

TAU/88

AUDIO AMPLIFIER

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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GENERAL
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ELECTRONICS
INC.



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Correction Bulletin

CB7401

January 16, 1974

The wiring diagram located on the rear page of the TAU/88 Installation Manual is incorrect. The speaker/phone switches shown connected to VHF1 and

VHF2 in the old illustration allowed the speaker line to open-up in the OFF switch position which could possibly damage some unprotected VHF units. In order to rectify this problem three new wiring diagrams are included with this correction bulletin.

In an attempt to clarify a few of the installation problems encountered in the field, an additional illustration has been included with this correction, which may help in simplifying applications of the TAU/88. The actual utilization of the equipment is limited only by the sophistication of the system into which the unit is installed and the ingenuity of the installing technician. It is our hope that through the use of Illustration A and a few moments spent with the TAU/88 Maintenance Manual, a skilled technician will be able to employ the TAU/88 to fulfill an unlimited number of audio amplification requirements.

The enclosed illustrations B through D are intended as guides only and do not under any circumstances preclude many other

Illustration B shows an installation which is recommended for typical applications. The audio from the VHF receivers can be applied directly to any of the low level inputs or if the number of inputs to the amplifier are critical, the two high level inputs can be converted to low level inputs by removing R9 and R10 from the internal amplifier circuitry. To do this refer to the Parts/Track Map or Component Location Diagram of the TAU/88 Maintenance Manual.

Illustration C depicts an installation in which the VHF receivers have high level speaker output only. In this application the high level inputs may have to be converted as described above, if a sufficient number of low level inputs are not available.

Illustration D is a third alternative, however, this application does have several limitations. This installation requires the use of DPDT switches without the center-OFF position. This switching arrangement precludes the ability to switch off the receiver output other than by reducing the receiver volume. The use of the high level amplifier inputs requires the use of high current capability switches in order to handle the high current levels normally associated with speaker audio circuits.

