

**AMPEX**

**MODEL S-3370**

**OPERATION AND  
MAINTENANCE MANUAL**

## TABLE OF CONTENTS

	Page
SECTION I DESCRIPTION AND SPECIFICATIONS	1
1. General Description	1
TABLE 1 - MAJOR COMPONENTS	1
2. Description of Major Components	2
3. Specifications	2
SECTION II INSTALLATION	5
1. Mounting and Interconnecting	5
2. Paging Panel	6
3. Sensing Panel	6
4. Timing Panel	6
5. Power Amplifier	10
6. Connecting the Main Speaker Assembly	11
SECTION III OPERATION	13
1. Starting the System	13
2. Stopping the System	14
SECTION IV PAGING PANEL	15
1. Electronic Theory	15
2. Maintenance	19
TABLE 2 - CORRECTIVE MAINTENANCE	19
3. Parts List	21
SECTION V SENSING PANEL	23
1. Electronic Theory	23
2. Maintenance	23
3. Parts List	27
SECTION VI TIMING PANEL	29
1. Electronic Theory	29
2. Parts List	29
SECTION VII POWER AMPLIFIER	31
1. Electronic Theory	31
2. Maintenance	31
3. Parts List	34

	Page
SECTION VIII MICROPHONE	37
1. Description	37
2. Parts List	37
SECTION IX SYSTEM CORRECTIVE MAINTENANCE TABLES	39
TABLE 4 - Paging	39
TABLE 5 - Music	40
TABLE 6 - Sensing	41
TABLE 7 - Timing	42
SUPPLEMENT A MODEL 450B REPRODUCER	

## LIST OF ILLUSTRATIONS

		Page
Fig.	1 Ampex Sound System	iii
	2 Rear View of Rack Mounting and Interconnecting	4
	3 Microphone Strapping	6
	4 Closeup View of Time Clock	8
	5 Connecting Main Speaker Assembly	11
	6 Power Block Diagram	12
	7 Control Block Diagram	12
	8 Audio Block Diagram	12
	9 Paging Panel Block Diagram	15
	10 Paging Panel	16
	11 Fading Circuit	17
	12 Schematic Diagram - Paging Panel	18
	13 Sensing Panel Block Diagram	23
	14 Sensing Panel	24
	15 Schematic Diagram - Sensing Panel	26
	16 Timing Panel	28
	17 Schematic Diagram - Timing Panel	29
	19 Power Amplifier Block Diagram	31
	20 Schematic Diagram - Power Amplifier	33
	21 Schematic Diagram - Microphone and Cable	37



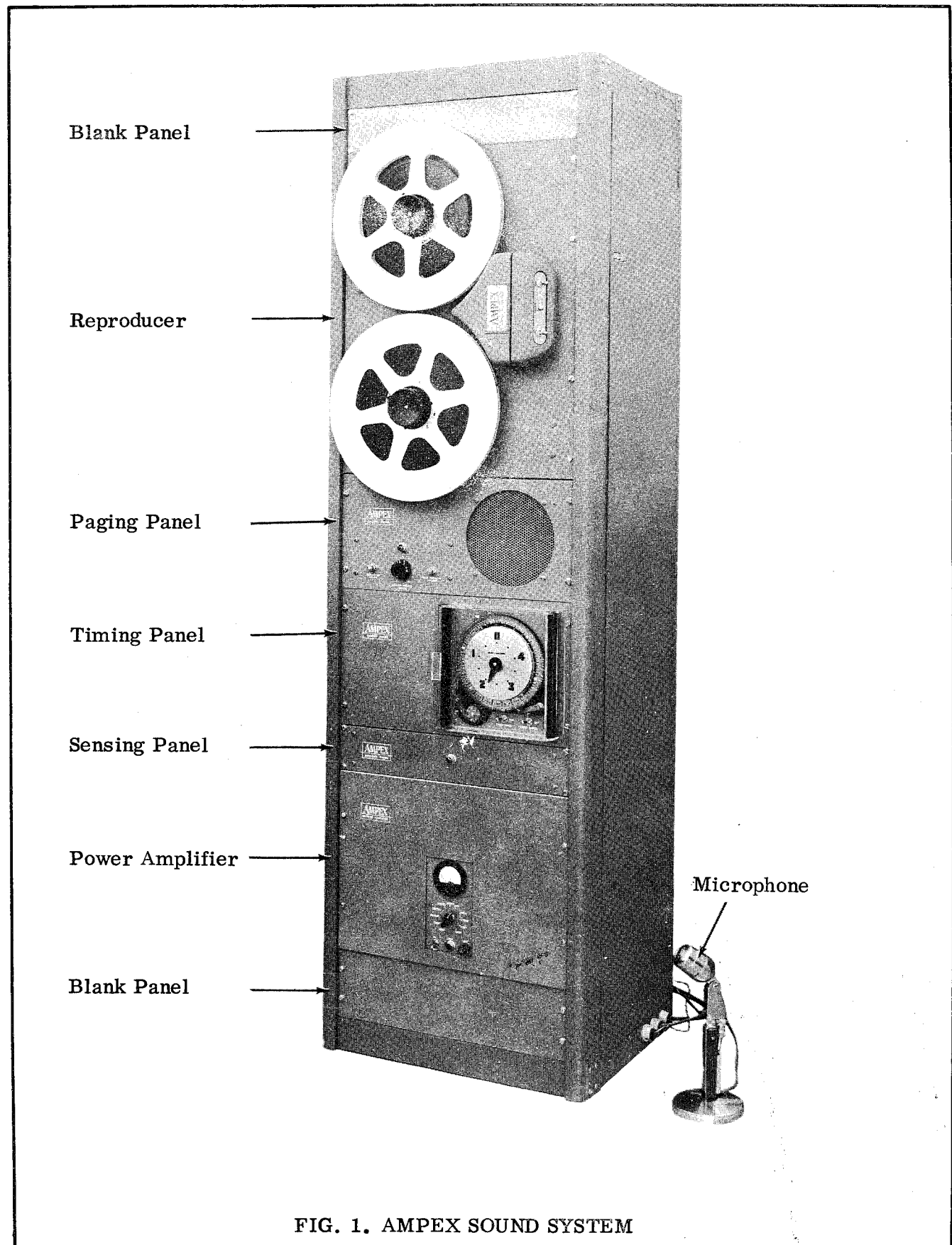


FIG. 1. AMPEX SOUND SYSTEM

SECTION IDESCRIPTION AND SPECIFICATIONS

## 1. GENERAL DESCRIPTION

A completely automatic industrial background music and paging system is provided in the AMPEX Model S-3370 Sound System. The system will:

- a. Play continuous background music on a predetermined schedule, controllable in 5 minute intervals throughout 24 hours;
- b. Provide paging facilities, with the background music fading out when the paging function is used, and fading in when paging is completed;
- c. Control power to the equipment so that during protracted periods of non-operation there is virtually no power consumed;
- d. Control the operation of the system so that background music will continue to the end of the current selection when the scheduled operating period is concluded;
- e. Provide monitoring facilities at the main installation.

TABLE 1

MAJOR COMPONENTS	
NAME	FUNCTION IN SYSTEM
Magnetic Tape Reproducer	Reproduce music pre-recorded on magnetic tape.
Paging Panel	Provide paging and monitoring facilities. Fade out music when paging.
Timing Panel	Provide Automatic timing control of background music and power.
Sensing Panel	Continue system operation so that music will not stop until the end of a selection.
Power Amplifier	Provide proper audio power to drive the main speaker assembly.
Microphone	Provide voice input for paging system. Control fading circuit.
Interconnecting Cables	Provide proper interconnecting of units.

## 2. DESCRIPTION OF MAJOR COMPONENTS

- a. Magnetic Tape Reproducer -- The AMPEX Model 450B Magnetic Tape Reproducer is described in detail in Supplement A.
- b. Paging Panel -- The Paging Panel contains a microphone input with proper pre-amplification for the microphone signal, a music input with a fading circuit to properly fade the music in and out as the paging function is used, and a monitor amplifier and speaker.
- c. Timing Panel -- The Timing Panel contains a time clock and proper switches to control the periods during the day when the background music will be playing. It also controls the power to all the major components of the system, with the exception of the time clock.
- d. Sensing Panel -- The electronic components of the Sensing Panel control the operation of a relay which supplies power to the capstan solenoid of the Magnetic Tape Reproducer whenever an audio signal is present at the input of the Sensing Panel.
- e. Power Amplifier -- The Power Amplifier supplies the proper amplification of both the music and voice (paging) circuits so that sufficient audio power output is obtained to drive the main speaker assembly.
- f. Microphone -- The microphone not only supplies the voice input for the paging system, but also, through the microphone switch, controls the fading circuit in the Paging Panel.
- g. Interconnecting Cables -- All interconnecting cables supplied with the system are identified by a metal band stamped with the cable number. Cables provided with the system are:

### Audio and Control Cables

7371-1  
7370-2  
7370-1  
7368-1  
7372-1

### Power Cables

2413-2 (2 provided)  
2413-3  
7369-1  
7387-1

## 3. SPECIFICATIONS

- a. Audio Power Output -- 120 watts into a 70.7 volt line.
- b. Timing --
- (1) PROGRAM ON-OFF: Controllable in five minute intervals throughout 24 hours.
  - (2) POWER: Controllable twice each 24 hours.
- c. Playing Time -- Continuous. Times listed below show how long the system will play without repeating at the tape speeds listed:
- (1) 3-3/4 inches per second: 14-inch reels 8 hours 32 minutes  
10-1/2-inch reels 4 hours 16 minutes
  - (2) 7-1/2 inches per second: 10-1/2-inch reels 2 hours 8 minutes

d. Power Requirements -- With a power source of 117 volts a-c, the system and components will draw approximately the following currents:

(1) ENTIRE SYSTEM	5.25 amperes
(2) PAGING PANEL	0.4 ampere
(3) SENSING PANEL	0.1 ampere
(4) TIMING PANEL	0.04 ampere
(5) POWER AMPLIFIER	3.7 amperes
(6) MAGNETIC TAPE REPRODUCER	1.0 ampere

e. Dimensions and Weights --

	Height (in)	Depth (in)	Width (in)	Weight (lb)
(1) Entire System (in rack)	75.6	18.5	22 *	295
(2) Paging Panel	8.75	8.5	19	16
(3) Sensing Panel	3.5	5.5	19	6
(4) Timing Panel	10.5	3.25	19	11
(5) Power Amplifier	14	10.5	19	72
(6) Reproducer	24.5	10	19	50

\* Side opening doors require additional 14 inches each side

f. Mounting -- All equipment is for mounting in standard 19 inch racks.

NOTE

See Supplement A for detailed specifications on the Magnetic Tape Reproducer.

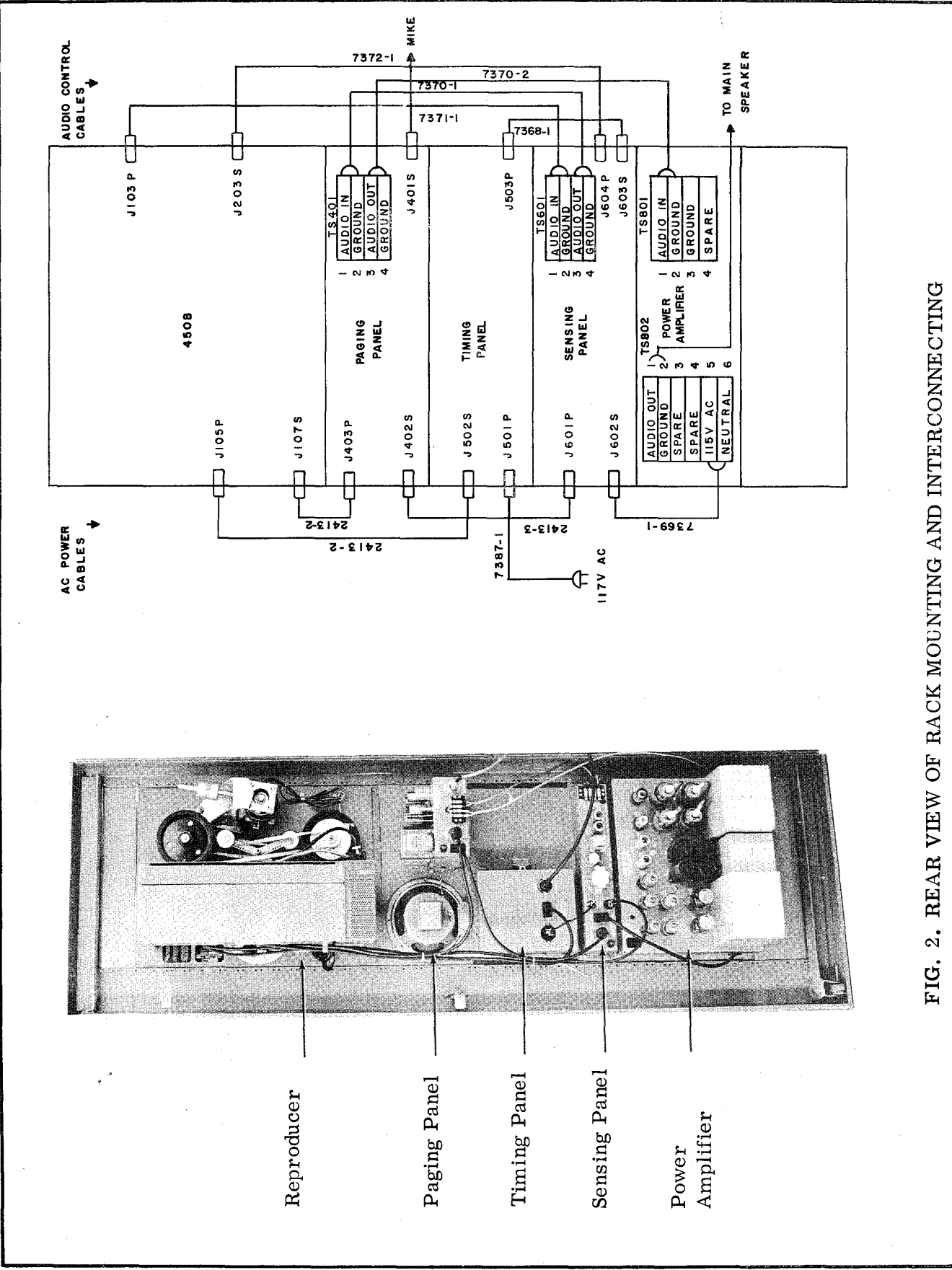


FIG. 2. REAR VIEW OF RACK MOUNTING AND INTERCONNECTING

SECTION II  
INSTALLATION

1. MOUNTING AND INTERCONNECTING

Mount the units in the rack as shown in FIG. 1. Install the interconnecting cables for the Model 450B Reproducer as described in supplement A, but do not connect the power cables.

a. Audio and Control Interconnecting --

Step 1. Connect cable No. 7371-1 from J103P on the Model 450B Reproducer to terminals Nos. 1 and 2 of TS601 on the Sensing Panel.

