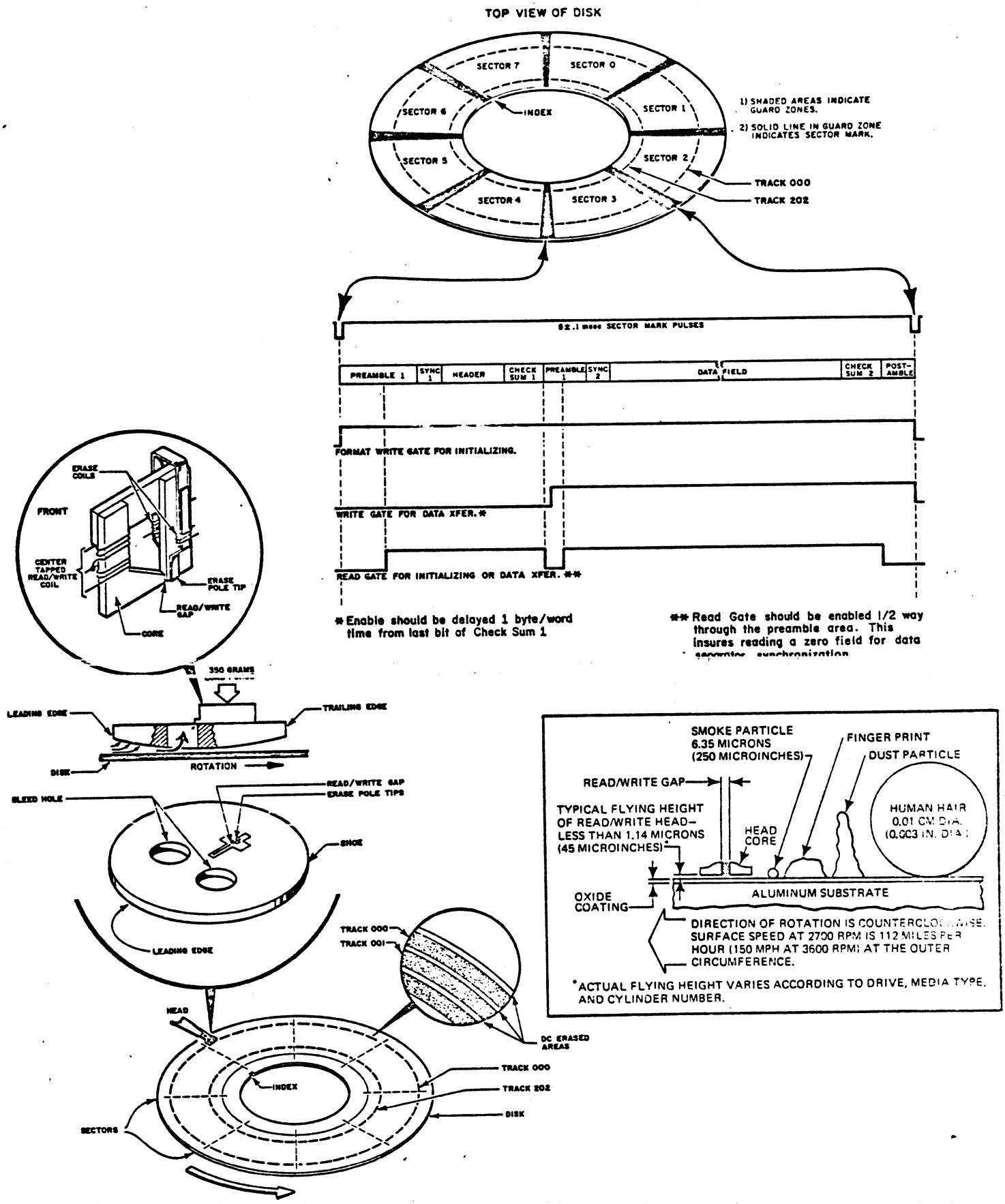


TYPICAL TRACK – SECTOR FORMAT

DISK AND CONTROLLER

The disk controller is designed to accommodate one of a variety of DIABLO dis[illegible]es, including models 31 and 44. Each [illegible]as two heads, one per side. Information is recorded on each disk in a 12-sector [illegible]t on each of up to 406 (depending on the disk model) radial track positions. T[illegible]ach disk contains up to 9744 recording positions (2 heads X 12 sectors X 406 trac[illegible]tions). Figure 1 tabulates various useful information about the performance of the di[illegible]ves.

DEVICE	DIABLO 31	DIABLO 44	
Number of drives/Alto	1 or 2	1	
Number of packs	1 removable	1 removable 1 fixed	
Number of cylinders	203	406	
Tracks/cylinder/pack	2	2	
Sectors per track	12	12	
Words per sector	2 header 8 label 256 data	2 header 8 label 256 data	
Data words/track	3072	3072	
Sectors/pack	4872	9744	
Rotation time	40	25	ms
Seek time (approx.)	15 + 8.6*sqrt(dt)	8 + 3*sqrt(dt)	ms*
min-avg-max	15-70-135	8-30-68	ms
Average access to 1 megabyte	80	32 (using both packs	ms
Transfer rate:			
peak/avg	1.6/1.22	2.5/1.9	Mb/s
peak/avg	10.2/13	6.7/8	µs/word
per sector	3.3	2.1	sec
for full display	.460	.266	sec
for 64K memory	1.03	.6	sec
whole drive	19.3	44 (both packs)	sec

*The notation dt stands for the number of tracks traveled during the seek.

FIGURE 1

The disk controller records three independent data blocks in each sector. The first is two words long, and is intended to include the address of the sector. This block is called the Header block. The second block is eight words long, and is called the Label block. The third block is 256 words long, and is the Data block. Each block may be independently read, written, or checked, except that writing, once begun, must continue until the end of the sector.

When a block is checked, information on the disk is compared word for word with a specified block of main memory. During checking, a main memory word containing 0 has special significance. When this word is encountered, the matching word read from the disk is stored in its place and does not take part in the check. This feature permits a combination of reading and checking to occur in the same block. (It also has the drawback of making it impossible to use the disk controller to check for words containing 0 on the disk).

The Alto program communicates with the disk controller via a four-word block of main memory. The first word is interpreted as a pointer to a chain of disk command blocks. If it contains 0, the disk controller will remain idle. Otherwise, the disk controller will commence execution of the command contained in the first disk command block. When a command is completed successfully, the disk controller stores a pointer to the next command in the chain and the cycle repeats. If a command terminates in error, a 0 is immediately stored and the disk controller idles. At the beginning of each sector, status information, including the number of the current sector, is stored. This can be used by the Alto program to sense the readiness of the disk and to schedule disk transfers, for example. When the disk controller begins executing a command, it stores the disk address of that command. This information is later used by the disk controller to decide whether seek operations or disk switches are necessary. It can be used by the Alto program for scheduling disk arm motion. If the Alto program stores an illegal disk address (like -1) in this word, the disk controller will perform a seek at the beginning of the next disk operation. (This is useful, for example, when a disk driver wants to force a restore operation). The disk controller also communicates with the Alto program by interrupts.

A disk command block is a ten-word block of memory which describes a disk transfer operation to the disk controller, and which is also used by the controller to record the status of that operation. The first word is a pointer to the next disk command block in this chain. A 0 means that this is the last disk command block in the chain. When the command is complete, the disk controller stores its status in the second word. The third word contains the command itself, telling the disk controller what to do. The fourth word contains a pointer to the block of memory from/to which the header block will be transferred. The fifth word contains a similar pointer for the label block. The sixth word contains a similar pointer for the data block.

The seventh and eighth words of the disk command block control the initiation of interrupts when the command block is finished.

The ninth word is unused by the disk controller, and may be used by the Alto program to facilitate chained disk operations. The tenth word contains the disk address at which the current operation is to take place.

DCB: Pointer to next command block.
DCB+1: Status.
DCB+2: Command.
DCB+3: Header block pointer.
DCB+4: Label block pointer.
DCB+5: Data pointer.
DCB+6: Command complete no-error interrupt bit mask.
DCB+7: Command complete error interrupt bit mask.
DCB+8: Currently unused.
DCB+9: Disk address.

A disk address word A contains the following fields:

FIELD	RANGE	SIGNIFICANCE
A[0-3]	0-13B	Sector number.
A[4-12]	0-625B (Model 44) 0-312B (Model 31)	Cylinder number.
A[13]	0-1	Head number.

FIELD	RANGE	SIGNIFICANCE
A[14]	0-1	Disk number (see also C[15]). 0 is removable pack on Model 44. 1 is optional second Model 31 drive.
A[15]	0-1	0 normally. 1 if cylinder 0 is to be addressed via a hardware "restore" operation.

A disk command word C contains the following fields:

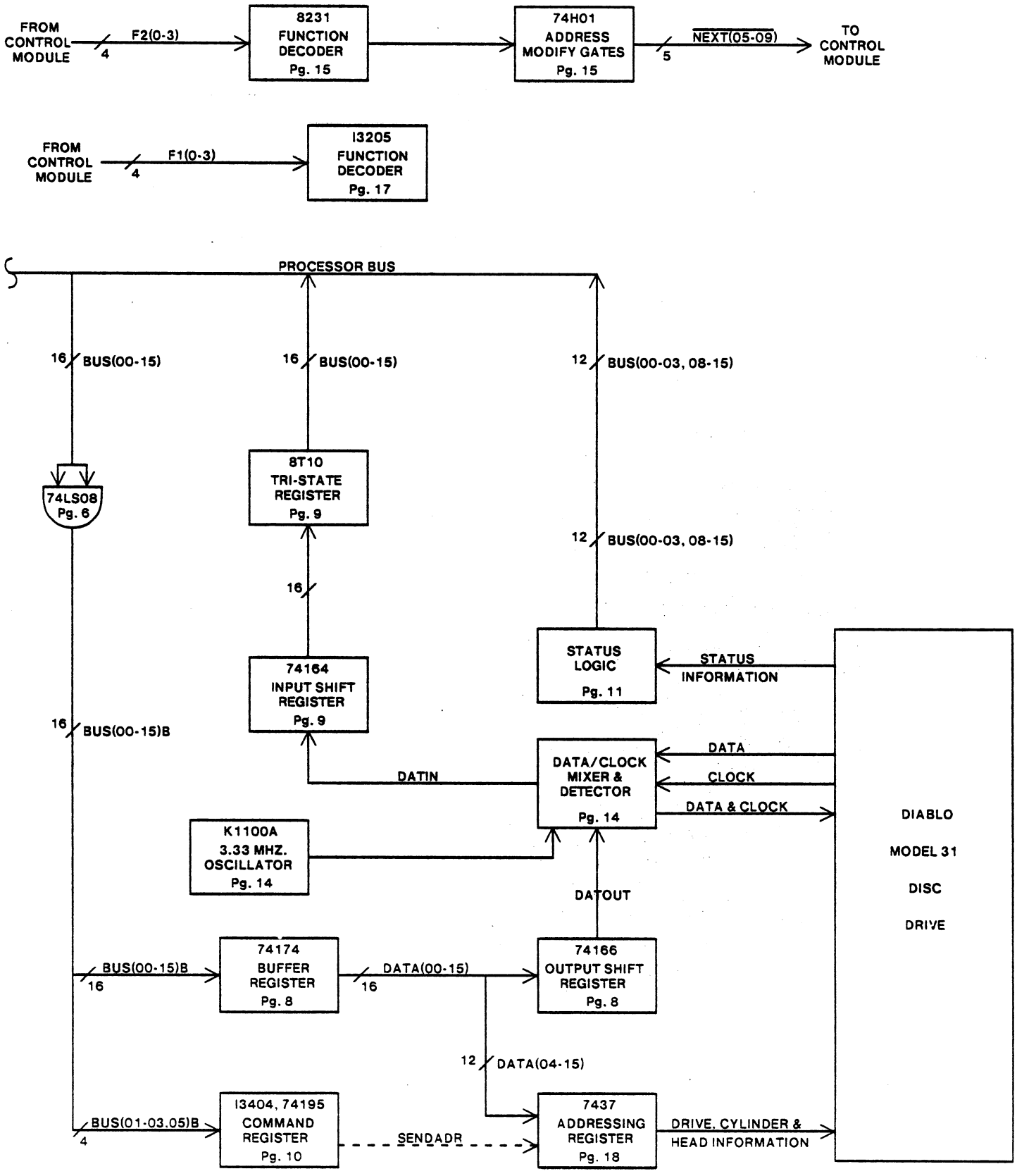
FIELD	RANGE	SIGNIFICANCE
C[0-7]	110B	Checked to verify that this is a valid disk command.
C[8-9]	0-3	0 if Header block to be read. 1 if Header block to be checked. 2 or 3 if Header block to be written.
C[10-11]	0-3	0 if Label block to be read. 1 if Label block to be checked. 2 or 3 if Label block to be written.
C[12-13]	0-3	0 if Data block to be read. 1 if Data block to be checked. 2 or 3 if Data block to be written.
C[14]	0-1	0 normally. 1 if the command is to terminate immediately after the correct cylinder position is reached (before any data is transferred).
C[15]	0-1	XOR'ed with A[14] to yield hardware disk number.

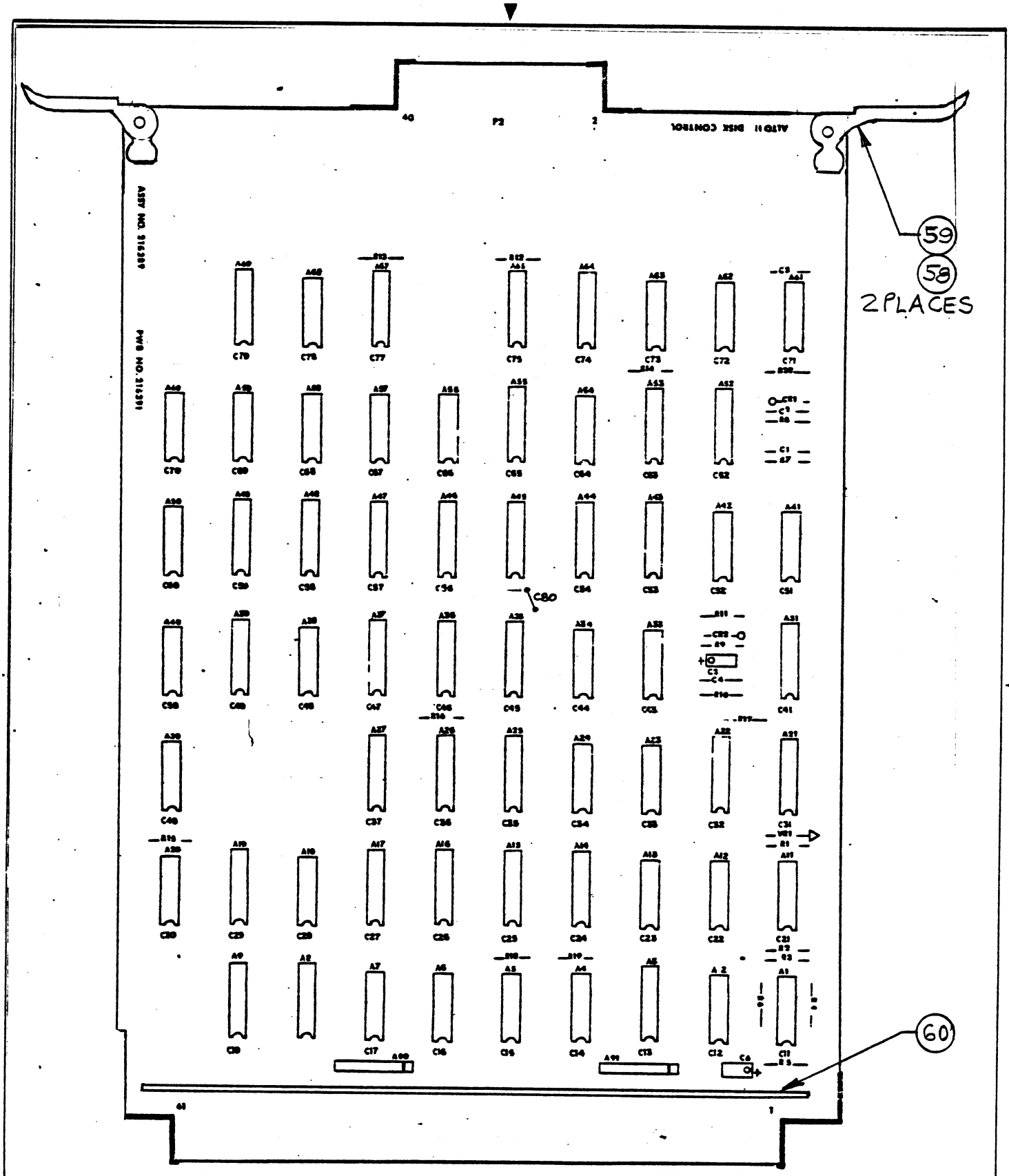
A disk status word S has the following fields:

FIELD	VALUES	SIGNIFICANCE
S[0-3]	0-13B	Current sector number.
S[4-7]	17B	One can tell whether status has been stored by setting this field initially to 0 and then checking for non-zero.
S[8]	0-1	1 means seek failed, possibly due to illegal cylinder address.
S[9]	0-1	1 means seek in progress.
S[10]	0-1	1 means disk unit not ready.

FIELD	VALUES	SIGNIFICANCE
S[11]	0-1	1 means data for sector processing was late during the last sector. Data and current sector number unreliable.
S[12]	0-1	1 means disk interface was not transferring data last sector.
S[13]	0-1	1 means checksum error. Command allowed to proceed.
S[14-15]	0-3	0 means command completed correctly. 1 means hardware error (see S[8-11]) or sector overflow. 2 means check error. Command terminated instantly. 3 means disk command specified illegal sector.

