TEK Service Manual

Part No. 070-8164-00
Product Group 20

VS 211
PAL VIDEO SYNCHRONIZER

including
RC 211
SYNCHRONIZER CONTROL

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Tektronix
COMMITTED TO EXCELLENCE

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WARRANTY

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In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

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SERVICE SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages may exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Certificate of the Manufacturer/Importer

We hereby certify that the VS 211 PAL Video Synchronizer complies with the RF Interference Suppression requirements of Amtsbl.-Vfg 1046/1984.

The German Postal Service was notified that the equipment is being marketed.

The German Postal Service has the right to re-test the series and to verify that it complies.

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Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das VS 211 PAL Video Synchronizer in Übereinstimmung mit den Bestimmungen der Amtsblatt-Verfügung 1046/1984 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprufüng der Serie auf Einhalten der Bestimmungen eingeräumt.

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NOTICE to the user/operator:

The German Postal Service requires that this equipment, when used in a test setup, may only be operated if the requirements of Postal Regulation, Vfg. 1046/1984, Par. 2, Sect. 1.7.1 are complied with.

HINWEIS für den Benutzer/Betreiber:

Dies Gerät darf in Meßaufbauten nur betrieben werden, wenn die Voraussetzungen des Par. 2, Ziff. 1.7.1 der Vfg. 1046/1984 eingehalten werden.

NOTICE to the user/operator:

The German Postal Service requires that Systems assembled by the operator/user of this instrument must also comply with Postal Regulation, Vfg. 1046/1984, Par. 2, Sect. 1.

HINWEIS für den Benutzer/Betreiber:

Die vom Betreiber zusammengestellte Anlage, innerhalb derer dies Gerät eingesetzt wird, muß ebenfalls den Voraussetzungen nach Par. 2, Ziff. 1 der Vfg. 1046/1984 genugen.

Table of Contents

SECTION 3
SPECIFICATIONS 3-1

SECTION 4
PERFORMANCE CHECKS & CALIBRATION PROCEDURES 4-1

List of Figures

SECTION 3 SPECIFICATIONS 3-1

SECTION 4 PERFORMANCE CHECKS & CALIBRATION PROCEDURES 4-1

SECTION 6 MAINTENANCE 6-1

SECTION 7 OPTIONS 7-1

SECTION INSTALLATION 8-1

APPENDIX C.1 RC 211 SERVICE INFORMATION C.1-1

List of Tables

APPENDIX C. RC 211 SERVICE INFORMATION 1-1

SECTION 1
INTRODUCTION

The Tektronix VS 211 PAL Frame Synchronizer is designed for reliability and ease of servicing. (See Fig. 1-1.) All major modules, except the I/O boards, are loaded from the front of the mainframe. The I/O boards are attached to a removable portion of the rear panel and can easily be unplugged from the mainframe by removing a few screws.

The mainframe is divided up into three compartments. The left compartment contains the ADC, DAC, and the Proc Amp/Decoder boards. Most digital processing is done in the center compartment on the Memory, Remote, and Controller boards. The Power Supply module is housed in the far right compartment. The circuit board modules in the left and center compartments can be placed on an Extender board for ease of troubleshooting. The Extender board is provided as an optional accessory and contains test points for all interconnections to the mainframe.

All circuit board modules are individually calibrated so a board can be replaced without having to recalibrate the entire instrument. Replaceable circuit boards make a board-exchange type of service practical. A good board can be installed in place of a faulty one to rapidly get the VS 211 back in service. Meanwhile, the faulty board can be either repaired by a technician at the site or sent to Tektronix for service.

The VS 211 has Power-Up, In-Service, and Troubleshooting diagnostics. The In-Service diagnostics are done continuously while the VS 211 is operating. LEDs on the ADC, DAC, Remote, and Controller boards are used to identify system errors when any of these diagnostic routines fail. Whenever one of these conditions is encountered, the front-panel System Status indicator flashes, quickly warning the user of a possible problem.

There are also parallel Composite Digital I/Os that comply with: 60B(Secretariat) 170, May 1989 "Helical-scan digital composite video cassette recording system using 19mm magnetic tape (format D-2) (NTSC, PAL, PAL-M)" These interfaces can either be used to time digital signals into the studio, convert an analog input signal into a timed composite parallel digital signal, or to check the operation of the VS 211. The digital interface gives access to the signal immediately after processing into digital and right before processing back to analog. This allows the ADC and the DAC to be checked in isolation, providing a quick and accurate method of evaluating ADC and DAC performances.

The RC 211 Remote Synchronizer (an optional accessory) provides extra flexibility in operating, troubleshooting, and calibrating the VS 211. It is not essential but will save time and effort, especially if the setup is changed often.

A complete description and operating instructions for the VS 211 can be found in the Operator's Manual.

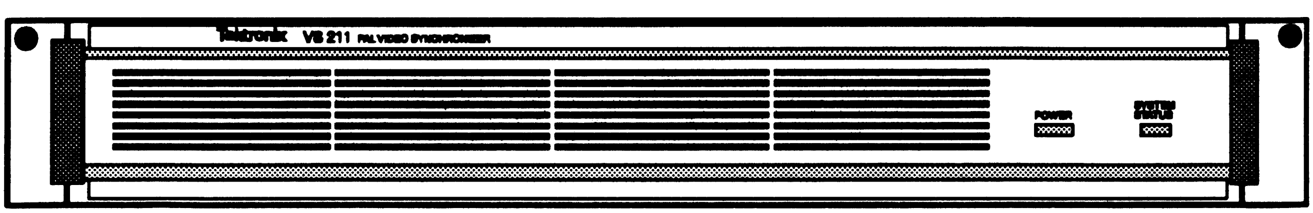


Fig. 1-1. The VS 211 Frame Synchronizer.

CONTROLS, INDICATORS, AND CONNECTORS

CONTROLS

When the front panel is in the lower position, a number of controls and switches are accessible. See Fig. 1-2.

Power Supply Board

① **ON/OFF** — Turns the instrument on and off. "ON" is when the button is pushed in.

WARNING

Even with the POWER switch in the OFF position, portions of the Power Supply and Lower I/O boards will still carry high voltages.

ADC Board

② **Reset Switch** — Pushbutton switch to reset the CPU. (Not required under normal circumstances.)

Diagnostic Switch — A rotary 16-position switch used in conjunction with a set of eight indicators on the ADC circuit board to check ADC board operations. See Section 5, Troubleshooting, for more details about the operation of this control.

③ **Input Gain** — A potentiometer used to set the gain of the VS 211 Input Amplifier (before A/D conversion).

④ **Program VCO Frequency Center** — A potentiometer used to center the voltage control oscillator for the ADC.

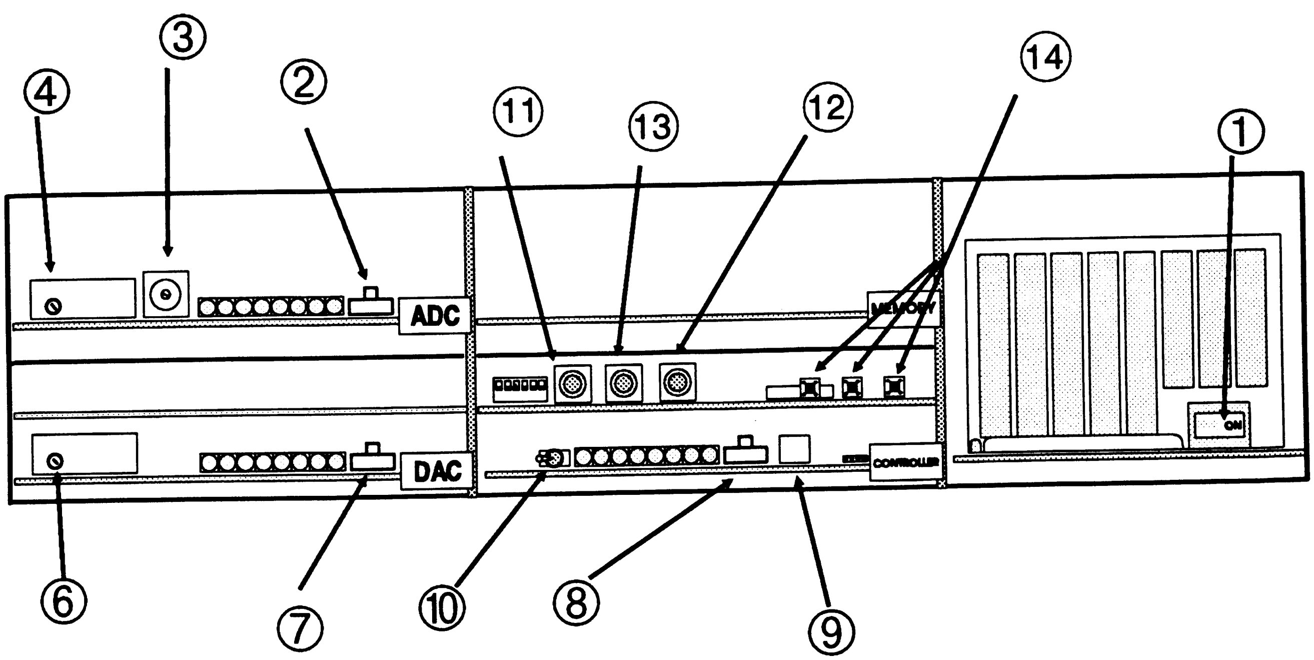


Fig. 1-2. Locations of the controls on the VS 211.

DAC Board

⑥ **Reference VCO Frequency Center** — A potentiometer to center the DAC's voltage controlled oscillator's center frequency.

Diagnostic Switch — A rotary 16-position switch used in conjunction with a set of eight indicators on the circuit board to check DAC operations. See Section 5, Troubleshooting, for more details.

⑦ **Reset Switch** — Pushbutton switch to reset the CPU. (Not required under normal circumstances.)

Controller Board

⑧ **Reset Switch** — Pushbutton switch to reset the CPU. (Not required under normal circumstances.)

⑨ **Diagnostic Switch** — A rotary 16-position switch used in conjunction with a set of eight indicators on the circuit board to check Controller operations. See Section 5, Troubleshooting, for more details.

Vertical Timing — Two jumpers on the Controller circuit board used to select vertical offset from 1 line delay to 2 lines advance.

⑩ **Bypass Switch** — Puts the VS 211 into Program Line Bypass.

Remote Board

⑪ **Video Gain** — A microprocessor controlled potentiometer used to set the signal gain of the output. Only affects active video, not sync, burst, or the vertical interval.

⑫ **Chroma Gain** — A microprocessor controlled potentiometer used to set the chrominance gain of the output.

⑬ **Black Level** — A microprocessor controlled potentiometer used to adjust the black level of the output.