Step 2. Connect cable No. 7370-1 from terminal Nos. 3 and 4 of TS601 on the Sensing Panel, to terminal Nos. 1 and 2 of TS401 on the Paging Panel.

Step 3. Connect cable No. 7370-2 from terminal Nos. 3 and 4 of TS401 on the Paging Panel to terminal Nos. 1 and 2 of TS801 on the Power Amplifier.

Step 4. Connect terminal Nos. 1 and 2 of TS802 on the Power Amplifier to the Main Speaker Assembly, using twisted-pair cable of sufficient size to safely carry the load.

Step 5. Connect the Microphone Cable (part of the Microphone Assembly) to J401S on the Paging Panel.

Step 6. Connect cable No. 7372-1 from J203S on the Model 450B Reproducer to J604P on the Sensing Panel.

Step 7. Connect cable No. 7368-1 from J603S on the Sensing Panel to J503P on the Timing Panel.

b. Power Interconnecting --

Step 1. Connect one cable No. 2413-2 from J502S on the Timing Panel to J105P on the Model 450B Reproducer.

Step 2. Connect the second cable No. 2413-2 from J107S on the Model 450B Reproducer to J403P on the Paging Panel.

Step 3. Connect cable No. 2413-3 from J402S on the Paging Panel to J601P on the Sensing Panel.

Step 4. Connect cable No. 7369-1 from J602S on the Sensing Panel to terminal Nos. 5 and 6 of TS802 on the Power Amplifier.

Step 5. Connect cable No. 7387-1 from J501P on the Timing Panel to a source of 110-120 A-C power.

CAUTION

This equipment is available either for 50 or 60 cps operation. The required power line frequency is indicated on the serial number plate.

2. PAGING PANEL

a. Inputs -- The microphone input transformer (T401) is strapped to give optimum response with a 50 ohm microphone. If a 150 to 250 ohm microphone must be used, restrap the transformer as shown in FIG. 3. DO NOT USE A HIGH IMPEDANCE MICROPHONE WITH THIS EQUIPMENT.

The music input matches a 600 ohm, unbalanced line.

b. Output -- The audio output impedance matches a high impedance unbalanced line.

c. Volume Control Adjustment -- Best operation will be obtained when the volume control of the Paging Panel is set high and that on the associated power amplifier is set low. To accomplish this, turn the MAIN SPEAKER VOLUME control (R413) full on (clockwise) and then back it off 1/4 turn. Adjust the volume control on the power amplifier to where the volume is approximately correct, return to the Paging Panel and accomplish the final adjustment at the MAIN SPEAKER VOLUME control.

The MICROPHONE VOLUME CONTROL, (R407) should be adjusted so that the paging system is clearly audible at all locations.

3. SENSING PANEL

a. Input -- The audio input is high impedance, unbalanced, so that it does not load down the line from the Reproducer.

b. Sensitivity Control -- The SENSITIVITY control (R601) has been set at the factory and treated with glyptol to ensure that it does not change. DO NOT TAMPER WITH THE ADJUSTMENT. The alignment of this circuit, explaining the test equipment necessary, is explained in the maintenance section of this manual.

4. TIMING PANEL

a. General -- There are three different pins which must be correctly inserted in the slots on the Program and Calendar dials:

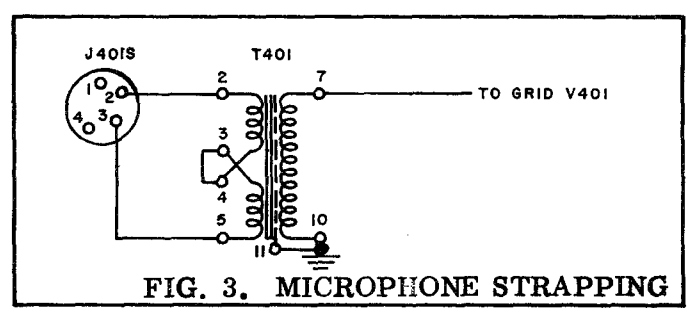


FIG. 3. MICROPHONE STRAPPING  
A-1114

- (1) The PROGRAM ON-OFF pins are inserted on the program dial with the top projection outward from the dial face to start the program, and inward from the dial face to stop the program.
- (2) The CALENDAR DIAL ACTUATING pins are inserted on the program dial, with the top projection inward from the dial face.
- (3) The CALENDAR DIAL pins are inserted on the calendar dial.

#### CAUTION

PINS MUST BE INSERTED UNTIL THE POINTS INSIDE THE OPEN END ENGAGE THE GROOVE NEAR THE EDGE OF THE DIAL. IF THEY ARE INSERTED INCORRECTLY THERE WILL BE INSUFFICIENT CLEARANCE AT THE ACTUATING ARMS AND DAMAGE TO THE CLOCK MECHANISM MAY RESULT. IT IS SUGGESTED THAT A PAIR OF LONG NOSE PLIERS BE USED WHEN INSERTING THE PINS.

b. Calendar dial -- The calendar dial contains 14 slots, two for each day in the week. The slots are marked with the initial letter of the day of the week they represent. The leading slot (i. e. the slot that reaches the calendar switch actuating arm first in counterclockwise rotation of the dial) represents the first period of the day, and the trailing slot represents the second period of the day. It is best to visualize the two divisions as being "Power On" periods or "Power Off" periods.

Power is supplied to the system whenever the calendar switch actuating arm is depressed by a calendar dial pin. The calendar dial is turned when the calendar dial actuating pins on the program disc engage the lower gear on the calendar dial. Thus, when the calendar dial pins are inserted there are four possibilities:

- (1) Power can be supplied to the system during the first period of the day and be turned off for the second period by inserting a calendar dial pin in the leading slot for that day and leaving the trailing slot blank.
- (2) Power can be turned off for the first period of the day and turned on for the second period, by leaving the leading slot blank and inserting a calendar dial pin in the trailing slot.
- (3) Power can be turned on throughout the 24 hours of the day by inserting a calendar dial pin in both the leading and trailing slots.
- (4) Power can be turned off throughout the 24 hours of the day by leaving both the leading and trailing slots blank.



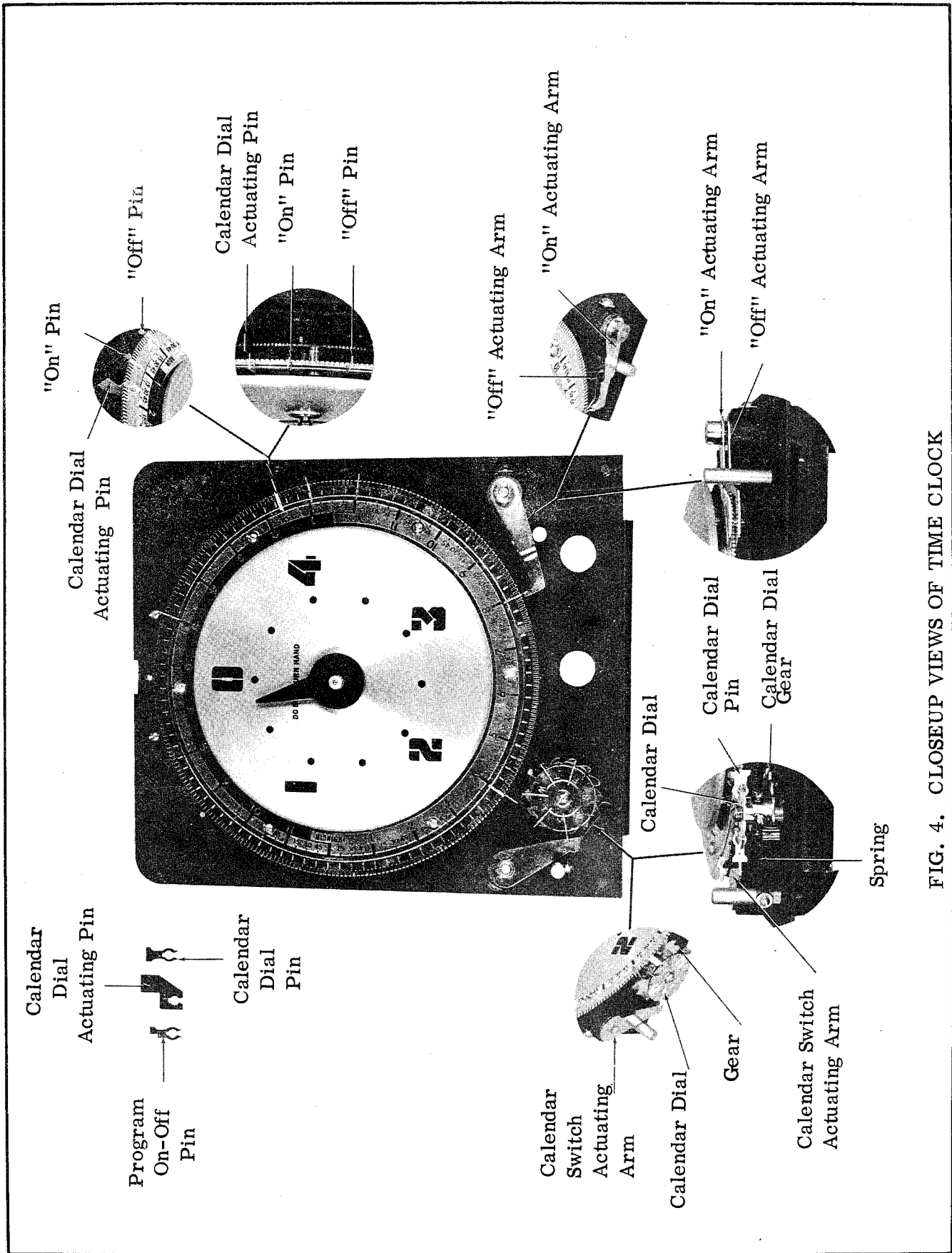


FIG. 4. CLOSEUP VIEWS OF TIME CLOCK

The "Power On" and "Power Off" periods do not necessarily have to be each 12 hours in duration. It will become apparent in the discussion of the program dial that either period can be as long or as short as desired, providing they represent the same periods every day throughout the week. For example, it is perfectly possible to have the first period represent from 7 a.m. to midnight, and the second period from midnight until 7 a.m. every day throughout the week, but it is not possible to have the first period represent from 7 a.m. to midnight on Monday, from 9 a.m. to 9 p.m. on Tuesday, from 7 a.m. to 10 p.m. Wednesday, etc.

CAUTION  
WHEN TURNING THE CALENDAR DIAL MAN-  
UALLY ALWAYS TURN IT IN A COUNTER-  
CLOCKWISE DIRECTION.

c. Program Dial -- The program dial rotates in a clockwise direction. The light portion of the scale represents A.M. and the dark portion represents P.M. Slots are placed at 5 minute intervals, with every third slot marked. The indicator hand makes one revolution in 5 minutes, and the program dial will advance one slot each time the indicator hand passes the "0" mark.

CAUTION  
DO NOT ATTEMPT TO MOVE THE INDI-  
CATOR HAND MANUALLY. ALWAYS TURN  
THE PROGRAM DIAL IN A CLOCKWISE DI-  
RECTION.

(1) INSERTING PROGRAM ON-OFF PINS: Insert the program on-off pins in the proper slots of the program dial. To start the program, insert the pins with the top projection outward from the face of the dial, so that they will engage the Program On Actuating Arm. To stop the program insert the pins with the top projection inward from the face of the dial, so that they will engage the Program Off Actuating Arm. The program may be started and stopped as many times during the 24 hours as is necessary. Place the pins at the exact time it is desired to control the program operation, as indicated on the program dial.

(2) INSERTING CALENDAR DIAL ACTUATING PINS: The calendar dial actuating pins rotate the calendar dial one slot. They are inserted with the top projection inward from the program dial, so that they will miss the program on-off actuating arms but will engage the lower gear on the calendar dial. These pins can usually be visualized as "Power On" and "Power Off" pins (depending upon the placement of the pins on the calendar dial) and will determine the periods into which the day is divided. Insert a pin which will result in power being turned on four hours preceding the time that the program will start. This is because of the placement of the calendar dial in relation to the program on-off actuating arms, where the program dial is synchronized with correct time. For example, if the program is to start at 8 a.m., insert the calendar dial actuating pin at the slot representing 4 a.m. This allows a one-half hour warm-up period for the system before the program starts. Insert a pin which will result in the power being turned off 3 hours and 20 minutes preceding the time that the program will stop. For example, if the program is to stop at 5 p.m. for the day, insert the calendar dial actuating pin at the slot representing 1:40 p.m. This will turn off power to the system 10 minutes after the program stops.

## CAUTION

AFTER ALL PINS HAVE BEEN INSERTED, TURN THE PROGRAM DIAL MANUALLY IN A CLOCKWISE DIRECTION AND BE SURE THAT THE PINS DO NOT CATCH ON THE ACTIVATING ARMS. ANY PIN THAT DOES CATCH IS NOT INSERTED FULLY IN THE SLOT.

d. Examples of Set up --

(1) The system is to operate from 8:00 a.m. to 12:00 noon, and from 1:00 p.m. to 5:00 p.m., five days a week. (FIG. 4 is set up for this operation.)

Calendar Dial Pins: Insert pins in the leading slots of M, T, W, T, F.  
 Program On-Off Pins: Insert "On" pins at 8:00 a.m. and 1:00 p.m.  
 Insert "Off" pins at 12:00 noon and 5:00 p.m.  
 Calendar Dial Actuating Pins: Insert pins at 4:00 a.m. and at 1:40 p.m.

(2) The system is to operate from 9:00 a.m. to 10:00 p.m. seven days a week.

Calendar Dial Pins: Insert pins in the leading slots of M, T, W, T, F, S, S.  
 Program On-Off Pins: Insert "On" pin at 9:00 a.m.  
 Insert "Off" pin at 10:00 p.m.  
 Calendar Dial Actuating Pins: Insert pins at 5:00 a.m. and at 6:40 p.m.

(3) The system is to operate from 10:00 a.m. to 3:00 p.m., and from 6:00 p.m. to 10:00 p.m. six days a week. (Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday).

