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53A-258 OCTAL D/A CARD

OPERATING MANUAL

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Printed in U.S.A.

05/24/90

8903-01-C
8903-01-D

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53A-258 OCTAL D/A CARD

OPERATING MANUAL

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53A-258 OCTAL D/A CARD

DESCRIPTION

The 53A-258 Octal D/A Card is a printed circuit board assembly for use in a CDS 53/63 Series System. The card consists of eight independent single-ended digital to analog converters (D/As) with plus and minus three decimal digit resolution. The eight outputs can be independently programmed from -9.995V to +9.995V in 5 millivolt steps.

Each D/A converter has a power amplifier on its output capable of supplying up to 100 milliamps of current, and each is short circuit protected.

CONTROLS AND INDICATORS

The following controls and indicators are provided to select and display the functions of the 53A-258 Card's operating environment.

Address-Select Switch

The Octal D/A Card has a miniature ten-position switch that selects the card's address (0-9) in the 53A/63A 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 what action the system is taking. Whenever the D/A 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 D/A Card is unaddressed, but that all required dc power (5 V dc, ±15 V dc) is being supplied.

Fuses

There are three fuses (5V, -15V, and +15V) which protect the system from overload conditions. If any fuse has blown, the Power LED will not light.

Function LEDS and Switches

Channel LEDs

The eight LEDs represent D/A channels A, B, C, D, E, F, G and H, reading from top to bottom of the column. A single channel LED will be lit at any given time, indicating the last channel to receive digital data from the system controller.

All channel LEDs will be lit after a Halt or STOP command if the Halt Switch is in the ON position or after power-up. They will remain on until one of the channels is programmed.

The LEDs will be unchanged by a HALT or STOP command if the Halt Switch is in the OFF position.

Halt Switch

This 1-position slide switch is located near the card's backplane edge connector. It selects the state of the 53A-258 Card after an @XH (Halt) or STOP command is received by the 53/63 Series System.

a. If the Halt Switch is in the ON position, then the 53A-258 Card is reset to its power-up state, all D/A outputs are set to 0 VDC, and the Power LED is lit.

b. If the Halt Switch is in the OFF position, then the 53A-258 Card becomes unaddressed, the Power LED is lit, and any programmed parameters of the card remain unchanged. Any partially completed command must be completed for proper operation of the card.

SPECIFICATIONS

Type:	Eight each single-ended, bipolar D/A converters with output current amplifiers.
Programmed By:	ASCII characters.
D/A Manufacturer:	Analog Devices, Model AD7537J Dual 12 bit D/A.
Amplifier Manufacturer:	Elantec Model EL2003CN.
Output:	Range: -9.995 to +9.995 volts. Output current, @ 9.995V: 100 milliamperes maximum per D/A. Minimum step size: 5 millivolts. Output impedance maximum (DC): 10 ohms (internal to amplifier). Short circuit duration: continuous. Short circuit current: 100 mA. Output current, @ 9.995V: 25 milliamperes per D/A.
Throughput:	Throughput is the maximum number of conversions per second which can be accomplished by the D/A converter on a continuous basis. The Octal D/A card is capable of a conversion rate in excess of 30,000 conversions per second. In a typical system, throughput will be limited by the system controller and the 53A System Communications Card.
Settling Time:	1.5 μs max (to within 0.01% of final value).
Slew Rate:	10V/μs.
Accuracy:	Monotonicity: Guaranteed (0 °C to 70 °C). Linearity Error @ 25 °C: Less than ±5 millivolts. Gain Error: Adjustable to zero with trim potentiometer. Offset Error: Adjustable to zero with trim potentiometer. Maximum error with time, % of full scale: 24 hrs (23 °C ±1 °C) ±0.02% 30 days (23 °C ±5 °C) ±0.03% 90 days (23 °C ±5 °C) ±0.05% 6 months (23 °C ±5 °C) ±0.08% 1 year (23 °C ±5 °C) ±0.09% Temperature Coefficient: ±30 ppm/ °C (0 °C to 50 °C).

Power Up:	When power is turned on, the card will go to the following known states: Card Unaddressed (Power LED - lit); All D/A outputs at zero volts (Channel LEDs - all lit);
Power Requirements:	5V and 15V dc power is provided by the internal Power Supply in the 53/63 Series Card Cage, with the following exception: if more than eight cards are to be used at full load in a 53A-002 Card Cage, please consult the factory.
Voltage (5-volt Supply):	4.75 V dc to 5.25 V dc.
Current (5-volt Supply):	290 milliamperes, maximum quiescent. 1.6 A, peak.
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):	130 mA, maximum quiescent, no load. 330 mA, peak, all outputs ar rated load.
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, -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:	197mm High, 220mm Deep, 13mm 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 card's shipping dimensions are: 254mm X 254mm X 127mm (10" X 10" X 5")
Weight:	0.23Kg. (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 Series Card Cage.

D/A Output Connections: A 48-pin printed circuit type hooded connector (53A-780), provides a connection for all D/A outputs.

Required Equipment:
(Not Supplied) Either a 53A-780 Hooded Connector or 53A-749 Analog Cable is required with this Card.

NOTE: A 53A-723 Analog Cable may also be used with this card, but provides connections for channels A through F only.

Equipment Supplied:
1 - 53A-258 Octal D/A Card.
3 - Spare Fuses (Part #42202-52001)
1 - Operating Manual (Part #00000-12580)
1 - Service Manual (Part #00000-22580)

OPERATION

The Octal D/A Card is programmed by ASCII characters issued from the system controller to the 53/63 System's communications Card. The Octal D/A Card is interfaced to the communications card through the 53 Series or 63 Series Card Cage's 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 in the addressed mainframe; Y is the 53A-258 Card's address (0-9) within the addressed mainframe. The 53A-258 Card's 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-258 Card is addressed, the commands listed below may be issued until another function card is addressed.

Detailed descriptions of the 53A-258's commands are given on the following pages. Command separators such as <CR>, <LF>, commas, colons, semi-colons, spaces, or null characters are optional between commands. Commands may be strung together without separators if desired.

Command	Description
EZ	This command is used to set a D/A converter to a given output voltage.

