

TAU/80 Audio Amplifier TAU/81 Audio Compression Amplifier TAU/100 Master Audio Control Panel MAINTENANCE MANUAL

CONTENTS

Section I	GENERAL INFORMATION
Section II	INSTALLATION MANUAL
Section III	OPERATING MANUAL
Section IV	MAINTENANCE MANUAL
Section V	PARTS LIST

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Electronics, Inc.**
4141 Kingman Dr.
Indianapolis, Indiana 46226
(Area 317-546-1113)

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Information Bulletin



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INDIANAPOLIS, IND. 46226
AREA 317 • 546-1113

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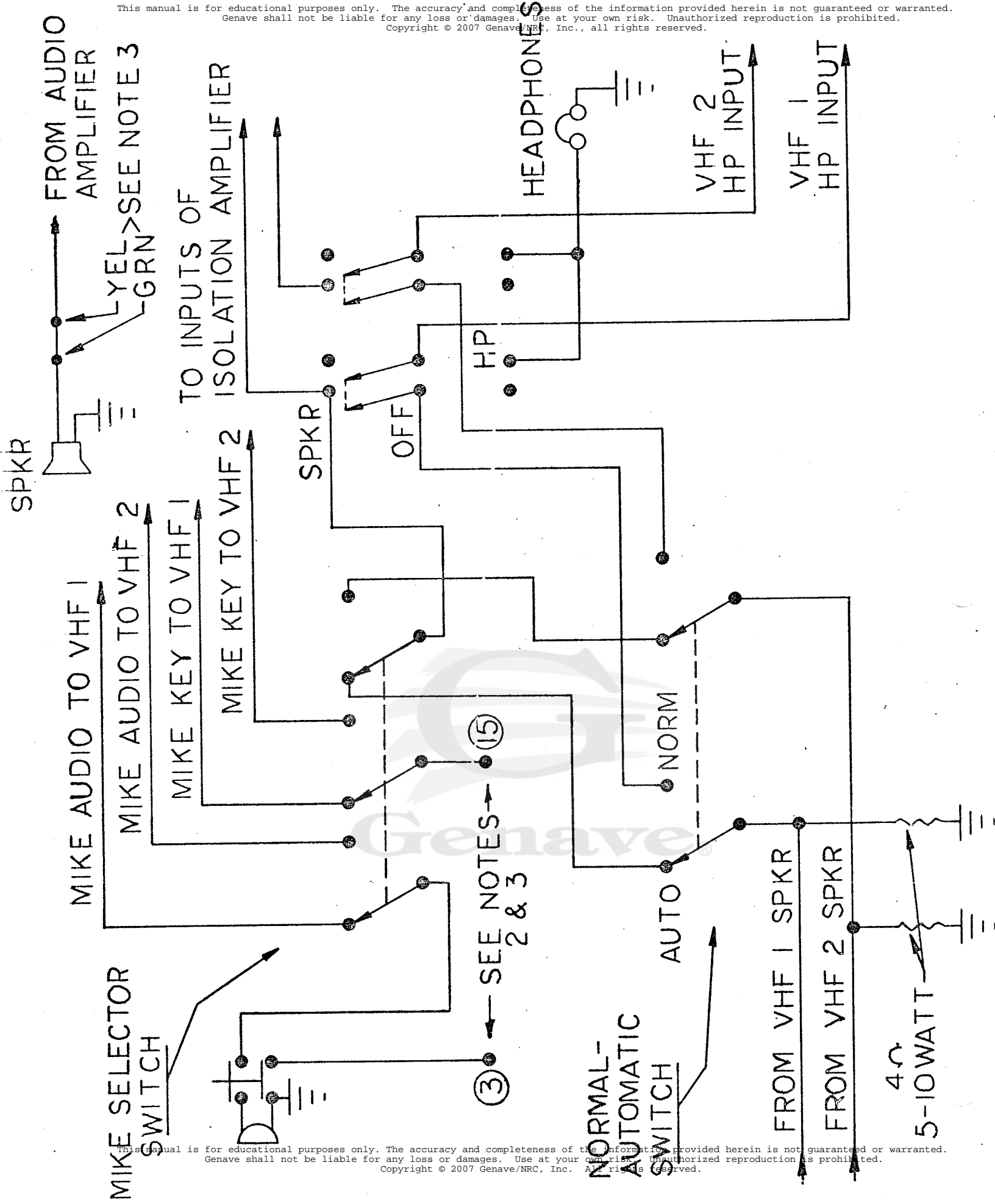
SUBJECT: Automatic selection of Com transceiver audios on an audio control panel.

The following is a schematic which shows how to automatically or manually select com transceiver inputs into the audio amplifier.

In the auto position, the mike selector switch (3 pole-2 position) selects the transceiver to be fed into the Audio control panel, and in manual position the transceivers are selected by the Audio control switches in the normal manner. The Auto-Normal switch is a 2-pole 2 position switch.

NOTES:

- 1) The speaker-headphone switches for the Com transceivers are 2 pole-3 position switches in order to use the headphone outputs of the transceivers when in headphone positions. This gives true emergency backup should either the transceiver power audio output or the isolation amplifier fail.
- 2) When using the Genave T/80 or T/81 audio amplifiers, the points labeled 3 and 15 on the mike key line are connected to pins 3 and 15 respectively, of the T/80 or T/81. Note that in this case no muting relay is required.
- 3) When using other than a Genave T/80 or T/81 (heaven help us!) then a muting relay (Genave MU/1) might be required. In that case, 3 is connected to MU/1 white, 15 MU/1 violet, the jumper from Green and Yellow on the speaker line is also removed and connected to the green and yellow wires respectively of the MU/1. The red wire of the MU/1 is then connected to the +14 volt line, or through a 390 ohm 2 watt resistor to the +28 VDC line.



SECTION I

GENERAL INFORMATION

1-1. Introduction

This service manual contains all of the information normally required to install, operate, and maintain the Genave Models: TAU/80, TAU/81, and TAU/100 Audio Amplifier, Audio Compression Amplifier, and Master Audio Control Panel; respectively.

1-2. Description

The TAU/80 consists of a self-contained, remote mounted audio isolation amplifier. It utilizes 8 silicon transistors in an all solid state design to provide 6 watts of audio output with adjustable input sensitivities.

The TAU/81 consists of a self-contained, remote mounted audio compression amplifier and an instrument panel mounted master volume control. It is also completely solid state, utilizing 12 silicon transistors to provide the same power output and adjustable input sensitivities as the TAU/80.

The TAU/100 consists of a self-contained, panel mounted audio control system. In addition to providing selection of up to 7 audio functions, the TAU/100 features a 12 silicon transistor compression amplifier circuit to provide up to 6 watts of audio output power. A master volume control on the front panel of the TAU/100 permits simultaneous setting of all audio levels with a single knob. The TAU/100 provides a public address feature and Com transmitter selection.

1-3. TAU/80 & TAU/81 Specifications

GENERAL:

WEIGHT:	0.1 lbs. TAU/81 Control Panel 1.4 lbs. Remote Amplifier
SIZE:	Remote Amplifier: 3¼" wide X 2" high X 4⅝" long (5½" incl. mounting flanges)
INPUT POWER:	0.2 amps (Min) 2 amps (Max) @ 14 VDC or 28 VDC
NUMBER OF TRANSISTORS:	TAU/80: 7 all silicon TAU/81: 12 all silicon

AMPLIFIER:

FREQUENCY (3 db pts):	200-3000 Hz
LOW LEVEL SENSITIVITY:	1.0 V rms
HGH LEVEL SENSITIVITY:	5W into 4 ohms
AUDIO OUTPUT:	6.0 W Nom.
NUMBER OF INPUTS:	6 Low Level 2 High Level
INPUT ISOLATION:	—50 db
INPUT IMPEDENCE:	Low Level—8000 ohms High Level—4 ohms
OUTPUT IMPEDENCE:	3-6 ohms

TAU/81 ONLY—

COMPRESSION RANGE:	1.0-10.0 V rms ± 3 db
MASTER CONTROL RANGE:	0-6 Watts

1-4. TAU/100 Specifications

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GENERAL:

WEIGHT: 1.6 Lbs.
FRONT PANEL:
SIZE: 6.5" x 1.75"
DEPTH BEHIND
PANEL: 3.875"
DEPTH WITH
CONNECTOR: 5.375"
INPUT POWER: 0.5 amps (Min)
2.3 (Max)
@ 14 VDC or 28 VDC
NUMBER OF
TRANSISTORS: 12 all silicon

AMPLIFIER:

FREQUENCY
(3db pts): 200-3000 Hz
SENSITIVITY
CONTROLS: Continuous from Max
to Zero Sens.
LOW LEVEL
SENSITIVITY: 1.0 V rms
AUDIO OUTPUT: 6.0 Nom.
NUMBER OF
INPUTS: 7 Low Level
1 Microphone
INPUT ISOLATION:—30 db Nom.
INPUT
IMPEDENCE: Low Level—600 ohms
OUTPUT
IMPEDANCE: 3-6 ohms
COMPRESSION
RANGE: 1.0-10.0 V rms. ±
3 db at Max Sens.
MASTER CONTROL
RANGE: 0-6 Watts
DUMMY LOADS: 2-4 ohm 5 Watt Loads

1-5. Equipment Supplied

- a. TAU/80
 - 1—TAU/80 Audio Amplifier
 - 1—Cable Connector (16 pin)
- b. TAU/81
 - 1—TAU/81 Audio Compression Amplifier
 - 1—TAU/81 Master Volume Control Panel
 - 1—Master Volume Control and mounting hardware
 - 1—Cable Connector (16 pin)

- c. TAU/100
 - 1—TAU/100 Master Audio Control System
 - 1—TAU/100 Mounting Tray and Hardware
 - 1—Cable Connector (25 pin)

1-6. Equipment Required, But Not Supplied

- a. Wire for harnesses
- b. Any Additional Switches or Controls Desired, (TAU/80 and TAU/81 only)

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SECTION II

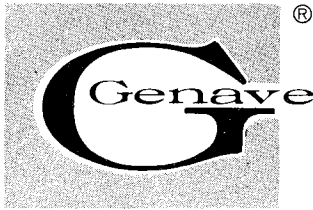
INSTALLATION MANUAL

The following Section
is reproduced
and included with every

TAU/80, 81 & 100

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

The logo for Genave, featuring a stylized 'G' with a circular arrow around it, and the word 'Genave' in a bold, sans-serif font with a registered trademark symbol.



GENERAL AVIATION ELECTRONICS, INC.
4141 KINGMAN DRIVE, INDIANAPOLIS, INDIANA 46226

INSTALLATION MANUAL

TAU/80 & TAU/81

Please Note:

THIS AMPLIFIER MUST BE INSTALLED by a properly certificated and authorized person in accordance with the Federal Aviation Regulations, Part 43. No responsibility for improper installation of this unit is either implied or assumed by the manufacturer. Units shown to be installed in violation of the FARs will not be covered by the warranty and will remove any and all responsibility from the manufacturer

for such equipment.


Warranty

Products bearing the trademark "GENAVE" or the trade name "GENERAL AVIATION ELECTRONICS, INC." have been fabricated by skillful technicians, under the strictest quality control conditions, using the finest materials and component parts available.

When properly adjusted and competently operated according to factory specifications and instructions, General Aviation Electronics Inc. unconditionally guarantees and warrants all parts and bench service labor for one (1) full year from the date of the original installation of the TAU/80 or TAU/81.

This warranty shall not apply to malfunction, which in the opinion of General Aviation Electronics, Inc. is the result of abusive use, accident, willful destruction, improper or unauthorized repair or installation. All service under this warranty must be performed by an Authorized Genave Distributor, or by returning the unit or units, freight pre-paid, to the factory at Indianapolis, Indiana.

GENERAL AVIATION ELECTRONICS, INC.

By 
Elmore W. Rice, III, President

The Company offers no other guarantees or warranties expressed or implied

Proper Installation Will Assure Quality

The TAU/80 or TAU/81 Amplifier you are installing is a high quality, rugged, complex piece of electronic equipment. It has been manufactured under rigid quality control and has been fully tested and operated at high temperatures to stabilize the component parts.

Proper installation of the Amplifier into your customer's aircraft is essential to complete the quality assurance program under which the unit was manufactured.

Specifications:

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(Unless otherwise specified, these specifications apply to both models)

WEIGHT:	0.1 lbs. TAU/81 Control Panel 1.4 lbs. Remote Amplifier
SIZE:	Remote Amplifier: 3¼" wide X 2" high X 4⅝" long (5½" incl. mounting flanges)
INPUT POWER:	0.2 amps (Min) 2 amps (Max) @ 14 VDC or 28 VDC
NUMBER OF TRANSISTORS:	TAU/80: 7 all silicon TAU/81: 12 all silicon
AMPLIFIER:	
FREQUENCY (3 db pts):	200-3000 Hz
SENSITIVITY CONTROL:	Continuous from Max to Zero Sens.
LOW LEVEL SENSITIVITY:	1.0 V rms
HIGH LEVEL SENSITIVITY:	5W into 4 ohms
AUDIO OUTPUT:	6.0 W Nom.
NUMBER OF INPUTS:	6 Low Level 2 High Level
INPUT ISOLATION:	-30 db Nom.
INPUT IMPEDENCE:	Low Level—600 ohms High Level—4 ohms
OUTPUT IMPEDENCE:	3-6 ohms
TAU/81 ONLY —	
COMPRESSION RANGE:	1.0-10.0 V rms ± 3 db at Max Sens.
MASTER CONTROL RANGE:	0-6 Watts

Unpacking

CAREFULLY REMOVE the Amplifier and its mounting accessories from the shipping container by removing the staples from the top of the carton and lifting the contents straight out. The carton should be saved until the installation is complete in the event that damage is discovered or return of the unit is necessary for some reason. Any damage due to shipping should be reported and a claim filed as soon as possible with the shipping company. (If it is necessary to re-ship, use our container which is specifically designed for that purpose.)

Pre-Installation Check

VISUALLY INSPECT the unit for any obvious external damage, such as dents, loose wires, etc. Any damage not related to shipping should be reported to General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana (46226), Area Code 317-546-1113, as soon as possible.

Damage due to shipping should be reported to and a claim should be filed promptly with the transportation company.

All Amplifiers are shipped in perfect operating condition. However, a pre-installation electrical test may be performed to assure that the unit has suffered no internal damage during shipment. For a detailed test procedure, refer to the Maintenance Section of the TAU/80 and TAU/81 Service Manual. DO NOT ATTEMPT to bench test the unit without proper equipment as specified in the Service Manual.

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Installation Planning

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THE LOCATION of the unit in the aircraft should be carefully selected with due consideration to the following:

1. The unit generates only a very small amount of heat and, as such, does not require any type of cooling. However, the unit must NOT be mounted directly above a vacuum tube device or any other equipments that generate a large amount of heat unless such equipments have cooling provisions installed to keep the heat generated therein from coming in contact with other equipments mounted in close proximity to them.

MOUNTING THE AMPLIFIER DIRECTLY OVER UNCOOLED VACUUM TUBE EQUIPMENT OR IN THE HOT AIR BLAST OF ANY DEVICE, INCLUDING CABIN HEATERS, WILL AUTOMATICALLY VOID THE WARRANTY

2. The placement of the unit should be such that all controls are easily accessible.

Installation

CONTROL PANEL

1. If holes are to be drilled in the aircraft panel, they should be spaced using the selected front or rear panel as a template. The holes should be drilled with a $\frac{1}{4}$ " drill.
2. Connect a wire of sufficient length to each control terminal to reach between the panel and the remote amplifier.

AMPLIFIER

1. Install the amplifier in the aircraft using a minimum of two mounting holes in opposite sides of the unit. Use the amplifier itself for a template, and drill the selected holes with a $\frac{5}{32}$ " drill. Use the #8-32 hardware supplied to attach the unit to the aircraft.
2. Fabricate the power and signal cable using the connector socket supplied. A wiring diagram is shown in Figure 2.

