





## 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

C O M M U N I C A T I O N S   E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

## W a r r a n t y

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

Addendum  
for  
Frequency Amplifier  
Model CHG-2B

With the exception of remote B+ switching for the r-f amplifier stages (V2706, V2707, and V2708) and the i-f balanced modulator stages (2704 and V2705), the CHG-2B is similar to Frequency Amplifier CHG-2A. The CHG-2A Instruction Manual will apply as written with the following exceptions:

- a. Figures III(A)-4-5b, III(A)-4-6b, and III(A)-8-1b should be changed in accordance with the information provided in figure 1 of this addendum.
- b. Operating instructions for the CHG-2 must be changed to indicate that the B+ switch should be set at OFF if remote B+ switching is to be accomplished.

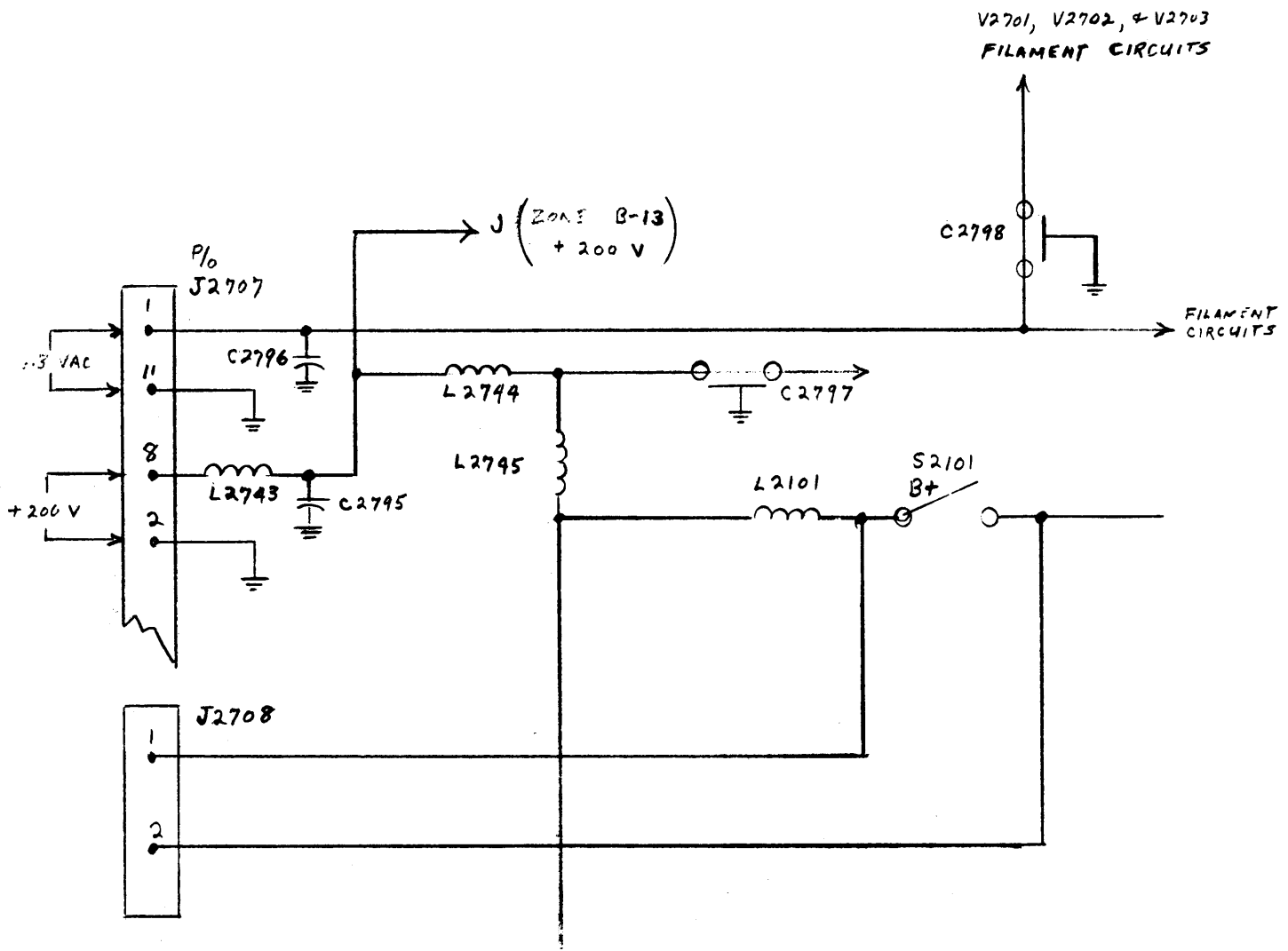


FIGURE 1



**INSTRUCTION BOOK CHANGE NOTICE**

Date 1-21-64

Manual affected: Frequency Amplifier CHG-2 IN -244

Page III(A)-i Table of Contents  
Section 2 - Installation

Change Table of Contents to read as follows:

- III(A)-2-1. Initial Inspection - - - - - III(A)-2-1
- III(A)-2-2. Mechanical Installation - - - III(A)-2-1
- III(A)-2-3. Electrical Installation - - - III(A)-2-2
- III(A)-2-4. Initial Adjustments - - - - - III(A)-2-2

---

Page III(A)-ii, List of Illustrations  
Section 2 - Installation

Change List of illustrations as follows:

1. Delete figure III(A)-2-2
2. Change title of figure III(A)-2-1 to read as follows:  
  
III(A)-2-1. Wiring Change for 230-Volt or 50-Cycle  
Operation

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

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

Attn: Director of Eng. Services.



CHANGE NO. 3



INSTRUCTION BOOK CHANGE NOTICE

Date February 13, 1964

Manual affected: Frequency Amplifier CHG-2 IN -244

Page III(A)-7-55, Parts List

Change TMC part number given for resistor R2725 from  
RV4ATRD102A to RV4ATRD102C

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

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

Attn.: Director of Eng. Services.



# TABLE OF CONTENTS

## SECTION 1—GENERAL DESCRIPTION

Paragraph	Page
III(A)-1-1. Purpose and Basic Principles	III(A)-1-1
III(A)-1-2. Description of Units . . . . .	III(A)-1-1
III(A)-1-3. Reference Data . . . . .	III(A)-1-1

## SECTION 2—INSTALLATION

III(A)-2-1. General . . . . .	III(A)-2-0
III(A)-2-2. Initial Inspection . . . . .	III(A)-2-0
III(A)-2-3. 115-vs 230-volt Power Supply Connections . . . . .	III(A)-2-0
III(A)-2-4. Interconnections . . . . .	III(A)-2-0
III(A)-2-5. Initial Adjustments . . . . .	III(A)-2-0

## SECTION 3—OPERATOR'S SECTION

III(A)-3-1. . . . .	III(A)-3-1
---------------------	------------

## SECTION 4—PRINCIPLES OF OPERATION

III(A)-4-1. Introduction . . . . .	III(A)-4-1
III(A)-4-2. Regenerative Divider . . . . .	III(A)-4-1
III(A)-4-3. Oven and Oscillator . . . . .	III(A)-4-1

## SECTION 4—PRINCIPLES OF OPERATION (Cont.)

Paragraph	Page
III(A)-4-4. Synthesizer . . . . .	III(A)-4-4
III(A)-4-5. IF Chassis . . . . .	III(A)-4-5
III(A)-4-6. Mid-frequency and RF Deck . . . . .	III(A)-4-5
III(A)-4-7. Power Supply CPP-1, 5 . . . . .	III(A)-4-6

## SECTION 5—TROUBLE-SHOOTING

III(A)-5-1. Introduction . . . . .	III(A)-5-1
III(A)-5-2. Voltages and Resistances . . . . .	III(A)-5-1
III(A)-5-3. Parts Location Data . . . . .	III(A)-5-1
III(A)-5-4. Trouble-Shooting Based on Circuit Sectionalization . . . . .	III(A)-5-1

## SECTION 6—MAINTENANCE

III(A)-6-1. Introduction . . . . .	III(A)-6-0
III(A)-6-2. Corrective Maintenance . . . . .	III(A)-6-0

## SECTION 7—PARTS LIST

## SECTION 8—SCHEMATIC DIAGRAMS

# LIST OF ILLUSTRATIONS

## SECTION 1—GENERAL DESCRIPTION

Figure	Page
III(A)-1-1a. Frequency Amplifier CHG-1, Front View .....	III(A)-v
III(A)-1-1b. Frequency Amplifier CHG-2, Front View .....	III(A)-vi
III(A)-1-2a. Frequency Amplifier CHG-1, Rear View .....	III(A)-1-2
III(A)-1-2b. Frequency Amplifier CHG-2, Rear View .....	III(A)-1-3
III(A)-1-3a. Power Supply CPP-1, Top View .....	III(A)-1-4
III(A)-1-3b. Power Supply CPP-5, Top View .....	III(A)-1-5

## SECTION 2—INSTALLATION

III(A)-2-1.	Rack Wiring Assembly for Synthesized GPT-10K and -40K Transmitters (AX-239 w/KIT-109; CK-466E) .....	III(A)-2-1
III(A)-2-2.	Rack Wiring Assembly for Synthesized SBT-1K Transmitters (Rack 11; CK-481C) .....	III(A)-2-3

## SECTION 4—PRINCIPLES OF OPERATION

III(A)-4-1a.	Schematic Diagram, Regenerative Divider of CHG-1 .....	III(A)-4-2
III(A)-4-1b.	Schematic Diagram, Regenerative Divider of CHG-2 .....	III(A)-4-3
III(A)-4-2a.	Schematic Diagram, Oven/Oscillator of CHG-1 .....	III(A)-4-7
III(A)-4-2b.	Schematic Diagram, Oven/Oscillator of CHG-2 .....	III(A)-4-9
III(A)-4-3a.	Schematic Diagram, Synthesizer of CHG-1 .....	III(A)-4-11
III(A)-4-3b.	Schematic Diagram, Synthesizer of CHG-2 .....	III(A)-4-13
III(A)-4-4a.	Schematic Diagram, IF Section of CHG-1 .....	III(A)-4-15
III(A)-4-4b.	Schematic Diagram, IF Section of CHG-2 .....	III(A)-4-17
III(A)-4-5a.	Schematic Diagram, Mid Frequency and RF Deck Sub-assembly (MF to RF Component) of CHG-1 .....	III(A)-4-19
III(A)-4-5b.	Schematic Diagram, Mid Frequency and RF Deck Sub-assembly (MF to RF Component) of CHG-2 .....	III(A)-4-21
III(A)-4-6a.	Schematic Diagram, RF Deck of CHG-1 .....	III(A)-4-23
III(A)-4-6b.	Schematic Diagram, RF Deck of CHG-2 .....	III(A)-4-25

III(A)-ii

## SECTION 4—PRINCIPLES OF OPERATION (Cont.)

Figure	Page
III(A)-4-7a. Gear Train Arrangement of Band/Range Switches, CHG-1 .....	III(A)-4-27
III(A)-4-7b. Gear Train Arrangement of Band/Range Switches, CHG-2 .....	III(A)-4-28

## SECTION 5—TROUBLE-SHOOTING

III(A)-5-1a.	Reference Designations for above Chassis Components of Frequency Amplifier Model CHG-1 .....	III(A)-5-8
III(A)-5-1b.	Reference Designations for above Chassis Components of Frequency Amplifier Model CHG-2 .....	III(A)-5-9
III(A)-5-2a.	Reference Designations for Below Chassis Components of Frequency Amplifier, Model CHG-1 .....	III(A)-5-10
III(A)-5-2b.	Reference Designations for Below Chassis Components of Frequency Amplifier, Model CHG-2 .....	III(A)-5-11
III(A)-5-3a.	Reference Designations for Lower Rear Components of Power Supply, Model CPP-1 .....	III(A)-5-12
III(A)-5-3b.	Reference Designations for Lower Rear Components of Power Supply, Model CPP-5 .....	III(A)-5-13
III(A)-5-4a.	Reference Designations for Upper Rear Components of Power Supply, Model CPP-1 .....	III(A)-5-14
III(A)-5-4b.	Reference Designations for Upper Rear Components of Power Supply, Model CPP-5 .....	III(A)-5-15

## SECTION 8—SCHEMATIC DIAGRAMS

III(A)-8-1a.	Schematic Diagram, Frequency Amplifier, CHG-1 (Sheet 1 of 2) .....	III(A)-8-1
III(A)-8-1a.	Schematic Diagram, Frequency Amplifier, CHG-1 (Sheet 2 of 2) .....	III(A)-8-3
III(A)-8-1b.	Schematic Diagram, Frequency Amplifier, CHG-2 (Sheet 1 of 2) .....	III(A)-8-5
III(A)-8-1b.	Schematic Diagram, Frequency Amplifier, CHG-2 (Sheet 2 of 2) .....	III(A)-8-7
III(A)-8-2a.	Schematic Diagram, Power Supply CPP-1 .....	III(A)-8-8
III(A)-8-2b.	Schematic Diagram, Power Supply CPP-5 .....	III(A)-8-9

001620244



# LIST OF TABLES

## SECTION 1—GENERAL DESCRIPTION

Table		Page
III(A)-1-1.	Electrical Characteristics, CHG . . . . .	III(A)-1-6
III(A)-1-2.	Front Panel Controls, CHG . . . . .	III(A)-1-6
III(A)-1-3.	Vacuum Tube Complement, CHG-1 . . . . .	III(A)-1-7
III(A)-1-4.	Vacuum Tube Complement, CHG-2 . . . . .	III(A)-1-8
III(A)-1-5.	Vacuum Tube Complement, CPP-1, 5 . . . . .	III(A)-1-9

## SECTION 4—PRINCIPLES OF OPERATION

III(A)-4-1.	Frequencies VS Band Selector Switch Position. . . . .	III(A)-4-6
-------------	---	------------

## SECTION 5—TROUBLE-SHOOTING

III(A)-5-1a.	Voltage and Resistance Measurements (CHG-1) . . . . .	III(A)-5-2
III(A)-5-1b.	Voltage and Resistance Measurements (CHG-2) . . . . .	III(A)-5-4
III(A)-5-2.	Stage Gains (CHG-1). . . . .	III(A)-5-6
III(A)-5-3.	RF Voltage Measurements (CHG-2). . . . .	III(A)-5-7

## FOREWORD

Frequency Amplifier Model CHG-2A directly replaces the obsoleted models CHG-1 and CHG-2 units.

Model CHG-2A is electrically similiar to the previous CHG units, differing only in the mechanical gear train arrangement.

Although the text of this manual may still refer to the CHG-1 and CHG-2 units, the reader is advised to ignore reference to the CHG-1 and interpret model CHG-2 as CHG-2A.

All charts and diagrams pertaining to the obsoleted units have been deleted although they may still be referenced to in the text.

The above mentioned changes also apply to the Power Supply Model CPP-5 directly replacing model CPP-1.

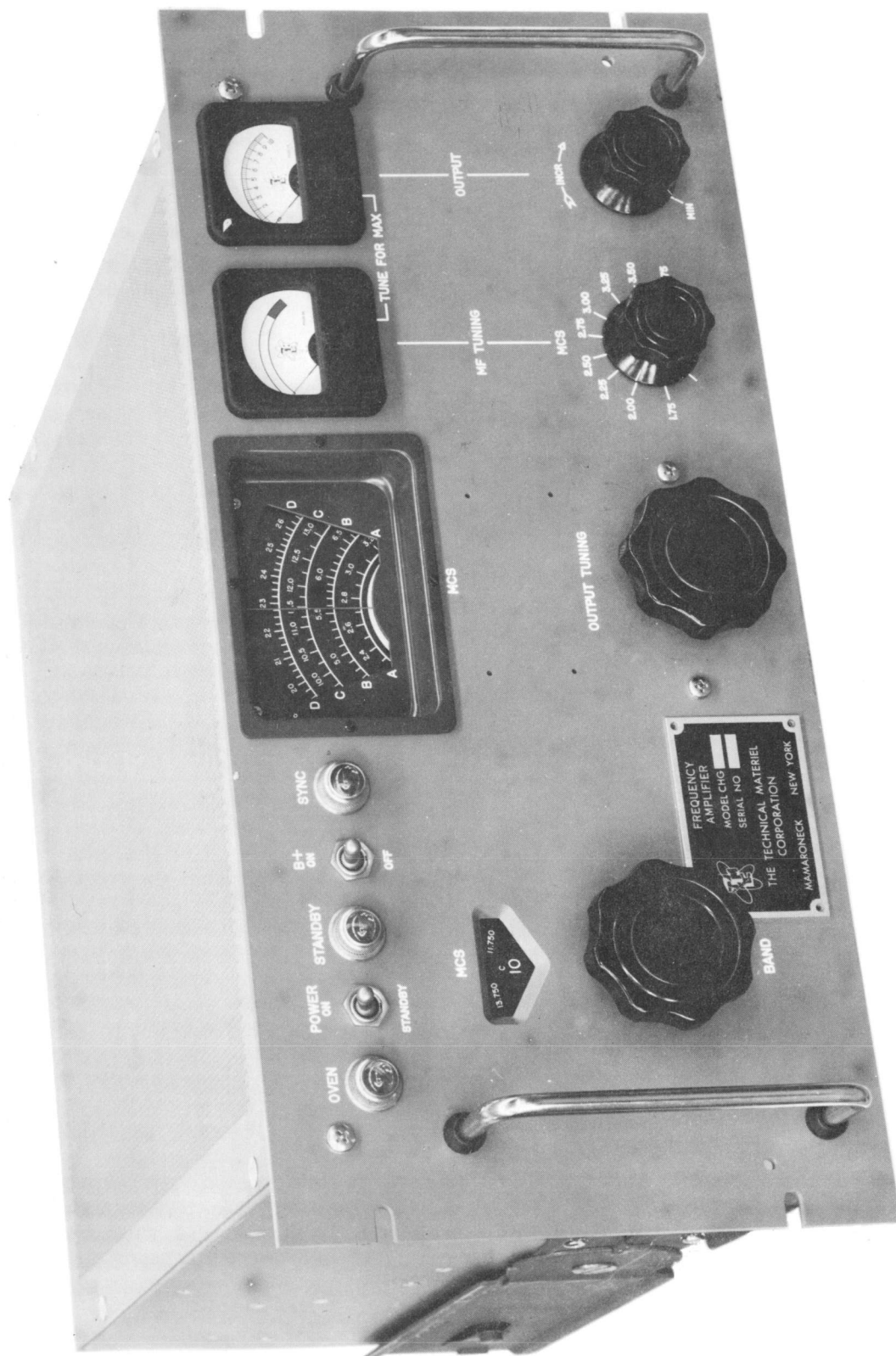


Figure III(A)-1-1b. Frequency Amplifier CHG-2, Front View

## SECTION 1

### GENERAL DESCRIPTION

#### III(A)-1-1. PURPOSE AND BASIC PRINCIPLES.

Technical Materiel Corporation's Frequency Amplifier, CHG (high frequency loop), supplies controlled frequencies in the 1.75- to 33.75-mc range in 100-cps steps. The frequency stability of the CHG is one cycle in 100,000,000 per day.

CHG is associated with five other units in the Controlled Precision Oscillator, CPO-1, as follows:

a. Controlled Master Oscillator, CMO-1, provides an input of 2- to 4-mc in 100-cps steps to the CHG.

b. Primary Standard, CSS-1, provides a 1-mc standard input to the CHG.

c. Power Supply, CPP-1, provides +200V DC (unregulated), +150V DC (regulated), and 6.3V AC for the CHG, where the application is to GPT-10K(R) and GPT-40K(A) transmitters.

d. Power Supply, CPP-5, provides the same voltages listed in step c. above, where the application is to a SBT-1K (E, F, G, H) transmitter. The CPP-5 contains a regulated transformer which is unnecessary in the CPP-1 because the 10K and 40K transmitters are supplied with regulated 115V AC.

e. CHG is associated with either of two other units in the Sideband Generator, SBG. Sideband Exciter, CBE-1, provides a 0.25-mc input, modulated in the 0- to 7.5-kc frequency range to the CHG. Sideband Exciter, CBE-2, provides a 0.25-mc input, modulated in the 0- to 3.3-kc frequency range to the CHG.

CHG accomplishes its function as follows:

a. CHG's modulator and amplifier is fed by the CMO and the associated CBE. It passes the difference frequency (lower sideband),  $F_{cmo} - F_{cbe}$ . If the CBE supplies unmodulated carrier, CHG's modulator-amplifier output is  $F_{cmo}$  minus 0.25-mc.

b. The CMO output frequency is synthesized in 100-cycle steps in the 2- to 4-mc range. CHG's modulator-amplifier's output ranges from 1.75- to 3.75-mc, synthesized in 100-cycle steps.

c. The modulator-amplifier's output is frequency translated in the CHG to yield the final output of 1.75- to 33.75-mc synthesized in 100-cycle steps.

The CHG has five subassemblies. These are:

a. Regenerative Divider.

b. Oven and Oscillator.

c. Synthesizer.

d. IF Chassis.

e. Mid-frequency and RF deck.

#### III(A)-1-2. DESCRIPTION OF UNITS.

The CHG is shown in figures III(A)-1-1 and III(A)-1-2. The front panel is 3/16-inch thick by 19 inches long and 10-1/2 inches high and is finished in TMC gray enamel. The chassis extends 19-1/4 inches behind the panel and is self-supporting.

The CPP is shown in figures III(A)-1-3. The front panel is 3/16-inch thick by 19 inches long and 5-1, 4 inches high and is finished in TMC gray enamel. The chassis extends 16-1/2 inches behind the panel and is self-supporting.

Controls and indicators for the operation of the CHG are located on its front panel. Fuses for the operation of the CPP are located on its front panel. The equipment is manufactured in accordance with JAN MIL Standards, whenever practicable. All parts and assemblies meet or exceed highest quality standards.

#### III(A)-1-3. REFERENCE DATA.

The crated dimensions of the CHG, crated with the CMO, are 23-1/8 by 32-1, 2 by 27 inches. These units weigh 204 pounds, gross, packed for shipment. The crated dimensions of the CPP-1 crated with CHL and CSS are 23-1, 4 by 28-3/4 by 23-1, 4 inches. These units weigh 165 pounds, gross, packed for shipment. Tables III(A)-1-1 through III(A)-1-5 contain additional reference data pertinent to the CHG and CPP.



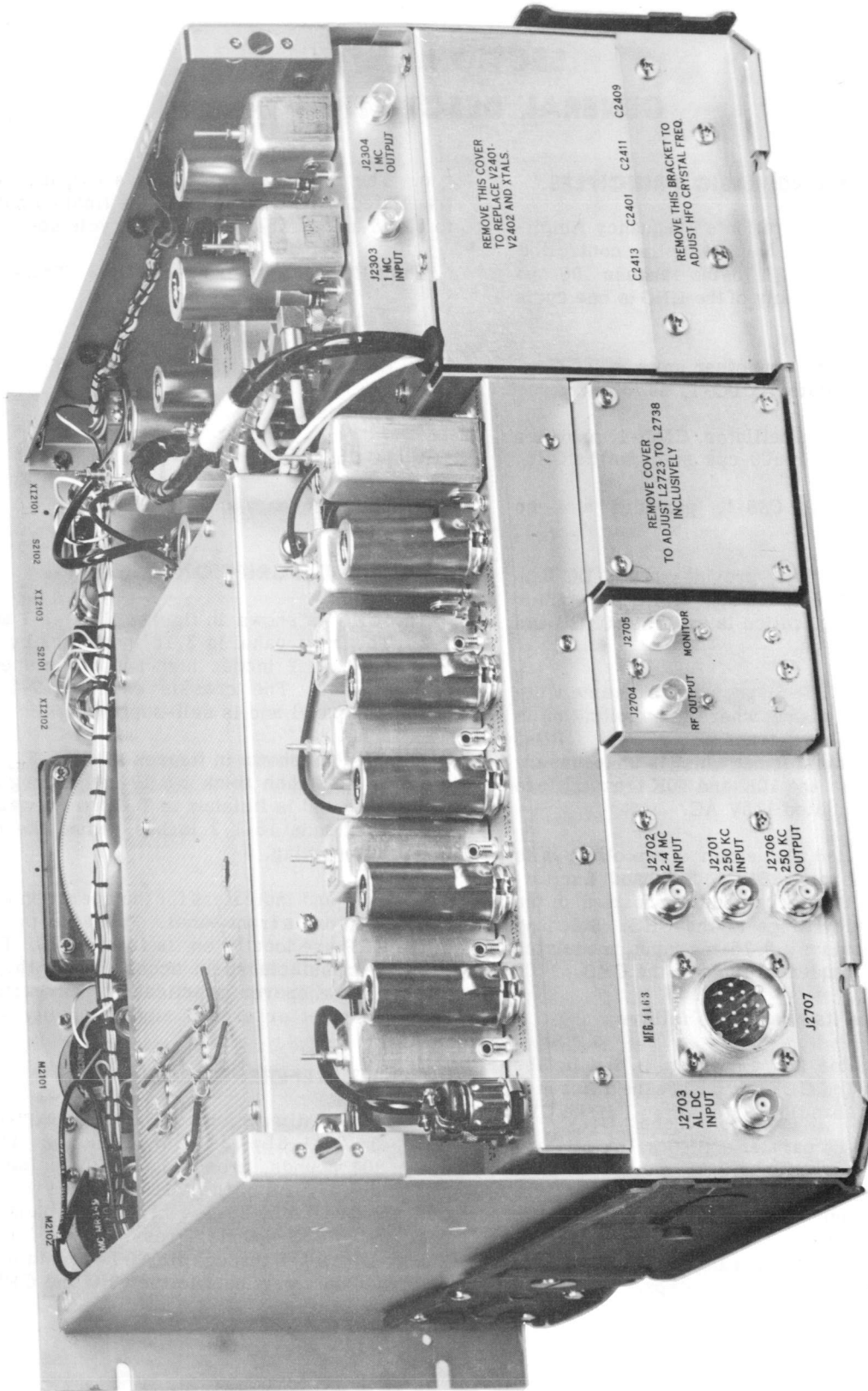


Figure III(A)-1-2b. Frequency Amplifier CHG-2, Rear View



Figure III(A)-1-3b. Power Supply CPP-5, Top View

**TABLE III(A)-1-1. ELECTRICAL CHARACTERISTICS, CHG**

ITEM	CHARACTERISTICS
Input Frequencies: From CMO From CBE-1 or From CBE-2 From CSS	2 to 4-mc, synthesized in 100 cycle steps. 0.25-mc audio modulated in 0- to 7.5-kc frequency range. 0.25-mc audio modulated in 0- to 3.3-kc frequency range. 1-mc (Standard).
Output Frequencies:	1.75- to 33.75-mc, synthesized in 100-cycle steps.
Output Power (Maximum):	1-watt (PEP) into 70-ohms.
Output Stability:	At the 100-cps discrete frequency steps, the automatic phase control system stabilizes frequency to one part in 100,000,000 per day.
Power Requirements (CPP-1 or CPP-5):	115- or 230V-AC, 50 to 60-cps, 200 watts (maximum).

