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GENERAL DESCRIPTION

The TR-66 Multiplex receiver is designed for continuous duty reception of commercial FM-SCA multiplex programming.

It has modular construction that enables a degree of flexibility unmatched by typical methods through cooler operation and long life. Solid-state design lends itself extremely well to these ends as many satisfied customers have found out. Already, the TR-66 tuner is complemented by the McMARTIN series of transistor amplifiers and accessories. A low-power audio module (LT-10, optional) will transform the TR-66 into a turner-amplifier combination. Modified power supply modules (optional) will allow either 12 VDC mobile operation or battery operation.

Straight-line design with convenient test points, simplified circuit-testing and alignment procedures as well as plug-in transistor sockets speed the technician's work. The main channel is crystal-controlled to receive any FM frequency between 88 and 108 mc. The automatic muting threshold is variable. An extremely well-regulated power supply, utilizing electronic control, assures circuit stability. The sub channel is variably-tuned by simple adjustment for convenient reception of any sub-carrier frequency between 25 and 75 kc.

The TR-66 utilizes a super-hetrodyne principle of circuitry which as originated and first introduced to this type of service by McMartin Industries, Inc.

SPECIAL FEATURES

* Transistors operate at less than 50% of their rated dissipation for increased long life through cool operation.

* The super-sensitive RF circuit offers sensitivity of 2 microvolts for 20 db quieting on the main channel. The sub channel has 3 microvolts for 25 db of quieting.

* An adjustable, automatic muting circuit is keyed by loss of either main or sub-carrier.

* Wide-bank discriminators in the main or sub channel provide linearity and minimum distortion and crosstalk.

* All test points are easily accessible on the top of the chassis.

* Seven tuned circuits in the sub channel provide extreme selectivity to eliminate sub-to-sub crosstalk.

* RF shielding meets FCC requirements.

* Comes with an RF connector and complete with both chassis and male-type connector for 72 ohm coax.

* There is a front panel switch for MN (main) or MX (sub channel). This switch simplifies servicing and enables a customer to switch to the main channel for special announcements such as historical events or local distress notices. A cover nut is supplied with all units and can replace the knob if it is desired that the customer be prevented from usage of the switch.

* The plug-in 3 watt amplifier, the LT-10, is available as an accessory item. The actual socket and all necessary wiring are incorporated in the receiver. The 25 and 70.7 volt outputs are available on terminal strips at the rear of the chassis.

SPECIFICATIONS

Main Channel

Range	88 - 108 mc
Sensitivity	2 uv for 20 db quieting
Selectivity	250 kc @ 3 db points
Capture Ratio	3.5 db
RF Input Antenna	72 ohms (solderless coax connector)
Distortion	1% @ 100% moudlation

Sub Channel

Range	25 - 75 kc tunable
Sensitivity	(20% Inj.) 3 uv/25 db quieting (10% Inj.) 7 uv/25 db quieting
Selectivity	10 kc @ 3 db points
Crosstalk	Main to SCA -55 db SCA to SCA -55 db
Frequency Response	30-8,000 cps $\pm$ 3 db
Distortion	1.5% @ $\pm$ 6 kc dev., 400 cps
Hum & Noise	60 db below full output
Outputs	Main or sub channel, switched 1.3v @ 600 ohms unbalanced (phono jack) (optional w/LT-10) 25v & 70.7v balanced @ 2w terminal board

General

Front Panel Controls	Main/Sub selector, volume control, power ON-OFF
Top Chassis	Adjustable automatic muting
Dimensions & Finish	11"w X 7"d X 5"h McMartin blue and silver
Power Supply	100-130v AC, 50-60 cps, 3 watts (15 watts/LT-10) double fused 1/4A; 1/8A 3AG
Shipping Weight	7 lbs.
Pilot Light Lamp	Neon assembly

