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53A-307 RELAY DRIVER CARD

OPERATION MANUAL

BFGoodrich
Aerospace

JcAIR Test Systems

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through
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53A-307 RELAY DRIVER CARD

OPERATING MANUAL

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53A-307 RELAY DRIVER CARD

DESCRIPTION

The 53A-307 Relay Driver Card is a printed circuit board assembly for use in a CDSbus 53/63 Series system. The 53A-307 Card enables the 53/63 Series System to control up to 40 independent external relays. The external relays may be randomly opened or closed by transmitting ASCII characters from the system controller to the 53/63 Series System. Diagnostics are provided by LED indicators on the card.

The control output to external relays is through Darlington-pair drivers that can sink up to 100 mA per output. The external voltage to be switched is supplied by the user and may range from 1V DC to 50V DC. The 40 output lines have built-in transient suppression diodes.

CONTROLS AND INDICATORS

The following controls and indicators are provided to select and display the functions of the 53A-307 Card's operating environment.

Address-Select Switch

The 53A-307 Card has a miniature 10-position switch labeled "ADDRESS" that selects the 53A-307 Card's address (0-9) in the 53/63 Series System. The switch's cover opens to allow the address to be reselected. A screwdriver with a narrow, flat blade should be used to turn the cam-action wiper to the desired address position.

Power LED

The Power LED provides a valuable diagnostic tool by giving the system programmer a visual indication of the action which the system is currently taking. Whenever the 53A-307 Card is addressed by the system controller, the Power LED goes out. The LED remains out until another function card is addressed. Since only one function card can be addressed at a time, an unlit Power LED indicates the function card with which the system controller is currently communicating. The Power LED being lit not only indicates that the 53A-307 Card is unaddressed, but that all required dc power (5V dc, "15V dc) is being supplied.

Fuse

The 5V DC power bus has a fuse that protects the system from overloads. If the fuse has blown, the Power LED will not light.

Function LEDS and Switches

LEDs

The following LEDs are provided at the top front edge of the 53A-307 Card to indicate the status of the card's operation:

Range LEDs (0, 10, 20, 30)
One of the four Range LEDs lights to display the range of the Units LEDs. The Range LEDs step each time the Step Switch is depressed.

Units LEDs (0-9)
The Range and Units LEDs together display the state of any output control line.

Example:

The output control lines are numbered 0 through 39. To view the state of line 27, depress the Step switch until Range LED 20 is lit. Now the Units LEDs are displaying lines 20 through 29. If Units LED 7 is lit, this indicates that line 27 is low and conducting current, that is, the coil of the external relay connected to line 27 is energized.

Switches

The following switches are provided to select the proper functions for the 53A-307 Card's operating environment:

Halt Switch

This two-position slide switch is located near the card's backplane edge connector. It selects the state of the 53A-307 Card after an @XH (Halt) or STOP command is received by the 53/63 Series System.

a. In position "Z" (or "C2"), all output bits are set to the "open" state, that is, not conducting current.

b. In position "H" (or "C1"), all output bits hold their present state after a "@XH" command or STOP command is received.

Step Switch

The Step switch is a push button switch located at the bottom front edge of the 53A-307 Card. The programmer can view the state of any output control line (0-39) by stepping through the four decades (0, 10, 20, 30) using the Step switch.

SPECIFICATIONS

Relay Drivers

Capacity:	40 open-collector transistor switches.
Each Transistor Collector-Emitter Saturation Voltage:	1.1V max. at I_c = 100mA.
Max Collector Current (I_c):	100mA.
Collector-Emitter Break-down Voltage:	50V.
*Turn-on Delay:	1Ts max.
*Turn-off Delay:	1Ts max.
	* From the time the L command is received until transistor turns on or off.
Output Driver:	Sprague ULN-2803A. (See Figure I).

Power Requirements:	5V dc power is provided by the internal Power Supply in the 53/63 Series Card Cage.
Voltage:	4.75V to 5.25V DC.
Current:	1.59A maximum, quiescent. 1.65A peak.

NOTE: The power to be switched on and off to the relays is supplied externally by the user.

Cooling:	Provided by the fan in the 53/63 Card Cage.
Temperature:	-10EC to +65EC, operating (assumes ambient temperature of 55E and airflow to assure less than 10EC temperature rise). -40EC to +85EC, storage.
Humidity:	Less than 95% R.H. non-condensing, -10EC to +30EC. Less than 75% R.H. non-condensing, +31EC to +40EC. Less than 45% R.H. non-condensing, +41EC to +55EC.
Dimensions:	197 mm high, 220 mm deep, 13 mm wide. (7.75" x 8.66" x 0.5")
Dimensions, Shipping:	When ordered with a 53/63 Card Cage, the card is installed in one of the card cage's function-card slots. When ordered alone, the shipping dimensions are: 254 mm x 254 mm x 127 mm (10" x 10" x 5")
Weight:	0.23 kg (0.5 lbs)
Weight, Shipping:	When ordered with a 53/63 Card Cage, the card is installed in one of the card cage's function-card slots. When ordered alone, the shipping weight is: 0.64 kg (1.4 lbs)
Mounting Position:	Any orientation.
Mounting Location:	Installs in any function-card slot of the 53/63 Card Cage.
Required Equipment (not supplied):	53A-780 Hooded Connector or 53A-742 Cable.
Equipment Supplied:	53A-307 Relay Driver Card Operating Manual (Part# 00000-13070) Service Manual (Part# 00000-23070)

OPERATION

Overview

The 53A-307 Card is programmed by ASCII character commands sent from the system controller to the 53/63 Series System communications card. The 53A-307 Card interfaces to the communications card through the 53A-002/63A-012 Card Cage backplane.

To address a function card for the first time, the system command "@XY" must be issued. "X" is the mainframe address (0-9) selected on the 53A-171 Control Card for that mainframe; "Y" is the card address (0-9) within that mainframe. The 53A-307 Card address is selected using the card's Address Select Switch. Once a function card is addressed, it remains addressed until the system receives another "@" character. Appendix A fully discusses the "@XY" command and the other 53/63 Series System commands. After the 53A-307 Card is addressed, the following commands may be issued until another function card is addressed.

Command	Description
C or O	The Open and Close commands allow the system controller to open (O) or close (C) an external relay connected to an individual control line. Closed - Conducting current (active low), Units LED lit. Open - Not conducting current. Syntax: CZ_1Z_2L or OZ_1Z_2L Z_1Z_2 represents a decimal number (0 to 39), which is the control line to be open or closed. The output pin controlled as a function of Z_1Z_2 is defined in Appendix B. The state of the control line is updated when the L (load) character is received by the card. Example: The command sequence "@04C1LC30L09L" closes relay 1 and 30, and opens relay 9. In this example, it is assumed that the 53A-307 Card has address 4 and is in mainframe 0. The Power LED is out.
L	The parallel Load command randomly opens or closes all relays controlled by the 53A-307 Card simultaneously. Syntax: Z_{10}. . .Z_1L

The "Z_{10}. . .Z_1" characters represent ten ASCII characters sent by the system controller to control all forty outputs simultaneously. Each of the ten characters controls 4 of the forty outputs with one of 16 ASCII character values. (See Table I and Appendix B, section 2). When the parallel Load command is used, all 10 characters must be output.

The "L" in the command sequence simultaneously loads the data to all forty output lines.

Once this command is issued, the system controller is free to address other function cards.

Example:
The command sequence "@049?76543210L" causes the 53A-307 Card to parallel-load the outputs with 9?76543210. To understand what relay output drivers are turned on or off by this command, refer to Table I and section 2 of Appendix B: For example, the character "9", position Z_{10}, causes the output transistors connected to output control line numbers 39 and 9 to conduct current; the character "?", position Z_9, causes the transistor connected to output control line numbers 8, 18, 28 and 38 to conduct current, and so on. The Power LED is out.

The above example assumes that the 53A-307 Card is at address 4 in mainframe 0.

