

31

Price \$5.00

SERVICE MANUAL FOR 387 RECEIVER



Scott . . . where innovation is a tradition



H. H. Scott, Inc. 111 Powdermill Road, Maynard, Mass., 01754

SPECIFICATIONS:

AMPLIFIER SECTION

Total power ± 1 dB	270 watts @ 4 ohms
IHF Music Power	220 watts @ 4 ohms 140 watts @ 8 ohms
Continuous Power Output (one channel driven)	100/100 watts @ 4 ohms 63/63 watts @ 8 ohms
Continuous Power Output (both channels driven)	85/85 watts @ 4 ohms 55/55 watts @ 8 ohms
Harmonic Distortion	0.5% at rated output
IHF Power Bandwidth	10 Hz - 38kHz
Hum and noise, phono	-65 dB
Hum and noise, phono (high level)	-75 dB

AUDIO SECTION

INPUT SENSITIVITY

Phono	high 4.2 mV low 8.5 mV
Mic	5.5 mV
Extra	0.70 V
Tape in	0.70 V

HUM AND NOISE (below rated output)

Phono	65 dB
Mic	65 dB
Extra	70 dB
Tape In	70 dB

INPUT IMPEDANCE

Phono	50 k ohms
Mic	50 k ohms
Extra	50 k ohms
Tape In	50 k ohms

TUNER SECTION - FM MULTIPLEX

Sensitivity	1.9 μ V
Tuning Range	88-108 MHz
Signal to Noise Ratio	65 dB below 100% mod.
Total Harmonic Distortion	0.6%
Frequency Response (FCC limit)	50-15000 Hz ± 1 dB

Capture Ratio	2.5 dB
Dial Calibration Accuracy	0.5% of station freq.
AM Suppression	55 dB
Separation @ 400 Hz	35 dB
Cross Modulation Rejection	80 dB
FM Muting Switching Level (Adjustable)	3 - 30 μ V
IM Distortion	0.5%

AM SECTION

Tuning Range	535 kHz to 1620 kHz
Bandwidth	-3 dB = 8 kHz -6 dB = 10 kHz
Selectivity	32 dB
THD (60% modulation)	2.0%
Usable Sensitivity	100 μ V/m @ 600 kHz
Hum and Noise	40 dB below 100% mod.
Spurious Response Rejection	>60 dB
IF rejection	>33 dB
Image rejection	>48 dB

POWER REQUIREMENTS

Line Voltage & Frequency	105-125 VAC/50-60 Hz
(110/220 Conversion)	100-120/190-235V

CONVENIENCE FEATURES

1. Front panel, 4-way speaker switching.
2. Dual bass and treble controls to simulate stereo sound from a monophonic source.
3. Front panel headphone jack.
4. Preamp sensitivity control for precise matching to cartridge output.
5. 72/75 ohm antenna jack with Balun switch for professional applications.
6. New total electronic protective circuitry is more effective than any fuse or circuit breaker.
7. Dual (front and rear panel) tape recording inputs and outputs permit connection of two recorders.

SET CONTROLS TO FOLLOWING POSITIONS FOR TEST PROCEDURES

Front Panel

Input Selector	Extra
Tone Controls	Flat (12 o'clock)
Loudness Power	AC Off
Balance	12 o'clock
No. 1 Speaker	ON *
Loudness/Vol	Vol *

* All other buttons should be in "out" position

Rear Panel

Preamp sensitivity max (up position)

Resistance checks – To be performed before unit is plugged in or turned on.

Note: The values obtained vary with the brand of VOM used. These values were obtained using a Triplet model 630A, which has a positive DC voltage at its red (positive) lead when used on ohms. Many other brands have negative voltage at the positive lead; all test lead positions should be reversed in such cases.

- (1) Connect the black lead to driver board pin 4 and the red lead to the emitter (top connection) of the PNP output (020-1111-024). Read about 1.5 k Ω on 1000 ohm scale.
- (2) Connect the red lead to driver pin 4 and repeat the procedure with the NPN (020-1111-023).
- (3) Power supply checks. Connect one VOM lead to pin 4 of the driver board and the other to the chassis. Meter should read about 1.5 K Ω on the 1000 ohm scale and then begin to rise as the filter capacitor charges.
- (4) Reverse the VOM leads connected to driver pin 4 and chassis. Repeat above measurement to check second half of power supply.
- (5) Repeat *all four* steps above for the second channel. (Test four will also reveal a shorted output in one channel.)

1. Bias and Balance Adjustments (no speaker connected)

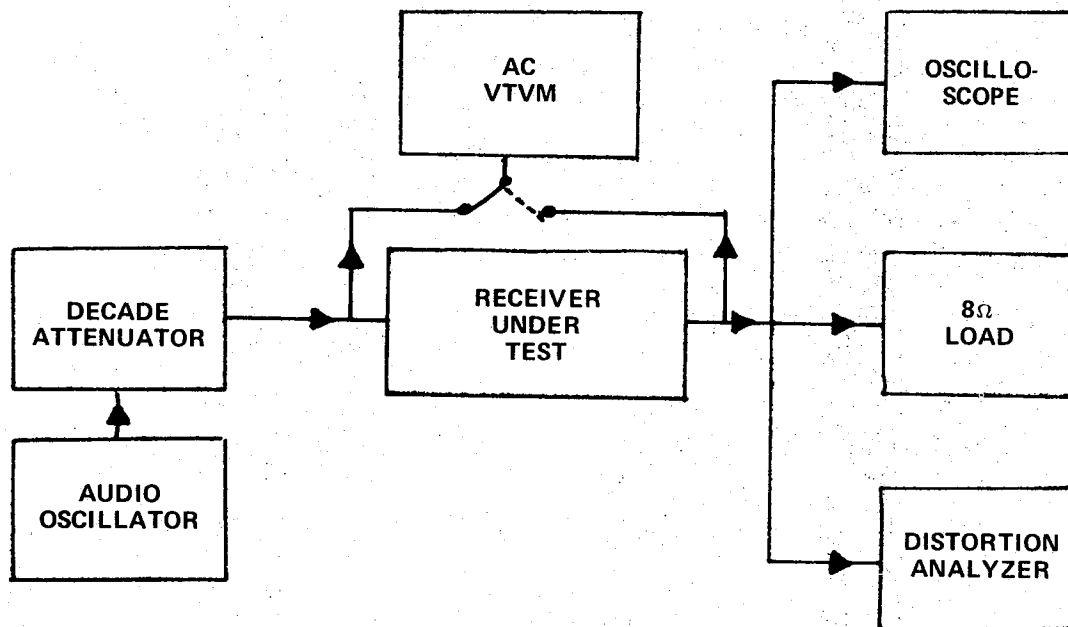
- (a) Preset bias adjustment pots for zero bias (arrows pointing toward front of unit).
- (b) Turn unit ON, leaving volume control at minimum; check supply voltage and regulator voltages. On power supply regulator measure following points:

- +	
(6) to (4)	24V \mp 10%
(3) to (1)	33V \mp 10%
(12) to (10)	13V \mp 10%
(9) to (7)	13V \mp 20%
- (c) Measure voltage across MAIN speaker terminal on 3V scale; reading should be less than 0.5V. Do *not* continue if voltage is larger than indicated.
- (d) Set VOM to 12 mA DC and connect leads to left MAIN speaker terminal. Adjust DC offset potentiometer on left driver module (R) for zero reading.
- (e) Repeat for right channel.
- (f) Set a Triplet model 630-A VOM to 12 mA DC scale and touch cases of left lower and upper output transistors (1111-023 and 1111-024) with negative and positive probe respectively. Be careful not to short the case to chassis! Adjust left driver amplifier module bias potentiometer for

1.0 mA after unit has warmed up for five minutes. Note: this corresponds to a bias current of 20 mA through the two 0.47Ω emitter resistors, or a 19 mV drop across the two emitter resistors. Use of a VOM on the current scale is to obviate the need for a millivoltmeter, or a shorting test jack.

- (g) Repeat on right upper and lower transistors for right channel.

BASIC TEST SETUP FOR AUDIO CHECKS



2. Audio Level Tests (Tone control plus driver and output stage)

- Turn input selector to EXTRA, connect audio oscillator to left EXTRA input on rear of RX. Set oscillator frequency to 1 kHz.
- Connect 8Ω resistive loads to left and right speaker output terminals; connect AC voltmeter across left 8Ω load (30V range).
- Turn volume control fully clockwise and observe wave form on scope; adjust output of oscillator until wave form is just below clipping; output voltage should be 21 V rms. ($-1\frac{1}{2}$ dB on 30V scale). Input must be -1 ± 1 dB on 1 V scale (0.70V).
- Check voltage at tape outputs, front and rear. Should be $0.70 \text{ V} \pm 1$ dB both channels.
- Observe wave form carefully and check for oscillations; a small notch appearing when amplifier is driven into hard clipping is caused by the bootstrap circuit and is normal.
- Repeat for right channel.

3. Frequency Response Check

- (a) Check that all controls are set as described on page 2.
- (b) Feed a 1 kHz audio signal into left EXTRA input and set volume control at about 11 o'clock. Adjust generator output to give a 0 dB reading on the 3 V scale. 3 dB down points occur between 10 and 20 Hz and between 25 and 35 kHz.

4. Tone Control Response (use conditions as in 3a. and 3b. above)

Bass 100 Hz	Treble 10 kHz
Boost 12 dB \pm 2 dB	12 dB \pm 2 dB
Cut 12 dB \pm 2 dB	15 dB \pm 2 dB

5. Distortion Check

- (a) Set tone controls to flat position and turn volume fully clockwise.
- (b) Set audio oscillator to 10 kHz and adjust output level so that wave form is just below clipping point.
- (c) THD must be below 0.6%.

6. Damping Factor Check

- (a) Feed 1 kHz audio signal into left channel TAPE IN, press tape monitor button and adjust generator or volume control for 0 dB on 3 V scale. Read identical input at front panel tape *input* jack. When 8 ohm load is removed output voltage must not change more than 1 dB. Repeat for right channel. Release TAPE MONITOR button.

7. Noise Filter

- (a) Feed 10 kHz audio signal into EXTRA.
- (b) Adjust generator or volume for 0 dB reading on 3 V scale across 8 ohm load.
- (c) Push NOISE FILTER button and observe 12 dB \pm 1 dB decrease in signal level.
- (d) Release NOISE FILTER button.

8. Loudness-Volume Check

- (a) Feed 1 kHz into EXTRA: push Vol-Comp. button in (VOL).
- (b) Set generator for -10 dB on 3 V scale across 8 ohm load; volume control at 9.
- (c) Release VOLUME COMP button and note 5 dB \pm 2dB increase.
- (d) Push button in again (VOL) and set oscillator to 100 Hz.
- (e) Release VOLUME COMP button and note 11 dB \pm 2 dB increase.
- (f) Repeat procedure at 10 kHz and observe increase of 5 dB \pm 1½ dB.
- (g) Check volume control tracking in 10 dB steps to 40 dB down. Output must not vary more than 3 dB between channels. Turn volume to minimum; output should be -70 dB with reference to full output (21V).

**9. #1 and #2 Speaker Switches Check:
Headphone Level Check – 8Ω loads –
should be 49 dB below speaker level**

Check operation of No. 1 and No. 2 speaker switches by connecting 8 ohm loads or speakers to each and selecting the appropriate button. Headphone output is not affected by speaker buttons.

10. Crosstalk, Stereo Switch and Balance Control Check

With volume control at maximum, audio generator feeding 1 kHz into EXTRA *left* input, increase generator output for 21 V rms into 8 ohm load. Connect VTVM across *right* channel 8 ohm load; signal level should be at least 45 dB down. Select MONO and note increase in signal level. Output of left and right channels should be within 1 dB of each other.

Rotate Balance Control to maximum counterclockwise position and observe a minimum drop of 50 dB; repeat similar test for other channel. Release button to STEREO position.

