RINGING AND TONE POWER PLANT
808A (J86834)
DESCRIPTION

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1. GENERAL

INTRODUCTION

1.01 This section describes the 808A ringing and tone power plant. Included in this section are the following:

- Physical description of the 808A Ringing and Tone Plant
- Functional description of the 808A Ringing and Tone Plant
- Description of operating requirements
- Description of maintenance requirements.

1.02 Whenever this section is reissued, the reason for reissue will be given in this paragraph. The Equipment Test List is not affected.

1.03 If this section is to be used with equipment or apparatus reflecting an earlier or later issue(s) of the SD(s), reference should be made to SDs and circuit descriptions (CDs) to determine the extent of the changes and the manner in which the section may be affected.

PURPOSE OF THE 808A RINGING AND TONE PLANT

1.04 ***Abbreviations and Acronyms:*** Refer to Table A for a list of abbreviations and acronyms with applicable terms in this section.

1.05 The purpose of the 808A ringing and tone power plant (J86834A AC-DC or J86834B superimposed) is to provide 6.0 ampere ringing current, tones, and signaling interruptions for the No. 1/1A Electronic Switching System (No. 1/1A ESS).

TABLE A

ABBREVIATIONS AND ACRONYMS

ABBREVIATION	TERM
TT	TOUCH TONE® Dial Tone
AR	Audible Ring Tone
BT	Busy Tone
MTI	Call Waiting Tone
HT	High Tone
TRAN	Tone Transformer
ROH	Receiver Off Hook
EML	Emergency Manual Lines
IPM	Interruptions Per Minute
HZ	Hertz
RMS	Root-Mean-Square (Alternating Current)
PT	Preempt Tone
AR30	Precedence Audible Ring Tone
MT	Conference Notification Tone
MT2	Busy Verification Tone

EQUIPMENT CHARACTERISTICS

1.06 The major generating functions in the 808A ringing and tone plant are duplicated and divided into side "0" and side "1". Both side "0" and side "1" are normally powered with either side connected to the office loads.

1.07 DC input power to the tone generators is supplied by the 24-volt central office battery. The -48 volt central office battery supplies the dc power for the ringing generators, the semiconductor-type interrupters, the receiver-off-hook generator, and the alarm and transfer relay operation. In superimposed ringing and tone power plants with the Zone 13 service feature, the -48 volt tripping supply is obtained from the central office battery and the +48 volt tripping supply from the 610D converter. In superimposed plants with the Zone 16 service feature, the 610D converter is not used and the +55 and -55 dc volt tripping supplies are obtained from 132AE power units. During normal operation, the rotary mechanical interrupters (KS-15634-L7) operate with 120-volt 60-Hz, single-phase commercial ac power. This interrupter is now rated manufacture discontinued and has been replaced by a solid-state interrupter. In case of a commercial

ac power failure, 120-volt ac power to the interrupters is supplied by the 504B power plant.

1.08 The system control provides for automatic transfer of the load in case of failure of either generator 0 or generator 1 and interrupter 0 or interrupter 1. All generators and interrupters are transferred as a unit. Manual control is also provided and it can supersede the system control. These plants are normally located in the switch-room lineup.

1.09 The 808A ringing and tone power plant furnishes the following tones:

(a) For 2-wire ESS offices, the following tones are furnished.

(1) RINGING CURRENT—(20 Hz, 6.0A, 84 to 86V, 94 to 101V and 102 to 110V rms output). See Note 1.

(2) TOUCH-TONE® DIAL TONE (TT)—Combined 350 and 440 Hz, 1 VA, 1.20V rms.

(3) AUDIBLE RINGING TONE (AR)—Combined 440 and 480 Hz, 1 VA, 0.36V rms. See Note 2.

(4) HIGH TONE (HT)—480 Hz, 1 VA, 0.29V rms. See Note 3.

(5) BUSY TONE (BT)—Combined 480 and 620 Hz, 1 VA, 0.18V rms. See Note 3.

(6) RECEIVER-OFF-HOOK TONE (ROH)—Combined frequencies of 1400, 2060, 2450, and 2600 Hz.

(7) PREEMPT TONE (PT)—Combined 440 and 620 Hz, 1 VA, 0.36V rms. See Note 4 (as required only).

(8) PRECEDENCE AUDIBLE RINGING TONE (AR4)—Combined 440 and 480 Hz, 1 VA, 0.36V rms. See Note 5 (as required only).

(9) CALL WAITING TONE (MT1)—440 Hz, 1 VA, 0.48V rms.

(10) BUSY VERIFICATION TONE (MT2)—440 Hz, 1 VA, 2.0V rms.

(b) For 4-wire ESS offices, the following additional tones are provided.

(1) CONFERENCE NOTIFICATION TONE (MT)—440 Hz, 1 VA, 0.20V rms.

(2) PRECEDURE AUDIBLE RINGING TONE (AR30)—Combined 440 and 480 Hz, 1 VA 0.36V rms.

