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53A-571 SYNCHRO/DIGITAL CARD

OPERATING MANUAL

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53A-571 SYNCHRO/DIGITAL CARD

OPERATING MANUAL

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53A-571 SYNCHRO/DIGITAL CARD

DESCRIPTION

The 53A-571 Synchro/Digital Card is a printed circuit board assembly for use in a CDS 53/63 Series System. The 53A-571 Card consists of one or two independent 16 bit synchro/digital converter channels. The second channel is included when Option 001 to the 53A-571 Card is ordered. When the 53/63 system controller requests input from either channel, a 6-digit decimal number preceded by a period is returned. For the channel selected, this number (0.000000 - 0.999999) represents the incoming 3-wire synchro-angle as a fraction of 360°.

CONTROLS AND INDICATORS

The following controls and indicators are provided to select and display the functions of the 53A-571 Card's operating environment.

Address Select Switch

The 53A-571 Card has a miniature 10-position switch which selects the card's address (0-9) in the 53/63 Series System. Open the switch's cover and use a screwdriver with a narrow, flat blade to turn the cam-action wiper to the desired 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-571 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-571 Card is unaddressed, but that all required dc power (5V dc, +15V dc) is being supplied.

Fuses

The 5V dc, and +15V dc power buses each have a fuse that protects the system from overloads. If a fuse has blown, the Power LED will not light.

Quadrant LEDs

Each channel has four quadrant LEDs, "QD1", "QD2", "QD3", and "QD4". The quadrant LEDs for a channel indicate the quadrant of the last angle read from that channel. When the 53/63 Series System powers up, the quadrant LEDs are unlit. They remain unlit until a channel

QD1	0.0000° - 89.9999°
QD2	90.0000° - 179.9999°
QD3	180.0000° - 269.9999°
QD4	270.0000° - 359.9999°

Front Edge Connector Inputs And Outputs

Synchro Analog Inputs

Each channel has three synchro-analog inputs for inputting the angular value in synchro format.

AC Reference Inputs

Each channel has an independent AC reference input (Ref HI and Ref LO) that provides a reference frequency for the 53A-571 that is equal to the frequency of the synchro-analog inputs.

The polarity conventions for the synchro analog inputs and AC reference inputs are as follows. S1, S2, and S3 are the synchro-analog inputs; RHI and RLO are the AC reference inputs, high and low, respectively. θ represents the position of the synchro shaft.

$$S3\text{-}S1 = (R_{HI}\text{-}R_{LO}) \sin \theta$$
$$S2\text{-}S3 = (R_{HI}\text{-}R_{LO}) \sin (\theta + 120°)$$
$$S1\text{-}S2 = (R_{HI}\text{-}R_{LO}) \sin (\theta + 240°)$$

S3-S1 will be in phase with R_{HI}-R_{LO} when sin θ is positive, and 180 degrees out of phase with R_{HI}-R_{LO} when sin θ is negative.

S2-S3 will be in phase with R_{HI}-R_{LO} when sin (θ + 120°) is positive, and 180 degrees out of phase with R_{HI}-R_{LO} when sin (θ + 120°) is negative.

S1-S2 will be in phase with R_{HI}-R_{LO} when sin (θ + 240°) is positive, and 180 degrees out of phase with R_{HI}-R_{LO} when sin (θ + 240°) is negative.

DC Reference Out

The DC reference voltage output (+7.5V DC nominal) is used as the reference voltage with respect to which the Error Out signal and the Velocity Out signal are measured.

CAUTION:

DC Reference Out should not be tied to ground.

Error Out

The Error Out signal, one line for each channel, is the filtered AC voltage measured by sin (θ - Φ). θ is the actual synchro input angle, and Φ is the 16-bit digital angle representing the current S/D converter output. A difference between angle θ and angle Φ reflects the tracking error between the instantaneous synchro input angle and the last S/D conversion. The Error Out signal, a dynamic signal, is created when the 53A-571 digital output attempts to follow the analog input. Under static conditions, this error output is zero. The Error Out signal is referenced to the 7.5V DC Reference signal. The average signal amplitude at nominal input voltage (11.8V RMS) for +1 LSB of error [equivalent to (θ - Φ) = 0.0055°] is 16 mV RMS.

Velocity Out

The Velocity Out signal, one line for each channel, measures the rate of change of the Error Out signal. A +1V DC output corresponds to a +0.5 rps (revolutions per second) rate of change for 400 Hz units. The Velocity Out signal is measured with respect to the 7.5V DC reference voltage.

NOTE: If the Error Out signal and the Velocity Out signal are to be used, each signal must feed to a separate high input of a differential amplifier. The DC reference voltage must then connect to the low inputs of these amplifiers.

The 53A-571 Card, as shipped from the factory, does not have the Error Out and Velocity Out signals connected to their respective front edge connector signal pins. To use these signals the two round "pads" located directly behind each signal pin must be connected with a jumper.

SPECIFICATIONS

Number of Channels:	One synchro/digital converter channel standard. Second channel included when Option 001 is ordered.
Type Input:	Synchro.
Synchro/Digital Converter Manufacturer:	ILC Data Device Corp. model no. SDC-14520-305.
Accuracy:	2.5 arc-minutes.
Settling Time:	500 milliseconds.
Resolution:	16 bits.
Frequency Range:	360 Hz to 1000 Hz.
Input Voltages	
Input format:	Synchro.
Reference input:	22V RMS - 30V RMS (26V RMS nominal).
Synchro voltage (V RMS, phase referenced to Ref Hi-Ref Lo)	S3-S1: 11.8 sin θ, in phase. S2-S3: 11.8 sin (θ +120°), in phase. S1-S2: 11.8 sin (θ +240°), in phase.
Minimum Input Impedance (balanced):	17.5 kohms - line to line. 11.5 kohms - line to ground.
Data Returned As:	Six digit decimal number (0.000000 to 0.999999) followed by carriage return and line feed. Returned data represents the synchro-angle as a fraction of 360°.
Power Requirements:	5V and +15V dc power is provided by the internal Power Supply in the 53/63 Series Card Cage.
Voltage (5-volt Supply):	4.75 V dc to 5.25 V dc.
Current (5-volt Supply):	1.0 A, maximum quiescent, two channels. 1.1 A, peak, two channels.
Voltage (+15-volt Supplies):	+14.5 V dc to +15.5 V dc. -14.5 V dc to -15.5 V dc.
Current (+15-volt Supplies):	0.035 A, maximum quiescent, two channels. 0.040 A, peak, two channels.

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. non-condensing, -10°C to +30°C. Less than 75% R.H. non-condensing, +31°C to +40°C. Less than 45% R.H. non-condensing, +41°C to +55°C.
Dimensions:	197 mm high, 220 mm deep, 13 mm wide. (7.5" x 8.66" x 0.8").
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:	0.25 kg. (0.55 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.
Input/Output Connections:	A 48-pin card-edge hooded connector (53A-780) connects to all front-edge input and output signals.
Required Equipment (not supplied):	53A-780 Hooded Connector or 53A-739 Analog Cable is required with this card.
Equipment Supplied:	53A-571 Synchro/Digital Card Spare Fuses (Part# 42202-52003) - Qty. 2. Operating Manual (Part# 00000-15710). Service Manual (Part# 00000-25710).

OPERATION

Overview

The 53A-571 Card is programmed by ASCII characters issued from the system controller to the 53/63 System's communications card. The 53A-571 Card interfaces to the communications card through the 53 Series or 63 Series Card Cage's backplane. When the 53/63 Series System powers up, the 53A-571 Card is unaddressed (power LED lit).

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-571 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-571 Card is addressed, the following commands may be issued until another function card is addressed:

Card Commands

The 53A-571 Card commands are as follows:

A selects channel A for input requests until a B command is issued.

B selects channel B for input requests until an A command is issued.

NOTE: Carriage-return <CR>, line-feed <LF>, space, or null characters that follow the A or B command do not affect operation.

Examples:

Command	Action
@05A	Selects channel A for data to be sent to the system controller. The 53A-571 Card address is mainframe 0, card address 5. The Power LED is out.
@32B	Selects channel B for data to be sent to the system controller. The 53A-571 Card address is mainframe 3, card address 2. The Power LED is out.
Input Request	For the channel selected, an input request returns the synchro input angle (0.0000 - 359.9999) as a 6-digit decimal fraction (.000000 - .999999) of 360°. Using the system controller to multiply this fraction by 360 converts the fraction to a value measured in degrees, represented by θ. Example: Decimal fraction returned = 0.684339 θ = 0.684339 x 360° = 246.3620°

The synchro-analog input is strobed on each input request; there is no need to re-address the channel with an A or B command to get an updated reading.

The synchro voltage inputs, S3-S1, S2-S3 and S1-S2 required for a reading of θ in degrees, are found by the following equations:

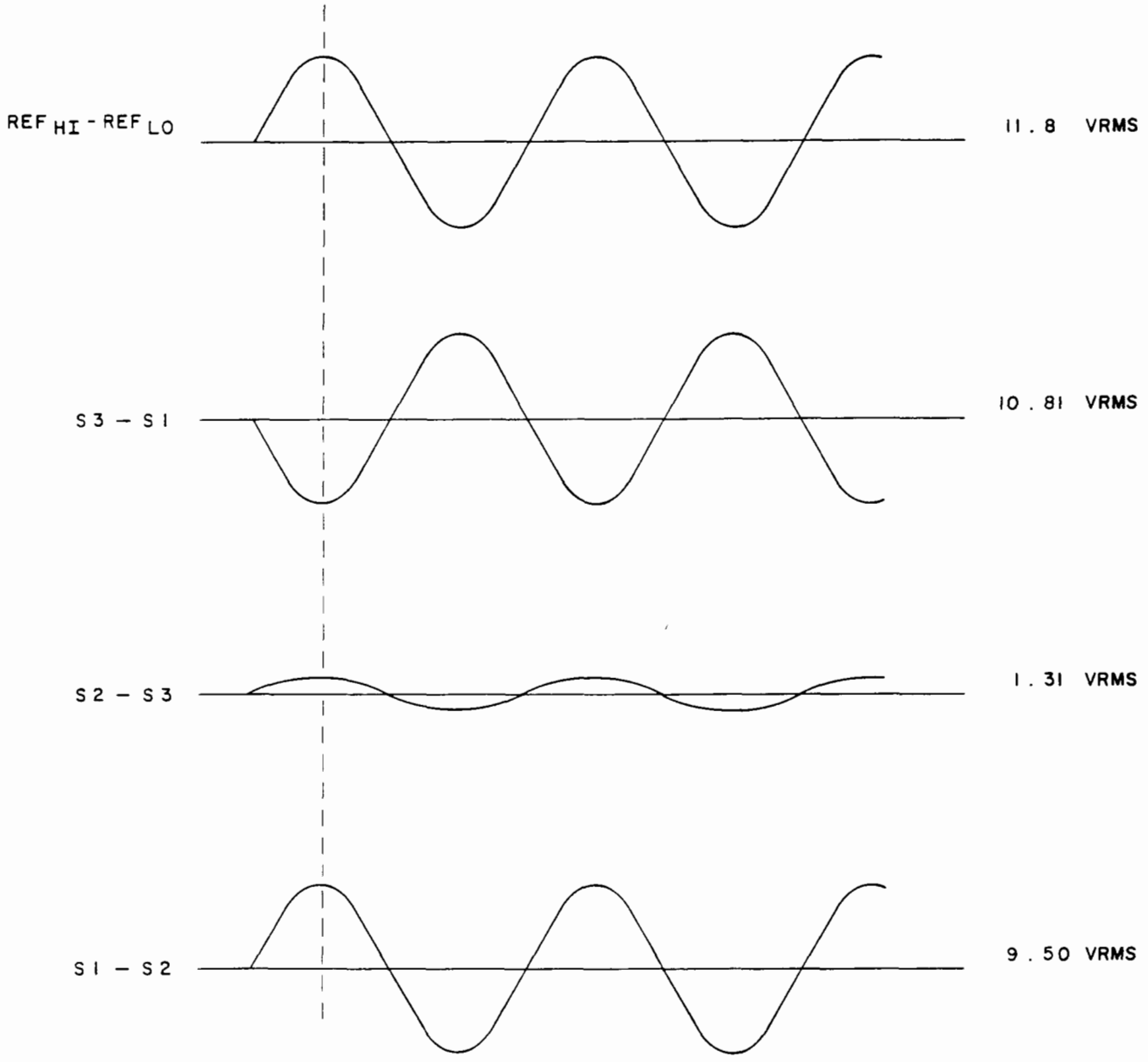
$$S3\text{-}S1 = 11.8 \sin \theta \text{ V RMS}$$
$$S2\text{-}S3 = 11.8 \sin (\theta + 120°) \text{ V RMS}$$
$$S1\text{-}S2 = 11.8 \sin (\theta + 240°) \text{ V RMS}$$