DISK CONTROL MODULE





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Material List

ML	Drawing No. 216389	Rev. J

Rev. J

Drawing No. 216389

ML

Drawing Title
ALTO II

ASSEMBLY, PRINTED WIRING-
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Model No.	Date	Sheet
ALTO II	6/14/76	4 Of

Item No.	Drawing Title	Drawing No.	No. Req.	Remarks
1	BOARD, PRINTED WIRING	216391	1	
2	SPEC, TEST	216390	REF	
3	SPEC, MODULE ASSEMBLY	216207	REF	
4	MICROCIRCUIT, MPQ3303		1	A1
5	74H04		3	A2, 56, 59
6	3205		1	A3
7	74LS08		4	A4, 5, 6, 7
8	74H00		1	A11
9	74S04		1	A12
10	74164		2	A13, 18
11	8T10		6	A14, 15, 16, 17, 46, 47
12	74166		2	A19, 39
13	7437		5	A20, 30, 40, 58, 68
14	74109		8	A21, 22, 43, 44, 45, 53,
				55, 67
15	74S32		2	A23, 57
16	7438		2	A24, 34
17	74174		3	A25, 26, 27
18	74123		2	A31, 52
19	7400		2	A33, 63
20	I3404		1	A35
21	74195		2	A36, 37
22	74H08		2	A38, 42
23	74H11		1	A41
24	8231		2	A48, 49
25	74H01		2	A50, 60
26	74S02		1	A54
27	7414		1	A61
28	74H106		1	A64
29	74153		1	A65
30	MICROCIRCUIT, 74161		1	A69
31	OSCILLATOR, K1100A 3.33 MH		1	A62
32				

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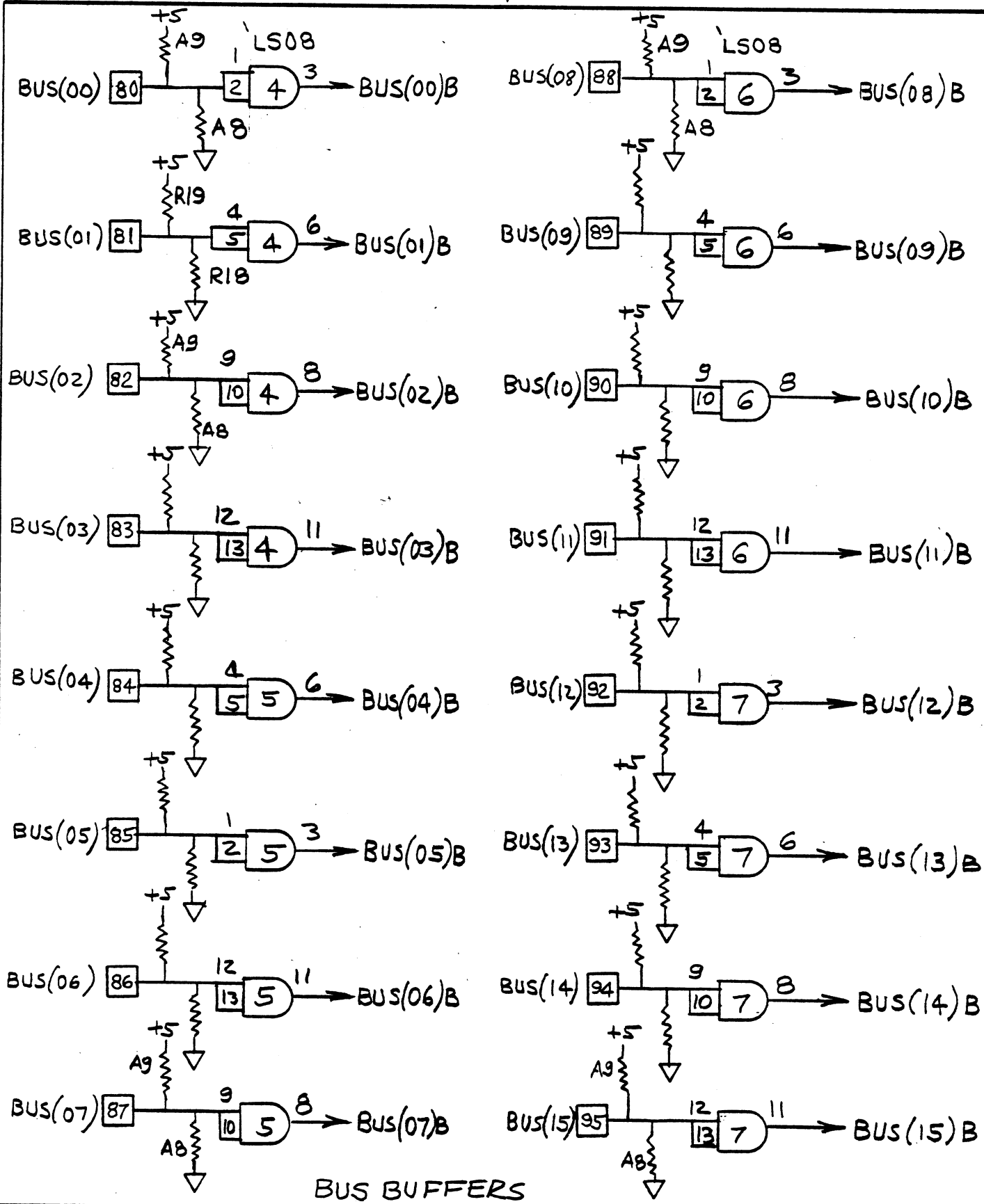
Model No. ALTO II | Date 6/14/76 | Sheet 5 Of

Item No.	Drawing Title	Drawing No.	No. Req.	Remarks
33	RESISTOR, NETWORK, DIP, 270Ω (AB#316A271)		1	A9
34	RESISTOR, NETWORK, DIP, 560Ω(AB#316A561)		1	A8
35	RESISTOR, NETWORK, 470Ω, (CTS #750-81-R470)		2	A90, 91
36	RESISTOR, FILM, 39Ω ±5%, 1/4W	116447-390	2	R1, R2
37	200 Ω ±5%, 1/4W	116447-201	5	R3, 4, 5, 6, 12
38	24K ±5%, 1/4W	116447-243	2	R7, 8
39	15K ±5%, 1/4W	116447-153	1	R9
40	30K ±5%, 1/4W	116447-303	1	R10
41	330 Ω ±5%, 1/4W	116447-331	2	R11, R20
42	560 Ω ±5%, 1/4W	116447-561	1	R18
43	270 Ω ±5%, 1/4W	116447-271	1	R19
44	RESISTOR, FILM, 1K ±5%, 1/4W	116447-102	5	R13, 14, 15, 16, 17
45				
46	DIODE, IN4148		2	CR1, CR2
47	DIODE, ZENER, IN5227		1	VR1
48				
49	CAPACITOR, 150PF NYTRONICS DC151		1	C1
50	CAPACITOR, .01μF		2	C2, C4
51	CAPACITOR, .47μF ±20%, 50V	114491-474	1	C3
52	CAPACITOR, 270PF NYTRONICS DC 271		1	C5
53	CAPACITOR, TANT., 22μF ±20%, 15V	114491-226	1	C6
54	CAPACITOR, .05μF, 10V CENTRALAB#UK10-503		61	C11-17, 19, 21-37, 40, 41, 43-54, 56-60, 62-75, 77-79
55	CAPACITOR, .022 μF, 16V #DC222		1	C80
56	SOCKET, MICROCIRCUIT		31	AUGAT#514-AG10D
57	SOCKET, MICROCIRCUIT		32	AUGAT#516-AG10D
58	RIVET	156111-005	2	
59	EXTRACTOR	216250	2	
60	STIFFENER	216242	1	



BUS BUFFERS

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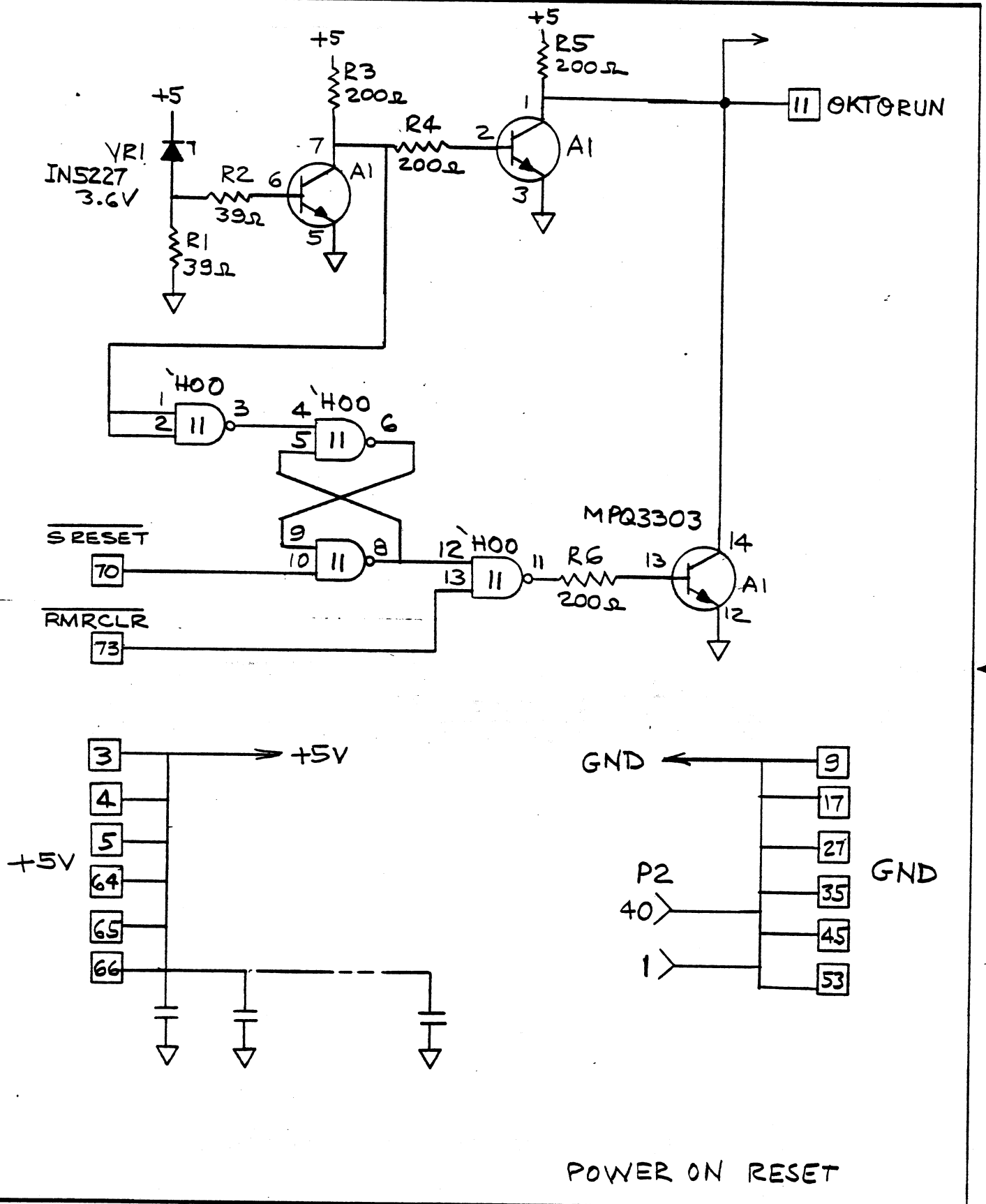

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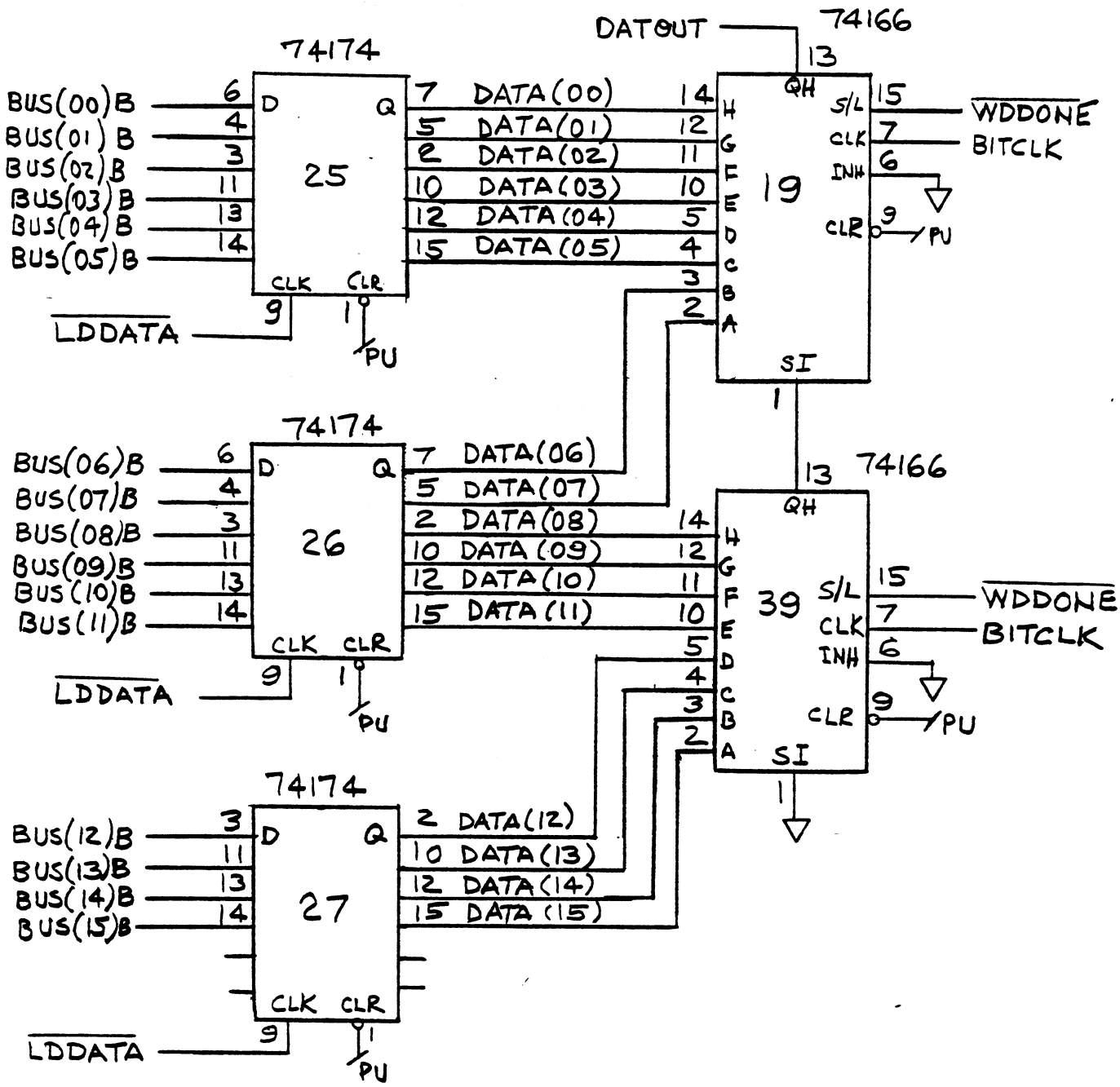

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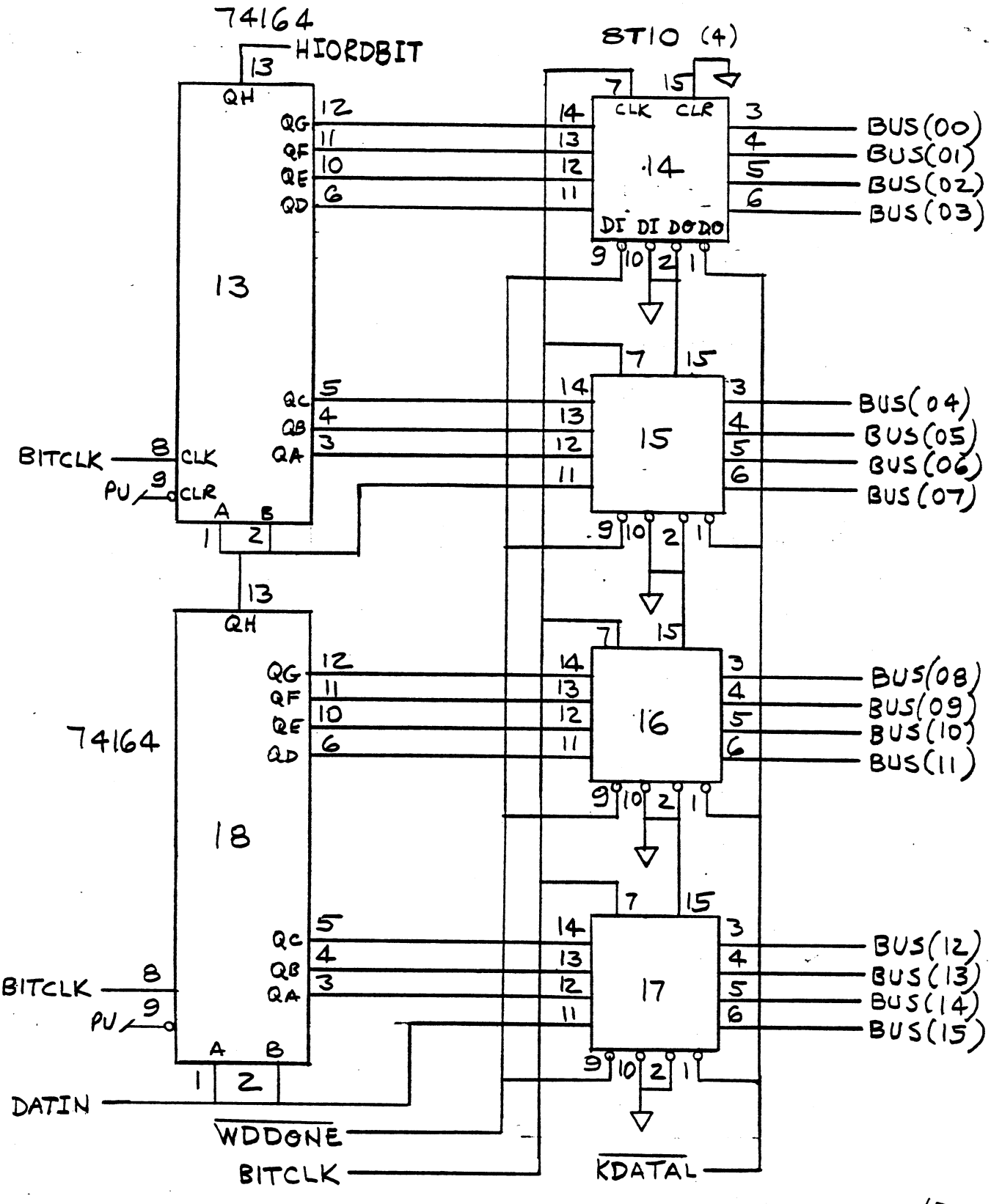

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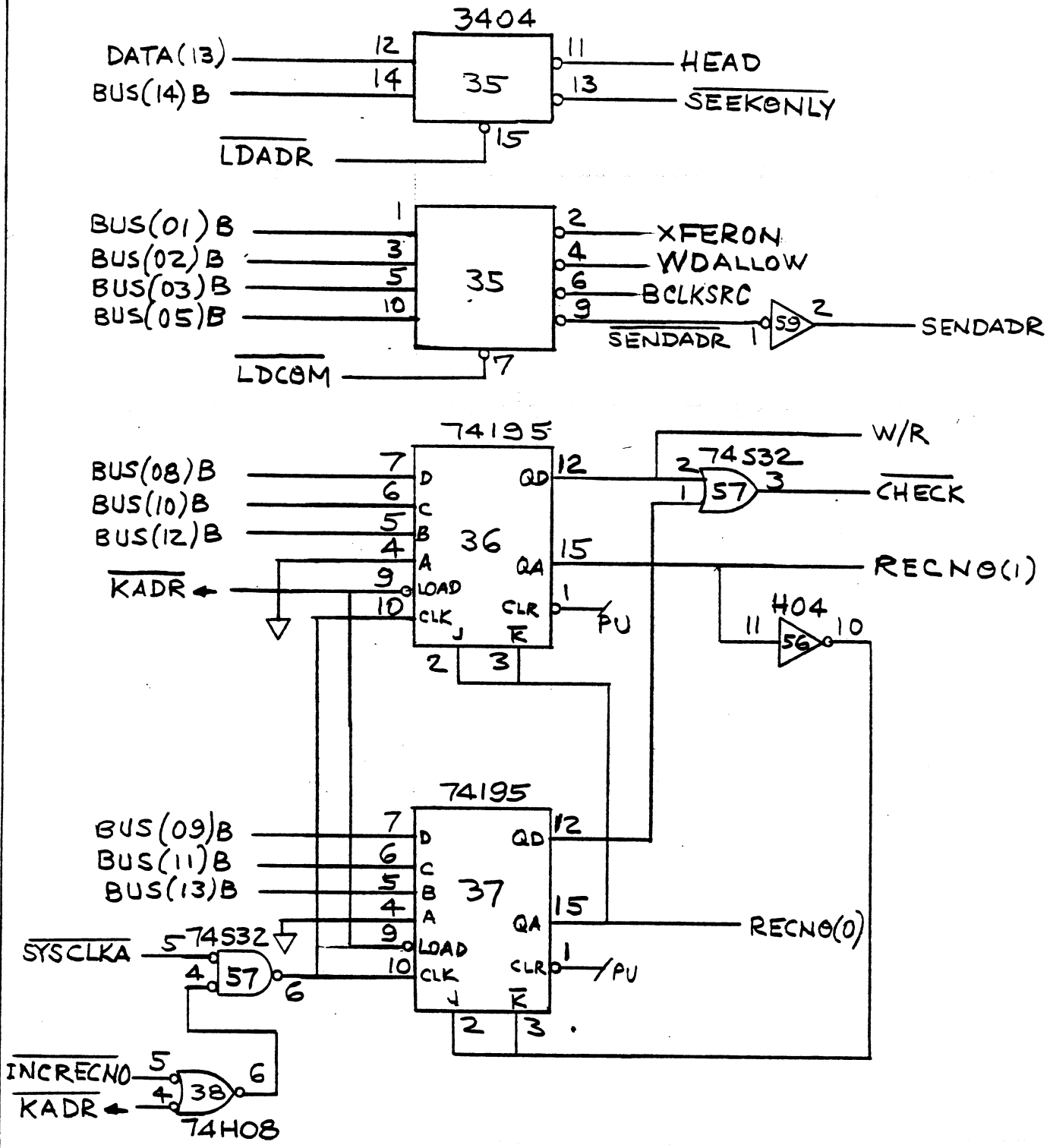