**TABLE III(A)-1-2. FRONT PANEL CONTROLS, CHG**

CONTROL	FUNCTIONS
B+ ON/OFF toggle switch:	Supplies +200V to RF amplifier when in ON position.
BAND knob:	Used to set band of output frequency.
MCS dial:	Indicates band of output frequency.
MCS meter:	Used to check peak tuning of output frequency.
MF TUNING MCS knob:	Used to peak tune CMO's and CBE's 1.75- to 3.75-mc product.
MF TUNING meter:	Indicates peak tuning of CMO's and CBE's 1.75- to 3.75-mc product.
OUTPUT INCR MIN/MAX knob:	Used to adjust output level of CHG.
OUTPUT meter:	Indicates power output of CHG.
OUTPUT TUNING knob:	Used to obtain peak tuning of output frequency.
OVEN indicator:	Lights when oven is receiving power.

**TABLE III(A)-1-2. FRONT PANEL CONTROLS, CHG (C mt.)**

CONTROL	FUNCTIONS
POWER ON/STANDBY switch:	Supplies power to oven only, when in STANDBY position.
STANDBY indicator:	Lights when POWER ON/STANDBY switch is in STANDBY position.
SYNC indicator:	Lights when 2-mc output of Synthesizer's mixer (V1503 or V2503) syncs with 2-mc output of Synthesizer's doubler (V1505 or V2505).

**TABLE III(A)-1-4. VACUUM TUBE COMPLEMENT, CHG-2**

SYMBOL	TYPE	FUNCTION
V2701	12AT7	Balanced Modulator
V2702	6AH6	Mid-frequency Amplifier
V2703	6AH6	Metering
V2704	6AU6	HF Amplifier
V2705	6AU6	HF Amplifier
V2706	6AH7	1st RF Amplifier
V2707	6CL6	2nd RF Amplifier
V2708	6146	RF Output
V2201	6AH6	18-mc Generator
V2202	6AH6	18-mc Amplifier
V2203	6AU6	1st IF Amplifier
V2204	6AU6	2nd IF Amplifier
V2205	6AU6	3rd IF Amplifier
V2206	6AU6	IF Output
V2301	6AH6	1-mc Output
V2302	6U8	1-mc Oscillator/Amplifier
V2401	6J4	HF Oscillator
V2402	6J4	HF Output
V2501	6AH6	Isolation Amplifier
V2502	6AH6	Harmonic Generator
V2503	6BA7	Mixer
V2504	6C56	Sync



**TABLE III(A)-1-4. VACUUM TUBE COMPLEMENT, CHG-2 (C nt.)**

SYMBOL	TYPE	FUNCTION
V2505	6AH6	Doubler
V2601	6BE6	Mixer
V2602	6U8	Tripler/250-KC Output

**TABLE III(A)-1-5. VACUUM TUBE COMPLEMENT, CPP 5**

SYMBOL	TYPE	FUNCTION
V401	OA2	Regulator

SECTION 2  
INSTALLATION

III(A)-2-1. INITIAL INSPECTION

Each CHG and CPP has been thoroughly checked and calibrated at the factory before shipment. Inspect the packing case and its contents immediately for possible damage when it arrives at the operating site. Unpack the equipment carefully and inspect the 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 tubes and other plug-in components installed. Check that all such components are properly seated in their sockets.

III(A)-2-2. MECHANICAL INSTALLATION

a. The CHG and the CPP are designed for mounting in a standard 19 inch wide equipment rack. Mounting dimensions for both units are given in paragraph III(A)-1-2.

b. To install the CPP, place the unit into the equipment rack and secure the front panel to the rack with rack screws.

c. To install the CHG proceed as follows:

(1) Set CHG slide mechanisms in tracks of equipment rack.

NOTE

It may be necessary to hold the tracks in the extended position while positioning the CHG.

(2) Slide CHG on tracks until release buttons engage hole in track.

(3) Press release buttons and push CHG-2A completely into equipment rack.

(4) Secure front panel to rack with rack screws.

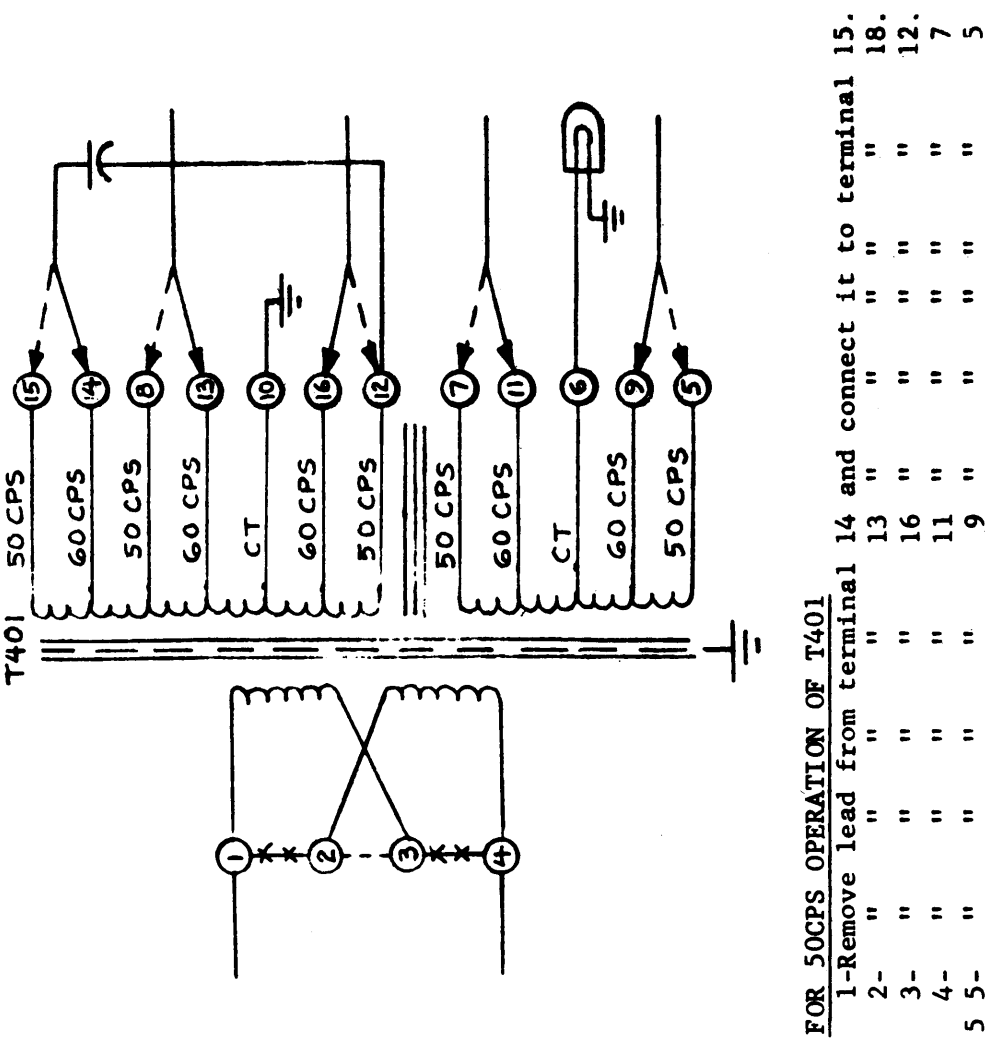
### III(A)-2-3. ELECTRICAL INSTALLATION

a. INTERCONNECTIONS - Refer to the overall system wiring diagram provided in the SBG-1/2 system manual and make cabling interconnections between the CHG and CPP and the other modular units as indicated.

b. 115-VS 230-VOLT, 50-VS 60-CYCLE POWER SUPPLY - The CHG and CPP are designed for 115- or 230- volt, 50-or 60-cycle single phase power; both units are factory-wired for 115-volt, 60-cycle power. If 230-volt or 50-cycle operation is required, minor wiring changes must be made as indicated in figure III(A)-2-1.

### III(A)-2-4. INITIAL ADJUSTMENTS

Before the CHG and CPP are shipped, they are aligned and thoroughly checked against the manufacturer's specifications: no initial adjustments are required before installation and operation. Alignment procedures necessary for preventive maintenance are given in Section 6 of this manual.

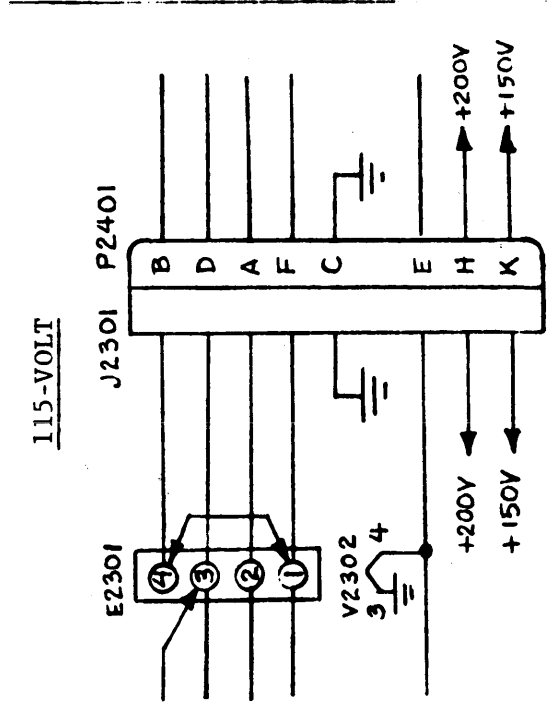


**FOR 50CPS OPERATION OF T401**

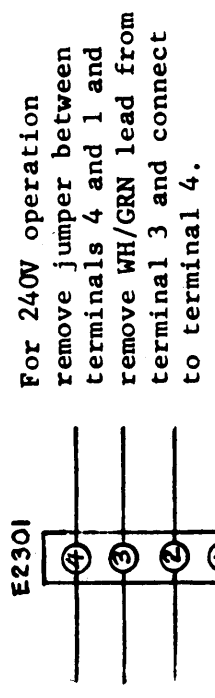
- 1-Remove lead from terminal 14 and connect it to terminal 15.
- 2- " " " " 13 " " " " 18.
- 3- " " " " 16 " " " " 12.
- 4- " " " " 11 " " " " 7
- 5 5- " " " " 9 " " " " 5

**FOR 230V OPERATION OF T401**

- 1-Remove jumpers marked \*\* from terminals 1,2 & 3,4.
- 2-Add jumper marked --- between terminals 2 & 3.



**230-VOLT**



For 240V operation  
 remove jumper between terminals 4 and 1 and  
 remove WH/GRN lead from terminal 3 and connect to terminal 4.

CHG

CPP

Figure III(A)-2-1. Wiring Changes for 230-Volt or 50-Cycle Operation



## SECTION 3 OPERATOR'S SECTION

**III(A)-3-1.** CHG and CPP are units of the Controlled Precision Oscillator CPO-1. The operating chart contained in Table I-3-1 (see Part I of manual) provides the information necessary for operation of the CHG and CPP as a component of the CPO-1.

## SECTION 4 PRINCIPLES OF OPERATION

### III(A)-4-1. INTRODUCTION.

CHG and CPP are described briefly in paragraphs I-4-3 and I-4-4, and figures I-4-5 through I-4-7 (see Part I of manual).

CHG has five sub-assemblies as follows:

- a. Regenerative Divider.
- b. Oven and Oscillator.
- c. Synthesizer.
- d. IF Chassis.
- e. Mid-frequency and RF deck.

CPP provides:

- a. +200V DC (unregulated).
- b. +150V DC (regulated).
- c. 6.3V AC.

Figures III(A)-8-1a, III(A)-8-1b, III(A)-8-2a, and III(A)-8-2b are overall schematic diagrams of the CHG's and the CPP's. Figures III(A)-4-1a, b through III(A)-4-7a, b are simplified schematic diagrams associated with stage-by-stage descriptions.

### III(A)-4-2. REGENERATIVE DIVIDER. (See figures III(A)-4-1a and III(A)-4-1b.)

The Regenerative Divider is supplied with precise 1-mc voltages and supplies precise 250-kc voltages obtained from frequency division of the 1-mc voltages by regeneration. Figures III(A)-4-1a and III(A)-4-1b show the process used.

Tripler (V1602A, CHG-1 or V2602A, CHG-2) has a weak noise spectrum on grid 9. Plate 1 is tuned for 750-kc. The 750-kc component of the noise spectrum takes the path indicated by the heavy solid line.

Mixer (V1601, CHG-1 or V2601, CHG-2) receives a 1-mc voltage from J1601 (CHG-1) or J2601 (CHG-2) and the 750-kc voltage described in the preceding paragraph. Plate 5 of the mixer is tuned to 250-kc. The 250-kc product of the mixer takes the path indicated by the heavy dashed lines. Note that the 250-kc product reaches grid 9 of V1602A (CHG-1) or V2602A (CHG-2).

V1602A (CHG-1) or V2602A (CHG-2) now functions as a tripler, converting its 250-kc input into 750-kc due to its 750-kc tuned plate tank. This starts successive cycles of regeneration until a substantial 250-kc level is built up. The 250-kc output stage V1602B (CHG-1) or V2602B (CHG-2) amplifies this built-up level and feeds it to output jack J1107 (CHG-1) or J2706 (CHG-2).

### III(A)-4-3. OVEN AND OSCILLATOR. (See figures III(A)-4-2a and III(A)-4-2b.)

The Oven and Oscillator has two inputs and five outputs as follows:

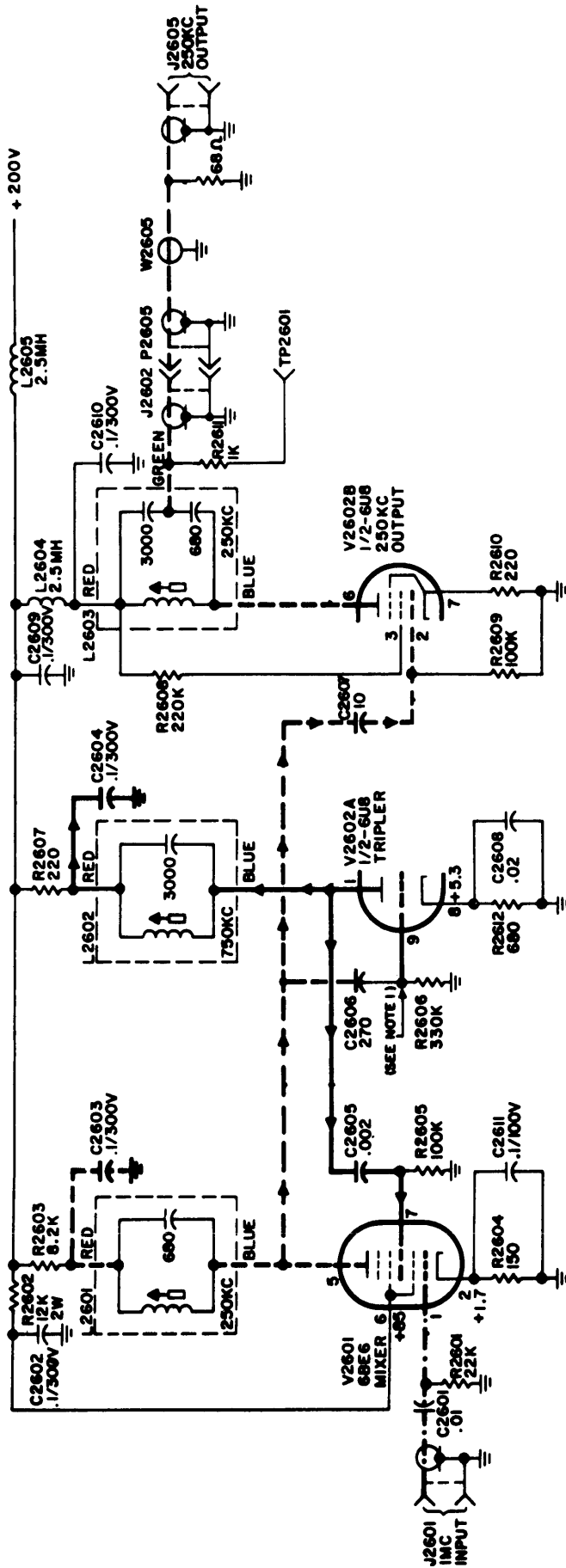
- a. Precise 1-mc input from CSS via J1301 (CHG-1) or J2303 (CHG-2).
- b. Phase detector DC input from the Synthesizer via J1305 (CHG-1) or J2311 (CHG-2).
- c. 1-mc output from oven/oscillator 1-mc amplifier via J1303 (CHG-1) or J2305 (CHG-2).
- d. 1-mc output from oven/oscillator 1-mc amplifier via J1304 (CHG-1) or J2306 (CHG-2).

6

7

8

9



NOTES

1. INITIAL INPUT TO V2602A IS NOISE SPECTRUM. SUBSEQUENTLY BY REGENERATIVE INPUT IS 250KC AND V2602A AMPLIFIES THIRD HARMONIC (750 KC).

LEGEND	
---	250KC SIGNAL PATH
- - - -	750KC SIGNAL PATH
.....	1000KC SIGNAL PATH

Figure III(A)-4-1b. Schematic Diagram, Regenerative Divider of CHG-2



e. 1-mc output from oven/oscillator 1-mc internal oscillator via J1302 (CHG-1) or J2304 (CHG-2).

f. Synthesized 8- to 15-mc voltages in 1-mc steps from oven/oscillator HF output stage via J1306 (CHG-1) or J2308 (CHG-2).

g. Synthesized 8- to 15-mc voltages in 1-mc steps from oven/oscillator HF output stage via J1307 (CHG-1) or J2309 (CHG-2).

The circuit shown in heavy solid lines begins at J1301 (CHG-1) or J2303 (CHG-2) (item a., above) and terminates at (1) J1302 (CHG-1) or J2304 (CHG-2) (item e., above) and (2) J1303 (CHG-1) or J2305 (CHG-2) (item c., above) and J1304 (CHG-1) or J2306 (CHG-2): provided selector switch S1301 (CHG-1) or S2301 (CHG-2) is in 1-MC EXT position (see figures III(A)-4-2a and III(A)-4-2b, top of chassis in rear left section). If selector switch S1301 (CHG-1) or S2301 (CHG-2) is in 1-MC INT position, 1-mc oscillator V1302A (CHG-1) or V2302A (CHG-2), rather than the external 1-mc standard, provides a 1-mc output. This is applied to J1302 (CHG-1) or J2304 (CHG-2); J1303 (CHG-1) or J2305 (CHG-2); and J1304 (CHG-1) or J2306 (CHG-2). (See heavy dashed line.)

High frequency oscillator V1303 (CHG-1) or V2401 (CHG-2) generates synthesized 8- to 15-mc voltages in 1-mc steps because of 16-position BAND selector switch-component S1402 (CHG-1) or S2401 (CHG-2) (in oven), whose positions are associated with 8- to 15-mc crystals and capacitors (also in oven), inductors-components L1306 and L1307 (CHG-1) or L2401 and L2402 (CHG-2), and a solid state vari-capacitor-component C1319 (CHG-1) or C2425 (CHG-2) whose capacitance varies with DC input. The path of the synthesized 8- to 15-mc voltages is shown in heavy dot-dash lines ending at J1306 (CHG-1) or J2308 (CHG-2) (item f., above) and J1307 (CHG-1) or J2309 (CHG-2) (item g., above).

The frequency of high frequency oscillator V1303 (CHG-1) or V2401 (CHG-2) is controlled by DC from a phase detector located in the Synthesizer. DC from the Synthesizer's phase detector enters the Oven and Oscillator via J1305 (CHG-1) or J2311 (CHG-2). The path is shown in heavy double-dot dash lines ending at vari-capacitor C1319 (CHG-1) or C2425 (CHG-2).

Switch S1402 (REAR) (CHG-1) or S2401 (REAR) (CHG-2) is a member of a 16-position 8-wafer switch assembly whose gear train simultaneously actuates a 4-position 8-wafer switch assembly. The arrangement is shown schematically in figures III(A)-4-7a and III(A)-4-7b. The front panel knob designated BAND simultaneously actuates the BAND [indicated by (16)] and RANGE [indicated by (4)] switches.

Phase detector T1501 (figure III(A)-4-3a) (CHG-1) or T2501 (figure III(A)-4-3b) (CHG-2) controls V1303, V1304 (CHG-1) or V2401, V2402 (CHG-2) frequency. This is done by controlling the supply of DC via J1305 (CHG-1) or J2311 (CHG-2) (item b., above) to vari-capacitor C1319 (CHG-1) or C2425 (CHG-2).

Comparison of figures III(A)-4-2a and III(A)-4-2b shows that CHG-2 contains a connector-filter ele-

ment assembly (J2302 to J2301) in order to suppress unwanted RF from the oscillator chassis. The HF oscillator's output section in the CHG-2 is closer to its crystals in order to minimize lead length. This and larger trimmer capacitors permits the use of crystals with greater tolerances. The crystals in the CHG-1 are selected for optimum performance.

#### III(A)-4-4. SYNTHESIZER. (See figures III(A)-4-3a and III(A)-4-3b.)

The Synthesizer has three inputs and three outputs as follows:

a. Precise 1-mc input from J1303 to P1509 (CHG-1) or J2305 to P2405 (CHG-2) of Oven and Oscillator to capacitor C1549 (figure III(A)-4-2a) (CHG-1) or C2548 (figure III(A)-4-2b) (CHG-2) of Synthesizer via wire W1506 (CHG-1) or W2504 (CHG-2) through a grommet located in Synthesizer.

b. Precise 1-mc input from J1304 (CHG-1) or J2306 (CHG-2) of Oven and Oscillator to Synthesizer via P1501 (CHG-1) or P2505 (CHG-2) and wire W1501 (CHG-1) or W2505 (CHG-2) to harmonic generator V1502 (CHG-1) or V2502 (CHG-2).

c. Synthesized 8- to 15-mc voltage (1-mc steps) input from J1307 (CHG-1) or J2308 (CHG-2) of Oven and Oscillator via wire W1502 (CHG-1) or W2502 (CHG-2) through a grommet located in the Synthesizer (same grommet mentioned in a., above).

d. DC Output of phase detector T1501 (CHG-1) or T2501 (CHG-2) via wire W1503 (CHG-1) or W2501 (CHG-2) through a grommet located in the Synthesizer (same grommet mentioned in a., above) to P1505 (figure III(A)-4-2a) (CHG-1) or P2403 (figure III(A)-4-2b) (CHG-2) Oven and Oscillator, thence to vari-capacitor C1319 (figure III(A)-4-2a) (CHG-1) or C2425 (figure III(A)-4-2b) (CHG-2).

e. ON CHG-1, precise 2-mc output from Synthesizer doubler V1505 via wire W1505 and P1503 on Synthesizer chassis to J1201 on IF chassis, thence to IF's 18-mc harmonic generator V1201 (figure III(A)-4-4a). ON CHG-2, precise 18-mc harmonic output from Synthesizer doubler V2505 via transformer T2502, wire W2503 and P2503 on Synthesizer chassis to J2201 on IF chassis, thence to 18-mc amplifier V2201 (figure III(A)-4-4b).

f. Precise 1-mc output from capacitor C1549 (CHG-1) or C2548 (CHG-2) in Synthesizer to J1502 (CHG-1) or J2601 (CHG-2) of Regenerative Divider, thence to mixer V1601 (figure III(A)-4-1a) (CHG-1) or V2601 (figure III(A)-4-1b) (CHG-2).

