SHEET INDEX

SHEET INDEX

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SUPPORTING INFORMATION

CATEGORY	NO.
INVERTER CIRCUIT	KS-20816,L2

OPTION INDEX

APP OR WRG	LOCATION

DWG ISSUE	EE OR CT ISSUED	DATE ISSUE	DRAWN	APPD	
1	1	1-9-73	JK DSS	SDC DHS AAH	KY
2A	1 APP 1A	5-19-76	JLP RJF	HTL CDR EJL	KY

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ISSUE 2A

SD-82178-01 1M99

POWER SYSTEMS
INDERTER CIRCUIT
500 VA, 120V, 60HZ
SINGLE PHASE
42.75-52.5 V DC INPUT
KS-20816,L2

(2)

BELL TELEPHONE LABORATORIES INCORPORATED — 6S

A.T. & T. CO. STANDARD

SD-82178-01-A1
7 SHEETS

SD-82178-01-A1

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
DC	50	-48	INVERTER
BATTERY SYMBOL -48		VOLTAGE RANGE 42-56	

102.

FEATURE OR OPTION	PROVIDE		
	APP FIG.	APP OR ARR.	QUANTITY
48V DC TO 117V AC 500 VA INVERTER	1		1

103.

RECORD OF APP. FIGURES, WIRING AND APPARATUS CHANGES							
CHANGED ON ISS	IF VOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT			
				STD.	A & M	M.D.	

104. UNASSIGNED.

105. FOR DC INPUT USE 6 GA WIRE FOR LOOP LENGTH OF 50 FEET OR LESS, 3 GA FOR 50 TO 100 FEET. MORE THAN 100 FEET FOR WIRE SPECIFIED TO GIVE LESS THAN 1 VOLT DROP AT 48 AMPERES.

EQUIPMENT NOTES:

201. UNASSIGNED

CROSS REFERENCE NOTES:

401. UNASSIGNED.

INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS
CAPACITANCE VALUES ARE IN M CROFARADS
VALUES PRECEEDED BY THE SYMBOL + (PLUS) OR − (MINUS) ARE IN VOLTS.

