

724464	1401 ALPHABETICAL LOGIC LISTING	REFERENCE ONLY	00.00.00.2	EC #
	TITLE	LOGIC #	GATE	110324V
	10X10 MATRIX SWITCH-8K REF. DWG.	1406	42.60.21.2	06B1
	1401 TIMING & VOLTAGE DIST REF DWG		42.40.53.2	01A1
	1403 POWER PLUG		23.04.11.2	01A2
	1403 SUMMARY CONNECTOR #1		21.04.01.2	01A2
	1403 SUMMARY CONNECTOR #1		21.04.11.2	01A2
	1403 SUMMARY CONNECTOR #2		22.04.01.2	01A2
	1403 SUMMARY CONNECTOR #2		22.04.11.2	01A2
	1406 4KDRIVER TERM RES REF. DWG.	1406	42.70.41.2	06B5
	1406 8K DRIVER TERM RES. REF. DWG.	1406	42.60.41.2	06B1
	1406 TIMING & VOLTAGE DIST REF. DWG.	1406	42.40.63.2	06B1
	1ST AND 2ND B CYCLE TRIGGERS		34.31.13.2	01B3
	2A COMPARE LATCHES		44.19.31.2	02A7
	2K STORAGE BLOCK DIAGRAM REF DWG		42.41.12.2	01A1
	3-6 PUNCH DECODE		36.23.21.2	01B7
	3-6 PUNCH DECODE		36.23.21.2	01B7
	4K STORAGE BLOCK DIAGRAM REF DWG		42.41.11.2	01A1
	4K STORAGE BLOCK DIAGRAM REF. DWG.	1406	42.71.11.2	06B5
	5X10 MATRIX SWITCH REF DWG		42.40.21.2	01A1
	5X10 MATRIX SWITCH-4K REF. DWG.	1406	42.70.21.2	06B5
	8K STORAGE BLOCK DIAGRAM REF. DWG.	1406	42.61.11.2	06B1
	8X10 MATRIX SWITCH REF DWG		42.40.31.2	01A1
	8X10 MATRIX SWITCH-4K REF. DWG.	1406	42.70.31.2	06B5
	8X10 MATRIX SWITCH-8K REF. DWG.	1406	42.60.31.2	06B1
	A AND B REGISTER CHECK LATCHES		35.30.31.2	01B6
	A AUX CYCLE LATCH		44.14.11.2	02B7
	A AUX STAR GATE IN AND OUT CONTROLS		44.15.01.2	02A7
	A AUX STAR RESET CONTROLS		44.16.21.2	02A7
	A BIT ZONE ADDER		34.33.13.2	01B3
	A COMPARE LATCHES		44.19.21.2	02A7
	A CYCLE ELIMINATE LATCH		44.11.11.2	02B7
	A CYCLE ELIMINATION		31.06.11.2	01B2
	A CYCLE LATCH		31.25.11.2	01B2
	A LATCH AND 2A LATCH		44.12.11.2	02B7
	A REG AND B REG WM		35.14.61.2	01A3
	A REG INHIBIT CONTROL		35.18.41.2	01A3
	A REG SET 1 2 4		41.50.91.2	02B6
	A REG SET 82C AND ARITH WM LATCH		35.18.61.2	01A3
	A REG SET 8 CD A B CZ		41.51.01.2	02B6
	A REG SET UNITS A B CZ		41.51.11.2	02B6
	A REG TRNASLATOR ADDER COMPARE		44.19.01.2	02A7
	A REGISTER SET		75.01.08.2	02A8
	A REGISTER CHECK MATRIX		35.30.11.2	01B6
	A REGISTER DISPLAY DRIVE		35.30.51.2	01B6
	A REGISTER COMBINED BITS 21		35.16.51.2	01A3
	A REGISTER COMBINED BITS 84		35.16.71.2	01A3
	A REGISTER COMBINED BITS AB		35.16.81.2	01A3
	A REGISTER COMBINED BITS NOT 21		35.16.61.2	01A3
	A REGISTER TRANSLATOR		34.32.12.2	01B3
	A REGISTER TRUE COMPLEMENT		34.32.13.2	01B3
	A STAR CONTROL HUNDREDS AND GATE OUT		32.32.21.2	01A7
	A STAR CONTROL UNITS AND TENS		32.32.11.2	01A7
	A STAR READ IN & STORE CYCLE 1 2 3		41.50.51.2	02B6
	A&B REG SET AND RESET		35.10.51.2	01A3
	ACTIVATE STORAGE DECODE	1406	42.67.01.2	06B4
	ADD CTRL ARITH RDR RVRS SCAN RDR		34.31.16.2	01B3
	ADDER CARRY		34.31.14.2	01B3
	ADDER CARRY AND OVERFLOW		34.31.15.2	01B3
	ADDER CONTROL-RECOMPLEMENT READR TR		34.31.17.2	01B3

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	TITLE	LOGIC #	GATE	110324V
	ADDER DOUBLER COMPARE	44.19.11.2	02A7	
	ADDR REG DR AND THOUSANDS C DISPLAY	32.40.31.2	01A7	
	ADDR REG VAL CHECK LATCH AND CTRLS	32.44.51.2	01A8	
	ADDRESS MODIFY OP CODE	44.62.02.2	01B1	
	ADDRESS MODIFY UNITS A BIT	42.62.01.2	01A8	
	ADDRESS MODIFY UNITS B BIT	42.62.03.2	01A8	
	ADDRESS MODIFY UNITS C ZONE BIT	42.62.02.2	01A8	
	ADDRESS STOP CONTROL SEC 1	32.45.21.2	01A8	
	ADDRESS STOP CONTROL SECT. 2	32.45.31.2	01A8	
	ADDRESS STOP INPUT SWITCHING SECT. 1	32.45.11.2	01A8	
	ALL SCAN COMP AND PRT OR CARR BUSY	36.01.11.2	01A6	
	ALL SCAN COMP-PR&CARR BUSY NUMERIC	36.01.11.2	01A6	
	ALL SCANS COMPLETE	36.01.11.2	01A6	
	ALL SCANS COMPLETE NUMERIC	36.01.11.2	01A6	
	ARITHMETIC INHIBIT CONTROL	35.18.51.2	01A3	
	ARITHMETIC MODIFY CONTROLS GEN	1406 42.65.01.2	06B4	
	AUTO SCAN CONTROL-1	32.31.11.2	01A7	
	AUTO SCAN CONTROL-2	32.31.21.2	01A7	
	AUX STAJ SET LATCH	44.11.01.2	02B7	
	AUX STAR 1 CTRL UNITS TENS HDS	44.15.21.2	02A7	
	AUX STAR 2 CTRL UNITS TENS HDS	44.15.31.2	02A7	
	AUX STAR 4 CTRL UNITS TENS HDS	44.15.41.2	02A7	
	AUX STAR 8 CTRL UNITS TENS HDS	44.15.51.2	02A7	
	AUX STAR A CTRL UNITS HUNDREDS	44.15.71.2	02A7	
	AUX STAR B CTRL UNITS HUNDREDS	44.16.01.2	02A7	
	AUX STAR CD CTRL UNITS TENS HDS	44.15.61.2	02A7	
	AUX STAR CZ CTRL UNITS HUNDREDS	44.16.11.2	02A7	
	B AUX CYCLE LAT	44.14.31.2	02B7	
	B AUX STAR GATE IN AND OUT CONTROLS	44.15.11.2	02A7	
	B AUX STAR RESET CONTROLS	44.16.31.2	02A7	
	B CYCLE LATCH	31.26.11.2	01B2	
	B GREATER OR LESS THAN A CONTROL	44.34.11.2	02A8	
	B GREATER OR LESS THAN A CONTROL	44.34.11.2	01B7	
	B REG AND A REG 1 BIT	35.11.21.2	01A3	
	B REG AND A REG 2 BIT	35.11.61.2	01A3	
	B REG AND A REG 4 BIT	35.12.21.2	01A3	
	B REG AND A REG 8 BIT	35.12.61.2	01A3	
	B REG AND A REG BIT A	35.13.21.2	01A3	
	B REG AND A REG BIT B	35.13.61.2	01A3	
	B REG BLANK AND COMBINED BITS AB	35.16.31.2	01A3	
	B REG DIGIT GENERATION	44.10.21.2	02B7	
	B REG INH CONT SECT 3 AND FORCE 8 2	35.18.31.2	01A7	
	B REG INHIBIT CONT	35.18.11.2	01A3	
	B REG INHIBIT CONT SECT 2	35.18.21.2	01A3	
	B REGISTER ADJUST PRINT	36.33.11.2	01A6	
	B REGISTER ADJUST PRINT NUMERIC	36.33.11.2	01A6	
	B REGISTER CHECK MATRIX	35.30.21.2	01B6	
	B REGISTER DIST. AND IND DISPLAY	35.30.41.2	01B6	
	B REGISTER PLANE 9-14	35.15.51.2	01A3	
	B REGISTER COMBINED BITS 21	35.16.11.2	01A3	
	B REGISTER COMBINED BITS 84	35.16.21.2	01A3	
	B REGISTER TRANSLATOR	34.32.11.2	01B3	
	B STAR CONTROL GATE OUT	32.33.31.2	01A7	
	B STAR CONTROL TENS AND HUNDREDS	32.33.21.2	01A7	
	B STAR CONTROL UNITS	32.33.11.2	01A7	
	B STAR READ IN	41.50.61.2	02B6	
	TENS DECODE SWITCH	42.54.11.2	01A1	
	BACKSPACE	TAU 89.60.40.1	00XA	

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	TITLE	LOGIC #	GATE	110324V
	BINARY ADDER	34.32.16.2	01B3	
	BIT COMPARE MATRIX	34.21.11.2	01B6	
	BIT TEST	41.10.11.2	01B6	
	BIT TEST OPR	41.10.21.2	01B1	
	BRANCH ON READER AND PUNCH BUSY	74.21.41.2	02B1	
	BUFFER CLOCK	46.37.21.2	01A5	
	BUFFER DISPLAY LINES	46.36.81.2	01A5	
	BUFFER MEMORY PULSES	46.37.31.2	01A5	
	BUFFER REGISTER ADJUST PRINT	36.33.11.2	01A6	
	BUFFER REGISTER ADJUST PRINT NUMERIC	36.33.11.2	01A6	
	C BIT ZONE ADDER	34.33.14.2	01B3	
	C E PANEL SYNC POINTS	37.31.21.2	01A2	
	CARR INLK LAT MAG DRIVS INDS	36.48.31.2	01B1	
	CARR STOP TR AND START SS	36.48.21.2	01B1	
	CARRIAGE OPR REGISTER	36.46.11.2	01B1	
	C. BIT GENERATOR	35.17.11.2	01A3	
	CHANNEL 9 AND 12 LATCHES	36.43.31.2	01B1	
	CHANNEL BRUSH REGISTER	36.43.11.2	01B1	
	CHANNEL BRUSH ENCODE 1 AND 2	36.42.11.2	01B1	
	CHANNEL BRUSH ENCODE 4 AND 8	36.42.21.2	01B1	
	CHAR REG TERMINATION & DISTRIBUTION	75.01.07.2	02A8	
	CHARACTER CONTROL LATCHES	74.31.31.2	02B1	
	CHECK LATCHES	36.14.11.2	01B4	
	CHECK PLANE ENTRY	36.17.31.2	01B7	
	CHECK PLANE ENTRY	36.17.31.2	01B7	
	CHECK RESET CONTROL	34.21.51.2	01B6	
	CHECKING ALTERNATE CYCLE CONTROL	36.17.11.2	01B7	
	CHECKING ALTERNATE CYCLE CONTROL	36.17.11.2	01B7	
	CHECKING INHIBIT & ERROR GATES	36.17.41.2	01B7	
	CHECKING INHIBIT & ERROR GATES	36.17.41.2	01B7	
	CHECKING ROW BIT CONTROL	36.17.21.2	01B7	
	CHECKING ROW BIT CONTROL	36.17.21.2	01B7	
	CLEAR B FIELD LAT AND SET PROD LAT	44.11.41.2	02B7	
	CLOCK CONTROL SECTION 1	31.10.11.2	01B3	
	CLOCK CONTROL SECTION 2	31.10.12.2	01B3	
	CLOCK TIMING CONTROLS	71.31.11.2	02A1	
	CLOCK TIMING CONTROLS	71.31.21.2	02A1	
	COL BIN MODIFIER CONTROL	41.11.51.2	02B8	
	COL BIN PCH DECODE6 HOLE COUNT	41.23.21.2	02B8	
	COL BIN PUNCH DECODE MATRIX	41.23.11.2	02B8	
	COL BIN READ ENCODE	41.23.31.2	02B8	
	COM GATE SET SIGN AND I-E CHANGE	44.13.01.2	02B7	
	COMP COUNTER 2 4 BIT DECODE NUMERIC	36.34.51.2	01A6	
	COMP CTR 8 A B BIT DECODE NUMERIC	36.34.61.2	01A6	
	COMP WD 1ST AND 2ND B BIT	44.70.41.2	02B6	
	COMP WD CYCLE CTL	44.70.31.2	02B6	
	COMPARE CHECK	TAU 89.50.30.1	00XC	
	COMPARE COUNTER	36.34.41.2	01A6	
	COMPARE COUNTER CONTROLS	36.34.31.2	01A6	
	COMPARE COUNTER CONTROLS NUMERIC	36.34.31.2	01A6	
	COMPARE COUNTER NUMERIC	36.34.41.2	01A6	
	COMPARE EQUAL LATCH AND CONTROL	34.21.21.2	01B6	
	COMPLEMENT AND SET A TRANS OUTPUT	44.13.11.2	02B7	
	COMPRESSED WORD OP CODE	44.70.11.2	01B1	
	COMPRESSED WORD CTL	44.70.21.2	02B6	
	CONTROL SIGNALS CABLE DRIVE	75.01.03.2	02A8	
	CONTROL SIGNALS CABLE DRIVE	75.01.02.2	02A8	
	CPU DATA CABLE DRIVE	75.01.01.2	02A8	

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CTRL SIGNAL TERMINATION & DIST.		75.01.06.2	02A8	110324V
CTRL SIGNAL TERMINATION&DIST.		75.01.05.2	02A8	
CURRENT DRIVERS AND CURRENT SOURCES		42.57.11.2	01A1	
CURRENT DRIVERS AND CURRENT SOURCES	1406	42.67.11.2	06B1	
CURRENT DRIVERS AND CURRENT SOURCES	1406	42.77.11.2	06B5	
DELAY COUNTER	TAU	89.30.40.1	00XB	
DELAY COUNTER	TAU	89.30.41.1	00XB	
DELAY COUNTER	TAU	89.30.42.1	00XB	
DELAY COUNTER	TAU	89.30.43.1	00XB	
DELAY COUNTER GATING	TAU	89.30.50.1	00XB	
DELAY COUNTER GATING	TAU	89.30.51.1	00XB	
DELAY COUNTER GATING	TAU	89.30.52.1	00XB	
DELAY COUNTER GATING	TAU	89.30.53.1	00XB	
DELAY COUNTER GATING	TAU	89.30.54.1	00XB	
DELAY COUNTER GATING	TAU	89.30.55.1	00XB	
DELAY COUNTER RESET TRIGGER RESET	TAU	89.30.31.1	00XB	
DELAY COUNTER DRIVE	TAU	89.30.20.1	00XB	
DELTA A AUX CYCLE LATCH		44.14.01.2	02B7	
DELTA A CYCLE		31.22.11.2	01B2	
DELTA B AUX CYCLE LATCH		44.14.21.2	02B7	
DELTA B CYCLE		31.23.11.2	01B2	
DELTA CYCLE CONTROL		31.20.11.2	01B2	
DELTA I CYCLE		31.21.11.2	01B2	
DELTA OVERLAP & OVERLAP CY LATCHES		74.31.21.2	02B1	
DELTA PROCESS CONTROL PRINT NUMERIC		36.31.61.2	01A6	
DELTA PROCESS CONTROL PRINT		36.31.61.2	01A6	
DELTA PROCESS CONTROL PRINT		36.31.61.2	01A6	
DELTA PROCESS CONTROL PRINT NUMERIC		36.31.61.2	01A6	
DISTRIBUTION SECTION 1		35.10.11.2	01A3	
DISTRIBUTION SECTION 1		35.10.11.2	01A3	
DISTRIBUTION SHEET		32.40.11.2	01A7	
DISTRIBUTION SHEET		36.37.61.2	01B5	
DISTRIBUTION SHEET		42.62.04.2	01A8	
DISTRIBUTION SHEET		46.10.01.2	01A4	
DISTRIBUTION SHEET		46.36.71.2	01A5	
DISTRIBUTION SHEET 1		36.31.81.2	01A6	
DISTRIBUTION SHEET 1		36.31.81.2	01A6	
DISTRIBUTION SHEET 1 NUMERIC		36.31.81.2	01A6	
DISTRIBUTION SHEET, 1 NUMERIC		36.31.81.2	01A6	
DISTRIBUTION SHEET 2		36.31.91.2	01A6	
DISTRIBUTION SHEET 2		36.31.91.2	01A6	
DISTRIBUTION SHEET 2 NUMERIC		36.31.91.2	01A6	
DISTRIBUTION SHEET 2 NUMERIC		36.31.91.2	01A6	
DUAL SPEED CARR SLOW BRUSH LATCHES		46.51.21.2	01A5	
DUAL SPEED CARR. BRUSH COMPARE		46.51.31.2	01A5	
DUAL SPEED CARR. SPEED CONTROL		46.51.41.2	01A5	
DUAL SPEED CARR. SLOW BRUSH INTEGRA		46.51.11.2	01A5	
DUAL SPEED CAR SP SK		46.51.71.2	01B1	
E2 TRIGGER AND CHANNEL REGISTER CTRL		36.43.21.2	01B1	
EDIT		34.10.11.2	01B6	
EDIT		34.10.21.2	01B6	
EDIT		34.10.31.2	01B6	
EDIT		34.10.41.2	01B6	
EDIT		34.10.51.2	01B6	
EDIT		34.10.61.2	01B6	
EDIT CONT.		35.10.31.2	01A3	
ENCODER		36.13.11.2	01B4	
ENCODER		36.13.21.2	01B4	



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	TITLE	LOGIC #	GATE	110324V
	END DIV LAT QUOT TR & REV SCAN LAT	44.12.01.2	02B7	
	ERROR CHECK & OVERLAP CY DISP LATCH	74.21.21.2	02B1	
	ERROR STOP	TAU 89.50.52.1	00XA	
	ERROR STOP READ GATING	TAU 89.40.12.1	00XC	
	ERROR TRIGGERS	TAU 89.50.50.1	00XA	
	EVEN PARITY OPERATIONS CHECK	35.28.11.2	01B1	
	EXPANDED EDIT DECIMAL OPTION	34.11.11.2	01B6	
	EXPANDED EDIT DOLLAR OPTION	34.11.31.2	01B6	
	EXPANDED EDIT ASTERISK OPTION	34.11.21.2	01B6	
	FEED AND PUNCH RELEASE OP CODES	56.70.11.2	01B1	
	FEED THROUGH AND DISTRIBUTION SHEET	31.09.51.2	01B2	
	FEED THROUGH SHEET	34.34.11.2	01B3	
	FEED THROUGH SHEET	36.19.11.2	01B4	
	FEED THROUGH SHEET	36.37.31.2	01A6	
	FEED THROUGH SHEET	36.37.31.2	01A6	
	FEED THROUGH SHEET	36.37.81.2	01B5	
	FEED THROUGH SHEET	36.49.21.2	01B1	
	FEED THROUGH SHEET	46.36.51.2	01A9	
	FEED THROUGH SHEET NUMERIC	36.37.31.2	01A6	
	FEED THROUGH SHEET NUMERIC	36.37.31.2	01A6	
	FEED THRU	32.46.11.2	01A8	
	FEED THRU SHEET	32.40.21.2	01A7	
	FEED THRU SHEET	37.30.41.2	01A2	
	FEED THRU SHEET	70.65.11.2	02A2	
	FEED THRU SHEET	70.65.11.2	02A2	
	FIFTY ONE COLUMN SCAN CONTROL	56.80.11.2	01A8	
	FILE OP AND PERCENT LATCH	75.01.04.2	02A8	
	FINAL AMPLIFIERS	TAU 89.40.10.1	00XC	
	FIRST ADDRESS TRANSFER	75.01.10.2	02A8	
	FORWARD STOP DELAY AND COMPUTE	TAU 89.30.56.1	00XB	
	FULL STORAGE PRINT	1406 42.66.03.2	06B4	
	GO TRIGGER	TAU 89.60.11.1	00XA	
	HAMMER CHECK PLANE CONNECTIONS 1-33	46.11.01.2	01A4	
	HAMMER CHECK PLANE CONNECTIONS 34-66	46.11.11.2	01A4	
	HAMMER CHECK PLANE CONNECTIONS 67-99	46.11.21.2	01A4	
	HAMMER CHECK PLANE CONNECTIONS 100-132	46.11.31.2	01A4	
	HAMMER DRIVE 130-132	36.39.91.2	01B5	
	HAMMER DRIVE 100-109	36.39.61.2	01B5	
	HAMMER DRIVE 110-119	36.39.71.2	01B5	
	HAMMER DRIVE 120-129	36.39.81.2	01B5	
	HAMMER DRIVE 1-9	36.38.61.2	01B5	
	HAMMER DRIVE 10-19	36.38.71.2	01B5	
	HAMMER DRIVE 20-29	36.38.81.2	01B5	
	HAMMER DRIVE 30-39	36.38.91.2	01B5	
	HAMMER DRIVE 40-49	36.39.01.2	01B5	
	HAMMER DRIVE 50-59	36.39.11.2	01B5	
	HAMMER DRIVE 60-69	36.39.21.2	01B5	
	HAMMER DRIVE 70-79	36.39.31.2	01B5	
	HAMMER DRIVE 80-89	36.39.41.2	01B5	
	HAMMER DRIVE 90-99	36.39.51.2	01B5	
	HAMMER RESET CHECK	36.37.51.2	01B5	
	HAMMER RESET CONTROL	36.37.41.2	01B5	
	HIGH-LOW-EQUAL TEST	44.34.31.2	02A8	
	HIGH-LCW-EQUAL TEST	44.34.31.2	01B7	
	HI-LO DIGIT COMPARE SECT 1	44.33.11.2	02A8	
	HI-LO DIGIT COMPARE SECT 1	44.33.11.2	01B7	
	HI-LO DIGIT COMPARE SECT 2	44.33.21.2	02A8	
	HI-LO DIGIT COMPARE SECT 2	44.33.21.2	01B7	

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HI-LO DIGIT COMPARE SECT 3	44.33.31.2	02A8	
HI-LO DIGIT COMPARE SECT 3	44.33.31.2	01B7	
HI-LO LATCH	44.34.21.2	02A8	
HI-LO LATCH	44.34.21.2	01B7	
HI-LO ZONE COMPARE	44.32.11.2	02A8	
HI-LO ZONE COMPARE	44.32.11.2	01B7	
HI-LO-EQ INPUT DIST	44.30.11.2	02A8	
HI-LO-EQ INPUT DIST	44.30.11.2	01B7	
HOME AND RUN TRIGGERS	36.31.11.2	01A6	
HOME AND RUN TRIGGERS	36.31.11.2	01A6	
HOME AND RUN TRIGGERS NUMERIC	36.31.11.2	01A6	
HOME AND RUN TRIGGERS NUMERIC	36.31.11.2	01A6	
HOME ERR&PR LINE COMP CTRLS NUMERIC	36.37.11.2	01A6	
HOME ERR&PR LINE COMP CTRLS NUMERIC	36.37.11.2	01A6	
HOME ERROR & PRINT LINE COMP CTRLS	36.37.11.2	01A6	
HOME ERROR & PRINT LINE COMP CTRLS	36.37.11.2	01A6	
HUNDREDS & THOUSANDS DECODE SWITCHES	42.56.11.2	01A1	
HUNDREDS & THOUSANDS DECODE SWITCHES 1406	42.76.11.2	06B5	
HUNDREDS AND THOUSANDS DECODE SWIT. 1406	42.66.11.2	06B1	
HUNDREDS DECODE SWITCHES	42.55.11.2	01A1	
HUNDREDS DECODE SWITCHES 1406	42.65.11.2	06B1	
HUNDREDS DECODE SWITCHES 1406	42.75.11.2	06B5	
HUNDREDS ZONE CARRY CONTROLS	41.50.71.2	02B6	
I CYCLE LATCH	31.24.11.2	01B2	
I O OPERATIONS	31.09.21.2	01B2	
I RING 4-5-6-7-8	31.31.41.2	01B6	
I RING 4-5-6-7-8 DISTRIBUTION	31.31.21.2	01B2	
I RING CONTROL	31.30.11.2	01B2	
I RING OP-1-2-3	31.31.31.2	01B6	
I RING OP-1-2-3 DISTRIBUTION	31.31.11.2	01B2	
I STAR CONTROL HUNDREDS AND GATE OUT	32.34.21.2	01A7	
I STAR CONTROL UNITS AND TENS	32.34.11.2	01A7	
I STAR RESTORE GATE	32.39.11.2	01A7	
I-E CHANGE SECTION 1	31.05.11.2	01B2	
I-E CHANGE SECTION 2	31.05.21.2	01B2	
I-E CHANGE SECTION 3	31.05.31.2	01B2	
I-O BRANCH CONTROL	73.11.41.2	02A2	
I-O DATA INPUT	73.11.21.2	02A2	
I-O LOAD AND CONTROL	73.12.21.2	02A2	
I-O SELECT CONTROL	73.11.11.2	02A2	
I-O SELECT CONTROL	73.11.31.2	02A2	
I-O SELECT CONTROL	73.11.51.2	02A2	
I-O SELECT CONTROL	73.11.61.2	02A2	
I-O SELECT CONTROL	73.11.71.2	02A2	
I-O WRITE	73.12.11.2	02A2	
INDEX 1 CONTROL	41.51.61.2	02B6	
INDEX A AND B STAR GATES	41.50.81.2	02B6	
INDEX ADDRESS REGISTER SET	41.50.41.2	02B6	
INDEX STAR	41.51.21.2	02B6	
INDEX TAG LATCHES	41.50.01.2	02B6	
INDEXING OPR CODES	41.52.31.2	01B1	
INDICATORS - CONSOLE	37.20.11.2	01A2	
INDICATORS - CONSOLE	37.20.21.2	01A2	
INDICATORS REF DWG	89.02.50.0	02A1	
INDICATORS-TAPE CE CONSOLE	71.81.11.2	02A1	
INDICATORS-TAPE CE CONSOLE	71.81.12.2	02A1	
INH DR TERM RES & FILTER CAP REF DWG	42.40.43.2	01A1	
INHIBIT 1	35.11.11.2	01A3	

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INHIBIT 2	35.11.51.2	01A3	110324V
INHIBIT 4	35.12.11.2	01A3	
INHIBIT 8	35.12.51.2	01A3	
INHIBIT A	35.13.11.2	01A3	
INHIBIT B	35.13.51.2	01A3	
INHIBIT C	35.14.11.2	01A3	
INHIBIT C DIG AND C ZONE	35.15.11.2	01A3	
INHIBIT CHECK LATCH	35.17.71.2	01A3	
INHIBIT CHECK SECTION 1	35.17.51.2	01A3	
INHIBIT CHECK SECTION 2	35.17.61.2	01A3	
INHIBIT DRIVERS	42.58.11.2	01A1	
INHIBIT DRIVERS	1406 42.68.11.2	06B1	
INHIBIT DRIVERS	1406 42.78.11.2	06B5	
INHIBIT DRIVERS	46.10.51.2	01A4	
INHIBIT GATING AND ARITH CHECK LATCH	44.13.21.2	02B7	
INHIBIT RESISTORS&FILTER C REF. DWG. 1406	42.68.21.2	06B1	
INHIBIT WM	35.14.51.2	01A3	
INPUT OUTPUT LINES REF DWG	73.91.91.2	02A2	
INPUTS FROM TAU REF DWG	89.02.35.0	02A1	
INPUTS FROM TAPE DRIVE 7330 REF DWG	89.02.21.0	02A1	
INPUTS FROM TAPE UNIT 729 REF DWG	89.02.20.0	02A1	
INQUIRY ATTACHMENT CONTROL CKTS	77.01.11.2	01B7	
INQUIRY ATTACHMENT DATA CKTS	77.01.21.2	01B7	
INQUIRY ATTACHMENT--DATA CKTS	77.01.21.2	02A8	
INQUIRY ATTACHMENT--CONTROL CKTS	77.01.11.2	02A8	
INQUIRY FEED THRU MOD-D	77.01.31.2	01B7	
INQUIRY-MODE MODIFY	77.01.01.2	01A2	
INTERLOCK STOP	36.02.11.2	01B4	
LAST ADDRESS & READ END CONTROL	36.16.11.2	01B4	
LOAD LATCH AND GATED WM	31.07.11.2	01B2	
LOGIC INDEX	TAU 89.10.01.1		
LOGIC INDEX	TAU 89.10.02.1		
LOGIC INDEX	TAU 89.10.03.1		
LOGIC INDEX	31.01.10.2	01B2	
LOGIC INDEX	31.10.10.2	01B3	
LOGIC INDEX	32.30.10.2	01A7	
LOGIC INDEX	34.00.00.2	01B6	
LOGIC INDEX	35.10.10.2	01A3	
LOGIC INDEX	35.20.10.2	01B1	
LOGIC INDEX	36.00.00.2	01A6	
LOGIC INDEX	36.01.10.2	01A6	
LOGIC INDEX	36.01.10.2	01A8	
LOGIC INDEX	36.01.10.2	01B4	
LOGIC INDEX	36.17.10.2	01B7	
LOGIC INDEX	36.30.10.2	01A6	
LOGIC INDEX	36.30.10.2	01A6	
LOGIC INDEX	36.37.00.2	01B5	
LOGIC INDEX	37.00.00.2	01A2	
LOGIC INDEX	37.17.10.2	01B7	
LOGIC INDEX	41.11.10.2	02B8	
LOGIC INDEX	42.53.10.2		
LOGIC INDEX	1406 42.63.10.2	06B1	
LOGIC INDEX	1406 42.65.00.2	06B4	
LOGIC INDEX	1406 42.73.10.2	06B5	
LOGIC INDEX	44.10.00.2	02B7	
LOGIC INDEX	44.15.00.2	02A7	
LOGIC INDEX	44.30.01.2	02A8	
LOGIC INDEX	44.30.10.2	01B7	

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	LOGIC INDEX	44.70.00.2	02B6	
	LOGIC INDEX	46.10.00.2	01A4	
	LOGIC INDEX	46.36.10.2	01A5	
	LOGIC INDEX	46.51.10.2	01A5	
	LOGIC INDEX	70.10.10.2	02A1	
	LOGIC INDEX	70.10.11.2	02A2	
	LOGIC INDEX	70.10.11.2	02A2	
	LOGIC INDEX	74.10.10.2	02B1	
	LP PT & BUSY & REWIND REWIND UNLD	TAU 89.60.02.1	00XA	
	LRCR ERROR & LRCR RESET	TAU 89.50.42.1	00XC	
	LRCR REG PSNS 1 2 4 AND 8 BITS	TAU 89.50.40.1	00XC	
	LRCR REG PSNS A B AND C BITS	TAU 89.50.41.1	00XC	
	MANUAL CARRIAGE CTRL	36.47.11.2	01B1	
	MANUAL CONTROLS SECTION 1	31.03.11.2	01B2	
	MANUAL CONTROLS SECTION 2	31.03.21.2	01B2	
	MANUAL CONTROLS SECTION 3	31.03.31.2	01B2	
	MANUAL OPERATION	71.71.41.2	02A1	
	MANUAL OPERATION	71.71.61.2	02A1	
	MANUAL OPERATION-C.E. CONSOLE	71.71.31.2	02A1	
	MANUAL OPERATION-OPERATORS CONSOLE	71.71.11.2	02A1	
	MANUAL OPERATION-OPERATORS CONSOLE	71.71.11.2	01A2	
	MANUAL OPERATION RESET AND LOAD TAPE	71.71.21.2	02A1	
	MEMORY SWITCH DRIVE	46.37.91.2	01A5	
	MOD. CTRLS IV TRAN & 1400 CHAR CTRL	32.42.41.2	01A8	
	MOD. CTRLS III UNITS & TENS BOR. & CR	32.42.31.2	01A8	
	MODIFIER CONTROLS II MOD & 361-1	32.42.21.2	01A8	
	MODIFIER CTRLS T PLUS 1 AND MINUS 1	32.42.11.2	01A8	
	MODIFIER EVEN DIGIT GENERATOR	32.44.21.2	01A8	
	MODIFIER INVALID ADDRESS	32.44.41.2	01A8	
	MODIFIER ODD DIGIT GENERATOR	32.44.11.2	01A8	
	MODIFIER SECT 2 BIT	32.43.21.2	01A8	
	MODIFIER SECT A BIT	32.43.51.2	01A8	
	MODIFIER SECT. 4 BIT	32.43.31.2	01A8	
	MODIFIER SECT. 8 BIT	32.43.41.2	01A8	
	MODIFIER SECT. 8 BIT	32.43.61.2	01A8	
	MODIFIER SECT. BORROW-CARRY BIT	32.43.91.2	01A8	
	MODIFIER SECT. C2 BIT	32.43.81.2	01A8	
	MODIFIER SECT. C DIGIT BIT	32.43.71.2	01A8	
	MODIFIER ZONE CK GEN	32.44.31.2	01A8	
	MODIFIER-SECT 1 BIT	32.43.11.2	01A8	
	MODIFY OPERATION CONTROLS	1406 42.65.02.2	06B4	
	MOVE COLUMN BINARY	41.11.41.2	02B8	
	MOVE RECORD	41.51.71.2	02B6	
	MULTIPLY AND DIVIDE OP CODES	44.10.91.2	01B1	
	O REGISTER GATING-WRITE LATCH	74.11.71.2	02B1	
	ODD PARITY OPERATIONS CHECK	35.28.21.2	01B1	
	ODD-EVEN CHARACTER COUNTER	TAU 89.40.62.1	00XC	
	OP REG ZONE DECODE	35.22.11.2	01B1	
	OP REGISTER LATCH	35.21.11.2	01B1	
	OP REGISTER UNITS DECODE 1	35.23.11.2	01B1	
	OP REGISTER UNITS DECODE 2	35.23.21.2	01B1	
	OPERATION CODES B NOT A ZONE	35.25.11.2	01B1	
	OPERATION CODES A NOT B ZONE	35.26.11.2	01B1	
	OPERATION CODES AB ZONE	35.24.11.2	01B1	
	OPERATION CODES NOT AB ZONE	35.27.11.2	01B1	
	OPERATIONAL DECODE	70.11.21.2	02A2	
	OPERATIONAL DECODE	70.11.21.2	02A2	
	OPERATIONAL DECODE	70.11.41.2	02A2	

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OPERATIONAL DECODE	70.11.41.2	02A2
OPERATIONAL DECODE	71.11.11.2	02A1
OPERATIONAL DECODE	71.11.21.2	02A1
OPERATIONAL DECODE	71.11.31.2	02A1
OPERATIONS CHECK LATCH	35.28.31.2	01B1
OPR REG DISPLAY DRIVE	35.29.11.2	01B1
OUTPUTS TO TAPE UNIT 729 REF DWG	89.02.25.0	02A1
OUTPUTS TO TAPE DRIVE 7330 REF DWG	89.02.26.0	02A1
OUTPUTS TO TAU REF DWG	89.02.30.0	02A1
OVERLAP BUSY AND COMPLETE CONTROLS	74.21.11.2	02B1
OVERLAP CONTROLS	71.61.21.2	02A1
OVERLAP CONTROLS	74.21.31.2	02B1
OVERLAP INTERLOCK STOP CONTROLS	74.31.61.2	02B1
OVERLAP PROCESS INTERLOCK CONTROLS 2	74.31.51.2	02B1
OVERLAP STAR-GATING	74.11.11.2	02B1
OVERLAP STAR-HUNDREDS	74.11.41.2	02B1
OVERLAP STAR-TENS	74.11.31.2	02B1
OVERLAP STAR-UNITS	74.11.21.2	02B1
OVERLAP START CONTROLS	74.31.11.2	02B1
OVERLAP-PROCESS INTERLOCK CONTROLS 1	74.31.41.2	02B1
PFR CHECK LOGIC	56.17.41.2	01B7
PFR CHECK PLANE REGISTER	56.10.91.2	01B7
PFR ENCODE-VALIDITY	56.13.11.2	01B4
PFR OP CODE GENERATION	56.15.11.2	01B7
PR PAR ERROR	46.36.91.2	01A5
PR RDY START-AFTER SP CTRL NUMERIC	36.31.71.2	01A6
PR RDY START-AFTER SP CTRL NUMERIC	36.31.71.2	01A6
PR RDY TR-SET 201 202 2 3	36.31.31.2	01A6
PR RDY TR-SET 201 202 2 3 NUMERIC	36.31.31.2	01A6
PR SCAN PR SCAN COMP AND WM PR TRIG	36.31.41.2	01A6
PR SCAN PR SCAN COMP AND WM PR TRIG	36.31.41.2	01A6
PR SCAN PR SCAN COMP TRS NUMERIC	36.31.41.2	01A6
PR SCAN PR SCAN COMP TRS NUMERIC	36.31.41.2	01A6
PR XFER AND PR XFER COMP TRS	36.31.51.2	01A6
PR XFER AND PR XFER COMP TRS NUMERIC	36.31.51.2	01A6
PRE-SENSE AND SENSE AMPLIFIERS 1406	42.69.11.2	06B1
PRE-SENSE AND SENSE AMPLIFIERS 1406	42.79.11.2	06B5
PRE-SENSE AND SENSE AMPLIFIERS-2K	42.59.11.2	01A1
PRE-SENSE AND SENSE AMPLIFIERS -4K	42.59.11.2	01A1
PRINT BUFFER RING DRIVE	46.37.71.2	01A5
PRINT BUFFER TENS RING	46.37.61.2	01A5
PRINT BUFFER TENS DRIVE	36.37.91.2	01B5
PRINT BUFFER UNITS RING U0-U4	46.37.41.2	01A5
PRINT BUFFER UNITS RING U5-U9	46.37.51.2	01A5
PRINT COMPARE	36.33.21.2	01A6
PRINT COMPARE	36.33.21.2	01A6
PRINT COMPARE NUMERIC	36.33.21.2	01A6
PRINT COMPARE NUMERIC	36.33.21.2	01A6
PRINT CONTROL CLOCK PULSES	46.37.81.2	01A5
PRINT ERROR	36.37.21.2	01A6
PRINT ERROR	36.37.21.2	01A6
PRINT ERROR NUMERIC	36.37.21.2	01A6
PRINT ERROR NUMERIC	36.37.21.2	01A6
PRINT INTERLOCK RD PCH	36.31.51.2	01A6
PRINT INTERLOCK RD PCH NUMERIC	36.31.51.2	01A6
PRINT READY START & AFTER SPACE CTRL	36.31.71.2	01A6
PRINT READY START & AFTER SPACE CTRL	36.31.71.2	01A6
PRINT READY TR AND SET 201 NUMERIC	36.31.31.2	01A6

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PRINT READY TRIGGER AND SET 201	36.31.31.2	01A6	
PRINT SCAN COUNTER	36.35.11.2	01A6	
PRINT SCAN COUNTER	36.35.11.2	01A6	
PRINT SCAN COUNTER NUMERIC	36.35.11.2	01A6	
PRINT SCAN COUNTER NUMERIC	36.35.11.2	01A6	
PRINT STORAGE LATCHES 1 2 4 8	46.10.21.2	01A4	
PRINT STORAGE LATCHES A-B-C-WM	46.10.31.2	01A4	
PRINT STORAGE SENSE AMPLIFIERS	46.10.61.2	01A4	
PRINT STORAGE ARRAY	46.11.41.2	01A4	
PRINT STRG LTCHS WM-PEC-PLC-EQC	46.10.41.2	01A4	
PROCESS CHECK AND MAR KEY CONTROL	31.09.11.2	01B2	
PROCESS CONTROL SECTION 1	31.02.11.2	01B2	
PROCESS CONTROL SECTION 2	31.02.21.2	01B2	
PROCESS CONTROL SECTION 3	31.02.31.2	01B2	
PROCESS CONTROL SECTION 4	31.02.41.2	01B2	
PROGRAM ACTIVITY RECORDING CONTROLS	74.11.81.2	02B1	
PROGRAM SKIP LATCH	31.08.11.2	01B2	
PROGRAM SKIP POSITIVE TEST	34.21.31.2	01B6	
PSS COUNTER	36.34.11.2	01A6	
PSS COUNTER	36.34.31.2	01A6	
PSS COUNTER 2 4 BIT DECODE NUMERIC	36.34.51.2	01A6	
PSS COUNTER 8 A B BIT DECODE NUMERIC	36.34.61.2	01A6	
PSS COUNTER ADVANCES	36.34.21.2	01A6	
PSS COUNTER ADVANCES NUMERIC	36.34.21.2	01A6	
PSS COUNTER ADJUST CONTROL TRIGGERS	36.34.11.2	01A6	
PSS COUNTER CONTROL GATES	36.34.41.2	01A6	
PSS COUNTER CONTROL GATES NUMERIC	36.34.41.2	01A6	
PSS COUNTER CONTROL TRIGGERS NUMERIC	36.34.11.2	01A6	
PSS COUNTER CONTROLS	36.34.21.2	01A6	
PSS COUNTER CONTROLS NUMERIC	36.34.21.2	01A6	
PSS COUNTER NUMERIC	36.34.11.2	01A6	
PSS COUNTER NUMERIC	36.34.31.2	01A6	
PSS MEMORY RING	36.31.21.2	01A6	
PSS MEMORY RING	36.31.21.2	01A6	
PSS MEMORY RING NUMERIC	36.31.21.2	01A6	
PSS MEMORY RING NUMERIC	36.31.21.2	01A6	
PSS TRIGGER	36.31.01.2	01A6	
PSS TRIGGER	36.31.01.2	01A6	
PSS TRIGGER NUMERIC	36.31.01.2	01A6	
PSS TRIGGER NUMERIC	36.31.01.2	01A6	
PULSE DISTRIBUTION	44.10.11.2	02B7	
PULSE DISTRIBUTION AND FEED THRU	44.10.01.2	02B7	
PUNCH CB GENERATION	36.21.11.2	01B4	
PUNCH CHECK DECODE	36.23.41.2	01B7	
PUNCH CHECK DECODE	36.23.41.2	01B7	
PUNCH DECODE	36.23.11.2	01B7	
PUNCH DECODE	36.23.11.2	01B7	
PUNCH DECODE	36.23.31.2	01B7	
PUNCH DECODE	36.23.31.2	01B7	
PUNCH DRIVER RESET	36.28.11.2	01B7	
PUNCH DRIVER RESET	36.28.11.2	01B7	
PUNCH DRIVE TENS	36.28.21.2	01B7	
PUNCH DRIVE TENS	36.28.21.2	01B7	
PUNCH FEED	36.24.11.2	01B4	
PUNCH MATRIX 0-1	36.29.11.2	01B7	
PUNCH MATRIX 0-1	36.29.11.2	01B7	
PUNCH MATRIX 2-3	36.29.21.2	01B7	
PUNCH MATRIX 2-3	36.29.21.2	01B7	

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PUNCH MATRIX 4-5	36.29.31.2	01B7
PUNCH MATRIX 4-5	36.29.31.2	01B7
PUNCH MATRIX 6-7	36.29.41.2	01B7
PUNCH MATRIX 6-7	36.29.41.2	01B7
PUNCH MATRIX 8-9	36.29.51.2	01B7
PUNCH MATRIX 8-9	36.29.51.2	01B7
PUNCH SCAN GENERATION	36.22.11.2	01B4
PUNCH SCAN COMPLETE	36.01.21.2	01B4
QUI BINARY DOUBLER	44.18.11.2	02A7
QUI-BINARY VALIDITY CHECK MATRIX	34.32.19.2	01B6
QUI-BINARY VALIDITY CHECK LATCH	34.32.20.2	01B6
QUI-BINARY DOUBLER CARRY TRIGGER	44.18.21.2	02A7
QUI-BINARY DOUBLER ENTRY	44.18.01.2	02A7
QUIN ADDER Q0 Q2 Q4 Q6 Q8 NOT CARRY	34.32.14.2	01B3
QUINARY ADDER OUTPUT	34.32.17.2	01B3
QUINARY ADDER-Q0 Q2 Q4 Q6 CARRY	34.32.15.2	01B3
RD PCH COL BIN LATCH	41.11.21.2	02B8
RD PCH COL BIN TRIGGER	41.11.11.2	02B8
RD-PCH COL BIN MAR CONTROL	41.11.31.2	02B8
READ A REG VRC	TAU 89.50.10.1	00XC
READ CLOCK	TAU 89.10.20.1	00XB
READ CLOCK GATING	TAU 89.10.30.1	00XB
READ CLOCK GATING	TAU 89.10.31.1	00XB
READ CLOCK DRIVE	TAU 89.10.10.1	00XB
READ CONDITION	TAU 89.60.20.1	00XA
READ DELAY CONTROL	TAU 89.30.10.1	00XB
READ FEED	36.10.11.2	01B4
READ GATING	70.61.21.2	02A2
READ GATING	70.61.21.2	02A2
READ GATING	70.61.31.2	02A2
READ GATING	70.61.31.2	02A2
READ GATING	70.61.41.2	02A2
READ GATING	70.61.41.2	02A2
READ GATING	71.61.11.2	02A1
READ IMP CB LOGIC	36.10.21.2	01B4
READ PUNCH RELEASE	56.70.21.2	01B4
READ PUNCH INDICATION	36.18.11.2	01B4
READ RECOGNITION	TAU 89.40.60.1	00XC
READ RECOGNITION	TAU 89.40.61.1	00XA
READ SCAN COMPLETE	36.01.31.2	01B4
READ SCAN GENERATION	36.11.11.2	01B4
READ WRITE VRC	TAU 89.50.20.1	00XC
REFERENCE DRAWING	73.00.00.2	02A2
REG A AND REG B C BIT PSN	TAU 89.40.23.1	00XC
REG A AND REG B 1 AND 2 BIT PSNS	TAU 89.40.20.1	00XC
REG A AND REG B 4 AND 8 BIT PSNS	TAU 89.40.21.1	00XC
REG A AND REG B A AND B BIT PSNS	TAU 89.40.22.1	00XC
REVERSE SCAN	31.04.11.2	01B2
R-W REGISTER BIT POSITION	TAU 89.40.50.1	00XC
R-W REGISTER BIT POSITION	TAU 89.40.51.1	00XC
R-W REGISTER BIT POSITION	TAU 89.40.52.1	00XC
ROW BIT CORE & RD BRSH CONN REF DWG	42.40.51.1	01A1
ROW BIT CORES & PR MAG CONN REF DWG	42.40.52.1	01A1
SEL&READY RD-&WRITE	TAU 89.60.10.1	00XA
SELECT & READY	TAU 89.60.01.1	00XA
SENSE SWITCHES OPTIONAL	34.22.11.2	01B6
SERIAL DISTRIBUTION SECTION I	32.41.11.2	01A8
SERIAL DISTRIBUTION SECTION II	32.41.21.2	01A8

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	SERIAL DISTRIBUTION SECTION III	32.41.31.2	01A8	
	SERIAL DISTRIBUTION SECTION IV	32.41.41.2	01A8	
	SERIAL GATE 1 AND 2 BITS	32.39.21.2	01A7	
	SERIAL GATE 4 AND 8 BITS	32.39.31.2	01A7	
	SERIALIZING GATE CD AND HCZ	32.39.41.2	01A7	
	SERIALIZING GATE HA AND HB	32.39.51.2	01A7	
	SET STARS AND ADDER CARRY	44.13.31.2	02B7	
	SET UP A REG CONTROL	36.12.21.2	01B4	
	SET UP ADDR CONTROL	36.12.11.2	01B4	
	SIGN CONTROL AND 8 BIT ZONE ADDER	34.33.12.2	01B3	
	SIGN TRIGGER	44.11.31.2	02B7	
	SIGNAL DISTRIBUTION SHEET	36.49.11.2	01B1	
	SINGLE CYCLE PRINT CONTROLS NUMERIC	36.35.21.2	01A6	
	SINGLE CYCLE PRINT CONTROLS	36.35.21.2	01A6	
	SINGLE CYCLE PRINT CONTROLS	36.35.21.2	01A6	
	SINGLE CYCLE PRINT CONTROLS NUMERIC	36.35.21.2	01A6	
	SKEW ERROR & A REG VRC	TAU 89.50.51.1	00XA	
	SOCKET RESERVATIONS	TAU 89.90.11.9	00XB	
	SOCKET RESERVATIONS	TAU 89.90.12.8	00XC	
	SOCKET RESERVATIONS	TAU 89.90.12.9	00XC	
	SOCKFT RESERVATIONS	TAU 89.90.10.8	00XA	
	SOCKFT RESERVATIONS	TAU 89.90.10.9	00XA	
	SPACE COUNTER	36.46.21.2	01B1	
	SPACE SKIP REGISTER	36.44.11.2	01B1	
	SPACE SKIP COMPARE EQUAL	36.45.11.2	01B1	
	SPECIAL CHARACTER COMPARE	44.31.11.2	02A8	
	SPECIAL CHARACTER COMPARE	44.31.11.2	01B7	
	STACKER SELECT	36.50.11.2	01B4	
	START	31.01.11.2	01B2	
	STOP BRUSH INTEGRATION	36.41.11.2	01B1	
	STOP BRUSH INTEGRATION	36.41.21.2	01B1	
	STOP I-O ATTACHMENT	73.11.83.2	01B6	
	STOP SS TRIGGER	36.48.11.2	01B1	
	STOR ADDRESSING H8 LOCATION C14-D14	32.37.41.2	01A7	
	STOR ADDRESSING HA LOCATION C16-D16	32.38.11.2	01A7	
	STOR ADDRESSING HB LOCATION C17-D17	32.38.21.2	01A7	
	STOR ADDRESSING HCD LOCATION C15-D15	32.37.51.2	01A7	
	STOR ADDRESSING HCZ LOCATION C18-D18	32.38.31.2	01A7	
	STORAGE ADDR MANUAL CONTROL & RESET	32.30.11.2	01A7	
	STORAGE ADDRESS U1 LOCATION C01-D 1	32.35.11.2	01A7	
	STORAGE ADDRESS T1 LOCATION C06-D 6	32.36.11.2	01A7	
	STORAGE ADDRESS H1 LOCATION C11-D11	32.37.11.2	01A7	
	STORAGE ADDRESS U2 LOCATION C02-D 2	32.35.21.2	01A7	
	STORAGE ADDRESS T2 LOCATION C07-D 7	32.36.21.2	01A7	
	STORAGE ADDRESS H2 LOCATION C12-D12	32.37.21.2	01A7	
	STORAGE ADDRESS U4 LOCATION C03-D 3	32.35.31.2	01A7	
	STORAGE ADDRESS T4 LOCATION C08-D 8	32.36.31.2	01A7	
	STORAGE ADDRESS U8 LOCATION C04-D 4	32.35.41.2	01A7	
	STORAGE ADDRESS T8 LOCATION C09-D 9	32.36.41.2	01A7	
	STORAGE ADDRESS UA LOCATION C19-D19	42.61.01.2	01A7	
	STORAGE ADDRESS UB LOCATION C21-D21	42.61.03.2	01A7	
	STORAGE ADDRESS UCD LOCATION C05-D 5	32.35.51.2	01A7	
	STORAGE ADDRESS TCD LOCATION C10-D1	32.36.51.2	01A7	
	STORAGE ADDRESS UCZ LOCATION C20-D2	42.61.02.2	01A7	
	STORAGE ADDRESSING H4 LOCATION C13-D13	32.37.31.2	01A7	
	STORAGE CLOCK PULSES Z1 Z2	31.12.94.2	01B3	
	STORAGE CONTROL PULSE GENERATION	1406 42.67.02.2	06B4	
	STORAGE CORE FRAME REF. DWG.	1406 42.60.11.2	06B1	



724464	1401 ALPHABETICAL LOGIC LISTING	REFERENCE ONLY	00.00.00.2	EC #
	TITLE	LOGIC #	GATE	110324V
	STORAGE CORE FRAME REF. DWG.	1406 42.70.11.2	06B5	
	STORAGE CORE FRAMES REF DWG	42.40.11.2	01A1	
	STORE CONTROLS	41.51.41.2	02B6	
	STORE CYCLE DRIVERS	41.50.31.2	02B6	
	STORE I STAR	41.51.51.2	02B6	
	STORE INDEX CONTROL	41.51.31.2	02B6	
	STORE INDEX CYCLE TRIGGERS	41.50.21.2	02B6	
	STORE INDEX CYCLE TRIG GATES	41.50.11.2	02B6	
	STOR. CLOCK PULSES R1 R2 R3 STROBE A	31.12.93.2	01B3	
	SW CORE DRIVE TERM RES 4K REF DWG	42.40.41.1	01A1	
	SW CORE DRIVE TERM RES 2K REF DWG	42.40.42.2	01A1	
	SWITCH MODE	37.30.11.2	01A2	
	SWITCH MODE II	37.30.12.2	01A2	
	SWITCH MODE-INQUIRY MACH ONLY	37.30.11.2	01A2	
	SWITCHES AND INDICATORS CONSOLE	37.31.11.2	01A2	
	SWITCHES CONSOLE LOWER PANEL	37.10.11.2	01A2	
	SWITCHES LOWER PANEL	37.30.31.2	01A2	
	SWITCHES MANUAL ADDRESS THOUSANDS	37.30.22.2	01A2	
	SWITCHES MANUAL ADDRESS UNITS & TENS	37.30.21.2	01A2	
	T TIME 000-015 015-045	31.12.22.2	01B3	
	T TIME 000-030 030-060	31.12.12.2	01B3	
	T TIME 030-105 075-105 75-000	31.12.41.2	01B3	
	T TIME 045-060 015-030 060-075	31.12.31.2	01B3	
	T TIME 045-075 U TIME 0 60	31.12.92.2	01B3	
	T TIME 060-000 075-090 030-090	31.12.32.2	01B3	
	T TIME 060-090	31.12.11.2	01B3	
	T TIME 090-000	31.12.21.2	01B3	
	T TIME 090-105 105-000	31.12.42.2	01B3	
	T TIME 090-030 U TIME 075-105	31.12.91.2	01B3	
	TAPE AND RP OVERLAP MODE LATCHES	74.21.01.2	02B1	
	TAPE OVERLAP CONTROL INTERLOCK	74.41.11.2	02B1	
	TAPE UNIT LINES	TAU 89.60.50.1	00XA	
	TAPE UNIT LINES	TAU 89.60.51.1	00XA	
	TENS ADDRESS DECODE	36.38.41.2	01B5	
	TENS DECODE SWITCH	1406 42.64.11.2	06B1	
	TENS DECODE SWITCH	1406 42.74.11.2	06B5	
	TENS HAMMER DRIVE	36.38.31.2	01B5	
	TENS RING SWITCHES	46.10.81.2	01A4	
	TENS RING SWITCHES AND INHIBIT TERM	46.10.91.2	01A4	
	TIE DOWN LIST REFERENCE DRAWING	42.40.10.2	01A1	
	TRANSFER PROGRAM	75.01.09.2	02A8	
	TRANSFER PROGRAM SKIP	34.21.41.2	01B6	
	TRANSFER SCAN MAR CONTROL	56.12.11.2	01B7	
	TRANSLATE AND CHECK DIGIT	34.32.18.2	01B3	
	TRUE COMPLEMENT	34.31.12.2	01B3	
	TRUE COMPLEMENT BINARY ENTRY	44.18.31.2	02A7	
	TRUE COMPLEMENT ANALYSIS	34.31.11.2	01B3	
	TRUE COMPLEMENT QUINARY ENTRY	44.18.41.2	02A7	
	U TIME 000-015 060-090	31.12.61.2	01B3	
	U TIME 000-030 030-060 T TIME 000- 6	31.12.51.2	01B3	
	U TIME 030-045 045-060 60-075	31.12.71.2	01B3	
	U TIME 105-000 090-000	31.12.62.2	01B3	
	U0-U4 HAMMER DRIVE	36.38.01.2	01B5	
	U5-U9 HAMMER DRIVE	36.38.11.2	01B5	
	UNIT PLUGGING CHART	TAU 89.90.11.1	00XB	
	UNIT PLUGGING CHART	TAU 89.90.12.1	00XC	
	UNIT PLUGGING CHART	TAU 89.90.51.1	00XA	
	UNIT PLUGGING CHART	31.01.20.2	01B2	

TITLE	LOGIC #	GATE	110324V
UNIT PLUGGING CHART	31.10.20.2	01B3	
UNIT PLUGGING CHART	31.31.30.2	01B6	
UNIT PLUGGING CHART	32.30.20.2	01A7	
UNIT PLUGGING CHART	32.36.02.2	01A8	
UNIT PLUGGING CHART	35.10.20.2	01A9	
UNIT PLUGGING CHART	35.20.20.2	01B1	
UNIT PLUGGING CHART	36.01.10.2	01A6	
UNIT PLUGGING CHART	36.01.20.2	01B4	
UNIT PLUGGING CHART	36.17.20.2	01B7	
UNIT PLUGGING CHART	36.17.20.2	01B7	
UNIT PLUGGING CHART	36.30.20.2	01A6	
UNIT PLUGGING CHART	36.30.20.2	01A6	
UNIT PLUGGING CHART	36.30.30.2	01A6	
UNIT PLUGGING CHART	36.37.10.2	01B5	
UNIT PLUGGING CHART	37.10.10.2	01A2	
UNIT PLUGGING CHART	41.10.10.2	02B8	
UNIT PLUGGING CHART	41.50.00.2	02B6	
UNIT PLUGGING CHART	42.53.20.2	01A1	
UNIT PLUGGING CHART	1406 42.63.00.2	06B1	
UNIT PLUGGING CHART	1406 42.64.00.2	06B4	
UNIT PLUGGING CHART	1406 42.73.10.2	06B5	
UNIT PLUGGING CHART	44.15.10.2	02A7	
UNIT PLUGGING CHART	44.30.01.2	01B7	
UNIT PLUGGING CHART	44.30.02.2	02A8	
UNIT PLUGGING CHART	44.44.10.2	02B7	
UNIT PLUGGING CHART	ERM 46.10.10.2	01A4	
UNIT PLUGGING CHART	46.36.20.2	01A5	
UNIT PLUGGING CHART	46.51.00.2	01A5	
UNIT PLUGGING CHART	70.10.11.2	02A2	
UNIT PLUGGING CHART	71.10.11.2	02A1	
UNIT PLUGGING CHART	73.11.82.2	02A2	
UNIT PLUGGING CHART	74.11.10.2	02B1	
UNITS ADDRESS DECODE	36.38.51.2	01B5	
UNITS DECODE SWITCH	42.53.11.2	01A1	
UNITS DECODE SWITCH	1406 42.63.11.2	06B1	
UNITS DECODE SWITCH	1406 42.73.11.2	06B5	
UNITS HAMMER DRIVE DISTRIBUTION	36.36.21.2	01B5	
UNITS RING SWITCHES	46.10.71.2	01A4	
UNITS ZONE SERIALIZING GATE	42.61.04.2	01A7	
UTIME90-105 30-90 75-90 30-000 60 9	31.12.81.2	01B3	
VALIDITY CHECK	36.13.31.2	01B4	
VOLTAGE DISTRIBUTION	71.71.51.2	02A1	
WRITE CLOCK	TAU 89.20.20.1	00XB	
WRITE CLOCK AND DELAY COUNT DRIVE	TAU 89.20.10.1	00XB	
WRITE CLOCK GATING	TAU 89.20.30.1	00XB	
WRITE CONDITION	TAU 89.60.30.1	00XA	
WRITE DELAY CONTROL	TAU 89.30.11.1	00XB	
WRITE DISC TAPE MARK ERASE	TAU 89.60.31.1	00XA	
WRITE GATING	70.51.21.2	02A2	
WRITE GATING	70.51.21.2	02A2	
WRITE GATING	70.51.31.2	02A2	
WRITE GATING	70.51.31.2	02A2	
WRITE GATING INPUT TO TAU	71.51.21.2	02A1	
WRITE GATING-O REG. STORE A REG.	74.11.61.2	02B1	
X POSITION LAT AND MULTIPLIER LAT	44.11.21.2	02B7	
ZONE BIT GENERATOR	34.33.11.2	01B3	

1. CHECK ALL MATERIAL RECEIVED AGAINST SHIPPING CHECK OFF LIST CONTAINED IN SYSTEM INSTALLATION PARTS PACKAGE (THIS PACKAGE CONTAINS ALL DETACHABLE CABLES ETC).
2. REMOVE ALL SHIPPING TAPE, BRACES AND OTHER MATERIAL AS PER PACKING AND UNPACKING INSTRUCTIONS INCLUDED WITH EACH UNIT.  
AT THIS TIME MAKE A THOROUGH PHYSICAL CHECK FOR DAMAGED, BROKEN OR LOOSE PARTS RESULTING FROM SHIPMENT (INCLUDING EDGE CONNECTORS). CAUTION - TURN FEED OVER MANUALLY WHEN REINSERTING BRUSH ASSEMBLY TO PREVENT BRUSH DAMAGE.
3. INSTALL THE FILE FEED MAGAZINE ON THE 1402. (REFER TO 1402 CE REFERENCE MANUAL FOR INSTRUCTIONS.)
4. CHECK THE 1402 RELAY GATE FOR LOOSE RELAYS AND DISPLACED ARMATURES.
5. MANUALLY TRIP CLUTCHES AND FEED CARDS THROUGH THE READ AND PUNCH FEEDS. CHECK FOR BINDS.
6. CHECK ALL MANUAL KNOBS, LEVERS, AND COVERS ON THE 1403 FOR PROPER OPERATION.
7. INSTALL (2) ANTI-WALK FOOT COMPONENT PARTS (2 SETS) TO THE 1403 FRAME NEAR THE CASTERS BY THE FOLLOWING PROCEDURE:  
INSERT THE MOUNTING STUD IN THE MACHINE FRAME FOR ITS FULL THREADED LENGTH. ASSEMBLE THE FOOT COVER AND MOUNTING FOOT TO THE STUD. BACK THE MOUNTING STUD OFF FOR THE REQUIRED DISTANCE TO STABILIZE THE MACHINE.
8. 1403-CHECK FOR OIL IN THE HYDRAULIC RESERVOIR. APPROX LEVEL TO BOTTOM OF MAGNETS.
9. 1403-CHECK FOR OIL IN THE RESERVOIR AT THE RIGHT END OF THE "T" CASTING (IBM #6)-1403.
10. ALL 1401 MACHINES FROM SERIAL NUMBER 20890 AND ABOVE HAVE BEEN DESIGNED FOR CABLES TO EXIT UNDERNEATH THE MACHINE. THE MACHINE WILL BE SHIPPED WITH CABLES ABOVE FRAME AND SHOULD BE INSTALLED AS DESCRIBED BELOW:
  - (A) AT 01B1-01B8 - REMOVE THROW AWAY COVER AND DISCARD
  - (B) AT 01B1 - REMOVE COVER SUPPORT BRACKET (194370) AND RETAIN. OPEN GATE 01B1.
  - (C) AT 01B8 - RUN ALL CABLES DOWN THROUGH THE OPENING AT 01B1-01B8. STARTING WITH CABLE NEAREST REAR OF MACHINE. PLACE A LOOP THROUGH THE OPENING SUCH THAT THE CABLE CONNECTOR GOES THROUGH LAST.
  - (D) AT 01B1 - 01B8 -  
INSTALL HOUSING (723351).  
INSTALL FIRE BARRIER THEN INSTALL FILTER.  
INSTALL COVER SUPPORT BRACKET, (194370) REMOVED IN STEP B, AT THE CENTER OF THE FRAME.  
INSTALL COVER (194372).  
FOR RAISED FLOOR INSTALLATION INSTALL KICK PLATE (597329).  
FOR ABOVE FLOOR INSTALLATION INSTALL KICK PLATE (723359)  
CLOSE GATE 01B1.
  - (E) AT 02B4-02B5 -  
REMOVE COVER (194372).  
OPEN GATE 02B4.  
CONNECT CABLES - FIRST PASSING THEM UP FROM UNDERNEATH FRAME.  
INSTALL HOUSING (723352).  
FOR ABOVE FLOOR INSTALLATIONS INSTALL CLAMP (723353) TO HOLD CABLES AT 02B5 SIDE OF MACHINE. THIS INCLUDES THE THREE 1403 CABLES IF THEY PASS UNDERNEATH THE LENGTH OF THE 1401.  
INSTALL FIRE BARRIER THEN INSTALL FILTER.  
FOR ABOVE - FLOOR INSTALLATIONS INSTALL KICK PLATE (723360).  
FOR RAISED FLOOR INSTALLATIONS INSTALL KICK PLATE (597329).  
INSTALL COVER (194372).  
CLOSE GATE 02B4.
11. CONNECT CABLES FROM THE 1401 TO THE 1402. - (SEE NOTE I).
12. CONNECT CABLES FROM THE 1401 TO THE 1403. (SHOE WITH GOLD PLATED PINS CONNECTS TO FRONT RECEPTACLE. ON CURRENT MACHINES THESE WILL ONLY FIT ONE WAY).
- 12A. IF SYSTEM HAS EXPANDED MEMORY, CONNECT POWER AND SIGNAL CABLES FROM 1401 TO THE 1406 (06B7) (WILL ONLY FIT ONE WAY AFTER 1401-20010 - SEE NOTE I).
13. CONNECT THE MAIN POWER CABLE TO THE UPPER TERMINALS ON THE INNER CIRCUIT BREAKER OF THE 1402 UNIT. THE GREEN (GROUND) WIRE SHOULD BE CONNECTED TO THE FRAME OF THE 1402. REFER TO 1402 WIRING DIAGRAM #609400, PAGE 11.01.11.1.  
ON SYSTEMS WITHOUT THE 1402 THE MAIN POWER CABLE WILL BE CONNECTED TO THE 1401 AT THE BULK POWER SUPPLY AT GATE LOCATIONS 02B7 AND 02B8. REFER TO 1401 POWER SUPPLY DIAGRAM. (BE SURE TO TIGHTEN ALL TERMINAL SCREWS FIRMLY).
14. DO NOT CONNECT TAPE UNIT CABLES AT THIS TIME.
15. CHECK CUSTOMERS POWER RECEPTACLE FOR THE PROPER TYPE OF VOLTAGE SUPPLY AND GROUND. GROUND CONNECTION SHOULD BE GREEN WIRE NON-CURRENT CARRYING EARTH GROUND. IF IT IS NECESSARY TO CHANGE THE SYSTEM VOLTAGE SEE STEP 1.0 OF REFERENCE MATERIAL.

## KEY LOCATION

NOTE I - 1402 CANNON CONNECTORS-THREAD ON OUTSIDE OF RING-SMALL-NEAR PIN 3  
-LARGE-NEAR PIN 3  
1406 CANNON CONNECTORS-THREAD ON OUTSIDE OF RING-SMALL-NEAR PIN 6  
-LARGE-NEAR PIN 15

DATE	EC NO	DATE	EC NO	DATE	EC NO
SEE INDEX CARD		11-20-61	113401	8-2-62	115586
3-12-63	116775	9-24-63	118575H	5-21-64	114096
8-11-64	114215	2-19-65	123446		

16. LIFT CARRIAGE BRUSHES AND OPEN "T" CASTING ON THE 1403 BEFORE APPLYING POWER.
17. APPLY POWER. CHECK ALL BLOWERS FOR OPERATION ON THE 1401 (AND 1406) ESPECIALLY THE ONE OVER THE CORE STORAGE UNITS. ALSO CHECK THE CARRIAGE BLOWER ON THE RIGHT SIDE OF THE 1403. PLACE A CARD OVER THE LOUVERS IN THIS COVER. IF THE CARD IS DRAWN AGAINST THE COVER, THE BLOWER IS OPERATING CORRECTLY.
18. A CHECK FOR PROPER PHASE ROTATION ON THE 1403. SLIP A PIECE OF PAPER OR TAB CARD THROUGH THE PAPER FEED ROLLERS ON THE BACK OF THE MACHINE. THE PAPER OR CARD SHOULD BE FED DOWN. IF THIS IS CORRECT CLOSE THE "T" CASTING AND CHECK TO SEE THAT THE CHAIN IS TURNING COUNTER CLOCKWISE, LOOKING DOWN AT IT. FINALLY CHECK TO SEE THAT AIR IS BLOWING INTO THE HAMMER UNIT. THIS CHECK CAN BE MADE BY PLACING A CARD OVER THE LOUVERS IN THE COVER ON THE LEFT SIDE OF THE 1403. IF THE CARD IS DRAWN AGAINST THE COVER, AIR IS BEING BLOWN INTO THE MACHINE. COMPLETE THE CHECK BY FEELING THAT AIR IS BEING BLOWN OUT OF THE HAMMER UNIT AT THE SIDES OF THE UNIT. IF ALL THREE OF THE ABOVE ARE INCORRECT REVERSE ANY TWO LEADS ON THE MAIN POWER CABLE. IF ONE OR TWO ARE INCORRECT FOLLOW PROCEDURE OUTLINED IN THE 1403 REFERENCE MANUAL PAGE 6, FORM #225-6493. (IF THE SYSTEM DOES NOT HAVE A PRINTER BUT HAS TAPE DRIVES USE STEPS 2.A OR STEP 27B FOR CHECKING PHASE RELATIONSHIP).
- B. IF ALL PHASING IS CORRECT IT IS NOW SAFE TO LOWER CARRIAGE BRUSHES. A CARRIAGE TAPE SHOULD BE INSTALLED.
19. PULL EMERGENCY OFF SWITCH AND POWER SHOULD DROP. REACTIVATE SWITCH AND APPLY POWER.
20. CHECK 1401, 1402 (AND 1406) POWER SUPPLY VOLTAGES. THEY SHOULD BE  $\pm 2\%$  WHEN MEASURED AS DESCRIBED BELOW.
- (A) MEASURE -6V, +6V, AND -12 VOLT OUTPUT AT GATE LOCATION O1E3. ADJUST FOR PROPER OUTPUT. ALWAYS ADJUST -6V BEFORE ADJUSTING -12V SEE 1401 WIRING DIAGRAM FOR LOCATION OF SUPPLIES LOCATED ON O2A4 AND O2A5 (1401 ONLY).
- (B) MEASURE -6V, +6V, AND -12V AT GATE LOCATION O2A1 ON MACHINES WITH TAPES. IF THIS FEATURE IS NOT PRESENT, MEASURE AT GATE LOCATION O2A7, O2A8 OR O2B6 DEPENDING ON WHICH MAY BE PRESENT. ADJUST FOR PROPER OUTPUT FROM THE SUPPLIES WHICH ARE LOCATED ON O2A3 AND O2A6. ALWAYS ADJUST -6V BEFORE ADJUSTING -12V. REFER TO 1401 WIRING DIAGRAM, (1401 ONLY).
- (C) MEASURE -36 VOLTS ON O2B2 ON MAGNETIC TAPE SYSTEMS WITH TAU 2.
- (D) MEASURE -60 VOLTS ON O1B8 AT THE -60 VOLT BUS BAR. ADJUST FOR THE PROPER OUTPUT FROM THE SUPPLY LOCATED IN THE 1402. IN MODEL D THIS SUPPLY IS LOCATED ON O1B4 (1401 ONLY).
- (E) MEASURE -20 VOLTS ON O1A1 AT F26R AND ADJUST FOR PROPER OUTPUT FROM THE SUPPLY LOCATED IN THE 1402. IN MODEL D, SUPPLY IS LOCATED ON GATE O2A8. (TURN OFF ALL POWER-INCLUDING LINE POWER INPUT TO 1402- AND MOVE TAPS ON SUPPLY IF ADJUSTMENT IS NECESSARY) -
- NOTE - -20 VOLT POWER SUPPLIES (PART NUMBER 473430) ON 1402 "M" SUFFIX AND LATER, ARE NOT ADJUSTABLE.
- (F) MEASURE +30 VOLTS ON O1A1 (AND 1406 CORE ARRAY GATES) AT F26N. MEASURE +12V FIXED ON O1A1 (AND 1406 CORE ARRAY GATES) AT F26Q. MEASURE +12V VARIABLE (18V DIFF) ON O1A1 (AND 1406 CORE ARRAY GATES) AT F13Q. ALWAYS ADJUST +30V BEFORE ADJUSTING +12V. IF VOLTAGE VARIATION OF THE MEMORY IS DESIRED REFER TO 1401 REFERENCE MANUAL.
- (G) THE MARGINAL VOLTAGES ARE NOT MEASURED. (IF THE ABOVE STEPS ARE FOLLOWED, THESE VOLTAGES SHOULD BE WITHIN TOLERANCES).
- (H) ON LATER MACHINES THE MARGINAL VOLTAGE SUPPLY WILL NOT BE PERMANENTLY INSTALLED IN THE SYSTEM. A PORTABLE SUPPLY CAN BE ORDERED BY THE BRANCH OFFICE. THIS WILL PROVIDE GREATER FLEXIBILITY FOR CHECKING THE SYSTEM INCLUDING ANY PERIPHERAL EQUIPMENT. A SPACE FOR STORAGE OF THE PORTABLE SUPPLY IS AVAILABLE IN THE LEFT END OF THE 1402 DIRECTLY UNDER THE PUNCH DRIVE MOTOR. THE PORTABLE SUPPLY CAN BE PLUGGED INTO ANY 115V RECEPTACLE AND IS USED THE SAME AS THE FIXED MARGINAL SUPPLY.
21. RUN READER AND PUNCH WITH NON-PROCESS RUNOUT KEY.
22. RUN READ WITH PROCESS UNIT. (PUT IN READ OP MANUALLY).
23. RUN PUNCH WITH PROCESS UNIT.
24. RUN PRINTER WITH PROCESS UNIT WITH NO INFORMATION IN THE PRINT AREA.
- 24A CARRIAGE CONTROL SINGLE SHOT ADJUSTMENTS.
- MAKE THESE ADJUSTMENTS ONLY IF THE 1403 IS BEING FIELD MERGED. OTHERWISE, PROCEED TO THE NEXT STEP.
- (A) 4.5 MILLISECOND SINGLE SHOT ADJUSTMENT. (LOGIC 36.43.21.2).  
A TAG LOCATED ON THE 1403 TRANSLATOR HANDLE SHOWS THE TIMING FOR THE 4.5 MS SINGLE SHOT. ADJUST THE 4.5 MS SINGLE SHOT FOR THIS TIMING.
- (B) 16 MILLISECOND SINGLE SHOT ADJUSTMENT. (LOGIC 36.31.31.2).  
SUBTRACT THE ACTUAL TIMING OF THE 4.5 MS SINGLE SHOT FROM 21.4. ADJUST THE 16 MS SINGLE SHOT FOR THIS TIMING.
- (C) 10 MS "CARRIAGE INTERLOCK" SINGLE SHOT ADJUSTMENT. (LOGIC 36.46.21.2).  
SUBTRACT 1.7 MS FROM THE FINAL ADJUSTMENT OF THE 16 MS SINGLE SHOT. ADJUST THE 10 MS SINGLE SHOT FOR THIS TIMING.
- 24B. IF IT IS DESIRED TO TEST THE RESET CHECK CIRCUITS PROCEED TO THE REFERENCE MATERIAL STEP 2.0.
25. RUN COMBINATION OP CODES 3,5,6, AND 7.

DATE	EC NO	DATE	EC NO	DATE	EC NO
SEE INDEX	CARD	11-20-61	113401	8-2-62	115586
3-12-63	116775	9-24-63	118575H	5-21-64	114096
8-11-64	114215	2-19-65	123446		

## 26. REMOVE POWER AND INSTALL TAPE UNIT CABLES.

- (A) FOR C, D AND F SYSTEMS - WHEN 729 AND 7330 TAPE UNITS ARE INTERMIXED, CABLES CANNOT BE CROSS CONNECTED. I.E. EACH END OF ANY TAPE CABLE MUST CONNECT TO THE SAME TYPE TAPE UNIT ON EITHER END. THE FIRST TAPE UNIT IN THE SYSTEM MUST ALSO BE CONNECTED TO THE PROPER CONNECTOR IN THE PROCESSING UNIT. AFTER THE INITIAL CABLE HOOKUP HAS BEEN MADE AND CHECKED OUT, THE CONNECTORS ON EACH END OF THE CABLES MUST BE IDENTIFIED WITH "729" OR "7330" LABELS PROVIDED IN THE SYSTEM MAINTENANCE PACKAGE FOR THIS PURPOSE. (NOTE - 729 AND 7330 CABLES HAVE IDENTICAL CONSTRUCTION.)

- 27A. IF SYSTEM HAS TYPE 729 TAPE DRIVES APPLY POWER AND CHECK ROTATION OF MOTORS BY HITTING LOAD REWIND. IF THE HEAD DOES NOT COME DOWN, CHECK FOR VACUUM IN COLUMNS. IF AIR IS BLOWING OUT, THE PHASING IS REVERSED. IF AIR IS BEING SUCKED IN, PHASING IS CORRECT AND SOMETHING ELSE IS PREVENTING THE HEAD FROM COMING DOWN. IF ROTATION IS INCORRECT, TURN OFF ALL POWER TO SYSTEM (LINE POWER INCLUDED) AND REVERSE ANY TWO PHASES AT CIRCUIT BREAKER #2 IN THE 1402 (REFER TO 1402 LOGICS FOR DIAGRAM-SEC 1A)  
NOTE: ON MOD D SYSTEMS, CIRCUIT BREAKER IS LOCATED 02B8.  
TURN POWER ON AND RECHECK ROTATION.

## 27B. IF SYSTEM HAS TYPE 7330 TAPE DRIVES.

- (A) CLEAN TRANSPORT AND CHAMBER.  
(B) TURN OFF 7330 POWER CONTROL SWITCHES.  
(C) INSTALL TERMINATOR SHOE.  
CAUTION: DO NOT, AT ANY TIME, TURN POWER ON WITHOUT A TERMINATOR SHOE INSTALLED ON THE 7330. DO NOT PLACE THE TERMINATOR SHOE ON THE 1401.  
(D) TURN ON 1401 MAIN LINE POWER.  
(E) TURN ON 7330 POWER CONTROL SWITCHES.  
(F) SYSTEMS WITH AN INTERMIX OF 729 AND 7330 TAPE DRIVES OMIT THIS SECTION AND PROCEED TO SECTION G. SYSTEMS WITH ONLY 7330 TAPE DRIVES CHECK LINE POWER PHASING AS FOLLOWS: WITH TAPE IN THE VACUUM COLUMNS, PUSH HEAD DOWN AND CHECK TO SEE THAT THE DRIVE CAPSTAN IS ROTATING IN A COUNTER CLOCKWISE DIRECTION. IF CAPSTAN IS ROTATING IN A CLOCKWISE DIRECTION, THE PHASING IS REVERSED. TURN OFF ALL POWER TO SYSTEM (LINE POWER INCLUDED) AND REVERSE ANY TWO PHASES AT CIRCUIT BREAKER #2 IN THE 1402 (REFER TO 1402 LOGICS FOR DIAGRAM - SECTION 1A).  
NOTE: ON MODEL D SYSTEMS CIRCUIT BREAKER IS LOCATED IN 02B8.  
(G) TURN POWER ON 7330 TAPE DRIVES. LOAD ONE OF THE 7330 TAPE DRIVES (PLACE TAPE IN VACUUM COLUMNS AND PUSH HEAD DOWN). CHECK TO SEE THAT THE DRIVE CAPSTAN IS ROTATING IN A COUNTER CLOCKWISE DIRECTION. IF CAPSTAN IS ROTATING IN A CLOCKWISE DIRECTION, THE PHASING IS REVERSED. TURN OFF ALL POWER TO SYSTEM (LINE POWER INCLUDED) AND SWITCH WIRES ON THE "A" SIDE OF FUSES 2 AND 3 IN 7330. USE 7330 REFERENCE MANUAL AS A GUIDE. REPEAT ABOVE PROCEDURE FOR EACH 7330 ON SYSTEM.  
(H) CHECK: READ BUS SIGNAL LEVEL, WRITE CIRCUIT FEED THROUGH, SKEW AND TRACKING AS PER 7330 C.E. REFERENCE MANUAL.

## 28. CHECK TAPE OPERATION FROM THE C.E. CONSOLE (02A1)

- (A) WRITE TAPE WITH TERMINAL AT A26 ON PIN A FOR CONTINUOUS WRITING, ON PINS B, C, AND D FOR WRITING WITH GAPS AND ON PIN J FOR 1 CHARACTER RECORDS.  
(B) WRITE TAPE MARK  
(C) BACK SPACE AND READ 1 RECORD TO CHECK TAPE INDICATE.  
(D) REWIND AND READ

## 29. CHECK TAPES WITH PROCESS UNIT.

- (A) MANUAL TAPE OP WRITE  
(B) MANUAL TAPE OP READ

## 30. IF SYSTEM HAS EXPANDED MEMORY, RUN THE PROGRAMS SHOWN BELOW TO INSURE THAT THE 1406 SIGNAL CABLES CONTACTS ARE MAKING:

- (A) FOR 8K SYSTEM, MANUALLY ENTER A "C" BIT IN LOCATION 7999 AND THEN ENTER L 7999 7998. IN ANY MEMORY LOCATIONS. BY STARTING THE LOAD OP, THE ENTIRE MEMORY SHOULD BE LOADED WITH "C" BITS, STORAGE SCAN. MANUALLY ENTER C, A, B, 8, 4, 2, 1 INTO 7999. THEN PROCEED AS ABOVE BY LOADING C, A, B, 8, 4, 2, 1 INTO THE ENTIRE MEMORY. STORAGE SCAN.  
(B) FOR 12K SYSTEM, MANUALLY ENTER IN LOCATION 11,999 AND USING PROGRAM L 11,999 11,999, PROCEED AS IN STEP (A).  
(C) FOR 16K SYSTEM, MANUALLY ENTER IN LOCATION 15,999 AND USING PROGRAM L 15,999 15,998, PROCEED AS IN STEP (A).

## 31. RUN CE DIAGNOSTIC TEST AS OUTLINED IN THE DIAGNOSTIC TEST PROCEDURE BOOK.

## 32. IF SYSTEM HAS EXPANDED MEMORY, PERFORM A FULL STORAGE PRINT OUT.

33. IF SYSTEM HAS 1311 DISK STORAGE DRIVES - REFER TO 1311 CUSTOMER ENGINEERING REFERENCE MANUAL (NUMBER 227-5649-X) AND ITS SUPPLEMENT (NUMBER 227-5758-X) SECTION 1.2.X FOR COMPLETE INSTALLATION INSTRUCTIONS AND CHECKOUT PROCEDURES.  
34. FOR CABLING 1409-1447 III ATTACHMENT, SEE FEATURE B/M 495081 PROVIDED IN 1409 MAINTENANCE PACKAGE.

## 35. IF SYSTEM HAS 1051 ATTACHMENT, INSTALL CABLES AS FOLLOWS:

- (A) THE AC POWER CABLE ATTACHED TO THE 1051 MUST ENTER THE 1447 FROM THE REAR AND CONNECT ON TBI AS INDICATED BY CORD ASSEMBLY DRAWING 737855.  
(B) THE 1447 END OF THE SIGNAL CABLE (737090) MUST ENTER THE 1447 FROM THE REAR, ALONGSIDE THE 1051 AC POWER CABLE. FEED THE CABLE LIP THRU THE 47C2 TNO HINGE AND PLUG THE PADDLE CARDS AS INDICATED BY SIGNAL CABLE PRINT (737090)  
(C) PLACE THE CABLE CLAMP (737063) OVER THE TWO CABLES JUST TO THE RIGHT OF THE EXISTING CABLE CLAMP. MAKING SURE THE WIDER SECTION OF THE CLAMP IS OVER THE LARGER CABLE. PUSH THE CLAMP'S THREADED ENDS THRU THE EXISTING FRAME HOLES. FASTEN THE CLAMP WITH TWO WASHERS (22478) AND TWO NUTS (23931).

DATE	EC NO	DATE	EC NO	DATE	EC NO
SEE INDEX CARD		8-11-64	114215		
3-12-63	116775	2-19-65	123446		
9-25-63	118575H				
5-21-64	114096				

35. (D). THE 1051 END OF THE SIGNAL CABLE ENTERS THE 1051 FROM THE BOTTOM SIDE. CLAMP CABLE ON EXISTING OPEN ENDED CABLE CLAMP AND RUN LEADS THRU GATE HINGE TO CARD SIDE OF GATE. PLUG PADDLE CARDS AS INDICATED ON CABLE ASSEMBLY DRAWING (737090).

## 36. SERIAL I/O CABLE INSTALLATION

WHEN THE SERIAL I/O DEVICE HAS A SHIELDED CABLE WITH A BRAIDED STRAP, GROUND THE BRAIDED STRAP USING AN I/O CONNECTOR MOUNTING SCREW.

## 37. 1401 METER CHECKOUT PROCEDURE

## IMPORTANT NOTE:

NOT MORE THAN 50 HOURS ALLOWED TEST TIME ON ANY OF THE METERS. (IN-CUSTOMER-MODE).

RUN METER TEST DFT 9500. CHECK METER OPERATION USING DFT INSTRUCTIONS.

## REFERENCE MATERIAL

## 1.0 TO CHANGE THE SYSTEM FROM 208V TO 230V COMPLETE THE FOLLOWING:

## 1401

- (A) EXPANDED BULK REGULATOR (ALL MODELS EXCEPT A) GATE 02A3 - MOVE WIRE OR WIRES ON BULK REGULATOR TB-4 TO TB-5.
- (B) 1250 WATT REGULATOR. LOCATED IN THE LEFT SIDE OF THE 1402. ON MODEL D SYSTEMS LOCATED ON GATE 02A7. MOVE THE WIRE ON THE 1250 WATT REGULATOR TB-4 TO TB-5.
- (C) 115V AC ISOLATION TRANSFORMER. LOCATED BEHIND THE RELAY PANEL ASSEMBLY IN THE 1402. ON MODEL D SYSTEMS LOCATED IN 02B7-8 GATE AREA. REMOVE THE WIRE ON THE TRANSFORMER SOLDER TERMINAL 6 AND SOLDER TO TERMINAL 7. ON LATER MODEL D MACHINES TERMINAL 7 IS WIRED TO TERMINAL POSITION 7 OF THE 8 POSITION BLOCK NEAR THIS TRANSFORMER. ON THESE MACHINES REMOVE THE WIRE ON TERMINAL POSITION 6 OF THIS BLOCK AND INSTALL ON TERMINAL 7.
- (D) 24V AC STEP DOWN TRANSFORMER. LOCATED IN THE 1402 BEHIND THE FUSE PANEL. (DOES NOT EXIST ON SYSTEMS BELOW 20000) ON MODEL D SYSTEMS LOCATED IN 02B7-8 GATE AREA. REMOVE THE WIRE ON STEP DCWN TRANSFORMER TB POSITION 2 AND INSTALL ON TB POSITION 3.
- (E) -60V AT 10 AMP OR -60V AT 20 AMP SUPPLY. LOCATED IN THE BACK OF THE 1402. ON MODEL D MACHINES LOCATED IN GATE AREA 01B4. REMOVE WIRE FROM VRI-4 AND INSTALL ON VRI-5. (VRI IS THE 12 POSITION TERMINAL BLOCK LOCATED TO THE BOTTOM OF THIS UNIT.)
- (F) 3V MARGINAL CHECK SUPPLY. (EXCEPT PORTABLE SUPPLIES, LOCATED IN THE LEFT END OF THE 1402. LOCATED IN GATE 02A8 ON MODEL D. REMOVE WIRE ON MC POWER SUPPLY POSITION VRI-4 AND INSTALL ON POSITION VRI-5. (THIS WIRING CHANGE IS MADE INTERNALLY OF THE SUPPLY ASSEMBLY DIRECTLY ON THE TRANSFORMER.)

## 1406

- (A) 415 WATT REGULATOR IN 1406 GATE 06B8. (NOT ON EARLIER SYSTEMS) REMOVE WIRE FROM TB POSITION 4 AND INSTALL ON TB POSITION 5.

## 1403

- (A) ONLY THE CHAIN MOTOR IS AFFECTED. WIRE TB7 AS PER WIRING DIAGRAM PAGE 01.09.1.

## 1405

- (A) CHANGE TRANSFORMER TAPS FOR 3 TRANSFORMERS AS SHOWN ON LOGIC PAGES 75.58.11 AND 75.58.21.

## 1407

- (A) NO CHANGE REQUIRED.

## 1409

- (A) INPUT TRANSFORMERS, GATE 47C4  
REMOVE REAR COVER, REMOVE CONNECTION AT TERMINAL #4 AND RECONNECT TO TERMINAL #5

DATE	EC NO	DATE	EC NO	DATE	EC NO
SEE INDEX CARD		11-20-61	113401	8-2-62	115586
3-12-63	116775	9-24-63	118575H	5-21-64	114096
8-11-64	114215	2-19-65	123446		

7330

(A) REFER TO 7330 SERVICE AID CEM - NUMBER 73

729

(A) ADD F/B 352075. THIS BILL INCLUDES A 230V TO 208V STEPDOWN TRANSFORMER.

1311

MOD IV AND MOD II

REFER TO CUSTOMER ENGINEERING REFERENCE MANUAL SUPPLEMENT (NUMBER 227-5758-X)  
FIGURE 1-3

METER DEVICES

(A) METER POWER SUPPLY (ALL CONFIGURATIONS ONLY THE INPUT AC POWER TO THE TRANSFORMER IS CHANGED. MOVE WIRE FROM TB-AC-4 TO TB-AC-5.

- 1.1 IF IT IS NECESSARY TO CHANGE THE SYSTEM FROM 230V TO 208V REVERSE THE INSTRUCTIONS IN STEP 1.0 ABOVE.
- 1.2 IF A VOLTAGE CHANGE IS MADE ON THE SYSTEM ENTER AN MES ORDER SO THAT RECORDS WILL BE PROPERLY UPDATED.
- 1.3 PROCEED NEXT TO STEP 16.
- 2.0 RUN PRINTER WITH PROCESS UNIT WITH NO INFORMATION IN THE PRINT AREA.
- 2.1 A. IF THE 1401 MACHINE NO. IS 10000-20000, PROCEED NEXT TO STEP 2.3.
- 2.2 B. IF THE 1401 MACHINE NO. IS 20000-AND ABOVE, SKIP STEP 2.3 AND PROCEED NEXT TO STEP 2.4.
- 2.3 TEST RESET CHECK CIRCUIT AS FOLLOWS:
- (A) CLEAR THE ENTIRE PRINT AREA AND EXECUTE A PRINT OPERATION WITH THE SCOPE SYNC ON C17N +U NOT FIRST SCAN GOING PLUS ON 36.35.11.1 (01A6).
- (B) SCOPE B03N AND B04N ON GATE 01B5, LOGIC 36.37.51.1 SHOULD GO TO +T WHEN NOT PRINTING AND -T WHEN PRINTING. SCOPE D03H, G AND D04G LOGIC 36.37.41.1 AND C04H, G AND D04H LOGIC 36.39.91.1 THEY SHOULD BE AT +T WHEN NOT PRINTING. WHEN PRINTING THEY WILL GO +T IN THE HALF OF A SUBSCAN JUST PRIOR TO THE TIME 1/6 OF THE HAMMERS MAY BE OPTIONED TO PRINT (SIX RESETS PER PRINT SCAN).
- (C) SCOPE PIN E OF TRIGGER IN E21 ON 01B5, LOGIC 36.37.51.1 SHOULD TURN ON (GO TO +U) 110 USEC AFTER SYNC GOES POSITIVE. SHOULD TURN OFF 220 USEC AFTER IT TURNS ON. PATTERN SHOULD REPEAT ITSELF EVERY 555 USEC WHILE PRINTING.
- (D) SCOPE PIN E OF TRIGGER IN F20 ON 01B5, LOGIC 36.37.51.1 SHOULD TURN ON (GO TO +U) 190 USEC AFTER SYNC GOES POSITIVE. SHOULD TURN OFF 220 USEC AFTER IT TURNS ON. PATTERN SHOULD REPEAT ITSELF EVERY 555 USEC WHILE PRINTING.
- (E) IF ABOVE TRIGGERS ARE OPERATING PROPERLY, PROCEED TO STEP F. IF NOT, THE HAMMER DRIVER RESETS ARE NOT WORKING PROPERLY. CHECK LOGIC ON 36.37.41.1 TO GET RESETS WORKING PROPERLY. THEN REPEAT STEPS C AND D THEN PROCEED TO F IF C AND D ARE O.K.
- (F) SCOPE PIN G OF F02 ON 01B5 (LOGIC 36.37.51.1) FOR THE FOLLOWING STEPS.
- (G) BEING VERY CAREFUL, TIE PIN E OF TRIGGER IN E21 TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4B ON 36.37.51.1, AND PIN G OF F02 ON 01B5 SHOULD GO TO +U AND STAY THERE BECAUSE THE RESET CHECK LATCH HAS BEEN "SET" WHICH WILL HOLD ALL THE HAMMER DRIVERS RESET. AFTER REMOVING CLIP LEAD, RESET THE LATCH WITH THE I-O CHECK RESET SWITCH.
- (H) TIE E21H TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4C AND RESULT SHOULD BE AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (I) TIE F20E TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4D AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (J) TIE F20H TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4E AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (K) A WITH PRINT STORAGE - TIE E20B TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 3F AND 4F AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- B WITHOUT PRINT STORAGE - TIE F15B TO "GROUND" WITH CLIP LEAD WHILE EXECUTING A PRINT OPERATION. THIS CHECKS LOGIC BLOCK 2G AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (L) A WITH PRINT STORAGE - OPEN T-FRAME ON 1403 WHILE EXECUTING THE ABOVE PRINT OPERATION WITH THE PRINT AREA CLEAR. THIS CHECKS LOGIC BLOCKS 5J AND 6J ON LOGIC 36.31.01.1 (GATE 01A6). RESULT SHOULD BE THE SAME AS FOR STEP G. RESET THE LATCH WITH THE I-O CHECK RESET SWITCH.
- B WITHOUT PRINT STORAGE - OPEN T-FRAME ON 1403 WHILE EXECUTING THE ABOVE PRINT OPERATION WITH THE PRINT AREA CLEAR. THIS CHECKS LOGIC BLOCKS 4J, 5J, AND 6J ON LOGIC 36.31.01.1 (GATE 01A6) AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET THE LATCH WITH THE I-O CHECK RESET SWITCH.

DATE	EC NO	DATE	EC NO	DATE	EC NO
SEE INDEX CARD		11-20-61	113401	8-2-62	115586
3-12-63	116775	9-24-63	118575H	5-21-64	114096
8-11-64	114215	2-19-65	123446		



- (M) TRY TO PRINT IN ONE POSITION ONLY. IF O.K., EXPAND THE PRINT FIELD. AFTER PRINTING IN ALL POSITIONS CHECK TO SEE THAT THE -60V HAMMER RESPONSE COMMON FUSES (2) ARE NOT BLOWN. IF FUSES HAVE BLOWN AND BLOW A SECOND TIME, CHECK FOR GROUNDS ON THE HAMMER RESPONSE LINES.

## 2.4 TEST RESET CHECK CIRCUIT AS FOLLOWS:

- (A) CLEAR THE ENTIRE PRINT AREA AND EXECUTE A PRINT OPERATION WITH THE SCOPE SYNC ON CIIN -T NOT FIRST SCAN GOING NEGATIVE ON 36.35.11.2 (01A6).
- (B) SCOPE B03N AND B04N ON GATE 01B5, LOGIC 36.37.51.2 SHOULD GO TO +T WHEN NOT PRINTING AND -T WHEN PRINTING. SCOPE D03H, G AND D04G LOGIC 36.37.41.2 AND C04H, G AND D04H LOGIC 36.39.91.2. THEY SHOULD BE AT +T WHEN NOT PRINTING. WHEN PRINTING, THEY WILL GO +T IN THE HALF OF A SUBSCAN JUST PRIOR TO THE TIME 1/6 OF THE HAMMERS MAY BE OPTIONED TO PRINT (SIX RESETS PER PRINT SCAN).
- (C) SCOPE PIN E OF TRIGGER IN E21 ON 01B5, LOGIC 36.37.51.2 SHOULD TURN ON (GO TO +U) 110 USEC AFTER SYNC GOES NEGATIVE. SHOULD TURN OFF 220 USEC AFTER IT TURNS ON. PATTERN SHOULD REPEAT ITSELF EVERY 555 USEC WHILE PRINTING.
- (D) SCOPE PIN E OF TRIGGER IN F20 ON 01B5, LOGIC 36.37.51.2 SHOULD TURN ON (GO TO +U) 190 USEC AFTER SYNC GOES NEGATIVE. SHOULD TURN OFF 220 USEC AFTER IT TURNS ON. PATTERN SHOULD REPEAT ITSELF EVERY 555 USEC WHILE PRINTING.
- (E) IF ABOVE TRIGGERS ARE OPERATING PROPERLY, PROCEED TO STEP F. IF NOT THE HAMMER DRIVER RESETS ARE NOT WORKING PROPERLY. CHECK LOGIC ON 36.37.41.2 TO GET RESETS WORKING PROPERLY. THEN REPEAT STEPS C AND D. THEN PROCEED TO F IF C AND D ARE O.K.
- (F) SCOPE PIN G OF F02 ON 01B5 (LOGIC 36.37.51.2) FOR THE FOLLOWING STEPS.
- (G) BEING VERY CAREFUL, TIE PIN E OF TRIGGER IN E21 TO "GROUND" WITH CLIP LEAD. THIS CHECKS BLOCK 4B AND 36.37.51.2 AND PIN G OF F02 ON 01B5. SHOULD GO TO +U AND STAY THERE BECAUSE THE RESET CHECK LATCH HAS BEEN "SET" WHICH WILL HOLD ALL THE HAMMER DRIVERS RESET. AFTER REMOVING CLIP LEAD, RESET THE LATCH WITH THE I-O CHECK RESET SWITCH.
- (H) TIE E21H TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4C AND RESULT SHOULD BE AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (I) TIE F20E TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4D AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (J) TIE F20H TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCK 4E AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (K) A WITH PRINT STORAGE - TIE E20B TO "GROUND" WITH CLIP LEAD. THIS CHECKS LOGIC BLOCKS 3F AND 4F AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.  
B WITHOUT PRINT STORAGE - TIE F15B TO "GROUND" WITH CLIP LEAD WHILE EXECUTING A PRINT OPERATION. THIS CHECKS LOGIC BLOCK 2G AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET LATCH AS FOR STEP G.
- (L) A WITH PRINT STORAGE - OPEN T-FRAME ON 1403 WHILE EXECUTING THE ABOVE PRINT OPERATION WITH THE PRINT AREA CLEAR. THIS CHECKS BLOCK 6G (OR 6F) LOGIC 36.31.11.2 (GATE 01A6) AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET THE LATCH WITH THE I-O CHECK RESET SWITCH..  
B WITHOUT PRINT STORAGE - OPEN T-FRAME ON 1403 WHILE EXECUTING THE ABOVE PRINT OPERATION WITH THE PRINT AREA CLEAR. THIS CHECKS LOGIC BLOCK 6G ON LOGIC 36.31.11.2 (GATE 01A6) AND RESULT SHOULD BE THE SAME AS FOR STEP G. RESET THE LATCH WITH THE I-O CHECK RESET SWITCH.
- (M) TRY TO PRINT IN ONE POSITION ONLY. IF O.K., EXPAND THE PRINT FIELD. AFTER PRINTING IN ALL POSITIONS CHECK TO SEE THAT THE -60V HAMMER RESPONSE COMMON FUSES (2) ARE NOT BLOWN. IF FUSES HAVE BLOWN AND BLOW A SECOND TIME, CHECK FOR GROUNDS ON THE HAMMER RESPONSE LINES.

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8-11-64	114215	2-19-65	123446		



LOGIC #	MACH	STAGE II	PART #	EC #
99.99.99.0	1401		723163	113544

POWER SUPPLY WIRING SCHEMATIC

PLUS/MINUS 6V AT 8 AMPS	473401
PLUS/MINUS 6V AT 12 AMPS	207208
PLUS/MINUS 6V AT 12 AMPS	473461
PLUS/MINUS 6V AT 16 AMPS	207211
PLUS/MINUS 6V AT 16 AMPS	473471
PLUS/MINUS 12V AT 12 AMPS	207232
PLUS/MINUS 12V AT 12 AMPS	473501
PLUS/MINUS 20V AT 6 AMPS	477221
PLUS/MINUS 20V AT 15 AMPS	207241
PLUS/MINUS 20V AT 15 AMPS	473431
PLUS/MINUS 30V AT 7 AMPS	210089
PLUS/MINUS 30V AT 7 AMPS	473561
PLUS/MINUS 3V MC AT 5 AMPS	477281
PLUS/MINUS 3V MC AT 5 AMPS	210864
PLUS/MINUS 12V AT 20 AMPS	208259
PLUS/MINUS 12V AT 20 AMPS	473381
PLUS/MINUS 60V AT 10 AMPS	220903
PLUS/MINUS 60V AT 20 AMPS	480766

SMS O/V PROTECTION SCHEMATIC

6V SUPPLIES	208948
12V SUPPLIES	208961
30V SUPPLIES	208968

LOGIC NO.	MACH	SMS CARD CAP CODE INDEX	PART NO.	EC NO.
99.99.99.9	1401		0723162	120070

CARD CAP	NAME	PART NO.	REF NO.	C.E. REF NO.
	CTDL FAMILY DELAY INFO 3 SHEETS			729955
	SDTDL FAMILY DELAY INFO 4 SHEETS			729954
AA F-	ALLOY UNIVERSAL DELAY CIRCUIT	371884	371884	729800
AD B-	CARD ASM TSTR ALY STOR ADDRESS REG	373000	373000	729801
AE A-	CTDL LOAD CARD	371929	371929	729802
AE C-	ALLOY HAMMER DRIVER LATCH	371940	371940	729803
AE D-	CTDL HIGH SPEED TRIGGER	371946	371946	729804
AE N-	ALLOY HAMMER DP LATCH - HIGH SPEED	371415	371415	729805
AE E-	POWER SUPPLY SEQUENCING	371945	370429	729953
AJ H-	POWER SUPPLY SEQUENCING	370429	370429	729953
AJ T-	ALLOY DIODES TYPE AAS	370564	370564	729902
AK B-	ALLOY MEMORY THERMAL SWITCHES	370425	370425	729806
AK C-	MEMORY EMITTER RESISTORS	370426	370426	729807
AM --	ALLOY ONE WAY N BLOCK	371203	370904	729808
AQ Q-	GENERAL DELAY CIRCUIT	370703	370703	734340
AQ U-	ALLOY SWITCH DECODER NO 2	370833	370833	729809
AQ V-	ALLOY Z DRIVER 12V	370834	370834	729810
AQ W-	ALLOY CURRENT SOURCE	370835	370835	729811
AQ X-	SENSE FINAL AMPLIFIER	370836	370836	729812
AS U-	SENSE AMPL RECTIFIER + CLIPPER	372285	372285	729956
CA C-	CTDL + AND GATE	371922	371922	729813
CE A-	DELAY LINE LUMPED 1 USEC	371944	371944	729814
CE D-	STANDARD CABLE TERMINATOR	370145	370145	729815
CE E-	CTDL PNP THREE WAY + GATE	370140	370140	729816
CE H-	CTDL INVERTER LATCH NPN	370139	370139	729817
CE K-	CTDL PNP INVERTER LATCH	370143	370143	729818
CE M-	CTDL-CARD TSTR T LINE LATCH	370357	370357	729819
C6 --	CTDL TWO WAY AND PNP NO LOADS	371263	370975	729820
C6 VW	CTDL TWO WAY AND PNP TWO LOADS	371261	370975	729822
C6 VV	CTDL TWO WAY AND PNP ONE LOAD	371262	370975	729821
C6 WW	CTDL TWO WAY AND PNP ALL LOADS	371251	370975	729823
CH --	CTDL TWO WAY AND NPN NO LOADS	371266	370976	729824
CH VV	CTDL TWO WAY AND NPN ONE LOAD	371265	370976	729825
CH VW	CTDL TWO WAY AND NPN TWO LOADS	371264	370976	729826
CH WW	CTDL TWO WAY AND NPN ALL LOADS	371252	370976	729827
CJ VU	CTDL 3 WAY AND PNP ONE LOAD	371267	370977	729828
CJ WF	CTDL 3 WAY AND PNP NO LOADS	371268	370977	729829
CJ WV	CTDL 3 WAY AND PNP ALL LOADS	371253	370977	729830
CJ YC	CTDL 3 WAY AND PNP ALL LOADS	371071	370977	729831
CK VU	CTDL 3 WAY AND NPN ONE LOAD	371269	370978	729832
CK WF	CTDL 3 WAY AND NPN NO LOADS	371270	370978	729833
CK WV	CTDL 3 WAY AND NPN ALL LOADS	371254	370978	729834
CK YC	CTDL 3 WAY AND NPN ALL LOADS	371072	370978	729835
CL VQ	CTDL EXTENDER CARD	371255	370979	729836
CL VR	CTDL EXTENDER CARD	371075	370979	729837
CL VS	CTDL N OR EXTENDER CARD	371074	370979	729838
CL VT	CTDL +P OR EXTENDER CARD	371073	370979	729839
CM --	CTDL COUPLING NETWORK	371256	371256	729840
CN WT	CTDL EMITTER FOLLOWER NPN	371260	371260	729841

LOGIC NO.	MACH	SMS CARD CAP CODE INDEX	PART NO.	EC NO.
99.99.99.9	1401		0723162	120070

CARD CAP	NAME	PART NO.	REF NO.	C.E. REF NO.
CN WU	CTDL TRANSLATE BLOCK NPN	371258	371258	729842
CP WT	CTDL EMITTER FOLLOWER PNP	371259	371259	729843
CP WU	CTDL TRANSLATE BLOCK PNP	371257	371257	729844
CQ --	CTDL ONE WAY PNP NO LOADS	371273	370981	729845
CQ YG	CTDL ONE WAY PNP ONE LOAD	371278	370981	729846
CQ ZT	CTDL ONE WAY PNP 2 LOADS	371272	370981	729847
CQ ZV	CTDL ONE WAY PNP ALL LOADS	371271	370981	729848
CR --	CTDL ONE WAY NPN NO LOADS	371276	370980	729849
CR YG	CTDL ONE WAY NPN ONE LOAD	371277	370980	729850
CR ZT	CTDL ONE WAY NPN 2 LOADS	371275	370980	729851
CR ZV	CTDL ONE WAY NPN ALL LOADS	371274	370980	729852
CW --	CTDL TRIGGER	371534	371534	729853
CY --	CTDL POWER INVERTER	371542	371542	729854
DA B-	DTDL AND GATE	371924	371924	729855
DA Z-	DIFF BASE OSCILLATOR 240KC S L GATED	370127	370127	729903
DB Z-	CONV DIFF BASE S P LINE TO SDTRL	370385	370385	729904
DC K-	CONV DIFF BASE N L TO SDTRL OR SDTDL	370468	370468	729905
DE F-	SDTDL FOUR 2 WAY N AND LOG BCKS W LD	370216	370216	729906
DE G-	SDTDL 4 2 WAY N + LOGIC BLKS W'O LDS	370217	370217	729907
DE J-	SDTDL 3 WAY IN + LOGIC BLK W'O LOADS	370219	370219	729908
DF J-	TDL + TRL LOAD CARD	370232	370232	729909
DF Q-	SDTDL INVERTING POWER DRIVER	370225	370225	729910
DF R-	SDTDL NON INVERTING POWER DRIVER	370226	370226	729911
DG P-	CARD ASM TSTR CLK + WITH EMIT FOL DR	370343	370343	729856
DG Q	CARD ASM TSTR CLK + WITH EMIT DR	370342	370342	729857
DG S-	SDTDL INDICATOR DRIVER	370347	370347	729912
DG T-	SDTDL 2 WAY LOGIC BLCK LOW SP W LDS	370380	370380	729913
DG U-	SDTDL 3 WAY LOGIC BLK LOW SP W'O LDS	370379	370379	729914
DG V-	SDTDL 2 WAY LOGIC BLCK LOW SP W LDS	370378	370378	729915
DG W-	SDTDL 3 WAY LOGIC BLCK LOW SP W'O LD	370377	370377	729916
DG X-	SDTDL 5 WAY LOGIC BLCK LOW SP W LDS	370376	370955	729917
DG Y-	SDTDL 5 WAY LOGIC BLCK LOW SP W'O LD	370375	370955	729918
DG Z-	SDTDL 10 WAY LOG BLK LOW SP W LOAD	370373	370955	729919
DH A-	SDTDL 10 WAY LOG BLK LOW SP W'O LOADS	370374	370955	729920
DH B-	SDTRL INVERTER LOW SPEED WITH LOAD	370340	370950	729921
DH C-	SDTDL INVERTER LOW SPEED W'O LOAD	370372	370950	729922
DH D-	SDTDL + SDTRL 3K RESISTOR CARD	370371	370371	729923
DH E-	SDTRL SINGLE SHOT	370262	370262	729924
DH F-	SDTDL TRIGGER AND DRIVER	370350	370350	729925
DH G-	SDTDL RAND W RFG BIT POS	370351	370351	729926
DH H-	SDTDL DBL LEVEL LB 42A LOW SP W'O LDS	370358	370358	729927
DH J-	SDTDL MUP NUMBER 4	370352	370352	729928
DH K-	SDTDL LATCH WITH GATE OUT	370349	370349	729929
DJ D-	TWIN CARD ASM FILE PROGRAM SKIP	373336	373336	373336
DJ E-	TWIN CARD ASM FILE OP DECODE	373333	373333	373333
DJ F-	TWIN CARD ASM LINE DRIVERS	373335	373335	373335
DK A-	ALLOY CURRENT SOURCE	370443	370443	729858
DZ A-	SENSE AMPL RECTIFIER + CLIPPER	372359	372359	729957
EY --	DRIFT DRIVER RESISTOR	371199	371199	729930
FP --	ALLOY LOAD RESISTOR	371453	371453	729859

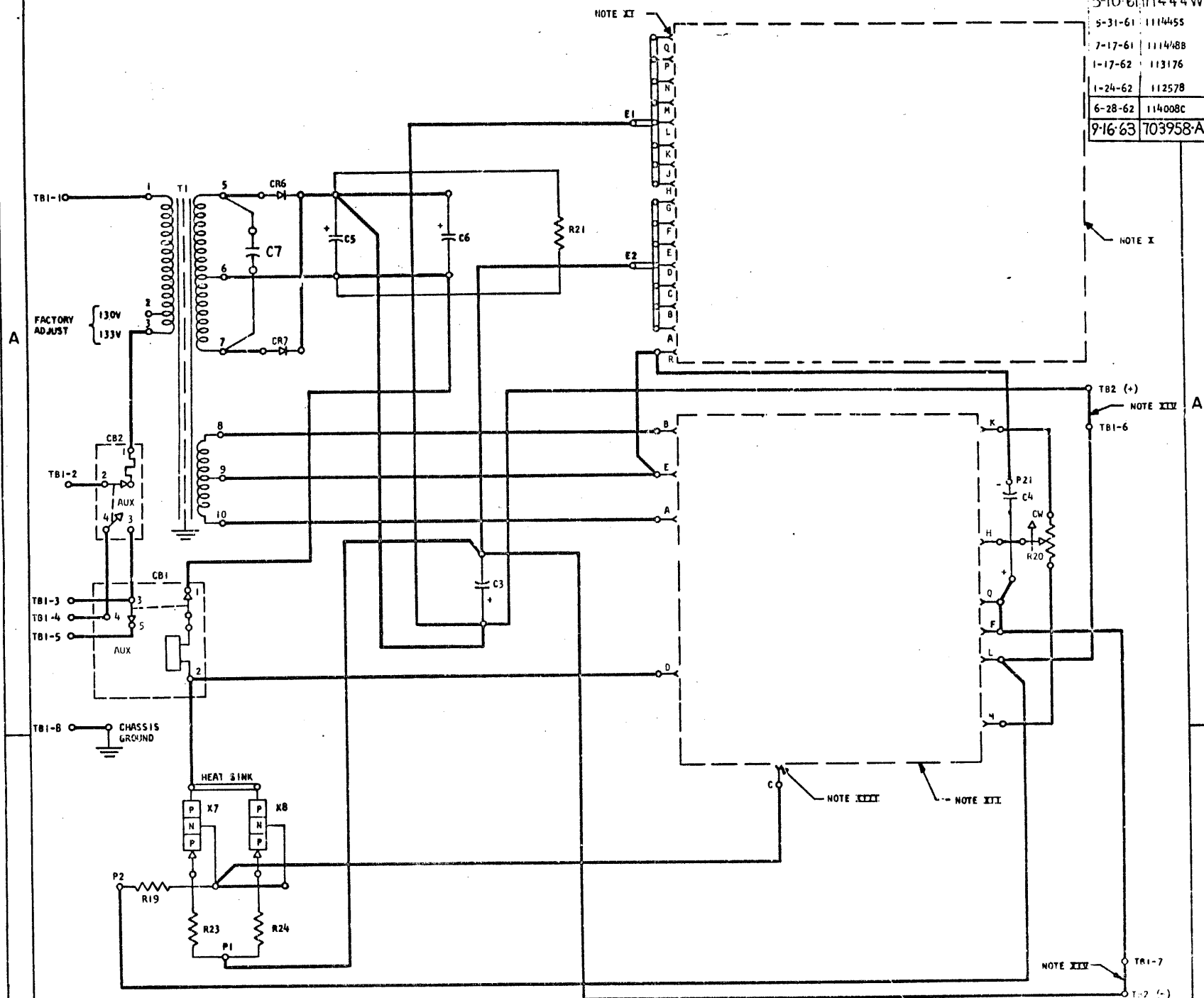
LOGIC NO.	MACH	SMS CARD CAP CODE INDEX	PART NO.	EC NO.
99.99.99.9	1401		0723162	120070

CARD CAP	NAME	PART NO.	REF NO.	C.E. REF NO.
FT --	ALLOY JSC 360KC FREE RUN CRYSTAL	371405	371405	729860
FW --	ALLOY SWITCHES	371490	371490	729861
6J --	GENERAL PURPOSE FILTER CARD	371501	371501	729862
6K --	CABLE DE COUPLE CARD	371533	371533	729931
HB --	CAP SENSE AMP NPN NO LOADS	371561	371561	741800
HB WW	CAP SENSE AMP NPN ALL LOADS	371500	371500	741416
HN --	ALLOY DRIVERS READ WRITE VM	371463	371463	729863
JB --	CTRL OSC 10KC FREE RUNNING CRYSTAL	371245	371245	729932
JF --	CTDL HI SPEED 1 WAY PNP NO LOADS	371579	370982	729864
JF VA	HIGH SPEED ONE WAY PNP ONE LOAD	371578	370982	729865
JF VN	CTDL HIGH SPEED ONE WAY PNP TWO LOAD	371577	370982	729866
JF VP	CTDL HIGH SPEED ONE WAY PNP ALL LOAD	371576	370982	729867
J6 --	CTDL HI SPEED 2 WAY AND PNP NO LOADS	371583	370983	729868
J6 VV	CTDL HI SPEED 2 WAY AND PNP ONE LOAD	371582	370983	729869
J6 VW	CTDL HI SPEED 2 WAY AND PNP 2 LOADS	371581	370983	729870
J6 WW	CTDL HI SPEED 2 WAY AND PNP ALL LOAD	371580	370983	729871
JH --	CTDL HIGH SPEED 3 WAY AND NO LOADS 6	371586	370984	729872
JH VU	CTDL HI SPEED 3 WAY AND PNP ONE LOAD	371585	370984	729873
JH WV	CTDL HI SPEED 3 WAY AND PNP ALL LOAD	371584	370984	729874
JJ --	CTDL HIGH SPEED ONE WAY NPN NO LOADS	371590	370985	729875
JJ VA	CTDL HIGH SPEED ONE WAY NPN ONE LOAD	371589	370985	729876
JJ VN	CTDL HI SPEED 1 WAY TWO LOADS	371588	370985	729877
JJ VP	CTDL HIGH SPEED ONE WAY NPN ALL LOAD	371587	370985	729878
JL VB	CTDL LOGIC INVERTER PNP ALL LOADS	371077	371077	729879
JM VB	CTDL LOGIC INVERTER NPN ALL LOADS	371079	371079	729880
JN --	CTDL TRIGGER GATE EXTENDER	371081	371081	729881
JZ --	CTDL TRIGGER NO 2	371082	371082	729882
KA --	INDICATOR DRIVER 40 MA	371546	371546	729883
NB --	CTDL SINGLE SHOT T INPUT	371591	371591	729884
NC --	CTDL SINGLE SHOT U INPUT	371592	371592	729885
NG TF	CTDL INTEGRATOR -U AND -T	371635	371635	729886
NG XX	CTDL INTEGRATOR -U AND -T	371996	371996	729887
NT --	ALLOY DIFFERENCE AMPLIFIER	371671	371671	729888
NU --	CTDL POWER INVERTER TYPE	371676	371676	729889
NW --	270 MEG RESISTOR CARD	371598	371598	729890
PP --	CTDL EMITTER FOLLOWER PNP	371365	371365	729891
PQ --	CTDL EMITTER FOLLOWER NPN	371370	371370	729892
QC --	ALLOY CLUTCH MAGNETIC DRIVER	371633	371633	729893
QD --	ALLOY RELAY DRIVER	371078	371078	729894
RK --	ALLOY OSC 347.5KC FREE RUN CRYSTAL	371788	371788	729895
TA B-	SDTRL 93 COAX LINE DR DISPERSED LDS	370066	370066	729933
TB 6-	SDTRL OSCILLATOR 320 KC S LINE GATED	370296	370296	729934
TB Q-	SDTRL OSCILLATOR 115 KC S LINE GATED	370295	370295	729935
TB R-	SDTRL OSCILLATOR 360 KC S LINE GATED	370297	370297	729936
TB S-	SDTRL OSCILLATOR 667 KC S LINE GATED	370298	370298	729937
TB V-	SDTRL OSCILLATOR 1 MC S LINE GATED	370299	370299	729938
TC K-	SDTRL END OF LINE TERMINATORS	370334	370334	729939
TD B-	SDTRL DIST LINE TERM W OPT LD RESIST	370389	370389	729940
TD C-	SDTDL SDTRL 6.67 KC OSCILLATOR	370401	370401	729941
TD D-	SDTDL SDTRL 115 KC OSCILLATOR	370400	370400	729942

LOGIC NO.	MACH	SMS CARD CAP CODE INDEX	PART NO.	EC NO.
99.99.99.9	1401		0723162	120070

CARD CAP	NAME	PART NO.	REF NO.	C.E. REF NO.
TD E-	SDTDL SDTRL 240 KC OSCILLATOR	370399	370399	729943
TD F-	SDTDL SDTRL 320 KC OSCILLATOR	370398	370398	729944
TD G-	SDTDL SDTRL 360 KC OSCILLATOR	370397	370397	729945
TD H-	SDTDL SDTRL 667 KC OSCILLATOR	370396	370396	729946
TD K-	SDTDL SDTRL 1 MC OSCILLATOR	370551	370551	729947
WL -	ALLOY SENSE AMPLIFIER NO 2	371898	371898	729896
WX -	ALLOY AMPLIFIER PRE SENSE NO 1	371899	371899	729897
YB Y-	SENSE AMPL INPUT FILTER AND SEL GATE	370417	370417	729948
YB Z-	SENSE AMPL RECTIFIER + CLIPPER	370418	370418	729949
YC A-	SENSE AMPL-CLIPPING LEVEL CONTROL	370419	370419	370419
YC B-	SENSE AMPL SEL 6 READ 6 + BD P CTRL	370420	370420	729950
YC C-	PEAK DETECTOR INTEGATOR + V M DRIVER	370421	370421	729951
YD M-	SENSE AMPLIFIER CLIPPING LEVEL CTR	370501	370501	729952
Y6 A-	POWER SUPPLY 6V OVERVOLTAGE	370575	370575	370575
Y6 B-	POWER SUPPLY 12V OVERVOLTAGE	370576	370576	370576
Y6 D-	POWER SUPPLY 30V OVERVOLTAGE	370578	370578	370578
Y6 E-	POWER SUPPLY 20V OVERVOLTAGE	370579	370579	370579
Y6 F-	POWER SUPPLY 20V AMPLIFIER	370607	370607	370607
Y6 G-	POWER SUPPLY 30V AMPLIFIER	370608	370608	370608
Y6 K-	POWER SUPPLY 20V 15A AMPLIFIER	370611	370611	370611
Y6 L-	POWER SUPPLY 6V AMPLIFIER	370612	370612	370612
Y6 M-	POWER SUPPLY 12V AMPLIFIER REF-6V	370613	370613	370613
Y6 Q-	POWER SUPPLY 3V AMPLIFIER	370616	370616	370616
ZK V-	ETH DELAY CIRCUIT	372687	372687	740601
2J MX	CTDL NPN TWO WAY GATE W <sup>2</sup> COLL LOAD	370144	370144	729898
3J MX	PNO TWO-WAY WITHOUT COLLECTORS LD	370141	370141	729899
4J MX	CTDL PNP TWO WAY GATE WITH COLL LOAD	370142	370142	729900
6J XD	CTDL STANDARD CABLE DRIVER	370089	370089	729901
AM	ALLOY-FIELD REPLACEMENT, AM CARD	370904		370904
CG	CTDL 2 WAY AND PNP FIELD REPLACEMENT	370975		370975
CH	CTDL 2 WAY AND NPN FIELD REPLACEMENT	370976		370976
CJ	CTDL 3 WAY AND PNP FIELD REPLACEMENT	370977		370977
CK	CTDL 3 WAY AND NPN FIELD REPLACEMENT	370978		370978
CL	CTDL EXTENDER CARD FIELD REPLACEMENT	370979		370979
CQ	CTDL 1 WAY PNP FIELD REPLACEMENT	370981		370981
CR	CTDL 1 WAY NPN FIELD REPLACEMENT	370980		370980
JF	CTDL HI SPEED 1 WAY PNP FLD REPLACE	370982		370982
JG	CTDL HI SPEED 2 WAY AND PNP FLD REP	370983		370983
JH	CTDL HI SPEED 3 WAY AND PNP FLD REP	370984	370984	370984
JJ	CTDL HI SPEED 1 WAY NPN FLD REPLACE	370985	370985	370985
5Y **	FIELD REPLACEMENT <sup>4</sup> 5	370950	370950	370950
6Y **	FIELD REPLACEMENT <sup>4</sup> 6	370955	370955	370955

5-10-61	111444W
5-31-61	111445S
7-17-61	111448B
1-17-62	113176
1-24-62	112578
6-28-62	114008C
9-16-63	703958-A

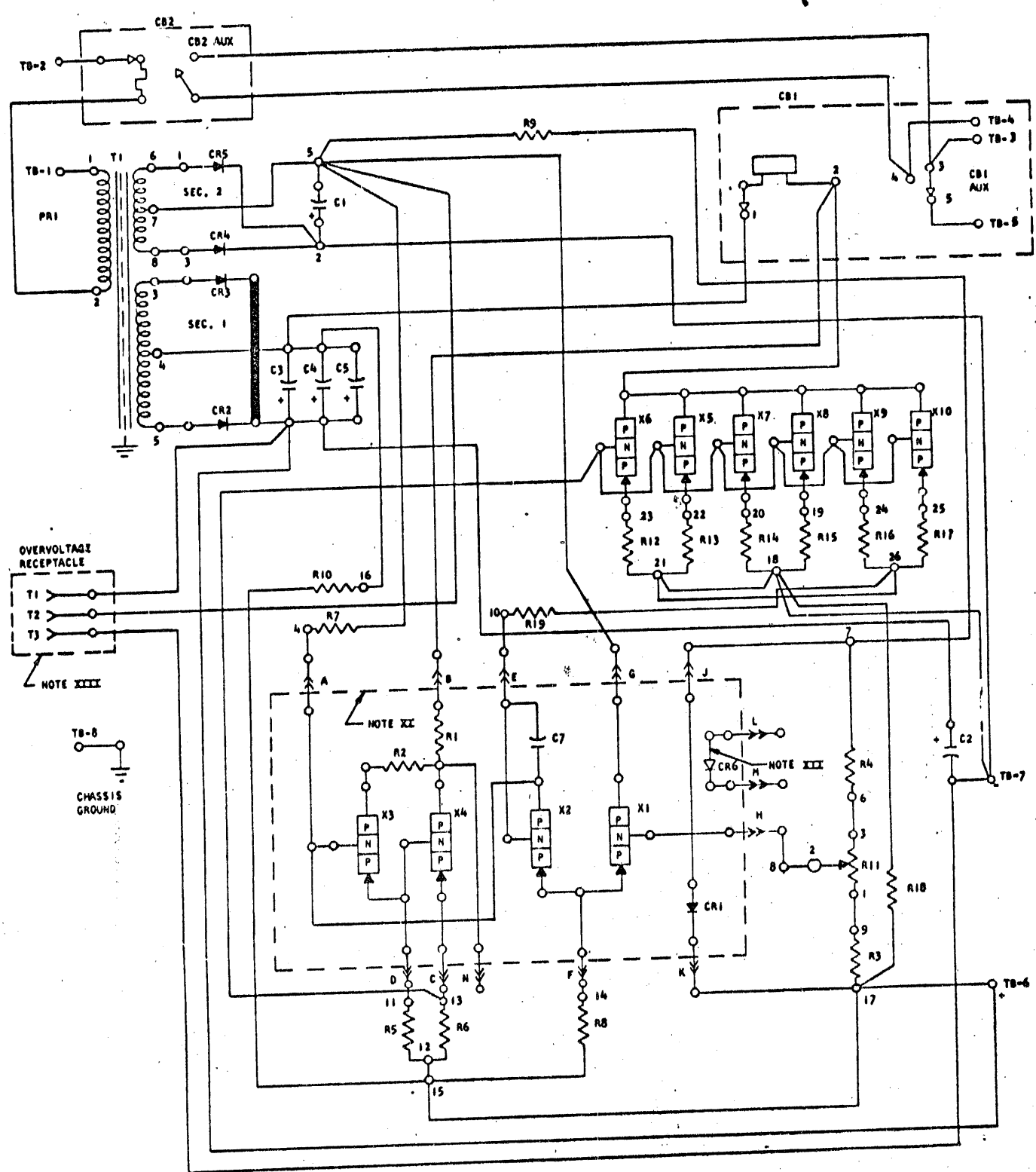


CODE	PART NO	DESCRIPTION	CODE	PART NO	DESCRIPTION
			R20	207340	POTENTIOMETER 250 OHM 1/2W
C3	208296	CAPACITOR 7,750MFD 10V DC	R21	322888	RESISTOR 100 OHM 2W
C4	208229	CAPACITOR 700 MFD 15V DC			
C5-6	208224	CAPACITOR 14,000 MFD 13V DC	R23-24	207324	RESISTOR 0.1 OHM 5W
C7	491228	CAPACITOR .01MFD 100 VDC			
CB1	208204	CIRCUIT BREAKER			
CB2	220913	CIRCUIT BREAKER			
			T1	472516	TRANSFORMER
CR6-7	598479	RECTIFIER CELL			
			EB-2		BUS PLATE
			TBI		TERMINAL BLOCK
			TB2		TERMINAL BLOCK
A & B		RECEPTACLE	X7-8	362214	TRANSISTOR TYPE 108
R19	372888	RESISTOR 100 OHM 2W			

- NOTES  
 I OVERVOLTAGE CARD ASSEMBLY 370575  
 XI UNIT RECEPTACLE "B"  
 XII COMPONENT CARD ASSEMBLY 370612  
 XIII UNIT RECEPTACLE "A"  
 XIV FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TBI-6 AND TBI-7

NAME	WIRING DIAGRAM-POWER
DESIGN	SUPPLY- 6V DC AT 8 AMP
DETAIL	
CHECK	
APPRO	

DATE	CHANGE NO
6-22-59	105580B
10-1-59	105583B
11-11-59	105584K
12-31-59	105584Y
2-2-60	105585C
3-23-60	105585W
10-26-60	105587L
3-6-61	111215
3-27-61	111432



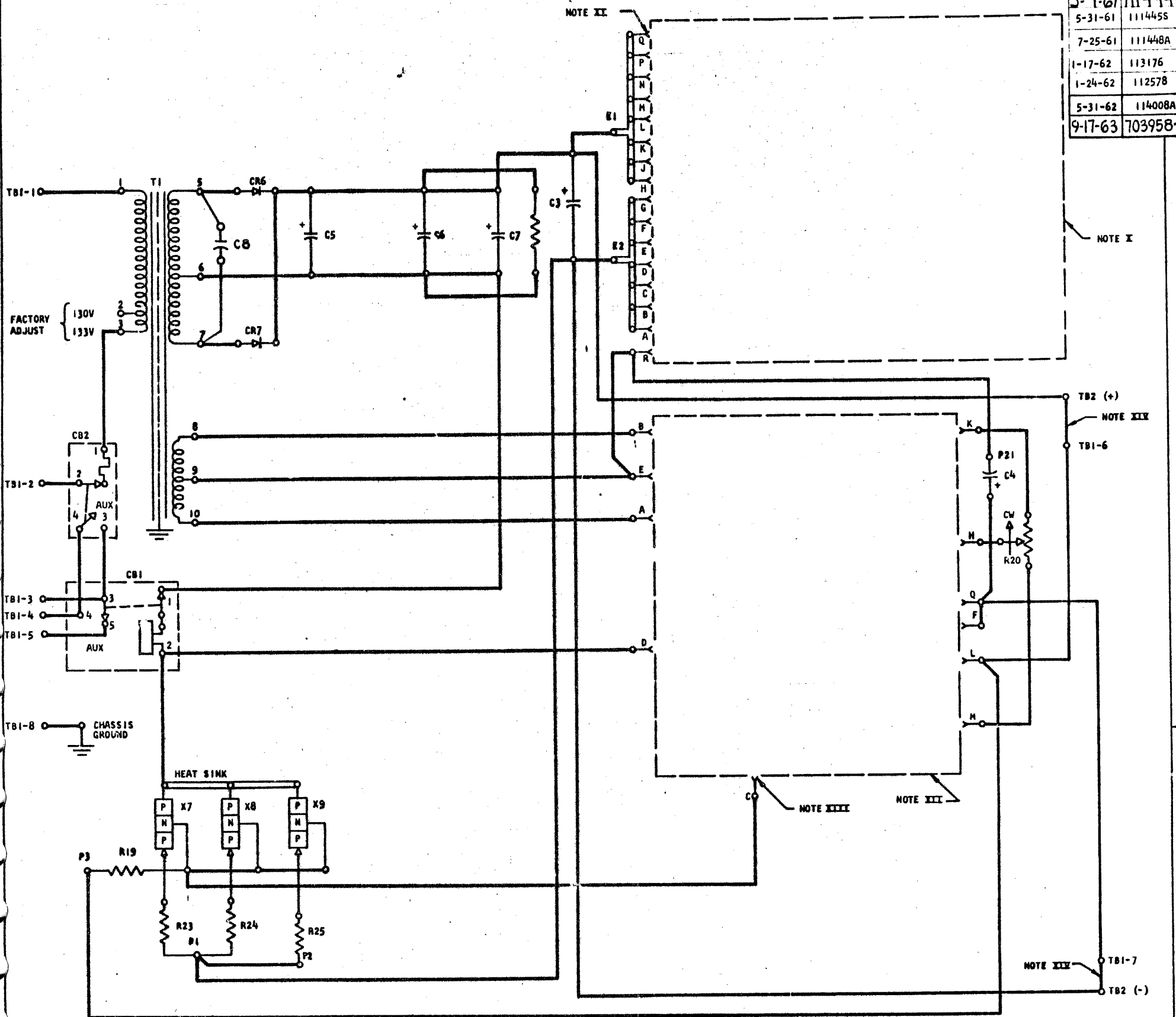
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
T1	207302	TRANSFORMER	R3	208256	RESISTOR 1.9K 5W
C1	207362	CAPACITOR 610 MFD 25V DC	R4	207374	RESISTOR 1.2K 5W
C2	207296	CAPACITOR 7750 MFD 10V DC	R5	317011	RESISTOR 470Ω 1/2W
C3, C5	208224	CAPACITOR 14,000 MFD 13V DC	R6	335329	RESISTOR 47Ω 2W
C7	492411*	CAPACITOR .01 MFD 100V DC	R7	317095	RESISTOR 9.1K 2W
CR1	209002 *	DIODE	R8	2102532	RESISTOR 2K 5W
CR2, CR3	598479	DIODE	R9	207290	RESISTOR 770 Ω 5W
CR4, CR5	207316	DIODE	R10	208190	RESISTOR 70Ω 5W
CB1	209159B	CIRCUIT BREAKER	R11	207340	POTENTIOMETER 250Ω 1/2W
X1, X2	535441 *	TRANSISTOR TYPE 026	R12-R17	207324	RESISTOR 0.1Ω 5W
X3	518689 *	TRANSISTOR TYPE 028	R18	317009	RESISTOR 390Ω 1/2W
X4	207363 *	TRANSISTOR TYPE 036	CR6	491300*	DIODE TYPE NU
X5-X10	209001	TRANSISTOR TYPE	CB2	220915	CIRCUIT BREAKER
R1	207320	RESISTOR 1Ω 5W	R19	317019	RESISTOR 2K 1/2W
R2	207321 *	RESISTOR 2Ω 1W			

NOTES  
 \* - INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY  
 XX COMPONENT CARD ASSEMBLY 371656  
 XXII NOT USED ON 6V SUPPLIES  
 XXIII WHEN THE 6 VOLT OVERVOLTAGE ASSEMBLY NUMBER 208947 IS USED, REFER TO O/V WIRING DIAGRAM NUMBER 208948

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM - POWER SUPPLY -		
	PLUS-MINUS 6V DC AT 12 AMP		
DATE	ACME 5-11-59	BY	MISC
DATE	ACME 5-11-59	BY	NONE
DATE	VO 7-22-59	BY	MDF 6-23-59
DATE	7-22-59	BY	7-2-59

C

DATE	CHANGE NO.
5-9-61	111444-D
5-31-61	111445S
7-25-61	111448A
1-17-62	113176
1-24-62	112578
5-31-62	114008A
9-17-63	703958-B



