



551 PBX SWITCHBOARD
CIRCUIT DESCRIPTION

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503.1 GENERAL: This part is issued to describe the operation of the various circuits of the 551 PBX switchboards. These include the cord, operator's telephone, dial, central office trunk and station line circuits. Relay adjustment sheets are also included.

503.2 CIRCUIT DESCRIPTION:

503.2-a Station Line Circuit (Series Lamp). Battery is supplied to the ring of the line through the auxiliary signal circuit and the station lamp, contacts of the station jack, to the station, returning to ground through contacts of the station jack, lighting the lamp and operating the buzzer from contacts of the N relay.

When a line relay is used: Battery is supplied through the winding of the relay and the station lamp is operated through contacts of this relay.

503.2-b When the call is answered: The rear (station) cord is used, which cuts off station signalling battery and ground by operating the contacts in the station jack.

503.2-c Talking battery is provided from contacts 4 and 5 top of the T relay, the 2-1 (85-ohm) winding of the 54D retard coil, contacts of the night and dial through key, contacts 3 and 1 bottom of the S relay, the winding of the A relay, ringing key contacts to the ring side of the station cord. Battery from terminal 2-1 winding of 54D retard coil through contacts of talk and dial key. C relay, contacts of dial through and night key, and contacts of front ring key to ring of front cord (trunk or station) for station-to-station calls.

Ground is provided from contacts 4 and 5 bottom of the T relay, the 3-4 (85-ohm) winding of the 54D retard coil, contacts of the night and dial through key, contacts 3 and 1 top of the S relay, contacts of the rear ringing key to the tip of the station cord. Ground is supplied from contacts 4 and 5 bottom of T relay, the 3-4 winding of 54D retard coil to contacts of talk and dial key, contacts of dial through and night key, and contacts of front ring key to tip of (trunk or station) cord for station-to-station calls.

The operator's telephone circuit is bridged to the station, when the talk and dial key is operated, over the ZT, T1, T2 and R2 leads.

503.2-d Trunk Circuit (B Type Relay). Ringing current applied to the ring side of the line, the 1MF condenser and thermistor, the secondary (1300-ohm) winding of the L relay, through the tip trunk jack contacts to the tip side of the line, which operates the trunk relay. It then locks operated from auxiliary signal circuit battery, through the primary (350-ohm) winding of the L relay, contacts 1 and 2 L relay, and contacts of the trunk jack to ground. The line lamp is lighted by a circuit completed from auxiliary signal battery through the L relay to ground. The buzzer will then operate from the contacts of the N relay in the auxiliary signal circuit. An older circuit in which a J-type relay was used, operates in a like manner. A check should be made that this type circuit is equipped with a thermistor.

Thermistors are used to prevent false operation of the trunk relay due to line current surges which occur when a call is completed and the plug removed from the trunk jack.

503.2-e The call is answered by a front (trunk-station) cord. When the plug is inserted in the trunk jack, the jack contacts controlling the lock up winding and trunk lamp are opened, releasing the L relay and extinguishing the lamp. Battery is furnished through 1/2 of the 19 AM resistance and the jack contacts to the sleeve of the trunk cord, operating the T relay in the cord circuit.

T Relay Operated:

- (1) Disconnects PBX battery and ground from the cord circuit.
- (2) Connects the windings of the 54D retard coil across the tip and ring of the trunk and trips the central office ring. From the tip side of the cord circuit, through the front ring key, night key, talk and dial key, 4-3 (85-ohm) winding of the 54D retard coil, contacts 4 and 3 bottom of the T relay, contacts 4 and 3 bottom of the E relay, 2-1 winding (85-ohm) of the 54D retard coil, talk and dial key, 2 and 1 top contacts of the T relay, night key and ring key contacts to the ring side of the cord circuit.
- (3) Short circuits the winding of the C relay in the ring side of the cord circuit to improve transmission.
- (4) Prepares a circuit to operate the E relay, at the time the station answers, from battery, contacts 4 and 3 top of the T relay through the primary winding of the B relay to contact 1 of the A relay.

503.2-f Operation of the talk and dial key connects the operator's telephone circuit to the line.

503.2-g When the call is connected to a station, the rear station cord is used. Insertion of the cord plug in the station jack will cause the supervisory lamp to light from ground on the sleeve of the station jack through contacts 2 and 3 of the A relay, the lamp, to battery supply through the auxiliary signal circuit relay. The ringing key operated splits the cord circuit and rings the station. At the time the station answers, trunk battery is extended through the station loop operating the A relay.

A Relay Operated:

- (1) Extinguishes the supervisory lamp.
- (2) Operates the E relay from station sleeve ground, contacts 2 and 1 of the A relay, the primary winding of the E relay, to contacts 3 and 4 top of the T relay to battery.

