TEK Preliminary
Service Information

Part Number 061-3384-00
Product Group 47

11A71
Amplifier

January 7, 1987

Tektronix®
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Preliminary Service Manual

This package should not in any way be considered a permanent service manual. The information contained in this document is intended solely as an aid to the service person while the permanent service manuals are being completed.

INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc. Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

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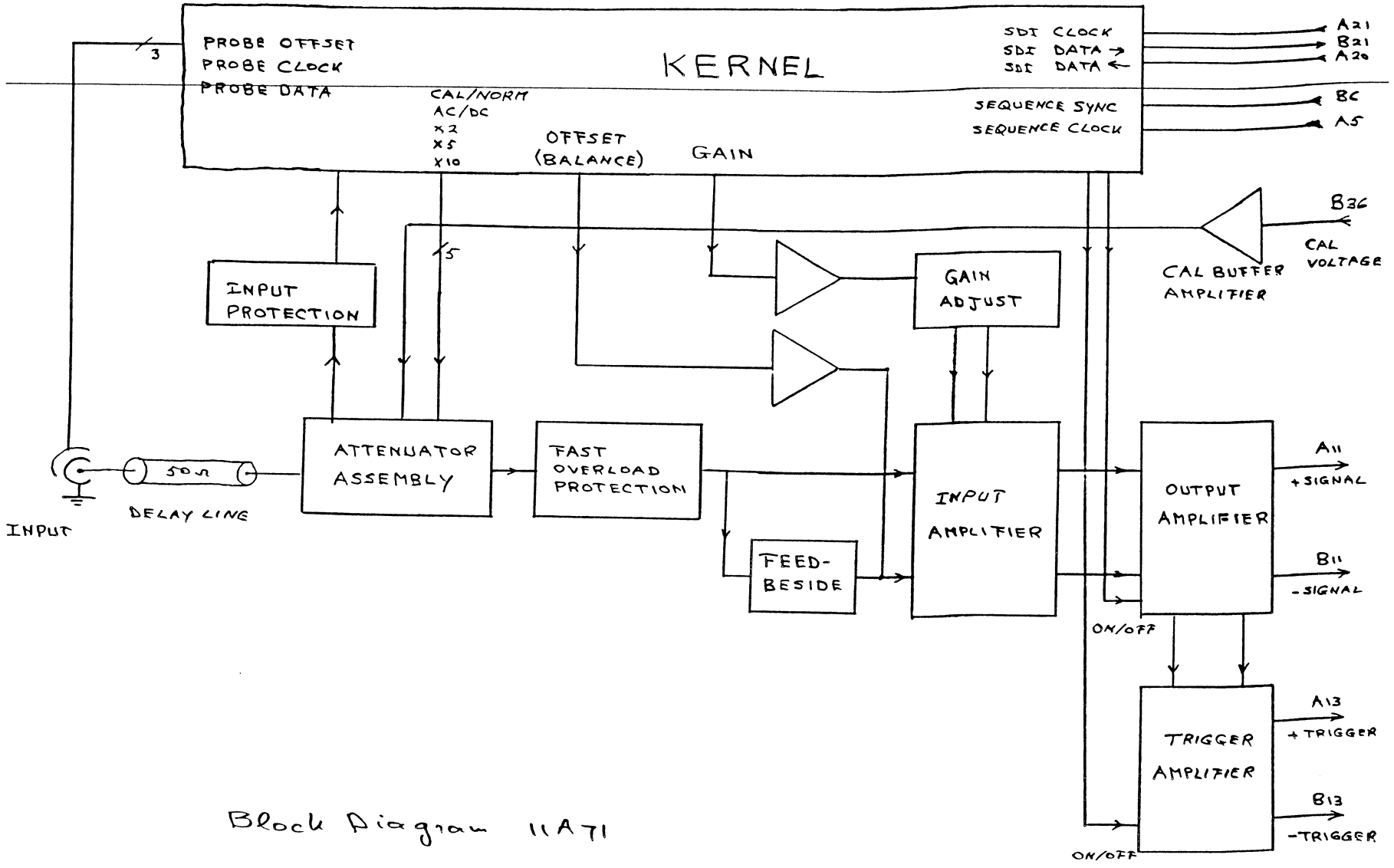

Block Diagram 11A71

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11A71 THEORY OF OPERATION

This section of the manual describes the circuitry used in the 11A71 Amplifier. First we give a block diagram description, using the block diagram shown in Figure 2-1, then we include a more detailed description that explains the relationships of the various parts of each major circuit. Schematic diagrams of all major circuits are included in Section 7, Diagrams and Circuit Board Illustrations. Refer to these schematics when reading the following descriptions for specific electrical values and relationships.

BLOCK DIAGRAM DESCRIPTION

The following discussion is intended to aid in understanding the overall concept of the 11A71 before discussing individual circuits in detail. Figure 2-1 is a block diagram of the 11A71. Each block represents a major circuit in the instrument. Only the basic interconnections between blocks are shown on the block diagram.

From the input bnc connector the input signal passes through the Delay Line and is applied to the Attenuator, which is controlled by five lines from the Kernel. Input coupling can be AC, DC or Off. In AC and DC coupling modes, the input signal is coupled to the Attenuator. In the Off mode, the signal path is open. During self-calibration the coupling is set to Off and a signal from the Calibration Buffer Amplifier is applied to the input.

The Attenuator has X2, X5, and X10 attenuation sections, which are connected in various ways to produce X2, X5, X10, X20, X50, or X100 attenuation.

If the amplitude of the input signal is sufficient to overload the instrument, Input Protection circuitry will activate the Kernel, which will switch the 11A71 to the Off mode.

A Fast-Overload Protection circuit protects the input amplifier from large signals until the Input Protection circuit disconnects the input signal.

The Kernel provides dc balance, dc offset, and gain adjust signals to the Input Amplifier, which accepts the single-ended input and produces a push-pull output for the Output Amplifier. Two outputs come from the Output Amplifier - one for the host mainframe, and one for the Trigger Amplifier, which provides the trigger signal for the mainframe.

On/Off signals from the Kernel control both the Output and Trigger Amplifiers independently.

DETAILED CIRCUIT OPERATION

A detailed description of the operation and relation of the circuits in the 11A71 Amplifier is given here. Complete schematic diagrams are provided in Section 7, Diagrams and Circuit Board Illustrations. In this discussion, the numbers inside the diamonds after headings refer to the schematic diagram that shows the subject circuit.

Delay Line 1

The 11A71 uses a fixed delay line, which consists of a precision length of 50 Ω coaxial cable. This fixed delay line is in series with the signal path; it matches the nominal delay of the 11A71 to that of the other 11A-series plug-in units.

Attenuators 1

The 11A71 attenuator consists of thick-film resistor networks and hermetically sealed DPDT relays. The attenuator also contains a 2.2 µF AC coupling capacitor and a high-frequency-compensation skin-loss network. The attenuator is protected against input signals that exceed 0.5 Watt. Defective attenuator modules are not repairable and should be replaced.

Caution

> When removing or inserting the attenuator module, take care to unbolt the attenuator-mounting bracket from the main circuit board first. The attenuator-mounting bracket, which supports the large AC coupling capacitor, is an integral part of the attenuator. To promote heat dissipation from the relay coils, the attenuator is not covered. Handle the attenuator module carefully.

Each attenuator has five relays. In this discussion, we assume that the #1 relay (Cal/Norm) passes a signal to the #2 relay (AC/DC). From the #2 relay, the signal goes to the #3 relay (X2/X1), then to the #4 relay (X5/X1), and finally to the #5 relay. Each relay function is explained below:

1. Calibrate/Normal (#1 relay)

   With the Cal/Norm relay in the Cal position (relay deenergized), the front panel input signal is disconnected and the attenuator input comes from pin 2 of the attenuator socket on the main

circuit board. With the Cal/Norm relay in the Norm position (relay energized), the front panel input signal is connected to the input of the #2 relay on the attenuator. The signal voltage at pin 2 of the attenuator socket on the main ECB is disconnected from the input of the #2 relay on the attenuator. The Cal/Norm relay applies the accurate calibration voltage signal (VCAL) to the very front end of the 11A71 signal path during Enhanced Accuracy calibration. To optimize calibration accuracy, the calibration signal follows a signal path nearly identical to that of the signal applied at the input connector. The Cal/Norm relay is also used in the Off coupling mode.

2. AC/DC Coupling (#2 relay)

The AC/DC relay inserts an coupling capacitor into the input signal path between the input bnc and the remainder of the attenuator. When the AC/DC relay is set to AC position (energized), the #1 relay is AC coupled to the #3 relay. Alternately, with the AC/DC relay set to DC (deenergized), the #1 relay is DC coupled to the #3 relay. The network of resistors surrounding the AC/DC relay serves to charge the coupling capacitor while Coupling is set to Off, and to discharge the coupling capacitor when the input signal is removed from the input connector.

3. X2/X1 (#3 relay)

With the #3 relay in the X2 position (de-energized), the signal from the #2 relay is attenuated by a factor of 2. With the #3 relay in the X1 position (energized), the signal from the #2 relay is not attenuated.

4. X5/X1 (#4 relay)

With the #4 relay in the X5 position (de-energized), the signal from the #3 relay is attenuated by a factor of 5. When the #4 relay is set to the X1 position (energized), the signal from the #3 relay is not attenuated.

5. X10/X1 (#5 relay)

With the #5 relay in the X10 position (deenergized), the signal from the #4 relay is attenuated by a factor of 10. With the #5 relay in X1 position (energized), the signal from the #4 relay is attenuated and proceeds to the output of the attenuator.

The attenuation factors of the attenuator networks are correct when the output of the attenuators drive a 50 Ω termination (the main amplifier incorporates a 50 Ω termination at its input).

Attenuator States

1. DC
   This is the most-used attenuator state. Here the Cal/Norm relay is set to select the input signal. The AC/DC relay selects DC and the #3, #4, and #5 relays are set for the required attenuation factors. To obtain X1Ø attenuation when 1ØØ mV/division is selected, relays #3 and #4 are set to X2 and X5, respectively.

2. Off
   In the Off mode the #1 relay selects Cal (disconnects the input signal), the #2 relay selects DC (allows precharge of the AC coupling capacitor), and the #3, #4, and #5 relays are deenergized to select maximum attenuation (X1ØØ total attenuation). Without the precharge feature, the 11A71 and the circuit under test might both be subjected to a large voltage transient when switching from Off to AC.

3. AC
   In the AC mode the #1 relay selects Norm (connects the input signal), the #2 relay selects AC, and the #3, #4, and #5 relays are set for the required attenuation factors. To obtain X1Ø attenuation when 1ØØ mV/division is selected, relays #3 and #4 are set to X2 and X5, respectively.

4. Calibration
   During calibration, the #1 relay selects Cal (disconnects the input signal), the #2 relay selects DC, and the #3, #4, and #5 relays turn on and off until calibration is complete.

Calibration Buffer Amplifier

Calibration Buffer Amplifier U22Ø provides unity-gain voltage following of the VCAL signal (B36 at edge connector). To reduce gain errors, the voltage is sensed inside the attenuator. The internal sense line is available at pin 3 of the attenuator. IC U22ØB, Q221, and Q22Ø provide power amplification of the VCAL signal while U22ØA senses the CALSENSE feedback signal. Diodes CR33Ø and CR331 eliminate latchup that could occur because Q22Ø and Q221 are powered by ±5 V supplies. Q22Ø and Q221 are off during normal instrument operation. During calibration K22Ø selects the calibration buffer amplifier, which requires Q22Ø and Q221 to produce up to ±4.Ø V into 5Ø Ω. C331, C32Ø, C23Ø, R231, and R23Ø stabilize the amplifiers. The value of R232 was chosen to be high enough to prevent bleeding the AC coupling precharge signal voltage when the input coupling is changed from Off to AC.

Input Protection

The 11A71 uses two input protection circuits to prevent damage from most common overloads. First, U630 protects the Input Amplifier from high-frequency transients (see Fast Overload Protection under Input Amplifier in this section). Second, the Cal/Norm relay, which is activated by U130, disconnects the Input Attenuator and subsequent circuitry:

1) when input coupling is set to Off; and
2) when a signal capable of damaging the Input Attenuator or U630 is applied to the input connector.

At pin 9 of the attenuator module, the input signal is sampled and attenuated. Integrated circuit U330 performs an approximate rms conversion on the input signal for frequencies up to about 100 MHz. Capacitor C420, at pin 1 of U330 integrates the rms signal. When the voltage across C420 exceeds 2 V pin 16 of U330 goes high, causing the kernel to switch the Cal/Norm relay to the Cal position (input Coupling will be Off). This condition will occur when the 11A71 input signal exceeds 5 Vrms.

An attenuator or resistor network will safely dissipate more than its continuous rating for a short period of time because of its thermal mass. By integrating the rms input voltage, U330 and C420 allow short term input of up to 12.5 W (25 V), an amount the 11A71 can handle safely. Above 25 V the risk of permanent damage to relay contacts becomes significant.

Radio frequencies (cw) above 100 MHz and greater than 0.5 W can cause damage because the sensitivity of U330 is reduced above 100 MHz. (For overload parameters, see Section 3, Specification, in the 11A71 Supplement to the Mainframe User's Reference manual, under Input Characteristics).

The RMS TEST signal is used to self-test U330. With RMS TEST at +1.1 V, U330 "sees" a simulated +11 V overload, as if the 11A71 was overdriven by a +11 Vdc signal. Similarly, with RMS TEST at -1.1 V, the simulated overload would be -11 V.

Relay Driver IC

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Relay Fast Power On (RFPO) 1

The RFP0 circuit controls operating power to U130, the IC that drives the attenuator relays. At power-up, U130 receives operating power when the +15A supply reaches +13.6 V. At power-down, power to U130 is turned off when the output of the +15A supply falls below +12.9 V.