Table I

Parallel Load ASCII Character Definition

ASCII Output (from system controller)	Relay Driver Card Output (to data receptor) BCD Bit Position
	8 4 2 1
0	0 0 0 0
1	0 0 0 1
2	0 0 1 0
3	0 0 1 1
4	0 1 0 0
5	0 1 0 1
6	0 1 1 0
7	0 1 1 1
8	1 0 0 0
9	1 0 0 1
:	1 0 1 0
;	1 0 1 1
<	1 1 0 0
=	1 1 0 1
>	1 1 1 0
?	1 1 1 1

See Appendix B, section 2, for a list of output pins controlled as a function of character number and bit number.

Command	Description
D	The Delay command causes the 53A-307 Card to delay approximately 1 ms before accepting the next command. This command lets the user program the relays controlled by the 53A-307 Card to be either "make-before-break" or "break-before-make". Example: The command sequence "@04C7LDDD08L" closes relay 7, waits 3 ms, and then opens relay 8, that is, make-before-break. The Power LED is out.
R	The Reset command opens all relays. Example: The command sequence "@04R" opens all the relays, that is, all outputs are not conducting current, and all unit LEDs are out. This example assumes that the 53A-307 Card is at address 4 in mainframe 0.

INSTALLATION

The 53A-307 Card is a function card; therefore, it may be plugged into any blue card slot. Setting the Address Select switch defines the card's programming address. To avoid confusion, it is recommended that the slot number and the programming address be the same.

CAUTION:
To avoid plugging the card in backwards, observe the following:

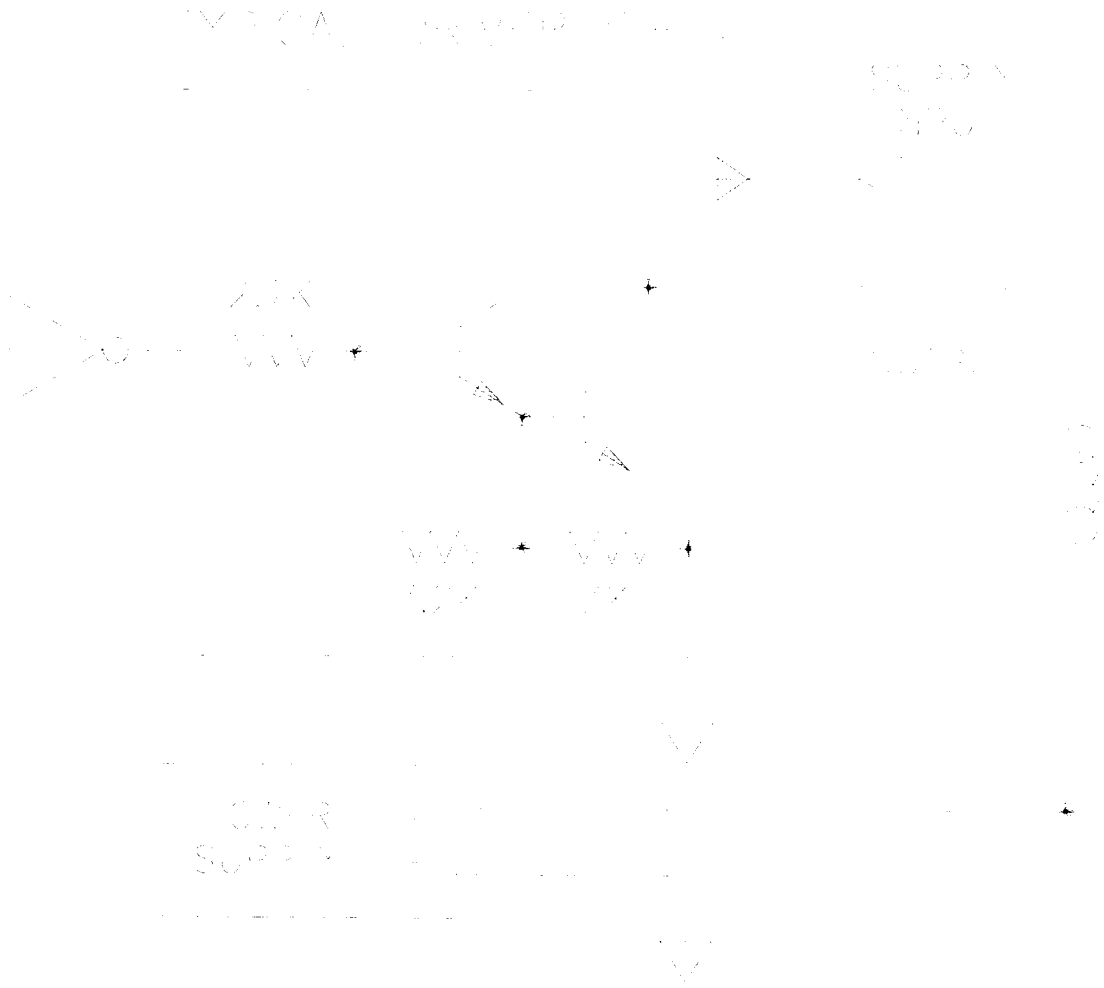
a. Match the keyed slot on the card to the key in the backplane connector. The component side should be to the right for a 53 Series Chassis and to the top for a 63 Series Chassis.

b. There are two ejectors on the card. Make sure the ejector marked "53A-307" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:
The 53A-307 Card is a piece of electronic equipment and therefore has some susceptibility to electrostatic damage (ESD). ESD precautions must be taken whenever the module is handled.

Figure I - TYPICAL DRIVER CIRCUIT

CAUTION:
To avoid damage to the 53A-307 Card from inductive voltage spikes created when relays are turned off, the "Supply Input" must be connected to the positive terminal of the external supply that powers the relay coils.



APPENDIX A

53/63 SERIES SYSTEM COMMANDS

Command	Description
@XY	The "@XY" command addresses a function card in the 53/63 Series System. @ is a delimiter used by the 53/63 Series System. X is a card cage address (0-9) defined by the Address-select Switch on the 53A-171 Control Card in the addressed card cage. Y is a function-card address (0-9) defined by the Address-select Switch on the function card. Once a card cage/function-card combination is addressed, it remains addressed until the 53/63 Series System detects a new @ character.
@XH	The @XH (HALT) command is used to halt all function cards within a mainframe. Individual types of function cards will react differently to the @XH command. However, all function cards, if addressed (Power LED - out) will become unaddressed (Power LED - Lit) after the @XH command. The @XH command affects only the function cards in the mainframe defined by "X". The effect of an @XH command on the 53A-307 Card is determined by the card's Halt Switch.
STOP	The STOP command is not a string of ASCII characters. The command is a hard-wired signal from the system controller (calculator or computer) to the 53/63 Series System communications card in each mainframe. When the system controller issues a STOP command, each function card, including the 53A-307 Card, reacts as if it received the "@XH" command described above. How the system controller executes the STOP command depends on the communications card used. With the 53A-128 IEEE-488 Card, for example, a STOP command is executed when the system controller asserts the IEEE-488 bus line IFC (InterFace Clear) true.

APPENDIX B

FRONT EDGE CONNECTOR PIN ASSIGNMENTS

On the following pages, two pin assignment lists are provided. The first defines the output pins as a function of the Open or Close command. The second defines the output pins as a function of the parallel Load command (10 BCD characters followed by an L). The Open or Close commands and the parallel Load may be used interchangeably to control an output pin. The Open or Close command may be correlated to the parallel Load command by the output pin for the two lists. For example, a C28L command is equivalent to setting BCD bit 4 in Z_9 of the parallel Load command since they both set pin 13 low.

