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THEORY OF OPERATION
AND
MAINTENANCE
FOR
REL PRECEDENT

MANUFACTURED BY
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GENERAL DESCRIPTION

1-1. GENERAL.

1-2. The REL Model 646C PRECEDENT Frequency Modulation Receiver is a high quality receiver of advanced design, using fifteen vacuum tubes and ten germanium diodes, for the reception of Frequency Modulated broadcast transmission in the 88-108 mc band. The PRECEDENT is suitable for use in the home, in a commercial installation, or in a broadcast station, with any high-fidelity sound system. Provision has been made for using the PRECEDENT for the reception of FM Broadcast Multiplex signals.

1-3. The PRECEDENT is a single-conversion, permeability-tuned superheterodyne, with three tuned circuits in the head-end and a 10.7 mc intermediate-frequency amplifier with ten tuned circuits. It incorporates circuits, heretofore used only in laboratory equipment, which provide a high degree of selectivity, sensitivity, excellent response and low distortion. It delivers low-level output at either 600 ohm or high impedance for input to the user's audio amplifier system. Capture Effect ratios, possible before only in laboratory receivers, have been achieved. Both "SIGNAL" and "TUNE" indicator meters are provided. The dial calibration accuracy is held to less than 0.1 mc. Tube complement and function of each tube and crystal diode are given in the Specifications. Refer to the Installation Instructions for parts list.

Table 1-1. Model 646C Precedent Tuner, Specifications.

FREQUENCY RANGE: 88 to 108 megacycles.

SENSITIVITY: 2 microvolts referred to 75 ohms produces a signal-to-noise ratio of better than 40 db.

SELECTIVITY: 170 kc at 6 db points.

FREQUENCY RESPONSE: Plus or minus 1 db 30 to 40,000 cycles, including deemphasis of 75 microsecond time constant.

NOISE SUPPRESSION: Internal noise is 70 db below full output.

WAVEFORM DISTORTION: Less than .5% for 100% modulation.

OUTPUT: A - 2 volts to high impedance.
B - 0.2 volts to 600 ohms.

ANTENNA INPUT CONNECTIONS: A - 300 ohms balanced.
B - 75 ohms unbalanced.

CONTROLS: Tuning, radio frequency gain, audio frequency gain with power switch.

INSTRUMENTATION: A - Signal strength meter.
B - Tuning meter.

POWER SUPPLY: 115 volts, 50/60 cycles, single phase, consumption 85 watts.

INTERMEDIATE FREQUENCY: 10.7 megacycles.

TUBE COMPLEMENT: Fifteen tubes including Rectifier tube, plus ten germanium diodes. 5Y3GT Rectifier, 6BK7A Cascode RF Amplifier, 6J6 Mixer-Oscillator, (5) 6BH6 IF Amplifier, (3) 6BH6 Pre-limiters, 6BH6 1st Limiter, 6AH6 2nd Limiter, 12AU7 1st and 2nd Audio Amplifier, and 12AU7 Cathode-Follower, Audio Output.

DIMENSIONS: *Chassis only Model, 15-5/8" wide, 5-7/8" high, 12-1/2" deep.
Relay Rack Model, 19" wide, 7" high, 12-1/2" deep.
Cabinet Model, 17" wide, 8" high, 13-1/2" deep.

*Net weight: 16 lbs.

ACCESSORIES AVAILABLE: Decorative Wood Mounting Frame, Relay Rack Panel.

SECTION 3

MAINTENANCE

1. GENERAL.

2. This section provides information to aid in maintenance of the PRECEDENT, gether with alignment procedures. Test equipment required includes:
1. VTVM with crystal diode r-f probe, FCA Senior Voltohmyst Model VTV-97A th Model WG-264 probe, or equal.
. Signal Generator, 10-11 mc, 88-108 mc, calibrated attenuator, Measure-ents Corporation Model 80 or equal.

3. SENSITIVITY.

4. For an overall sensitivity check, proceed as follows: (see figure 12).
. Check the gain of pre-limiter section. Using a VTVM with crystal diode r-f obe, measure the output r-f volts at the first limiter grid, noting the amount of f input at 10.7 mc required for 1.0 r-f volts output. Table 3-1 gives repre-ntative values for each stage. In making these measurements, use a 50-ohm rminating resistor at the end of the signal generator cable, and make the con-ctions as short as possible.
. Check the gain and selectivity of the selective intermediate frequency ampli- from the mixer grid to the grid of the 1st pre-limiter.
. Check the limiters, measuring the r-f output voltage at the output of the 6AL6 iver tube, V13.
. Check the discriminator for zero-center, balance, and output voltage.

Table 3-1. Sensitivity Check.

SIGNAL INPUT AT	SIGNAL INPUT LEVEL FOR 1.0V RF OUTPUT
in 1, V11, 3rd pre-limiter	60,000 micro-volts
in 1, V10, 2nd pre-limiter	30,000 micro-volts
in 1, V9, 1st pre-limiter	10,000 micro-volts
in 1, V8, 5th i-f amplifier	3,200 micro-volts
in 1, V7, 4th i-f amplifier	750 micro-volts
in 1, V6, 3rd i-f amplifier	150 micro-volts
in 1, V5, 2nd i-f amplifier	40 micro-volts
in 1, V4, 1st i-f amplifier	10 micro-volts
in 5, V3, Mixer. Gain of Tuner should give 1.0V r-f on noise, and 10 micro-volts input will give 1.5V r-f output.	

e:
Signal generator at 10.7 mc connected to designated input.
R-f output measured at first limiter grid.
PRECEDENT R-f Gain control at maximum CW.