

NATIONAL CLASS 310-2  
ELECTRONIC DATA PROCESSOR

ENGINEERING DESCRIPTION

VOLUME 3  
EQUIPMENT DIAGRAMS

MAY 1, 1961

COMPANY CONFIDENTIAL

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the approval of the National Cash Register Company

Prepared For  
THE NATIONAL CASH REGISTER COMPANY  
DAYTON 9, OHIO

By  
CONTROL DATA CORPORATION



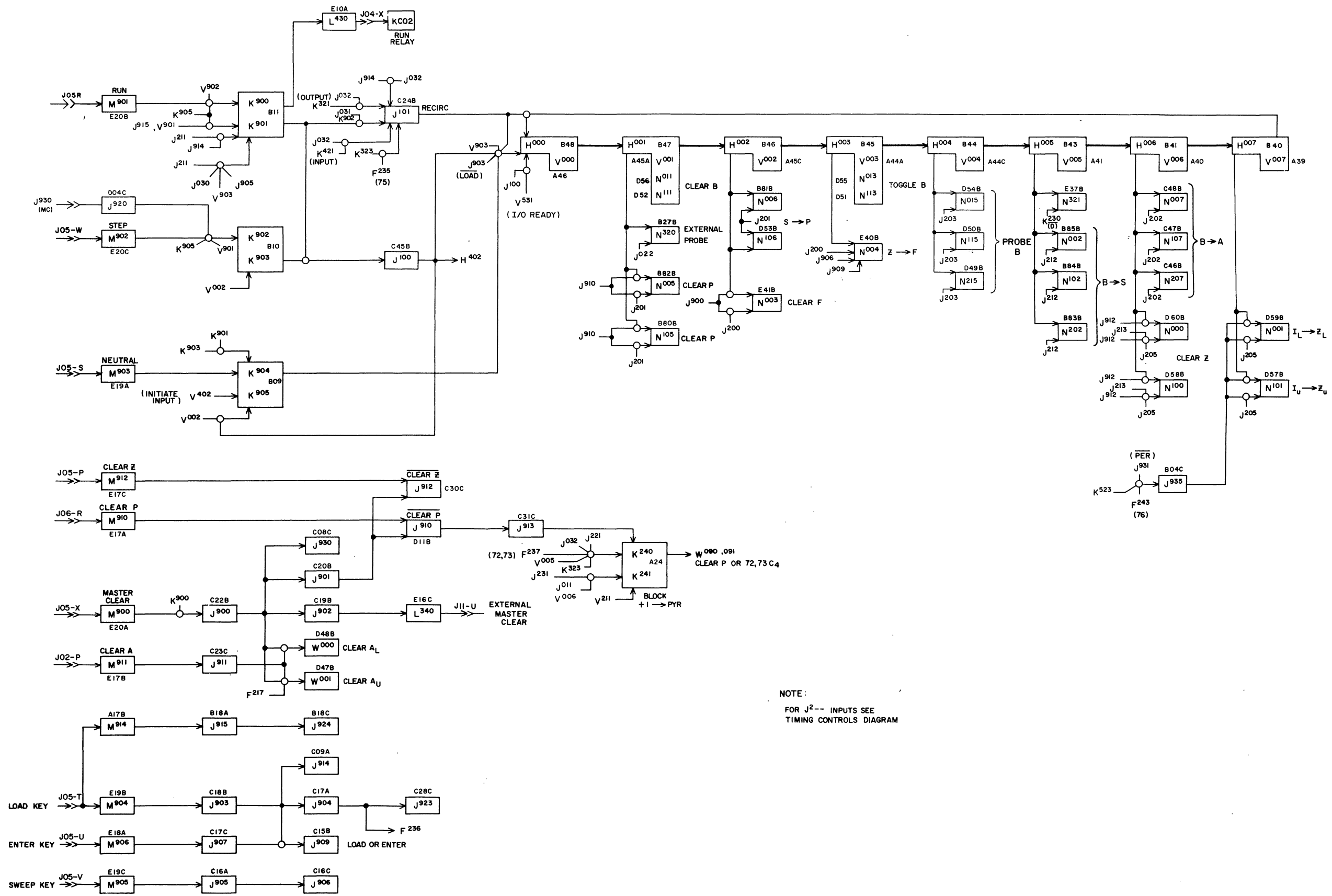
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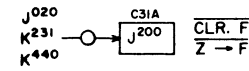
## C351-4 TYPEWRITER

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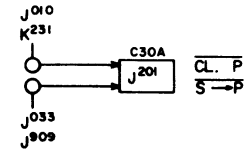


NOTE:  
FOR J<sup>2</sup>-- INPUTS SEE  
TIMING CONTROLS DIAGRAM

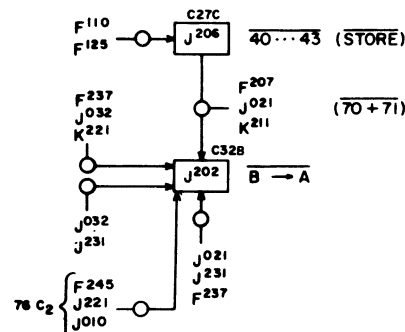




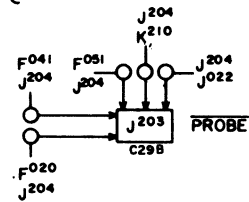
DOWN FOR  
EARLY 31d  
D-CYCLE  
FIRST TRANSFER ON I/O SEQUENCE



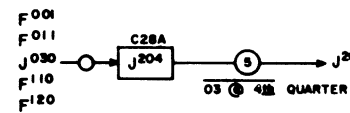
DOWN FOR  
EARLY D2  
EARLY 4 ON LD OR ENTER



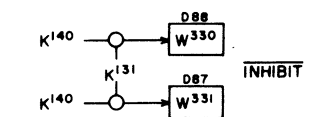
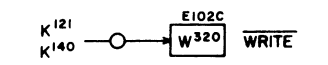
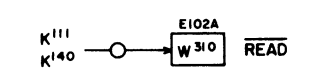
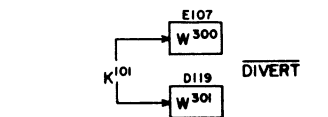
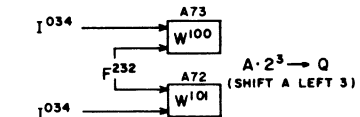
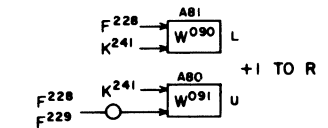
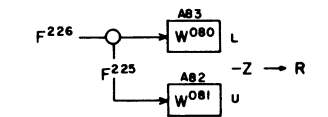
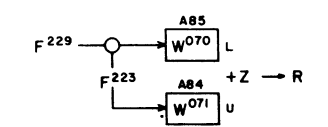
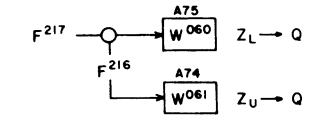
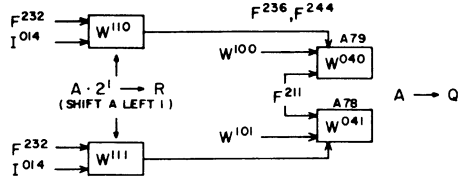
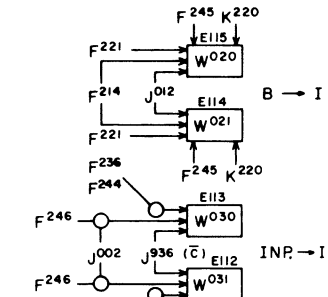
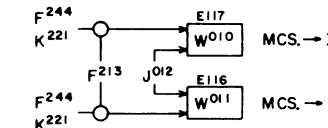
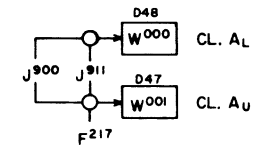
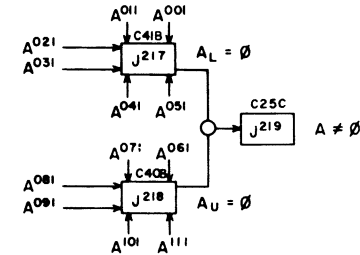
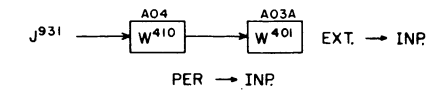
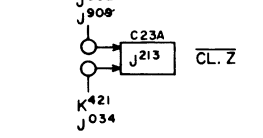
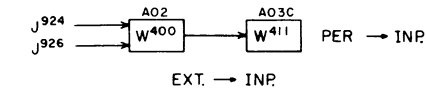
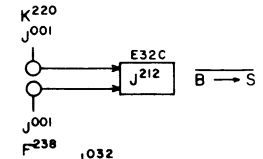
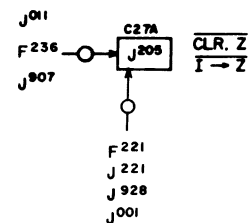
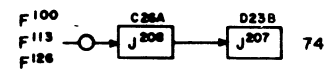
J202 IS DOWN FOR  
40...43, 70, 71, @ B3  
72, 73, D3  
72, 73, C4  
D4  
76 C2 (EARLY)



J203 IS UP FOR LOGICAL SUM  
INSTRUCTIONS ONLY.



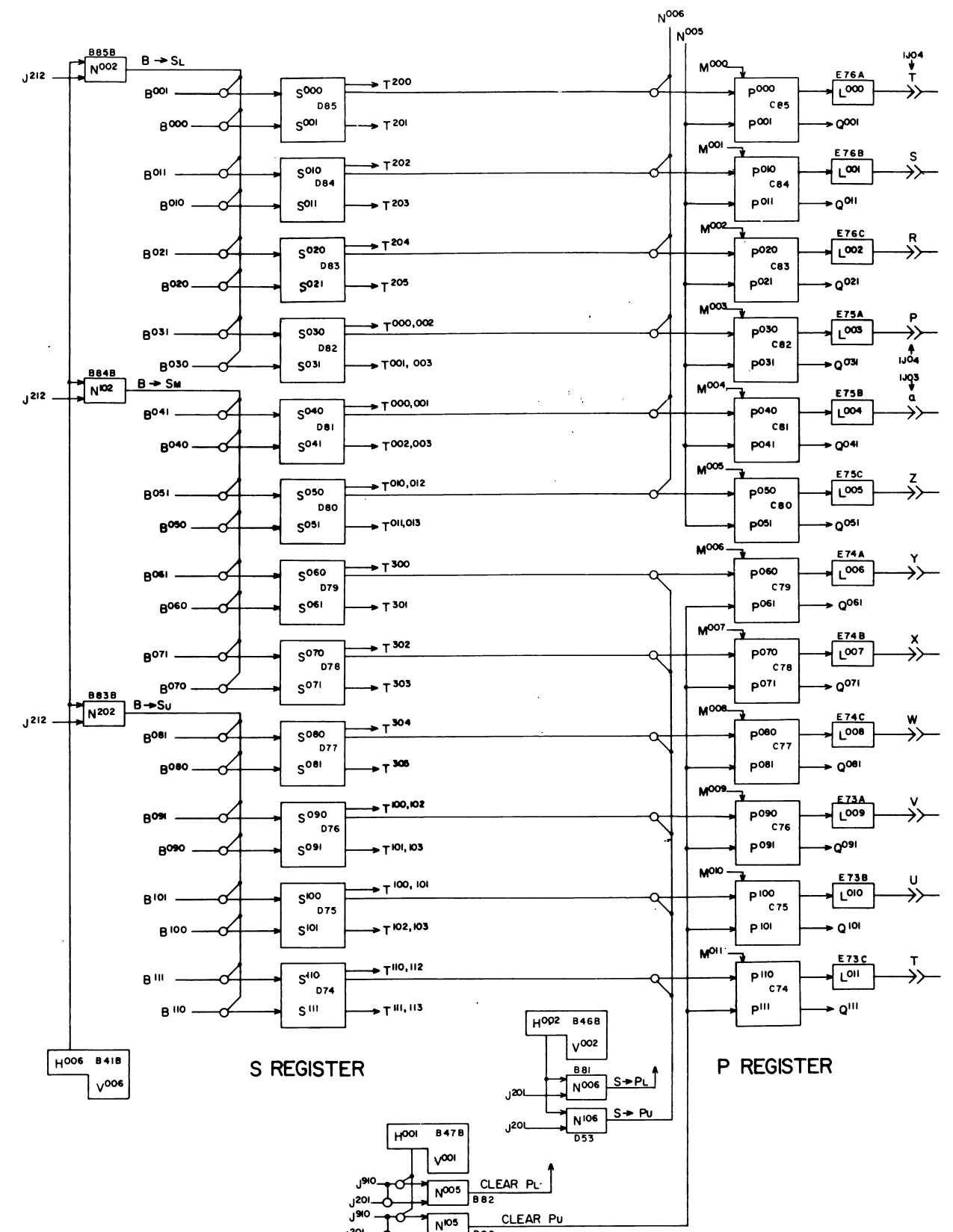
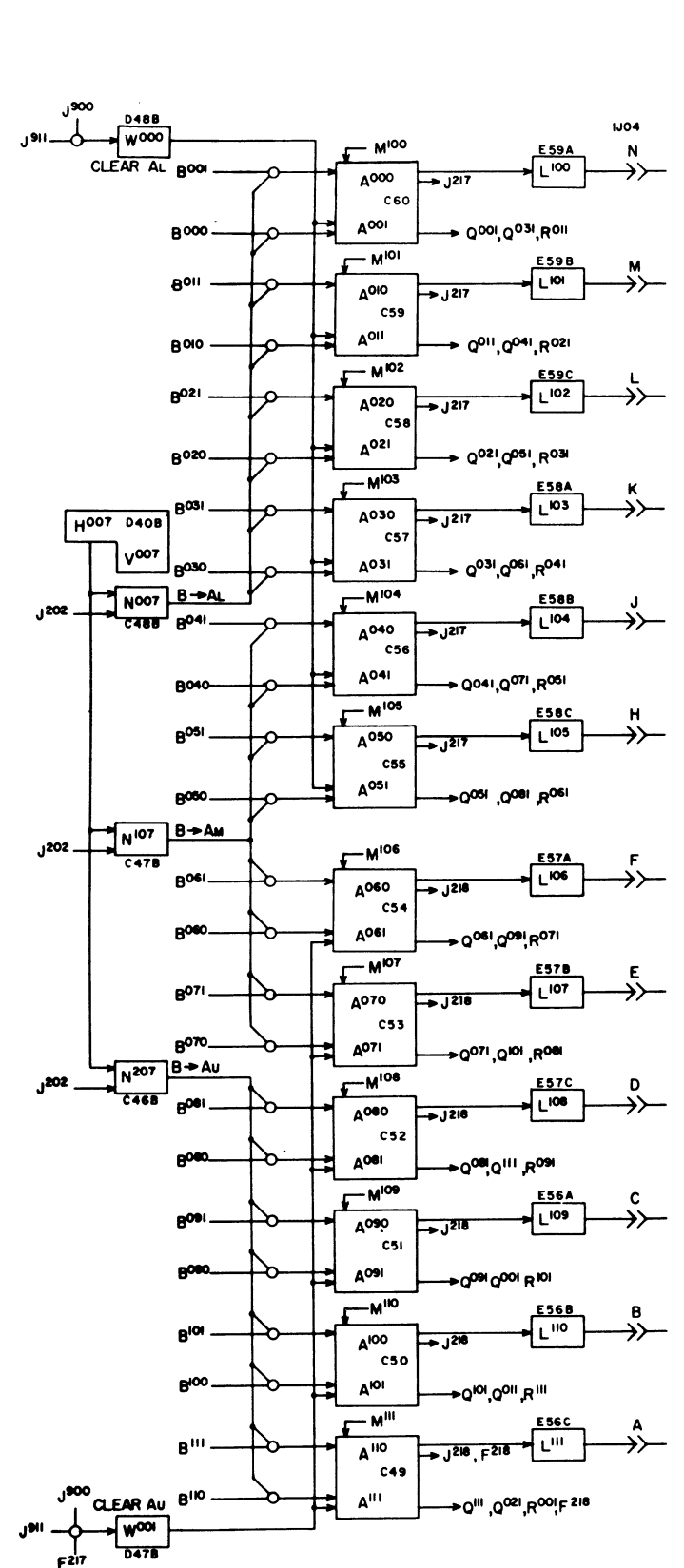
J204 IS DOWN FOR  
LOGICAL SUM.



