

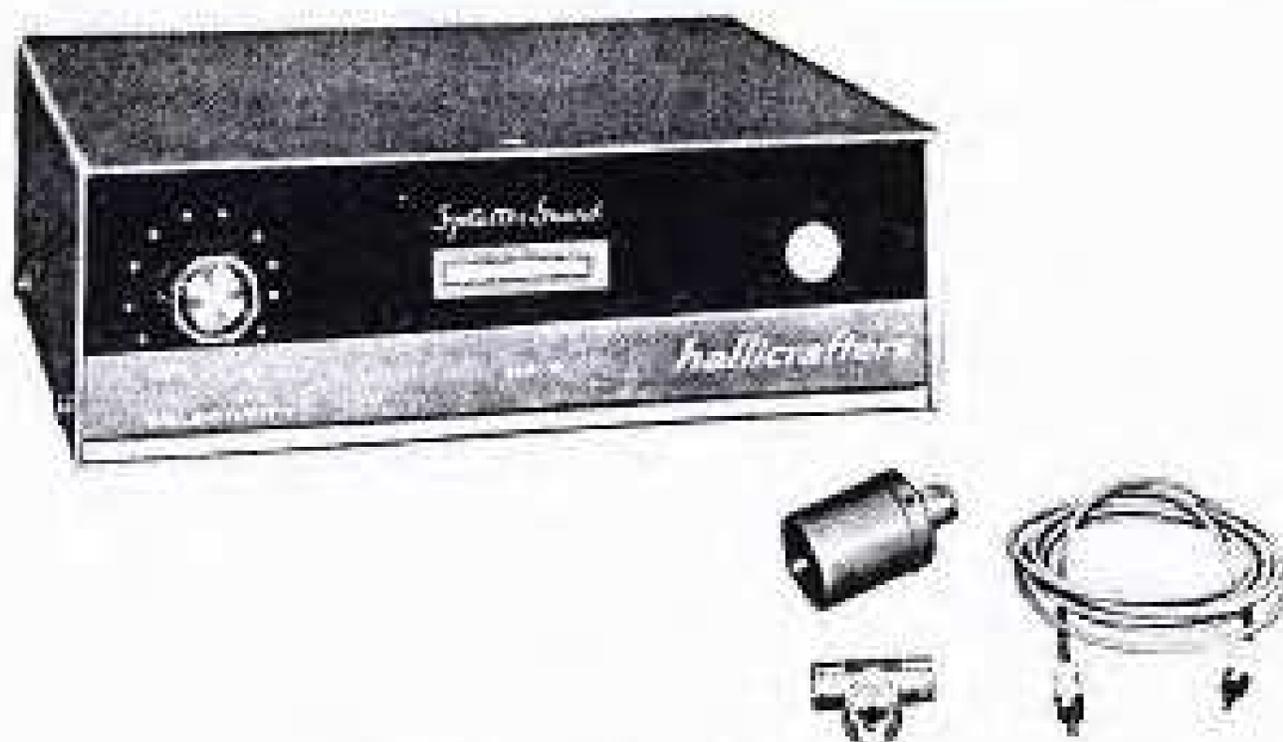


*hallicrafters*

**OPERATING AND SERVICE INSTRUCTIONS**

*Splatter Guard*

**MODULATION INDICATOR  
MODEL HA-8**



#### Hallicrafters' Model HA-8.

Hallicrafters' Model HA-8 *Spitter's Sword*® Modulation Indicator is basically a special form of oscilloscope which provides the operator of a radio station with a visual means of monitoring the RF voltage level at the antenna transmission line. Since the device is essentially free of inertia, the indicator follows the amplitude variations occurring with speech, etc., so that the operator can tell when he is driving the transmitter to its maximum capability. The principal is the same as that currently used to visually monitor recording levels on tape recorders in order to avoid distortion caused by overdriving the recording head.