TAC/83 Connector Wiring

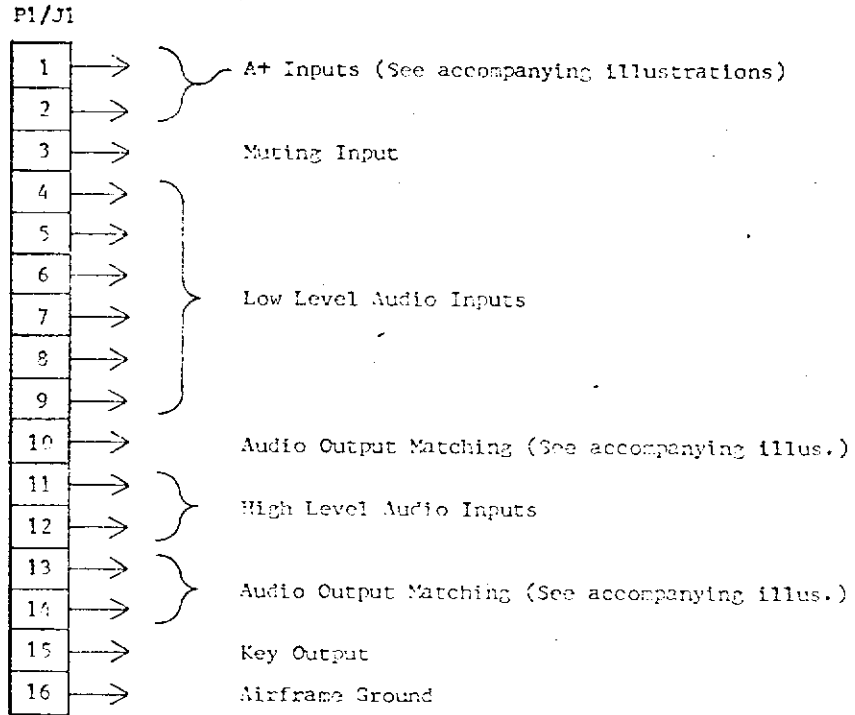


ILLUSTRATION B

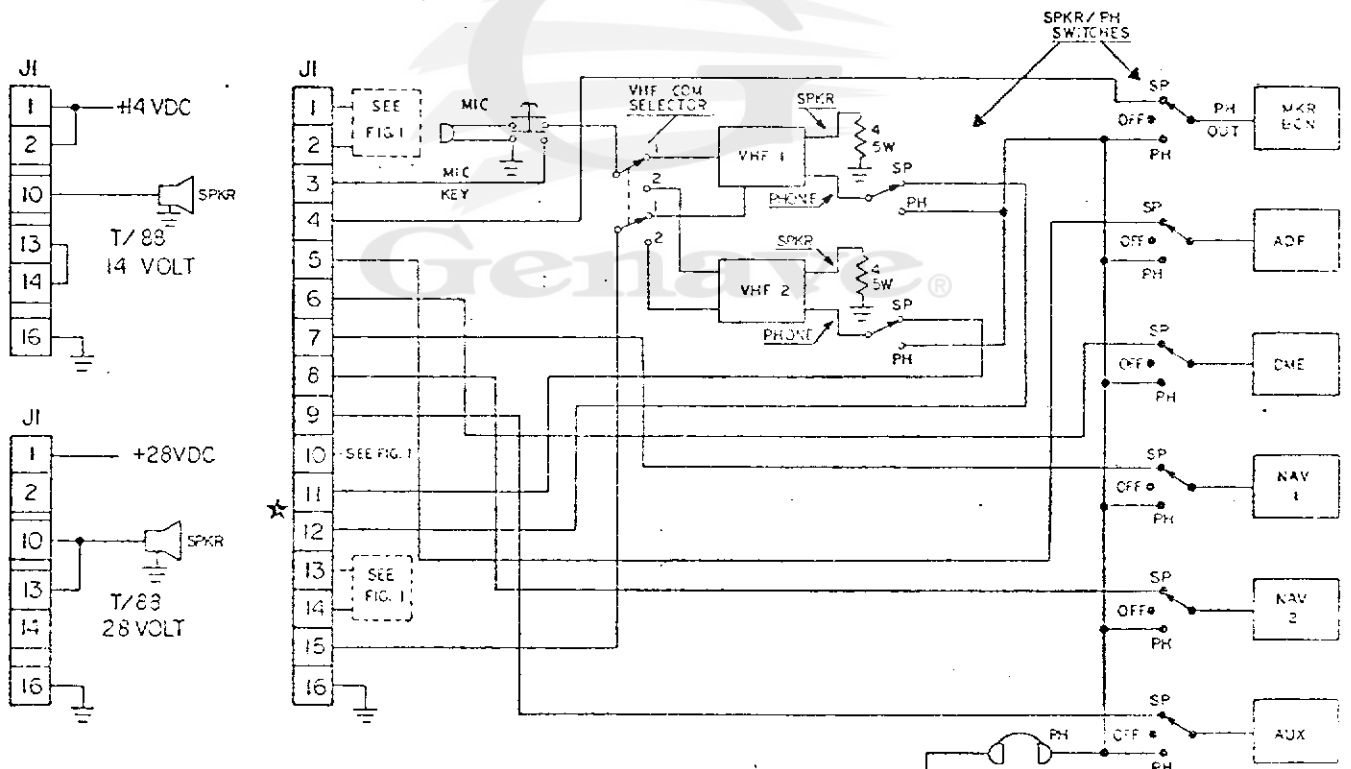


FIG 1

FIG. 2

ILLUSTRATION C

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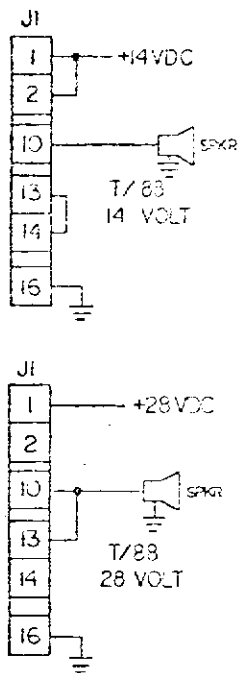
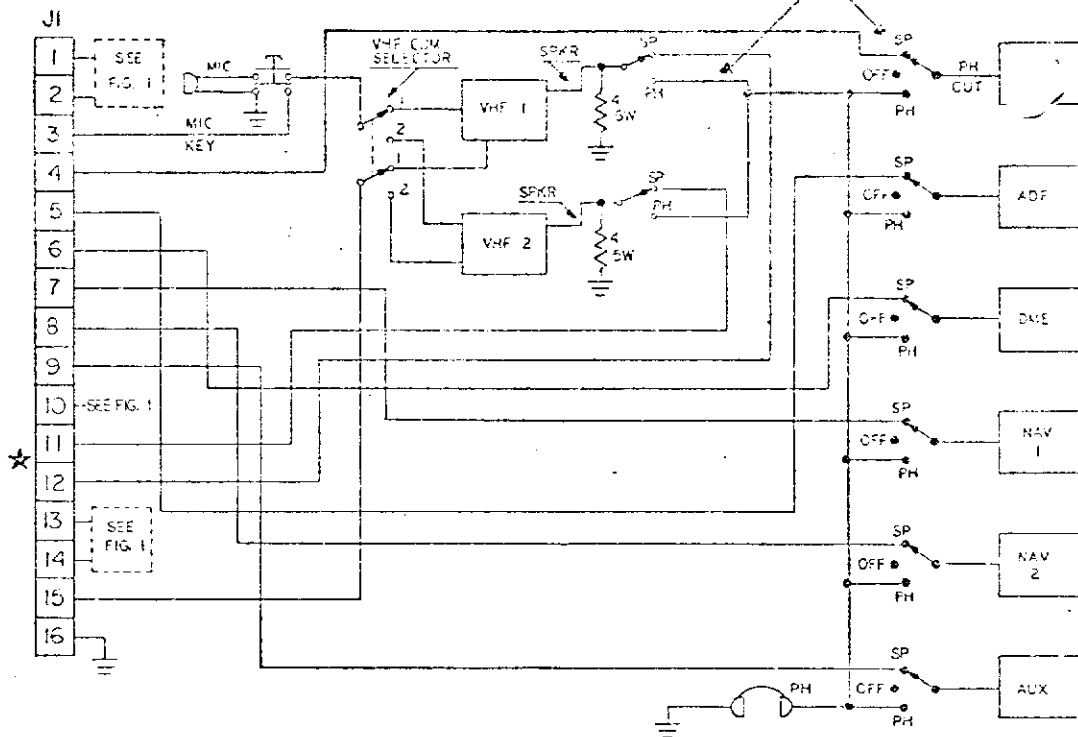


FIG 1



★NOTE: INTERNAL 40HM LOAD RESISTORS MUST BE REMOVED (SEE TEXT)

FIG 2

ILLUSTRATION D

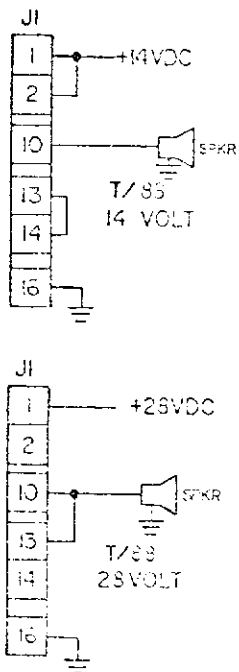


FIG 1

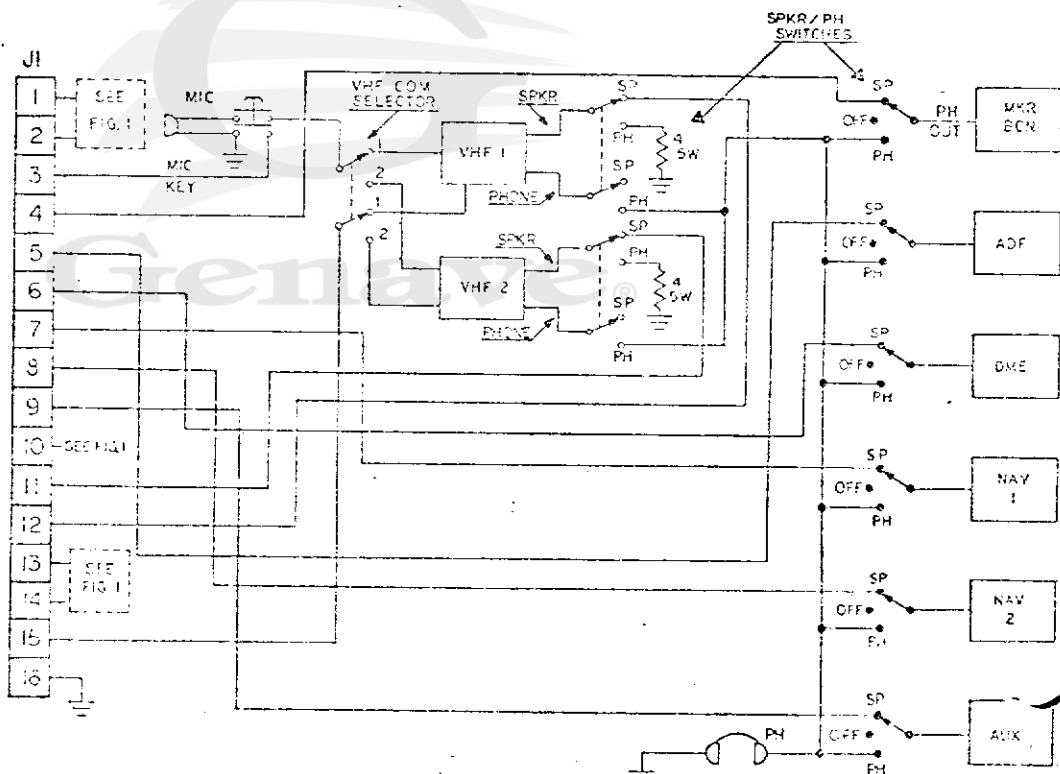


FIG 2

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Service Bulletin

GENERAL
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4141 KINGMAN DRIVE
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SB7401

January 18, 1974

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

Following the printing of the TAU/88 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/88 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 3 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 9 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.

* TAU/88's after Serial No. 11-35 will contain this modification.