E Relay Operated:

- (1) Short circuits the secondary winding (36-ohm) of the A relay to improve transmission.
- (2) Disconnects the 54D retard coil holding bridge from the cord circuit.
- (3) Prepares a circuit to operate the S relay when the called station disconnects.
- (4) Locks operated from ground, contacts of the talk and dial key, the 4 and 3 top contacts of the E relay, the primary winding to battery through contacts 4 and 3 top of the T relay.

503.2-h Through Supervision: Upon completion of the call and when the station disconnects the A relay releases:

- (1) Lights the supervisory lamp and operates the buzzer.
- (2) Connects sleeve ground through contacts 1 and 2 top of the E relay, the winding of the S relay to battery, operating the S relay.

S Relay Operated:

- (1) Splits the station end of the cord circuit from the trunk cord, releasing the central office equipment.

- (2) Connects signalling battery to the station through the secondary winding of the E relay, contacts 1 and 2 bottom of the S relay, contacts 1 and 2 bottom of the E relay to the ring of the station cord. Ground is furnished through contacts 2 and 1 top of the S relay to the tip of the station cord. Should another inward call be received before the cordpair is taken down, the R relay will operate in series with the R condenser across the tip and ring of the trunk cord, lighting the front cord supervisory lamp. Due to the operated S relay the station will not be signalled.

503. 2-i Non-Through Supervision: Upon completion of the call and when the station disconnects the A relay releases:

- (1) Lights the supervisory lamp and operates the buzzer. Release of the A relay releases the E relay which connects the holding bridge windings of the 54D retard coil across the tip and ring of the cord circuit, preventing the central office equipment from releasing.

503. 2-j Operator's Dial Circuit: With talk and dial key operated, and as the dial is moved off normal, ground is connected through the ON contacts to the (345-ohm) primary winding of the H relay to battery.

H Relay Operated:

- (1) Connects the 18BH resistance across the winding of the 54B retard coil through H relay 1 and 2 top contacts.
- (2) Disconnects the ring of the operator's set from the cord circuit through contacts 2 and 3 top.
- (3) Operates D relay from ON ground, contacts 1 and 2 bottom, winding of the D relay to battery.

D Relay Operated:

- (1) Disconnects the ring of the operator's set from the 5-6 winding of the 27A repeat coil through contacts 3 and 4 bottom.
- (2) Shunts the windings of the 54B retard coil and the 18BH resistance through contacts 1 and 2 bottom.
- (3) Connects ground from contacts 4 and 3 top to the (280-ohm) secondary winding of the H relay to battery to insure operation.
- (4) Operates the F relay from ground contacts 2 and 1 top to the winding of the F relay to battery.

F Relay Operated:

