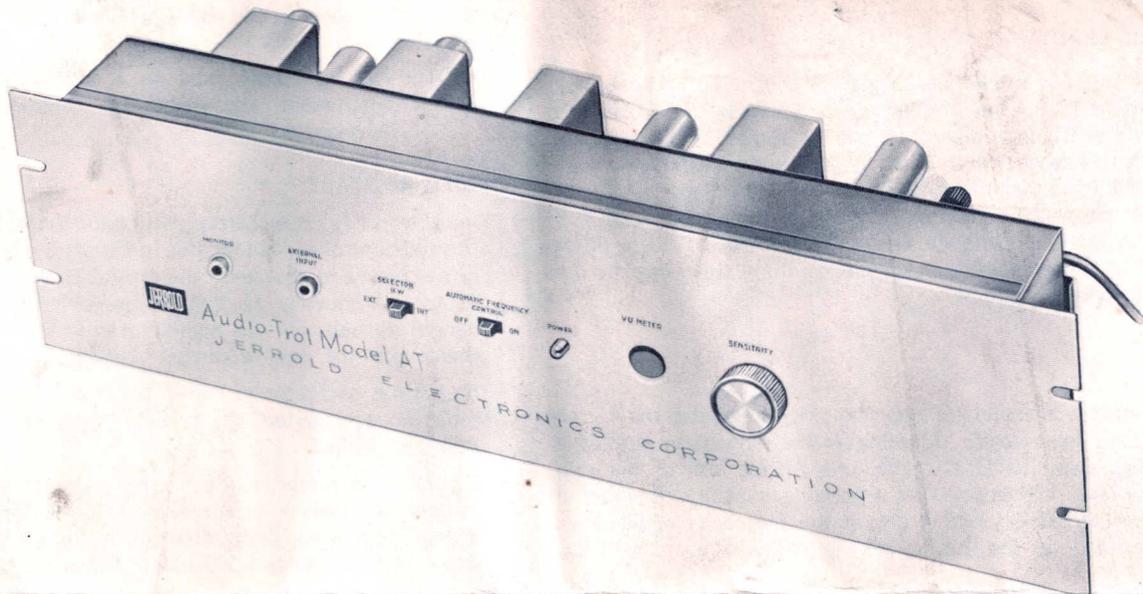




435-324.2

## AUDIO-TROL MODEL AT-\*



### DESCRIPTION

The Jerrold Audio-Trol Model AT-\* permits sound from any audio source (an FM or AM tuner, a record player, a tape recorder, or a microphone) to be inserted on any unused channel in a tv distribution system. This is accomplished by providing an unmodulated picture carrier at the desired tv channel frequency and a modulated sound carrier 4.5 mc above this picture carrier. The resultant rf output is fed into the system for distribution to individual receivers.

There are two basic series of Model AT-\*: series LOW BAND covers channels 2 thru 6 and series HIGH BAND covers channels 7 thru 13. Circuitry is similar for both series, differing

only in the value of some of the components and the type of tubes employed. The series model is factory-tuned to the channel ordered by the customer. The channel number becomes part of the model number.

Each Audio-Trol comprises an audio section, an if section, an automatic frequency control section, a monitoring and metering section, a video rf section, and an audio rf section. These circuit stages are combined in a chassis which is mounted on a front panel suitable for 19" standard rack installation, or for mounting in a cabinet together with Jerrold AM/FM tuner Model AFT-300.

