module.

When the METER switch is in the SIGNAL position the AGC voltage at the emitter of Q616 is applied to the front panel meter. The meter reading indicates the relative strength of the incoming rf signal.

#### 4-6. 100 KILOCYCLE I-F MODULE.

Refer to figures 4-1 and 7-5. The 100 Kilocycle I-F Module converts the first i-f frequency signal of 6.4 megacycles to a second i-f frequency signal of 100 kilocycles. This module receives input signals of 6.5 megacycles and 6.4 megacycles from the 6.5 Megacycle Oscillator Module and the 6.4 Megacycle I-F, AGC, and Noise Silencer Module, respectively. The module furnishes a 100 kilocycle second i-f output signal to either the receiver detector circuits or to an external sideband converter. The 100 kilocycle signal is also applied to the AGC circuit.

The 6.4 megacycle signal is applied directly to mixer Q401; the 6.5 megacycle signal is routed to the mixer via amplifier Q410. The collector of the mixer consists of a critically coupled, double-tuned stage with an 8 kilocycle bandwidth. The mixer output produces a 100 kilocycle second i-f signal with a bandwidth of 8 kilocycles. The second i-f signal is applied directly to the output amplifiers Q408 and Q409 or to the output amplifiers through "Q" Multipliers Q406 and Q407, that provides bandwidths of 0.5, 2, and 4 kilocycles. Q2, Q3, Q4 and Q5 serve as buffer amplifiers to provide the proper gain for the various bandwidth positions. The proper buffer transistor, Q2, Q3, Q4, or Q5 is turned on with the IF SELECTIVITY switch. The switch also shunts inductor L4 with a



particular resistance load in the 2 and 4 kilocycle positions to maintain a constant feedback (R420 and R421) in the Q407 circuit.

The collector of Q408 supplies the 100 kilocycle second i-f signal to the receiver detector circuits located in the BFO Product Detector and Line Amplifier Module. The collector of Q409 supplies the 100 kilocycle signal through transformer T401 to the external sideband converter unit. The emitter of Q409 supplies the 100 kilocycle signal to the AGC circuit located in the 6.4 Megacycle I-F, AGC, and Noise Silencer Module.

#### 4-7. BFO PRODUCT DETECTOR AND LINE AMPLIFIER MODULE.

Refer to figures 4-1 and 7-6. The BFO Product Detector and Line Amplifier Module contains the AM detector, the beat frequency oscillator, the product detector and the line amplifier circuitry. This module detects the 100 kilocycle second i-f signal it receives from the 100 Kilocycle I-F Module.

The 100 kilocycle signal is amplified by Q301 and Q302. At the collector of Q302 the AM and MCW signals are detected by diode CR301; the resultant audio signals are applied to the AM position of the MODE switch. At the emitter of Q302 the CW, FAX, and FSK signals are routed to the product detector Q303.

In the CW mode of operation, Q303, Q304, Q305 and Q306 are turned on. The beat frequency oscillator Q306 is an LC oscillator with a voltage controlled capacitor CR303 for tuning

the oscillator from 97 to 103 kilocycles. The front panel BFO control R529 varies the dc voltage applied to CR303. The oscillator frequency is amplified by Q304 and Q305 and provides the switching signal for the product detector Q303. The product detector mixes the 100 kilocycle second i-f signal from Q302 with the beat frequency oscillator signal from Q304; the resultant audio signal is routed via the MODE switch to an isolation amplifier located on the Power Supply and Audio Amplifier Module.

The line amplifier receives audio signals from the isolation amplifier in the Power Supply and Audio Amplifier Module via the LINE LEVEL control. The audio signal is amplified by Q307 and balanced amplifier Q308 and Q309. The audio output signal is applied across the 600-ohm secondary windings of transformer T303 and is available at terminals 3, 4, and 5 of E301 located on the rear panel.

When the METER switch is in the 0 DBM position, the audio output signal appearing across the secondary winding of T303 is applied to the front panel meter via full-wave rectifier diodes CR304 and CR305. The LINE LEVEL control is used to set the audio output signal to a level of 0 dbm as measured on the front panel meter.

#### 4-8. POWER SUPPLY AND AUDIO AMPLIFIER MODULE.

Refer to figures 4-1 and 7-7. The Power Supply and Audio Amplifier Module contain the audio isolation amplifier, the 24-volt power supply, and the audio amplifier. Some components of the

power supply and the audio amplifier are located on the main chassis.

When the MODE switch is in the AM or CW positions, isolation amplifier Q201 receives an audio signal from the BFO Product and Line Amplifier Module. The isolation amplifier output signal is applied to Q202 the input stage of the audio amplifier via the AF GAIN control and to the line amplifier via the LINE LEVEL control. (The line amplifier has been discussed in paragraph 4-7). The amplified output of Q202 is further amplified by balanced amplifier Q203 and Q204. The amplified audio output signal is applied to balanced power amplifier Q102 and Q103 located on the main chassis. The power output signal supplied across the 4-ohm secondary winding of transformer T102 is available at terminals 1 and 2 of E301 located on the rear panel for connection to a loudspeaker. The audio signal output produced at the collector of Q102 is applied via d-c blocking capacitor C208 and resistor R219 to the front panel MONITOR jack. This jack provides the means to headset monitor the audio signal applied to the loudspeaker.

The power supply operates with an input of 115/230 volts, 47 to 400 cycles per second, single-phase power and provides output voltages of plus and minus 12 volts dc. Facilities are provided for automatic switchover to battery powered operation in the event of a-c power failure. The incoming a-c line voltage is stepped down to approximately 28 volts ac by power

transformer T101 and rectified by bridge rectifiers CR201 through CR204. The resultant d-c output voltage is filtered by capacitor C101 and passed through isolator diode CR5 to the regulator circuit and to relay K101 via current limiting resistor R222. Energizing relay K1 turns on POWER lamp DS102.

Zener diode CR101 provides a regulated 24 volts across its terminals; zener diodes CR102 and CR103 each provides a regulated 12 volts across their respective terminals. Series regulator keeps the -12 volt output voltage constant by varying its impedance directly in proportion to changes in output voltage.

In the event of a-c power failure, the receiver circuits can be automatically powered by an external 24-volt battery. With BAT. switch S109 set to IN, the positive battery leg is connected via the BAT. switch contacts to the plus 12 volt terminal. The negative battery leg is connected to the base of Q101. In this case, Q101 acts as an ordinary diode to couple the negative battery voltage to the -12 volt terminal. Isolator diode CR203 is back biased by the positive voltage at its cathode; this deenergizes relay K1. When relay K1 is deenergized BATTERY lamp DS101 is turned on. When normal ac power is used, the external battery charges through resistor R101. When the battery is used to power the receiver circuits, diode CR104 conducts which shorts out resistor R101.

## SECTION 5

### MAINTENANCE

#### 5-1. PREVENTIVE MAINTENANCE .

a. GENERAL. - The VLRB receiver 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.

b. 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.

#### NOTE

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.

### 5-2. REPAIR OF PRINTED CIRCUITS

a. GENERAL. - Although the troubleshooting procedure for printed circuits are similar to those for conventional circuits, the repair of printed circuits requires considerably more skill and patience. The printed circuits are small and compact; therefore, personnel should become familiar with the special servicing techniques required.

The defective part should be pinpointed by a study of the symptoms and by careful and patient analysis of the circuit before attempting to trace trouble on a printed circuit board. Ascertain whether the conducting strips are coated with a protective lacquer, epoxy resin, or similar substance. If so, carefully scrape it away.

Breaks in the conducting strip (foil) can cause permanent or intermittent trouble. In many instances, these breaks will be small that they cannot be detected by the naked eye. These almost invisible cracks (breaks) can be located only with the aid of a powerful hand-or stand-held magnifying glass.

b. MULTIMETER CHECKOUT. - The most common cause of an intermittent condition is poorly soldered connections. Other causes are: Broken boards, broken conducting strips, fused conducting strips, arc-over, loose terminals, etc.

To check out and locate trouble in the conducting strips of a printed circuit board, set up a multimeter (one which does not use a current in excess of 1 ma) for making point-to-point resistance tests, using

needle point probes. Insert one point into the conducting strip, close to the end of terminal, and place the other probe on the terminal or opposite end of the conducting strip. The multimeter should indicate continuity. If the multimeter indicates an open circuit, drag the probe along the strip (or if the conducting strip is coated, puncture the coating at intervals) until the multimeter indicates continuity. Mark this area then use a magnifying glass to locate the fault in the conductor.

#### CAUTION

Before using an ohmmeter for testing a circuit containing transistors or other voltage-sensitive semiconductors, check the current it passes under test on all ranges. DO NOT use a range that passes more than 1 ma.

c. HOW TO REPAIR THE BREAK. - If the break in the conducting strip is small, lightly scrape away any coating covering the area of the conducting strip to be repaired. Clean the area with a firm-bristle brush and approved solvent. Then repair the cracked or broken area of the conducting strip by flowing solder over the break. Considerable care must be exercised to keep the solder from flowing onto an adjacent strip.

If a strip is burned out, or fused, cut and remove the damaged strip. Connect a length of insulated wire across the breach or from solder-point to solder-point.

After the repairs are completed, clean the repaired area with a stiff brush and solvent. Allow the board to dry thoroughly, and then coat the repaired area with an epoxy resin or similar compound. This coating not only will protect the repaired area but will help to strengthen it.

#### CAUTION

After repairs, always scrutinize the board for solder droppings that may cause possible shorts.

Frequently, a low-resistance leakage path will be created by moisture and/or dirt that has carbonized onto the phenolic board. This leakage can be detected by measuring the suspected circuit with a multimeter. To overcome this condition, thoroughly clean the carbonized area with solvent and a stiff brush. If this does not remove it, use a scraping tool (spade end of a solder-aid tool or its equivalent) to remove the carbon, or drill a hole through the leakage path to break the continuity of the leakage. When the drilling method is used, be careful not to drill into a part mounted on the other side.