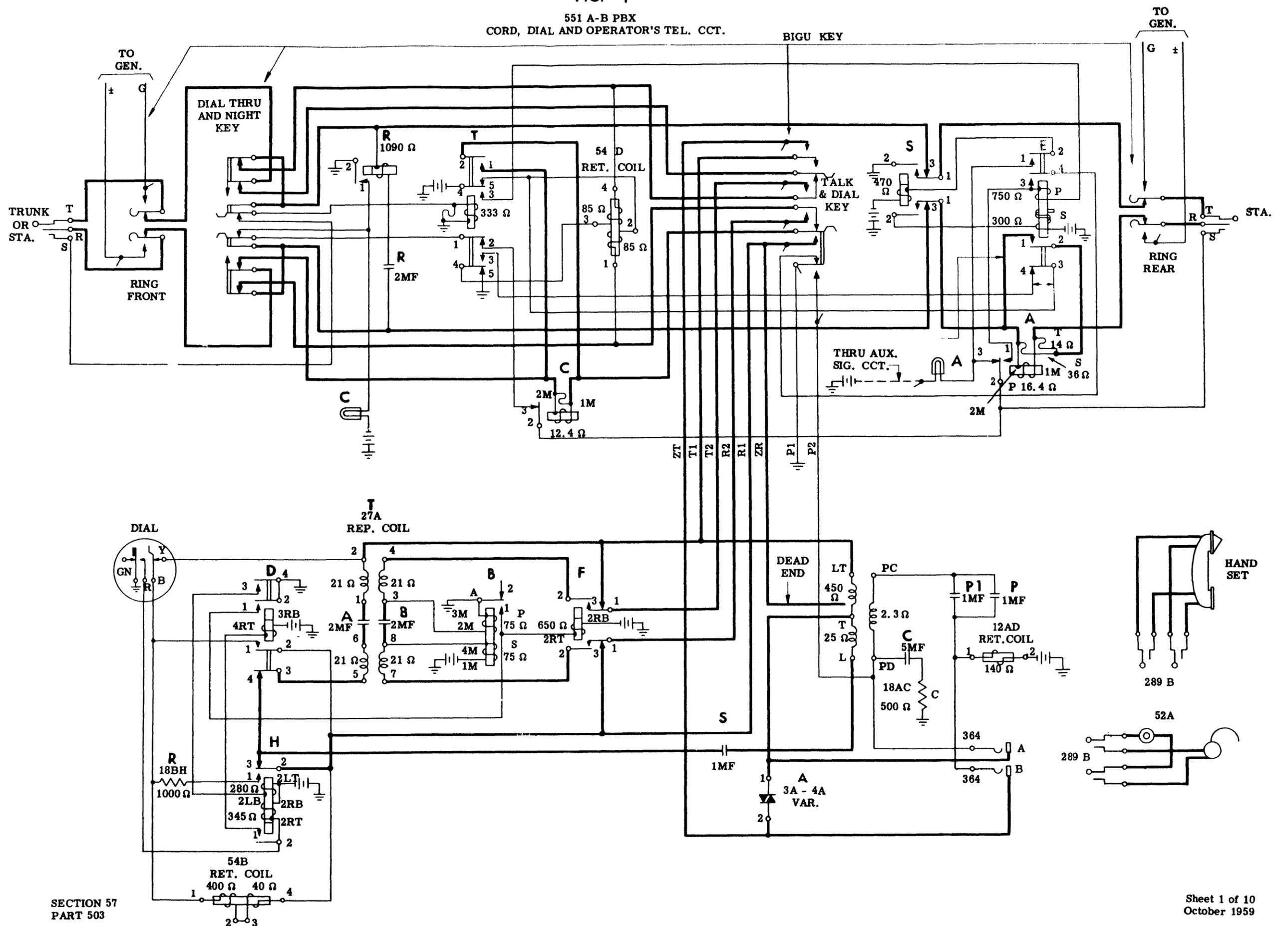
- (1) Splits the station cord from the trunk cord.
- (2) Connects the tip and ring of the station cord through its 1 and 2 top and bottom contacts to the 4-3, 7-8 windings of the 27A retard coil, through the primary (ground) and secondary (battery) windings of the B relay for station talking and signalling purposes.

B relay locks operated through the station loop and station or through the holding bridge in the cord circuit.

Relays H and D release each time the dial restores, connecting the 54B retard coil shunted by the 18BH resistance as a holding bridge. Relays B and F remain operated until dialing is completed and release when the talk and dial key is restored to normal. The dial pulsing circuit is shown by the broken lines.

503.2-k When the night and dial through key is operated and a station is connected to a trunk, no equipment in the cord circuit is left connected except the R relay and condenser ringing bridge. A patch cord may be used for night connections; however, not more than three stations may be connected to one trunk. The sleeve conductor shall not be connected.

FIG. 1
551 A-B PBX
CORD, DIAL AND OPERATOR'S TEL. CCT.