Using $\theta = 246.3620$ from the example above, the results are:

S3-S1 = 10.81V RMS out of phase (with respect to R_{HI}-R_{LO})
S2-S3 = 1.31V RMS in phase (with respect to R_{HI}-R_{LO})
S1-S2 = 9.50V RMS in phase (with respect to R_{HI}-R_{LO})

Figure 1 shows the differential reference and the three differential synchro inputs for this example. Note that all synchro inputs are always either in phase or 180 degrees out of phase with respect to the reference. The ratio between the amplitudes of the three differential inputs (not phase angle difference) determines the angular value represented by a synchro signal.

EXAMPLE
SYNCHRO WAVEFORMS
FOR $\theta = 246.362°$



NOTE :

THE FREQUENCY OF THE ABOVE WAVEFORMS EQUALS THE FREQUENCY OF THE REFERENCE.

FIGURE 1

INSTALLATION

The 53A-571 Card is a function card; therefore, it may be installed in 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-571" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:

The 53A-571 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 SERIES SYSTEM COMMANDS

Command	Description
@XY	The @XY (Address) 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 halts all function cards within the card cage defined by X. This command does not affect function cards in other card cages. How a function card reacts to the @XH command depends on the particular card. If the 53A-571 Card is addressed (Power LED out) when a "@XH" command is received, the card will become unaddressed (Power LED lit). In all cases, an addressed function card (Power LED out) becomes unaddressed (Power LED lit).
STOP	The STOP command is not a string of ASCII characters. This command is hard-wired from the system controller to the 53/63 System's communications card in each card cage. When the system controller issues a STOP command, each function card (including the 53A-571 Card) reacts as if it had received the @XH command described above. How the system controller executes a STOP command depends on the communications card used. For example, when using the 53A-128 IEEE-488 Communications Card, a STOP command is executed whenever the system controller asserts the IEEE-488 bus line IFC (Interface Clear) true.

APPENDIX B

FRONT EDGE CONNECTOR PIN ASSIGNMENTS

Pin No.	Function
1	S1 (synchro-analog input), channel A.
2	S2 (synchro-analog input), channel A.
3	S3 (synchro-analog input), channel A.
4	Reserved S4 (resolver), channel A.
5	RHI (reference input, high), channel A.
6	RLO (reference input, low), channel A.
7	Error Out, channel A. *
8	Velocity Out, channel A. *
9	DC Reference Out, channel A. *
10	S1 (synchro-analog input), channel B.
11	S2 (synchro-analog input), channel B.
12	S3 (synchro-analog input), channel B.
13	Reserved S4 (resolver), channel B.
14	RHI (reference input, high), channel B.
15	RLO (reference input, low), channel B.
16	Error Out, channel B. *
17	Velocity Out, channel B. *
18	DC Reference Out, channel B. *

NOTE: Channel B synchro input/output signals are only active on 53A-571 Cards with option 001 installed.

* User installed jumper required on 53A-571 Card.

SERVICE MANUAL

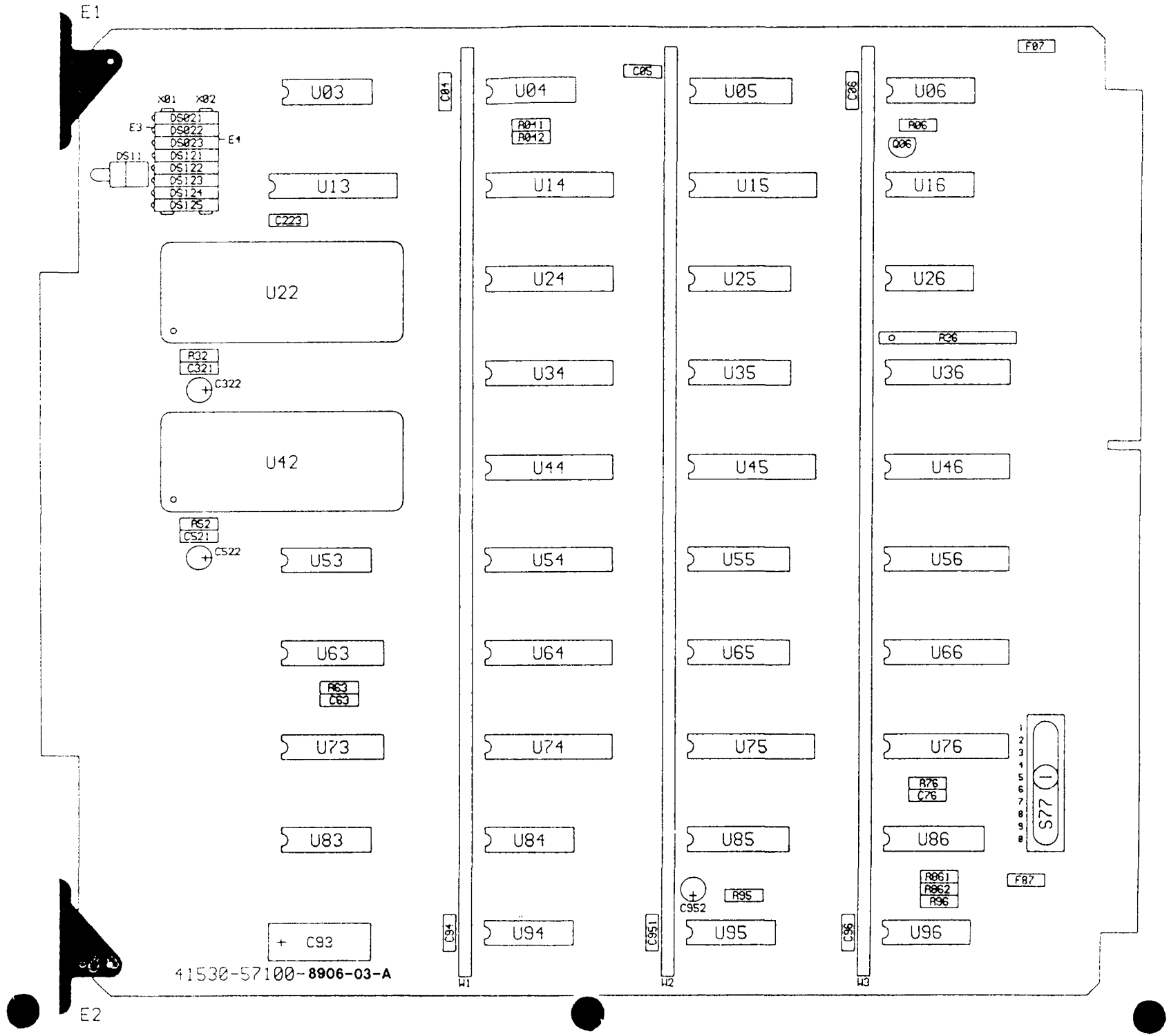
53A-571

SYNCHRO DIGITAL CONVERTER

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REFERENCE DESIGNATOR	CDS PART NUMBER	QTY	PART DESCRIPTION	MFG NUM	MFG PART NUMBER
C04,05,06,94,951,96	20128-10006	6	CAP FXD CER .1UF 20% 50VDCW	0058	C322C104M5U5CA
C223	21528-33003	1	CAP FXD MICA 330PF 5% 100VDCW	0025	CD7CA331J03
C321,521	20128-10005	2	CAP FXD CER .01UF 20% 50VDCW	0106	1C25Z5U103M050B
C322,522,952	22022-10008	3	CAP FXD TA 10UF 10-20% 20-25VDCW	0106	199D106X9025CA1
C63,76	20128-47006	2	CAP FXD CER .47UF 20% 50VDCW	0075	RPE123Z5U474M50V
C93	21018-15009	1	CAP FXD ELECT 150UF 75% -10% 16VDCW	0025	NLW150-16
DS021,022,023,121,122,123,124 125	32000-02003	8	DIODE LIGHT EMITTING RED WITH RESISTOR 0	0039	547-2003
DS11	32000-00103	1	DIODE LIGHT EMITTING RED 50MA	0039	550-0103
E1	40401-00571	1	EJECTOR STAMP 53A-571 STYLE B BLUE	0026	40401-00571
E2	40401-10057	1	EJECTOR STAMP S-D STYLE D BLUE	0026	40401-10057
E3	45050-03293	1	DCL LED 8POS DRW 00000-00564	0026	45050-03293
E4	45050-03236	1	DCL LED 8POS BLK DRW 00000 -00473	0026	45050-03236
F07,87	42202-52001	2	FUSE SUB-MIN 2AMP	0061	251002
PCB1	41530-57100	1	P.C. BOARD VERSION 2L 8906	0026	41530-57100
Q06	51100-03646	1	TRANSISTOR NPN HIGH SPEED SWITCH	0074	MPS3646
R041	10117-33003	1	330 OHM RES COMP 1-4W 5%	0087	R25J-330-5%
R042,06,862,96	10117-10005	4	10K RES COMP 1-4W 5%	0087	R25J-10K-5%
R32,52	10117-10002	2	10 OHM RES COMP 1-4W 5%	0087	R25J-10-5%
R36	12008-33004	1	3.3K RES NETWORK SIP 5% 1.5W 9-PKG	0027	750-101-R3.3K
R63,76	10117-22003	2	220 OHM RES COMP 1-4W 5%	0087	R25J-220-5%

REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM	MFG PART NUMBER
R861	10117-91005	1	91K RES COMP 1-4W 5%	0087	R25J-91K-5%
R95	10117-30004	1	3K RES COMP 1-4W 5%	0087	R25J-3K-5%
S77	42050-10010	1	SWITCH 10POS.	0101	C42315-A61-A11
U03,84	77203-07408	2	IC TTL ALS QUAD 2-INPUT AND GATE	0107	74ALS08
U04	76601-07438	1	IC TTL QUAD 2-INPUT NAND BUFFER W-OC	0107	7438
U05,25,35,55,65,85	71256-08283	6	IC TTL S 4-BIT BCD ADDER	0092	N82S83N
U06,26,95	78401-07414	3	IC TTL HEX SCHMITT INVERTING BUFFER	0107	7414
U13	79814-00022	1	PAL PROGRAMMED 16R8L REV A 53A-570 71 72 73	0026	79814-00022
U14	79813-00000	1	PROGRAMMED PROM U13 53A-571 AND 573	0026	79813-00000
U15,36,45,56,66,75,76	73310-74244	7	IC TTL LS OCTAL BUFFER NON-INVERTING	0107	74LS244N
U16,96	76901-07402	2	IC TTL LS QUAD 2-INPUT NOR GATE	0107	74LS02
U22	20100-14520	1	IC HYBRID SYNCHRO TO DIGITAL CONV 16 BITS 0-	0036	SDC-14520-305
U24	79813-00001	1	PROGRAMMED PROM U23 53A-571 AND 573	0026	79813-00001
U34,64	73001-74273	2	IC TTL LS OCTAL D-TYPE FLIP-FLOP	0107	74LS273
U44	79813-00002	1	PROGRAMMED PROM U33 53A-571 AND 573	0026	79813-00002
U46	73310-74240	1	IC TTL LS OCTAL BUFFER	0107	74LS240
U53	73001-07474	1	IC TTL LS DUAL D-TYPE EDGE TRIG FLIP-FLOP	0107	74LS74A
U54	79813-00003	1	PROGRAMMED PROM U63 53A-571 AND 573	0026	79813-00003
U63	71200-74161	1	IC TTL LS SYNCH 4-BIT COUNTER	0107	74LS161A
U73	79001-07442	1	IC TTL LS 4-LINE TO 10-LINE DECODER	0107	74LS42


E1
X01
X02
E3
DS021
DS022
DS023
E4
DS11
DS121
DS122
DS123
DS124
DS125
U03
U04
U05
U06
C01
C05
C06
F07
A011
A012
A06
Q06
U13
U14
U15
U16
C223
U22
U24
U25
U26
R36
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C321
C322
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U73
U74
U75
U76
R76
C76
S77
U83
U84
U85
U86
R861
R862
R96
F87
C952
R95
+ C93
U94
U95
U96
C94
C951
C96
W1
W2
W3
41530-57100-8906-03-A
E2