302. DESIGNATIONS SHOWN IN [ ] ARE FOR REFERENCE ONLY.

303. THIS CIRCUIT BREAKER IS NOT SUPPLIED.

304. THIS LEAD IS ADJUSTED AT THE FACTORY.

SD-82178-01-A2

ISSUE 2A KY

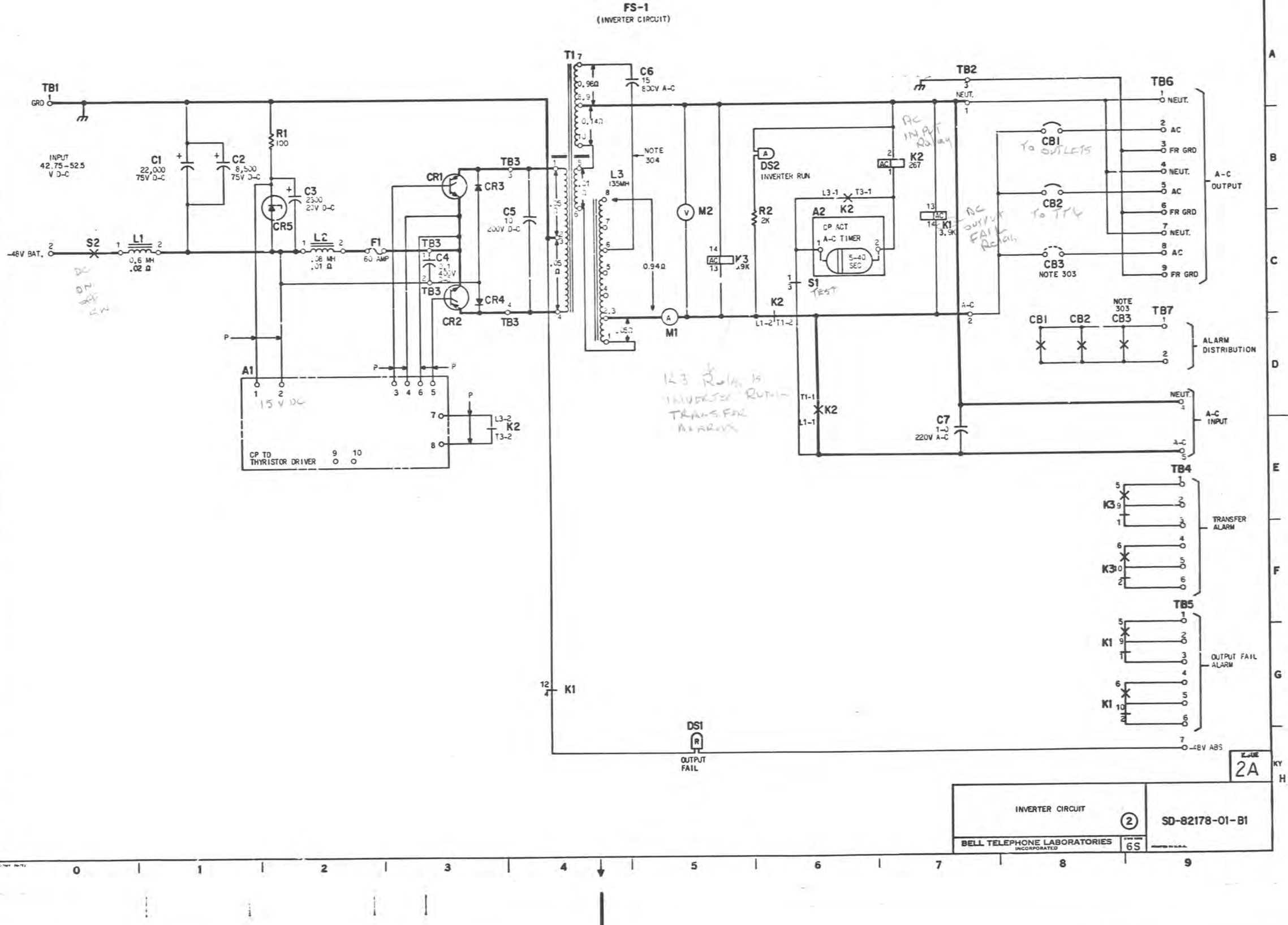
INVERTER CIRCUIT

SD-82178-01-A2

BELL TELEPHONE LABORATORIES INCORPORATED

FORM 6S

FS-1
(INVERTER CIRCUIT)



SD-82178-01-B1

INVERTER CIRCUIT (2)	SD-82178-01-B1
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

SIZE 2A

APP FIG. 1

CIRCUIT PACK			
EQPT LOC			
DESIG	CP T7	CP A7	
LORAIN CODE	4873-524	4874-019	
OPTION			
ELEM IDENT	TERM	TERM	
TERM FS LOC	10-1E3	2-1C7	

RELAY

DESIG	LOC	LORAIN CODE
K1	1G9	(2546-482)
	1G9	
	1G4	
	1C7	
K2	1E3	(2546-381)
	1D5	
	1D6	
	1B7	
	1E3	

DESIG	LOC	LORAIN CODE
K3	1E9	(2546-482)
	1F9	
	1C5	

CAPACITOR

DESIG	LOC	LORAIN CODE
C1	1B1	(2731-382), 22,000 µF 75V, ELECTROLYTIC
C2	1B1	(2731-325), 8,500 µF 75V, ELECTROLYTIC
C3	1C2	(2731-272), 2,300 µF 20VDC, ELECTROLYTIC
C4	1C3	(2713-325), 0.1 µF 400V FIXED
C5	1C3	(2716-329), 10 µF 200V FIXED
C6	1A4	(2714-748), 15 µF 800VAC PAPER
C7	1D7	(2714-530), 1 µF 220VAC FIXED