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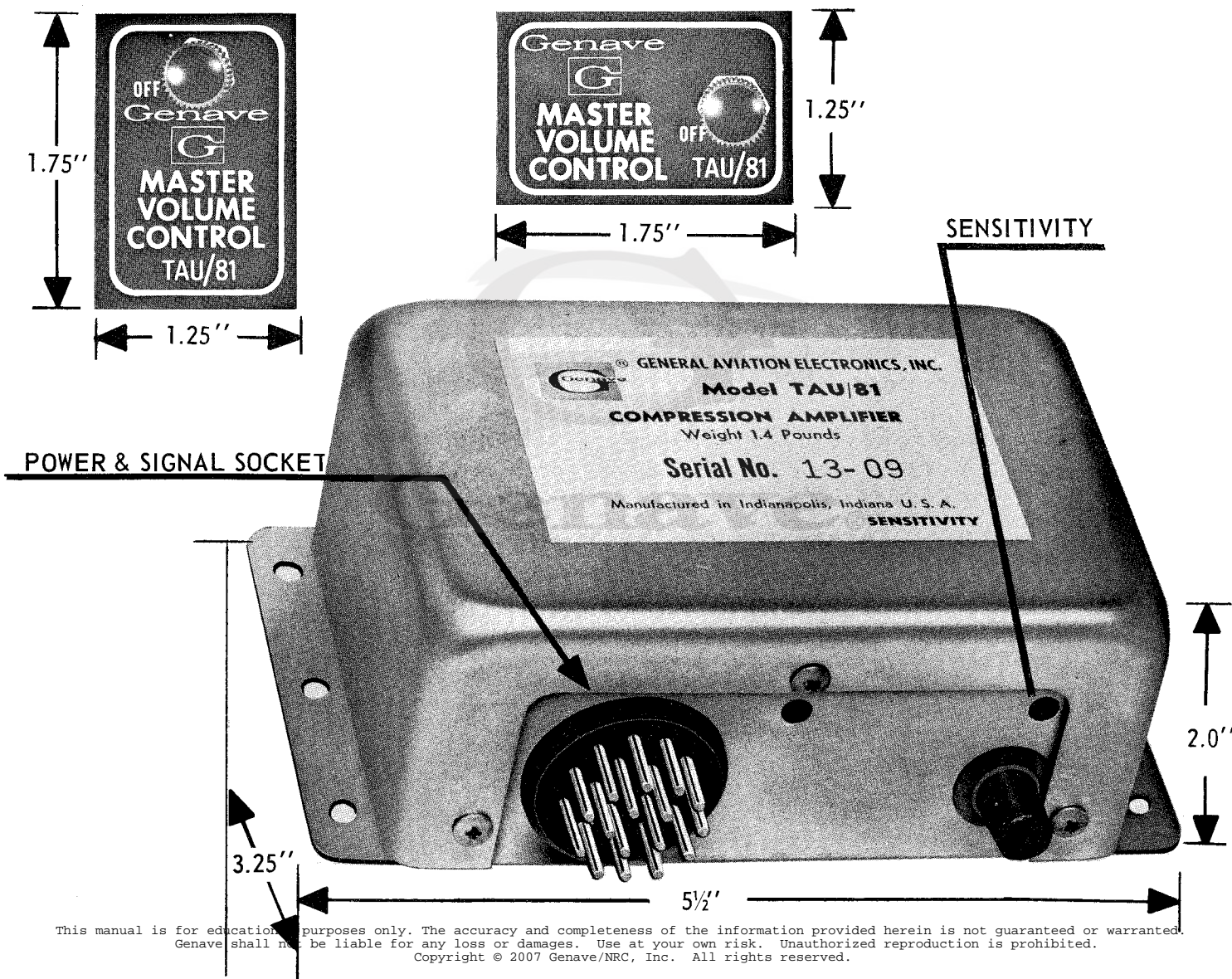
3. Connect the wires just fabricated to the appropriate points in the aircraft's electronic system. Mechanically secure the cables at appropriate support points

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4. Connect the cables to the amplifier.
5. Update appropriate logs and papers of the aircraft.
6. Fill in the necessary information required by the warranty card.
7. Be sure the remainder of the warranty card is filled in by your customer and returned to the Factory. The Warranty Card must be completed and returned to Genave for the warranty to be in effect.

Post Installation Check

UPON COMPLETION of the installation, a flight test is desirable to insure that the Amplifier is operating properly.



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A + CONNECTIONS

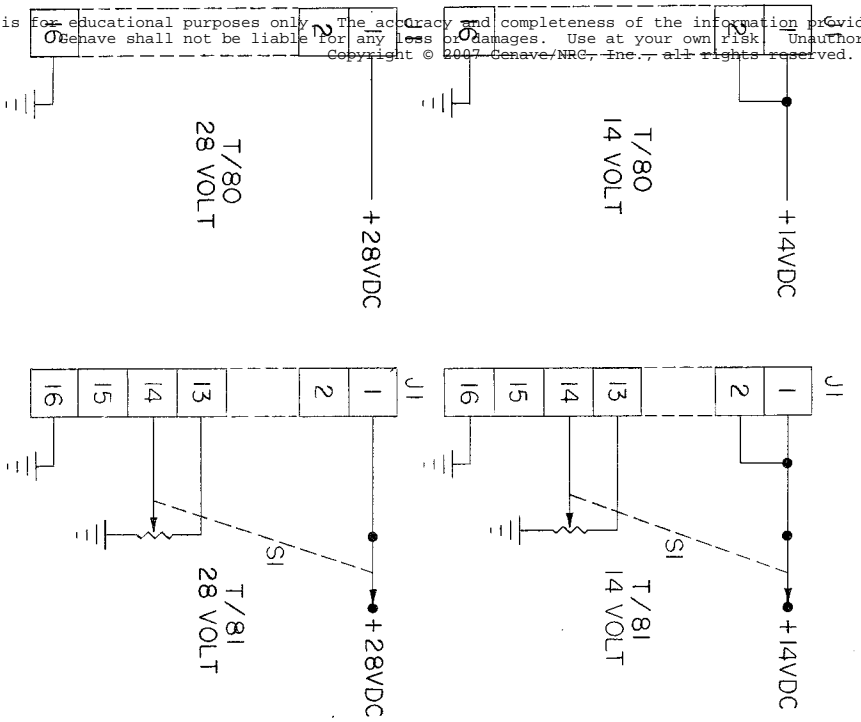


FIG. 1

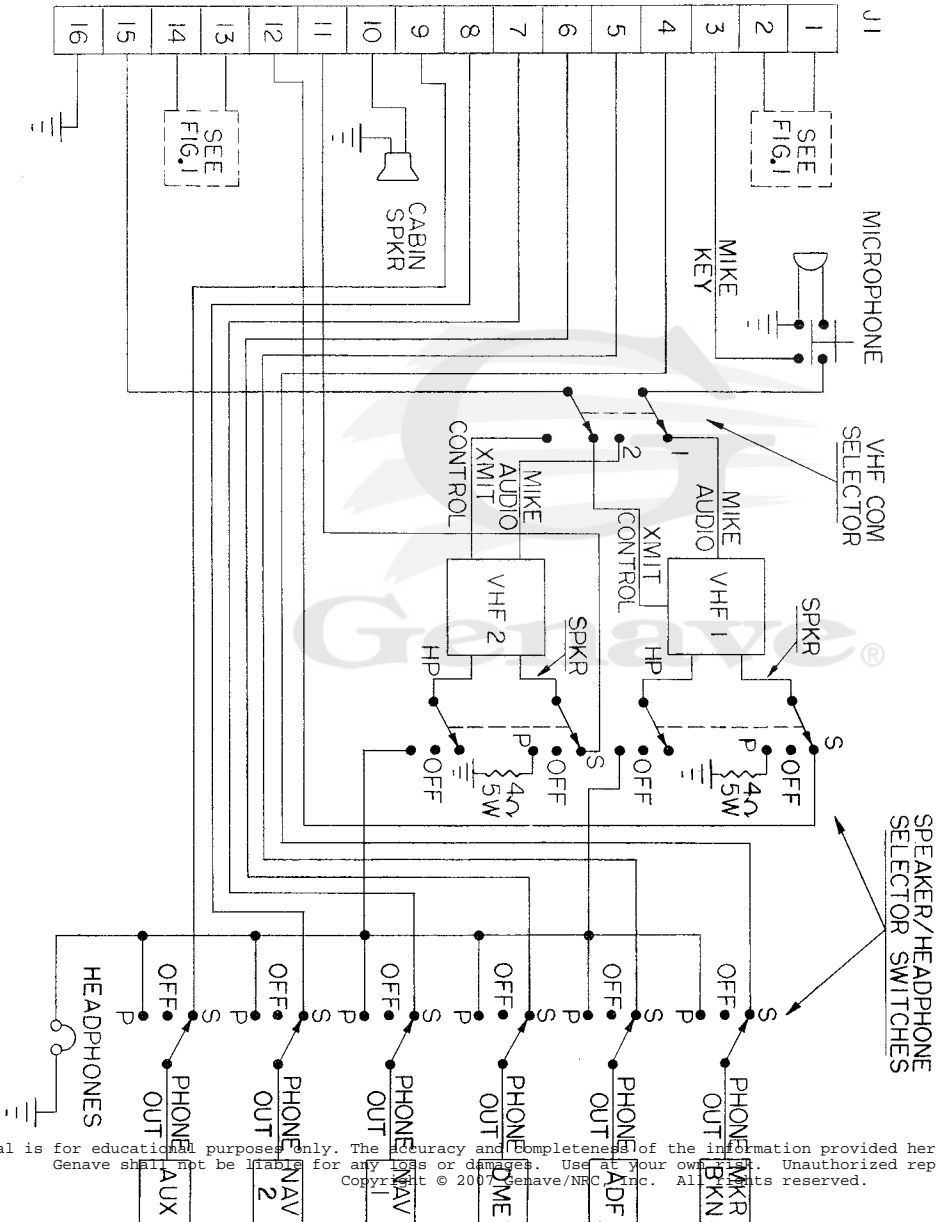
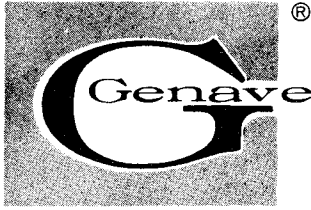


FIG. 2



GENERAL AVIATION ELECTRONICS, INC.
4141 KINGMAN DRIVE, INDIANAPOLIS, INDIANA 46226

INSTALLATION MANUAL

TAU/100

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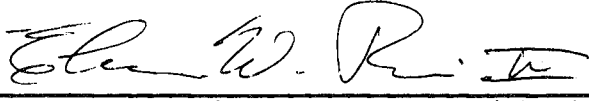
Warranty

Products bearing the trademark "GENAVE" or the trade name "GENERAL AVIATION ELECTRONICS, INC." have been fabricated by skillful technicians, under the strictest quality control conditions, using the finest materials and component parts available.

When properly adjusted and competently operated according to factory specifications and instructions, General Aviation Electronics, Inc. unconditionally guarantees and warrants all parts and bench service labor for one (1) full year from the date of the original installation of the TAU/100.

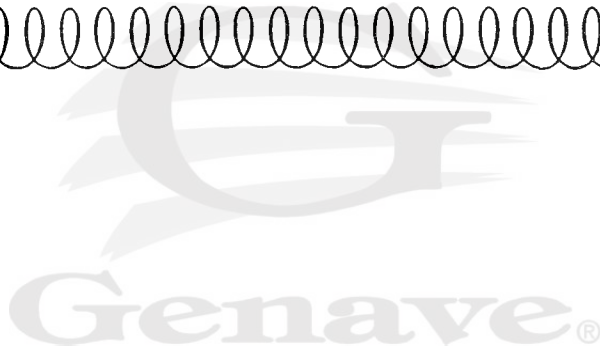
This warranty shall not apply to malfunction, which in the opinion of General Aviation Electronics, Inc. is the result of abusive use, accident, willful destruction, improper or unauthorized repair or installation. All service under this warranty must be performed by an Authorized Genave Distributor, or by returning the unit or units, freight pre-paid, to the factory at Indianapolis, Indiana.

GENERAL AVIATION ELECTRONICS, INC.

By 
Elmore W. Rice, III, President

The Company offers no other guarantees or warranties* expressed or implied

Proper Installation Will Assure Quality



The TAU/100 unit you are installing is a high quality, rugged, complex piece of electronic equipment. It has been manufactured under rigid quality control and has been fully tested and operated at high temperatures to stabilize the component parts.

Proper installation of the unit into your customer's aircraft is essential to complete the quality assurance program under which the unit was manufactured.

Specifications:

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GENERAL:

WEIGHT: 1.6 Lbs.
FRONT PANEL:
SIZE: 6.5" x 1.75"
DEPTH BEHIND
PANEL: 3.875"
DEPTH WITH
CONNECTOR: 5.375"
INPUT POWER: 0.5 amps (Min)
2.3 (Max)
@ 14 VDC or 28 VDC
NUMBER OF
TRANSISTORS: 12 all silicon

AMPLIFIER:

FREQUENCY
(3db pts): 200-3000 Hz
SENSITIVITY
CONTROLS: Continuous from Max
to Zero Sens.
LOW LEVEL
SENSITIVITY: 1.0 V rms
AUDIO OUTPUT: 6.0 Nom.
NUMBER OF
INPUTS: 7 Low Level
1 Microphone
INPUT ISOLATION: -30 db Nom.
INPUT
IMPEDENCE: Low Level—600 ohms
OUTPUT
IMPEDANCE: 3-6 ohms
COMPRESSION
RANGE: 1.0-10.0 V rms. ±
3 db at Max Sens.
MASTER CONTROL
RANGE: 0-6 Watts
DUMMY LOADS: 2-4 ohm 5 Watt Loads

Unpacking

CAREFULLY REMOVE the unit and its mounting accessories from the shipping container by removing the staples from the top of the carton and lifting the contents straight out. The carton should be saved until the installation is complete in the event that damage is discovered or return of the unit is necessary for some reason. Any damage due to shipping should be reported and a claim filed as soon as possible with the shipping company. (If it is necessary to re-ship, use our container which is specifically designed for that purpose.)

Pre-Installation Check

VISUALLY INSPECT the unit for any obvious external damage, such as dents, loose wires, etc. Any damage not related to shipping should be reported to General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana (46226), Area Code 317-546-1111, as soon as possible.

Damage due to shipping should be reported to and a claim should be filed promptly with the transportation company.

All units are shipped in perfect operating condition. However, a pre-installation electrical test may be performed to assure that the unit has suffered no internal damage during shipment. For a detailed test procedure, refer to the Maintenance Section of the TAU/100 Service Manual. DO NOT ATTEMPT to bench test the unit without proper equipment as specified in the Service Manual.

Installation Planning

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THE LOCATION of the unit in the aircraft should be carefully selected with due consideration to the following:

1. The unit generates only a very small amount of heat and, as such, does not require any type of cooling. However, the unit must NOT be mounted directly above a vacuum tube device or any other equipments that generate a large amount of heat unless such equipments have cooling provisions installed to keep the heat generated therein from coming in contact with other equipments mounted in close proximity to them.

MOUNTING THE UNIT DIRECTLY OVER UNCOOLED VACUUM TUBE EQUIPMENT OR IN THE HOT AIR BLAST OF ANY DEVICE, INCLUDING CABIN HEATERS, WILL AUTOMATICALLY VOID THE WARRANTY

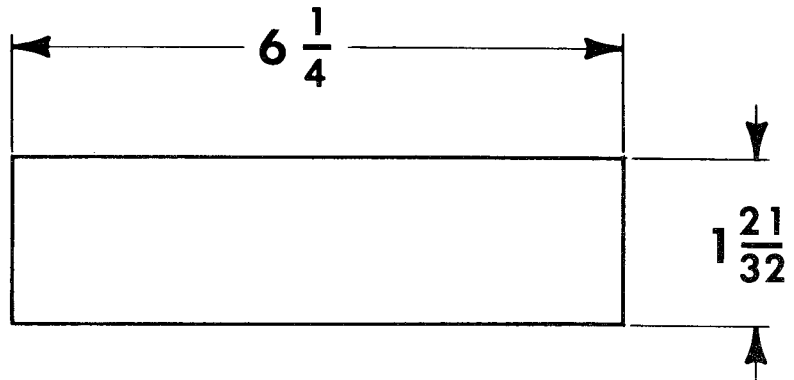
2. The placement of the unit should be such that all controls are easily accessible.

Installation

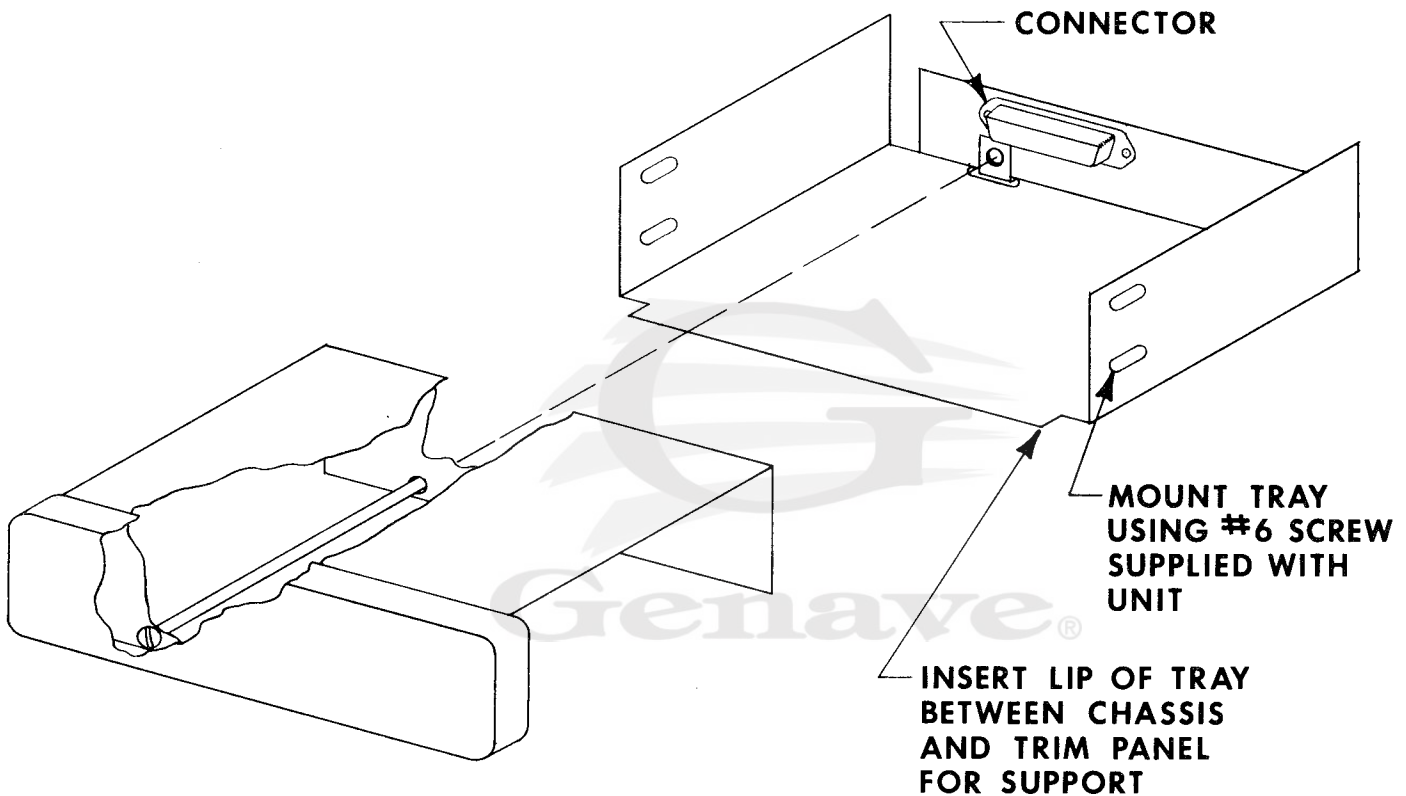
1. The aircraft panel cutout for the TAU/100 is 6 1/4" wide x 1 21/32" high. Make this cutout in the selected location.
2. Insert the supplied mounting rack into the cutout. Mark the rack mounting holes on the panel support brackets on both sides of the cutout. If the location chosen does not provide the brackets, two angle brackets must be made and installed. Drill out the marked mounting holes with a #27 drill.
3. Install the rack in the aircraft panel, using the holes drilled in step 2, the #6-32 Binder head screws, washers, and nuts supplied. All screws must have their heads inside the rack.
4. Fabricate the power and signal cable using the connector socket supplied. A wiring diagram is shown in this manual.
5. Connect the cable just fabricated to the appropriate points in the aircraft's electronic system. Mechanically secure the cable at appropriate support points.
6. Insert the unit into the rack. Tighten the mounting bolt to secure the unit in the panel. Do not use excessive torque on the bolt. Tighten only until the unit is snugly secured against the front panel.
7. Update the appropriate logs and papers of the aircraft.

