EDISON ELECTRONICS

a McGraw-Edison Company Division

MODEL 800A
STANDARD SIGNAL GENERATOR
OPERATING INSTRUCTIONS

Grenier Field, Manchester, New Hampshire 03103 · (603) 669-0940·TWX 710-220-1747

TECHNICAL MANUAL

OPERATING & MAINTENANCE INSTRUCTIONS

MODEL 800A

STANDARD SIGNAL GENERATOR

Printed in U.S.A.

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SUPPLEMENTARY SHEET

MEASUREMENT 800 SERIES
STANDARD SIGNAL GENERATORS

The frequency ranges of the Model 800 series of generators are listed below.

	MODEL 800	MODEL 801
"A" Range	25 MHz to 33 MHz	25 MHz to 33 MHz
"B" Range	32 MHz to 42 MHz	32 MHz to 42 MHz
"C" Range	41 MHz to 54 MHz	41 MHz to 54 MHz
"D" Range	130 MHz to 175 MHz	68 MHz to 88 MHz
"E" Range	400 MHz to 470 MHz	130 MHz to 175 MHz
"F" Range	890 MHz to 960 MHz	400 MHz to 475 MHz

	MODEL 802	MODEL 803
"A" Range	25 MHz to 33 MHz	25 MHz to 33 MHz
"B" Range	32 MHz to 42 MHz	32 MHz to 42 MHz
"C" Range	41 MHz to 54 MHz	41 MHz to 54 MHz
"D" Range	68 MHz to 88 MHz	130 MHz to 175 MHz
"E" Range	88 MHz to 115 MHz	400 MHz to 475 MHz
"F" Range	130 MHz to 175 MHz	475 MHz to 520 MHz

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FOREWORD

Additional information with regard to the applications and maintenance of this equipment will be available from time to time. Users of the Model 800A Standard Signal Generator are urged to discuss their problems with us and to suggest such modifications as might make the instrument more adaptable to their special requirements.

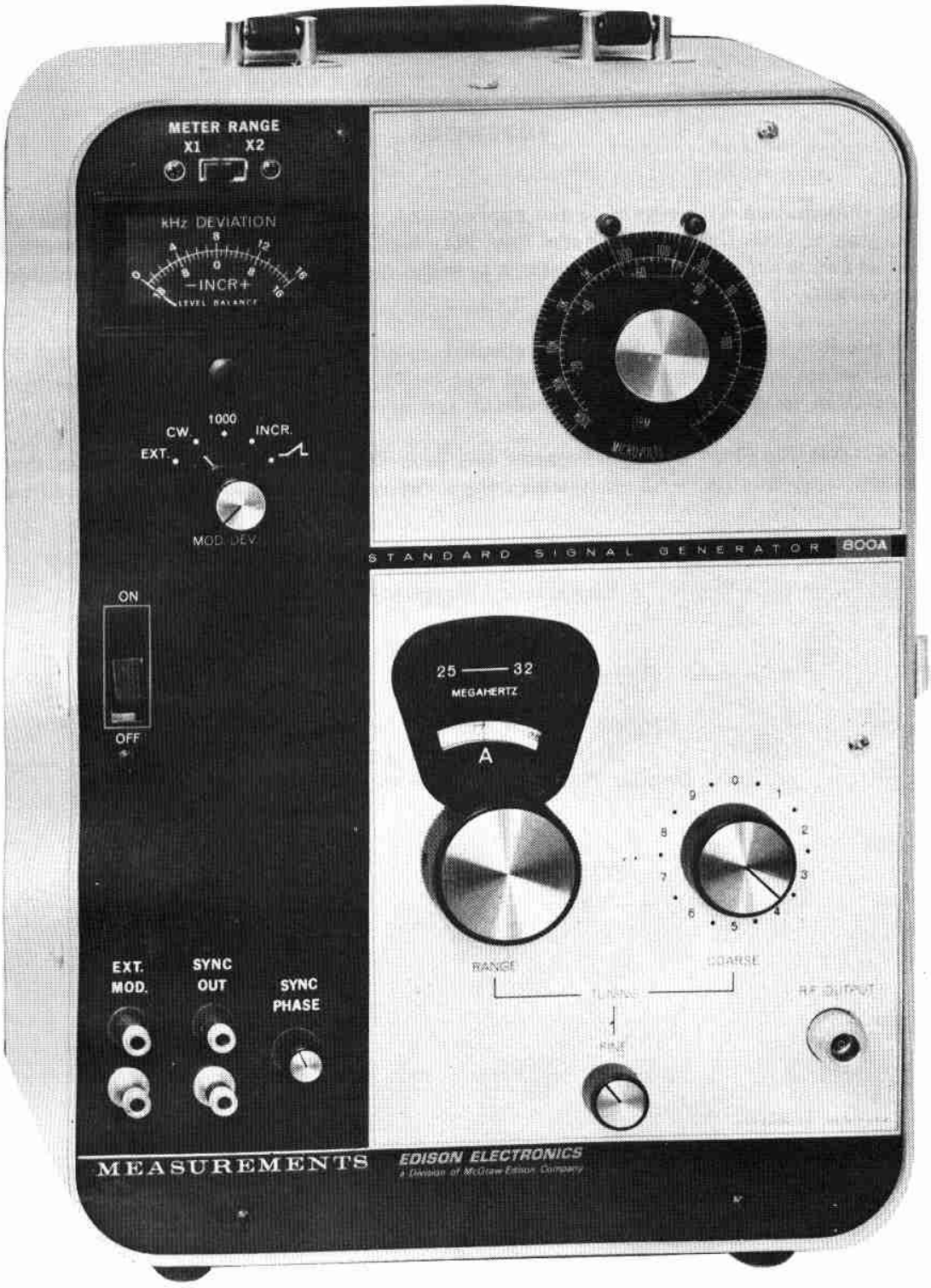
Whenever possible, maintenance difficulties should be reported to EDISON ELECTRONICS DIVISION (Measurements) before proceeding with the actual repairs. Through our familiarity with the instrument, we are in a position to suggest the most expedient and accurate repair procedure.

Your Model 800A Standard Signal Generator has been designed and manufactured to the highest standards of instrument quality. With reasonable care, many years of trouble-free service can be expected of it.

Engineering Department

MEASUREMENTS

EDISON ELECTRONICS DIVISION
McGraw-Edison Company
Grenier Field, Manchester, N.H. 03103



MODEL 800-A STANDARD SIGNAL GENERATOR

FIG. 1

SECTION I

INTRODUCTION

SCOPE OF MANUAL

This manual describes the basic operation and maintenance of the Model 800A Standard Signal Generator. Also included are the recommended procedures for preparing the instrument for reshipment or for prolonged storage, and a list of replaceable parts.

SECTION II

DESCRIPTION AND DATA

GENERAL

The Model 800A Standard Signal Generator is a portable test instrument for checking the operation of mobile communication receivers. CW or frequency-modulated carrier waveforms may be selected as required. Provisions are also included for receiver alignment by the "Dual Trace" method.

TECHNICAL CHARACTERISTICS

Carrier Frequency Ranges

NEW MODEL 801A

OLD MODEL

a.	Frequency	Band Letter
	25 - 32 MHz	A
	32 - 41 MHz	B
	41 - 54 MHz	C
	130 - 175 MHz	D 68-88 MHz
	400 - 470 MHz	E 130-175
	890 - 960 MHZ*	F 400-470

* Band F is calibrated on the second harmonic of the 445 to 480 MHz range.

b. The Range Switch operates a mask to expose the frequency used.

Frequency Accuracy

Each range is individually calibrated to an accuracy of + 0.5%.

Tuning

a. A Coarse Tuning Knob is geared to the main frequency dial. This knob may be set to place its indicator at zero at any desired frequency.

b. A Fine Tuning Knob electronically fine tunes the oscillator.

R.F. Output Voltage

a. The output voltage is continuously variable from 100,000 microvolts to 0.1 microvolt. The output is also calibrated from -8 to -128 DBM. (0 DBM is one milliwatt into 50 ohms). An individually calibrated correction curve is supplied for band F.

b. A pad mark is provided on the fiducial so that the output may be read directly when a 2-to-1 voltage-ratio (6 db) pad is employed.

c. The output is calibrated in terms of the voltage developed across a 50-ohm resistive termination.

5. R.F. Output System

a. The mutual inductance attenuator is of the wave-guide-below-cut-off type. This attenuator has excellent incremental calibration accuracy determined by its physical dimensions which are held to close tolerances.

b. The output voltage reference level is continuously monitored by a temperature-compensated barretter bridge.

c. The output of the barretter bridge controls the automatic output level adjusting circuit. The microvolt reference level is accurate to +10% from 25 MHz to 470 MHz; an output chart is provided for 890 to 960 MHz.

d. To improve reliability, no resistor is used in series with the output pick-up loop. Inadvertently operating the press-to-talk button when servicing mobile equipment could burn out such a resistor. An external pad, Measurement's Part No. 800-P-1 or 800-P-3, may be used to improve the VSWR of the output system.

6. Shielding

a. Double shielding is used on the oscillator to reduce stray radiation to a low value of less than .1 microvolt.

b. Multi-section individually-shielded r.f. filters are used on all circuits supplying the oscillator.

c. Carrier leakage is negligible on all frequency ranges.

7. Frequency Modulation

a. The Model 800A is an FM signal generator utilizing variable-capacitance diodes in the frequency modulator.

b. An internal 1000 hertz Wien bridge RC oscillator provides modulation voltage. Peak deviation may be varied from zero to 16 KHz.