SERVICE MANUAL

53A-571

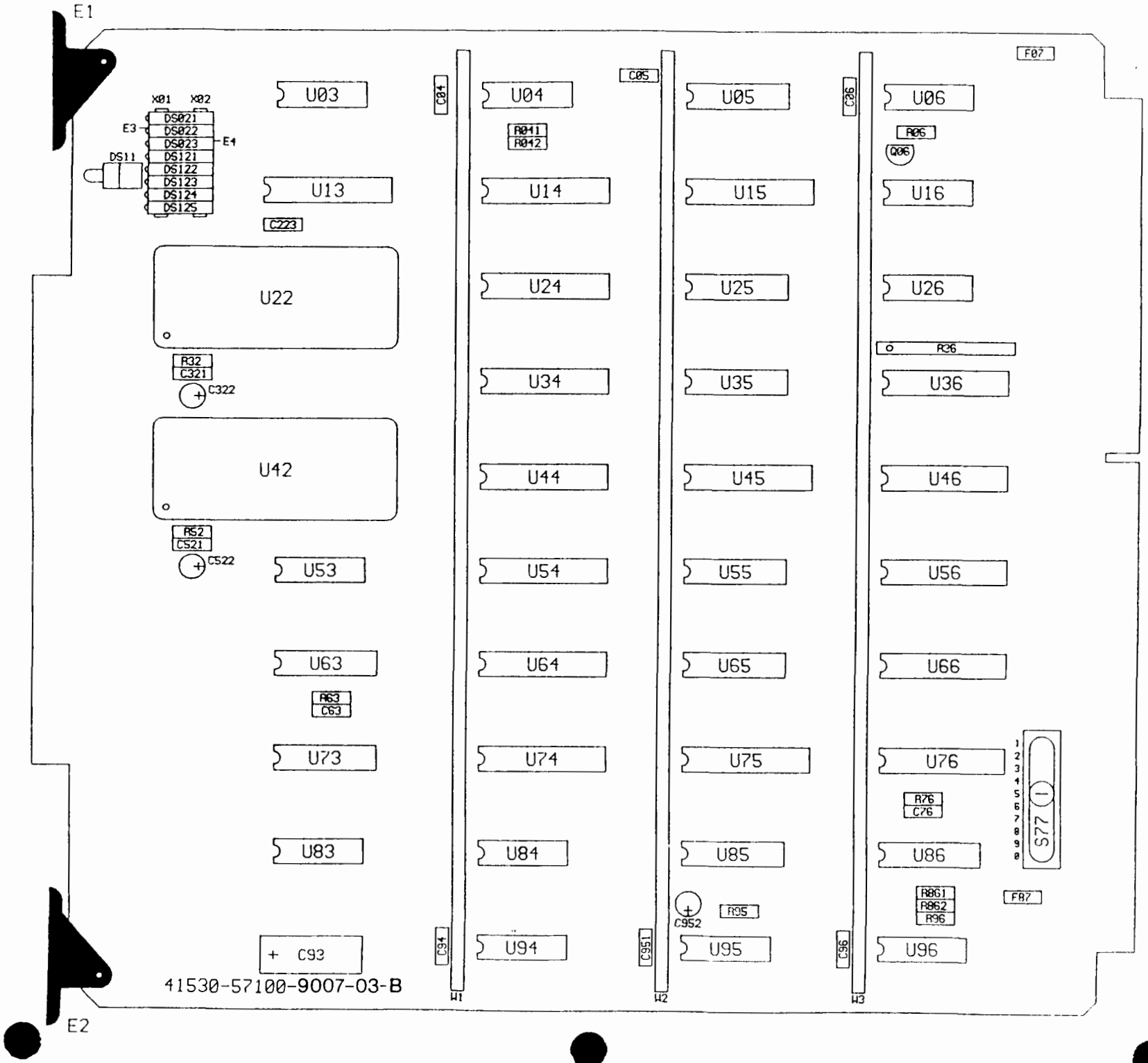
SYNCHRO DIGITAL CONVERTER

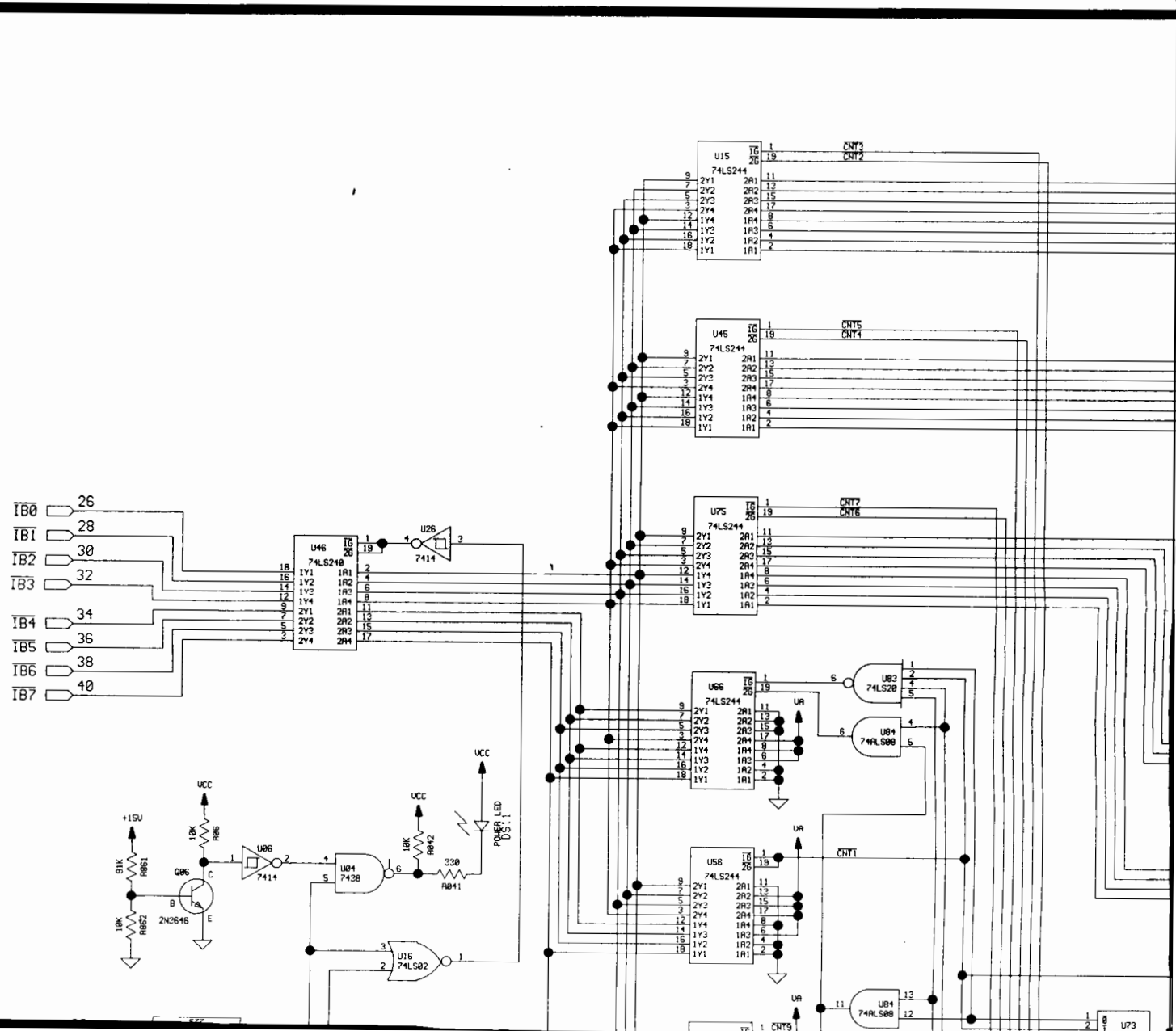
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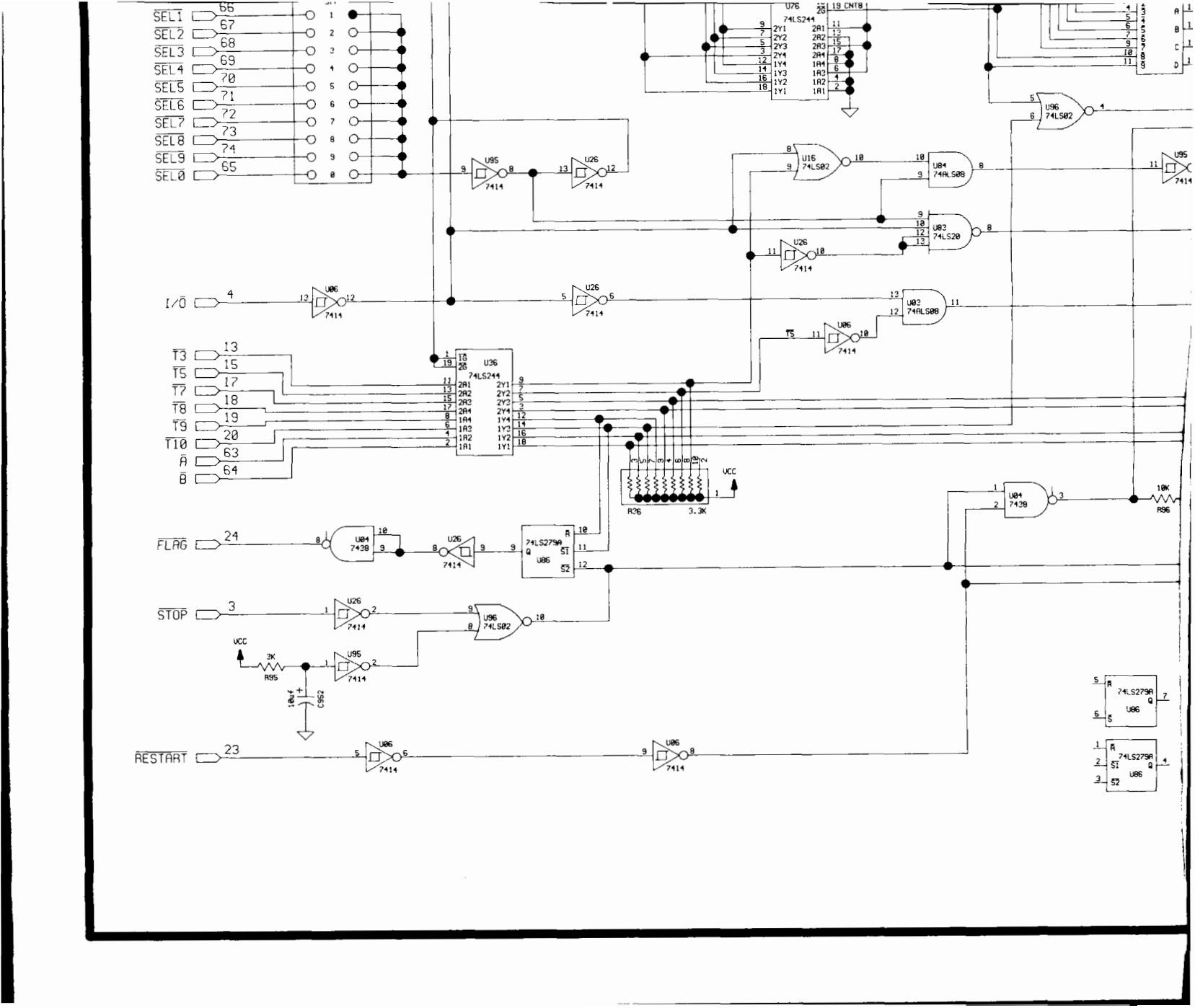
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
C04,05,06,94,951,96	20128-10006	6	CAP FXD CER .1UF 20% 50VDCW	0058	C322C104M5U5CA
C223	21528-33003	1	CAP FXD MICA 330PF 5% 100VDCW	0025	CD7CA331J03
C321,521	20128-10005	2	CAP FXD CER .01UF 20% 50VDCW	0106	1C25Z5U103M050B
C322,522,952	22022-10008	3	CAP FXD TA 10UF 10-20% 20-25VDCW	0106	199D106X9025CA1
C63,76	20128-47006	2	CAP FXD CER .47UF 20% 50VDCW	0075	RPE123Z5U474M50V
C93	21018-15009	1	CAP FXD ELECT 150UF 75% -10% 16VDCW	0025	NLW150-16
DS021,022,023,121,122,123,124 125	32000-02003	8	DIODE LIGHT EMITTING RED WITH RESISTOR 0	0039	547-2003
DS11	32000-00103	1	DIODE LIGHT EMITTING RED 50MA	0039	550-0103
E1	40401-00571	1	EJECTOR STAMP 53A-571 STYLE B BLUE	0026	40401-00571
E2	40401-10057	1	EJECTOR STAMP S-D STYLE D BLUE	0026	40401-10057
E3	45050-03293	1	DCL LED 8POS DRW 00000-00564	0026	45050-03293
E4	45050-03236	1	DCL LED 8POS BLK DRW 00000 -00473	0026	45050-03236
F07,87	42202-52001	2	FUSE SUB-MIN 2AMP	0061	251002
PCB1	41530-57100	1	P.C. BOARD VERSION 2L 9007	0026	41530-57100
Q06	51100-03646	1	TRANSISTOR NPN HIGH SPEED SWITCH	0074	MPS3646
R041	10117-33003	1	330 OHM RES COMP 1-4W 5%	0087	R25J-330-5%
R042,06,862,96	10117-10005	4	10K RES COMP 1-4W 5%	0087	R25J-10K-5%
R32,52	10117-10002	2	10 OHM RES COMP 1-4W 5%	0087	R25J-10-5%
R36	12008-33004	1	3.3K RES NETWORK SIP 5% 1.5W 9-PKG	0027	750-101-R3.3K
R63,76	10117-22003	2	220 OHM RES COMP 1-4W 5%	0087	R25J-220-5%

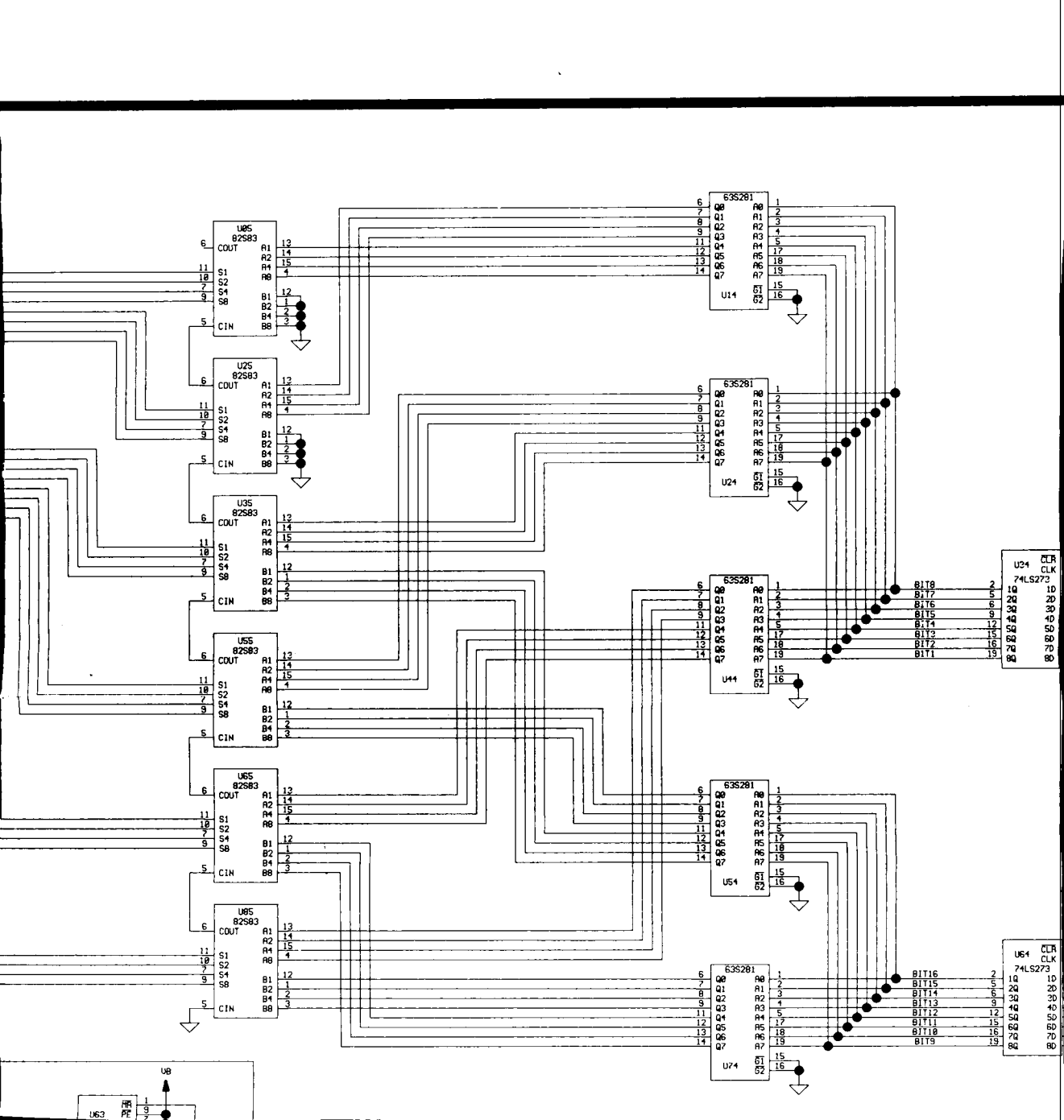
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
R861	10117-91005	1	91K RES COMP 1-4W 5%	0087	R25J-91K-5%
R95	10117-30004	1	3K RES COMP 1-4W 5%	0087	R25J-3K-5%
S77	42050-10010	1	SWITCH 10POS.	0101	C42315-A61-A11
U03,84	77203-07408	2	IC TTL ALS QUAD 2-INPUT AND GATE	0107	74ALS08
U04	76601-07438	1	IC TTL QUAD 2-INPUT NAND BUFFER W-OC	0107	7438
U05,25,35,55,65,85	71256-08283	6	IC TTL S 4-BIT BCD ADDER	0092	N82S83N
U06,26,95	78401-07414	3	IC TTL HEX SCHMITT INVERTING BUFFER	0107	7414
U13	79814-00022	1	PAL PROGRAMMED 16R8L REV A 53A-570 71 72 73	0026	79814-00022
U14	79813-00000	1	PROGRAMMED PROM U13 53A-571 AND 573	0026	79813-00000
U15,36,45,56,66,75,76	73310-74244	7	IC TTL LS OCTAL BUFFER NON-INVERTING	0107	74LS244N
U16,96	76901-07402	2	IC TTL LS QUAD 2-INPUT NOR GATE	0107	74LS02
U22	20100-14520	1	IC HYBRID SYNCHRO TO DIGITAL CONV 16 BITS 0-	0036	SDC-14520-305
U24	79813-00001	1	PROGRAMMED PROM U23 53A-571 AND 573	0026	79813-00001
U34,64	73001-74273	2	IC TTL LS OCTAL D-TYPE FLIP-FLOP	0107	74LS273
U44	79813-00002	1	PROGRAMMED PROM U33 53A-571 AND 573	0026	79813-00002
U46	73310-74240	1	IC TTL LS OCTAL BUFFER	0107	74LS240
U53	73001-07474	1	IC TTL LS DUAL D-TYPE EDGE TRIG FLIP-FLOP	0107	74LS74A
U54	79813-00003	1	PROGRAMMED PROM U63 53A-571 AND 573	0026	79813-00003
U63	71200-74161	1	IC TTL LS SYNCH 4-BIT COUNTER	0107	74LS161A
U73	79001-07442	1	IC TTL LS 4-LINE TO 10-LINE DECODER	0107	74LS42