(3) PREEMPT TONE (PT)—Combined 440 and 620 Hz, 1 VA, 0.36V rms.

Note 1: The plants provide, in ac-dc and superimposed offices, CODE 1 GEN BR1, BR2, and BR3 only. All other coded ringing is provided by ESS circuits.

Note 2: Provides three brushes interrupted at 10 ipm, 2 seconds on and 4 seconds off.

Note 3: Provides balanced distribution of continuous and interrupted tone at 60 and 120 IPM.

Note 4: To be replaced by routine alerting and priority signaling.

Note 5: Provides three brushes interrupted at 30 IPM, 0.25 second on and 1.75 seconds off.

2. PHYSICAL DESCRIPTION

A. Introduction

2.01 The J86834A and J86834B 808A ringing and tone plants are designed to mount on two types of ESS standard frameworks for 25-inch mounting plates. The size of the bays are as follows.

(a) ***Double Bays:*** 7 feet high, 1 foot deep, and 4 feet 4 inches wide

(b) ***Single Bay:*** 7 feet high, 1 foot deep, and 2 feet 2 inches wide.

2.02 ***AC-DC Office:*** This office requires a double bay and two single bays located to the left of the double bay in the lineup (see Fig. 1).

Note: A single bay may be added to the right of the double bay for the addition of

splitting resistors for maximum growth of the office.

2.03 ***Superimposed Office:*** This office requires two double bays and one single bay located to the right of the double bay in the lineup (see Fig. 2).

2.04 The equipment which comprises the 808A ringing and tone plant is as follows (refer to Fig. 1 and 2):

(1) Manual ringing and tone panel

(2) Control, test, interrupter, and transfer relays

(3) Tone oscillators

(4) Tone amplifiers

(5) ROH generator

(6) Tone distribution splitting resistors

(7) Ringing inverters

(8) Ringing distribution fuse panel

(9) Battery distribution fuse panel

(10) Low pass DC input line filter

(11) Solid-state interrupter

(12) Ringing switches.

(13) 132AE power unit

(14) 172A regulator.

B. Manual Control Panel

2.05 The manual ringing and tone panel provides ON-OFF switching and status indicators for the 808A ringing and tone plant. Refer to Fig. 3 for arrangement of switches and lamps. Refer to Table B for function of switches and lamps.

C. Control, Test, Interrupter, and Transfer Relays

2.06 The control relays provide ON-OFF switching of the dc power to the plant circuits. The test relays are used to perform marginal checks on the monitors and ground-cross detection circuits within the plant. The interrupter relays, fed from the solid-state interrupter, provide the actual interruptions for the ringing and tone outputs. The transfer relays determine which side of the plant ("0" or "1") is connected to the office load.

D. Tone Oscillators

2.07 Duplicated tone oscillators are located at the bottom of bay 3. Four precision oscillators are provided at 350-, 440-, 480-, and 620-Hz, one for each side "0" and "1".

E. Tone Amplifiers

2.08 The tone amplifiers are located directly above the tone oscillators on bay 3. The amplifiers mix and amplify the signals from the tone oscillators to produce the nine call-progress tones. The tone amplifiers are duplicated to provide regular and reserve service.

F. ROH Generator

2.09 Located near the top of bay 2, the Receiver Off Hook (ROH) 400A tone generator supplies a distinctive tone signal. The acoustic signal is used to alert a customer that the receiver is off-hook.

G. Tone Distribution Splitting Resistors

2.10 The tone distribution splitting resistors are located in the upper portion on all four bays. The 450Ω resistors provide balanced output of the various tones generated within the 808A ringing and tone plant.

H. Ringing Inverters

2.11 Duplicate dc-to-ac J87266 inverters supply 20-Hz ringing current to side "0" and side "1" of the ringing and tone plant. The inverters mount side by side in bays 2 and 1.

I. Ringing Distribution Fuse Panel

2.12 The ringing distribution fuse panel is located above the ringing inverter in bay 1. The 70-type fuses connect 105V±, -TRP, AC-DC, and CODE 1 GEN BR1, BR2, BR3 outputs to office circuits as required.