The Model 800A may also be externally modulated. Approximately 1 Vrms is required for 16 KHz deviation. Frequency deviation response is within 1 db from d c to 15 KHz.

c. An internal 20 Hz saw-tooth generator provides continuously adjustable metered sweep width up to 64 KHz peak-to-peak.

d. Internal DC modulation voltages provide metered INCREMENTAL Carrier shifts up to 16 KHz each side of carrier.

8. Residual Modulation

a. Residual FM is less than 100 hertz at 460 MHz.

b. Regulated dc power supplies are used for the plate and the heater of the oscillator tube.

9. Frequency Deviation

a. Peak deviation is indicated directly on the panel meter for all bands.

b. Deviation accuracy is within +10% of full scale.

c. Means are provided for manually shifting the carrier frequency +16 kilohertz (INCREMENTAL) to facilitate discriminator alignment. This is accomplished by varying the d c potential applied to the variable-capacitance diodes. The frequency shift, in kilohertz, is indicated by the panel meter.

10. Power Supply Source

a. Potential 115 or 230 volts +10%

b. Frequency 50 to 60 Hertz

c. Power Consumption 16 watts

11. Sync Out Voltage

The output voltage at these terminals is proportional to the EXT. MOD. input voltage. A 2.2V rms, 20 Hz. EXT. MOD. input voltage will generate a 0-5 volt (0-pk) full wave rectified Sync Output voltage. The rectified voltage is phase shifted 90° (nominally) from the EXT. MOD. voltage and can be varied +10° from nominal.

C. DESIGN FEATURES

1. The electrical and mechanical design of the Model 800A Standard Signal Generator is based upon many years of experience gained in manufacturing thousands of Standard Signal Generators. The Model 800A is a standard of radio frequency voltage. It generates an accurately calibrated voltage at an accurately calibrated frequency. Solid state circuitry is used wherever practical to reduce operating temperature and improve stability.

2. In accordance with Measurement's policy of maintaining high-quality features in instruments, the Model 800A uses a temperature-compensated barretter bridge for continuously monitoring and controlling the level of the output voltage. The barretter bridge is the most accurate standard presently available for RF voltage measurement and, because of its response, insures a high degree of absolute voltage accuracy. It is superior to a crystal diode in its stability, its freedom from errors due to temperature changes, and in its excellent long-term stability.

3. RF leakage is negligible and microphonics have been minimized to make the Model 800A suitable for checking the most sensitive receiver.

4. A solid state internal oscillator provides a 1000 Hz modulation frequency. Modulation from an external source may also be used.

5. A solid state internal 20 Hz saw-tooth generator provides linear carrier sweep up to 64 KHz peak-to-peak as indicated on the internal modulation meter.

7. Regulated and well-filtered direct-current power supplies are used for oscillator plate and heater to provide good frequency stability and to minimize residual FM due to power frequency hum. The power transformer is floated on rubber mounts to reduce power-line-frequency mechanical vibration of the oscillator components.

8. The frequency bands have been designed to give excellent band spread by using a tuning ratio of approximately 1.3 to 1.0. This small tuning range permits the use of a variable capacitor with heavy rotor plates and wide plate spacing to reduce microphonics to a minimum.

9. Frequency modulation is produced by two variable-capacitance diodes connected across

the stator plates of the tuning capacitor through adjustable trimmer capacitors to obtain optimim Q, low distortion, and maximim stability.

10. Deviation compensation is provided by a tracking potentiometer ganged to the tuning dial and individual level-setting potentiometers for each frequency band. The deviation is indicated directly on the panel meter for all bands.
11. A means is provided for incremental change in carrier frequency to facilitate discriminator alignment. This is accomplished by varying the dc potential applied to the variable-capacitance diodes. The frequency shift, in kilohertz, is indicated by the panel meter.
12. Electronic Fine Tuning is provided enabling very fine adjustment of carrier frequency with or without modulation.
13. Provisions are included for receiver alignment by the "Dual Trace" method (see Appendix I).

D. COMPONENTS SUPPLIED

The following is included with each shipment:

1 Model 800A Standard Signal Generator

Approx. Weight	24 lbs with transit cover
Height	14-1/2"
Width	10-1/2"
Depth	10-1/2"
Volume	1 cubic foot

1 Manual of Operating and Maintenance Instructions

E. PACKAGING

	Domestic	Export
Approx. Wt.	34 lbs	46 lbs
Height	15"	16-1/2"
Width	20-1/2"	22-1/2"
Depth	12-1/2"	16"
Volume	2.3 cu. ft.	3.5 cu. ft.

For export shipment the Model 800A is usually packed in a domestic carton for air shipment or combination with other items. Export packing in wooden boxes for ocean freight is available at extra cost.

SECTION III

CONTROL FUNCTIONS

A. POWER

1. The ON-OFF Switch controls the application of line voltage to the primary of the power transformer.
2. The FUSE (located at the rear of the instrument) protects against overloads.

B. TUNING DIAL

1. The RANGE Knob selects one of the six frequency ranges. The range letter and frequency appears in the window above the knob as it is rotated.
2. The COARSE TUNING Knob sets the desired carrier frequency. The frequency is directly indicated under the fiducial line in the panel opening directly above the RANGE Knob. The Frequency Dial will automatically disengage when the usable part of the tuning range has been passed. To facilitate selectivity measurements about any center frequency the Frequency Dial may be disengaged from the tuning mechanism by pressing the Coarse Tuning Knob to the right. The Coarse Tuning Knob may then be rotated so that it may be placed at zero with reference to its calibration marks.
3. The FINE TUNING Knob electronically fine tunes the carrier.

C. EXT. MOD.

1. The EXT. MOD. binding posts on the left side of the panel permit the application of an external signal for frequency modulation of the carrier.
2. Approximately 16 KHz FM deviation is produced at 1.0 V rms of modulating signal. The deviation is indicated on the panel meter.

D. OUTPUT CONTROL

1. The OUTPUT Control is a dial calibrated in MICROVOLTS and DBM. This dial adjusts the position of the output loop in the piston attenuator and will indicate the true output in MICROVOLTS or DBM when the R.F. OUTPUT connector is terminated in a 50 ohm resistive load.
2. In order to check the output R.F. level, the MOD. switch must be in the CW position. This connects the meter to the output bridge circuit. When the MOD. switch is in any other position, the meter is disconnected from the barretter bridge and is used to indicate frequency deviation.
3. When a 50 ohm, 6 db pad is connected between output connector and 50 ohm load resistor, the output level is read directly beneath the pad line on the plastic fiducial.

E. MOD - DEV SWITCH

1. The MOD - DEV Switch is located directly below the meter. Its purpose is to supply the carrier signal with the type of modulation desired.
   a. The EXT. position allows external modulation to be applied to the oscillator via the two EXT. MOD. binding posts located at the left side of the front panel. This deviation is indicated on the panel meter.
   b. The CW position provides an unmodulated continuous-wave carrier. In this position the panel meter is connected to the bolometer bridge for R.F. voltage level checking.
   c. The 1000 hertz position applies approximately 1 V rms to the modulator input for internal 1000 Hz modulation.
   d. The INCR. Position permits incremental adjustment of the carrier frequency.
   e. The SAW-TOOTH position applies a sweep voltage to the modulator input for internal modulation. The saw-tooth wave-form is also available from the EXT. MOD. binding posts for application to the horizontal or sync. input of an oscilloscope.

F. DEV. CONTROL

1. The DEV. Control is a potentiometer which controls frequency deviation when either internal or external modulation is employed. It also adjusts incremental frequency shift. It is operated by the smaller knob on the MOD - DEV switch.
2. The frequency deviation, or incremental frequency shift, is indicated on the panel meter.

G. METER

1. The meter is used to check the reference level of output voltage and also to measure deviation.
2. When the MOD - DEV switch is in the CW position, the meter is connected to the barretter bridge to monitor the R.F. output level.
3. When the MOD -DEV switch is in any other position, the meter is disconnected from the barretter bridge and indicates frequency deviation in KHz. In this case the meter is connected to a crystal diode rectifier and operates as an a c voltmeter.
4. When the MOD - DEV switch is in the INCR. position, the meter indicates incremental shift in carrier frequency.

H. METER RANGE SWITCH

The Meter Range Switch is used to double the range of the meter. This is accomplished by placing a shunt across the meter terminals. Thus, in the X2 position, +32 KHz of deviation can be measured.

I. SYNC OUT

The Sync Out binding posts are only used during Dual Trace Alignment of a receiver. The voltage available at these posts is generated directly from the input signal at the EXT. MOD. jacks. It is first phase shifted and then full wave rectified to provide a synchronous (with the audio modulation voltage) phase adjustable sync signal at twice the modulation frequency.

J. SYNC PHASE

The Sync Phase control is only used when performing receiver alignment by the Dual Trace method. Its function is to vary the phase angle of the voltage available at the Sync Out terminals. Thus, during Dual Trace Alignment, the Phase control provides the means of overlaying the two IF patterns on the oscilloscope.

SECTION IV

SERVICE UPON RECEIPT OF INSTRUMENT

A. PRELIMINARY INSPECTION

The following preliminary checks will indicate whether or not the instrument is operating properly.