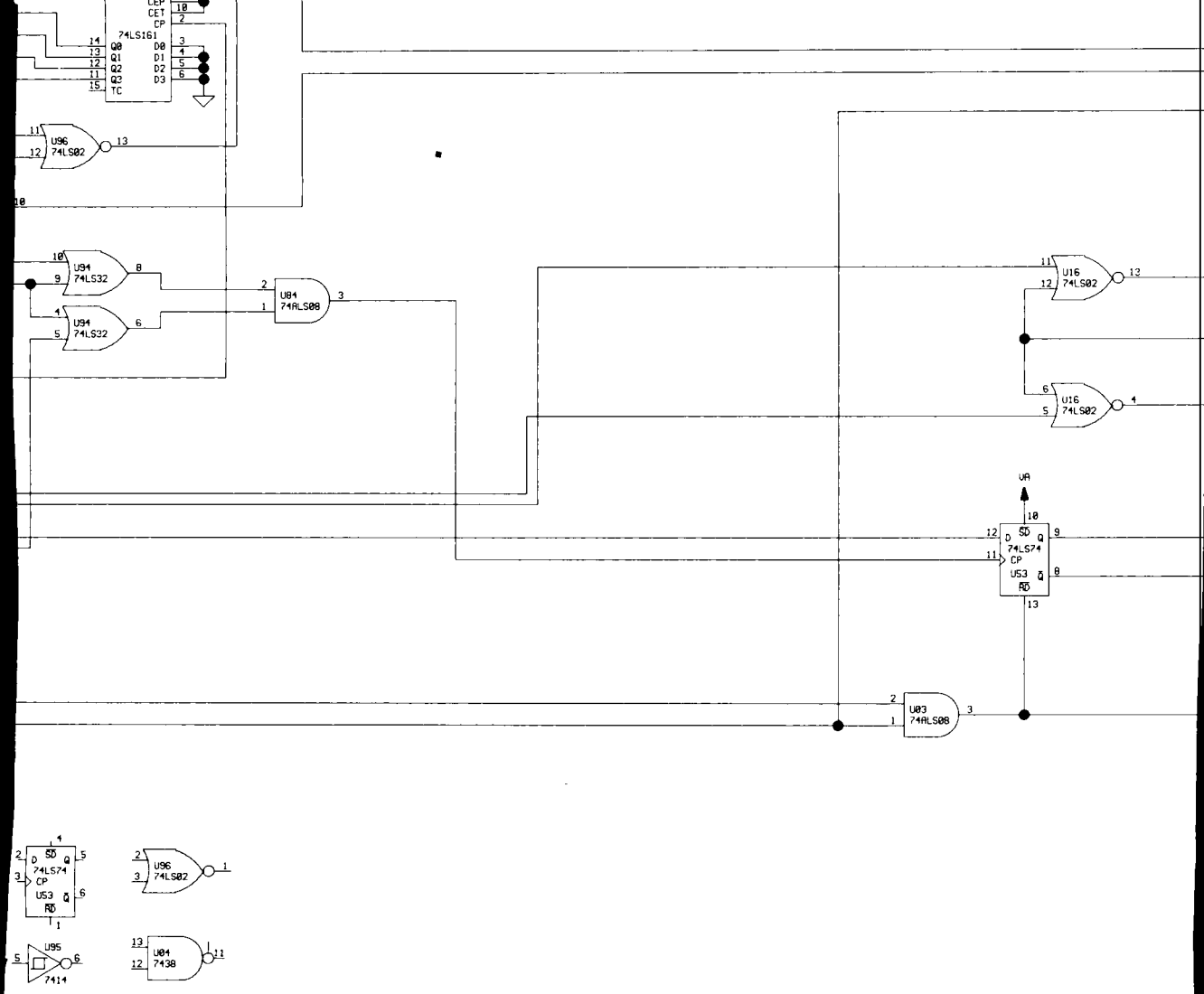
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U74	79813-00004	1	PROGRAMMED PROM U73 53A-571 AND 573	0026	79813-00004
U83	76500-07420	1	IC TTL LS DUAL 4-INPUT NAND GATE	0107	74LS20
U86	73205-74279	1	IC TTL LS QUAD S-R LATCH	0107	74LS279
U94	77815-07432	1	IC TTL LS QUAD 2-INPUT OR GATE	0107	74LS32
W1,2,3	93517-75397	3	BUS BAR P.75 F.3 X9 L7.2	0090	M-833 9.75.3
X01,02	45010-08100	2	SOCKET SIP 8 PIN	0032	CAS-08VSC-12B

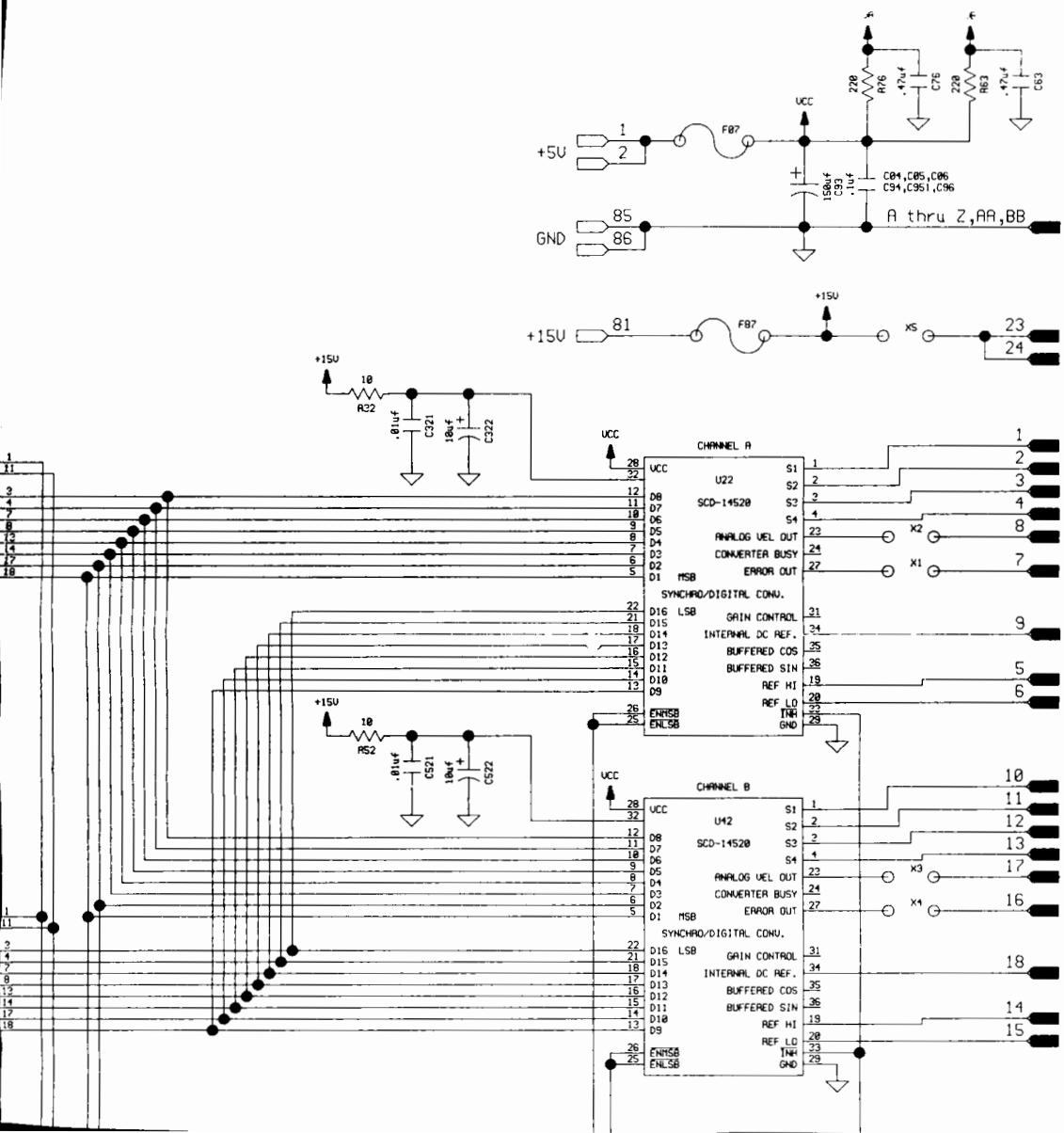

E1
X01
X02
E3
E4
DS11
DS021
DS022
DS023
DS121
DS122
DS123
DS124
DS125
U03
U13
C223
U22
R32
C321
C322
U42
R52
C521
C522
U53
U63
R63
C63
U73
U83
+ C93
41530-57100-9007-03-B
E2
C04
U04
R041
R042
U14
U24
U34
U44
U54
U64
U74
U84
C94
U94
W1
C05
U05
U15
U25
U35
U45
U55
U65
U75
U85
C952
R95
C951
U95
W2
C06
U06
R06
Q06
U16
U26
R36
U36
U46
U56
U66
U76
R76
C76
U86
R861
R862
R96
C96
U96
W3
F07
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S77
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4
5
6
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8
9
0

