RCA

Broadcast Equipment

BTS-101A
Stereo Generator

MI-561061A

IB-8025127

WARNING

VOLTAGES THAT ARE DANGEROUS TO LIFE ARE INVOLVED IN THE OPERATION OF THIS ELECTRONIC EQUIPMENT. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH VOLTAGES APPLIED. DANGEROUS CONDITIONS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM TO AVOID PERSONAL INJURY OR LOSS OF LIFE.

EMERGENCY
FIRST AID INSTRUCTIONS

Personnel engaged in the installation, operation, or maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and practice. It is the duty of all operating personnel to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

RESCUE BREATHING

1. Find out if the person is breathing.

   You must find out if the person has stopped breathing. If you think he is not breathing, place him flat on his back. Put your ear close to his mouth and look at his chest. If he is breathing, you can feel the air on your cheek. You can see his chest move up and down. If you do not feel the air or see the chest move, he is not breathing.

2. If he is not, open the airway by tilting his head backward.

   Lift up his neck with one hand and push down on his forehead with the other. This opens the airway. Sometimes doing this will let the person breathe again by himself. If it does not, begin rescue breathing.

3. If he is still not breathing, begin rescue breathing:

   Keep his head tilted backward.
   Pinch his nose shut.
   Put your mouth tightly over his mouth.
   Blow into his mouth once every five seconds.
   Do Not Stop Rescue Breathing Until Help Comes.

LOOSEN CLOTHING — KEEP WARM

Do this when the victim is breathing by himself or help is available. Keep him quiet as possible and from becoming chilled. Otherwise, treat him for shock.

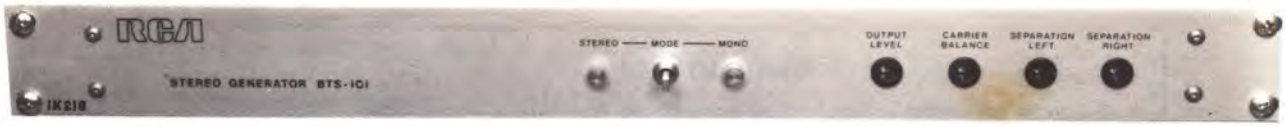
BURNS

SKIN REDDENED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Consult a physician.

SKIN BLISTERED OR FLESH CHARRED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

EXTENSIVE BURN-SKIN BROKEN: Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

Broadcast Equipment



Instructions

BTS-101A

Stereo Generator

MI-561061A

Commercial Communications Systems Division/Front and Cooper Streets/Camden, New Jersey, U.S.A., 08102

PRINTED IN U.S.A.

DL779M

IB-8025127

SAFETY PRECAUTIONS

This equipment is designed to fully safeguard all personnel from operating hazards. Labels on the equipment and caution notices in the instruction book clearly point out these potential hazards.

Any module or Printed Wiring Board may have hazardous voltages exposed, so caution must be exercised.

Follow the recommended procedures provided in the Instruction Book for care and maintenance of the equipment.

Always replace the protective covers after servicing the equipment.

WARRANTY ITEMS

Particular parts and/or equipment covered by warranty are specifically stated as such in the warranty or contract given to the customer at the time of sale. The warranty or contract also stipulates the conditions under which the warranty may be exercised.

To obtain a new replacement for such warranty items, contact your local RCA sales office and please supply Product Identification (including the Original Invoice Number, MI Number, Type Number, Model Number, and Serial Number) and Replacement Part Identification (including Stock Number and Description). Requests for warranty replacements may be unduly delayed if all this information is not supplied.

EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or if evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Report all shortages and damages to RCA, Communication Systems Division – Camden, New Jersey 08102.

RCA will file all claims for loss and damage on this equipment so long as the inspection report is obtained. Disposition of the damaged item will be furnished by RCA.

FIELD ENGINEERING SERVICE

RCA Field Engineering Service is available at current rates. Requests for field engineering service may be addressed to your RCA Broadcast Field Representative or the RCA Service Company, Incorporated – Broadcast Service Division – Camden, New Jersey 08102. Telephone (609) 338-3434.

TECH ALERT

Emergency 24 hour telephone consultation service for technical problems is available. Call TECH ALERT at (609) 338-3434. Telex messages will be forwarded to the addressee upon receipt. Western Union telex number is 83-4450.

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TECHNICAL SUMMARY

PERFORMANCE	
Audio Input Impedance	Resistive 600 ohms, Balanced
Audio Input Level	+10 dBm ± 2 dB at 400 Hz
Audio Frequency Response	±1 dB, 30 Hz to 15,000 Hz
Harmonic Distortion	0.5% or less
Intermodulation Distortion	0.3% or less
Signal to Noise Ratio	70 dB
Pilot Carrier Stability	19 kHz ±1 Hz
Separation	40 dB
Subcarrier Suppression (referred to 100% modulation)	50 dB
Crosstalk	
Without Audio Low Pass Filter	45 dB
With Audio Low Pass Filter	40 dB
Pre-Emphasis Network Time Constant	0, 25, 50 or 75 usec, switchable
Output Level	3.5 volts peak-to-peak
Output Impendance (See Note 1)	180 ohms
ELECTRICAL	
Power Line Requirements	120 or 240 volts, single phase, 50/60 Hz
Combined Line Voltage Variation and Regulation	±10%
Power Consumption	10 watts max.
MECHANICAL	
Dimensions, inches (cm) (overall):	
Width	19 (48.3)
Height	1.75 (4.4)
Depth	9 (22.9)
Weight, pounds (kg)	7.125 (3.23)
Altitude, feet (meters)	7500 (2286) max.
Ambient Temperature	-20°C to +70°C (-4°F to +140°F)

NOTE 1. The BTS-101A will meet all listed performance specifications with up to 10 feet of RG-58/U cable feeding into a load impedance of 5000 ohms or greater; and will meet all FCC rules in effect as of date of manufacture with up to 50 feet of RG-58/U cable.

LIST OF EQUIPMENT

BTS-101A Stereo Generator, less two Audio Lowpass Filters	MI-561061A
Plug-in 15 kHz Lowpass Filters (two)	MI-561064
Complete set of connector plugs for the BTS-101A Stereo Generator (required only when Interface Panel MI-561071 and/or Interconnecting Cable MI-561067 are not used) (optional)	MI-561069
Set of chassis slides for servicing (optional)	MI-561073
Drilling Template for mounting units (optional)	3742738

RECOMMENDED TEST EQUIPMENT

Precision AC Voltmeter	H.P. 400FL or equivalent
Audio Oscillator	H.P. 200CD or equivalent
Sweep Generator	Wavetec #180 or equivalent
Precision Differential Amplifier	See figure 14.
DC Voltmeter	Simpson 260 or equivalent
De-emphasis Network	See figure 15.
Oscilloscope	Tektronix Type 531 with Type H plug-in or equivalent. Scope requirements are detailed in the Separation Adjustment procedure.
Stereo FM Monitor	BW-85A (BW-185) fitted with external input attenuator (5K pot connected through a maximum of two (2) feet of RG-58/U to the monitor's baseband input).

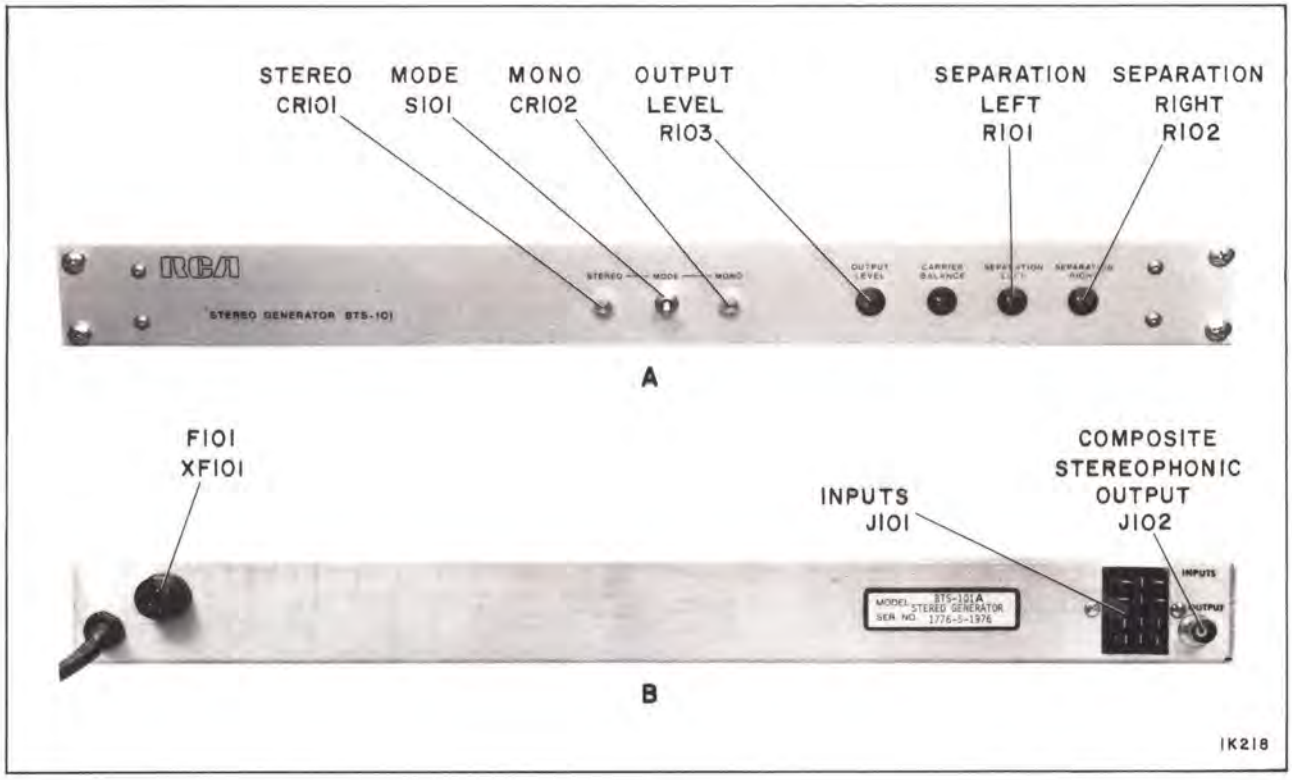


Figure 1. BTS-101A External Views

GENERAL DESCRIPTION

The BTS-101A is a completely self-contained stereo generator needing no parent equipment to generate the composite sterephonic signal. Although designed specifically to operate in conjunction with the RCA BTE-115 FM Exciter, the BTS-101A may be used in any application requiring the generation of a high-quality stereo signal. Since it is self-contained, it may be tested and adjusted without the need of an exciter.

A pair of program audio signals, preferably processed by the RCA BA-150 Digital Overshoot Compensation (DOC) Processor, are applied to the input of the unit. (See block diagram, figure 2). These signals are routed through the rf filter to the internal printed wiring board. Each channel signal is then pre-emphasized and applied to a 15 kHz audio lowpass filter. The pre-emphasis is adjustable and both the pre-emphasis and the audio lowpass filter are switch defeatable. The two audio channels, thus processed, are applied to the analog inputs of an electronic switch operating at 38 kHz. The 38 kHz switching signal and the 19 kHz pilot tones are both derived from a stable 3.04 MHz crystal oscillator. The output of the electronic switch is applied to a phase-linear lowpass filter to remove unwanted switching-signal components. The filter output is amplified to a level of 3.5 volts peak-to-peak for application to the following equipment, normally the BTE-115 Exciter. In addition to the normal composite signal output, the BTS-101A delivers a pair of audio signal samples, representative of the individual audio channel modulationg signals, for application to the metering system of an affiliated BTE-115 FM Exciter. Remote mode

switching connections are located at the rear connector. A momentary closure to ground is needed to switch modes; an internal latch keeps the unit in the selected mode.

INSTALLATION

GENERAL

This procedure covers installation of the BTS-101A Stereo Generator either in other applications or when used with the BTE-115 Exciter in the following RCA transmitters.

BTF-3ES1 BTF-5ES2	referred to in text as BTF 3/5
BTF-5ES1 BTF-10ES1 BTF-20ES1	referred to in text as BTF 5/10/20

This procedure can generally be applied to other FM exciters and transmitters as well. Drilling and tapping of the required mounting holes in the cabinet should already have been accomplished in these RCA transmitters (see BTE-115 Exciter Unit Instruction Book IB-8025256-1), and the transmitter should be prepared for exciter installation using the instructions.

MOUNTING THE INTERCONNECT CABLE

An interconnecting cable assembly, MI-561067-4, -5, or -6 may be supplied with the exciter system, and may already be installed in the transmitter. This cable interconnects the stereo generator to the BTE-115 exciter unit, and also provides for inputs to the system.

