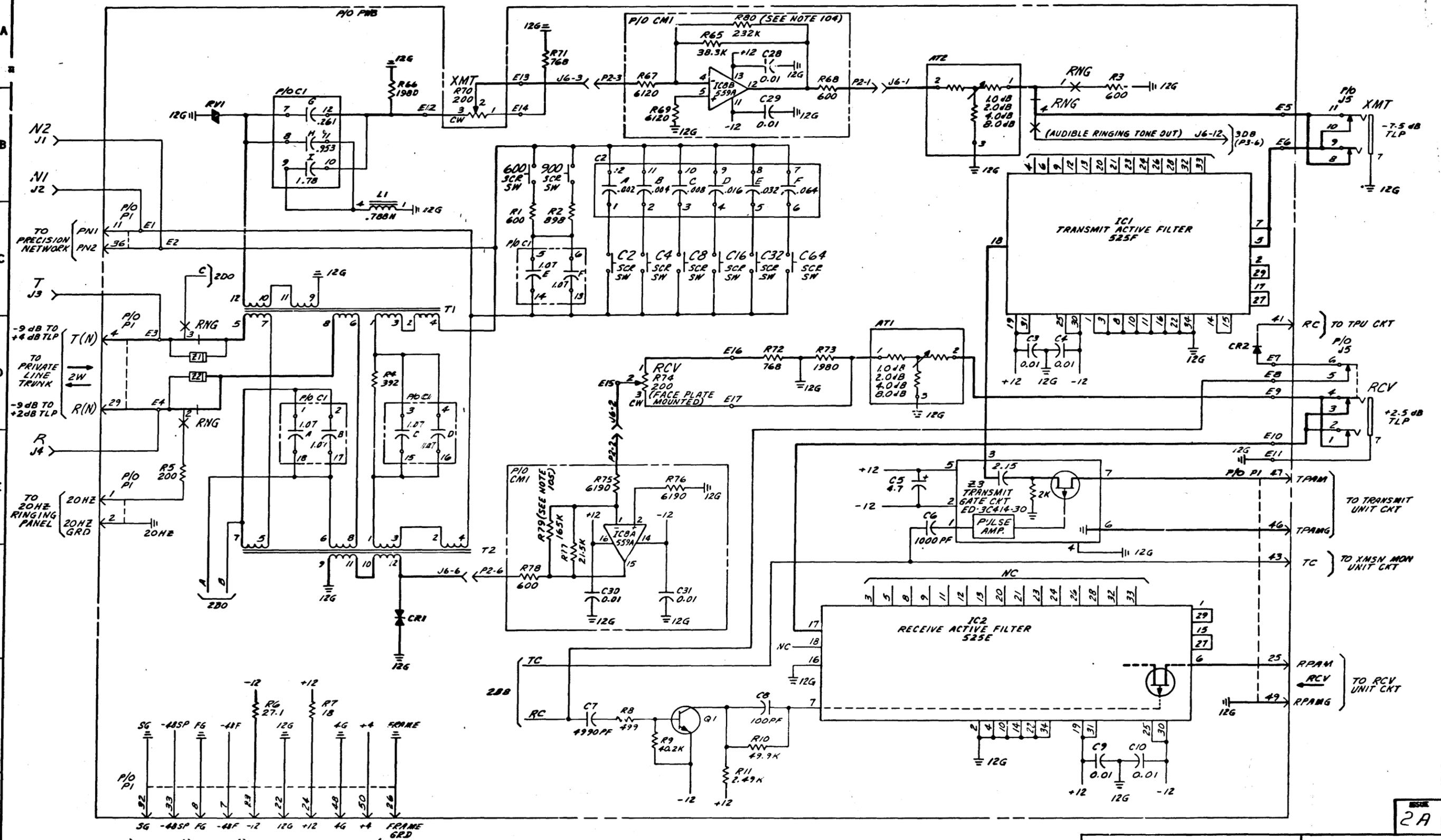
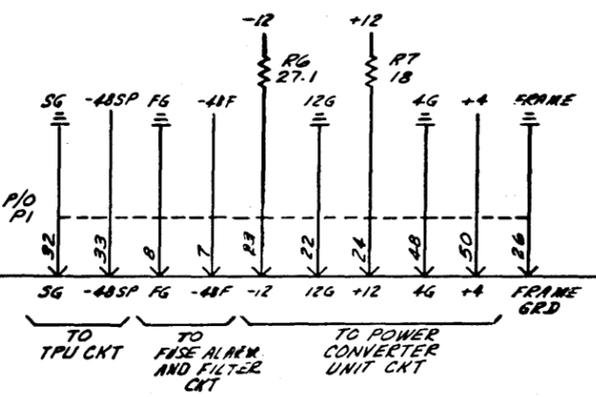