TRANSISTOR COMPLETE

Symbol	Type	Function
Q1	2N2654	RF oscillator (crystal)
Q2	2N2654	RF amplifier
Q3	2N2654	Mixer
Q4	2N2654	1st 10.7 I.F. amplifier
Q5	2N2654	2nd 10.7 I.F. amplifier
Q6	2N2654	3rd 10.7 I.F. amplifier
Q7	SFT337	67 kc amplifier
Q8	SFT337	sub channel oscillator
Q9	SFT337	sub channel mixer
Q10	SFT337	1st 455 I.F. amplifier
Q11	SFT337	2nd 455 I.F. amplifier
Q12	SFT337	muting transistor
Q13	SFT337	1st audio amplifier
Q14	SFT337	2nd audio amplifier
Q15	DTE110	voltage regulator

2N3399
2N3399

DIODE COMPLEMENT

Symbol	Type	Function
D1	1N51	doubler
D2	1N3604	10.7 discriminator
D3	1N3604	10.7 discriminator
D4	1N3604	main channel AGC
D5	1N3604	sub channel AGC
D6	1N3604	sub channel discriminator
D7	1N3604	sub channel discriminator
ZD-1	1R12	voltage regulation
SR1	1N1693 (40267)	power rectifier
SR2	1N1693 (40267)	power rectifier
SR3	1N1693 (40267)	power rectifier

UNPACKING

Remove receiver from carton and examine for signs of external physical damage. Remove the top cover by loosening the four screws at the sides. Examine transistors, crystal, etc., to see that they are properly seated in their sockets. If any damage is noticed, immediately notify the shipping agency and advise McMartin Industries, Inc. of such action.

Contents of Carton:

1 -McMartin multiplex receiver

1 -Instruction Manual *

1 -Cover Nut (for MN-MX switch)

*Instruction manuals are usually supplied with the first five sets per customer unless additional copies are requested.

Pre Check

Because of the conditions during shipments such as moisture, vibration, etc., it is advisable to bench-check alignment and operation of the receiver prior to final installation.

Receiver Location

Sufficient space should be allowed for proper circulation of air to aid in the cooling of the unit. Keyhole slots are provided in all bottom plates to facilitate mounting the receiver on a wall. This is important in order to increase air circulation and also to prevent use of the receiver as a "shelf" for paper, books, etc. It will also eliminate the possibility of your customers moving the receiver and shorting or breaking connecting wires. The receiver should be located as near to the entrance of the antenna feed-in as possible.

Antenna

A properly selected and installed antenna is one of the most important factors in satisfactory multiplex reception. Good directional characteristics are very important in the reduction of "multipath" (crosstalk) reception and only proper antenna installation can eliminate this. This condition is the most common inlarge metropolitan areas and mountainous country. High-grain antennas normally have the best directional pattern, and, although signal strength may be high at a given location, it may still be necessary to use this type to eliminate multipath. The antenna should be oriented for a combination of best signal and lowest multipath.

For all installations we recommend the use of a McMARTIN outside, 5 element, 72 ohm, cut-to-frequency, directional antenna, (A72-SF). For proper location and orientation of the antenna, we recommend using the McMARTIN model TX-200 Field Strength Meter.

Antenna Connection

An RF coaxial receptacle is provided on the rear of the chassis for the recommended outside antenna. A solderless connector plug is furnished with the receiver for the connection to the cable. The coaxial lead-in eliminates ignition and other man-made noises and has better impedance matching, as well.

In an extremely strong signal area, McMARTIN model AP-60 attenuation pad installed between the cable and receiver may be desirable to prevent overloading the receiver's front end. The recommended input impedance is 72 ohms, however, a 50 ohm impedance may be used with little mis-match. Additional antenna connector plugs may be obtained from McMartin Industries by ordering part #17-48.

Antenna Connection cont'd.

72 ohms, however, a 50 ohm input impedance may be used with little mis-match. Additional antenna connector plugs may be obtained from McMartin Industries by ordering part #17-48.