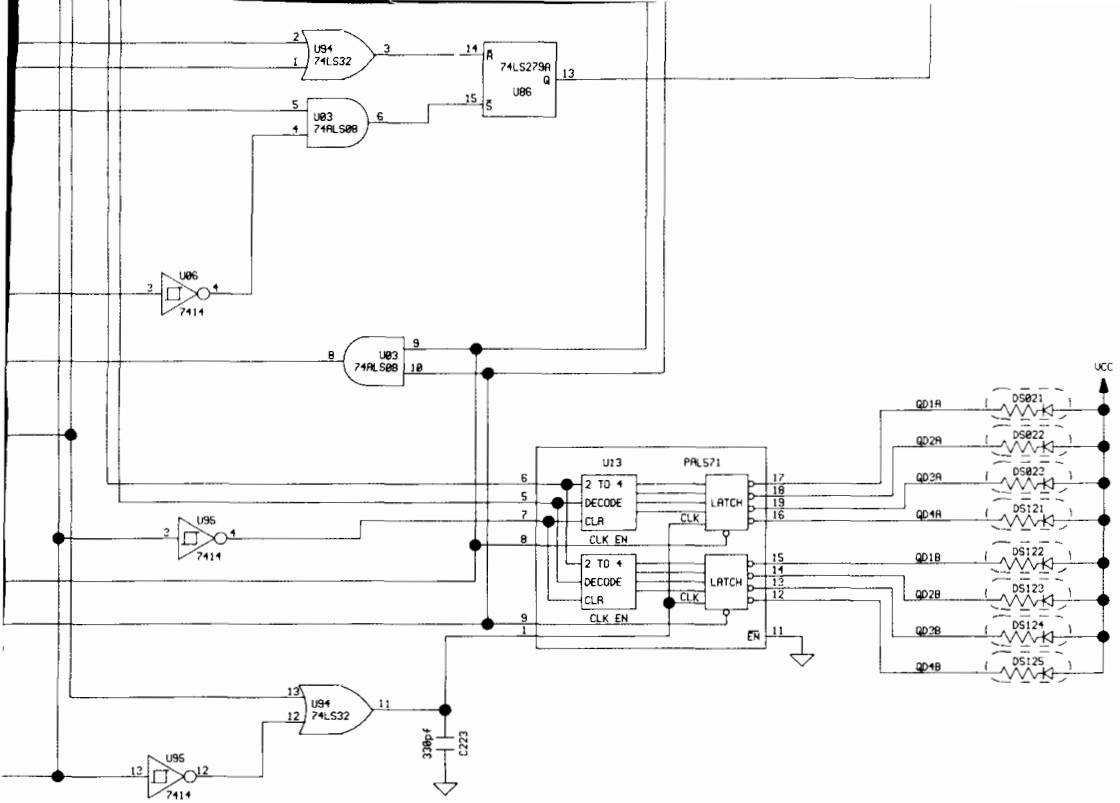

IB0
IB1
IB2
IB3
IB4
IB5
IB6
IB7
26
28
30
32
34
36
38
40
U46
74LS240
U26
7414
U15
74LS244
U45
74LS244
U75
74LS244
U66
74LS244
U56
74LS244
U83
74LS20
U84
74ALS08
U84
74ALS08
U06
7414
U04
7428
U16
74LS02
+15V
VCC
91K
R861
10K
R862
10K
R86
10K
R872
330
R841
Q86
2N2646
POWER LED
DS11
CNT3
CNT2
CNT5
CNT4
CNT7
CNT6
CNT1
VA


SEL1
SEL2
SEL3
SEL4
SEL5
SEL6
SEL7
SEL8
SEL9
SEL0
I/O
T3
T5
T7
T8
T9
T10
A
B
FLAG
STOP
RESTART
VCC
U95
U26
U06
U36
74LS244
U76
74LS244
U16
74LS02
U84
74ALS08
U83
74LS20
U02
74ALS00
U96
74LS02
U04
7438
U86
74LS279A
R36
3.3K
R96
10K
R95
3K
C952
10uf
19 CNT8


U85
82S83
U65
82S83
U55
82S83
U35
82S83
U25
82S83
U85
82S83
COUT
S1
S2
S4
S8
CIN
A1
A2
A4
A8
B1
B2
B4
B8
U74
U54
U44
U24
U14
63S281
A0
A1
A2
A3
A4
A5
A6
A7
Q0
Q1
Q2
Q3
Q4
Q5
Q6
Q7
G1
G2
U64
U34
74LS273
CLR
CLK
1D
2D
3D
4D
5D
6D
7D
8D
1Q
2Q
3Q
4Q
5Q
6Q
7Q
8Q
BIT16
BIT15
BIT14
BIT13
BIT12
BIT11
BIT10
BIT9
BIT8
BIT7
BIT6
BIT5
BIT4
BIT3
BIT2
BIT1
U8
U63


CEP
CET
CP
74LS161
Q0
Q1
Q2
Q3
TC
D0
D1
D2
D3
U96
74LS02
U94
74LS32
U84
74RLS08
U16
74LS02
VA
SD
D
74LS74
CP
U53
Q
RD
U03
74RLS08
U95
7414
U84
7408


+5V
GND
F87
VCC
220 R76
.47uf C76
220 R63
.47uf C63
150uf C93
.1uf
C84,C85,C86
C94,C95,C96
A thru Z,AA,BB
+15V
81
F87
X5
23
24
10 R32
.01uf C321
10uf C322
CHANNEL A
U22
SCD-14520
VCC
D8
D7
D6
D5
D4
D3
D2
D1 MSB
SYNCHRO/DIGITAL CONV.
D16 LSB
D15
D14
D13
D12
D11
D10
D9
ENMSB
ENLSB
S1
S2
S3
S4
ANALOG VEL OUT
CONVERTER BUSY
ERROR OUT
GAIN CONTROL
INTERNAL DC REF.
BUFFERED COS
BUFFERED SIN
REF HI
REF LO
INH
GND
X2
X1
10 R52
.01uf C521
10uf C522
CHANNEL B
U42
X3
X4