Calendar Dial Pins: Insert pins in the leading slots of T, W, T, F, S, and S.  
 Program On-Off Pins: Insert "On" pins at 10:00 a.m. and at 6:00 p.m.  
 Insert "Off" pins at 3:00 p.m. and at 10:00 p.m.  
 Calendar Dial Actuating Pins: Insert pins at 6:00 a.m. and at 6:40 p.m.

(4) The system is to operate from 4:00 p.m. to 2:00 a.m. every day except Tuesday.

Calendar Dial Pins: Insert pins in the trailing slots of M, W, T, F, S, S.  
 Program On-Off Pins: Insert "On" pins at 4:00 p.m.  
 Insert "Off" pins at 2:00 a.m.  
 Calendar Dial Actuating Pins: Insert pins at 12:00 noon and at 10:40 p.m.

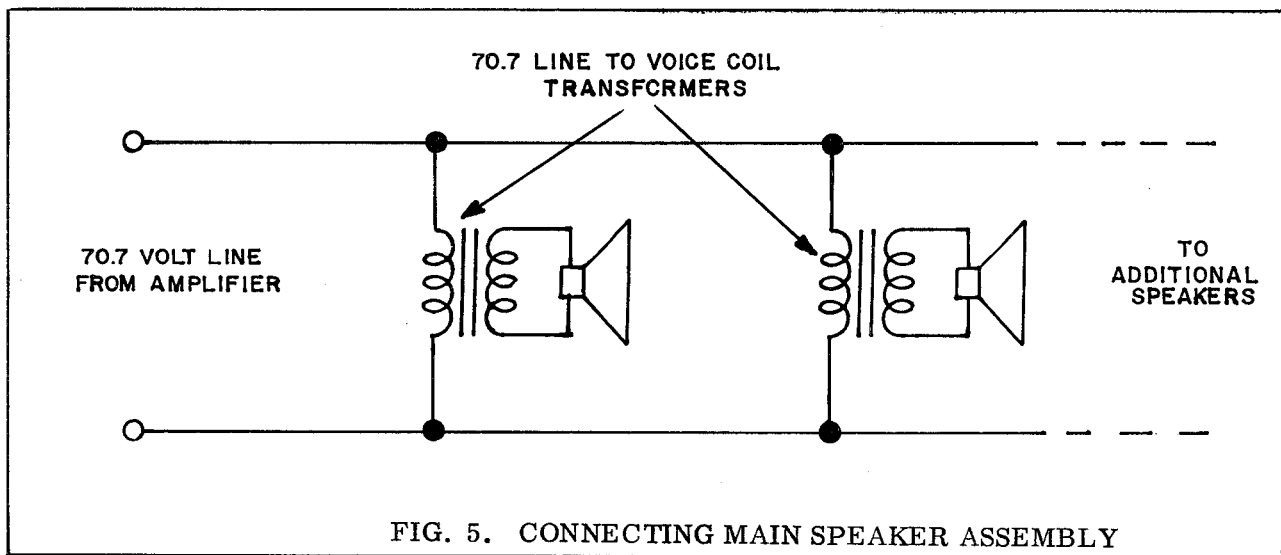
## 5. POWER AMPLIFIER

a. Input -- The audio input matches a high impedance unbalanced line.

b. Output -- The output transformer (T802) is wired for a 70.7 volt (167 ohms) line output.

### 6. CONNECTING THE MAIN SPEAKER ASSEMBLY

It is suggested that the main speaker assembly be connected by using 70.7 Line to Voice Coil Transformers, which will match the 70.7 volt line output of the Power Amplifier to the voice coils of the speakers which are used. These transformers have the primary tapped according to wattage to be used at the particular location, and the secondary tapped according to impedance to match the speaker voice coil. Using these transformers, it is a simple matter to parallel the speakers so that the full power output of the power amplifier is utilized. A typical 70.7 Line to Voice Coil Transformer would have a primary with taps for 8, 4, 2, 1, and .5 watts, and a secondary with taps for 4, 8, and 16 ohms. Example: If it was determined that a certain location would require 4 watts using an 8 ohm speaker, the 4 watt taps on the primary of the transformer would be connected across the output line, and the 8 ohm taps on the secondary would be connected to the voice coil of the speaker. Continue paralleling the transformers across the line at the different locations until the full power output is used.



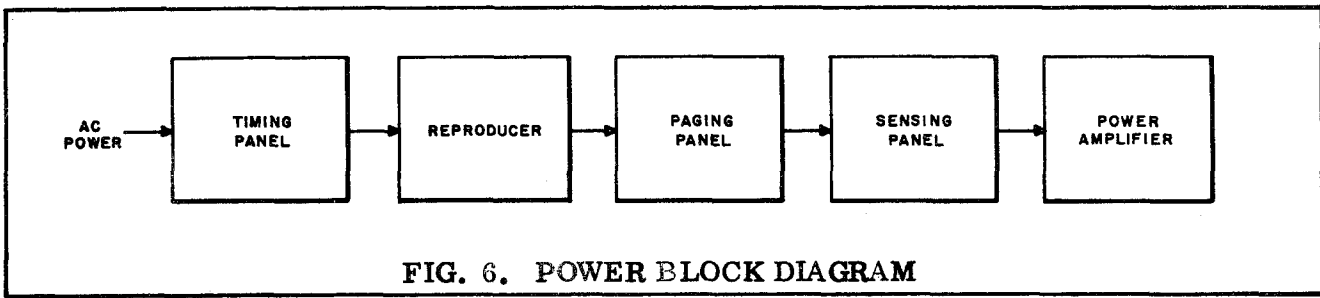


FIG. 6. POWER BLOCK DIAGRAM

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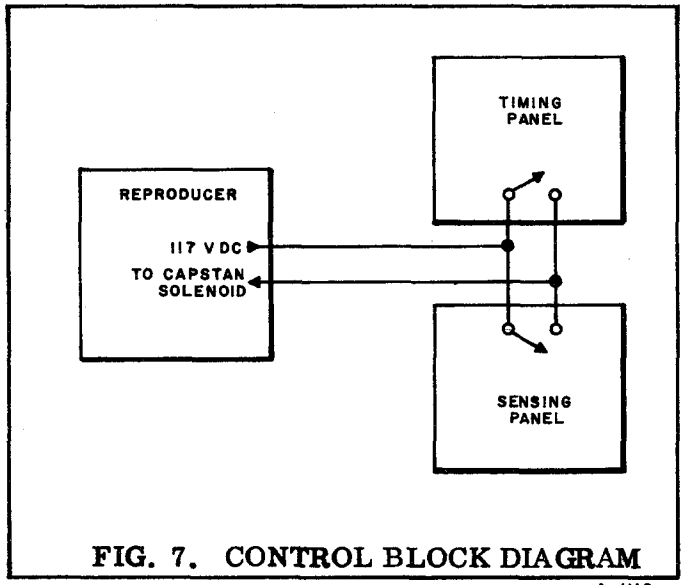


FIG. 7. CONTROL BLOCK DIAGRAM

A-1118

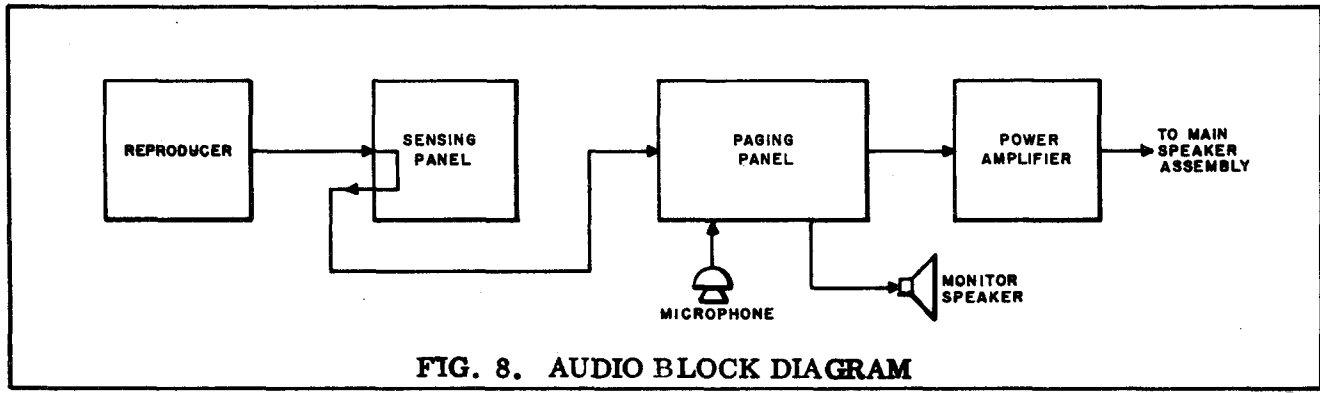


FIG. 8. AUDIO BLOCK DIAGRAM

A-1117

SECTION IIIOPERATION

## 1. STARTING THE SYSTEM

a. Synchronizing with correct time --

Step 1. Turn the TIMER POWER switch to the "on" position.

Step 2. Observe the progress of the indicating hand and turn the TIMER POWER switch to the "off" position exactly as the indicating hand reaches "0".

Step 3. Turn the program dial in a clockwise direction, stopping when the point of the Program On Actuating Arm indicates the start of the five minute interval then in progress. Example: If the correct time is 10:37 a.m. set the program dial so that the actuating arm indicates 10:35 a.m.

Step 4. Exactly at the start of the next five minute interval turn the TIMER POWER switch to the "on" position. When the indicator hand starts to move, the program dial will advance one five minute interval and thus indicate the correct time.

Step 5. Turn the Calendar Dial in a counter-clockwise direction until the correct period of the proper day is opposite the calendar switch actuating arm.

b. Starting system operation --

(1) When operation is to start at a time when the background music would normally be operating:

Step 1. Press the Program Off Actuating Arm with the eraser end of a pencil, or some such object, until the Program On Actuating Arm is released.

Step 2. Turn the ON-OFF switch on the Power Amplifier to the "on" position.

Step 3. Turn the ON-OFF switch on the Tape Transport of the Reproducer to the "on" position.

Step 4. Allow a five minute warm up period.

Step 5. Turn the STOP-START switch on the Tape Transport of the Reproducer to the "start" position.

Step 6. Press the Program On Actuating Arm until it latches in place.

(2) When operation is to start at a time when the background music would not normally be operating:

Step 1. Turn the ON-OFF switch on the Power Amplifier to the "on" position.

Step 2. Turn the ON-OFF switch on the Tape Transport of the Reproducer to the "on" position.

Step 3. Turn the STOP-START switch on the Tape Transport of the Reproducer to the "start" position.

## 2. STOPPING THE SYSTEM

### a. Normal--To change reels, etc.

Step 1. Turn the STOP-START switch on the Tape Transport of the Reproducer to the "stop" position. When it is desired to resume automatic operation, return the STOP-START switch back to the "start" position.

### b. Abnormal--To turn off all power to the system for an extended period.

Step 1. Turn START-STOP switch on the Tape Transport of the Reproducer to the "stop" position.

Step 2. Turn the ON-OFF switch on the Tape Transport of the Reproducer to the "off" position.

Step 3. Turn the ON-OFF switch on the Power Amplifier to the "off" position.

Step 4. Manually turn the Calendar Dial until the calendar switch actuating arm is not depressed by a calendar dial pin.

The time clock, at this point, is drawing the only power in the system. To restart, reverse the procedure, returning all controls to their original positions.

Step 5. To stop the time clock turn the TIMER POWER switch on the Timing Panel to the "off" position. To restart, the entire starting procedure as explained in Paragraph 1 must be followed.

## SECTION IV

## PAGING PANEL

## 1. ELECTRONIC THEORY

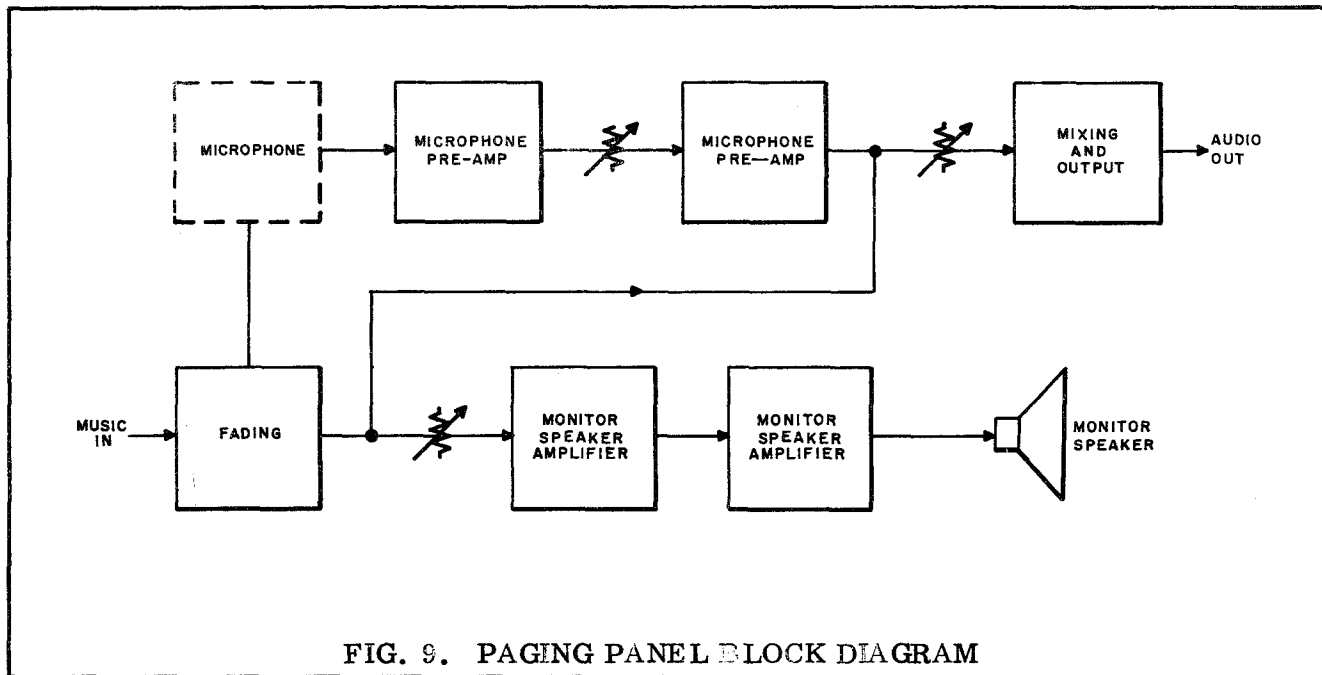


FIG. 9. PAGING PANEL BLOCK DIAGRAM

There are two audio inputs to the paging panel — a microphone input at pins 2 and 3 of J401S, and a music input at terminal Nos. 1 and 2 of TS401. A-1119

The microphone audio circuit consists of two stages of pre-amplification (V401 and V402A), the gain of which is controlled by the MICROPHONE VOLUME control (R407). The music circuit consists of a fading stage, V403A, the output of which is connected both to the mixing stage (V402B) — which mixes the microphone and music signals—and to two stages of amplification (V403B and V404), which drive the monitor speaker.