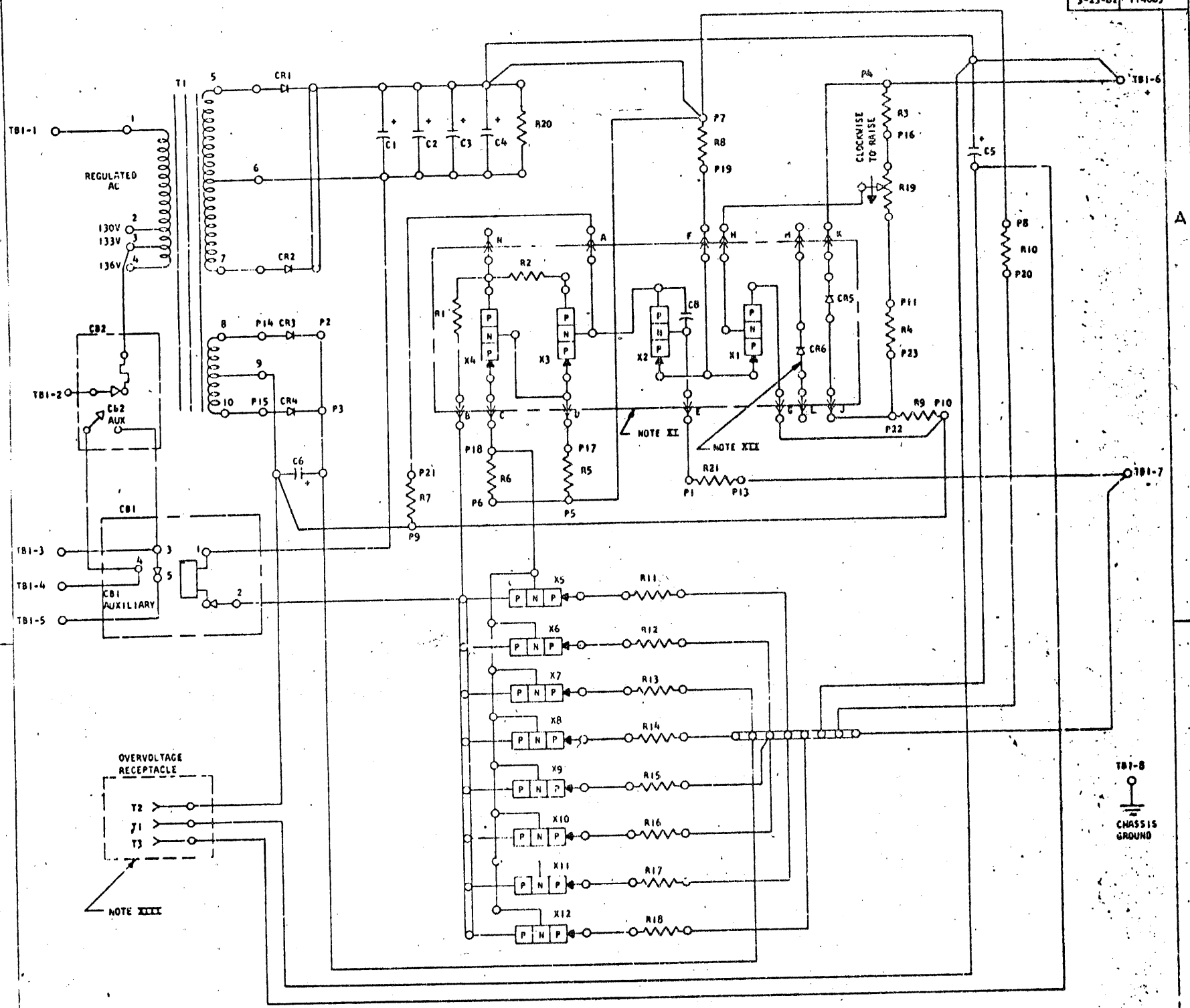
COMPONENT CHART					
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C3	207296	CAPACITOR 7,750 MFD 10V DC	R20	207340	POTENTIOMETER 250 OHM 1/2W
CB	491228	CAPACITOR .01 MF 100 V DC	R21	208190	RESISTOR 70 OHM 5W
C5-7	208224	CAPACITOR 14,000 MFD 13V DC	R23-25	207324	RESISTOR 0.1 OHM 5W
C4	208229	CAPACITOR 700 MFD 15V DC			
CB1	208198	CIRCUIT BREAKER			
CB2	220915	CIRCUIT BREAKER			
			T1	473566	TRANSFORMER
CR6-7	127324	RECTIFIER CELL			
E1-2		BUS PLATE	TB1		TERMINAL BLOCK
A & B		RECEPTACLE	TB2		TERMINAL BLOCK
R19	322888	RESISTOR 100 OHM 2W	X7-9	369214	TRANSISTOR TYPE 10B

NOTES  
 I OVERVOLTAGE CARD ASSEMBLY 370575  
 II UNIT RECEPTACLE "B"  
 III COMPONENT CARD ASSEMBLY 370612  
 XIII UNIT RECEPTACLE "A"  
 XIV FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-6 AND TB1-7

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM - POWER		
SUPPLY - 6V DC AT 12 AMP			
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	MDE 3-11-61
APPRO		CHECK	



DATE	CHANGE NO
8-31-59	105580Y
12-16-59	105584M
1-28-60	105585D
4-5-60	105585V
10-26-60	105587L
3-23-62	114003

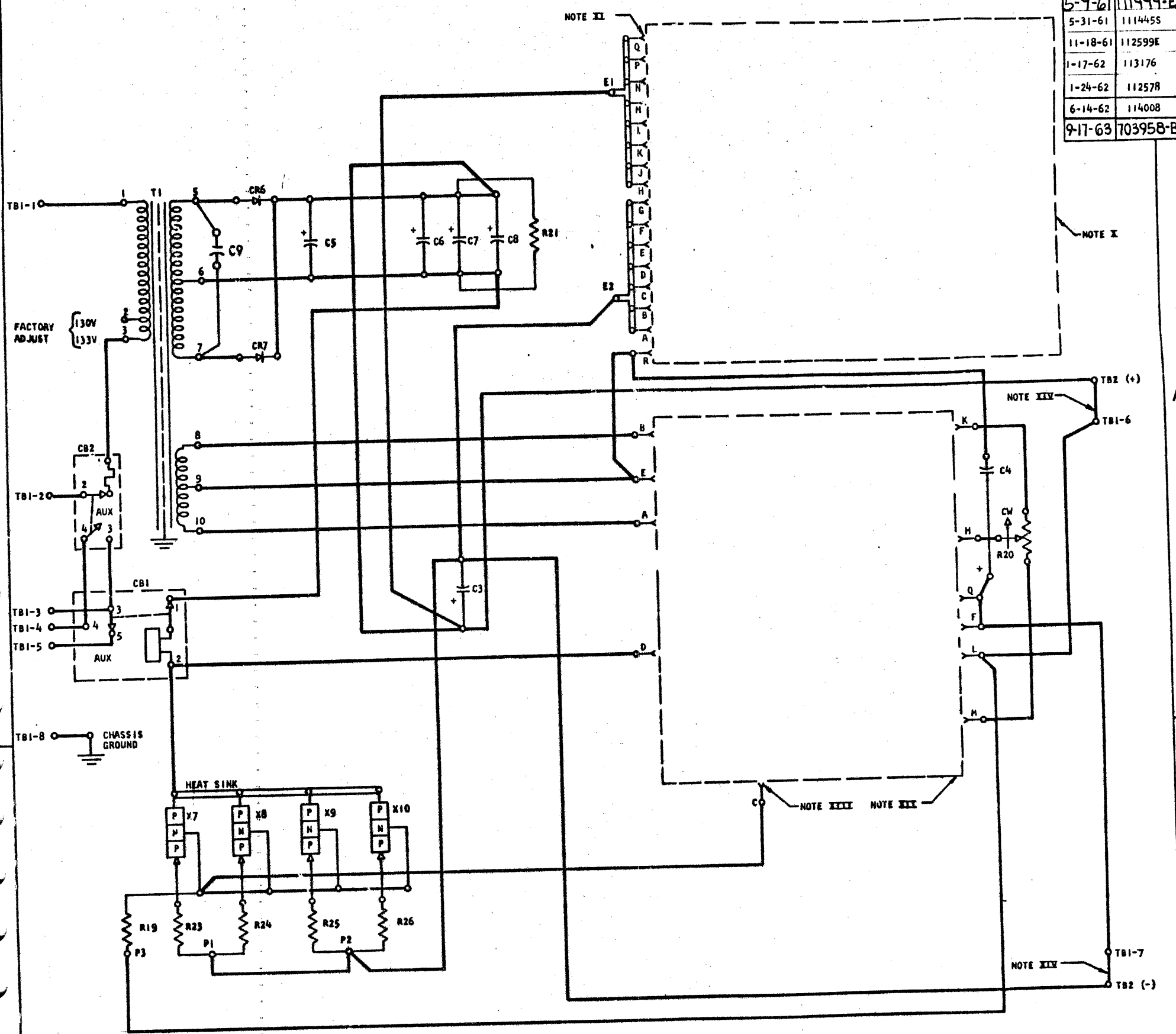


COMPONENT CHART					
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
T1	222789	TRANSFORMER	R8, R21	317019	RESISTOR 2K 1/2W
CR1, CR2	127324	DIODE	R10	335138	RESISTOR 200 OHM 2W
CR3, CR4	207316	DIODE	R11-R18	208985	RESISTOR 0.1 OHM 5W
CR5*	205002	DIODE	R19	207358	POTENTIOMETER 150 OHM 2W
CR6*	491300	DIODE TYPE AU	R20	207319	RESISTOR 50 OHM 5W
C1-C4	208224	CAPACITOR 14,000 MFD 13V DC	CB2	220916	CIRCUIT BREAKER
C5	208230	CAPACITOR 7,000 MFD 13V DC	R9	317014	RESISTOR 600 OHM 1/2W
C6	208228	CAPACITOR 5,500 MFD 19V DC	CB*	492411	CAPACITOR 0.01 MFD 100V DC
CB1	207350	CIRCUIT BREAKER			
X1-X2*	535441	TRANSISTOR TYPE 026			
X3*	518689	TRANSISTOR TYPE 028			
X4*	207363	TRANSISTOR TYPE 036			
X5-X12	209001	TRANSISTOR TYPE			
R1*	207320	RESISTOR 1 OHM 5W			
R2*	207321	RESISTOR 2 OHM 1W			
R3	208987	RESISTOR 1.25K 5W			
R4	207371	RESISTOR 800 OHM 5W			
R5	317013	RESISTOR 620 OHM 1/2W			
R6	322898	RESISTOR 100 OHM 2W			
R7	300721	RESISTOR 10K 1/2W			

NOTES  
 \* - INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY  
 XI - COMPONENT CARD ASSEMBLY NO. 371656  
 XII - NOT USED ON 6 VOLT SUPPLIES  
 XIII - WHEN THE 6 VOLT OVERVOLTAGE ASSEMBLY NUMBER 208947 IS USED, REFER TO 0/V WIRING DIAGRAM NUMBER 208548

INTERNATIONAL BUSINESS MACHINES CORP.				
NAME	WIRING DIAGRAM - POWER SUPPLY -			
	+6V DC AT 16A			
DESIGN	PECO	5-25-59	TYPE	MISC
DETAIL	HAV	8-27-59	SCALE	NONE
CHECK	DPG	8-28-59	DRAW	HAV 8-27-59
APPRO	WP	9-1-59	CHECK	RAW

DATE	CHANGE NO.
5-9-61	111444-E
5-31-61	111445S
11-18-61	112599E
1-17-62	113176
1-24-62	112578
6-14-62	114008
9-17-63	703958-B

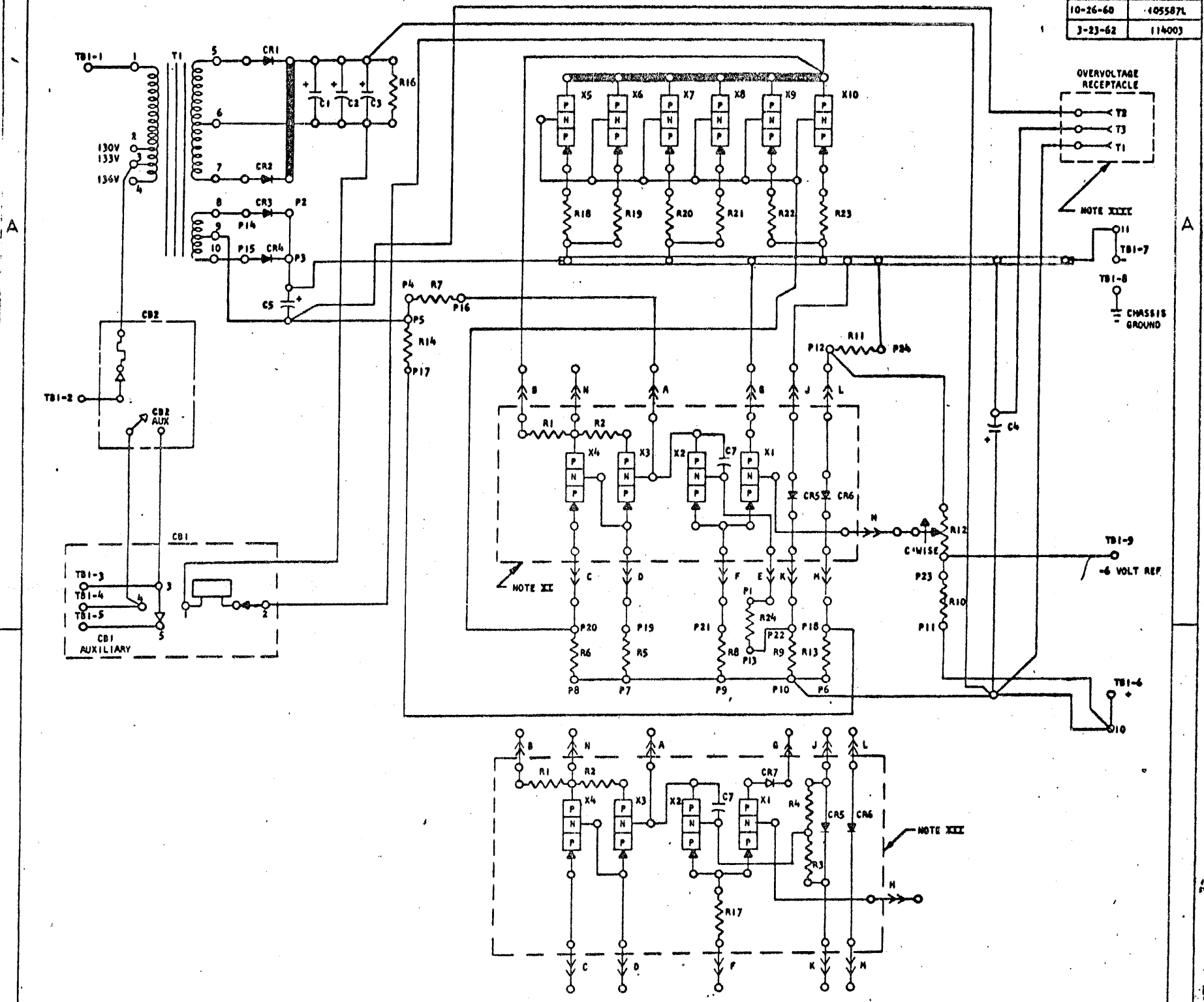


COMPONENT CHART					
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
			R20	207340	POTENTIOMETER 250 OHM 1/2W
C3	208230	CAPACITOR 7,000 MFD 13V DC	R21	505301	RESISTOR 50 OHM 5W
C4	208228	CAPACITOR 5,500 MFD 19V DC			
C5-8	208224	CAPACITOR 14,000 MFD 13V DC	R23-26	207324	RESISTOR 0.1 OHM 5W
C9	491228	CAPACITOR .01 MF 100 V DC			
CB1	207350	CIRCUIT BREAKER			
CB2	220916	CIRCUIT BREAKER	T1	NOTE XV	TRANSFORMER
CR6-7	127324	RECTIFIER CELL			
			TB1		TERMINAL BLOCK
E1-2		BUS PLATE	TB2		TERMINAL BLOCK
A & B		RECEPTACLE	X7-10	369214	TRANSISTOR TYPE 10B
R19	322888	RESISTOR 100 OHM 2W			

- NOTES  
 I OVERVOLTAGE CARD ASSEMBLY 370575  
 II UNIT RECEPTACLE "B"  
 III COMPONENT CARD ASSEMBLY 370612  
 IV UNIT RECEPTACLE "A"  
 V FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-6 AND TB1-7.  
 VI T1 TRANSFORMER PART NUMBER 208184 FOR 60 CYCLES AND PART NUMBER 441178 FOR 50 CYCLES

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM - POWER		
SUPPLY - 6V DC AT 16 AMP			
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	MDE 3-11-
APPRO		CHECK	

DATE	CHANGE NO
6-23-59	105580H
10-16-59	105583P
12-18-59	105584M
1-28-60	105585D
4-5-60	105585V
10-26-60	105587L
3-23-62	114003



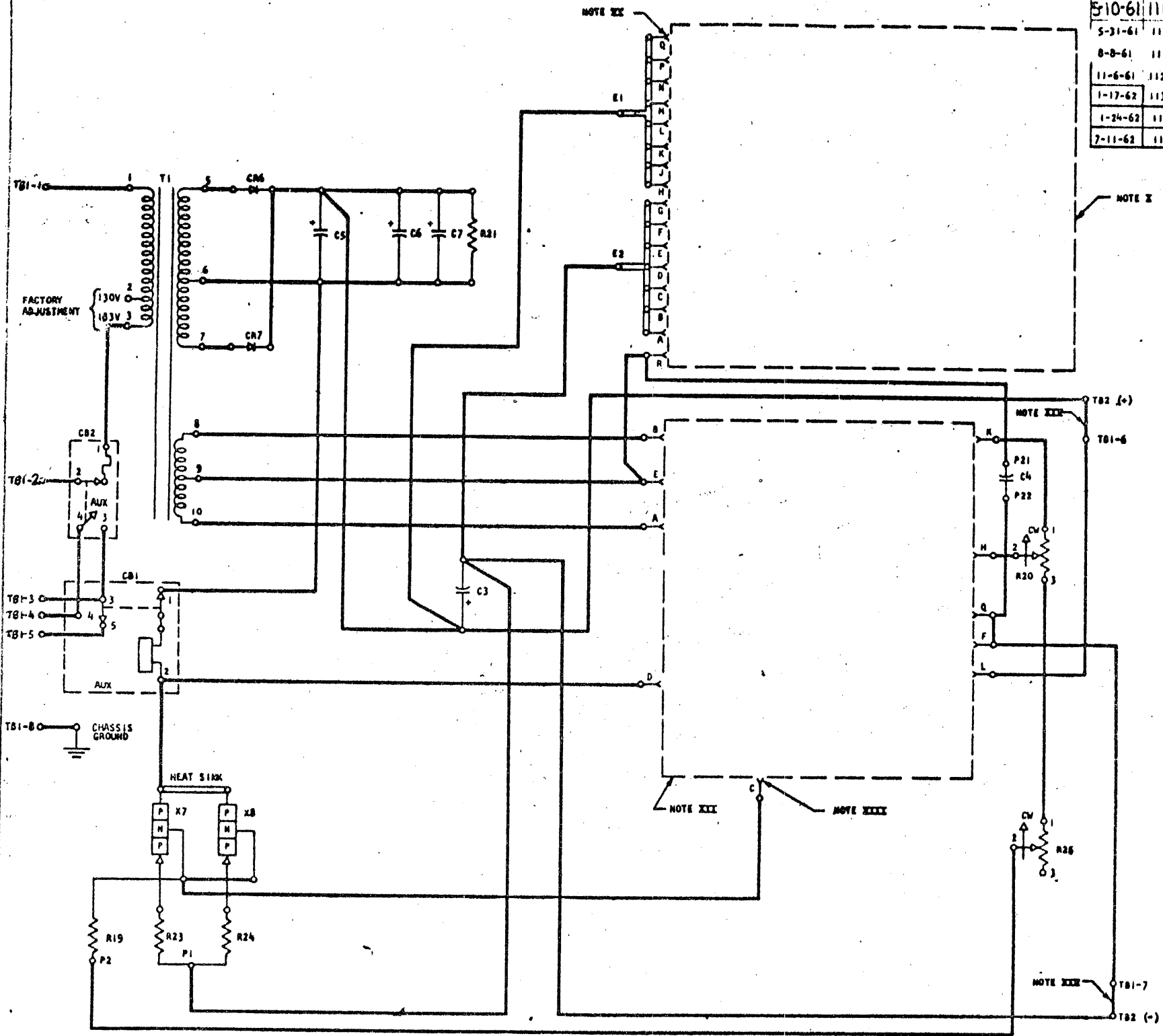
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
T1	222792	TRANSFORMER	R3 *	207326	RESISTOR 1.7K 5W
C1-C4	208221	CAPACITOR 11,000 MFD 19V DC	R4 *	207228	RESISTOR 2.3K 5W
C5	208229	CAPACITOR 700 MFD 15V DC	R5	317276	RESISTOR 1.2K 1/2W
			R6	338138	RESISTOR 200 OHM 2W
X1, X2 *	535441	TRANSISTOR TYPE 026	R7	317529	RESISTOR 8.2K 1/2W
X3 *	518689	TRANSISTOR TYPE 028	R8	213693	RESISTOR 1K 1/2W
X4 *	207363	TRANSISTOR TYPE 036	R9	317005	RESISTOR 160 OHM 1/2W
X5-X10	209001	TRANSISTOR TYPE	R10	208986	RESISTOR 325 OHM 5W
CB1	208198	CIRCUIT BREAKER	R11	207381	RESISTOR 2K 5W
CR1, 2	127324	DIODE	R12	207357	POTENTIOMETER 200 OHM 2W
CR3, 4	207316	DIODE	R13	317012	RESISTOR 510 OHM 1/2W
CR5 *	209002	DIODE	R14	300721	RESISTOR 10K 1/2W
CR6 *	491300	DIODE TYPE AU	R16	472539	RESISTOR 100 OHM 10W
R1 *	207320	RESISTOR 1 OHM 5W	R7*, R24	317019	RESISTOR 2K 1/2W
R2 *	207321	RESISTOR 2 OHM 1W	R18-23	200985	RESISTOR 0.1 OHM 5W
CB2	220916	CIRCUIT BREAKER	CR7*	503591	DIODE TYPE F(S)
C7*	492411	CAPACITOR 0.01 MFD 100V DC			

NOTES  
 X \*INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY  
 XI COMPONENT CARD ASSEMBLY NO. 371656 FOR REFERENCE TO GROUND  
 XII COMPONENT CARD ASSEMBLY NO. 371655 FOR REFERENCE TO -6 VOLTS  
 XIII WHEN THE 12 VOLT OVERVOLTAGE ASSEMBLY NUMBER 208960 IS USED, REFER TO O/V WIRING DIAGRAM NUMBER 208961

INTERNATIONAL BUSINESS MACHINES CORP				
NAME		WIRING DIAGRAM - POWER SUPPLY -		
±12V DC AT 12 AMP				
DESIGN	PECO	5-29-59	TYPE	MISC
DETAIL	MOE	6-21-59	SCALE	NONE
CHECK	DPG	6-22-59	DRAW	
APPRO	WP	8-7-59	CHECK	



DATE	CHANGE NO.
5-31-61	1114458
8-8-61	111448K
11-6-61	112589
1-17-62	113176
1-24-62	112578
7-11-62	114008F



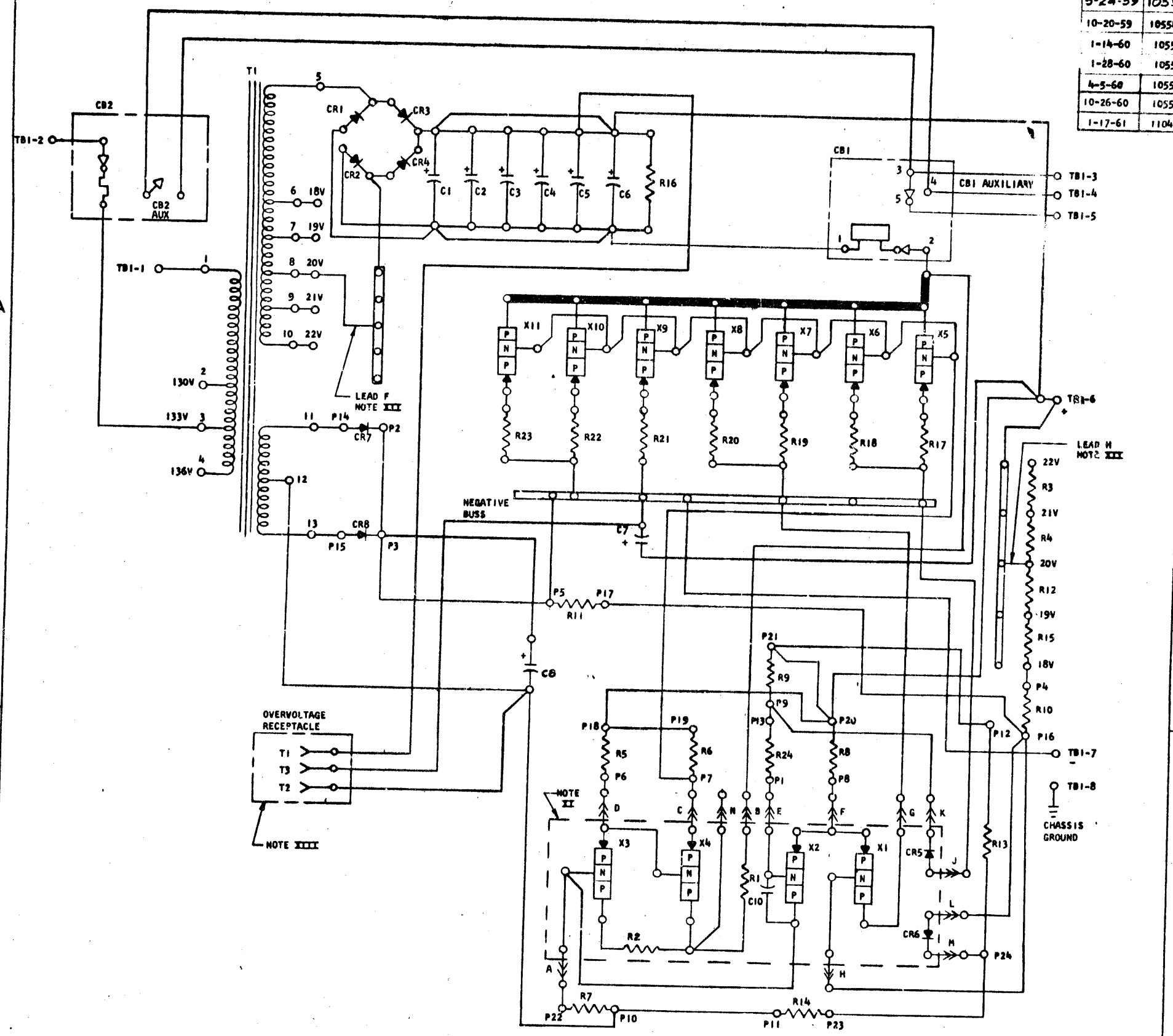
COMPONENT CHART

CODE	PART NO	DESCRIPTION	CODE	PART NO	DESCRIPTION
C3	360244	CAPACITOR 5,000 MFD 25V DC	R20	207393	POTENTIOMETER 500 OHM 1/2W
C4	207310	CAPACITOR 100 MFD 25V DC	R21	507142	RESISTOR 100 OHM 25W
C5-7	501544	CAPACITOR 10,000 MFD 25V DC	R23-4	207324	RESISTOR 0.1 OHM 5W
CB1	207349	CIRCUIT BREAKER	R25	207392	POTENTIOMETER 2.5K 1/2W
CB2	220915	CIRCUIT BREAKER			
CR6-7	316197	RECTIFIER CELL	T1	207304	TRANSFORMER
E1-2		BUS PLATE	TB1		TERMINAL BLOCK
A & B		RECEPTACLE	TB2		TERMINAL BLOCK
R19	207336	RESISTOR 250 OHM 5W	X7-8	349214	TRANSISTOR

- NOTES  
 X OVERVOLTAGE CAID ASSEMBLY 370579  
 XI UNIT RECEPTACLE "B"  
 XII COMPONENT CARD ASSEMBLY 370607  
 XIII UNIT RECEPTACLE "A"  
 XIV FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-6 AND TB1-7

INTERNATIONAL BUSINESS MACHINES, Corp			
NAME		WIRING DIAGRAM-POWER	
SUPPLY-20V DC AT 6 AMP			
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	MDE 3-27-61
APPRO	LET 5-10-61	CHECK	

DATE	CHANGE NO.
5-24-59	105580K
10-20-59	105583T
1-14-60	105584W
1-28-60	105585D
4-5-60	105585V
10-26-60	105587L
1-17-61	110497

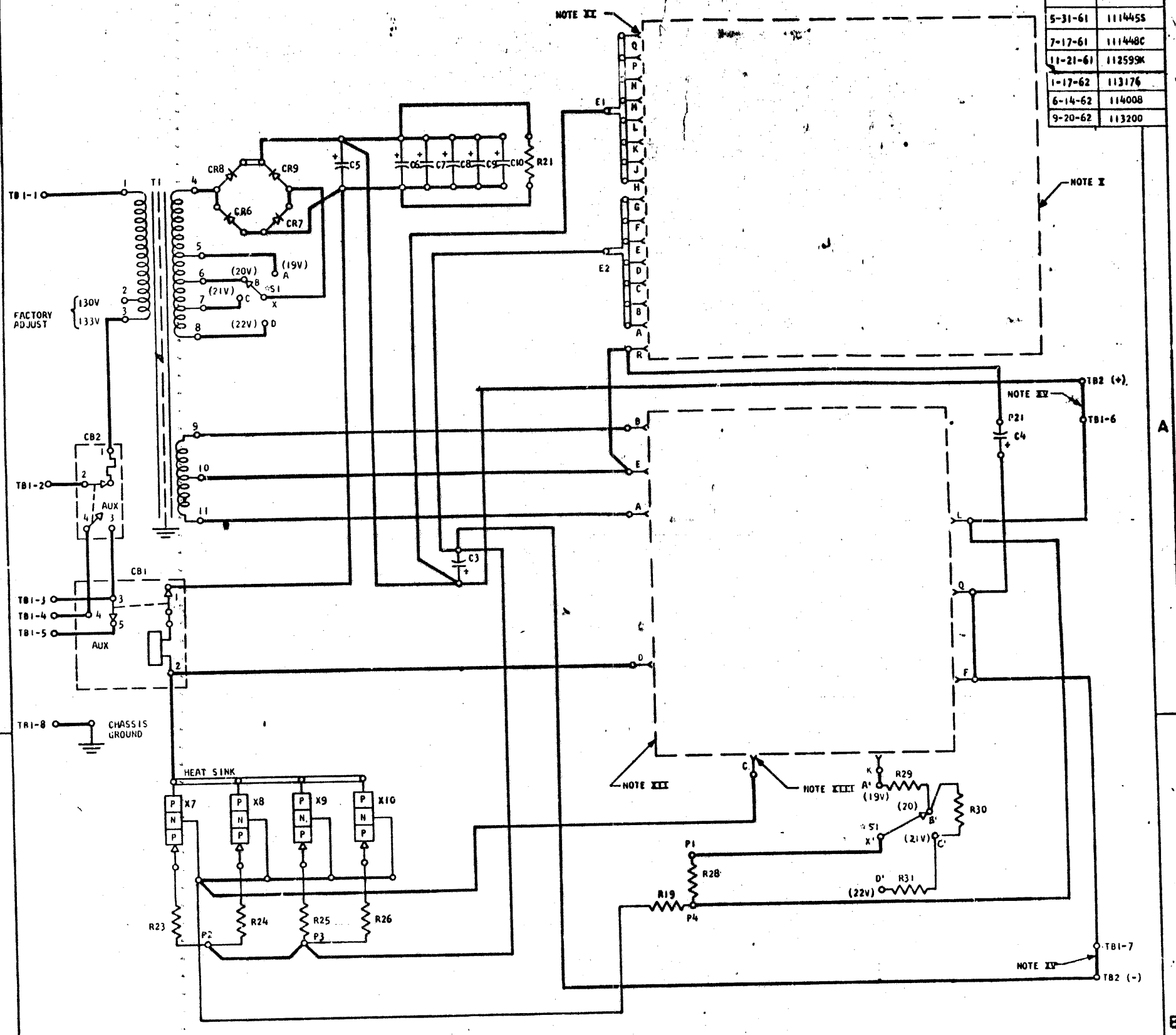


CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
T1	208175	TRANSFORMER	R3, 4, 12, 15	207365	RESISTOR 200 OHM 5W
C1-C7	208238	CAPACITOR 10,000 MFD 99V DC	R5, R24	317019	RESISTOR 2K 1/2W
CB	208229	CAPACITOR 700 MFD 15V DC	R6	207326	RESISTOR 250 OHM 5W
CR1-CR4	208386	DIODE	R7	300721	RESISTOR 10K 1/2W
CR5	209002	DIODE	R8	317024	RESISTOR 5.1K 1/2W
CR6	491300	DIODE TYPE AU	R10	208938	RESISTOR 1650 OHM 5W
CR7, CR8	207316	DIODE	R11	207381	RESISTOR 2K 5W
X1, X2	535441	TRANSISTOR TYPE O26	R13	213693	RESISTOR 1K 1/2W
X3	518689	TRANSISTOR TYPE O28	R14	300721	RESISTOR 10K 1/2W
X4	207363	TRANSISTOR TYPE O36	R16	208825	RESISTOR 25 OHM 50W
X5-X11	209001	TRANSISTOR TYPE	R17-23	208985	RESISTOR 0.1 OHM 5W
CB1	208198	CIRCUIT BREAKER	R9	213693	RESISTOR 1K 1/2W
R1	207320	RESISTOR 1 OHM 5W	CB2	220918	CIRCUIT BREAKER
R2	207321	RESISTOR 2 OHM 1W	C10*	492411	CAPACITOR 0.01 MFD 100V DC

NOTES  
 I \* INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY  
 II COMPONENT CARD ASSEMBLY NO. 371656  
 III LEADS F AND H MOVE TOGETHER  
 XIII WHEN THE 20 VOLT OVERVOLTAGE ASSEMBLY NUMBER 208972 IS USED, REFER TO O/V WIRING DIAGRAM NUMBER 208973

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM - POWER SUPPLY -		
± 20V DC AT 15A			
DESIGN	PECO 5-28-59	MODEL	MISC
DETAL	JCS 5-28-59	DATE	NONE
CHECK	JMC 6/10/59	DRAWN	MDE 7-13-59

DATE	CHANGE NO
5-9-61	111444P
5-31-61	111445S
7-17-61	111448C
11-21-61	112599K
1-17-62	113176
6-14-62	114008
9-20-62	113200



COMPONENT CHART

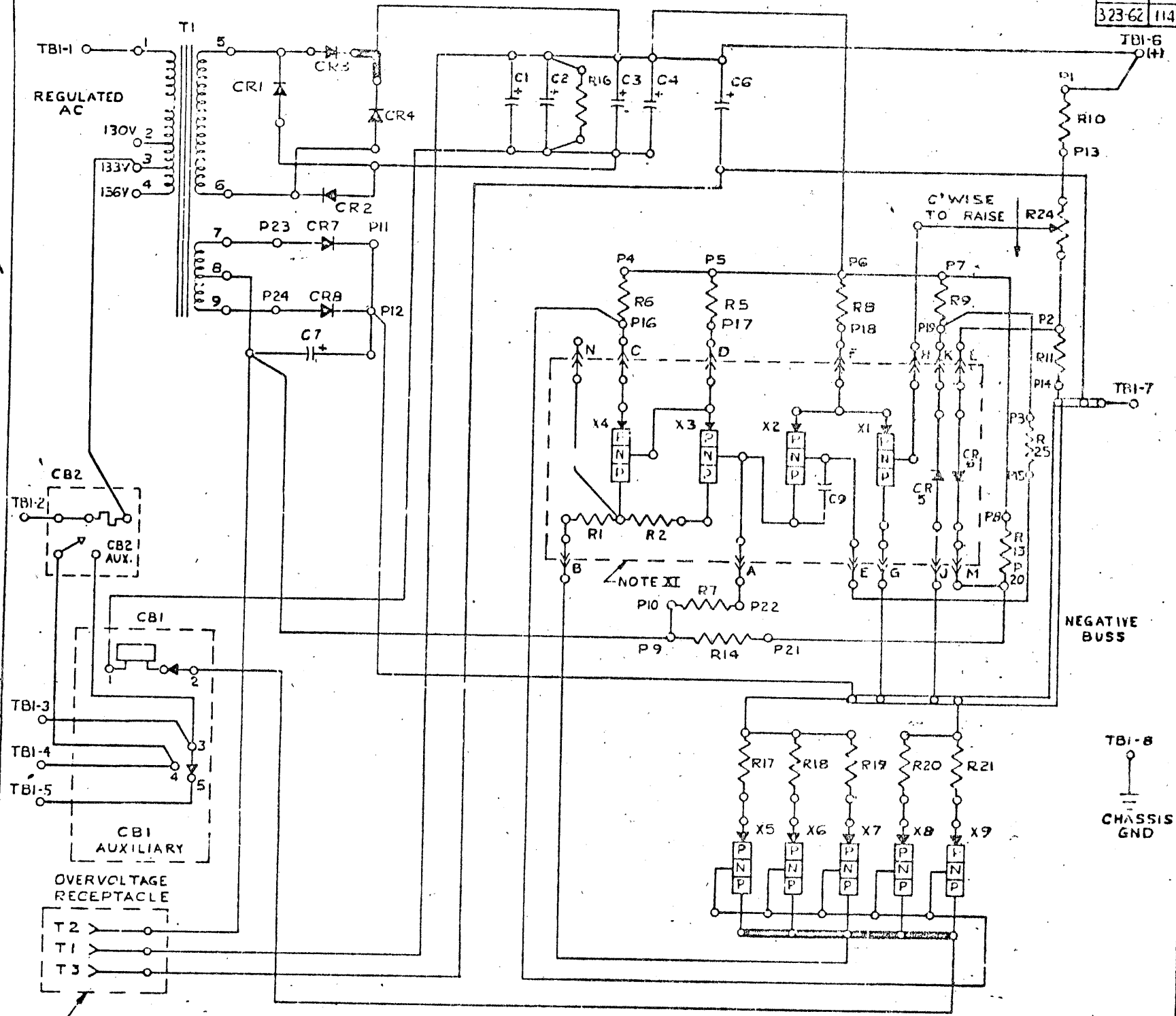
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C3	208238	CAPACITOR 10,000 MFD 33V DC	R21	208825	RESISTOR 25 OHM 50W
C4	208229	CAPACITOR 700 MFD 15V DC	R23-26	207324	RESISTOR 0.1 OHM 5W
C5-10	208238	CAPACITOR 10,000 MFD 33V DC	R28-31	207365	RESISTOR 200 OHM 5W
CB1	207350	CIRCUIT BREAKER	S1	730267	SWITCH
CB2	220918	CIRCUIT BREAKER	T1	NOTE XVI	TRANSFORMER
CR6-9	216198	RECTIFIER 1E1LL	TB1		TERMINAL BLOCK
E1-2		BUS PLATE	TB2		TERMINAL BLOCK
F & B		RECEPTACLE	X7-10	369214	TRANSISTOR
R19	207336	RESISTOR 250 OHM 5W			

- NOTES  
 XI OVERVOLTAGE CARD ASSEMBLY 370579  
 XII UNIT RECEPTACLE "B"  
 XIII COMPONENT CARD ASSEMBLY 370611  
 XIV UNIT RECEPTACLE "A"  
 \* SWITCH (S1) MUST NOT BE TURNED WITHOUT UNLOADING SUPPLY BY OPENING CB1 FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-6 AND TB1-7  
 XVI T1 TRANSFORMER PART NUMBER 473416 FOR 60 CYCLES AND PART NUMBER 441191 FOR 50 CYCLES

INTERNATIONAL BUSINESS MACHINES CORP			
NAME		WIRING DIAGRAM-POWER	
SUPPLY- 20V DC AT 15 AMP			
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	MDE 3-4-61
APPRO		CHECK	



DATE	CHANGE NO
4-26-60	105587-R
2-13-61	111221
3-27-61	114432
3-23-62	114003



NOTE XII

- NOTES:
- X \* INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY.
  - XI COMPONENT CARD ASSEMBLY NUMBER 37165G.
  - XII WHEN THE 30VOLT OVERVOLTAGE ASSEMBLY 208967 IS USED REFER TO O/V WIRING DIAGRAM 208968

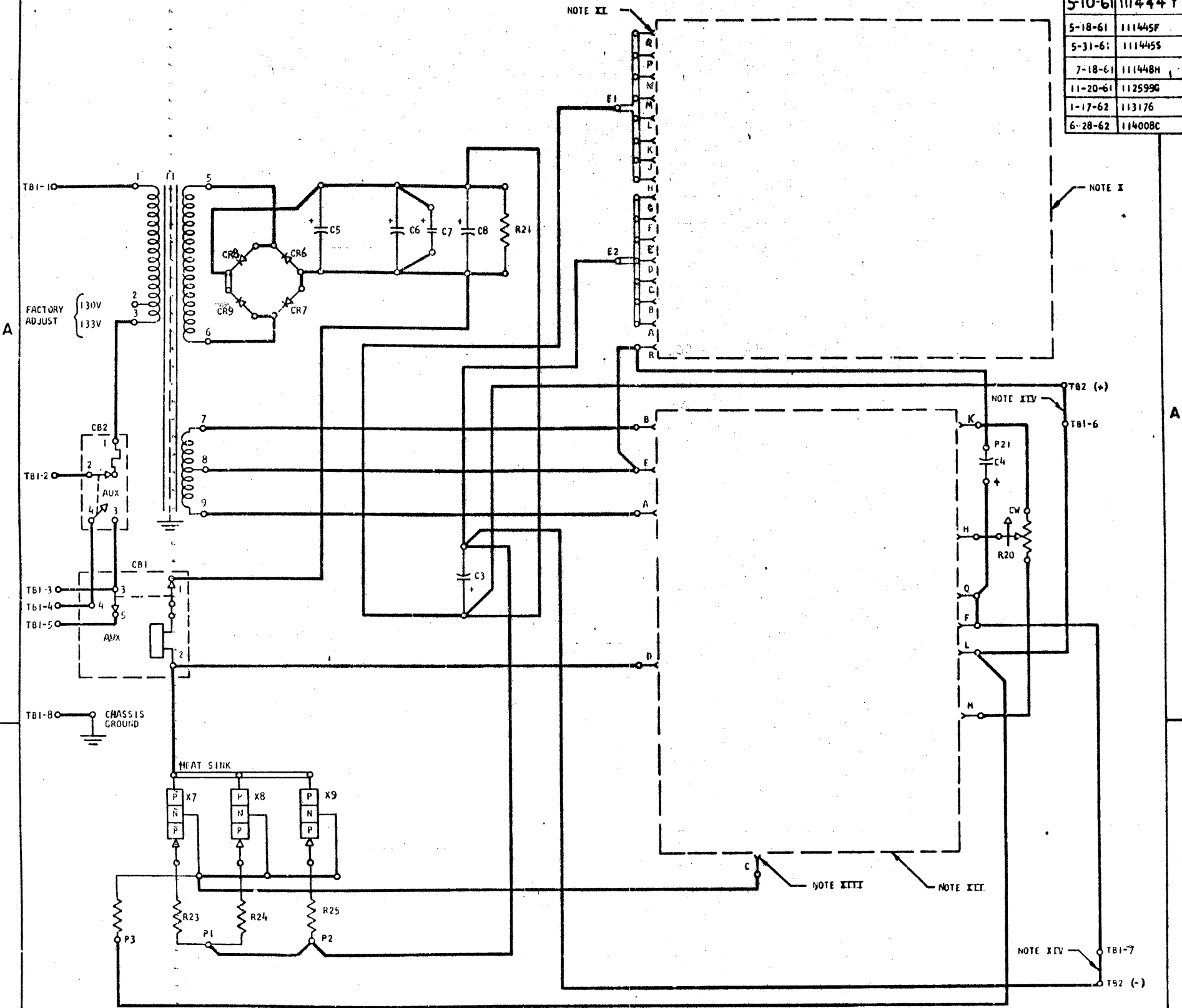
COMPONENT CHART

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
R10	207378	RESISTOR 2050 Ω 5W	T1	222794	XFMR
R11	207379	RESISTOR 1K Ω 5W	CR1-4	598479	DIODE
R13	317024	RESISTOR 5,100 Ω 1/2W	CR7-8	207316	DIODE
R14	300721	RESISTOR 10K Ω 1/2W	CR5*	209002	DIODE
R16	507142	RESISTOR 100 Ω 25W	CR6*	491300	DIODE IBM AU
R17-R21	208968	RESISTOR 0.1 Ω 5W	X1, X2*	535441	TRANSISTOR TYPE 02A
R24	208933	POT. 125 Ω 2W.W.W.	X3*	518689	TRANSISTOR TYPE 02A
C1-C3	208235	CAP. 5,500 MFD 45V	X4*	207364	TRANSISTOR TYPE 03G
C4-C6	208245	CAP. 2,500 MFD 45V	X5-9	208196	TRANSISTOR TYPE 037
C7	208229	CAP. 700 MFD 15V	CB1	207349	CIRCUIT BREAKER (3 AMP)
R9	317353	RESISTOR 2K Ω 1W	R1*	207310	RESISTOR 1 Ω 5W
CB2	220917	CIRCUIT BREAKER	R2*	207321	RESISTOR 2 Ω 1W
C9*	492411	CAP. .01MFD 100 VDC	R5	323920	RESISTOR 3K 1/2W
R25	317019	RESISTOR 2K Ω 1/2W	R6	210255	RESISTOR 500 Ω 5W
			R7, R8	300721	RESISTOR 10K 1/2W

INTERNATIONAL BUSINESS MACHINES CORP  
 NAME: WIRING DIAGRAM 30V AT 7 AMP  
 PECO 8-24-60 TYPE  
 PECO 8-24-60 SCALE  
 JDM 8-24-60 DRAW  
 LET 8-24-60 CHECK



DATE	CHANGE NO
5-10-61	111444Y
5-18-61	111445F
5-31-61	111445S
7-18-61	111448H
11-20-61	112599G
1-17-62	113176
6-28-62	114008C



COMPONENT CHART

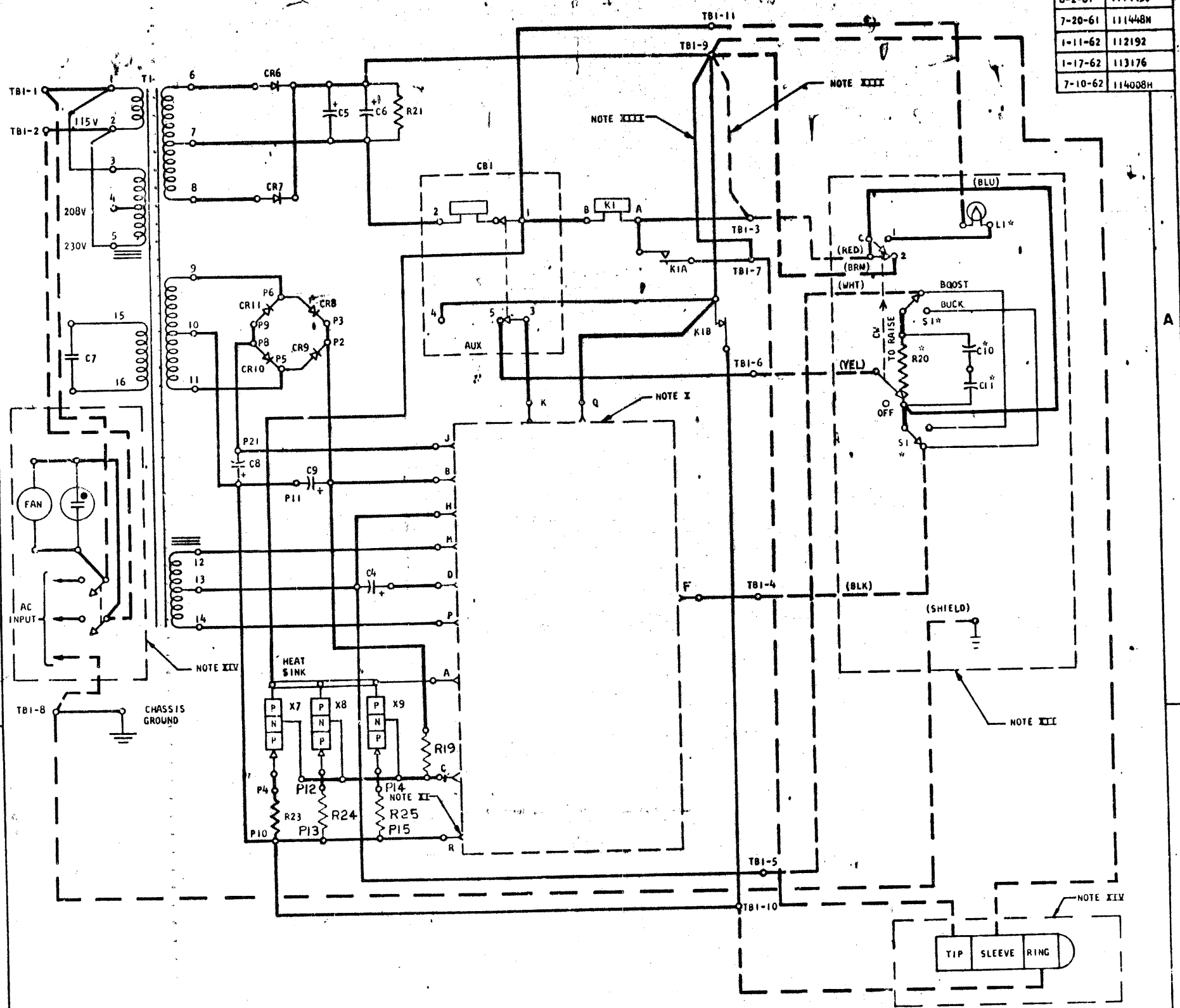
CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
			R20	207340	POTENTIOMETER 250 OHM 1/2W
C3	208245	CAPACITOR 2,500 MFD 45V DC	R21	507142	RESISTOR 100 OHM 25W
C4	208229	CAPACITOR 700 MFD 15V DC			
C5-7	208235	CAPACITOR 5,500 MFD 45V DC	R23-25	207324	RESISTOR 0.1 OHM 5W
C8	208245	CAPACITOR 2,500 MFD 45V DC			
CB1	207349	CIRCUIT BREAKER	T1	NOTE XV	TRANSFORMER
CB2	220917	CIRCUIT BREAKER			
CR6-9	216197	RECTIFIER CELL			
E1-2		BUS PLATE	TB1		TERMINAL BLOCK
			TB2		TERMINAL BLOCK
A & B		RECEPTACLE	X7-9	369214	TRANSISTOR TYPE 10B
R19	2102155	RESISTOR 500 OHM 5W			

NOTES  
 X OVERVOLTAGE CARD ASSEMBLY 370578  
 XI UNIT RECEPTACLE "B"  
 XII COMPONENT CARD ASSEMBLY 370608  
 XIII UNIT RECEPTACLE "A"  
 XIV FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-6 AND TB1-7  
 XV T1 TRANSFORMER PART NUMBER 210092 FOR 60 CYCLES AND PART NUMBER 441188 FOR 50 CYCLES

INTERNATIONAL BUSINESS MACHINES CORP

NAME	WIRING DIAGRAM-POWER SUPPLY		
	30V DC AT 7 AMP		
DESIGN		TYPE	MISC..
DETAIL		SCALE	NONE
CHECK		DRAW	MDE 3-27-61
APPROV		CHECK	

DATE	CHANGE NO
5-11-61	111445E
6-2-61	111445S
7-20-61	111448M
1-11-62	112192
1-17-62	113176
7-10-62	114008H



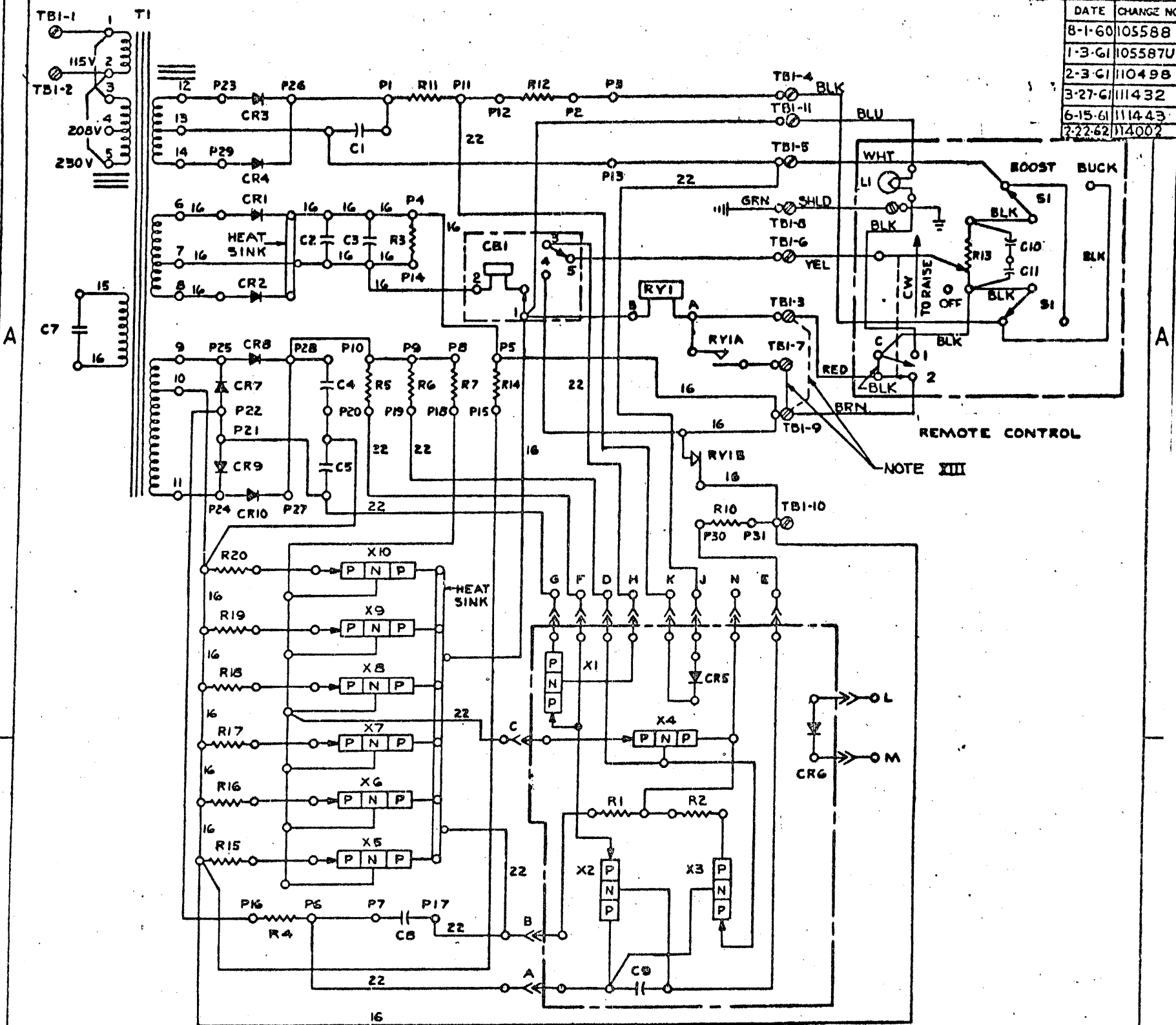
COMPONENT CHART

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C4	210845	CAPACITOR 1250 MFD 25V DC			
C5-6	479953	CAPACITOR 15,000 MFD 10V DC			
C7	210873	CAPACITOR 6 MFD 330V AC	R19	317012	RESISTOR 510 OHM 1/2W
C8-9	203229	CAPACITOR 700 MFD 15V DC	*R20		
*C10-11			R21	301881	RESISTOR 240 OHM 2W
CB1	20734R	CIRCUIT BREAKER	R23-25	207324	RESISTOR .01 OHM 5W
CR6-7	216197	RECTIFIER CELL	*S1	210844	REGULATOR
CR8-11	207316	RECTIFIER CELL	TB1		TERMINAL BLOCK
K1	210874	RELAY	X7-9	369214	TRANSISTOR TYPE 10B
			*L1		

- NOTES  
 I COMPONENT CARD ASSEMBLY 370616  
 II UNIT RECEPTACLE  
 III REMOTE CONTROL ASSEMBLY CONSISTING OF 210846 (POT-SWITCH ASH) AND 27630 (SWITCH). SUPPLIED WITH PORTABLE UNIT ONLY \* COMPONENTS ON REMOTE ASSEMBLY  
 IIII REMOVE JUMPER FOR PORTABLE APPLICATION APPLY JUMPER AS SHOWN WITH DOTTED LINE FOR SPECIAL SYSTEM REQUIREMENT  
 IV INPUT AND OUTPUT FOR PORTABLE ASSEMBLY SHOWN FOR REFERENCE ONLY. REFER TO WIRING DIAGRAM PART NUMBER 210869.

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM-POWER SUPPLY		
3V DC AT 5A MARGIN CHECK			
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	MOE 5-10-61
APPRO	LET 5-11-61	CHECK	

DATE	CHANGE NO
8-1-60	105588
1-3-61	105587U
2-3-61	110498
3-27-61	11432
6-15-61	11443
2-22-62	114002



COMPONENT CHART

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
T1	210844	REG. REACTOR	R4	300721	RES. 10K $\Omega$ 1/2 W
C1	210845	CAP. 1250 MFD 25 VDC	R5	317024	RES. 5100 $\Omega$ 1/2 W
C2, C3	479953	CAP. 15 K MFD 10 VDC	R6	213693	RES. 1K $\Omega$ 1/2 W
C4, C5	208229	CAP. 700 MFD 15 VDC	R7	317012	RES. 510 $\Omega$ 1/2 W
C7	210873	CAP. 6 MFD 330 VAC	R10	317019	RES. 2K $\Omega$ 1/2 W
C8	492411	CAP. .01 MFD 100 VDC	R11	317014	RES. 680 $\Omega$ 1/2 W
*C9	492411	CAP. .01 MFD 100 VDC	R12	208256	RES. 1900 $\Omega$ 5W $\pm 1\%$
C10, C11	521737	CAP. 50 MFD 12VDC	R13	210846	RES. 1000 $\Omega$ 2 W
CB1	207348	CIRCUIT BREAKER	R14	323918	RES. 180 $\Omega$ 1/2 W
CR1, 2	598479	RECTIFIER	R15-20	207324	RES. 1 $\Omega$ 5W
CR3, 4	207316	RECTIFIER	RY1	210874	RELAY
*CR5	209002	ZENER	S1	128455	SWITCH
*CR6	491300	RECTIFIER	*X1, X2	535441	TRANS.
CR7-10	207316	RECTIFIER	*X3	518689	TRANS.
*R1	207320	RES.	*X4	207363	TRANS.
*R2	207321	RES.	X5-10	209001	TRANS.
R3	301881	RES. 240 $\Omega$ 2 W	L1	219628	LAMP

NOTES:

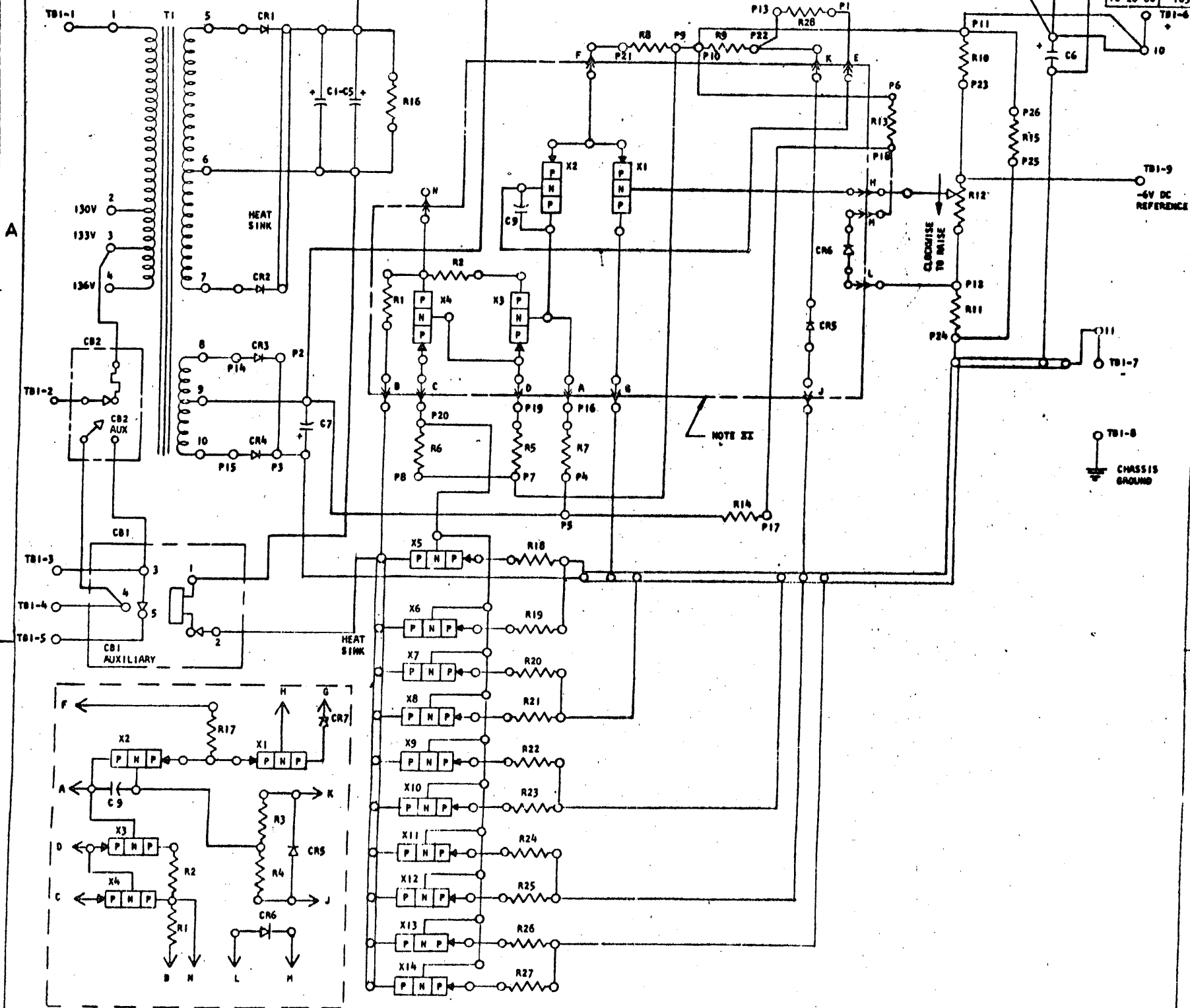
- I** ALL WIRE TO BE 20 GA. BLACK UNLESS OTHERWISE NOTED.
- XI** \* INDICATES COMPONENT LOCATED ON COMPONENT CARD ASSEMBLY.
- XII** ORDER ONE EACH OF 210846 (POT. SWITCH ASM) AND 27630 (SWITCH) EXCEPT WHEN UNIT IS TO BE AS A PORTABLE.
- XIII** REMOVE JUMPER FOR PORTABLE APPLICATION. APPLY JUMPER AS SHOWN IN DOTTED LINE FOR SPECIAL SYSTEM REQUIREMENT

INTERNATIONAL BUSINESS MACHINES CORP	
NAME	$\pm 3V$ DC AT 5 AMP MARGINAL
CHECK	
DESIGN	PECO 6-24-60 TYPE
DETAIL	PECO 6-24-60 SCALE
CHECK	RLB 7-1-60 DRAW
APPRO	KSD 8-22-60 CHECK

DATE	CHANGE NO
	105581M
1-18-60	105584Q
1-28-60	105585D
4-5-60	105585V
10-26-60	105587L

OVERVOLTAGE RECEPTACLE

NOTE XXXI



A

A

NOTE XXXI

NOTES

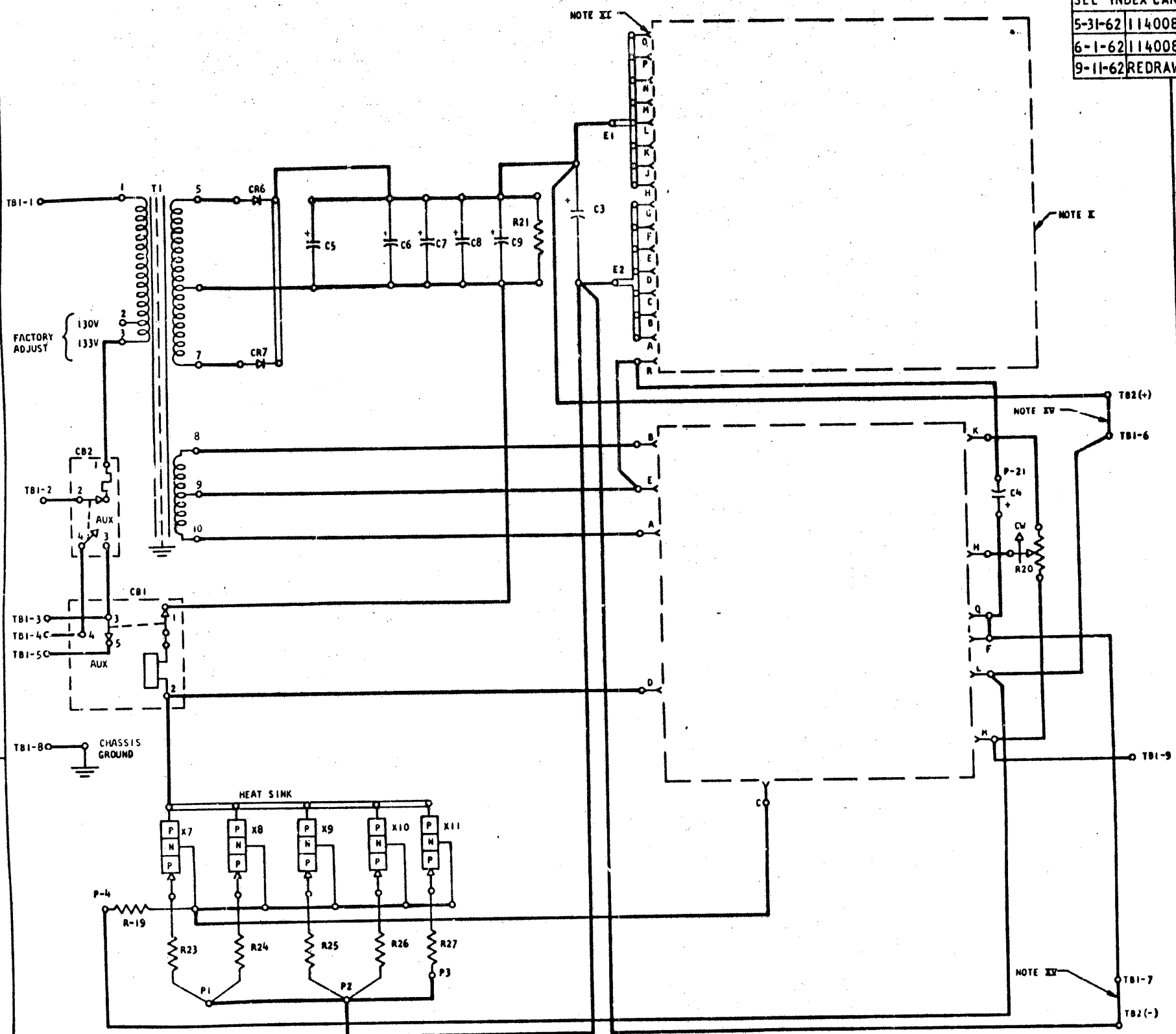
- X \* INDICATES COMPONENTS LOCATED ON COMPONENT CARD ASSEMBLY
- XX COMPONENT CARD ASSEMBLY NO. 371656 FOR REFERENCE TO GROUND
- XXXI COMPONENT CARD ASSEMBLY NO. 371655 FOR REFERENCE TO -6V DC
- XXXX WHEN THE 12 VOLT OVERVOLTAGE ASSEMBLY NUMBER 208960 IS USED, REFER TO O/V WIRING DIAGRAM NUMBER 208961

COMPONENT CHART

CODE	PART NO	DESCRIPTION	CODE	PART NO	DESCRIPTION
T1	219980	TRANSFORMER	R4*	207228	RESISTOR 2.3K 5W
C1-C5	208221	CAPACITOR 11,000 MFD 19V DC	R5	317276	RESISTOR 1.2K 1/2W
C6	208228	CAPACITOR 5,500 MFD 19V DC	R6	335138	RESISTOR 200 OHM 2W
C7	208229	CAPACITOR 700 MFD 15V DC	R7	317529	RESISTOR 8.2K 1/2W
CR1, CR2	127324	RECTIFIER CELL	R8	213693	RESISTOR 1K 1/2W
CR3, CR4	207316	RECTIFIER CELL	R9	317005	RESISTOR 160 OHM 1/2W
CR5*	209002	DIODE	R10	208986	RESISTOR 325 OHM 5W
CR6*	491300	DIODE TYPE AU	R11	207381	RESISTOR 2K 5W
X1, X2*	535441	TRANSISTOR TYPE O26	R12	207357	POTENTIOMETER 200 OHM 2W
X3*	518609	TRANSISTOR TYPE O28	R13	317012	RESISTOR 510 OHM 1/2W
X4*	207363	TRANSISTOR TYPE O36	R14	300721	RESISTOR 10K 1/2W
X5-X14	209001	TRANSISTOR TYPE	R15	317433	RESISTOR 560 OHM 1W
CB1	208223	CIRCUIT BREAKER	R16	221517	RESISTOR 75 OHM 10W
R1*	207320	RESISTOR 1 OHM 5W	R17*, R26	317019	RESISTOR 2K 1/2W
R2*	207321	RESISTOR 2 OHM 1W	R18-R27	208985	RESISTOR 0.1 OHM 5W
R3*	207326	RESISTOR 1.7K 5W	CB2	220918	CIRCUIT BREAKER
C9*	492411	CAPACITOR 0.01 MFD 100V DC	CR7*	503591	DIODE TYPE F(S)

INTERNATIONAL BUSINESS MACHINES CORP				
NAME	WIRING DIAGRAM - POWER SUPPLY -			
12V DC AT 20 AMPS				
DESIGN	PECO	7-15-59	TYPE	MISC
DETAIL	NAV	9-18-59	SCALE	NONE
CHECK	RLB	9-18-59	DRAW	
APPRO			CHECK	

DATE	CHANGE NO
SEE INDEX CARD	
5-31-62	114008A
6-1-62	114008D
9-11-62	REDRAWN



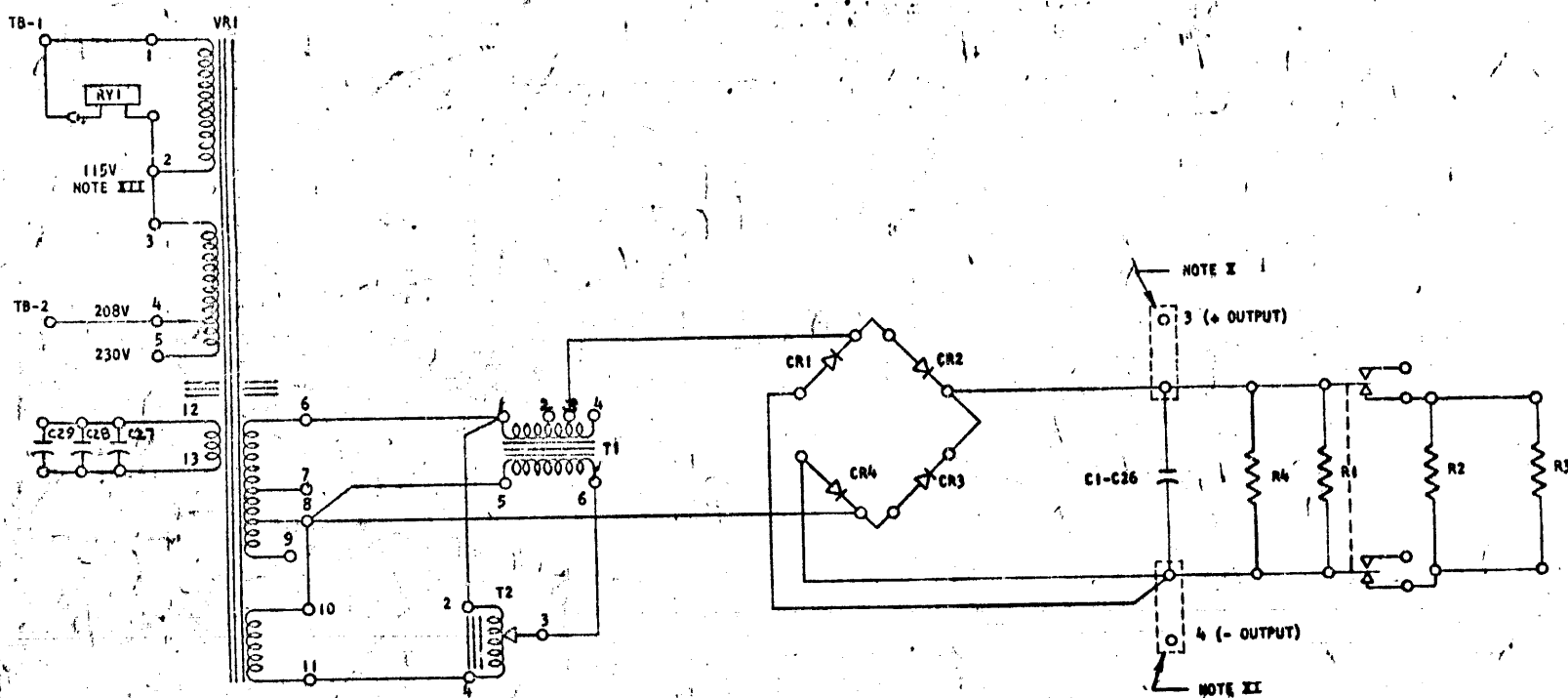
COMPONENT CHART

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
			R20	207340	POTENTIOMETER 250 OHM 1/2W
C3	208228	CAPACITOR 5,500MFD 19V DC	R21	221517	RESISTOR 75 OHM 10W
C4	208229	CAPACITOR 700 MFD 15V DC			
C5-9	208221	CAPACITOR 11,000 MFD 19V DC	R23-27	207324	RESISTOR 0.1 OHM 5W
CB1	208273	CIRCUIT BREAKER			
CB2	220918	CIRCUIT BREAKER			
			T1	NOTE XVI	TRANSFORMER
			CR6-7	216198	RECTIFIER CELL
			E1-2		BUS PLATE
			A & B		RECEPTACLE
R19	135138	RESISTOR 200 OHM 2W	TB1		TERMINAL BLOCK
			TB2		TERMINAL BLOCK
			X7-11	396214	TRANSISTOR

- NOTES  
 X OVERVOLTAGE CARD ASSEMBLY 370576  
 XI UNIT RECEPTACLE "B"  
 XII FOR REFERENCE TO GROUND USE COMPONENT CARD ASSEMBLY 370610  
 XIII FOR REFERENCE TO -6V DC, USE COMPONENT CARD ASSEMBLY 370613  
 XIV UNIT RECEPTACLE "A"  
 XV FOR REMOTE SENSING REMOVE JUMPERS INDICATED AND SENSE BETWEEN TB1-C AND TB1-7  
 XVI T1 TRANSFORMER PART NUMBER 473446 FOR 60 CYCLES AND PART NUMBER 477295 FOR 50 CYCLES

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM - POWER		
SUPPLY	- 12V DC AT 20 AMP		
DESIGN		TYPE	MISC
DETAIL		SCALE	NONE
CHECK		DRAW	9-11-62
APPRO	LET 5-8-61	CHECK	9-11-62

DATE	CHANGE NO.
10-22-59	105581G
1-14-60	105585B
3-11-60	105585S
2-8-61	111210

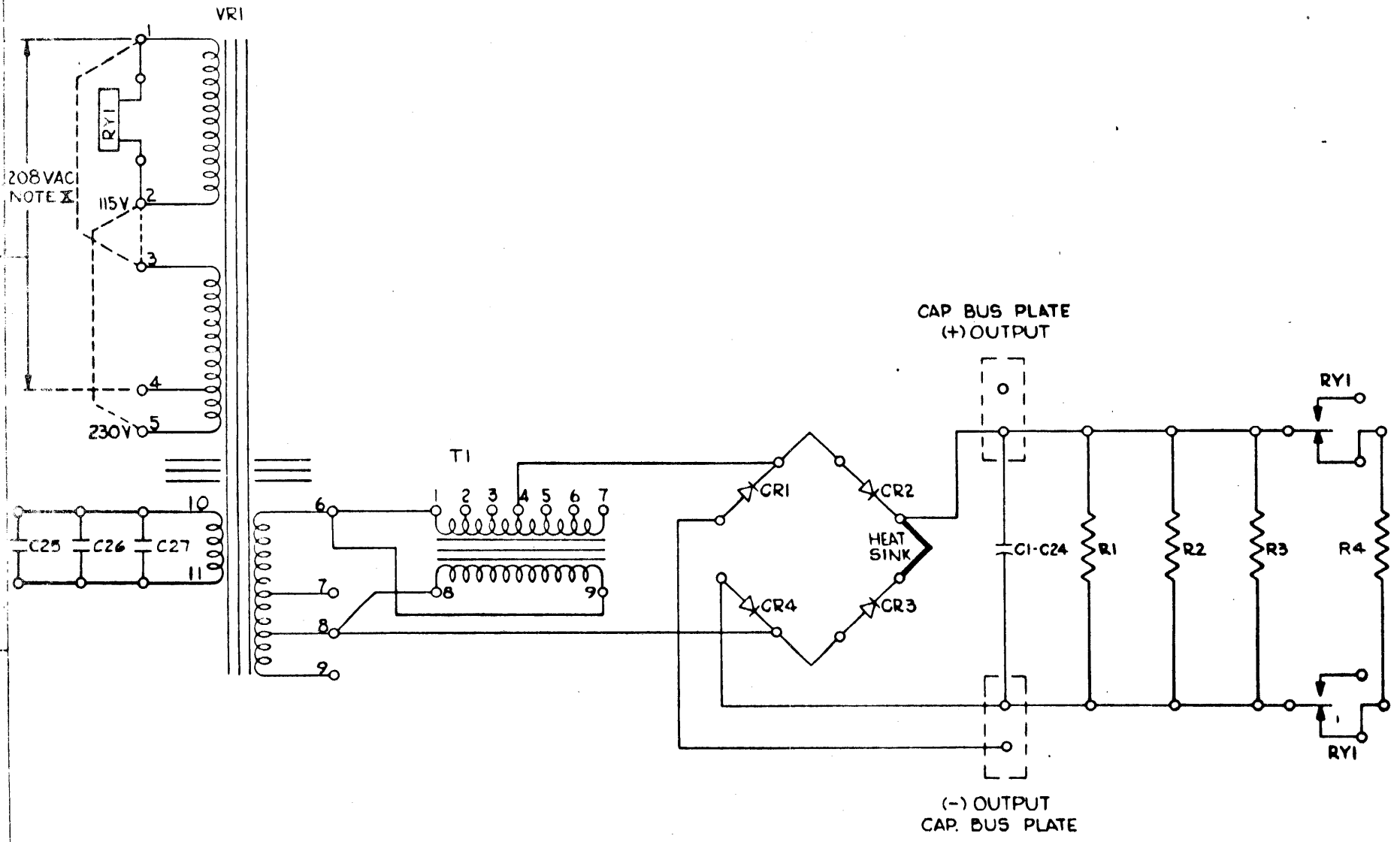


COMPONENT CHART		
CODE	PART NO.	DESCRIPTION
VR1	221342	VOLTAGE REGULATOR
T1	271266	TRANSFORMER, BUCK-BOOST
T2	360310	TRANSFORMER, AUTO
C1-C26	208232	CAPACITOR 3500 MFD 75V DC
C27-C29	207361	CAPACITOR 45 MFD 330V AC
CR1-CR4	127524	DIODE
R1, R4	505798	RESISTOR 150 OHM 50W
R2	322739	RESISTOR 50Ω 50W
R3	208825	RESISTOR 25Ω 50W
RY1	242618	RELAY

NOTES  
 I + CAPACITOR BUS PLATE PART NUMBER 221982  
 II - CAPACITOR BUS PLATE PART NUMBER 222011  
 III FOR 115V AC OPERATION CONNECT TAPS 1 TO 3 AND 2 TO 5 AND CONNECT INPUT TO 1 AND 2. REMOVE JUMPER 2 TO 3.

INTERNATIONAL BUSINESS MACHINES CORP				
NAME	WIRING DIAGRAM - POWER SUPPLY -			
60 V DC AT 10 AMPS				
DESIGN	PECO	3-17-59	TYPE	MISC
DETAIL	RLB	9-1-59	SCALE	NONE
CHECK	DPG	9-1-59	DRAW	
APPRO	REW	10-22-59	CHECK	

DATE	CHG
8-10-60	
11-7-62	703519



COMPONENT CHART		
CODE	PART NO.	DESCRIPTION
CI-C24	480740	CAPACITOR 3150MFD 75VDC
C25-C27	208388	" 25 MFD 330VAC
CR1-CR4	127324	DIODE
R1 R3	509798	RESISTOR 150Ω 50W
R4	208825	" 25Ω 50W
RY1	242618	RELAY
TI	480750	TRANS. BUCK-BOOST
VRI	480751	VOLTAGE REGULATOR

NOTES:  
 X FACTORY WIRED FOR 208V INPUT. FOR 208V OPERATION CONNECT INPUT TO TAPS 1 AND 4. CONNECT TAPS 2 AND 3. FOR 230V INPUT MOVE LEAD FROM TAP 4 TO TAP 5. FOR 115V OPR CONNECT TAPS 1 TO 3 AND 2 TO 5, CONNECT INPUT TO 1 AND 2. REMOVE LEAD BETWEEN TAPS 2 AND 3.

XI

INTERNATIONAL BUSINESS MACHINES CORP			
NAME	WIRING DIAGRAM-POWER		
SUPPLY-60 V. DC AT 20 AMPS			
DESIGN		TYPE	1401
DETAIL	2/24/60	SCALE	NONE
CHECK	2/24/60	DRW	
APPRO	2/24/60	CHK	

729955

STANDARDS CODE

CTDL DELAY INFORMATION

CARD CODE 729955

GENERAL

SHEET 1 OF 3

THE TURN ON, TURN OFF DELAYS OF THE CIRCUITS USED IN A PARTICULAR MACHINE ARE COMPLEX FUNCTIONS OF MANY VARIABLES SUCH AS THE TRANSISTOR DELAY, INPUT-OUTPUT LOADING, FALL AND RISE TIME, ETC.

THE DELAY SPECIFICATIONS ARE GIVEN BELOW AND ARE CLASSIFIED BY CIRCUIT TYPE.

WHEN POSSIBLE, REPRESENTATIVE RANGES OF DELAY ARE GIVEN ON EACH INDIVIDUAL CIRCUIT SHEET AND SHOULD BE USED AS A GUIDE. SPECIFIC CIRCUIT APPLICATION AND/OR CAPACITIVE LOAD (EXAMPLE: WIRE CAPACITANCE) MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES.

THE FOLLOWING INFORMATION IS PROVIDED FOR THOSE CASES WHERE CARD REPLACEMENT DOES NOT RESULT IN IMPROVEMENT AND A MORE DETAILED ANALYSIS IS NECESSARY.

THE DELAY OF THE SIGNAL IN THE CTDL BLOCKS IS A FUNCTION OF THE TRANSISTOR DELAYS PLUS THE LOADING EFFECTS OF THE INPUT AND OUTPUT CIRCUITS. DELAYS FOR SEVERAL STAGES IN CASCADE ARE NUMERICALLY EQUAL TO THE SUM OF INDIVIDUAL STAGES. UNLESS OTHERWISE STATED, DELAYS ARE MEASURED FROM THE TIME THE INPUT SIGNAL CROSSES ITS REFERENCE VOLTAGE TO THE TIME THE OUTPUT SIGNAL CROSSES ITS REFERENCE VOLTAGE, AS SHOWN.

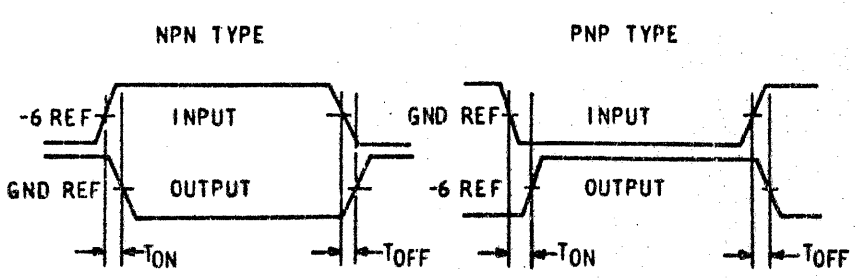
IN THIS EXAMPLE ALL MAXIMUM DELAYS WILL BE USED:

**TURN ON DELAY**

2 T BLOCKS	2 X 0.7	=	1.4
2 U BLOCKS	2 X 0.52	=	1.04
5 ADDITIONAL U BLOCKS	5 X (-0.01)	=	-0.05
2 ADDITIONAL T BLOCKS	0	=	0
2 P-TYPE CS BLOCK	2 X 0.015	=	0.03
4 PARALLEL COLLECTORS	4 X 0.007	=	0.028
23 INPUT DIODES	23 X 0.02	=	0.46
<b>TOTAL TURN ON DELAY FROM A TO B</b>			<b>2.908 U SEC</b>

**TURN OFF DELAY**

2 T BLOCKS	2 X 0.18	=	0.36
2 U BLOCKS	2 X 0.12	=	0.24
2 1ST U BLOCK LOAD	2 X 0.09	=	0.18
2 2ND U BLOCK LOAD	2 X 0.13	=	0.26
1 3RD U BLOCK LOAD	0.18	=	0.18
1 1ST T BLOCK LOAD	0.22	=	0.22
1 2ND T BLOCK LOAD	0.30	=	0.30
2 P-TYPE CS BLOCK	2 X 0.02	=	0.04
4 PARALLEL COLLECTORS	4 X 0.01	=	0.04
23 INPUT DIODES	23 X 0.005	=	0.115
<b>TOTAL TURN OFF DELAY FROM A TO B</b>			<b>1.935 U SEC</b>



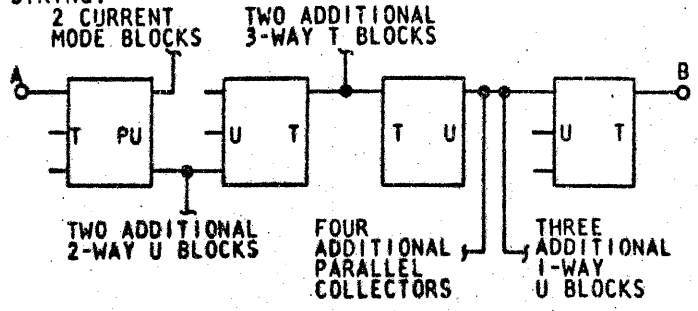
**\*\*BASIC LOGIC BLOCK DELAY INFORMATION\*\***

DATA FOR CALCULATION OF DELAY IN A STRING OF LOGIC WHEN DRIVING CTDL BLOCKS FROM THE CTDL OUTPUT AND CURRENT MODE BLOCKS FROM THE CURRENT MODE OUTPUT.

	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX	MIN	MAX	MIN
DELAY PER PNP BLOCK IN STRING	.70	.20	.18	.06
DELAY PER NPN BLOCK IN STRING	.52	.18	.12	.05
ADDITIONAL DELAY ON STRING				
FOR THE FIRST PNP TYPE LOAD	.00	-.03	.22	.06
FOR THE SECOND PNP TYPE LOAD	.00	-.03	.30	.07
FOR THE THIRD PNP TYPE LOAD	.00	-.03	.40	.08
FOR THE FOURTH PNP TYPE LOAD	.00	-.03	.50	.10
FOR THE FIRST NPN TYPE LOAD	-.01	-.03	.09	.01
FOR THE SECOND NPN TYPE LOAD	-.01	-.03	.13	.02
FOR THE THIRD NPN TYPE LOAD	-.01	-.03	.18	.03
FOR THE FOURTH NPN TYPE LOAD	-.01	-.03	.22	.04
DELAY PER PNP TYPE CS LOADS ON STRING	.02	.00	.02	.005
DELAY PER NPN TYPE CS LOADS ON STRING	.015	.00	.02	.005
DELAY PER PARALLEL COLLECTOR	.097	.00	.01	.004
DELAY PER DIODE INPUT	*.02	.00	.005	.000
DELAY PER 100 PF	.05	.02	.06	.03

\* WIRES ASSUMED ON GATES -- INCLUDES WIRING CAPACITANCE EFFECT BETWEEN ADJACENT CARDS.

EXAMPLE OF CTDL DELAY LOGIC STRING. CONSIDER THE FOLLOWING LOGIC STRING:



**\*\*LOGIC INVERTER\*\***

	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX	MIN	MAX	MIN
DELAY PER PNP INVERTER IN STRING	-.08	-.14	.55	.06
DELAY PER NPN INVERTER IN STRING	0	-.06	.41	-.02
ADDER LOGIC INVERTER DELAY:				
PER PNP INPUT LOAD	0	0	.015	.01
PER PNP OUTPUT LOAD	0	-.005	.01	.006
PER NPN INPUT LOAD	-.02	-.01	.04	.02
PER NPN OUTPUT LOAD	0	0	.01	0
DELAY ACROSS PNP BLOCK DRIVING LOGIC INVERTER IN STRING	.91	.26	.30	.26
DELAY ACROSS NPN BLOCK DRIVING LOGIC INVERTER IN STRING	.38	.28	.20	.14
ADDITIONAL DRIVING BLOCK DELAY				
PER PNP INPUT LOAD	0	0	0	0
PER PNP OUTPUT LOAD	0	-.02	.01	0
PER NPN INPUT LOAD	0	0	0	0
PER NPN OUTPUT LOAD	-.013	-.043	.01	.01
DELAY ACROSS PNP BLOCK DRIVEN BY LOGIC INVERTER	.74	.32	.22	.20
ADDITIONAL DELAY DUE TO INVERTER OUTPUT LOADING				
1ST PNP BLOCK	0	0	.16	.07
2ND PNP BLOCK	0	-.02	.22	.08
3RD PNP BLOCK	0	-.02	.33	.09
4TH PNP BLOCK	0	-.01	.39	.11
DELAY ACROSS NPN BLOCK DRIVEN BY LOGIC INVERTER	.35	.28	.17	.09
ADDITIONAL DELAY DUE TO INVERTER OUTPUT LOADING				
1ST NPN BLOCK	-.02	-.02	.18	.08
2ND NPN BLOCK	-.01	-.01	.21	.10
3RD NPN BLOCK	-.01	-.02	.22	.10
4TH NPN BLOCK	-.01	-.02	.42	.15

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CTDL DELAY	6-27-62	115599							729955
DESIGN	INFO - REF. DWG.									
DETAIL	WM 3-1-62	SCALE								
CHECK	RK 3-1-62	DRAW								
APPRO		CHECK								

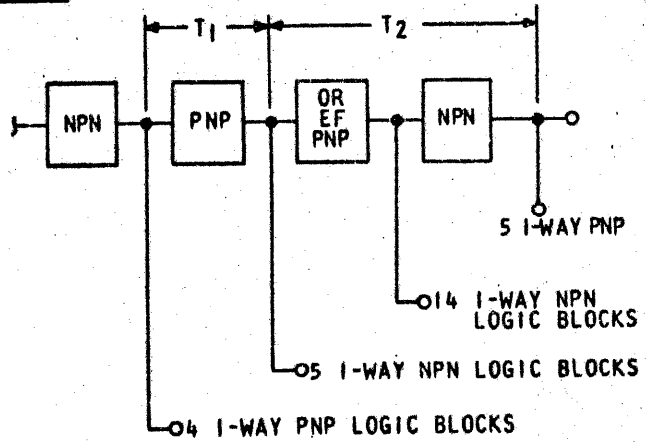
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**\*\*E, F "OR" CIRCUITS\*\***

**DELAY INFORMATION**

**TEST CIRCUIT**



**PNP EMITTER "OR" DELAY (U SEC)**

	T <sub>1</sub>		T <sub>2</sub>		T <sub>1</sub>		T <sub>2</sub>	
	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
DELAY PER BLOCK	.92	.28	.15	.10	.50	.12	.12	.12
DELAY PER ADDED BLOCK ON DRIVER INPUT	.00	.00	.06	.03	.00	.01	.02	.00
DELAY PER ADDED CTDL BLOCK ON DRIVER OUTPUT	.00	-.01	.00	.00	-.01	-.02	.04	.06
DELAY PER ADDED CTDL BLOCK ON E.F.	.01	-.008	.00	.00	.00	-.01	.006	.01
DELAY PER ADDED CTDL BLOCK ON DRIVER BLOCK	.01	.00	.00	.00	-.03	-.01	.00	.00
DELAY W/3 E.F. ON DRIVER - NO LOAD R IN DRIVER	.29	.28	.30	.10	.50	.25	.24	.12
DELAY PER ADDED E.F.	.00	-.02	.02	.00	.00	.00	-.01	.00
DELAY PER ADDED CTDL BLOCK ON DRIVER INPUT	.00	-.01	.02	.00	.00	-.005	-.005	.00
DELAY PER ADDED BLOCK ON E.F. OUTPUT	.00	.002	.002	.00	.00	-.01	.015	.00
DELAY PER ADDED BLOCK ON DRIVER BLOCK	.00	.00	.004	.00	.00	-.02	.00	.00

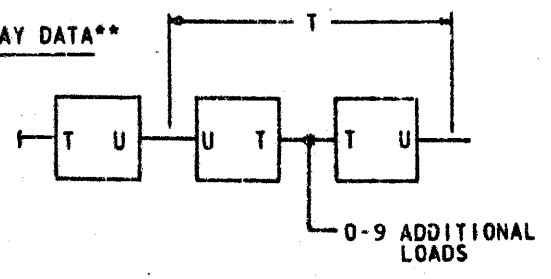
**NPN EMITTER "OR" DELAY (U SEC)**

	T <sub>1</sub>		T <sub>2</sub>		T <sub>1</sub>		T <sub>2</sub>	
	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
DELAY PER BLOCK	.42	.36	.15	.14	.70	.19	.10	.06
DELAY PER ADDED BLOCK ON DRIVER	-.02	.01	.05	.08	.00	.00	.01	.02
DELAY PER ADDED CTDL BLOCK ON DRIVER OUTPUT	-.01	-.01	.005	.00	.00	.00	.03	.01
DELAY PER ADDED CTDL BLOCK ON E.F.	.00	.00	.00	.00	.00	.002	.005	.005

	T <sub>ON</sub>		T <sub>OFF</sub>		T <sub>ON</sub>		T <sub>OFF</sub>	
	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
DELAY PER ADDED CTDL BLOCK ON DRIVER BLOCK	.00	.00	.00	.00	-.04	.00	.00	.00
DELAY W/3 E.F. ON DRIVER - NO LOAD R IN DRIVER	.32	.36	.15	.14	.70	.20	.16	.06
DELAY PER ADDED E.F.	.02	.00	-.02	.00	.00	.00	.00	.00
DELAY PER ADDED CTDL BLOCK ON DRIVER INPUT	.00	-.02	.02	.00	.00	.00	.01	.00
DELAY PER ADDED BLOCK ON E.F. OUTPUT	.005	.00	.00	.00	-.005	.00	.01	.00
DELAY PER ADDED BLOCK ON DRIVER BLOCK	.01	.00	.00	.00	-.01	-.00	.00	.00

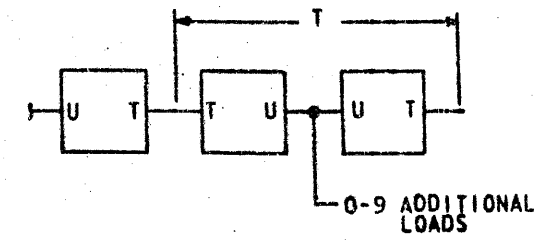
**\*\*TRANSLATE BLOCK DELAY DATA\*\***

**NPN BLOCK**



TOTAL NUMBER OF LOADS	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX.	MIN.	MAX.	MIN.
1	.70	.16	.34	.12
2	.70	.16	.36	.13
3	.70	.16	.40	.14
4	.70	.17	.43	.15
5	.70	.17	.46	.16
6	.70	.18	.48	.17
7	.70	.18	.50	.18
8	.70	.18	.51	.19
9	.70	.19	.57	.20
10	.70	.20	.60	.21

**PNP BLOCK**



TOTAL NUMBER OF LOADS	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX.	MIN.	MAX.	MIN.
1	.52	.17	.26	.14
2	.52	.17	.31	.16
3	.52	.17	.35	.17
4	.52	.18	.38	.19
5	.53	.18	.41	.20
6	.53	.18	.44	.21
7	.53	.19	.47	.22
8	.53	.19	.50	.23
9	.53	.19	.54	.24
10	.53	.20	.56	.25

CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	
NAME	CTDL DELAY	DATE	6-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.	729955
DESIGN	WM	3-1-62	SCALE								
CHECK	RC	3-1-62	DAWG								
APPRO			CHECK								

72955

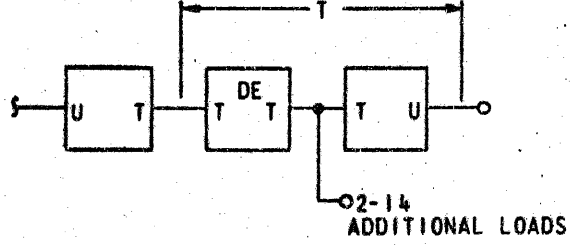
STANDARDS CODE

CARD CODE 72955

SHEET 3 OF 3

**\*\*EMITTER FOLLOWER DELAY\*\***

NPN



TOTAL NUMBER OF LOADS	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX.	MIN.	MAX.	MIN.
3	.68	.14	.25	.05
4	.68	.15	.26	.06
5	.68	.16	.27	.06
6	.68	.17	.27	.07
7	.68	.18	.29	.07
8	.68	.19	.30	.08
9	.68	.20	.31	.08
10	.68	.21	.32	.08
11	.68	.21	.33	.08
12	.68	.21	.34	.08
13	.68	.22	.35	.09
14	.68	.22	.36	.09
15	.68	.23	.37	.09

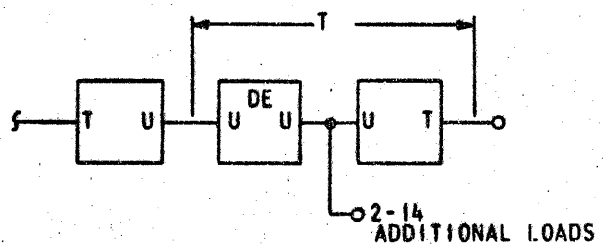
**\*\*CURRENT MODE BLOCK WITH CTDL COUPLING NETWORK\*\***

DELAY DATA

	TURN ON (U SEC)			
	IN PHASE		INVERTED	
	MIN	MAX	MIN	MAX
BASIC N BLOCK DELAY	.100	.100	.150	.200
PER CTDL BLOCK LOAD	-.010	-.005	-.020	-.005
PER ADDED FAN-IN DIODE	-.002	-.002	-.001	-.001
BASIC P BLOCK DELAY	.080	.110	.210	.240
PER CTDL BLOCK LOAD	.000	.010	-.020	-.005
PER ADDED FAN-IN DIODE	-.001	-.001	-.002	-.002
BASIC CTDL PNP DELAY	.230	.560	.200	.500
PER CTDL BLOCK LOAD	.000	.020	-.000	.020
PER ADDED FAN-IN DIODE	-.020	-.020	-.022	-.012
BASIC CTDL NPN DELAY	.200	.450	.180	.400
PER CTDL BLOCK LOAD	.020	.020	-.010	-.010
PER ADDED FAN-IN DIODE	.015	.030	-.018	-.006

	TURN OFF (MU SEC)			
	IN PHASE		INVERTED	
	MIN	MAX	MIN	MAX
BASIC N BLOCK DELAY	.090	.090	.090	.130
PER CTDL BLOCK LOAD	.010	.010	.010	.010
PER ADDED FAN-IN DIODE	.001	.001	.001	.001
BASIC P BLOCK DELAY	.060	.130	.100	.120
PER CTDL BLOCK LOAD	.000	.020	-.010	.010
PER ADDED FAN-IN DIODE	.002	.002	-.001	-.001
BASIC CTDL PNP DELAY	.060	.340	.140	.350
PER CTDL BLOCK LOAD	.020	.100	.000	.100
PER ADDED FAN-IN DIODE	.002	.021	.012	.020
BASIC CTDL NPN DELAY	.160	.220	.140	.170
PER CTDL BLOCK LOAD	.100	.260	.060	.290
PER ADDED FAN-IN DIODE	.005	.010	.005	.010

PNP



TOTAL NUMBER OF LOADS	TURN ON (U SEC)		TURN OFF (U SEC)	
	MAX.	MIN.	MAX.	MIN.
3	.48	.18	.17	.06
4	.50	.19	.18	.06
5	.52	.20	.19	.07
6	.54	.21	.21	.07
7	.56	.22	.22	.08
8	.58	.23	.23	.08
9	.59	.24	.24	.09
10	.59	.24	.26	.09
11	.60	.25	.28	.09
12	.60	.26	.29	.10
13	.61	.26	.30	.10
14	.61	.27	.31	.10
15	.62	.27	.33	.10

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					
CTDL DELAY										
INFO. - REF. DWG										
DESIGN	WH	3-1-62	SCALE							
CHECK	RQ	3-1-62	DRAW							
APPRO			CHECK							

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STANDARDS CODE

SDTDL LOGIC FAMILY DELAY INFORMATION

CARD CODE 729954

GENERAL

DEFINITIONS

SHEET 1 OF 4

THE TURN ON, TURN OFF DELAYS OF THE CIRCUITS USED IN A PARTICULAR MACHINE ARE COMPLEX FUNCTIONS OF MANY VARIABLES SUCH AS THE TRANSISTOR DELAY, INPUT-OUTPUT LOADING, FALL AND RISE TIME, ETC.

THE DELAY SPECIFICATIONS ARE GIVEN BELOW AND ARE CLASSIFIED BY CIRCUIT TYPE. WHEN POSSIBLE, REPRESENTATIVE RANGES OF DELAYS ARE GIVEN ON EACH INDIVIDUAL CIRCUIT SHEET AND SHOULD BE USED AS A GUIDE. SPECIFIC CIRCUIT APPLICATION AND/OR CAPACITIVE LOAD (EXAMPLE: WIRE CAPACITANCE) MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES.

THE FOLLOWING INFORMATION IS PROVIDED FOR THOSE CASES WHERE CARD REPLACEMENT DOES NOT RESULT IN IMPROVEMENT AND A MORE DETAILED ANALYSIS IS NECESSARY.

HIGH SPEED, LOW SPEED CIRCUITS

THE SDTDL CIRCUITS ARE CLASSIFIED INTO TWO MAJOR FAMILIES, THE LOW SPEED AND THE HIGH SPEED CIRCUITS. THE DIFFERENCE BETWEEN THE TWO FAMILIES CONSISTS OF THE INPUT SPEED UP CAPACITOR THAT IS USED ONLY IN THE HIGH SPEED LOGIC BLOCKS.

DELAY CHARTS:

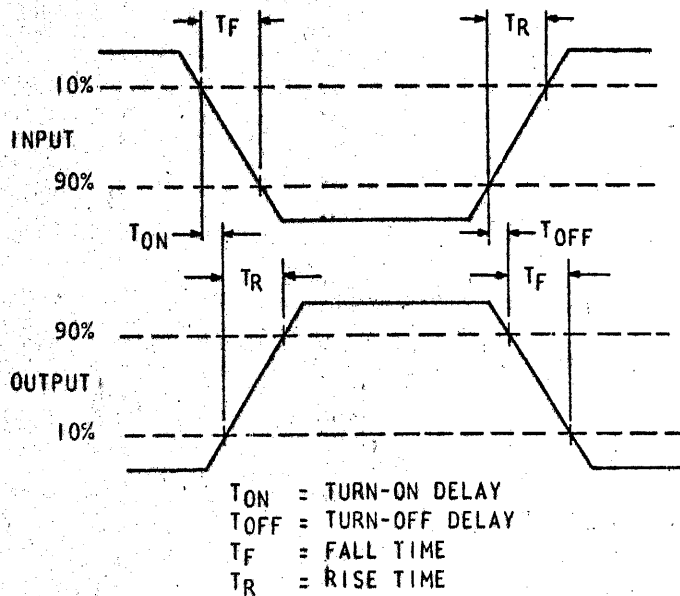
NUMEROUS CHARTS GIVING DELAY INFORMATION HAVE BEEN INCLUDED IN THIS DOCUMENT. BOTH MINIMUM AND MAXIMUM DELAYS ARE GIVEN AS A FUNCTION OF SOME VARIABLE OR VARIABLES. NOMINAL DELAYS HAVE BEEN AVOIDED DUE TO POSSIBLE MISINTERPRETATIONS. THE MAXIMUM DELAYS GIVEN ARE SLIGHTLY LESS THAN THE THEORETICAL MAXIMUM DELAY. THE MAXIMUM DELAYS GIVEN SHOULD NOT BE EXCEEDED IN PRACTICAL APPLICATIONS.

USE OF GRAPHS

THE FOLLOWING STEPS ARE RECOMMENDED FOR USING THE INFORMATION PROVIDED IN THE ACCOMPANYING GRAPHS.

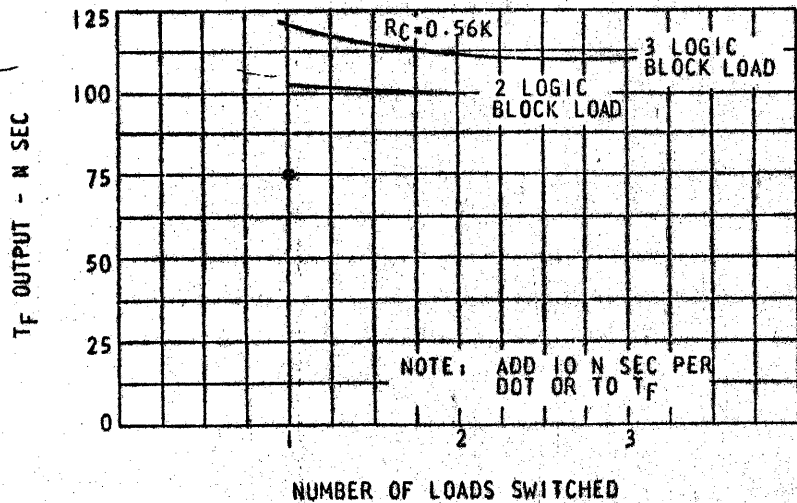
1. GIVEN A LOAD CONFIGURATION REFER TO THE GRAPH OUTPUT FALL TIME VS. LOADING TO DETERMINE THE OUTPUT FALL TIME.
2. GIVEN THE INPUT FALL TIME, THE OUTPUT RISE IS DETERMINED FROM THE GRAPH OF OUTPUT RISE TIME VS. INPUT FALL TIME.
3. KNOWLEDGE OF THE RISE TIME AND USE OF THE GRAPH OF TURN-OFF DELAY VS. INPUT RISE TIME RESULTS IN TURN-OFF LIMITS.
4. KNOWLEDGE OF INPUT FALL TIME AND USE OF THE GRAPH OF TURN-ON DELAY VS. INPUT FALL TIME RESULTS IN TURN-ON LIMITS.

THE RISE AND FALL TIMES WERE MEASURED FROM THE 10% TO 90% POINTS OF THE INPUT AND OUTPUT WAVEFORM. THE TURN-ON DELAY WAS MEASURED AS THE TIME INTERVAL BETWEEN 10% DOWN AT THE INPUT TO 10% UP AT THE OUTPUT. THE TURN-OFF DELAY WAS MEASURED AS THE TIME INTERVAL BETWEEN 10% UP AT THE INPUT TO 10% DOWN AT THE OUTPUT. UNLESS OTHERWISE STATED THE RISE, FALL AND DELAY TIMES ARE GIVEN IN N SEC (NANOSECONDS).

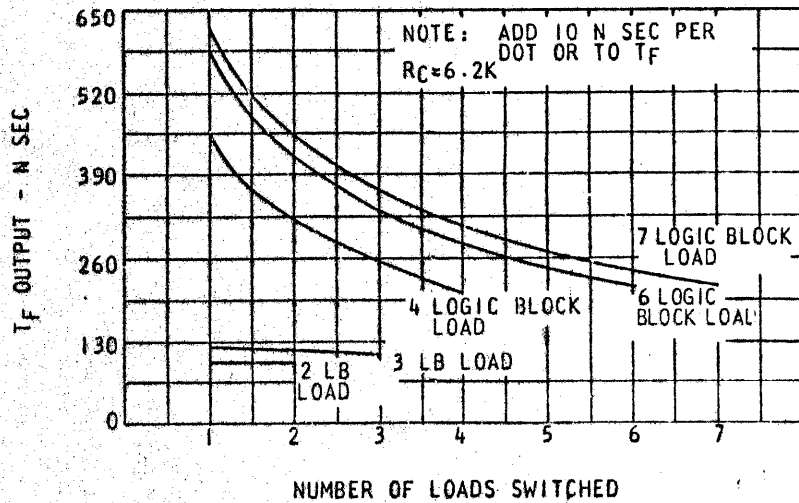


\*\*HIGH SPEED SINGLE LEVEL LOGIC BLOCK\*\*

OUTPUT FALL TIME VS LOADING



OUTPUT FALL TIME VS LOADING



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME SDTDL LOGIC DELAY				4-2-62	115599					
INFO. - REF DWG										
DESIGN	WH	3-1-62	SCALE							
CHECK	RQ	3-1-62	DRAW							
APPRO			CHECK							

LIG 6-4-62

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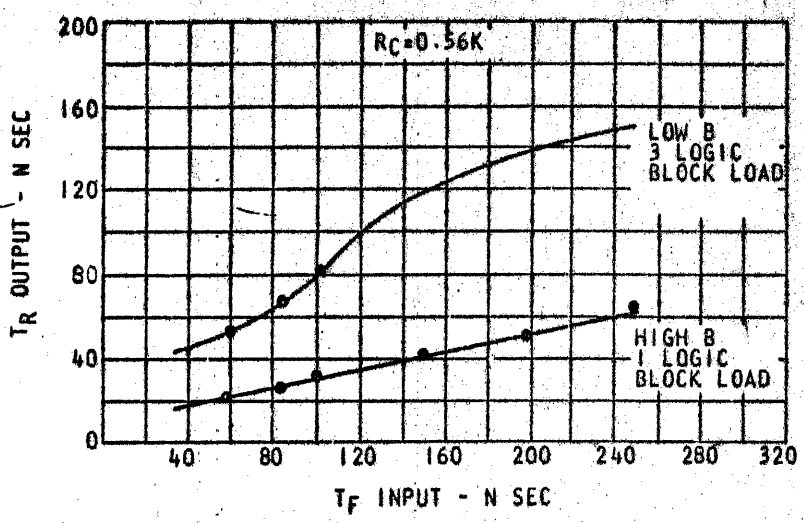
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STANDARDS CODE

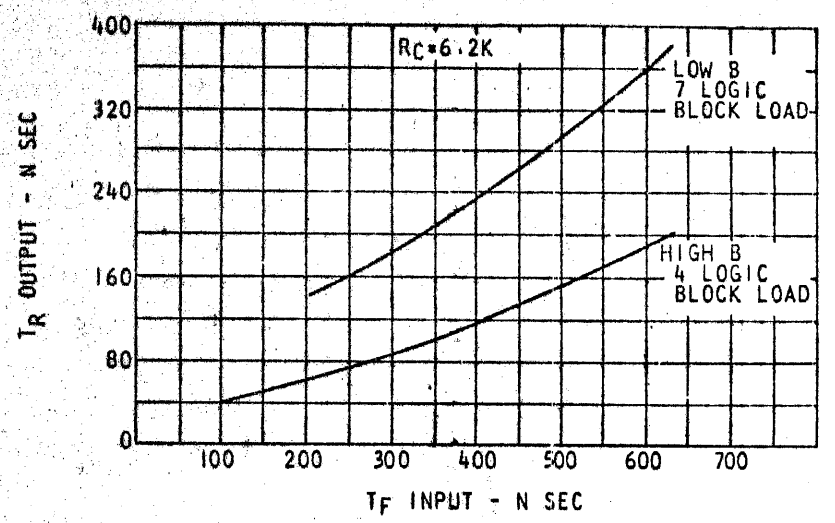
CARD CODE 729954

SHEET 2 OF 4

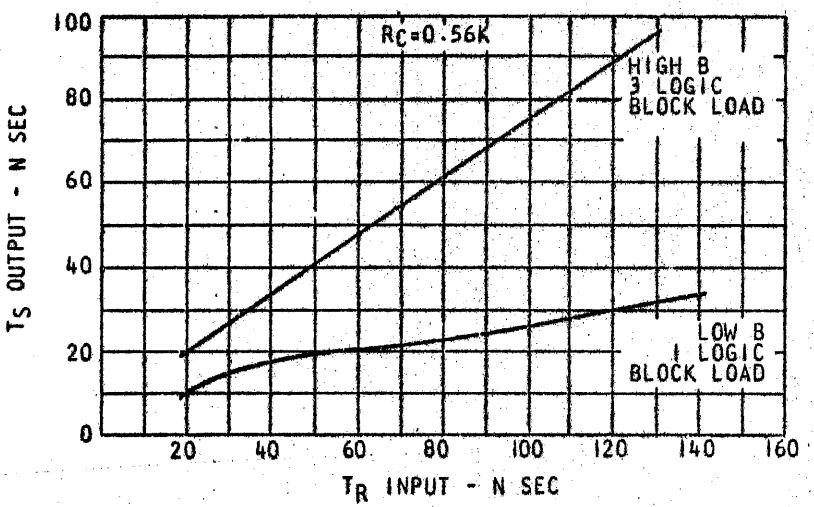
OUTPUT RISE TIME VS INPUT FALL TIME



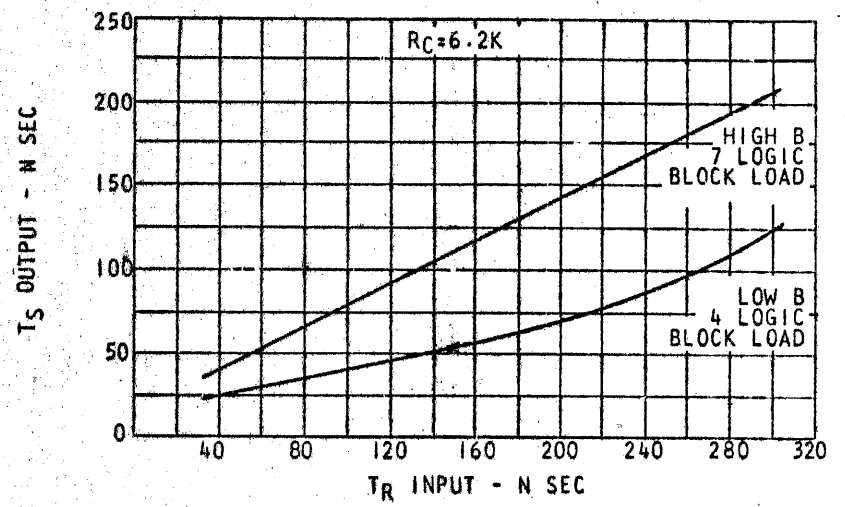
OUTPUT RISE TIME VS INPUT FALL TIME



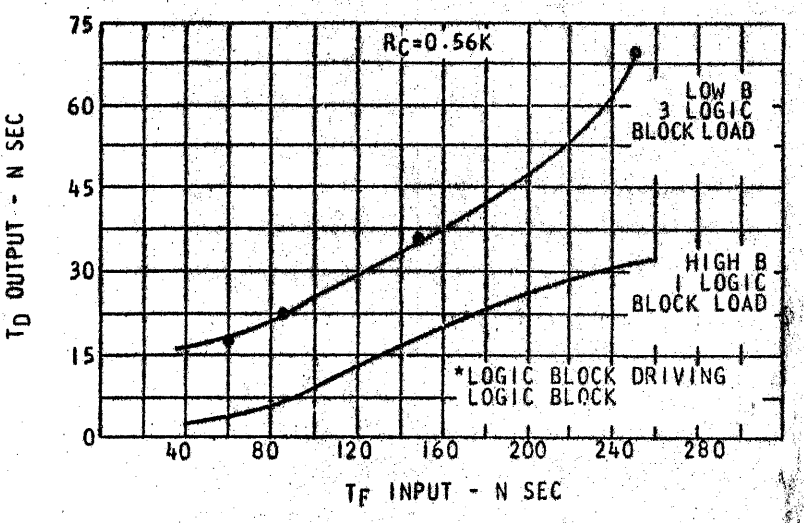
TURN-OFF VS INPUT RISE TIME



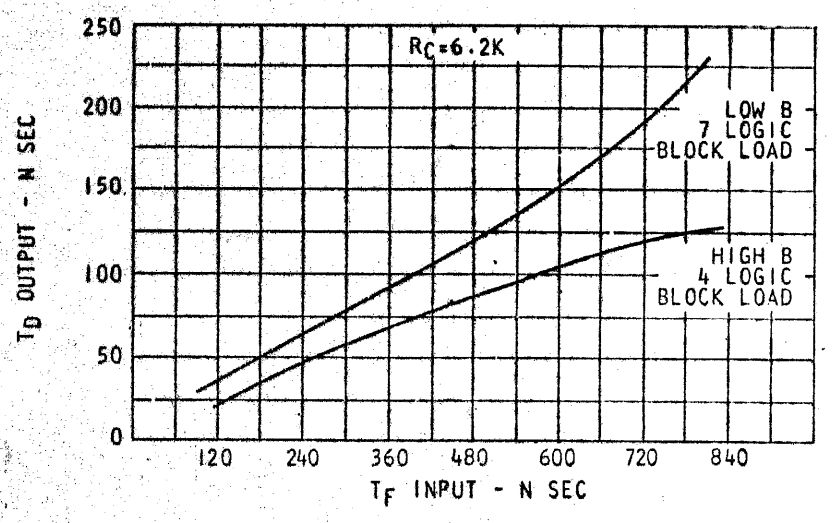
TURN-OFF VS INPUT RISE TIME



TURN-ON VS INPUT FALL TIME\*



TURN-ON VS INPUT FALL TIME



CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					
INFO										
DESIGN	WH	3-1-62	SCALE							
CHECK	RQ	3-1-62	DRAW							
APPRO			CHECK							

LIG 6-4-62

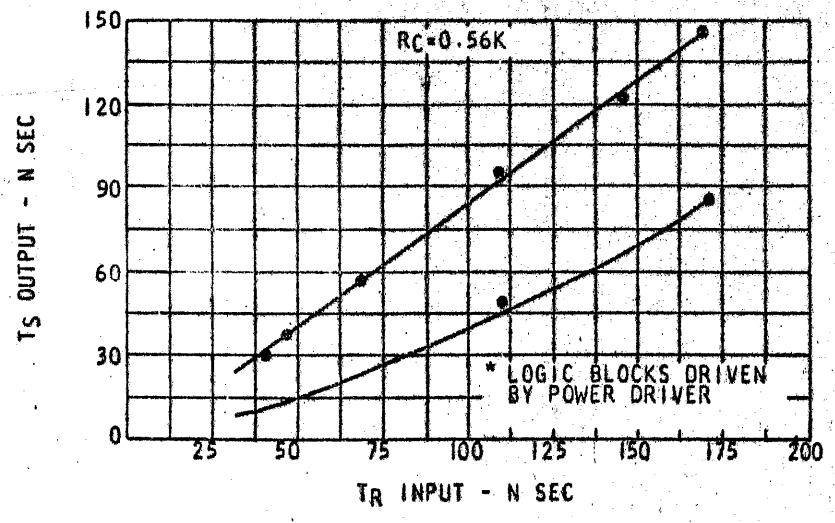
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STANDARDS CODE  
729954

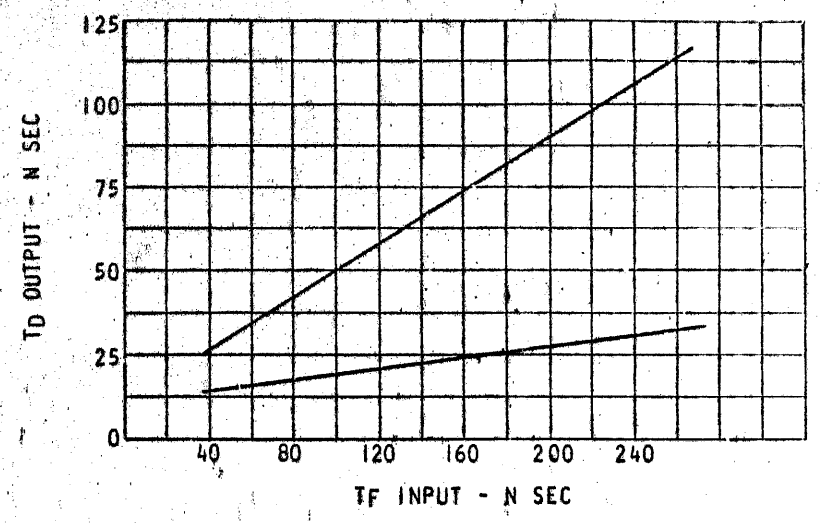
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SHEET 3 OF 4

TURN-OFF VS RISE TIME INPUT \*



TURN-ON VS FALL TIME INPUT

(LOGIC BLOCK DRIVEN BY POWER DRIVERS)

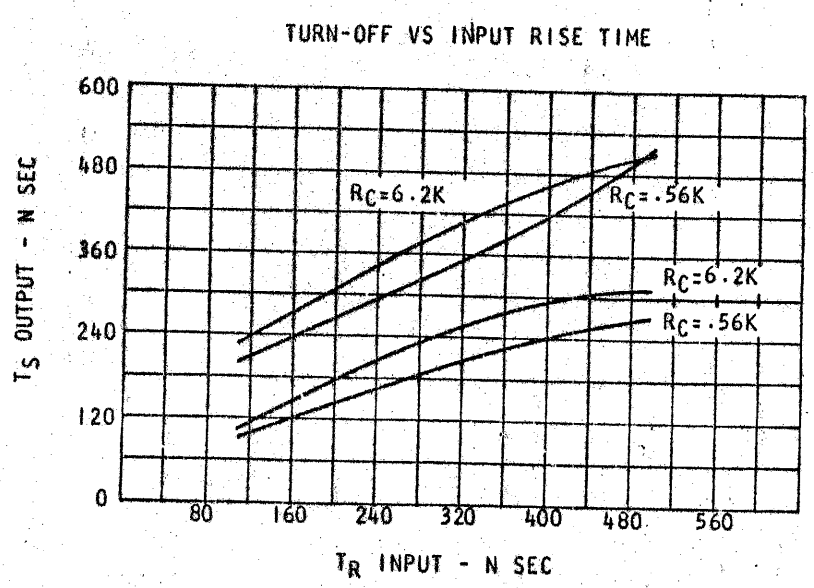
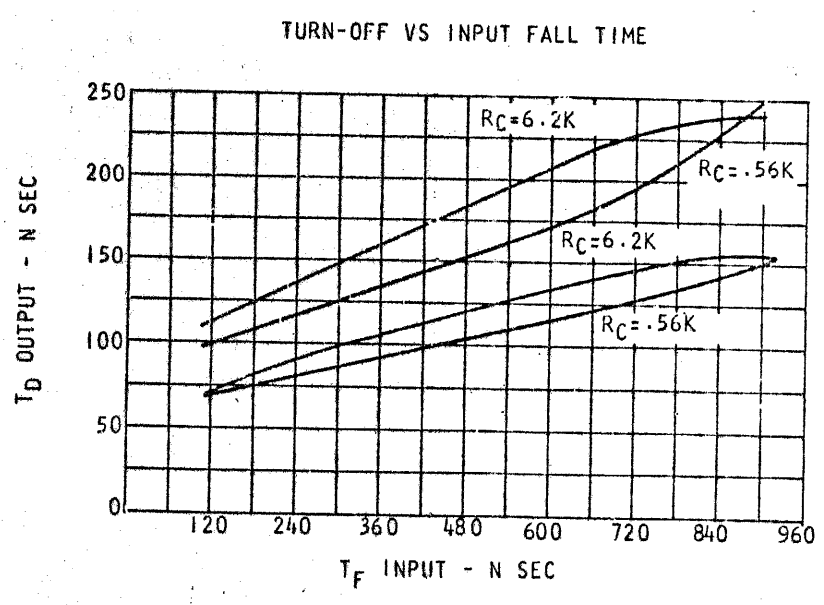
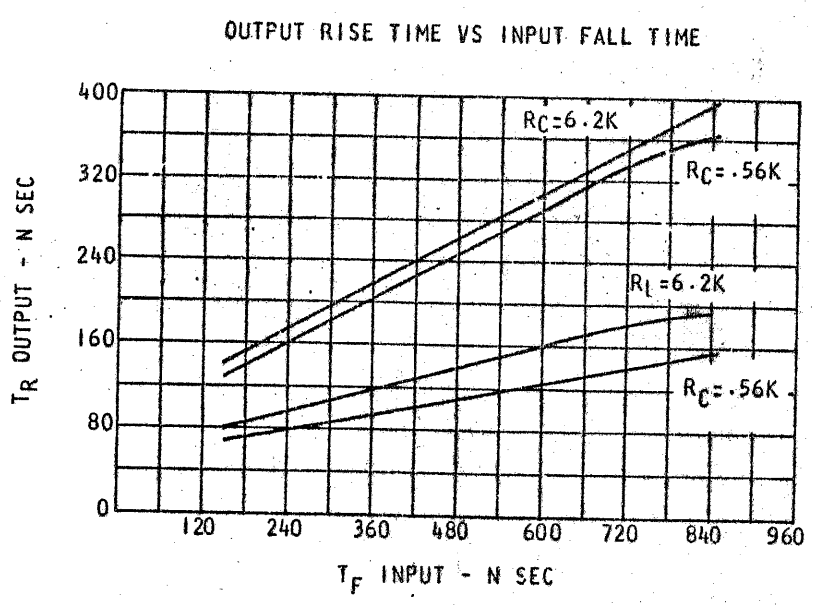
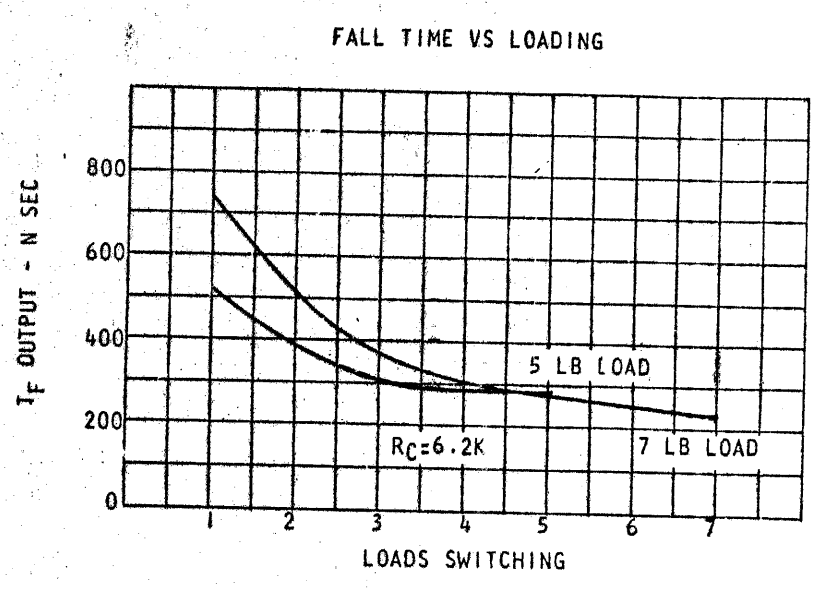
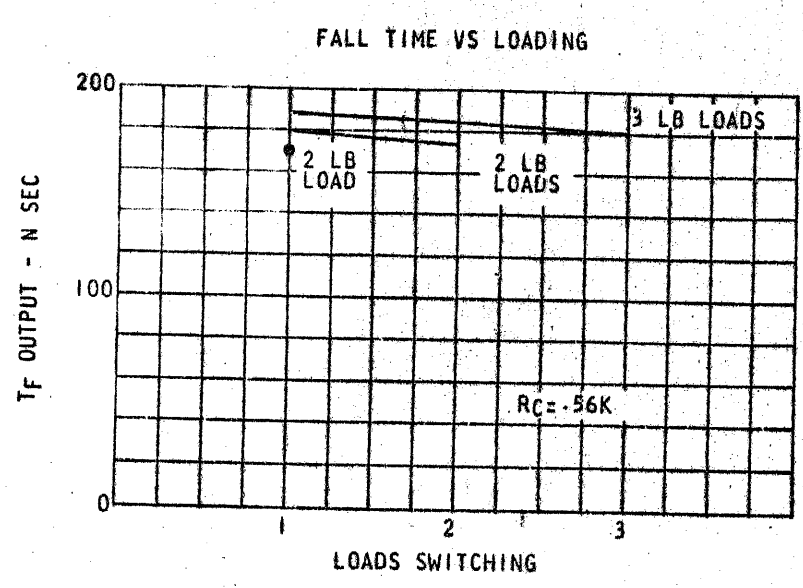


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME S.D.T.D.L LOGIC DELAY				6-21-62	115599					729954
INFO. - REF. DWG.										
DESIGN	WH	3-1-62	SCALE							
CHECK	RQ	3-1-62	DRAW							
APPRO			CHECK							

LIG 6-4-62

**\*\*LOW SPEED SINGLE LEVEL LOGIC BLOCKS\*\***



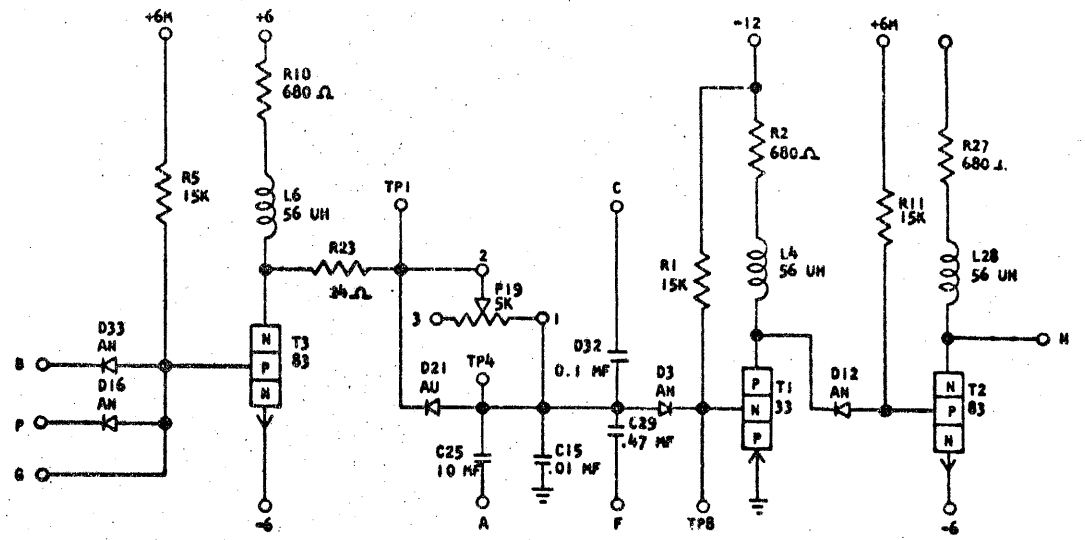
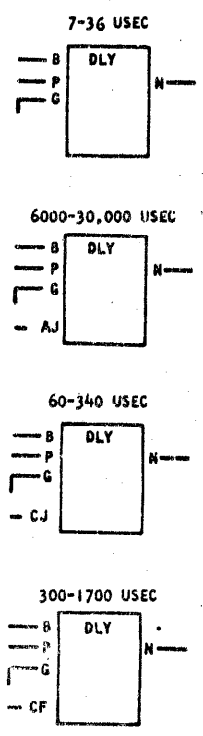
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62
DEVELOPMENT NO.	