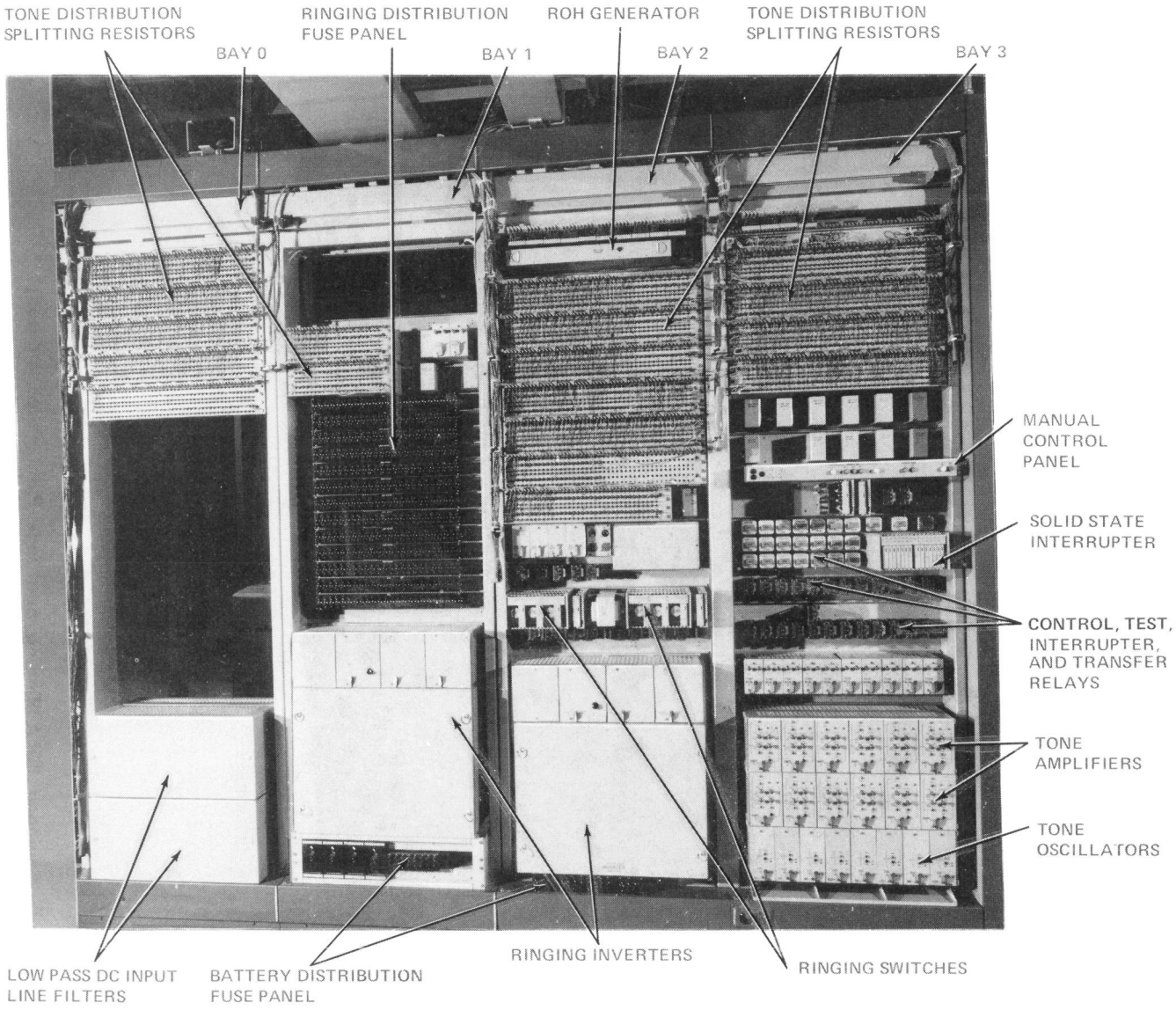

Fig. 1—Fully Equipped 808A Ringing and Tone Power Plant (AC-DC Office)