### SPECIFICATIONS

<b>RF OUTPUT:</b>	Min. 55 dbj, each carrier, separately controlled over 20 db range, at each of two twin 75-ohm terminals.	<b>PRE-EMPHASIS NETWORKS:</b> Built-in, TV standards.
<b>FREQUENCY STABILITY:</b>	Video carrier crystal controlled, sound carrier AFC controlled to crystal.	<b>DISTORTION:</b> Less than 1%, 2nd harmonic and hum.
<b>SPURIOUS SIGNALS:</b>	Min. 50 db down.	<b>TUBE COMPLEMENT:</b> Low channel models: (1) GBC8, (1) GASG, (3) GCBG, (1) OB2, (1) GAUG, (1) GAB4, (1) GAL5. High channel models: (1) GBC8, (1) GASG, (2) GCY5, (1) OB2, (1) GCBG, (1) GAUG, (1) GAB4, (1) GAL5.
<b>OUTPUT SWR:</b>	1.2 Bridging (return loss 21 db).	<b>REGULATION:</b> Gastube voltage regulation.
<b>FREQUENCY:</b>	Any TV channel, vhf.	<b>POWER REQUIREMENTS:</b> 45 watts at 117 volts, 60 cycles ac.
<b>CARRIERS:</b>	One at video frequency, unmodulated, one at sound frequency, frequency-modulated, with $\pm 25$ kc max. deviation.	<b>DIMENSIONS:</b> Panel 19" x 5 1/4", depth behind panel 5 1/2".
<b>APPLICATION:</b>	Utilizes unused channels in TV distribution systems.	<b>MOUNTING:</b> Standard 19" rack.
<b>SIGNAL FOR MAXIMUM DEVIATION:</b>	Min. 50 mv audio, high impedance.	<b>SHIPPING WEIGHT:</b> 12 lb. lbs.

## CIRCUIT DESCRIPTION

### POWER SUPPLY

Model AT-\* obtains its operating voltages from a built-in power supply employing line transformer **N**, a full-wave rectifier bridge SiR1 through SiR4, an RC filter, and a voltage stabilizer tube VL. Input is from a 117 vac 60 cps source to the fused (FSI) primary of **N**. Front panel switch SW3 energizes and de-energizes the unit.

### AUDIO INPUT

Audio input is applied via sensitivity control RI and coupling capacitor C4 to the grid of audio amplifier tube V2A. The setting of RI determines the level of signal voltage applied. The response of this amplifier is governed by a pre-emphasis network comprising R4, R5 and C6. The plate output of V2A is coupled through capacitor C5 to the grid of tube V28 employed as a reactance modulator for the Lf. stage. Filter L4, C10 prevents oscillator voltages from appearing in the amplifier plate circuit.

### I.F. STAGE

The reactance modulator V28 frequency-modulates the 4.5 mc oscillator pentode V3. Coupling of the V28 plate output is through capacitor C13 to the tank circuit and to the grid of V3. Thus V28 appears as a variable capacitance shunted across the oscillator tank circuit the frequency of which is determined by the tuning of the cathode-tapped coil L6.

The oscillator output is fed through C22 and L31 to the suppressor grid of the r.f. mixer tube V6.

### AFC CIRCUIT

Automatic frequency control is exercised by a discriminator circuit employing transformer T2 and duo-diode V4. T2 translates frequency changes into voltage changes by the action of in-phase and out-of-phase components on the plate voltages of the diodes. With AFC switch SW2 in ON position, the dc voltage developed across the diode load resistors R15 and R16 is applied as a corrective voltage to the grid of V28. When the frequency of V3 tends to increase, the polarity of the corrective voltage is such that it increases the apparent shunt capacity across the oscillator tank circuit and effectively lowers the frequency of the oscillator back to 4.5 mc. When the frequency of V3 tends to decrease, a reverse action takes place and the oscillator frequency is effectively increased to 4.5 mc.

## INSTALLATION—GENERAL

Audio-Trol units can be added to tv distribution systems as described and illustrated in this section.

1. At head-ends using single-channel distribution amplifiers with no adjacent channels involved, the outputs of Audio-Trol units can be mixed directly with the outputs of the single-channel amplifiers.

NOTE: A second output can be obtained by removing the TR-72F.

### MONITORING AND METERING CIRCUITS

These circuits are isolated from the a.c. stage by a cathode follower V5 which is coupled to V4 through C19. A de-emphasis network comprising R24 and C21 provides an audio output, consistent with the audio input, at MONITOR jack J4. The VU-METER receptacle J3, coupled via C20 to V5, provides an output consistent with the input to V28. A standard VU meter (0 VU = 1 mw across 600 ohms) plugged into J3 will read 0 VU when the deviation of the 4.5 mc oscillator is  $\pm 25$  kc.

