



# **TAU/200**

## **MASTER AUDIO CONTROL PANEL**

### **MAINTENANCE MANUAL**

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Indianapolis, Indiana 46226

# SECTION I

## GENERAL INFORMATION

### 1-1. Introduction

This service manual contains all of the information normally required to install, operate, and maintain the TAU/200 Master Audio Control Panel.

### 1-2. Description

The TAU/200 consists of a self-contained, panel mounted audio control system. In addition

to providing selection of up to 7 audio inputs, the TAU/200 features front panel microphone selection for 3 transceivers as well as the P.A. function. Remote marker-beacon indicator lamps are also incorporated into the front panel design. The solid state circuitry consists of 5 silicon transistors, 5 diodes, and 1 integrated circuit. Nominal audio output is 10 watts with a supply of 14 VDC.

### 1-3. Specifications

#### GENERAL:

Weight:	1.8 Lbs.
Front Panel Size:	6.5" × 1.6"
Overall Dimensions:	6.5" wide × 1.6" high
	× 6.75" deep (w/connector)
Input Power:	14VDC @ .35A (Min), 1.5A (Max)
	28VDC @ .20A (Min), 2.7A (Max)
Number of Transistors:	5—all silicon
Number of Diodes:	4
Number of Integrated Circuits:	1

#### AMPLIFIER:

Frequency (3db pts):	200-3000 Hz
Sensitivity:	1.0V rms
Audio Output:	10 W @ 14VDC
	16 W @ 28VDC
Number of Inputs:	7, plus 1 microphone
Input Isolation:	-50 db
Input Impedance:	680 ohms
Output Impedance:	3-6 ohms

### 1-4. Equipment Supplied

- 1—TAU/200 Master Audio Control System
- 1—TAU/200 Mounting Tray and Hardware
- 1—Female Cable Connector (32 pin)

### 1-5. Equipment Required, But Not Supplied

- Cabling, as required
- 250 ohm, 25 watt dimmer pot (optional)

- 15 volt zener diode, 25 watt (28 volt operation; see Installation Manual)
- DELTA/303, for Marker Beacon capability (optional)
- Microphone, Aircraft type, Carbon, Genave Model 41K or equivalent
- Switch, SPDT, for external input enable
- External Aircraft Speaker, 4 ohm (optional)
- Fuse or circuit breaker, .5 Amp



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# **SECTION II**

# **INSTALLATION MANUAL**

**The following section  
is reproduced  
and included with every**

**TAU/200**

**It is made part of  
this manual  
for your permanent  
reference**

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**Model: TAU/200**

# SECTION III

## OPERATING MANUAL



### 3-1. Operating Controls and Indicators

The TAU/200 has ten operating controls which are located on the front panel. These controls are:

1. 7 Input Selector Switches
2. Microphone Selector (for selecting desired transmitter)
3. Auto Selector Switch
4. Market Beacon Power & Lamp Intensity Switch

Power for the TAU/200 is obtained from an externally switched A+ supply. In normal installations the TAU/200 will be activated when the master power switch is turned on.

After power is supplied to the unit, the desired avionics inputs can be selected by the seven Input Selector Switches. By flipping the desired

switch up from its center (OFF) position, the output will be heard over the speaker. By flipping the switch down from the OFF position, the output will be heard over the headphones. To adjust the listening level of either the headphones or the speaker output, it is only necessary to adjust the volume control on the selected equipment to the desired level.

In an emergency situation or failure of the audio amplifier or speaker, the desired audio outputs may still be obtained by listening over the headphones and switching the desired unit to the PHONE position on the TAU/200 panel.

When wishing to transmit, the Microphone Selector should be switched to the desired transmitter position. The microphone will then be connected to the selected transmitter. Audio from the speaker will be muted while transmitting.

If an external P.A. speaker is connected, the Public Address feature can be utilized by switching the Microphone Selector to the EXT position. In this position the microphone is connected to the amplifier within the TAU/200. The TAU/200 audio amplifier in turn supplies audio to the P.A. speaker. When the Microphone Selector is in the EXT position it is possible to hear the avionics audio over the external P.A. speaker by flipping the desired Input Selector Switch to the SPEAKER position.

The Auto Selector Switch insures that you will be listening to the receive audio from the unit on which you will be transmitting. When this

switch is turned on, to either SPEAKER or PHONE, it automatically switches the receive audio from the unit selected by the Microphone Selector Switch to the TAU/200.

The TAU/200 also features a Power and Lamp Intensity Switch as well as indicator lamps for a remotely mounted Marker Beacon Receiver. Power for the Marker Beacon Receiver will be turned on when the switch is turned to either the BRITE or the DIM position. It should be noted that this switch is to control the intensity of the Marker Beacon lamps only. Back-light dimming for the TAU/200, if used, will be accomplished externally.



# SECTION IV

## MAINTENANCE MANUAL

### 4-1. INTRODUCTION

This section provides the basic information required to electronically test, adjust, and repair the electronic circuitry of the TAU/200 master audio control system. It is assumed that the person working on the unit has a reasonable familiarity with the principles and terminology of avionics.

### 4-2. THEORY OF OPERATION

#### 1. General

The TAU/200 is an audio control unit which provides isolation and amplification of up to seven front-panel selectable audio inputs. Also on the front panel is a microphone switch for selecting one of 3 transmitters or for selecting the public address feature. Automatic speaker muting is provided for all audio inputs while transmitting. A power switch and indicator lamps for a remotely mounted Marker Beacon Receiver are also incorporated into the design of the unit. For details of the Marker Beacon Receiver refer to the Genave DELTA/303 Maintenance Manual.

Basically the TAU/200 amplifier consists of a preamplifier, driver, and power amplifier. The unit is all solid state and is designed to operate on either 14 or 28 VDC by changing a single jumper wire on the connector.

#### 2. Detailed Theory

The TAU/200 preamplifier is fed by seven low level inputs selected by the Input Selector switches S1 thru S7. Audio mixing and isolation takes place in the network formed by R1, R2, R3, R4, R5, R6, R7, R8, and R11. The mixed audio

is coupled to the preamplifier section of IC1A by capacitor C1. Bias and filtering for IC1A is provided by R12, R13, C6, and C2. RF de-coupling is accomplished by C3 and C4. Sensitivity may be adjusted by potentiometer R15. Diode CR2 is normally biased on by the network of R16, R17, R78, and C8. Depressing the push-to-talk button on the microphone removes the bias from CR2 causing it to appear open, thus preventing audio being coupled to IC1B. The resultant effect is a muted audio amplifier while transmitting. Bias and filtering for IC1B is provided by R19, R20, and C9. RF de-coupling is provided by C10 and C11. Audio is coupled between the output of IC1A and the input of IC1B by C7, R21, and R22. R34 and C20 are used for coupling the microphone audio into the amplifier. Microphone bias is derived from R33. R23 provides D.C. feedback for the amplifier and C13 provides the correct high-frequency audio roll-off. The output of IC1B is coupled to the input of Q1 by R24. Bias for Q1 is provided by R25. Feedback for Q1 is provided by the network of C14, C15, and R26. The power output section is a Class B, direct coupled, complementary symmetry push-pull amplifier consisting of Q2, Q3, Q4, and Q5. Diodes CR4 and CR5 provide bias for Q2 and Q3. Crossover distortion is minimized by diode CR3. A.C. feedback for the output stages is derived from R29. Capacitor C16 couples the audio output to T1. For 14 VDC operation the audio output is connected to the center tap of T1 (pin 15). The autotransformer-action of T1 produces a higher output than would otherwise be obtainable for 14 volt operation. For 28 VDC operation the audio output is connected to the top of T1 (pin 16). The transmitter keying line

for the various COM units used with the TAU/200 is selected by S9, Section 1, Front. CR1 is used as a DC blocking diode to protect the muting circuitry from the transmitter relay circuitry of the selected COM transceiver. When S9, Section 1, Rear is in the EXT position, audio is fed to the headphones in order for the pilot to hear himself speak while using an external speaker. S9, Section 2, Front is used for switching the microphone audio to the desired transceiver or for selecting the P.A. mode. S9, Section 2, Rear connects the external speaker to the output of the audio amplifier when switched to the EXT position.

When the AUTO switch is in the SPEAKER position, the receiver audio from the transceiver selected by the Microphone Selector will automatically be connected to the amplifier. When the AUTO switch is in the PHONE position, the audio selected by the microphone switch will automatically be connected to the headphones. In both cases the pilot will have the proper receiver audio for the transceiver he has selected, regardless of the position of the Audio Input Selector switches.

When using the TAU/200 for Public Address, the selected audio inputs will be amplified and heard over the external speaker. The receiver

audio can be muted while in the P.A. mode by using an external switch to ground pin 1 of the connector. Opening the switch to remove the ground will restore normal operation.

#### 4-3. TEST EQUIPMENT REQUIRED

- a. Audio Signal Generator
- b. AC Voltmeter
- c. Oscilloscope, low frequency, DC coupled preferred
- d. VTVM or VOM, any accurate instrument
- e. Power Supply, 14 VDC or 28 VDC @ 3 amps, filtered

#### 4-4. ADJUSTMENT PROCEDURES

1. Connect a 4 ohm, 5 watt resistor in place of the speaker.
2. Connect an AC voltmeter across the resistor to measure the output voltage applied.
3. Apply power to the unit and feed a 1 KHz signal at 1 volt rms from the audio generator into one of the audio input points of the TAU/200.
4. Adjust potentiometer R15 for a 4 volt rms output across the resistor (4 watts).