1. Output Pin Assignments as Function of Open or Close Command

OUTPUT CONTROL LINES	OUTPUT PINS
0	11
1	10
2	9
3	8
4	7
5	6
6	5
7	4
8	3
9	2
10	M
11	L
12	K
13	J
14	H
15	F
16	E
17	D
18	C
19	B
20	21
21	20
22	19
23	18
24	17
25	16
26	15
27	14
28	13
29	12
30	Y
31	X
32	W
33	V
34	U
35	T
36	S
37	R
38	P
39	N
SUPP. INPUT	A
GROUND RETURN	24,BB

2. Output Pin Assignments as Function of Parallel Load Command

Digit	BCD BIT (See Table I)	Output Pin
Z_{10} (First Character)	1 2 4 8	2 B 12 N
Z_9	1 2 4 8	3 C 13 P
Z_8	1 2 4 8	4 D 14 R
Z_7	1 2 4 8	5 E 15 S
Z_6	1 2 4 8	6 F 16 T
Z_5	1 2 4 8	7 H 17 U
Z_4	1 2 4 8	8 J 18 V
Z_3	1 2 4 8	9 K 19 W
Z_2	1 2 4 8	10 L 20 X
Z_1 (First Character)	1 2 4 8	11 M 21 Y
Supp. Input Ground Return		A 24,BB

APPENDIX C

LED ASSIGNMENTS

Range LEDs

0
10
20
30

Units LEDs

0
1
2
3
4
5
6
7
8
9

Example: If Range LED 10 and Units LEDs 6 and 9 are lit, then the transistors connected to output bit 16 and 19 are conducting, and the transistors connected to output bits 10, 11, 12, 13, 14, 15, 17, and 18 are not conducting.

53A-307 RELAY DRIVER CARD

SERVICE MANUAL

BFGoodrich
Aerospace

JcAIR Test Systems

WARRANTY

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6/22/98 8103-01-A
through
8604-02-A

JcAIR INC.

NAME: 40 BIT RELAY DRIVER BD 8604-02-A ASSY NO: 53A-307

REVISION: 00 DATE: 03/22/95

ITEM/ SYMBOL	JcAIR P/N	DESCRIPTION	U/M	QTY	MFG	MFG'S P/N
1	41530-30700	P.C. BOARD VERSION 2S 8604	EA	1.00	HARMON	41530-30700
					MCCURDY CIRCUIT	41530-30700
					TEKTRONIX INC.	41530-30700
					UNICIRCUITS	41530-30700
C01	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	15.00	AVX/KYOCERA	SR215E104MAA50VDCW
					KEMET-UNION CAR	C322C104M5U5CA
					SPRAGUE/VISHAY	1C20Z5U104M050B
C02	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C07	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C15	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C16	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C37	21018-15009	CAP FXD ELECT 150UF 75% -10% 16VDCW	EA	1.00	CORNELL-DUBILIE	NLW150-16
					MALLORY CAPACIT	TT16M150A
C91	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C94	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C041	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C042	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C861	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C862	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C931	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C932	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C951	21528-20002	CAP FXD MICA 20PF 5% 500VDCW	EA	1.00	CORNELL-DUBILIE	CD6CD200J03
					CORNELL-DUBILIE	CD6ED200J03
C952	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C971	20128-10006	CAP FXD CER .1UF 20% 50VDCW	EA	-		
C972	21018-10008	CAP FXD ELECT 10UF 75% -10% 16VDCW	EA	1.00	CORNELL-DUBILIE	NLW10-16
					SPRAGUE/VISHAY	TE1155
CR86	32000-04148	DIODE SILICON 75V 1A 5%	EA	2.00	NATIONAL SEMI /	1N4148
CR87	32000-04148	DIODE SILICON 75V 1A 5%	EA	-		
DS01	32000-00103	DIODE LED RED 50MA	EA	1.00	DIALIGHT	550-0103
					DIALIGHT	550-0406
					QUALITY TECHNOL	MV60538.MP7
DS010	32000-02003	DIODE LED RED W/RES	EA	14.00	DIALIGHT	547-2003
					EATON CORPORATI	134LIC
					QUALITY TECHNOL	MR5010.MP1
DS011	32000-02003	DIODE LED RED W/RES	EA	-		
DS012	32000-02003	DIODE LED RED W/RES	EA	-		
DS013	32000-02003	DIODE LED RED W/RES	EA	-		
DS110	32000-02003	DIODE LED RED W/RES	EA	-		
DS111	32000-02003	DIODE LED RED W/RES	EA	-		
DS112	32000-02003	DIODE LED RED W/RES	EA	-		
DS113	32000-02003	DIODE LED RED W/RES	EA	-		
DS114	32000-02003	DIODE LED RED W/RES	EA	-		
DS210	32000-02003	DIODE LED RED W/RES	EA	-		
DS211	32000-02003	DIODE LED RED W/RES	EA	-		
DS212	32000-02003	DIODE LED RED W/RES	EA	-		
DS213	32000-02003	DIODE LED RED W/RES	EA	-		
DS214	32000-02003	DIODE LED RED W/RES	EA	-		

JcAIR INC.

NAME: 40 BIT RELAY DRIVER BD 8604-02-A ASSY NO: 53A-307

REVISION: 00 DATE: 03/22/95

ITEM/ SYMBOL	JcAIR P/N	DESCRIPTION	U/M	QTY	MFG	MFG'S P/N
E1	40401-00307	STAMP 53A-307 STYLE B BLUE	EA	1.00	STU PHILLIPS CO	53A-307
E2	40401-10034	STAMP RLY DRIV STYLE D BLUE	EA	1.00	STU PHILLIPS CO	RLY DRIV
E3	45050-03256	DCL LED 14POS -00498	EA	1.00	GOOD DECAL	45050-03256
E4	45050-03257	DCL LED 14POS BLK -00499	EA	1.00	GOOD DECAL	45050-03257
E5	42050-12671	SWITCH CAP WHITE FOR 8125A	EA	1.00	C & K COMPONENT	8018-1
F07	42202-52001	FUSE SUB-MIN 2AMP	EA	1.00	LITTLEFUSE INC.	251002
					SAN-O	SP5-2A
R01	10117-33003	RES COMP 330 1-4W 5%	EA	1.00	ALLEN-BRADLEY C	RC07GF331J
					NIC	NIC-NCF25-330
					ROHM CORP.	R25JE-330-5%
R06	10117-10004	RES COMP 1K 1-4W 5%	EA	4.00	ALLEN-BRADLEY C	RC07GF102J
					ROHM CORP.	R25JE-1K-5%
R07	10117-10005	RES COMP 10K 1-4W 5%	EA	4.00	ALLEN-BRADLEY C	RC07GF103J
					ROHM CORP.	R25JE-10K-5%
R17	10117-10005	RES COMP 10K 1-4W 5%	EA	-		
R25	10117-10004	RES COMP 1K 1-4W 5%	EA	-		
R35	10117-10004	RES COMP 1K 1-4W 5%	EA	-		
R86	10117-33005	RES COMP 33K 1-4W 5%	EA	1.00	ALLEN-BRADLEY C	RC07GF333J
					ROHM CORP.	R25JE-33K-5%
R87	10117-10005	RES COMP 10K 1-4W 5%	EA	-		
R95	10117-10005	RES COMP 10K 1-4W 5%	EA	-		
R97	10117-10004	RES COMP 1K 1-4W 5%	EA	-		
S77	42050-10010	SWITCH 10POS.	EA	1.00	JcAIR	42050-10010
S91	42050-12670	SWITCH MOM SPDT PC BRD MNT	EA	1.00	C & K COMPONENT	8125SD9ABE
S93	42050-10121	SWITCH DIP 1POS DPDT	EA	1.00	GRAYHILL INC.	76SD01S
U02	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	10.00	TEXAS INSTR. IN	74276 TI ONLY
U03	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	8.00	MOTOROLA SEMICO	SN74LS259
					NATIONAL SEMI /	DM74LS259
U04	79005-74153	IC TTL DUAL 4-TO-1 DATA SELECTOR	EA	5.00	NATIONAL SEMI /	DM74153
					TEXAS INSTR. IN	74153
U05	79000-07442	IC TTL BCD-TO-DECIMAL DECODER	EA	2.00	NATIONAL SEMI /	DM7442
					TEXAS INSTR. IN	7442
U06	71202-74161	IC TTL BINARY COUNTER SYNCHRONOUS 4-BIT	EA	1.00	TEXAS INSTR. IN	74161
U07	76600-07400	IC TTL QUAD 2-INPUT NAND GATE	EA	5.00	NATIONAL SEMI /	DM7400
					TEXAS INSTR. IN	7400
U12	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U13	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U14	79005-74153	IC TTL DUAL 4-TO-1 DATA SELECTOR	EA	-		
U15	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	9.00	NATIONAL SEMI /	DM7402
					TEXAS INSTR. IN	7402
U16	76600-07400	IC TTL QUAD 2-INPUT NAND GATE	EA	-		
U17	73310-74240	IC TTL LS OCTAL BUFFER	EA	2.00	MOTOROLA SEMICO	SN74LS240
					NATIONAL SEMI /	DM74LS240
					TEXAS INSTR. IN	74LS240
U22	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U23	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U24	79005-74153	IC TTL DUAL 4-TO-1 DATA SELECTOR	EA	-		