## SECTION 6 PARTS LIST

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F101 is designated XF101. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

### Title

Main Chassis and Power Supply Assembly  
Power Supply and Audio Amplifier Module  
BFO Product Detector and Line Amplifier Module  
100 Kilocycle I-F Module  
6.5 Megacycle Oscillator Module  
6.4 Megacycle I-F, AGC, and Noise Silencer Module  
RF100-2 Band Module  
Local Oscillator  
RF Tuning Assembly  
600 Kilocycle Lowpass Filter Assembly

P A R T S   L I S T

**Main Chassis and Power Supply Assembly**

C101	CAPACITOR, FIXED, ELECTROLYTIC: 1,700 uf, -10% +75%; 75 WVDC.	CE112-2N
CR101	SEMICONDUCTOR DEVICE, DIODE: silicon; nom. Zener voltage 24 V; standard anode-to-stud polarity, negative-grounded application; tolerance $\pm 5\%$ ; junction and storage temperature rating $-65^{\circ}\text{C}$ to $+175^{\circ}\text{C}$ ; power dissipation 10 watts DC; solder terminals; hermetically sealed metal and glass case.	VR10124S51
CR102	SEMICONDUCTOR DEVICE, DIODE: silicon; 12 volts nom., $\pm 5\%$ ; 10 watts max. dissipation at $25^{\circ}\text{C}$ ; max. current rating 210 ma; max. impedance 3.0 ohms; storage temperature $175^{\circ}\text{C}$ .	1N2976B
CR103	SEMICONDUCTOR DEVICE, DIODE:	1N2978RB
CR104	SEMICONDUCTOR DEVICE, DIODE: silicon; 600 volts max. continuous DC current, 0.50 amp at $100^{\circ}\text{C}$ ; surge current peak 75 amps; max. operating temperature $150^{\circ}\text{C}$ ; max. forward voltage drop 1.0 volts; max. reverse current 1000 ua.	1N2484
DS101	LAMP, INCANDESCENT: 28 volts; 0.04 amp; miniature bayonet base T-3-1/4 bulb.	BI101-1819
DS102	Same as DS101.	
E101	TERMINAL BOARD, BARRIER: 5 terminals; 6-32 thd. x 1/4" lg. binder head screws; phenolic black bakelite.	TM100-5
E102	TERMINAL BOARD: insert type.	TM128-2
E103	TERMINAL BOARD: insert type.	TM128-3
E104	TERMINAL BOARD: insert type.	TM128-4
E105	TERMINAL BOARD: insert type.	TM126-10
F101	FUSE, CARTRIDGE: 1/2 amp; quick-acting; AGC 1/2.	FU100-.500
F102	Same as F101.	
F103	Same as F101.	
FL101	FILTER, LOWPASS: 600 KC. (See separate list for breakdown)	FX208
J101 thru J110	NOT USED	
J111	CONNECTOR, RECEPTACLE, ELECTRICAL: 3 number 16 male contacts; straight type.	MS3102A14S-1P
J112	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 number 16 male contacts; straight typ	MS3102A14S-2P
J113	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 round female contact; straight typ; series BNC to BNC.	JJ172
J114 thru J120	Same as J113.	

J121	JACK, TELEPHONE: tip and sleeve; bushing mounted.	JJ034
J201	CONNECTOR, RECEPTACLE, ELECTRICAL: 22 female, flat solid face contacts; for single sided 3/32" PC boards; current rating 5 amps; 1800 V RMS; float bushing; 3.20" lg. x 0.440" w x 0.75" h.	JJ293-22S
J202 thru J205	Same as J201.	
K101	RELAY, ARMATURE: DPDT; 700 ohms, $\pm 10\%$ DC resistant; operating voltage 24 VDC; current rating 35 ma, 700 mw at 25°C; contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-1
K201	NOT USED	
K202	Same as K101.	
M101	METER, INDICATING: AF/RF; 50 ua movement; approx. resistance 2,000 ohms; black rectangular case.	MR181
Q101	TRANSISTOR: germanium; PNP; collector to base and collector to emitter voltage 45 VDC at 300 ma, 30 VDC at 500 ma; emitter-base voltage 25 volts; collector current 3 amps; power dissipation 62.5 watts at 25°C; junction temperature range -65°C to +100°C; hermetically sealed metal case.	2N2143
Q102	Same as Q101.	
Q103	Same as Q101.	
R101	RESISTOR, FIXED, WIREWOUND: 100 ohms, current rating 223 ma; 5 watts.	RW107-18
R102	Same as R101.	
R103	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF683K
R201 thru R228	Refer to Power Supply and Audio Amplifier PC Board Assembly.	
R229	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$ ; 2 watts; taper A.	RV4NAYSG501A
R230	Same as R229.	
R301 thru R349	Refer to BFO/600 ohm Product Detector and Line Amplifier Module.	
R350	RESISTOR, VARIABLE, COMPOSITION: 25,000 ohms, $\pm 10\%$ ; 2 watts; taper A	RV4NAYSD253A
R501 thru R536	Refer to 6.5 MC, IF Oscillator Module	
R537	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 2 watts; taper A	RV4NAYSG103A

S101	SWITCH, ROTARY:	SW362
S102	SWITCH, ROTARY:	SW365
S103	Same as S101.	
S104	SWITCH, ROTARY:	SW364
S105	Refer to RF Tuning Assembly.	
S106	SWITCH, TOGGLE: DPDT; 6 amps rated at 250 volts AC; 28° angle of throw; solder lug terminals, (one pole unused).	ST22N
S107	SWITCH, TOGGLE: DPST; 6 amps rated at 250 volts AC; 28° angle of throw; solder lug terminals.	ST22K
S108	Same as S107.	
S109	Same as S106.	
T101	TRANSFORMER, POWER, ISOLATION, STEP-DOWN: primary input 105, 115, 125 or 210, 230, 250 V; frequency 50/60 cps, phase 1; secondary 28 V, rated at 500 ma; 2-13/16" lg. x 2-11/16" wide x 2-3/8" high; hermetically sealed steel case.	TF269
T102	TRANSFORMER, AUDIO OUT: primary- 500 ohms, center tap; secondary- 4 ohms; max. audio operating level 1 watt; frequency range 50-10,000 cps; solder stud terminals; fully enclosed steel case.	TF272
XDS101	LIGHT, INDICATOR: with green frosted lens; for miniature bayonet base T-3-1/4 bulb.	TS106-3
XDS102	LIGHT, INDICATOR: with red frosted lens; for miniature bayonet base T-3-1/4 bulb.	TS106-1
XF101	FUSEHOLDER: extractor post type; accommodates cartridge fuse 1/4" dia. x 1-1/4" long; rated at 15 amps, 250 V max.; o/a length 1-3/4"; bushing mounted.	FH103
XF102	Same as XF101.	
XF103	Same as XF101.	
XK101	SOCKET, RELAY: with retainer; 6 contacts, solder type terminals; black phenolic socket.	TS171-1
XK201	NOT USED	
XK202	Same as XK101.	
XQ101	SOCKET, SEMICONDUCTOR DEVICE: 2 pin contact accommodation; 0 040" or 0 050" dia ; polarized; 1 terminal lug grounding strap; o/a dimensions 1-37/64" x 1" max	TS166-S1
XQ102	Same as XQ101.	
XQ103	Same as XQ101.	

P A R T S   L I S T

Power Supply and Audio Amplifier Module

C201	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-50-25
C202	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-100-25
C203	CAPACITOR, FIXED, ELECTROLYTIC: 200 uf, -10% +150% at 120 cps at 25°C; 15 WVDC; polarized; insulated tubular case.	CE105-200-15
C204	CAPACITOR, FIXED, ELECTROLYTIC: 6 uf, -10% +150% at 120 cps at 25°C; 15 WVDC; polarized; insulated tubular case.	CE105-6-15
C205	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-10-25
C206	Same as C201.	
C207	Same as C205.	
C208	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C209	Same as C203.	
C210	Same as C202.	
C211	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, GMV; 500 WVDC.	CC100-29
CR201	SEMICONDUCTOR DEVICE, DIODE: silicon; 600 volts, max. continuous DC current; 0.50 amp at 100°C; surge current peak 75 amps; max. operating temperature 150°C; max. forward voltage drop 1.0 volts; max. reverse current 1,000 ua.	1N2484
CR202	Same as CR201.	
CR203	Same as CR201.	
CR204	Same as CR201.	
CR205	Same as CR201.	
CR206	SEMICONDUCTOR DEVICE, DIODE:	1N961B
Q201	TRANSISTOR: PNP; germanium, alloy junction; collector to base voltage 30 volts; collector to emitter, and emitter to base voltage 20 volts; collector current 200 ma; power dissipation 200 mw; storage temperature -65°C to +100°C; metal case.	2N396A
Q202	Same as Q201.	
Q203	TRANSISTOR: germanium; junction type contacts; rated at 25°C- collector voltage 25 volts; collector current 0.50 ma; wire lead type terminals, o/a dim. 0.370" x 0.260"; hermetically sealed nickel case.	2N1370
Q204	Same as Q203.	

R201	RESISTOR, FIXED, COMPOSITION: 680 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF681K
R202	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF331K
R203	RESISTOR, FIXED, COMPOSITION: 1,800 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF182K
R204	RESISTOR, FIXED, COMPOSITION: 18 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF180K
R205	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF152K
R206	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF102K
R207	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF151K
R208	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF471K
R209	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF392K
R210	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF822K
R211	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R212	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R213	Same as R211.	
R214	Same as R211.	
R215	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R216	Same as R215.	
R217	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF122K
R218	Same as R217.	
R219	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF223K
R220	RESISTOR, FIXED, COMPOSITION: 15 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF150K
R221	Same as R220.	
R222	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1 watt.	RC32GF471K
R223	NOT USED	
R224	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 2 watts.	RC42GF221K
R225	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R226	Same as R207.	
R227	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF477K
R228	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF222K
T201	TRANSFORMER: AF; line output; primary impedance 5K ohms, center tap; secondary 600 ohms, center tap; power rated at 10 mw; frequency range 50-10,000 cps; wire lead type terminals; encapsulated case.	TF271



PARTS LIST

EF0 Product Detector and Line Amplifier Module

C301	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-2-25
C302	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-50-25
C303	Same as C301.	
C304	Same as C301.	
C305	CAPACITOR, FIXED, MICA DIELECTRIC: 240 uuf, ±5%; 500 WVDC; straight wire leads.	CM111F241J5S
C306	Same as C301.	
C307	Same as C301.	
C308	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C309	CAPACITOR, FIXED, MICA DIELECTRIC: 750 uuf, ±5%; 300 WVDC; straight wire leads.	CM111F751J3S
C310	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±5%; 500 WVDC; straight wire leads.	CM112E103J5S
C311	Same as C302.	
C312	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-100-25
C313	Same as C312.	
C314	CAPACITOR, FIXED, MICA DIELECTRIC: 9,100 uuf, ±2%; 500 WVDC; straight wire leads.	CM112F912G5S
C315	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, ±5%; 500 WVDC; straight wire leads.	CM111E330J5S
C316	Same as C314.	
C317	Same as C302.	
C318	Same as C301.	
C319	Same as C301.	
C320	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +60% -40%; 150 WVDC.	CC100-35
C321	Same as C301.	
C322	Same as C301.	
C323	Same as C301.	
C324	CAPACITOR, FIXED, MICA DIELECTRIC: 3,300 uuf, ±5%; 300 WVDC; straight wire leads.	CM112F332J3S
C325	Same as C301.	