Pin Nos. 1 and 4 of the microphone input connector J401S, are the control connections for the fading circuit. The fading time is determined by the discharge and charge time of C406 and C407. R423 and R424 comprise a voltage divider circuit, the junction of which is at approximately +41 volts. This voltage is applied to the cathode of V403A (through resistor R422). When the paging feature is not in use, and K401 contacts are in the normal (de-energized) position, the +41 volts is also applied to the grid of V403A, through resistors R420, R419, and R418. Thus the only bias on the tube is that developed across R422, and V403A will conduct. The +41 volts is also applied to the cathode of V402A in the microphone circuit, holding that tube cut off.

When the microphone switch is closed across pins 1 and 4 of J401S, K401 is energized, and its contact connects the grid of V403A to ground. However, before the grid can reach ground potential C406 and C407 must discharge through R419. The grid thus gradually approaches



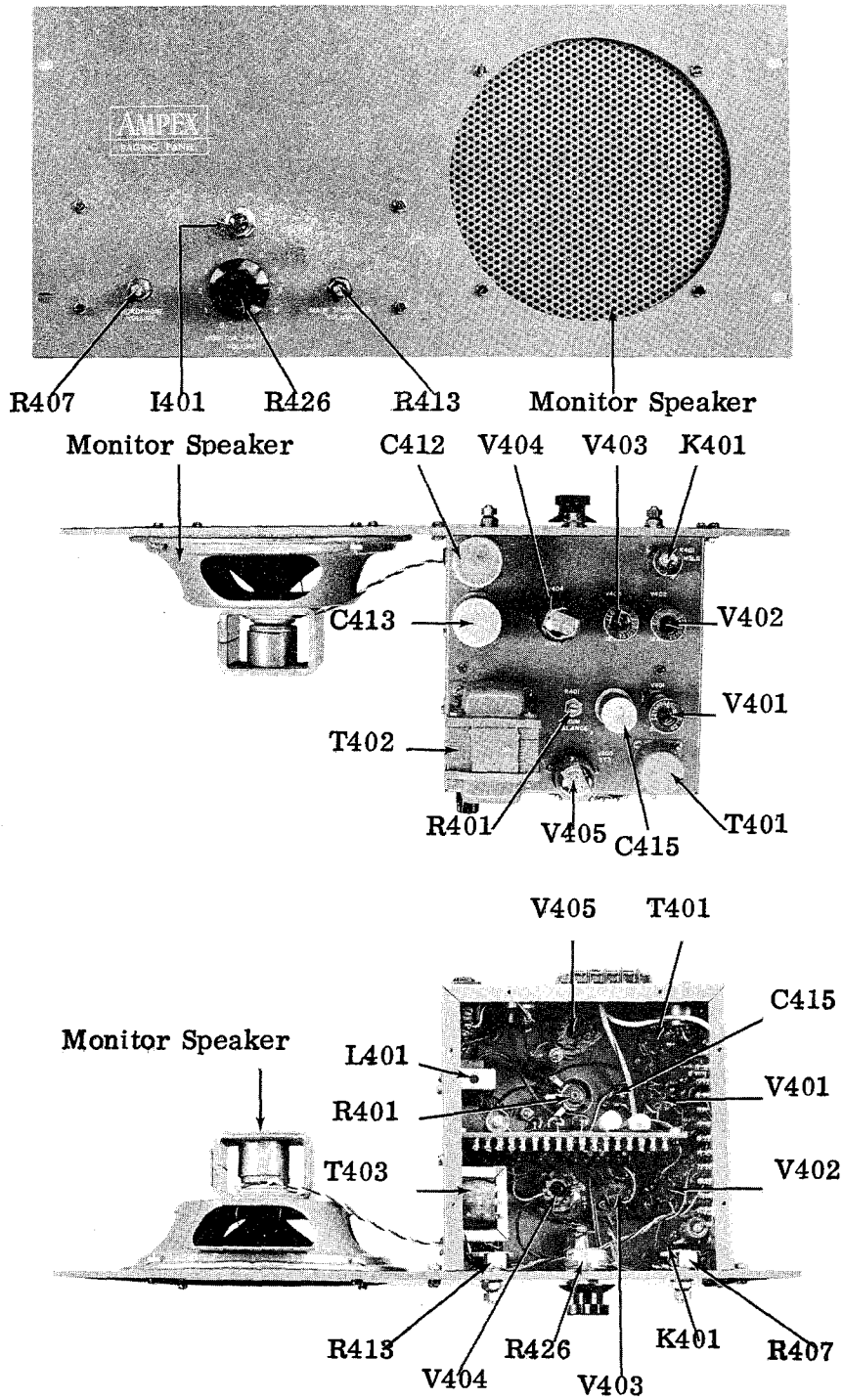
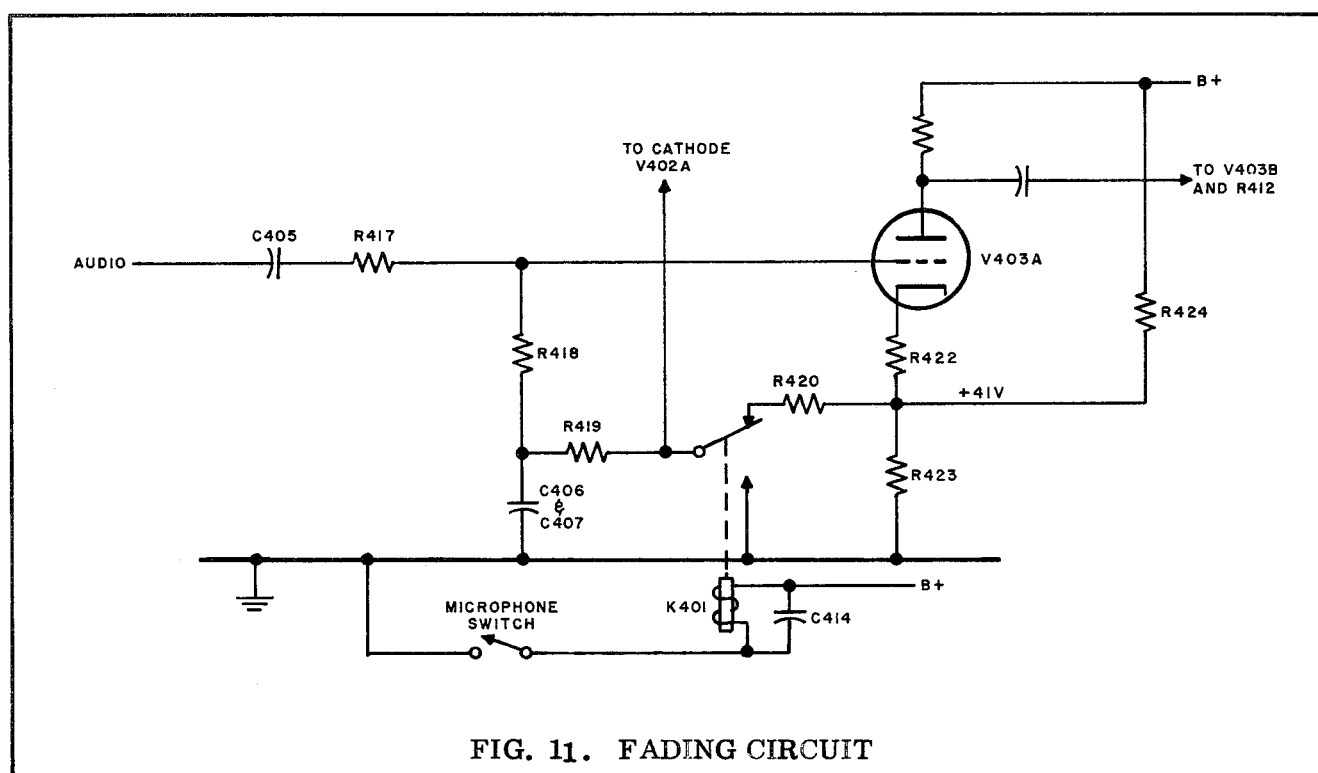


FIG. 10. PAGING PANEL

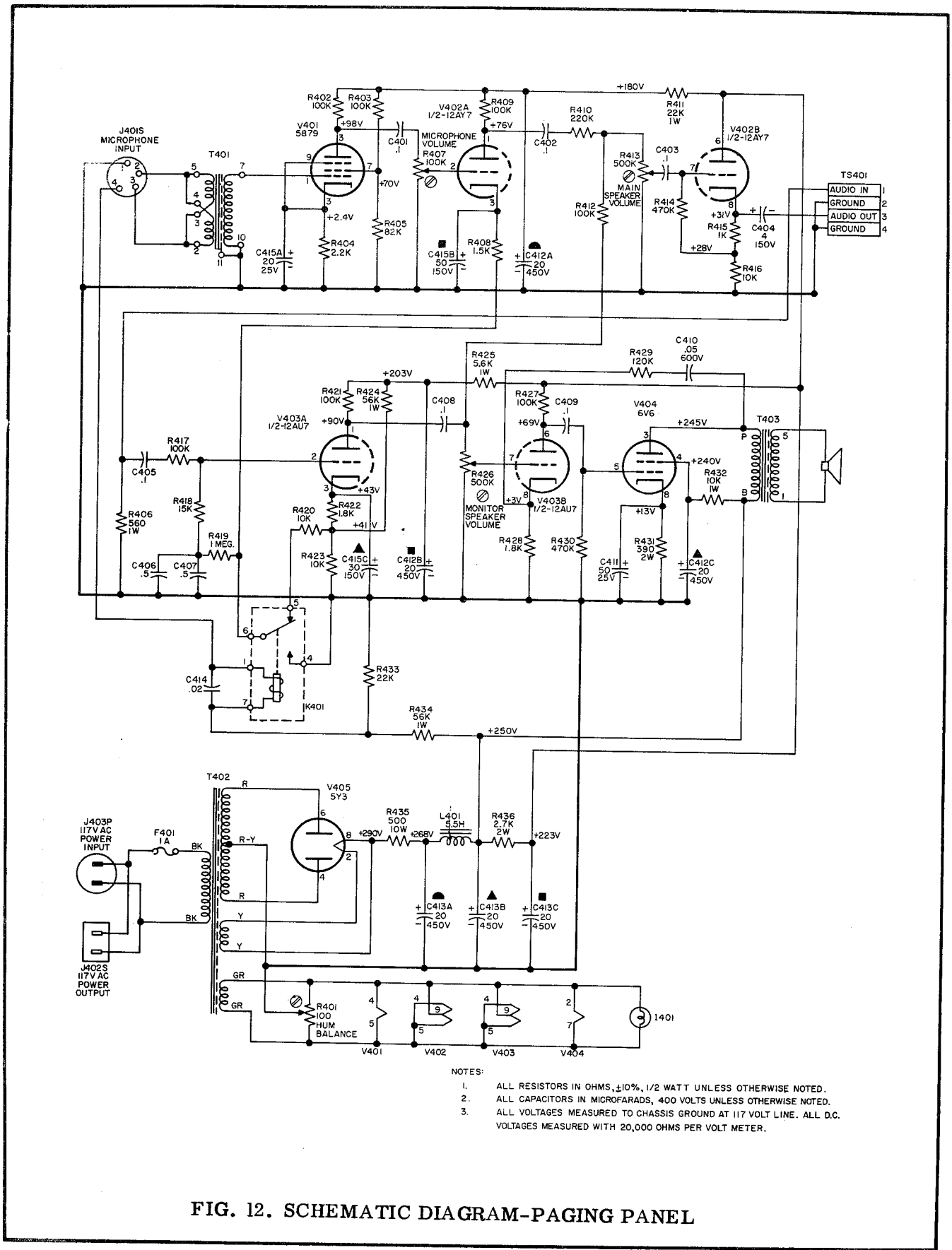
ground potential, increasing the bias until V403A is cut off and the music is inaudible. The relay contact also connects the cathode of V402A to ground, placing that tube in a conducting mode and activating the microphone audio circuit. There is a very short time constant in this circuit (R408, C415) and the action is almost instantaneous.

When the microphone switch is released after the paging operation, the grid of V403A will return to the +41 volt potential at the same rate that C406 and C407 charge through R419, gradually decreasing the bias on the tube until the capacitors are completely charged and normal operation has been restored. R420 is a current limiting resistor for the cathode circuit of V402A, so that when the +41 volts is applied suddenly to the cathode--when the microphone switch is released--the charging current of C415 will not be excessive.



The cathode follower mixing circuit (V402B) amplifies either the microphone or music signal and delivers it to the audio output at terminal Nos. 3 and 4 of TS401. The main speaker volume control, R413, controls the gain of this stage. The cathode follower output may be connected to low impedance loads through long shielded cables because of its low output impedance. Load impedances down to 5,000 ohms may be used.

The two stages of amplification for the monitor speaker are conventional, resistance coupled, audio amplifiers. Monitor speaker volume is controlled at R426.



NOTES:  
 1. ALL RESISTORS IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE NOTED.  
 2. ALL CAPACITORS IN MICROFARADS, 400 VOLTS UNLESS OTHERWISE NOTED.  
 3. ALL VOLTAGES MEASURED TO CHASSIS GROUND AT 117 VOLT LINE. ALL D.C. VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER.

FIG. 12. SCHEMATIC DIAGRAM-PAGING PANEL

A full wave power supply consisting of a power transformer, T402, a full wave rectifier, V405, and a filter circuit, R435, C413 and L401, complete the components in the paging panel.