11. Phono and MIC preamp Gain Checks

- (a) Select PHONO on selector switch; reduce audio oscillator to approximately 3 mV output and feed a 1 kHz signal into left phono input; volume control is set fully clockwise. Adjust oscillator output until output at speaker terminals is just below clipping (21 v rms). Input level must be -5 ± 2 dB on .01 V scale.
- (b) Set preamp sensitivity switch to "LOW" and note a 6 ± 1 dB drop in output level; return switch to "HIGH" position.
- (c) To check MIC gain make proper connections and select MIC position on selector switch. Adjust input so that output at speaker terminals is just below clipping. Input signal level must be -3 ± 2 dB on .01 V scale.
- (d) Set preamp switch to "LOW" and note a $5\frac{1}{2} \pm 1$ dB reduction in output signal. Return sensitivity switch to "HIGH" position.
- (e) Repeat above steps for right channel.

Nominal Over-All Gain @ 1 kHz

	At Speaker (full volume)	At Tape Out
Phono (hi sens)	73½ dB	43 dB
Phono (low sens)	67½ dB	37 dB
MIC (hi sens)	71½ dB	41 dB
MIC (low sens)	66 dB	35½ dB
EXT	30½ dB	0 dB

12. Phono (R1AA) and MIC Response Checks

- (a) Release speaker pushbuttons and connect AC VTVM to left TAPE OUT jack.
- (b) Selector switch to PHONO position.
- (c) Set oscillator to 1 kHz and adjust its output to obtain a 0 dB reading on 0.3 V scale of AC VTVM.
- (d) Check that the following readings are within ± 2 dB of those given in table.
- (e) To check MIC response, repeat steps c and d after making the proper connections.

Frequency	Phono (R1AA)	MIC
1 kHz	0 dB	0 dB
100 kHz	+13 dB	0 dB
10 kHz	-13 3/4 dB	-1 dB

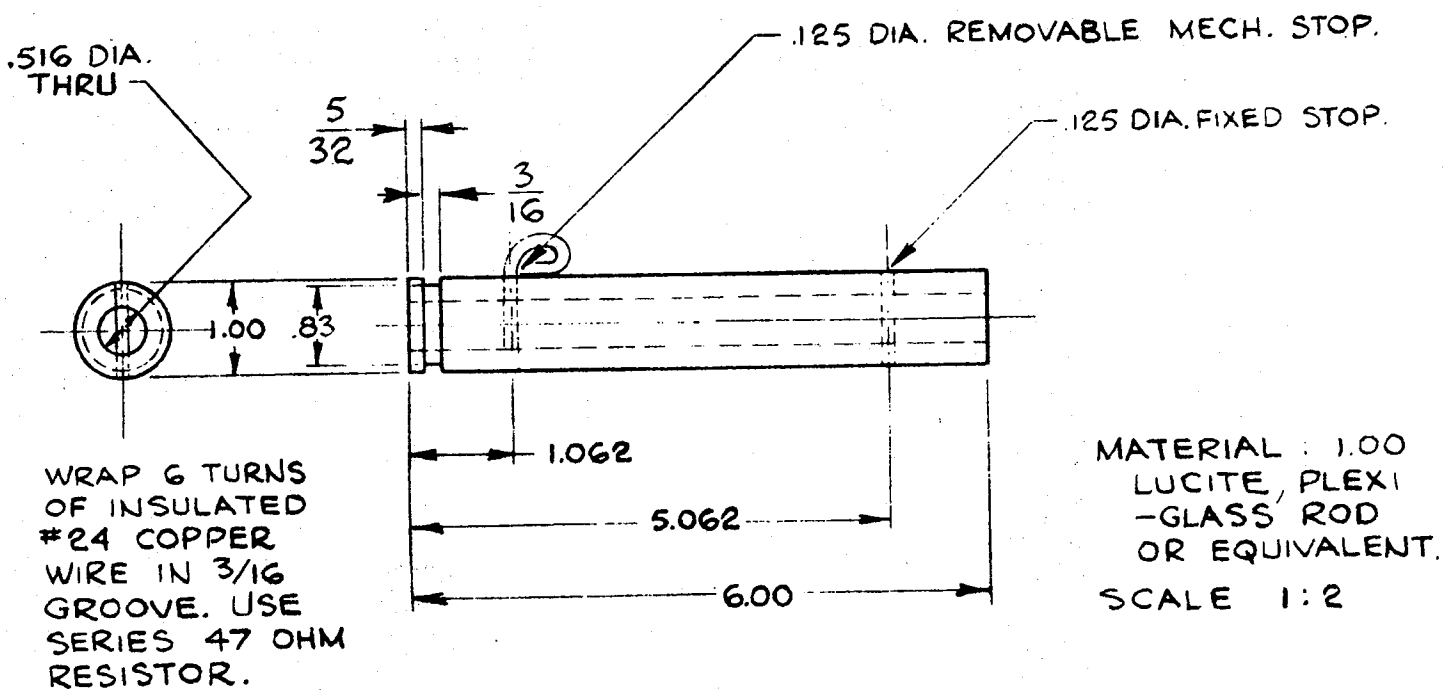
(f) Repeat response checks for right channel.

13. Hum and Noise Check (at speaker terminals)

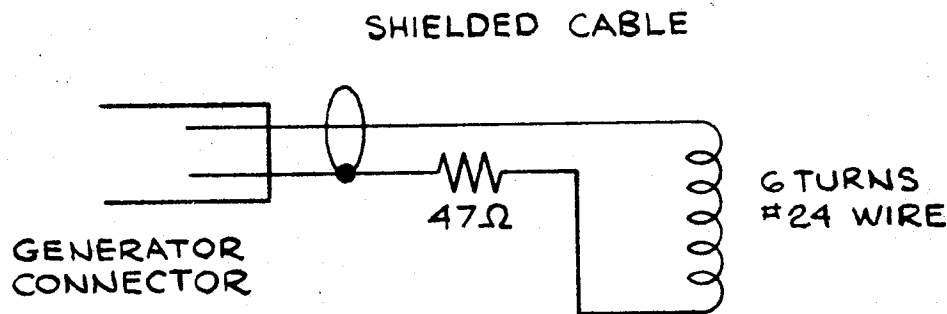
(a) Set volume fully clockwise; tone controls to flat position; turn on speakers. Short both phono inputs.

(b) Position	Unweighted Noise (max.) at speaker terminals
Phono	20 mV
MIC	15 mV
EXT	8 mV

(c) Set volume to minimum, read maximum noise of 2 mV.