The ability to visually monitor the transmitted signal level and operate the transmitter near peak-power capability without driving it beyond the distortion level provides the operator with a means of obtaining maximum performance from his equipment while transmitting a clean signal for others to copy.

The Model HA-8 installation consists of the display unit, a detector unit, a TEE adapter, and a six-foot interconnecting cable.

The system is simple, and takes only a few minutes to install in a station system which uses the generally accepted PL-259 and SO-239 series of 50-ohm coaxial cable connectors (Amphenol 83 series RF connectors).

The Model HA-8 is designed for use with 50-ohm antenna transmission lines. The installation will not change the VSWR on the transmission line over the 3-MC to 30-MC frequency range. A minor change in VSWR will be detected on the 50-MC to 54-MC band. On the 144-MC to 148-MC band a VSWR of 1.5/1 may increase to 2/1 with the detector unit inserted into the line. Transmission line hardware becomes more critical at higher frequencies, therefore no recommendation will be made for application above 148 MC.

Transmitter power output levels between approximately 40 watts and 1000 watts can be handled by the Model HA-8. At power levels of 1000 watts, the VSWR on the line becomes the limiting factor as far as safely operating the detector unit. Exceeding a VSWR of 2/1 could cause damage to the diodes because of the increased voltage appearing along the transmission line.

Power levels as low as approximately 10 watts can be monitored by opening the detector unit and changing the 2-mmf coupling capacitor (C101) to 4 mmf; however, in the 6-meter and 2-meter bands, this change would have an adverse effect on the VSWR.

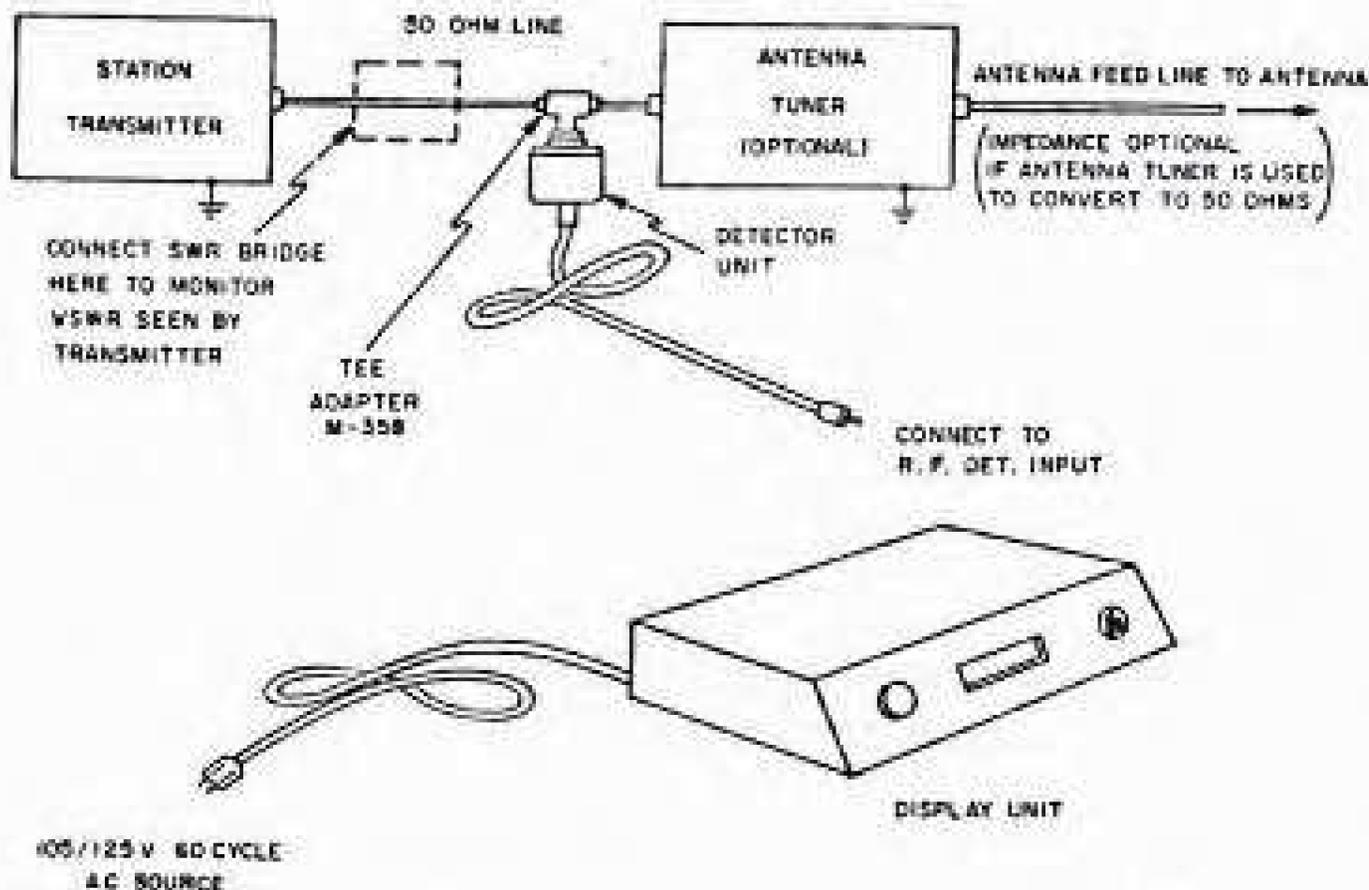
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## POWER SOURCE.