2. MAINTENANCE

This equipment has passed a series of rigorous tests before being shipped from the factory. Barring damage during transit or installation, it can be expected that the unit will perform within its rigid specifications over long periods of time. Certain electronic components, however, are subject to deterioration, and as time passes it may become necessary to replace component parts of the equipment. This procedure has been devised with the above possibility in mind. Only qualified personnel should be permitted to work on this equipment.

a. Preventive Maintenance -- Once each month make a visual inspection of the equipment. Look for potting material leaking from transformer or capacitors, loose hold down nuts or screws, loose wires, etc.

b. Corrective Maintenance -- TABLE 2

SYMPTOM	CHECKING PROCEDURE AND ISOLATION OF TROUBLE
I401 not lit, tube filaments not lit.	Probable cause is F401 fuse.
Paging Feature does not function	If the music system is o.k. the cause is either in the microphone or stages V401, V402A.
Music is not audible	If the paging system is o.k., the cause is either in the Reproducer or in stage V403A.
Music does not fade out for paging	Trouble is in the microphone switch or in the circuit of K401.
Monitor speaker does not operate	If the main speaker assembly is o.k., the trouble is in stages V403B or V404.
Main speaker assembly does not operate either with music or paging	Trouble is either in the Power Amplifier, or in stage V402B.
No high voltage to tubes	Trouble is in power supply stage, V405

PARTS LIST

PAGING PANEL  
CATALOG No. 7407-1

Schematic Ref. No.	Description	Ampex Catalog Number
C401	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C402	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C403	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C404	4 Mfd, 150 Volt, Electrolytic Capacitor	CO-53
C405	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C406	.5 Mfd, 400 Volt, Paper Capacitor	CO-46
C407	.5 Mfd, 400 Volt, Paper Capacitor	CO-46
C408	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C409	.1 Mfd, 400 Volt, Paper Capacitor	CO-294
C410	.05 Mfd, 600 Volt, Paper Capacitor	CO-251
C411	50 Mfd, 25 Volt, Electrolytic Capacitor	CO-60
C412	20-20-20 Mfd, 450 Volt, Electrolytic Capacitor	CO-236
C413	20-20-20 Mfd, 450 Volt, Electrolytic Capacitor	CO-236
C414	.02 Mfd, 500 Volt, Ceramic Disc Capacitor	CO-337
C415	50-30 Mfd, 150 Volt, and 20 Mfd, 25 Volt, Electrolytic Capacitor	CO-463
F401	1 ampere, 250 Volt, Fuse	FU-1
I401	6.3 Volt, .15 Ampere, Lamp	LA-5
J401S	Receptacle, Cannon, XL-4-13	PL-138S
J402S	Receptacle, Hart 1626L	PL-419S
J403P	Receptacle, Hubbell 7466	PL-104P
K401	Relay, 10,000 ohm	RL-66
L401	Choke, 5.5 Henry	CH-62
<b>ALL RESISTORS ± 10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED</b>		
R401	100 Ohm Potentiometer, Wire Wound	RE-618
R402	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R403	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R404	2,200 Ohm, 1/2 W, Composition Resistor	RE-369
R405	82,000 Ohm, 1/2 W, Composition Resistor	RE-455
R406	560 Ohm, 1 W, Composition Resistor	RE-3
R407	100,000 Ohm, Audio Taper Potentiometer	RE-227
R408	1,500 Ohm, 1/2 W, Composition Resistor	RE-332
R409	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R410	220,000 Ohm, 1/2 W, Composition Resistor	RE-301
R411	22,000 Ohm, 1 W, Composition Resistor	RE-18

ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER

Schematic Ref. No.	Description	Ampex Catalog Number
R412	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R413	500,000 Ohm, Audio Taper Potentiometer	RE-230
R414	470,000 Ohm, 1/2 W Composition Resistor	RE-302
R415	1,000 Ohm, 1/2 W, Composition Resistor	RE-448
R416	10,000 Ohm, 1/2 W, Composition Resistor	RE-453
R417	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R418	15,000 Ohm, 1/2 W, Composition Resistor	RE-304
R419	1 Megohm, 1/2 W, Composition Resistor	RE-290
R420	10,000 Ohm, 1/2 W, Composition Resistor	RE-453
R421	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R422	1,800 Ohm, 1/2 W, Composition Resistor	RE-492
R423	10,000 Ohm, 1/2 W, Composition Resistor	RE-453
R424	56,000 Ohm, 1 W, Composition Resistor	RE-23
R425	5,600 Ohm, 1 W, Composition Resistor	RE-12
R426	500,000 Ohm, Audio Taper Potentiometer	RE-584
R427	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R428	1,800 Ohm, 1/2 W, Composition Resistor	RE-492
R429	120,000 Ohm, 1/2 W, Composition Resistor	RE-716
R430	470,000 Ohm, 1/2 W, Composition Resistor	RE-302
R431	390 Ohm, 2 W, Composition Resistor	RE-516
R432	10,000 Ohm, 1 W, Composition Resistor	RE-15
R433	22,000 Ohm, 1/2 W, Composition Resistor	RE-298
R434	56,000 Ohm, 1 W, Composition Resistor	RE-23
R435	500 Ohm, 10 W, Wire Wound Resistor	RE-72
R436	2,700 Ohm, 2 W, Composition Resistor	RE-161
T401	Transformer, Microphone	B-9386
T402	Transformer, Power	B-6298
T403	Transformer, Output	TR-60
TS401	Terminal Strip, Barrier Type	TS-13-1-4
V401	5879 Vacuum Tube	TU-35
V402	12AY7 Vacuum Tube	TU-63
V403	12AU7 Vacuum Tube	TU-28
V404	6V6GT Vacuum Tube	TU-5
V405	5Y3GT Vacuum Tube	TU-14
	Assembly, Dial Light, Red Jewel	DL-6
	Grille, Speaker	C-5939-1
	Knob, 1-1/2 inch, Black Skirted	KN-3
	Post, Fuse	FE-2
	Shield, Tube, 7 pin miniature	SD-7
	Shield, Tube, 9 pin miniature	SD-8
	Speaker, Monitor, 8 inch	SQ-2

ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER

SECTION VSENSING PANEL

## 1. ELECTRONIC THEORY

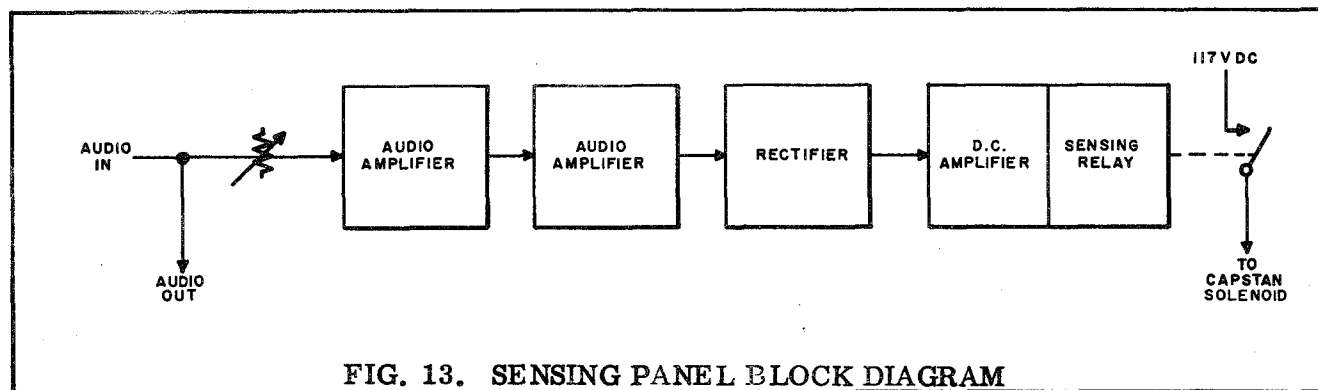


FIG. 13. SENSING PANEL BLOCK DIAGRAM

A-1121

The audio signal from the reproducer enters the sensing panel at terminal Nos. 1 and 2 on TS601.

V601A and V601B constitute two stages of audio amplification, the gain of which is controlled by R601, SENSITIVITY control. The amplified signal from V601B is rectified by V602A, which is connected as a diode detector. The output is taken across R608 and impressed on the grid of V602B. The cathode of V602B, without audio signal input, is held at approximately +14 volts, by the action of voltage dividers R609 and R610. This voltage effectively prevents the tube from conducting unless an audio signal is present at the input to the panel. When the rectified audio signal across R608 is sufficient to overcome the fixed bias on V602B, that tube will conduct, energizing relay K601 and connecting the relay contact across pin 1 and pin 6.

117 Volts, d-c, enters the sensing panel from the reproducer at pin No. 1 of J604P. When K601 is energized it completes a circuit between pin No. 1 and pin No. 2 of J604P. This returns the 117 volts, d-c, to the reproducer and then to the capstan solenoid. The capstan solenoid will thus be energized as long as there is an audio signal input to the sensing panel.

The power supply is a conventional half-wave rectifier, employing a selenium rectifier, SR601, a power transformer, T601, and a filtering circuit consisting of C605A, R611, and C605B. The 6.3 volt, a-c, filament winding of the transformer is connected to the mid-tap of the 12AX7 and 12AU7 tubes to provide the necessary filament voltage.

## 2. MAINTENANCE

This equipment has passed a series of rigorous tests before being shipped from the factory. Barring damage during transit or installation, it can be expected that the unit will perform

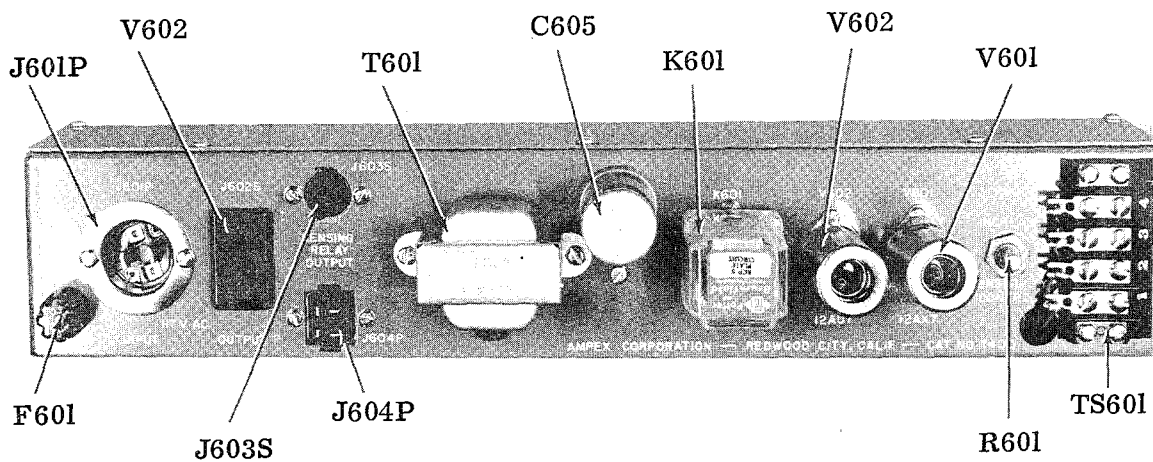
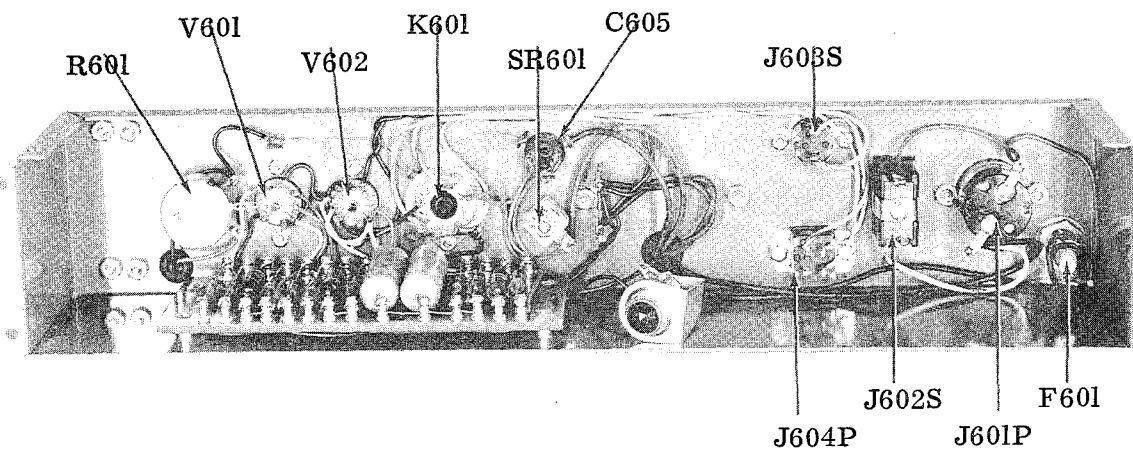
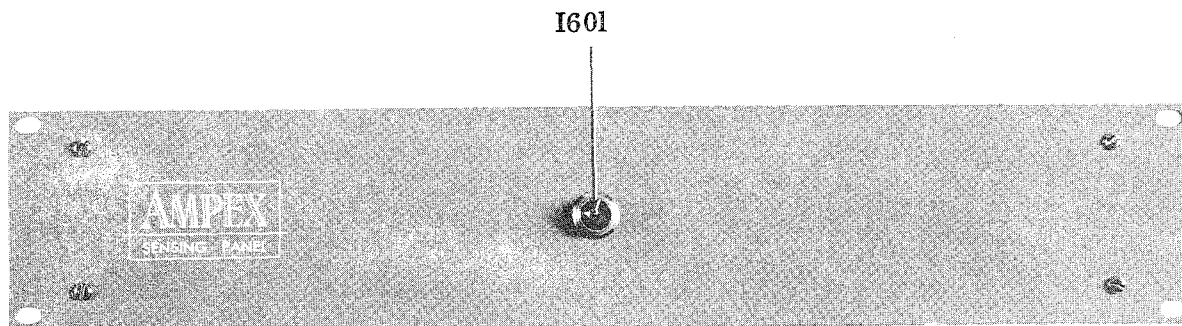


FIG. 14. SENSING PANEL



within its rigid specifications over long periods of time. Certain electronic components, however, are subject to deterioration, and as time passes it may become necessary to replace component parts of the equipment. This procedure has been devised with the above possibility in mind. Only qualified personnel should be permitted to work on this equipment.

a. Preventive Maintenance -- Once each month make a visual inspection of the equipment. Look for potting material leaking from transformer or capacitors, loose hold down nuts or screws, loose wires, etc.

b. Corrective Maintenance --

(1) ADJUSTING THE SENSITIVITY CONTROL

Step 1. Connect an audio oscillator at terminal Nos. 1 and 2 of TS601. It may be necessary to devise an attenuating network in series with the oscillator so that the output will go down to .044 volts (-25 dbm).

Step 2. Connect a vacuum tube voltmeter at terminal Nos. 1 and 2 of TS601, paralleling the audio oscillator.

