

**TEKTRONIX®**

**DAC 850E**

Option 3, 4, 13, & 14

**DIGITAL-TO-ANALOG  
CONVERTER**

INSTRUCTION MANUAL

Tektronix, Inc.  
P.O. Box 500  
Beaverton, Oregon 97077

Serial Number \_\_\_\_\_

**OEM WARRANTY**  
**COMMUNICATIONS DIVISION**  
**DAC 850E**

The DAC 850E is warranted against defective materials and workmanship under normal use and service for a period of ninety days from date of initial shipment. Tektronix will repair or replace, at its option, those products determined to be defective within the warranty period and returned, freight prepaid, to Tektronix Factory Service, Delivery Station 93-186, P.O. Box 500 Beaverton, Oregon 97077.

Tektronix shall be under no obligation to furnish warranty service if:


- a. Attempts to repair or service the equipment are made by other than Tektronix personnel.
- b. Modifications are made by other than Tektronix personnel.

The foregoing warranty shall be enforceable only by the original buyer and not by the buyer's customer.

There is no implied warranty for fitness of purpose.

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# DAC 850E

## Option 3, Option 4, Option 13, and Option 14

### DESCRIPTION

The TEKTRONIX DAC 850E is an 8-bit digital-to-analog converter optimized for digital video processing but capable of operating at a 50-MHz input word rate, and designed for an OEM market. The Option 3 and Option 4 models have been optimized to operate at three and four times subcarrier rate (respectively) in the NTSC system. The Option 13 and 14 models have been optimized to operate at three and four times subcarrier rate (respectively) in the PAL system. The low-pass filter and  $\sin x/x$ -corrected output amplifiers are flat over the video passband. The advanced design of the DAC 850E provides a clean, monotonic, analog signal without the usual "deglitching" output circuits of more conventional high-speed converters. The DAC 850E does not need to be "matched" to a specific analog-to-digital converter. The DAC 850E can be utilized as a multiplying or external-referenced D/A converter.

The DAC 850E in its option configurations consists of a small Low-Pass Filter board piggy-backed on the larger Converter board. The larger board is 6" X 8", with a dual 40-contact edge connector, with 0.1" spacing, and no parts projecting more than 1" above the main board. Both boards are manufactured with and by UL-approved materials and processes.

### INTERFACE REQUIREMENTS

#### Signal Input Considerations

The DAC 850E requires an 8-bit, parallel, straight binary code (BIN) input format. Logic levels are ECL-compatible; a "high" is  $-0.96\text{ V}$  to  $-0.81\text{ V}$ , a "low" is  $-1.85\text{ V}$  to  $-1.65\text{ V}$ . Each data input represents one standard ECL load. Bit 0 through Bit 7 inputs are assigned to edge-connector pins 3, 5, 7, 9, 11, 13, 15, and 17 respectively. Bit  $\bar{0}$  through Bit  $\bar{7}$  inputs are assigned to edge-connector pins 4, 6, 8, 10, 12, 14, 16, and 18 respectively. All odd pin numbers are on the component side of the edge connector, with the even numbers on the opposite side.

#### Strobe (or clock) Input Consideration

The input word can be updated at any rate up to 50 MHz. The pulse applied to the differential strobe inputs must be at least 8 ns wide and end at least 8 ns before the next pulse transition. In each Option, the low-pass filter and output amplifier have been optimized for minimum nonlinear distortions at the respective update rates of each system subcarrier multiple.

The strobe inputs at pins 37 and 38 are balanced ECL, terminated in 100  $\Omega$ , and requiring logic levels of  $-0.96$  to  $-0.81$  V to recognize a "high", and  $-1.85$  to  $-1.65$  V to recognize a "low". Locations for pulldown resistors for each strobe input are provided on the A1 Converter board in the event that the external system does not pull down on the clock bus lines. (See the schematic diagram and Figure 3, Parts Location illustration.)

#### NOTE

*If a TEKTRONIX ADC 820E is being used in the system, and is strobed by a common clock bus, pulldowns (100  $\Omega$  to  $-2$  V) already exist on the A/D board and need not be added to the D/A board.*

#### Reference Voltages

INTERNAL. The DAC 850E contains its own highly regulated, internal reference voltage source. When referenced to this internal voltage source, all conversion performance specifications are guaranteed.

EXTERNAL. A special external reference voltage input is provided at pin 1 of the edge connector and requires a strap change on the Converter board. (See the schematic diagram and Figure 3, Parts Location Illustration.) In the externally-referenced mode, the DAC 850E can be used as a multiplying D/A converter. In this mode, the conversion specification tolerances cannot be guaranteed.

#### Output Capabilities

The output signal is bipolar and monotonic over the peak-to-peak full-scale voltage range of 1.214 V. The resolution is 1 LSB of the 8-bit input code. This can be stated two ways:  $1/255$  equals 0.4%, or  $1.214/255$  equals 4.76 mV. Output accuracy is within  $\pm 1/2$  LSB (0.2% of full scale, or 2.38 mV).

Non-linear distortions in the form of differential phase and gain have been minimized for use in the video passband, especially for applications in color television.

The output signal is dc-offset  $-286$  mV, with a 50 mV adjustable range. Two outputs are provided at pins 59 and 61 of the edge connector. Each output can be terminated in 75  $\Omega$  and has a return loss of  $-30$  dB or greater.

#### Timing Relationships

See Figure 1. The key timing reference point is the 50% point of the leading edge of the strobe pulse. The data must be present and stable for at least 7 ns before the pulse edge occurs, and must remain stable for at least 1 ns after the pulse edge.