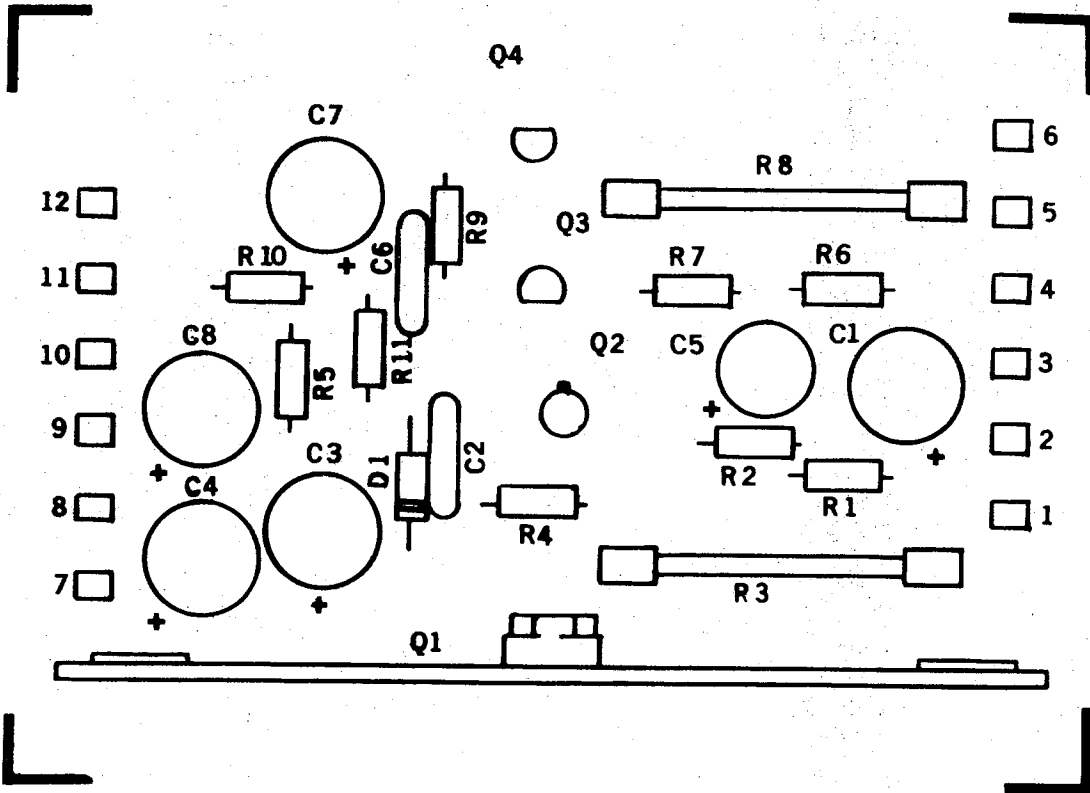
FORM FOR AM COUPLING LOOP



CIRCUIT FIGURE AM-1

Q1 QP 14
 Q2 QA 15
 Q3 S 1990
 Q4 S 2209

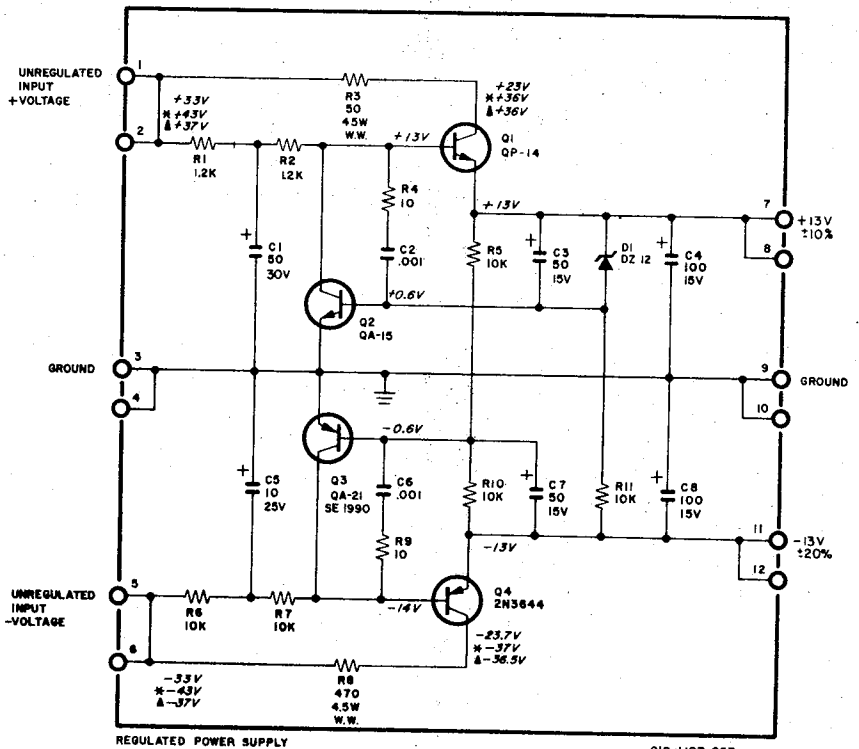
CIRCUIT DIAGRAM 100-1340-012



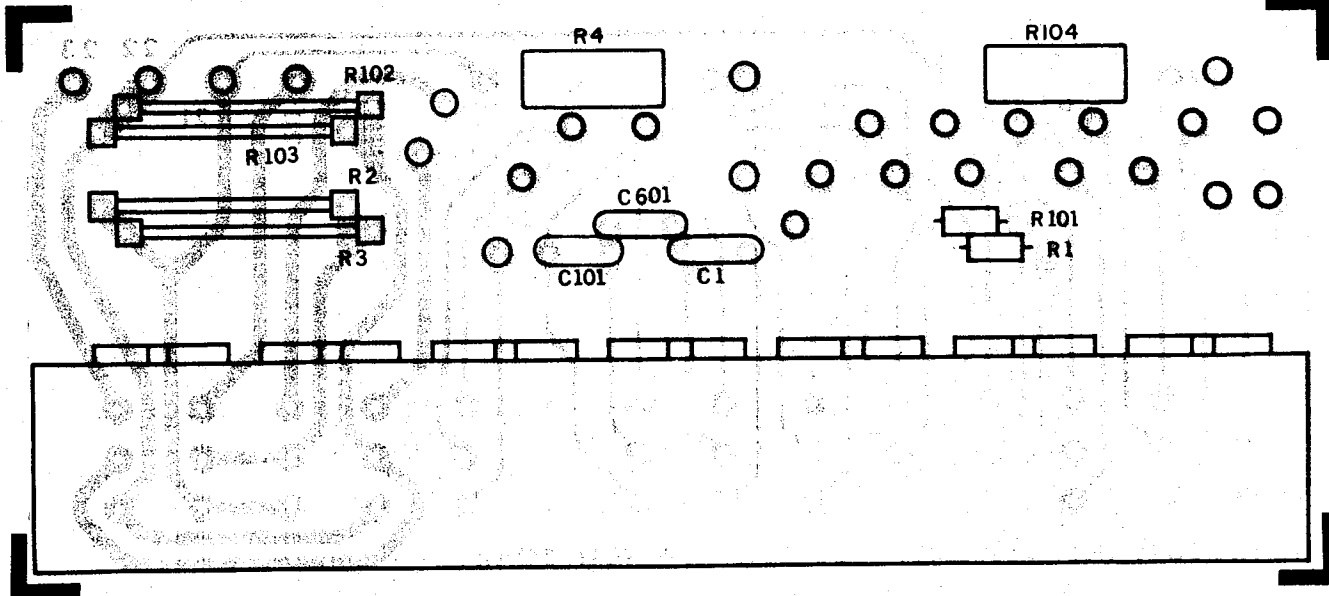
POWER SUPPLY

019-1107-057

- NOTES:
1. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE IN OHMS $\pm 10\%$. CAPACITANCE IN MFD'S, RESISTORS 1/4 WATT, AND VOLTS ARE D.C. $\pm 15\%$ MEASURED WITH 20K Ω /VOLT V.O.M.
 2. HIGHEST SERIES NUMBERS: R11, C8, D1, Q4
 3. UNREGULATED INPUT VOLTAGE RANGE $\pm (25V \text{ TO } 44V)$
 4. * INDICATES THE ONLY VOLTAGES WHICH CHANGE WITH 43V INPUT. (387).
 5. Δ INDICATES THE ONLY VOLTAGES WHICH CHANGE WITH 37V INPUT. (499).

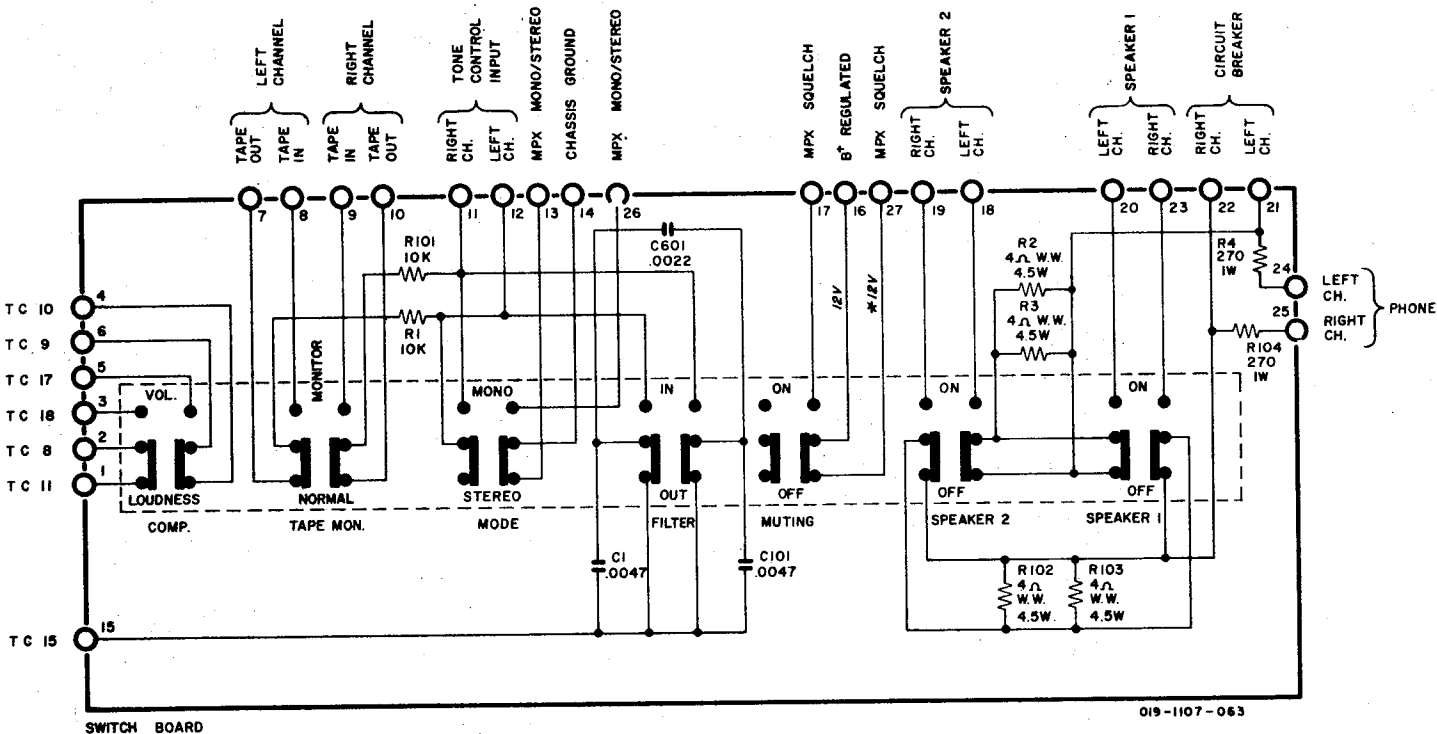


CIRCUIT DIAGRAM 100-1352-002



PUSH BUTTON SW.

019-1107-063/A



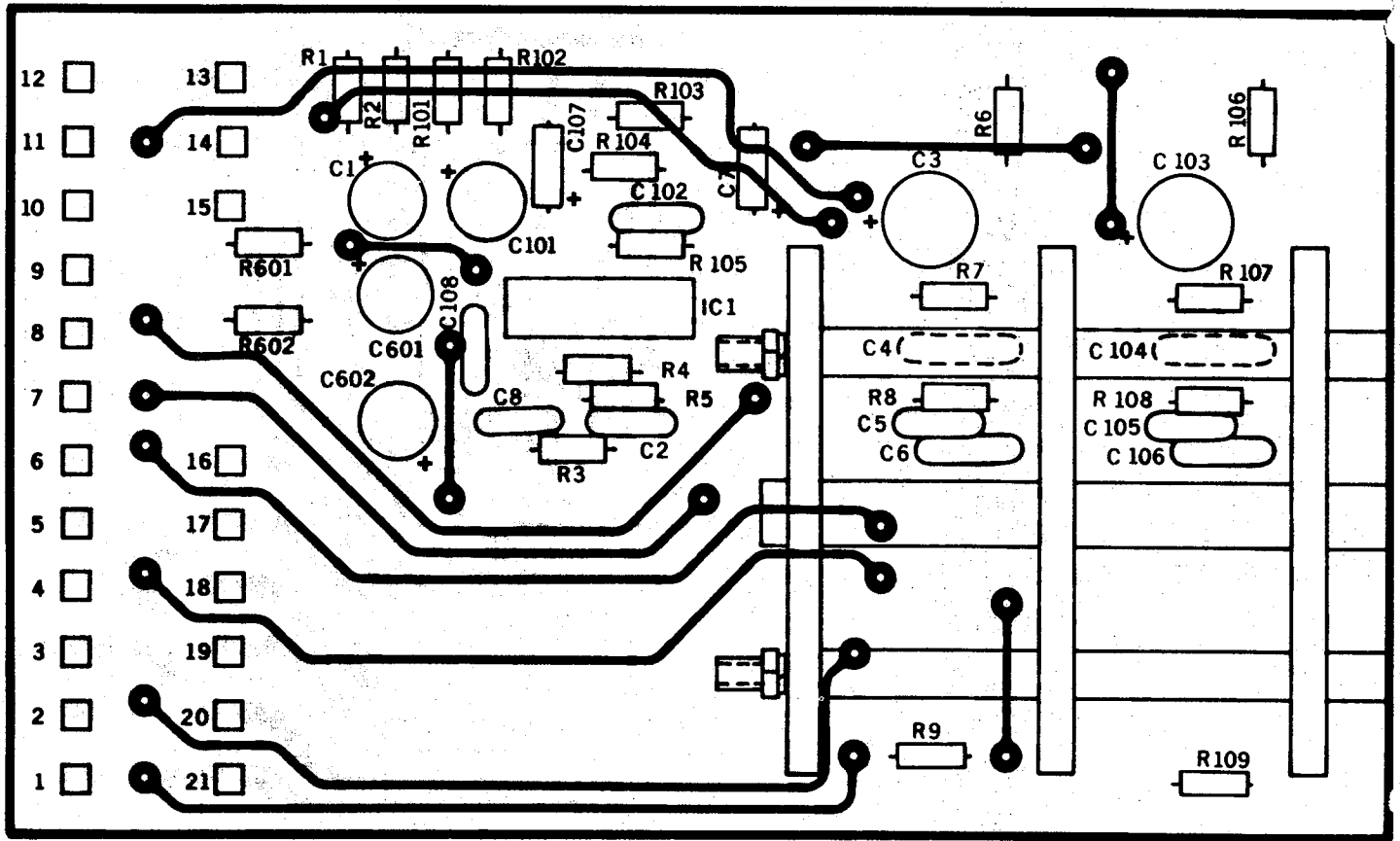
019-1107-063

NOTES:

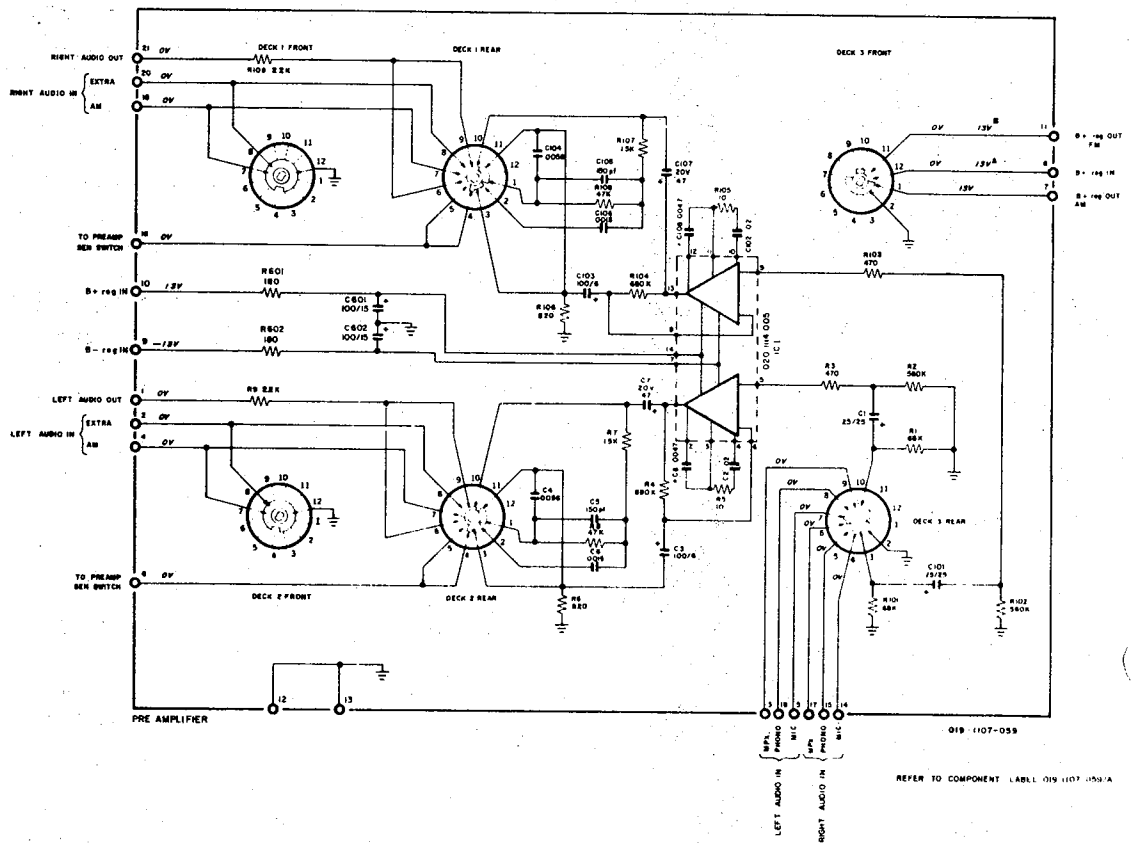
1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, RESISTORS 1/4 WATT, ±10%, CAPACITANCE IN MFD'S.
2. T C = TONE CONTROL ASSY PIN NO'S
3. HIGHEST SERIES NO'S. — C1, C101, C601, R4, R104
4. REFER TO COMPONENT LABEL 019-1107-063/A REV.0
5. * WHEN MUTING OFF.
6. ALL OTHER VOLTAGES ARE 0. VOLTS.