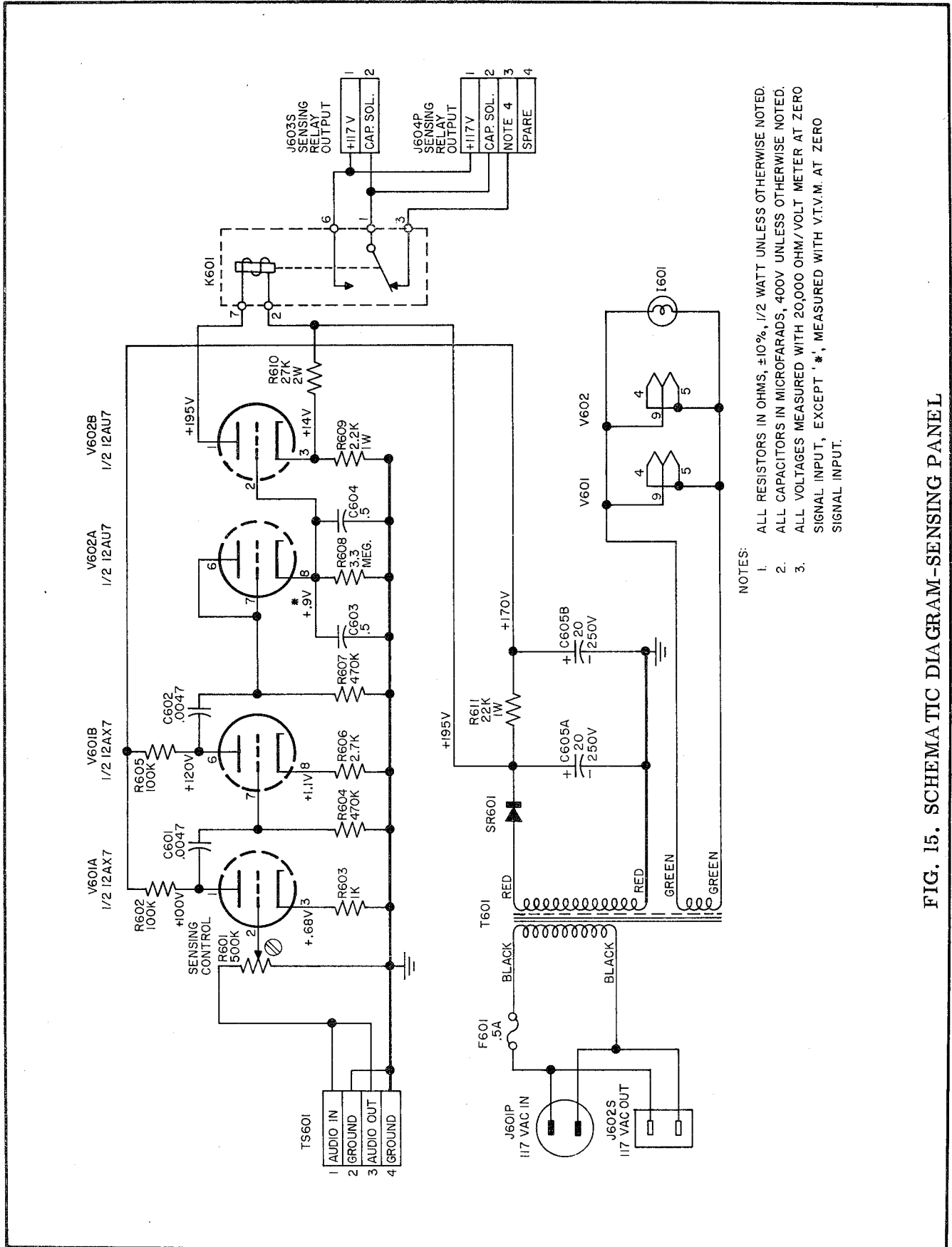
Step 3. Tune the audio oscillator to 1,000 cps.

Step 4. Advance the gain on the audio oscillator until K601 is energized.

Step 5. Slowly back off the gain on the audio oscillator and determine at what point, as read on the VTVM, K601 de-energizes. This reading should be .044 volts (-25 dbm).

Step 6. If K601 is not de-energizing at the proper point, adjust R601 until, as the gain on the audio oscillator is slowly decreased, the relay de-energizes just as the meter reads .044 volts.

(2) Other corrective maintenance procedures on the Sensing Panel will consist of checking tubes, voltages, and resistances.



- NOTES:
1. ALL RESISTORS IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE NOTED.
  2. ALL CAPACITORS IN MICROFARADS, 400V UNLESS OTHERWISE NOTED.
  3. ALL VOLTAGES MEASURED WITH 20,000 OHM/VOLT METER AT ZERO SIGNAL INPUT, EXCEPT '\*', MEASURED WITH V.T.V.M. AT ZERO SIGNAL INPUT.

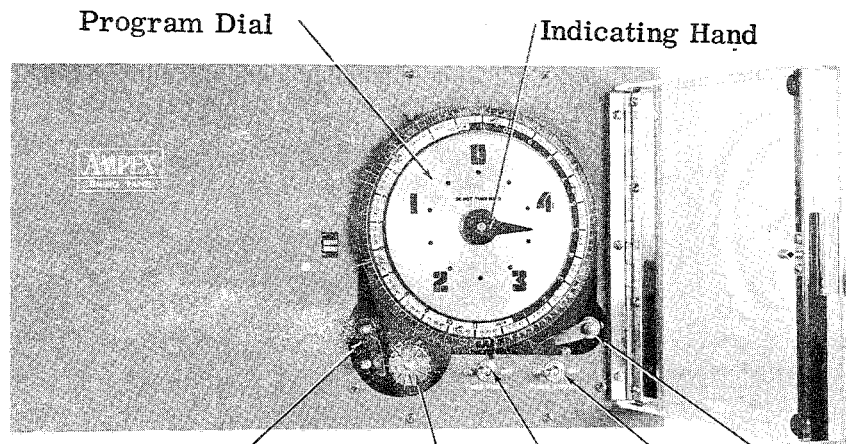
FIG. 15. SCHEMATIC DIAGRAM-SENSING PANEL

PARTS LIST

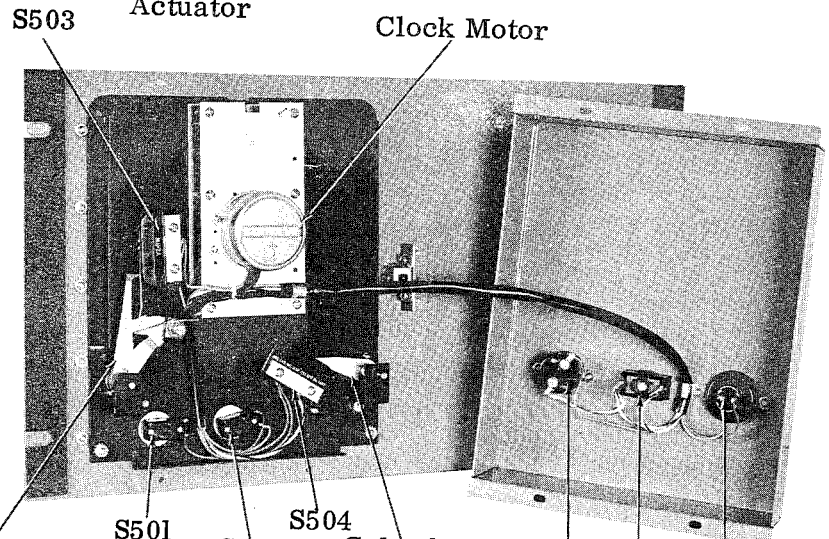
SENSING PANEL  
CATALOG NO. 7400-1

Schematic Ref. No.	Description	Ampex Catalog Number
C601	.0047 Mfd, 400 Volt, Paper Capacitor	CO-334
C602	.0047 Mfd, 400 Volt, Paper Capacitor	CO-334
C603	.5 Mfd, 400 Volt, Paper Capacitor	CO-46
C604	.5 Mfd, 400 Volt, Paper Capacitor	CO-46
C605	20-20 Mfd, 250 Volt, Electrolytic Capacitor	CO-458
F601	.5 Ampere, 250 Volt, Fuse	FU-24
I601	6.3 Volt, .15 Ampere, Lamp	LA-5
J601P	Receptacle, Hubbell 7466	PL-104P
J602S	Receptacle, Hart 1626L	PL-419S
J603S	Receptacle, Jones S-302AB	PL-75S
J604P	Receptacle, Jones P-304AB	PL-301P
K601	Relay, SPDT, 10,000 ohms	RL-65
ALL RESISTORS ± 10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED		
R601	500,000 Ohm Audio Taper Potentiometer	RE-230
R602	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R603	1,000 Ohm, 1/2 W, Composition Resistor	RE-448
R604	470,000 Ohm, 1/2 W, Composition Resistor	RE-302
R605	100,000 Ohm, 1/2 W, Composition Resistor	RE-300
R606	2,700 Ohm, 1/2 W, Composition Resistor	RE-373
R607	470,000 Ohm, 1/2 W, Composition Resistor	RE-302
R608	3.3 Megohm, 1/2 W, Composition Resistor	RE-753
R609	2,200 Ohm, 1 W, Composition Resistor	RE-7
R610	27,000 Ohm, 2 W, Composition Resistor	RE-172
R611	22,000 Ohm, 1 W, Composition Resistor	RE-18
SR601	Selenium Rectifier, Seletron 10Y5	SR-26
T601	Transformer, Power	TR-69
TS601	Terminal Strip, Barrier Type	TS-13-1-4
V601	12AX7 Vacuum Tube	TU-29
V602	12AU7 Vacuum Tube	TU-28
	Assembly, Dial Light, Red Jewel	DL-6
	Post, Fuse	FE-2
	Shield, Tube, 9 pin miniature	SD-8

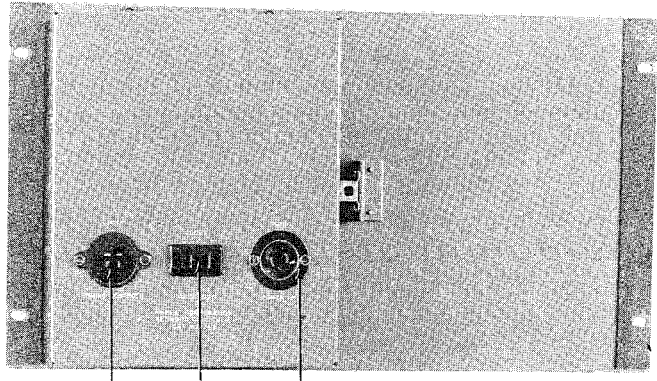
ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER



Calendar Switch Actuator      Calendar Dial      Program On-Off Actuator



Program On-Off Latching      S501      S502      Calendar Switch Actuator      J501P      J502S      J503P



J503P J502S J501P

FIG. 16. TIMING PANEL

SECTION VI

TIMING PANEL

1. ELECTRONIC THEORY

The 117 volt, a-c, power enters the Timing Panel at J501P. The **TIMER POWER SWITCH** controls this power to the time clock, which in turn controls--by means of the Calendar Switch--the delivering of the 117 volt, a-c, power out at J502S.

At J503P, 117 volts, d-c, enters at pin 1. The time clock controls the operation of the Program Off-On switch, S503, which delivers the 117 volts, d-c, to pin 2 of J503P, from where it returns to the Magnetic Tape Reproducer. The **TIMER BYPASS SWITCH**, S501, bypasses the Program Off-On switch, so that when S501 is in the "on" position, the time clock will not control the operation of the Magnetic Tape Reproducer.

**PARTS LIST**

Schematic Ref. No.	Description -	Ampex Catalog Number
J501P	Receptacle, Hubbell 7466	PL-104P
J502S	Receptacle, Hart 1626L	PL-419S
J503P	Receptacle, Jones P-304RP	PL-429P
S501	Switch, Bat Handle, SPST	SW-74
S502	Switch, Bat Handle, SPST	SW-74
	Assembly, Time Clock, Montgomery TSC (Includes clock, actuating arms, latching mechanism, microswitches S503 and S504, calendar dial)	C-7391

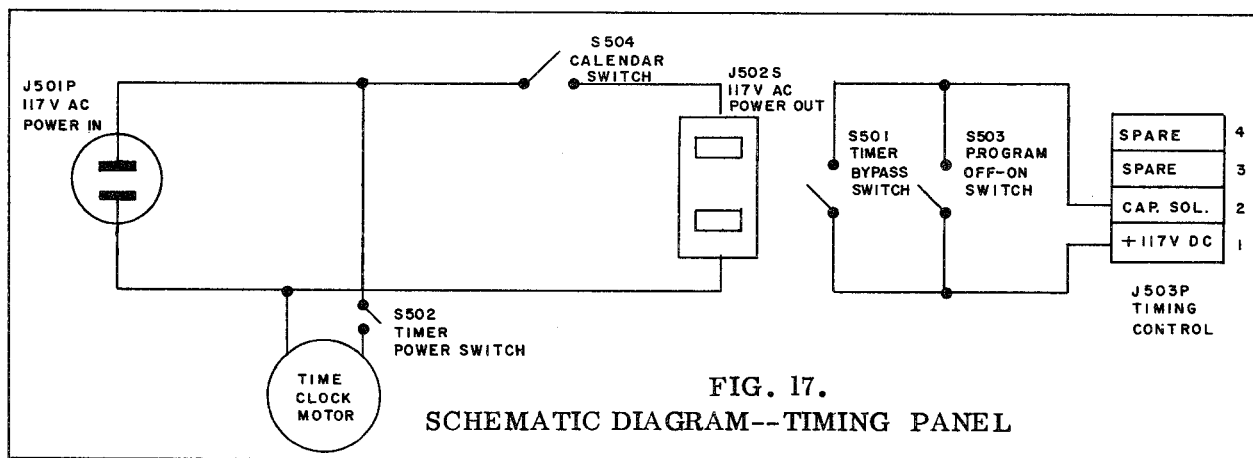
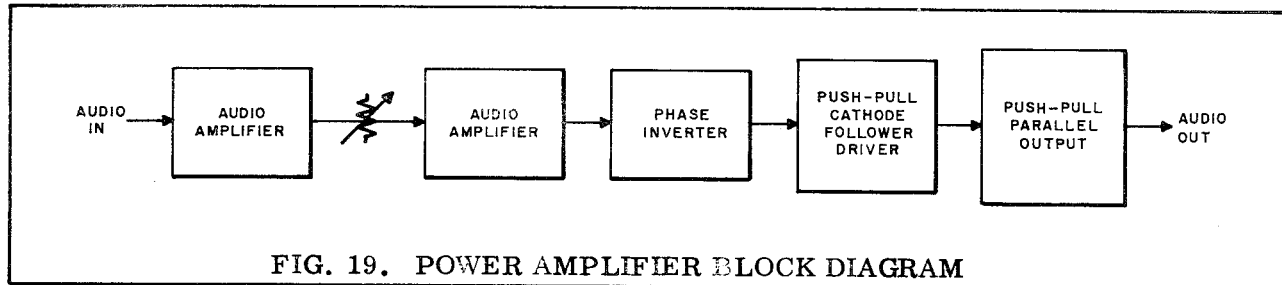


FIG. 17.  
SCHEMATIC DIAGRAM--TIMING PANEL

SECTION VIIPOWER AMPLIFIER

## 1. ELECTRONIC THEORY



The audio signal input enters the Power Amplifier at terminal Nos. 1 and 2 of TS801, from where it passes to the grid of V801. V801 and V802 are single-ended amplifier stages, with the GAIN control (R806) in the grid circuit of the second stage. V803A and V803B form a phase inverter circuit, which feeds the push-pull, cathode follower driver stage V804A and V804B. The output stage is parallel push-pull, with V806 and V808 paralleled, and V805 and V807 paralleled.