Syntax: $\pm E_1E_2E_3[E_4]Z$

The ± in the command sequence represents the polarity of the voltage to be programmed. All voltages are assumed to be positive unless a "-" is received in the command string. The "+" is optional.

$E_1E_2E_3[E_4]$ represents the voltage to be output by the D/A, in the range from -9.995 to +9.995 volts. E_1 is the most significant digit and E_4 is the least significant digit. The string $E_1E_2E_3E_4$ programs $E_1.E_2E_3E_4$ volts. E_4 may be omitted, and will be assumed to be zero. For example, the command string "23", "0230", or "023" programs 0.230 volts.

Z represents the D/A Channel (A, B, C, D, E, F, G, or H) to be set to the above voltage. The letter may be upper or lower case.

If more than four digits are sent, only the last four are used by the 53A-258 Card.

A decimal point may be sent between E_1 and E_2 if desired. A decimal point in any other position is ignored.

The 53A-285 Card has a minimum resolution of 5 millivolts. E_4 is always truncated to either 5 or 0 (0, 1, 2, 3 or 4 truncates to 0; 5, 6, 7, 8, or 9 truncates to 5). To round to the closest available value instead of truncating, add 2 to the fourth digits value, then place the + or - sign in front of the value, and transmit the resulting value (see Example 3 below).

Examples:

1. The command +3.14B, +314B, 3.14B, 314B, +3.140B, +3140B, 3.140B or 3140B can be used to set D/A channel B to 3.140 volts.

   Status: Power LED out.
   Channel LEDs - B lit, all others out.

2. The command 3149B will set D/A channel B to 3.145 volts.

   Status: Power LED out.
   Channel LEDs - B lit, all others out.

3. To round instead of truncating, using the previous example, send 3151 (3149 + 2), which will program 3.150 volts.

4. The command @05500A-1002B-300C4OO5D will program channels A, B, C, and D in a mainframe at address 0 and 53A-258 at address 5 to the following voltage levels:

   A 5.000 volts
   B -1.000 volts
   C -3.000 volts
   D 4.005 volts

   Status: Power LED - out.
   Channel LEDs - D lit, all others out.

5. A D/A channel output can be continuously changed.

   @05-456F456F-456F456F-456F456F....

   The F D/A channel will output a square wave with upper and lower limits of 4.560 volts. The frequency of update will depend primarily on the system controller throughput.

   Status: Power LED - out.
   Channel LEDs - F lit, all others out.

6. The Registers $E_1E_2E_3E_4$ are always automatically cleared (set to 0.000 Volts) on power-up and after any channel address (Z).

   @05200FBCDAE will set channel F to +2.000 volts and all other channels to 0.000 volts.

   Status: Power LED - out.
   Channel LEDs - E lit, all others out.

7. Data is always loaded into the Registers $E_1E_2E_3E_4$ from the right and shifted to the left. The advantage of this is that it is unnecessary to transmit leading zeroes.

@05A3B31C314D3145HE-7F-0314G

A 0.000 volts
B 0.030 volts
C 0.310 volts
D 3.140 volts
H 3.145 volts
E 0.000 volts
F -0.070 volts
G -0.310 volts

Status: Power LED - out.
Channel LEDs - G lit, all others out.

INSTALLATION

The 53A-258 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-258" is at the top for a 53 Series Chassis and to the left for a 63 Series Chassis.

CAUTION:

The 53A-258 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 mainframe address (0-9) defined by the address-select switch on the 53A-171 Control Card in the addressed mainframe.

Y is a function-card address (0-9) defined by the address-select switch on the function card. Once a mainframe/function-card combination is addressed, it remains addressed until the 53/63 Series System detects a new @ character.

@XS The @XS (Status) command provides the interrupt status of all function cards within the mainframe defined by X. The interrupt status of all function cards in the addressed mainframe is latched into the 53A-171 Control Card when the @XS command is issued. All function cards in all mainframes become unaddressed after the @XS command is issued. The 53A-258 Card has no interrupt capability, and does not require use of the @XS command. The 53A-171 Control Card Operating Manual describes the @XS command in detail.

@XH The @XH (Halt) command halts all function cards within the mainframe defined by X. This command does not affect function cards in other mainframes. How a function card reacts to the @XH command depends on the particular card.

On the 53A-258 Card the position of the Halt Switch causes the @XH command to have the following effects: If the Halt Switch is ON, the 53A-258 Card will set all D/A channels to 0.000 volts and all LEDs on the 53A-258 Card will light. If the Halt switch is OFF the 53A-258 Card voltage levels and LEDs will not change. In both switch positions, the 53A-258 Card, if addressed (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 mainframe. When the system controller issues a STOP command, each function card (including the 53A-258 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

INPUT/OUTPUT CONNECTIONS

The analog signals produced by the eight D/A converters can be accessed by either the 53A-780 hooded edge connector or by the 53A-749 Analog Cable*. The signal assignments are listed below.

		53A-749 Analog Cable	
Channel	53A-780 Pin Number/Letter	Jacket Color	Wire Pair and Drain Wire**
A High	2	White	Black
Low	B,C		White, Drain
B High	4	Black	Black
Low	D,E		White, Drain
C High	8	Brown	Black
Low	J,K		White, Drain
D High	13	Red	Black
Low	P,R		White, Drain
E High	18	Orange	Black
Low	V,W		White, Drain
F High	20	Yellow	Black
Low	X,Y		White, Drain
G High	10	Green	Black
Low	L,M		White, Drain
H High	15	Blue	Black
Low	S,T		White, Drain

* The 53A-723 Analog Cable, sold with the 53A-257 6 Channel D/A card may also be used with the 53A-258 channels for A through F. However, the 53A-723 Cable will not access channels G and H. The 53A-749 Cable must be used if channels G and H are to be used.

** For most applications, the drain wire should not be connected at the user load. Trim back the foil shield and drain wire, then connect only the black and white wires to the load.

Four additional pins are provided for bringing in external ±15 VDC power. These pins may be required in a 53A-002 Card Cage when fully loaded with 53A-258 cards (consult factory in this case).

The ±15V DC external power pin assignments for the front edge connector are: +15V, Pins 23 and 24; -15V, Pins 21 and 22; Ground, AA and BB.