IC-1, SC5116P

CIRCUIT DIAGRAM 100-1333-020



PRE-AMP



- NOTES:
1. UNLESS OTHERWISE SPECIFIED; RESISTANCE IN OHMS, 10% 1/4 WATT, AND CAPACITANCE IN MFD'S.
 2. IC1 IS Q10-118-008.
 3. RESISTOR SERIES NUMBERS C8, R9, IC1, C108, R109, C602, R802 4 SHOWN IN MIC POSITION, COUNTER CLOCKWISE, VIEWED FROM FRONT.
 6. ARROWHEADS INDICATES MAIN SIGNAL PATH.
 - 6.8 FOR USE WITH μA 739 (C8 & C108 .0047).
 7. A ON AM ONLY.
 8. ON FM ONLY.

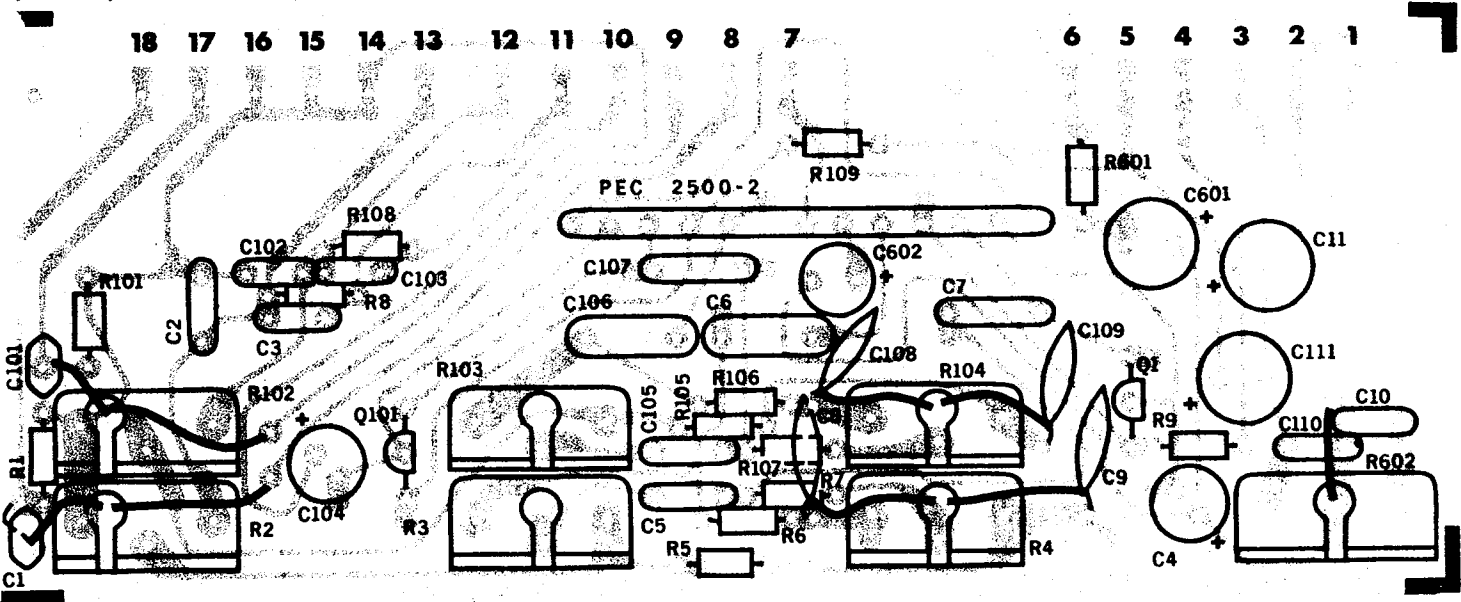
MDI SELECTOR SWITCH 083-1157-041

POSITION	FUNCTION
1	MIC
2	PHONO
3	FM
4	AM
5	EXTRA

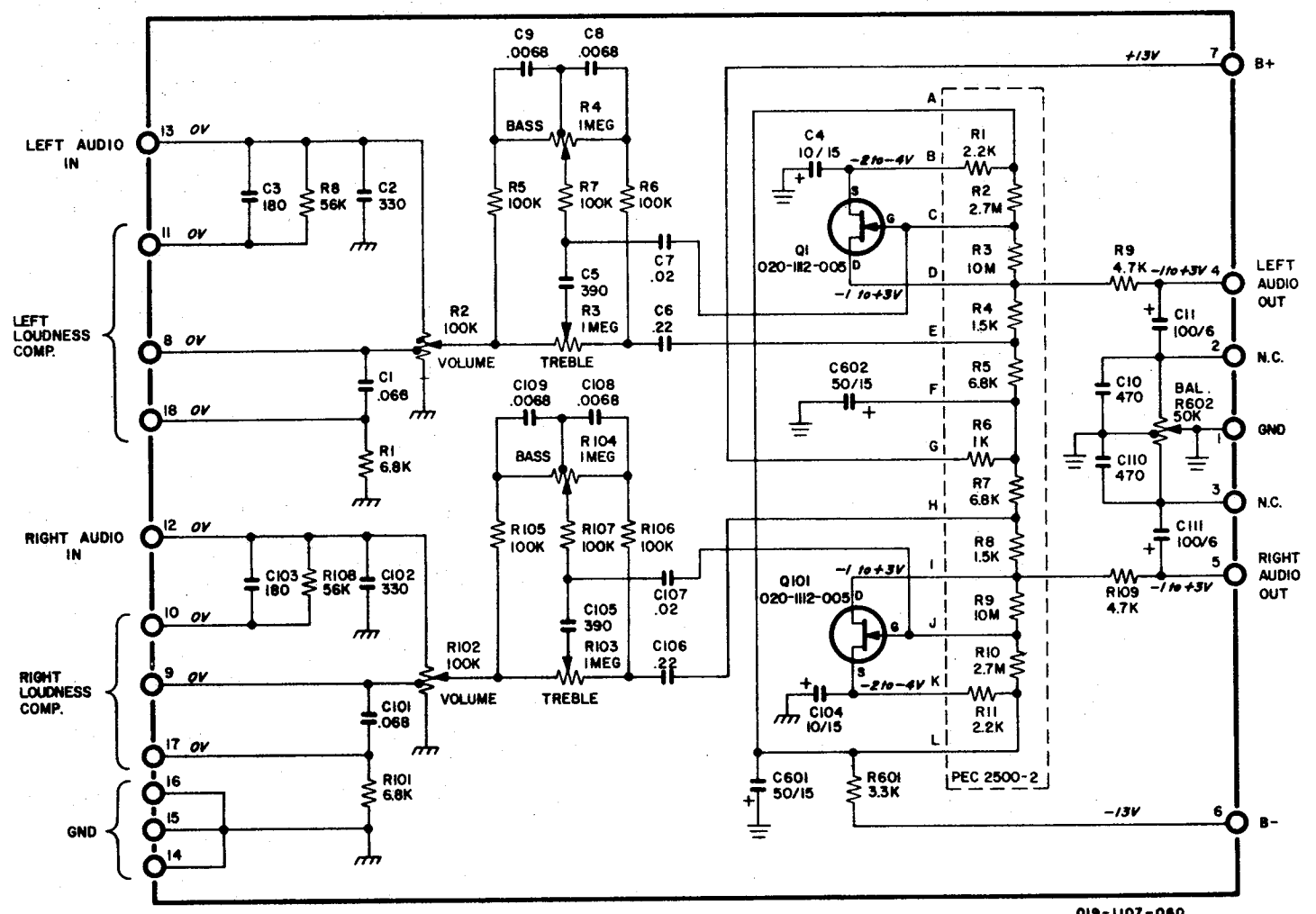
SWITCH SHOWN IN MAX CCW POSITION (MIC).

1, Q101, 020-1112-005

CIRCUIT DIAGRAM 100-1334-007



ONE CONTROL & LOUDNESS



TONE CONTROL AND LOUDNESS

019-1107-060

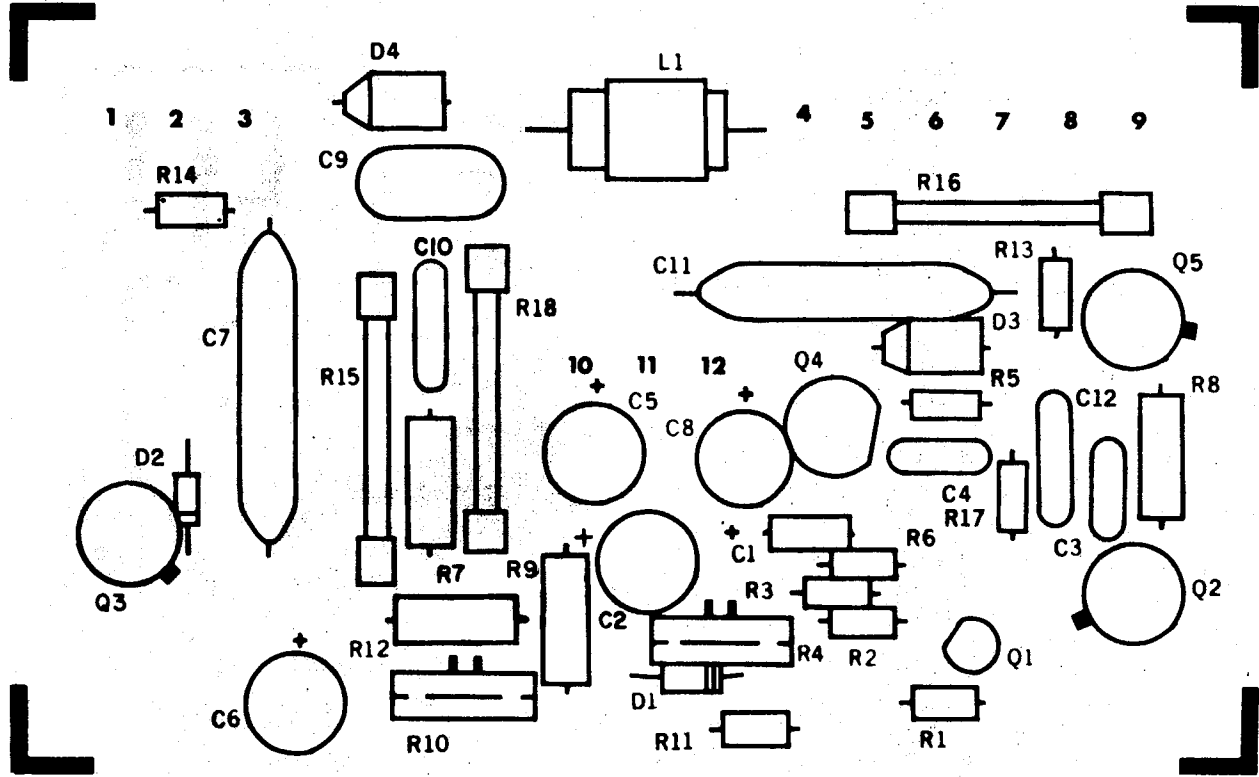
- NOTES:
1. UNLESS OTHERWISE SPECIFIED: RESISTANCE IN OHMS $\pm 10\%$ 1/4 WATT, AND CAPACITANCE IN MFD'S.
 2. HIGHEST SERIES NO'S ARE: R9, R109, R602, C11, C111, C602, Q1, Q101.
 3. WHEN TONE CONTROLS ARE IN FLAT POSITION, THE OVERALL VOLTAGE GAIN OF THIS CIRCUIT IS APPROXIMATELY UNITY. (0db)