Degenerative feedback is obtained through either the C815, R847 circuit or the C816, R822 circuit, dependent upon how the output transformer is strapped.

The Meter, M801, is connected across the following metering resistors: Position 1, R805; position 2, R810; position 3, R816; position 4, R817; position 5, R830; position 6, R829; position 7, off; position 8, R836; position 9, R835; position 10, R838; position 11, R837.

Decoupling circuits for stages V801, V802 and V803 are formed by capacitor C811 in conjunction with R804, R809 and R818.

The power supply consists of a power transformer (T801), a full wave rectifier (V809 and V810), a filtering circuit (L801, C812 and C813). A low voltage secondary winding is rectified by SR801 and SR802, and filtered by L802 and C814. Proper regulation is obtained by voltage regulators V811, V812, V813, V814, and V815.

## 2. MAINTENANCE

This equipment has passed a series of rigorous tests before being shipped from the factory. Barring damage during transit or installation, it can be expected that the unit will perform within its rigid specifications over long periods of time. Certain electronic components, however, are subject to deterioration, and as time passes it may become necessary to replace component parts of the equipment. This procedure has been devised with the above possibility in mind. Only qualified personnel should be permitted to work on this equipment.

a. Preventive Maintenance -- Once each month make a visual inspection of the equipment. Look for potting material leaking from transformer or capacitors, loose hold down nuts or screws, loose wires, etc.

Once each month check the readings at M801. Deviation from the normal reading, as indicated on the schematic diagram, will usually point out possible sources of trouble before they occur.

b. Corrective Maintenance -- Trouble can be easily isolated to one stage by rotating the meter selector switch through its 11 positions and noting where any deviation from the normal readings occur. Start checking at the first stage (V801) and continue in order.





PARTS LISTPOWER AMPLIFIER  
CATALOG NO. 7413-1

Schematic Ref. No.	Description	Ampex Catalog Number
C801	50 Mfd., 25 volt, Electrolytic Capacitor	CO-60
C802	.1 Mfd., 600 volt, Tubular Capacitor	CO-33
C803	.1 Mfd., 600 volt, Tubular Capacitor	CO-33
C805	.1 Mfd., 600 volt, Tubular Capacitor	CO-33
C806	.25 Mfd., 600 volt, Tubular Capacitor	CO-35
C807	.25 Mfd., 200 volt, Tubular Capacitor	CO-340
C808	.25 Mfd., 200 volt, Tubular Capacitor	CO-340
C809	.25 Mfd., 600 volt, Tubular Capacitor	CO-35
C810	.25 Mfd., 600 volt, Tubular Capacitor	CO-35
C811	30-30-20 Mfd., 475 volt, Electrolytic Capacitor	CO-244
C812	30-30-20 Mfd., 475 volt, Electrolytic Capacitor	CO-244
C813	30-30-20 Mfd., 475 volt, Electrolytic Capacitor	CO-244
C814	30-30-20 Mfd., 475 volts, Electrolytic Capacitor	CO-244
C815	.0001 Mfd., 500 volt, Mica Capacitor	CO-3
C816	.0003 Mfd., 500 volt, Mica Capacitor	CO-103
C817	.01 Mfd., 600 volt, Disc Capacitor	CO-268
C818	.00005 Mfd., 500 volt, Mica Capacitor	CO-2
F801	5 ampere, 250 volt, Fuse	FU-5
I801	6-8 volt, .15 ampere, Lamp	LA-5
L801	Choke, Filter	B-6471
L802	Choke, Filter	A-1155
M801	Meter, 0 to 1 Milliamp	ME-11
ALL RESISTORS 1 WATT $\pm 10\%$ UNLESS OTHERWISE SPECIFIED		
R801	220,000 ohms, Composition Resistor	RE-28
R802	2,200 ohms, Composition Resistor	RE-7
R803	56,000 ohms, Composition Resistor	RE-23
R804	22,000 ohms, Composition Resistor	RE-18
R805	3,300 ohms, 1%, Film Resistor	RE-188
R806	250,000 ohms, Audio Taper Potentiometer	RE-229
R807	2,200 ohms, Composition Resistor	RE-7
R808	56,000 ohms, Composition Resistor	RE-23
R809	22,000 ohms, Composition Resistor	RE-18
R810	3,300 ohms, 1%, Film Resistor	RE-188

ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER

Schematic

Ampex  
Catalog  
Number

Ref. No.	Description	
R811	220,000 ohms, Composition Resistor	RE-28
R812	2,200 ohms, Composition Resistor	RE-7
R813	1,800 ohms, Composition Resistor	RE-438
R814	56,000 ohms Composition Resistor	RE-23
R815	56,000 ohms Composition Resistor	RE-23
R816	1,800 ohms, 1%, Film Resistor	RE-634
R817	1,800 ohms, 1%, Film Resistor	RE-634
R818	4,700 ohms, Composition Resistor	RE-11
R819	130,000 ohms, 5%, Composition Resistor	RE-649
R820	180,000 ohms, 5%, Composition Resistor	RE-650
R821	180,000 ohms, Composition Resistor	RE-635
R822	6,800 ohms, 1%, Film Resistor	RE-192
R823	330,000 ohms, Composition Resistor	RE-30
R824	330,000 ohms, Composition Resistor	RE-30
R825	50,000 ohms, 2Watt, Linear Wirewound Potentiometer	RE-636
R826	50,000 ohms, 2 Watt, Linear Wirewound Potentiometer	RE-636
R827	6,800 ohms, Composition Resistor	RE-13
R828	6,800 ohms, Composition Resistor	RE-13
R829	750 ohms, 1%, Film Resistor	RE-639
R830	750 ohms, 1%, Film Resistor	RE-639
R831	330 ohms, Composition Resistor	RE-346
R832	330 ohms, Composition Resistor	RE-346
R833	330 ohms, Composition Resistor	RE-346
R834	330 ohms, Composition Resistor	RE-346
R835	5.6 ohms, 1% Film Resistor	RE-632
R836	5.6 ohms, 1% Film Resistor	RE-632
R837	5.6 ohms, 1%, Film Resistor	RE-632
R838	5.6 ohms, 1%, Film Resistor	RE-632
R839	100 ohms, Composition Resistor	RE-260
R840	100 ohms, Composition Resistor	RE-260
R841	680 ohms, 1%, Film Resistor	RE-311
R842	39 ohms, Composition Resistor	RE-497
R843	39 ohms, Composition Resistor	RE-497
R844	39 ohms, Composition Resistor	RE-497
R845	5,000 ohms, 1%, Film Resistor	RE-640
R846	6,800 ohms, 1%, Film Resistor	RE-192
R847	20,000 ohms, 5%, Composition Resistor	RE-644
R848	6,500 ohms, 25 Watt, Wirewound Resistor	RE-638
R849	10,000 ohms, 25 Watt, Wirewound Resistor	RE-122
R850	150,000 ohms, 2 Watt, Composition Resistor	RE-601
R851	150,000 ohms, 2 Watt, Composition Resistor	RE-601
R852	5.6 ohms, Composition Resistor	RE-633
R853	2,000 ohms, 10 Watt, Wirewound Resistor	RE-82

ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER

Schematic Ref. No.	Description	Ampex Catalog Number
S801	Switch, SPST, 10 Amperes	SW-67
S802	Switch, Rotary Selector, 11 Position	SW-68
SR801	Selenium Rectifier	SR-7
SR802	Selenium Rectifier	SR-7
T801	Transformer, Power	B-6472
T802	Transformer, Output	B-6954-1
TS801	Terminal Strip, Barrier Type	TS-13-1-4
TS802	Terminal Strip, Barrier Type	TS-13-1-10
TS803	Terminal Strip, 6 point tie	TS-2-6
V801	5879 Vacuum Tube	TU-35
V802	5879 Vacuum Tube	TU-35
V803	6SN7-GT Vacuum Tube	TU-13
V804	6BL7 Vacuum Tube	TU-66
V805	807 Vacuum Tube	TU-7
V806	807 Vacuum Tube	TU-7
V807	807 Vacuum Tube	TU-7
V808	807 Vacuum Tube	VU-7
V809	5R4GY Vacuum Tube	TU-59
V810	5R4GY Vacuum Tube	TU-59
V811	OD3 (VR-150) Vacuum Tube	TU-2
V812	OD3 (VR-150) Vacuum Tube	TU-2
V813	OD3 (VR-150) Vacuum Tube	TU-2
V814	OD3 (VR-150) Vacuum Tube	TU-2
V815	OA3 (VR-75) Vacuum Tube	TU-21
	Dial Light Assembly	DL-27
	Fuse Extractor Post	FE-2

ALWAYS ORDER PARTS BY AMPEX CATALOG NUMBER

SECTION VIII

MICROPHONE

The microphone is a dynamic, or pressure type, instrument. A movable coil, attached to the diaphragm, is moved in a fixed magnetic field in accordance with variations in sound pressure. At voice frequencies the microphone has an essentially non-directional pickup pattern.

, A press-to-talk switch is contained in the microphone stand. This switch is wired to connectors No.1 and No.2 in the 4-pin male Cannon connector. It does not make or break the microphone wiring, but is intended to be used in controlling the associated microphone circuitry.

PARTS LIST

Connector, Cannon XL-4-12	PL-135P
Connector, Amphenol	PL-427P
Microphone, Electrovoice	MI-2
Stand, microphone, Electrovoice	MI-3