To use external power, the standard ±15V fuses must be removed from their location next to the Address Select switch and relocated at an "optional" fuse position at the bottom of the card near the front edge connector.

CAUTION:

If "optional" fuses are to be used, then the fuses next to the Address Select switch must be removed.

APPENDIX C

CALIBRATION

The 53A-258 Card must be calibrated every 12 months for the card to meet its published accuracy specifications. Calibrate the 53A-258 Card in an environment where the temperature is between 21° and 25°C. If this is not feasible, or the card will be operating under a wide temperature variation, consult the temperature drift specifications. Allow a ten minute warm-up period before performing the calibration.

The Octal D/A Card consists of eight separate D/A converters. The eight converters must be calibrated individually. For ease of calibration, it is recommended that the card be extended from the card cage using a 53A-850 Extender Card and a 53A-780 Connector plugged onto the front edge of the D/A Card.

Required Test Equipment

- a 5½ digit or greater DVM with an accuracy of at least 0.5 millivolts from -10 to +10 VDC.

Procedure

Each channel has an offset and gain adjustment listed in the following table. The DVM high and low will be connected to the Output and Ground pins listed for each channel. A CDS 53A-332 Scanner Card may be used to automate switching between the channels without affecting calibration accuracy.

Channel	Offset Pot	Gain Pot	Output Pin Number	Ground Pin Number
A	R34	R221	2	B
B	R44	R32	4	D
C	R54	R421	8	J
D	R64	R621	13	P
E	R74	R721	18	V
F	R84	R821	20	X
G	R1041	R92	10	L
H	R1141	R1021	15	S

1. Turn on the 53A-002 Card Cage power and allow five minutes for warm-up.

2. For each channel:

    a. Connect the high input of the DVM to the channel's Output Pin listed above.

    b. Connect the low input of the DVM to the channel's Ground Pin listed above.

    c. Program Octal D/A Card with @XYZ, where X and Y are the Control Card and D/A Card address respectively, and Z is the channel being calibrated.

d. Adjust offset potentiometer until the DVM reads within 500 microvolts of 0 volts.

e. Program Octal D/A Card with @XY9995Z.

f. Adjust gain potentiometer until the DVM reads 9.995 volts ±500 microvolts.

g. Repeat steps 3b through 3f one additional time.

APPENDIX D

SAMPLE BASIC PROGRAM FOR 53A-258

The sample program below is written in Advanced BASIC (BASICA) for an IBM PC. The PC is connected to the CDS 53/63 Series Card Cage using a 53A-903 Card installed in the PC. The 53A-903 I/O Card provides an IEEE-488 interface between the PC and the CDS Card Cage. The 53A-258 Card has been set to address 9. The address of the 53/63 Card Cage containing the 53A-258 Card is address 1.

The sample program sets the D/A Card as follows:

Channel A to +5.000 volts;
Channel B to -5.200 volts;
Channel C to 0.000 volts;
Channel D ramps from 0.000 volts to -5.000 volts in 25 millivolt steps;
Channel E ramps from 0.000 volts to +5.000 volts in 25 millivolt steps;
Channel F to +9.995 volts;
Channel G to -9.995 volts;
Channel H to 0.000 volts.

For this program, PCX is a variable containing the IEEE-488 address of the CDS 53/63 Series Card Cage and GPIB0 is a variable containing the IEEE-488 address of the 53A-903 I/O card. The 53A-903 commands used in this program are:

IBFIND, IBINIT1, IBINIT2, IBLOAD
: These commands load and initialize the software drivers for the 53A-903 card in the PC. The drivers are loaded from the software disk supplied with the 53A-903.

IBSIC
: Resets the IEEE-488 interface, setting the interface IFC line true for 100 microseconds.

IBTMO
: Defines the PC timeout for I/O operations to the 53A-903.

IBWRT
: Writes the contents of a string variable to the 53/63 Series Card Cage.

IBRD
: Reads data bytes from the 53/63 Series Card Cage and stores them in string variables. Note that the variable must first be filled with space characters equal to the maximum number of data bytes to be read.

Sample BASIC Program

In this program listing, lines which are indented and not preceded by a line number are not part of the BASIC program. They are inserted here as comments to explain what the program is doing at each numbered line.

NOTE: Lines 1 through 50 are included in the program to initialize the 53A-903 IEEE-488 interface card in the PC. In this example program, RD$ is filled with spaces prior to each IBRD statement. The number of spaces used is equal to the number

of data bytes to be received. This is done to show the exact number of data bytes returned at each input statement.

```
1    CLEAR ,60000!
```
BASIC declarations.

```
2    IBINIT1 = 60000!

3    IBINIT2 = IBINIT1 + 3

4    BLOAD "BIB.M",IBINIT1:KEY OFF

5    CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,
     IBONL,IBRSC, IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,
     IBRDF,IBWRTF)

6    CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,
     IBRD, IBRDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,
     IBWRTIA, IBSTA%,IBERR%,IBCNT%)

10   BDNAME$="PCX":CALL IBFIND (BDNAME$,PCX%)
```
Find the IEEE-488 devices.

```
20   BDNAME$="GPIB0":CALL IBFIND(BDNAME$,GPIB0%)

30   CALL IBSIC(GPIB0%)
```
Reset the IEEE-488 devices.

```
40   TIMEOUT%=0

50   CALL IBTMO(PCX%,TIMEOUT%):CALL IBTMO(GPIB0%,TIMEOUT%)
```
Disable the PC timeout function for I/O operations to the 53A-903.

```
1000 ADRS258$ = "@19"
```
ADRS258$ is the address of the 53A-258 Card. The D/A Card is in the cage whose 53A-171 address is 1 and the 53A-258 is at address 9.

```
1010 WRT$ = ADRS258$ + "500A-520BCDE9995F-9995GH"
```
WRT$ is a string variable that becomes the concatenation of the address of the 53A-258 Card and a string containing the initial DC voltage output codes for all eight D/A channels.

- 500A sets channel A to +5.000 volts.
- -520B sets channel B to -5.200 volts.
- CDE sets channels C, D and E to 0.000 volts.
- 9995F sets channel F to +9.995 volts.
- -9995G sets channel G to -9.995 volts.
- H sets channel H to 0.000 volts.

```
1020 CALL IBWRT(PCX%,WRT$)
```
Outputs the contents of WRT$ to the 53A-258 Card.