8. Fill out and return the bottom section of the warranty card.
9. Give the remainder of the warranty card to your customer. The proper sections of the warranty card **MUST** be completed and returned to Genave by both the dealer and the customer for the warranty to be in effect.

Panel Cutout



Mounting Rack

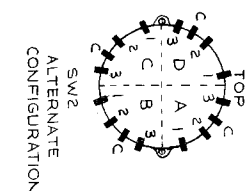
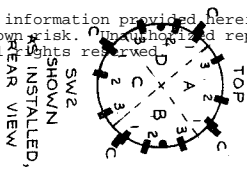
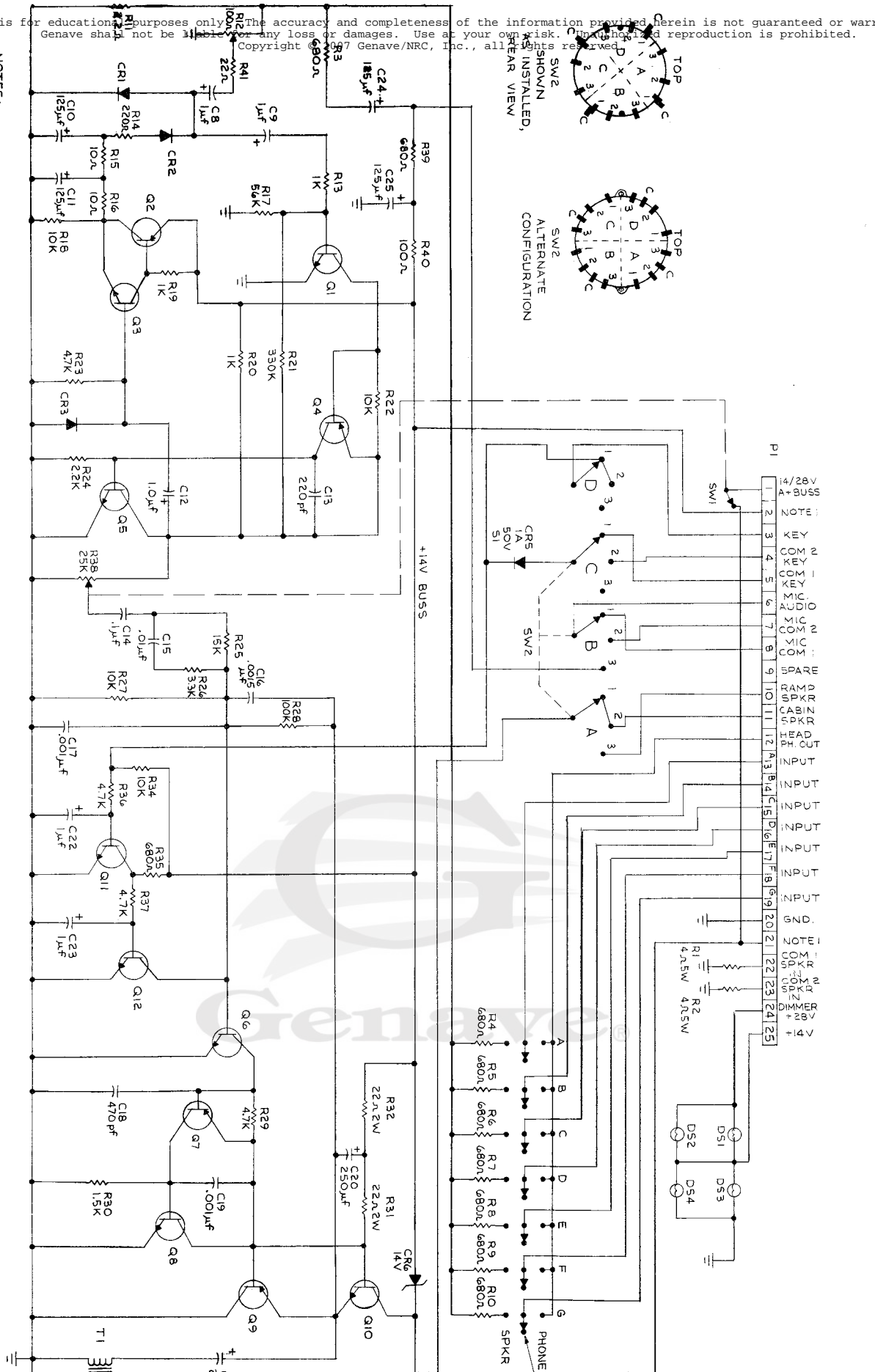


Post Installation Check

UPON COMPLETION of the installation, a flight test is desirable to insure that the unit is operating properly.

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- NOTES:
1. ALL RESISTORS ARE 1/2W, 10% EXCEPT AS NOTED
 2. FOR 14V OPERATION JUMPER PINS 2+21 AND 20 AND 24.
 3. FOR MASTER RADIO ON/OFF, CONNECT SOLENOID COIL TO PIN 1 OF P1.



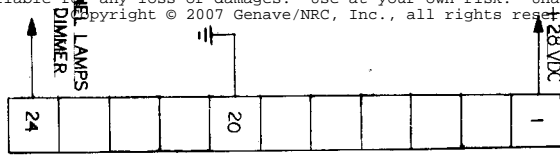
P1

1	14/28V
2	A+ BUSS
3	NOTE: X Y Z
4	OM
5	OM
6	OM
7	MIC. I/O
8	AC I/O
9	OM
10	SPARE
11	RAM
12	CABIN
13	HEAD
14	INPUT
15	INPUT
16	INPUT
17	INPUT
18	INPUT
19	INPUT
20	GND.
21	NOTE: X Y Z
22	OM
23	OM
24	OM
25	OM

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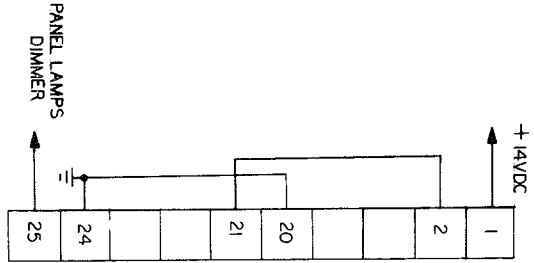
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28 VDC INSTALLATION

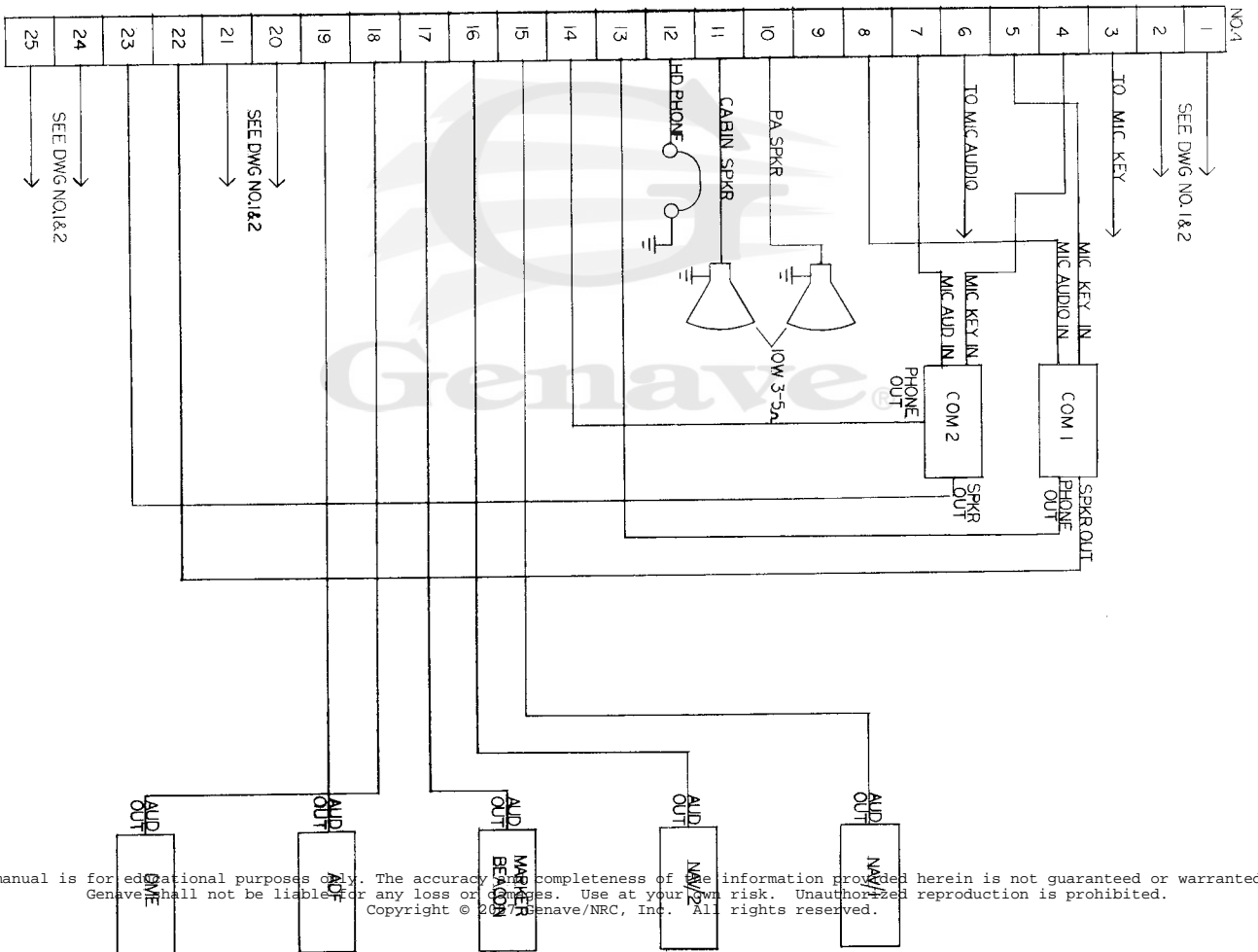


NO.1

14 VDC INSTALLATION



NO.2



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2-3. Installation Notes

1. Number of Inputs

Both the TAU/80 and the TAU/81 have six low level and two high level inputs. The high level inputs are the same as the low level inputs except that they have an additional 4 ohm 5 watt resistor from the input to electrical ground. There are three possible uses for these two high level inputs:

- A. As high level inputs as prewired
- B. As low level inputs by removal of the 4 ohm 5 watt resistors
- C. As speaker load resistors by removal of the series 680 ohm coupling resistors (refer to schematic).

2. Compression in Existing Audio Systems

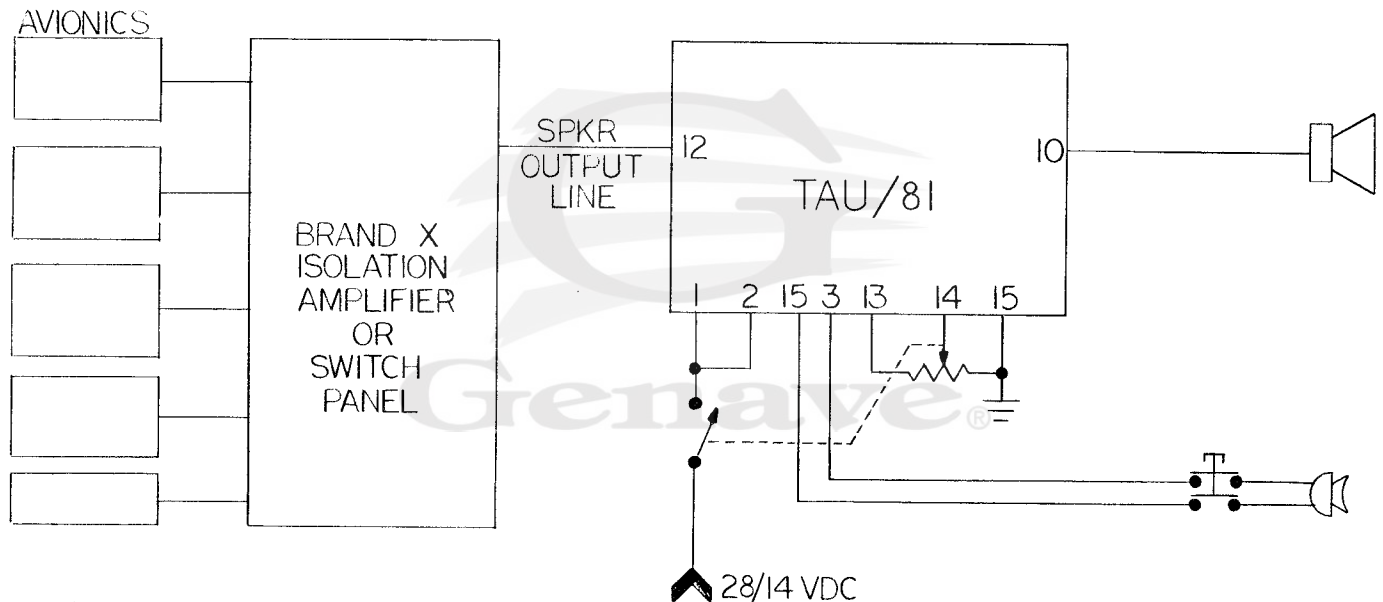
It is possible to incorporate the TAU/81 into existing audio systems in order to gain the bene-

fits of compression. The schematic of Figure 2-4-1 illustrates one method of doing so.

3. Automatic Selection of Com Transceiver Audios on an Audio Control Panel.

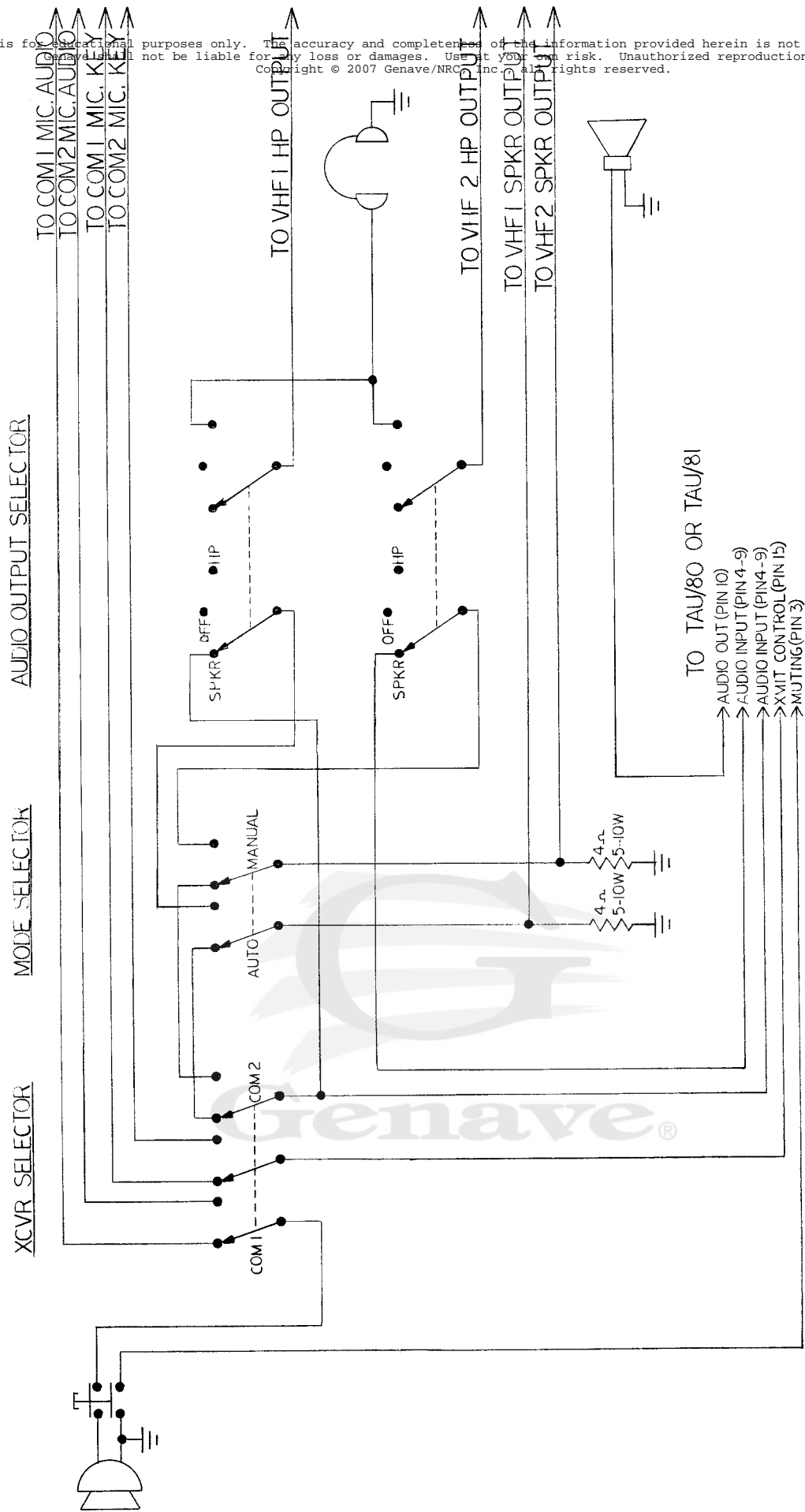
The schematic of Figure 2-4-2 shows the wiring necessary to provide automatic or manual selection of Com transceiver inputs to the audio amplifier.