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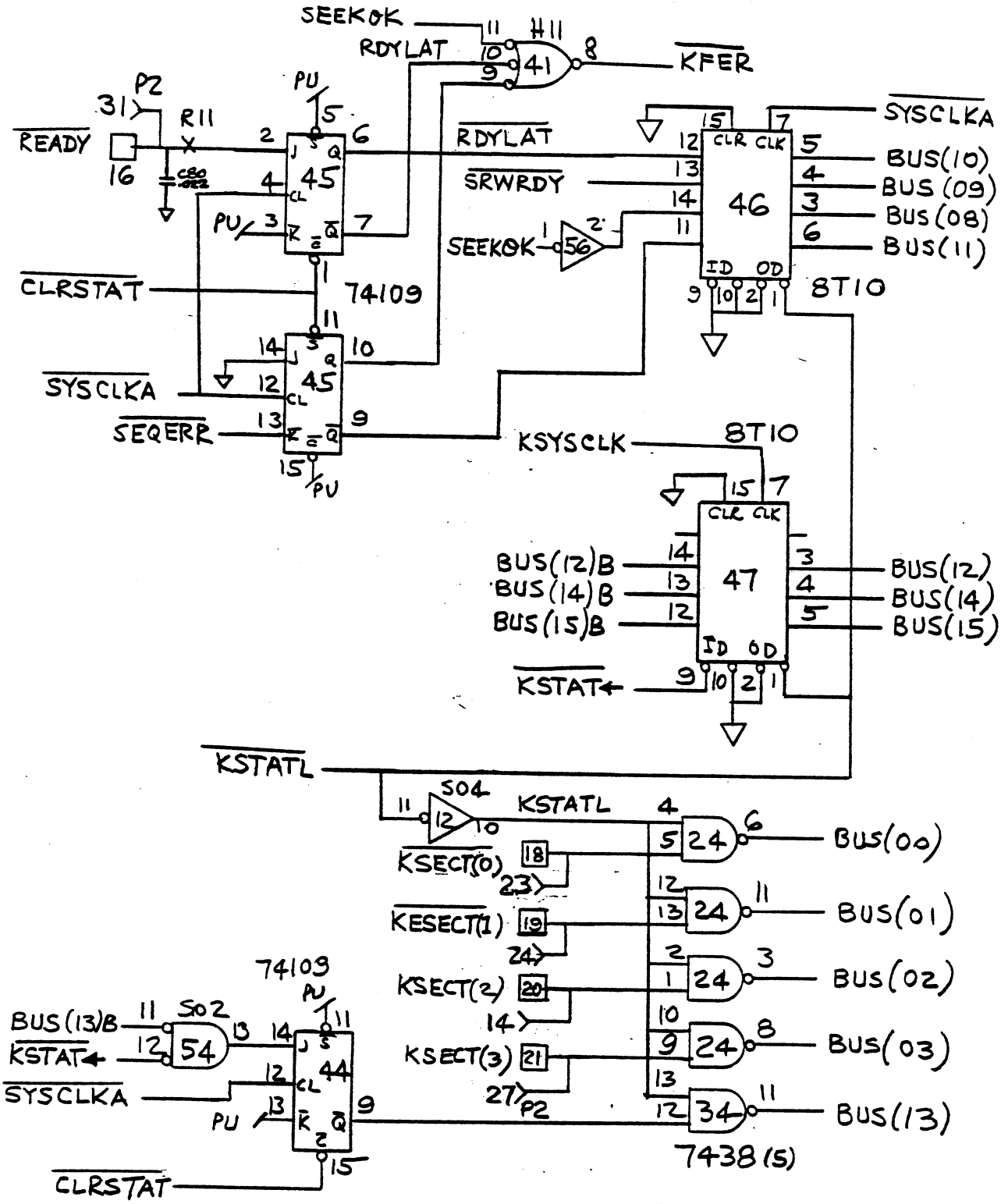

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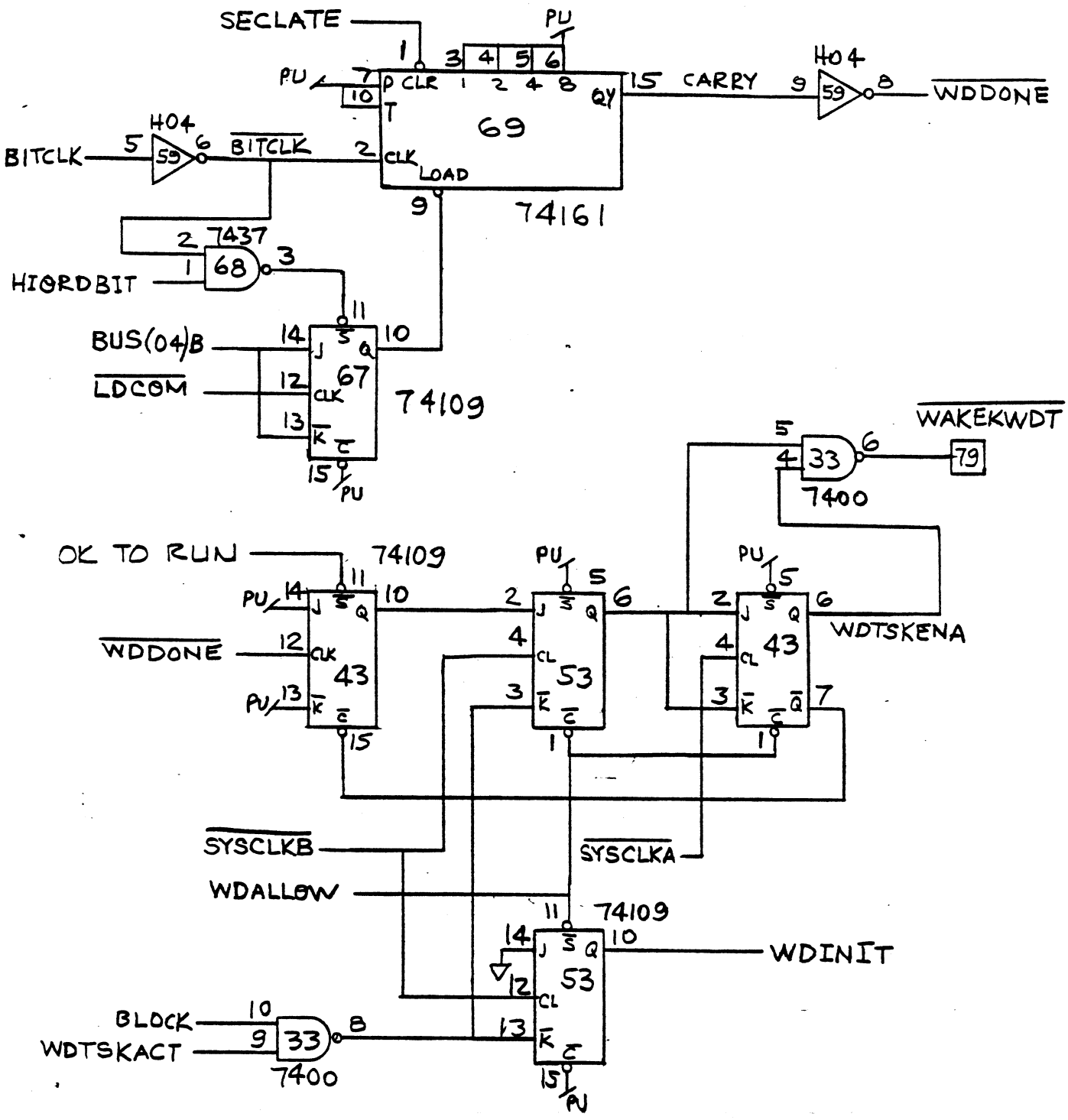

WORD TIMING

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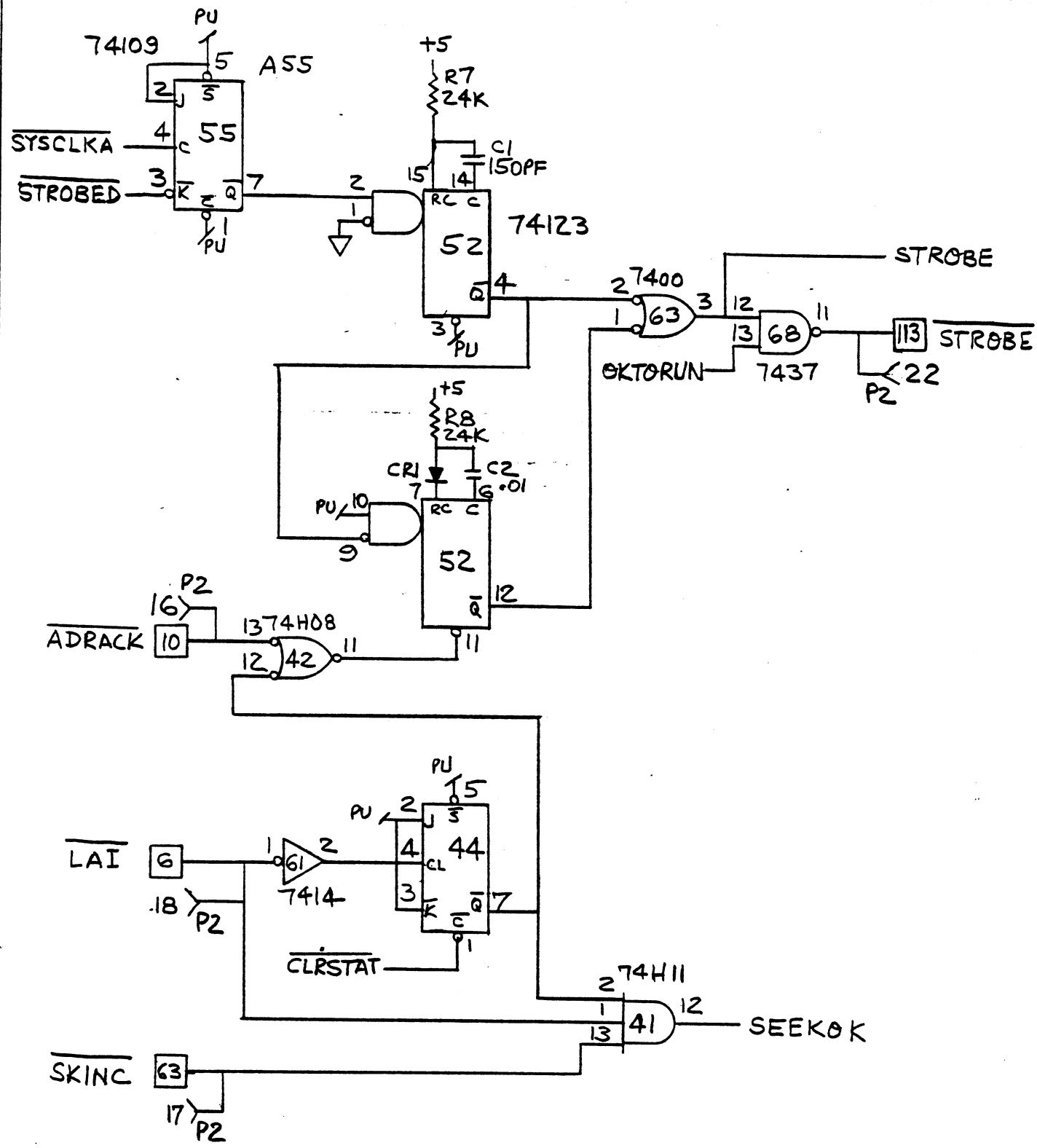

STROBE, SEEK ERRORS

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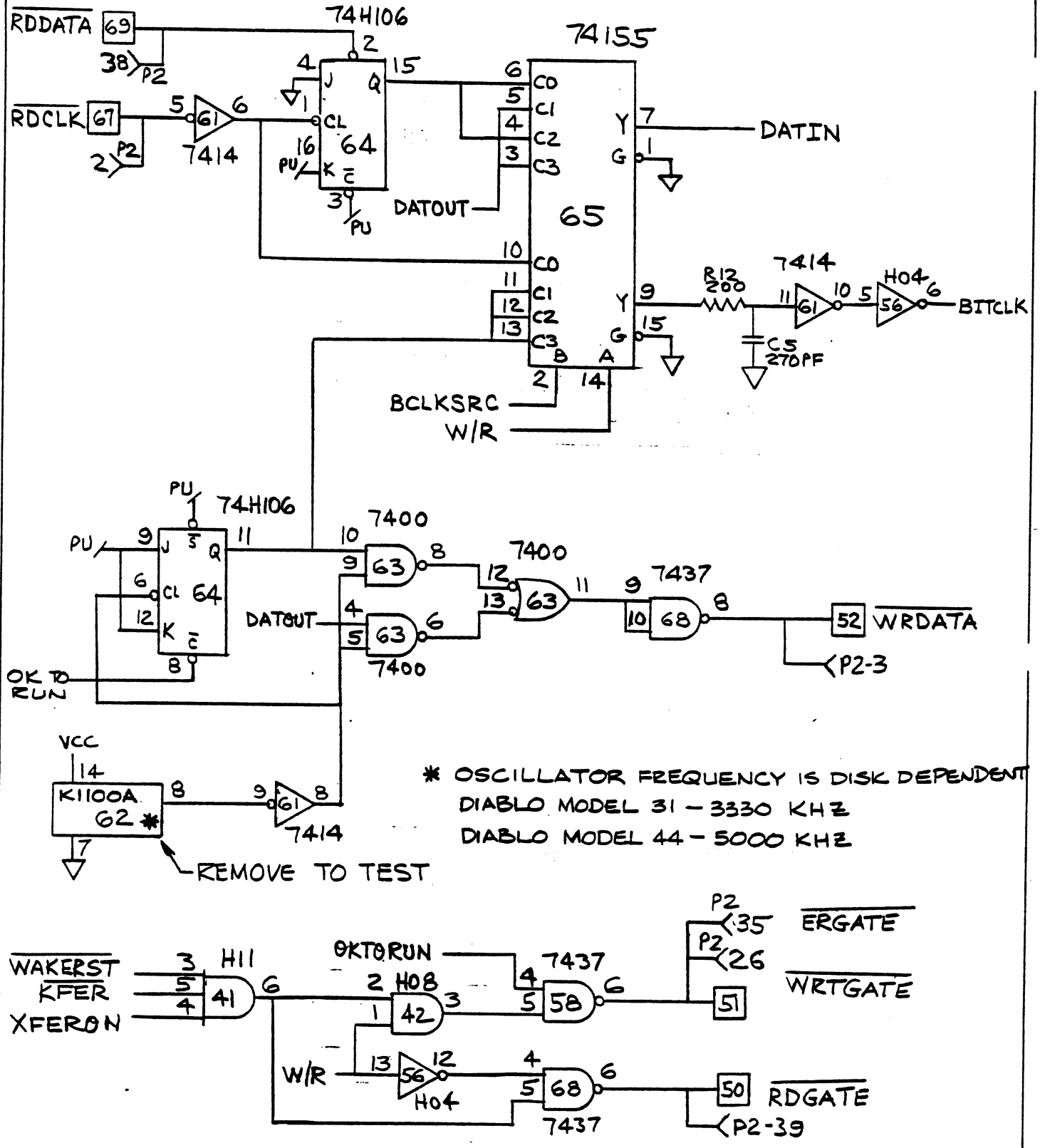

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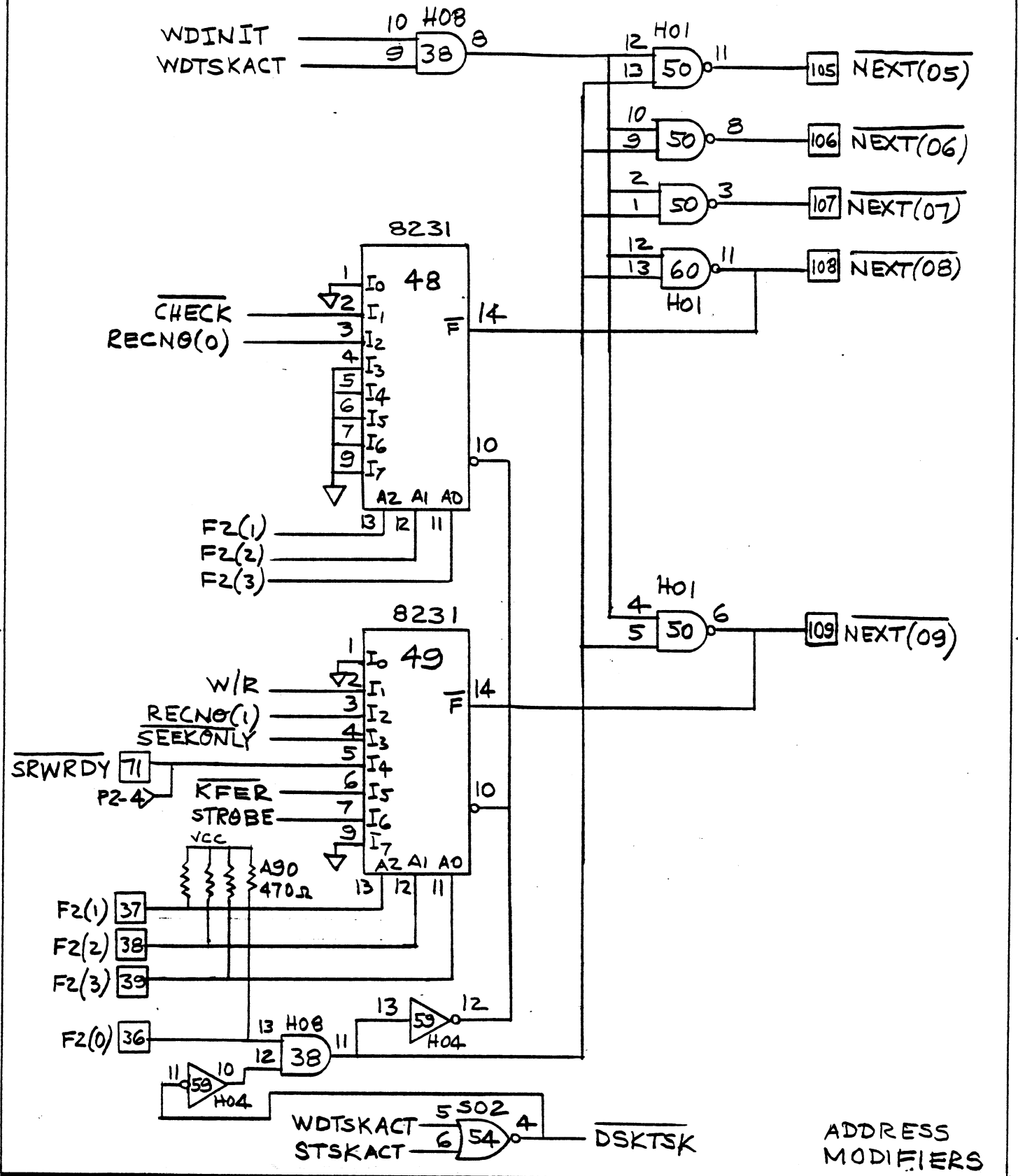

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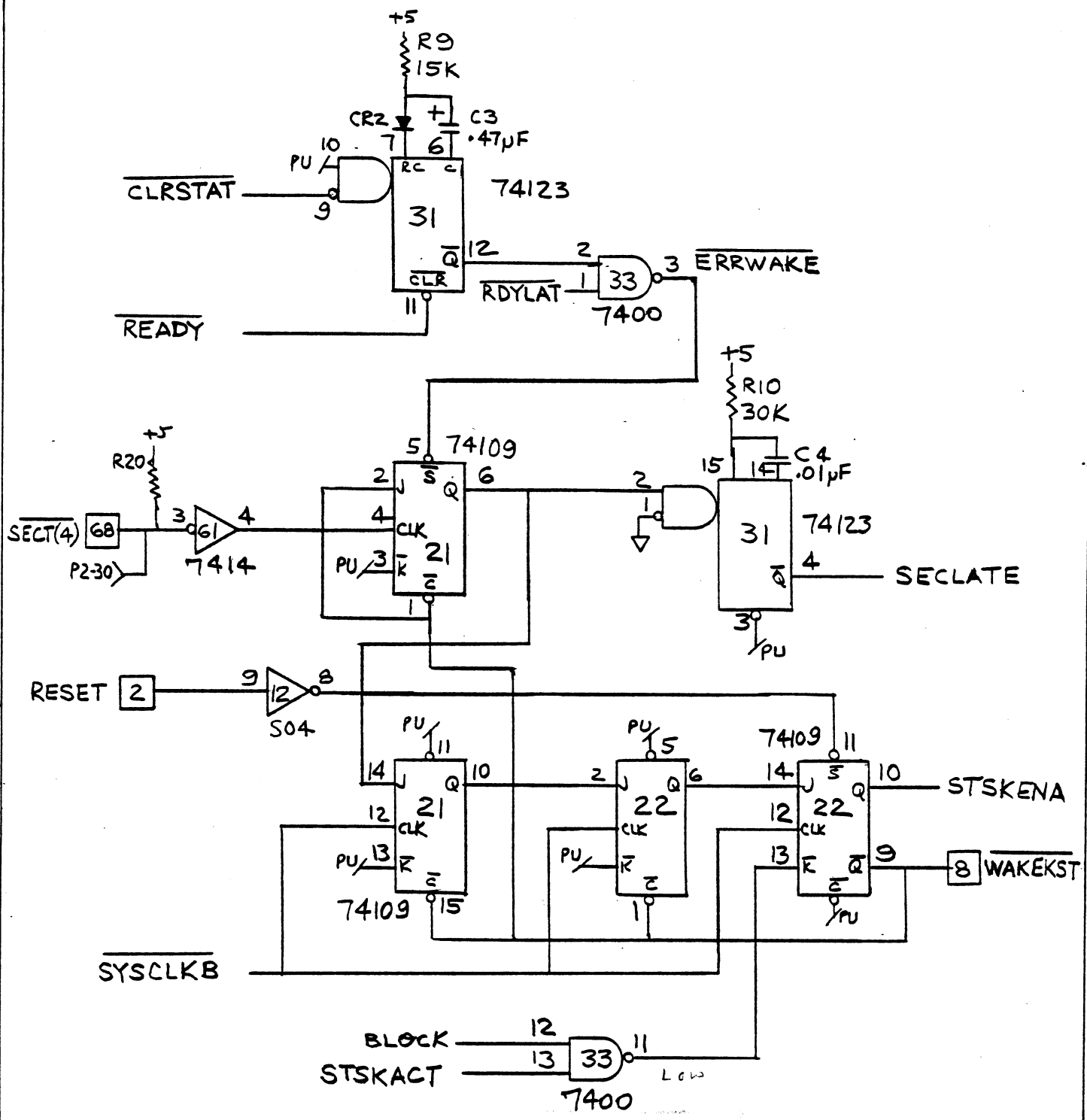

