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53A-333 REED RELAY SCANNER CARD

OPERATING MANUAL

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53A-333 REED RELAY SCANNER CARD

OPERATING MANUAL

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53A-333 REED RELAY SCANNER CARD

DESCRIPTION

The 53A-333 Reed Relay Scanner Card is a printed circuit board assembly for use in a CDS 53/63 System. The 53A-333 Card provides fifteen 3-wire channels of analog signal acquisition, and routes any one of fifteen input channels to a common bus at a switching rate of 150 channels per second. A channel can be randomly selected (closed) by transmitting ASCII characters from the system controller to the 53/63 System.

Up to ten 53A-333 Cards can be plugged into a single 53A-002 Card Cage or up to five 53A-333 Cards can be plugged into a 63A-012 Card Cage to provide scanning of up to 150 or 75 channels, respectively. As many as ten 53A-002 or 63A-012 Card Cages can be chained together to provide a system with up to fifteen hundred (using 53A-002 Card Cages) or seven hundred fifty (using 63A-012 Card Cages) 3-wire input channels. If desired, 53A-331 (ten 4-wire channels), 53A-334 (thirty-two 1-wire channels), 53A-332 (twenty 2-wire channels) Reed Relay Scanner Cards or 53A-336 (sixteen 2-wire channels) High Voltage Scanner Cads can be mixed with 53A-333 Cards in the same card cage.

Diagnostics include indicator LEDs and a readback feature that returns a two-digit number to the system controller indicating the number of the closed channel. The readback feature uses a fourth pole on each relay to test all 53A-333 Card circuitry including the relay coils. If there is more than one relay closed at the same time, an error code is generated.

CONTROLS AND INDICATORS

The following controls and indicators are provided to select and display the functions of the 53A-333 Card's operating environment.

Address-Select Switch

The 53A-333 Card has a miniature 10-position switch labeled "ADDRESS" that selects the 53A-333 Card's address (0-9) in the 53/63 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-333 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-333 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-333 Card to indicate the status of the card's operation:

Channel LEDs

The column of 12 LEDs near the front-edge connector indicate the specific scanner channel closed. If the closed channel is between 0 and 9, the "0X" LED and one of the LEDs marked "0" through "9" is lit; if the closed channel is between 10 and 14, the "1X" LED and one of the LEDs marked "0" through "4" is lit. Any other combination indicates an error.

Switches

The following switches are provided to select the proper functions for the 53A-333 Card's operating environment:

Scan Clear Switch

At the rear of the 53A-333 Card is a 1-section rocker switch that determines if the card is to open all its channels when a channel is closed on another scanner card (53A-331, 53A-332, 53A,333, 53A-334, 53A-336):

Rocker Setting	Results
C1	a. A closed channel on this card is opened when a channel is closed on another scanner card.
	b. Closing a channel on this card sends a "clear" pulse to all other scanner cards.
C2	a. Closing channels on other scanner cards has no effect on this card.
	b. When a channel is closed on this card, a "clear" pulse is not sent to other scanner cards.

Analog Bus Switch

At the bottom front center of the 53A-333 Card is a 2-section rocker switch that connects the common output lines (Common High, Low, and Guard) of the scanner to the analog backplane bus (Backplane High, Low, and Guard) of the 53A-002/63A-012 Card Cage:

Rocker Setting	Results
C1, C4	Common High, Low, Guard are connected to Backplane High, Low, and Guard, respectively.
C1, C3	Common High and Low are connected to Backplane High and Low, respectively. Common Guard is disconnected from the analog backplane bus.
C2, C4	Common Guard is connected to Backplane Guard. Common High and Low are disconnected from the analog backplane bus.
C2, C3	Common High, Low, and Guard are disconnected from the analog backplane bus.

Bus Resistance Switch

At the bottom rear center of the 53A-333 Card is a 2-section rocker switch which may be used to connect 1-megohm resistors from Common High to ground, from Common Low to Ground or from Common Guard to ground of the 53/63 System. When high voltages are being switched by the card, the resistors can be switched in and used to discharge the backplane analog bus between scanner channel closings so that the maximum switching voltage specifications of the card are not exceeded. See Appendix C for applications information on using this switch.

Rocker Settings	Results
C1, C3	Disconnect 1-megohm resistors from the scanner common bus.
C2, C4	Connect 1-megohm resistors between Common High, Common Low, Common Guard and Ground.
C1, C4	Connect 1-megohm resistor between Common Guard and Ground only.
C2, C3	Connect 1-megohm resistors between Common High, Common Low and Ground only.

SPECIFICATIONS

Configuration:	15-channel, 3-wire scanner.
Relay Type:	4-pole, form A (3 poles for 3-wire scanner; 1 pole for self-test).
Relay Manufacturer:	Coto - model 7004-5054 or equivalent.
Contacts:	
Maximum Switching Power (resistive):	10W.
Maximum Switching Voltage:	200V DC (see Appendix C). 130V AC RMS, balanced input. 75V AC RMS, one side grounded. 90V AC RMS, one side grounded. * * Maximum voltage with S95 switch in the C2, C4 position.
Maximum Switching Current:	0.5 amps.
Initial Contact Resistance:	Less than 150 milliohms (dry circuit). Less than 200 milliohms (1.5 milliseconds or more after coil energized, 0.5V at 50mA).
Final Contact Resistance (End of Reed Life):	Less than 1 ohm.
Dielectric Strength:	250V (between contacts).
Reed Life:	10^8 operations/channel at 1V DC/1V p-p at less than 10 mA (dry circuit). 10^7 ops/channel - 30V DC/30V p-p at 300 mA. 10^6 ops/channel - 20V DC/20V p-p at 500 mA.
Duty:	Continuous.
Scanning Rate:	Random channels selected at greater than 150 channels per second.
Signal Path Specifications:	These specifications include the effects of the card cage backplane; they are valid at the analog output connector on the backplane:
Differential Thermal Offset:	Less than 10 µV.
Single-Line Thermal Offset:	Less than 40 µV.
Initial Signal Path Resistance:	Less than 400 milliohms.

Final Signal Path Resistance (End of Reed Life):	Less than 1.4 ohms.
Insulation Resistance:	Greater than 10 gigohms between all insulated parts.
Crosstalk Between Channels:	1 kHz - less than -90 dB. 10 kHz - less than -80 dB. 100 kHz - less than -62 dB. 1 MHz - less than -56 dB. Crosstalk measurements are made at the common output with a closed channel terminated by 600 ohms; signal is applied to channels not selected.
Power-Up:	On power-up, the 53A-333 Card is unaddressed (power LED lit), and all channels are open (channel LEDs out).
Power-Down:	On power-down, the 53A-333 Card has all channels open (channel LEDs out).
Power Requirements:	5V DC from the 53A-060 power supply in the 53A-002 Card Cage, and the 63A-070 power supply in the 63A-012 Card Cage.
Voltage:	4.57V DC to 5.25V DC.
Current:	0.80 A max. quiescent. 0.85 A peak.
Cooling:	Provided by the fan in the 53/63 Card Cage.
Temperature:	-10 °C to +65 °C, operating (assumes ambient temperature of 55 ° and airflow to assure less than 10 °C temperature rise). -40 °C to +85 °C, storage.
Humidity:	Less than 95% R.H. noncondensing.
Dimensions:	197mm high, 220mm deep, 13mm wide. (7.5" 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 function card slots. When ordered alone, the shipping dimensions are: 254mm x 254mm x 127mm. (10" x 10" x 5").
Weight:	0.46 kg. (1.0 lbs).