When the switch is placed in the auto position the mike selector switch (3-pole, 2-position) selects the transceiver audio output to be fed into the audio control panel, and in the manual position the transceivers audio output is selected by the audio control panels switches on the audio control panel in the normal manner. The Auto-Normal switch is a 2-pole, 2-position switch.



**FIGURE 2-4-1
COMPRESSION IN EXISTING
AUDIO SYSTEMS**

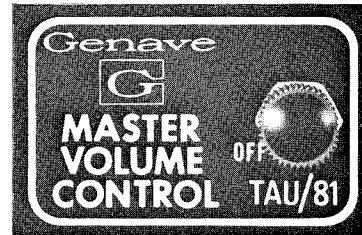
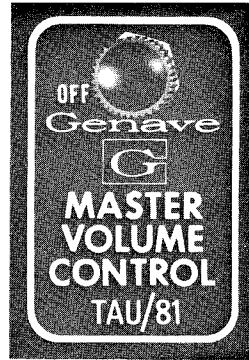
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FIGURE 2-4-2
AUTOMATIC COM AUDIO SELECTION

SECTION III OPERATING MANUAL



3-1. TAU/80 & 81 Operating Controls and Indicators

In the simplest installations the TAU/80 will have no operating controls of its own. Instead, the input levels to the TAU/80 and therefore the output level will be dependent upon the audio output level of the equipment driving it. In more complex installations, there may be controls independent of the avionics (Audio Control Panels, etc.) which affect the TAU/80. (See system diagrams in the TAU/80 & 81 Installation Manual.)

The TAU/80 has a sensitivity adjustment which is located within the unit itself. This adjustment is set at the time of installation to provide full audio output from the audio levels of the various avionics on board the aircraft.

To operate the TAU/80 it is only necessary to adjust the output of each piece of avionics for the desired listening level.

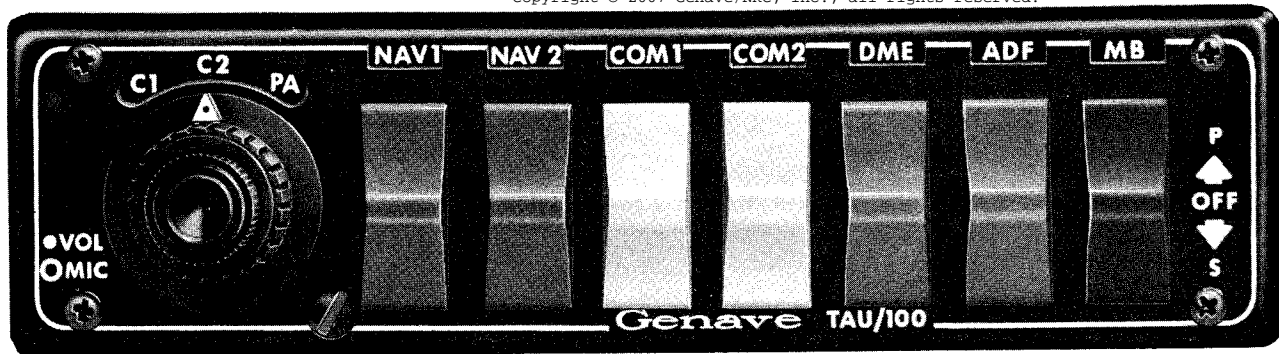
The TAU/81 is similar to the TAU/80 described above, except that in addition the TAU/81 has a panel mounted Master Volume Control. The compression feature of the TAU/81 allows the

output level set on the master volume control to remain constant when the input levels from the avionics are changing.

In addition to the normal uses of compression (i.e. constant output for varying inputs), the TAU/81 has an additional feature which can be quite useful. When two signals are present at the same time, one at the lower threshold of compression and one at the upper end of compression, the stronger signal will drive the compression down, thus driving the weak signal below audibility.

As an example, the pilot may set the ADF to listen to enroute weather (or music) and have Center frequency on the VHF Com receiver. The ADF will play at normal output until Center comes on, at which time the Center will come through loud and clear. When properly adjusted, the action is as absolute as switching the signals on and off.

If the ADF output is not adjustable, it may be necessary to add series resistance with its output until the level is at compression threshold. This value of resistance can be found by trial and error.



3-2. TAU/100 Operating Controls and Indicators

The TAU/100 has nine operating controls which are located on the front panel. These controls are:

1. Off/On/Volume
2. Transmitter/PA Selector
3. 7 Function Selector Switches

To operate the TAU/100 it is only necessary to turn the unit on by rotating the Off/On/Volume control clockwise past the click. The desired avionics outputs can then be selected on the 7 function selector switches. By sliding a switch towards the bottom of the panel the audio from that unit will be fed to the speaker. The Off/On/Volume control should then be adjusted to the desired speaker listening level.

If for any reason no output is heard from the selected unit be sure to check that the unit is turned-on, the volume control on that unit is prop-

erly set, and that a signal is being received. If in doubt switch the TAU/100 selector switch to the uppermost, or Phone, position. If an output is present it should be audible over the headphones.

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/100 panel.

When wishing to transmit, the Transmitter/PA Selector should be switched to the desired transmitter position—C1 (Com 1) or C2 (Com 2). The microphone will then be connected to the desired transmitter.

If a PA speaker is connected the Public Address feature can be utilized by switching the transmitter/PA Selector to the PA position. In this position the microphone is connected to the audio amplifier within the TAU/100. The TAU/100 audio amplifier in turn supplies audio to the PA speaker.

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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/80 and TAU/81 audio amplifiers and the TAU/100 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 audio amplifier circuitry of the TAU/80, TAU/81, and TAU/100 are very similar. The TAU/80 and TAU/81 circuitry can be divided into three major circuit functions. These circuit functions are:

- A. Preamplifier
- B. Power Amplifier
- C. Muting Circuitry

The power amplifier sections of the TAU/80, TAU/81, and TAU/100 are all three exactly identical. The TAU/80 has a simple audio mixing preamplifier preceding the power amplifier while the TAU/81 and TAU/100 have an audio mixing compression preamplifier preceding the power amplifier. In addition, the TAU/100 is equipped with switches to select which audio outputs will be applied to the mixer circuitry.

2. Detailed Theory

A. *TAU/80 Preamplifier*—The TAU/80 preamplifier is fed from two high level inputs and six low level inputs. The two high level inputs are paralleled by the two 4 ohm, 5 watt load resistors, R1 and R2. These two load resistors provide power dissipation in order to allow the two high level inputs to be successfully mixed with the low level inputs.

Audio mixing takes place in the mixing network formed by R3, R4, R5, R6, R7, R8, R9, R10, and R38. R39, the sensitivity adjustment, selects the desired audio level to be fed to the preamplifier. C6, the 1 Mfd. coupling capacitor, applies the selected audio level to the base of Q13, the pream-

plifier transistor. Q13 and associated circuitry form the voltage amplifier circuit which feeds audio to the power amplifier through C7, a 1 Mfd. coupling capacitor. A 25 K volume control can be substituted for the jumper between pins 13 and 14 of J1. This volume control will allow adjustment of the audio level fed to the power amplifier. R44 and C5 function as a line filter.

B. *TAU/81 and TAU/100 Preamplifier*—The preamplifier circuitry of the TAU/81 and TAU/100 are incorporated with compression circuitry. The TAU/81 compression preamplifier is fed from two high level inputs and six low level inputs. The two high level inputs are paralleled by the two 4 ohm, 5 watt load resistors. R1 and R2. These two load resistors provide power dissipation in order to allow the two high level inputs to be successfully mixed with the low level inputs. Audio mixing takes place in the mixing network formed by R3, R4, R5, R6, R7, R8, R9, R10, and R11.

The TAU/100 compression preamplifier is fed from 8 low level inputs. Seven of these inputs are derived from the front panel function selector switches while the remaining low level input is received from the microphone. R3, R4, R5, R6, R7, R8, R9, R10, and R11 form the mixing network in the TAU/100. R39, R40, and C25 form a noise free current source for microphone bias. R39 may be changed, if necessary, in the field to provide the proper modulation percentage with non-standard, low, or high output microphones. The design value is proper for all new single-button carbon microphones or their equivalent such as the various transistorized types designed for direct replacement of the carbon type.

The mixed audio from the various inputs is applied across R12, the sensitivity adjustment. R12 sets the level of audio applied to the compression preamplifier. R39 in the TAU/81 and R41 in the TAU/100 are utilized to obtain linear compression at all sensitivity adjustment settings. The selected audio will be fed to the active compression device, CR1, through C8, a 1 Mfd. coupling capacitor. CR1 performs the compression which will be discussed later.

The compressed audio is fed through C9 and R13 to the base of Q1 a common emitter voltage amplifier. The amplified signal at the collector of Q1 is applied to the DC coupled power amplifier formed by Q4, Q5, and associated circuitry. Output from this amplifier is applied to the audio power amplifier and to the compression circuitry through C12. CR3 clips the negative portion of the audio waveform which is applied to the power rectifier of Q2, Q3, and associated circuitry. R15, R16, C10, and C11 form a two section filter for the control voltage output of the power rectifier. The positive DC control voltage is applied through the current limiting resistor, R14, and the blocking diode, CR2, to the compression diode CR1. As the audio level at the output of the power amplifier increases the DC voltage at the collector of Q2 increases. This increase in voltage increases the forward bias applied to the compression diode thereby lowering the audio load resistance and reducing the level of audio applied to Q1.

The output of the compression preamplifier is applied across the volume control, R38, and from there to the audio power amplifier. The volume control sets the level of audio signal to be sent to the audio power amplifier.

C. *Power Amplifier*—The power amplifier employed in the TAU/80, TAU/81, and TAU/100 is a four stage direct coupled Class B complementary symmetry amplifier consisting of Q6, Q7, Q8, Q9, and Q10. Both DC and AC feedback are provided via R28 and C16. This feedback stabilizes the bias conditions of the entire amplifier over the temperature range of -50 to $+100$ degrees Centigrade.

High frequency band shaping is controlled by the feedback capacitor, C16, and the shunt capacitor, C17. R25, R26, and C15 determine the audio frequency response at 800 Hz. and below. Capacitors C18 and C19 are used to provide closed loop stability and do not affect the audio bandpass response of the power amplifier.

The high power output of Q9 and Q10 is applied through the AC coupling capacitor, C21, to T1, the output transformer. T1 is used to raise the output impedance and voltage level of the amplifier in order to properly modulate the aircraft speaker.

D. *Muting Circuitry*—The muting circuitry of

the TAU/80, TAU/81, and TAU/100 consists of a two stage switching circuit which, when activated, lowers the base bias on Q6 inducing cut-off. This circuit prevents audio of any nature from reaching the speaker during transmit.

CR5 is a DC blocking diode which protects the muting circuitry from the transmitter relay circuitry of the Com transceiver. When the push-to-talk button on the microphone is depressed Q11 will be turned-off which causes Q12 to turn-on. When Q12 turns-on the base biasing resistance on Q6 changes, lowering the bias and cutting off Q6. When the microphone button is released the muting circuitry returns to its previous state.

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

A. TAU/80 Adjustment

1. Connect a 4 ohm, 5 watt resistor in place of the speaker.
2. Connect an AC voltmeter across the resistor to measure the voltage applied.
3. Apply power to the TAU/80 and feed audio from the unit having the lowest audio output level to the TAU/80. (For bench adjustment it may be necessary to simulate the lowest input level to the TAU/80 with an audio signal generator.)
4. Adjust the sensitivity adjustment, R 39, to obtain 4 volts rms across the 4 ohm resistor (4 watts). If a master volume control is utilized in this particular installation it should be set in the maximum volume position for this adjustment.

B. TAU/81 & TAU/100 Adjustment

1. Connect a 4 ohm, 5 watt resistor in place of the speaker.
2. Connect an AC voltmeter across the resistor to measure the voltage applied.

3. Apply power to the TAU/81 or TAU/100 and feed 6.0 to 10.0 V rms into one of the low level inputs.
4. Adjust the master volume control to obtain a midrange reading on the decibel scale of the AC voltmeter. Maintain the output level below clipping.
5. Reduce the audio input to the TAU/81 or TAU/100 to 2.0 V rms. The output level should drop no more than 3 db. If the reduction in output is in excess of 3 db adjust R12, the sensitivity adjustment, to obtain an output level which is less than 3 db down.
6. The compression threshold and sensitivity are now properly set and will maintain output within ± 3 db with input levels of 2 to 20 volts.
7. If a compression threshold other than the normal standard is desired, it is only necessary to adjust the sensitivity adjustment to provide less than 3 db drop in output when the desired threshold audio level is applied to the TAU/81 or TAU/100.

TAU/80 AUDIO AMPLIFIER TAU/81 AUDIO COMPRESSION AMPLIFIER TAU/100 MASTER AUDIO CONTROL PANEL MAINTENANCE MANUAL

4-5. TROUBLESHOOTING INFORMATION

I. General

It is assumed that the technician performing any troubleshooting or repair work on the 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 DC Voltage Measurements given in Table 4-5-1, the Schematic Diagrams (Figures 4-5-2 through 4-5-5), and the Parts/Track Maps (Figures 4-5-6 through 4-5-8).