F TRANSLATORS

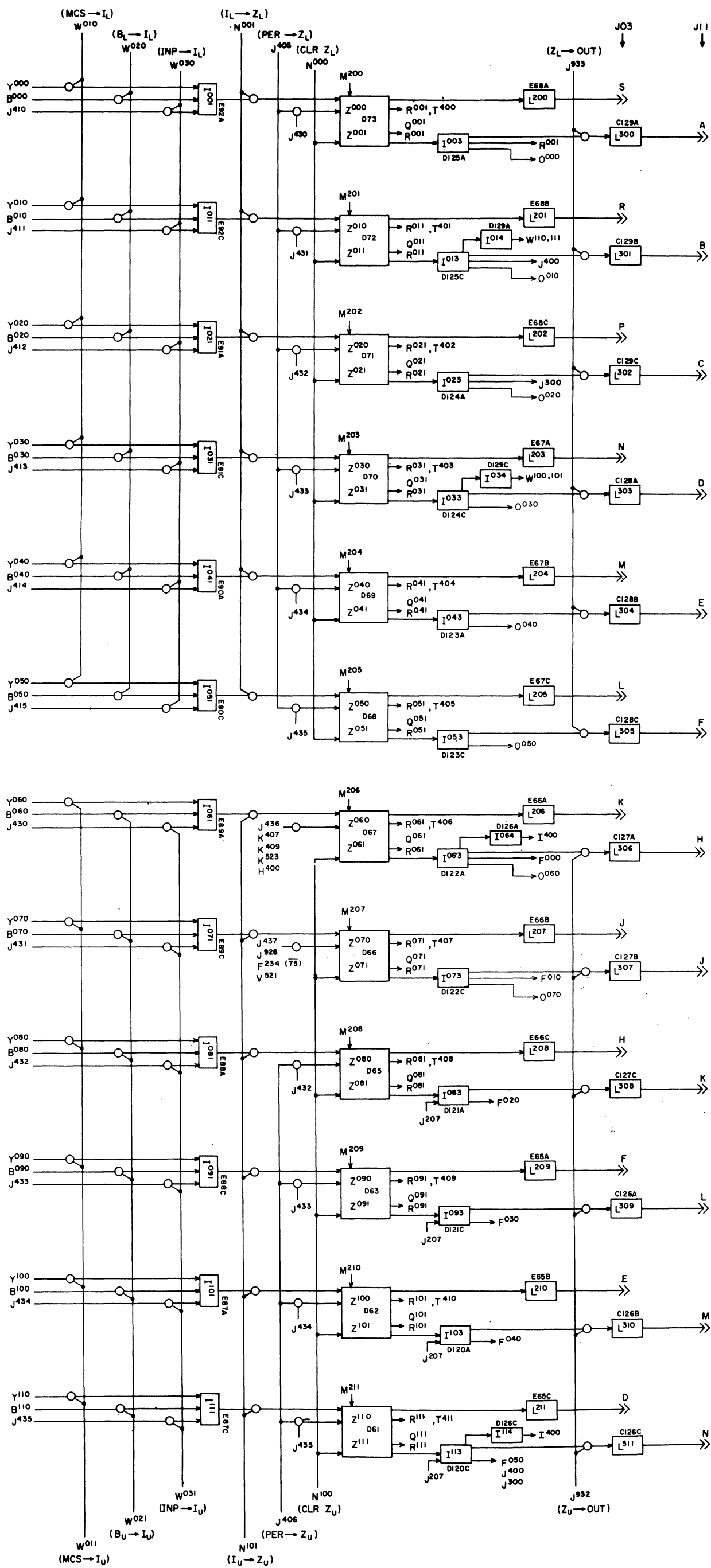
SYMBOL	FUNCTION
F211	A -> Q
F213	73
F214	73
F215	P -> Q
F216	Z -> Q
F217	Z_L -> Q
F221	72
F223	Z -> R
F226	-Z_L -> R
F228	+I -> R
F229	Z_L -> R
F232	A SHIFT
F236	72 C OR LOAD MODE
F237	72, 73
F238	72, 73
F244	76
F245	76
F246	72



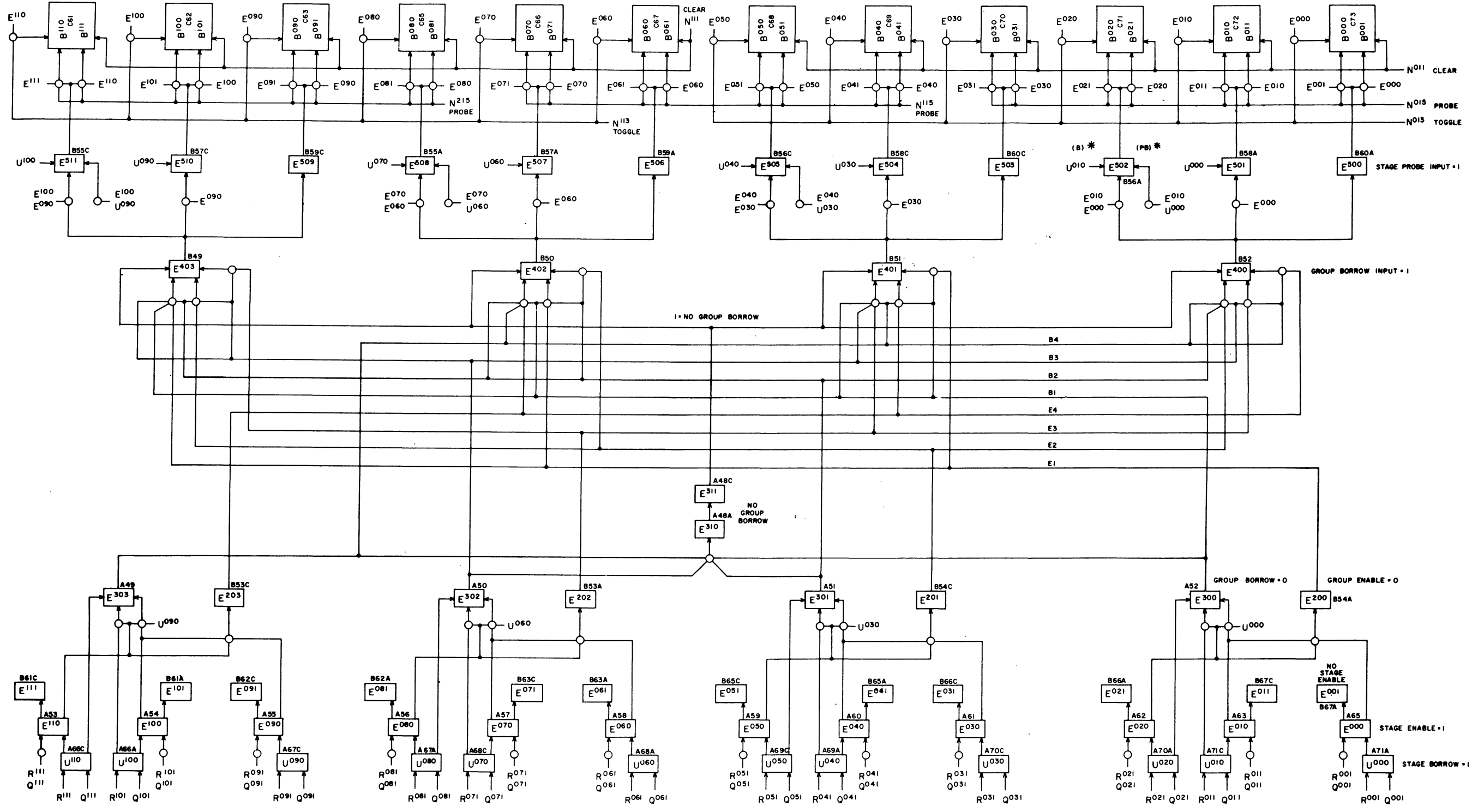


NOTE  
 JACK CONNECTIONS SHOWN GO TO  
 DIGITAL DISPLAY UNITS IN CONSOLE.





NOTES:  
 L200...L211 OUTPUTS GO TO  
 DIGITAL DISPLAY UNIT IN  
 CONTROL CONSOLE.  
 L300...L311 FEED THE OUTPUT  
 CABLE

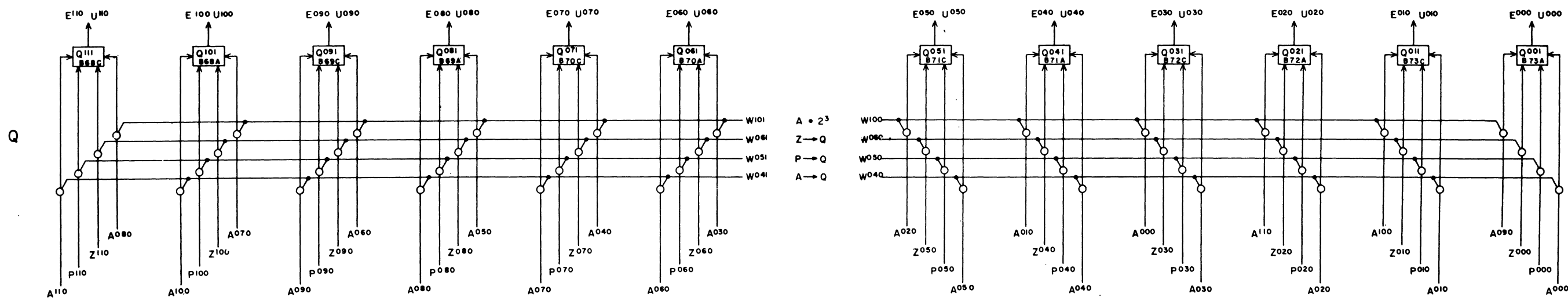
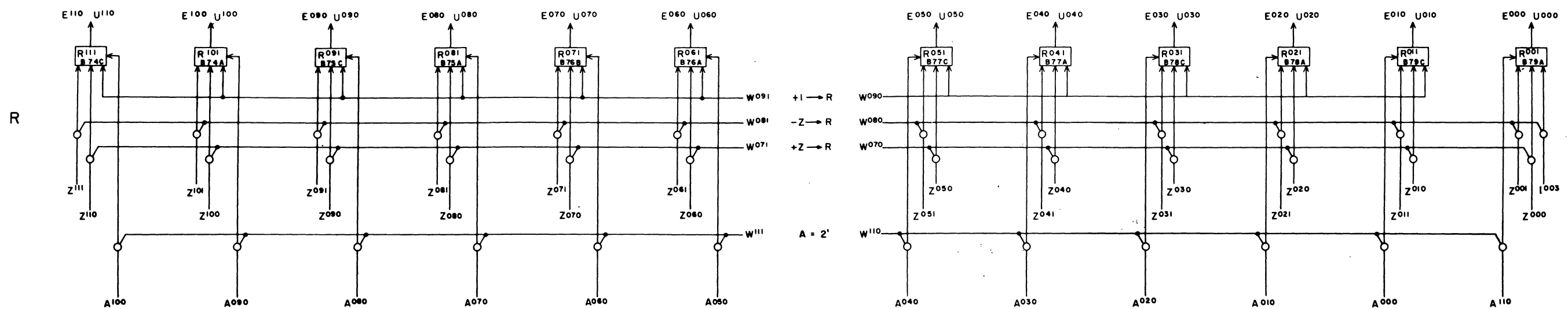


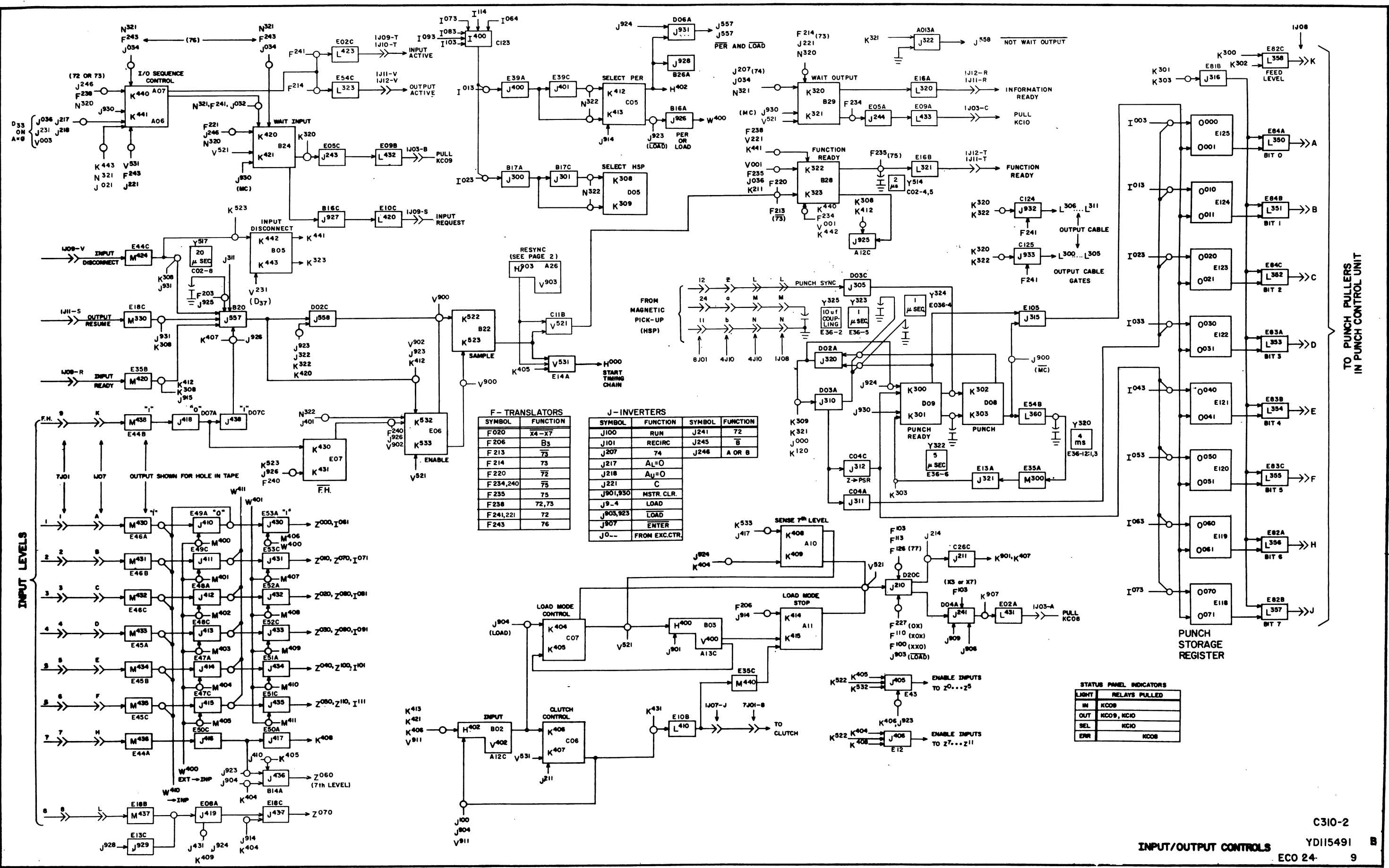
PYRAMID INPUTS  
 +Z } R  
 -Z }  
 +1 }  
 A-2' }  
 P } Q  
 A }  
 A-2<sup>3</sup> }  
 +Z }

\* SEE TEXT FOR (B) & (PB) DESIGNATION. THESE TERMS APPLY TO THE CORRESPONDING INPUTS IN EACH OF THE OCTAL GROUPS.