SECTION 57
PART 503

FIG. 2

551 A-B PBX CORD CCT.
STATION TO OPERATOR
(TALKING CCT.)

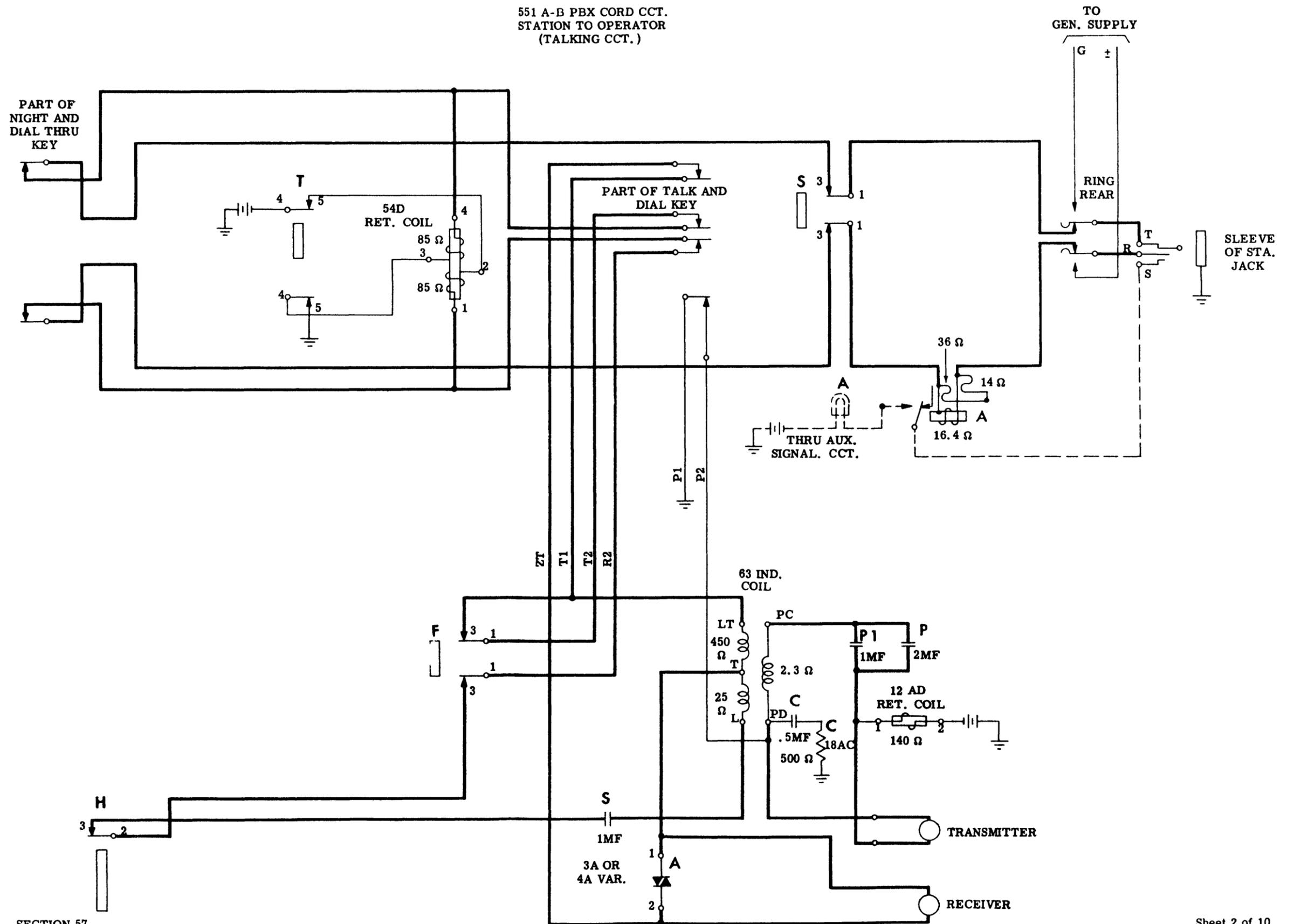


FIG. 5
 551 A-B PBX CORD CCT.
 THRU SUPERVISION
 (STATION IN HANG-UP CONDITION)