**FS 1**  
TRANSMIT AND RECEIVE  
CKT



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2A

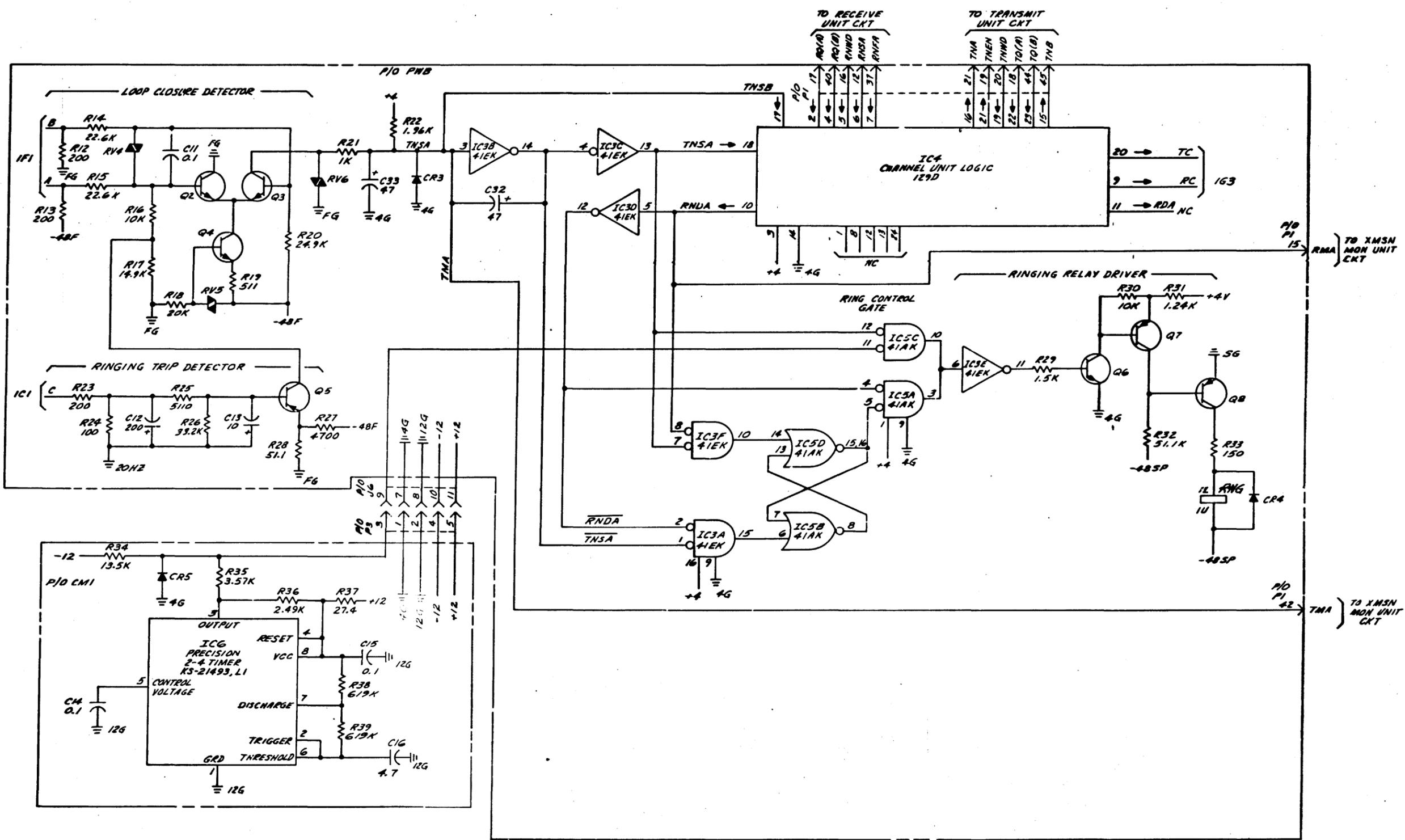
2-WIRE, 900-OHM  
PRIVATE LINE AUTOMATIC RINGDOWN  
CHANNEL UNIT

SD-3C228-01-B1

BELL TELEPHONE LABORATORIES  
INCORPORATED

DWG NO. 6S

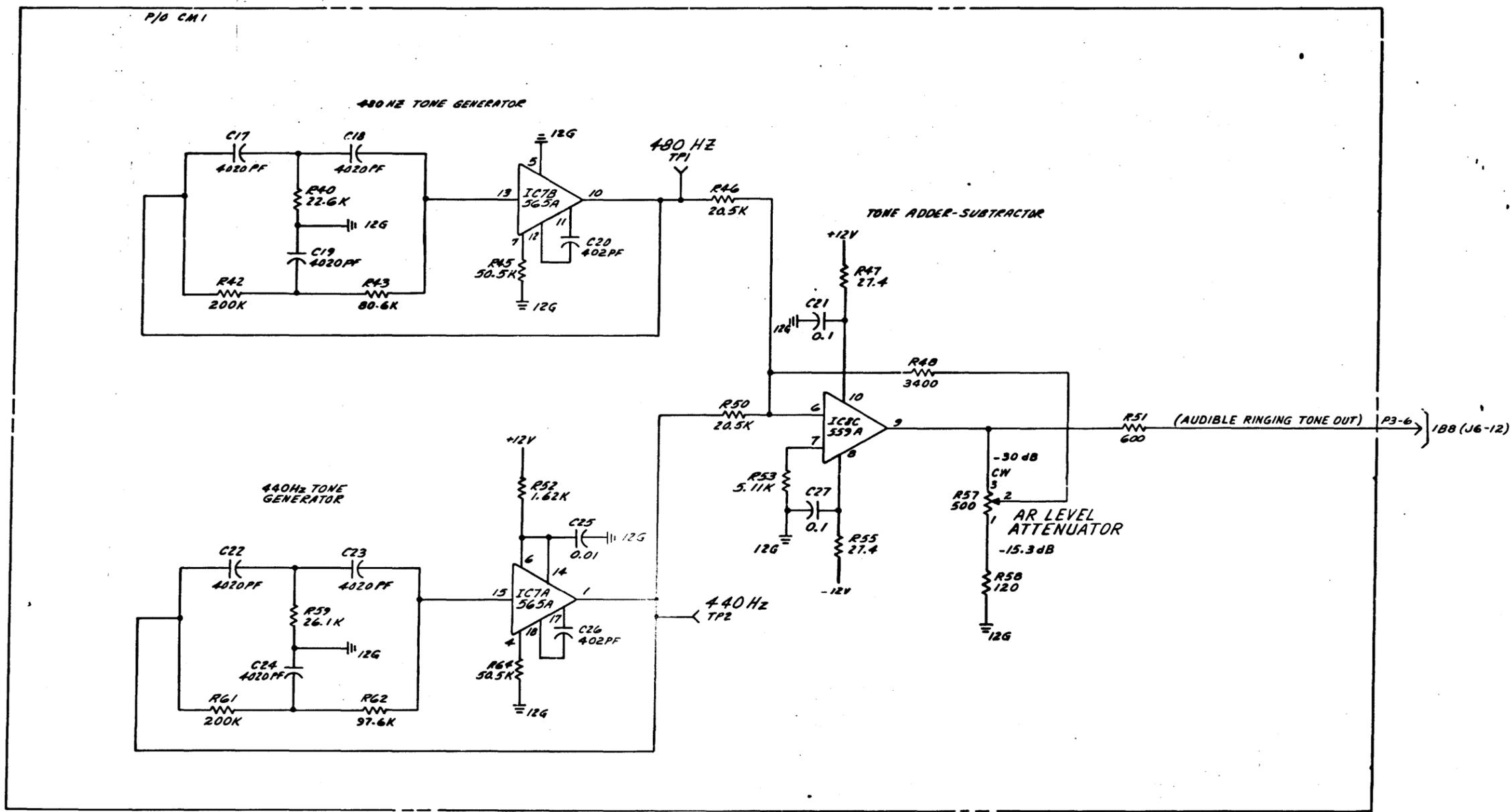
**FS 2**  
RINGING CONTROL CKT



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ISSUE  
2A

FS 3  
AUDIBLE RINGING TONE GENERATOR



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APP FIG. 1

CONNECTOR

DESIG	LOC	CODE
M2(J1)	180	KS-20667,L14
M1(J2)	180	KS-20667,L15
T(J3)	1C0	KS-20667,L9
R(J4)	1E0	KS-20667,L13
(1) RCV(J5)	1D9	601A(JACK)
(1) JMT(J5)	1A9	