DIODE

DESIG	LOC	LORAIN CODE
CR3	1B3	(2813-141), 12AMP 300V
CR4	1C3	(2813-141), 12AMP 300V
CR5	1B1	(2836-251), 15V 50 WATT

INDUCTOR

DESIG	LOC	LORAIN CODE
L1	1C0	(4413-027), COKE, FILTER, DC
L2	1C2	(4411-051), COKE, COMMUTATING
L3	1C4	(4427-029), COKE, LINEAR, AC

FUSE

DESIG	LOC	LORAIN CODE
F1	1C2	(2485-325), 6AMP 130V

LAMP

DESIG	LOC	LORAIN CODE
DS1	1G5	(2581-213), 48V, FILAMENT
DS2	1B5	(2581-213), 48V, FILAMENT

METER

DESIG	LOC	LORAIN CODE
M1	1D5	(2933-255), 0-5 AMMETER, AC
M2	1C5	(2953-264), 0-150 VOLTMETER, AC

RESISTOR

DESIG	LOC	LORAIN CODE
R1	1B1	(2656-609), 750HM, 50 WATT, ± 5%
R2	1C5	(2656-520), 2K, 25 WATT, ± 5%

SWITCH

DESIG	LOC	LORAIN CODE
S1	1D5	(2513-612), 6AMP 125VAC
S2	1C0	(2513-825), 50AMP 65VAC

THYRISTOR

DESIG	LOC	LORAIN CODE
CR1	1B3	(2863-022), 35AMP 300V
CR2	1C3	(2863-022), 35AMP 300V

TRANSFORMER

DESIG	LOC	LORAIN CODE
T1	1B4	(4523-015) FERRORESONANT, REGULATING

ISSUE 2A

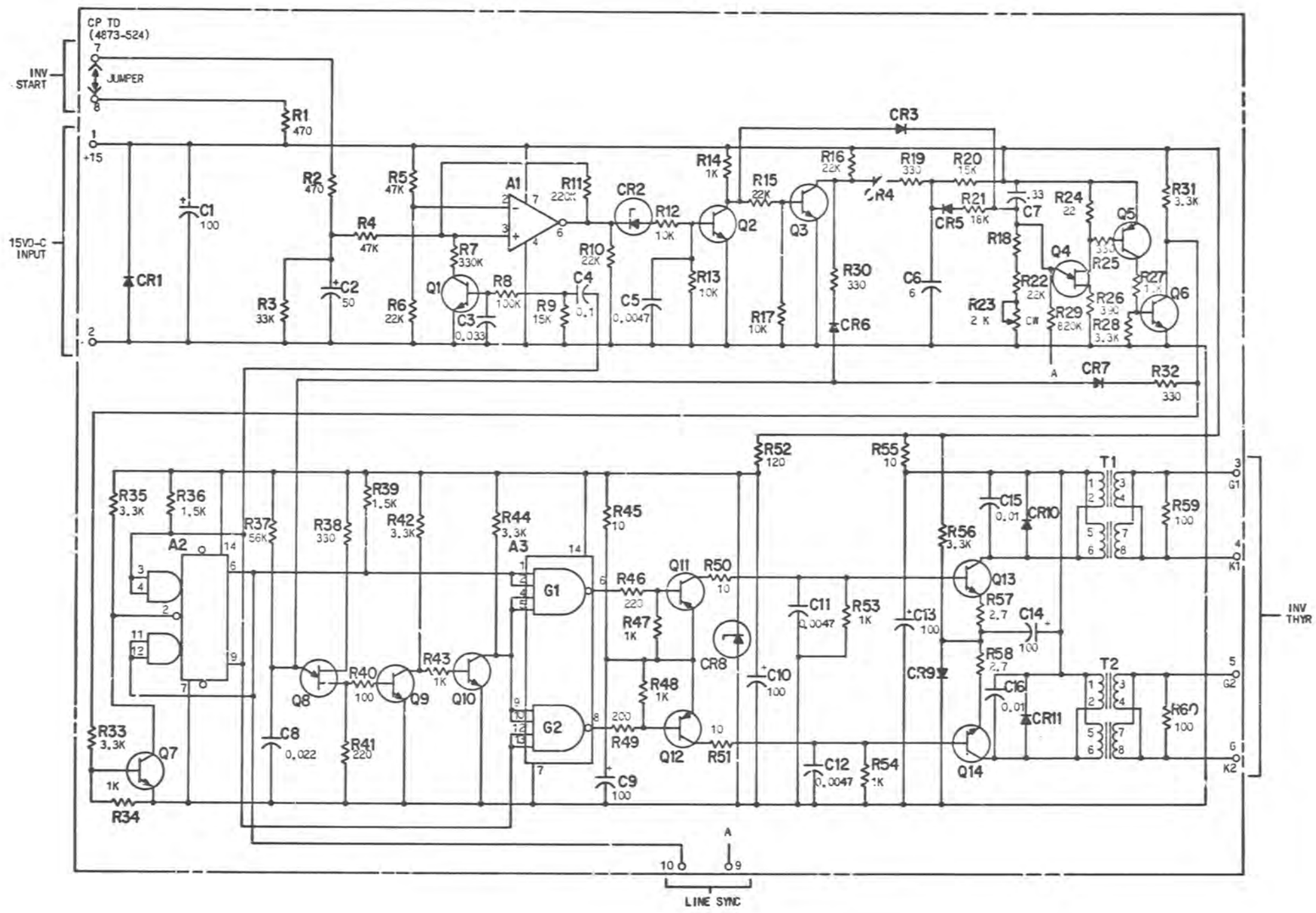
INVERTER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