SERVICE ADDENDUM

Aligment Procedure Using the TX-100 Signal Generator

Transistorized Multiplex Receiver, TR-66

MAIN CHANNEL:

Coil Designation:			
L-1 . . .	Antenna Coil	T-1 . . .	First 10.7 IF
L-2 . . .	RF Coil	T-2 . . .	Second 10.7 IF
L-3 . . .	Oscillator Coil	T-3 . . .	Third 10.7 IF
L-4 . . .	Doubler Coil	T-4 . . .	10.7 Discriminator

1. Remove the Q-12 muting transistor from its socket and turn the squelch control fully clockwise.

2. Remove the crystal from its socket and disconnect the antenna.

3. Inject a 10.7 mHz signal from the TX-100 generator into the main channel mixer circuit. (Connect the alligator clip to the body of the 2 pf capacitor, C-7).

4. Place the main/multiplex switch in the main position.

5. Attach a VTVM, +1.5 VDC scale, to Test Point B and tune the main channel IF transformers for mixiumum voltage.

NOTE: Never allow the voltage at Test Point B to exceed 0.7 VDC during IF alignment as limiting will occur and a voltage peak at resonance cannot be obtained.

6. Remove the VTVM from Test Point B and place it on Test Point C.

7. Tune the top slug of the discriminator, T-4, for 0.5 VDC positive.

8. With a 0.5 VDC reference on Test Point C, tune the bottom slug of the third 10.7 IF transformer for maximum voltage on TP-C.

INCREASE THE 10.7 INJECTION TO MAXIMUM FOR THE FOLLOWING STEPS.

9. Tune the top slug of the discriminator, T-4, for zero voltage at Test Point C.

Main Channel cont'd.

10. With the VTVM still on Test Point C, change the injection frequency to 10.8 mHz and note the amount of meter deflection. Now change the injection frequency to 10.6 mHz and note the amount of meter deflection. . . adjust the bottom slug of the discriminator for an equidistant deflection from center 10.7 zero, alternately switching from 10.6 to 10.8 mHz. It may become necessary to correct for center 10.7 zero, with the top slug of the discriminator due to interaction of the slugs in alignment. Proper alignment of the discriminator will result in zero voltage with 10.7 injection and an equidistant deflection at 10.6 and 10.8 mHz, this deflection being not less than 0.7 VDC.

11. Remove the signal injection and replace the crystal in its socket.

12. Remove the VTVM from Test Point C and place it on Test Point A on the negative 1.5 VDC scale.

13. Adjust the oscillator core for maximum voltage and when reached, turn the core counterclockwise until the voltage decreases 5% or 10% below the voltage obtained at resonance.

14. Tune the doubler coil for minimum voltage at Test Point A.

15. Remove the VTVM from Test Point A and place it on Test Point B on the positive 1.5 VDC scale.

16. Connect an antenna to the receiver and note the amount of limiter voltage obtained at Test Point B. If this voltage is higher than 0.7 VDC, add corresponding pads in the antenna line to lower the limiter voltage to 0.7 VDC for the remaining main channel alignment.

17. Tune the doubler coil for maximum voltage at Test Point B.

18. Tune the RF coil for maximum voltage at Test Point B.

19. Tune the antenna coil for maximum voltage at Test Point B.

20. If the limiter voltage reaches or exceeds 0.7 VDC, add additional pads in the antenna line and repeat steps 17, 18, and 19 until maximum limiter voltage is obtained with minimum signal input.

SERVICE ADDENDUM

Transistorized Multiplex Receiver, TR-66

SUB-CHANNEL:

Coil Designation:
L-5 . . . 67 kHz peaking coil
L-6 . . . sub-channel oscillator coil
T-5 . . . first 455 kHz IF
T-6 . . . second 455 kHz IF
T-7 . . . 455 kHz discriminator

THE MAIN CHANNEL SHOULD BE CHECKED FOR PROPER OPERATION PRIOR TO ALIGNMENT OF THE SUB-CHANNEL.

1. Remove the crystal from its socket and place the Mn/Mx switch in the Mx position.

2. Remove the sub-channel oscillator, Q-8, from its socket.

3. Inject a 455 kHz signal at the junction of the two capacitors, C-34 and C-35, on the signal side of the peaking coil.

4. Attach a VTVM to Test Point D using the positive 1.5 VDC scale.

5. Tune the sub-channel IF transformers for maximum voltage, reducing the signal injection as not to exceed 0.7 VDC during alignment.