⑭ **Horizontal Timing** — Three pushbuttons on the Remote Control board to advance or delay the output signal to match the reference input.

< and > — The fine adjustments. They advance or delay in 0.125 nsec (≈ 0.2°) steps for a total range of 50°.

COARSE — The coarse timing adjustment. When this button is held down in conjunction with either < or > the advance or delay is speeded up to rapidly scroll through the timing range.

DIP Switch Controls — The DIP switches on the Remote board, located behind the Proc Amps, direct functions that can be controlled either locally or by the Remote unit (RC 211). See Section 8, Installation, for details.

Diagnostic Switches — A 16-pin rotary switch used in conjunction with a set of eight indicators on the Remote board to check remote related operations. See Section 5, Troubleshooting, for more details.

Rear Panel

Line Voltage Setting Switch — Chooses between 115 and 220 line voltage. See ⑧ on Fig. 1-5 for its location.

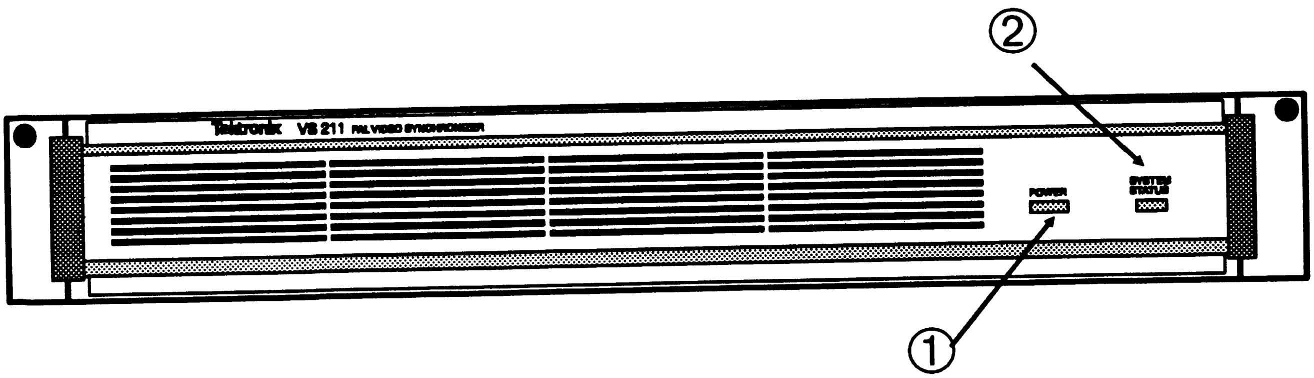


Fig. 1-3.
Location of POWER and SYSTEM STATUS LEDs.

INDICATORS

Front-Panel Indicators (See Fig. 1-3)

The front panel of the VS 211 contains two indicator lights:

① **Power** — A green light-emitting diode (LED) that indicates when the +5 V power supply is regulated.

② **System Status** — A blinking red LED to indicate an abnormal signal or circuit condition.

Diagnostic Indicators (See Fig. 1-4)

LEDs, located on the front edges of the circuit boards, provide information concerning the VS 211's operating status. The diagnostic indicators operate in conjunction with the SYSTEM STATUS indicator. If the SYSTEM STATUS is blinking, at least one internal LED indicator will also be on. The indicators have different meanings when used in conjunction with the user diagnostics (available through the diagnostic switches). See Section 5, Troubleshooting, for more details.

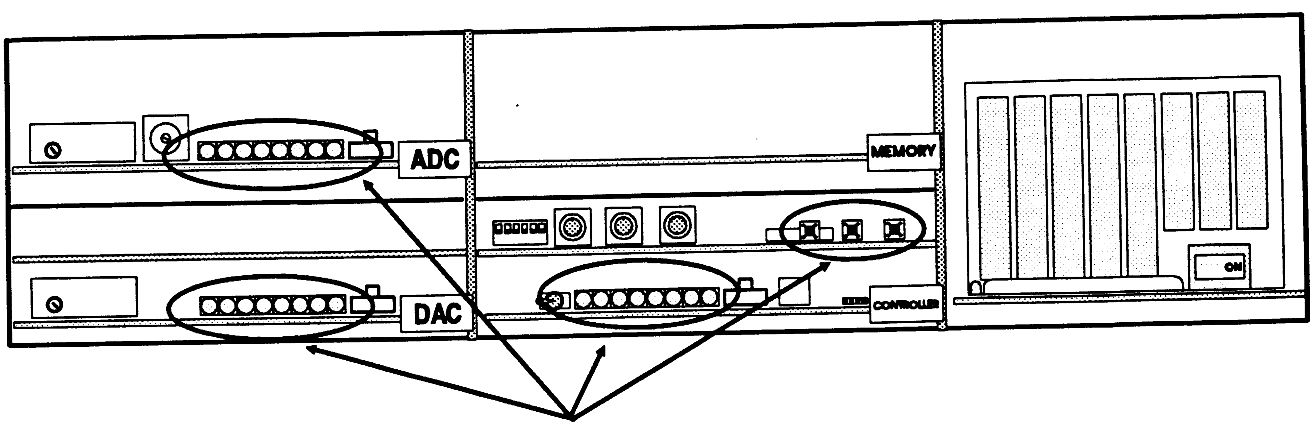


Fig. 1-4. Locations of the Diagnostic LEDs.

CONNECTORS
(See Fig. 1-5)

Video Signals

① **PROGRAM INPUT** — 75 Ω signal input (BNC connector). (High impedance loop-through to PROGRAM OUTPUT when in BYPASS.)

② **PROGRAM OUTPUT** — 75 Ω signal output (BNC connector). (High impedance loop-through from PROGRAM INPUT when in BYPASS.)

③ **MONITOR OUTPUT** — 75 Ω output of the buffer amplifier. This signal is always processed through the frame synchronizer.

④ **REFERENCE** — A loop-through video input used as the timing reference for the PROGRAM OUTPUT.

Remote Control

⑤ The **REMOTE** connector is a 9-pin subminiature, D-series with female contacts. The connector is used to interface a separate Remote Control unit (RC 211) or personal computer. See Section 3, under Interface Requirements, for more information. See Appendix B for the PC commands.

NOTE

Operation with a pc is a non-standard and non-supported mode of operation.

Digital Input/Output

⑥ **COMPOSITE DIGITAL INPUT and OUTPUT** — Two subminiature, D-series, 25-pin connectors. They comply with: 60B(Secretariat) 170, May 1989 "Helical-scan digital composite video cassette recording system using 19mm magnetic tape (format D-2) (NTSC, PAL, PAL-M)".

Audio Delay

⑦ **AUDIO DELAY** — An output signal used by audio synchronizers (such as the Tektronix 118 AS) to match the audio and video delay. See the Specification Section for more information.

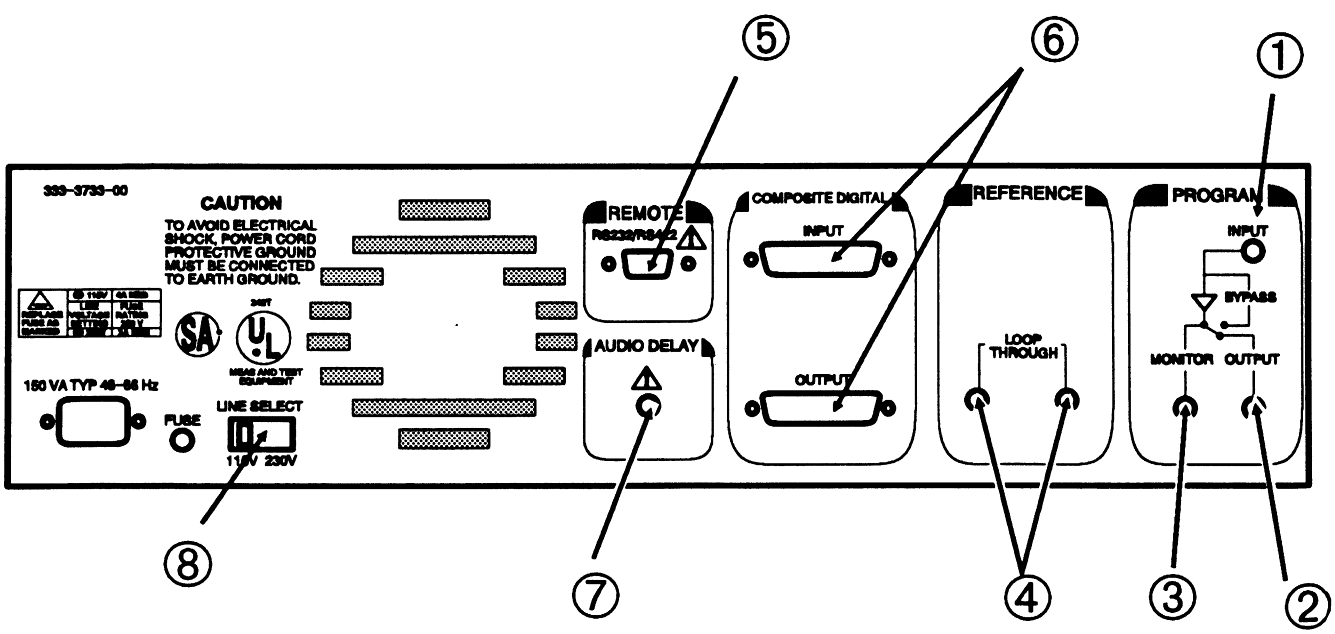


Fig. 1-5. Location of the rear-panel connectors.

SECTION 2
THEORY OF OPERATION

This section of the manual is divided into three main parts: Instrument Level, Board Level, and Schematic Level.

Therefore, where the user should turn for information will depend upon their needs. General information is found at the Instrument Level. Board functions are found at the Board Level. Specific components and signal names are given at the Schematic Level.

Not all boards go into all levels of detail. Only where it is not self-evident will the descriptions go all the way to the schematic level.

NOTE

The following signal name conventions are used throughout this manual and in the schematics:
(SIGNAL) is equivalent to $\overline{\text{SIGNAL}}$,
[SIGNAL] is an aside of SIGNAL,
[(SIGNAL)] is an aside of (SIGNAL).

INTRODUCTION TO THE VS 211

The VS 211's purpose is to match the timing of the input video signal (in either analog or composite digital form) to a reference signal. This is accomplished by digitizing, storing, and then reading out the input signal at the appropriate time as determined by the reference.

The primary output of the synchronizer is the timed signal in both analog (PROGRAM OUTPUT) and digital (COMPOSITE DIGITAL OUTPUT) forms. The other outputs of the synchronizer are: AUDIO DELAY and MONITOR. The AUDIO DELAY is used to control an audio synchronizer to avoid lip sync errors. The MONITOR output is identical to the PROGRAM OUTPUT except in Bypass mode. In Bypass, the MONITOR output continues being processed by the synchronizer (not simply looped-through like the PROGRAM OUTPUT in this mode). The REMOTE is an I/O to a remote control unit which allows synchronizer adjustments to occur at a remote location.