Parts Required for Modification

R35 4710012 330 ohm, $\frac{1}{4}$ W, 10%

CR6 4810011 Zener Diode, 24V, 1W, 10%

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



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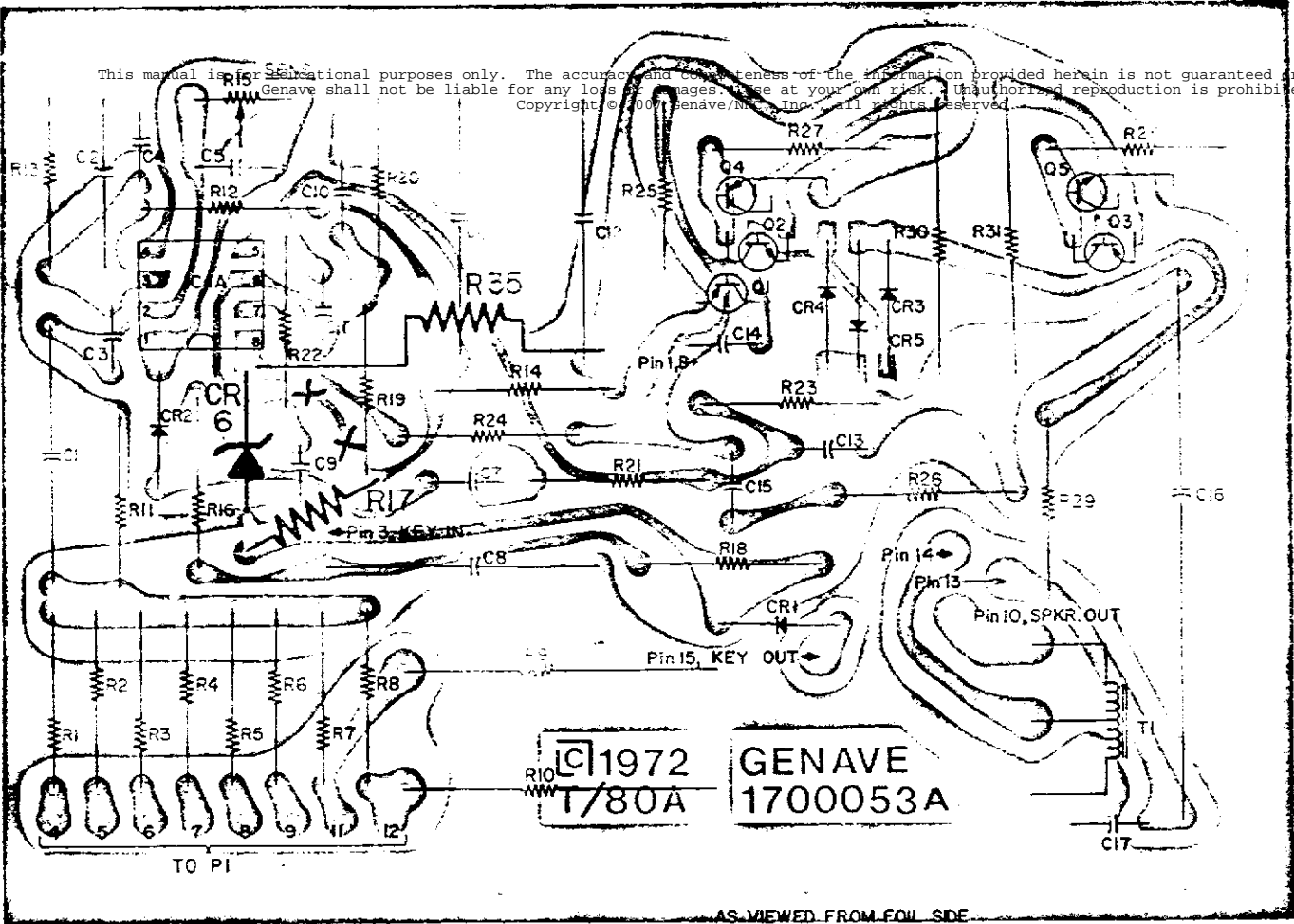
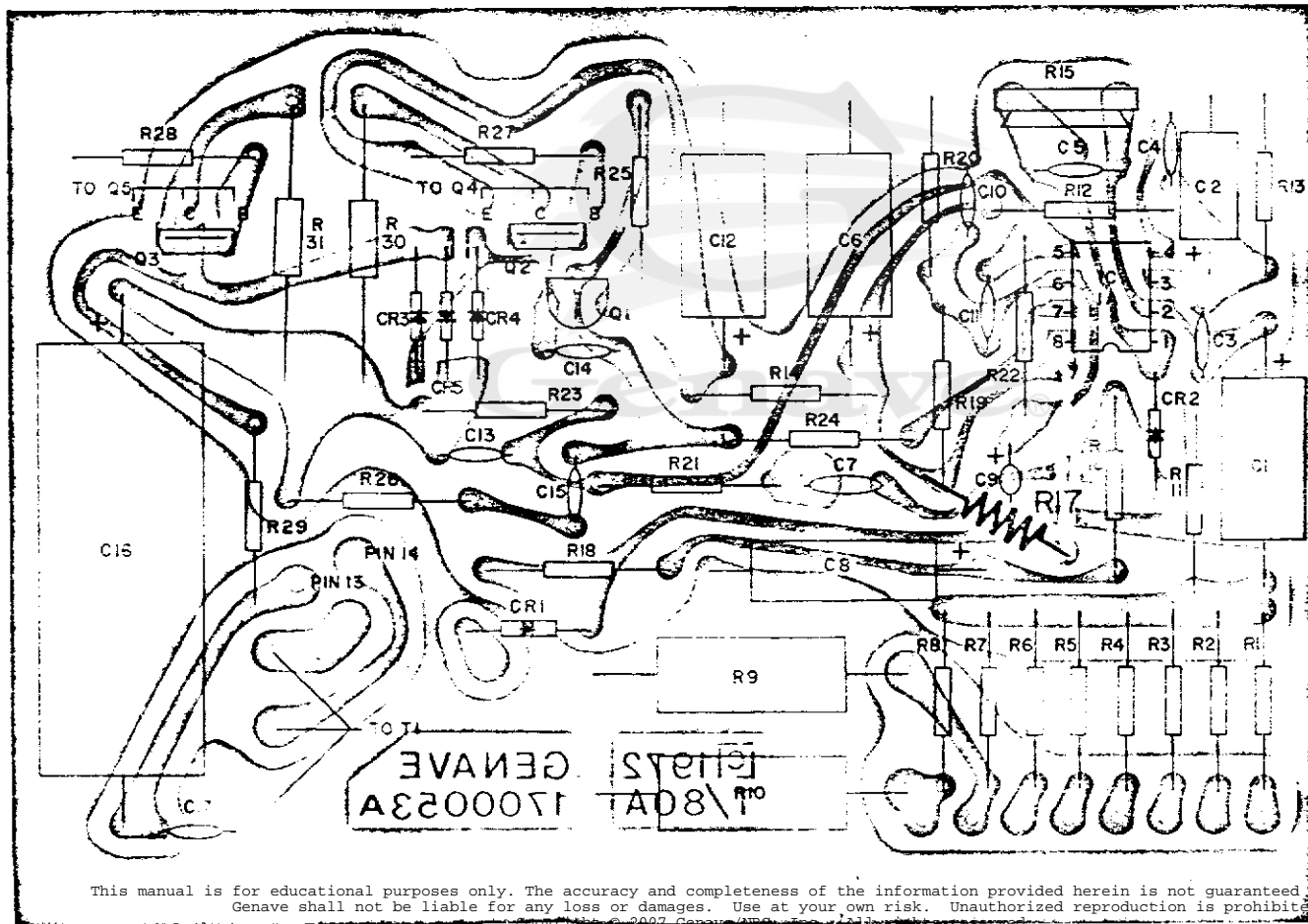