NAME: 40 BIT RELAY DRIVER BD 8604-02-A ASSY NO: 53A-307

REVISION: 00 DATE: 03/22/95

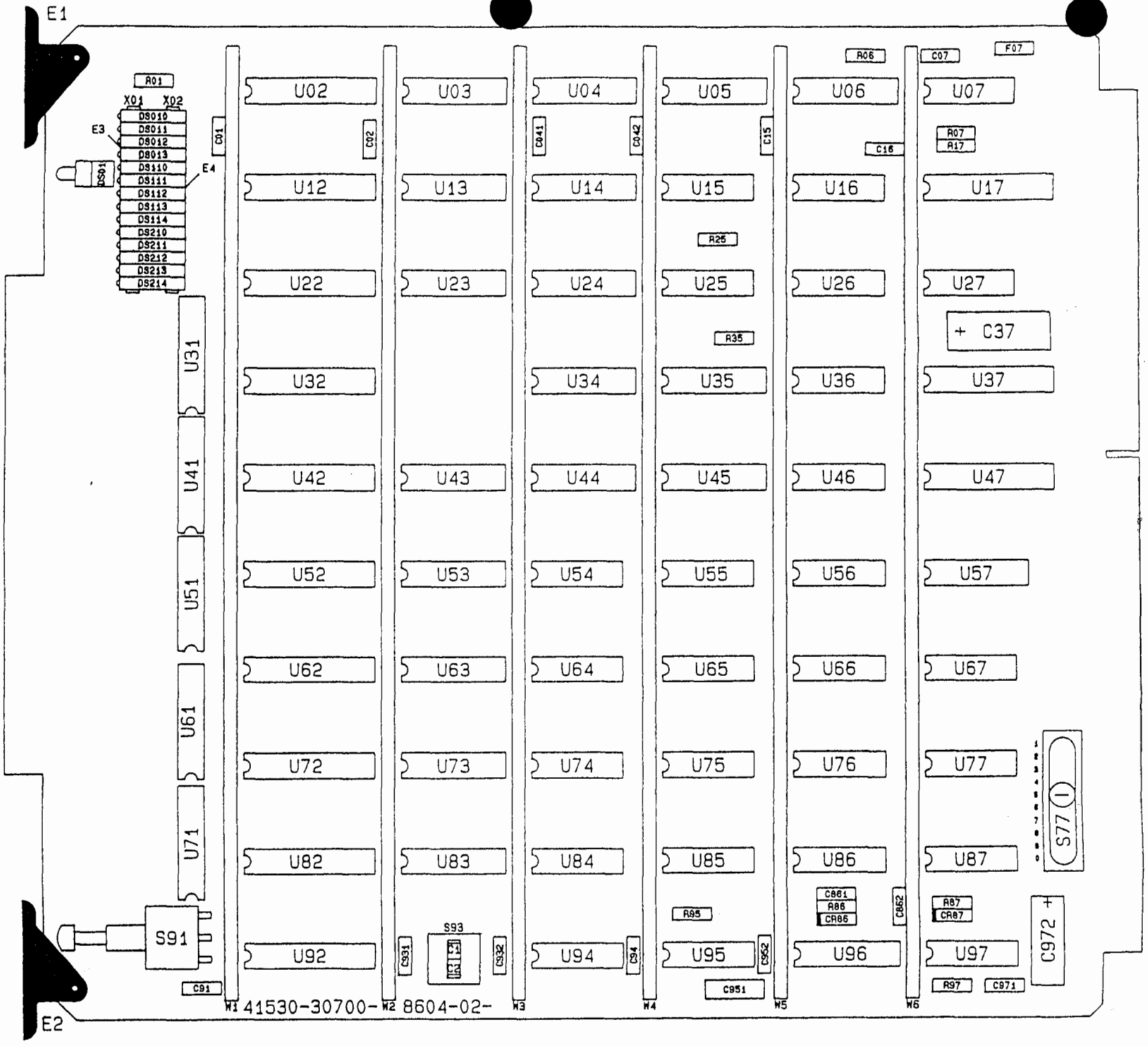
ITEM/ SYMBOL	JcAIR P/N	DESCRIPTION	U/M	QTY	MFG	MFG'S P/N
U25	76601-07438	IC TTL QUAD 2-INPUT NAND BUFFER W-OC	EA	1.00	NATIONAL SEMI /	DM7438
					TEXAS INSTR. IN	7438
U26	73300-07404	IC TTL HEX INVERTER	EA	3.00	NATIONAL SEMI /	DM7404
					TEXAS INSTR. IN	7404
U27	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U31	73405-02803	IC HIGH-VLT-CUR DARLINGTON TRANS ARRAY	EA	5.00	ALLEGRO	ULN2803A
					MOTOROLA SEMICO	ULN2803A
					SGS/THOMPSON MO	ULN2803A
U32	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U34	79005-74153	IC TTL DUAL 4-TO-1 DATA SELECTOR	EA	-		
U35	79910-74157	IC TTL QUAD 2-TO-1 LINE DATE SELECTOR-MU	EA	1.00	NATIONAL SEMI /	DM74157
					TEXAS INSTR. IN	74157
U36	76600-07400	IC TTL QUAD 2-INPUT NAND GATE	EA	-		
U37	73310-74240	IC TTL LS OCTAL BUFFER	EA	-		
U41	73405-02803	IC HIGH-VLT-CUR DARLINGTON TRANS ARRAY	EA	-		
U42	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U43	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U44	79005-74153	IC TTL DUAL 4-TO-1 DATA SELECTOR	EA	-		
U45	71200-74192	IC TTL COUNTER SYNCH UP-DOWN	EA	1.00	TEXAS INSTR. IN	74192
U46	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U47	73000-74273	IC TTL OCTAL FLIP-FLOP D-TYPE	EA	1.00	TEXAS INSTR. IN	74273
U51	73405-02803	IC HIGH-VLT-CUR DARLINGTON TRANS ARRAY	EA	-		
U52	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U53	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U54	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U55	77200-07408	IC TTL QUAD 2-INPUT AND GATE	EA	2.00	NATIONAL SEMI /	DM7408
					TEXAS INSTR. IN	7408
U56	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U57	79000-07442	IC TTL BCD-TO-DECIMAL DECODER	EA	-		
U61	73405-02803	IC HIGH-VLT-CUR DARLINGTON TRANS ARRAY	EA	-		
U62	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U63	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U64	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U65	77200-07408	IC TTL QUAD 2-INPUT AND GATE	EA	-		
U66	76600-07430	IC TTL 8-INPUT NAND GATE	EA	3.00	NATIONAL SEMI /	DM7430
					TEXAS INSTR. IN	7430
U67	76600-07410	IC TTL TRIPLE 3-INPUT NAND GATE	EA	1.00	NATIONAL SEMI /	DM7410
					TEXAS INSTR. IN	7410
U71	73405-02803	IC HIGH-VLT-CUR DARLINGTON TRANS ARRAY	EA	-		
U72	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U73	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		
U74	76600-07430	IC TTL 8-INPUT NAND GATE	EA	-		
U75	76600-07420	IC TTL DUAL 4-INPUT NAND GATE	EA	1.00	NATIONAL SEMI /	DM7420
					TEXAS INSTR. IN	7420
U76	76600-07430	IC TTL 8-INPUT NAND GATE	EA	-		
U77	73300-07404	IC TTL HEX INVERTER	EA	-		
U82	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U83	73601-74259	IC TTL LS QUAD BISTABLE LATCH	EA	-		

