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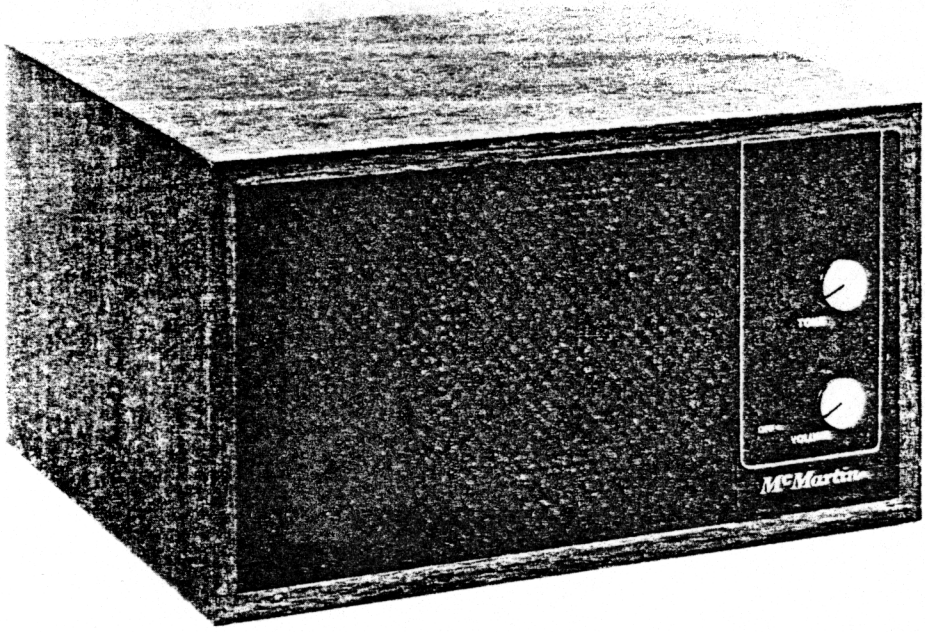

McMartin Industries, Inc.

TRE-5B

INSTRUCTION MANUAL

WARNING - TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

I. TECHNICAL SPECIFICATIONS

MAIN CHANNEL	
Range	Single frequency in range of 88-108MHz, crystal controlled
RF Input	Telescopic antenna, Provision for external 50/75 ohm unbalanced antenna
Sensitivity	1.2 microvolts for 30db quieting
Selectivity	45db rejection of alternate channel
SUBCHANNEL	
Frequency	67KHz, ±6KHz deviation. Other frequencies available on special order
Sensitivity	4.5 microvolts/30db quieting
Selectivity	Two-section bandpass filter and phase-locked loop
Deemphasis	Modified 150 microseconds, 75 microsecond available by simply clipping out capacitor C-39.
Crosstalk	Stereo to SCA or main to SCA: 50db or greater below a 400Hz reference tone.
AUXILIARY OUTPUT JACK	
SCA Channel Frequency Response	±3.0db, 50-6000Hz modified 150 microseconds deemphasis
Main Channel Frequency Response	±3.0db 50-15,000Hz
Output Level (Main or SCA)	500 millivolts into 50K-ohm load
Hum & Noise	SCA typically greater than 55db below 1 volt
HEADPHONE JACK	8 ohm impedance and 1 watt output response same as internal audio system.
INTERNAL AUDIO SYSTEM	
Frequency Response	Tailored to the internal 5 inch speaker system
Tone Control	0-10db low frequency roll off at 50Hz. **Note:** Does not affect auxiliary output jack.
Output	1 watt, 100-4500Hz
Distortion	0.5% (400Hz) typical; less than 2.0% ±6KHz deviation, 100-4500Hz at 1 watt
Hum & Noise	55db below 1 watt at 400Hz
POWER SOURCE	117/125 VAC, 50/60Hz, ~~UL approved wall receptacle~~ transformer
DIMENSIONS	5.5"H x 9.5"W x 8"D
FINISH	Walnut finish wood cabinet
SHIPPING WEIGHT	6 pounds

II. GENERAL DESCRIPTION

The McMartin Model TR-E5B is a complete multiplex receiver designed for continuous duty reception of FM/SCA educational or commercial multiplex broadcasting.

The TR-E5B consists of a dual gate MOS FET RF amplifier/mixer, IF amplifier/limiter/demodulator, subchannel filter/demodulator and audio power amplifier. This circuitry, as well as power supply rectifiers and filters, occupies a single printed circuit board.