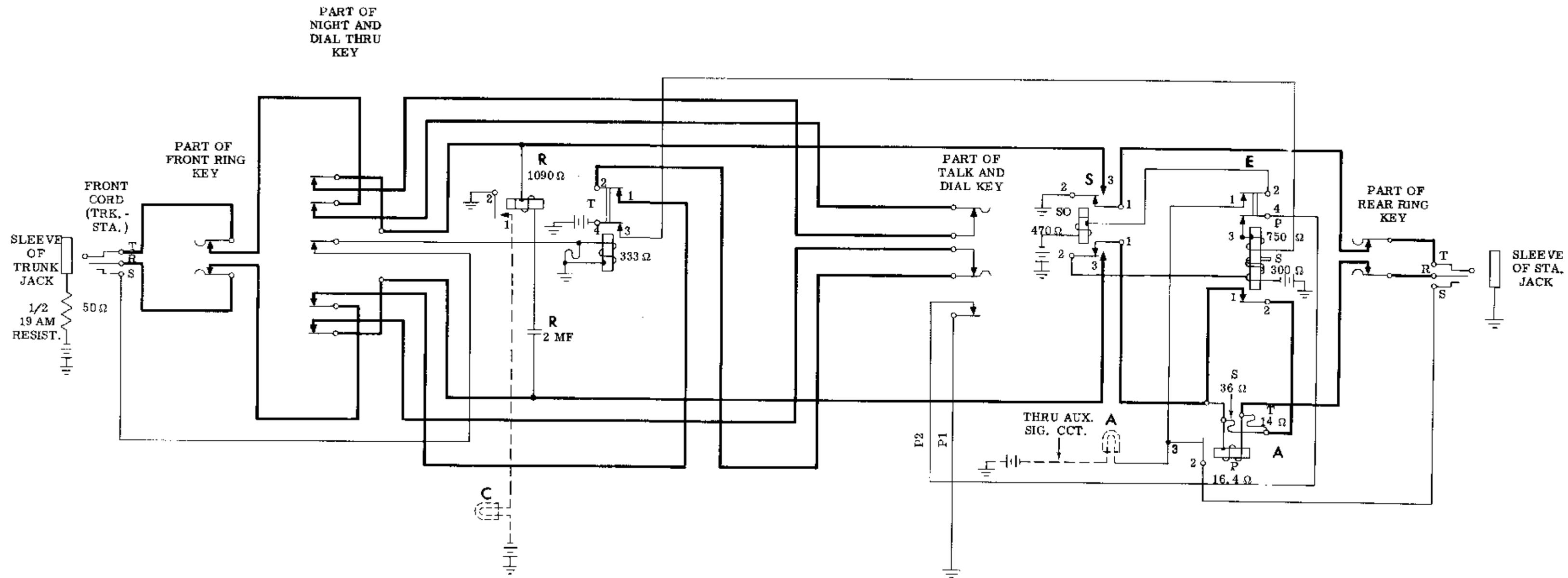
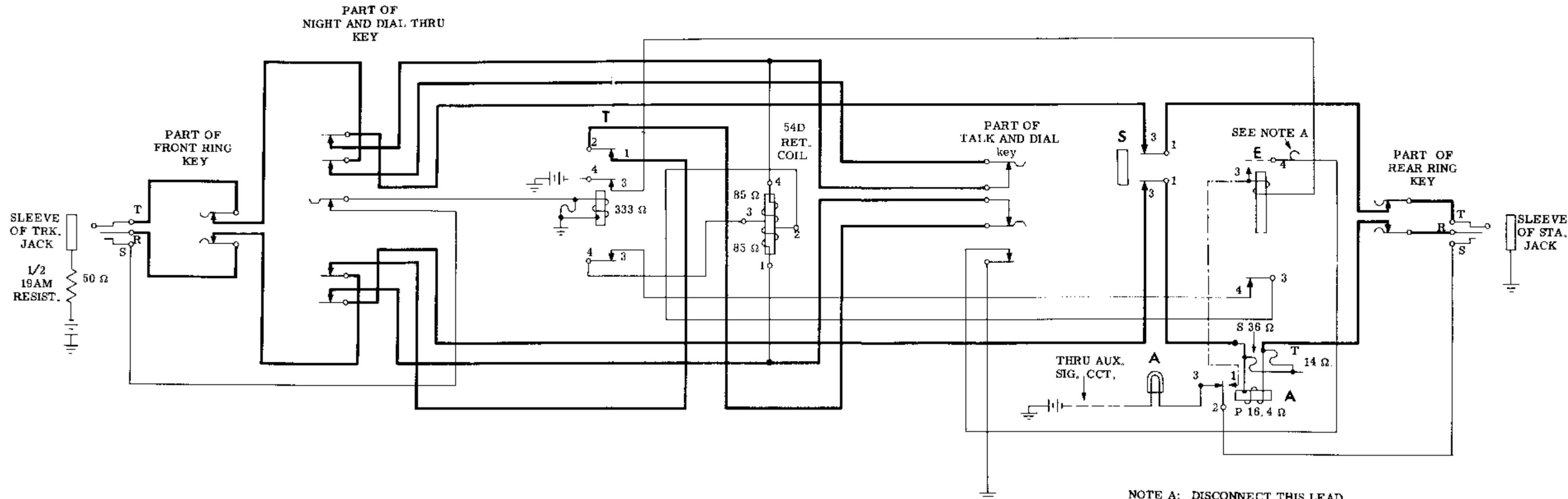
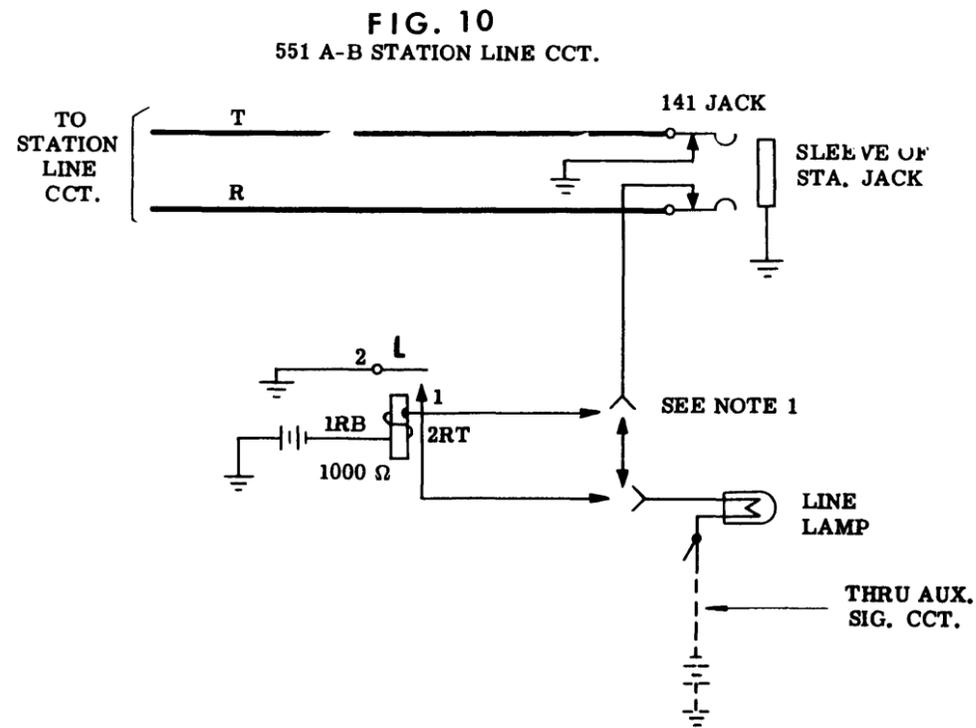