6. Remove the VTVM from Test Point D and place it on Test Point E.

7. Tune the top slug of the sub-channel discriminator for zero voltage.

8. Refer to step 10 in the main channel alignment procedure and linearize the sub-channel discriminator using 445 and 465 kHz injection frequencies. This alignment must be done with maximum signal injection from the alignment generator.

9. With the VTVM still on Test Point E, replace the oscillator transistor, Q-8, and remove the signal injection from the generator.

10. Replace the main channel crystal and attach an antenna to the receiver.

11. Tune the sub-channel oscillator coil, L-6, for zero voltage at Test Point E. The correct alignment of the oscillator will result in zero voltage at Test Point E, maximum voltage at Test Point D, and an audio signal at the output of the TR-66.

12. Remove the VTVM from Test Point E and place it on Test Point D.

13. Adjust the peaking coil for maximum voltage at Test Point D.

14. Touch up the alignment of the sub-channel IF's for maximum voltage at Test Point D along with the best sound quality from the receiver. Do not sacrifice voltage for sound quality as improper muting will result.

15. Replace the muting transistor, Q-12, and adjust the variable mute control for 0.2 VDC at Test Point D.

SHOULD YOU EXPERIENCE TROUBLE . . .

At this very moment, there are over 18,000 McMartin receivers providing excellent service in this country and abroad in conjunction with many different makes of transmitting equipment and under all types of conditions. If you experience difficulty initially, it could be because of component failure in the receiver ..... or because of any of the numerous conditions in the following paragraphs.

Test Equipment

Normally, only a VTVM is needed for field alignment. For further trouble shooting, the following additional equipment will be helpful:

1. McMartin model TX-100 multiplex alignment generator or RF generator (FM type), Range: 400 kc to 110 mc.

2. Audio generator, 20 cps to 100 kc range.

3. Oscilloscope

RF and audio generators will rarely be required, but could be helpful. The cost of this type equipment is usually very high compared to its merit for use in the field.

The McMartin model TX-100 is an inexpensive crystal-controlled generator with 10.6 mc, 10.7 mc, 10.8 mc, 445 kc, 455 kc, 465 kc, and 472 kc outputs.

McMartin's complete facilities and experienced engineering staff are available to you, should any serious difficulties develop.

Distortion (sub-channel)

McMartin receivers are designed to work with a sub-carrier deviation of $\pm$ 6KC. This deviation is adequate for good frequency response and good signal-to-noise ratio. It will also reduce possible sub-to-sub or stereo-to-sub crosstalk. However, more deviation can introduce high-frequency distortion. If greater deviation is required, it can be supplied as an option from McMartin Industries, Inc.

Crosstalk (main-to-sub)

Crosstalk is intermodulation between the main and sub channel(s). It can occur only in places where the main channel is present, such as: main channel exciter, transmitting antenna system, receiver antenna, and the main channel portion of the receiver. Crosstalk is not developed in the sub channel portion of a receiver.

To assure accurate calibration and adjustment of your transmitter at all times, we recommend using McMARTIN model TBM-4000 combination FM-SCA Multiplex Modulation Monitor. It will simultaneously monitor main and sub channel modulation plus sub-carrier frequency. Also, it reads percent of

Crosstalk (main to sub) cont'd

sub-carrier injection and crosstalk directly. All specifications meet or surpass present FCC requirements for Type Approval on FM.

Many operators also utilize the McMARTIN model TBM-1000 and model TBM-2000 for accurate, "off-the-air," metered and aural monitoring. These units are particularly useful for remote monitoring.

At the transmitter check:

1. Main channel per cent of modulation. This is a common source of crosstalk. Do not over-modulate.

2. Tuning of the main channel exciter, driver, and finals. The circuits must be broad band and linear. Phase error causes crosstalk.