Q1, 020-1110-027
Q2, 020-1110-038

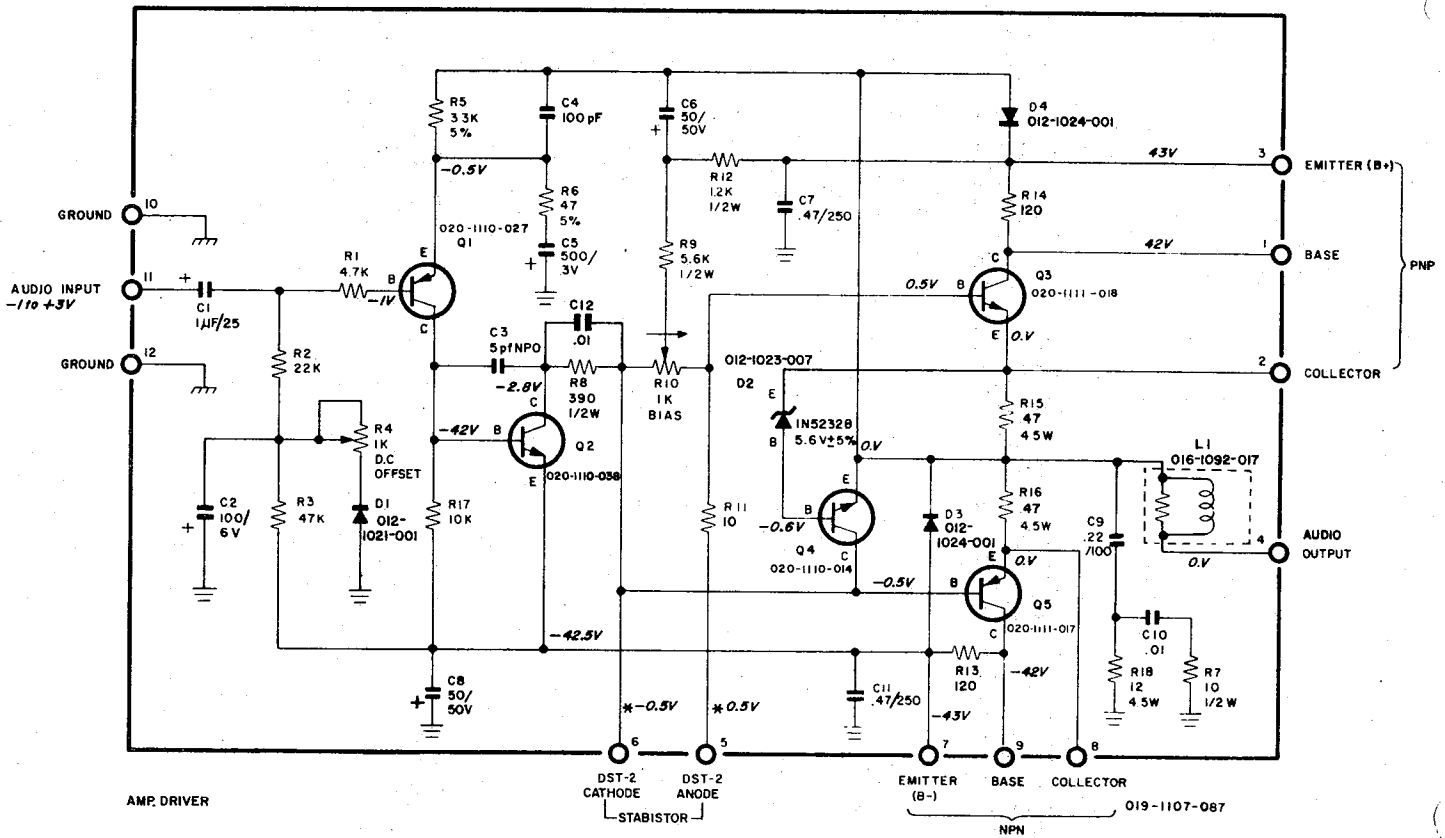
Q3, 020-1111-018
Q4, 020-1110-014

Q5, 020-1111-017

CIRCUIT 100-1335-011



DRIVER



AMP DRIVER

NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE IN OHMS $\pm 10\%$, CAPACITANCE IN MFD'S, RESISTORS 1/4 WATT, AND VOLTS ARE D.C. $\pm 15\%$ MEASURED WITH 20K Ω /VOLT V.Q.M.

2. HIGHEST SERIES NUMBERS: R18, C12, D4, Q5, L1

3. * AFFECTED BY D.C. OFFSET ADJUSTMENT.

NOTE:

REFER TO COMPONENT LABEL C19-1107-087/A.

AM TUNER SECTION

(See Diagrams – Page 7)

1. Preliminary 455 kHz Alignment

Set Tuning to middle of AM band, 1000 kHz. Output from Left Tape Out jack. Input from 455 kHz generator (modulated to 30% with 400 kHz) to External AM antenna Inputs (shorting bar removed). With 2 μV or less generator output, peak the first IF can for maximum output (single tuned can). After peaking, remove 455 kHz generator leads and *reconnect* external AM antenna shorting bar.

2. Oscillator Adjustment

With tuning capacitor maximum capacity (fully closed) adjust pointer to "0" on logging scale (center of pointer aligned with center of "0"). Couple output of AM generator (600 kHz modulated to 60% with 400 Hz) to loopstick with AM coupling loop, using mechanical stop for 1" penetration of loopstick. (See Fig. AM-1). Tune unit to 600 kHz. Attenuate input of RF signal until signal level is just noticeable on scope (using maximum usable scope activity). Adjust oscillator coil T203 while manually tuning unit for output peak as read on VTVM. Set AM generator to 1600 kHz modulated to 60% with 400 Hz.

Tune unit to 1600 kHz. Adjust oscillator trimmer C225 for maximum output as read on VTVM using weak RF input signal.

Repeat the above adjustments of oscillator coil and oscillator trimmer until no further improvement can be made.

3. Antenna Trimmer Adjustment

Set AM generator to 1400 kHz modulated to 60% with 400 Hz. Tune unit to 1400 kHz. Adjust antenna trimmer C232 for maximum output as read on VTVM using weak RF input signal.

4. AGC Potentiometer Adjustment (R-221)

Tune unit to 600 kHz. Couple output of AM Generator (600 kHz modulated to 60% with 400 Hz) to loopstick with AM Coupling loop removing mechanical stop and using full penetration of coupling loop (5"). Adjust RF Attenuator for 2 μV input to AM Coupling loop. Adjust AGC Potentiometer on Front End for an Audio output of .95 volts. Return AM Coupling loop to 1" penetration (using mechanical stop to set penetration) and observe less than .3V drop in output.

5. 600 kHz Measurements

With unit tuned to 600 kHz and AM Coupling loop set for 1" penetration, set RF Attenuator for an input to the AM Coupling loop equivalent to 500 μV . Note Audio output – should be between 0.65 and 1.25 volts from Tape Out Jacks. Attenuate RF input (approx. 10.0 μV). Check audio output which should not drop more than 3.0 dB from that noted for input equivalent to 500 μV .

6. 1000 kHz Measurements

- (a) With unit tuned to 1000 kHz and AM coupling loop set for 1" penetration, set rf attenuator for an input to the AM coupling loop equivalent to 500 μV . Note audio output – should be between .65 and 1.25 volts from Tape Out jacks. Attenuate rf input to approx. 10.0 μV . Check audio output which should not drop more than 3.0 dB from that noted at 500 μV .
- (b) Set rf input to the AM coupling loop equivalent to 500 μV . Measure harmonic distortion of audio output. Maximum allowable THD is 2.0%.

7. 1400 kHz Measurements

With unit tuned to 1400 kHz and AM coupling loop set for 1" penetration, set rf attenuator for an input to the AM coupling loop equivalent to approx. 620 μV . Note audio output – should be between 0.65 and

1.25 volts from Tape Output jacks. Attenuate rf input to $10 \mu\text{V}$. Check audio output which should not drop more than 3 dB from a $500 \mu\text{V}$ input.

8. Calibration

- (a) With AM coupling loop set for 1" penetration, set rf attenuator for an input to the AM coupling loop equivalent to a $300 \mu\text{V}/\text{M}$ field at 600 kHz. Tune to 600 kHz tuning for maximum Tuning meter reading. Check calibration of Dial Pointer — should read $600 \text{ kHz} \pm 10 \text{ kHz}$.
- (b) Repeat above procedure for the following frequencies:

Frequency	Calibration
800 kHz	$800 \text{ kHz} \pm 10 \text{ kHz}$
1000 kHz	$1000 \text{ kHz} \pm 20 \text{ kHz}$
1200 kHz	$1200 \text{ kHz} \pm 20 \text{ kHz}$
1400 kHz	$1400 \text{ kHz} \pm 10 \text{ kHz}$
1600 kHz	$1600 \text{ kHz} \pm 10 \text{ kHz}$

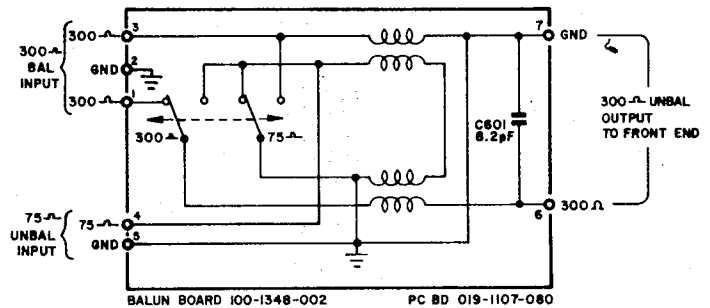
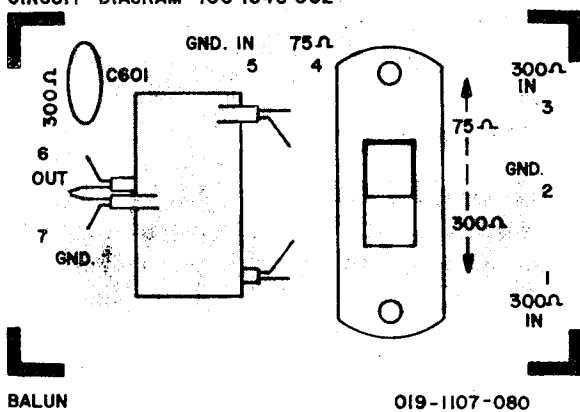
- (c) At 1600 kHz check for a rise and fall of meter indication and audio output as unit is tuned through the rf signal.
- (d) Meter should read in first block on noise. However, some higher meter indication is not unusual due to noise within the plant. With full gen. sig. of approx. $600 \mu\text{V}$ meter should read no lower than beginning of fourth block.

9. Final Listen AM

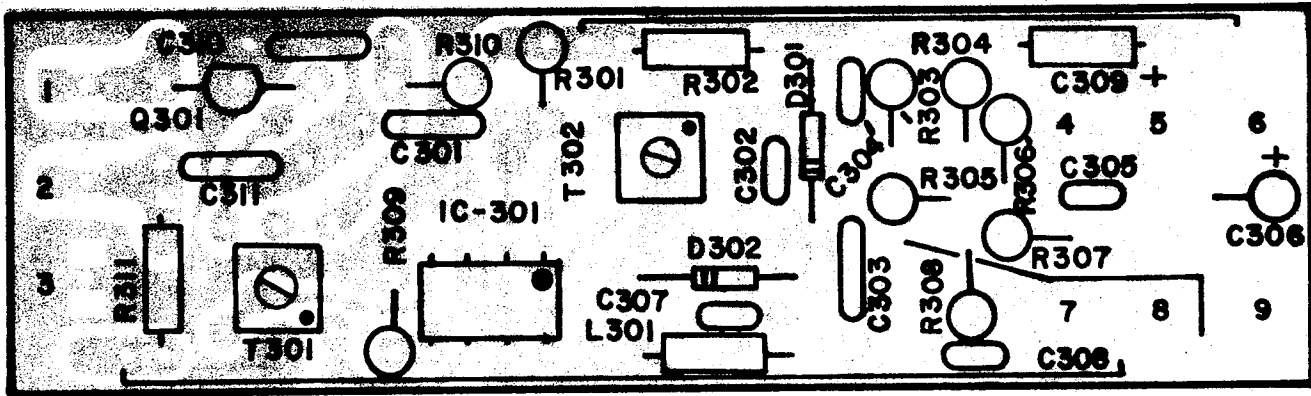
Using headphones plugged into the front panel Phone jack and Loudness control adjusted for adequate output, slowly tune across the AM dial listening for oscillations and no output indicating shorting tuning capacitor plates.