Weight, Shipping:	When ordered with a 53/63 Card Cage, the card is installed in one of the card cage function card slots. When ordered alone, the shipping weight is: 0.92 kg. (2.0 lbs).
Mounting Position:	Any orientation.
Mounting Location:	Installs in any function-card slot of the 53/63 Series Card Cage.
Input Connection:	A 48-pin card-edge hooded connector (53A-780) or the 53A-720 Analog Cable provides a connection for all analog signal inputs and common outputs.
Output Connection:	The analog output is connected through either the 48-pin front-edge connector of the 53A-333 Card or the analog output connector on the 53A-002 or 63A-012 Card Cage backplane.
Required Equipment (Not Supplied):	53A-780 Hooded Connector or the 53A-720 Analog Cable.
Equipment Supplied:	53A-333 Reed Relay Scanner Card. Spare Fuse (Part #42202-52001). Operating Manual (Part #00000-13330). Service Manual (Part #00000-23330).

OPERATION

Overview

The 53A-333 Reed Relay Scanner Card is programmed by ASCII characters issued from the system controller to the 53/63 System's communications card. The 53A-333 Card is interfaced to the communications card through the 53 Series or 63 Series Card Cage's backplane.

When a command is issued to close a channel on the 53A-333 Card, all channels on all scanner cards (53A-331, 53A-332, 53A-333, 53A-334, and 53A-336) are automatically opened. This feature prevents accidentally connecting more than one set of scanner input lines to the common outputs lines at the same time. Once a channel is closed, it stays closed until another channel is closed; on each card, only one channel may be closed at a time. If the user does not want all channels to automatically open when a channel on another scanner card is closed, then the Scan Clear switch defined in the Description section should be set to position C2.

To address the 53A-333 Card for the first time, the system command "@XY" must be sent. "X" is the mainframe address (0-9); "Y" is the card-slot address (0-9) within that mainframe. Once the 53A-333 Card is addressed, it stays addressed until the system receives a new "@XY" command with a new "XY". Appendix A fully discusses the "@XY" command and the other 53/63 System commands. After the 53A-333 Card is addressed, the commands listed below may be issued until another function card is addressed.

Card Commands

Detailed descriptions of the 53A-333 Card's commands are as follows:

Command	Description
Z_1Z_2	The Z_1Z_2 command connects the three input lines of a channel to the three common output lines.
	Z_1Z_2 is a 2-digit decimal integer that represents the channel number (00-14) to be closed. When closing channels 00 to 09, the "0" character(s) may be optionally replaced by ASCII space characters, but the leading "0" or space character may not be omitted.
	Example: The command @0205 opens any closed channel and then closes channel 5 of the scanner card at card-slot 2, mainframe 0.
	Status: Power LED is out. Channel LEDs "0X" and "5" are lit; all others are out.

R

The R command resets (opens) all channels of a given scanner card.

Example: The command @02R opens all channels on the 53A-333 Card in card-slot 2, mainframe 0.

Status:
Power LED is out.
Channel LEDs are out.

Input Request

An input request to the 53A-333 Card lets the user interrogate the card to find out which channel, if any, is closed. When the 53A-333 Card is addressed (power LED out) and the system controller requests input from the 53/63 System, the card returns a 2-digit number followed by <CR><LF>. The number returned corresponds to the closed channel (00-14). If no channels are closed, "20" is returned. If the card malfunctions, "30" is returned. The readback feature uses a fourth pole on each relay to detect a closed channel, providing a self test of the complete card, including the relay coil.

INSTALLATION

The 53A-333 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-333" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:

The 53A-333 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.

APPENDIX A

53/63 SYSTEM COMMANDS

Command	Description
@XY	The "@XY" command addresses a function card in the 53/63 System. The "@" is a delimiter used by the 53/63 System. The "X" is a mainframe address (0-9) defined by the Address Select Switch on the 53A-171 Control Card in that mainframe; the "Y" is a function-card address (0-9) defined by the Address Select Switch on the function card. Once a mainframe and function card combination is addressed, it remains addressed until the 53/63 System detects a new "@" character.
@XH	The "@XH" (Halt) command halts all function cards within the mainframe defined by "X". The command does not affect function cards in other mainframes. If the 53A-333 Card is addressed (Power LED out) when a "@XH" command is received, the card will become unaddressed (Power LED lit).
STOP	The STOP command is not a string of ASCII characters. The command is hard-wired from the system controller (calculator or computer) to the 53/63 System communications card in each mainframe. When the system controller issues a STOP command, each function card, including the 53A-333 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

PIN ASSIGNMENTS FOR THE FRONT-EDGE CONNECTOR

Pin No.	Description	Pin No.	Description
A	Channel 0 High	1	Channel 1 High
B	Channel 0 Low	2	Channel 1 Low
C	Channel 0 Guard	3	Channel 1 Guard
D	Channel 2 High	4	Channel 3 High
E	Channel 2 Low	5	Channel 3 Low
F	Channel 2 Guard	6	Channel 3 Guard
H	Channel 4 High	7	Channel 5 High
J	Channel 4 Low	8	Channel 5 Low
K	Channel 4 Guard	9	Channel 5 Guard
L	Channel 6 High	10	Channel 7 High
M	Channel 6 Low	11	Channel 7 Low
N	Channel 6 Guard	12	Channel 7 Guard
P	Channel 8 High	13	Channel 9 High
R	Channel 8 Low	14	Channel 9 Low
S	Channel 8 Guard	15	Channel 9 Guard
T	Channel 10 High	16	Channel 11 High
U	Channel 10 Low	17	Channel 11 Low
V	Channel 10 Guard	18	Channel 11 Guard
W	Channel 12 High	19	Channel 13 High
X	Channel 12 Low	20	Channel 13 Low
Y	Channel 12 Guard	21	Channel 13 Guard
Z	Channel 14 High	22	Common High
AA	Channel 14 Low	23	Common Low
BB	Channel 14 Guard	24	Common Guard

APPENDIX C

HIGH VOLTAGE SWITCHING WITH THE 53A-333

Because a scanning system has multiple sources that can be switched to a common bus, with each source having system-dependent amounts of capacitance, several considerations besides the 200V rating of the relay contacts affect the level of voltage that can actually be switched.