SECTOR, ERROR WAKEUPS

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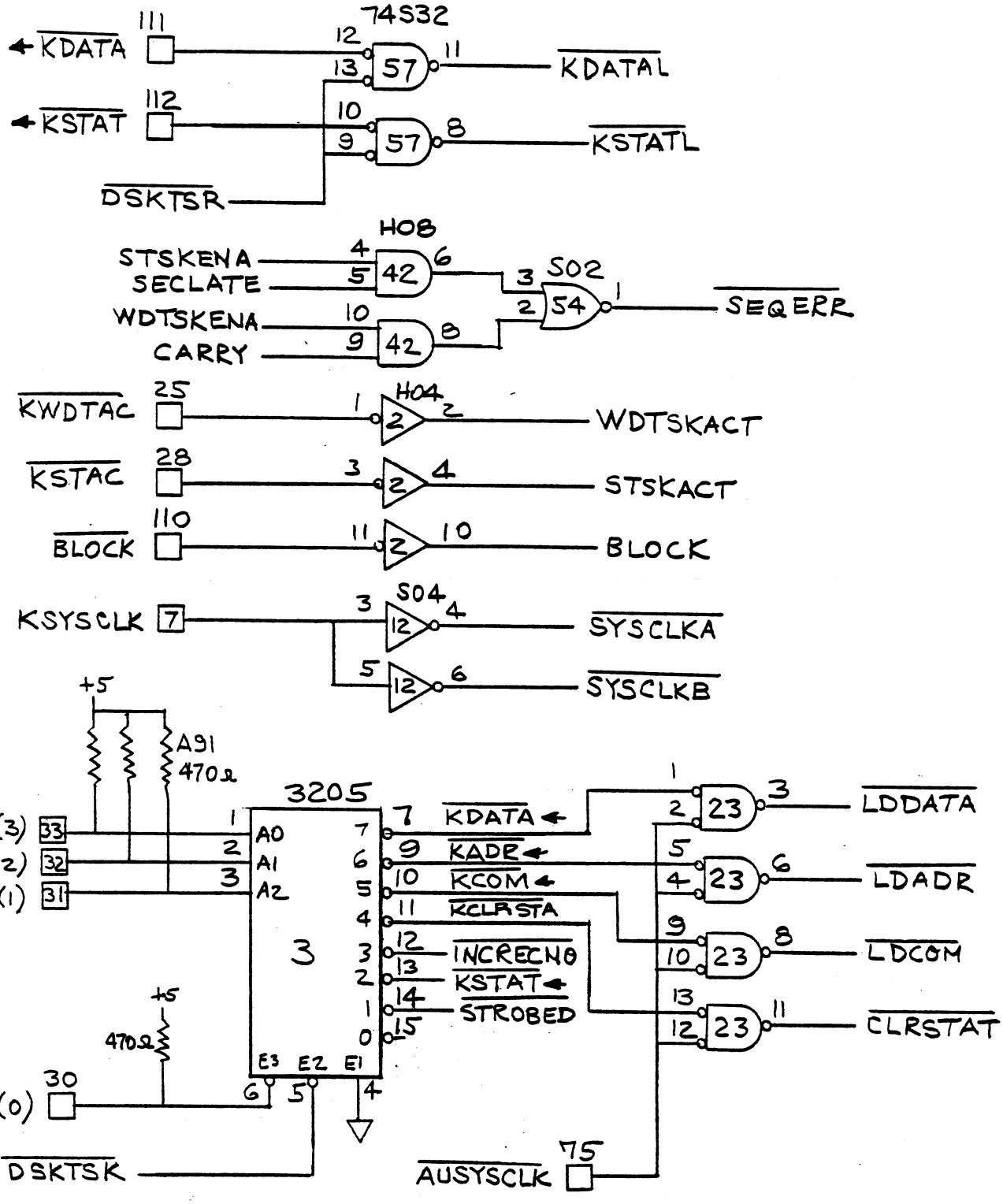

F DECODE , CLOCKS

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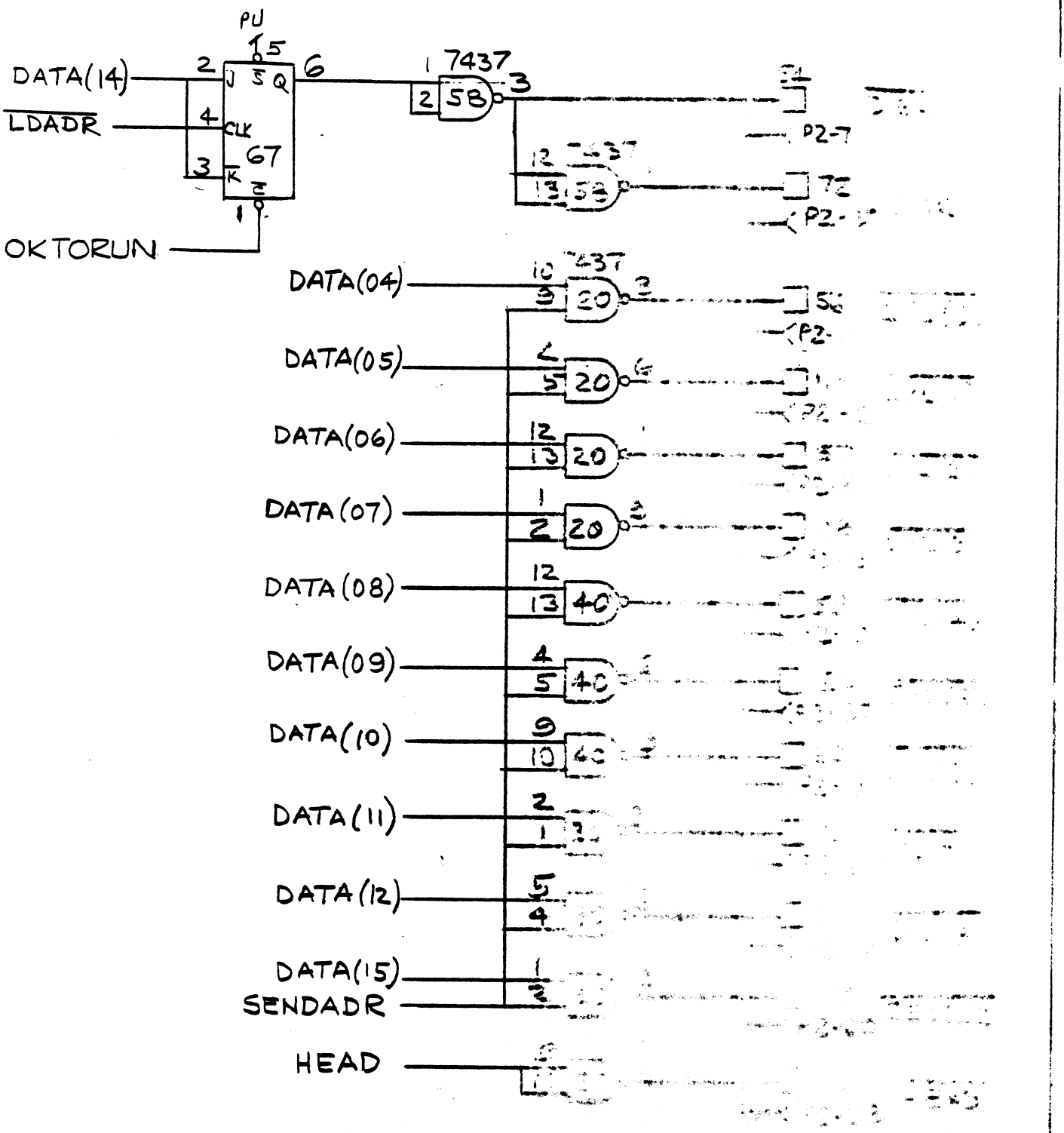

DISK

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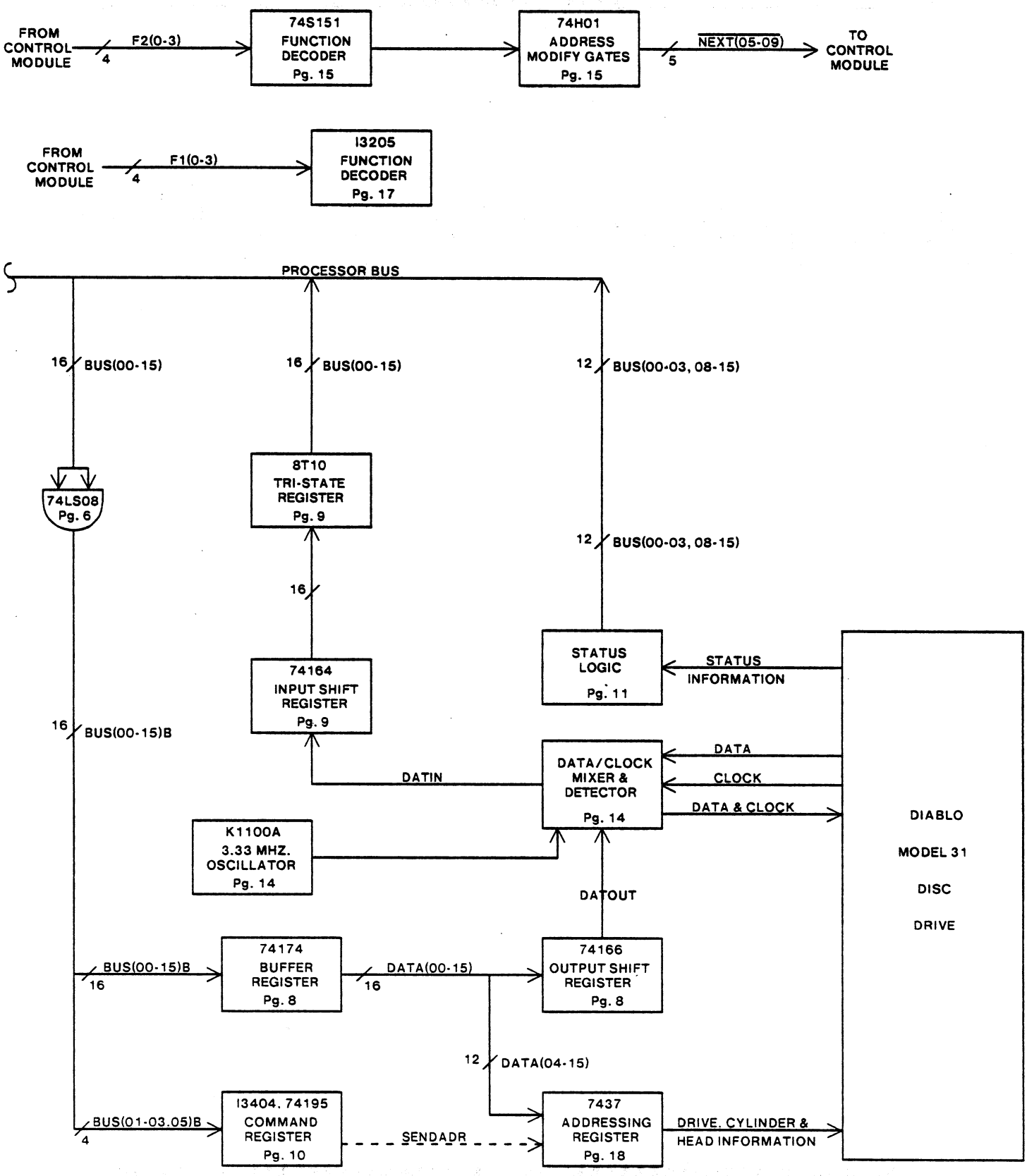
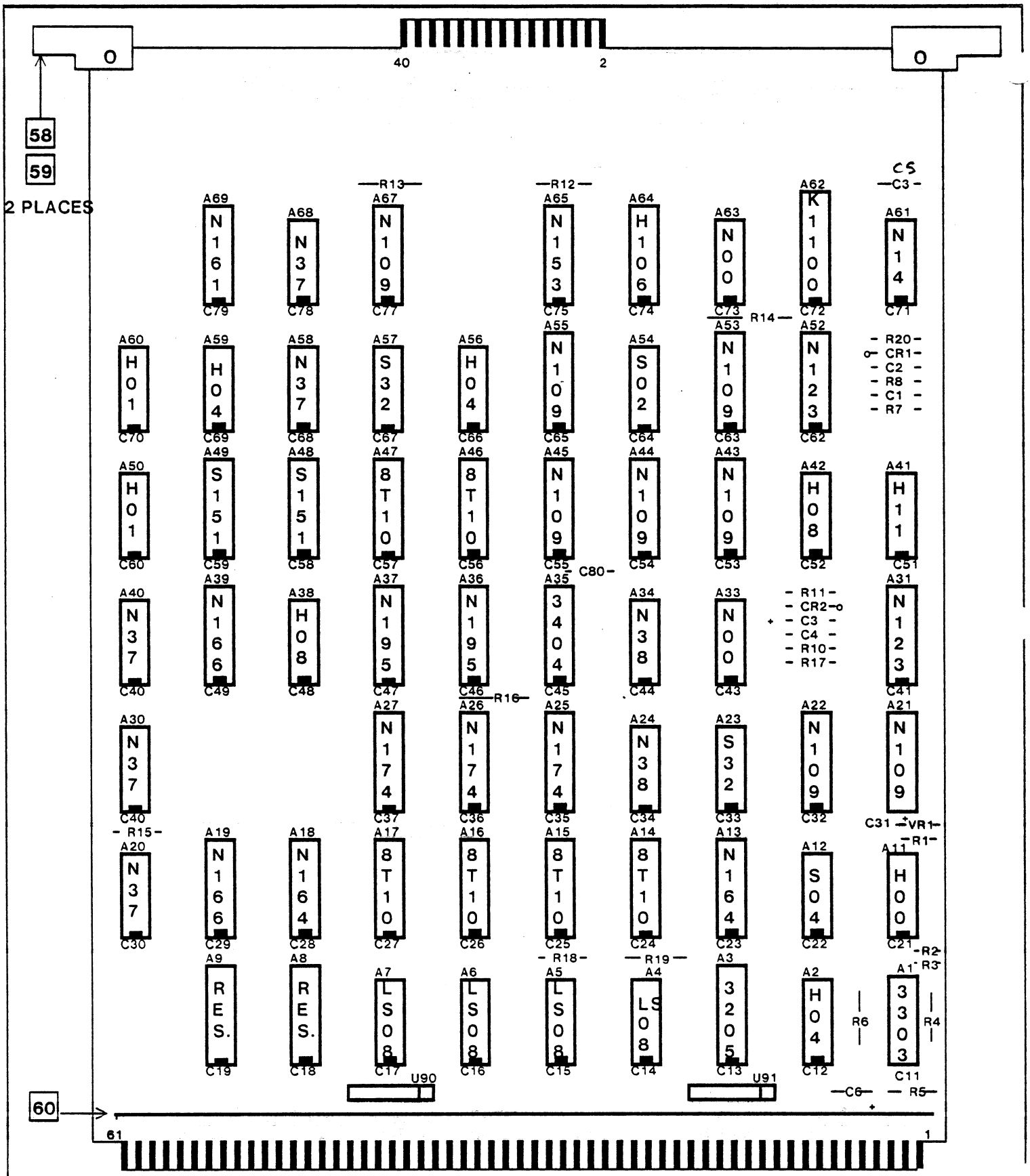
DISK CONTR

DISK CONTROL MODULE





PROPRIETARY NOTE ON SHEET 1 APPLIES TO ALL SHEETS			FILE: DSKCON03.SIL	
TITLE	ASSEMBLY, P.W. DISK CONTROL	DWG. SIZE A4	DWG. NO. 218092 SHEET 3 OF 20	SHEET REV. B

ELECTRICAL REF. DESIGNATIONS	ITEM	PART NO.	DESCRIPTION	QTY.
	1	218093	BOARD, PRINTED WIRING	1
	2	TAPE NO. 6389	TEST PROGRAM USED IN TERADYNE TESTER	REF
	3	216207	SPEC, MODULE ASSEMBLY	REF
A1	4	MPQ3303	MICROCIRCUIT MOTOROLA	1
A2, 56, 59	5	74H04	MICROCIRCUIT TI	3
A3	6	3205	MICROCIRCUIT INTEL	1
A4,5,6.7	7	74LS08	MICROCIRCUIT TI	4
A11	8	74H00	MICROCIRCUIT TI	1
A12	9	74S04	MICROCIRCUIT TI	1
A13,18	10	74164	MICROCIRCUIT TI	2
A14,15,16,17,46,47	11	8T10	MICROCIRCUIT SIGNETICS	6
A19,39	12	74166	MICROCIRCUIT TI	2
A20,30,40,58,68	13	7437	MICROCIRCUIT TI	5
A21,22,43,44,45,53	14	74109	MICROCIRCUIT TI	8
55,67				
A23,57	15	74S32	MICROCIRCUIT TI	2
A24,34	16	7438	MICROCIRCUIT TI	2
A25,26,27	17	74174	MICROCIRCUIT TI	3
A31,52	18	74123	MICROCIRCUIT TI	2
A33,63	19	7400	MICROCIRCUIT TI	2
A35	20	I3404	MICROCIRCUIT INTEL	1
A36,37	21	74195	MICROCIRCUIT TI	2
A38,42	22	74H08	MICROCIRCUIT TI	2
A41	23	74H11	MICROCIRCUIT TI	1
A48,49	24	74S151	MICROCIRCUIT TI	2
A50,60	25	74H01	MICROCIRCUIT TI	2
A54	26	74S02	MICROCIRCUIT TI	1
A61	27	7414	MICROCIRCUIT TI	1
A64	28	74H106	MICROCIRCUIT TI	1
A65	29	74153	MICROCIRCUIT TI	1
A69	30	74161	MICROCIRCUIT TI	1
A62	31	K1100A	OSCILLATOR, 3.33 MHZ MOTOROLA	1