JACK  
SEE CONNECTOR

POTENTIOMETER

DESIG	LOC	CODE
R70	183	KS-21423,L5
R74	1D4	KS-21423,L5

PRINTED WIRING BOARD

DESIG	LOC	CODE
PWB	1A4,2A4	ED-3C499-( )

E/M RELAY

DESIG	RNG
CODE	MA35A
OPTION	
CONT	LOC
ARR	
4	EBM 1B7
3	EBM 1D1
2	EBM 1D1
1	EBM 1A7
COIL	2E8

ATTENUATOR

DESIG	LOC	CODE
AT1	1D6	50E
AT2	1B6	50E

CAPACITOR

DESIG	LOC	CODE
C1	1B1,1D1	734B,CAP-PAK
	1D2,1C3	
C2	1B4	726K,CAP-PAK
C3	1D7	KS-16048,L4,.01
C4	1D7	KS-16048,L4,.01
C5	1E6	651C,4.7
C6	1E6	KS-16742,L27,1000PF
C7	1G4	KS-16742,L27,4990PF
C8	1G5	KS-16958,L31,100PF
C9	1G7	KS-16048,L4,.01
C10	1G7	KS-16048,L4,.01
C11	2B1	KS-19774,L5,0.1
C12	2D1	KS-19524,L15,200
C13	2D2	601M
C32	2B3	652A,47
C33	2B2	652A,47