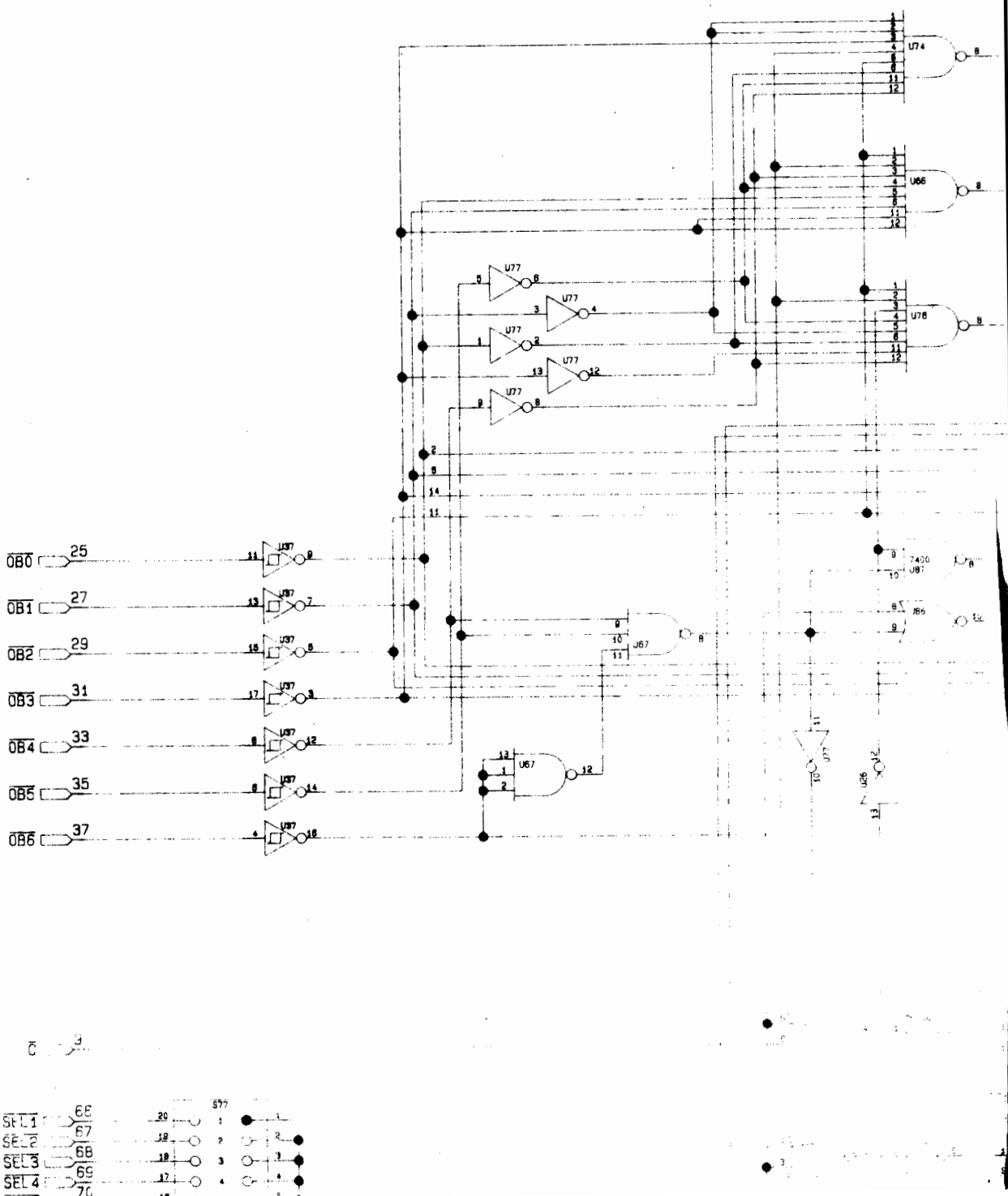
JcAIR INC.

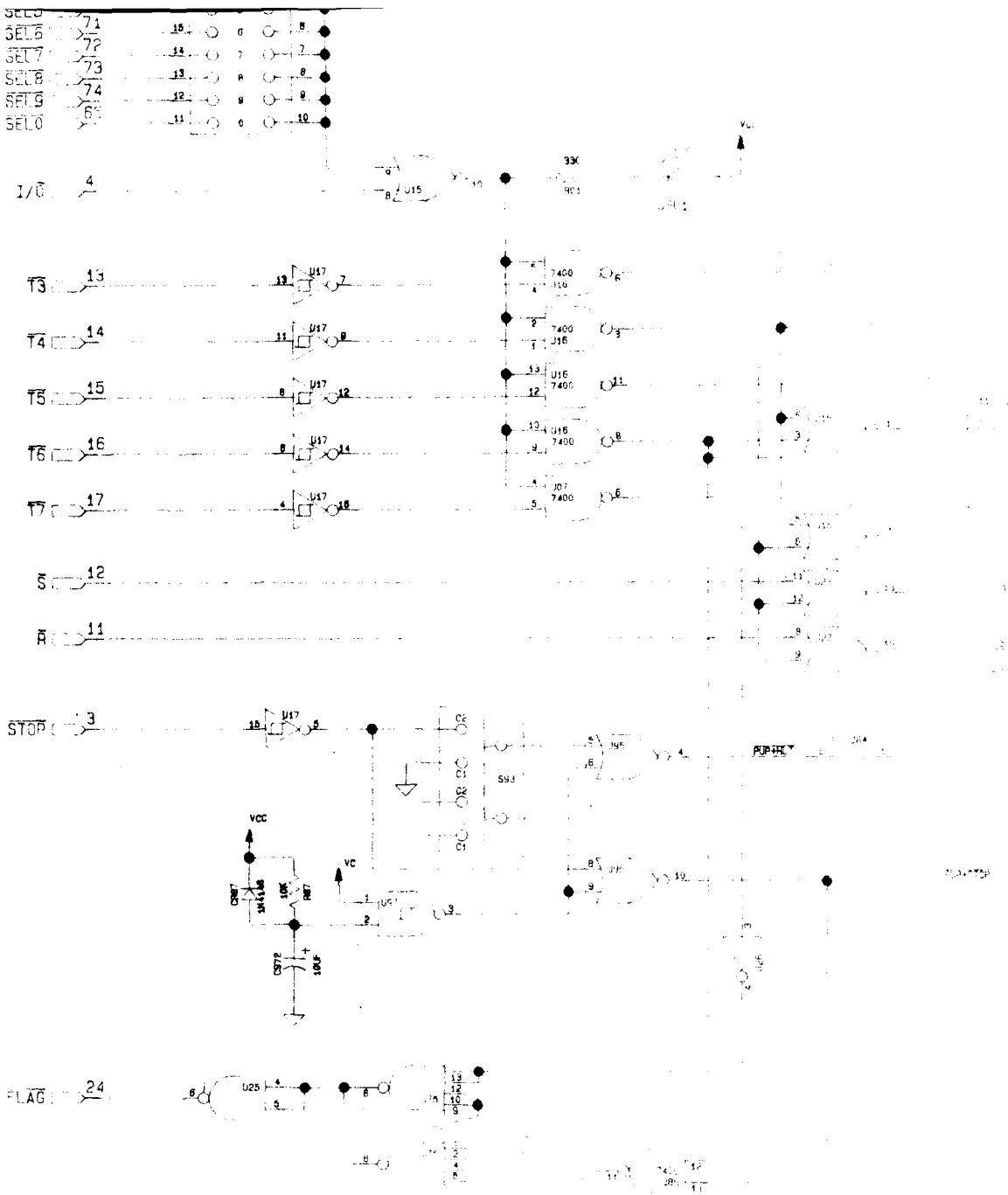
NAME: 40 BIT RELAY DRIVER BD 8604-02-A ASSY NO: 53A-307