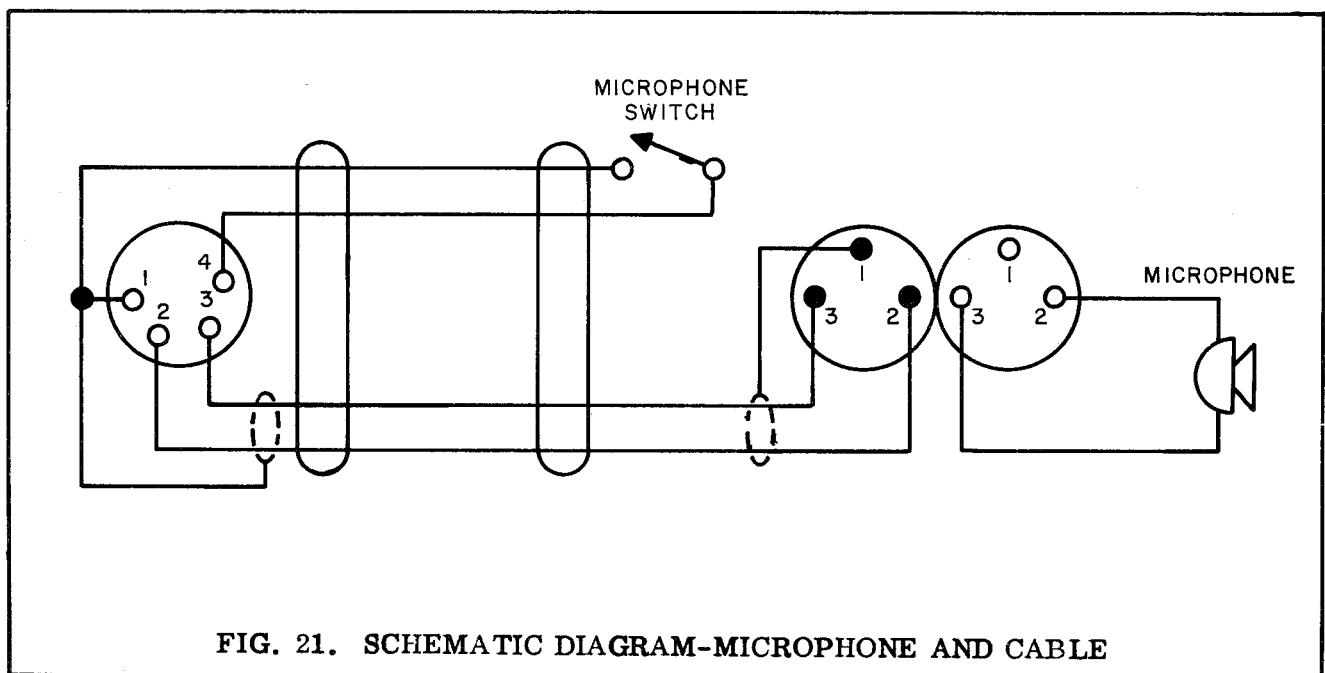


FIG. 21. SCHEMATIC DIAGRAM-MICROPHONE AND CABLE

SECTION IX - SYSTEM CORRECTIVE MAINTENANCE TABLES

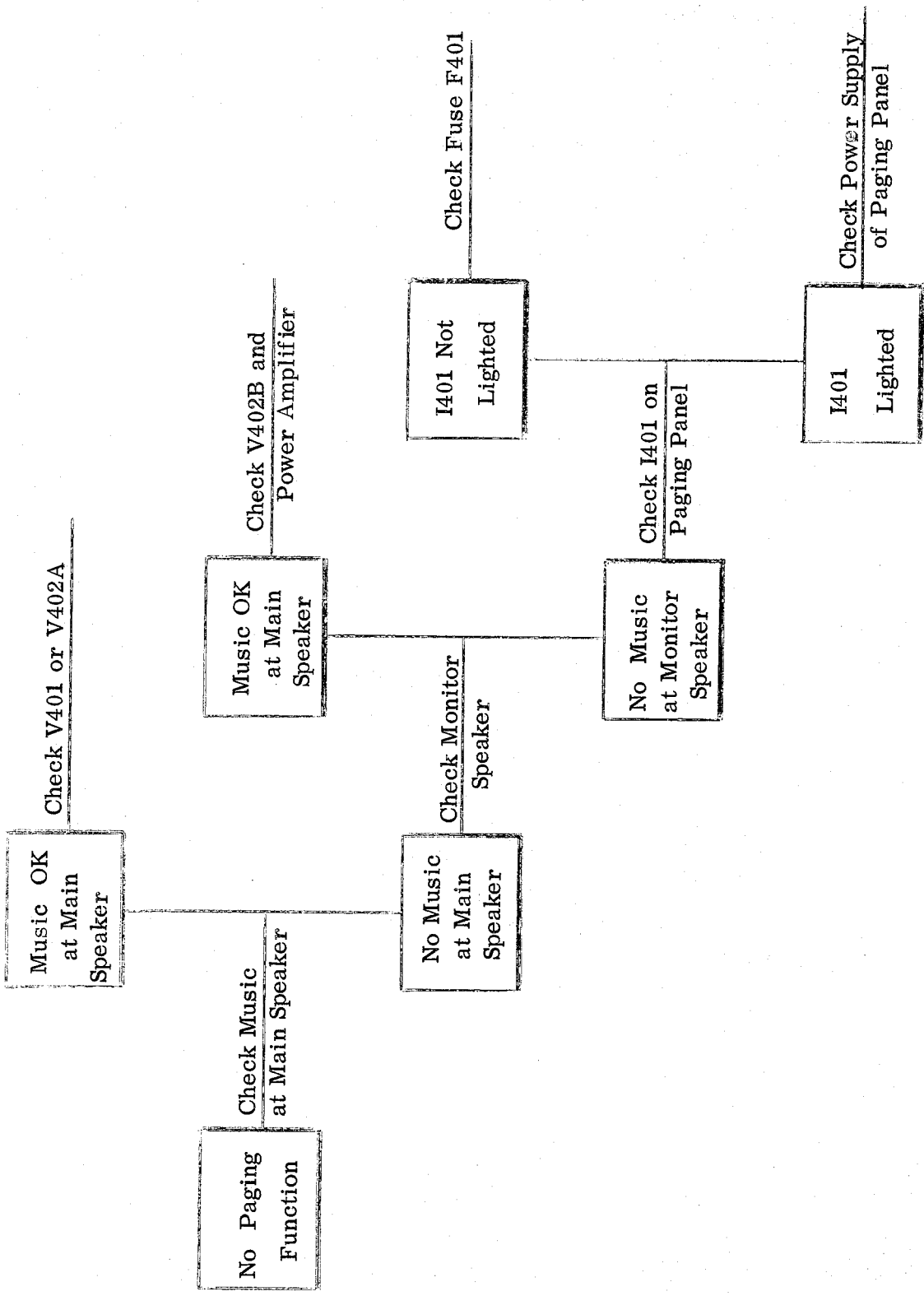


TABLE 4 - PAGING

SECTION IX - SYSTEM CORRECTIVE MAINTENANCE TABLES

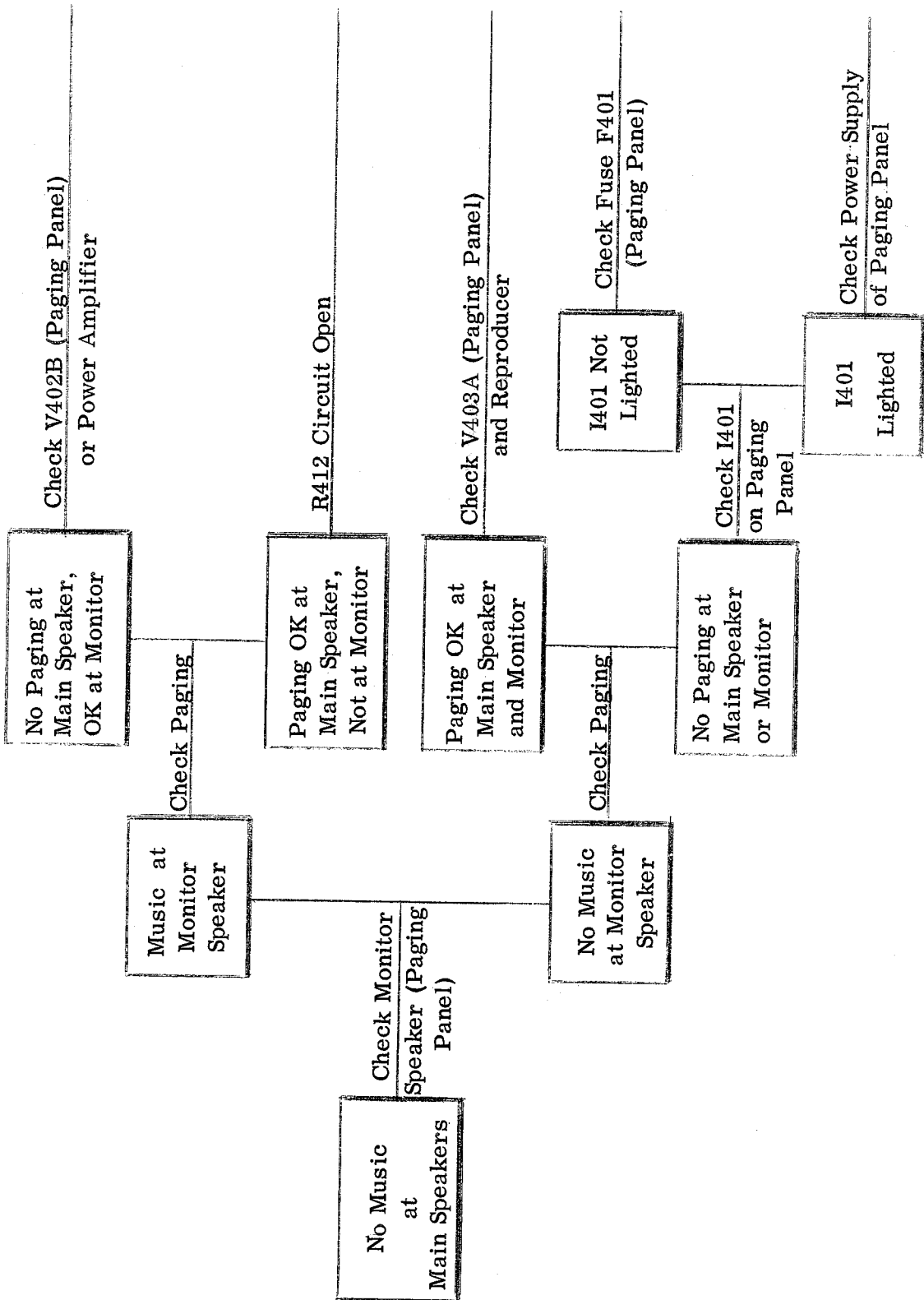


TABLE 5 - MUSIC

SECTION IX - SYSTEM CORRECTIVE MAINTENANCE TABLES (cont.)

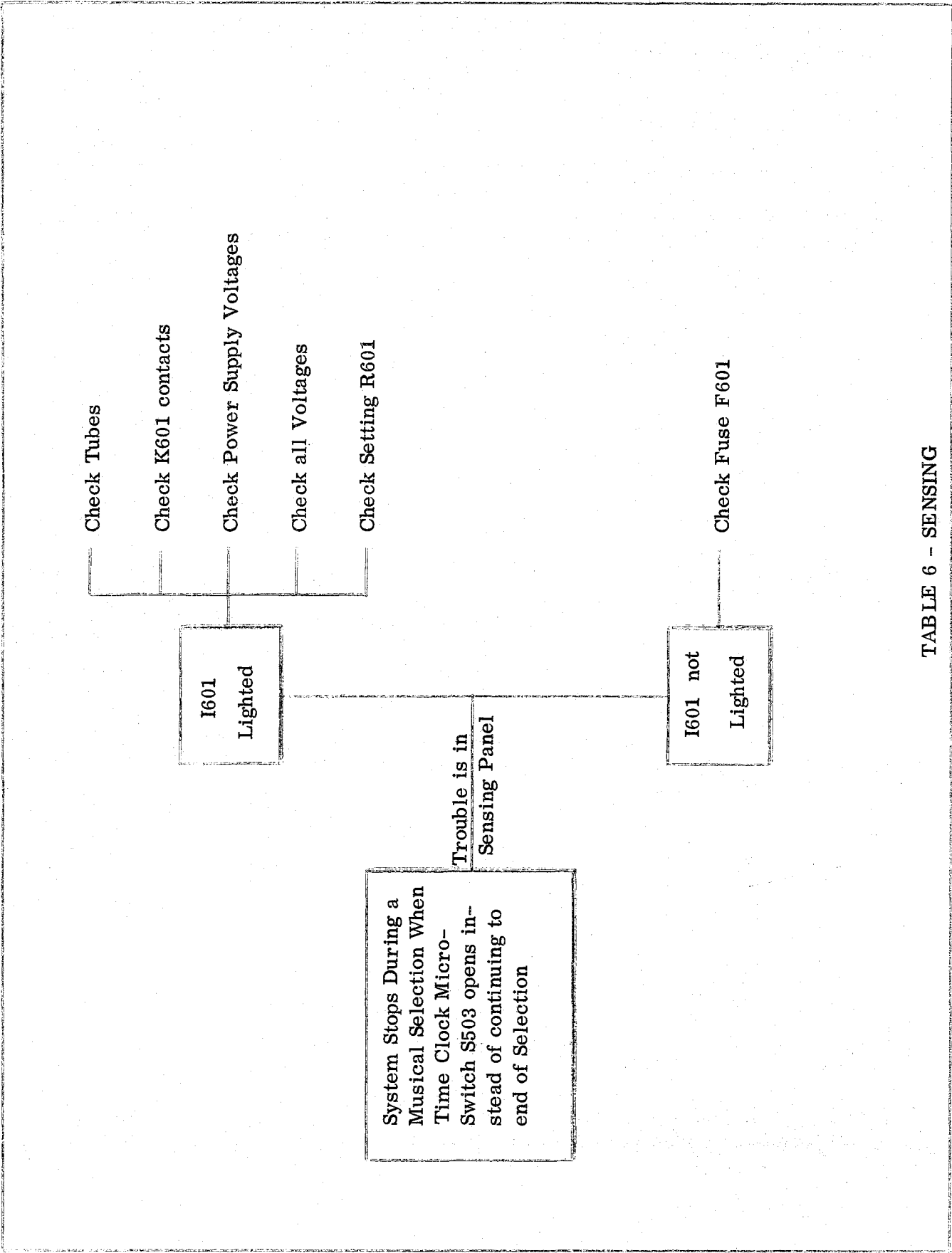


TABLE 6 - SENSING

SECTION IX - SYSTEM CORRECTIVE MAINTENANCE TABLES (cont)

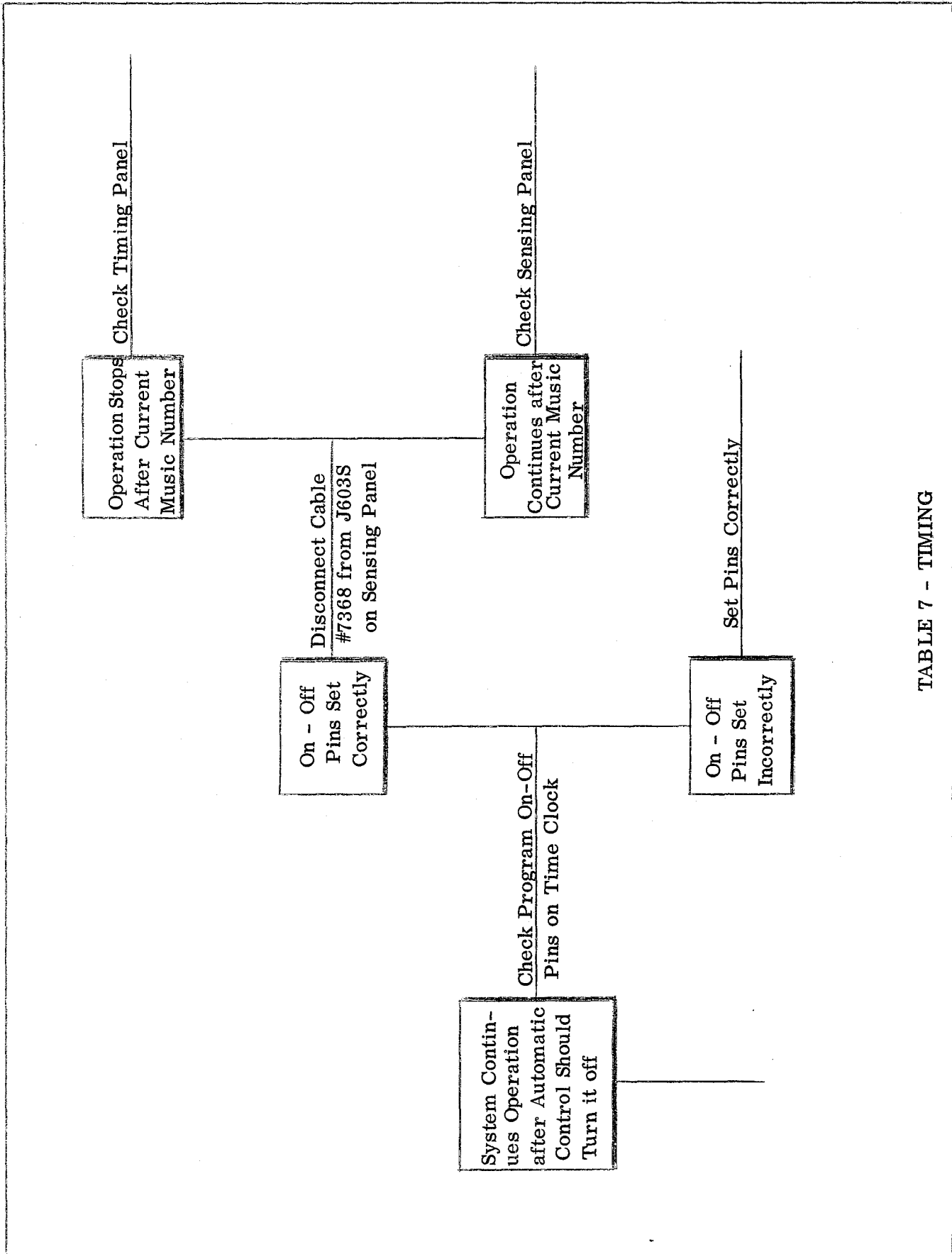


TABLE 7 - TIMING