COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES, P.B.X. STATION LINES OR P.B.X. MANUAL SELECTED TRUNKS DIAL CENTRAL OFFICE OR P.B.X. FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The rating of this circuit is changed from AT&TCo Standard to Mfr. Disc.

D.2 The replacement note is added.

D.3 Prior to this issue "V" wiring from lead 5 to the (E) resistance was designated "K" wiring at the end next to the (E) resistance.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3310-MHK-RLL-XS

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES, PBX STATION LINES OR PBX MANUAL SELECTED TRUNKS
DIAL CENTRAL OFFICE OR PBX
FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded	Superseded By
"Q" Option 239JK Relay	"N" Option 280AJ Relay

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The after soak for the (PL) relays read -32 and -20.

C.2 Removed test note 2 which read "There shall be sufficient clearance between each arm. stop pin and its associated pole face with a 3 gauge inserted in this space to permit the corresponding contacts to close when the rel. is operated on 32 ma.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Optional designations are assigned and shown at the (PL) relays.

D.2 Options are added to the options used table and the record of figures, wiring, and apparatus changes table.

D.3 The use of the 239JK relays is rated Manufacture Discontinued and is superseded by the 280AJ relays to provide a polarized relay that has improved adjustment stability.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-GSW-AJB

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES, PBX STATION LINES OR PBX MANUAL SELECTED TRUNKS
DIAL CENTRAL OFFICE OR PBX
FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The adjustment for

		Soak	Opr.	Hold	Rel.	
(B) relay Y110 was	(Test	70	34	3.6	1.8)	Rel. Wdg. Alone
	(Readj.	70	32	3.4	2.2)	
	(Test	140	68	7.2	3.2)	Par. Comb. (B)
	(Readj.	140	64	6.8	3.9)	Rel. and (A) Res.
(C) relay Y118	Test	65	41	3.4	1.9	
	Readj.	65	39	3.2	2	
(LD) relay Y73	Test	31.5	21	3	1	
	Readj.	31.5	20	2.8	1.4	

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-WB-WLF

CD-96134-01
Issue 2-D
Appendix 2-D
Dwg. Iss. 8-D

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES, P.B.X. STATION LINES OR P.B.X. MANUAL SELECTED TRUNKS DIAL CENTRAL OFFICE OR P.B.X. FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The release adjustment for relay B, winding alone was readj. 1.9.

The release adjustment for relay B, parallel combination (B) relay and (A) resistance was readj. 3.4.

The release adjustment for relay LD was readj. 1.1.

C.2 Added test note "Adjacent relays shall not be energized. See B.S.P."

C.3 Added insulate inf. for relay B on ckt. req. tables.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-ESG-WLF

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES, P.B.X. STATION LINES OR P.B.X. MANUAL SELECTED TRUNKS DIAL CENTRAL OFFICE OR P.B.X.
FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded	Superseded by
R wiring (G) 18DN 3200 ohm resistance	Q wiring (G) 18JW 10,000 ohm resistance
R-(PL) 239HT relay	Q-(PL) 239JK relay
11A Lamp	11B Lamp
Added	
101M Vacuum Tube	
T-(C) 19GW resistance	
T-(V) 18BR resistance	

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 This circuit was reissued to make provision for the use of 101M tubes to avoid delay in placing the circuit in talking condition due to slow heating of the filaments of the old style tubes where filament control is provided.

D.2 Note 108 is now shown as feature or option table.

D.3 Working limits were removed from the drawing and the statement "See range charts for dial long lines circuit" was added in their place.

D.4 Prior to Issue 7-D - "Working Limits" were

	Wet End	Dry End
To Sub.	2000ω*	
To 48V Dial Long Line with S Type Rel.	2000ω*	1000ω*
To SXS Central Office		800ω*
Min. Ins. Res.	30,000ω	30,000ω

*Conductor Loop Res.

D.5 S Wiring and apparatus,
C condenser 2 mf and
F resistance 18AL 600 ohms rated Mfr. Disc.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-WLF-JBD

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
FOR SUBSCRIBER LINES IN 885 OHM STEP-BY-STEP OFFICE OR FOR LONG TRUNKS TO 885 OHM STEP-BY-STEP OFFICE FROM P.B.X. NO. 505C, 506A, 506B, 550C, 550SC, 551A, 551B, 551D, 600C, 605A, 606A, 701A OR 702A OR FOR LONG STATION LINES ASSOCIATED WITH ONE OF THE ABOVE P.B.X.'S OR WITH P.B.X. NO. 604C, 700C, 710C, 711A, 740A, 740B OR 740C FOR USE WITH 22 TYPE TELEPHONE REPEATER

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Reissued to show Z, Y & W wiring to provide means for keeping the repeater filaments permanently lighted and to control the plate battery so that the plate battery will only be connected when the long line circuit is in use.

D.2 Added Notes 107 and 108.