C326	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, $\pm 5\%$ ; 300 WVDC; straight wire leads.	CML12F152J3S
C327	CAPACITOR, FIXED, MICA DIELECTRIC: 150 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11E151J5S
C328	Same as C310.	
C329	Same as C301.	
C330	Same as C308.	
C331	Same as C320.	
C332	CAPACITOR, FIXED, ELECTROLYTIC: 200 uf, $-10\%$ $+150\%$ at 120 cps at $25^{\circ}\text{C}$ ; 15 WVDC; polarized; insulated tubular case.	CE105-200-15
C333	Same as C302.	
C334	Same as C320.	
C335	Same as C312.	
C336	NOT USED	
C337	Same as C332.	
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; max. peak inverse voltage 60 V; continuous average forward current 50 ma; max. peak forward current 150 ma; max. surge current 500 ma; max. inverse current 500 ua at 50 volts or 30 ua at 10 volts.	1N34A
CR302	SEMICONDUCTOR DEVICE, DIODE:	1N961
CR303	CAPACITOR, VOLTAGE, VARIABLE, SILICON:	CX106-13
CR304	Same as CR301.	
CR305	Same as CR301.	
L301	COIL, RADIO FREQUENCY: fixed; 10,000 uh; 76.6 ohms DC resistance; current rating 66 ma; molded case.	CL275-103
L302	Same as L301.	
L303	COIL, RADIO FREQUENCY: fixed; 56,000 uh; 499 ohms DC resistance; current rating 26 ma; molded case.	CL275-563
L304	COIL, INTERMEDIATE FREQUENCY: adjustable ;	AC180
Q301	TRANSISTOR: NPN diffused silicon; collector to base voltage 25 volts; collector to emitter voltage 20 volts; emitter to base voltage 3 volts; collector current 200 ma; power dissipation 1 watt at $25^{\circ}\text{C}$ ; junction temperature $-65^{\circ}\text{C}$ to $+175^{\circ}\text{C}$ ; metal case	2N706

Q302	Same as Q301	
Q303	TRANSISTOR: PNP, germanium, alloy junction; collector to base voltage 30 volts; collector to emitter, and emitter to base voltage 20 volts; collector current 200 ma; power dissipation 200 mw; storage temperature -65°C to +100°C; metal case.	2N396A
Q304	Same as Q303.	
Q305	Same as Q303.	
Q306	Same as Q301.	
Q307	Same as Q303.	
Q308	Same as Q303.	
Q309	Same as Q303.	
R301	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R302	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R303	RESISTOR, FIXED, COMPOSITION : 1,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF102K
R304	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF392K
R305	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R306	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF152K
R307	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF222K
R308	Same as R304.	
R309	Same as R302.	
R310	RESISTOR, FIXED, COMPOSITION: 390 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF391K
R311	Same as R306.	
R312	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF333K
R313	Same as R303.	
R314	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF153K
R315	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF471K
R316	RESISTOR, FIXED, COMPOSITION: 1,800 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF182K
R317	Same as R302.	
R318	Same as R305.	
R319	Same as R302	
R320	Same as R303	
R321	Same as R302	
R322	Same as R307	

R323	Same as R303.	
R324	RESISTOR, FIXED, COMPOSITION: 5,600 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF562K
R325	Same as R302.	
R326	Same as R305.	
R327	RESISTOR, FIXED, COMPOSITION: 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF393K
R328	Same as R305.	
R329	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF183K
R330	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF272K
R331	Same as R301.	
R332	Same as R303.	
R333	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF822K
R334	Same as R302.	
R335	Same as R327.	
R336	Same as R303.	
R337	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R338	Same as R302.	
R339	Same as R324.	
R340	Same as R303.	
R341	Same as R330.	
R342	Same as R306.	
R343	Same as R306.	
R344	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R345	Same as R344.	
R346	NOT USED	
R347	Same as R307.	
R348	Same as R307.	
R349	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; nom. power rating 0.25 watt at 70°C; linear taper	RV111U103A
T301	TRANSFORMER, AUDIO FREQUENCY: primary- impedance 10,000 ohms, 1,160 ohms DC resistance; secondary- impedance 1,200 ohms, CT; 100 ohms DC resistance; fully enclosed black molded epoxy case.	TF246-14X
T302	TRANSFORMER, AUDIO FREQUENCY: interstage; primary impedance 100K ohms, center tap; secondary 1.5K ohms, center tap; power rated at 100 mw; frequency range 50-10,000 cps; wire lead type terminals; encapsulated case.	TF270

T303

Same as T302.

TP301

TERMINAL STUD: 3/32" board mounting; brass.

TE127-3

P A R T S   L I S T

100 Kilocycle I-F Module

C401	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-2-50
C402	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +60% -40%; 150 WVDC.	CC100-35
C403	Same as C401.	
C404	Same as C402.	
C405	Same as C402.	
C406	Same as C401.	
C407	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±5%; 100 WVDC; straight wire leads.	CML12F103J1S
C408	Same as C402.	
C409	Same as C402.	
C410	Same as C401.	
C411	CAPACITOR, FIXED, MICA DIELECTRIC: 620 uuf, ±5%; 500 WVDC; straight wire leads.	CML11F621J5S
C412	Same as C407.	
C413	Same as C401.	
C414	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C415	Same as C401.	
C416	Same as C401.	
C417	Same as C401.	
C418	Same as C401.	
C419	Same as C401.	
C420	Same as C414.	
C421	Same as C401.	
C422	Same as C401.	
C423	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 10,000 uuf, +1%; 30 WVDC.	CX104-77
C424	Same as C414.	
C425	Same as C414.	
C426	Same as C414.	
C427	Same as C414.	
C428	Same as C401.	
C429	Same as C401.	



C430	CAPACITOR, FIXED, MICA DIELECTRIC: 240 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads	CM11F241J5S
C431	Same as C430.	
C432	Same as C414.	
C433	Same as C414.	
C434	Same as C401.	
C435	Same as C401.	
C436	Same as C414.	
C437	Same as C430.	
C438	Same as C402.	
C439	Same as C402.	
C440	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CM11F101J5S
C441	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, $\pm 5\%$ ; 100 WVDC; straight wire leads.	CM12F103J1S
L401	COIL ASSEMBLY: adjustable;	AC182
L402	Same as L401.	
L403	COIL, RADIO FREQUENCY: fixed; 10,000 uh; 76.6 ohms DC resistance; current rating 66 ma; molded case.	CL275-103
L404	COIL ASSEMBLY: adjustable;	AC181
L405	Same as L403.	
L406	Same as L403.	
L407	COIL ASSEMBLY: adjustable;	AC183
Q401	TRANSISTOR: NPN diffused silicon; collector to base voltage 25 volts; collector to emitter voltage 20 volts; emitter to base voltage 3 volts; collector current 200 ma; power dissipation 1 watt at 25°C; junction temperature -65°C to +175°C; metal case.	2N706
Q402 thru Q410	Same as Q401.	
R401	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF151K
R402	Same as R401.	

R403	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF102K
R404	Same as R403	
R405	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF470K
R406	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R407	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF272K
R408	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R409	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF222K
R410	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF682K
R411	Same as R410.	
R412	Same as R406.	
R413	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R414	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF471K
R415	Same as R409.	
R416	Same as R403.	
R417	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R418	Same as R403.	
R419	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF822K
R420	Same as R410.	
R421	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U103A
R422	RESISTOR, FIXED, COMPOSITION: 5,600 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF562K
R423	Same as R408.	
R424	Same as R403.	
R425	Same as R403.	
R426	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF392K
R427	Same as R403.	
R428	Same as R413.	
R429	Same as R419.	
R430	Same as R408.	
R431	Same as R403.	
R432	Same as R426.	
R433	Same as R426	

R434 Same as R408.  
R435 Same as R426  
R436 Same as R417.  
R437 Same as R410.  
R438 Same as R406.  
R439 Same as R414.  
R440 Same as R403.  
R441 Same as R421.  
R442 Same as R407.  
R443 Same as R421.  
T401 TRANSFORMER, INTERMEDIATE FREQUENCY: adjustable;

TT228

TP401 TERMINAL STUD: 3/32" board mounting; brass.  
TP402 Same as TP401.  
thru  
TP407

TE127-3

PARTS LIST

6.5 Megacycle Oscillator Module

C501	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, $\pm 5\%$ ; 100 WVDC; straight wire leads.	CML11F102J1S
C502	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 8-50 uuf; operating temperature range $-55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ ; 350 WVDC.	CV109-9
C503	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, $+60\%$ $-40\%$ ; 150 WVDC.	CC100-35
C504	CAPACITOR, FIXED, MICA DIELECTRIC: 680 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11E681J5S
C505	CAPACITOR, FIXED, MICA DIELECTRIC: 150 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11F151J5S
C506	Same as C503.	
C507	Same as C503.	
C508	Same as C503.	
C509	Same as C501.	
C510	Same as C503.	
C511	Same as C503.	
C512	Same as C503.	
C513	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11E101J5S
C514	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML12F102J5S
C515	Same as C503.	
C516	CAPACITOR, FIXED, MICA DIELECTRIC: 2,700 uuf, $\pm 1\%$ or $\pm 0.5$ uuf whichever is greater; 500 WVDC; straight wire leads.	CML12F272D5S
C517	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11E330J5S
C518	CAPACITOR, FIXED, MICA DIELECTRIC: 8,200 uuf, $\pm 1/2\%$ or $\pm 0.5$ uuf whichever is greater; 500 WVDC; straight wire leads.	CML12F822D5S
C519	CAPACITOR, FIXED, MICA DIELECTRIC: 620 uuf, $\pm 1/2\%$ or $\pm 0.5$ uuf whichever is greater; 500 WVDC; straight wire leads.	CML11F621D5S
C520	Same as C517.	
C521	Same as C516.	
C522	Same as C503.	
C523	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, $+80\%$ $-20\%$ 100 WVDC.	CC100-28
C524	Same as C503.	
C525	Same as C523.	
C526	Same as C523.	
C527	CAPACITOR, FIXED, MICA DIELECTRIC: 82 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11E820J5S
C528	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CML11C050J5S
C529	Same as C502.	
C530	Same as C527	
C531	Same as C503	

C532	Same as C503.	
C533	Same as C513	
C534	Same as C503.	
C535	Same as C503.	
C536	CAPACITOR, FIXED, MICA DIELECTRIC: 10 uuf, $\pm 10\%$ ; 500 WVDC; straight wire leads.	CM111C100K5S
C537	CAPACITOR, FIXED, MICA DIELECTRIC: 47 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CM111E470J5S
C538	Same as C528.	
C539	Same as C502.	
C540	Same as C513.	
C541	Same as C503.	
C542	CAPACITOR, FIXED, MICA DIELECTRIC: 68 uuf, $\pm 5\%$ ; 500 WVDC; straight wire leads.	CM111E680J5S
C543	Same as C503.	
C544	Same as C503.	
C545	Same as C503.	
C546	Same as C503.	
C547	CAPACITOR, FIXED, ELECTROLYTIC: 200 uf, $-10\%$ $+150\%$ at 120 cps at $25^{\circ}\text{C}$ ; 15 WVDC; polarized; insulated tubular case.	CE105-200-15
C548	Same as C547.	
C549	NOT USED	
C550	Same as C523.	
C551	Same as C503.	
L501	COIL ASSEMBLY: adjustable;	AC184
L502	COIL, RADIO FREQUENCY: fixed; 680 uh; 12.0 ohms DC resistance; current rating 160 ma; molded case.	CL275-681
L503	Same as L502.	
L504	Same as L502.	
L505	Same as L502.	
L506	COIL ASSEMBLY: adjustable;	AC185
L507	COIL ASSEMBLY: adjustable;	AC186
L508	Same as L507	