The first, and most serious, problem is caused by high voltage switching into a capacitive bus. The severity of the problem depends on current and heat limitations of the relay. The contacts on the 53A-333 are rated at 10W and 0.5 amp. Even though the currents appear to be very low in a high impedance measurement application, the bus capacitance causes extremely large inrush currents which may be enough to seriously damage or degrade the reliability of the relay contacts.

It is not easy to determine analytically the amount of voltage and capacitance that will cause enough inrush current to degrade the contacts. Tek/CDS has found the following approximation to work, though:

> The voltage times the capacitance should not exceed 10^{-8} volt-farads for a 10W contact.

(40V into a 250 pF bus, for example.) If this value is exceeded, the 53A-336 (which has a contact rating of 150W) may be used, or resistors may be placed between the scanner card common and the bus. On the 53A-333, if the backplane analog bus is used, the resistors may be installed in place of a 3-position switch on the card (consult the factory). If the front connector is used for the scanner bus, the resistors need to be installed in the mating connector to the 53A-332. A resistor of 20 to 200 Ohms is typically used, depending on how much series resistance can be tolerated in the application. Consult the factory for installation or resistor selection assistance.

The second problem is that the previous switched voltage may still be present on the common bus (due to the bus capacitance). A situation could occur where the previous voltage is -200V (DC or instantaneous AC) and the new voltage is +200V, placing 400V across the relay contacts and exceeding their 200V rating. This problem may be relieved by placing discharge resistors on each leg of the bus. The 53A-333 provides 1 Mohm resistors on-card that can be activated with a Bus Resistance switch (see the Controls and Indicators sub-section). When multiple scanner cards are used, the resistances on one or multiple cards may be used.

The use of these resistors needs to take into consideration the required measurement impedance of the application and whether the time constant of the resistance with the bus capacitance is sufficient to discharge the voltage to the required level within the switching time of the scanning card. The bus capacitance depends on the amount of cabling. The typical capacitance of a Tek/CDS 53A-715 Cable, for example, is 15 pF per foot. The minimum time between release of one voltage and contact closure for the next voltage on a 53A-333 is 3.0 msec. (See below for an example analysis.)

The scanning time can be lengthened by switching in an unused scanning channel between the two switched voltages. A time delay in the program will have no effect. Tek/CDS scanning

modules automatically release the previous relay a fixed time prior to the closing of a new channel to automatically preclude two scanner sources being shorted.

The third consideration is the maximum contact breakdown of 250V DC or 1000V RMS. In DC applications particularly, the maximum difference between any two DC sources is, as a result, limited to 250V DC.

Example:

Input voltage on 2 successive 53A-333 channels	= 165V DC first channel; -165V DC second channel
Backplane analog bus capacitance	= 2000 pF
Backplane analog bus impedance	= 1 megohm
Residual voltage after 3.0 ms	= VR

$$VR = V \times e^{-(t/RC)}$$
$$= 165 \times e^{-(.003 / 1 \times 10^6 \times 2000 \times 10^{-12})}$$
$$= 37.0$$

For this example, the next channel to be closed is at -165V. Therefore, the voltage across the relay contacts could be 37 - (-165), or 202.0V. Since 202.0V is more than 200V (the switching voltage of the 53A-333 Card), an unused channel should be closed between the closure of the two channels.

