

SHEET INDEX	
SHEET INDEX CIRCUIT NOTES SUPPORTING INFORMATION OPTION INDEX WORKING LIMITS	1
EQUIPMENT NOTES INFORMATION NOTES	2
FS1-C.O. OR PBX LINE CIRCUIT APP FIG. 1	3
FS2-C.O. OR PBX LINE CIRCUIT APP FIG. 2	4

CIRCUIT NOTES: (CONT)						
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	MD
4B1	FIG. 1, 2	FIG. 1		FIG. 2		FIG. 1
4B1	T	T				T
4B1	Y	NONE		Y		

104. TOTAL LOOP RESISTANCE OF THE A LEAD TO THE B GROUND THROUGH THE A1 LEAD SHALL NOT EXCEED 50 OHMS.
105. STATION LAMP LOOP SHALL NOT EXCEED 50 OHMS.
106. A MAXIMUM OF 26 STATION LAMPS MAY BE CONNECTED TO THE L LEAD.
107. IF THE KEY SERVICE UNIT IS FURNISHED WITH 412A KTUs ISSUES 1 THRU 4, THE CONTACT PROTECTIVE NETWORK (186D TYPE) MUST BE REMOVED FROM THE CIRCUIT.
108. IDLE STATE CURRENT IS 40 MA AT -24 VOLTS FOR 400H ISSUE 1.
109. IDLE STATE CURRENT IS 16MA AT -24 VOLTS FOR 400H ISSUE 2.

CIRCUIT NOTES:			
DESIG	FUSE AMP	POTENTIAL	ONE PER
		-24	(FUSE PROVIDED ON ASSOC KSU OR PANEL CKT)
BATTERY SYMBOL		VOLTAGE RANGE	
-24		20-26	

FEATURE OR OPTION		APP FIG.	APP OR WRG	QUANTITY
BASIC C.O. OR PBX LINE CIRCUIT (MFR DISC.)	C.O. OR PBX LINE CIRCUIT		T	1 PER LINE
	AUDIBLE SIGNALS		W	
	INTERRUPTED RING		V	
	COMMON WITH RELAY CONTROL		S	
	DELATED HOLD CIRCUIT RELEASE		R	
	LONG HOLD ABANDON TIMEOUT, FOR ESS NO. 1, 812 PBX, 770 PBX, DIMENSION PBX			
BASIC C.O. OR PBX LINE CIRCUIT	AUDIBLE SIGNALS		W	1 PER LINE
	INTERRUPTED RING		V	
	COMMON WITH RELAY CONTROL		S	
	DELATED HOLD CIRCUIT RELEASE		R	
	LONG HOLD ABANDON TIMEOUT, FOR ESS NO. 1, 812 PBX, 770 PBX, DIMENSION PBX			
	SHORT HOLD ABANDON FOR ALL OTHERS		Y	
LONG RING TIMEOUT 12-17 SECS				

SUPPORTING INFORMATION	
CATEGORY	NO.

OPTION INDEX			
APP OR WRG	RATED ON ISSUE	REF NOTES	LOCATION
Y	STD 2		4F0
W	STD 1		360, 4G0
V	STD 1		360, 4G1
T	MD 2		3A2
S	STD 1		301, 4D1
R	STD 1		300, 4D0

400H
LINE CARD

WORKING LIMITS:

RINGING RANGES							
APP FIG.	MINIMUM RINGING VOLTAGE (RMS)	MINIMUM LEAKAGE RESISTANCE	MAXIMUM NO. OF RINGERS				
			0	1	2	3	
			MAXIMUM RINGING RANGE (OHMS)				
1	72V	10K	3100	2000	1475	1150	
	80V	10K	4000	2550	1900	1500	
	84V	10K	4500	3000	2125	1625	
	84V	20K	5850	3500	2500	1800	