CONNECTOR

DESIG	LOC	CODE
J6	1A3,1A6, 1D4,1F3, 1B8,2E3	KS-21290,L2

DIODE

DESIG	LOC	CODE
CR1	1F2	521B
CR2	1D8	458C
CR3	2B3	456F
CR4	2E8	458A

INDUCTOR

DESIG	LOC	CODE
L1	1B2	1622BJ,788H

PRINTED WIRING BOARD (CONT)

INTEGRATED CKT

DESIG	LOC	CODE
IC1	1B7	525F
IC2	1F6	525E
(1) IC3A	2E3	41EK
IC3B	2B3	
IC3C,D	2B4	
IC3E	2D6	
IC3F	2D5	
IC4	2B6	129D
(1) IC5A,C	2D8	41AK
IC5B	2E5	
IC5D	2D5	

NETWORK

DESIG	LOC	CODE
Z1	1D1	185A
Z2	1D1	185A
Z3	1E6	ED-3C414-30

RESISTOR

DESIG	LOC	CODE
R1	1C3	KS-20810,L1A,600
R2	1C3	KS-20810,L1A,898
R3	1A7	KS-20810,L1A,600
R4	1D2	KS-20810,L1A,392
R5	1E0	KS-14603,L38D,200
R6	1G1	KS-20810,L1A,27.1
R7	1G2	KS-20810,L1A,18
R8	1G4	KS-20810,L1A,499
R9	1G4	KS-20810,L1A,40.2K
R10	1G5	KS-20810,L1A,49.9K
R11	1G5	KS-20810,L1A,2.49K
R12	2B0	KS-14603,L1CD,200
R13	2B0	KS-14603,L1CD,200
R14	2B1	KS-20810,L1A,22.6K
R15	2B1	KS-20810,L1A,22.6K
R16	2B1	KS-20810,L1A,10K
R17	2C1	KS-20810,L1A,14.9K
R18	2C1	KS-20810,L1A,20K
R19	2C2	KS-20810,L1A,511
R20	2C2	KS-20810,L1A,24.9K
R21	2B2	KS-20810,L1A,1K
R22	2B3	KS-20810,L1A,1.96K
R23	2D1	KS-14603,L38D,200
R24	2D1	KS-20810,L1A,100
R25	2D1	KS-20810,L1A,5110
R26	2D1	KS-20810,L1A,33.2K
R27	2D2	KS-20810,L1A,4700
R28	2D2	KS-20810,L1A,51.1
R29	2D7	KS-20810,L1A,1.5K
R30	2C8	KS-20810,L1A,10K
R31	2C8	KS-20810,L1A,1.24K
R32	2D8	KS-20810,L1A,51.1K
R33	2D8	KS-20810,L1A,150
R66	1B3	KS-20616,L1A,1980
R71	1A4	KS-20616,L1A,768
R72	1D5	KS-20616,L1A,768
R73	1D5	KS-20616,L1A,1980

SELECTOR BLOCK

DESIG	LOC	CODE
(1) C2		841587793 1 REQ
C4		
C8	1C4	
C16		
C32		
C64		

600	1B3	840844039
900	1B3	840844039

TRANSFORMER

DESIG	LOC	CODE
T1	1C2	2663
T2	1F3	2663

SCREW SWITCH

SEE SELECTOR BLOCK

PRINTED WIRING BOARD (CONT)

TRANSISTOR

DESIG	LOC	CODE
Q1	1G4	66J
Q2	2B1	66L
Q3	2B7	66L
Q4	2C1	66L
Q5	2D2	51C
Q6	2D7	646
Q7	2C8	51A
Q8	2D8	51B

VARIATOR

DESIG	LOC	CODE
RV1	1B1	106A
RV4	2B1	106A
RV5	2C1	106A
RV6	2B2	106A

CIRCUIT MODULE

DESIG	LOC	CODE
CM1	1A4,1E3, 2E1,3B1	ED-7C081-( )

E/M

CAPACITOR

DESIG	LOC	CODE
C14	2F1	KS-20736,LB,0.1
C15	2F2	KS-20736,LB,0.1
C16	2G3	606E
C17	3B1	570FK
C18	3B2	570FK
C19	3C2	570FK
C20	3C3	KS-16958,L29,402PF
C21	3D5	KS-20736,LB,0.1
C22	3E1	570FK
C23	3E2	570FK
C24	3F2	570FK
C25	3E3	KS-16048,L4,.01
C26	3F3	KS-16958,L29,402PF
C27	3E4	KS-20736,LB,0.1
C28	1A5	KS-19774,L2,.01
C29	1B5	KS-19774,L2,.01
C30	1E3	KS-19774,L2,.01
C31	1E4	KS-19774,L2,.01

CONNECTOR

DESIG	LOC	CODE
P2	1A4,1A5, 1E4,1F3	65433-006,BERG ELEC
P3	2E3,3D8	65433-006,BERG ELEC

DIODE

DESIG	LOC	CODE
CR5	2E1	456F

INTEGRATED CIRCUIT

DESIG	LOC	CODE
IC6	2F1	KS-21493,L1
(1) IC7A	3F3	565A
IC7B	3C3	
(1) IC8A	1E4	559A
IC8B	1A5	
IC8C	3D5	

POTENTIOMETER

DESIG	LOC	CODE
R57	3E5	KS-21423,L2

PRINTED WIRING BOARD (CONT)