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME SDDL LOGIC DELAY				.62	115599					729954
INFO. - REF DWG										
DESIGN	WH	3-1-62	SCALE							
CHECK	RQ	3-1-62	DRAW							
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371884

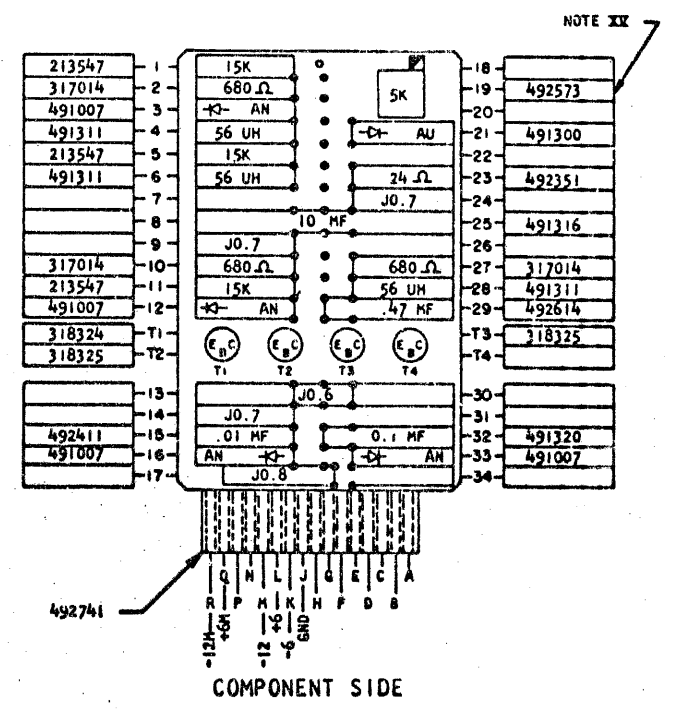
ALLOY UNIVERSAL DELAY CIRCUIT



SEQUENCE OF OPERATION

1. ALL INPUTS UP ALL TRANSISTORS ARE ON OUTPUT IS DOWN
2. ANY DOWN INPUT WILL CAUSE T3 TO GO OFF; T1 AND T2 WILL REMAIN ON UNTIL RC CAPACITOR IS CHARGED. WHEN THE CAPACITOR IS CHARGED T1 AND T2 WILL BE OFF AND THE OUTPUT WILL BE UP

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B	U	INPUT	UP	-5.26 0.24
P	U	INPUT	DOWN	-7.44 -12.5
N	T	OUTPUT	UP	1.44 6.24
B		EXTENDER INPUT	DOWN	-5.46 -6.24
			UP	-6
			DOWN	-12



NOTE XX

213547	1	15K	18	492573
317014	2	680Ω	19	491300
491007	3	5K	20	492351
491311	4	56 UH	21	491316
213547	5	15K	22	317014
491311	6	56 UH	23	491311
	7	24Ω	24	492614
	8	10 MF	25	318325
	9	JO.7	26	
317014	10	680Ω	27	491320
213547	11	15K	28	491007
491007	12	56 UH	29	
	13	0.47 MF	30	
	14	JO.7	31	
	15	0.1 MF	32	
	16	AN	33	
	17	JO.8	34	

COMPONENT SIDE

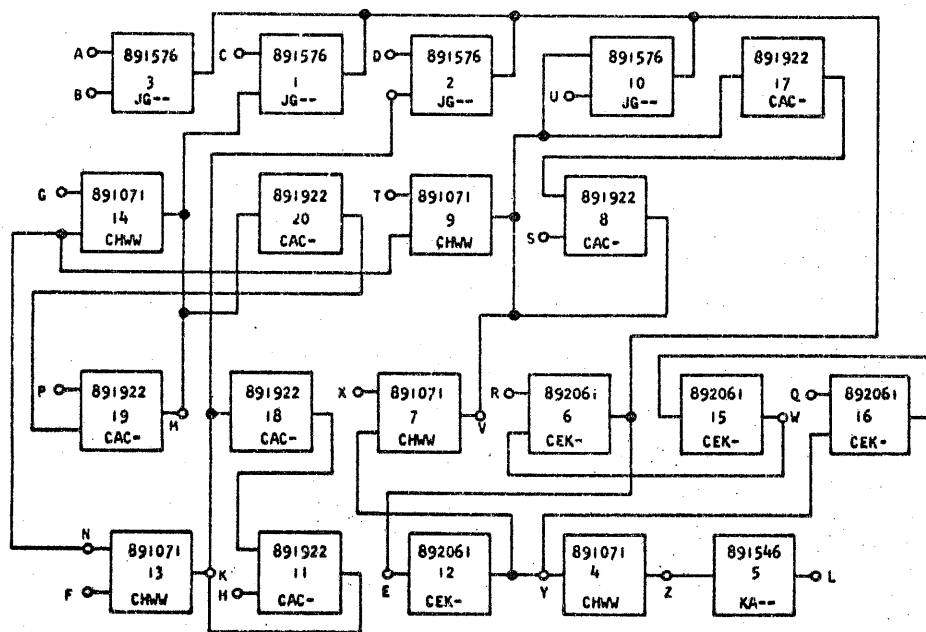
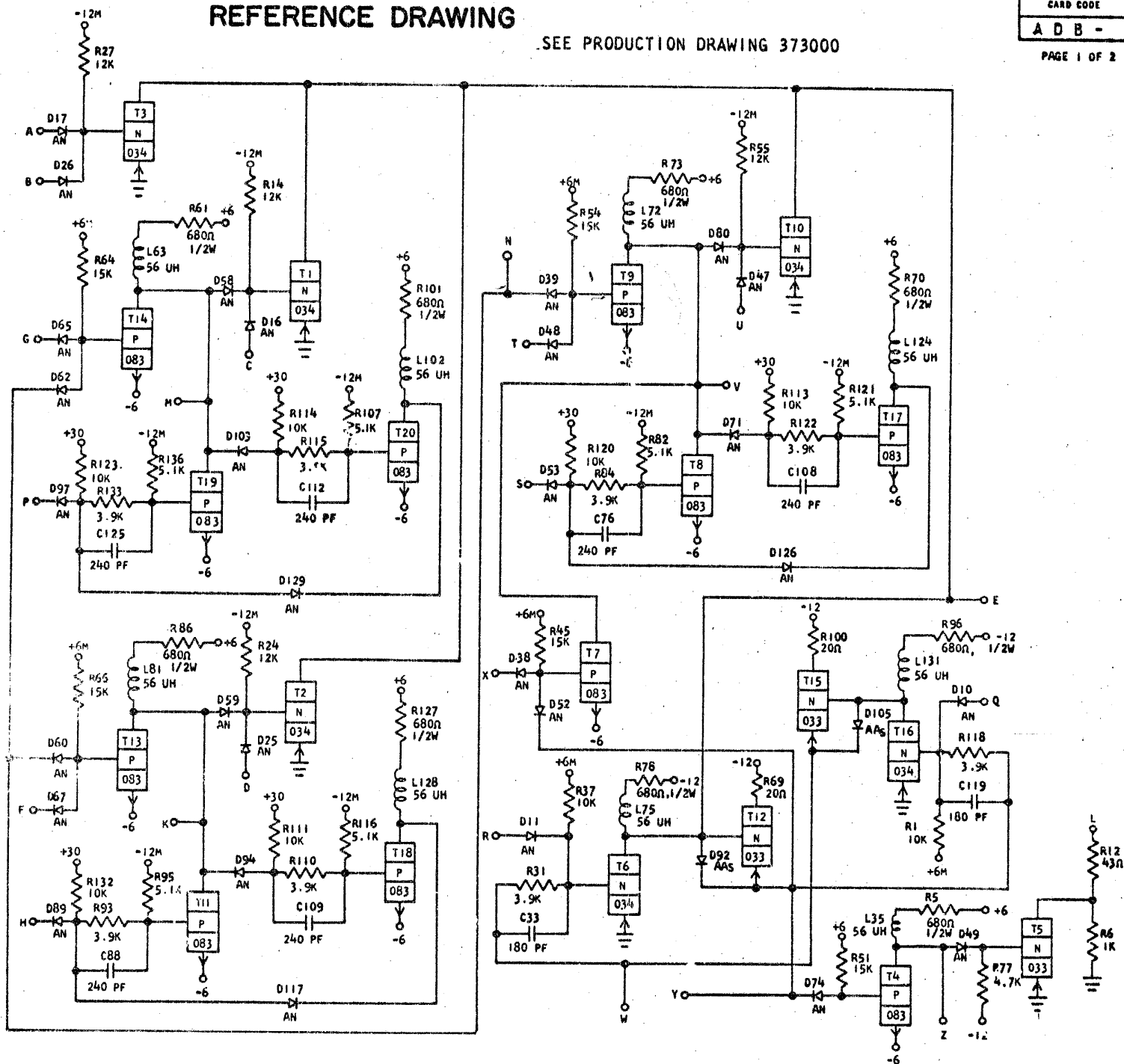
CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGF NO.	APPROVAL	DATE	CHANGF NO.	APPROVAL	DEVELOPMENT NO.
NAME: CARD ASM TSTR - ALLOY				6-27-62	115599					729800
UNIVERSAL DELAY CIRCUIT										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							



# REFERENCE DRAWING

SEE PRODUCTION DRAWING 373000



VOLTAGE	PIN
GROUND	1
-6	2
+6	3
-12	4
+30	5
+6M	7
-12M	8

### SEQUENCE OF OPERATION

1. THE ONE AND TWO DIGIT NUMBERS SHOWN IN THE INDIVIDUAL BLOCKS OF THE BLOCK DIAGRAM REFER TO A TRANSISTOR OF THE SAME NUMBER IN THE DETAILED SCHEMATIC
2. THE 800,000 SERIES NUMBER IN EACH BLOCK REFERS TO THE ENGINEERING SPECIFICATION FOR THAT PARTICULAR CIRCUIT
3. THE CARD AND CAP CODE IN EACH BLOCK REFERS TO THE RESPECTIVE PORTION OF THE DETAILED CIRCUITRY
4. FOR INFORMATION PERTAINING TO WAVE FORMS OF EACH INDIVIDUAL CIRCUIT, REFER TO THE CARD AND CAP CODE OF THE CIRCUIT

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

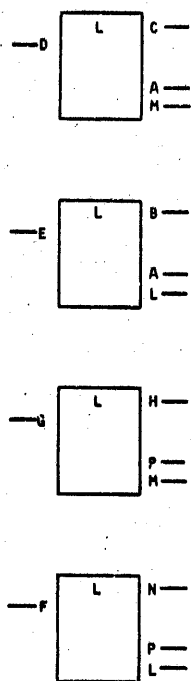
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASSEMBLY- ALLOY				4-29-62	115599					729801
STORAGE ADDRESS REGISTER										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG 3-17-62							
APPRO			CHECK							



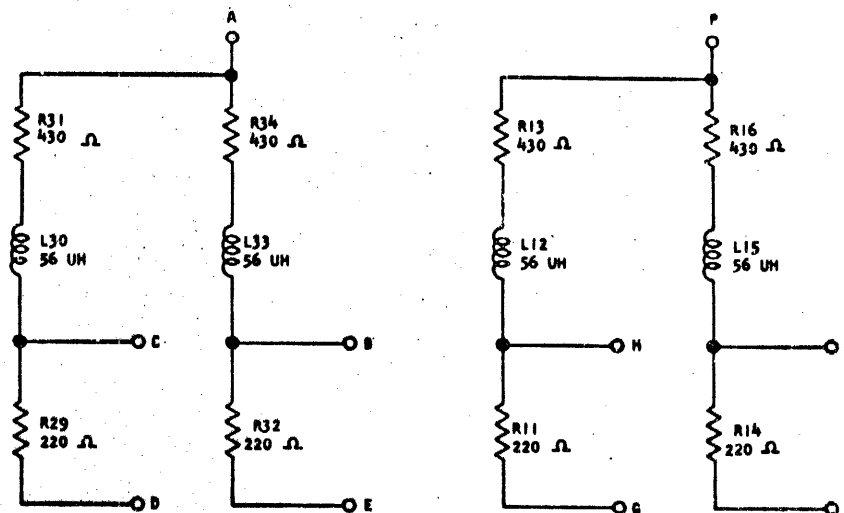


# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371929

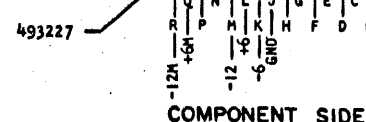
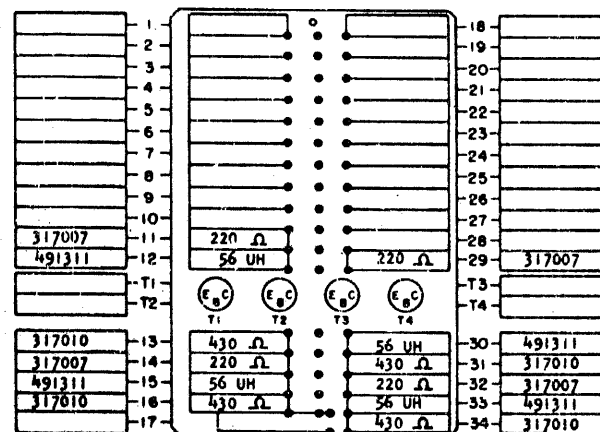


## CTDL LOAD CARD



### SEQUENCE OF OPERATION

1. AS COLLECTOR LOAD FOR CTDL BLOCK TO PROVIDE CURRENT MODE OUTPUT
2. A AND P CONNECTED TO +6 VOLTS; D, E, G, F ARE T LEVEL INPUTS AND C, B, H, M ARE N LEVEL OUTPUTS
3. A AND P CONNECTED TO -12 VOLTS; D, E, G, F ARE U LEVEL INPUTS AND C, B, H, N ARE P LEVEL OUTPUTS



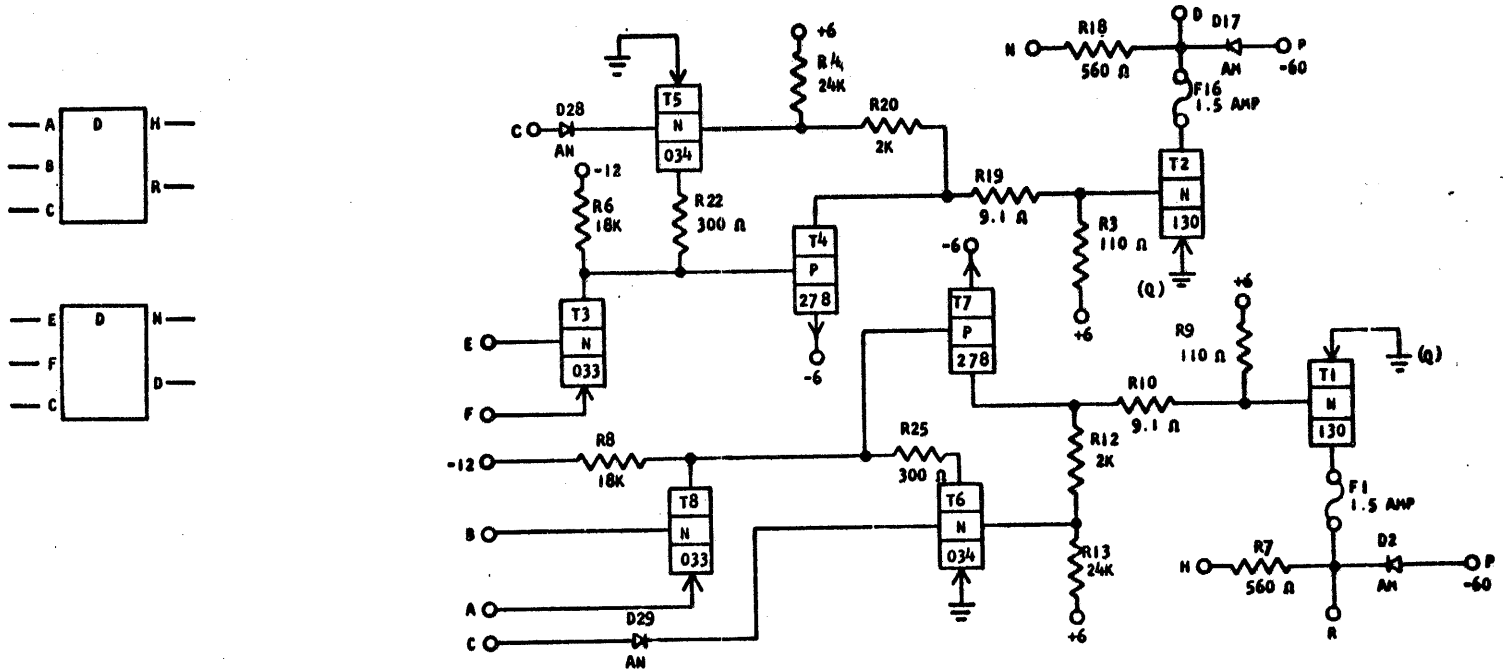
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL				6-27-62	115599					
LOAD CARD										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG	3-17-62						
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371940

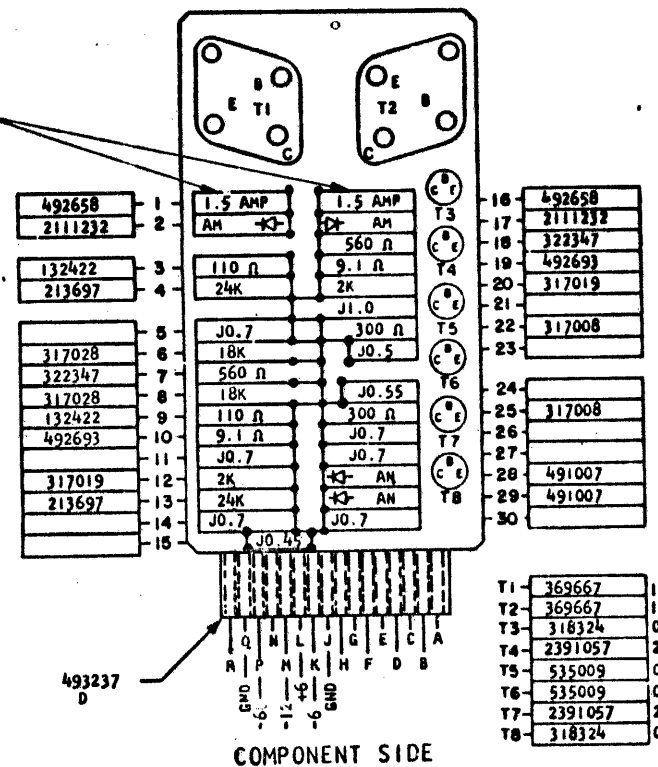
ALLOY HAMMER DRIVER LATCH



SEQUENCE OF OPERATION

1. WHEN INPUTS AT E (GATE) AND F (SET) ARE IN COINCIDENCE T3 TURNS ON
2. WITH T3 ON, T4 TURNS ON, T5 TURNS ON AND LATCHES T4
3. T2 TURNS ON THE OUTPUT IS GND
4. WHEN C (RESET) IS UP T5, T4, T2 TURN OFF AND THE OUTPUT IS -60V
5. FAILURE TO RESET PROPERLY WILL RESULT IN BLOWN FUSE

483316 (4) MOUNT LUGS



PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, B	N	GATE	UP	+5.61	+6.24
			DOWN	-1.19	-3.91
A, F	T	SET	UP	-3.91	-7.1
			DOWN	-5.46	-6.24
C	T	RESET	UP	+1.44	+6.24
			DOWN	-.81	-6.24
H, N		HAMMER CHECK DRIVE	UP		
D, R	V	OUTPUT	UP	-2.5	-0
			DOWN	-54	-60

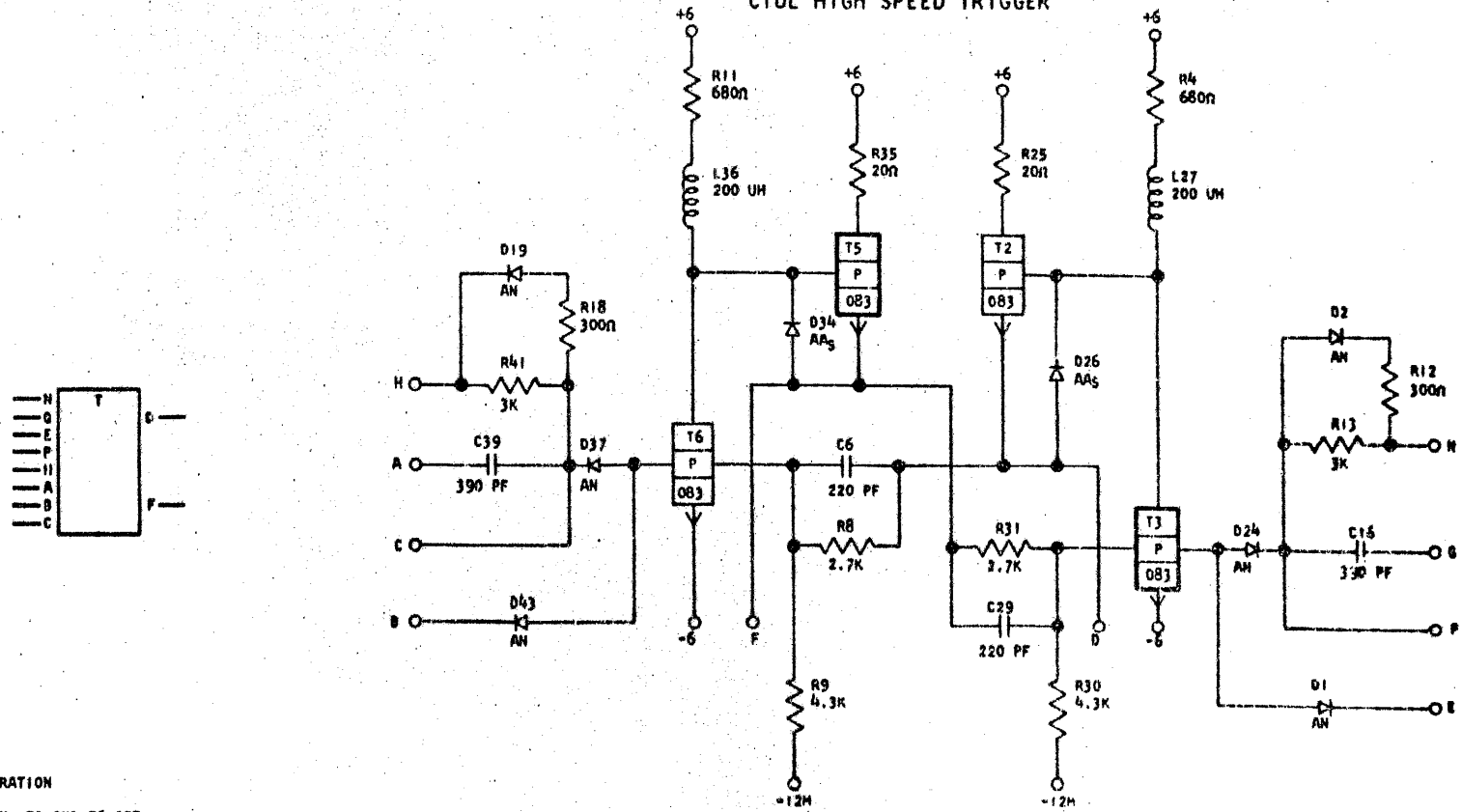
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR -				6-27-62	115529		3-26-65	123735	GLK	729803
ALLOY HAMMER DRIVER LATCH				9-18-62	112467	MDL				
DESIGN	RQ	3-1-62	MODEL	SMS	2-6-63	1:6063				
DETAIL	WH	3-1-62	SCALE	NONE	9-15-64	121632				
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK		11-21-64	122721	GLK			

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371946

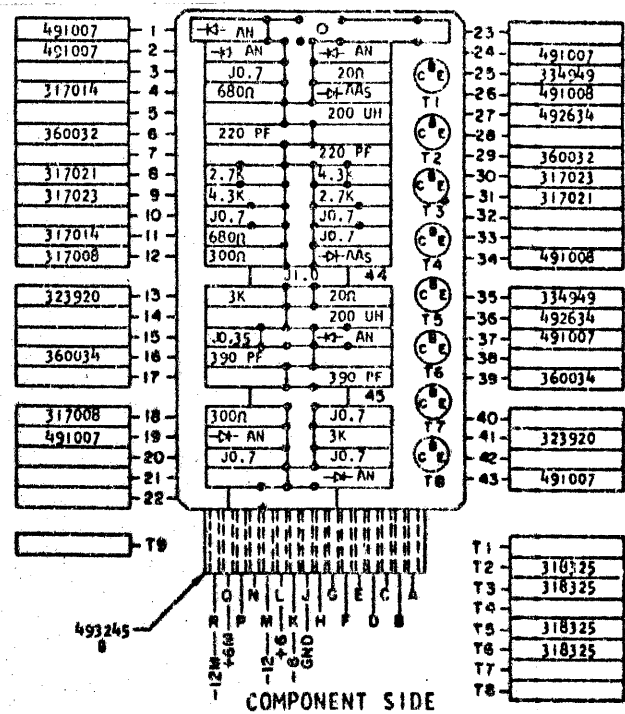
CTDL HIGH SPEED TRIGGER



SEQUENCE OF OPERATION

1. T3 AND T5 ON, T2 AND T6 OFF
2. PIN N MUST BE CONDITIONED TO A DOWN LEVEL 0.58 U SEC. BEFORE A NEGATIVE SHIFT IS APPLIED TO PIN G FOR A UP LEVEL AT D AND DOWN LEVEL AT F
3. TO FLIP TRIGGER TO ORIGINAL STATE PIN H AND A MUST BE CONDITIONED AS WERE PINS N AND G
4. DOWN INPUT AT B WILL RESET TRIGGER TO CONDITION 1 AND DOWN INPUT AT E WILL RESET TRIGGER TO CONDITION 2
5. P AND C ARE EXTENDER INPUTS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, G	U SET	[Waveform]	UP	-5.4 +2.4
N	T GATE	[Waveform]	UP	3.85 6.24
H	T GATE	[Waveform]	UP	3.85 6.24
D	T OUTPUT	[Waveform]	UP	3.85 6.24
F	T OUTPUT	[Waveform]	UP	3.85 6.24
E	U RESET	[Waveform]	UP	-5.4 +2.4
			DOWN	-7.44 -12.5



DELAY - USEC

1. DELAY FROM INPUT TO OUTPUT OF OFFSIDE (LOADED)
 

DRIVING CTDL LOADS:	T ON	.14 MIN	.16 MAX
	T OFF	.08 MIN	.35 MAX
DRIVING HI SPEED MESA:	T ON	.05 MIN	.17 MAX
	T OFF	.1 MIN	.51 MAX
2. DELAY FROM INPUT TO ONSIDE (UNLOADED)
 

DRIVING HI SPEED DTDL MESA:	T ON	.13 MIN	.51 MAX
	T OFF	.08 MIN	.14 MAX
DRIVING CTDL LOADS:	T ON	.11 MIN	.38 MAX
	T OFF	.08 MIN	.11 MAX

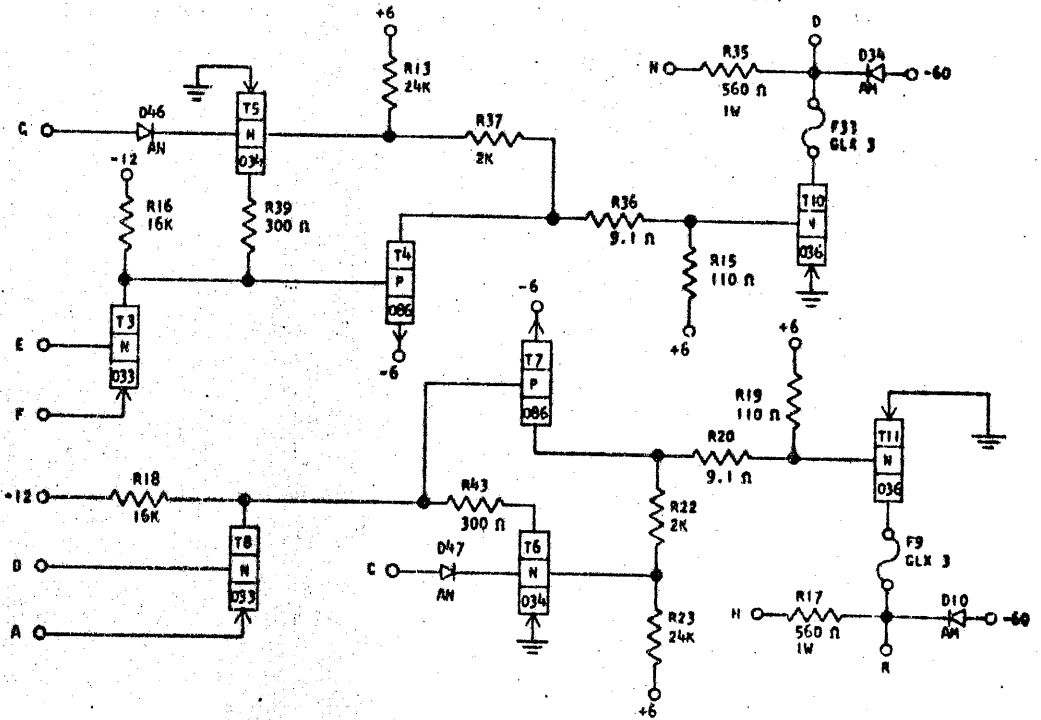
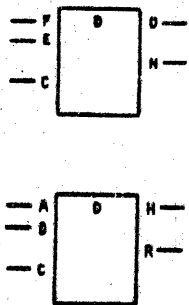
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL				6-27-62	115599					729804
HIGH SPEED TRIGGER										
DESIGN	RQ	3-1-62	MODEL							
DETAIL	WH	3-1-62	SCALT	NONE						
CHECK	WH	3-1-62	DRAW	L10 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371415

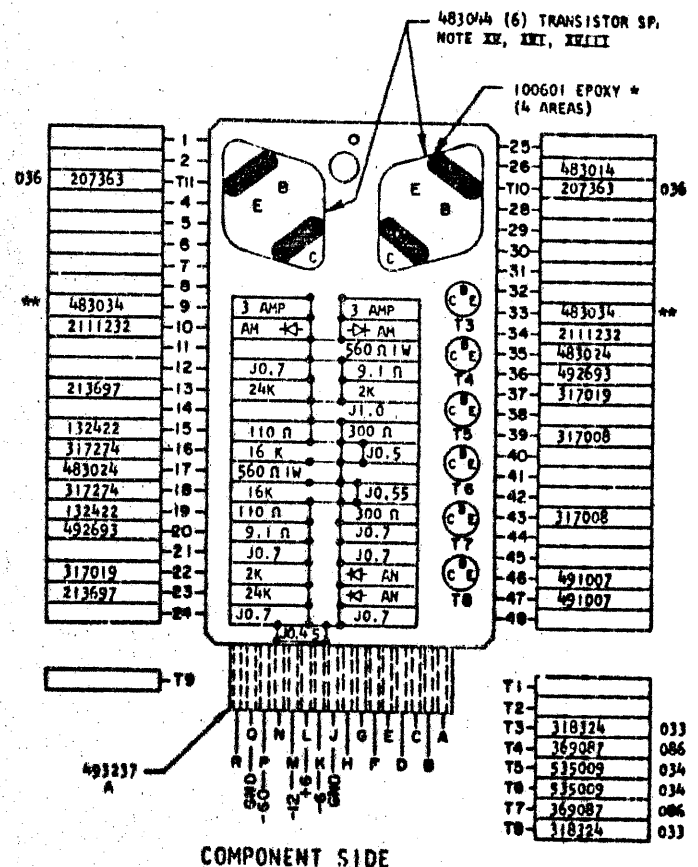
ALLOY HAMMER DRIVER LATCH (HIGH SPEED)



SEQUENCE OF OPERATION

1. WHEN INPUTS AT E (GATE) AND F (SET) ARE IN COINCIDENCE T3 TURNS ON
2. WITH T3 ON, T4 TURNS ON, T5 TURNS ON, AND LATCHES T4
3. T10 TURNS ON, THE OUTPUT IS GROUND
4. WHEN C (RESET) IS UP, T5 TURNS OFF, T4 TURNS OFF, T10 TURNS OFF AND THE OUTPUT IS -60V

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
F, A	T SET		UP -3.91	-0.71
E, B	N GATE		DOWN -5.46	-6.24
C	T RESET		UP 1.44	6.24
N, M	HAMMER CHECK DRIVE		DOWN -0.81	-6.24
R, D	V OUTPUT		UP -2.5	0
			DOWN -54	-60



COMPONENT SIDE

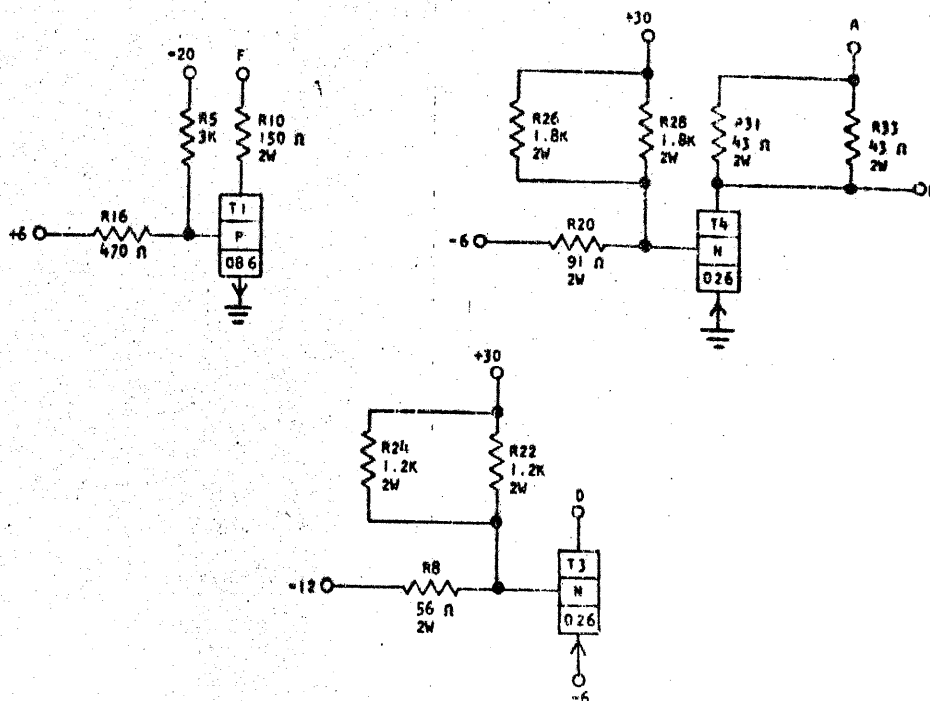
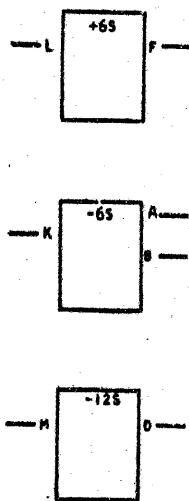
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - ALLOY				6-27-62	115599					
HAMMER DRIVER LATCH(HIGH SPEED)										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370429

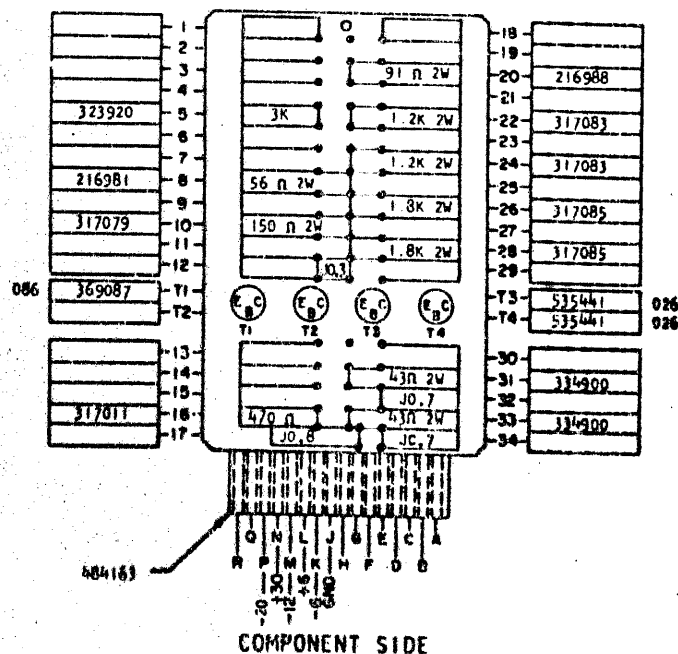
## POWER SUPPLY SEQUENCING



### SEQUENCE OF OPERATIONS

1. THESE THREE CIRCUITS ARE SINGLE-STAGE RELAY DRIVERS, USED TO SENSE A GIVEN VOLTAGE. IF PRESENT, THIS VOLTAGE ALLOWS A TRANSISTOR TO CONDUCT AND OPERATE A RELAY IN THE COLLECTOR CIRCUIT. IF THIS VOLTAGE DROPS OUT DURING NORMAL OPERATIONS THE RELAY WILL ALSO DROP.
2. THE OUTPUT VOLTAGE LEVEL WHEN THE TRANSISTORS ARE OFF DEPENDS UPON THE RETURN VOLTAGE OF THE RELAY IN THE COLLECTOR CIRCUIT.
3. THE +6 VOLT SENSE (T1) MAY OPERATE A RELAY RETURNED TO NO MORE THAN 35 VOLTS, THE -6 VOLT SENSE (T4) 45 VOLTS, AND THE -12 VOLT SENSE (T3) 40 VOLTS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
K	V	-6	UP	-1.1	+0.24
			DOWN	-5.76	-6.24
B	OUTPUT	SEE NOTE 2	UP	-0.24	+0.24
			DOWN		
A	OUTPUT	SEE NOTE 2	UP	-0.24	+0.24
			DOWN		
L	V	+6	UP	+5.76	+6.24
			DOWN	+1.8	-0.24
F	OUTPUT	SEE NOTE 2	UP		
			DOWN	+0.24	-0.24
M	V	-12	UP	-1.0	+0.24
			DOWN	-11.52	-12.48
D	OUTPUT	SEE NOTE 2	UP	-6.24	-5.76
			DOWN		



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-				4-29-62	115599					
POWER SUPPLY SEQUENCING										
DESIGN	MODEL	SMS								
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

729902

STANDARDS CODE

CARD CODE

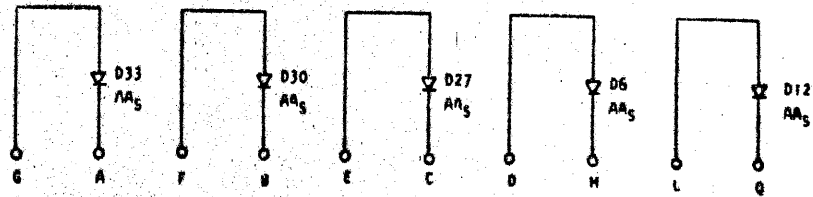
729902

A J T -

# REFERENCE DRAWING

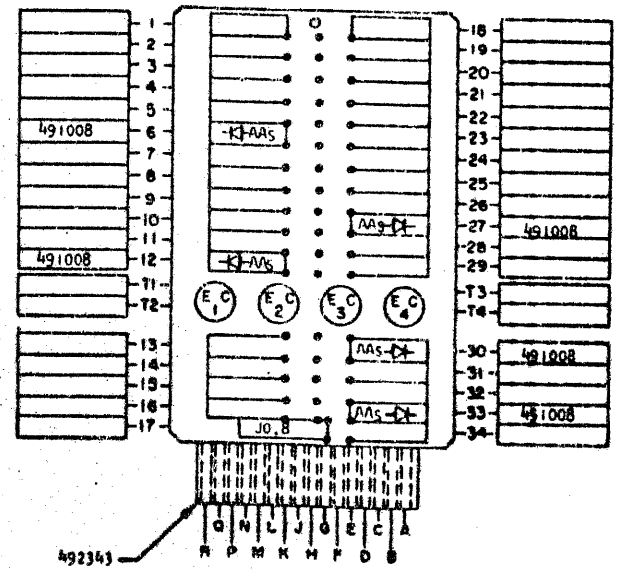
SEE PRODUCTION DRAWING 370564

## ALLOY-DIODES, TYPE AA5



### APPLICATION NOTES

THESE DIODES CAN BE USED AS INPUTS TO EITHER P OR N TYPE LOGIC BLOCKS DEPENDING ON HOW THE PINS ARE CONNECTED.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - ALLOY -				4-27-62	115599					
DIODES, TYPE AA5										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L16	3-17-62					
APPRO			CHECK							

729902

C

729806

STANDARDS CODE

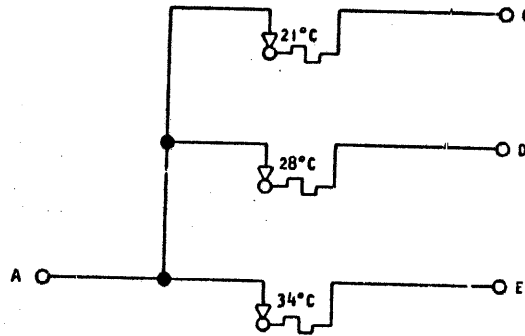
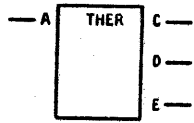
CARD CODE 729806

A K B -

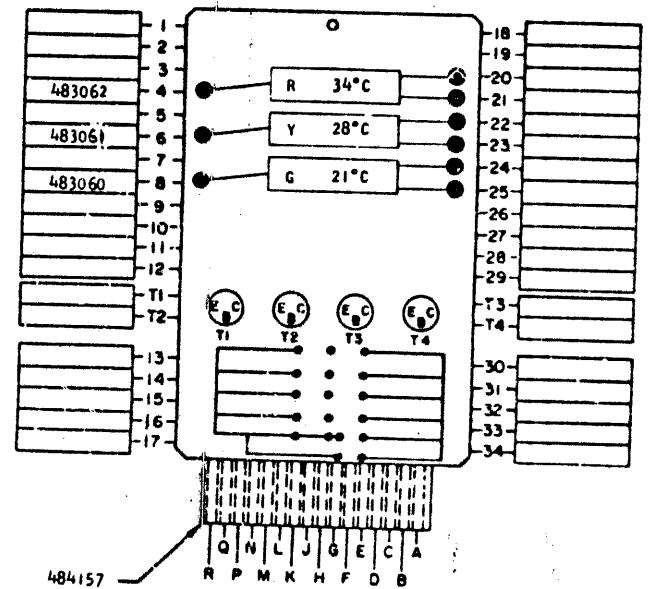
# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370425

## ALLOY-MEMORY THERMAL SWITCHES



1. CARD CONTROLS DRIVE CURRENT BY DECREASING CURRENT FOR AN INCREASE IN MEMORY AMBIENT TEMPERATURE



COMPONENT SIDE

HOLE PATTERN		CIRCUIT AND PACKAGING STANDARD	
491329	APPROVAL	ABC	DATE
			4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-21-62	115599					729806
CARD ASM TSTR -ALLOY-				1-21-64	119680					
MEMORY THERMAL SWITCHES										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

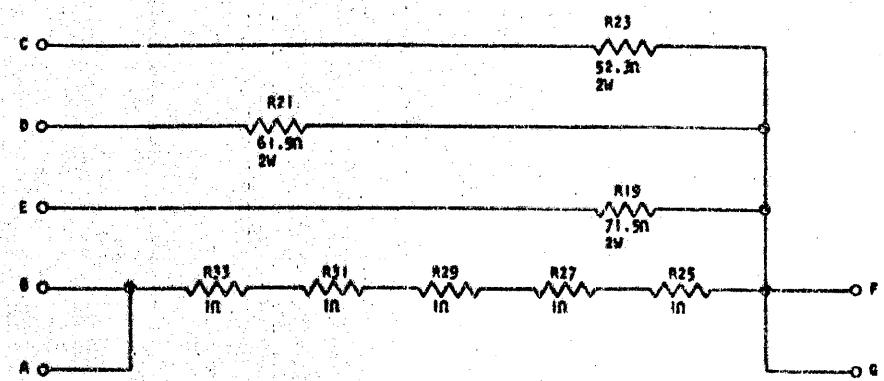
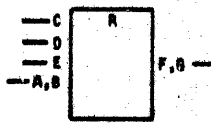
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# REFERENCE DRAWING

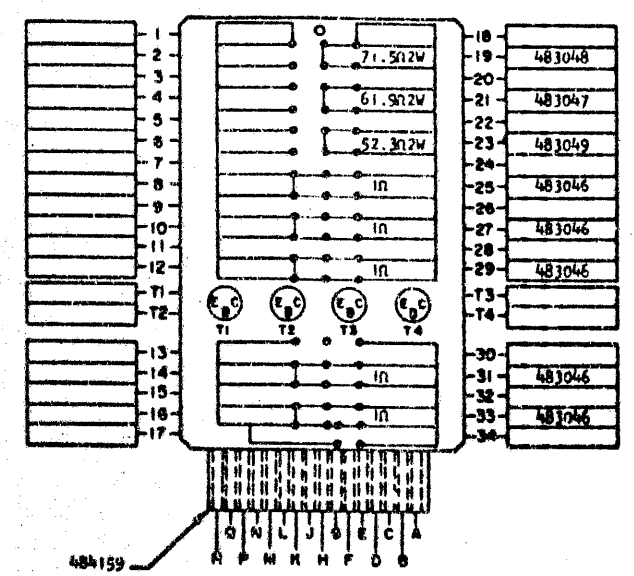
SEE PRODUCTION DRAWING 370426

## MEMORY EMITTER RESISTORS



### SEQUENCE OF OPERATION

1. CARD CONTAINS PORTION OF EMITTER RESISTANCE OF A MEMORY CONSTANT CURRENT DRIVE SOURCE
2. RESISTORS LOCATED BETWEEN EMITTER AND EMITTER RETURN VOLTAGE ARE SWITCHED OUT OF CIRCUIT AS TEMPERATURE INCREASES



### COMPONENT SIDE

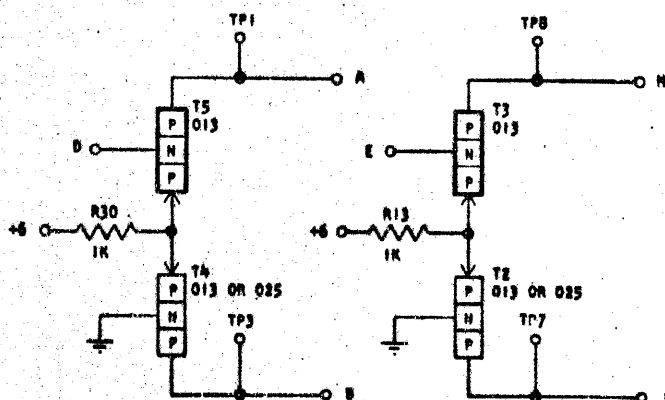
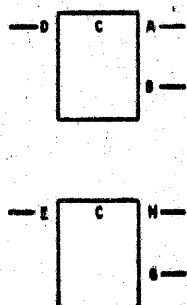
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - MEMORY				4-29-62	115599					
EMITTER RESISTORS										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371203

## ALLOY-ONE WAY "N" BLOCK



### SEQUENCE OF OPERATION

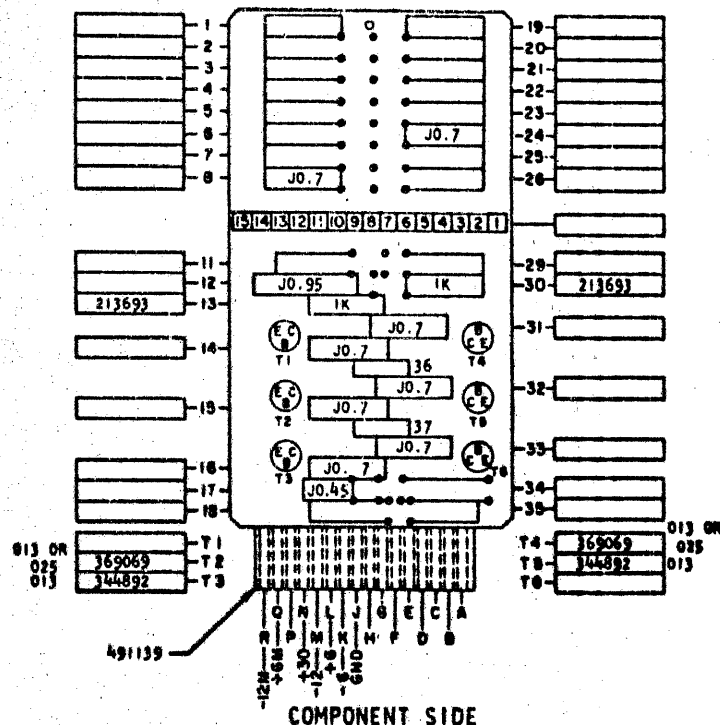
1. INPUT DOWN T5, T3 ON; T4, T2 OFF
2. INPUT UP T5, T3 OFF; T4, T2 ON
3. IN & OUT OF PHASE OUTPUTS AVAILABLE
4. COLLECTORS TIED TO COUPLING NETWORK

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, E	N	INPUT	UP	+0.4 3.0
			DOWN	-0.4 -3.0
A, H	P	OUTPUT	UP	-5.6 -3.0
			DOWN	-6.4 -7.1
B, G	P	OUTPUT	UP	-5.6 -3.5
			DOWN	-6.4 -7.1

### DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	.17	.35
TURN OFF	.17	.35

NOTE: THE DELAYS WERE MEASURED AS THE TIME INTERVAL FROM THE CROSSING OF THE INPUT REFERENCE BY THE INPUT SIGNAL TO THE CROSSING OF THE OUTPUT REFERENCE BY THE OUTPUT SIGNAL.

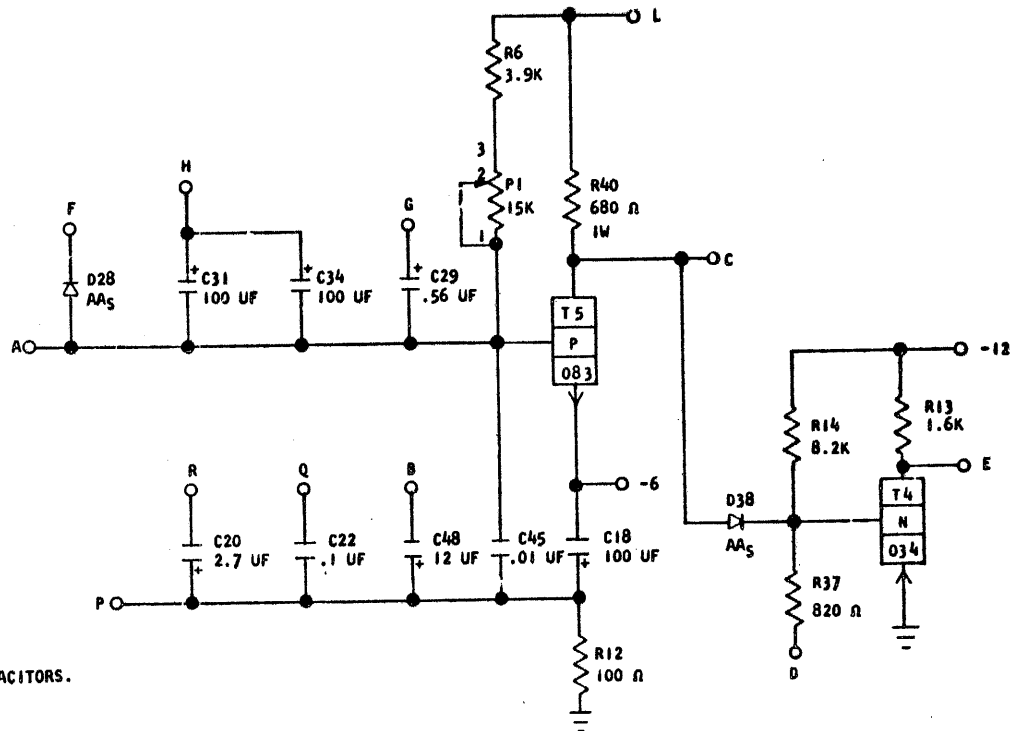
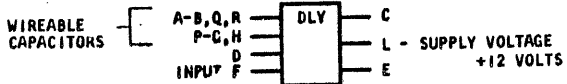


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-ALLOY-ONE WAY "N" BLOCK				6-27-62	115599					
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L10	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
PRODUCTION DRAWING 370703

## GENERAL DELAY CIRCUIT



### SEQUENCE OF OPERATION

1. INPUT LEVEL DOWN, OUTPUT C UP, OUTPUT E DOWN.
2. INPUT SWITCHING TO UP LEVEL, OUTPUT C DELAYED THEN SWITCHES TO DOWN LEVEL. OUTPUT E DELAYED THEN SWITCHES TO UP LEVEL.
3. THE DELAY OF THE POSITIVE EDGE IS DETERMINED BY THE WIREABLE CAPACITORS. THE OUTPUT REMAINS AS LONG AS INPUT REMAINS UP.

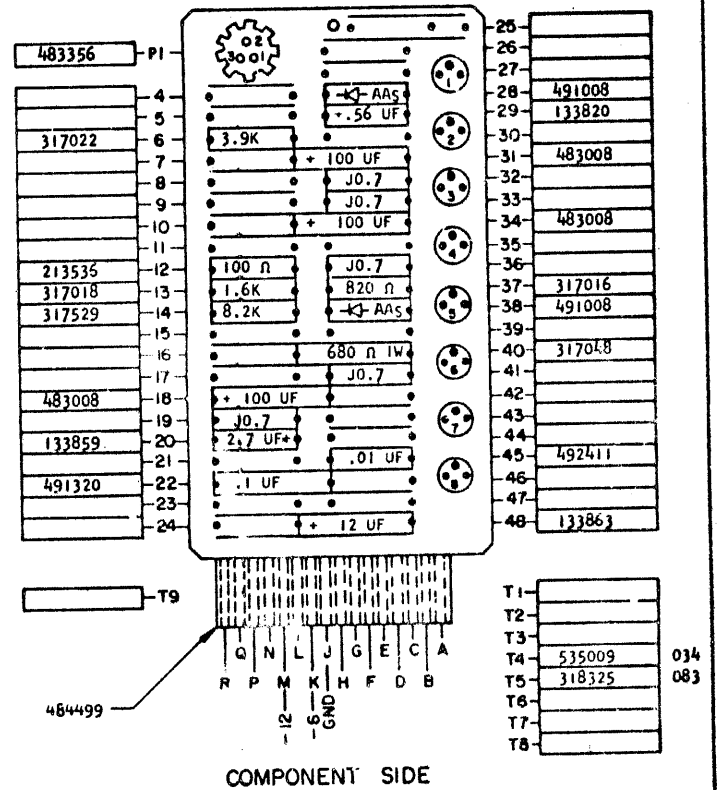
NOTE: PIN D GROUNDED

PINS	SIGNAL NAME	WAVESHAPES	LEVELS		
			MIN	MAX	
F	INPUT		UP	-5.31V	+ .24V
			DOWN	-6.95V	-12.48V
E	OUTPUT		UP	- .54V	+ .24V
			DOWN	-5.81V	-12.48V
C	OUTPUT		UP	+1.44V	+6.7V
			DOWN	-4.47V	-6.24V

### DELAY:

	POT SET AT 0K	POT SET AT 15%
INPUT F	7 USEC	34 USEC
A-Q	72 USEC	370 USEC
F-G	300 USEC	1.75 MSEC
A-R	1.80 MSEC	9 MSEC
A-B	9 MSEC	39 MSEC
P-H	140 MSEC	650 MSEC

\* DELAY IS MEASURED FROM THE TIME D28 REVERSE BIASES TO WHEN OUTPUT C CROSSES GROUND.



COMPONENT SIDE

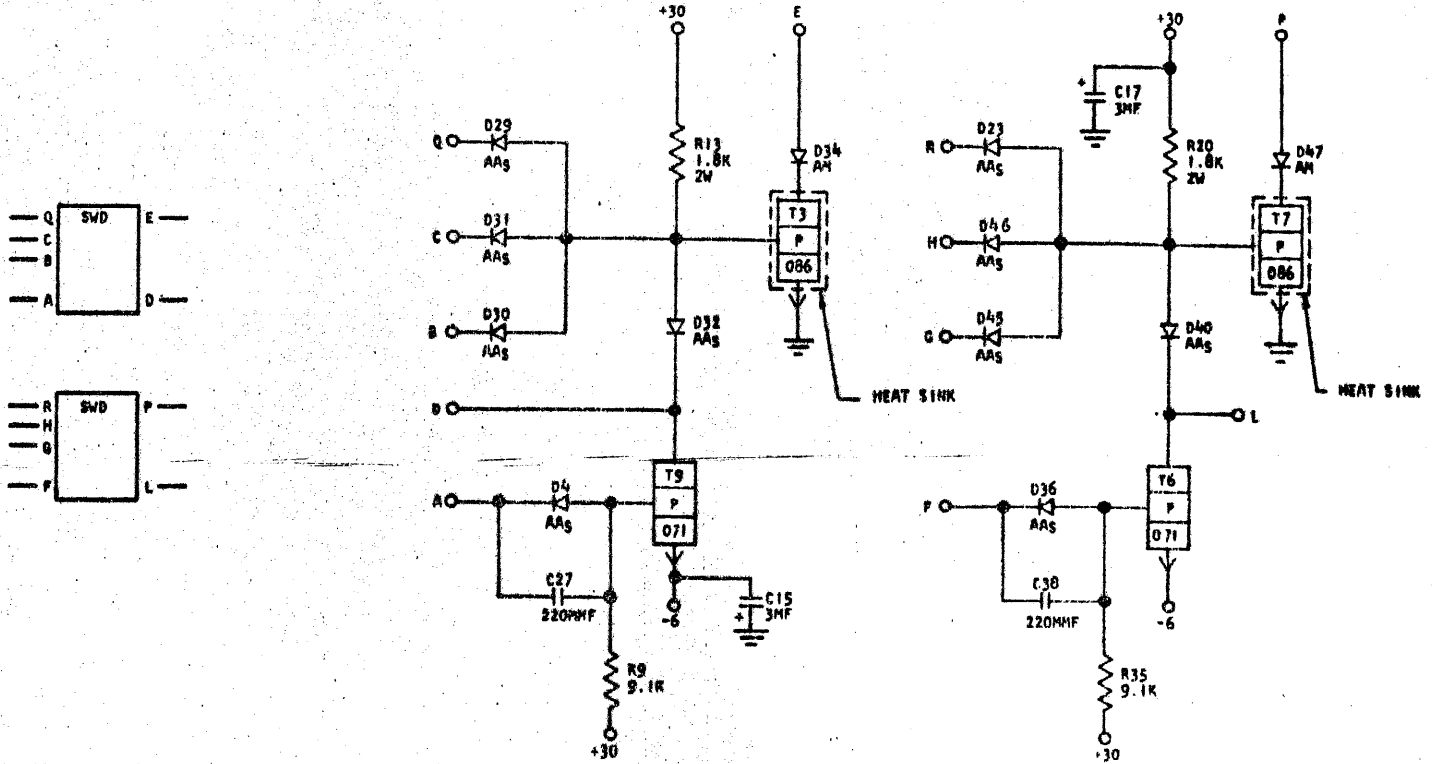
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME GENERAL DELAY CIRCUIT				4-25-63	116800B					
DESIGN				9-12-63	117832					
DETAIL				7-1-64	119012-B					
CHECK										
APPRO										

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370833

ALLOY SWITCH, DECODER NUMBER 2



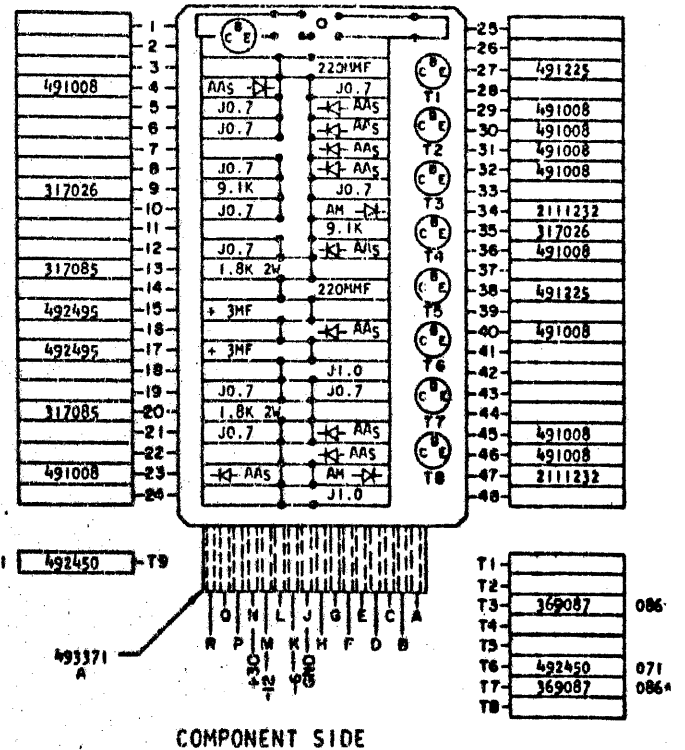
SEQUENCE OF OPERATION

- UP INPUTS TO T3, DOWN INPUT T9, T3 ON, T9 OFF  
MAX. CURRENT FLOWS IN T3
- UP INPUTS TO T3, UP INPUT T9, T3 OFF T9 ON MIN  
CURRENT FLOWS IN T3
- T6, T7 CONDITIONED BY SAME SEQUENCE
- WHEN IN OFF CONDITION OUTPUT ON T3 AND T7 WILL  
REFLECT THE VOLTAGES INDUCED FROM CORES.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			A	B
A, F	U	INPUT	UP	MIN -4.56 MAX 0.24
Q, R	T	INPUT	UP	MIN 1.74 MAX 14.76
C, H	T	INPUT	DOWN	MIN -5.46 MAX -6.24
B, G	T	INPUT	UP	MIN 1.74 MAX 14.76
D, L	T	OUTPUT	DOWN	MIN -5.46 MAX -6.24
E, P	Z	OUTPUT	UP	MIN 0.74 MAX 0.24
T3 T7	INPUT		DOWN	MIN -1.14 MAX -9.76

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	----	0.36
TURN OFF	----	0.45



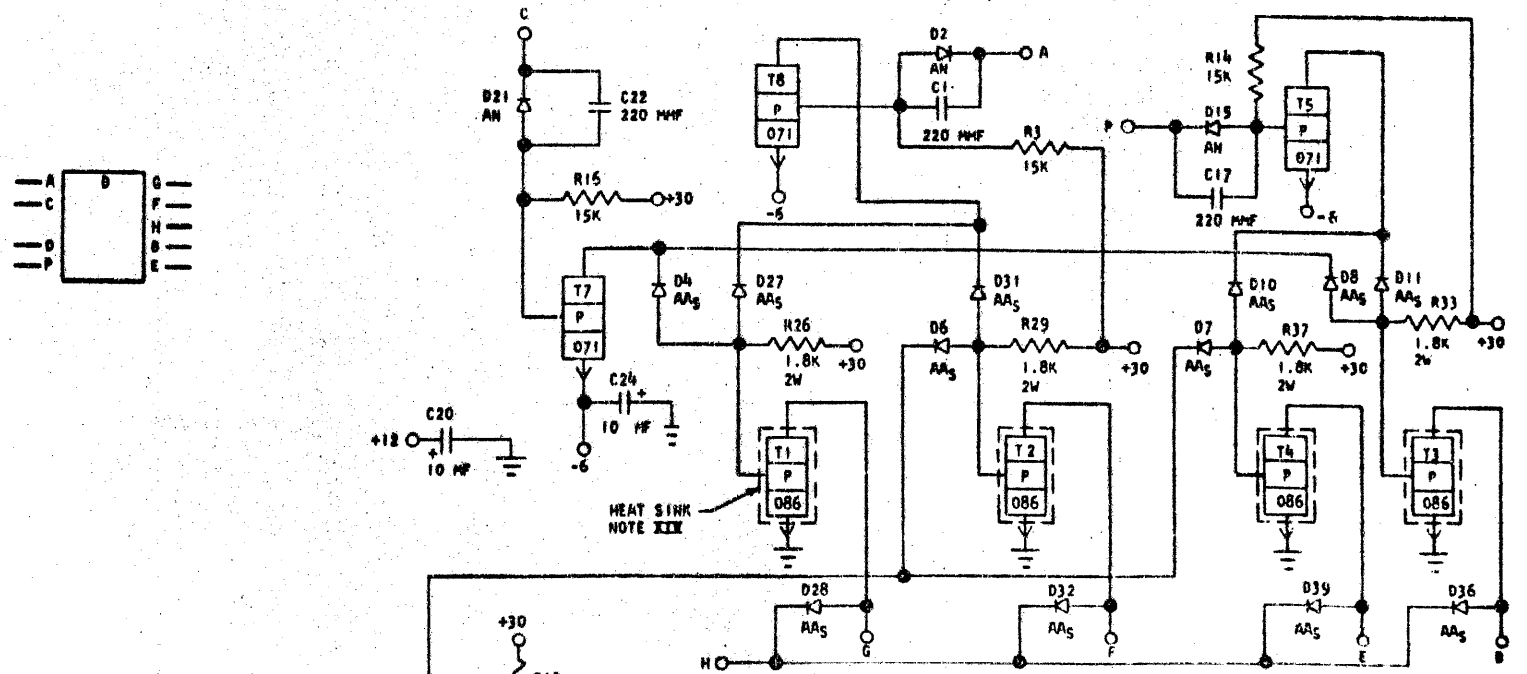
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-ALLOY SWITCH, DECODER NUMBER 2				4-2-62	115599					729809
DESIGN	RQ	2-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370834

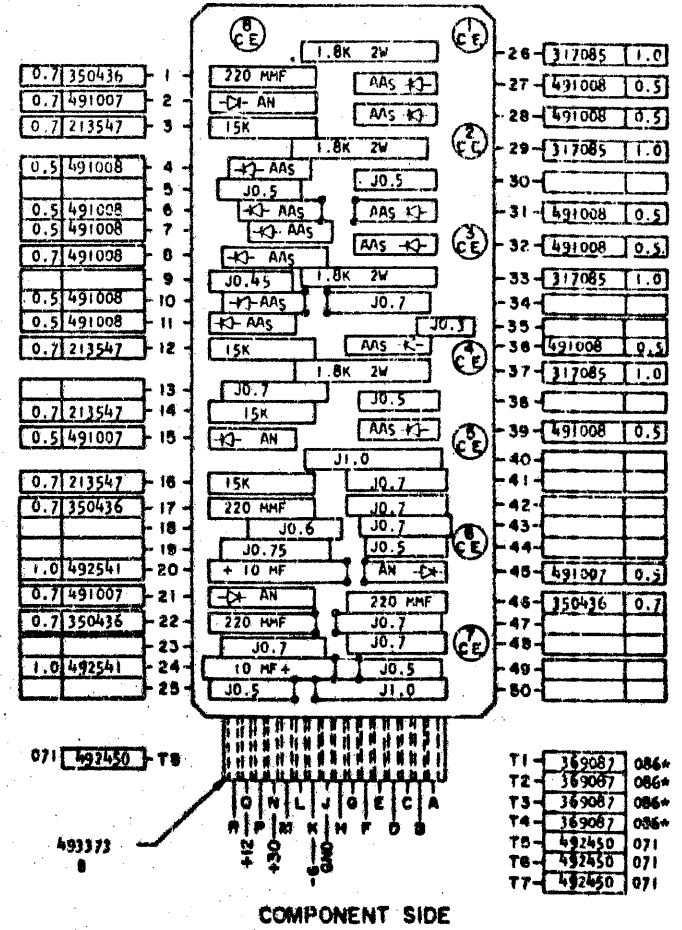
ALLOY-DRIVER, Z, 12 VOLTS



SEQUENCE OF OPERATION

- PIN H TIED TO Q (+12)
- WAVE SHAPE A TO T5, T6, ON; T1, T2, T3, T4, T7 OFF
- DOWN INPUT AT A, T8 OFF T1 ON, OUTPUT AT G DOWN
- T7, T8 OFF, INPUT AT T1, +3. TO 4. VOLTS
- DELAYS FROM INPUT TO OUTPUT, MEASURED FROM -6 VOLT LEVEL ON INPUT TO +6 VOLT LEVEL ON OUTPUT.  
TURN ON 0.9 USEC MAX  
TURN OFF 0.35 USEC MAX

PINS	SIGNAL NAME	WAVE SHAPE		LEVELS	
		A	B	MIN	MAX
A	U INPUT	[Waveform]	[Waveform]	UP -4.66	0.24
				DOWN -7.44	-12.5
P	U INPUT	[Waveform]	[Waveform]	UP -4.66	0.24
				DOWN -7.44	-12.5
C	U INPUT	[Waveform]	[Waveform]	UP -4.66	0.24
				DOWN -7.44	-12.5
D	U INPUT	[Waveform]	[Waveform]	UP -4.66	0.24
				DOWN -7.44	-12.5
G	U OUTPUT	[Waveform]	[Waveform]	UP +12	+12
				DOWN -0.74	+0.24
F	U OUTPUT	[Waveform]	[Waveform]	UP +12	+12
				DOWN -0.74	+0.24
B	U OUTPUT	[Waveform]	[Waveform]	UP +12	+12
				DOWN -0.74	+0.24
E	U OUTPUT	[Waveform]	[Waveform]	UP +12	+12
				DOWN -0.74	+0.24



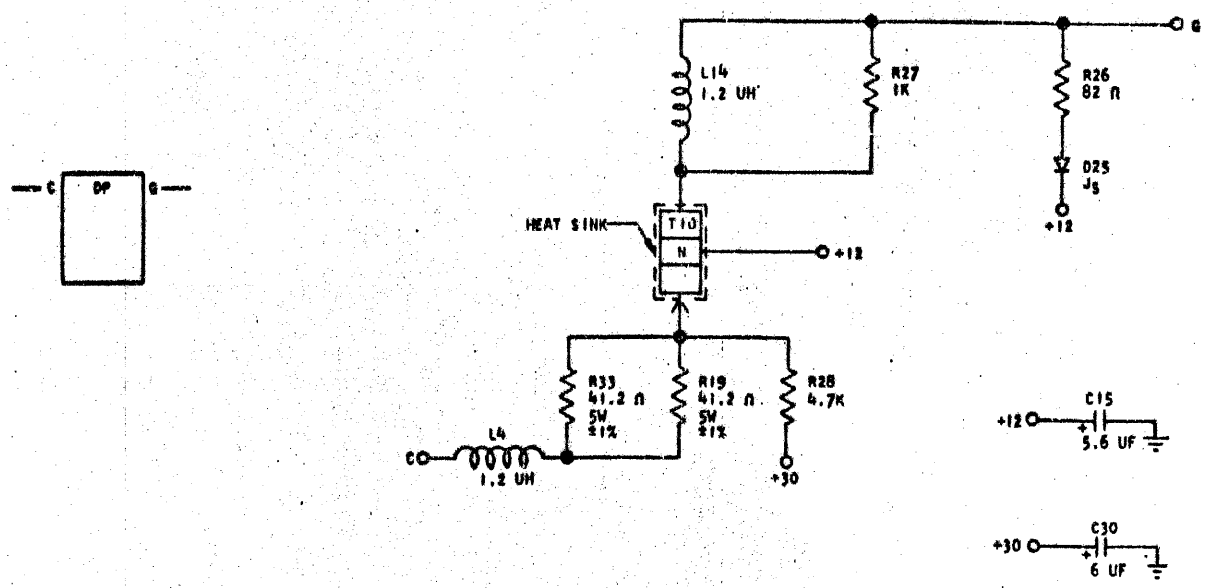
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - ALLOY-				4-27-62	115599					
DRIVER, Z, 12 VOLTS										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WM	3-1-62	DRAW	LTU	3-7-62					
APPROD			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370B35

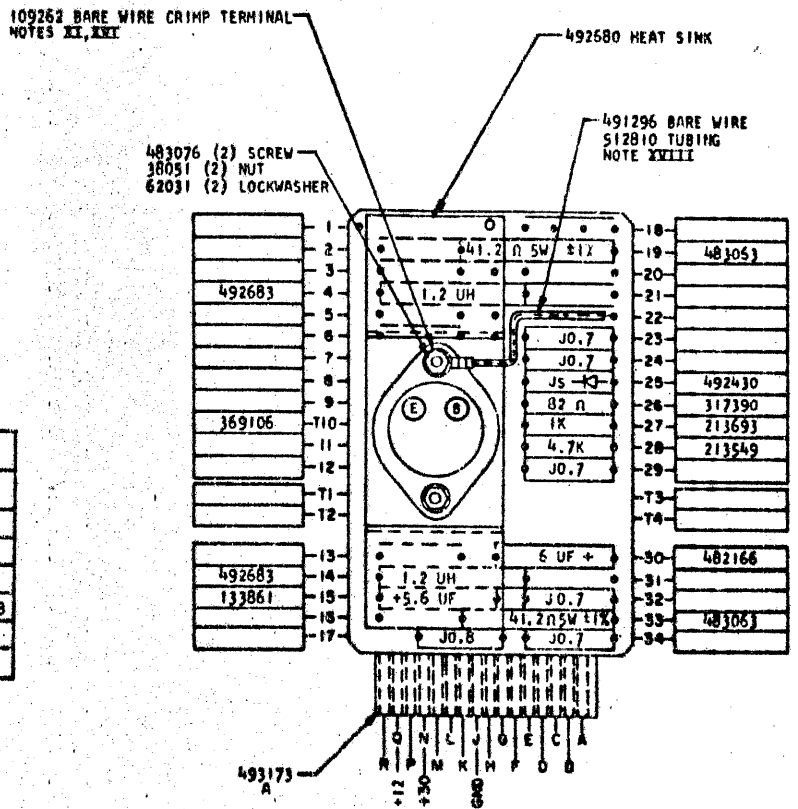
ALLOY-CURRENT SOURCE #2  
RECOMMEND MOUNT ON ONE INCH CENTERS NOTE XXIII



SEQUENCE OF OPERATION

1. THIS CIRCUIT PROVIDES A CONSTANT CURRENT SOURCE WHEN POWER IS UP. TRANSISTOR IS ON WHEN POWER IS ON

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C		VOLTAGE PIN	UP	+28.8	+31.2
			DOWN		
B	OUTPUT		UP		+11.0
			DOWN	-10.52	-11.48



COMPONENT SIDE

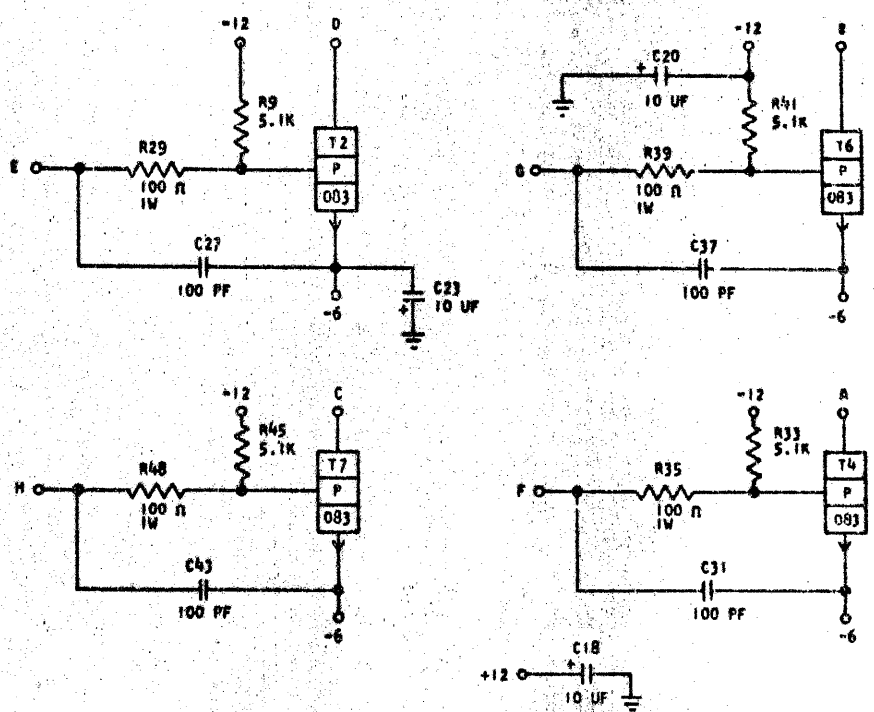
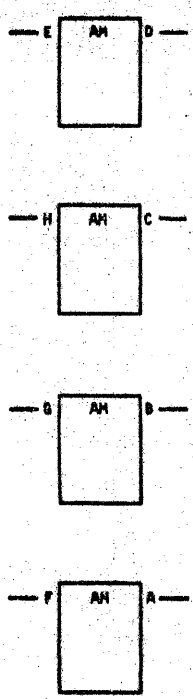
CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - ALLOY -			4-2-62	115599					
CURRENT SOURCE #2										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-4-62	DRAW	L10	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370836

SENSE - FINAL AMPLIFIER

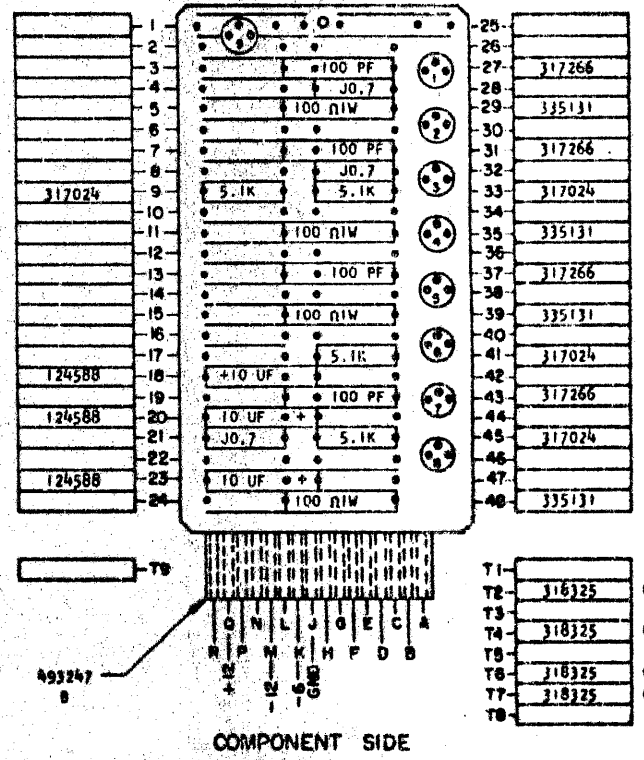


SEQUENCE OF OPERATION

1. INPUT UP, TRANSISTOR ON, OUTPUT DOWN. THIS CIRCUIT PROVIDES A -T LINE FROM A +U LINE INPUT. THE OFF OUTPUT VOLTAGE DEPENDS ON LOAD DRIVEN
2. DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.09	0.19
TURN OFF	0.44	2.00

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, H, O, F	U	INPUT	UP	-5.2	+2.4
			DOWN	-11.52	-12.48
D, C, B, A	-T	OUTPUT	UP		
			DOWN	-5.46	-6.24

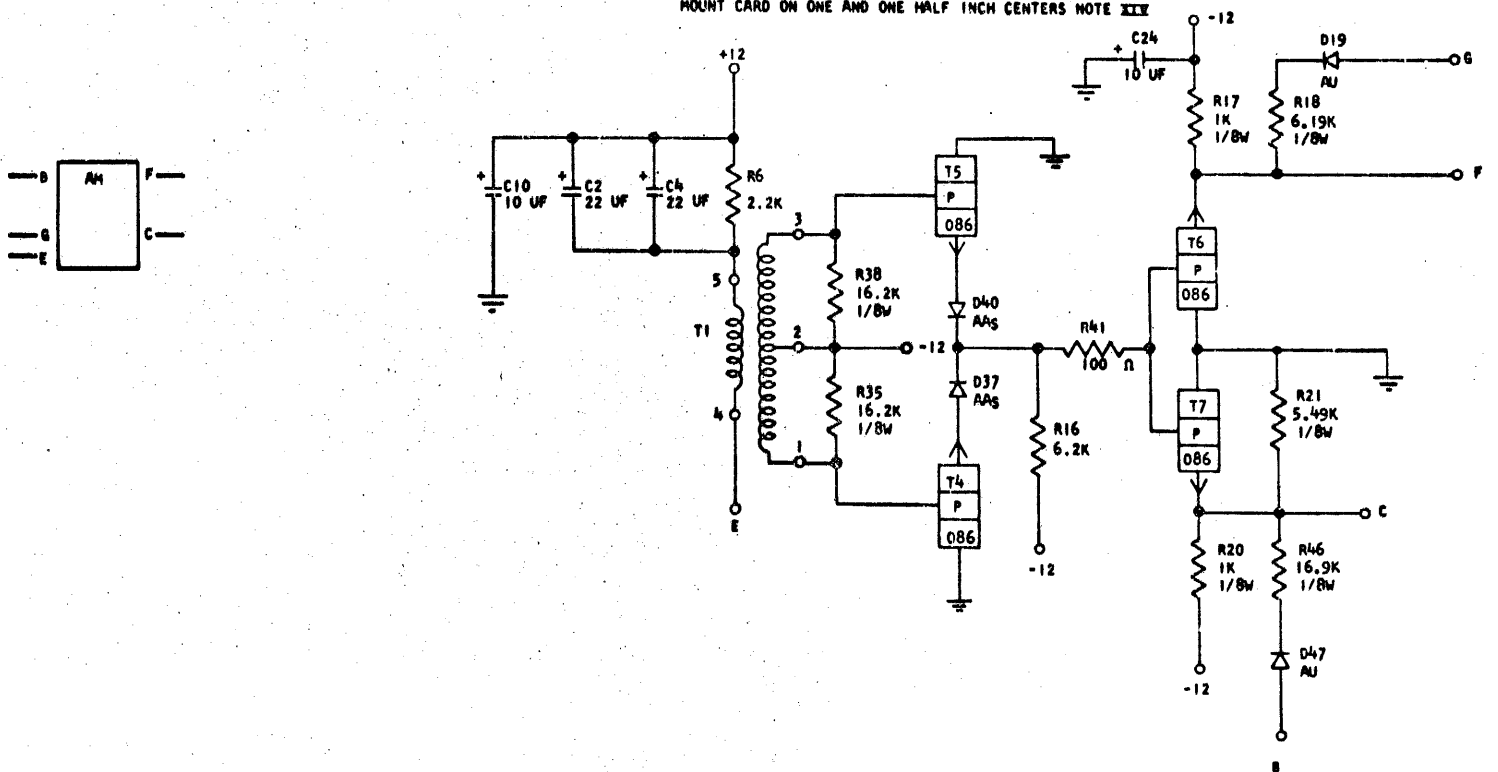


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

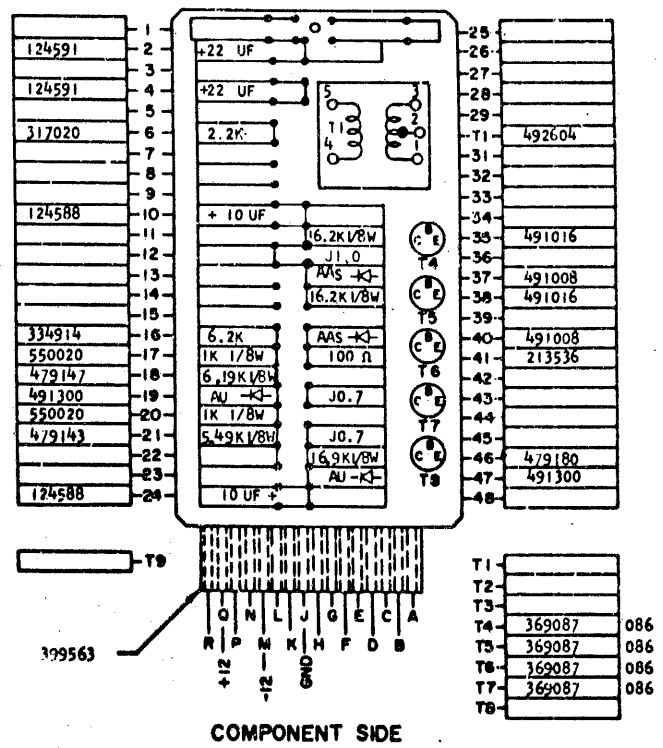
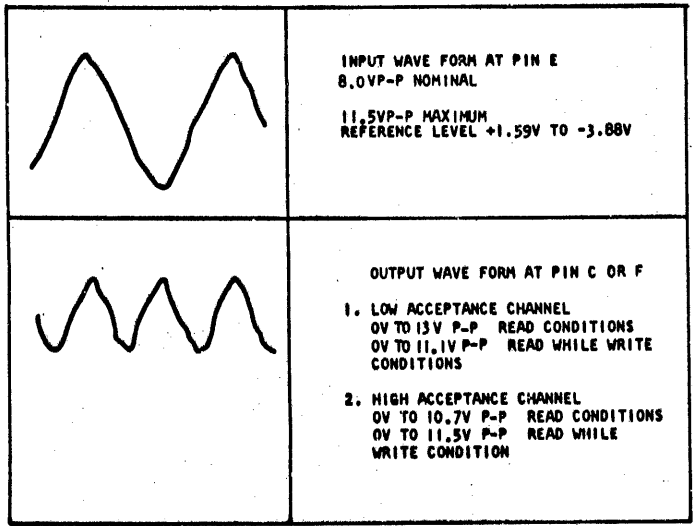
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DRK	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	113599					
FINAL AMPLIFIER										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L18 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 372285

SENSE AMPLIFIER-RECTIFIER AND CLIPPER  
MOUNT CARD ON ONE AND ONE HALF INCH CENTERS NOTE III



APPLICATION NOTES  
VOLTAGES AT PIN 6 AND 8 FROM CLIPPING CARD



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

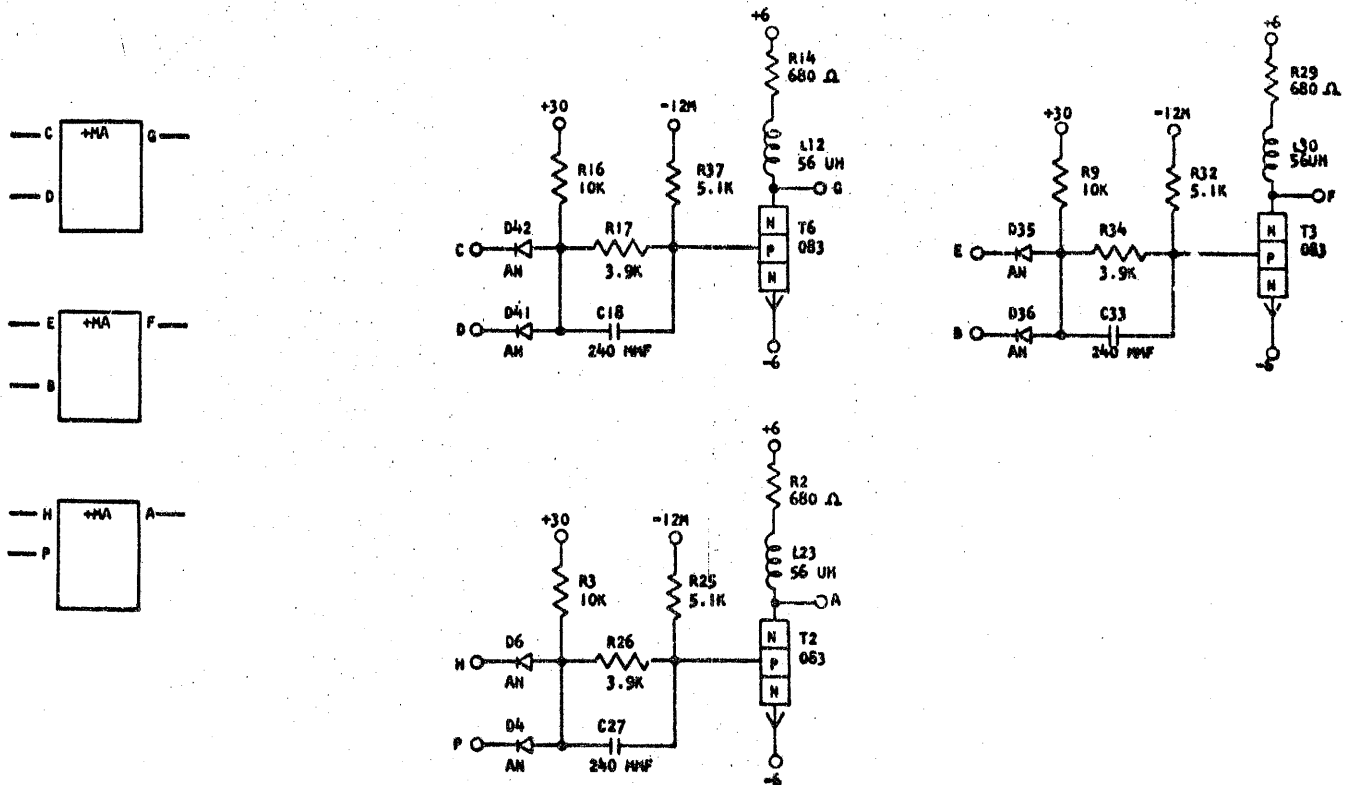
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - SENSE AMPLIFIER-RECTIFIER AND CLIPPER				6-29-62	115599					729956
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	DRAN	3-1-62	LIG 3-17-62							
APPRO	CHECK									



REFERENCE DRAWING

SEE PRODUCTION DRAWING 371922

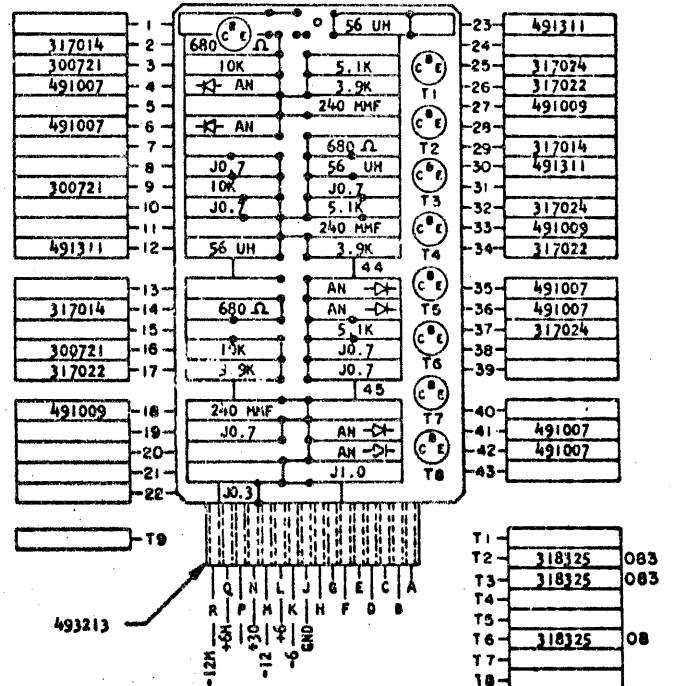
CTDL + AND GATE



SEQUENCE OF OPERATION

1. ALL INPUTS UP TRANSISTOR ON OUTPUT DOWN
2. EITHER OR BOTH INPUTS DOWN TRANSISTOR OFF OUTPUT UP
3. DELAY WHEN DRIVING CTDL LOADS  
TURN ON .1 USEC MAX  
TURN OFF .25 USEC MAX
4. DELAY WHEN DRIVING CLOCK LOAD  
TURN ON .26 USEC MAX  
TURN OFF .12 USEC MAX

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, D M, P E, B	T	INPUTS	UP	+3.68	+6.24
			DOWN	-4.46	-6.24
G A F	T	OUTPUTS	UP	+1.44	+6.24
			DOWN	-4.62	-6.24



COMPONENT SIDE

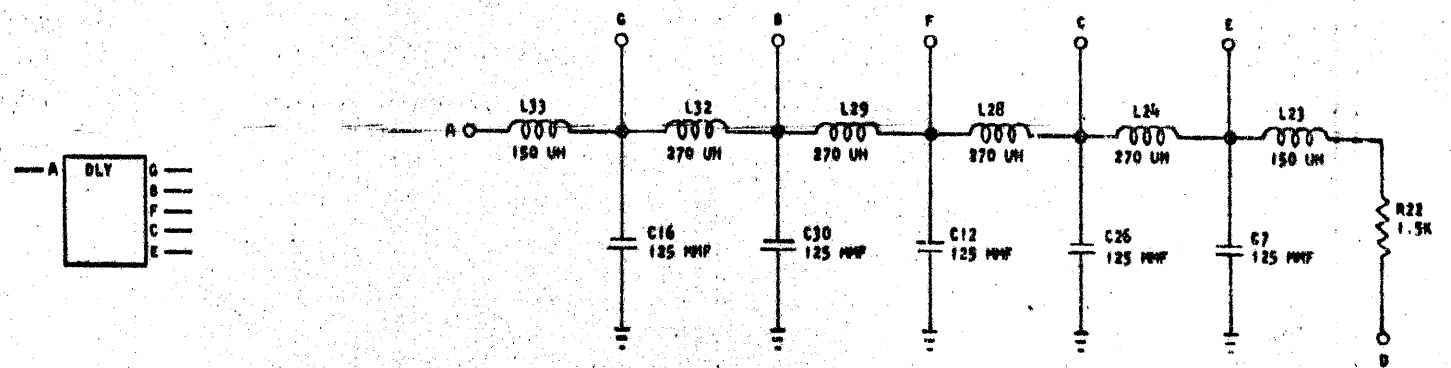
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME: CARD ASM TSTR - CTDL + AND GATE				6-29-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371944

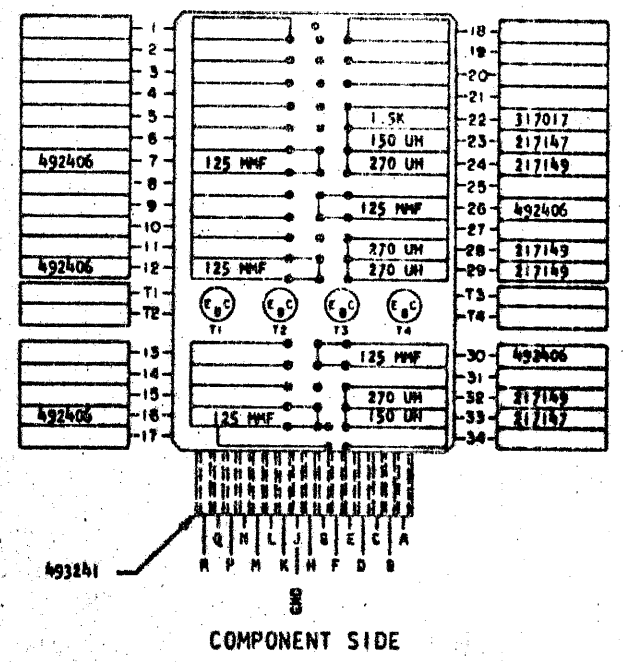
DELAY LINE LUMPED, 1 USEC



SEQUENCE OF OPERATION

1. INPUT UP, OUTPUT UP AFTER DELAY
2. DELAYS: G - 0.2 U SEC  
B - 0.4 U SEC  
F - 0.6 U SEC  
C - 0.8 U SEC  
E - 1.0 U SEC
3. TIE 1.5K RESISTOR (PIN D) TO -6 WHEN DRIVING MESA - AND GATE. TIE RESISTOR TO GROUND WHEN DRIVING + AND GATE

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	T	INPUT	UP	+3.85 +6.24
			DOWN	-4.46 -6.24
G	T	OUTPUT	UP	+3.45 +5.82
			DOWN	-4.48 -6.24
B	T	OUTPUT	UP	+3.45 +5.02
			DOWN	-4.48 -6.24
F	T	OUTPUT	UP	+3.45 +5.82
			DOWN	-4.48 -6.24
C	T	OUTPUT	UP	+3.45 +5.82
			DOWN	-4.48 -6.24
E	T	OUTPUT	UP	+3.45 +5.82
			DOWN	-4.48 -6.24

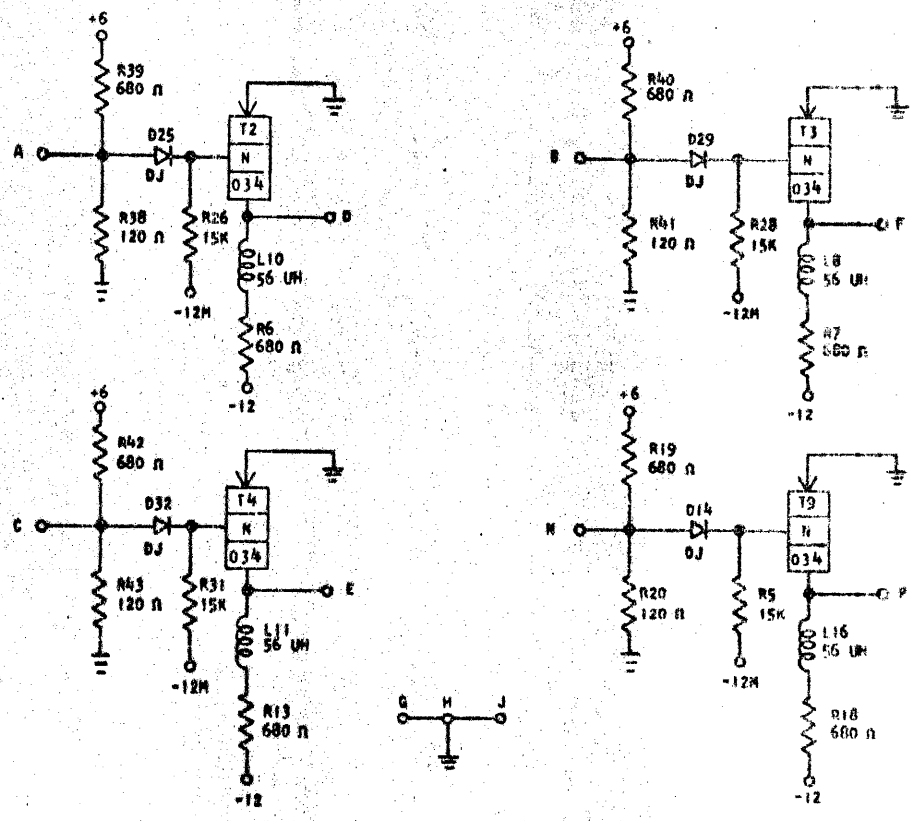
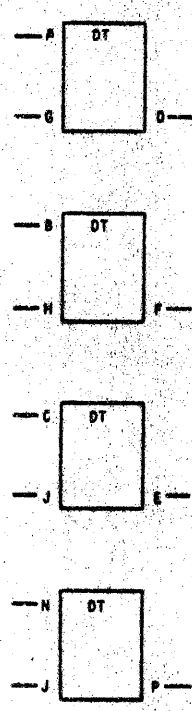


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM YSTR - DELAY				1-29-62	115599					
LINE LUMPED, 1 USEC										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAWN	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370145

STANDARD CABLE TERMINATOR

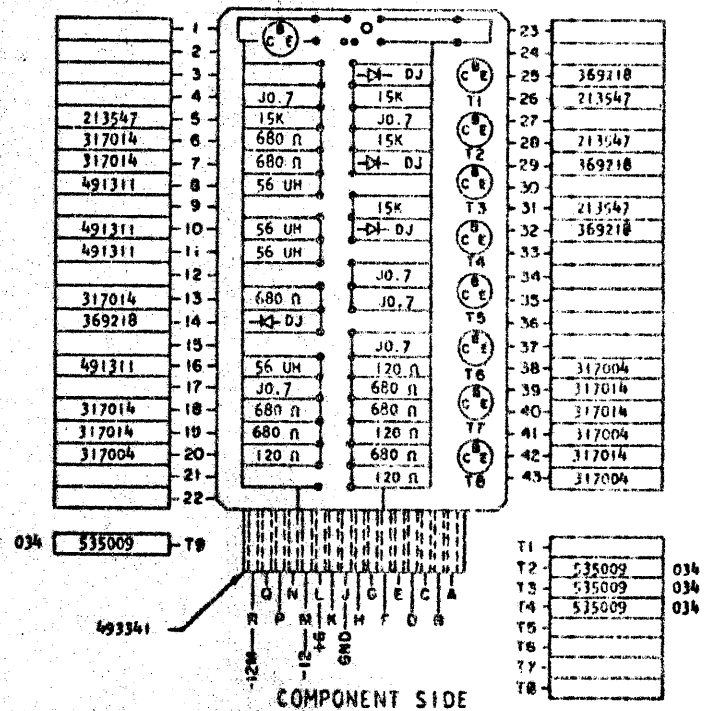


- SEQUENCE OF OPERATION
1. INPUT DOWN TRANSISTOR ON OUTPUT UP
  2. INPUT UP TRANSISTOR OFF OUTPUT DOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, B, C, H	N	INPUT	UP	0.65	1.03
			DOWN	-0.37	-4.46
G, H, J	J	GROUND			
D, F, E, P	U	OUTPUT	UP	-0.54	0.24
			DOWN	-7.44	-12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	115.0	220.0
TURN OFF	127.0	312.0



CIRCUIT AND PACKAGING STANDARD

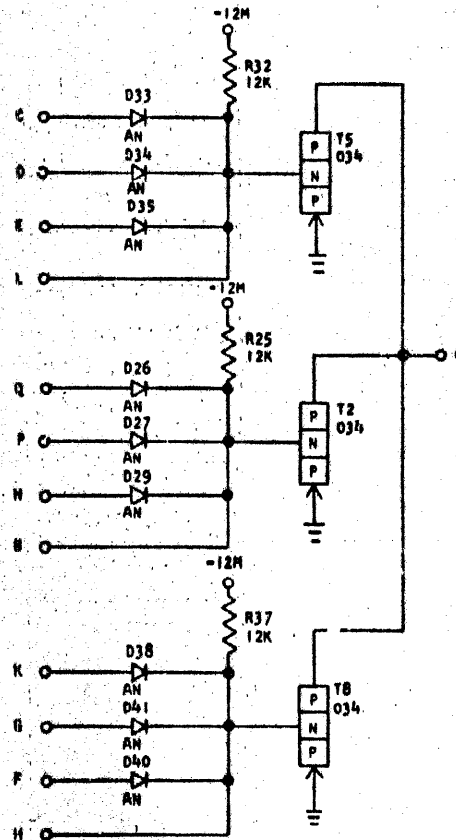
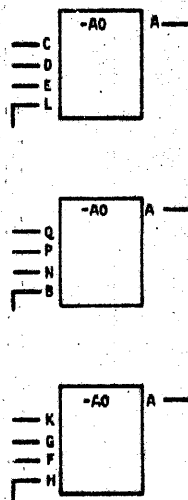
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHARGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - STANDARD	4-29-62	115599					729815
CABLE TERMINATOR								
DESIGN	RQ	3-1-62	SCALE	NONE				
CHECK	WH	3-1-62	DRAW	LIG	3-17-62			
APPRO			CHECK					

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370140

CTDL PNP-3 WAY AND GATE



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. COLLECTOR LOADING REQUIRED
4. INPUTS ON EXTENDER CARD MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT.
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

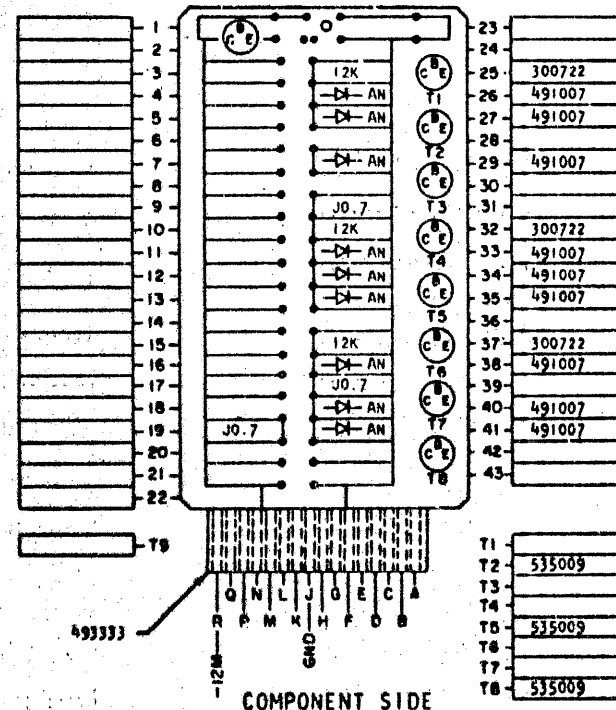
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, D, E	T INPUT	[Waveform: High to Low]	UP	1.44	6.24
			DOWN	-0.74	-6.24
Q, P, N	T INPUT	[Waveform: High to Low]	UP	1.44	6.24
			DOWN	-0.74	-6.24
K, G, F	T INPUT	[Waveform: High to Low]	UP	1.44	6.24
			DOWN	-0.74	-6.24
L, B, H	EXTENDER INPUT	[Waveform: High to Low]	UP	1.44	6.24
			DOWN	0	0
A	U OUTPUT	[Waveform: Low to High]	UP	-0.54	0.24
			DOWN	-7.44	-12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

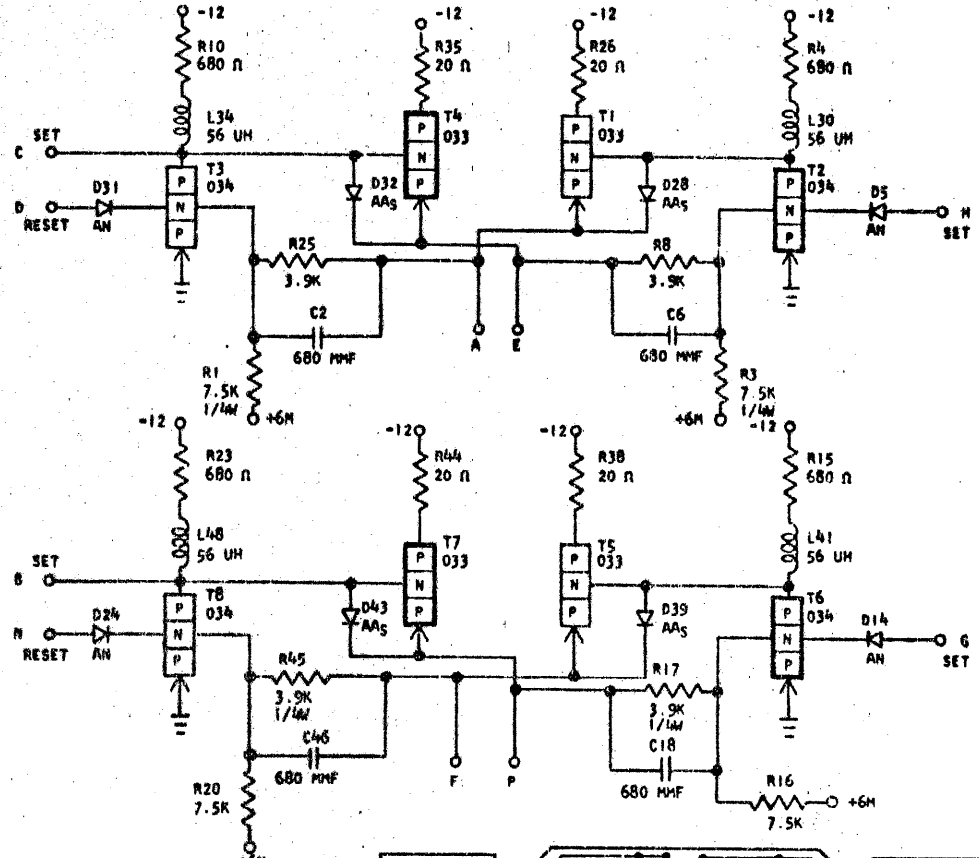
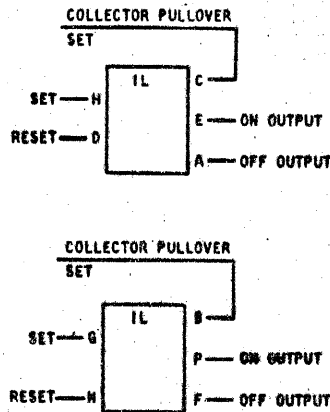
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME   CARD ASH TSTR -CTDL PNP 3				6-29-62	115599					
WAY AND GATE										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							



REFERENCE DRAWING

SEE PRODUCTION DRAWING 370143

CTDL PNP - INVERTER LATCH



SEQUENCE OF OPERATION

1. T2 & T4 ON, T1 & T3 OFF
2. DV SET AT H OR C TURNS T2 OFF AND T1 ON  
T3 TURNS ON AND T4 TURNS OFF
3. 6V RESET AT D RETURNS CIRCUIT TO CONDITION (1)

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
G, H	T SET	[Waveform]	UP	1.44 6.24
D, N	T RESET	[Waveform]	DOWN	-5.46 -6.24
E, P	ON OUTPUT	[Waveform]	UP	-1.24 .24
A, F	OFF OUTPUT	[Waveform]	DOWN	-9.29 -12.48
B, C	COLLECTOR PULLOVER SET	[Waveform]	UP	-1.24 .24
			DOWN	-9.29 -12.48

DELAY

1. SET AND RESET DELAY:  
TURN ON .15 USEC FOR SET TO OUTPUT AT OFFSIDE (PIN A, F)  
AND FOR RESET TO OUTPUT OF OFFSIDE (PIN E, P).
2. TURN ON .40 USEC FOR SET TO OUTPUT AT ONSIDE (PIN E, P)  
AND FOR RESET TO OUTPUT OF ONSIDE (PIN A, F).

216465	1	7.5K 1/4W	0	3.9K	25	317022
350449	2	680 MHF	20 n		26	334949
216465	3	7.5K 1/4W	JO.7		27	
37014	4	680 n	KT AAS		28	491008
491007	5	JO.7	DI-AN		29	
350449	6	680 MHF	56 UH		30	491311
317022	7	JO.7	DI-AN		31	491007
317014	8	3.9K	KT AAS		32	491008
	9	JO.7	JO.7		33	
	10	680 n	56 UH		34	491311
	11	JO.7	20 n		35	334949
	12	JO.7	JO.7		36	
	13	JO.7	JO.7		37	
491007	14	DI-AN	20 n		38	334949
317014	15	680 n	KT AAS		39	491008
300720	16	7.5K	JO.7		40	
216458	17	3.9K 1/4W	56 UH		41	491311
350449	18	680 MHF	JO.7		42	
300720	19	JO.7	KT AAS		43	491008
	20	7.5K	20 n		44	334949
	21	3.9K 1/4W	680 MHF		45	216458
	22	JO.7	680 MHF		46	350449
317014	23	680 n	JO.7		47	
491007	24	DI-AN	56 UH		48	491311

T1	318324	033
T2	535009	034
T3	535009	034
T4	318324	033
T5	318324	033
T6	535009	034
T7	318324	033
T8	535009	034

COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD

APPROVAL DATE

ABC 4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASK YSTR-CTDL-PNP				6-29-62	115599					
INVERTER LATCH										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG 3-17-62							
APPRO			CHECK							

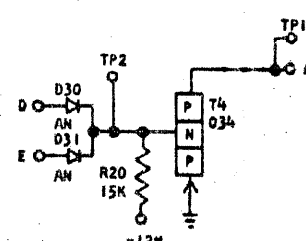
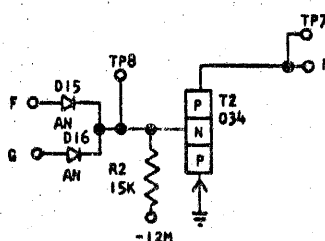
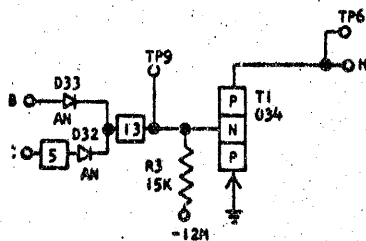
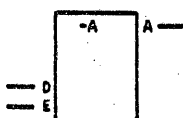
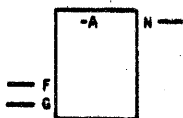
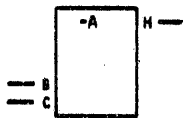




REFERENCE DRAWING

SEE PRODUCTION DRAWING 371263

CTDL - TWO WAY "AND" PNP NO LOADS



SEQUENCE OF OPERATION

1. BOTH INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. EXTERNAL COLLECTOR LOADING REQUIRED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

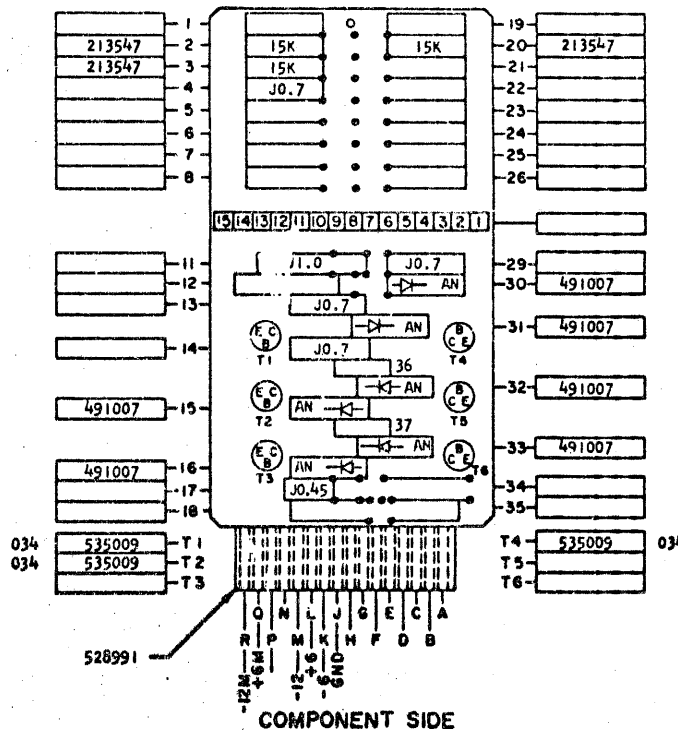
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, F, D	INPUT	[Waveform: High then Low]	UP	1.44 6.24
C, G, E	INPUT	[Waveform: High then Low]	DOWN	-0.74 -6.24
H, N, A	OUTPUT	[Waveform: High then Low]	UP	-0.54 0.24
			DOWN	-7.44 -12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "ON".



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

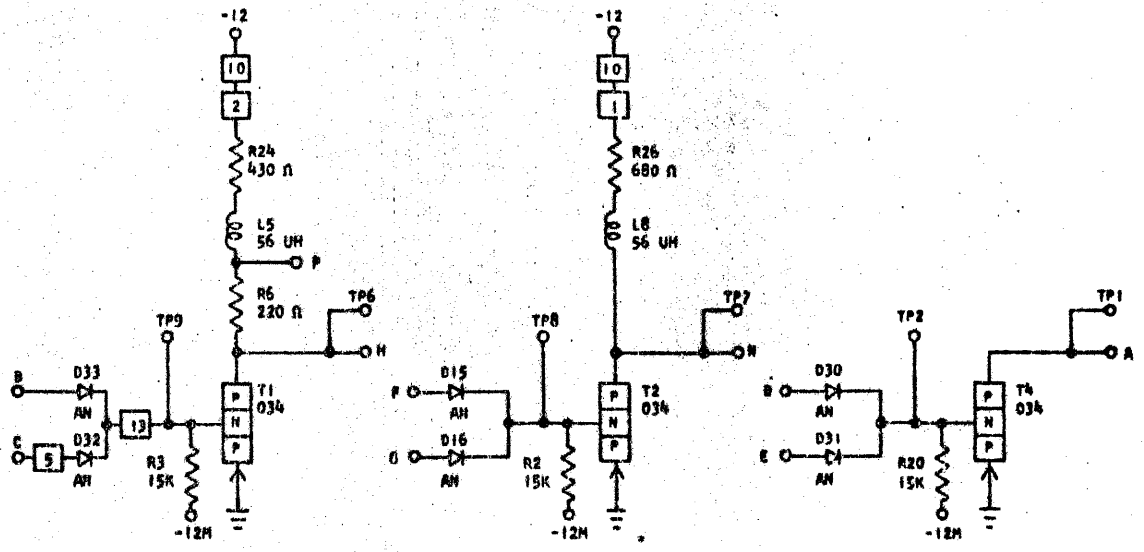
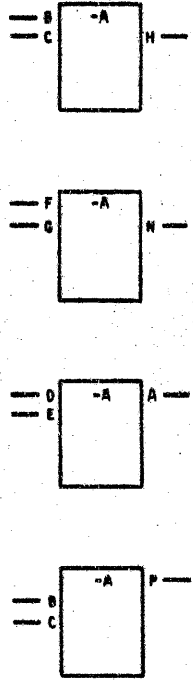
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR -CTDL - TWO WAY "AND" PNP NO LOADS				6-29-62	115599					729820
DESIGN		MODEL	SMS							
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							



# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371261

## CTDL - TWO WAY "AND" PNP TWO LOADS



### SEQUENCE OF OPERATION

1. BOTH INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. T4 COLLECTOR MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

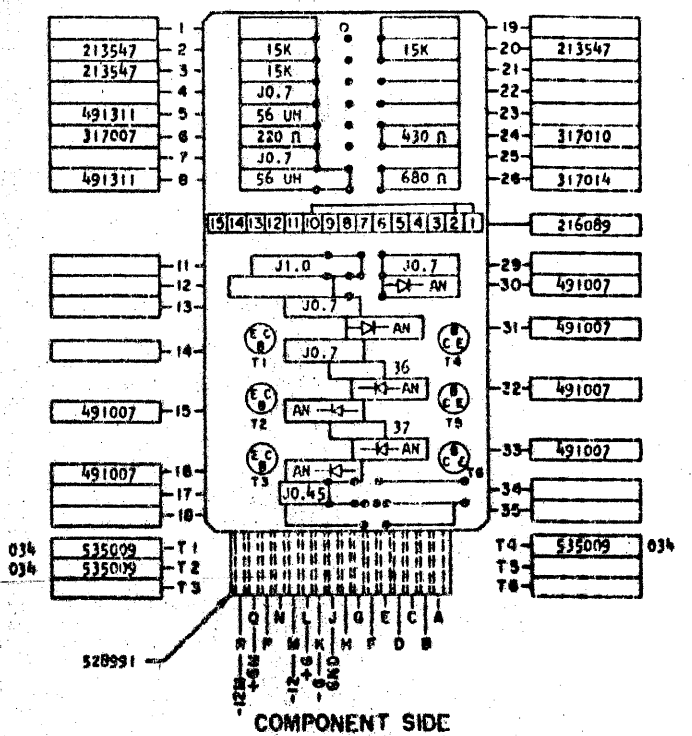
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, F, D	T	INPUT	UP	1.44 6.24
C, G, E	T	INPUT	DOWN	-0.74 -6.24
H, N, A	U	OUTPUT	UP	-0.54 9.24
P	P	OUTPUT	DOWN	-4.93 -12.5
			DOWN	-8.82 -12.5

### DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



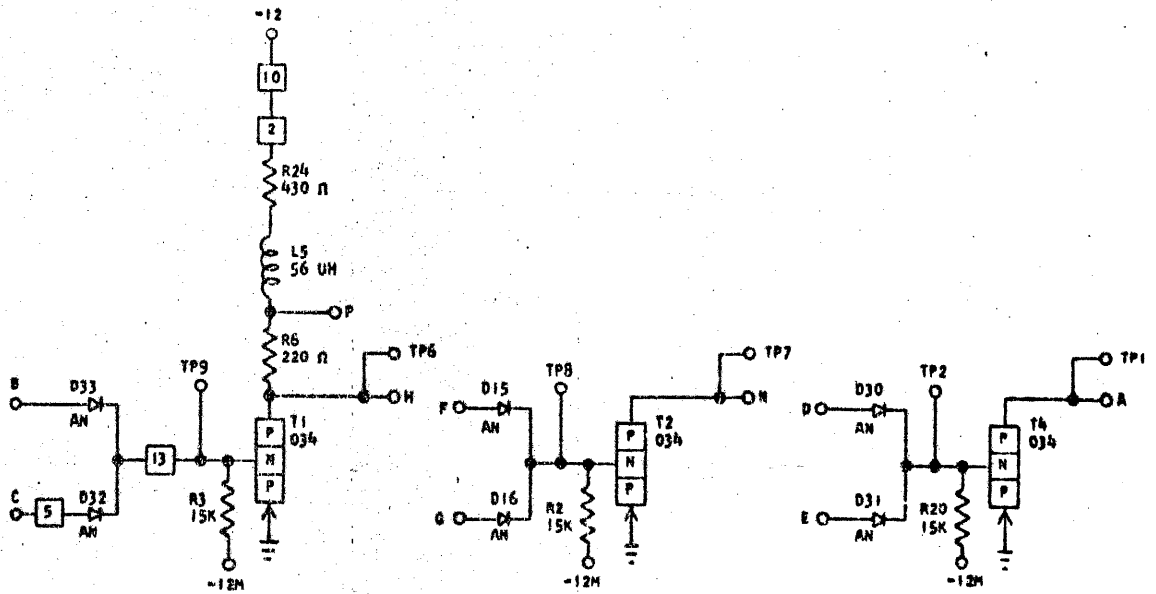
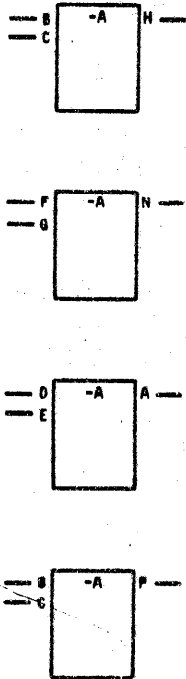
### COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL-TWO				4-29-62	115599					729822
WAY "AND" PNP TWO LOADS										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371262

CTDL - TWO WAY "AND" PNP ONE LOAD



SEQUENCE OF OPERATION

1. BOTH INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. T2, T4, COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

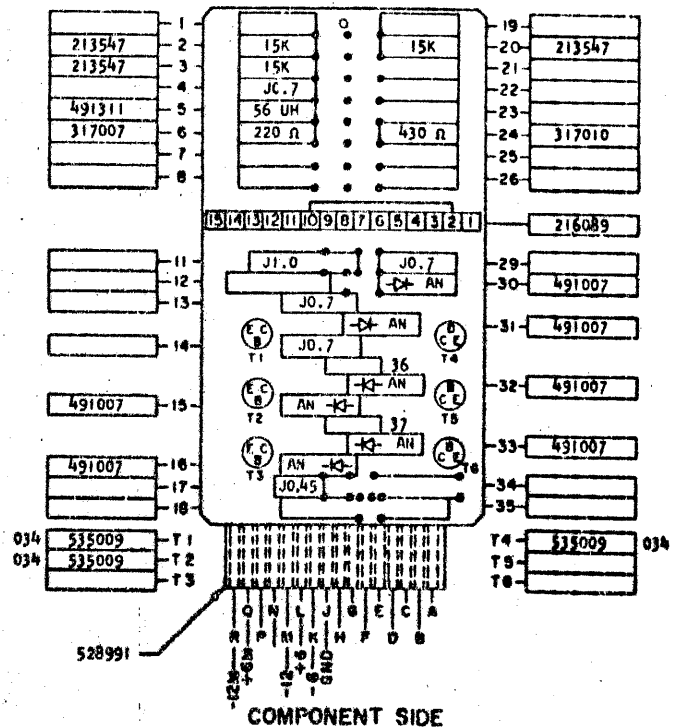
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, F, D	T	INPUT	UP	1.44 6.24
			DOWN	-0.74 -6.24
C, G, E	T	INPUT	UP	1.44 6.24
			DOWN	0.74 -6.24
H, N, A	U	OUTPUT	UP	0.54 0.24
			DOWN	-7.44 -12.5
P	P	OUTPUT	UP	-4.93 -3.54
			DOWN	-8.82 -12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				4-29-62	115599					
CARD ASM TSTR -CTDL - TWO WAY "AND" PNP ONE LOAD										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							



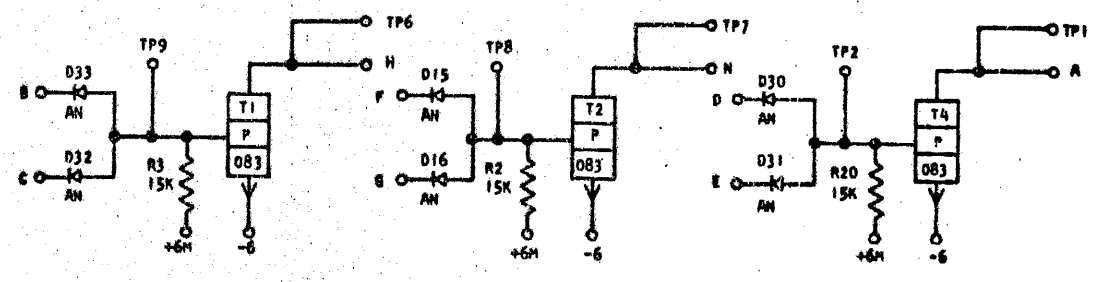
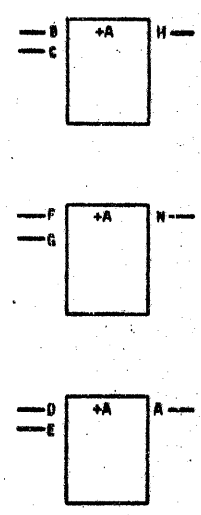
729824

STANDARD CODE

CARD CODE 729824  
CH --

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371266

CTDL - TWO WAY "AND" NPN NO LOADS



SEQUENCE OF OPERATION

1. BOTH INPUTS UP, TRANSISTOR ON, OUTPUT DOWN
2. ANY INPUT DOWN, TRANSISTOR OFF, OUTPUT UP
3. COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

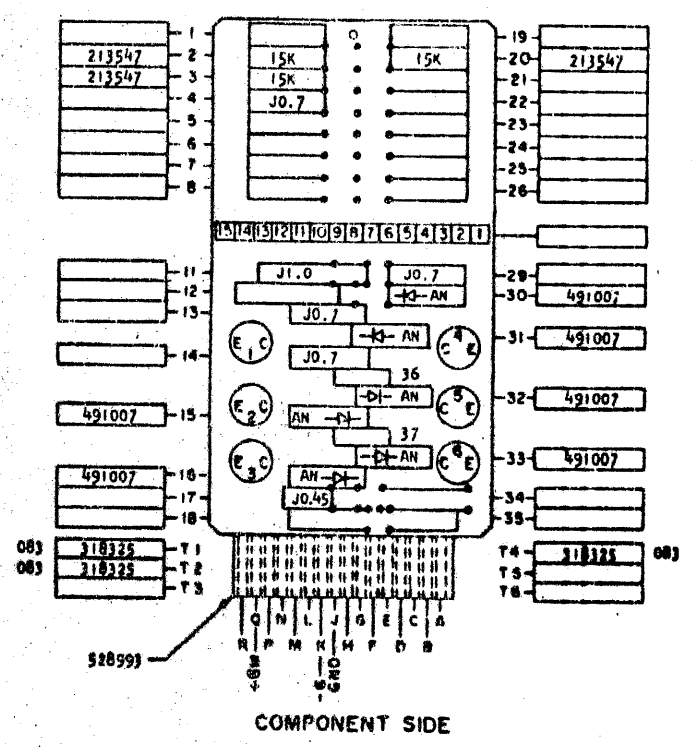
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
				MIN	MAX
B, F, D	U INPUT		UP	-5.26	0.24
C, G, E	U INPUT		DOWN	-7.44	-12.5
H, N, A	T OUTPUT		UP	1.44	6.24
			DOWN	-5.46	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING OF "OR".

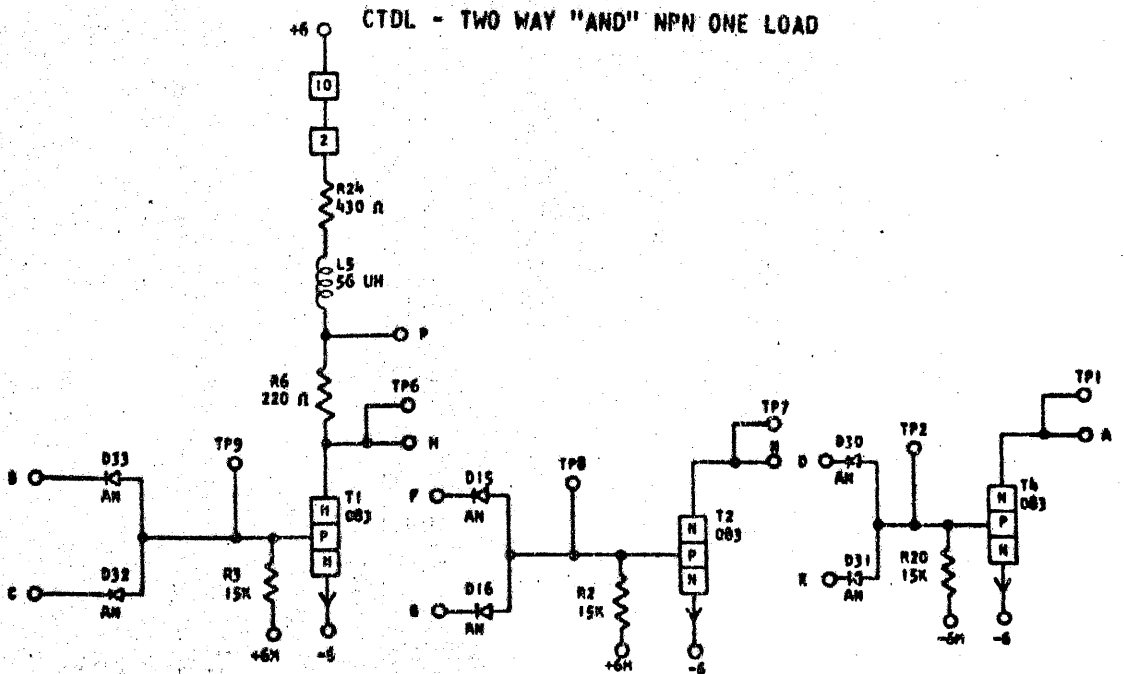
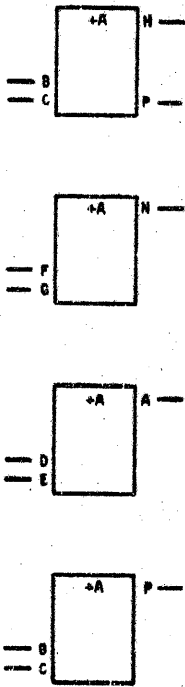


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL-TWO WAY "AND" NPN NO LOADS				6-29-62	115599					729824
DESIGN		MODFL	SMS							
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECR	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

C

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371265



SEQUENCE OF OPERATION

1. BOTH INPUTS UP, TRANSISTOR ON, OUTPUT DOWN
2. ANY INPUT DOWN, TRANSISTOR OFF, OUTPUT UP
3. T2, T4 COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

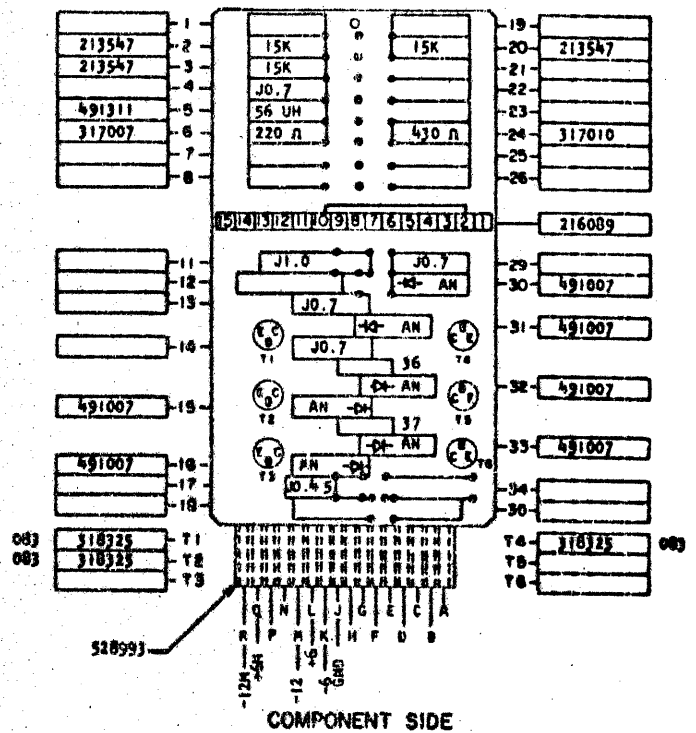
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			HIN	MAX
B, F, D	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
C, G, E	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
M, N, A	T	OUTPUT	UP	1.44 6.24
			DOWN	-5.46 -6.24
P	N	OUTPUT	UP	2.82 6.24
			DOWN	-1.07 -2.40

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.



COMPONENT SIDE

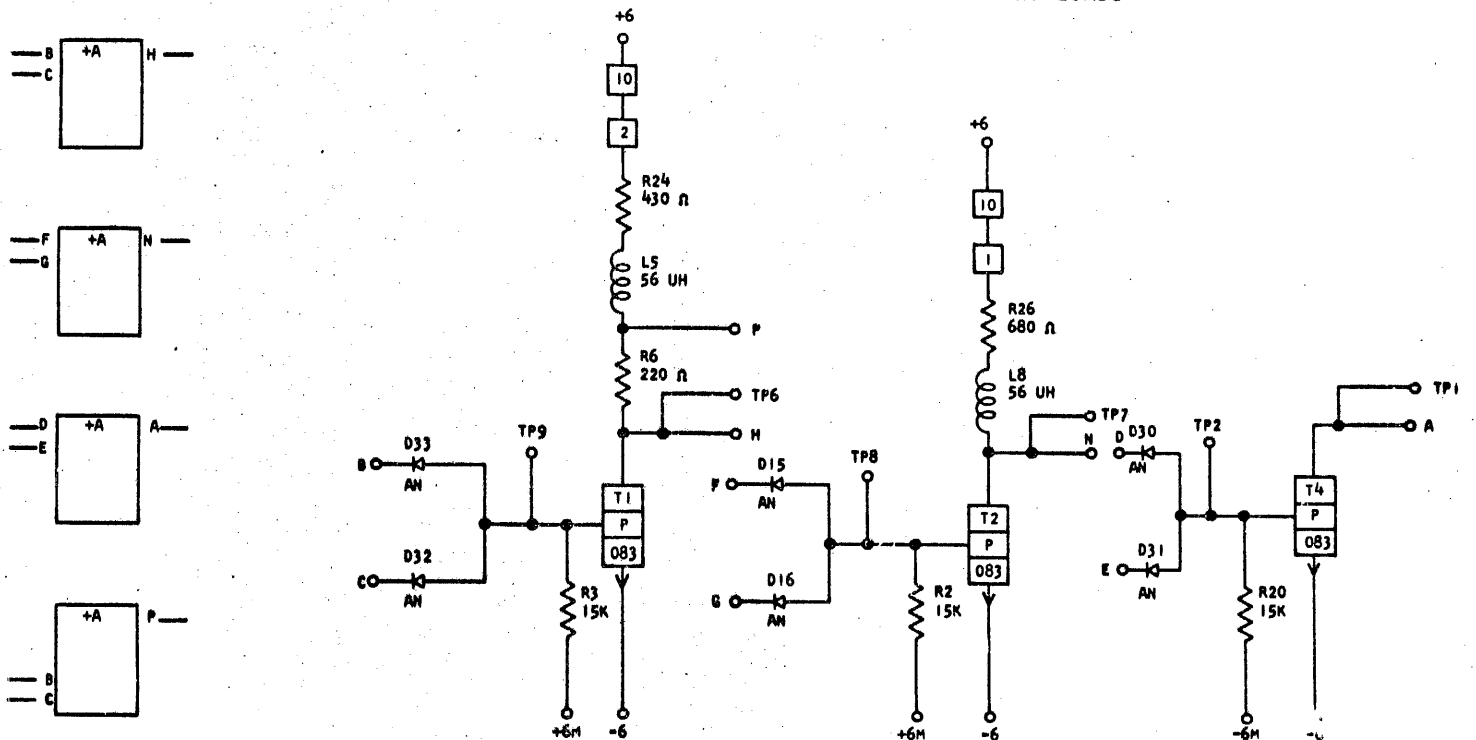
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME: CARD ASM TSTR-CTDL - TWO WAY "AND" NPN ONE LOAD				4-27-62	115599					
DESIGN	RQ	3-1-62	MODEL	SH5						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371264

CTDL-TWO WAY "AND" NPN TWO LOADS



SEQUENCE OF OPERATION

1. BOTH INPUTS UP, TRANSISTOR ON, OUTPUT DOWN
2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP
3. T4 COLLECTOR MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

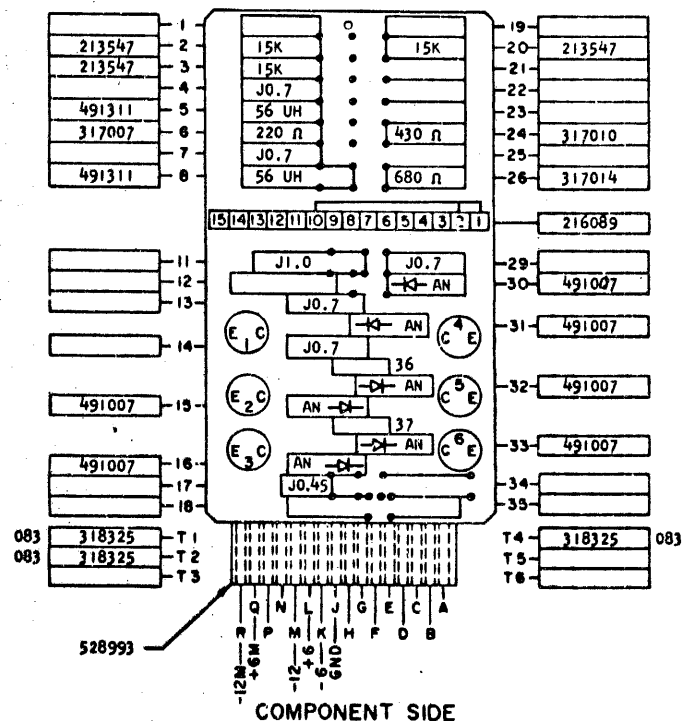
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, F, D	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
C, G, E	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
H, N, A	T	OUTPUT	UP	1.44 6.24
			DOWN	-5.46 -6.24
P	N	OUTPUT	UP	2.82 6.24
			DOWN	-1.07 -2.40

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

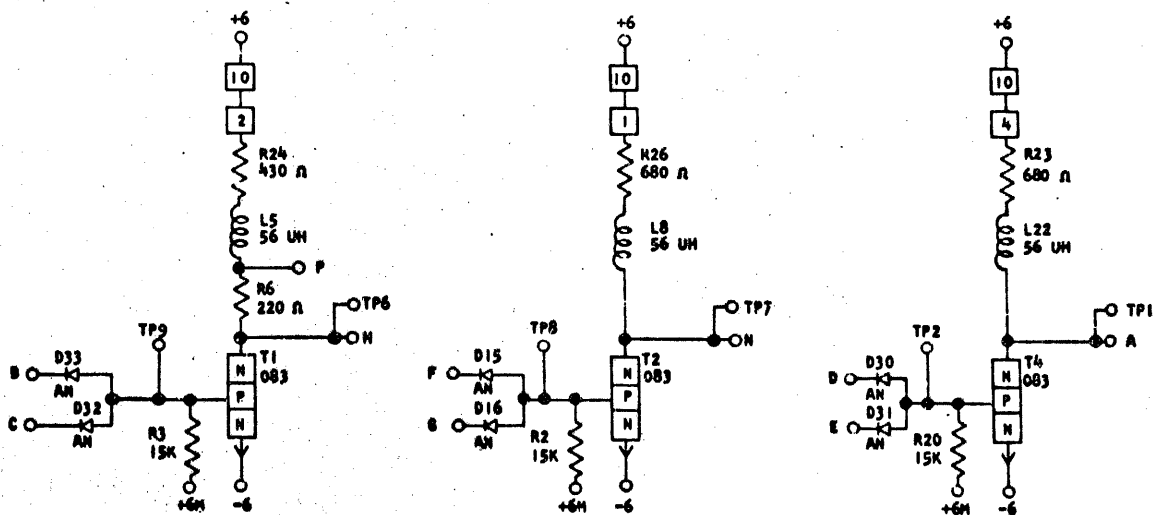
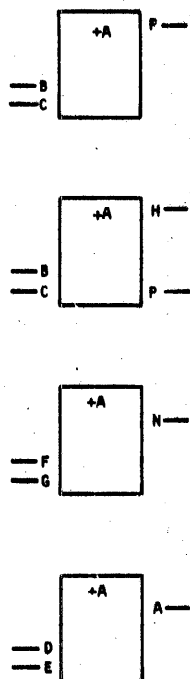
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR CTDL-TWO WAY "AND" NPN TWO LOADS				6-29-62	115599					729826
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LTG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371252

CTDL - TWO WAY "AND" NPN



SEQUENCE OF OPERATION

1. BOTH INPUTS UP, TRANSISTOR ON, OUTPUT DOWN
2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

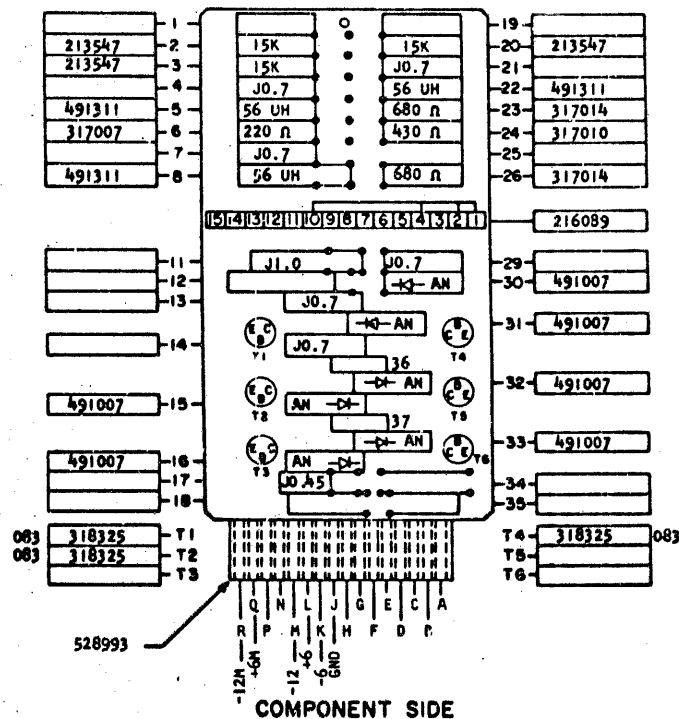
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, F, D	U INPUT		UP	-5.3 0.2
C, G, E	U INPUT		DOWN	-7.4 -12.5
H, N, A	T OUTPUT		UP	1.4 6.24
P	N OUTPUT		DOWN	-5.5 -6.24
			UP	2.82 6.24
			DOWN	-1.07 -2.40

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".