Xerox Corporation
701 South Aviation Boulevard

XEROX

ELECTRICAL REF. DESIGNATIONS	ITEM	PART NO.	DESCRIPTION		QTY.
A9	33	AB#316A271	RESISTOR, NETWORK, DIP, 270ohm	ALLEN BRADREY	1
A8	34	AB#316A561	RESISTOR, NETWORK, DIP, 560ohm	ALLEN BRADREY	1
A90,91	35	750-81-R470	RESISTOR, NETWORK, DIP, 470ohm	CTS	2
R1,R2	36	CB3905	RESISTOR,FILM,39ohm,5%,1/4W	ALLEN BRADREY	2
R3,4,5,6,12	37	CB2015	RESISTOR,FILM,200ohm,5%,1/4W		5
R7,8	38	CB2435	RESISTOR,FILM,24Kohm,5%,1/4W		2
R9	39	CB1535	RESISTOR,FILM,15Kohm,5%,1/4W		1
R10	40	CB3035	RESISTOR,FILM,30Kohm,5%,1/4W		1
R11,20	41	CB3315	RESISTOR,FILM,330ohm,5%,1/4W		2
R18	42	CB5615	RESISTOR,FILM,560ohm,5%,1/4W		1
R19	43	CB2715	RESISTOR,FILM,270ohm,5%,1/4W		1
R13,14,15,16,17	44	CB1025	RESISTOR,FILM,1Kohm ,5%,1/4W	ALLEN BRADREY	5
	45				
CR1,CR2	46	1N914	DIODE	TI	2
VR1	47	IN5227	DIODE, ZENER	TI	1
	48				
C1	49	DC151	CAPACITOR, 150PF	NYTRONIC	
C2,4	50	DC103	CAPACITOR, 0.01uF	NYTRONIC	2
C5	51	DC271	CAPACITOR,270PF	NYTRONIC	1
C80	52	DC222	CAPACITOR,0.22uF,16V	NYTRONIC	1
C3	53	474M015POY	CAPACITOR,0.47uF,20%,15V	MALLORY	1
C6	54	226M015POY	CAPACITOR,TANT., 22uF,20%,15V	MALLORY	1
C11-17,19,21-37,40, 41,43-54,56-60,	55	UK10-503	CAPACITOR, 0.05UF, 10V	CENTRALAB	61
62-75,77-79					
	56	514-AG11D	SOCKET, MICROCIRCUIT,AUGAT		11
	57	516-AG11D	SOCKET, MICROCIRCUIT,AUGAT		22
	58	156111-005	RIVET		2
	59	216250	EXTRACTOR		2
	60	216242	STIFFENER		1

PROPRIETARY NOTE ON SHEET 1 APPLIES TO ALL SHEETS

FILE: DSKCON05.SIL

TITLE
ALTOII
ASSEMBLY, PRINTED WIRING BOARD
DISK CONTROL MODULE

DWG. SIZE: A4

DWG. NO. 218902

SHEET 5 OF 20

SHEET REV 9

ELECTRICAL REF. DESIGNATIONS	ITEM	PART NO.	DESCRIPTION		QTY.
A9	33	AB#316A271	RESISTOR, NETWORK, DIP, 270ohm	ALLEN BRADREY	1
A8	34	AB#316A561	RESISTOR, NETWORK, DIP, 560ohm	ALLEN BRADREY	1
A90,91	35	750-81-R470	RESISTOR, NETWORK, DIP, 470ohm	CTS	2
R1,R2	36	CB3905	RESISTOR,FILM,39ohm,5%,1/4W	ALLEN BRADREY	2
R3,4,5,6,12	37	CB2015	RESISTOR,FILM,200ohm,5%,1/4W		5
R7,8	38	CB2435	RESISTOR,FILM,24Kohm,5%,1/4W		2
R9	39	CB1535	RESISTOR,FILM,15Kohm,5%,1/4W		1
R10	40	CB3035	RESISTOR,FILM,30Kohm,5%,1/4W		1
R11,20	41	CB3315	RESISTOR,FILM,330ohm,5%,1/4W		2
R18	42	CB5615	RESISTOR,FILM,560ohm,5%,1/4W		1
R19	43	CB2715	RESISTOR,FILM,270ohm,5%,1/4W		1
R13,14,15,16,17	44	CB1025	RESISTOR,FILM,1Kohm ,5%,1/4W	ALLEN BRADREY	5
	45				
CR1,CR2	46	1N914	DIODE	TI	2
VR1	47	IN5227	DIODE, ZENER	TI	1
	48				
C1	49	DC151	CAPACITOR, 150PF	NYTRONIC	1
C2,4	50	DC103	CAPACITOR, 0.01uF	NYTRONIC	2
C5	51	DC271	CAPACITOR,270PF	NYTRONIC	1
C80	52	DC222	CAPACITOR,0.22uF,16V	NYTRONIC	1
C3	53	474M015POY	CAPACITOR,0.47uF,20%,15V	MALLORY	1
C6	54	226M015POY	CAPACITOR,TANT., 22uF,20%,15V	MALLORY	1
C11-17,19,21-37,40, 41,43-54,56-60,	55	UK10-503	CAPACITOR, 0.05UF, 10V	CENTRALAB	61
62-75,77-79					
	56	514-AG11D	SOCKET, MICROCIRCUIT,AUGAT		31
	57	516-AG11D	SOCKET, MICROCIRCUIT,AUGAT		32
	58	156111-005	RIVET		2
	59	216250	EXTRACTOR		2
	60	216242	STIFFENER		1

PROPRIETARY NOTE ON SHEET 1 APPLIES TO ALL SHEETS

FILE: DSKCON05.SIL

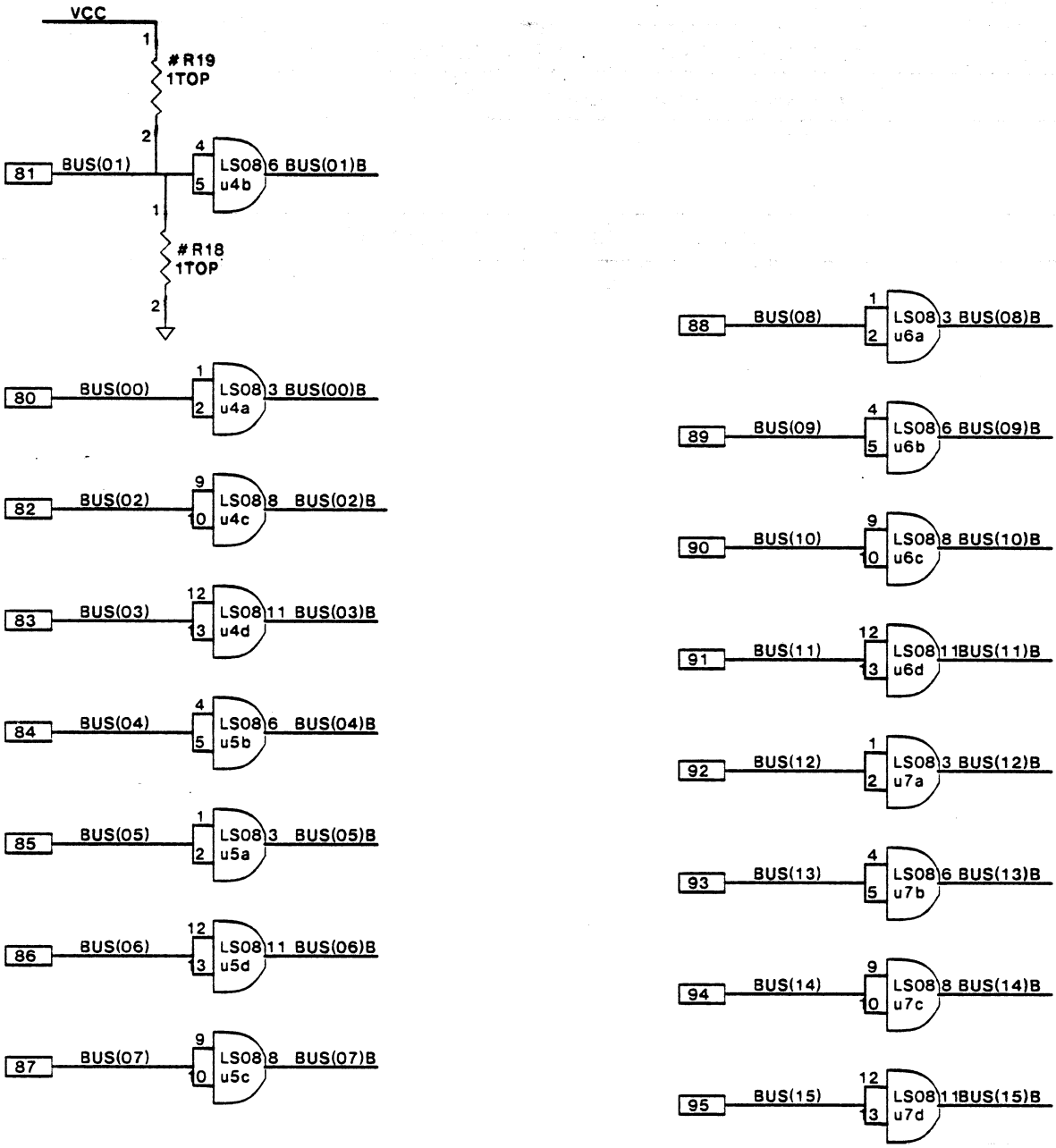
TITLE
ALTOII
ASSEMBLY, PRINTED WIRING BOARD
DISK CONTROL MODULE

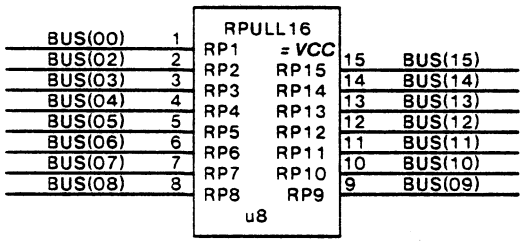
DWG. SIZE: A4

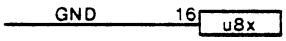
DWG. NO. 218902

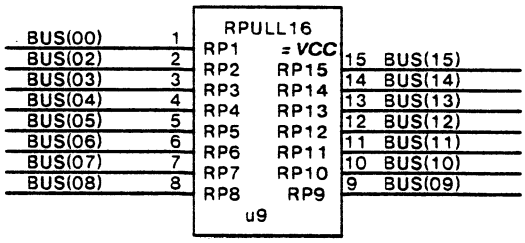
SHEET REV. B

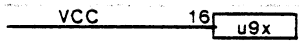
SHEET 5 OF 20











BUSS BUFFER

BUS BUFFERS

XEROX	Project		File	Designer	Rev	Date	Page
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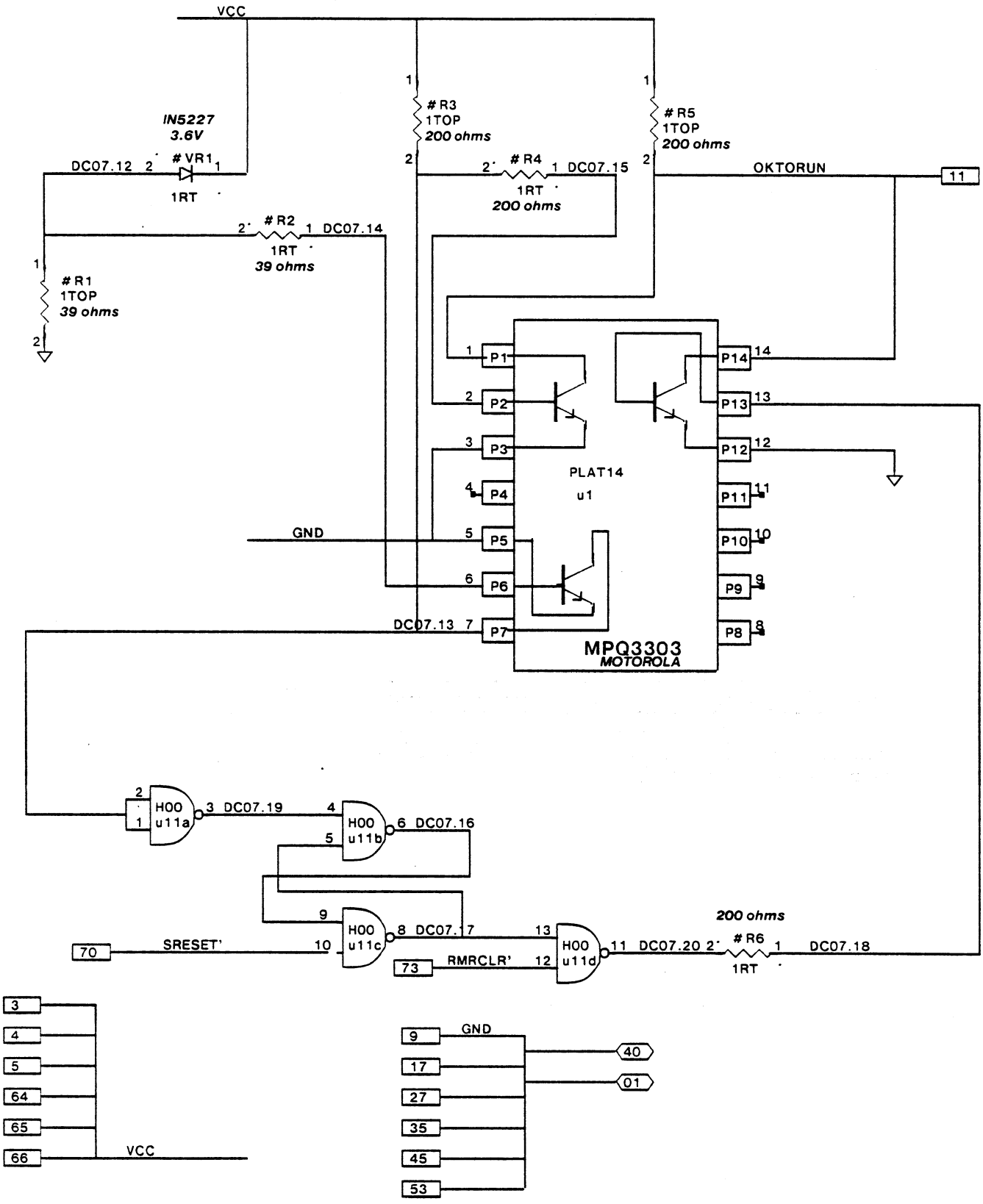
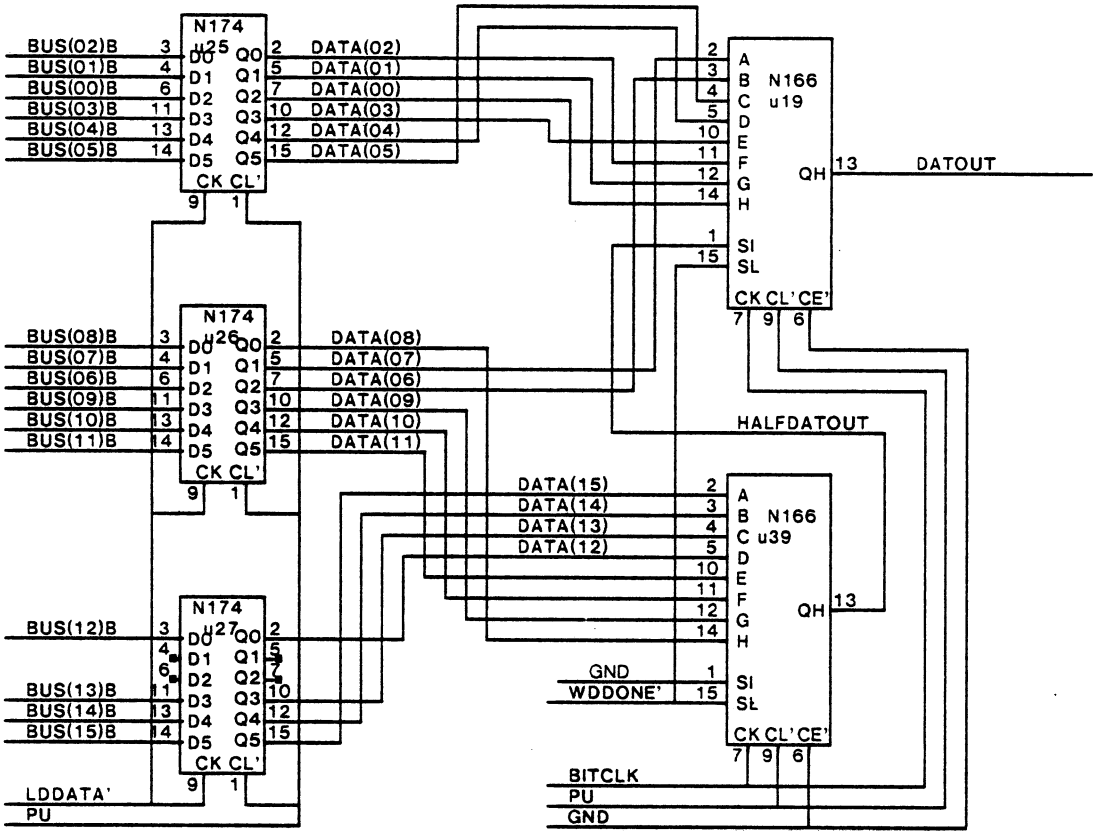


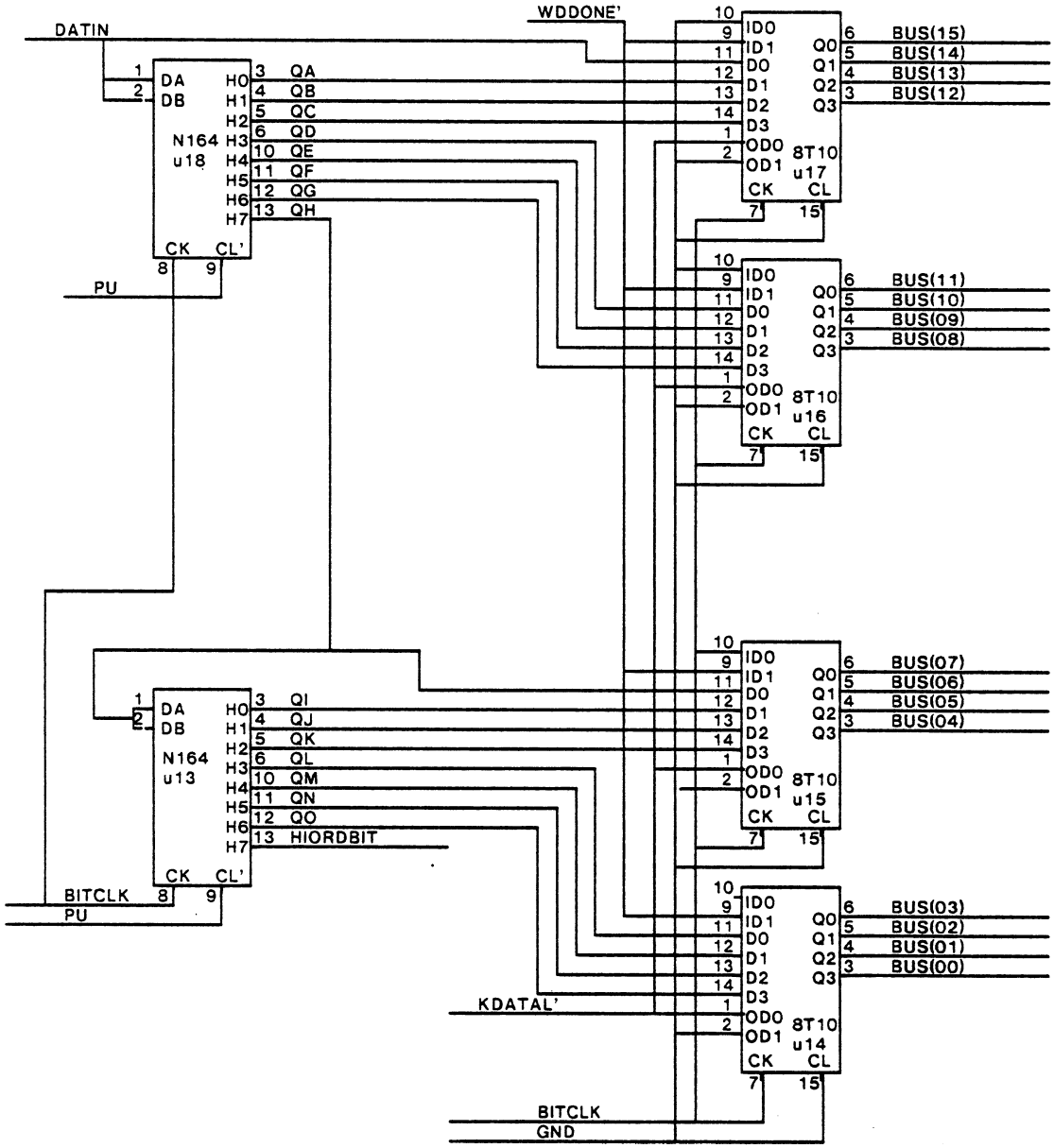
Power on Reset

XEROX SPG	Project ALTOII	ASSEMBLY, P.W DISK CONTROL MODULE	File DskCon07.sil	Designer FREEMAN	Rev B	Date 9/25/80	Page 07