CIRCUIT MODULE (CONT)

RESISTOR

DESIG	LOC	CODE
R34	2E1	KS-20616,L1A,13.5K
R35	2E2	KS-20616,L1A,3.57K
R36	2E2	KS-20616,L1A,2.49K
R37	2E2	KS-20616,L1A,27.4
R38	2F2	KS-20616,L1A,619K
R39	2E2	KS-20616,L1A,619K
R40	3C2	KS-20616,L1A,22.6K
R42	3C1	KS-20616,L1A,200K
R43	3C2	KS-20616,L1A,80.6K
R45	3C3	KS-20616,L1A,50.5K
R46	3C4	KS-20616,L1A,20.5K
R47	3C5	KS-20616,L1A,27.4
R48	3D5	KS-20616,L1A,3400
R50	3D4	KS-20616,L1A,20.5K
R51	3D6	KS-20616,L1A,600
R52	3E3	KS-20616,L1A,1.62K
R53	3E4	KS-20616,L1A,5.11K
R55	3E5	KS-20616,L1A,27.4
R58	3F5	KS-20616,L1A,120
R59	3F2	KS-20616,L1A,26.1K
R61	3F1	KS-20616,L1A,200K
R62	3F2	KS-20616,L1A,97.6K
R64	3F3	KS-20616,L1A,50.5K
R65	1A5	KS-20616,L1A,38.3K
R67	1A4	KS-20616,L1A,6120
R68	1A6	KS-20616,L1A,600
R69	1B5	KS-20616,L1A,6120
R75	1E3	KS-20616,L1A,6190
R76	1E4	KS-20616,L1A,6190
R77	1E3	KS-20616,L1A,21.5K
R78	1F3	KS-20616,L1A,600
R79	1E3	KS-20616,L1A,165K
R80	1A5	KS-20616,L1A,232K

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2-WIRE, 900-0HM  
PRIVATE LINE AUTOMATIC RINGDOWN  
CHANNEL UNIT

SD-3C228-01-C1

BELL TELEPHONE LABORATORIES  
INCORPORATED

65

2A

A  
B  
C  
D  
E  
F  
G  
H

CIRCUIT NOTES:

101.	DESIG	FUSE AMP	POTENTIAL	ONE PER
BATTERY SYMBOL			VOLTAGE RANGE	

CIRCUIT NOTES: (CONT)

- 104. THIS RESISTOR IS TO BE SELECTED AT MANUFACTURE TO MEET GAIN REQUIREMENTS. IF THE RESISTOR VALUE SHOWN ON SHEET B1 IS INADEQUATE, A VALUE MAY BE SELECTED FROM AMONG THE FOLLOWING KS20810, L1A RESISTORS: 187K, 200K, 246K, 267K.
- 105. THIS RESISTOR IS TO BE SELECTED AT MANUFACTURE TO MEET GAIN REQUIREMENTS. IF THE RESISTOR VALUE SHOWN ON SHEET B1 IS INADEQUATE, A VALUE MAY BE SELECTED FROM THE FOLLOWING KS20810, L1A RESISTORS: 123K, 133K, 149K, 172K, 192K.

EQUIPMENT NOTES:

- 201. \*P1\* INDICATES PRINTED CONNECTOR FINGERS OF P1B PLUG END AND MATES WITH A 940A CONNECTOR.
- 202. DESIGNATIONS SHOWN IN BOLD CHARACTERS IN B SECTION ARE MARKED ON UNIT.
- 203. TO CLOSE A SCREW SWITCH, THE SCREW SHALL BE TIGHTENED SUFFICIENTLY TO INSURE CONTACT BETWEEN TERMINALS AND UNDERSIDE OF SCREW HEAD. CAUTION IN TIGHTENING SCREW IS RECOMMENDED TO AVOID SHEARING OF SCREW. TO OPEN A SCREW SWITCH, THE SCREW SHALL BE LOOSENED APPROXIMATELY TWO COMPLETE TURNS. UNIT IS NORMALLY FURNISHED WITH SCREWS OPEN AND ATTENUATORS SET TO MAXIMUM.

INFORMATION NOTES:

- 301. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROFARADS. VALUES PRECEDED BY THE SYMBOL (+) PLUS OR (-) MINUS ARE IN VOLTS.