IC U330 detects that both the +15A and +5D power supplies have attained a large enough voltage to guarantee proper attenuator relay state changes. Also, at power-down U330 rapidly shuts off the relay supply current when the +15A supply begins to drop. VR430 sets the +15A "supply up" trip point. Resistors R232 and R330 divide the +15A voltage so it can be compared to the VR430 voltage. The relay power is turned on when +15A = +13.6 V (double the voltage across VR452). The relay power is turned off when +15A = +12.9 V (0.7 + 2(VR452 - 0.7). The difference in the "relay power on" and "relay power off" voltage trip points (0.7 V) ensures that U330 does not oscillate during power-up or power-down.

Positive feedback through C330 to U330 causes U330 to make fast on/off transitions. Capacitor C331 filters digital noise. Diode VR330 lengthens the RESET(L) pulse at power-down. IC U330 drives Q230 through R231. Normally pin 1 of U330 is near zero V, which saturates Q230. When saturated, Q230 furnishes current to U130 through CR229 and L230. Diode CR229 drops 0.7 V to lower the power dissipated in the attenuator relays. Inductor L230 and C230 bypass the relay power to reduce digital noise at the attenuators.

Fuse Check Circuit 1

The Fuse Check Circuit produces +1.18 V for Digital-to-Analog Converter (DAC) U310 when fuses F100, F110, F111, and F112 are intact. In normal operation, the +1.18 V indicates that the probe power supplies are all functioning properly. If any fuse fails, the FUSE CHECK output will change by at least ±1V and the DAC, as directed by the processor, will acquire the new signal level. If the FUSE CHECK signal is not close to +1.18 V, U941 will send an error message to the mainframe display after power-up or after an Enhanced Accuracy calibration is performed. Diodes CR320 and VR320 limit the FUSE CHECK voltage to -0.3 V minimum and +5.1 V maximum.

Fast Overload Protection

The Fast Overload Protection stage protects the input amplifier from possible damage from fast-rise, high-amplitude input signals. Without this protection, such signals could damage U830 before the Input Protection circuitry, diagram 1, could respond and interrupt the input signal.

In normal operation, U630's four diodes are forward-biased. Signals applied to pin 8 pass through U630 to pin 18 with 15% attenuation. Bias resistors in U630 and the four diodes comprise a matched 50 Ω attenuator. The voltage at pin 3 of U630 is regulated by U610 and Q510. Potentiometer R521 (Input I) sets the current in Q630 to equal the current supplied to pin 3 of U630. This maintains 0 V at pins 8 and 18 of U630 when no input signal is present.

Potentiometer R511 (Z In) adjusts the voltage at pins 3 and 13 of U630, thus setting the current in U630. Because current flow determines the dynamic impedance of the four diodes in U630, and because these diodes are in series with the input signal, the impedance at U630 pin 8 also determines the 11A71 input impedance. The Z In control, R521, sets the sum of all currents flowing into U630 pin 8 to equal zero.

Because the dynamic resistance of U630's diodes depends on both temperature and current, current flow in pins 3 and 13 can be varied as a function of temperature to maintain constant diode dynamic impedance at all temperatures. Thermistor RT520 senses the ambient temperature and adjusts the voltage at U630 pin 3 to make U630's operation temperature independent.

Signals over about 1.0 V reverse-bias one of the two left-hand diodes in U630. Positive signals turn off the top-left diode, and negative signals turn off the lower-left diode. When one diode is turned off, maximum current will flow from one of the power supplies through one of the resistors in U630. This current will apply only about 0.9 V to U830's input, which U830 can accept safely.

Feedbeside

"Feedbeside" is a method of compensating for low-frequency imperfections in the frequency response of U830 and U930. Self-heating of the base-emitter junction of some transistors in U830 and U930 causes the gain to increase slightly at low frequencies as compared to midband gain. To correct this, U430 inverts and amplifies a portion of the input signal, then applies its output to four resistor-capacitor (RC) networks. Each of these RC networks has a different time constant. Potentiometers R510, R411, R410, R311, R312, and R310 are adjusted to provide a correction signal, which U400 inverts, amplifies, and applies through R732 to U830. The correction signal is subtracted from the signal entering pin 7 of U830. Proper adjustment of the five compensation controls results in flat frequency response and optimum transient response at the output (pins A11 and B11 on diagram 3). Diode network CR430, CR431, CR432, and CR433 limit the amplitude of the signal to the RC networks to improve overdrive recovery.

Input Amplifier

The Input Amplifier stage provides gain control and amplification of the signal. The single-ended input signal from the Fast Overload Protection stage enters U830 on pin 7, and the correction signal from the Feedbeside network enters U830 at pin 12.

Current flow through R831 and R731 dictates the proportion of signal current that flows in each pair of common-base transistors in U830. The gain of the input amplifier is controlled by the A3A1 Sample-Hold board through R311 and amplifier and level-shifter U120B.

The circuitry in U830 is a cascode amplifier using a Gilbert multiplier. For ease of explanation, assume that equal currents flow in R731 and R831, forward-biasing Q3, Q4, Q5, and Q6, which also conduct equal currents. Assume also that the base of Q2 (in U830) is held at a constant level (in reality, the feedbeside signal is injected here). Transistors Q1 and Q2 act as a phase splitter with the signal at the collector of Q2 in phase with the signal at the base of Q1. If a positive-going signal is applied to U830 pin 7 the emitters of Q3 and Q4 are pulled more negative, which increases their conduction. At the same time, the emitters of Q5 and Q6 go more positive because Q1's increased conduction reduces Q2's conduction. Current in Q5 and Q6 decreases by the amount that Q3's and Q4's conduction increases. Because transistor pairs Q4-Q5 and Q3-Q6 are cross-coupled to pins and 19, respectively, and one transistor in each pair increases its conduction by the same amount that its counterpart decreases conduction, current at pins and 19 stays constant. This is the zero-gain condition for the circuit. (In actual operation the circuit operates near full gain, and zero-gain condition does not occur.)

When the base voltage of Q600A goes positive due to a change in the gain setting, Q600A, Q600B, and U700A increase current flow through R831 and decrease current flow through R731. IC U700A ensures that the total current through R831 and R731 does not vary.

Increased current in R831 causes Q3 and Q6 to conduct more, while Q4 and Q5 conduct less because less current flows in R731. The summation of currents at the collectors of Q3 and Q5 results in a current at U830 pin 19 that is out of phase with the input at U830 pin 17. This phenomenon results because Q3 conducts more out-of-phase signal than Q5 conducts in-phase-signal. Similarly, Q6 conducts more in-phase signal than Q4 conducts of the out-of-phase signal. Such increased conduction of Q3 and Q6, together with decreased conduction of Q4 and Q5, results in a gain increase for U830.

Analog Control Voltage System 2

The Analog Control Voltage System (ACVS) generates dc voltage levels used to set input offset, balance and amplifier gain. The main ACVS components are the seneschal IC (U820), digital-to-analog converter (DAC) U620, and the sample/hold module (A3A1).

Circuitry in U820 drives both the DAC and the sample/hold module. Every 30 µs U620 is driven to one of eight voltage levels stored in U820's memory. Each A3A1 output is updated every 300 µs. The DAC is a two-byte, latched-data unit, which means that the high and low data bytes are loaded separately into the DAC. U820 produces LCLK and UCLK, which together control the latching of the individual high and low data bytes. The upper byte is latched in first by UCLK pulsing low. Then the signal LCLK pulses low, which transfers in the lower byte and tells the DAC that the 12-bit value is valid.

While the DAC is being driven, the sample/hold module is given the address of a selected output using signals ARA0, ARA1, and ARA2; then strobed with the signal MAJSTB(L). The DAC is internally set to produce precisely +5.0 volts maximum and -5.0 volts minimum. Resistors R535 and R523 divide the DAC output to ±1.136 V to create the VDAC signal, which drives the sample/hold module directly. Resistors R532 and R531 level-shift the DAC output and drive ADC U310 to self-test the DAC.

Analog-to-Digital Converter 2

The Analog-to-Digital converter (ADC) is contained in the TLC540 (U310). The TLC540 is a complete eight-bit, switched-capacitor, successive-approximation A/D converter. It has a serial interface to the microprocessor with a 12-channel analog multiplexer that can be used to sample any one of 11 inputs or an internal "selftest" voltage. The sample/hold operates under microprocessor control.

The A/D converter signal lines are described below:

Name	pin#	Description
A0	1	(not used)
A1	2	(not used)
A2	3	Analog input for Fuse check.
A3	4	(not used)
A4	5	Analog input for CH1 Probe data.
A5	6	(not used)
A6	7	(not used)
A7	8	(not used)
A8	9	(not used)
A9	11	Analog input for DAC selftest.
A10	12	Analog input for MAJTST (A3A1 selftest).
A11	--	(internal self-test of A/D = 1/2[(REF+)+(REF-)] voltage).
Address in	17	Serial address input used to select A/D input A0-A11.
Sys clock	19	Runs the A/D conversion hardware.
I/O clock	18	Serial I/O clock input.
CS (L)	15	Enables A/D converter I/O and conversion.
Data out	16	Serial data output.
REF+	14	Positive reference for the A0-A11 inputs.
REF-	13	Negitive reference for the A0-A11 inputs.

The A0-A11 inputs are referenced to the input signal lines REF+ and REF-. The REF+ line is connected to +5A and the REF- line is connected to ground. Therefore, inputs near GND potential will convert to values near the digital value 00 (Hex) and inputs near +5A potential will convert to values near the digital value FF (Hex). A correctly operating A/D converter will give a self-test value of near 80 (Hex) for the A11 internal input shown above.

Battery Backed Up RAM 2

The Random Access Memory (RAM) is contained in the DS1220 battery backed up static RAM (U700). The DS1220 is a 16,384 bit, fully static, nonvolatile memory module organized as 2048 words by eight bits. The nonvolatile memory module has a self-contained lithium energy source and control circuitry that constantly monitors +5D (+5 volt digital supply) for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent garbled data. An unlimited number of write cycles can be executed and no additional support circuitry is required for microprocessor interface. The pins labeled A0-A10 are the address lines, and the pins labeled D0-D7 are the data lines.

Read Mode

The static RAM executes a read cycle when WR(L) is (high) and CS(L) low. The unique address specified by the 11 address inputs (A0-A10) defines which of the 2048 bytes of data is to be accessed. Valid data will be available to the eight data-output drivers within the access time after the last address input signal is stable.

Write Mode

The static RAM is in the write mode when WR(L) and CS(L) are both low) after the address inputs are stable. The latter occurring falling edge of CS(L) or WR(L) will determine the start of the write cycle. which is terminated by the earlier rising edge of CS(L) or WR(L). All address inputs must be kept valid throughout the write cycle.

Data Retention Mode

The nonvolatile RAM module provides full functional capability as long as +5D is greater than 4.5 V, and write-protects at 4.25 V nominal. Data is maintained in the absence of +5D with no additional support circuitry. RAM U801 constantly monitors +5D. Should the supply voltage decay, the RAM will automatically write-protect itself; all RAM inputs become "don't care", and all outputs are high impedance. As +5D falls below approximately 3.0 V, the power-switching circuit connects the lithium energy source to the RAM. During power-up, when +5D rises above approximately 3.0 volts, the power switching circuit connects external +5D to the RAM, and disconnects the lithium energy source. Normal RAM operation can resume after +5D exceeds 4.5 volts.

CPU 2

The CPU (U500) is an 8031 single-chip, eight-bit microcontroller. It contains an on-chip oscillator and clock circuitry, 32 I/O lines, 64 k of address space for external data memory, 64 k of address space for external program memory, two 16-bit timer/counters, a five-source interrupt structure, full-duplex serial port, and a Boolean processor.

Port bit descriptions (I=Input, O=Output, Bi=Bidirectional) and usage.

Bit#	Desc	Usage
P0.0	Bi	Output for the adrs latch & bidirectional data bus
P0.1	Bi	"
P0.2	Bi	"
P0.3	Bi	"
P0.4	Bi	"
P0.5	Bi	"
P0.6	Bi	"
P0.7	Bi	"
P1.0	I	Attenuator checkback data (serially encoded)
P1.1	I	A-D converter data (serially encoded)
P1.2	O	(not used)
P1.3	Bi	Signature Analyzer Clock
P1.4	Bi	Signature Analyzer Start
P1.5	Bi	Signature Analyzer Stop
P1.6	I	A/D converter clock
P1.7	O	Relay disable
P2.0	O	Address bit 8 of the RAM and EPROM
P2.1	O	Address bit 9 of the RAM and EPROM
P2.2	O	Address bit 10 of the RAM and EPROM
P2.3	O	Address bit 11 of the RAM and EPROM
P2.4	O	Address bit used to enable the output latch (U410) and bit 12 of EPROM
P2.5	O	Address bit used to enable RAM U700 and U820 and bit 13 of EPROM
P2.6	O	Address bit used to enable U820
P2.7	O	Address bit used to enable EPROM and U430
P3.0	O	Attenuator shift data (serially encoded) and A/D converter Address In
P3.1	O	Attenuator shift clock
P3.2	I	(not used)
INT	I	(P3.3) Interrupt from seneschal (U820)
P3.4	O	A/D converter enable (U810)
P3.5	I	Sense for jumper J400
WR(L)	O	(P3.6) Write (L)
RD(L)	O	(P3.7) Read (L)

Misc pins on the 8031:

Reset	I	Resets the CPU. all port bits are set high on reset
XTL1	I	Input to the crystal oscillator
XTL2	O	Output from the crystal oscillator
PSEN	O	Program store enable
ALE	O	Address latch enable

Oscillator 2

Microprocessor U500 contains circuitry to drive a 12-MHz ceramic resonator (Y520). All oscillator circuitry is inside U500 except the 20 pF capacitance etched into the circuit board runs to Y520.

Seneschal IC 2

Because U820 has at least four functions, seneschal, which means "steward in charge of a lord's estate." is a fitting name. The seneschal chip is a multi-function integrated circuit that provides a serial communication path to the mainframe, control circuits for an ACVS system with up to 16 analog outputs, and multiplexed output drivers for setting the gain and bandwidth control bits for both plug-in channels.

As is conventional, the schematic shows inputs on the left (except for ALE, Fetch, and INT, which are outputs) and outputs on the right.

Signal descriptions (I=Input, O=Output, Bi=Bidirectional) and usage.