II. Table of Figures

A. Alignment and Test Setup

- 4-4-1 TAU/80 and 81 Alignment and Test Setup

4-4-2 TAU/100 Alignment and Test Setup

B. Top Views

- 4-4-3 TAU/80, Top View
- 4-4-4 TAU/81, Top View
- 4-4-5 TAU/100, Top View

C. Block Diagrams

- 4-4-6 Block Diagrams

D. DC Voltage Measurements

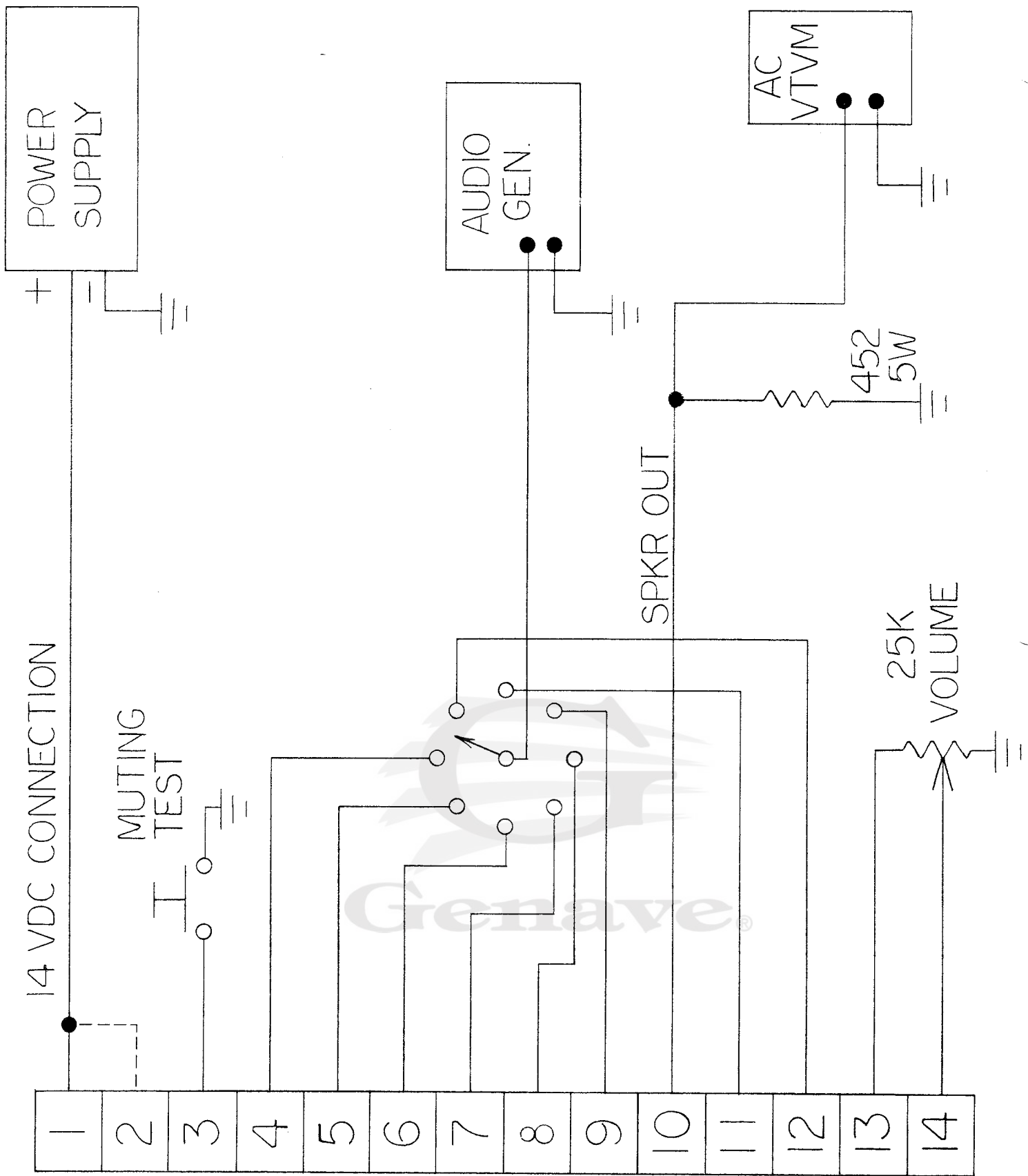
- 4-5-1 DC Voltage Measurements

E. Schematic Diagrams

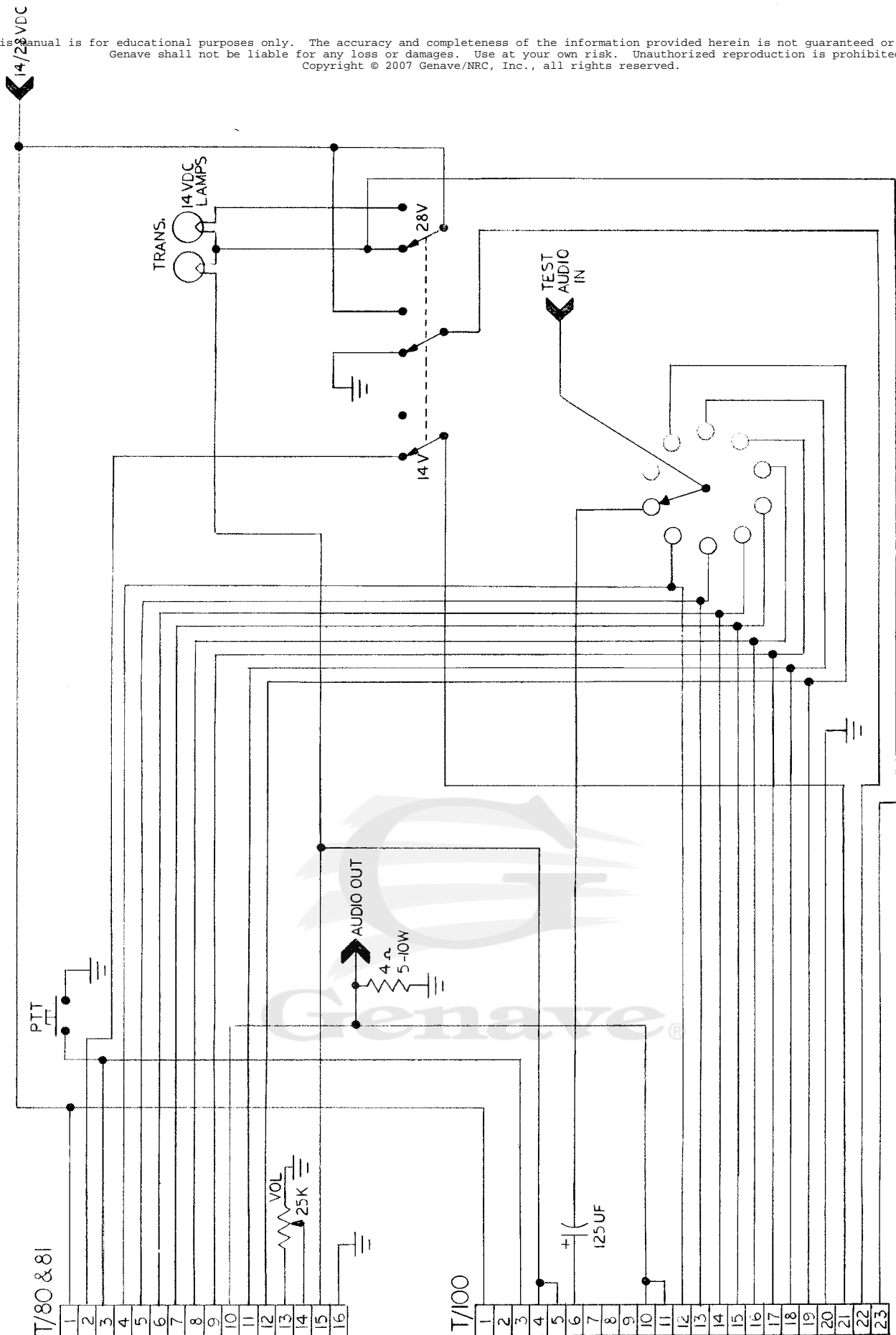
- 4-5-2 TAU/80 Schematic Diagram
- 4-5-3 Early TAU/80 Schematic Diagram
- 4-5-4 TAU/81 Schematic Diagram
- 4-5-5 TAU/100 Schematic Diagram

F. Parts/Track Maps

- 4-5-6 TAU/80 Parts/Track Map
- 4-5-7 TAU/81 Parts/Track Map
- 4-5-8 TAU/100 Parts/Track Map

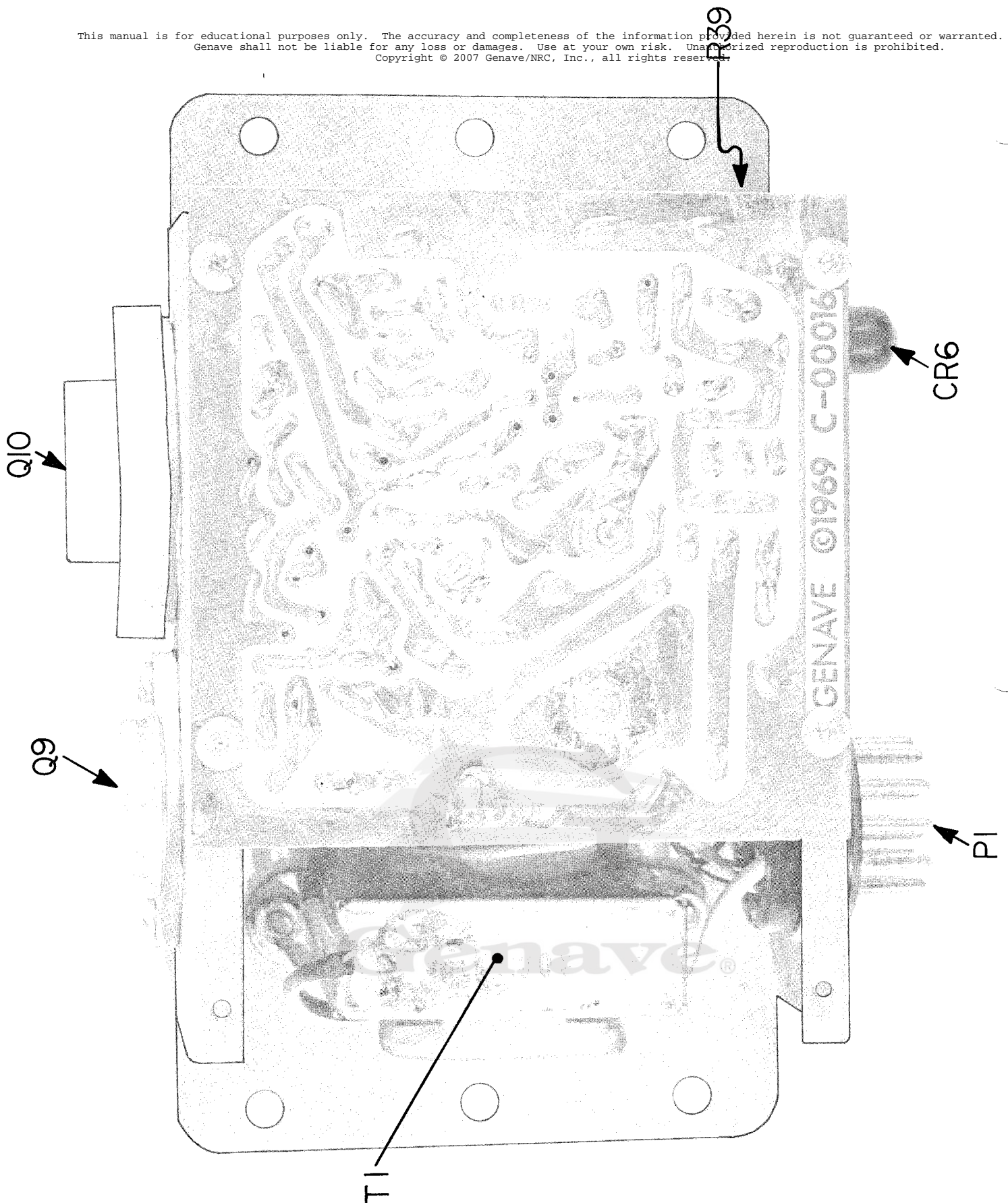


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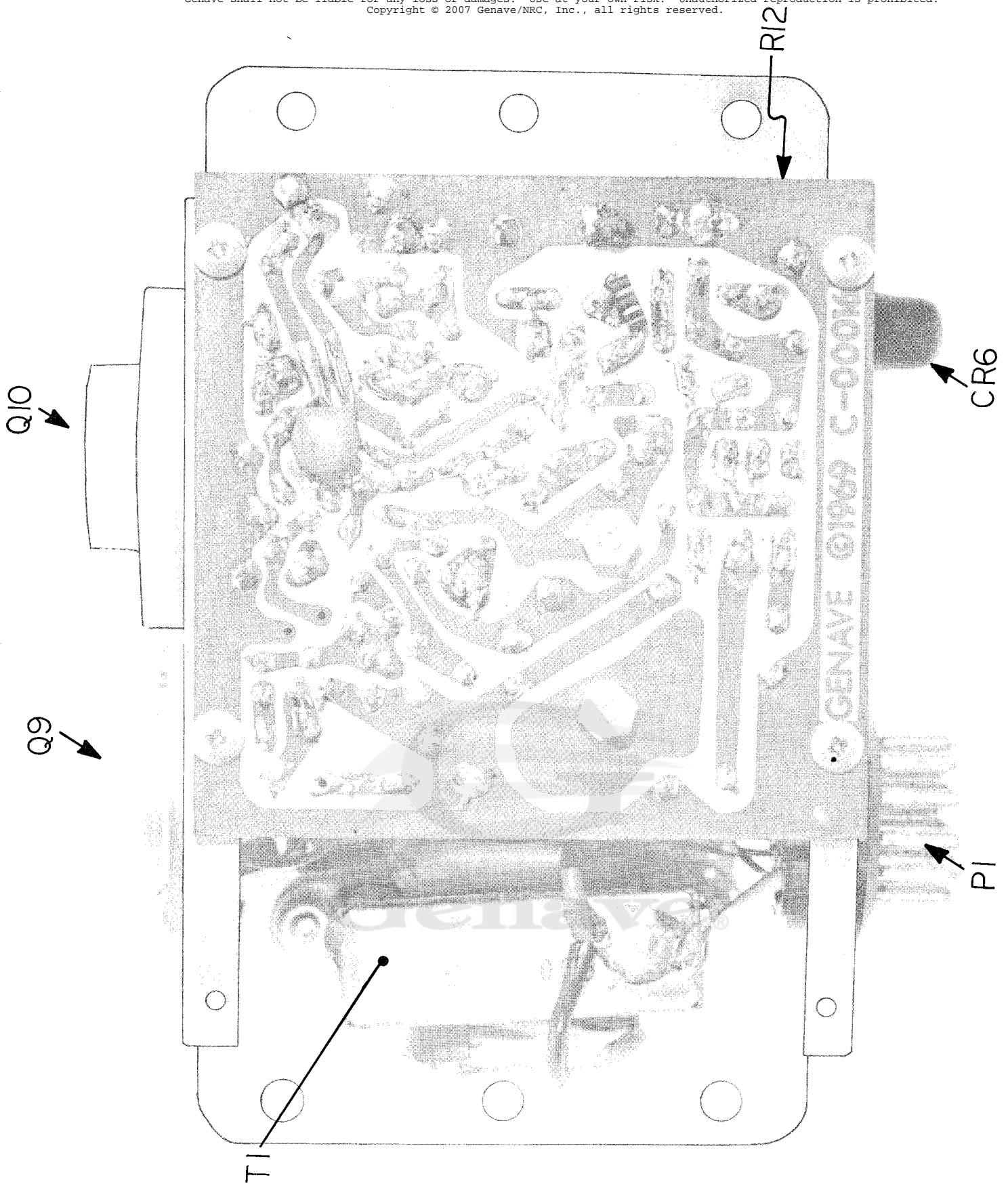
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FIGURE 4-4-3
TAU/80, TOP VIEW

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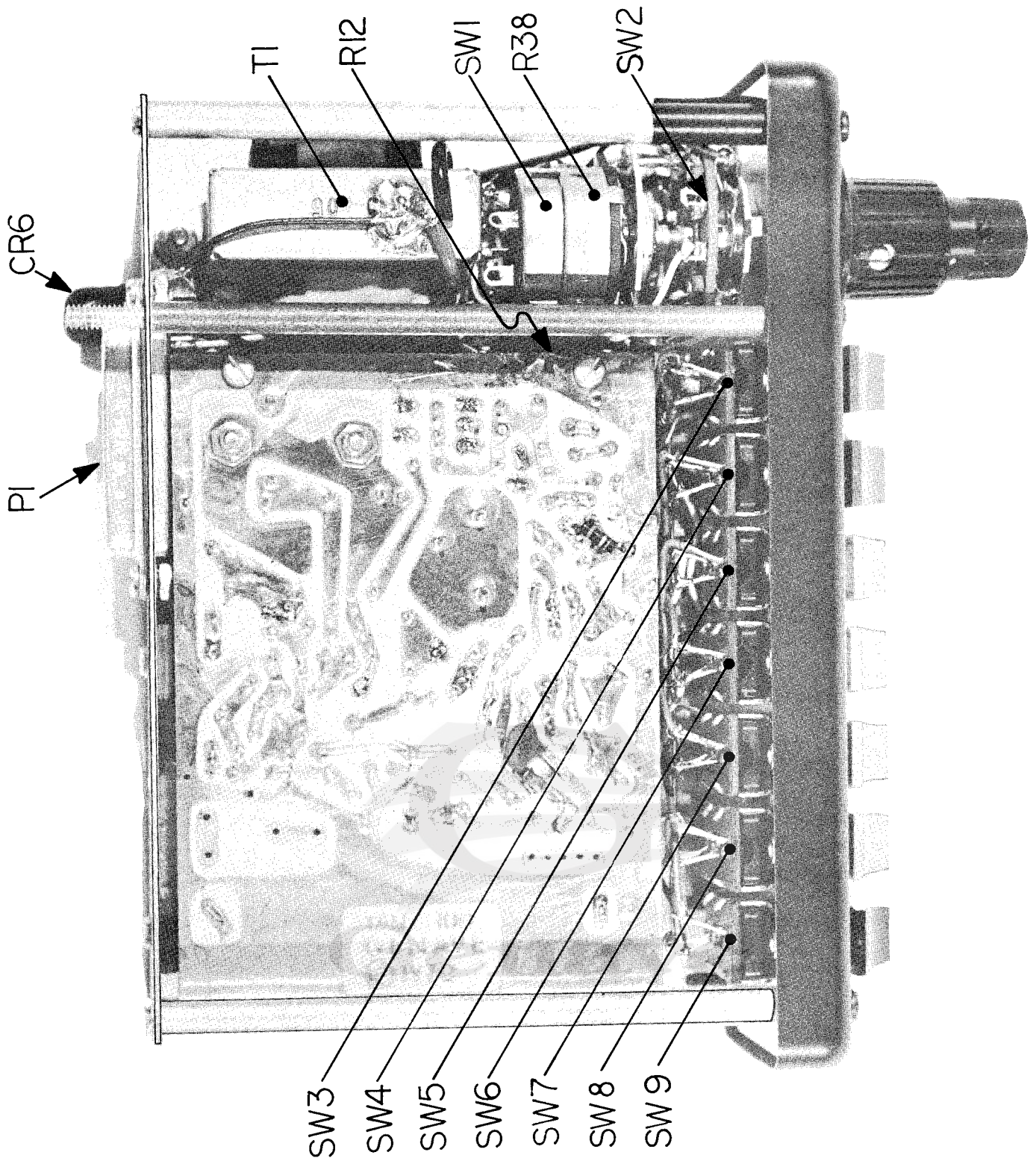
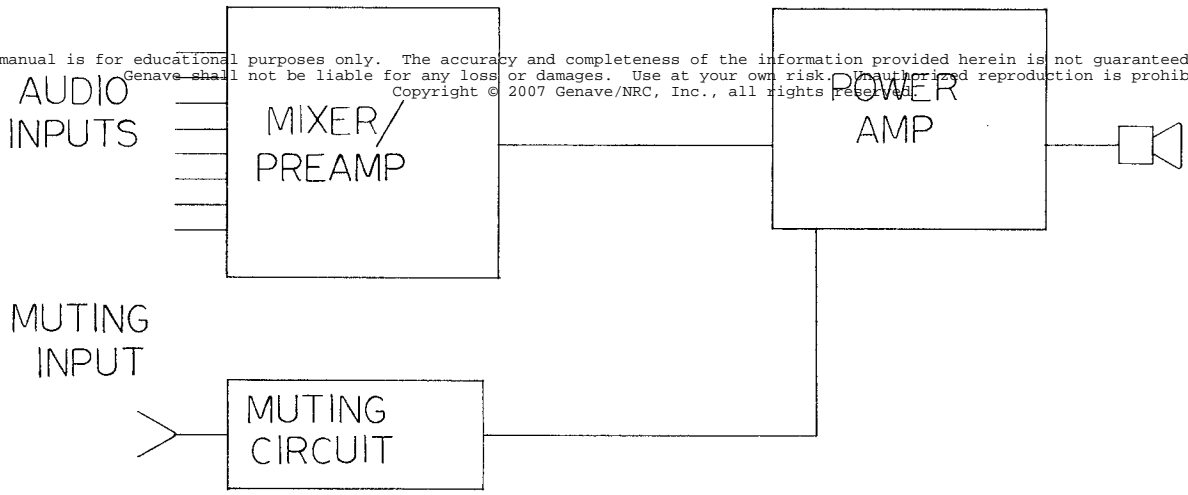
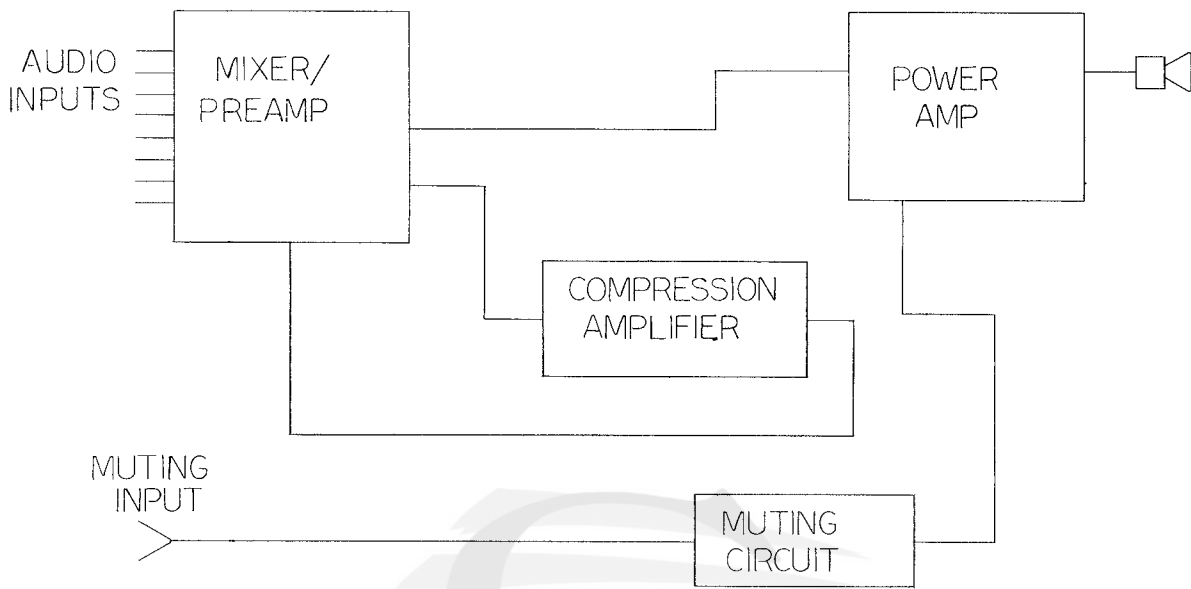