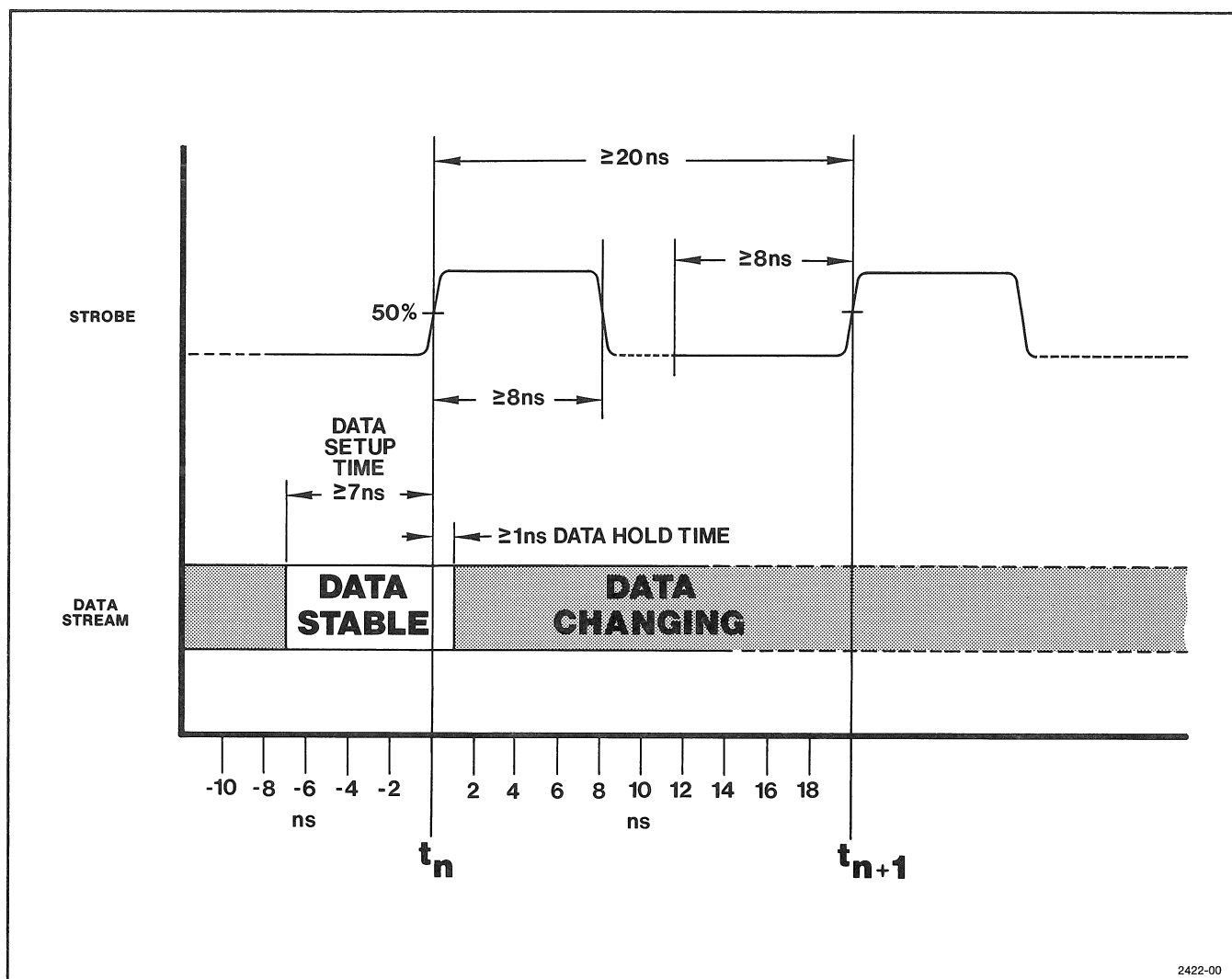


Fig. 1. Data and Strobe Timing for Minimum Pulse Width and Maximum Update Rate.

### Power Supply Requirements

The DAC 850E is designed to operate from commonly available analog and digital power supplies of +12 V, -12 V, +5 V, and -5.2 V. A +5 V supply capable of delivering at least 75 mA is required for analog circuits. Power supply lines should be carefully decoupled and as noise-free as possible, especially the +5 V Analog and -5.2 V supplies. Each power supply is named for its nominal value, with the tolerable limits and current delivery capabilities called out in the specification table. No more than 5.3 watts are needed to power the DAC 850E.

## INSTALLATION

### Thermal Considerations

The DAC 850E will operate within its stated specification in ambient temperatures ranging from 0° to 60° C. Location within an OEM enclosure should consider convection air flow and temperature rise effect of the physical board orientation and relationship to other system components.

### Physical Orientation

The circuit board will benefit from optimum convection air flow when mounted vertically with the edge connector down. Other recommended mounting positions are also vertical on either edge. The worst position would be flat with the component side down.

### Mechanical Outline

See Figure 2 for maximum outside dimensions. Note that the dual-40 edge connector has keying slots between pins 25, 26, and 27, 28; 75, 76, and 77, 78. Components have been kept back from the sides of the board to allow mounting using card guides.

### Connectors

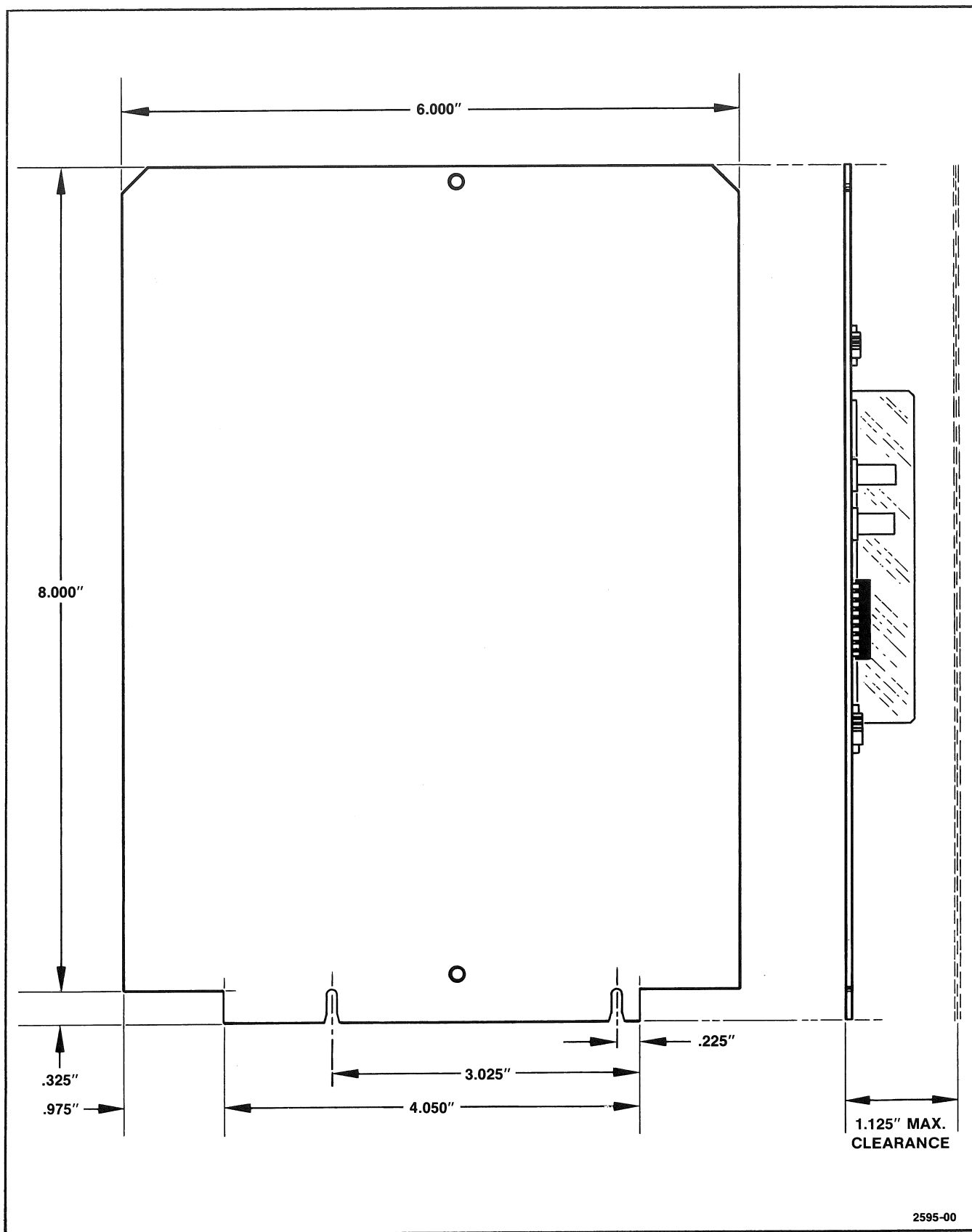
The following connectors will mate satisfactorily with the DAC 850E dual-40, 0.100"-spacing, edge connector:

Style	Vendor	Tektronix Part Number
0.025" Square Pins	Continental Connector Corporation, K600-100-80WB	131-0626-00
Pierced Tabs	Viking, 3VH40/1JN5	131-1856-00
Zero Insertion Force (with square pins)	AMP 1-530801-3 (3/16" leads)	none

This list is by no means exhaustive. Examination of connector manufacturers' catalog may show other compatible connectors.