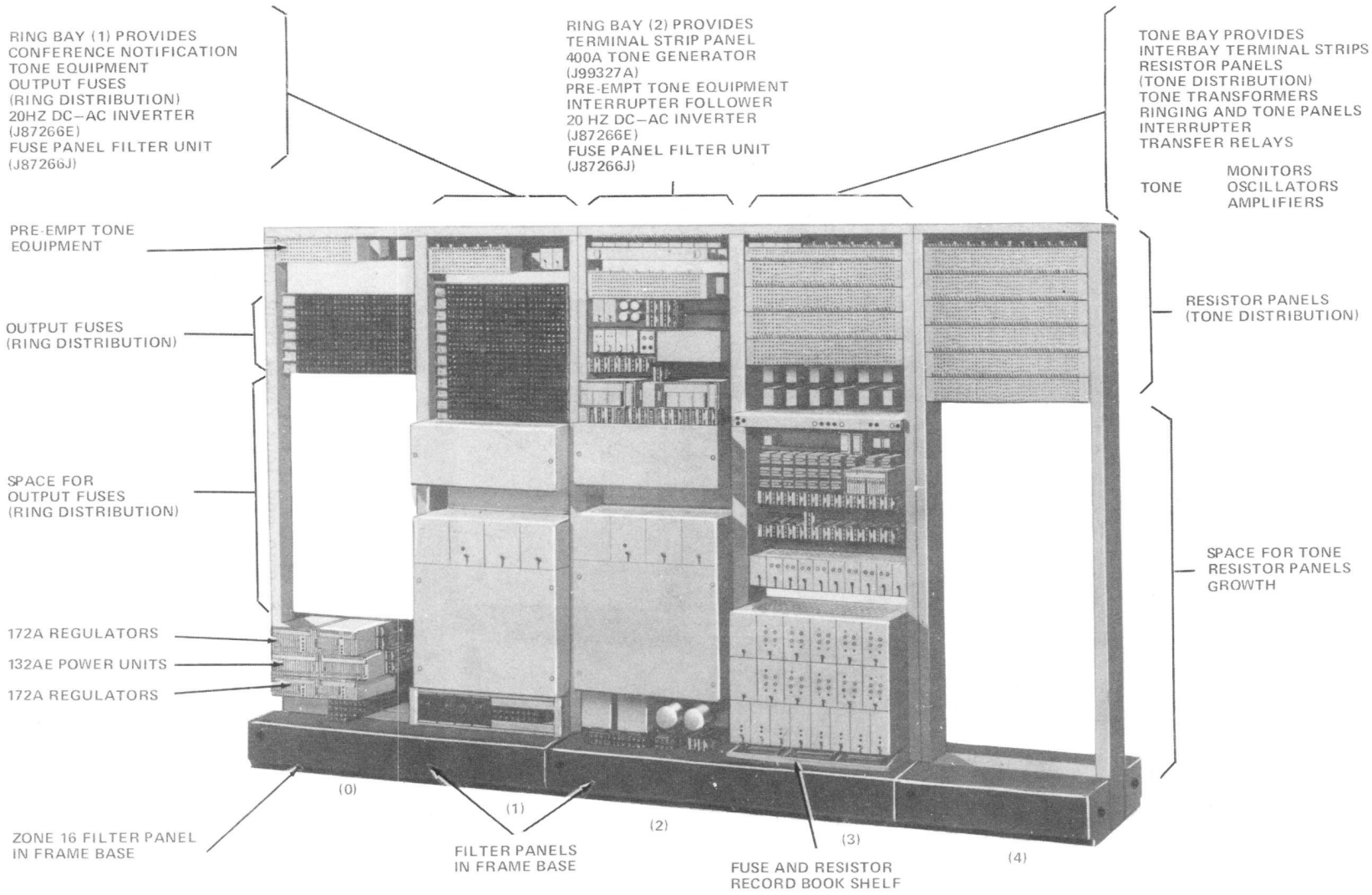

Fig. 2—Fully Equipped 808A Ringing and Tone Plant (Superimposed)

J. Battery Distibution Fuse Panel

2.13 The battery distibution fuse panel is located at the bottom of bays 2 and 1. The 70-type fuses supply -48 Vdc power to the control relays, ringing inverters, and ROH generator. Positive 24 Vdc power is also supplied to the solid-state interrupter, tone amplifier and tone oscillator circuits through similar type fuses. In superimposed offices with the Zone 13 service feature, -48V and +48 Vdc tripping voltages are provided. The -48 volt tripping supply is obtained from the central office battery, and the +48 volt tripping voltage from the 610D converter. In superimposed offices with the Zone 16 service feature, +55 and -55 volt tripping voltages are provided. The +55 and -55 volt tripping voltages are obtained from 132AE power units (the 610D converter is not used).

K. Low Pass DC Input Line Filter

2.14 The low pass dc input line filters are located at the bottom of bay 0, one each for side "0" and side "1". The filters are electrically located between the central office battery and the inverter. They reduce both the noise fed back to the battery from the inverter, and the source impedance presented to the inverter by the battery.

L. Solid-State Interrupter

2.15 The solid-state interrupter (see Fig. 2) is located above the control, test, and transfer relays on bay 3. The interrupter provides the interruptions for machine ringing, tones, and signaling.

M. Ringing Switches

2.16 The ringing switches receive timing signals from the solid-state interrupter to produce the CODE 1 GEN1 BR1, BR2, and BR3 interrupted ringing.

3. FUNCTIONAL DESCRIPTION

A. Introduction

3.01 The function of the 808A ringing and tone power plant is to provide 6.0 amperes of ringing current, tones, and signaling interruptions for the No. 1/1A ESS. The functional units of the 808A plant are as follows:

- Ringing Inverters
- Tone Amplifier
- Tone Generator
- ROH Generator
- Solid-State Interrupter
- Ringing Circuit—Control and Distribution
- Monitor Circuits
- Tone Oscillators
- Output Distribution Circuit
- Output Transfer Circuit.

Power and control signal flow within the 808A plant is given in Fig. 4.