1030 FOR MVRAMP = 0 TO 5000 STEP 25

The FOR loop will ramp the variable MVRAMP from 0 (millivolts) to 5000 (millivolts, or 5 volts) in steps of 25 (millivolts).

1040 VNEG$ = "-0000" : VPOS$ = "0000"

Initialize the string variables VNEG$ and VPOS$.

1050 WRT$ = VNEG$ + STR$(MVRAMP) + "D"

Concatenate the initialized string variable VNEG$ with the string representation of the variable MVRAMP and the letter 'D' (for D/A Channel D). If the MVRAMP is 325 the resulting string variable WRT$ would be: "-0000 325D"

When sent to the 53A-258 D/A Card this string would cause D/A Channel D to be set to -0.325 volts.

The 53A-258 Card ignores the space in WRT$. It uses only the four digits immediately preceding the letter (D).

1060 WRT$ = WRT$ + VPOS$ + STR$(MVRAMP) + "E"

Concatenate the initialized string variable VPOS$ with the string representation of the variable MVRAMP and the letter 'D' (for D/A Channel D). If the MVRAMP is 4050 the resulting string variable WRT$ would be: "0000 4050D"

When sent to the 53A-258 D/A Card this string would cause D/A Channel D to be set to +4.050 volts.

1070 CALL IBWRT(PCX%,WRT$)

This line transfers the data in WRT$ to the 53A-258 Card.

1080 NEXT MVRAMP

1090 END

SERVICE MANUAL

53A-258

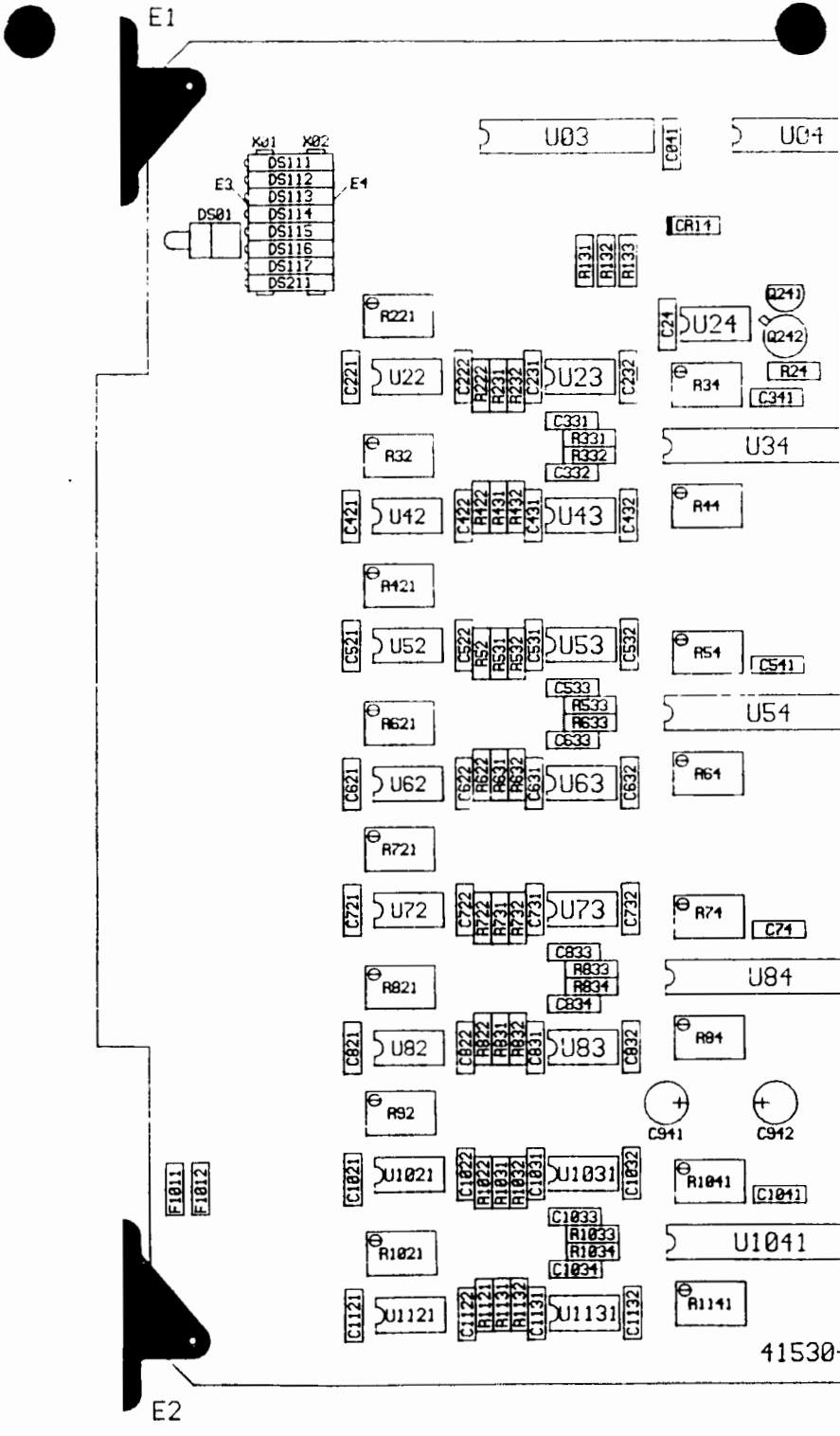
EIGHT CHANNEL D-A CARD WITH 5MV RESOLUTION