### 4-5. TROUBLESHOOTING INFORMATION

#### I. General

It is assumed that the technician performing any troubleshooting or repair work on this unit is familiar with the principles of aviation electronics and the procedures of troubleshooting electronic equipment. It is further assumed that he has a working knowledge of transistorized circuitry and the use of all the normal test equipment found in the field.

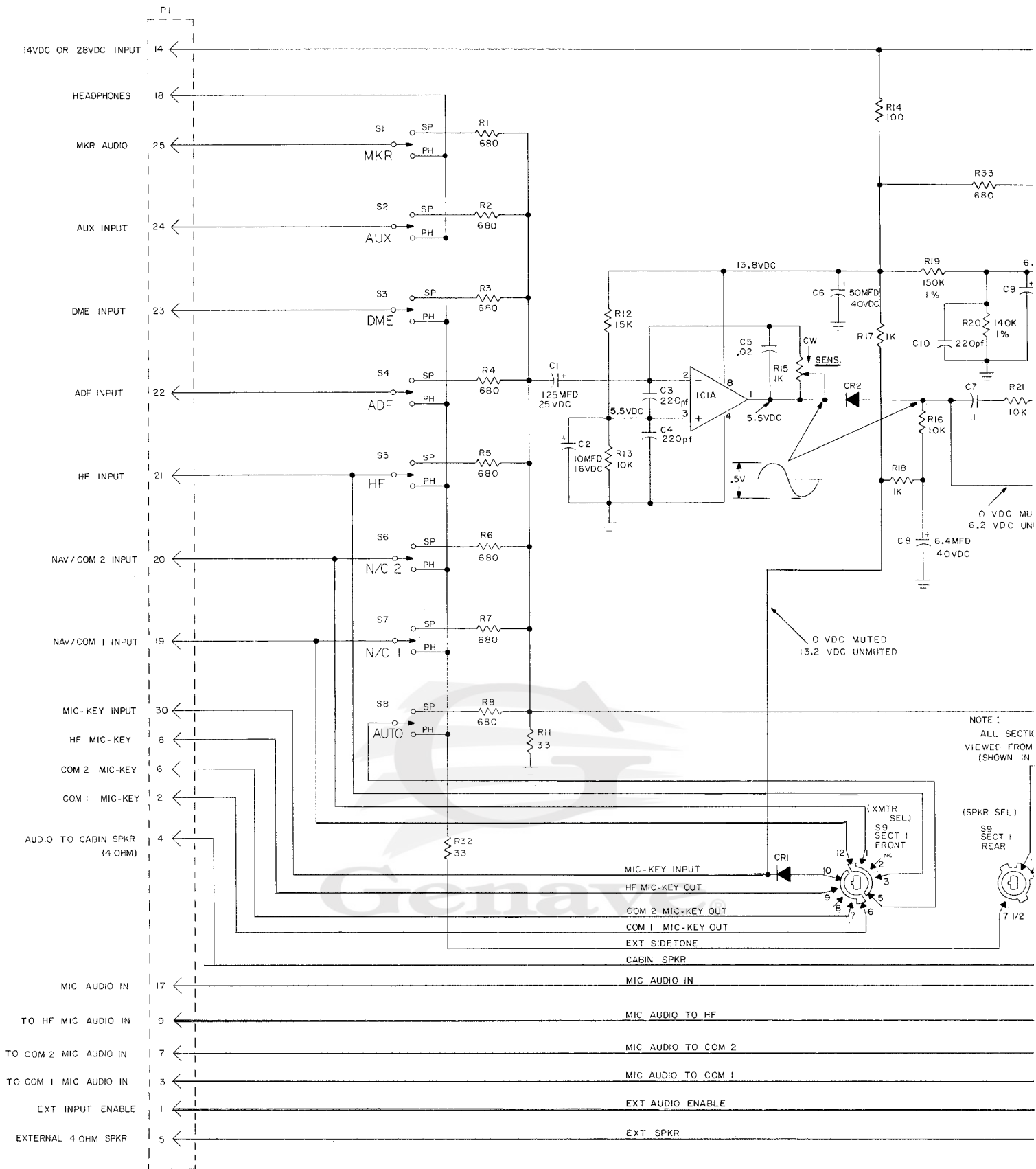
The primary aids to troubleshooting the unit are the Schematic Diagram and DC Voltage Measurements (Figure 4-5-1), Parts/Track Map Figure 4-5-2), and the Component Location Illustration (Figure 4-5-3).

#### II. Table of Figures

- A. Block Diagram  
Figure 4-4-1
- B. Alignment and Test Setup  
Figure 4-4-2
- C. Photos  
Figure 4-4-3 Bottom View  
Figure 4-4-4 Top View
- D. Schematic Diagram  
Figure 4-5-1
- E. Component Location Illustrations  
Figure 4-5-2 Parts/Track Map  
Figure 4-5-3 Component Location Diagram

**NOTE: DC Voltage Measurements and waveforms are included on the Schematic Diagram, Figure 4-5-1**

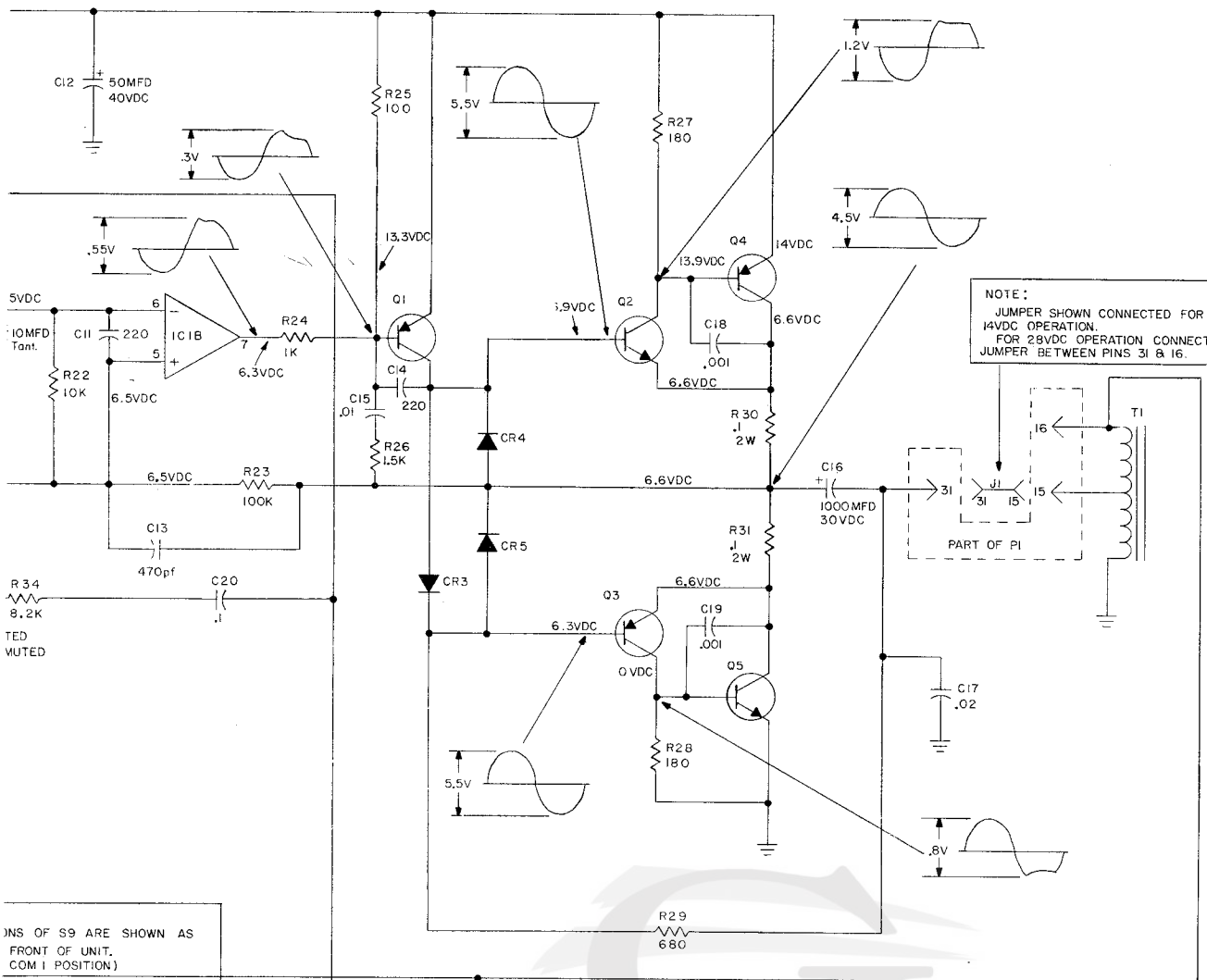
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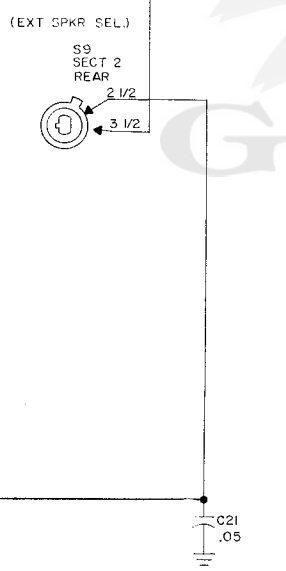
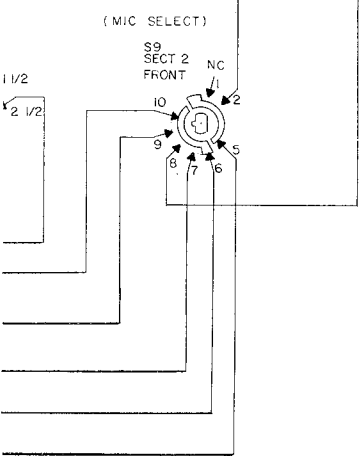
**Figure 4-5-1**  
**SCHEMATIC DIAGRAM**





NOTE:  
 JUMPER SHOWN CONNECTED FOR  
 14VDC OPERATION.  
 FOR 28VDC OPERATION CONNECT  
 JUMPER BETWEEN PINS 31 & 16.