8906-03-A

REVISION LEVEL	ECO #
8906-03-A	994

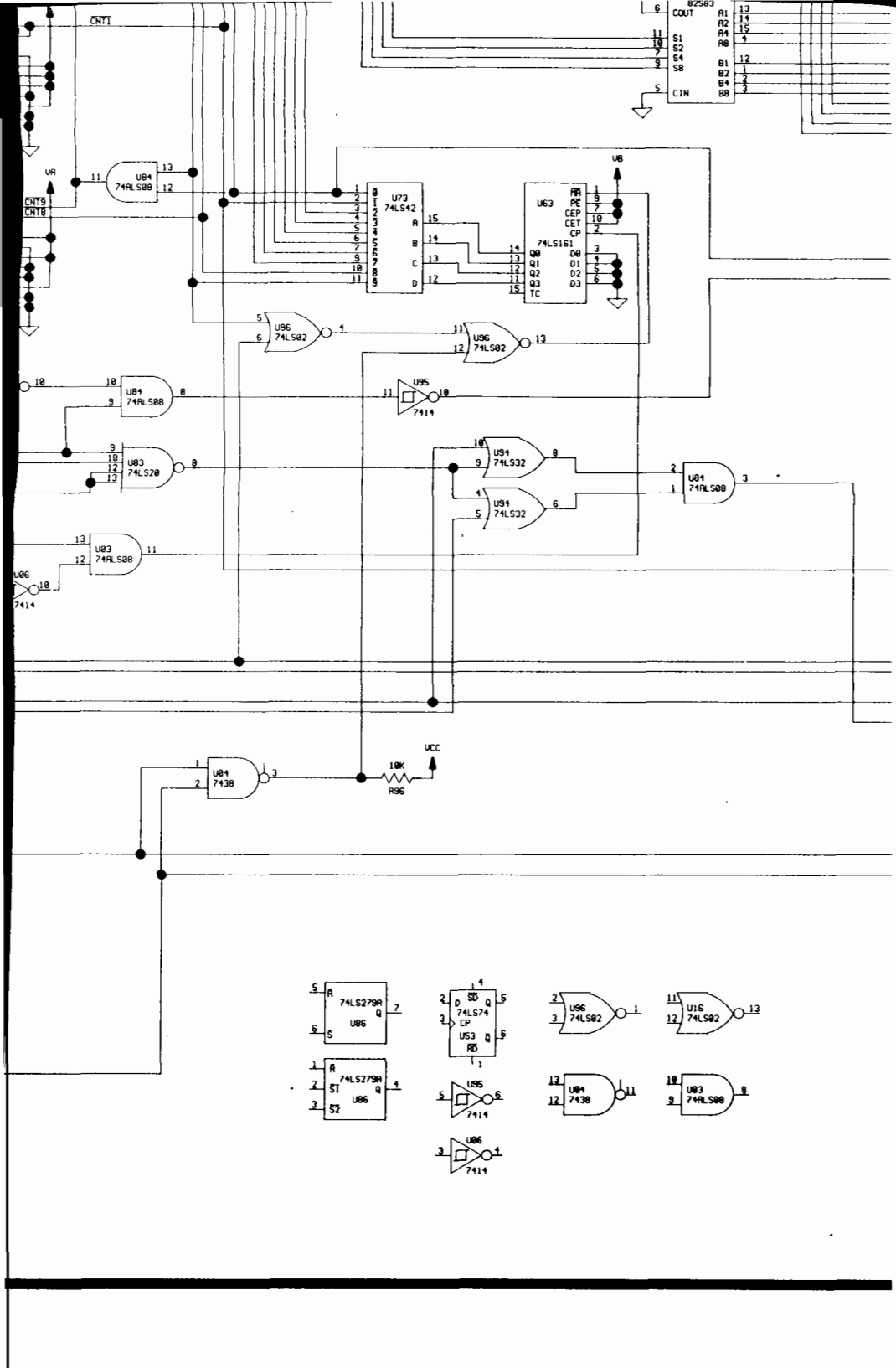
COLORADO DATA SYSTEMS

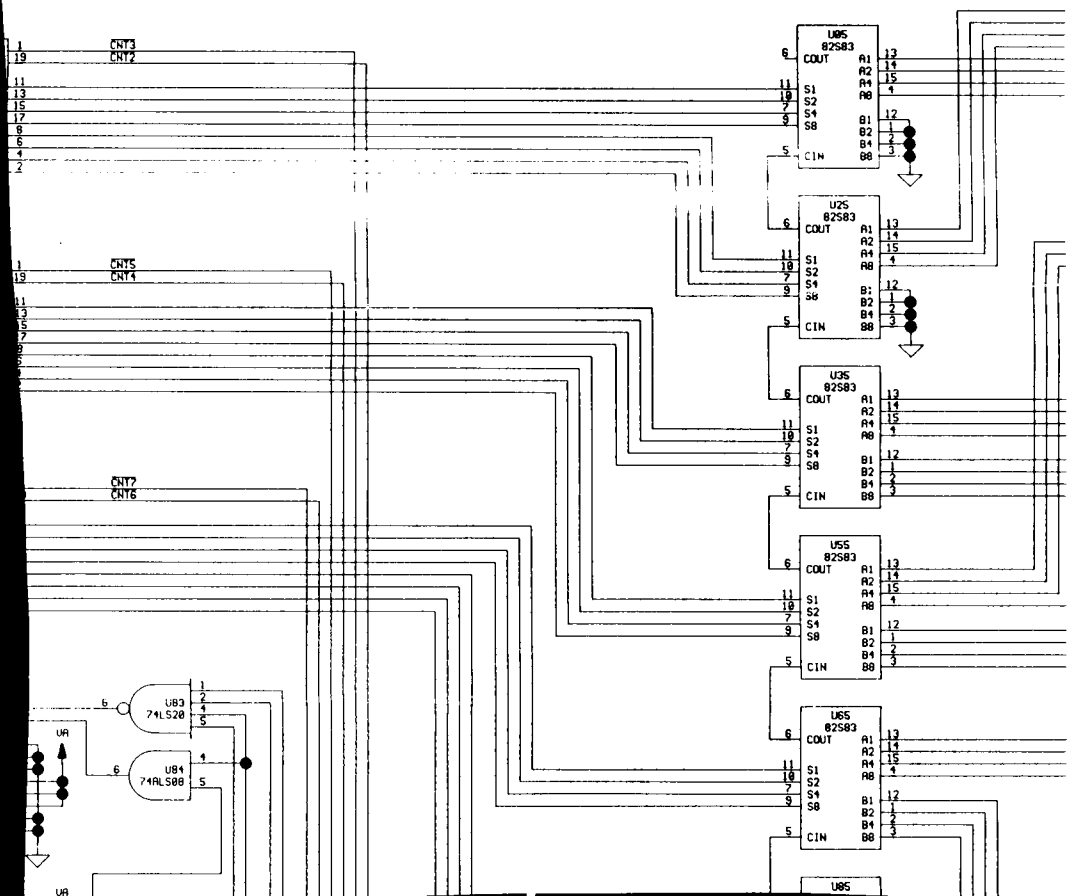
PART NO.: 53A-571

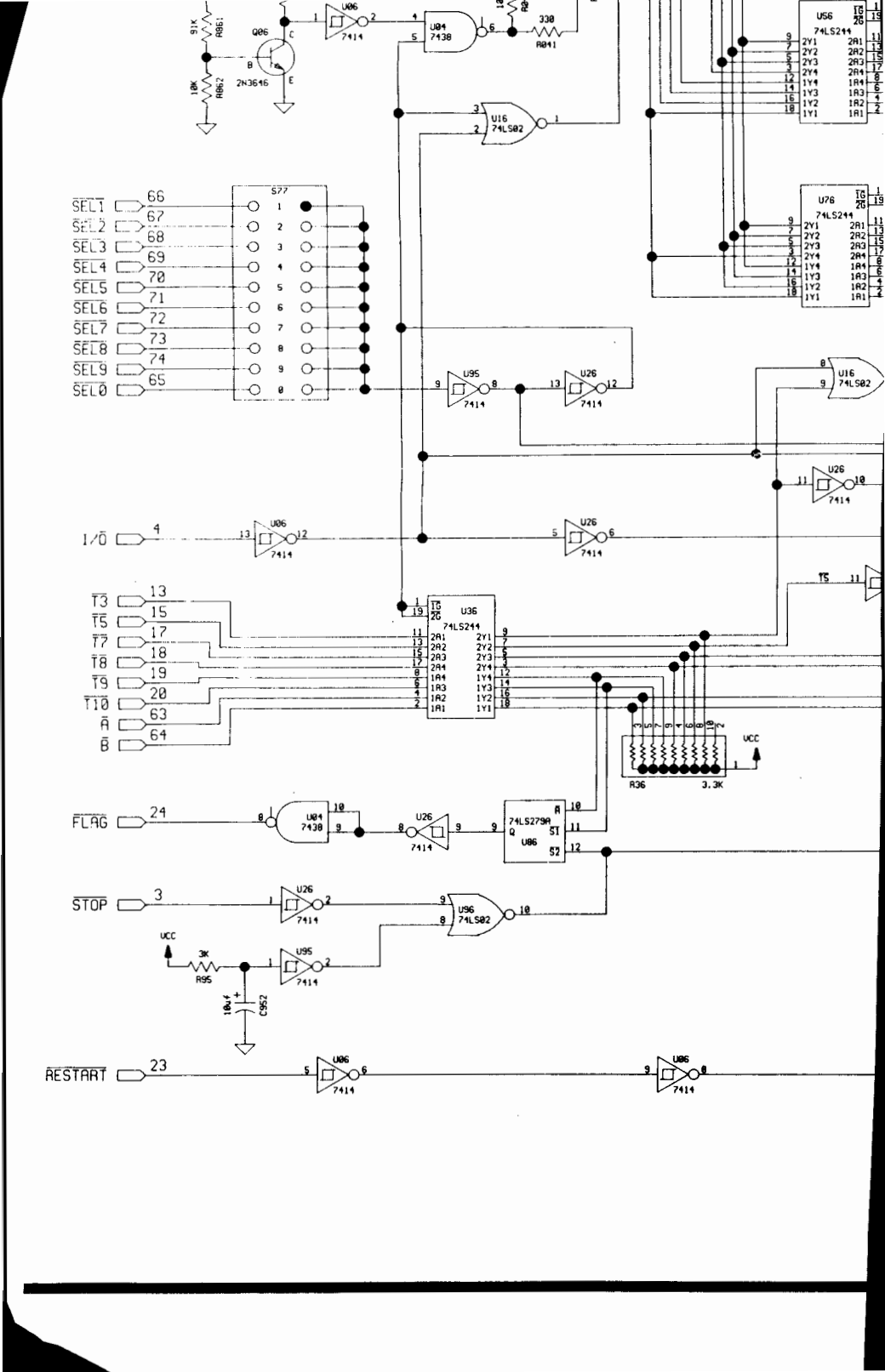
DESCRIPTION: SYNCRO/DIGITAL

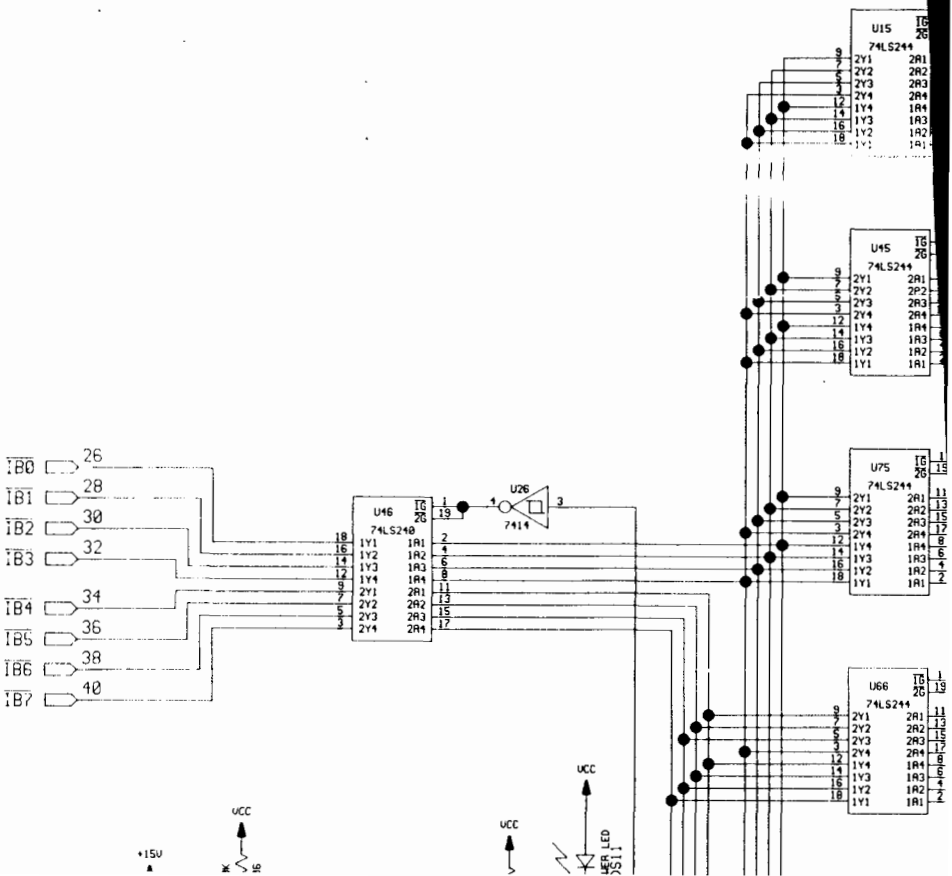
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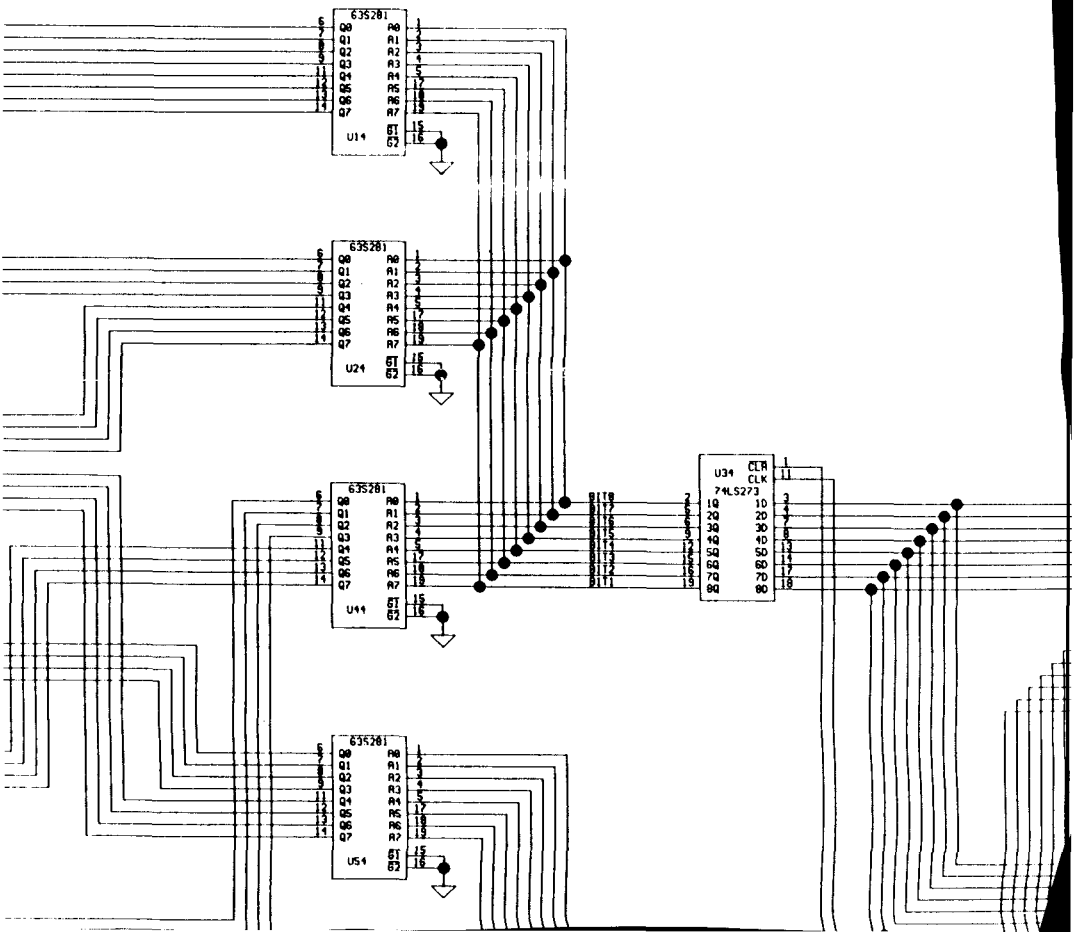
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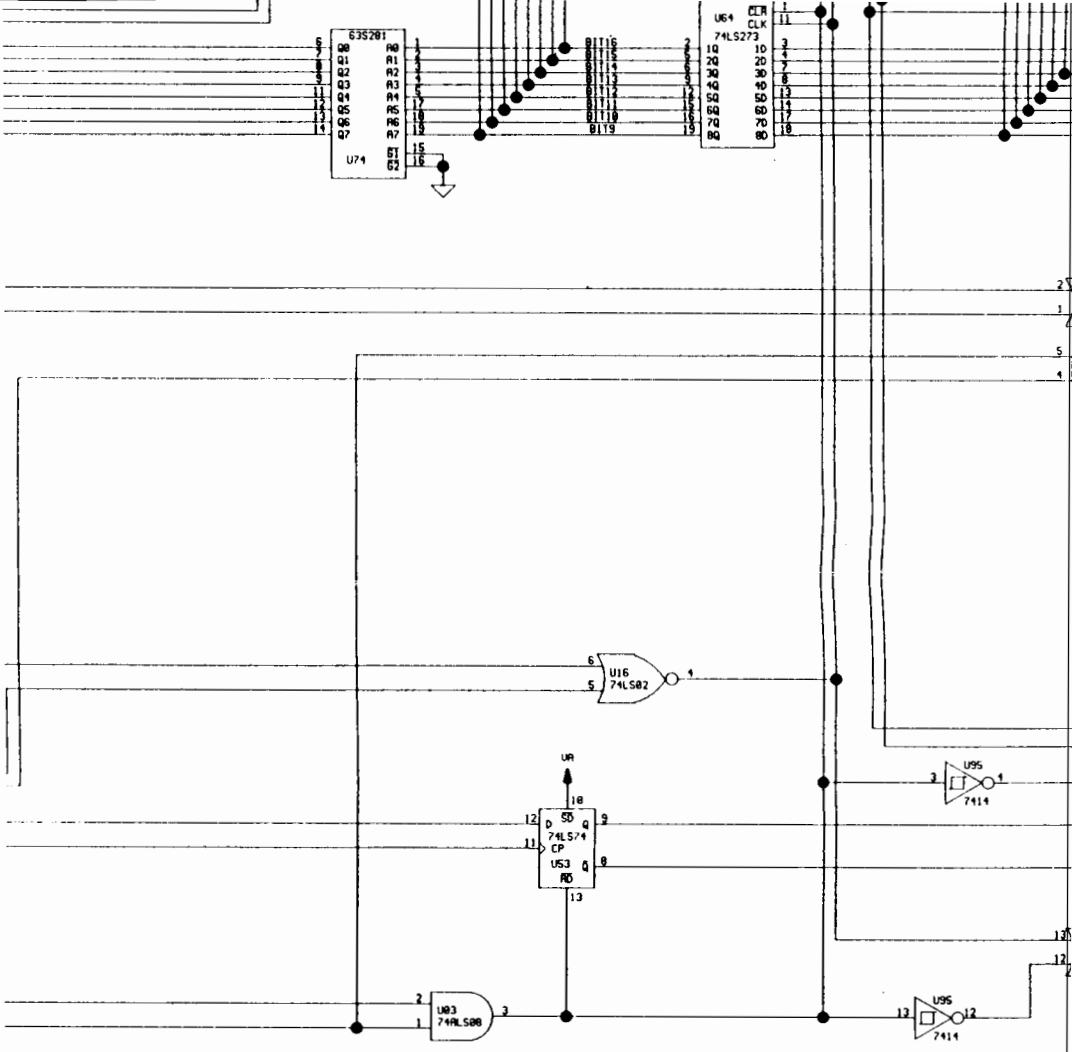