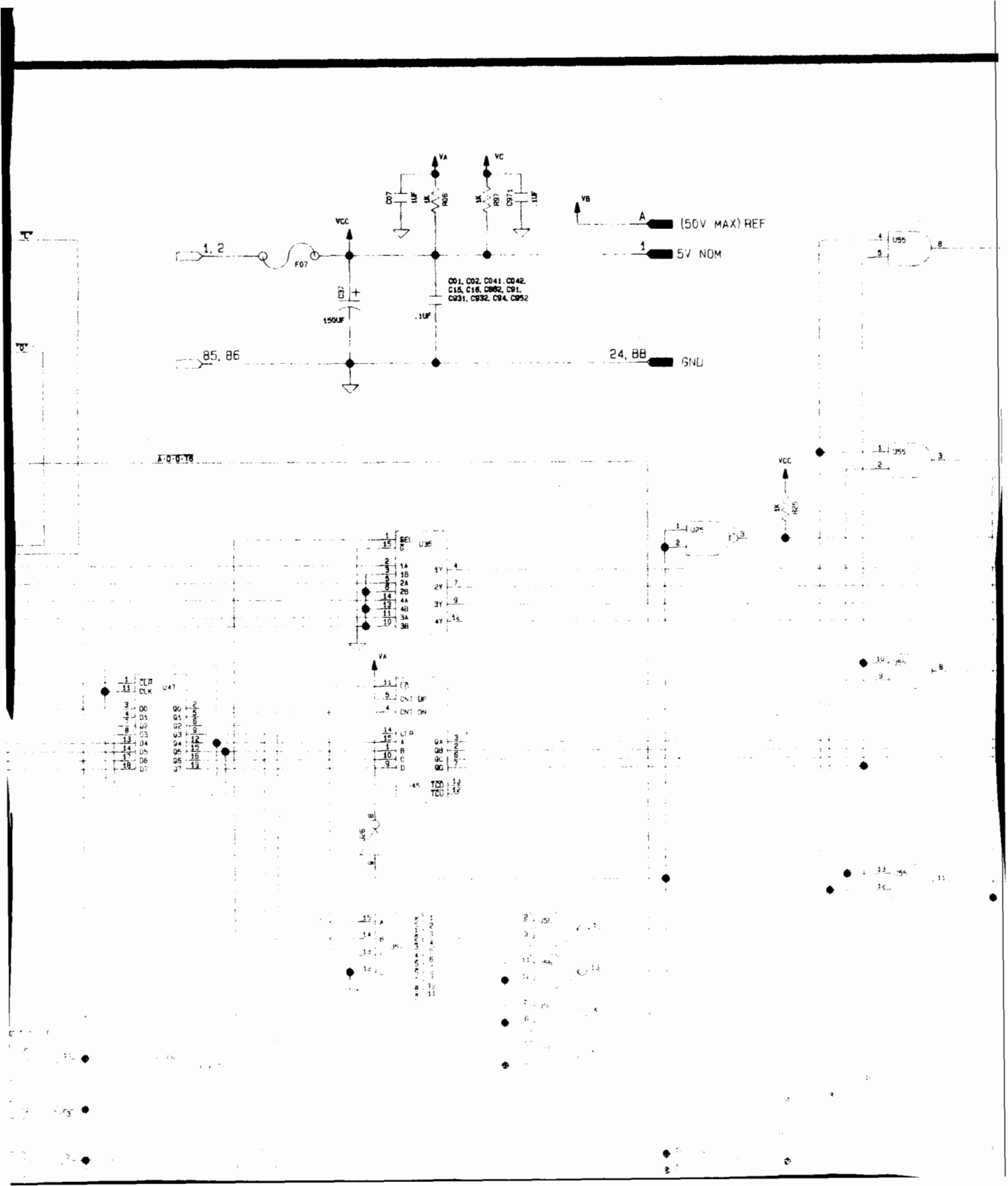
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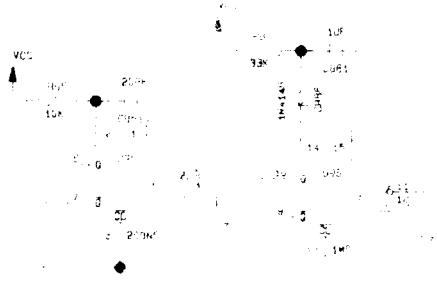
ITEM/ SYMBOL	JcAIR P/N	DESCRIPTION	U/M	QTY	MFG	MFG'S P/N
U84	73300-07404	IC TTL HEX INVERTER	EA	-		
U85	76600-07400	IC TTL QUAD 2-INPUT NAND GATE	EA	-		
U86	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U87	76600-07400	IC TTL QUAD 2-INPUT NAND GATE	EA	-		
U92	73000-74276	IC TTL QUAD FLIP-FLOP J-K	EA	-		
U94	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U95	76900-07402	IC TTL QUAD 2-INPUT NOR GATE	EA	-		
U96	74200-09602	IC TTL DUAL RETRIGGERABLE MONOSTABLE	EA	1.00	FAIRCHILD	DM9602N
					NATIONAL SEMI /	DM8602N
					NATIONAL SEMI /	DM9602
U97	78400-74132	IC TTL QUAD 2-INPUT NAND SCHMITT TRIGGER	EA	1.00	NATIONAL SEMI /	DM74132
					TEXAS INSTR. IN	74132
W1	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	6.00	CIRCUIT COMPONE	M-833 9.75.3
					ELDRE	6102-6-10.3
W2	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	-		
W3	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	-		
W4	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	-		
W5	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	-		
W6	93517-75397	BUS BAR P.75 F.3 X9 L7.2 1	EA	-		
X01	45010-14100	SOCKET SIP 14 PIN	EA	2.00	CIRCUIT ASSEMBL	CAS-14VSC-12B
					STANFORD APPLIE	CSA3000-14BC
X02	45010-14100	SOCKET SIP 14 PIN	EA	-		
REF0	53A-307	40 BIT RELAY DRIVER BD 8604-02-A	EA	-		