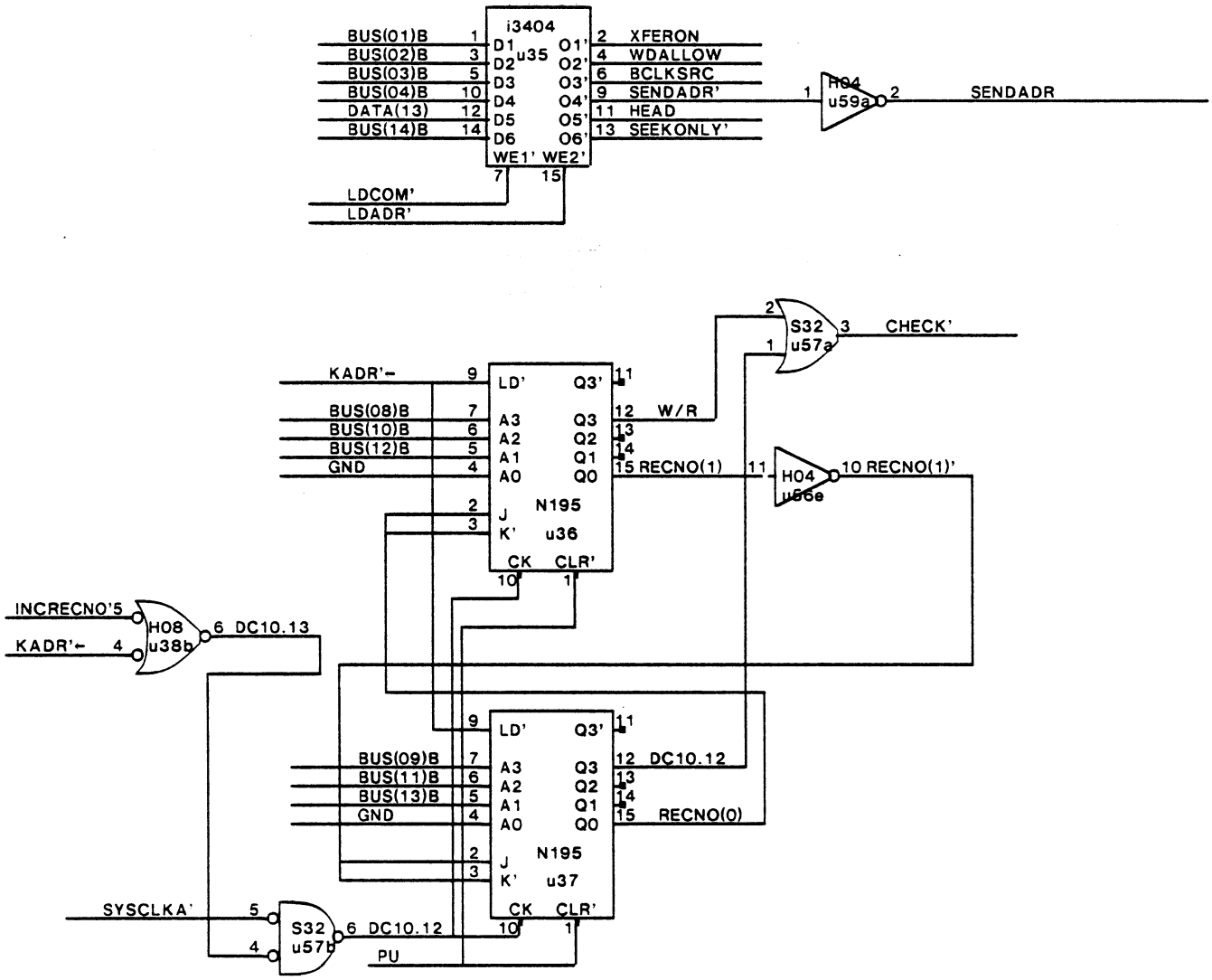
Write S/R

XEROX SPG	Project ALTOII	ASSEMBLY,P.W. DISK CONTROL MODULE	File DskCon08.sil	Designer FREEMAN	Rev B	Date 9/25/80	Page 08



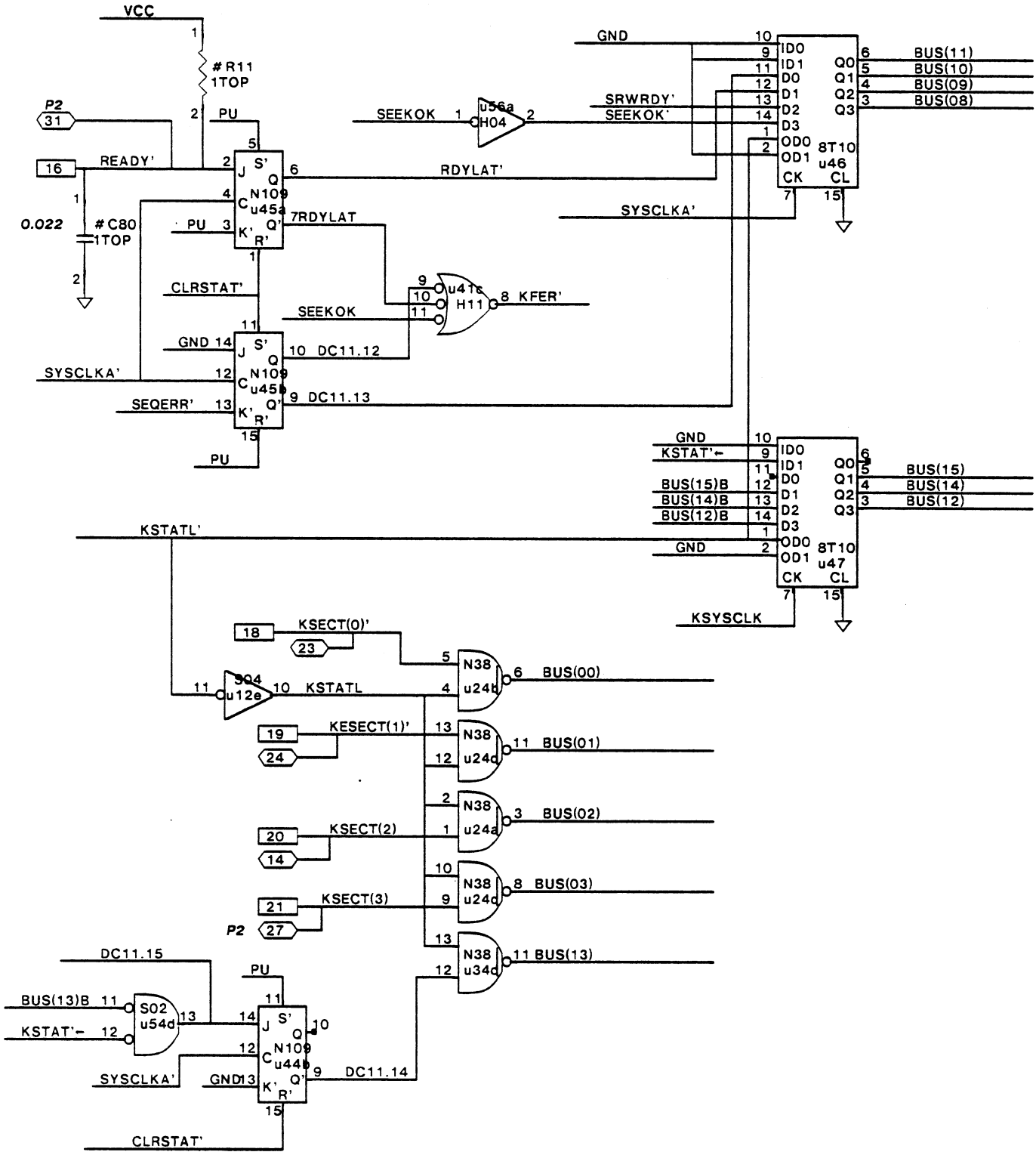
READ S/R

XEROX	Project		File	Designer	Rev	Date	Page
SPG	ALTOII	ASSEMBLY, P.W. DISK CONTROL MODULE	DskCon09.sil	FREEMAN	B	9/22/80	09



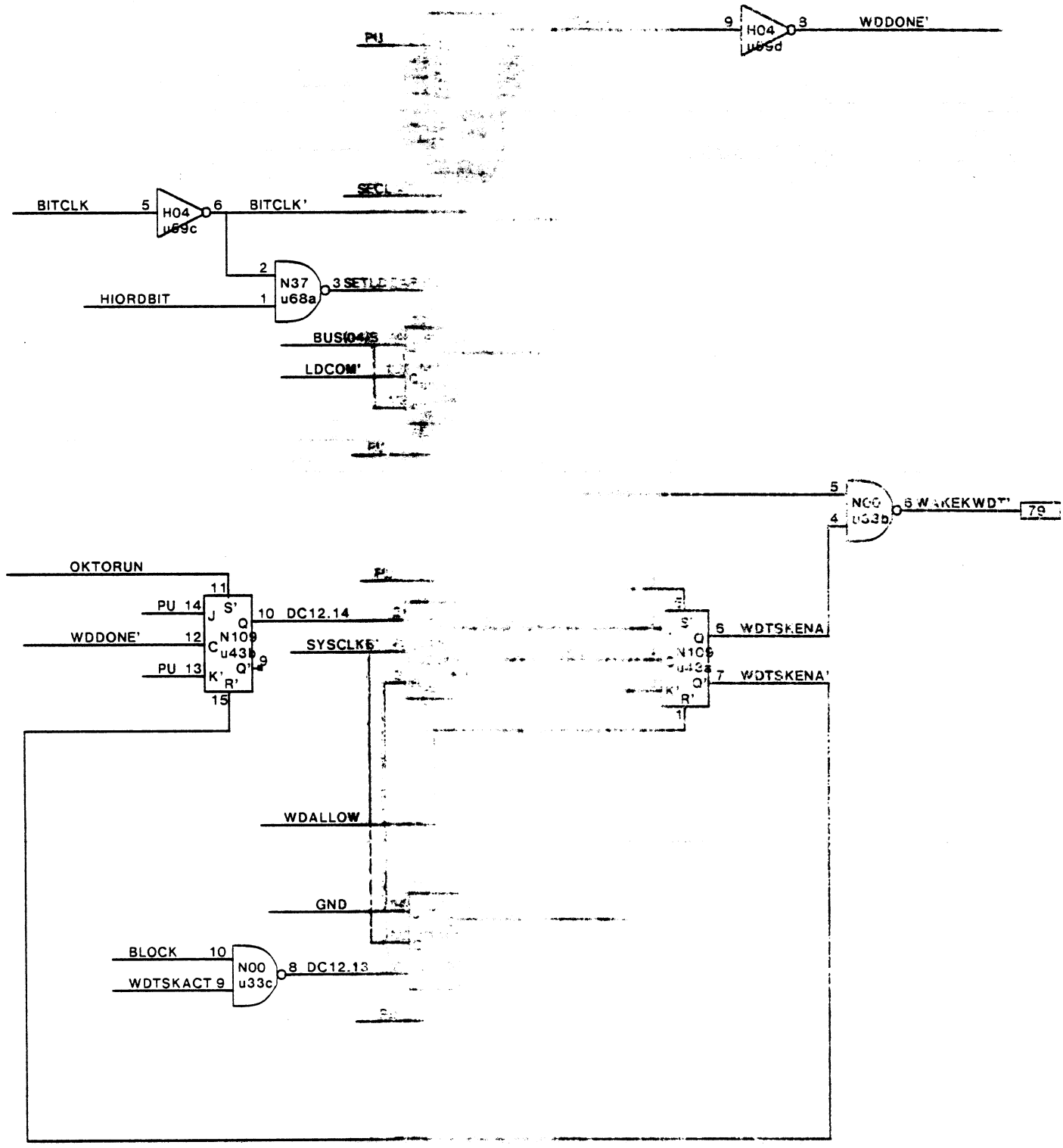
COMP. AND REG.

XEROX SPG	Project ALTO II	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCon10.sil	Designer FREEMAN	Rev B	Date 9/26/80	Page 10

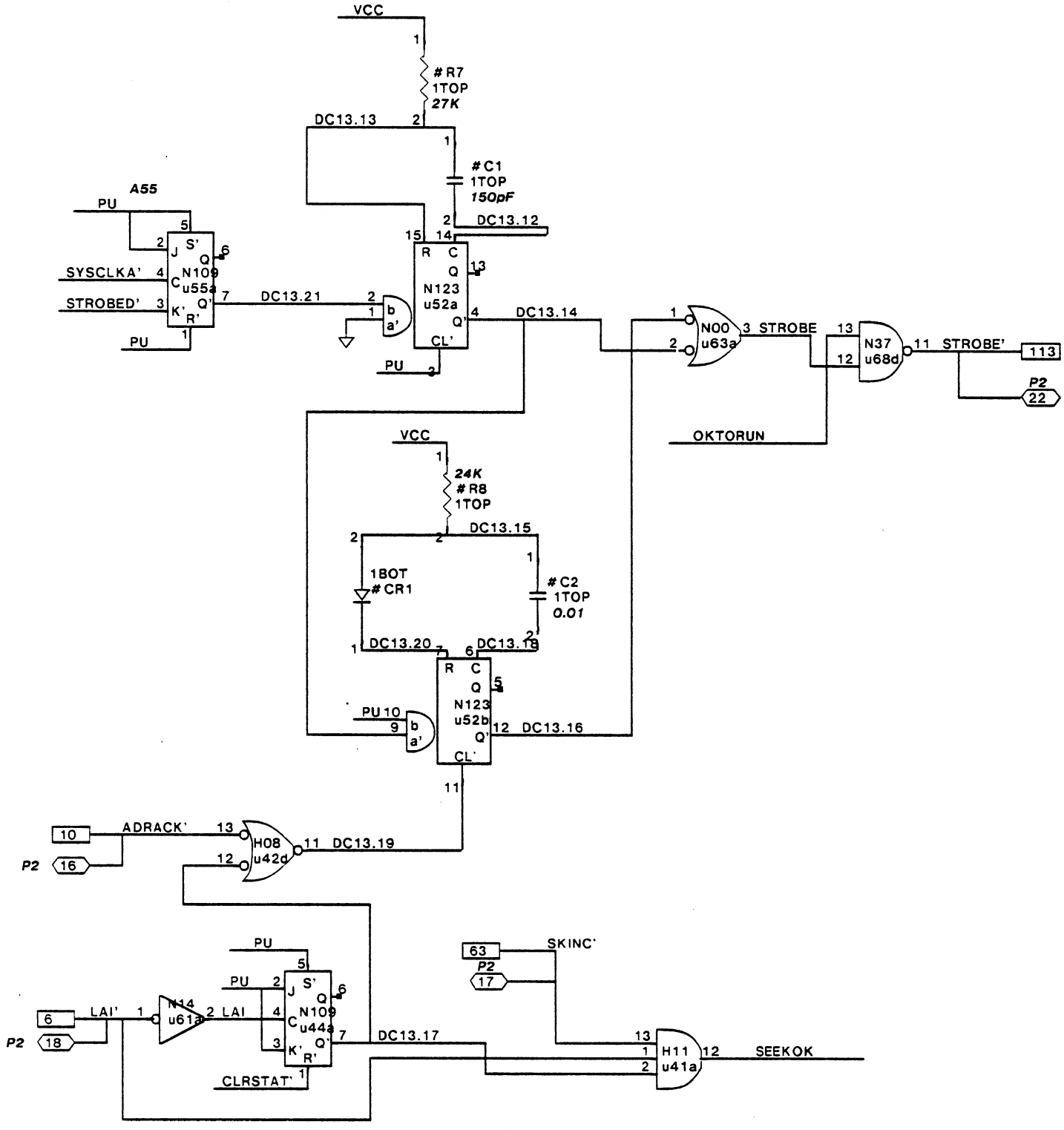


STATUS

XEROX SPG	Project ALTO II	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCon11.SIL	Designer FREEMAN	Rev B	Date 9/26/80	Page 11

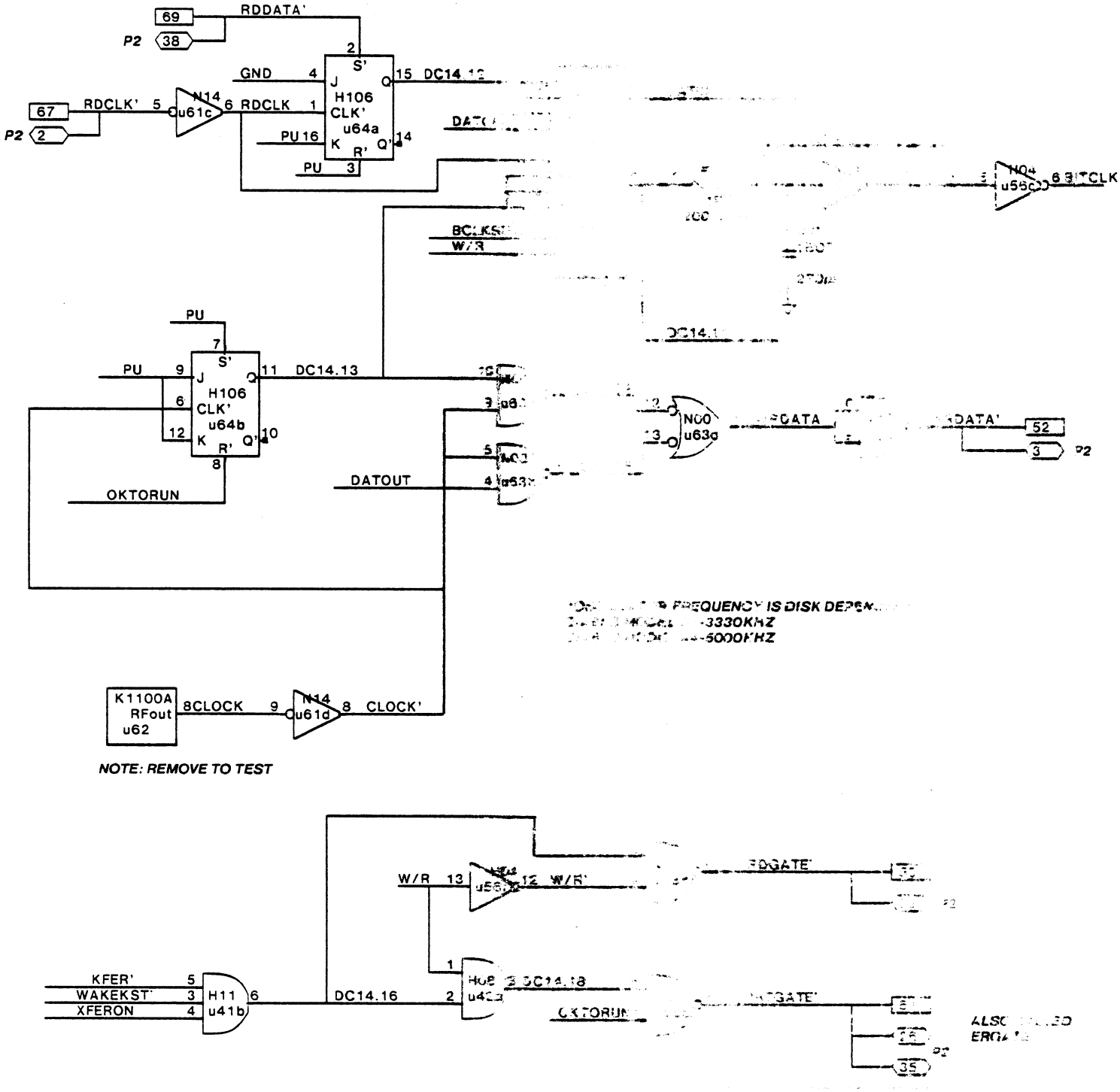


XEROX SPG	Project ALTO II	ASSEMBLY, P.C. DISK CONTROL V	File DskCon12.sil	Designer FREEMAN	Rev B	Date 9/26/80	Page 12