NOTICE
NOT FOR USE OR DISCLOSURE
OUTSIDE THE BELL SYSTEM
EXCEPT UNDER WRITTEN AGREEMENT

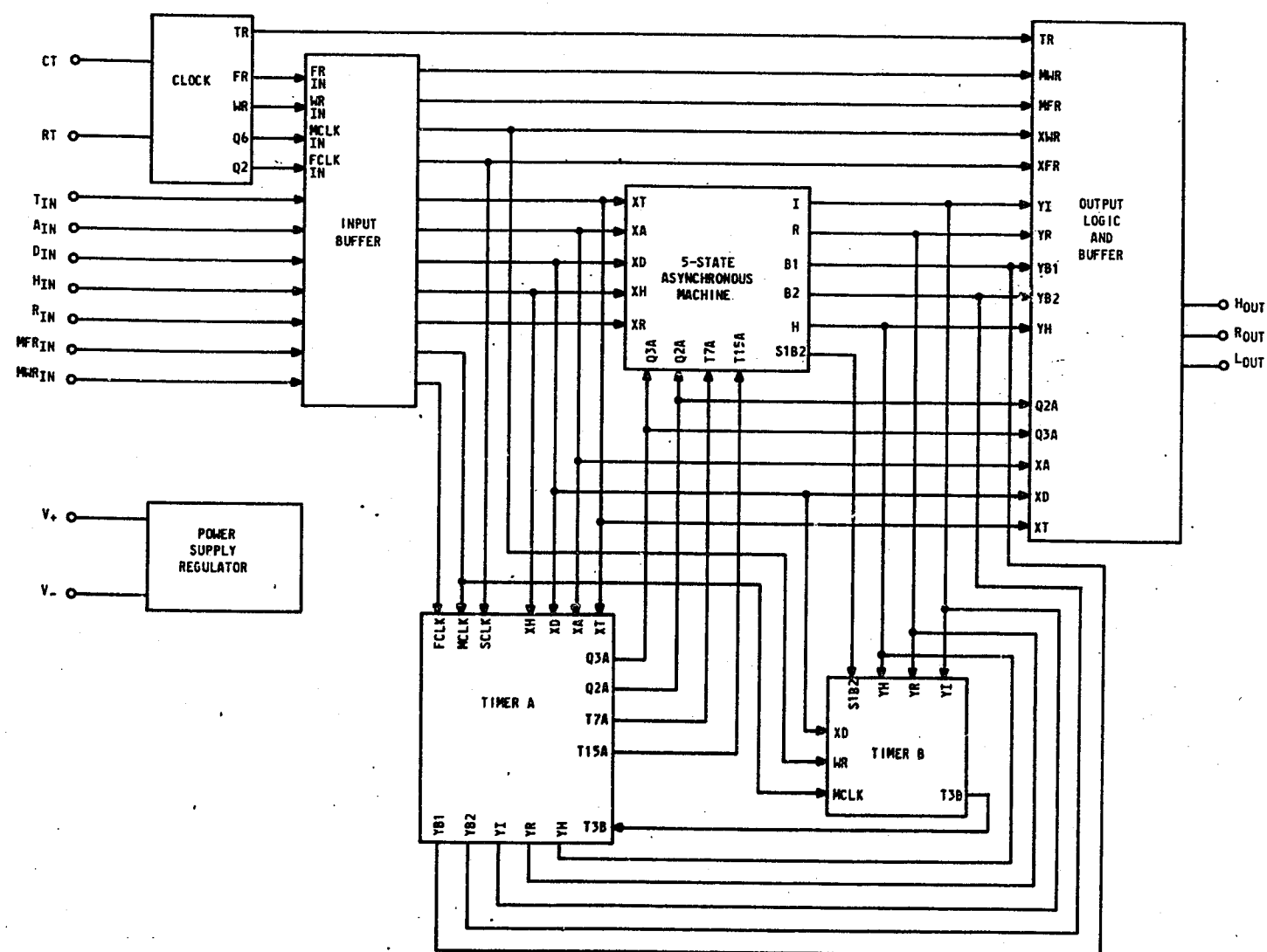
1 K03		AT&TCO STANDARD
STATION SYSTEMS KEY TELEPHONE SYSTEMS NO. 1A2		SD-69942-01-1 4 SHEETS
CO OR PBX LINE CIRCUIT (400H KTU)		
BELL TELEPHONE LABORATORIES INCORPORATED		6S