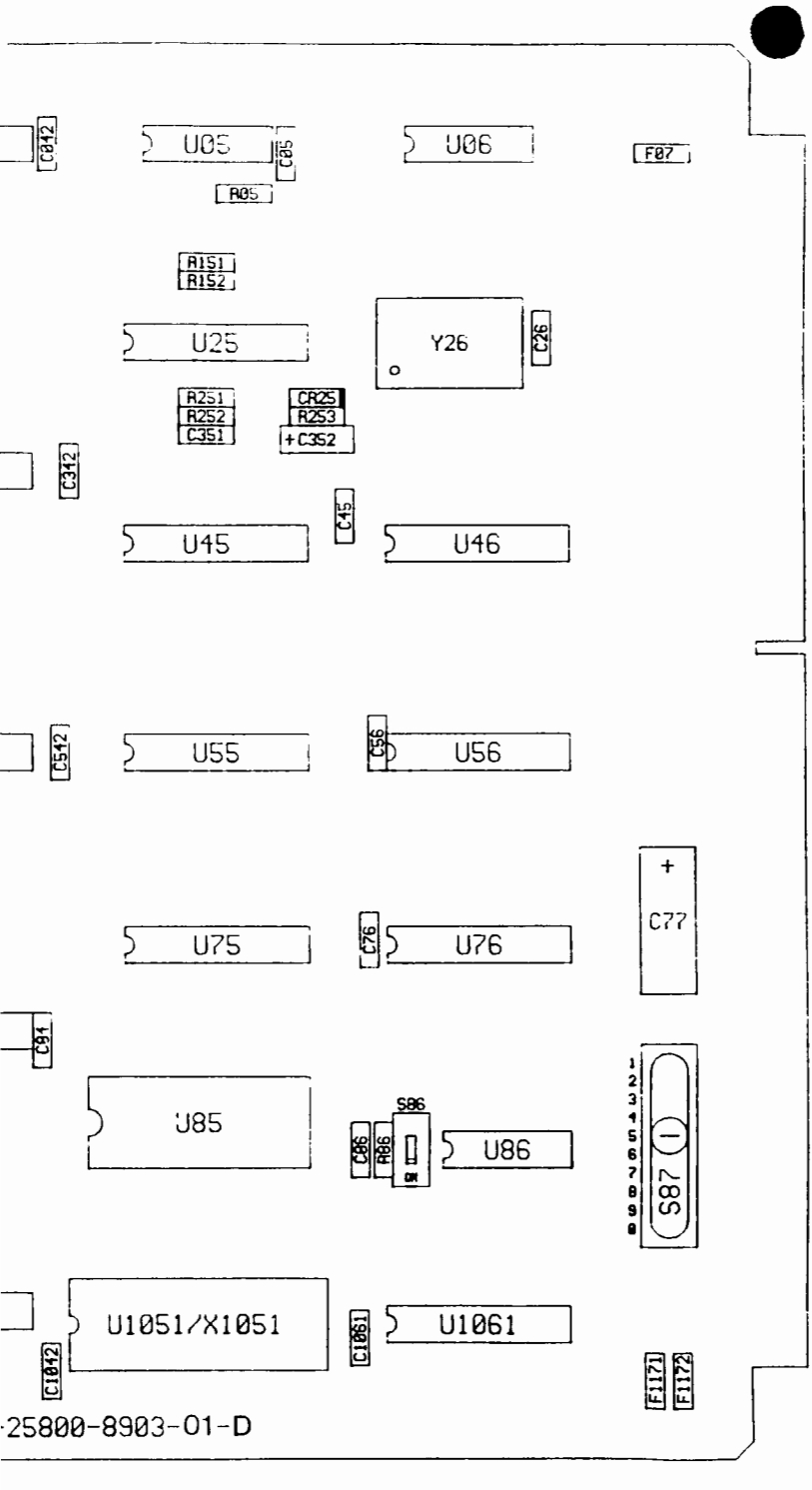
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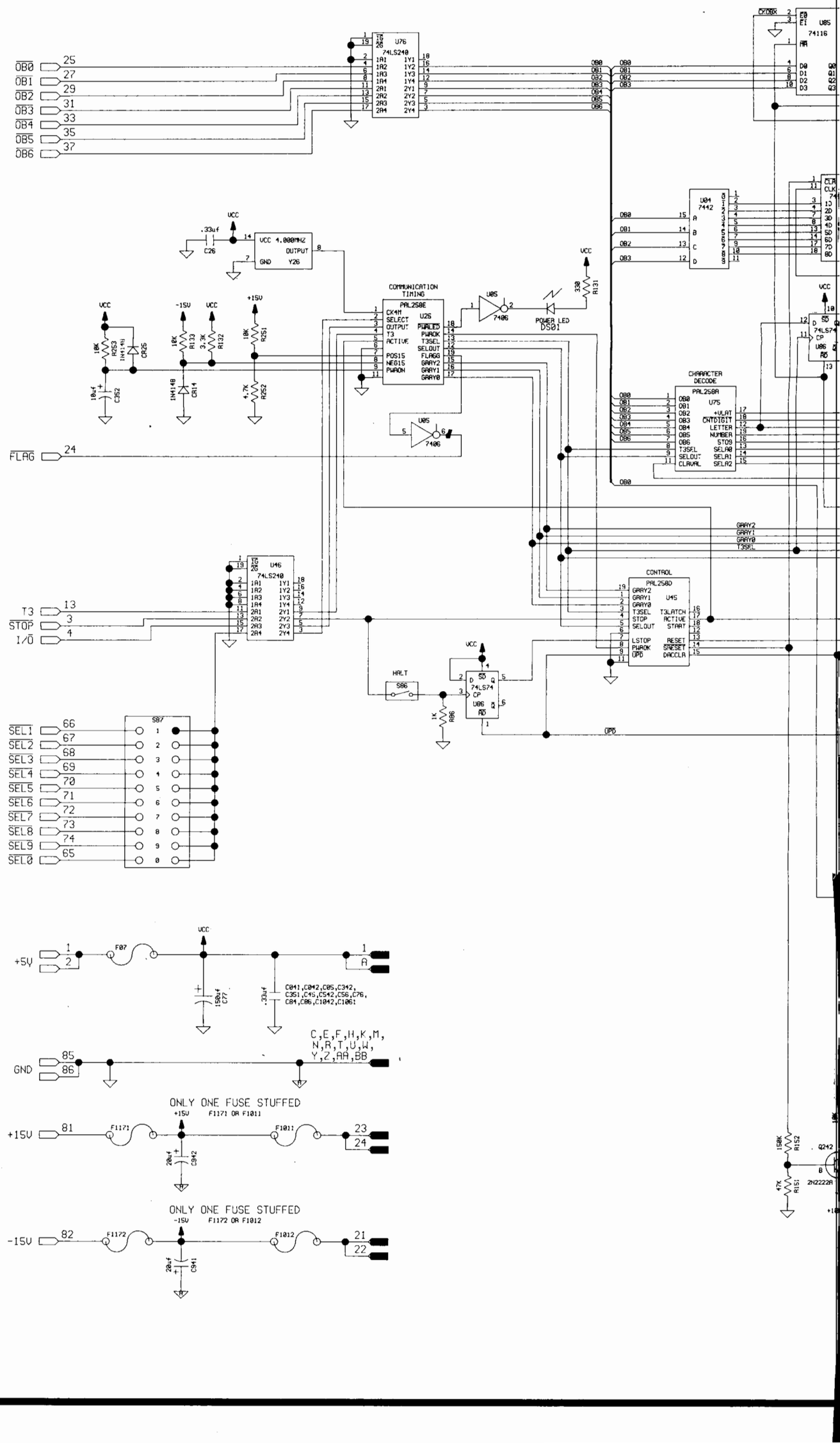
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
C041,042,05,1021,1022,1031,1032 1041,1042,1061,1121,1122,1131 1132,221,222,231,232,24,26,341 342,351,421,422,431,432,45,521 522,531,532,541,542,56,621,622 631,632,721,722,731,732,74,76 821,822,831,832,84,86	20129-33006	51	CAP FXD CER .33UF 20% STABLE 50VDCW	0005	SR215E334MAA
C1033,1034,331,332,533,633,833 834	21528-30002	8	CAP FXD MICA 30PF 5% 500VDCW	0012	DM10-300J
C352	22018-10008	1	CAP FXD TA 10UF 10% 50VDCW	0106	173D106X9025W
C77	21018-15009	1	CAP FXD ELECT 150UF 75% -10% 16VDCW	0025	NLW150-16
C941,942	22022-20008	2	CAP FXD TA 22UF 10-20% 20-25VDCW	0106	199D226X9025CA1
CR14,25	32000-04148	2	DIODE SILICON 75V 1A 5%	0078	1N4148
DS01	32000-00103	1	DIODE LIGHT EMITTING RED 50MA	0039	550-0103
DS111,112,113,114,115,116,117 211	32000-02003	8	DIODE LIGHT EMITTING RED WITH RESISTOR 0	0039	547-2003
E1	40401-00258	1	EJECTOR STAMP 53A-258 STYLE B BLUE	0026	40401-00258
E2	40401-10011	1	EJECTOR STAMP D-A STYLE D BLUE	0026	40401-10011
E3	45050-03317	1	DCL LED 8 POS DRW 00000-00080	0026	45050-03317
E4	45050-03236	1	DCL LED 8POS BLK DRW 00000 -00473	0026	45050-03236
F07,1171,1172	42202-52001	3	FUSE SUB-MIN 2AMP	0061	251002
PCB	41530-25800	1	P.C. BOARD VERSION 4L 8903	0026	41530-25800
Q241	51100-00300	1	TRANSISTOR VMOS N-FET	0102	VN0300L
Q242	51100-02222	1	TRANSISTOR NPN SILICON GP	0107	2N2222
R05,86	10117-10004	2	1K RES COMP 1-4W 5%	0087	R25J-1K-5%
R1021,221,32,421,621,721,821,92	15138-20004	8	2K RES VAR CER 20TRN 1-2W 100PPM	0021	3299W-1-202