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

1.1 The purpose of this circuit is to extend the operating range of a dial subscriber line, a P.B.X. station line, or a P.B.X. trunk and to provide means for connecting to a two-wire telephone repeater.

2. WORKING LIMITS

2.1

	Wet End	Dry End
To Subscriber	2,000Ω*	
To 48 V. Dial L.L. with "S" Type Relay	2,000Ω*	1,000Ω*
To SxS Cent. Off.		800Ω*
Min. Insulation Resistance	30,000Ω	30,000Ω

*Conductor Loop Resistance.

3. FUNCTIONS

3.1 To operate the associated subscriber line circuit or P.B.X. station line circuit when a call is originated.

3.2 To provide means for repeating dial pulses.

3.3 To provide transmitter battery to the subset.

3.4 To relay switchhook supervision.

3.5 To provide a new supply of ringing current when ringing current is connected to this circuit.

3.6 To light the filaments of the vacuum tubes in the associated telephone repeater when an outgoing call is made or when the line is seized on an incoming.

3.7 To prevent clicks to the calling party after ringing is connected to the circuit.

3.8 To trip machine ringing only during the silent interval.

3.9 To prevent repeater singing during dialing.

4. CONNECTING CIRCUITS

4.1 Step-by-step subscriber line circuit.

4.2 P.B.X. station line circuit.

4.3 Trunk circuit at P.B.X.

4.4 Long Line or long trunk circuit.

4.5 Compromise and balancing network circuit.

4.6 22A1 telephone repeater.

DESCRIPTION OF OPERATION

5. OUTGOING CALLS FROM SUBSCRIBER OR P.B.X. STATION

5.1 Call Originated

When a call is originated from a station or subscriber, relays (L) and (PL) operate over the loop. Relay (L) removes the short-circuit from relay (B), operates relay (B) which operates relay (B1). Relay (PL) closes part of the loop toward the station or P.B.X. trunk. Relay (B) closes a partial circuit for the operation of relay (C). Relay (B1) (1) completes the closure of the loop to the telephone repeater toward the central office or P.B.X., (2) grounds

terminal #6 of the telephone repeater to light filaments, ("Z" wiring or closes the plate battery "W" wiring), (3) removes the (RU) relay from the incoming circuit to the subscriber.

5.2 Dialing

When dial tone is heard, the dial is operated and relay (PL) repeats the dial pulses. During the release periods of relay (L), relay (C) operates and short-circuits the input to the repeater so that the repeater will not sing. Relays (B) and (C) hold during pulsing.

5.3 Battery Supply to Telephone Repeater

Battery is supplied to the telephone repeater through the ballast lamp (BALL L), retardation coil (K), resistances (E) and (C) to terminals 4, 5 and 7 of the telephone repeater. Plate battery is supplied to terminal 2 of the telephone repeater through the (P2) retardation coil, and to terminal 3 through the retardation coil (P1). When "W" wiring is used the plate battery is under control of relay (B1). The grid battery supply is furnished to terminals 4 and 5 of the repeater.

5.4 Talking

When the call is answered, no change takes place in this circuit. Transmitter battery is supplied to the subset through the windings of relays (PL) and (L) and repeating coil (A).

5.5 Disconnection

If the called party disconnects first no change takes place in this circuit. When the calling party disconnects relays (PL) and (L) release which in turn release relays (B) and (B1) and the circuit restores to normal.

6. INCOMING CALL

6.1 Line or Trunk Selected

When this line or trunk connected to this circuit is selected and ringing current is connected to the tip and ring, relay (RU) operates, operating relay (R). The operation of relay (R) operates relay (LD). Relay (R), (1) removes the tip and ring of the repeater from the subscribers line, (2) applies ringing current to the subscriber through resistance lamp (±). Relay (LD) opens a part of the tip and ring of the repeater to the subscriber and closes the circuit for the battery supply to the filaments of the telephone repeater, "Z" wiring only. When ringing current is disconnected from the circuit relay (RU) releases in turn releasing

relay (R) which in turn (1) releases relay (LD), (2) closes the tip and ring of the subscriber line back to the contacts of relay (LD) which is slow to release to allow the line to be charged by battery through resistance (H) and ground, before being again connected to the telephone repeater. This avoids clicks to the calling subscriber by preventing false operation of (PL) and (L) relays from line surges.

6.2 If the call is answered during the ringing interval no change takes place in this circuit until the silent period. If the call is answered during the silent interval, relays (PL) and (L) operate as described under paragraph 5.1.

6.3 Disconnection

If the calling party disconnects first no change takes place in this circuit. When the called party disconnects the circuit functions as described in paragraph 5.5.

7. FLASHING

As the switchhook is moved up and down in order to flash an operator at the central office, or the P.B.X. attendant, relays (PL) and (L) follow the switchhook. Relay (PL) opens and closes the loop to the central office or P.B.X.