NOTE: The VU meter must be a high-impedance type instrument and must not contain a 600-ohm termination.

### VIDEO RF STAGE

The video rf (picture carrier) oscillator employs tube V7 in a crystal-controlled, tuned-grid, tuned-plate oscillator circuit. For the low-band channels, the crystal CRI is cut to provide the same frequency as that of the picture carrier of the channel desired; for the high-band channels, CRI is cut to provide half the picture carrier frequency.

The crystal oscillator is tuned by grid inductance L1 and feedback is adjusted by cathode inductance L2. Neither circuit is peaked.

L3 tunes the plate circuit to the crystal frequency for a low-band channel, or to the second harmonic of the crystal frequency for a high-band channel. In a high-band unit, this circuit is tunable from 175 mc to 216 mc.

Capacitor C27 couples the plate output of V7 to the control grid of mixer tube V6. Capacitor C44 couples the output to the control grid of the picture carrier amplifier V9. The plate output of V9 is sharply tuned to the picture carrier frequency by trimmer C3 and coupled via C49 to the PIX RF OUT jacks J5 and J6. The amplifier gain is adjustable by PIX potentiometer R42.

### AUDIO RF STAGE

The mixer tube V6 beats the picture carrier signal on its control grid against the modulated 4.5 mc oscillator signal at its suppressor grid to provide a frequency-modulated sound carrier separated by 4.5 mc from the picture carrier. The plate of V6 is tuned to this difference by trimmer C1. This tuned output is then coupled via C26 to the grid of sound amplifier V8. The plate output of V8 is sharply tuned by trimmer C2 and then coupled through C32 to SOUND RF OUT jacks J7 and J8. Sound amplifier gain is adjustable by SOUND potentiometer R31.

2. At head-ends using single-channel distribution amplifiers with adjacent channels involved, the outputs of the Audio-Trol units should not be mixed directly with the outputs of the amplifiers. Groups of non-adjacent channel amplifiers can be mixed with non-adjacent channel Audio-Trols through hybrid networks such as Jerrold

CHART OF CONTROL AND CONNECTIONS  
FRONT PANEL

NAME AND POSITION	CIRCUIT DESIGNATION	TYPE	FUNCTION
MONITOR	J4	Jack	High-impedance input to amplifier or phones for monitoring the audio source.
EXTERNAL INPUT	J2	Jack	100 k-ohm impedance input for connecting external audio input (e.g. microphone).
SELECTOR SW INT EXT	SW1	2-position switch	Connects 11 to modulator. Connects J2 to modulator.
AUTOMATIC FREQUENCY CONTROL ON OFF	SW2	2-position	Normal position; sound is maintained at 4.5 mc of pix carrier frequency. AFC circuit is de-energized.
POWER	SW3	Push-button switch (illuminated)	Energizes and de-energizes the equipment.
VU METER	J3	Receptacle	Permits connection of VU meter for test purposes.
SENSITIVITY	R1	Potentiometer	Control audio input signal level.
CHASSIS			
RF OUT SOUND	J7, J8	Coax. Fittings	Dual output, connect to system for insertion of sound.
RF OUT PIX	J5, J6	Coax. Fittings	Dual output, connect to system for insertion of pix carrier; may be disconnected and fed through separate pix modulator.
SOUND	R31	Potentiometer	Adjusts sound carrier level.
PIX	R42	Potentiometer	Adjusts pix carrier level.
INTERNAL AUDIO INPUT	11	Jack	For connection to internal audio source (e.g. AFT-30m).
LINE 1/2 AMP	FS1	Fuse	1/2 amp. 125 vac line fuse.

Model 1592, or Jerrold DC-series. These are especially designed to provide isolation and prevent interaction between adjacent channels. Use of the hybrid network involves a 3 db reduction in tv channel outputs.

NOTE: A second output can be obtained by removing both TR-72F terminations and mixing the outputs in a second hybrid network.