Because this is an in-line device, the signal is bypassed in the event of a power failure to preserve signal path integrity (but the COMPOSITE DIGITAL INPUT is not bypassed to the COMPOSITE DIGITAL OUTPUT under any circumstances).

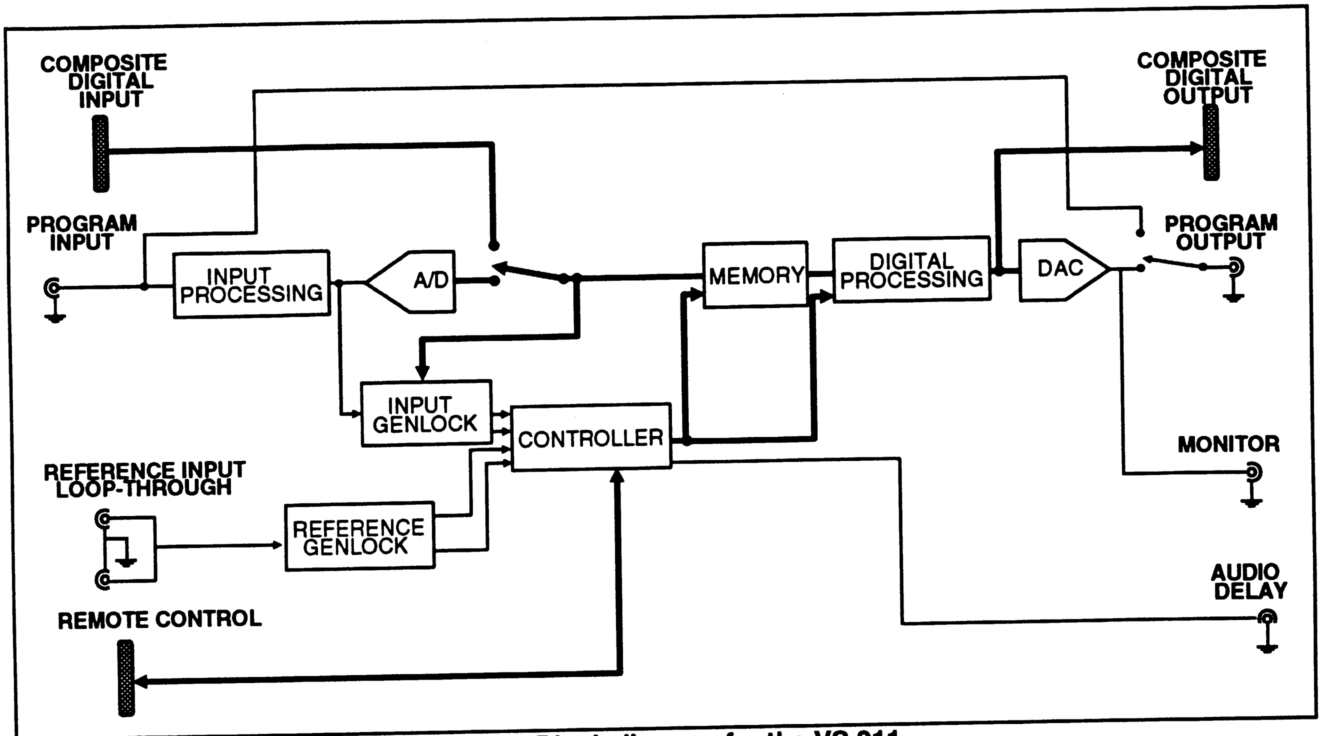


Fig. 2-1. Block diagram for the VS 211.

BLOCK DIAGRAM DESCRIPTION (See Fig. 2-1)

A composite video signal enters the synchronizer through the PROGRAM INPUT. In the event of a bypass, either manual or automatic, the signal is directly routed to the PROGRAM OUTPUT. Under normal operating conditions, the signal is buffered, low-pass filtered (for anti-aliasing), and clamped (to prevent dc drift). This signal then goes to a 10-bit A/D. After the signal has been converted to digital, a multiplexer determines whether the digitized PROGRAM INPUT or the signal from the COMPOSITE DIGITAL INPUT (both are in the same form at this point in time) will be used as the input for the system. The chosen signal is then written into Memory clocked by timing signals from the Controller.

The Input Genlock derives timing information from the digitized input signal. The Genlock uses the digitized input signal to calculate the phase of burst and the position of the sync relative to burst (the SC/H phase of the incoming signal). It generates a correction voltage to keep its VCO locked on the incoming signal. The outputs of the Input Genlock are W_CLK ($4F_{sc}$) and (W_F1L7) (a one clock width wide color frame reference pulse). These signals control writing the data into memory.

The signals that control reading the data out of memory are derived from the REFERENCE input signal. The REFERENCE input signal is treated comparably to the video input signal. It is buffered, clamped, low-pass filtered, and converted to an 8-bit digital signal. The Reference Genlock analyzes the signal to determine burst phase in order to lock its PLL. It also calculates SC/H phase. From this information R_CLK ($4F_{sc}$) and (R_F1L7) are derived and sent to the Controller.

The Controller uses the timing information from the Input and Reference Genlocks along with manual delay and other information from either the Remote board or the RC 211 (via the Remote Control Port) to derive the signals needed to supervise the Memory's reading and writing. The Controller also provides information to control an audio synchronizer via the AUDIO DELAY output.

Another function of the Controller is sync and burst insertion. When sync and burst insertion is required, a clean sync and burst are read from a PROM look-up table and output to the DAC board, instead of the original stored in Memory.

Regulated by the Controller, the digital video signal is read from Memory. This signal enters the Digital Processing Amplifier. In this amplifier, the signal is FIR filtered to separate the chrominance from the luminance. The chrominance is multiplied by the chroma gain signal, while the luminance is multiplied by the luminance gain. Then the chrominance and luminance are added back together along with the dc level (BLACK LEVEL).

Finally, the signal is converted to ECL to drive the DAC and the COMPOSITE DIGITAL OUTPUT. The analog output of the DAC is low-pass filtered (to remove any high frequency components introduced by the digitizing process), buffered, and output as the PROGRAM OUTPUT and MONITOR signals.

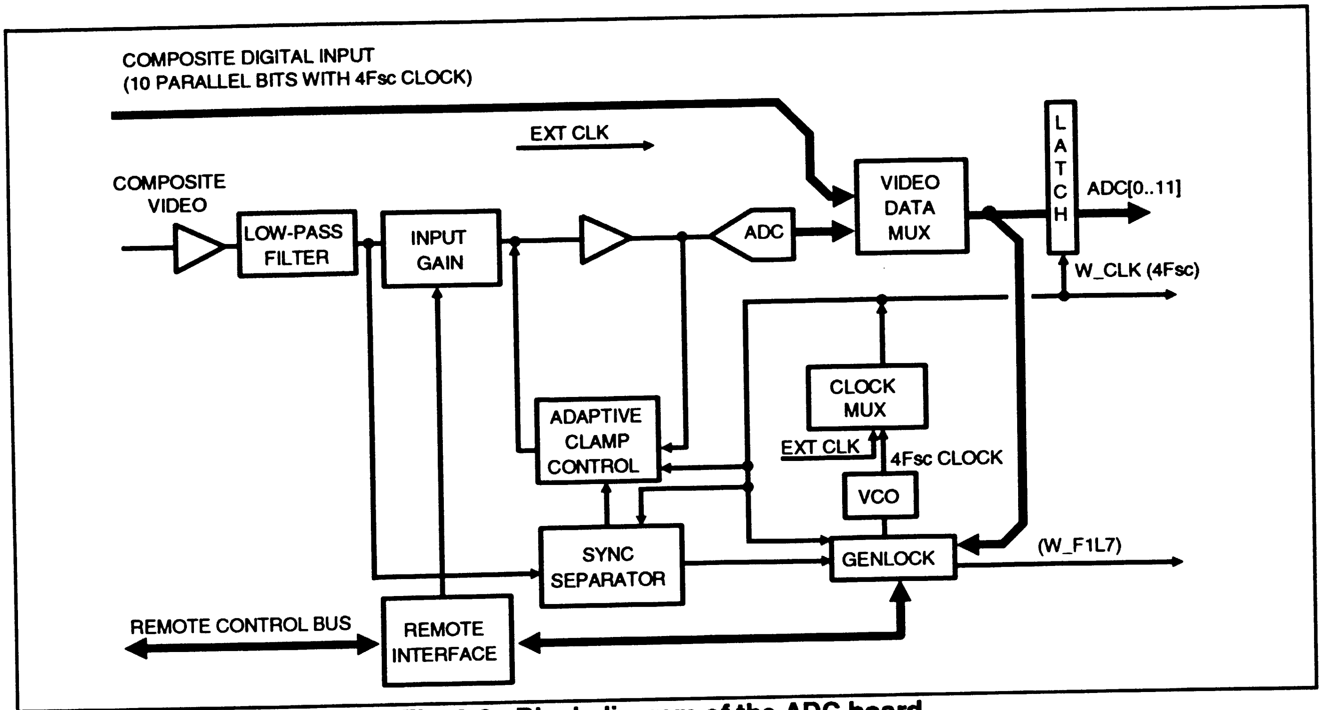


Fig. 2-2. Block diagram of the ADC board.

ADC BOARD

BLOCK LEVEL DESCRIPTION (See Fig. 2-2)

The task of the VS 211 ADC board is to genlock to incoming video, digitize it, and provide 4Fsc clocks (W_CLK) and a field reference pulse (W_F1L7).

The composite video signal, from the PROGRAM INPUT, is immediately buffered and low-pass filtered. (This is for both anti-aliasing and to ensure that the signal is within the 5.5 MHz PAL standard.) The output of the filter is directed to the Sync Separator and to a gain control stage (Input Gain).

The Sync Separator pulls the sync information from the video signal to derive the timing signals for the Genlock.

The Input Gain is an amplifier (controlled either by a potentiometer or through the Remote Control Bus) in the signal processing path. Its purpose is to compensate for any attenuation of the input signal.

After the Input Gain, the video is clamped at backporch level. The Adaptive Clamp circuit samples video just prior to the input of the ADC during backporch time and positions the sync of a nominal (≈ 1 V_{p-p}) video signal to the negative reference of the converter. Timing for the Clamp is derived from the Sync Separator circuit. The Adaptive Clamp has circuitry that looks at the composite video signal and measures the RMS noise. As noise increases, the speed of the Clamp loop is slowed to prevent streaking. The output of the Clamp drives the Analog to Digital Converter (ADC).