## SERVICE

Please review the warranty in force at the time of purchase. For repair and recalibration, End Users should return the DAC 850E to the OEM who supplied their equipment. End Users who purchase directly from Tektronix should return the DAC 850E directly to Factory Service in Beaverton, Oregon 97077.



2595-00

Fig. 2. Circuit Board Dimensions.

### CONNECTOR PIN ASSIGNMENT

(All odd pin numbers are on the component side of the board. All even pin numbers are on the opposite side.)

(Top Side) Function	Pin	Pin	(Bottom Side) Function
External Reference Voltage	1	2	NC
Bit 0	3	4	Bit 0
Bit 1	5	6	Bit 1
Bit 2	7	8	Bit 2
Bit 3	9	10	Bit 3
Bit 4	11	12	Bit 4
Bit 5	13	14	Bit 5
Bit 6	15	16	Bit 6
Bit 7	17	18	Bit 7
NC	19	20	NC
NC	21	22	NC
NC	23	24	NC
NC	25	26	NC
NC	27	28	NC
NC	29	30	Power Supply Ground
NC	31	32	NC
NC	33	34	NC
NC	35	36	NC
Strobe	37	38	Strobe
NC	39	40	NC
NC	41	42	NC
NC	43	44	NC
NC	45	46	NC
NC	47	48	NC
NC	49	50	NC
NC	51	52	-5.2 V
+5 V <sub>1</sub> Analog	53	54	NC
NC	55	56	NC
NC	57	58	NC
Signal Out	59	60	Signal Out Ground
Signal Out	61	62	Signal Out Ground
NC	63	64	NC
NC	65	66	+12 V
NC	67	68	NC
NC	69	70	-12 V
NC	71	72	NC
NC	73	74	Power Supply Ground
NC	75	76	NC
NC	77	78	NC
NC	79	80	NC



## SPECIFICATION

Characteristic	Performance Requirements				
D/A Conversion (Valid for Internal $V_{REF}$ only)					
Resolution	8 bits (1 LSB=0.4% of full scale).				
Accuracy (including Linearity)	$\pm 1/2$ LSB ( $\pm 0.2\%$ of full scale).				
Monotonicity	Guaranteed for 8 bits. Output polarity follows input code change.				
Nonlinear Distortions	(Measured with a distortion-free, digitized, 286 mV p-p subcarrier linearity ramp.)				
Differential Gain	0.75% or less (Options 4 & 14), 1% or less (Options 3 & 13).				
Differential Phase	0.25° or less (Options 4 & 14), 0.5° or less (Options 3 & 13).				
Frequency Response Amplitude	Option 3	Option 4	Option 13	Option 14	
	0 dB, $\pm 0.2$ dB	0 to 3.6 MHz	0 to 5 MHz	0 to 5 MHz	0 to 6 MHz
	-3 dB or less	5.37 MHz	7.16 MHz	6.65 MHz	8.8 MHz
-42 dB or less	7.5 MHz and up	10 MHz and up	9.3 MHz and up	12.4 MHz and up	
Constant Delay (within 10 ns)	0 to 3.6 MHz	0 to 5 MHz	0 to 5 MHz	0 to 6 MHz	
Noise (Excluding quantizing noise measured under no signal condition.)	-67 dB or less to 5 MHz.				
	-60 dB or less to 20 MHz.				

## INTERFACE REQUIREMENTS

Data Inputs Format	8-bit parallel, straight binary (BIN) differential ECL inputs, terminated in 100 $\Omega$ .
Logic	ECL-compatible; High -0.96 V to -0.81 V Low -1.85 V to -1.65 V

## SPECIFICATIONS (cont)

Characteristics	Performance Requirements
Setup Time	At least 7 ns before 50% point of leading edge of strobe pulse.
Hold Time	At least 1 ns after 50% point of leading edge of strobe pulse.
Strobe Input Format	Differential ECL inputs, terminate in 100 $\Omega$ .
Logic	ECL: High $-0.96$ to $-0.81$ V. Low $-1.85$ to $-1.65$ V.
Up-date Rate	50 MHz, maximum.
Minimum Pulse Width	8 ns.
Maximum Pulse Width	Must end at least 8 ns before next pulse transition.
External Reference Input ( $V_{REF}$ Multiplying Input)	A wire jumper must be moved on the Converter board to connect to the external input pin. (The DAC $V_{REF}$ is normally tied to an onboard reference supply.)
$V_{REF}$ for Normal Output	$-5.66$ V.
External Reference Gain	350 mV/V Full Scale.
Frequency Response	
Option 3	0 dB to 5.37 MHz.
Option 4	0 dB to 7.16 MHz.
Option 13	0 dB to 6.65 MHz.
Option 14	0 dB to 8.8 MHz.
Output	
Full Scale Range	1.214 V peak-to-peak $\pm 1\%$ (adjustable).
DC Offset	$-286$ mV $\pm 50$ mV (adjustable).
Offset Range	At least 100 mV.
Impedance	75 $\Omega$ (2 outputs).
Return Loss	At least $-30$ dB.

**POWER SUPPLY REQUIREMENTS**

<b>Characteristic</b>	<b>Performance Requirement</b>
+12 V	+12 Vdc $\pm$ 1.5% (11.8 to 12.2 V) at 16 mA.
-12 V	-12 Vdc $\pm$ 1.5% (-11.8 to +12.2 V) at 200 mA.
+5 V (Analog V1)	+5 Vdc $\pm$ 5% (4.75 to 5.25 V) at 75 mA.
-5.2 V	-5.2 Vdc $\pm$ 5% (-4.94 to -5.46 V) at 370 mA.
Power Consumption	5.3 Watts or less.

**PHYSICAL**

Size	6" x 8" x 1".
Connector	Dual 40 contact card edge, with 0.1" spacing.

**ENVIRONMENTAL**

Temperature Range	0° to 60°C.
Warmup Time	Allow 3 minutes.