SD-82178-01-C1

SD-82178-01-C1

CPS TD
(THYRISTOR DRIVER)



SD-82178-01-J1A

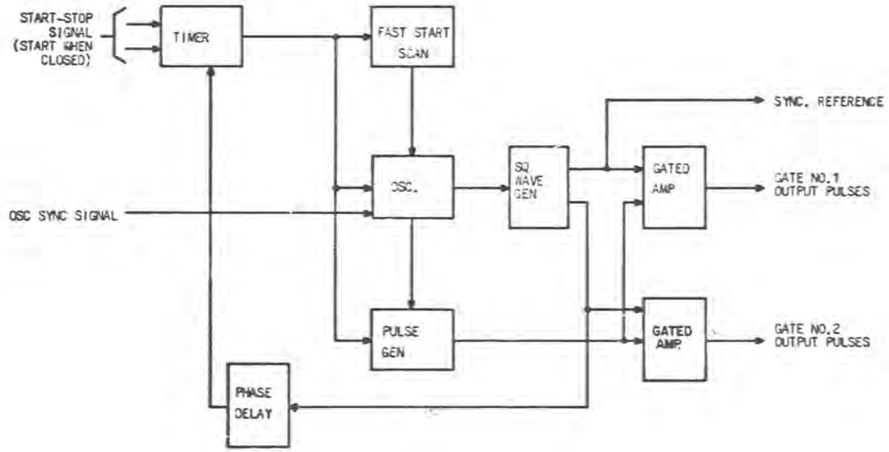
ISSUE 7 KY

INVERTER CIRCUIT	SD-82178-01-J1A
BELL TELEPHONE LABORATORIES INCORPORATED	6S

COMPONENT LIST

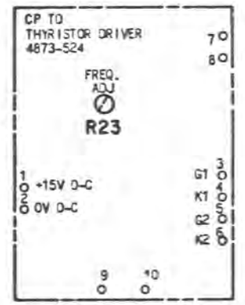
	CAPACITOR DESIG	LORAIN CODE
	(5)C1,9,10,13,14	(2731-138)100UF,25V D-C ELEC.
	C2	(2731-129)50UF,25V D-C ELEC.
	C3	(2713-224)0.033UF,200V D-C
	C4	(2713-132)0.1UF,100V D-C
	(3)C5,11,12	(2713-115)0.0047UF,100V D-C
	C6	(2737-135)6 UF,75V D-C
	C7	(2715-112)0.33UF,100V D-C
	C8	(2713-222)0.022UF,200V D-C
	(2)C15,16	(2713-118)0.01UF,100V D-C
	DIODE DESIG	LORAIN CODE
	(9)CR1,3,4,5,6,7,9,10,11	(2812-223)
	CR2	(2835-523)9.1V,0.25W ZENER
	CR8	(2835-202)5.1V,1W ZENER
	DUAL FOUR-INPUT GATE DESIG	LORAIN CODE
	A3	(2574-022)
	FLIP-FLOP DESIG	LORAIN CODE
	A2	(2874-002)
	OP AMP DESIG	LORAIN CODE
	A1	(2871-103)
	RESISTOR DESIG	LORAIN CODE
	(2)R1,2	(2637-161)470 OHM,1/2 W,5%
	R3	(2615-299)33K,1/2W,10%
	(2)R4,5	(2637-257)47K,1/2W,5%
	(4)R6,10,15,16	(2637-241)22K,1/2W,5%
	R7	(2615-323)330K,1/2W,10%
	R8	(2637-273)100K,1/2W,5%
	(2)R9,20	(2637-233)15K,1/2W,5%
	R11	(2615-319)220K,1/2W,10%
	(4)R12,13,17,27	(2637-225)10K,1/2W,5%
	R29	(2615-333)820K,1/2W,10%
	(5)R19,25,30,32,38	(2615-251)330 OHM,1/2W,10%
	R23	(2683-131)2K,1W,POT,5%
	R22	(2664-228)22K,4W,1%
	R24	(2615-223)22 OHM,1/2W,10%
	R26	(2651-171)390 OHM,3W,5%
	R21	(2615-293)18K,1/2W,10%
	(.)R34,43,47,48,53,54,14	(2615-263)1K,1/2W,10%
	(7)R28,31,33,35,42,44,56	(2615-275)3.3K,1/2W,10%
	(2)R36,39	(2615-267)1.5K,1/2W,10%
	R37	(2637-213)5.6K,1/2W,5%
	(3)R40,59,60	(2615-239)100 OHM,1/2W,10%
	(3)R41,46,49	(2615-247)220 OHM,1/2W,10%
	(4)R45,50,51,55	(2637-051)100W,1/2W,5%
	R52	(2651-157)120 OHM,3W,5%
	(2)R57,58	(2615-205)2.7 OHM,1/2W,10%
	R18	RESISTANCE VALUE SELECTED AT FACTORY
	TRANSFORMER DESIG	LORAIN CODE
	(2)T1,2	(4471-007)
	TRANSISTOR DESIG	LORAIN CODE
	(7)Q1,2,3,6,7,9,10	(2841-100)
	(3)Q5,11,12	(2843-151)
	Q4	(2851-034)
	Q8	(2851-036)
	(2)Q13,14	(2841-145)

FLOW DIAGRAM



MANUFACTURING REFERENCES

CATEGORY	NUMBER
ASSEMBLY DRAWING	4873-524
CONNECTOR ON FRAME	NONE



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS AND VALUES PRECEDED BY THE SUMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. CODES WITHIN PARENTHESES, AS(4873-524), REPRESENT L.P.C. PART NUMBERS.
3. INTEGRATED CIRCUIT POWER PINS.