The circuit shown in heavy solid lines begins at P1501, (CHG-1) or P2505 (CHG-2) (item b., above) with a precise 1-mc input and goes to grid 1 of V1502 (CHG-1) or V2502 (CHG-2). Sixteen position Selector Switch S1501 REAR (CHG-1) or S2501 REAR (CHG-2) provides selection of eight plate-tank circuits tuned from 6- to 13-mc in 1-mc steps. As shown in figures III(A)-4-7a and III(A)-4-7b, Selector Switch S1501 (REAR) (CHG-1) or S2501 (REAR) (CHG-2) is one of many switches

ganged to the BAND knob on CHG's front panel. The selected harmonic (see block diagrams on figures III(A)-4-3a and III(A)-4-3b) is fed to grid 7 of mixer V1503 (CHG-1) or V2503 (CHG-2).

The circuit shown in heavy dot dash lines begins at J1307, (CHG-1) or J2308 (CHG-2) in Oven and Oscillator, passes through the Synthesizer's grommet (item c., above) and goes to grid 1 of V1501 (CHG-1) or V2501 (CHG-2). The circuit voltages are synthesized 8- to 15-mc in 1-mc steps. The selected harmonic A (see block diagrams on figures III(A)-4-3a and III(A)-4-3b) reaches grid 2 of mixer V1503 (CHG-1) or V2503 (CHG-2) via the output of isolation amplifier V1501 (CHG-1) or V2501 (CHG-2).

Referring to figures III(A)-4-7a and III(A)-4-7b, the position of ganged switch wafer S1402 (CHG-1) or S2401 (CHG-2) in the oven compartment, and of wafer S1501 (CHG-1) or S2501 (CHG-2) in the Synthesizer compartment are such that frequency A is exactly (when synthesized) 2-mc greater than frequency C. In this condition the output of mixer V1503 (CHG-1) or V2503 (CHG-2) is exactly 2-mc and is fed to SYNC indicator V1504 (CHG-1) or V2504 (CHG-2) and to phase detector T1501 (CHG-1) or T2501 (CHG-2).

The circuit shown in heavy dot and dash lines begins at J1303 (figure III(A)-4-2a) (CHG-1) or J2305 (figure III(A)-4-2b) (CHG-2) on the Oven and Oscillator. One arm includes doubler V1505 (CHG-1) or V2505 (CHG-2) and phase detector T1501 (CHG-1) or T2501 (CHG-2) (item a., above); a second arm goes to P1508 (CHG-1) or P2506 (CHG-2) on the Synthesizer; thence to J1601, and C1601 (figure III(A)-4-1a) (CHG-1) or J2601 and C2601 (figure III(A)-4-1b) (CHG-2) on the Regenerative Divider (item f., above); a third arm (applicable to CHG-2 only) includes doubler V2505 and P2503 on the Synthesizer subassembly; thence to J2202 on the IF Subassembly (item d., above).

Phase detector T1501 (CHG-1) or T2501 (CHG-2) compares the 2-mc product of mixer V1503 (CHG-1) or V2503 (CHG-2) (frequency A minus frequency C) with the precisely doubled 1-mc frequency output of doubler V1505 (CHG-1) or V2505 (CHG-2). If the two 2-mc frequencies are equal, the phase detector passes a DC voltage to the Oven and Oscillator to lock in its high frequency oscillator V1303 (CHG-1) or V2401 (CHG-2). The path of the DC is shown by heavy dot and dash lines (item d., above).

#### III(A)-4-5. IF CHASSIS. (See figures III(A)-4-4a and III(A)-4-4b).

Figure I-4-6 shows that the IF strip is used by the mid-frequency and RF deck only on bands 2, 3, 4, 5. On these bands, IF's balanced modulator receives CMO/CBE's 1.75- to 3.75-mc voltages. On all other bands, IF's output is grounded in the mid-frequency and RF deck.

Figures III(A)-4-4a and III(A)-4-4b show the frequency amplifier IF section. The CHG-1 IF strip receives precise 2-mc voltages from the synthesizer via J1201, P1506 on the IF chassis. This is fed to

harmonic generator V1201, plate tuned to 18-mc. The CHG-2 IF strip receives 18-mc voltages from the synthesizer via J2202, P2503 on the IF chassis. Thus, V2201 (the counterpart of V1201 in the CHG-1 unit) serves only as an amplifier instead of a harmonic generator. Amplifier V1202 (CHG-1) or V2202 (CHG-2) amplifies the 18-mc output of V1201 (CHG-1) or V2201 (CHG-2) and feeds balanced modulator CR1201, CR1202 (CHG-1) or CR2201, CR2202 (CHG-2).

On bands 2, 3, 4, and 5, when the IF strip receives CMO/CBE's 1.75- to 3.75-mc voltages from the mid-frequency and RF deck via J1202, P1101 (CHG-1) or J2203, P2701 (CHG-2) this 1.75- to 3.75-mc voltage is mixed with the 18-mc voltage. This mixed signal is filtered and the 14.25- to 16.25-mc differenced voltages are then amplified by the 4-stage IF amplifier. The 14.25- to 16.25-mc output of the 4-stage amplifier is returned to the mid-frequency and RF deck via J1203, P1102 (CHG-1) or J2204, P2702 (CHG-2).

#### III(A)-4-6. MID-FREQUENCY AND RF DECK. (See figures III(A)-4-5a, III(A)-4-5b, III(A)-4-6a, and III(A)-4-6b).

Analysis of the circuits is in two parts--figures III(A)-4-5a and III(A)-4-5b that deal with the mid-frequency to RF frequency translation feature, and figures III(A)-4-6a and III(A)-4-6b that deal with the three-stage RF amplifier.

Referring to figure I-4-6 and to the balanced modulator in figures III(A)-4-5a and III(A)-4-5b, balanced modulator V1101 (CHG-1) or V2701 (CHG-2) receives 2- to 4-mc input from CMO on cathodes 3, 8 and audio-modulated 250-kc input from CBE on grids 2, 7. The balanced modulator's output (lower sideband) is in the 1.75- to 3.75-mc frequency range. The following amplifier V1102 (CHG-1) or V2702 (CHG-2) is equipped with transformer coupled T1102 (CHG-1) or T2702 (CHG-2) two-section grid tuning and transformer coupled T1103 (CHG-1) or T2703 (CHG-2) two-section output tuning. V1102's (CHG-1) or V2702's (CHG-2) output circuit is equipped with a metering circuit containing metering amplifier V1103 (CHG-1) or V2703 (CHG-2) and meter M1001 (CHG-1) or M2101 (CHG-2), V2701's input circuit is provided with ALDC via J2703 which is fed by associated GPT-10K(R) or GPT-40K(A) drivers or by SBT-1K's PS-4A unit. This feature is absent in CHG-1.

The next circuit element consists of wafers of the 16- position 3- wafer BAND Selector Switch which is ganged to 4-position 8-wafer RANGE Selector Switch. In the 2, 3, 4, 5 positions, bands 2, 3, 4, 5 are routed to and from the IF strip (see heavy solid line) to balanced modulator T1104 (CHG-1) or V2704 and V2705 (CHG-2). The unused 1, 6 through 16-positions on S1101A, B, (FRONT) (CHG-1) or S2701A, B (FRONT) (CHG-2) are grounded via the 2, 3, 4, 5 positions on S1101A, B (REAR) (CHG-1) or the 7, 8, 9, 10 positions on S2701A, B (REAR) (CHG-2). In the 1, 6 through 16-positions, bands 1, 6 through 16 are routed directly from T1103 (CHG-1) or T2703 (CHG-2) (FRONT) (CHG-1) or to S201A, B (FRONT) (CHG-2) to balanced modulator T1104 (CHG-1) or V2704 and V2705 (CHG-2).

The balanced modulator also receives high frequency voltages from the Oven and Oscillator via J1306, P1194, wire W1104, grid 1 of HF AMP V1104, plate tank circuits of V1104, to balanced modulator T1104 via P1103 and J1103, all of CHG-1 or via J2309, P2703, wire W2703, grid 1 of HF AMP V2709, plate tank circuits of V2709, to cathode 7 on balanced modulator V2704, all of CHG-2 (see heavy dotted lines).

The plate tank circuits of V1104 (CHG-1) or V2709 (CHG-2) are associated with two wafers of the 16-position 8- wafer BAND Selector Switch. Table III(A)-4-1 shows the frequencies of the wanted voltages at various terminals of balanced modulator T1104 (CHG-1) or V2704 and V2705 (CHG-2) versus position of the 16-position 8- wafer BAND Selector Switch.

The output of balanced modulator T1104 (CHG-1) or V2704 and V2705 (CHG-2) is fed to the commutator or 1 segment of S1103 (REAR) (CHG-1) or S2703 (REAR) (CHG-2). Gain control is provided by OUTPUT gain control resistor R1125 (CHG-1) or R2725 (CHG-2).

Figures III(A)-4-6a and III(A)-4-6b show the final circuits in the mid-frequency and RF deck. The solid heavy lines indicate signal flow in the 1.75- to 3.75-mc range. The signals are amplified by four amplifiers which are grid and plate tuned. The heavy dash lines indicate signal flow in the 3.75- to 7.35-mc range. The signals are amplified by the same four amplifiers.

The heavy dot-dash lines indicate signal flow in the 7.75- to 15.75-mc range. The signals are amplified by the same four amplifiers. The heavy double-dot dash lines indicate signal flow in the 15.75- to 33.75-mc range. The signals are again amplified by the same four amplifiers.

Meter M1002 (CHG-1) or M2102 (CHG-2) indicates output level throughout the 1.75- to 33.75-mc frequency range.

### III(A)-4-7. POWER SUPPLY CPP-1. 5. (See figure III(A)-8-2.)

The CHG's require 200V DC (unregulated), 150V AC (regulated), 6.3V AC and 115/530V AC from the CPP-1.

200V DC reaches CHG's via terminal H of J402 and is obtained by a "dry" rectifier composed of CR401 through CR404 selenium rectifiers.

150V DC reaches CHG's via terminal G of J402 and is obtained by OA2 regulator tube fed by 200V DC unregulated bus.

6.3V AC output reach CHG's via terminals NC, BF, and AJ of J402. POWER ON indicator 1401 operates on 3.15V AC to ground. Terminal J402 interconnects with J1106 (CHG-1) or J2701 (CHG-2).

**TABLE III(A)-4-1. FREQUENCIES VS BAND SELECTOR SWITCH POSITION**

Switch Position	Band	MCS Dial Designation	Frequency A Oven/Oscillator	Input freq. from S1101A	Input freq. V1103	Output freq. to S1103
1	1	OA	10-mc	1.75-3.75mc	20-mc	1.75-3.75mc
2	2	2B	10-mc	14.25-16.25mc	20-mc	3.75-5.75mc
3	3	4B	11-mc	14.25-16.25mc	22-mc	5.75-7.75mc
4	4	6C	12-mc	14.25-16.25mc	24-mc	7.75-9.75mc
5	5	8C	13-mc	14.25-16.25mc	26-mc	9.75-11.75mc
6	6	10C	10-mc	1.75-3.75mc	10-mc	11.75-13.75mc
7	7	12C	12-mc	1.75-3.75mc	12-mc	13.75-15.75mc
8	8	14D	14-mc	1.75-3.75mc	14-mc	15.75-17.75mc
9	9	16D	16-mc	1.75-3.75mc	16-mc	17.75-19.75mc
10	10	18D	9-mc	1.75-3.75mc	18-mc	19.75-21.75mc
11	11	20D	10-mc	1.75-3.75mc	20-mc	21.75-23.75mc
12	12	22D	11-mc	1.75-3.75mc	22-mc	23.75-25.75mc
13	13	24D	12-mc	1.75-3.75mc	24-mc	25.75-27.75mc
14	14	26D	13-mc	1.75-3.75mc	26-mc	27.75-29.75mc
15	15	28D	14-mc	1.75-3.75mc	28-mc	29.75-31.75mc
16	16	30D	15-mc	1.75-3.75mc	30-mc	31.75-33.75mc

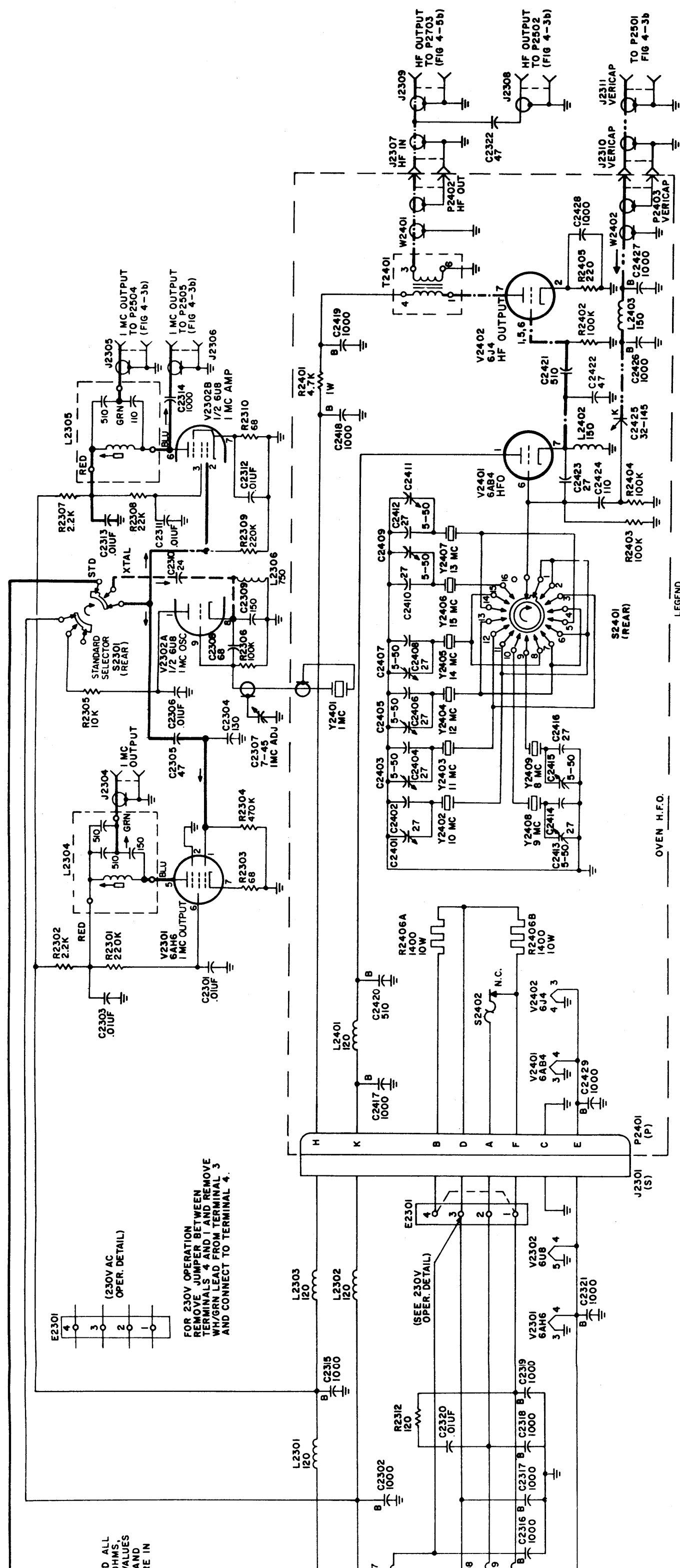
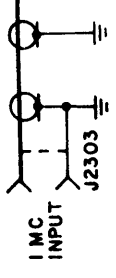
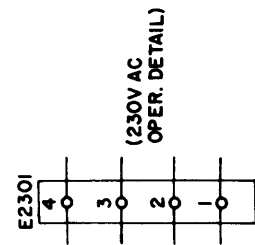
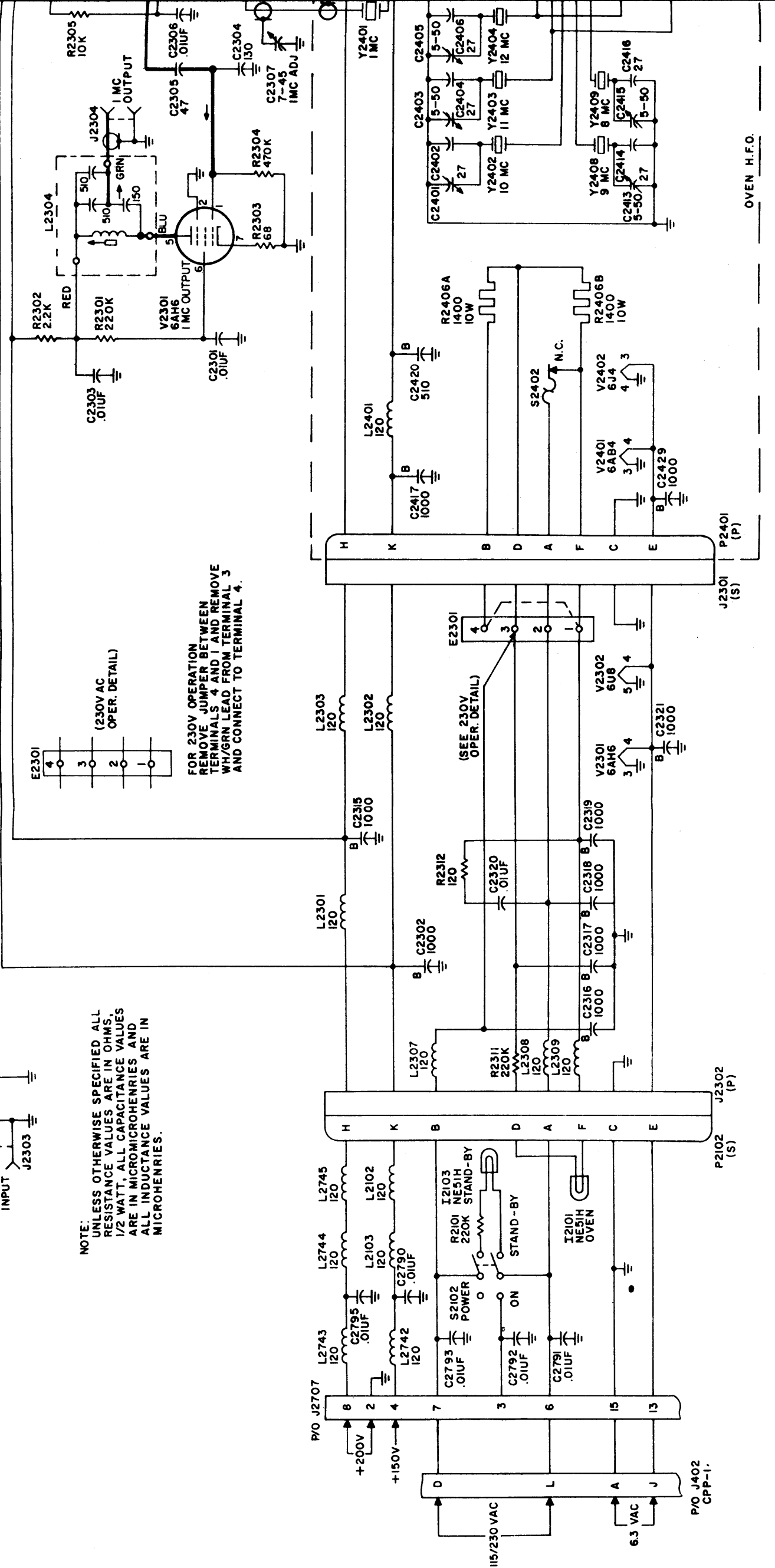


Figure III(A)-4-2b. Schematic Diagram, Oven/Oscillator of CHG-2



NOTE:  
UNLESS OTHERWISE SPECIFIED ALL  
RESISTANCE VALUES ARE IN OHMS,  
1/2 WATT, ALL CAPACITANCE VALUES  
ARE IN MICROMICROHENRIES AND  
ALL INDUCTANCE VALUES ARE IN  
MICROHENRIES.



FOR 230V OPERATION  
REMOVE JUMPER BETWEEN  
TERMINALS 4 AND 1 AND REMOVE  
WHY/GRN LEAD FROM TERMINAL 3  
AND CONNECT TO TERMINAL 4.

(230V AC  
OPER. DETAIL)

P/O J402  
CPP-1.

P2102 (S)  
J2302 (P)

J2301 (S)  
P2401 (P)

OVEN H.F.O.

- LEGEND**
- SOLID-1-MC OR HARMONICS OF 1-MC STD (C-MC)
  - DOTTED-HFO INPUT (A-MC)
  - - - - DOT/DASH, 2ND HARMONIC OF 1-MC STD
  - · - · - · DOUBLE DOT/DASH (DC OUTPUT OF PHASE DETECTION)
  - \* \* \* \* \* 2 MC DIFFERENCE OF A-MC (-----) AND C-MC (-----) SIGNALS.

**NOTE:**  
UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, 1/2 WATT, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS AND ALL INDUCTANCE VALUES ARE IN MICROHENRIES.

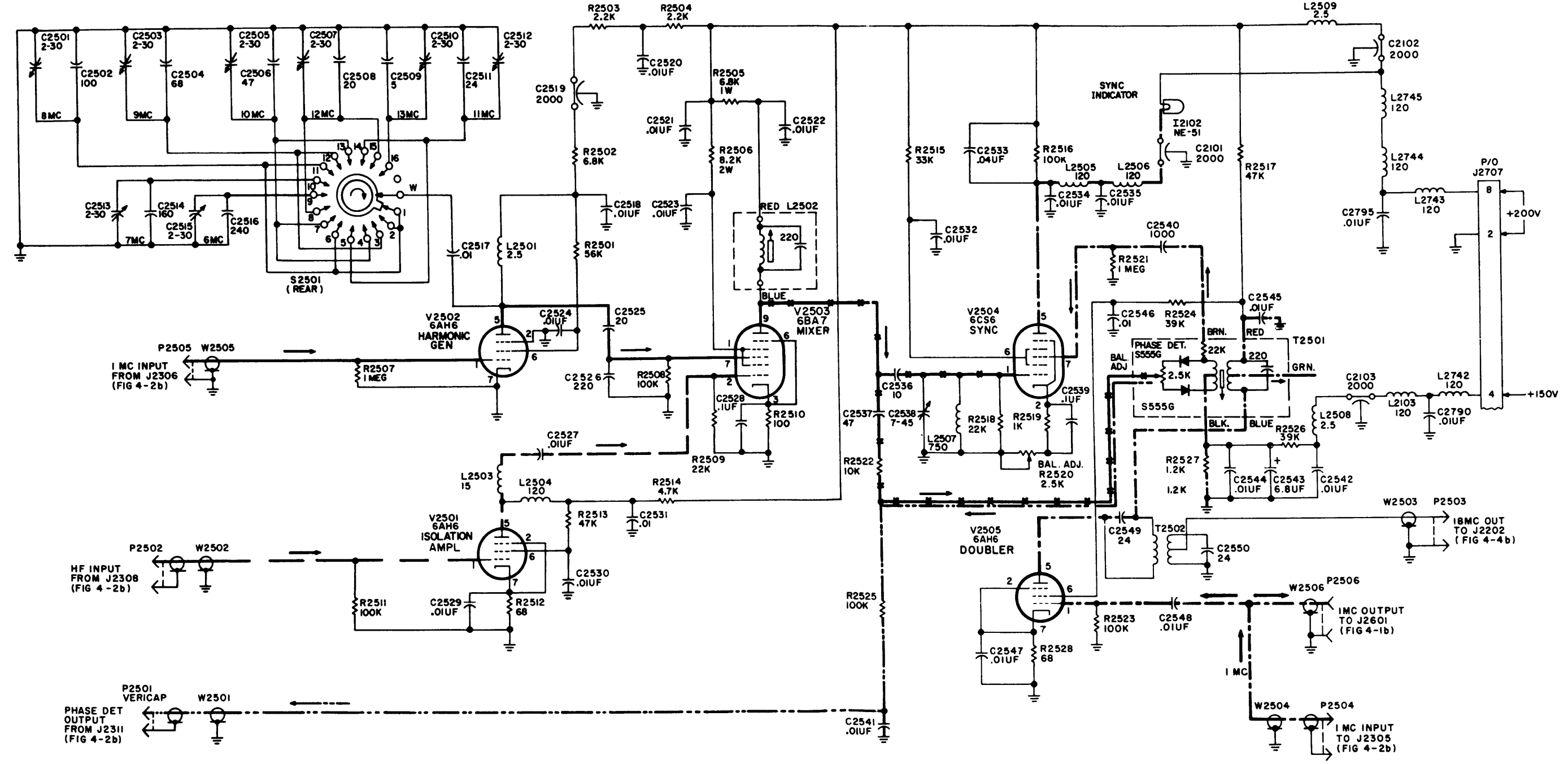
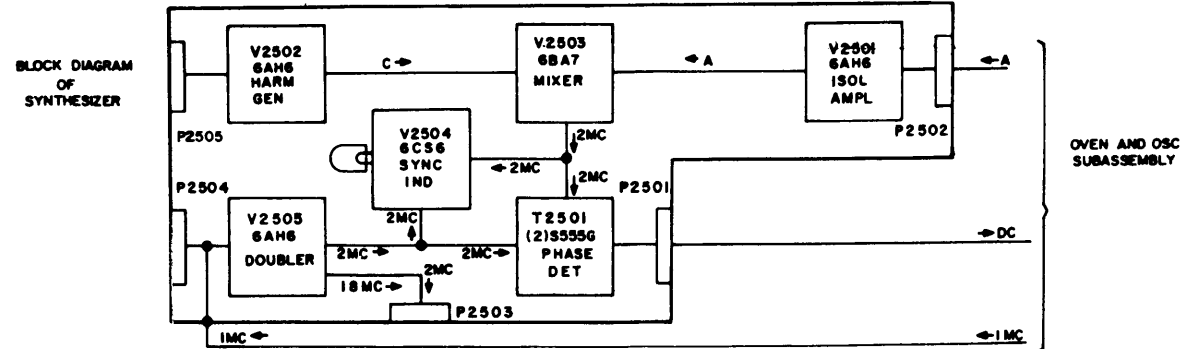