FIGURE 4-4-5
TAU/100, TOP VIEW

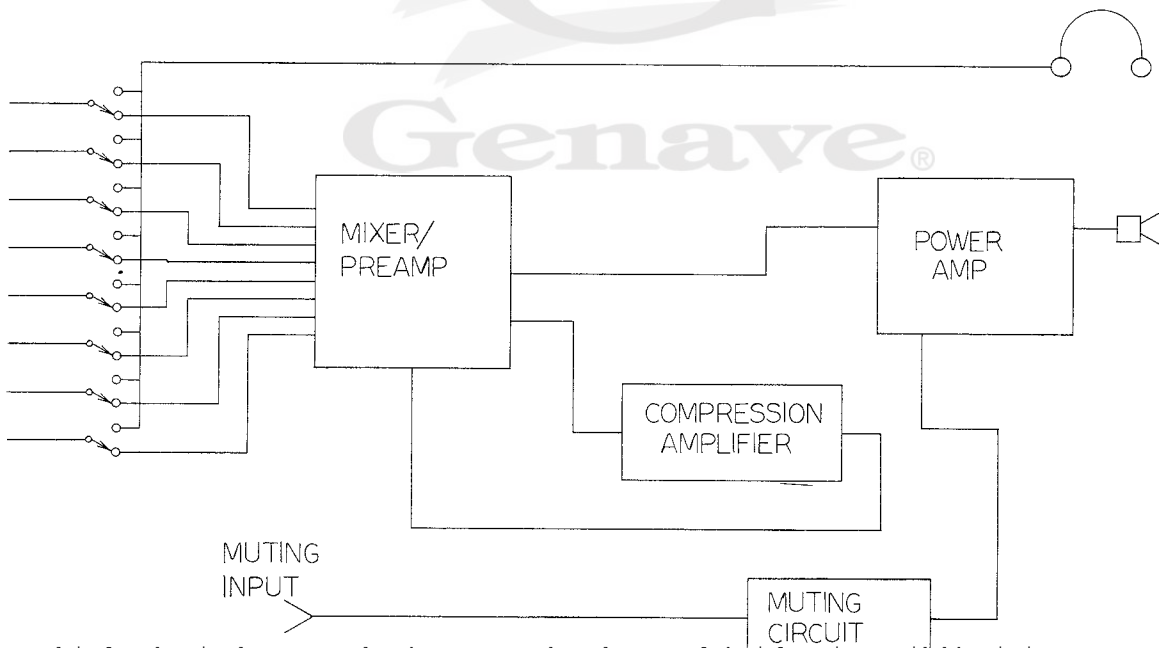
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TAU/80



TAU/81



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DC VOLTAGE MEASUREMENTS

All voltages shown in this table must be measured with a VTVM or equivalent. The input voltage should be set as listed. Sensitivity and volume

controls should both be set to maximum. A variation of $\pm 20\%$ of the measured voltages from those listed may be considered normal.

TAU/80, 14 VDC Input

Ref. No.	No Signal			Modulated			Muted, Modulated		
	E	B	C	E	B	C	E	B	C
Q6	0.0	0.4	4.9	0.0	0.4	4.7	0.0	0.0	14.8
Q7	5.5	4.9	0.5	5.3	4.7	0.5	14.8	14.8	0.0
Q8	0.0	0.5	5.5	0.0	0.5	5.3	0.0	0.0	14.8
Q9	5.2	5.5	0.0	5.2	5.3	0.0	14.8	14.8	0.0
Q10	5.2	5.5	14.8	5.2	5.3	13.2	14.8	14.8	14.8
Q11	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.2	7.8
Q12	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.6	0.0
Q13	0.4	1.0	10.8	0.3	0.9	9.8	0.4	1.0	11.0

TAU/80, 28 VDC Input

Q6	0.0	0.4	5.2	0.0	0.4	5.0	0.0	0.0	19.0
Q7	5.6	5.2	0.5	5.4	5.0	0.5	19.0	19.0	0.0
Q8	0.0	0.5	5.6	0.0	0.5	5.4	0.0	0.0	19.0
Q9	5.3	5.6	0.0	5.2	5.4	0.0	18.0	19.0	0.0
Q10	5.3	5.6	28.8	5.2	5.4	27.0	18.0	19.0	28.0
Q11	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.4	9.6
Q12	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.6	0.0
Q13	0.4	1.0	11.4	0.3	0.8	9.8	0.6	1.2	12.6

TAU/81 & TAU/100, 14 VDC Input

Q1	0.0	4.8	2.7	0.0	0.4	2.4	0.0	0.5	2.5
Q2	14.8	14.8	0.0	13.0	13.0	0.8	14.8	14.8	0.6
Q3	0.0	0.0	14.8	0.8	0.3	13.0	0.6	0.3	14.8
Q4	3.1	2.6	0.6	3.0	2.5	0.6	3.1	2.3	0.6
Q5	0.0	0.6	3.1	0.0	0.6	3.0	0.0	0.6	3.1
Q6	0.0	0.4	5.6	0.0	0.4	6.0	0.0	0.0	14.8
Q7	6.3	5.6	0.5	6.5	6.0	0.4	14.8	14.8	0.0
Q8	0.0	0.5	6.3	0.0	0.4	6.5	0.0	0.0	14.8
Q9	6.0	6.3	0.0	6.4	6.5	0.0	14.8	14.8	0.0
Q10	6.0	6.3	14.8	6.4	6.5	13.0	14.8	14.8	14.8
Q11	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.2	8.2
Q12	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.6	0.0

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FIGURE 4-5-1

DC VOLTAGE MEASUREMENTS

TAU/81 & TAU/100, 28 VDC Input

Q1	0.0	0.5	2.5	0.0	0.5	2.5	0.0	0.5	2.5
Q2	19.0	19.0	0.0	14.5	14.5	0.7	19.5	19.5	0.4
Q3	0.0	0.0	19.0	0.7	0.2	14.5	0.4	0.2	19.5
Q4	3.1	2.5	0.7	3.1	2.5	0.6	3.1	2.5	0.7
Q5	0.0	0.7	3.1	0.0	0.6	3.1	0.0	0.7	3.1
Q6	0.0	0.5	5.8	0.0	0.4	6.0	0.0	0.0	19.5
Q7	6.4	5.8	0.5	6.5	6.0	0.4	19.5	19.5	0.0
Q8	0.0	0.5	6.4	0.0	0.4	6.5	0.0	0.0	19.5
Q9	6.0	6.4	0.0	6.4	6.5	0.0	19.5	19.5	0.0
Q10	6.0	6.4	28.8	6.4	6.5	25.0	19.5	19.5	28.8
Q11	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.4	10.4
Q12	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.6	0.0



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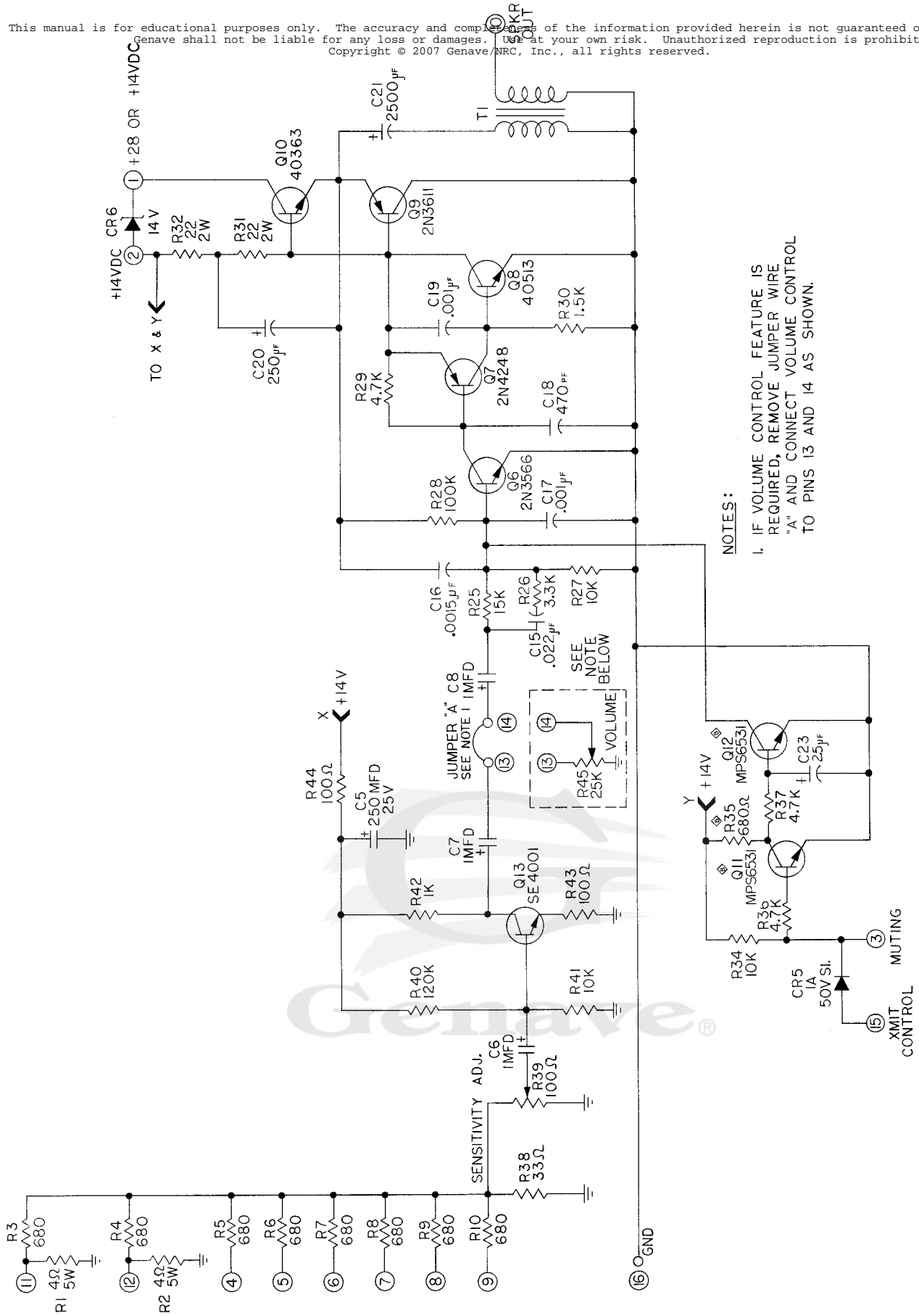
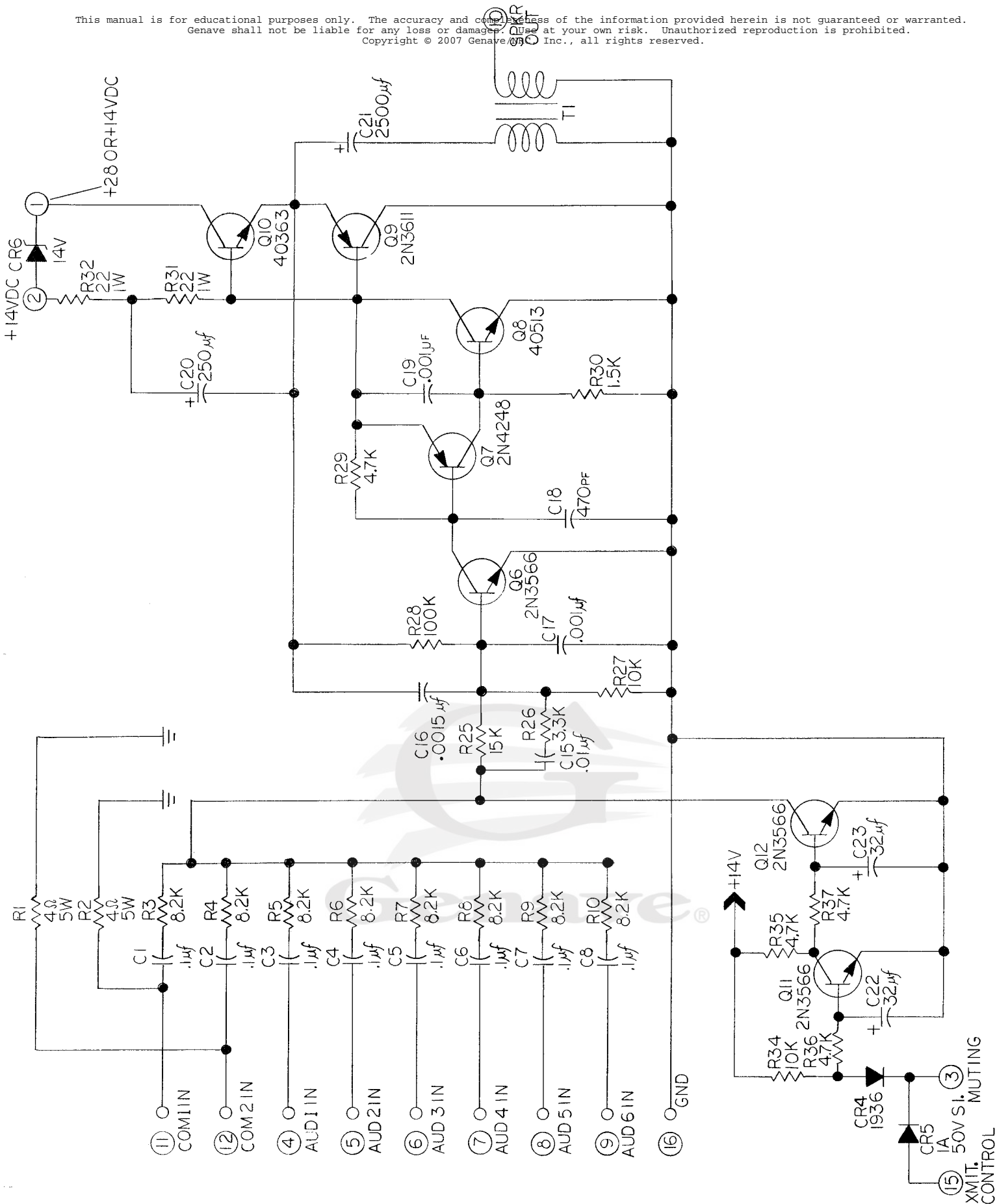
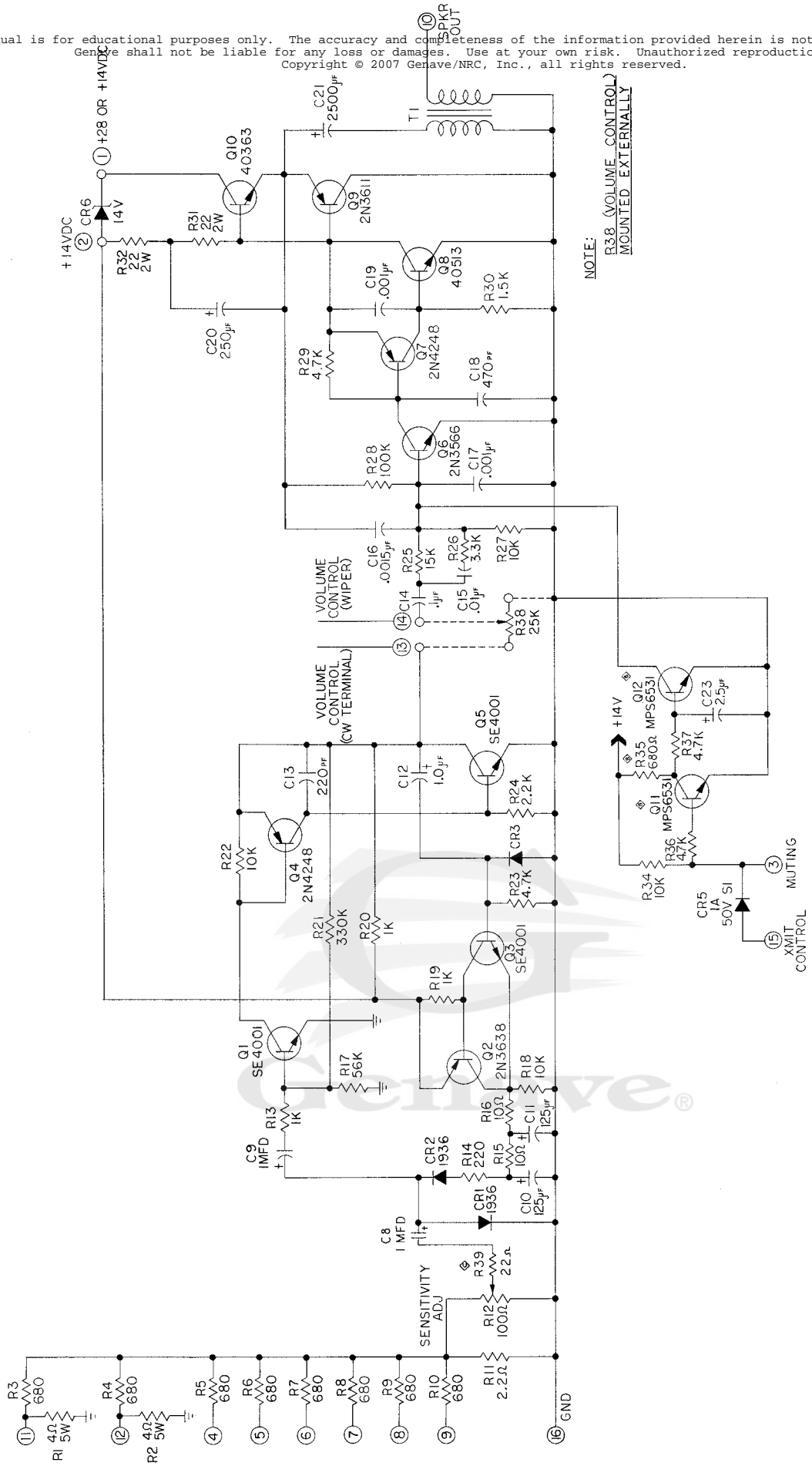