1. Connect the power cord to a power source of 115 volts 50-60 hertz alternating current (unless a special nameplate is attached to the instrument indicating that it has been wired for 230 volts 50-60 hertz operation). Turn the power ON and note whether the Frequency Dial and Meter are illuminated. If not, check the line cord connections and fuse. If the fuse is defective replace it with a new Type MDL slow blow fuse.
2. Allow about ten minutes for the instrument to stabilize.
3. Rotate the RANGE Knob until the letter "A" appears in the window above the knob. Rock the knob slightly from side to side to make cer-

tain that the range change mechanism has locked into position.

4. Place the MOD - DEV Switch in the CW position. The meter pointer should rest on the LEVEL BALANCE mark on the meter dial.
5. Repeat steps A.3. and A.4. for each frequency range.
6. Place the MOD - DEV Switch in the 1000 position and rotate the Dev control from full counterclockwise to the full clockwise position. The Meter pointer should deflect from zero to full scale.

SECTION V

OPERATION

A. OPERATING PROCEDURE

1. Connect the power cord to a source of 115 volt 50-60 hertz alternating current (unless a special nameplate is attached to the instrument indicating that it has been wired for 230 volt 50-60 hertz operation.) Place the ON-OFF switch in the ON position. Allow about ten minutes for the instrument to become stabilized.
2. Rotate the RANGE Knob to select the desired frequency band.
3. Set the COARSE TUNING Knob to the desired carrier frequency and adjust the FINE TUNING Knob as necessary for critical frequency adjustment.
4. Turn the MICROVOLTS dial to the desired output voltage as indicated under the fiducial line.
5. To frequency modulate the carrier, set the MOD - DEV Switch to EXT., 1000, INCR., or Saw-tooth as desired. Rotate the DEV. control to desired KHz DEVIATION as indicated on the meter.
6. To frequency modulate the carrier using external modulation, connect the modulating signal to the EXT. MOD. binding posts. This signal should be approximately 1 V rms to produce the 16 KHz of deviation. Set the MOD - DEV Switch to EXT. and rotate DEV. control to desired KHz DEVIATION as indicated on the meter.
7. If incremental control of carrier frequency is desired, set MOD - DEV Switch to INCR. The DEV. control adjusts the frequency shift, as indicated on lower scale of the meter.
8. For all frequency bands, the deviation in KHz is indicated on the panel meter to an accurancy of +10% of full scale.

NOTE: The equipment under test should have a 50-ohm input, otherwise matching pads will have to be used and input voltage as read on the attenuator dial corrected.

SECTION VI

MAINTENANCE

A. GENERAL PRECAUTIONS

1. The purpose of this section is to acquaint operating and maintenance personnel with procedures for making certain adjustments that may be necessary after tube or critical parts are replaced.
2. It should be noted that most of the field replaceable parts are available from MEASUREMENTS. Please refer to MEASUREMENTS' part numbers when ordering. Pre-tested and preadjusted plug-in printed curcuit boards are also available. These generally require very slight readjustment after installation. The adjustment procedures outlined in this section should be carefully followed. When the described test equipment is not available, it would be advisable to return the Model 800A to MEASUREMENTS for repair.
3. The following precautionary procedures should be observed if the Model 800A is opened for examination:
   a. Do not attempt to readjust any controls not specifically described in the following paragraphs.
   b. Do not use an ohmmeter or other source of current without first unsoldering one terminal of each of the Bolometer Assemblies. These Bolometer elements are easily burned out and difficult to replace.
   c. The instrument should not be grounded during a soldering operation because of possible electrical leakage in soldering irons.
   d. Exposed portions of the calibrated Carrier Frequency Dial should be protected against handling. No liquids should be used for cleaning this dial.

B. REMOVING THE INSTRUMENT FROM THE CASE

1. Disconnect the power cord from the AC source.
2. Turn the MICROVOLTS Dial clockwise to the 100,000 microvolts position.

3. With the instrument in its normal upright position, remove six Phillips head screws nearest the front edge of the case. Two on each side, one on the top and one on the bottom. Break sealing wax on the bottom screw. The front section of the instrument is now free of the case except for the cable connecting it to the power supply chassis.
4. Gently tip the top of the instrument forward so that the edges of the front panel may be grasped with the hands. Remove instrument from the case.
5. Lay the instrument face down supporting the edges of the panel on a pair of 2" x 4" wood blocks or equivalent. Allow clearance so that no weight rests on the control knobs.
6. The Power Supply Assembly may be removed from the case by removing the six Phillips head screws holding it into the case.

C. REMOVING THE FRONT PANEL

1. Place the instrument with the top edge of the panel down.
2. Remove the Range, Coarse and Fine Tuning and Mod-Dev, and the Sync Phase Knobs.
3. Remove the clear plastic fiducial which is located above the Microvolts Dial. Remove the Microvolts Dial.
4. Remove the connections from EXT. MOD. and the Sync Out posts.
5. Disconnect the leads from the Meter. Mark the leads so that they may be properly replaced.
6. Remove Meter Multiplier Switch S4.
7. Remove the six Phillips head 6-32 screws (2 nickel and 4 black) from face of panel. The front panel is now free of the front section.

D. LAMP REPLACEMENT

If lamp replacement is indicated, proceed as follows:

1. For Meter Lamp replacement remove the instrument from the case. Remove bayonet 6 volt lamp and replace with a GE 44 lamp or equal.
2. For Carrier Frequency Dial Lamp replacement remove the instrument from the case and remove the front panel. Remove the bayonet 6 volt lamp and replace with a GE 44 lamp or equal.

E. POWER SUPPLY ADJUSTMENT

Remove the instrument and power supply from the case, exposing the numbered pin connections on the underside of the power supply connector mounted on the power supply chassis. With the instrument connected to the power supply and with the power supply connected to an adjustable source of A.C. power:

1. Adjust A.C. line voltage to 115 VAC (Note: Some instruments are prewired to operate on 230 VAC - adjust accordingly.)
2. Switch instrument power switch "ON".
3. Using an accurate (+3% or better) high impedance V.O.M. (20,000 ohms per volt suggested) measure and adjust the three power supply voltages as indicated. *Do not readjust power supply voltages if within +3% of nominal values.* A slight change in adjustment could effect the adjust of other circuits:

Voltage	Test Point on Connector	Adjustment Control
(adjust 1st) +115V DC	pt 3 to ground 4	+115V ADJ.
(adjust 2nd) +12V DC	pt 2 to ground 4	+ 12V ADJ.
(adjust last) -6.3V DC	pt 1 to ground 4	-6.3V ADJ.

4. Vary line voltage +15 VAC. The +115V DC and +12V DC supplies will not vary noticeably over this range. The -6.3V DC supply will vary up to 0.1 VDC.
5. If a high sensitivity oscilloscope or VTVM is available, check residual hum and noise of the three power supplies:

   +115V DC - less than 5 mv rms.
   + 12V DC - less than 1 mv rms.
   - 6V DC - less than 1 mv rms.

NOTE: Adjustment of the power supplies affects many other adjustments throughout the Model 800A. It is important therefore, that the remainder of the measurements described in this section be performed and adjustments made as indicated.

F. R.F. OSCILLATOR TUBE REPLACEMENT

If replacement of the Oscillator Nuvistor Tube V101 is indicated, proceed as follows:

1. Remove the strap holding the oscillator shield covers.
2. Twist off the outer and inner shield covers. Tools must never be used to pry off these covers as even slight dents in the cans or covers may cause serious leakage of the carrier.
3. Remove the lower screw from roller spring on top of the coil disc and retract the upper screw

sufficiently to permit roller to be removed. Rotate the spring to clear the coil disc.

4. Rotate coil disc to place detent roller midway between detent positions.
5. Hold coil disc firmly and remove nut which secures the coil disc (use a 1" spanner wrench).
6. Lift the detent roller clear of disc edge and carefully lift coil disc assembly from its hub. The oscillator tube is now available for replacement. If possible, select a tube which has the least effect on the frequency calibration.
7. Retract the detent roller, making certain its spring is engaged. Lower the coil disc in proper position to engage the flatted portion of the coil disc hub. Release detent roller against the edge of coil disc and rock disc until it is properly seated. Replace the coil disc nut and tighten firmly.
8. Replace the roller, insert the lower roller spring screw and tighten both screws.
9. Check alignment of the three coil contacts with their respective contact posts on the capacitor assembly since misalignment may cause serious damage.

G. R.F. OSCILLATOR VOLTAGE VARIABLE CAPACITOR REPLACEMENT

CAUTION

The voltage variable capacitors used in the Model 800A have seldom been a cause of trouble. Throughout the years Measurements has produced many thousands of Signal Generators employing similar or identical modulators. Although the voltage variable capacitors have often been suspected of causing noise, instability and even hum in the Signal Generators, the problems could almost invariably be traced to other causes. Installation and adjustment of the voltage variable capacitors is particularly critical and should only be performed after very careful consideration.

1. Remove the R.F. Oscillator shield covers and coil disc as described in paragraph F.
2. Unsolder and replace the entire Voltage Variable Capacitors assembly including C102 and C105 trimmer capacitors, Voltage Variable Capacitors C103 and C104, and 150K resistors R103, R104, and R105. The trimmer closest to the panel (C102) should be preset to 5 pf., before the assembly is installed in the oscillator.
3. Replace the coil disc assembly as described in paragraph F.
4. Set Generator to "A" Range and set frequency to 25 MHz.
5. Modulate the oscillator using the internal 1000 Hz modulation (set to 16 KHz deviation).
6. Using an external Standard Deviation Meter such as Measurements Model 140 A or Model 920, measure the actual deviation.
7. Adjust trimmer C105 until the actual deviation measures 16 KHz.