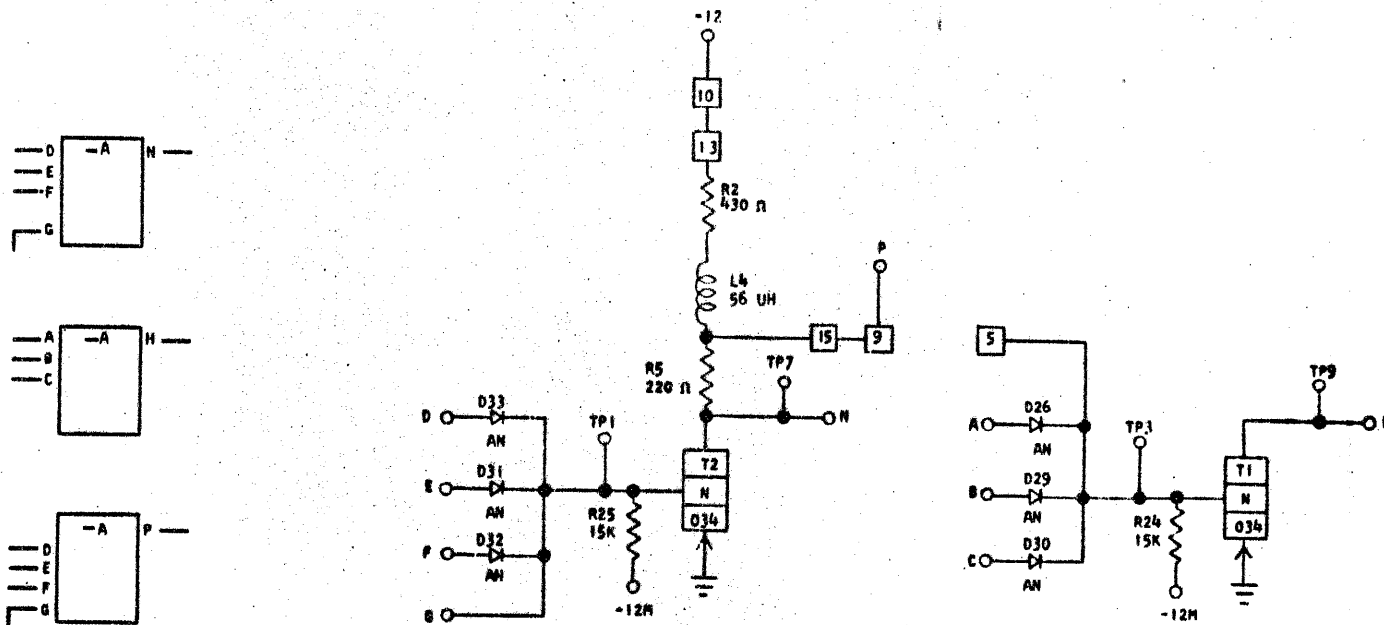


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL - TWO WAY "AND" NPN				6-29-62	115599					729827
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	RQ	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIF 3-17-62							
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371267

CTDL 3 WAY "AND" PNP ONE LOAD



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. INPUTS ON EXTENDER CARD DOWN IN COINCIDENCE WITH DOWN INPUTS ON CARD FOR UP OUTPUT
4. T1 COLLECTOR MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

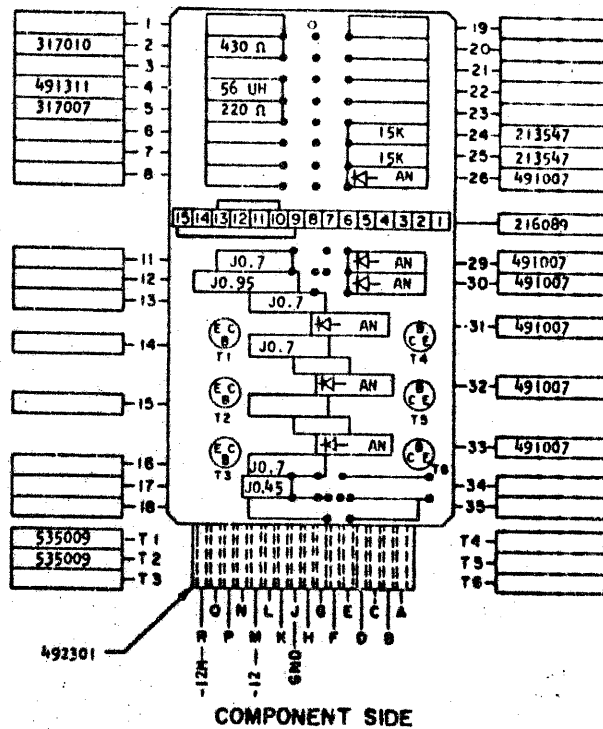
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
D, A T	INPUT		UP	1.44	6.24
			DOWN	-0.74	-6.24
E, B T	INPUT		UP	1.44	6.24
			DOWN	-0.74	-6.24
F, C T	INPUT		UP	1.44	6.24
			DOWN	-0.74	-6.24
G	EXTENDER INPUT		UP	+6.0	
			DOWN	0.0	
H, M U	OUTPUT		UP	-0.54	0.24
			DOWN	-7.44	-12.5
P	OUTPUT		UP	-4.93	-3.54
			DOWN	-8.82	-12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCK.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

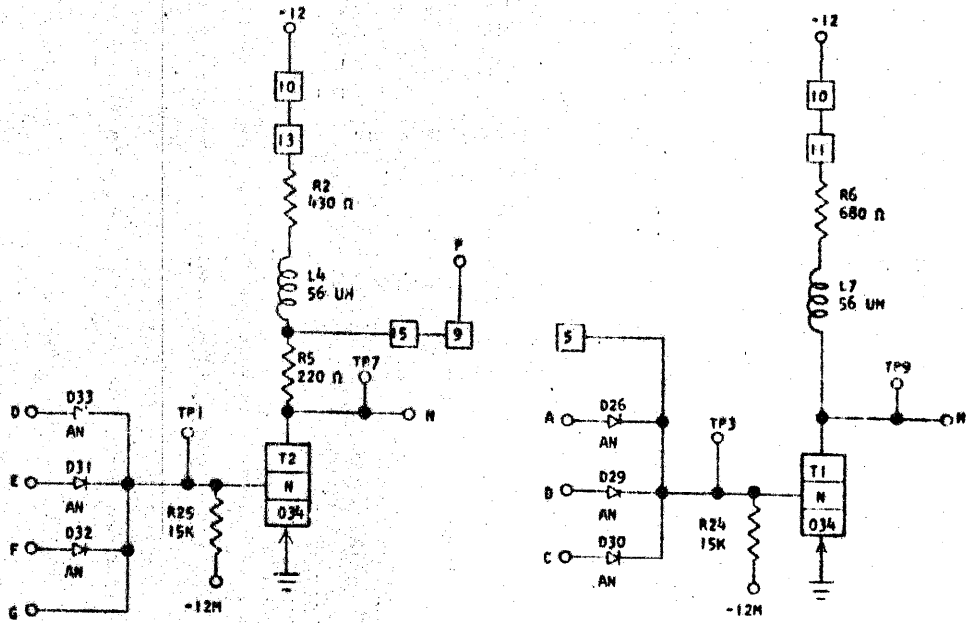
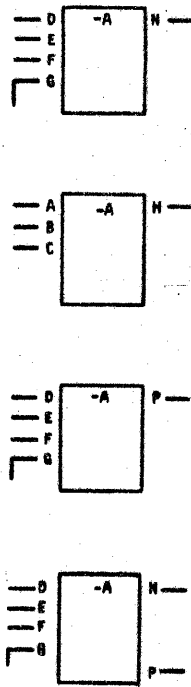
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL - 3				6-17-62	115599					729828
WAY "AND" PNP ONE LOAD										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LTG	3-17-62					
APPRO			CHECK							





REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371253

CTOL 3-WAY "AND" PNP



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN, TRANSISTOR ON, OUTPUT UP
2. ANY INPUT UP, TRANSISTOR OFF, OUTPUT DOWN
3. THE INPUTS ON THE EXTENDER CARD MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR AN UP OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

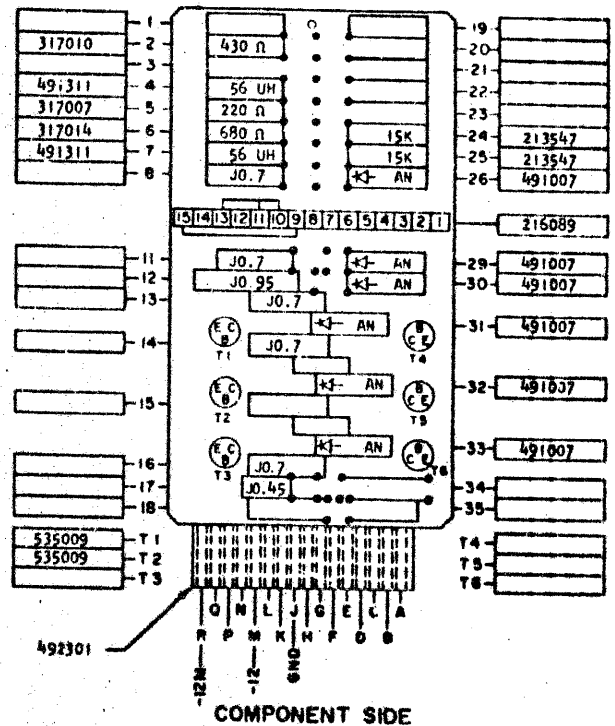
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, A	T INPUT	[Waveform]	UP	1.4 6.2
E, B	T INPUT	[Waveform]	UP	1.4 6.2
F, C	T INPUT	[Waveform]	UP	1.4 6.2
N, H	U OUTPUT	[Waveform]	UP	-0.5 0.2
P	P OUTPUT	[Waveform]	UP	-4.93 -3.54
E	T EXTENDER INPUT	[Waveform]	UP	+6.
			DOWN	-0.7 -6.2
			DOWN	-7.4 -12.5
			DOWN	-8.82 -12.5
			DOWN	0.0

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS.  
EXAMPLE: LOGIC BLOCK DRIVING EP "OR".

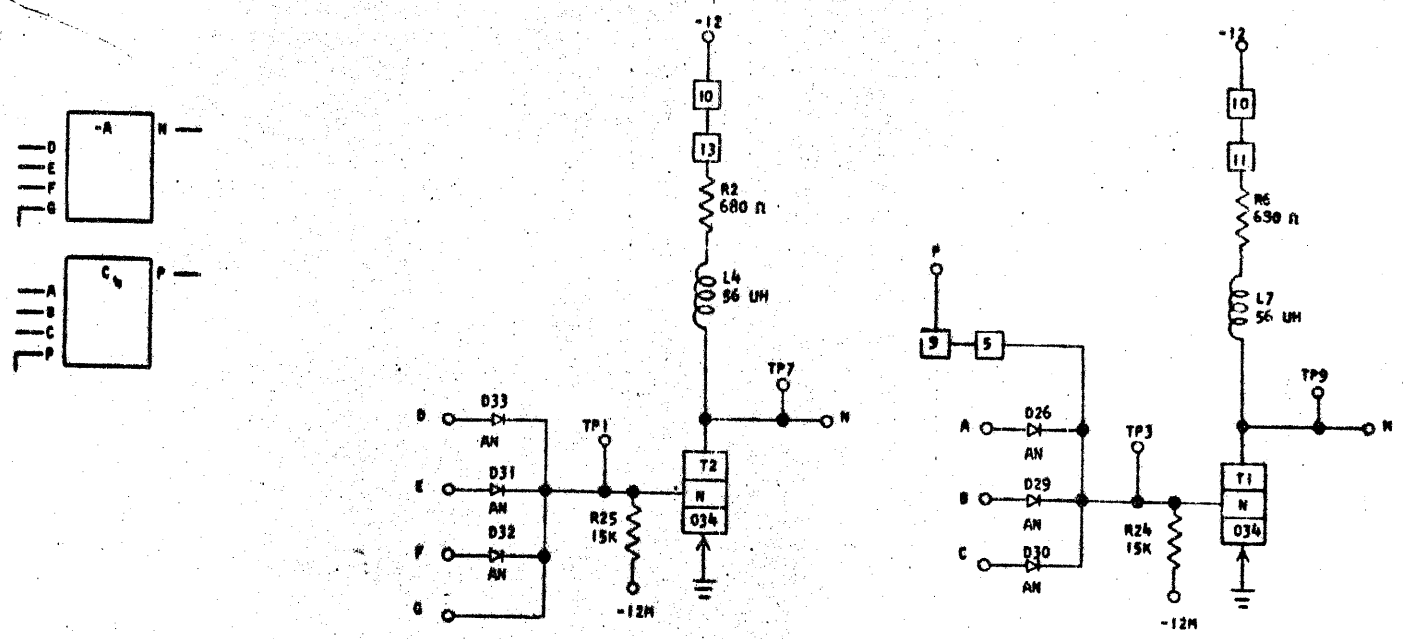


COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD			
APPROVAL		DATE	
ABC		4-2-62	
NAME	DATE	CHANGE NO.	APPROVAL
INTERNATIONAL BUSINESS MACHINES CORP.			
NAME CARD ASM TSTR-CTOL - 3	6-29-62	115599	
WAY "AND" PNP			
DESIGN	MODEL	SCALE	DATE
RQ	SMS	NONE	
DETAIL	CHECK	DRAW	DATE
3-1-62	WM	3-17-62	
APPROV	CHECK	DATE	DEVELOPMENT NO.
			729830

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371071

CTDL 3-WAY "AND" PNP  
EXTENDABLE INPUTS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. INPUTS ON DIODE EXTENDER CARD MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

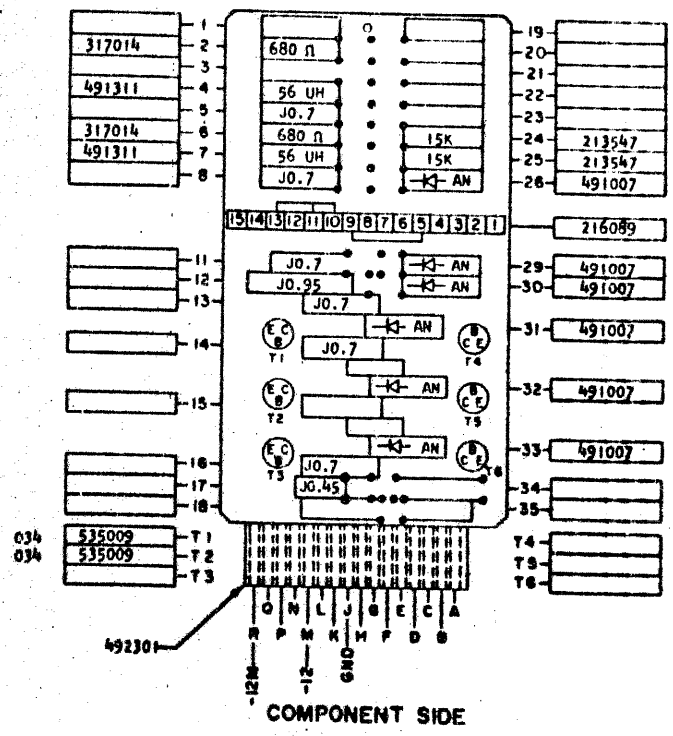
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, A	T	INPUT	UP	1.44 6.24
E, B	T	INPUT	DOWN	-0.74 -6.24
F, C	T	INPUT	UP	1.44 6.24
			DOWN	-0.74 -6.24
N, H	U	OUTPUT	UP	-0.54 0.24
			DOWN	-7.44 -12.5
G, P		EXTENDER INPUT	UP	+6
			DOWN	0.0

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING OF "OR".



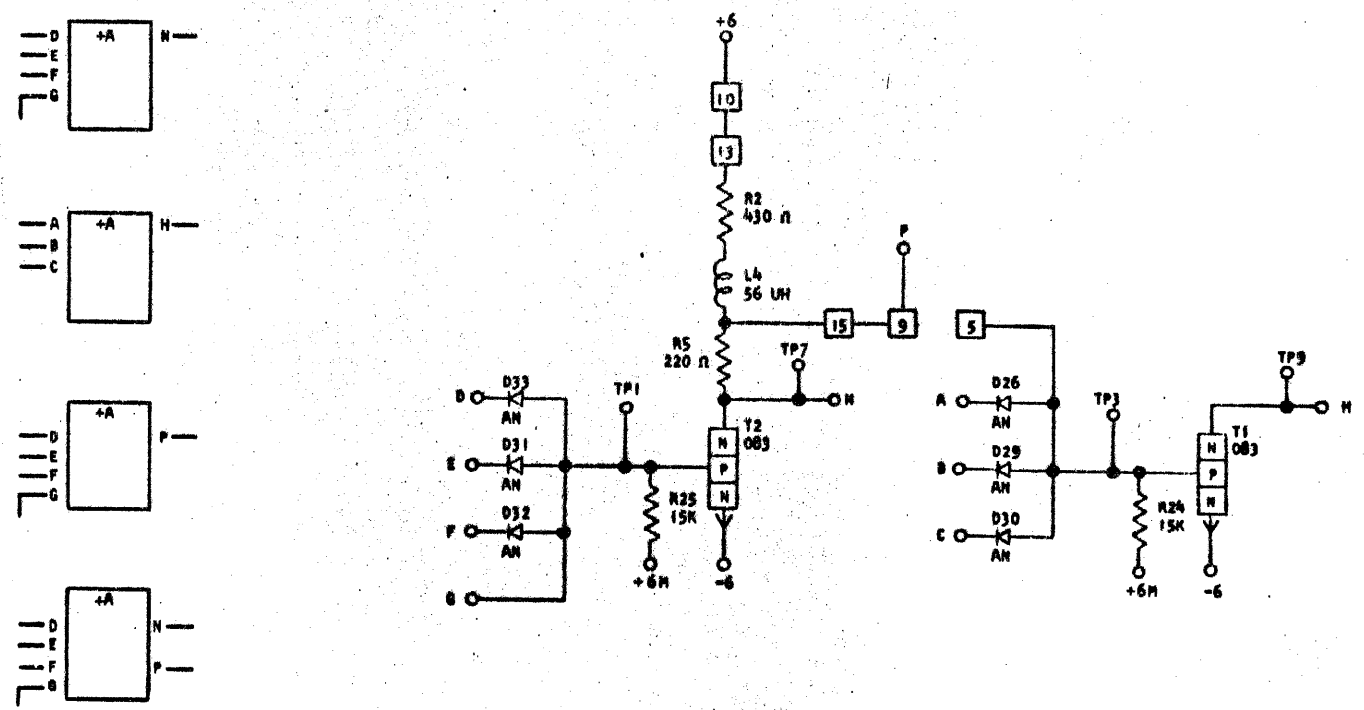
INTERNATIONAL BUSINESS MACHINES CORP.							
NAME	DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
CARD ASM TSTR-CTDL-3 WAY "AND" PNP-EXTENDABLE INPUTS	6-27-62	115599					
DESIGN	RQ	3-1-62	SCALE	NONE			
CHECK	WH	3-1-62	DRAW	LIG	3-17-62		
APPROD			CHECK				

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371269

CTDL-3 WAY "AND" NPN ONE LOAD



- SEQUENCE OF OPERATION
1. ALL INPUTS UP TRANSISTOR ON OUTPUT DOWN
  2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP
  3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP INPUTS CARD FOR DOWN OUTPUT
  4. T1 COLLECTOR MUST BE LOADED
  5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

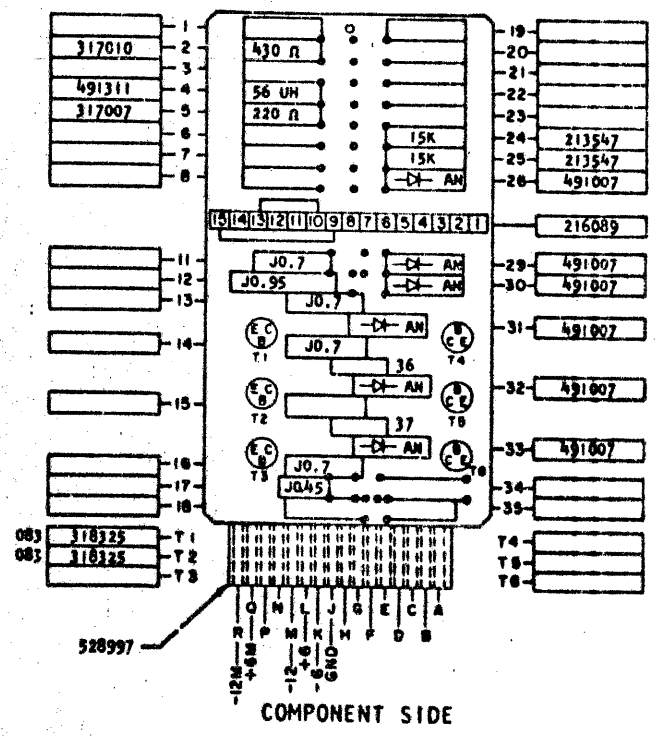
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, A	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
E, B	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
F, C	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
G	EXTENDER INPUT	INPUT	UP	-6.
			DOWN	-12.
N, M	T	OUTPUT	UP	1.44 6.24
			DOWN	-5.46 -6.24
P	N	OUTPUT	UP	2.82 6.24
			DOWN	-1.07 -2.40

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".

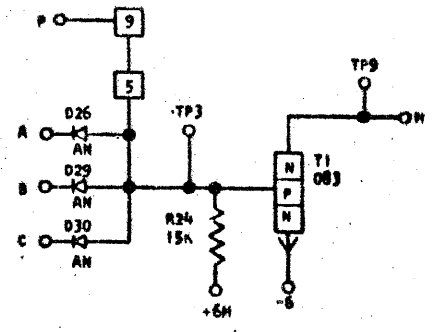
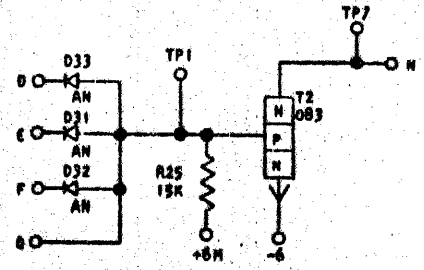
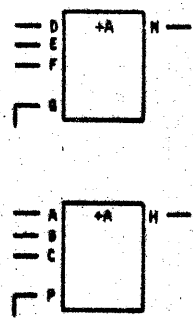


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR-CTDL THREE				6-29-62	115599					729832
WAY "AND" NPN										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	RQ	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LTG	3-17-62						

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371270

CTDL-3-WAY "AND" NPN NO LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS UP TRANSISTOR ON OUTPUT DOWN
2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP
3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP INPUTS ON CARD FOR DOWN OUTPUT.
4. COLLECTORS MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

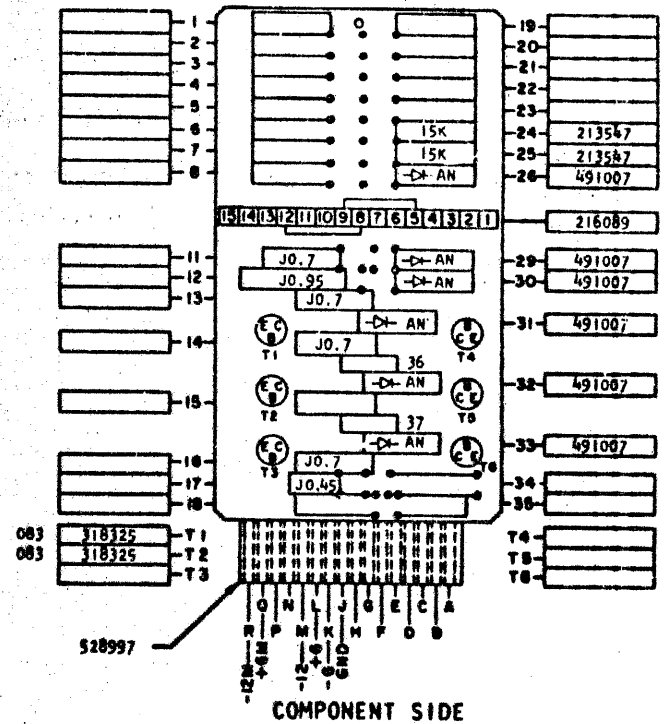
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, A	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
E, B	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
F, C	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
G, P	EXTENDER INPUT	INPUT	UP	-6.
			DOWN	-12.
N, H	T	OUTPUT	UP	1.44 6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

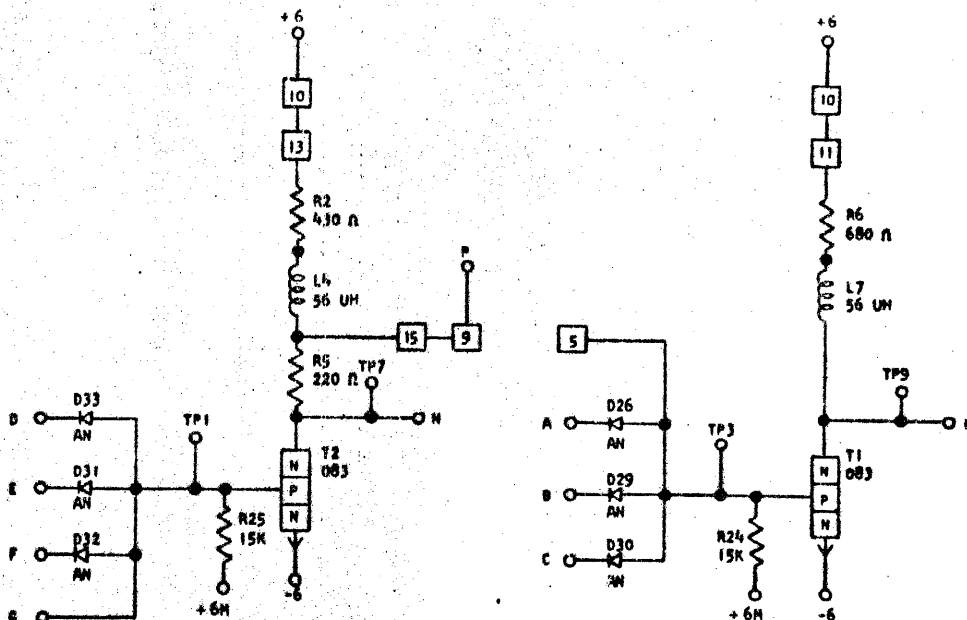
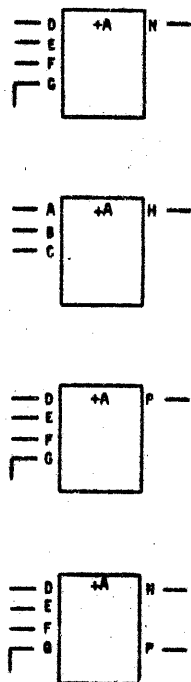
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL - THREE				6-29-62	115599					
WAY "AND" NPN-NO LOADS										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPR			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371254

CTDL - 3 - WAY "AND" NPN



SEQUENCE OF OPERATION

1. ALL INPUTS UP, TRANSISTOR ON OUTPUT DOWN
2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP
3. THE INPUTS ON EXTENDER CARD MUST BE UP IN COINCIDENCE WITH INPUTS ON CARD FOR A DOWN OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

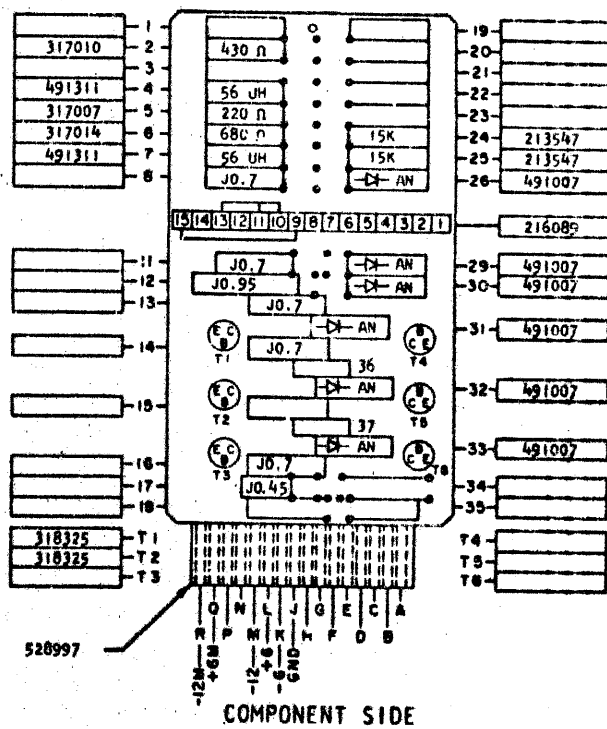
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, A	U INPUT	[Waveform: High to Low]	UP	-5.3 0.2
E, B	U INPUT	[Waveform: High to Low]	DOWN	-7.4 -12.5
F, C	U INPUT	[Waveform: High to Low]	UP	-5.3 0.2
			DOWN	-7.4 -12.5
N, H	T OUTPUT	[Waveform: High to Low]	UP	1.4 6.2
			DOWN	-5.5 -6.2
P	N OUTPUT	[Waveform: High to Low]	UP	2.82 6.24
			DOWN	-1.07 -2.40
G	EXTENDER INPUT	[Waveform: High to Low]	UP	+6.
			DOWN	0.0

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

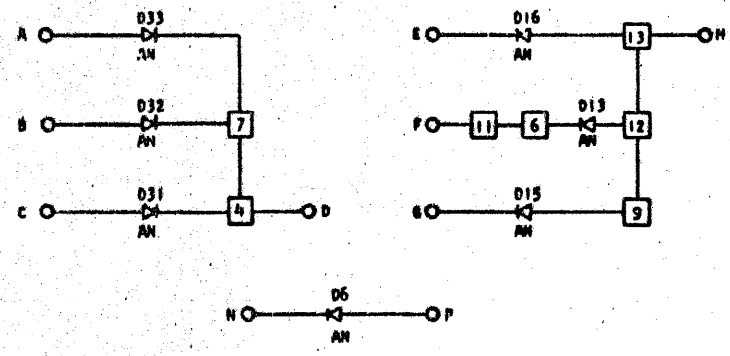
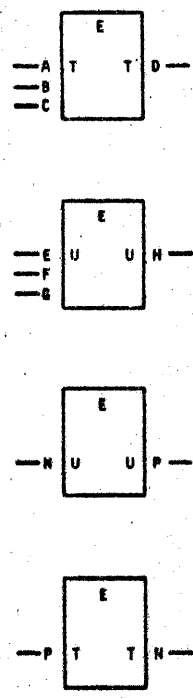
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL - 3 -				6-7-62	115599					
WAY "AND" NPN										
DESIGN	MODEL	SMS								
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-1-62					
APPRO	CHECK									



REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371255

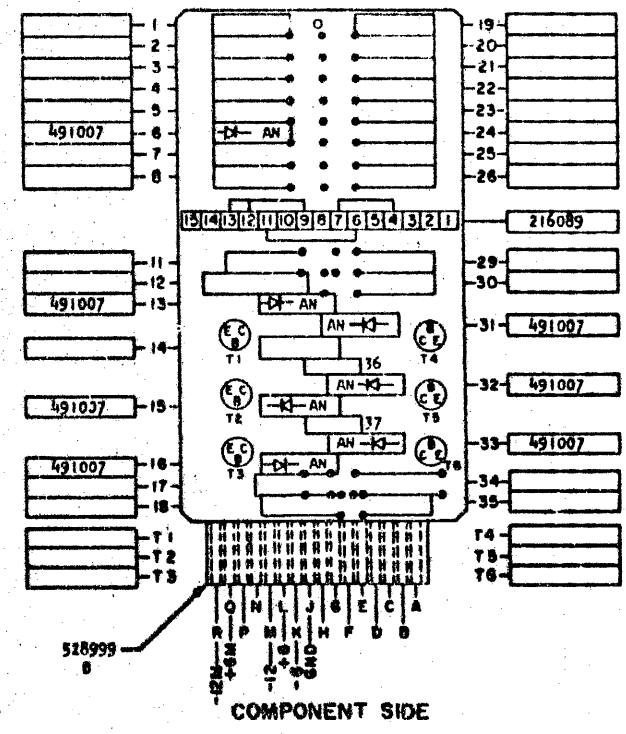
CTDL EXTENDER CARD



SEQUENCE OF OPERATION

1. OUTPUT FROM PIN D EXPANDS INPUTS TO N TYPE BLOCK
2. OUTPUT FROM PIN H EXPANDS INPUTS TO P TYPE BLOCK
3. D6 USED TO EXPAND INPUTS TO P OR N TYPE BLOCK BY REVERSING CONNECTIONS ON TERMINAL PINS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
B	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
C	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
D	T	EXTENDER OUTPUT	UP	+6	
			DOWN	0.0	
E	U	INPUT	UP	-5.26	0.24
			DOWN	-7.44	-12.5
F	U	INPUT	UP	-5.26	0.24
			DOWN	-7.44	-12.5
G	U	INPUT	UP	-5.26	0.24
			DOWN	-7.44	-12.5
H	U	EXTENDER OUTPUT	UP	-6	
			DOWN	-12	



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

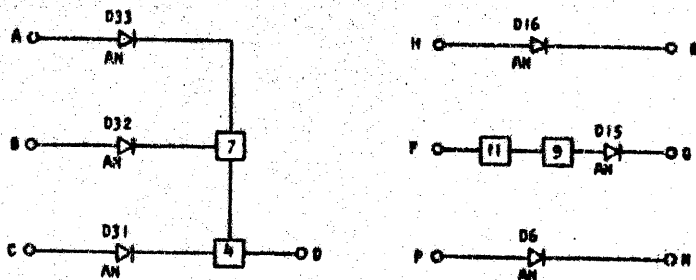
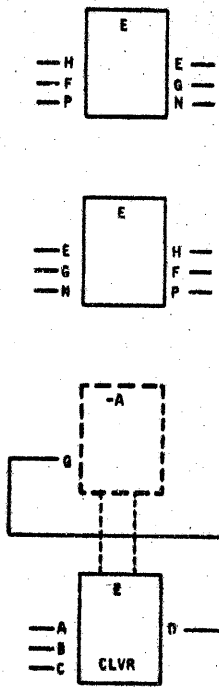
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL				6-29-62	115599					
EXTENDER CARD										
DESIGN	MODEL	SCALE	SMS							
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPROD		CHECK								



REFERENCE DRAWING

SEE PRODUCTION DRAWING 371075

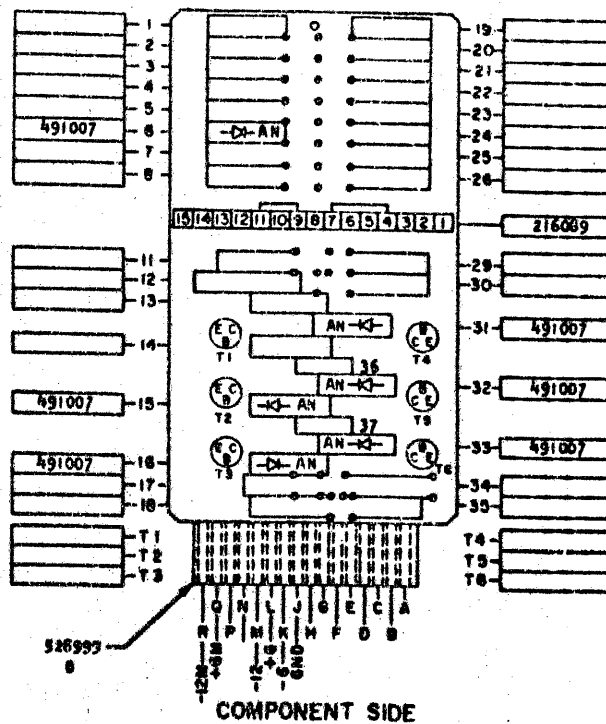
CTDL EXTENDER CARD



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN IN COINCIDENCE WITH INPUTS ON OUTPUT CARD FOR EXTENDER DOWN OUTPUT
2. ANY INPUT UP WILL GIVE UP EXTENDER OUTPUT
3. D6, D15, D16 EXPAND INPUTS TO BOTH P & N TYPE BLOCKS HAVING EXTENDER INPUTS, BY REVERSING CONNECTIONS ON TERMINAL PINS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	T	INPUT	UP	1.44 6.24
			DOWN	-0.74 -6.24
B	T	INPUT	UP	1.44 6.24
			DOWN	-0.74 -6.24
C	T	INPUT	UP	1.44 6.24
			DOWN	-0.74 -6.24
D	T	EXTENDER OUTPUT	UP	1.44 6.24
			DOWN	-0.5 0.2



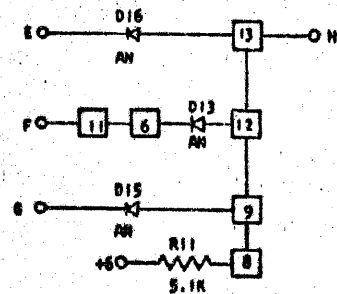
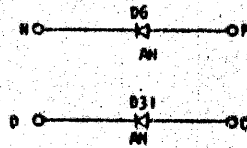
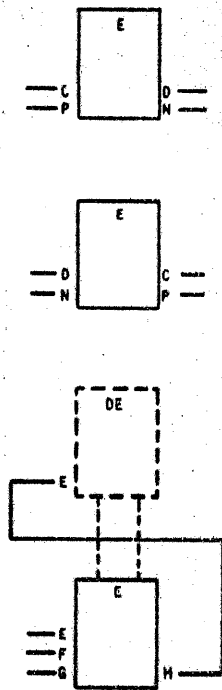
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - CTDL	EXTENDER CARD	MODEL	SMS	6-29-62	115599				
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WM	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371074

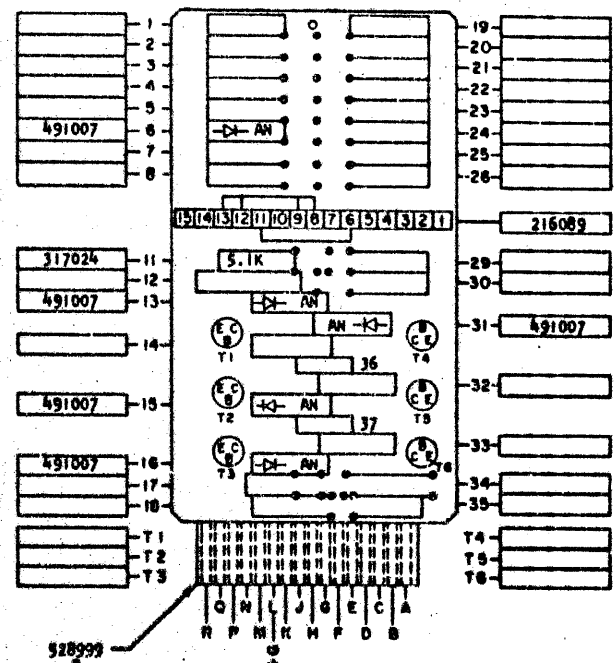
CTDL -N "OR" EXTENDER CARD



SEQUENCE OF OPERATION

1. OUTPUT FROM P1H H EXPANDS THE INPUTS TO DE CARD & PERFORMS - OR FUNCTION
2. D6, D31 EXPAND INPUTS TO BOTH P & N TYPE BLOCKS BY REVERSING CONNECTIONS ON TERMINAL PINS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E	T	INPUT	UP	1.81 6.24
			DOWN	-1.74 -6.24
F	T	INPUT	UP	1.81 6.24
			DOWN	-1.74 -6.24
G	T	INPUT	UP	1.81 6.24
			DOWN	-1.74 -6.24
H	T	EXTENDER OUTPUT	UP	1.81 6.24
			DOWN	-1.74 -6.24



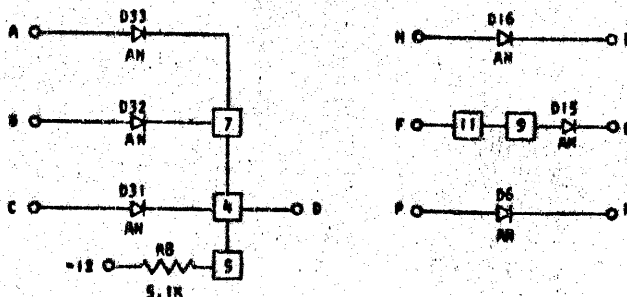
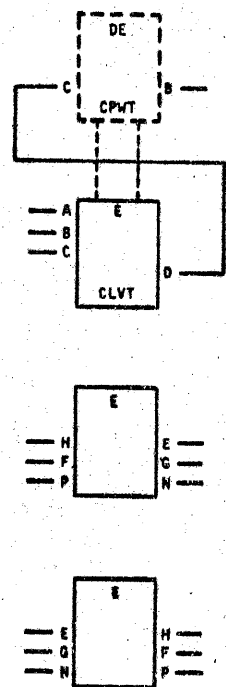
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR CTDL-N				6-29-62	115599					
"OR" EXTENDER CARD										
DESIGN	MODEL	SMS								
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO	CHECK									

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371073

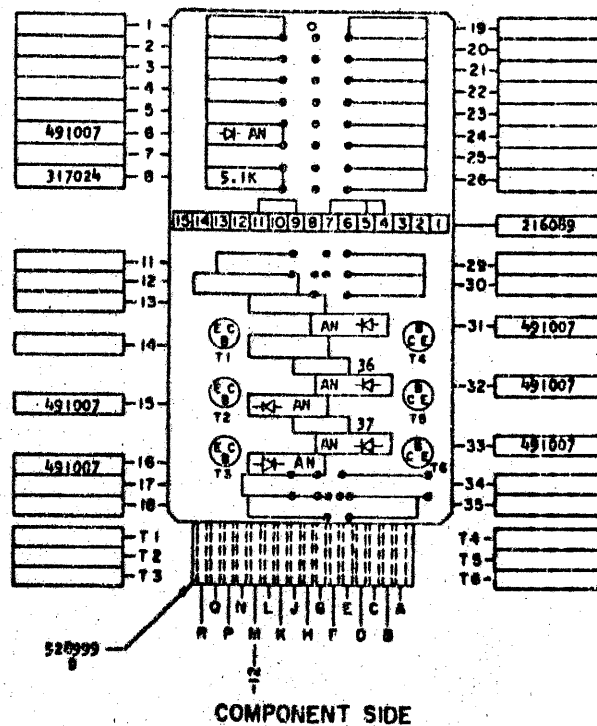
CTDL +P "OR" EXTENDER CARD



SEQUENCE OF OPERATION

1. OUTPUT FROM PIN D EXPANDS THE INPUTS TO DE LARD & PREFORMS + OR FUNCTION
2. D6, D15, D16, EXPAND INPUTS TO BOTH P & N TYPE BLOCKS BY REVERSING PIN CONNECTIONS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	U INPUT	[Waveform]	UP -4.26	0.24
B	U INPUT	[Waveform]	UP -4.26	0.24
C	U INPUT	[Waveform]	UP -4.26	0.24
D	U EXTENDER OUTPUT	[Waveform]	UP -4.26	0.24
			DOWN -7.81	-12.5



COMPONENT SIDE

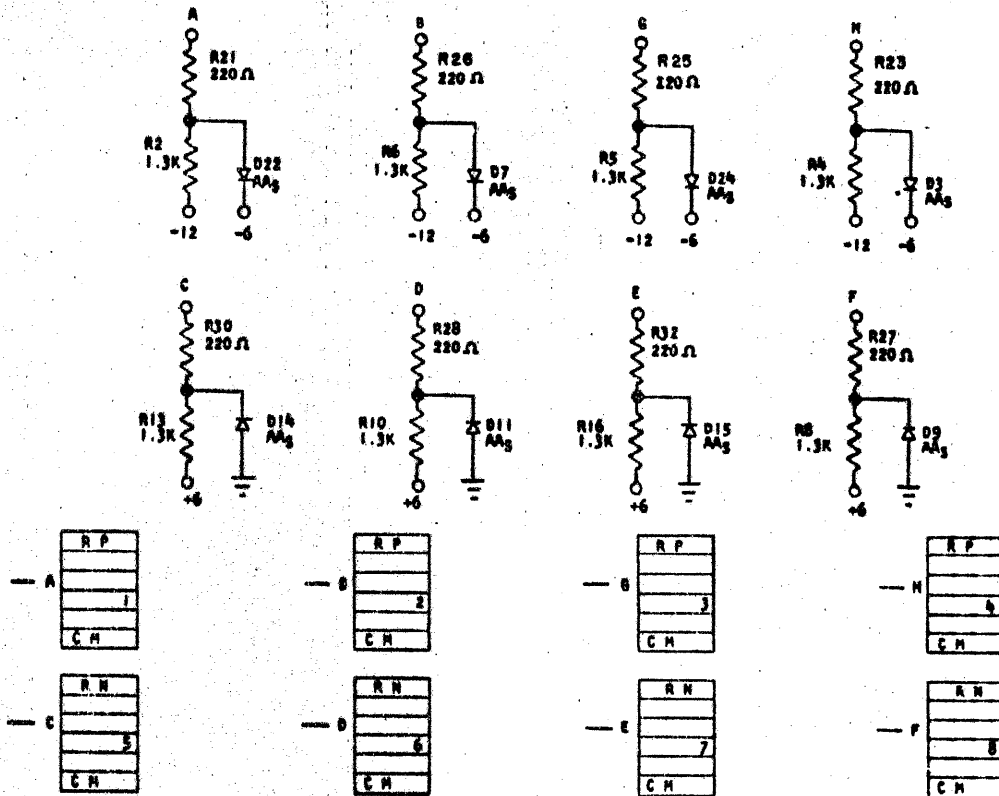
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR CTDL +P		4-29-62	115599					
"OR" EXTENDER CARD								
DESIGN	MODEL	SCALE						
DETAIL RD	3-1-62	NONE						
CHECK WH	3-1-62	DRAW L10	3-17-62					
APPRO		CHECK						

REFERENCE DRAWING

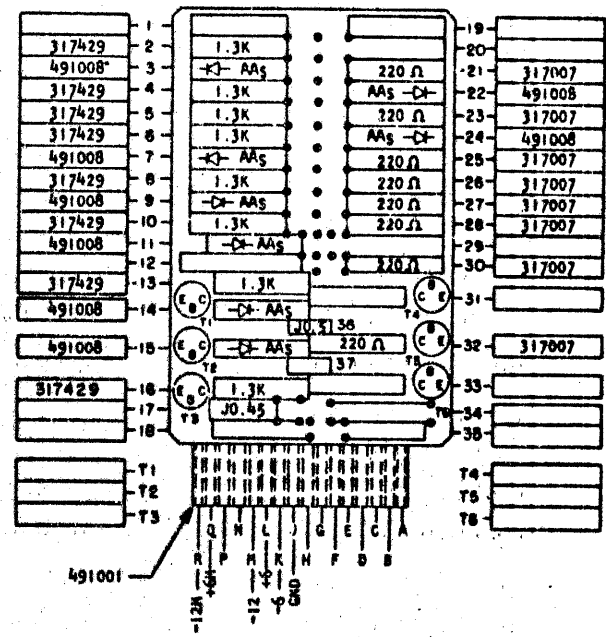
SEE PRODUCTION DRAWING 371256

CTDL - COUPLING NETWORK



SEQUENCE OF OPERATION

1. COLLECTOR LOADING FOR CURRENT MODE LOGIC BLOCKS
2. A, B, G, H, PROVIDE P LEVEL OUTPUTS; C, D, E, F, PROVIDE N LEVEL OUTPUTS
3. FOR DELAY DATA REFER TO THE GENERAL INFORMATION ON CTDL. DELAY UNDER CURRENT MODE TO CTDL COUPLING.



COMPONENT SIDE

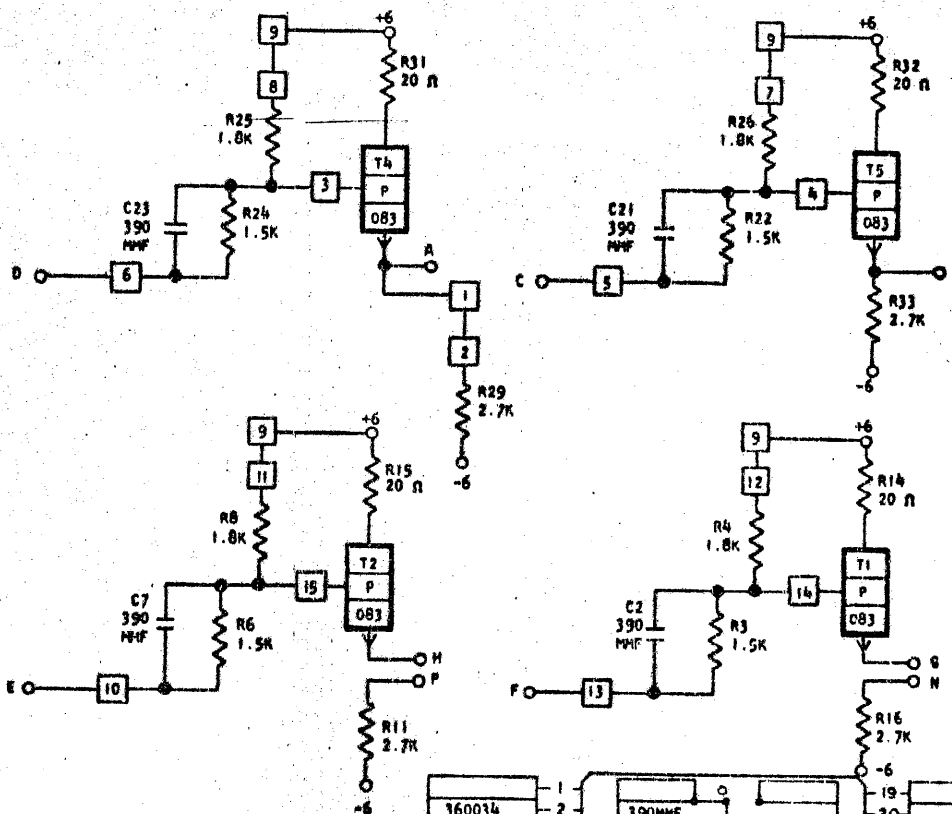
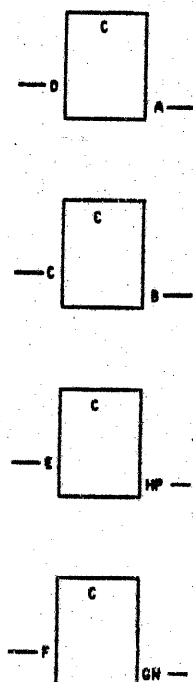
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL		6-29-62	115599					
COUPLING NETWORK								
DESIGN	RQ	3-1-62	SCALE	NONE				
CHECK	WH	3-1-62	DRAW	LIG	3-1-62			
APPRO			CHECK					



REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371258

CTDL-TRANSLATE BLOCK NPN



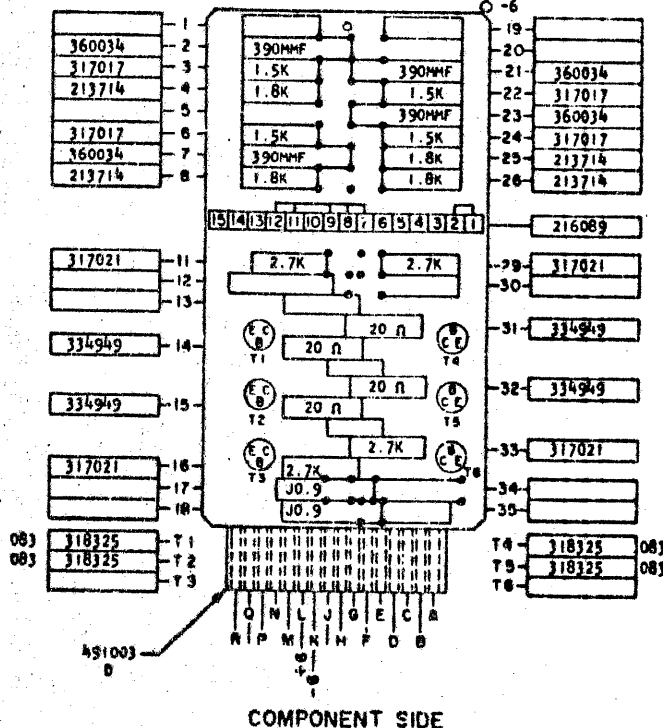
SEQUENCE OF OPERATION

1. TRANSISTOR ALWAYS IN CONDUCTION; T1, T2, EMITTER MUST BE LOADED
2. OUTPUT WILL FOLLOW INPUT
3. LOGICAL FUNCTIONS PERFORMED WHEN OUTPUTS SHARE COMMON LOAD

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, C, E, F	U	INPUT	UP	-0.54 0.24
			DOWN	-7.44 -12.5
A, B, H, G	T	OUTPUT	UP	1.44 3.12
			DOWN	-0.74 -5.23

DELAY

THE DELAY CHARACTERISTICS OF THE TRANSLATE BLOCK ARE SIMILAR TO THOSE OF THE EF.  
NO APPRECIABLE DELAY SHOULD BE NOTICED WHEN THE DRIVING BLOCK IS TURNED ON OR OFF.  
APPRECIABLE DELAY CAN BE OBSERVED (1 TO 2.5 USEC.) WHEN THE DRIVING BLOCK IS TURNED ON AND THE OUTPUT OF THE TRANSLATE BLOCK IS DRIVING SIGNIFICANT WIRING CAPACITANCE (SEVERAL FEET OF WIRE FROM ONE GATE TO ANOTHER.)



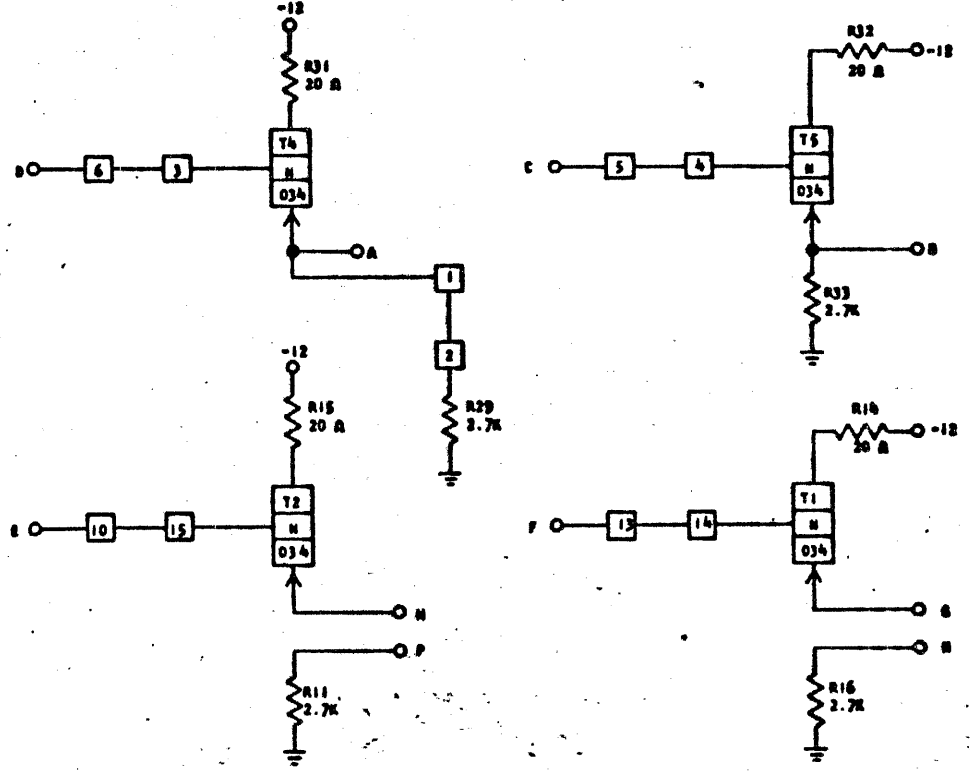
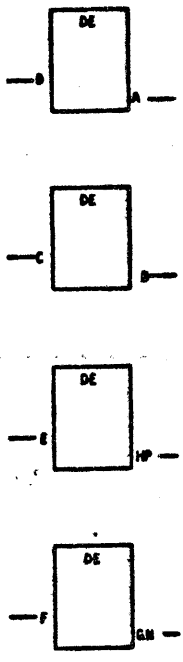
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL				4-29-62	115599					
TRANSLATE BLOCK NPN										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG	3-17-62						
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371259

CTDL - EMITTER FOLLOWER PNP



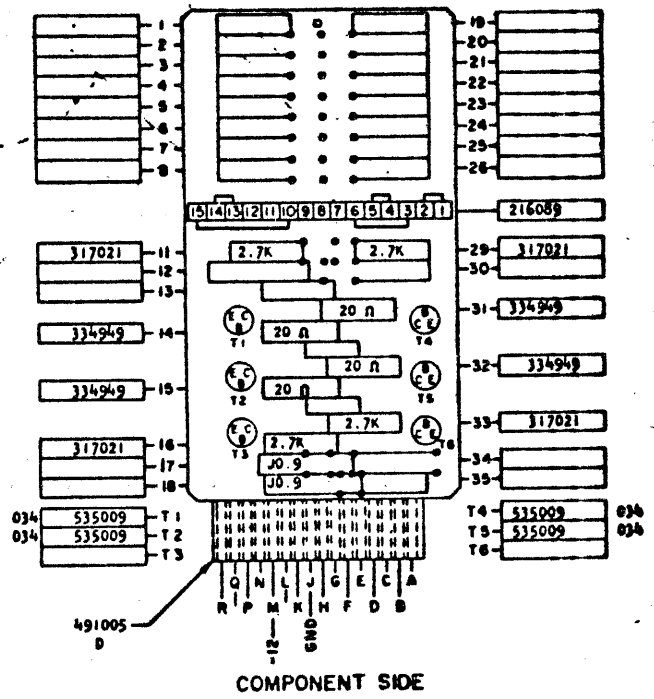
SEQUENCE OF OPERATION

1. OUTPUT WILL FOLLOW INPUT, TRANSISTOR ALWAYS IN CONDUCTION
2. LOGICAL FUNCTIONS PERFORMED WHEN OUTPUTS SHARE COMMON LOAD
3. T1, T2 EMITTER MUST BE LOADED

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, C, E, F	U INPUT		-5.5	+2.4
A, B, H, G	U OUTPUT		-7.6	-12.5
			-5.3	0.2
			-7.4	-12.5

**DELAY**  
THERE IS NO APPRECIABLE DELAY BETWEEN THE INPUT AND THE OUTPUT OF THE EF WHEN THE LOGIC BLOCK THAT DRIVES THE EF IS TURNED OFF.

WHEN THE LOGIC BLOCK THAT DRIVES THE EF IS TURNED ON, THE EF DELAY IS A FUNCTION OF ITS CAPACITIVE LOAD (EXAMPLE: WIRING CAPACITANCE). IN SOME CIRCUIT APPLICATIONS, THIS DELAY CAN BE IN THE ORDER OF 3 OR 4 USEC. IN NORMAL APPLICATION (NO APPRECIABLE WIRING CAPACITANCE ON THE OUTPUT OF THE EF) THE DELAY IS NOT APPRECIABLE.

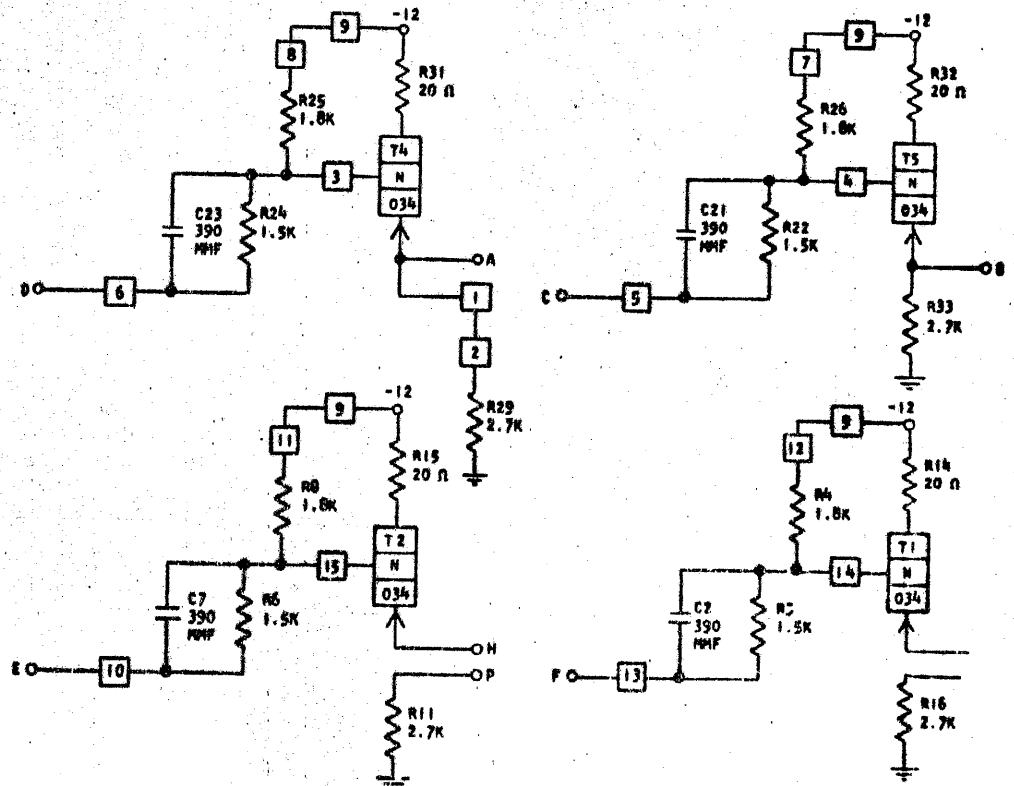
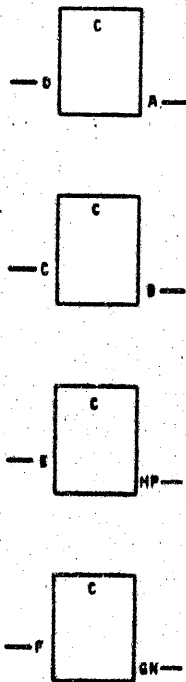


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					729843
EMITTER FOLLOWER PNP										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371257

CTDL - TRANSLATE BLOCK - PNP



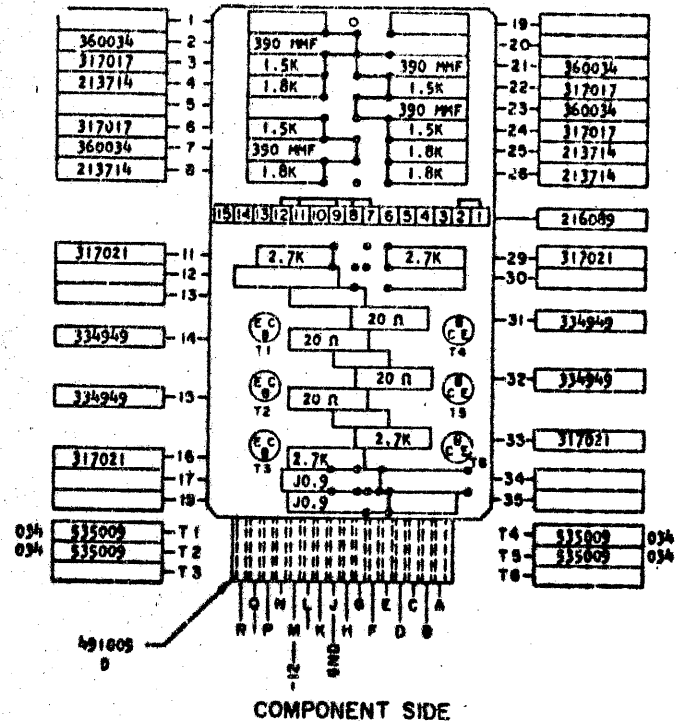
SEQUENCE OF OPERATION

1. OUTPUT WILL FOLLOW INPUT, TRANSISTOR ALWAYS IN CONDUCTION
2. LOGICAL FUNCTIONS PERFORMED WHEN OUTPUTS SHARE COMMON LOAD
3. T1, T2 EMITTER MUST BE LOADED

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, C E, F	T	INPUT	UP	1.44 6.24
A, B H, G	U	OUTPUT	UP	-5.2 -0.8
			DOWN	-5.5 -6.24
			DOWN	-7.4 -9.2

DELAY

THE DELAY CHARACTERISTICS OF THE TRANSLATE BLOCK ARE SIMILAR TO THOSE OF THE EP.  
NO APPRECIABLE DELAY SHOULD BE NOTICED WHEN THE DRIVING BLOCK IS TURNED ON OR OFF.  
APPRECIABLE DELAY CAN BE OBSERVED (1 TO 2.5 USEC.) WHEN THE DRIVING BLOCK IS TURNED ON AND THE OUTPUT OF THE TRANSLATE BLOCK IS DRIVING SIGNIFICANT WIRING CAPACITANCE (SEVERAL FEET OF WIRE FROM ONE GATE TO ANOTHER).



COMPONENT SIDE

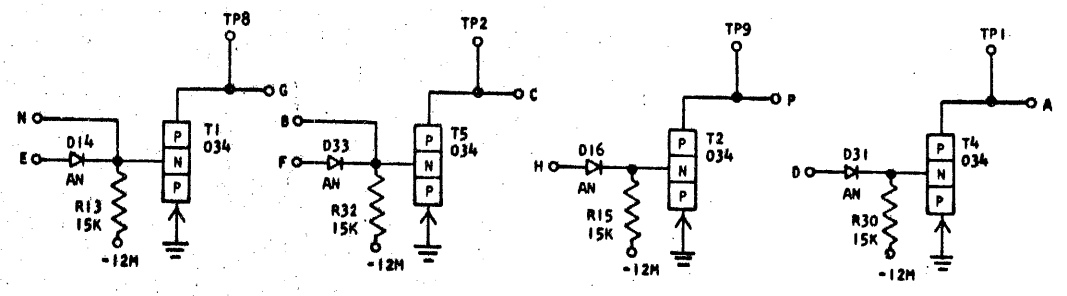
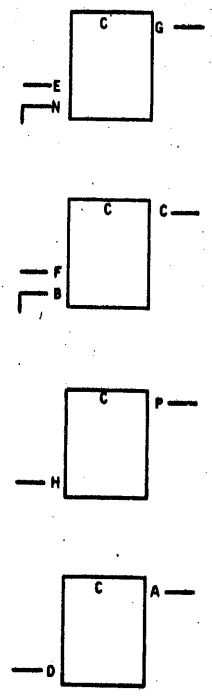
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH ISTR -CTDL				6-29-62	115599					
TRANSLATE BLOCK - PNP										
DESIGN		MODEL	SMS							
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							



REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371273

CTDL - ONE WAY PNP NO LOADS.



SEQUENCE OF OPERATION

1. DOWN INPUT TRANSISTOR ON OUTPUT UP
2. UP INPUT TRANSISTOR OFF OUTPUT DOWN
3. INPUTS ON EXTENDER CARD DOWN IN COINCIDENCE WITH DOWN INPUT ON CARD FOR UP OUTPUT
4. COLLECTORS MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

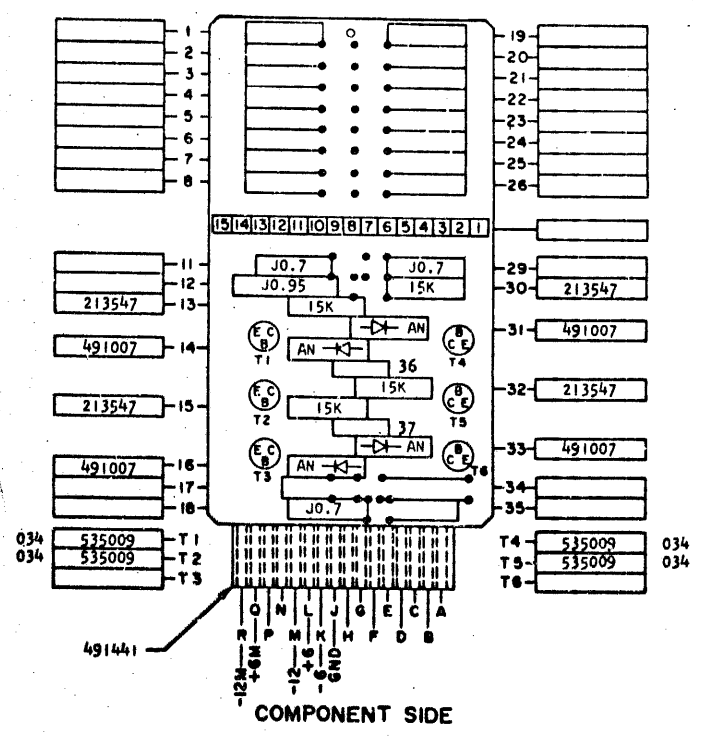
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	T INPUT	[Waveform: High to Low]	UP	1.44 6.24
N, B	EXTENDER INPUT	[Waveform: High to Low]	UP	+5.0
G, C, P, A	U OUTPUT	[Waveform: High to Low]	DOWN	0.0
			UP	-0.54 0.24
			DOWN	-7.44 -12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING 'OR'.



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

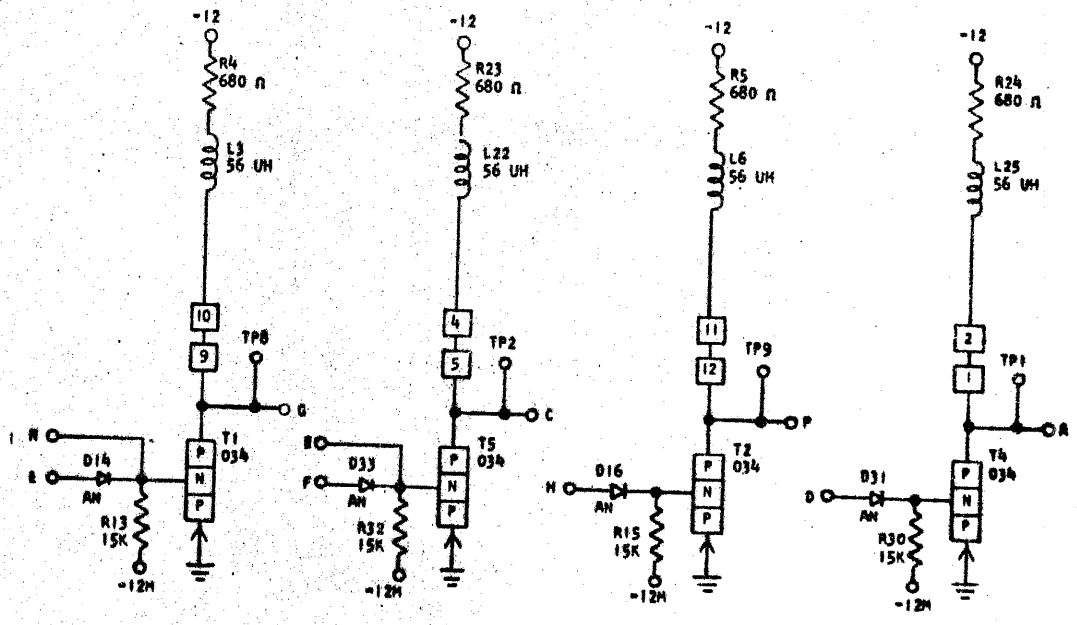
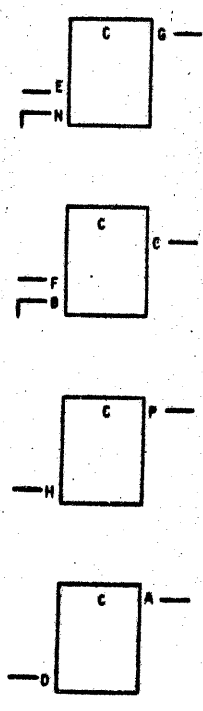
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR -CTDL-ONE				6-29-62	115599					
WAY PNP NO LOADS										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							





REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371271

CTDL - ONE WAY PNP 4 LOADS  
FOUR ON CARD



SEQUENCE OF OPERATION

1. DOWN INPUT TRANSISTOR ON OUTPUT UP
2. UP INPUT TRANSISTOR OFF OUTPUT DOWN
3. INPUTS ON EXTENDER CARD DOWN IN COINCIDENCE WITH DOWN INPUT ON CARD FOR UP OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

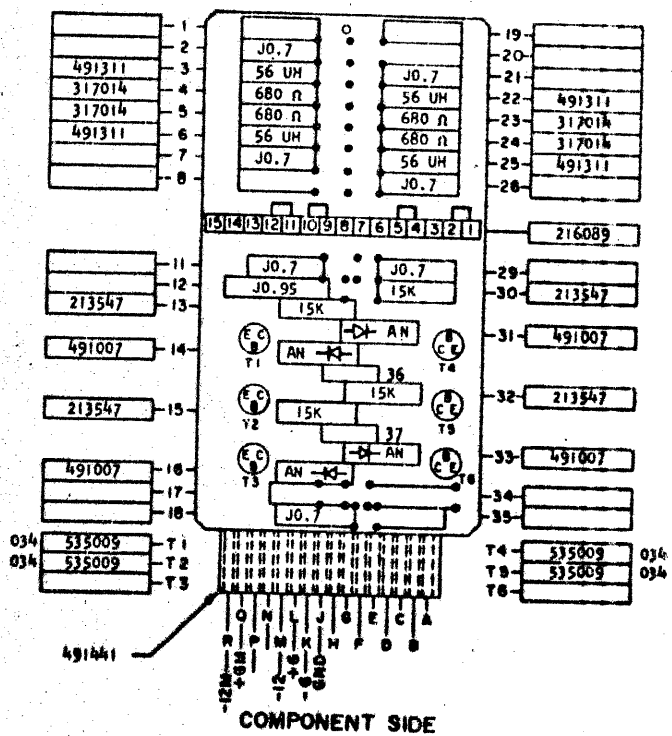
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D	T	[Waveform]	UP	1.44	6.24
			DOWN	-0.74	-6.24
H, B	EXTENDER INPUT	[Waveform]	UP	+6	
			DOWN	0.0	
G, C, P, A	U	[Waveform]	UP	-0.54	0.24
			DOWN	-7.44	-12.5

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".

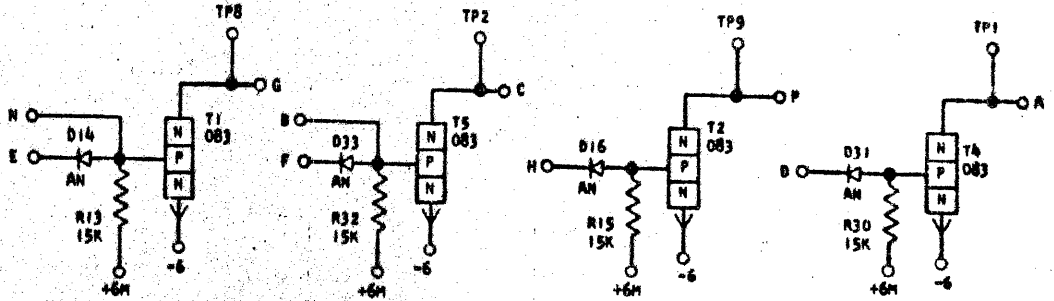
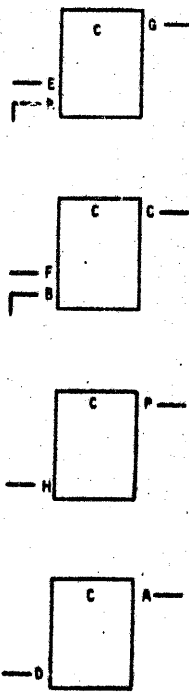


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASM - CTDL-ONE WAY PNP 4 LDS-FOUR ON CARD				6-27-62	115599					
DESIGN	RQ	MODEL	SMS							
DETAIL	3-1-62	SCALE	NONE							
CHECK	3-1-62	DRAW	LIG	3-17-62						
APPRO		CHECK								

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371276

CTDL - ONE WAY NPN NO LOADS  
FOUR ON CARD



SEQUENCE OF OPERATION

1. UP INPUT TRANSISTOR ON OUTPUT DOWN
2. DOWN INPUT TRANSISTOR OFF OUTPUT UP
3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP INPUT ON CARD FOR DOWN OUTPUT
4. COLLECTORS MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

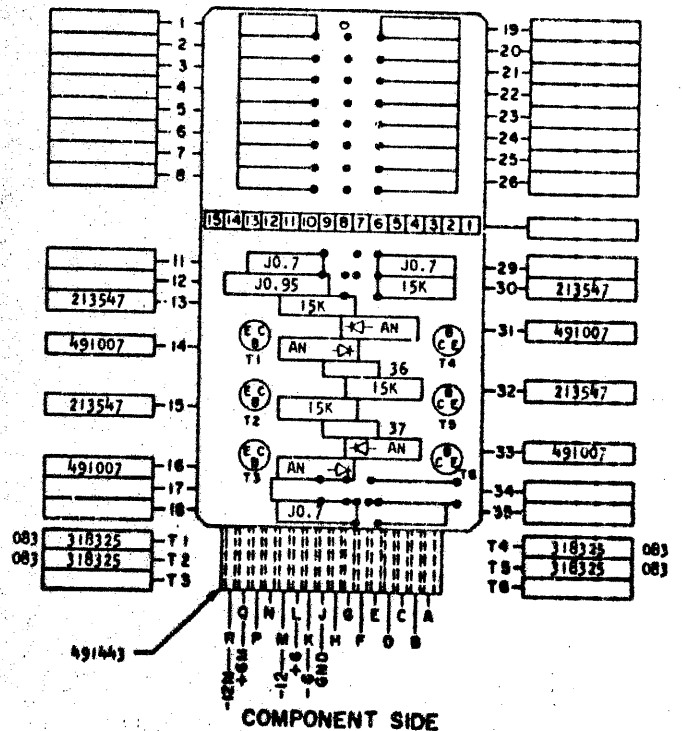
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, M, D	U	INPUT	UP	-5.26 0.24
N, B	EXTENDER INPUT		DOWN	-7.44 -12.5
G, C, P, A	T	OUTPUT	UP	-6.
			DOWN	-12.
			UP	1.44 6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.

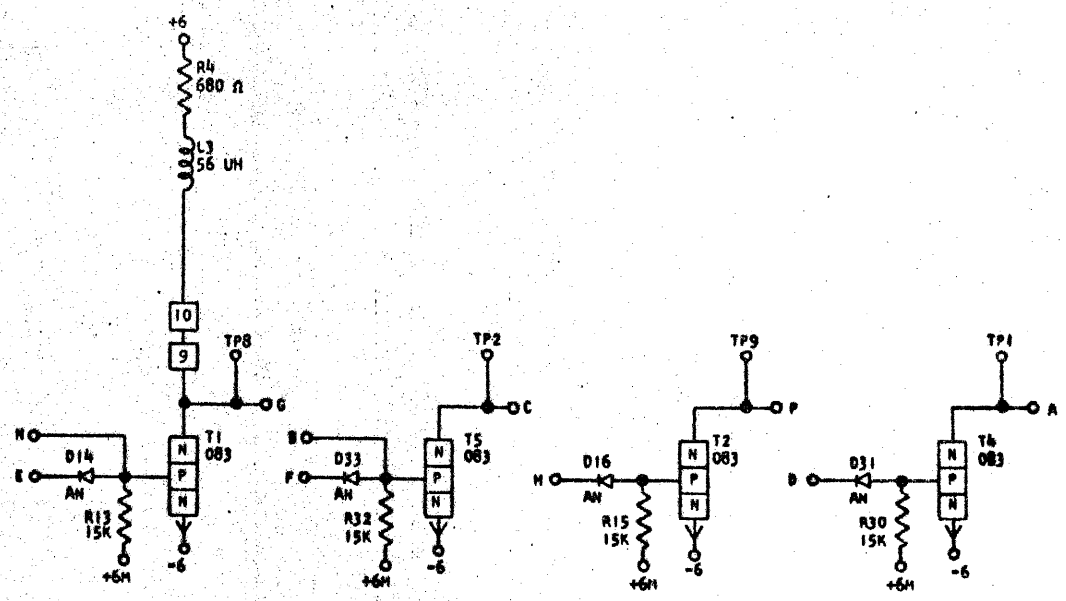
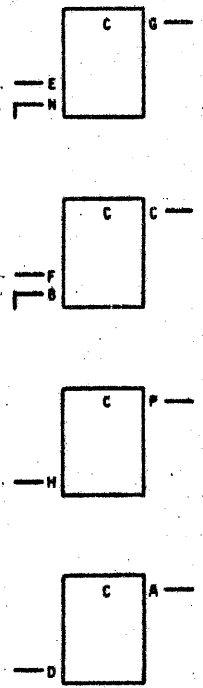


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL-ONE	DATE	6-29-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
WAY NPN NO LOS-FOUR ON CARD										
DESIGN		MODEL	SMS							
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371277

CTDL - ONE WAY NPN I LOAD -  
FOUR ON CARD



SEQUENCE OF OPERATION

1. UP INPUT TRANSISTOR ON OUTPUT DOWN
2. DOWN INPUT TRANSISTOR OFF OUTPUT UP
3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP INPUT ON CARD FOR DOWN OUTPUT
4. T2, T4, T5 COLLECTORS MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

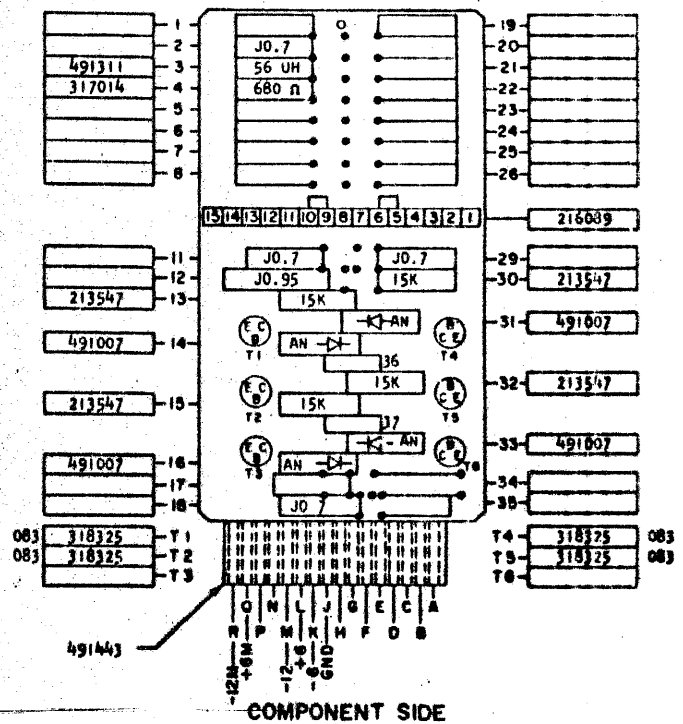
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	U	INPUT	UP	-5.26 0.24
			DOWN	-7.44 -12.5
H, B		EXTENDER INPUT	UP	-6.
			DOWN	-12
S, C, P, A	T	OUTPUT	UP	1.44 6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.

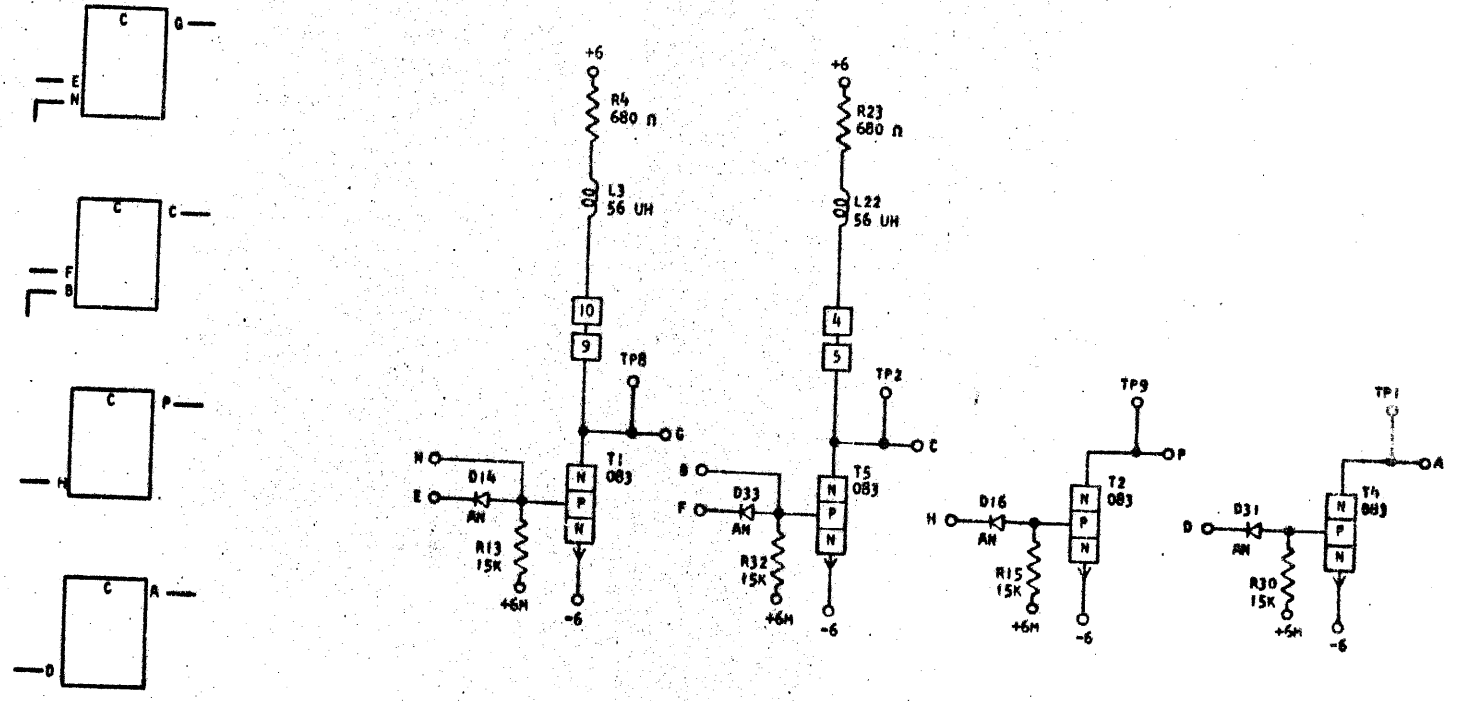


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL - ONE WAY NPN I LD.-FOUR ON CARD				6-24-62	115599					
DESIGN	MODEL	SCALE	3MS							
DETAIL	RD	3-1-62	NONE							
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371275

CTDL - ONE WAY NPN



SEQUENCE OF OPERATION

1. UP INPUT TRANSISTOR ON OUTPUT DOWN
2. DOWN INPUT TRANSISTOR OFF OUTPUT UP
3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP
4. T2, T4 COLLECTORS MUST BE LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

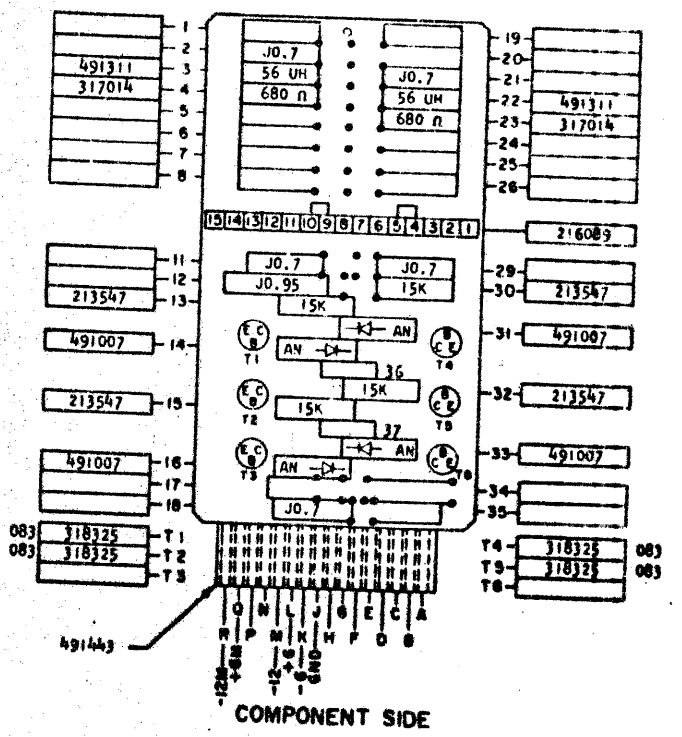
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			HIM	MAX
E, F, H, D	U	INPUT	UP	-5.26 0.24
N, B	EXTENDER INPUT	[Waveform]	DOWN	-7.44 -12.5
			UP	-6.0
G, C, P, A	T	OUTPUT	DOWN	-12.5
			UP	1.44 6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'DN'.

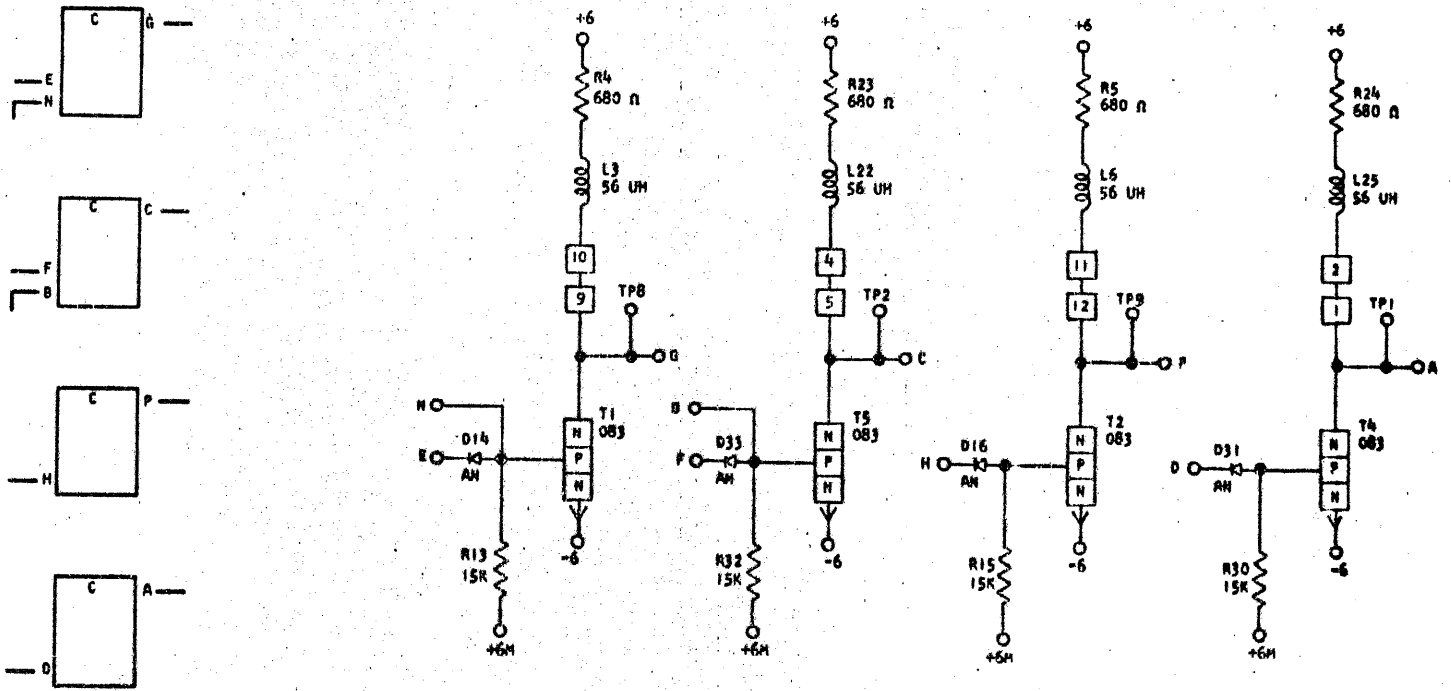


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASH TSTR-CTDL-ONE	DATE	6-29-62	CHANGE NO.	115599	APPROVAL		CHANGE NO.		DEVELOPMENT NO.
DESIGN	WAY NPN	MODEL	SHS							
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	L10 3-17-62							
APPROV		CHECK								

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371274

CTDL-ONE WAY NPN FOUR LOADS



SEQUENCE OF OPERATION

1. UP INPUT TRANSISTOR ON OUTPUT DOWN
2. DOWN INPUT TRANSISTOR OFF OUTPUT UP
3. INPUTS ON EXTENDER CARD UP IN COINCIDENCE WITH UP INPUT ON CARD FOR DOWN OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

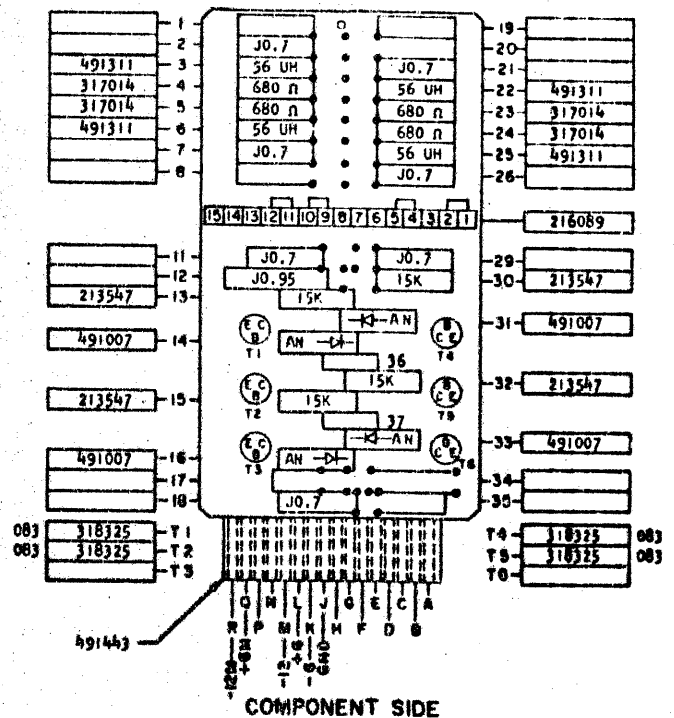
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	U INPUT	[Waveform]	UP -5.26	0.24
N, B	EXTENDER INPUT	[Waveform]	UP -7.44	-12.5
G, C, P, A	T OUTPUT	[Waveform]	UP 1.44	6.24
			DOWN -5.46	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.



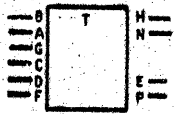
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM T5TR -CTDL-	6-27-62	115599					
ONE WAY NPN FOUR LOADS								
DESIGN		MODEL	SMS					
DETAIL	110 3-1-62	SCALE	NONE					
CHECK	WH 3-1-62	DRAW	L10 3-17-62					
APPRO		CHECK						

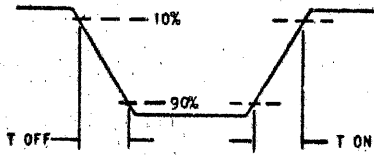


REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371534



DELAY - USEC

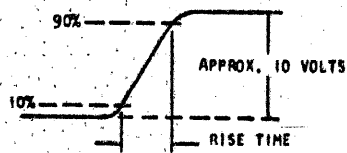
TYPICAL INVERTER AND EF OUTPUT WAVEFORM



INVERTER DELAY		
	MINIMUM	MAXIMUM
T OFF	0.15	0.8
T ON	0.10	0.3
EF DELAY		
	MINIMUM	MAXIMUM
T OFF	0.05	0.1
T ON	0.10	0.4

THE FOLLOWING DELAY INFORMATION APPLIES WHEN THE AC TRIGGERING INPUT PULSE HAS A RISE TIME OF 0.45 USEC. (SEE FOLLOWING FIGURE)

TRIGGERING PULSE

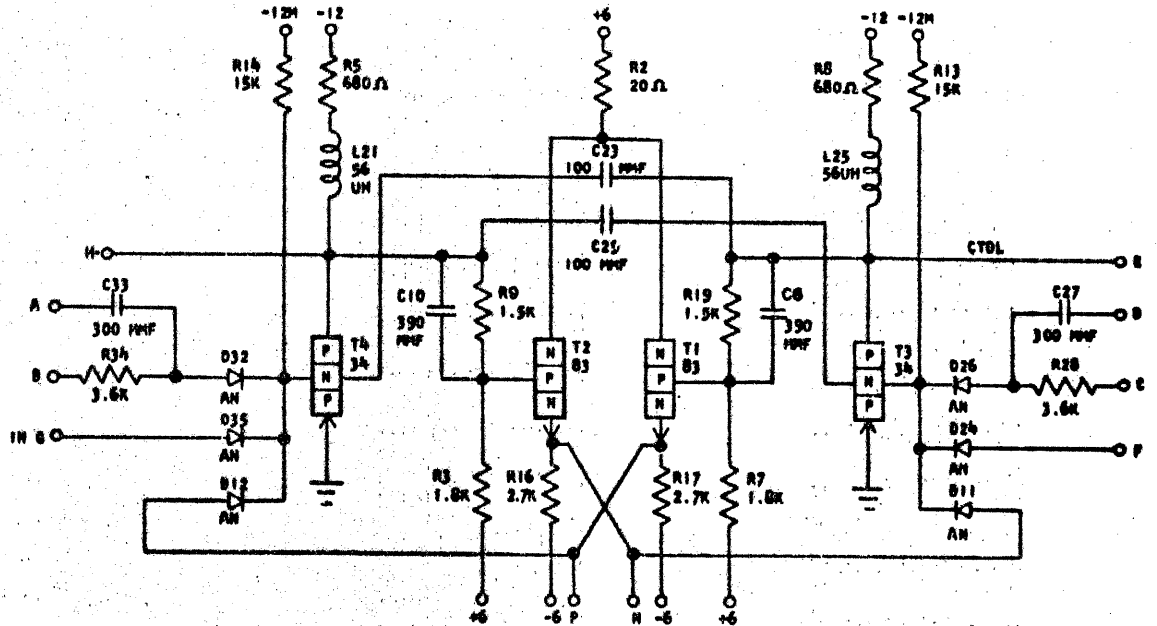


	MINIMUM	MAXIMUM
FROM AC SET TO INVERTER OUTPUTS	0.10	0.40
FROM AC SET TO EF OUTPUTS	0.10	0.30

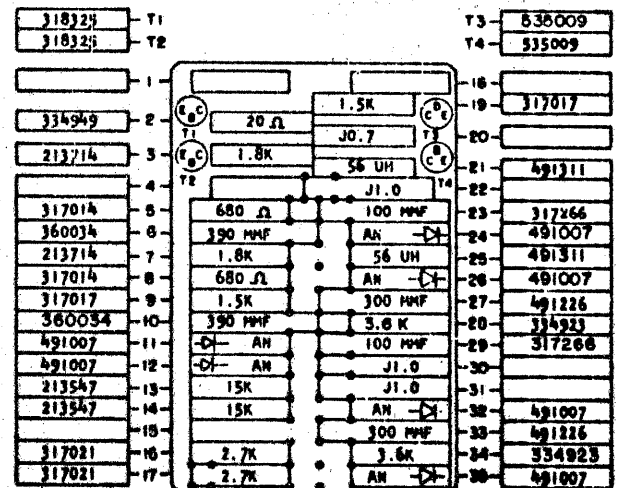
SEQUENCE OF OPERATION

1. T4, T2 ON, T3, T1 OFF
2. GATE UP TO PIN B, AC SET TO PIN A T3, T1 ON T4, T2 OFF
3. GATE UP TO PIN C, AC SET TO PIN D T3, T1 OFF T4, T2 ON
4. GATE MUST BE UP 3.75 U SEC BEFORE AC SET
5. DC SET PIN G, T3, T1 ON T4, T2 OFF
6. COLLECTIVE PULLOVER MAY BE USED TO TURN T3 OR T4 ON
7. DC SET ON PIN F UP WHEN T1, T3 ARE ON WILL RESET TO CONDITION 1
8. DC SET OR RESET PULSE WIDTH: 0.5 USEC MINIMUM.

CTOL TRIGGER



PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B	U	GATE	UP	-0.54	0.24
			DOWN	-7.44	-12.4
A, D	U	AC SET	UP	-0.54	0.24
			DOWN	-7.44	-12.4
G	T	DC SET	UP	1.44	6.24
			DOWN	-0.74	-6.24
E	U	OUTPUT	UP	-5.2	-0.8
			DOWN	-7.4	-9.2
N	T	OUTPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
C	U	GATE	UP	-0.54	0.24
			DOWN	-7.44	-12.4
F	T	DC SET	UP	1.44	6.24
			DOWN	-0.74	-6.24
P	T	OUTPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
H	U	OUTPUT	UP	-5.2	-0.8
			DOWN	-7.4	-9.2

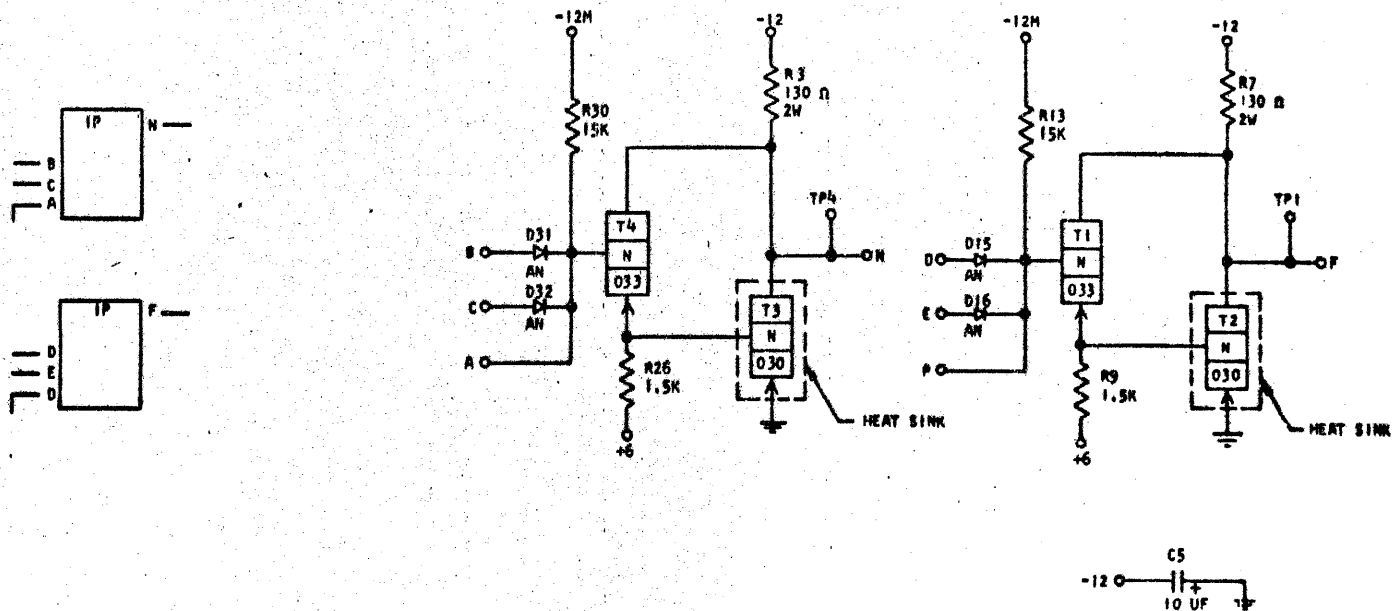


CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME   CARD ASH T8TR-CTOL TRIGGER				6-21-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371542

CTDL POWER INVERTER



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN T4, T1 ON; T3, T2 OFF OUTPUT UP
2. ANY INPUTS UP T4, T1, OFF; T3, T2 ON OUTPUT DOWN
3. DOWN INPUT OF AT LEAST 1 U SEC REQUIRED TO TURN T4 OR T1 ON
4. EXTENDER INPUTS MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, D	T	INPUT	UP	1.44	6.24
			DOWN	-5.46	-6.24
C, E	T	INPUT	UP	1.44	6.24
			DOWN	-5.46	-6.24
A, E	EXTENDER INPUT	INPUT	UP	-6	
			DOWN	-12	
N, F	U	OUTPUT	UP	-5.2	0.8
			DOWN	-7.4	-9.2

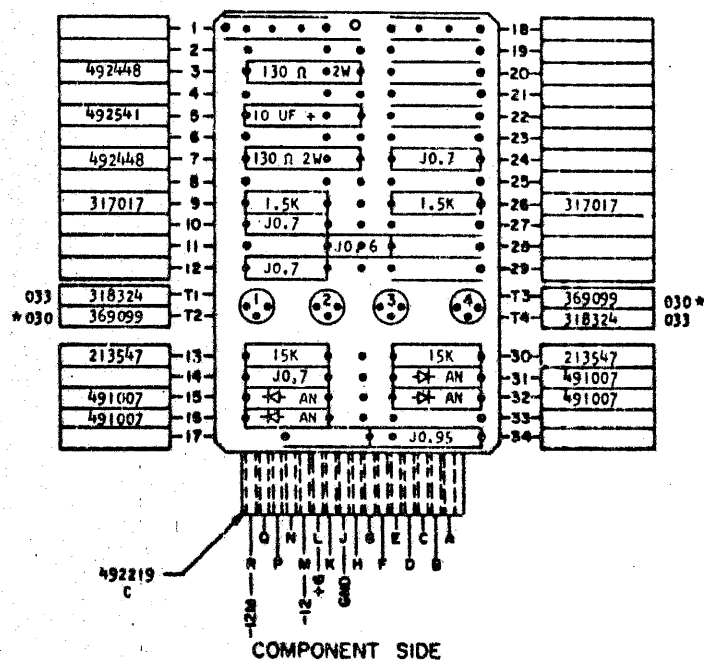
DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.20	0.60*
TURN OFF	0.25	0.40**

\*THIS DELAY CAN INCREASE TO 0.75 USEC FOR CAPACITIVE LOAD.

\*\*THIS DELAY CAN INCREASE TO 0.55 USEC FOR CAPACITIVE LOAD.

NOTE: LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.



COMPONENT SIDE

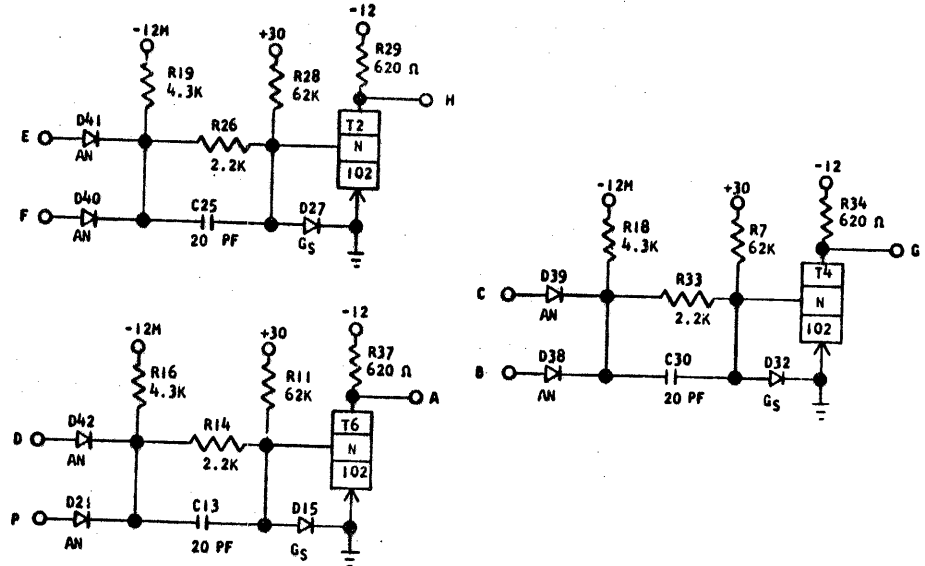
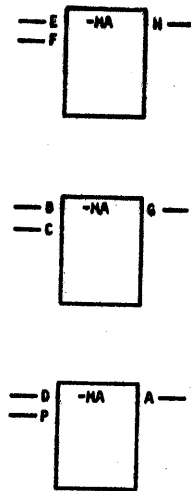
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL				6-19-62	115599					
POWER INVERTER										
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG 5-17-62							
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371924

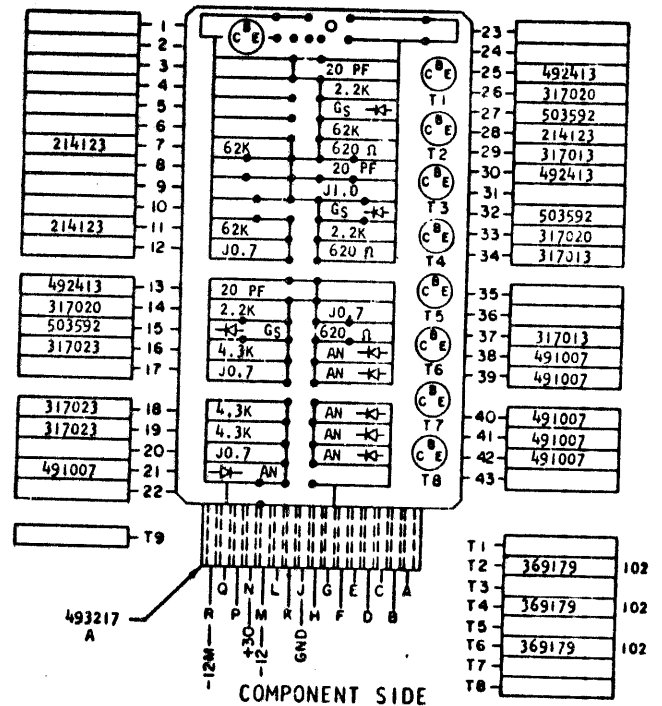
DTDL - AND GATE



SEQUENCE OF OPERATION

1. INPUTS DOWN TRANSISTOR ON OUTPUT UP
  2. EITHER OR BOTH INPUTS UP TRANSISTOR OFF AND OUTPUT IS DOWN
  3. DRIVING CTDL LOADS:  
 MAXIMUM TURN ON DELAY - .28 USEC  
 MAXIMUM TURN OFF DELAY - .09 USEC
- DRIVING WORST CASE CLOCK LOAD  
 MAXIMUM TURN ON DELAY - .15 USEC  
 MAXIMUM TURN OFF DELAY - .144 USEC

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, D, P, C, B	T	INPUTS	UP	+1.44	+6.24
			DOWN	-4.46	-6.24
H, A, G	U	OUTPUTS	UP	-.89	+2.4
			DOWN	-7.44	-12.48



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

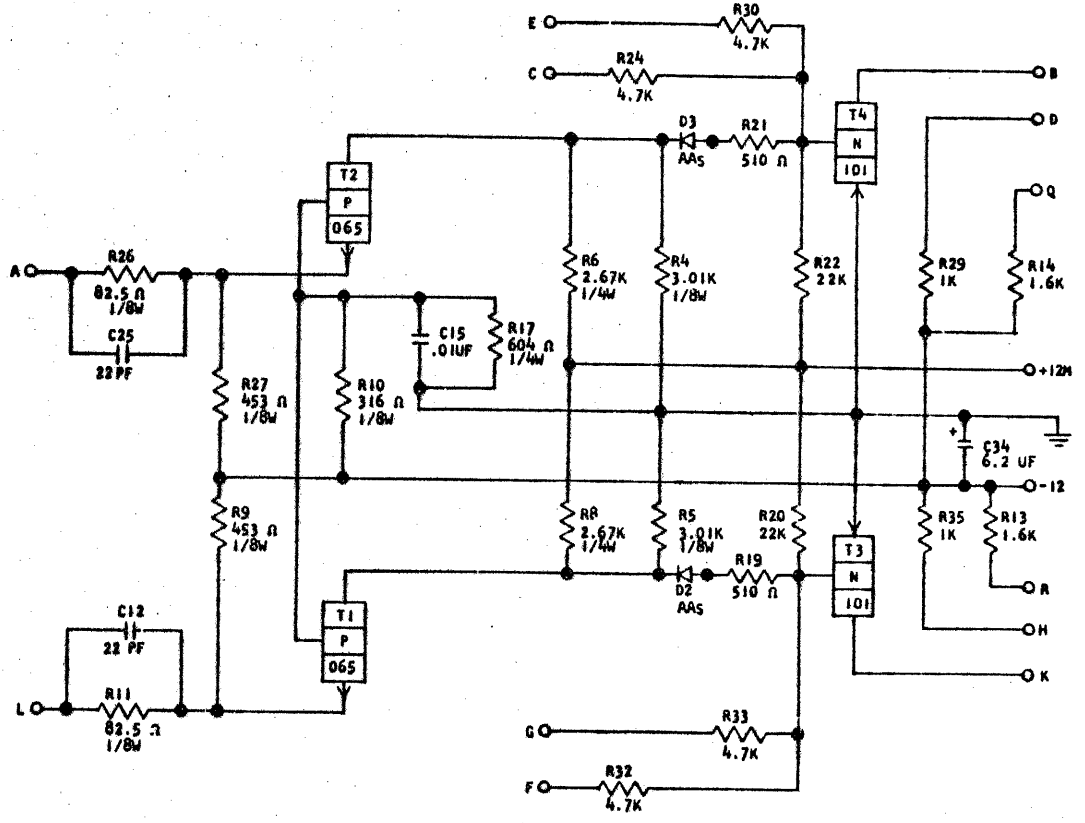
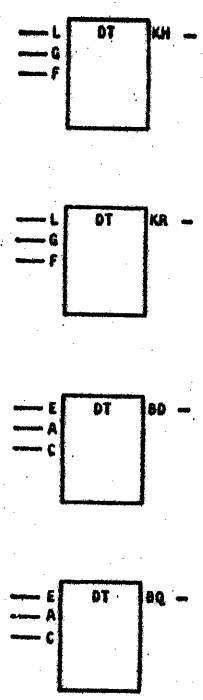
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - DTDL - AND GATE				6-29-62	115599					
DESIGN				1-3-63	116034					
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							



REFERENCE DRAWING

SEE PRODUCTION DRAWING 370385

CONVERTER-DIFFUSED BASE S-P-LINE TO SDTRL, OR S D TDL



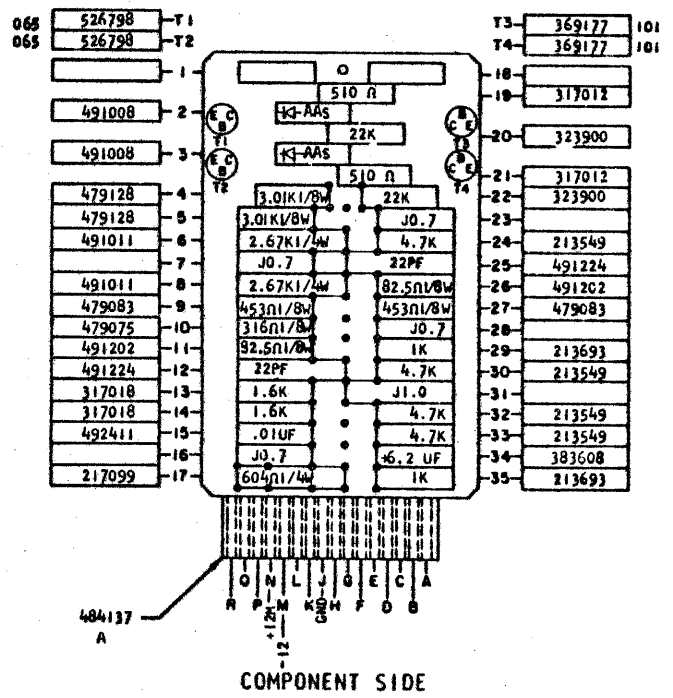
SEQUENCE OF OPERATION

INPUT A UP LEVEL, T2 CONDUCTS. THIS CAUSES T4 TO CONDUCT AND THE OUTPUT IS UP. EITHER PIN D OR Q IS TIED TO B DEPENDING IF SDTRL OR S D TDL BLOCKS ARE DRIVEN. THE OTHER CIRCUIT WITH INPUT L WORKS IN THE SAME MANNER. THE CIRCUIT ACCEPTS A P-LINE SIGNAL FROM THE COAXIAL LINE AND CONVERTS IT TO AN S LEVEL. THE GATES ACCOMPLISH A THREE WAY NOR FUNCTION; THAT IS, ANY NEGATIVE INPUT ON E, C OR OUTPUT OF T2 IN DOWN LEVEL WILL GIVE AN UP LEVEL OUTPUT FROM T4. IF THE 4.7K GATE IS NOT TO BE USED, IT MUST BE TIED TO GROUND.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
L, A	P INPUT	[Waveform]	UP -5.6	5.2
E, C, F, G	S GATE	[Waveform]	UP -0.45	-0.05
B, D, Q	S OUTPUT	[Waveform]	DOWN -6.87	-12.48
R, H, K	S OUTPUT	[Waveform]	UP -0.45	-0.05
			DOWN -6.87	-12.48

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	50	80
TURN OFF	50	80



COMPONENT SIDE

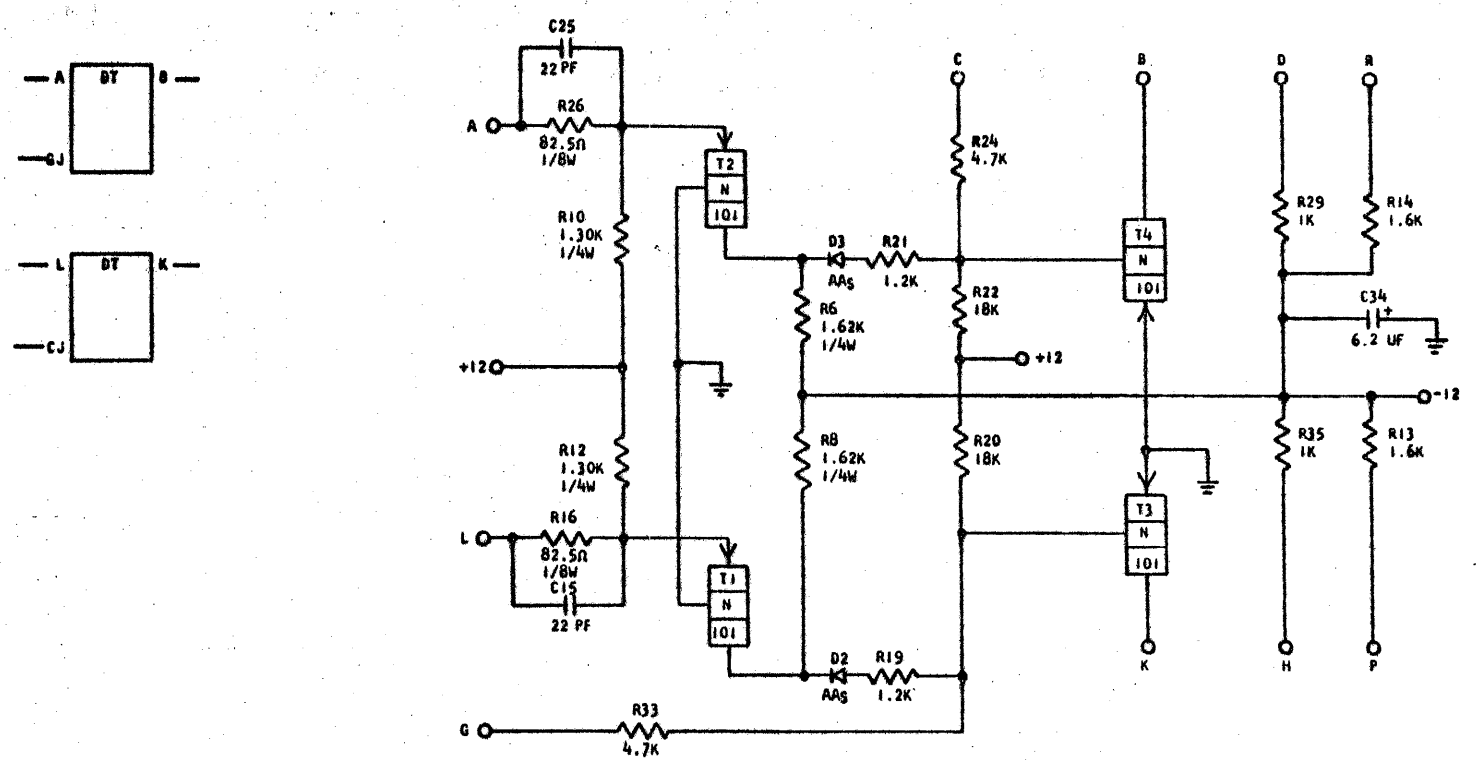
CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
ABC	4-2-62		

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CONV-DIFF BASE				6-27-62	115599					
S P-LINE TO SDTRL, OR S D TDL				11-7-62	114364					
DESIGN	RQ	3-1-62	MODEL							
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370468

CONVERTER-DIFFUSED BASE N-LINE TO SDTRL OR SDTDL



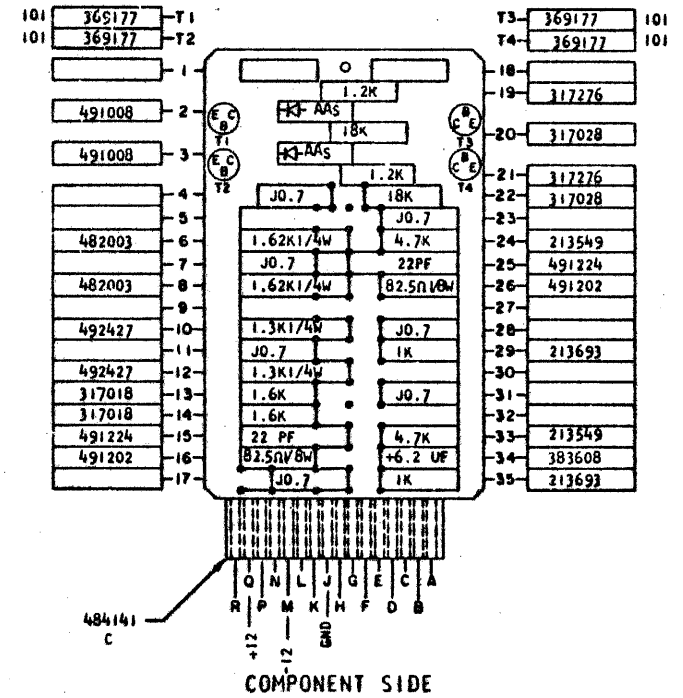
SEQUENCE OF OPERATION

1. WITH GATE INPUT UP OR TIED TO GROUND A DOWN INPUT AT A TURNS T2 OFF AND T4 ON AND GIVES AN UP OUTPUT
2. T4 AND T3 COLLECTORS MUST BE LOADED:  
1.6K RESISTOR FOR SDTDL OUTPUT  
1 K RESISTOR FOR SDTRL OUTPUT
3. IF THE 4.7K RESISTOR (PIN C, G) IS NOT TO BE USED, IT MUST BE TIED TO GROUND.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, L	N	INPUT	UP	+0.4	+0.5
			DOWN	-0.4	-0.8
G, C	S	GATE INPUT	UP	-0.5	-0.05
			DOWN	-6.9	-12.5
B, K	S	SDTDL OUTPUT	UP	-0.65	-0.1
			DOWN	-5.81	-12.5
R, K	S	SDTRL OUTPUT	UP	-0.45	-0.05
			DOWN	-6.87	-12.5

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	50.0	72.0
TURN OFF	-60.0	72.0

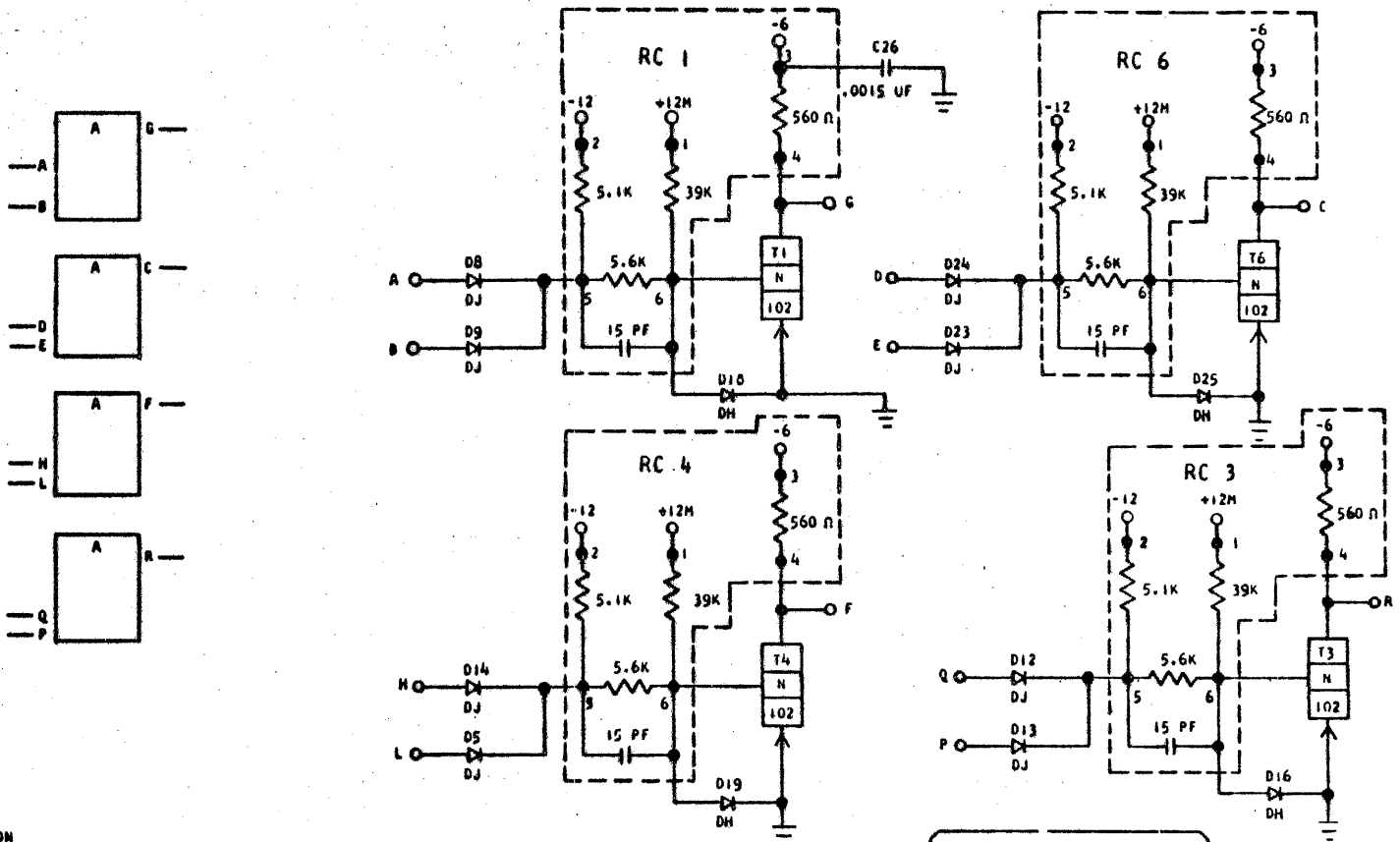


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-27-62	115599					
CARD ASM TSTR- CONVERTER-DIFFUSED BASE-N-LINE TO SDTRL OR SDTDL				11-7-62	114364					
DESIGN	RQ	3-1-62	MODEL	SHS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

**REFERENCE DRAWING**  
SEE PRODUCTION DRAWING 370216

**SOTDL-FOUR 2 WAY N AND LOGIC BLOCKS WITH LOADS**



**SEQUENCE OF OPERATION**

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, D, H, Q	Y	INPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8
B, E, L, P	Y	INPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8
G, C, F, R	Y	OUTPUT	UP	-0.65	-0.1
			DOWN	-5.8	-8.8

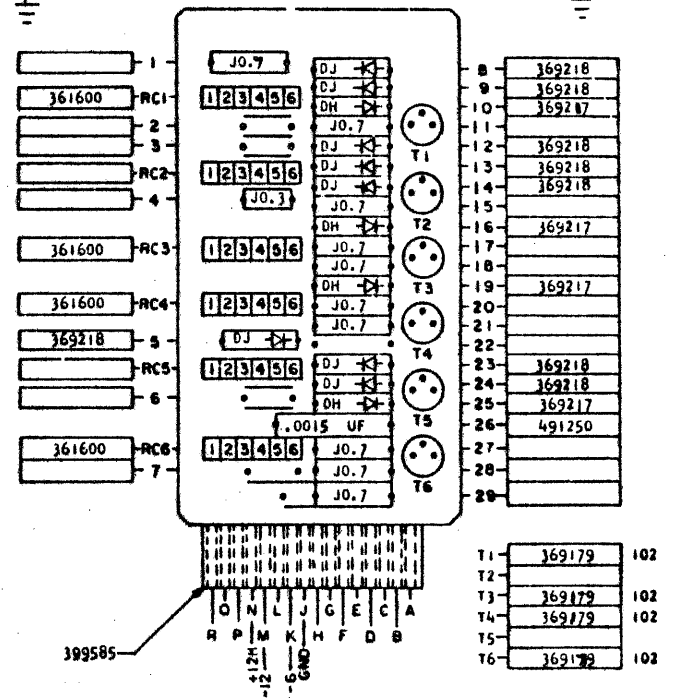
DELAY: SOTDL - HIGH SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	5	30
TURN OFF (NSEC)	10	80

\*THIS DELAY CAN INCREASE TO 75 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 120 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



**COMPONENT SIDE**

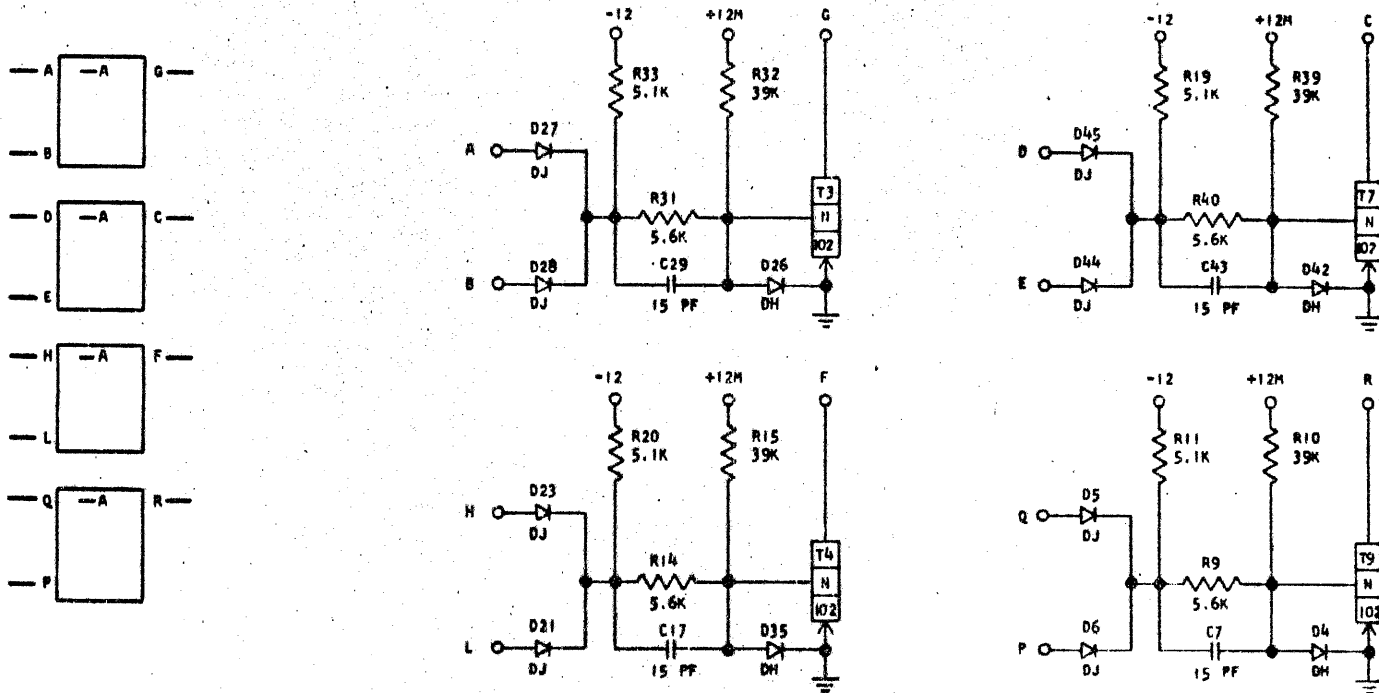
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SOTDL-FOUR				6-29-62	115599					
2-WAY N AND LOG BCKS WITH LOADS				1-2-62	116034					
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WN	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370217

SOTDL FOUR 2-WAY N AND LOGIC BLOCKS WITHOUT LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, D, H, Q	Y INPUT		UP	-0.65 -0.1
B, E, L, P	Y INPUT		DOWN	-5.81 -8.8
G, C, F, R	Y OUTPUT		UP	-0.65 -0.1
			DOWN	-5.8 -8.8

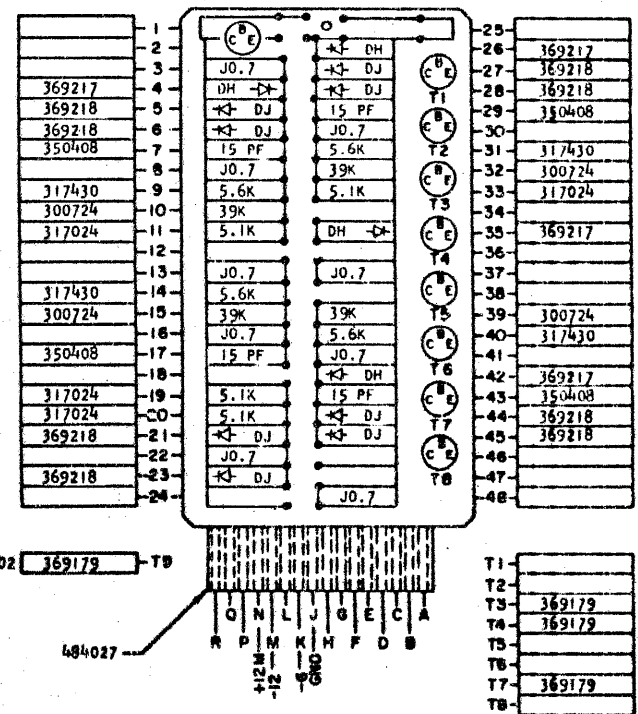
DELAY: SOTDL - HIGH SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	5	30%
TURN OFF (NSEC)	10	80%

\*THIS DELAY CAN INCREASE TO 75 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 120 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

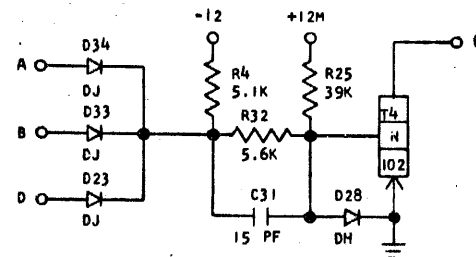
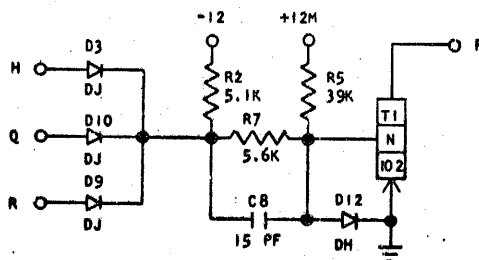
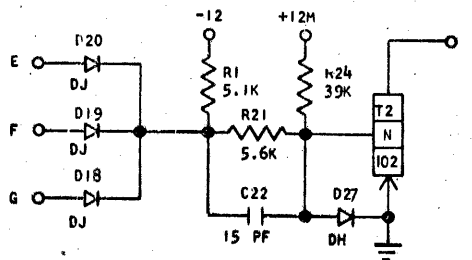
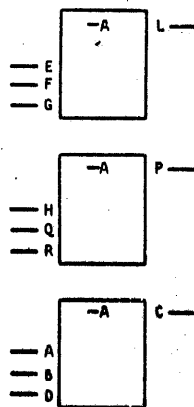
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM 1STR-SOTDL 4 2-WAY N AND LOGIC BLOCKS WITHOUT LOADS		6-17-62	115599					729907
DESIGN	RQ	MODEL	SMS					
DETAIL	WH	SCALE	NONE					
CHECK	3-1-62	DRAW	LIE 3-1-62					
APPRO		CHECK						



REFERENCE DRAWING

SEE PRODUCTION DRAWING 370219

SOTDL THREE 3-WAY N AND LOGIC BLOCKS WITHOUT LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHIPE	LEVELS	
			MIN	MAX
E, H, A	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
F, Q, B	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
G, R, D	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
L, P, C	Y OUTPUT	[Waveform: Low to High]	UP	-0.65 -0.1
			DOWN	-5.81 -8.8

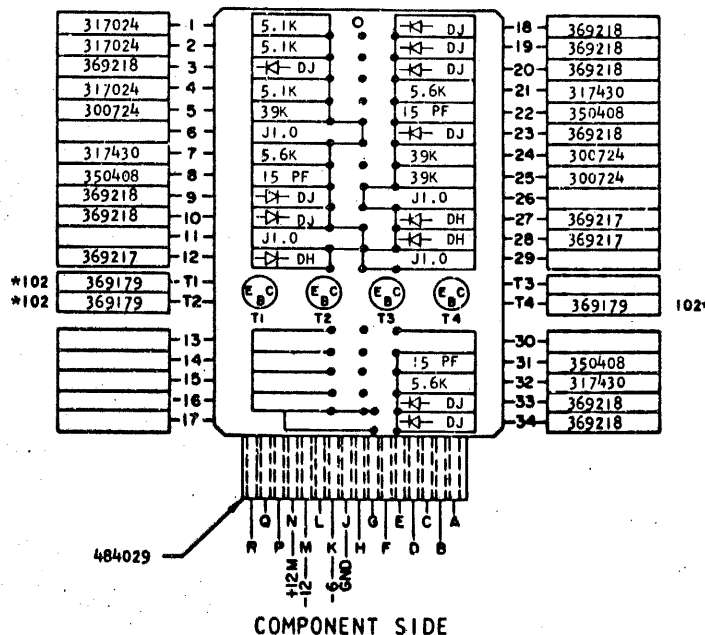
DELAY: SOTDL - HIGH SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	5	30*
TURN OFF (NSEC)	10	80**

\*THIS DELAY CAN INCREASE TO 75 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 120 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SOTDL THREE	6-29-62	115599					
DESIGN	3-WAY N AND LOG BCKS WITHOUT LDS							
DETAIL	RQ 3-1-62 SCALE NONE							
CHECK	WH 3-1-62 DRAW LIQ 3-1-7-62							
APPRO								

729909

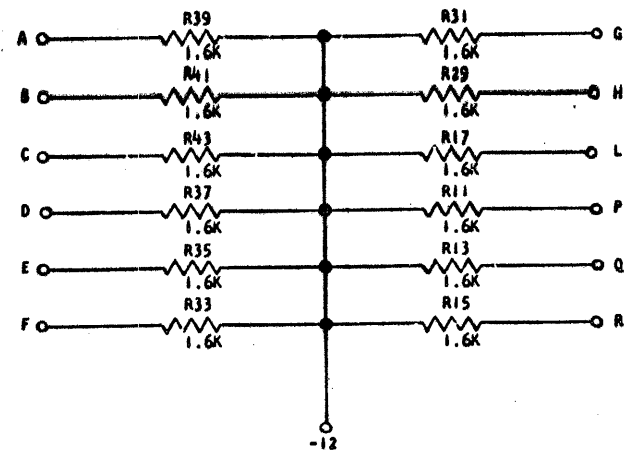
STANDARDS  
CODE

CARD CODE 729909  
D F J -

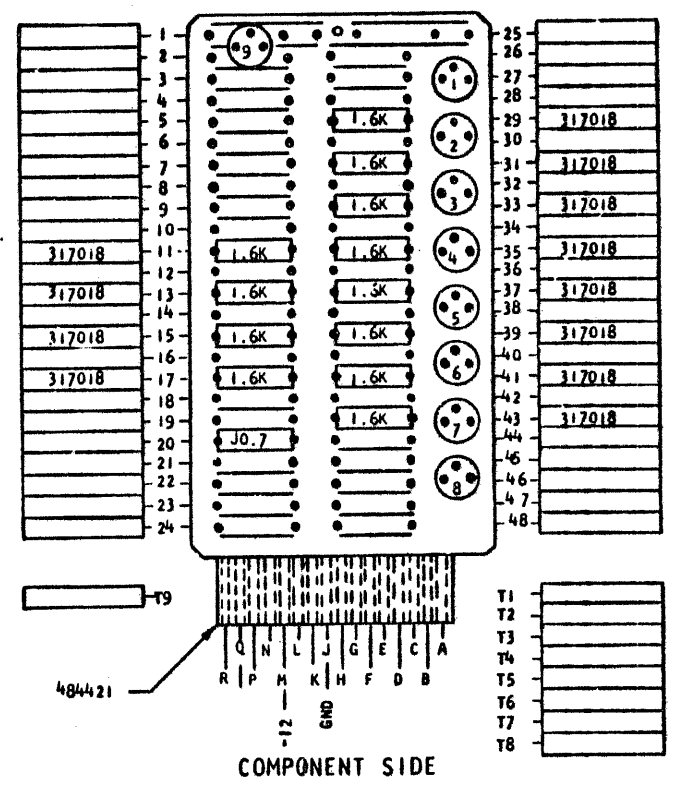
# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370232

## TDL & TRL LOAD CARD



**APPLICATION**  
 1. USED FOR TDL AND TRL COLLECTOR LOADING  
 2. MAY BE USED IN PARALLEL IN CERTAIN APPLICATIONS



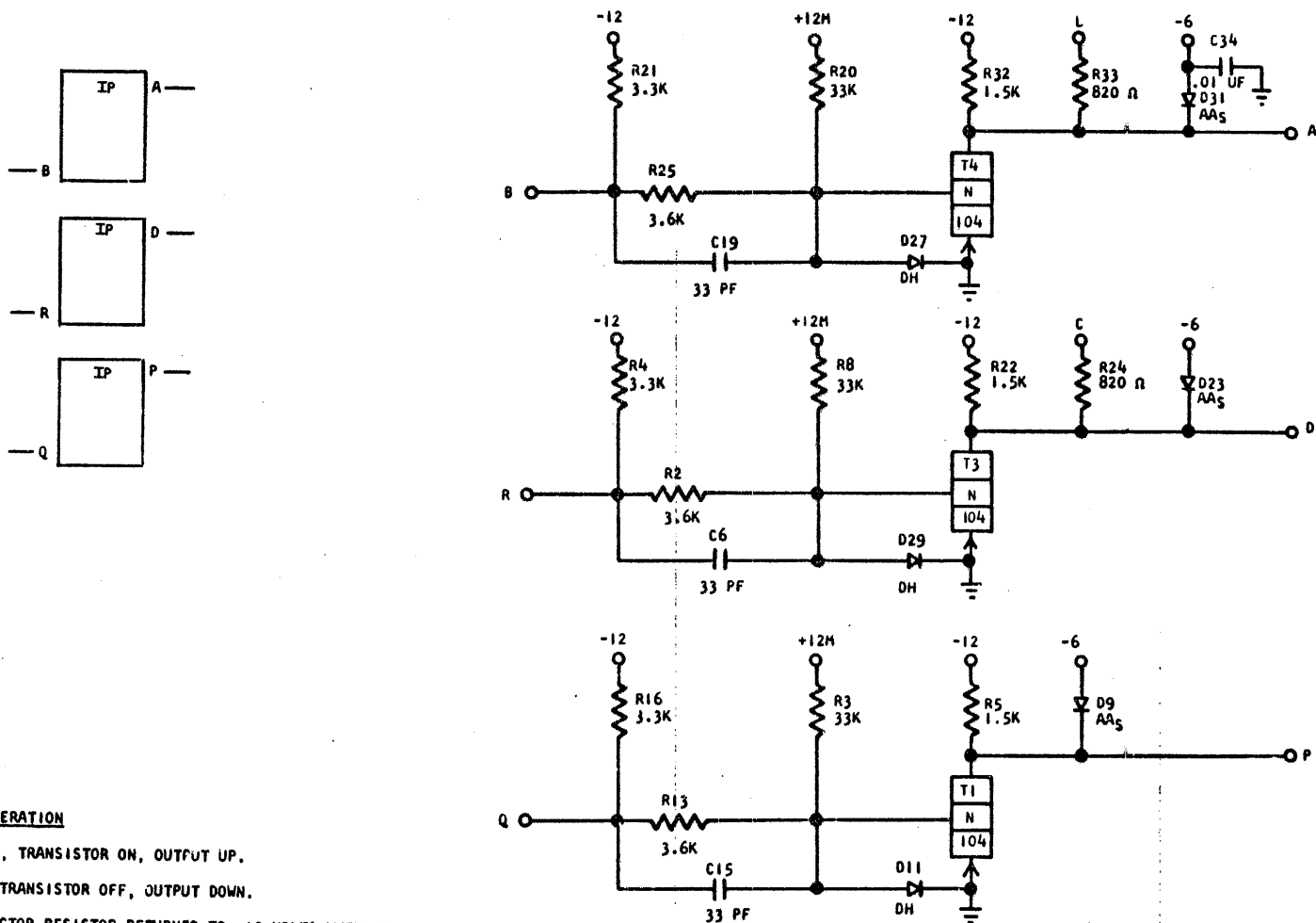
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					
LOAD CARD				7-30-63	117824					
DESIGN		MODEL	S/S 8018							
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	JRP	7-11-63					
APPRO			CHECK							

729909

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370225

INVERTING POWER DRIVER



SEQUENCE OF OPERATION

1. INPUT DOWN, TRANSISTOR ON, OUTPUT UP.
2. INPUT UP, TRANSISTOR OFF, OUTPUT DOWN.
3. 820Ω COLLECTOR RESISTOR RETURNED TO -12 VOLTS WHEN DRIVING NEGATIVE "OR" INPUTS OF DOUBLE LEVEL LOGIC BLOCKS AND WHEN DRIVING TRIGGER AC INPUTS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, R, Q	Y	INPUT	UP	-0.65	-0.10
			DOWN	-7.14	-5.84
A, D, P	Y	OUTPUT	UP	-0.65	-0.10
			DOWN	-6.06	-6.8

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	10.0##	50.0##
TURN OFF	14.0##	35.0##

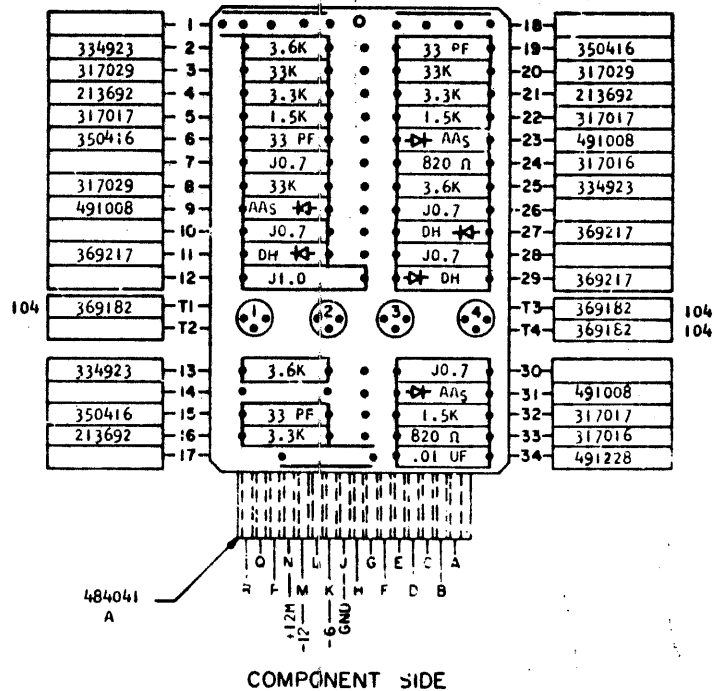
## ASSUMES LOAD OF 10 LOGIC BLOCKS AND TR INPUT OF 70 NSEC AND INPUT TF OF 135 NSEC.