SERVICE MANUAL

53A-333

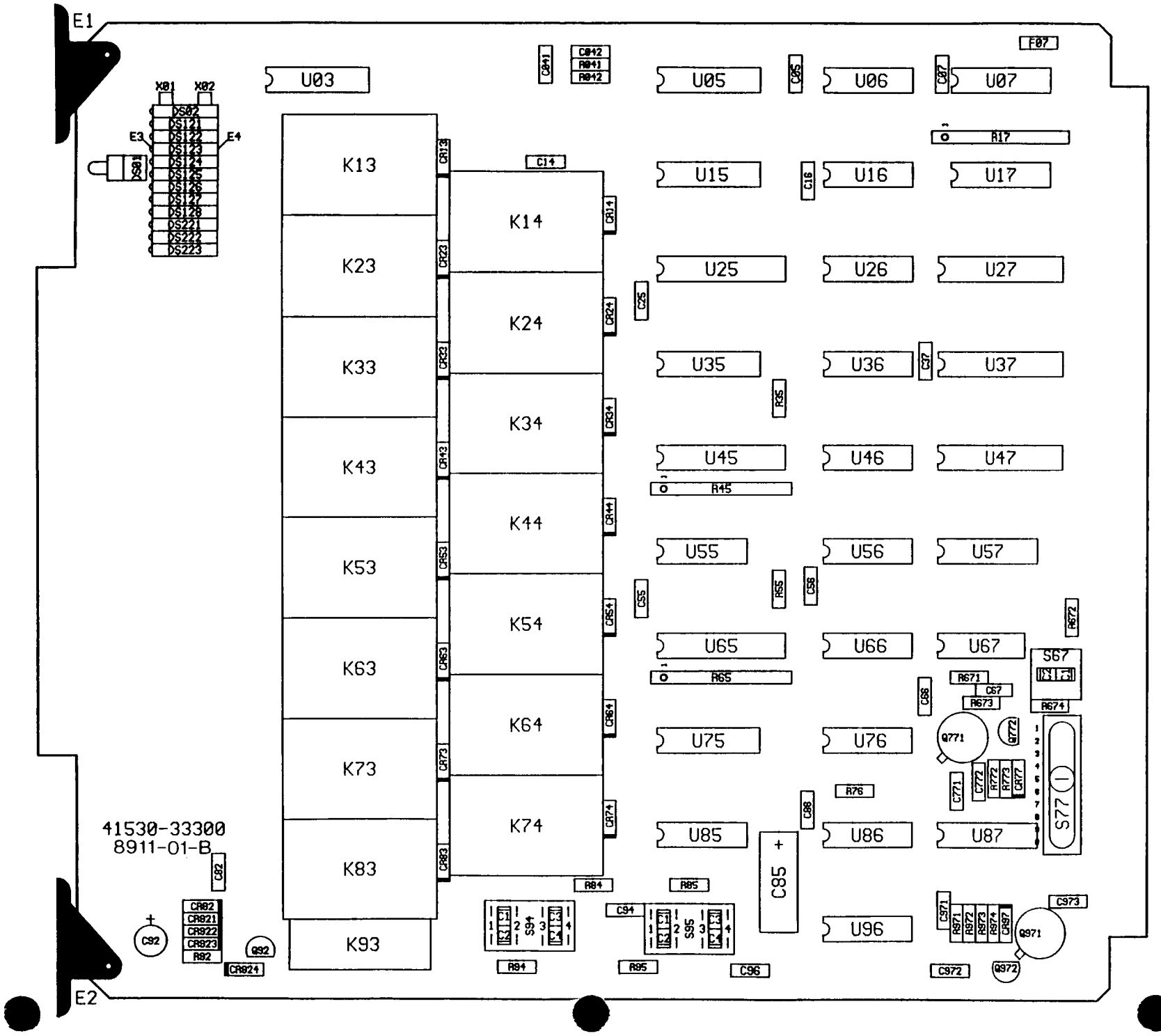
REED RELAY SCANNER THREE WIRE W R-BCK

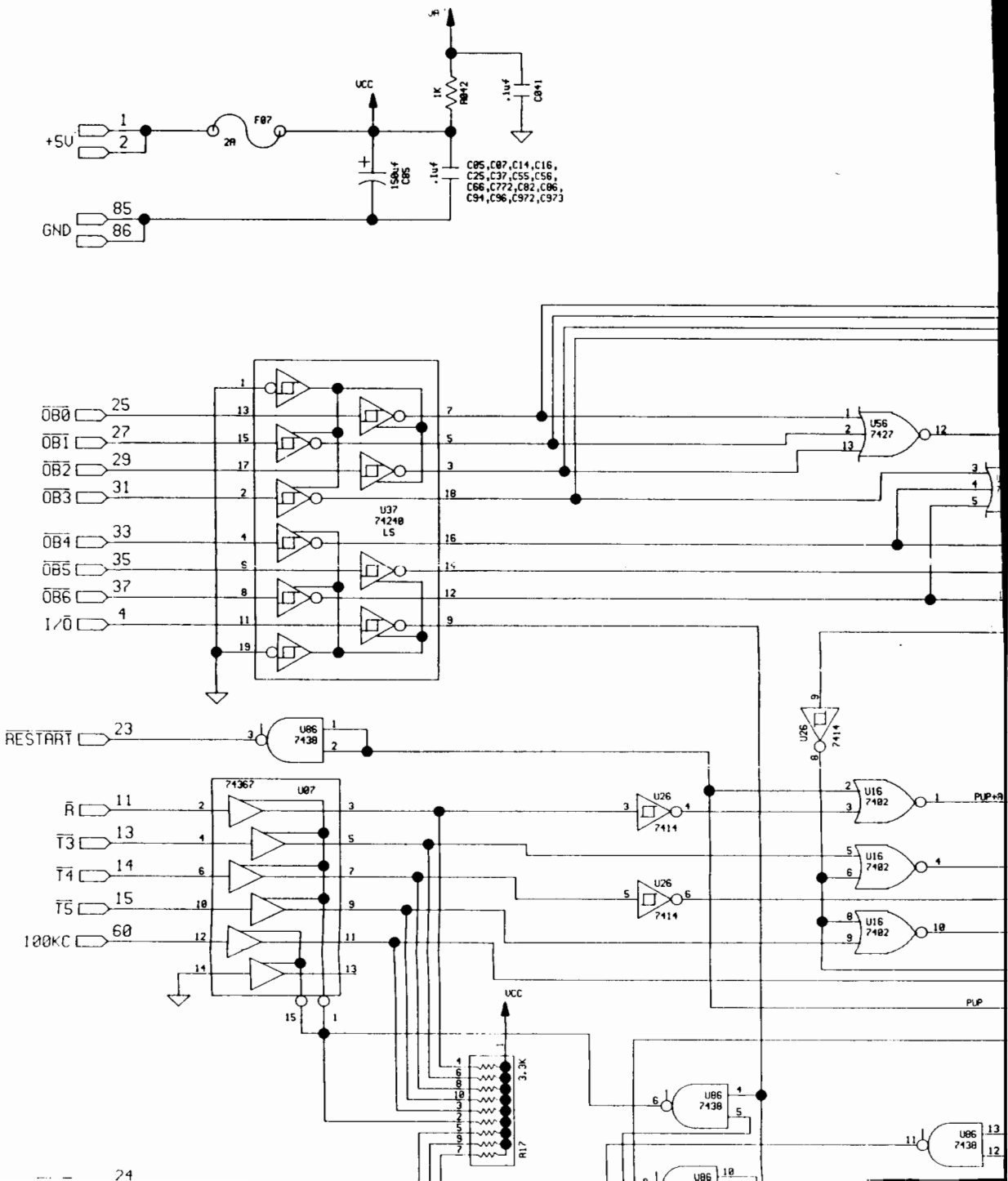
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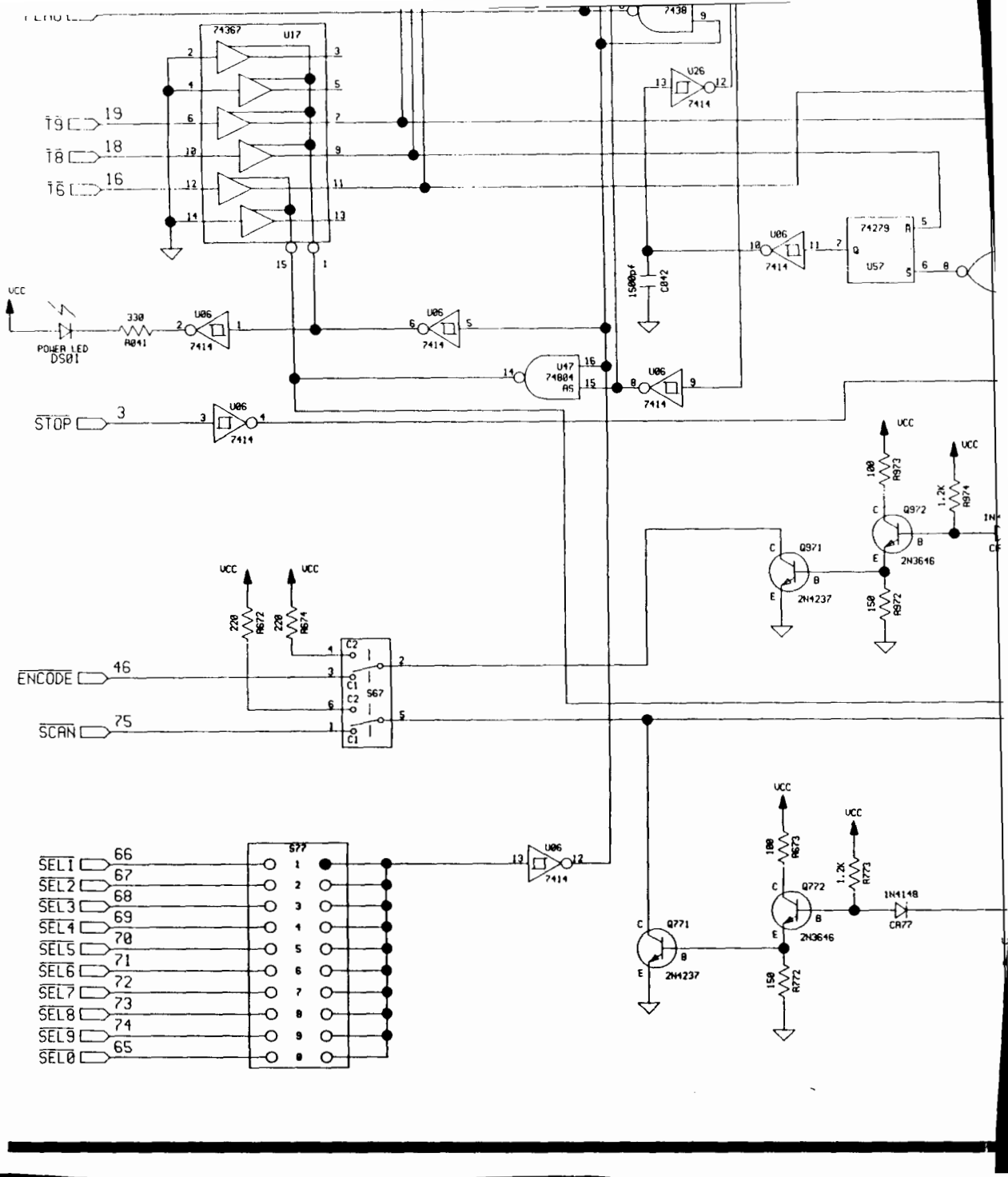
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C041,05,07,14,16,25,37,55,56,66 772,82,86,94,96,972,973	20128-10006	17	CAP FXD CER .1UF 20% 50VDCW	0058	C322C104M5U5CA
C042	20128-15004	1	CAP FXD CER .0015UF 10% STABLE 100VDCW	0106	1C10X7R152M050B
C67	20128-47006	1	CAP FXD CER .47UF 20% 50VDCW	0075	RPE123Z5U474M50V
C771,971	20128-47005	2	CAP FXD CER .047UF 10% STABLE 100VDCW	0058	CK06BX473K
C85	21018-15009	1	CAP FXD ELECT 150UF 75% -10% 16VDCW	0025	NLW150-16
C92	22022-20008	1	CAP FXD TA 22UF 10-20% 20-25VDCW	0106	199D226X9025CA1
CR13,14,23,24,33,34,43,44,53,54 63,64,73,74,77,82,83,921,922,923 924,97	32000-04148	22	DIODE SILICON 75V 1A 5%	0078	1N4148
DS01	32000-00103	1	DIODE LIGHT EMITTING RED 50MA	0039	550-0103
DS02,121,122,123,124,125,126,127 128,221,222,223	32000-02003	12	DIODE LIGHT EMITTING RED WITH RESISTOR 0	0039	547-2003
E1	40401-00333	1	EJECTOR STAMP 53A-333 STYLE B BLUE	0026	40401-00333
E2	40401-10015	1	EJECTOR STAMP SCANNER STYLE D BLUE	0026	40401-10015
E3	45050-03275	1	DCL LED 12POS DRW 00000-00514	0026	45050-03275
E4	45050-03279	1	DCL LED 12POS BLK DRW 00000 -03279	0026	45050-03279
F07	42202-52001	1	FUSE SUB-MIN 2AMP	0061	251002
K13,14,23,24,33,34,43,44,53,54 63,64,73,74,83	83000-05054	15	RELAY REED 4 PST 250 OHM 200V 0-	0138	7004-5054
K93	33000-20006	1	RELAY REED SPDT 500OHMS 3.8V	0111	220-001-5M
PCB	41530-33300	1	P.C. BOARD VERSION 4L 8911	0026	41530-33300
Q771,971	51100-04237	2	TRANSISTOR NPN SWITCH	0074	2N4237