LOGIC DIAGRAM  
BORROW PYRAMID

C310-2  
YD103238





**F-TRANSLATORS**

SYMBOL	FUNCTION
F 020	X4-X7
F 206	B3
F 213	73
F 214	73
F 220	72
F 234,240	75
F 235	75
F 238	72,73
F 241,221	72
F 243	76

**J-INVERTERS**

SYMBOL	FUNCTION	SYMBOL	FUNCTION
J100	RUN	J241	72
J101	RECIRC	J245	B
J207	74	J246	A OR B
J217	A <sub>L</sub> =0		
J218	A <sub>U</sub> =0		
J221	C		
J901,930	MSTR. CLR.		
J9-4	LOAD		
J903,923	LOAD		
J907	ENTER		
J0--	FROM EXC.CTR.		

**STATUS PANEL INDICATORS**

LIGHT	RELAYS PULLED
IN	KC09, KC10
OUT	KC09, KC10
SEL	KC10
ERR	KC08

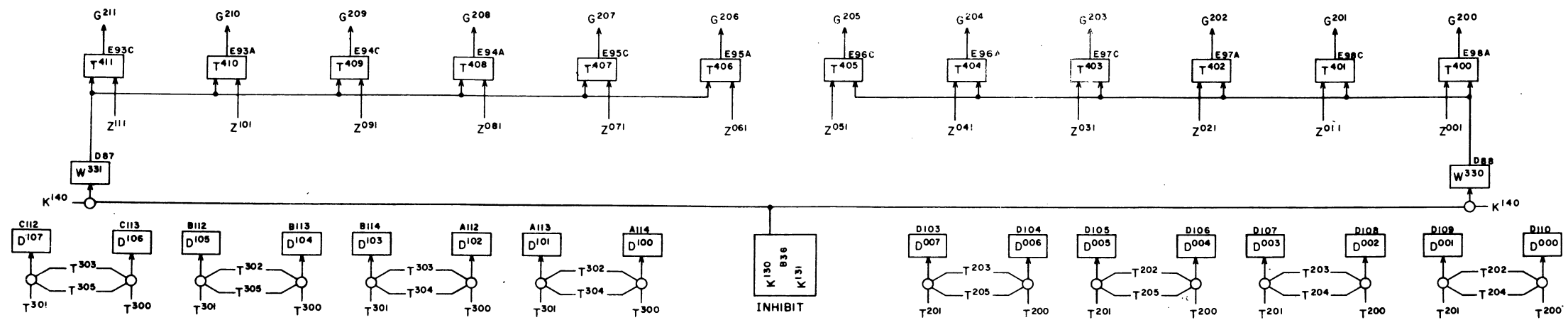
C310-2

INPUT/OUTPUT CONTROLS YDI15491

ECO 24- 9

INHIBIT DRIVERS

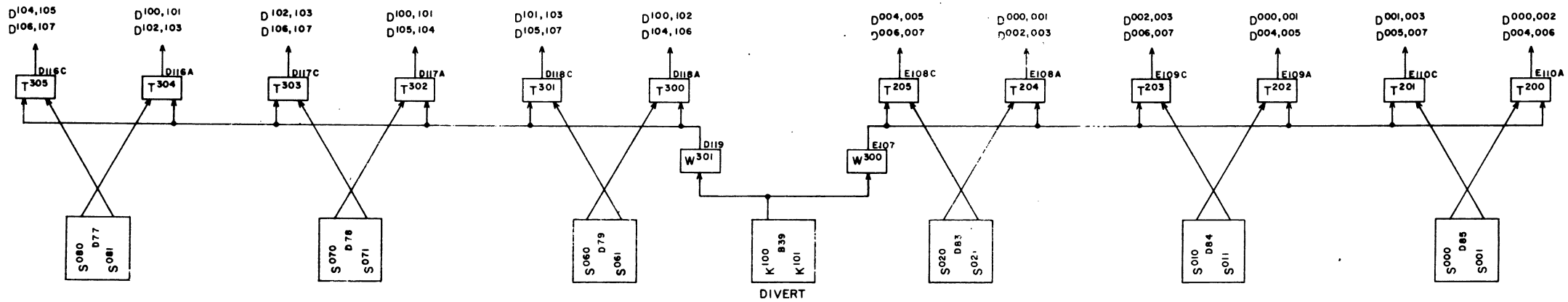
INHIBIT



HORIZONTAL  
(X-XX)

VERTICAL  
(XXX-)

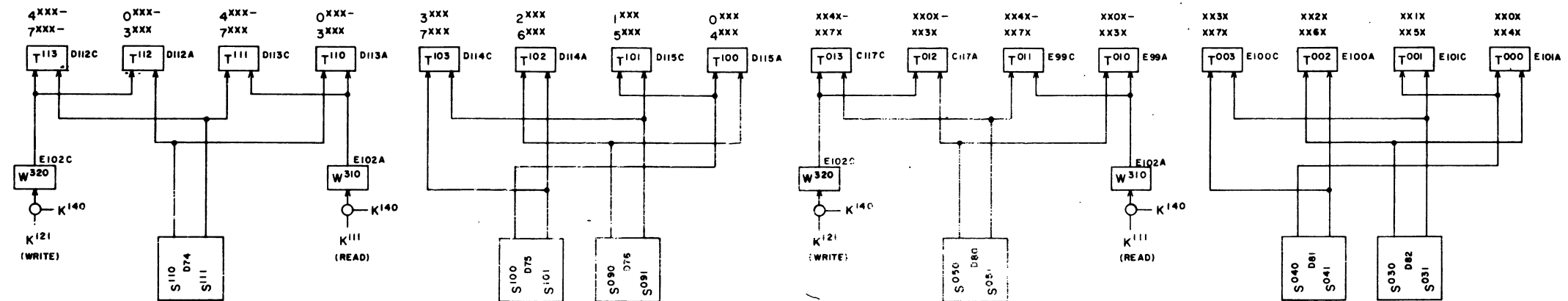
DIVERT



HORIZONTAL

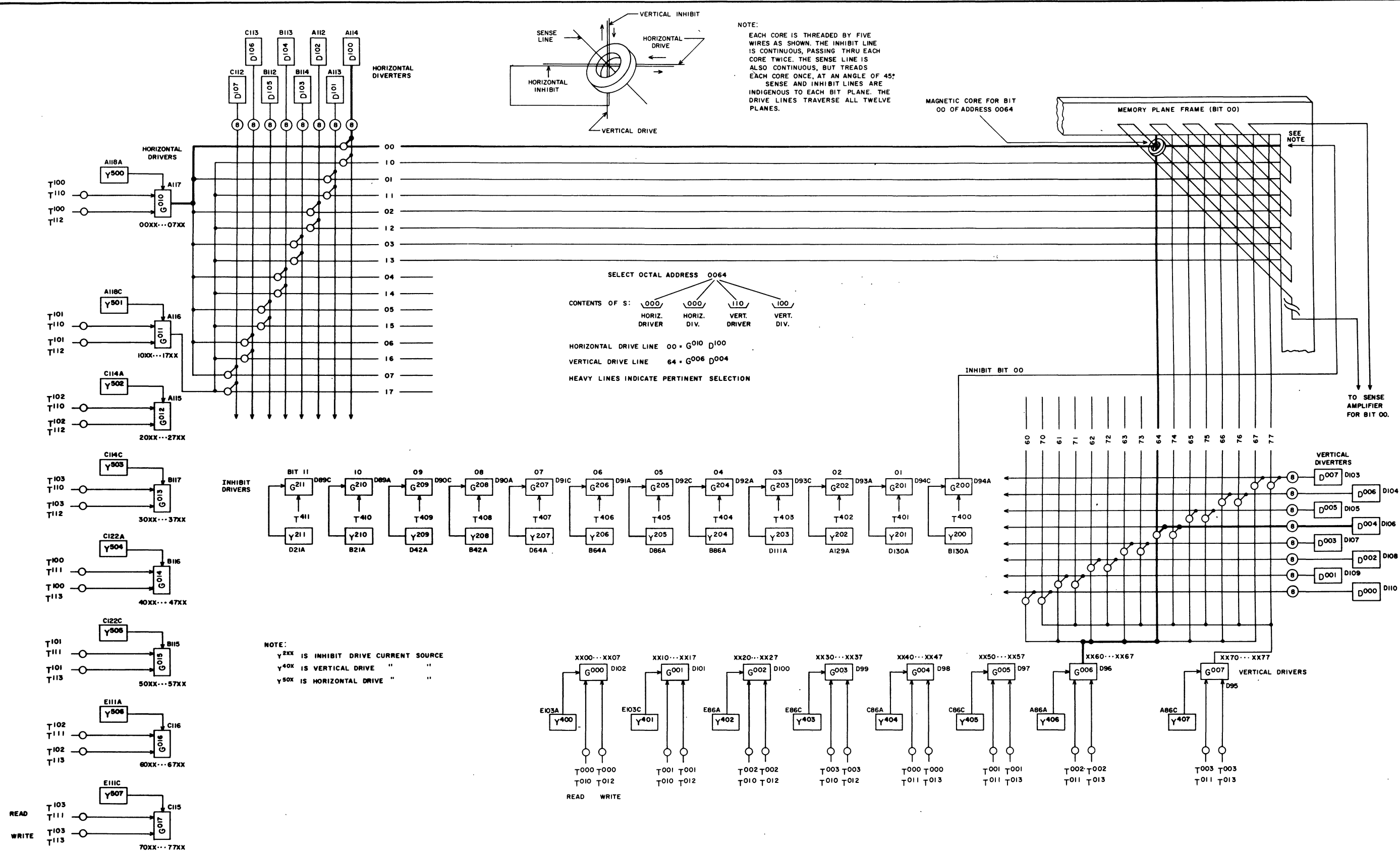
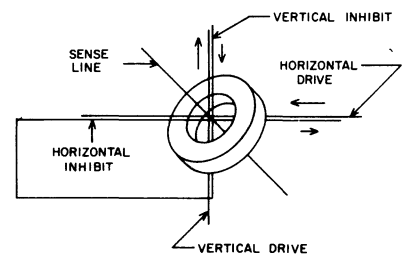
VERTICAL