8. RESISTANCES AND CONDENSERS

Resistance (F) and condenser (C) are used as spark control for the contacts of relay (PL). Condenser and resistance designated (B) are used as a spark control for the contacts of relays (B1) and (LD).

9. TEST AND PATCHING JACKS

The jacks designated (REP LINE) and (REP NET) are provided for testing the repeater. Jacks designated (LINE) and (LINE NET) are provided for patching purposes. The jacks marked MON are provided for monitoring on the repeaters. The (A) jack is provided for testing the (PL) and (L) relays.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

JBD)
WLF) C

R4 MAKE)
T1 MAKE-TS2 ON TERM 5 WITH TS DELAY LOCKED
ACKT is COMPLETED TO STEP THE
A. REG TO TERM 6. WHEN THE 1 SEC RING
INTERVAL IS ENDED & THE S.R RELEASE
PUTTING GRD. ON INTRPTR. SO THAT WHEN (F)
INTRPTR. MAKES AND BREAKS A REG WILL
STEP TO TERM 6. DURING THIS OPERATION
~~THE~~ CKT. IS IN THE 3 SEC. SILENT PERIOD &
WHILE STILL IN THIS PERIOD THE B INTRPTR
MUST MAKE TO ALLOW T.S. 2 RELAY TO
OPERATE & PUT TRIP LOOP ON & STEP A
REG. TO 7 BEFORE NEXT RING PERIOD

INFORMATION.— FOR MANUFAC

NOTE: 1 FOR M. OF O. SHEETS

L. P. B. X. READ
P20876 REL.
CKT. REQ.
ANGED TO
ITH SUPPLE-

CLASS: A
ISSUE: 21

Q. & TEST
VERE CHANGED
E WITH SUPP.
ES. 239664
DED TO ENG.
W.E. CO'S.
389 ISSUE 18
UE. 16. IN
NOTE "N.Y.
EPT" READ
T. & T. CO."

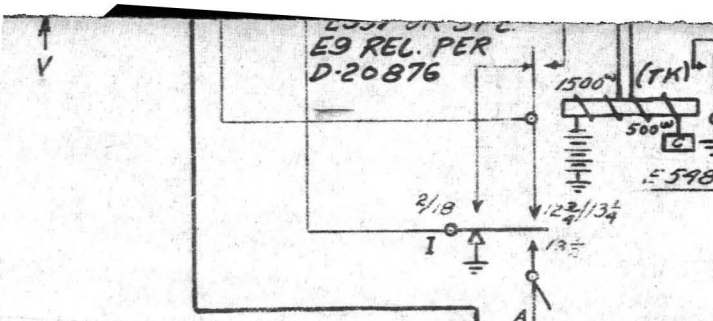
PSN

JL

B.F.M.

INFORMATION-NOT

NOTE: 1 DO NOT CHANGE
T-431252 IF SAM
" 2. THIS DWG. IS PA
REPLACED BY



SEQ SW. (U) D-22274 X-70126

POS. 1 NORMAL
" 2 BRUSH SELECTION
" 3 AWAIT SENDER TRIP
" 4 TENS SELECTION
" 5 AWAIT SENDER
" 6 UNITS SELECTION
" 7 NO TEST PASS BY
" 8 NO TEST PASS BY
" 9 AWAIT LINE REL.
" 10 CHANGING HOLDING CKT. (L) REL. PASS BY
" 11 CHANGING HOLDING CKT. (L) REL PASS BY
" 12 TESTING RB.X. RING
" 13 AWAIT (TK) REL.
" 14 RETURN ON BUSY & PREMATURE REL.
" 15 TALKING
" 16 AWAIT CALLED SUB. RELEASE
" 17 BUSY BACK
" 18 RETURN

COMMUTATOR ~~44, 38, 36~~ OR 3M (SEE

45-50 VOLTS

							S	0		.051	
							S	N.O.		.037	
51	PBX.	X-70037	2	SPL.	SPL.			0		.0275	
								N.O.		.0215	
1 02 0876	PBX.	X-70037	2	SPL.	.020			0		.022	
								N.O.		.018	
65	(SD)	TS	2	HL	.015			0		.013	

2 BELL — 1 SEC. SILENT 1 SEC RING 3 SEC
SILENT BETWEEN THE 2 BELLS.

A REG. ON TERM (4) START OF 1 SEC RING PERIOD
R, R1, SR, X TS. OPERATE. A REG ENERGIZES THRU
TS RELAY OPERATED. AT END OF RING PERIOD SR, R1 &
R RELAYS RELEASE THIS RELEASES T.S. RELAY &
A REL. STEPS TO POS. 5.

A REG ON TERM (5). WITH SR, R1, RX TS
RELEASED & DURING 1 SEC SILENT PERIOD CKT.
REMAINS AS IS UNTIL START OF 1 SEC RING.
PERIOD THEN SR, R1, RX TS OPERATE & T