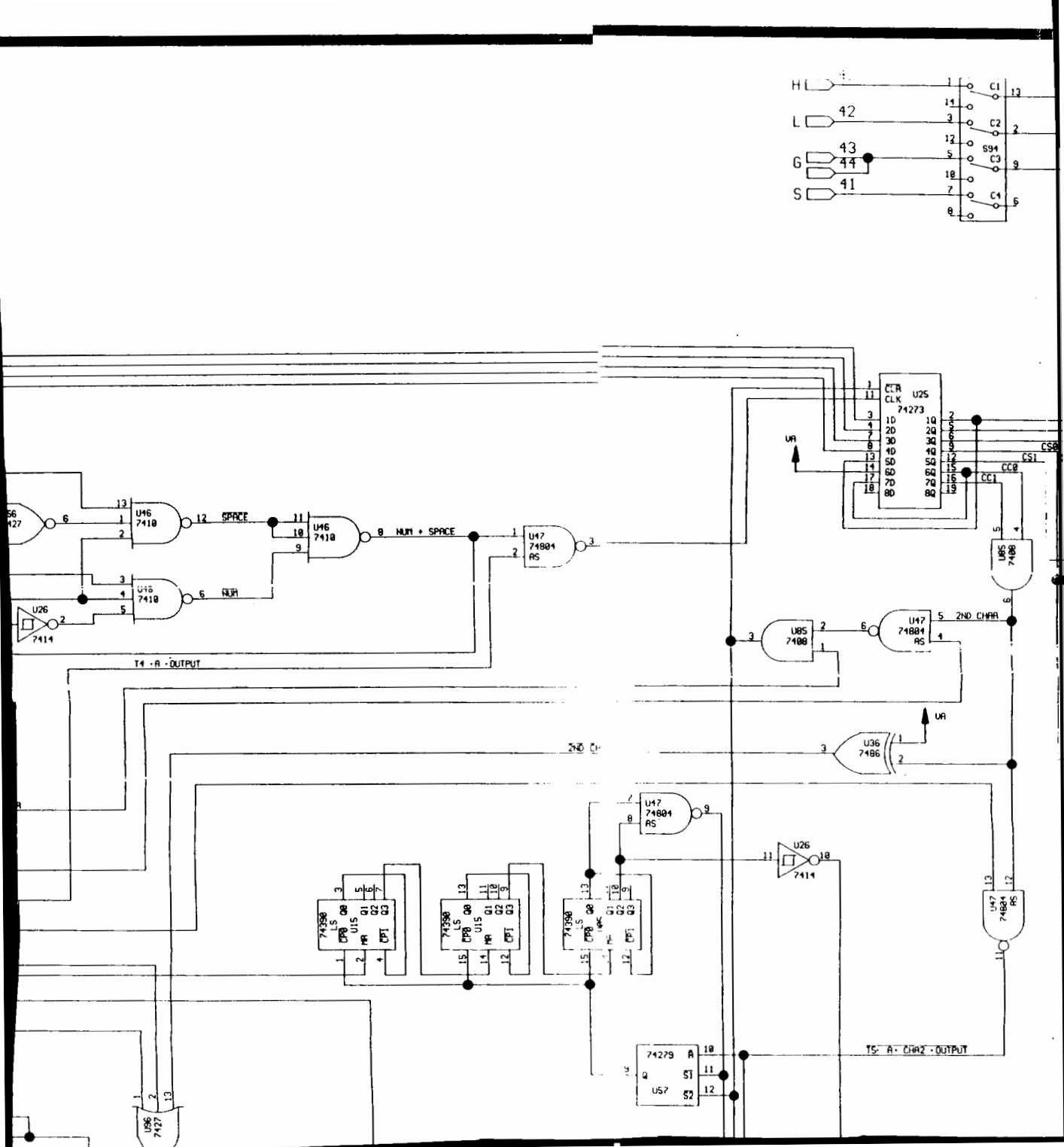
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Q772,92,972	51100-03646	3	TRANSISTOR NPN HIGH SPEED SWITCH	0074	MPS3646
R041	10117-33003	1	330 OHM RES COMP 1-4W 5%	0087	R25J-330-5%
R042,85	10117-10004	2	1K RES COMP 1-4W 5%	0087	R25J-1K-5%
R17,45,65	12008-33004	3	3.3K RES NETWORK SIP 5% 1.5W 9-PKG	0027	750-101-R3.3K
R35,55	10117-33004	2	3.3K RES COMP 1-4W 5%	0087	R25J-3.3K-5%
R671,672,674	10117-22003	3	220 OHM RES COMP 1-4W 5%	0087	R25J-220-5%
R673,973	10117-10003	2	100 OHM RES COMP1-4W 5%	0087	R25J-100-5%
R76,971	14024-33205	2	33.2K RES FILM 1-4W 1% 100PPM	0035	RN55D3322F
R772,972	10117-15003	2	150 OHM RES COMP 1-4W 5%	0087	R25J-150-5%
R773,974	10117-12004	2	1.2K RES COMP 1-4W 5%	0087	R25J-1.2K-5%
R84,94,95	10117-10007	3	1M RES COMP 1-4W 5%	0087	R25J-1M-5%
R92	10117-22004	1	2.2K RES COMP 1-4W 5%	0087	R25J-2.2K-5%
S67	42050-10121	1	SWITCH DIP 1POS DPDT	0048	76SD01S
S77	42050-10010	1	SWITCH 10POS.	0101	C42315-A61-A11
S94,95	42050-10122	2	SWITCH DIP 2POS DPDT	0048	76SD02S
U03	79000-07442	1	IC TTL BCD-TO-DECIMAL DECODER	0107	7442
U05,15	71204-74390	2	IC TTL LS DUAL DECADE COUNTER	0078	74LS390
U06,26,67	78401-07414	3	IC TTL HEX SCHMITT INVERTING BUFFER	0107	7414
U07,17	73310-74367	2	IC TTL HEX BUS DRIVER NON-INVERTING	0107	74367
U16	76900-07402	1	IC TTL QUAD 2-INPUT NOR GATE	0107	7402
U25	73000-74273	1	IC TTL OCTAL D-TYPE FLIP-FLOP	0107	74273
U27	79814-00018	1	PAL PROGRAMMED 16L8L REV B 53A-332 AND 333	0026	79814-00018
U35,75	73405-00590	2	IC TTL 8-BIT ADDRESSABLE LATCH DRIVER	0092	NE590N