3. VSWR of the antenna must be low.

4. Sub channel deviation and injection must be correct. We normally recommend 15 per cent injection for monaural main channel and one sub. If two subs are used, we recommend 12 per cent on the higher sub, and 18 per cent on the lower. With stereo operation you are limited to 10 per cent.

At the receiver check:

1. Rotate the antenna for best rejection of multipath signals. This is a common cause of crosstalk. A fluctuating signal is an indication of multipath.

2. Re-check oscillator and discriminator adjustments.

3. Only after checking all the above factors, listen for crosstalk. with the sub channel modulation removed, and very carefully adjust the top and bottom slugs of T1, T2, and T3 for minimum crosstalk. The bottom slug of T1 will have the most effect, if any. THESE ADJUSTMENTS ARE CRITICAL. Do not tune more than 1/8 turn in either direction from the original setting. Generally, minimum crosstalk will occur when the I.F.'s are peaked to 10.7 mc. Regardless, all McMARTIN receivers are sweep-aligned at the factory for minimum crosstalk and maximum performance.

Crosstalk (sub-to-sub)

This is caused by over-deviation of one or both sub channels.

SHOULD YOU EXPERIENCE TROUBLE.....cont'd

Automatic Muting

The adjustabel threshold should be established just below the point where noise caused by a weak signal would become objectionable. This circuit is fast-acting and positive. It will not create a "popping noise," nor is it affected adversely by the time constant used at the transmitter when muting between musical selections. Advancing an additional 1/8 turn allows for component aging and signal variance.

Hum & Noise

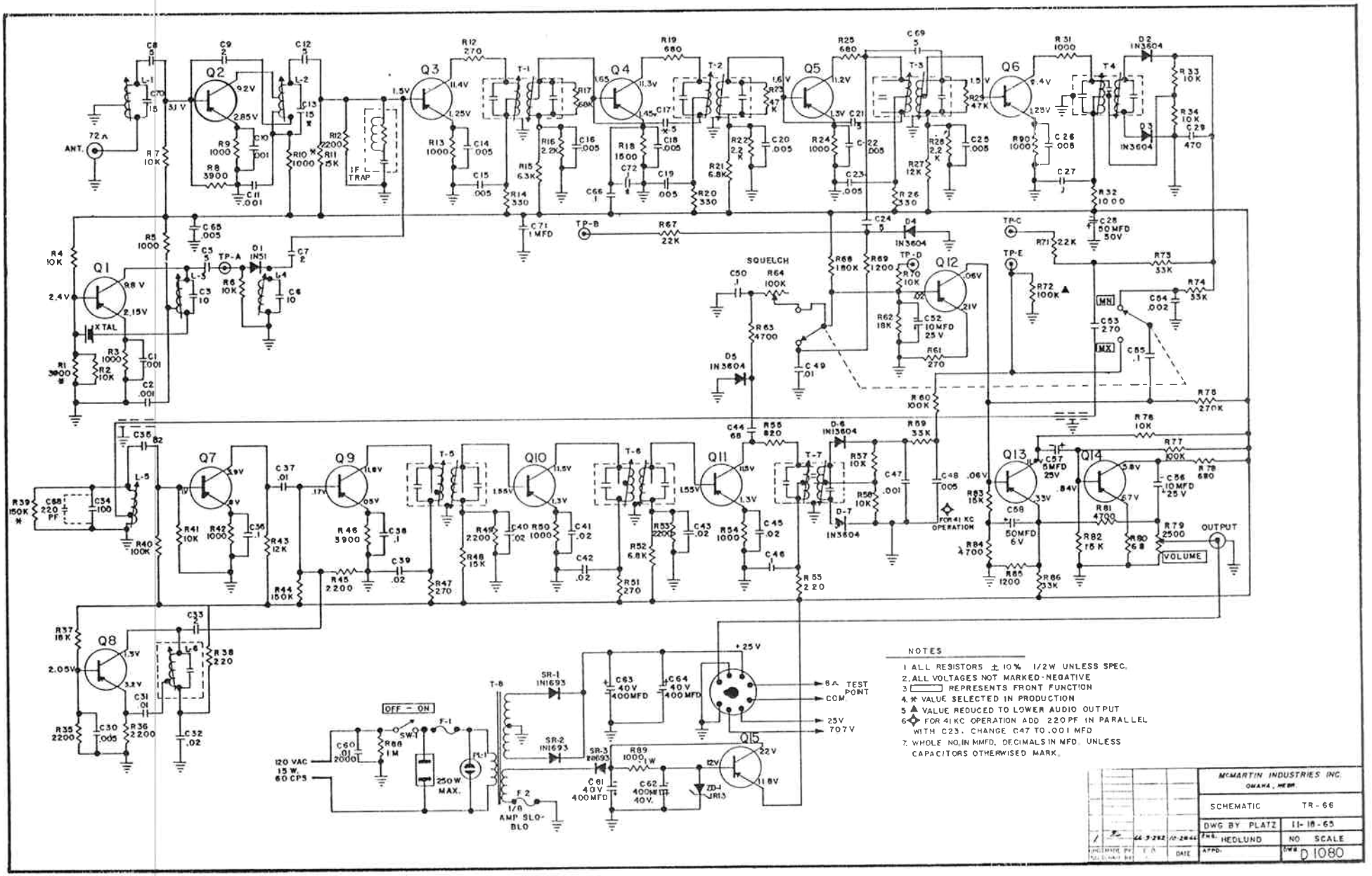
The transmitter or studio equipment is sometimes at fault and can be checked by listening to several different receivers. Ignition or "spark" type noise usually stems from the receiving antenna installation, and by mounting the antenna away from the noise source (i.e. highway) the situation will be alleviated. Noise-producing equipment, such as motors and cash registers, feed into the receiver via the AC power source and should be located and corrected beforehand. This can be accomplished through the use of line filters. If any of the test point voltages indicated on the schematic are very low, check for defective transistors. Under certain conditions a strong RF signal may be picked up and detected by the audio-amplifying system directly.