102.	FEATURE OR OPTION	PROVIDE		
		APP FIG	APP OR HRG	QUANTITY

103.	RECORD OF FIGURES, WIRING AND APPARATUS CHANGES						
	CHANGED ON ISSUE	IF JOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT		
					STD	A&M	NO

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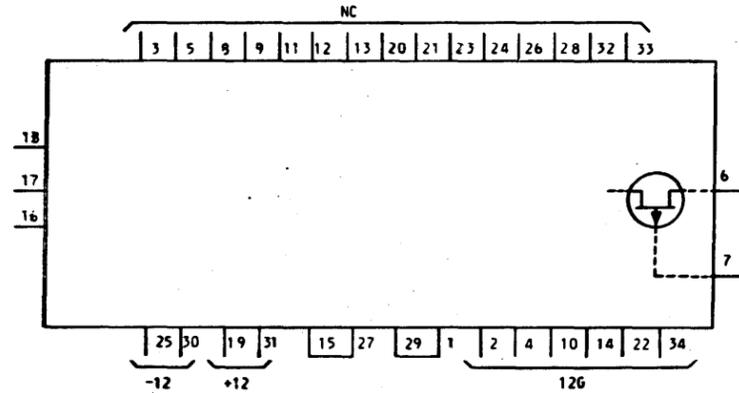
27

2-WIRE, 900-OHM PRIVATE LINE AUTOMATIC RINGDOWN CHANNEL UNIT	SD-3C228-01-D1
BELL TELEPHONE LABORATORIES INCORPORATED	6S

INFORMATION NOTES: (CONT)

3.02 IC DEVICE CIRCUIT ELEMENTS

(a) 525E RECEIVE ACTIVE FILTER



INPUT/OUTPUT INFORMATION

PIN 6 IS THE PRIMARY CHANNEL INPUT FOR THE RECEIVE PULSE AMPLITUDE MODULATED SIGNAL.

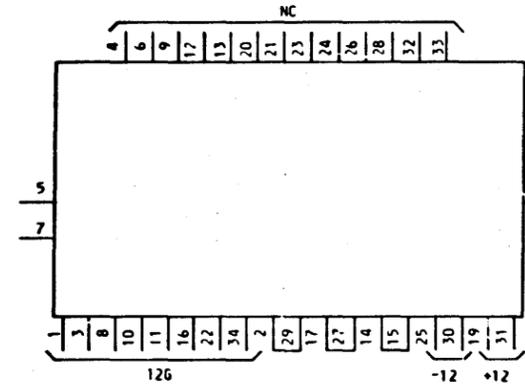
PIN 7 IS THE TIMING INPUT REQUIRED TO SAMPLE THE INDIVIDUAL CHANNEL.

PIN 17 IS THE PRIMARY CHANNEL OUTPUT FOR THE RECONSTRUCTED VOICE FREQUENCY SIGNAL.

CIRCUIT DESCRIPTION

THE RECEIVING ACTIVE FILTER, RECONSTRUCTS THE TRANSMITTED WAVEFORM FROM THE RECEIVED SAMPLES. IT EFFECTIVELY HAS A LOW-PASS CHARACTERISTIC WHICH SUPPRESSES FREQUENCY COMPONENTS IN THE INPUT ABOVE 4 KHZ.

(b) 525F TRANSMIT ACTIVE FILTER



INPUT/OUTPUT INFORMATION

PIN 5 IS THE PRIMARY VOICE FREQUENCY SIGNAL INPUT.

PIN 18 IS THE FILTERED VOICE FREQUENCY OUTPUT.

CIRCUIT DESCRIPTION

THE TRANSMIT ACTIVE FILTER IS A LOW-PASS FILTER WHICH EFFECTIVELY SUPPRESSES FREQUENCIES ABOVE 4 KHZ. THESE FREQUENCIES WOULD PRODUCE MODULATION PRODUCTS BELOW 4 KHZ IF THEY WERE NOT SUPPRESSED.

BELL SYSTEM PROPRIETARY INFORMATION  
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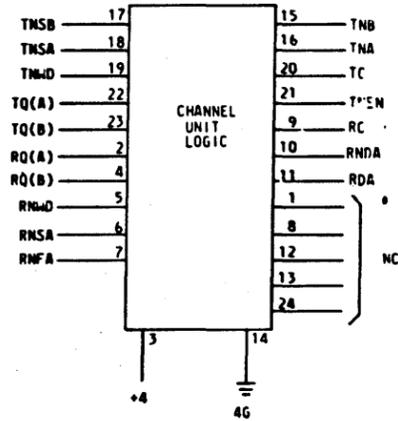
2-WIRE, 900-OHM  
PRIVATE LINE AUTOMATIC RINGDOWN  
CHANNEL UNIT