Signal	Pin	Desc	Usage
WR(L)	23	I	Writes data into the Seneschal chip.
INT	22	O	Interrupt to processor (communication from mainframe).
CS	21	I	Allows writes or reads to the Seneschal chip only when high.
PSEN(L)	20	I	The PSEN signal when low, allows CPU execution of instructions stored in RAM (U801)
ALE	18	I	Latches the address inputs on falling edge.
RD(L)	24	I	The RD (read strobe) signal when low, allows the reading of data stored in RAM by the CPU. The RD input also causes the seneschal to send the data specified by the last address it captured with ALE from its AD7-AD0 pins, onto those same AD7-AD0 pins.
AD0	17	Bi	Address input, data input, and data output.
AD1	16	Bi	Address input, data input, and data output.
AD2	15	Bi	Address input, data input, and data output.
AD3	14	Bi	Address input, data input, and data output.
AD4	13	Bi	Address input, data input, and data output.
AD5	12	Bi	Address input, data input, and data output.
AD6	11	Bi	Address input, data input, and data output.
AD7	10	Bi	Address input, data input, and data output.
FETCH(L)	19	O	The FETCH output is the "AND" of RD and PSEN. When FETCH is low, the RAM (U801) can send dat to the data bus if the RAM chip select is enabled.
SCLK	29	I	Sequence clock, positive edge increments the channel switch sequencer.
SYNC	30	I	Sequence sync, high level applied during SCLK high clears the channel switch sequence counter.

Signal	Pin	Desc	Usage
CLK	5,27	I	Serial communications clock input.
M-P	26	I	Mainframe to plugin serial data input.
GS1(L)	6	O	Channel 1 gain/bandwidth setting strobe.
BP0	47	O	Bandwidth bit 0.
BP1	48	O	Bandwidth bit 1.
GP0	49	O	Gain bit 1.
GP1	50	O	Gain bit 1.
GP2	51	O	Gain bit 1.
D0	61	O	DAC data bit 0.
D1	60	O	DAC data bit 1.
D2	59	O	DAC data bit 2.
D3	58	O	DAC data bit 3.
D4	57	O	DAC data bit 4.
D5	56	O	DAC data bit 5.
D6	55	O	DAC data bit 6.
D7	54	O	DAC data bit 7.
MAJSTB(L)	63	O	Sample/Hold module #1 sample strobe.
ARA0	52	O	Sample/Hold module output select address bit 0.
ARA1	53	O	Sample/Hold module output select address bit 1.
ARA2	46	O	Sample/Hold module output select address bit 2.
LCLK(L)	64	O	DAC data latch strobe low byte.
UCLK(L)	65	O	DAC data latch strobe high byte.
TRIGON1	31	O	Channel 1 trigger path on.
DISPON1	28	O	Channel 1 display path on.
DISPINV1	4	O	Channel 1 display path invert.
P-M	7	O	Plugin to mainframe serial data.

Digital-to-Analog Converter 2

The Digital-to-Analog Converter (DAC) is contained in the AD667 (U620). The AD667 is a complete, voltage output, 12-bit DAC including a high-stability, buried-zener voltage reference and double-buffered input latch on a single chip. The converter uses 12 precision high-speed bipolar current-steering switches and a laser-trimmed thin-film resistor network to provide fast settling time and high accuracy.

Latching in data

The DAC latch control lines are described below:

Name	pin#	Description
CS(L)	11	Enables latching inside DAC
A3(L)	12	Enables final latching of 12 bit value to DAC
A2(L)	13	Enables initial latching of upper four MSBs of DAC value
A1(L)	14	Enables initial latching of middle four bits of DAC value
A0(L)	15	Enables initial latching of lowest four LSBs of DAC value

A low on any pin shown above will enable the described function. The latches are transparent when the control signals are low and latch when the control signals go high. In the 11A71 the CS(L) signal is tied low so the DAC is always receptive to having the latches loaded.

Once the 12-bit digital value is loaded, that value is converted to an analog current at the minus input of the on-chip operational amplifier. The op-amp adjusts its output such that the minus input of the op-amp is always at GND potential. In this manner the DAC current is converted to an output voltage that represents the digital input code minus an offset voltage. The offset is generated by the on-chip reference circuit, which is connected so that for a digital code of 0 the total output voltage will be -5 V (at pin 2 and 9) and for a code of 4095 the output will be +5 V. R534 drops a small amount of the reference voltage to help center the output between ±5 V.

Address Buffer Latch 2

Eight-bit transparent latch U600 buffers the address bits from the MPU (U500) to the battery RAM (U700). When U600 pin 1 is high, the latch inputs drive the outputs. When the latch enable input goes low, U600 latches its outputs. The outputs are constantly on because the EN(L) input is wired low.

Output Latches 2

Eight-bit transparent latch U1001 serves as an eight-bit output port from MPU U700. When pin 11 of U1001 is high, the latch inputs drive the outputs. When the latch-enable input goes low, U820 latches its outputs. The outputs are constantly on because the EN(L) input is wired low. IC U1001 is an eight-bit, edge-clocked latch with constantly on outputs. When low, the EN(L) input allows the data inputs to be latched in whenever the CP input goes high.

U520 2

The C and D sections of hex-inverter U520 are wired as a two-input NOR gate and used to address eight-bit output port U410. U520A and U520B serve as output drivers for the probe data lines (from the 11A71 to any attached probe). Because U520 is an open-collector part, the probe can also pull down on the probe data lines to send messages to the 11A71. Diode VR220 protects the probe data lines from static voltages.

Reset Circuit 2

Reset IC U410 disables the CPU while the instrument is powering up or down. The reset circuit keeps the RESET input of microprocessor U500 low unless the output of the +5D supply falls below +4.55 V. At power-up, the pin 2 input of U411 (Rin) holds RESET high. When the +5D supply reaches +4.55 V ±50 mV, U411 will produce a low on RESET after 13 ms. Capacitor C420 sets this delay time. When RESET goes low, the CPU can begin executing stored instructions.

At power-down, when the +5D supply decays to +4.55 V, U410 sets RESET high.

Sample/Hold Assembly 3

This part discusses the Sample/Hold (S/H) assembly as a component in the instrument. The S/H board contains only surface-mounted components; they are coated with insulating material to minimize leakage current. A defective S/H assembly is not repairable and should be replaced.

One-of-eight analog multiplexer U100 periodically updates the voltages on C100 through C115. Inputs A1, B1, and C1 of U100 are the avenue through which U100 receives the address of the selected holding capacitor, while the S/H IN input receives the voltage to be applied to that capacitor. Amplifiers U102 and U103, which have very high impedance and unity gain, are used to buffer the voltages on holding capacitors C100 through C115 while U100 is updating those voltages. The holding capacitors can be charged only when the U100's EN1 input is low.

One-of-eight analog multiplexer U100 periodically updates the voltages on C100 through C115. Inputs A1, B1, and C1 of U100 are the avenue through which U100 receives the address of the selected holding capacitor, while the S/H IN input receives the voltage to be applied to that capacitor. Amplifiers U102 and U103, which have very high impedance and unity gain, are used to buffer the voltages on holding capacitors C100 through C115 while U100 is updating those voltages. The holding capacitors can be charged only when the U100's EN1 input is low.

Analog multiplexer U101 provides a readback path for self-testing analog voltage outputs V1 through V8, which are normally in the range of ±1.15 V. The READ 0, READ 1, and READ 2 lines contain the address of the voltage to be read; the analog readback is the FROUT signal. Readback is possible only when the EN2 line is low.

Coarse and Fine Offsets 3

Coarse and Fine Offset voltages are available for the main amplifier (U830) and any external TEKPROBE accessory.

The S/H module furnishes coarse offset, fine offset, and amplifier dc balance voltages, respectively, at its pin 15, 16, and 19 outputs. These three signals are summed at the inverting input of U120A, which drives U830 at pin 12.

The probe-offset voltage is divided by R210 and R310. Diodes CR111 and CR110 clamp any static voltages introduced at the TEKPROBE connector.

In the 11A71 the amplifier offset and the probe offset are driven by separate outputs. When an active probe with a TEKPROBE connector is used, the probe offset output is driven and the main amplifier receives no offset voltage. When a nonactive probe is used, the offset voltage is applied only to the amplifier input; the probe offset output is not driven.

NOTE

The Performance Verification Procedure is located in the 11A71 User's Reference Supplement (Part No. 070-6288-00).

11A71 Preliminary
Adjustment Procedure

NOTE

This procedure is intended to provide a way to manually set all internal adjustments. Consult the plug-in supplement in the User's Reference manual for more information about advertised specifications and instrument operation. Consult the test equipment manuals for information concerning test equipment setup or interconnection.

A separate procedure is provided in the User's Reference manual plug-in supplement to verify basic instrument operation without checking all features and performance requirements.

Using This Procedure

In this procedure, bold and italicized letters identify menu labels and display messages. Initial capital letters identify connectors, controls, and indicators (e.g., Position) on associated test equipment. Initial capital letters also identify adjustments inside the 11A71 (e.g., Input I).

A heading system is used to readily identify the steps that contain performance check and/or adjustment instructions. For example, if CHECK is the first word in the title of a step, an electrical specification is checked. If ADJUST is the first word in the title, the step contains one or more internal adjustments. If CHECK/ADJUST appears in the title, the step involves electrical specification checks and related adjustments. If EXAMINE is the first word in the step title, the step concerns measurement limits that indicate whether the instrument is operating properly; these limits are not to be interpreted as electrical specifications.

The alphabetical instructions under each step (a, b, c, etc.) may also contain **CHECK, EXAMINE, ADJUST,** or **INTERACTION** as the first word of the instruction. These terms are defined as follows:

ADJUST—describes which adjustment to make and the desired result. We recommend that the adjustment not be made if a previous CHECK or EXAMINE instruction indicates that no adjustment is necessary.

CHECK—indicates that the instruction accomplishes an electrical specification check.

EXAMINE—usually precedes an ADJUST instruction and indicates that the instruction determines whether adjustment is necessary. If no ADJUST instruction appears in the same step, the EXAMINE instruction concerns measurement limits that have no related adjustment. Measurement limits following the word EXAMINE are not to be interpreted as specifications. They are provided as indicators of a properly functioning instrument and to aid in the adjustment process.

INTERACTION—indicates that the adjustment described in the preceding instruction interacts with other circuits. The nature of the interaction is described and reference is made to the step(s) affected.

Power-Up Defaults

At the initial power-up, the 11402 assigns default front-panel settings and operating parameters. In this procedure, those default settings are used unless a change is specifically indicated. Changing any default setting other than those indicated may cause erroneous or unexpected results.

Menu Selections

Although brief instructions are included in the procedure for making menu selections, detailed descriptions of those menus as well as instructions on how to exit menus after selections are made are generally not included. Comprehensive descriptions of menus and instrument features are found in the 11401/11402 User's Reference Manual.

Vertical and Horizontal Settings

In this procedure, instructions are not provided for selecting the required vertical and horizontal settings. Detailed instructions for operating the 11401/11402 display are given in the User's Reference manual. Familiarity with these operating principles is essential to perform the Adjustment procedure.

Plug-in Unit Installation and Removal

The front-panel ON/STANDBY switch should be set to STANDBY before installing or removing plug-in units. After the plug-in unit is installed, the switch may be set back to ON. The instrument will first perform its normal diagnostic and self-test sequence, then restore the front-panel settings in effect at the time of the power-down.

Required Test Equipment

The following equipment is required for the adjustment procedure:

1. **Oscilloscope.** Tektronix 11402 Digitizing Oscilloscope.
2. **Signal Standardizer.** Tektronix 067-0587-02 Signal Standardizer Calibration Fixture with the interface connector modified for 11000-series use.
3. **Calibration Generator.** Tektronix PG 506 Calibration Generator.
4. **Digital Multimeter.** Tektronix DM 501A Digital Multimeter, or Fluke 8842A.
5. **Power Module Mainframe.** Tektronix TM 503 Power Module Mainframe.
6. **Signal Pick-Off.** Tektronix 067-1262-00 Signal Pick-Off Calibration Fixture.
7. **Flexible Extender.** Tektronix 067-1261-00 Flexible Extender Calibration Fixture.
8. **BNC Coaxial Cable.** 50Ω ±1% precision, 36 inches long, Tektronix Part 012-0482-00.
9. **BNC-Banana Adapter.** BNC female to dual banana, Tektronix Part 103-0090-00.
10. **BNC-Peltola Adapter** (2 required). Tektronix Part 131-1315-01.
11. **50-ohm Terminator** (2 required). Tektronix Part 011-0049-01.

Power-Up Sequence

1. Remove the Left side cover from the 11A71 and insert in the Right plug-in compartment.
2. Connect the 11402 to a suitable power source and switch the rear-panel PRINCIPAL POWER SWITCH to ON.
3. Switch the front-panel ON/STANDBY switch to ON.
4. Allow the instrument to warm-up for at least 20 minutes.
5. Press the 11402 ENHANCED ACCURACY button.

A. EXAMINE/ADJUST Input Current and Impedance (A1R521, A1R511)

NOTE

All instrument settings not listed under SETUP CONDITIONS are default upon initialization.

SETUP CONDITIONS

Insert Flexible Extender in 11402 left vertical compartment. Connect 11A71 to Flexible Extender through Signal Pick-Off Calibration Fixture. Remove right side dust cover from 11A71.

Set the following controls in the sequence listed:

11402 Oscilloscope
- Power ..... On
- Menus ..... Utility
- Utility ..... Initialize

11A71
- Display Select ..... CH 1

11402 Oscilloscope
- Vertical Icon ..... selected
- Vertical Size ..... 10 mV

Digital Multimeter
- Range ..... 200 ohms

Connect the Digital Multimeter through the 50-ohm cable and adapter to the 11A71 input connector.

a. **EXAMINE**—the Digital Multimeter for a reading of 50.00 ohms, within the limits of 49.95 and 50.05 ohms.

b. **ADJUST**—Input I adjustment, R521 on the A1 Main circuit board, for 50.00 ohms.

c. Set the Digital Multimeter Range to 200 mV, dc.

d. **EXAMINE**—the Digital Multimeter for a reading of 0.0 mV, within the limits of –0.1 mV and +0.1 mV.

e. **ADJUST**—Z In adjustment, R511 on the A1 Main circuit board, for 0.0 mV.

f. **INTERACTION**—Repeat parts a through e.

g. Remove BNC Coaxial Cable from 11A71 front-panel connector.

B. EXAMINE/ADJUST Trigger Balance and Common Mode (A1R812, A1R813)

NOTE

All instrument settings not listed under SETUP CONDITIONS are default upon initialization

SETUP CONDITIONS

Connect 50-ohm Terminators to the A13 and B13 connectors on the Signal Pick-Off Calibration Fixture, using the BNC-Peltola Adapter.

11402 Oscilloscope
- Power ..... On
- Vertical Icon ..... selected
- Vert Offset knob resolution ..... Fine

Digital Multimeter
- Range ..... 200 mV dc

a. Connect the Digital Multimeter leads to points K and M (located near the rear of the A1 Main circuit board).

b. Set the Vert Offset control knob for a Digital Multimeter readout of approximately zero volts.

c. Connect the Digital Multimeter leads to points D and E (located near the rear of the A1 Main circuit board).

d. **EXAMINE**—the Digital Multimeter for a reading of 0.0 mV, within the limits of –0.5 mV and +0.5 mV.

e. **ADJUST**—Trigger Bal adjustment, R813 on the A1 Main circuit board, for 0.0 mV.

f. Connect the Digital Multimeter leads to either point D or E, and ground (a good ground is located in the tooling hole near point K).

g. **EXAMINE**—the Digital Multimeter for a reading of 0.0 mV, within the limits of –0.5 mV and +0.5 mV.

h. **ADJUST**—Com Mode adjustment, R812 on the A1 Main circuit board, for 0.0 mV.

i. Turn 11402 power switch off. Remove Flexible Extender and Signal Pick-Off Calibration Fixtures from the 11402 oscilloscope.

C. EXAMINE/ADJUST Low-Frequency Transient Response (A1R310, A1R311, A1R312, A1R410, A1R411, A1R510, A1C412)

NOTE

All instrument settings not listed under SETUP CONDITIONS are default upon initialization.

SETUP CONDITIONS

Insert the 11A71 directly into the left plug-in compartment. Insert the 067-0587-02 Signal Standardizer in the center plug-in compartment. Set the following controls in the sequence listed:

11402 Oscilloscope
- Power ..... On
- Menus buttons ..... Utility
- Utility menu ..... Initialize
- Icon ..... Def Wfm
- Vertical Description menu selection:
  - ..... C (center)
  - ..... Enter Desc
- Menus buttons ..... Trigger
- Trigger menu ..... Source Desc
- Main Trigger Source Description menu:
  - ..... C (center)
  - ..... Enter Desc
- Main Size control knob ..... 1 ms/div
- Main Pos control knob ..... –1 ms

Signal Standardizer
- Test ..... +Step Resp
- Rep Rate ..... 100 Hz
- Amplitude ..... 8 div
- Position ..... 1 div from top

11402 Oscilloscope
- Menus buttons ..... Store/Recall
- Store/Recall menu ..... Store Waveform
- Store Waveform menu ..... Wfm 1

Signal Standardizer
- Rep Rate ..... 1 kHz

11402 Oscilloscope
- Main Size control knob ..... 100 µs/div
- Store/Recall menu ..... Store Waveform
- Store Waveform menu ..... Wfm 1

Signal Standardizer
- Rep Rate ..... 10 kHz

11402 Oscilloscope
- Main Size control knob ..... 10 µs/div
- Store/Recall menu ..... Store Waveform
- Store Waveform menu ..... Wfm 1
- Store/Recall menu ..... Remove Wfm 1

a. Remove Signal Standardizer from center plug-in compartment.

b. Press 11A71 CH 1 button.

c. Set 11402 Oscilloscope:

Icon	Vertical
Vert Size control knob	100 mV
Vert Offset control knob	–400 mV
Icon	Horizontal
Main Size control knob	1 ms

d. Connect BNC Coaxial Cable (50Ω precision cable) from the Calibration Generator (PG506) Fast Rise –1 V to 0 V output connector to the 11A71 CH 1 input connector.

e. Set PG 506 Calibration Generator:

Selector switch	Fast Rise
Period	10 ms
Pulse Amplitude	8 div

f. Set 11402 Oscilloscope:

Store/Recall menu	Recall Waveform
Recall Stored Waveform menu	Stored 1

g. **EXAMINE**—the dim waveform (as compared to the bright waveform) for a flat top, within the limits of +1% and –0.5%.

h. **ADJUST**—compensation adjustments, R410 and R411 on the A1 Main circuit board, for a flat top on the dim waveform as compared to the bright waveform.

i. Set PG 506 Calibration Generator Period to 1 ms.

j. Select (touch) the dim waveform.

k. Set the 11402 Oscilloscope Main Size control knob to 100 µs.

l. Select (touch) the dim waveform.

m. Set the 11402 Oscilloscope:

Store/Recall menu	Remove Wfm 2
	Recall Waveform
Recall Stored Waveform menu	Stored 2

n. **EXAMINE**—the dim waveform for minimum long-term spiking and rolloff (flat top).

o. **ADJUST**—compensation adjustment, R311 and R312 on the A1 Main circuit board, for optimum square-wave flat top (dim waveform).

p. Set PG 506 Calibration Generator period to 0.1 ms.

q. Select (touch) the dim waveform.

r. Set 11402 Oscilloscope Main Size control knob to 10 µs.

s. Select (touch) the dim waveform.

t. Set 11402 Oscilloscope:

Store/Recall menu.....Remove Wfm 2
.....Recall Waveform
Recall Stored Waveform menu.....Stored 3

u. **EXAMINE**—the dim waveform for minimum long-term spiking and rolloff (flat top).

v. **ADJUST**—compensation adjustment, R310, R510, and C412 on the A1 Main circuit board, for optimum square-wave flat top (dim waveform).

w. Set 11402 Oscilloscope:

Enhanced Accuracy button.....selected
Menus.....Utility
Utility menu.....Self Test

Troubleshooting with Diagnostics

At power-up, 11000-series instruments perform a series of self-tests to verify correct operation. These tests may be performed individually at any time as part of Extended Diagnostics.

Diagnostic tests are significant aids in troubleshooting digital parts of this instrument. In troubleshooting analog parts of the instrument, diagnostic tests can provide a starting place.

For example, diagnostic routines can exercise and test the following parts of the instrument:

Group I	Group II	Group III
Relay Drvr	ADC Test	ACVS Test
Probecodes	Fuse Test	ExplainCal
Cksm Plug	Protection Test	
Cksm Probe		
Walk Ones		

Ch. 1 Cal	Meas Sys
Probe Gain	CalMeasure
Atten Gain	Cal Sigpath
Gain High	
Gain Low	
Balance	
Coarse Dac	
CC Dumper	

If the attenuator or U830, U910, or U930 is replaced the transient response and thermals should be readjusted. Refer to Part 2 of the service manual for information about calibrating the instrument.

Diagnostics in 11301/11302

Diagnostic tests are accessed through the Utility major menu. To display the Utility major menu, press the UTILITY button on the front panel of the host oscilloscope. The mainframe will then display its Utility menu, with an entry entitled Ext Test. Touch the Ext Test entry, then touch Run to access the Blocks menu. The Blocks menu contains entries for installed plug-in units.

To select a plug-in unit for diagnosis you must make the following three choices:

- Choose the plug-in entry in the Block column;
- Choose which area of the plug-in is to be tested; and
- Choose the test routine to be performed.

If an 11A71 is installed in the Left plug-in compartment, it can be diagnostically tested by using the following steps:

1. Touch the Left 11A71 menu item in the Block column.

2. Touch the AREA entry at the top of the crt.

3. Touch the name of the area you wish to test (entries are Group 1, Group II, Group III, Ch. 1 Cal, and Meas. Sys., as listed previously).

For example, if you want to test the 11A71 A/D Converter, touch Group II; if you want to test Ch. 1 Attenuator Gain, touch Ch. 1 Cal.

4. Touch the ROUTINE entry at the top right of the crt. A list of test routines will be displayed.

5. Touch the name of the desired test.

For example, if you selected Ch. 1 Cal so that you can test Atten Gain, touch the Atten Gain entry in the list at the left side of the crt.

6. To perform the Atten Gain (or other selected) test, touch RUN at the lower right corner of the crt.

The Atten Gain test will be performed and the results will be displayed in the Window, Read, Faults, and Index columns. For example, the Atten Gain test produced these results:

Window		Read	Faults	Index
Ø.98	1.Ø2	1.ØØ		pass

For more detail about Diagnostics refer to the mainframe manual.

Diagnostics in 114Ø1/114Ø2

Diagnostic tests are available through the Utility major menu. To display the Utility major menu, press the UTILITY button on the front panel of the host oscilloscope. The mainframe will then display its Utility major menu, which will contain an Extended Diagnostics entry. Touch the Extended Diagnostics entry to access the extended Diagnostics menu, which contains entries for installed plug-in units.

To select a plug-in unit for diagnosis you must make the following three choices:

- Choose the desired plug-in entry in the BLOCK column;
- Choose which area of the plug-in is to be tested; and
- Choose the test routine to be performed.

If an 11A71 is installed in the Left plug-in compartment, it can be diagnostically tested by using the following steps:

1. Touch the Left 11A71 menu item in the BLOCK column.

2. Touch the (2) AREA entry in the major menu area at the bottom of the crt. The Area selections will be displayed in a vertical column.

3. Touch the Area entry you wish to test (entries are Group I, Group II, Group III, Ch. 1 Cal, and Meas. Sys., as listed previously).

For example, if you want to test the 11A71 A/D Converter, touch Group II; if you want to test Ch. 1 Attenuator Gain, touch Ch. 1 Cal.

4. In the major menu area at the bottom of the crt, touch (3) Routine. A list of test routines will be displayed.

5. Touch the name of the desired test.

For example, if you selected Ch. 1 Cal so that you can test Atten Gain, touch the Atten Gain entry in the list at the left side of the crt.

6. To perform the Atten Gain (or other selected) test, touch (r) Run at the lower right corner of the crt.

The Atten Gain test will be performed and the results will be displayed in the Index, Faults, Min, Max and Actual columns. For example, the Atten Gain test produced these results:

ROUTINE	INDEX	FAULTS	MIN	MAX	ACTUAL
b) Atten Gain	pass		Ø.98Ø	1.Ø2Ø	1.ØØ7

To exit the extended diagnostic mode, touch (E) Exit in the lower right corner of the crt.

For further detail about Diagnostics refer to the mainframe manual.

Attenuators

Diagnostics are only one way of testing attenuators. The attenuators can also be tested by having the oscilloscope mainframe perform an Enhanced Accuracy calibration. To use this method, press the Enhanced Accuracy button on the front panel of the mainframe oscilloscope. Although the Enhanced Accuracy calibration does not comprehensively test the attenuators, if the calibration takes place successfully the attenuators probably function correctly. Enhanced Accuracy calibration does not check the trigger path. If Enhanced Accuracy calibration does not run successfully, individual attenuators may be tested with the Atten Gain tests in the Ch. 1 Cal. group.

Front-Panel Board(s) and LEDs

You can use either of the following two methods to check Front-Panel Board(s) and LEDs:

1. With plug-in unit installed and mainframe turned on, press each plug-in display on/off button.

   If button-presses cause a) the associated CH n light to come on and a trace to appear on the crt, and b) the trace to disappear and the CH n light to go off, the Front-Panel Board and the LEDs are working correctly.

2. Run diagnostic test CCDumper. If the instrument passes the test the Front-Panel Board and LEDs are working correctly.

Latch Testing

The walking-one's test (Group I: Walk Ones) can be run to check the operation of the instrument's latches. A test oscilloscope or logic analyzer must be used to confirm that the latches function correctly.

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.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

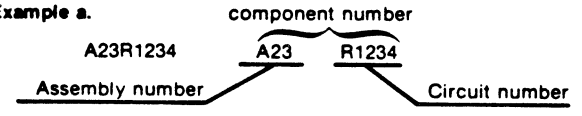
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

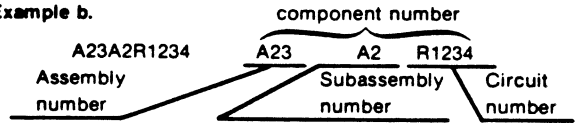
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

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.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00853	SANGAMO WESTON INC SANGAMO CAPACITOR DIV	SANGAMO RD P O BOX 128	PICKENS SC 29671
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
02735	RCA CORP SOLID STATE DIVISION	ROUTE 202	SOMERVILLE NJ 08876
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05828	GENERAL INSTRUMENT CORP GOVERNMENT SYSTEMS DIV	600 W JOHN ST	HICKSVILLE NY 11802
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV	464 ELLIS ST	MOUNTAIN VIEW CA 94042
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
14193	CAL-R INC	1601 OLYMPIC BLVD	SANTA MONICA CA 90404
14552	MICRO/SEMICONDUCTOR CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704
15238	ITT SEMICONDUCTORS A DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP	500 BROADWAY P O BOX 168	LAWRENCE MA 01841
15636	ELEC-TROL INC	26477 N GOLDEN VALLEY RD	SAUGUS CA 91350
19613	MINNESOTA MINING AND MFG CO TEXTOOL PRODUCTS DEPT ELECTRONIC PRODUCT DIV	1410 E PIONEER DR	IRVING TX 75061
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
24355	ANALOG DEVICES INC	RT 1 INDUSTRIAL PK P O BOX 280	NORWOOD MA 02062
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
34649	INTEL CORP	3065 BOWERS AVE	SANTA CLARA CA 95051
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	640 PAGE MILL RD	PALO ALTO CA 94304
51406	MURATA ERIE NORTH AMERICA INC GEORGIA OPERATIONS	1148 FRANKLIN RD SE	MARIETTA GA 30067
54473	MATSUSHITA ELECTRIC CORP OF AMERICA	ONE PANASONIC WAY	SECAUCUS NJ 07094
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
75042	TRW INC TRW ELECTRONIC COMPONENTS IRC FIXED RESISTORS PHILADELPHIA DIV	401 N BROAD ST	PHILADELPHIA PA 19108
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES IL 60016
76493	BELL INDUSTRIES INC MILLER J W DIV	19070 REYES AVE P O BOX 5825	COMPTON CA 90224
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
91293	JOHANSON MFG CO	P O BOX 329	BOONTON NJ 07005
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
TK1356	MURATA/ERIE N AMERICA CORP	645 W 11TH AVE	ERIE PA 16512
TK1450	TOKYO COSMOS ELECTRIC CO LTD	2-268 SOBUDAI ZAMA	KANAGAWA 228 JAPAN

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-9735-00			CIRCUIT BD ASSY:MAIN	80009	670-9735-00
A2	670-9336-00			CIRCUIT BD ASSY:FRONT PANEL	80009	670-9336-00
A3	670-9747-00			CIRCUIT BD ASSY:KERNEL	80009	670-9747-00
A1	670-9735-00			CIRCUIT BD ASSY:MAIN	80009	670-9735-00
A1A1	----- -----			CIRCUIT BOARD:HIGH FREQUENCY (NOT REPLACEABLE)		
A1C220	281-0791-00			CAP,FXD,CER DI:270PF,10%,100V	04222	MA101C271KAA
A1C230	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A1C231	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A1C240	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A1C241	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A1C310	283-0100-00			CAP,FXD,CER DI:0.0047UF,10%,200V	04222	SR306A472KAA
A1C320	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1C330	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A1C331	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1C400	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A1C410	283-0249-00			CAP,FXD,CER DI:0.068PF,10%,50V	04222	SR305C683KAA
A1C411	283-0268-00			CAP,FXD,CER DI:0.015UF,20%,50V	04222	3439-050C-153K
A1C412	281-0265-00			CAP,VAR,CER DI:5.2-30PF,100V	TK1356	TZ03R300FR169
A1C420	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C421	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C440	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A1C500	281-0783-00			CAP,FXD,CER DI:0.1 UF 20%,100V	04222	MA401C104MAA
A1C510	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	00853	D151F891G0
A1C511	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C630	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A1C640	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A1C710	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C711	283-0177-05			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAATR
A1C810	281-0783-00			CAP,FXD,CER DI:0.1 UF 20%,100V	04222	MA401C104MAA
A1C811	283-0326-00			CAP,FXD,CER DI:0.082UF,10%,50V	51406	RPE111X7R823K50V
A1C821	283-0408-00			CAP,FXD,CER DI:0.68UF,+100-0%,12V	91293	120S41Y684PP2S
A1C823	283-0249-00			CAP,FXD,CER DI:0.068PF,10%,50V	04222	SR305C683KAA
A1C835	283-0249-00			CAP,FXD,CER DI:0.068PF,10%,50V	04222	SR305C683KAA
A1C928	283-0408-00			CAP,FXD,CER DI:0.68UF,+100-0%,12V	91293	120S41Y684PP2S
A1C930	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1C940	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1C1000	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C1001	290-0943-01			CAP,FXD,ELCTLT:47UF,20%,25V	55680	ULB1E470MPAANA1T
A1C1010	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1C1020	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A1CR120	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR121	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR130	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR330	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR331	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR430	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR431	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR432	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR433	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR500	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR610	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR640	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR700	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1CR800	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1F100	159-0253-00			FUSE,CARTRIDGE:0.250A,125V,FAST,SUBMIN	75915	251.250 T & R T1
A1F110	159-0235-00			FUSE,WIRE LEAD:0.75A,125V,FAST	80009	159-0235-00
A1F111	159-0235-00			FUSE,WIRE LEAD:0.75A,125V,FAST	80009	159-0235-00
A1F112	159-0253-00			FUSE,CARTRIDGE:0.250A,125V,FAST,SUBMIN	75915	251.250 T & R T1
A1J120	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 20)	22526	48283-036
A1K220	148-0086-00			RELAY,REED:FORM C,100MA,100VDC,150 OHM	15636	R8149-1
A1L230	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1L240	108-1354-00			COIL,RF:FXD,3.3UH,10%	80009	108-1354-00
A1L720	108-0538-00			COIL,RF:FIXED,2.7UH	76493	JWM#87059
A1L810	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1L900	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1L922	108-0413-00			COIL,RF:FIXED,0.4UH	80009	108-0413-00
A1L927	108-0413-00			COIL,RF:FIXED,0.4UH	80009	108-0413-00
A1L1009	108-0436-00			COIL,RF:FIXED,240NH	80009	108-0436-00
A1L1010	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1L1019	108-0436-00			COIL,RF:FIXED,240NH	80009	108-0436-00
A1L1030	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1L1110	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A1LR823	108-0924-02			COIL,RF:FIXED,1.7UH	80009	108-0924-02
A1LR825	108-0271-00			COIL,RF:FIXED,235NH	80009	108-0271-00
A1LR833	108-0271-00			COIL,RF:FIXED,235NH	80009	108-0271-00
A1LR835	108-0924-02			COIL,RF:FIXED,1.7UH	80009	108-0924-02
A1P130	131-3798-00			CONN,RCPT,ELEC:7 POSITION,0.1 SPACING	80009	131-3798-00
A1P1010	131-3908-00			TERM SET,PIN:2 X 8,0.025 SQ,0.1 CENTERS	80009	131390800
A1Q220	151-0622-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8956(MPSM51A)
A1Q221	151-0710-00			TRANSISTOR:NPN,SI,TO-92 PLUS	04713	MPSM01A
A1Q510	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
A1Q600	151-0261-00			TRANSISTOR:PNP,SI,TO-77	04713	SD441
A1Q630	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q710	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
A1Q740	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
A1Q800	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q810	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q840	151-0192-05			TRANSISTOR:NPN,SI,TO=92	04713	ORDER BY DESCR
A1Q841	151-0192-05			TRANSISTOR:NPN,SI,TO=92	04713	ORDER BY DESCR
A1Q900	151-0192-05			TRANSISTOR:NPN,SI,TO=92	04713	ORDER BY DESCR
A1Q901	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q940	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q941	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1Q1000	151-0192-05			TRANSISTOR:NPN,SI,TO=92	04713	ORDER BY DESCR
A1Q1030	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
A1R100	322-3430-00			RES,FXD,FILM:294K OHM,1%,0.2M,TC=TO	80009	322-3430-00
A1R110	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 100K
A1R111	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 100K
A1R210	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 100K
A1R211	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 100K
A1R220	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 1K00
A1R230	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 1K00
A1R231	322-3072-00			RES,FXD,FILM:54.9 OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 54E9
A1R232	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 10K0
A1R240	322-3072-00			RES,FXD,FILM:54.9 OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 54E9
A1R241	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 499E
A1R310	311-2235-00			RES,VAR,NONWM:TRMR,10K OHM,20%,0.5M LINEAR	TK1450	GFO6UT 10 K
A1R311	311-2233-00			RES,VAR,NONWM:TRMR,3.0K OHM,20%,0.5M LINEAR	TK1450	GFO6UT3K
A1R312	311-2236-00			RES,VAR,NONWM:TRMR,20K OHM,20%,0.5M LINEAR	TK1450	GFO6UT 20K
A1R320	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CRB20 FXE 10K0
A1R321	322-3314-00			RES,FXD,FILM:18.2K OHM,1%,0.2M,TC=TO	80009	322-3314-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R322	313-1473-00			RES,FXD,FILM:47K OHM,5%,0.2W	57668	TR2OJE 47K
A1R323	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 2KOO
A1R324	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 10KO
A1R325	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 10KO
A1R400	322-3320-00			RES,FXD,FILM:21K OHM,1%,0.2W,TC=TO	80009	322-3320-00
A1R401	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 2KOO
A1R402	322-3400-00			RES,FXD,FILM:143K OHM,1%,0.2W,TC=TO	80009	322-3400-00
A1R410	311-2238-00			RES,VAR,NONWW:TRMR,50K OHM,20%,0.5W LINEAR	TK1450	GFO6UT 50 K
A1R411	311-2239-00			RES,VAR,NONWW:TRMR,100K OHM,20%,0.5W LINEAR	TK1450	GFO6UT 100K
A1R420	313-1822-00			RES,FXD,FILM:8.2K,OHM,5%,0.2W	57668	TR2OJE 08K2
A1R421	313-1823-00			RES,FXD,FILM:82K OHM,5%,0.2W	57668	TR2OJE 82K
A1R422	313-1303-00			RES,FXD,FILM:30K OHM,5%,0.2W	57668	TR2OJE 30K
A1R423	313-1204-00			RES,FXD,FILM:200K,5%,0.2W	57668	TR2OJE 200K
A1R424	313-1392-00			RES,FXD,FILMN:3.9K OHM,5%,0.2W	57668	TR2OJE 03K9
A1R425	313-1473-00			RES,FXD,FILM:47K OHM,5%,0.2W	57668	TR2OJE 47K
A1R426	322-3260-00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 4K99
A1R430	321-0190-00			RES,FXD,FILM:931 OHM,1%,0.125W,TC=T2	19701	5043ED931ROF
A1R500	323-0310-00			RES,FXD,FILM:16.5K OHM,1%,0.5W,TC=TO	75042	CECTO-1652F
A1R510	311-2235-00			RES,VAR,NONWW:TRMR,10K OHM,20%,0.5W LINEAR	TK1450	GFO6UT 10 K
A1R511	311-2234-00			RES,VAR,NONWW:TRMR,5K OHM,20%,0.5W	TK1450	GFO6UT 5K
A1R520	313-1202-00			RES,FXD,FILM:2K OHM,5%,0.2W	57668	TR2OJEO2KO
A1R521	311-2229-00			RES,VAR,NONWW:TRMR,250 OHM,20%,0.5W LINEAR	TK1450	GFO6UT 250
A1R522	321-1289-07			RES,FXD,FILM:10.1K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K10B
A1R530	322-3260-00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 4K99
A1R531	313-1512-00			RES,FXD,CMPSN:5.1K OHM,5%,0.2W	57668	TR2OJE 5K1
A1R532	313-1102-00			RES,FXD,FILM:1K OHM,5%,0.2W	57668	TR2OJEO1KO
A1R540	313-1151-00			RES,FXD,FILM:150 OHM,5%,0.2W	57668	TR2OJE150E
A1R541	313-1303-00			RES,FXD,FILM:30K OHM,5%,0.2W	57668	TR2OJE 30K
A1R542	321-0289-06			RES,FXD,FILM:10.0K OHM,0.25%,0.125W,TC=T9	19701	5033RE10K00C
A1R600	321-0612-03			RES,FXD,FILM:500 OHM,0.25%,0.125W,TC=T2	19701	5033RC500ROC
A1R601	321-0289-03			RES,FXD,FILM:10.0K OHM,0.25%,0.125W,TC=T2	07716	CEAC10001C
A1R602	321-0289-03			RES,FXD,FILM:10.0K OHM,0.25%,0.125W,TC=T2	07716	CEAC10001C
A1R610	322-3428-00			RES,FXD,FILM:280K OHM,1%,0.2W,TC=TO	80009	322-3428-00
A1R611	322-3223-00			RES,FXD,FILM:2.05K OHM,1%,0.2W,TC=TO	80009	322-3223-00
A1R612	322-3162-00			RES,FXD,FILM:475 OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 475E
A1R613	322-3223-00			RES,FXD,FILM:2.05K OHM,1%,0.2W,TC=TO	80009	322-3223-00
A1R614	313-1151-00			RES,FXD,FILM:150 OHM,5%,0.2W	57668	TR2OJE150E
A1R615	313-1682-00			RES,FXD,FILM:6.8K OHM,5%,0.2W	57668	TR2OJE O6K8
A1R616	313-1102-00			RES,FXD,FILM:1K OHM,5%,0.2W	57668	TR2OJEO1KO
A1R617	322-3206-00			RES,FXD,FILM:1.37K OHM,1%,0.2W,TC=TO	80009	322-3206-00
A1R620	322-3315-00			RES,FXD,FILM:18.7K OHM,1%,0.2W,TC=TO	80009	322-3315-00
A1R621	313-1200-00			RES,FXD,FILM:20 OHM,5%,0.2W	57668	TR2OJE2OE
A1R622	308-0541-00			RES,FXD,MM:1K OHM,0.1%,3W,TC=2OPPM	91637	RS2B-B10000B
A1R630	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2W	57668	TR2OJE100E
A1R700	313-1120-00			RES,FXD,FILM:12 OHM,5%,0.2W	57668	TR2OJE12E0
A1R710	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2W	57668	TR2OJE100E
A1R711	322-3108-00			RES,FXD,FILM:130 OHM,1%,0.2W,TC=TO	80009	322-3108-00
A1R712	322-0139-00			RES,FXD,FILM:274 OHM,1%,0.25W,TC=TO	91637	MFF1421G274ROF
A1R720	323-0133-00			RES,FXD,FILM:237 OHM,1%,0.5W,TC=TO	75042	CECTO-2370F
A1R723	313-1682-00			RES,FXD,FILM:6.8K OHM,5%,0.2W	57668	TR2OJE O6K8
A1R725	313-1821-00			RES,FXD,FILM:820 OHM,5%,0.2W	57668	TR2OJE 820E
A1R730	301-0201-00			RES,FXD,FILM:200 OHM,5%,0.5W	19701	5053CX200ROJ
A1R731	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2W	80009	313-1510-00
A1R732	313-1151-00			RES,FXD,FILM:150 OHM,5%,0.2W	57668	TR2OJE150E
A1R733	322-3179-00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=TO	80009	322-3179-00
A1R740	322-3202-00			RES,FXD,FILM:1.24K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 1K24
A1R741	322-3202-00			RES,FXD,FILM:1.24K OHM,1%,0.2W,TC=TO	57668	CRB2O FXE 1K24
A1R742	308-0541-00			RES,FXD,MM:1K OHM,0.1%,3W,TC=2OPPM	91637	RS2B-B10000B
A1R800	322-3296-00			RES,FXD,FILM:11.8K OHM,1%,0.2W,TC=TO	80009	322-3296-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R801	322-3204-00			RES,FXD,FILM:1.3K OHM,1%,0.2M,TC=T0	80009	322-3204-00
A1R802	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 10K0
A1R803	322-3363-00			RES,FXD,FILM:59K OHM,1%,0.2M,TC=T0	80009	322-3363-00
A1R804	322-3281-00			RES,FXD,FILM:8.25K OHM,1%,0.2M,TC=T0	80009	322-3281-00
A1R805	322-3295-00			RES,FXD,FILM:11.5K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 11K5
A1R810	313-1131-00			RES,FXD,FILM:130 OHM,5%,0.26	57668	TR20JT68 130E
A1R811	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 499E
A1R812	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A1R813	311-2226-00			RES,VAR,NONWW:TRMR,50 OHM,20%,0.5M	TK1450	GF06UT 50 OHM
A1R814	301-0302-00			RES,FXD,FILM:3K OHM,5%,0.5M	19701	5053CX3K000J
A1R820	323-0116-00			RES,FXD,FILM:158 OHM,1%,0.5M,TC=T0	19701	5053RD158R0F
A1R830	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R831	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R840	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 249E
A1R841	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 249E
A1R842	322-3219-00			RES,FXD,FILM:1.87K,OHM,1%,0.2M,TC=T0	80009	322-3219-00
A1R843	322-3262-00			RES,FXD,FILM:5.23K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 5K23
A1R900	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 249E
A1R901	322-3202-00			RES,FXD,FILM:1.24K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 1K24
A1R902	322-3262-00			RES,FXD,FILM:5.23K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 5K23
A1R903	322-3219-00			RES,FXD,FILM:1.87K,OHM,1%,0.2M,TC=T0	80009	322-3219-00
A1R904	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 3K01
A1R905	322-3203-00			RES,FXD,FILM:1.27K OHM,1%,0.2M,TC=T0	80009	322-3203-00
A1R906	322-3171-00			RES,FXD,FILM:590 OHM,1%,0.2M,TC=T0	80009	322-3171-00
A1R907	313-1332-00			RES,FXD,FILM:3.3K OHM,5%,0.2M	57668	TR20JE 03K3
A1R910	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R911	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R912	317-0121-00			RES,FXD,CMPSN:120 OHM,5%,0.125M	01121	BB1215
A1R913	317-0121-00			RES,FXD,CMPSN:120 OHM,5%,0.125M	01121	BB1215
A1R914	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R915	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R925	321-0183-00			RES,FXD,FILM:787 OHM,1%,0.125M,TC=T0	07716	CEAD787R0F
A1R930	322-3203-00			RES,FXD,FILM:1.27K OHM,1%,0.2M,TC=T0	80009	322-3203-00
A1R931	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R932	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A1R933	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A1R940	313-1332-00			RES,FXD,FILM:3.3K OHM,5%,0.2M	57668	TR20JE 03K3
A1R941	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 3K01
A1R942	322-3171-00			RES,FXD,FILM:590 OHM,1%,0.2M,TC=T0	80009	322-3171-00
A1R1000	322-3202-00			RES,FXD,FILM:1.24K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 1K24
A1R1001	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 249E
A1R1009	323-0184-00			RES,FXD,FILM:806 OHM,1%,0.5M,TC=T0	24546	NA65D806F
A1R1010	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1011	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1019	323-0184-00			RES,FXD,FILM:806 OHM,1%,0.5M,TC=T0	24546	NA65D806F
A1R1027	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1029	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1030	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1031	321-1296-03			RES,FXD,FILM:12.0K OHM,0.25%,0.125M,TC=T2	07716	CEAC12001C
A1R1032	313-1510-00			RES,FXD,FILM:51 OHM,5%,0.2M	80009	313-1510-00
A1R1040	322-3286-00			RES,FXD,FILM:9.31K OHM,1%,0.2M,TC=T0	57668	CRB20 FXE 9K31
A1R1041	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2M,TC=T0	80009	322-3126-00
A1R1042	322-3280-00			RES,FXD,FILM:8.06K OHM,1%,0.2M,TC=T0	80009	322-3280-00
A1R1130	313-1103-00			RES,FXD,FILM:10K OHM,5%,0.2M	57668	TR20JE10K0
A1RT520	307-0642-00			RES,THERMAL:10K OHM,5%,25 DEG C	01295	TG1/8 103J
A1RT725	307-0477-00			RES,THERMAL:1K OHM,10%,6MW/DEG C	14193	2J21
A1RT820	307-0126-00			RES,THERMAL:100 OHM,10%,NTC	14193	2D21-101-D
A1RT1030	307-0250-00			RES,THERMAL:390 OHM,10%,0.125M	01295	TG1/8 391K
A1TP100	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036

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A1TP110	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A1TP111	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A1TP112	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A1U220	156-1191-00			MICROCKT,LINEAR:DUAL BI-FET OPNL AMPL	01295	TL072ACP
A1U330	155-0076-00			MICROCKT,LINEAR:INPUT PROTECTION	80009	155-0076-00
A1U400	156-1156-00			MICROCKT,LINEAR:OPERATIONAL AMPLIFIER	27014	LF356N
A1U430	156-1156-00			MICROCKT,LINEAR:OPERATIONAL AMPLIFIER	27014	LF356N
A1U530	156-0067-00			MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
A1U610	156-0067-00			MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
A1U630	155-0180-00			MICROCKT,LINEAR:FAST INPUT PROTECTION	80009	155-0180-00
A1U700	156-0158-04			MICROCKT,LINEAR:DUAL OPNL AMPL	01295	N99320JG
A1U800	156-0067-00			MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
A1U830	155-0181-00			MICROCKT,LINEAR:INPUT AMPLIFIER	80009	155-0181-00
A1U910	155-0175-00			MICROCKT,LINEAR:TRIGGER AMPLIFIER	80009	155-0175-00
A1U930	155-0175-00			MICROCKT,LINEAR:TRIGGER AMPLIFIER	80009	155-0175-00
A1U1040	156-0158-04			MICROCKT,LINEAR:DUAL OPNL AMPL	01295	N99320JG
A1VR810	152-0304-00			SEMICOND DVC,DI:ZEN,SI,20V,5%,0.4W,DO-7	15238	Z5411
A1VR921	153-0069-00			SEMICOND DVC SE:1N4742A FAMILY,MATCHED PAIR	80009	153-0069-00
A1VR928	153-0069-00			SEMICOND DVC SE:1N4742A FAMILY,MATCHED PAIR	80009	153-0069-00
A2	670-9336-00			CIRCUIT BD ASSY:FRONT PANEL	80009	670-9336-00
A3	670-9747-00			CIRCUIT BD ASSY:KERNEL	80009	670-9747-00
A3A1	670-8986-00			CIRCUIT BD ASSY:SAMPLE/HOLD	80009	670-8986-00
A3C120	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C210	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C211	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C230	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C310	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C330	281-0791-00			CAP,FXD,CER DI:270PF,10%,100V	04222	MA101C271KAA
A3C331	281-0791-00			CAP,FXD,CER DI:270PF,10%,100V	04222	MA101C271KAA
A3C411	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C420	290-0778-00			CAP,FXD,ELCTLT:1UF,+50 -10%,50V,NPLZD	54473	ECE-A50N1
A3C520	281-0895-00			CAP,FXD,CER DI:6.8PF,100MVDC	04222	MA101A6R8DAA
A3C530	281-0895-00			CAP,FXD,CER DI:6.8PF,100MVDC	04222	MA101A6R8DAA
A3C600	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C621	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C630	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C700	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C701	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C730	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A3C900	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305SC474MAA
A3C930	290-1157-00			CAP,FXD,ELCTLT:220UF,20%,25DVC	80009	290-1157-00
A3CR110	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR111	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR229	152-0066-00			SEMICOND DVC,DI:RECT,SI,400V,1A,DO-41	05828	GP10G-020
A3CR230	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR320	152-0322-00			SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
A3CR710	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR720	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR900	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR901	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR910	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR911	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR912	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR913	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR920	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A3CR921	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)

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A3J100	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 6)	22526	48283-036
A3J110	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 20)	22526	48283-036
A3J400	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 3)	22526	48283-036
A3J410	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 3)	22526	48283-036
A3J930	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 6)	22526	48283-036
A3L230	108-1354-00			COIL,RF:FXD,3.3UH,10%	80009	108-1354-00
A3L920	108-1315-00			COIL,RF:FXD,440NH,+/-10%	80009	108-1315-00
A3Q230	151-0622-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8956(MPSM51A)
A3R100	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R110	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R210	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2M,TC=TO	57668	CR820 FXE 499E
A3R211	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R212	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R213	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 15K0
A3R214	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 20K0
A3R215	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 20K0
A3R220	322-3218-00			RES,FXD,FILM:1.82K OHM,1%.0.2M,TC=TO	80009	322-3218-00
A3R221	322-3255-00			RES,FXD,FILM:4.42K OHM,1%,0.2M,TC=TO	80009	322-3255-00
A3R222	313-1561-00			RES,FXD,FILM:560 OHM,5%,0.2M	57668	TR20JE 560E
A3R223	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R230	322-3220-00			RES,FXD,FILM:1.91K OHM,1%,0.2M,TC=TO	80009	322-3220-00
A3R231	322-3220-00			RES,FXD,FILM:1.91K OHM,1%,0.2M,TC=TO	80009	322-3220-00
A3R232	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 100K
A3R310	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R311	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R330	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 100K
A3R331	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R332	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R410	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R411	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 10K0
A3R530	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R531	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 20K0
A3R532	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 20K0
A3R533	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 1K00
A3R534	322-3039-00			RES,FXD,FILM:24.9 OHM,1%,0.2M,TC=TO	57668	CR820 FXE 24E9
A3R535	322-3244-00			RES,FXD,FILM:3.4K OHM,1%,0.2M,TC=TO	57668	CR820 FXE 3K40
A3R720	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A3R900	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A3R910	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A3R911	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A3R920	313-1101-00			RES,FXD,FILM:100 OHM,5%,0.2M	57668	TR20JE100E
A3TP130	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP500	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP501	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP502	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP510	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP511	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP610	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP720	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP900	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP910	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP911	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP912	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
A3TP920	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U120	156-0158-04			MICROCKT,LINEAR:DUAL OPNL AMPL	01295	N99320JG
A3U130	156-2669-00			MICROCKT,INTFC:RELAY DRVR,8 OUTPUT SERIAL INPUT W/LATCHES	80009	156-2669-00
A3U310	156-2455-00			MICROCKT,LINEAR:8 BIT A/D PERIPHERALS W/ SERIAL CONTROL & 11 INPUTS,SCRN	01295	TLC541IN3
A3U330	156-1225-00			MICROCKT,LINEAR:DUAL COMPARATOR	01295	LM393P
A3U410	156-1065-01			MICROCKT,DGTL:OCTAL D TYPE TRANS LATCHES	04713	SN74LS373 ND/JD
A3U411	156-2396-00			MICROCKT,DGTL:RESET GENERATOR,5V SUPPLY	01295	TL7705 ACP
A3U430	156-2370-00			MICROCKT,DGTL:CMOS,QUAD 2 TO 1 SELECTOR/ MULTIPLEXER	02735	QHCT257EX98
A3U500	156-1684-01			MICROCKT,DGTL:MICROCOMPUTER,8 BIT	34649	P8031AH
A3U520	156-0724-02			MICROCKT,DGTL:HEX INV W/OC OUT,SCRN,	01295	SN74LS05NP3
A3U600	156-1065-01			MICROCKT,DGTL:OCTAL D TYPE TRANS LATCHES	04713	SN74LS373 ND/JD
A3U610	156-0386-02			MICROCKT,DGTL:TRIPLE 3-INP NAND GATE	07263	74LS10PCQR
A3U620	156-2459-00			MICROCKT,LINEAR:12 BIT D TO A CONVERTER	24355	AD667JN/+
A3U700	156-2671-00			MICROCKT,DGTL:CMOS,2048 X 8 SRAM MDL W/ INTEGRAL BATTERY DS1220,24	80009	156-2671-00
A3U800	160-4065-00			MICROCKT,DGTL:HMOS,16384 X 8 EPROM,PRGM	80009	160-4065-00
A3U820	156-2625-00			MICROCKT,DGTL:NMOS,CUSTOM,SENESCHAL	80009	156-2625-00
A3VR220	152-0175-00			SEMICOND DVC,DI:ZEN,SI,5.6V,5%,0.4W,DO-7	14552	TD3810976
A3VR320	152-0195-00			SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
A3VR330	152-0175-00			SEMICOND DVC,DI:ZEN,SI,5.6V,5%,0.4W,DO-7	14552	TD3810976
A3VR430	152-0647-00			SEMICOND DVC,DI:ZENER,SI,6.8V,5%,400MW,DO-7	04713	SZG35014K3RL
A3VR431	152-0175-00			SEMICOND DVC,DI:ZEN,SI,5.6V,5%,0.4W,DO-7	14552	TD3810976
A3X500	136-0757-00			SKT,PL-IN ELEK:MICROCIRCUIT,40 DIP	09922	DILB40P-108
A3X800	136-0755-00			SKT,PL-IN ELEK:MICROCIRCUIT,28 DIP	09922	DILB28P-108
A3X820	136-0813-00			SKT,PL-IN ELEK:CHIP CARRIER,68 CONTACTS	19613	268-5400-00-1102
A3Y520	119-2395-00			RESONATOR,CER:12MHZ,CMOS,5%	80009	119-2395-00

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.

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.

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
	••••END ATTACHING PARTS••••
	Detail Part of Assembly and/or Component
	Attaching parts for Detail Part
	••••END ATTACHING PARTS••••
	Parts of Detail Part
	Attaching parts for Parts of Detail Part
	••••END ATTACHING PARTS••••

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.

Attaching parts must be purchased separately, unless otherwise specified.

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

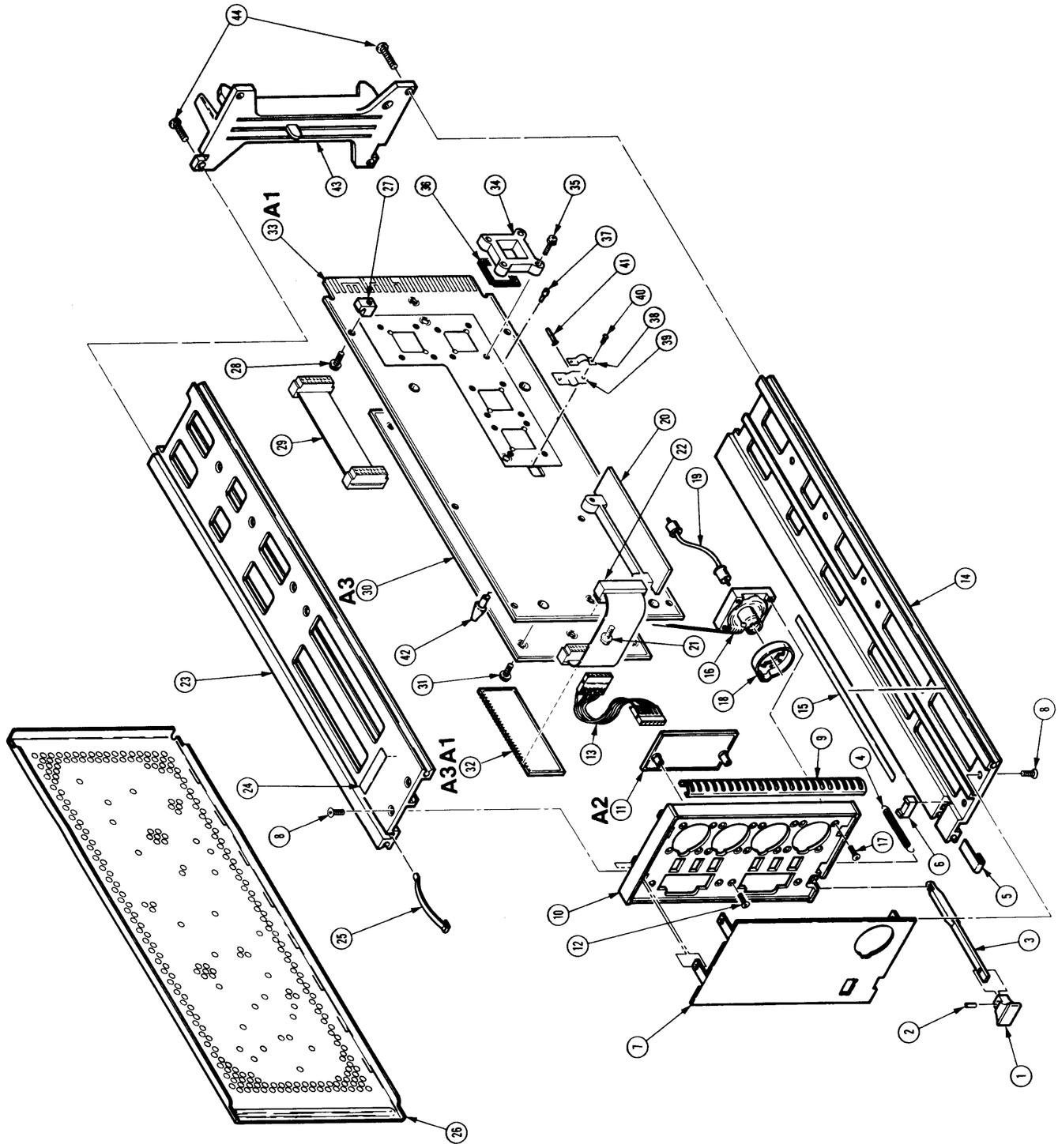
CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	P O BOX 3608	HARRISBURG PA 17105
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 60477
07707	USM CORP SUB OF EMHART INDUSTRIES INC USM FASTENER DIV	510 RIVER RD	SHELTON CT 06484
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
22599	AMERACE CORP ESNA DIV	15201 BURBANK BLVD SUITE C	VAN NUYS CA 91411
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	366-1058-00			1	KNOB:GRAY,0.625 X 0.255 X 0.485	80009	366-1058-00
					(ATTACHING PARTS)		
-2	214-1095-00			1	PIN,SPRING:0.187 L X 0.094 OD,STL,CD PL	22599	52-022-094-0187
					(END ATTACHING PARTS)		
-3	105-0076-04			1	RELEASE BAR,LCH:PLUG-IN UNIT	80009	105-0076-04
-4	214-1280-00			1	SPRING,HLCPS:0.14 OD X 1.126 L,TWIST LOOP	80009	214-1280-00
-5	214-1054-00			1	SPRING,FLAT:0.825 X 0.322,SST	80009	214-1054-00
-6	105-0075-00			1	BOLT,LATCH:	80009	105-0075-00
-7	333-3409-00			1	PANEL,FRONT:	80009	333-3409-00
					(ATTACHING PARTS)		
-8	211-0392-00			4	SCREW,MACHINE:4-40 X 0.25,FLH,82 DEG,STL	80009	211-0392-00
					(END ATTACHING PARTS)		
-9	348-0235-00			2	SHLD GSKT,ELEK:FINGER TYPE,4.734 L	92101	ORDER BY DESCR
-10	386-5219-00			1	SUBPANEL,FRONT:	80009	386-5219-00
-11	----- -----			1	CIRCUIT BD ASSY:FRONT PANEL		
					(SEE A2 REPL)		
					(ATTACHING PARTS)		
-12	211-0398-00			2	SCREW,MACHINE:2-56 X 0.312,FLH,82 DEG,STL	80009	211-0398-00
					(END ATTACHING PARTS)		
-13	174-0159-00			1	CA ASSY,SP,ELEC:6,26 AWG,3.0 L,RIBBON	80009	174-0159-00
-14	426-2061-00			1	FR SECT,PLUG-IN:LOWER,ALUMINUM	80009	426-2061-00
-15	334-3540-00			1	MARKER,IDENT:MARKED WARNING	80009	334-3540-00
-16	131-3589-00			1	CONN ASSY,ELEC:FRONT PNL	80009	131-3589-00
					(ATTACHING PARTS)		
-17	211-0398-00			4	SCREW,MACHINE:2-56 X 0.312,FLH,82 DEG,STL	80009	211-0398-00
					(END ATTACHING PARTS)		
-18	354-0654-00			1	RING,CONN ALIGN:BNC	80009	354-0654-00
-19	174-0205-00			1	CABLE ASSY,RF:50 OHM COAX,3.5 L	80009	174-0205-00
	174-0665-00			1	CABLE ASSY,RF:50 OHM COAX,13.3 L	80009	174-0665-00
	343-0549-00			1	STRAP,TIEDOWN,E:0.091 W X 4.0 L,ZYTEL	06383	PLT1M
-20	119-2397-00			1	ATTENUATOR:5 STAGE PROGRAMMABLE	80009	119-2397-00
					(ATTACHING PARTS)		
-21	211-0304-00			2	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T9 TORX	01536	ORDER BY DESCR
					(END ATTACHING PARTS)		
-22	174-0559-00			1	CA ASSY,SP,ELEC:20,28 AWG,2.25 L,RIBBON	80009	174-0559-00
-23	426-2060-00			1	FR SECT,PLUG-IN:UPPER,ALUMINUMN	80009	426-2060-00
-24	334-3438-00			1	MARKER,IDENT:MARKED TURN OFF POWER	80009	334-3438-00
-25	214-1061-00			1	CONTACT,ELEC:GROUNDING,CU BE	80009	214-1061-00
-26	337-1064-12			2	SHIELD,ELEC:SIDE FOR PLUG-IN UNIT	80009	337-1064-12
-27	220-0022-00			6	NUT BLOCK:0.4 X 0.25 X 0.33,4-40 THRU,NI	80009	220-0022-00
					(ATTACHING PARTS)		
-28	211-0304-00			6	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T9 TORX	01536	ORDER BY DESCR
					(END ATTACHING PARTS)		
-29	174-0560-00			1	CA ASSY,SP,ELEC:16,28 AWG,2.75 L,RIBBON	80009	174-0560-00
-30	----- -----			1	CIRCUIT BD ASSY:KERNEL		
					(SEE A3 REPL)		
					(ATTACHING PARTS)		
-31	211-0304-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T9 TORX	01536	ORDER BY DESCR
					(END ATTACHING PARTS)		
					KERNAL BOARD ASSEMBLY INCLUDES:		
-32	----- -----			1	.CIRCUIT BD ASSY:SAMPLE/HOLD		
					.(SEE A3A1 REPL)		
-33	----- -----			1	CIRCUIT BD ASSY:MAIN		
					(SEE A1 REPL)		
-34	426-1351-00			4	.FRAME,MICROCKT:1.75 CM	80009	426-1351-00
					. (ATTACHING PARTS)		
-35	211-0391-00			16	.SCREW,MACHINE:2-56 X 0.437,P4,STL CD PL	80009	211-0391-00
					. (END ATTACHING PARTS)		
-36	131-1967-00			4	.CONT SET,ELEC:MICROCKT,1.75 CM,RUBBER	80009	131-1967-00
-37	136-0252-07			21	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-38	131-2032-00			1	.CONTACT,ELEC:SINGLE,TOP,CU BE	80009	131-2032-00
-39	131-2033-00			1	.CONTACT,ELEC:SINGLE,BOTTOM,CU BE	80009	131-2033-00
					. (ATTACHING PARTS)		
-40	210-0702-00			2	.EYELET,METALLIC:0.047 OD X 0.125 L	07707	S-6127
					. (END ATTACHING PARTS)		
-41	136-0252-00			1	.SOCKET,PIN TERM:U/W 0.019 DIA PINS	00779	2-330808-7
-42	386-1557-00			1	.SPACER,CKT BD:0.29 H,ACETAL	80009	386-1557-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-43	386-5296-00			1	PANEL,REAR: (ATTACHING PARTS)	80009	386-5296-00
-44	213-0904-00			4	SCREW,TPG,TR:6-32 X 0.5,PNH,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
					STANDARD ACCESSORIES		
	070-6288-00			1	MANUAL,TECH:USERS REFERENCE,11A71	80009	070-6288-00
					OPTIONAL ACCESSORIES		
	070-6289-00			1	MANUAL,TECH:SERVICE,11A71	80009	070-6289-00

FIG. 1 EXPLODED VIEW



11A71

RELAY DRIVE FROM P110-15 ②
P120 15
VCAL CAL VOLTAGE
CAL GND
B36
B35
R320 10k
C220 270
U220A TL72
C331 270
CR330
CR331
U220B TL72
R220 1k
Q221
Q220
+5v
-5v
C320 .001
R231 45.9
C230 0.1
R230 1k
+5A
CR120
K220
-15v
CR130
CR121
+15v
R232 100k
P240
2
0.1
ATTENUATOR ASSEMBLY
CAL NORM
P130 4
PROBE DATA
+15P
+5P
-5P
-15P
PROBE OFFSET FROM P120-3 ③
PROBE CLOCK FROM U410-9, THRU J120-9 ②
PARTIAL A1 MAIN BOARD
* FRONT PANEL PROBE CONNECTOR
J115
VERTICAL INPUT SIGNAL
J230
500k
2.2μF
DC
AC
5k
500k
66.8
16.7
16.7
X2
X1
75.4
120.7
75.4
X5
X1
61.6
249
61.6
X10
X1
J400
J530
VERT SIG TO U630-8 ③
P120 7
PROBE DATA TO U310-5 THRU P110-7 ②
F100 0.25A
F110 0.75A
F111 0.75A
F112 0.25A
+15P
+5P
-5P
-15P
+15v
-5v
-15v
R110 100k
R111 100k
R100 249k
R211 100k
R210 100k
12
FUSE CHECK TO U310-3 THRU P110-12 ②
U330 M94
C420 47μF
+5A
R325 10k
13
OVERLOAD SENSE TO U430-14 THRU P110-13 ②
AVE
VIN
DET
REF
C330 0.1
9
P240
L240 3.3μH
C241 0.1
16
12
7
5
20
X10
X1
X5
X1
X2
X1
CAL
NORM
DC
AC
4
6
11
15
19
CR126
CR125
CR124
CR123
CR122
RMS TEST FROM P120-5 ③
R241 499
C240 .01
R240 54.9
P110
PROBE DATA
-15P
-5P
VERTICAL INPUT SIG
PROBE OFFSET
+15P
+5P
PROBE CLOCK
* PROBE CONNECTOR
RELAY DISABLE FROM U500-8
ATTEN SHIFT CLOCK FROM U500-11
RELAY CONTROL FROM U500-3
ATTEN SHIFT DATA FROM U500-10
FROM ②
U130 UNC5810A
CLK
OE
STB
SIN
SOUT
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
P110 P120
CAL/NORM
AC/DC
X10
X5
X2
ATTEN CHECKBACK DATA TO U500-1 ②
+15v
VR430 6.8V
R332 10k
R331 10k
VR330 5.6v
+5D
C330 270
R232 100k
R330 100k
R231 1.91k
C331 270
U330 LM393N
RESET FROM U410-5 ②
+18V
R230 1.91k
Q230
CR229
CR230
L230 3.3μH
C230 0.1
FAST-ON POWER
U130 UNC5810A
PARTIAL A3 KERNEL BOARD