0V	PIN 4	A1
	PIN 7	A2,A3
+5V	PIN 14	A2,A3
+15V	PIN 7	A1

4. FURNISHED WITH MINI PIN TERMINALS.

INPUT/OUTPUT INFORMATION

FUNCTION: A. TO PROVIDE TWO OUT OF PHASE 60 HZ INVERTER GATE DRIVE SIGNALS UPON INITIATED START
B. TO PROVIDE INVERTER GATE DRIVE TIMED SHUTDOWN AT PROPER ROTATION UPON INITIATED STOP

INPUT POWER: PIN 1 ——+15V D-C AT APPROX.240 MA MIN.
PIN 2 ——0V D-C REFERENCE

INPUT SIGNALS: PINS 7 AND 8 - CLOSED CIRCUIT ACTUATED INVERTER GATE DRIVE START. DELAY TIME APPROX. 30 M SEC.
-OPEN CIRCUIT ACTUATED INVERTER GATE DRIVE STOP. DELAY TIME APPROX. 5 SECONDS.
PIN 9 —— OSC. SYNC. INPUT RESPONDING TO D-C LEVEL FROM 0 TO 15 VOLTS.

OUTPUT SIGNALS: PIN 3 —— NO.1 THYRISTOR GATE DRIVE CURRENT LIMITED TO APPROX.1.5 AMP WITH 6 TO 10 VOLT PULSES. PULSE WIDTH APPROX. 14 USEC. PERIOD APPROX. 150 U SEC. RISETIME LESS THAN 0.1 U SEC.
PIN 4 —— CATHODE REFERENCE FOR PIN 3.
PIN 5 —— SAME AS PIN 3 BUT GATE NO.2.
PIN 6 —— CATHODE REFERENCE FOR PIN 5.
PIN 10—— INVERTER STATE REFERENCE FOR SYNC. CIRCUIT.

CIRCUIT DESCRIPTION

15 VOLT POWERED THYRISTOR DRIVER PROVIDING TWO 60 HZ,180° OUT OF PHASE PULSE TRAINS FOR THYRISTOR INVERTER GATES CLOSED CIRCUIT ACTUATED START, CONTROLS A TIMER STARTING A PULSE GENERATOR AND A CLOCK OSCILLATOR WHICH SCANS RAPIDLY FROM A HIGH TO NORMAL FREQUENCY OF 120 HZ.
THE CLOCK OSCILLATOR TOGGLES A FLIP-FLOP WHOSE OUTPUTS ARE GATED WITH THE PULSE GENERATOR AND AMPLIFIED TO PROVIDE THE OUTPUT PULSE TRAINS. OPENING THE START TERMINALS WILL SHUT DOWN THE THYRISTOR GATE DRIVE, AFTER A FEW SECONDS DELAY, AT THE BEGINNING OF A PULSE TRAIN BY THE TIMER CLAMPING THE OSCILLATOR AND PULSE GENERATOR AFTER RECEIVING A SLIGHTLY DELAYED SYNC. SIGNAL FROM THE FLIP-FLOP.

DRAWING RECORD

ISSUE 1 KY

INVERTER CIRCUIT (2)

SD-82178-01-J1B

BELL TELEPHONE LABORATORIES INCORPORATED 6S

FIRST USE ON MODEL

SD-82178-01-J1B

CPS-A-C T
(A-C TIMER)