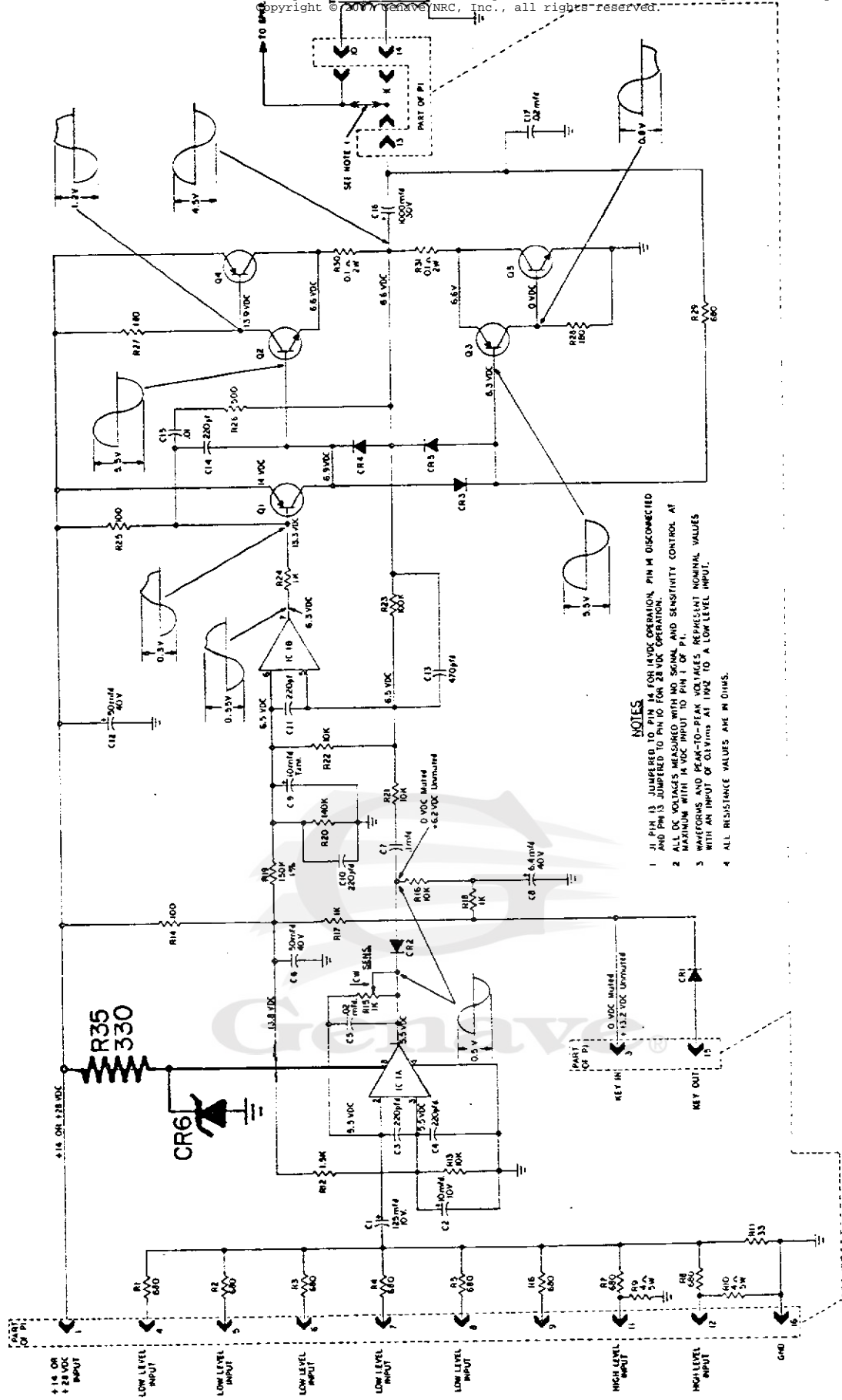
Figure 4 PARTS/TRACK MAP



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Figure 4-5-3 COMPONENT LOCATION DIAGRAM

Model: TAU/88



- NOTES**
1. J1 PIN 13 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 0.5VMS AT 1MS TO A LOW LEVEL INPUT.
 4. ALL RESISTANCE VALUES ARE IN OHMS.

Figure 6
SCHEMATIC DIAGRAM



4141 KINGMAN DRIVE
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SB7403

February 19, 1974

Subject: Audio Amp Muting Transients

Complaints from the field have arisen on both TAU/88 and TAU/200 audio amp muting transient "thump" or "pop."

The following changes have been made in current production units to eliminate this annoyance.

R 17	1K ^{WAS} (4700025)	3.3K ^{NOW} (4710023)
R 18	1K (4700025)	3.3K (4710023)
C 8	6.4uf/40v (1540012)	10uf/25v (1540014)

IF MODIFYING IN THE FIELD, DO NOT USE LARGER VALUES OR FEEDBACK MAY OCCUR.

ADDITIONAL MODEL TAU/200F INFORMATION

The TAU/200 and TAU/200F models utilize the same circuitry except for one minor difference. No "auto" function is provided for the AUX position of the microphone selector. The wire from pin 3 of S9-sect 1-front to pin 21 of P1 is eliminated.

If the "auto" function on AUX is desired, merely install the missing wire on the circuit board as part of your normal installation planning and wiring.

SECTION I

INFORMATION GENERAL

1-1. Introduction

This service manual contains all of the information normally required to install, operate, and maintain the TAU/88 Audio Amplifier.

1-2. Description

The TAU/88 consists of a self-contained, remote mounted audio amplifier. It utilizes 1 Integrated Circuit and 5 silicon transistors in an all solid state design to provide 10 watts of audio output.