SD-3C228-01-D2

BELL TELEPHONE LABORATORIES  
INCORPORATED

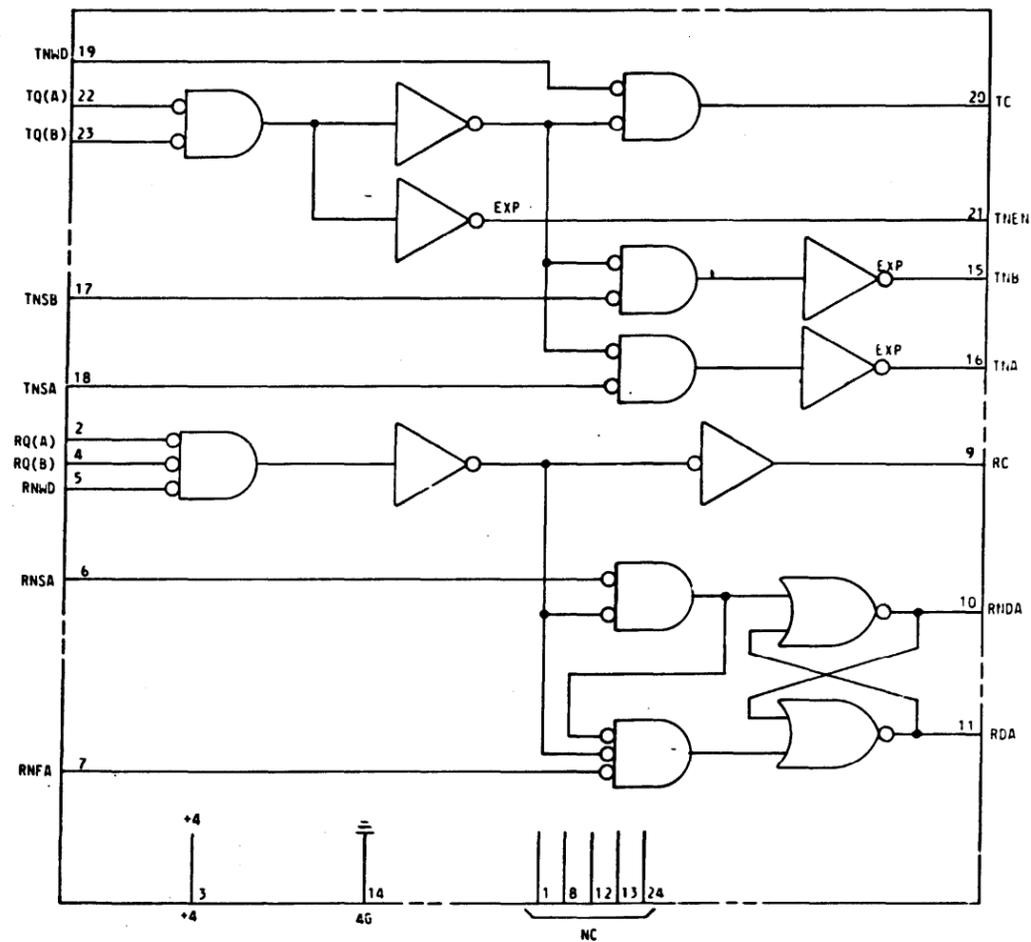
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INFORMATION NOTES (CONT)  
 302. I.C. DEVICE CIRCUIT ELEMENTS (CONT)  
 (C) 129D CHANNEL UNIT LOGIC



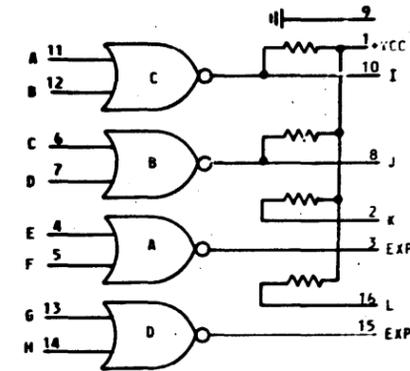
INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