FIGURE 4-5-2
TAU/80 SCHEMATIC



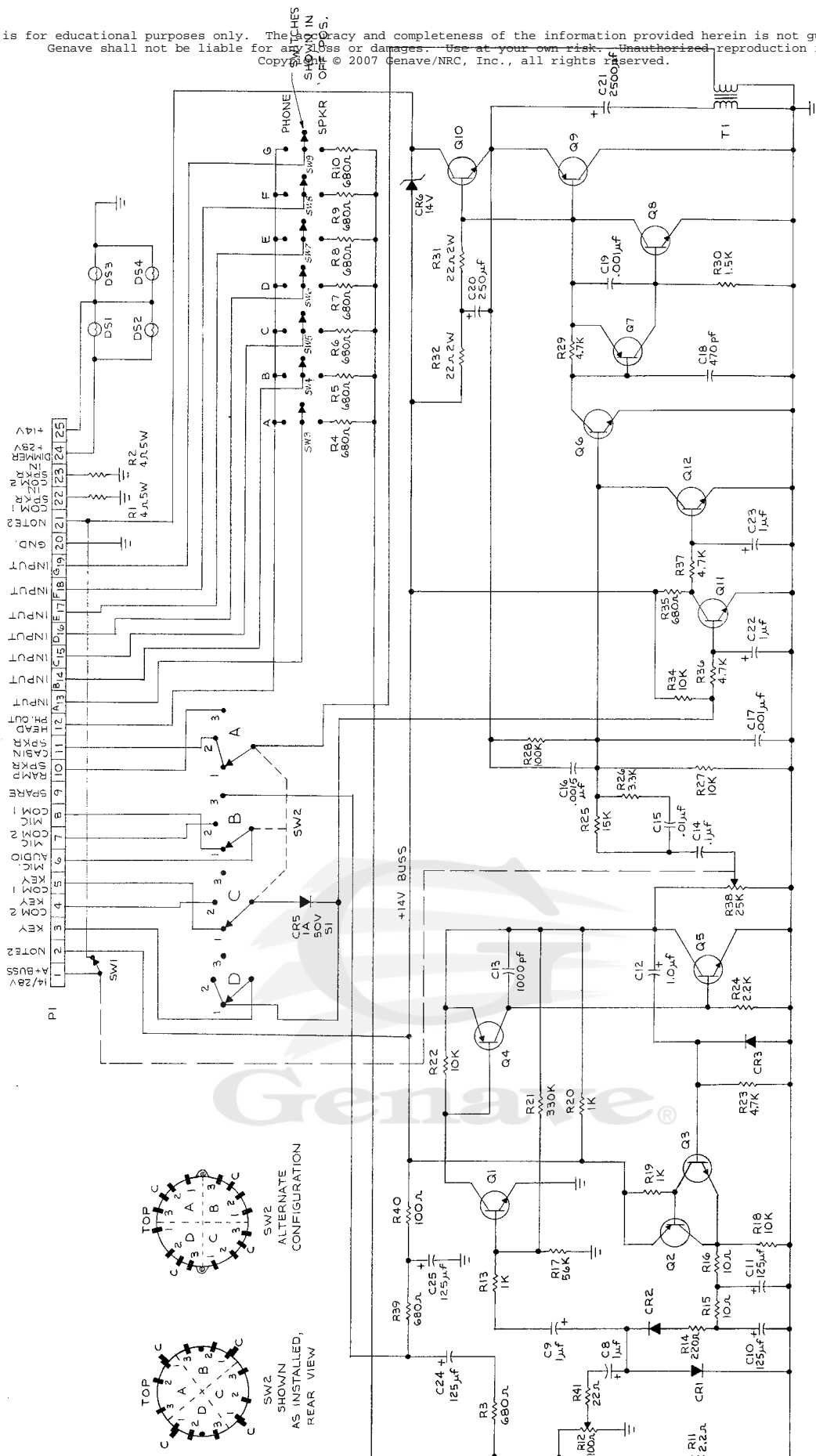
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FIGURE 4-5-4
TAU/81 SCHEMATIC

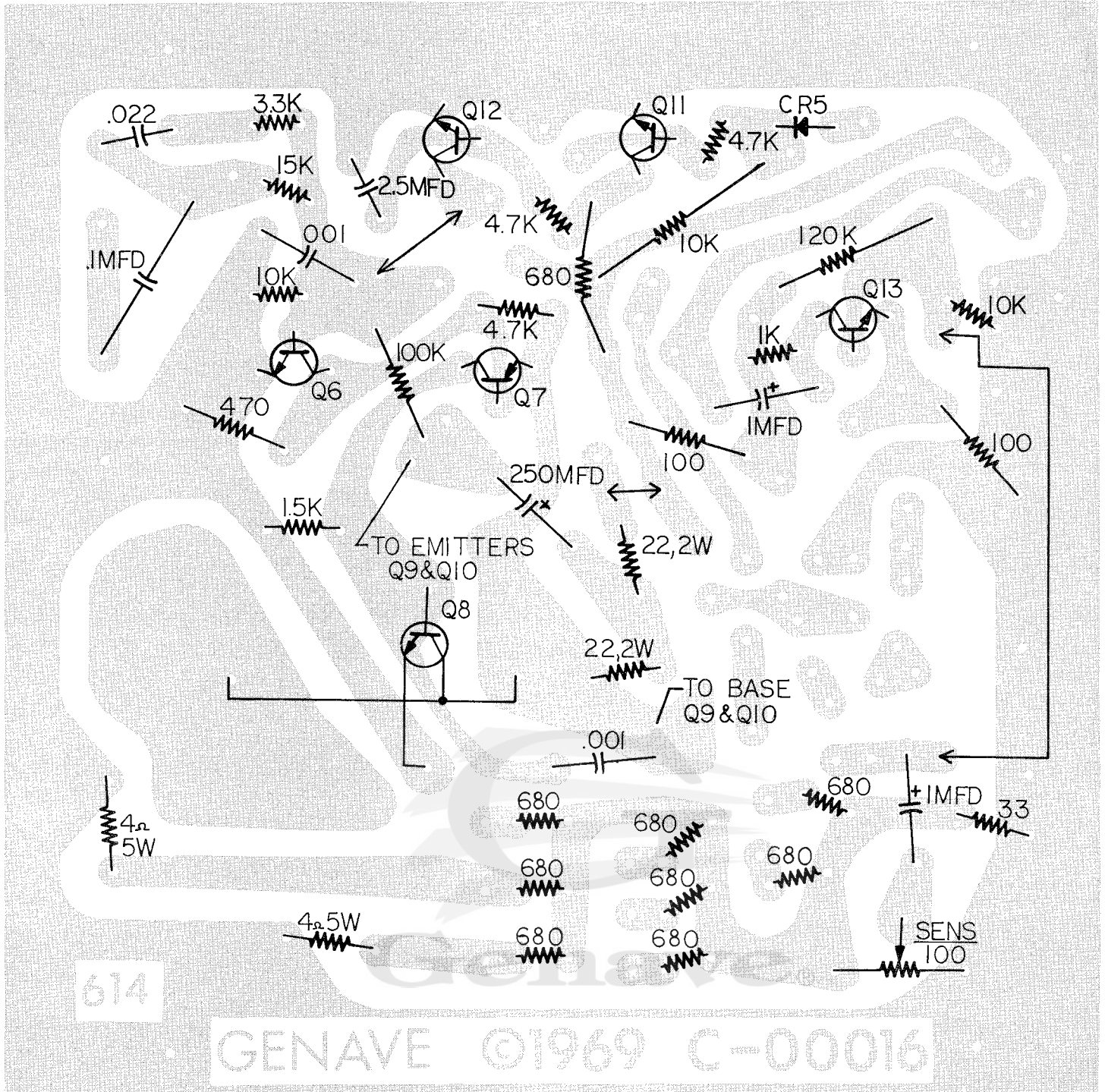
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NOTES:
 1. ALL RESISTORS ARE 1/2W, 10% EXCEPT AS NOTED
 2. FOR 14V OPERATION JUMPER PINS 2+21 AND 20 AND 24.
 3. FOR MASTER RADIO ON/OFF, CONNECT SOLENOID COIL TO PIN21 OF P1.

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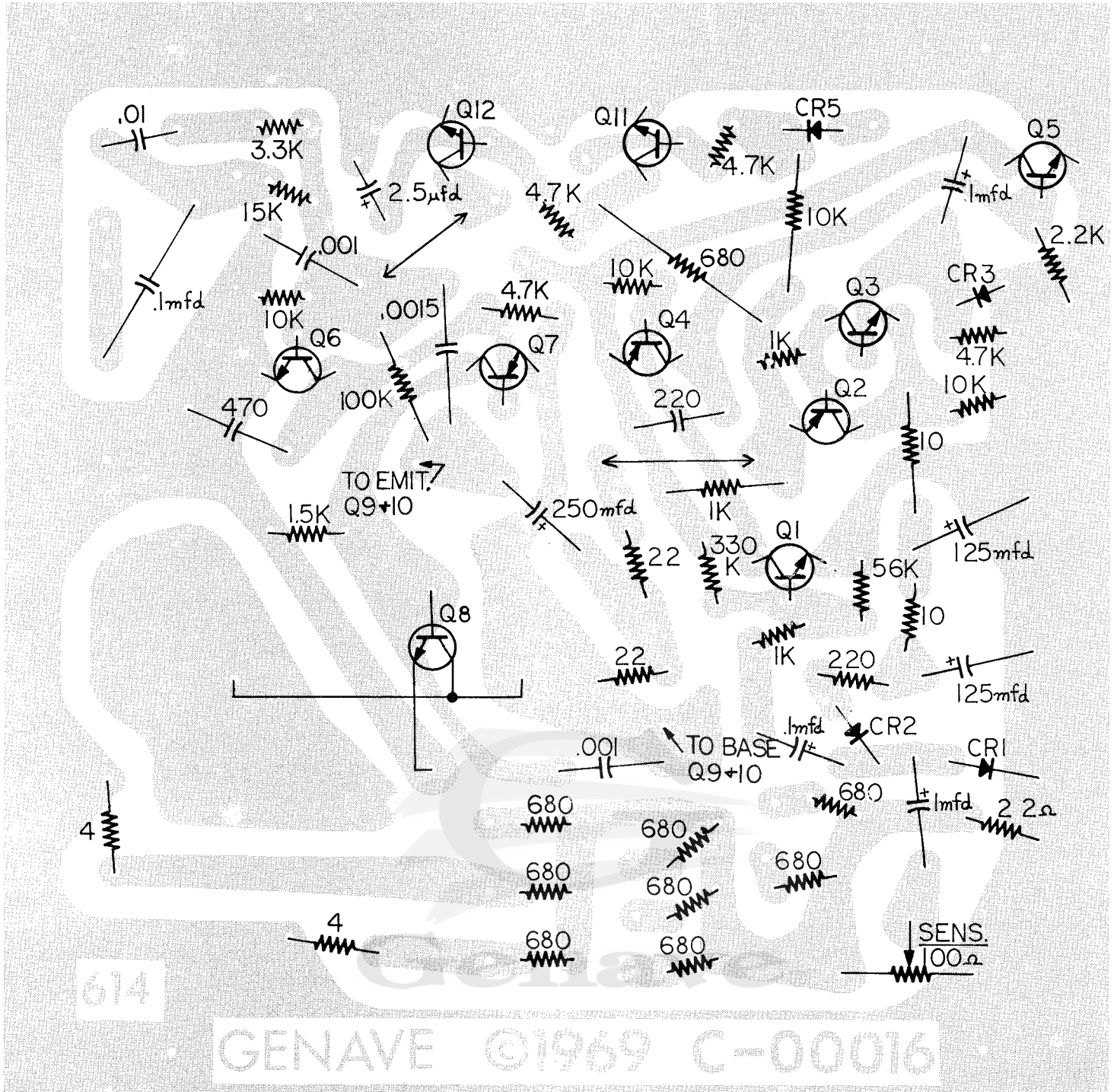
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FIGURE 4-5-6
TAU/80 PARTS/TRACK MAP