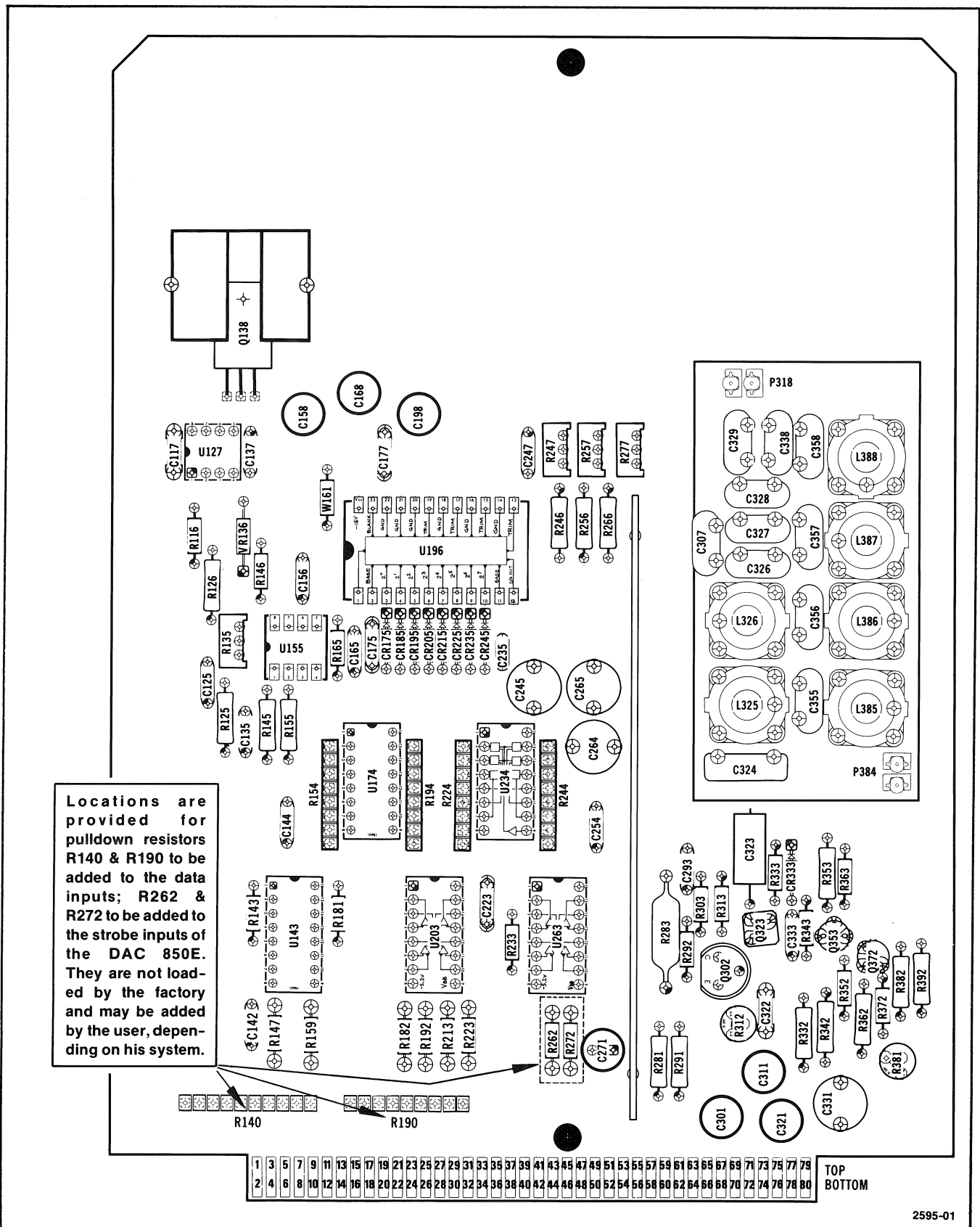


Fig. 3. Parts Location.

# REPLACEABLE ELECTRICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

## SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number  
00X Part removed after this serial number

### ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

## ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
03888	KDI PYROFILM CORPORATION	60 S JEFFERSON ROAD	WHIPPANY, NJ 07981
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
09023	CORNELL-DUBILIER ELECTRONIC DIVISION		
	FEDERAL PACIFIC ELECTRIC CO.	2652 DALRYMPLE ST.	SANFORD, NC 27330
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
72136	ELECTRO MOTIVE CORPORATION, SUB OF INTERNATIONAL ELECTRONICS CORPORATION	SOUTH PARK AND JOHN STREETS	WILLIMANTIC, CT 06226
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
93790	CORNELL-DUBILIER ELECTRONICS DIVISION FEDERAL PACIFIC ELECTRIC CORP.	1605 RODNEY FRENCH BLVD.	NEW BEDFORD, MA 02741

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-5268-00			CKT BOARD ASSY:D/A CONVERTER,ECL	80009	670-5268-00
C117	281-0519-00			CAP.,FXD,CER DI:47PF,+/-4.7PF,500V	72982	308-000COG0470K
C125	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C135	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C137	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C142	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C144	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C156	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C158	290-0755-00			CAP.,FXD,ELCTLT:100UF,+50-10%,10V	56289	502D223
C168	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C171	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C175	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C177	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C198	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C223	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C235	283-0212-00			CAP.,FXD,CER DI:2UF,20%,50V	72982	8141N064Z5U205M
C245	281-0160-00			CAP.,VAR,CER DI:7-25PF,350V	72982	538-011B7-25
C247	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C254	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C264	281-0160-00			CAP.,VAR,CER DI:7-25PF,350V	72982	538-011B7-25
C265	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	72982	538-011-D 9-45
C271	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C293	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D153F1050F0
C301	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C311	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C321	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C322	281-0572-00			CAP.,FXD,CER DI:6.8PF,+/-0.5PF,500V	72982	301-000C0H0689D
C323	290-0415-00			CAP.,FXD,ELCTLT:5.6UF,10%,35V	56289	150D565X9035B2
C331	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	72982	538-011-D 9-45
C333	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D153C220K0
CR175	152-0153-02			SEMICONV DEVICE:SILICON,15V,100NA 10V	80009	152-0153-02
CR185	152-0153-02			SEMICONV DEVICE:SILICON,15V,100NA 10V	80009	152-0153-02
CR195	152-0153-02			SEMICONV DEVICE:SILICON,15V,100NA 10V	80009	152-0153-02
CR205	152-0153-02			SEMICONV DEVICE:SILICON,15V,100NA 10V	80009	152-0153-02
CR215	152-0153-02			SEMICONV DEVICE:SILICON,15V,100NA 10V	80009	152-0153-02
CR225	153-0068-00			SEMICONV DVC,SE:SWITCH,TRIO MATCHED	80009	153-0068-00
CR235	153-0068-00			SEMICONV DVC,SE:SWITCH,TRIO MATCHED	80009	153-0068-00
CR245	153-0068-00			SEMICONV DVC,SE:SWITCH,TRIO MATCHED	80009	153-0068-00
CR333	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
Q138	151-0462-01			TRANSISTOR:SILICON,PNP,SELECTED	80009	151-0462-01
Q302	151-0103-02			TRANSISTOR:SILICON,NPN,SEL	80009	151-0103-02
Q323	151-0438-01			TRANSISTOR:SILICON,PNP,SELECTED	80009	151-0438-01
Q353	151-0190-07			TRANSISTOR:SILICON,NPN,SEL	80009	151-0190-07
Q372	151-0190-07			TRANSISTOR:SILICON,NPN,SEL	80009	151-0190-07
R116	315-0331-00			RES.,FXD,CMPNS:330 OHM,5%,0.25W	01121	CB3315
R125	321-0278-00			RES.,FXD,FILM:7.68K OHM,1%,0.125W	91637	MFF1816G76800F
R126	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
R135	311-1307-00			RES.,VAR,NONWIR:500 OHM,0.50W	32997	3299W-R27-501
R143	315-0101-00			RES.,FXD,CMPNS:100 OHM,5%,0.25W	01121	CB1015
R145	321-0208-00			RES.,FXD,FILM:1.43K OHM,1%,0.125W	91637	MFF1816G14300F
R146	315-0101-00			RES.,FXD,CMPNS:100 OHM,5%,0.25W	01121	CB1015
R147	315-0101-00			RES.,FXD,CMPNS:100 OHM,5%,0.25W	01121	CB1015