## ASSUMES LOAD OF 4 LOGIC BLOCKS AND INPUT TR OF 35 NSEC AND INPUT TF OF 70 NSEC.

RISE TIME	16.0	70.0# TO 110.0##
FALL TIME	75.0	125.0## TO 190.0#

# OCCURS WHEN DRIVING TRIGGERS.

## OCCURS WHEN DRIVING LOGIC BLOCKS.

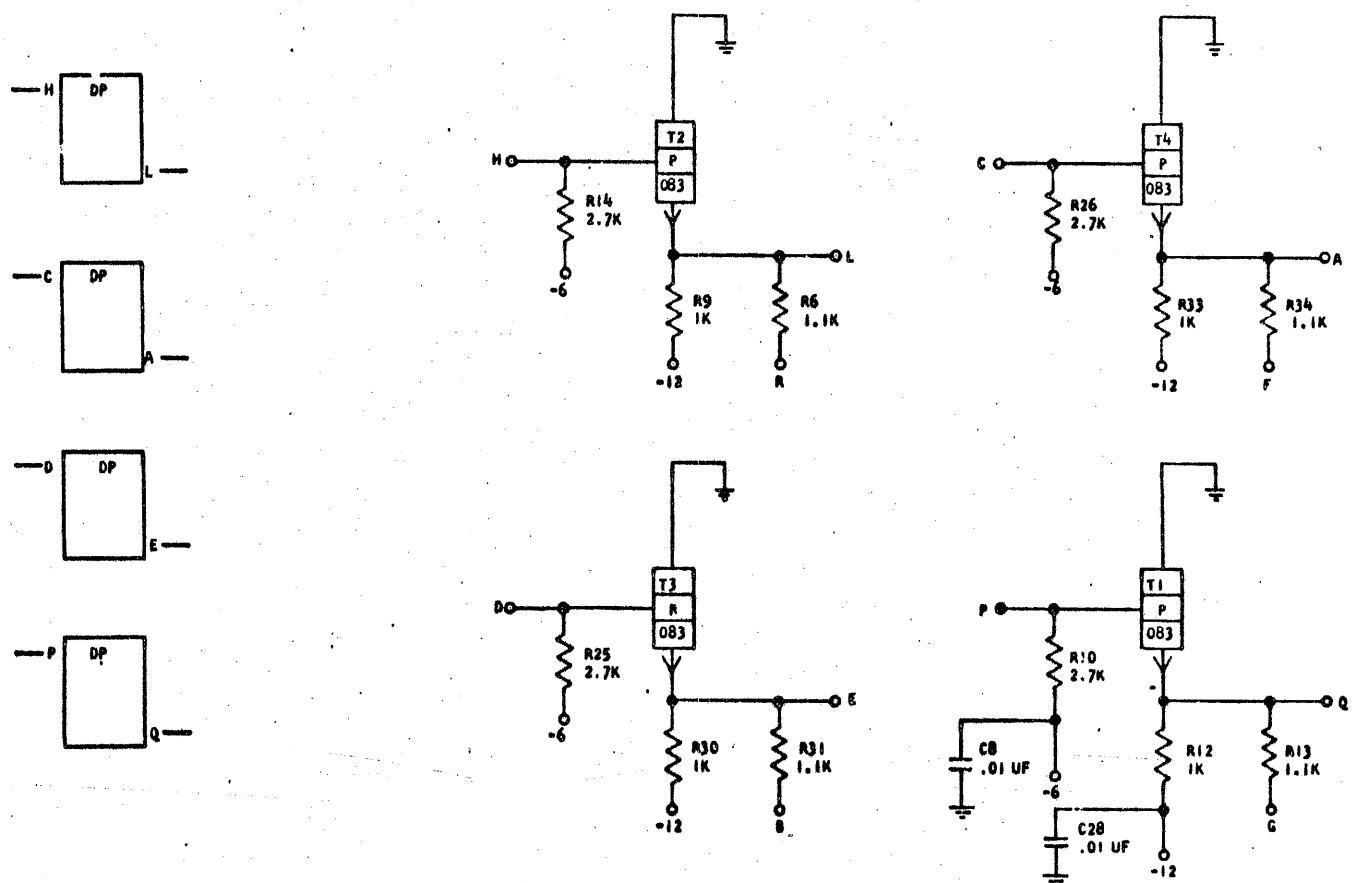


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASSEMBLY TRANSISTOR - INVERTING POWER DRIVER				6-29-62	115599					
DESIGN				12-30-62	119217					
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370226

SDTDL NON-INVERTING POWER DRIVER



SEQUENCE OF OPERATION

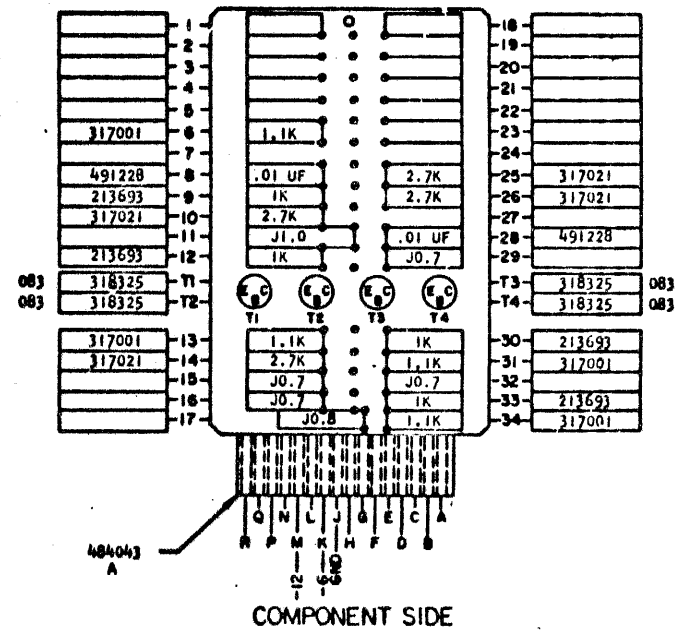
- OUTPUT WILL FOLLOW INPUT
- PINS R, F, S, AND G MAY BE CONNECTED TO PIN H (-12) FOR CERTAIN APPLICATIONS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
H, C, D, P	Y	INPUT	UP	-0.65 -0.10
			DOWN	-5.81 -8.8
L, A, E, Q	Y	OUTPUT	UP	-1.10 -0.22
			DOWN	-7.30 -5.83

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	6.0	20.0
TURN OFF	6.0	20.0

OUTPUT RISE AND FALL TIMES ARE WITHIN ±10 NSEC'S OF THE INPUT RISE AND FALL TIMES, RESPECTIVELY.



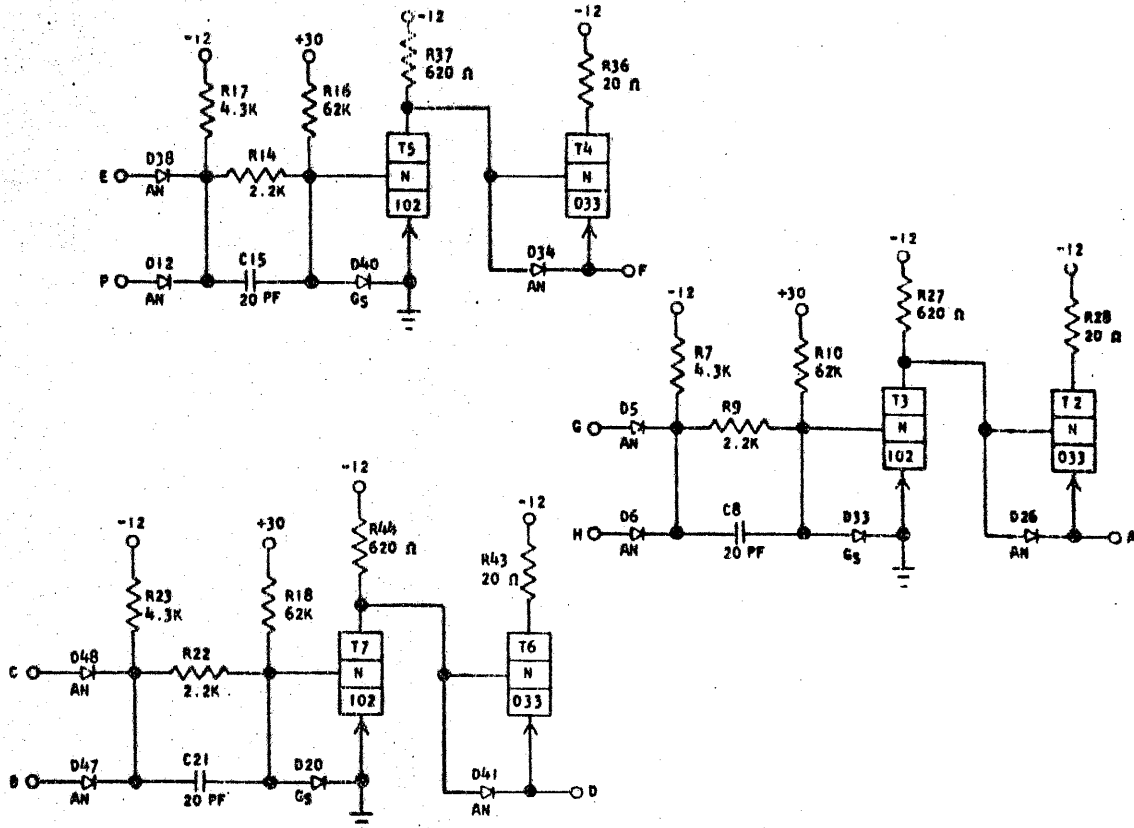
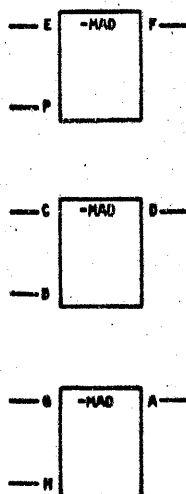
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-27-62	115599					729911
NON-INVERTING POWER DRIVER				1-3-63	116034					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 13-17-62						
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370363

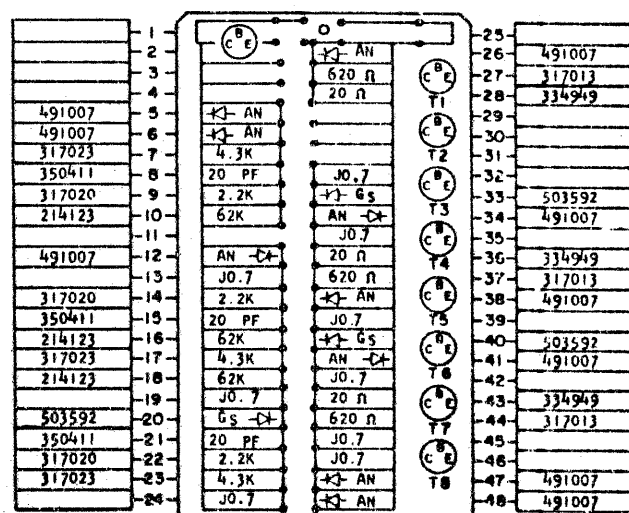
CLOCK -AND WITH EMITTER FOLLOWER DRIVER



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN T5 TURNS ON, T4 OFF, OUTPUT IS UP
2. ANY INPUT UP, T5 OFF, T4 ON, OUTPUT IS DOWN
3. DELAY DRIVING CTDL LOADS  
TURN ON .28 USEC MAX  
TURN OFF .1 USEC MAX
4. DELAY DRIVING CLOCK LOAD  
TURN ON .15 USEC  
TURN OFF .15 USEC

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, P, C, B, G, H	T	INPUT	UP	1.44	6.24
			DOWN	-4.46	-6.24
F, D, A	U	OUTPUT	UP	-.89	.24
			DOWN	-7.44	-12.48



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CLOCK - AND WITH EMITTER FOLLOWER DRIVER				6-19-62	115599					
DESIGN	RQ	3-1-62	MODEL SMS							
DETAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG 3-17-62							
APPRO			CHECK							

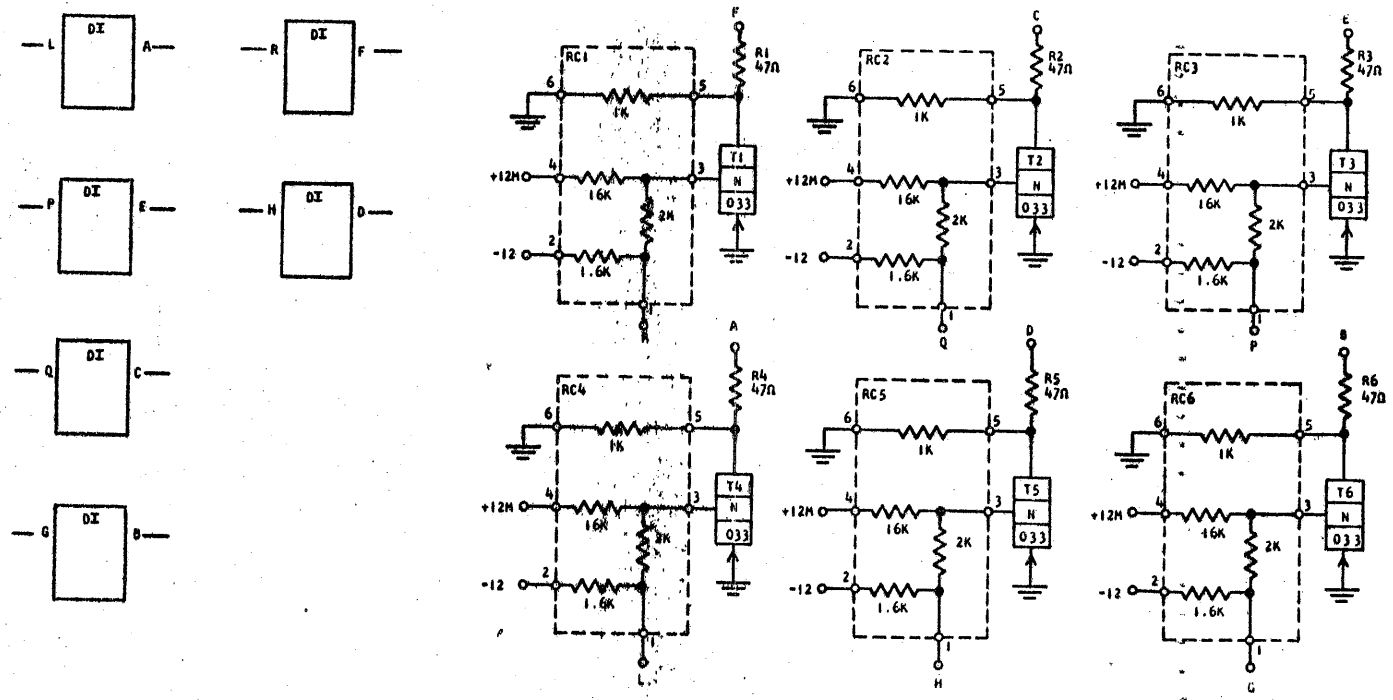


729912  
STANDARDS CODE  
2-7045

CARD CODE  
D G S - 729912

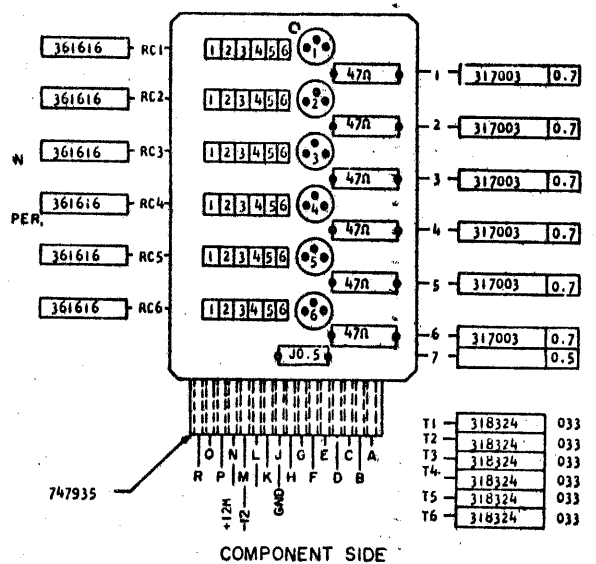
REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370347

INDICATOR DRIVER



- SEQUENCE OF OPERATION
1. INPUT DOWN TRANSISTOR ON OUTPUT UP
  2. INPUT UP TRANSISTOR OFF OUTPUT DOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
L, R, P, H, Q, G	Y	INPUT	UP	-0.65 0.10
A, F, E, D, C, B	S	OUTPUT	DOWN	-5.81 -7.84
			UP	-1.67
			DOWN	-9.62



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR - INDICATOR DRIVER				6-29-62	115599					
DESIGN	RQ	3-1-62	SCALE	NOTED	3-1-63					
CHECK	WH	3-1-62	DRAW	L10	2-7-62	119685				
APPRO			CHECH							

729912

C

729913

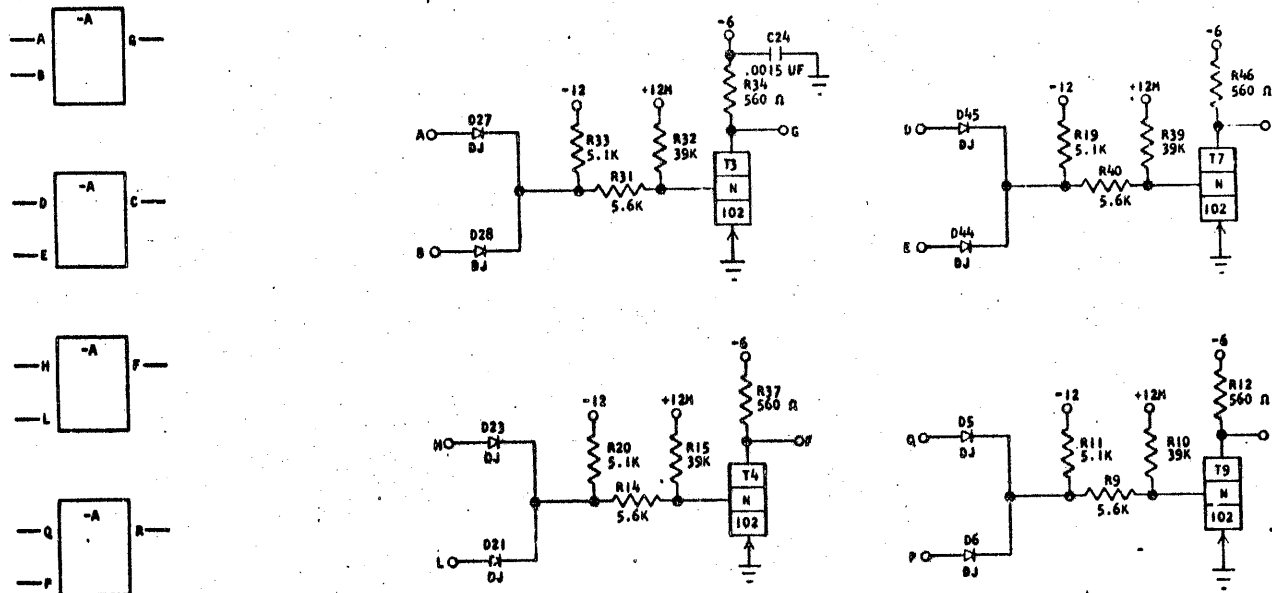
STANDARDS  
COOL

CARD CODE 729913  
DGT -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370380

SOTDL-2 WAY LOGIC BLOCK LOW SPEED WITH LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, D, H, Q	Y INPUT		UP	-0.65 -0.1
B, E, L, P	Y INPUT		DOWN	-5.81 -8.8
G, C, F, R	Y OUTPUT		UP	-0.65 -0.1
			DOWN	-5.81 -8.8

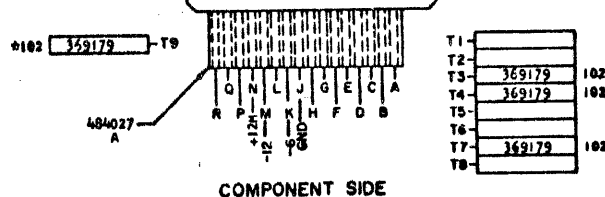
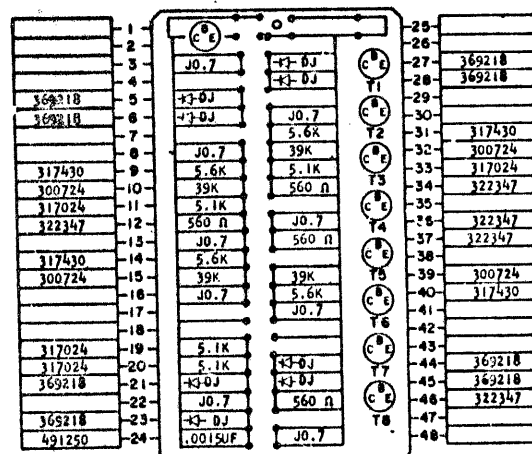
DELAY: SOTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN	MAX
TURN ON (NSEC)	75	100**
TURN OFF (NSEC)	40	200**

\*\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SOTDL-2-WAY	DATE	4-2-62	CHANGE NO.	119599	APPROVAL		DATE		DEVELOPMENT NO.
LOGIC BLOCK	LOW SPEED WITH LOADS	DATE	3-19-63	CHANGE NO.	116153	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ	MODEL	SMS	DATE	10-21-63	CHANGE NO.	118933	APPROVAL		DEVELOPMENT NO.
DETAIL	WH	SCALE	NONE							
CHECK	WH	DRAW	LIG	3-17-62						
APPRO		CHECK								

729913

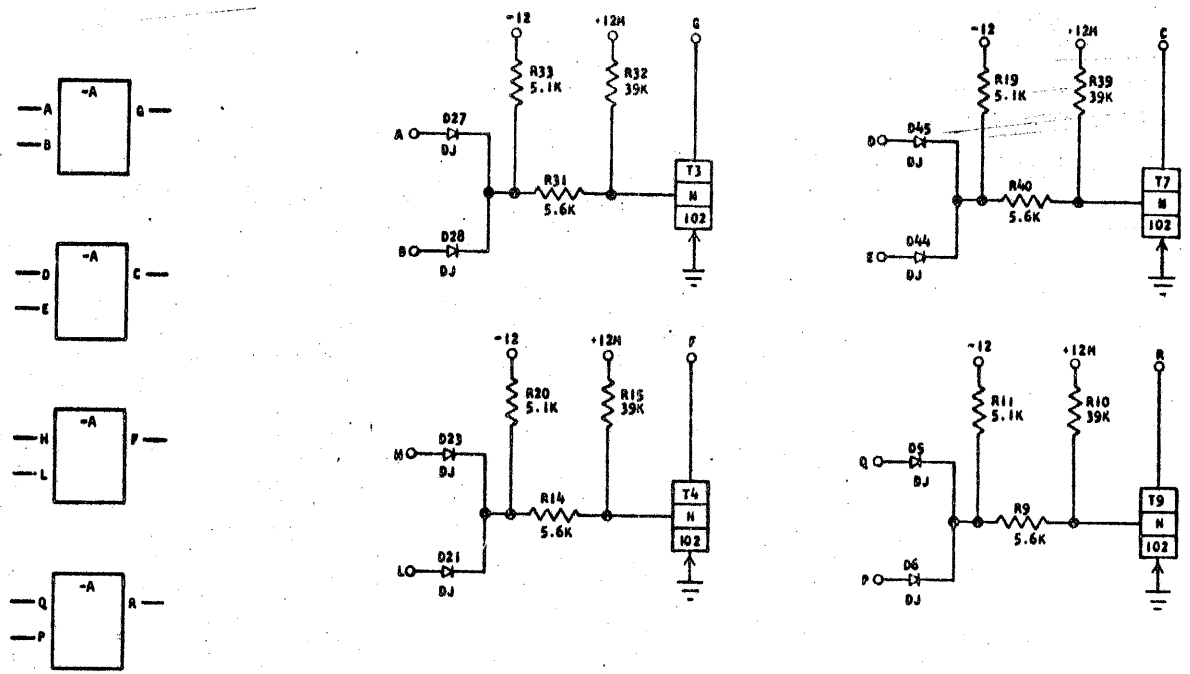


729914  
STANDARDS CODE

CARD CODE 729914  
D G U -

**REFERENCE DRAWING**  
SEE PRODUCTION DRAWING 370379

**SOTDL 2-WAY LOGIC BLOCK LOW SPEED WITHOUT LOADS**



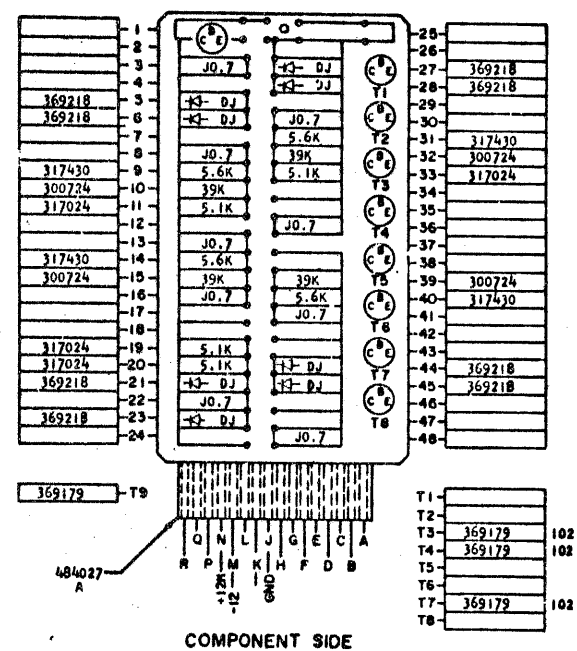
- SEQUENCE OF OPERATION**
1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
  2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT DOWN
  3. COLLECTORS MUST BE LOADED
  4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, D, H, Q	Y INPUT	[Waveform]	UP -0.65	-0.1
B, E, L, P	Y INPUT	[Waveform]	UP -0.65	-0.1
C, F, R	Y OUTPUT	[Waveform]	UP -0.65	-0.1
			DOWN -5.81	-8.8
			DOWN -5.81	-8.8

DELAY: SOTDL - LOW SPEED  
LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

TURN ON (NSEC)	MIN 75	MAX 100*
TURN OFF (NSEC)	40	200**

\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.  
\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR-SOTDL 2-WAY				6-27-62	115599					
LOGIC BCK LOW SPEED WITHOUT LOADS				1-3-63	116034					
DESIGN RQ 3-1-62				10-21-63	118933					
DETAIL RQ 3-1-62										
CHECK WH 3-1-62										
APPROV										

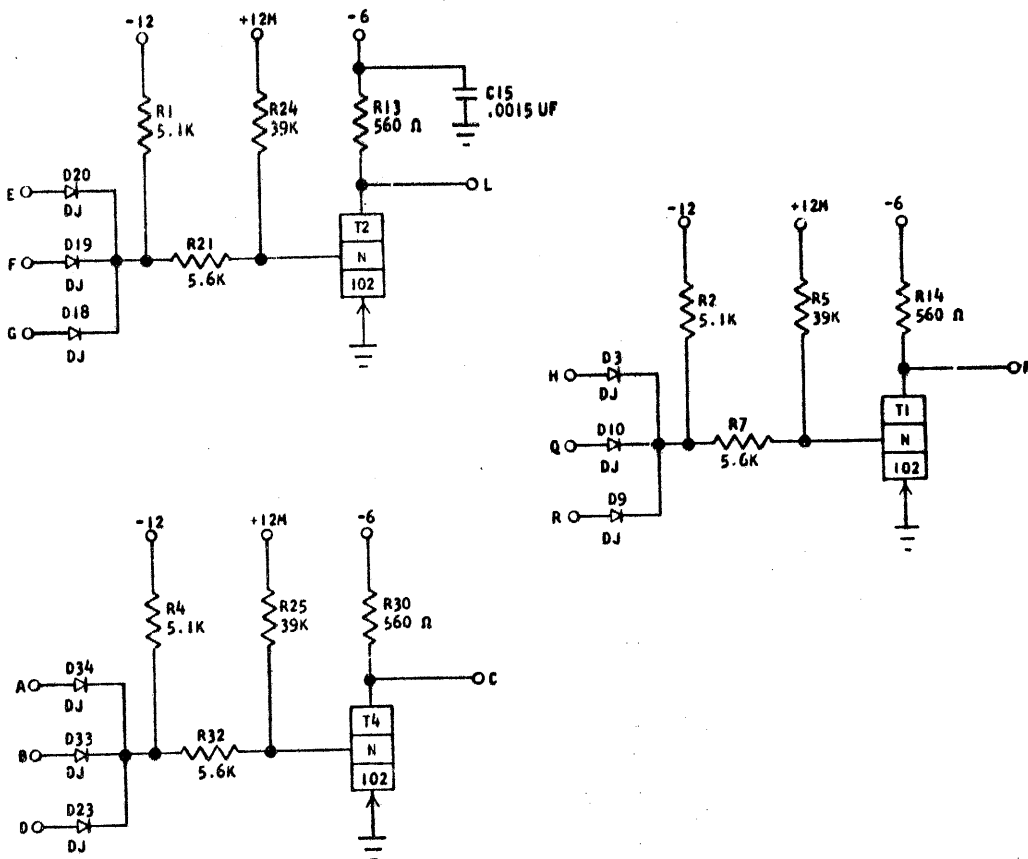
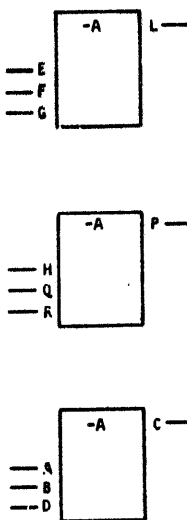
C

729914

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370378

SOTDL - 3-WAY LOGIC BLOCK LOW SPEED WITH LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, H, A	Y	INPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8
F, Q, B	Y	INPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8
G, R, D	Y	INPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8
L, P, C	Y	OUTPUT	UP	-0.65	-0.1
			DOWN	-5.81	-8.8

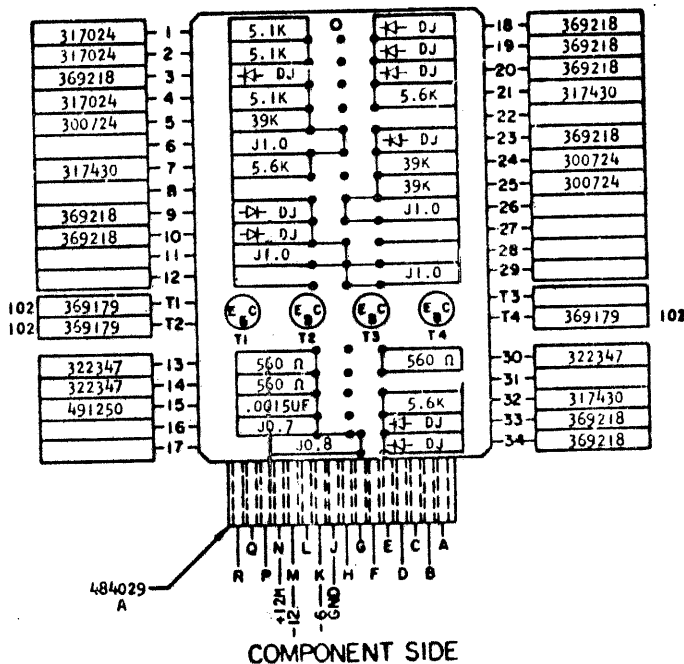
DELAY: SOTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN	MAX
TURN ON (NSEC)	75	100
TURN OFF (NSEC)	40	200

\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SOTDL-3-WAY	DATE	4-2-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
LOGIC BLOCK	LOW SPEED WITH LOADS	DATE	1-3-63	CHANGE NO.	116034	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ 3-1-62	SCALE	NONE	DATE	10-21-63	CHANGE NO.	118933	APPROVAL		DEVELOPMENT NO.
DETAIL	WH 3-1-62	DRAW	LIG 3-17-62	DATE		CHANGE NO.		APPROVAL		DEVELOPMENT NO.
CHECK		CHECK		DATE		CHANGE NO.		APPROVAL		DEVELOPMENT NO.

729916

STANDARD CODE

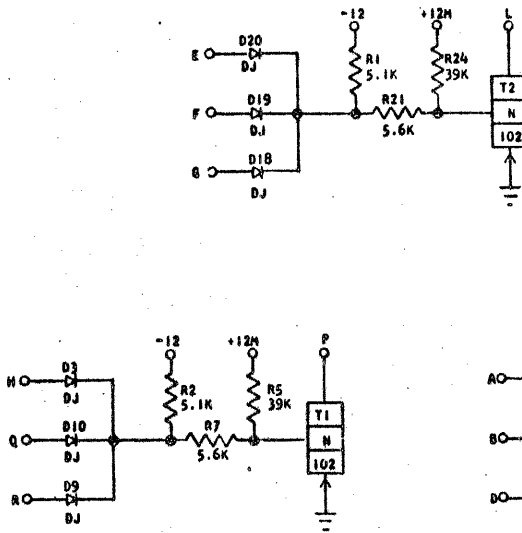
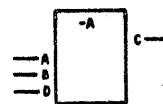
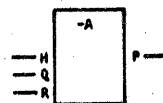
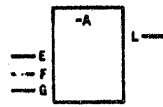
CARD CODE 729916

D G W -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370377

SCTDL 3-WAY LOGIC BLOCK LOW SPEED WITHOUT LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, H, A	Y INPUT	[Waveform: High to Low]	UP	-0.65	-0.1
F, Q, B	Y INPUT	[Waveform: High to Low]	DOWN	-5.81	-8.8
G, R, D	Y INPUT	[Waveform: High to Low]	UP	-0.65	-0.1
L, P, C	Y OUTPUT	[Waveform: Low to High]	DOWN	-5.81	-8.8
			UP	-0.65	-0.1
			DOWN	-5.81	-8.8

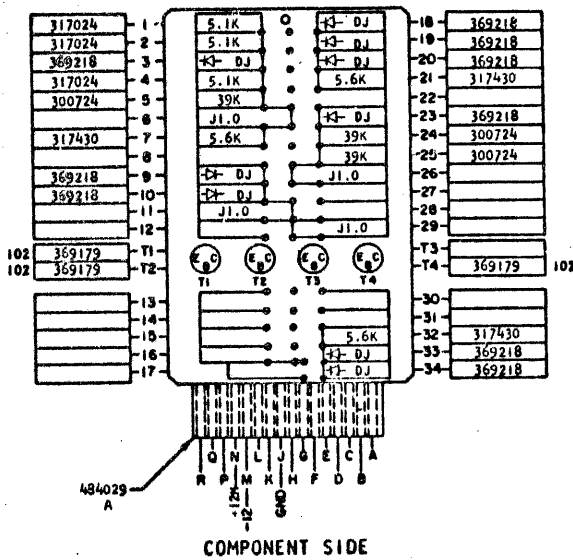
DELAY: SOTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN	MAX
TURN ON (NSEC)	75	100 <sup>+</sup>
TURN OFF (NSEC)	40	200 <sup>+</sup>

THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

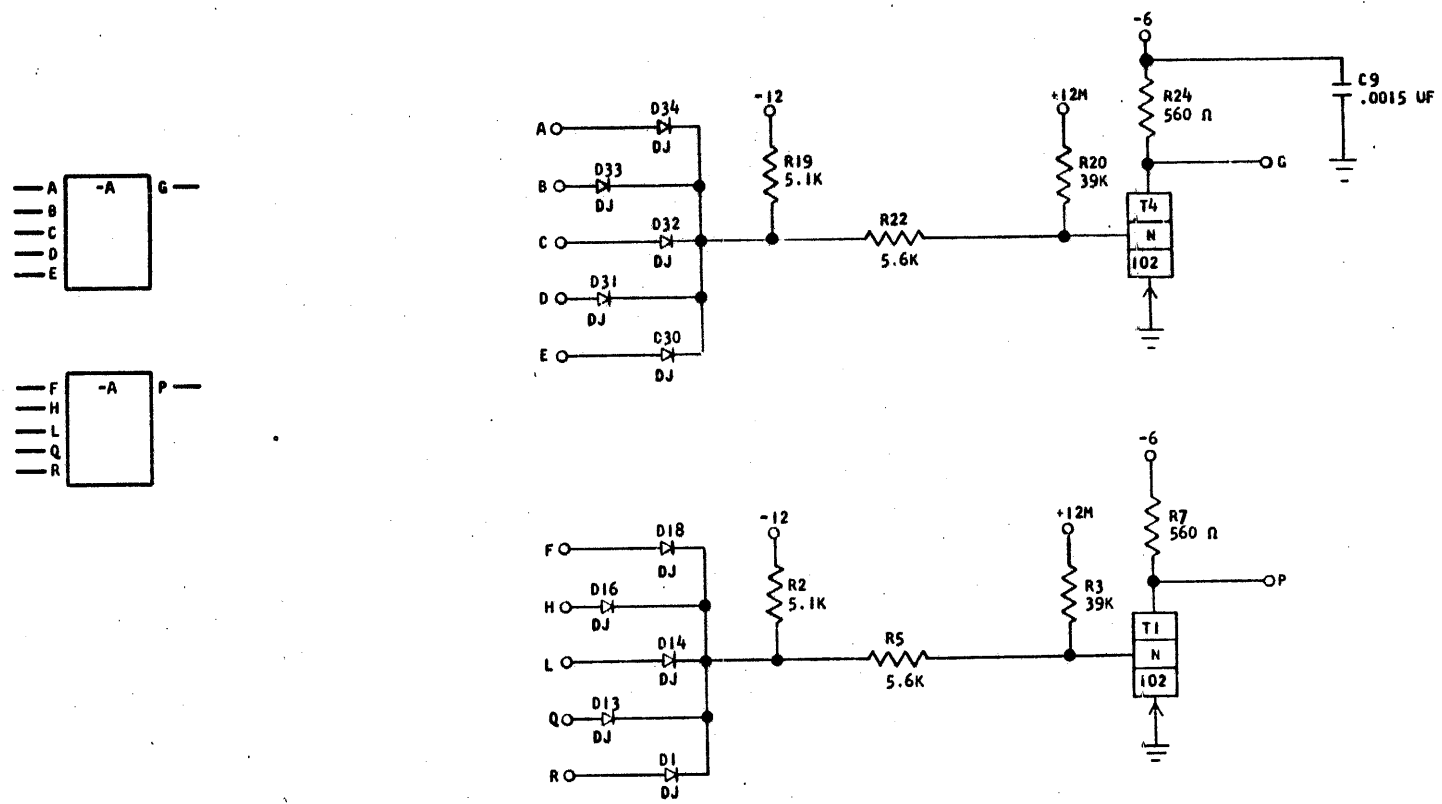
INTERNATIONAL BUSINESS MACHINES CORP.	DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SOTDL 3-WAY	4-29-62	115599					
LOGIC BCK LOW SPEED WITHOUT LOADS	1-3-63	116034					
DESIGN	10-21-63	118933					
DETAIL RQ 3-1-62 SCALE NONE							
CHECK WH 3-1-62 DRAW LIG 3-17-62							
APPRO							
CHECK							

729916

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370376

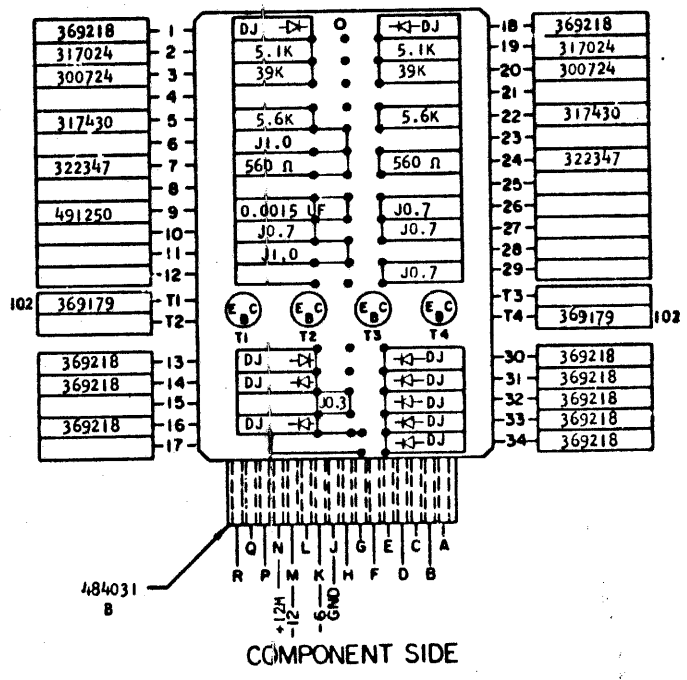
## SDTDL-5-WAY LOGIC BLOCK LOW SPEED WITH LOADS



### SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, F	Y	INPUT	UP: -0.65	DOWN: -5.81
B, H	Y	INPUT	UP: -0.65	DOWN: -5.81
C, L	Y	INPUT	UP: -0.65	DOWN: -5.81
D, Q	Y	INPUT	UP: -0.65	DOWN: -5.81
E, R	Y	INPUT	UP: -0.65	DOWN: -5.81
G, P	Y	INPUT	UP: -0.65	DOWN: -5.81



DELAY: SDTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	75	100**
TURN OFF (NSEC)	40	200**

\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTDL 5-WAY	DATE	6-29-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
LOGIC BLOCK LOW SPEED WITH LOADS		DATE	7-30-63	CHANGE NO.	117803	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN		DATE	9-15-64	CHANGE NO.	121632	APPROVAL		DATE		DEVELOPMENT NO.
DETAIL	RQ 3-1-62	SCALE								
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APP-ID		CHECK								

729918

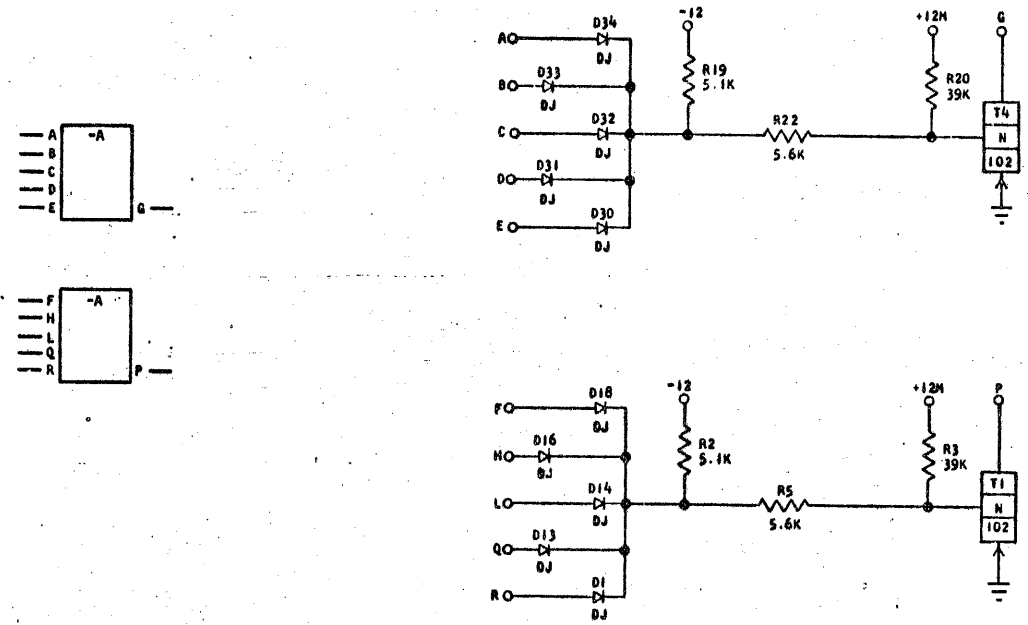
STANDARDS CODE

CARD CODE 729918  
D G Y -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370375

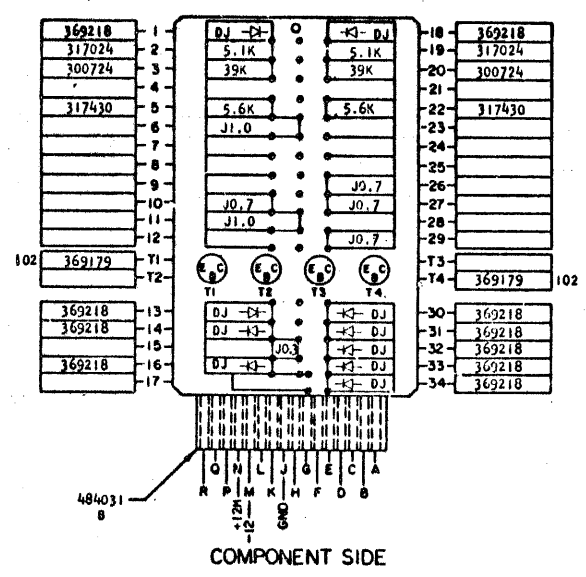
SOTDL 5 WAY LOGIC BLOCK LOW SPEED WITHOUT LCAD



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT DOWN
2. ANY INPUT UP TRANSISTOR OFF OUTPUT UP
3. COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, F	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
B, H	Y INPUT	[Waveform: High to Low]	DOWN	-5.8 -8.8
C, L	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
D, Q	Y INPUT	[Waveform: High to Low]	DOWN	-5.8 -8.8
E, R	Y INPUT	[Waveform: High to Low]	UP	-0.65 -0.1
G, P	Y OUTPUT	[Waveform: High to Low]	DOWN	-5.81 -8.8



DELAY: SPTDL - LOW SPEED  
LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN	MAX
TURN ON (NSEC)	75	100*
TURN OFF (NSEC)	40	200**

\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM YSTR-SOTDL 5-WAY	DATE	4-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
LOGIC BLOCK	LOW SPEED WO/LOAD	DATE	7-30-63	CHANGE NO.	117803	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ 3-1-62	MODEL	SMS	DATE	9-15-64	CHANGE NO.	121632	APPROVAL		DEVELOPMENT NO.
DETAIL	WH 3-1-62	SCALE	NONE	DATE		CHANGE NO.		APPROVAL		DEVELOPMENT NO.
CHECK	WH 3-1-62	DRAW	LIG 3-17-62	DATE		CHANGE NO.		APPROVAL		DEVELOPMENT NO.
APPROV		CHECK		DATE		CHANGE NO.		APPROVAL		DEVELOPMENT NO.

C

729918

729919

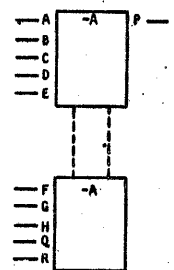
STANDARDS CODE

CARD CODE 729919  
D G Z -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370373

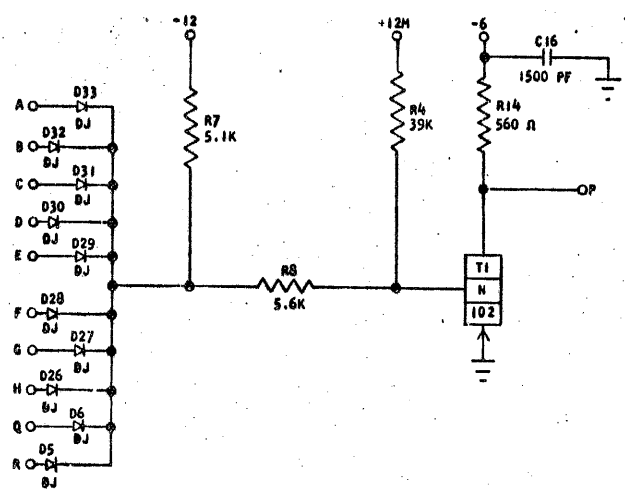
10 WAY LOGIC BLOCK LOW SPEED WITH LOAD



DELAY: SOTDL - LOW SPEED  
LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

TURN ON (NSEC)	MIN. 75	MAX. 100**
TURN OFF (NSEC)	40	200**

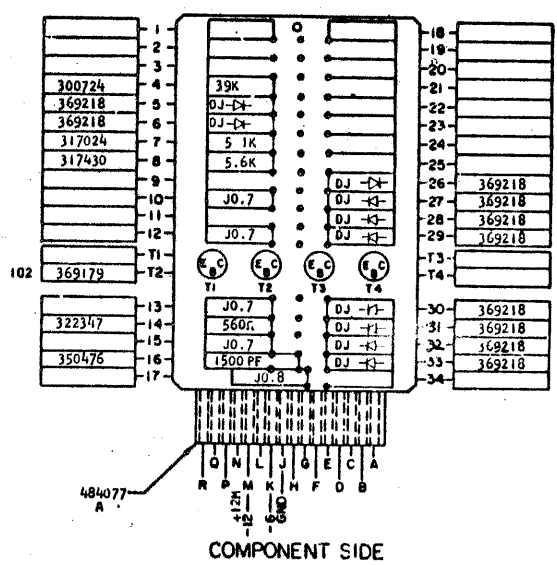
\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.  
\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN TRANSISTOR ON OUTPUT UP
2. ANY INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	Y INPUT	[Waveform]	UP -0.65	-0.1
B	Y INPUT	[Waveform]	DOWN -5.81	-8.8
C	Y INPUT	[Waveform]	UP -0.65	-0.1
D	Y INPUT	[Waveform]	DOWN -5.81	-8.8
E	Y INPUT	[Waveform]	UP -0.65	-0.1
F	Y INPUT	[Waveform]	DOWN -5.81	-8.8
G	Y INPUT	[Waveform]	UP -0.65	-0.1
H	Y INPUT	[Waveform]	DOWN -5.81	-8.8
Q	Y INPUT	[Waveform]	UP -0.65	-0.1
R	Y INPUT	[Waveform]	DOWN -5.81	-8.8
P	Y OUTPUT	[Waveform]	UP -0.65	-0.1
			DOWN -5.81	-8.8



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR 10-WAY	DATE	6-29-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
LOGIC BLOCK	LOW SPEED WITH LOAD	DATE	12-30-63	CHANGE NO.	119217	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ 3-1-62	MODEL	SMS							
DETAIL	WH 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								

729919

CIRCUIT FAMILY SOTDL



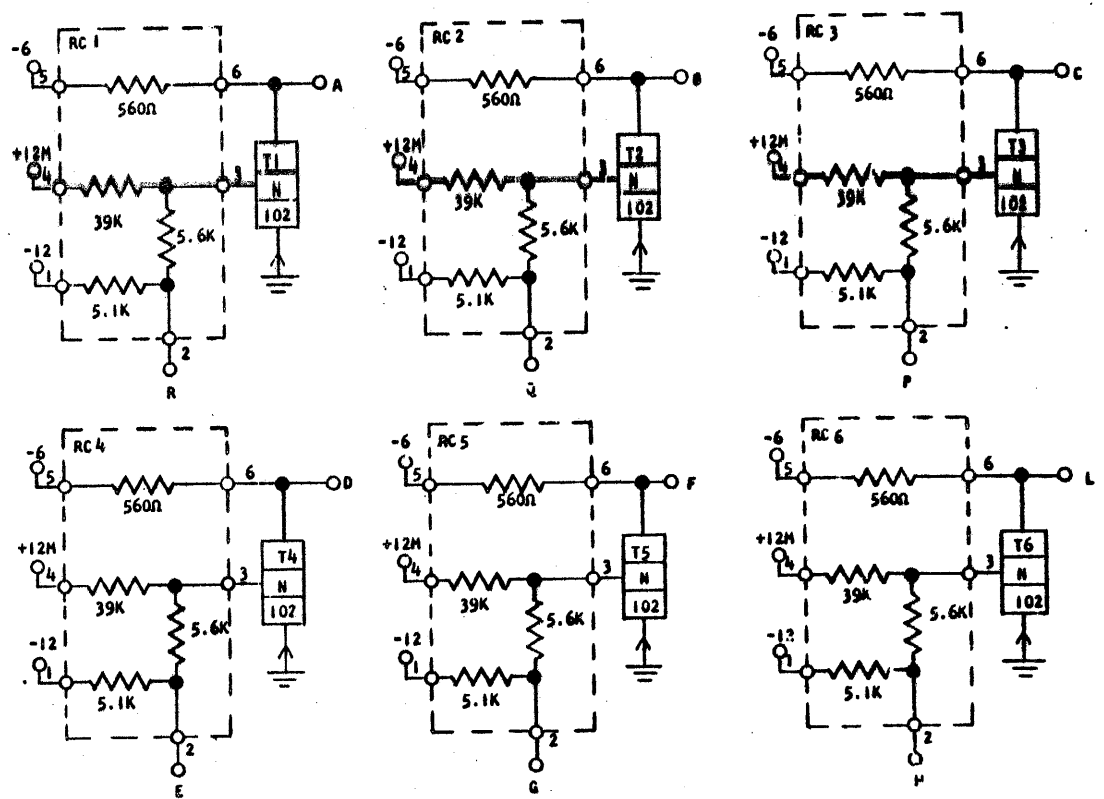
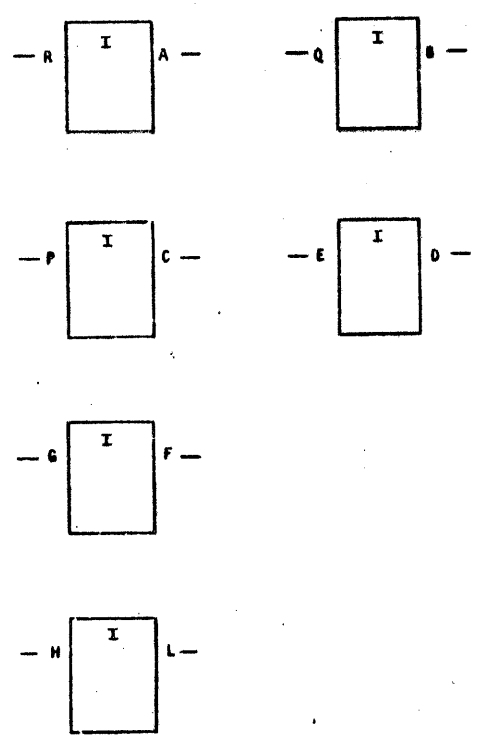
729921

STANDARDS CODE

CARD CODE 729921  
D H B -

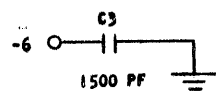
REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370348

INVERTER LOW SPED WITH LOAD



SEQUENCE OF OPERATION

1. INPUT DOWN TRANSISTOR ON OUTPUT UP
2. INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.



PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
R, Q, P, E, G, H	INPUT	[Square wave]	UP: -0.65	DOWN: -8.8
A, B, C, D, F, H	OUTPUT	[Square wave]	UP: -0.65	DOWN: -8.8

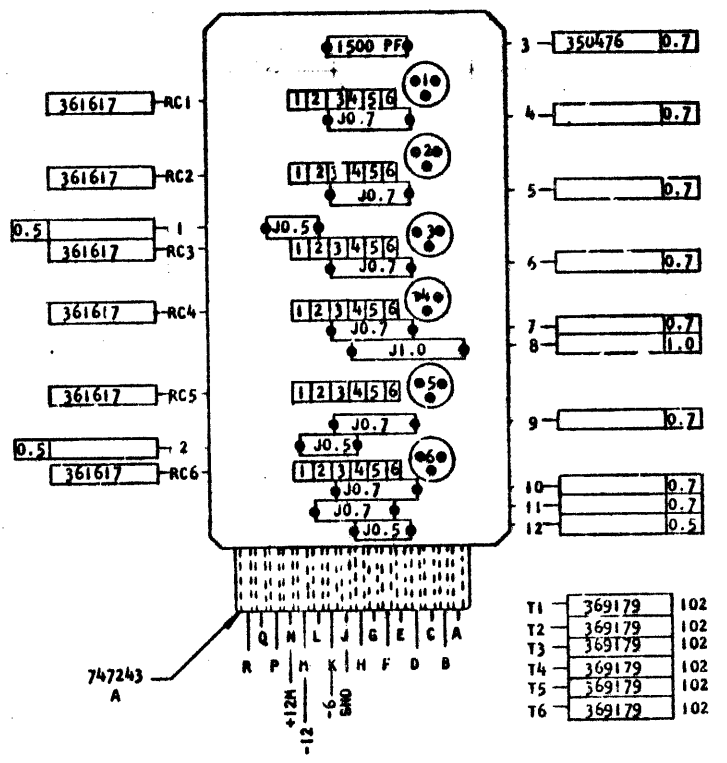
DELAY: SOTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	75	100**
TURN OFF (NSEC)	40	200**

\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

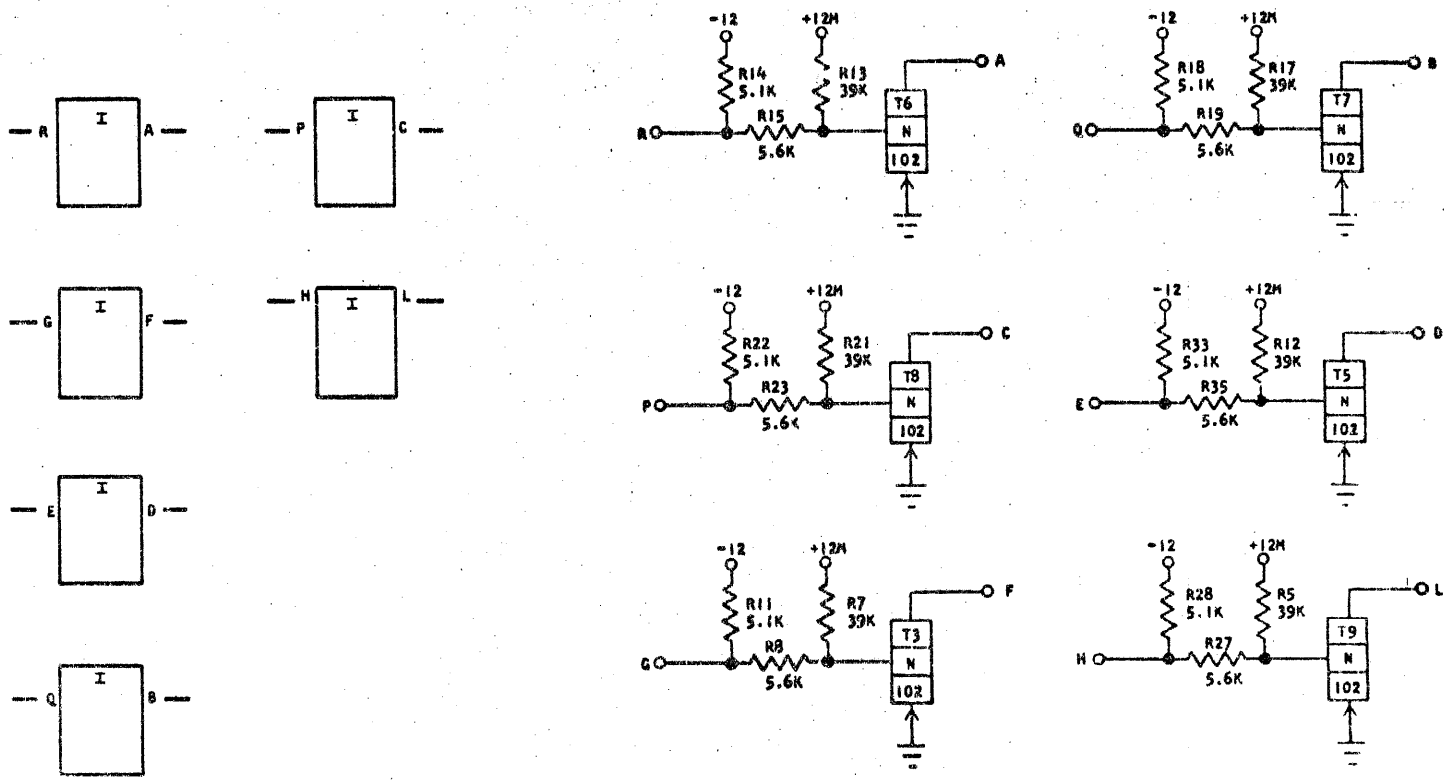
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					729921
INVERTER LOW SPEED WITH LOAD				1-3-63	116034					
DESIGN	RQ	3-1-62	SCALE	7-12-63	116192					
DETAIL	WH	3-1-62	DRAW	8-31-64	121906					
CHECK										
CIRCUIT FAMILY										SOTDL

C



REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370372

SDTDL INVERTER LOW SPEED W/O LOAD



SEQUENCE OF OPERATION

1. INPUT DOWN TRANSISTOR ON OUTPUT UP
2. INPUT UP TRANSISTOR OFF OUTPUT DOWN
3. ALL COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
R,Q,P, E,G,H	Y INPUT		UP DOWN	-.65 -5.81	-.1 -8.8
A,B,C, D,F,L	Y OUTPUT		UP DOWN	-.65 -5.81	-.1 -8.8

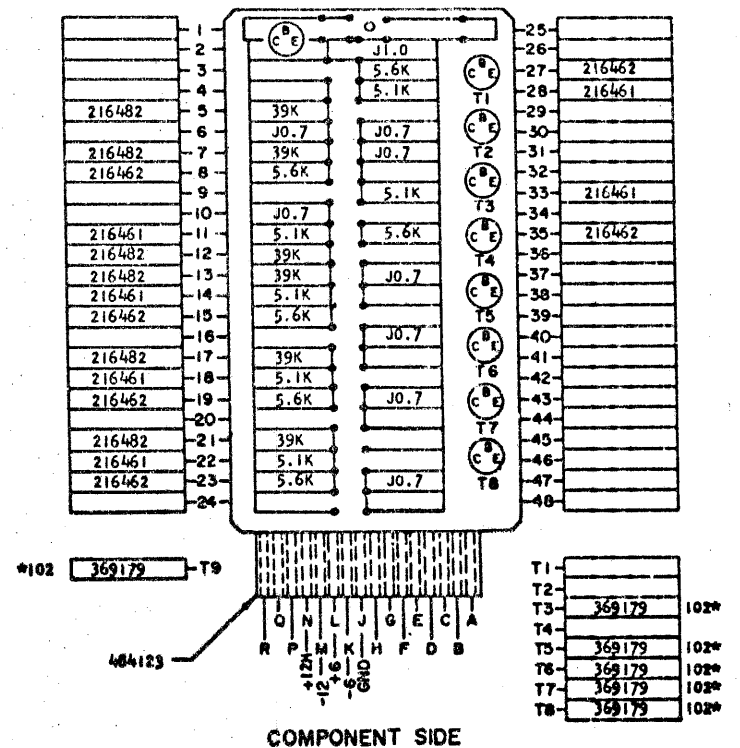
DELAY: SDTDL - LOW SPEED

LOGIC BLOCK WITH 560 OHM COLLECTOR RESISTOR

	MIN.	MAX.
TURN ON (NSEC)	75	100**
TURN OFF (NSEC)	40	200**

\*\*THIS DELAY CAN INCREASE TO 200 NSEC WHEN THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.

\*\*THIS DELAY CAN INCREASE TO 350 NSEC WHEN THE DRIVING BLOCK OR THE BLOCK THAT DRIVES THE DRIVING BLOCK HAS 6.2K COLLECTOR RESISTOR RETURNED TO -12V.



COMPONENT SIDE

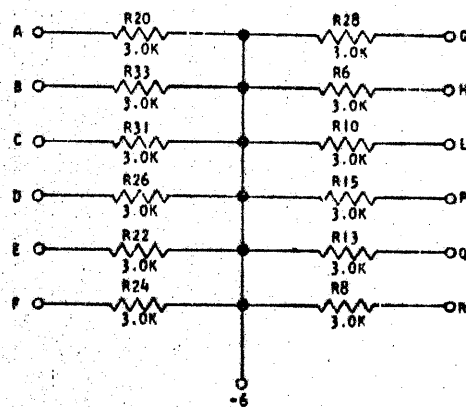
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR- SDTDL				4-10-62	115599					729922
INVERTER LOW SPEED W/O LOAD										
DESIGN	MODEL	SCALE	SMS							
DETAIL RQ	3-1-62	SCALE NONE								
CHECK WH	3-1-62	DRAW LIG	3-17-62							
APPRO		CHECK								

# REFERENCE DRAWING

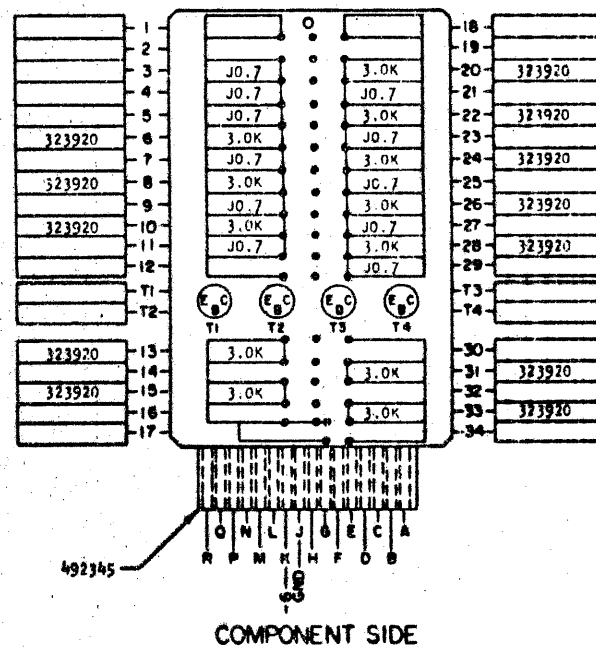
SEE PRODUCTION DRAWING 370371

## SDTDL AND SDTRL 3K RESISTOR LOAD



### APPLICATION

1. FOR COLLECTOR LOADING OF SDTDL AND SDTRL CARDS



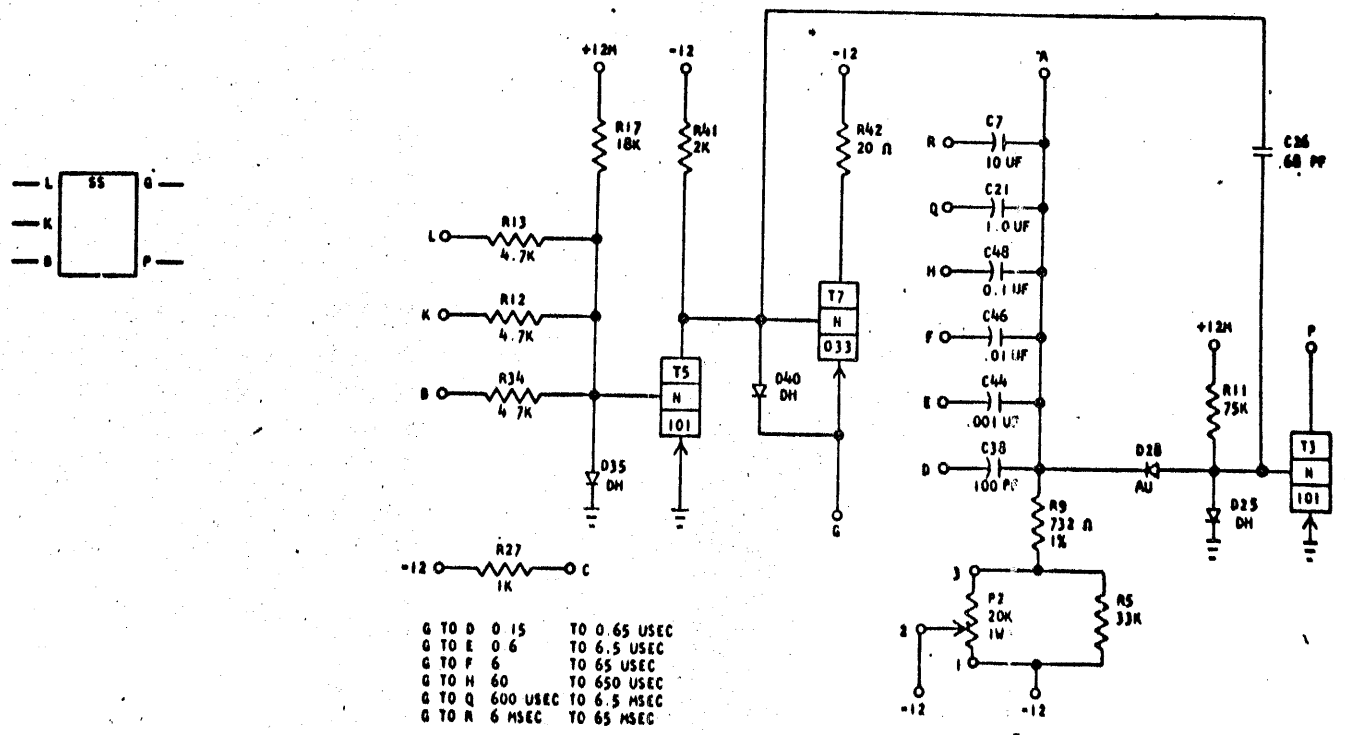
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SDTDL AND SDTRL 3K RESISTOR CARD				4-19-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L13	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370262

SDTRL - SINGLE SHOT  
0.15 USEC TO 65 MSEC

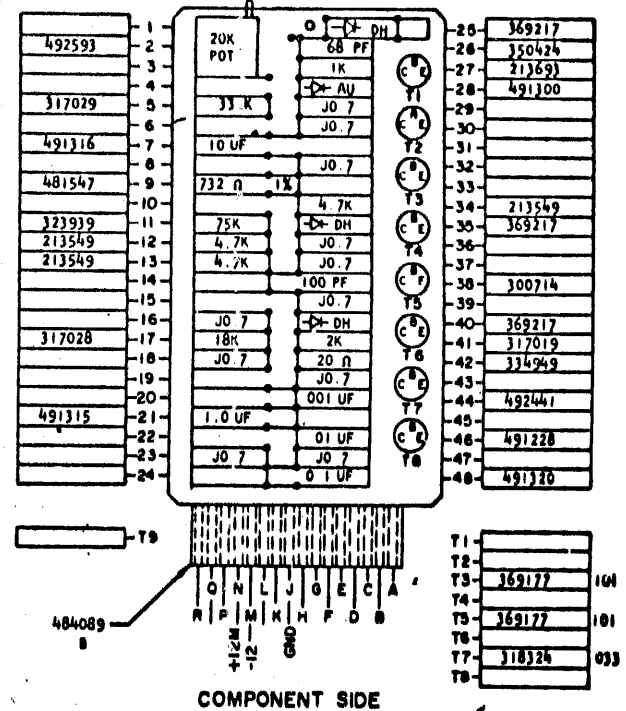


G TO D	0.15	TO 0.65 USEC
G TO E	0.6	TO 6.5 USEC
G TO F	6	TO 65 USEC
G TO H	60	TO 650 USEC
G TO Q	600 USEC	TO 6.5 MSEC
G TO R	6 MSEC	TO 65 MSEC

SEQUENCE OF OPERATION

1. PIN P TIED TO C FOR COLLECTOR LOAD, AND TO ANY INPUT IF INPUT PULSE IS NARROWER THAN REQUIRED OUTPUT PULSE. G IS TIED TO REQUIRED TIME CONSTANT INPUT
2. ALL INPUTS UP T5 OFF, T3 ON, OUTPUT UP
3. DOWN INPUT T5 ON, T3 OFF, OUTPUT DOWN
4. T3 TURNED BACK ON AT END OF TIME CONSTANT

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
L	Y	INPUT	UP	-0.6	-0.1
			DOWN	-6.87	-12.5
K	Y	INPUT	UP	-0.6	-0.1
			DOWN	-6.87	-12.5
B	Y	INPUT	UP	-0.6	-0.1
			DOWN	-6.87	-12.5
P	Y	OUTPUT	UP	-0.6	-0.1
			DOWN	-6.87	-10.5
T3	BASE	SWITCH LEVEL			



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

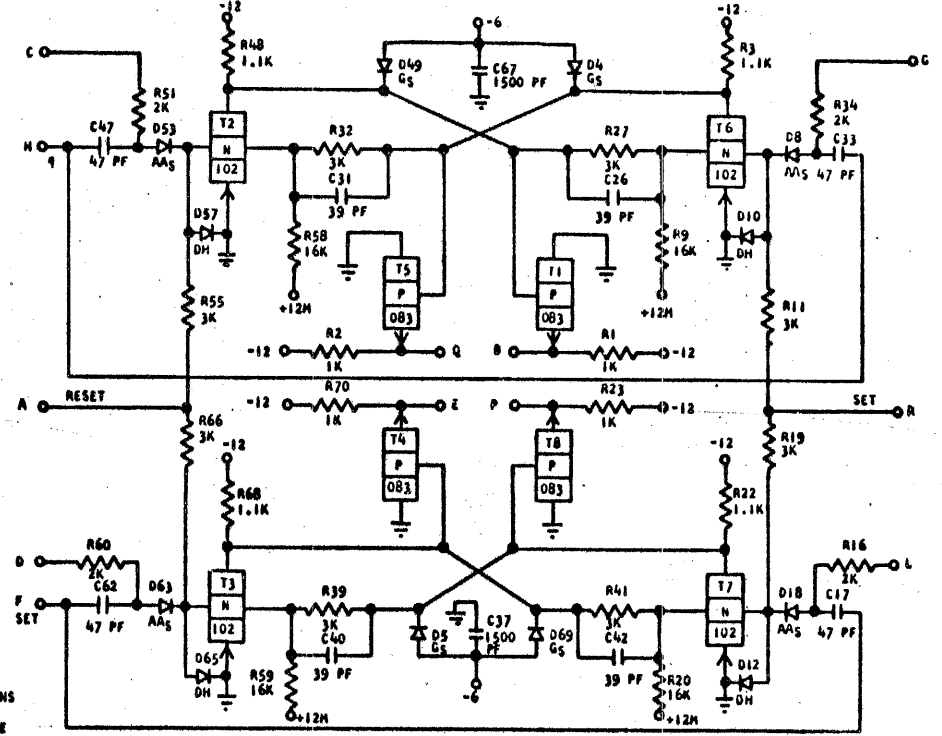
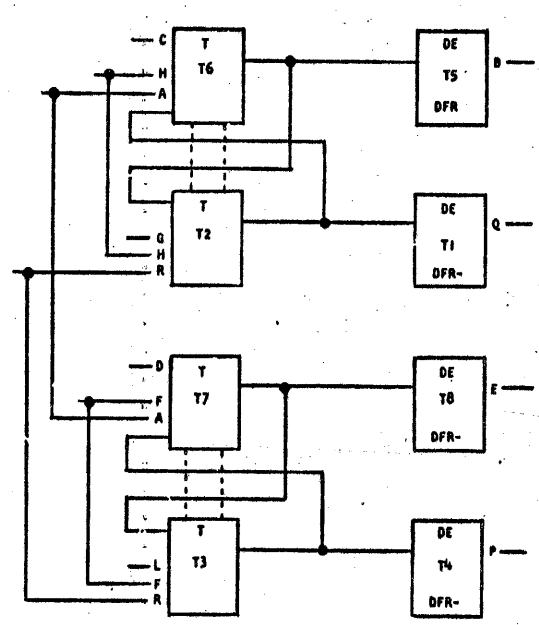
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SDTRL- SINGLE SHOT				6-29-62	115599					
DESIGN										
DETAIL RQ 3-1-62										
CHECK WM 3-1-62										
APPRO										

STANDARDS CODE  
2-7045

CARD CODE 729925  
D H F -

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370350

TRIGGER AND DRIVER



SEQUENCE OF OPERATION

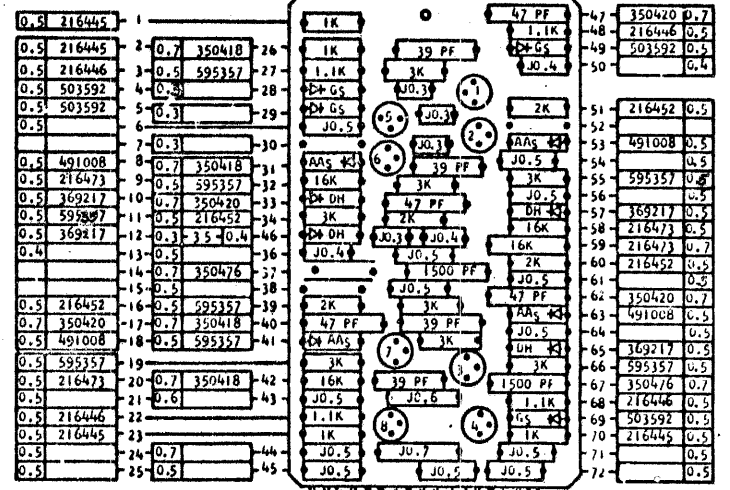
THE RESET INPUT RESPONDS TO A NEGATIVE VOLTAGE LEVEL. RESETTING TURNS T6, T7, T5 AND T8 ON AND THE OTHER TRANSISTORS WILL BE IN THE OPPOSITE STATE. THE GATES ARE CONDITIONED BY A POSITIVE VOLTAGE LEVEL AND THE AC SET IS RESPONSIVE TO A POSITIVE VOLTAGE LEVEL. THUS, TO SET THE TRIGGER MEANS TO TURN OFF THE TRANSISTOR WHOSE GATE AND SET ARE BOTH POSITIVE. THE DC SET RESPONDS TO A NEGATIVE VOLTAGE LEVEL. THUS, WHEN THE TRIGGER IS DC SET, T2, T3, T1 AND T4 WILL BE ON.

DELAY - NSEC	T <sub>ON</sub>		T <sub>RISE</sub>		T <sub>OFF</sub>		T <sub>FALL</sub>	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
BINARY OPERATION:	123	36	63	16	240	115	200	95
GATED:	135	40	48	16	205	82	160	61

NOTE: T<sub>ON</sub> IS DEFINED AS THE DELAY FROM THE TIME AN AC INPUT SIGNAL ARRIVES UNTIL THE "OFF" TRANSISTOR HAS TURNED ON COMPLETELY. THIS IS MEASURED FROM THE TIME THE AC INPUT HAS SHIFTED 10%.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			UP	DOWN
C, D	GATE	[Waveform]	-65	-1
H, F	AC SET	[Waveform]	-65	-7.64
R	DC SET	[Waveform]	-65	-1
A	RESET	[Waveform]	-65	-1
Q, P	OUTPUT	[Waveform]	-1.1	-7.3
B, E	OUTPUT	[Waveform]	-1.1	-2.2
G, L	GATE	[Waveform]	-65	-1

IN THE POSITIVE DIRECTION UNTIL THE "OFF" TRANSISTOR HAS SHIFTED 90% POSITIVE.  
T<sub>OFF</sub> IS MEASURED FROM THE TIME AN AC INPUT HAS SHIFTED 10% POSITIVE UNTIL THE OUTPUT OF THE "ON" TRANSISTOR HAS SHIFTED 90% NEGATIVE.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASSEMBLY TRANSISTOR - TRIGGER AND DRIVER				6-29-62	115599					
DESIGN				1-3-63	116034					
DETAIL				12-30-62	119217					
CHECK				9-15-64	121632					
APPROV										
CHECK										

729925



729927

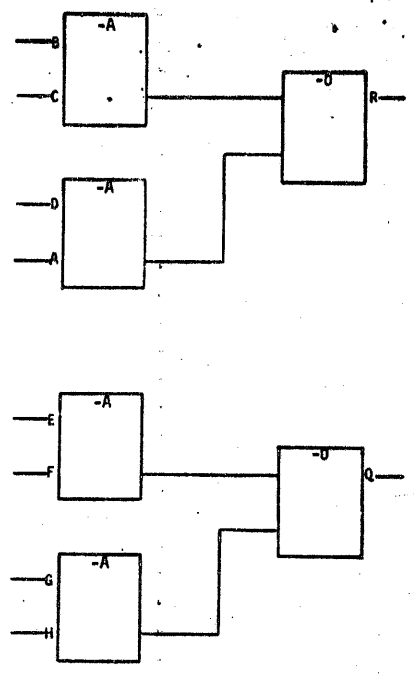
STANDARDS CODE

CARD CODE 729927

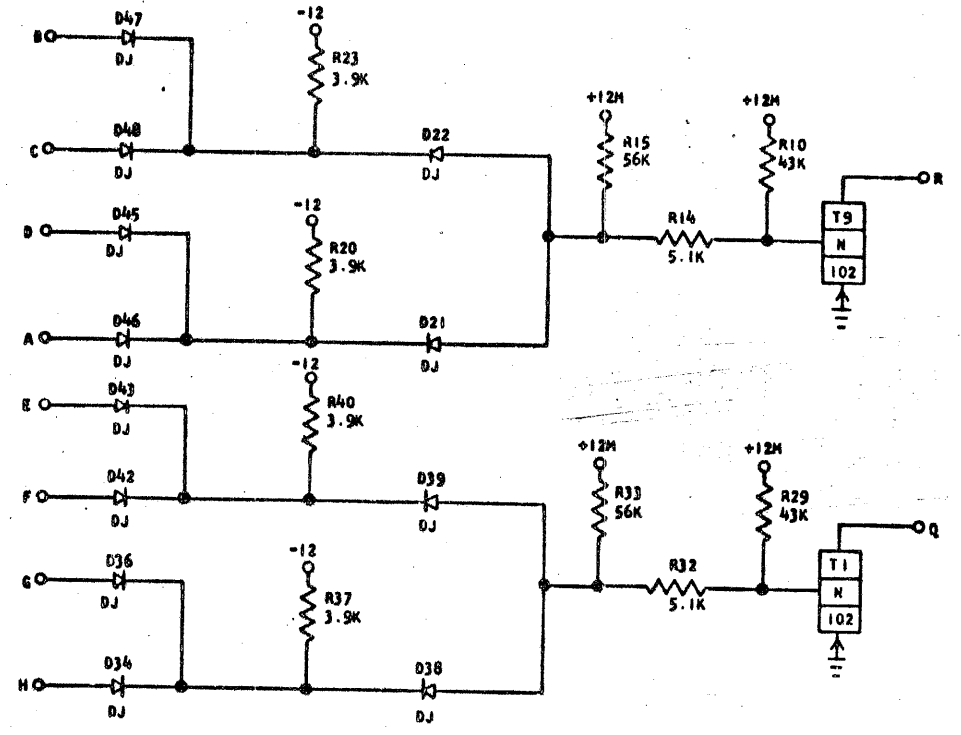
D H H -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370358



SOTDL DOUBLE LEVEL LOGIC BLOCK #2A LOW SPEED, WO LOADS



SEQUENCE OF OPERATION

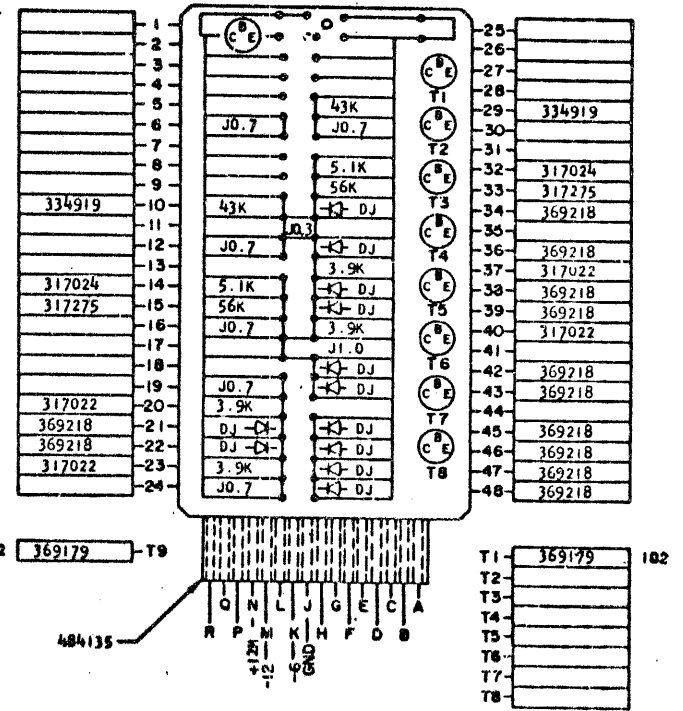
1. PINS B AND C MUST BE DOWN TO HAVE A DOWN LEVEL AT D22
2. PINS D AND A MUST BE DOWN TO HAVE A DOWN LEVEL AT D21
3. EITHER LEVEL DOWN AT D21 OR D22 WILL CAUSE THE TRANSISTOR TO TURN ON, THE OUTPUT WILL BE UP
4. EITHER B OR C UP WILL CAUSE AN UP LEVEL AT D22
5. EITHER D OR A WILL CAUSE AN UP LEVEL AT D21
6. BOTH LEVELS AT D21 AND D22 MUST BE UP TO TURN THE TRANSISTOR OFF, THE OUTPUT WILL BE DOWN
7. T1 AND T9 MUST BE COLLECTOR LOADED

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, C D, A	Y INPUT		UP	-0.65	-0.1
			DOWN	-5.81	-8.8
R	Y OUTPUTS		UP	-0.65	-0.1
			DOWN	-5.81	-8.8
E, F G, H	Y INPUTS		UP	-0.65	-0.1
			DOWN	-5.81	-8.8
Q	Y OUTPUTS		UP	-0.65	-0.1
			DOWN	-5.81	-8.8

DELAY - NSEC

	MIN.	MAX
TURN ON	70	240
TURN OFF	110	515

NOTE: MAXIMUM DELAY MAY INCREASE FOR A 6.2K COLLECTOR RESISTOR.

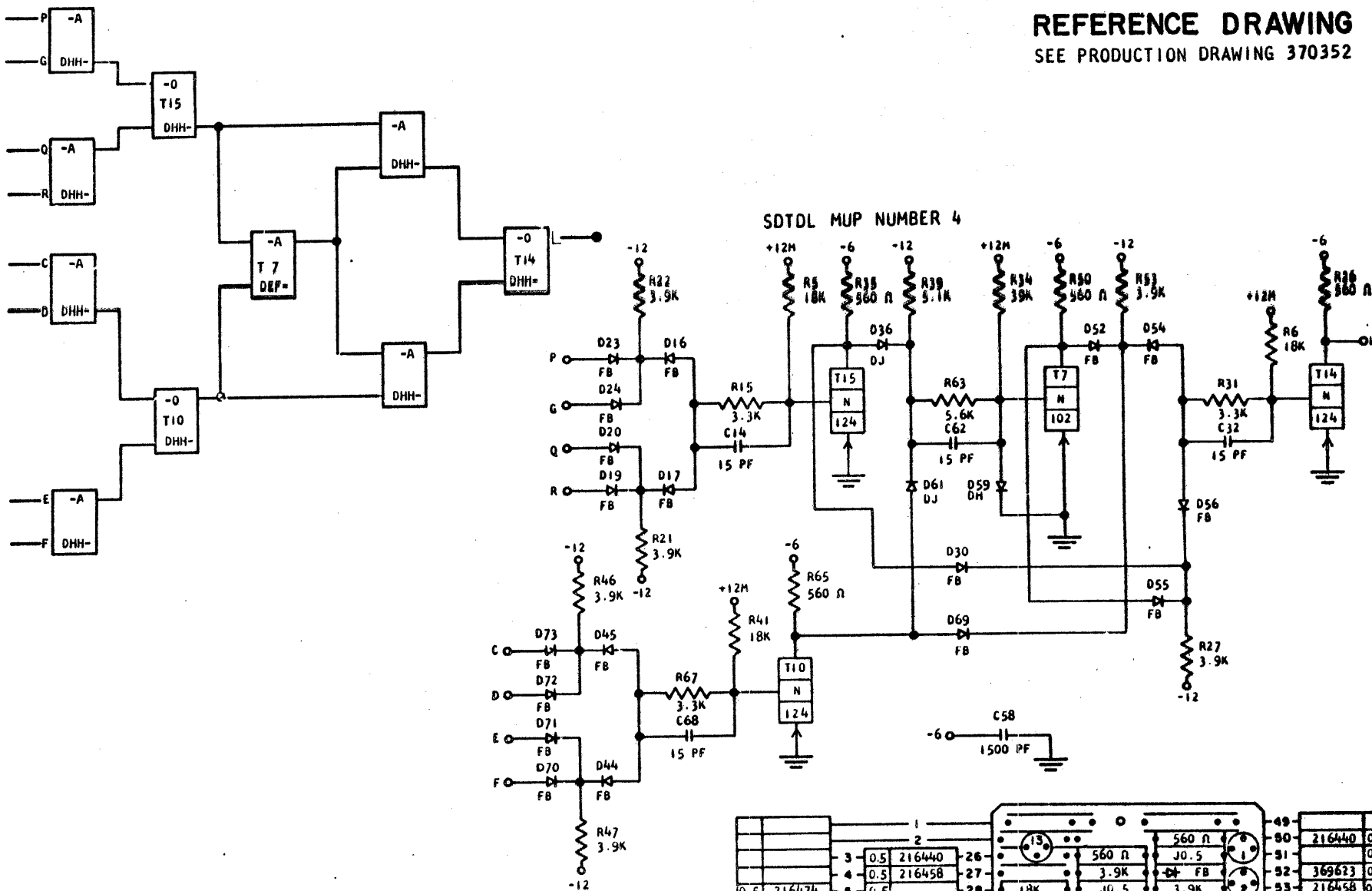


COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SOTDL-DOUBLE				4-2-62	115599					729927
LEVEL LB #2A LOW SPEED, WO LOADS				1-3-63	116034					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	LIG	3-17-62	DRAW	LIG						

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370352



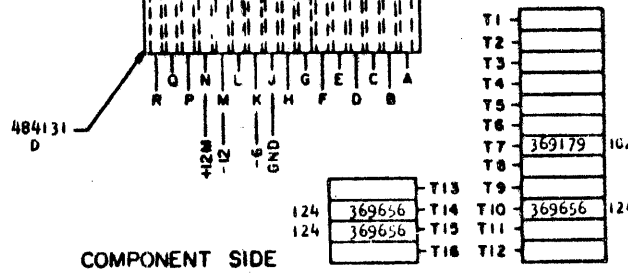
SEQUENCE OF OPERATION

- THE FIRST LEVEL OF DIODES OF BOTH T15 AND T10 PERFORM A NEGATIVE AND, AND THE SECOND LEVEL OF DIODES PERFORM A NEGATIVE OR INVERT FUNCTION. THE DIODES OF T7 AND T7 PERFORM A NEGATIVE AND INVERT FUNCTION. THE OUTPUTS OF T15 AND T10 DRIVE THE DIODES OF T7. THE OUTPUTS OF T15, T10 DRIVE THE DIODES OF T7. THE OUTPUTS OF T15, T10 DRIVE THE DIODES OF T7. THE OUTPUTS OF T15, T10 DRIVE THE DIODES OF T7. THE OUTPUTS OF T15, T10 DRIVE THE DIODES OF T7. WHICH PERFORMS A NEGATIVE AND FUNCTION. THE SECOND LEVEL OF DIODES AND T14 PERFORM A NEGATIVE OR INVERT FUNCTION. THIS CIRCUIT IS USED TO CHECK FOR ODD PARITY OF A TAPE CHARACTER. T15 AND T10 ARE EXCLUSIVE OR'S THAT EACH DETERMINE IF TWO BITS ARE ODD OR EVEN PARITY AND THEN T14, ANOTHER EXCLUSIVE OR, COMPARES THE OUTPUTS OF T15 AND T10 TO DETERMINE IF ALL FOUR BITS ARE EVEN OR ODD PARITY.
- THE CARD CODES SHOWN IN THE BLOCKS REFER TO INDIVIDUAL CARDS SIMILAR TO THAT PORTION OF CIRCUITRY
- DELAY - NSEC  

INPUTS TO OUTPUT:	MIN.	MAX.
TURN ON	32	263
TURN OFF	27	213

3	0.5	216440	26	560 Ω	560 Ω	80	216440	0.5
4	0.5	216458	27	3.9K	J0.5	81	369623	0.5
0.5	216474	5	0.5	18K	J0.5	82	216458	0.5
0.5	216474	6	0.5	18K	J0.5	83	369623	0.5
7	0.5	369623	28	J0.5	J0.5	84	369623	0.5
8	0.5	216456	29	J0.5	J0.5	85	369623	0.5
9	0.7	350408	30	3.3K	J0.5	86	369623	0.5
10	0.5		31	15 PF	J0.5	87	350408	0.7
11	0.5	216482	32	1500 PF	J0.5	88	369217	0.5
12	0.5	216440	33	39K	J0.5	89	369218	0.5
13	0.5	369218	34	J0.5	J0.5	90	350408	0.7
0.7	350408	14		15 PF	15 PF	91	216442	0.5
0.5	216456	15		3.3K	5.6K	92	216440	0.5
0.5	369623	16	0.5	J0.5	J0.5	93	216456	0.5
0.5	369623	17	0.5	J0.5	J0.5	94	350408	0.7
0.5	369623	18	0.5	J0.5	J0.5	95	369623	0.5
0.5	216458	19	0.5	J0.5	J0.5	96	369623	0.5
0.5	369623	20	0.5	J0.5	J0.5	97	369623	0.5
0.5	369623	21	0.5	J0.5	J0.5	98	369623	0.5
0.5	216458	22	0.5	J0.5	J0.5	99	369623	0.5
0.5	369623	23	0.5	J0.5	J0.5	100	369623	0.5
0.5	369623	24	0.5	J0.5	J0.5	101	369623	0.5
0.5	369623	25	0.5	J0.5	J0.5	102	369623	0.5

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
P, G, Q, R	Y	INPUT	UP	-0.65 - -1
			DOWN	-5.81 - -8.8
C, D, E, F	Y	INPUT	UP	-0.65 - -1
			DOWN	-5.81 - -8.8
L	Y	OUTPUT	UP	-0.65 - -1
			DOWN	-5.81 - -8.8

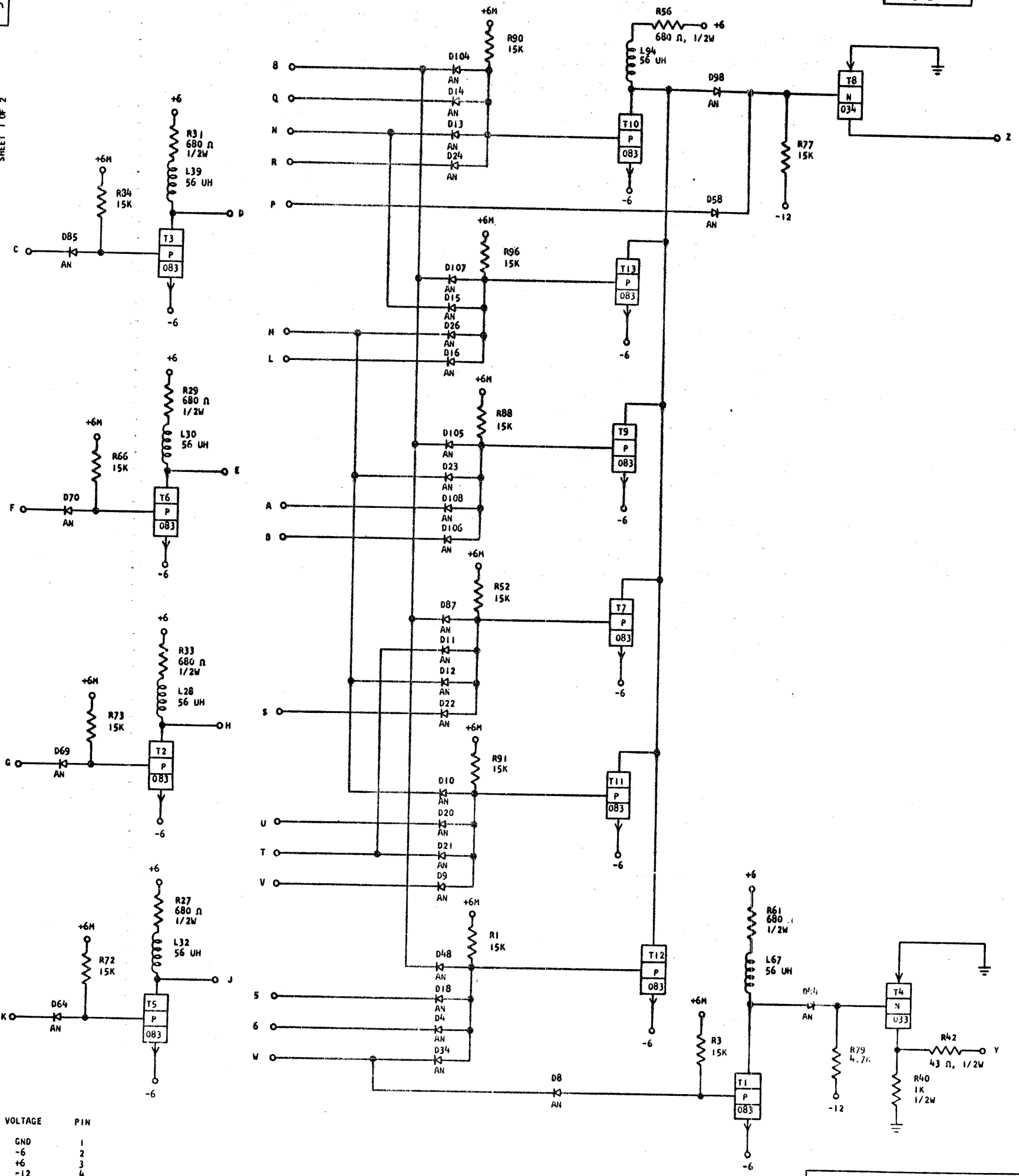


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR- SDTDL				4-10-63	116155					729928
MUP NUMBER 3					SEE INDEX CARD					
DESIGN		MODEL	SMS	11-5-63	118934					
DETAIL		SCALE	NONE							
CHECK		DRAW	LIG	5-27-64	119024					
APPRO		CHECK								







VOLTAGE	PIN
GND	1
-6	2
+6	3
-12	4
+6M	7

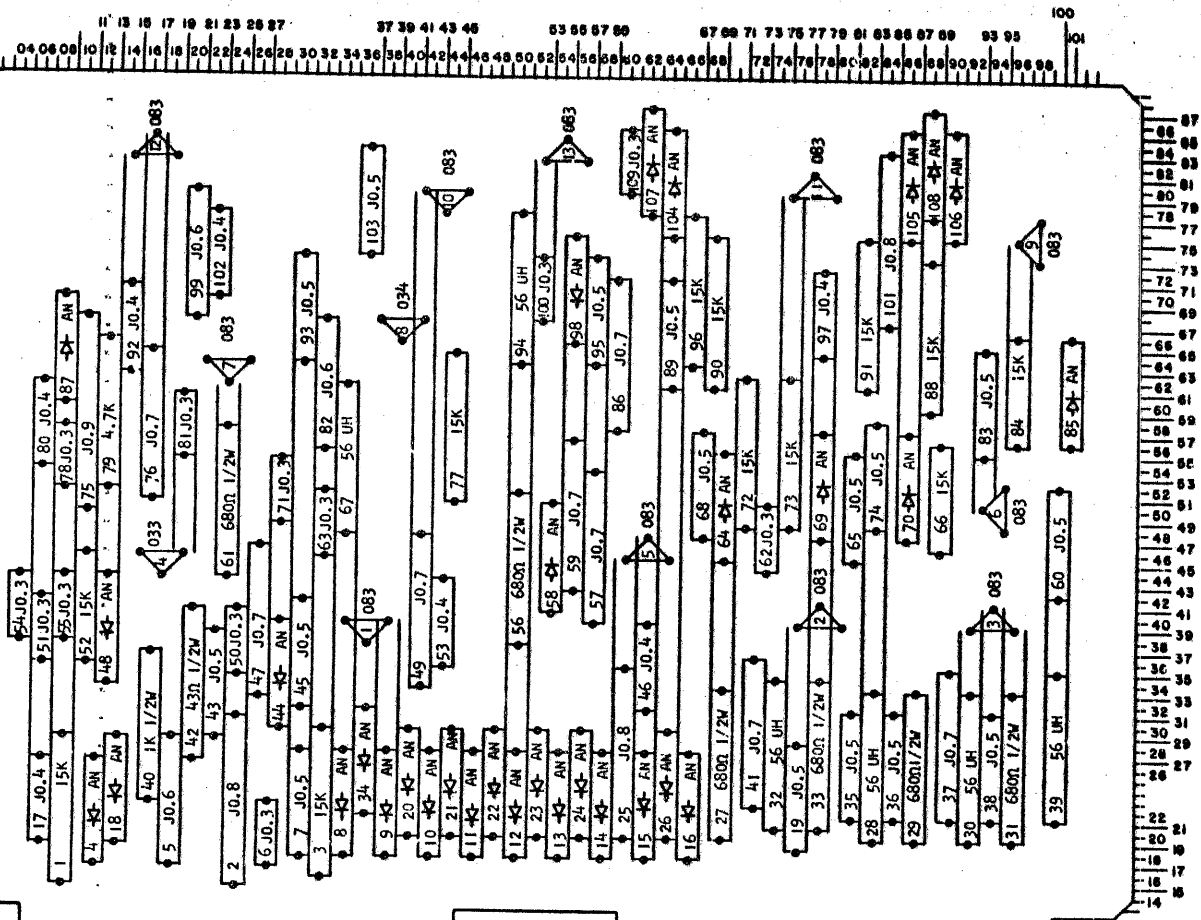
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASM - FILE				9.21.62	113615	MDL				
PROGRAM SKIP				12-20-62	D114728	MDL				X1325
DESIGN	VE	8-15-62	MODEL SMS 1401							
DETAIL	VE	8-15-62	SCALE NONE							
CHECK	VE	8-15-62	DRAW VE	8-15-62						
APPRO			CHECK							

STANDARDS CODE  
2-7045

CARD CODE  
373336  
D J D -

SHEET 2 OF 2



HOLE PATTERN  
490263

PART NO.	VALUE	QTY.
132399	43n1/2W	1
213693	1K 1/2W	1
216460	4.7K	1
216472	15K	12
317014	680n1/2W	6
491007	AN	32
491311	56 UH	6
318324	033	1
318325	033	1
535009	034	1

POSITION	VALUE	LOWER HOLE	UPPER HOLE	POSITION	VALUE	LOWER HOLE	UPPER HOLE	POSITION	TYPE	E	B	C
1	15K	0814	0828	57	JO.7	5739	5753	1	083	3439	3637	3839
2	JO.8	2414	2430	58	AN	5340	5350	2	083	8039	7811	7639
3	15K	3215	3229	59	JO.7	5542	5556	3	083	9639	9441	9239
4	AN	1116	1126	60	JO.5	10042	10052	4	033	1545	1743	1945
5	JO.6	1816	1828	61	680n1/2W	2343	2357	5	083	6445	6247	6045
6	JO.3	2716	2722	62	JO.3	7344	7350	6	083	9552	9350	9548
7	JO.5	3017	3027	63	JO.3	3245	3251	7	083	2163	2361	2563
8	AN	3417	3427	64	AN	6945	6955	8	034	3767	3965	4167
9	AN	3817	3827	65	JO.5	8145	8155	9	083	9877	9675	9873
10	AN	4217	4227	66	15K	8946	8956	10	083	4179	4377	4579
11	AN	4617	4627	67	56 UH	3447	3461	11	083	7979	7781	7579
12	AN	5017	5027	68	JO.5	6747	6757	12	083	1882	1684	1482
13	AN	5417	5427	69	AN	7847	7857	13	083	5682	5484	5282
14	AN	5817	5827	70	AN	8647	8657					
15	AN	6217	6227	71	JO.3	2848	2854					
16	AN	6617	6627	72	15K	7148	7162					
17	JO.4	0618	0626	73	15K	7548	7562					
18	AN	1318	1328	74	JO.5	8348	8358					
19	JO.5	7618	7628	75	JO.9	1049	1067					
20	AN	4019	4029	76	JO.7	1650	1664					
21	AN	4419	4429	77	15K	4450	4464					
22	AN	4819	4829	78	JO.3	0851	0857					
23	AN	5219	5225	79	4.7K	1251	1265					
24	AN	5619	5629	80	JO.4	0653	0661					
25	JO.8	6019	6035	81	JO.3	1954	1960					
26	AN	6419	6429	82	JO.6	3255	3267					
27	680n1/2W	6919	6933	83	JO.5	9355	9365					
28	56 UH	8319	8333	84	15K	9656	9666					
29	680n1/2W	8719	8733	85	AN	10156	10166					
30	56 UH	9219	9233	86	JO.7	5957	5971					
31	680n1/2W	9619	9633	87	AN	0859	0869					
32	56 UH	7420	7434	88	15K	8859	8873					
33	680n1/2W	7820	7834	89	JO.5	6461	6471					
34	AN	3621	3631	90	15K	6861	6875					
35	JO.5	8121	8131	91	15K	8261	8275					
36	JO.5	8521	8531	92	JO.4	1462	1470					
37	JO.7	9021	9035	93	JO.5	3063	3073					
38	JO.5	9421	9431	94	56 UH	5063	5077					
39	56 UH	10021	10035	95	JO.5	5763	5773					
40	1K 1/2W	1622	1636	96	15K	6663	6677					
41	JO.7	7222	7236	97	JO.4	7864	7872					
42	43n 1/2W	2026	2040	98	AN	5565	5575					
43	JO.5	2228	2238	99	JO.6	2067	2079					
44	AN	2829	2839	100	JO.3	5267	5273					
45	JO.5	3031	3041	101	JO.8	8467	8483					
46	JO.4	6231	6239	102	JO.4	2269	2277					
47	JO.7	2632	2646	103	JO.5	3673	3683					
48	AN	1233	1243	104	AN	6475	6485					
49	JO.7	4133	4147	105	AN	8675	8685					
50	JO.3	2434	2440	106	AN	9075	9085					
51	JO.3	0635	0641	107	AN	6277	6287					
52	15K	1035	1045	108	AN	8877	8887					
53	JO.4	4335	4343	109	JO.3	6079	6085					
54	JO.3	0437	0443									
55	JO.3	0837	0843									
56	680n1/2W	5037	5051									

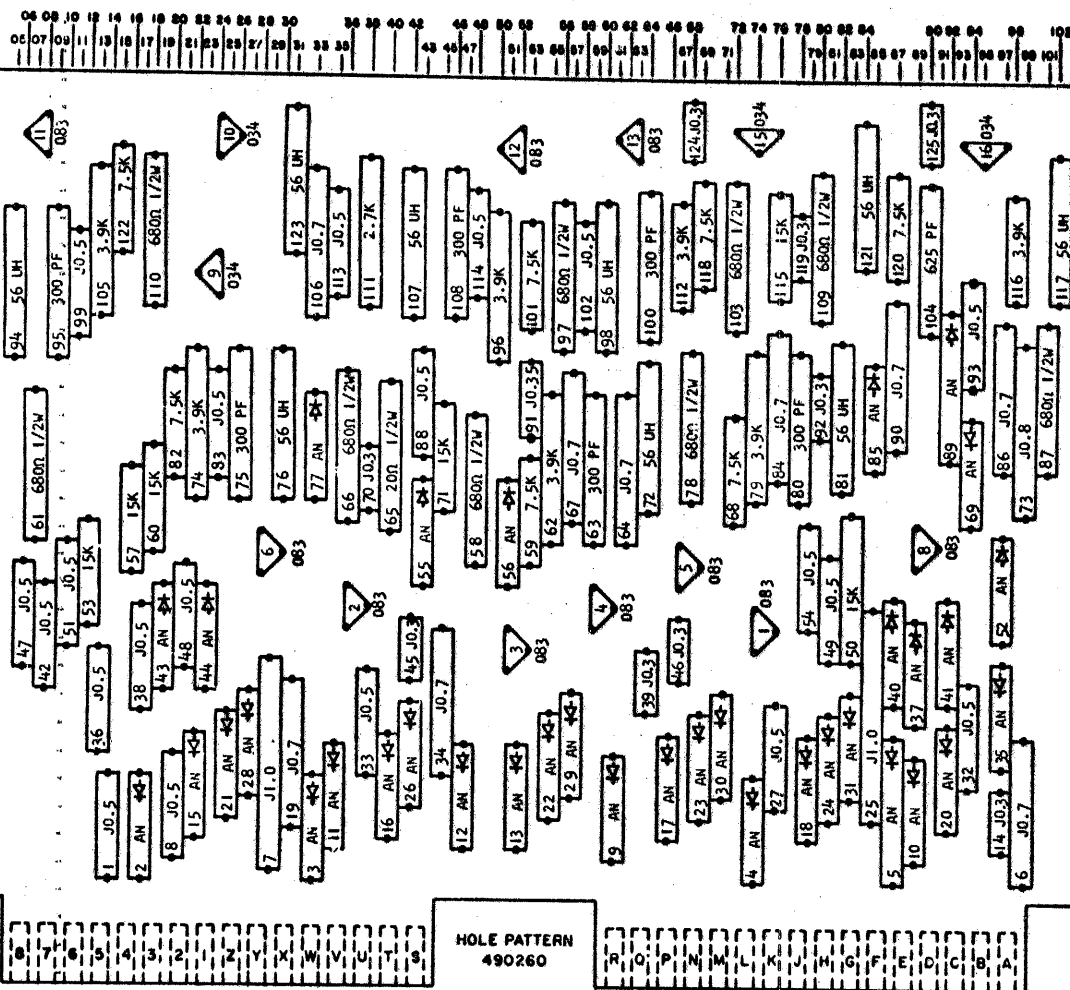
NOTES  
 I CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 893160  
 II ASSEMBLE TO ENGINEERING SPECIFICATION 893001  
 III "U" IN BLOCK DENOTES BARE WIRE JUMPER 491296  
 IIII ALL RESISTORS ARE 1/4 WATT AND ±5% UNLESS OTHERWISE NOTED

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
NAF	5-6-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASH- FILE PROGRAM				2-7-62	113615	MDL				373336
SKIP				12-20-62	D114728	MDL				X 1325
DESIGN	VE	8-20-62	SCALE	NONE						
CHECK	VE	8-20-62	DRAW	VE	8-20-62					
APPRO	SV	8-20-62	CHECK							

C





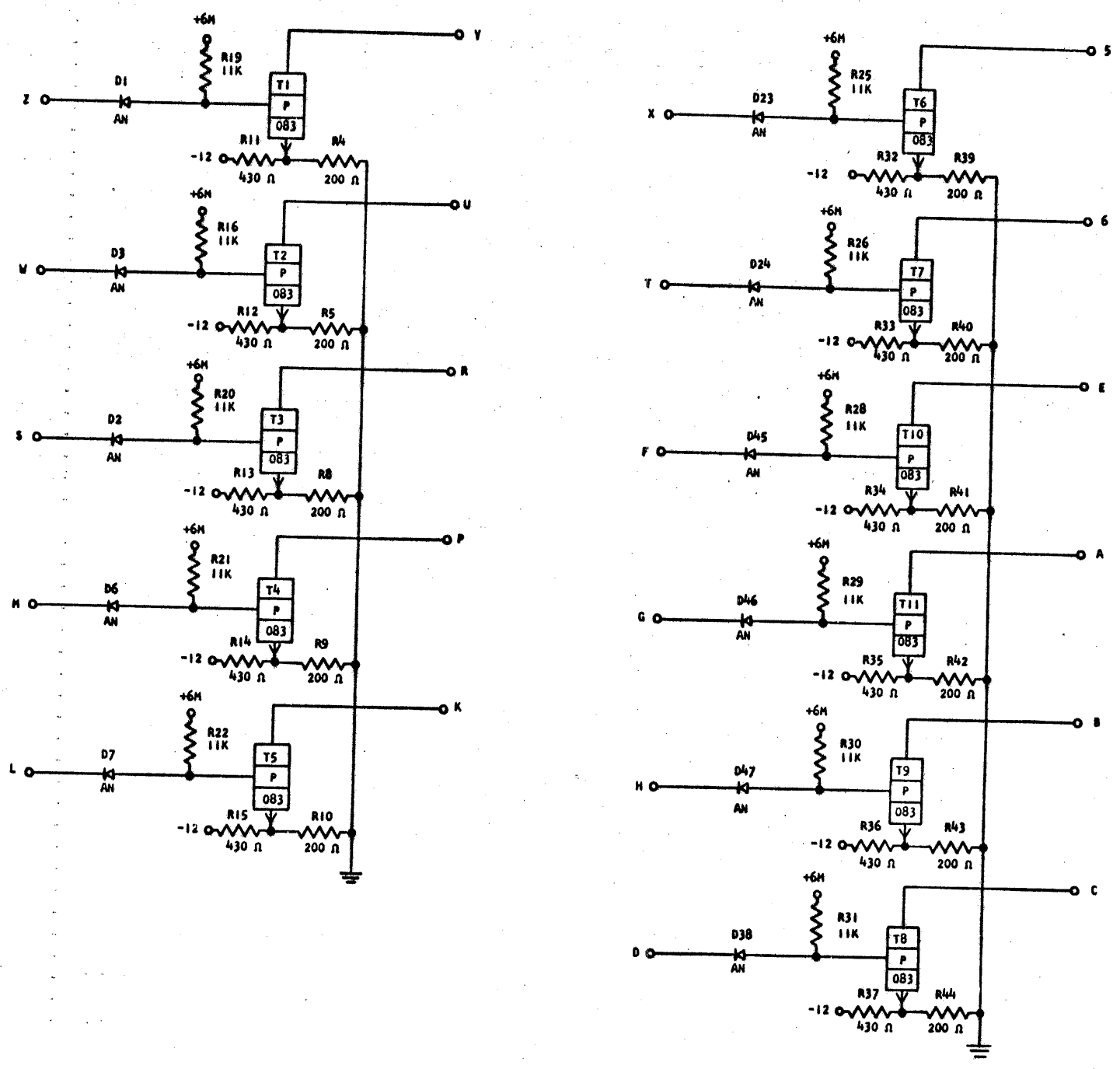
PART NO	VALUE	QTY
216458	3.9K	7
216465	7.5K	7
216472	15K	6
317014	6800 1/2W	9
317021	2.7K 1/2W	1
334949	200 1/2W	1
350439	300 PF	6
491007	AN	36
491311	56 UH	9
492414	625 PF	1
318325	083	10
535009	034	4

POSITION	VALUE	LOWER HOLE	UPPER HOLE	POSITION	VALUE	LOWER HOLE	UPPER HOLE	POSITION	VALUE	LOWER HOLE	UPPER HOLE	POSITION	TYPE	E	B	C
1	JO.5	1414	1424	43	AN	1932	1942	85	AN	8553	8563	1	083	7436	7638	7440
2	AN	1714	1724	44	AN	2332	2342	86	JO.7	9753	9767	2	083	3638	3840	3642
3	AN	3314	3324	45	JO.3	4233	4239	87	6800 1/2W	10153	10167	3	083	5134	5336	5138
4	AN	7414	7424	46	JO.3	6733	6739	88	JO.5	4354	4364	4	083	5938	6140	5942
5	AN	8714	8728	47	JO.5	0634	0644	89	AN	9254	9268	5	083	6742	6944	6746
6	JO.7	9914	9928	48	JO.5	2134	2144	90	JO.7	8755	8769	6	083	2843	3045	2847
7	J1.0	2915	2935	49	JO.5	8135	8145	91	JO.35	5356	5363	7	083	8944	9146	8948
8	JO.5	2016	2026	50	15K	8335	8349	92	JO.3	8056	8062	8	034	2473	2271	2469
9	AN	6116	6126	51	JO.5	1036	1046	93	JO.5	9461	9471	9	034	2482	2684	2486
10	AN	8916	8926	52	AN	9737	9747	94	56 UH	0563	0577	10	083	0886	0684	0882
11	AN	3517	3527	53	15K	1238	1248	95	300 PF	0963	0977	11	083	5285	5083	5281
12	AN	4717	4727	54	JO.5	7938	7948	96	3.9K	5063	5077	12	083	6386	6184	6382
13	AN	5217	5227	55	AN	4342	4352	97	6800 1/2W	5664	5678	13	083	7285	7083	7285
14	JO.3	9717	9723	56	AN	5142	5152	98	56 UH	6064	6078	14	034	9384	9582	9784
15	AN	2218	2228	57	15K	1643	1653	99	JO.5	1165	1175	15	083	8067	8051	8051
16	AN	4018	4028	58	6800 1/2W	4844	4858	100	300 PF	6465	6479	16	083	1868	1882	1882
17	AN	6618	6628	59	7.5K	5344	5354	101	7.5K	5366	5376	17	083	3868	3882	3882
18	AN	7918	7928	60	15K	1845	1855	102	JO.5	5866	5876	18	083	6768	6778	6778
19	JO.7	3119	3133	61	6800 1/2W	0746	0760	103	6800 1/2W	7266	7280	19	083	3569	3579	3579
20	AN	9219	9229	62	3.9K	5546	5560	104	625 PF	9066	9080	20	083	4869	4879	4879
21	AN	2520	2530	63	300 PF	5946	5960	105	3.9K	1367	1381	21	083	7669	7679	7679
22	AN	5520	5530	64	JO.7	6246	6260	106	JO.7	3367	3381	22	083	9869	9879	9879
23	AN	6920	6930	65	200 1/2W	4047	4061	107	56 UH	4267	4281	23	083	10269	10283	10283
24	AN	8120	8130	66	6800 1/2W	3648	3662	108	300 PF	4667	4681	24	083	6970	6980	6980
25	J1.0	8520	8540	67	JO.7	5748	5762	109	6900 1/2W	8067	8081	25	083	7871	7877	7877
26	AN	4221	4231	68	7.5K	7248	7258	110	6800 1/2W	1868	1882	26	083	8771	8781	8781
27	JO.5	7621	7631	69	AN	9448	9458	111	2.7K	3868	3882	27	083	8771	8781	8781
28	AN	2722	2732	70	JO.3	3849	3855	112	3.9K	6768	6778	28	083	8472	8486	8486
29	AN	5722	5732	71	15K	4549	4559	113	JO.5	3569	3579	29	083	1573	1583	1583
30	AN	7122	7132	72	56 UH	6449	6463	114	JO.5	4869	4879	30	083	3173	3187	3187
31	AN	8322	8332	73	JO.8	9949	9965	115	15K	7669	7679	31	083	6882	6888	6888
32	JO.5	9423	9433	74	3.9K	2250	2264	116	3.9K	9869	9879	32	083	9082	9088	9088
33	JO.5	3824	3834	75	300 PF	2650	2664	117	56 UH	10269	10283	33	083	9082	9088	9088
34	JO.7	4524	4538	76	56 UH	3050	3064	118	7.5K	6970	6980	34	083	8472	8486	8486
35	AN	9725	9735	77	AN	3350	3360	119	JO.3	7871	7877	35	083	1573	1583	1583
36	JO.5	1326	1336	78	6800 1/2W	6850	6864	120	7.5K	8771	8781	36	083	3173	3187	3187
37	AN	8929	8939	79	3.9K	7450	7464	121	56 UH	8472	8486	37	083	6882	6888	6888
38	JO.5	1730	1740	80	300 PF	7850	7864	122	7.5K	1573	1583	38	083	3173	3187	3187
39	JO.3	6430	6436	81	56 UH	8251	8265	123	56 UH	3173	3187	39	083	6882	6888	6888
40	AN	8731	8741	82	7.5K	2052	2062	124	JO.3	6882	6888	40	083	9082	9088	9088
41	AN	9231	9241	83	JO.5	2452	2462	125	JO.3	9082	9088	41	083	9082	9088	9088
42	JO.5	0832	0842	84	JO.7	7652	7666					42	083			