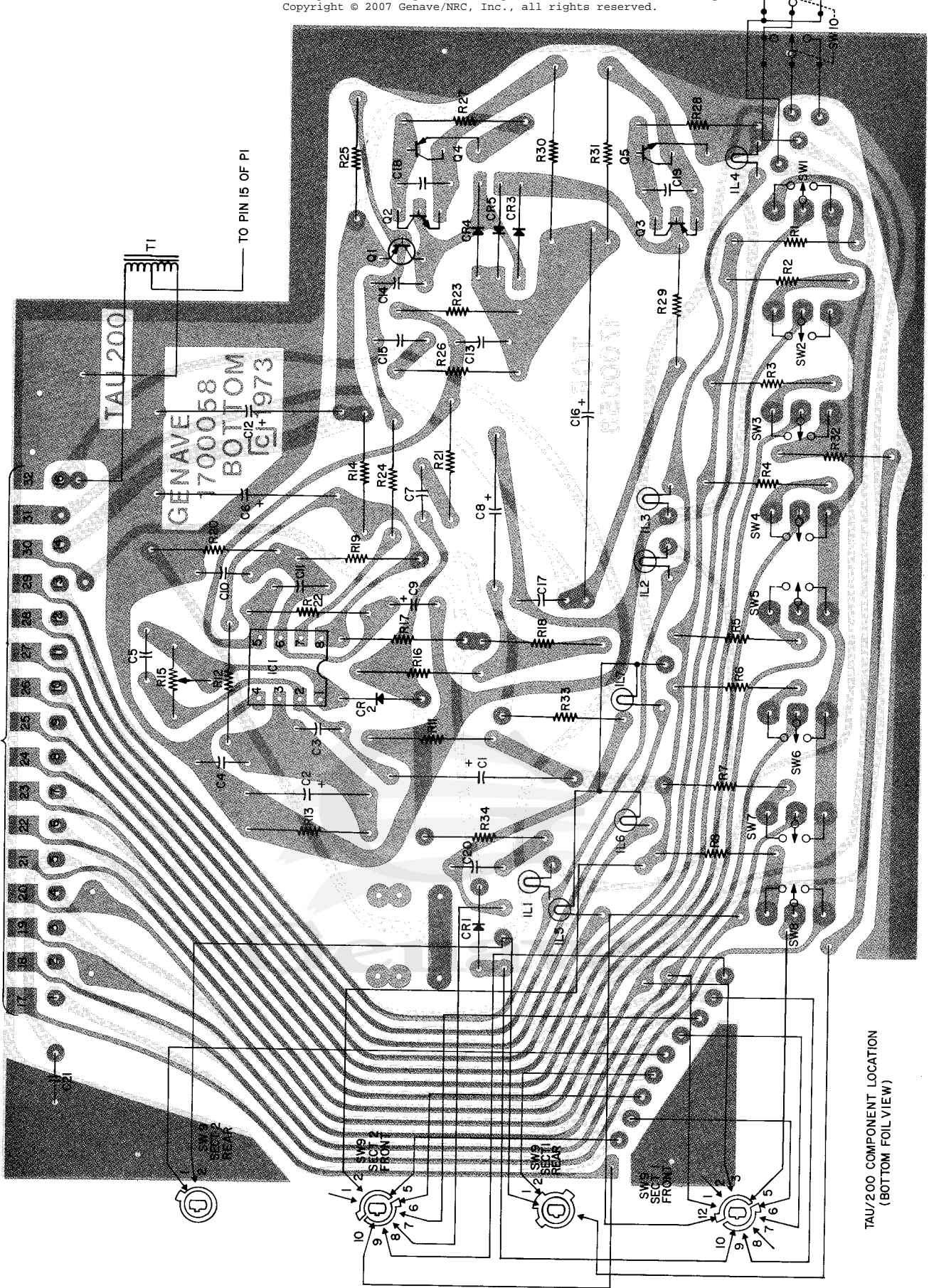
TERMS OF S9 ARE SHOWN AS  
 FRONT OF UNIT.  
 COM 1 POSITION)



- NOTES:
- (1) ALL MEASUREMENTS TAKEN WITH 14VDC INPUT TO PIN 14.
  - (2) ALL DC VOLTS MEASURED WITH NO SIGNAL AND SENS. CONTROL AT MAXIMUM.
  - (3) WAVEFORMS AND PEAK TO PEAK VOLTAGES REPRESENT NOMINAL VALUES WITH AN INPUT OF .1V RMS AT 1 KHz.
  - (4) ALL CAPACITANCE VALUES ARE IN MFD UNLESS OTHERWISE NOTED.
  - (5) ALL RESISTANCE VALUES ARE IN OHMS.

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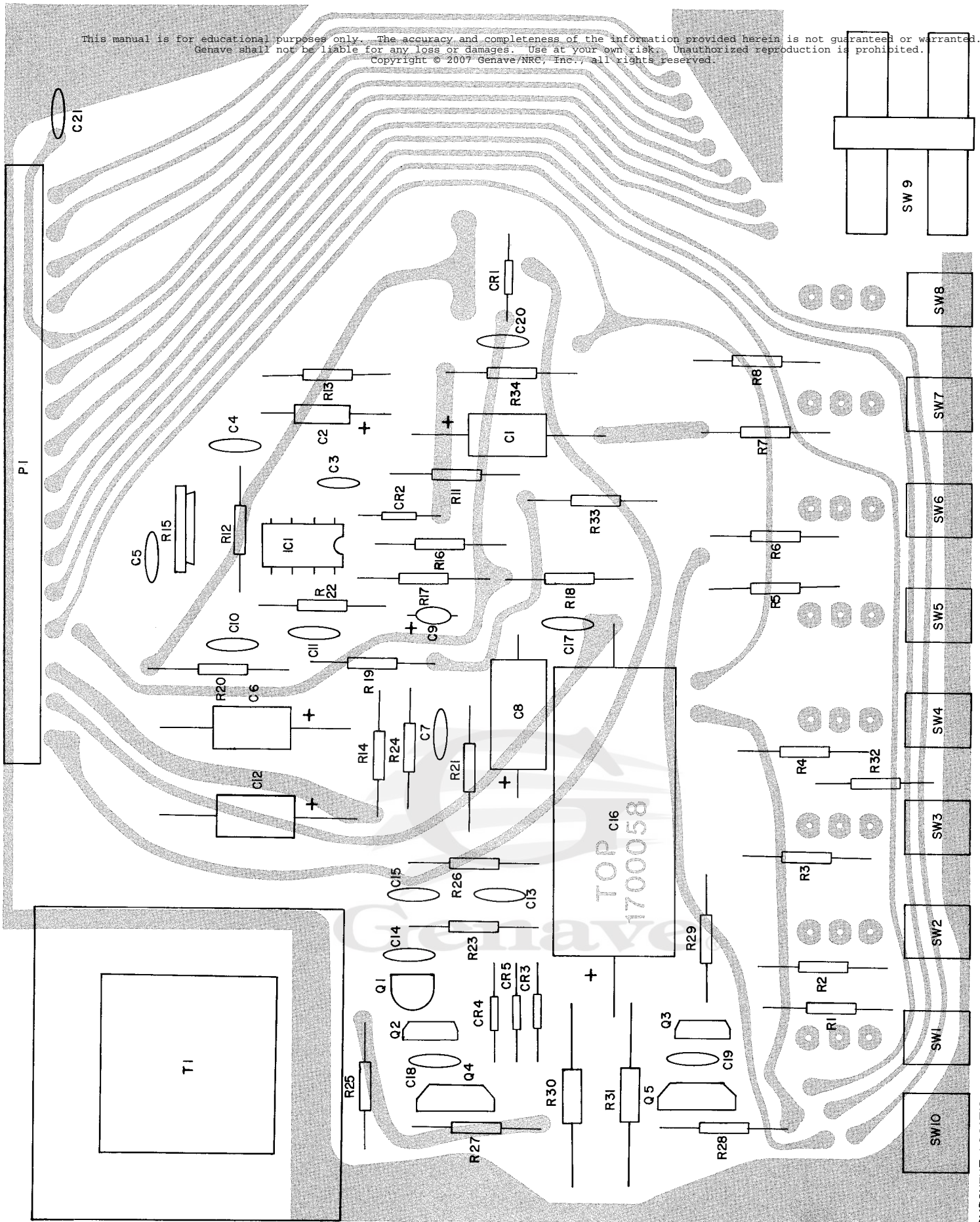
NUMBERS INDICATE PIN CONNECTIONS OF PI