The ADC outputs a 10 bit digital representation of the composite video signal with sync tip represented by a hex value of 004_h and a peak white value of $34C_h$. See Fig. 2-3.

The output of the ADC goes to a Multiplexer (MUX) that selects between the ADC's output and the COMPOSITE DIGITAL INPUT as the input to the synchronizer. (The MUX is controlled through the Remote bus via the Genlock's processor kernel.) The output of the MUX goes to the Genlock and Latches.

The Genlock circuitry is a microprocessor and data acquisition system that gets input from the Video Data MUX, the Remote Control Bus, and the Sync Separator. The Genlock samples sync and burst from the Video Data MUX and calculates the phase of burst, the position of sync, and the relationship between the sync and burst (SC/H phase). It outputs a correction voltage to the VCO to lock it to the burst of the incoming video signal. The Genlock also outputs a color frame reference pulse (W_F1L7) that occurs for one $4F_{sc}$ clock cycle at the 50% point of sync on field 1 line 7 of the PAL eight field sequence. If the Video Data MUX had selected COMPOSITE DIGITAL INPUT instead of output from the ADC, then the $4F_{sc}$ clocks (W_CLK) will be provided from the Composite Digital signal clocks. (The genlock will not affect the external clock, but will provide the color frame reference pulse based on the external data.)

The output of the Latches is sent through the Upper I/O board and stored on the Memory board.

LIST OF SCHEMATICS for ADC BOARD

1 INPUT CHANNEL

2 ADC, DATA MUX, & LATCHES

3 GENLOCK IC & SYNC SEPARATOR

4 GENLOCK PROCESSOR KERNEL

5 VCO and CLOCK DISTRIBUTION

6 INTERCONNECT & POWER DISTRIBUTION

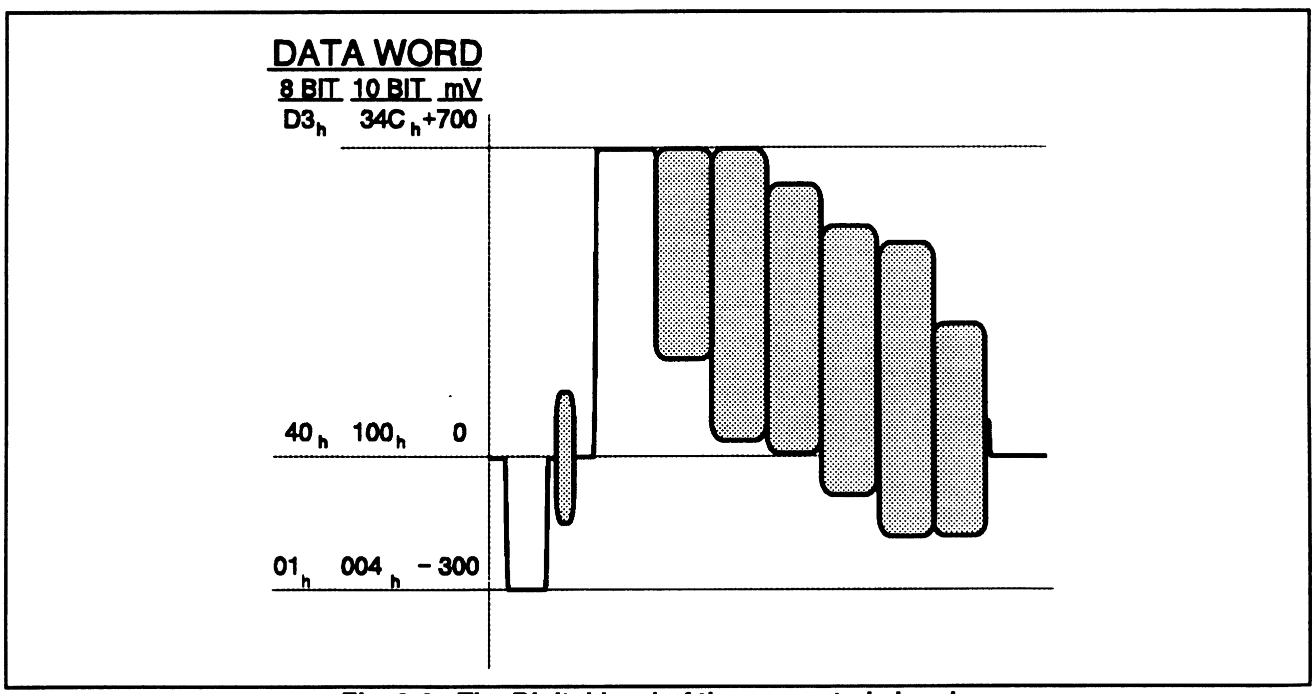


Fig. 2-3. The Digital level of the converted signals.

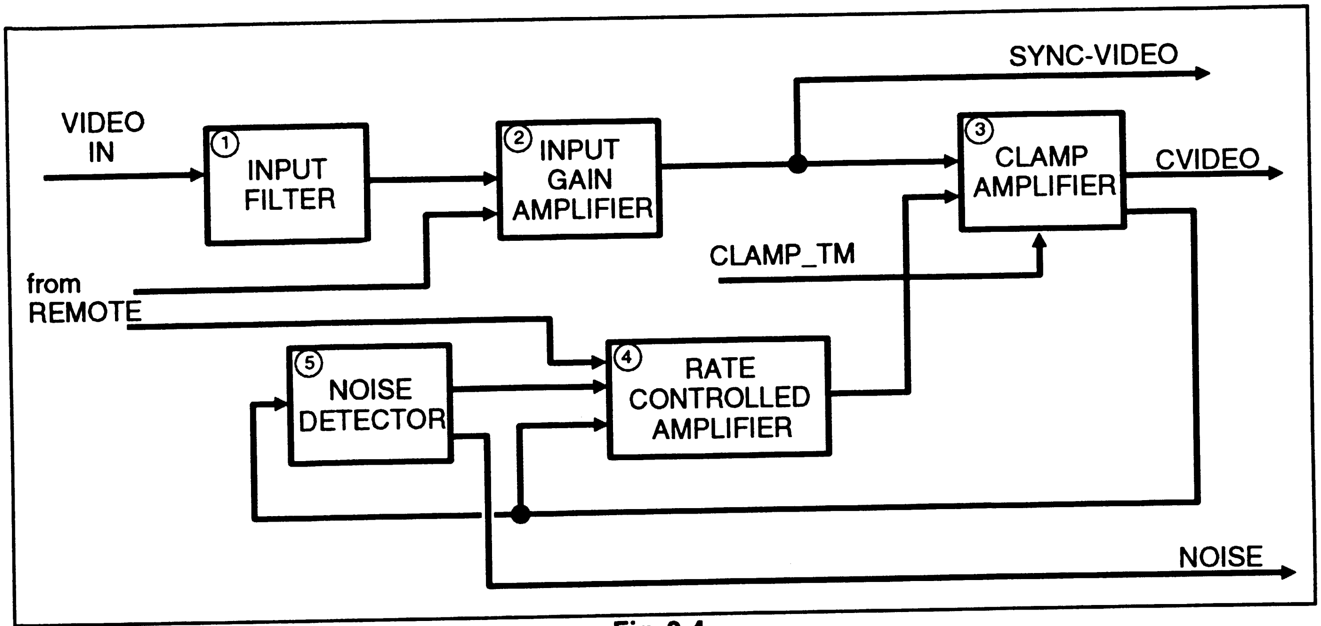


Fig. 2-4.
Block diagram of the Input Channel circuit on the ADC board.

SCHEMATIC LEVEL DESCRIPTIONS
ADC BOARD

INPUT CHANNEL ◊1
(See Fig. 2-4)

① Input Filter

The purpose of the Input Filter is to remove any out-of-band components of the input signal and provide source and load termination of 75 Ω.

The first three sections of the filter (L7, L8, and L9 plus associated components) form a 7-pole elliptical low-pass filter. The next section (C33, C42, L14, R27, and other associated components) is a loss compensator, which flattens out the total filter response in the center of the frequency band. The last section of the filter (L10 - L13, etc.) is the group delay corrector. J3 and J4 can take the filter out of service if necessary for diagnostic testing.

② Input Gain Amplifier

The Input Gain Amplifier gets its gain input from either the on board input gain proc amp pot or from the RC 211 via the remote port, selected by J1. This amplifier is user adjustable and is designed to compensate for input attenuation or low level inputs.

③ Clamp Amplifier

The program video signal from the Input Gain Amplifier is applied to the input of the Clamp Amplifier. The Clamp Amplifier (U5) is a non-inverting amplifier that drives the ADC. Clamping is controlled by the DC offset from the Rate Controlled Amplifier, applied to pin 2.

④ Rate Controlled Amplifier

The video signal output from the Clamp Amplifier is applied to the input of the Rate Controlled Amplifier through a chrominance band-stop filter (C21 and L6) which removes the burst information from the backporch of the video signal. The sample and hold device, U7, samples the dc voltage level from the backporch, clocked by CLMP_TM on pin 14. U7 samples the input signal at pin 2 during the time that pin 14 is low and holds the sample when pin 14 is high. The input to pin 14 is the CLMP_TM signal derived from on board clocks and signals from the Sync Separator ④.

The output of U7 pin 7 drives an integrator, U14. The integrator circuit consists of the amplifier (U14), the feedback capacitor (C53), and the input resistance (R42 plus up to three other parallel resistors from the Noise Detector). The integrator circuit compares the backporch level from the Clamp Amplifier output with the clamp dc level set by R64 (the Clamp DC Level Adjustment) which is applied to the positive input of U14. If there is a difference between these two levels, the integrator feeds a signal back to the negative input of the Clamp Amplifier (U5) to cause the output to slew towards the desired offset level. The integrator capacitor C53 then holds the integrator output level until another offset difference is detected.

The rate at which the integrator responds to correct the dc offset at the output of the Clamp Amplifier is determined by the amount of noise on the program signal. With no noise, the integrator reacts the fastest, but as the noise level increases the rate of correction slows down. This is accomplished by changing the input resistance of the integrator. When no noise is present, the input resistances (R42, R43, R44, and R46) are all in parallel. U10A, U10B, and U10C and the switches in U13 control the paralleling of the resistors across R42. U10 is a quad comparator with reference voltages on each of the - inputs and the Noise Detector output driving the + inputs. As the noise level on the program video signal increases, the dc voltage level out of the noise detector rises above the threshold level of each comparator, that comparator will open its switch and remove the corresponding parallel resistor from across R42. This will cause the reaction speed of the integrator to slow down. U10D generates the NOISE signal flagging a noisy input signal (≈ 26 dB signal to noise ratio or worse).

The output of integrator U14 drives an inverting amplifier U17, which has a gain of -1.