- NOTES
- I CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 893157
  - II ASSEMBLE TO ENGINEERING SPECIFICATION 893001
  - III "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296
  - IV ALL RESISTORS ARE 1/4 W AND ±5% UNLESS OTHERWISE NOTED

CIRCUIT AND PACKAGING STANDARD			
APPROVAL	DATE	APPROVAL	DATE
NAI	8-6-62		

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASSEMBLY- FILE		8-22-62	113617	MDL				373333
OPERATION DECODE		12-12-62	D116040	MDL				X1241
DESIGN	MODEL SMS 1401							
DETAIL	SCALE NONE							
CHECK	LIG 7-4-62	DRAW	LIG 9-4-62					
APPRO	W.S.V. 10-1	CHECK						

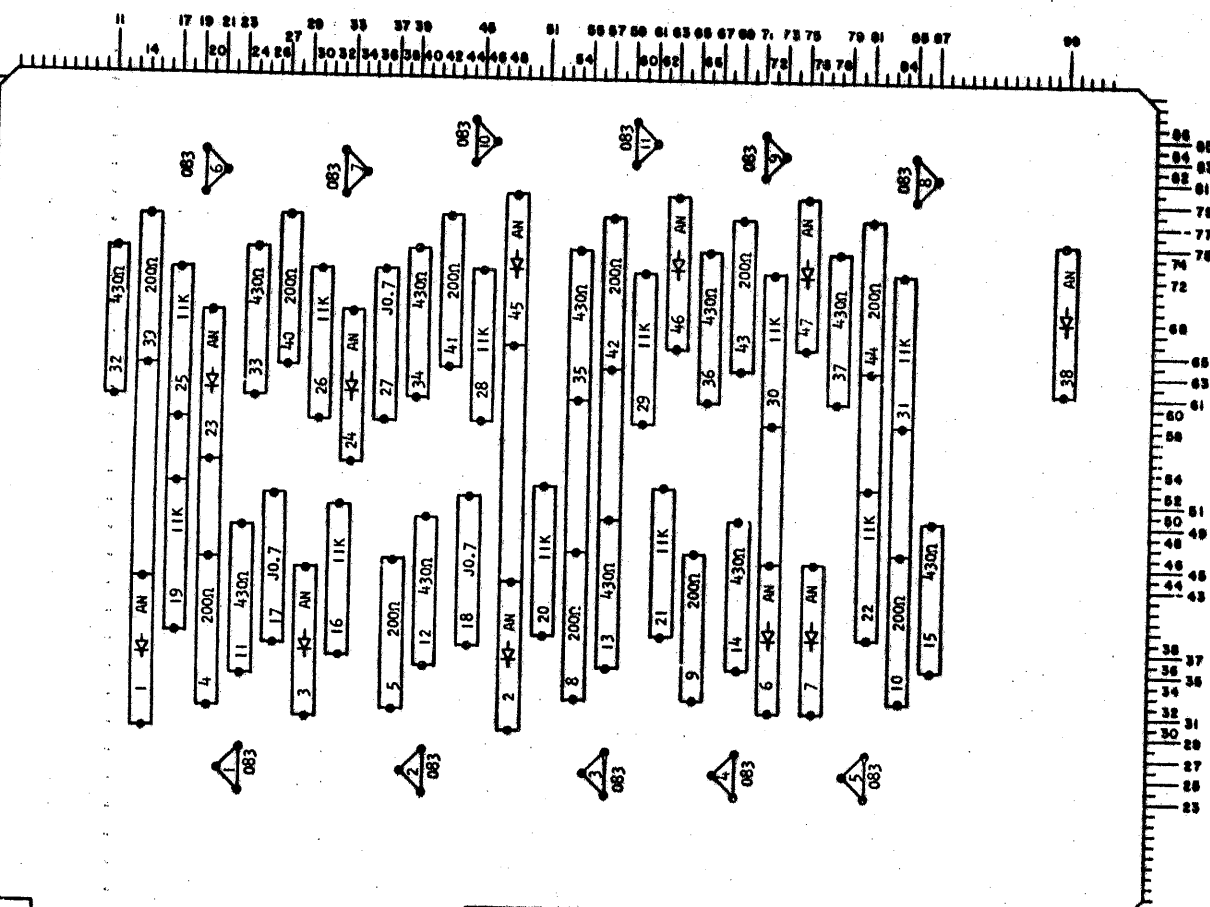


VOLTAGE PIN  
GND J, I, Q AND V  
-12 4  
+6M 7

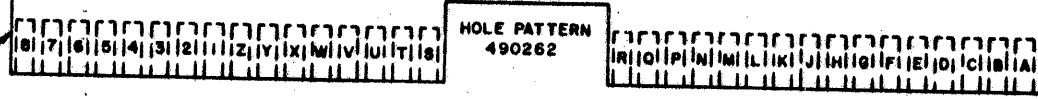
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	373335
NAME TWIN CARD ASM - LINE DRIVERS		9-21-62	113615	MDL				X1242	
DESIGN	VE	8-15-62	SCALE	NONE					
DETAIL	VE	8-15-62	DRAW	VE	8-15-62				
CHECK	VE	8-15-62	CHECK						
APPRO									

SHEET 2 OF 2



PART NO.	VALUE	QTY.
317006	200Ω	11
317010	430Ω	11
317027	11K	11
491007	AN	11
318325	083	11



POSITION	VALUE	LOWER HOLE	UPPER HOLE
1	AN	1429	1443
2	AN	4829	4843
3	AN	2930	2944
4	200Ω	2031	2045
5	200Ω	3731	3745
6	AN	7231	7245
7	AN	7631	7645
8	200Ω	5432	5446
9	200Ω	6532	6546
10	200Ω	8432	8446
11	430Ω	2334	2348
12	430Ω	4035	4049
13	430Ω	5735	5749
14	430Ω	6935	6949
15	430Ω	8735	8749
16	11K	3236	3250
17	JO.7	2637	2651
18	JO.7	4437	4451
19	11K	1738	1752
20	11K	5138	5152
21	11K	6238	6252
22	11K	8138	8152
23	AN	2054	2068
24	AN	3354	3368
25	11K	1758	1772
26	11K	3058	3072
27	JO.7	3658	3672
28	11K	4558	4572
29	11K	6058	6072
30	11K	7258	7272
31	11K	8458	8472
32	430Ω	1160	1174
33	430Ω	2460	2474
34	430Ω	3960	3974
35	430Ω	5460	5474
36	430Ω	6660	6674
37	430Ω	7860	7874
38	AN	9961	9975
39	200Ω	1463	1477
40	200Ω	2763	2777
41	200Ω	4263	4277
42	200Ω	5763	5777
43	200Ω	6963	6977
44	200Ω	8163	8177
45	AN	4865	4879
46	AN	6365	6379
47	AN	7565	7579

POSITION	TYPE	E	B	C
1	083	2327	2125	2323
2	083	4027	3825	4023
3	083	5727	5525	5723
4	083	6927	6725	6923
5	083	8127	7925	8123
6	083	1979	2181	1983
7	083	3279	3481	3283
8	083	8579	8781	8583
9	083	7181	7383	7185
10	083	4482	4684	4486
11	083	5982	6184	5986

NOTES  
 X CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 893159  
 XI ASSEMBLE TO ENGINEERING SPECIFICATION 893001  
 XII "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296  
 XIII ALL RESISTORS ARE 1/2 WATT AND ±5% UNLESS OTHERWISE NOTED

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
NAF	8-6-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME TWIN CARD ASM- LINE DRIVERS				9-21-62	113615	MDL				X 1242
DESIGN				12-20-62	D114728	MDL				
DETAIL VE 8-20-62				SCALE NONE						
CHECK VE 8-20-62				DRAW VE 8-20-62						
APPRO SW				7-7-62		CHECK				

C

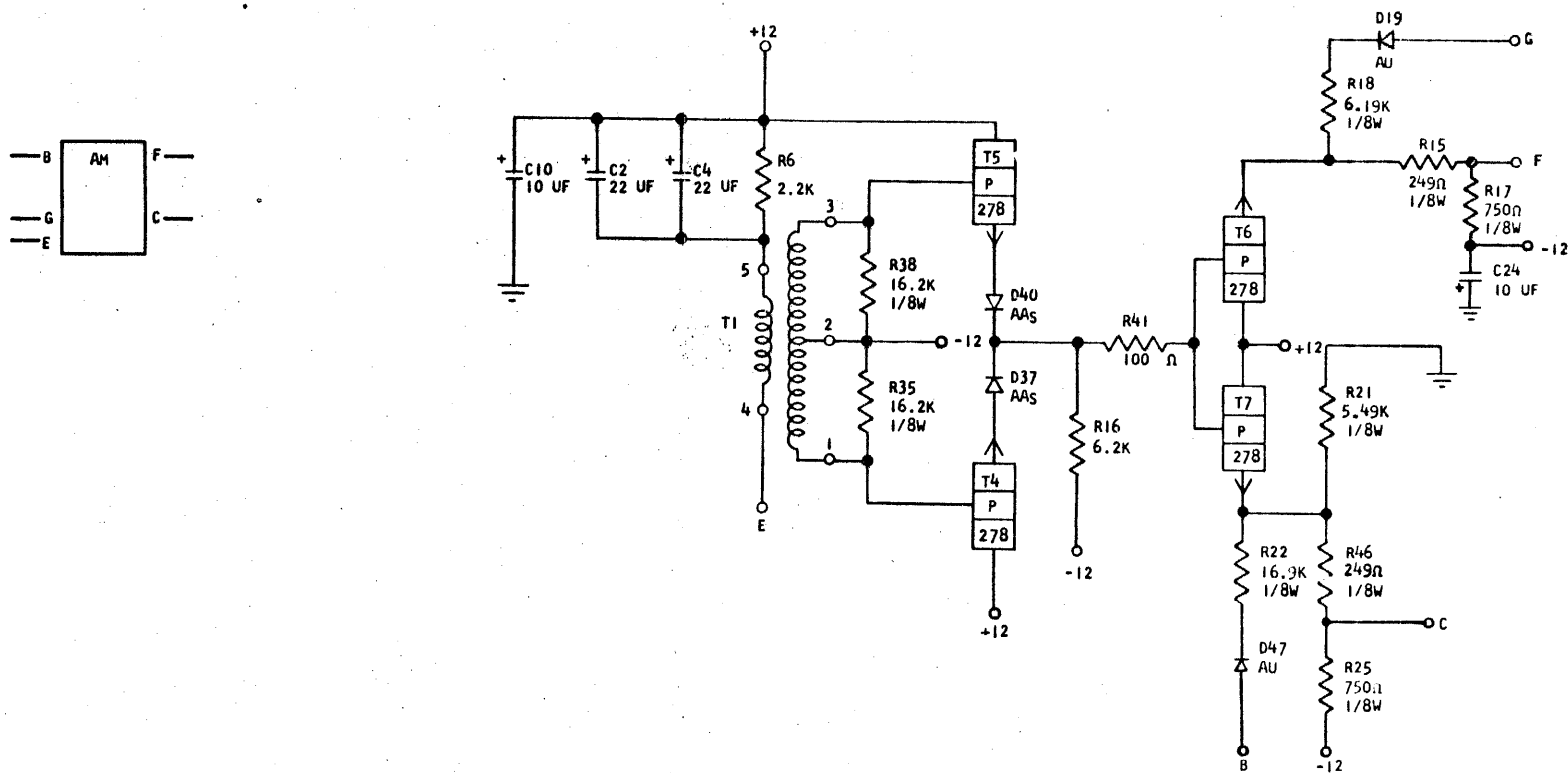


# REFERENCE DRAWING

SEE PRODUCTION DRAWING 372359

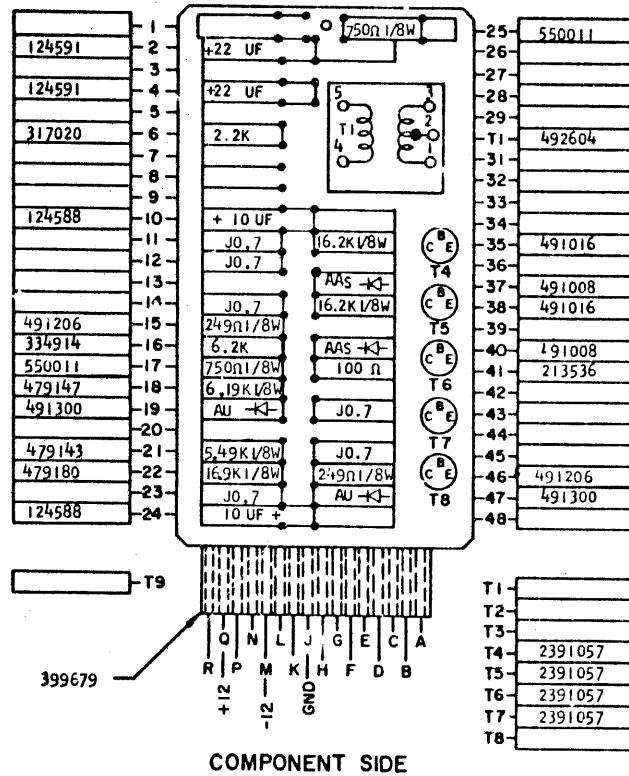
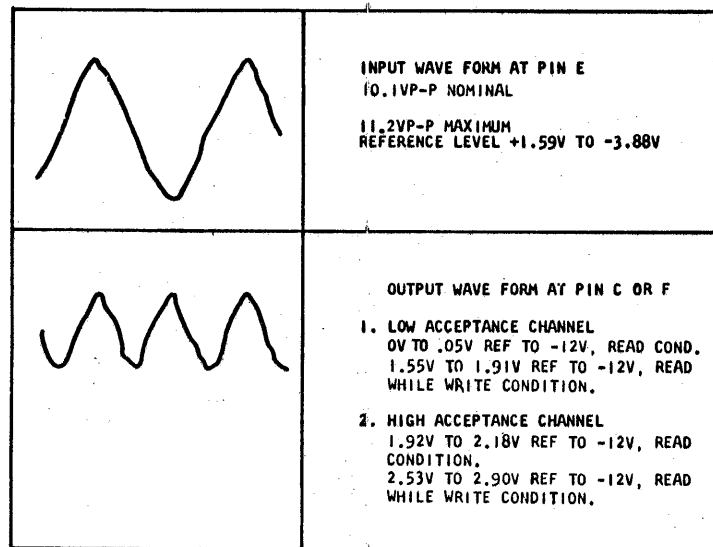
## SENSE AMPLIFIER-RECTIFIER AND CLIPPER

MOUNT CARD ON ONE AND ONE HALF INCH CENTERS NOTE XIV



### APPLICATION NOTES

VOLTAGES AT PIN G AND B FROM CLIPPING CARD



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

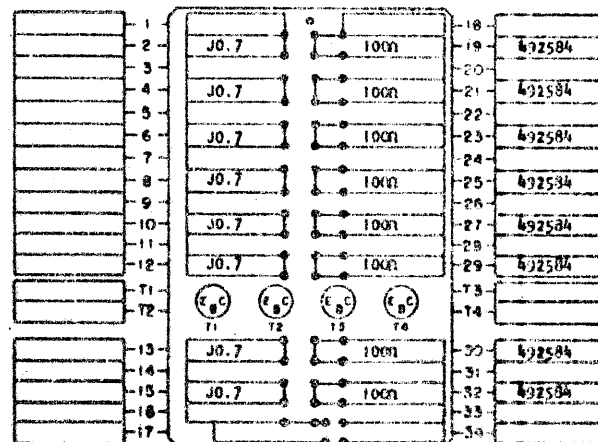
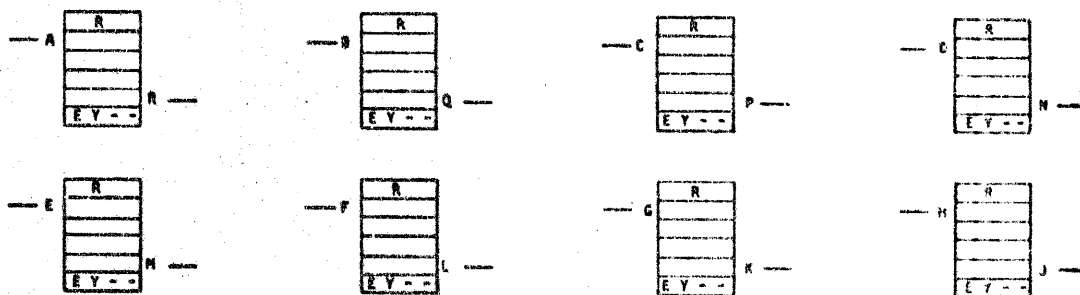
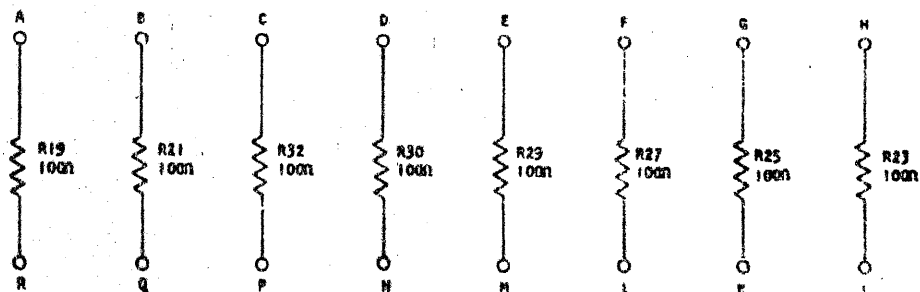
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - SENSE AMPLIFIER-RECTIFIER AND CLIPPER			6-27-62	115599					729957
DESIGN	SMS			2-11-64	119678					
DETAIL	RQ	3-1-62	SCALE	NONE	11-21-64	122721	GLK			
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							



# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371199

## DRIFT-DRIVER, RESISTOR



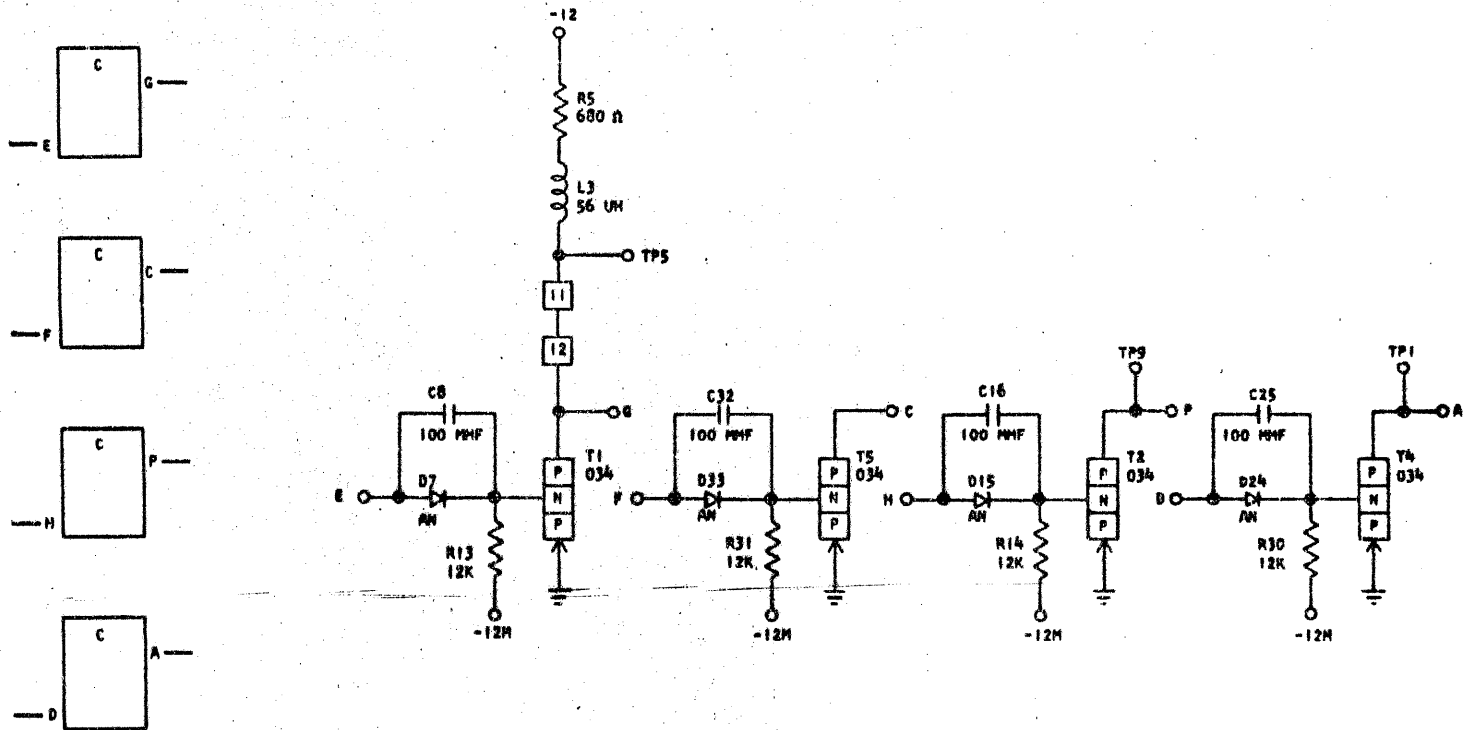
492739

COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD			
APPROVAL		DATE	
ABC		4-2-62	

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - DRIFT-DRIVER, RESISTOR				6-29-62	115599					729930
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

CTDL HIGH SPEED ONE WAY PNP ONE LOAD



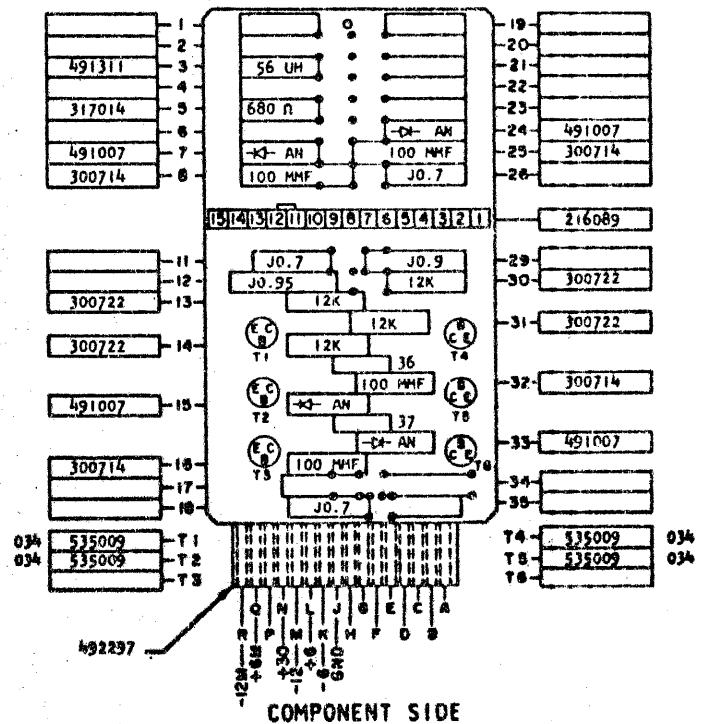
SEQUENCE OF OPERATION

1. WHEN THE INPUT IS UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN.
2. WHEN THE INPUT IS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP.
3. T2, T4, T5 MUST BE COLLECTOR LOADED.
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	T INPUT		UP 1.44	6.24
G, C, P, A	U OUTPUT		UP -.54	.24
			DOWN -.74	-6.24
			DOWN -7.44	-12.48

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.25
TURN OFF	0.10	0.40



COMPONENT SIDE

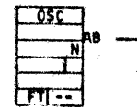
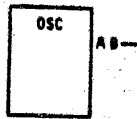
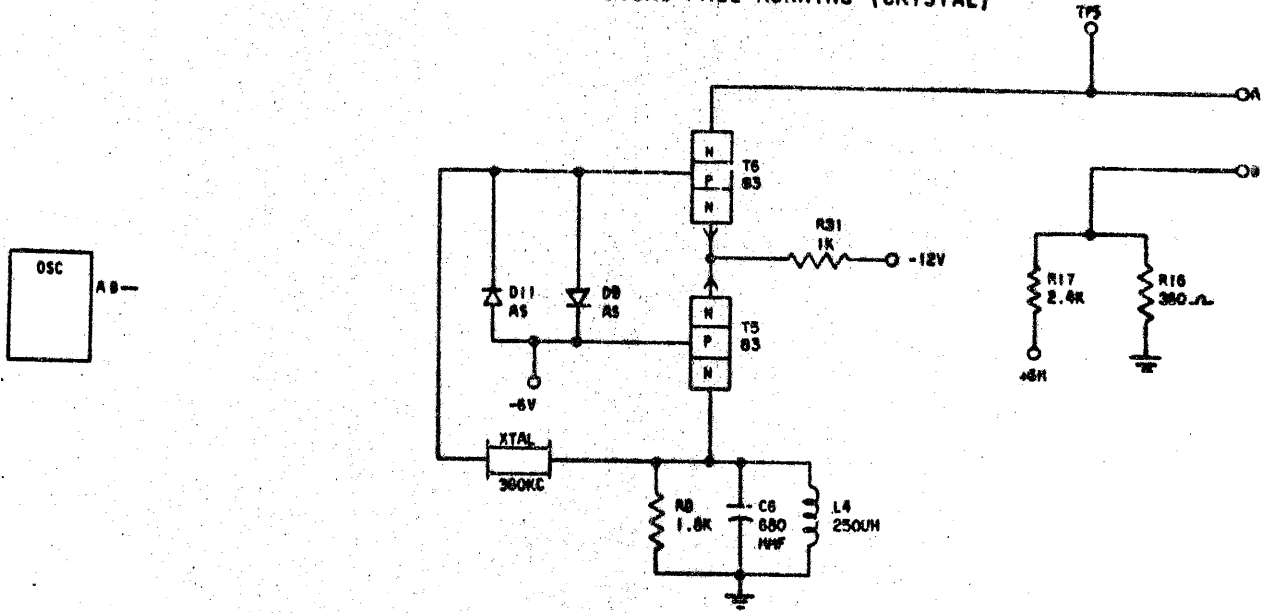
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.	DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL HIGH SPEED ONE WAY PNP ONE LOAD	3-1-62	115599					
DESIGN	MODEL	SMS					
DETAIL	RQ 3-1-62	SCALE NONE					
CHECK	WH 3-1-62	DRAW LIG 3-17-62					
APPRO		CHECK					

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371405

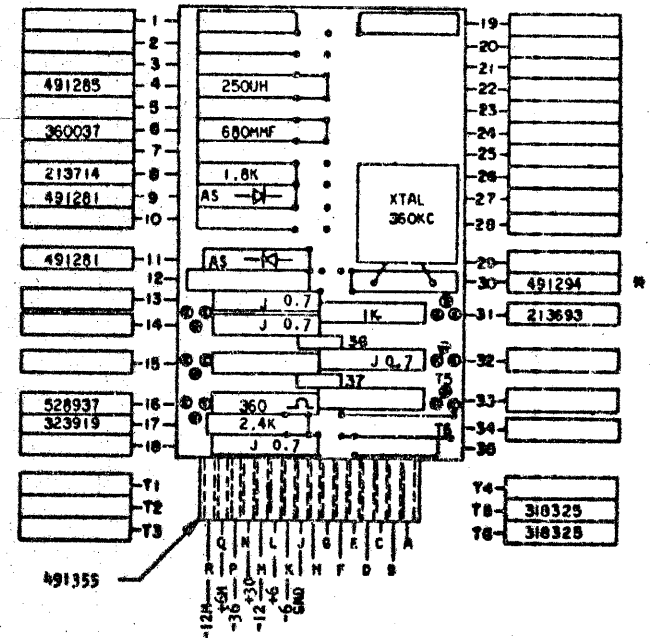
ALLOY - OSCILLATOR 360KC FREE RUNNING (CRYSTAL)



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON
2. PIN A MUST BE TIED TO PIN B

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			HIN	MAX
A	OUTPUT		UP	.697 .86
			DOWN	-.92 -2.94



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

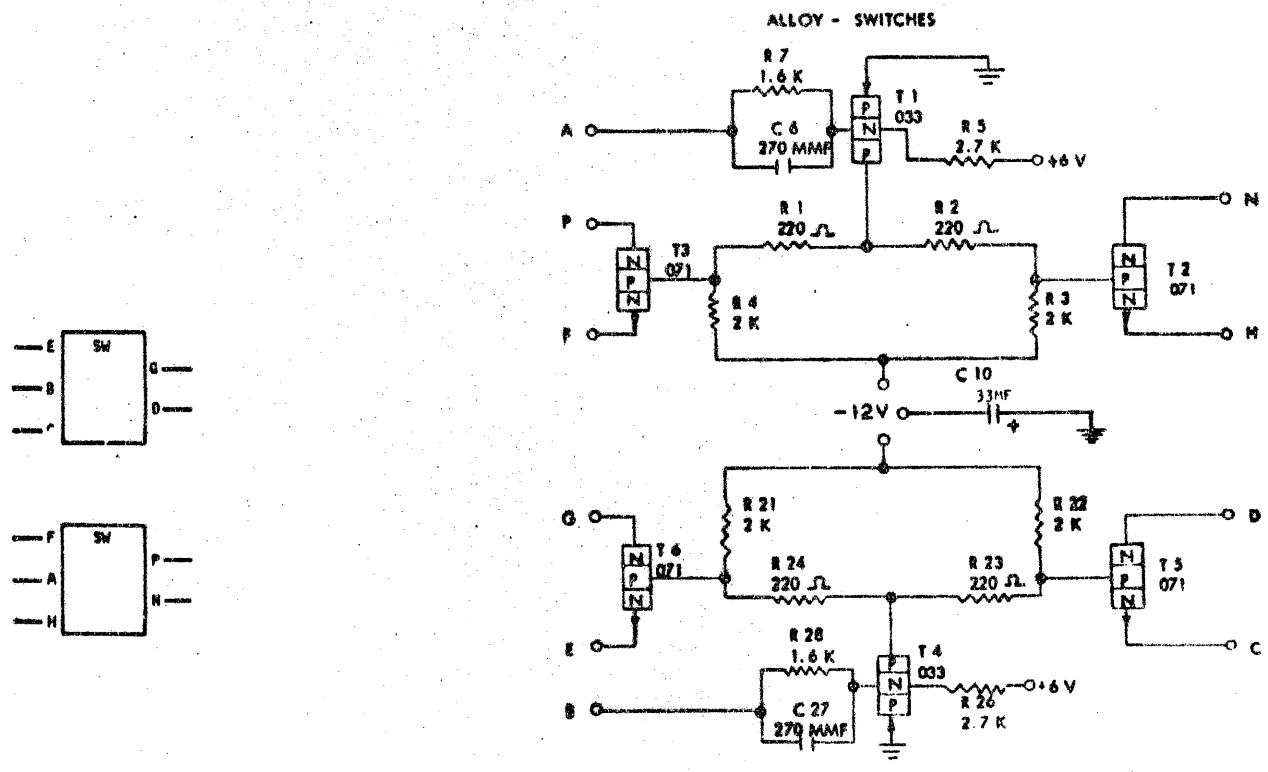
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.		
NAME	CARD ASH TSTR - ALLOY	DATE	6/29-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.		
OSC.	F/R NPN 360KC (CRYSTAL)	DESIGN		MODEL	SMS	SCALE	NONE	CHECK	WH	3-1-62	SCALE	NONE
DETAIL	RQ	3-1-62	SCALE	NONE	CHECK	WH	3-1-62	DRAW	L18	3-17-62	APPRO	
APPRO												

729861

STANDARD CODE

CARD CODE 729861  
FW --

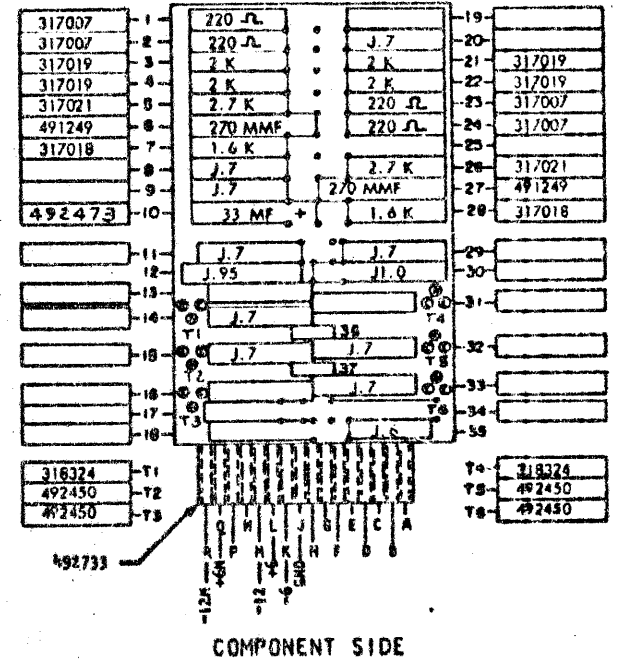
REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371490



SEQUENCE OF OPERATION

1. COLLECTORS OF T3, T2, T6, T5 ARE TIED TO +6 THRU A TERMINATING RESISTOR CARD AND THEIR EMITTERS ARE TIED TO CURRENT DRIVER SOURCE CARD THRU WINDINGS IN CORE ARRAY.
2. A DOWN INPUT AT A WILL TURN T1 ON AND T3 OR T2 DEPENDING ON WHICH TRANSISTOR IS SUPPLIED EMITTER CURRENT FROM CURRENT DRIVER CARD.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, B	INPUT		UP -0.2	DOWN +0.3
			DOWN -5.6	-12



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR - ALLOY - SWITCHES				6-29-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK			DRAW	L10 D-17-62						
APPRO			CHECK							

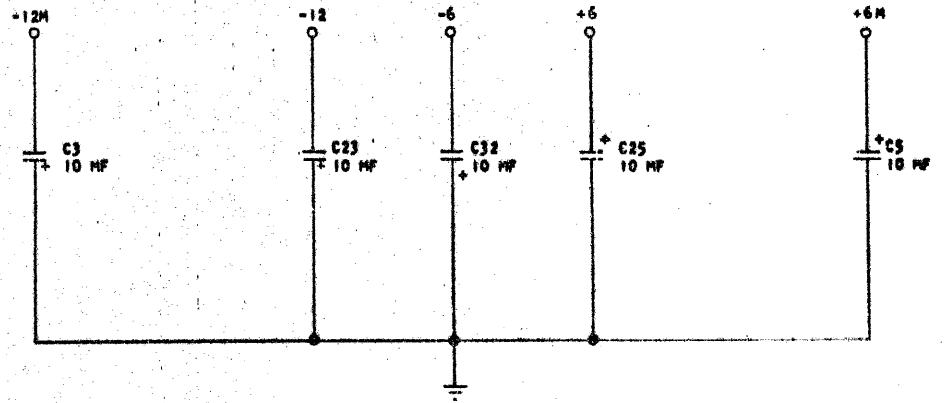
729861

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371501

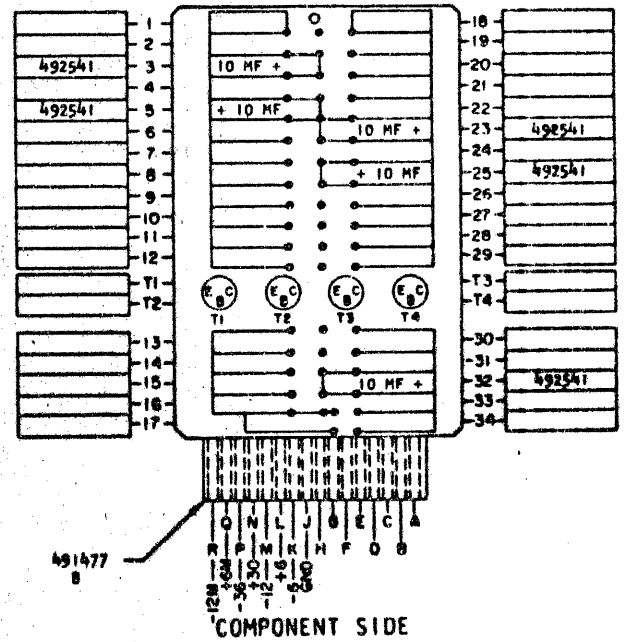
GENERAL PURPOSE FILTER CARD

FILT



APPLICATION

- 1. THIS CARD USED TO FILTER SUPPLY VOLTAGES TO GROUND POTENTIAL



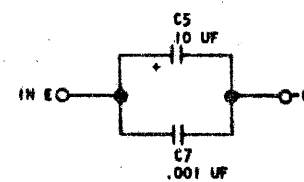
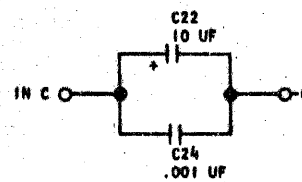
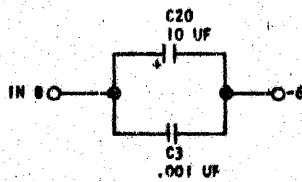
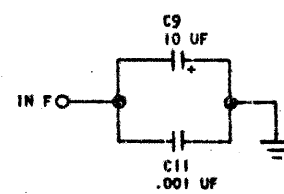
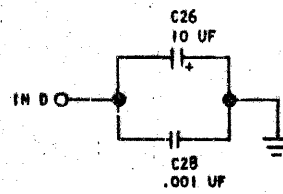
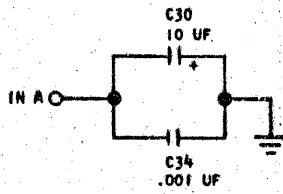
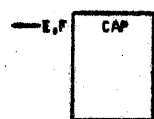
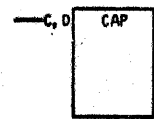
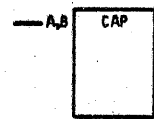
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR- GENERAL PURPOSE FILTER CARD	4-27-62	115599					
DESIGN								
DETAIL	RQ 3-1-62	SCALE	NONE					
CHECK	WH 3-1-62	DRAW	LIG 3-17-62					
APPRO		CHECK						

# REFERENCE DRAWING

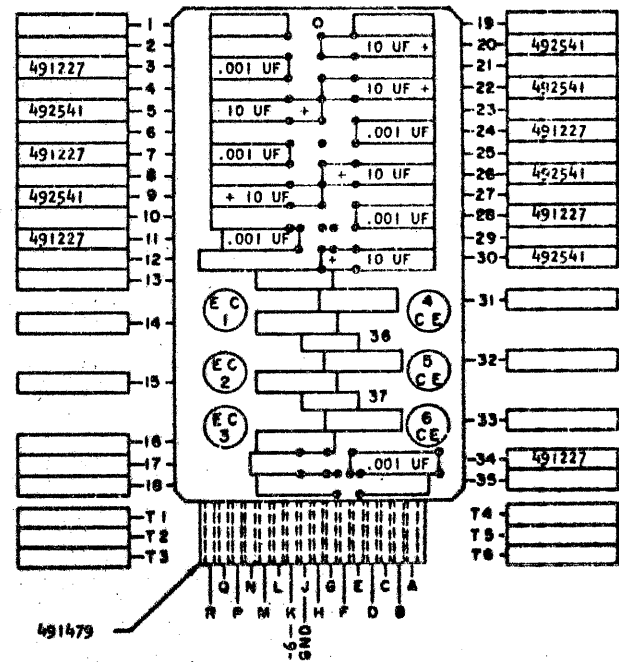
SEE PRODUCTION DRAWING 371533

## CABLE DE COUPLE CARD



### SEQUENCE OF OPERATION

1. CARD DECOUPLES THE NEUTRAL WIRE OF A TWISTED PAIR OR THE SHIELD OF A COAXIAL CABLE



COMPONENT SIDE

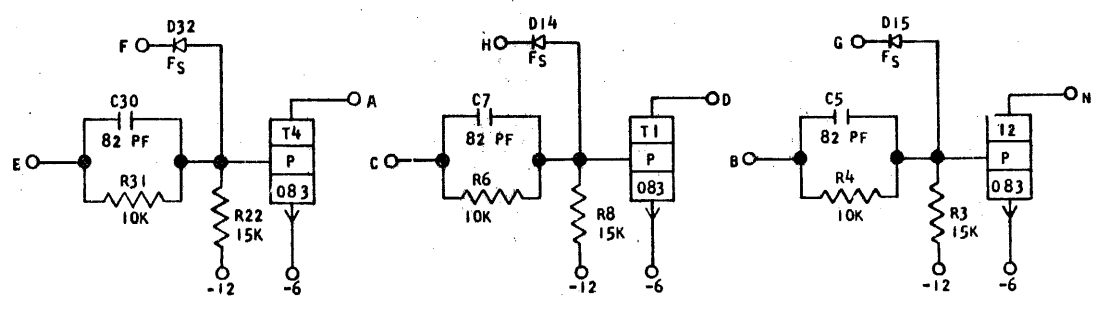
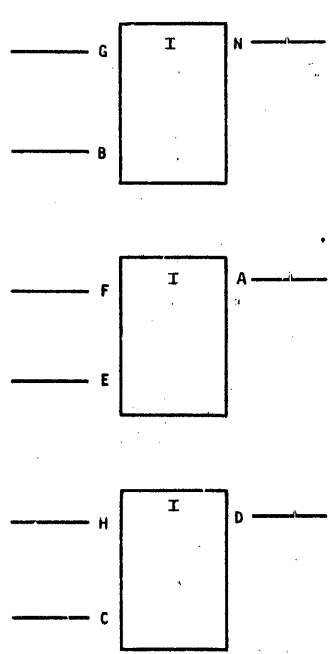
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CABLE		6-27-62	115599					
DESIGN DE COUPLE CARD								
MODEL	SMS							
SCALE	NONE							
SCALE	LIG 3-17-62							
CHECK	WH							
APPRO	CHECK							

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371561

## CAP SENSE AMPLIFIER - NO LDS



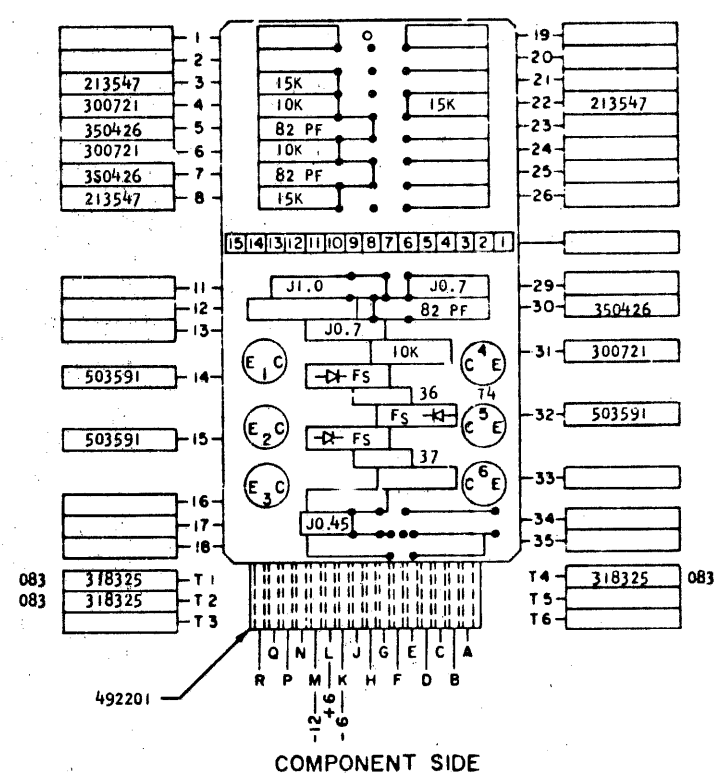
### SEQUENCE OF OPERATION

1. GATE AND SIGNAL UP, TRANSISTOR ON, DOWN OUTPUT
2. GATE OR SIGNAL DOWN, TRANSISTOR OFF, UP OUTPUT
3. INPUT DOWN, TRANSISTOR OFF, OUTPUT UP.
4. INPUT UP, TRANSISTOR ON, OUTPUT DOWN.
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PIN	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, E, C	INPUT SIGNAL		UP	+1.44	+6.24
			DOWN	-5.46	-6.24
G, F, H	INPUT GATE		UP	-5.46	+0.24
			DOWN	-7.44	-12.48
N, A, D	OUTPUT		UP	+1.44	+6.24
			DOWN	-5.46	-6.24

### DELAYS - USEC

	MINIMUM	MAXIMUM
TURN ON	0	0.07
TURN OFF	0.20	0.55



### COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CAP SENSE		3-25-64	120123	<i>[Signature]</i>	9-15-64	121922		
AMPLIFIER - NO LDS								
DESIGN								
DETAIL								
CHECK								
APPRO								

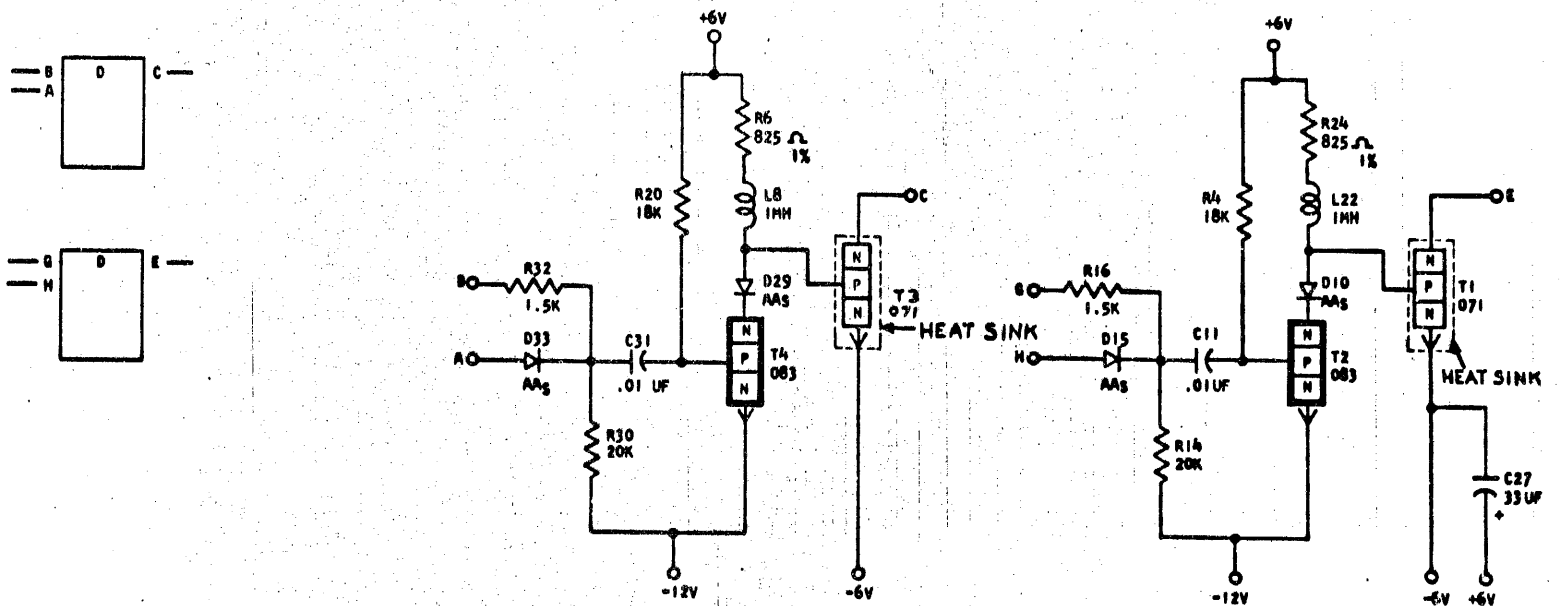




REFERENCE DRAWING

SEE PRODUCTION DRAWING 371463

ALLOY-DRIVERS, READ WRITE VM

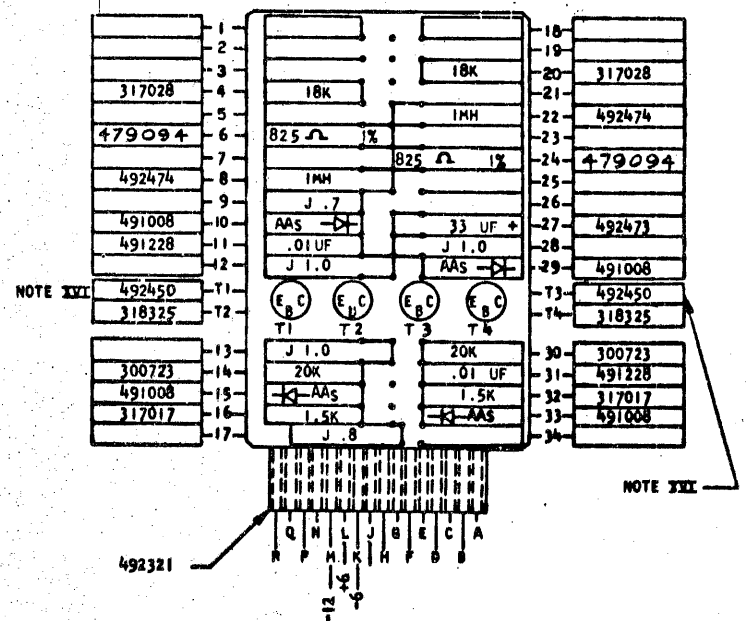


SEQUENCE OF OPERATION

1. T4, T2 ON; T3, T1 OFF
2. DOWN INPUT AT B 0.5 U SEC BEFORE DOWN INPUT AT A TURNS T4 OFF T3 ON
3. WAVE FORM AT C OR E NOT SHOWN AS THE FUNCTION OF T1 AND T3 IS CURRENT OUTPUT
4. DELAY  

	MAXIMUM
TURN ON	.3 USEC
TURN OFF	.37 USEC

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, G	U INPUT GATE		UP	-0.54	0.24
			DOWN	-7.44	-12.5
A, H	U INPUT SET		UP	0.0	-0.1
			DOWN	-11.5	-12.5
INPUT OF	BASE T1, T3		UP	-5.8	
			DOWN	-11.8	



COMPONENT SIDE

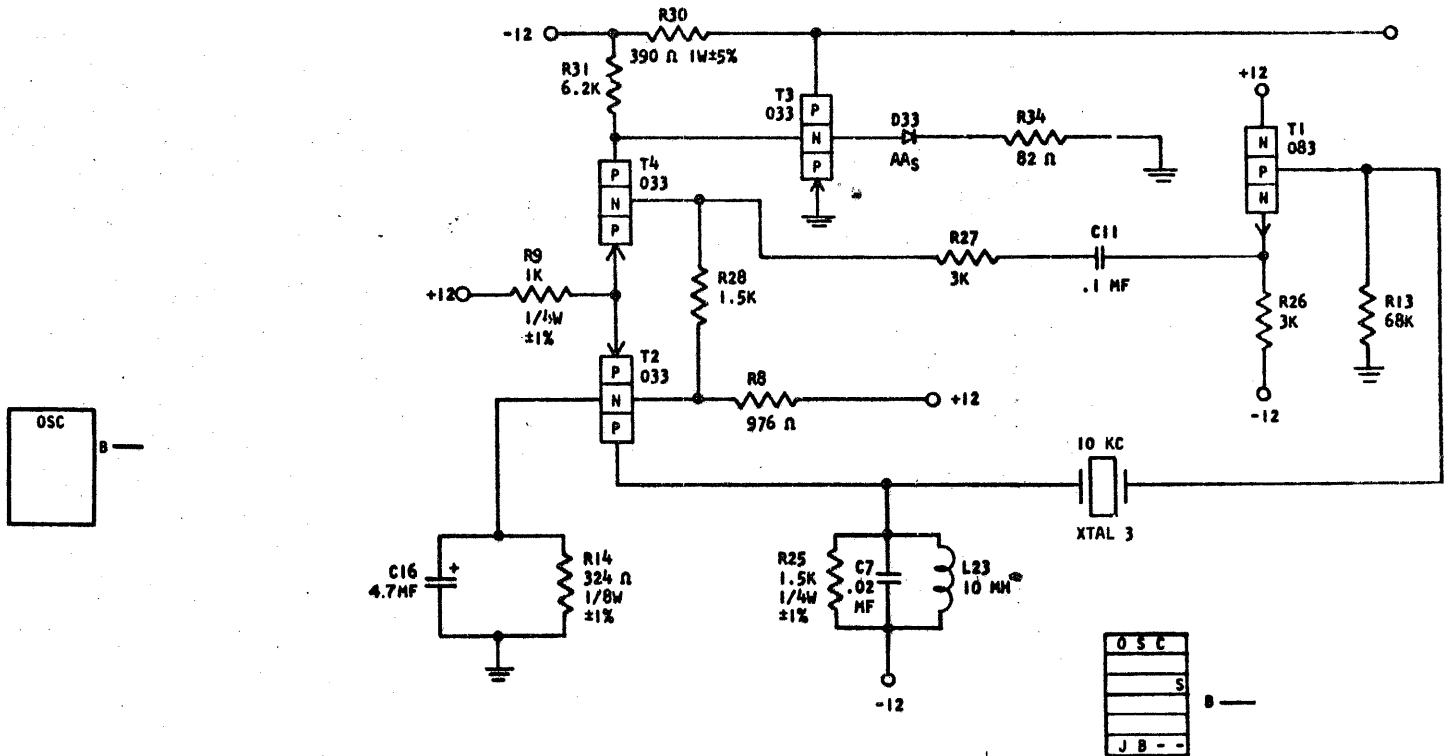
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - ALLOY		6-27-62	115599					729863
DRIVERS - READ WRITE VM								
DESIGN	RQ	3-1-62	SCALE	SMS				
DETAIL	WH	3-1-62	SCALE	NONE				
CHECK	WH	3-1-62	DRAW	L10	3-17-62			
APPRO			CHECK					

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371245

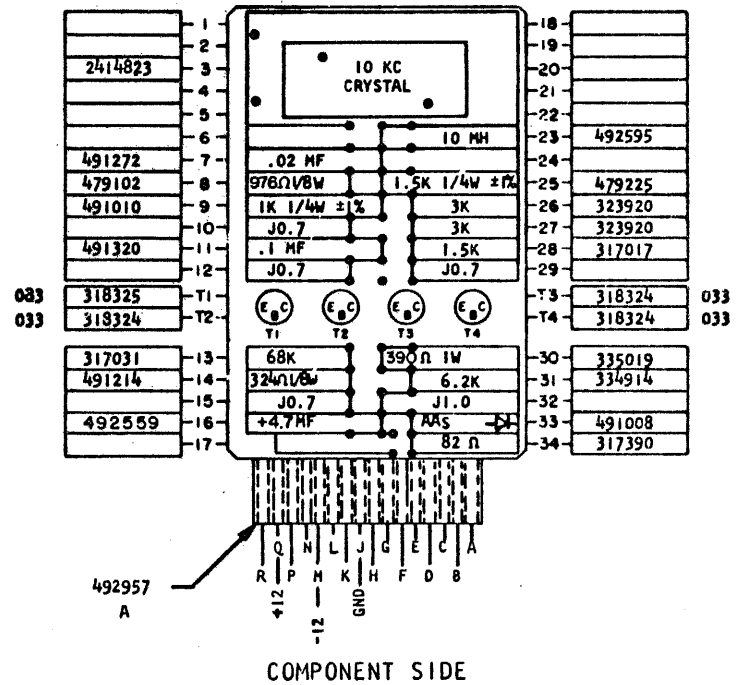
CTRL-OSCILLATOR, 10 KC FREE RUNNING (CRYSTAL)



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, OSCILLATOR TURNS ON

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B	S	OUTPUT	UP	0	-2
			DOWN	-11.8	-12.12



COMPONENT SIDE

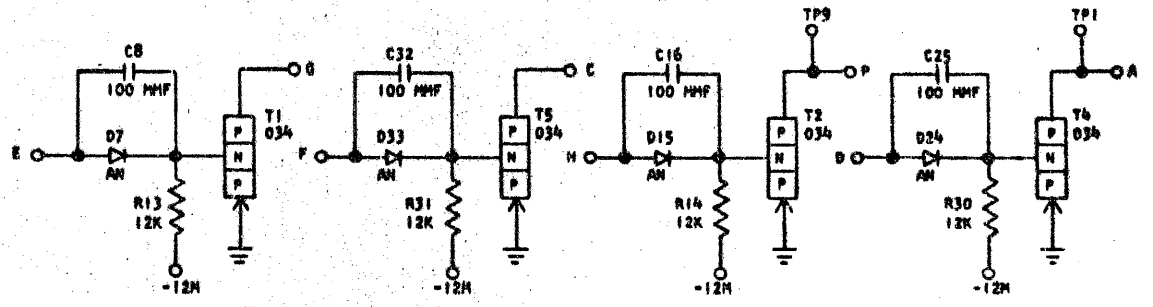
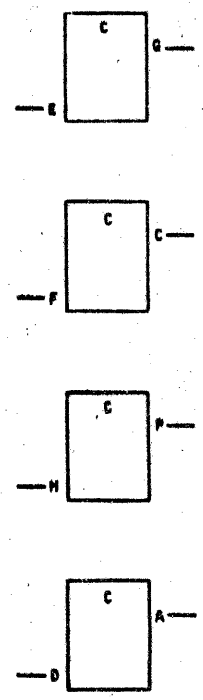
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - CTRL OSC.	DATE	2-9-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
	10KC FREE RUNNING CRYSTAL	DATE	8-28-63	CHANGE NO.	117802	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN		MODEL	SMS	DATE	12-29-64	CHANGE NO.	120699	APPROVAL	GLK	DEVELOPMENT NO.
DETAIL	RQ	SCALE	NONE							
CHECK	WH	DRAW	LIG	3-17-62						
APPRO		CHECK								

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371579

CTDL - HIGH SPEED ONE WAY PNP NO LOADS



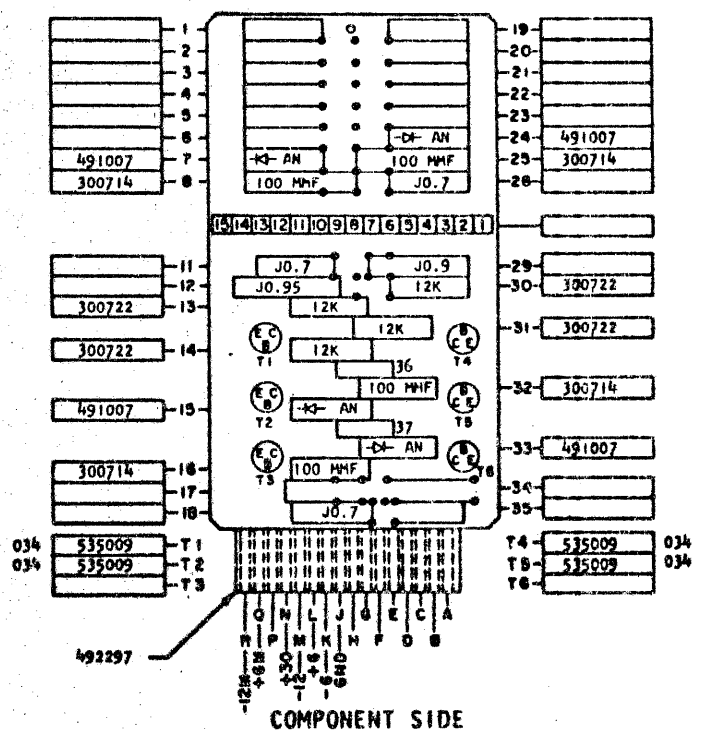
SEQUENCE OF OPERATION

1. WHEN THE INPUT IS UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. WHEN THE INPUT IS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP
3. ALL OUTPUTS MUST BE COLLECTOR LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	T INPUT		UP	1.44 6.24
G, C, P, A	U OUTPUT		DOWN	-7.44 -6.24
			UP	-7.54 -.24
			DOWN	-7.44 -12.48

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.25
TURN OFF	0.10	0.40



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL - HIGH				6-28-62	115599					729864
SPEED 1 WAY PNP NO LOADS										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L18	3-17-62					
APPRO			CHECK							

729859

STANDARDS CODE

CARD CODE

729859

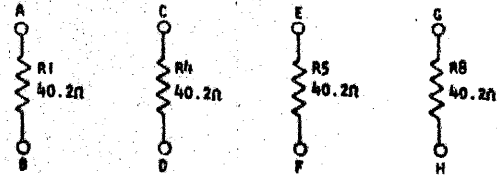
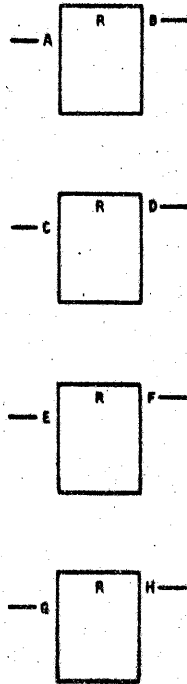
FP --

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371453

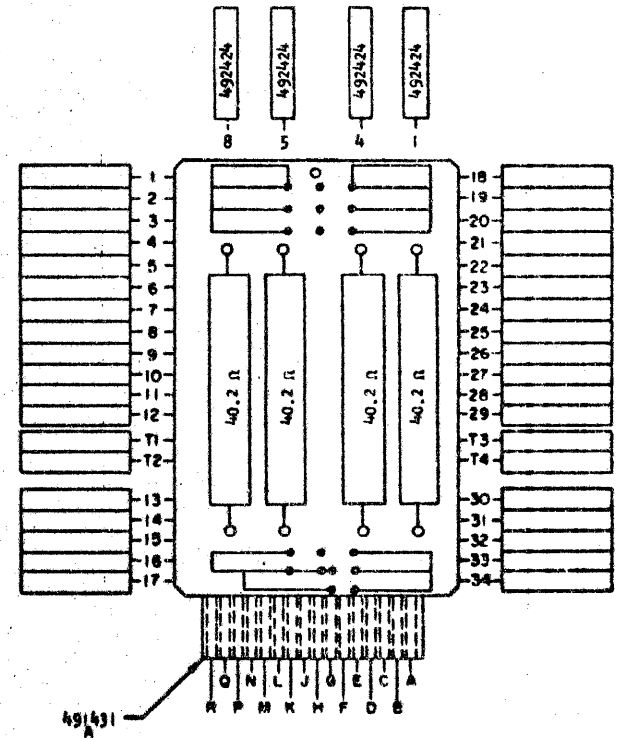
ALLOY - LOAD RESISTOR - 40.2Ω 2W

MOUNT CARD ON ONE INCH CENTERS NOTE XXX



APPLICATION

- 1. USED AS TERMINATING RESISTOR PRINT BUFFER ARRAY



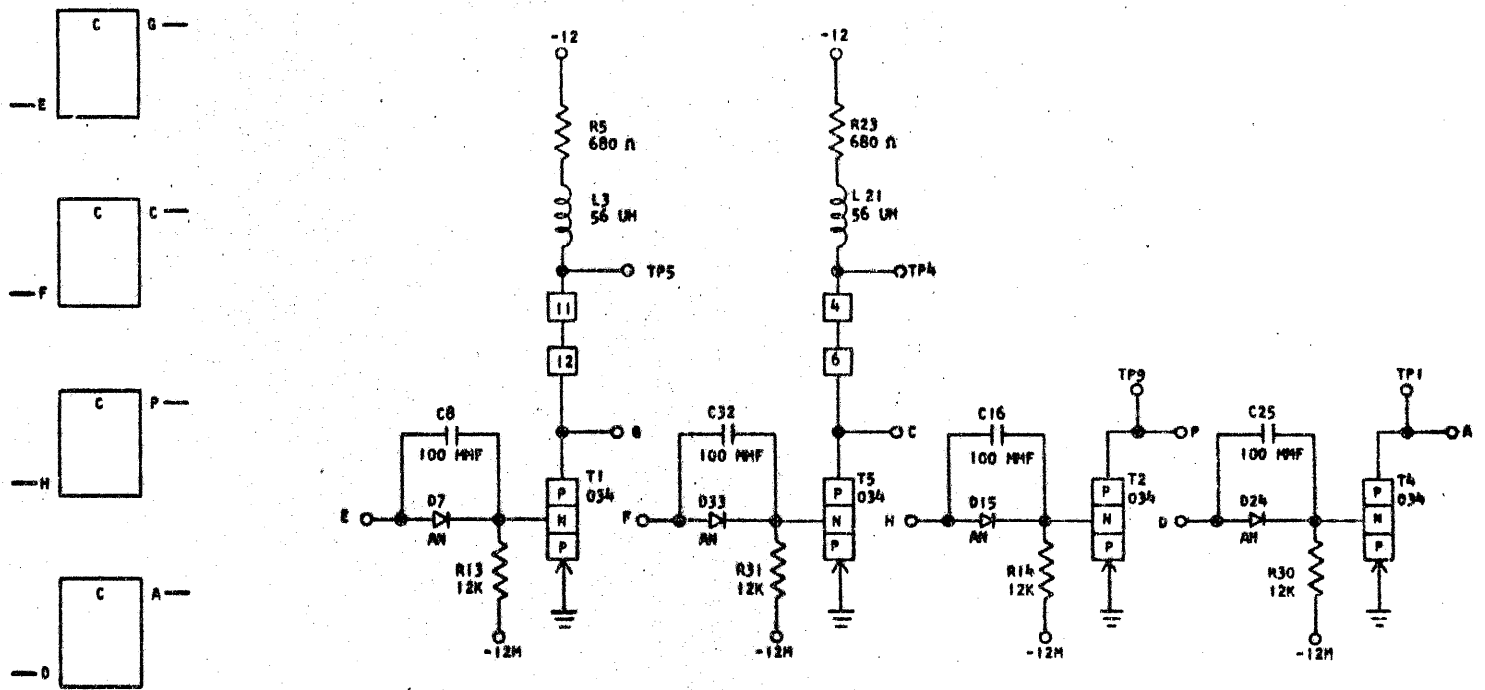
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - ALLOY				6-27-62	115592					729859
LOAD RESISTOR 40.2Ω 2W										
DESIGN	RQ	3-1-62	SCALE	NONE						
DETAIL	WH	3-1-62	DRAW	LIG	3-17-62					
CHECK										
APPRO			CHECK							

C

CTDL HIGH SPEED ONE WAY PNP TWO LOADS



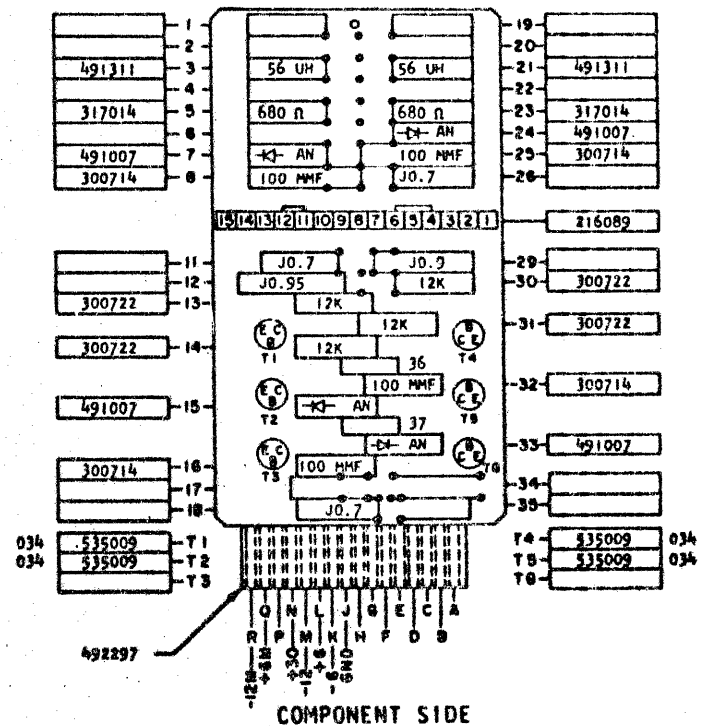
SEQUENCE OF OPERATION

1. WHEN THE INPUT IS UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. WHEN THE INPUT IS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP
3. T2, T4 COLLECTORS MUST BE LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D	T INPUT		UP	1.44	6.24
			DOWN	-0.74	-6.24
G, C, P, A	U OUTPUT		UP	-0.54	0.24
			DOWN	-7.44	-12.44

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.25
TURN OFF	0.10	0.40



COMPONENT SIDE

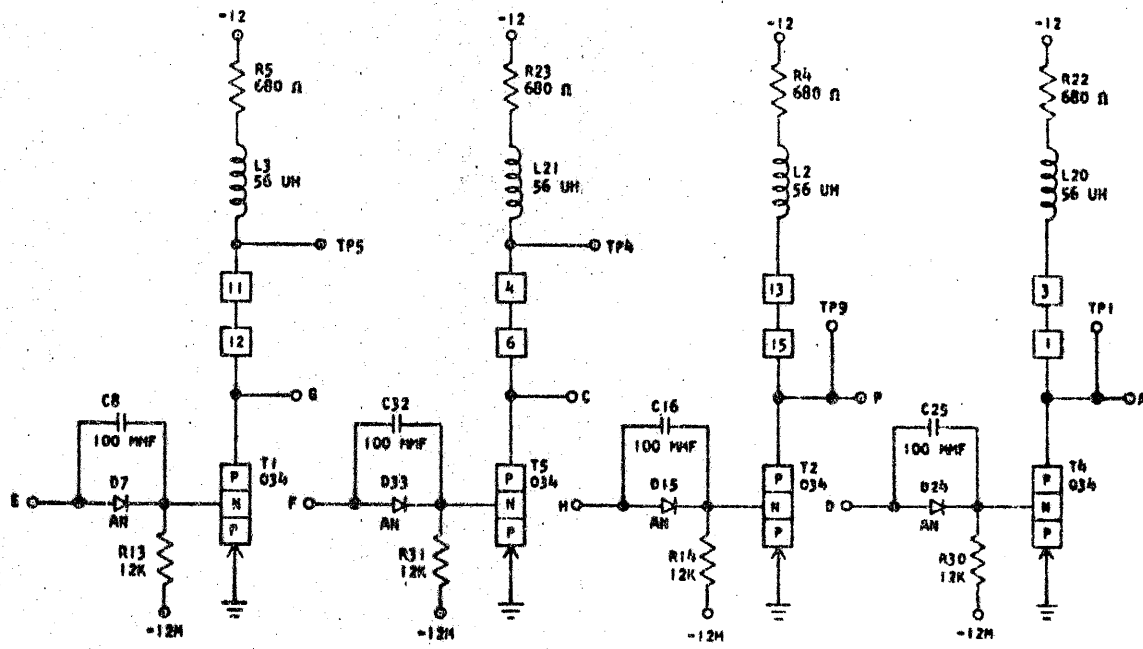
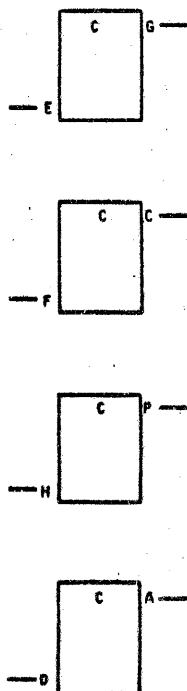
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR- CTDL HIGH	4-27-62	115599					
DESIGN	MODEL SMS							
DETAIL	RQ 3-1-62 SCALE NONE							
CHECK	WH 3-1-62 DRAW LIG 3-17-62							
APPRO	CHEK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371576

CTDL HIGH SPEED ONE WAY PNP ALL LOADS



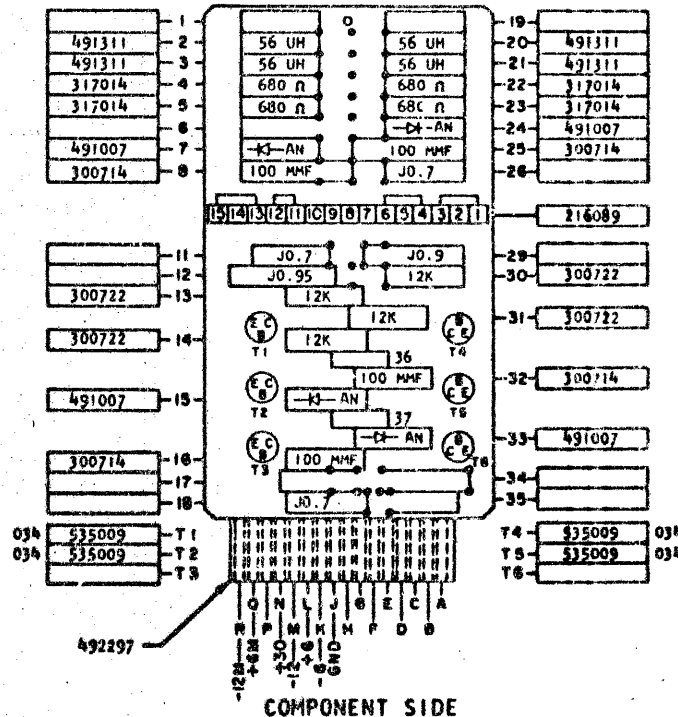
SEQUENCE OF OPERATION

1. WHEN THE INPUT IS UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. WHEN THE INPUT IS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
E, F, H, D	T INPUT	[Waveform: High pulse]	UP	1.44 6.24
			DOWN	-.74 -6.24
G, C, P, A	U OUTPUT	[Waveform: Low pulse]	UP	-.54 .24
			DOWN	-7.44 -12.48

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.25
TURN OFF	0.10	0.40



COMPONENT SIDE

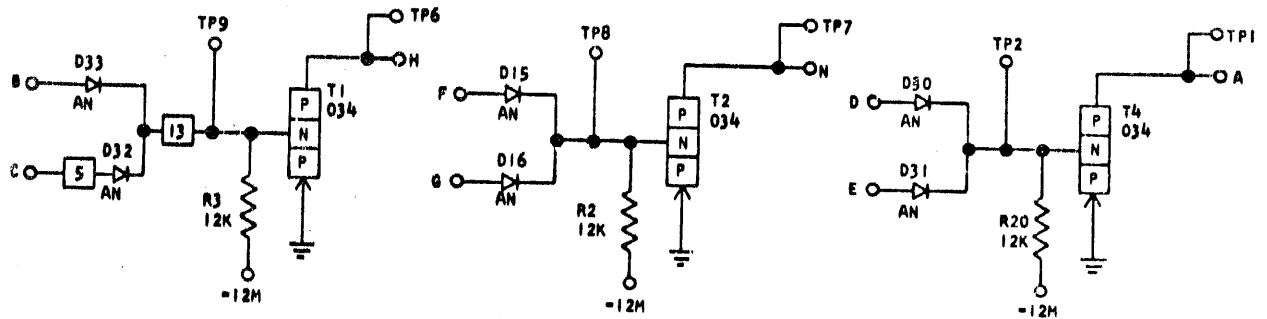
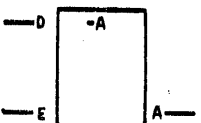
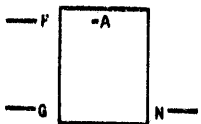
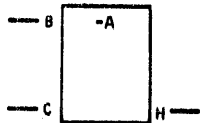
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL HIGH SPEED ONE WAY PNP ALL LOADS				4-27-62	115599					729867
DESIGN	RQ	3-1-62	MODEL	SHS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPD			CHECK							

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371583

## CTDL HIGH SPEED - TWO WAY "AND" PNP NO LOADS



### SEQUENCE OF OPERATION

1. ANY INPUT UP, TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP
3. ALL OUTPUTS MUST BE COLLECTOR LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

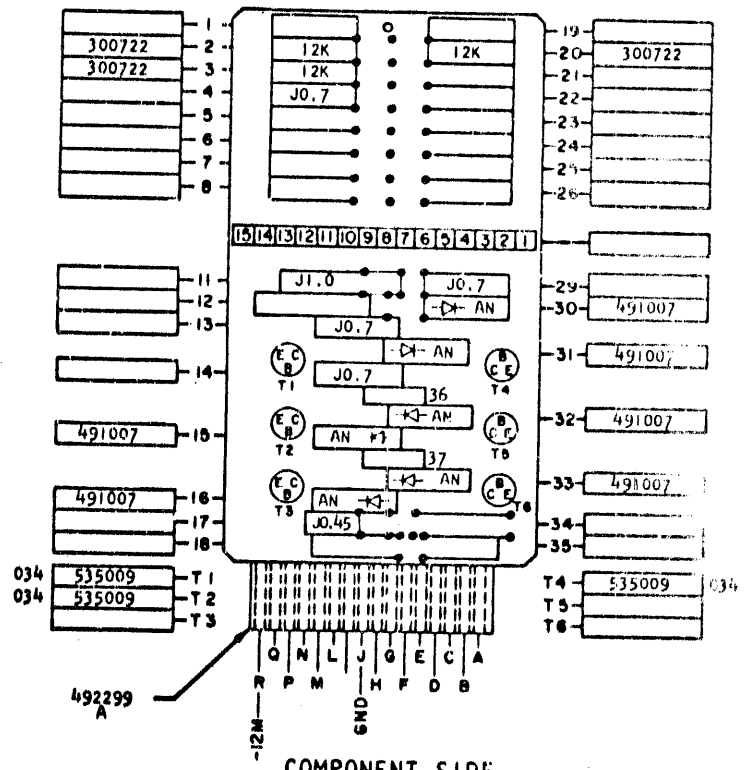
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B, F, D, C, G, E	T	INPUT	UP	+1.4V -0.74	+6.2V -6.2V
H, N, A	U	OUTPUT	UP	-0.54	+2.4V
			DOWN	-7.44	-12.48

### DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



### COMPONENT SIDE

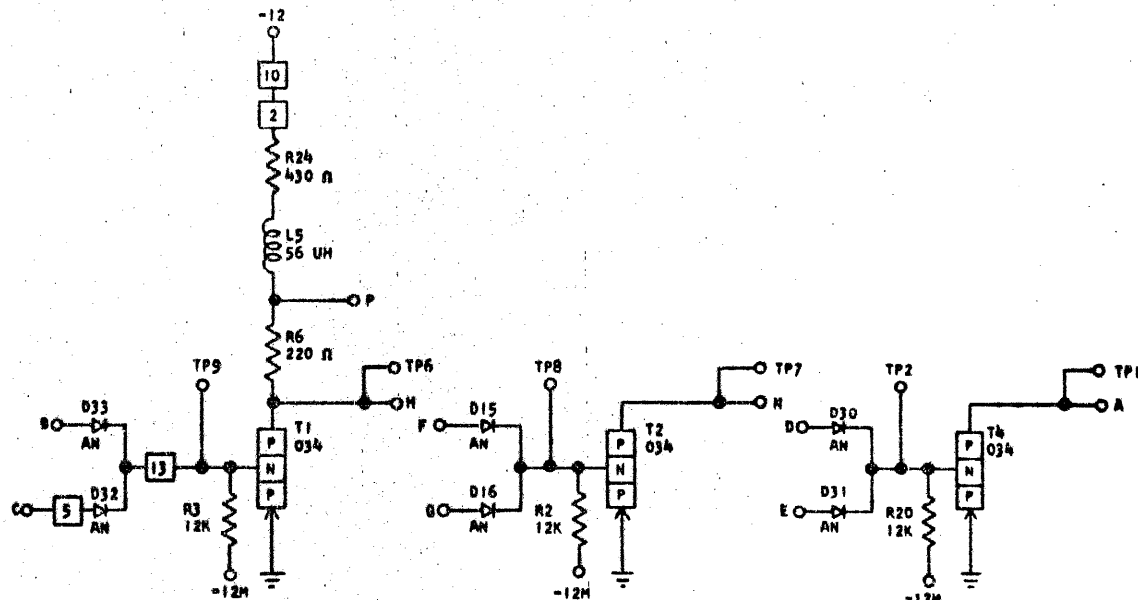
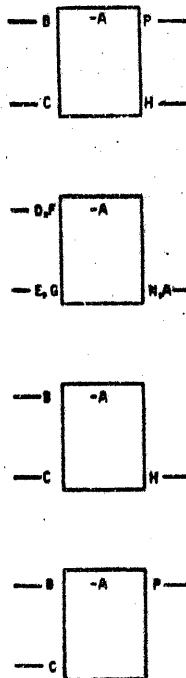
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL HIGH	DATE	6-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	MODEL SMS	CHECK	WH	DRAW	LIQ 3-17-62	APPRO				
DETAIL	RQ 3-1-62	SCALE	NONE							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371582

CTDL HIGH SPEED-TWO WAY "AND" PNP ONE LOAD



SEQUENCE OF OPERATION

1. ANY INPUT UP, TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, THE TRANSISTOR IS ON THE OUTPUT IS UP
3. T2, T4 MUST BE COLLECTOR LOADED
4. PIN P IS CURRENT MODE OUTPUT
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

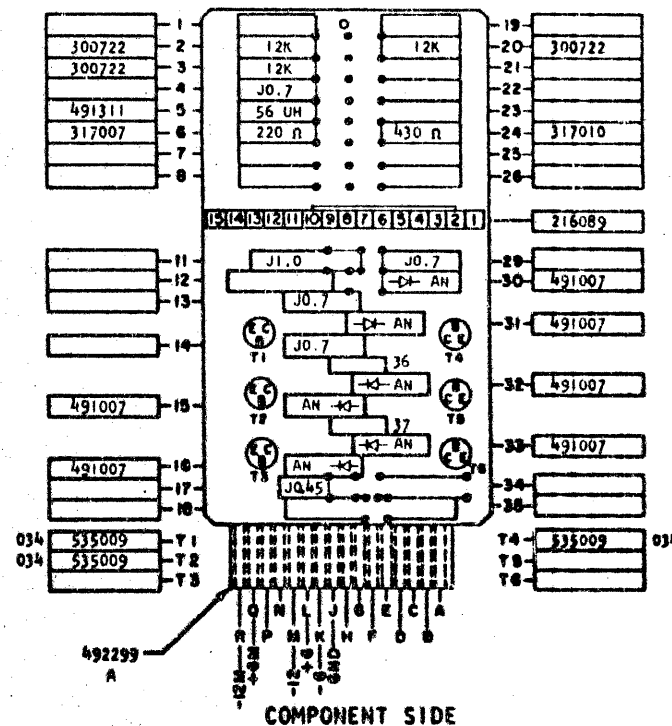
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, C	T	INPUT	UP	+1.44 +6.24
			DOWN	-0.74 -6.24
H	U	OUTPUT	UP	-0.54 +2.24
			DOWN	-7.44 -12.48
P	P	OUTPUT	UP	-4.93 -3.54
			DOWN	-8.82 -12.48
D, F, E, G	T	INPUT	UP	+1.44 +6.24
			DOWN	-0.74 -6.24
H, A	U	OUTPUT	UP	-0.54 +2.24
			DOWN	-7.44 -12.48

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".

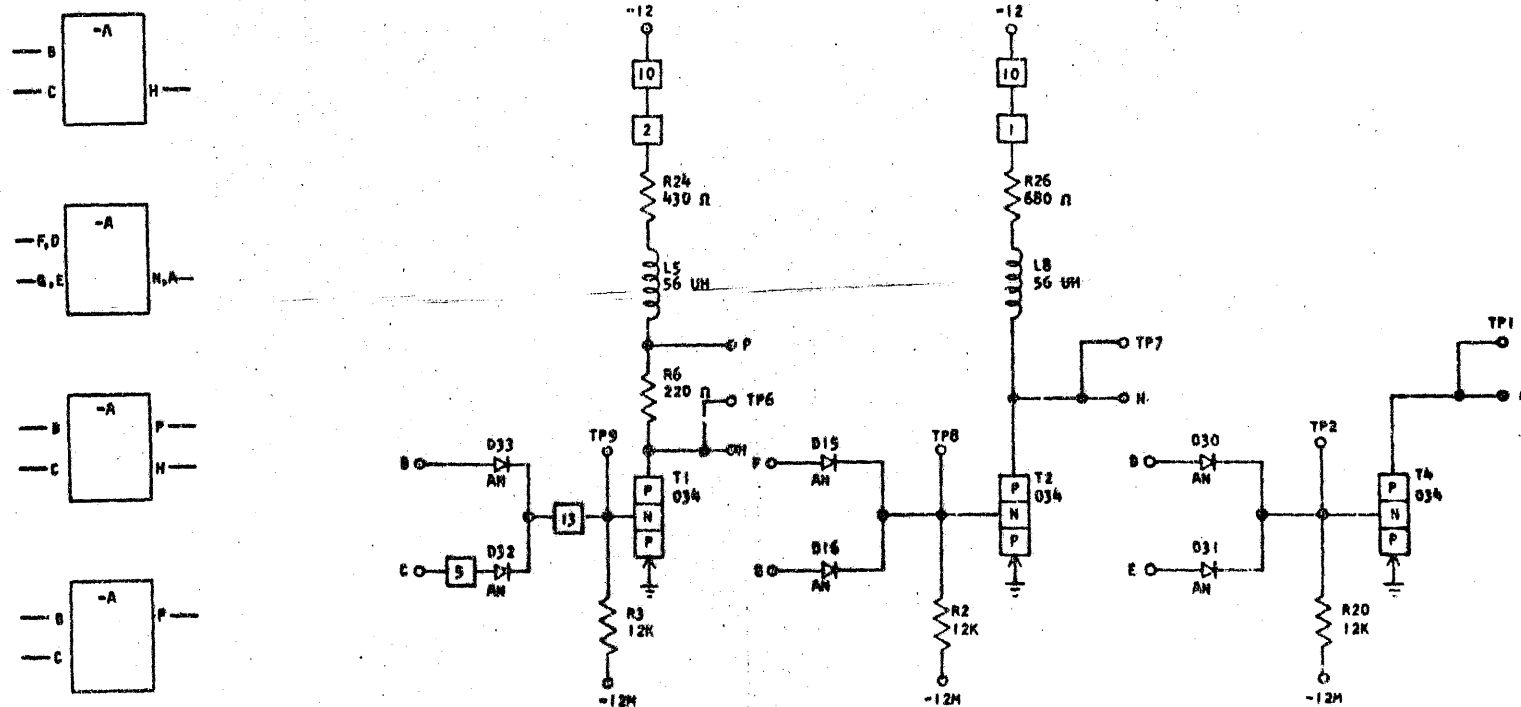


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR- CTDL HIGH	DATE	6-29-62	CHANGE NO.	115399	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ	MODEL	SMS							
DETAIL	RQ	SCALE	NONE							
CHECK	WH	DRAW	LIG	3-17-62						
APPRO		CHECK								



CTDL HIGH SPEED - TWO WAY "AND" PNP TWO LOADS



SEQUENCE OF OPERATION

1. ANY INPUT UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, THE TRANSISTOR IS ON, THE OUTPUT IS UP
3. T4 MUST BE COLLECTOR LOADED
4. PIN P IS CURRENT MODE OUTPUT
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

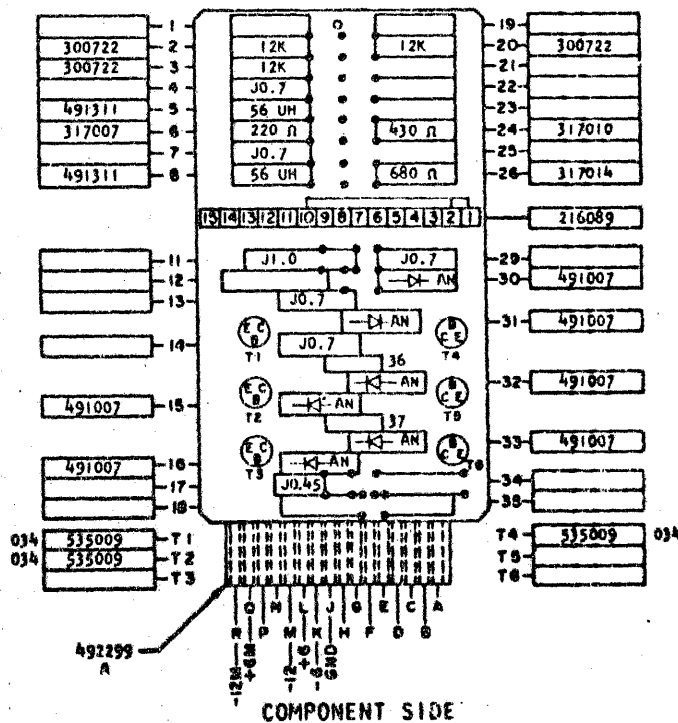
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B,C	T INPUT	[Waveform]	UP	+1.44 +6.24
H	U OUTPUT	[Waveform]	UP	-.54 +.24
P	P OUTPUT	[Waveform]	UP	-4.93 -3.54
F,D	T INPUT	[Waveform]	UP	+1.44 +6.24
H	U OUTPUT	[Waveform]	UP	-.54 +.24
D,E	T INPUT	[Waveform]	UP	+1.44 +6.24
A	U OUTPUT	[Waveform]	UP	-.54 +.24

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.



COMPONENT SIDE

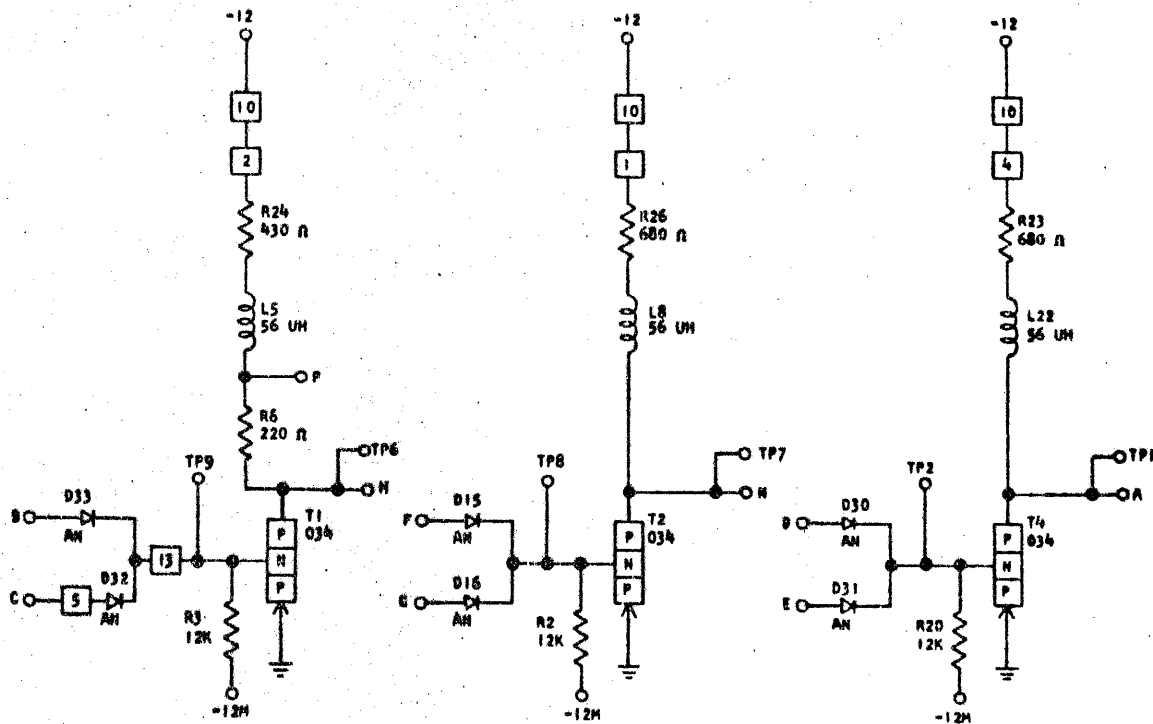
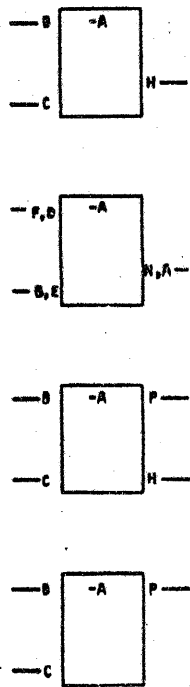
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL HIGH	DATE	6-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	RQ 3-1-62	SCALE	NONE							
DETAIL	WH 3-1-62	DRAW	LIG 3-1-62							
CHECK										
APPRO										

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371580

CTDL HIGH SPEED-TWO WAY "AND" PNP ALL LOADS



SEQUENCE OF OPERATION

1. ANY INPUT UP, TRANSISTOR OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, TRANSISTOR ON, THE OUTPUT IS UP
3. PIN P IS CURRENT MODE OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

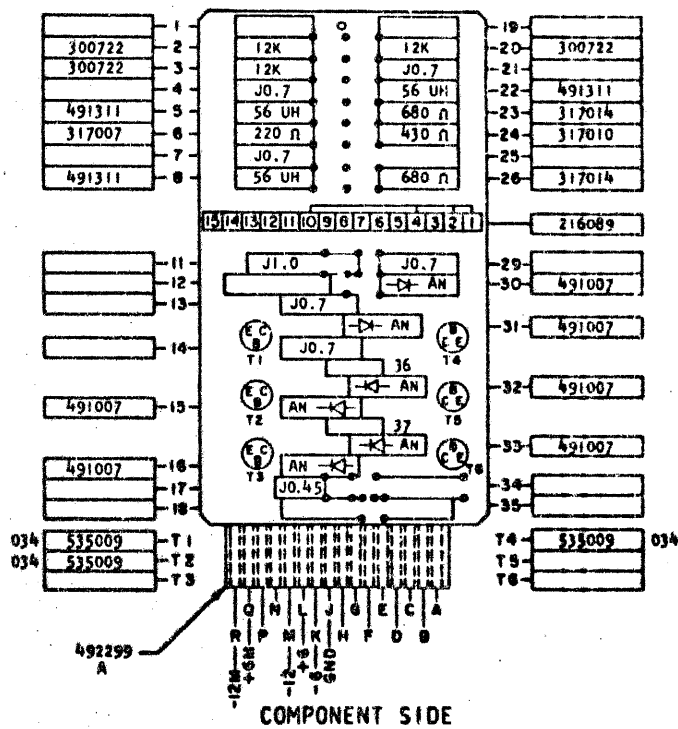
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
B,C	T INPUT		UP	+1.44	+6.24
			DOWN	-.74	-6.24
H	U OUTPUT		UP	-.54	+2.4
			DOWN	-7.44	-12.48
P	P OUTPUT		UP	-4.93	-3.54
			DOWN	-8.82	-12.48
F,D, B,E	T INPUT		UP	+1.44	+6.24
			DOWN	-.74	-6.24
A,N	U OUTPUT		UP	-.54	+2.4
			DOWN	-7.44	-12.48

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80*

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

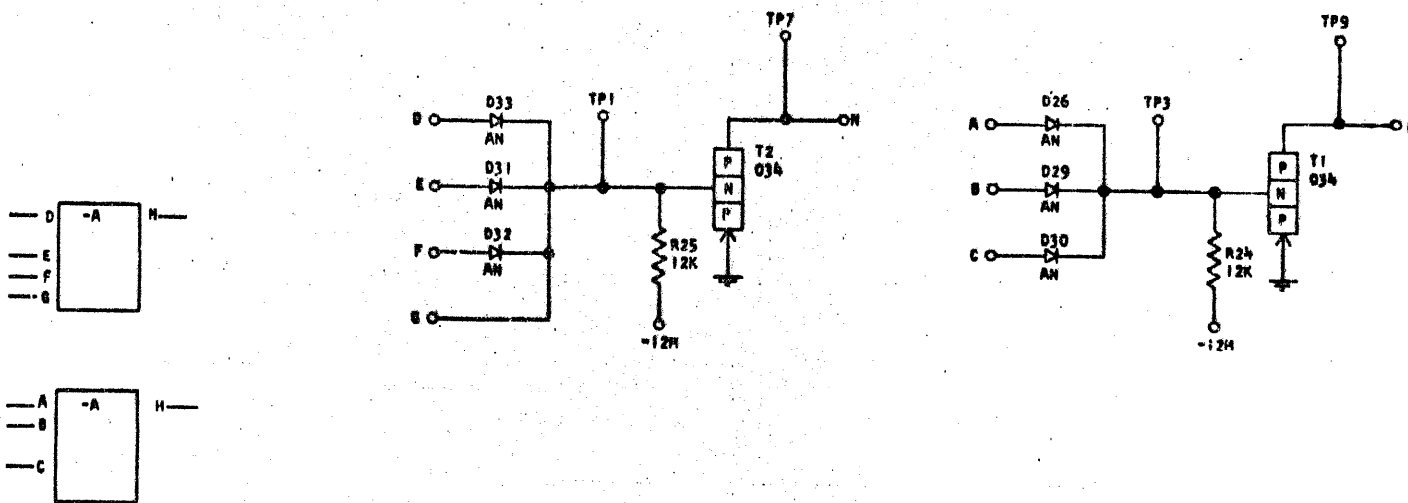
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	
NAME	CARD ASM TSTR-CYDL HIGH	DATE	6-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.	
DESIGN		MODEL	SMS								
DETAIL RQ	3-1-62	SCALE	NONE								
CHECK	WH 3-1-62	DRAW	LIG 9-17-62								
APPRO		CHECK									

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371586

CTDL HIGH SPEED 3-WAY "AND" NO LOADS



SEQUENCE OF OPERATION

1. ANY INPUT UP, TRANSISTOR OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, TRANSISTOR ON, THE OUTPUT IS UP
3. INPUTS ON EXTENDER INPUTS MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT
4. BOTH OUTPUTS MUST BE COLLECTOR LOADED
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

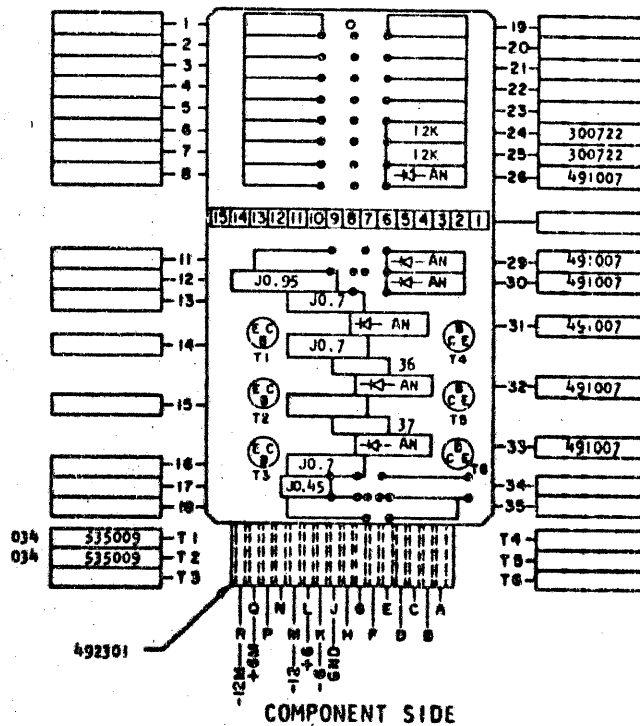
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
D, E, F	T INPUT		UP	+1.44	+6.24
			DOWN	-0.74	-6.24
N	U OUTPUT		UP	-0.54	+0.24
			DOWN	-7.44	-12.48
			UP		
A, B, C	T' INPUT		UP	+1.44	+6.24
			DOWN	-0.74	-6.24
H	U OUTPUT		UP	-0.54	+0.24
			DOWN	-7.44	-12.48
G	EXTENDER INPUT		UP	+6	
			DOWN	0.0	

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF 'OR'.



COMPONENT SIDE

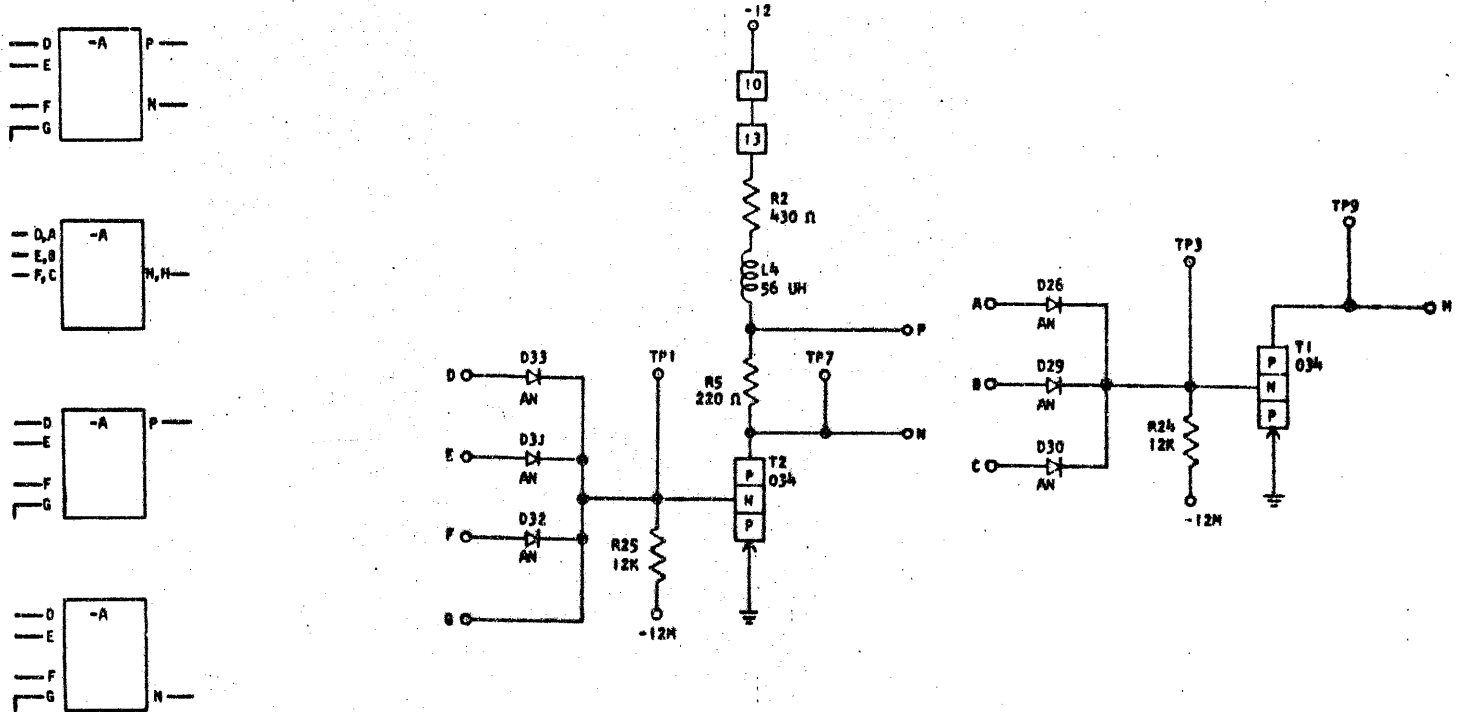
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM YSTR-CTDL HIGH	DATE	4-2-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
SPEED	3-WAY "AND" PNP NO LOADS									
DESIGN	RQ 3-1-62	MODEL	SMS							
DETAIL	WH 3-1-62	SCALE	NONE							
CHECK	LN 3-17-62	DRAW	L10							
APPRO		CHECK								

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371585

CTDL HIGH SPEED THREE WAY "AND" PNP ONE LOAD



SEQUENCE OF OPERATION

1. ANY INPUT UP, TRANSISTOR OFF, THE OUTPUT IS DOWN
2. ALL INPUTS DOWN, TRANSISTOR ON, THE OUTPUT IS UP
3. INPUTS ON EXTENDER CARD MUST BE DOWN IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT
4. T1 MUST BE COLLECTOR LOADED
5. PIN P IS CURRENT MODE OUTPUT
6. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

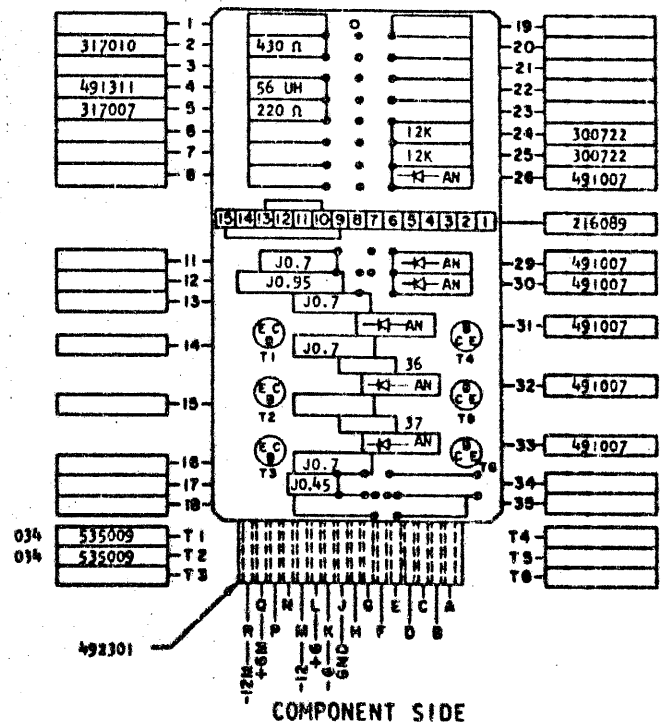
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
D, E, F	T INPUT		UP	+1.44	+6.24
			DOWN	-0.74	-6.24
N	U OUTPUT		UP	-0.54	+0.24
			DOWN	-7.44	-12.48
P	U OUTPUT		UP	-4.93	-3.54
			DOWN	-8.82	-12.48
A, B, C	T INPUT		UP	+1.44	+6.24
			DOWN	-0.74	-6.24
H	U OUTPUT		UP	-0.54	+0.24
			DOWN	-7.44	-12.48
G	EXTENDER INPUT		UP	+6	
			DOWN	0.0	

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING OF "OR".



COMPONENT SIDE

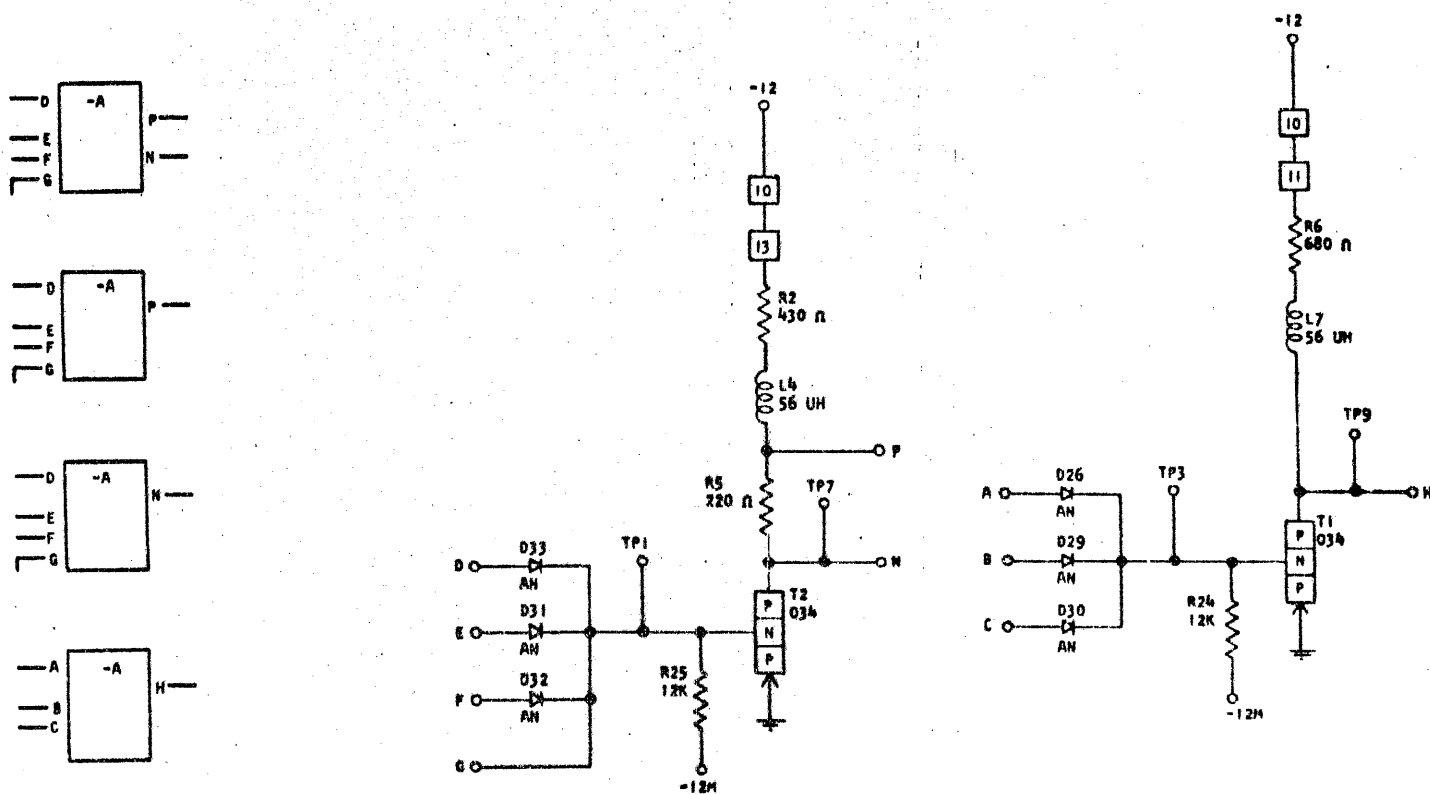
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL HIGH	DATE	6-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
SPEED	THREE WAY "AND" PNP ONE LD	DESIGN		MODEL	SMS	DETAIL	RQ 3-1-62	SCALE	NONE	
CHECK	WH 3-1-62	DRAW	LIG 3-17-62	APPRO		CHECK				

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371584

CTDL HIGH SPEED 3 - WAY "AND" PNP ALL LOADS



SEQUENCE OF OPERATION

1. ALL INPUTS DOWN, TRANSISTOR IS ON, THE OUTPUT IS UP
2. ANY ONE INPUT UP, THE TRANSISTOR IS OFF, THE OUTPUT IS DOWN
3. ALL INPUTS ON EXTENDER CARD MUST BE IN COINCIDENCE WITH INPUTS ON CARD FOR UP OUTPUT
4. PIN P IS CURRENT MODE OUTPUT
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

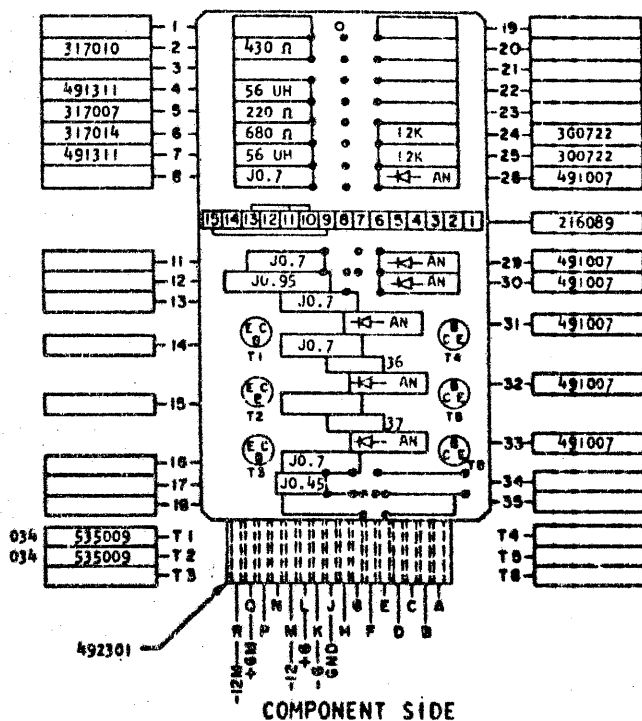
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, E, F	T INPUT	[Waveform: High then Low]	UP: 1.44	DOWN: -0.74
N	U OUTPUT	[Waveform: High then Low]	UP: -0.54	DOWN: -7.44
P	P OUTPUT	[Waveform: High then Low]	UP: -4.93	DOWN: -8.82
A, B, C	T INPUT	[Waveform: High then Low]	UP: 1.44	DOWN: -0.74
H	U OUTPUT	[Waveform: High then Low]	UP: -0.54	DOWN: -7.44
G	EXTENDER INPUT	[Waveform: High then Low]	UP: +6	DOWN: 0.0

DELAY

	MINIMUM	MAXIMUM
TURN ON	0.15	0.50
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



COMPONENT SIDE

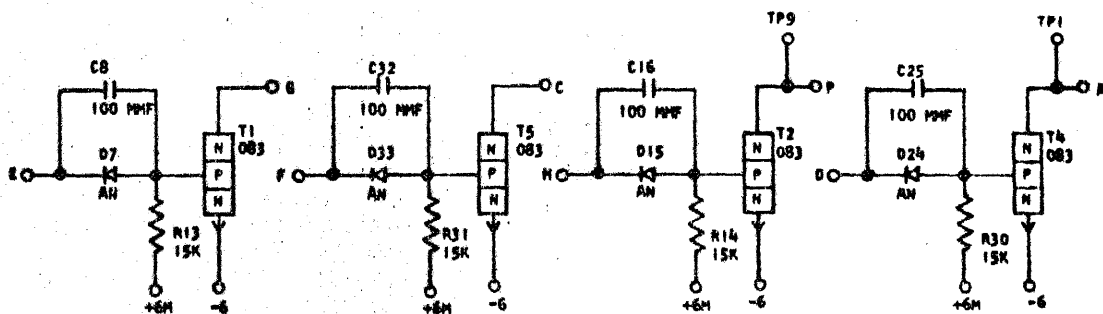
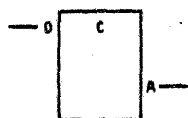
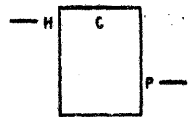
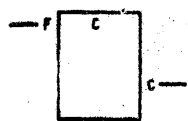
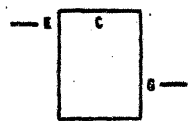
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL HIGH SPEED 3-WAY "AND" PNP ALL LOADS			4-17-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371590

CTDL HIGH SPEED ONE WAY NPN NO LOADS



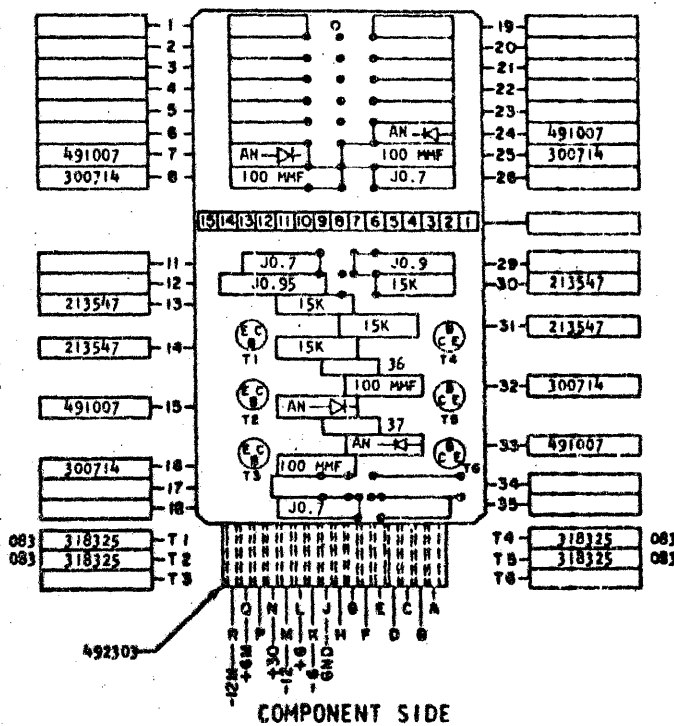
SEQUENCE OF OPERATION

1. IF THE INPUT IS UP, THE TRANSISTOR IS ON, THE OUTPUT IS DOWN
2. IF THE INPUT IS DOWN, THE TRANSISTOR IS OFF, THE OUTPUT IS UP
3. ALL TRANSISTORS MUST BE COLLECTOR LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D	U	INPUTS	UP	-5.26	+2.24
			DOWN	-7.44	-12.48
G, C, P, A	T	OUTPUTS	UP	+1.44	+6.24
			DOWN	-5.26	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.20
TURN OFF	0	0.30



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-CTDL HIGH SPEED ONE WAY NPN NO LOADS	4-29-62	115599					
DESIGN								
DETAIL	RQ 3-1-62	SCALE	NONE					
CHECK	WH 3-1-62	DRAW	LIG 3-17-62					
APPRO		CHECK						

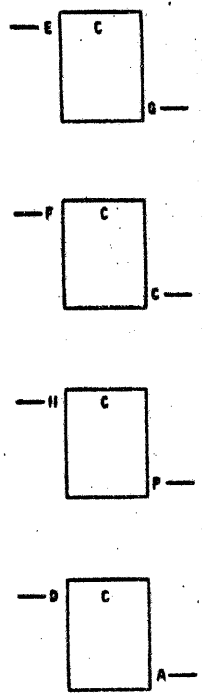
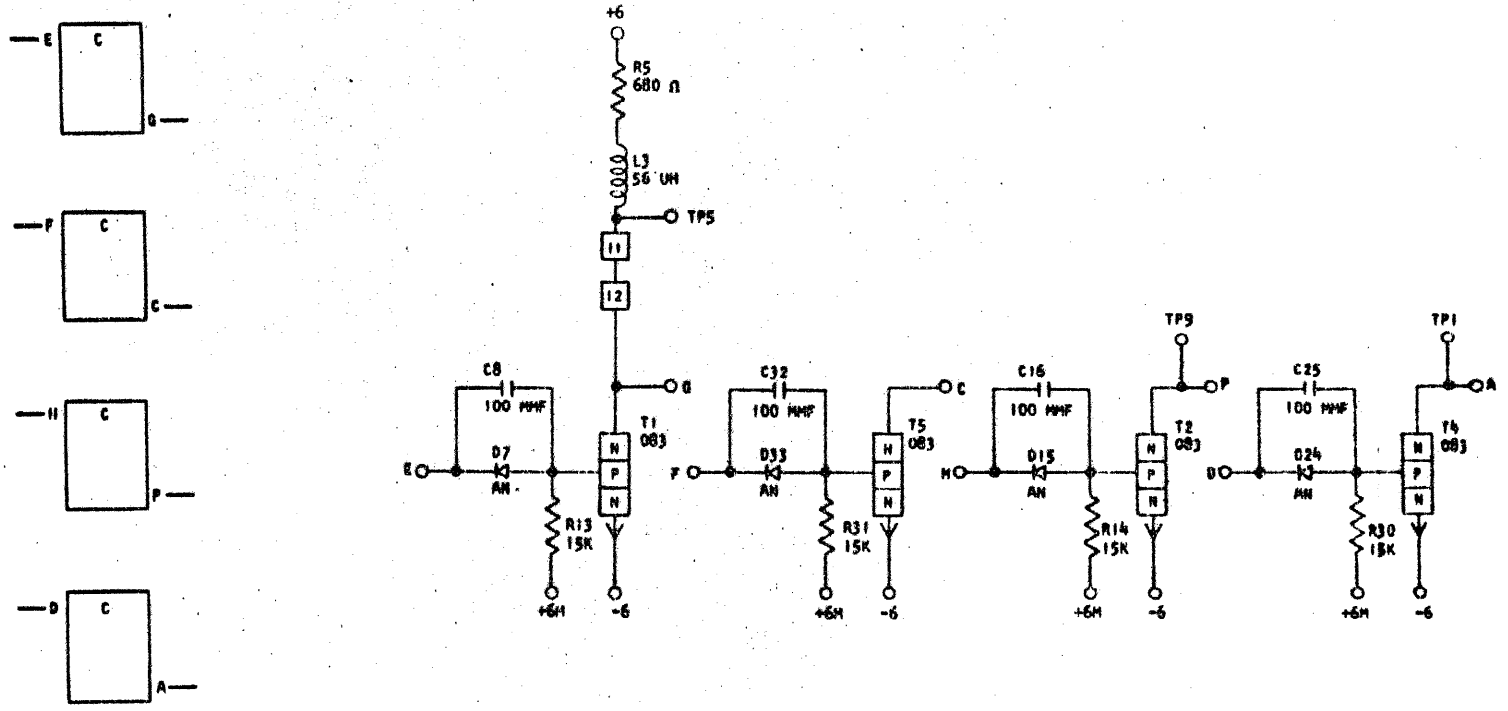
729876

STANDARDS CODE

CARD CODE 729876  
JJ VA

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371589

CTDL HIGH SPEED ONE WAY NPN ONE LOAD



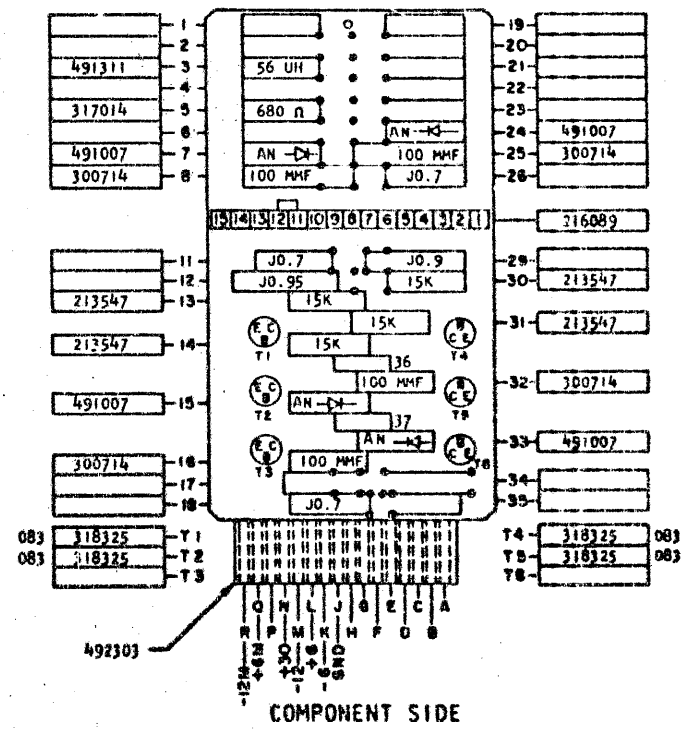
SEQUENCE OF OPERATION

1. IF THE INPUT IS UP, THE TRANSISTOR IS ON, THE OUTPUT IS DOWN
2. IF THE INPUT IS DOWN, THE TRANSISTOR IS OFF, THE OUTPUT IS UP
3. T5, T2, T4 MUST BE COLLECTOR LOADED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D	U	INPUT	UP	-5.26	+2.24
			DOWN	-7.44	-12.40
G, C, P, A	T	OUTPUT	UP	+1.44	+6.24
			DOWN	-5.46	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.20
TURN OFF	0	0.30



COMPONENT SIDE

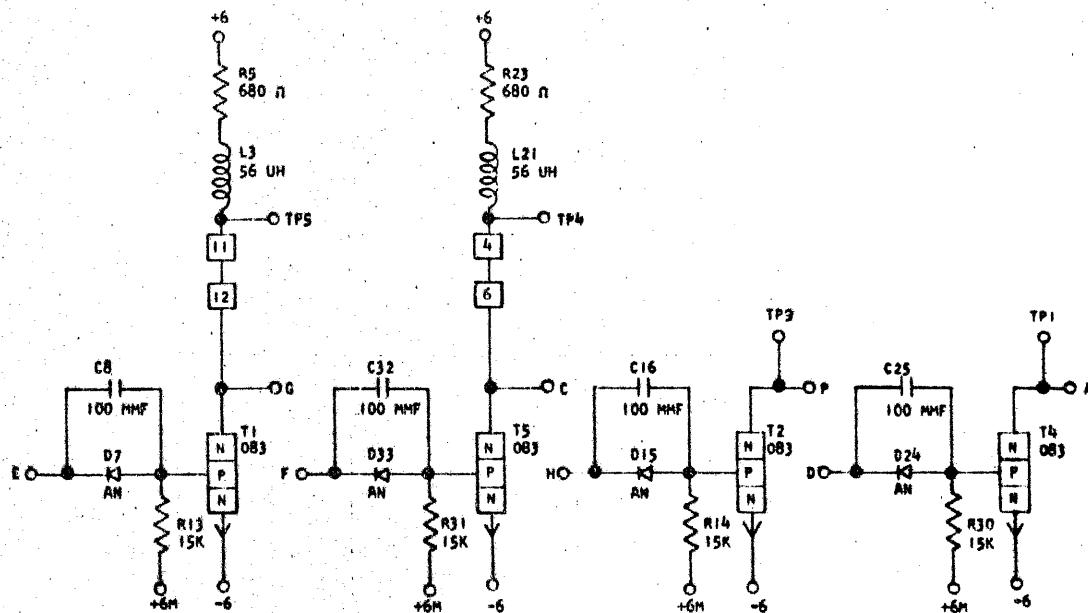
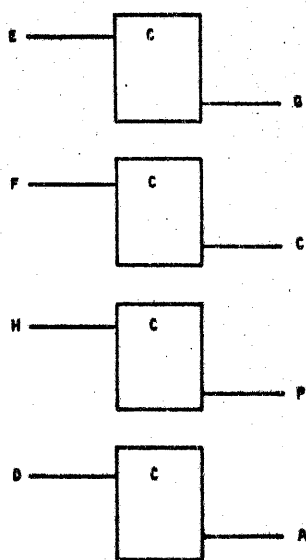
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL HIGH				6-17-62	115599					
SPEED ONE WAY NPN ONE LOAD										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

729876

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371588

CTDL HIGH SPEED ONE WAY NPN TWO LOADS



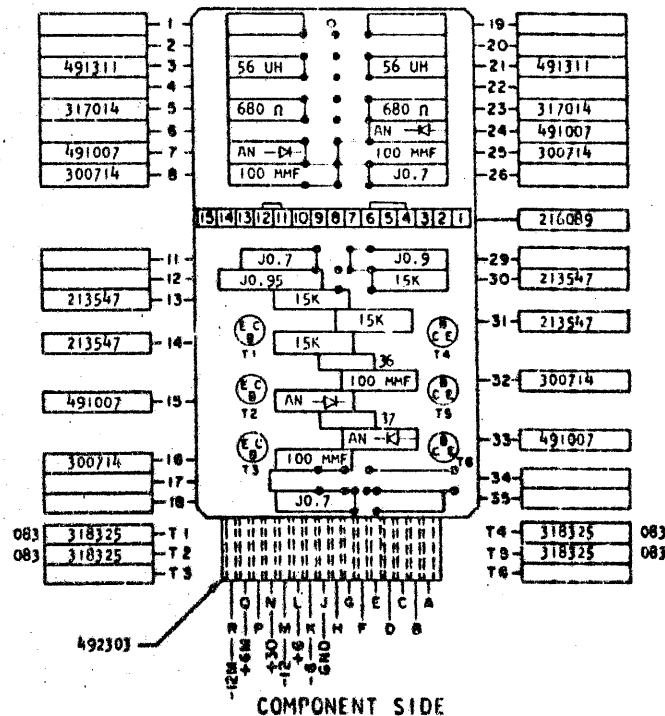
SEQUENCE OF OPERATION

1. IF THE INPUT IS UP, THE TRANSISTOR IS ON, THE OUTPUT IS DOWN
2. IF THE INPUT IS DOWN, THE TRANSISTOR IS OFF, THE OUTPUT IS UP
3. PINS P & A MUST BE TIED TO COLLECTOR LOAD
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D U	INPUT		UP	-5.26	+2.4
			DOWN	-7.44	-12.48
G, C, P, A T	OUTPUT		UP	+1.44	+6.24
			DOWN	-5.46	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.30
TURN OFF	0	0.30



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

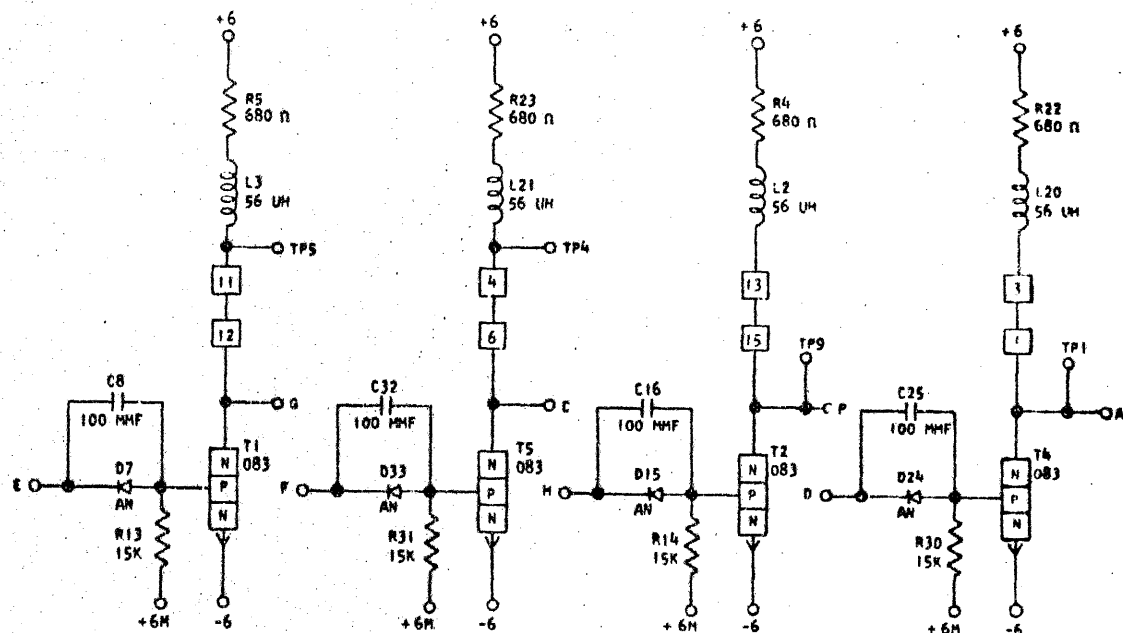
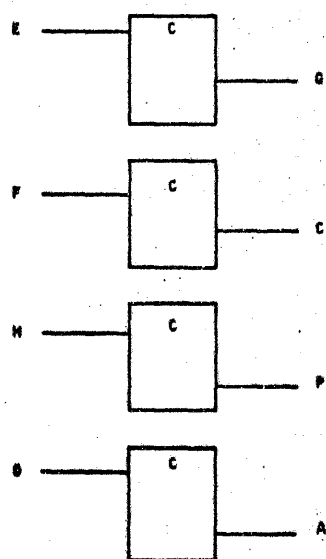
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL HIGH SPEED ONE WAY NPN TWO LOADS				6-27-62	115599					
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	VN	3-1-62	DRAW	LTC	3-17-62					
APPRO			CHECK							



REFERENCE DRAWING

SEE PRODUCTION DRAWING 371587

CTDL HIGH SPEED ONE WAY NPN ALL LOADS



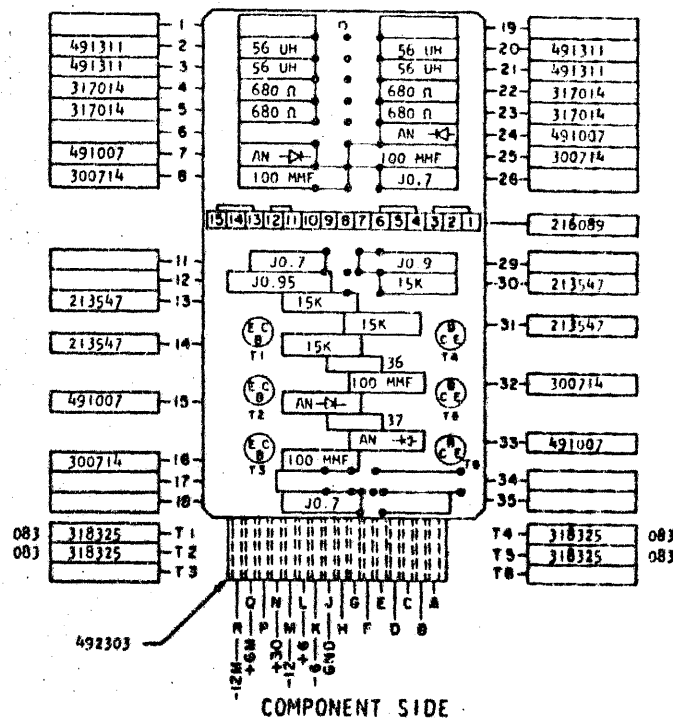
SEQUENCE OF OPERATION:

1. IF THE INPUT IS UP, THE TRANSISTOR IS ON, THE OUTPUT IS DOWN.
2. IF THE INPUT IS DOWN, THE TRANSISTOR IS OFF, THE OUTPUT IS UP.
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E, F, H, D	U	INPUT	UP	-5.26	+2.24
			DOWN	-7.44	-12.48
G, C, P, A	T	OUTPUT	UP	+1.44	+6.24
			DOWN	-5.46	-6.24
			UP		
			DOWN		

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.20
TURN OFF	0	0.30



COMPONENT SIDE

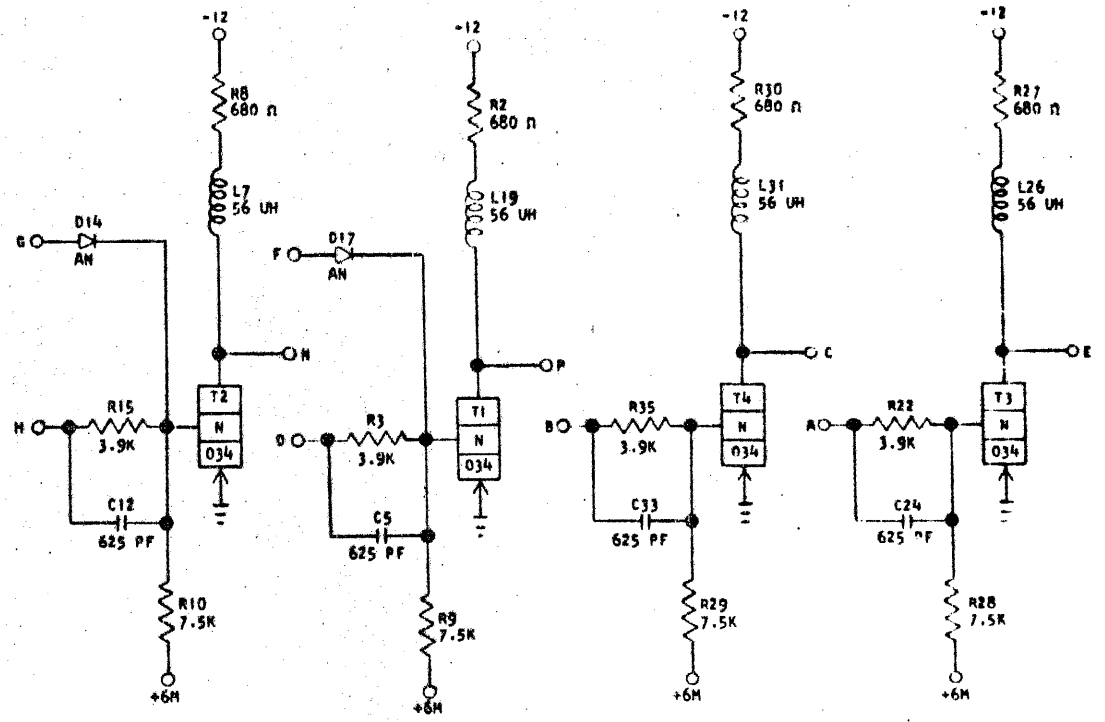
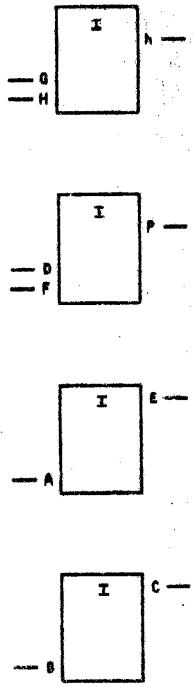
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL HIGH				6-27-62	115599					729878
SPEED ONE WAY NPN ALL LOADS										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371077