**Figure 4-5-2**  
PARTS/TRACK MAP

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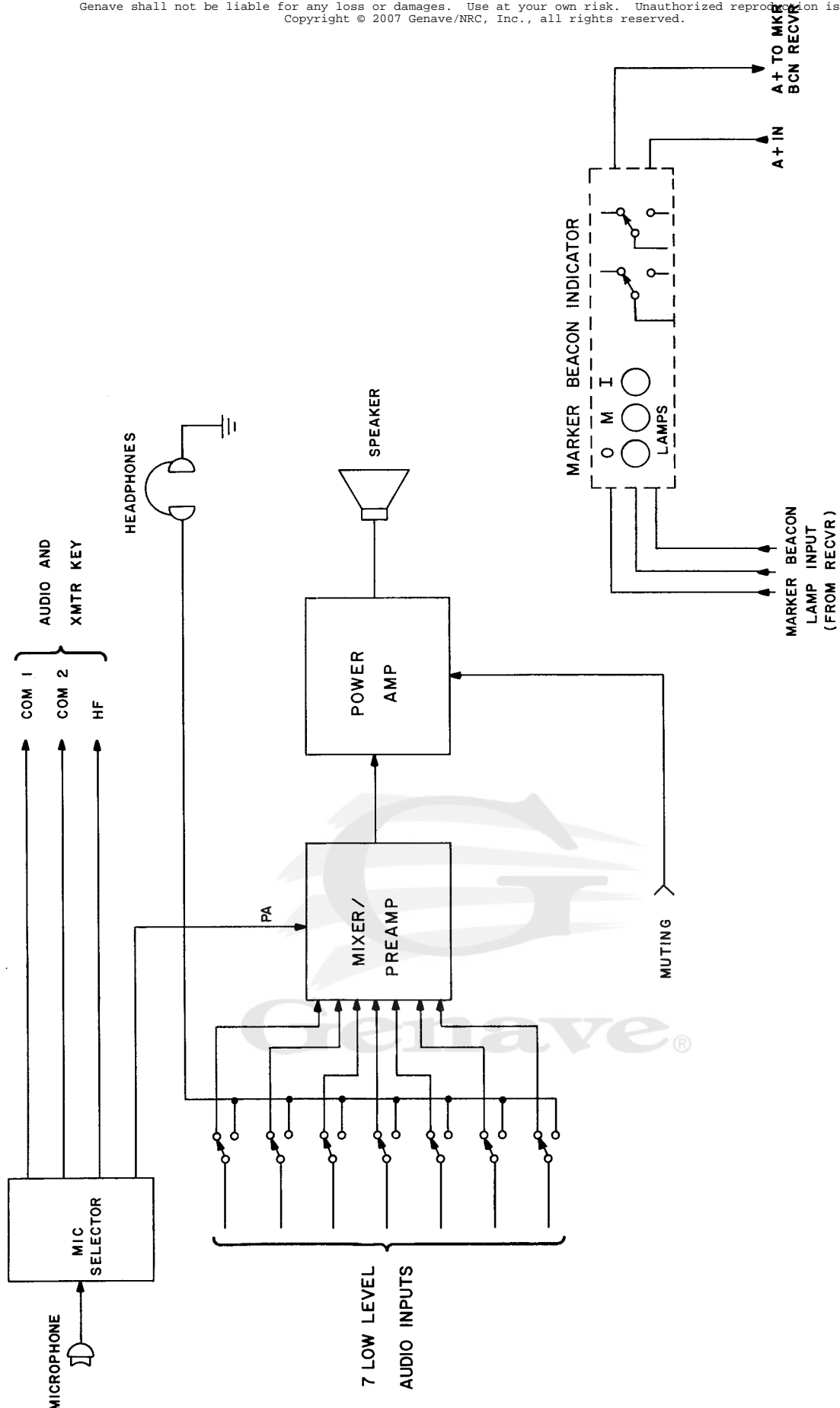


TAU/200 COMPONENT LOCATION VIEW AND TOP FOIL VIEW

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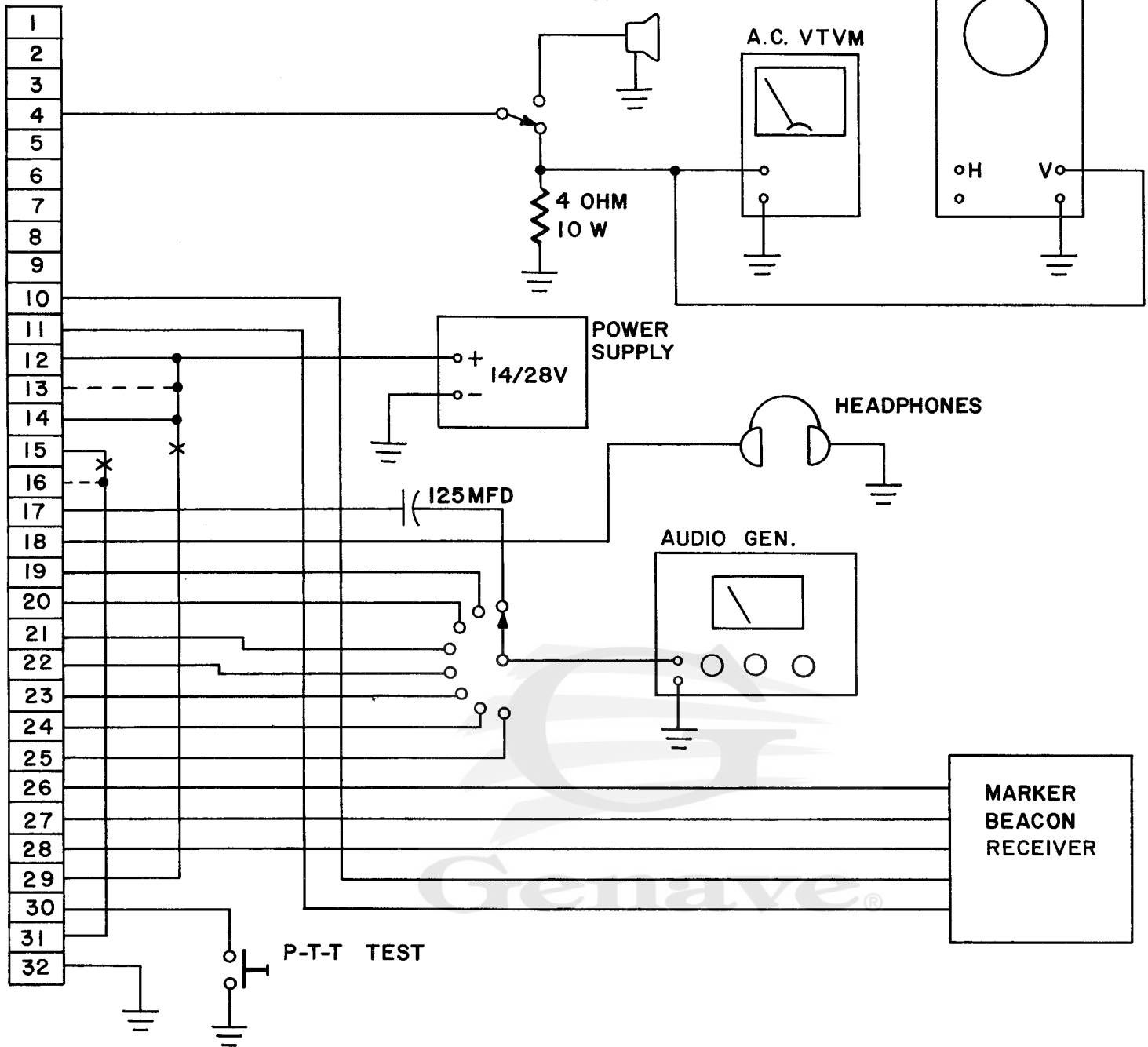
**Figure 4-5-3**  
**COMPONENT LOCATION DIAGRAM**

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**CONNECT TO  
TAU/200**

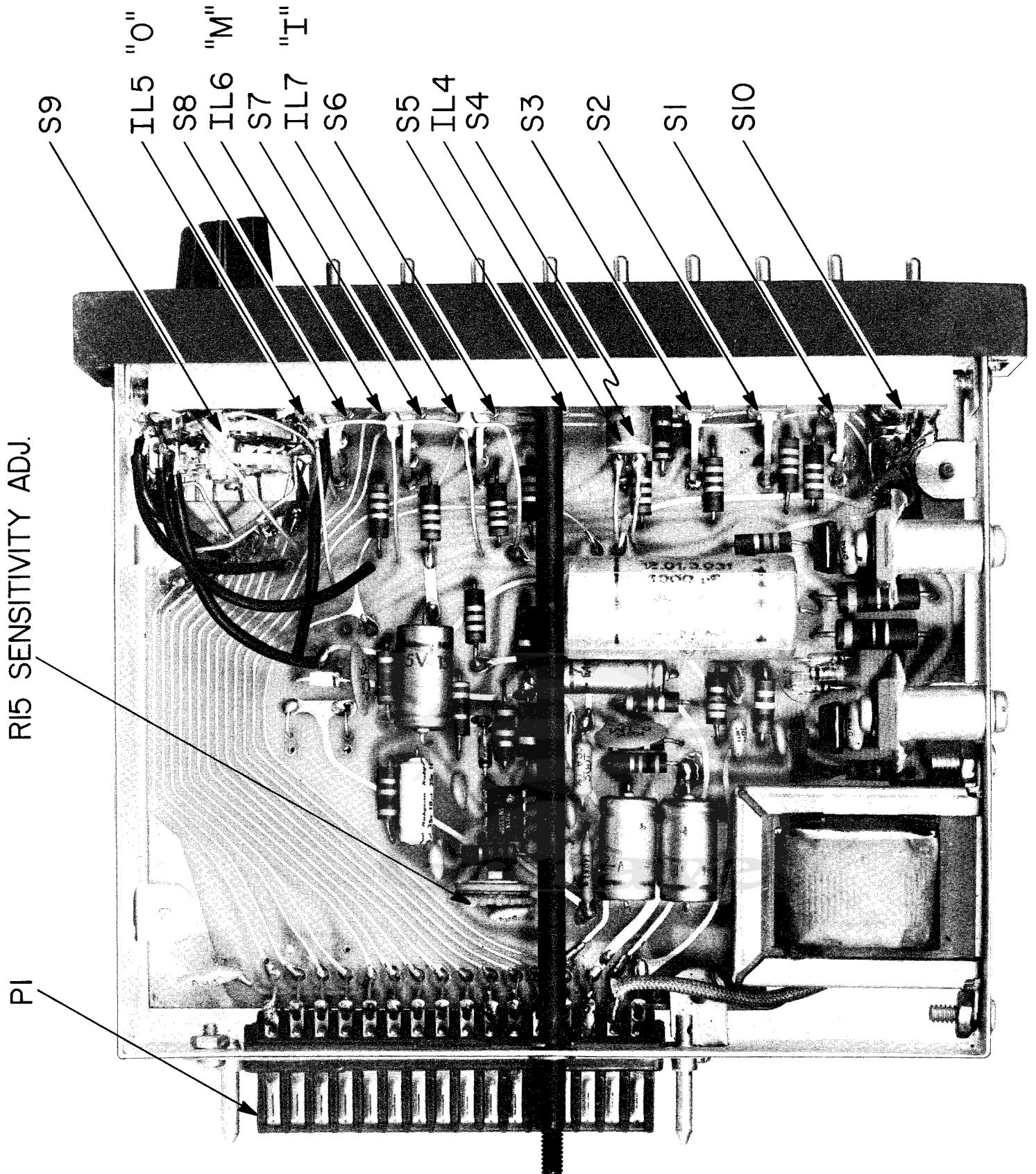


**NOTE :**

Connections shown are for 14 volt operation.