Replaceable Electrical Parts—DAC850E

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R154	307-0539-00		RES NTWK,THK FI:(7)510 OHM,10%,1W	03888	A3HT727
R155	321-0169-00		RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562ROF
R159	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R165	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R181	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R182	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R192	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R194	307-0539-00		RES NTWK,THK FI:(7)510 OHM,10%,1W	03888	A3HT727
R213	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R223	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R224	307-0539-00		RES NTWK,THK FI:(7)510 OHM,10%,1W	03888	A3HT727
R233	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R244	307-0539-00		RES NTWK,THK FI:(7)510 OHM,10%,1W	03888	A3HT727
R246	321-0244-00		RES.,FXD,FILM:3.4K OHM,1%,0.125W	91637	MFF1816G34000F
R247	311-1896-00		RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3299W-1-502
R256	321-0244-00		RES.,FXD,FILM:3.4K OHM,1%,0.125W	91637	MFF1816G34000F
R257	311-1896-00		RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3299W-1-502
R266	321-0244-00		RES.,FXD,FILM:3.4K OHM,1%,0.125W	91637	MFF1816G34000F
R277	311-1896-00		RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3299W-1-502
R281	321-0085-00		RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75ROOF
R283	308-0252-00		RES.,FXD,WW:390 OHM,5%,3W	91637	CW2B-B390ROJ
R291	321-0085-00		RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75ROOF
R292	315-0680-00		RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R303	307-0103-00		RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R312	311-1263-00		RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R313	315-0272-00		RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R332	321-0203-00		RES.,FXD,FILM:1.27K OHM,1%,0.125W	91637	MFF1816G12700F
R333	315-0202-00		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R342	321-0097-00		RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100ROF
R343	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R352	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R353	321-0088-00		RES.,FXD,FILM:80.6 OHM,1%,0.125W	91637	MFF1816G80R60F
R362	321-0293-00		RES.,FXD,FILM:11K OHM,1%,0.125W	91637	MFF1816G11001F
R363	315-0151-00		RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R372	315-0220-00		RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R381	311-1271-00		RES.,VAR,NONWIR:50K OHM,10%,0.50W	32997	3329P-L58-503
R382	321-0356-00		RES.,FXD,FILM:49.9K OHM,1%,0.125W	91637	MFF1816G49901F
R392	321-0210-00		RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
U127	156-0700-01		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U143	156-0308-03		MICROCIRCUIT,DI:QUAD LINE RECEIVER	80009	156-0308-03
U155	156-0770-02		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,CHK	80009	156-0770-02
U174	156-0633-01		MICROCIRCUIT,DI:HEX D MASTER-SLAVE FLIP-FLOP	80009	156-0633-01
U196	155-0169-00		MICROCIRCUIT,DI:D/A HYBRID,8 BIT	80009	155-0169-00
U203	156-0308-03		MICROCIRCUIT,DI:QUAD LINE RECEIVER	80009	156-0308-03
U234	156-0633-01		MICROCIRCUIT,DI:HEX D MASTER-SLAVE FLIP-FLOP	80009	156-0633-01
U263	156-0308-03		MICROCIRCUIT,DI:QUAD LINE RECEIVER	80009	156-0308-03
VR136	152-0395-00		SEMICONV DEVICE:ZENER,0.4W,4.3V,5%	04713	1N749A
W161	131-0566-00		LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1



OPTION 3						
Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A2 <sup>1</sup>	670-5325-01			CKT BOARD ASSY:LOW PASS FILTER(3 X NTSC)	80009	670-5325-01
C307 <sup>1</sup>	283-0787-00			CAP.,FXD,MICA DI:1053PF,1%,500V	72136	DM19E 10530FO
C324 <sup>1</sup>	283-0793-00			CAP.,FXD,MICA DI:3035,1%,500V	72136	DM19FD30350FO
C326 <sup>1</sup>	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F201FO
C327 <sup>1</sup>	283-0668-00			CAP.,FXD,MICA D:184PF,1%,500V	00853	D155F1840FO
C328 <sup>1</sup>	283-0786-00			CAP.,FXD,MICA DI:745PF,1%,500V	72136	DM15FD7450FO
C338 <sup>1</sup>	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560FO
C355 <sup>1</sup>	283-0785-00			CAP.,FXD,MICA DI:250PF,1%,500V	09023	CD15FD251FO3
C356 <sup>1</sup>	283-0788-00			CAP.,FXD,MICA DI:267PF,10%,500V	72136	DM15ED2670FO
C357 <sup>1</sup>	283-0791-00			CAP.,FXD,MICA DI:156PF,1%,500V	72136	DM15ED1560FO
C358 <sup>1</sup>	283-0688-00			CAP.,FXD,MICA D:464PF,1%,300V	00853	3F4640FO
L325 <sup>1</sup>	114-0363-00			COIL,RF:VARIABLE,1.26-1.53UH	80009	114-0363-00
L326 <sup>1</sup>	114-0368-00			COIL,RF:VARIABLE,1.37-1.70UH	80009	114-0368-00
L385 <sup>1</sup>	120-1181-00			TRANSFORMER,RF:VARIABLE,POTCORE	80009	120-1181-00
L386 <sup>1</sup>	120-1179-00			TRANSFORMER,RF:VARIABLE,POTCORE	80009	120-1179-00
L387 <sup>1</sup>	114-0366-00			COIL,RF:VARIABLE,2.30-2.80UH	80009	114-0366-00
L388 <sup>1</sup>	114-0367-00			COIL,RF:VARIABLE,2.70-3.30UH	80009	114-0367-00
OPTION 4						
A2 <sup>2</sup>	670-5325-00			CKT BOARD ASSY:LOW PASS FILTER	80009	670-5325-00
C307 <sup>2</sup>	283-0645-00			CAP.,FXD,MICA D:790PF,1%,100V	00853	D151E791FO
C324 <sup>2</sup>	283-0696-00			CAP.,FXD,MICA D:2300PF,1%,500V	93790	CD19ED232FO3
C326 <sup>2</sup>	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D153F1050FO
C327 <sup>2</sup>	283-0641-00			CAP.,FXD,MICA D:180PF,1%,100V	00853	D151E181FO
C328 <sup>2</sup>	283-0690-00			CAP.,FXD,MICA D:560PF,0.5%,300V	09023	CD15FCS61E03
C329 <sup>2</sup>	283-0637-00			CAP.,FXD,MICA D:20PF,2.5%,100V	00853	D151E200D0
C338 <sup>2</sup>	283-0637-00			CAP.,FXD,MICA D:20PF,2.5%,100V	00853	D151E200D0
C355 <sup>2</sup>	283-0668-00			CAP.,FXD,MICA D:184PF,1%,500V	00853	D155F1840FO
C356 <sup>2</sup>	283-0725-00			CAP.,FXD,MICA D:214PF,1%,500V	00853	D15-5E2140FO
C357 <sup>2</sup>	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D153F1130G0
C358 <sup>2</sup>	283-0752-00			CAP.,FXD,MICA D:345PF,1%,500V	00853	D15ED50F500
L325 <sup>2</sup>	114-0349-00			COIL,RF:VARIABLE,0.98 TO 1.08MH	80009	114-0349-00
L326 <sup>2</sup>	114-0350-00			COIL,RF:VARIABLE,1.06 TO 1.10UH	80009	114-0350-00
L385 <sup>2</sup>	120-1139-00			XFMR,RF:VARIABLE,POT CORE	80009	120-1139-00
L386 <sup>2</sup>	120-1138-00			XFMR,RF:VARIABLE,POT CORE	80009	120-1138-00
L387 <sup>2</sup>	114-0351-00			COIL,RF:VARIABLE,1.95 TO 2.05MH	80009	114-0351-00
L388 <sup>2</sup>	108-0890-00			COIL,RF:FIXED,2.21UH,POT CORE	80009	108-0890-00
OPTION 13						
A2 <sup>3</sup>	670-5325-02			CKT BOARD ASSY:LOW PASS FILTER	80009	670-5325-02
C307 <sup>3</sup>	283-0790-00			CAP.,FXD,MICA DI:850PF,1%,500V	72136	DM19ED851FO
C324 <sup>3</sup>	283-0729-00			CAP.,FXD,MICA D:2500PF,5%,500V	00853	D19-5E252J0
C326 <sup>3</sup>	283-0604-00			CAP.,FXD,MICA D:304PF,2%,300V	00853	D153F3040G0
C328 <sup>3</sup>	283-0789-00			CAP.,FXD,MICA DI:600PF,1%,500V	72136	DM15ED601FO
C329 <sup>3</sup>	283-0643-00			CAP.,FXD,MICA D:22PF,+/-0.5PF,300V	00853	D105C220D
C338 <sup>3</sup>	283-0643-00			CAP.,FXD,MICA D:22PF,+/-0.5PF,300V	00853	D105C220D
C355 <sup>3</sup>	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F201FO
C356 <sup>3</sup>	283-0725-00			CAP.,FXD,MICA D:214PF,1%,500V	00853	D15-5E2140FO