In the BTF-5/10/20 transmitter (if not already installed), mount the interconnect cable along the inside edge of the front left hand mounting rail in the transmitter, using flat head screws and cable ties provided with the cable as required. The cable should be positioned so the end with the 24 pin connector extends toward the bottom of the transmitter, and such that the two, three, or four legs of the cable will breakout in the area where the associated units will be mounted. Connect the cable to the existing transmitter wiring, and coil any excess length in the bottom of the transmitter.

For the BTF-3/5 transmitter, mount the cable as shown in figure 7 of either the BTF-3ES1 (IB-8027593-1) or the BTF-5ES2 (IB-8027984-1) Instruction Book.

When the optional chassis slides MI-561073 are used, the same holes are used for mounting the chassis slides and the cable ties. Refer to instructions provided with the chassis slides for installation details.

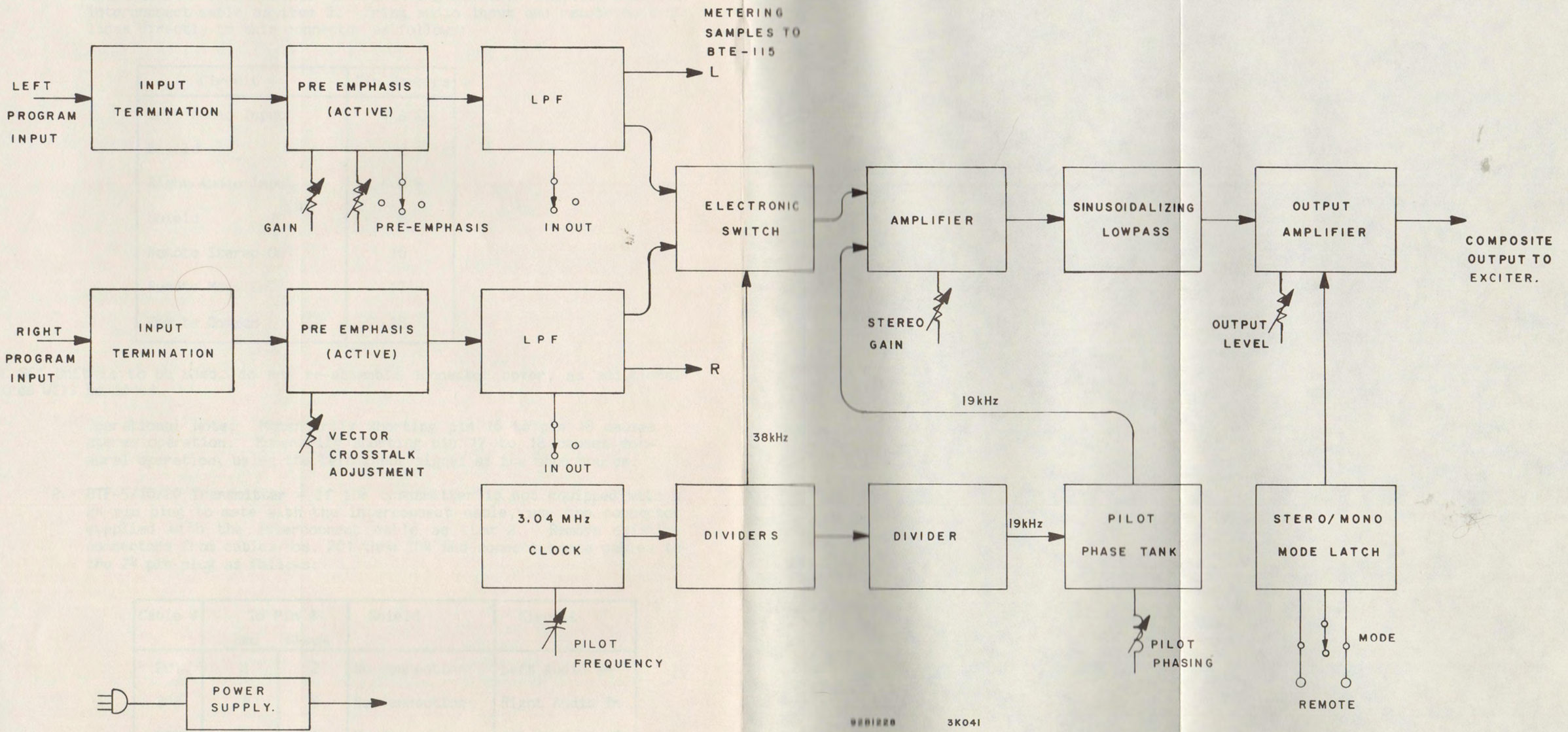


Figure 2. Stereo Generator Block Diagram

CONNECTIONS TO THE MAIN CABLE CONNECTOR

The 24 pin plug on the interconnect cable provides for audio input to and remote control of the exciter system. Connect as follows:

1. BTF-3/5 Transmitter - Install the mating connector supplied with the interconnect cable as item 2. Bring audio input and remote control lines directly to this connector as follows:

Circuit	Pin Numbers
Left Audio Input	1 & 2
Shield	3
Right Audio Input	4 & 5
Shield	6
Remote Stereo On	16
Remote Mono On	17
Remote Common	18

If SCA Unit is to be used, do not re-assemble connector cover, as additional wires will be added.

Operational Note: Momentarily shorting pin 16 to pin 18 causes stereo operation. Momenarily shorting pin 17 to 18 causes monaural operation, using the left input signal as the mono source.

2. BTF-5/10/20 Transmitter - If the transmitter is not equipped with a 24 pin plug to mate with the interconnect cable, use the connector supplied with the interconnect cable as item 2. Remove existing connectors from cables Nos. 201 thru 204 and connect these cables to the 24 pin plug as follows:

Cable #	To Pin #		Shield	Circuit
	Red	Black		
201	1	2	No Connection	Left Audio In
202	4	5	No Connection	Right Audio In
203	10	11	No Connection	SCA #1 Audio In
204	13	14	No Connection	SCA #2 Audio In

Remove wires number 514, 516, and 517 from the cable harness that was removed from the transmitter during the installation of the BTE-115 exciter. Connect these wires from 1TB6 to the 24 pin connector as follows:

Wire #	From	To Pin #	Circuit
514	1TB6-15	17	Remote Mono On
516	1TB6-17	16	Remote Stereo On
517	1TB6-18	18	Remote Common

If SCA Unit is to be used, do not re-assemble connector cover, as additional wires will be added to this connector.

Operational Note: Momentarily shorting 1TB6-17 to 1TB6-18 causes normal stereo operation. Momentarily shorting 1TB6-15 to 1TB6-18 causes monaural operation, using the left input signal as the mono source.

STEREO GENERATOR IN OTHER APPLICATIONS

For installations where the stereo generator is not mounted adjacent to the BTE-115 exciter as well as operation remote from the transmitter, the interconnect cable will not be utilized. In this case, a complete set of connectors for the stereo generator may be ordered as MI-561069 and a complete set of connectors for the BTE-115 may be ordered as MI-561068. Item 1 of connector kit MI-561069, which mates with J101, must be utilized. Connect audio input and mode control lines to this connector as follows:

Circuit	Pin Number
Left Audio Input High	6
Left Audio Input Low	3
Shield	2
Right Audio Input High	4
Right Audio Input Low	1
Shield	5
Remote Stereo On	10
Remote Mono On	12
Common	11

Operational Note: Momentarily shorting pin 10 to pin 11 causes stereo operation. Momentarily shorting pin 12 to pin 11 causes monaural operation. Switching may be accomplished by a switch, pushbutton, relay or NPN transistor.

FINAL MOUNTING

For systems utilizing an SCA generator, omit the remainder of this installation procedure and go to the installation instructions for that unit. If no SCA is to be used, mount the Exciter System Components as follows:

INTERFACE/RADIATE PANEL

Mount panel in place and connect the 4 pin plug and ac twist-lock connector to the panel. Dress associated cables to not interfere with removal of the exciter or stereo generator for servicing.

EXCITER UNIT

Connect the umbilical cord extending from the interface panel to the 6 pin control connector at the rear of the exciter. Connect the 10 pin plug on the interconnect cable to the mating input connector on the exciter. Connect the associated rf connector from the interconnect cable to the composite input on the exciter. (If there are additional rf connectors on this cable, they will be labeled "SCA" an should connect to the SCA INPUT on the exciter). Connect the rf output and ac power cables to the exciter, and mount the exciter in place.

STEREO GENERATOR

Connect the 12 pin connector on the interconnect cable to the INPUT connector J101 of the stereo generator, and the associated rf connector to the OUTPUT jack J102. Plug ac cord into the interface panel. Mount stereo generator.

Fill unused space(s) with blank panels.

ROUTINE OPERATION

Frequent readjustment of the BTS-101A circuitry is not normally necessary. Occasional manual or remote mode switching will be the most common operation.

The transmission mode may be switched from stereophonic to monaural (with a preselected audio channel for the source), and back. Switching can be accomplished by a momentary (or continuous) connection to ground, and that connection can be accomplished by a switch, pushbutton, relay or NPN transistor. The selected mode is indicated by the light-emitting diode stereo or mono indicator lamp. Refer to the schematic diagram, figure 7.

The stereo pilot should be held at a level of 9%. The most convenient method of trimming this level is the front-panel OUTPUT LEVEL control. This is a vernier adjustment, with a few dB of range. Should the desired setting of this control be at an extreme of its range, resetting the internal PILOT LEVEL control R46 may be called for, or resetting the audio limiter outputs may be in order. See Alignment Procedure. The normal output level from the BTS-101A is 3.5 volts peak-to-peak for 100% modulation. This should occur with a 10 dBm input level.

The SEPARATION control settings should be checked during routine proof of performance checks. Separation tests will require that programming material be removed from the channel under test.

DETAILED CIRCUIT DESCRIPTION

Left and right audio signals are applied to the INPUTS connector J101 on the rear of the BTS-101A. Refer to the schematic diagram, figure 7. The left channel is connected to pins 3 and 6, while the right channel is connected to pins 1 and 4. Pins 2, 5, 8, and 11 are available to ground the shields of these lines. The audio signals are routed to the printed wiring board through rf filters composed of L101, L102, L103, and L104 operating in conjunction with capacitors C101, C102, C103, and C104. Following the rf filtering, the signals are applied to the input pads and transformers T102 and T103.

The left channel input transformer is terminated by R5, in parallel with R6, R7, and R8. The range of the LEFT GAIN control R7 is restricted by R6 and R8. The output from R7 is applied to R9, which, with C1, forms an on-board rf filter. The output of this filter is then amplified by U1. Capacitor C4 is placed in the negative feedback loop of U1 to cause a very slight but predictable phase lag at 15 kHz. The output of amplifier U1 is fed into a phase correction network comprised of R12, R13, and C6, to allow low audio frequency square wave transmission. Capacitor C5 is added to this network to compensate for a slight high-frequency loss at 15 kHz in the audio lowpass filters. The signal is then fed to amplifier U2 which functions as an active pré-emphasis network.

The pre-emphasis time-constant is determined essentially by the sum of R15 and R16 operating in conjunction with capacitor(s) C12 and C13. A flat frequency response is obtained by switching out both C12 and C13. A 50μs time-constant is obtained by switching in C13 only; 75μs is obtined by also switching in C12. In either case, LEFT PRE-EMPHASIS control R15 is adjusted for the correct frequency response.

The output of U2 is applied to the 15 kHz audio lowpass filter FL1 via series terminating resistor R18. The filter output, terminated by R20 is applied to buffer U3 (to drive the electronic switch for stereo generation) and to U7 (to drive the metering system in the BTE-115 FM Exciter). C14 limits the audio noise bandwidth to 60 kHz when the audio lowpass filter is switched out.

The right audio channel functions in a manner similar to the left except that various adjustments have been added to enable precise audio channel phase and amplitude tracking to easily allow linear crosstalk cancellation. Specifically, 150 Hz control R28 allows the individual audio channels to be adjusted to an identical value at low frequencies. When the pre-emphasis is switched out, 15 kHz (FLAT) control C24 should be adjusted for audio channel phase tracking at 15 kHz. When the pre-emphases is switched in, 1500 Hz control R37 enables the right pre-emphasis time-constant to be trimmed to agree with that obtained in the left channel. Phase agreement at 15 kHz is enabled by 15 kHz control R35.

The output of U4 is applied to the 15 kHz audio lowpass filter FL2 for the right channel through series terminating resistor R40. Filter output is terminated by R42 and is applied to buffer U6 (to drive the electronic switch for the stereo generation process), and to U8 (to provide an audio sample for the affiliated BTE-115 Exciter metering system). C35 limits the audio noise bandwidth to 60 kHz when the audio lowpass filter is switched out.