EQUIPMENT NOTES:

200. THE 400H KTU, ISSUE 1 IS SHIPPED WITH J3 ORIENTED AS SHOWN. TERMINAL 10 THRU 1 OF J3 MATES WITH TERMINAL 10 THRU 1 OF J1 RESPECTIVELY, AND WITH J4 OPTION "S" AND J5 OPTION "W".
201. TERMINALS D1 AND D2 ARE USED BY THE CRAFTSPERSON TO DETERMINE IF THE LINE CIRCUIT IS ACTUALLY CONNECTED TO A CO OR PBX LINE. BY SHORTING THESE TERMINALS THE LED (DS101) WILL TURN ON IF THE CIRCUIT IS CONNECTED TO A CO OR PBX LINE. IF IT IS NOT, THE LED WILL NOT TURN ON.
202. THE 400H KTU, ISSUE 2, IS SHIPPED WITH (J4) OPTION "S" AND (J5) OPTION "W". IF OPTION "Y" IS REQUIRED OPTION PLUG KS-21290,L7 IS TO BE ORDERED SEPARATELY AS COMCODE 841732613.

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.
302. THE 400H KTU SHALL BE USED WITH THE 235A AND 236A STATION LINE CONCENTRATORS ONLY WHEN THE CONCENTRATORS HAVE BEEN MODIFIED AS SHOWN ON THE APPLICABLE ISSUES OF SD-69387-01, SD-69498-01 AND SD-69499-01.
303. BLOCK DIAGRAM OF 41HD INTEGRATED CIRCUIT. THE 41JS IS SIMILAR TO THE 41HD BUT IS CONTAINED ON A SINGLE CHIP.



CIRCUIT DESCRIPTION

THE 41HD OR 41JS INTEGRATED CIRCUIT IS A 16 PIN DIP UTILIZING I^2L TECHNOLOGY. IT CONSISTS OF SEVEN (7) BASIC COMPONENTS: AN INPUT BUFFER, AN OUTPUT BUFFER, A CLOCK, A POWER SUPPLY REGULATOR, 2 TIMERS AND A 5-STATE ASYNCHRONOUS SEQUENTIAL MACHINE. THE POWER SUPPLY REGULATOR DEVELOPS A 4 DIODE VOLTAGE DROP TO POWER THE I^2L CIRCUITRY. THE CLOCK IS AN ON CHIP OSCILLATOR WHICH PROVIDES ALL THE INTERNAL TIMING. THE INPUT AND OUTPUT BUFFERS MERELY CONVERT VOLTAGE LEVELS FROM T^2L TO I^2L AND BACK TO T^2L AGAIN. ALSO ASSOCIATED WITH THE OUTPUT BUFFERS IS THE NECESSARY LOGIC CIRCUITRY TO PROVIDE THE VARIOUS MODES OF OPERATION FOR THE LINE CIRCUIT. TIMER A IS A 4-BIT COUNTER AND TIMER B IS A 2-BIT COUNTER. TIMER B TOGETHER WITH TIMER A PERFORM ALL THE REQUIRED TIMING INTERVALS FOR THE 5-STATE ASYNCHRONOUS MACHINE. THESE TIMING INTERVALS COUPLED WITH INPUTS AIN, DIN, MIN AND RIN DETERMINE WHICH ONE OF THE 5 OUTPUTS FROM THE 5-STATE MACHINE IS ASSERTED.