NOTE: The voltage at the wiper of section 3 of the Deviation Band switch should measure 6 VAC rms with approximately 55V DC bias and 16 KHz deviation. If not, set the deviation control to provide these voltages regardless of the internal modulation meter reading. Reset trimmer C105 to obtain 16 KHz deviation as measured on the external Deviation Meter. This will necessitate readjustment of the Deviation Adjust Potentiometers as outlined in paragraph L of this Section.

H. R.F. OSCILLATOR BOLOMETER REPLACEMENT

CAUTION

In testing the bolometer circuit, do not use an ohmmeter or other source of current without first unsoldering one terminal of each of the bolometer assemblies. The Bolometer elements are easily burned out and difficult to replace. The instrument should not be grounded during a soldering operation because of possible electrical leakage in the soldering iron.

1. Remove R.F. Oscillator shield covers and coil disc as in paragraph F, exposing the Bolometer block assembly.
2. Make careful note of the leaddress of the wires and cable leading to and from the bolometer block (including the wire passing through the sub-panel of the instrument).
3. Disconnect the resistance wire insulated leads from the filter terminals by unsoldering carefully.
4. Disconnect the wire which passes through the sub-panel to the r.f. choke by unsoldering the choke end.
5. Remove the three 6-32 screws which attach the block to the shields and sub-panel.
6. Gently remove the bolometer block, drawing the attached wire through the sub-panel. Allow

the shielded cable to remain attached to the block.

7. Unsolder the lead attached to the bolometer through the lead washered hole in the bottom of the block. Also detach the connection to the terminating resistor R109 through the access hole in the bottom of the block.
8. Loosen the 4-40 Allen head set screws and slide the bolometer assemblies from the block.
9. Reinstall repaired bolometer block assemblies into the block; resolder connections and retighten set screws. Reshape the lead washer slightly concave to assure positive seal of the shield and sub-panel hole.
10. Reinstall the bolometer block. Tighten the three mounting screws evenly to assure tight lead washer seal.
11. Reconnect all leads carefully and redress to minimize effects of leakage and spurious resonance.
12. Reinstall the coil disc and the shield covers as described in paragraph F.

I. AUTOMATIC OUTPUT BOARD ADJUSTMENT

1. Connect the R.F. output of the Model 800A through a MEASUREMENTS Type H-5710 cable and Type 800-P-3 (6db) pad to the input of a MEASUREMENTS Model 202C Standard Barretter Bridge.
2. Carefully adjust the mechanical zero of the Model 800A meter.
3. Disconnect the lead from the R.F. filter capacitor C109. Insulate the lead from the grounded chassis.
4. Connect the ouput of an external variable power supply to C109. The power supply should be capable of supplying up to 25 ma dc.
5. Turn the Model 800A power ON to provide filament voltage to the oscillator nuvistor tube V101.
6. Set the output of the Model 800A to 0.1 volt on the attenuator dial.
7. Adjust the external power supply to provide a 50 mv reading on the Barretter Bridge.
8. With the Model 800A MOD switch in the CW position, adjust the OUTPUT ADJ. pot on the INCR., DIST. printed circuit board until the Model 800A meter reads zero.
9. Short the input to the bases of Q701 (on the AUTOMATIC OUTPUT printed circuit board) together. Be extremely careful not to short either of these points to ground or to any other point on the socket. This could instantly destroy the bolometers in the R.F. Oscillator circuit. Adjust the BAL. control R708 for zero reading on the Model 800A Meter.
10. Adjust BIAS control, R704, for a reading of 75V DC as measured at the output of Q703 using an accurate high impedance V.O.M. This voltage reading is available from the lead previously disconnected from C109.
11. Turn the Model 800A Power OFF and remove the external power supply.
12. Disconnect the short at the input to Q701.
13. Reconnect the output lead to C109.
14. Turn the power on and test each Range of the Model 800A to see that the meter "zeroes" in the C.W. position. The output voltage measured at C109 should vary within the range of 25V DC to 105V DC in the normal control of output level.
15. If the readings on the Model 202C do not spread properly about the 50 MV reading, readjust the OUTPUT ADJ. accordingly. Recheck the output throughout each frequency range.

J. OUTPUT (INCR. DIST. BOARD PT. 3) ADJUSTMENT

1. Check each frequency range of the Model 800A with the MOD switch in C.W. to see that the Automatic Output Board and the R.F. Oscillator are functioning properly.
2. Connect the output of the Model 800A through a Measurements Type H-5710 cable and Type 800-P-3 (6 db) pad to the input of a Measurements Model 202C Standard Barretter Bridge.
3. Set the Output Attenuator of the Model 800A to 0.1 volts (100K uv). The reading on the temperature stabilized and "zeroed" Barretter Bridge should be 50 mv +10%.
4. Check each frequency range of the Model 800A for output voltage accuracy.
5. Adjust the OUTPUT ADJ., R309 located on the INCR. DIST. printed circuit board for optimum compromise of output accuracy over the frequency ranges of the Model 800A. Allow a few seconds after each adjustment for the Automatic Output circuit to stabilize.

K. DEVIATION AMPLI. BOARD ADJUSTMENT

1. Attach a VTVM such as Measurements Model 162 or Model 162R to the collector of Q502 on the Dev. Ampli. Board. Set the meter to the +100V DC range.

2. Turn the Model 800A power on.
3. Turn the DEV. control on the Model 800A to maximum CCW in the EXT. modulation position.
4. Adj. BIAS II, R508, for a reading of 45V on the VTVM.
5. Turn the DEV. control of the Model 800A to mid-range and rotate control back and forth about a quarter of a turn. Adj. BIAS I, R507, for zero change in VTVM reading as the DEV. control is rotated throughout its range.
6. If necessary readjust BIAS II, R508, for a 45V reading.
7. Repeat steps 5 and 6 until the conditions of reading 45V with zero effect from DEV. control rotation are met.
8. Switch MOD to the 1000 Hz position and increase the DEV. control for a 16 KHz reading on the Model 800A meter.
9. The A.C. voltage at the base and collector of Q502 should be approximately 1V rms and 10V rms respectively.

L. DEVIATION BOARD ADJUSTMENT

1. Attach a VTVM such as Measurements Model 162 or Model 162R to the C124 filter capacitor on the shield can of the R.F. Oscillator.
2. Set frequency on 25 MHz to "A" RANGE and the Power switch ON.
3. Connect the Model 800A to a Measurements Model 140A or Model 920 Standard Deviation Meter.
4. Check to see that the actual deviation as measured with the Standard Deviation Meter matches the reading of the internal Model 800A at 16 KHz. If not, readjust "A" band DEV. ADJ. R611. The voltage measured by the VTVM should be approximately 6V AC and 55V DC. If not, it probably will be necessary to readjust the R.F. Osc. Voltage Variable Capacitors as outlined in paragraph G.
5. Measure deviation at 32 MHz on "A" Range and adjust R612.
6. Alternately measure and adjust R611 and R612 until the deviation accuracy is compromised over the entire "A" Range.
7. Accurately measure the DC voltage at C124 (25 MHz on "A" range).
8. Adjust the DIST. ADJ., R307, located on the INCR. DIST. BOARD PT. 2 until the voltage at the wiper of R307 exactly equals the voltage at C124.
9. Repeat step 6, if necessary, to correct for the affect of the adjustment of the DIST. ADJ. R307.
10. Repeat steps 7, 8, and 9 until all conditions are satisfied. Note that the DIST. ADJ., R307, will not have to again be adjusted throughout the remainder of the procedure.
11. Set frequency to 32 MHz on "B" Range. Check deviation and adjust DEV. ADJ., R609, if necessary.
12. Alternately measure and adjust R609 and R610 until the deviation accuracy is compromised over the entire "B" Range.
13. Perform similar adjustments of Ranges "C", "D", and "E" with the associated DEV. ADJS., until all are adjusted as in step 1 for "B" Range.
14. Perform similar adjustment RANGE "F" but the actual deviation reading as measured by the Model 140A should be half of the indicated reading on the Model 800A. This is due to the doubling effect in using the 2nd Harm. as the calibrated output frequency of RANGE "F".

M. DISTORTION (INCR. DIST. BOARD PT. 2) ADJUSTMENT

The adjustment of the DIST. ADJ., R307 normally affects the accuracy of "A" Range deviation. Distortion Adjustment should not be attempted except as part of the Deviation Board Adjustment procedure. Refer to paragraph L of this section.

N. INCREMENTAL (INCR. DIST. BOARD PT. 1) ADJUSTMENT

1. Attach a direct coupled oscilloscope through a high impedance probe from the wiper of the DEV. Control, R51, to ground.
2. Establish a ground reference line at the vertical center of the oscilloscope.
3. Switch the Model 800A Power ON and switch the MOD switch to the 1000 Hz position. Set the Dev. Control to 16 KHz.
4. Adjust the vertical sensitivity of the oscilloscope so that, with the ground at center, the tips of the sinusoid are set to the highest and lowest graticule lines. Full scale on the oscilloscope will now correspond to the "peak-to-peak" deviation of 32 KHz (Note that the Model 800A is calibrated in terms of "peak" deviation).
5. Switch the MOD switch to the INCR. position.
6. Adjust the INCR. CENT., R306, fully CCW.