COMPONENT LIST

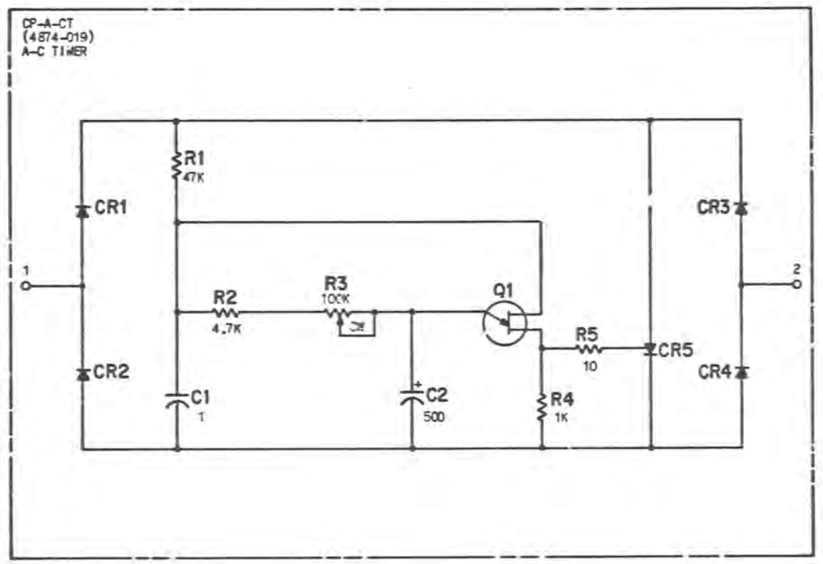
CAPACITOR DESIG	LORAIN CODE
C1	(2715-273) 1UF,200V D-C
C2	(2731-185) 500UF,25V D-C ELECT.

DIODE DESIG	LORAIN CODE
(4) CR1,2,3,4	(2812-232)

RESISTOR DESIG	LORAIN CODE
R1	(2615-303)47K, 1/2W
R2	(2615-279)4.7K, 1/2W
R3	(2575-511)100K, 1/2W POT
R4	(2615-263)1K, 1/2W
R5	(2615-215)10 OHMS, 1/2W

THYRISTOR DESIG	LORAIN CODE
CR5	(2861-072)

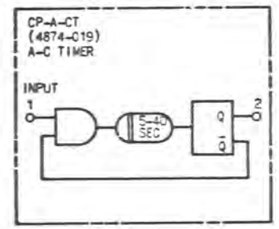
TRANSISTOR DESIG	LORAIN CODE
Q1	(2851-036)



MANUFACTURING REFERENCES

CATEGORY	NUMBER
ASSEMBLY DRAWING	4874-019
CONNECTOR ON FRAME	NONE

SYMBOL



INPUT/OUTPUT INFORMATION

FUNCTION: TO PROVIDE AT LEAST ONE FULL HALF CYCLE OF CURRENT AFTER A DELAY OF 5-40 SECONDS FROM APPLICATION OF VOLTAGE.

INPUT POWER: PIN 1 AND PIN 2.
WHILE TIMING - 0.004 AMPERE AT 230 VOLTS A-C OR 0.001a AMPERE AT 120 VOLTS A-C.
WHEN CR5 FIRES - 5 AMPERE MAXIMUM FOR LESS THAN 5 CYCLES.

LOAD - THIS DEVICE MUST BE CONNECTED IN SERIES WITH IT'S LOAD.

CIRCUIT DESCRIPTION.

TIMER, TIME DELAY UPON ENERGIZATION. APPLICATION OF VOLTAGE TO PINS 1 AND 2, THROUGH THE LOAD CIRCUIT, CAUSES A CAPACITOR TO CHARGE. WHEN THE CAPACITOR REACHES A PRESET VALUE THE UNIJUNCTION WILL TRIGGER THE THYRISTOR FOR A LEAST ONE FULL HALF CYCLE. THUS SUPPLYING A PULSE OF CURRENT TO THE LOAD.

NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS AND VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. CODES WITHIN PARENTHESES, AS (2615-303), REPRESENT L.P.C. PART NUMBERS.
3. FURNISHED WITH MINI PINS TERMINALS.
4. ALL TRACES ON THIS CIRCUIT BOARD ARE AT LINE POTENTIAL, DUE CARE SHOULD BE TAKEN TO PREVENT ACCIDENTAL CONTACT BY PERSONEL.

SD-82178-01-J2

ISSUE 1

INVERTER CIRCUIT (2)

BELL TELEPHONE LABORATORIES INCORPORATED

SD-82178-01-J2