- At head-ends using broad-band amplifiers, a Jerrold DC-8 is recommended to mix the outputs. This involves an 8 db loss to the AT-\* channel, but only 1 db reduction in the output of the broad-band amplifier.
- Inputs to the AT-\* can be from a Jerrold Model AFT-300 tuner, from any output tap on a background music amplifier, or any similar source. Additional input can be provided directly via a low-output microphone with the AT-\* SOUND gain control set at near maximum; or, where a microphone is used remotely and interchangeably with a tuner, via a preamplifier between the microphone and the Audio-Trol. A relay can be used for remote switching. A further possibility is the tapping of an existing balanced audio distribution line by means of a step-down transformer and a pad or potentiometer (see fig. 4).

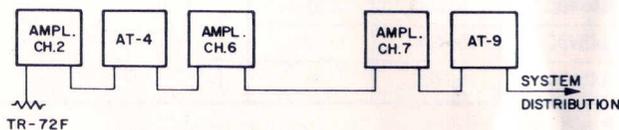


Fig. 1 AT-\* Units in System With No Adjacent Channels.

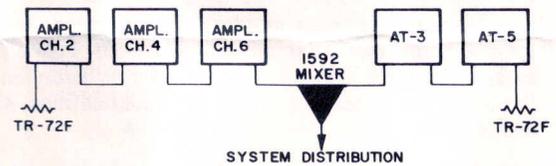


Fig. 2 AT-\* Unites in System With Adjacent Channels.

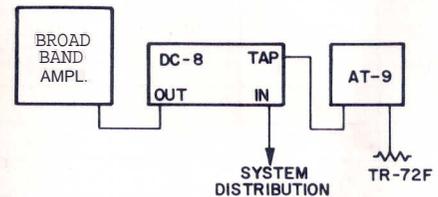


Fig. 3 AT-\* Used With Broad-Band Amplifier.

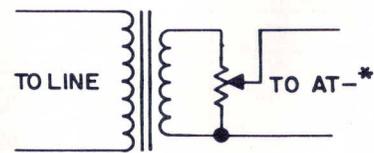


Fig. 4 Tapping an Audio Distribution Line for Obtaining an Input to Model AT-\*.

# INSTALLATION PROCEDURE

1. Accessories shipped with each Model AT-\*:  
 4 mounting screws  
 1 coaxial cable connector, Model F-59A  
 1 terminating resistor, Model TR-72F (in place)  
 1 jumper cable (in place)
2. Mount the Audio-Trol with the 4 mounting screws supplied; use the 4 slots in the front panel.
3. Connect the output from the audio source to the INTERNAL INPUT jack at the AT-\* chassis. Be sure that an audio source receiver receives sufficient antenna signal for quiet operation.
4. Plug the AT-\* line cord into a 117vac outlet and energize the unit; allow 30 minutes for warm-up.
5. Connect a Model 704-B field strength meter to the unterminated output fitting and read the level of the video carrier generated in the AT-\*. Adjust PIX potentiometer at chassis until the meter indicates the desired level.  
  
 Record the level for future reference.
6. Tune the meter to the sound carrier. Adjust the SOUND potentiometer until the meter indicates the desired level.\*\* Record the reading for future reference. Disconnect the meter.
7. Prepare a piece of RG-59/U cable of sufficient length to interconnect Model AT-\* and the system head-end amplifiers or mixing network or other device chosen as point for the audio input.. Install a Model F-59A connector at each end of the cable (one connector is supplied with the AT-\*) as described in Jerrold publications 435-344 and 435-345.

- B. Connect one end of the cable to the unterminated OUTPUT fitting on the chassis of Model AT-\*. Connect the other end of the cable to the system equipment.. If a second output spigot on the Model AT-\* is required for feeding two AT-\* channels into the system, remove the TR-72F from its fitting and use that fitting to interconnect both Models AT-\* via an RG-59/U jumper equipped with F-59A connectors.
9. Plug a high-impedance VU-meter into the VU METER receptacle and adjust SENSITIVITY control until the meter indicates 0 VU or less at maximum broadcast sound level. This maximum broadcast sound level can best be monitored during commercials or fortissimo sound passages to catch occasional peaks. It should be remembered that many air signals are fully deviated only for short periods.
10. Disconnect the VU-meter.
11. Turn on the tv set at the monitoring location and tune to the AT-\* channel; if audio is undistorted, the installation is complete. If distortion is noted, back off the SENSITIVITY control on the AT-\* until distortion is eliminated; then back the control off a trifle more for safety. Installation is now complete.