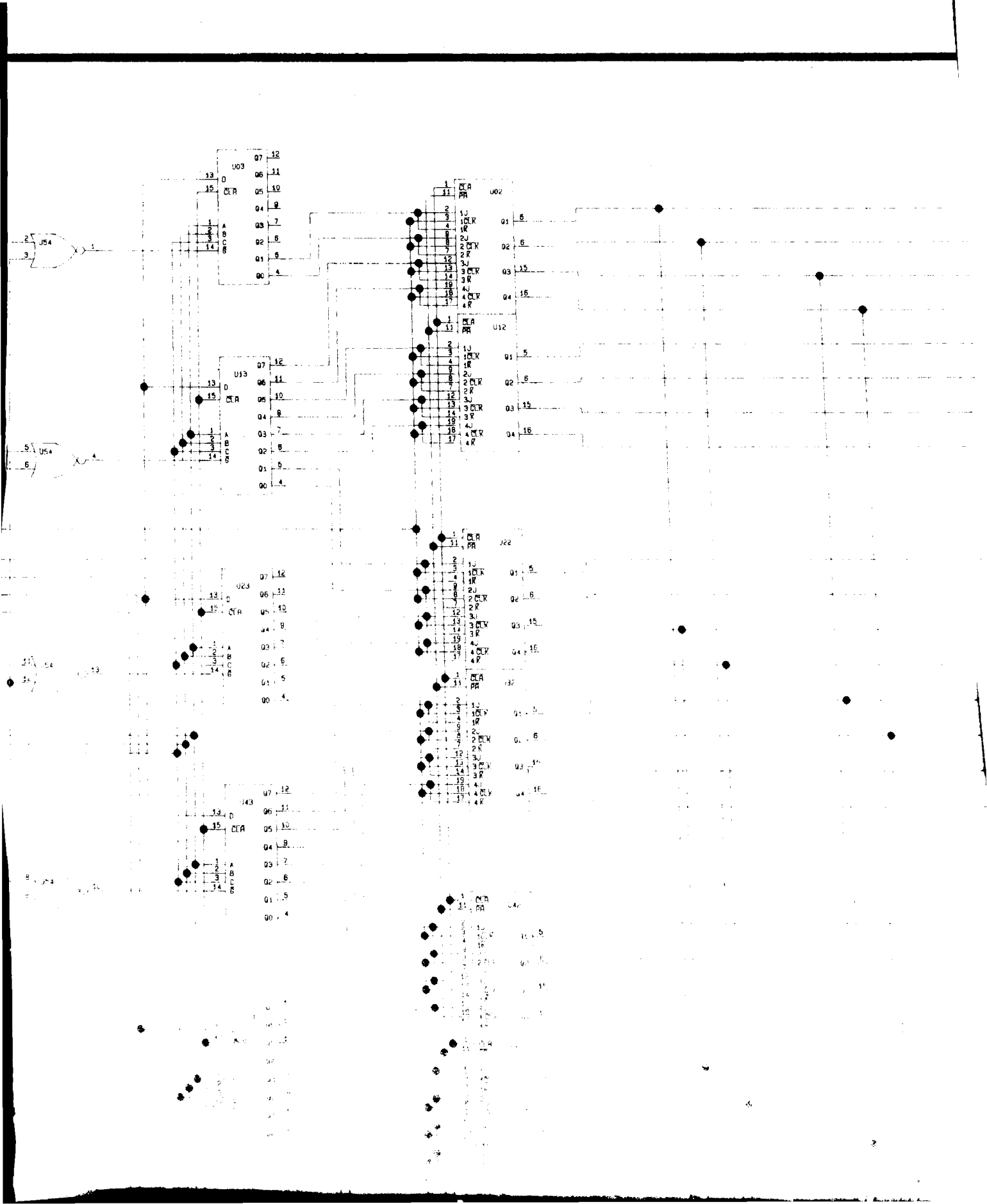

E1
E2
E3
E4
X01
X02
DS010
DS011
DS012
DS013
DS110
DS111
DS112
DS113
DS114
DS210
DS211
DS212
DS213
DS214
DS01
A01
C01
C02
C041
C042
C15
A06
C07
F07
C16
A07
A17
A25
A35
+ C37
S91
S93
C91
C931
C932
C94
C951
C952
A85
C861
A86
CR86
C862
A87
CR87
R97
C971
C972 +
S77
W1
W2
W3
W4
W5
W6
41530-30700-
8604-02-
U02
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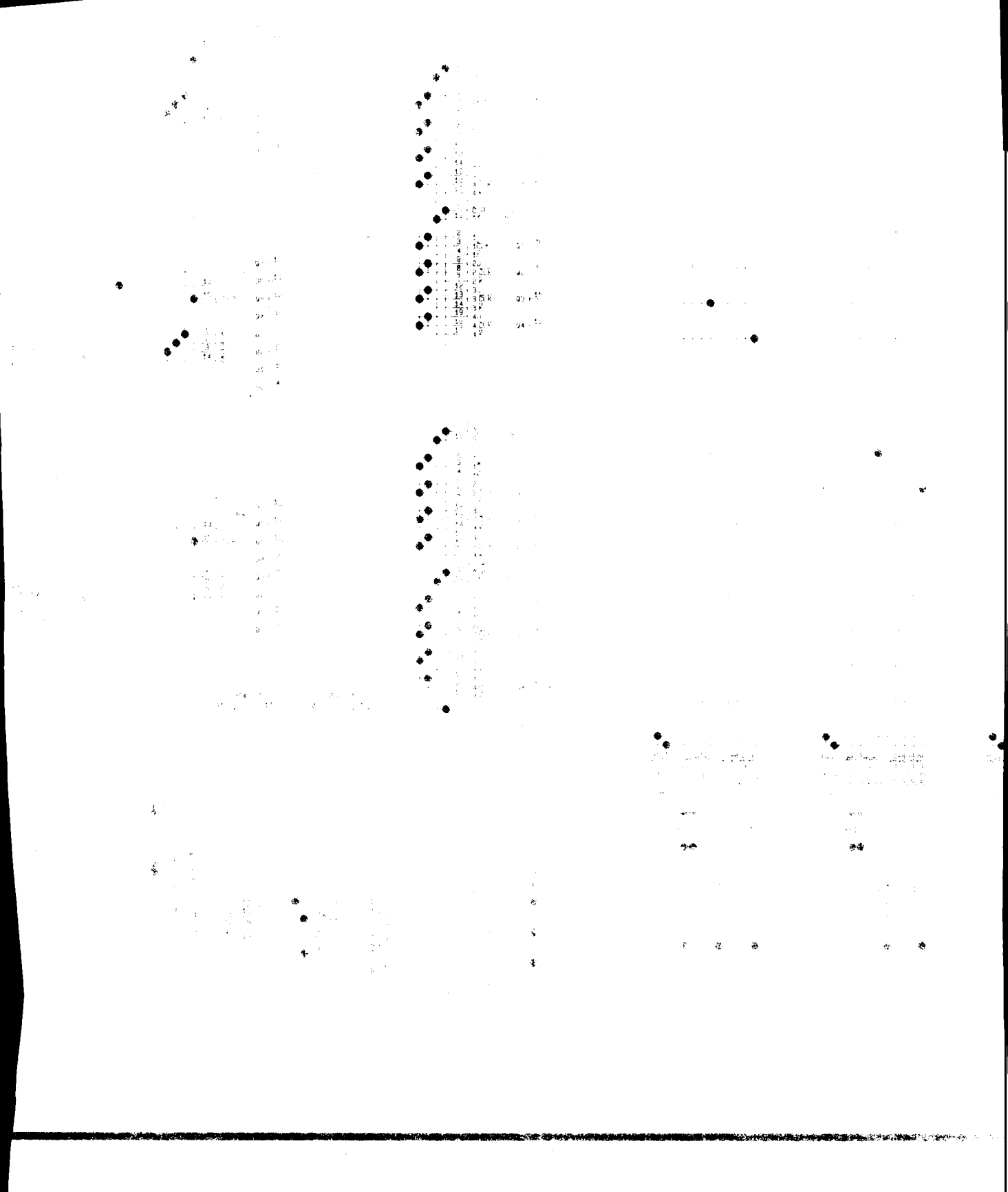

OB0
OB1
OB2
OB3
OB4
OB5
OB6
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27
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37
U74
U66
U76
U77
U67
U37
7400
U87
U85
U86
SEL1
SEL2
SEL3
SEL4
39
67
68
69
70
SW7