The RF amplifier section uses a diode-protected, dual-gate MOS field-effect transistor with excellent AGC action and minimum cross-modulation characteristics. The local oscillator is crystal controlled for drift-free operation. The oscillator frequency, (10.7 MHz below the TR-E5B operating frequency) produces a 10.7 MHz intermediate frequency when the operating frequency appears at the input of the dual-gate MOS FET mixer.

The main channel IF section consists of a linear bandpass filter, the output of which feeds a monolithic integrated circuit, IC-2, which incorporates a three-stage IF amplifier/limiter, a double-balanced quadrature RF detector, audio preamplifier and AGC voltage circuitry.

The SCA information is separated from the main channel programming by a simple two section bandpass filter and fed to IC-3. The IC-3 is a specially designed integrated circuit combining the function of a 60 dB amplifier/limiter demodulator, audio amplifier and also incorporates main and SCA muting functions.

The recovered SCA audio from IC-3 is fed directly to the front panel volume control and rear panel audio output jack which provides a termination for interconnecting external audio systems or recording systems. A front panel tone control is incorporated to provide the desired frequency response.

The volume control adjusts the audio drive voltage to IC-4 which amplifies the signal suitable for driving the speaker and rear panel phone jack. The volume control has no effect on the rear panel auxiliary jack.

III. INSTALLATION

Location
In relatively strong signal areas, the integral telescopic whip antenna will provide excellent reception. When located in proximity to high buildings or other structures employing metallic construction, crosstalk resulting from multipath effects can be minimized by orienting the whip antenna for optimum results.

External Antenna
A properly selected and installed outside antenna is one of the most important factors for satisfactory SCA reception particularly in weaker signal areas or in large metropolitan areas of mountainous country. High gain antennas normally have the best directional patterns. Good directional characteristics are important in the reduction of 'multipath' (crosstalk) reception. The antenna should be oriented for a combination of best signal and lowest multipath. The recommended antenna input is 50-75 ohms, with coaxial type transmission line used from the antenna to the TR-E5B input.

IV. ALIGNMENT

Field Alignment
The TR-E5B is factory tuned to your frequency. Normally the only field adjustment necessary is to peak the antenna coil (L-1) if an external antenna is used.

NOTE: L-1 has been adjusted to the whip antenna.

Local Oscillator Alignment
1. Remove the chassis from the cabinet by removing the screws from the bottom of the cabinet.
2. Connect a voltmeter (20K ohm/volt VOM) to R-8, located adjacent to crystal and ground.
3. Turn oscillator slug counterclockwise (OUT) to top of white coil.
4. Insert the proper crystal into the crystal socket.

$$\text{crystal frequency} = \frac{\text{operating frequency} - 10.7\ \text{MHz}}{2}$$

5. Slowly turn oscillator slug (IN) until the voltage rises abruptly, indicating oscillation. Continue in clockwise direction until voltage drops 1/10 to 2/10 of a volt above the peak to insure positive starting.
6. Turn the doubler slug (brown coil) L-5 counterclockwise (OUT) as far as it will go.
7. Slowly turn the doubler slug IN until a drop in voltage occurs; tune for the lowest dip.

RF Alignment
1. Extend whip antenna fully or connect external antenna in weak or fringe area. **NOTE:** Remove jumper when using external antenna.
2. Connect a voltmeter (20K ohm/volt VOM) to test point TP-1 and ground, TP-1 is located adjacent to IC-1.
3. Tune the antenna coil L-1 (brown), RF coil L-2 (white) and mixer coil L-3 (yellow) for maximum voltage at TP-1.
4. Repeat tuning of L-3 and doubler coil L-5 as there is slight interaction between the two. **NOTE:** It is possible to get an indication of voltage at TP-1 with signals below 3 microvolts.
5. Repeat tuning of L-1, L-2, L-3 and L-5 for maximum voltage.

This completes the alignment of the TR-E5B receiver.

V. FINAL ADJUSTMENT

RF Level Mute Adjustment (R-27)
NOTE: The RF level mute controls the threshold of the RF input level of the receiver and should not be confused with main channel muting; the SCA subchannel must be on the air for the RF level mute adjustment.

The RF level mute control trimpot R-27 is set at the factory for muting at approximately 5 microvolts of RF input level; however, under noisy conditions this may have to be adjusted at higher levels of RF input. The RF level mute is useful in fringe or weak signal areas which will mute the receiver when the level falls below the pre-determined level preventing noise from appearing in the SCA program channel.