<sup>1</sup>Option 3 only.  
<sup>2</sup>Option 4 only.  
<sup>3</sup>Option 13 only.

Replaceable Electrical Parts—DAC850E

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
C357 <sup>1</sup>	283-0638-00		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151E131F0
C358 <sup>1</sup>	283-0670-00		CAP.,FXD,MICA D:375PF,1%,500V	00853	D155F3750F0
L325 <sup>1</sup>	114-0349-00		COIL,RF:VARIABLE,0.98 TO 1.08MH	80009	114-0349-00
L326 <sup>1</sup>	114-0350-00		COIL,RF:VARIABLE,1.06 TO 1.10 UH	80009	114-0350-00
L385 <sup>1</sup>	120-1139-00		XFMR,RF:VARIABLE,POT CORE	80009	120-1139-00
L386 <sup>1</sup>	120-1138-00		XFMR,RF:VARIABLE,POT CORE	80009	120-1138-00
L387 <sup>1</sup>	114-0351-00		COIL,RF:VARIABLE,1.95 TO 2.05MH	80009	114-0351-00
L388 <sup>1</sup>	114-0369-00		COIL,RF:VARIABLE,2.19-2.53UH	80009	114-0369-00
OPTION 14					
A2 <sup>2</sup>	670-5325-03		CKT BOARD ASSY:LOW PASS FILTER(4 X PAL)	80009	670-5325-03
C307 <sup>2</sup>	283-0691-00		CAP.,FXD,MICA D:650PF,1%,300V	72136	DM15F651F0300
C324 <sup>2</sup>	283-0626-00		CAP.,FXD,MICA D:1800PF,5%,500V	00853	D195E182J0
C326 <sup>2</sup>	283-0603-00		CAP.,FXD,MICA D:113PF,2%,300V	00853	D153F1130G0
C327 <sup>2</sup>	283-0728-00		CAP.,FXD,MICA D:120PF,1%,500V	00853	D15-5F121F0
C328 <sup>2</sup>	283-0622-00		CAP.,FXD,MICA D:450PF,1%,300V	00853	D153F451F0
C338 <sup>2</sup>	283-0642-00		CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-3E330G0
C355 <sup>2</sup>	283-0644-00		CAP.,FXD,MICA D:150PF,1%,500V	00853	D151E151F0
C356 <sup>2</sup>	283-0640-00		CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C357 <sup>2</sup>	283-0631-00		CAP.,FXD,MICA D:95PF,1%,100V	00853	D151E950F0
C358 <sup>2</sup>	283-0769-00		CAP.,FXD MICA D:278PF,1%,500V	00853	D15-5F2780F0
L325 <sup>2</sup>	114-0361-00		COIL,RF:VARIABLE,0.74 TO 0.86UH	80009	114-0361-00
L326 <sup>2</sup>	114-0362-00		COIL,RF:VARIABLE,0.82-0.90UH	80009	114-0362-00
L385 <sup>2</sup>	120-1180-00		TRANSFORMER,RF:VARIABLE,POT CORE	80009	120-1180-00
L386 <sup>2</sup>	120-1178-00		TRANSFORMER,RF:VARIABLE,POT CORE	80009	120-1178-00
L387 <sup>2</sup>	114-0364-00		COIL,RF:VARIABLE,1.42-1.68UH	80009	114-0364-00
L388 <sup>2</sup>	114-0365-00		COIL,RF:VARIABLE,1.64-1.90UH	80009	114-0365-00

<sup>1</sup>Option 13 only.

<sup>2</sup>Option 14 only.

# REPLACEABLE MECHANICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

## SPECIAL NOTES AND SYMBOLS

- X000 Part first added at this serial number
- 00X Part removed after this serial number

## FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

## INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

- ```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
-----
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
-----
Parts of Detail Part
Attaching parts for Parts of Detail Part
-----
    
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - - - indicates the end of attaching parts.

**Attaching parts must be purchased separately, unless otherwise specified.**

## ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

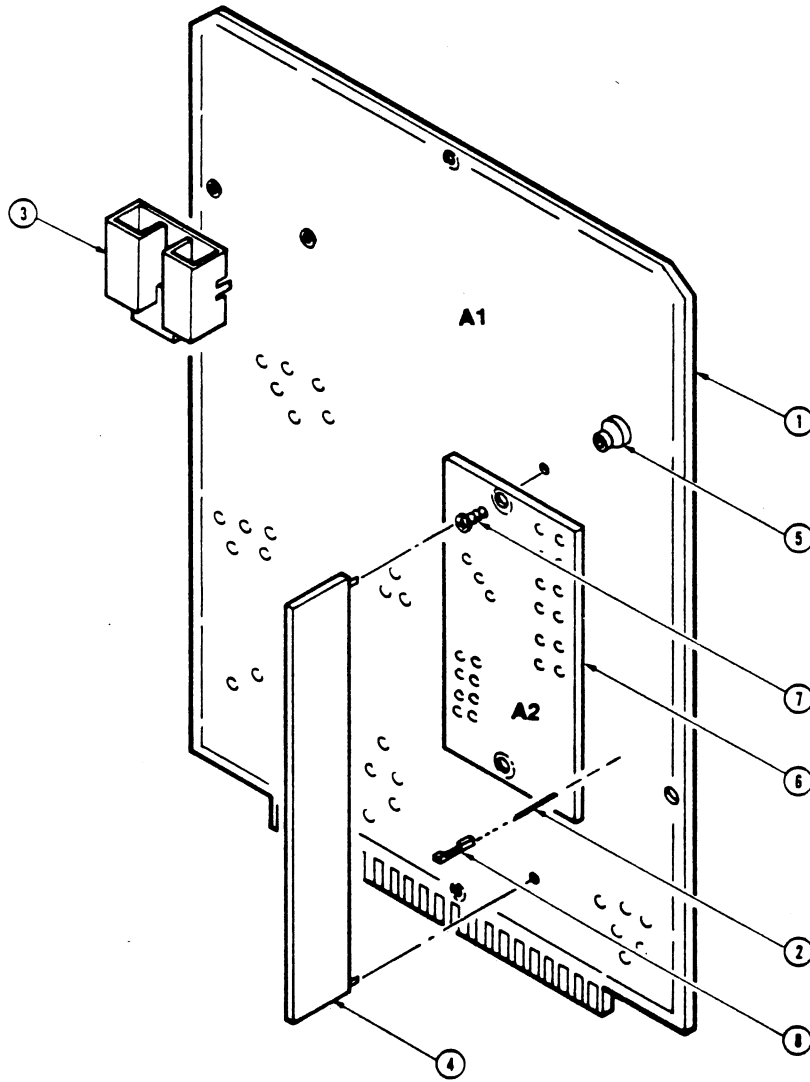
## ABBREVIATIONS

|       |                    |         |                       |          |                      |         |                 |
|-------|--------------------|---------|-----------------------|----------|----------------------|---------|-----------------|
| "     | INCH               | ELCTRN  | ELECTRON              | IN       | INCH                 | SE      | SINGLE END      |
| *     | NUMBER SIZE        | ELEC    | ELECTRICAL            | INCAND   | INCANDESCENT         | SECT    | SECTION         |
| ACTR  | ACTUATOR           | ELECTLT | ELECTROLYTIC          | INSUL    | INSULATOR            | SEMICON | SEMICONDUCTOR   |
| ADPTR | ADAPTER            | ELEM    | ELEMENT               | INTL     | INTERNAL             | SHLD    | SHIELD          |
| ALIGN | ALIGNMENT          | EPL     | ELECTRICAL PARTS LIST | LPHLDR   | LAMPHOLDER           | SHLDR   | SHOULDERED      |
| AL    | ALUMINUM           | EOPT    | EQUIPMENT             | MACH     | MACHINE              | SKT     | SOCKET          |
| ASSEM | ASSEMBLED          | EXT     | EXTERNAL              | MECH     | MECHANICAL           | SL      | SLIDE           |
| ASSY  | ASSEMBLY           | FIL     | FILLISTER HEAD        | MTG      | MOUNTING             | SLFLKG  | SELF-LOCKING    |
| ATTEN | ATTENUATOR         | FLEX    | FLEXIBLE              | NIP      | NIPPLE               | SLVG    | SLEEVING        |
| AWG   | AMERICAN WIRE GAGE | FLH     | FLAT HEAD             | NON WIRE | NOT WIRE WOUND       | SPR     | SPRING          |
| BD    | BOARD              | FLTR    | FILTER                | OBD      | ORDER BY DESCRIPTION | SO      | SQUARE          |
| BRKT  | BRACKET            | FR      | FRAME or FRONT        | OD       | OUTSIDE DIAMETER     | SST     | STAINLESS STEEL |
| BRS   | BRASS              | FSTNR   | FASTENER              | OVH      | OVAL HEAD            | STL     | STEEL           |
| BRZ   | BRONZE             | FT      | FOOT                  | PH BRZ   | PHOSPHOR BRONZE      | SW      | SWITCH          |
| BSHG  | BUSHING            | FXD     | FIXED                 | PL       | PLAIN or PLATE       | T       | TUBE            |
| CAB   | CABINET            | GSKT    | GASKET                | PLSTC    | PLASTIC              | TERM    | TERMINAL        |
| CAP   | CAPACITOR          | HDL     | HANDLE                | PN       | PART NUMBER          | THD     | THREAD          |
| CER   | CERAMIC            | HEX     | HEXAGON               | PNH      | PAN HEAD             | THK     | THICK           |
| CHAS  | CHASSIS            | HEX HD  | HEXAGONAL HEAD        | PWR      | POWER                | TNSN    | TENSION         |
| CKT   | CIRCUIT            | HEX SOC | HEXAGONAL SOCKET      | RCP      | RECEPTACLE           | TPG     | TAPPING         |
| COMP  | COMPOSITION        | HLCPS   | HELICAL COMPRESSION   | RES      | RESISTOR             | TRH     | TRUSS HEAD      |
| CONN  | CONNECTOR          | HLEXT   | HELICAL EXTENSION     | RGD      | RIGID                | V       | VOLTAGE         |
| COV   | COVER              | HV      | HIGH VOLTAGE          | RLF      | RELIEF               | VAR     | VARIABLE        |
| CPG   | COUPLING           | IC      | INTEGRATED CIRCUIT    | RTNR     | RETAINER             | W/      | WITH            |
| CRT   | CATHODE RAY TUBE   | ID      | INSIDE DIAMETER       | SCH      | SOCKET HEAD          | WSHR    | WASHER          |
| DEG   | DEGREE             | IDNT    | IDENTIFICATION        | SCOPE    | OSCILLOSCOPE         | XFMR    | TRANSFORMER     |
| DWR   | DRAWER             | IMPLR   | IMPELLER              | SCR      | SCREW                | XSTR    | TRANSISTOR      |

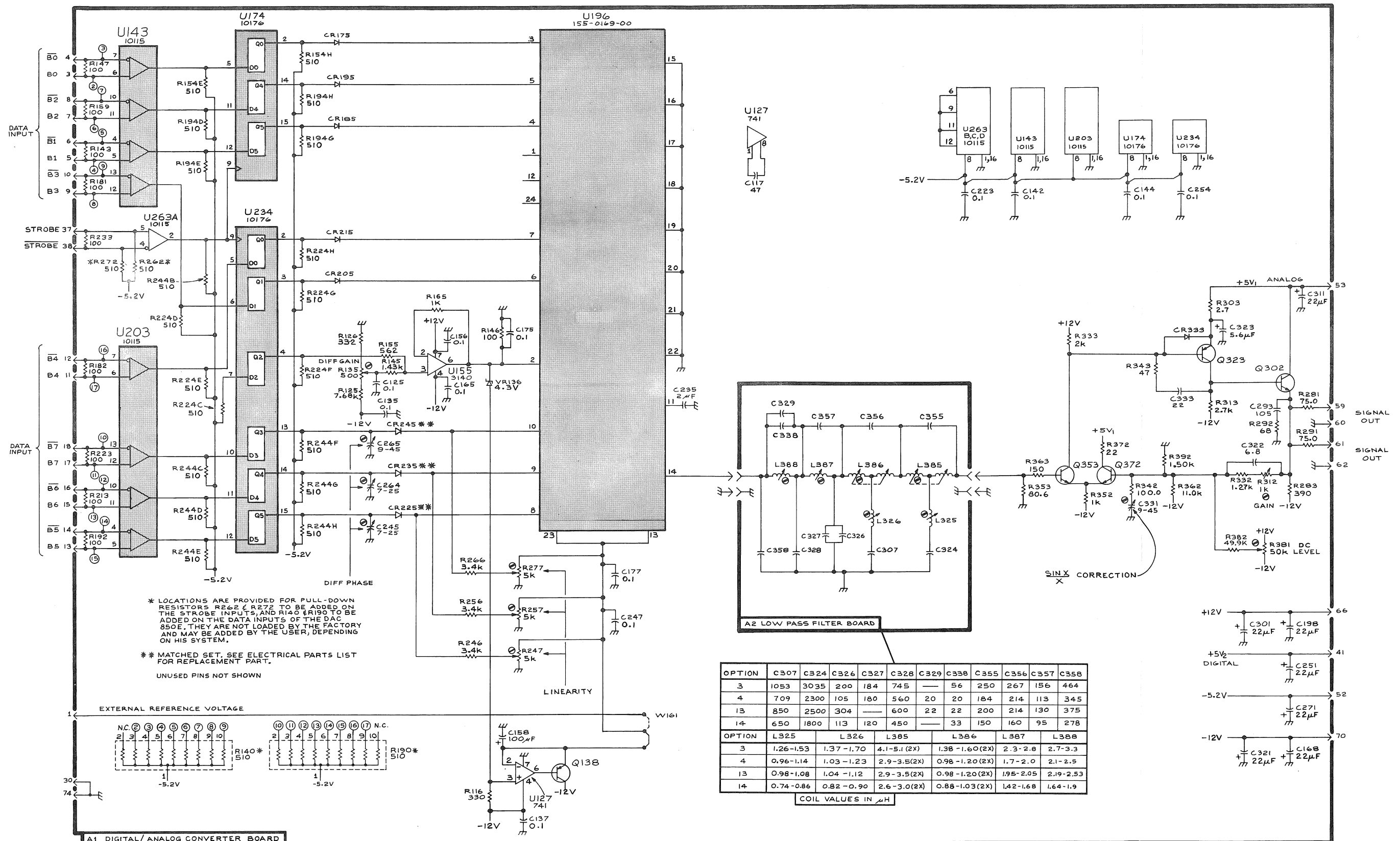
CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