CTDL LOGIC INVERTER PNP ALL LOADS



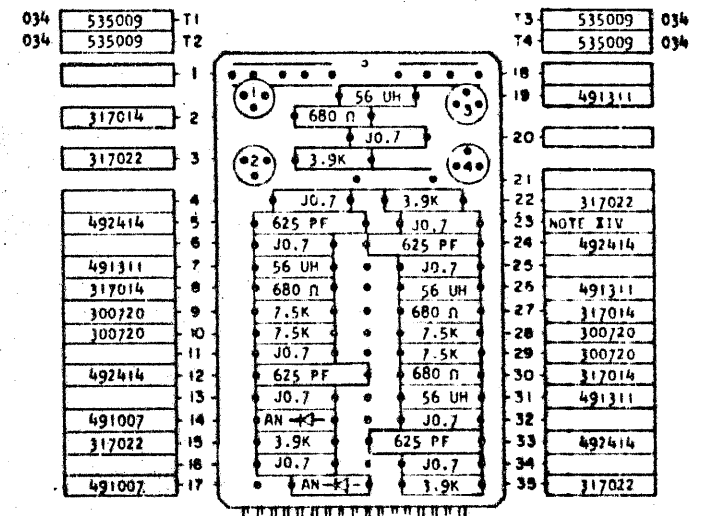
SEQUENCE OF OPERATION

1. FOR AN UP OUTPUT THE INPUT MUST BE DOWN
2. THE GATING DIODE IS PROVIDED ONLY TO RESET A LOGIC INVERTER LATCH. IT SHOULD NOT BE USED AS A SIGNAL INPUT SINCE IT IS POSSIBLE FOR THE SIGNAL INPUT TO OVERRIDE THE GATE
3. IN APPLICATIONS USING BOTH INPUTS ON CIRCUITS 1 AND 2 THE GATE (PINS G OR F) AND SIGNAL INPUTS MUST BE DOWN FOR AN UP OUTPUT
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
H, D	U	INPUT SIGNAL	UP	-0.54 +0.24
			DOWN	-7.44 -12.48
G, F	T	INPUT GATE	UP	+1.44 +6.24
			DOWN	-0.74 -6.24
H, P	U	OUTPUT	UP	-0.54 +0.24
			DOWN	-7.44 -12.48
A, B, H, D	U	INPUT	UP	0.54 +0.24
			DOWN	-7.44 -12.48
E, C, P, H	U	OUTPUT	UP	-0.54 +0.24
			DOWN	-7.44 -12.48

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	-0.05	-0.15
TURN OFF	+0.05	+0.55

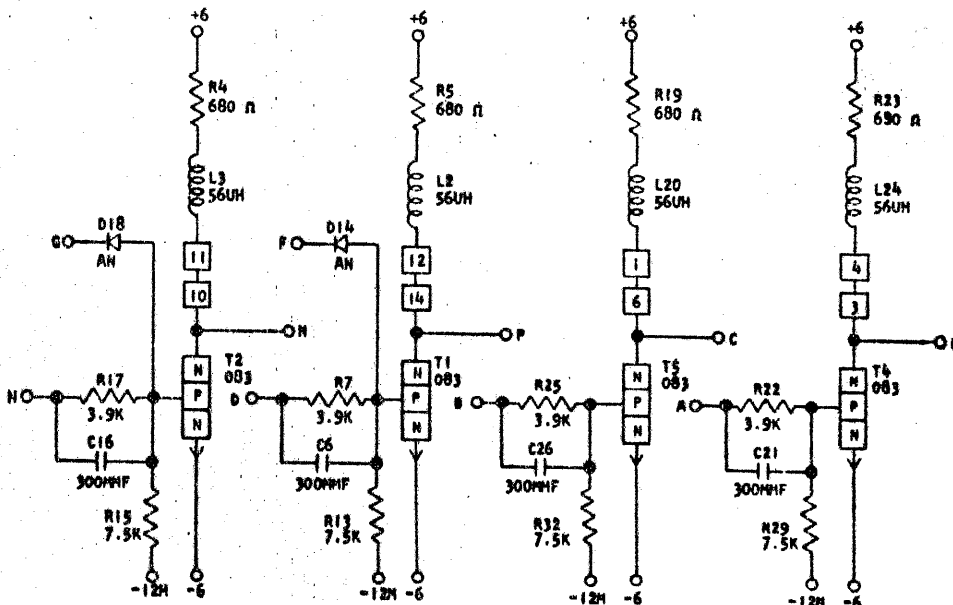
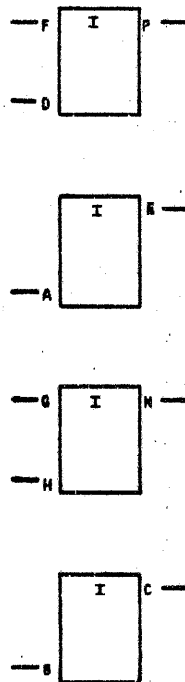


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR - CTDL		6-27-62	115599					729879
LOGIC INVERTER PNP ALL LOADS								
DESIGN	RQ 3-1-62	MODEL	SMS					
DETAIL	WH 2-1-62	SCALE	NONE					
CHKFR	WH 2-1-62	DRAW	L19 3-17-62					
APPRO		CHECK						

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371079

CTDL LOGIC INVERTER NPN ALL LOADS



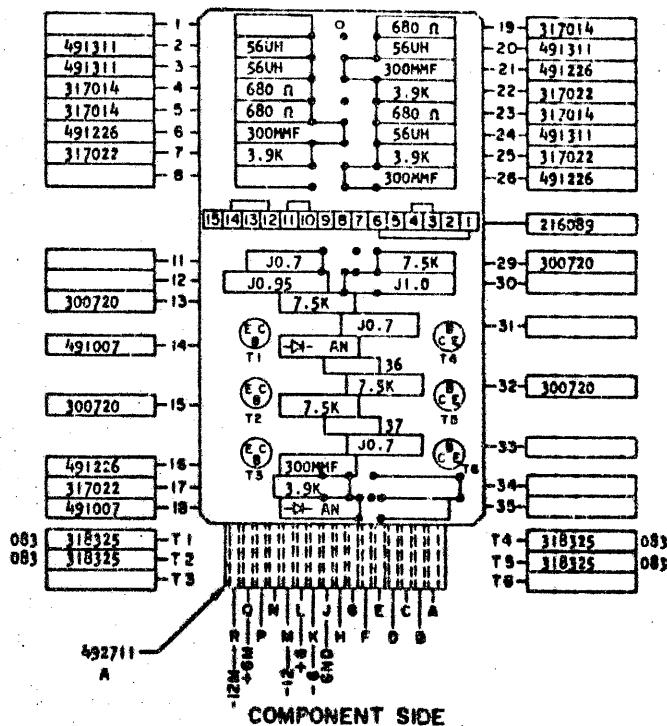
SEQUENCE OF OPERATION

1. GATE AND SIGNAL UP, TRANSISTOR ON, DOWN OUTPUT.
2. GATE OR SIGNAL DOWN, TRANSISTOR OFF, UP OUTPUT.
3. INPUT DOWN, TRANSISTOR OFF, OUTPUT UP.
4. INPUT UP, TRANSISTOR ON, OUTPUT DOWN.
5. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
H, D	Y	INPUT SIGNAL	UP	+1.44 +6.24
			DOWN	-5.46 -6.24
G, F	U	INPUT GATE	UP	-5.26 +0.24
			DOWN	-7.44 -12.48
N, P	T	OUTPUT	UP	+1.44 +6.24
			DOWN	-5.46 -6.24
B, A	T	INPUT	UP	+1.44 +6.24
			DOWN	-5.46 -6.24
C, E	T	OUTPUT	UP	+1.44 +6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	-0.05	0
TURN OFF	-0.05	+0.40



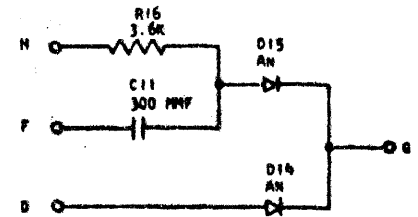
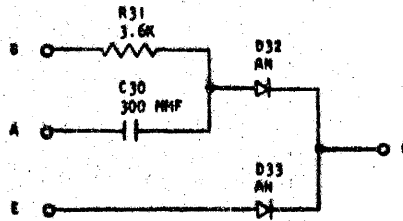
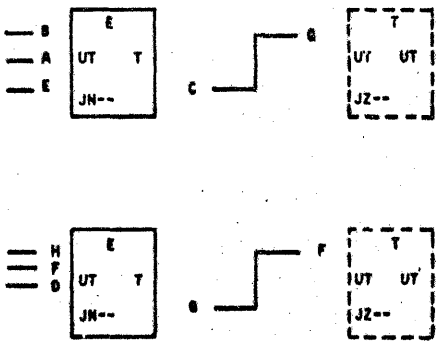
COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL				4-29-62	115599					
LOGIC INVERTER NPN ALL LOADS										
DESIGN	RQ	MODEL	SHS							
DETAIL	3-1-62	SCALE	NONE							
CHECK	3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371081

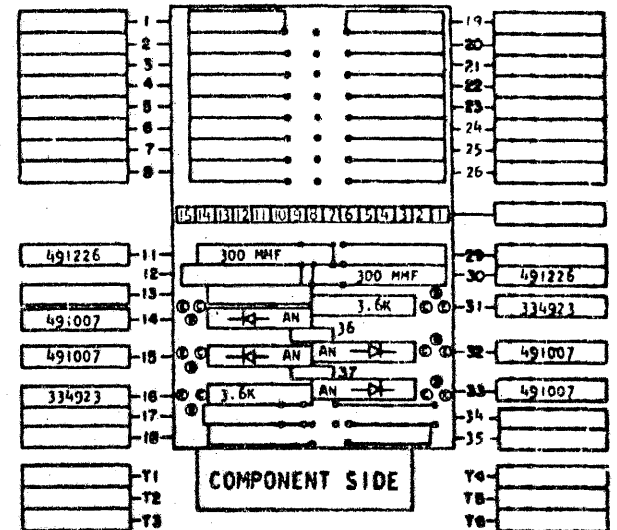
CTDL - TRIGGER GATE EXTENDER



SEQUENCE OF OPERATION

1. AN UP INPUT AT PINS E, D OR AN UP INPUT AT BOTH B, H AND A, F PROVIDES A POSITIVE OUTPUT AT PIN C, G.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, H	U GATE INPUT		UP	-5.3 0.2
A, F	U AC SET INPUT		UP	-5.3 0.2
			DOWN	-7.4 -12.5
E, D	T DC SET INPUT		UP	1.44 6.2
			DOWN	-0.74 -6.2
C, G	EXTENDER OUTPUT		UP	1.44 6.2
			DOWN	-0.2 -0.2

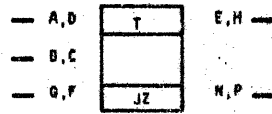


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL - TRIGGER GATE EXTENDER				6-29-62	115599					729881
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG B-17-52						
APPRO			CHECK							

REFERENCE DRAWING

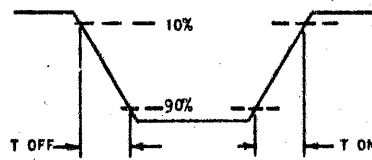
SEE PRODUCTION DRAWING 371082



CTDL TRIGGER NO 2

DELAY - USEC

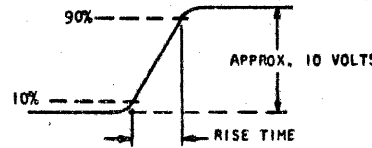
TYPICAL INVERTER AND EF OUTPUT WAVEFORM



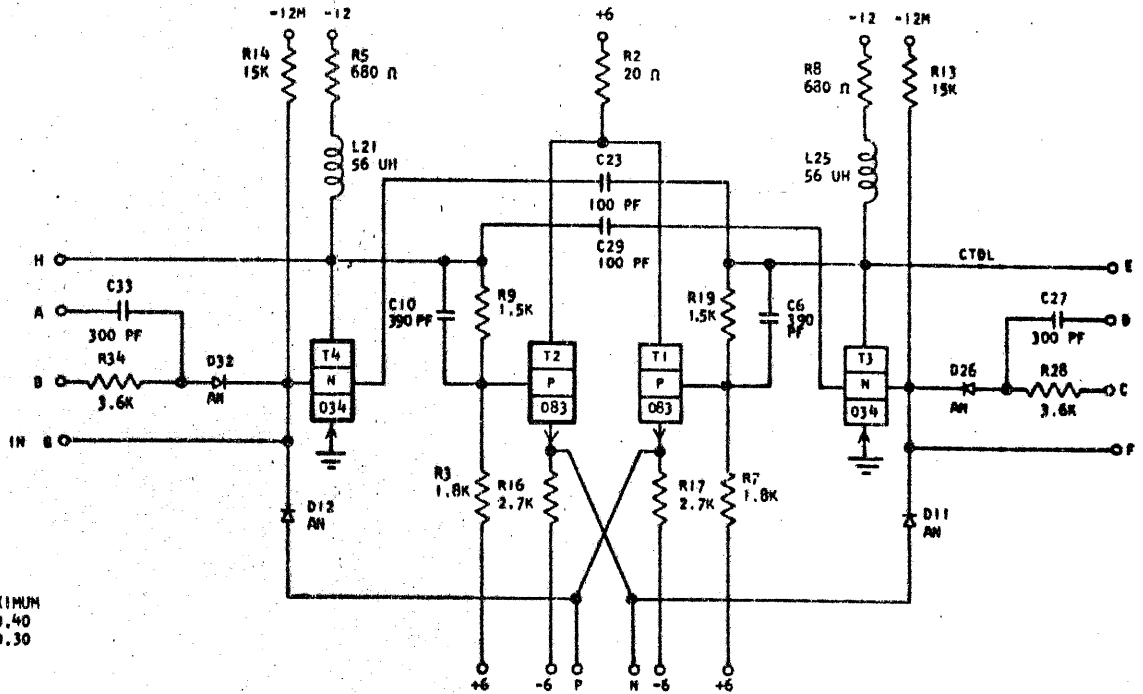
INVERTER DELAY	MINIMUM	MAXIMUM
T OFF	0.15	0.8
T ON	0.10	0.3
EF DELAY	MINIMUM	MAXIMUM
T OFF	0.05	0.1
T ON	0.10	0.4

THE FOLLOWING DELAY INFORMATION APPLIES WHEN THE AC TRIGGERING INPUT PULSE HAS A RISE TIME OF 0.45 USEC. (SEE FOLLOWING FIGURE)

TRIGGERING PULSE



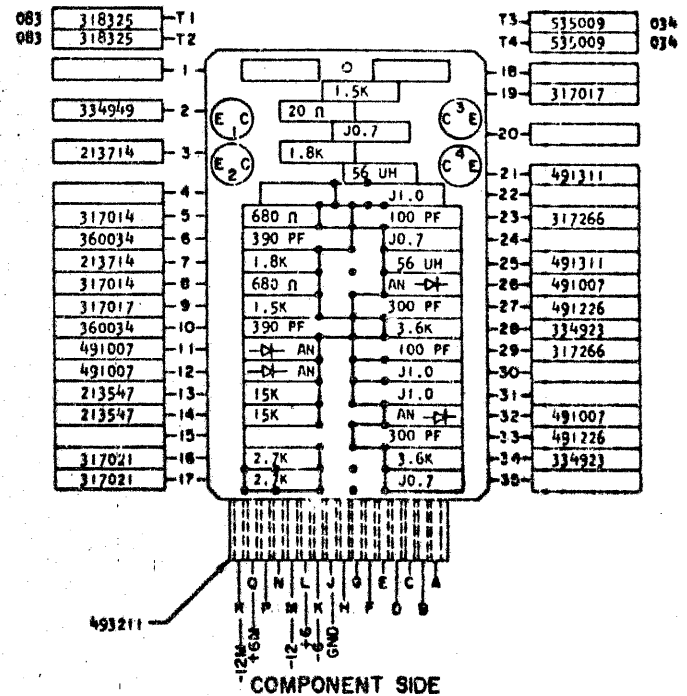
	MINIMUM	MAXIMUM
FROM AC SET TO INVERTER OUTPUTS	0.10	0.40
FROM AC SET TO EF OUTPUTS	0.10	0.30



SEQUENCE OF OPERATION

1. T2 & T4 ON, T1 & T3 OFF
2. PIN B MUST BE CONDITIONED TO AN UP LEVEL 3.75 U SEC BEFORE A POSITIVE SHIFT IS APPLIED TO PIN A TO GIVE AN UP OUTPUT AT PINS E & P AND A DOWN OUTPUT AT PINS H & N. T2 & T4 ARE NOW OFF AND T1 & T3 ON.
3. TO FLIP THE TRIGGER TO ORIGINAL STATE PIN C & D MUST BE CONDITIONED AS WERE PINS A & B ABOVE.
4. COLLECTIVE PULLOVER CAN BE USED ON PINS E & H TO GIVE AN UP OUTPUT.
5. A (JN --) EXTENDER CARD PERMITS ADDITIONAL INPUTS AT PINS G & F TO CONTROL THE TRIGGER.
6. IF SET OR RESET IS ACCOMPLISHED THROUGH PINS G OR F, THE MINIMUM PULSE WIDTH IS 0.5 USEC.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, D	T A.C. SET	[Square Wave]	UP -0.5	0.2
B	U GATE	[Pulse]	UP -0.5	0.2
C	U GATE	[Pulse]	UP -0.5	0.2
E	U OUTPUT	[Pulse]	UP -5.2	-0.8
H	U OUTPUT	[Pulse]	UP -5.2	-0.8
N	T OUTPUT	[Pulse]	UP 1.4	3.1
P	T OUTPUT	[Pulse]	UP 1.4	3.1



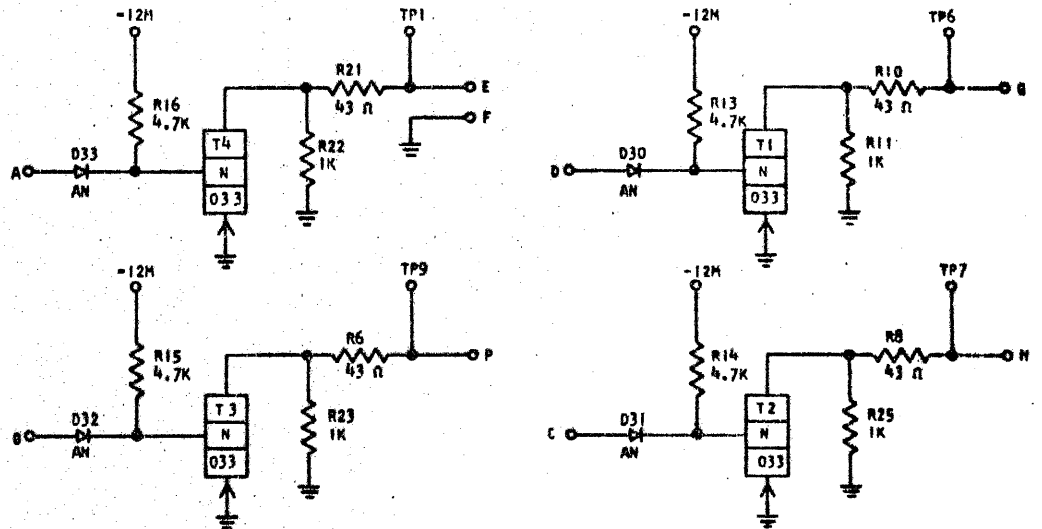
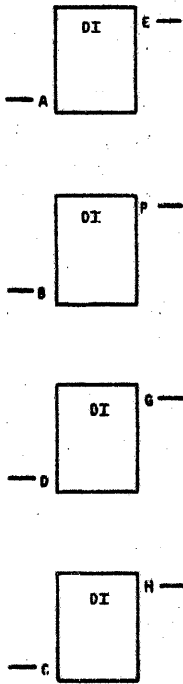
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - CTDL	6-28-62	115599					
TRIGGER NO 2								
DESIGN		MODEL	SMS					
DETAIL	RQ 3-1-62	SCALE	NONE					
CHECK	WH 3-1-62	DRAW	LIG 3-17-62					
APPRO		CHECK						

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371546

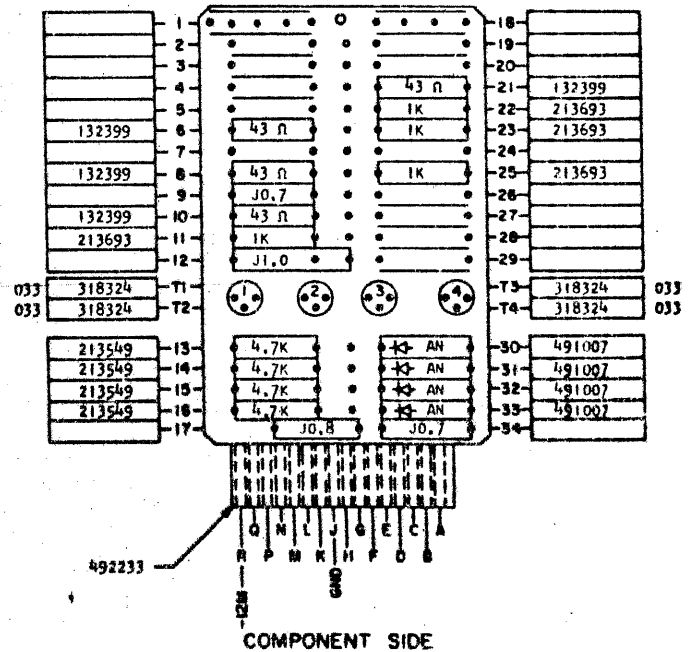
ALLOY - INDICATOR DRIVER 40 MA



SEQUENCE OF OPERATION

1. INPUT DOWN TRANSISTOR ON OUTPUT UP
2. INPUT UP TRANSISTOR OFF OUTPUT DOWN

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, D, B, C	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
E, G, P, H	U	OUTPUT	UP	-0.54	0.24
			DOWN		-10



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR- ALLOY-				6-27-62	115599					
INDICATOR DRIVER (40 MA)										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

729884

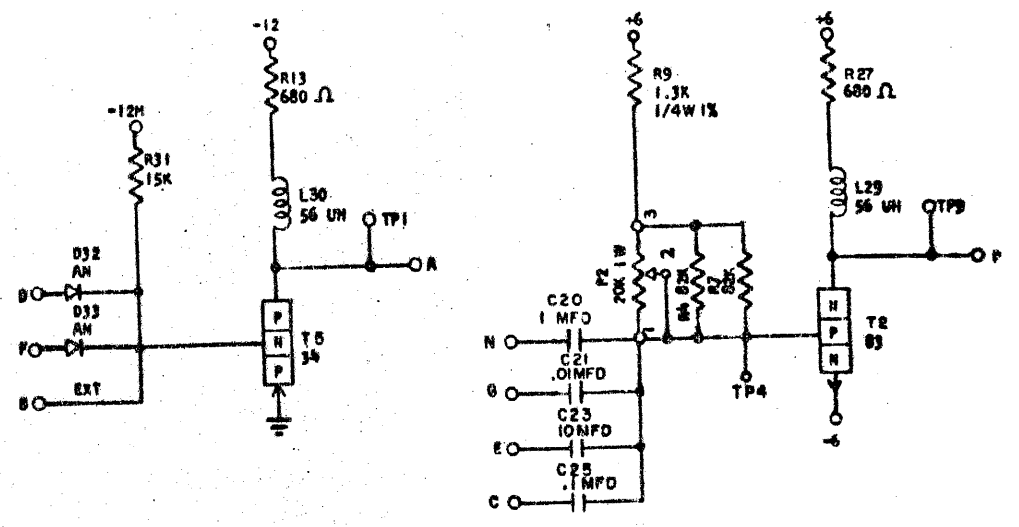
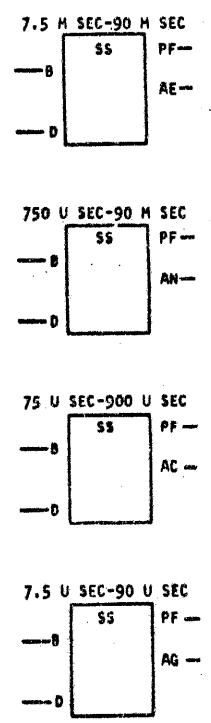
STANDARD CODE

CARD CODE 729884  
NB --

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 371591

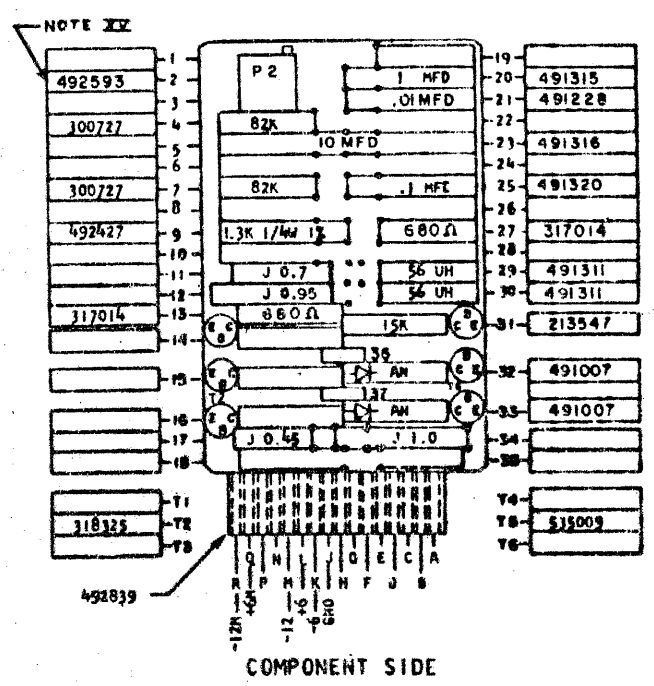
## CTDL SINGLE SHOT "T" INPUT



### SEQUENCE OF OPERATION

1. T2, T2 ON; P TIED TO F FOR LATCH BACK AND A TO EITHER N, G, E OR C
2. POSITIVE GOING INPUT TO D, T2, T5 OFF
3. R.C. NETWORK DETERMINES LENGTH OF TIME T2 OFF
4. UP INPUT ON EXTENDER CARD WILL GIVE SAME SEQUENCE

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D	T	INPUT	UP	1.4 6.2
			DOWN	-0.7 -6.2
B		EXTENDER INPUT	UP	-6
			DOWN	-12
F	T	INPUT	UP	1.4 6.2
			DOWN	-0.7 -6.2
P	F	OUTPUT	UP	1.4 6.2
			DOWN	-5.46 -6.2
A	U	OUTPUT	UP	-0.54 0.24
			DOWN	-7.44 -12.5
T2 BASE		SWITCH LEVEL		-5.8 -6



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASSEMBLY TSTR - CTDL				4-27-62	115599					
SINGLE SHOT "T" INPUT										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WN	3-1-62	DRAW	L18 3-17-62						
APPRO			CHECK							

729884

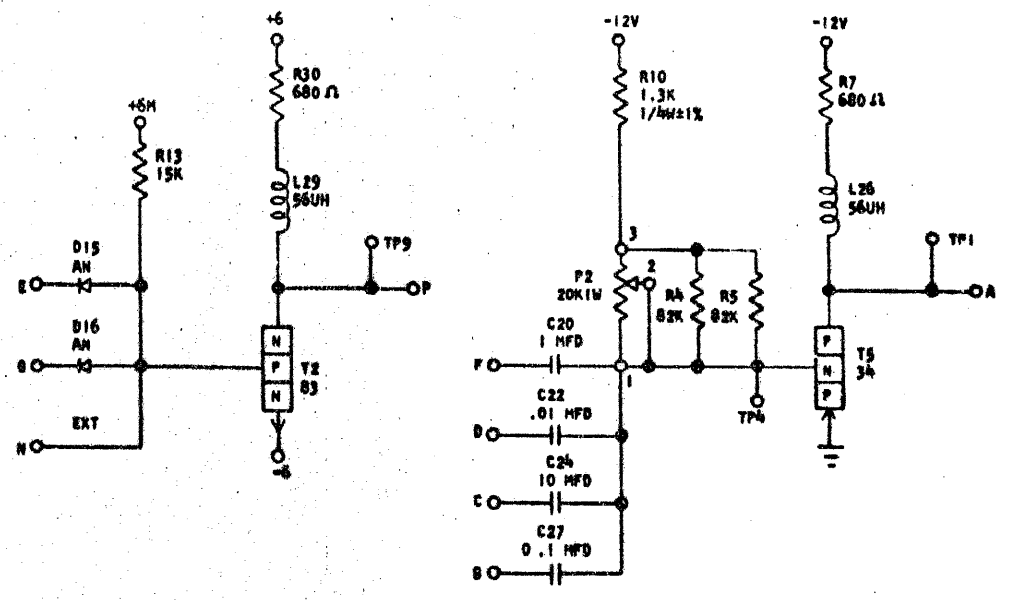
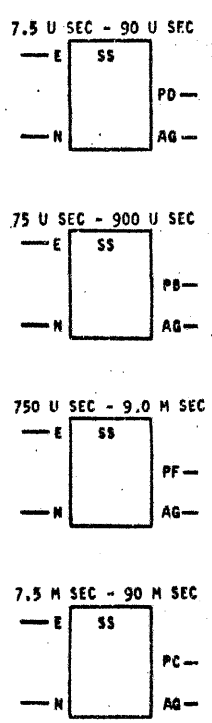
729885

STANDARDS CODE

CARD CODE 729885  
NC --

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371592

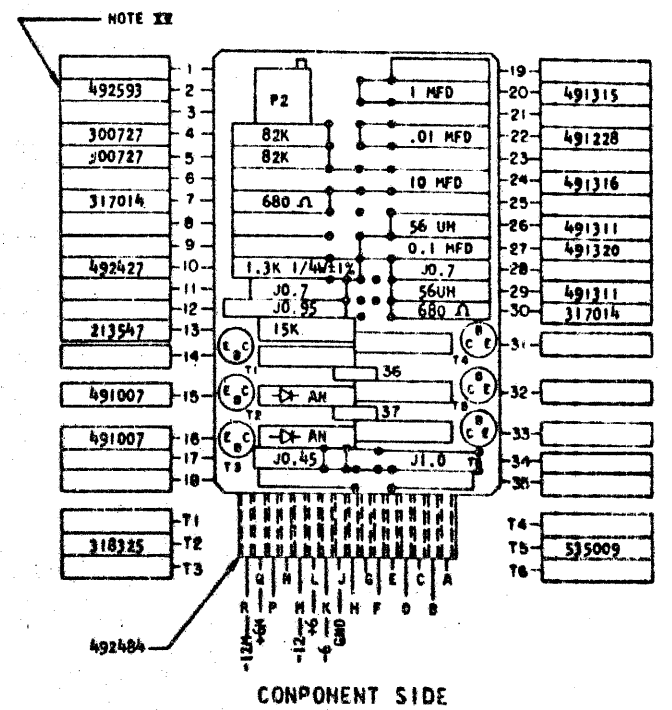
CTDL SINGLE SHOT "U" INPUT



SEQUENCE OF OPERATION

1. T2, T5 ON; A TIED TO G FOR LATCH BACK AND P TO EITHER D, B, F OR C
2. MINUS GOING INPUT TO E, T2, T5 OFF
3. R.C. NETWORK DETERMINES LENGTH OF TIME T5 OFF
4. DOWN INPUT ON EXTENDER CARD WILL GIVE SAME SEQUENCE

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
				MIN	MAX
E	U	INPUT	UP	-0.5	0.2
			DOWN	-7.4	-12.5
N	EXTENDER INPUT	[Dashed]	UP	-6	
			DOWN	-12	
G	U	INPUT	UP	-0.5	0.2
			DOWN	-7.4	-12.5
A	U	OUTPUT	UP	-0.5	0.2
			DOWN	-7.44	-12.5
P	T	OUTPUT	UP	1.44	6.24
			DOWN	-5.46	-6.24
T5 BASE	SWITCH LEVEL	[Graph]			



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	
NAME	CARD ASSEMBLY TSTR - CTDL	DATE	6-19-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.	
DESIGN	RQ 3-1-62	MODEL	SMS								
DETAIL	WH 3-1-62	SCALE	NONE								
CHECK	WH 3-1-62	DRAW	LIG 3-17-62								
APPRO		CHECK									

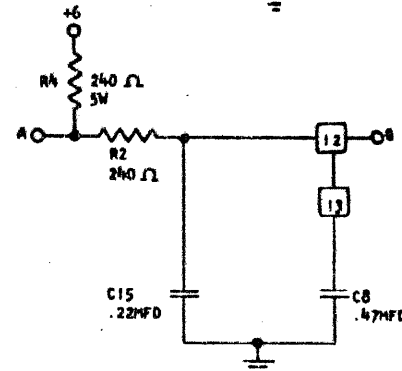
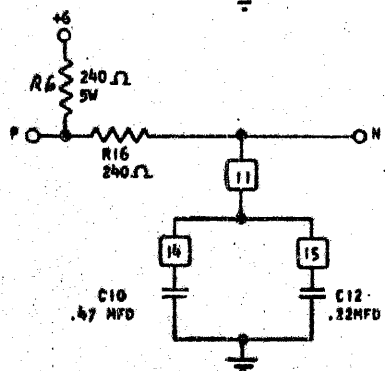
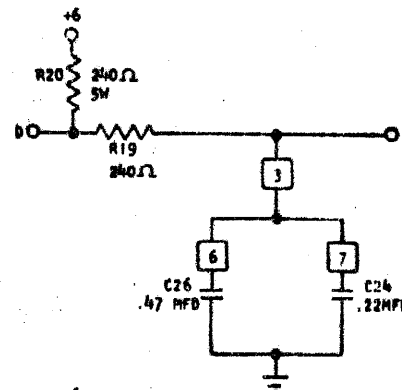
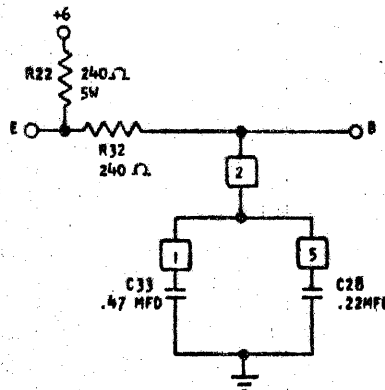
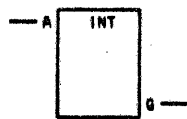
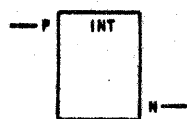
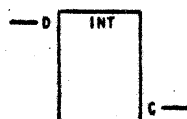
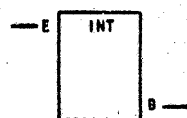
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REFERENCE DRAWING

SEE PRODUCTION DRAWING 371635

CTDL - INTEGRATOR - U AND - T



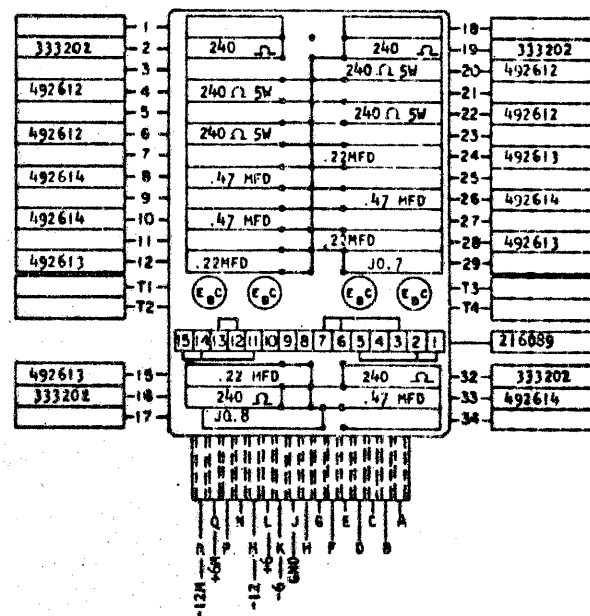
APPLICATION

- USED TO PROVIDE AN OUTPUT THAT IS FREE OF INTERMITTENT FLUCTUATIONS RESULTING FROM BOUNCING OF MECHANICAL OPERATED CONTACTS
- B, C, N, G ARE AT +6 LEVEL IF CONTACT IS OPEN AND -6 LEVEL IF CLOSED
- WHEN THE INPUT IS MADE THROUGH A CAM TO 130 OHMS TIED TO -12 VOLTS, THE OUTPUT IS A-T LINE. DELAY IS AS FOLLOWS: RTH=325 OHMS, 3T=3RTH C.

	MINIMUM	MAXIMUM	CAPACITANCE
TURN ON	3T=510 USEC	3T=845 USEC	.69UF
TURN ON	348	580	.47UF
TURN ON	162	268	.22UF
RTH=480 OHMS			
TURN OFF	3T=755	1250	.69UF
TURN OFF	514	852	.47UF
TURN OFF	240	400	.22UF

- WHEN THE INPUT IS MADE THROUGH A CAM TO -12 VOLTS, THE OUTPUT IS A-U LINE. DELAY IS AS FOLLOWS: RTH=240 OHMS

	MINIMUM	MAXIMUM	CAPACITANCE
TURN ON	3T=377 USEC	626 USEC	.69UF
TURN ON	257	426	.47UF
TURN ON	120	200	.22UF
RTH=480 OHMS			
TURN OFF	3T=754 USEC	1254 USEC	.69UF
TURN OFF	514	852	.47UF
TURN OFF	240	400	.22UF



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

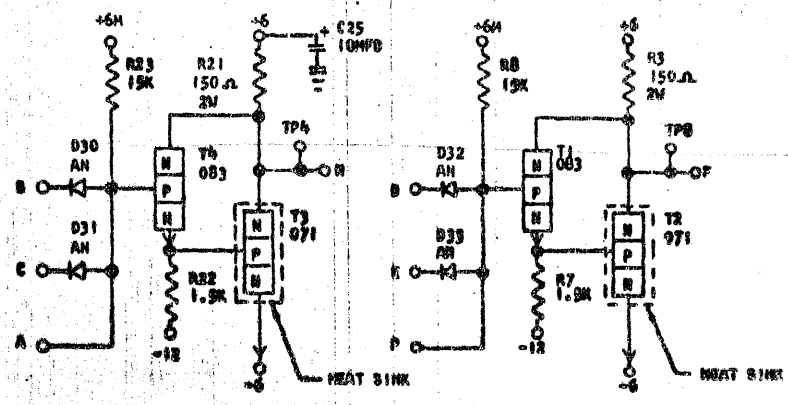
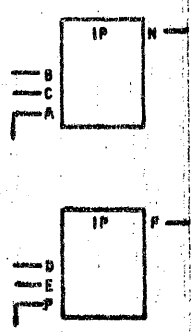
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR-CTDL-				6-29-62	115529					
INTEGRATOR - U AND T										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	L10	3-17-62					
APPRO			CHECK							





REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371676

CTDL POWER INVERTER  
"P" TYPE



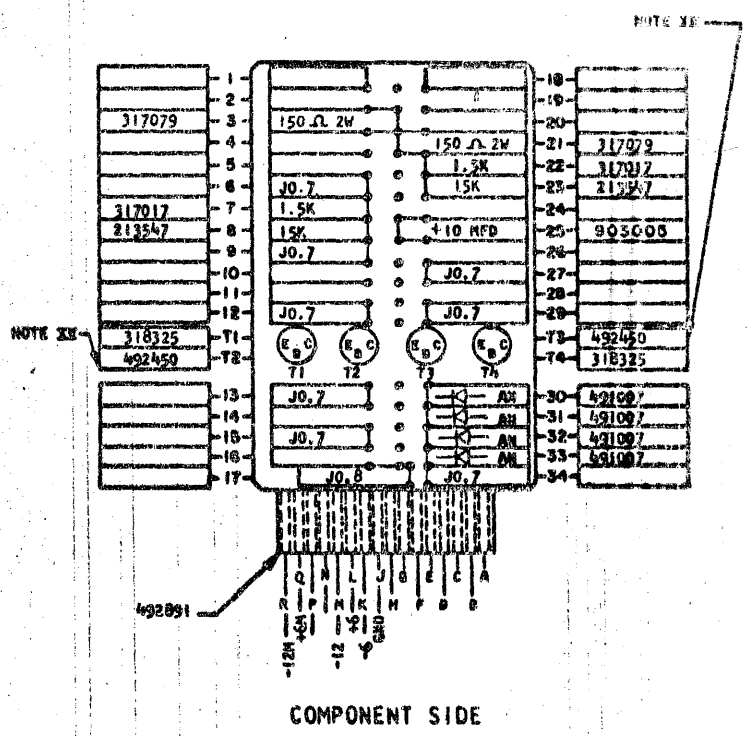
SEQUENCE OF OPERATION

1. ALL INPUTS UP TRANSISTORS ON OUTPUT DOWN.
2. ANY INPUT DOWN TRANSISTORS OFF OUTPUT UP.
3. INPUTS TO EXTENDER CARD MUST BE UP IN COINCIDENCE WITH INPUTS TO CARD FOR DOWN OUTPUT.
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, O	U INPUT		UP	-5.26 0.24
C, E	U INPUT		DOWN	-7.44 -12.5
A, P	EXTENDER INPUT		UP	-6
H, F	T OUTPUT		UP	1.44 6.24
			DOWN	-5.46 -6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.10	0.40
TURN OFF	0.10	0.15



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD

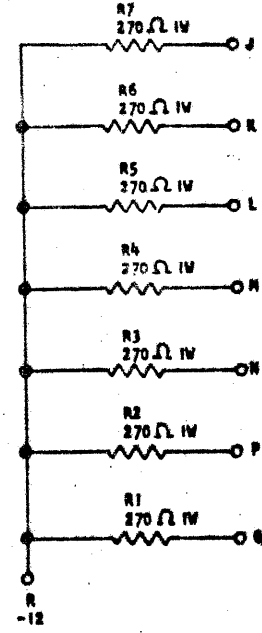
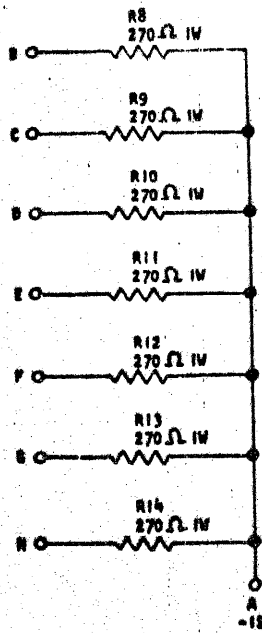
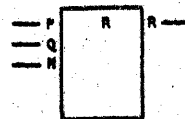
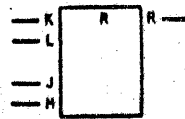
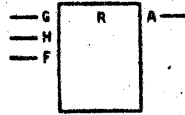
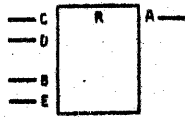
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.			DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASSEMBLY T3TR-CTDL			4-26-62	115599					
POWER INVERTER P TYPE									
DESIGN	MODEL	SMS							
DETAIL	RQ 3-1-62	SCALE NONE							
CHECK	WH 3-1-62	DRAW LIG 3-1-62							
APPRO	CHECK								

# REFERENCE DRAWING

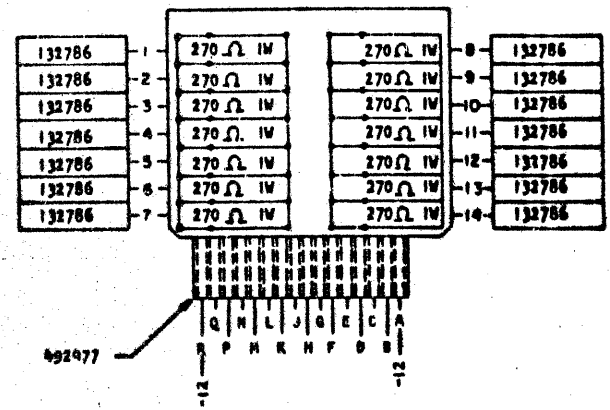
SEE PRODUCTION DRAWING 371598

## 270Ω RESISTOR CARD



### APPLICATION

1. ALLOWS MECHANICAL SWITCH INPUT TO CTDL BLOCK
2. SWITCH OPEN OUTPUT -12V, SWITCH CLOSED OUTPUT GROUND LEVEL
3. EACH RESISTOR IS USED INDIVIDUALLY



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD			
APPROVAL		DATE	
ABC		4-2-62	

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM RESISTOR -270Ω				6-26-62	115599					729890
DESIGN		MODEL	SMS							
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPROV		CHECK								

729891

STANDARD CODE

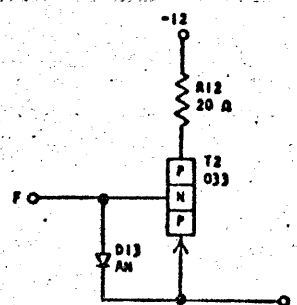
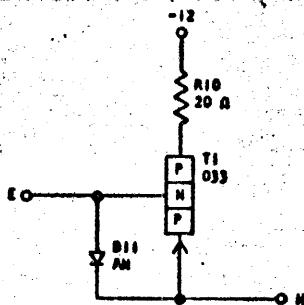
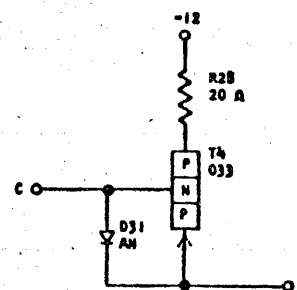
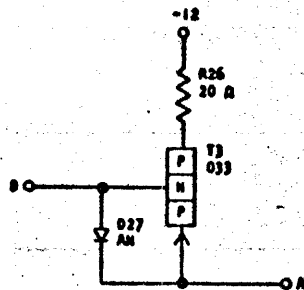
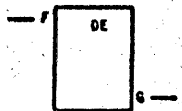
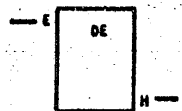
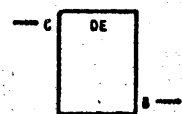
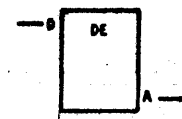
CARD CODE 729891

PP --

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371365

CTDL Emitter Follower - PNP



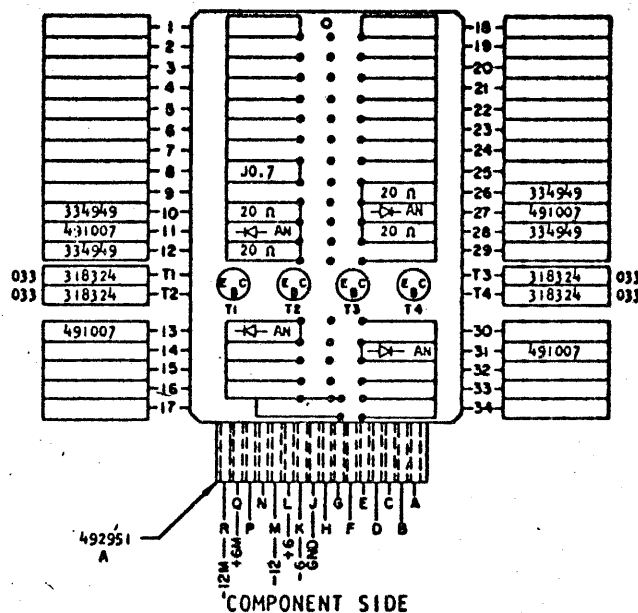
SEQUENCE OF OPERATION

1. INPUT DOWN - TRANSISTOR ON OUTPUT DOWN
2. INPUT UP - TRANSISTOR OFF OUTPUT UP
3. CIRCUIT MAY DRIVE UP TO 40 1-WAY LOGIC BLOCKS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, E, C, F	U INPUT		UP	-0.54 0.24
A, H, B, G	U OUTPUT		DOWN	-9.66 -12.5
			UP	-5.26 0.24
			DOWN	-7.44 -12.5

DELAY - USEC

NO APPRECIABLE DELAY BETWEEN THE INPUT AND OUTPUT OF THE HIGH DRIVE EF.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARDS	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - CTDL Emitter Follower-PNP				4-26-62	115599					
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

729891

C

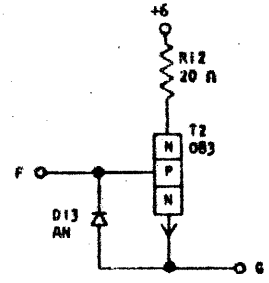
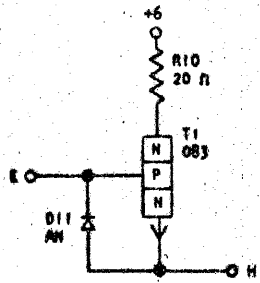
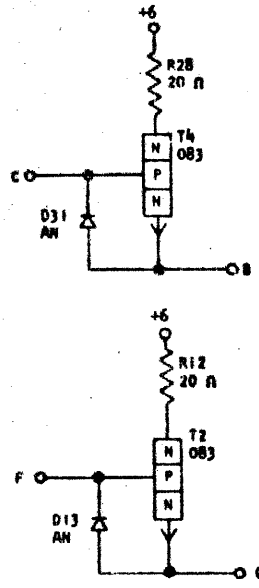
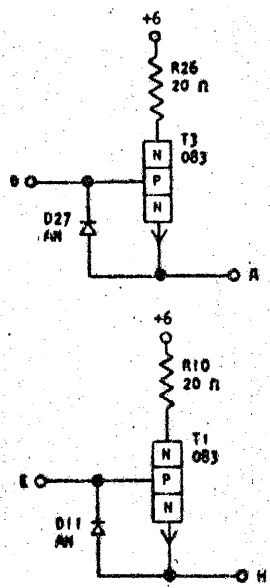
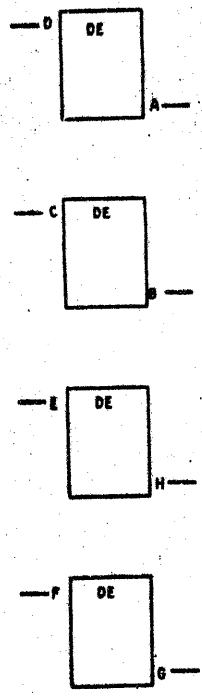
729892

STANDARDS CODE

CARD CODE 729892  
PQ --

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 371370

CTDL Emitter Follower - NPN



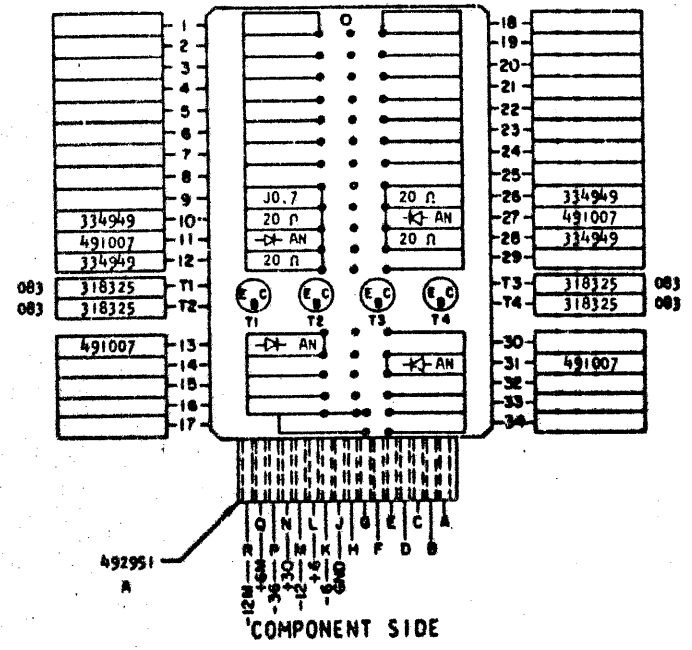
SEQUENCE OF OPERATION

1. OUTPUT WILL FOLLOW INPUT
2. CIRCUIT MAY DRIVE UP TO 40 1-WAY LOGIC BLOCKS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
D, C, E, F	T INPUT		UP	4.26 6.24
A, B, H, G	T OUTPUT		UP	3.89 6.24
			DOWN	-5.46 -6.24
			DOWN	-4.46 -6.24

DELAY - USEC

NO APPRECIABLE DELAY BETWEEN THE INPUT AND OUTPUT OF THE HIGH DRIVE EF.



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-CTDL Emitter FOLLOWER-NPN		6-26-62	115599					
DESIGN	MODEL SMS							
DETAIL	RQ 3-1-62	SCALE NONE						
CHECK	WH 3-1-62	DRAW LIQ 3-17-62						
APPRO	CHECK							

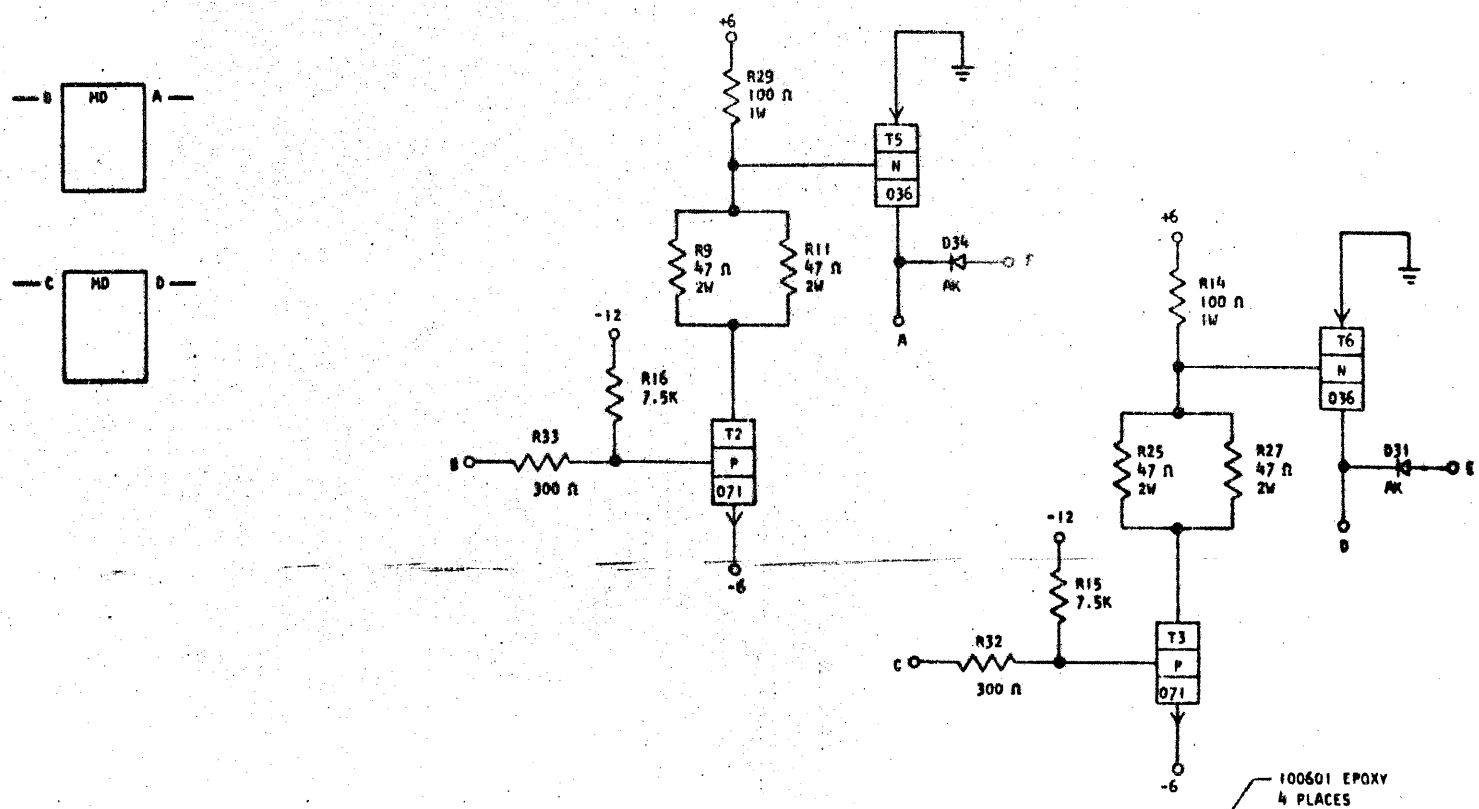
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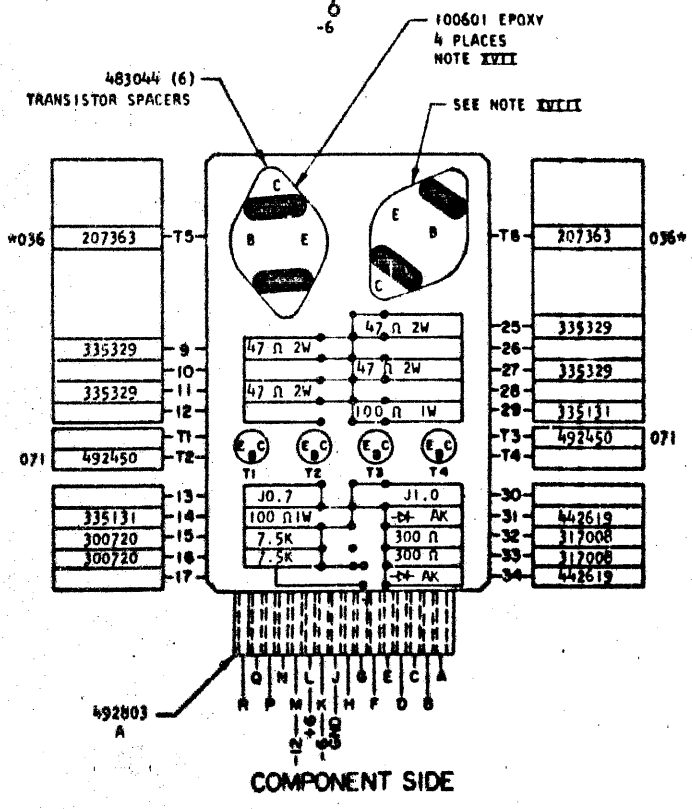
SEE PRODUCTION DRAWING 371633

ALLOY-CLUTCH MAGNETIC DRIVER



SEQUENCE OF OPERATION  
INPUT UP TRANSISTORS ON OUTPUT UP

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
B, C	U	INPUT	UP	+0.54
			DOWN	-7.44
A, D	OUTPUT	OUTPUT	UP	+1.24
			DOWN	-20
F, E	CLAMP	CLAMP	UP	-20
			DOWN	-20

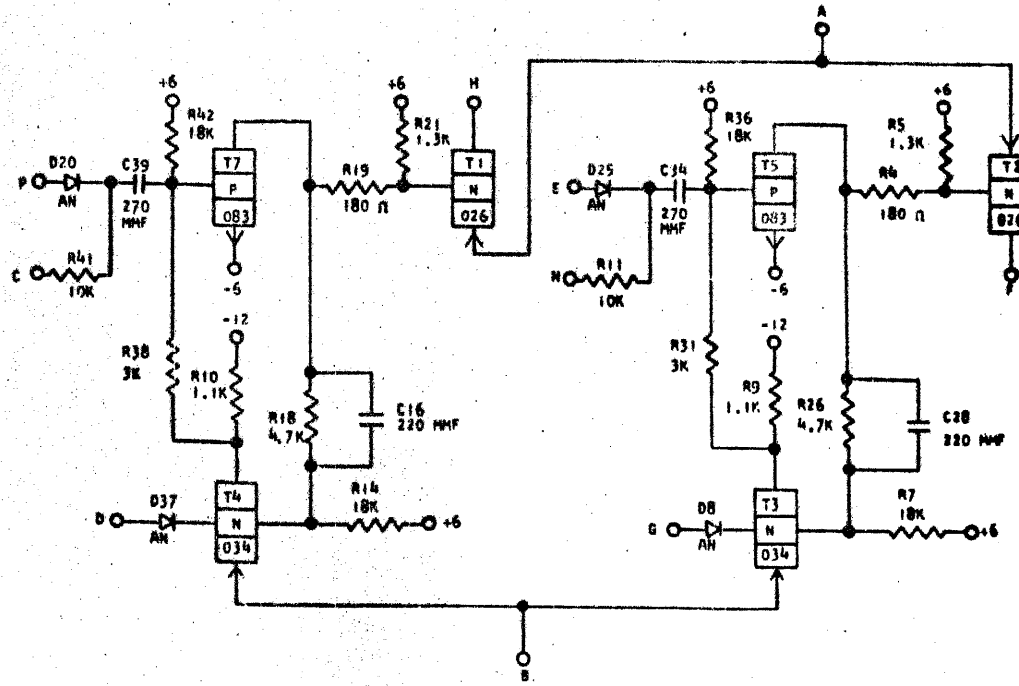
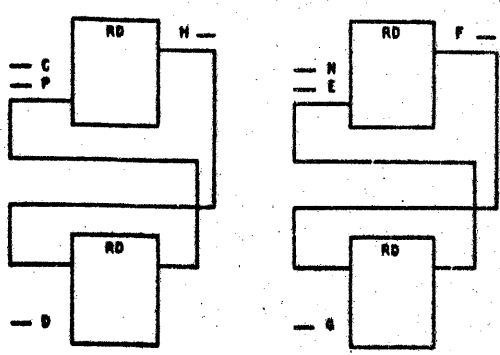


CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-ALLOY CLUTCH MAGNETIC DRIVER			6-27-62	115599					
DESIGN	MODEL	SCALE	SMS							
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								



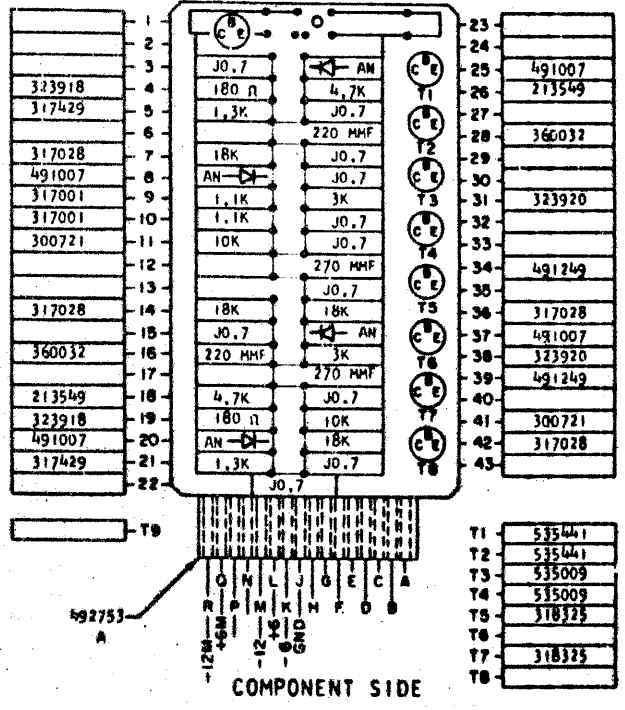
ALLOY-RELAY DRIVER



SEQUENCE OF OPERATION

- PIN C MUST BE DOWN 7.5 U SEC BEFORE P GOES TO UP LEVEL, TURNING T7 ON. T7 ON TURNS T1 & T4 ON. T4 PROVIDES LATCH BACK TO HOLD T7 ON.
- UP LEVEL AT D OR MECHANICAL RESET AT B WILL TURN T4 OFF AND OPEN LATCH BACK TO T7.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
C, N U	INPUT	[Waveform]	UP	-3.0 0.2
P, E U	INPUT	[Waveform]	DOWN	-10.0 -12.5
D, G T	RESET	[Waveform]	UP	1.4 6.2
H, F W	OUTPUT	[Waveform]	DOWN	-0.7 -6.2
			UP	0.2
			DOWN	-4.5



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASH TSTR	DRIVER		6-16-62	115599					72989A
DESIGN	RQ	3-1-62	MODEL	SHS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

729895

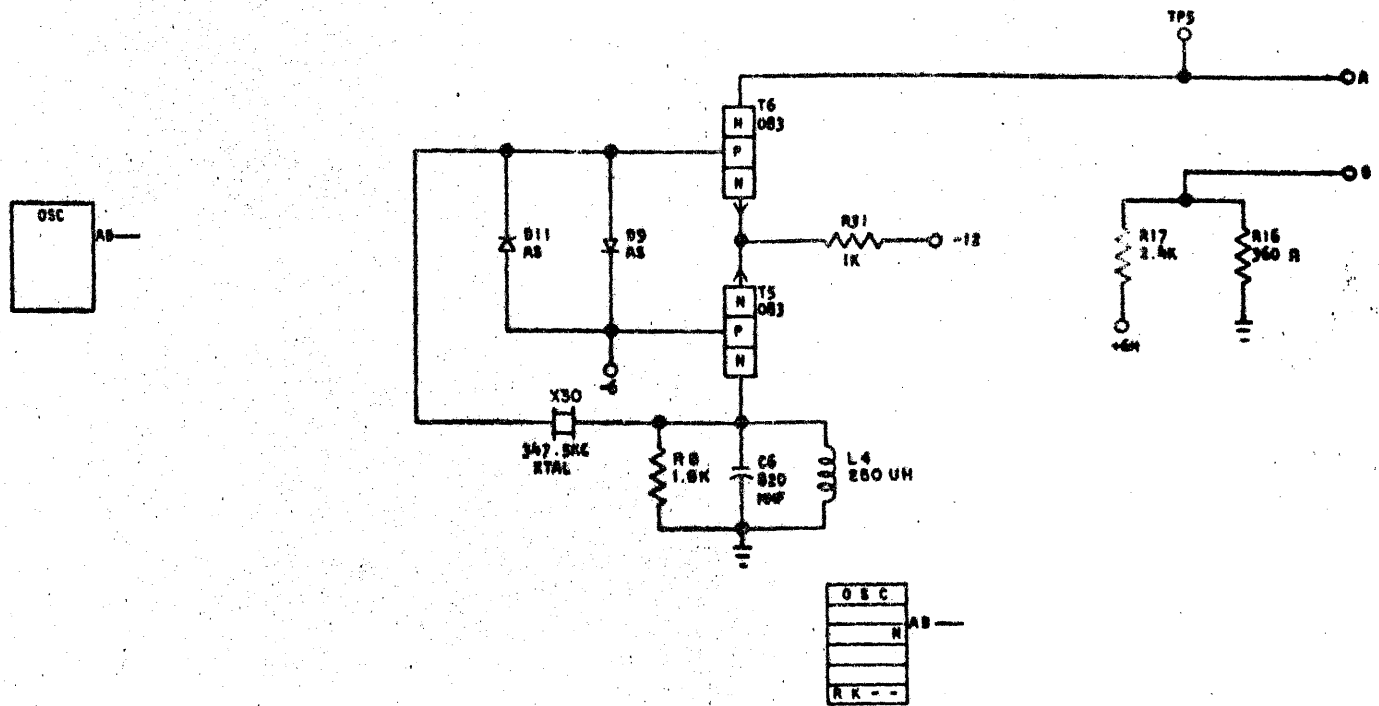
STANDARD CODE

CARD CODE 729895  
RK --

REFERENCE DRAWING

SEE PRODUCTION DRAWING 371788

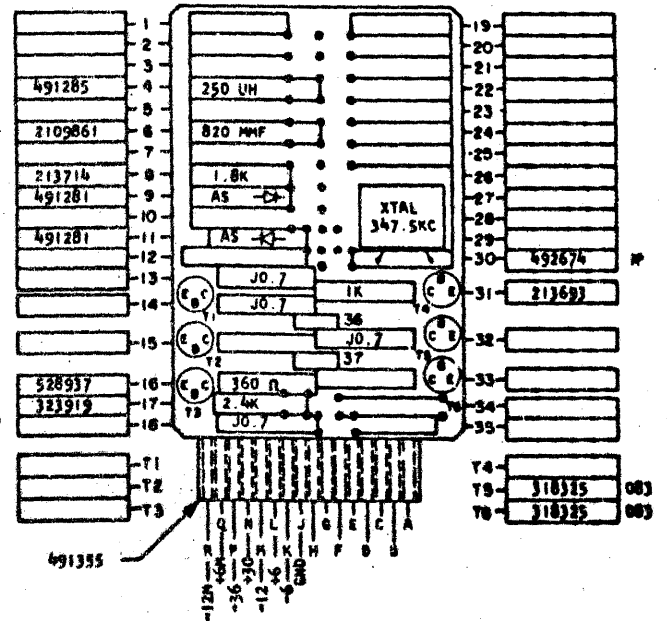
ALLOY - OSCILLATOR 347.5KC FREE RUNNING (CRYSTAL)



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR IS TURNED ON
2. PIN A MUST BE TIED TO PIN B FOR LOAD

PINS	SIGNAL NAME	WAVE SHAPE	LEVEL	
			MIN	MAX
A	OUTPUT		UP .69	.86
			DOWN -.9	-2.04



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

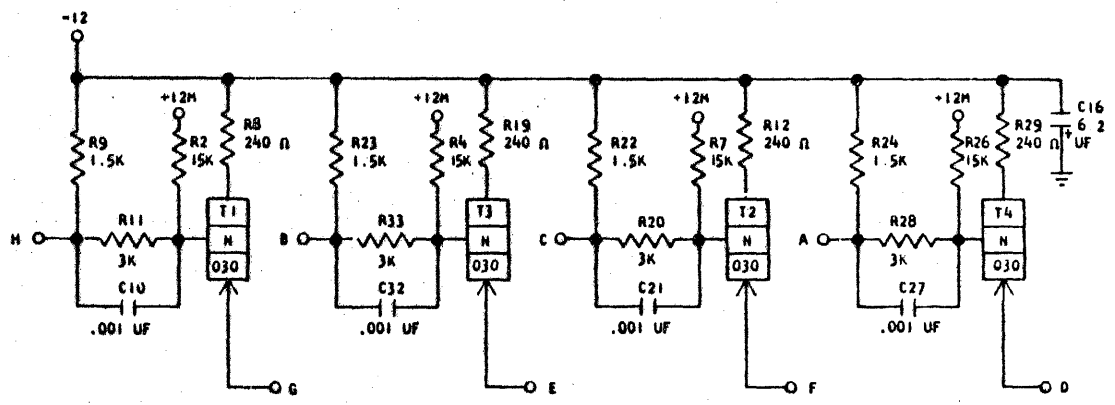
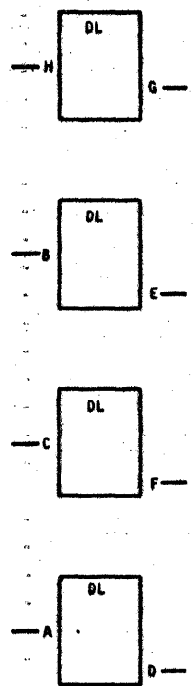
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-ALLOY-OSC				4-2-62	115599					
347.5KC FREE RUNNING (CRYSTAL)										
DESIGN	RQ	3-1-62	MODEL SMS							
D-TAIL	WH	3-1-62	SCALE NONE							
CHECK	WH	3-1-62	DRAW LIG	3-17-62						
D-PRO			CHECK							

729895

C

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370066

SDTRL 93Ω COAX LINE DRIVER-DISPERSED LOADS



- SEQUENCE OF OPERATION
1. INPUT DOWN TRANSISTOR ON OUTPUT DOWN
  2. INPUT UP TRANSISTOR OFF OUTPUT UP

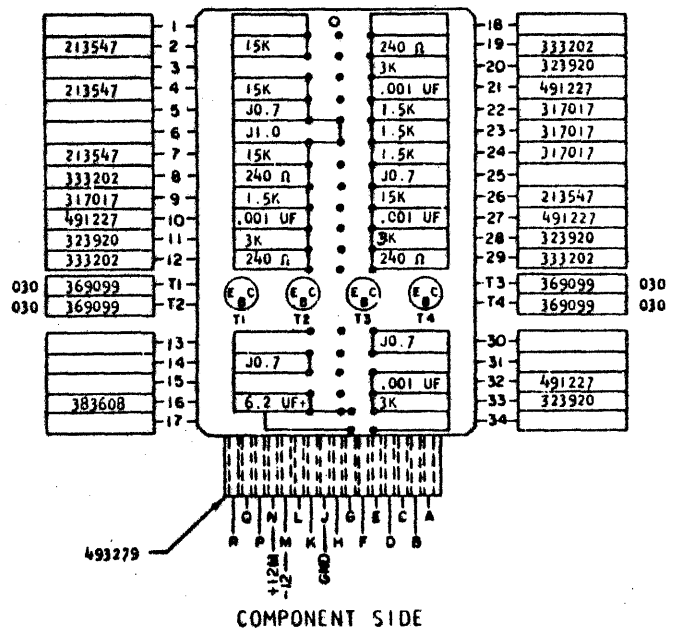
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
H, B, C, A	S INPUT	[Waveform: High to Low]	UP	-0.6
			DOWN	-1.14
G, E, F, D	N OUTPUT	[Waveform: High to Low]	UP	+0.8
			DOWN	-0.8
G, E, F, D	R OUTPUT	[Waveform: High to Low]	UP	12.
			DOWN	0.0

DELAY - NSEC - DISPERSED LOADS:

	MINIMUM	MAXIMUM
TURN ON	10	40
TURN OFF	0	10

DELAY - NSEC - "DOT-ORING"

	MINIMUM	MAXIMUM
TURN ON	16	52
TURN OFF	0	10



CIRCUIT AND PACKAGING STANDARD

APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTRL 93 Ω	6-27-62	115599					729933
	COAX LINE DRIVER-DISPERSED LOADS	11-7-62	114364					
DESIGN	RQ							
DETAIL	RQ	3-1-62						
CHECK	WH	3-1-62						
APPRO								

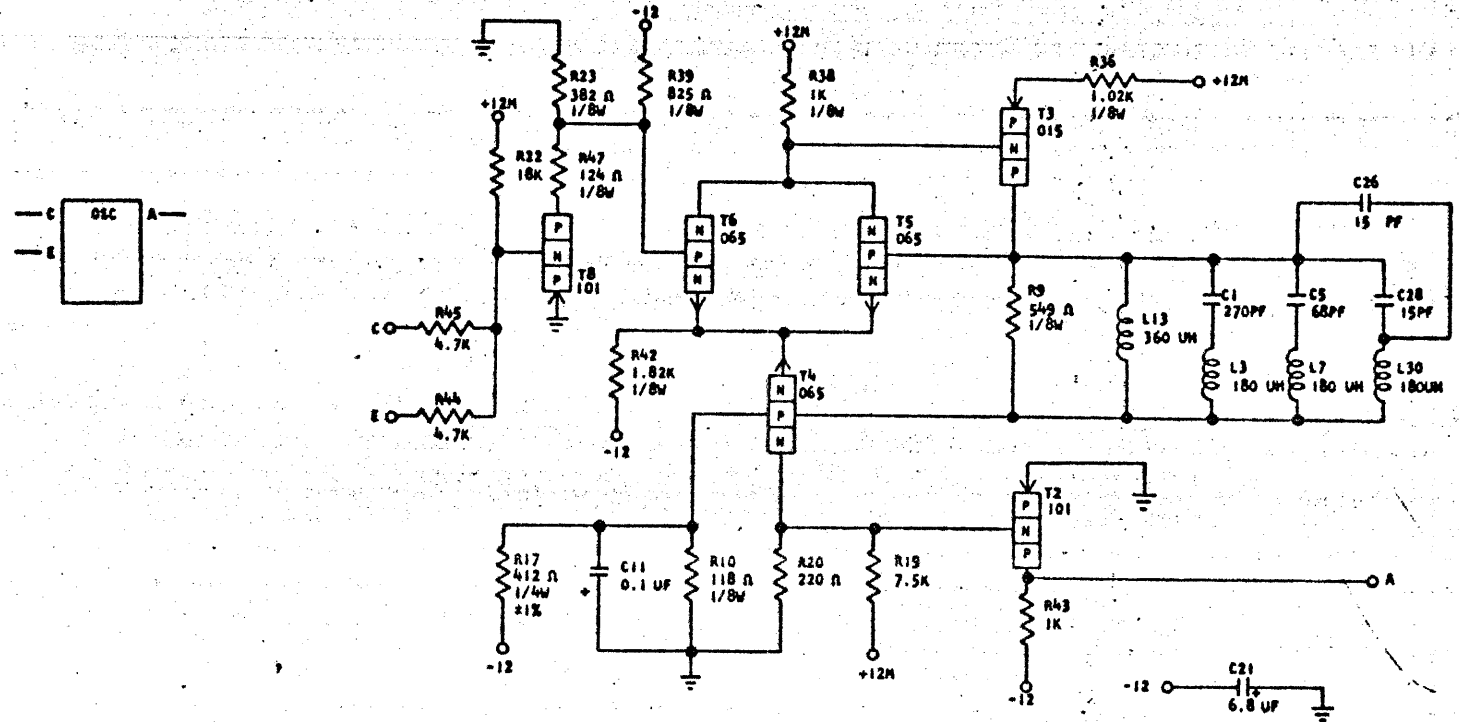
729934

STANDARD CODE

CARD CODE 729934  
T B 6 -

REFERENCE DRAWING  
SEE PRODUCTION DRAWING 370296

SDTRL - OSCILLATOR, 320 KC S LINE GATED



SEQUENCE OF OPERATION

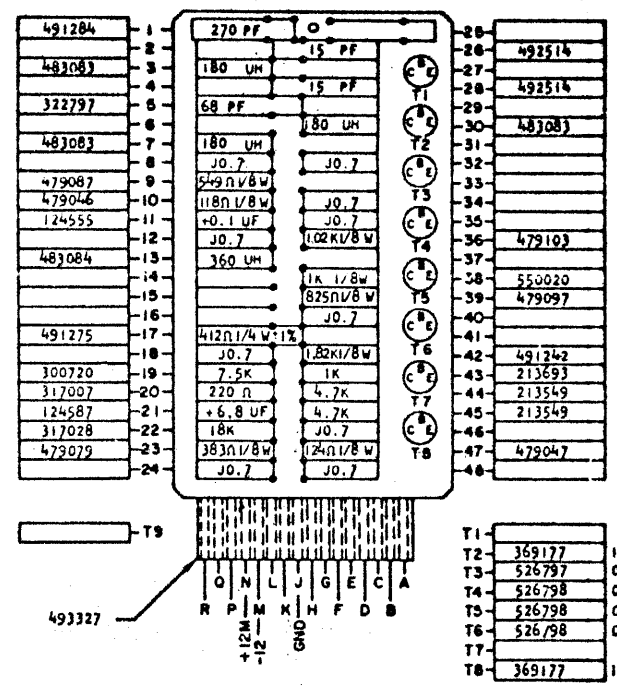
1. WHEN C AND E ARE UP, T8 TURNS OFF, OSCILLATOR TURNS ON
2. WHEN C OR E ARE DOWN, T8 TURNS ON, OSCILLATOR TURNS OFF

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, E	S INPUT		UP	-.45	-.05
			DOWN	-6.87	-12.5
A	S OUTPUT		UP	-.45	-.05
			DOWN	-6.87	-12.5

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	70	100
TURN OFF*	160	200
RISE TIME	52	66
FALL TIME	42	60

\*APPLIES ONLY WHEN GATING, WHEN OUTPUT IS AT A + S LEVEL.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTRL OSC	DATE	4-2-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN		MODEL	SMS							
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-1-62							
APPRO		CHECK								

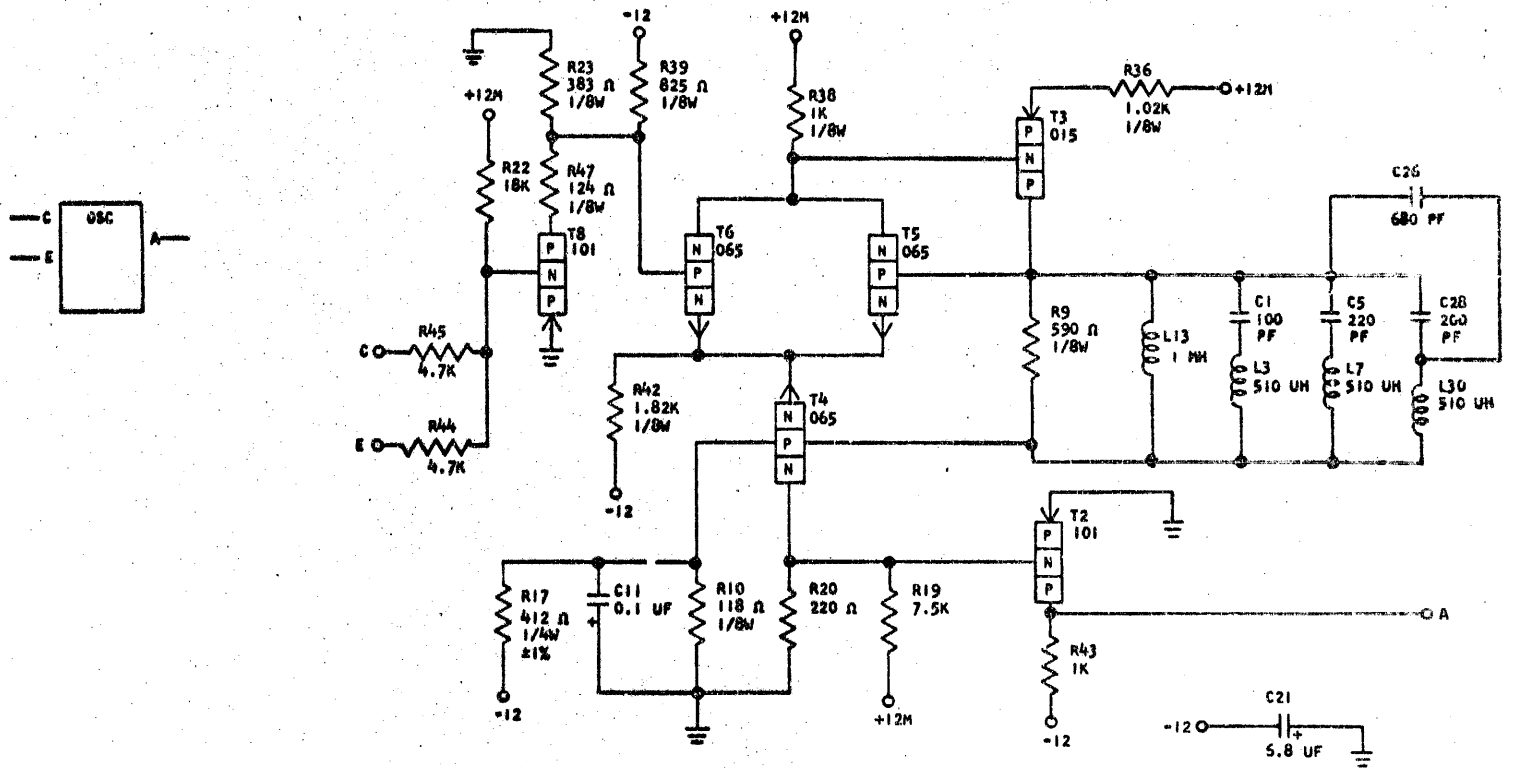
C

729934

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370295

SDTRL - OSCILLATOR, 115 KC S LINE GATED



SEQUENCE OF OPERATION

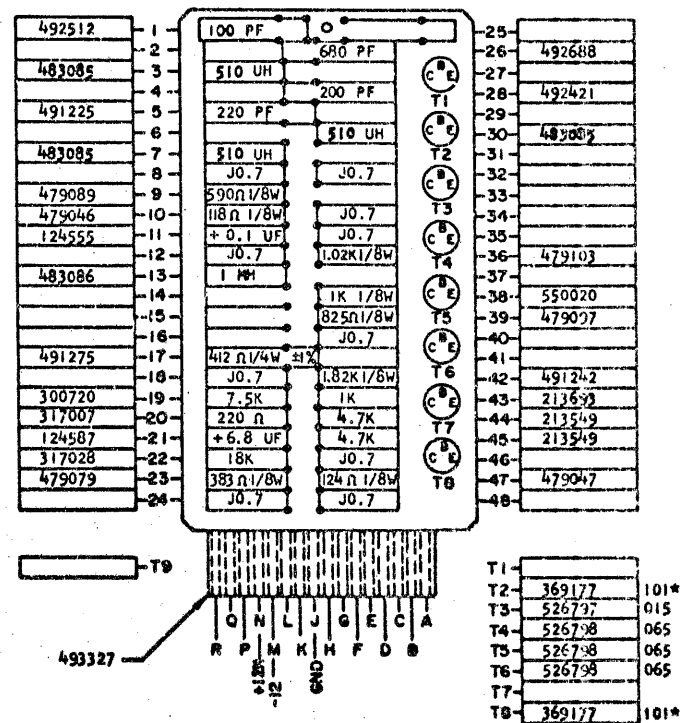
1. WHEN C AND E ARE UP, T8 TURNS OFF, OSCILLATOR TURNS ON
2. WHEN C OR E IS DOWN, T8 TURNS ON, OSCILLATOR TURNS OFF

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, E	S INPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5
A	S OUTPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	60	130
TURN OFF*	110	190
RISE TIME	28	82
FALL TIME	21	58

\*APPLIES ONLY WHEN GATING, WHEN OUTPUT IS AT A + S LEVEL.

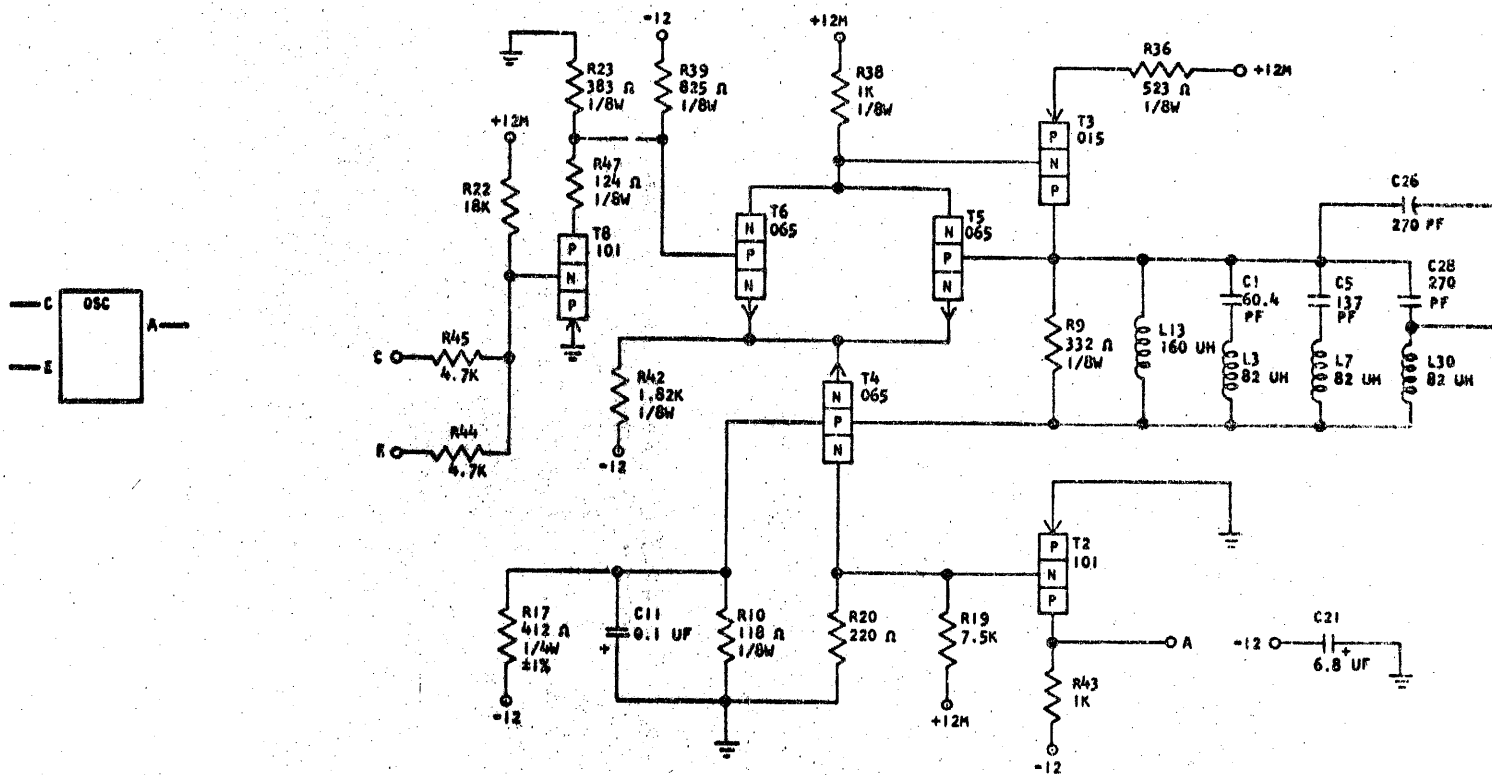


COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SDTRL-OSC				6-29-62	115599					
115 KC S LINE GATED										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

SDTRL - OSCILLATOR, 360 KC S LINE GATED



SEQUENCE OF OPERATION

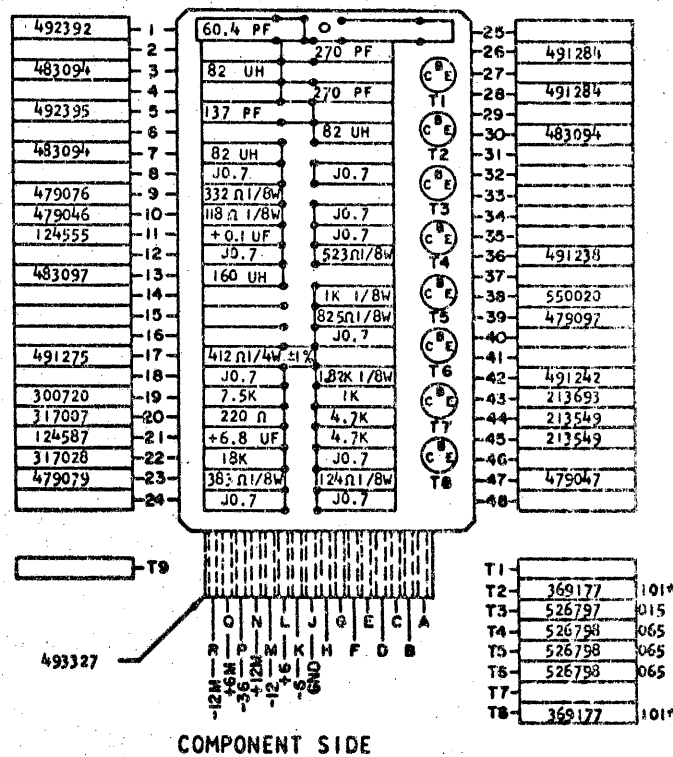
1. WHEN C AND E ARE UP, T8 TURNS OFF, OSCILLATOR TURNS ON
2. WHEN C OR E IS DOWN, T8 TURNS ON, OSCILLATOR TURNS OFF

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, E	S INPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5
A	S OUTPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5

DELAY - NSEC.

	MINIMUM	MAXIMUM
TURN ON	70	110
TURN OFF*	160	200
RISE TIME	28	52
FALL TIME	46	54

\*APPLIES ONLY WHEN GATING, WHEN OUTPUT IS AT A + S LEVEL.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

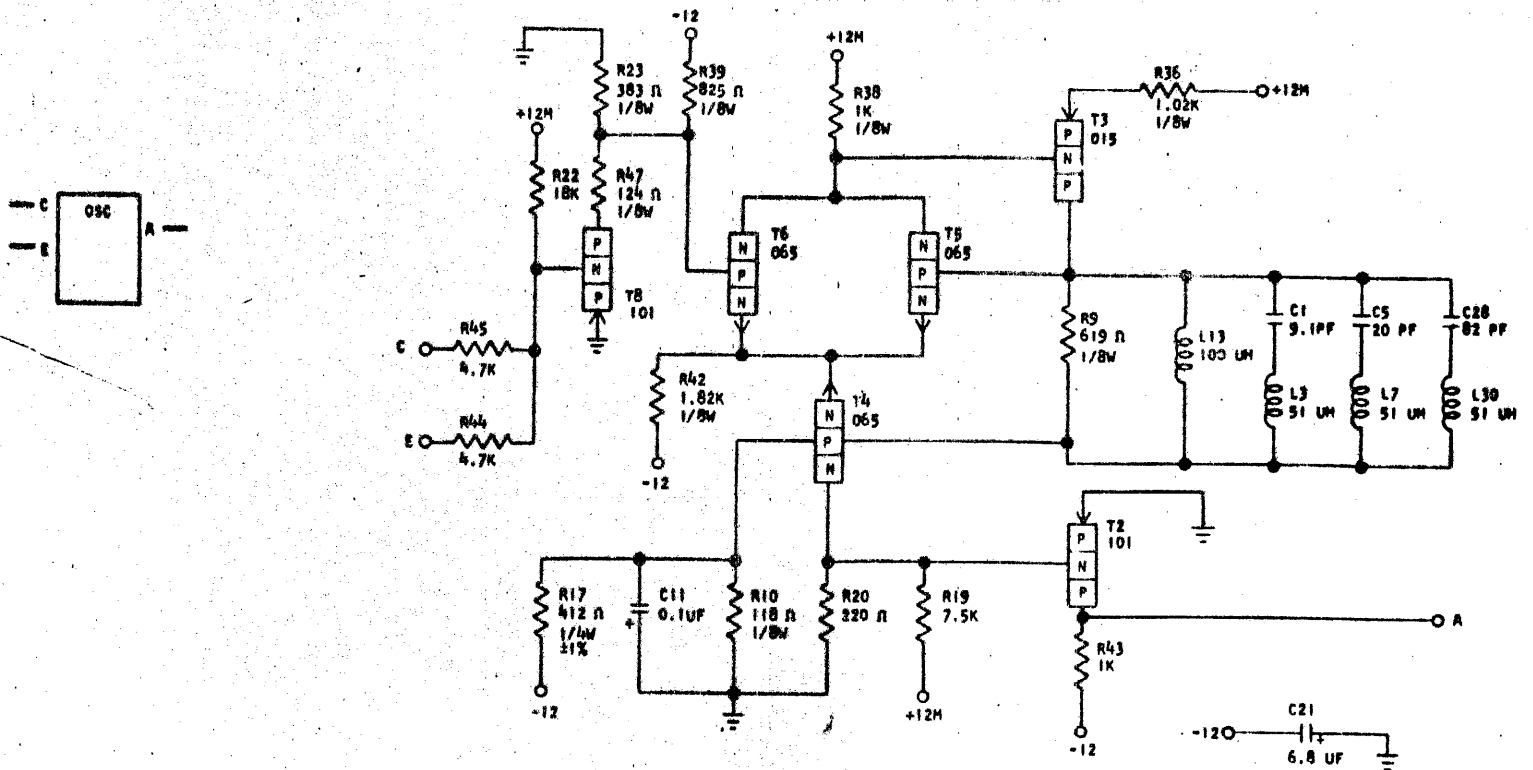
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SDTRL-OSC.		6-29-62	115599					72936
360 KC S LINE GATED								
DESIGN	MODEL	SCALE						
DETAIL RQ	3-1-62	SCALE NONE						
CHECK WH	3-1-62	DRAW LIS	3-17-62					
APPRO	CHECK							



REFERENCE DRAWING

SEE PRODUCTION DRAWING 370299

SDTRL - OSCILLATOR, 1 MC S LINE GATED



SEQUENCE OF OPERATION

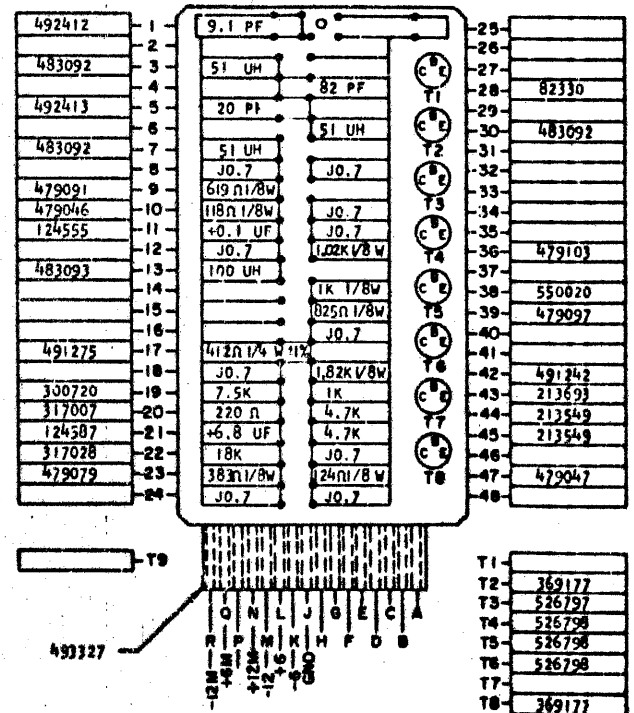
1. WHEN C & E ARE UP, T8 TURNS OFF, OSCILLATOR TURNS ON
2. WHEN C OR E IS DOWN, T8 TURNS ON, OSCILLATOR TURNS OFF

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
C, E	S INPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5
A	S OUTPUT		UP	-0.45	-0.05
			DOWN	-6.87	-12.5

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	70	170
TURN OFF*	80	200
RISE TIME	52	110
FALL TIME	42	220

\*APPLIES ONLY WHEN GATING, WHEN OUTPUT IS AT A + S LEVEL.



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD

APPROVAL	DATE
ABC	4-2-62

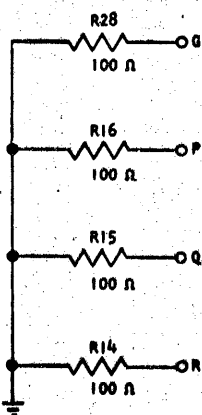
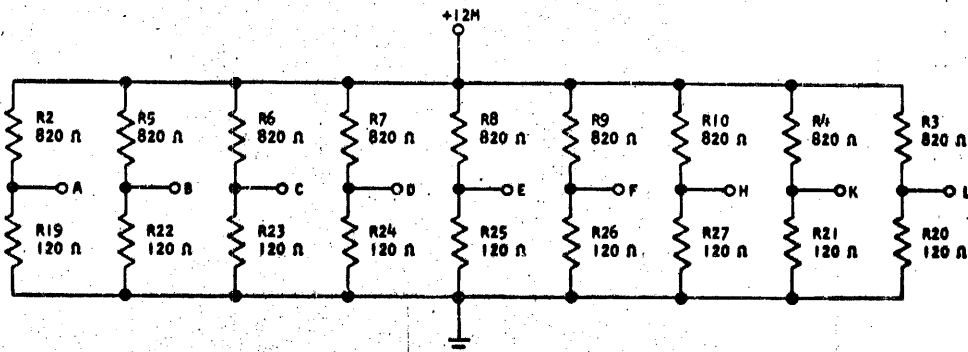
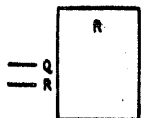
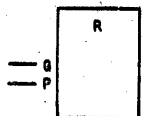
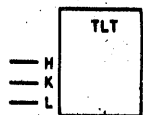
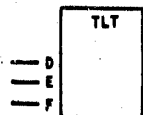
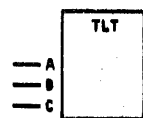
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR- SDTRL-OSC,	6-29-62	115599					729938
1 MC S LINE GATED								
DESIGN	MODEL SMS							
DETAIL	RQ 3-1-62 SCALE NONE							
CHECK	WH 3-1-62 DRAW LTB 3-17-62							
APPRO	CHECK							



REFERENCE DRAWING

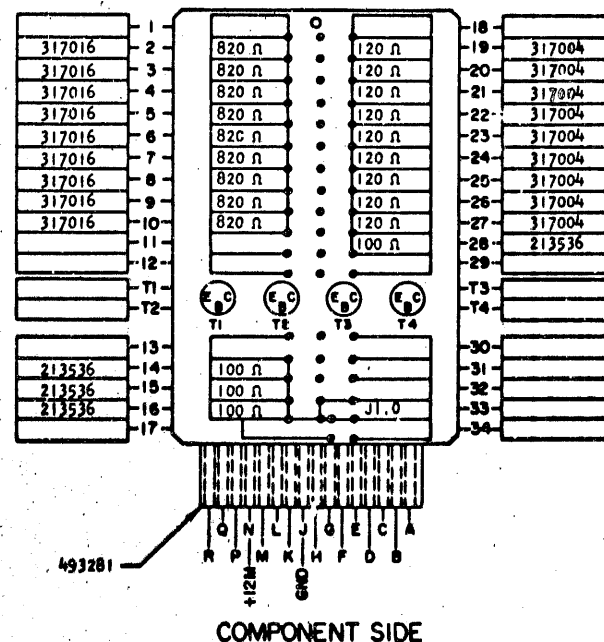
SEE PRODUCTION DRAWING 370334

SDTRL - END OF LINE TERMINATORS



APPLICATION

1. 100Ω RESISTOR USED TO TERMINATE A SDTRL TRANSMISSION LINE
2. 820Ω AND 120Ω RESISTOR FORM COUPLING NETWORK WHICH ACTS AS A SPECIAL END OF LINE TERMINATOR FOR SDTRL COAXIAL LINE AND WITH ITS' INPUT PIN FORMS A SEPARATE CIRCUIT
3. EACH PIN REPRESENTS A SEPARATE NETWORK OR RESISTOR



COMPONENT SIDE

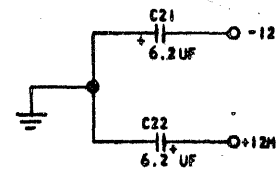
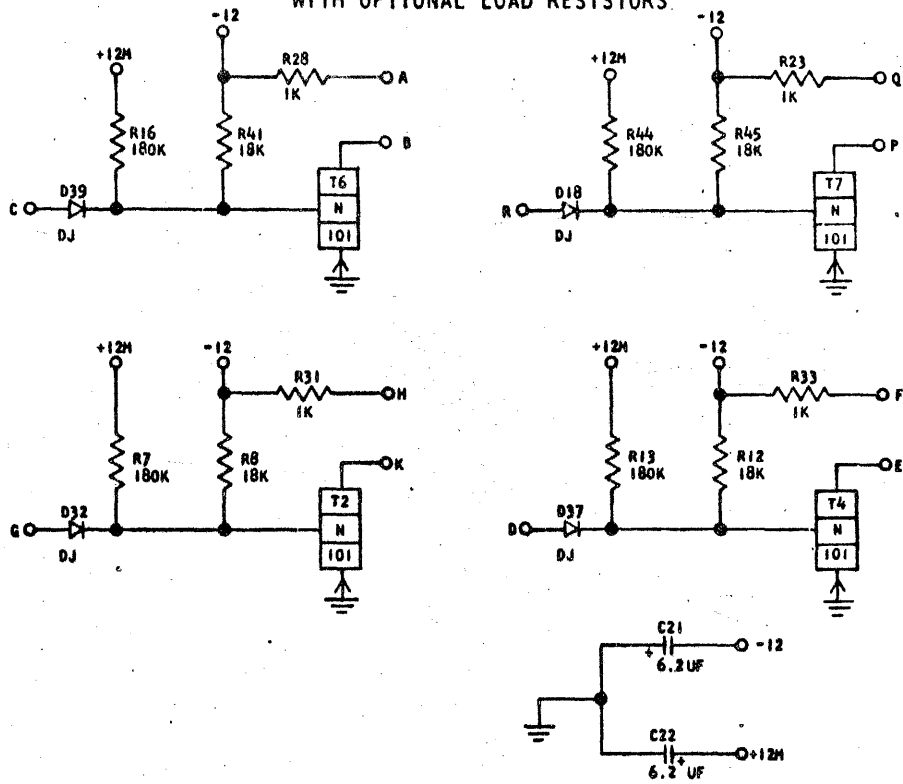
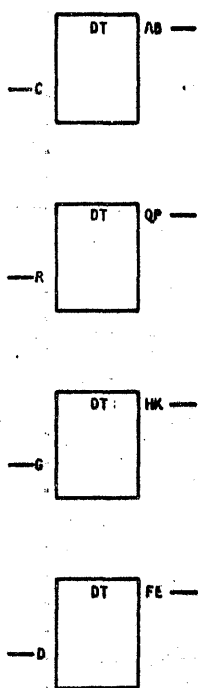
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	
NAME	CARD ASM. TSTR - SDTRL -	DATE	6-29-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.	
	END OF LINE TERMINATORS										
DESIGN		MODEL	SMS								
DETAIL	RQ 3-1-62	SCALE	NONE								
CHECK	WH 3-1-62	DRAW	LIG 3-17-62								
APPRO		CHECK									

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370389

SDTRL-DISTRIBUTED LINE TERMINATOR WITH OPTIONAL LOAD RESISTORS



SEQUENCE OF OPERATION

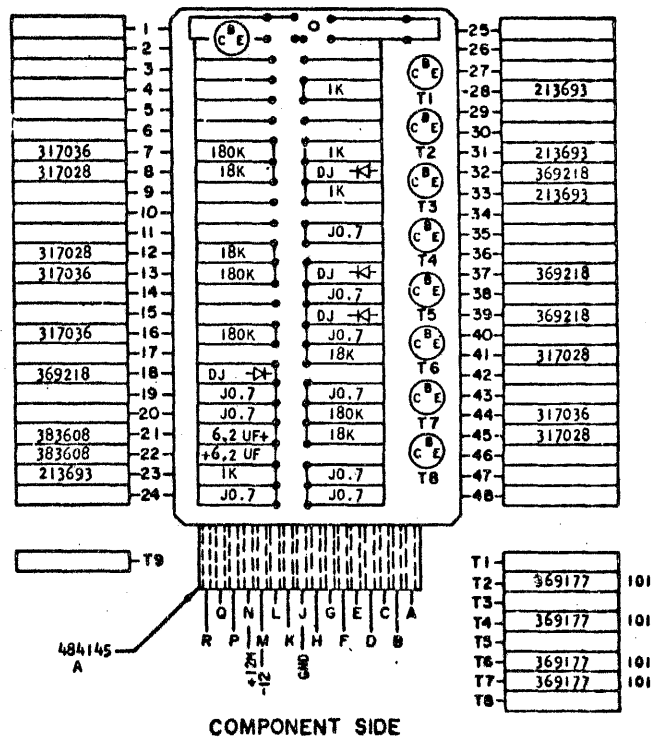
1. DOWN INPUT TRANSISTOR ON OUTPUT UP
2. UP INPUT TRANSISTOR OFF OUTPUT DOWN
3. COLLECTORS MUST BE LOADED

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
C, R, G, D	N	INPUT	UP	+6.5
			DOWN	-7
B, P, K, E	Y	OUTPUT	UP	-1
			DOWN	-6.87

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	106	120*
TURN OFF	108	126*

\*FOR 100 FT OF CABLE.



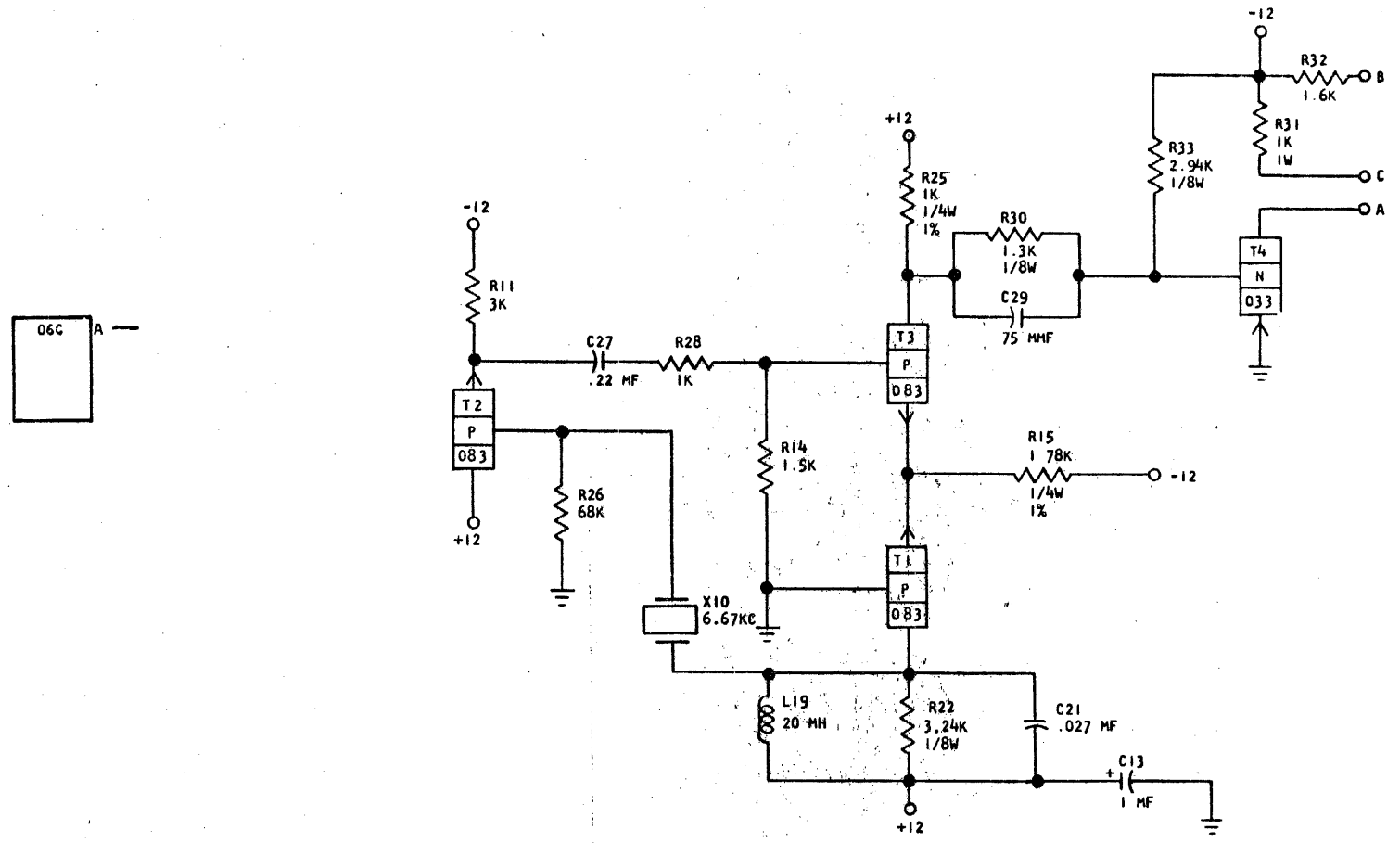
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - SDTRL-DISTRIBUTED LINE TERMINATOR				6-29-62	115599					
DESIGN RQ 3-1-62				11-7-62	114364					
CHECK WR 3-1-62										
APPRO										

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370401

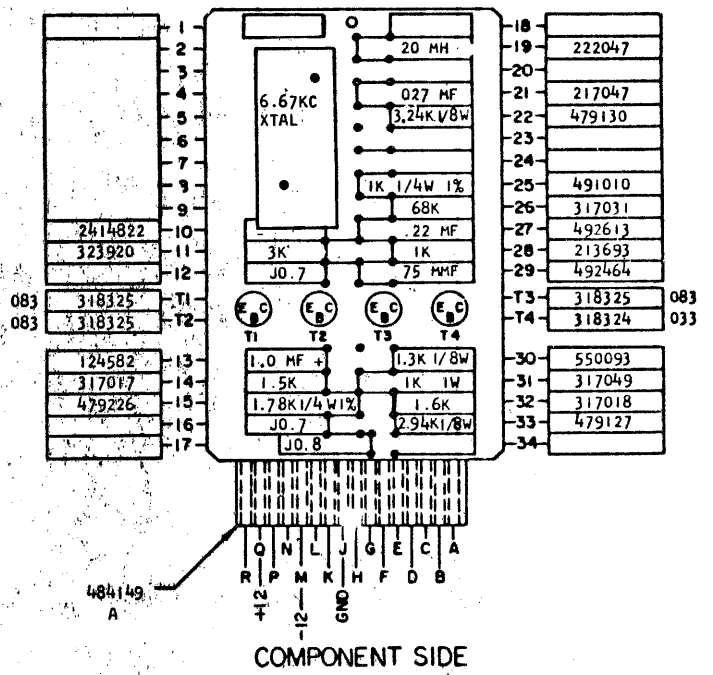
SDTDL-SDTRL - 6.67 KC OSCILLATOR



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON.
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON THE CURRENT REQUIREMENTS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A	S	OUTPUT	UP	-5	-1
			DOWN	-5.8	-12.48



COMPONENT SIDE

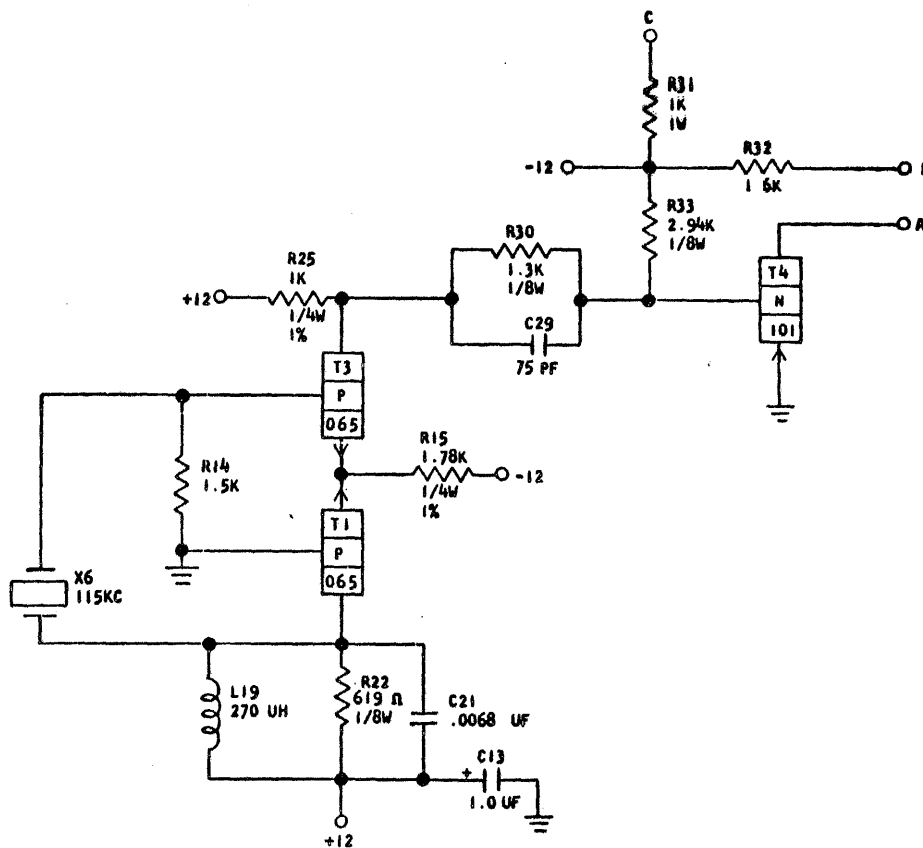
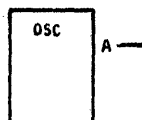
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTL			6-29-62	115599					
	SDTRL-6.67 KC OSCILLATOR			8-28-63	117802					
DESIGN		MODEL	SMS	12-29-64	120699	GLK				
DETAIL	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370400

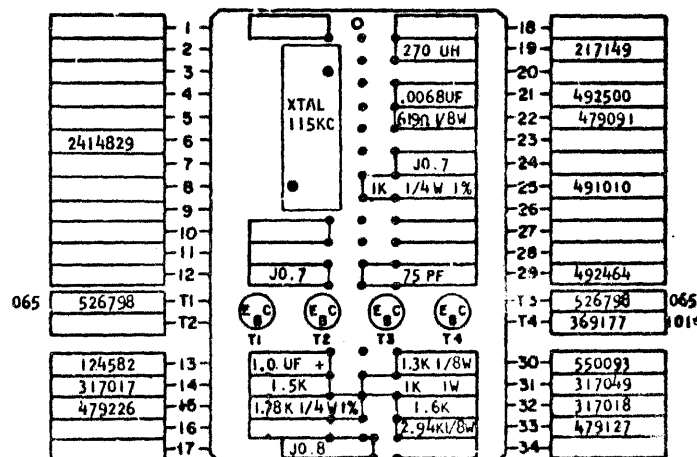
SDTDL-SDTRL - 115 KC OSCILLATOR



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON CURRENT REQUIREMENTS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A	S	OUTPUT	UP	-0.45	-0.05
			DOWN	-5.8	-12.48



484149  
A  
COMPONENT SIDE

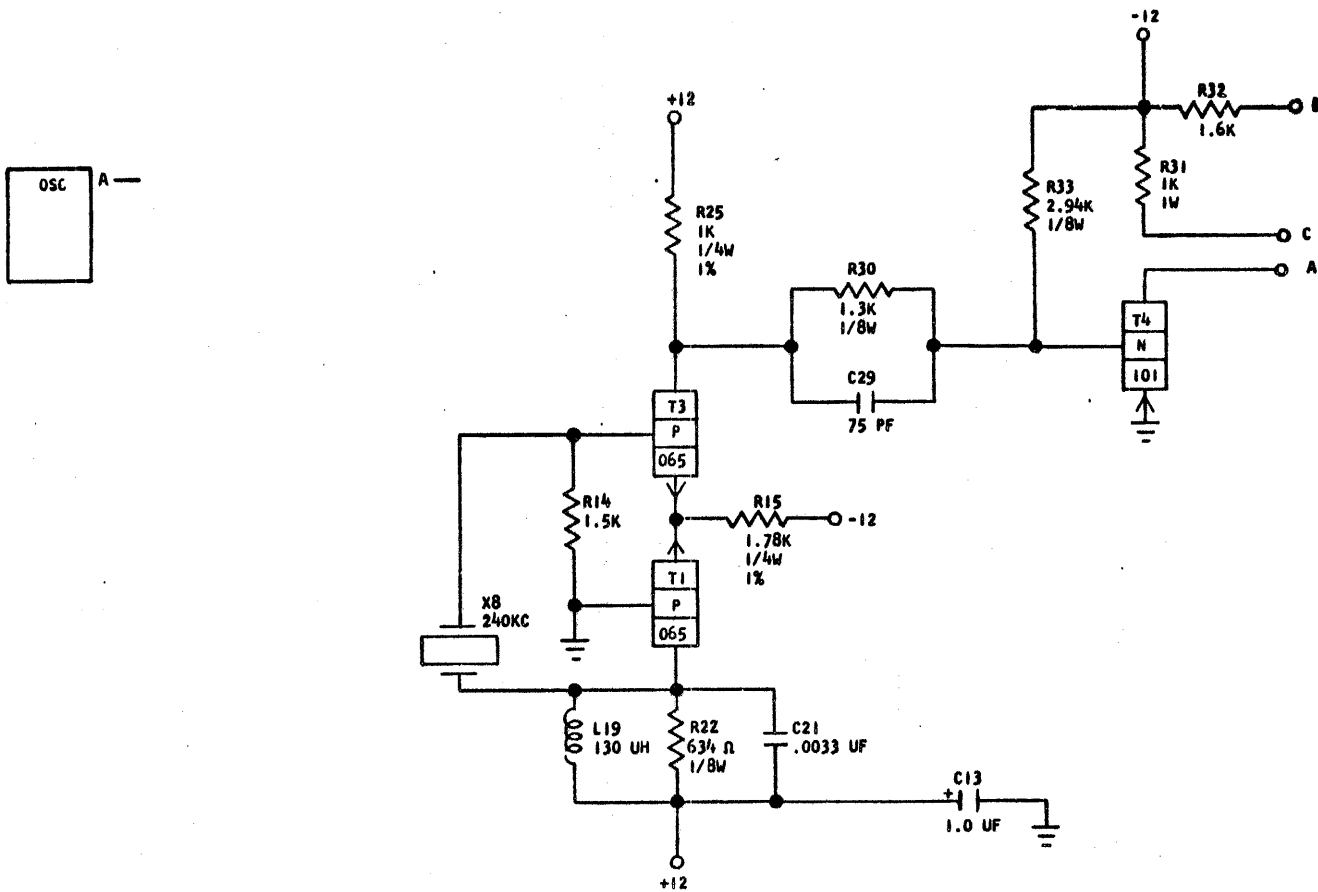
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-29-62	115599					729942
SDTRL-115 KC OSCILLATOR				8-28-63	117802					
DESIGN	RQ	3-1-62	SCALE	SMS	2-29-64	120699	GLK			
DETAIL	WH	3-1-62	DRAW	NONE						
CHECK	WH	3-1-62	CHECK	LIG	3-17-62					

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370399

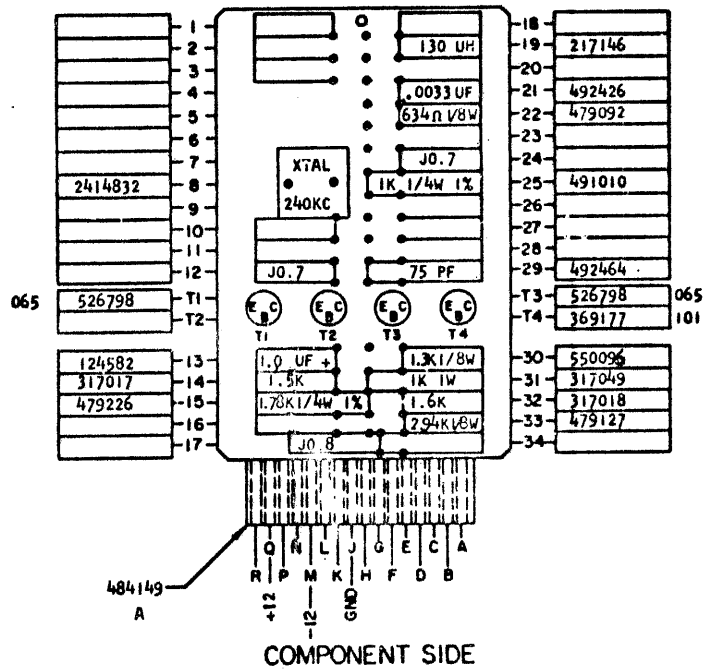
## SDTDL-SDTRL-240 KC OSCILLATOR



### SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON CIRCUIT REQUIREMENTS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MAX	MIN	
A	S	OUTPUT	UP	-0.45	-0.05
			DOWN	-0.05	-12.48



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTDL			6-29-62	115599					
	SDTRL-240 KC OSCILLATOR			8-28-63	117802					
DESIGN		MODEL	SMS	12-29-64	120699	GLK				
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								

729944

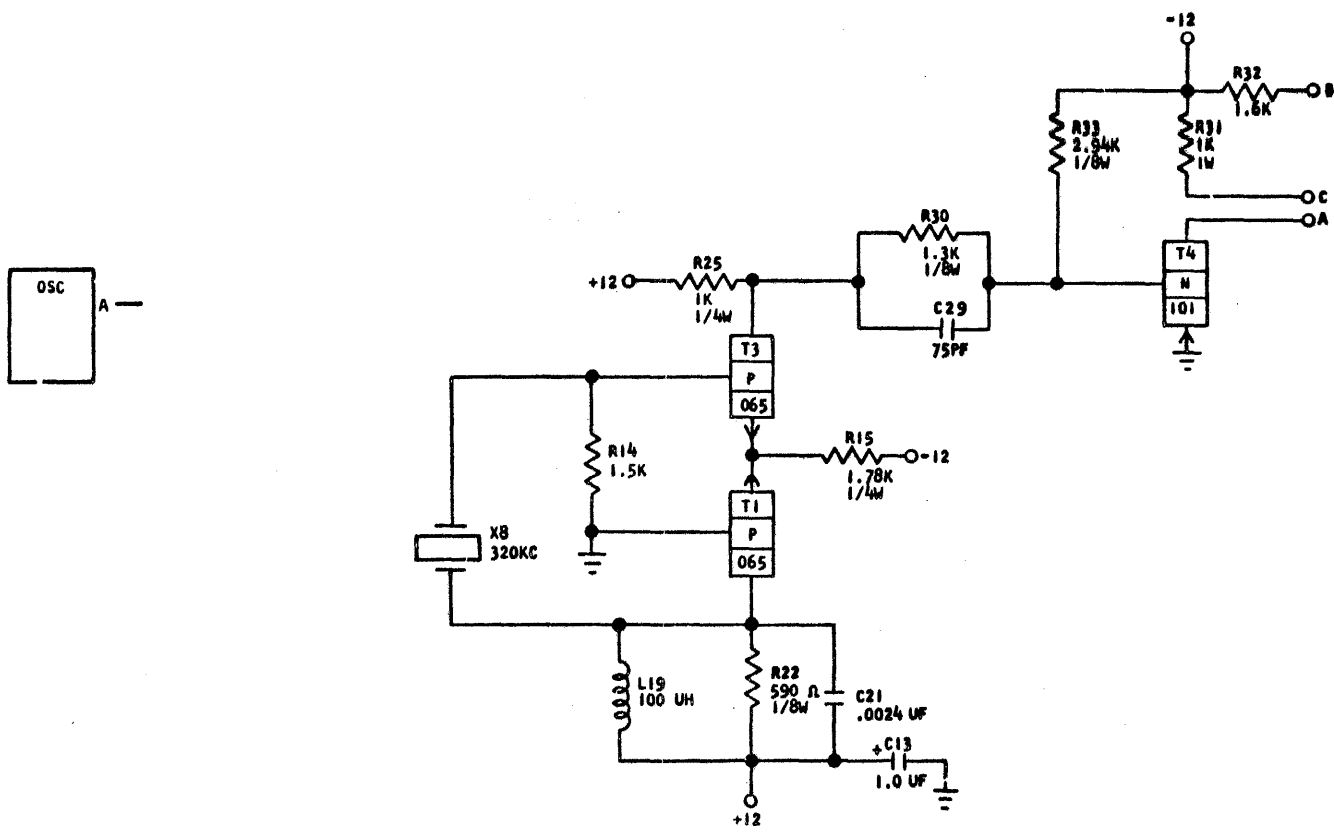
STANDARDS CODE

CARD CODE 729944  
TDF -

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370398

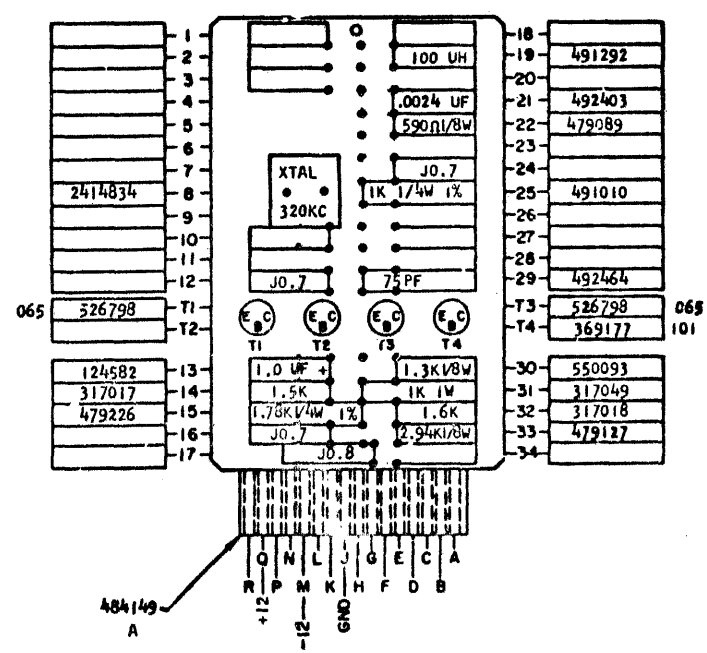
SDTDL-SDTRL-320 KC OSCILLATOR



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON.
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON CURRENT REQUIREMENTS.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A	S	OUTPUT	UP	-0.45	-0.05
			DOWN	-5.8	-12.48



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTDL			6-29-62	115599					
	SDTRL-320 KC OSCILLATOR			8-28-63	117802					
DESIGN	RQ	3-1-62	SCALE	SMS	12-29-64	120699	GLK			
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

C

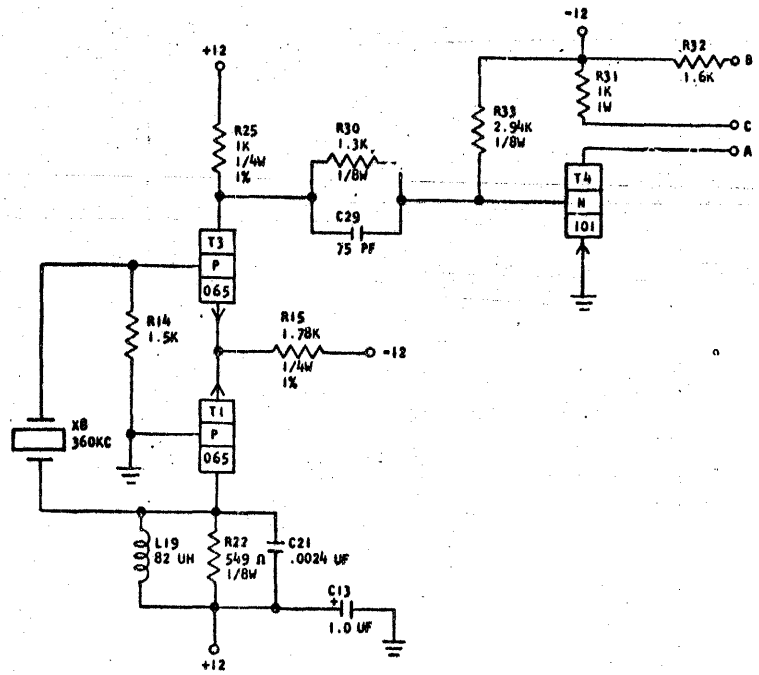
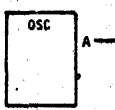
729945

STANDARDS CODE

CARD CODE 729945  
T D G -

**REFERENCE DRAWING**  
SEE PRODUCTION DRAWING 370397

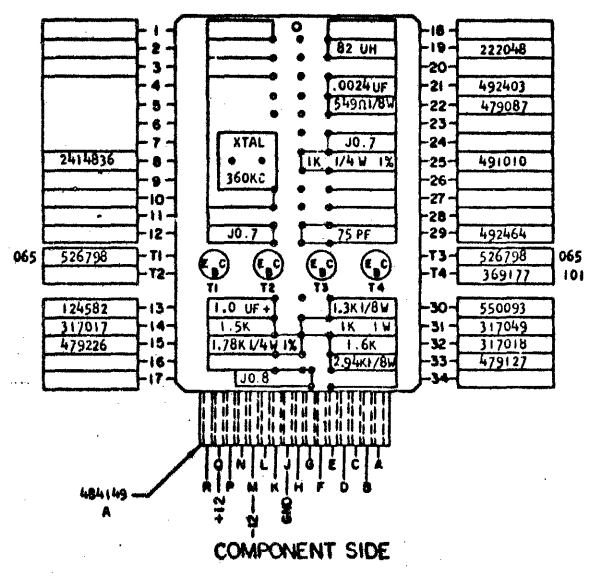
**SDTDL-SDTRL - 360 KC OSCILLATOR**



**SEQUENCE OF OPERATION**

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON CURRENT REQUIREMENTS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	S OUTPUT	360 KC	UP	-4.5 - .05
			DOWN	-5.8 -12.4B



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM	TSTR	SDTDL	6-29-62	115599					
	SDTRL		387 KC OSCILLATOR	8-28-63	117802					
DESIGN		MODEL	SMS	12-29-64	120699	GLK				
DETAIL	MQ	3-1-57	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG	3-17-62					
APPRO			CHECK							

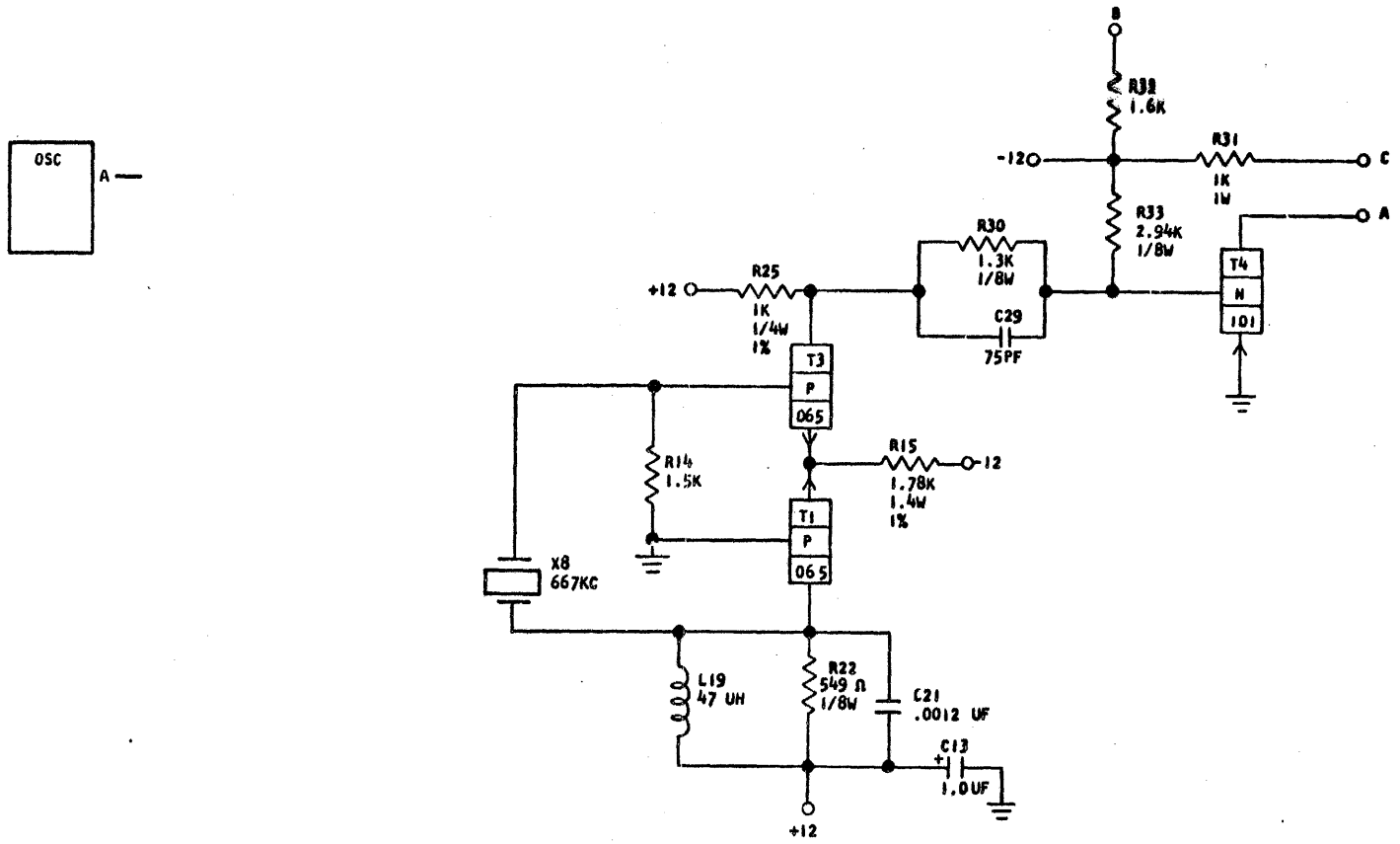
729945

C

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370396

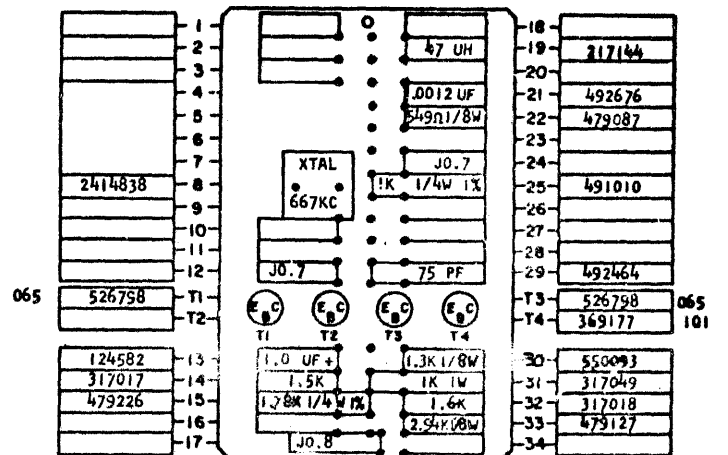
SDTDL-SDTRL-667 KC OSCILLATOR



SEQUENCE OF OPERATION

1. WHEN POWER IS UP, THE OSCILLATOR TURNS ON
2. PIN A CAN BE TIED TO TWO DIFFERENT LOADS, DEPENDING ON CURRENT REQUIREMENTS

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A	S	OUTPUT	UP	-0.45	-0.05
			DOWN	-5.8	-12.48



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR-SDTDL			6-27-62	115599					
	SDTRL-667 KC OSCILLATOR			8-28-63	117802					
DESIGN		MODEL	SMS	12-29-64	120699	GLK				
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	LIG 3-17-62							
APPRO		CHECK								

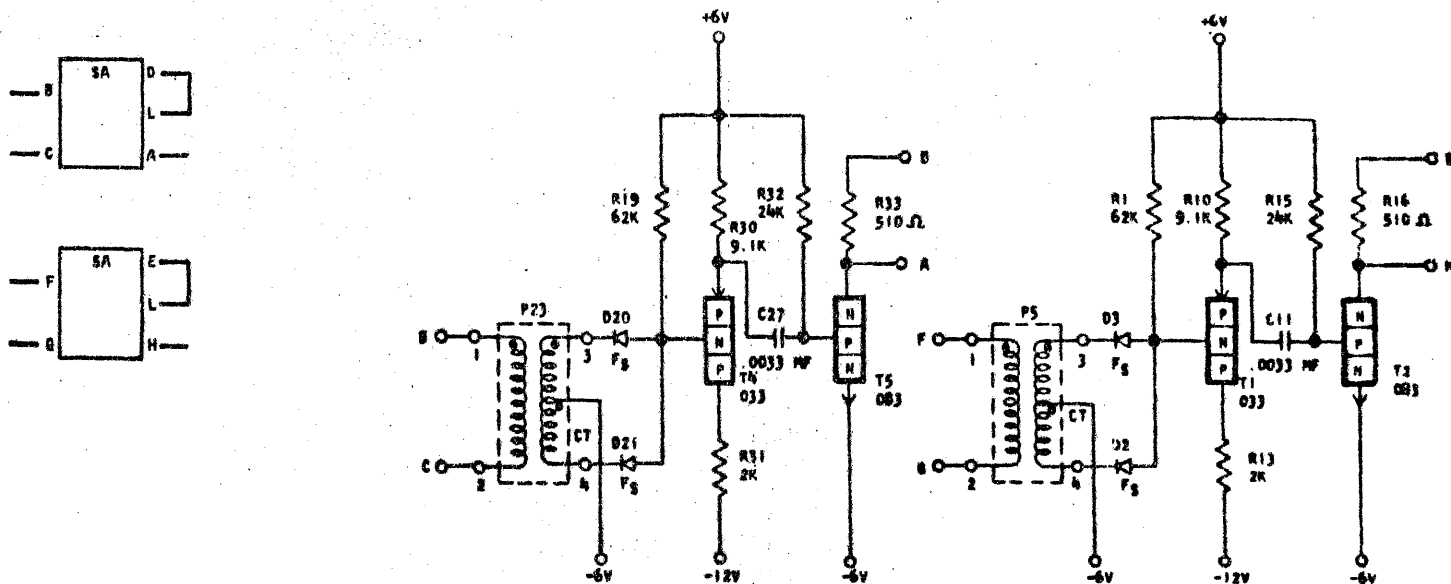




REFERENCE DRAWING

SEE PRODUCTION DRAWING 371898

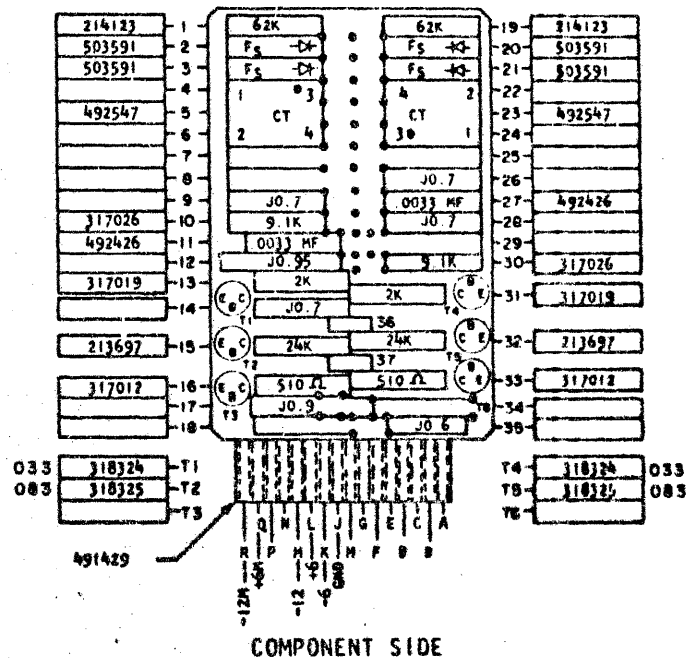
ALLOY-SENSE AMPLIFIER NO. 2  
MOUNT CARD ON ONE INCH CENTERS



SEQUENCE OF OPERATION

1. WITH NO INPUT ALL TRANSISTORS ARE IN CONDUCTION; OUTPUT IS DOWN. E AND D ARE TIED TO +6V.
2. 50 MV MIN. P-P ACROSS B AND C IS STEPPED UP AND RECTIFIED APPEARING AS NEGATIVE SHIFT ON BASE OF T4. A NEGATIVE IV SHIFT FROM T4 EMITTER THEN TURNS T5 OFF AND THE OUTPUT IS UP.
3. AMPLIFIER OUTPUT DELAY IS 1.0 USEC MAXIMUM. AMPLIFIER DELAY SHALL BE DEFINED AS THE TIME TAKEN FROM THE 50% POINT ON THE RISE OF THE "ONE" SIGNAL TO THE 10% POINT OF THE LEADING EDGE VOLTAGE TRANSITION AT THE OUTPUT.