⑤ Noise Detector

The Noise Detector analyzes the amount of noise present on the backporch of the video signal at the output of the sample and hold device (U7) and controls the reaction time of the integrator in the Rate Controlled Amplifier accordingly. As the noise level increases, the integrator is slowed down.

The output of U7 also drives the + input of op amp U15, which is configured as a high pass filter. U15 drives the RMS converter, U58, through either U8A, U8B, or the large transient detector (U9A and U9B configured as a window detector).

To avoid detecting large dc transients as noise, the large transient detector (U8A and U8B) monitors the high-pass filter output for voltage changes that exceed the ±1.88 V threshold. If the output of U15 exceeds either of these thresholds, the output of the large transient detector switches from a high to a low state, triggering the time out circuit (U16A, a one shot multivibrator). U16A output, after being triggered, goes high opening switch U12 and disconnecting the outputs of U15 from the RMS converter (U58). If the threshold level was exceeded due to a short term transient, U16A output will revert to a low level after a short time out (≈ 1 ms) allowing switch U12 to close.

To determine if high noise levels are being detected as large transients, U9B, an integrator, detects and averages the time the U16A's output is high. When the output of U16A is high for an excessive time (which would occur if high noise levels are present) the output of the integrator (U9B) ramps up to 2.5 V. When the output exceeds 2.5 V, U9A's output is forced low. This closes switch U12B and connects the output of U15 to the input of the RMS converter. The time that U12B is closed depends upon the amount of noise on the signal. Large DC level transients, such as those caused by hot switches, etc., do not occur on a frequent basis, therefore frequent tripping of the large transient detector occurs only when there is high amplitude noise.

U58 is an RMS Noise converter that provides a dc output directly proportional to the RMS value of its input. U58 has a long time constant determined by C52, C48, and R52 that average the noise pulses. Averaging is used because noise levels on television signals do not change rapidly and using a time constant equal to the number of fields ensures that the clamp amplifier will not be upset by a random occurrence. The voltage level output of U58 drives the noise comparator in the Rate Controlled Amplifier.

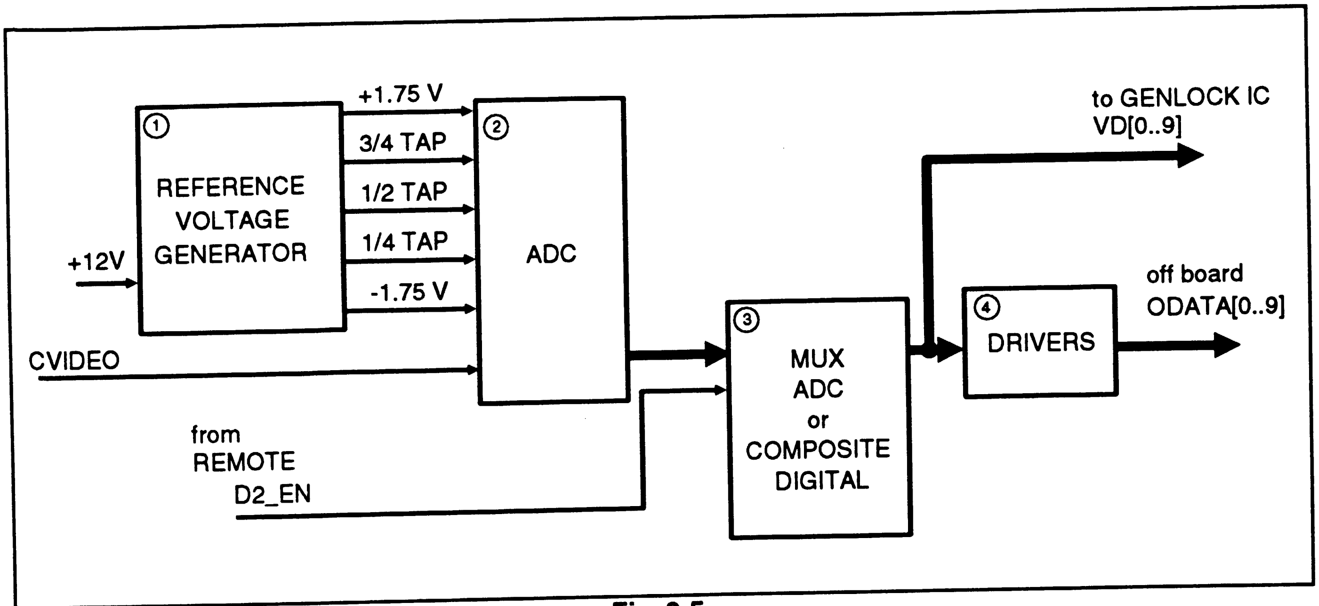


Fig. 2-5.
Block diagram of the ADC board's ADC, Data MUX, and Latches circuitry.

ADC, DATA MUX, & LATCHES ② (See Fig. 2-5)

① Reference Voltage Generator

The purpose of the reference voltage generator is to generate precise, accurate voltages as reference for the ADC. The main reference voltages are ± 1.75 V and all the other voltages are derived from these references. Adjustments are provided on the ¼, ½, and ¾ taps on the reference ladder allowing for minor corrections in linearity.

② ADC

The ADC takes the filtered and clamped video input and converts it to a digital signal in the ADC (U4). The signal is then sent to the MUXs.

③ MUX — ADC or Composite Digital

U32 is driven by the Genlock Processor system and sends out the signal to decide whether the input signal should be the PROGRAM INPUT or the COMPOSITE DIGITAL signal.

U29-U31 are the MUXs that multiplex between the PROGRAM INPUT signal (AD[0-9]) and the COMPOSITE DIGITAL signal D2[0-9]. The chosen signal is VD[0..9]. VD[0..9] goes to the Genlock IC ③ and the Drivers.

④ Drivers

VD[0..9] is latched by U28 and U29. The signal is clocked through the latches by the WCLK signal (derived from the main clock). These latches drive the signal off the board through J17 and J15C-1.

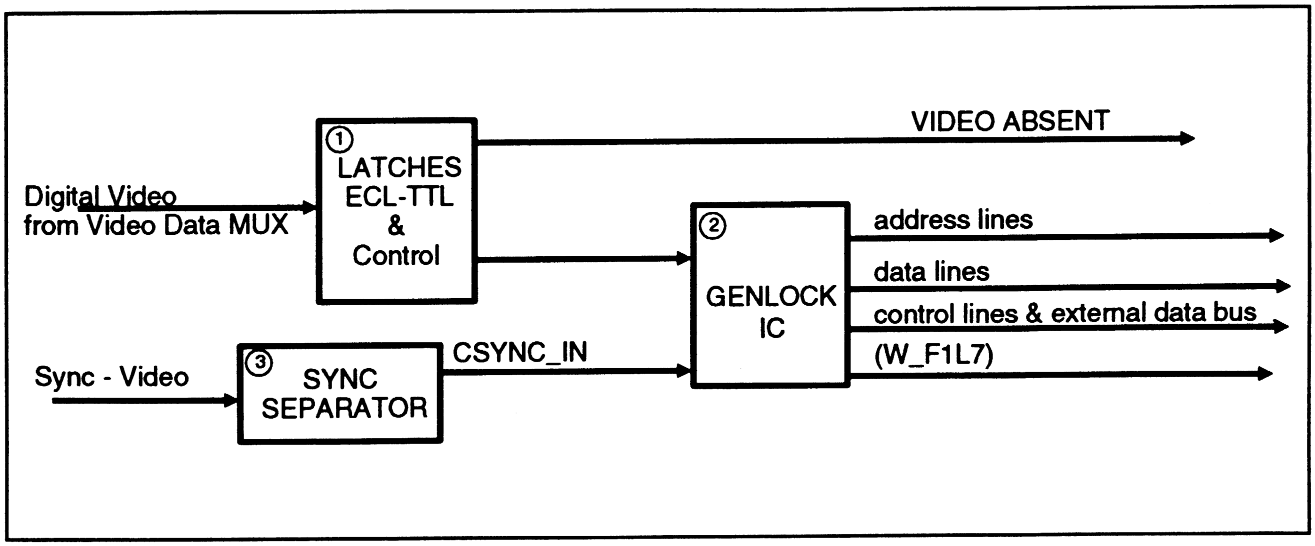


Fig. 2-6. Block diagram of the genlock schematic.

GENLOCK IC & SYNC SEPARATOR ③ (See Fig. 2-9)

① Latches

There are two types of latches. The ECL→TTL latches and the processing latch.

The ECL→TTL latches convert the COMPOSITE DIGITAL INPUT to TTL levels.

The processing latch flags video absent. It separates the COMPOSITE DIGITAL's comp sync, flags sound-in-sync and holds at the last value until the sound-in-sync pulse is finished. It sends only the middle 8 bits to the Genlock IC (where the comp sync should be located) because using only these bits will provide greater resolution.

② Genlock IC

The Genlock IC, U37, performs a wide variety of tasks. It gets the middle data bits from U64 and the address from the µP. Using this input, the Genlock IC puts out the field 1 line 7 pulse, W_F1L7.

The Genlock IC generates the I/O control signals from the address inputs. U37 has controllers and decoders inside to count events and derive timing signals. The Genlock IC generates the soft reset pulse if the proper I/O address is not generated within 2 fields. Important signals are:

1. START_SMP from the internal counter/decoder tells CTC U23 that the Genlock IC is ready to sample sync and burst. Sample Finish tells the CTC that sampling is finished and it can read sync and burst data stored in the GLIC.
2. The I/O Signals control many of the chip enables throughout the instrument.
3. The most important is W_F1L7. This signal flags the whole instrument that the input signal is ready to start working on a new color field (1 of 8).
4. UNLOCK will allow the Genlock IC to correct its data window timing until the processor (U24) positions the data in the window.

③ Sync Separator

The Sync Separator and the Sync Generator are two ICs that work together to produce the composite sync output. The Sync Separator (U66) basically takes the video signal directly out of the input filter and outputs a 0 to -5 V sync pulse. This signal is sent to the Sync Generator (U67). The Sync Generator uses sync pulses to generate the CSYNC_IN signal until the VCO is locked. Once the VCO is locked then the sync generator will simply free run based on the W_F1L7 pulse and the phase locked system clock, SYSCLK. This allows the signal to stay locked in the presence of greater amounts of noise.