\*\*Criteria for establishing "desired" sound level:

- a. Where channels are non-adjacent, the sound carrier level may be the same as the Audio-Trol pix carrier level, except where re-amplifiers are used; there it may be necessary to depress the sound carrier 10 db to avoid overloading the re-amplifiers.
- b. Where channels are adjacent with tv on the high side of the Audio-Trol, the Audio-Trol sound carrier may have to be depressed 15 to 18 db below the tv pix carrier to avoid adjacent channel interference in tv sets. It should not be depressed below the Audio-Trol pix carrier, if this is already 15 to 18 db down in a high-output system.

## VOLTAGE MEASUREMENTS CHART

TUBE	PIN NO.1	2	3	4	5	6	7	B	9
V1, OB2	105VDC	0	0	0	105VDC	0	0		
V2, 6BCB	60VDC	*10VDC	15VDC	6,1AC	6,1AC	105VDC	2VDC	1,6VDC	0
V3, 6AU6	(*)-1,7VDC	0	6,1AC	6,1AC	110VDC	105VDC	0		
V4, 6AL5	0	*-35VDC	6,1AC	6,1AC	0	0	*-35VDC		
V5, 6AB4	150VDC	0	6,1AC	6,1AC	0	*4VDC	6VDC		
V6, 6AS6	-2,5VDC	0	6,1AC	6,1AC	150VDC	150VDC	-2,5VDC	} Chan. 7-13	
V7, 6CB6	(*)-7VDC	0	6,1AC	6,1AC	140VDC	145VDC	0		
V8, 6CY5	-2VDC	2,2VDC	6,1AC	6,1AC	145VDC	145VDC	2,2VDC		
V9, 6CY5	.3VDC	2,5VDC	6,1AC	6,1AC	145VDC	145VDC	2,5VDC		

V6, 6AS6	-7VDC	0	6,1AC	6,1AC	150VDC	150VDC	-5	} Chan. 2-6	
V7, 6CB6	(*)-7VDC	0	6,1AC	6,1AC	145VDC	145VDC	0		
V8, 6CB6	-2	.aVDC	6,1AC	6,1AC	145VDC	150VDC	0		
V9, 6CB6	-6	BVDC	6,1AC	6,1AC	145VDC	150VDC	0		

\*Taken with VTVM.  
 (\*) Taken with VTVM thru 100k Resistor.  
 All controls fully CWO  
 AFC SW in ON position.  
 Readings taken with 20,000n per volt movement.

## RESISTANCE MEASUREMENTS CHART

TUBE	PINNO.1	2	3	4	5	6	7	8	9
V1, OB2	9K	0	INF	INF	9K	INF	0		
V2, 6BC8	*30K	1 Meg	10.5K	.1	.1	*4.5	1.4 Meg	*20K	0
V3, 6AU6	100K	0	.1	.1	9K	33	.15		
V4, 6AL5	0	100K	.1	.1	200K	0	100K		
V5, 6AB4	7K	0	.1	.1	INF	100K	1.2K		
V6, 6AS6	100K	0	.1	.1	7.5K	7K	100K	} Ch" 7-13	
V7, 6CB6	22K	0	.1	.1	7K	7K	0		
V8, 6CY5	220K	100	.1	.1	7.5K	7K	100n.		
V9, 6CY5	220K	100	.1	.1	7.5K	7K	100		

V7, 6CB6	100K	0	.1	.1	7K	7K	0	} Ch" 2-6
V8, 6CB6	220K	100	.1	.1	7.5K	7K	0	
V9, 6CB6	220K	100	.1	.1	7.5K	7K	0	

Taken from Pin of V1.  
All controls fully CW0  
AFC switch in ON position.