The outputs of U3 and U6 are applied to the electronic switch U9 through dc blocking capacitors C18, C19, C39, and C40. Diodes CR5 and CR6 prevent the blocking capacitors from becoming reverse-biased by power on and power off transients. The transmission of the left signal from pin 3 to pin 2 of the electronic switch is controlled by the switching signal applied to pin 1. A 38 kHz square wave from U15 is applied to this pin, resulting in a left channel signal, switched on and off at a 38 kHz rate, being present at pin 2. Likewise, the right channel signal is transmitted from pin 6 to pin 7, controlled by a 38 kHz square wave applied to pin 8. However, the control signal at pin 8 is 180° out of phase with the control signal at pin 1. Therefore, pins 2 and 7 can be connected together and the resultant signal at the combined point will switch from left to right at a 38 kHz rate. The output of the electronic switch is applied to summing amplifier U10 through resistors R57 and R58. Capacitor C22 limits the maximum slow rate from the electronic switch to less than 50 volts per microsecond, thereby insuring that transient intermodulation distortion products will not be generated in the summing amplifier. Separation-correction signals from LEFT SEPARATION control R101 through R59 and RIGHT SEPARATION control R102 through R44 are also applied to the summing amplifier.

The pilot signal is derived from a 3.04 MHz crystal oscillator formed by Q1 and associated components. The frequency of this oscillator is determined primarily by crystal Y1. The signal may be trimmed to the desired frequency (corresponding to a pilot-tone frequency of 19.0 kHz) by PILOT FREQUENCY capacitor C54. Transistor Q2 interfaces the oscillator into the logic buffer U12B. The output of U12B at pin 4 is a pulse at a rate of 3.04 MHz and is applied to divider U13 for division down to 304 kHz. The output of U13 at pin 11 is applied to the input of U14, which divides the signal down to 76 kHz. The output of U14 at pin 9 drives the final divider U15. The outputs at U15 pins 5 and 6 are the aforementioned out of phase 38 kHz pulses which drive the electronic switch U9. A 19 kHz signal is also supplied by divider U15 at pin 9. The 19 kHz signal is buffered by U12A and is then applied to buffers Q3 and Q4. The low impedance of this stage provides drive for the pilot filter consisting of L1 and PILOT PHASE control C58. L1 permits phasing or timing of the pilot tone relative to the 38 kHz switching signal. The output of PILOT LEVEL control R46, a sinusoid, is applied to the summing amplifier through R45.

GAIN of the summing amplifier U10 is determined by STEREO GAIN control R61, whose range is limited by R60. The output of this stage is applied to the phase-linear 53 kHz lowpass filter FL3 through series terminating resistor R63. The filter output is terminated primarily by R64. This filter attenuates any signal component above 53 kHz. This results in a smoothing out of the switched pulse left and right signal into a continuous wave.

Signal input to the output buffer amplifier U11 is determined by K1, which selects either the mono input from pin M or the stereo signal appearing across R64. The mono signal source is determined by the connection to pin M of either the left channel (L) input or the right channel (R) input. The unit is normally wired to utilize the left channel signal, but conversion in the field to supply the right channel signal for mono transmission may be easily accomplished. Refer to the FIELD MODIFICATIONS section, Mono Source Selection and to figures 5 and 7. To eliminate the possibility of phase-cancellation problems in the interconnecting link between the program source and the transmitter site, only one audio channel at a time is accepted for transmission in the mono mode. For proper channel balance, both the L and R cables must remain connected to their respective terminals.

Relay K1 is controlled by transistor Q5. This transistor is part of a latching circuit involving Q5, Q6, Q7 and Q8. This latch may be switched from one mode to the other by operating either the front panel mode switch or by momentary connection to ground of the remote control terminals, J101, pin 10 or 12. A transistor or open-collector TTL gate may be used to accomplish remote control switching. Capacitor C60 simulates closing of S101 to the STEREO position so that the latch will set to the STEREO mode upon each application of power. If it is desired to power up to monaural operation, move C60 to the equivalent position near Q7. Installing C60 in the alternate position is described in the FIELD MODIFICATIONS section, Power Up to Monaural. Light-emitting diodes CR101 and CR102 indicate the mode status on the front panel.

The power supply is of conventional design, with a split-primary power transformer, full wave rectification, and electronic regulation of critical voltages.

FIELD MODIFICATIONS

POWER-UP TO MONAURAL

The BTS-101A is normally shipped from the factory wired to return to the stereophonic mode of operation at turn-on or following a power failure. Should it be necessary to return to the monaural mode following a power failure, one capacitor must be moved. Locate C60 (10 MF 20 volts) on the components layout drawing, figure 5, and the BTS-101A top view, figure 4, and carefully de-solder it from the printed wiring board. Reinstall the capacitor in the pair of holes immediately to the left of the original location (as viewed from the front). The unit will now return to monaural operation following a power failure. This change does not affect the stere-mono switching.

MONO SOURCE SELECTION

The stereo generator is normally shipped to utilize the left channel for monaural transmission. To select the right channel, unsolder the center conductor of the shielded cable (L) from the terminal immediately in front of the mono-stereo selection relay K1. In its place, solder the center conductor of the companion (R) shielded cable.

> NOTE: Both L and R cables must remain in place and connected to terminals L and R for proper channel belance. In case of a modification to right channel mono output, insure that the M pin end of the unused cable does not short.

REWIRING POWER TRANSFORMER FOR 240 V AC INPUT

The BTS-101A is normally wired for a primary voltage of 120 V ac. The split-primary power transformer, T101, can have its windings connected in series for 240 V ac input, as shown on the schematic. The transformer has been designed for either 50 or 60 Hz operation. When the transformer is reconnected for 240 V ac operation, the fuse should be changed to one with a 1/8-ampere rating.

ALIGNMENT PROCEDURE

The internal adjustments are factory sealed to prevent changes due to vibration during shipment, and should not normally require field adjustment. This alignment procedure is provided in the event that component replacement or other unusual conditions make realignment necessary.

TEST EQUIPMENT

The test equipment listed in the RECOMMENDED TEST EQUIPMENT list in the front of this book is necessary for the alignment of the BTS-101A Stereo Generator. It is very important that the test equipment be checked periodically for accuracy of calibration.

POWER SUPPLY CHECK

1. Apply power to the stereo generator and check the dc voltages at TP6 (gray) and TP7 (white). Refer to figure 4. The voltages should be plus and minus 24 volts, ±10% respectively.

2. Check the voltage regulators by testing the following points (see figure 12):

   A. The dc voltage at U1 pin 7 should be 12 volts ±5%.
   B. The dc voltage at U1 pin 4 should be -12 volts ±5%.
   C. The dc voltage at U15 pin 14 should be 5 volts ±5%.

AUDIO STAGE ALIGNMENT

1. Connect the left and right audio inputs in parallel and in phase and apply a 2.45 volt rms audio signal at 2122 Hz (equivalent to an L=R signal of +10 dBm).

2. Check that stereo generator is in STEREO mode (S101 to STEREO), and set the PILOT LEVEL control to off (R46 fully counterclockwise).

3. Set the audio amplifiers flat by switching out pre-emphasis networks (switches S1 through S4 to left) and audio filters out (switches S5 and S6 up).

4. Set LEFT GAIN control (R7) for an output level of 0 dBV (0.775 V rms) at TP3 (green).

5. Set right channel 150 Hz linear crosstalk control (R28) for a 0 dBV level at TP4 (blue).

6. Reduce oscillator level until output at TP3 equals -3 dBV (0.548 V rms). Switch to left channel pre-emphasis networks (switches S1 and S2 to right) and adjust LEFT PRE-EMPHASIS control (R15) until output at TP3 equals 0 dBV. Switch out left pre-emphasis (switches S1 and S2 to left) and return oscillator to original level.

7. Switch in left channel 15 kHz audio lowpass filter FL1 (rear filter, switch S5 down). Set oscillator to 19 kHz. While monitoring TP3 with an oscilloscope;

   A. Adjust inductor L4 for a null. See figure 9.
   B. Adjust L6 for a null at 22 kHz.
   C. Adjust L2 for a null at 30 kHz.
   D. Recheck 19 and 22 kHz adjustments. Switch left channel filter out of the circuit (switch S5 up).

8. Move the scope to TP4 and switch in the right 15 kHz lowpass filter FL2 (front filter, switch S6 down). Set the oscillator to 19 kHz and;

   A. Adjust inductor L4 for a null.
   B. Adjust L6 for a null at 22 kHz,

C. Adjust L2 for a null at 30 kHz.
D. Recheck 19 and 22 kHz adjustments. Switch the right 15 kHz filter out of the circuit (switch S6 up).

9. Disconnect the audio oscillator from the generator inputs and connect a sweep generator in its place.

A. Set the scope for external horizontal input and drive this input with the control voltage output of the sweep generator. Set the sweep width of the generator to cover the range of 200 Hz to 16 kHz, and set the sweep rate to approximately 5 sweeps per second.

B. This step requires the use of a precision differential amplifier having a common mode rejection ratio of approximately 80 dB. Such an amplifier may be constructed as shown in figure 14. Connect the inputs of the precision unity gain differential amplifier to TP3 and TP4 and connect the differential amplifier output to the vertical input of the oscilloscope.

C. Set the scope to 1 V/cm sensitivity; feed a left only reference signal to the sweep generator, and adjust the output level of the sweep generator to yield a 2 volts peak-to-peak signal on the scope.

Feed an L=R signal to the stereo generator and set the scope sensitivity to 5 mV/cm.

The scope now displays amplitude and phase errors (between the two audio channels) on the vertical axis against frequency on the horizontal axis. Adjustments will now be made which will reduce these errors to 5 mV peak-to-peak (1 cm peak-to-peak) which is 52 dB below the reference level. It may be necessary to decrease the scope sensitivity at the beginning of an adjustment but the displayed error should ultimately be below 5 mV peak-to-peak (1 cm peak-to-peak on 5 mV/cm setting).

Confirm that both pre-emphasis networks are switched out (switches S1 through S4 to the left).

10. Adjust right channel 150 Hz linear crosstalk control (R28) for minimum amplitude on the scope during the mid and low-frequency portion of the sweep. Adjust 15 kHz linear crosstalk (FLAT) capacitor C24 for minimum amplitude at the higher frequencies.

11. This step requries that the sweep generator signal be de-emphasized. Insert a suitable de-emphasis network, such as the one shown in figure 15, between the sweep generator and stereo generator. Note that the de-emphasis network shown is designed to work into the 300 ohm impedance presented by the parallel connection of the left and right inputs of the stereo generator. Whenever this network is used to feed a single 600 ohm input, that input should be paralleled with a 600 ohm resistor so that the de-emphasis network always operates into a 300 ohm load.

Switch in the pre-emphasis networks of both audio channels (switches S1 through S4 to the right). Adjust right channel 1500 Hz linear crosstalk control (R37) for minimum amplitude at the mid-frequencies. Adjust right channel 15 kHz linear crosstalk control (R35) for minimum amplitude at the high frequencies.

12. Repeat steps 10 and 11 (de-emphasis and pre-emphasis out for step 10).

AUDIO FILTER ALIGNMENT

During this phase of alignment, the permissible error magnitude will be relaxed to .01 volts peak-to-peak (2 cm peak-to-peak on 5 mV/cm setting), which is 46 dB below the reference level. The differential amplifier, sweep oscillator, and oscilloscope should remain in the same configuration as utilized in the previous steps. Again, it may be necessary to vary the scope vertical sensitivity at the beginning of this adjustment, but the error should utimately be .01 volts peak-to-peak, or less, for frequencies below 15 kHz.

1. Switch in both left and right channel audio lowpass filters (switches S5 and S6 down) and carefully adjust each inductor slug on FL1 and FL2 for minimum error. This alignment should be accomplished by a number of small systematic adjustments working from inductor to inductor in a repetitive cycle. No single adjustment will obtain the desired results, but rather, a balance of a number of correct adjustments is necessary. The criterion for a correct single adjustment is to reduce the error single amplitude as much as possible while simultaneously reducing amplitude variations (ripple) in the error signal. Both criteria are equally important and reduction of error amplitude at the expense of increasing error ripple is to be avoided. When this point is found, it is time to move on to another inductor for further adjusment. When the audio filters are properly adjusted, the differential amplifier should yield a monitonically rising error signal with increasing frequency. The end result should look trumpet shaped, with the error signal not exceeding .01 volts peak-to-peak at 15 kHz and below.

2. Switch the left and right channel pre-emphasis networks out (switches S1 through S4 to left) and remove sweep de-emphasis. Confirm that the filters meet specification in this configuration.

3. Disconnect the differential amplifier and sweep oscillator. Re-connect the audio oscillator to the left input at +10 dBm. While monitoring TP3 with an audio voltmeter, confirm that the frequency response is down not more than 0.5 dB at 10 kHz, and not more than 1 dB at 15 kHz. Also, check that the stopband response is down 40 dB or better at and above 19 kHz.

4. Repeat step 3 for right channel at TP4.

SEPARATION ADJUSTMENT

1. Insert the de-emphasis network and switch in the stereo generator's left and right channel pre-emphasis networks (switches S1 through S4 to right).