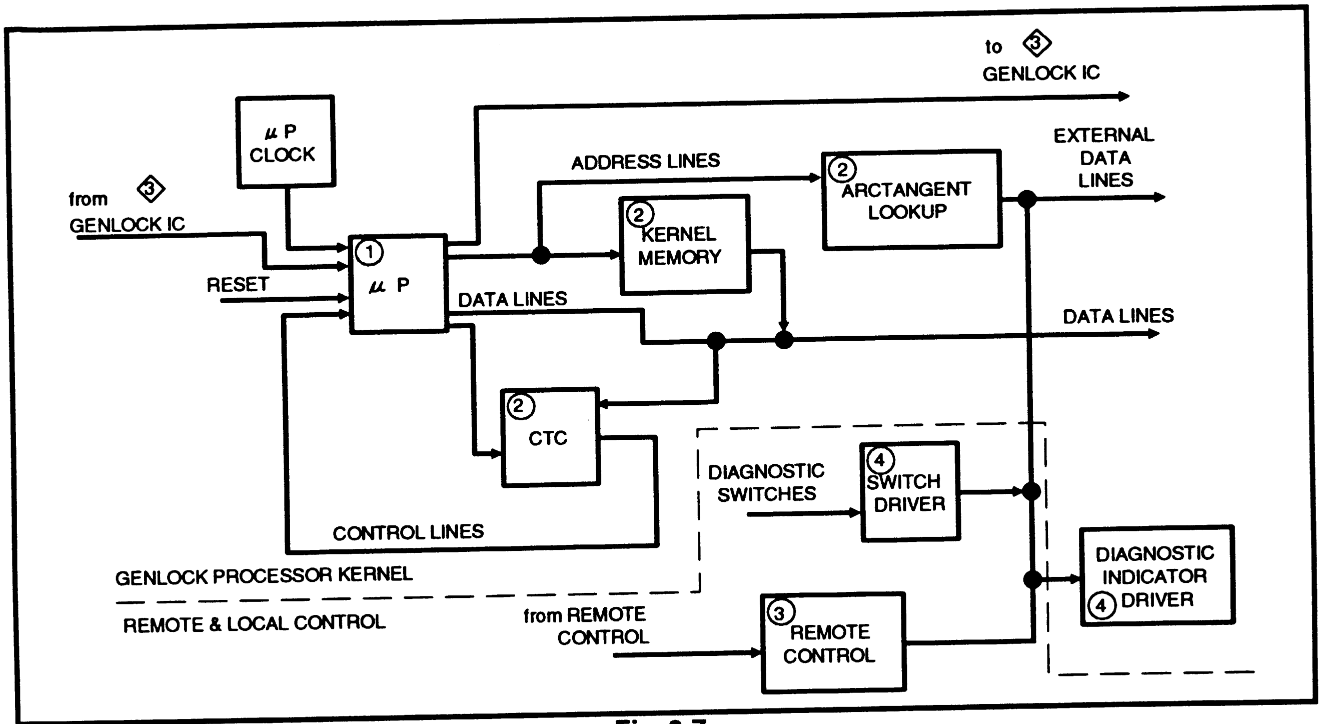


Fig. 2-7.
Block Digarm of the Genlock Processor Kernel on the ADC board.

GENLOCK PROCESSOR KERNEL ④ (See Fig. 2-7)

This section briefly describes the functions of the Microprocessor (µP) Kernel and its components. For a description of the diagnostics executed by the µP, refer to the Maintenance section of this manual.

The µP Kernel has four main functions: (1) to acquire and maintain genlock with the incoming reference signal, (2) to service remote commands, (3) to control the Memory's read timing, and (4) to execute diagnostics. The components of the µP Kernel are described as follows:

Genlock Processor Kernel

① Microprocessor

The Microprocessor (µP) (U24) is the heart of the Kernel. Receiving its program instructions from the EPROM (U25), the µP controls the Kernel through address lines (A0-A14), data lines (D0-D7), and various other control lines. When the instrument is being powered up the RESET pulse goes low, resetting the µP Kernel. The µP can be manually reset by pressing the manual reset button, S1.

During normal operation, the Genlock IC (U37)③ monitors the µP. If the µP is not sending the proper I/O decoded address U37 will pulse the NMI (non-maskable interrupt) of the Z80 causing the processor to reinitialize without running the power-up diagnostics.

U18 also contains a timer circuit. During normal operation, the µP keeps this timer reset by asserting the I/O_14 line repeatedly. If the µP fails to reset the timer, U18 resets the µP. Moving jumper J6 to the 2-3 position forces RESET low and moving J5 to the 2-4 position disables the µP resets for troubleshooting purposes. U18 also monitors the + 5 V supply and will generate a reset if it falls below 4.75 V.

② Kernel Memory, Arctangent Lookup, & CTC

EPROM (U25) contains the instructions that control the µP. The EPROM occupies the µP's address spaces between 0000 and 7FFF hex.

The Arctangent PROM (U26) is a look-up table of the trigonometric function of the ratio of two numbers. While doing genlock calculations, the µP looks up the solution to the arctangent calculation in the PROM instead of calculating it.

The µP first outputs the divisor of the calculation and it is latched in U19. This provides the lower half of the PROM address. Then the µP reads from the arctangent I/O location. By virtue of the µP architecture, the upper 8 address lines contain the I/O port address. These 8 bits form the upper 8 bits of the PROM address. The PROM outputs are then available on the external data bus ED0-ED7.

The E^2PROM (U63) is an electrically writable and erasable PROM. It is used to store the genlock sampling angle and remote video gain values. It occupies addresses E000 - E7FF. Selection for reading and writing is controlled via U62.

The E^2PROM is read at power-up and after a reset. These values are transferred to the processor RAM for use by the appropriate circuitry.

Remote and Local Control

③ Remote and Local Control

The Remote Buffer (U39) is controlled by EPROM U65. The Remote Buffer takes signals from the Remote Control Bus and, using information generated internally on the ADC board, derives control signals for use in the Microprocessor Kernel. These control signals are sent out on the ED (External Data) bus.

④ Diagnostic Selectors and LEDs

The diagnostic select switch, S2, controls the diagnostic routines that are run on the ADC board through the µP. U22 latches the signals from the switches and sends them off on the ED bus to drive the µP.

Latches U21 and U22 drive the diagnostic LEDs with signals from the External Data bus.

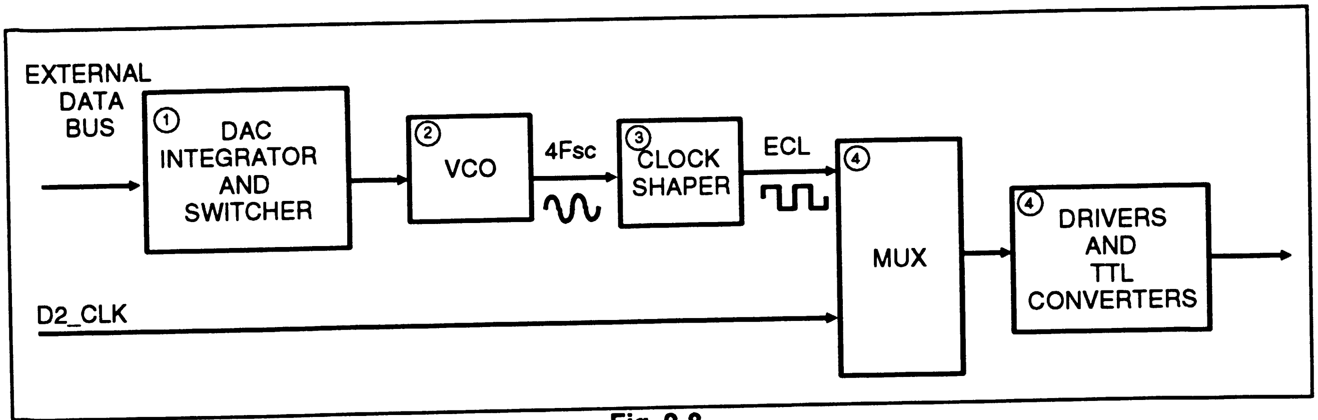


Fig. 2-8.
Block Diagram of the VCO and Clock Distribution circuit on the ADC board.

VCO and CLOCK DISTRIBUTION ⑤ (See Fig. 2-8)

① DAC Integrator and Switcher

The Genlock IC controls the VCO through the VCO DAC Integrator (U45). The VCO DAC converts the Genlock IC correction word to current pulses. These pulses are applied to integrator, U53B. The correction word ranges from 00 to FF hex. Integrator U53B has two main functions. First it works as a current-to-voltage converter for the current pulses generated by the VCO DAC. These pulses shift the VCO frequency to correct the VCO phase. Second, the integrator produces an average of the correction pulses. This average is essentially a dc level that tracks the input burst frequency. The Genlock IC controls switches in U47 through the (INT)/GENLOCK and (HOLD)/ACQUIRE lines. The switches put the VCO in one of four operating modes: Internal, Genlock, Acquire, or Hold. Each one is described below.

INTERNAL MODE: When the Genlock IC cannot detect a valid genlock input, it switches the genlock input into internal mode by pulling the (INT)/GENLOCK line low. This pulls the correction voltage at the integrator output to midrange or zero volts by closing three switches. The first switch shorts out the integrator capacitor; the second and third switches short out any residual voltage to ensure the correction voltage applied to the VCO is truly zero or midrange.

GENLOCK MODE: When the GENLOCK System detects a valid genlock input signal it pulls the (INT)/GENLOCK line high to apply the VCO correction voltage to the VCO.

ACQUIRE MODE: To acquire lock with the genlock input, the genlock loop needs to be faster than when it is just holding lock. To speed up the GENLOCK LOOP, the Genlock IC increases the integrator gain by pulling the (HOLD)/AQUIRE line high. This adds a large resistance (R105) to the integrator feedback loop.

HOLD MODE: To hold lock, the GENLOCK System slows down the genlock loop by pulling the HOLD/AQUIRE line low to remove R105 from the integrator feedback loop.

② VCO

Capacitor C90 and the series combination of C92, C93, and C94 appear in parallel with crystal Y2. This parallel circuit is the heart of the Oscillator. The series combination of varactor CR8 and C91 also appear in parallel with the crystal and determine the frequency correction range of the oscillator. As the Genlock IC changes the VCO correction voltage, the reversed bias diode shifts the frequency over a correction range centered around the oscillator's free-running frequency.

Jumper J11 (in the 2-3 position) allows the VCO correction voltage to be grounded when the free-running frequency is being adjusted with C90.

Jumper positions 3-4 and 3-5 select the minimum and maximum correction voltages to check the full VCO correction range.

③ Clock Shaper

Q8 buffers the VCO output. ECL driver U48A converts the buffered output into a complementary pair of squarewave clocks. Two RC circuits (R112/C107 and R106/C95) average the square waves. Op amp, U53A, amplifies the difference between these averages and shifts the bias of the VCO output to correct the duty cycle to 50%. Through U48B a corrected differential ECL signal is applied to the MUX.

④ MUX and TTL Converter

The MUX (U55) controls which clock signal to use: the clock from the Clock Shaper Circuit or the clock from the Composite Digital Input, J15A1. The MUX is controlled by the D2_ENECL signal from the Genlock IC. The output of the MUX is an ECL signal which goes to ECL driver U48C and the ECL → TTL converter U54. The ECL clock signals , CLK and CLK, are used locally to clock the ADC, U4. The clocks converted to TTL are system clocks and are used throughout the ADC board.