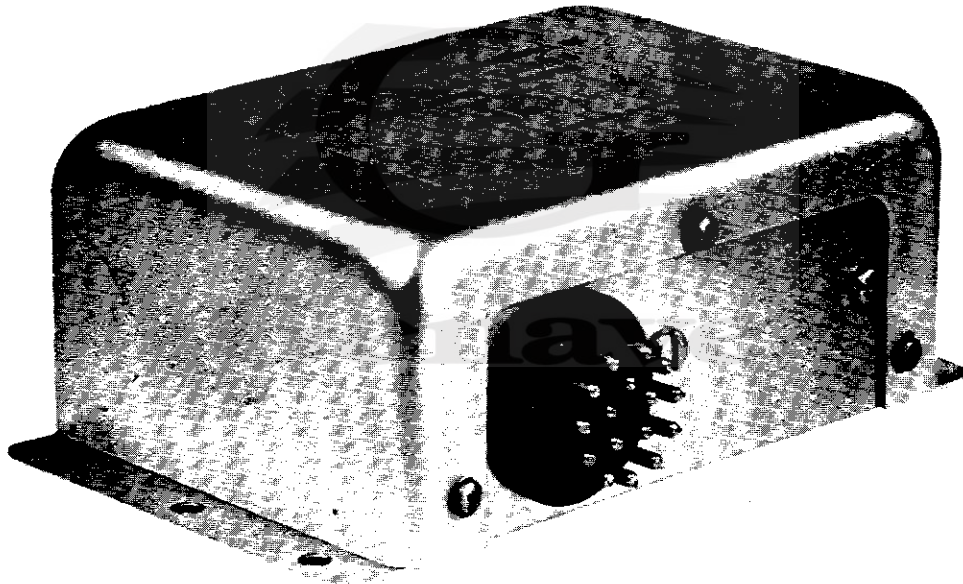
1-3. TAU/88 Specifications

GENERAL:

WEIGHT:	1.0 lbs. Remote Amplifier
SIZE:	Remote Amplifier 3¼" wide x 2" high x 4½" long (5½" long incl. mounting flanges)
INPUT POWER:	14 VDC, .02A (MIN) 1.5A (MAX) 28 VDC, .04A (MIN) .93A (MAX)
NUMBER OF IC'S:	1
NUMBER OF TRANSISTORS:	5 all silicon

AMPLIFIER:

FREQUENCY (3 db pts):	200-3000 Hz
LOW LEVEL SENSITIVITY:	1.0 Vrms
HIGH LEVEL SENSITIVITY:	5W into 4 ohms
AUDIO OUTPUT:	10W @ 14V, 16W @ 28V
NUMBER OF INPUTS:	6 Low Level 2 High Level
INPUT ISOLATION:	-50 db
INPUT IMPEDANCE:	Low Level 680 ohms High Level 4 ohms
OUTPUT IMPEDANCE:	3-6 ohms



1-4. Equipment Supplied

- 1—TAU/88 Audio Amplifier
- 1—Cable Connector (16 pin)

1-5. Equipment Required, But Not Supplied

- a. Wire for harnesses
- b. Any additional switches or controls desired



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SECTION II

INSTALLATION MANUAL

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

TAU/88

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

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Model: TAU/88

SECTION III

OPERATING MANUAL

3-1. TAU/88 Operating Controls and Indicators

In the simplest installations the TAU/88 will have no operating controls of its own. Instead, the input levels to the TAU/88 and therefore the output level will be dependant 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/88.

The TAU/88 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/88 it is only necessary to adjust the output of each piece of avionics for the desired listening level.



SECTION IV

MAINTENANCE MANUAL

4-1. Introduction

This section provides the basic information required to electronically test, adjust, and repair the TAU/88 audio amplifier. 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

I. General

The TAU/88 can be divided into three major circuit functions. These circuit functions are:

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

II. Detailed Theory

Preamplifier—The TAU/88 preamplifier is fed from two high level inputs and six low level inputs. The two high level inputs are paralleled by two 4 ohm, 5 watt load resistors, R9 and R10. 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 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.

Muting Circuitry—Diode CR2 is normally biased on by the network of R16, R17, R18, 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.

Power Amplifier—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. 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. The autotransformer-action of T1 produces a higher output than would otherwise be obtainable for 14 volt operation.

4-3. Test Equipment Required

- a. Audio Signal Generator, 1 KHz @ 1 Vrms
- b. AC Voltmeter, any accurate instrument
- 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/88.
- 4. Adjust R15 for a 4 V rms output.

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 Unit 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 View