## MAINTENANCE

- For routine maintenance tests, check the levels at the respective spigots and compare with levels recorded during initial set-up.
- The voltage and resistance measurement charts, the replacement parts list, and the schematics given here will facilitate trouble shooting and service in case of component failure.
- Model AT-\* may require re-alignment after a tube replacement. Follow the procedure given here.
  - Equipment required:
    - Sweep Generator (Jerrold Model 890, or equivalent)
    - Marker Generator (Jerrold Model CM-6, or equivalent)
    - Signal Generator
    - Oscilloscope
    - Detector (Jerrold Model D-86-7F)
    - Field Strength Meter (Jerrold Model 704B)
    - Frequency Meter (Model BC-221 or equivalent)
  - Aligning the Discriminator Transformer:
    - Ground cathode (Pin 7) of 4.5 mc Oscillator (6AU6) V3.
    - Connect 75 ohm resistor between control grid (Pin 1) and ground on 4.5 mc Oscillator (V3).
    - Connect Sweep Generator to Pin 1 of V3.
    - Couple in 4.5 mc Marker.
    - Attach scope to junction of R-18-C9.
    - Place AFC switch in OFF position.
    - Adjust discriminator transformer for the response shown in fig. 5.
  - Aligning the 4.5 mc Oscillator:
    - Insert 4.5 mc marker into RF jack of detector.
    - Couple loosely to output of 4.5 mc oscillator (Pin 5 of 6AU6) and insert in remaining RF jack on detector.
- Couple scope output of detector to oscilloscope.
- Place AFC switch in manual position.
- Adjust oscillator slug for zero beat with signal generator's 4.5 mc.
- Place AFC switch in AFC position.
- Adjust secondary of discriminator transformer (near bottom of chassis) to again zero beat.
- Touch up secondary until frequency is 4.5 mc  $\pm$  1 kc or better. Use only an accurate frequency meter.
- Keep AFC switch in AFC position for all further alignments.

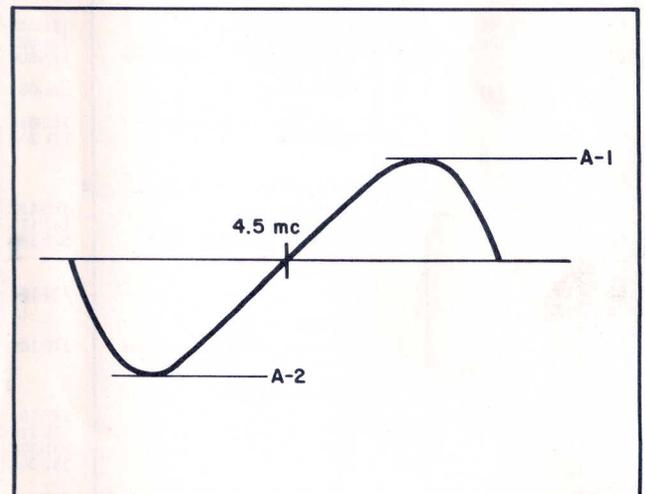


Fig. 5 Discriminator Response.

d. Aligning the RF Stage:

1. Connect FSM to RF output (terminate unused output). Adjust FSM to channel picture carrier (high band 2 x crystal frequency low band 1 x crystal frequency).

NOTE: With RF level pots set at full gain, start with FSM at most sensitive position.

2. Pix: L1 is the oscillator tuning and L2 is the feedback and therefore increases output, but if it is set too high, the oscillator can jump off the crystal frequency and run free. L2 must be set so that this does not happen anywhere in the tuning range of L1. When L1 is peaked it will be found that output falls off rapidly on one side of the peak and slowly on the other side. The

final setting of L1 is to turn it to the slow side until the output falls off one or two db from the peak. This is necessary to insure starting.

3. RF adjustment: In high band units plate coil L3 should be peaked to maximum while the oscillator is being adjusted, so as to be sure that the oscillator adjustment is valid after L3 has been set.
  4. Replace 4.5 mc oscillator tube (6AU6).
  5. Adjust FSM to sound carrier (back off on attenuation for reading).
  6. Adjust C1 and C2 for maximum reading (minimum of 55 dbj).
  7. Adjust FSM to pix carrier and retouch L3 and C3.
- NOTE: On Lo-Band Models L3 is not used.