Figure III(A)-4-3b. Schematic Diagram, Synthesizer of CHG-2

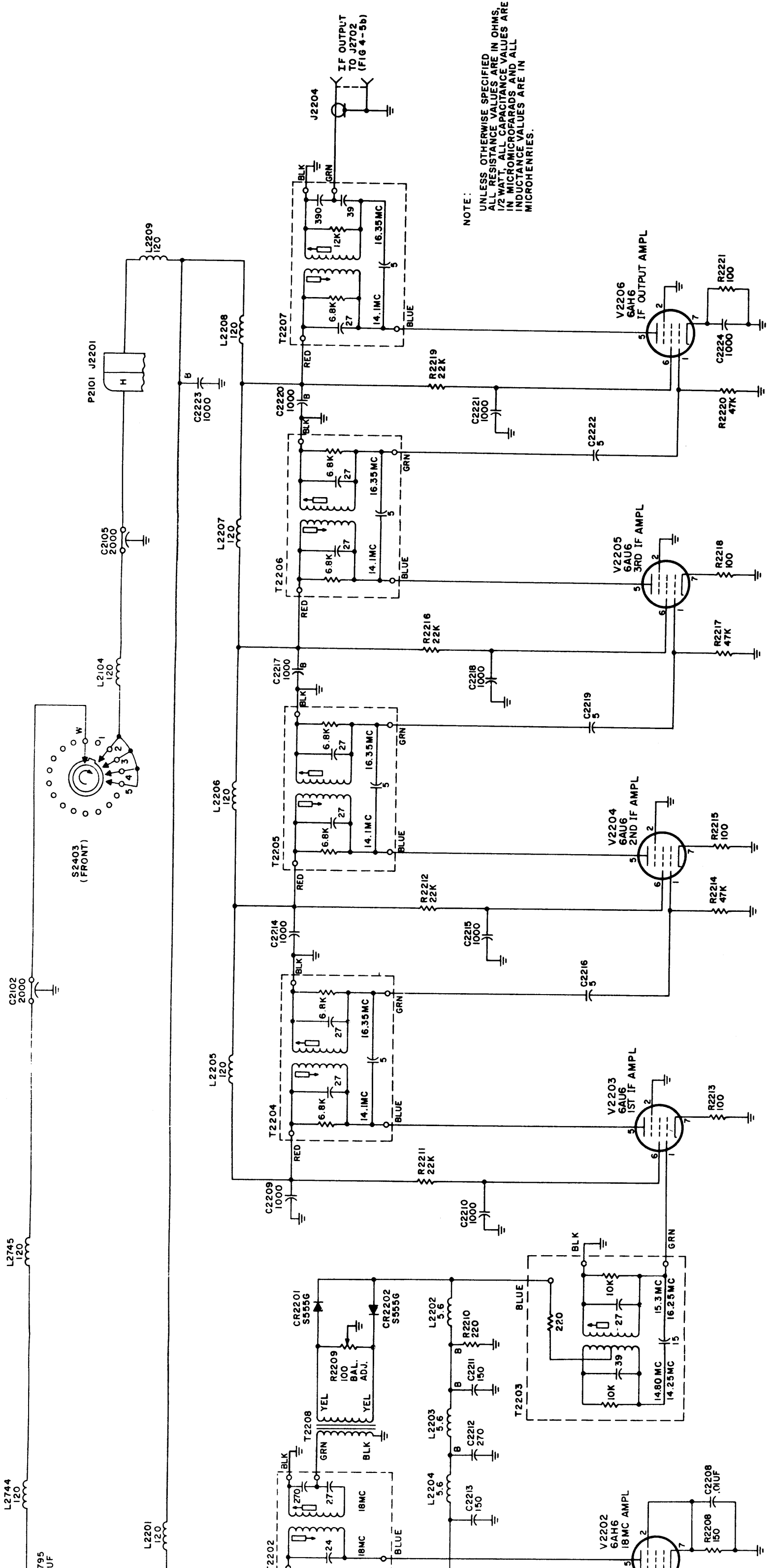
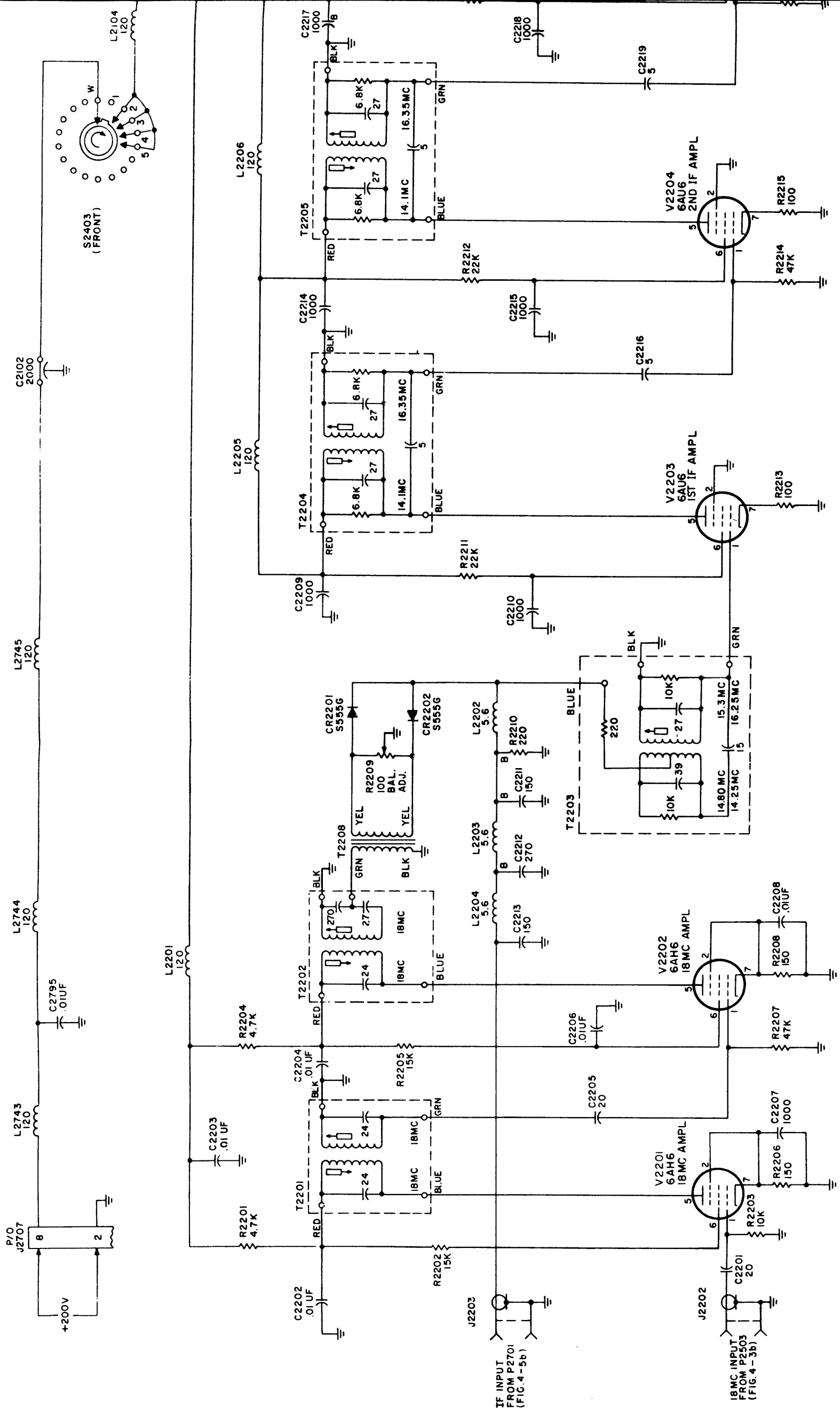


Figure III(A)-4-4b. Schematic Diagram, IF Section of CHG-2  
 III(A)-4-17 — III(A)-4-18





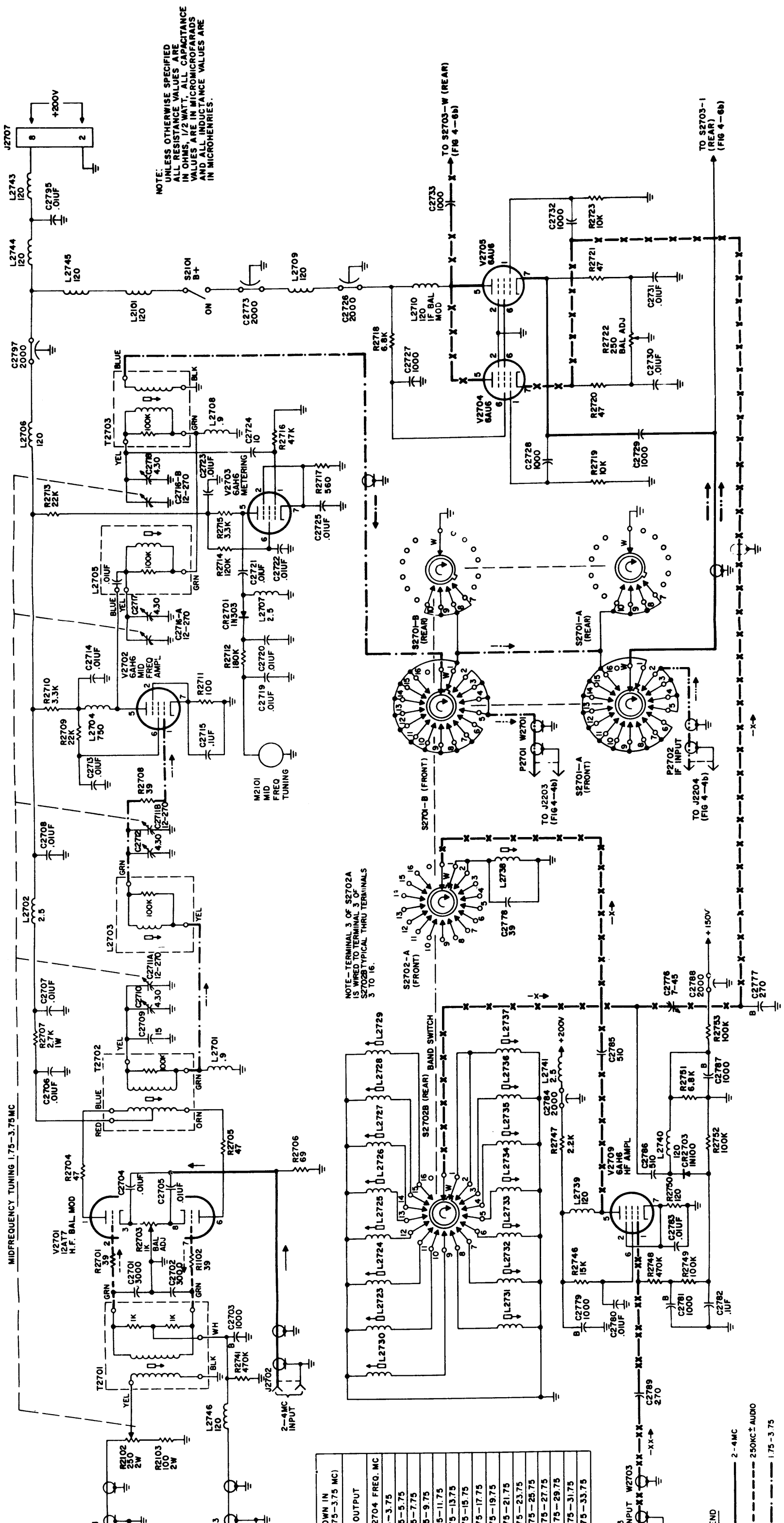
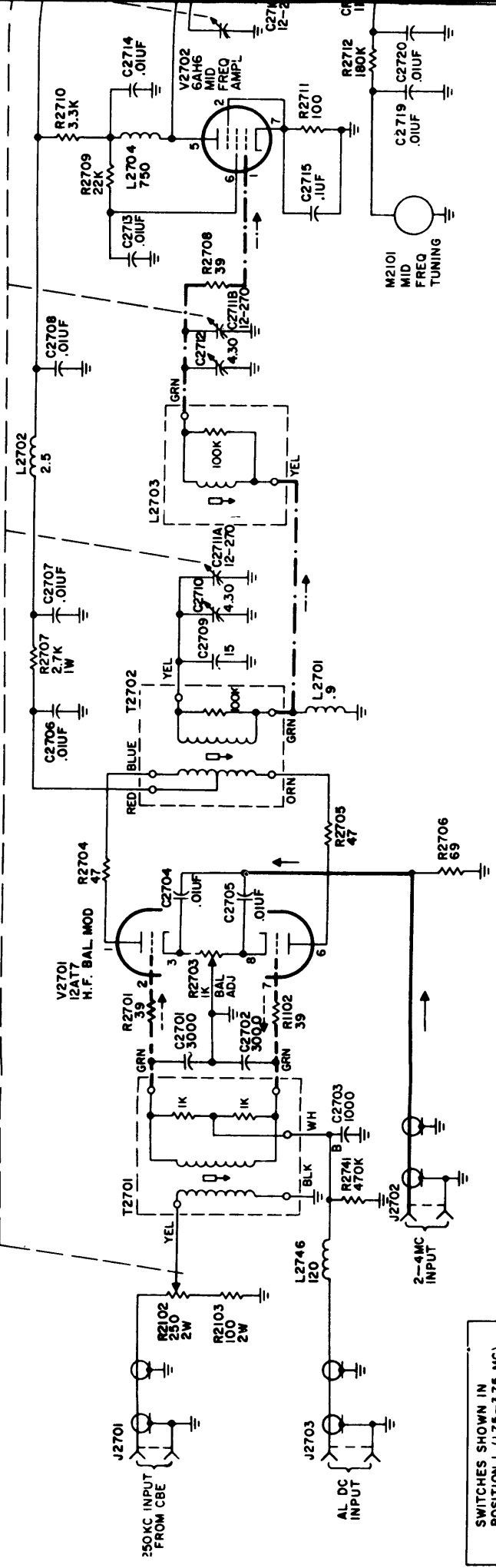


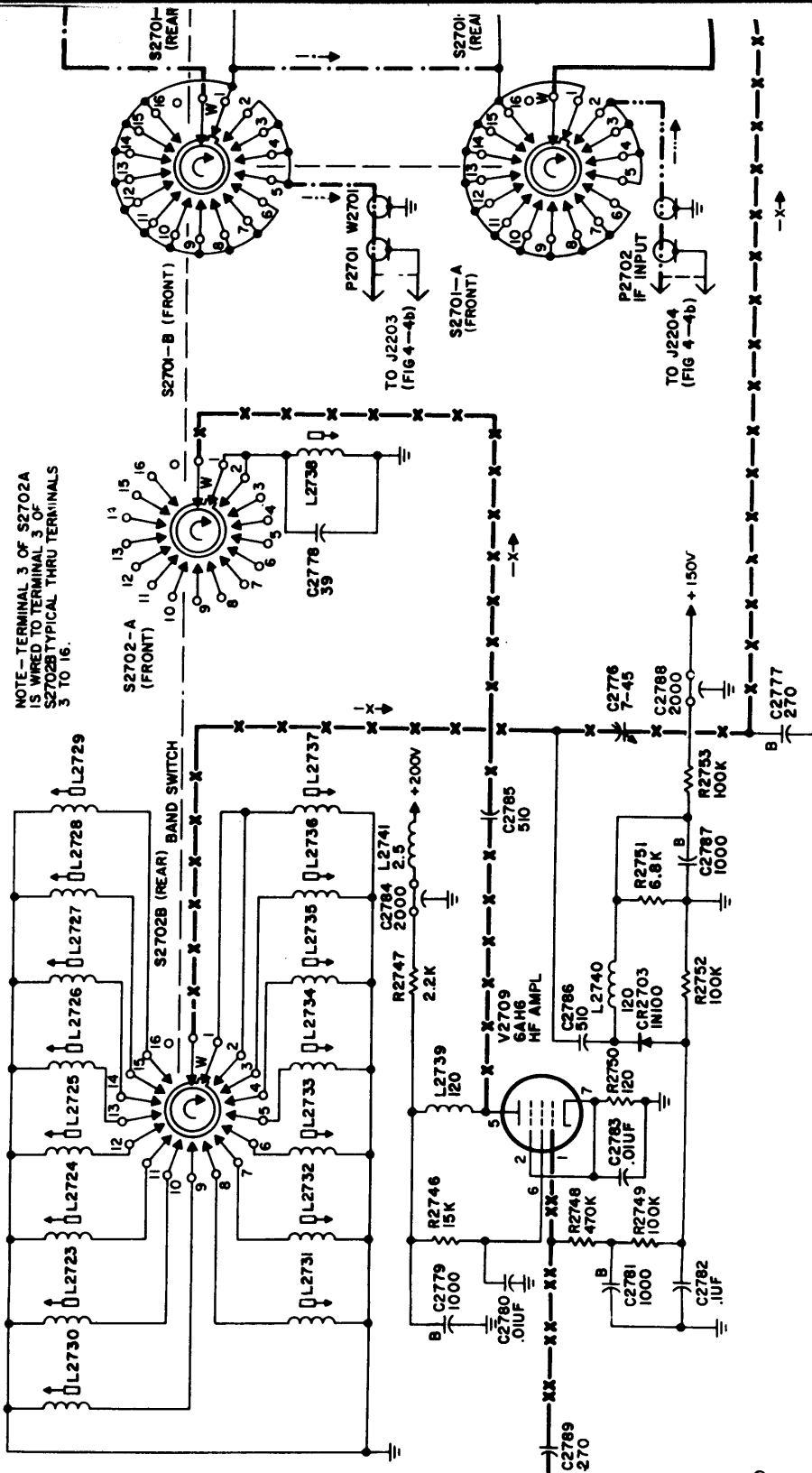
Figure III(A)-4-5b. Schematic Diagram, Mid Frequency and RF Deck Subassembly (MF to RF Component) of CHG-2

MIDFREQUENCY TUNING 1.75-3.75 MC



SWITCHES SHOWN IN POSITION 1 (1.75-3.75 MC)		
S2701, S2702	BAND	RF OUTPUT
POS 1	0	J2704 FREQ. MC
2	1	1.75-3.75
3	2	3.75-5.75
4	3	5.75-7.75
5	4	7.75-9.75
6	5	9.75-11.75
7	6	11.75-13.75
8	7	13.75-15.75
9	8	15.75-17.75
10	9	17.75-19.75
11	10	19.75-21.75
12	11	21.75-23.75
13	12	23.75-25.75
14	13	25.75-27.75
15	14	27.75-29.75
16	15	29.75-31.75
	16	31.75-33.75

NOTE - TERMINAL 3 OF S2702A IS WIRED TO TERMINAL 3 OF S2702B TYPICAL THRU TERMINALS 5 TO 16.



LEGEND  
 - - - - - 2-4MC  
 - - - - - 250KC ± AUDIO  
 - - - - - 1.75-3.75  
 - - - - - 14.25-16.25  
 - - - - - HF OUTPUT  
 - - - - - HF INPUT





## SECTION 5 TROUBLE-SHOOTING

### III(A)-5-1. INTRODUCTION

This section explains how to locate and diagnose equipment troubles and maladjustments. The information necessary to remedy the troubles and maladjustments will be found in Section 6 of this manual under the heading "Maintenance."

The following aids to troubleshooting are provided:

- a Schematic diagrams
- b Voltage and resistance measurement charts
- c RF voltage measurements chart

### III(A)-5-2. VOLTAGES AND RESISTANCES

The voltage and resistance measurements shown in table III(A)-5-1b are taken under the conditions mentioned above each table. Table III(A)-5-3 lists RF voltage measurements in the CHG-2 taken under the conditions listed in table III(A)-5-3.

### III(A)-5-3. PARTS LOCATION DATA

Figures III(A)-5-1 through III(A)-5-4 locate major electronic components in the CHG-2 and CPP-5 units. These figures may be used as troubleshooting aids to locate and identify the major electronic components in the CHG-2 and CPP-5 units.

### III(A)-5-4. TROUBLESHOOTING BASED ON CIRCUIT SECTIONALIZATION

Refer to III(G)-6.

**TABLE III(A)-5-1b. VOLTAGE AND RESISTANCE MEASUREMENTS, CHG-2**

DC VOLTAGES (BAND MC SWITCH IN POSITION "8", 2-4 MC INSERTION AND 250 KC INSERTION REMOVED, OUTPUT - FULL CW, MF TUNE - 2 MC, ALL VOLTAGES POSITIVE TO GROUND UNLESS OTHERWISE INDICATED.)

DC VOLTAGES TO CHASSIS

TUBE	PIN NO.									
	1	2	3	4	5	6	7	8	9	CAP
V2201	0	1.2	0	H	155	130	1.2			
V2202	0	1.2	0	H	153	130	1.2			
V2203	0	0	0	H	195	135	.9			
V2204	0	0	0	H	195	137	.95			
V2205	0	0	0	H	195	133	1.0			
V2206	0	0	0	H	195	147	1.1			
V2301	-.15	0	0	H	190	80	.15			
V2302	107	-.45	140	H	0	180	.5	.1	-.3	
V2401	142	0	H	0	0	-.45	0			
V2402	0	2	0	H	0	0	.150			
V2501	-.1	.4	H	0	165	115	.4			
V2502	-32	0	H	0	157	125	0			
V2503	105	-.9	1.4	0	H	1.4	0	0	.172	
V2504	0	5.3	0	H	122	122	0			
V2505	-38	.5	H	0	165	122	.5			
V2601	-32	1.45	H	0	180	100	-1.25			
V2602	195	-.7	65	H	0	195	.5	4	-5.6	
V2701	175	0	1.85	H	H	175	0	2.0	0	
V2702	0	.8	0	H	168	123	.8			
V2703	0	1.25	0	H	138	100	1.25			
V2704	0	0	0	H	195	160	1.8			
V2705	0	0	0	H	195	160	1.8			
V2706	0	0	0	H	180	135	1.05			
V2707	3.3	0	NC	0	H	195	0	156	NC	
V2708	21.5	H	195	21.5	0	21.5	0	0		195
V2709	-.3	1.0	H	0	180	155	1.0			

**TABLE III(A)-5-1b. VOLTAGE AND RESISTANCE MEASUREMENTS, CHG-2 (C nt.)**

**RESISTANCES (MAIN POWER OFF)**

TUBE	PIN NO.									
	1	2	3	4	5	6	7	8	9	CAP
V2201	10K	150	0	0	inf.	inf.	150			
V2202	47K	150	0	0	inf.	inf.	150			
V2203	0	0	0	0	inf.	inf.	100			
V2204	47K	0	0	0	inf.	inf.	100			
V2205	47K	0	0	0	inf.	inf.	100			
V2206	47K	0	0	0	inf.	inf.	100			
V2301	450K	0	0	0	0	0	60			
V2302	inf.	210K	inf.	0	0	inf.	70	17	90K	
V2401	80K	inf.	0	0	inf.	90K	0			
V2402	90K	200	0	0	inf.	inf.	inf.			
V2501	100K	60	0	0	inf.	inf.	60			
V2502	1M	0	0	0	0	inf.	0			
V2503	inf.	22K	100	0	0	100	100K	inf.	inf.	
V2504	17	1.7K	0	0	inf.	inf.	100K			
V2505	90K	70	0	0	inf.	inf.	70			
V2601	22K	150	0	0	inf.	inf.	100K			
V2602	inf.	90K	inf.	0	0	inf.	220	650	300K	
V2701	inf.	450K	560	0	0	inf.	450K	560	0	
V2702	40	100	0	0	inf.	inf.	100			
V2703	47K	600	0	0	inf.	inf.	600			
V2704	1K	0	0	0	inf.	inf.	220			
V2705	1K	0	0	0	inf.	inf.	220			
V2706	12	0	0	0	inf.	inf.	100			
V2707	100	10	NC	0	0	inf.	0	inf.	NC	
V2708	220	0	inf.	220	10	220	0	0		inf.
V2709	560K	120	0	0	inf.	inf.	120			
V2709	3	1.0	H	0	180	155	1.0			

**TABLE III(A)-5-3. RF VOLTAGE MEASUREMENTS, CHG-2**

TEST CONDITIONS: Unit tuned for maximum output on 10 mcs. 0 db carrier, CHAN. A & B off, use external 1 mc standard.		
1 mc INPUT	J-2303	0.9
1 mc OUTPUT	J-2304	2.1
1 mc OUTPUT	J-2305, P-2504, P-2309, J-2601	13.0
1 mc OUTPUT	J-2306, P-2505	13.0
HFO OUTPUT	P-2402, J-2307, J-2309, P-2703	6.0
HFO OUTPUT	J-2308, P-2502	0.9
250 kc OUTPUT	J-2602, P-2704, J-2706	1.4
250 kc INPUT	J-2702	0.14
2-4 mc INPUT	J-2702	1.0
RF OUTPUT	J-2704	3.0