R/W DRIVE



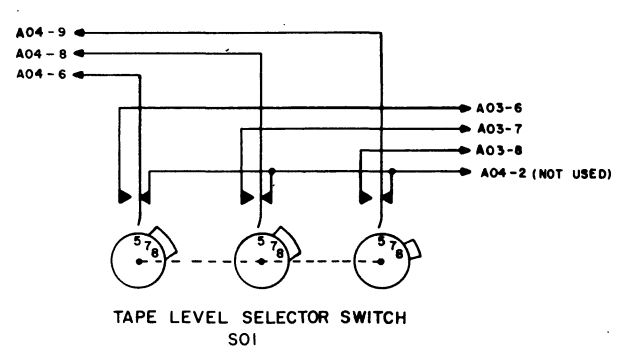
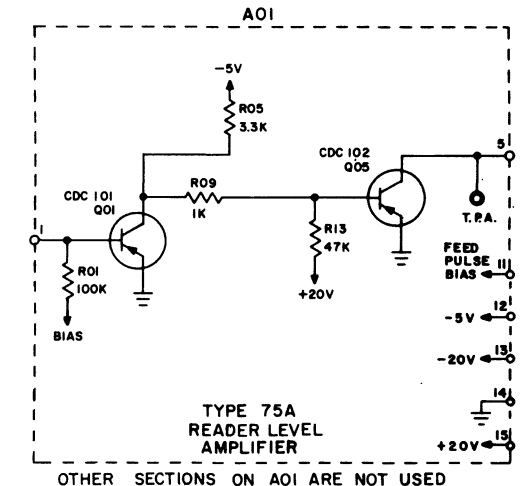
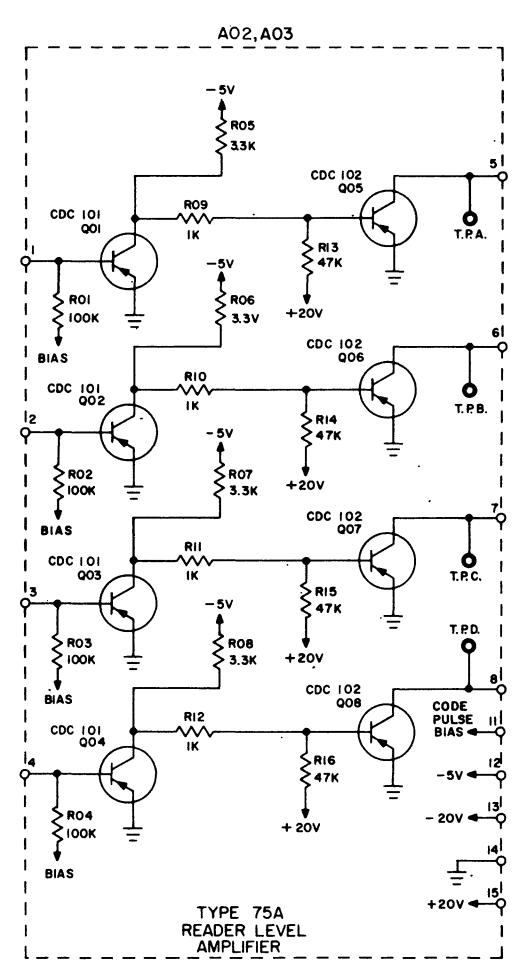
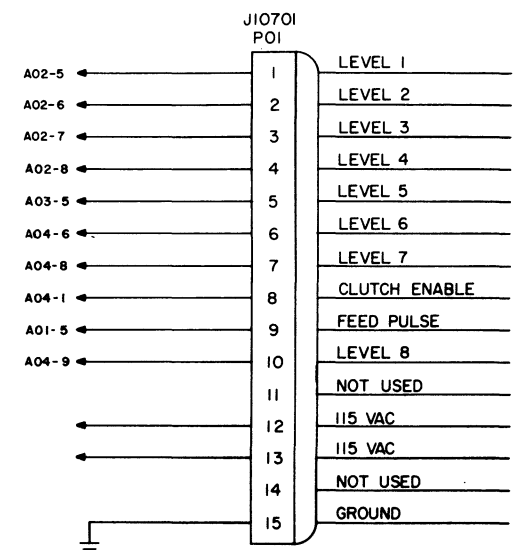
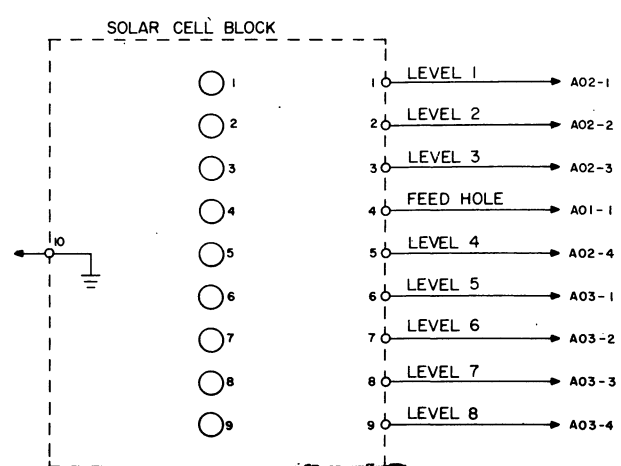
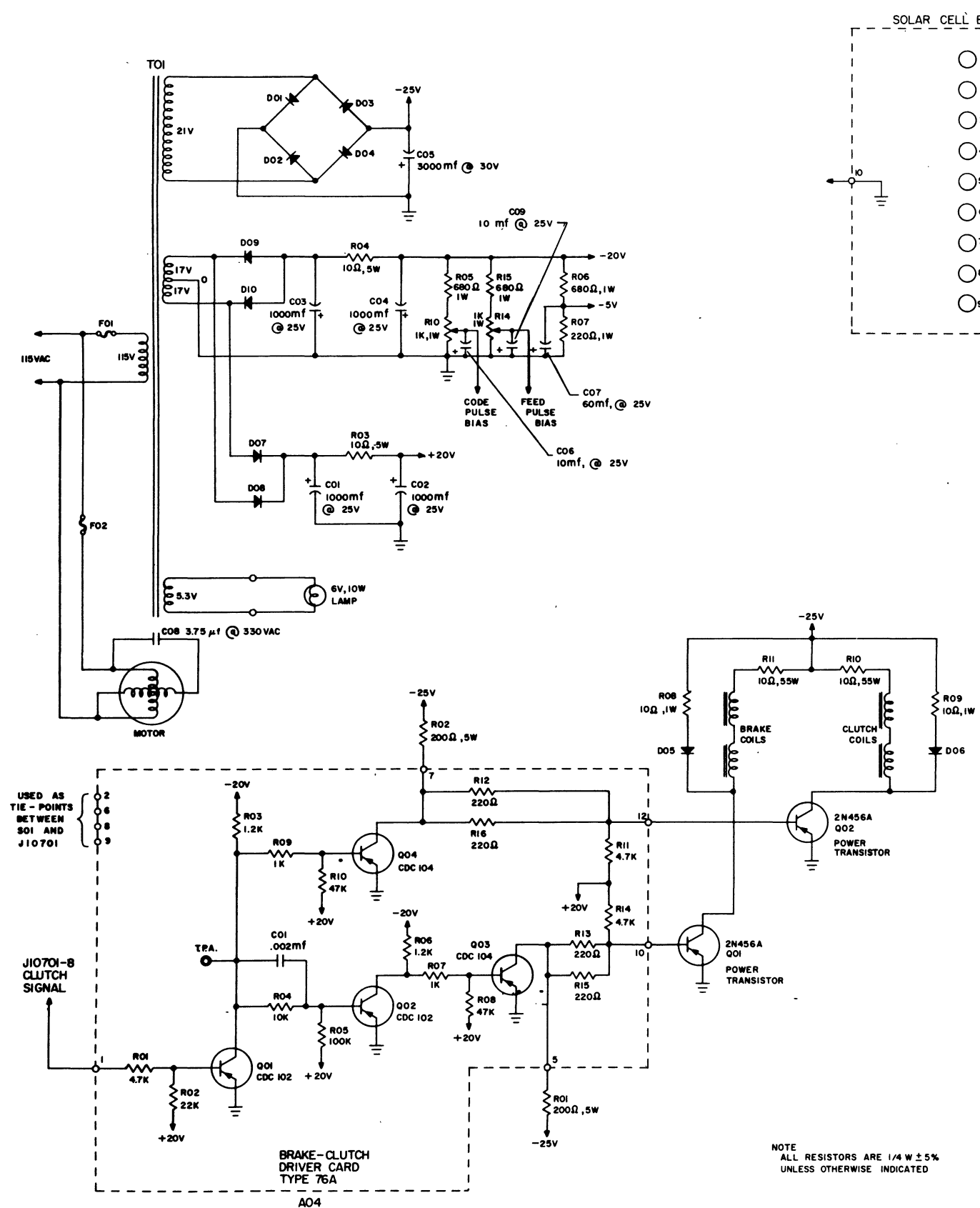
NOTE:  
 LOW-ORDER DIGIT IN DESTINATION SYMBOL SIGNIFIES  
 MAGNITUDE OF DIVERTER LINE SELECTED. THUS:  
 D104,105 = X4XX OR X5XX  
 D106,107 = X6XX OR X7XX  
 OUTPUT DESIGNATIONS FROM T305, AND T205  
 =XXX4,XXX5,XXX6, XXX7

NOTE:  
 EACH CORE IS THREADED BY FIVE WIRES AS SHOWN. THE INHIBIT LINE IS CONTINUOUS, PASSING THRU EACH CORE TWICE. THE SENSE LINE IS ALSO CONTINUOUS, BUT TREADS EACH CORE ONCE, AT AN ANGLE OF 45°. SENSE AND INHIBIT LINES ARE INDIGENOUS TO EACH BIT PLANE. THE DRIVE LINES TRAVERSE ALL TWELVE PLANES.



C310-2

LOGIC DIAGRAM YD103048  
 STORAGE ADDRESS SELECTION SMALL MEMORY STACK 11



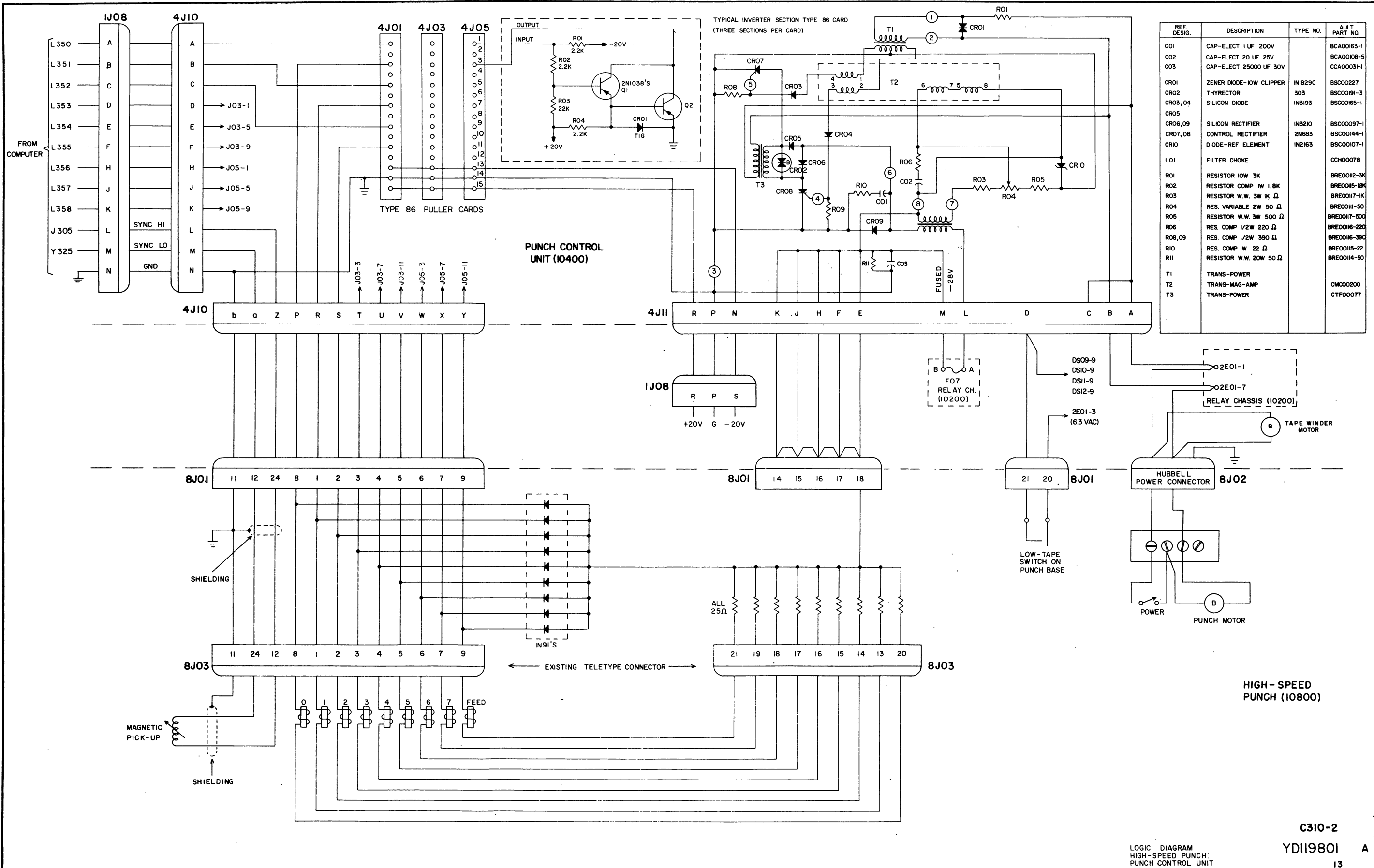
NOTE  
ALL RESISTORS ARE 1/4 W ± 5%  
UNLESS OTHERWISE INDICATED

C310-2

PAPER TAPE  
READER CIRCUITS

YD103243

A  
12



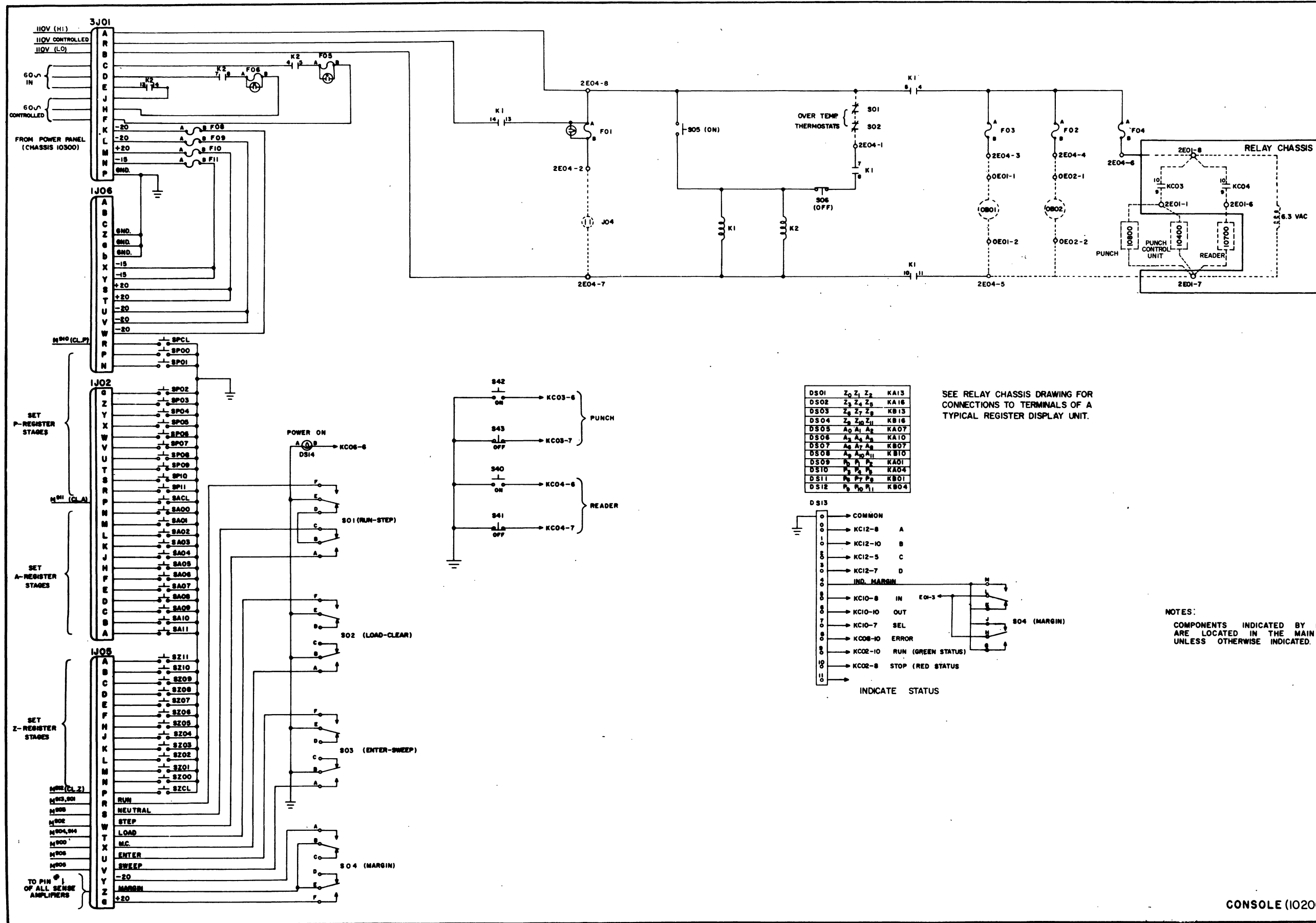
REF. DESIG.	DESCRIPTION	TYPE NO.	AULT. PART NO.
C01	CAP-ELECT 1 UF 200V		BCA00163-1
C02	CAP-ELECT 20 UF 25V		BCA00108-5
C03	CAP-ELECT 25000 UF 30V		CCA00031-1
CR01	ZENER DIODE-10V CLIPPER	IN1829C	BSC00227
CR02	THYRECTOR	303	BSC00191-3
CR03,04	SILICON DIODE	IN3193	BSC00165-1
CR05			
CR06,09	SILICON RECTIFIER	IN3210	BSC00097-1
CR07,08	CONTROL RECTIFIER	2N683	BSC00144-1
CR10	DIODE-REF ELEMENT	IN2163	BSC00107-1
L01	FILTER CHOKE		CCH00078
R01	RESISTOR 10W 3K		BRE0012-3K
R02	RESISTOR COMP 1W 1.8K		BRE0015-18K
R03	RESISTOR W.W. 3W 1K Ω		BRE0017-1K
R04	RES. VARIABLE 2W 50 Ω		BRE0011-50
R05	RESISTOR W.W. 3W 500 Ω		BRE0017-500
R06	RES. COMP 1/2W 220 Ω		BRE0016-220
R08,09	RES. COMP 1/2W 390 Ω		BRE0016-390
R10	RES. COMP 1W 22 Ω		BRE0015-22
R11	RESISTOR W.W. 20W 50 Ω		BRE0014-50
T1	TRANS-POWER		
T2	TRANS-MAG-AMP		CMC00200
T3	TRANS-POWER		CTF00077