The display unit is designed to operate from a 105-volt to 125-volt, 60-cycle, alternating-current source. Power consumption is 3 watts maximum.

## CONNECTION TO ASSOCIATED EQUIPMENT.

1. Select a location for the display unit so that, in the operating position, the SENSITIVITY knob is readily accessible and the display window can be comfortably observed while transmitting.
2. Connect the detector unit into the antenna transmission line as shown. Note that one side of the detector circuit is grounded; therefore, it must be used with an unbalanced 50-ohm transmission line. When the antenna is driven by a balanced transmission line, an antenna tuner is generally used to transfer from an unbalanced low-impedance line to a balanced high (or low) impedance antenna feed line. The Model HA-8 can also be used to monitor the drive level of a high-power final amplifier. In this case, the detector unit is connected into the transmission line between the exciter unit and the final amplifier. Keep in mind that the final-amplifier drive level must be approximately 35 watts to operate the display unit. A 4-mmf capacitor may be substituted for the 2-mmf coupling capacitor (C101) in the detector unit and the drive level can then be as low as approximately 10 watts to operate the display unit. Note that the 4-mmf capacitor will have an adverse effect on the VSWR of the line, especially on 8 meters and 2 meters.
3. Interconnect the detector unit and the display unit with the audio-type shielded cable supplied. If the station layout requires more than six feet of cable, ready-made cable lengths up to 25 feet may be obtained from stores selling high-fidelity audio equipment. This cable carries DC current only and may be any length desired.
4. Connect the power cord of the display unit to the utility outlet to complete the installation.



092-04618

The Model HA-8 Connected to Associated Equipment.

**OPERATION.**

Turn on the Model HA-8 by turning the SENSITIVITY knob clockwise to actuate the switch.

**TUNING UP.**

Since the Model HA-8 is a voltage-sensitive device connected into the antenna transmission line, it may be used to advantage during transmitter tune-up. Simply transmit a carrier, turn up the SENSITIVITY control and tune for narrowest dark-space gap. Reset the SENSITIVITY control as required to keep the gap open as the output level of the transmitter increases during the tuning procedure.