TAU/80, 81, & 100



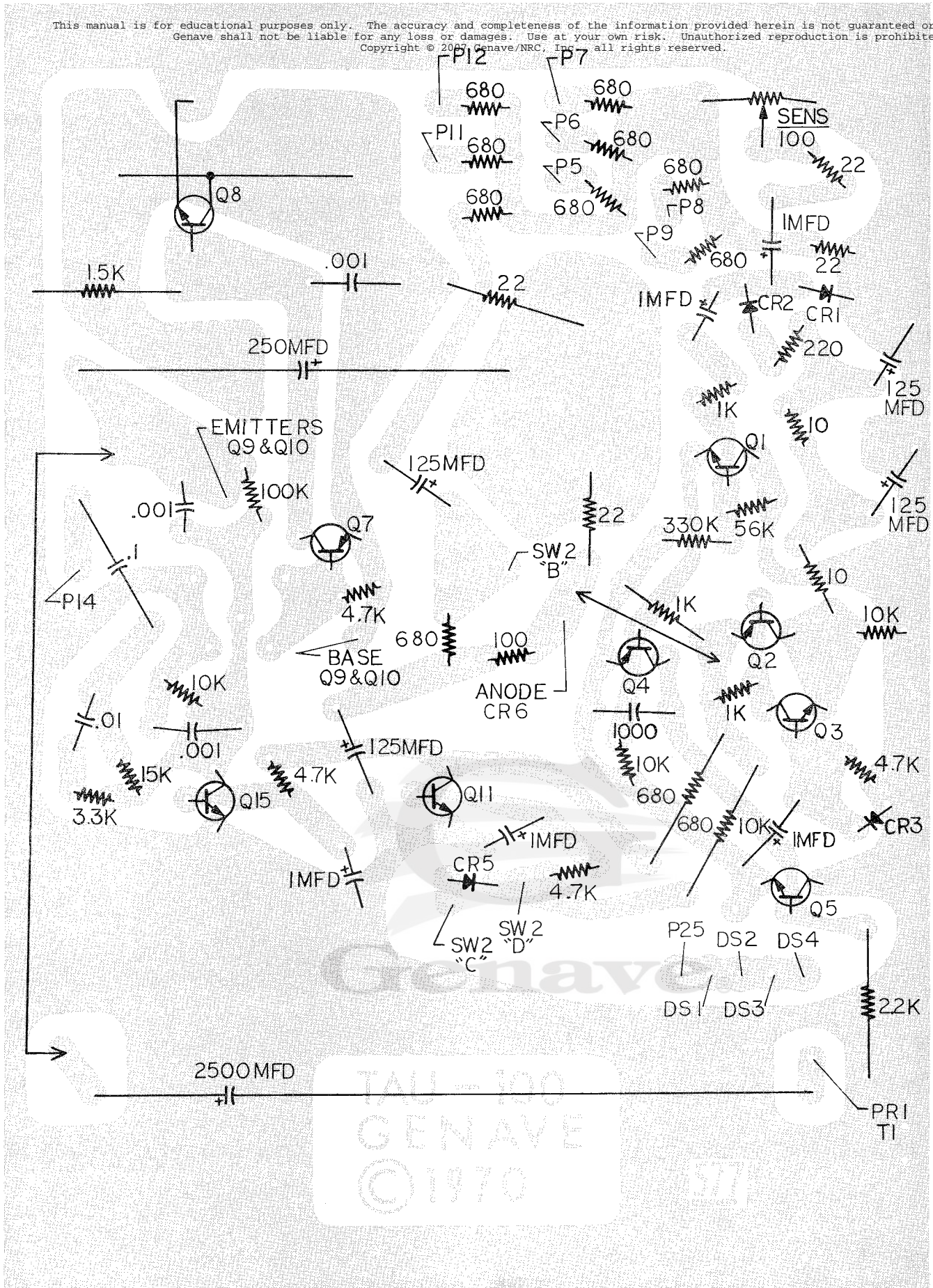


FIGURE 4-5-8
TAU/100 PARTS/TRACK MAP

SECTION V

TAU/80 PARTS LIST

Ref. No.	Genave Part No	DESCRIPTION	Ref. No.	Part No. Genave	DESCRIPTION
CAPACITORS					
C1		Unassigned	R5	4700023	680 ohm, 1/2 W, 10%
C2		Unassigned	R6	4700023	680 ohm, 1/2 W, 10%
C3		Unassigned	R7	4700023	680 ohm, 1/2 W, 10%
C4		Unassigned	R8	4700023	680 ohm, 1/2 W, 10%
C5	1540025	Aluminum Electrolytic, 250 mfd, 15 V	R9	4700023	680 ohm, 1/2 W, 10%
C6	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R10	4700023	680 ohm, 1/2 W, 10%
C7	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R11		Unassigned
C8	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R12		Unassigned
C9		Unassigned	R13		Unassigned
C10		Unassigned	R14		Unassigned
C11		Unassigned	R15		Unassigned
C12		Unassigned	R16		Unassigned
C13		Unassigned	R17		Unassigned
C14		Unassigned	R18		Unassigned
C15	1500024	Mylar, .022 mfd, 100 V	R19		Unassigned
C16	1500005	Mylar, .0015 mfd, 100 V	R20		Unassigned
C17	1500001	Mylar, .001 mfd, 100 V	R21		Unassigned
C18	1520041	Disc Ceramic, 470 pfd, 10%, 100 V	R22		Unassigned
C19	1500001	Mylar, .001 mfd, 100 V	R23		Unassigned
C20	1540025	Aluminum Electrolytic, 250 mfd, 15 V	R24		Unassigned
C21	1540041	Aluminum Electrolytic, 2500 mfd, 10 V	R25	4700039	15 K, 1/2 W, 10%
C22		Unassigned	R26	4700031	3.3 K, 1/2 W, 10%
C23	1540005	Aluminum Electrolytic, 2.5 mfd, 16 V	R27	4700037	10 K, 1/2 W, 10%
DIODES					
CR1		Unassigned	R28	4700049	100 K, 1/2 W, 10%
CR2		Unassigned	R29	4700033	4.7 K, 1/2 W, 10%
CR3		Unassigned	R30	4700027	1.5 K, 1/2 W, 10%
CR4		Unassigned	R31	4740006	Wire Wound, 22 ohm, 2 W, 1%
CR5	4810013	Silicon, General Purpose, 1 Amp, 50 V	R32	4740006	Wire Wound, 22 ohm, 2 W, 1%
CR6	4810016	Zener, 14 V, 10 W	R33		Unassigned
TRANSISTORS					
Q1		Unassigned	R34	4700037	10 K, 1/2 W, 10%
Q2		Unassigned	R35	4700023	680 ohm, 1/2 W, 10%
Q3		Unassigned	R36	4700033	4.7 K, 1/2 W, 10%
Q4		Unassigned	R37	4700033	4.7 K, 1/2 W, 10%
Q5		Unassigned	R38	4700008	33 ohm, 1/2 W, 10%
Q6	4800028	Silicon, NPN, SPS1425, Red	R39	4760013	Potentiometer, 100 ohm, 30%
Q7	4800028	Silicon, NPN, SPS1425, Red	R40	4700050	120 K, 1/2 W, 10%
Q8	4800041	Silicon, NPN, 40514	R41	4700037	10 K, 1/2 W, 10%
Q9	4800003	Silicon, PNP, 2N3611	R42	4700025	1 K, 1/2 W, 10%
Q10	4800001	Silicon, NPN, 2N3055	R43	4700013	100 ohm, 1/2 W, 10%
Q11	4800028	Silicon, NPN, SPS1425, Red	R44	4700013	100 ohm, 1/2 W, 10%
Q12	4800028	Silicon, NPN, SPS1425, Red	R45	4760007	Potentiometer, 25 K, 20% (Optional)
Q13	4800028	Silicon, NPN, SPS1425, Red	TRANSFORMERS		
RESISTORS					
R1	4740016	Wire Wound, 4 ohm, 5 W, 10%	T1	5600008	Audio Output
R2	4740016	Wire Wound, 4 ohm, 5 W, 10%	MISCELLANEOUS		
R3	4700023	680 ohm, 1/2 W, 10%	J1	2100011	Connector, 16-pin, Female
R4	4700023	680 ohm, 1/2 W, 10%	P1	2100014	Connector, 16-pin, Male
			CV1	2100018	Cover, Connector, for J1
			CV2	2500200	Cover, Transistor
				2500275	Chassis
				2500280	Cover, Chassis

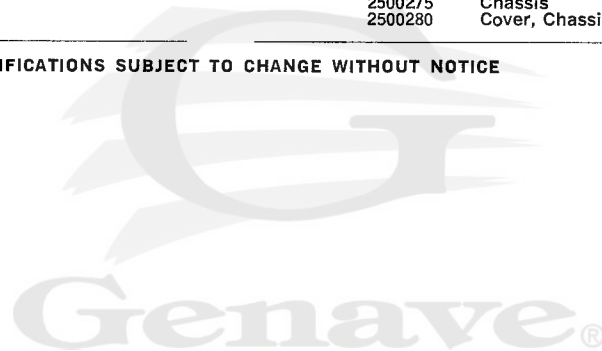
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE


Genave®

TAU/81 PARTS LIST

Ref. No.	Genave Part No.	DESCRIPTION	Ref. No.	Genave Part No.	DESCRIPTION
CAPACITORS					
C1		Unassigned	R5	4700023	680 ohm, 1/2 W, 10%
C2		Unassigned	R6	4700023	680 ohm, 1/2 W, 10%
C3		Unassigned	R7	4700023	680 ohm, 1/2 W, 10%
C4		Unassigned	R8	4700023	680 ohm, 1/2 W, 10%
C5		Unassigned	R9	4700023	680 ohm, 1/2 W, 10%
C6		Unassigned	R10	4700023	680 ohm, 1/2 W, 10%
C7		Unassigned	R11	4700001	2.2 ohm, 1/2 W, 10%
C8	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R12	4700013	Potentiometer, 100 ohm, 30%
C9	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R13	4700023	1K, 1/2 W, 10%
C10	1540023	Aluminum Electrolytic, 125 mfd, 10 V	R14	4700017	220 ohm, 1/2 W, 10%
C11	1540023	Aluminum Electrolytic, 125 mfd, 10 V	R15	4700003	10 ohm, 1/2 W, 10%
C12	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R16	4700003	10 ohm, 1/2 W, 10%
C13	1520033	Z5F Disc, 220 pfd, 10%, 500 V	R17	4700046	56 K, 1/2 W, 10%
C14	1500035	Mylar, .1 mfd, 10%, 100 V	R18	4700017	10 K, 1/2 W, 10%
C15	1500018	Mylar, .01 mfd, 10%, 100 V	R19	4700023	1 K, 1/2 W, 10%
C16	1500005	Mylar, .0015 mfd, 10%, 100 V	R20	4700023	1 K, 1/2 W, 10%
C17	1500001	Mylar, .001 mfd, 10%, 100 V	R21	4700055	330 K, 1/2 W, 10%
C18	1520041	N1500 Disc, 470 pfd, 10%	R22	4700037	10 K, 1/2 W, 10%
C19	1500001	Mylar, .001 mfd, 10%, 100 V	R23	4700033	4.7 K, 1/2 W, 10%
C20	1540025	Aluminum Electrolytic, 250 mfd, 15 V	R24	4700029	2.2 K, 1/2 W, 10%
C21	1540041	Aluminum Electrolytic, 2500 mfd, 10 V	R25	4700039	15 K, 1/2 W, 10%
C22		Unassigned	R26	4700031	3.3 K, 1/2 W, 10%
C23	1540005	Aluminum Electrolytic, 2.5 mfd, 16 V	R27	4700037	10 K, 1/2 W, 10%
DIODES					
CR1	4810017	Silicon, High Speed Switching, FD1936	R28	4700049	100 K, 1/2 W, 10%
CR2	4810017	Silicon, High Speed Switching, FD1936	R29	4700033	4.7 K, 1/2 W, 10%
CR3	4810017	Silicon, High Speed Switching, FD1936	R30	4700027	1.5 K, 1/2 W, 10%
CR4		Unassigned	R31	4740006	Wire Wound, 22 ohm, 2 W, 1%
CR5	4810013	Silicon, General Purpose, 1 Amp, 50 V	R32	4740006	Wire Wound, 22 ohm, 2 W, 1%
CR6	4810016	Zener, 14 V, 10 W	R33		Unassigned
TRANSISTORS					
Q1	4800028	Silicon, NPN, SPS1425, Red	R34	4700037	10 K, 1/2 W, 10%
Q2	4800025	Silicon, PNP, SPS1422, Vio	R35	4700023	680 ohm, 1/2 W, 10%
Q3	4800028	Silicon, NPN, SPS1425, Red	R36	4700033	4.7 K, 1/2 W, 10%
Q4	4800008	Silicon, PNP, SPS1426, Blk	R37	4700033	4.7 K, 1/2 W, 10%
Q5	4800028	Silicon, NPN, SPS1425, Red	R38	4760007	Potentiometer, 25 K, 20%
Q6	4800028	Silicon, NPN, SPS1425, Red	R39		Unassigned
Q7	4800028	Silicon, NPN, SPS1425, Red	R40		Unassigned
Q8	4800041	Silicon, NPN, 40514	R41	4700006	22 ohm, 1/2 W, 10%
Q9	4800003	Silicon, PNP, 2N3611	R42		Unassigned
Q10	4800001	Silicon, NPN, 2N3055	R43		Unassigned
Q11	4800028	Silicon, NPN, SPS1425, Red	R44		Unassigned
Q12	4800028	Silicon, NPN, SPS1425, Red	R45		Unassigned
Q13	4800028	Silicon, NPN, SPS1425, Red	TRANSFORMERS		
RESISTORS					
R1	4740016	Wire Wound, 4 ohm, 5 W, 10%	T1	5600008	Audio Output
R2	4740016	Wire Wound, 4 ohm, 5 W, 10%	MISCELLANEOUS		
R3	4700023	680 ohm, 1/2 W, 10%	J1	2100011	Connector, 16-pin, Female
R4	4700023	680 ohm, 1/2 W, 10%	P1	2100014	Connector, 16-pin, Male
			CV1	2100018	Cover, Connector, for J1
			CV2	2500200	Cover, Transistor
				2500275	Chassis
				2500280	Cover, Chassis

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



TAU/100 PARTS LIST

Part No.	Genave Ref. No.	DESCRIPTION	Part No.	Genave Ref. No.	DESCRIPTION
CAPACITORS					
C1		Unassigned	R9	4700023	680 ohm, 1/2 W, 10%
C2		Unassigned	R10	4700023	680 ohm, 1/2 W, 10%
C3		Unassigned	R11	4700001	2.2 ohm, 1/2 W, 10%
C4		Unassigned	R12	4760013	Potentiometer, 100 ohm, 30%
C5		Unassigned	R13	4700025	1 K, 1/2 W, 10%
C6		Unassigned	R14	4700017	220 ohm, 1/2 W, 10%
C7		Unassigned	R15	4700003	10 ohm, 1/2 W, 10%
C8	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R16	4700003	10 ohm, 1/2 W, 10%
C9	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R17	4700046	56 K, 1/2 W, 10%
C10	1540024	Aluminum Electrolytic, 125 mfd, 16 V	R18	4700037	10 K, 1/2 W, 10%
C11	1540024	Aluminum Electrolytic, 125 mfd, 16 V	R19	4700025	1 K, 1/2 W, 10%
C12	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R20	4700025	1 K, 1/2 W, 10%
C13	1520048	Z5P Disc, .001 mfd, 10%	R21	4700055	330 K, 1/2 W, 10%
C14	1540003	Aluminum Electrolytic, 1 mfd, 40 V	R22	4700037	10 K, 1/2 W, 10%
C15	1500018	Mylar, .01 mfd, 10%, 100 V	R23	4700033	4.7 K, 1/2 W, 10%
C16	1500005	Mylar, .0015 mfd, 10%, 100 V	R24	4700029	2.2 K, 1/2 W, 10%
C17	1500001	Mylar, .001 mfd, 10%, 100 V	R25	4700039	15 K, 1/2 W, 10%
C18	1520041	N1500 Disc, 470 pfd, 10%	R26	4700031	3.3 K, 1/2 W, 10%
C19	1520001	Mylar, .001 mfd, 10%, 100 V	R27	4700037	10 K, 1/2 W, 10%
C20	1540025	Aluminum Electrolytic, 250 mfd, 15 V	R28	4700049	100 K, 1/2 W, 10%
C21	1540041	Aluminum Electrolytic, 2500 mfd, 10 V	R29	4700033	4.7 K, 1/2 W, 10%
C22		Unassigned	R30	4700027	1.5 K, 1/2 W, 10%
C23	1540005	Aluminum Electrolytic, 2.5 mfd, 16 V	R31	4740006	Wire Wound, 22 ohm, 1/2 W, 1%
C24	1540024	Aluminum Electrolytic, 125 mfd, 16 V	R32	4740006	Wire Wound, 22 ohm, 1/2 W, 1%
C25	1540024	Aluminum Electrolytic, 125 mfd, 16 V	R33		Unassigned
DIODES					
CR1	4810017	Silicon, High Speed Switching, FD1936	R34	4700037	10 K, 1/2 W, 10%
CR2	4810017	Silicon, High Speed Switching, FD1936	R35	4700023	680 ohm, 1/2 W, 10%
CR3	4810017	Silicon, High Speed Switching, FD1936	R36	4700033	4.7 K, 1/2 W, 10%
CR4		Unassigned	R37	4700033	4.7 K, 1/2 W, 10%
CR5	4810013	Silicon, General Purpose, 1 Amp, 50 V	R38	4760007	Potentiometer, 25 K, 20%, with Switch
CR6	4810016	Zener, 14 V, 10 W	R39	4700023	680 ohm, 1/2 W, 10%
LAMPS					
DS1	3900003	Backlighting, 14 V, 80 ma, Lunar White	R40	4700013	100 ohm, 1/2 W, 10%
DS2	3900003	Backlighting, 14 V, 80 ma, Lunar White	R41	4700006	22 ohm, 1/2 W, 10%
DS3	3900003	Backlighting, 14 V, 80 ma, Lunar White	R42		Unassigned
DS4	3900003	Backlighting, 14 V, 80 ma, Lunar White	R43		Unassigned
TRANSISTORS					
Q1	4800028	Silicon, NPN, SPS1425, Red	R44		Unassigned
Q2	4800025	Silicon, PNP, SPS1422, Vio	R45		Unassigned
Q3	4800028	Silicon, NPN, SPS1425, Red	SWITCHES		
Q4	4800008	Silicon, PNP, SPS1426, Blk	SW1		Part of R38
Q5	4800028	Silicon, NPN, SPS1425, Red	SW2	5100038	C1/C2/PA Selector
Q6	4800028	Silicon, NPN, SPS1425, Red	SW3	5100001	Function Selectors, SPST
Q7	4800028	Silicon, NPN, SPS1425, Red	SW4	5100001	Function Selectors, SPST
Q8	4800041	Silicon, NPN, 40514	SW5	5100001	Function Selectors, SPST
Q9	4800003	Silicon, PNP, 2N3611	SW6	5100001	Function Selectors, SPST
Q10	4800001	Silicon, NPN, 2N3055	SW7	5100001	Function Selectors, SPST
Q11	4800028	Silicon, NPN, SPS1425, Red	SW8	5100001	Function Selectors, SPST
Q12	4800028	Silicon, NPN, SPS1425, Red	SW9	5100001	Function Selectors, SPST
Q13	4800028	Silicon, NPN, SPS1425, Red	MISCELLANEOUS		
RESISTORS					
R1	4740016	Wire Wound, 4 ohm, 5 W, 10%	J1	2100026	Connector, 25-pin, Female
R2	4740016	Wire Wound, 4 ohm, 5 W, 10%	P1	2100027	Connector, 25-pin, Male
R3	4700023	680 ohm, 1/2 W, 10%		2100025	Clamp, Connector
R4	4700023	680 ohm, 1/2 W, 10%		2400019	Knob, C1/C2/PA Selector
R5	4700023	680 ohm, 1/2 W, 10%		2500247	Knob, Volume
R6	4700023	680 ohm, 1/2 W, 10%		2500090	Screw, Mounting
R7	4700023	680 ohm, 1/2 W, 10%		2500650	Chassis
R8	4700023	680 ohm, 1/2 W, 10%		2500930	Tray, Mounting
				2500968	Panel, Trim
				2501182	Panel, Light
				9050005	Plug, Button
				5100003	Cap, Glamor Function Switch, Black
				5100004	Cap, Glamor Function Switch, White
				5100005	Cap, Glamor Function Switch, Red
				5100006	Cap, Glamor Function Switch, Blue

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE