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Colin Hinson
In the village of Blunham, Bedfordshire.

Tektronix®
COMMITTED TO EXCELLENCE

PLEASE CHECK FOR CHANGE INFORMATION AT THE REAR OF THIS MANUAL.

1500-SERIES CHART RECORDER

INSTRUCTION MANUAL

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

070-2554-00
Product Group 27

Serial Number B 114880

First Printing MAR 1978
Revised APR 1983

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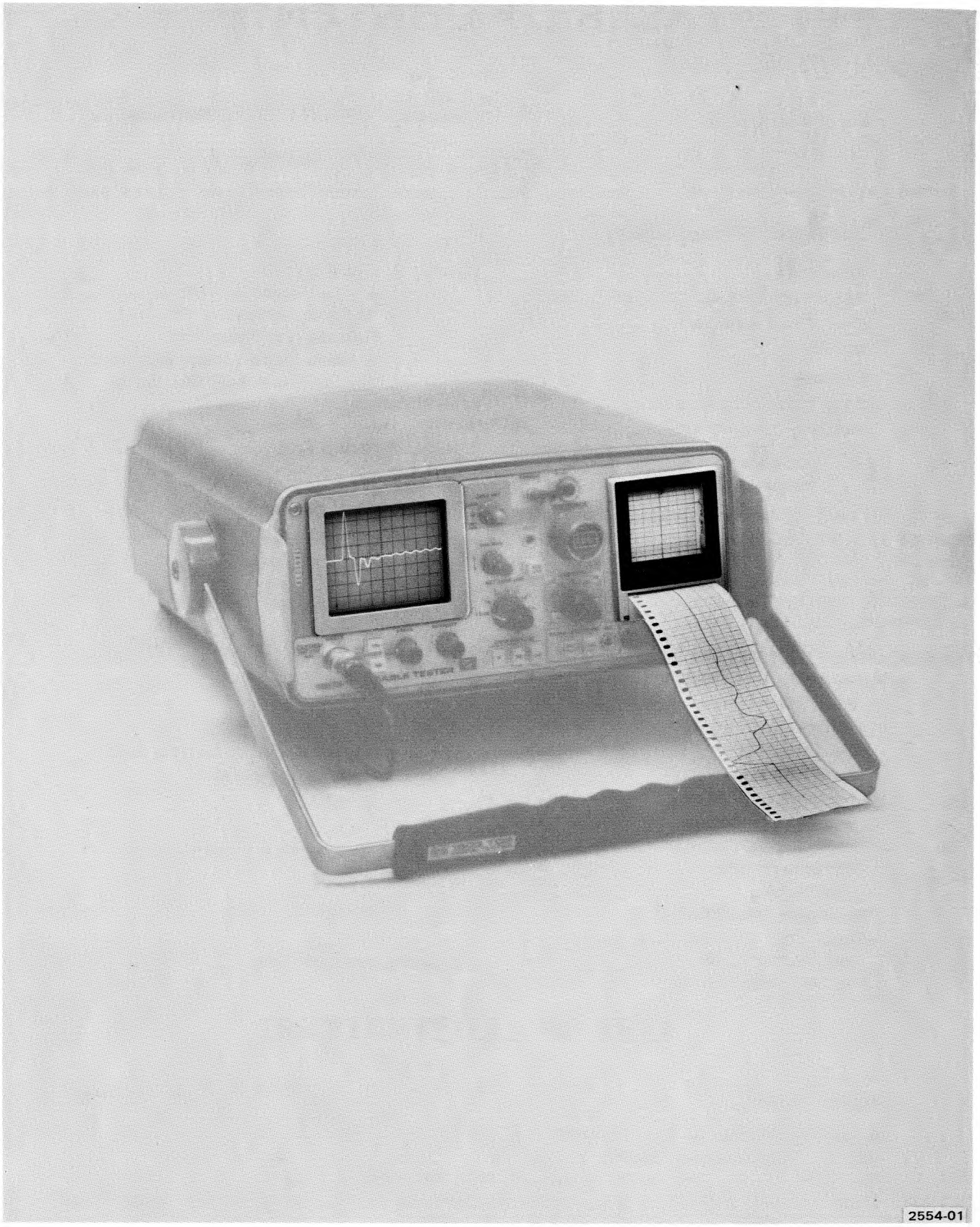

2554-01

Section 1
INTRODUCTION

The Tektronix Y-T Chart Recorder is an optional accessory to the 1500 Series instruments; it plugs into the instrument in place of the X-Y Output Module. The Recorder uses a heated stylus and 4 cm wide, heat sensitive chart paper to reproduce the crt display.

A chart recording is a permanent record. It can be of great service in fault interpretation; e.g., a chart recording of a faulty twisted pair can be compared to that of a good twisted pair.

Section 2
OPERATING INSTRUCTIONS

Installation

The Tektronix Y-T Chart Recorder can be installed in the instrument's plug-in receptacle in place of the X-Y Output Module. The LOCK knob secures the chart recorder in the instrument.

Stylus Alignment

When the RECORD switch is lifted, power is applied to the recorder stylus. The position of the stylus can then be aligned by adjusting the STYLUS POSITION screw. Align the stylus to correspond with the reference level of the crt trace.

Chart Paper Alignment

To align the chart horizontally, pull the paper until a dark line is aligned with the red reference line seen through a sprocket hole.

Record

When the RECORD switch is pushed up and then released, a chart recording starts. The chart recording circuitry automatically shuts off when the recording is completed. Extra graph paper is run to allow removal of the recording.

Evaluation

In evaluating a graph, the distance between two dark horizontal lines corresponds to one vertical division of the crt display. The distance between two dark vertical lines corresponds to one major horizontal division of the crt display.

Battery Operating Time

The chart recorder can make up to 20 graphs on a full charge of the batteries; the instrument will still operate for a minimum of 5 hours. After 20 graphs have been made, the time that the instrument can be operated without recharging the batteries will be reduced by approximately 3 minutes per recording.

Installing Chart Recorder Paper

About 60 graphs can be made with one roll of chart recorder paper. A new roll of chart paper is installed in the following manner:

CAUTION

Turn the instrument power switch off prior to removing or installing the Y-T chart recorder.

1. Turn LOCK knob ccw and pull chart recorder from the instrument.

2. Push down on the bottom edges of the bezel and lift upward for part numbers 016-0506-03 and up; for part numbers 016-0506-02 and below, pull forward on base of bezel and lift upward.

3. Remove empty spool from recorder by pulling it upward.

4. Place new roll of graph paper in top of recorder and push into place between the spring-loaded paper holders. Be sure the grid of the paper faces up. (See Fig. 2-1).

5. Pull the paper over the rollers and down the front of the recorder. Lower the bezel until it latches into place.

6. Align the graph paper so that one of the dark lines is lined up with the red line on the plate behind the chart paper seen through a sprocket hole. This sets the graph paper so that a recording will start at one of the dark lines which corresponds to the edge of the crt graticule.

7. Place the chart recorder back into the instrument, turning the LOCK knob clockwise to lock.

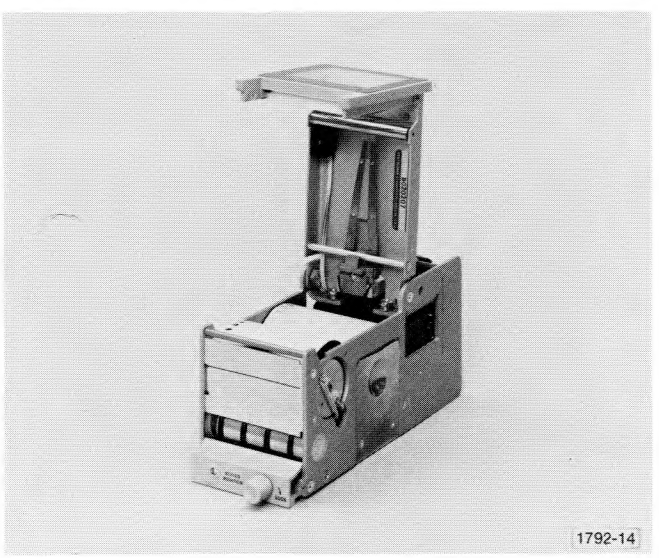


Fig. 2-1. Tektronix Y-T Chart Recorder.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

Section 3
CIRCUIT DESCRIPTION

This section describes the Chart Recorder circuitry using the circuit diagrams on the pull-outs at the back of this manual. The Chart Recorder contains three basic circuits: the motor voltage control, the heater voltage regulator, and a pen drive amplifier.

Part Numbers 016-0506-04 and up

The Chart Recorder contains four basic circuits: the motor voltage control, the motor speed control, the heater voltage regulator, and a pen drive amplifier.

Motor-Voltage Control

When pin 4 of P1096 is switched to 0 volt, Q8136. This transistor acts as a switch and applies 12 volts to the Motor Speed Control.

Motor-Speed Control

Motor current and torque load are sensed by R2026 and U2035A, providing a signal to U2035B, where it is compared with a reference voltage set by R1015. Integrated circuit U2035B and transistors Q1039 and Q1024 form a voltage-controlled current source for the drive motor.

Heater-Voltage Regulator

This circuit provides 3 A at 1.0 volt to the stylus heating element. The circuit is a series-switching regulator type. Transistor Q8126 acts as a series switch that supplies current to energy storage device L8215. Q4021 and Q8218 form the sensing amplifier whose signal is amplified by Q8222, Q8129, Q8128, and Q8127 in order to switch Q8126. Diode CR8223 shunts the current that flows through L8215 when Q8126 is turned off. R8220 is used to set the output voltage at 1 volt. The 1 volt switching supply is controlled by the stylus heat control line (pin 12), which is grounded when stylus heat is required.

Pen-Drive Amplifier

The pen-drive amplifier consists of operational amplifier U8118 and power amplifiers Q8112, Q8115, Q8116, and Q8212. STYLUS POSITION, an external screwdriver adjustment, R8211, is used to center the stylus on the chart paper. Gain of the amplifier is controlled by R8112, an internal screwdriver adjustment. The power amplifier circuit provides amplification to either positive or negative going inputs. The $+5$ volts and -5 volts to the power amplifiers are controlled by the chart recorder power switches in the main instrument.

Diodes CR8118 and CR8134 are used to protect the pen drive amplifier from high reverse voltages which may occur on the ± 5 volt power lines. Thermistor RT1039 and R1037 compensate for pen motor non-linearity.

Speed Sensing

A speed-sensing circuit consists of CR0282, and photosensitive transistor Q0182. As the paper travels, Q0182 is activated by the passing of every sprocket hole. The on-off rate of Q0182 is an indication of the paper motor speed. This activation rate is used to synchronize the display sweep speed with the paper-motor speed.

Part Numbers 016-0506-03

Motor Voltage Control. When pin 4 of J0196 is switched to a low state, Q8136 is turned on. This transistor acts as a switch and applies 12 V to U8110. This IC in turn applies 5 V to paper drive motor B0291. At the end of a recording, dynamic breaking is applied to the paper motor by the combination of Q8124 and Q8122.

Heater Voltage Regulator. This circuit provides 3 A at 1.0 V to the stylus heating element. The circuit is a series-switching regulator type. Q8126 acts as a series switch and L8215 acts as an energy storage device. Q8219 and Q8218 form the sensing amplifier and Q8222 and Q8127 are current amplifiers. Q8129 is a base current limiter for Q8126 and prevents the base drive of Q8126 from being over 300 mA. CR8223 shunts the current that flows through L8215 when Q8126 is turned off. R8220 is used to set the output voltage at 1 V. The 1 V switching supply is controlled by the stylus heat control line (pin 12). The control line is grounded when the stylus is required.

Pen Drive Amplifier. The pen-drive amplifier consists of operational amplifier U8118 and power amplifiers Q8112, Q8115, Q8116, and Q8212. STYLUS POSITION, an external screwdriver adjustment R8211, is used to center the external screwdriver adjustment R8211, is used to center the stylus on the chart paper. Gain of the amplifier is controlled by R8112, an internal screwdriver adjustment. The power amplifier circuit provides amplification to either positive or negative going inputs. The $+8$ Volts and -8 Volts to the power amplifiers are controlled by the chart recorder power switches Q5273 and Q5277 located on the logic board. CR8118 and CR8134 are used to protect the pen-drive amplifier from high reverse voltages which may occur on the ± 8 Volt power lines. R8216, CR8226 and CR8227 form a compensating network for pen motor nonlinearity.

Speedsensing. A speedsensing circuit consists of CR0282, the LED light source, and photosensitive transistor Q0182. As the paper travels, Q0182 is activated by the passing of every sprocket hole. The on-off rate of Q0182 is an indication of the paper motor speed. This activation rate is used to synchronize the display sweep speed with the paper motor speed.

Part Numbers 016-0506-02 and below.

Motor Voltage Control. The Motor Voltage Control consists of on-off switch Q8125; motor quick stop circuitry, Q8124, Q8122; and over-voltage protection network, Q8136, Q8128.

If a battery of less than 8 V is used, Q8125 can be turned on in a saturated mode by connecting the motor control line (pin 4) to ground. When the Chart Recorder is used with the 1503, the battery voltage will be between 10 V and 14 V. This prevents the switch Q8125 from being saturated by the over-voltage protection network. (The paper drive motor can only withstand 7.5 V maximum.)

The paper drive motor voltage is sensed by Q8128 and referenced with VR8127. The collector current of Q8128 drives Q8136 which shunts the base current of Q8125 in such a fashion that the paper drive motor voltage remains at ≈7 V.

A quick stop network for the paper drive motor is formed by Q8124 and Q8122. This network is activated when the motor control signal is removed. Q8122 short circuits the armature of the paper drive motor and electrically stops the motor. The circuit is connected like an SCR (base-collector to base-collector configuration). The latching cycle is initiated by Q8124 when the motor voltage drops by approximately 0.5 V causing the base of Q8124 to draw a current. Q8124 turns on Q8122, which increases the current of Q8124 until both Q8124 and Q8122 are saturated. Q8124 and Q8122 will remain saturated until the charge of C8131 has decayed, after which Q8124 and Q8122 become unlatched. CR8122 and R8131 are needed to charge C8131 when the paper drive motor is turned on.

Heater Voltage Regulator. This circuit provides 3 A at 1.0 V to the stylus heating element. The circuit is a series-switching regulator type. Q8126 acts as a series switch and L8215 acts as an energy storage device. Q8219 and Q8218 form the sensing amplifier; Q8222 and Q8127 are current amplifiers. Q8129 is a base current limiter for Q8126 and prevents the base drive of Q8126 from being over 300 mA. CR8223 shunts the current that flows through L8215 when Q8126 is turned off. R8227 is used to set the output voltage at 1 V. The 1 V switching supply is controlled by the stylus heat control line (pin 12). The control line is grounded when the stylus heat is required.

Pen Drive Amplifier. The pen-drive amplifier consists of operational amplifier U8118 and power amplifiers Q8112, Q8115, Q8116, and Q8212. STYLUS POSITION, an external screwdriver adjustment R8211, is used to center the stylus on the chart paper. Gain of the amplifier is controlled by R8112, an external screwdriver adjustment. The power amplifier circuit provides amplification to either positive or negative going inputs. The +8 Volts and −8 Volts to the power amplifiers are controlled by the chart recorder power switches Q5273 and Q5277 located on the logic board. CR8118 and CR8134 are used to protect the pen-drive amplifier from high reverse voltages which may occur on the ±8 Volt power lines. R8216, CR8226 and CR8227 form a compensating network for pen motor non-linearity.

Speedsensing. A speedsensing circuit consists of CR0282, the LED light source, and photosensitive transistor Q0182. As the paper travels, Q0812 is activated by the passing of every sprocket hole. The on-off rate of Q0182 is an indication of the paper motor speed. This activation rate is used to synchronize the display sweep speed with the paper motor speed.

Section 4
CALIBRATION

Equipment Required

1. 25 feet (5 metres) of cable (any known length of this approximate length may be used.)

2. Three-inch screwdriver

Typical Instrument Control Settings:

RET LOSS	0 dB
NOISE FILTER	Out
0-dB SET	4 div pulse
DISTANCE Dial	000
FEET/DIV	.5
CABLE DIELECTRIC	SOLID POLY

1. Chart Recorder Checks

NOTE

There are two internal electrical adjustments in the chart recorder. For part numbers 016-0506-03 and up, R8112 controls the gain for the Pen Motor Drive and R8220 controls the stylus temperature. For part numbers 016-0506-02 and below, R8211 controls the gain for the Pen Motor Drive and R8227 controls the stylus temperature. Power consumption goes up as the stylus temperature increases; therefore it is important to have the stylus temperature as low as possible without sacrificing an adequate recording trace.

a. Connect the 25 foot (5 metre) cable to the instrument's CABLE connector.

b. Use the ZERO REF SET control to locate the leading edge of the test pulse on the 2nd graticule line from the left.

c. Use the position control to set the base line on the second horizontal graticule line from the bottom.

d. Lift the RECORD switch to RECORD and hold.

e. ADJUST—the recorder STYLUS POSITION control so that the stylus is lined up with the second bold line from the right on the chart paper (see Fig. 4-1).

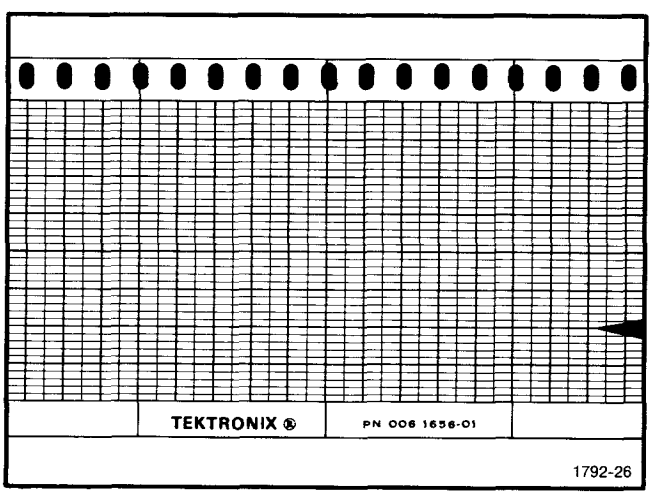


Fig. 4-1. Stylus Position adjusted.

f. Release the RECORD switch and allow the chart recorder to record the graph.

g. When the recording is complete, remove the graph from the chart recorder. Check that the recording is dark enough to be read and that the recording starts at the 2nd division line from the right and extends to the 6th division line from the right. If the graph printing is too light or too dark, adjust the stylus temperature. If the graph amplitude does not correspond to that on the crt, adjust the chart recorder gain.

2. Stylus Temperature and Chart Recorder Gain Adjustments

a. Remove the chart recorder from the instrument.

b. ADJUST—R8220 in part numbers 016-0506-03 and up, R8227 in part numbers 016-0506-02 and below, (STYLUS TEMP), clockwise to increase the graph intensity or counterclockwise to decrease the intensity. See Fig. 4-2 for location of chart recorder adjustment. Use Fig. 4-2(A) for part numbers 016-0506-03 and up; Fig. 4-2(B) for part numbers 016-0506-02 and below.

c. ADJUST—R8211 (GAIN) clockwise to increase the amplitude of the chart trace or counterclockwise to decrease the amplitude of the chart trace.

d. Place the chart recorder back in the instrument.

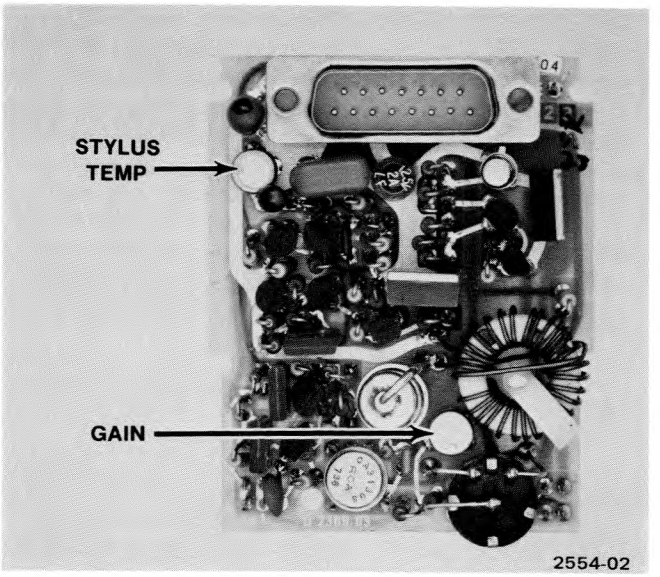


Fig. 4-2(A). Chart Recorder controls (front view), 670-1742-04 & up.

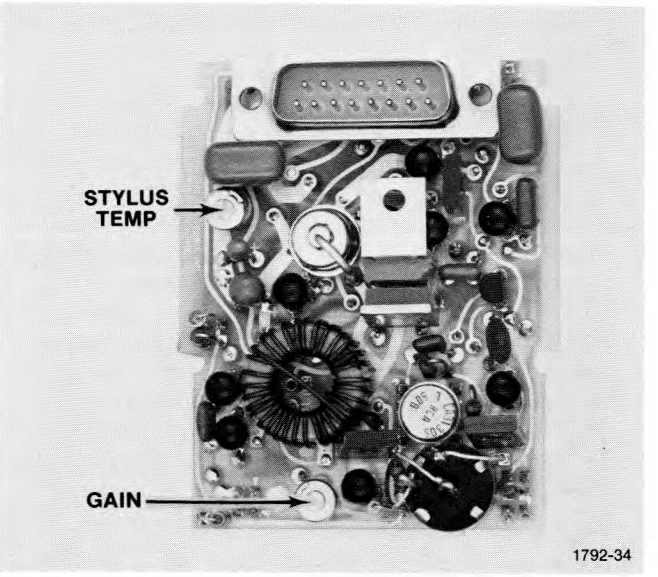


Fig. 4-2(B). Chart Recorder controls (front view), 670-1742-03.

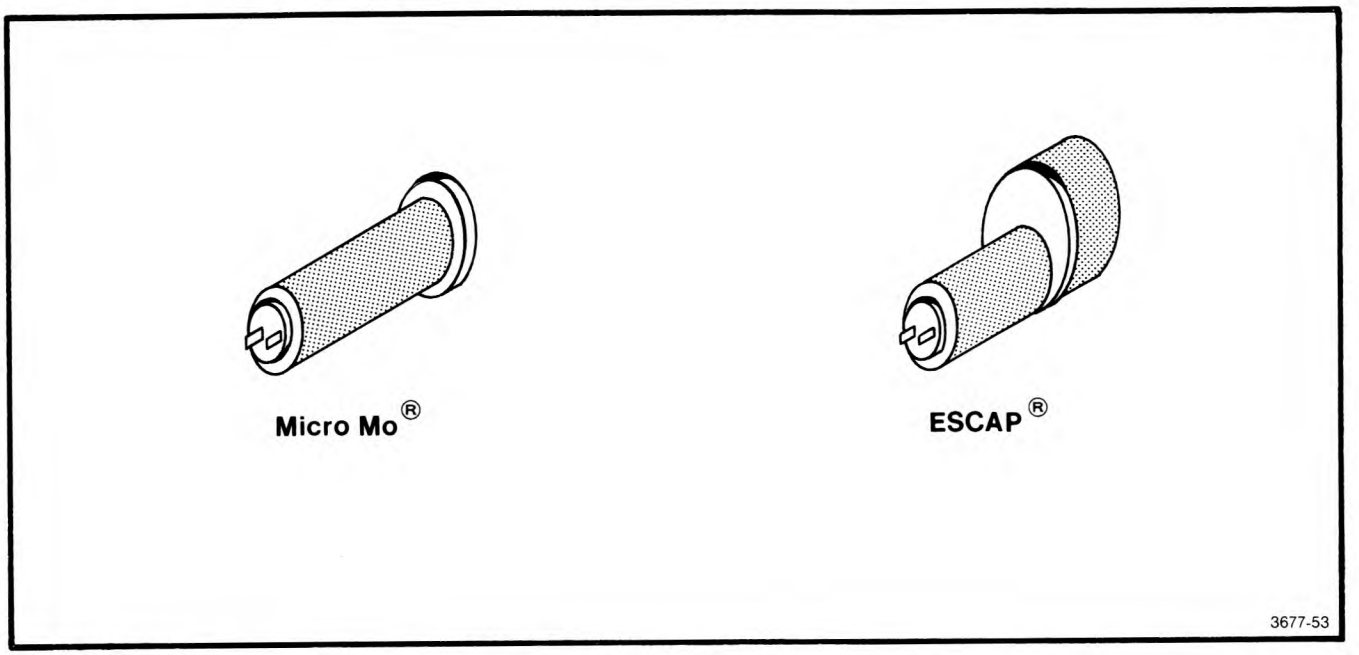


Fig. 4-3. Chart Recorder motors.

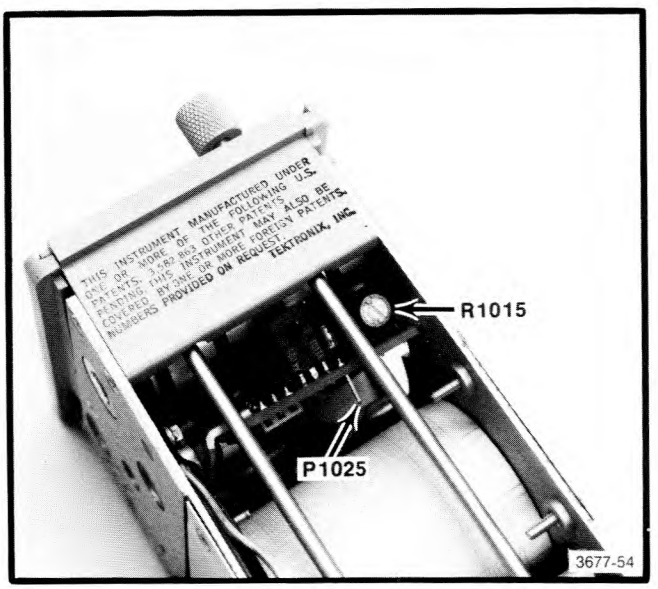


Fig. 4-4. Motor speed control.

3. Motor Speed Adjustment (for part numbers 016-0506-04 and up)

a. To make the motor speed adjustment determine which motor has been used in your instrument. See Fig. 4-3.

b. Set up a voltmeter and attach a probe to P1025 on the Motor Speed Control board. See Fig. 4-4.

c. With the Chart Recorder on the Chart Recorder Extender (067-1071-00) push the RECORD button and, while the chart is running, adjust R1015 for

1.55 V if the MicroMo motor has been used,
1.79 V if the ESCAP motor has been used.

Section 5
MAINTENANCE

Chart Recorder Repair

Except for the stylus and the rubber rollers, the chart recorder is virtually maintenance free. Instructions for replacing the stylus and the rubber rollers are given in the following procedures. If replacement of other mechanical parts should be necessary, refer to the exploded views which are located in the mechanical parts list section.

Changing the Stylus

1. Disconnect P82 from the circuit board (see Fig. 5-1A).

2. Remove the two screws from the rear of the cover and carefully remove the cover (see Fig. 5-1B).

3. Disconnect P81 from the circuit board.

4. Using a 0.05-inch allen wrench, loosen the set screw and lift the assembly off the motor shaft.

5. Remove the holding screw from the stylus assembly.

6. Separate the stylus and the holder.

7. Install a new stylus (Tektronix Part No. 119-0365-00).

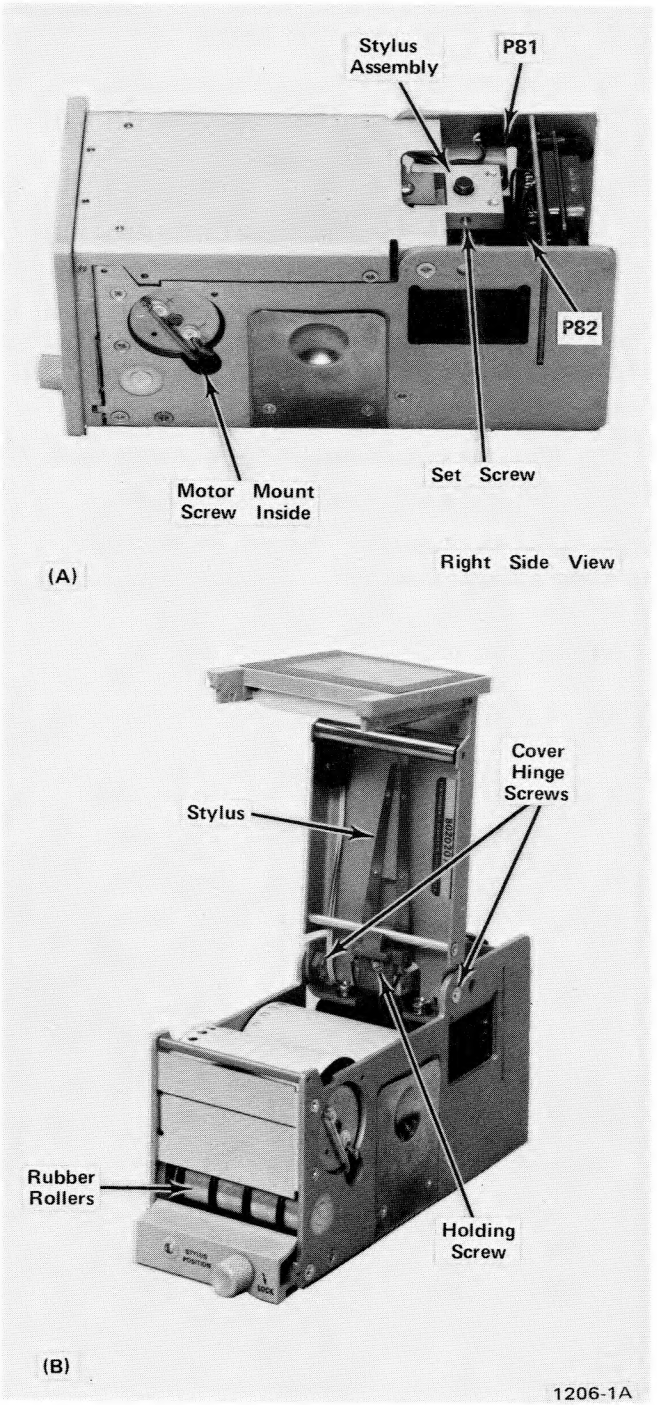


Fig. 5-1(A)(B). Location of Chart Recorder components.

8. Loop the stylus wires around the motor shaft as shown in Fig. 5-2. Connect P82 and P81.

CAUTION

The recorder will not operate accurately unless step 8 is performed exactly as described.

9. Re-install the stylus assembly so that approximately 1/16 inch of the motor shaft protrudes through the assembly.

10. Center the writing element on the writing roller.

11. Tighten the set-screw; the stylus should now move freely with a light pressure on the writing roller. Adjust as necessary by bending the stylus near the holder.

12. Move the stylus assembly into a vertical position.

13. Re-install the cover; the stylus should be located behind the two metal rollers.

14. With the cover closed and the paper roll removed, check to see if the stylus holder clears the lift bar. Readjust the height of the stylus holder and stylus pressure as necessary.

Replacing the Rubber Rollers

1. Remove the chart recorder from the instrument.

2. Remove the right side (see Fig. 5-1A). (The cover must be removed first.)

3. Loosen the motor mount screws.

4. Remove the metal roller.

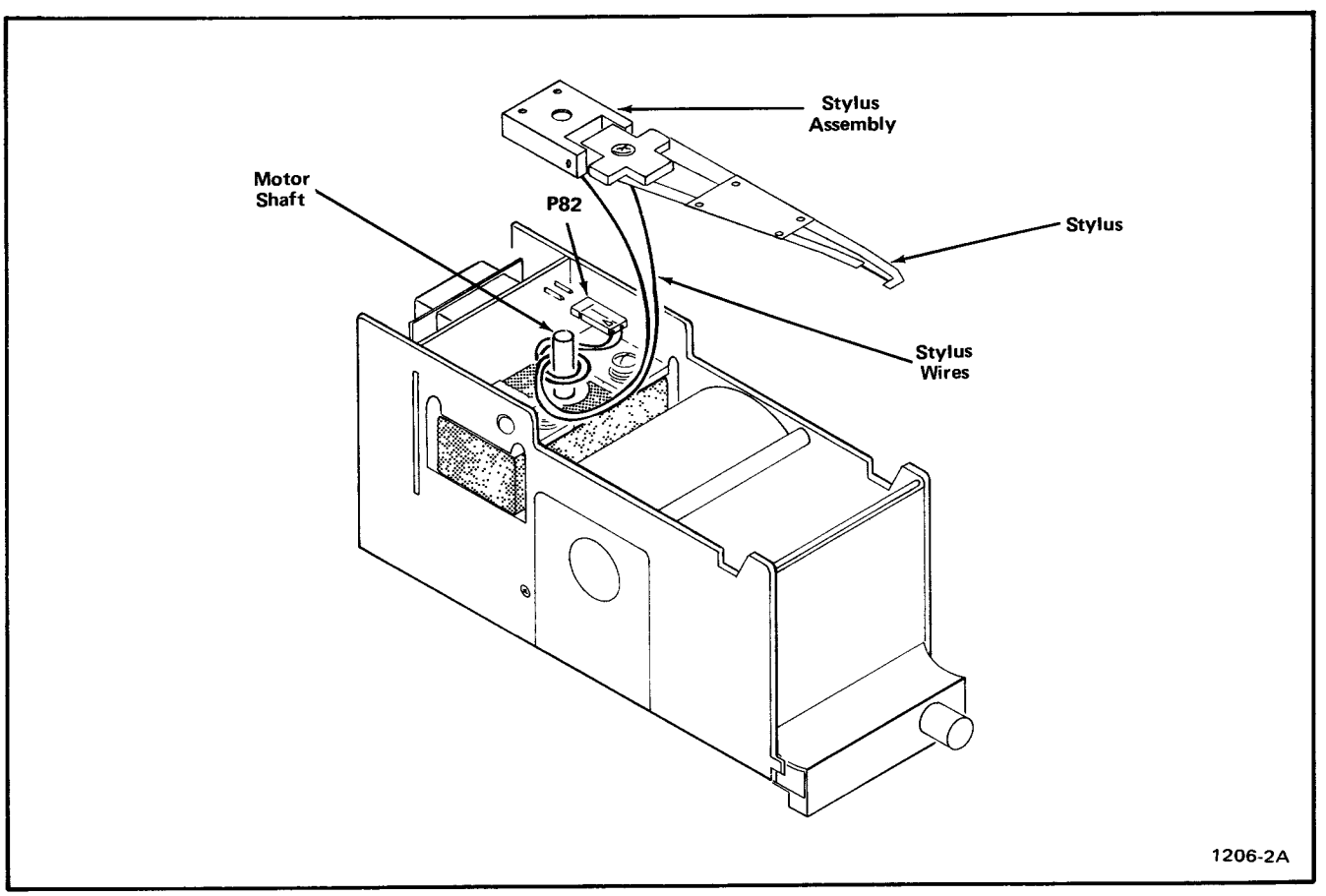


Fig. 5-2. Correct alignment of stylus assembly connecting wire.

5. Remove the old rubber rings and install four new rings.

6. Set the metal roller back into the left bearing. Be sure drive belt is positioned properly.

7. Replace the right side.

8. Move the motor slightly to take up slack in the belt and tighten the motor mount screws.

CAUTION

Do NOT overtighten the drive belt.

9. Position the motor LC network to be clear of the paper roll and drive roller.

REPACKAGING FOR SHIPMENT

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a carton of corrugated cardboard having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Refer to the following table for carton test strength requirements.

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.

4. Seal carton with shipping tape or industrial stapler.

SHIPPING CARTON TEST STRENGTH

Gross Weight (lb)	Carton Test Strength (lb)
0-10	200
10-30	275
30-120	375
120-140	500
140-160	600

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
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
11237	CTS KEENE, INC.	3230 RIVERSIDE AVE.	PASO ROBLES, CA 93446
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50778	PORTESCAP, US	730 FIFTH AVENUE	NEW YORK, NEW YORK 10019
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-1742-03			CKT BOARD ASSY:CHART RECORDER	80009	670-1742-03
A1	670-1742-04			CKT BOARD ASSY:CHART RECORDER	80009	670-1742-04
A1	670-1742-05			CKT BOARD ASSY:CHART RECORDER	80009	670-1742-05
B0291	147-0036-00			MOTOR,DC:420 RPM,3.5-7.5V	50778	AR-1601-A1
B0295	147-0037-01			ACTR,ELMCH,RTRY:1.5V FOR 14.5 DEG ROT	80009	147-0037-01
C0302	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C8121	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	59660	831-518-Z5D0181J
	----- -----			(670-1742-03 ONLY)		
C8121	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	0831085Z5E00471J
	----- -----			(BEGAN USAGE ON 670-1742-04)		
C8123	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C8125	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	56289	273C5
C8126	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N061Z5U0103M
C8131	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	90201	TDC107M020WLD
C8218	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C8227	290-0530-00			CAP.,FXD,ELCTLT:68UF,20%,6V	90201	TDC686M006NLF
C8228	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C8236	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	90201	TDC107M020WLD
CR0282	150-1004-01			LAMP,LED:ASSY,W/HOLDER	80009	150-1004-01
	----- -----			(BEGAN USAGE ON 016-0506-01)		
CR0282	150-1040-01			LAMP,LED:W/LEADS & DIODE HOLDER	80009	150-1040-01
	----- -----			(BEGAN USAGE ON 016-0506-02)		
CR8118	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR8120	152-0323-00			SEMICOND DEVICE:SILICON,35V,0.1A	80009	152-0323-00
CR8122	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR8134	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR8212	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR8223	152-0502-00			SEMICOND DEVICE:SILICON,20V,5A	04713	1N5823
CR8226	152-0075-00			SEMICOND DEVICE:GE,25V,40MA	14433	G866
CR8227	152-0075-00			SEMICOND DEVICE:GE,25V,40MA	14433	G866
F8120	159-0128-00			FUSE,CARTRIDGE:2A,125V,5 SEC	75915	273002
L0302	108-0598-00			COIL,RF:200UH	80009	108-0598-00
L0392	108-0598-00			COIL,RF:200UH	80009	108-0598-00
L8215	108-0708-00			COIL,RF:FIXED,75NH	80009	108-0708-00
Q0182	151-0313-01			TRANSISTOR:SILICON,NPN	80009	151-0313-01
Q8112	151-0324-00			TRANSISTOR:SILICON,PNP	04713	SJE915
Q8115	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q8116	151-0342-00			TRANSISTOR:SILICON,PNP	07263	S035928
Q8122	151-0207-00			TRANSISTOR:SILICON,NPN	03508	X32D6191
Q8124	151-0342-00			TRANSISTOR:SILICON,PNP	07263	S035928
Q8125	151-0335-00			TRANSISTOR:SILICON,PNP	04713	SJE917
Q8126	151-0366-00			TRANSISTOR:SILICON,PNP	03508	X45C277
Q8127	151-0331-00			TRANSISTOR:SILICON,NPN	03508	X40C115
	----- -----			(670-1742-03 ONLY)		
Q8127	151-0334-00			TRANSISTOR:SILICON,NPN	04713	SJ914
	----- -----			(BEGAN USAGE ON 670-1742-04)		
Q8128	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q8129	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q8136	151-0342-00			TRANSISTOR:SILICON,PNP	07263	S035928
	----- -----			(670-1742-03 ONLY)		
Q8136	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
	----- -----			(BEGAN USAGE ON 670-1742-04)		
Q8212	151-0323-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE521	04713	SJE916
Q8218	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q8219	151-0341-00			TRANSISTOR:SILICON,NPN	07263	SO40065
Q8222	151-0342-00			TRANSISTOR:SILICON,PNP	07263	SO35928
R8112	311-0644-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W	73138	82-34-1
R8114	316-0391-00			RES.,FXD,CMPSN:390 OHM,10%,0.25W	01121	CB3911
	----- -----			(670-1742-03 ONLY)		
R8114	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8116	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
R8117	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R8118	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R8119	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8121	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R8122	316-0332-00			RES.,FXD,CMPSN:3.3K OHM,10%,0.25W	01121	CB3321
R8123	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R8124	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R8125	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R8126	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R8129	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R8129	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R8131	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R8133	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R8137	316-0152-00			RES.,FXD,CMPSN:1.5K OHM,10%,0.25W	01121	CB1521
R8211	311-0580-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	11237	300SF-41695
	----- -----			(670-1742-03 ONLY)		
R8211	311-1970-00			RES.,VAR,NONWIR:PNL,50K OHM,10%,1.0W	01121	SPSN 0485503U
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8212	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R8213	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8214	316-0272-00			RES.,FXD,CMPSN:2.7K OHM,10%,0.25W	01121	CB2721
R8215	316-0392-00			RES.,FXD,CMPSN:3.9K OHM,10%,0.25W	01121	CB3921
	----- -----			(670-1742-03 ONLY)		
R8215	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8216	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R8217	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R8218	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R8219	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R8220	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R8221	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R8222	316-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021
	----- -----			(670-1742-03 ONLY)		
R8222	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8223	307-0111-00			RES.,FXD,CMPSN:3.6 OHM,5%,0.25W	01121	CB36G5
R8224	307-0111-00			RES.,FXD,CMPSN:3.6 OHM,5%,0.25W	01121	CB36G5
R8225	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R8226	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
	----- -----			(670-1742-03 ONLY)		
R8226	316-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8227	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
	----- -----			(670-1742-03 ONLY)		
R8227	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8228	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
	----- -----			(670-1742-03 ONLY)		

Ckt No.	Tektronix Part No	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R8228	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
	----- -----			(BEGAN USAGE ON 670-1742-04)		
R8229	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R8231	316-0103-00			RES.,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R8232	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R8233	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R8234	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
U8110	156-0277-00			MICROCIRCUIT,LI:VOLTAGE REGULATOR	07263	MICR0A7805UC
U8118	156-0686-02			MICROCIRCUIT,LI:OPNL AMPL,SCREENED	02735	CA3130S/5
VR8127	152-0280-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it goes to the low state.

Abbreviations are based on ANSI Y1.1-1972.

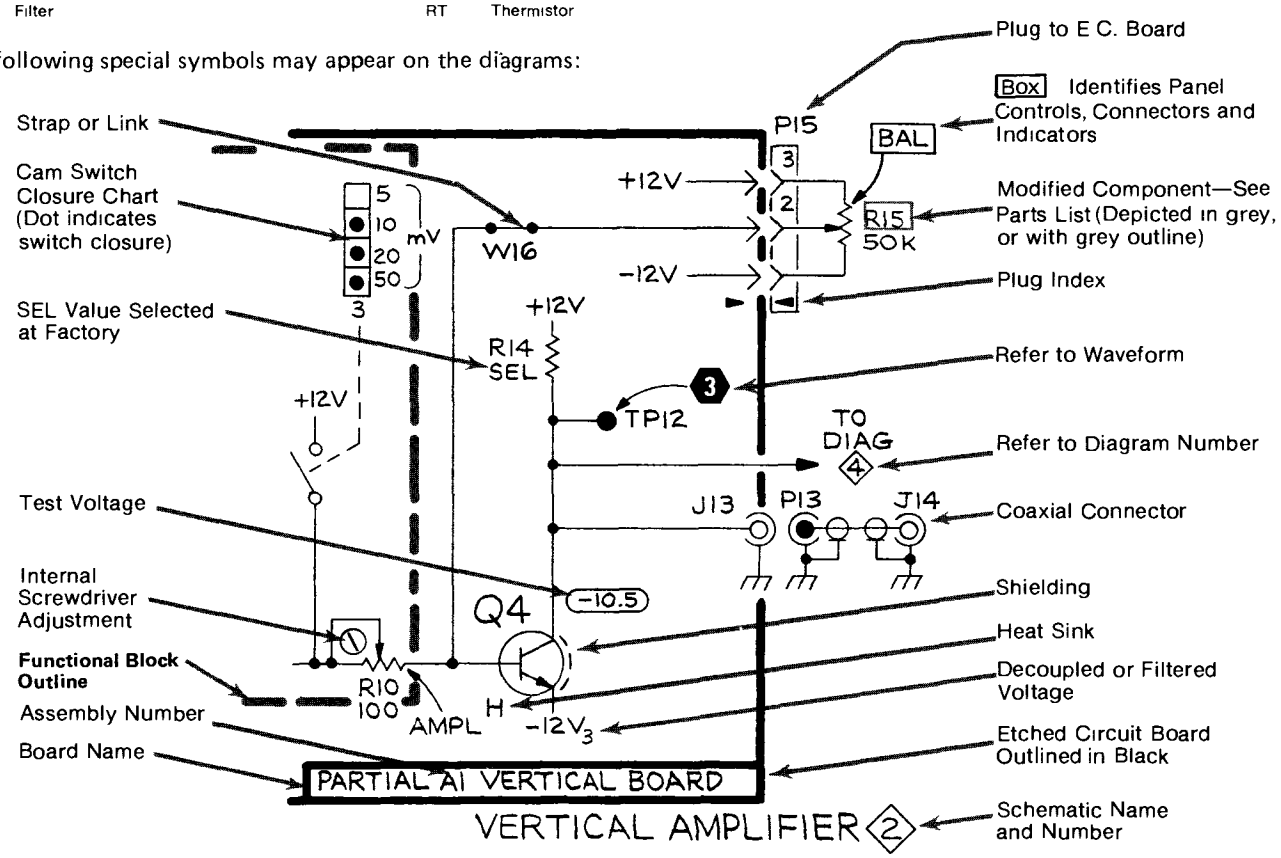
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc)	H	Heat dissipating device (heat sink, heat radiator etc)	S	Switch or contactor
AT	Attenuator, fixed or variable	HR	Heater	T	Transformer
B	Motor	HY	Hybrid circuit	TC	Thermocouple
BT	Battery	J	Connector, stationary portion	TP	Test point
C	Capacitor, fixed or variable	K	Relay	U	Assembly, inseparable or non-repairable (integrated circuit, etc)
CB	Circuit breaker	L	Inductor, fixed or variable	V	Electron tube
CR	Diode, signal or rectifier	M	Meter	VR	Voltage regulator (zener diode, etc)
DL	Delay line	P	Connector, movable portion	W	Wirestrap or cable
DS	Indicating device (lamp)	Q	Transistor or silicon-controlled rectifier	Y	Crystal
E	Spark Gap, Ferrite bead	R	Resistor, fixed or variable	Z	Phase shifter
F	Fuse	RT	Thermistor		
FL	Filter				

The following special symbols may appear on the diagrams:



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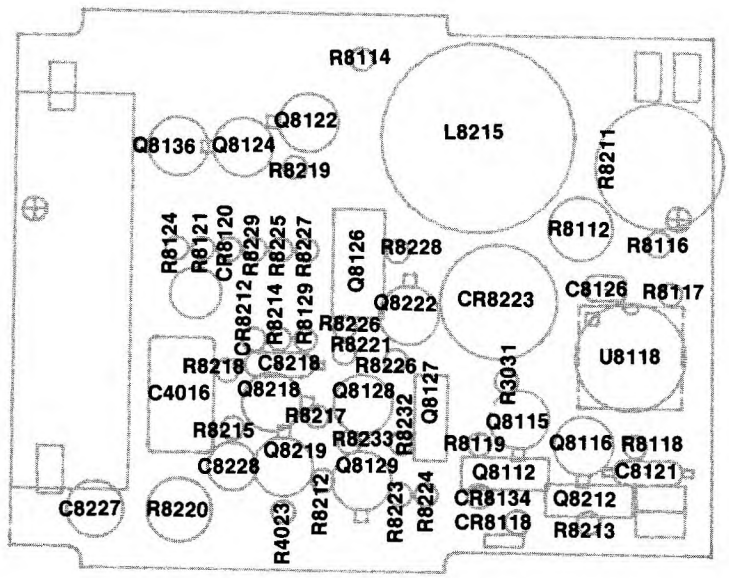
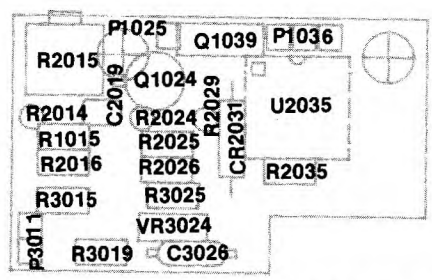


A1—Chart Recorder 670-1742-06



A1A1—Motor Speed Control 670-7275-00

P1096
15
6
9
5
CHART SPEED SENSE
5
STYLUS HEAT
12
+5V
R8218 2.2 k
CR8212
C8218 0.1
R8217 5.1 k
R8226 1 k
+12V
R8221 510
Q8222
R8129 620
Q8126
+12V
L8215 75μH
CR8223
Q8128
R8222 1 k
R8233 6.2 k
Q8127
R8228 10 k
+5V
Q8218
Q4021
R8215 6.8 k
+5V
Q8129
R8232 6.2 k
C8228 1μF
R8220 1 k
STYLUS TEMP
R8223 3.6
R8224 3.6
R8212 1 k
R8214 2.7 k
-5V
C8227 68μF
+5V
7
CA3130
U8118
4
-5V
+5V CHART
CR8118
R8119 470
Q8112
Q8115
R8118 220
C8121 470
U8118
CA3130
R4023 4.7
R3031 3.0 K
3
Y'
11
10
-5V CHART
5
13
+5V CHART
C8126 .01
Q8116
Q8212
R8213 470
-5V CHART
R8117 24 K
R8112 20 K
GAIN
CR8134
8
6
5
7
+5V
14
6
R8124 5.1 k
+12V
+12V
Q8136
F8120 2.0A
+12V
C4016 47μF
MTR CONTROL
5
4
3
2
1
-5V
R8121 1.5 k
+12V
R8229 5.1 k
CR8120
Q8124
Q8122
R8225 62 K
R8219 18 K
+12V
R8227 62 K
R8116 270 K
-5V
+5V
R8211 50 K
+5V
A1 CHART RECORDER
P85
1
R8114 390
+5V
P81
2
CHART SPEED SENSE
P82
STYLUS
Q0182
PAPER
P83
GRN
YEL
B0295
M
PAPER SUPPLY SPOOL
(P85-2) +V
CR0282
P84
BLK
RED
B0291 PAPER DRIVE
M
t°
RT1039 5.0
R1037 2.7
R2016 51 k
U2035B
C3026 0.1
R2029 470
Q1039
R2014 62 k
R2024 100 k
CR2031 1.2ma
Vb
R2015 130 k
Q1024
R2025 6.2
R1015 10 k
VR3024 5.1V
U2035A LM358
R3015 62 k
R2035 8.2 k
R3025 47 k
C2019 .022
R3019 10 K
R2026 3.9
P1025
P1036
A1A1 MOTOR SPEED CONTROL
STYLUS POSITION
CHART RECORDER 1
016-0506-04
1500
REV OCT 1982

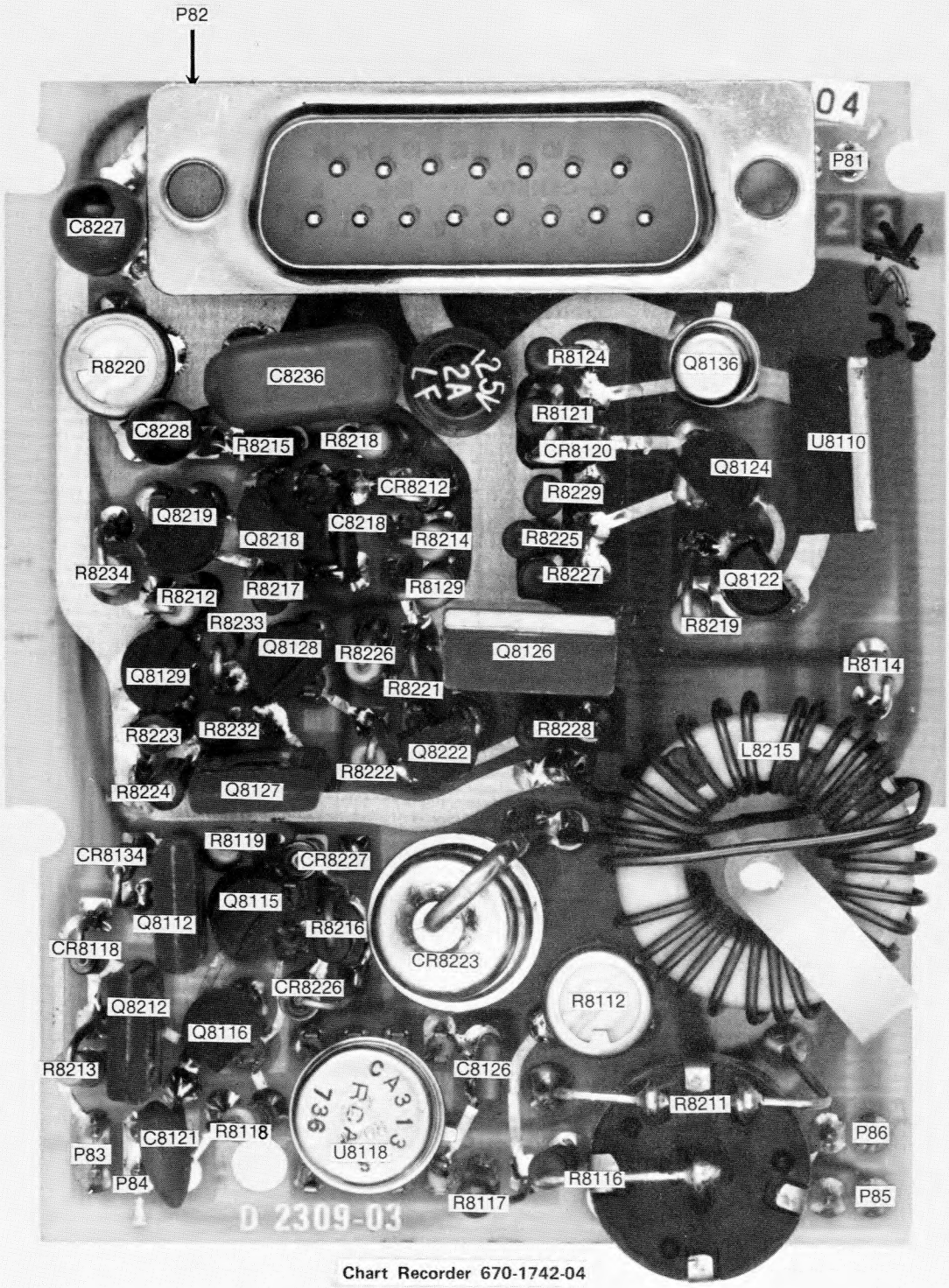
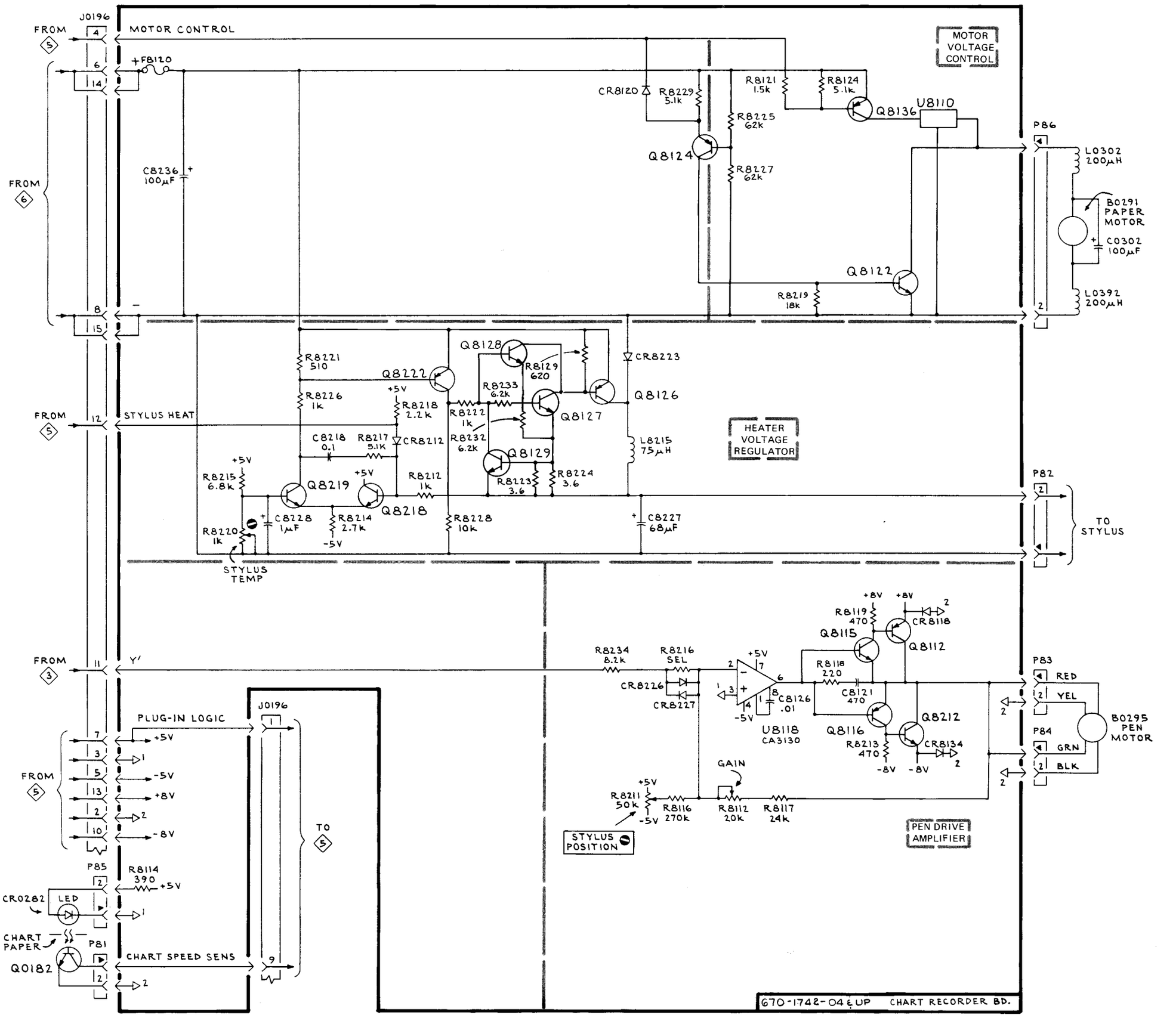


Chart Recorder 670-1742-04

2554-05


FROM 5
J0196
4
MOTOR CONTROL
6
14
+FB120
FROM 6
C8236 100µF
8
15
−
MOTOR VOLTAGE CONTROL
CR8120
R8229 5.1k
R8121 1.5k
R8124 5.1k
Q8136
U8110
R8225 62k
Q8124
R8227 62k
Q8122
R8219 18k
P86
L0302 200µH
B0291 PAPER MOTOR
C0302 100µF
L0392 200µH
2
FROM 5
12
STYLUS HEAT
R8221 510
Q8222
Q8128
R8129 620
CR8223
R8226 1k
+5V
R8218 2.2k
R8233 6.2k
R8222 1k
Q8126
Q8127
R8232 6.2k
C8218 0.1
R8217 5.1k
CR8212
L8215 75µH
HEATER VOLTAGE REGULATOR
Q8129
R8223 3.6
R8224 3.6
R8215 6.8k
Q8219
Q8218
R8212 1k
P82
2
TO STYLUS
C8228 1µF
R8214 2.7k
-5V
R8228 10k
C8227 68µF
R8220 1k
STYLUS TEMP
FROM 3
11
Y'
R8234 8.2k
R8216 SEL
CR8226
CR8227
+8V
R8119 470
CR8118
Q8115
Q8112
R8118 220
C8121 470
C8126 .01
U8118 CA3130
Q8116
Q8212
R8213 470
CR8134
-8V
P83
RED
YEL
P84
GRN
BLK
B0295 PEN MOTOR
GAIN
R8211 50k
R8116 270k
R8112 20k
R8117 24k
STYLUS POSITION
PEN DRIVE AMPLIFIER
FROM 5
7
3
5
13
2
10
PLUG-IN LOGIC
+5V
-5V
+8V
-8V
J0196
1
9
TO 5
P85
R8114 390
CR0282
LED
CHART PAPER
P81
Q0182
CHART SPEED SENS
670-1742-04 & UP CHART RECORDER BD.

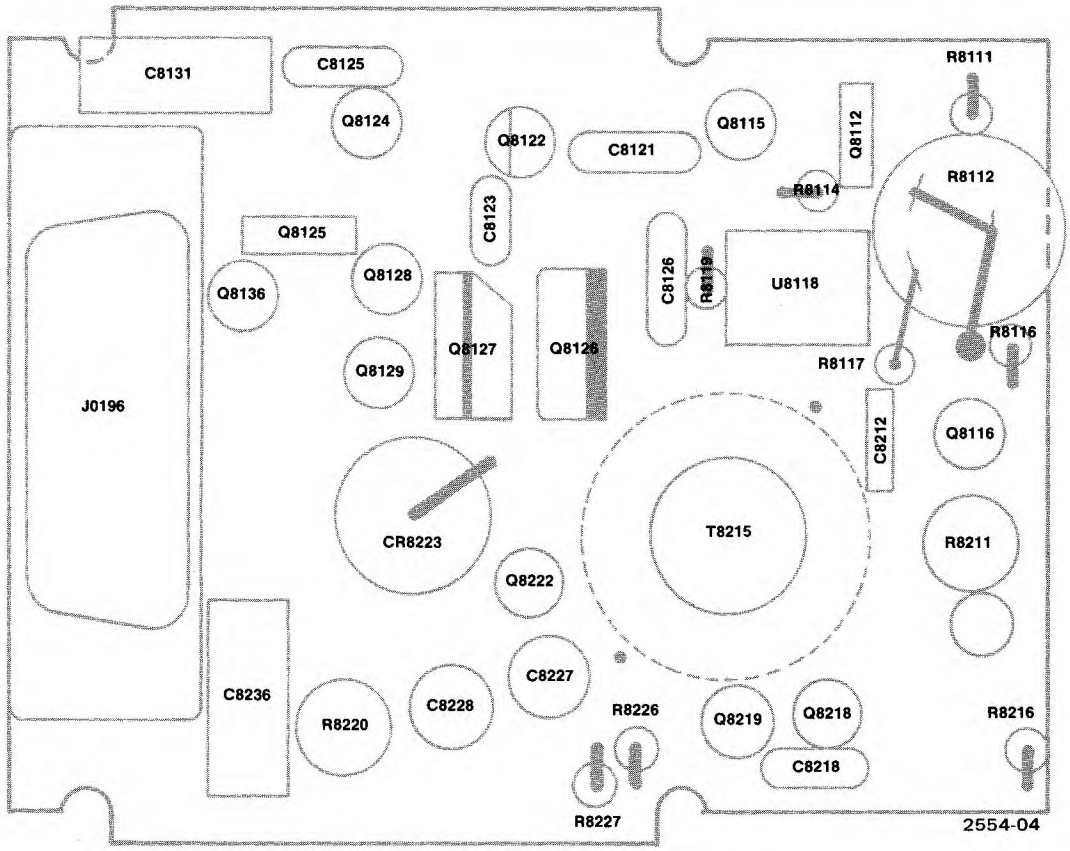


Chart Recorder 670-1742-03 & Below(Front)

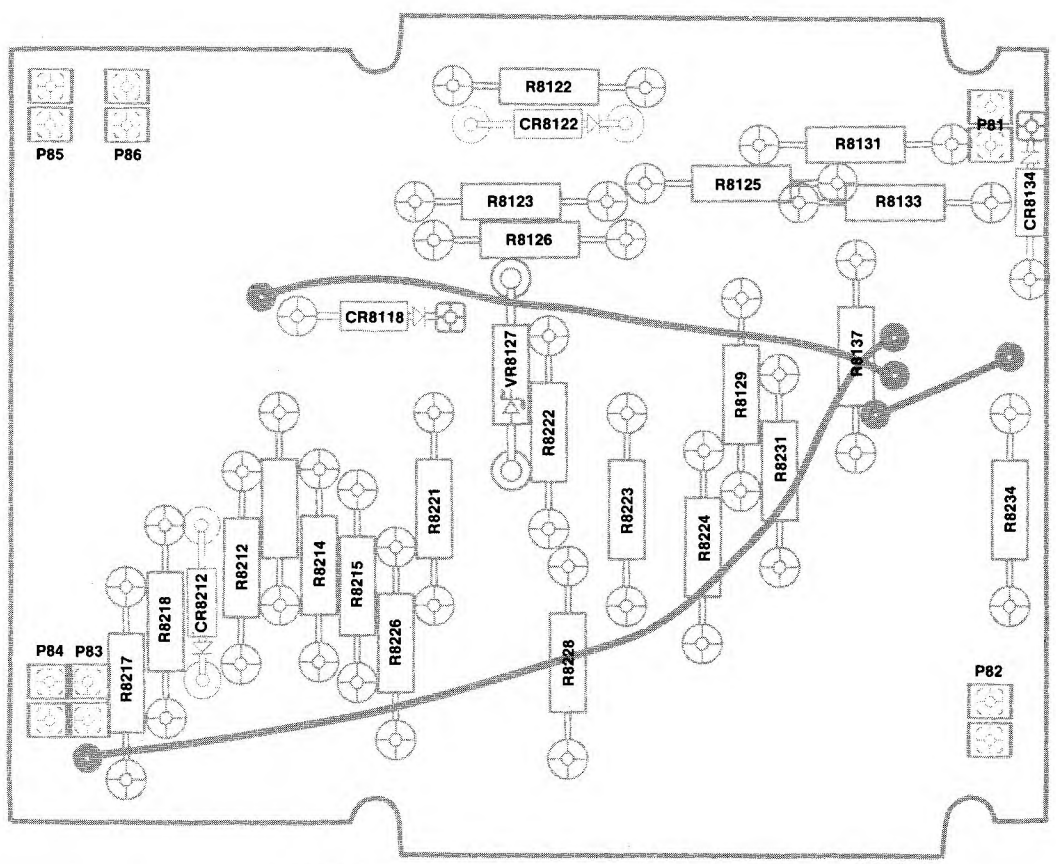
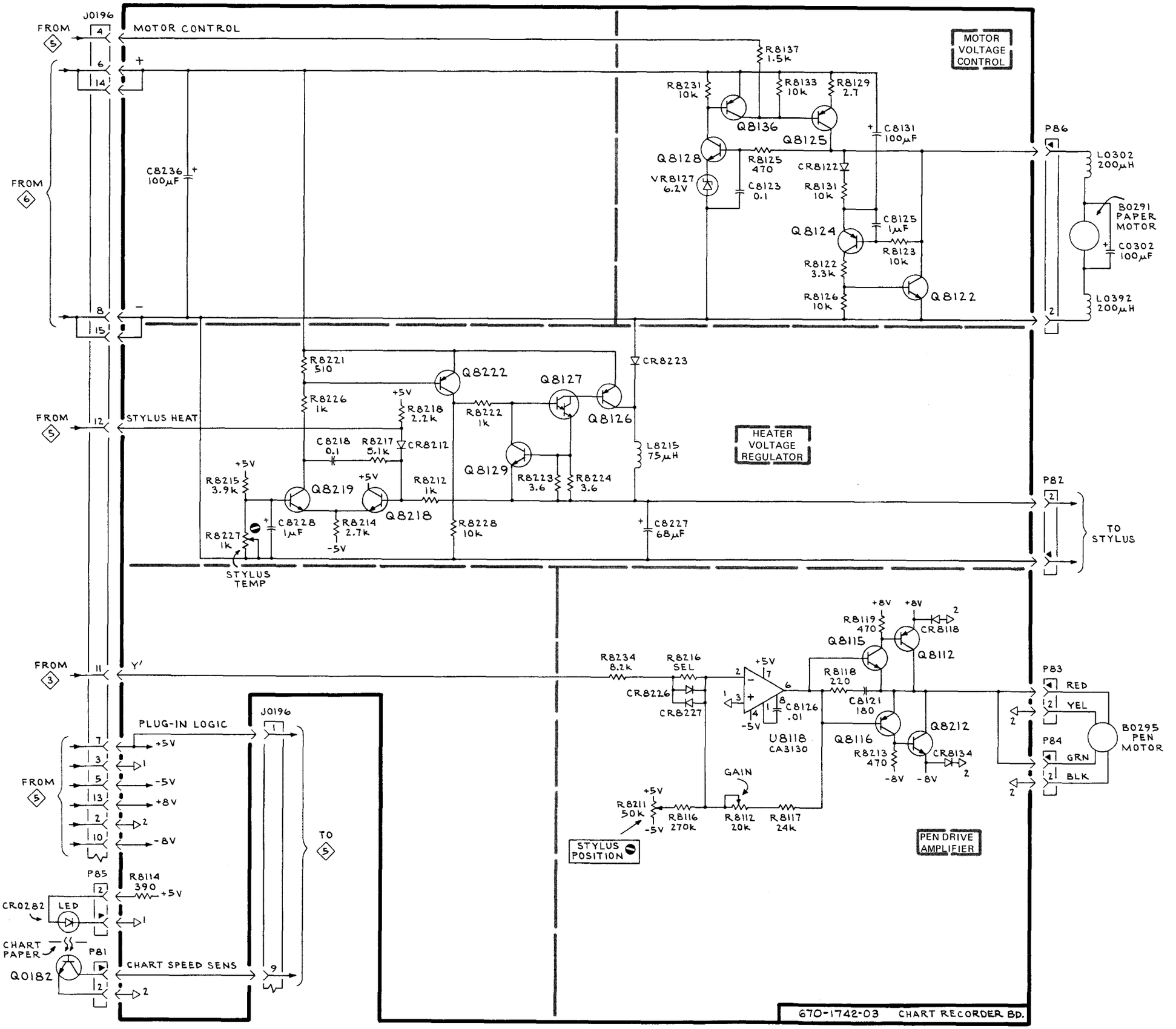


Chart Recorder 670-1742-03 & Below(Rear)



016-0506-02 & BELOW

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CHART RECORDER 2 NLL

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

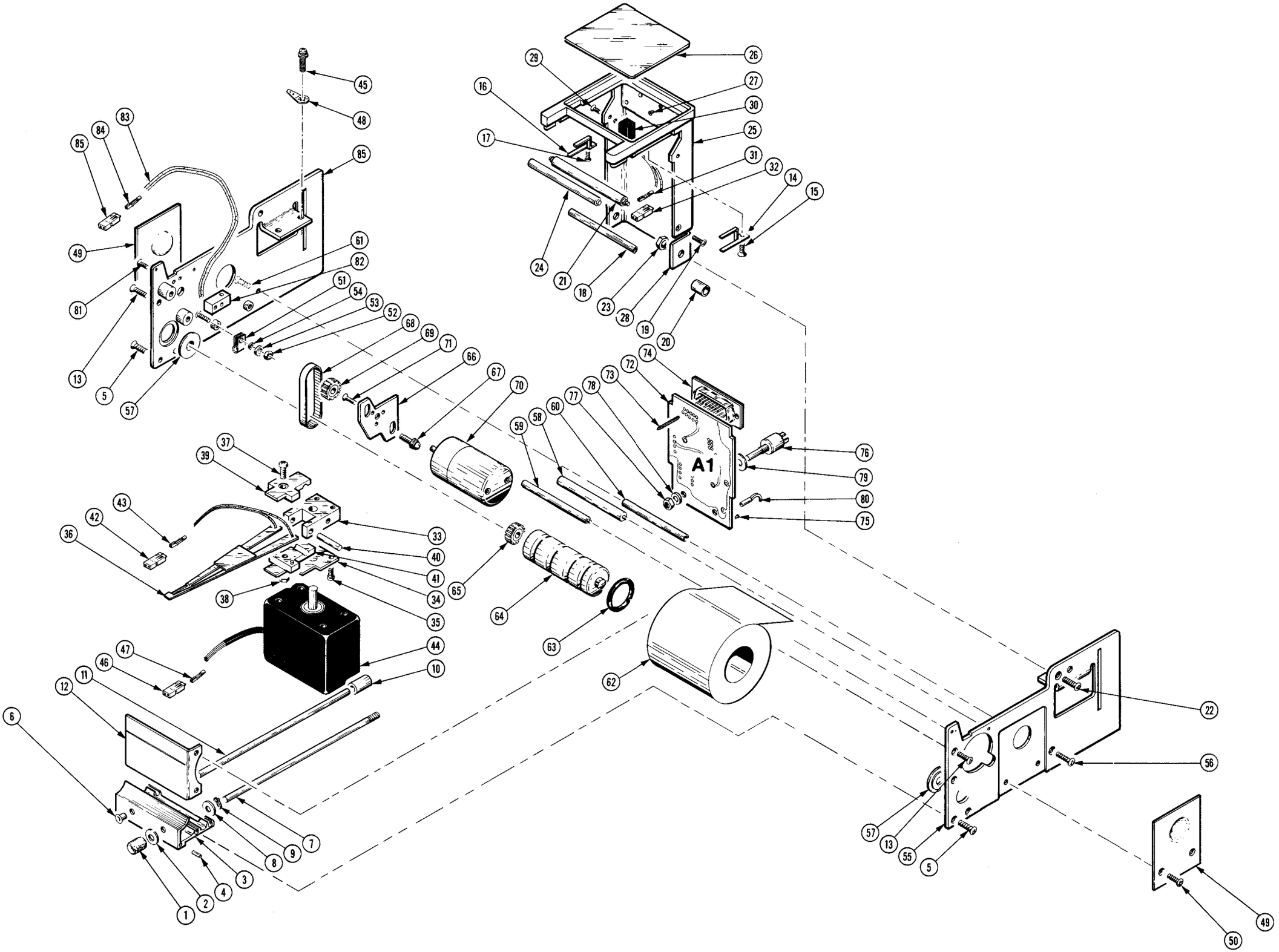
CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000BK	STAUFFER SUPPLY	105 SE TAYLOR	PORTLAND, OR 97214
0000Y	PLASTOCK, INC.	380 CHESTNUT STREET	NORWOOD, NJ 07648
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
12360	ALBANY PRODUCTS CO., DIV. OF PNEUMO DYNAMICS CORPORATION	145 WOODWARD AVENUE	SOUTH NORWALK, CT 06586
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
45722	USM CORP., PARKER-KALON FASTENER DIV.		CAMPBELLSVILLE, KY 42718
56878	STANDARD PRESSED STEEL COMPANY	BENSON EAST	JENKINTOWN, PA 19046
70276	ALLEN MFG. CO.	P. O. DRAWER 570	HARTFORD, CT 06101
71468	ITT CANNON ELECTRIC	666 E. DYER RD.	SANTA ANA, CA 92702
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
76854	OAK INDUSTRIES, INC., SWITCH DIV.	S. MAIN ST.	CRYSTAL LAKE, IL 60014
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83259	PARKER SEAL CO-O-SEAL, DIVISION OF PARKER-HANNIFIN CORP.	10567 JEFFERSON BLVD.	CULVER CITY, CA 90231
83309	ELECTRICAL SPECIALITY CO., SUBSIDIARY OF BELDEN CORP.	213 E. HARRIS AVE. SOUTH	SAN FRANCISCO, CA 94080
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	016-0506-01			1		CHART RECORDER:GENERAL PURPOSE	80009	016-0506-01
	016-0506-02			1		CHART RECORDER:GENERAL PURPOSE	80009	016-0506-02
	016-0506-03			1		CHART RECORDER:GENERAL PURPOSE	80009	016-0506-03
-1	366-1368-00			1		. KNOB:PLUG-IN,SECURING	80009	366-1368-00
	213-0076-00			1		. . SETSCREW:2-56 X 0.125 INCH,HEX.SOC STL	74445	OBD
-2	210-1011-00			1		. WASHER,NONMETAL:0.13 ID X 0.375 " OD,PLSTC	83309	OBD
-3	426-0852-00			1		. FRAME SECT,CAB.:PLUG-IN,SECURING	80009	426-0852-00
	426-0852-01			1		. FRAME SECT,CAB.:PLUG-IN,SECURING	80009	426-0852-01
	----- -----			-		. (BEGAN USAGE ON 016-0506-02)		
-4	214-2201-00			2		. . PIN,SPRING:0.187 L X 0.069 OD,STL CD PL	56878	31-S-062-0187
	----- -----			-		. (BEGAN USEAGE ON 016-0506-02)		
						(ATTACHING PARTS)		
-5	211-0101-00			4		. SCREW,MACHINE:4-40 X 0.25,100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-6	358-0378-00			1		. BUSHING,SLEEVE:0.131 ID X 0.125 L	80009	358-0378-00
-7	384-0824-00			1		. PIN,STR,THD:6.417 INCH LONG	80009	384-0824-00
	384-1349-00			1		. PIN,STR,THD:0.125 DIA X 6.417" LONG	80009	384-1349-00
	----- -----			-		. (BEGAN USEAGE ON 016-0506-03)		
-8	210-0803-00			1		. WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
-9	354-0175-00			1		. RING,RETAINING:TYPE EXT,U/O 0.188 ID SFT	79136	5133-18-MI
-10	376-0029-00			1		. CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00			2		. . SETSCREW:4-40 X 0.094,STL BK OXD,HEX SKT	000BK	OBD
-11	384-1157-00			1		. EXTENSION SHAFT:0.125 OD X 4.44 INCH L,AL	80009	384-1157-00
-12	386-2118-00			1		. PLATE,BACKING:CHART PAPER	80009	386-2118-00
						(ATTACHING PARTS)		
-13	211-0030-00			3		. SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL	83385	OBD
						- - - * - - -		
-14	214-1678-00			1		. SPRING,RLR TNSN:RIGHT	80009	214-1678-00
						(ATTACHING PARTS)		
-15	213-0254-00			1		. SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	OBD
						- - - * - - -		
-16	214-1679-00			1		. SPRING,RLR TNSN:LEFT	80009	214-1679-00
						(ATTACHING PARTS)		
-17	213-0254-00			1		. SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	OBD
						- - - * - - -		
-18	129-0326-00			1		. SPACER,POST:0.125 OD X 2.1 INCH L,AL	80009	129-0326-00
						(ATTACHING PARTS)		
-19	211-0030-00			2		. SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL	83385	OBD
						- - - * - - -		
-20	105-0714-00			2		. STOP,SLIDE:0.25 L X 0.128 ID,SST	80009	105-0714-00
	213-0140-00			2		. . SETSCREW:2-56 X 0.94 INCH,HEX SOC STL	70276	OBD
-21	214-1674-00			1		. RLR,CHART PPR:2.154 INCH LONG,SST,DRIVEN	80009	214-1674-00
	200-1302-01			1		. BEZEL ASSEMBLY:	80009	200-1302-01
	200-1302-03			1		. BEZEL ASSEMBLY:	80009	200-1302-03
	----- -----			-		. (BEGAN USEAGE ON 016-0506-02)		
						(ATTACHING PARTS)		
-22	211-0101-00			2		. SCREW,MACHINE:4-40 X 0.25,100 DEG,FLH STL	83385	OBD
-23	220-0629-00			2		. NUT,SLEEVE:4-40 X 0.312,HEX,BRS	80009	220-0629-00
						- - - * - - -		
	----- -----			-		. BEZEL ASSY INCLUDES:		
-24	214-1663-00			1		. . RLR,CHART PPR:2.179 INCH LONG,SST,MOVING	80009	214-1663-00
-25	200-1302-00			1		. . BEZEL,CHART REC:	80009	200-1302-00
	200-1302-02			1		. . BEZEL,CHART REC:	80009	200-1302-02
	----- -----			-		. . (BEGAN USEAGE ON 016-0506-02)		
-26	331-0298-00			1		. . WINDOW,OBS:2.250 W X 2.30 INCH L,CLEAR	80009	331-0298-00
-27	006-0400-00			4		. . EYELET,METALLIC:0.088 X 0.165,SLIVER PLATED	76854	11198-1
-28	426-0839-01			1		. . FR SECT,CHART:TOP	80009	426-0839-01
	----- -----			1		. TRANSISTOR HOLDER ASSY:(SEE Q0182 REPL)		
						(ATTACHING PARTS)		
-29	213-0254-00			2		. SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	OBD
						- - - * - - -		
	----- -----			-		. TRANSISTOR HOLDER ASSY INCLUDES:		
-30	352-0309-00			1		. . HOLDER,LED:	80009	352-0309-00
-31	131-0707-00			2		. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	47439

Fig & Index No	Tektronix Part No	Serial/Model No Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-32	352-0169-00			1		. . HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-33	214-1681-00			1		. HINGE HALF:STATIONERY	80009	214-1681-00
	213-0205-00			1		. . SETSCREW:4-40 X 0.188,HSS	80009	213-0205-00
-34	214-1680-00			1		. SPRING PIN HNC:	80009	214-1680-00
						(ATTACHING PARTS)		
-35	211-0116-00			2		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
						- - - * - - -		
-36	119-0365-00			1		. STYLUS,CHART RE:W/WIRES	80009	119-0365-00
						(ATTACHING PARTS)		
-37	211-0008-00			1		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-38	210-0406-00			1		. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	12161-50
-39	214-1682-00			1		. HINGE HALF:MOVING UPPER	80009	214-1682-00
-40	214-1749-00			1		. PIN,HINGE:0.75 L X 0.125 OD SST	80009	214-1749-00
-41	214-1682-01			1		. HINGE HALF:MOVING LOWER	80009	214-1682-01
						- - - * - - -		
	----- -----			-		. STYLUS,CHART INCLUDES:		
-42	352-0169-00			1		. . HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-43	131-0708-00			2		. . CONTACT,ELEC:0.48"L,28-32 AWG WIRE	22526	47437
-44	----- -----			1		. ACTR,ELMCH,RTRY:(SEE B0295 REPL)		
						(ATTACHING PARTS)		
-45	211-0601-00			4		. SCR,ASSEM WSHR:6-32 X 0.312,DOUBLE SEMS	83385	OBD
						- - - * - - -		
	----- -----			-		. ACTUATOR INCLUDES:		
-46	352-0169-00			2		. . HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-47	131-0707-00			4		. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	47439
-48	210-0205-00			1		. TERMINAL,LUG:SE #8	86928	5442-7
-49	352-0296-00			2		. HOLDER,PAPER:	80009	352-0296-00
						(ATTACHING PARTS)		
-50	211-0112-00			4		. SCREW,MACHINE:2-56 X 0.375,FLH,100 DEG	83385	OBD
						- - - * - - -		
-51	343-0119-00			1		. CLAMP,LOOP:0.094 INCH DIA	95987	3/32-2
						(ATTACHING PARTS)		
-52	210-0405-00			1		. NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	12157-50
-53	210-0053-00			1		. WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL	83385	OBD
-54	210-0850-00			1		. WASHER,FLAT:0.093 ID X 0.281 INCH OD	12327	OBD
						- - - * - - -		
-55	426-0837-00			1		. FRAME SECTION:LEFT	80009	426-0837-00
	426-0837-01			1		. FR SECT,CHART:LEFT	80009	426-0837-01
	----- -----			-		. (BEGAN USAGE ON 016-0506-02)		
						(ATTACHING PARTS)		
-56	211-0030-00			1		. SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL	83385	OBD
						- - - * - - -		
-57	401-0147-00			2		. BUSHING,PLASTIC:0.730 OD	80009	401-0147-00
-58	214-1662-00			1		. RLR,CHART PPR:0.250 DIA X 2.154 I LONG,STA	80009	214-1662-00
-59	214-1664-00			1		. RLR,CHART PPR:0.125 DIA X 2.154 INCH L	80009	214-1664-00
-60	129-0327-00			1		. SPACER,POST:0.188 OD X 2.024 INCH L,AL	80009	129-0327-00
						(ATTACHING PARTS)		
-61	211-0030-00			1		. SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL	83385	OBD
						- - - * - - -		
-62	006-1658-01			1		. CHART,RCDG,PPR:GRAY PRINT TYP,GRAY	80009	006-1658-01
-63	354-0429-00			4		. RING,RUBBER:0.562 ID X 0.75 OD	80009	354-0429-00
	354-0558-00			1		. PACK,PREFMD:0.549 ID X 0.103 W/RUBBER	83259	2-113-E774-5D
	----- -----			-		. (BEGAN USEAGE ON 016-0506-02)		
-64	214-1675-01			1		. RLR,CHART PPR:DRIVE CORE	80009	214-1675-01
-65	401-0186-02			1		. SPROCKET WHEEL:20 TEETH	80009	401-0186-02
	213-0140-00			1		. . SETSCREW:2-56 X 0.94 INCH,HEX SOC STL	70276	OBD
-66	386-2084-00			1		. PLATE,MOTOR MTG:	80009	386-2084-00
						(ATTACHING PARTS)		
-67	211-0207-00			2		. SCR,ASSEM WSHR:4-40 X 0.312 DOUBLE SEMS	83385	OBD
						- - - * - - -		
-68	214-1709-00			1		. BELT,POS DRIVE:	0000Y	OBD
-69	401-0186-01			1		. SPROCKET WHEEL:20 TEETH	80009	401-0186-01
	213-0048-00			1		. . SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-70	----- -----			1		. MOTOR,DC:(SEE B0291 REPL)		
						(ATTACHING PARTS)		
-71	211-0202-00			3		. SCREW,MACHINE:M1.7,5MM,FLH,SLOT,STL	12360	OBD
						- - - * - - -		

Fig & Index No	Tektronix Part No	Serial/Model No Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-72	----- -----			1		. CKT BOARD ASSY:RECORDER(SEE A1 REPL)		
-73	131-0608-00			12		. . TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-74	131-1164-00			1		. . CONNECTOR,RCPT,:15 PIN CKT CARD MOUNT	71468	DA 15 PH
-75	136-0252-04			15		. . SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	----- -----			-		. (670-1742-03 ONLY)		
	136-0252-04			49		. SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	----- -----			-		. . (BEGAN USAGE ON 670-1742-04)		
	136-0252-04			2		. . SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	----- -----			-		. . (BEGAN USAGE ON 670-1742-05)		
	136-0252-00			2		. . SOCKET,PIN TERM:0.145 INCH LONG	00779	2-330808-7
	----- -----			-		. . (BEGAN USAGE ON 670-1742-04)		
-76	----- -----			1		. . RESISTOR,VAR:(SEE R8211 REPL)		
						(ATTACHING PARTS)		
-77	210-0583-00			1		. . NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-78	210-0940-00			1		. . WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
-79	210-0992-00			1		. . WASHER,FLAT:0.265 ID X 0.01 THK,TEFLON	80009	210-0992-00
						- - - * - - -		
-80	343-0089-00			1		. . CLAMP,LOOP:LARGE	80009	343-0089-00
	----- -----			-		. . (BEGAN USAGE ON 670-1742-04)		
	----- -----			1		. LAMP,LED:W/HOLDER(SEE CR0282 REPL)		
						(ATTACHING PARTS)		
-81	213-0254-00			2		. SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	OBD
						- - - * - - -		
	----- -----			-		. TRANSISTOR ASSY INCLUDES:		
-82	352-0310-00			1		. . RETAINER,XSTR:	08261	OBD
-83	175-0825-00			FT		. . WIRE,ELECTRICAL:2 WIRE RIBBON	80009	175-0825-00
-84	131-0707-00			2		. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	47439
-85	352-0169-00			1		. . HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-86	426-0838-00			1		. FRAME SECT,CAB:RIGHT	80009	426-0838-00
	426-0838-01			1		. FR SECT,CHART:RIGHT	80009	426-0838-01
	----- -----			-		. (BEGAN USAGE ON 016-0506-02)		
	198-2796-01			1		. WIRE SET,ELEC:	80009	198-2796-01



1500-SERIES CHART RECORDER

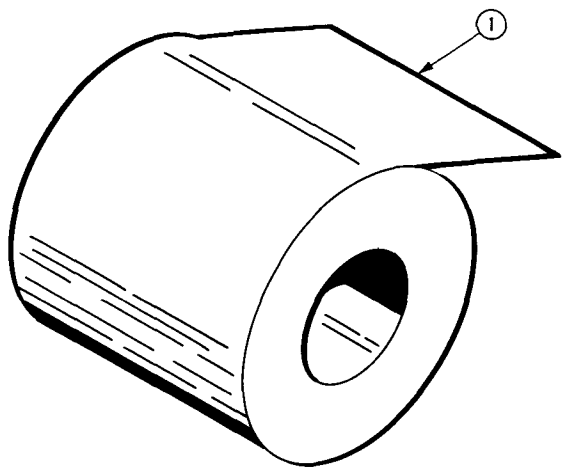


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
	070-2554-00			1		MANUAL,TECH:INSTRUCTION	80009	070-2554-00
-1	006-1658-01			1		CHART,RCDG,PPR:GRAY	80009	006-1658-01

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.

Tektronix
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 8-20-82 Change Reference: M41402 Rev 2

Product: 1500-Series Chart Recorder Manual Part No.: 070-2554-00

DESCRIPTION

Revised 3-15-83

EFF SN B113785 (1502 OPTION 04)

EFF SN B094375 (1503 OPTION 04)

CHANGE TO:

A1	670-1742-06	CKT BOARD ASSY:CHART RECORDER

ADD:

C4016	290-0943-00	CAP.,FXD,ELCTLT:47UF,+50-10%,25V
R1037	307-0103-00	RES.,FXD,CMPSN:2.7 OHM,5%,0.25W
R3031	315-0302-00	RES.,FXD,CMPSN:3K OHM,5%,0.25W
R4023	315-0472-00	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W
RT1039	307-0157-00	RES.,THERMAL:5 OHM,10%,DISC

REMOVE:

C8236	290-0519-00	CAP.,FXD,ELCTLT:100UF,20%,20V
CR8226	152-0075-00	SEMICOND DEVICE:GE,25V,40MA
CR8227	152-0075-00	SEMICOND DEVICE:GE,25V,40MA
R8216	315-0152-00	RES.,FXD,CMPSN:1.5K OHM,5%,0.25W
R8234	315-0822-00	RES.,FXD,CMPSN:8.2K OHM,5%,0.25W
U8110	156-0277-00	MICROCIRCUIT,LI:VOLTAGE REGULATOR

ADD:

A1A1	670-7275-00	CKT BOARD ASSY:CHART RECORDER (MOTOR SPEED CONTROL)
A1A1C2019	283-0191-00	CAP.,FXD,CER DI:0.022UF,20%,50V
A1A1C3026	283-0024-00	CAP.,FXD,CER DI:0.1UF,+80-20%,50V
A1A1CR3021	152-0460-00	SEMICOND DEVICE:SILICON,25V,1MA
A1A1Q1024	151-0302-00	TRANSISTOR:SILICON,NPN
A1A1Q1039	151-0311-01	TRANSISTOR:SILICON,NPN
A1A1R1015	311-1284-00	RES.,VAR,NONWIR:20K OHM,10%,0.5W
A1A1R2014	317-0623-00	RES.,FXD,CMPSN:62K OHM,5%,0.125W
A1A1R2015	317-0134-00	RES.,FXD,CMPSN:130K OHM,5%,0.125W
A1A1R2016	317-0513-00	RES.,FXD,CMPSN:51K OHM,5%,0.125W
A1A1R2024	317-0104-00	RES.,FXD,CMPSN:100K OHM,5%,0.125W
A1A1R2025	307-0114-00	RES.,FXD,CMPSN:6.2 OHM,5%,0.25W

		DESCRIPTION
A1A1R2026	307-0105-00	RES.,FXD,CMPSN:3.9 OHM,5%,0.25W
A1A1R2029	317-0471-00	RES.,FXD,CMPSN:470 OHM,5%,0.125W
A1A1R2035	317-0822-00	RES.,FXD,CMPSN:8.2K OHM,5%,0.125W
A1A1R3015	317-0623-00	RES.,FXD,CMPSN:62K OHM,5%,0.125W
A1A1R3019	317-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.125W
A1A1R3025	317-0473-00	RES.,FXD,CMPSN:47K OHM,5%,0.125W
A1A1U2035	156-0853-00	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,DUAL
A1A1VR3024	152-0195-00	SEMICOND DEVICE:ZENER,0.4W,5.1V,5%