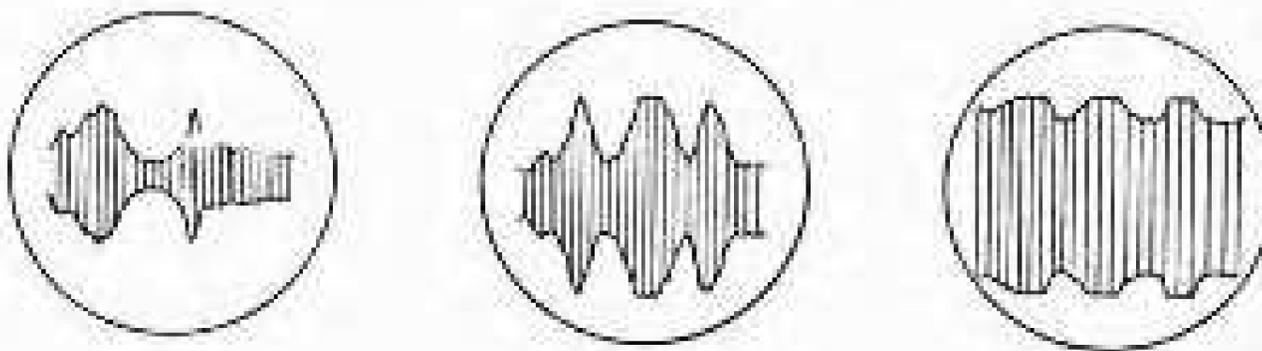
**MONITORING SSB TRANSMISSIONS.**

1. Turn on the station transmitter and transmit a carrier level adjusted to the saturation power output level or the power level normally considered to be the transmitter's maximum power output.

2. Set the SENSITIVITY control of the Model HA-8 so that the illuminated shafts of light just touch and produce a bright line at the center of the display.

3. As the transmitter is modulated, the two illuminated shafts will be brightest at either side and taper off in intensity toward the center, showing a dark space in the center with an occasional bright line showing at the exact center when the transmitter reaches peak output. If the transmitter is overdriven and badly distorted, the shafts of light will approach constant brightness all the way to the center with a very bright line showing at the exact center. At lower levels more of the center area darkens showing that only occasional peaks are present in the envelope.

TYPICAL OSCILLOSCOPE DISPLAY



Splitter-Sound DISPLAY



NO FLAT TOPPING

OCCASIONAL  
FLAT TOPPINGEXCESSIVE  
FLAT TOPPING

500-10000

Typical Oscilloscope and Model HA-8 Displays.

## MONITORING AM TRANSMISSIONS (LINEAR AMPLIFIER SYSTEMS).

1. Turn on the station transmitter and transmit a carrier adjusted for the saturation power output level of the transmitter.
2. Set the SENSITIVITY control of the Model HA-8 so that the illuminated shafts of light just touch and produce a bright line at the center of the display.
3. To establish the correct carrier level relative to the power-level capability of the transmitter, reduce the carrier level to one-half voltage across the transmission line. The transmitter generally has an indicator to determine this level accurately. Note that the length of the illuminated shaft of light in the display unit is not linear with voltage across the transmission line, hence reducing its length to one-half will not establish the correct carrier level.
4. As the transmitter is modulated, the illuminated shafts will taper off in intensity toward the center showing a dark space in the center with an occasional bright line showing at dead center when the transmitter reaches peak output and flat-tops.

### NOTE

High-level AM transmitters can be monitored by the Model HA-8 but require indexing by means other than the saturated carrier level as described for linear systems. Generally the transmitter is modulated and checked for 100% modulation by observing plate current shift, or by an actual oscilloscope check. At this level the Model HA-8 sensitivity is set to produce the bright fold-over line at the center. During transmissions, the operator may then monitor his output levels as described above for SSB or linear AM systems.

## REPLACING OR ADJUSTING DISPLAY TUBE.

The display tube may be reached by removing the four cabinet-cover screws and lifting the cover from the base unit.

The display tube is held in place by a clip and bracket arrangement so that it may be accurately positioned relative to the window opening. The centering of the display tube is best obtained by transmitting a carrier and adjusting the SENSITIVITY control for a narrow dark space or bright fold-over line to establish the tube display center.