Q501	TRANSISTOR: NPN diffused silicon; collector to base voltage 25 volts; collector to emitter voltage 20 volts; emitter to base voltage 3 volts; collector current 200 ma; power dissipation 1 watt at 25°C; junction temperature -65°C to +175°C; metal case.	2N706
Q502	Same as Q501.	
Q503	TRANSISTOR: PNP germanium drift field; collector to base and collector to emitter voltage 40 volts; emitter to base voltage 0.5 volts; collector and emitter current 10 ma; power dissipation 240 mw at 25°C; storage temperature -65°C to +100°C; hermetically sealed metal case.	2N384
Q504	Same as Q503.	
Q505	Same as Q503.	
Q506	Same as Q503.	
Q507	Same as Q503.	
Q508	Same as Q503.	
R501	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R502	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R503	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF102K
R504	Same as R503.	
R505	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF100K
R506	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF682K
R507	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF471K
R508	Same as R506.	
R509	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R510	Same as R502.	
R511	Same as R502.	
R512	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R513	RESISTOR, VARIABLE, COMPOSITION: standard derating; 100 ohms, $\pm 5\%$ ; resolution 0.43%; rated at 1.0 watt at 60°C; square trimmer.	RV113-1
R514	Same as R501.	
R515	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF470K
R516	Same as R501.	
R517	Same as R503	
R518	RESISTOR, FIXED, COMPOSITION: 680 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF681K
R519	Same as R503	
R520	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF333K

R521	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$ ; 1/2 watt <sup>(Sheet 4 of 4)</sup>	RC20GF680K
R522	Same as R506.	
R523	Same as R503.	
R524	Same as R503.	
R525	Same as R509.	
R526	Same as R506.	
R527	Same as R518.	
R528	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF222K
R529	Same as R509.	
R530	Same as R507.	
R531	Same as R515.	
R532	Same as R501.	
R533	Same as R509.	
R534	Same as R503.	
R535	Same as R515.	
R536	Same as R512.	
T501	TRANSFORMER, INTERMEDIATE FREQUENCY: adjustable;	TT229
T502	TRANSFORMER, INTERMEDIATE FREQUENCY: adjustable;	TT230
T503	TRANSFORMER, INTERMEDIATE FREQUENCY: adjustable;	TT231
T504	TRANSFORMER, INTERMEDIATE FREQUENCY: adjustable;	TT232
TP501	TERMINAL STUD: 3/32" board mounting; brass.	TE12 7-3
TP502 thru TP506	Same as TP501.	
Y501	CRYSTAL UNIT, QUARTZ: 6.5 MC	CR116
Y502	Same as Y501.	
Y503	Same as Y501	



P A R T S   L I S T

6.4 Megacycle I-F, AGC, and Noise Silencer Module

C601	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C602	Same as C601.	
C603	Same as C601.	
C604	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +60% -40%; 150 WVDC.	CC100-35
C605	Same as C601.	
C606	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, ±5%; 500 WVDC; straight wire leads.	CML11E101J5S
C607	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-2-25
C608	Same as C601.	
C609	Same as C601.	
C610	Same as C601.	
C611	Same as C601.	
C612	Same as C607.	
C613	Same as C607.	
C614	Same as C607.	
C615	Same as C607.	
C616	Same as C607.	
C617	Same as C607.	
C618	Same as C601.	
C619	Same as C601.	
C620	Same as C607.	
C621	Same as C607.	
C622	NOT USED	
C623	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-50-25
C624	Same as C607.	
C625	Same as C601.	
C626	Same as C607	
C627	Same as C607	
C628	Same as C601.	
C629	Same as C607	

C630	Same as C607	
C631	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-100-25
C632	Same as C631.	
C633	Same as C604.	
CR601	SEMICONDUCTOR DEVICE: DIODE: germanium; max. peak inverse voltage 60 V; continuous average forward current 50 ma; max. peak forward current 150 ma; max. surge current 500 ma; max. inverse current 500 ua at 50 volts or 30 ua at 10 volts.	1N34A
CR602	Same as CR601.	
CR603	Same as CR601.	
CR604	Same as CR601.	
CR605	SEMICONDUCTOR DEVICE, DIODE: silicon; 175 volts max. peak inverse voltage; 30 ma at 25°C and 15 ma at 150°C; two axial wire lead type terminals; hermetically sealed glass case.	1N463
CR606	SEMICONDUCTOR DEVICE, DIODE:	VR101-1A
CR607	Same as CR601.	
CR608	Same as CR601.	
CR609	SEMICONDUCTOR DEVICE, DIODE:	1N957B
CR610	SEMICONDUCTOR DEVICE, DIODE:	1N961
Q601	TRANSISTOR: PNP germanium drift field; collector to base and collector to emitter voltage 40 volts; emitter to base voltage 0.5 volts; collector and emitter current 10 ma; power dissipation 240 mw at 25 C; storage temperature -65 C to +100 C; hermetically sealed metal case.	2N384
Q602	Same as Q601.	
Q603	Same as Q601.	
Q604	Same as Q601.	
Q605	Same as Q601.	
Q606	TRANSISTOR: NPN diffused silicon; collector to base voltage 25 volts; collector to emitter voltage 20 volts; emitter to base voltage 3 volts; collector current 200 ma; power dissipation 1 watt at 25°C; junction temperature -65°C to +175°C; metal case.	2N706

Q607	TRANSISTOR:	2N863
Q608	Same as Q606.	
Q609	Same as Q601.	
Q610	Same as Q606.	
Q611	Same as Q606.	
Q612	Same as Q606.	
Q613	Same as Q606.	
Q614	Same as Q606.	
Q615	Same as Q607.	
Q616	Same as Q607.	
Q617	Same as Q606.	
R601	NOT USED	
R602	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R603	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF102K
R604	Same as R603.	
R605	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF470K
R606	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R607	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R608	Same as R607.	
R609	Same as R605.	
R610	Same as R606.	
R611	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF151K
R612	Same as R605.	
R613	Same as R607.	
R614	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF222K
R615	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF153K
R616	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF154K
R617	Same as R603	
R618	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R619	Same as R618	

R620	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF471K
R621	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF682K
R622	Same as R607.	
R623	Same as R605.	
R624	Same as R607.	
R625	Same as R607.	
R626	Same as R618.	
R627	Same as R621.	
R628	Same as R620.	
R629	Same as R620.	
R630	Same as R621.	
R631	RESISTOR, FIXED, COMPOSITION: 5,600 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF562K
R632	Same as R620.	
R633	Same as R603.	
R634	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF104K
R635	Same as R607.	
R636	Same as R603.	
R637	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U103A
R638	Same as R618.	
R639	Same as R615.	
R640	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF122K
R641	Same as R606.	
R642	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF680K
R643	Same as R603.	
R644	Same as R606.	
R645	RESISTOR, FIXED, COMPOSITION: 33 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF330K
R646	Same as R637.	
R647	Same as R603.	
R648	Same as R603	
R649	Same as R618	
R650	Same as R621.	
R651	NOT USED	

R652	Same as R637.	
R653	NOT USED	
R654	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF333K
R655	Same as R618.	
R656	NOT USED	
R657	Same as R618.	
R658	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF123K
R659	Same as R634.	
R660	Same as R605.	
R661	Same as R614.	
R662	RESISTOR, FIXED, COMPOSITION: 270 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF271K
R663	Same as R605.	
R664	Same as R607.	
R665	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF223K
R666	Same as R665.	
T601	TRANSFORMER, RADIO FREQUENCY: adjustable;	TT220
T602	TRANSFORMER, AUDIO FREQUENCY: primary- impedance 10,000 ohms, 1,160 ohms DC resistance; secondary- impedance 1,200 ohms, CT; 100 ohms DC resistance; fully enclosed black molded epoxy case.	TF246-14X
TP601	TERMINAL STUD: 3/32" board mounting; brass.	TE127-3
TP602 thru TP606	Same as TP601.	
Y601	FILTER, CRYSTAL: 6.4 MC	FX198

P A R T S   L I S T

RF100-2 Band Module

C701	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case	CE105-2-25
C702	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C703	Same as C701.	
C704	CAPACITOR, FIXED, MICA DIELECTRIC: 1,300 uuf, ±1%; 500 WVDC; straight wire leads.	CML12F132F5S
C705	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 8-50 uuf; operating temperature range -55°C to +85°C; 350 WVDC.	CV109-9
C706	Same as C701.	
C707	CAPACITOR, FIXED, MICA DIELECTRIC: 3,200 uuf, +1%; 300 WVDC; straight wire leads. (Used on RF Bands 1 and 2 only)	CML12F332F3S
C708	Same as C705.	
C709	Same as C705.	
C710	Same as C707. (Used on RF Bands 1 and 2 only)	
C711	Same as C705.	
C712	Same as C704.	
C713	Same as C702.	
C714	Same as C701.	
C715	Same as C701.	
C716	Same as C701.	
C717	Same as C704.	
C718	Same as C705.	
C719	Same as C707. (Used on RF Bands 1 and 2 only)	
C720	Same as C705.	
C721	Same as C702.	
C722	Same as C701.	
C723	Same as C701.	
C724	Same as C702.	
C725	Same as C701.	
C726	Same as C702	
C727	Same as C701.	
C728	Same as C701	



C729	Same as C701.	
C730	Same as C701.	
C731	Same as C701.	
CR701	SEMICONDUCTOR DEVICE, DIODE:	VR103-1E
L701	COIL, RADIO FREQUENCY: adjustable; (Used on RF Bands 1 and 2 only)	AC176
L701	COIL, RADIO FREQUENCY: adjustable; (Used on RF Band 3 only)	AC177
L701	COIL, RADIO FREQUENCY: adjustable; (Used on RF Band 4 only)	AC178
L701	COIL, RADIO FREQUENCY: adjustable; (Used on RF Band 5 only)	AC179
L702	Same as L701. (Used on RF Bands 1 and 2 only)	
L702	Same as L701. (Used on RF Band 3 only)	
L702	Same as L701. (Used on RF Band 4 only)	
L702	Same as L701. (Used on RF Band 5 only)	
L703	Same as L701. (Used on RF Bands 1 and 2 only)	
L703	Same as L701. (Used on RF Band 3 only)	
L703	Same as L701. (Used on RF Band 4 only)	
L703	Same as L701. (Used on RF Band 5 only)	
Q701	TRANSISTOR: PNP germanium drift feild; collector to base and collector to emitter voltage 40 volts; emitter to base voltage 0.5 volts; collector and emitter current 10 ma; power dissipation 240 mw at 25°C; storage temperature -65°C to +100°C; hermetically sealed metal case.	2N384
Q702	TRANSISTOR:	2N863
Q703	Same as Q701.	
Q704	Same as Q702	
Q705	Same as Q701	
Q706	Same as Q702	
Q707	Same as Q701.	