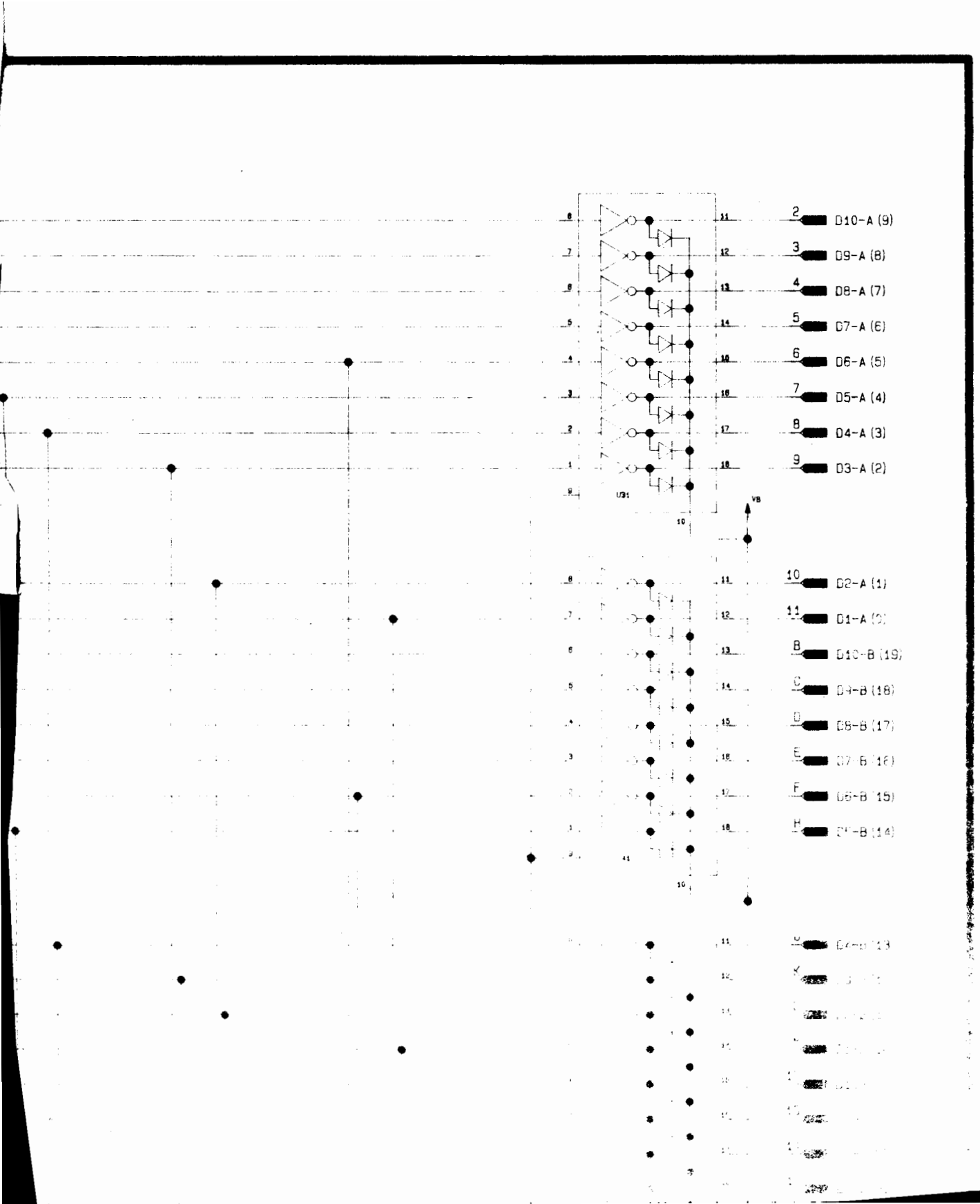

SEL5 71
SEL6 72
SEL7 73
SEL8 74
SEL9 69
SEL0 70
I/O 4
T3 13
T4 14
T5 15
T6 16
T7 17
S 12
R 11
STOP 3
FLAG 24
VCC
VC

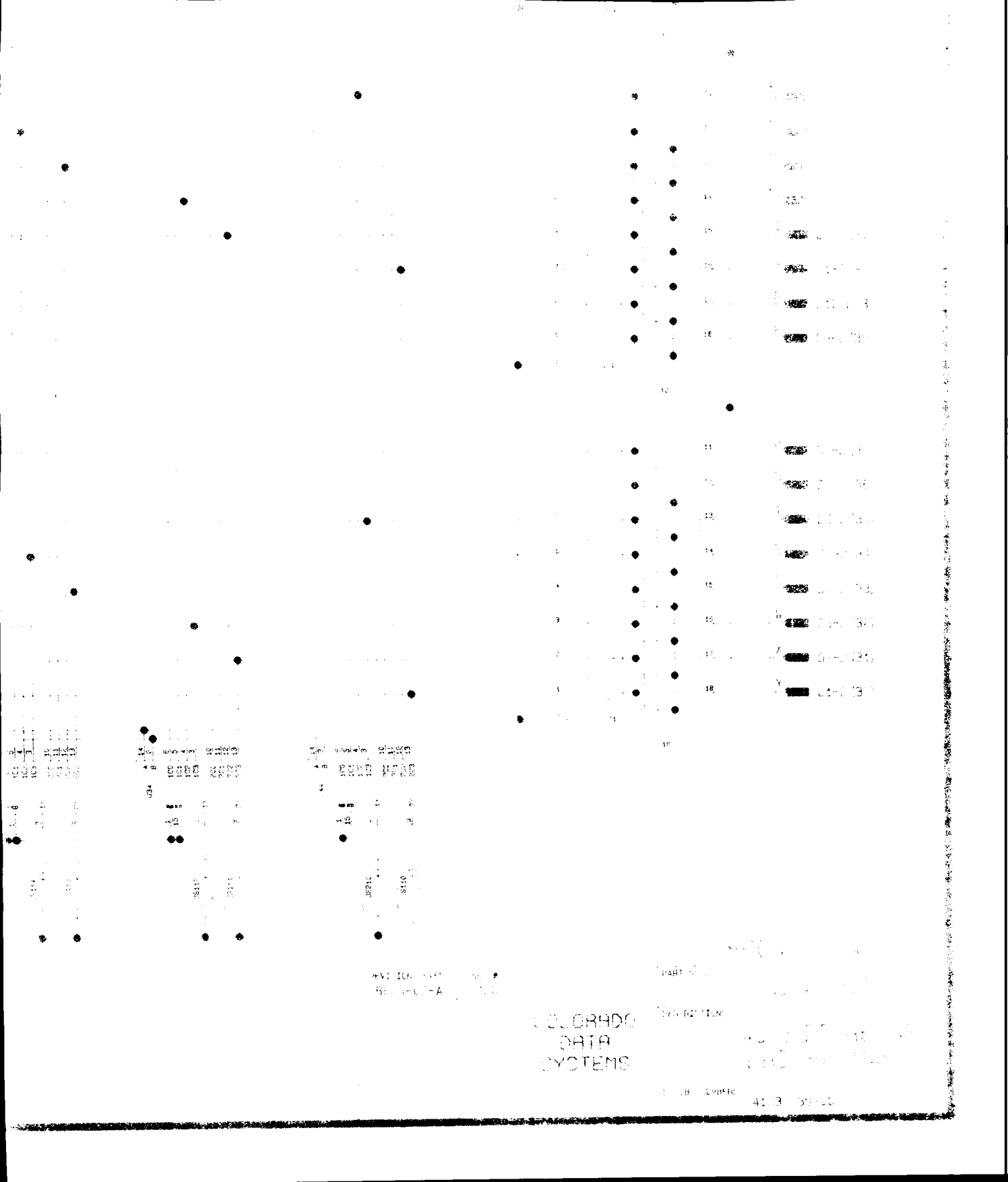

VA
VC
VB
VCC
C07
1UF
R06
1K
R07
C071
1UF
1, 2
F07
C37
150UF
.1UF
C01, C02, C041, C042, C15, C16, C062, C91, C931, C932, C94, C952
85, 86
24, 88
GND
A
(50V MAX) REF
1
5V NOM
U55
U25
R25
U35
U47
U45
J46


VCC
10K
20pF
1uF
33K
1M+1M
33pF
20K






2 D10-A (9)
3 D9-A (8)
4 D8-A (7)
5 D7-A (6)
6 D6-A (5)
7 D5-A (4)
8 D4-A (3)
9 D3-A (2)
VB
10 D2-A (1)
11 D1-A (2)
B D10-B (19)
C D9-B (18)
D D8-B (17)
E D7-B (16)
F D6-B (15)
H D5-B (14)



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