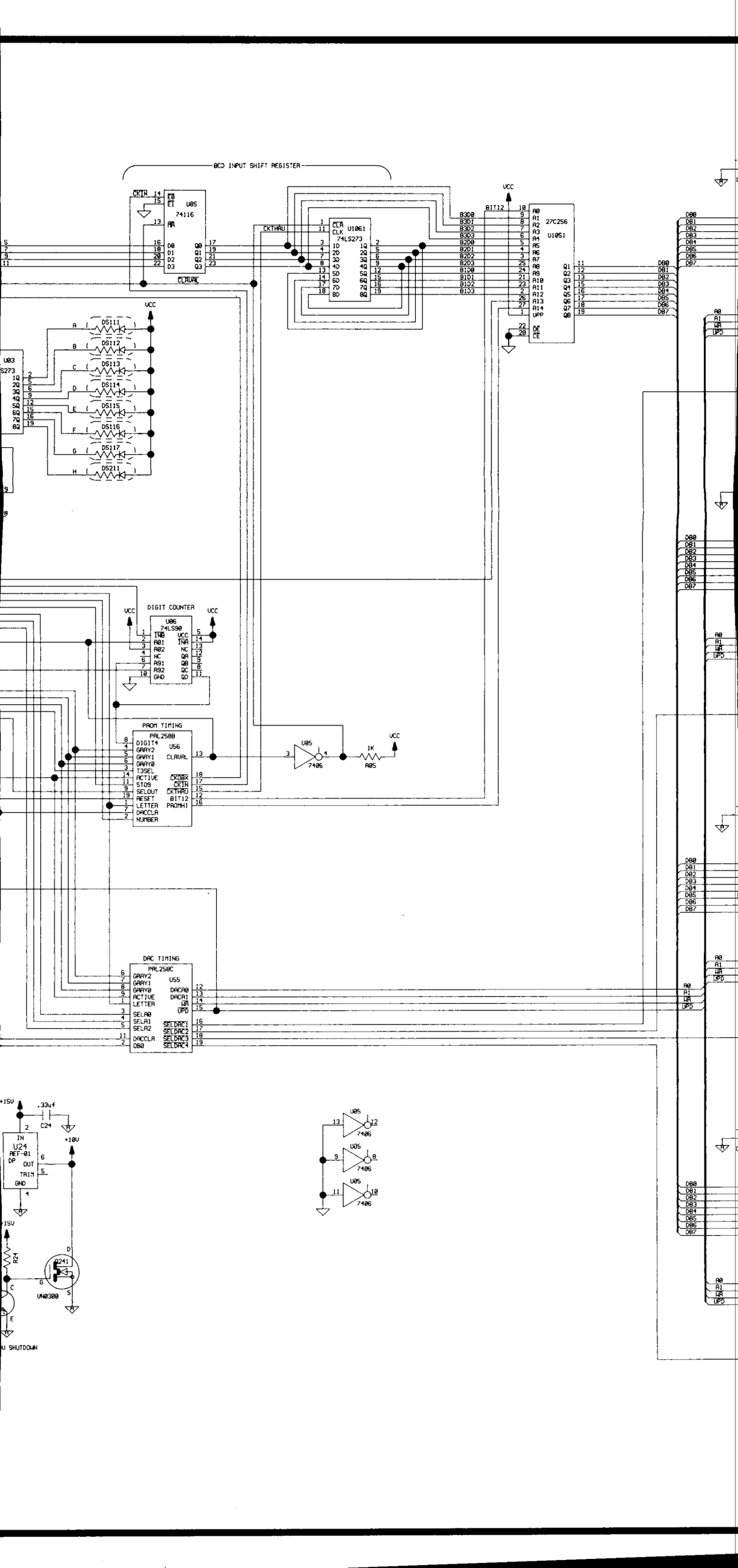
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
R1022,1121,222,422,52,622,722 822	14036-19105	8	19.1K RES FILM 1-4W .1% 25PPM	0035	RN55E1912B
R1031,1131,231,431,531,631,731 831	14036-20005	8	20K RES FILM 1-4W .1% 25PPM	0035	RN55E2002B
R1032,1132,232,432,532,632,732 832	14036-10005	8	10K RES FILM 1-4W .1% 25PPM	0035	RN55E1002B
R1033,1034,331,332,533,633,833 834	14024-47502	8	47.5 OHM RES FILM 1-4W 1% 100PPM	0035	RN55D47R5F
R1041,1141,34,44,54,64,74,84	15138-10003	8	100 OHM RES VAR CER 25TRN 1-2W 100PPM	0021	3299W-1-101
R131	10117-33003	1	330 OHM RES COMP 1-4W 5%	0087	R25J-330-5%
R132	10117-33004	1	3.3K RES COMP 1-4W 5%	0087	R25J-3.3K-5%
R133,24,251,253	10117-10005	4	10K RES COMP 1-4W 5%	0087	R25J-10K-5%
R151	10117-47005	1	47K RES COMP 1-4W 5%	0087	R25J-47K-5%
R152	14024-15006	1	150K RES FILM 1-4W 1% 100PPM	0035	RN55D1503F
R252	10117-47004	1	4.7K RES COMP 1-4W 5%	0087	R25J-4.7K-5%
S86	42050-10101	1	SWITCH DIP 1POS SPST	0093	JS-8794-01
S87	42050-10010	1	SWITCH 10POS.	0101	C42315-A61-A11
U03,1061	73001-74273	2	IC TTL LS OCTAL D-TYPE FLIP-FLOP	0107	74LS273
U04	79000-07442	1	IC TTL BCD-TO-DECIMAL DECODER	0107	7442
U05	73300-07406	1	IC TTL HEX INVERTER BUFFER-DRIVER	0107	7406
U06	71201-07490	1	IC TTL LS DECADE COUNTER	0107	74LS90
U1021,1121,22,42,52,62,72,82	20102-02003	8	IC VIDEO LINE DRIVER 100MHZ	0424	EL2003CN
U1031,1131,23,43,53,63,73,83	61000-00712	8	OP AMP BIFET DUAL HIGH-SPEED	0011	AD712JN
U1041,34,54,84	20100-07537	4	IC DUAL D-A 12 BIT	0011	AD7537JN
U1051	79813-00134	1	PROGRAMMED PROM U1051 53A-258	0000	
U24	52200-00001	1	REFERENCE 10V 20MA 0-25 PPM	0082	REF01DP