WARRANTY

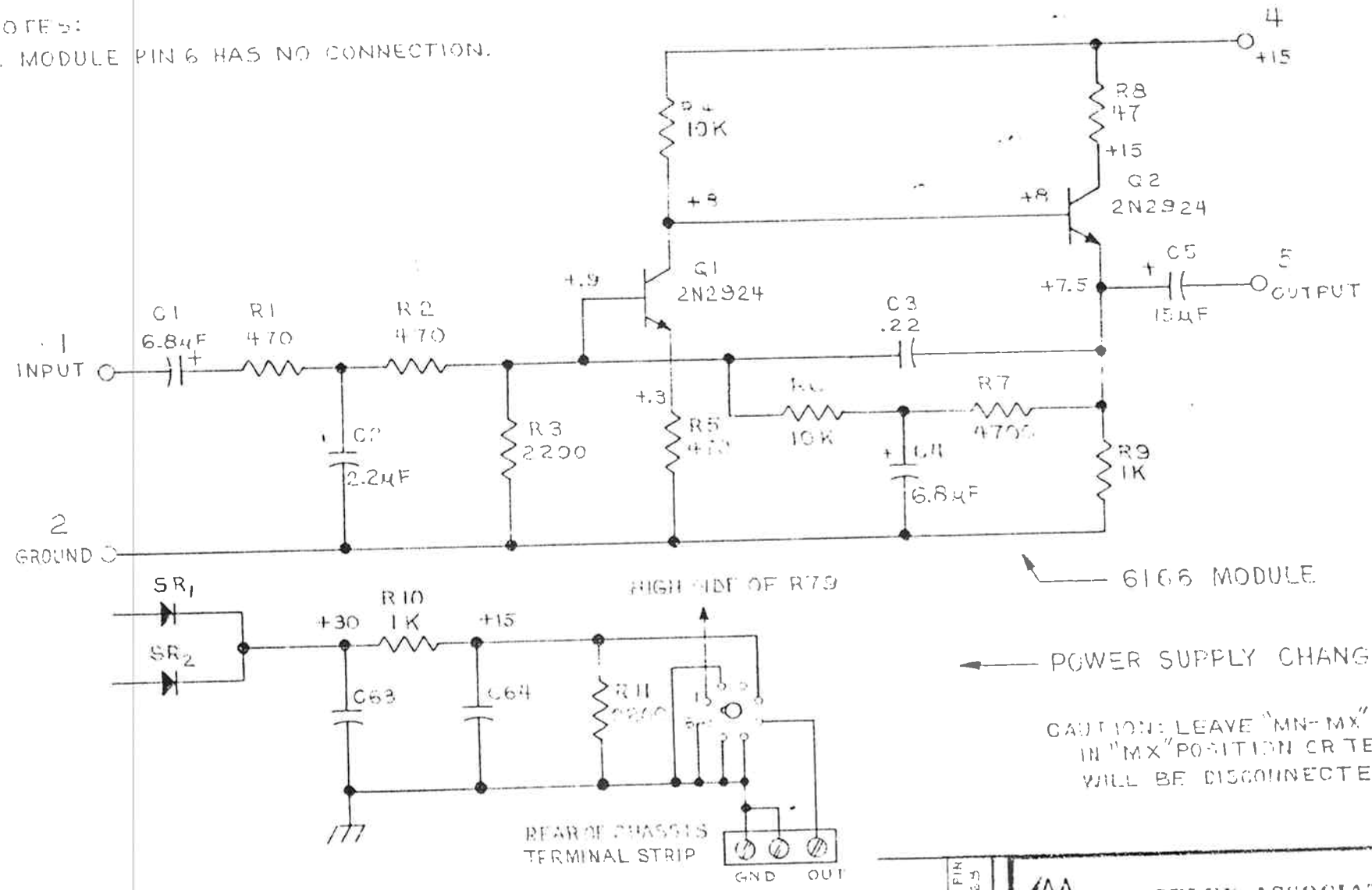
McMARTIN broadcast and audio products are warranted to be free from defects in workmanship----FOREVER.

At our discretion, we will exchange or repair any defective unit or components, at any time, without charge. Material and components are guaranteed for a minimum period of ninety days from the date of original purchase. Transportation charges must be prepaid on equipment returned for warranty service.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accidents, incorrect wiring not our own, improper installation or to use in violation of the instruction furnished by us, nor to units that have been altered outside our factory.


Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
ANT.
XTAL
SQUELCH
OFF - ON
120 VAC 15 W. 60 CPS
250 W MAX.
1/8 AMP SLO-BLO
VOLUME
OUTPUT
+25V
25V
707V
8A TEST POINT
COM
1F TRAP
MN
MX
FOR 41 KC OPERATION
NOTES
1 ALL RESISTORS ± 10% 1/2W UNLESS SPEC.
2. ALL VOLTAGES NOT MARKED - NEGATIVE
3 ☐ REPRESENTS FRONT FUNCTION
4. ✻ VALUE SELECTED IN PRODUCTION
5 ▲ VALUE REDUCED TO LOWER AUDIO OUTPUT
6 ◇ FOR 41KC OPERATION ADD 220 PF IN PARALLEL WITH C23. CHANGE C47 TO .001 MFD
7. WHOLE NO. IN MMFD. DECIMALS IN MFD. UNLESS CAPACITORS OTHERWISED MARK.
McMARTIN INDUSTRIES INC.
OMAHA, NEBR
SCHEMATIC TR-66
DWG BY PLATZ 11-18-65
ENG. HEDLUND NO SCALE
APPD.
DWG D 1080

NOTES:
1. MODULE PIN 6 HAS NO CONNECTION.



A	ADD NOTE 1. ADD PIN 2 TO GND 11/65	MOSELEY ASSOCIATES, INC. SANTA BARBARA, CALIFORNIA	
		TELEMETRY AMPLIFIER FOR TR-66 TYPE II SYSTEM	
		DWN FXV 3-66 / CHK JCT 3-66	91A 6166 A