### CAUTION

Approximately 200 volts DC appears around the display tube socket. Avoid contacting the socket terminals when making adjustments.

## SERVICE AND OPERATING QUESTIONS.

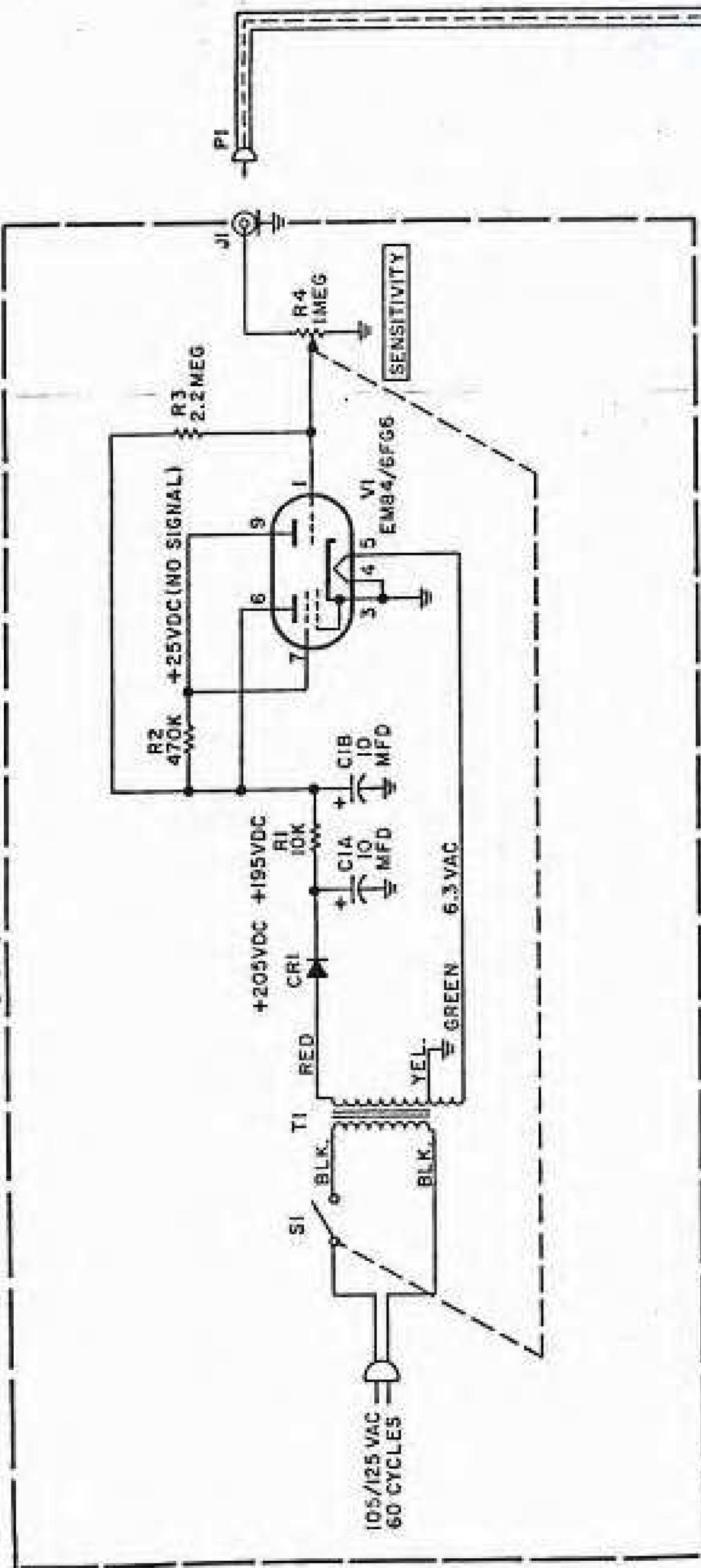
For further information regarding operation or servicing of this equipment, contact the dealer from whom the unit was purchased. The Hallicrafters Company maintains an extensive system of Authorized Service Centers where any required service will be performed promptly and efficiently at no charge if this equipment is delivered to the service center within 90 days from date of purchase by the original buyer and the defect falls within the terms of the warranty. It is necessary to present the bill of sale in order to establish warranty status. After the expiration of the warranty, repairs will be made for a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown below. For the location of the one nearest you, consult your dealer or your local telephone directory.