R701	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF102K
R702	Same as R701.	
R703	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R704	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF100K
R705	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF333K
R706	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R707	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Bands 1 and 2 only)	RC20GF103K
R707	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Bands 3 and 4 only)	RC20GF153K
R707	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Band 5 only)	RC20GF223K
R708	Same as R701.	
R709	Same as R701.	
R710	RESISTOR, FIXED, COMPOSITION: 22 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF220K
R711	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF822K
R712	Same as R711.	
R713	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF272K
R714	Same as R706.	
R715	Same as R707. (Used on RF Bands 1 and 2 only)	
R715	Same as R707. (Used on RF Bands 3 and 4 only)	
R715	Same as R707. (Used on RF Band 5 only)	
R716	Same as R701.	
R717	Same as R701.	
R718	Same as R701.	
R719	Same as R710.	
R720	Same as R711.	
R721	Same as R705.	
R722	Same as R706.	
R723	Same as R701.	
R724	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt	RC20GF101K
R725	Same as R701.	

R726	RESISTOR, FIXED, COMPOSITION: 120 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Bands 1, 2 and 4 only) (SEE NOTE 1)	RC20GF121K
R726	RESISTOR, FIXED, COMPOSITION: 180 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Band 3 only) (SEE NOTE 1)	RC20GF181K
R726	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Band 5 only) (SEE NOTE 1)	RC20GF680K
R727	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R728	Same as R707. (Used on RF Bands 1 and 2 only) (SEE NOTE 2)	
R728	Same as R707. (Used on RF Bands 3 and 4 only) (SEE NOTE 2)	
R728	RESISTOR, FIXED, COMPOSITION: 39,000 ohms, $\pm 10\%$ ; 1/2 watt. (Used on RF Band 5 only) (SEE NOTE 2)	RC20GF393K
TP701	TERMINAL STUD: 3/32" board mounting; brass.	TE127-3
TP702	Same as TP701.	

NOTE

- 1 Value of R726 may be changed if necessary, to achieve proper output.
- 2 R728 to be used only, if bandwidth is too narrow

PARTS LIST

Local Oscillator

C901	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case	CE105-2-25
C902	Same as C901.	
C903	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±1%; 100 WVDC; straight wire leads.	CML12F103F1S
C904	CAPACITOR, FIXED, MICA DIELECTRIC: 330 uuf, ±2%; 500 WVDC; straight wire leads.	CML11F331G5S
C905	Same as C904.	
C906-1	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, ±1%; 500 WVDC; straight wire leads.	CML12F152F5S
C906-2	CAPACITOR, FIXED, MICA DIELECTRIC: 270 uuf, ±2%; 500 WVDC; straight wire leads. (SEE NOTE 1)	CML11F271G5S
C907	Same as C903.	
C908	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, ±20%; 25 WVDC from -55°C to +85°C; radial lead type.	CC112R104M
C909	Same as C901.	
C910	CAPACITOR, FIXED, MICA DIELECTRIC: 5,100 uuf, ±1%; 300 WVDC; straight wire leads.	CML12F512F3S
C911	CAPACITOR, FIXED, MICA DIELECTRIC: 150 uuf, ±2%; 500 WVDC; straight wire leads.	CML11F151G5S
C912	Same as C911.	
C913-1	CAPACITOR, FIXED, MICA DIELECTRIC: 470 uuf, ±2%; 500 WVDC; straight wire leads.	CML11F471G5S
C913-2	CAPACITOR, FIXED, MICA DIELECTRIC: 47 uuf, ±1%; 500 WVDC; straight wire leads. (SEE NOTE 1)	CML11E470F5S
C914	Same as C910.	
C915	Same as C908.	
C916	Same as C901.	
C917	CAPACITOR, FIXED, MICA DIELECTRIC: 3,600 uuf, ±1%; 500 WVDC; straight wire leads.	CML12F362F5S
C918	CAPACITOR, FIXED, MICA DIELECTRIC: 82 uuf, ±2%; 500 WVDC; straight wire leads.	CML11E820G5S
C919	Same as C918.	
C920-1	Same as C906-2	
C920-2	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, ±1%; 500 WVDC; straight wire leads (SEE NOTE 1)	CML11E330F5S
C921	Same as C917.	

C922	Same as C908.	
C923	Same as C901.	
C924	CAPACITOR, FIXED, MICA DIELECTRIC: 3,900 uuf, $\pm 1\%$ ; 300 WVDC; straight wire leads.	CM112F392F3S
C925	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 2\%$ ; 500 WVDC; straight wire leads.	CM111F101G5S
C926	Same as C925.	
C927-1	CAPACITOR, FIXED, MICA DIELECTRIC: 390 uuf, $\pm 2\%$ ; 500 WVDC; straight wire leads.	CM111F391G5S
C927-2	CAPACITOR, FIXED, MICA DIELECTRIC: 68 uuf, $\pm 1\%$ ; 500 WVDC; straight wire leads. (SEE NOTE 1)	CM111E680F5S
C928	Same as C924.	
C929	Same as C908.	
C930	Same as C901.	
C931	Same as C906-1.	
C932	Same as C913-2.	
C933	Same as C913-2.	
C934-1	Same as C925.	
C934-2	Same as C920-2. (SEE NOTE 1)	
C935	Same as C906-1.	
C936	Same as C908.	
C937	Same as C901.	
C938	Same as C901.	
C939	Same as C901.	
C940	Same as C908.	
C941	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 8-50 uuf; operating temperature range $-55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ ; 350 WVDC.	CV109-9
C942	Same as C941	

C943	Same as C941	
C944	Same as C941	
C945	Same as C941.	
CR901	SEMICONDUCTOR DEVICE, DIODE:	1N961
CR902	CAPACITOR, VOLTAGE VARIABLE, SILICON:	CX106-13
CR903	Same as CR902.	
CR904	Same as CR902.	
CR905	Same as CR902.	
CR906	Same as CR902.	
L901	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC187
L902	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC192
L903	Refer to Tuning Assembly for component listing.	
L904	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC188
L905	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC193
L906	Refer to Tuning Assembly for component listing.	
L907	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC189
L908	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC194
L909	Refer to Tuning Assembly for component listing.	
L910	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC190
L911	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC195
L912	Refer to Tuning Assembly for component listing.	
L913	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC191
L914	COIL, INTERMEDIATE FREQUENCY: adjustable;	AC196
L915	Refer to Tuning Assembly for component listing.	
Q901	TRANSISTOR: NPN diffused silicon; collector to base voltage 25 volts; collector to emitter voltage 20 volts; emitter to base voltage 3 volts; collector current 200 ma; power dissipation watt at 25°C; junction temperature -65°C to +175°C; metal case.	2N706
Q902	Same as Q901	
Q903	Same as Q901	
Q904	Same as Q901	

Q905	Same as Q901	
Q906	Same as Q901	
R901	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF331K
R902	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF104K
R903	Same as R902.	
R904	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF471K
R905	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF221K
R906	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R907	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF222K
R908	Same as R902.	
R909	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF103K
R910	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 10\%$ ; 1/2 watt. (SEE NOTE 2)	RC20GF223K
R911	Same as R906.	
R912	RESISTOR, FIXED, COMPOSITION: 180 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF181K
R913	Same as R907.	
R914	Same as R902.	
R915	Same as R909.	
R916	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 10\%$ ; 1/2 watt. (SEE NOTE 2)	RC20GF153K
R917	Same as R906.	
R918	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF151K
R919	Same as R907.	
R920	Same as R902.	
R921	Same as R909.	
R922	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$ ; 1/2 watt. (SEE NOTE 2)	RC20GF123K
R923	Same as R906.	
R924	Same as R912.	
R925	Same as R907.	
R926	Same as R902.	
R927	Same as R909.	
R928	Same as R916. (SEE NOTE 2)	
R929	Same as R906.	
R930	Same as R918	



R931	Same as R907	
R932	Same as R902.	
R933	Same as R909.	
R934	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 10\%$ ; 1/2 watt. (SEE NOTE 2)	RC20GF822K
R935	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF101K
R936	Same as R909.	
R937	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF102K
R938	Same as R937.	
R939	Same as R902.	
R940	Same as R902.	
R941	Same as R902.	
TP901	TERMINAL STUD: 9/32" board mounting; brass.	TE127-3

NOTE

1. Capacitors C906-2, C913-2, C920-2, C927-2 and C934-2 are used only if necessary; to be determined in test.
2. Value of resistors R910, R916, R922, R928 and R934 may be changed in test.

P A R T S   L I S T

RF Tuning Assembly

J201 thru J205	Refer to Main Chassis and Power Supply Assembly	
J206	CONNECTOR, RECEPTACLE, ELECTRICAL: female	JJ293-22S
J207	Same as J206.	
J208	Same as J206.	
J209	Same as J206.	
J210	Same as J206.	
J211	CONNECTOR, RECEPTACLE, ELECTRICAL: male	JJ321-11P
J212	CONNECTOR, RECEPTACLE, ELECTRICAL: female	JJ321-7P
J213	CONNECTOR, RECEPTACLE, ELECTRICAL: male	JJ321-3P
J214	Same as J212.	
J215	Same as J212.	
J216	Same as J212.	
J217	CONNECTOR, PLUG, ELECTRICAL: accommodates RG174/U coaxial cable; one male pin type contact rated at 500 volts peak; bayonet polarization; twist lock; 50 ohms nom. impedance; BNC crimp type.	PL244-1
L901	Refer to Local Oscillator Assembly.	
L902	Refer to Local Oscillator Assembly.	
L903	TRANSFORMER, RADIO FREQUENCY: adjustable	AC208
L904	Refer to Local Oscillator Assembly.	
L905	Refer to Local Oscillator Assembly.	
L906	Same as L903.	
L907	Refer to Local Oscillator Assembly.	
L908	Refer to Local Oscillator Assembly.	
L909	Same as L903.	
L910	Refer to Local Oscillator Assembly.	
L911	Refer to Local Oscillator Assembly.	
L912	TRANSFORMER, RADIO FREQUENCY: adjustable	AC209
L913	Refer to Local Oscillator Assembly.	
L914	Refer to Local Oscillator Assembly	
L915	Same as L912	
S101	SWITCH, ROTARY:	SW363

T701	TRANSFORMER, RADIO FREQUENCY: fixed	TT203
T702	TRANSFORMER, RADIO FREQUENCY: fixed	TT207
T703	TRANSFORMER, RADIO FREQUENCY: fixed	TT211
T704	TRANSFORMER, RADIO FREQUENCY: fixed	TT204
T705	TRANSFORMER, RADIO FREQUENCY: fixed	TT208
T706	TRANSFORMER, RADIO FREQUENCY: fixed	TT212
T707	TRANSFORMER, RADIO FREQUENCY: fixed	TT207
T708	TRANSFORMER, RADIO FREQUENCY: fixed	TT209
T709	TRANSFORMER, RADIO FREQUENCY: fixed	TT213
T710	TRANSFORMER, RADIO FREQUENCY: fixed	TT206
T711	TRANSFORMER, RADIO FREQUENCY: fixed	TT210
T712	TRANSFORMER, RADIO FREQUENCY: fixed	TT214

P A R T S   L I S T

600 Kilocycle Lowpass Filter Assembly

C1	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, $\pm 1\%$ ; 300 WVDC; straight wire leads	CML12F152F3S
C2	Same as C1.	
C3	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, $\pm 5\%$ ; 100 WVDC; straight wire leads.	CML12F103J1S
C4	Same as C3.	
C5	Same as C3.	
C6	Same as C1.	
C7	Same as C1.	
J1	CONNECTOR RECEPTACLE, ELECTRICAL: RF type; 1 round male contact; straight type; series BNC to BNC.	UG625B/U
J2	Same as J1.	
L1	COIL, RADIO FREQUENCY: fixed;	CL342
L2	COIL, RADIO FREQUENCY: fixed;	CL343
L3	COIL, RADIO FREQUENCY: fixed;	CL344
L4	Same as L3.	
L5	Same as L2.	
L6	Same as L1.	