HIGH-SPEED PUNCH (10800)

C310-2  
YD119801 A  
13

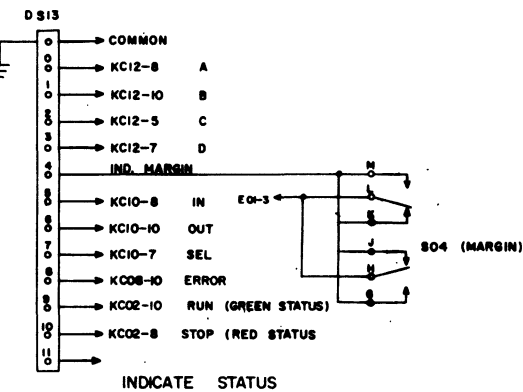
LOGIC DIAGRAM  
HIGH-SPEED PUNCH  
PUNCH CONTROL UNIT



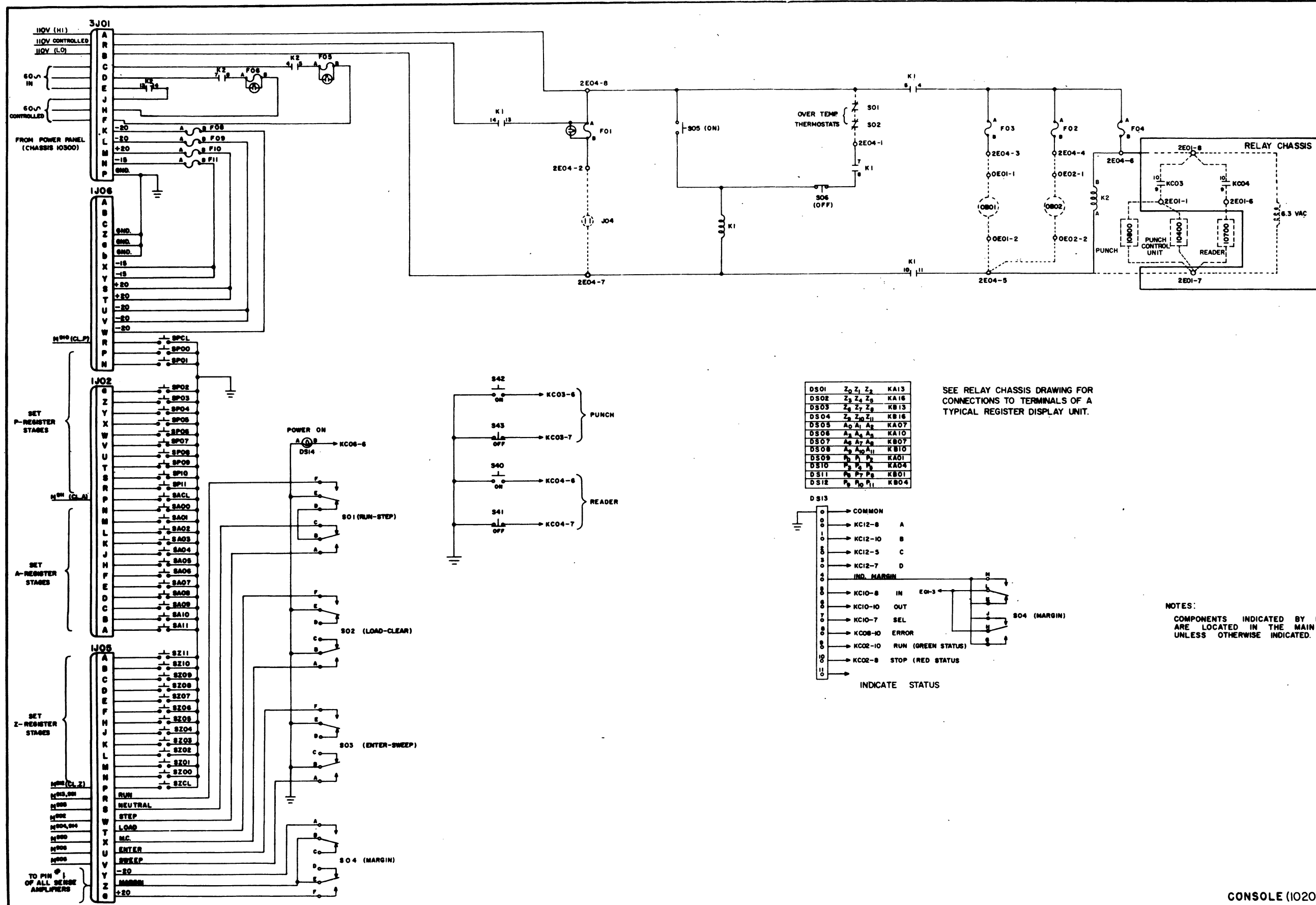


DS01	Z <sub>0</sub>	Z <sub>1</sub>	Z <sub>2</sub>	KA13
DS02	Z <sub>3</sub>	Z <sub>4</sub>	Z <sub>5</sub>	KA16
DS03	Z <sub>6</sub>	Z <sub>7</sub>	Z <sub>8</sub>	KB13
DS04	Z <sub>9</sub>	Z <sub>10</sub>	Z <sub>11</sub>	KB16
DS05	A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	KA07
DS06	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	KA10
DS07	A <sub>6</sub>	A <sub>7</sub>	A <sub>8</sub>	KB07
DS08	A <sub>9</sub>	A <sub>10</sub>	A <sub>11</sub>	KB10
DS09	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	KA01
DS10	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	KA04
DS11	P <sub>6</sub>	P <sub>7</sub>	P <sub>8</sub>	KB01
DS12	P <sub>9</sub>	P <sub>10</sub>	P <sub>11</sub>	KB04

SEE RELAY CHASSIS DRAWING FOR CONNECTIONS TO TERMINALS OF A TYPICAL REGISTER DISPLAY UNIT.

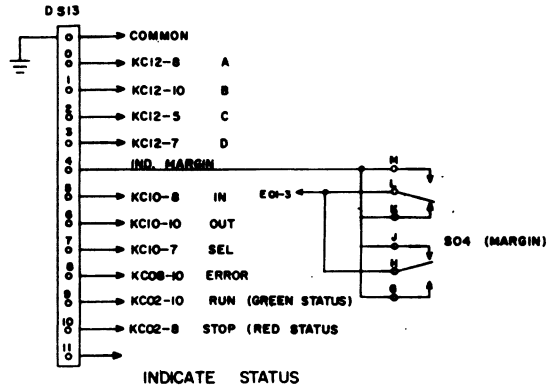


NOTES:  
COMPONENTS INDICATED BY DASHED LINES ARE LOCATED IN THE MAIN CABINET UNLESS OTHERWISE INDICATED.



DS01	Z <sub>0</sub>	Z <sub>1</sub>	Z <sub>2</sub>	KA13
DS02	Z <sub>3</sub>	Z <sub>4</sub>	Z <sub>5</sub>	KA16
DS03	Z <sub>6</sub>	Z <sub>7</sub>	Z <sub>8</sub>	KB13
DS04	Z <sub>9</sub>	Z <sub>10</sub>	Z <sub>11</sub>	KB16
DS05	A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	KA07
DS06	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	KA10
DS07	A <sub>6</sub>	A <sub>7</sub>	A <sub>8</sub>	KB07
DS08	A <sub>9</sub>	A <sub>10</sub>	A <sub>11</sub>	KB10
DS09	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	KA01
DS10	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	KA04
DS11	P <sub>6</sub>	P <sub>7</sub>	P <sub>8</sub>	KB01
DS12	P <sub>9</sub>	P <sub>10</sub>	P <sub>11</sub>	KB04

SEE RELAY CHASSIS DRAWING FOR CONNECTIONS TO TERMINALS OF A TYPICAL REGISTER DISPLAY UNIT.



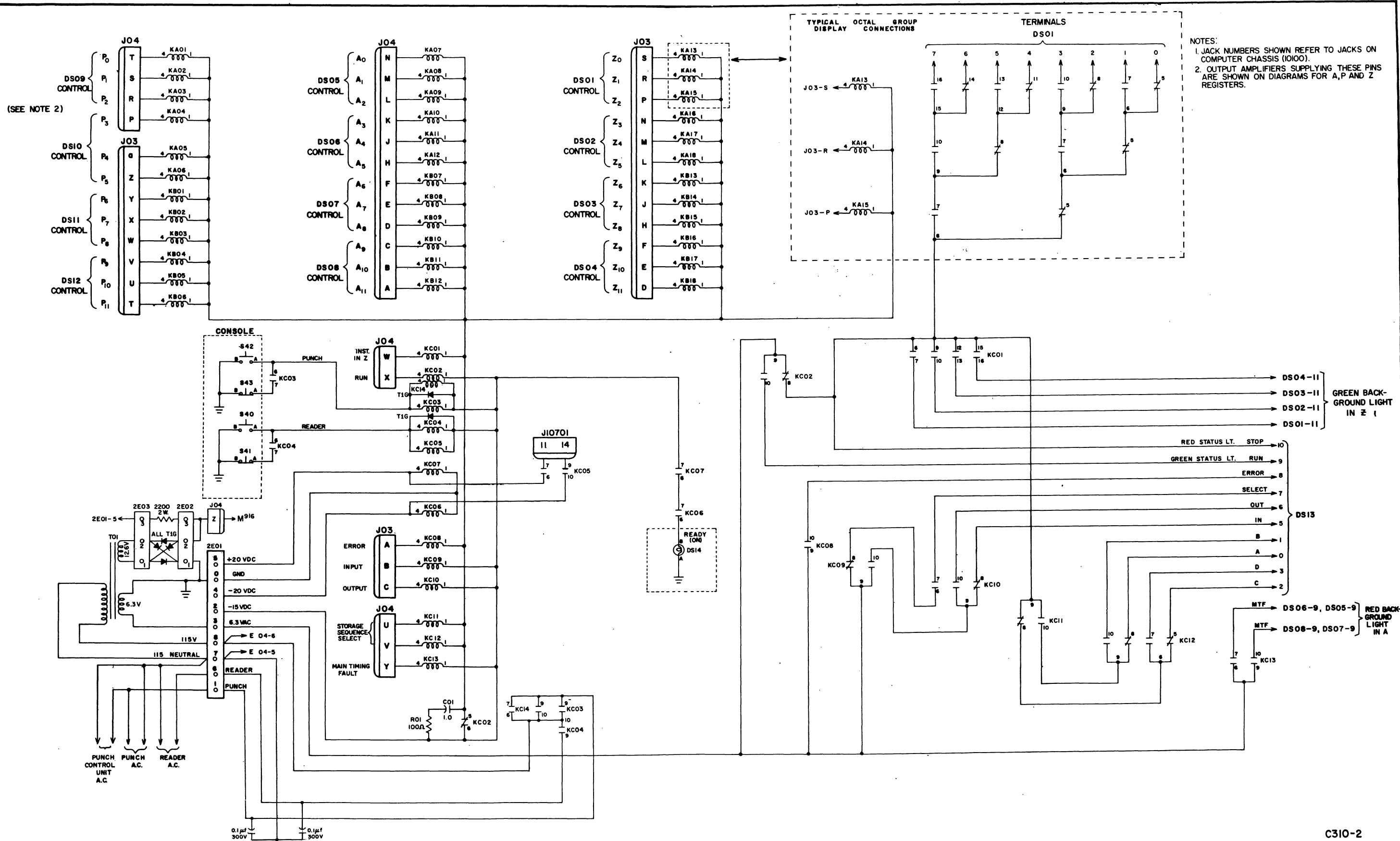
NOTES:  
COMPONENTS INDICATED BY DASHED LINES ARE LOCATED IN THE MAIN CABINET UNLESS OTHERWISE INDICATED.

C-310-2

CONSOLE (10200)

YD103245B

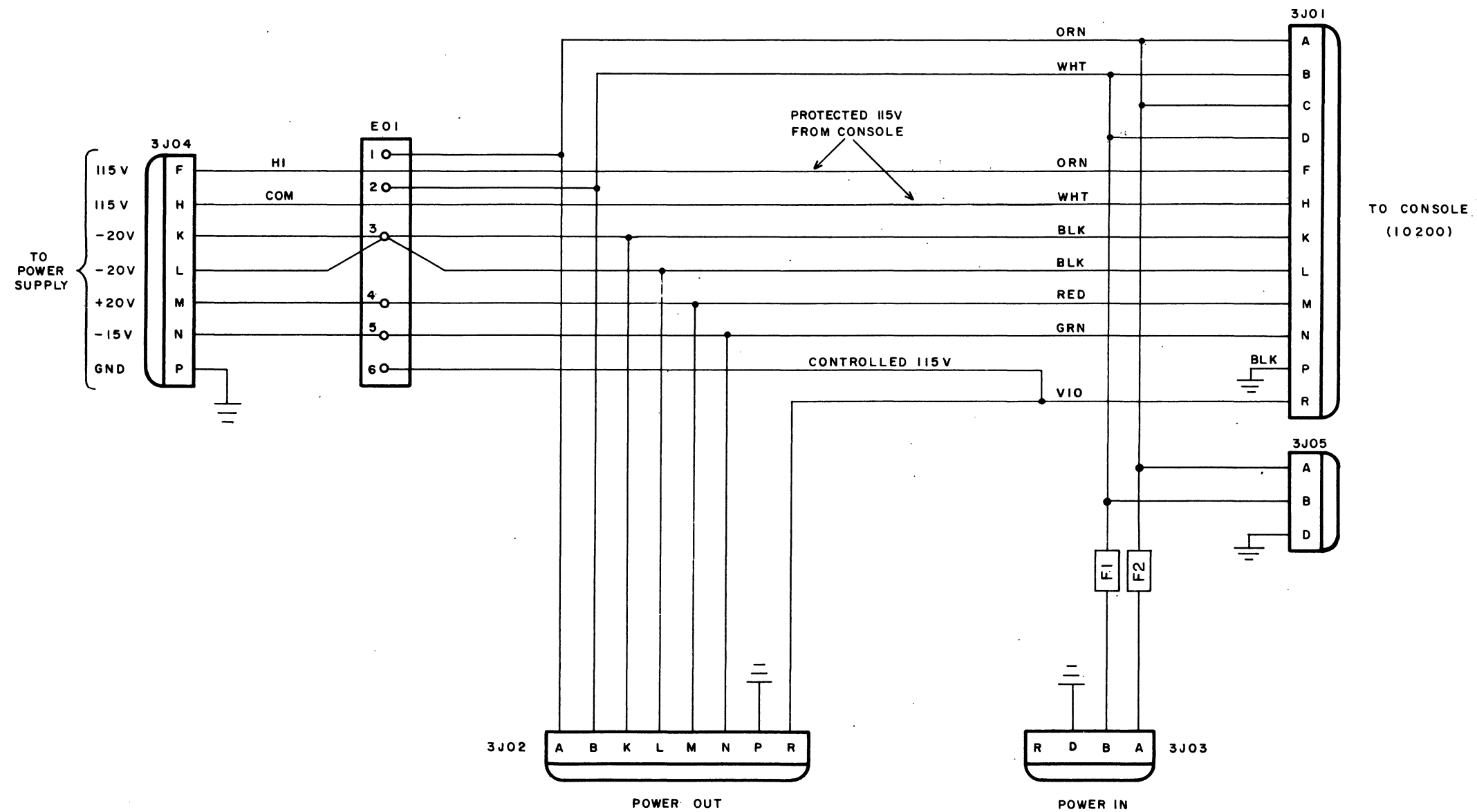
SERIAL 24 & UP 14



NOTES:  
 1. JACK NUMBERS SHOWN REFER TO JACKS ON COMPUTER CHASSIS (10100).  
 2. OUTPUT AMPLIFIERS SUPPLYING THESE PINS ARE SHOWN ON DIAGRAMS FOR A, P AND Z REGISTERS.