REPLACEMENT PARTS LIST—MODEL AT-\*

ASSEMBLY				REF. DWG. NO.: 861-378 (lo) 861-373 (hi)				ASSEMBLY				REF. DWG. NO.: 861-378 (lo) 861-373 (hi)			
ITEM	SCHEMATIC DESIGNATION	QTY	DESCRIPTION	JERROLD PART NO.	ITEM	SCHEMATIC DESIGNATION	QTY	DESCRIPTION	JERROLD PART NO.	ITEM	SCHEMATIC DESIGNATION	QTY	DESCRIPTION	JERROLD PART NO.	
CAPACITORS															
1	C1, 2, 3	3	0.97 pt. trimmer	821-203	37	V5	1	6A84	131-299	37	V5	1	6A84	131-299	
2	C4	1	0.047 ut. 200 v, molded	125-031	38	V6	1	6AS6	131-307	38	V6	1	6AS6	131-307	
3	C5, 7	2	0.1 ut. 200 v, molded	125-020	39	V7, 8, 9 (lo)	3	6C86	131-313	39	V7, 8, 9 (lo)	3	6C86	131-313	
4	C6	1	0.01 ut. 400 v, molded	125-013	40	V7 (hi)	1			40	V7 (hi)	1			
5	C8	1	20 ut. 250 v, electrolytic	127-002		V8, 9 (hi)	2	6CY5	131-316		V8, 9 (hi)	2	6CY5	131-316	
6	C9	1	2.2 pt. 600 v, temp. coet.	121-005											
7	C10, 49, 52 (lo)	3	33 pt. 600 v, temp. coet.	121-020											
	C10, 54, 57 (hi)	3			41	FSL	1	3AG, 125v, 0.5 amp., slo-blo.	101-335						
8	C11, 13, 23, 24	19	1000 pt., 600 v, GMV, ceramic	123-115						42	PLI	1	Lamp, GV, 0.2 amp.	102-004	
	27, 28, 29, 32, 39, 42, 45, 46, 47 (lo)														
	C11, 13, 20, 29, 34-41, 45, 46, 50-53 (hi)	18			43	SiRL4	4	Silicon rectifier	137-706						
9	C12	1	5 pf., 600 v, temp. coel.	121-008	RESISTORS										
10	C14	1	51 pf., 2%, 600 v temp. coel.	121-026	44	RI	1	100 k, pot., split spline, CTS type	118-092						
11	C15	1	20 pf., 2%, 600 v	121-109				45 with SPS shaft or equal		45	R2	1	45 with SPS shaft or equal	112-737	
12	C16, 17	2	0.01 ut. disc.	124-031	46	R3	1	1 meg., 5%, 1/2w	112-539	46	R4, 9	2	27 k, 5%, 1/2w	112-539	
13	C18	1	50 pt., 2%, 600 v, tubular ceramic	123-122	47	R4, 9	2	470 ohm, 5%, 1/2w	112-517	47	R5, 24	2	10 k, 10%, 1/2w	112-488	
14	C19	1	0.047 ut. 400 v, molded	125-001	48	R6, 17, 18	3	510 k, 5%, 1/2w	112-704	48	R6, 17, 18	3	510 k, 5%, 1/2w	112-704	
15	C20	1	1 ut. 200 v, metal paper	125-019	49	R7	1	8.2 k, 10%, 1/2w	112-479	49	R7	1	8.2 k, 10%, 1/2w	112-479	
16	C21	1	6800 pt. 400 v molded	125-025	50	R8	1	4.7 k, 10%, 1/2w	112-446	50	R8	1	4.7 k, 10%, 1/2w	112-446	
17	C22 (lo)	1	1.5 pt. temp. coet.	121-004	51	R10	1	240 ohm, 5%, 1/2w	112-284	51	R10	1	240 ohm, 5%, 1/2w	112-284	
18	C22, 27, 42, 44 (hi)	4	10 pf. temp. coel.	121-011	52	R11	1	33 k, 10%, 1w	112-552	52	R11	1	33 k, 10%, 1w	112-552	
19	C26, 44 (lo)	2	1000 pf. lead thru	129-200	53	R12, 19, 27, 39 (lo)	4	100 k, 10%, 1/2w	112-614	53	R12, 19, 27, 39 (lo)	4	100 k, 10%, 1/2w	112-614	