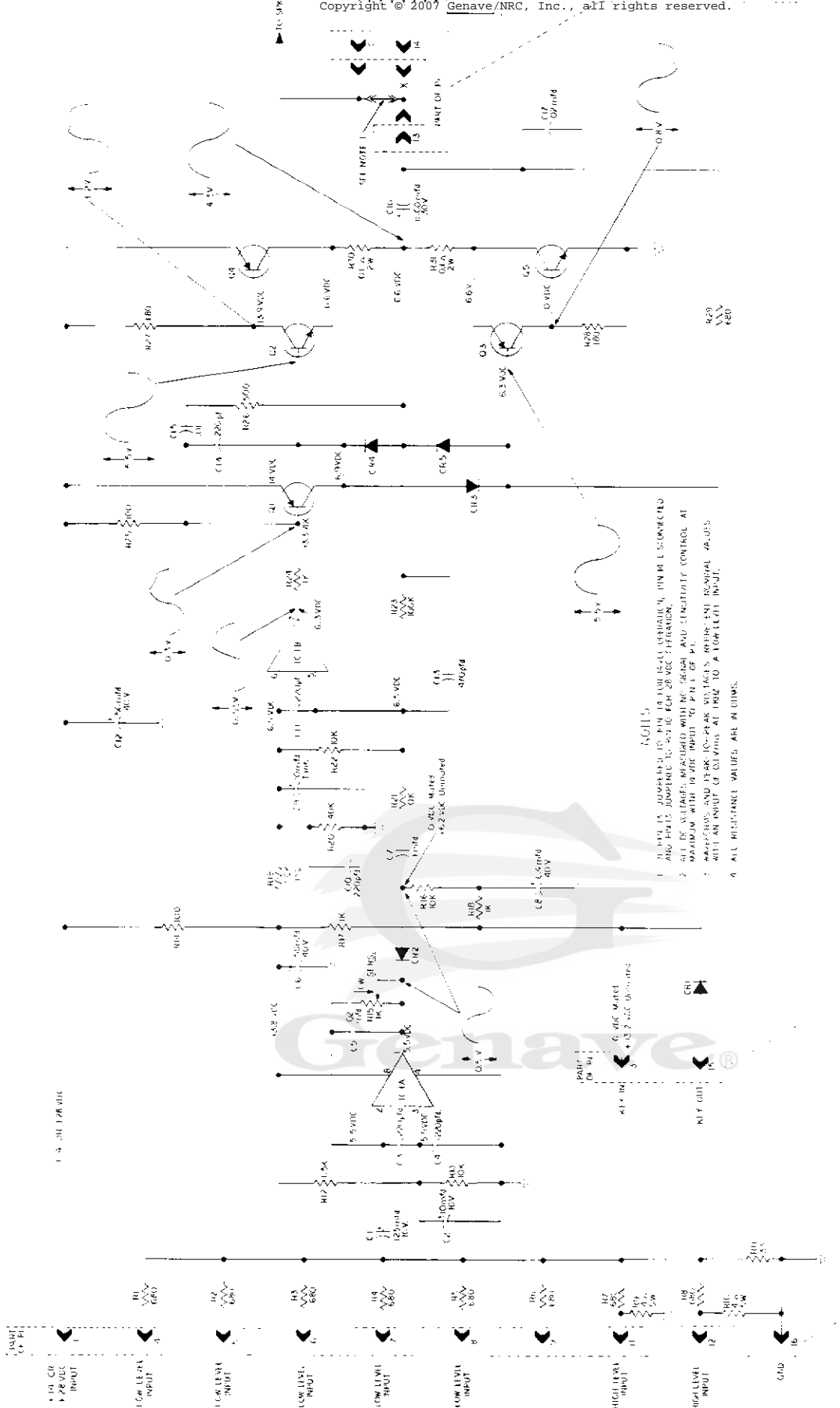


Figure 4-5-1
SCHEMATIC DIAGRAM

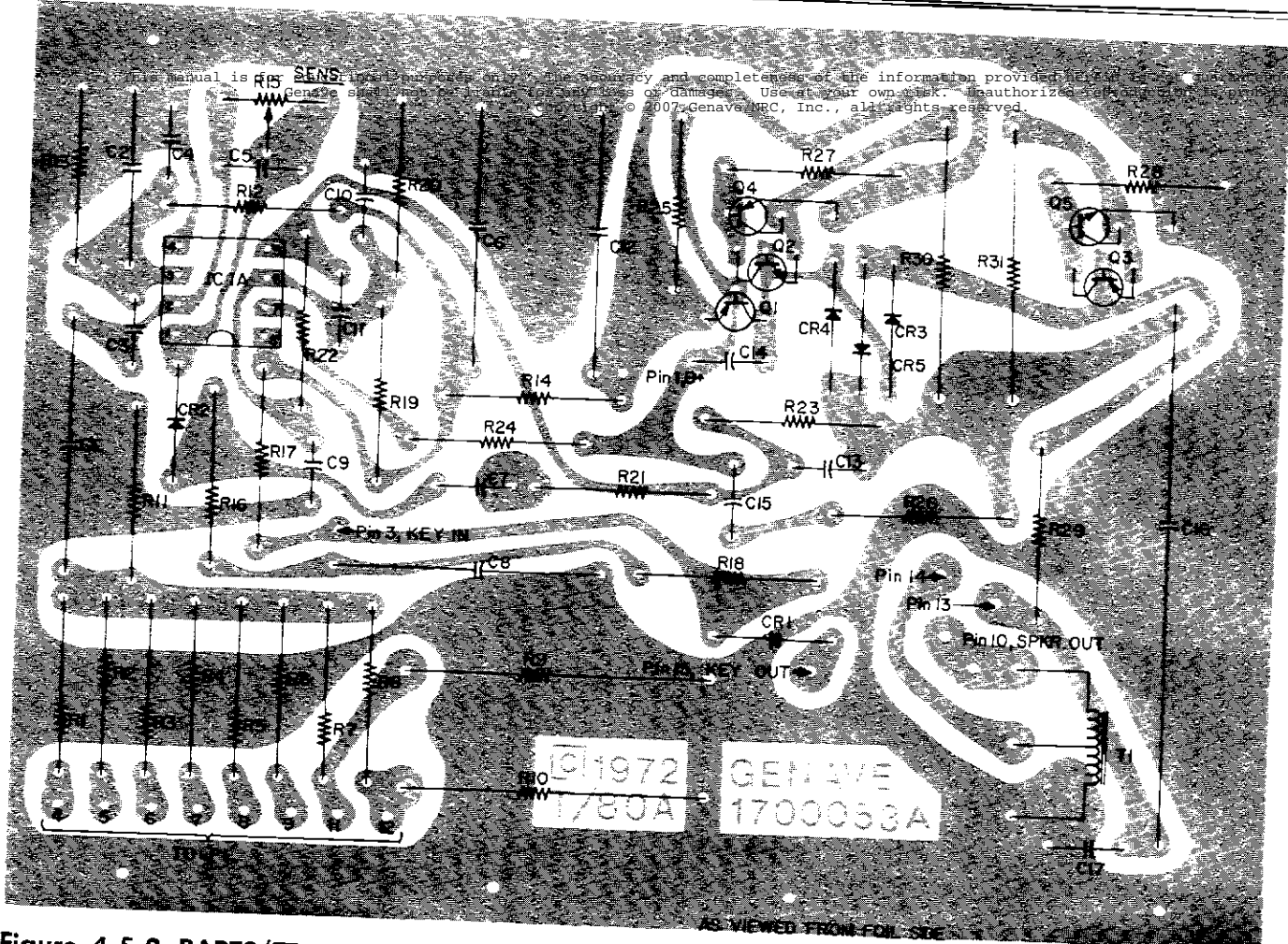


Figure 4-5-2 PARTS/TRACK MAP