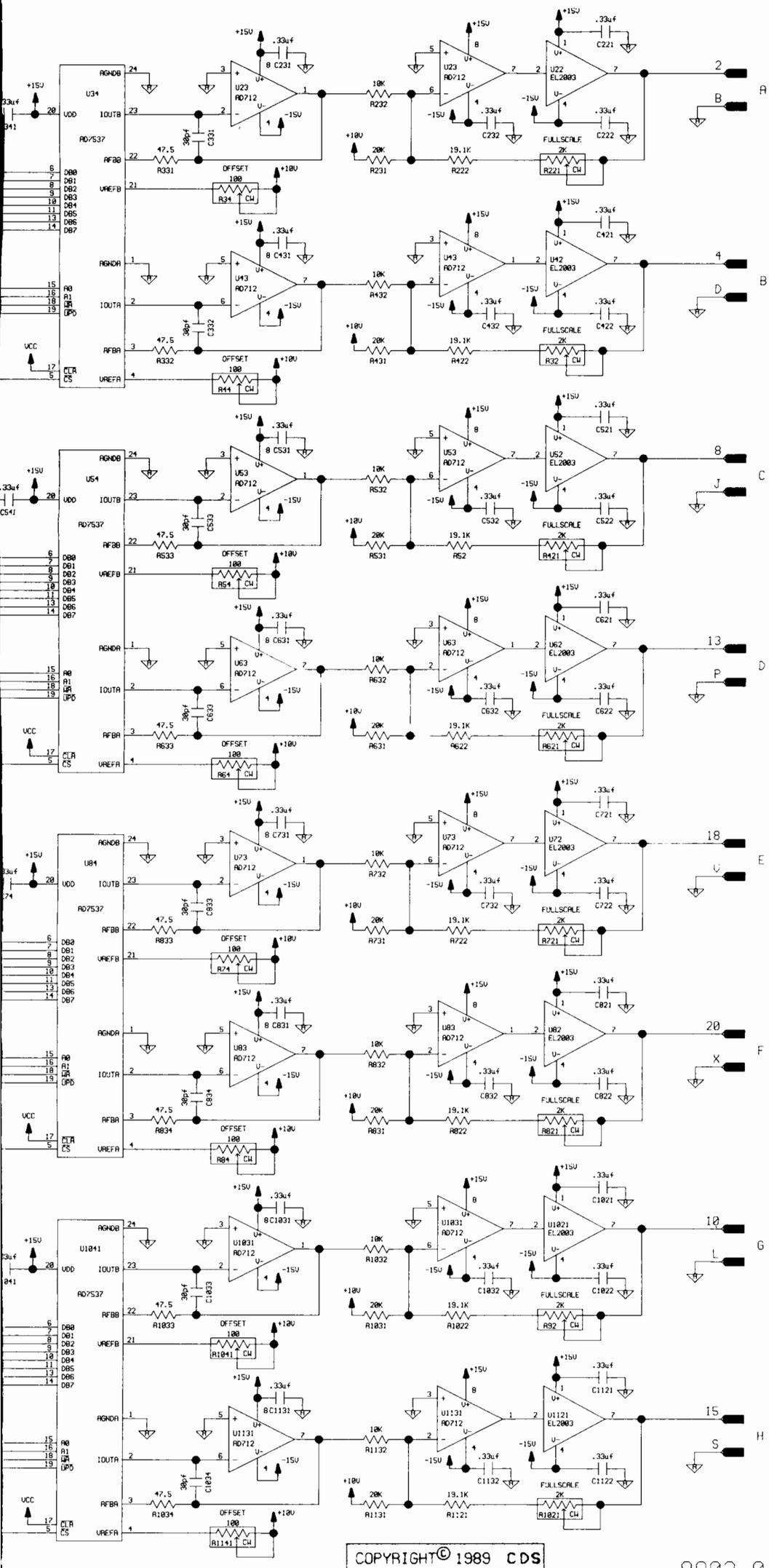
REFERENCE DESIGNATOR	CDS PART NUMBER	QTY.	PART DESCRIPTION	MFG. NUM.	MFG. PART NUMBER
U25	79814-00332	1	PAL PROGRAMMED EP310 REV B 53A-258	0000	
U45	79814-00218	1	PAL PROGRAMMED EP310 REV A 53A-258	0000	
U46,76	73310-74240	2	IC TTL LS OCTAL BUFFER	0107	74LS240
U55	79814-00217	1	PAL PROGRAMMED EP310 REV A 53A-258	0000	
U56	79814-00216	1	PAL PROGRAMMED EP310 REV A 53A-258	0000	
U75	79814-00215	1	PAL PROGRAMMED EP310 REV A 53A-258	0000	
U85	73600-74116	1	IC TTL DUAL 4-BIT LATCH	0107	74116
U86	73001-07474	1	IC TTL LS DUAL D-TYPE EDGE TRIG FLIP-FLOP	0107	74LS74A
X01,02	45010-08100	2	SOCKET SIP 8 PIN	0032	CAS-08VSC-12B
X1051	45012-28100	1	SOCKET 28-PIN DIP LOW PRO	0089	ICN286-S5-G
Y26	89499-04000	1	CRYSTAL OSC 4.000MHZ 50PPM	0037	XO-43A-4.000