C310-2

RELAY CHASSIS (10200) YD103 246 B  
 ECO 26 15



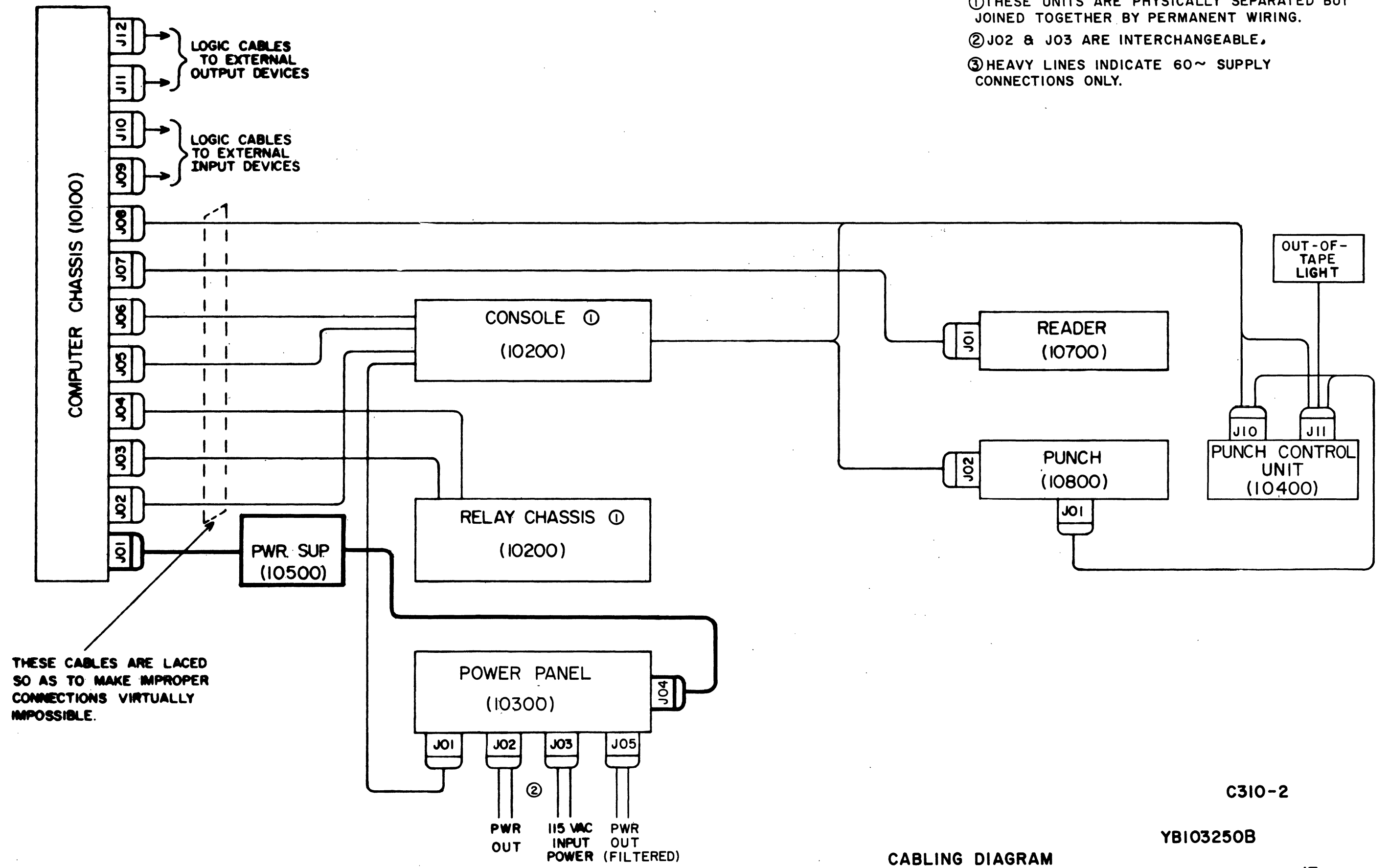
C310-2

YB103247A

60 CPS INTERCHANGE PANEL

NOTES

- ① THESE UNITS ARE PHYSICALLY SEPARATED BUT JOINED TOGETHER BY PERMANENT WIRING.
- ② J02 & J03 ARE INTERCHANGEABLE.
- ③ HEAVY LINES INDICATE 60~ SUPPLY CONNECTIONS ONLY.

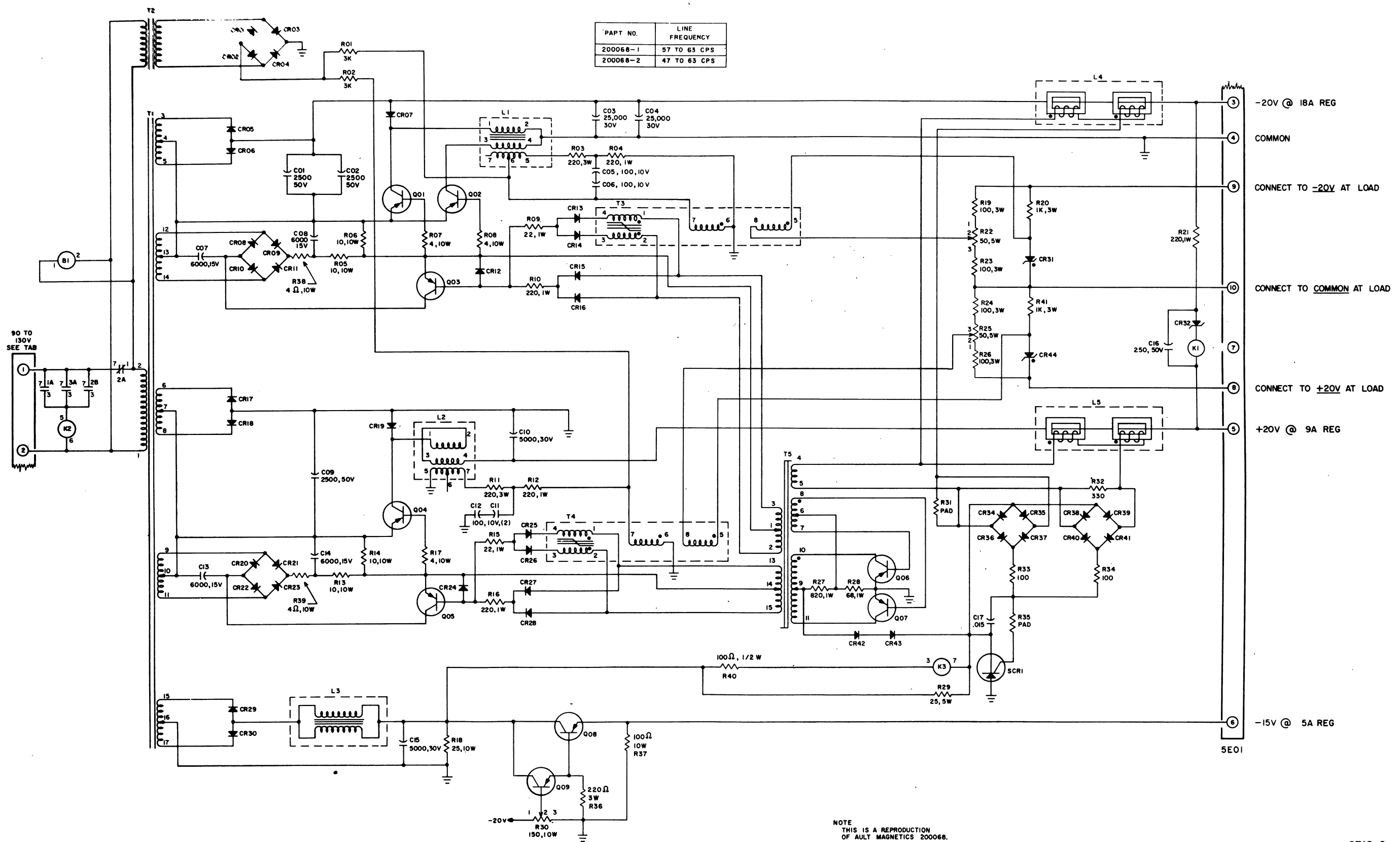


THESE CABLES ARE LACED SO AS TO MAKE IMPROPER CONNECTIONS VIRTUALLY IMPOSSIBLE.

CABLING DIAGRAM

C310-2  
YB103250B

PART NO.	LINE FREQUENCY
200068-1	57 TO 63 CPS
200068-2	47 TO 63 CPS

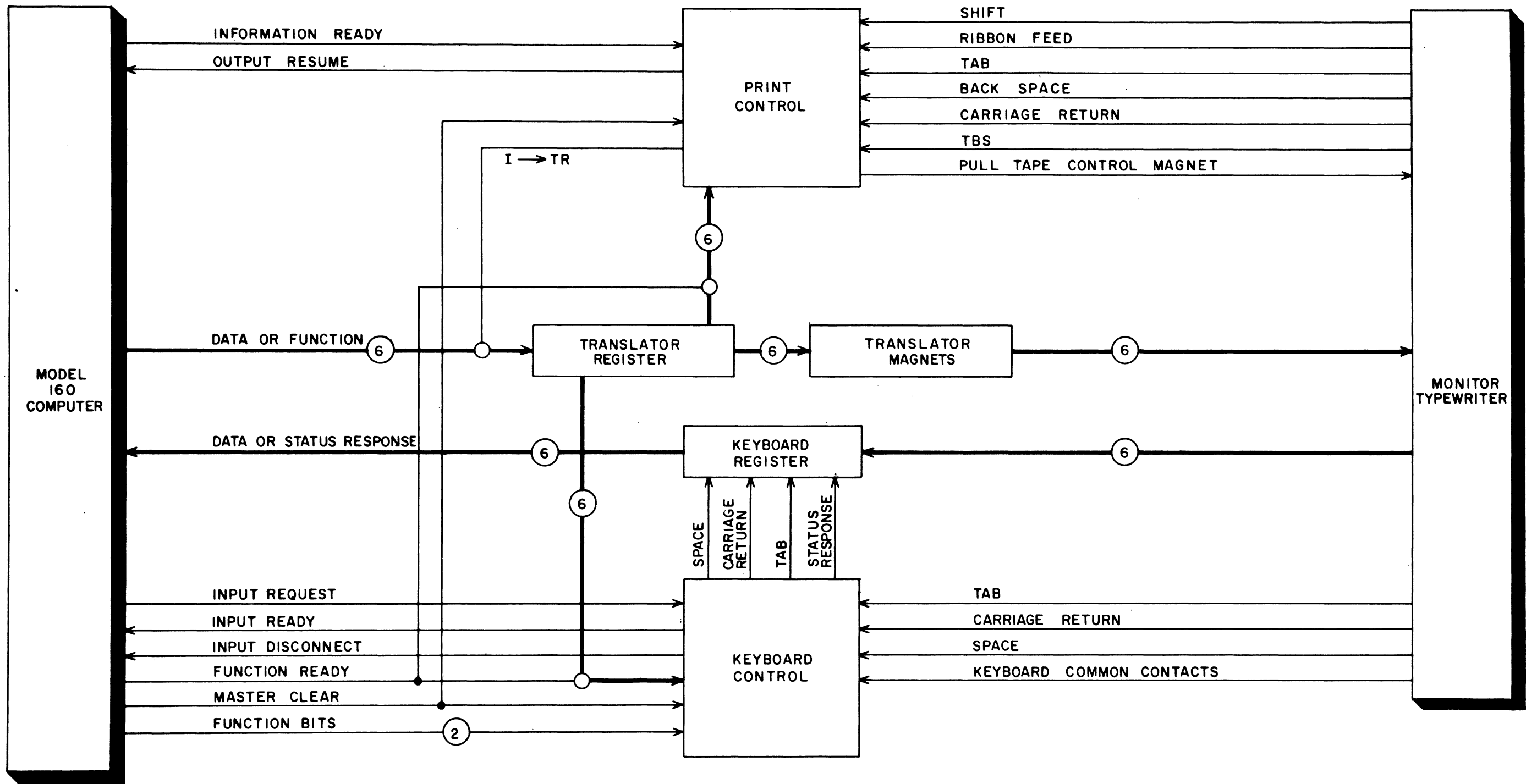


90 TO 130V  
SEE TAB

NOTE  
THIS IS A REPRODUCTION  
OF AULT MAGNETICS 200068.