7. Rotate the DEV. Control to the point corresponding to ground on the oscilloscope. This should also cause a zero reading on the Model 800A meter. (-16 KHz on the INCR. scale).
8. Readjust the INCR. CENT., R306, for "O" INCR. reading on the Model 800A Meter.
9. Adjust the INCR. ADJ., R304, so that full scale readings on the oscilloscope correspond to full scale +16 KHz on the Model 800A Meter when the DEV. control is rotated.
10. Repeat adjustment of the INCR. CENT., R306, and INCR. ADJ., R304 so the full scale readings on the oscilloscope correspond to full scale +16 KHz on the Model 800A Meter and also that the ground reading on the oscilloscope corresponds to zero on the meter. The two adjustments are interdependent and generally require back and forth adjusting a few times until all of the three conditions are satisfied.

O. AUDIO OSC. BOARD ADJUSTMENT

1. Connect the high impedance probe of an oscilloscope to the EXT binding posts of the Model 800A.
2. Switch the Power ONand the MOD switch to the 1000 Hz position. Decrease the BIAS ADJ., R206, on the Audio Osc. Board until the oscillator drops out of oscillation. Increase the BIAS ADJ., R206 until slightly beyond where the oscillations start again. (Note that a few seconds are required for the oscillator to stabilize each time the oscillation starts.)
3. Attach an audio counter to the EXT. binding posts and measure the frequency of oscillation. Adjust the FREQ. ADJ., R207 for exactly 1000 hertz on the counter.
4. Readjust the BIAS ADJ., R206, as in steps 1 and 2 and test the starting of the oscillator by switching the MOD switch in and out of the 1000 Hz position. If the oscillator is sluggish starting, advance the BIAS ADJ., R206, slightly.
5. Observe the waveshape of the 1000 Hz sinusoid on the oscilloscope. The waveshape should be undistorted and greater than 3.5V peak-to-peak.
6. Connect a harmonic distortion analyzer to the EXT binding posts. Harmonic distortion should measure less than 0.5%.

P. SAW-TOOTH BOARD TEST

1. Attach a direct-coupled oscilloscope to the EXT. MOD. binding posts.
2. Switch the Power ON and the MOD switch to the saw-tooth position.
3. Observe the waveform of the saw-tooth as viewed on the oscilloscope. The Model 800A saw-tooth waveform should be linear providing that the oscilloscope sweep circuit is also suitably linear.
4. Advance the DEV Control to maximum. The reading should be well beyond full scale on the Model 800A Meter (X2 Range). The amplitude of the saw-tooth as measured on the oscilloscope should be greater than 6 volts peak-to-peak.

SECTION VII

EQUIPMENT USED WITH MODEL 800A

A. ACCESSORIES AND AUXILIARY EQUIPMENT

1. Accessories
   a. Type 800-P-1 Output Matching Pad, 6 db loss, with Type N Input Connector and UHF Output Connector.
   b. Type 800-P-3 Output Matching Pad, 6 db loss, with Type N Input Connector and Type N Output Connector.
   c. Type M-342 Output Matching Pad, 10 to 1 voltage ratio (20 db), 50 ohm for use from DC to 1000 MHz. Type N Input Connector and Type N Output.
   d. Type H-6080 Cable consisting of 4 ft. of RG-55/U with Type UHF Connectors at both ends.
   e. Type H-5710 Cable consisting of 4 ft. of RG-55/U with Type N Connectors at both ends.
   f. Type 84-Z2-2 Cable consisting of 4 ft. of RG-8/U with Type N Connector at one end and UHF Connector at other end.
   g. Type 80-ZH-4 Cable consisting of 4 ft. of RG-55/U with Type N Connector at one end and a pair of 3/4" spaced binding posts terminated in 50 ohm resistor at other end.
2. Auxiliary Equipment
   a. Model 202-C Standard Barretter Bridge.
   b. Model 111-B Crystal Calibrator.
   c. Model 140A Standard Deviation Meter or Model 920 Standard Deviation Meter.
   d. Model 162, or 162R Vacuum Tube Voltmeter.

SECTION VIII

STORAGE AND EQUIPMENT

A. STORAGE

1. Remove dust from controls and outer surface of instrument with a clean rag.
2. Wrap instrument in heavy wrapping paper and seal seams with gummed tape or similar adhesive.
3. Store in a dry place. If excessive humidity is unavoidable, the wrapped instrument should be placed in a moisture-proof bag with a sufficient quantity of drying agent, such as silica gel, to insure a dry atmosphere. When the use of bag and desiccant is necessary, the instrument should be checked at six-month intervals to determine the effectiveness of the seal.

B. SHIPMENT

1. Wrap the instrument with heavy wrapping paper and seal seams with gummed tape or similar adhesive.
2. Place in fibre-board carton or wooden box large enough to permit at least three inches of excelsior or similar packing material between the instrument and sides of the box. For export packing, the instrument must be wrapped in waterproof paper and the seams sealed with waterproof glue or similar sealing compound before being placed in a wooden box.

SECTION IX

TABLE OF REPLACEABLE PARTS

Model 800A Standard Signal Generator

Symbol	Meas. Part No.	Description
CAPACITOR		
C 1	H-6617	Elect., 20-20-20 mf
2	H-6671-11	Ceramic, 100 mmf, 5%, NPO
3	H-7886-1	Mylar, .22 mf
4	H-6619-6	Ceramic, 5K mmf, GMV
5	H-7513-9	Elect., 10 mf, 15V
6	H-7601-4	Elect., 1000 mf, 15V
7	H-7601-4	Elect., 1000 mf, 15V
8	H-7601-4	Elect., 1000 mf, 15V
9	H-7513-9	Elect., 10 mf, 15V
10	H-7601-3	Elect., 1000 mf, 50V
11	H-7601-3	Elect., 1000 mf, 50V
12	H-7886-8	Mylar, 10K mmf, 20%
51	H-7886-1	Mylar, .22 mf
101	H-8025	Tuning Capacitor Assy. Includes C101A thru E
102	H-6643	Variable; Mica, 0.8 to 10 mmf
103	H-6600-3	Voltage-variable, 12 mmf
104	H-6600-3	Voltage-variable, 12 mmf
105	H-6643	Variable; Mica, 0.8 to 10 mmf
106	H-6162	Fixed; Ceramic, 10K mmf
107	H-6162	Fixed; Ceramic, 10K mmf
108	H-6160	Fixed; Ceramic, 1K mmf
109	H-5944	Fixed; Feed-thru, 1K mmf, GMV
110	H-5944	Fixed; Feed-thru, 1K mmf, GMV
111	H-5944	Fixed; Feed-thru, 1K mmf, GMV
112	H-5944	Fixed; Feed-thru, 1K mmf, GMV

Symbol	Meas. Part No.	Description
113	H-5944	Fixed; Feed-thru, 1K mmf, GMV
114	H-5250	Fixed; Ceramic, Disc, 10K mmf, GMV
115	H-5944	Fixed; Feed-thru, 1K mmf, GMV
116	H-5250	Fixed; Ceramic, Disc, 10K mmf, GMV
117	H-5944	Fixed; Feed-thru, 1K mmf, GMV
118	H-5944	Fixed; Feed-thru, 1K mmf, GMV
119	H-5942	Fixed; Feed-thru, 100 mmf. 20%
120	H-5942	Fixed; Feed-thru, 100 mmf, 20%
121	H-6627	Fixed; Standoff, 100 mmf, 20%
122	H-6627	Fixed; Standoff, 100 mmf, 20%
123	H-5942	Fixed; Standoff, 100 mmf, 20%
124	H-5942	Fixed; Standoff, 100 mmf, 20%
125	H-5944	Fixed; Standoff, 1K mmf, GMV
126	H-5944	Fixed; Standoff, 1K mmf, GMV
127	H-5562	Fixed; Standoff, 1K mmf, GMV
128	H-6629	Fixed; Ceramic, 22 mmf, 5%, NPO 30
129	H-6629	Fixed; Ceramic, 22 mmf, 5%, NPO 30
130	H-5944	Fixed; Feed-thru, 1K mmf, GMV
201	H-8060-1	Fixed; Film, .015 mf, 10%
202	H-8060-1	Fixed; Film, .016 mf, 10%
203	H-7886-1	Mylar, .22 mf
204	H-7513-6	Elect., 10 mf, 25V
205	H-7886-1	Mylar, .22 mf
206	H-7886-1	Mylar, .22 mf
401	H-7886-1	Mylar, .22 mf
402	H-7513-8	Elect., 100 mf, 25V
403	H-7513-8	Elect., 100 mf, 25V
501	H-7886-1	Elect., 6mf, 100V
502	H-7886-1	Mylar, .22 mf
701	H-7887-11	Elect., 250 mf, 16V
702	H-7513-21	Elect., 20 mf, 150V
801	H-7886-4	Polyester, .47 mf, 250V
802	H-7886-4	Polyester, .47 mf, 250V
RECTIFIER/DIODE		
CR 1		Rectifier, MDA-920A-7
2		Rectifier, MDA-920A-1
3		Rectifier, MDA-920A-2
4		Diode, IN758A — 10V Zener
301		Diode, IN270
501		Diode, IN5252B
801		Diode, IN270
802		Diode, IN270
803		Diode, IN270
804		Diode, IN270
LAMPS		
E 1	H-5582	Lamp, 6V
2	H-5582	Lamp, 6V
201	H-5582	Lamp, 120V, 3W
FUSE		
F 1	H-5018-16	Fuse, 1/4 amp