Remove shorting bar on external antenna. Connect outside antenna to unit. Check calibration and tuning meter indication using stations. Remove outside antenna, replace shorting bar and tighten screws.

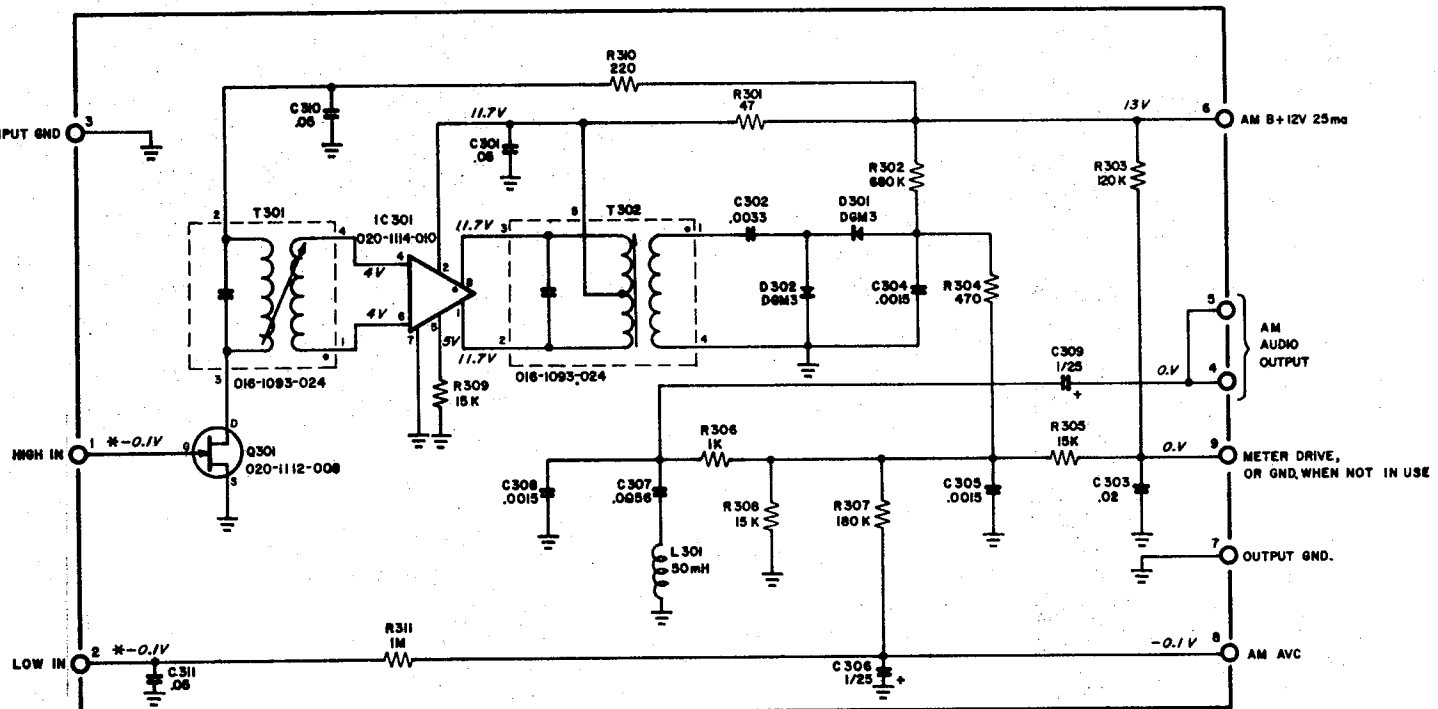
CIRCUIT DIAGRAM 100-1348-002



CIRCUIT DIAGRAM 100-1331-017



AM IF

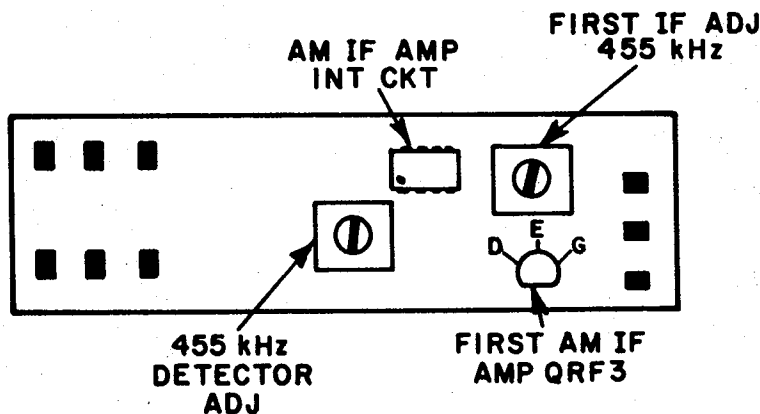


AM IF STRIP

019-1107-061

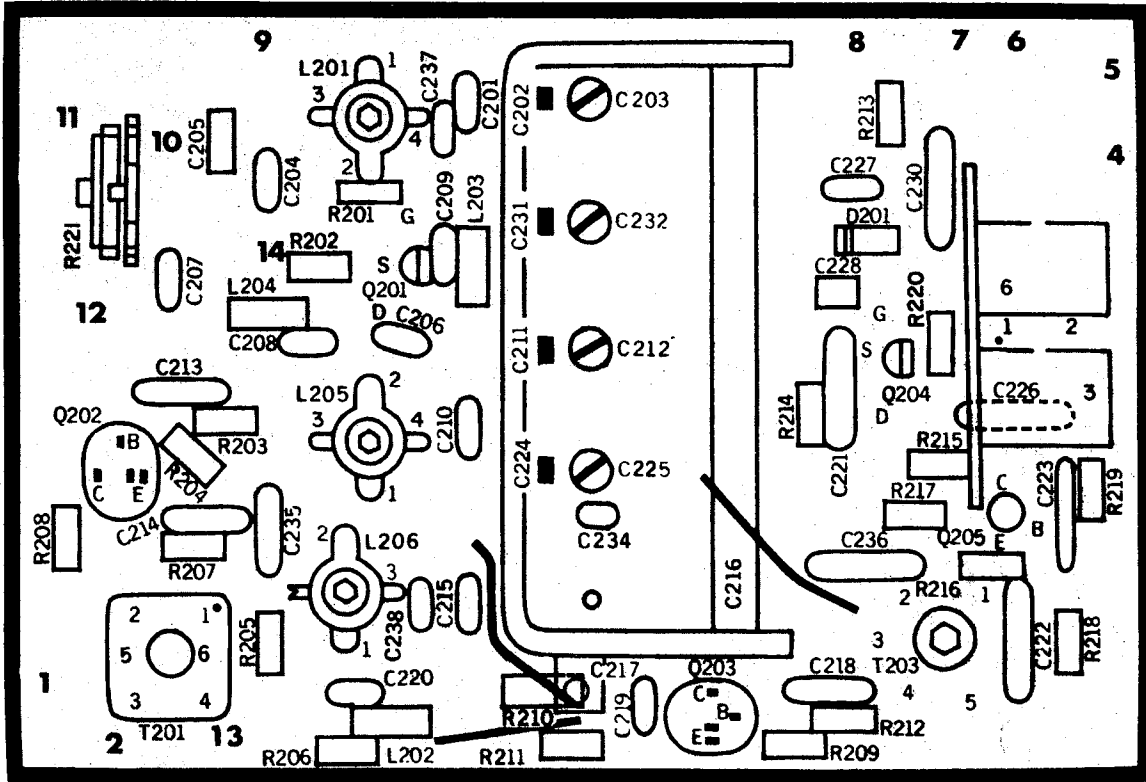
NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE IN OHMS $\pm 10\%$ 1/4 WATT, AND CAPACITANCE IN MFD'S
2. IC 301 IS 020-1114-010, T301 AND T302 ARE 016-1093-024, Q301 IS 020-1112-008
3. HIGHEST SERIES NUMBERS, C311, R311, L301, IC 301, T302, Q301, D302.
4. GREEN DOT ON TOP OF TRANSFORMER OR COIL CAN INDICATES PIN NO. 1.
5. DOT ON TOP OR TIP ON SIDE OF IC INDICATES PIN NO. 8.
6. * HIGH INPUT IMPEDANCE METER ONLY (10 M Ω OR HIGHER).