60 CPS REGULATED  
POWER SUPPLY

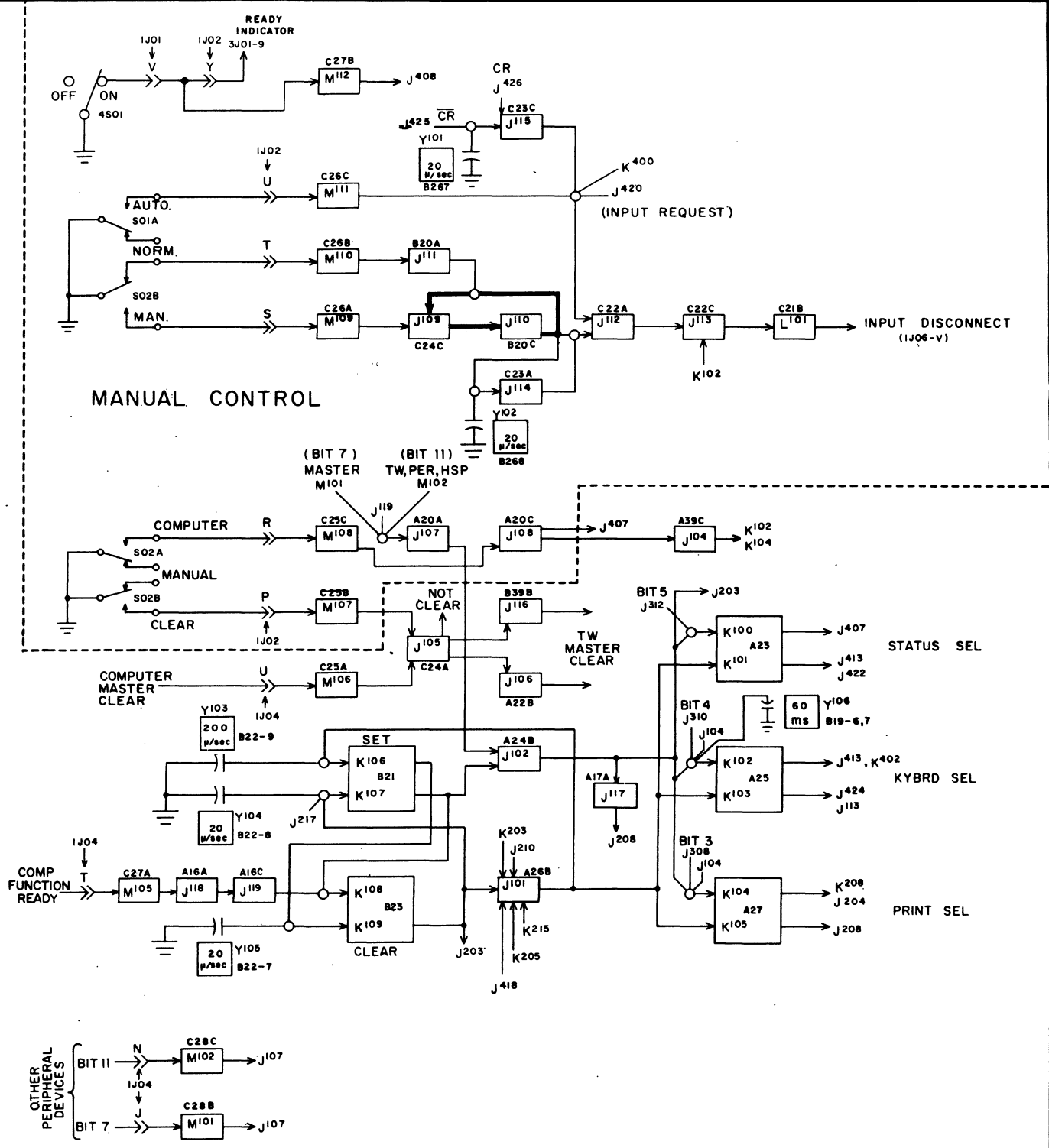
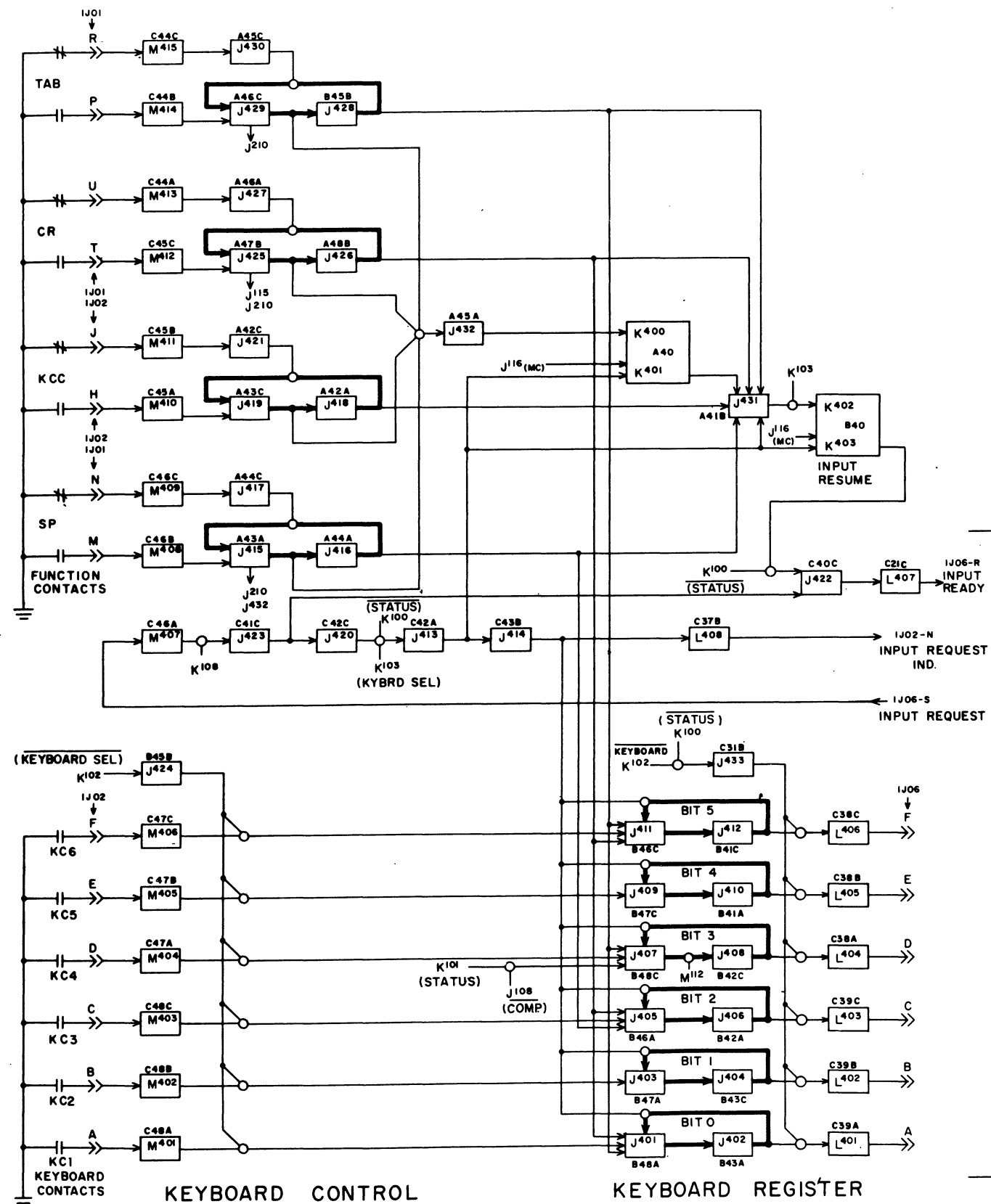
C310-2  
YD103251 C