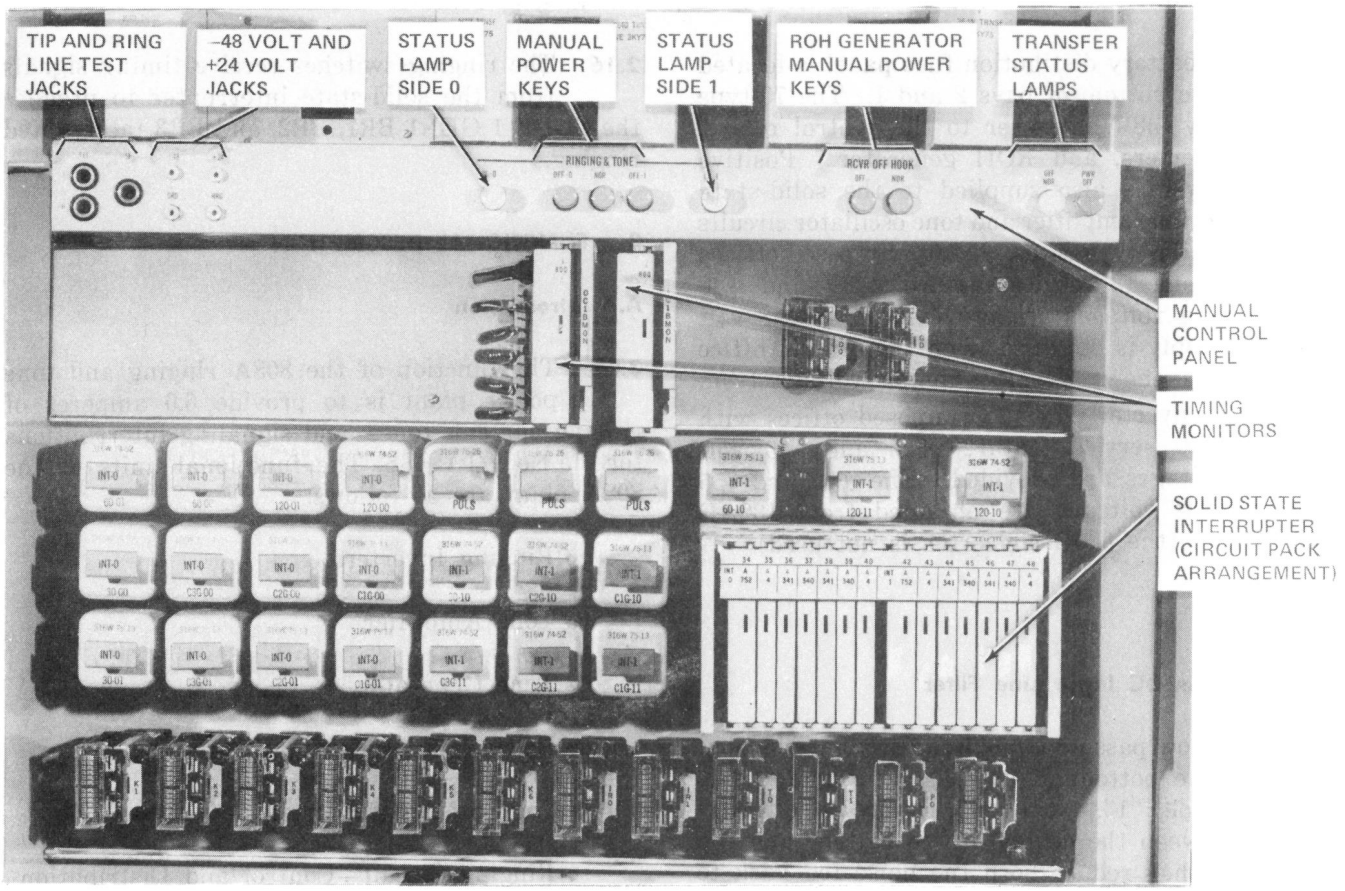

Fig. 3—Manual Ringing and Tone Panel, Timing Monitors, and Solid-State Interrupter—808A

B. Ringing Inverters

3.02 The J87266 ringing inverter operates from -48 Vdc to provide 6 amperes of high-capacity ringing power (nonaudible) at the following voltages:

- Two outputs of 86 volts rms at 20 Hz
- One output of 105 volts rms at 20 Hz.

C. Tone Amplifier

3.03 The tone amplifier functions to:

(1) Provide regular and reserve transistor amplifiers

(2) Mix and amplify signals from oscillators

(3) Produce tones for audible ringing, TOUCH-TONE® dial tone, high tone busy

TABLE B

CONTROLS AND INDICATORS

NAME	EQUIP. LOCATION	CONTROL INDICATOR	TYPE	FUNCTION
Manual Ringing and Tone Panel (J86815F)	MISC. PWR. FRM.			Manual keys, automatic and manual lamps.
		PWR OFF	Lamp (red)	Lights when OFF-0, OFF-1 or ROH OFF key is depressed, or by 48-volt fuse alarm.
		OFF NOR	Lamp (white)	Lights when OFF-0, OFF-1 or ROH OFF key is depressed.
		ROH * NOR	Pushbutton key	When depressed, -48 volts is applied to ROH generator.
		ROH * OFF	Pushbutton key	When depressed, -48 volt power is removed from ROH generator.
		OS-1	Lamp (white)	Lights when power is removed from side 1.
		OFF-1 *	Pushbutton key	When depressed, NOR key is released, power is removed from side 1, and load is transferred to side 0.
		NOR *	Pushbutton key	When depressed, both sides 0 and 1 are powered and the system control determines which side will feed the load.
		OFF-0*	Pushbutton key	When depressed, NOR key is released, power is removed from side 0, and load is transferred to side 1.
		OS-0	Lamp (white)	Lights when power is removed from side 0.
ROH Generator (400A)	MISC. PWR. FRM.	DS1	Lamp (red)	Lights when low- or no-tone output.