INTERCONNECT and POWER DISTRIBUTION 6

See Tables 2-1 through 2-3 for pin-out information.

Table 2-1. Pin-out for J15A1

PIN	SIGNAL NAME
1	AGROUND
2	AGROUND
3	AGROUND
4	not connected
5	not connected
6	not connected
7	not connected
8	D2_CLK
9	not connected
10	not connected
11	AGROUND
12	WCLKB
13	-5 V
14	-5 V
15	-12 V
16	DGROUND
17	DGROUND
18	+12 V
19	+5 V
20	+5 V
21	WCLKA
22	DGROUND
23	D2_9
24	D2_8
25	D2_7
26	D2_6
27	D2_5
28	D2_4
29	D2_3
30	D2_2
31	D2_1
32	D2_0

Table 2-2. Pin-out for J15B1

PIN	SIGNAL NAME
1	AGROUND
2	PROG_IN
3	AGROUND
4	not connected
5	not connected
6	(CLK_EN)
7	not connected
8	(NOISE)
9	VID_ABS
10	(W_F1L7)
11	AGROUND
12	AGROUND
13	-5 V
14	-5 V
15	-12 V
16	DGROUND
17	DGROUND
18	+12 V
19	+5 V
20	+5 V
21	DGROUND
22	DGROUND
23	(RI/O_0)
24	RRD/(WR)
25	RCM_7
26	RCM_6
27	RCM_5
28	RCM_4
29	RCM_3
30	RCM_2
31	RCM_1
32	RCM_0

Table 2-3. Pin-out for J15C1.

PIN	SIGNAL NAME
1	AGROUND
2	AGROUND
3	AGROUND
4	not connected
5	not connected
6	not connected
7	not connected
8	(D2_CLK)
9	not connected
10	not connected
11	GROUND
12	(WCLKB)
13	-5 V
14	-5 V
15	-12 V
16	DGROUND
17	DGROUND
18	+12 V
19	+5 V
20	+5 V
21	(WCLKA)
22	DGROUND
23	ADC9
24	ADC8
25	ADC7
26	ADC6
27	ADC5
28	ADC4
29	ADC3
30	ADC2
31	ADC1
32	ADC0

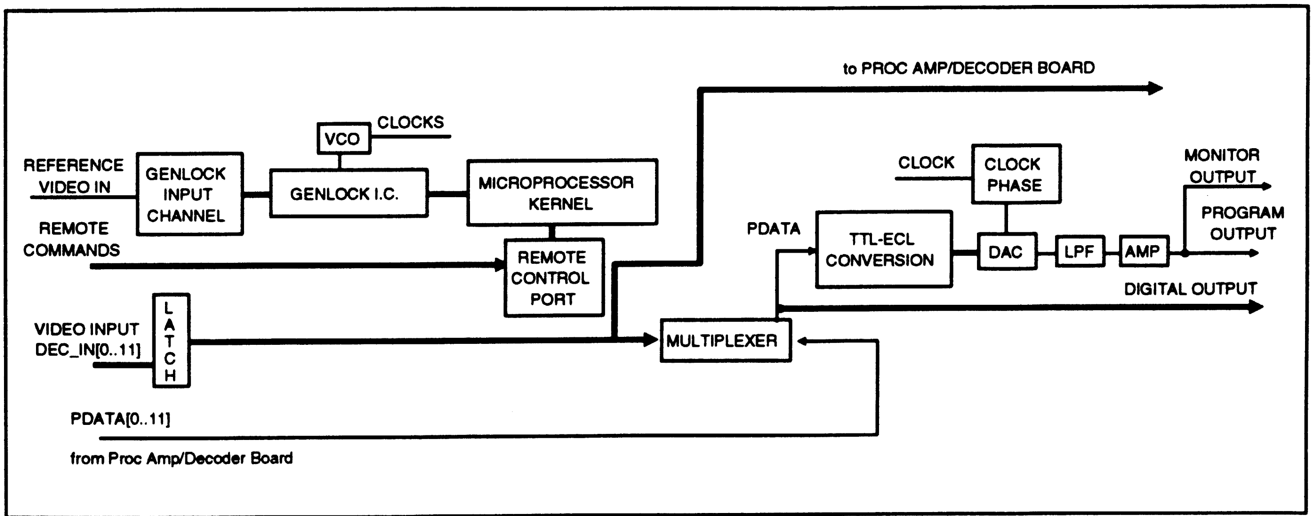


Fig. 2-9. Block diagram of the DAC board.

DAC BOARD

BLOCK LEVEL DESCRIPTION (See Fig. 2-9)

The DAC board has two functions. The first is to genlock to the REFERENCE Input signal in order to supply the $4F_{SC}$ clock (R_CLK) and reset pulse [(R_F1L7)] to the Controller board. The second function is to process the synchronized digital signal and output it in both analog and parallel composite digital formats (COMPOSITE DIGITAL OUTPUT).

The REFERENCE Input is buffered, clamped, low-passed filtered, and converted to digital form. The Genlock Processor then analyzes the data to calculate the burst phase to keep the PLL locked. The SC/H phase is also calculated to provide timing for the field reset pulse.

The TTL data from the Memory board is clocked with the Reference Genlock signals. It then goes through the Latches on the DAC board and up to the Proc Amp/Decoder board where the Processing Amplifiers allow the user to adjust the signal. The data is then returned to the DAC board. A Multiplexer selects between the Proc Amp input data and the Proc Amp output data (Proc Amp disabled or enabled). This data is converted to ECL and drives the DAC and the rear panel parallel video output (COMPOSITE DIGITAL OUTPUT).

The DAC converts the data to an analog signal, which is then low-pass filtered with a reconstruction filter, buffered by the output amplifier, and output as the PROGRAM OUTPUT and MONITOR signals.

LIST OF SCHEMATICS

1. INTERCONNECT
2. ADC, CLAMP, & GENLOCK IC
3. PROCESSOR KERNEL
4. VCO AND CLOCKS
5. DIGITAL INPUT
6. DAC & OUTPUT STAGE

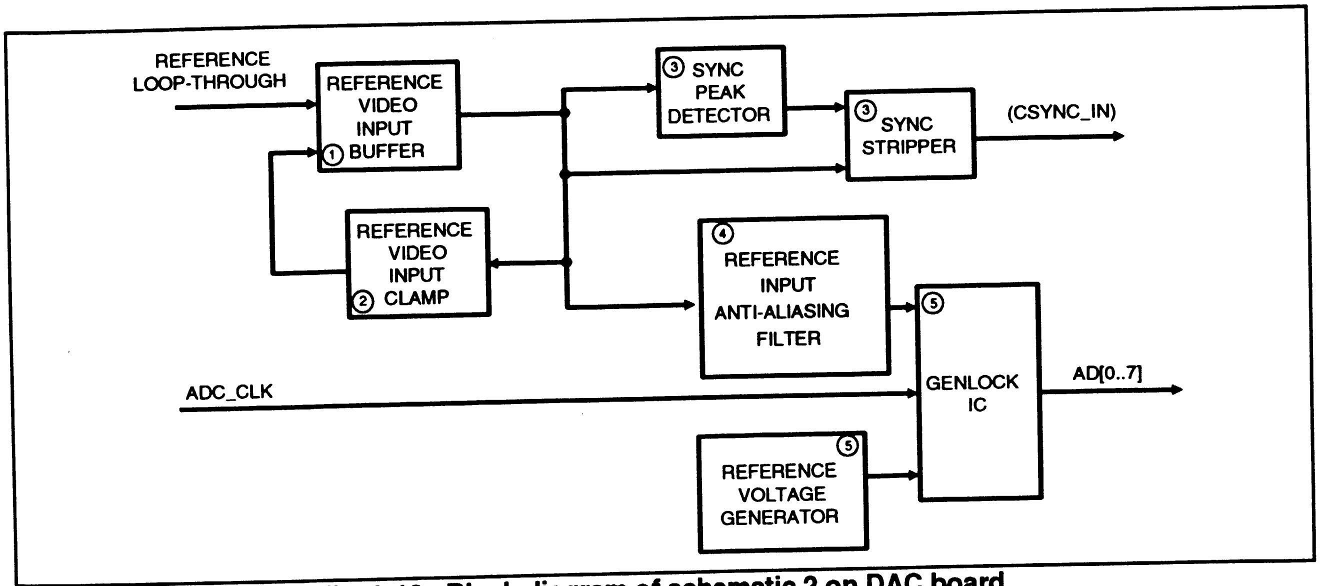


Fig. 2-10. Block diagram of schematic 2 on DAC board.

SCHEMATIC LEVEL DESCRIPTION DAC BOARD

② ADC, CLAMP, & GENLOCK IC (See Fig. 2-10)

① Reference Video Input Buffer

The ac coupled genlock input buffer inverts and amplifies the REFERENCE Input signal so sync and burst fill the range of the genlock ADC (U2).

At the input stage, op amp U1 isolates and amplifies the REFERENCE Input signal. The signal is fed back to the input of the amplifier at the negative input of U1. The input clamp feedback is also added back to the signal at that point.

② Reference Video Input Clamp

By comparing the sync tip voltage of the REFERENCE Input signal with a -50 mV reference, the input clamp circuit generates a dc offset voltage to clamp the incoming signal to -50 mV.

The CLAMP_TM signal (derived from the output of the sync stripper) enables U8 allowing it to generate a voltage equal to the difference between the sync of the input video applied to pin 3 and the -50 mV reference applied to pin 2. The difference is stored in C36 for the remainder of the line. This correction voltage is buffered by U5B and applied to U1 through R13 where it clamps the sync tip of the genlock input to -50 mV.

③ Sync Peak Detector & Sync Stripper

The Sync Peak Detector and sync stripper extract sync pulses from the buffered REFERENCE Input signal and applys them to the Input Clamp and the Genlock IC. C38 and L2 filter off the chrominance portion of the REFERENCE Input signal. The remainder of the signal goes to the Sync Peak Detector and inverting op amp. U7 compares the outputs of these devices and produces the composite sync.

In addition to driving the Clamp Circuit, the stripped sync signal is applied to the Microprocessor Kernel through U22.

④ REFERENCE Input Anti-Aliasing Filter

Made of C28, C35, C34, and L1, this filter attenuates spectral components above the video band to prevent aliasing of the REFERENCE Input signal when it is quantized by the ADC.

⑤ Reference Voltage Generator & Genlock IC

The ADC (U2) converts the clamped and inverted video signal into 8-bit data. U3 provides a regulated +2.5 V reference for the Reference Voltage Generator (U5A and U5B). The Reference Voltage Generator scales down to the plus and minus reference voltages for the ADC.