1. With an SCA program present, turn the RF level control (trimpot R-27) in a counterclockwise direction until the subchannel program mutes.
2. Note the position of the control where muting occurs. Turn the RF level control R-27 in a clockwise direction to restore the program and turn the control 1/8 to 1/4 of a turn past this point.

Subchannel Mute Adjustment (R-44)
The subchannel mute controls the threshold of the level of the SCA mute point and is subjected to the injection level of the transmission. **NOTE:** The SCA subcarrier must be on the air for the following mute adjustment.

1. Turn the subchannel mute control (trimpot R-44) in a clockwise direction until the subchannel program mutes.
2. Slowly reverse the control counterclockwise 1/8 to 1/4 turn past the point of muting which restored the SCA program.

The subchannel mute is controlled by the absence or presence of the subcarrier and is not a function of the main channel signal level.

External Antenna Connection
The TR-E5B has provision for an external antenna for weak and fringe area signals. It is imperative in high

multipath areas, especially some metropolitan areas, to use an external antenna to eliminate crosstalk which is due to multipath reception. Crosstalk is similar to ghosting in TV reception.

1. Remove jumper between internal antenna and 50 ohm terminals.

2. Connect the external antenna to the 50 ohm and ground terminal.

NOTE: It is desirable to use coaxial cable and connect internal wire to 'ant' terminal and shield to 'gnd' terminal.

CAUTION: The TR-E5B has excellent overload characteristics and will handle signal levels up to 0.1 volts. However, if an external antenna is used in some metropolitan areas, it is possible that signals of several volts may overload the receiver, producing noise and giving the effect of a weak signal. Should this occur, a 20 or 30 dB pad should be inserted in the antenna lead until the signal is clean.

VI. PARTS LIST

The majority of the components in the TR-E5B are of standard value and tolerance and generally available from local electronic parts distributors. Those items of McMartin manufacture or of special value or tolerance are listed.

SYMBOL	P/N	DESCRIPTION
L-1	930080	Antenna Coil (brown)
L-2	930081	RF Coil (white)
L-3	930082	Mixer Coil (yellow)
L-4	930081	Osc. Coil (white)
L-5	930080	Doubler Coil (brown)
L-6 and L-7	931081	67KHz Chokes
RFC-1	930097	22u Henry Choke
T-1	940019	10.7MHz Matching Transformer
T-2	940013	Detector Coil
Q-1	201031	3N211 MOS-FET
Q-2	201091	3N212 MOS-FET
Q-3	201049	SE-4001 Osc. Transistor
IC-1	230034	10.7MHz IC IF System
IC-2	230066	MOB-604 IC Special
IC-3	230037	LM-380N IC Audio Amp
R-27 and R-44	400062	10K Trimpots RF and SCA Mute
R-36	400062	10K Trimpot SCA Frequency Control
T-1	900085	Wall Mount Trans. 115 - 15V AC
SPKR	161007	5 inch 8 ohm Speaker (round)
Antenna	179002	Antenna Rod and Mounting
FL-1	935053	10.7MHz Bandpass Filter
Crystal	090013	38 - 48MHz Third Overtone Crystal
SW-2	480022	2 Pos Slide Sw
R-1	401027	100K Tone Control
R-2	400069	25K Vol Control with On/Off Switch
Knobs	180017	Tone Control and Volume Control

WARRANTY

McMartin products are warranted to be free from defects in materials and workmanship for a period of one year after shipping date, when subjected to normal usage and service. All warranties are void if (a) equipment has been altered or repaired by others without McMartin's specific prior authorization; or (b) equipment is operated under environmental conditions or circumstances other than those specifically described in McMartin literature or instruction manuals.

Upon notification within the applicable warranty period, McMartin agrees without charge, to repair, replace, or supply replacement parts for any properly maintained equipment or parts that are defective as to design, materials or workmanship and that are returned in accordance with McMartin's instructions to the Buyer. At McMartin's sole discretion, the Buyer may be requested to return the defective part or equipment to McMartin, FOB Omaha, Nebraska. Parts or equipment may be returned only with McMartin's prior authorization and must be identified by a return authorization number previously issued by McMartin's Customer Service Department. All merchandise so returned must be sent transportation prepaid, at Buyer's risk. Full details of the failure or malfunction should be included so as to expedite repair or replacement. Repair parts or repaired or replaced equipment will be returned to the Buyer, FOB factory.