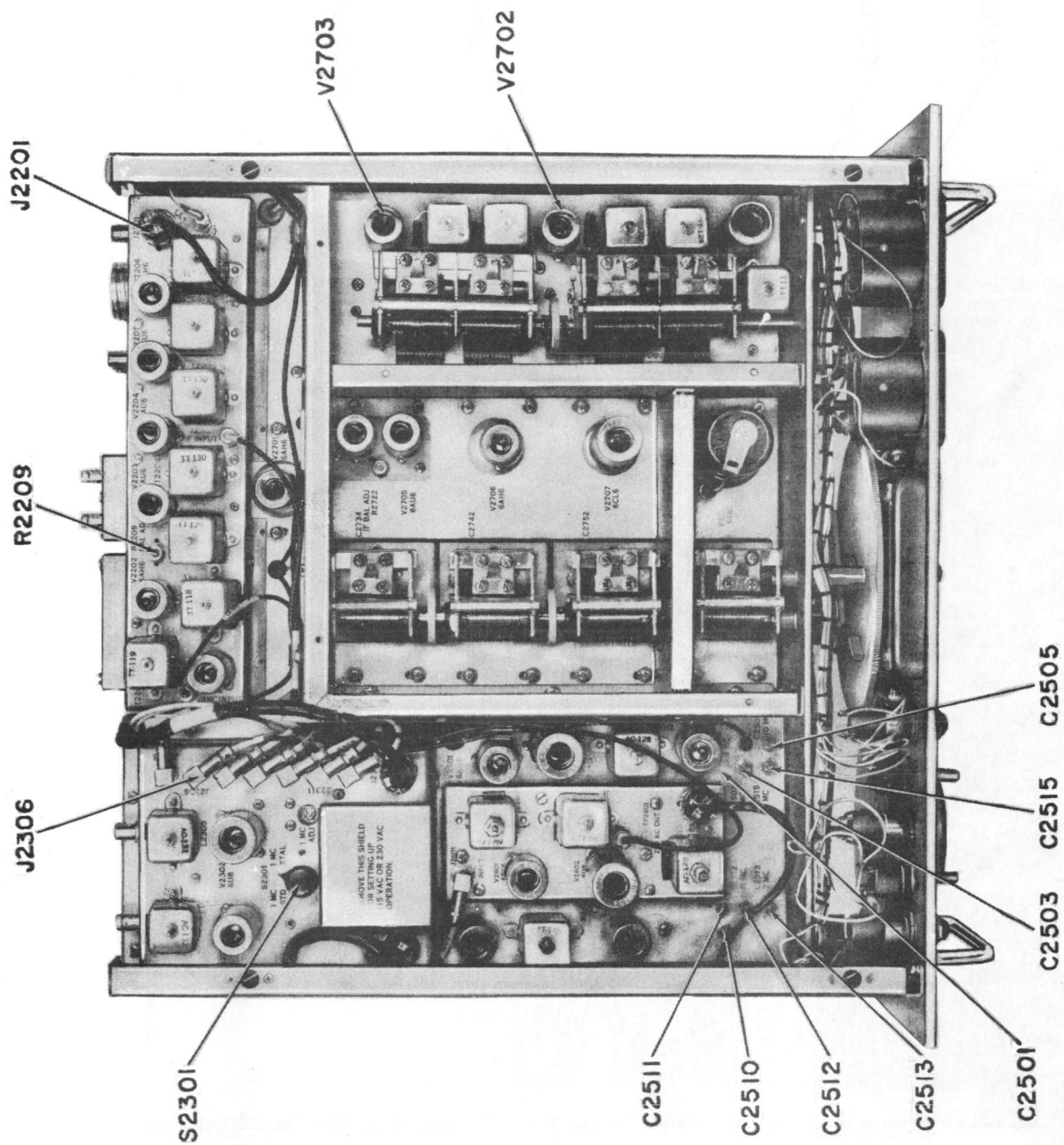


Figure III(A)-5-1b. Reference Designations for Above Chassis Components of Frequency Amplifier, Model CHG-2

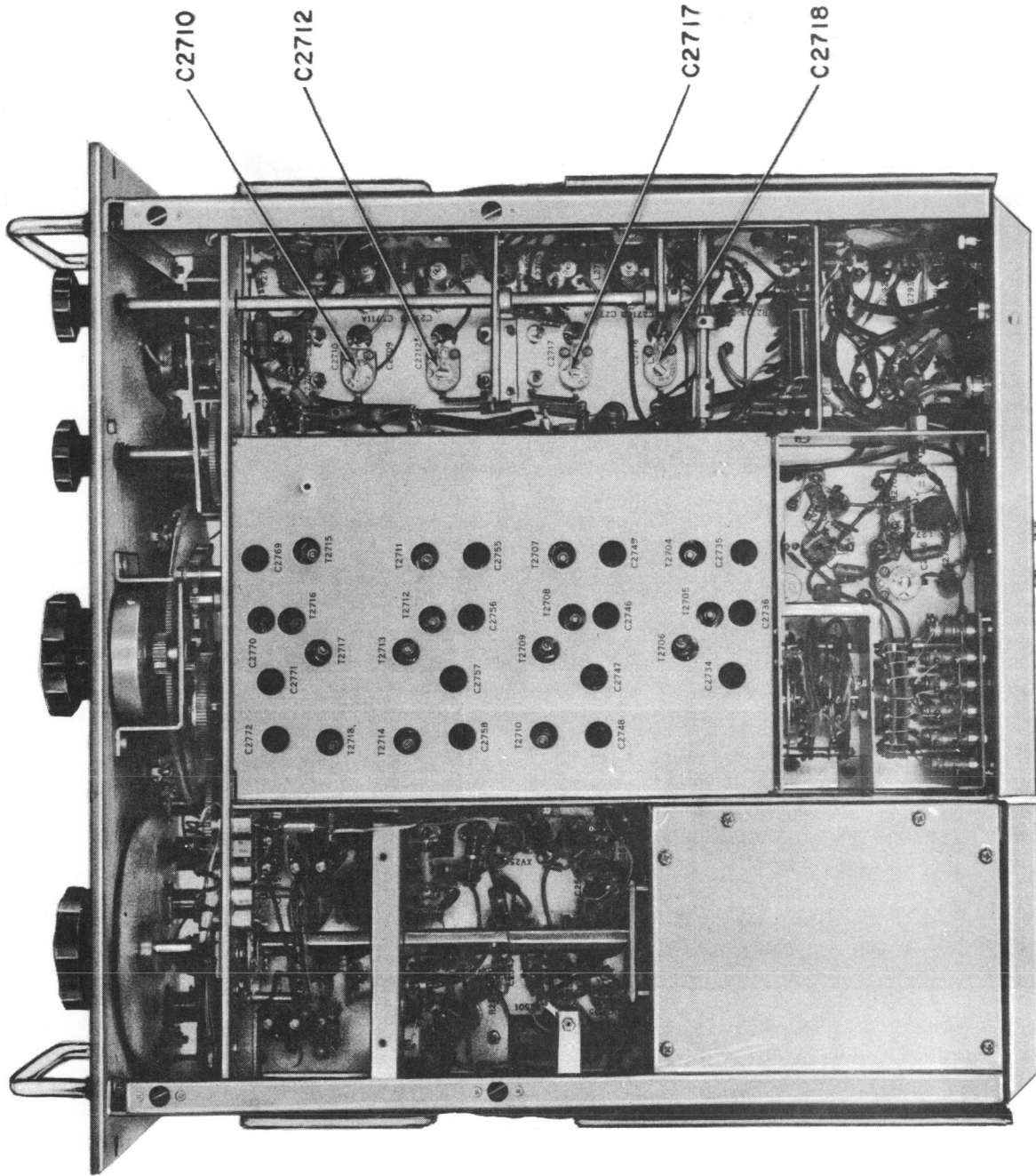


Figure III(A)-5-2b. Reference Designations for Below Chassis Components of Frequency Amplifier, Model CHG-2

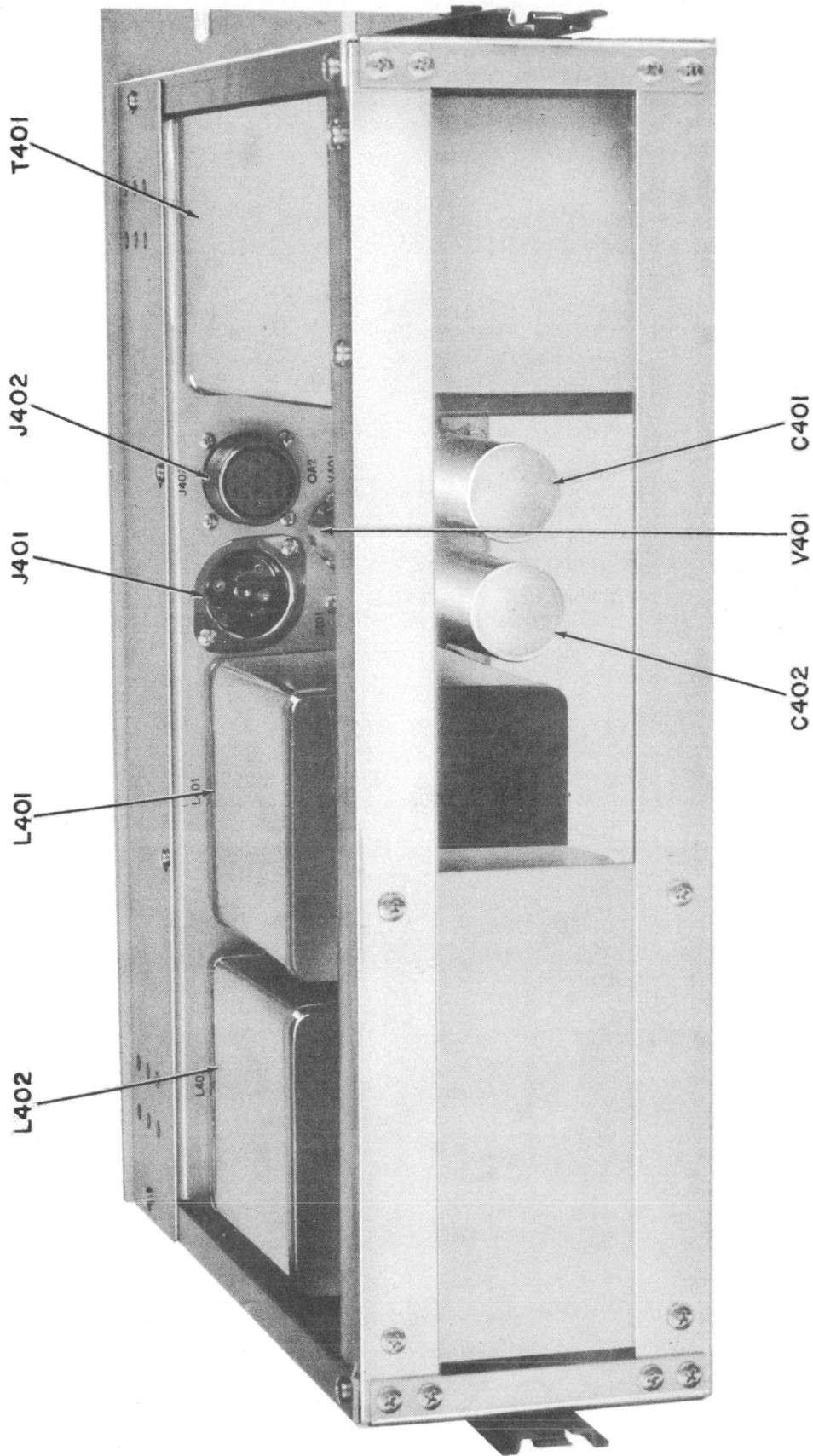


Figure III(A)-5-3b. Reference Designations for Lower Rear Components of Power Supply Model CPP-5

## **SECTION 6**

### **MAINTENANCE**

#### **III(A)-6-1. INTRODUCTION**

Maintenance may be divided into three categories: operator's maintenance, preventive maintenance and corrective maintenance.

Corrective maintenance is sometimes considered as consisting of information useful in locating and diagnosing equipment troubles and maladjustments, existing and/or pending, and information necessary to remedy the equipment troubles and maladjustments.

The CHG and CPP units have been designed to provide long-term, trouble-free operation under continuous duty conditions. It is recommended that any necessary maintenance be done by a competent maintenance technician familiar with troubleshooting techniques. If the trouble cannot be corrected, it is recommended that the unit at fault be returned to the Technical Materiel Corporation for servicing.

#### **III(A)-6-2. CORRECTIVE MAINTENANCE**

Corrective maintenance of the CHG and CPP units will consist mainly of replacement of tubes and other electrical components. It should be noted that when replacing tubes or other components, the technician should observe for exact or equivalent replacements by referring to the parts list in Section 7. Polarity and positioning of certain components should be observed before removing so that the replacement component will fit and operate properly.

This section also includes the necessary alignment and test procedures for the CHG-2A unit. These procedures are derived from factory test procedures modified for field service use.

A. Oven

1. Connect units to CPP-5 as shown in paragraph 1, instrument layout.
2. Set power switch to "ON" position.
3. Leave B+ switch in "OFF" position. (This applies B+ to RF sections only).
4. Measure B+ at T2702 (red dot). Reading should be approximately 180 volts.
5. Observe the "oven" pilot light; it must light.
6. Allow the unit to warm-up for approximately two (2) hours. (During the warm-up period, MF Channel may be aligned.)
7. After the oven begins to cycle, observe the time "ON", and time "OFF" periods; time "ON" approximately ten (10) minutes and time "OFF" approximately three (3) minutes at room temperature.

B. 1 MC Internal Standard

1. Set Standard Selector Switch S2501 to "STD".
2. Connect H.P. VTVM to junction point of W2504 and W2506. Connect CSS-1A to J2303.
3. Adjust L2305 for Max voltage output. The voltage must be 15V or greater.
4. Connect 70 ohm load to J2304.
5. Connect the VTVM to the 70 ohm load.
6. Adjust L2304 for max. output on the voltmeter. The voltage must be 1.0V or greater.
7. Set standard selector switch S2501 to "XTAL".
8. Connect the frequency counter to the 70 ohm load.
9. Adjust C2307 until frequency becomes 1,000,000 cycles  $\pm$  one count.
10. Measure voltage at J2304; it must be 2.0 V or greater.
11. Set the standard selector switch S2501 to "STD."
12. Lock the coils.

### C. Synthesizer Chassis

1. Connect scope to blue dot of T2501.
2. Set Bal. Adj. Pot. on T2501 fully clockwise.
3. Tune T2501 for max 2 mc signal. It must be at least 35 V peak to peak. Lock the coil.
4. Disconnect J2305.
5. Connect scope to top of T2502 (coax cable.)
6. Connect signal generator set at 18,000,000 cps + 50 kc and approximately 0.1 volts to junction of W2504 and W2506.
7. Tune T2502 for max output; both primary and secondary. Lock both ends of T2502.
8. Connect scope to the junction of R2522 and R2525. (Orange dot of T2501.)
9. Tune L2502 for maximum signal at the scope.
10. Set Bandswitch to position "2".
11. Tune C2501 for maximum signal at the scope approximately 1.5 V.P.P. Repeat step 9, lock coil.
12. Set Bandswitch to position "4".
13. Tune C2503 for maximum,
14. Set Bandswitch to position "6".
15. Tune C2505 for max.
16. Set Bandswitch to position "8".
17. Tune C2512 for max.
18. Set Bandswitch to position "14".
19. Tune C2507 for max.
20. Set Bandswitch to position "16".
21. Tune C2515 for max.
22. Set Bandswitch to position "18".
23. Tune C2513 for max.
24. Set Bandswitch to position "30".

25. Tun C2510 for max.
26. Reconnect P2504 to J2305.
27. Measure DC Voltage at junction of R2526 and R2527 (blk dot of T2501). It must be approximately 4 volts.
28. Connect VTVM to orange dot of T2501.
29. Set balance adjust on T2501 so that the voltage is the same as obtained in step #27. Lock the balance adjust Pot.
30. Disconnect all equipment from the synthesizer chassis.

D. H.F. Injection Oscillator

1. Set Scope on DC Range and on .1 Volts per cm. vertical deflection scale.
2. Connect Scope to junction of R2526 and R2527 (blk dot of T2501) and adjust the vertical position control until the horizontal line appears exactly in the center of the screen.
3. Without touching the scope controls, place the scope probe to the junction of R2525 and C2541. (Near orange dot of T2501).
4. Tune crystals as per chart to the same horizontal reference line which was established in section D step 38.

NOTE: When audio oscillation appears, tune toward maximum amplitude until oscillation disappears and continue turning the trimmer until the line appears in the center.

<u>BAND SWITCH POSITION</u>	<u>ADJUST</u>
2	C2401
4	C2403
6	C2405
8	C2411
11	C2407
16	C2415
18	C2413
30	C2409

5. Check the following band positions; the horizontal line must still be in the center within ± 0.25 Volt.

BAND SWITCH  
POSITIONS

0  
10  
12  
20  
22  
24  
26  
28

6. Disconnect the Scope.

E. Sync Circuit Indicator

1. Set Bandswitch to "2".
2. Set potentiometer R2520 fully clockwise, and adjust C2538 to 2/3 capacity. Then advance the potentiometer R2520 to the point where the sync light just goes on.
3. Set the Bandswitch in between positions "2" and "4"; the sync light must go off.
4. Check all positions "2" through "30" in all positions the sync light must go on.

F. Alignment of H.F. Amplifier

1. Connect AC-VTVM to junction of C2777 and C2776.
2. Set Trimmer C2776 to mid-capacity.
3. Follow the chart below. In each case, the output voltage must be 0.5 V RMS.

<u>BAND SWITCH</u>	<u>TUNE FOR MAXIMUM AND LOCK THE COILS</u>
2	L2737
4	L2736
6	L2735
8	L2734
10	L2733
12	L2732
14	L2731
16	L2730
18	L2723
20	L2724
22	L2725
24	L2726
26	L2727
28	L2728
30	L2729



#### G. Mid-Frequency Channel

1. Connect signal generator to J2702 and set it @ 1.75 mc.
2. Set mid-frequency tuning knob to 1.75 mc mark.
3. Set trimmers C2710, C2712, and C2718 to mid-capacity.
4. Tune T2703, T2708, L2703 and L2702 for max. indication of the MF meter.
5. Set signal generator to 3.75 mc and MF knob to 3.75 mark.
6. Tune trimmers C2710, C2712, C2717 and C2718 for max. indication.
7. Repeat tuning of low and high ends for max. indications.
8. Set signal generator for 1.75 mc output, MF knob to 1.75 mark.
9. Adjust R2703 for minimum indication on MF meter.
10. Connect coax jumper between J2701 and J2706 on back of unit.
11. Set signal generator to 4 mc, MF knob to 3.75 mark.
12. Tune T2701 for maximum indication on MF meter.

#### H. R.F. Channel

1. Connect signal generator to J2702 at 2 mc. Peak MF at 1.75. Connect 70 ohm load to J2704.
2. Adjust Bal. Adj. Pot. R2722 fully clockwise.
3. Set Trimmers C2735, C2736, C2737, C2745, C2746, C2747, C2748, C2755, C2756, C2757, C2758, C2769, C2770, C2771, C2772 to mid-position.
4. Observe the MF meter and increase the drive from the generator to pin the meter. Set RF gain to max.
5. Turn on the B+ switch.
6. Set the bandswitch to "0" position.
7. Set dial reading to 1.75 mcs.
8. Adjust T2718, T2710, and T2714 for maximum.
9. Set the Bandswitch to "2" position.
10. Set dial to 3.75 mcs position (Band B)

11. Tune T2717, T2713, T2709, and T2706 for peak meter reading indication.
12. Set Bandswitch to "6" position.
13. Set dial to 7.75 mcs (Band C).
14. Tune T2716, T2712, T2708 and T2705.
15. Set Bandswitch to "14" position.
16. Set dial to 15.75 mcs (Band D).
17. Tune T2715, T2711 and T2707 and T2704.
18. Set generator to 4 mc and peak MF on 3.75.
19. Set dial to 33.75 mcs, bandswitch to pos. 30.
20. Tune C2769, C2755, C2745 and C2735.
21. Set dial to 15.75 mcs. (Band C).
22. Tune C2770, C2756, C2746 and C2736.
23. Set dial to 7.75 mcs, bandswitch to pos. 4.
24. Tune C2771, C2757, C2747 and C2737 for peak meter reading indication.
25. Set dial reading to 3.75 mcs, bandswitch to pos. 0.
26. Adjust C2772, C2758 and C2748 for maximum.
27. Repeat alignments of bands 0, 2, 6 and 14 (low ends).
28. Set dial to 10 mc (band C) and band pos to 10. Adjust R2722 for minimum indication on output meter.
29. Repeat alignments of bands 0, 4, 12 and 30 (high ends).
30. Repeat low and high end alignments, place cover on RF section and touch up ends on each band.

I. Distortion Test

1. Take distortion measurements as shown in the following chart. In each case, the distortion products must be at least 45 db below PEP.
2. Equipment is to be set up as shown in the instrument layout.

Freq. MC	Band Sw.	Gen. Input MC	Output Tuning Dial Band	M.F. Tuning within white Field (MCS)	VOX Setting	Output Meter Between (CHG)
-------------	-------------	---------------------	----------------------------------	--	----------------	----------------------------------

2	0	2.25	A	2.00	2500	9-10
4	2	2.25	B	2.00	2250	9-10
6	4	2.25	B	2.00	3250	9-10
8	6	2.25	C	2.00	2125	9-10
12	10	2.25	C	2.00	3125	9-10
16	14	2.25	D	2.00	2062	9-10
24	22	2.25	D	2.00	3062	9-10
32	30	2.25	D	2.00	2031	9-10

J. 250 kc divider

1. Connect 70 ohm load and AC-VTVM to J2706, voltage should read at least 1V.

K. ALDC Test

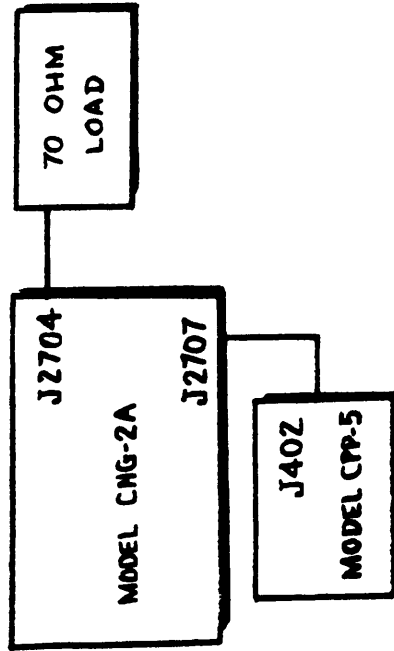
1. Set CHG-2 for 2 mc operation.
2. Connect a negative 0-7 VDC to J2703.
3. The output meter should read approximately the values given in the chart below.

<u>ALDC INPUT J2703</u>	<u>RF OUTPUT METER</u>
OVDC	8.5
-5VDC	3.0
-7VDC	.85

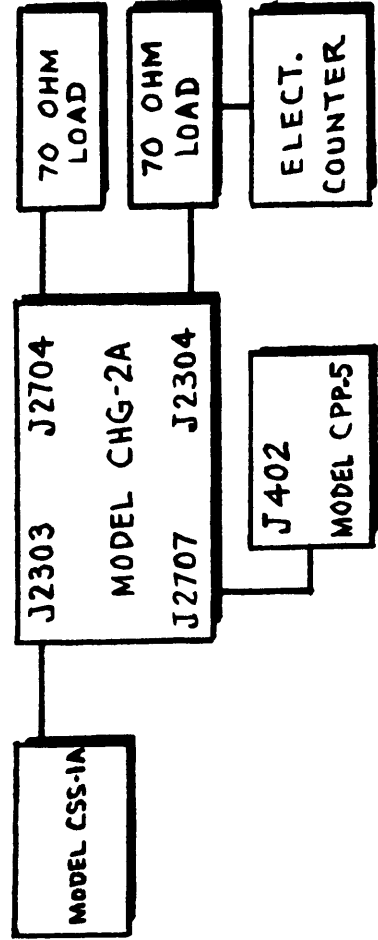
III-6-10a. Test Procedure for Frequency Amplifier (High Frequency Loop) Model CHG-2A.