SECTION 7  
SCHEMATIC DIAGRAMS

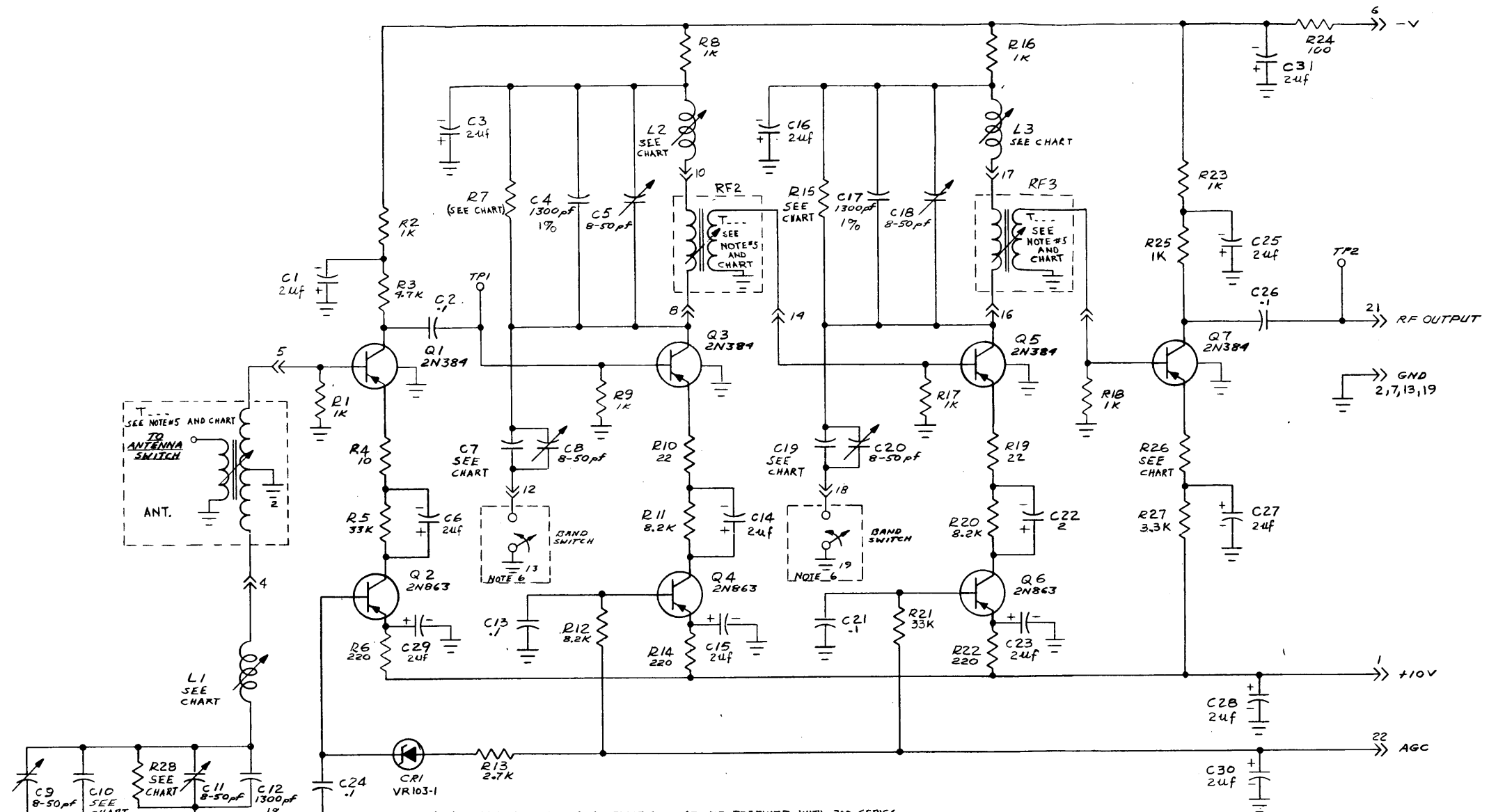
•

•

•

•





1. ALL SYMBOLS ON THIS SCHEMATIC MUST BE PREFIXED WITH 700 SERIES  
EX: R8 = R708; R21 = R721
2. UNLESS OTHERWISE SPECIFIED: (A) ALL RESISTORS ARE 1/2 WATT. (B) ALL CAPACITORS ARE IN MFD.
3. R726 VALUE MAY BE CHANGED TO ACHIEVE PROPER OUTPUT.
4. R728 TO BE USED ONLY IF BAND WIDTH IS TOO NARROW.
5. TRANSFORMERS ARE PHYSICALLY LOCATED ON RF TUNING CHASSIS ASSEMBLY  
REF: AX540 (SEE CHART FOR REFERENCE SYMBOLS).
6. BANDSWITCH PHYSICALLY LOCATED ON RF TUNING CHASSIS ASSEMBLY  
(SEE SCHEMATIC ABOVE)

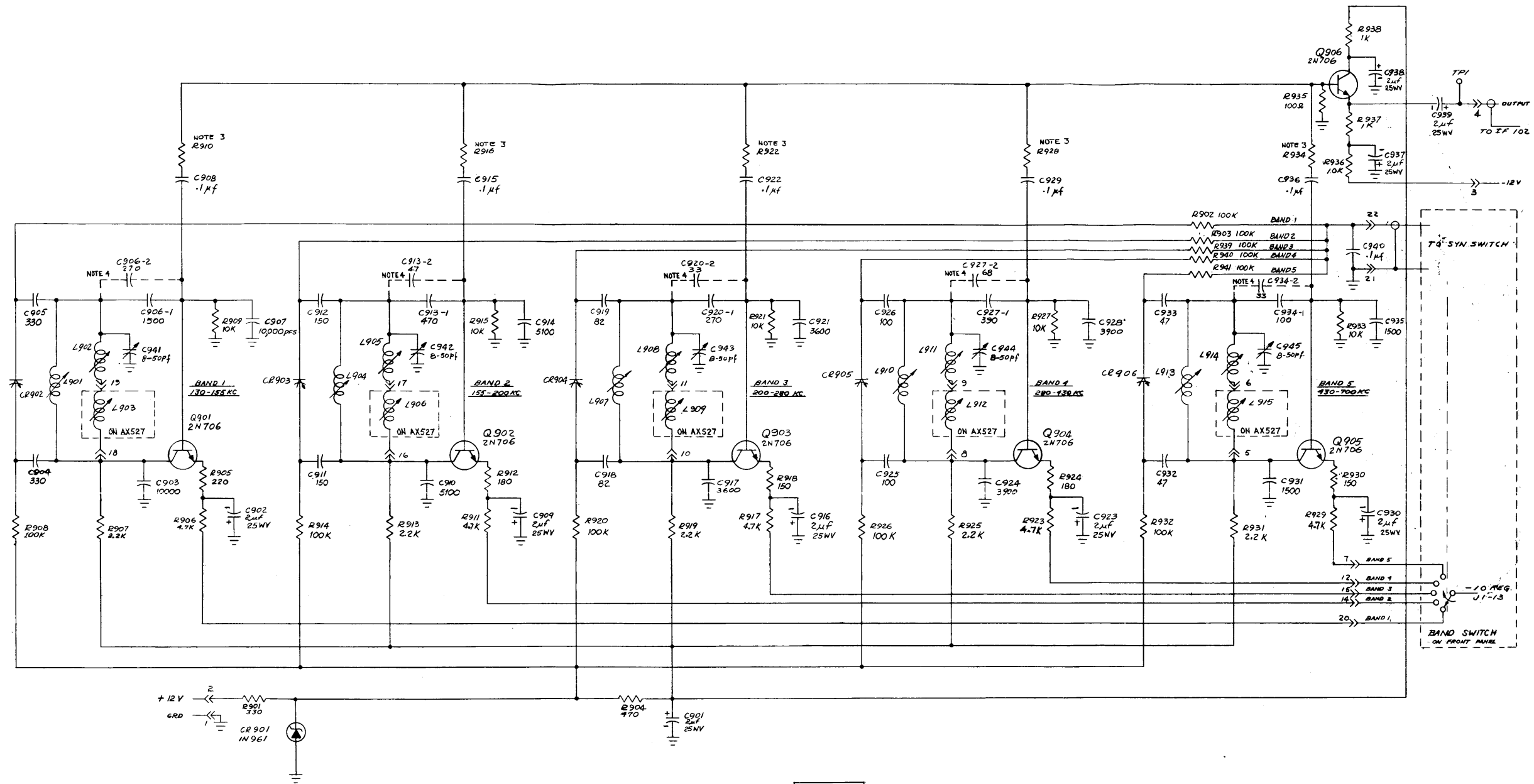
LAST SYMBOLS	
R28	
C31	
L3	
Q7	
CR1	

TMC PART NUMBER	BAND	C707	C710	C719	R707	R715	R726 NOTE 3	R728 NOTE 4	L701, L702, L703 PART NO.	RF TRANSFORMER SYM.		
									ANT.	RF2	RF3	
A3662-2	1 & 2	3200	3200	3200	10K	10K	120	10K	AC176	T701	T702	T703
A3662-3	3	NONE	NONE	NONE	15K	15K	180	15K	AC177	T704	T705	T706
A3662-4	4	NONE	NONE	NONE	15K	15K	120	15K	AC178	T707	T708	T709
A3662-5	5	NONE	NONE	NONE	22K	22K	68	39K	AC179	T710	T711	T712

USE THESE RESISTORS WHEN BAND WIDTH IS TOO NARROW.