20	C23, 43 (hi)	3	8.2 pf. temp. coel.	121-010	54	R12, 19, 27 (hi)	3			54	R13, 14, 22, 28, 33, 44 (lo)	6	33 ohm, 1/2w	112-176	
21	C24, 30, 4, (hi)	3	3.3 pf.	121-006											
22	C25 (lo)	1	2.7 pf. temp. coel.	121-040											
23	C26 (hi)	1	1 pt. temp. coel.	121-003											
24	C31 (lo)	1	150-150 ut. 250 v, electrolytic	127-600	55	R13, 14, 22, 28, 33, 44 (lo)	6	33 ohm, 1/2w	112-176	55	R13, 14, 22, 28, 33, 44 (lo)	6	33 ohm, 1/2w	112-176	
25	C33 (hi)	1													
26	C41, 43 (lo)	2	0.5 pt. temp. coet.	121-001						56	R15, 16	2	100 k, 5%, 1/2w	112-611	
27	C32, 49 (hi)	2			57	R20, 29, 34, 40, 45 (lo)	5	330 ohm, 10%, 1/2w	112-299	57	R20, 29, 34, 40, 45 (lo)	5	330 ohm, 10%, 1/2w	112-299	
28	C41 (lo)	1	20 pt., 2%, 600 v, temp. coet.	121-014											
29	C50, 51 (lo)	2	15 pt., 2%, 500 v	121-204											
30	C55, 56 (hi)	2													
CONNECTORS															
28	J1, 2, 4	3	Phone Jack	185-116	58	R21	1	820 ohm, 5%, 1/2w	112-350	58	R21	1	820 ohm, 5%, 1/2w	112-350	
29	J3	1	Meter socket	182-113	59	R23	1	510 ohm, 5%, 1/2w	112-326	59	R23	1	510 ohm, 5%, 1/2w	112-326	
30	J5-8	4	Connector assembly, F-61A	821-155	60	R25	1	1.2 k, 5%, 1/2w		60	R25	1	1.2 k, 5%, 1/2w		
CRYSTAL															
31	CRI	1	Customer order	139-109	61	R30, 41	2	220 k, 10%, 1/2w	112-371	61	R30, 41	2	220 k, 10%, 1/2w	112-371	
DISCRIMINATOR															
32	T2	1	4.2 mc discriminator, modified Miller 1467	142-100	62	R31, 42	2	100 k, pot., SI shaft & locknut	118-008	62	R31, 42	2	100 k, pot., SI shaft & locknut	118-008	
ELECTRON TUBES															
33	V1	1	082	132-102	63	R32, 43	2	100 ohm, 1/2w	112-239	63	R32, 43	2	100 ohm, 1/2w	112-239	
34	V2	1	68C8	131-310	64	R35	1	18 ohm, 10%, 1/2w	112-143	64	R35	1	18 ohm, 10%, 1/2w	112-143	
35	V3	1	6AU6	131-308	65	R36	1	47 k, 10%, 1/2w	112-574	65	R36	1	47 k, 10%, 1/2w	112-574	
36	V4	1	6ALT	131-303	66	R37	1	600 ohm, 10w, w.w.	113-003	66	R37	1	600 ohm, 10w, w.w.	113-003	
					67	R38	1	1.8k, 10%, 1/2w	112-396	67	R38	1	1.8k, 10%, 1/2w	112-396	
					68	R38 (hi)	1	22 k, 5%, 1/2w	112-527	68	R38 (hi)	1	22 k, 5%, 1/2w	112-527	
SWITCHES															
					69	SW1, 2	2	Dpdt, slide	162-019	69	SW1, 2	2	Dpdt, slide	162-019	
					70	SW3	1	Spst, pushbutton	162-020	70	SW3	1	Spst, pushbutton	162-020	
TRANSFORMER															
					71	T1	1	Transformer	141-180	71	T1	1	Transformer	141-180	

NOTE: Schematic designation R26 is not used.