CO OR PBX LINE

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-69942-01-2

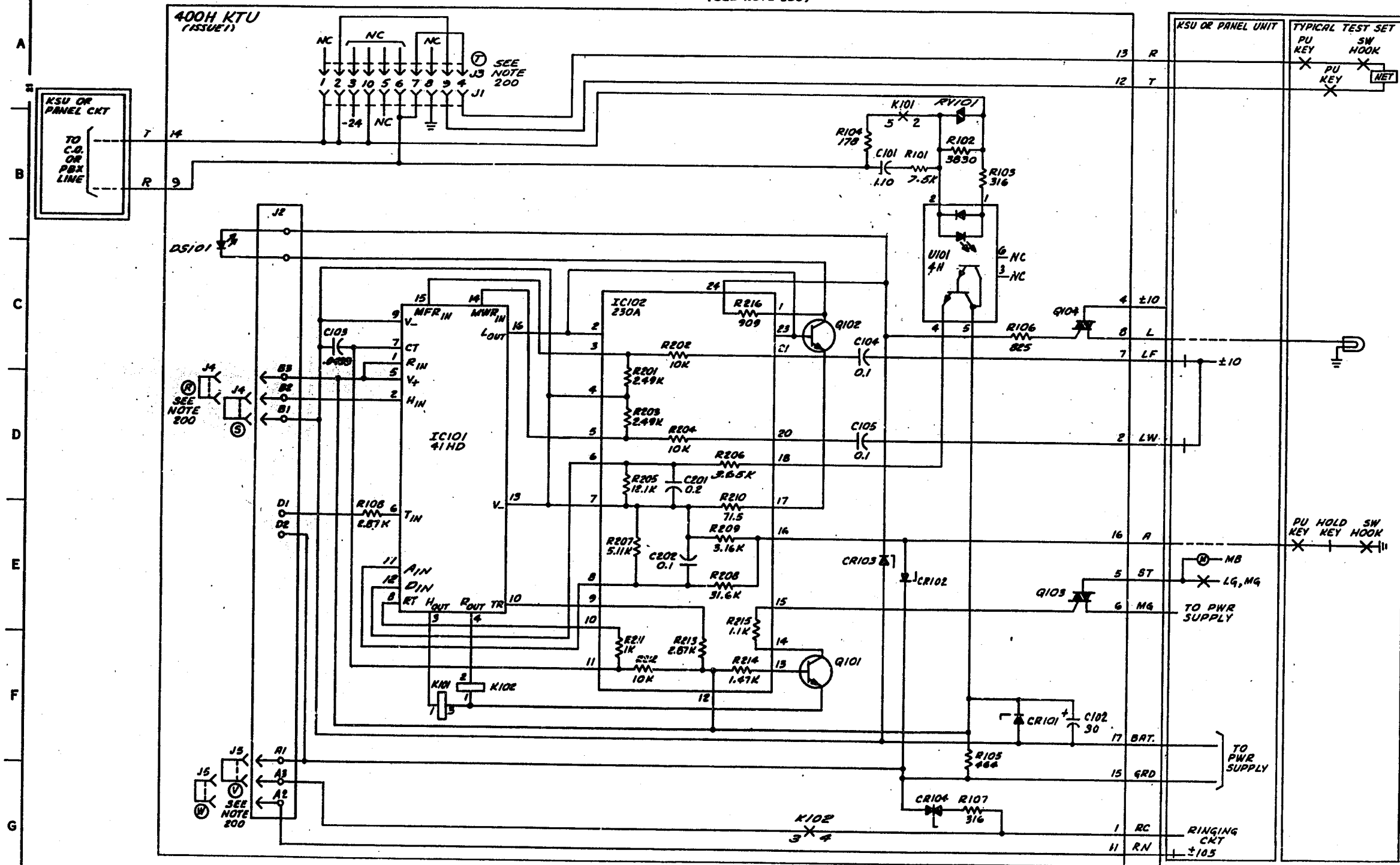
6S

PRINTED IN U.S.A.

ISSUE
4B1

FSI (MFR DISC)
C.O. OR PBX LINE CIRCUIT
(SEE NOTE 200)