2. Set the front-panel SEPARATION LEFT and SEPARATION RIGHT controls of the stereo generator to mid-position. Also, set the variable capacitor (C6) on the 53 kHz lowpass filter (FL-3) to half mesh.

3. Set the audio oscillator to 500 Hz at +10 dBm, feeding left channel only.

4. Set the stereo generator in MONO mode and monitor the composite output at J102 on a scope. Externally synchronize the scope sweep with the audio

oscillator. Adjust the front-panel OUTPUT LEVEL control on the stereo generator until the output signal measures 3.5 volts peak-to-peak on the scope.

5. Set the stereo generator in STEREO mode and adjust the STEREO GAIN control (R61) for an output of 3.5 volts peak-to-peak at J102.

6. If scope performance has previously been verified, skip this step. Check oscilloscope phase shift and overload characteristics by monitoring the signal at pin 2 of the electronic switch U9. Set the scope vertical amplifier sensitivity to 5 mV/cm, dc. Ideally, a flat baseline should be observed because the actual separation at this point is well in excess of 60 dB. A scope which displays a baseline whose variation is 2.5 mV peak-to-peak or less is acceptable for the remainder of these adjustments. This amount of variation limits the accuracy of further separation adjustments to 58 dB. If the scope displays more than 2.5 mV peak-to-peak baseline variation, which is not caused by poor overload characteristics, it may be possible to correct this by properly adjusting the high-frequency compensation circuits in the scope's vertical amplifiers.

7. Once the performance of the scope has been verified, keep it set at 5 mV/cm dc and monitor the stereo generator output at J102. Adjust the LEFT SEPARATION control for a flat baseline at 500 Hz. See figure 3, photo 1.

8. Set the oscillator to 14 kHz, and adjust the variable capacitor (C6) on the 53 kHz lowpass filter (FL3) for a flat baseline.

> NOTE: In case of failure of a component in FL3, the entire filter assembly must be replaced.

9. Repeat Steps 7 and 8 until the baseline is flat at both 500 Hz and 14 kHz.

10. With the oscillator at 500 Hz, feed a right only signal and adjust the RIGHT SEPARATION control for a flat baseline.

11. While observing the baseline amplitude, manually sweep the oscillator from 500 Hz to 15 kHz for both left only and right only input conditions. Verify that the worst case baseline amplitude is no greater than 15 mV peak-to-peak (3 cm peak-to-peak). This corresponds to a separation figure of 47 dB and usually occurs around 8 kHz.

PILOT ADJUSTMENT

1. Feed signal to both inputs in phase (L+R signal). Set oscillator to 500 Hz at 2.45 volts rms and switch stereo generator to MONO mode.

2. Verify that the stereo generator output at J102 is 3.5 V peak-to-peak. Adjust front-panel OUTPUT LEVEL control, if necessary.

3. Connect the output (J102) of the stereo generator through a 5000 ohm pot to the baseband input of a BW-85A (BW-185) stereo monitor.

   Set the monitor's function switch to TOTAL and the range switch to MOD.

   Adjust the pot until the monitor reads 100% modulation.

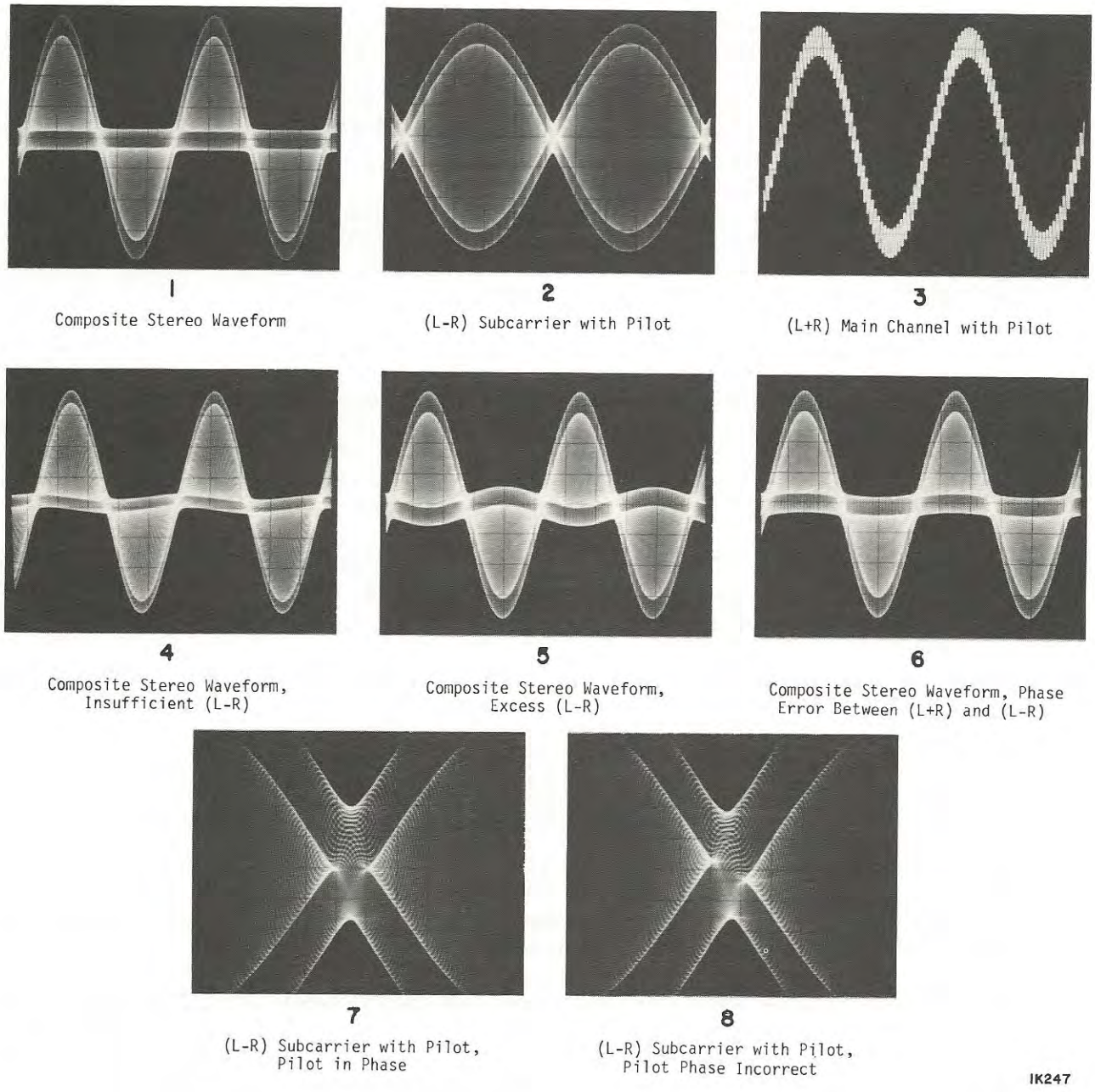


Figure 3. Oscilloscope Waveforms

4. Switch the stereo generator to STEREO mode and adjust STEREO GAIN control (R61) until the monitor indicates 91% modulation.

5. Switch stereo monitor function switch to PILOT, and center the stereo generator's PILOT LEVEL control (R46).

6. Using a plastic tuning tool, adjust PILOT PHASE control (L1) for maximum pilot level.

7. Adjust PILOT LEVEL control (R46) for a pilot amplitude of 9% on the stereo monitor.

8. While watching the Hz deviation meter on the stereo monitor, adjust PILOT FREQUENCY control (C54). Make sure that pilot frequency can be adjusted to either side of 19 kHz, and then set it 0.5 Hz high.

9. Reverse the signal leads to the right input (L-R signal) and monitor the stereo generator output (J102) with a scope. Using a plastic tuning tool, adjust PILOT PHASE control (L1) for correct pilot phase as reflected by the scope "bow tie" pattern. See figure 3, photos 7 and 8.

10. Check that pilot amplitude is still 9%. Adjust the PILOT LEVEL control (R46), if necessary.

REMOTE FUNCTIONS

1. Verify that the metering samples (J101 pins 7 and 9) are approximately 0.8 volts rms. Pin 7 is the left sample and pin 9 is the right sample.

2. Check external mode lines for proper operation. Short pin 12 of J101 to ground for mono mode and short pin 10 of J101 for stereo mode of operation.

FINAL CONSIDERATIONS

The stereo generator, as it now stands, is optimally aligned in all regards. Separation and crosstalk from all causes for frequencies between 50 Hz and 15 kHz will be in excess of 45 dB. Therefore, no further adjustments should be performed on the stereo generator. During the final performance verification, the BW-85A (BW-185) FM monitor will be used to secure the majority of readings included on the final test data sheet. If, during final test, the monitor produces unfavorable readings avoid any temptation to adjust the stereo generator. Rather, recalibrate the monitor in accordance with instructions supplied with it.

PARTS ORDERING INFORMATION

REPLACEMENT PARTS

Replacement parts bearing a Stock Number should be ordered by Item, Description, and Stock Number from RCA, Distributor and Special Products Division, Deptford, New Jersey 08096. Items listed under a Master Item (MI) Number should be ordered from RCA, Commercial Communications Systems Division, Camden, NJ 08102.

Because of possible products modifications and/or the unavailability of parts, the item which will be supplied against an order for a replacement part may not be an exact duplicate of the original part. As a result, some of the replacement parts received may require a mounting modification of the customer's design. In some cases, parts and/or instructions for adapting the substitute parts will be supplied. In no way will the substitute parts impair the operation or performance of the equipment.

For information regarding the use of any parts received, write RCA, Tech Alert, Bldg. 2-8, Camden, NJ 08102, or call (609) 338-3434.

EMERGENCY PART SERVICE

For emergency part service during working hours, contact RCA Distributor and Special Products Division, telephone (609) 848-5900 or (609) 541-3636 extension 2234 or 2235. After working hours (Eastern time) telephone (609) 853-0560.

LOCATION	ORDERING INSTRUCTIONS
Continental United States, including Alaska and Hawaii	Replacement Parts bearing a STOCK NUMBER should be ordered from RCA Distributor and Special Products Division – 2000 Clements Bridge Road – Deptford, NJ 08096.
	Replacement Parts bearing a MASTER ITEM (MI) NUMBER should be ordered from RCA, Commercial Communcations Systems Division – Camden, NJ 08102 or your nearest RCA Regional Office.
	Replacement Parts with NO STOCK or MASTER ITEM (MI) NUMBER are standard components. They are not stocked by RCA and should be obtained from your local electronics distributor.
Dominion of Canada	Order from your local RCA Sales Representative or his office or from: RCA Victor Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, Hawaii, and the Dominion of Canada	Order from your local RCA Sales Representative or from: RCA International Division, Clark, New Jersey – U.S.A. – Wire: RADIOINTER
	Emergency: Cable RADIOPARTS, DEPTFORD, NJ

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
			BTS-101A STEREO GENERATOR MI-561061A
			MAIN FRAME
C101 THRU C105	241490		470PF 20% 500V FEED-THRU
CR101	441635		LED - AMBER, STEREO
CR102	441635		LED - AMBER, MONO
F101	427383		FUSE - 1/4 AMP 250 V (120 VAC INPUT)
F101	98105		FUSE - 1/8 AMP 250 V (240 VAC INPUT)
FL101 THRU FL106	427389		3000PF 500V FEED-THRU
J101	444316		CONNECTOR - INPUT
J102	223973		CONNECTOR - OUTPUT
L101 THRU L105	425969		INDUCTOR 10UH
R101	444324		1000 OHM VAR (SEPARATION LEFT)
R102	444324		1000 OHM VAR (SEPARATION RIGHT)
R103	444324		1000 OHM VAR (OUTPUT LEVEL)
S101	444333		SWITCH - TOGGLE, STEREO/MONO MODE
T101	444327		TRANSFORMER - POWER
T102	426792		TRANSFORMER - AUDIO
T103	426792		TRANSFORMER - AUDIO
U101	429929		I.C. - TYPE LM309K
U102	444326		I.C. - TYPE UA7812KC
XF101	429892		HOLDER, FUSE
XU101	248368		SOCKET - KIT, FOR U101
XU102	248368		SOCKET - KIT, FOR U102
			STEREO PW BOARD
C1	230245		150 PF 5% 500V MICA
C2	423708		100000PF 20% 25V CER
C3	423708		100000PF 20% 25V CER
C4	213496		47PF 2% 500V MICA
C5	228720		240PF 1% 500V MICA
C6	420561		.47 UF 3% 100V FILM
C7	435312		10 UF 10% 20V TANT
C8	423708		100000PF 20% 25V CER
C9	435312		10 UF 10% 20V TANT
C10	423708		100000PF 20% 25V CER
C11	433046		5PF +-.5PF 500V MICA
C12	230048		910PF 5% 500V MICA
C13	215380		1800 PF 5% 500V MICA
C14	426858		1110PF 2% 500V MICA
C15	446680		100000 PF 20% 50V GLASS
C16	426027		10000PF 20% 50V CER
C17	423708		100000PF 20% 25V CER
C18	424800		220UF 20% 10V TANT
C19	424800		220UF 20% 10V TANT
C20	423708		100000PF 20% 25V CER