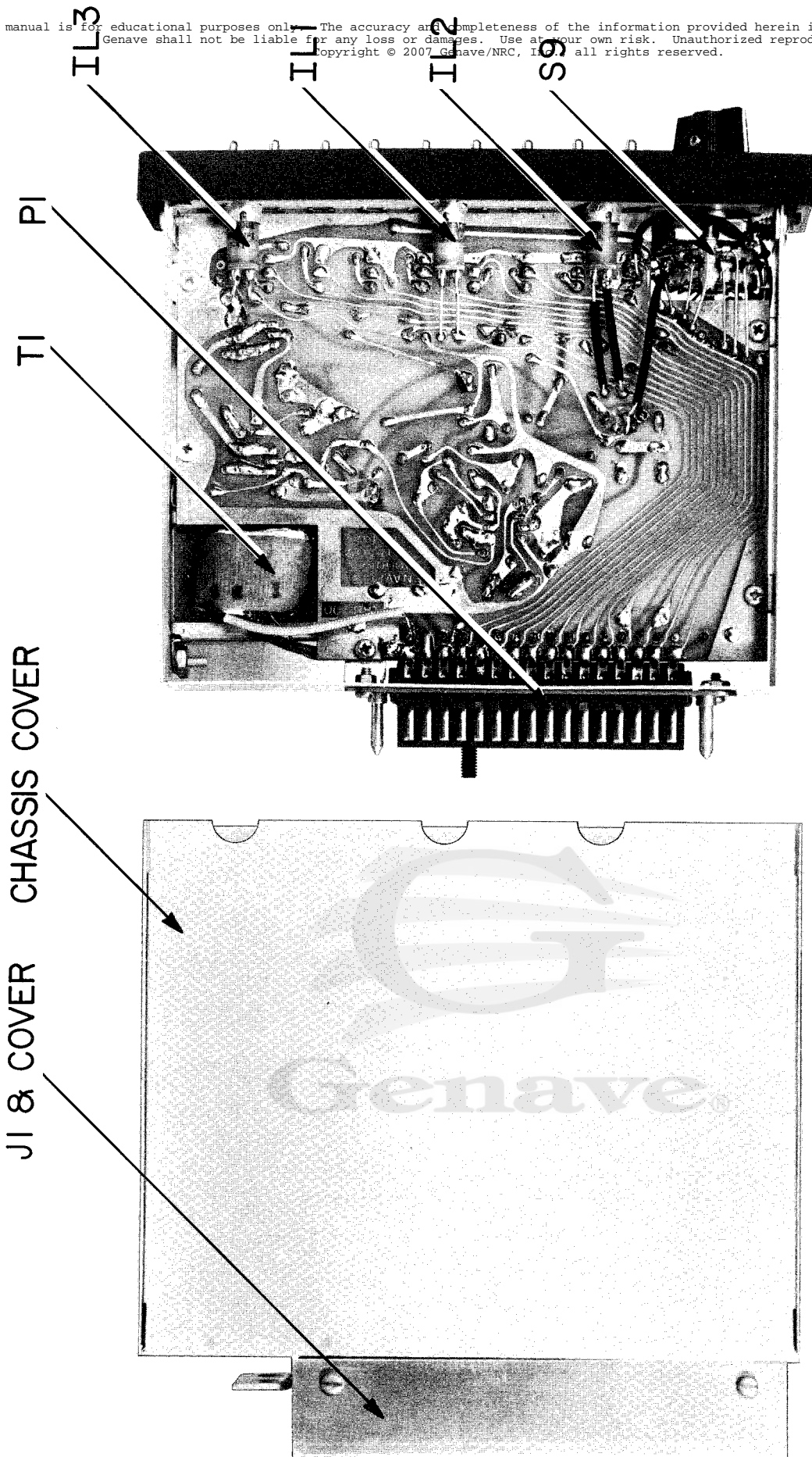
For 28 volt operation break lines at points marked "x" and connect as shown by dotted lines.

**Figure 4-4-2  
ALIGNMENT AND TEST SETUP**



**Figure 4-4-3  
UNIT, BOTTOM VIEW**

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Figure 4-4-4  
UNIT, TOP VIEW

TAU/200 COMPONENT LOCATION  
(Q) COMPONENT LOCATION VIEW AND TOP FOIL VIEW)

# SECTION V

## TAU/200

### PARTS LIST

Part No.	Genave Ref. No.	Description	Part No.	Genave Ref. No.	Description
<b>CAPACITORS</b>					
C1	1540024	Aluminum Electrolytic, 150 mfd, 25 V	R9		Unassigned
C2	1540014	Aluminum Electrolytic, 10 mfd, 10 V	R10		Unassigned
C3	1520033	Z5F Disc, 220 pfd	R11	4700008	33 ohm, 1/2 W, 10%
C4	1520033	Z5F Disc, 220 pfd	R12	4700039	15 K, 1/2 W, 10%
C5	1520051	M25 Disc, .01 mfd	R13	4700037	10 K, 1/2 W, 10%
C6	1540019	Aluminum Electrolytic, 50 mfd, 40 V	R14	4700013	100 ohm, 1/2 W, 10%
C7	1520055	Disc, .1 mfd, +80—20%	R15	4760015	Potentiometer, 1 K, 20%
C8	1540012	Aluminum Electrolytic, 6.4 mfd, 40 V	R16	4700037	10 K, 1/2 W, 10%
C9	1550004	Tantalum, 10 mfd, 25 V	R17	4700025	1 K, 1/2 W, 10%
C10	1520033	Z5F Disc, 220 pfd	R18	4700025	1 K, 1/2 W, 10%
C11	1520033	Z5F Disc, 220 pfd	R19	4720014	150 K, 1/4 W, 1%
C12	1540019	Aluminum Electrolytic, 50 mfd, 40 V	R20	4720013	140 K, 1/4 W, 1%
C13	1520040	Z5F Disc, 470 pfd	R21	4700037	10 K, 1/2 W, 10%
C14	1520033	Z5F Disc, 220 pfd	R22	4700037	10 K, 1/2 W, 10%
C15	1520051	Y5U Disc, .01 mfd	R23	4700049	100K, 1/2 W, 10%
C16	1540038	Aluminum Electrolytic, 1000 mfd, 30 V	R24	4700025	1 K, 1/2 W, 10%
C17	1520053	M25 Disc, .02 mfd	R25	4700013	100 ohm, 1/2 W, 10%
C18	1520071	Z5F Disc, 1000 pfd	R26	4700027	1.5 K, 1/2 W, 10%
C19	1520071	Z5F Disc, 1000 pfd	R27	4700016	180 ohm, 1/2 W, 10%
C20	1520055	Disc, .1 mfd, +80—20%	R28	4700016	180 ohm, 1/2 W, 10%
C21	1520054	M25 Disc, .05 mfd	R29	4700023	680 ohm, 1/2 W, 10%
<b>DIODES</b>					
CR1	4810013	Silicon, General Purpose, SD-1	R30	4740000	.1 ohm, 2 W, 10%
CR2	4810017	Silicon, High Speed Switching, FD1936	R31	4740000	.1 ohm, 2 W, 10%
CR3	4810017	Silicon, High Speed Switching, FD1936	R32	4700008	33 ohm, 1/2 W, 10%
CR4	4810017	Silicon, High Speed Switching, FD1936	R33	4700023	680 ohm, 1/2 W, 10%
CR5	4810017	Silicon, High Speed Switching, FD1936	R34	4700036	8.2 K, 1/2 W, 10%
<b>LAMPS</b>					
IL1	3900003	Backlighting, 14 V, 80 ma, Lunar White	SW1	5100075	Selectors, SPDT Input
IL2	3900003	Backlighting, 14 V, 80 ma, Lunar White	SW2	5100075	Selectors, SPDT Input
IL3	3900003	Backlighting, 14 V, 80 ma, Lunar White	SW3	5100075	Selectors, SPDT Input
IL4	3900003	Backlighting, 14 V, 80 ma, Lunar White	SW4	5100075	Selectors, SPDT Input
IL5	3900029	Indicator, Amber, 14 V, 80 ma	SW5	5100075	Selectors, SPDT Input
IL6	3900027	Indicator, Blue, 14 V, 80 ma	SW6	5100075	Selectors, SPDT Input
IL7	3900028	Indicator, Clear, 14 V, 80 ma	SW7	5100075	Selectors, SPDT Input
<b>INTEGRATED CIRCUITS</b>					
IC1	3130012	Dual OP-AMP, N5558V	SW8	5100075	Selectors, SPDT Auto
<b>TRANSISTORS</b>					
Q1	4800016	Silicon, PNP, MPS A55	SW9	5100074	Selector Microphone
Q2	4800018	Silicon, NPN, MPS U01	SW10	5100076	Function Selector, Mkr. Bcn, DPDT
Q3	4800022	Silicon, PNP, MPU U51	<b>TRANSFORMER</b>		
Q4	4800011	Silicon, PNP, MJE 105	T1	5600034	Audio, 4 ohm
Q5	4800013	Silicon, NPN, SJE5036	<b>MISCELLANEOUS</b>		
<b>RESISTORS</b>					
R1	4700023	680 ohm, 1/2 W, 10%	2502641		Genave Logo
R2	4700023	680 ohm, 1/2 W, 10%	2508841		Knob, C1/C2/EXT/HF
R3	4700023	680 ohm, 1/2 W, 10%	2508511		Overlay, Trim Panel
R4	4700023	680 ohm, 1/2 W, 10%	2508761		Front Panel
R5	4700023	680 ohm, 1/2 W, 10%	2100072		32 pin Connector, Male
R6	4700023	680 ohm, 1/2 W, 10%	2100072		32 pin Connector, Female
R7	4700023	680 ohm, 1/2 W, 10%	2508172		Tray, Mounting
R8	4700023	680 ohm, 1/2 W, 10%	2508162		Cover, Connector
			2508192		Mount, Connector
			2504271		Heatsink, (Q4, Q5)
			2508132		Panel, Switch Mounting
			2508182		Chassis
			2508502		Screw, Retaining
			2850009		Ring, Retaining (for above)