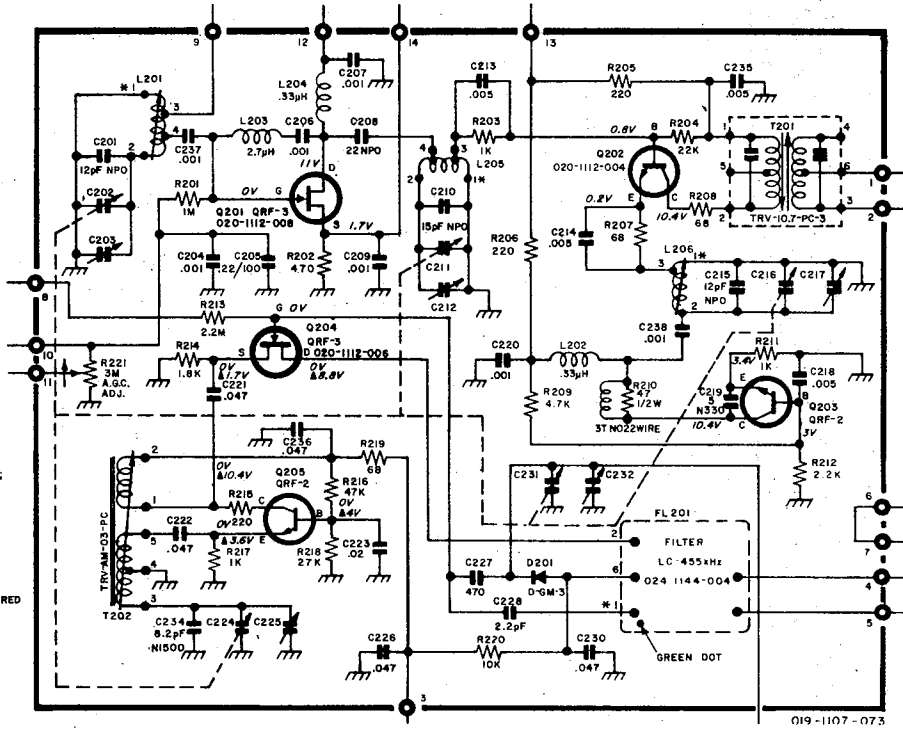


Q201; Q202; 020-1112-008 020-1112-004
 Q204; Q203, Q205; 020-1112-006 020-1112-001

CIRCUIT, 100-1330-016



AM/FM FRONT END

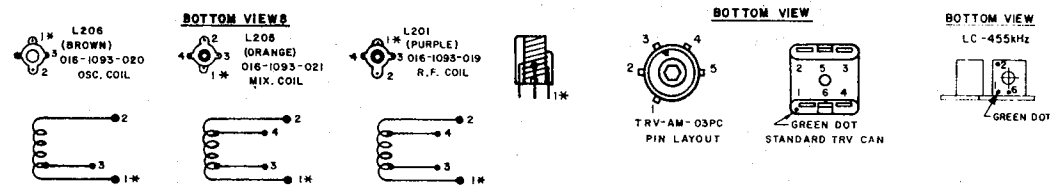


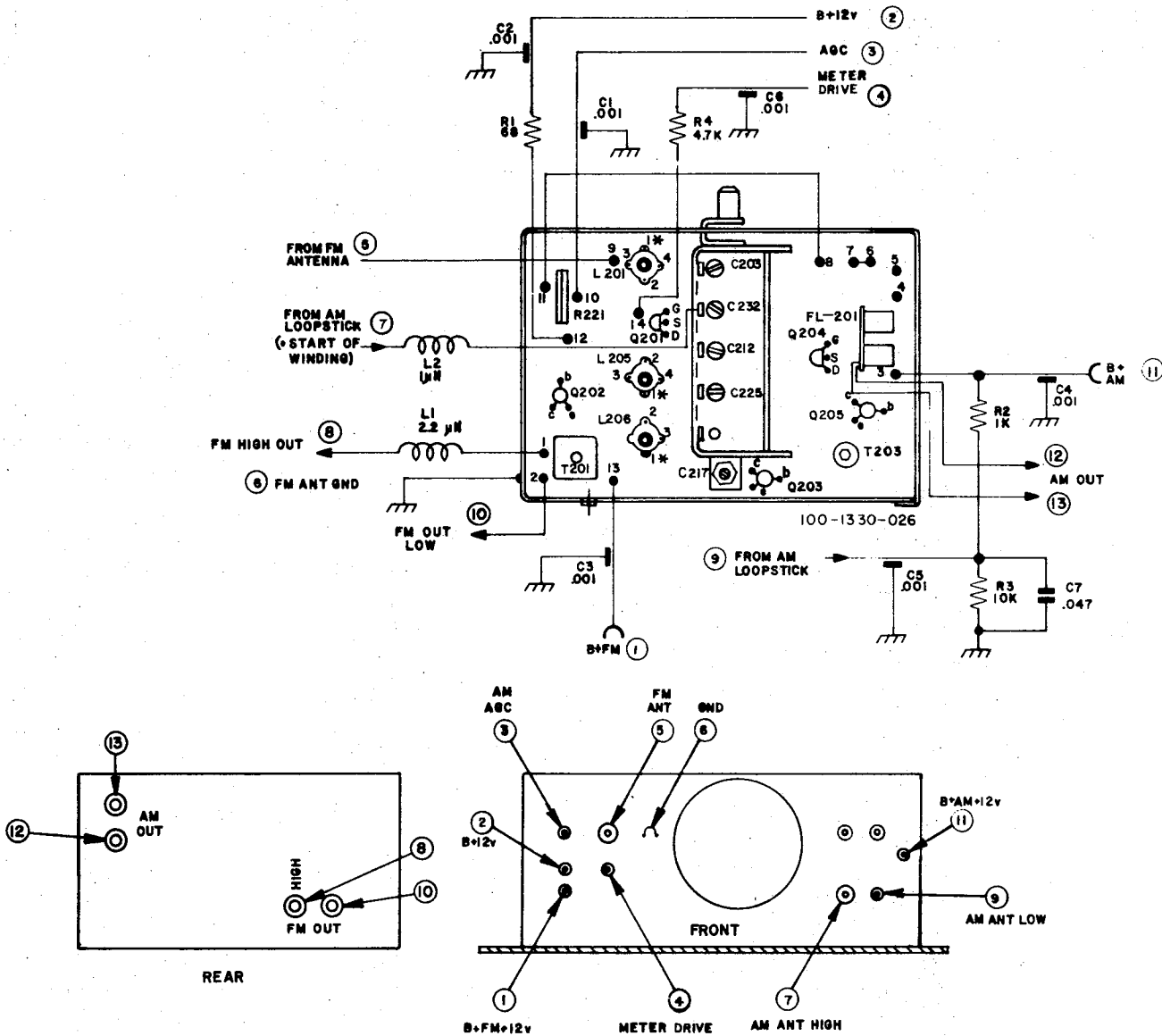
- NOTES:
 1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IN OHMS $\pm 10\%$. RESISTORS 1/4 WATT. CAPACITANCE IN MFD'S.
 2. * INDICATES START OF COIL WINDING.
 3. COMPONENTS DELETED: C228, C235.
 4. & INDICATES VOLTAGE MEASURED WITH INPUT SWITCH IN "AM" POSITION AND NO SIGNAL.
 5. ALL VOLTAGES $\pm 15\%$.

HIGHEST NUMBERS	SERIES NUMBERS
L206	C238
R221	T202
Q201	Q205
	FL201

REFER TO COMPONENT LABEL 019-1107-073/8
 REFER ALSO TO ASSEMBLY 100-1330-008

AM/FM FRONT END





NOTES:

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE IN OHMS $\pm 10\%$
RESISTORS 1/4 WATT.
CAPACITANCE IN MFD'S

2. ARROWS INDICATE MAIN SIGNAL PATH

3. TRIMMERS: C 203 — FM ANT. } HIGH ADJ.
C 232 — AM ANT. }
C 212 — FM MIX. }
C 225 — AM OSC. }
C 217 — FM OSC. }

COILS: L 201 — FM RF. } LOW ADJ.
L 205 — FM MIX. }
L 206 — FM OSC. }

TRANSFORMERS:
T 201 — FM I.F.
T 202 — AM

FILTERS: FL 201 — AM

TRANSISTORS:
Q 201 — FM, RF AMP
Q 202 — FM MIX.
Q 203 — FM OSC.
Q 204 — AM, RF AMP/MIX
Q 205 — AM OSC

POTENTIOMETER:
R 221 — AGC ADJ.

* INDICATES BOTTOM OF WIND
HIGHEST SERIES NUMBERS

C 7
R 4
L 2

THIS ASSEMBLY IS IDENTICAL TO 100-1330-016 EXCEPT FOR MECHANICAL DIFFERENCES. USE 100-1330-016 CIRCUIT AND 019-1107-073/B COMPONENT LABEL. BLANK OUT 100-1330-016 ON LABEL WHEN IT IS PRINTED IN THE SERVICE MANUAL.

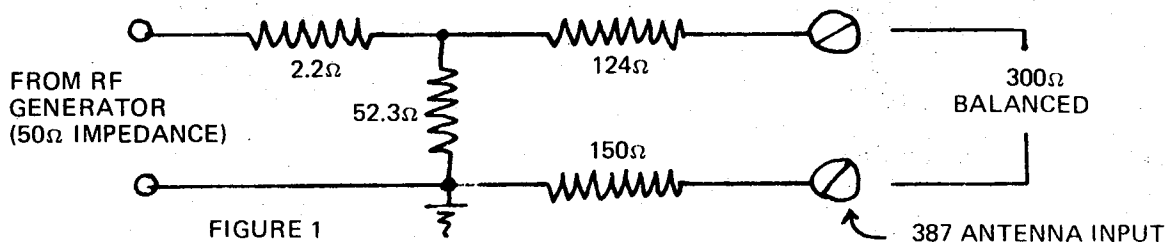
FM TUNER

1. FM RF Section Alignment

- (a) Check that all coils and trimmers are preset to their normal position.
- (b) Set Balun switch for 300Ω position, use balanced input attenuator. See Figure 1 below.
- (c) Set dial pointer to 106 MHz pipeline signal and adjust front end IF can (both slugs). Use a $30\mu\text{V}$ signal.
- (d) Adjust oscillator trimmer for correct dial reading.
- (e) Adjust mixer and antenna trimmer for maximum output; reduce output from pipeline so that a 20 dB S/N ratio is maintained.
- (f) Set dial pointer to 90 MHz and adjust oscillator coil for Maximum Output. Adjust FM RF coil and FM mixer coil for maximum output.
- (g) Repeat steps c, d, and e until no further improvement can be noticed.
- (h) Check signal strength meter; half scale deflection at $55\mu\text{V}$ gen. output.
- (i) Check for output at tape monitor jacks with $1000\mu\text{V}$ mono generator signal, unit in STEREO mode. Output should be between 1.5 and 3.0 volts for 100% modulation. No more than 1 dB difference between channels.

2. FM IF Amplifier Alignment

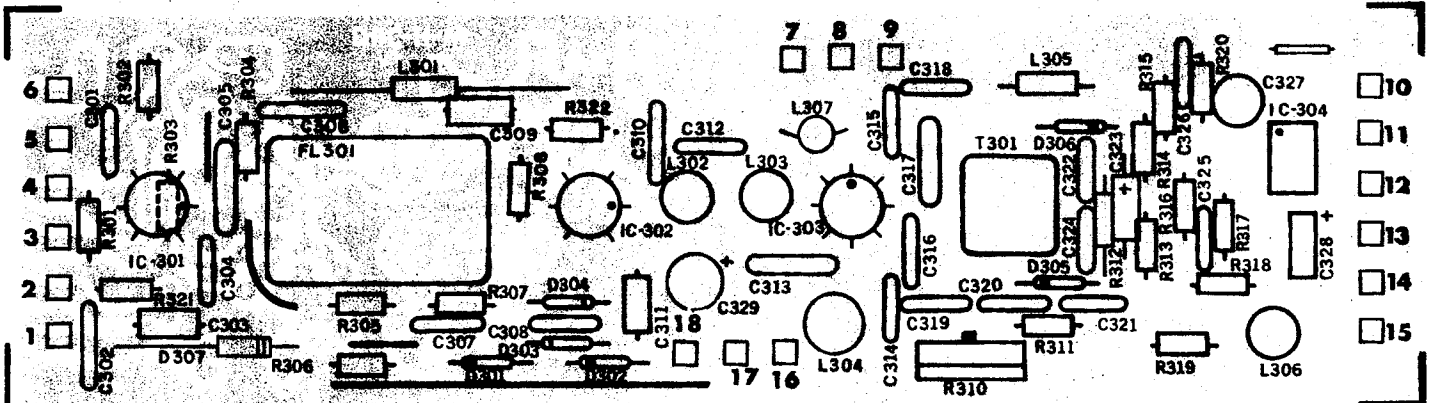
- (a) Connect oscilloscope to TAPE out jack and RF generator to 300Ω FM antenna terminal.
- (b) Set generator to 90 MHz and $7\mu\text{V}$ output; modulate RF signal with 400 Hz audio (± 75 KHz deviation).
- (c) Tune receiver to exact center of signal and adjust bottom of detector can for maximum output.
- (d) Check that receiver is tuned to the *exact* center of the signal and that the 50K potentiometer is set fully clockwise (arrow to right if viewed from the front).
- (e) Adjust top slug of detector can until Perfect Tune light turns on.
- (f) Rotate 50K potentiometer until Perfect Tune light just goes out on a $7\mu\text{V}$ signal. Then rotate pot about 2 notches (on pot knob) further in the same direction. Perfect tune may flash on sidebands but not on noise.
- (g) Measure sensitivity at top and bottom end of FM dial to insure that receiver meets its published specifications.
- (h) De-emphasis Check — Note: Decrease in output of 12 ± 2 dB at 8.2 kHz (ref. — 400 Hz).
- (i) Distortion — $1000\mu\text{V}$, 400 Hz 100% modulation — maximum allowable distortion is 0.6%. Note: Use mono signal but leave receiver switch in "Stereo" position.
- (j) Calibration — check calibration against stations; maximum tolerance ± 0.2 MHz.



Note: All resistors $\frac{1}{2}$ watt carbon. All resistors should be bridge or DVM selected for value as close as possible to those shown above.