CNT1
CNT9
CNT8
U84
74ALS08
U73
74LS42
U63
74LS161
U96
74LS02
U95
7414
U91
74LS32
U83
74LS20
U86
7438
VCC
10K
R96
82S83
COUT
CIN
74LS279A
74LS74
U16


CNT3
CNT2
CNT5
CNT4
CNT7
CNT6
U8S
82S83
U2S
82S83
U3S
82S83
U5S
82S83
U6S
82S83
U8S
COUT
CIN
S1
S2
S4
S8
A1
A2
A4
A8
B1
B2
B4
B8
U83
74LS20
U84
74ALS08
VA
VA

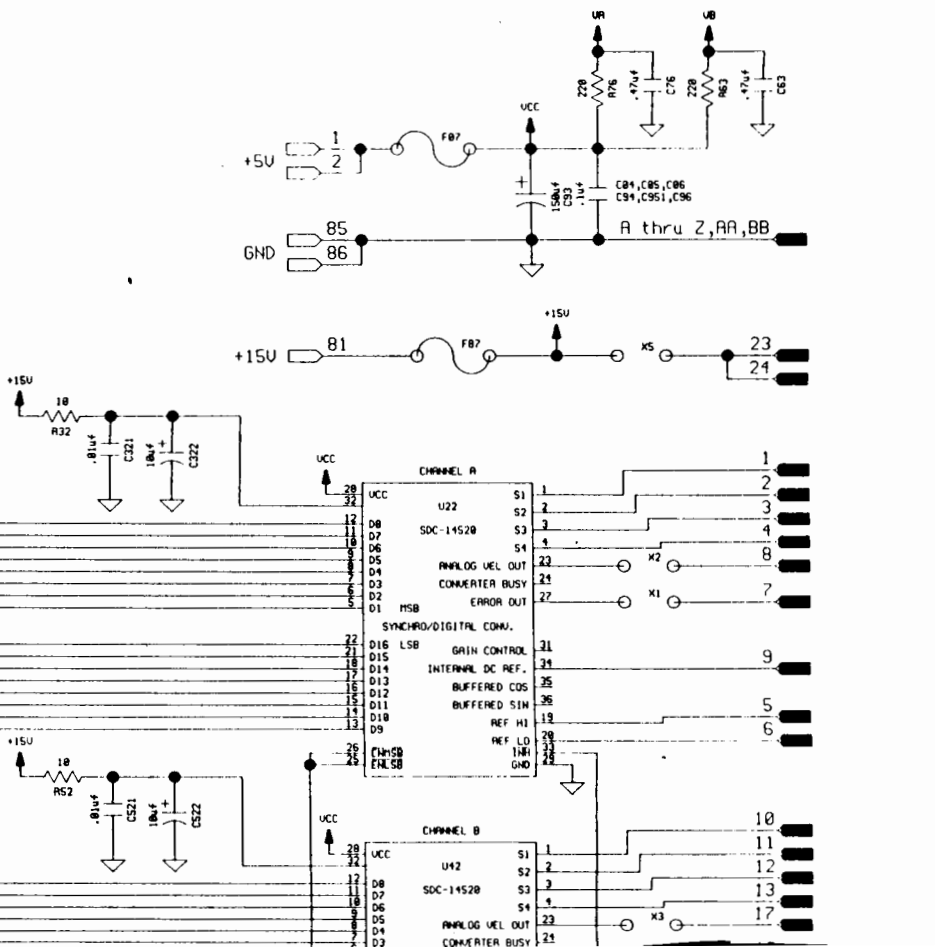

91K
R861
10K
R862
Q06
2N3646
U06
7414
U04
7438
330
R841
U16
74LS02
U56
74LS244
U76
74LS244
S77
SEL1
SEL2
SEL3
SEL4
SEL5
SEL6
SEL7
SEL8
SEL9
SEL0
U95
U26
I/O
U36
T3
T5
T7
T8
T9
T10
A
B
FLAG
74LS279A
U86
R96
3.3K
VCC
STOP
U96
3K
R95
10uf
C952
RESTART

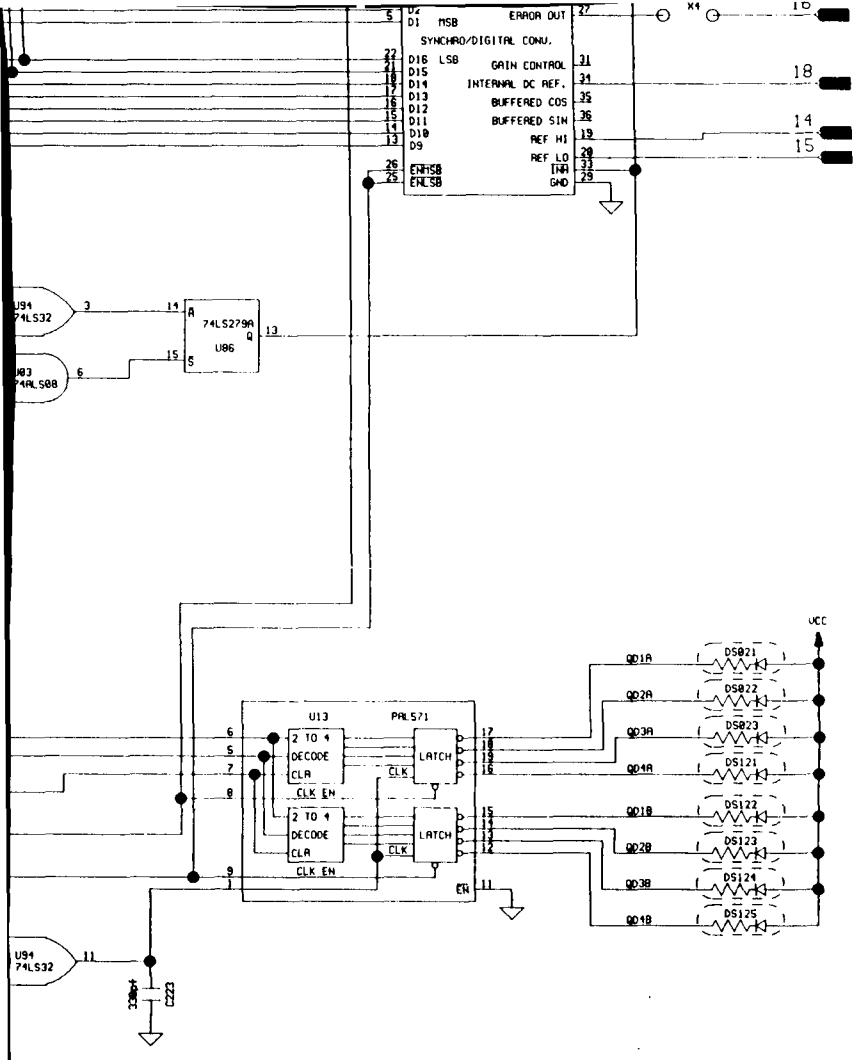

U15
74LS244
U45
74LS244
U75
74LS244
U66
74LS244
U46
74LS240
U26
7414
IB0
IB1
IB2
IB3
IB4
IB5
IB6
IB7
26
28
30
32
34
36
38
40
VCC
+15V
1K
LED


635281
U14
U24
U44
U54
U34
CLR
CLK
74LS273



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+5V
GND
F87
VCC
VA
VB
220
R76
.47uf
C76
R63
C63
C84,C85,C86
C94,C95,C96
A thru Z,AA,BB
+15V
F87
X5
23
24
R32
C321
C322
CHANNEL A
U22
SDC-14520
SYNCHRO/DIGITAL CONV.
ANALOG VEL OUT
CONVERTER BUSY
ERROR OUT
GAIN CONTROL
INTERNAL DC REF.
BUFFERED COS
BUFFERED SIN
REF HI
REF LO
X2
X1
R52
CHANNEL B
U42
X3



9007-03-B

REVISION LEVEL	ECO #
8906-03-A	994
9007-03-B	1380

COLORADO DATA SYSTEMS

PART NO.: 53A-571

DESCRIPTION: SYNCRO/DIGITAL

P.C.B. NUMBER: 41530-57100

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