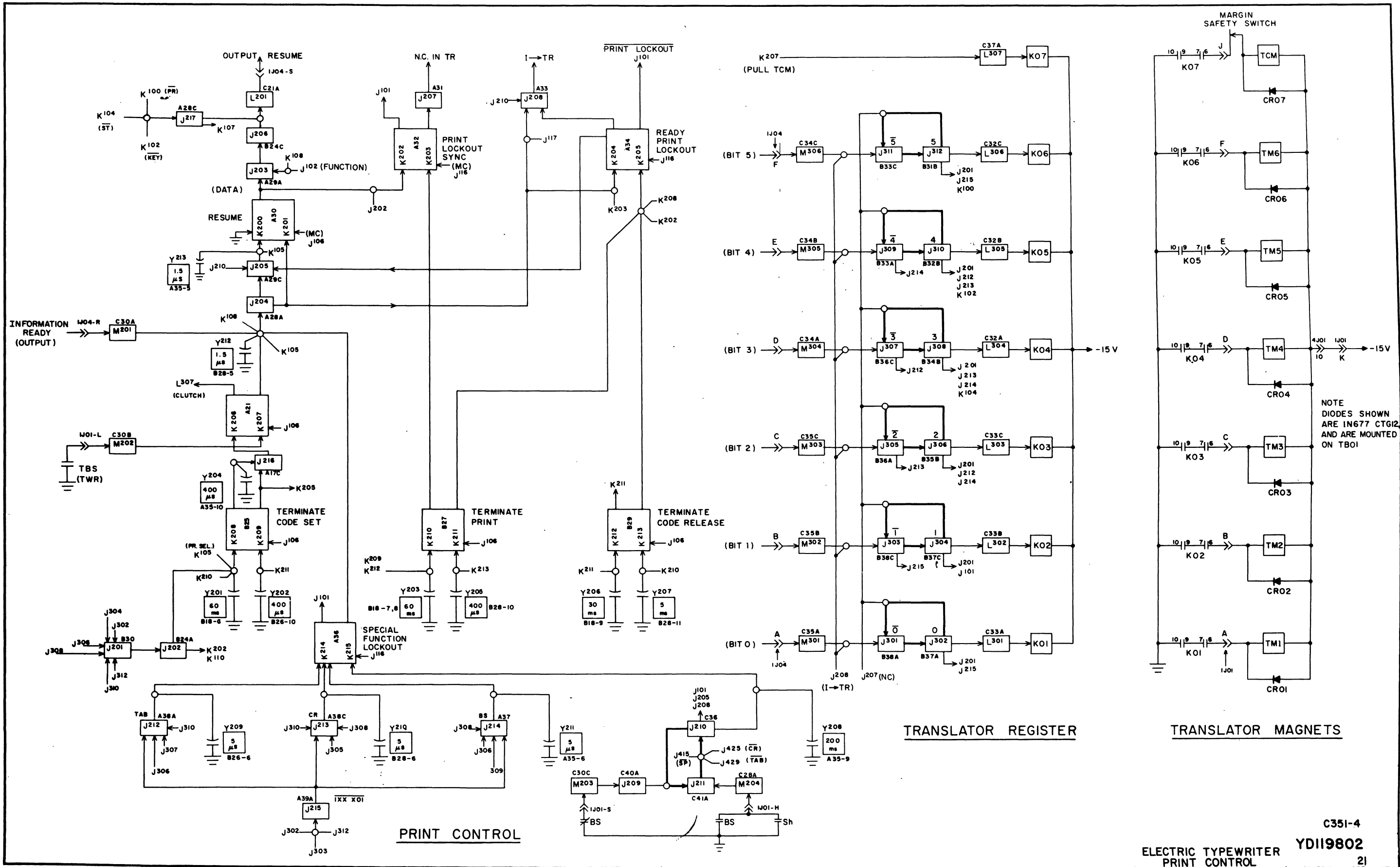
C351-4

YB119800

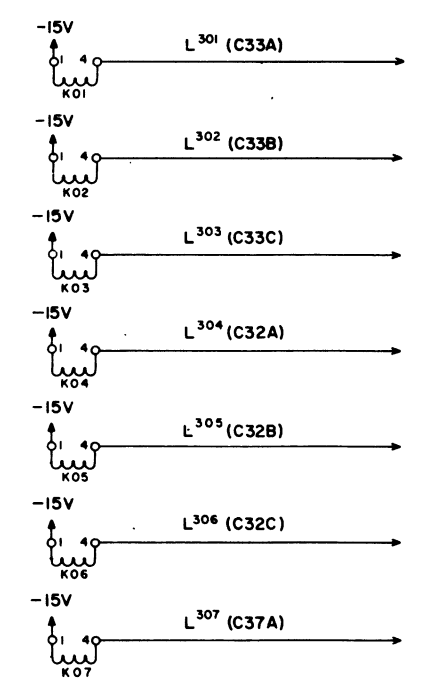
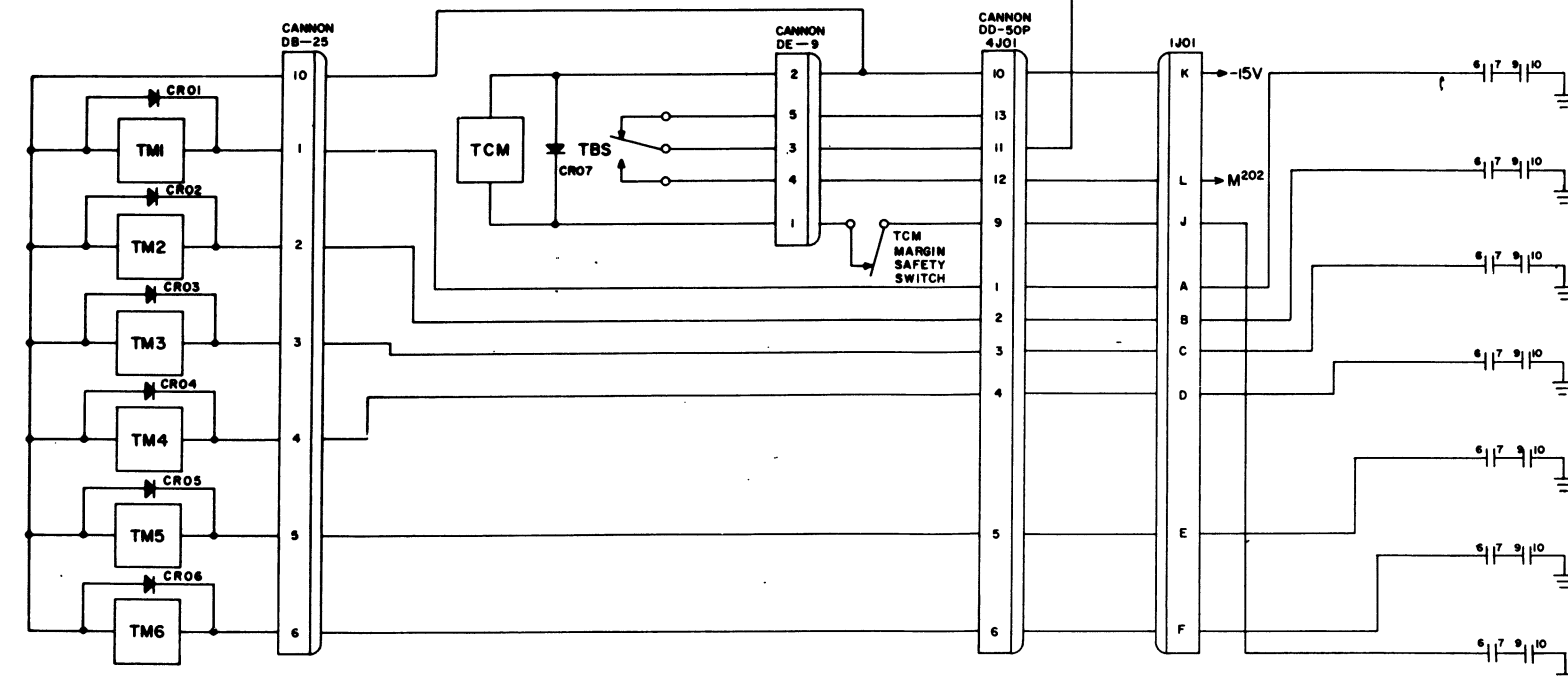
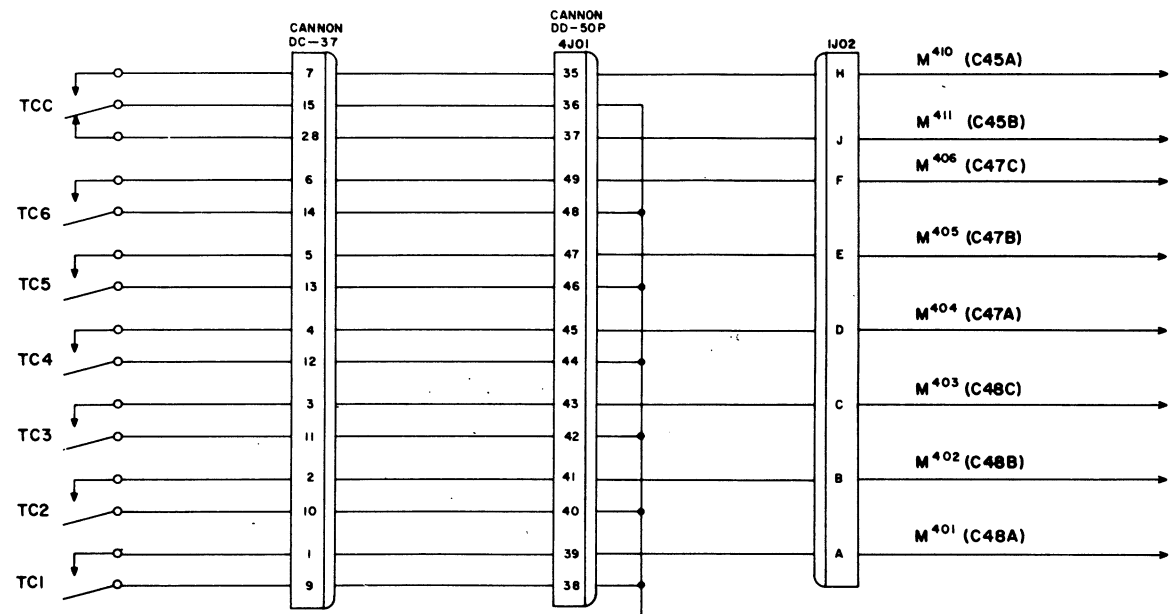
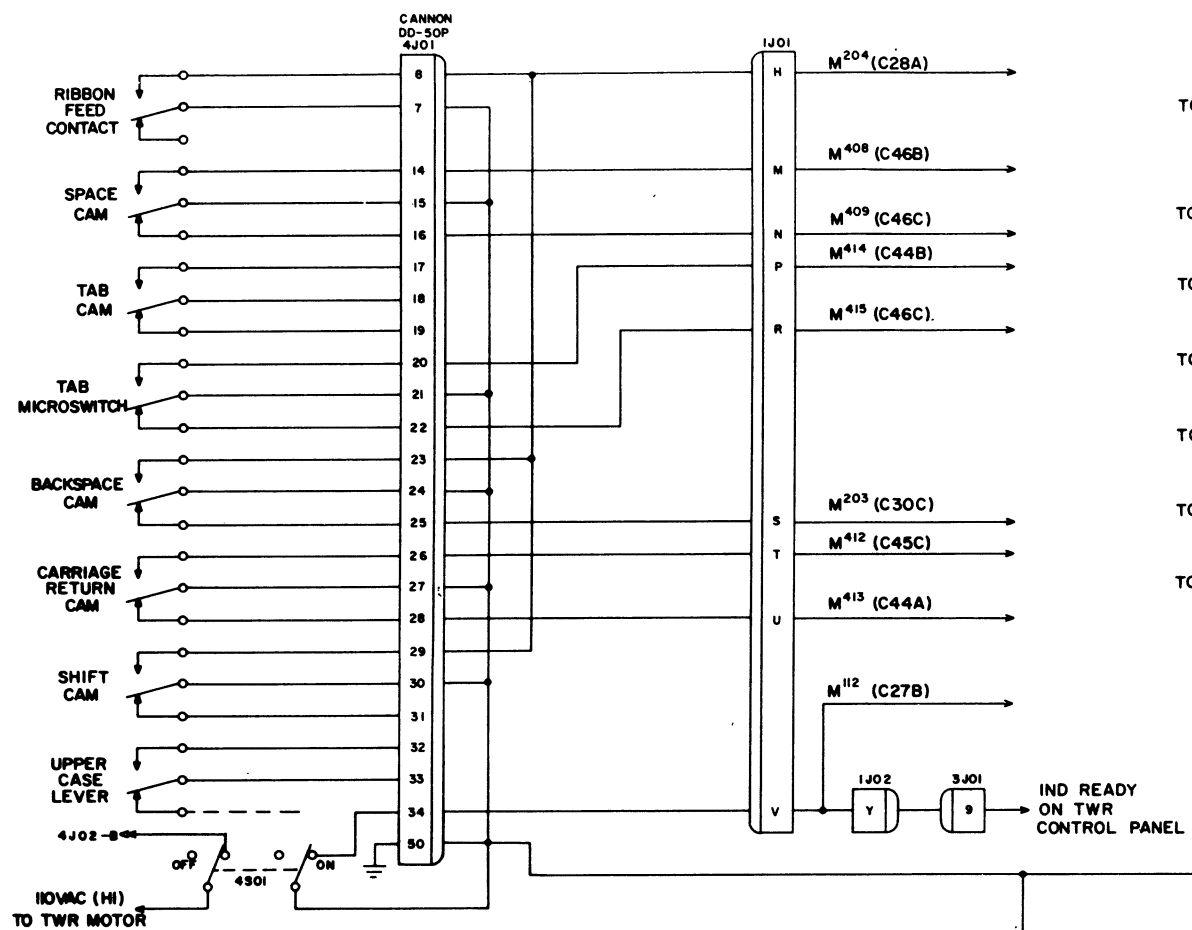
OVERALL LOGIC DIAGRAM



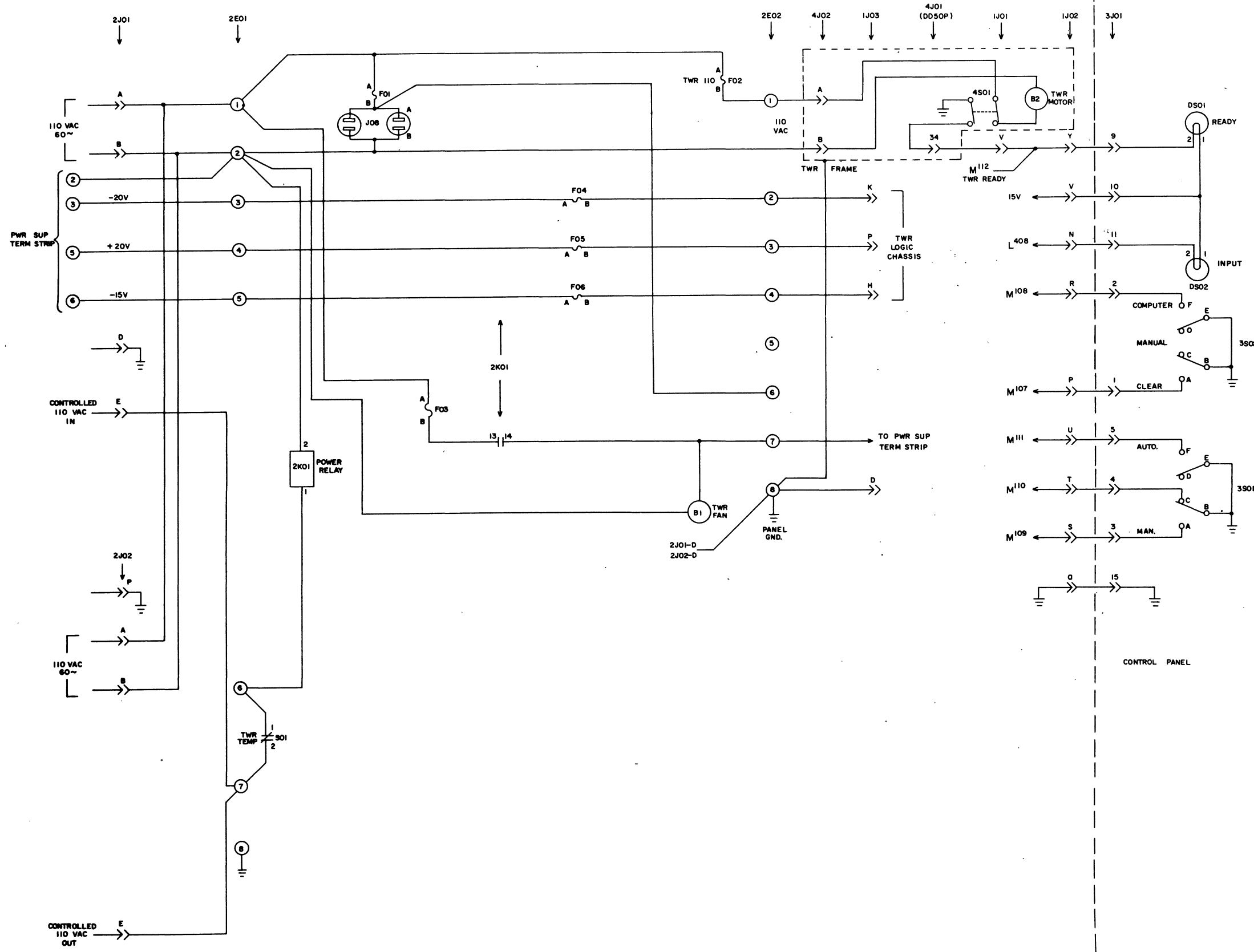




NOTE  
 DIODES SHOWN  
 ARE 1N677 CTG12  
 AND ARE MOUNTED  
 ON TBO1

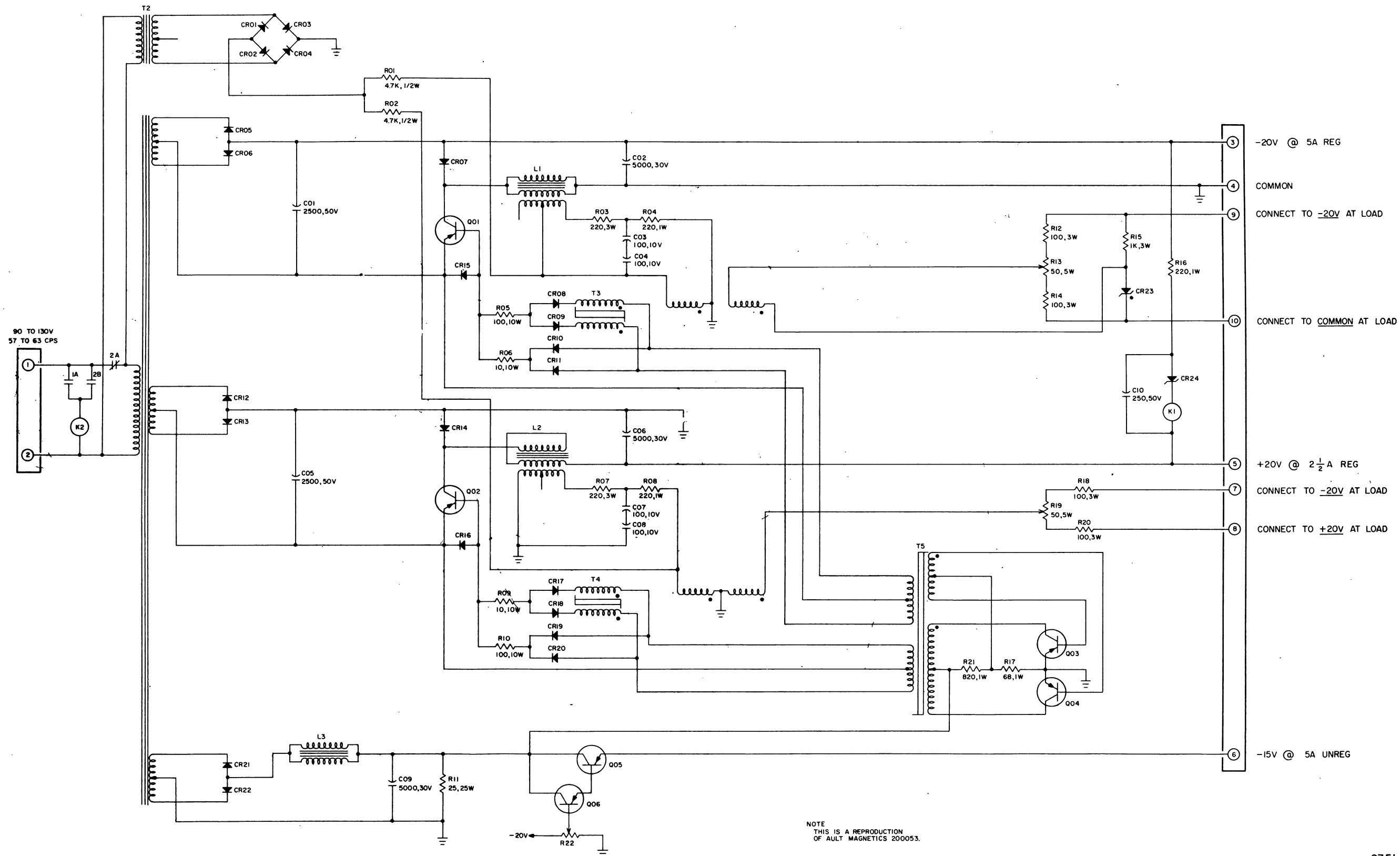


NOTES  
 1. ALL DIODES ARE TG-12 (IN677) POLARIZED + -  
 2. PORTIONS OF THIS DRAWING ARE TAKEN FROM SOROBAN ENGINEERING INC. DRAWING NO. C-1556.  
 3. NUMBERS IN PARENTHESES INDICATE JACK ASSIGNMENTS LOCATED ON 30100 CHASSIS.



**CONNECTOR KEY**

- 1J01 LOGIC } TWR LOGIC
  - 1J02 LOGIC } TWR LOGIC
  - 1J03 POWER } CHASSIS
  - 1J04 OUTPUT } CHASSIS
- 
- 2J01 } JUNCTION BOX POWER
  - 2J02 } JUNCTION BOX POWER
  - 2E01 } JUNCTION BOX TERMINAL STRIPS
  - 2E02 } JUNCTION BOX TERMINAL STRIPS
  - 3J01 CONTROL PANEL CONNECTOR
  - 4J01 } TWR CHASSIS
  - 4J02 } TWR CHASSIS



- ③ -20V @ 5A REG
- ④ COMMON
- ⑨ CONNECT TO -20V AT LOAD
- ⑩ CONNECT TO COMMON AT LOAD
- ⑤ +20V @ 2 1/2 A REG
- ⑦ CONNECT TO -20V AT LOAD
- ⑧ CONNECT TO +20V AT LOAD
- ⑥ -15V @ 5A UNREG

NOTE  
THIS IS A REPRODUCTION  
OF AULT MAGNETICS 200053.

**COMMENT SHEET**

MANUAL TITLE N. C. R. COMPUTER VOL. III DIAGRAMS

Customer Engineering Manual

PUBLICATION NO. 60010200 REVISION \_\_\_\_\_

FROM: NAME: \_\_\_\_\_

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**PLANT TWO**



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