CK-757 A

Figure 7-1. RF100-2, Schematic Diagram 7-2/7-3



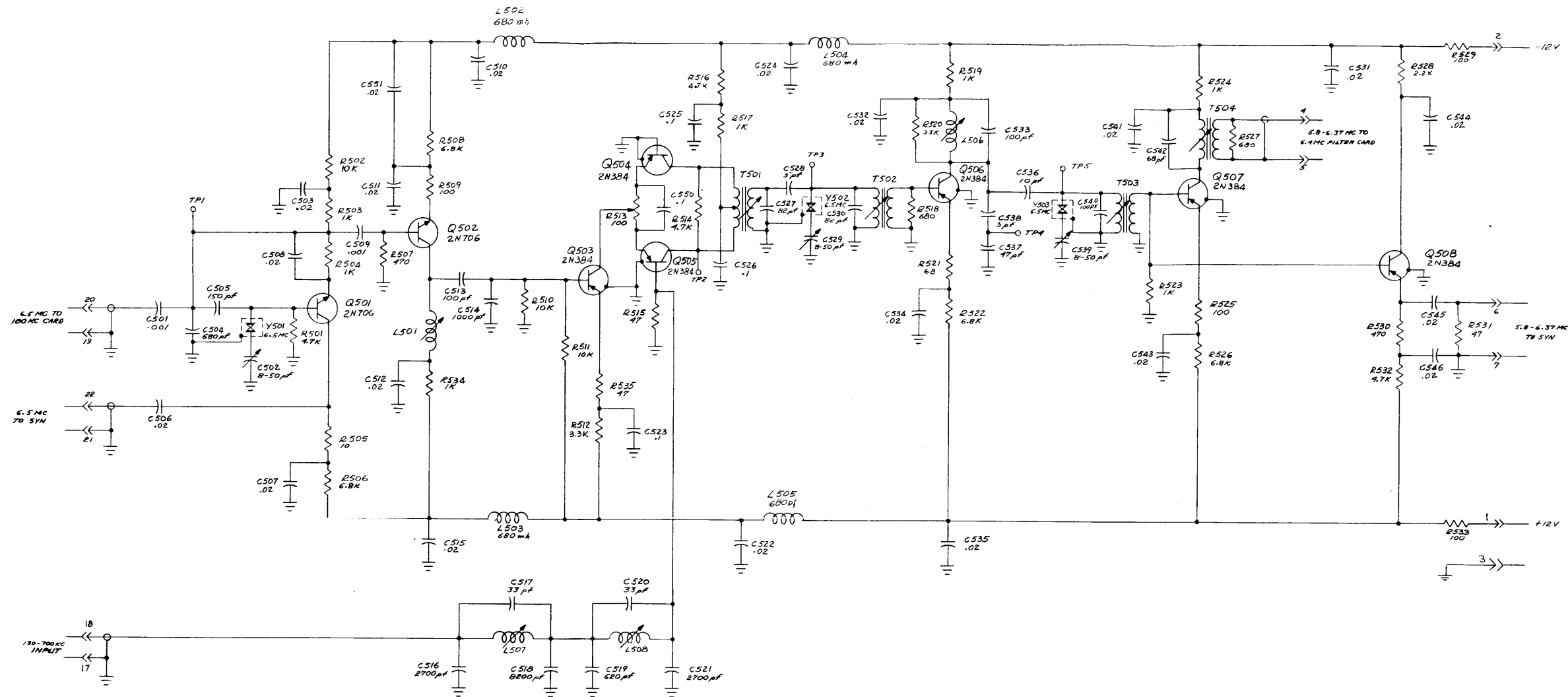
LAST SYMBOLS

R941
C945
L915
CR906
Q906

- NOTE:
1. ALL RESISTORS ARE 1/8 W, EXCEPT AS NOTED
  2. ALL CAPACITORS ARE IN PF, EXCEPT AS NOTED
  3. VALUES OF R910, 916, 922, 928, 934 TO BE DETERMINED IN TEST, THE FOLLOWING CHART IS AN AID FOR TESTING AND SHOULD BE USED FOR REFERENCE ONLY:
- | RESISTOR | TEST VALUE |
|----------|------------|
| R910     | 2.2K       |
| R916     | 15K        |
| R922     | 15K        |
| R928     | 15K        |
| R934     | 15K        |
| R938     | 8.2K       |
4. C906-2, 913-2, 920-2, 927-2, 934-2 USED ONLY IF NECESSARY; TO BE DETERMINED IN TEST.

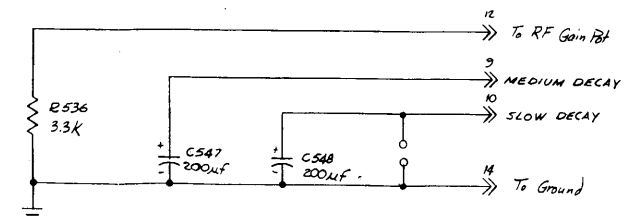
CK-758 A

Figure 7-2. Local Oscillator, Schematic Diagram



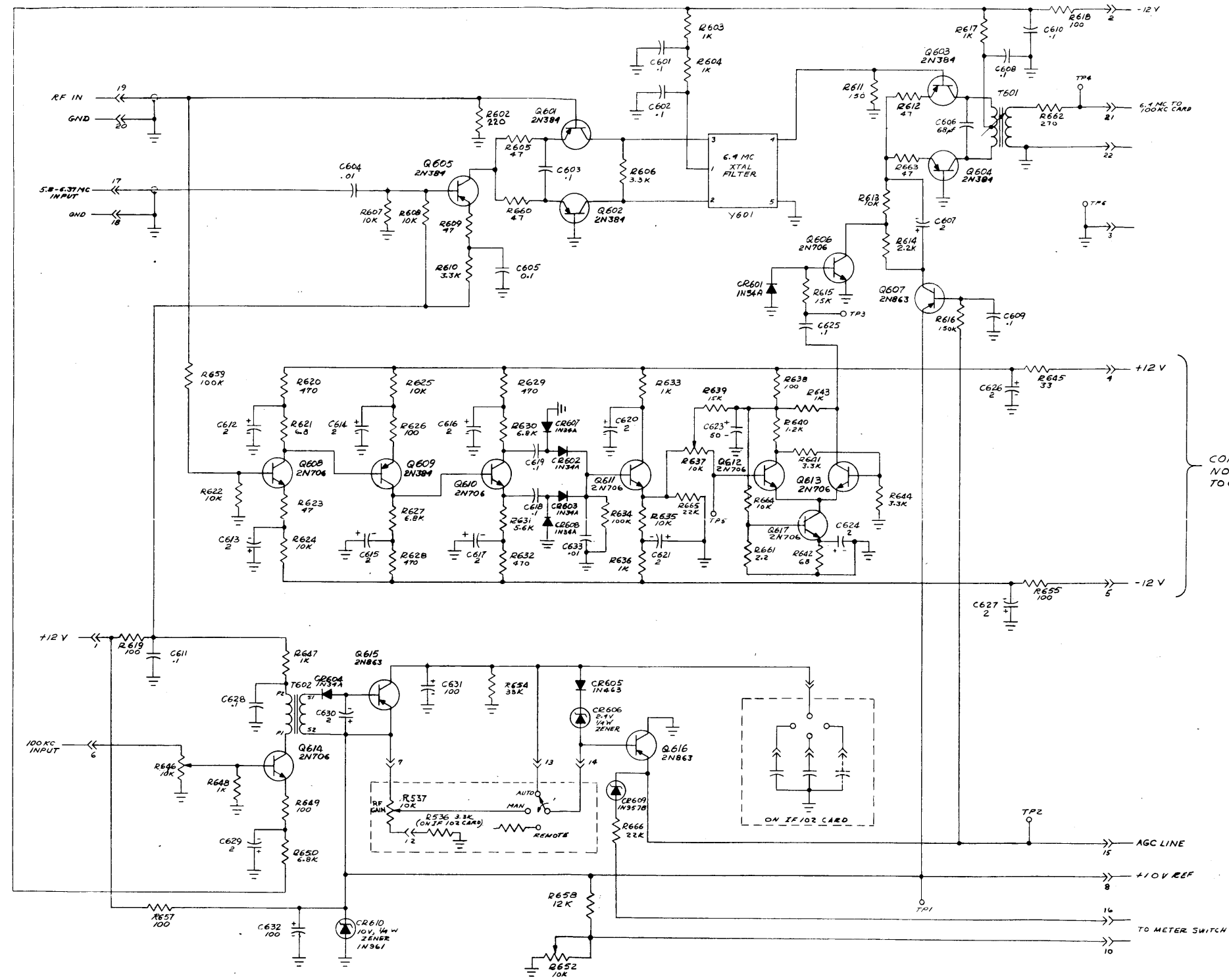
LAST SYMBOLS	MISSING SYMBOLS
R536	C549
C551	
L508	
Y503	
Q508	
T503	

NOTE: UNLESS OTHERWISE SPECIFIED  
 ALL CAPACITORS ARE IN  $\mu\text{f}$ .  
 ALL RESISTORS ARE IN OHMS,  $\text{K}\Omega$ ,  $\text{M}\Omega$ .