APP FIG. 1



RELAY	DESIG	LOC	CODE
	K101		327P
	K102		345A OR 345B
CAPACITOR	DESIG	LOC	CODE
	C101	3A5	7020, 1.10
	C102	3F4	603L, 30
	C103	3C1	5706P, 0.0499
	C104	3C5	722B, 0.1
	C105	3D5	722B, 0.1
CONNECTING BLOCK	DESIG	LOC	CODE
	J2	3B1	77D
CONNECTOR, HEADER	DESIG	LOC	CODE
	J1	3B2	KS-21290, L8
CONNECTOR, JUMPER	DESIG	LOC	CODE
	J3	3A2	841736242
	J4	3C1, 3D1	KS-21290, L7
	J5	3F1, 3G1	KS-21290, L7
DIODE	DESIG	LOC	CODE
	CR101	3F4	808A
	CR102	3E5	808A, 521AB
	CR103	3E5	808A
	CR104	3G5	808CH
DIODE, LIGHT EMITTING	DESIG	LOC	CODE
	DS101	3B0	556A
INTEGRATED CIRCUIT	DESIG	LOC	CODE
	IC101	3D2	41H0
	IC102	3C3	230A
OPTO-ISOLATOR	DESIG	LOC	CODE
	U101	3C5	4H
RESISTOR	DESIG	LOC	CODE
	R101	3A5	KS-20810, L1A, 7.5K
	R102	3B5	KS-20616, L1A, 3850
	R103	3B6	KS-20616, L1A, 316
	R104	3B5	KS-20289, L4A, 178
	R105	3G6	KS-20289, L4C, 346, 364
	R106	3C6	KS-20810, L1A, 816
	R107	3G5	KS-20616, L1A, 816
	R108	3D2	KS-20616, L1A, 2.87K
TRANSISTOR	DESIG	LOC	CODE
	Q101	3F5	66AK
	Q102	3C5	66AK
	Q103	3E6	94B
	Q104	3C6	97A
VARISTOR	DESIG	LOC	CODE
	RV101	3B5	106D