FIG. 6
551 A-B PBX CORD CCT.
NON-THRU SUPERVISION



NOTE A: DISCONNECT THIS LEAD
WHEN NON-THRU SUPERVISION
IS REQUIRED.



NOTE 1: STATION LINE SIGNALING

WITH L RELAY	LESS L RELAY
500 Ω	150 Ω

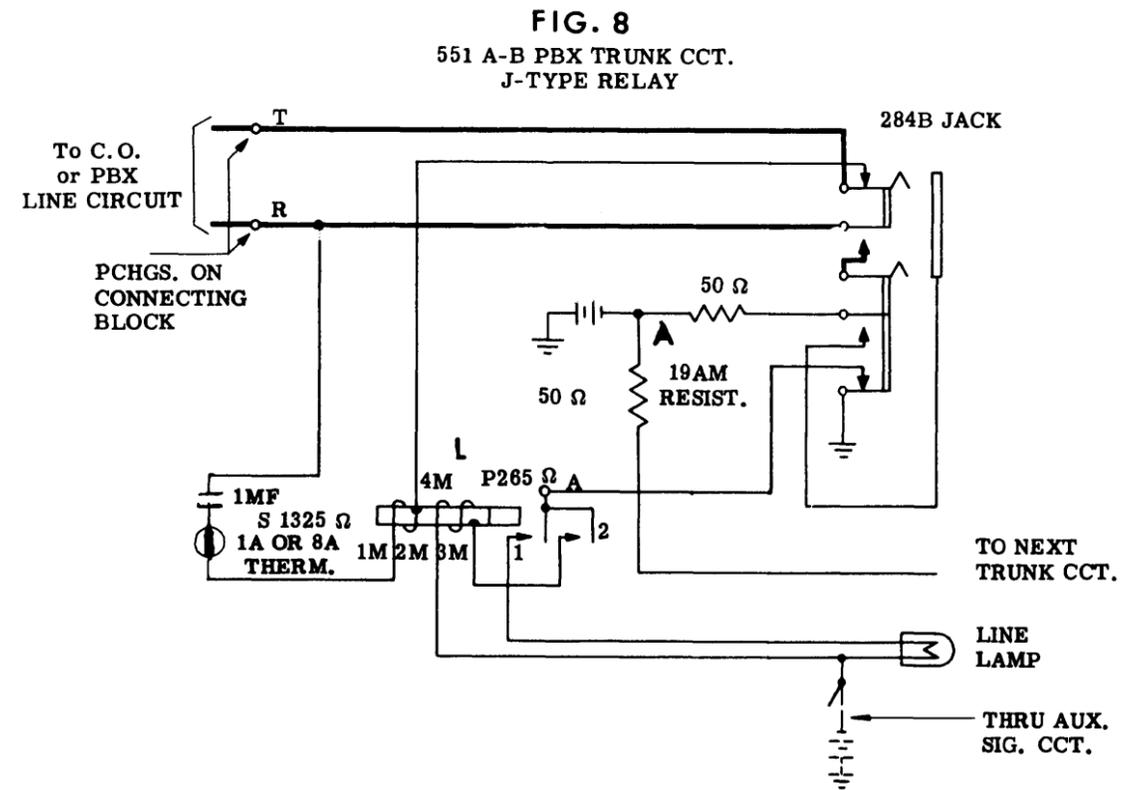


FIG. 9
551 A-B PBX TRUNK CCT.
B-TYPE RELAY

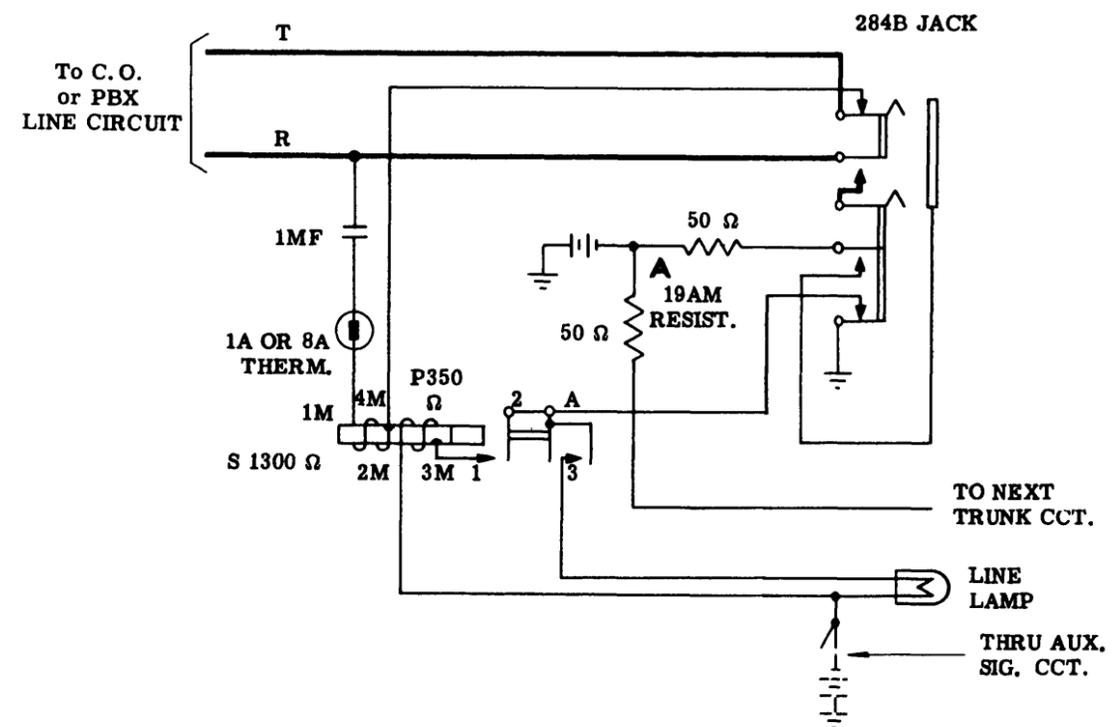
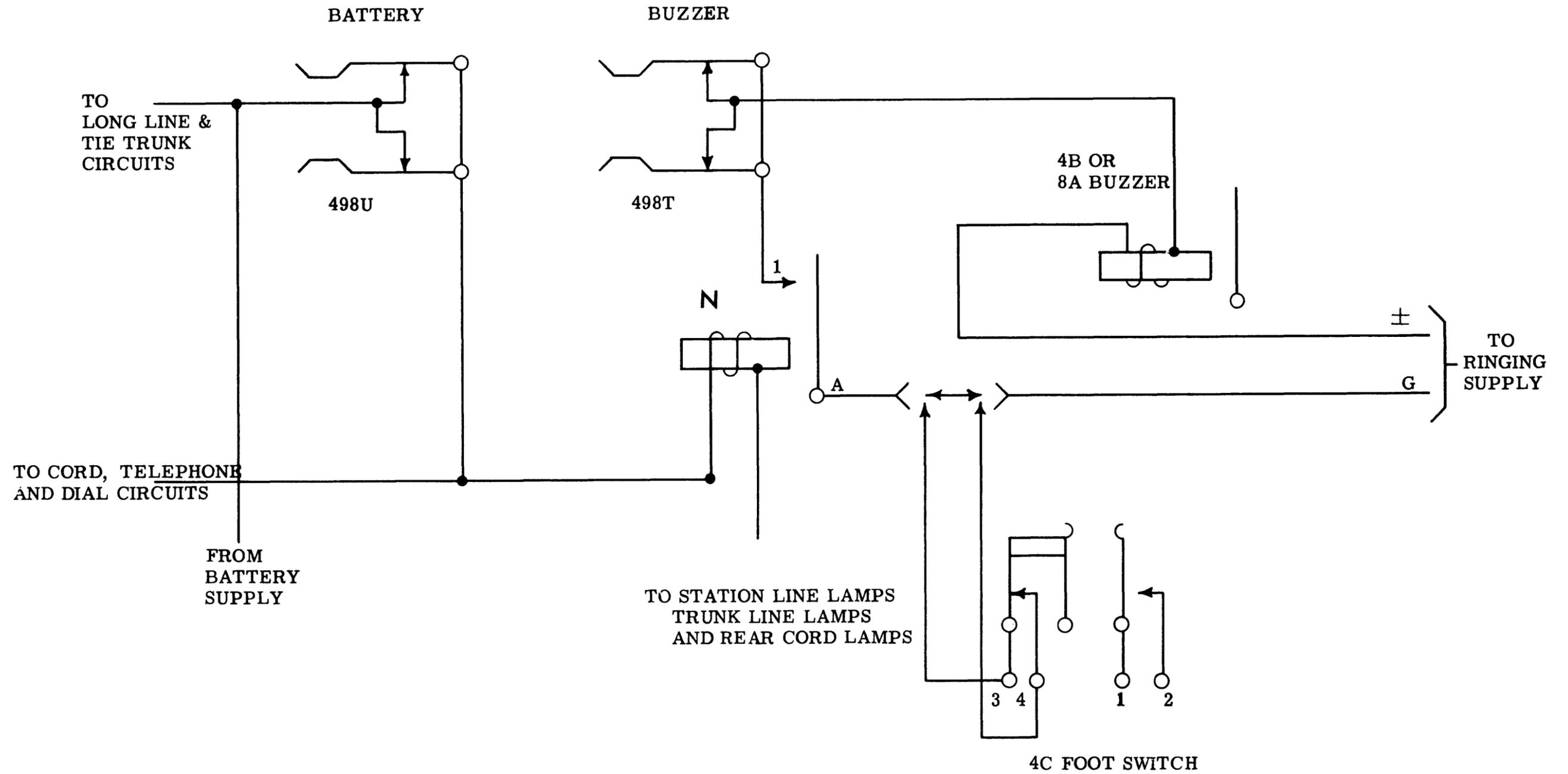