Symbol	Meas. Part No.	Description
CONNECTOR		
J 1	HS-18-1&2	Binding Post & Cap
2	HS-18-1&2	Binding Post & Cap
3	HS-18-1&2	Binding Post & Cap
4	HS-18-1&2	Binding Post & Cap
101		Part of W101
COILS		
L 101		Part of Att. Assy. Not replaceable.
102		Part of Att. Assy. Not replaceable.
103	H-6168	Coil Assembly, Range A25-32MHz
104	H-6170	Coil Assembly, Range B32-41MHz
105	H-6172	Coil Assembly, Range C41-54MHz
106	H-6175	Coil Assembly, Range D130-175MHz
107	H-5744	Coil; Choke; r.f., 50 uh, 20%
108	H-5744	Coil; Choke; r.f., 50 uh, 20%
109	H-1442	Coil; Choke; r.f., 18 uh, 20%
110	H-1442	Coil; Choke; r.f., 18 uh, 20%
111	H-1442	Coil; Choke; r.f., 18 uh, 20%
112	H-5538	Coil; Choke; r.f., 15 uh, 20%
113	H-5538	Coil; Choke; r.f., 15 uh, 20%
114	H-1441	Coil; Choke; r.f., 14 uh approx.
115	H-6563	Coil; Filter, 400 uh, 20%
116	H-6563	Coil; Filter, 400 uh, 20%
117	H-6563	Coil; Filter, 400 uh, 20%
118	H-6563	Coil; Filter, 400 uh, 20%
119	H-1442	Coil; Choke; r.f., 18 uh
120	H-1442	Coil; Choke; r.f., 18 uh
121	H-1442	Coil; Choke; r.f., 18 uh
122	H-6109	Coil; Choke; r.f., 150 uh approx.
123	H-5744	Coil; Choke; r.f., 50 uh, 20%
	H-6538	Coil Assembly; Range E. 400-470 MHz
	H-6538	Coil Assembly; Range F. 890-960 MHz
124	H-6706	Coil Assembly; Range F. 68-88 MHz
125	H-7505	Coil Assembly; Range F. 88-115 MHz
METER		
M 1	H-7998	Meter, 50 u amp
TRANSISTORS		
Q 1		Transistor, 2N4249
2		Transistor, 2N4249
3		Transistor, 2N4898
4		Transistor, 2N5294
5		Transistor, 2N3440
6		Transistor, 2N3440
7		Transistor, 2N4240
201		Transistor, 2N4123
202		Transistor, 2N4123
203		Transistor, 2N4123
401		Transistor, 2N2646
402		Transistor, 2N5485
501		Transistor, 2N3440

Symbol	Meas. Part No.	Description
502		Transistor, 2N3440
503		Transistor, 2N3440
701		Transistor, TD100
702		Transistor, TD100
703		Transistor, 2N4240
704		Transistor, 2N3440
RESISTORS		
R 1	H-3728-101	Fixed Comp., 100 ohms, 10%, 1/2 W
2	H-8062-050	Fixed W.W., 4 ohms, 5W
3	H-3728-182	Fixed Comp., 1.8K ohms, 10%, 1/2W
4	H-3727-362	Fixed Comp., 3.6K ohms, 5%, 1/2 W
5	H-8061-502	Var. Comp., 5K ohms
6	H-3727-912	Fixed Comp., 9.1K ohms, 5%, 1/2W
7	H-3731-103	Fixed Comp., 10K ohms, 10%, 1W
8	H-3727-203	Fixed Comp., 20K ohms, 5%, 1/2W
9	H-3727-204	Fixed Comp., 200K ohms, 5%, 1/2 W
10	H-3734-221	Fixed Comp., 220 ohms, 10%, 2W
11	H-3728-223	Fixed Comp., 22K ohms, 10%, 1/2W
12	H-3728-123	Fixed Comp., 12K ohms, 10%, 1/2W
13	H-6692-B2002F	Fixed Film, 20K ohms, 1%, 1/2W
14	H-8061-502	Var. Comp., 5K ohms
15	H-6692-B6652F	Fixed Film, 66.5K ohms, 1%, 1/2W
16	H-3733-203	Fixed Comp., 20K ohms, 5%, 2W
17	H-8061-102	Var. Comp., 1K ohms
18	H-3728-101	Fixed Comp., 100K ohms, 10%, 1/2W
51	H-6634	Var. Comp., 10K ohms
52	H-3728-104	Fixed Comp., 100K ohms, 10%, 1/2W
53	H-8084-102	Var. Comp., 1K ohms, 2W
54	H-3728-222	Fixed Comp., 2.2K ohms, 10%, 1/2W
55	H-8497-103	Var. Comp., 10K ohms, 20%, 1/2W
56	H-8673-252	Fixed Comp., 2.5K ohms, 1%, 1/8W
101	H-5586	Var. W.W., 20K ohms
102	H-3728-473	Fixed Comp., 47K ohms, 10%, 1/2W
103	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
104	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
105	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
106	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
107		Part of Cap. Assy. C106
108		Part of Cap. Assy. C107
109	H-6685-23	Fixed Film, 63K ohms, 1%, 1/2W
110	H-3727-510	Fixed Comp., 51K ohms, 10%, 1/2W
111	H-3731-102	Fixed Comp., 1K ohms, 10%, 1W
112	H-3731-222	Fixed Comp., 2.2K ohms, 10%, 1W
113	H-3731-222	Fixed Comp., 2.2K ohms, 10%, 1W
201	H-3727-912	Fixed Comp., 9.1K ohms, 5%, 1/2W
202	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
203	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
204	H-3727-562	Fixed Comp., 5.6K ohms, 5%, 1/2W
205	H-3728-102	Fixed Comp., 1K ohms, 10%, 1/2W
206	H-8061-501	Var. Comp., 500 ohms
207	H-8061-103	Var. Comp., 10K ohms
208	H-3727-512	Fixed Comp., 51K ohms, 5%. 1/2W
209	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W

Symbol	Meas. Part No.	Description
210	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
211	H-3728-102	Fixed Comp., 1K ohms, 10%, 1/2W
212	H-3728-101	Fixed Comp., 100 ohms, 10%, 1/2W
213	H-3727-201	Fixed Comp., 200 ohms, 5%, 1/2W
301	H-3728-682	Fixed Comp., 6.8K ohms, 10%, 1/2W
302	H-3727-162	Fixed Comp., 1.6K ohms, 5%, 1/2W
303	H-3727-433	Fixed Comp., 43K ohms, 5%, 1/2W
304	H-8061-253	Var. Comp., 25K ohms
305	H-3727-242	Fixed Comp., 2.4K ohms. 5%, 1/2W
306	H-8061-102	Var. Comp., 1K ohms
307	H-8061-104	Var. Comp., 100K ohms
308	H-3727-242	Fixed Comp., 2.4K ohms, 5%, 1/2W
309	H-8061-101	Var. Comp., 100 ohms
401	H-3727-205	Fixed Comp., 2 meg., 5%, 1/2W
402	H-3727-202	Fixed Comp., 2K ohms, 5%, 1/2W
403	H-3727-101	Fixed Comp., 100 ohms, 5%, 1/2W
404	H-3728-101	Fixed Comp., 100 ohms, 10%, 1/2W
405	H-3728-392	Fixed Comp., 3.9K ohms, 10%, 1/2W
406	H-3730-133	Fixed Comp., 13K ohms, 5%, 1W
501	H-3727-303	Fixed Comp., 30K ohms, 5%, 1/2W
502	H-3727-753	Fixed Comp., 75K ohms, 5%, 1/2W
503	H-3727-164	Fixed Comp., 160K ohms, 5%, 1/2W
504	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
505	H-3728-474	Fixed Comp., 470K ohms, 10%, 1/2W
506	H-3727-511	Fixed Comp., 510 ohms, 5%, 1/2W
507	H-8061-103	Var. Comp., 10K ohms
508	H-8061-251	Var. Comp., 250 ohms
509	H-3727-242	Fixed Comp., 2.4K ohms, 5%, 1/2W
510	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
511	H-3727-304	Fixed Comp., 300K ohms, 5%, 1/2W
601	H-8061-103	Var. Comp., 10K ohms
602	H-8061-103	Var. Comp., 10K ohms
603	H-8061-103	Var. Comp., 10K ohms
604	H-8061-103	Var. Comp., 10K ohms
605	H-8061-103	Var. Comp., 10K ohms
606	H-8061-103	Var. Comp., 10K ohms
607	H-8061-103	Var. Comp., 10K ohms
608	H-8061-103	Var. Comp., 10K ohms
609	H-8061-103	Var. Comp., 10K ohms
610	H-8061-103	Var. Comp., 10K ohms
611	H-8061-103	Var. Comp., 10K ohms
612	H-8061-103	Var. Comp., 10K ohms
701	H-3727-431	Fixed Comp., 430 ohms, 5%, 1/2W
702	H-3727-301	Fixed Comp., 300 ohms, 5%, 1/2W
703	H-3728-561	Fixed Comp., 560 ohms, 10%, 1/2W
704	H-8061-102	Var. Comp., 1K ohms
705	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
706	H-3728-154	Fixed Comp., 150K ohms, 10%, 1/2W
707	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
708	H-8061-502	Var. Comp., 5K ohms
709	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
710	H-3727-203	Fixed Comp., 20K ohms, 5%, 1/2W
711	H-3727-203	Fixed Comp., 20K ohms, 5%, 1/2W