The above warranty does not extend to other equipment, such as tubes, transistors, I.C.'s lamps or fuses manufactured by others, which are subject to only such adjustment as McMartin may obtain from the suppliers thereof. McMartin shall not be liable for consequential damages resulting from the use of, or the inability to use, the equipment; nor for any loss, damage or expense incurred thereby; nor from any other cause.

Except as set forth herein, and except as to title, there are no warranties, or any affirmations of fact or promises by McMartin, with reference to the equipment, or to merchantability, fitness, for particular application, signal coverage, infringement, or otherwise, which extend beyond the description of the equipment on the face hereof.

VII. SCHEMATIC DIAGRAM

SCHEMATIC RECEIVER P/N 000002 page 6

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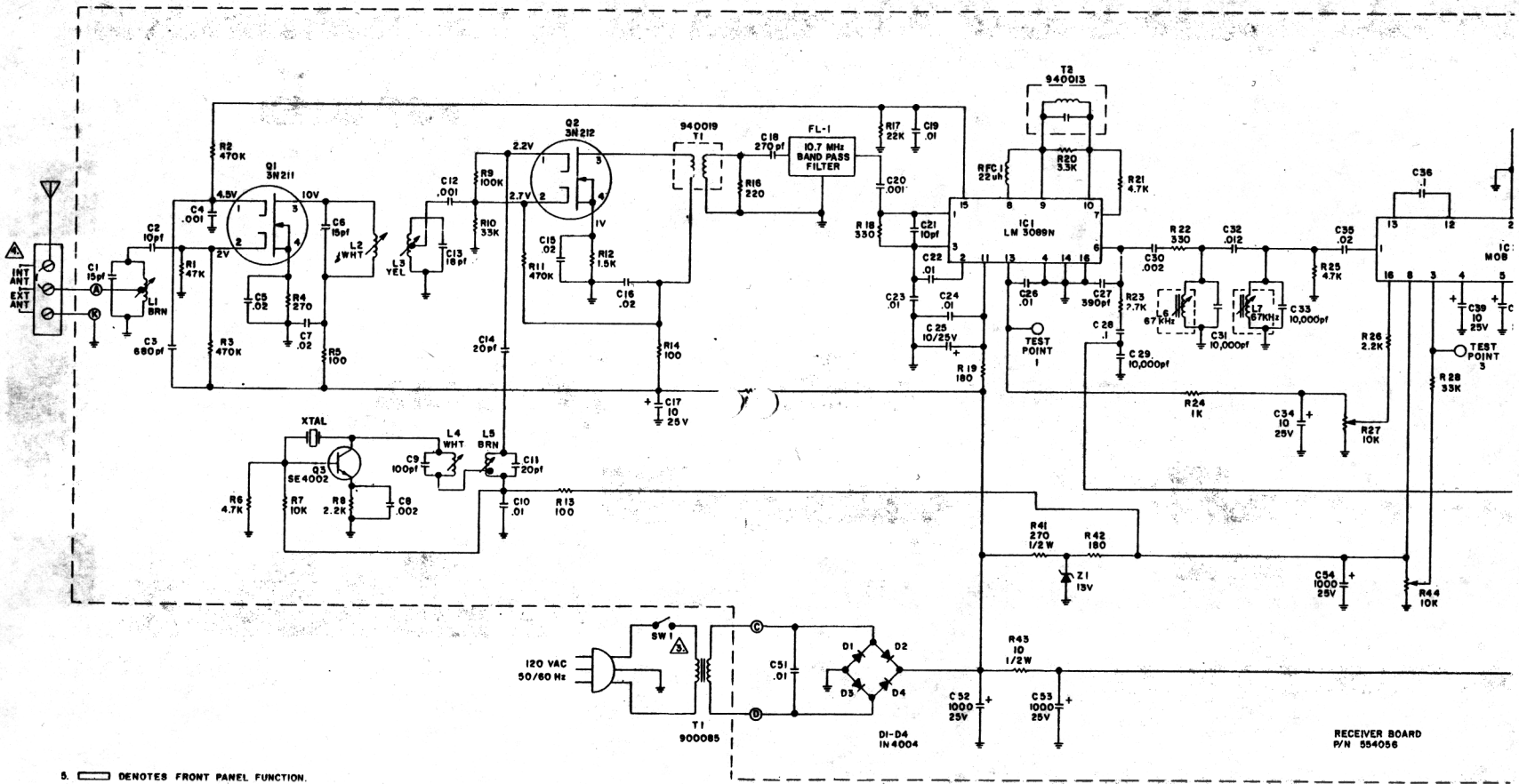