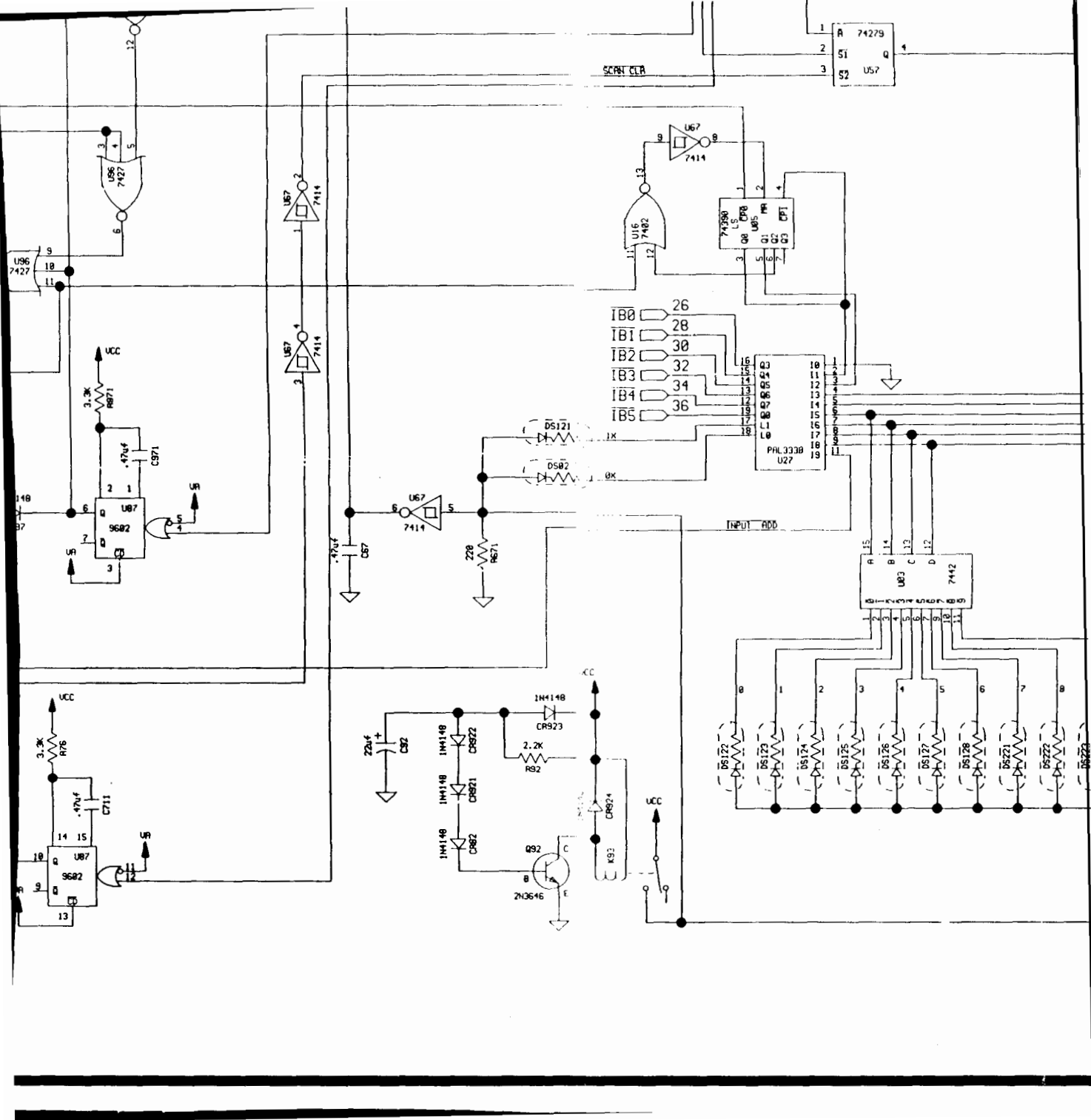
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
U36	77800-07486	1	IC TTL QUAD 2-INPUT EXCLUSIVE OR GATE	0107	7486
U37	73310-74240	1	IC TTL LS OCTAL BUFFER	0107	74LS240
U45,65	79814-00017	2	PAL PROGRAMMED 16L8L REV A 53A-332 AND 333	0026	79814-00017
U46	76600-07410	1	IC TTL TRIPLE 3-INPUT NAND GATE	0107	7410
U47	76510-74804	1	IC TTL AS HEX 2-INPUT NAND DRIVER	0107	74AS804
U55,85	77200-07408	2	IC TTL QUAD 2-INPUT AND GATE	0107	7408
U56,96	76900-07427	2	IC TTL TRIPLE 3-INPUT NOR GATE	0107	7427
U57	73200-74279	1	IC TTL QUAD R-S LATCH	0107	74279
U66,76	77815-07432	2	IC TTL LS QUAD 2-INPUT OR GATE	0107	74LS32
U86	76601-07438	1	IC TTL QUAD 2-INPUT NAND BUFFER W-OC	0107	7438
U87	74200-09602	1	IC TTL DUAL RETRIGGERABLE MONOSTABLE	0078	9602
X01,02	45001-12100	2	CONNECTOR SIP 12 PIN	0026	45001-12100