Specifications Subject to Change Without Notice.



GENERAL  
AVIATION  
ELECTRONICS  
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4141 KINGMAN DRIVE  
INDIANAPOLIS, IND. 46226  
AREA 317 • 546-1111

SB7401

January 18, 1974

Subject: Eliminating Turn-On/Turn-Off Audio  
Spikes from TAU/88 and TAU/200.

Following the printing of the TAU/38 and the TAU/200 Maintenance Manuals a design change was implemented in both of these units. This design change was performed in order to eliminate a turn-on and turn-off audio spike which was found to occur in several units. This audio spike problem is characterized by a loud audio "pop" when turning-on or turning-off the unit. All factory units shipped after January 18, 1974 will contain this modification.\* The procedure for performing this modification will be the same for both the TAU/38 and the TAU/200.

A separate regulated bias source has been added to supply the integrated circuit, IC1. To modify the unit proceed as follows:

1. Remove the unit from the mounting case.
2. Cut the lead of R17 where it connects to Pin 8 of IC1 (See Figures 1 & 5).
3. Reconnect R17 to the junction of R19 and R14 as shown in Figures 2 and 4.
4. Cut the circuit board track between the two X's shown in Figures 2 and 4.
5. Solder CR6 to the foil side of the printed circuit board, connecting it between Pin 8 of IC1 and ground (See Figures 2 and 4).
6. Solder R35 to the foil side of the printed circuit board, connecting it between Pin 8 of IC1 and the A+ line.
7. Reinstall the unit in the mounting case.

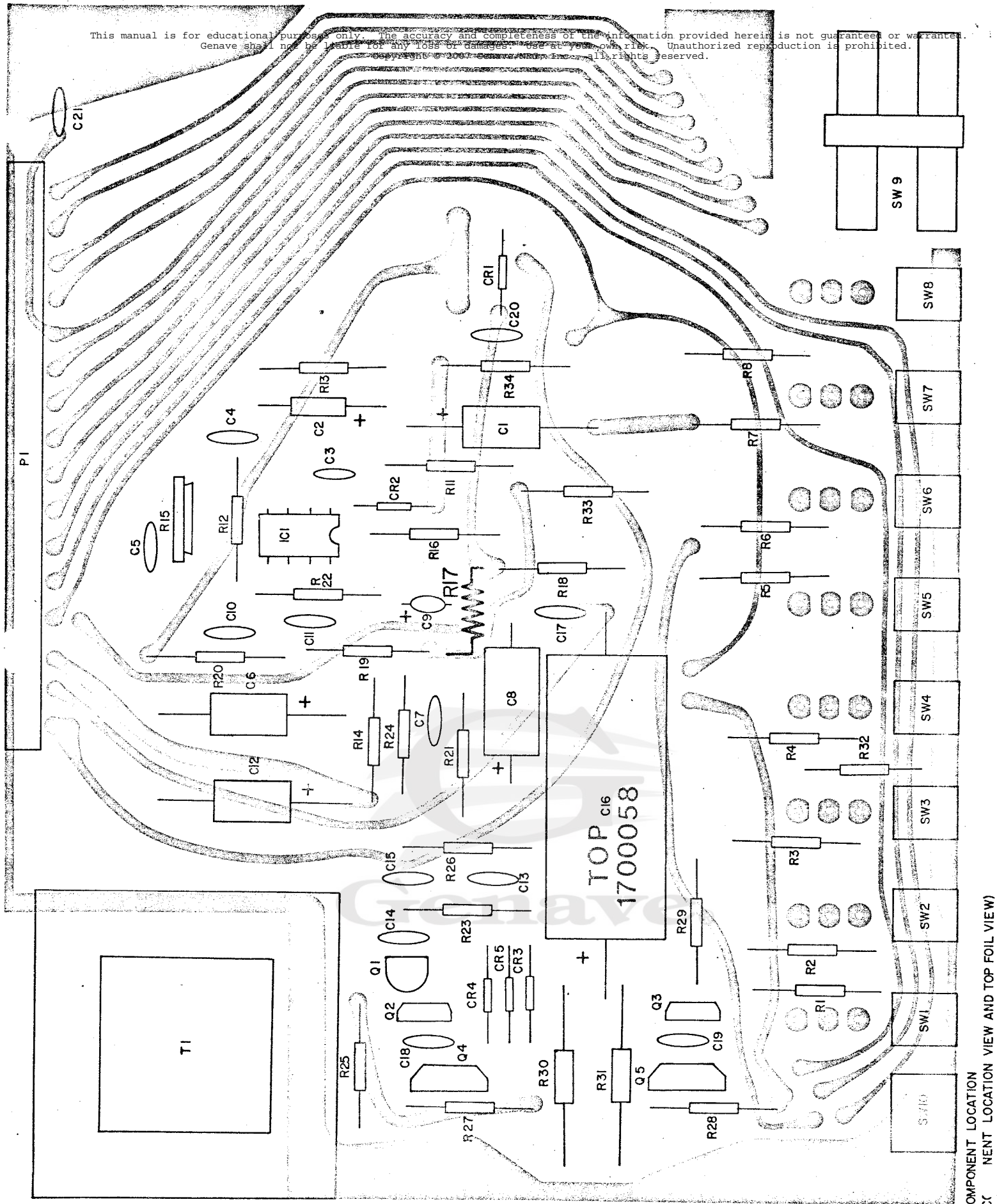
### Parts Required for Modification

R35 4710012 330 ohm,  $\frac{1}{2}$ W, 10%  
CR6 4810011 Zener Diode, 24V, 1W, 10%

NOTE: The above parts should be added to the TAU/88  
and TAU/200 Maintenance Manual Parts Lists.



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TAU/200 COMPONENT LOCATION  
(CONTINUED LOCATION VIEW AND TOP FOIL VIEW)