CK-755A

Figure 7-3. 6.5 Osc. - 6.37 - 5.8 MC  
 IF102, Schematic Diagram



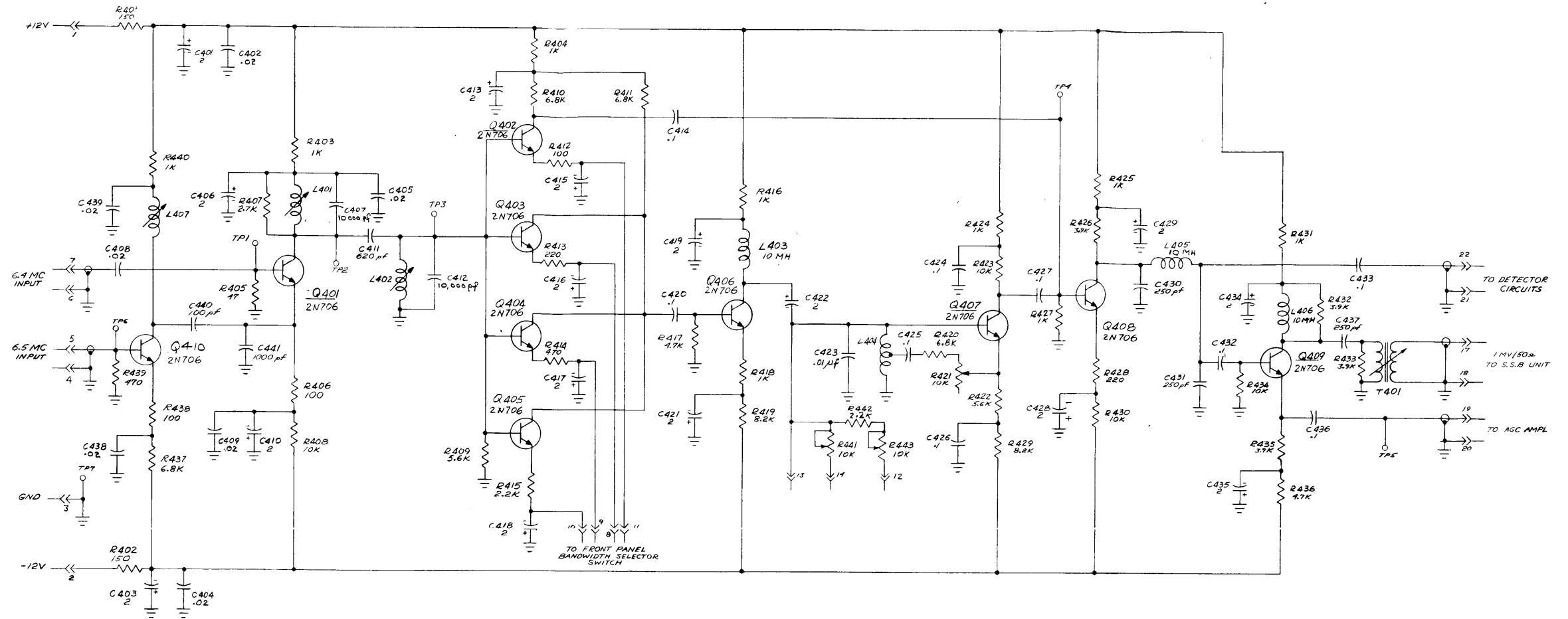
CONNECTED TO FRONT PANEL  
NOISE SILENCER DPDT ON-OFF  
TOGGLE SWITCH.

UNLESS OTHERWISE SPECIFIED:  
ALL CAPACITORS ARE  $\mu$ F.  
ALL RESISTORS ARE IN OHMS, 1/2W.

LAST SYMBOLS	MISSING SYMBOLS
R666	R653
C633	R656
CR610	C622
Q617	RG01
T602	R651
Y601	

CK-760A

Figure 7-4. AGC-Noise Silencer-6.4 MC-IF, Schematic Diagram

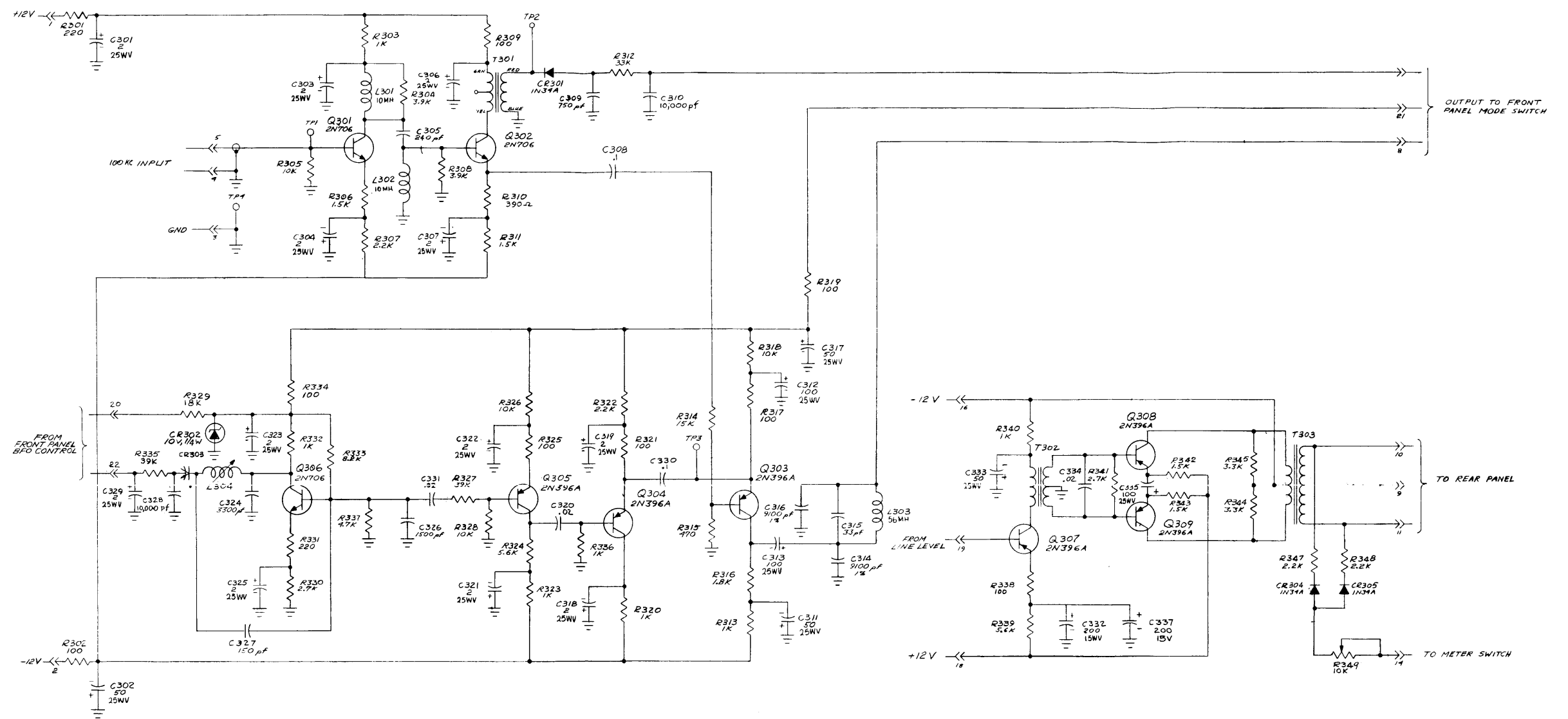


NOTE: ALL CAPACITOR VALUES IN μF EXCEPT AS NOTED.  
ALL RESISTORS 1/2 W EXCEPT AS NOTED.

LAST SYMBOL		
R443	C441	L407
T401	Q410	

CK-761 A

Figure 7-5. 100 KC - IF101, Schematic Diagram

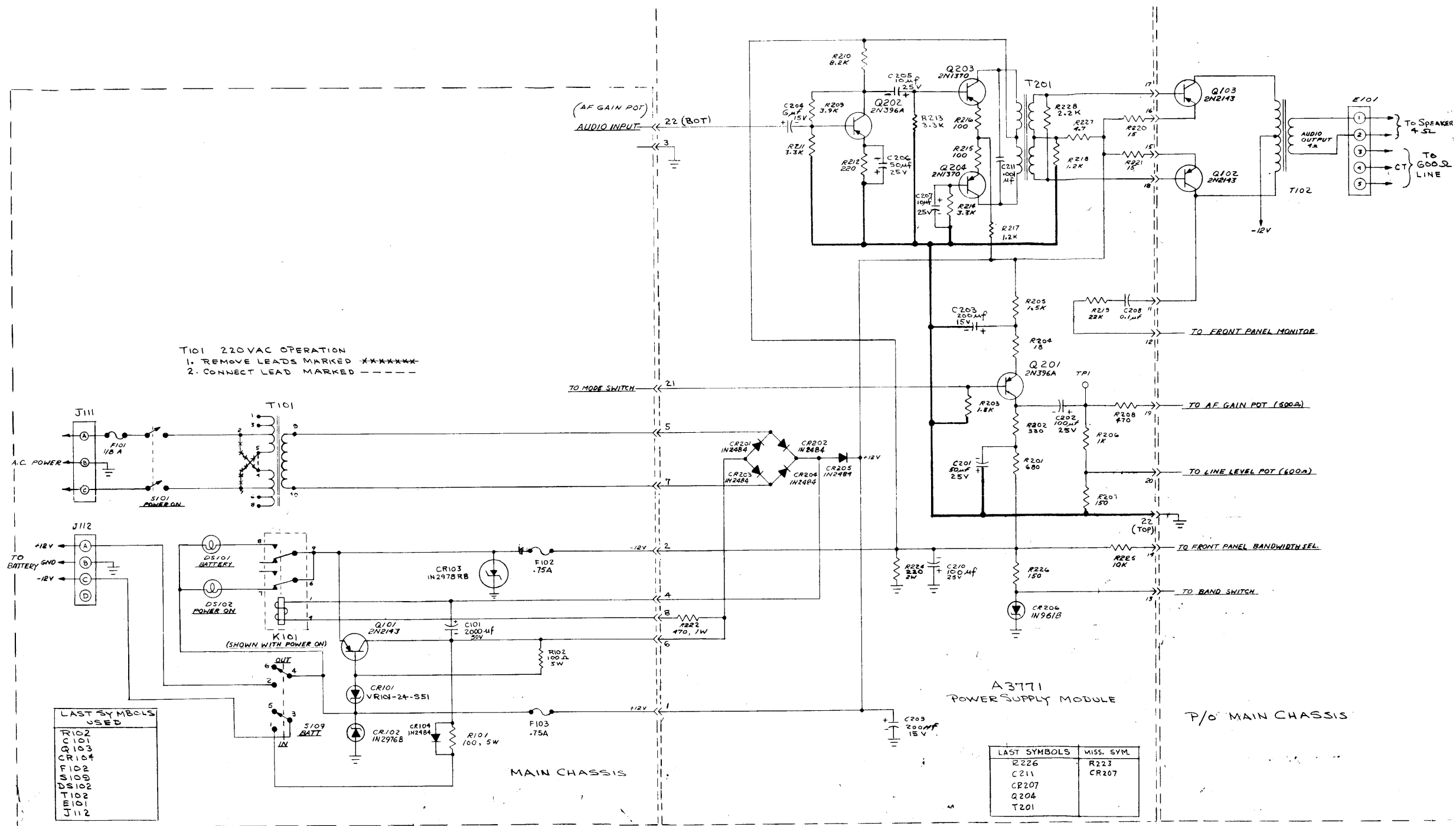


NOTE :  
 ALL CAPACITORS VALUES IN  $\mu\text{fd}$  EXCEPT AS NOTED  
 ALL RESISTORS 1/2 W EXCEPT AS NOTED

LAST SYMBOLS	MISSING SYMBOLS
R349	R346
C337	C336
Q309	
L304	
T303	
TP304	
CR305	

CK-759 C

Figure 7-6. BFO Product Detector, Schematic Diagram



LAST SYMBOLS USED
R102
C101
Q103
CR104
F102
S103
DS102
T102
E101
J112

LAST SYMBOLS	MISS. SYM.
R226	R223
C211	CR207
CR207	
Q204	
T201	

CK-756 B

Figure 7-7. Power Supply and Audio Amplifier, Schematic Diagram

7-14/7-15