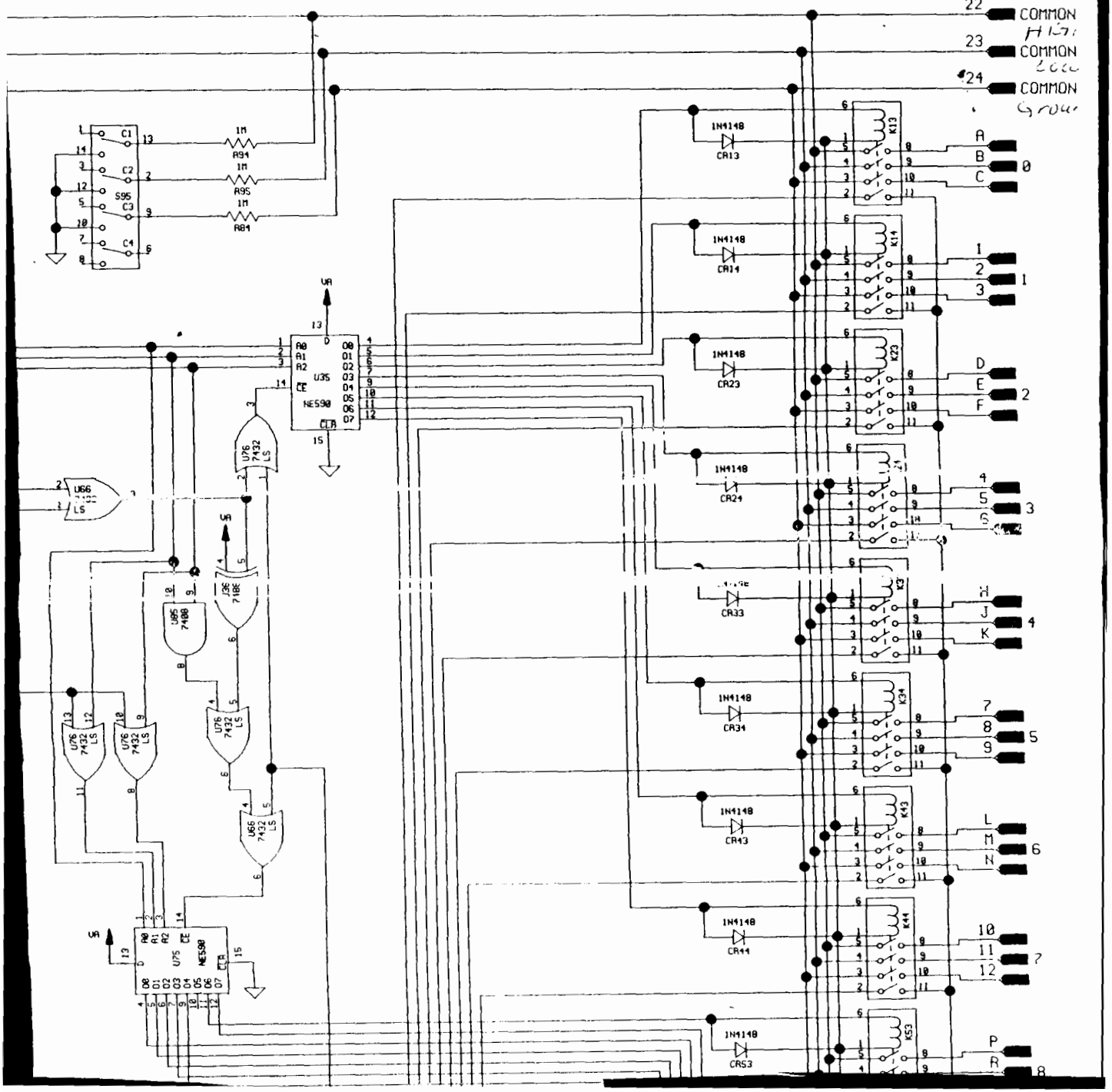

E1
E2
E3
E4
X01
X02
DS02
DS121
DS122
DS123
DS124
DS125
DS126
DS127
DS128
DS221
DS222
DS223
DS01
U03
K13
K14
K23
K24
K33
K34
K43
K44
K53
K54
K63
K64
K73
K74
K83
K93
CR13
CR14
CR23
CR24
CR33
CR34
CR43
CR44
CR53
CR54
CR63
CR64
CR73
CR74
CR83
C14
C841
C842
R841
R842
F07
U05
U06
U07
C05
C07
R17
U15
U16
U17
C16
U25
U26
U27
C25
U35
U36
U37
C37
R35
U45
U46
U47
R45
U55
U56
U57
C55
R55
C56
U65
U66
U67
R65
R672
S67
R671
C67
R673
R674
C66
Q771
Q772
C771
C772
R772
R773
CR77
S77
R76
U75
U76
C68
U85
U86
U87
C85
U96
R84
R85
S94
S95
C94
C96
C92
CR82
CR821
CR822
CR823
R82
CR824
Q92
C82
41530-33300
8911-01-B
C971
R971
R972
R973
R974
CR97
Q971
C973
Q972
C972