Symbol	Meas. Part No.	Description
712	H-3727-203	Fixed Comp., 20K ohms, 5%, 1/2W
713	H-3727-203	Fixed Comp., 20K ohms, 5%, 1/2W
714	H-3728-681	Fixed Comp., 680 ohms, 10%, 1/2W
715	H-3728-103	Fixed Comp., 10K ohms, 10%, 1/2W
716	H-3731-333	Fixed Comp., 33K ohms, 10%, 1W
717	H-3731-333	Fixed Comp., 33K ohms, 10%, 1W
718	H-3728-102	Fixed Comp., 1K ohms, 10%, 1/2W
719	H-3727-202	Fixed Comp., 2K ohms, 5%, 1/2W
801	H-8430-104	Fixed Comp., 100K ohms, 5%, 1/4W
BOLOMETER		
RT 101)		
102)	H-710	Bolometer; Matched pair
PLUGS		
P 1	H-8085	Plug, Interconnecting Cable
2		Part of W1
3		Part of W1
SWITCH		
S 1	H-8073	Switch, power
2	H-7941	Switch, Mod-Dev. Includes R51
3	H-7940	Switch, band
4	H-8075	Switch, meter range
TRANSFORMER		
T 1	H-8011	Transformer
801	H-8672	Transformer
TUBES		
V 1		Tube, electron Type 5651A
101		Tube, electron Type 6DV4
CABLES		
W 1	H-7746	Cord; power. Includes P2 & P3
101	H-8055	Output Cable and Connector
		(PRINTED CIRCUIT BOARD ASSEMBLIES)
	H-8666	Saw-Tooth Generator
	H-7948	Deviation Amplifier
	H-7951	Audio Oscillator
	H-7954	Incr. Adj.
	H-7960	Deviation Adj.
	H-7963	Automatic Output
	H-8020	Power Supply
	H-8660	Dual Trace Alignment
		(OTHER ASSEMBLIES)
	H-7971	Output Dial & Knob Assy.
	H-8086-4	Range Tuning Knob
	H-8086-3	Coarse Tuning Knob
	H-8086-1	Fine Tuning Knob
	H-8086-2	Mod-Dev. Knobs. 2 Concentric Knobs

APPENDIX I

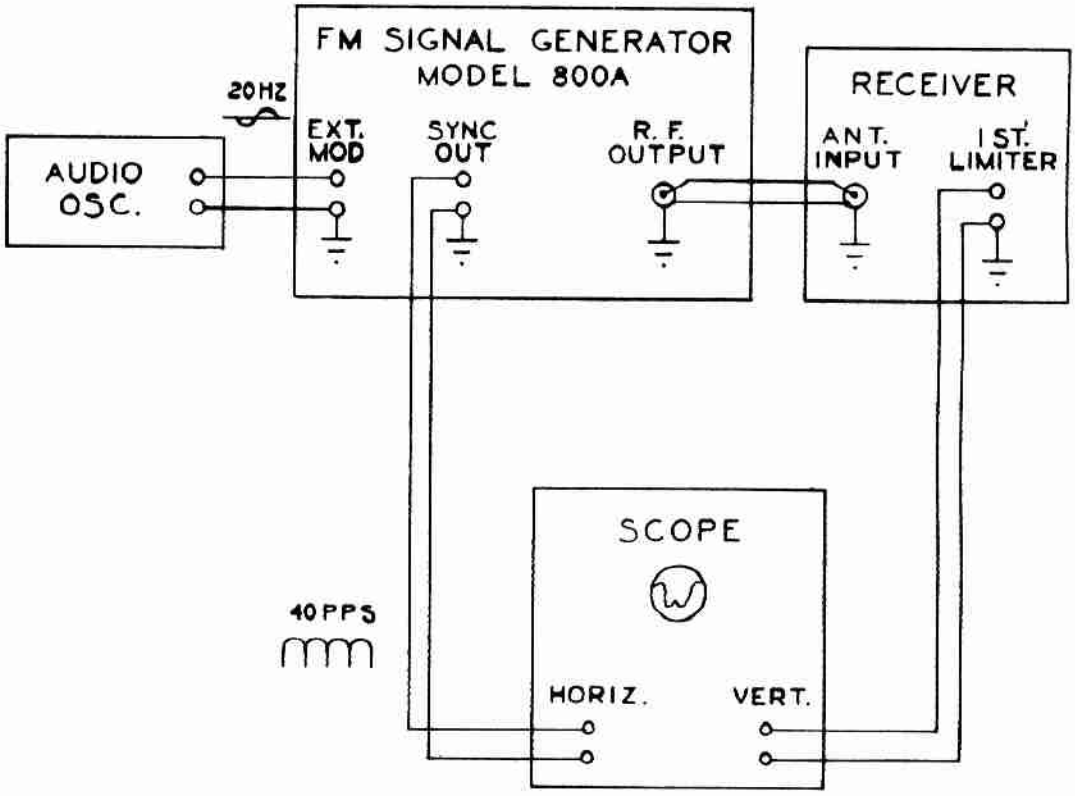
DUAL TRACE ALIGNMENT

The IF filters of FM receivers are usually aligned so that their response curve is symmetrical. This can be done by synchronizing the scope at *twice* the modulating frequency, producing two overlapping traces (dual trace) on the scope.

One trace shows the response as the IF filter is swept from below its center frequency to above its center frequency. The other trace shows the response when swept from above to below. One trace is simply the reverse picture of the other. This makes it particularly easy to align a receiver so that its response is symmetrical---by simply tuning the IF filters so that the two traces coincide.

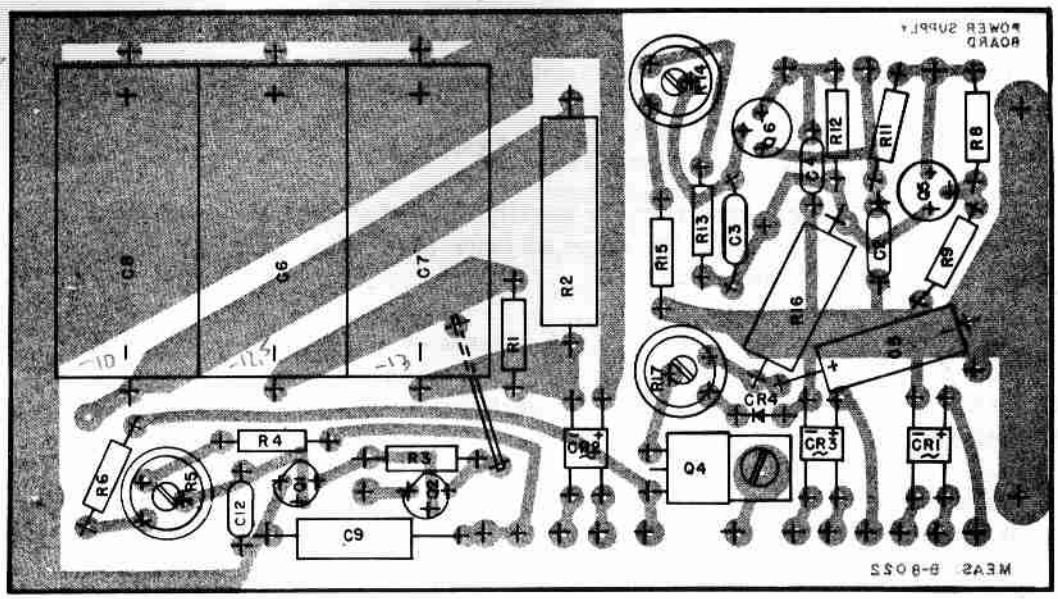
Trace coincidence does *not* necessarily indicate perfect alignment. The IF filters must also be tuned for maximum gain (maximum trace height). If it is necessary to sacrifice gain to obtain coincidence the peak & dip method should be used first to bring the tuned circuits close to alignment and then the alignment should be completed using the dual trace method.

The test setup for performing dual trace alignment is shown in Figure 2.