E1
E2
E3
E4
X01
X02
DS01
DS111
DS112
DS113
DS114
DS115
DS116
DS117
DS211
U03
U04
C041
CR11
R131
R132
R133
Q241
Q242
C24
U24
R24
C341
R34
R221
C221
U22
C222
R222
R231
R232
C231
U23
C232
C331
R331
R332
C332
U34
R32
C421
U42
C422
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R44
R421
C521
U52
C522
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R532
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U53
C532
R54
C541
C533
R533
R633
C633
U54
R621
C621
U62
C622
R622
R631
R632
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R64
R721
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R84
R92
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U1041
R1021
C1121
U1121
C1122
R1121
R1131
R1132
C1131
U1131
C1132
R1141
41530-


C042
U05
C05
R05
U06
F07
R151
R152
U25
Y26
C26
R251
R252
C351
CR25
R253
+C352
C312
C45
U45
U46
C542
U55
C56
U56
+
C77
U75
C76
U76
C91
U85
S86
C86
R86
ON
U86
1
2
3
4
5
6
7
8
9
0
S87
U1051/X1051
C1061
U1061
C1042
F1171
F1172
25800-8903-01-D


OB0
OB1
OB2
OB3
OB4
OB5
OB6
U76
74LS240
VCC 4.000MHZ
OUTPUT
GND
Y26
C26
.33uf
COMMUNICATION
TIMING
PAL25B6
U25
CK4M
SELECT
OUTPUT
T3
ACTIVE
POS15
NEG15
PWROH
PWRLES
PWROK
T3SEL
SELOUT
FLAGS
GRAY2
GRAY1
GRAY0
U85
7406
POWER LED
DS01
330
R131
18K
R253
3.3K
R132
10K
R133
1N4148
CR25
CR14
4.7K
R252
10uf
C352
FLAG
U46
T3
STOP
I/O
CONTROL
PAL25B0
U45
GRAY2
GRAY1
GRAY0
T3SEL
T3LATCH
STOP
ACTIVE
SELOUT
START
LSTOP
RESET
PWROK
SRESET
UPD
DACCLR
HALT
S86
1K
R86
74LS74
U86
A5
S87
SEL1
SEL2
SEL3
SEL4
SEL5
SEL6
SEL7
SEL8
SEL9
SEL0
U04
7442
CHARACTER
DECODE
PAL25B8
U75
+VLAT
CNTDIGIT
LETTER
NUMBER
STO9
SELA0
SELA1
SELA2
CLAVAL
CR08X
74116
+5V
F07
150uf
C77
.33uf
C841,C842,C85,C342,
C351,C45,C542,C56,C76,
C84,C86,C1042,C1061
GND
C,E,F,H,K,M,
N,R,T,U,W,
Y,2,AA,BB
ONLY ONE FUSE STUFFED
+15V
F1171 OR F1011
F1171
F1011
20uf
C942
-15V
F1172 OR F1012
F1172
F1012
C941
158K
R152
47K
R151
Q242
2N2222A


BCD INPUT SHIFT REGISTER
U05
74116
CKTHRU
U1051
74LS273
27C256
U1051
VCC
BIT12
CLRVAL
DIGIT COUNTER
U06
74LS90
PAOM TIMING
PAL2588
U56
DAC TIMING
PAL258C
U55
1K
R05
7406
+15V
.33uf
C24
U24
REF-01
+10V
Q241
VN0300
R24
SHUTDOWN



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8903-01-C

REVISION LEVEL	ECO #
8809-01-A	ISSUED
8811-01-B	803
8903-01-C	941

COLORADO DATA SYSTEMS

PART NO.: 53A-258

DESCRIPTION: OCTAL D/A

P.C.B. NUMBER: 41530-25800

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