Make no service shipments to the factory unless instructed to do so by letter, as The Hallicrafters Company will not accept responsibility for unauthorized shipments.

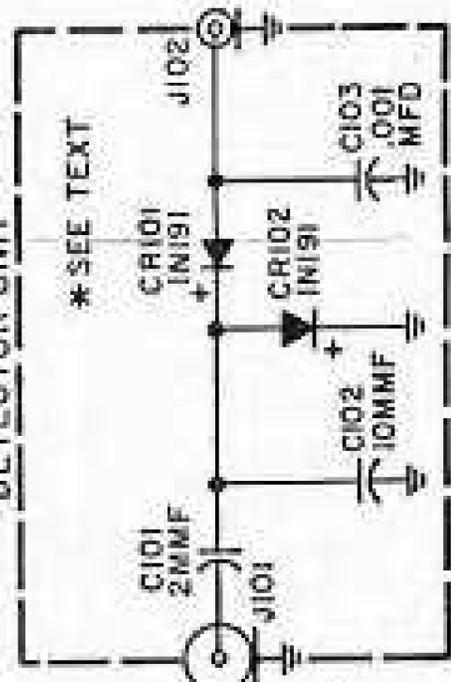
The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate such revisions in earlier models.



DISPLAY UNIT



DETECTOR UNIT



NOTES:

ALL RESISTORS 1/2 WATT.  
 VOLTAGES SHOWN ARE OBTAINED AT 117 VAC.  
 SOURCE VOLTAGE, 20,000 OHM/VOLT METER.  
 APPROX. -15VDC AT THE GRID (PIN 1) OF THE  
 DISPLAY TUBE WILL CLOSE THE DARK SPACE  
 GAP. (EQUAL TO APPROX. 40V RMS RF AT DETECTOR  
 INPUT WITH SENSITIVITY CONTROL SET FOR  
 MAXIMUM SENSITIVITY.)

TEE ADAPTER  
 M-35B

USE WITH 50 OHM  
 TRANSMISSION LINE  
 1000 WATTS MAX.  
 40 WATTS MIN.

088-002846

Schematic Diagram, Model HA-8 Modulation Indicator.

## SERVICE REPAIR PARTS LIST

Symbol	Description	Hallcrafters Part Number
<u>RESISTORS</u>		
	Resistor 10K ohms 10%, 1/2 W	451-252103
	Resistor 470K ohms 10%, 1/2 W	451-252474
	Resistor 2.2 Megohms 10%, 1/2 W	451-252225
	Resistor, Variable	025-002133
<u>CAPACITORS</u>		
1, C1B	Capacitor 2X10MFD, 200 V	045-000906
1	Capacitor 2MMF, NPO	491-001020-25
2	Capacitor 10MMF, NPO	491-004100-23
3	Capacitor 0.001MFD, 500 V	047-200230
<u>MISCELLANEOUS</u>		
	Adaptor, Tee	010-002592
	Cabinet	066-003705
	Cable Assembly	078-007744
1	Connector, Coaxial	010-100056
J102	Connector, Phono	036-100041
	Cover, Cabinet	066-003701
	Detector Assembly, Complete	150-005631
101, CR102	Diode 1N191	019-102018
	Knob, SENSITIVITY	015-001772
	Line Cord	087-100078
	Lock, Line Cord	078-200397
1	Rectifier, Selenium	027-200224
	Socket, Tube	006-001060
	Transformer, Power	052-001003
	Trim strip	007-000816
	Tube, Electron; 6EM84/6FG6	090-001463