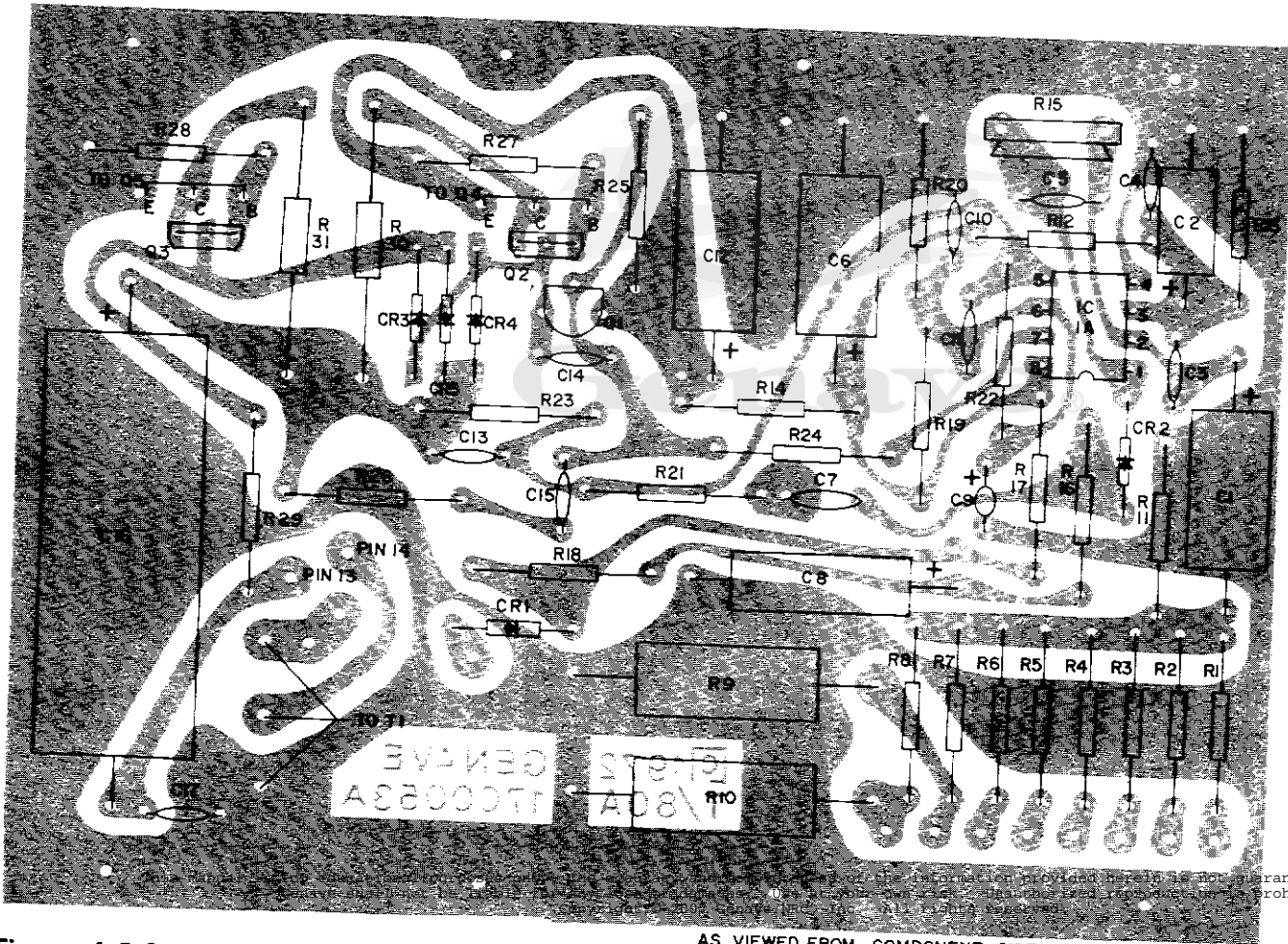


Figure 4-5-3 COMPONENT LOCATION DIAGRAM

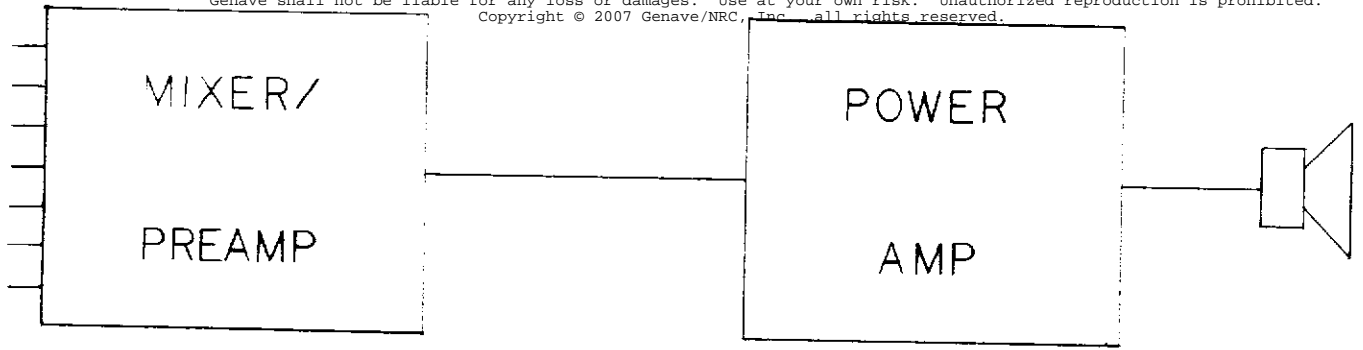
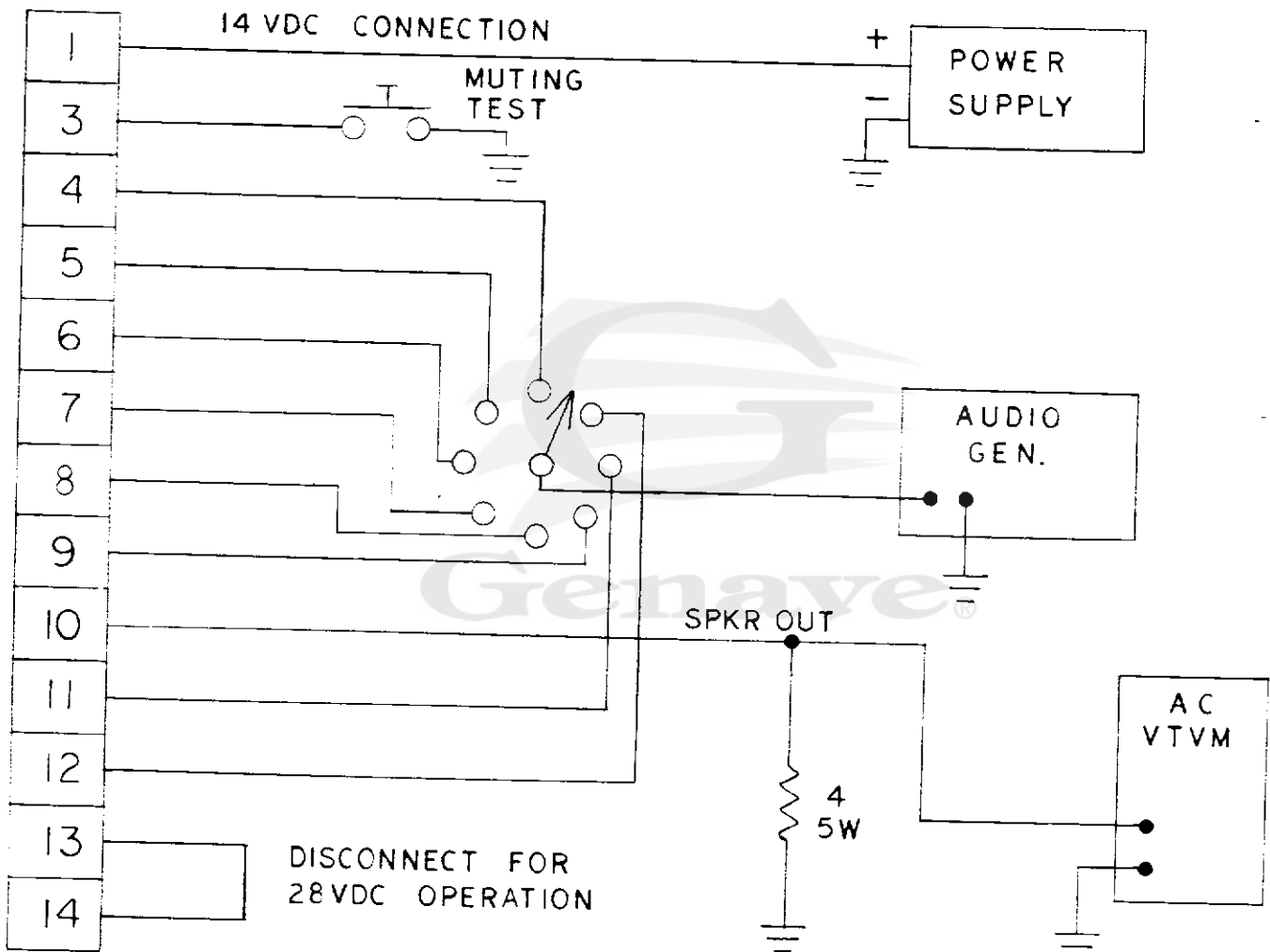