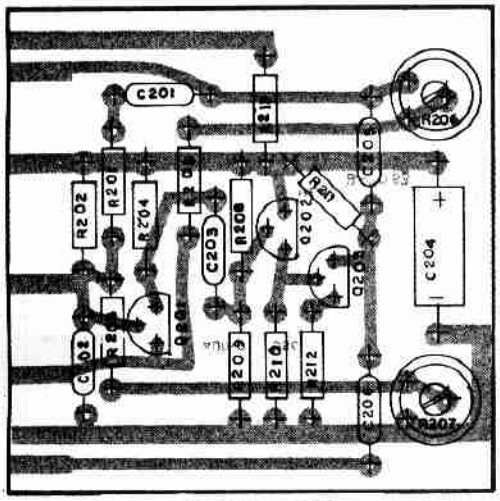


TEST SETUP FOR 20 H_z DUAL TRACE SWEEP ALIGNMENT

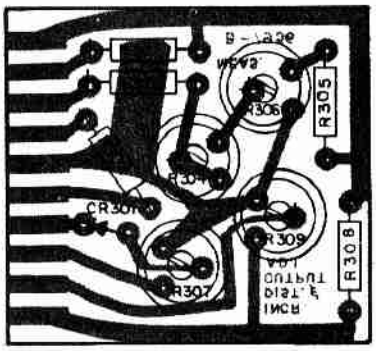
FIG. 2



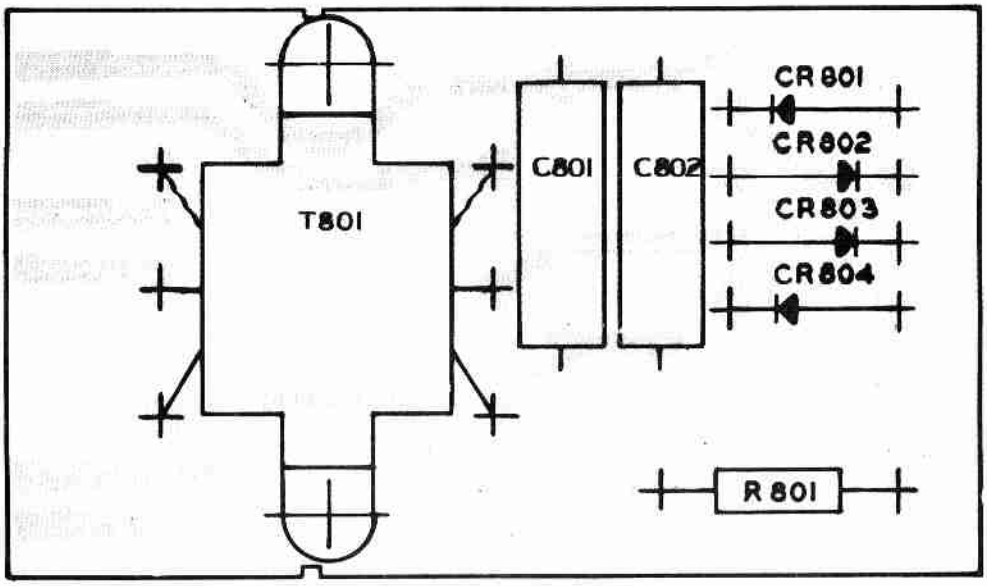
POWER SUPPLY
PR. CIR. BOARD



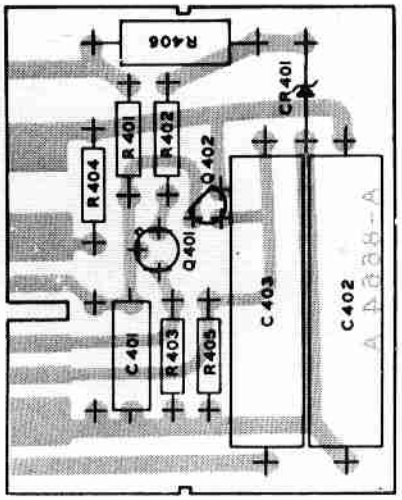
AUDIO OSC.
PR. CIR. BOARD



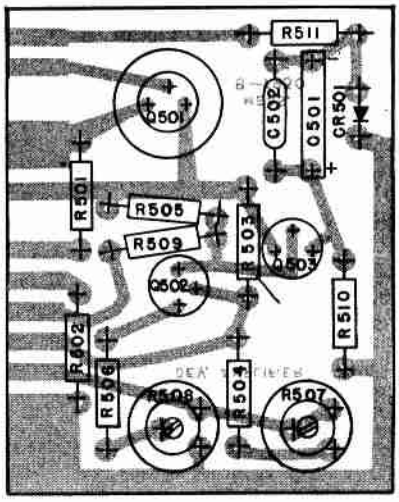
INCR. DIST. AND OUTPUT ADJUST
PR. CIR. BOARD



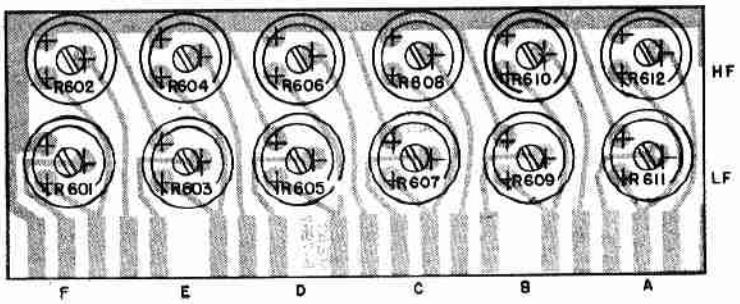
SYNC. GENERATOR
PR. CIR. BOARD



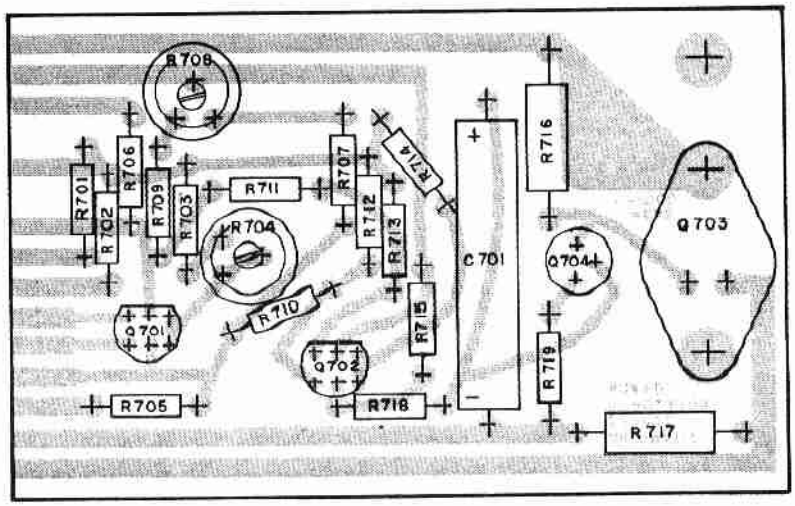
SAW TOOTH GEN.
PR. CIR. BOARD



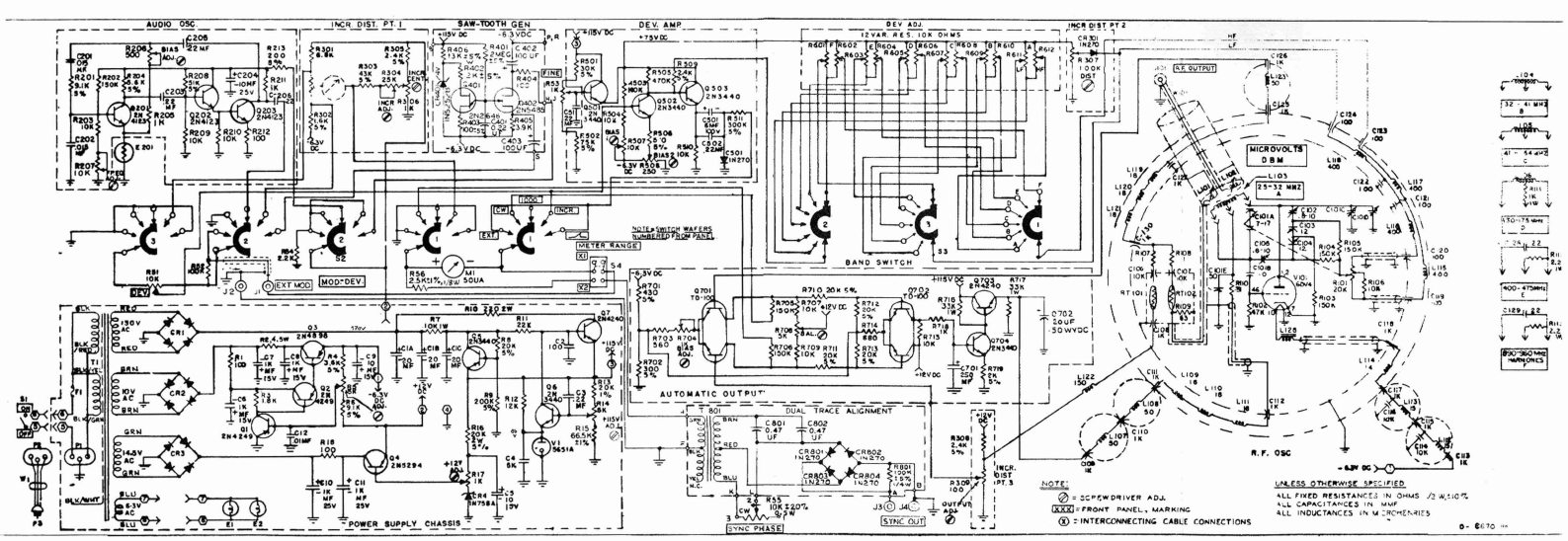
DEV. AMP.
PR. CIR. BOARD



DEV. ADJ.
PR. CIR. BOARD



AUTOMATIC OUTPUT
REGULATOR BOARD


AUDIO OSC
INCR. DIST. PT. 1
SAW-TOOTH GEN.
DEV. AMP.
DEV ADJ.
12 VAR. RES. 10K OHMS
INCR DIST PT 2
R.F. OUTPUT
MICROVOLTS
DBM
25-32 MHZ
BAND SWITCH
AUTOMATIC OUTPUT
DUAL TRACE ALIGNMENT
R.F. OSC
POWER SUPPLY CHASSIS
SYNC PHASE
SYNC OUT
METER RANGE
EXT MOD
MOD DEV
NOTE: SWITCH WAFERS NUMBERED FROM PANEL
NOTE:
⊘ = SCREWDRIVER ADJ.
XXX = FRONT PANEL MARKING
Ⓧ = INTERCONNECTING CABLE CONNECTIONS
UNLESS OTHERWISE SPECIFIED
ALL FIXED RESISTANCES IN OHMS /2 WATT 10%
ALL CAPACITANCES IN MMF
ALL INDUCTANCES IN MICROHENRIES
6-6670