111630244

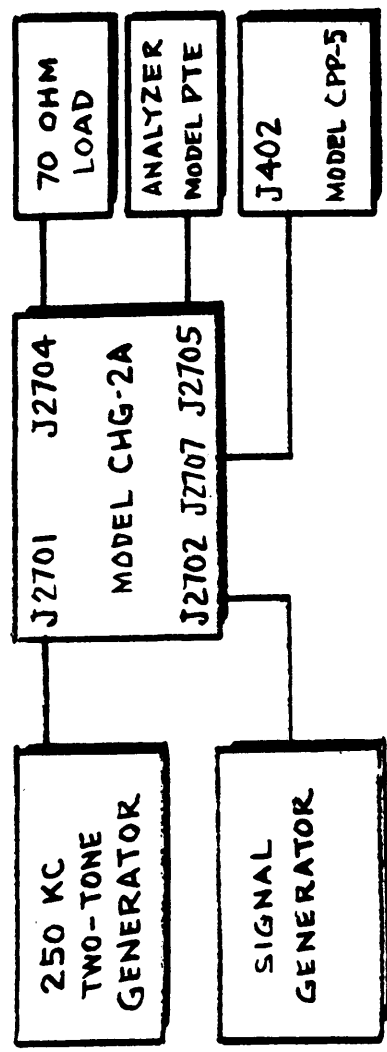
1. Oven Test Setup



2. 1 MC Standard Test Setup



3. Distortion Test Setup



4. Test equipment Required

1. Simpson Multimeter Model 260
2. Hewlett-Packard VTVM Model HP410B
3. Signal generator, Measurements model 82 or equivalent
4. Oscilloscope, Tektronix Type 545A or equivalent.
5. Electronic Counter, H.P. 524C
6. Two-Tone 250 kcs Generator.
7. Panoramic-Analyzor. (PTE)

Figure III-6-8a. Test Equipment Setup for CHG-2A

# SECTION 7

## PARTS LIST

### INTRODUCTION

Reference designations have been assigned to identify all maintenance parts of the equipment. They 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 a resistor, amplifier, electron tube, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as electron tube or fuse, are identified by reference designation which include the

reference designation of the plug-in device. For example, the socket for tube V1101 is designated XV1101. Column 1 of the parts lists gives reference designations of the parts in alphabetical and numerical order. Column 2 gives the name and describes the various parts. Major part assemblies are listed in their entirety; subparts of a major assembly are listed in alphabetical and numerical order with reference to its major assembly. Column 3 indicates how the part is used within a major component. Column 4 lists each Technical Materiel Corporation part number.

**FREQUENCY AMPLIFIER CHG-2  
FINAL CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2101	CAPACITOR, fixed; ceramic.	RF Bypass	CK70A202M
C2102	Same as C2101.		
C2103	Same as C2101.		
C2104	Same as C2101.		
C2105	Same as C2101.		
I2101	LAMP, neon: miniature bayonet base; 110 volt, 1/25 watt, T-3-1/4 bulb.	OVEN Indicator	BI-100-51H
I2102	LAMP, neon: miniature bayonet base; 110 volt, 1/25 watt, T-3-1/4 bulb.	SYNC Indicator	BI-100-51
I2103	Same as I2101.	STANDBY Indicator	
I2104	LAMP, incandescent: miniature bayonet base; 6-8 v; 250 ma; T-3-1/4 bulb, bayonet base.	Dial Illumination	BI-101-44
I2105	Same as I2104.	Same as I2104	
L2101	COIL, R. F.: fixed; 120 uhy.	RF Choke	CL-240-120
L2102	Same as L2101.		
L2103	Same as L2101.		
L2104	Same as L2101.		
M2101	METER, MF tuning: 0-25 ua; approx. resistance 2200 ohms; pointer type, knife edge.	Mid-Frequency Tuning	MR-148
M2102	METER, output: 0-25 ua; approx. resistance 2200 ohms, pointer type, knife edge.	Output Meter	MR-149
P2101	CONNECTOR, plug: female; miniature hexagon, 9 pin.	IF Amplifier Filament Connector	PL-189-9S
P2102	Same as P2101.	Oscillator Filament Connector	
P2103	Same as P2101.	Divider Chain Filament Connector	
R1001	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Voltage Dropping	RC20GF224K
R2102	RESISTOR, variable: composition; 250 ohms, linear, $\pm 10\%$ , 2 watts.	Input Gain Adjustment	RV4ATRE251B
R2103	RESISTOR, fixed: composition; 100 ohms, $\pm 10\%$ , 500 wvdc.	Series Input Voltage Divider	RC42GF101K

**FREQUENCY AMPLIFIER CHG-2  
FINAL CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
S2101	SWITCH, toggle: SPST; 6 amps, 125 VAC; 28° angle of throw; solder lug terminals.	B+ ON-OFF	ST12A
S2102	SWITCH, toggle: DPDT; 3 amps, 250 V.	Power ON- STANDBY	ST22N
XI2101	LIGHT, indicator: w/clear white lens; for miniature bayonet base, T-3-1/4 bulb.	Socket for I2101	TS-106-2
XI2102	Same as XI2101.	Socket for I2102	
XI2103	Same as XI2101.	Socket for I2103	
XI2104	SOCKET, bracket: for miniature bayonet base, T-3-1/4 bulb; right angle, down turned.	Socket for I2104	TS-107-2
XI2105	Same as XI2104.	Socket for I1005	

**FREQUENCY AMPLIFIER CHG-2  
IF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2201	CAPACITOR, fixed: mica; 20 uf.	Coupling	CM15B200J
C2202	CAPACITOR, fixed: ceramic; .01 uf, GMV, 500 wvdc.	Decoupling	CC-100-16
C2203	Same as C2202.		
C2204	Same as C2202.		
C2206	Same as C2202.	Same as C2201	
C2207	CAPACITOR, fixed: ceramic; .001 uf, $\pm 10\%$ , 500 wvdc; disc type.	Same as C2201	CC-100-9
C2208	Same as C2202.	Same as C2202	
C2209	Same as C2207.	Same as C2202	
C2210	Same as C2207.	Same as C2202	
C2211	CAPACITOR, fixed: mica, button, 150 uuf.	Same as C2202	CB21QB151K
C2212	CAPACITOR, fixed: mica, button, 270 uuf.	Same as C2202	CB21QB271K
C2213	Same as C2211.	Same as C2202	
C2214	Same as C2207.	Same as C2201	
C2215	Same as C2207.	Same as C2202	
C2216	CAPACITOR, fixed: mica; 5 uuf, $\pm 20\%$ , char. B, 300 wvdc.	Same as C2201	CM15B050M
C2217	CAPACITOR, fixed: mica, button, .001 uf.	Same as C2201	CB21QB102K
C2218	Same as C2207.	Same as C2202	
C2219	Same as C2216.	Same as C2201	
C2220	Same as C2217.	Same as C2201	
C2221	Same as C2207.	Cathode Bypass	
C2222	Same as C2216.	Same as C2201	
C2223	Same as C2217.	Same as C2202	
C2224	Same as C2207.	Same as C2201	
CR2201	DIODE, germanium: gold bonded; fast switching type.	Bal. Mod.	DD-102-1
CR2202	Same as CR2201.		
J2201	CONNECTOR, receptacle: miniature; hexagon, 9 contacts, male. Mates with PL-189.	Power Connector	JJ-193-9P
J2202	CONNECTOR, receptacle: male; one contact, 50 ohms.	2 Mc Input	JJ-154
J2203	Same as J2202.	IF Input	



**FREQUENCY AMPLIFIER CHG-2  
IF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
J2204	Same as J2202.	IF Output	
L2201	COIL, R. F. : fixed; moulded with powder iron core, 20 mc 120 uhy, $\pm 10\%$ , Q=55 at 790 kc.	RF Choke	CL-240-120
L2202	COIL, R. F. : fixed; moulded 5.6 uh.	Same as L2201	CL-240-5.6
L2203	Same as L2202.		
L2204	Same as L2202.		
L2205	Same as L2201.		
L2206	Same as L2201.		
L2207	Same as L2201.		
L2208	Same as L2201.		
L2209	Same as L2201.		
MP2201 thru MP2236	CORE, toroid: bead type.	Capacitance Compensator	CI-120-1
R2201	RESISTOR, fixed: composition; 4700 ohms, $\pm 10\%$ , 1/2 watt.	Voltage Dropping	RC20GF472K
R2202	RESISTOR, fixed: composition; 15,000 ohms, $\pm 10\%$ , 1/2 watt.	Screen Load	RC20GF153K
R2203	RESISTOR, fixed: composition.	Grid Leak Bias	RC20GF103K
R2204	Same as R2203.	Same as R2201	
R2205	Same as R2202.	Same as R2201	
R2206	RESISTOR, fixed: composition; 150 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF151K
R2207	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2203	RC20GF473K
R2208	Same as R2206.	Same as R2203	
R2209	RESISTOR, variable: composition; 100 ohms, $\pm 10\%$ , 1/2 watt.	Bal. Adjust	RV106UX8B101A
R2210	RESISTOR, fixed: composition.	Same as R2202	RC20GF221K
R2211	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2202	RC20GF223K
R2212	Same as R2211.	Same as R2202	
R2213	RESISTOR, fixed; composition; 100 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2206	RC20GF101K
R2214	Same as R2207.		

**FREQUENCY AMPLIFIER CHG-2  
IF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2215	Same as R2213.	Same as R2206	
R2216	Same as R2211.	Same as R2202	
R2217	Same as R2207.		
R2218	Same as R2213.	Same as R2206	
R2219	Same as R2211.	Same as R2202	
R2220	Same as R2207.	Same as R2202	
R2221	Same as R2213.	Same as R2206	
T2201	TRANSFORMER, R. F. : tuned; 18 mcs.	18 mc Generator	TT-119
T2202	TRANSFORMER, R. F. : tuned; 18 mcs.	18 mc Amplifier Oscillator	TT-118
T2203	TRANSFORMER, R. F. : tuned; 15 mcs.	IF Input	TT-121
T2204	TRANSFORMER, R. F. : tuned; 14 - 16 mc.	1st IF Mixer	TT-117
T2205	Same as T2204.		
T2208	TRANSFORMER, R. F. : fixed		TR-165
V2201	TUBE, electron: sharp cutoff R. F. pentode; 7 pin miniature.	18 mc Amplifier	6AH6
V2202	Same as V2201.		
V2203	TUBE, electron: sharp cutoff R. F. pentode; 7 pin miniature.	1st IF Amplifier	6AU6
V2204	Same as V2203.	2nd IF Amplifier	
V2205	Same as V2203.	3rd IF Amplifier	
V2206	Same as V2201.	IF Output Amplifier	
XV2201	SOCKET, electron tube: 7 pin miniature.	Socket for V2201	TS-102-P01
XV2202	Same as XV2201.	Socket for V2202	
XV2203	Same as XV2201.	Socket for V2203	
XV2204	Same as XV2201.	Socket for V2204	
XV2205	Same as XV2201.	Socket for V2205	
XV2206	Same as XV2201.	Socket for V2206	

**FREQUENCY AMPLIFIER CHG-2  
OSCILLATOR CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2301	CAPACITOR, fixed: ceramic; .01 uf, GMV, 500 wvdc.	Decoupling	CC-100-16
C2302	CAPACITOR, fixed: mica, button, 1000 uuf.	Same as C2301	CB21QB102K
C2303	Same as C2301.	Cathode Bypass	
C2304	CAPACITOR, fixed: mica dielectric; 130 uuf, $\pm 2\%$ , char. C., 300 wvdc.	RF Bypass	CM15C131G
C2305	CAPACITOR, fixed: mica dielectric; 47 uuf, $\pm 5\%$ , char. C., 300 wvdc.	Coupling	CM15C470J
C2306	Same as C2301.		
C2307	CAPACITOR, variable: ceramic, 7-45 uuf.		CV11C450
C2308	CAPACITOR, fixed: mica dielectric; 68 uuf, $\pm 5\%$ , char. C., 300 wvdc.	Same as C2305	CM15B680J
C2309	CAPACITOR, fixed: mica dielectric; 110 uuf, $\pm 5\%$ , 300 wvdc.	Same as C1304	CM15B111J
C2310	CAPACITOR, fixed: mica dielectric; 24 uuf, $\pm 5\%$ , char. C., 300 wvdc.	Same as C2305	CM15C240J
C2311	Same as C2301.		
C2312	Same as C2301.		
C2313	Same as C2301.		
C2314	CAPACITOR, fixed: mica; 1000 uuf, $\pm 5\%$ , char. B., 500 wvdc.	Same as C2305	CM20B102J
C2315	Same as C2302.		
C2316	Same as C2302.		
C2317	Same as C2302.		
C2318	Same as C2302.		
C2319	Same as C2302.		
C2320	Same as C2301.	Same as C2303	
C2321	Same as C2302.		
C2322	CAPACITOR, fixed: mica; 27 uf, $\pm 5\%$ , char. C., 300 wvdc.	p/o Voltage Divider Network	CM15C270J
J2301	CONNECTOR, receptacle: miniature hexagon; 9 contacts, male, mates with PL-189.	Power Connector	JJ-193-9P
J2302	Same as J2301.		
J2303	CONNECTOR, receptacle: electrical; 1 female contact; 52 ohms, BNC type.	1 Mc Input	UG-625/U

**FREQUENCY AMPLIFIER CHG-2  
OSCILLATOR CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
J2304	Same as J2303.	1 Mc Output	
J2305	CONNECTOR, receptacle.	Same as J2304	JJ-211
J2306	Same as J2303.	Same as J2304	
J2307	CONNECTOR, receptacle: male; one contact, 50 ohms.	Same as J2306	JJ-154
J2308	Same as J2307.	Same as J2306	
J2309	Same as J2307.	HF Input from Phase Detector	
J2310	Same as J2307.	HF Output	
J2311	Same as J2307.	Same as J2310	
L2301	COIL, R. F. : fixed; molded, with powder iron core; 20 mc, 120 uh $\pm 10\%$ , Q=55 at 790 kc.	RF Choke	CL-240-120
L2302	Same as L2301.		
L2303	Same as L2301.		
L2304	COIL, R. F. : tuned; 140 uh, $\pm 10\%$ , Q=40 at 790 kc; oper. freq. 1 mc; includes one 150 uhf and two 510 uuf capacitors.	1 Mc Output Transformer	AC-132
L2305	COIL, R. F. : tuned; 140 uh, $\pm 10\%$ , Q=40 at 790 kc; oper. freq. 1 mc; includes one 110 uuf and one 510 uuf capacitor.	1 Mc Oscillator Tank	AC-131
L2306	COIL, R. F. : 750 microhenries, $\pm 20\%$ , 100 ma max. current; DC resistance approx. 17 ohms; bakelite body.	Same as L2301	CL-100-5
L2307	Same as L2301.		
L2308	Same as L2301.		
L2309	Same as L2301.		
MP2301 thru MP2318	CORE, toroid: bead.	Capacitance Compensator	CI-120-1
R2301	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Leak Bias	RC20GF224K
R2302	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load	RC20GF222K
R2303	RESISTOR, fixed: composition; 68 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF680K
R2304	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2301	RC20GF474K

**FREQUENCY AMPLIFIER CHG-2  
OSCILLATOR CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2305	RESISTOR, fixed: composition; 10,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2302	RC20GF103K
R2306	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2304	RC20GF104K
R2307	Same as R2302.		
R2308	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2301	RC20GF223K
R2309	Same as R2301.		
R2310	Same as R2303.		
R2311	Same as R2301.		
R2312	RESISTOR, fixed: composition.		RC20GF121K
S2301	SWITCH, rotary: 1 section; 2 positions, mycalex insulation; contacts and wipers nickel plated.	Standard Selector	SW-150
V2301	TUBE, electron: sharp cutoff R. F. pentode, 7 pin miniature.	1 Mc Output Amplifier	6AH6
V2302 A, B	TUBE, electron: 9 pin miniature.	1 Mc Oscillator/ 1 Mc Amplifier	6U8
XV2301	SOCKET, electron tube: 7 pin miniature.	Socket for V2301	TS102P01
XV2302	SOCKET, electron tube: 9 pin miniature.	Socket for V2302	TS103P01

**FREQUENCY AMPLIFIER CHG-2  
OVEN CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2401	CAPACITOR, variable: glass, 5-50 uuf.	10 Mc Tuning	CV-107-1
C2402	CAPACITOR, fixed: mica dielectric; 27 uuf, $\pm 5\%$ , 300 wvdc.	10 Mc Padder	CM15B270J
C2403	Same as C2401.	11 Mc Tuning	
C2404	Same as C2402.	11 Mc Padder	
C2405	Same as C2401.	12 Mc Tuning	
C2406	Same as C2402.	12 Mc Padder	
C2407	Same as C2401.	14 Mc Tuning	
C2408	Same as C2402.	14 Mc Padder	
C2409	Same as C2401.	15 Mc Tuning	
C2410	Same as C2402.	15 Mc Padder	
C2411	Same as C2401.	13 Mc Tuning	
C2412	Same as C2402.	13 Mc Padder	
C2413	Same as C2401.	9 Mc Tuning	
C2414	Same as C2402.	9 Mc Padder	
C2415	Same as C2401.	8 Mc Tuning	
C2416	Same as C2402.	8 Mc Padder	
C2417	CAPACITOR, fixed: mica, button, 1000 uuf.	Decoupling	CB21QB102K
C2418	Same as C2417.		
C2419	Same as C2417.		
C2420	CAPACITOR, fixed: mica, 510 uuf.	Same as C2417	CM15B511J
C2421	Same as C2420.	Coupling	
C2422	CAPACITOR, fixed: mica, 47 uuf.	Same as C2421	CM15C470J
C2423	Same as C2422.	Cathode Bypass	
C2424	CAPACITOR, fixed: mica; 110 uuf.	Same as C2423	CM15B111J
C2425	CAPACITOR, voltage variable.	Same as C2423	CX-106-1
C2426	Same as C2417.		
C2427	Same as C2417.		
C2428	CAPACITOR, fixed: mica; 110 uuf.	Same as C2423	CM20B162J
C2429	Same as C2417.		

**FREQUENCY AMPLIFIER CHG-2  
OVEN CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
MP2401 thru MP2406	CORE, toroid: bead type.	Capacitance Compensator	CI-120-1
P2401	CONNECTOR, plug: 9-pin male.		PL-189-9P
P2402	CONNECTOR, plug: RF miniature.	HF OUT	PL-205
P2403	Same as P2402.	VARICAP	
R2401	RESISTOR, fixed: composition.	Voltage Dropping	RC32GF472K
R2402	RESISTOR, fixed: composition.	Same as R2401	RC20GF104K
R2403	Same as R2402.		
R2404	Same as R2402.		
R2405	RESISTOR, fixed: composition.	Same as R2401	RC20GF221K
R2406 A, B	ELEMENT, heater: series resistance = 2800 ohms, parallel resistance = 700 ohms, 20 watts; asbestos insulation.	Heater Element	RR-129-1
S2401	WAFER, rotary: 1 section; 16 positions, contacts 8, rotors silver plated brass.	p/o Bandswitch	WS-121
S2402	SWITCH, thermostatic: 70° ±5%; hermetically sealed contacts, normally closed; max. volts 250 AC or DC.	70° Thermostat	SS-103-0-70
S2403	WAFER, rotary: 1 section; 5 positions.	Same as S2401	WS-123
T2401	TRANSFORMER, pulse.	Input	TF-228U13
V2401	TUBE, electron.	HF Oscillator	6AB4
V2402	TUBE, electron.	HF Output	6J4
W2401	CABLE, main.	HF Input	CA-617
W2402	CABLE, if.	HF Output	CA-623-14.00
XV2401	SOCKET, tube: 7 pin.	Socket for V2401	TS-102-P01
XV2402	Same as XV2401.	Socket for V2402	
XY2401	SOCKET, crystal: .486" spacing for .050" pin dia.	Socket for Y2401	TS-104-1
XY2402	Same as XY2401.	Socket for Y2402	
XY2403	Same as XY2401.	Socket for Y2403	
XY2404	Same as XY2401.	Socket for Y2404	

**FREQUENCY AMPLIFIER CHG-2  
OVEN CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
XY2405	Same as XY2401.	Socket for Y2405	
XY2406	Same as XY2401.	Socket for Y2406	
XY2407	Same as XY2401.	Socket for Y2407	
XY2408	Same as XY2401.	Socket for Y2408	
XY2409	Same as XY2401.	Socket for Y2409	
Y2401	CRYSTAL, quartz: 1 mc.	1 Mc Crystal	CR-27/U-1.000P
Y2402	CRYSTAL, quartz: 10 mc.	10 Mc Crystal	CR-27/U-10.000P
Y2403	CRYSTAL, quartz: 11 mc.	11 Mc Crystal	CR-27/U-11.000P
Y2404	CRYSTAL, quartz: 12 mc.	12 Mc Crystal	CR-27/U-12.000P
Y2405	CRYSTAL, quartz: 14 mc.	14 Mc Crystal	CR-27/U-14.000P
Y2406	CRYSTAL, quartz: 15 mc.	15 Mc Crystal	CR-27/U-15.000P
Y2407	CRYSTAL, quartz: 13 mc.	13 Mc Crystal	CR-27/U-13.000P
Y2408	CRYSTAL, quartz: 9 mc.	9 Mc Crystal	CR-27/U-9.000P
Y2409	CRYSTAL, quartz: 8 mc.	8 Mc Crystal	CR-27/U-8.000P



**FREQUENCY AMPLIFIER CHG-2  
SYNTHESIZER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2501	CAPACITOR, variable: glass; 2.0-30.0 uuf, -100 to +100, 1000 wvdc.	8 Mc Trimmer	CV-104-1
C2502	CAPACITOR, fixed: mica; 100 uuf, $\pm 5\%$ , char. B, 300 wvdc.	8 Mc Padder	CM15B101J
C2503	Same as C2501.	9 Mc Trimmer	
C2504	CAPACITOR, fixed: mica dielectric; 68 uuf, $\pm 5\%$ , 300 wvdc, char. B.	9 Mc Padder	CM15B680J
C2505	Same as C2501.	10 Mc Trimmer	
C2506	CAPACITOR, fixed: mica; 47 uuf, $\pm 5\%$ , char. B, 300 wvdc.	10 Mc Padder	CM15B470J
C2507	Same as C2501.	12 Mc Trimmer	
C2508	CAPACITOR, fixed: mica; 20 uuf, $\pm 5\%$ , char. C, 300 wvdc.	12 Mc Padder	CM15C200J
C2509	CAPACITOR, fixed: mica; 5 uuf, $\pm 20\%$ , char. B, 300 wvdc.	13 Mc Trimmer	CM15B05GM
C2510	Same as C2501.	13 Mc Padder	
C2511	CAPACITOR, fixed: mica; 24 uuf, $\pm 5\%$ , 300 wvdc, char. B.	11 Mc Trimmer	CM15B240J
C2512	Same as C2501.	11 Mc Padder	
C2513	Same as C2501.	7 Mc Trimmer	
C2514	CAPACITOR, fixed: mica; 160 uuf, $\pm 5\%$ , 300 wvdc, char. B.	7 Mc Padder	CM15B161J
C2515	Same as C2501.	6 Mc Trimmer	
C2516	CAPACITOR, fixed: mica: 240 uuf, $\pm 5\%$ , 300 wvdc, char. B.	6 Mc Padder	CM15B241J
C2517	CAPACITOR, fixed: ceramic; .01 uf, GMV, 500 wvdc.	Coupling	CC-100-16
C2518	Same as C2517.	Decoupling	
C2519	CAPACITOR, fixed: ceramic; feed-thru type; 2000 uuf, $\pm 20\%$ , char. A, 500 wvdc.	RF Bypass	CK70A202M
C2520	Same as C2517.	Same as C2518	
C2521	Same as C2517.	Same as C2518	
C2522 thru C2524	Same as C2517.	Same as C2518	
C2525	Same as C2508.	Coupling	

**FREQUENCY AMPLIFIER CHG-2  
SYNTHESIZER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2526	CAPACITOR, fixed: mica; 220 uuf, $\pm 5\%$ , 300 wvdc, char. C.	p/o Voltage Divider Network	CM15C221J
C2527	Same as C2517.		
C2528	CAPACITOR, fixed: ceramic; .1 uf, $+80-20\%$ , 500 wvdc.	Cathode Bypass	CC-100-28
C2529	Same as C2517.	Same as C2518	
C2530	Same as C2517.	Same as C2525	
C2531	Same as C2517.	Same as C2518	
C2532	Same as C2517.	Same as C2518	
C2533	CAPACITOR, fixed: metallized paper; .05 uf, 200 wvdc.	Plate Bypass	CN-111-5
C2534	Same as C2517.	Same as C2518	CV11C450
C2535	Same as C2517.	Same as C2519	
C2536	CAPACITOR, fixed: mica; 10 uuf, $\pm 10\%$ , char. B, 300 wvdc.	Same as C2525	CM15B100K
C2537	Same as C2506.	DC Blocking	
C2538	CAPACITOR, variable: ceramic; 7-45 uuf, char. C, 500 wvdc.	Trimmer	CV11C450
C2539	Same as C2528.	Same as C2528	
C2540	CAPACITOR, fixed: ceramic; .001 uf, $\pm 10\%$ , 500 wvdc, disc type.	Same as C2525	CC-100-9
C2541	Same as C2517.	Same as C2519	
C2542	Same as C2517.	Same as C2519	
C2543	CAPACITOR, solid electrolytic tantalum; 6.8 uf, $\pm 20\%$ , 6 vdc; plastic film insulating sleeve; hermetically sealed.	Time Constant	CE-106
C2544	Same as C2517.	Same as C2518	
C2545	Same as C2517.	Same as C2528	
C2546	Same as C2517.	Same as C2518	
C2547	Same as C2517.	Same as C2518	
C2548	Same as C2517.	Same as C2525	
C2549	Same as C2511.	18 Mc Tuning	
C2550	Same as C2511.	Same as C2549	
C2551	Same as C2519.	Same as C2519	