FIG. 11
551 PBX SWITCHBOARD
BATTERY CUT-OFF
AND
AUXILIARY SIGNAL CIRCUIT



CIRCUIT REQUIREMENTS														
551 CORD, TELEPHONE, DIAL, TRUNK AND STATION CIRCUITS														
APPARATUS		MECH. REQ.		CIRCUIT PREPARATION			TEST SET PREP.	TEST NOTE NO.	CURRENT FLOW REQUIREMENT					REMARKS
DESIG.	CODE	CONT. PRESS	ARM. TRVL.	BLK. OR INSUL.	TEST CLIP DATA BATT.	GND.			TEST WDG.	TEST FOR	AFTER SOAK	TEST MA	READJ. MA	
RELAYS														
B	G1		40	F. NO	2T(F)	2B(F)			P-S	OPR.		10.5	10	
										RLS.		4.7	5	
D	R189		15	H. NO		4RT	GND			OPR.		4.7	5	
F	R190		35	B. NO		2RT	GND			OPR.		16	15	
H	R188		20	1-2B		2RT	GND	1	P	OPR.		27	25	
						2LB	GND	1	S	HOLD		26	24.5	
L	J48		25			3M	GND	2	P	OPR.		19.5		
									S	A. C.				RING FROM C. O.
L	B365		25			3M	GND		P	OPR.		6	5.6	
									S	A. C.				RING FROM C. O.
L	E5		15			RT	GND			OPR.		8.4	8	

TEST NOTES:

1 - OPERATE THROUGH PRIMARY WINDING 2RT, APPLY HOLD CURRENT TO SECONDARY 2 RB AND OPEN PRIMARY. RELAY SHALL REMAIN OPERATED.

2 - MINIMUM ARMATURE TENSION 5 GRAMS.

CIRCUIT REQUIREMENTS														
551 CORD, TELEPHONE, DIAL, TRUNK AND STATION CIRCUITS														
APPARATUS		MECH. REQ.		CIRCUIT PREPARATION			TEST SET PREP.	TEST NOTE NO.	CURRENT FLOW REQUIREMENT					REMARKS
DESIG.	CODE	CONT. PRESS	ARM. TRVL.	BLK. OR INSUL.	TEST CLIP DATA				TEST WDG.	TEST FOR	AFTER SOAK	TEST MA	READJ. MA	
RELAYS														
A	B1088		30			RING R. CD.	GND	1	P-S-T	OPR.	150	9.1	8.6	
										RLS.		4.1	4.4	
C	B1089		30			RING F. CD.	GND			OPR.	150	9.1	8.6	
										RLS.		4.1	4.4	
E	E805		15	A-T OPR.		SL. R. CD.	GND	2	P	OPR.		16	14	
R	J12		23					3		OPR.		AC		
S	178EL	TEST	NOTE			2TE	GND	4		OPR.		26	24	
										N OPR.		13	13.7	
T	E804		20			SL. F. CD.	BAT			OPR.		32	29	

TEST NOTES:

- 1 - GROUND SLEEVE REAR CORD TO OBSERVE LAMP OPERATION.
- 2 - OPERATE AND RESTORE TALK AND DIAL KEY.
- 3 - APPLY RINGING CURRENT THROUGH 7000Ω N. I. RESIST. TO TIP AND RING OF FRONT CORD WITH NITE AND DIAL THROUGH KEY OPERATED.

- 4 - NORMALLY CLOSED CONTACTS SHALL BE 10 GRAMS MINIMUM.