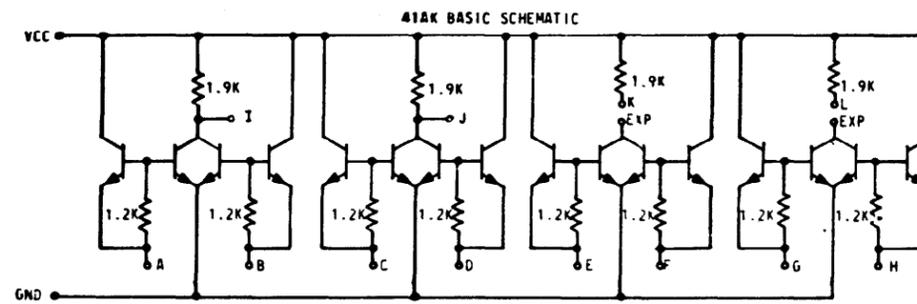


(D) 41AK QUAD 2-INPUT NOR GATE

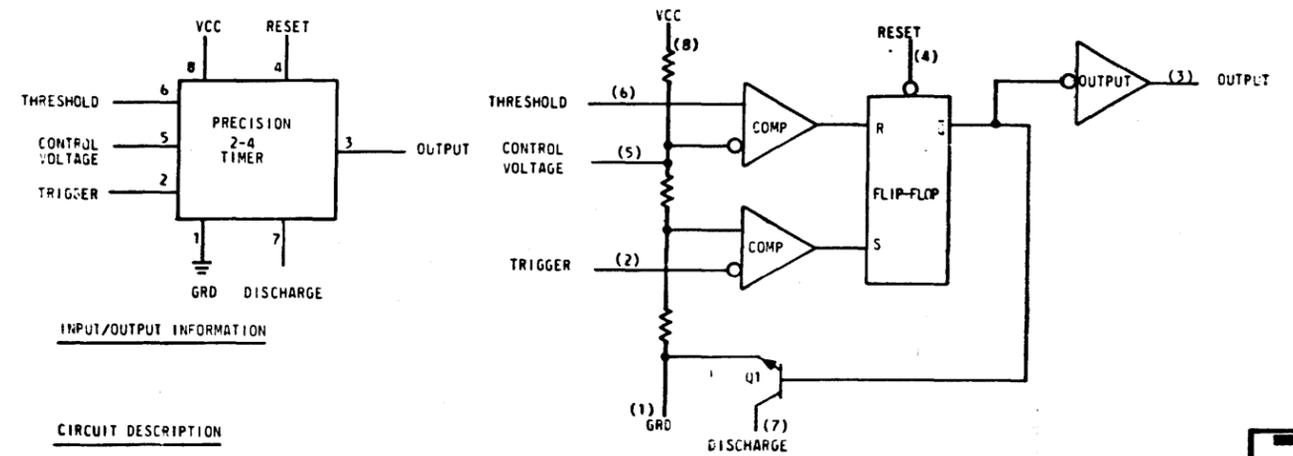
INPUT/OUTPUT INFORMATION



CIRCUIT DESCRIPTION



(E) KS-21493, LI PRECISION TIMER



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

BELL SYSTEM PROPRIETARY INFORMATION  
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2-WIRE, 900-OHM  
 PRIVATE LINE AUTOMATIC RINGDOWN  
 CHANNEL UNIT

SD-3C228-01-D3

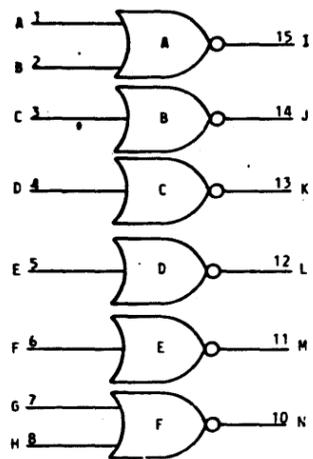
BELL TELEPHONE LABORATORIES  
 INCORPORATED

6S

INFORMATION NOTES (CONT)

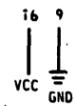
302. IC DEVICE CIRCUIT ELEMENT

(F) **41EK** 1-1-1-1-2-2 INPUT NOR GATE

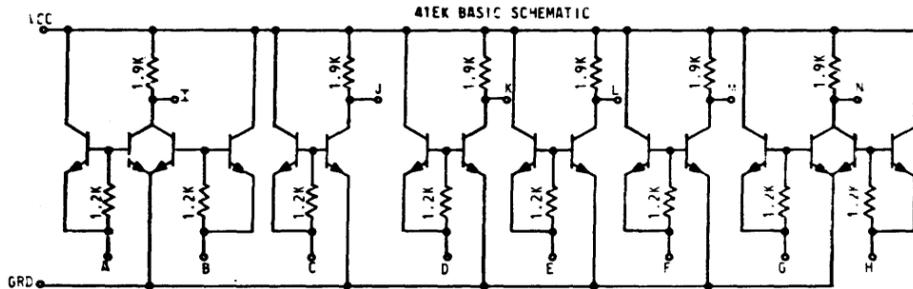


INPUT/OUTPUT INFORMATION

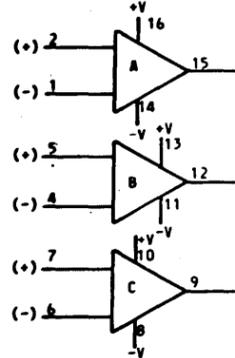
CIRCUIT DESCRIPTION



**41EK BASIC SCHEMATIC**



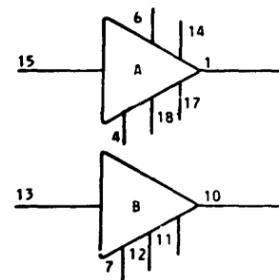
(G) **559A** TRIPLE VOICE FREQUENCY AMPLIFIER



INPUT/OUTPUT INFORMATION

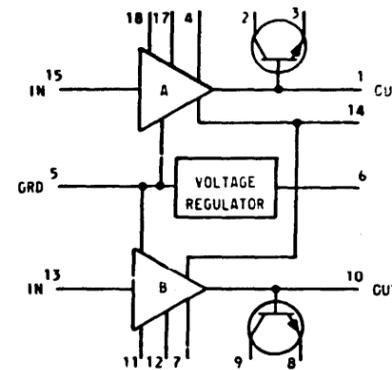
CIRCUIT DESCRIPTION

(H) **565A** DUAL AMPLIFIER/OSCILLATOR WITH GAIN COMPRESSION



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION



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