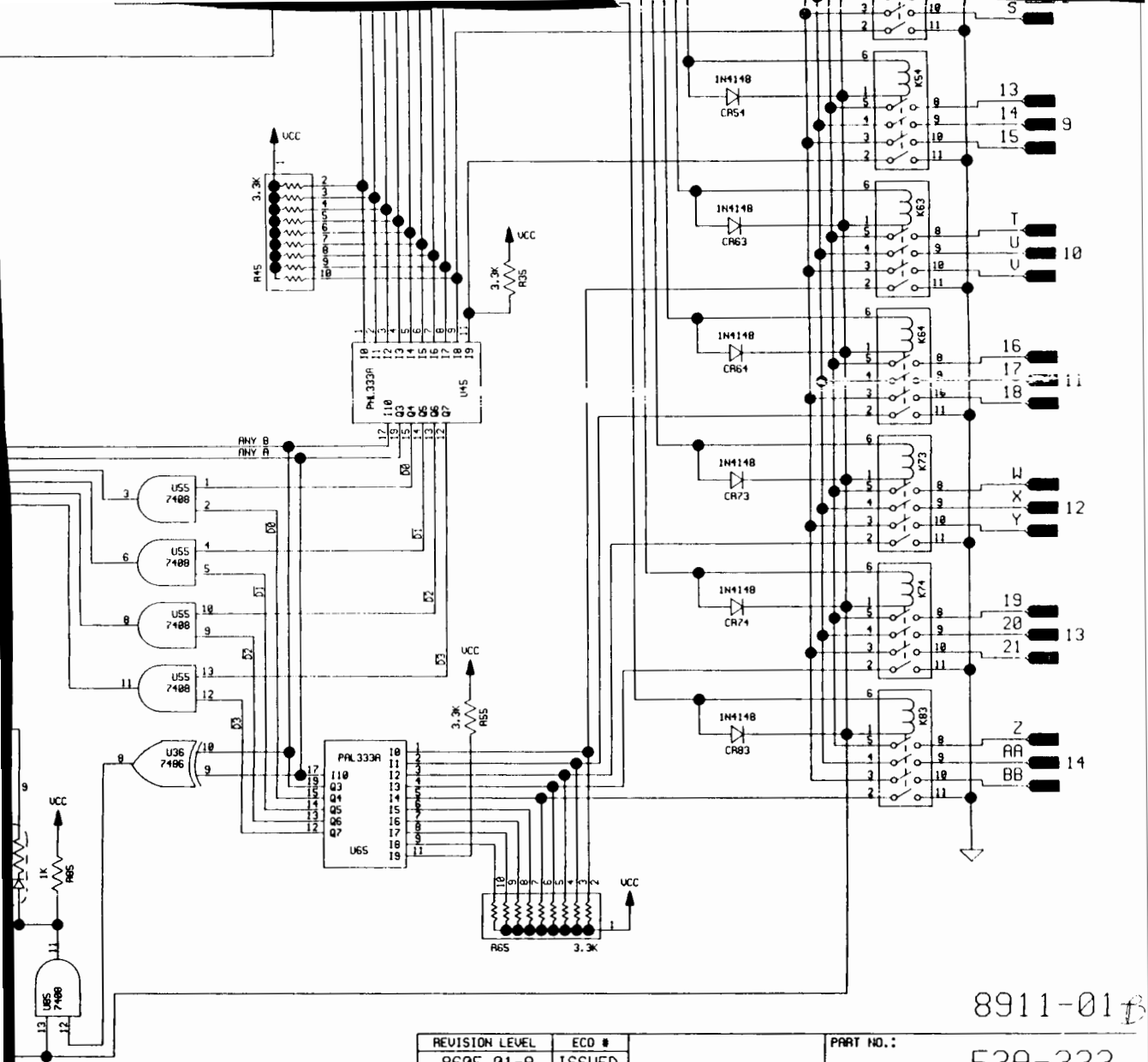

+5V
GND
F07
2A
VCC
1K
R842
.1uf
C841
150uf
C85
.1uf
C85,C87,C14,C16,
C25,C37,C55,C56,
C66,C772,C82,C96,
C94,C96,C972,C973
U37
74240
LS
OB0
OB1
OB2
OB3
OB4
OB5
OB6
I/O
U56
7427
RESTART
U86
7438
74367
U07
R
T3
T4
T5
100KC
U26
7414
U16
7402
PUP
PUP+9
3.3K
R17


74367
U17
T9
T8
T6
19
18
16
15
1
7438
9
U26
7414
13
12
74279
U57
U06
VCC
330
R041
POWER LED
DS01
1500pf
C042
U47
74804
AS
STOP
3
100
R973
1.2K
R974
Q972
2N3646
Q971
2N4237
150
R972
220
R672
R674
ENCODE
46
SCAN
75
S67
SEL1
SEL2
SEL3
SEL4
SEL5
SEL6
SEL7
SEL8
SEL9
SEL0
66
67
68
69
70
71
72
73
74
65
S77
R673
R773
Q772
Q771
1N4148
CR77
R772


H
L
42
G
43
44
S
41
S91
C1
C2
C3
C4
U25
74273
CLR
CLK
1D
2D
3D
4D
5D
6D
7D
8D
1Q
2Q
3Q
4Q
5Q
6Q
7Q
8Q
VA
CS0
CS1
CC0
CC1
U46
7410
SPACE
NUM + SPACE
NUM
U47
74804
AS
U26
7414
U85
7408
2ND CHAR
T4 - A - OUTPUT
U36
7486
2ND CH
74398
LS
U15
CP0
CP1
MR
Q0
Q1
Q2
Q3
74279
U57
S1
S2
T5 - A - CHA2 - OUTPUT
U56
7427


SCAN CLR
U57
74279
U67
7414
U96
7427
U16
7402
74390
U85
U87
9602
VCC
3.3K
R871
.47uf
C971
VA
IB0
IB1
IB2
IB3
IB4
IB5
26
28
30
32
34
36
PAL3330
U27
DS121
DS02
1X
0X
INPUT ADD
220
R671
C67
U83
7442
DS122
DS123
DS124
DS125
DS126
DS127
DS128
DS221
DS222
3.3K
R76
C711
22uf
C92
1N4148
CR923
2.2K
R92
CR922
CR921
CR82
Q92
2N3646
CR924
K93


22
COMMON
23
COMMON
24
COMMON
S95
C1
C2
C3
C4
1M
A94
A95
A84
1N4148
CR13
CR14
CR23
CR24
CR33
CR34
CR43
CR44
CR53
K13
K14
K23
K33
K34
K43
K44
K53
A
B
C
D
E
F
H
J
K
L
M
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P
R
0
1
2
3
4
5
6
7
8
9
10
11
12
VA
U35
NE590
U76
7432
LS
U66
U85
7408
U36
7186
U75



8911-01

REVISION LEVEL	ECO #
8605-01-A	ISSUED
8911-01-B	1167

COLORADO DATA SYSTEMS

PART NO.: 53A-333

DESCRIPTION: REED RELA SCANNER CA

P.C.B. NUMBER: 41530-33300

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