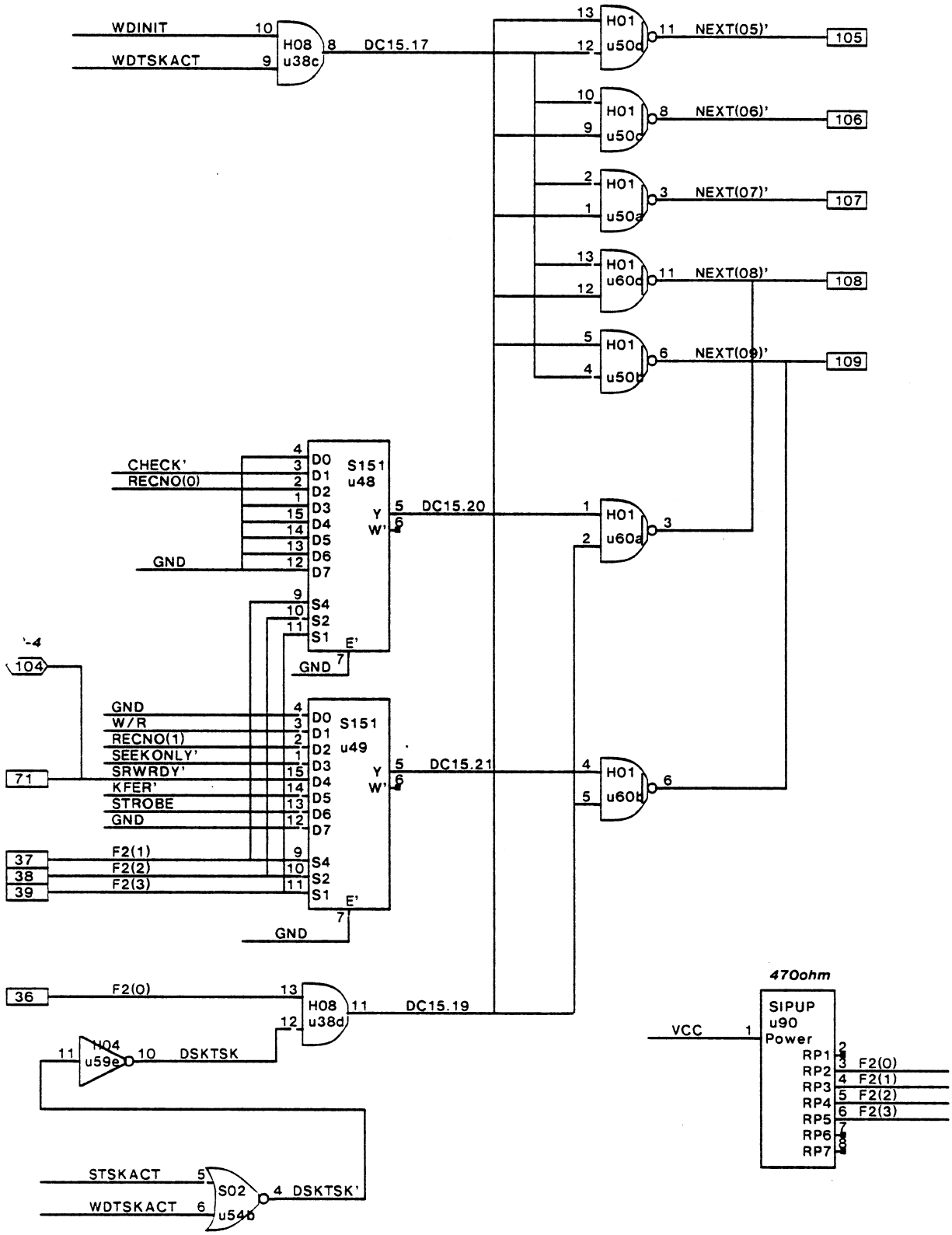
STROBE, SEEK ERRORS

XEROX SPG	Project ALTO II	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCon13.sil	Designer FREEMAN	Rev B	Date 9/26/80	Page 13



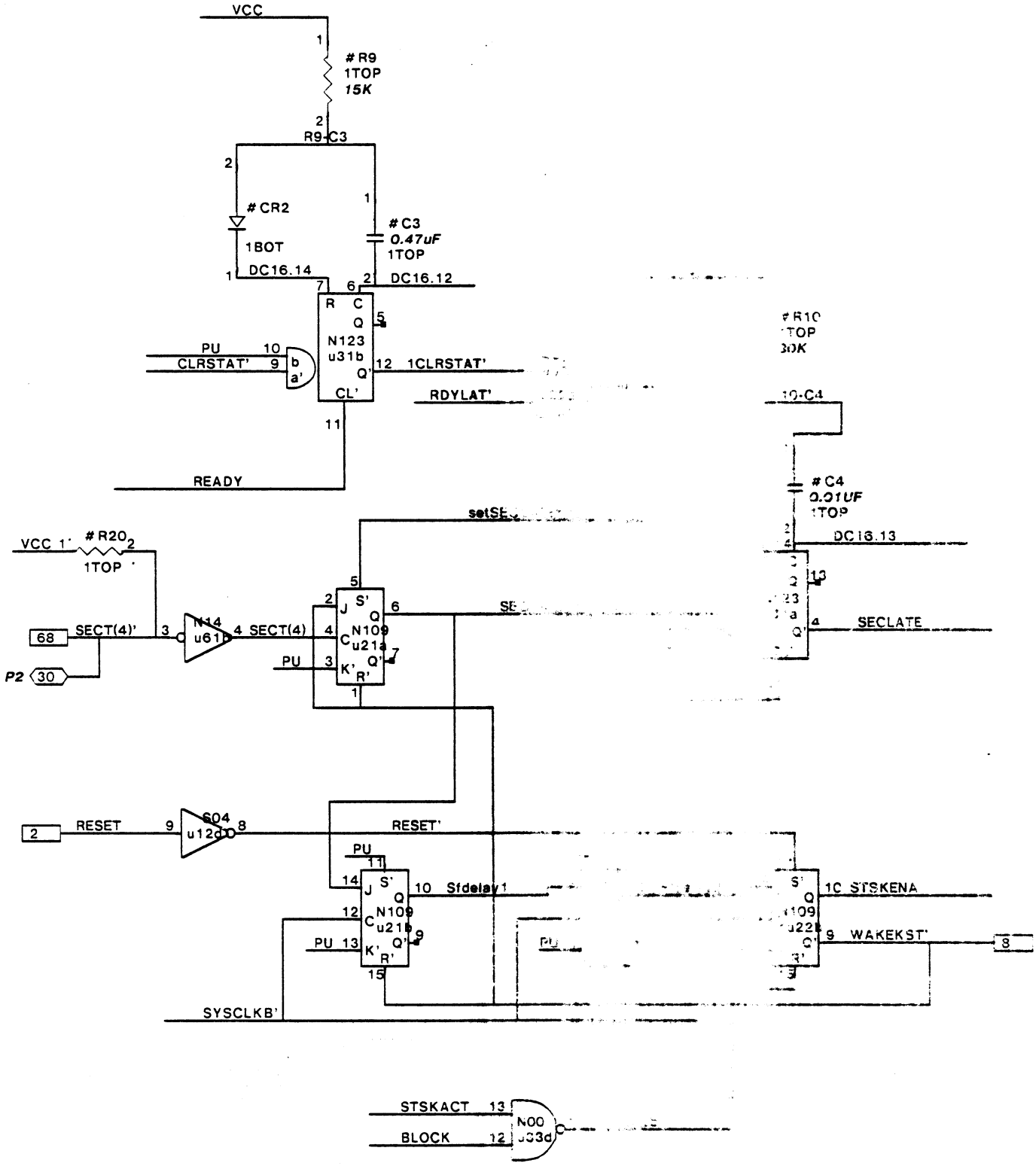
DATA HANDLING

XEROX SPG	Project ALTOII	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCtl4.sil	Designer FREEMAN	Rev B	Date 9/26/80	Page



Address Modifiers

XEROX SPG	Project ALTO II	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCon15.sil	Designer JSTEWART	Rev B	Date 9/29/80	Page 15



SECTOR, ERROR WA[illegible]

XEROX	Project		File	Designer	Rev	Date	Page
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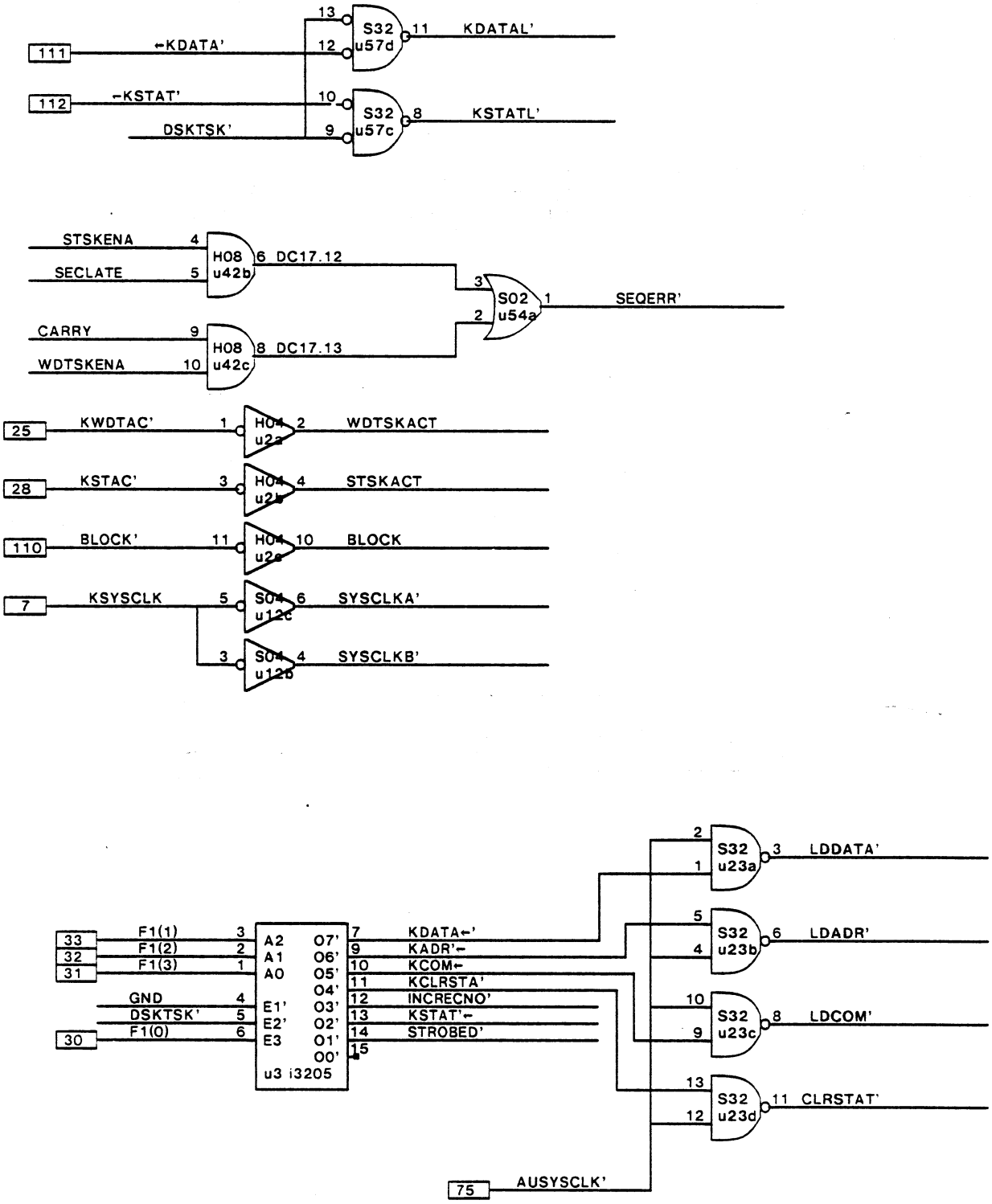
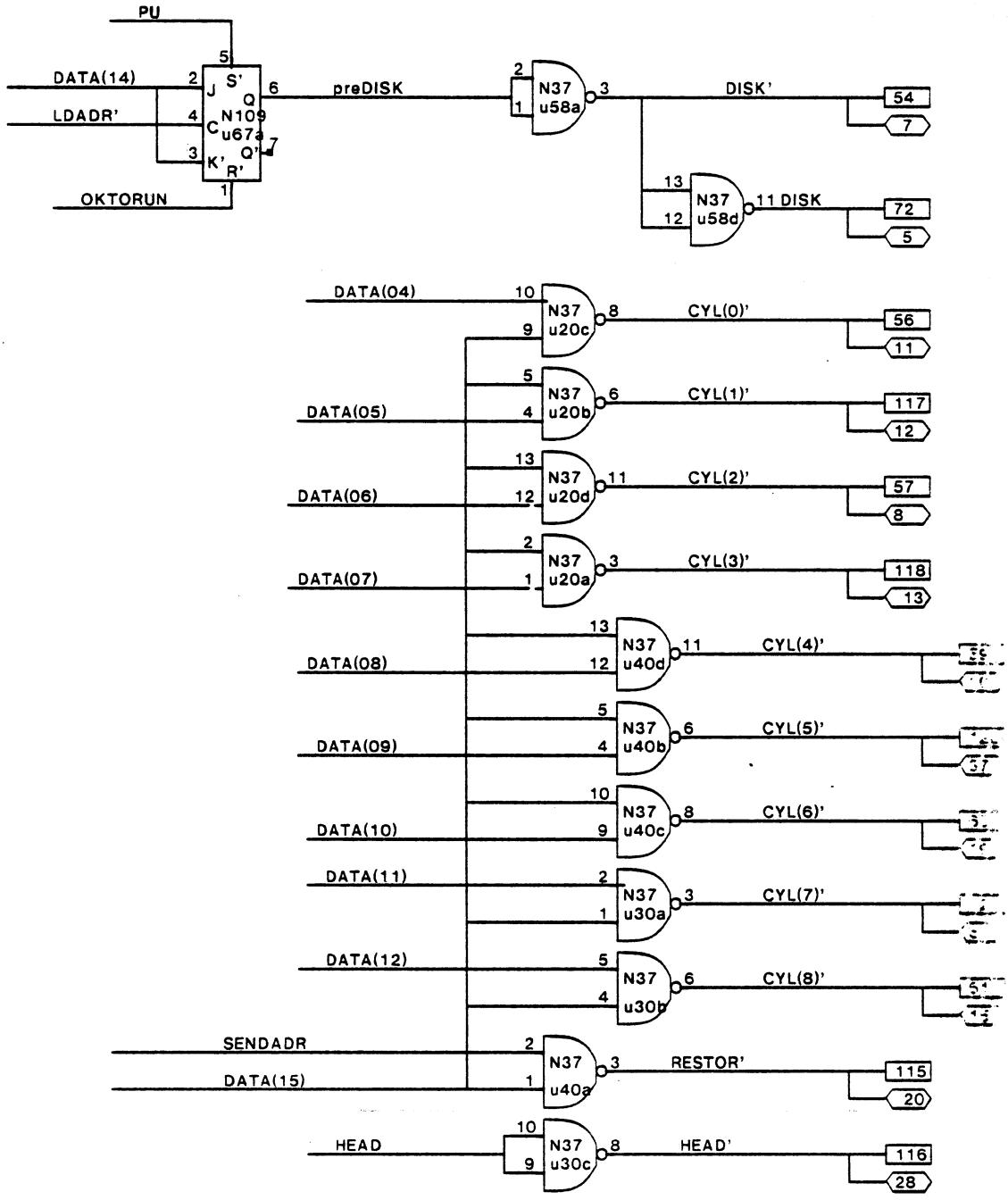


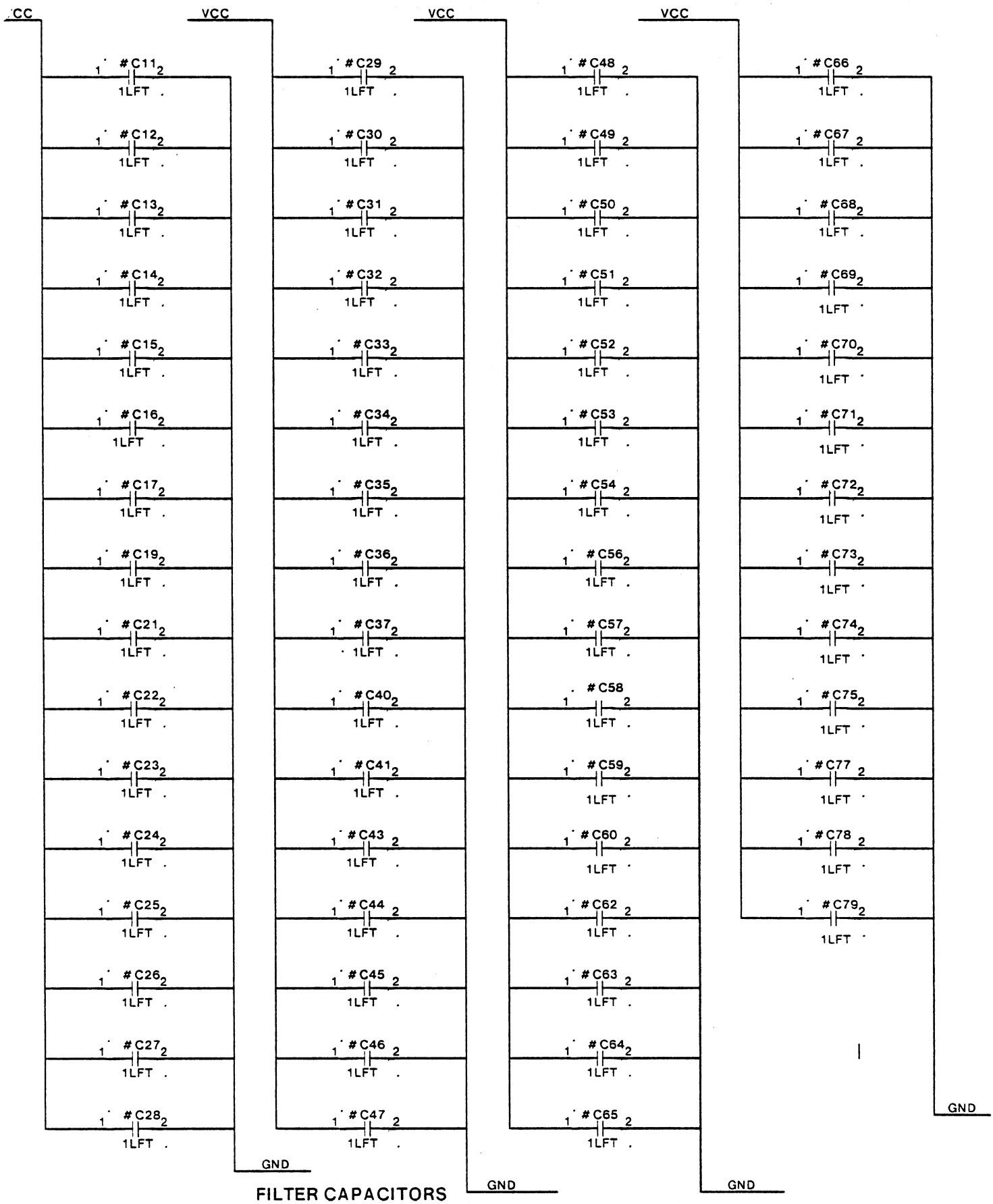
F DECODE, CLOCKS

XEROX SPG	Project ALTO II	ASSEMBLY, P.W DISK CONTROL MODULE	File DskCon17.SIL	Designer FREEMAN	Rev B	Date 9/26/80	Page 17



DISK ADDRESSING

XEROX SPG	Project ALTO II	ASSEMBLY, P.W. DISK CONTROL MODULE	File DskCon18.sil	Designer FREEMAN	Rev B	Date 9/26/80	Page 18



FILTER CAPACITORS

XEROX SPG	Project ALTO II	ASSEMBLY, P.W DISK CONTROL MODULE	File DskCon19.sil	Designer FREEMAN	Rev B	Date 9/29/80	Page 19

INTERNAL DISC CABLE WIRE LIST
(Disc Control Module to Disc Drive)

Disc Drive Connector	Disc Control Module Connector	Signal Name
A	2	Read Clock
B	3	Write Data & Clock
C	38	Read Data
D	1 or 40	Ground
E	39	Read Gate
F	4	Ready to Seek, Read, or Write
H	34	Write Protect Input
J	37	Track Address - bit 8
K	35	Erase Gate
L	5	Select Line - Unit 1
M	36	High Density Indication
N	6	Track Address - bit 2
P	33	Write Protect Status Indication
R	7	Select Line - Unit 2
S	32	Pseudo Sector Mark
T	8	Track Address - bit 64
U	31	File Ready
V	9	Select Line - Unit 3
W	30	Sector Mark
X	10	Track Address - bit 16
Y	29	Index Mark
Z	11	Select Line - Unit 4
AA	28	Head Select
BB	12	Track Address - bit 128
CC	27	Sector Address - bit 1
DD	1 or 40	Ground
EE	26	Write Gate
FF	13	Track Address - bit 32
HH	25	Write Check
JJ	14	Sector Address - bit 2
KK	24	Sector Address - bit 4
LL	15	Track Address - bit 1
MM	23	Sector Address - bit 8
NN	16	Address Acknowledge
PP	No Connection	OPEN LINE
RR	19	Track Address - bit 4
SS	22	Strobe
TT	17	Seek Incomplete
UU	21	Sector Address - bit 16
VV	20	Restore
WW	1 or 40	Ground
XX	18	Logical Address Interlock

TRACK "0" ADJUSTMENT

1) USING THE SEEK EXERCISER

A) LOAD SCRATCH PACK OR C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

B) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

X AXIS (CHANNEL # 1) AT TP1 ON J1 MODULE.
X AXIS (CHANNEL # 1) VOLTS PER DIVISION AT 2.0
Y AXIS (CHANNEL # 2) AT TP2 ON J1 MODULE.
Y AXIS (CHANNEL # 2) VOLTS PER DIVISION AT 2.0
TIME PER DIVISION ON X-Y

C) SETUP THE SEEK EXERCISER AS FOLLOWS:

ADDRESS 1 AND 2: ALL SWITCHS TO "OFF" POSITION
RESTORE: "ON" POSITION
START: "START" POSITION
STEP MODE: "STOP" POSITION (CONTINUOUS)
CYCLE RATE: FULLY C/W

D) ADDRESS 2, BIT "1" TO "ON" POSITION.