*These switches are mechanically interlocked such that only one switch may be operated at a time.

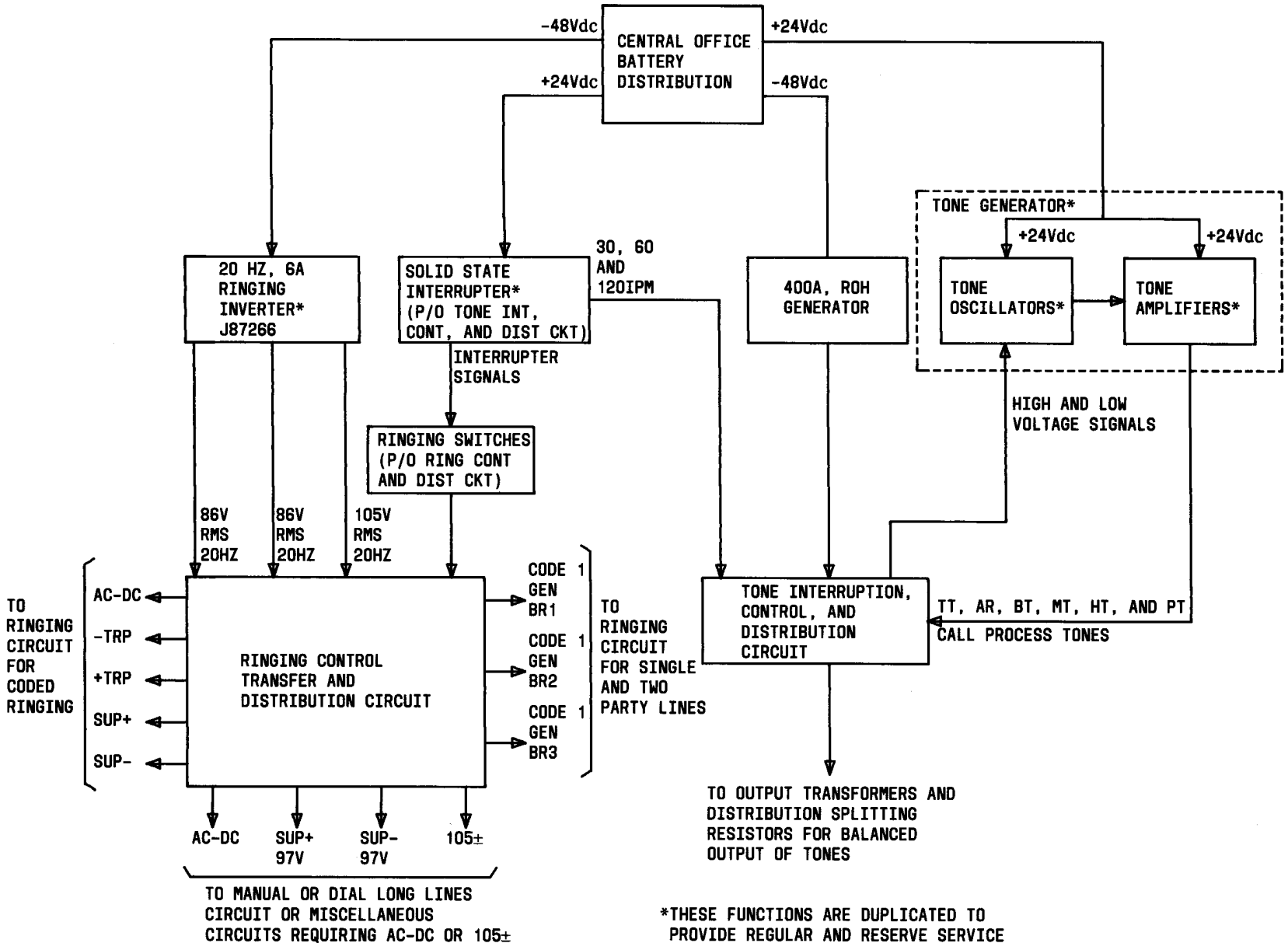

Fig. 4—Power and Control Signal Flow Within the 808A Ringing and Tone Plant—Block Diagram

tone, preempt tone, precedence audible ring tone, call waiting tone and busy verification tone for use in the ringing and tone power plant for the No. 1/1A ESS 2-wire offices.

(4) Provide preempt tone conference notification tone and precedence audible ring tone for 4-wire No. 1/1A ESS offices.

D. Tone Generator

3.04 The tone generator operates from +24 Vdc to supply nine call-progress tones developed from four oscillators feeding summing amplifiers. One or two oscillator outputs are applied to the tone amplifiers. The tone amplifier outputs are connected to tone transformers. The call-progress tones are as follows:

(1) AR—Audible Ringing Tone, 440 Hz and 480 Hz combined

(2) TT—TOUCH-TONE, 350 Hz and 440 Hz combined.