IC TYPE	+5A	-5A	+5D	+15V	-15V	⏚D	⏚A
5810A			6				5
393N				8		4,5,6	
TL72				8	4		
M94	2	4					6,7,8,9, 10,11,12, 14,15

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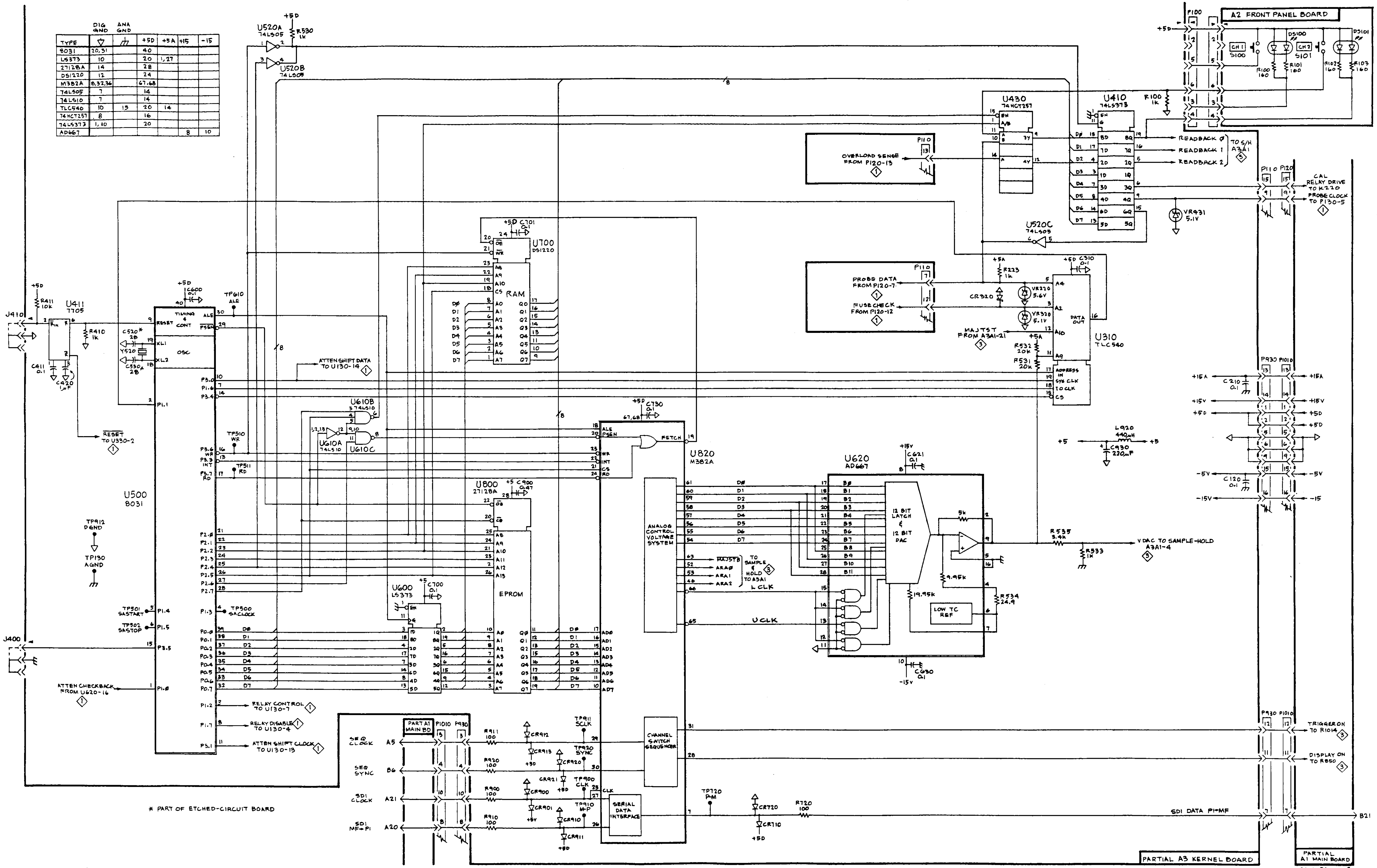
ATTENUATOR ①

TYPE	DIG GND	ANA GND	+5D	+5A	+15	-15
8031	20,31		40			
LS373	10		20	1,27		
27128A	14		28			
DS1220	12		24			
M382A	8,32,36		67,68			
74LS05	7		14			
74LS10	7		14			
TLC540	10	13	20	14		
74HCT257	8		16			
74LS373	1, 10		20			
AD667					8	10



A2 FRONT PANEL BOARD
U500 8031
U411 7705
U520A 74LS05
U520B 74LS05
U520C 74LS05
U610A 74LS10
U610B 74LS10
U610C
U700 DS1220
RAM
U800 27128A
EPROM
U600 LS373
U820 M382A
ANALOG CONTROL VOLTAGE SYSTEM
CHANNEL SWITCH SEQUENCER
SERIAL DATA INTERFACE
U620 AD667
12 BIT LATCH & 12 BIT DAC
LOW TC REF
U430 74HCT257
U410 74LS373
U310 TLC540
OVERLOAD SENSE FROM P120-13
PROBE DATA FROM P120-7
FUSE CHECK FROM P120-12
READBACK Ø
READBACK 1
READBACK 2
TO S/H A3A1
CAL RELAY DRIVE TO K220
PROBE CLOCK TO P130-5
V DAC TO SAMPLE-HOLD A3A1-4
ATTEN SHIFT DATA TO U130-14
RESET TO U330-2
ATTEN CHECKBACK FROM U620-16
RELAY CONTROL TO U130-7
RELAY DISABLE TO U130-4
ATTEN SHIFT CLOCK TO U130-13
TRIGGER ON TO R1014
DISPLAY ON TO R850
SDI DATA PI→MF
PART A1 MAIN BD
PARTIAL A3 KERNEL BOARD
PARTIAL A1 MAIN BOARD
* PART OF ETCHED-CIRCUIT BOARD

11A71

KERNEL ②

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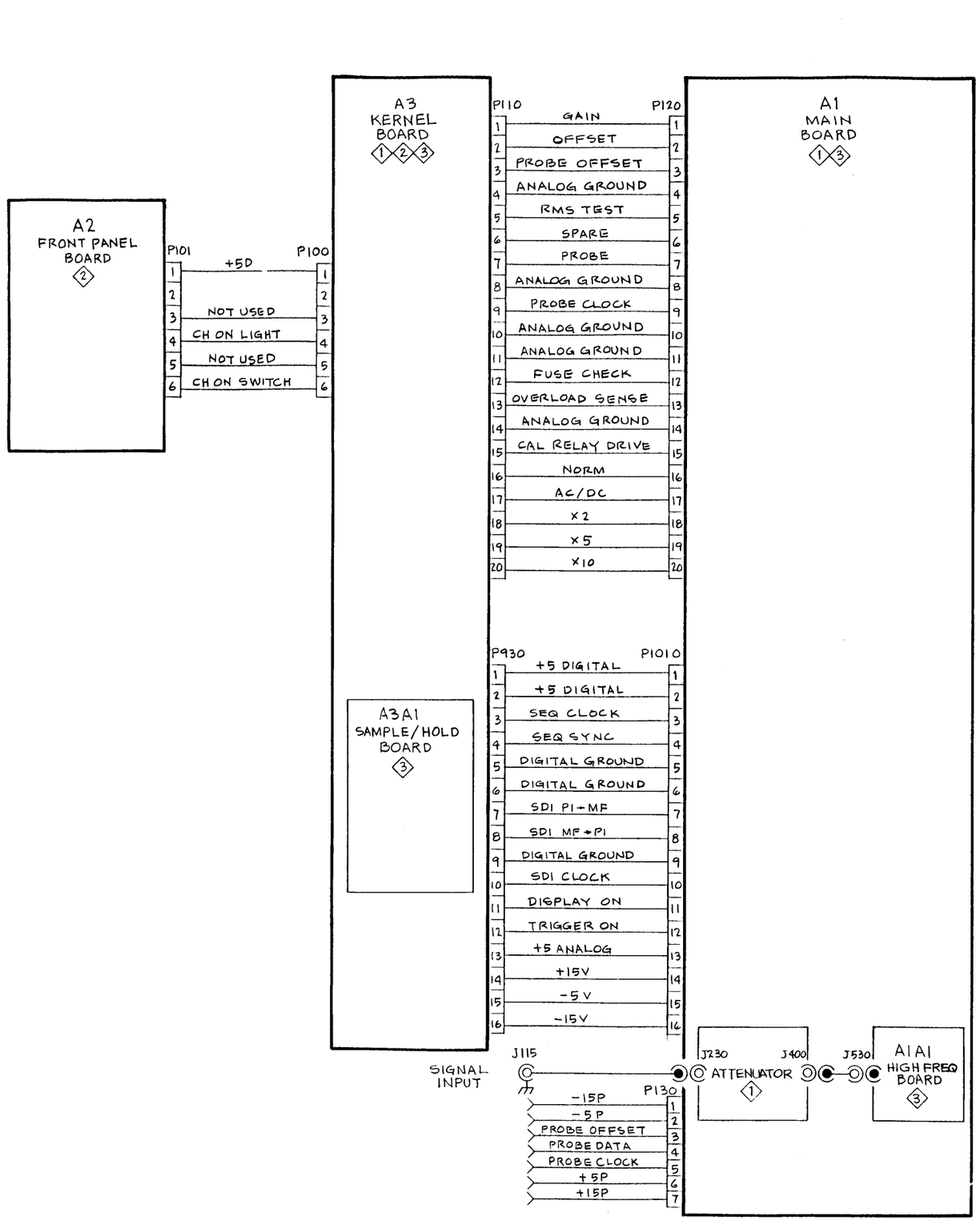
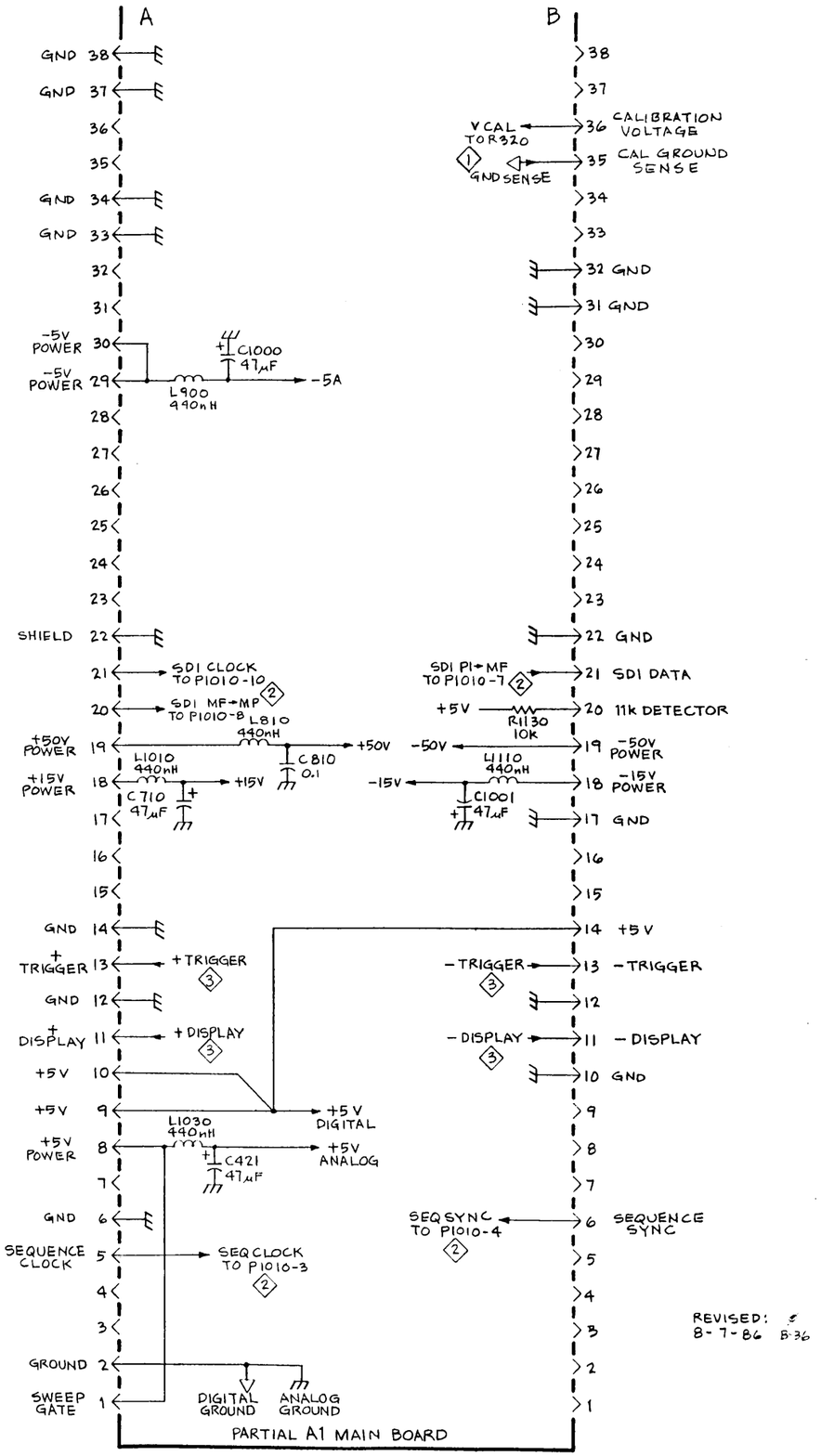
U100 74HC4051
U101 74HC4051
U102 TL074C
U103 TL074C
U120B 0158
U120A 0158
U700A 0158
U700B 158
U910
U800 741
U1040A
U1040B 0158
U530 741
U610 741
U630
U400 356
U430 356
U830
U930
Q600A
Q600B
Q710
Q740
Q810
Q1000
Q900
Q901
Q800
Q510
Q630
Q840
Q841
Q940
Q941
Q990
Q1030
A3A1 SAMPLE-HOLD BOARD
PARTIAL A3 KERNEL BOARD
PARTIAL A1 MAIN BOARD
A1A1 HIGH-FREQUENCY BOARD
PARTIAL A1 MAIN BD
FROM U820 ◇2
VDAC FROM R535 ◇2
FROM U410 ◇2
FB OUT
PROBE OFFSET TO P130-3 ◇1
RMS TEST TO R241 ◇1
MAJTST TO U310-12 ◇2
OFFSET
COM MODE
TRIGGER ON FROM P1010-12 ◇2
+TRIG A13
-TRIG B13
TRIGGER SIGNAL OUT
TRIGGER BAL
VERTICAL SIG FROM J ◇1
-VERT SIG B11 A12
+VERT SIG A11 B12
VERTICAL SIGNAL OUT
DISPLAY ON FROM P1010 ◇2
REV: 8-20-86 E3 12-8-86
11A71
AMPLIFIER ◇3





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WIRING DIAGRAM / MAIN INTERFACE 4