CO OR PBX LINE

SD-69942-01-3

BELL TELEPHONE LABORATORIES
INCORPORATED

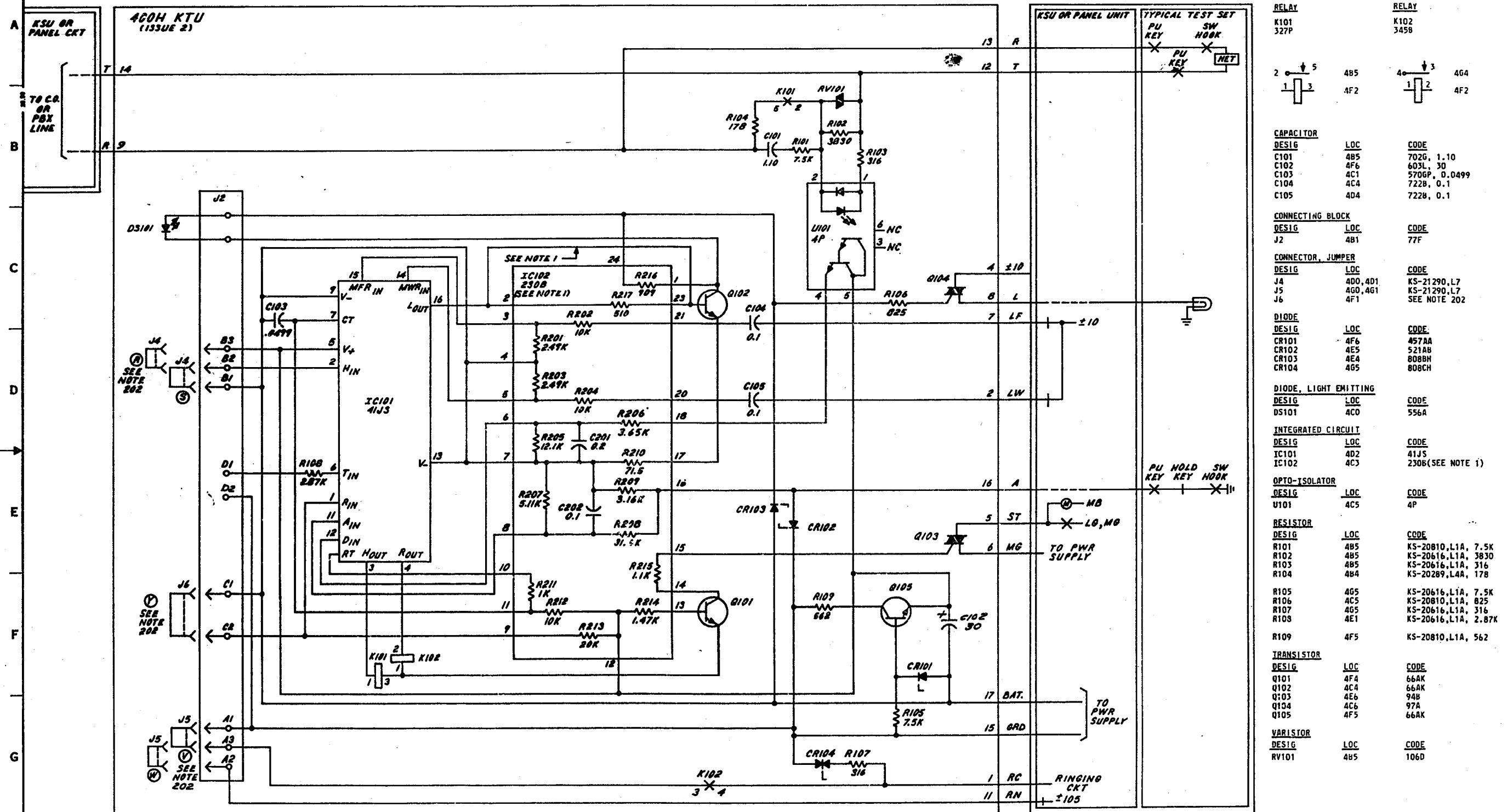
6S

PRINTED IN U.S.A.

ISSUE
4B1

FS 2
CO. OR PBX LINE CIRCUIT
(SEE NOTE 202)

APP FIG. 2



RELAY		RELAY	
K101	327P	K102	345B
			
2	4B5	4	4G4
1	4F2	1	4F2
CAPACITOR			
DESIG	LOC	CODE	
C101	4B5	702G, 1.10	
C102	4F6	603L, 30	
C103	4C1	570GP, 0.0499	
C104	4C4	722B, 0.1	
C105	4D4	722B, 0.1	
CONNECTING BLOCK			
DESIG	LOC	CODE	
J2	4B1	77F	
CONNECTOR, JUMPER			
DESIG	LOC	CODE	
J4	4D0, 4D1	KS-21290, L7	
J5	4G0, 4G1	KS-21290, L7	
J6	4F1	SEE NOTE 202	
DIODE			
DESIG	LOC	CODE	
CR101	4F6	457AA	
CR102	4E5	521AB	
CR103	4E4	808BH	
CR104	4G5	808CH	
DIODE, LIGHT EMITTING			
DESIG	LOC	CODE	
DS101	4C0	556A	
INTEGRATED CIRCUIT			
DESIG	LOC	CODE	
IC101	4D2	41JS	
IC102	4C3	230B(SEE NOTE 1)	
OPTO-ISOLATOR			
DESIG	LOC	CODE	
U101	4C5	4P	
RESISTOR			
DESIG	LOC	CODE	
R101	4B5	KS-20810, L1A, 7.5K	
R102	4B5	KS-20810, L1A, 3830	
R103	4B5	KS-20810, L1A, 316	
R104	4B4	KS-20289, L4A, 178	
R105	4G5	KS-20810, L1A, 7.5K	
R106	4C5	KS-20810, L1A, 825	
R107	4G5	KS-20810, L1A, 316	
R108	4E1	KS-20810, L1A, 2.87K	
R109	4F5	KS-20810, L1A, 562	
TRANSISTOR			
DESIG	LOC	CODE	
Q101	4F4	66AK	
Q102	4C4	66AK	
Q103	4E6	94B	
Q104	4C6	97A	
Q105	4F5	66AK	
VARISTOR			
DESIG	LOC	CODE	
RV101	4B5	106D	

NOTES:

1. EARLY PRODUCTION OF ISSUE 2 USED THE 230A INTEGRATED CIRCUIT. LATER PRODUCTION, USING THE 230B INTEGRATED CIRCUIT, HAS THE PRINTED WIRING CONNECTION FROM TERM 2 OF (IC102) TO TERM 23 OF (IC102) REMOVED.

CO OR PBX LINE

DWG SIZE
6S

ISSUE
4B1

BELL LABORATORIES

SD-69942-01

-4

PRINTED IN U.S.A.