(3) MT—Conference Notification Tone, 440 Hz

(4) BT-Busy Tone, 480 Hz and 620 Hz combined

(5) HT—High Tone 480 Hz

(6) PT—Preempt Tone, 440 Hz and 620 Hz combined.

(7) AR30—Precedure Audible Ring Tone, 440 Hz and 480 Hz combined

(8) MT2—Busy Verification Tone 440 Hz

(9) MT1— Call Waiting Tone 440 Hz

E. ROH Generator

3.05 The ROH generator combines and amplifies outputs from four oscillators to generate a pulsating signal. This distinctive tone signal is applied to a subscriber line on which the handset has been left off-hook. The acoustic output of the receiver is intended to alert the subscriber to replace the handset on-hook.

F. Interrupter Circuit

3.06 This circuit is a solid-state interrupter which is designed to perform the functions previously requiring mechanical interrupters KS-15634-L7 (Mfr Disc.). This circuit provides the timing, 2-seconds ON and 4 seconds OFF (10 IPM), to drive the ringing switches in the ringing control and distribution circuit. This interrupter circuit also provides the interruptions 30, 60, and 120 IPM for the tone outputs.

G. Ringing Circuit—Control and Distribution

3.08 The purpose of this circuit is to provide 6.0A of ringing current, continuous and interrupted, at the voltages required by No. 1/1A ESS offices.

3.09 This circuit contains the ringing switches (see Fig. 1) which receive timing signals from the interrupter circuit. The timing signals are used to drive the ringing switches which produce the actual CODE 1 GEN 1 BR1, BR2, and BR3 interrupted ringing.

H. MONITOR CIRCUITS

3.10 The function of the monitors within the ringing and tone plant is to detect a loss of a tone output, ringing output, or ground on a tone output. The following monitors are located within the ringing and tone plant:

- Tone Monitors
- ROH Generator Monitor
- Ringing Monitors
- CODE 1 GEN 1 Monitor
- Timing Monitors
- Ground Cross-Detection.

3.11 The tone monitors (TONE MON 0 and TONE MON 1) check each of the tone signals from the amplifier circuit for high- and low-voltage failure. These monitors are provided in duplicate with one set for the regular amplifiers and the other for the reserve amplifiers.

3.12 The ROH generator monitor circuit is part of the 400A tone generator. The ROH

generator monitor indicates an alarm condition when the tone signal falls below a predetermined level, or fails completely during a power failure.

3.13 For AC-DC offices, ringing monitors (RING MON 0 and RING MON 1) are provided to check the 105V ±rms output and the ac-dc output. These monitors operate on release of 1D ferrod sensors in the master scanner circuit. The ac-dc monitor checks for loss of either the 20 Hz or its dc component. The 105V ± monitor is a no-voltage detector which monitors the 105-volt output from the 20-Hz ringing generators. One ringing monitor is connected at the output of each inverter. In addition, a ringing voltage monitor is connected at the output of GEN 0 to monitor the emergency manual line (EML 105±) output.

3.14 In superimposed offices, the SUP+ and SUP- outputs are monitored for each generator. These monitors are the same as those described in paragraph 3.13. In addition, another monitor is provided which operates a relay whenever the office battery is off float to provide a means of holding the dc superimposed voltages within limits for superimposed offices.

3.15 Monitors that check the CODE 1 GEN 1 BR1, BR2, and BR3 output are provided as the MR MON- monitors. If the interrupter brush fails, the resulting drop in current will initiate an alarm to transfer the plant automatically.

3.16 Through the operation of timing monitors 0C1B and 1C1B, the system knows whether or not the relays which transfer the plant between the "0" side and the "1" side are operating properly.

I. Tone Oscillators

3.17 The general function of the tone oscillators is to provide precision tones at 350-, 440-, 480-, and 620-Hz for the regular and reserve side of No. 1/1A ESS power plants.

J. Tone Interruption, Control, and Distribution Circuit

3.18 The tone interruption, control, and distribution circuit connects the outputs from the tone generators, and ROH generator to the office circuit through output transformers and splitting resistors. This circuit also provides a solid-state interrupter timing circuit which provides the signaling interruptions (10 IPM) for the CODE 1 GEN BR1, BR2, and BR3 ringing outputs by using the ringing switches in the ringing control and distribution circuit. The interrupter timing circuit also provides the interruptions (30, 60, and 120 IPM) for the tone outputs.

3.19 The output transfer circuit connects the office load to ringing outputs and tone outputs from either side "0" or side "1". The transfer relays are normally under system control. An override to system control is provided by the manual power off keys (OFF-0 and OFF-1) located on the plant ringing and tone panel. The ROH generator is not transferred.