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Figure 1

COMPONENT LOCATION DIAGRAM

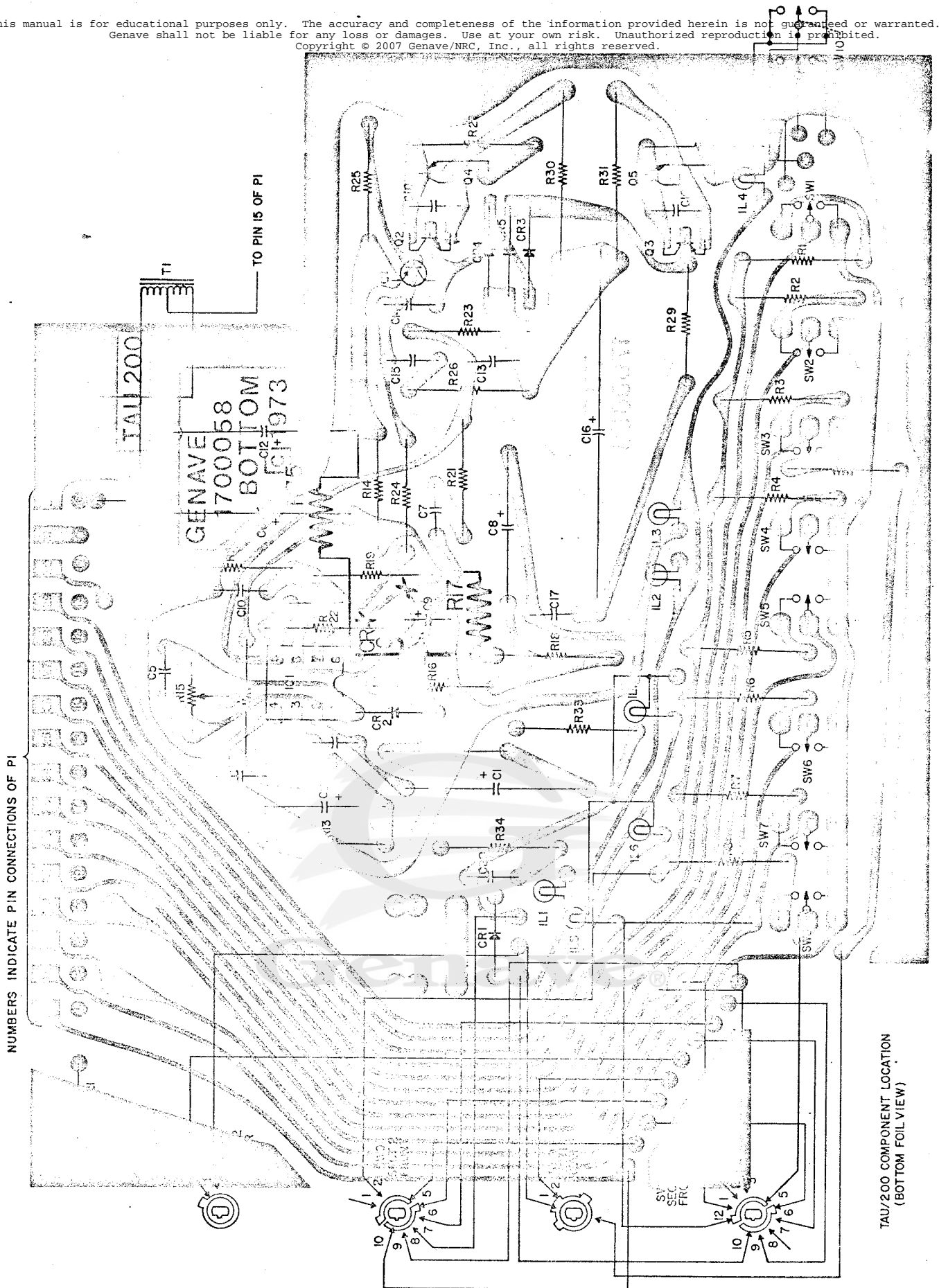
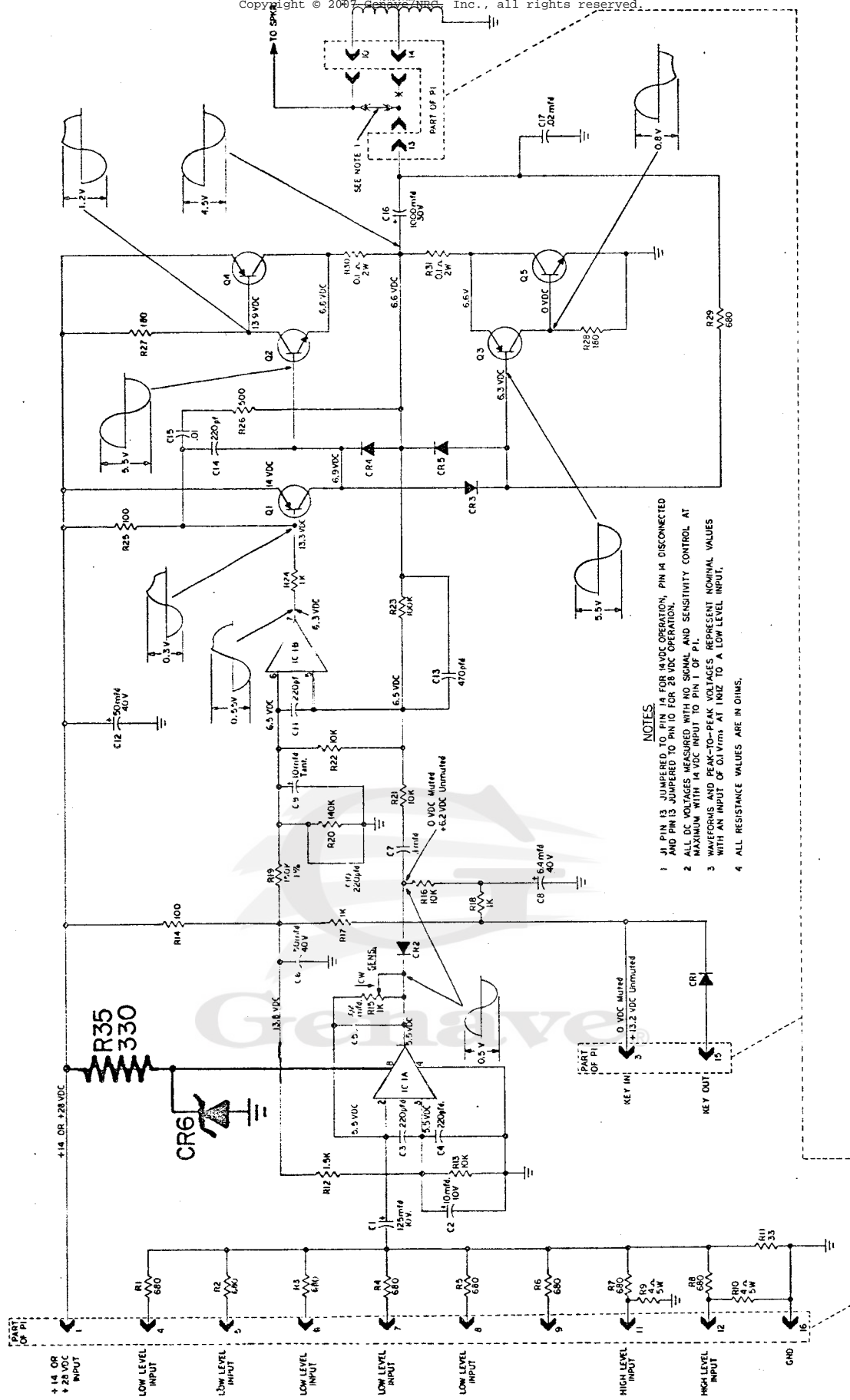


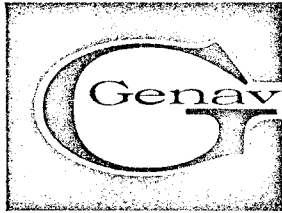
Figure 2  
PARTS/TRACK MAP



- NOTES
1. IF PIN 13 IS JUMPED TO PIN 14 FOR 14VDC OPERATION, PIN 14 DISCONNECTED AND PIN 13 JUMPED TO PIN 10 FOR 28 VDC OPERATION.
  2. ALL DC VOLTAGES MEASURED WITH NO SIGNAL AND SENSITIVITY CONTROL AT MAXIMUM WITH 14 VDC INPUT TO PIN 1 OF PI.
  3. WAVEFORMS AND PEAK-TO-PEAK VOLTAGES REPRESENT NOMINAL VALUES WITH AN INPUT OF 0.1 Vrms AT IN2 TO A LOW LEVEL INPUT.
  4. ALL RESISTANCE VALUES ARE IN OHMS.

Figure 6  
SCHEMATIC DIAGRAM

GENERAL  
AVIATION  
ELECTRONICS  
INC.



4141 KINGMAN DRIVE  
INDIANAPOLIS, IND. 46226  
AREA 317 • 546-1111

SB7405

June 26, 1974

Subject: TAU/200F MASTER AUDIO CONTROL PANEL

The TAU/200F MASTER AUDIO CONTROL PANEL is the same as the TAU/200, with the exception of differently labeled inputs.

Seperate Nav and Com inputs are provided in place of the HF and DME inputs.

A new schematic is provided, while the TAU/200 Parts/Track Map, Component Location and Parts List are identical.



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# Service Bulletin

SB7406

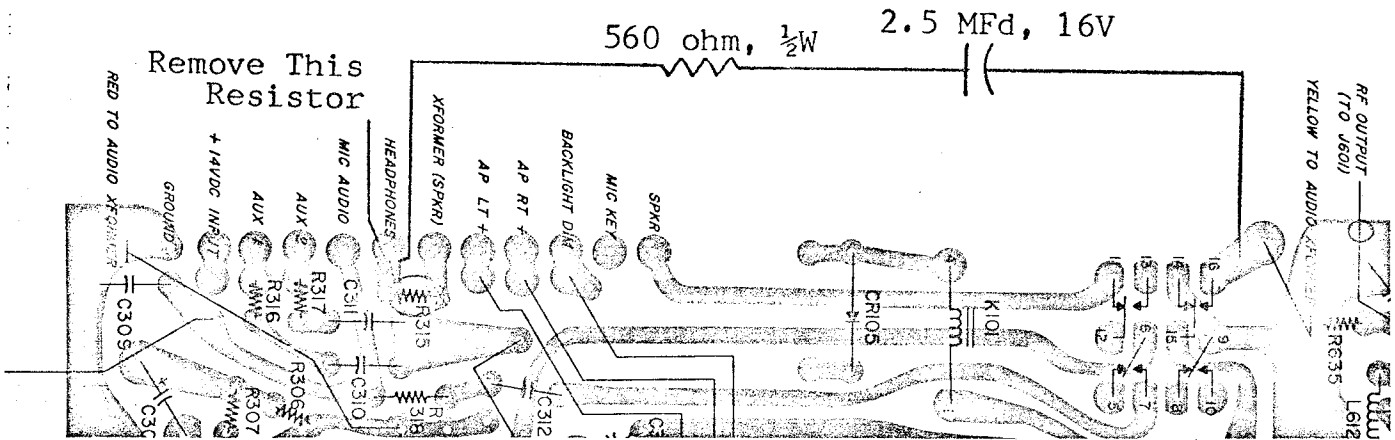
July 2, 1974

SUBJECT: ALPHA/500 and ALPHA/600 Modifications To  
Reduce Audio Loading With TAU/200.