Figure 4-4-1
BLOCK DIAGRAM



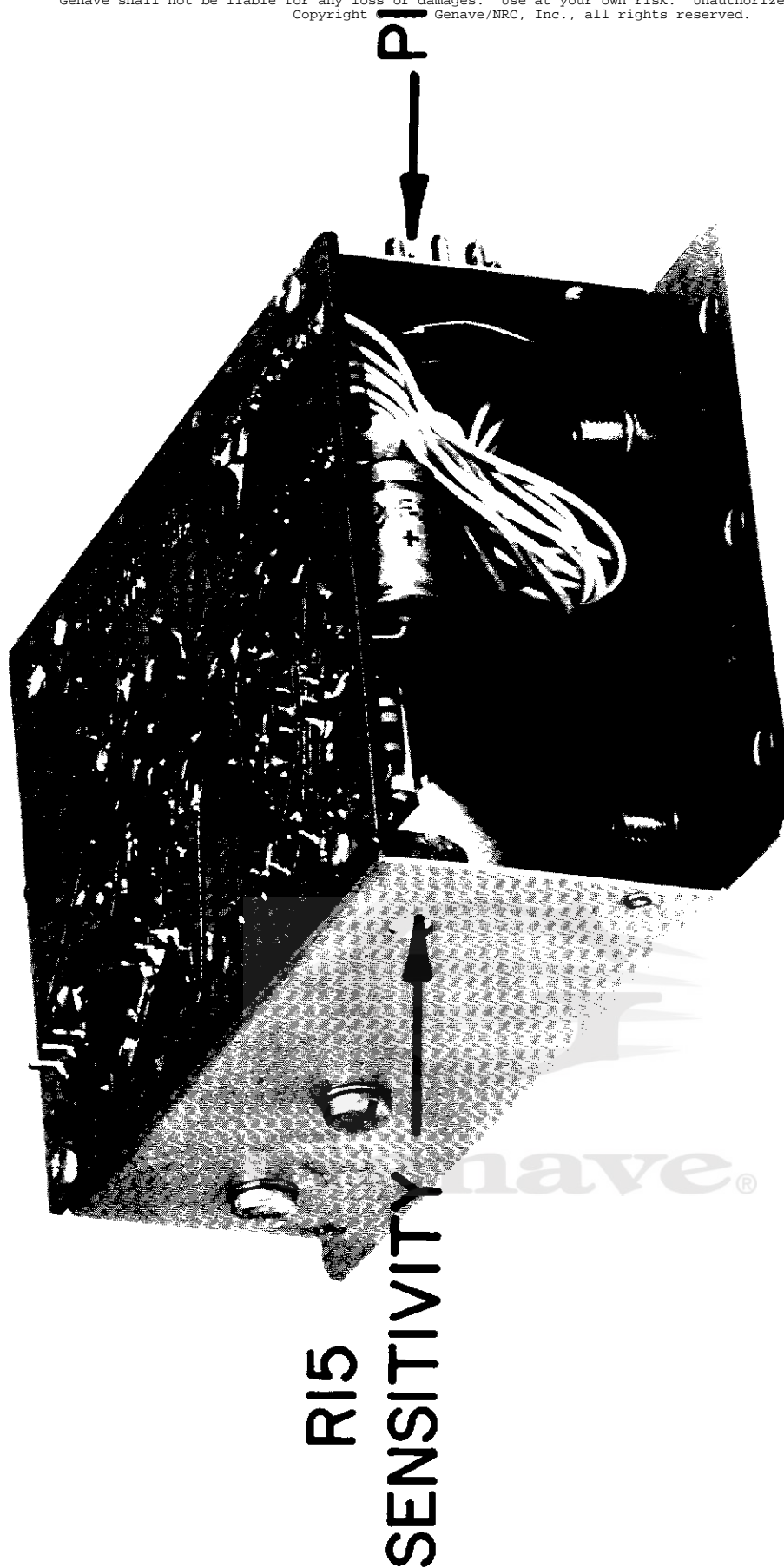


Figure 4-4-3

Unit, TOP VIEW

TAU/88

PARTS LIST

Ref. No.	Part No.	DESCRIPTION	Ref. No.	Part No.	DESCRIPTION
CAPACITORS			R21	4700037	10K, 1/2 W, 10%
C1	1540023	Electrolytic, 125 mfd, 10 V	R22	4700037	10K, 1/2 W, 10%
C2	1540014	Electrolytic, 10 mfd, 16 V	R23	4700049	100K, 1/2 W, 10%
C3	1520034	Y5E Disc, 220 pfd.	R24	4700025	1K, 1/2 W, 10%
C4	1520034	Y5E Disc, 220 pfd.	R25	4700013	100 ohm, 1/2 W, 10%
C5	1520053	M25 Disc, .02 mfd.	R26	4700027	1.5K, 1/2 W, 10%
C6	1540019	Electrolytic, 50 mfd, 40 V	R27	4700016	180 ohm, 1/2 W, 10%
C7	1520055	Disc, .1 mfd, +80 -20	R28	4700016	180 ohm, 1/2 W, 10%
C8	1540012	Electrolytic, 6.4 mfd, 40 V	R29	4700023	680 ohm, 1/2 W, 10%
C9	1550004	Tantalum, 10 mfd, 25 V	R30	4740000	.1 ohm, 2 W, 10%
C10	1520034	Y5E Disc, 220 pfd.	R31	4740000	.1 ohm, 2 W, 10%
C11	1520034	Y5E Disc, 220 pfd.	R32		Unassigned
C12	1540019	Electrolytic, 50 mfd, 40 V			IC's
C13	1520042	Y5E Disc, 470 pfd.	IC1	3130012	Dual OP-AMP, N5558V
C14	1520034	Y5E Disc, 220 pfd.			TRANSISTORS
C15	1520051	Y5U Disc, .01 mfd.	Q1	4800016	Silicon, PNP, MPS-A55
C16	1540038	Electrolytic, 1000 mfd, 30 V	Q2	4800018	Silicon, NPN, MPS-U01
C17	1520053	M25 Disc, .02 mfd.	Q3	4800022	Silicon, PNP, MPS-U51
C18		Unassigned	Q4	4800011	Silicon, PNP, MJE-105
			Q5	4800014	Silicon, NPN, SJE-5036
RESISTORS					DIODES
R1	4700023	680 ohm, 1/2 W, 10%	CR1	4810013	Silicon, General Purpose, 100 V, SD-1
R2	4700023	680 ohm, 1/2 W, 10%	CR2	4810017	Silicon, High Speed Switch, FD1936
R3	4700023	680 ohm, 1/2 W, 10%	CR3	4810017	Silicon, High Speed Switch, FD1936
R4	4700023	680 ohm, 1/2 W, 10%	CR4	4810017	Silicon, High Speed Switch, FD1936
R5	4700023	680 ohm, 1/2 W, 10%	CR5	4810017	Silicon, High Speed Switch, FD1936
R6	4700023	680 ohm, 1/2 W, 10%			TRANSFORMER
R7	4700023	680 ohm, 1/2 W, 10%	T1	5600034	Audio Output
R8	4700023	680 ohm, 1/2 W, 10%			MISCELLANEOUS
R9	4740016	4 ohm, 5 W, 10%, WW	J1	2100011	Connector, 16 pin, Female
R10	4740016	4 ohm, 5 W, 10%, WW	P1	2100014	Connector, 16 pin, Male
R11	4700008	33 ohm, 1/2 W, 10%		2100018	Cover
R12	4700039	15K, 1/2 W, 10%		2508052	Chassis
R13				2500281	Cover
R14	4700013	100 ohm, 1/2 W, 10%		2504271	Heatsink (2-used)
R15	4760015	Trimmer, 1K			
R16	4700037	10K, 1/2 W, 10%			
R17	4700025	1K, 1/2 W, 10%			
R18	4700025	1K, 1/2 W, 10%			
R19	4720014	150K, 1/4 W, 10%			
R20	4720013	140K, 1/4 W, 10%			

Specifications Subject to Change Without Notice.

NOTE: Any part contained in this parts list may be replaced with a part from any of the Genave Parts Kits, provided, the replacement part bears the same Genave part number.