Symbol	Stock No.	Drawing No.	Description
C21	423708		100000PF 20% 25V CER
C22	228718		75PF 5% 500V MICA
C23	230245		150 PF 5% 500V MICA
C24	440047		15PF - 60PF VARIABLE, 15 KHZ FLAT
C25	432015		10PF +-.5PF 500V MICA
C26	423708		100000PF 20% 25V CER
C27	228720		240PF 1% 500V MICA
C28	423708		100000PF 20% 25V CER
C29	420561		.47 UF 3% 100V FILM
C30	423708		100000PF 20% 25V CER
C31	423708		100000PF 20% 25V CER
C32	433046		5PF +-.5PF 500V MICA
C33	230048		910PF 5% 500V MICA
C34	215380		1800PF 5% 500V MICA
C35	426858		1110PF 2% 500V MICA
C36	423708		100000PF 20% 25V CER
C37	426027		10000PF 20% 50V CER
C38	423708		100000PF 20% 25V CER
C39	424800		220UF 20% 10V TANT
C40	424800		220UF 20% 10V TANT
C41	426033		2PF 10% 500V MICA
C42	423708		100000PF 20% 25V CER
C43	426027		10000PF 20% 50V CER
C44	423708		100000PF 20% 25V CER
C45	435312		10 UF 10% 20V TANT
C46	423708		100000PF 20% 25V CER
C47	426027		10000PF 20% 50V CER
C48	435312		10 UF 10% 20V TANT
C49	423708		100000PF 20% 25V CER
C50	424275		3PF 5% 500V MICA
C51	426027		10000PF 20% 50V CER
C52	435312		10 UF 10% 20V TANT
C53	238220		470 PF 5% 500V MICA
C54	440047		15PF - 60PF VARIABLE, PILOT FREQUENCY
C55			TRIM VALUE (OPTIONAL)
C56	423708		100000PF 20% 25V CER
C57	426027		10000PF 20% 50V CER
C58	435178		3300PF 10% 100V MICA
C59	435312		10 UF 10% 20V TANT
C60	435312		10 UF 10% 20V TANT
C61	242964		500 UF 75V ELECT
C62	242964		500 UF 75V ELECT
C63	423664		1UF 10% 35V TANT
C64	420492		2.2UF 10% 35V TANT
C65 THRU			
C67	423664		1UF 10% 35V TANT
CR1 THRU			
CR4	234552		DIODE - TYPE 1OD2
CR5	242220		DIODE - TYPE 1N4154
CR6	242220		DIODE - TYPE 1N4154
CR7	234552		DIODE - TYPE 1OD2
K1	444311		RELAY
L1	446687		COIL 15-40 MH PILOT PHASE
Q1	420558		TRANSISTOR - TYPE 2N3819
Q2	241778		TRANSISTOR - TYPE 2N3563
Q3	2N3053		TRANSISTOR - TYPE 2N3053
Q4	2N4037		TRANSISTOR - TYPE 2N4037
Q5 THRU			
Q8	2N3053		TRANSISTOR - TYPE 2N3053
R5	435554		825 OHM 1% 1/8W FILM
R6	440074		475 OHM 1% 1/8W FILM
R7	446684		1000 OHM VARIABLE, LEFT GAIN
R8	446678		1020 OHM 1% 1/8W FILM
R9	108865		1000 OHM 5% 1/4W COMP
R10	440074		475 OHM 1% 1/8W FILM

Symbol	Stock No.	Drawing No.	Description
R11	428519		4750 OHM 1% 1/10W FILM
R12	436330		22100 OHM 1% 1/8W FILM
R13	446679		34000 OHM 1% 1/8W FILM
R14	108865		1000 OHM 5% 1/4W COMP
R15	436791		10000 OHM LINEAR VARIABLE, LEFT PRE-EMPHASIS
R16	436330		22100 OHM 1% 1/8W FILM
R17	108861		100 OHM 5% 1/4W COMP
R18	437682		4990 OHM 1% 1/8W FILM
R19	230605		27 OHM 5% 1/4W COMP
R20	437682		4990 OHM 1% 1/8W FILM
R21	108861		100 OHM 5% 1/4W COMP
R26	435554		825 OHM 1% 1/8W FILM
R27	440074		475 OHM 1% 1/8W FILM
R28	446684		1000 OHM VARIABLE, 150 HZ
R29	446678		1020 OHM 1% 1/8W FILM
R30	108865		1000 OHM 5% 1/4W COMP
R31	440074		475 OHM 1% 1/8W FILM
R32	428519		4750 OHM 1% 1/10W FILM
R33	436330		22100 OHM 1% 1/8W FILM
R34	446679		34000 OHM 1% 1/8W FILM
R35	426851		1000 OHM LINEAR VARIABLE, 15 KHZ
R36	108864		470 OHM 5% 1/4W COMP
R37	436791		10000 OHM LINEAR VARIABLE, 1500 HZ
R38	436330		22100 OHM 1% 1/8W FILM
R39	108861		100 OHM 5% 1/4W COMP
R40	437682		4990 OHM 1% 1/8W FILM
R41	230605		27 OHM 5% 1/4W COMP
R42	437682		4990 OHM 1% 1/8W FILM
R43	108861		100 OHM 5% 1/4W COMP
R44	436331		47500 OHM 1% 1/8W FILM
R45	232289		470000 OHM 5% 1/4W COMP
R46	436795		100000 OHM LINEAR VARIABLE, PILOT LEVEL
R47 THRU			
R50	108865		1000 OHM 5% 1/4W COMP
R51	108866		2200 OHM 5% 1/4W COMP
R52	218758		220 OHM 5% 1/4W COMP
R53	108861		100 OHM 5% 1/4W COMP
R54	435056		1000000 OHM 1% 1/4 FILM
R55	108865		1000 OHM 5% 1/4W COMP
R56	108861		100 OHM 5% 1/4W COMP
R57	446678		1020 OHM 1% 1/8W FILM
R58	433401		5620 OHM 1% 1/8W FILM
R59	436331		47500 OHM 1% 1/8W FILM
R60	108867		6800 OHM 5% 1/4W COMP
R61	436791		10000 OHM LINEAR VARIABLE, STEREO GAIN
R62	108861		100 OHM 5% 1/4W COMP
R63	437682		4990 OHM 1% 1/8W FILM
R64	437682		4990 OHM 1% 1/8W FILM
R65	444542		180 OHM 5% 1/4W COMP
R66	427566		68000 OHM 5% 1/4W COMP
R67	427566		68000 OHM 5% 1/4W COMP
R68	444542		180 OHM 5% 1/4W COMP
R69	113524		2700 OHM 5% 1/4W COMP
R70	441694		820 OHM 5% 1/4W COMP
R71	512147		470 OHM 5% 1W COMP
R72	218499		10000 OHM 5% 1/4W COMP
R73	426213		4700 OHM 5% 1/4W COMP
R74	108866		2200 OHM 5% 1/4W COMP
R75	218499		10000 OHM 5% 1/4W COMP
R76	218499		10000 OHM 5% 1/4W COMP
R77	426213		4700 OHM 5% 1/4W COMP
R78 THRU			
R80	218499		10000 OHM 5% 1/4W COMP
R81	108866		2200 OHM 5% 1/4W COMP
R82	512147		470 OHM 5% 1W COMP
R83	426233		22 OHM 5% 1/4W COMP
R84	426233		22 OHM 5% 1/4W COMP
S1 THRU			
S6	432426		SWITCH - SLIDE DPDT

Symbol	Stock No.	Drawing No.	Description
TP1	425993		JACK - ORANGE
TP2	425992		JACK - YELLOW
TP3	425994		JACK - GREEN
TP4	425990		JACK - BLUE
TP5	425989		JACK - VIOLET
TP6	425988		JACK - GREY
TP7	425997		JACK - WHITE
U1 THRU			
U6	435504		I.C. - TYPE LM318N
U7	423797		I.C. - TYPE UA741CP
U8	423797		I.C. - TYPE UA741CP
U9	446683		I.C. - TYPE H1-201-5
U10	435504		I.C. - TYPE LM318N
U11	435504		I.C. - TYPE LM318N
U12	425796		I.C. - TYPE SN7404N
U13	422417		I.C. - TYPE SN7490AN
U14	425797		I.C. - TYPE SN7493N
U15	433814		I.C. - TYPE SN7474J
U16	438486		I.C. - TYPE UA7912UC
XQ1 THRU			
XQ8	446686		SOCKET - TRANSISTOR
XU1 THRU			
XU8	444332		SOCKET - I.C. 8PIN
XU9	446685		SOCKET - I.C. 16PIN
XU10	444332		SOCKET - I.C. 8PIN
XU11	444332		SOCKET - I.C. 8PIN
XU12 THRU			
XU15	444315		SOCKET - I.C. 14PIN
XY1	444314		CONNECTOR - (XTAL) - TWO REQUIRED
Y1	444312		CRYSTAL - 3.04MHZ
			DUAL INPUT PADS
R1 THRU			
R4	426234		820 OHM 10% 1/4W COMP.
R22 THRU			
R25	426234		820 OHM 10% 1/4W COMP.
			53 kHz LOW PASS FILTER
FL3	446681		53 KHZ LPF
			15kHz LOW PASS FILTER MI-561064
FL1, FL2			
C1	441639		1930 PF 2% 500V MICA
C2	227692		360 PF 5% 500V MICA
C3	441641		2530 PF 2% 500V MICA
C4	441642		1815 PF 2% 500V MICA
C5	441640		2200 PF 1% 500V MICA

Symbol	*Stock No.*	*Drawing No.*	*Description*
C6	444303		1300 PF 5% 500V MICA
C7	444303		1300 PF 5% 500V MICA
L2	444306		INDUCTOR, VARIABLE
L4	444305		INDUCTOR, VARIABLE
L6	444304		INDUCTOR, VARIABLE
			INTERCONNECT CABLE FOR BTE-115 STEREO SYSTEM
			MI-561067
			3729869-506 REV 1
5P1	446036	3729870-0011	CONNECTOR, 24 CONTACT MALE
5P3	445153	3729870-0008	CONNECTOR, 6 CONTACT FEMALE
5P4	445155	3729870-0010	CONNECTOR, 12 CONTACT FEMALE
5P5	445152	3729870-0006	CONNECTOR, 8 CONTACT FEMALE
5P6	445152	3729870-0006	CONNECTOR, 8 CONTACT FEMALE
5P7 THRU 5P12	431554	993150-0061	CONNECTOR, BNC
	444754	3729870-0012	CONNECTOR, 24 CONTACT FEMALE

SUGGESTED STATION SPARES

Description	Symbol	Stock No.	Quantity Domestic	Quantity Foreign
Crystal, 3.04 MHz	Y1	444312	1	1
Fuse, MDL, 1/4A (120V Input)	F101	427383	5	5
Fuse, MDL, 1/8A (240V Input)	F101	098105	5	5
Transistor, 2N3819	Q1	420558	1	1
Transistor, 2N3563	Q2	421778	1	1
Transistor, 2N3053	Q3, Q5 thru Q8	2N3053	2	2
Transistor, 2N4037	Q4	2N4037	1	1
Potentiometer, 1K 10-turn trimmer	R35	426851	1	1
Integrated Circuit, LM318	U1 thru U6, U10, U11	435504	3	3
Integrated Circuit, H1-201-5	U9	446683	1	1
Integrated Circuit, UA741CP	U7, U8	423797	1	1
Integrated Circuit, 7404N	U12	425796	1	1
Integrated Circuit, 7490AN	U13	422417	1	1
Integrated Circuit, 7493N	U14	425797	1	1
Integrated Circuit, 7474J	U15	433814	1	1
Integrated Circuit, LM309K regulator	U101	429929	1	1
Integrated Circuit, 7812 regulator	U102	444326	1	1
Integrated Circuit, 7912 regulator	U16	438486	1	1

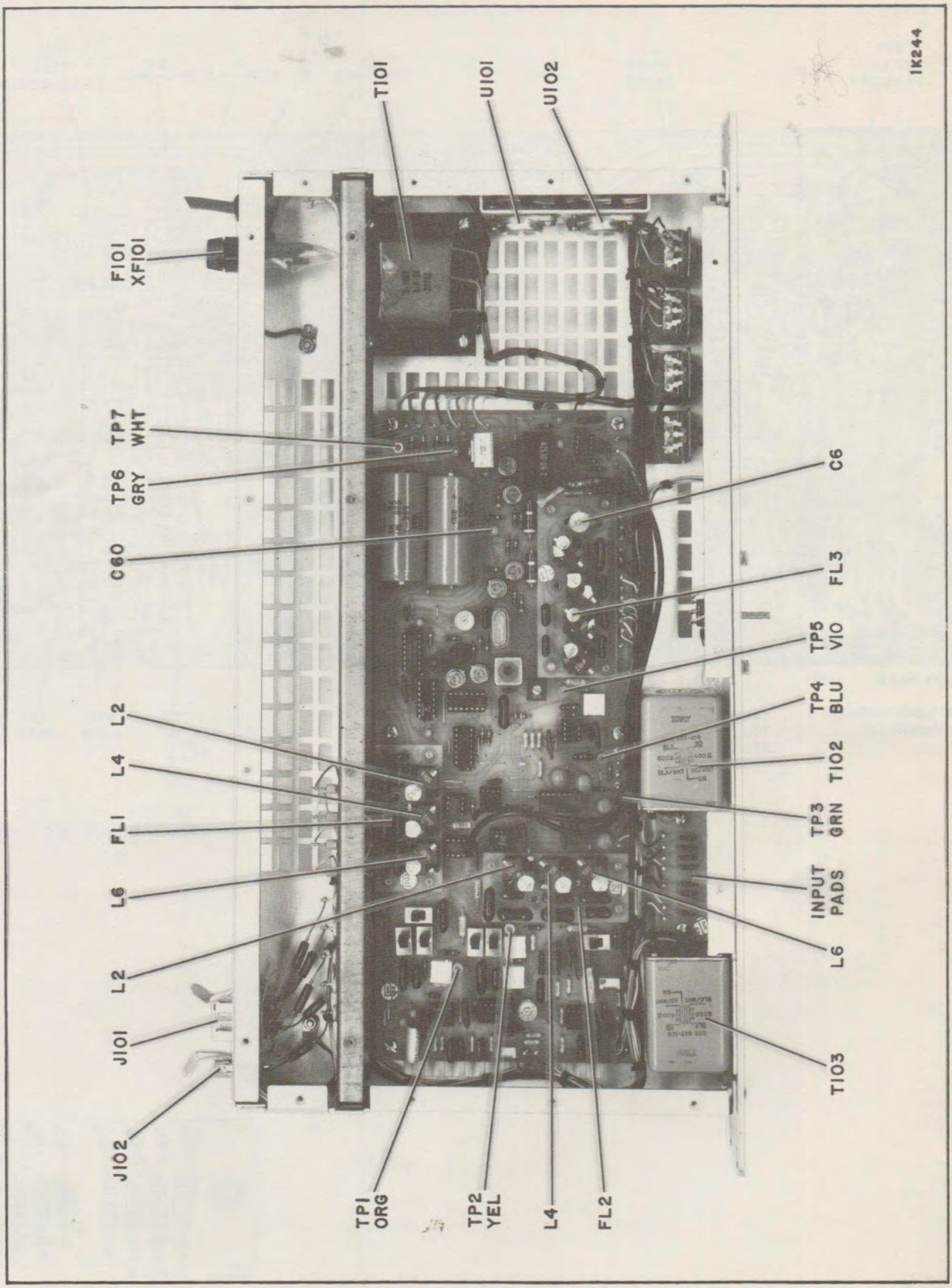
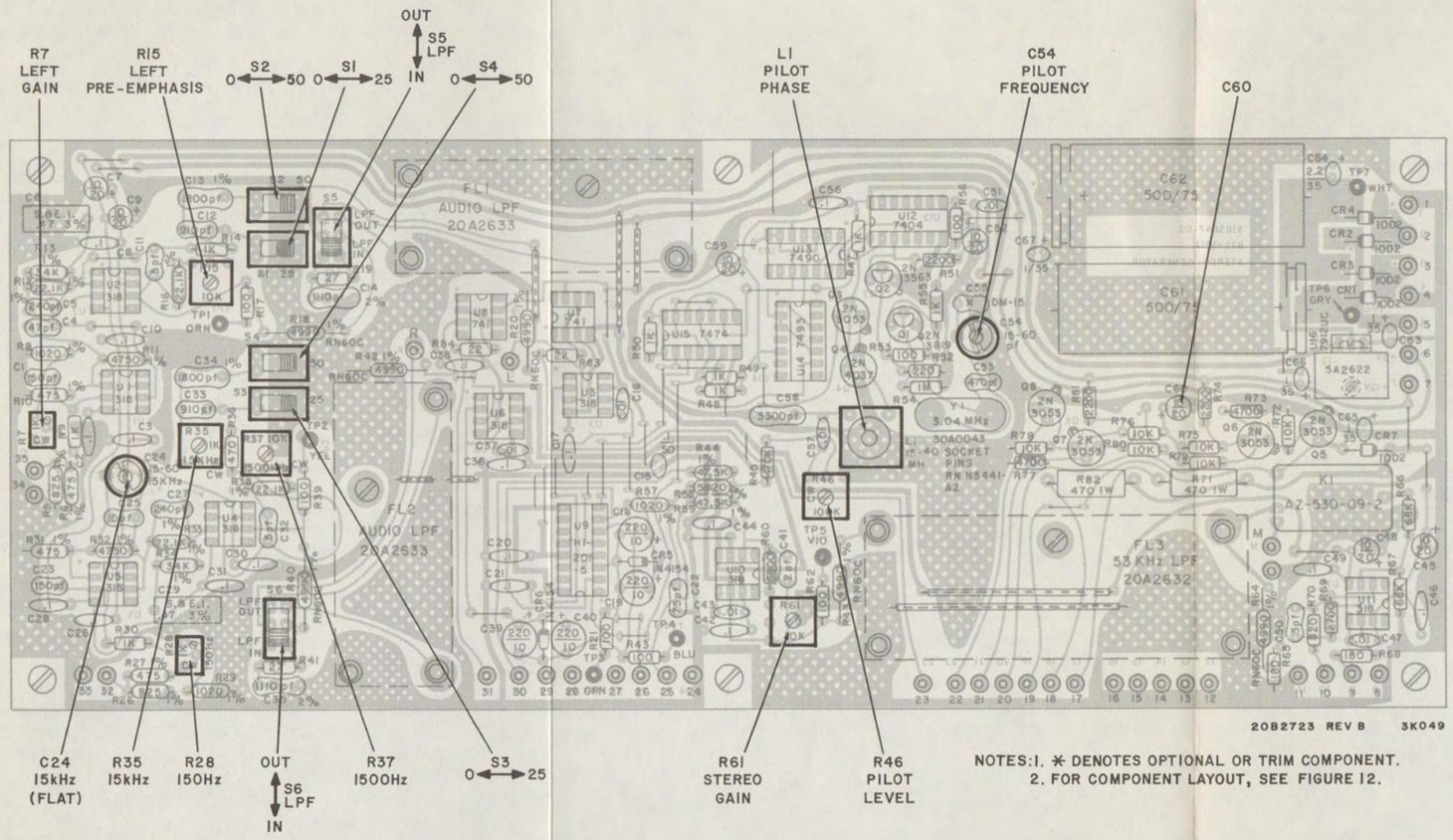


Figure 4. BTS-101A Top View



NOTES: 1. * DENOTES OPTIONAL OR TRIM COMPONENT.
2. FOR COMPONENT LAYOUT, SEE FIGURE 12.

Figure 5. PW Board Switches and Adjustments

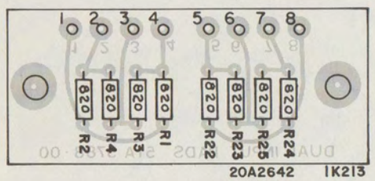


Figure 6. Dual Input Pad Components

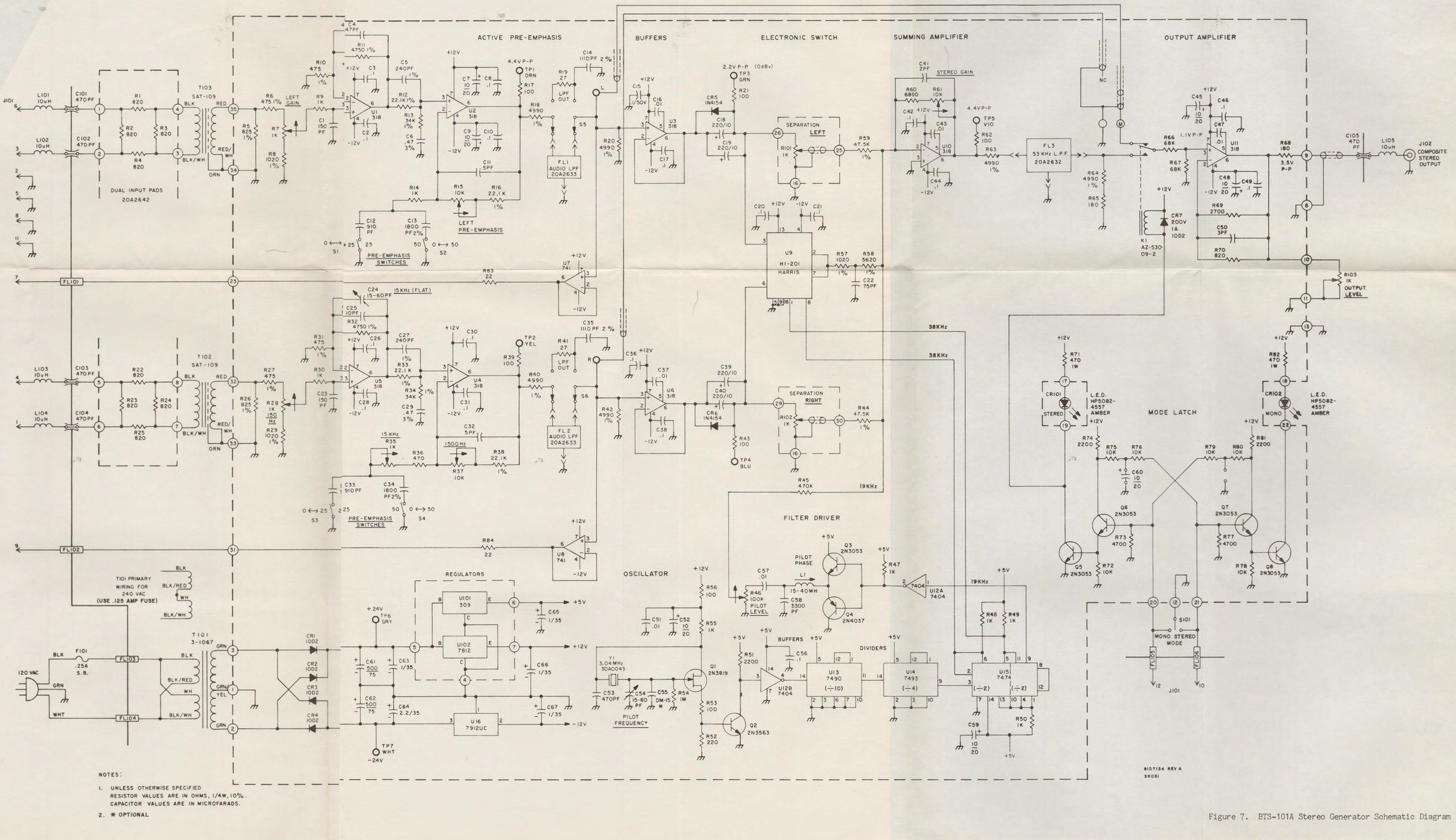


Figure 7. BTS-101A Stereo Generator Schematic Diagram

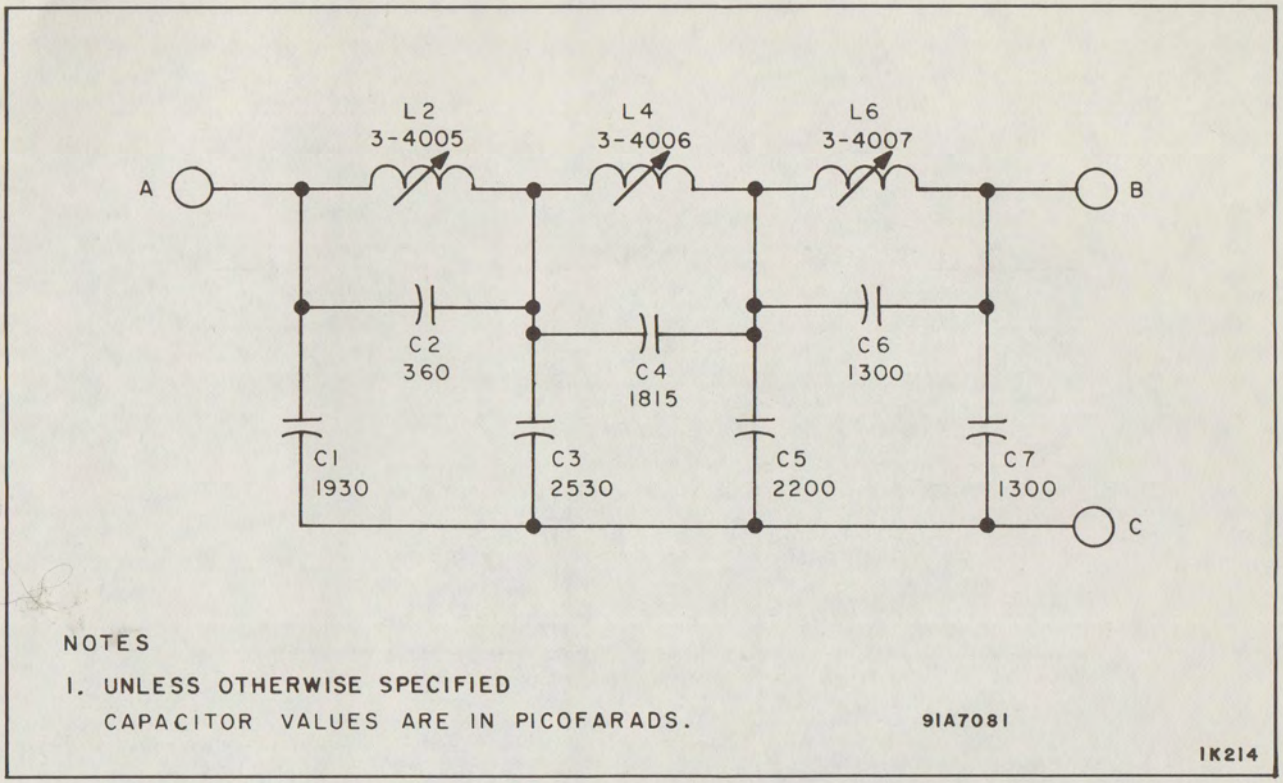


Figure 8. Audio Lowpass Filter Schematic

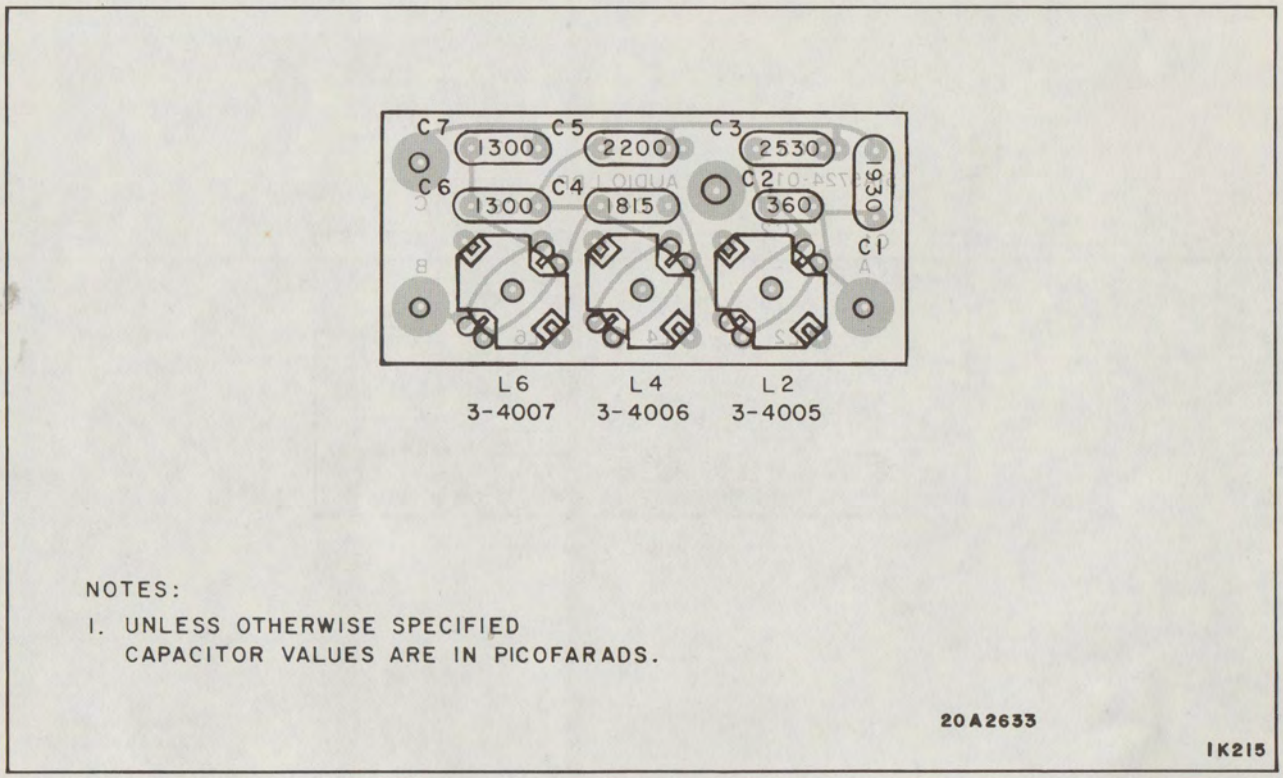


Figure 9. Audio Lowpass Filter Components Location

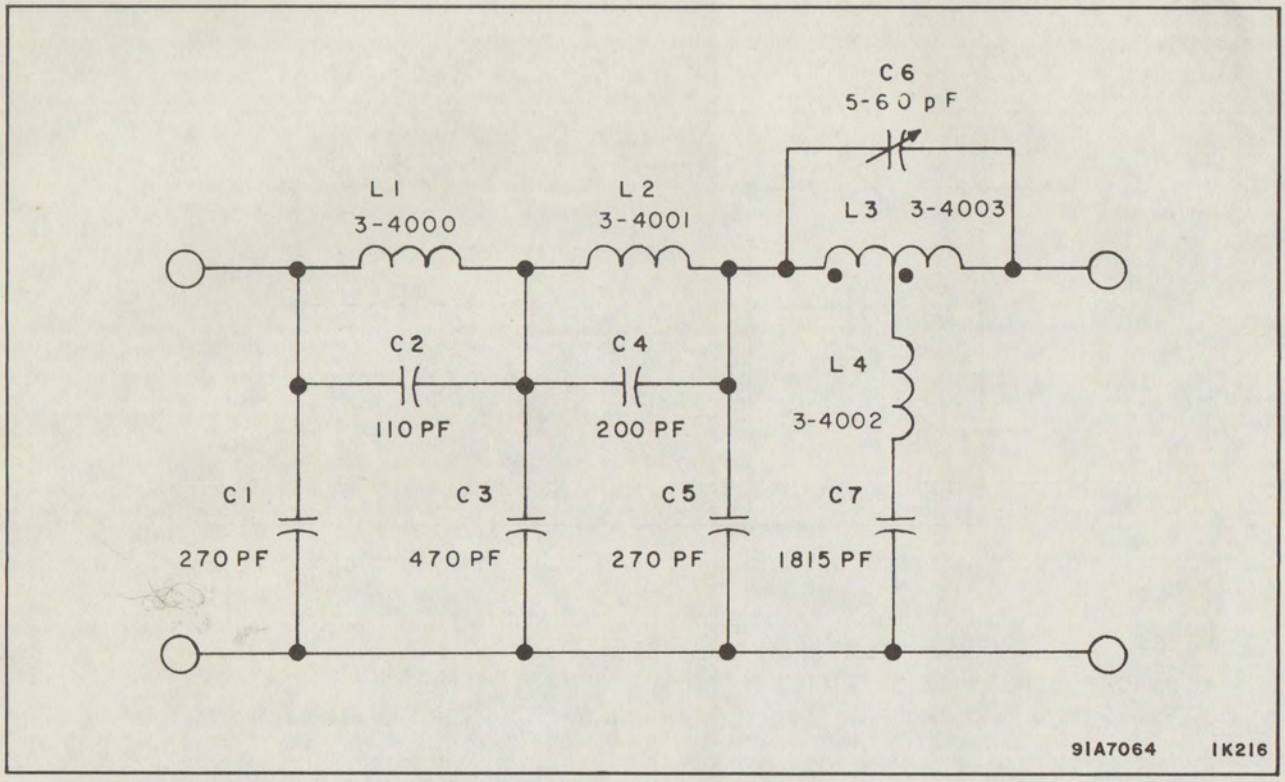


Figure 10. 53 kHz Filter Schematic

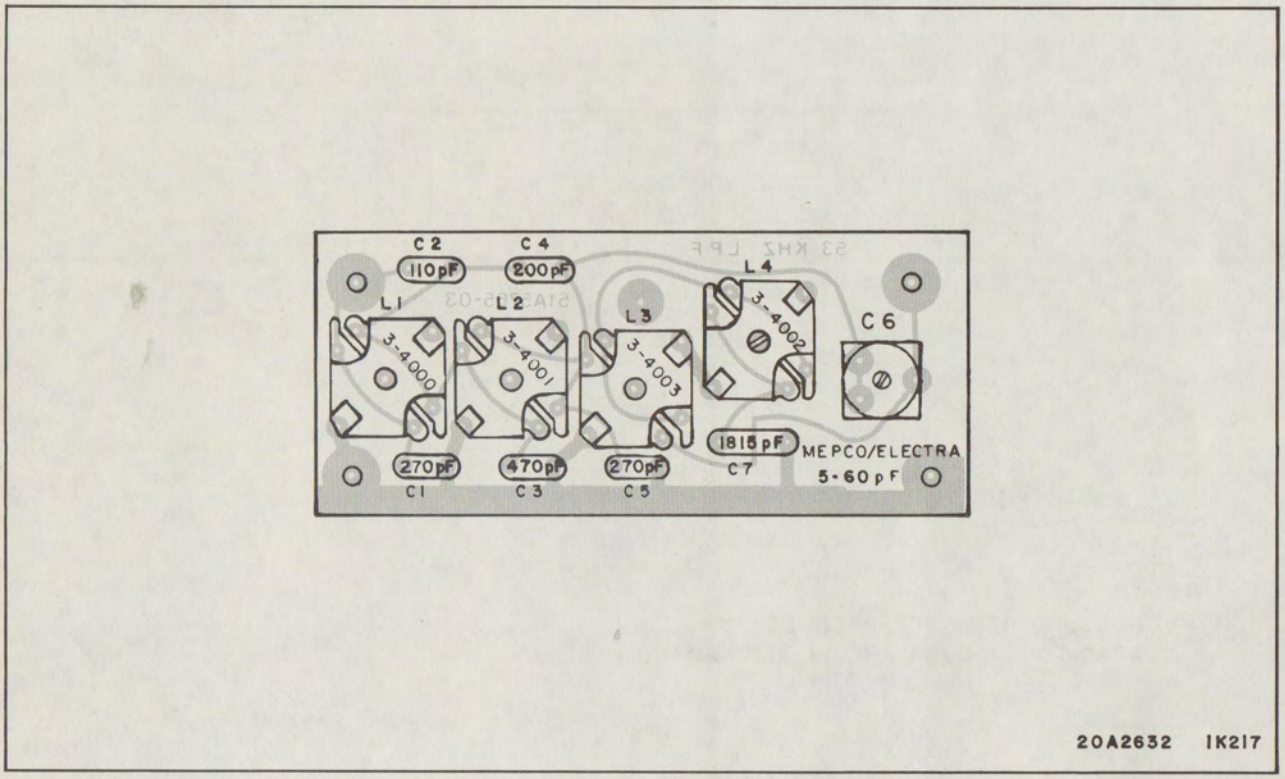
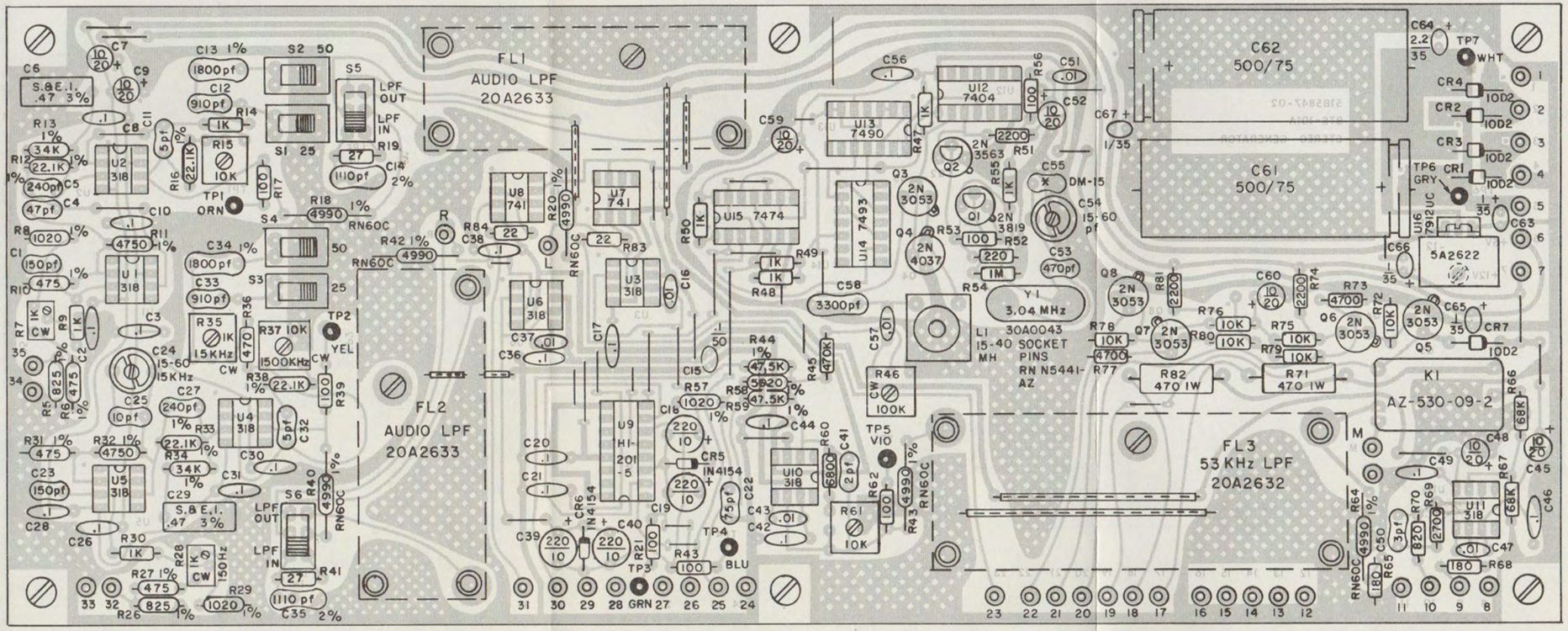


Figure 11. 53 kHz Filter Components Location



NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4 W, 10%, & CAPACITOR VALUES ARE IN MICROFARADS.
2. * DENOTES OPTIONAL OR TRIM COMPONENT.

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Figure 12. BTS-101A Stereo Generator Components Location

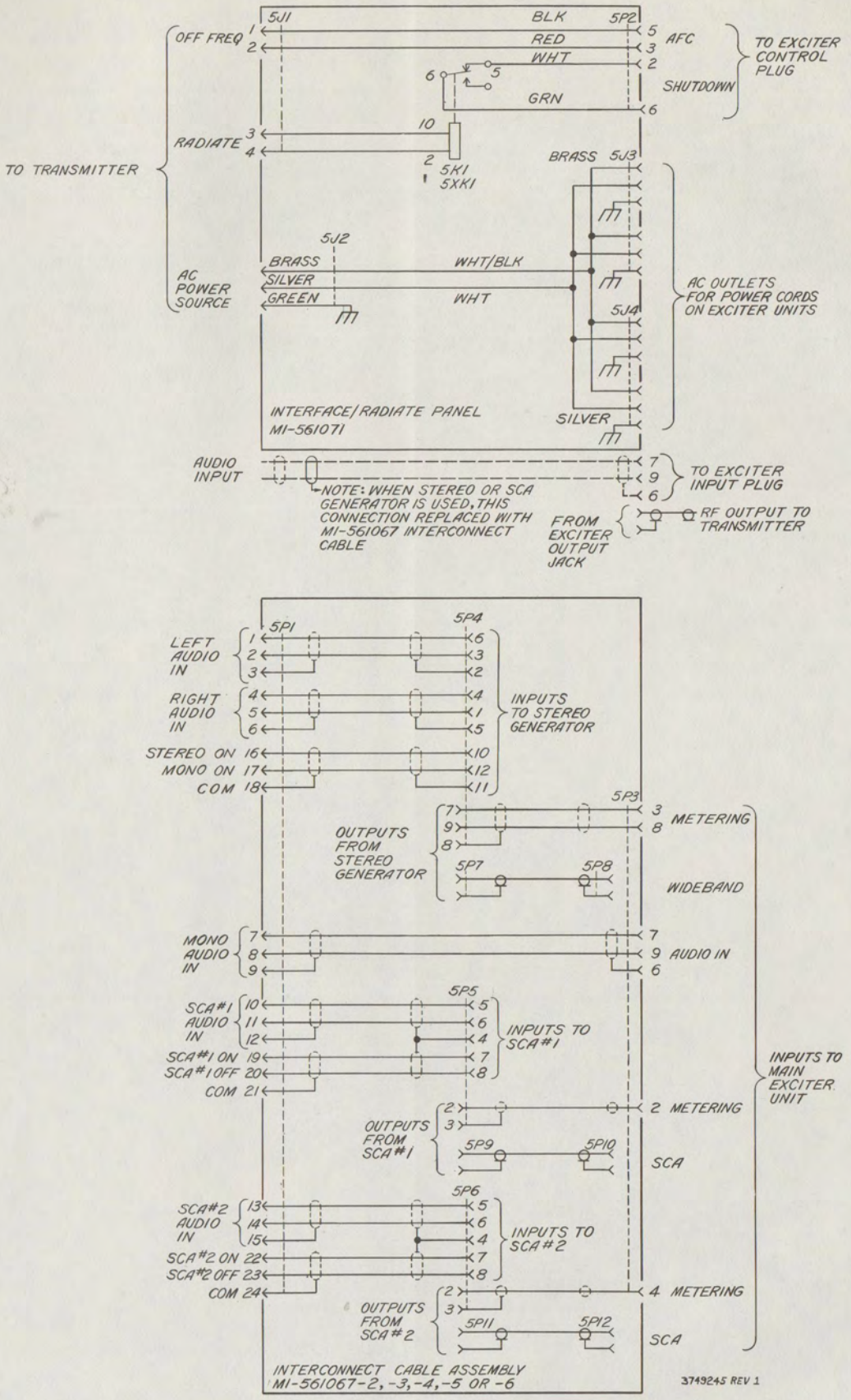
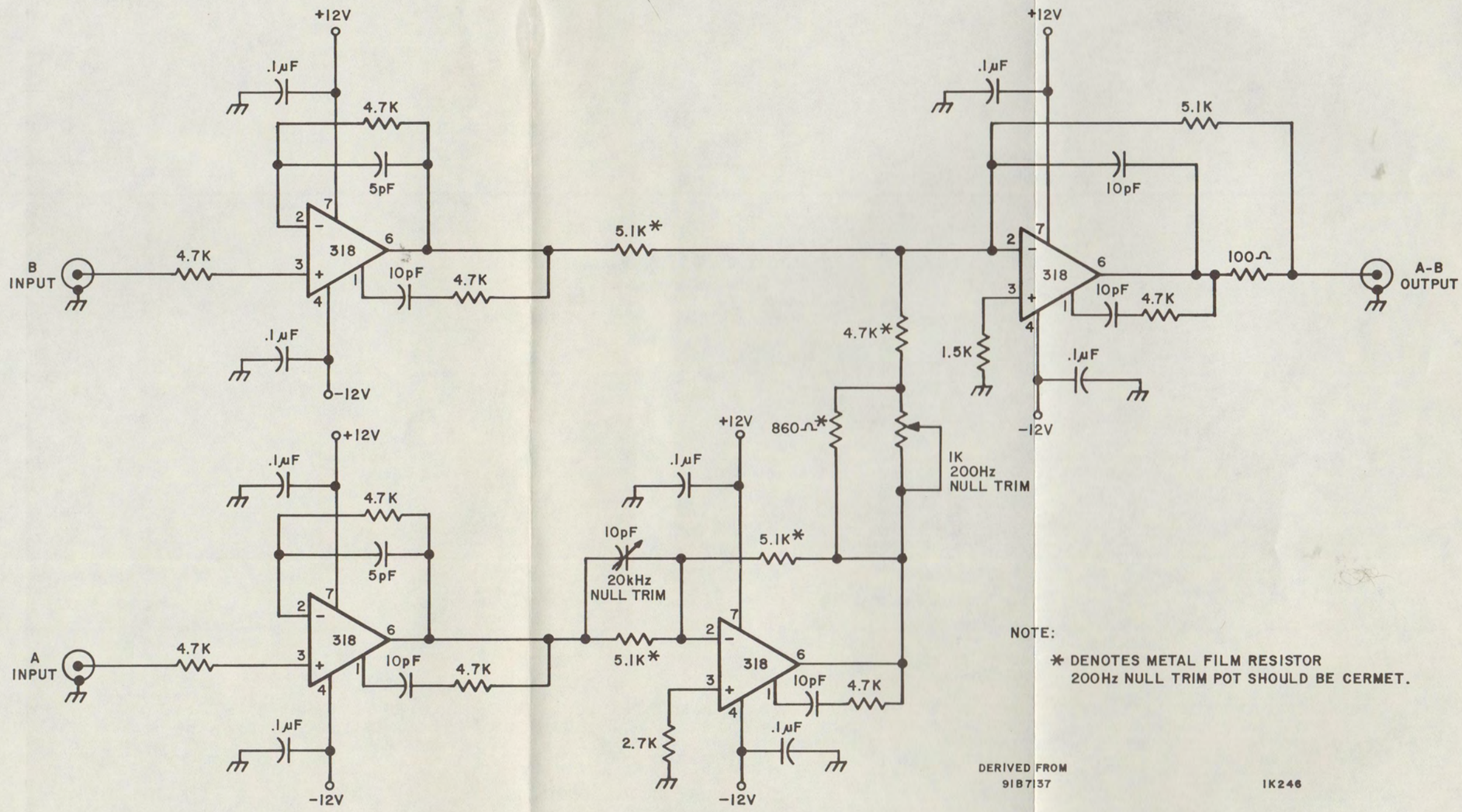


Figure 13. Interconnecting Cable Schematic



NOTE:

* DENOTES METAL FILM RESISTOR
200Hz NULL TRIM POT SHOULD BE CERMET.

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Figure 14. Precision Differential Test Generator Schematic

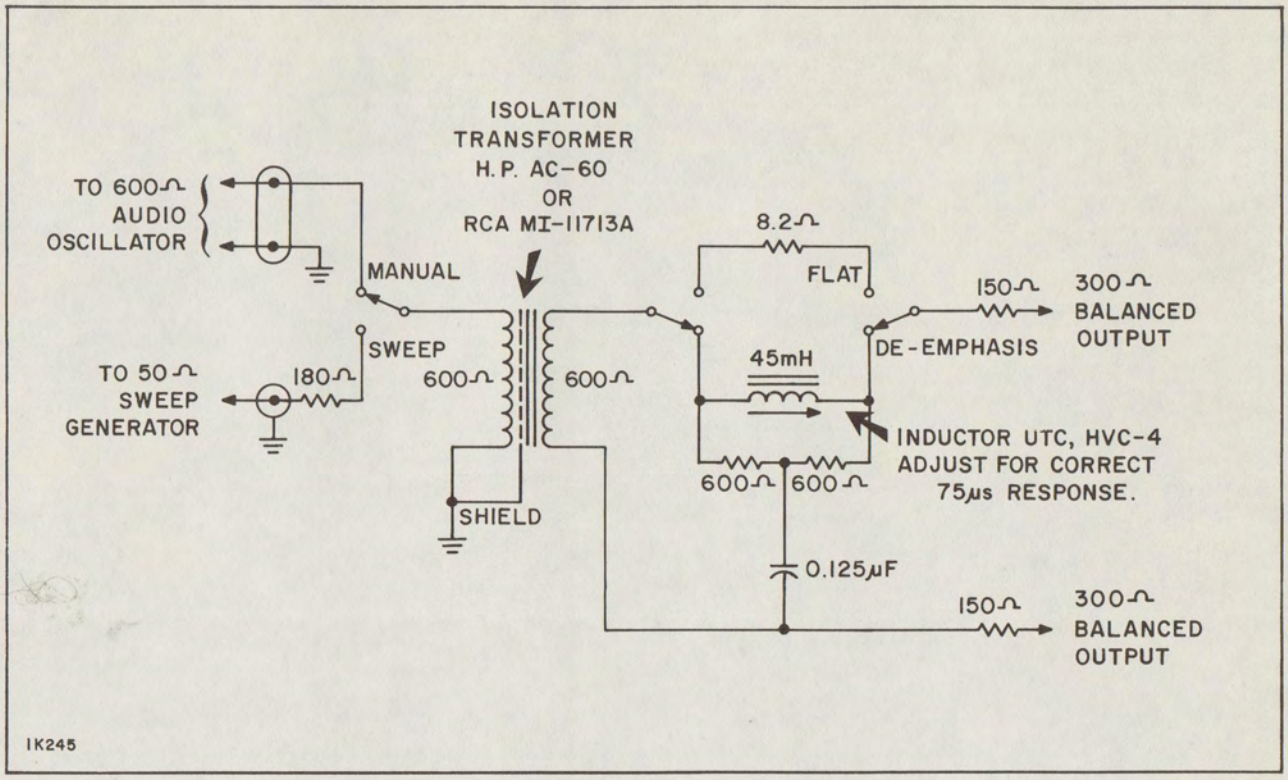

Figure 15. De-emphasis Network Schematic

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