When using the TAU/200 Master Audio Control Panel with an ALPHA/500 or ALPHA/600 Nav/Com Transceiver, the 10 ohm headphone output of the transceiver may severely load the audio outputs of other avionics equipment connected to the audio switching panel when listening to the combined audio from several units. To remedy this situation the following modifications will be implemented in the ALPHA/500 and ALPHA/600:

1. In the ALPHA/600, a new headphone transformer winding will be added to the audio transformer on all units produced after July 15, 1974.
2. Effective July 15, 1974 all ALPHA/500's built will be modified by the removal of R315, a 10 ohm resistor from the bottom of the printed circuit board and the addition of a 2.5 MFd, 16 V. capacitor and a 560 ohm,  $\frac{1}{2}$  watt resistor from Pin 16 of the T/R relay, K101, to the "headphone" cable connection at the rear of the Osc, Xmtr, Audio circuit board (See Figure A). This modification can also be performed in the field to those units produced prior to July 15, 1974.
3. Both ALPHA/500's and ALPHA/600's produced prior to July 15, 1974 can be modified by use of an inexpensive audio transformer which can be added externally to the unit. This transformer should have a a 500 ohm center tapped winding and be connected as shown in Figure B. Suitable transformers are: Radio Shack #273-1379, Lafayette Radio #33P85531, or Calectro #D1-712.

### ALPHA/500 CIRCUIT BOARD MODIFICATIONS



Rear of OSC, XMTR, AUDIO BOARD

Figure A

### ALPHA/500 & 600 EXTERNAL MODIFICATION

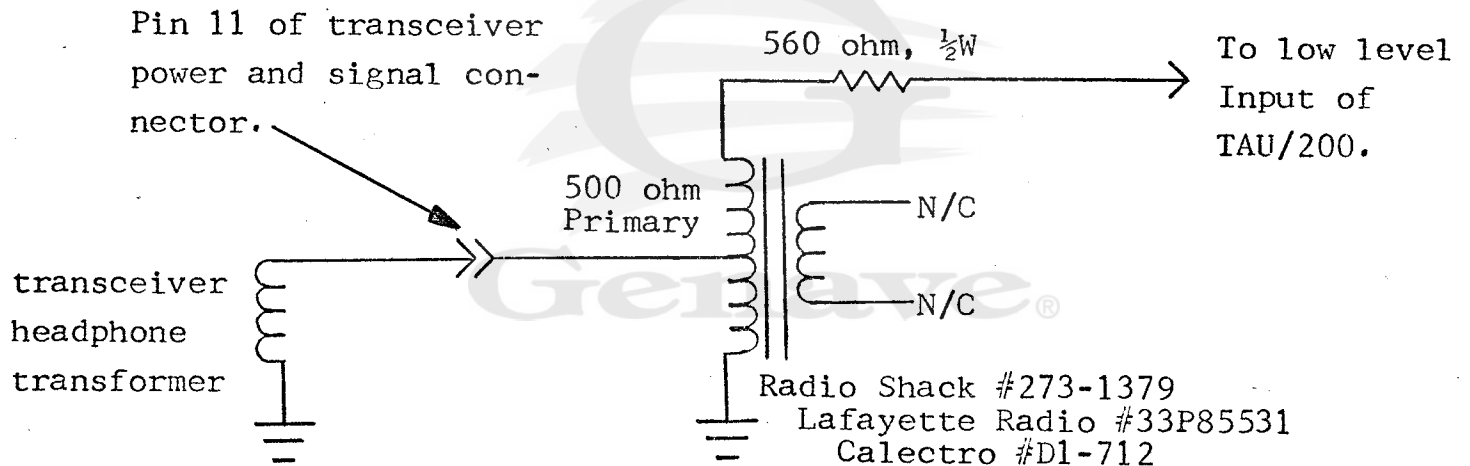
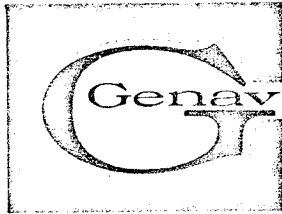


Figure B



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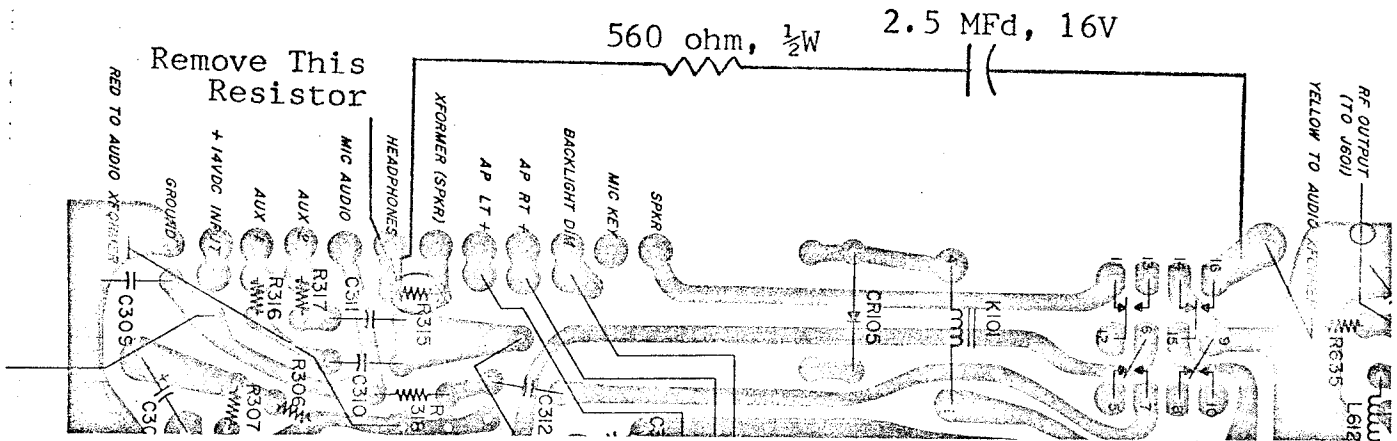
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SUBJECT: ALPHA/500 and ALPHA/600 Modifications To Reduce Audio Loading With TAU/200.

When using the TAU/200 Master Audio Control Panel with an ALPHA/500 or ALPHA/600 Nav/Com Transceiver, the 10 ohm headphone output of the transceiver may severely load the audio outputs of other avionics equipment connected to the audio switching panel when listening to the combined audio from several units. To remedy this situation the following modifications will be implemented in the ALPHA/500 and ALPHA/600:

1. In the ALPHA/600, a new headphone transformer winding will be added to the audio transformer on all units produced after July 15, 1974.
2. Effective July 15, 1974 all ALPHA/500's built will be modified by the removal of R315, a 10 ohm resistor from the bottom of the printed circuit board and the addition of a 2.5 MFd, 16 V. capacitor and a 560 ohm,  $\frac{1}{2}$  watt resistor from Pin 16 of the T/R relay, K101, to the "headphone" cable connection at the rear of the Osc, Xmtr, Audio circuit board (See Figure A). This modification can also be performed in the field to those units produced prior to July 15, 1974.
3. Both ALPHA/500's and ALPHA/600's produced prior to July 15, 1974 can be modified by use of an inexpensive audio transformer which can be added externally to the unit. This transformer should have a 500 ohm center tapped winding and be connected as shown in Figure B. Suitable transformers are: Radio Shack #273-1379, Lafayette Radio #33P85531, or Calectro #D1-712.

### ALPHA/500 CIRCUIT BOARD MODIFICATIONS



Rear of OSC, XMTR, AUDIO BOARD

Figure A

### ALPHA/500 & 600 EXTERNAL MODIFICATION

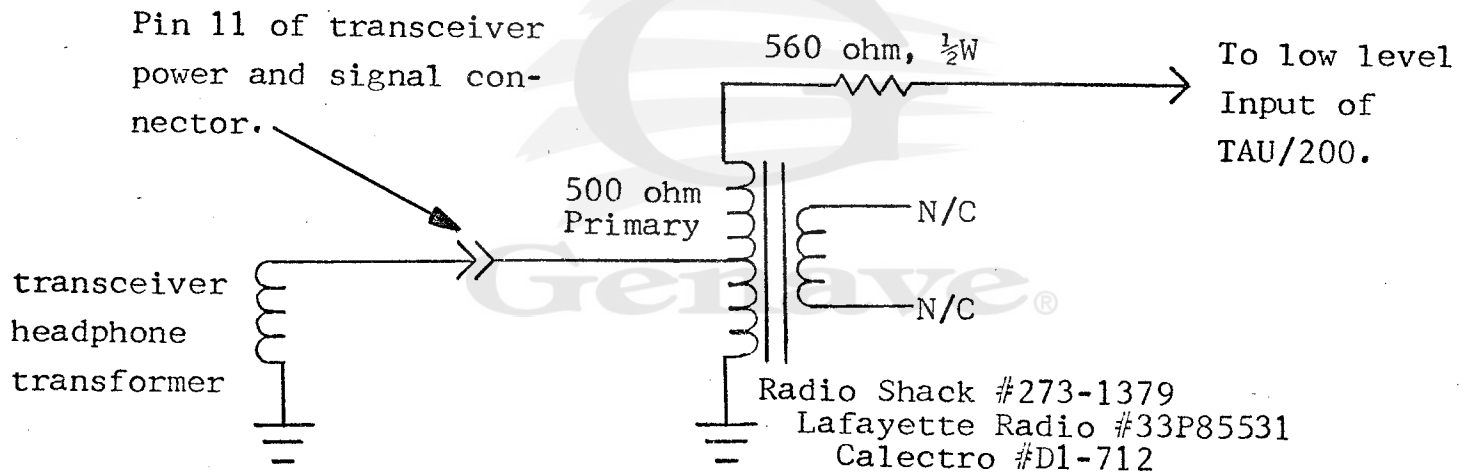


Figure B

# ALPHA/600

## T701 INSTALLATION