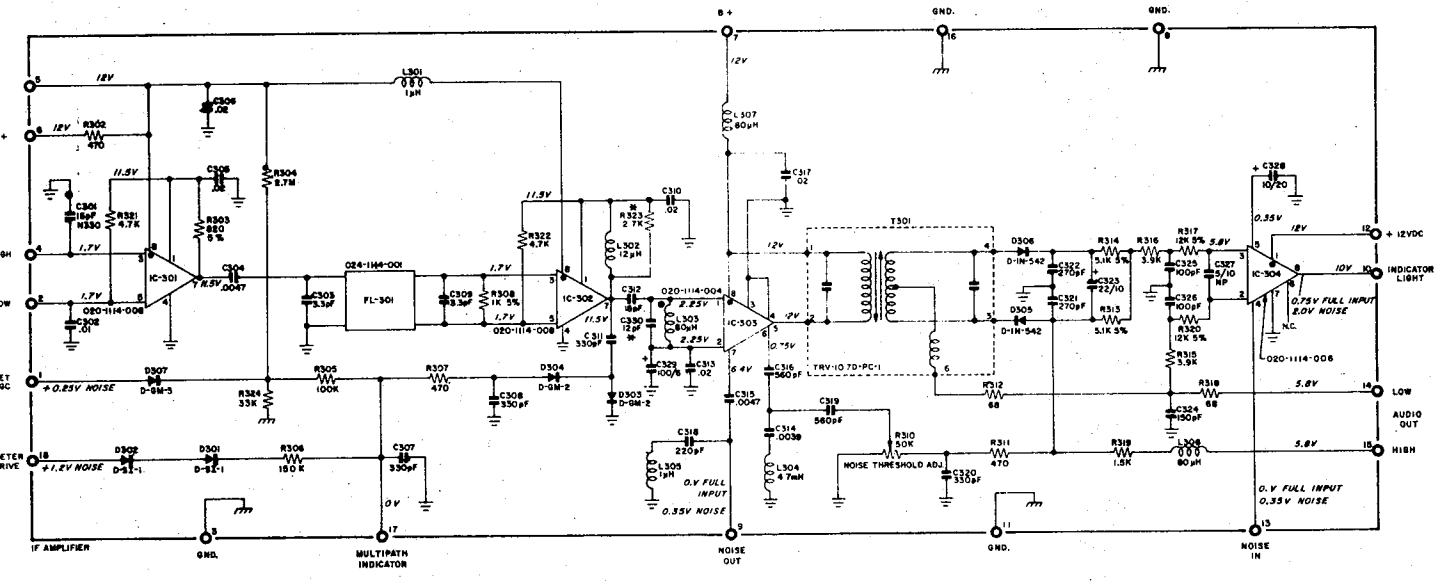
- IC-301 μ A703 020-1114-001
- IC-302 μ A703 020-1114-001
- C-303 μ A719 020-1114-004
- C-304 (5C5117) 020-1114-006
- L-301 024 1144-001

CIRCUIT DIAGRAM 100-1331-013



CRYSTAL FILTER IF AMP.

019-1107-061

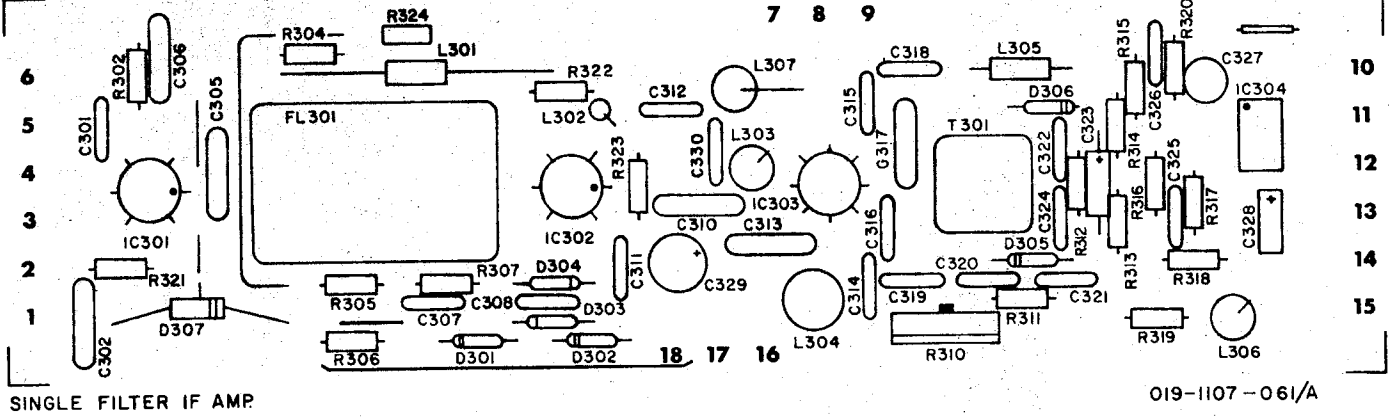


- NOTES:
1. UNLESS OTHERWISE SPECIFIED: RESISTANCE IN OHMS $\pm 10\%$ 1/4 WATT, AND CAPACITANCE IN MFD'S.
 2. HIGHEST SERIES IC304, FL301, T301, L307, C330, R324, D307 (R301 DELETED)
 3. DOT ON POTENTIOMETER INDICATES EXTREME CW POSITION VIEWED FROM KNOB END.
 4. * ATTACHED BY FLYING JOINTS.
 5. COMPONENTS DELETED: R301, R308

ALTERNATE FM/IF STRIP (LC FILTER)

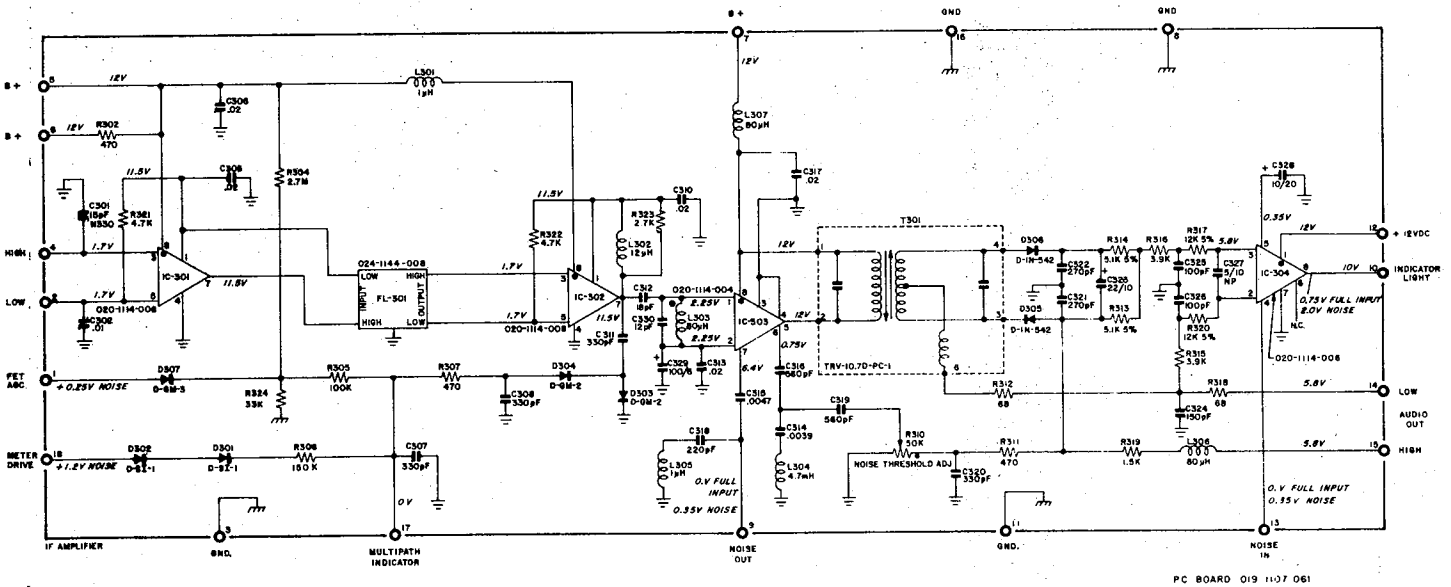
IC-301 μ A703 020-1114-008
 IC-302 μ A703 020-1114-008
 IC-303 μ A719 020-1114-004
 IC-304 (SC5117) 020-1114-006
 FL-301 024-1144-008 (ALTERNATE 024-1144-001)

CIRCUIT DIAGRAM 100-1331-013



FOR USE WITH 019-1107-061 REV. 4 BOARD AND OVER.

IF ALTERNATE 024-1144-001 IS USED,
 REFER TO ASSEMBLY 100-1331-013 REV. II.
 THIS COMPONENT LABEL ARTWORK CANNOT BE USED
 FOR THE PURPOSE OF SILK SCREENING A PC BOARD.

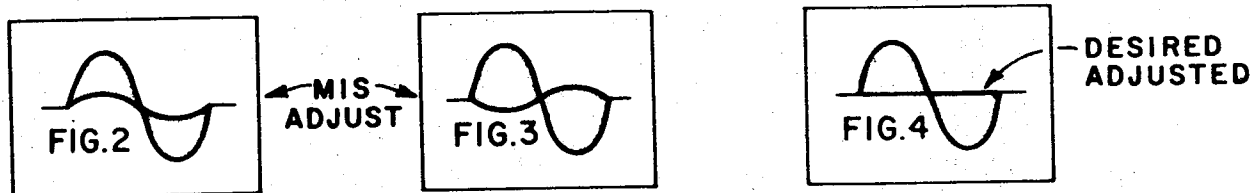


- NOTES
- UNLESS OTHERWISE SPECIFIED, RESISTANCE IN OHMS $\pm 10\%$ 1/4 WATT, AND CAPACITANCE IN PFD'S.
 - HIGHEST SERIES IC304, FL301, T301, L301, C330, R324, D307, (R301, R305, R308, C303, C304 AND C305 DELETED)
 - DOT ON POTENTIOMETER INDICATES EXTREME CW POSITION VIEWED FROM KNOB END
 - COMPONENTS DELETED: R303, R308, C303, C304, C308, R301, R308

6 POLE SINGLE FILTER IF AMPLIFIER
 REFER TO COMPONENT LABEL 019-1107-061/A
 FOR USE WITH 019-1107-061 REV. 4 BOARD AND OVER

MULTIPLEX ALIGNMENT

- With the two pots at maximum in direction shown by Figure 1, prepare to align the 67 kHz trap and the HF SEP trap. Tune to a signal modulated with 67 kHz and with a low capacity troubleshooting probe on IC pin 3, adjust the 67 kHz trap for minimum output. Leave probe on pin 3, tune to a stereo signal, and adjust HF SEP trap for a straight base line as shown in Figure 4.



(IF THE NEXT SET OF ADJUSTMENTS ARE NOT DONE CAREFULLY, PROPER SEPARATION WILL BE DIFFICULT TO ACHIEVE)

- Move probe to IC pin 1, while still on a stereo signal adjust first 19 kHz can for *maximum* output. The second 19 kHz can should also be adjusted at this point for *maximum* output.
 - Move troubleshooting probe to IC pin 13 and align the 38 kHz can for *maximum* output. (No alignment of the 19 kHz circuits should be done with troubleshooting probe at this point.)
 - Now that all the alignment has been completed, separation can be achieved in the usual manner by rotating the separation pot. Adjust for MAXIMUM achievable separation (absolute minimum of 35 dB).
 - Any phasing that is required must only be done by slight adjustment of the 38 kHz can only.
- If the 19 kHz and 38 kHz adjustments were done carefully, separation should fall within ± 2 dB between channels and going back and forth between stereo signals for readjustment should not be necessary.
- To set stereo light and muting, set muting switch to ON position, adjust mute light and pot on noise until stereo light goes off, continue until muting occurs and then move pot knob one notch further in the same direction. Unit should switch to stereo on signal of 12–30 μ V.

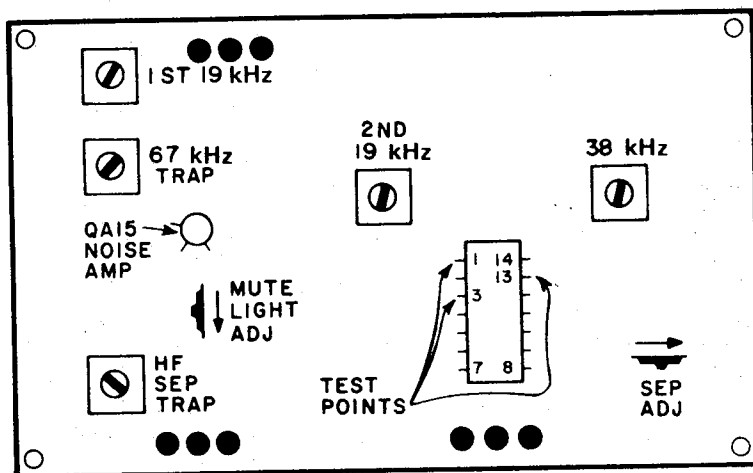


FIG. 1