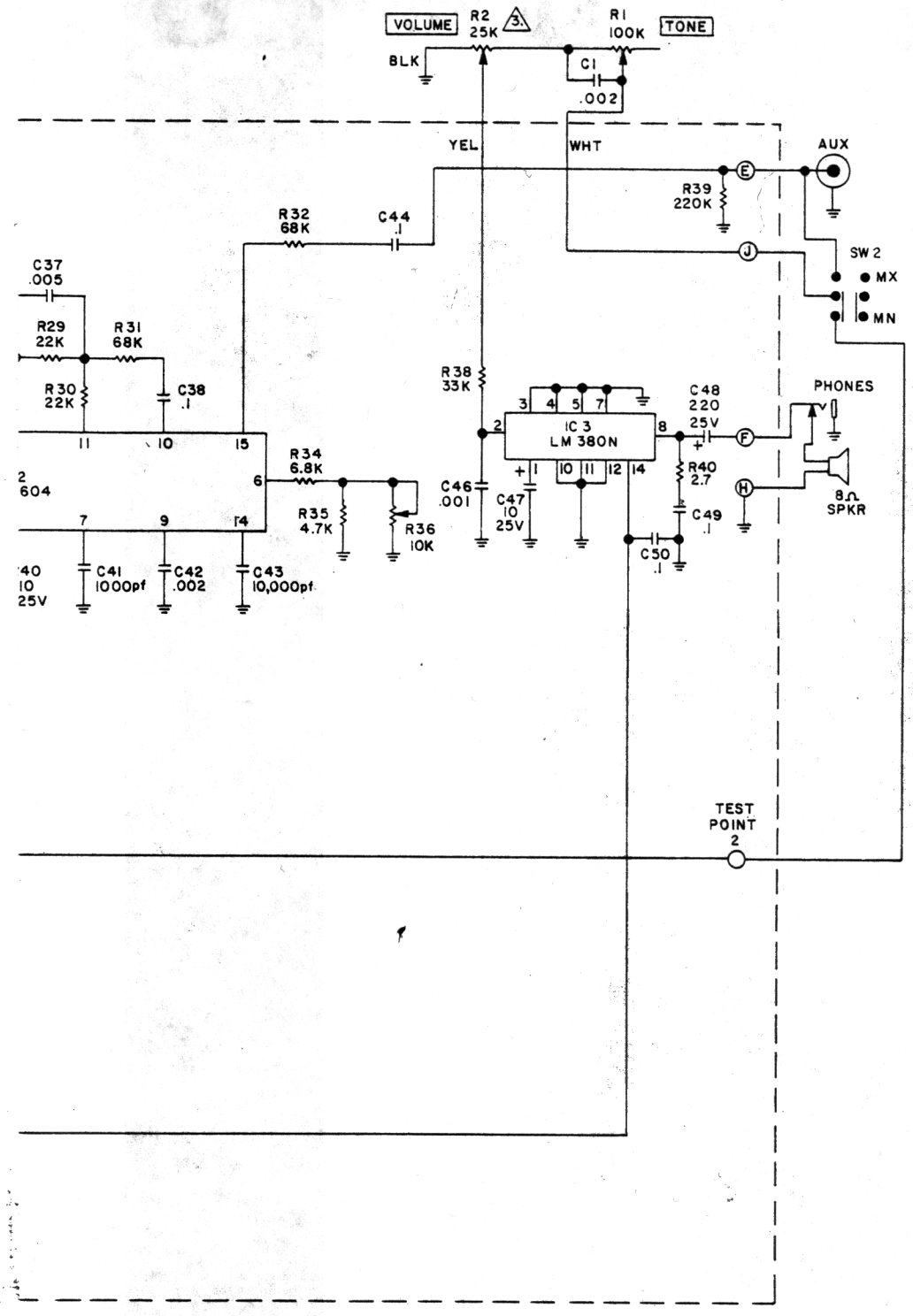
5. ▭ DENOTES FRONT PANEL FUNCTION.

4. INSTALL JUMPER FOR INTERNAL ANTENNA. REMOVE WHEN USING EXTERNAL ANTENNA.

3. SW1 IS IN R2, ON-OFF VOLUME CONTROL.

2. UNLESS OTHERWISE SPECIFIED:
CAPACITORS IN MFD
RESISTORS IN OHMS, 1/4 W 20%.

NOTES: 1. DATE OF THIS SCHEMATIC: MAR. 30, 1978.



TR-E5B

MASTER SCHEMATIC

P/N 000002

March 30, 1978