4. DESCRIPTION OF OPERATION

4.01 The 808A power plant operates to provide ringing current, TOUCH-TONE dial tone (TT), audible ringing tone (AR), high tone (HT), busy tone (BT), and receive-off-hook tone (ROH), as well as signaling interruptions for the No. 1/1A ESS. The plant also provides conference notification tone (MT), precedence audible ringing tone (AR30), and prempt tones (PT) for 4-wire No. 1/1A ESS, where required. Call waiting tone (MT1) and busy verification tone (MT2) are provided for the 2-wire Centrex offices. Precedence audible ring tone (AR30) and prempt tones (PT) are provided for 2-wire Centrex offices on an optional basis. The TOUCH-TONE dial tone (TT), audible ringing tone (AR), busy tone (BT), precedence audible ringing tone (AR30), and prempt tone (PT) each consists of two different signals generated by separate tone oscillators and then mixed together and amplified by individual tone amplifier. The high tone (HT), conference notification tone (MT), call waiting tone (MT1), and busy verification (MT2) are each generated by a single oscillator and amplified by individual amplifiers. The outputs of all the amplifiers are monitored to detect a high- or low-voltage condition.

4.02 The receiver-off-hook tone is supplied by a 400A tone generator (receiver-off-hook generator) and the ringing current by a J87266, 20 Hz, dc-to-ac inverter. The ringing outputs are monitored to detect a no- or low-voltage condition. Signaling interruptions for the CODE 1 GEN BR1, BR2, and BR3 ringing outputs are provided by a semiconductor-type interrupter circuit. Timing is controlled by either the KS-15634-L7 rotary interrupter (Mfr Disc.) or the solid-state timing circuit, which also provides interruptions for the tone outputs. Interruptions for all other coded

ringing are provided by connecting circuits in the No. 1/1A ESS.

4.03 For reserve ringing and tone power, the plant includes duplicate oscillators and amplifiers (tone generators), J87266 inverters (ringing generators), interrupters, and monitors, as well as distibution, transfer, and fuse alarm circuits. Reserve receiver-off-hook power is not duplicated.

4.04 For AC-DC offices, continuous AC-DC (not audible) and 105V± are fed to connecting office circuits. The 105V± is obtained directly from the generators.

4.05 For superimposed offices, AC-DC and 105± are provided. In addition, superimposed positive (SUP+), superimposed negative (SUP-), positive tripping (+TRP), negative tripping (-TRP), SUP+ (97V), and SUP- (97V) are provided. In superimposed ringing and tone power plants with the Zone 13 service feature, the -48 volt dc tripping supply (-TRP) is obtained from the central office battery and the +48 volt dc tripping supply (+TRP) from the 610D converter. In superimposed plants with the Zone 16 service feature, the 610D converter is not used and the +55 and -55 volt dc tripping supplies are obtained from 132AE power units.

5. MAINTENANCE

5.01 Scheduled maintenance must be performed on the plant for reliable service. The following routine checks should be performed periodically to prevent faulty or inadequate plant operation.

(a) Clean ventilation passages.

(b) Check relays and associated equipment.

(c) Check tone amplifiers and tone monitors:

(1) Amplifier dc balance checks

(2) Amplifier voltage checks

(3) Low-voltage tone monitor checks

(4) High-voltage tone monitor checks.

(d) Pulsing signal output check (Receiver-off-hook generator).

(e) Tone distribution voltage checks.

(f) Output filter voltage check.

(g) High- and low-voltage control relay checks.

(h) Transfer and alarm checks.

(i) Transfer relay checks.

(j) Fuse alarm checks.

(k) Fuse alarm relay checks.

(l) Interrupter checks.

(m) Distribution circuit checks.

(n) Ringing distribution voltage checks.

(o) Ground cross-detection circuit checks.

5.02 Maintenance and trouble-locating procedures are provided in the ***Task Oriented Practice (TOP)*** for the appropriate system.

6. REFERENCES

6.01 The following listing provides additional information concerning the 808A ringing and tone power plant.

SECTION	TITLE
167-726-101	808A Ringing and Tone Power Plant—Theory of Operation
167-726-301	808A Ringing and Tone Power Plant—Operating Methods
CD-81652-01	Tone Circuit—Interruption, Control, and Distribution - No. 1 ESS Offices—Ringing and Tone Power Plant (J86815, J86834)
CD-81654-01	Oscillator Circuit - No. 1 ESS and No. 1 TSPS Offices—Ringing and Tone Power Plant
CD-81655-01	Amplifier Circuit - No. 1 ESS and No. 1 TSPS Offices—Ringing and Tone Power Plant

SECTION	TITLE
CD-81703-01	Interrupter Circuit—Semiconductor Type
CD-81709-01	Control and Distribution - AC-DC or Superimposed Ringing for No. 1 ESS Offices—808A Ringing and Tone Power Plant (J86834)
CD-81717-02	Inverter (and Filter) Circuit—20 Hz, DC-to-AC Inverter, 86 Volts 6 Amperes — (J87266 E, F, G, H, J)
CD-99303-01	400A Tone Generator Circuit.