E) POSITION SCOPE PATTERN IN CENTER OF DISPLAY.

F) ADDRESS 2, BIT "1" TO "OFF" POSITION.

G) DOES CONTINUOUS RESTORE OPERATION. ADJUST ECCENTRIC (TT), (FIGURE 5-7 VIEW E OF DIABLO MAINTENANCE MANUAL) FOR PATTERN TO BE 135 DEGREES + OR - 10 DEGREES. SEE FIGURE 5-8 OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION.

2) USING THE DIEX PROGRAM

WARNING: DO NOT ENABLE WRITING!
TO DISABLE WRITING: AFTER BOOTING DIEX, HIT THE "RETURN" KEY.

A) BOOT DIEX, EITRER FROM THE NET OR DISC PACK. DISABLE WRITING!

B) LOAD SCRATCH PACK OR C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

C) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

X AXIS (CHANNEL # 1) AT TP1 ON J1 MODULE.
X AXIS (CHANNEL # 1) VOLTS PER DIVISION AT 2.0
Y AXIS (CHANNEL # 2) AT TP2 ON J1 MODULE.
Y AXIS (CHANNEL # 2) VOLTS PER DIVISION AT 2.0
TIME PER DIVISION ON X-Y

D) SELECT "RESTORE DISK" USING MIDDLE MOUSE BUTTON.

E) POSITION SCOPE PATTERN IN CENTER OF DISPLAY.

F) DOES CONTINUOUS RESTORE OPERATION. ADJUST ECCENTRIC (TT), (FIGURE 5-7 VIEW E OF DIABLO MAINTENANCE MANUAL) FOR PATTERN TO BE 135 DEGREES + OR - 10 DEGREES. SEE FIGURE 5-8 OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION.

G) SELECT "RESTORE DISK" USING LEFT MOUSE BUTTON.

READ/WRITE HEADS ADJUSTMENT

1) USING THE SEEK EXERCISER

A) LOAD C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

B) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

CHANNEL # 1 AT TP6 ON J9 MODULE.
CHANNEL # 1 VOLTS PER DIVISION ON 2.0
CHANNEL # 2 AT TP2 ON J10 MODULE.
CHANNEL # 2 VOLTS PER DIVISION ON .2
TIME PER DIVISION ON 5 m sec.
TRIGGER ON: CHANNEL # 1 (-) SLOPE

C) SETUP THE SEEK EXERCISER AS FOLLOWS:

ADDRESS # 1 SWITCHES IN THE "OFF" POSITION.
ADDRESS # 2 SWITCHES 64, 32, 8, 1 IN THE "ON" POSITION.
ALL OTHER ADDRESS # 2 SWITCHES IN THE "OFF" POSITION.
RESTORE: "ON" POSITION
START: "START" POSITION
STEP MODE: "STEP" POSITION
CYCLE RATE: MIDWAY BETWEEN C/W AND CC/W

D) DO A SEEK TO CYLINDER 105 BY DEPRESSING AND RELEASING THE "STEP PUSHBUTTON" UNTIL THE HEADS ARE AT CYLINDER 105.

E) ADJUST HEADS FOR EQUAL VALLEYS USING THE ADJUSTMENT SCREWS (RR) AND (SS), (FIGURE 5-7 VIEW E OF DIABLO MAINTANENCE MANUAL). SEE FIGURE 5-9 AND 5-10 OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION

F) IF ADJUSTMENT IS NECESSARY THE HEAD CLAMP SCREWS SHOULD BE TIGHTEN AS BELOW: SEE FIGURE 5-7 VIEW E OF THE DIABLO MAINTANENCE MANUAL.

SINGLE HEAD CLAMP SCREWS (MM) AND (NN): 26 in/ozs. OF TORQUE.
DUAL HEAD CLAMP SCREW (PP): 50 in/ozs. OF TORQUE.

2) USING THE DIEX PROGRAM

WARNING: DO NOT ENABLE WRITING!
TO DISABLE WRITING: AFTER BOOTING DIEX, HIT THE "RETURN" KEY.

A) BOOT DIEX, EITHER FROM THE NET OR DISC PACK. DISABLE WRITING!

B) LOAD C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

C) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

CHANNEL # 1 AT TP6 ON J9 MODULE.
CHANNEL # 1 VOLTS PER DIVISION ON 2.0
CHANNEL # 2 AT TP2 ON J10 MODULE.
CHANNEL # 2 VOLTS PER DIVISION ON .2
TIME PER DIVISION ON 5 m sec.
TRIGGER ON: CHANNEL # 1 (-) SLOPE

D) SELECT "FIRST CYL = 00" AND TYPE 105, THEN DEPRESS AND RELEASE THE LEFT MOUSE BUTTON.

E) SELECT "LAST CYL = 202" THEN DEPRESS AND RELEASE THE LEFT MOUSE BUTTON.

F) SELECT "RESTORE DISK" USING THE LEFT MOUSE BUTTON, UNTIL THE DISC DRIVE STATUS REPORTS CYLINDER 105.

G) ADJUST HEADS FOR EQUAL VALLEYS USING THE ADJUSTMENT SCREWS (RR) AND (SS), (FIGURE 5-7 VIEW E OF DIABLO MAINTANENCE MANUAL). SEE FIGURE 5-9 AND 5-10 OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION

H) IF ADJUSTMENT IS NECESSARY THE HEAD CLAMP SCREWS SHOULD BE TIGHTEN AS BELOW: SEE FIGURE 5-7 VIEW E OF THE DIABLO MAINTANENCE MANUAL.

SINGLE HEAD CLAMP SCREWS (MM) AND (NN): 26 in/ozs. OF TORQUE.
DUAL HEAD CLAMP SCREW (PP): 50 in/ozs. OF TORQUE.

TRANSDUCER ADJUSTMENT

1) USING THE SEEK EXERCISER

A) LOAD C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

B) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

CHANNEL # 1 AT TP6 ON J9 MODULE.
CHANNEL # 1 VOLTS PER DIVISION ON 2.0
CHANNEL # 2 AT TP2 ON J10 MODULE.
CHANNEL # 2 VOLTS PER DIVISION ON 2.0
TIME PER DIVISION ON 5 micro. sec.
TRIGGER ON: CHANNEL # 1 (-) SLOPE

C) SETUP THE SEEK EXERCISER AS FOLLOWS:

ADDRESS # 1 SWITCHES IN THE "OFF" POSITION.
ADDRESS # 2 SWITCHES 64, 32, 4 IN THE "ON" POSITION.
ALL OTHER ADDRESS # 2 SWITCHES IN THE "OFF" POSITION.
RESTORE: "ON" POSITION
START: "START" POSITION
STEP MODE: "STEP" POSITION
CYCLE RATE: MIDWAY BETWEEN C/W AND CC/W

D) DO A SEEK TO CYLINDER 100 BY DEPRESSING AND RELEASING THE "STEP PUSHBUTTON" UNTIL THE HEADS ARE AT CYLINDER 100.

E) ALTERNATELY SELECT THE HEADS AND ADJUST THE SECTOR TRANSDUCER, (FIGURE 5-13 A AND B OF DIABLO MAINTANENCE MANUAL) TO POSITION THE FIRST PEAK OF THE ISOLATED PLUSE FROM EACH OF THE HEADS SYMMETRICALLY AROUND THE 30 micro. sec. POINT. SEE FIGURE 5-13 C OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION. THE SEPARATION BETWEEN THE HEADS MUST BE LESS THAN 10 micro. sec.

2) USING THE DIEX PROGRAM

WARNING: DO NOT ENABLE WRITING!
TO DISABLE WRITING: AFTER BOOTING DIEX, HIT THE "RETURN" KEY.

A) BOOT DIEX, EITHER FROM THE NET OR DISC PACK. DISABLE WRITING!

B) LOAD C. E. ALIGNMENT PACK AND BRING UP TO READY STATE.

C) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

CHANNEL # 1 AT TP6 ON J9 MODULE.
CHANNEL # 1 VOLTS PER DIVISION ON 2.0
CHANNEL # 2 AT TP2 ON J10 MODULE.
CHANNEL # 2 VOLTS PER DIVISION ON 2.0
TIME PER DIVISION ON 5 micro. sec.
TRIGGER ON: CHANNEL # 1 (-) SLOPE

D) SELECT "FIRST CYL = 105" AND TYPE 100, THEN DEPRESS AND RELEASE THE LEFT MOUSE BUTTON.

E) SELECT "LAST CYL = 105" THEN DEPRESS AND RELEASE THE LEFT MOUSE BUTTON.

F) SELECT "RESTORE DISK" USING THE LEFT MOUSE BUTTON, UNTIL THE DISC DRIVE STATUS REPORTS CYLINDER 100.

G) ALTERNATELY SELECT THE HEADS AND ADJUST THE SECTOR TRANSDUCER, (FIGURE 5-13 A AND B OF DIABLO MAINTANENCE MANUAL) TO POSITION THE FIRST PEAK OF THE ISOLATED PLUSE FROM EACH OF THE HEADS SYMMETRICALLY AROUND THE 30 micro. sec. POINT. SEE FIGURE 5-13 C OF THE DIABLO MAINTANENCE MANUAL FOR SCOPE PRESENTATION. THE SEPARATION BETWEEN THE HEADS MUST BE LESS THAN 10 micro. sec.

MODEL 31 DISC DRIVE
DATA GATE RETROFIT OF J10 MODULE

1) TO CHECK THE DATA GATE

A) SCOPE CONNECTIONS AND SETUP AS FOLLOWS (TEKTRONIX MODEL 465):

CHANNEL # 1 AT TP3 ON J10 MODULE
CHANNEL # 1 VOLTS PER DIVISION AT 2.0
CHANNEL # 2 AT TP5 ON J10 MODULE
CHANNEL # 2 VOLTS PER DIVISION AT 2.0
TIME PER DIVISION AT .05 micro. sec.
TRIGGER ON: CHANNEL # 1 (-) SLOPE

B) LOAD SCRATCH PACK AND BRING UP TO READY STATE.

C) POSITION CHANNEL # 1 SCOPE TRACE SO THAT THE 50% POINT OF THE FALLING EDGE IS ON THE LEFT SIDE OF THE SCOPE DISPLAY.

D) THERE SHOULD BE TWO FALLING EDGES OF CHANNEL # 2's SCOPE TRACE. THE 50% POINT OF FALLING EDGES SHOULD BE APPROXIMATELY 440 nsec. AND 460 nsec.

NOTE: THE FACTORY SETS THE DATA GATE AT 450 nsec. AND 470 nsec. BUT SPG MANUFACTURING MODIFIES THIS TO APPROXIMATELY 440 nsec. AND 460 nsec.

2) TO VERIFY IF DATA GATE IS CORRECT

A) BOOT DIEX, EITHER FROM THE NET OR DISC PACK. ENABLE WRITING.

B) LOAD SCRATCH PACK AND BRING UP TO READY STATE.

C) RUN DIEX AS YOU NORMALLY WOULD TO CHECK OUT THE MODEL 31 DISC DRIVE. WHILE RUNNING "INIT FULL TEST" MONITOR THE DATA GATE AND VERIFY THAT DURING THE READ PASS THE SCOPE PRESENTATION IS NOT JUMPING AROUND. CHECKSUM ERRORS (04 ERRORS) THAT OCCUR AND ARE TOTALLY RANDOM WITH REGUARDS TO CYLINDER, HEAD, AND SECTOR COULD BE CONSIDERED AS ERRORS CAUSED BY AN INCORRECT DATA GATE.

3) TO MODIFY THE DATA GATE

A) NOTE THE VALUES OF RESISTORS H53 AND F28

B) TO INCREASE THE TIME OF THE DATA GATE, RESISTORS H53 AND F28 NEED TO BE DECREASED IN VALUE.

C) FIND SOME RESISTORS THAT ARE STANDARD VALUES ABOVE OR BELOW THE VALUE NOTED IN STEP A. REPLACE RESISTORS H53 AND F28 WITH THE APPROPRIATE VALUE RESISTORS.

D) RETEST THE DATA GATE TO INSURE IT IS CORRECT.

MODEL 31 DISC DRIVE SPECIAL TOOLS

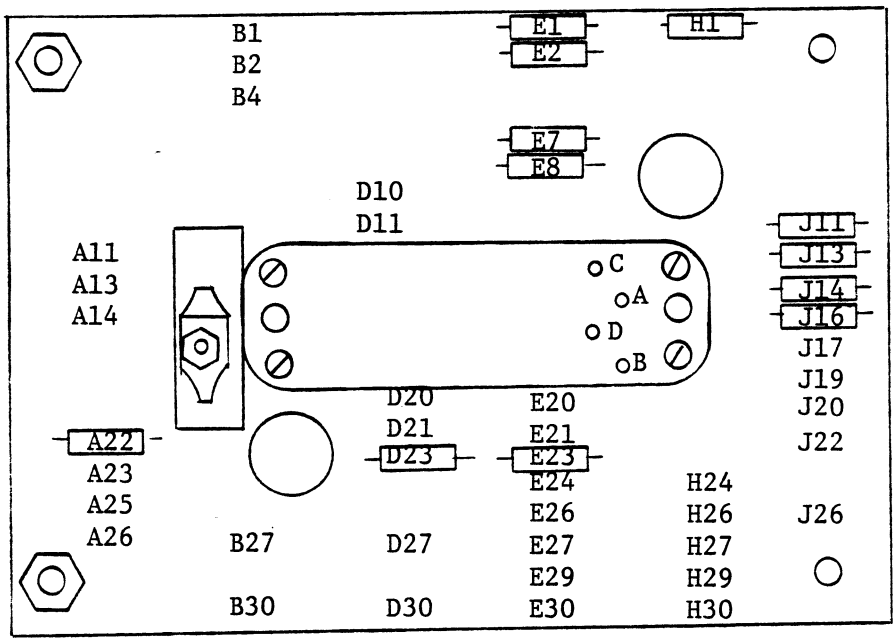
XEROX P/N	DESCRIPTION	VENDOR P/N
600T1372	ALIGNMENT CARTRIDGE	70268
600T1373	SEEK RESTORE EXERCISER	11142
600T1380	TEST TERMINATOR	11075
600T1374	EXTENDER BOARD	11040-01
600T1375	BAR TOOL	15172
600T1376	CONE TOOL	15171
600T1396	TORQUE WRENCH SET	....
ABOVE TORQUE WRENCH SET CONTAINS THE FOLLOWING:		
600T1378	TORQUE WRENCH HANDLE	70342
600T1379	EXTENDER XCELITE MOD.	70345-01
600T1381	BIT XCELITE 99-22	70343
600T383	BIT XCELITE 990764	....

TERMINATOR SERIES 30

P/N 11175-03

FOR ALTO II DISC DRIVE (DIABLO)

FEMALE CONNECTOR



Leave the following resistors on the terminator, clip off the rest:

E1	D23	J11
E2		J13
E7		J14
E8		J16
E23		

Leave on the following caps, clip off the rest:

A22 H1

This leaves the following pins terminated:

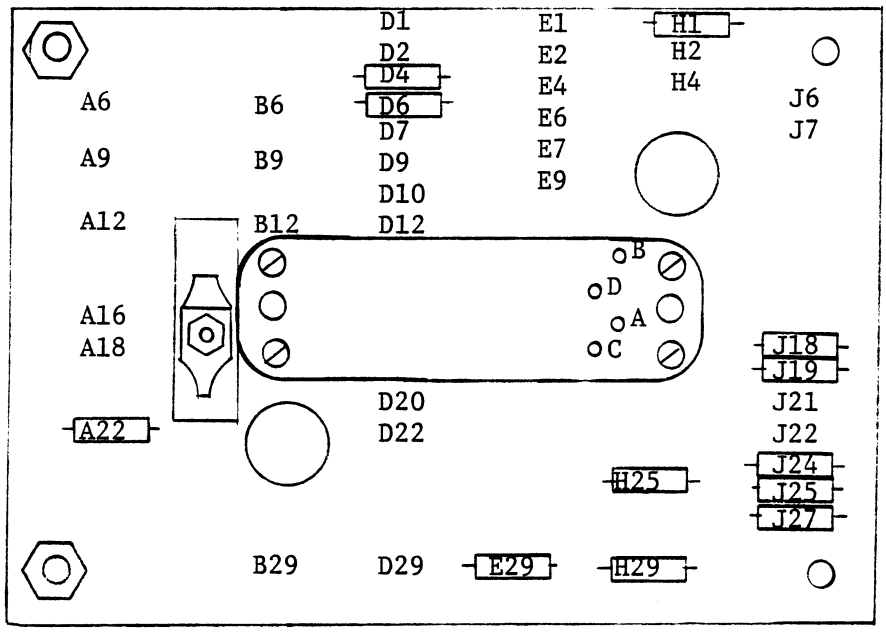
A,C,H,S,V

TERMINATOR SERIES 30

P/N 11174-03

FOR ALTO II DISC DRIVE (DIABLO)

MALE CONNECTOR



Leave the following resistors on the terminator, clip off the rest:

D4	E29	J18	H25
D6		J19	H29
		J24	
		J25	
		J27	

Leave on the following caps, clip off the rest:

A22 H1

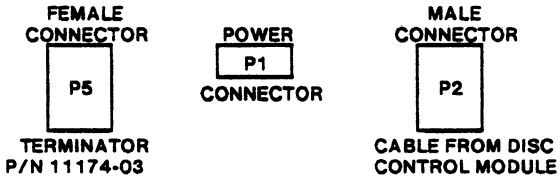
This leaves the following pins terminated:

A,C,H,S,V

DISC DRIVE DAISY CHAINING DIAGRAM

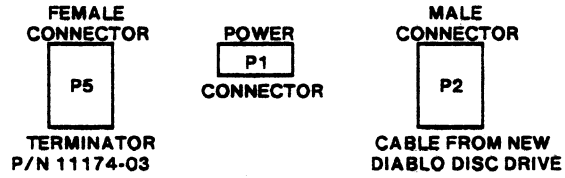
NORMAL VIEW (BACK)

ONE DRIVE

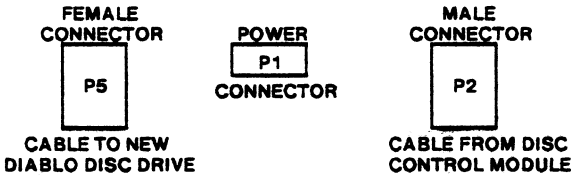


TWO DRIVES

NEW DRIVE



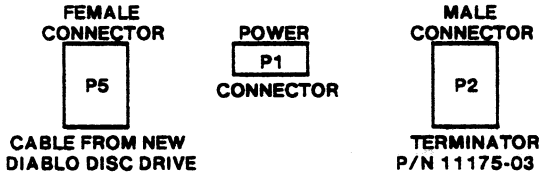
ORIGINAL DRIVE



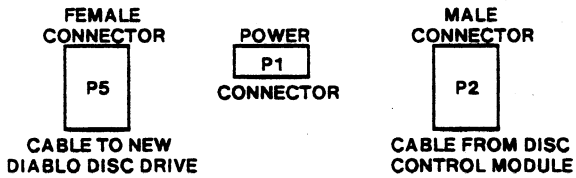
THIS CONFIGURATION REQUIRES ONLY A CABLE P/N 11245-XX

TWO DRIVES

NEW DRIVE



ORIGINAL DRIVE



THIS CONFIGURATION REQUIRES A CABLE P/N 11105-XX AND TERMINATOR P/N 11175-03

NOTE: XX ON CABLE P/N's IS LENGTH IN INCHES. 60" OR 84" ARE AVERAGE LENGTHS.