| Mfr. Code | Manufacturer           | Address              | City. State. Zip         |
|-----------|------------------------|----------------------|--------------------------|
| 000BH     | FAB-TEK                | 17 SUGAR HOLLOW ROAD | DANBURY, CT 06810        |
| 22526     | BERG ELECTRONICS, INC. | YORK EXPRESSWAY      | NEW CUMBERLAND, PA 17070 |
| 80009     | TEKTRONIX, INC.        | P O BOX 500          | BEAVERTON, OR 97077      |
| 83385     | CENTRAL SCREW CO.      | 2530 CRESCENT DR.    | BROADVIEW, IL 60153      |

| Fig. & Index No. | Tektronix Part No.         | Serial/Model No. Eff | Dscnt | Qty | 1 2 3 4 5 | Name & Description                                              | Mfr   |             |
|------------------|----------------------------|----------------------|-------|-----|-----------|-----------------------------------------------------------------|-------|-------------|
|                  |                            |                      |       |     |           |                                                                 | Code  | Part Number |
| -1               | -----                      |                      |       | 1   |           | DIGITAL ANALOG:CONVERTER,ECL BOARD(SEE A1 EPL)                  |       |             |
| -2               | 131-0787-00                |                      |       | 4   |           | . CONTACT,ELEC:0.64 INCH LONG                                   | 22526 | 47359       |
| -3               | 214-2518-00                |                      |       | 1   |           | . HEAT SINK,XSTR:TO-220 OR TO-202                               | 000BH | 106B-B-HT   |
| -4               | 337-1995-00                |                      |       | 1   |           | . SHLD,ELECTRICAL:DEFLECTION CIRCUIT CARD                       | 80009 | 337-1995-00 |
| -5               | 129-0106-00                |                      |       | 2   |           | . POST,ELEC-MECH:0.218 OD X 0.125 INCH L,RRS                    | 80009 | 129-0106-00 |
| -6               | -----                      |                      |       | 1   |           | CKT BOARD ASSY:LOW PASS FILTER(SEE A2 EPL)<br>(ATTACHING PARTS) |       |             |
| -7               | 211-0097-00                |                      |       | 2   |           | SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL                         | 83385 | OBD         |
|                  |                            |                      |       |     |           | -----                                                           |       |             |
|                  |                            |                      |       |     |           | . CKT BOARD ASSY INCLUDES:                                      |       |             |
| -8               | 136-0263-04<br>070-2595-00 |                      |       | 4   |           | . SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN                     | 22526 | 75377-001   |
|                  |                            |                      |       | 1   |           | MANUAL,TECH:INSTRUCTION(NOT SHOWN)                              | 80009 | 070-2595-00 |







DAC 850E, OPTION 3, 4, 13 & 14

@

D-A CONVERTER

| OPTION | C307 | C324 | C326 | C327 | C328 | C329 | C338 | C355 | C356 | C357 | C358 |
|--------|------|------|------|------|------|------|------|------|------|------|------|
| 3      | 1053 | 3035 | 200  | 184  | 745  | —    | 56   | 250  | 267  | 156  | 464  |
| 4      | 709  | 2300 | 105  | 180  | 560  | 20   | 20   | 184  | 214  | 113  | 345  |
| 13     | 850  | 2500 | 304  | —    | 600  | 22   | 22   | 200  | 214  | 130  | 375  |
| 14     | 650  | 1800 | 113  | 120  | 450  | —    | 33   | 150  | 160  | 95   | 278  |

| OPTION | L325      | L326      | L385         | L386           | L387      | L388      |
|--------|-----------|-----------|--------------|----------------|-----------|-----------|
| 3      | 1.26-1.53 | 1.37-1.70 | 4.1-5.1 (2X) | 1.38-1.60 (2X) | 2.3-2.8   | 2.7-3.3   |
| 4      | 0.96-1.14 | 1.03-1.23 | 2.9-3.5 (2X) | 0.98-1.20 (2X) | 1.7-2.0   | 2.1-2.5   |
| 13     | 0.98-1.08 | 1.04-1.12 | 2.9-3.5 (2X) | 0.98-1.20 (2X) | 1.95-2.05 | 2.19-2.53 |
| 14     | 0.74-0.86 | 0.82-0.90 | 2.6-3.0 (2X) | 0.88-1.03 (2X) | 1.42-1.68 | 1.64-1.9  |

COIL VALUES IN  $\mu$ H