**FREQUENCY AMPLIFIER CHG-2  
SYNTHESIZER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
L2501	COIL, toroidal: 2.5 uh; $\pm 5\%$ , $Q=250$ at 20 mc; operating frequency range 9-20 mc.	RF Choke	CL-239
L2502	COIL, R. F.: tuned; 20 uh, $\pm 1$ uh, $Q=70$ or greater; frequency resonance = 2.5 mc.	2 Mc Mixer Oscillator	AC-128
L2503	COIL, R. F.: fixed; 15 uhy.		CL-270-15
L2504	COIL, R. F.: fixed; moulded, with powder iron core, 20 mc, 120 uh, $\pm 10\%$ , $Q=55$ at 790 kc.	Same as L2501	CL-240-120
L2505	Same as L2504.	Same as L2501	
L2506	Same as L2504.		
L2507	COIL, R. F.: 750 microhenries, $\pm 20\%$ , 100 ma max. current; DC resistance approx. 17 ohms; bakelite body.	Same as L2501	CL-100-5
L2508	COIL, R. F.: 2.5 mh, 100 ma; molded.	Same as L2501	CL-140-1
L2509	Same as L2508.	Same as L2501	
MP2501 thru MP2518	CORE, toroid: bead.	Capacitance Compensator	CI-120-1
P2501	CONNECTOR, plug: min. coaxial type.	1 Mc Input	PL-154
P2502	Same as P2501.	Divider Chassis 1 Mc Input	
P2503	CONNECTOR, plug: min.	18 Mc Input	PL-204
P2504	Same as P2501.	2 Mc Output	
P2505	Same as P2501.	2 Mc Input	
P2506	Same as P2501.	1 Mc Output	
R2501	RESISTOR, fixed: composition; 56,000 ohms, $\pm 10\%$ , 1/2 watt.	Screen Load	RC20GF563K
R2502	RESISTOR, fixed: composition; 6800 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load	RC20GF682K
R2503	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Voltage Dropping	RC20GF222K
R2504	Same as R2503.	Same as R2503	
R2505	RESISTOR, fixed: composition; 6800 ohms, $\pm 10\%$ , 1 watt.	Same as R2502	RC32GF682K
R2506	RESISTOR, fixed: composition; 8200 ohms, $\pm 10\%$ , 2 watts.	Same as R2501	RC42GF822K
R2507	RESISTOR, fixed: composition; 1 megohm, $\pm 10\%$ , 1/2 watt.	Grid Leak Bias	RC20GF105K

**FREQUENCY AMPLIFIER CHG-2  
SYNTHESIZER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2508	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2507	RC20GF104K
R2509	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2507	RC20GF223K
R2510	RESISTOR, fixed: composition; 100 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF101K
R2511	Same as R2508.	Same as R2507	
R2512	RESISTOR, fixed: composition; 68 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2510	RC20GF680K
R2513	RESISTOR, fixed: composition; 47 K ohms, $\pm 10\%$ , 1/2 watt.	Same as R2502	RC20GF473K
R2514	RESISTOR, fixed: composition; 4700 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2503	RC20GF472K
R2515	RESISTOR, fixed: composition; 33,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2501	RC20GF333K
R2516	Same as R2508.	Same as R2503	
R2517	Same as R2514.	Same as R2502	
R2518	Same as R2509.	Same as R2507	
R2519	RESISTOR, fixed: composition; 1000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2502	RC20GF102K
R2520	RESISTOR, variable: composition; 2500 ohms, $\pm 10\%$ , 1/2 watt, slotted locking shaft.	Synchronization Balance Adjustment	RV106UX8B252A
R2521	Same as R2507.	Same as R2507	
R2522	RESISTOR, fixed: composition; 10,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2503	RC20GF103K
R2523	Same as R2508.	Same as R2507	
R2524	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2503	RC20GF393K
R2525	Same as R2508.	Same as R1502	
R2526	Same as R2524.	Same as R2501	
R2527	RESISTOR, fixed: composition; 1200 ohms, $\pm 5\%$ , 1/2 watt.	Same as R2503	RC20GF122J
R2528	Same as R2512.	Same as R2512	
S2501	SWITCH, rotary: 16 positions; 1 section, bakelite insulation; silver plated brass contacts.	p/o Bandswitch	SW-278
T2501	TRANSFORMER, R. F.: tuned; 2 mc, 540 uh, $\pm 15$ uh, Q=50 or greater; frequency 790 kc.	2 Mc Tank & Phase Detector	TT-115

**FREQUENCY AMPLIFIER CHG-2  
SYNTHESIZER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
T2502	TRANSFORMER, R. F.: tuned; 18 mc output.	18 Mc Tuning	TT-128
V2501	TUBE, electron: sharp cutoff R. F. pentode; 7 pin miniature.	Isolation Amplifier	6AH6
V2502	Same as V2501.	Harmonic Generator	
V2503	TUBE, vacuum: pentagrid converter.	Mixer	6BA7
V2504	TUBE, vacuum: pentagrid amplifier.	SYNC	6CS6
V2505	Same as V2501.	Doubler	
W2501	CABLE ASSEMBLY, R. F.	Varicap	CA-622-14.50
W2502	Same as W2501.	Isolation Amplifier	CA-622-13.00
W2503	Same as W2501.	2 Mc Output	CA-622-23.00
W2504	Same as W2501.	1 Mc Output	CA-622-16.50
W2505	Same as W2501.	Harmonic Generator	CA-622-16.50
W2506	Same as W2501.	Divider Input	CA-622-4.50
XV2501	SOCKET, electron tube: 7 pin miniature.	Socket for V2501	TS-102-P01
XV2502	Same as XV2501.	Socket for V2502	
XV2503	SOCKET, electron tube: 9 pin miniature.	Socket for V2503	TS-103-P01
XV2504	Same as XV2501.	Socket for V2504	
XV2505	Same as XV2501.	Socket for V2505	

**FREQUENCY AMPLIFIER CHG-2  
DIVIDER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2601	CAPACITOR, fixed: ceramic; .01 uf, GMV, 500 wvdc.	Coupling	CC-100-16
C2602	CAPACITOR, fixed: mylar; dielectric, .1 uf, $\pm 20\%$ , 300 wvdc.	Decoupling	CN106D1003M
C2603	Same as C2602.	Same as C2602	
C2604	Same as C2602.	Same as C2602	
C2605	CAPACITOR, fixed: ceramic; .002 uf, GMV, 500 wvdc.	Same as C2601	CC-100-11
C2606	CAPACITOR, fixed: mica; 270 uuf, $\pm 2\%$ , char. C., 300 wvdc.	Same as C2601	CM15C271G
C2607	CAPACITOR, fixed: mica; 10 uuf, $\pm 10\%$ , char. B., 500 wvdc.	Same as C2601	CM20B100K
C2608	CAPACITOR, fixed: ceramic dielectric; .02 uf, $+80-20\%$ , 500 wvdc.	Cathode Bypass	CC-100-24
C2609	Same as C2602.	Same as C2602	
C2610	Same as C2602.	Same as C2602	
C2611	CAPACITOR, fixed: ceramic; .1 uf, $+80-20\%$ , 500 wvdc.	Same as C2608	CC-100-28
J2601	CONNECTOR, receptacle: male, one contact, 50 ohms.	1 Mc Input	JJ-211
J2602	Same as J2601.	250 Kc Output	
J2603	CONNECTOR, receptacle: miniature hexagon; 9 contacts, male.	Power Connector	JJ-193-9-P
L2601	COIL, R. F.: tuned; 250 kc, 540 uh, $\pm 15\%$ , Q=50 or greater; frequency = 790 kc.	Mixer Plate, 250 Kc Oscillator	AC-125
L2602	COIL, R. F.: tuned; 750 kc; 11 uh, $\pm 5\%$ , Q=50 or greater, frequency = 2.5 mc.	750 Kc Tripler	AC-127
L2603	COIL, R. F.: tuned; 250 kc; 540 uh, $\pm 15\%$ , Q=50 or greater; frequency = 790 kc.	250 Kc Output Oscillator	AC-126
L2604	COIL, R. F.: 2.5 mh, 100 ma.	RF Choke	CL-140-1
L2605	Same as L2604.	Same as L2604	
MP2601 thru MP2612	CORE, toroid: bead.	Capacitance Compensator	CI-120-1
R2601	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Leak Bias	RC20GF223K
R2602	RESISTOR, fixed: composition; 12,000 ohms, $\pm 10\%$ , 2 watts.	Screen Load	RC42GF123K

**FREQUENCY AMPLIFIER CHG-2  
DIVIDER CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2603	RESISTOR, fixed: composition; 8200 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load	RC20GF822K
R2604	RESISTOR, fixed: composition; 150 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF151K
R2605	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2601	RC20GF104K
R2606	RESISTOR, fixed: composition; 330,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2601	RC20GF334K
R2607	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2603	RC20GF221K
R2608	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1 watt.	Same as R2602	RC32GF224K
R2609	Same as R2605.	Same as R2601	
R2610	Same as R2607.	Same as R2604	
R2611	RESISTOR, fixed: composition; 1000 ohms, $\pm 10\%$ , 1/2 watt.	Terminating Load	RC20GF102K
R2612	RESISTOR, fixed: composition; 680 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2604	RC20GF681K
TP2601	FEED-THRU, teflon: press fit; capacitance = 1.0 uuf; voltage rating = 2000.	Test Point	TE-169-1
V2601	TUBE, electron: pentagrid converter; 7 pin miniature.	Mixer	6BE6
V2602 A & B	TUBE, electron: 9 pin miniature.	Tripler/250 Kc Output	6U8
XV2601	SOCKET, electron tube: 7 pin miniature.	Socket for V2601	TS-102-P01
XV2602	SOCKET, electron tube: 9 pin miniature.	Socket for V2602	TS-103-P01

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2701	CAPACITOR, fixed: mica; 3000 uuf, $\pm 2\%$ , char. D, 500 wvdc.	Equalizer	CM30D302G
C2702	Same as C2701.	Same as C2701	
C2703	CAPACITOR, fixed: mica; button type; 1000 uuf, $\pm 10\%$ , char. W., 300 wvdc.	Decoupling	CB21QW102K
C2704	CAPACITOR, fixed: ceramic; .01 uf, GMV, 500 wvdc.	Coupling	CC-100-16
C2705	Same as C2704.	Same as C2704	
C2706	Same as C2704.	Same as C2703	
C2707	Same as C2704.	Same as C2703	
C2708	Same as C2704.	Same as C2703	
C2709	CAPACITOR, fixed: mica dielectric; 15 uuf, $\pm 10\%$ , 300 wvdc.	Padder	CM15B150K
C2710	CAPACITOR, variable: ceramic; 4-30 uuf, char. C, 500 wvdc.	Trimmer	CV11C300
C2711 A, B	CAPACITOR, variable: air; 2 sections, 21 plates, 12.5-282 uuf.	p/o MF Tuning Control	CB-156-2
C2712	Same as C2710.	Same as C2710	
C2713	Same as C2704.	Same as C2704	
C2714	Same as C2704.	RF Bypass	
C2715	CAPACITOR, fixed: ceramic; .1 uf, +80 -20%, 500 wvdc.	Cathode Bypass	CC-100-28
C2716 A, B	CAPACITOR, variable: air; 2 sections. 21 plates. 12.5-280 uuf.	Same as C2711 A, B	CB-156-1
C2717	Same as C2710.	Same as C2710	
C2718	Same as C2710.	Same as C2710	
C2719	Same as C2704.	Same as C2714	
C2720	Same as C2704.	Same as C2704	
C2721	Same as C2704.	Same as C2703	
C2722	Same as C2704.	Same as C2715	
C2723	Same as C2704.	Same as C2703	
C2724	CAPACITOR, fixed: mica dielectric; 10 uuf, $\pm 5\%$ , char. C., 300 wvdc.	Same as C2704	CM15C100J
C2725	Same as C2704.	Same as C2715	



**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2726	CAPACITOR, fixed: ceramic; feed-thru type; 2000 uuf, $\pm 20\%$ .	Same as C2714	
C2727	CAPACITOR, fixed: ceramic; disc type; .001 uf, $\pm 10\%$ , 500 wvdc.	Same as C2703	
C2728	Same as C2727.	Same as C2703	
C2729	Same as C2727.	Same as C2715	
C2730	Same as C2704.	Same as C2704	
C2731	Same as C2704.	Same as C2704	
C2732	Same as C2727.	Same as C2703	
C2733	Same as C2727.	Bypass	
C2734	Same as C2710.	p/o 1st RF Amplifier Tank Oscillator	
C2735	CAPACITOR, variable: ceramic; 3-12 uuf, 500 wvdc.	Same as C2734	CV11A120
C2736	CAPACITOR, variable: air; 1 section, 21 plates, 12.5-282 uuf.	p/o Output Tun- ing Control	CB-157-1
C2737	Same as C2710.	Same as C2734	
C2738	Same as C2726.	Same as C2714	
C2739	Same as C2703.	p/o Voltage Divider Network	
C2740	CAPACITOR, fixed: paper; .1 uf, +40 -10%, 400 wvdc.	Same as C2703	CN-100-4
C2741	CAPACITOR, fixed: mica; dielectric, 510 uuf, $\pm 5\%$ , char. B., 300 wvdc.	Same as C2704	CM15B511J
C2742	Same as C2734.	Same as C2736	
C2743	Same as C2727.	Same as C2733	
C2744	Same as C2704.	Meter Bypass	
C2745	Same as C2735.	p/o 2nd RF Amplifier Tank Oscillator	
C2746	Same as C2710.	Same as C2745	
C2747	Same as C2710.	Same as C2745	
C2748	Same as C2726.	Same as C2714	
C2749	Same as C2726.	Same as C2714	
C2750	Same as C2703.	Same as C2733	

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2751	Same as C2741.	DC Blocking	
C2752	Same as C2734.	Same as C2736	
C2753	Same as C2727.	Same as C2733	
C2754	Same as C2727.	Same as C2733	
C2755	Same as C2735.	p/o RF Output Amplifier Tank Oscillator	
C2756	Same as C2710.	Same as C2755	
C2757	Same as C2710.	Same as C2755	
C2758	Same as C2710.	Same as C2755	
C2759	Same as C2726.	Same as C2714	
C2760	Same as C2740.	Same as C2714	
C2761	Same as C2741.	Same as C2704	
C2762	Same as C2703.	Same as C2714	
C2763	Same as C2741.	Same as C2704	
C2764	CAPACITOR, variable: air; 1 section, 21 plates, 12.5-282 uuf.	Same as C2736	CB-157-2
C2765	Same as C2727.	Same as C2714	
C2766	Same as C2727.	Same as C2755	
C2767	Same as C2727.	Same as C2755	
C2768	CAPACITOR, electrolytic: tantalum; 5 uf, +50 -15%, 60 wvdc.	Same as C2715	CE-107-1
C2769	Same as C2710.	Same as C2755	
C2770	Same as C2710.	Same as C2755	
C2771	Same as C2710.	Same as C2755	
C2772	Same as C2710.	p/o 2nd RF Amplifier Tank Oscillator	
C2773	Same as C2726.	Same as C2714	
C2774	Same as C2704.	Same as C2714	
C2775	Same as C2704.	Same as C2714	
C2776	CAPACITOR, variable: ceramic; 7-45 uuf, char. C, 500 wvdc.	Same as C2710	CV11C450

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
C2777	CAPACITOR, fixed: mica; button type; 270 uuf, ±10%, char. W, 300 wvdc.	Same as C2733	CB21QW271K
C2778	CAPACITOR, fixed: mica dielectric; 39 uuf, ±5%, char. C., 300 wvdc.	p/o 20 Mc Tank Circuit	CM15C390J
C2779	Same as C2703.	Same as C2714	
C2780	Same as C2704.	Same as C2714	
C2781	Same as C2703.	Plate Decoupling	
C2782	Same as C2715.	Same as C2739	
C2783	Same as C2704.	Same as C2714	
C2784	Same as C2726.	Same as C2714	
C2785	Same as C2741.	Same as C2704	
C2786	Same as C2741.	Same as C2714	
C2787	Same as C2703.	Same as C2755	
C2788	Same as C2726.	Same as C2714	
C2789	CAPACITOR, fixed: mica; 270 uuf, ±5%, char. C, 300 wvdc.	Same as C2704	CM15C271J
C2790	Same as C2704.	Same as C2714	
C2791	Same as C2704.	Same as C2714	
C2792	Same as C2704.	Same as C2714	
C2793	Same as C2704.	Same as C2714	
C2794	Same as C2704.	Same as C2703	
C2795	Same as C2704.	Filter	
C2796	Same as C2704.	Same as C2795	
C2797	Same as C2726.	Same as C2714	
C2798	Same as C2726.	Same as C2714	
C2799	Same as C2726.	Same as C2714	
C2800	Same as C2726.	Same as C2714	
C2801	Same as C2726.	Same as C2714	
C2802	Same as C2726.	Same as C2714	
C2803	Same as C2726.	Same as C2714	
C2804	Same as C2726.	Same as C2714	
C2805	Same as C2704.	Same as C2714	

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
CR2701	DIODE, bonded silicon.	Meter Rectifier	1N303
CR2702	DIODE, germanium.	Rectifier	1N100
CR2703	Same as CR2702.	Same as CR2701	
J2701	JACK, bulkhead.	250 Kc Input from CBE	JJ-172
J2702	Same as J2701.	2-4 Mc Input from CMO	
J2703	Same as J2701.	250 Kc Output	
J2704	CONNECTOR, receptacle: electrical; 1 female contact; 52 ohms, BNC type.	RF Output	UG-625/U
J2705	Same as J2704.	Monitor	
J2706	Same as J2701.	Same as J2705	
J2707	CONNECTOR, receptacle: male; 16 contacts, aluminum alloy cadmium plated.	Power Connector	JJ-183
L2701	COIL, R. F.: fixed; .9 uhy, $\pm 5\%$ , $Q = 110$ , test frequency at 2.5 mcs.	RF Choke	CL-241
L2702	COIL, R. F.: 2.5 uhy, 100 ma.	Same as L2701	CL-140-1
L2703	COIL, R. F.: tuned; 1.75-3.75 mc, 22 uf, $\pm 1$ uh, $Q = 30$ or greater; test frequency 2.5 mc.	Mid-Frequency Amplifier Grid Coil	AC-130
L2704	COIL, R. F.: 750 microhenries, $\pm 20\%$ , 100 ma max. current; DC resistance approx. 17 ohms; bakelite body.	Same as L2701	CL-100-5
L2705	COIL, R. F.: tuned; 1.75-3.75 mc, 22 uh, $\pm 1$ uh, $Q = 30$ or greater, test frequency 2.5 mc.	p/o MF Amplifier Plate Oscillator	AC-129
L2706	COIL, R. F.: fixed; moulded w/powder iron core; 20 mc, 120 uhy, $\pm 10\%$ , $Q = 55$ at 790 kc.	Same as L2701	CL-240-120
L2707	Same as L2702.	Same as L2701	
L2708	Same as L2701.	Same as L2701	
L2709	Same as L2706.	Same as L2701	
L2710 thru L2717	Same as L2706.	Same as L2701	
L2718	Same as L2702.	Same as L2701	
L2719 thru L2722	Same as L2706.	Same as L2701	

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
L2723	COIL, R. F. : tuned; 20 mc, 0.92 uhy, Q=55 or greater, test frequency - 7.9 mc.	Bands 12 & 11 Multiplier	CL-247
L2724	Same as L2723.	Band 10 Multiplier	
L2725	COIL, R. F. : tuned; 22 mc, 0.63 uhy, Q=90 or greater, test frequency - 25 mc.	Bands 3 & 12 Multiplier	CL-249
L2726	Same as L2725.	Bands 14 & 13 Multiplier	
L2727	COIL, R. F. : tuned; 26 mc, 0.45 uhy, Q=85 or greater, test frequency 25 mc.	Bands 5 & 14 Multiplier	CL-251
L2728	Same as L1111.	Band 15 Multiplier	
L2729	COIL, R. F. : tuned; 30 mc, 0.36 uhy, Q=80 or greater, test frequency - 25 mc.	Band 16 Multiplier	CL-253
L2730	COIL, R. F. : tuned; 16 mc, 1.23 uhy, Q=65 or greater, test frequency 7.9 mc.	Band 9 Multiplier	CL-246
L2731	COIL, R. F. : tuned; 14 mc, 1.7 uhy, Q=50 or greater, test frequency 7.9 mc.	Band 8 Multiplier	CL-245
L2732	COIL, R. F. : tuned; 12 mc, 2.45 uhy, Q=50 or greater, test frequency 7.9 mc.	Band 7 Multiplier	CL-244
L2733	COIL, R. F. : tuned; 10 mc, 3.35 uhy, Q=50 or greater, test frequency 7.9 mc.	Band 6 Multiplier	CL-243
L2734	Same as L2727.	Same as L2727	
L2735	Same as L2725.	Same as L2725	
L2736	Same as L2725.	Same as L2725	
L2737	Same as L2723	Same as L2723	
L2738	Same as L2723.	p/o 20-Mc Tank Circuit	
L2739	Same as L2706.	Same as L2701	
L2740	Same as L2706.	Same as L2701	
L2741	Same as L2702.	Same as L2701	
L2742	Same as L2706.	Same as L2701	
L2743	Same as L2706.	Same as L2701	
L2744	Same as L2706.	Same as L2701	
L2745	Same as L2706.	Same as L2701	
L2746	Same as L2706.	Same as L2701	

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
MP2701 thru MP2796	CORE, toroid: bead.	Filament Parasitic Suppressors	CI-120-1
P2701	CONNECTOR, plug: miniature coaxial type.	IF Input	PL-204
P2702	Same as P2701.	IF Output	
P2703	CONNECTOR, plug: miniature coaxial, angle type.	Balanced Modulator Input	PL-155
P2704	Same as P2701.	HF Input	
PS2701	SUPPRESSOR, parasitic.	Parasitic Suppressor	AX-164
R2701	RESISTOR, fixed: composition; 39 ohms, $\pm 10\%$ , 1/2 watt.	Grid Leak Bias	RC20GF390K
R2702	Same as R2701.	Same as R2701	
R2703	RESISTOR, variable: composition; 1000 ohms, $\pm 10\%$ , 1/2 watt.	Balance Adjust	RV106UX8B102A
R2704	RESISTOR, fixed: composition; 47 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load, V2701	RC20GF470K
R2705	Same as R2704.	Same as R2704	
R2706	RESISTOR, fixed: composition; 68 ohms, $\pm 10\%$ , 1/2 watt.	Input Termination	RC20GF680K
R2707	RESISTOR, fixed: composition; 2700 ohms, $\pm 10\%$ , 1 watt.	Voltage Dropping	RC32GF272K
R2708	Same as R2701.	Plate load	
R2709	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Screen Load	RC20GF223K
R2710	RESISTOR, fixed: composition; 3300 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2708	RC20GF332K
R2711	RESISTOR, fixed: composition; 100 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF101K
R2712	RESISTOR, fixed: composition; 180,000 ohms, $\pm 10\%$ , 1/2 watt.	Meter Load	RC20GF184K
R2713	Same as R2709.	Same as R2707	
R2714	RESISTOR, fixed: composition; 120,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2709	RC20GF124K
R2715	Same as R2710.	Same as R2708	
R2716	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2701	RC20GF473K

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2717	RESISTOR, fixed: composition; 560 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2711	RC20GF561K
R2718	RESISTOR, fixed: composition; 6800 ohms, $\pm 10\%$ , 1/2 watt.	Voltage Divider	RC20GF682K
R2719	RESISTOR, fixed: composition.	Same as R2701	RC20GF103K
R2720	Same as R2704.	R. F. Bal	
R2721	Same as R2704.	R. F. Bal	
R2722	RESISTOR, variable: composition.	R. F. Bal. Adj	RV106UX8B251A
R2723	Same as R2711.	Grid leak Bias	
R2724	RESISTOR, fixed: composition; 3900 ohms, $\pm 10\%$ , 1/2 watt.	Load	RC20GF392K
R2725	RESISTOR, variable: composition; 1000 ohms, linear $\pm 10\%$ , 2 watts.	Output Gain Adjust	RV4ATRD102A
R2726	Same as R2709.		
R2727	Same as R2701.	Same as R2710	
R2728	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Grid Limiter	RC20GF100K
R2729	Same as R2711.	Same as R2711	
R2730	RESISTOR, fixed: composition; 1000 ohms, $\pm 10\%$ , 1 watt.	Same as R2707	RC32GF102K
R2731	Same as R2724.	Same as R2724	
R2732	RESISTOR, fixed: composition; 5600 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2709	RC20GF562K
R2733	Same as R2701.	Same as R2728	
R2734	Same as R2728.	Same as R2728	
R2735	RESISTOR, fixed: composition; 68,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2701	RC20GF683K
R2736	Same as R2724.	Same as R2724	
R2737	Same as R2711.	Same as R2707	
R2738	Same as R2728.	Same as R2728	
R2739	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2701	RC20GF224K
R2740	RESISTOR, fixed: ceramic; wir wound, 250 ohms, 5 watts.	Same as R2711	RW-107-23