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A, H	T	OUTPUT	UP	1.4V 6.2V
			DOWN	-5.4V -6.2V



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR - ALLOY	DATE	4-27-62	CHANGE NO.	115599	APPROVAL		DATE		DEVELOPMENT NO.
DESIGN	MODEL	SCALE								
DETAIL	RQ 3-1-62	SCALE	NONE							
CHECK	WH 3-1-62	DRAW	L18 2-17-62							
APPRO		CHECK								

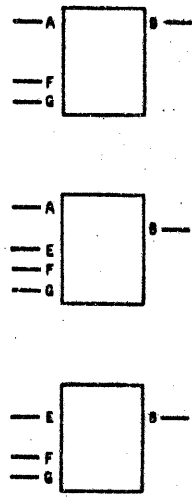
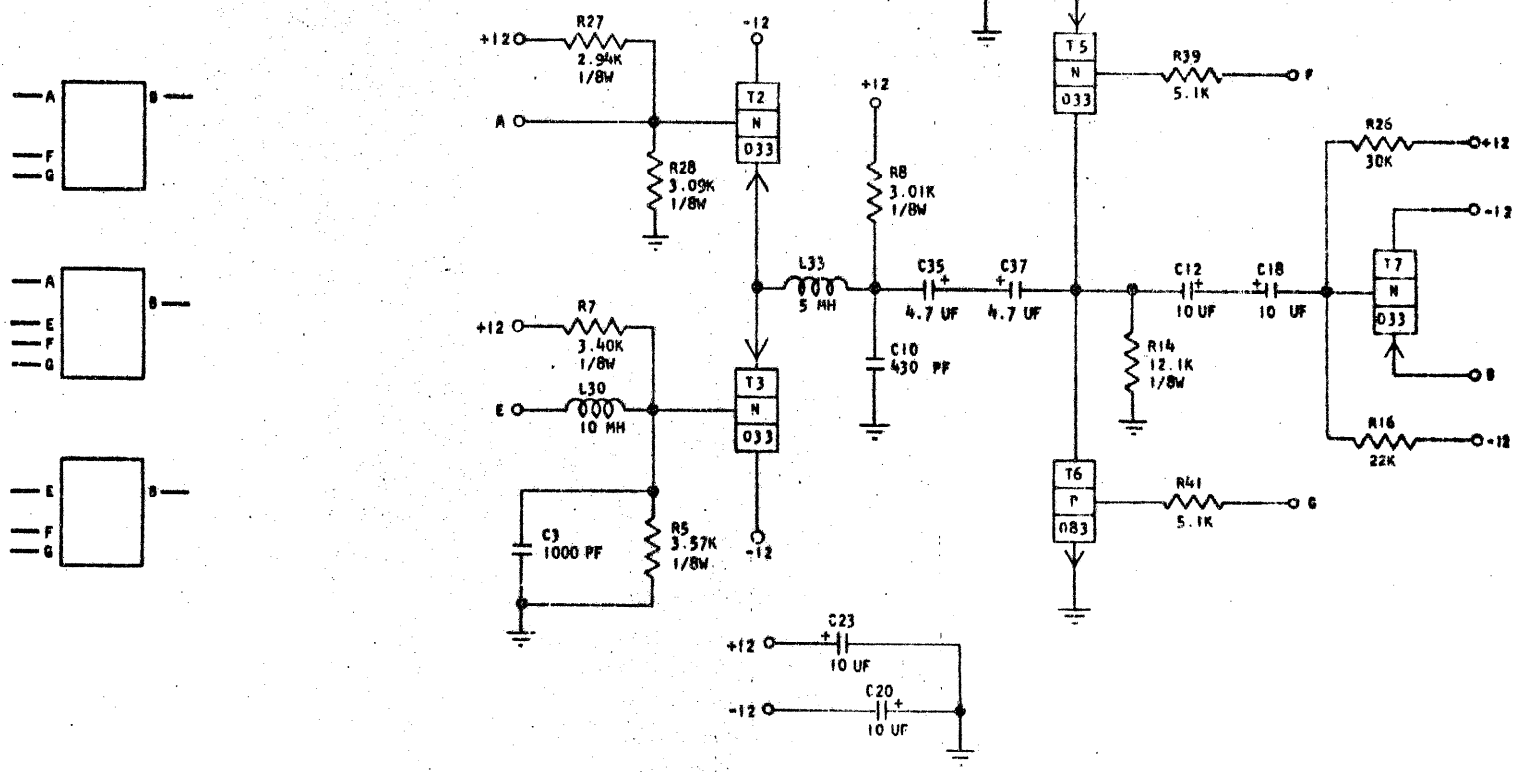


# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370417

## SENSE AMPLIFIER - INPUT FILTER AND SELECT GATE

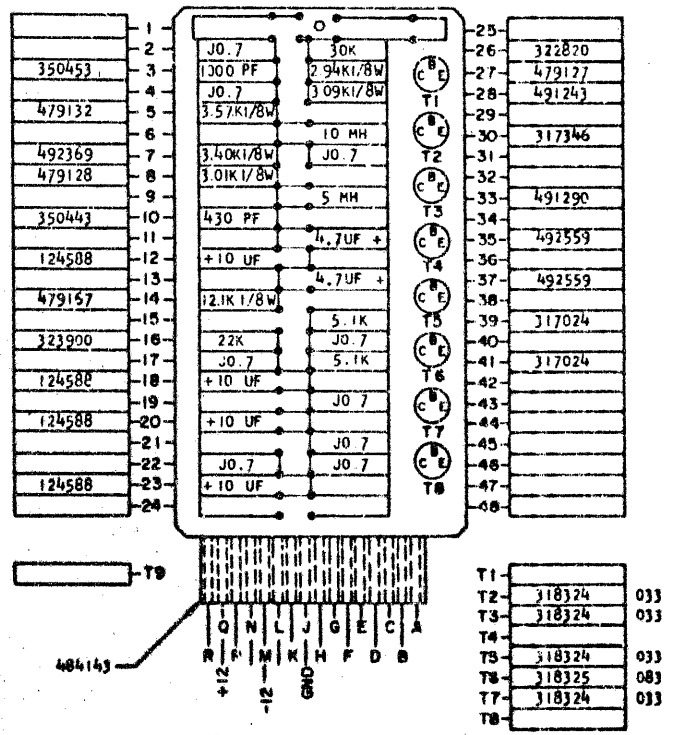
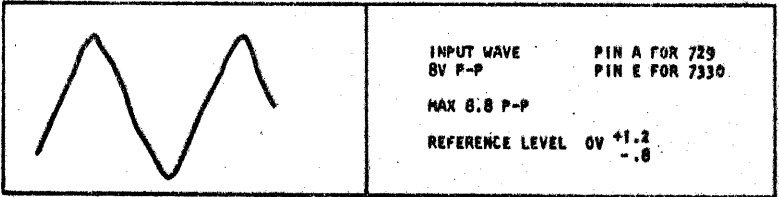
MOUNT CARD ON ONE INCH CENTERS NOTE XXX



### SEQUENCE OF OPERATION

- PIN F AT +12V AND PIN G AT -12V FROM GATE ON FINAL AMPS. CARD
- PIN B WAVE FORM WILL BE SAME AS INPUT WAVE FORM
- TRANSISTOR THAT DOES NOT HAVE INPUT IS CUT OFF

### WAVE FORMS



### COMPONENT SIDE

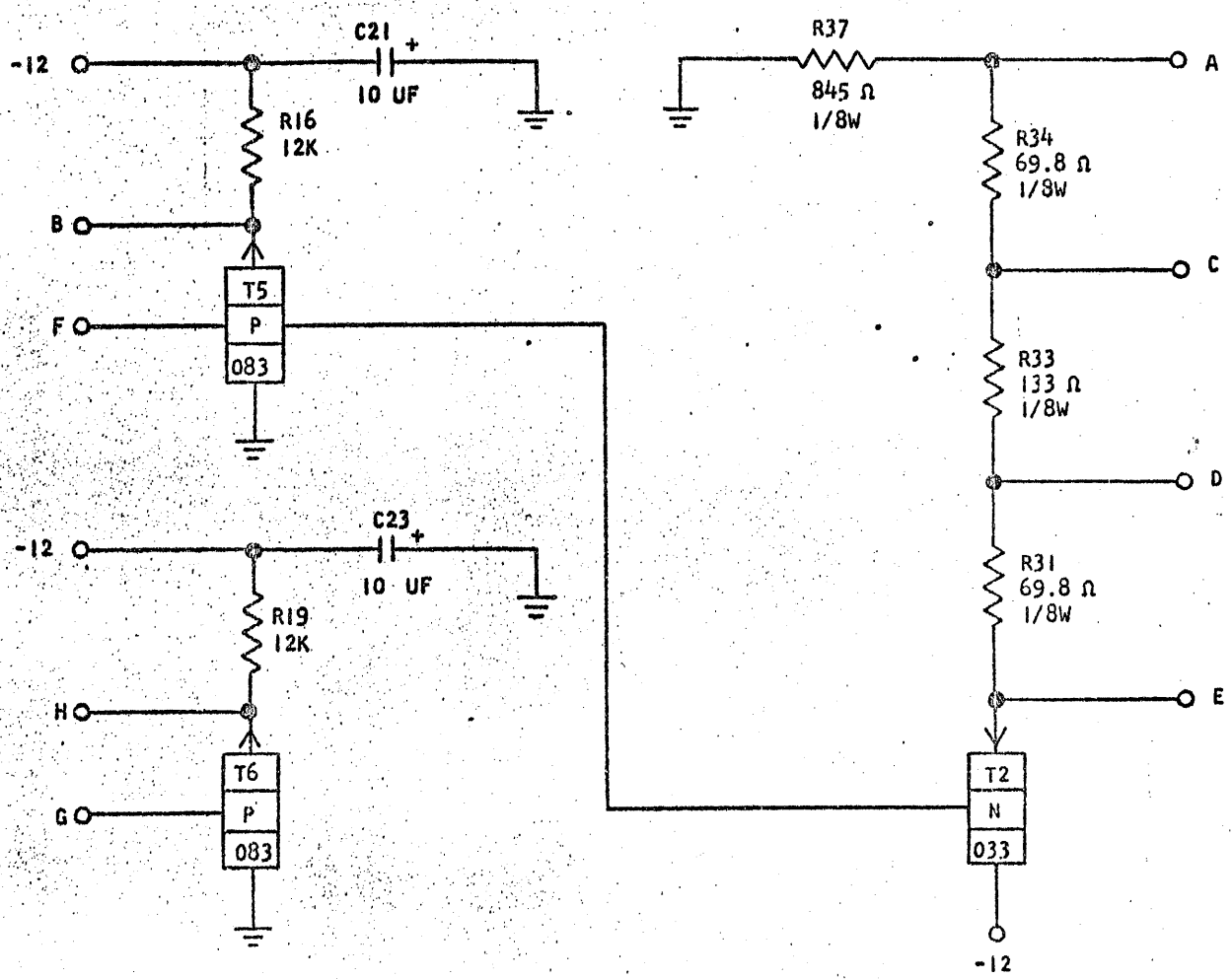
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-SENSE AMPL		6-19-62	115599					729948
INPUT FILTER AND SELECT GATE								
DESIGN	RQ	3-1-62	SCALE	NONE				
CHECK	WH	3-1-62	DRAW	LIG	3-17-62			
APPRO			CHECK					

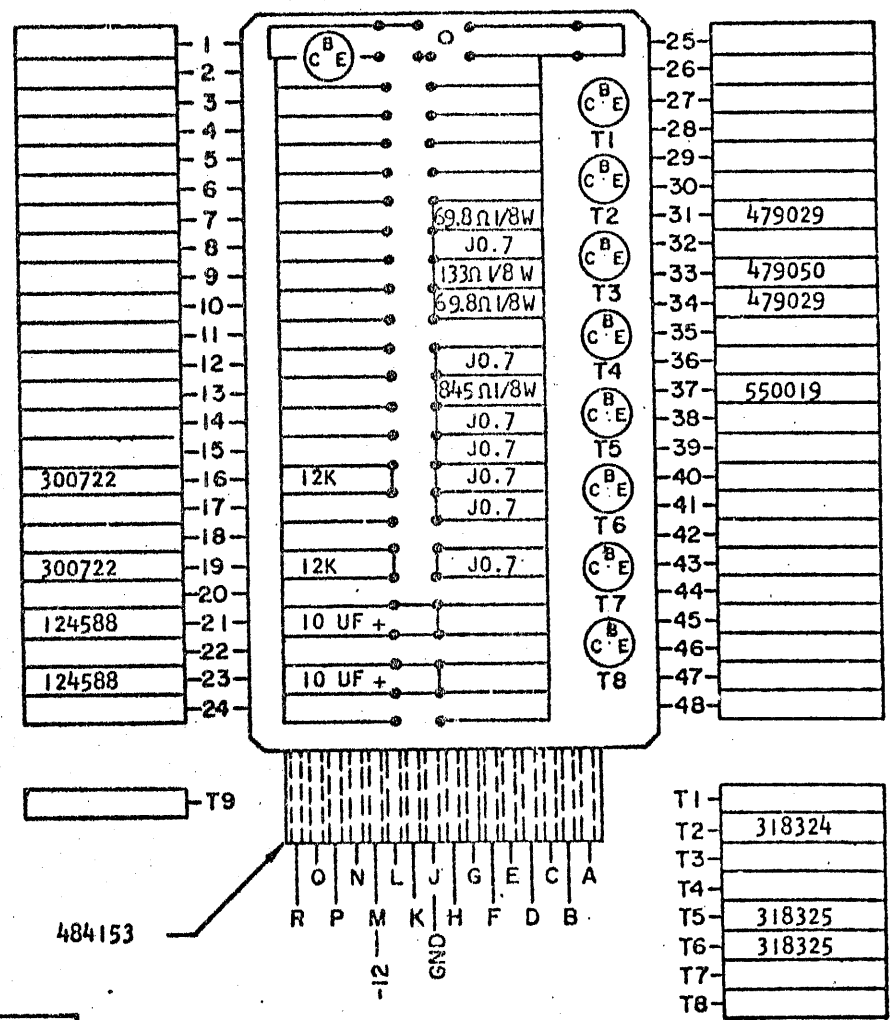


SENSE AMPLIFIER-CLIPPING LEVEL CONTROL

STANDARDS CODE  
370419  
2-7045 Y C A -



- NOTES
- X CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892419
  - XI ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
  - XII ALL RESISTORS ARE 1/2 WATT AND ±5% UNLESS OTHERWISE NOTED (AS NOTE XIV)
  - XIII "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296
  - XIV ALL 1/8 WATT RESISTORS ARE ±1%
  - XV



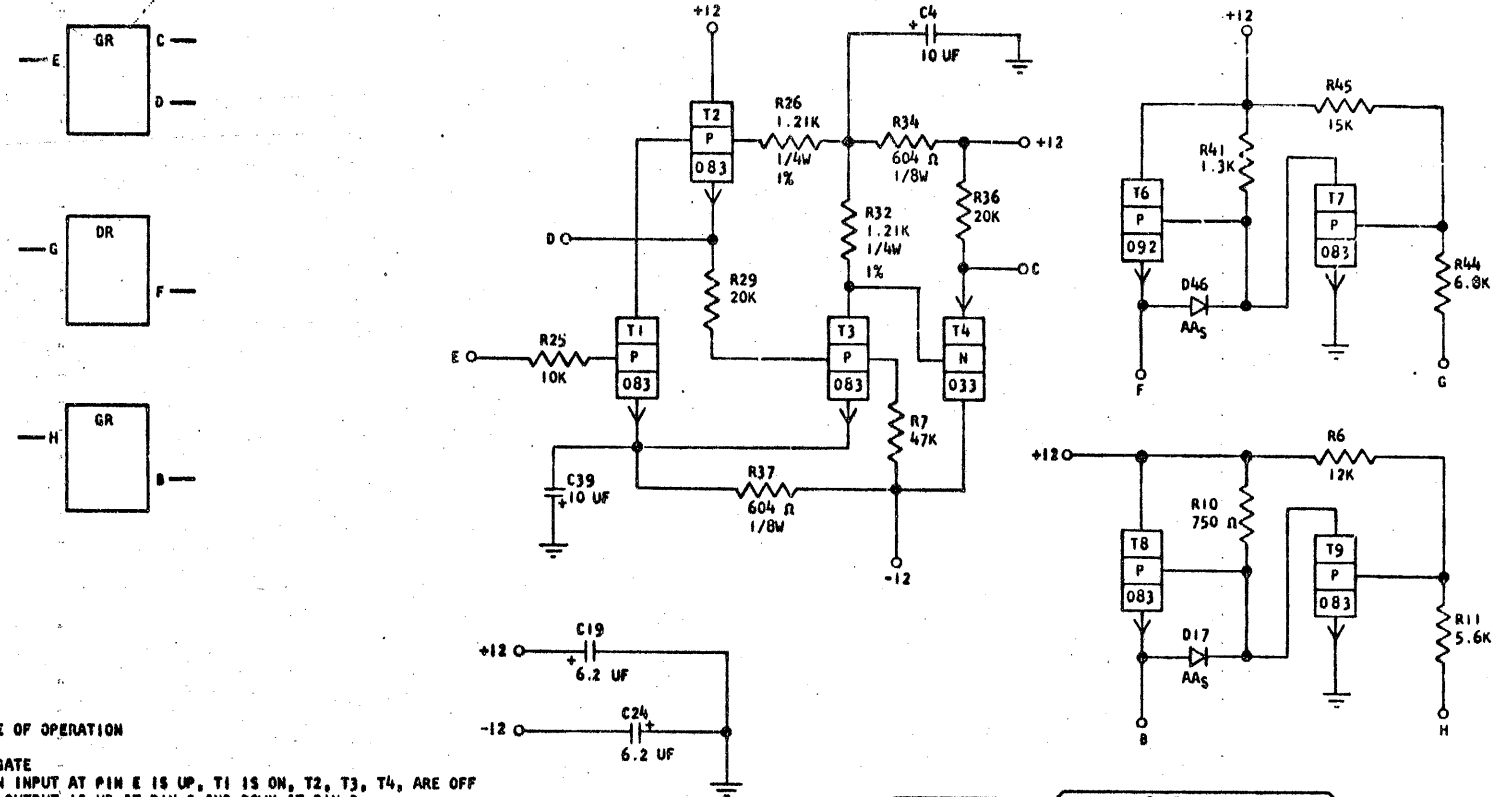
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
KMT	12-13-60
HOLE PATTERN	
493457	

INTERNATIONAL BUSINESS MACHINES CORP.	DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	370419
NAME CARD ASM TSTR - SENSE	12-20-60	110939	NOTE XV				2547-1419	
AMPLIFIER-CLIPPING LEVEL CONTROL	3-2-61	111228	NOTE XV					
DESIGN VJK 11-1-60	10-3-61	112721	NOTE XV					
DETAIL ED 11-2-60	12-7-61	D113129	IWB					
CHECK TPA 11-15-60								
APPROD BES 12-20-60								

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370420

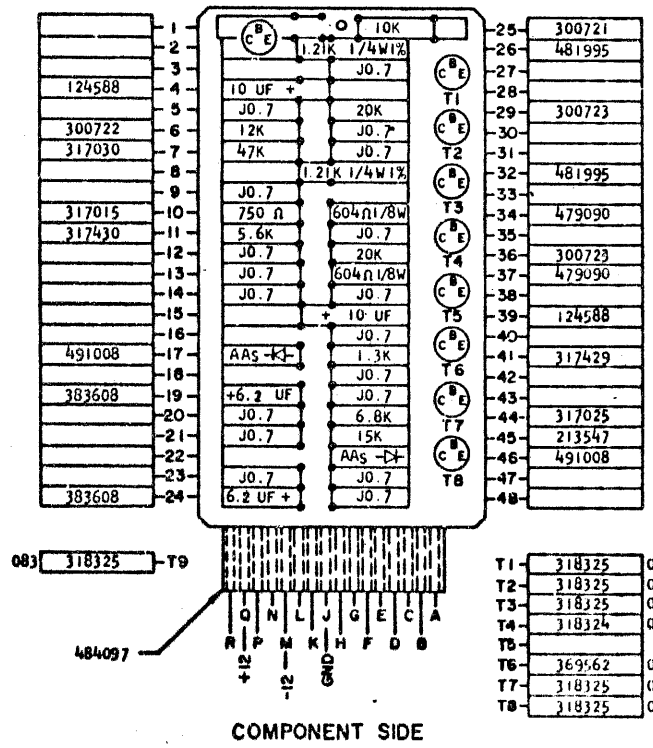
SENSE AMPLIFIER-SELECT GATE, READ GATE AND BAND PASS CTRL



SEQUENCE OF OPERATION

- A. SELECT GATE
  1. WHEN INPUT AT PIN E IS UP, T1 IS ON, T2, T3, T4, ARE OFF THE OUTPUT IS UP AT PIN C AND DOWN AT PIN D
  2. WHEN OUTPUT AT PIN E IS DOWN, T1 IS OFF, T2, T3, T4 ARE ON, THE OUTPUT IS DOWN AT PIN C AND UP AT PIN D
- B. READ GATE
  1. WHEN INPUT AT PIN G IS UP, T7 TURNS ON, T6 TURNS ON AN OUTPUT AT PIN F IS DOWN
  2. WHEN INPUT AT PIN G IS DOWN, T7 IS OFF T6 IS ON, AND OUTPUT AT PIN F IS UP
- C. NOISE REJECTION
  1. WHEN INPUT AT H IS UP, T9 IS ON, T8 IS ON AND OUTPUT AT B IS DOWN
  2. WHEN INPUT AT H IS DOWN, T9 IS OFF, T8 IS ON AND THE OUTPUT AT B IS UP

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
E	SELECT GATE INPUT		UP	-5	-1
			DOWN	-7.42	-12.48
C	SELECT GATE OUTPUT #1		UP	5.14	7.23
			DOWN	-4.43	-6.64
D	SELECT GATE OUTPUT #2		UP	4.52	6.88
			DOWN	-4.76	-6.84
G	READ GATE INPUT		UP	-5	-1
			DOWN	-6.87	-12.48
F	READ GATE OUTPUT		UP	+9.39	+12.48
			DOWN	+7	0
H	NOISE REJECT INPUT		UP	-5	-1
			DOWN	-6.87	-12.48
B	NOISE REJECT OUTPUT		UP	10.41	12.48
			DOWN	.7	0



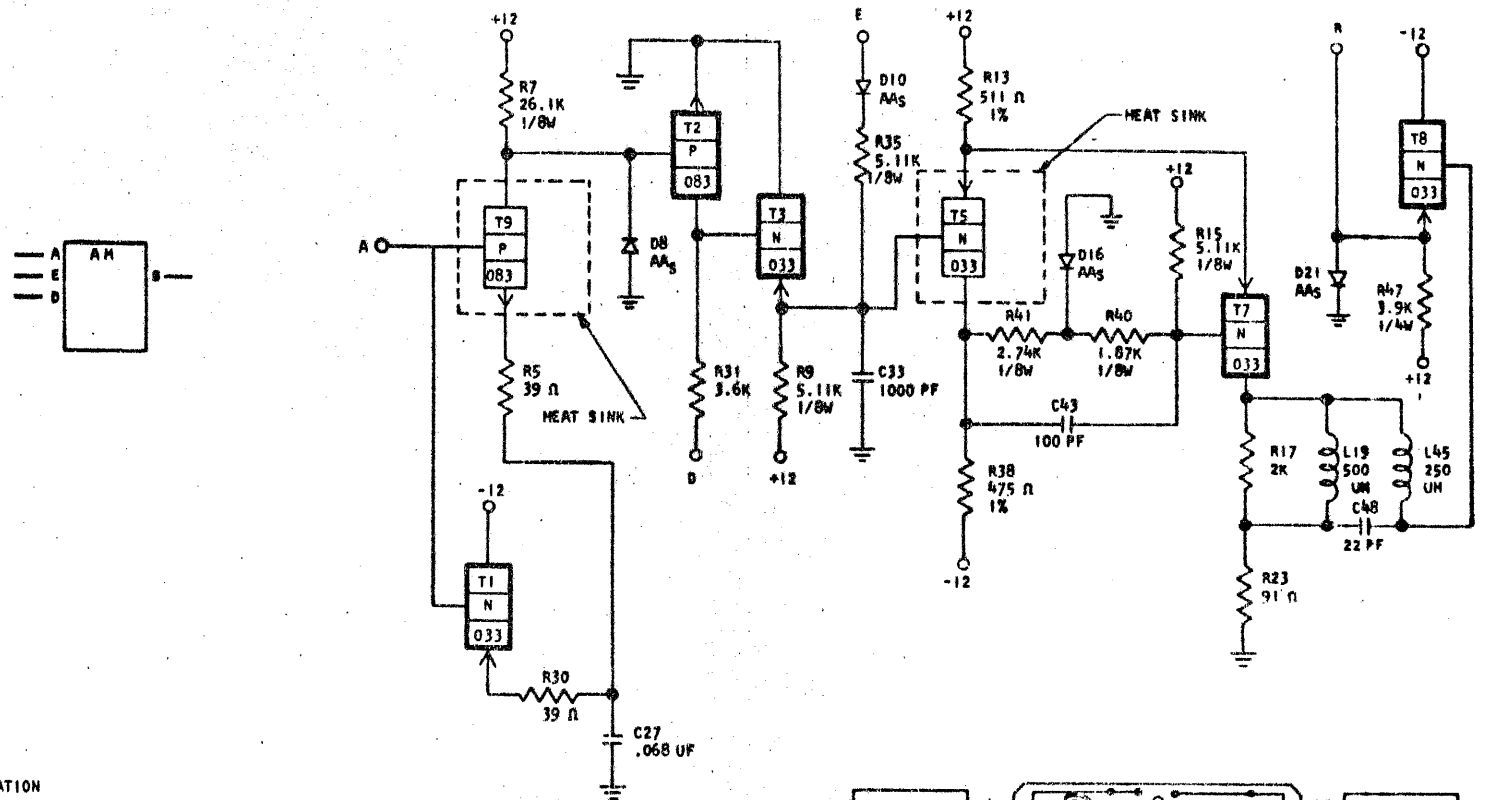
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR-SEN AM-SEL		6-29-62	115599					
GT, RD QT AND BAND PASS CTRL		11-7-62	114364					
DESIGN	RQ	MODEL	SMS					
DETAIL	RQ	SCALE	NONE					
CHECK	WH	3-1-62	DRAW	LIG 3-17-62				
APPRO		CHECK						

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370421

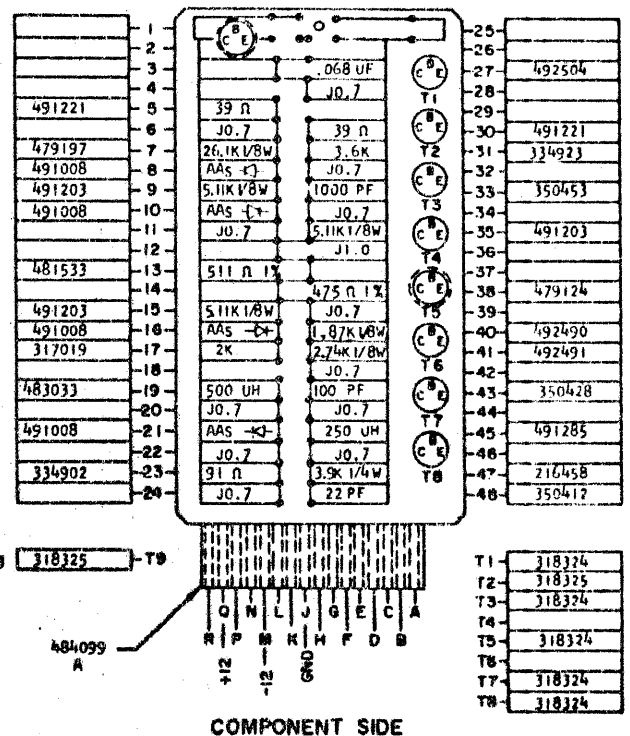
PEAK DETECTOR, INTEGRATOR & V.M. DRIVER



SEQUENCE OF OPERATION

1. THIS CIRCUIT IS USED TO SENSE A PEAK IN THE TAPE SIGNAL AFTER IT HAS BEEN AMPLIFIED BY THE TAPE PRE-AMPLIFIER. TRANSISTORS 1 AND 9 SENSE THE PEAK AND THIS SIGNAL IS AMPLIFIED BY T2 TO DRIVE T3 WHICH IN TURN DRIVES THE INTEGRATOR AND THE SCHMITT TRIGGER. WHEN THE SCHMITT TRIGGER FIRES, THE FALL TRANSITION IS SHAPED INTO THE OUTPUT PULSE (-12V) AND THEN IT IS COUPLED TO THE LOAD BY T8, AN EMITTER FOLLOWER.
2. A READ CONTROL LINE IS USED TO GATE THE SIGNAL DURING SWITCHING BETWEEN READ AND READ-WHILE-WRITE CONDITIONS: PIN D, ANOTHER CONTROL LINE CHANGES THE NOISE REJECTION OF THE CIRCUIT DEPENDING UPON THE TYPE OF TAPE DRIVE WHICH IS USED: PIN E, FOR HIGH FREQUENCY OPERATION THE INPUT AT PIN E IS AT +12 V, FOR LOW FREQUENCY OPERATION THE INPUT TO PIN E IS 0 V.
3. OUTPUT CAN DRIVE SOTDL OR SOTRL CIRCUITS.

PINS.	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
A	INPUT		UP	9 PEAK
E	NOISE REJECTION GATE		UP	+10.41
			DOWN	0
B S	OUTPUT		UP	0
			DOWN	-11.5
D Y	READ GATE		UP	+9.39
			DOWN	0



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD			
APPROVAL		DATE	
ABC		4-2-62	

INTERNATIONAL BUSINESS MACHINES CORP.	DATE	CHARGE NO.	APPROVAL	DATE	CHARGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - PEAK	6-27-62	115599					729951
DESIGNER	MODEL	SCALE					
DETAIL RQ 3-1-62	MODEL SMS	SCALE NONE					
CHECK VM 3-1-62	DRAW LIG 3-17-62						
APPRO	CHECK						



729952

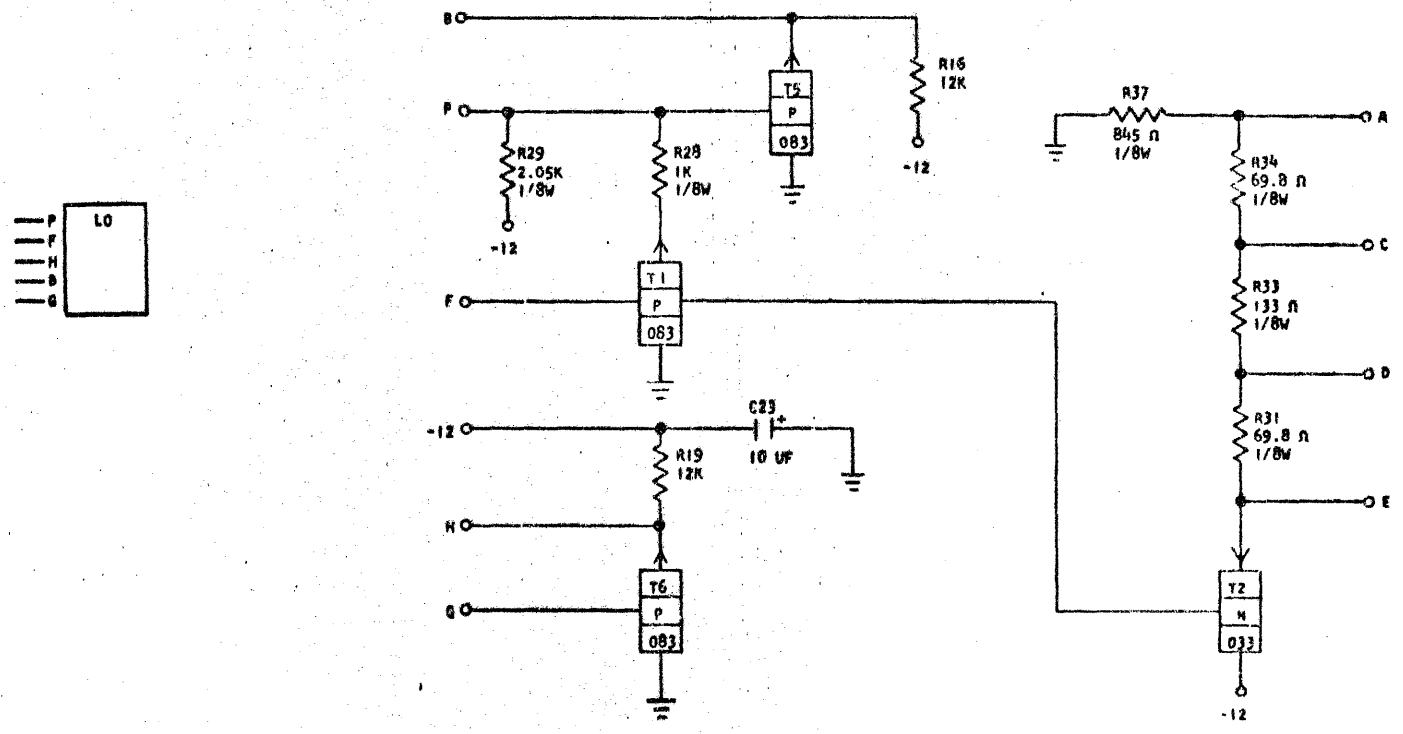
STANDARDS CODE

CARD CODE 729952  
Y D M -

# REFERENCE DRAWING

SEE PRODUCTION DRAWING 370501

## SENSE AMPLIFIER-CLIPPING LEVEL CONTROL



### APPLICATION NOTES

HIGH ACCEPTANCE - READ WHILE WRITE CONDITION

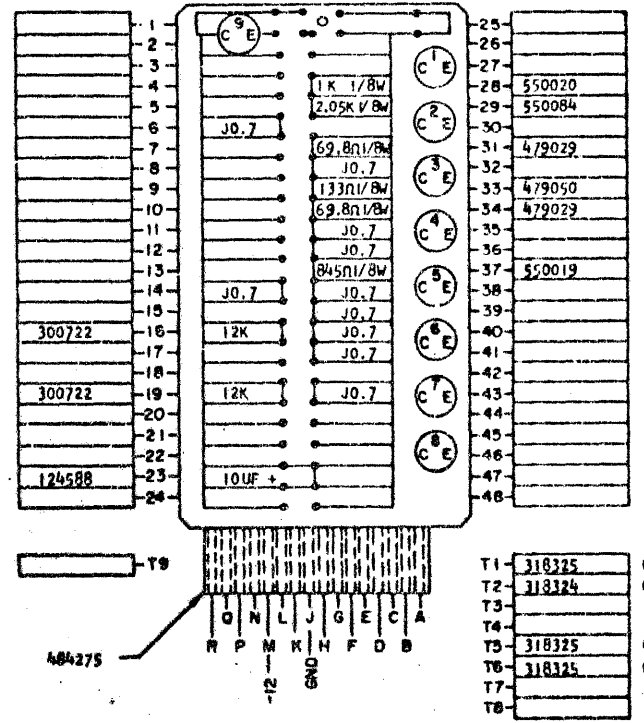
LOW SPEED TAPE  
PIN F 0.0V +S  
PIN P -12.5V  
PIN B -3.07V TO -5.09V

HIGH SPEED TAPE  
PIN F 0.0V +S  
PIN P 0.0V  
PIN B -.2V TO -.5V

### READ CONDITION

HIGH AND LOW SPEED DRIVES  
PIN F -12V  
PIN B -11.1V TO -12.5V

LOW ACCEPTANCE  
PIN F 0.0 VOLTS  
PIN P -12 VOLTS  
PIN H 0.0V  
PIN M -8.03 TO -12.5 DEPENDS ON WHAT PIN (A,C,D,E) IS TIED TO



### COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

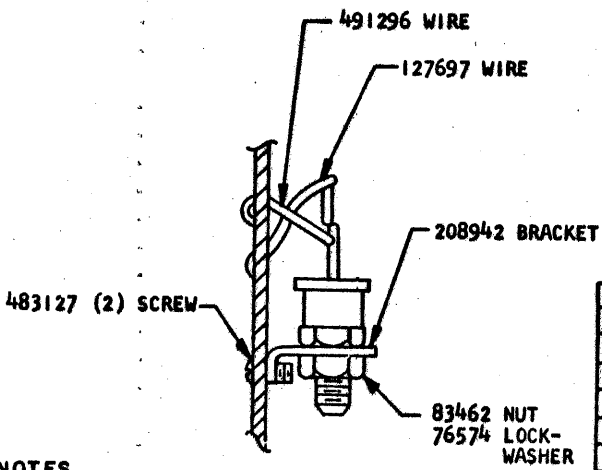
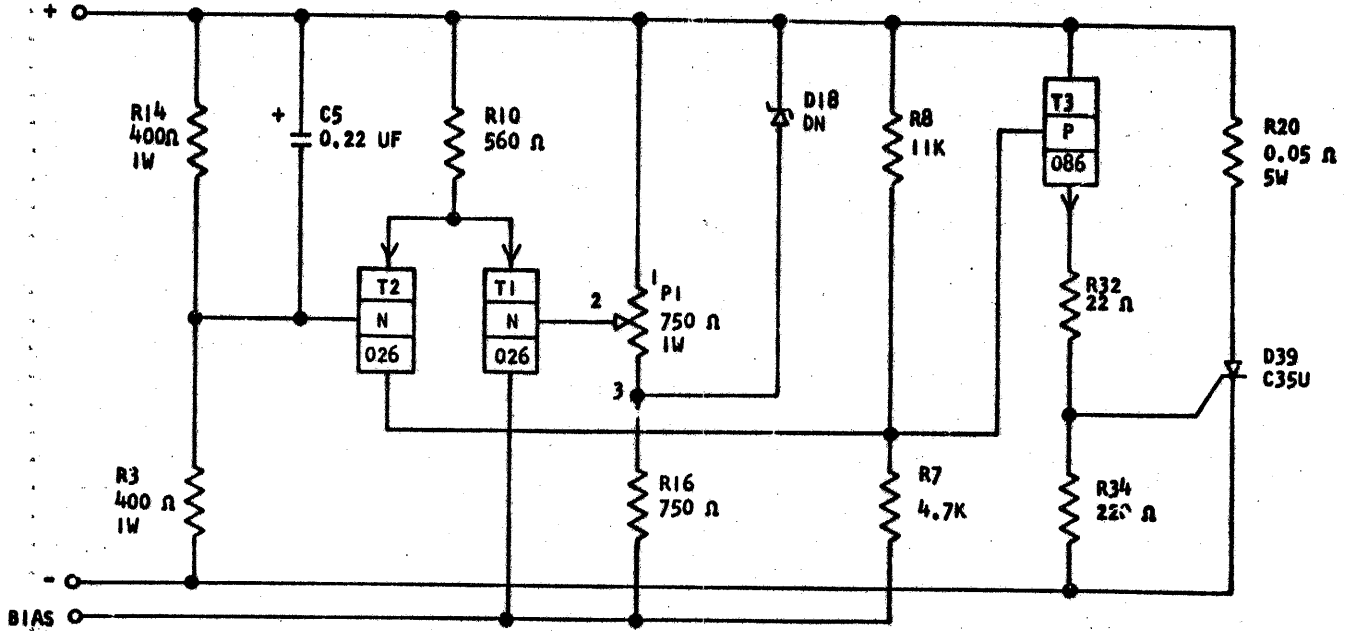
INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				6-27-62	115599					729952
CARD ASM TSTR-SENSE										
AMPLIFIER-CLIPPING LEVEL CONTROL										
DESIGN	RQ	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG B-17-62						
APPRO			CHECK							

C

OVERVOLTAGE PROTECTION 6 VOLT

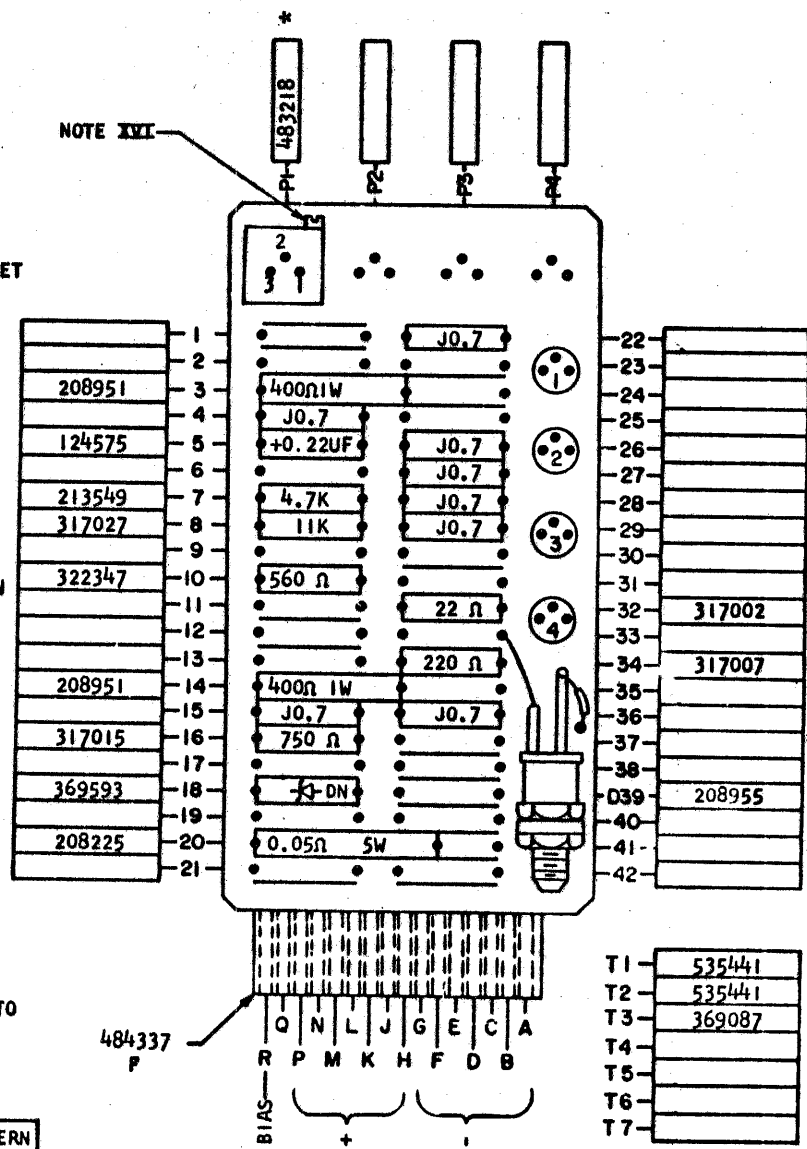
MOUNT CARDS ON ONE-INCH CENTERS NOTE IX

370575  
STANDARDS CODE  
2-7045  
Y G A -



NOTES

- I CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892575
- II ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- III ALL RESISTORS ARE 1/2 WATT AND ±5% UNLESS OTHERWISE NOTED (AS NOTE XIV)
- IV "J" IN BLOCK DENOTES BARE WIRE JUMPER, 491296
- V ALL 1 WATT RESISTORS ARE ±1%
- VI MAXIMUM HEIGHT THAT COMPONENTS MAY PROJEKT ABOVE THE SURFACE OF THE CARD WILL BE .850
- VII EPOXY CEMENT 483002 TO BE APPLIED TO RESISTANCE TRIMMING SCREW AFTER A VOLTAGE SETTING OF 6.78<sup>+0.100</sup><sub>-0.000</sub> VOLTS IS MADE



**B** XIX POTENTIOMETER 483218 NOT TO BE SUBJECTED TO LIQUIDS.

DPD CIRCUIT & PACKAGING STANDARD		
APPROVAL	DATE	HOLE PATTERN
JHT	1-24-62	493474

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	370575	
NAME CARD ASM TSTR- OVER-VOLTAGE PROTECTION 6 VOLT				5-26-61	111817	IWB	9-25-62	113606	MDL	88-2125		
DESIGN	EDF	12-20-61	MODEL	SMS	11-28-61	112469	IWB	4-15-63	D116148			MDL
DETAIL	JH	12-29-61	SCALE	NONE	12-22-61	113162	IWB	2-11-64	D119678	GWS		
CHECK	EDF	1-5-62	DRAW	VE	7-17-62	2-6-62	113685	MDL	5-4-64	120096		GWS
APPRO	GWS	2-5-62	CHECK	PRF	7-23-62	5-23-62	0113950	MDL				

OVERVOLTAGE PROTECTION 12 VOLT

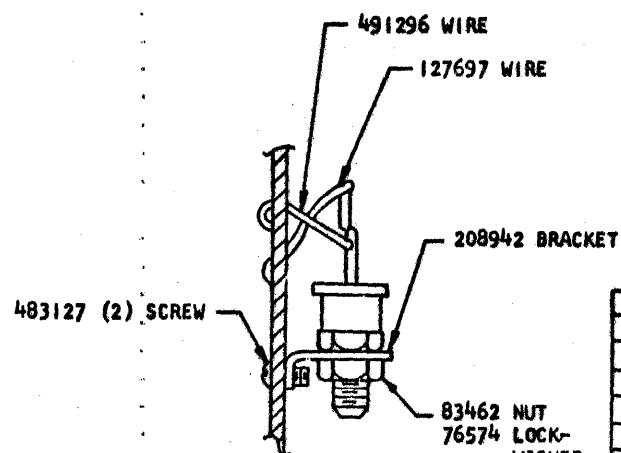
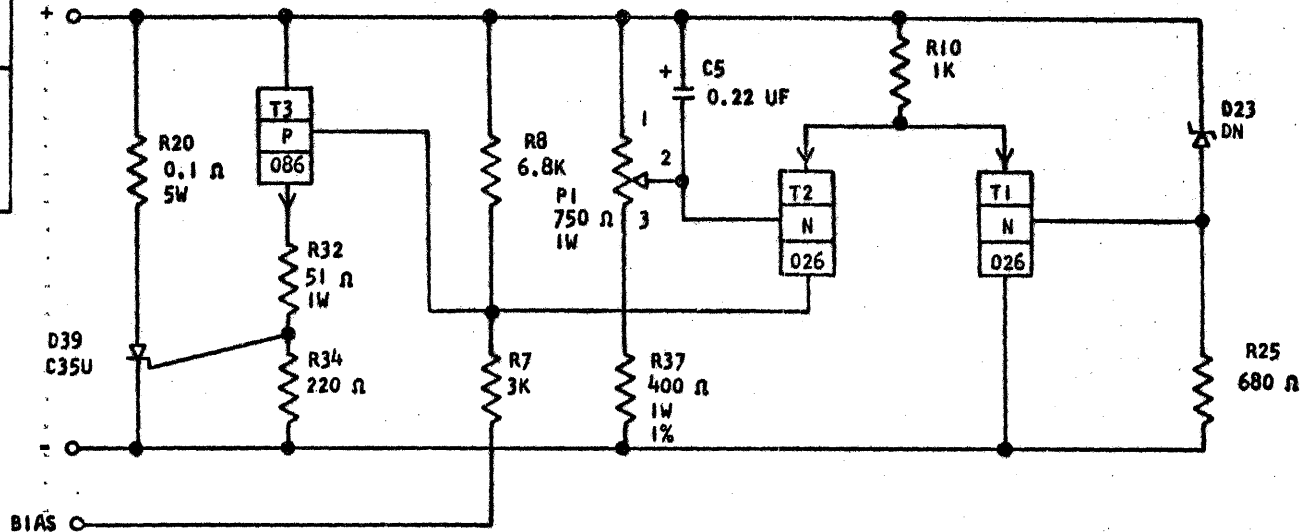
MOUNT CARD ON ONE-INCH CENTERS NOTE XIV

370576

Y G B -

STANDARDS CODE

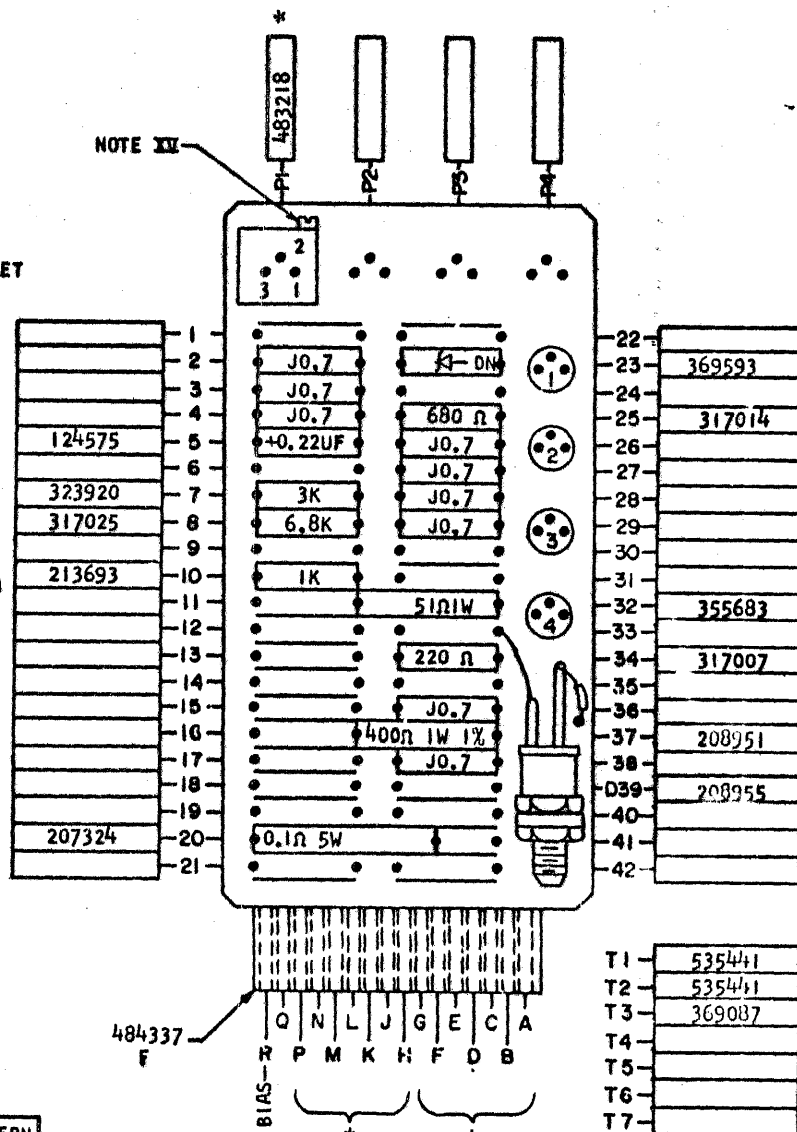
-2-7045



NOTES

- I CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892576
- II ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- III ALL RESISTORS ARE 1/2 WATT AND ±5% UNLESS OTHERWISE NOTED
- IV "J" IN BLOCK DENOTES BARE WIRE JUMPER, 491296
- V MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE THE SURFACE OF THE CARD WILL BE .850.
- VI EPOXY CEMENT 483002 TO BE APPLIED TO RESISTANCE TRIMMING SCREW AFTER A VOLTAGE SETTING OF 12.96<sup>+1.00</sup>/<sub>-.000</sub> VOLTS IS MADE.

NOTE VII



**B** XVIII \* POTENTIOMETER 483218 NOT TO BE SUBJECTED TO LIQUIDS

DPD CIRCUIT & PACKAGING STANDARD	
APPROVAL	DATE
JHT	1-24-62
HOLE PATTERN	
493474	

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	370576
NAME	CARD ASM TSTR - OVER-VOLTAGE PROTECTION 12 VOLT			5-26-61	111817	IWB	5-23-62	D113950	MDL	88-2126	
DESIGN	EDF	12-20-61	MODEL	SMS	7-27-61	112417	NGJ	9-25-62	113606		
DETAIL	JH	12-29-61	SCALE	NONE	11-28-61	112469	IWB	4-15-63	D116148	MDL	
CHECK	EDF	1-4-62	DRAW	VE	7-17-62	113162	IWB	2-11-64	D119678	GWS	
APPRO	GWS	2-5-62	CHECK	SRF	7-23-62	113685	MDL	5-4-64	120096	GWS	



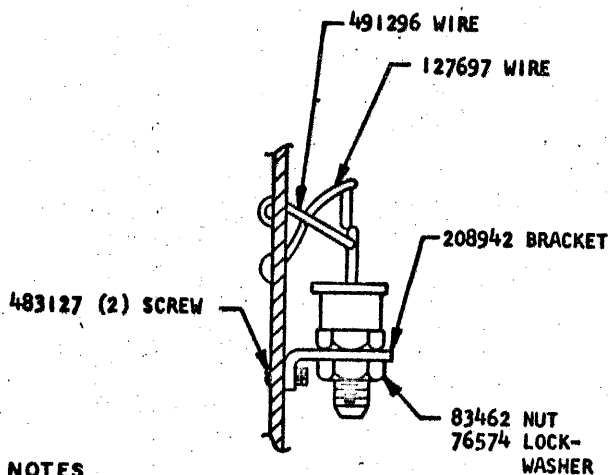
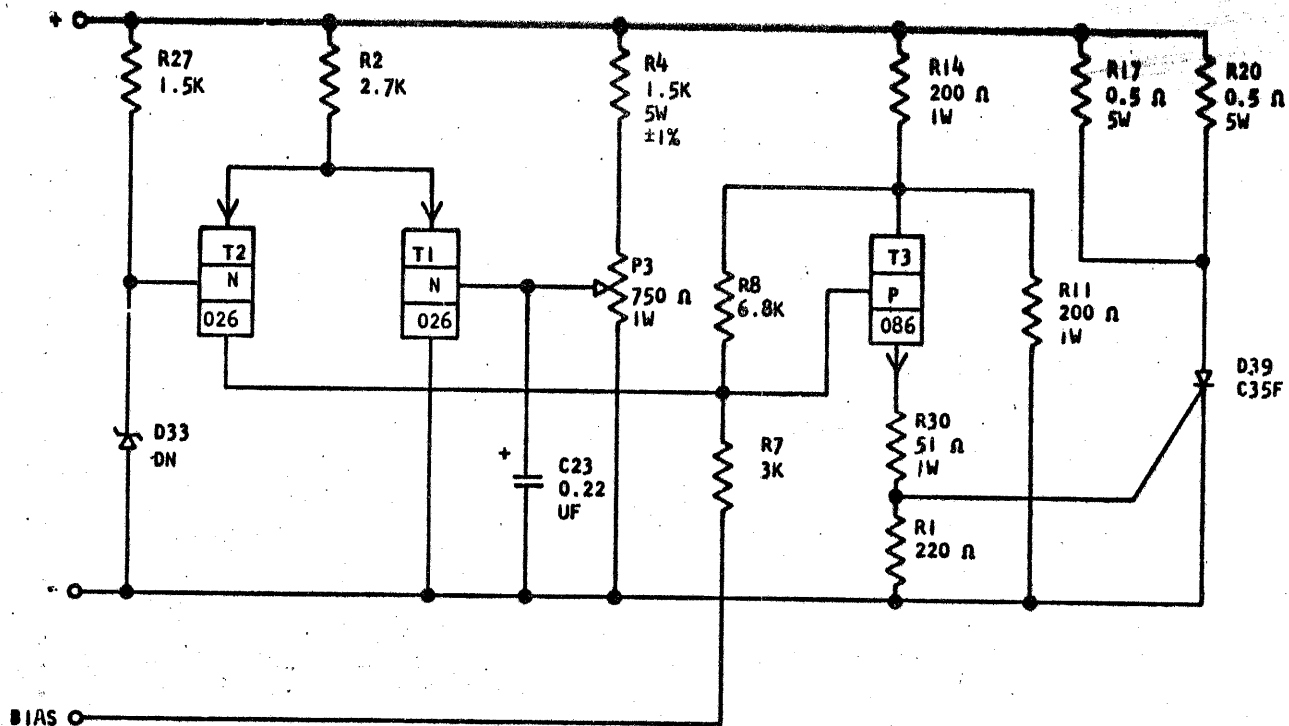
OVERVOLTAGE PROTECTION 20 VOLT  
MOUNT CARD ON ONE INCH CENTERS NOTE XIV

370579

Y G E -

STANDARDS CODE

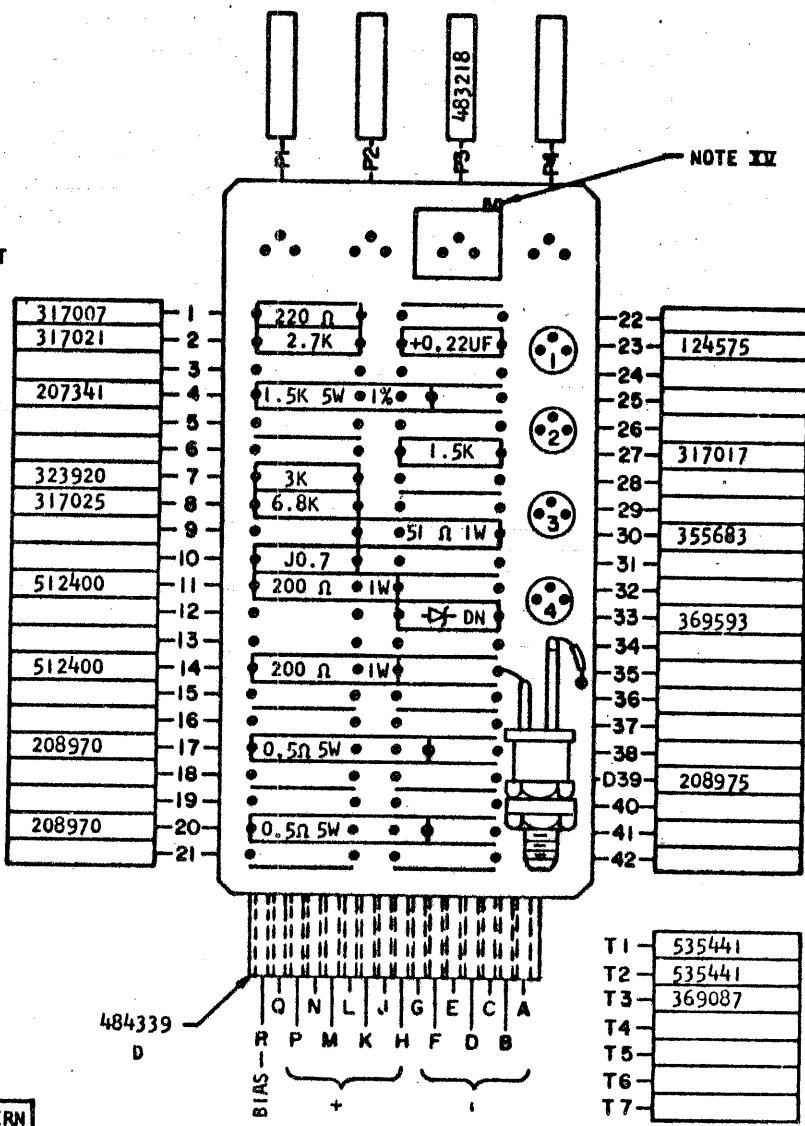
2-7045



NOTES

- I** CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892579
- II** ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- XII** ALL RESISTORS ARE 1/2 WATT AND ±5% UNLESS OTHERWISE NOTED
- XIII** "J" IN BLOCK DENOTES BARE WIRE JUMPER, 491296
- XIV** MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE THE SURFACE OF THE CARD WILL BE .766
- XV** EPOXY CEMENT 483002 TO BE APPLIED TO RESISTANCE TRIMMING SCREW AFTER A VOLTAGE SETTING OF 22.6<sup>+100</sup>/<sub>-1000</sub> VOLTS IS MADE
- XVI**
- XVII**

**B** 483218 AND 208975 MUST NOT BE SUBJECTED TO ANY LIQUIDS



DPD CIRCUIT & PACKAGING STANDARD	
APPROVAL	DATE
JHT	1-24-62
HOLE PATTERN	
493474	

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	370579
NAME CARD ASM TSTR-OVER-		SEE INDEX CARD			5-4-64	120096	GWS	88-2127	
VOLTAGE PROTECTION 20 VOLT		2-6-62	113685	MDL					
DESIGN	EDF 12-20-61	MODEL	SMS						
DETAIL	JH 12-29-61	SCALE	NONE	8-6-62	114712	MDL			
CHECK	EDF 1-4-62	DRAW	VE 7-16-62	3-5-63	D116107	MDL			
APPRO	SW 8-8-62	CHECK		5-21-63	D116180	LHR			

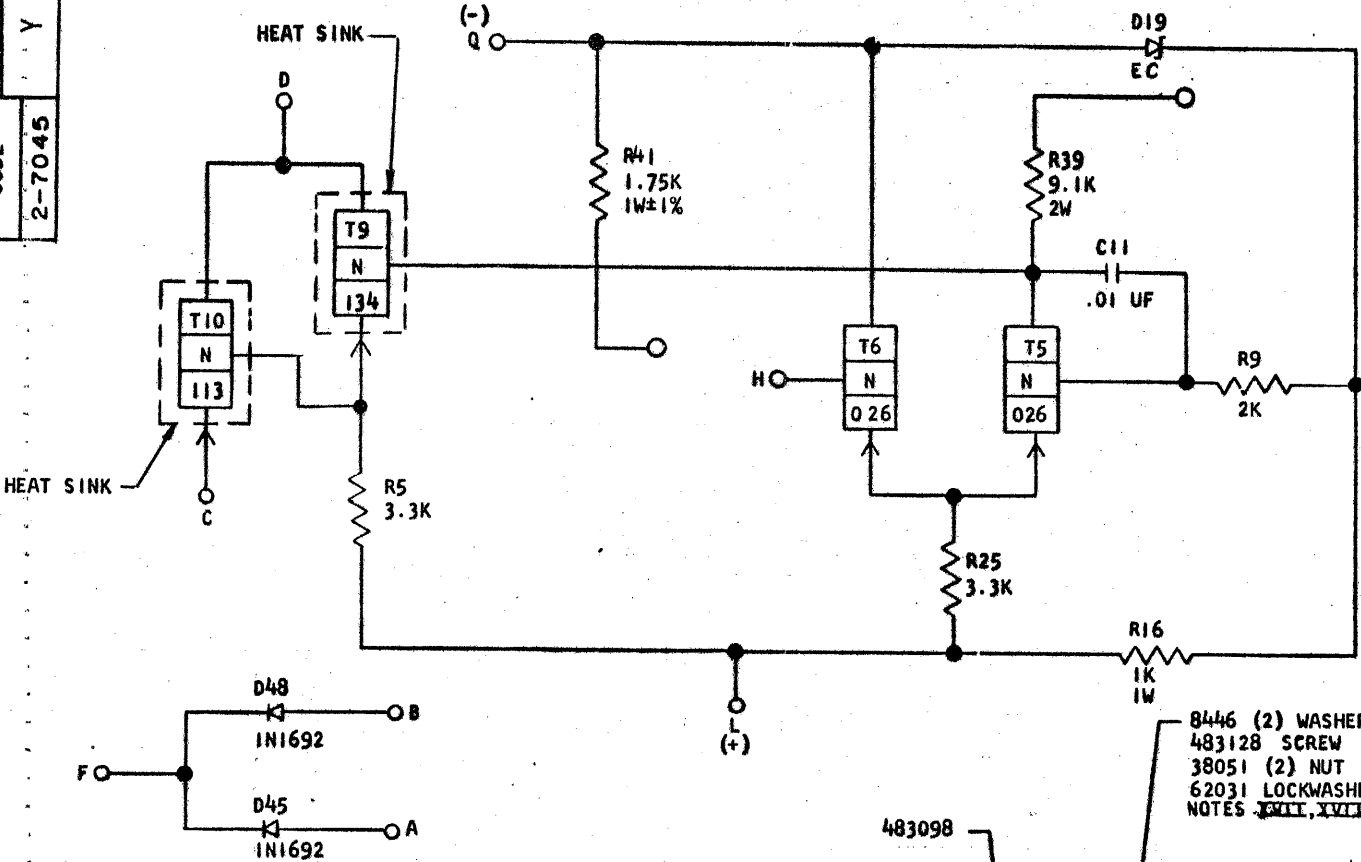
370607

20 VOLT DIFF. AMPLIFIER  
MOUNT CARD ON ONE-INCH CENTERS - NOTE XIV

370607

STANDARDS CODE

2-7045

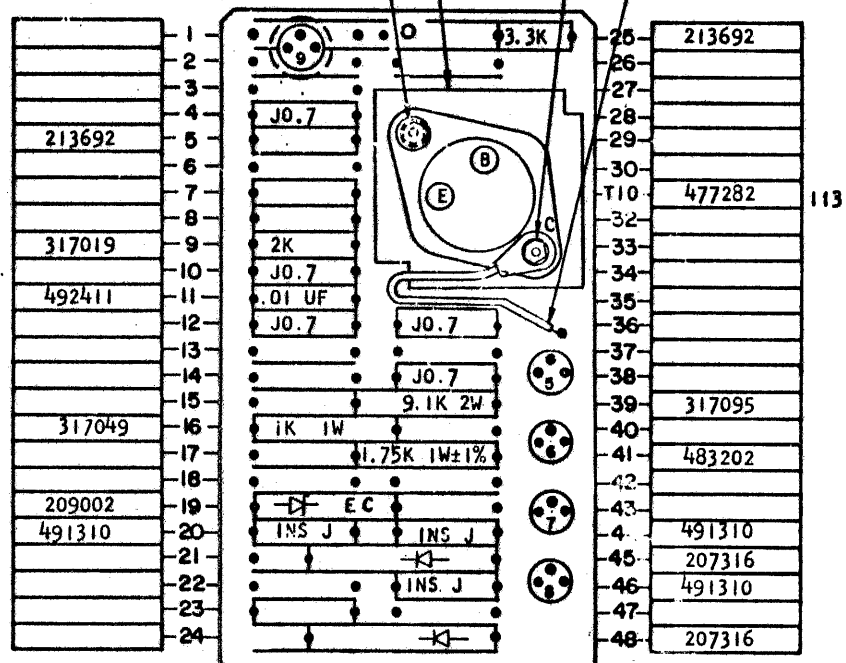


- 8446 (2) WASHER
- 483128 SCREW
- 38051 (2) NUT
- 62031 LOCKWASHER
- NOTES XVII, XVIII

- 483129 SPACER
- 483138 SCREW
- 62031 LOCKWASHER

NOTES

- XI CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892607
- XII ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- XIII ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
- XIV "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296 UNLESS OTHERWISE NOTED
- XV DO NOT CRIMP TRANSISTOR LEADS.
- XVI MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF THE CARD IS .850
- XVII CASE IS ELECTRICALLY CONNECTED TO COLLECTOR, CONNECTION COMPLETED THROUGH JUMPER.
- XVIII WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE.
- XIX HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED



B

CIRCUIT AND PACKAGING STANDARD

APPROVAL

DATE

HOLE PATTERN

747800

J.H. Topor

11/24/62

COMPONENT SIDE

INTERNATIONAL BUSINESS MACHINES CORP.

NAME CARD ASM TSTR - 20 VOLT DIFF. AMPLIFIER

DESIGN EDF 12-20-61 MODEL SMS

DETAIL JH 12-29-61 SCALE NONE

CHECK EDF 1-3-62 DRAW MDE 1-8-62

APPRO GWS 2-5-62 CHECK WWS 1-10-62

DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
6-8-61	111822	NOTE XIV	8-30-62	113136	NOTE XIV	88-2150
12-1-61	112448	NOTE XIV	12-19-63	117838	GWS	
12-26-61	112448A	NOTE XIV	8-10-64	121671	FVL	
2-6-62	113685	NOTE XIV				
3-28-62	113967	NOTE XIV				

370607

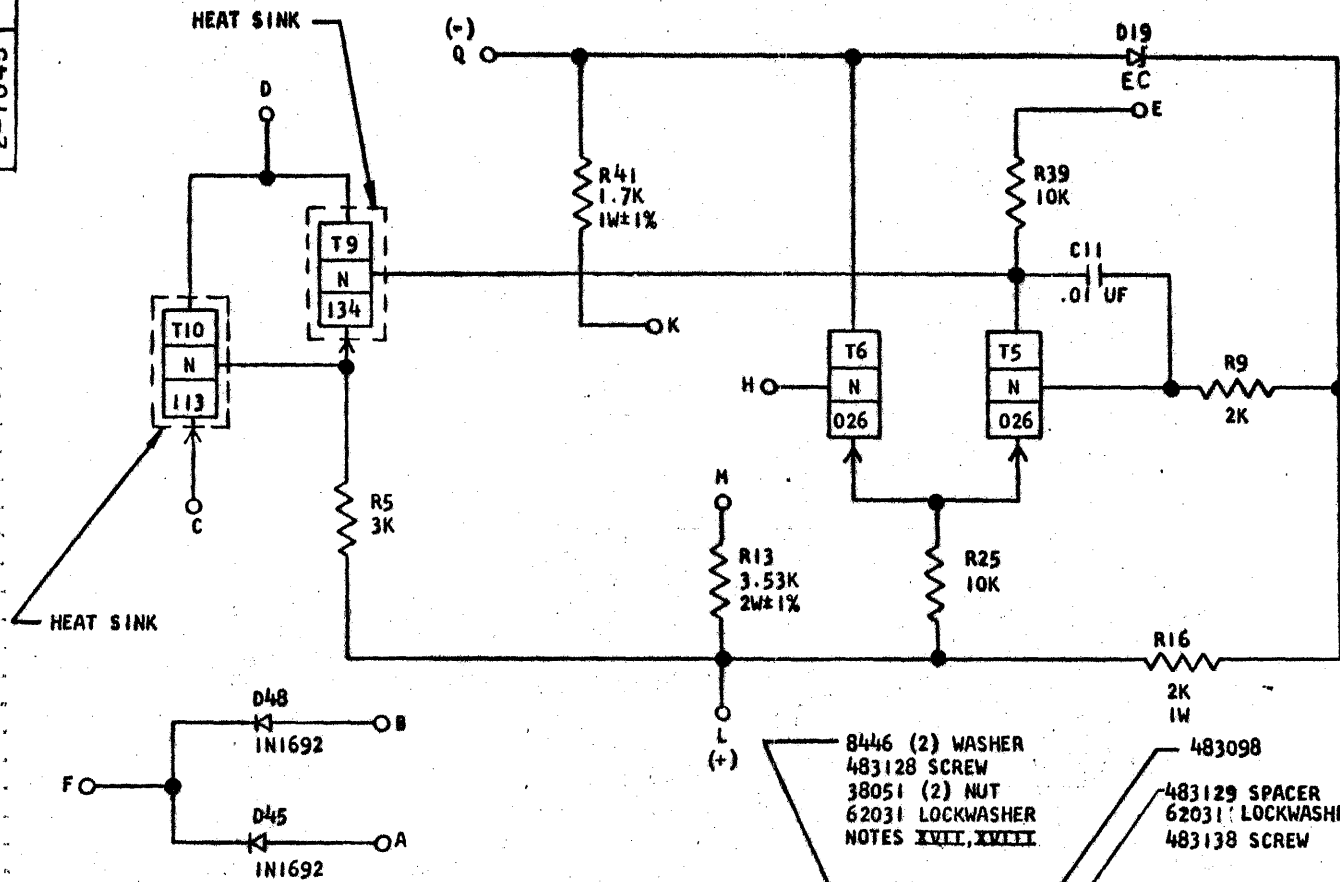
30 VOLT DIFF. AMPLIFIER  
MOUNT CARD ON ONE-INCH CENTERS - NOTE XVI

370608

Y G G

STANDARDS CODE

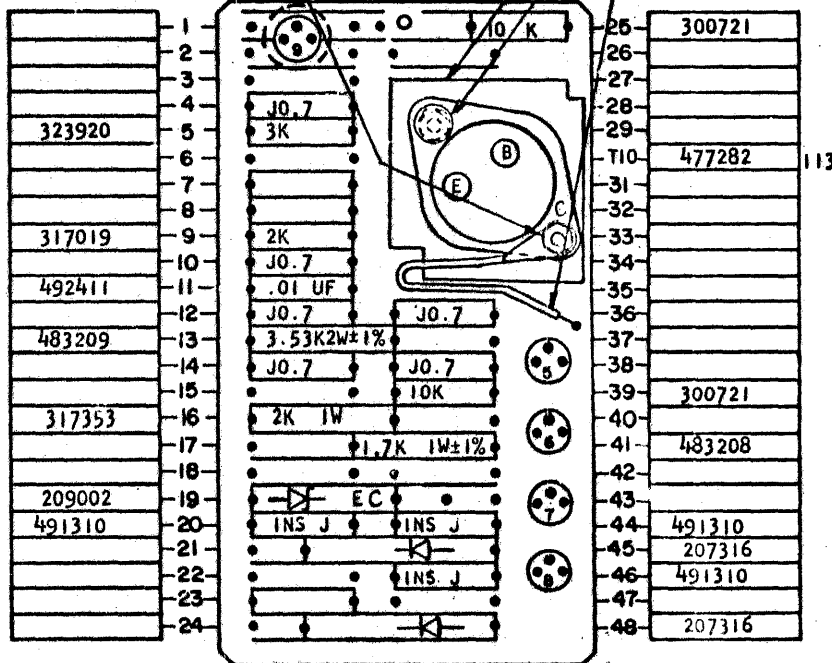
2-7045



- 8446 (2) WASHER
- 483128 SCREW
- 38051 (2) NUT
- 62031 LOCKWASHER
- NOTES XVII, XVIII
- 483098
- 483129 SPACER
- 62031 LOCKWASHER
- 483138 SCREW

NOTES

- XI CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892608
- XII ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- XIII ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
- XIV "J" IN BLOCK DENOTES BARE WIRE JUMPER 49129S UNLESS OTHERWISE NOTED
- XV DO NOT CRIMP TRANSISTOR LEADS
- XVI MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF THE CARD IS .850
- XVII CASE IS ELECTRICALLY CONNECTED TO COLLECTOR, CONNECTION COMPLETED THROUGH JUMPER.
- XVIII WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE.
- XIX HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED



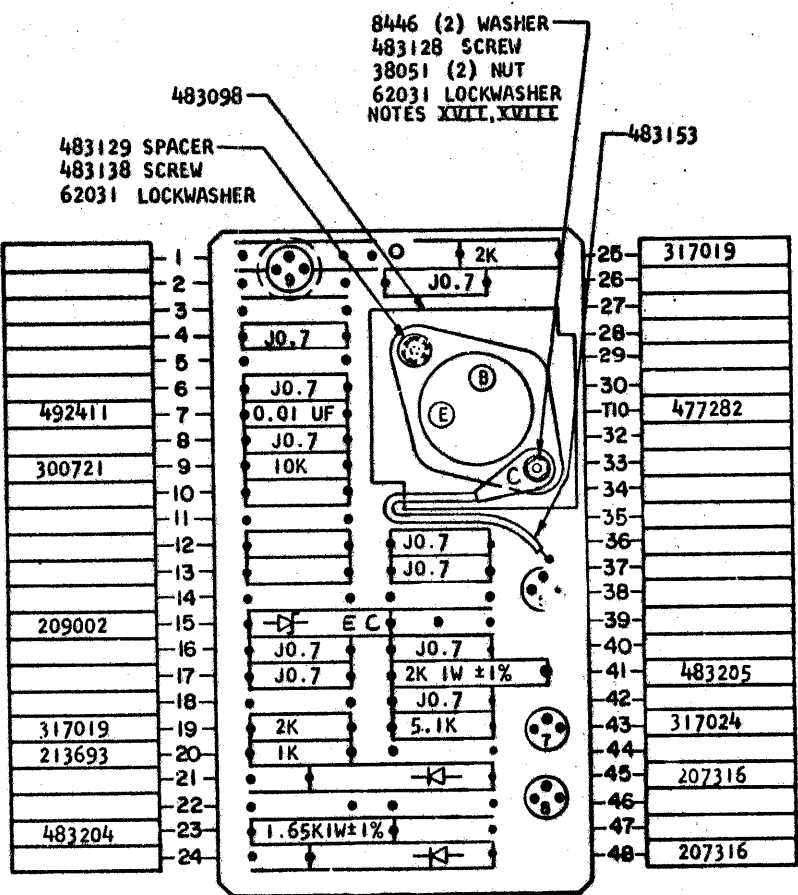
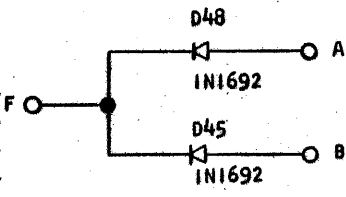
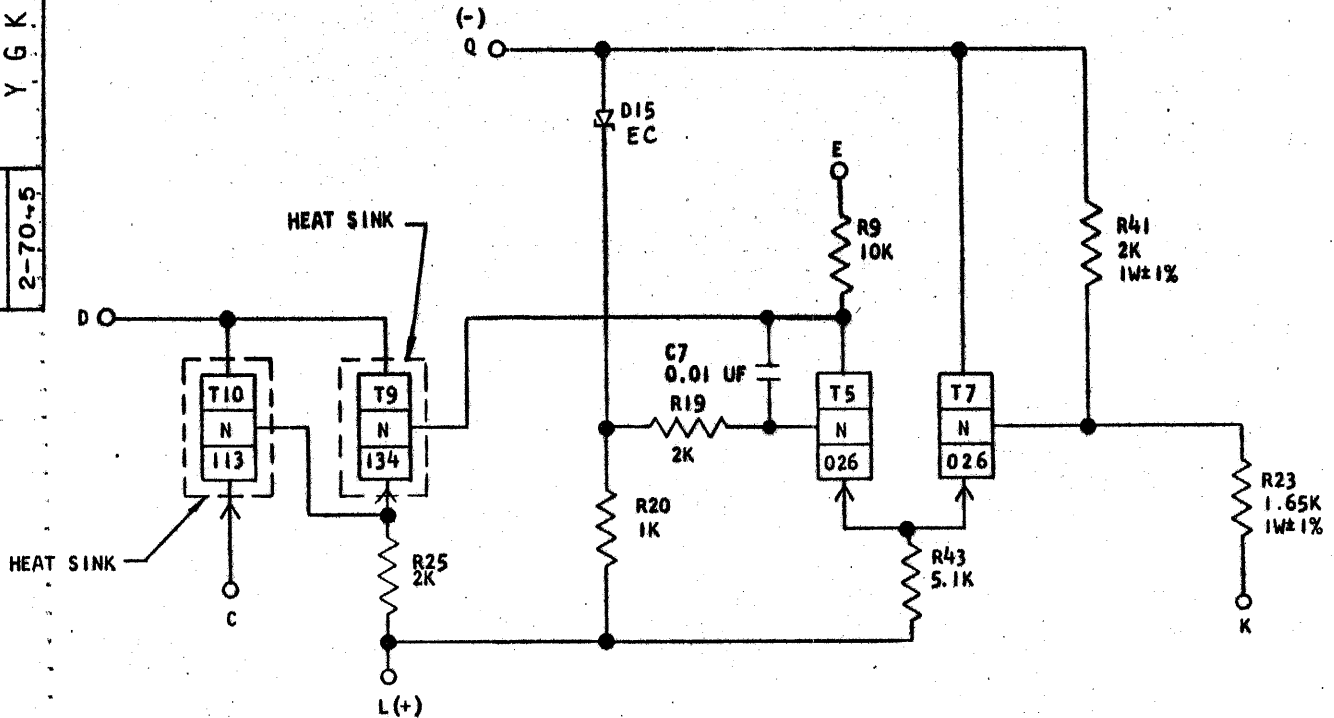
B

CIRCUIT AND PACKAGING STANDARD		APPROVAL		DATE		HOLE PATTERN		COMONENT SIDE	
		JH Topoz		1/24/62		747800		T1 T2 T3 T4 T5 535441 026 T6 535441 026 T7 T8	
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	370608
NAME CARD ASM TSTR-30 VOLT DIFF. AMPLIFIER		6-8-61	111822	NOTE XIV	8-30-62	113136	NOTE XIV	88-2151	
DESIGN EDF 12-20-61 MODEL S:1S		12-1-61	112448	NOTE XIV	12-19-63	117838	GWS		
DETAIL JH 12-29-61 SCALE NONE		12-26-61	112448A	NOTE XIV	8-10-64	121671	FVL		
CHECK EDF 1-3-62 DRAW MDE 1-8-62		2-6-62	113685	NOTE XIV					
APPRO GWS 2-5-62 CHECK MDE 1-10-62		3-28-62	113967	NOTE XIV					

370611  
STANDARDS CODE  
2-70-5  
Y G K

20 VOLT AT 15 AMP DIFF AMPLIFIER  
MOUNT CARD ON ONE INCH CENTERS - NOTE XVI

370611



- NOTES**
- X** CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892611
  - XI** ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
  - XII** ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
  - XIII** "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296
  - XIV**
  - XV** DO NOT CRIMP TRANSISTOR LEADS.
  - XVI** MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF THE CARD IS .850
  - XVII** CASE IS ELECTRICALLY CONNECTED TO COLLECTOR, CONNECTION COMPLETED THROUGH JUMPER.
  - XVIII** WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE.
  - XIX**
  - XX** HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED

B

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
<i>J.H. Tokos</i>	<i>1/24/62</i>

HOLE PATTERN
747800

COMPONENT SIDE

INTERNATIONAL BUSINESS MACHINES CORP.	DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR-20 VOLT AT 15 AMP DIFF AMPLIFIER	6-8-61	111822	NOTE XIV	8-30-62	113136	NOTE XIV	88-2160A
DESIGN EDF 12-20-61	12-1-61	112448	NOTE XIV	12-19-63	117838	GWS	
MODEL SMS	12-26-61	112448A	NOTE XIV	8-10-64	121671	FVL	
SCALE NONE							
CHECK EDF 1-4-62	2-6-62	113685	NOTE XIV				
DRAW MDE 1-9-62	3-28-62	113967	NOTE XIV				
APPRO GWS 2-5-62							
CHECK WBS 1-10-62							

370611



370612

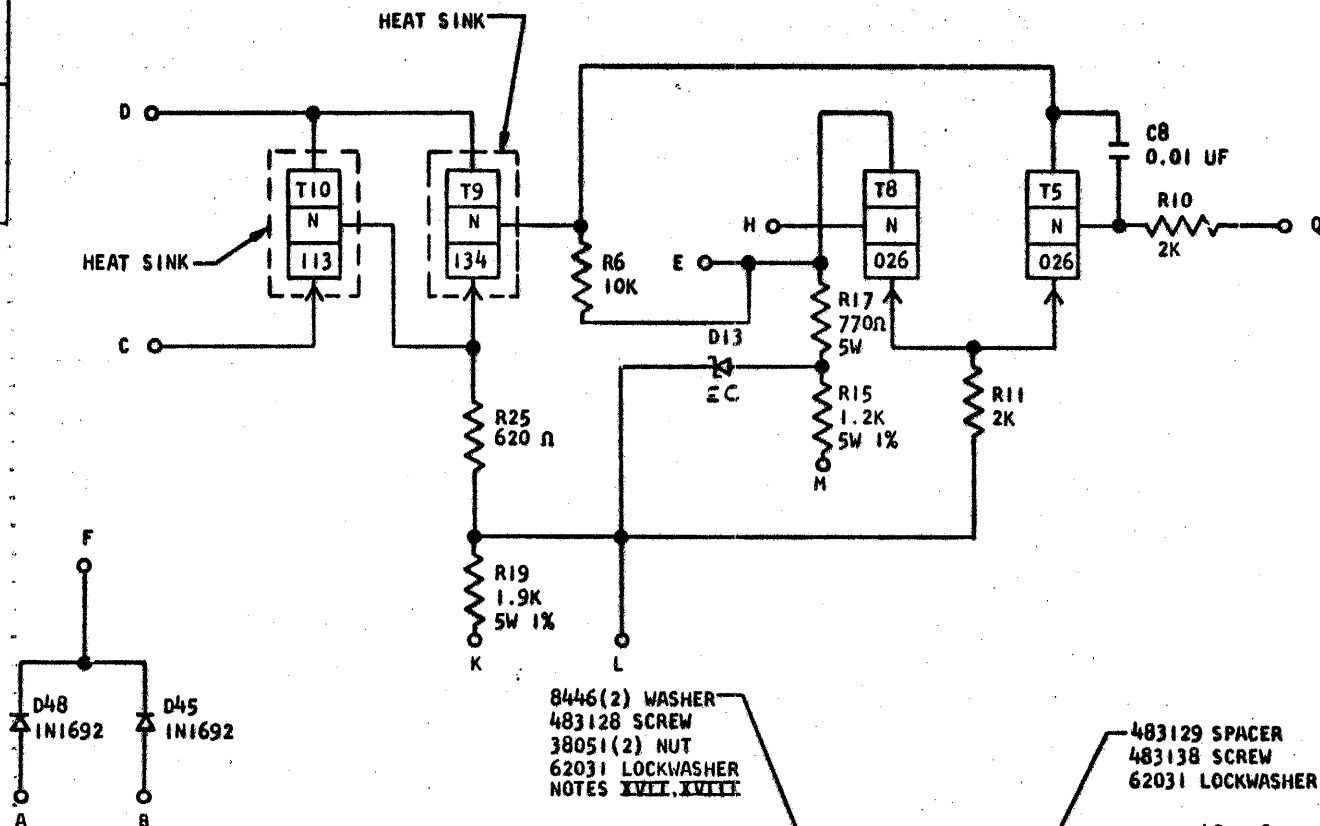
6 VOLT DIFF AMPLIFIER  
MOUNT CARD ON ONE INCH CENTERS - NOTE XVII

370612

Y G L -

STANDARDS CODE

2-7045

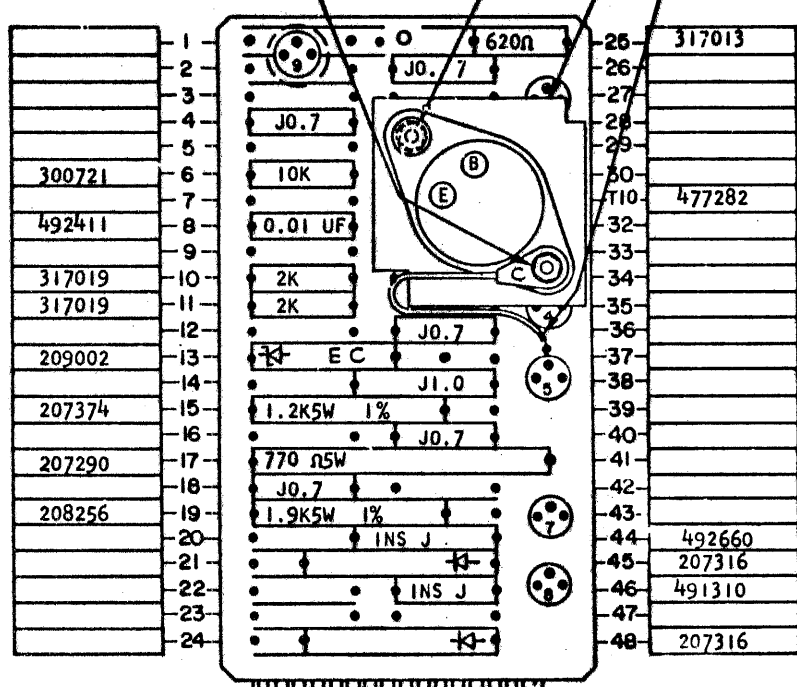


- 8446(2) WASHER
- 483128 SCREW
- 38051(2) NUT
- 62031 LOCKWASHER
- NOTES XVII, XVIII

- 483129 SPACER
- 483138 SCREW
- 62031 LOCKWASHER

NOTES

- X CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892612
- XI ASSEMBLE TO ENGINEERING SPECIFICATION 895396, 891999
- XII ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
- XIII "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296 UNLESS OTHERWISE NOTED
- XIV
- XV DO NOT CRIMP TRANSISTOR LEADS.
- XVI MAX HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF CARD IS .850
- XVII CASE IS ELECTRICALLY CONNECTED TO COLLECTOR, CONNECTION COMPLETED THROUGH JUMPER
- XVIII WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE
- XIX
- XX HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED



B

CIRCUIT AND PACKAGING STANDARD		APPROVAL		DATE		HOLE PATTERN		COMONENT SIDE	
		J H Tolson		1/24/62		747800			
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.	
NAME CARD ASM TSTR - 6 VOLT		6-8-61	111822	NOTE XIV	12-19-63	117838	GWS	88-2149	
DIFF AMPLIFIER		12-1-61	112448	NOTE XIV				370612	
DESIGN	EDF 12-20-61	MODEL	SMS						
DETAIL	JH 12-29-61	SCALE	NONE						
CHK	EDF 1-4-62	DRAW	VE 1-9-62						
APPRO	GWS 2-5-62	CHECK	DAK 1-10-62						
		3-28-62	113967	NOTE XIV					

82-3987-2 6-22-61

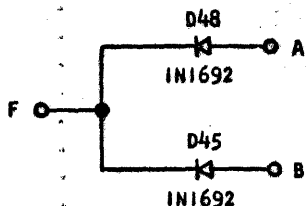
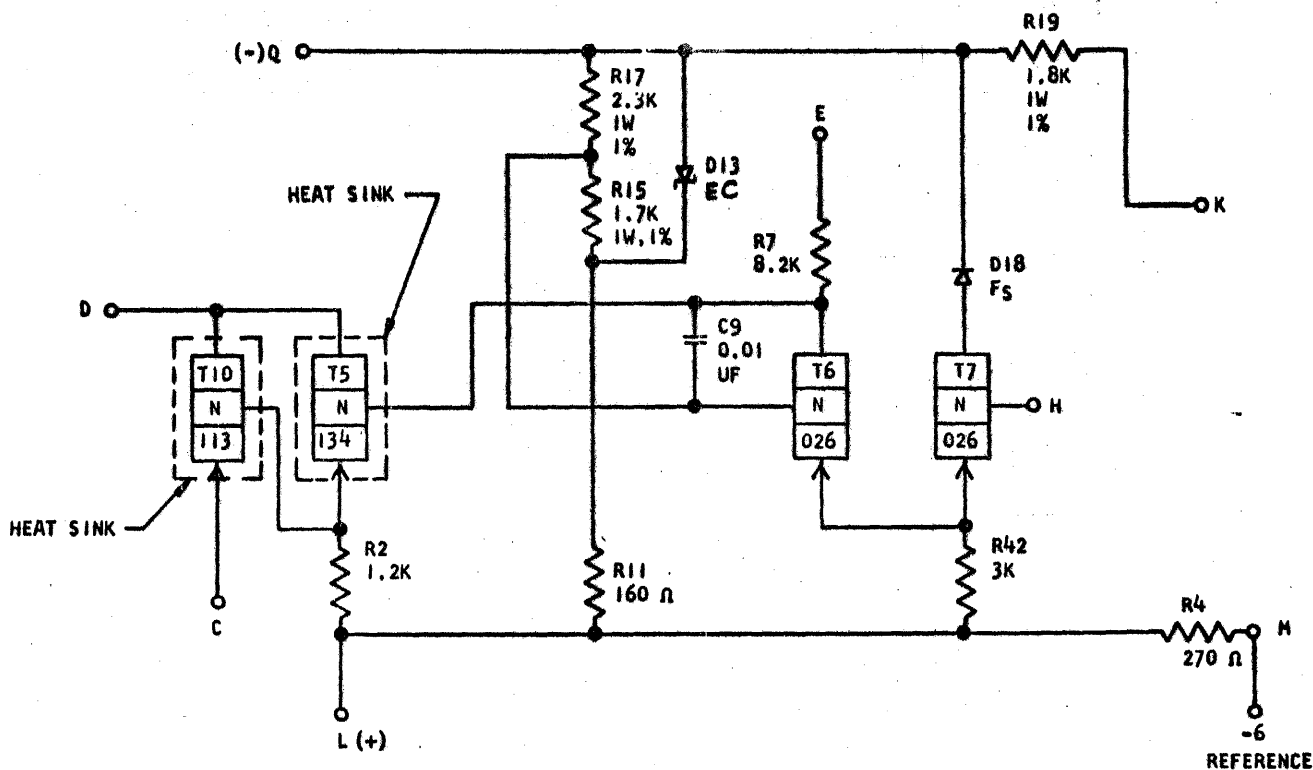
370613

YGM -

STANDARDS CODE 2-7045

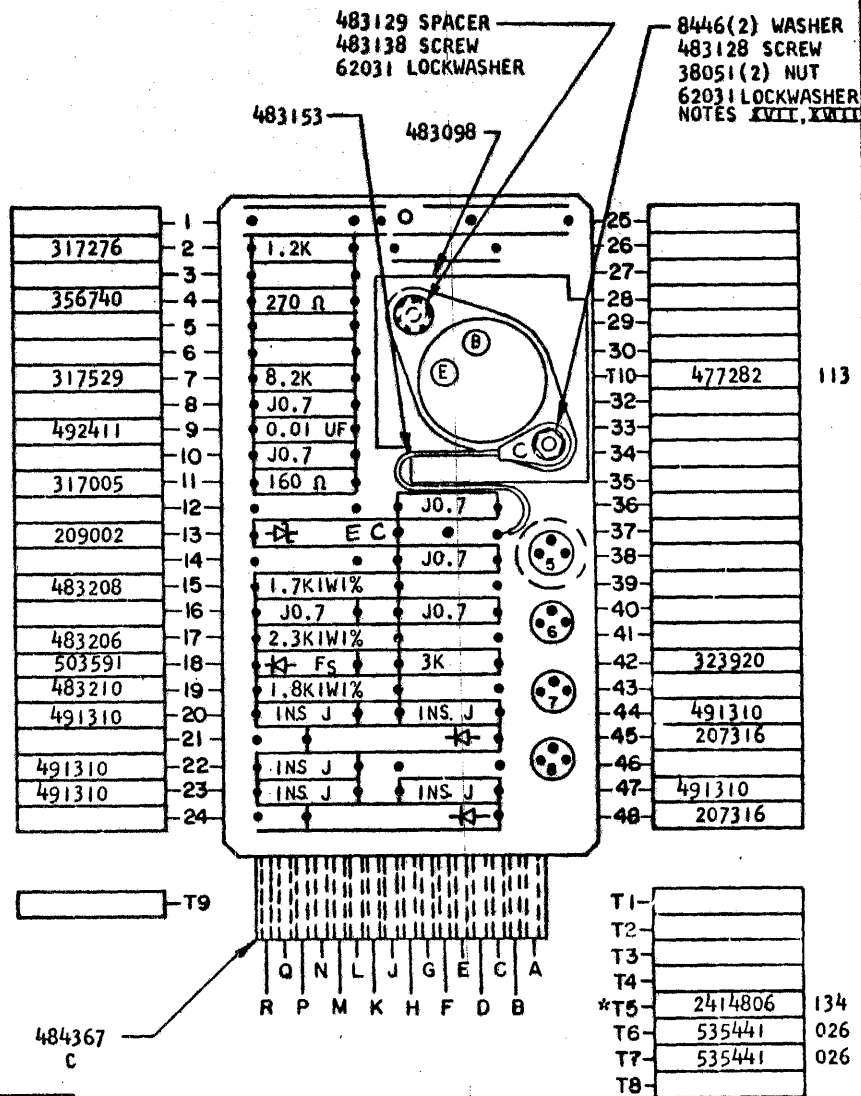
REFERENCE TO -6 VOLTS  
MOUNT CARD ON ONE INCH CENTERS - NOTE XVI

370613



NOTES

- I** CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892613
- XI** ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- XII** ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
- XIII** "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296 UNLESS OTHERWISE NOTED
- XIV**
- XV** DO NOT CRIMP TRANSISTOR LEADS.
- XVI** MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF THE CARD IS .850
- XVII** CASE IS ELECTRICALLY CONNECTED TO COLLECTOR. CONNECTION COMPLETED THROUGH JUMPER
- XVIII** WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE.
- XIX**
- XX** HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED



B

CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
<i>JH Tokoa</i>	<i>1/24/62</i>

HOLE PATTERN
747800

COMPONENT SIDE

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME	CARD ASM TSTR -	6-8-61	111822	NOTE XIV	6-21-62	D113950	NOTE XIV	88-2159
	REFERENCE TO -6 VOLTS	12-1-61	112448	NOTE XIV	8-30-62	113136	NOTE XIV	
DESIGN	EDF 12-20-61	MODEL	SMS					370613
DETAIL	JH 12-29-61	SCALE	NONE					
CHECK	FD 1-4-62	DRAW	VE 1-9-62		2-6-62	113685	NOTE XVII	
APPROV	GWS 2-5-62	CHECK	JK 1-10-62		3-28-62	113967	NOTE XIV	

82-3987-2 6-22-61

# 3 VOLT MARGINAL CHECK DIFF AMP

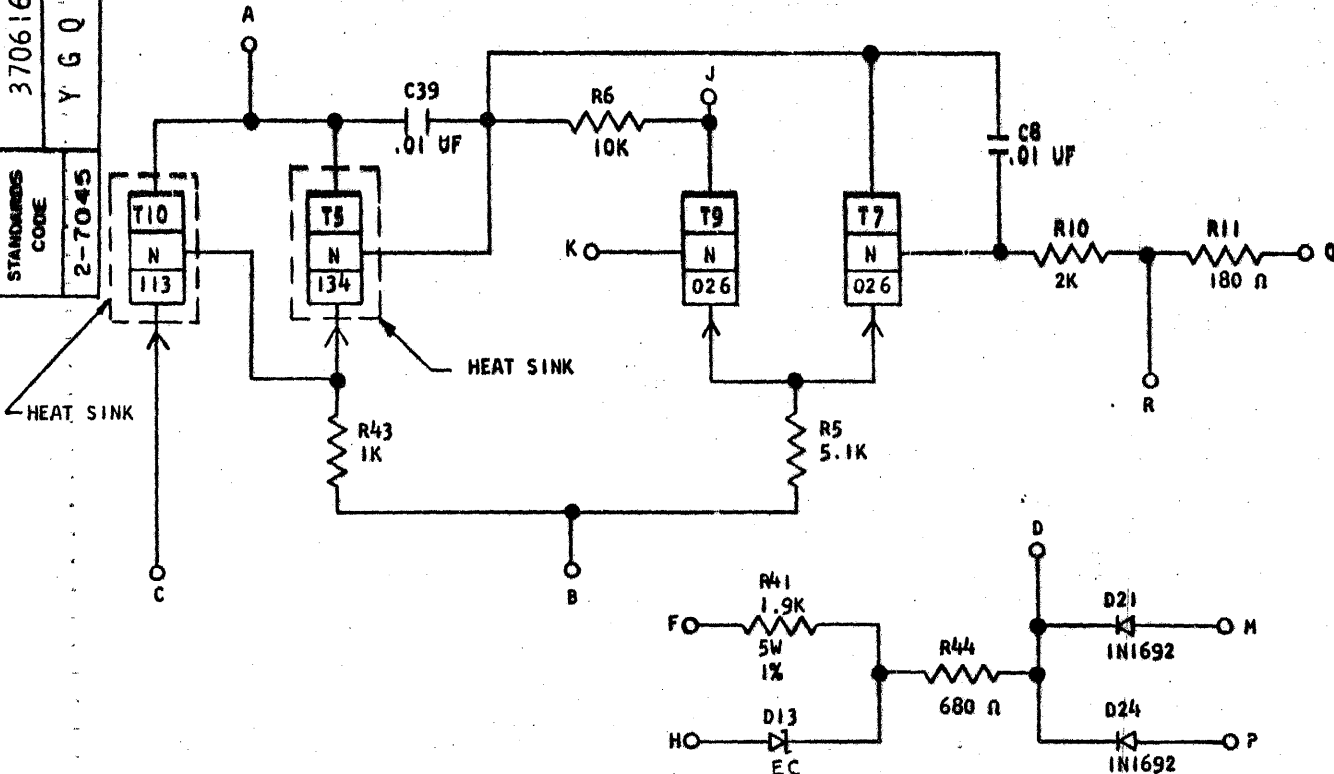
MOUNT CARD ON ONE-INCH CENTERS - NOTE XVII

370616

370616

Y G Q -

STANDARDS  
CODE  
2-7045

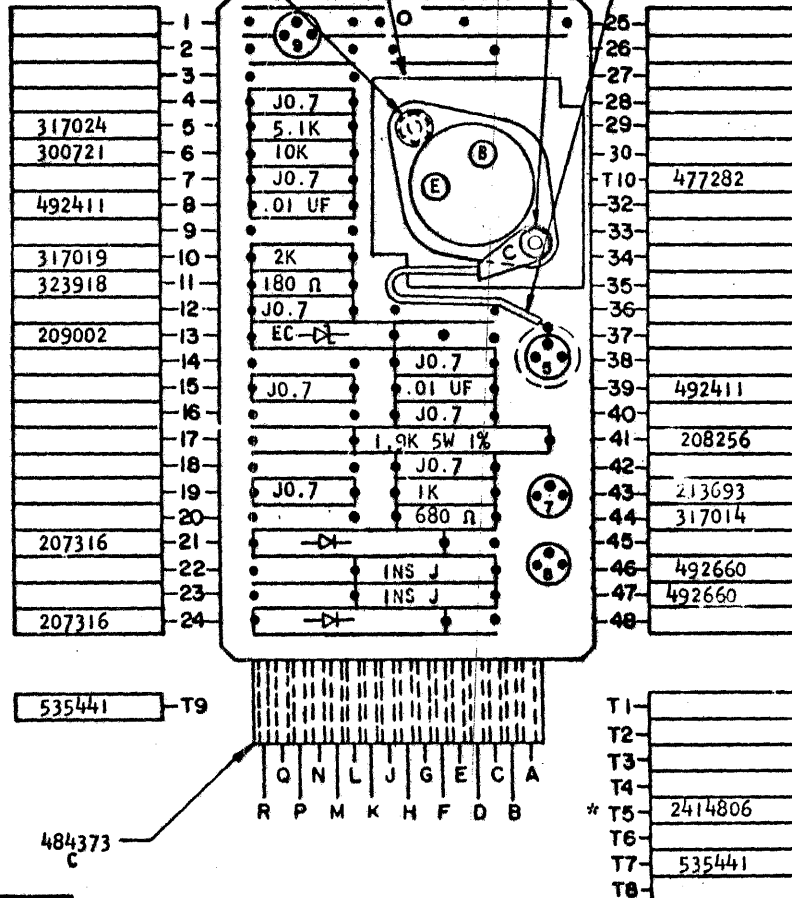


483129 SPACER  
483138 SCREW  
62031 LOCKWASHER

8446 (2) WASHER  
483128 SCREW  
38051 (2) NUT  
62031 LOCKWASHER  
NOTES XVII, XVIII

**NOTES**

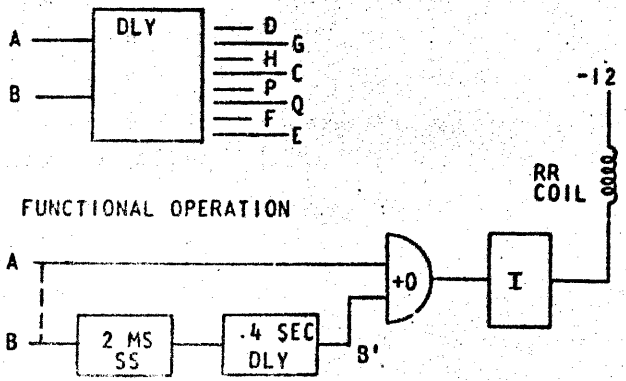
- X** CIRCUIT MUST CONFORM TO ENGINEERING SPECIFICATION 892616
- XI** ASSEMBLE TO ENGINEERING SPECIFICATION 895396 AND 891999
- XII** ALL RESISTORS ARE 1/2 WATT AND ± 5% UNLESS OTHERWISE NOTED
- XIII** "J" IN BLOCK DENOTES BARE WIRE JUMPER 491296 UNLESS OTHERWISE NOTED
- XIV**
- XV** DO NOT CRIMP TRANSISTOR LEADS.
- XVI** MAXIMUM HEIGHT THAT COMPONENTS MAY PROJECT ABOVE SURFACE OF CARD IS .850
- XVII** CASE IS ELECTRICALLY CONNECTED TO COLLECTOR, CONNECTION COMPLETED THROUGH JUMPER.
- XVIII** WASHER 8446 TO BE PLACED BETWEEN HEAT SINK AND CARD SURFACE
- XIX**
- XX** HEAT SINKS 492434 OR 492435 TO BE SELECTED AS REQUIRED



**B**

CIRCUIT AND PACKAGING STANDARD		HOLE PATTERN		COMPONENT SIDE				
APPROVAL	DATE	747800						
<i>J H Tokos</i>		7/24/62						
INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASM TSTR - 3 VOLT MARGINAL CHECK DIFF AMPLIFIER		6-8-61	111822	NOTE XIV	12-19-63	117838	GWS	88-2165
DESIGN EDF 12-20-61 MODEL SMS		12-1-61	112448	NOTE XIV				
DETAIL JH 12-29-61 SCALE NONE		12-26-61	112448 A	NOTE XIV				
CHECK EDF 1-4-62 DRAW MDE 1-8-62		2-6-62	113685	NOTE XIV				
APPRO GWS 2-5-62 CHECK MDE 1-9-62		3-28-62	113967	NOTE XIV				
82-3987-2		6-22-61						370616

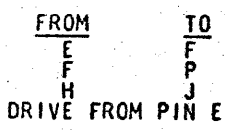
REFERENCE DRAWING  
SEE PRODUCTION DRAWING 372687



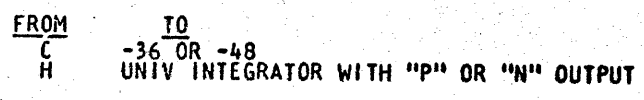
SEQUENCE OF OPERATION

1. NORMAL OPERATION PINS A AND B TIED TOGETHER (DRIVE EIMS FROM PIN G).
2. POSITIVE GOING INPUT ON PIN B CAUSES B' TO TIME OUT 400 MILLSEC. (SEE TIMING CHART).
3. THE N.C. REED RELAY IS DE-ENERGIZED (POINTS CLOSED) FOR A OR B' UP (METER RUN CONDITION).
4. FOR A ONLY, IN THE UP LEVEL THE NC REED RELAY IS DE-ENERGIZED (POINTS CLOSED). FOR A ONLY, IN THE DOWN N.C. REED RELAY IS ENERGIZED (POINTS OPEN). THE LEVEL OF THE WAVE FORM APPEARING AT RRI-2 IS DEPENDENT ON TYPE OF LOGIC BEING DRIVEN.

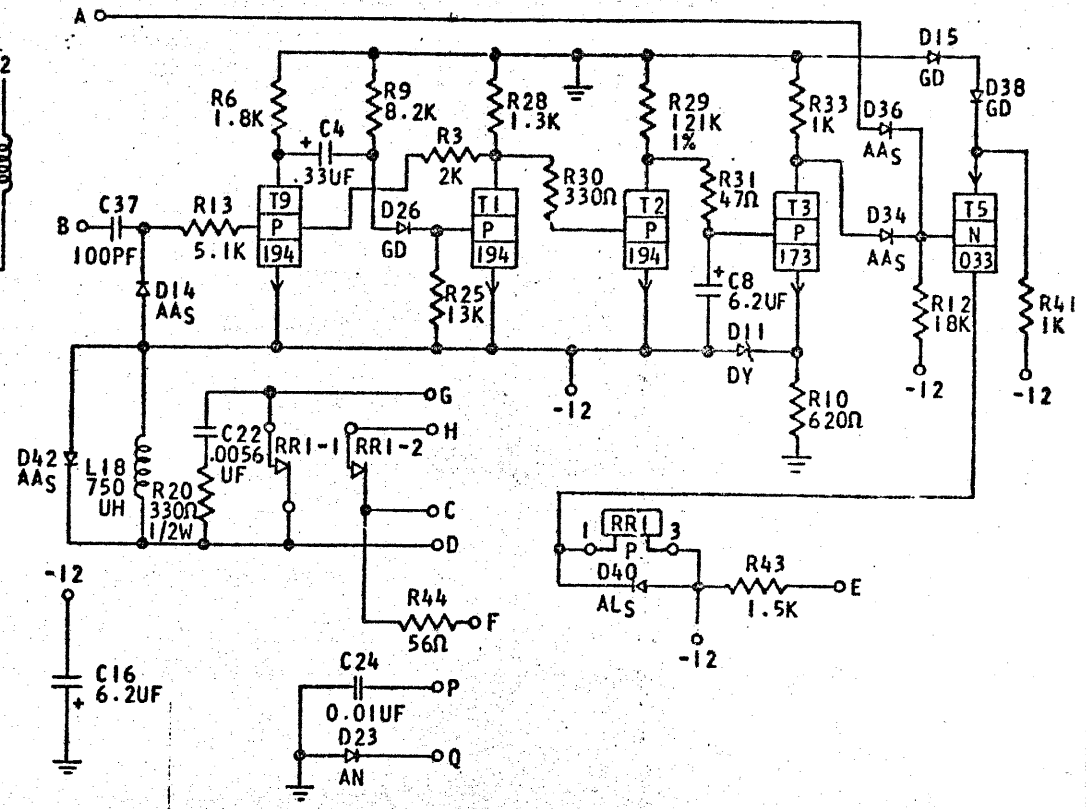
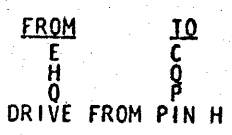
A. FOR DRIVING INTO CTRL, CTDL, SOTDL AND SOTRL CONNECT THE FOLLOWING:



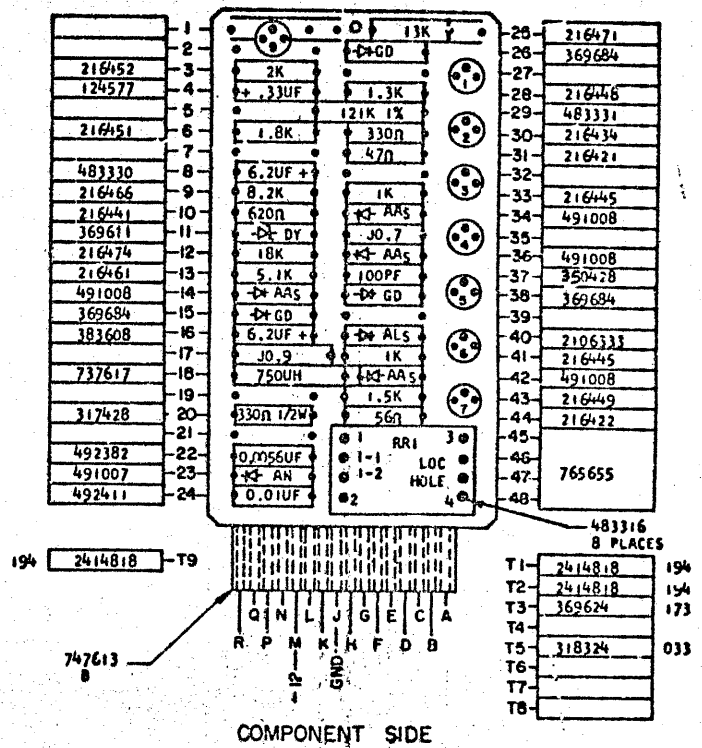
B. FOR DRIVING CURRENT MODE, CONNECT THE FOLLOWING:



C. FOR DRIVING INTO DDTL LOGIC, CONNECT THE FOLLOWING:



PIN	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A ONLY	DIODE INPUT		UP	-0.81	+6.27
			DOWN	-3.0	-15
G	RRI-1 OUTPUT		UP	--	--
A TO B	INPUT		DOWN	-11.00	-12.48
			POS. GOING SHIFT	5.1	13.20
B-G	RRI-1 OUTPUT		DOWN	-11.00	-12.48



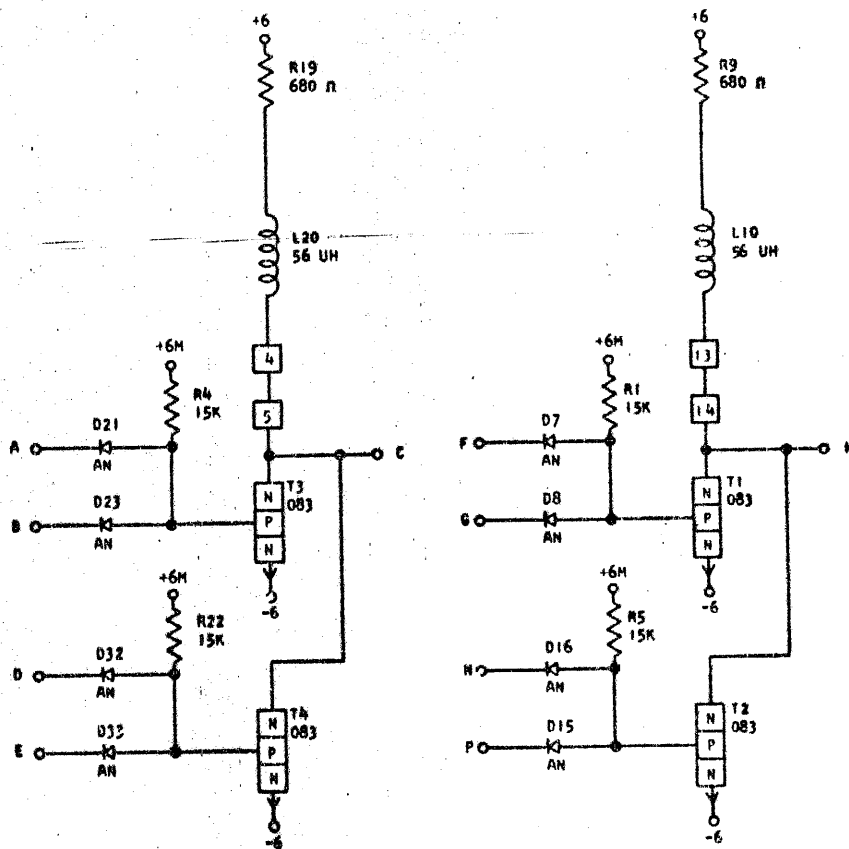
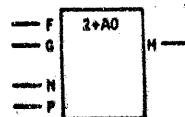
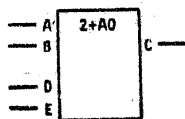
CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASSEMBLY TSTR - ETH		9-20-63	117898					
DELAY CIRCUIT								
DESIGN	FVL 8-8-63	MODEL						
DETAIL	FVL 8-8-63	SCALE						
CHECK		DRAW						
APPRO	GWS 8-9-63	CHECK						

REFERENCE DRAWING

SEE PRODUCTION DRAWING 370144

CTDL NPN TWO WAY GATE W/ COLLECTOR LOAD



SEQUENCE OF OPERATION

1. BOTH INPUTS TO A TRANSISTOR UP, TRANSISTOR ON OUTPUT DOWN
2. FOR UP OUTPUT, EITHER INPUT TO BOTH TRANSISTORS MUST BE DOWN
3. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

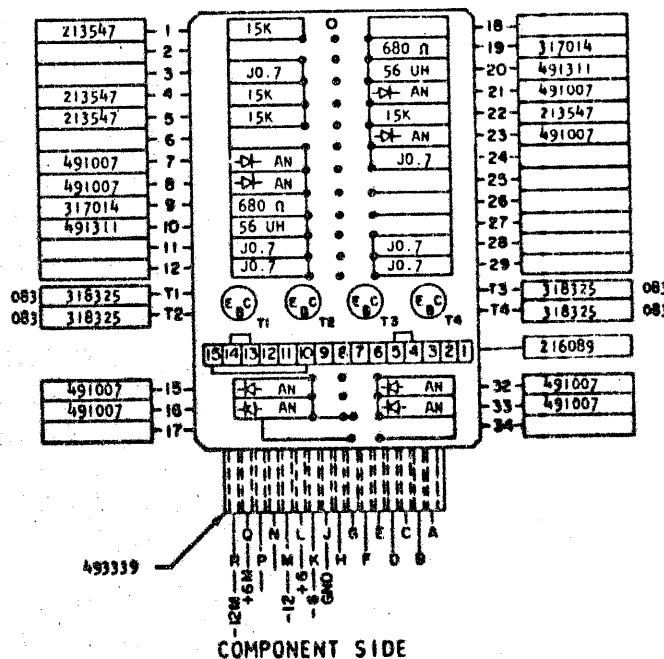
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, D, F, N	U	INPUT	UP	-5.26	0.24
			DOWN	-7.44	-12.5
B, G, E, P	U	INPUT	UP	-5.26	0.24
			DOWN	-7.44	-12.5
C, M	T	OUTPUT	UP	1.44	6.24
			DOWN	-5.44	-6.24

DELAY - USEC

	MINIMUM	MAXIMUM
TURN ON	0.05	0.70
TURN OFF	0.05	1.50

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

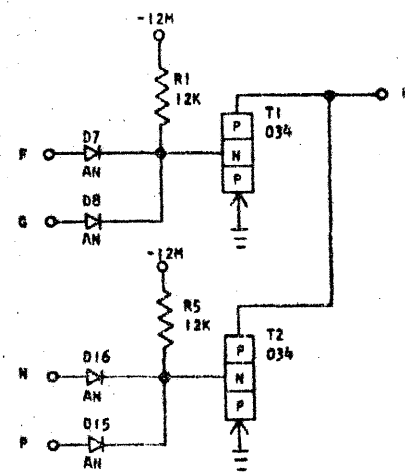
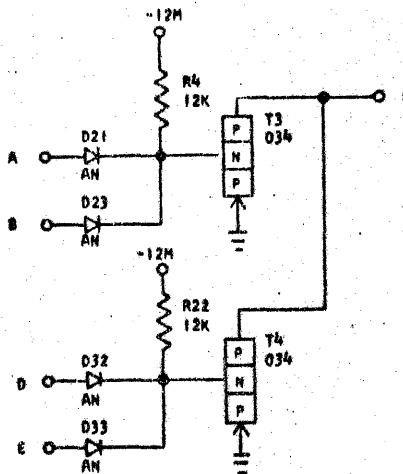
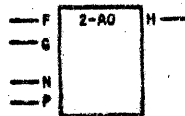
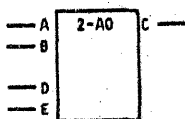
NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS. EXAMPLE: LOGIC BLOCK DRIVING EF "OR".



CIRCUIT AND PACKAGING STANDARD	
APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.				DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME				4-2-62	115599					729898
TWO WAY GATE W/ COLLECTOR LOAD										
DESIGN	RQ	3-1-62	MODEL	SMS						
DETAIL	WH	3-1-62	SCALE	NONE						
CHECK	WH	3-1-62	DRAW	LIG 3-17-62						
APPRO			CHECK							

**REFERENCE DRAWING**  
 SEE PRODUCTION DRAWING 370141

**CTDL PNP TWO WAY GATE WITHOUT COLLECTOR LOAD**

**SEQUENCE OF OPERATION**

1. BOTH INPUTS TO A TRANSISTOR DOWN, TRANSISTOR ON OUTPUT UP
2. FOR DOWN OUTPUT, EITHER INPUT TO BOTH TRANSISTORS MUST BE UP
3. EXTERNAL LOADING OF COLLECTORS REQUIRED
4. LOGIC BLOCKS MAY HAVE SYMBOLS OTHER THAN SHOWN

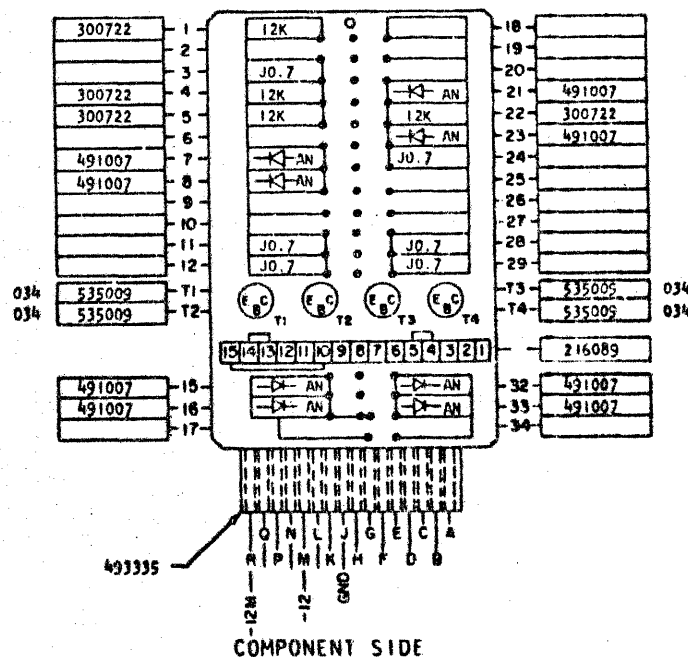
PINS	SIGNAL NAME	WAVE SHAPE	LEVELS		
			MIN	MAX	
A, D, F, H	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
B, G, E, P	T	INPUT	UP	1.44	6.24
			DOWN	-0.74	-6.24
C, H	U	OUTPUT	UP	-0.54	0.24
			DOWN	-7.44	-12.5

**DELAY - USEC**

	MINIMUM	MAXIMUM
TURN ON	0.10	0.80
TURN OFF	0.05	0.80

\*THIS DELAY CAN OCCUR ONLY ON HEAVILY LOADED BLOCKS.

NOTE: THE ABOVE RANGES OF DELAYS ARE REPRESENTATIVE. SPECIFIC CIRCUIT APPLICATION AND/OR WIRING CAPACITANCE MAY RESULT IN DELAYS WHICH ARE OUT OF THE GIVEN RANGES. IN SUCH CASES, CARD REPLACEMENT SHOULD INDICATE IF THE CIRCUIT IS OUT OF SPECIFICATIONS.  
EXAMPLE: LOGIC BLOCK DRIVING EF "OR".

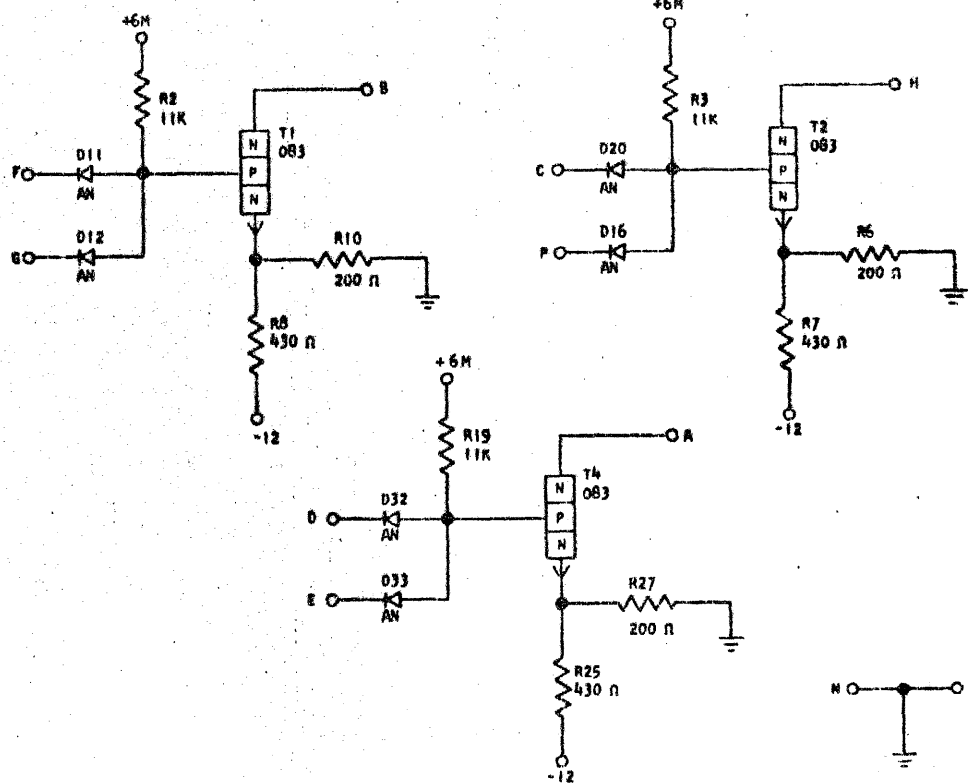
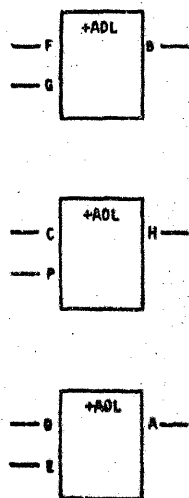

**CIRCUIT AND PACKAGING STANDARD**

APPROVAL	DATE
ABC	4-2-62

INTERNATIONAL BUSINESS MACHINES CORP.		DATE	CHANGE NO.	APPROVAL	DATE	CHANGE NO.	APPROVAL	DEVELOPMENT NO.
NAME CARD ASH TSTR-CTDL PNP TWO WAY GATE WITHOUT COLLECTOR LOAD		6-19-62	115599					729899
DESIGN	MODEL	SMS						
DETAIL RQ	3-1-62	SCALE	NONE					
CHECK WN	3-1-62	DRAW	LIG	3-17-62				
APPRO		CHECK						



CTDL STANDARD CABLE DRIVER



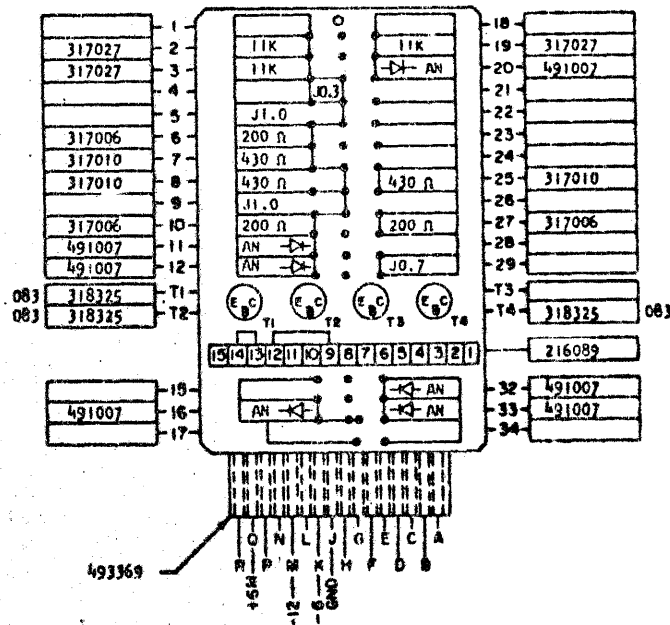
SEQUENCE OF OPERATION

1. ALL INPUTS UP TRANSISTOR ON OUTPUT DOWN
2. ANY INPUT DOWN TRANSISTOR OFF OUTPUT UP

PINS	SIGNAL NAME	WAVE SHAPE	LEVELS	
			MIN	MAX
F, C, D	U INPUT		UP -0.98	0.24
G, P, E	U INPUT		UP -0.98	0.24
B, H, A	N OUTPUT		DOWN -1.25	-2.66
N, J	GROUND		UP	
			DOWN	

DELAY - NSEC

	MINIMUM	MAXIMUM
TURN ON	455	652
TURN OFF	48	94



COMPONENT SIDE

CIRCUIT AND PACKAGING STANDARD			
APPROVAL		DATE	
ABC		4-2-62	
INTERNATIONAL BUSINESS MACHINES CORP.	NAME	DATE	CHARGE NO.
CARD ASM YSTR-CTDL	DRIVER	4-2-62	115599
DESIGN RQ	3-1-62	MODEL SPS	
DETAIL WH	3-1-62	SCALE NONE	
CHECK WH	3-1-62	DRAW LIG	3-17-62
APPRO		CHECK	