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
R2742	Same as R2730.		
R2743	RESISTOR, fixed: composition; 820 ohms, $\pm 10\%$ , 1/2 watt.	p/o Voltage Divider	RC20GF821K
R2744	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2743	RC20GF221K
R2745	Same as R2735.	Same as R2712	
R2746	RESISTOR, fixed: composition; 15,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2709	RC20GF153K
R2747	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2710	RC20GF222K
R2748	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2701	RC20GF474K
R2749	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2707	RC20GF104K
R2750	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ , 1/2 watt.	Same as R2711	RC20GF121K
R2751	Same as R2718.		
R2752	Same as R2749.	Voltage Divider	
R2753	Same as R2749.	Same as R2707	
S2701 A, B	SWITCH, rotary: two sections, 16 positions, shorting type contacts, bakelite insulation.	Bandswitch	SW-279
S2702 A	WAFER, switch: 16 positions; 1 section, silver plated contacts.	p/o Bandswitch	WS-122
S2702 B	WAFER, rotary: 1 section; 16 positions, contacts and rotors are silver plated brass.	Same as S1102A	WS-121
S2703	WAFER, switch: four positions; shorting type.	Range Switch; p/o Bandswitch	WS-101
S2704	Same as S2703.	Same as C2742	
S2705	Same as S2703.	Same as S2702A	
S2706	Same as S2703.	Same as C2711 A, B	
T2701	TRANSFORMER, R. F.: tuned; primary -90 uhy, secondary 200 uhy, $Q=25$ or greater at 790 kc.	250 Kc Input	TT-133
T2702	TRANSFORMER, R. F.: tuned; 3 winding, operating frequency 1.75 -3.75 mc.	Bal. Mod. In	TT-124
T2703	TRANSFORMER, R. F.: tuned; 1.75 -3.75 mc, primary winding 21 uh, secondary 4.3 uh, $Q=40$ at 5 mc.	MF Output	TT-123



**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
T2704	TRANSFORMER, R. F. : tuned; 15.75 -33.75 mc operating frequency; total inductance, .40 uh, $\pm$ .01 uh; consists of 110 uf capacitor.	p/o 1st Ampl. Tank Osc.	TT-132
T2705	TRANSFORMER, R. F. : 8-16 mc; slug tuned.	Same as C2745	CL-164
T2706	TRANSFORMER, R. F. : 4-8 mc; slug tuned.	Same as C2745	CL-163
T2707	TRANSFORMER, R. F. : 16-32 mc; slug tuned.	Same as C2745	CL-188
T2708	Same as T2705.	Same as C2755	
T2709	Same as T2706.	Same as C2755	
T2710	TRANSFORMER, R. F. : tuned; 1.75 -3.75 mc; 3 uhy, Q=60 or greater; test frequency 2.5 mc.	Same as C2755	TT-127
T2711	TRANSFORMER, R. F. : 15.75 -33.75 mc operating frequency; L = .39-.41 uh, Q=170 or greater; test frequency -25 mcs.	Same as C2755	CL-264
T2712	Same as T2705.	Same as C2735	
T2713	Same as T2706.	Same as C2755	
T2714	Same as T2709.	Same as C2745	
T2715	TRANSFORMER, R. F. : 16-32 mc; slug tuned.	Same as C2755	CL-189
T2716	TRANSFORMER, R. F. : 8-16 mc; slug tuned.	Same as C2755	CL-165
T2717	Same as T2706.	Same as C2735	
T2718	TRANSFORMER, R. F. : tuned; 1.75 -3.75 mc; 3 uhy, Q=60 or greater; test frequency = 2.5 mc.	Same as C2755	TT-126
V2701	TUBE, electron: duo triode; 9 pin miniature.	Balance Modulator	12A77
V2702	TUBE, electron: sharp cutoff R. F. pentode; 7 pin miniature.	Mid-Frequency Amplifier	6AH6
V2703	Same as V2702.	Metering Tube	
V2704	TUBE, electron.	IF Bal. Mod	6AU6
V2705	Same as V2704.		
V2706	Same as V2702.	1st RF Amplifier	
V2707	TUBE, electron: power pentode; wide band amp., 9 pin miniature.	2nd RF Amplifier	6CL6
V2708	TUBE, electron: beam power; large wafer octal base with sleeve, duo triode; 9 pin miniature.	RF Output	6146
V2709	Same as V2702.	HF Amplifier	
W2701	CABLE ASSEMBLY, RF.	IF Input	CA-621-19.50

**FREQUENCY AMPLIFIER CHG-2  
MF-RF CHASSIS**

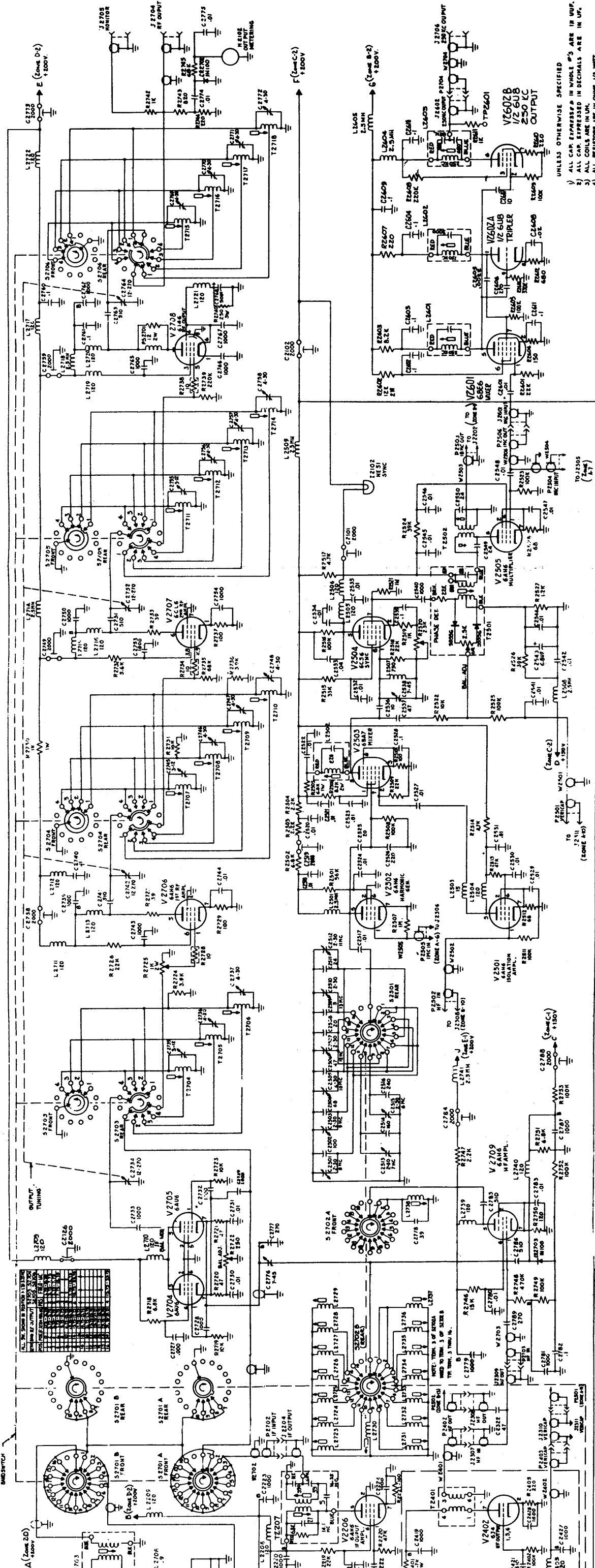
SYM.	DESCRIPTION	FUNCTION	TMC DWG. OR PART NO.
W2702	CABLE ASSEMBLY, RF.	IF Output	CA-621-21.00
W2703	CABLE ASSEMBLY, RF.	BAL. MOD. Input	CA-622-12.00
W2704	CABLE ASSEMBLY, RF.	HF Input	CA-480-14-35.50
XV2701	SOCKET, electron tube: 9 pin miniature.	Socket for V2701	TS-103-P01
XV2702	SOCKET, electron tube: 7 pin miniature.	Socket for V2702	TS-102-P01
XV2703	Same as XV2702.	Socket for V2703	
XV2704	Same as XV2702.	Socket for V2704	
XV2705	Same as XV2702.	Socket for V2705	
XV2706	Same as XV2702.	Socket for V2706	
XV2707	Same as XV2701.	Socket for V2707	
XV2708	SOCKET, electron tube: octal.	Socket for V2708	TS-101-P01
XV2709	Same as XV2702.	Socket for V2709	

SYM.	DESCRIPTION	APPLICATION	TMC DWG. OR PART NO.
C401	CAPACITOR, electrolytic: 80 uf; 450V	CPP-1, 5	CE51F800R
C402	CAPACITOR, electrolytic: 80 uf; 450V	CPP-1, 5	CE51F800R
C403	CAPACITOR, fixed: paper	CPP-1, 5	CN-110-103-G
C404	CAPACITOR, fixed: paper; 6.0 uf; 660 WVDC (Purchased as a matched set with transformer T401)	CPP-5 only	CP-111
CR401	DIODE, rectifier: silicone	CPP-1, 5	1N1084
CR402	DIODE, rectifier: silicone	CPP-1, 5	1N1084
CR403	DIODE, rectifier: silicone	CPP-1, 5	1N1084
CR404	DIODE, rectifier: silicone	CPP-1, 5	1N1084
F401	FUSE, 2 amp (115V OPERATION)	CPP-1, 5	FU-102-2
F401	FUSE, cartridge: SLO-BLO, lamp (230V OPERATION)	CPP-1, 5	FU-102-1
F402	FUSE, 3 amp (115V OPERATION)	CPP-1, 5	FU-102-3
F402	FUSE, cartridge: SLO-BLO, 1.5 amp (230V OPERATION)	CPP-1, 5	FU-102-1.5
F403	FUSE, 0.5 amp (115V OPERATION)	CPP-1, 5	FU-102-.5
I401	LAMP, incandescent	CPP-1, 5	BI-101-47
J401	RECEPTACLE, male: twist lock 3 wire	CPP-1, 5	JJ-175
J402	RECEPTACLE	CPP-1, 5	MS3102A-20-27S
L401	REACTOR, filter	CPP-1, 5	TF-5013
L402	REACTOR, filter	CPP-1, 5	TF-5013
P401	CONNECTOR, plug: female 3 prong	CPP-1, 5	PL-176
P402	CONNECTOR, plug: male 2 prong	CPP-1, 5	PL-171
R401	RESISTOR, fixed: wirewound; 2K, 10W	CPP-1, 5	RW-109-28
R402	RESISTOR, fixed: composition	CPP-1, 5	RC32GF104K
T401	TRANSFORMER, power	CPP-1 only	TF-226
T401	TRANSFORMER, power: regulated (Purchased as a matched set with capacitor C404)	CPP-5 only	TF-230
V401	TUBE, electron	CPP-1, 5	OA2
W401	CABLE, AC (includes P401 and P402)	CPP-1, 5	CA-555-1
XC401	SOCKET, octal	CPP-1, 5	TS-101-P01
XC402	SOCKET, octal	CPP-1, 5	TS-101-P01

## POWER SUPPLY CPP-1, 5

SYM.	DESCRIPTION	APPLICATION	TMC DWG. OR PART NO.
XCR401	HOLDER, rectifier: polarized	CPP-1, 5	CU-128
XCR402	HOLDER, rectifier: polarized	CPP-1, 5	CU-128
XCR403	HOLDER, rectifier: polarized	CPP-1, 5	CU-128
XCR404	HOLDER, rectifier: polarized	CPP-1, 5	CU-128
XF401	FUSE, extractor: post	CPP-1, 5	FH-104-3
XF402	FUSE, extractor: post	CPP-1, 5	FH-104-3
XF403	FUSE, extractor: post	CPP-1, 5	FH-104-3
XI401	SOCKET, lens: miniature; bayonet, red frosted	CPP-1, 5	TS-106-1
XV401	SOCKET & SHIELD, miniature: 7 pin	CPP-1, 5	TS-102-P01

**SECTION 8**  
**SCHEMATIC DIAGRAMS**



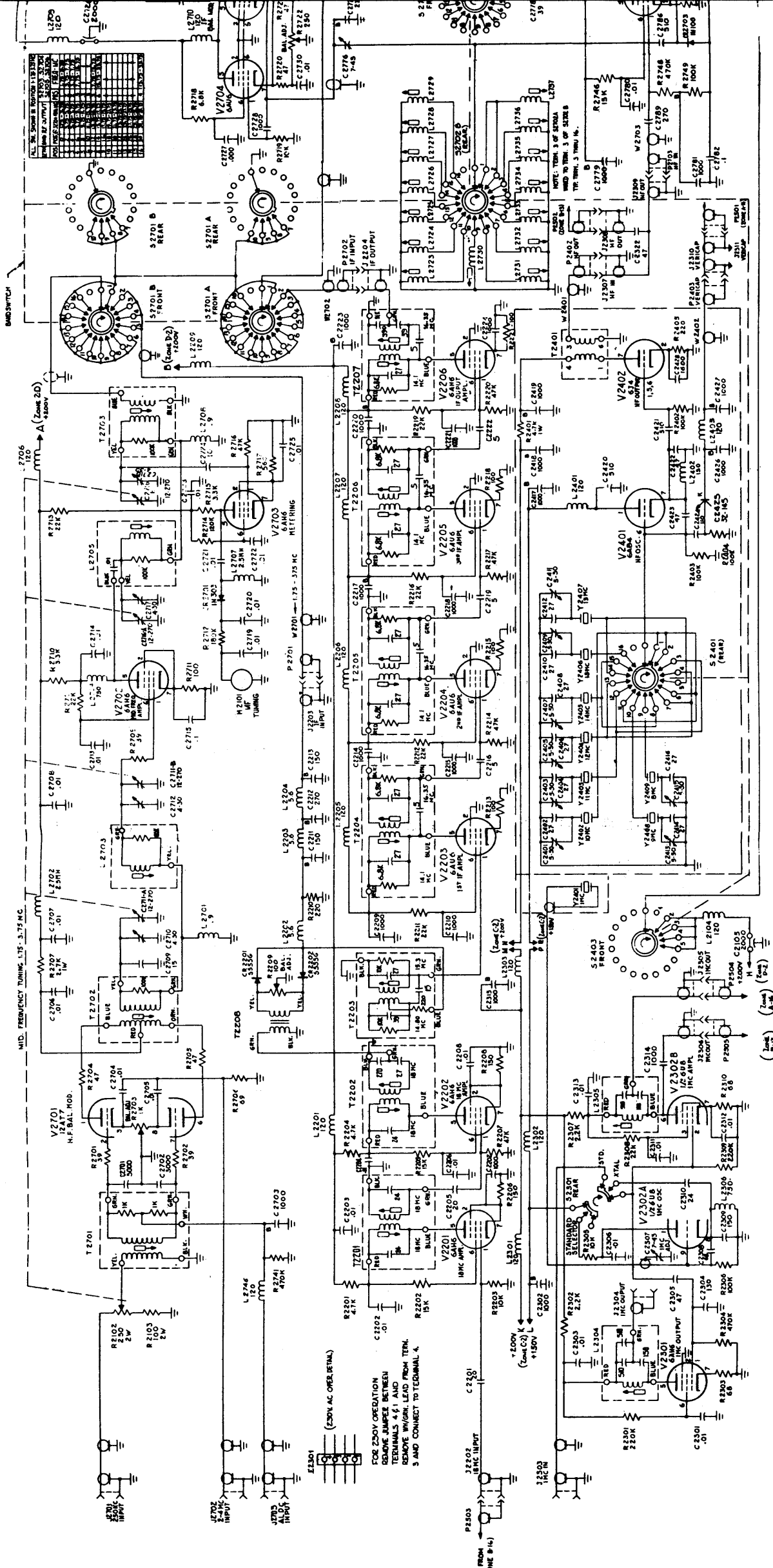
UNLESS OTHERWISE SPECIFIED  
 1) ALL CAP EXPRESSED IN WHOLE #S ARE IN UUF.  
 2) ALL CAP EXPRESSED IN DECIMALS ARE IN UF.  
 3) ALL COILS ARE IN UH.  
 4) ALL RESISTORS ARE IN OHMS, 1/2 WATT.

Figure III(A)-8-1b. Schematic Diagram, Frequency Amplifier, CHG-2 (Sheet 1 of 2)

(CK-905)

001620244

III(A)-8-5 - III(A)-8-6



MID. FREQUENCY TUNING - 1.75 - 3.75 MC.

ANTENNA SWITCH

REAR FRONT

FROM (ZONE 814)  
150V  
250V  
200V

(200V) (100V)

(250V) (150V)

NOTE: TERMINAL 3 OF SETWA  
WAS TO TERMINAL 3 OF SETWB  
BY THE TERM. 3 THRU IN.

(200V) (100V)

(250V) (150V)

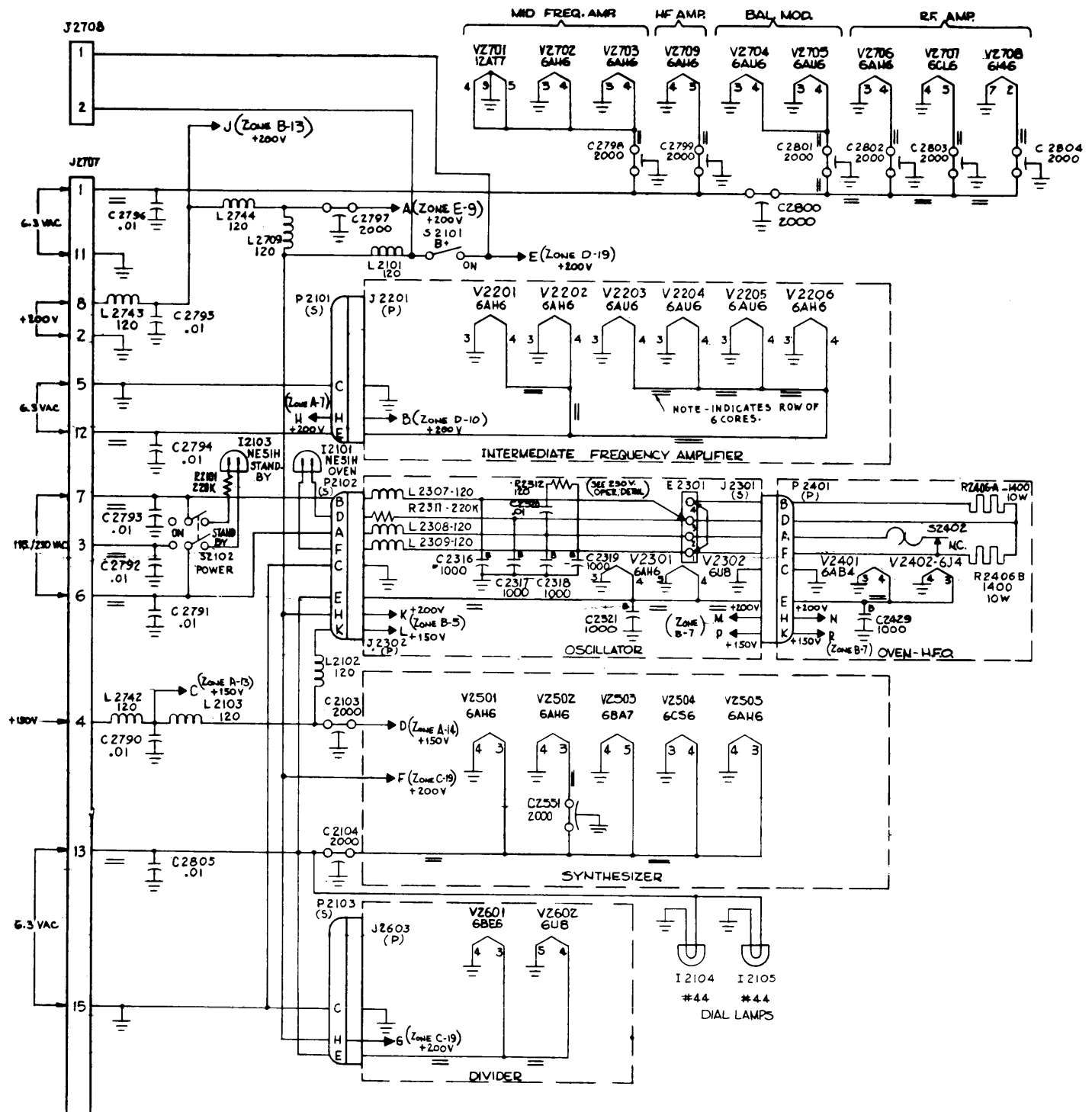


Figure III(A)-8-1b. Schematic Diagram, Frequency Amplifier, CHG-2 (Sheet 2 of 2)

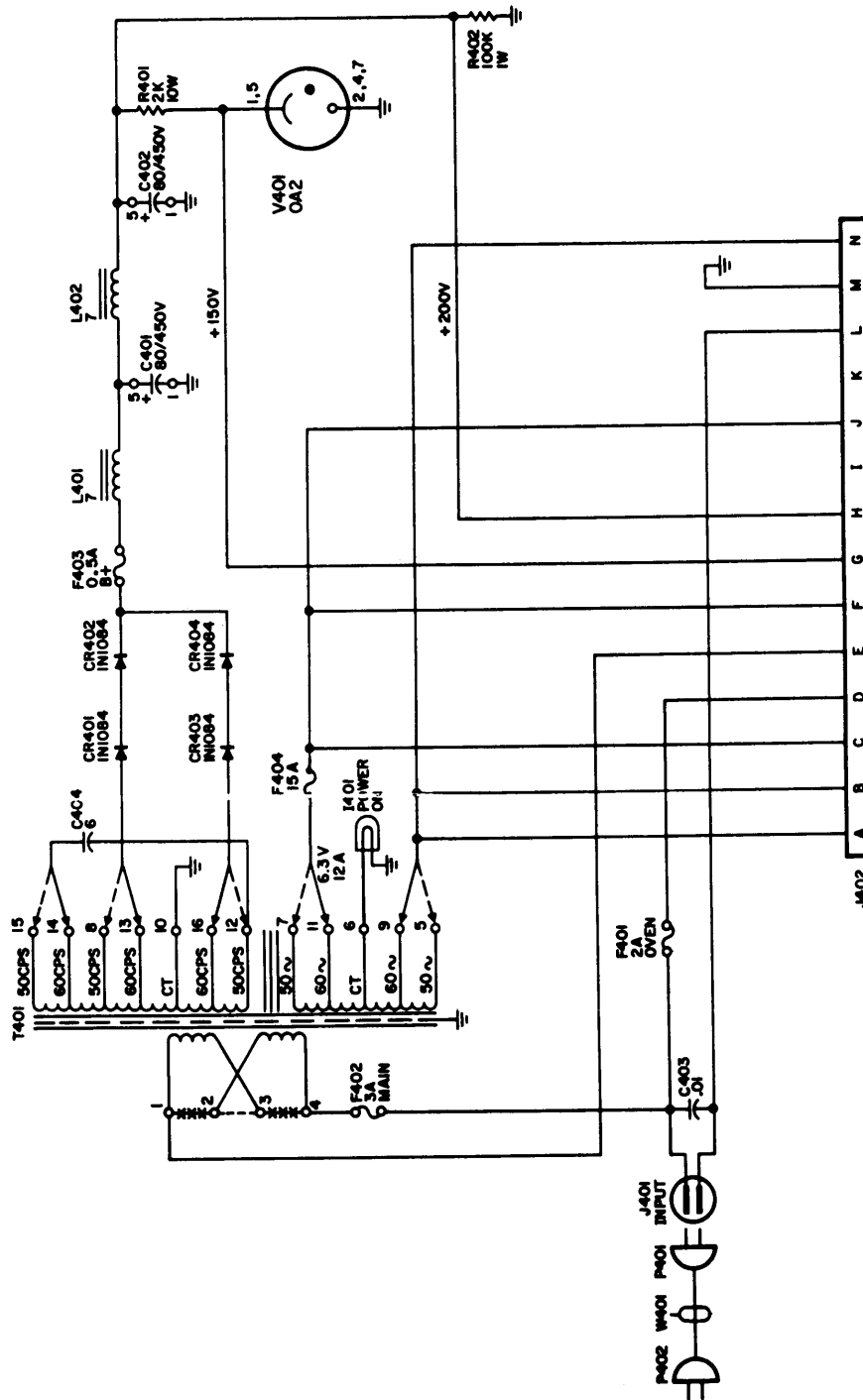


**FOR 230V OPERATION OF T401**

- 1- REMOVE JUMPERS MARKED \*\*\* FROM TERMINALS 1, 2 & 3, 4.
- 2- ADD JUMPER MARKED --- BETWEEN TERMINALS 2 & 3.

**FOR 50~ OPERATION OF T401**

- 1- REMOVE LEAD FROM TERMINAL 14 AND CONNECT IT ON TERMINAL 15.
- 2- . . . . . 13 . . . . . 8.
- 3- . . . . . 16 . . . . . 12.
- 4- . . . . . 11 . . . . . 7.
- 5- . . . . . 9 . . . . . 5.



UNLESS OTHERWISE SPECIFIED  
 ALL CAPACITORS ARE IN MICROFARADS.  
 ALL RESISTORS ARE 1/2 WATT.  
 ALL COILS ARE IN HENRIES.

LAST SYMBOLS

- C404
- CR404
- F404
- T401
- J402
- L402
- P402
- R402
- V401
- W401

MISSING SYMBOLS

Figure III(A)-8-2b. Schematic Diagram, Power Supply, CPP-5