Because the ADC is clocked by clock signal derived from the VCO (ADC_CLK), the ADC output indicates the VCO-to-burst phase relationship. During each field, the Genlock IC (U83) repeatedly checks the phase relationship , and if necessary, shifts the VCO frequency to keep it in phase with the incoming burst. The data is sent to the Genlock IC.

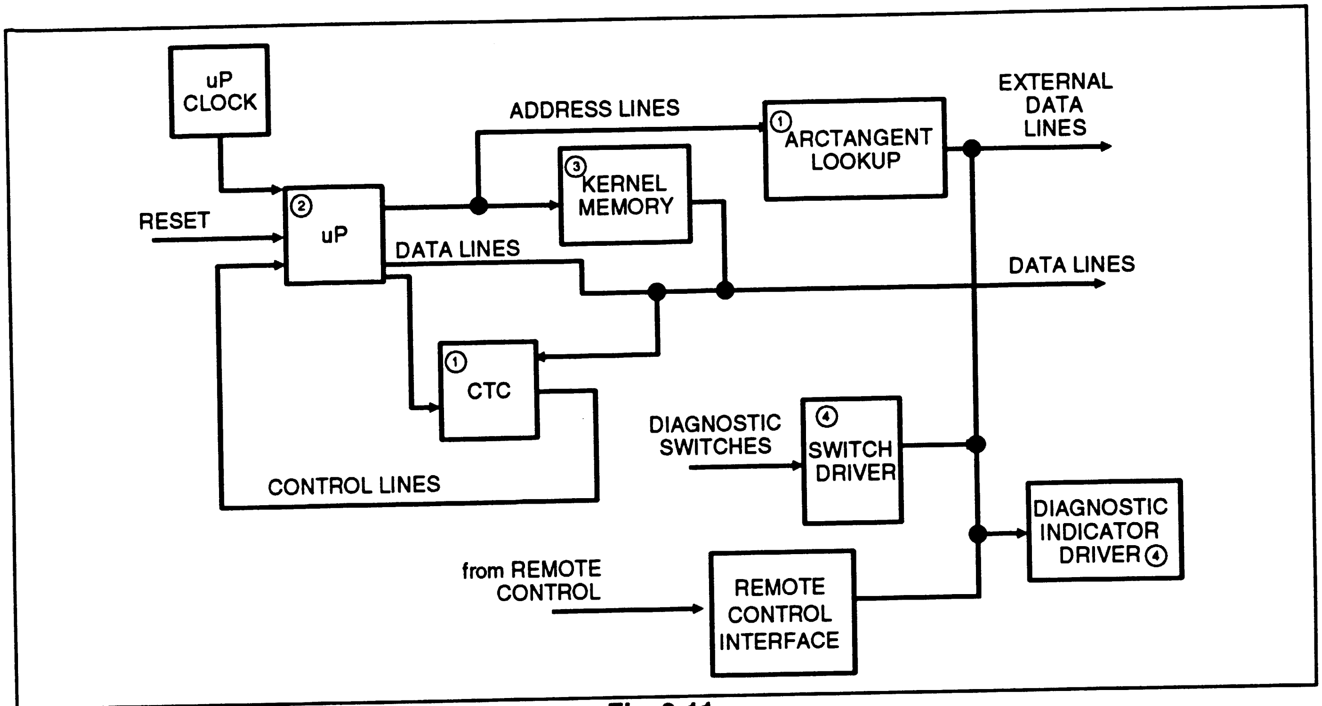


Fig. 2-11.
Block diagram of the DAC Processing Kernel.

③ PROCESSOR KERNEL (See Fig. 2-11)

① Z80, CTC, and Arctangent Look-up

This section briefly describes the functions of the Microprocessor Kernel and its components. For a description of the diagnostics executed by the µP, refer to the Maintenance section of this manual.

The µP Kernel has four main functions: (1) to acquire and maintain genlock with the incoming reference signal, (2) to service the remote commands, (3) to control the Memory's read timing, and (4) to execute diagnostics. The components of the µP Kernel are described as follows:

② Microprocessor

The Microprocessor (µP) (U23) is the heart of the Kernel. Receiving its program instructions from the EPROM (U24), the µP controls the Kernel through address lines A[0..14], data lines D[0..7], and various other control lines. When the instrument is being powered up the RESET pulse goes low, resetting the µP Kernel. The µP can be manually reset by pressing the manual reset button, S2.

During normal operation, the CTC (U22) monitors the µP. If the µP is not sending the correct data and addresses to the CTC, the CTC puts out a RESET pulse to interrupt and reinitialize the µP.

U18 also contains a timer circuit. During normal operation, the µP keeps this timer reset by asserting the I/O_14 line repeatedly. If the µP fails to reset the timer, U18 resets the µP. Moving jumper J5 to the 2-3 position forces RESET low, and moving J5 to the 2-4 position disables the µP resets for troubleshooting purposes.

③ Kernel Memory

EPROM (U24) contains the instructions that control the µP. The EPROM occupies the µP's address space between 0000 and 7FFF hex.

The Arctangent PROM (U19) is a look-up table of the trigonometric function of two numbers. While doing genlock calculations, the µP looks up the solution to the arctangent calculation in the PROM instead of calculating it.

First the µP outputs the divisor of the calculation and is latched by U25. This provides the lower half of the PROM address. Then the µP reads from the arctangent I/O location. By virtue of the µP architecture, the upper 8 address lines contain the I/O port address. These 8 bits form the upper 8 bits of the PROM address. The PROM outputs are then available on the external data bus ED[0..7].

NVRAM (U20) is a combination of nonvolatile memory and static RAM. The NVRAM contains genlock timing presets and remote control selected data. The NVRAM occupies addresses E000-E07F.

Immediately following a µP reset, the µP loads the data from the nonvolatile portion of the NVRAM into the RAM portion. Then, from the RAM, loads this information to the appropriate circuits. If new information is selected from the remote, it is stored in the RAM portion of the memory until an NVSAVE is applied, then the new data is stored in NVRAM.

The NVRAM is controlled by the µP via the NVRAM Controller PAL (U21). The Controller PAL decodes the µP address and control lines to generate read, write, and chip select pulses for the NVRAM.

④ Diagnostic Selectors and LEDs

The Diagnostic Select Switch, S1, controls the diagnostic routines that are run on the ADC board through the µP. U28 latches the signals from the switches and sends them on the ED bus to drive the µP.

Latches U26 and U27 drive the diagnostic LEDs with signals from the External Data bus.

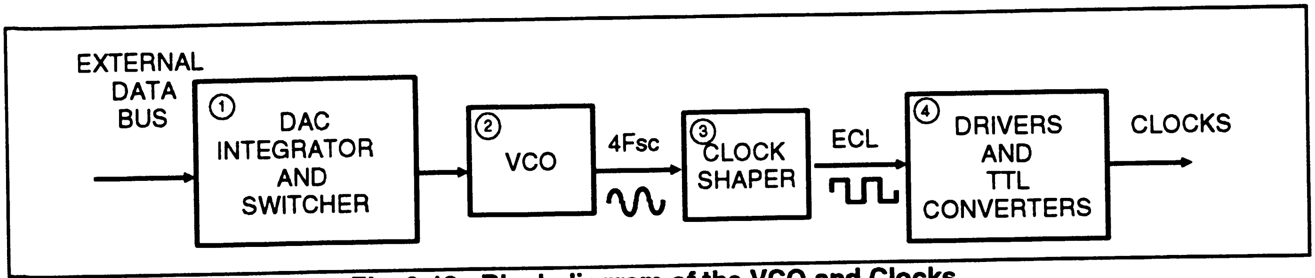


Fig. 2-12. Block diagram of the VCO and Clocks.

④ VCO AND CLOCKS (See Fig. 2-12)

① DAC Integrator and Switcher

The Genlock IC controls the VCO through the VCO DAC Integrator (U29). The VCO DAC converts the genlock IC correction word to current pulses and applies then to the integrator, U37B. The correction word ranges from 00 to FF hex. Integrator U37B has two main functions. First it works as a current-to-voltage converter for the current pulses generated by the VCO DAC. These pulses shift the VCO frequency to correct the VCO phase. Second, the integrator produces an average of the correction pulses. This average is essentially a dc level that tracks the input burst frequency. The Genlock IC controls the switches in U47 through the (INT)/GENLOCK and (HOLD)/AQUIRE lines. The switches put the VCO in one of four operating modes: Internal, Genlock, Acquire, and Hold. Each one is described below.

INTERNAL MODE: When the Genlock IC cannot detect a valid genlock input, it switches the genlock input into internal mode by pulling the (INT)/GENLOCK line low. This pulls the correction voltage at the integrator output to midrange or zero volts by closing three switches. The first switch shorts out the integrator capacitor; the second and third switches short out any residual voltage to ensure the correction voltage applied to the VCO is truly zero or midrange.

GENLOCK MODE: When the Genlock IC detects a valid genlock input signal it pulls the (INT)/GENLOCK line high to apply the VCO correction voltage to the VCO.

ACQUIRE MODE: To acquire lock with the genlock input, the genlock loop needs to be faster than when it is just holding lock. To speed up the GENLOCK LOOP, the Genlock IC increases the integrator gain by pulling the HOLD/AQUIRE line high. This adds a large resistance (R105) to the Integrator feedback loop.

HOLD MODE: To hold lock, the Genlock IC slows down the genlock loop by pulling the (HOLD)/AQUIRE line low to remove R105 from the integrator feedback loop.

② VCO

Capacitor C46 and the series combination of C45, C51, and C52 appear in parallel with crystal Y2. This parallel circuit is the heart of the Oscillator. The series combination of varactor CR4 and C54 also appears in parallel with the crystal and determine the frequency correction range of the oscillator. As the Genlock IC changes the VCO correction voltage, the reversed bias diode shifts the frequency over a correction range centered around the oscillator's free-running frequency.

Jumper J7 (in the 2-3 position) allows the VCO correction voltage to be grounded when the free-running frequency is being adjusted with C46. Jumper positions 3-4 and 3-5 select the minimum and maximum correction voltages to check the full VCO correction range.

③ Clock Shaper

Q8 buffers the VCO output. ECL driver U39A converts the buffered output into a complementary pair of squarewave clocks. Two RC circuits (R64/C55 and R42/C43) average the square waves. Op amp U37A amplifies the difference between these averages and shifts the bias of the VCO output to correct the duty cycle to 50%. Through U39C and U39B a corrected differential ECL signal is applied to the Clock Drivers and the ECL → TTL Converters.

④ Clock Drivers and TTL Converter

U40 is a differential clock driver for clocks used on the board. U41 and U48 are ECL → TTL converters used to drive the timing signals off the board.

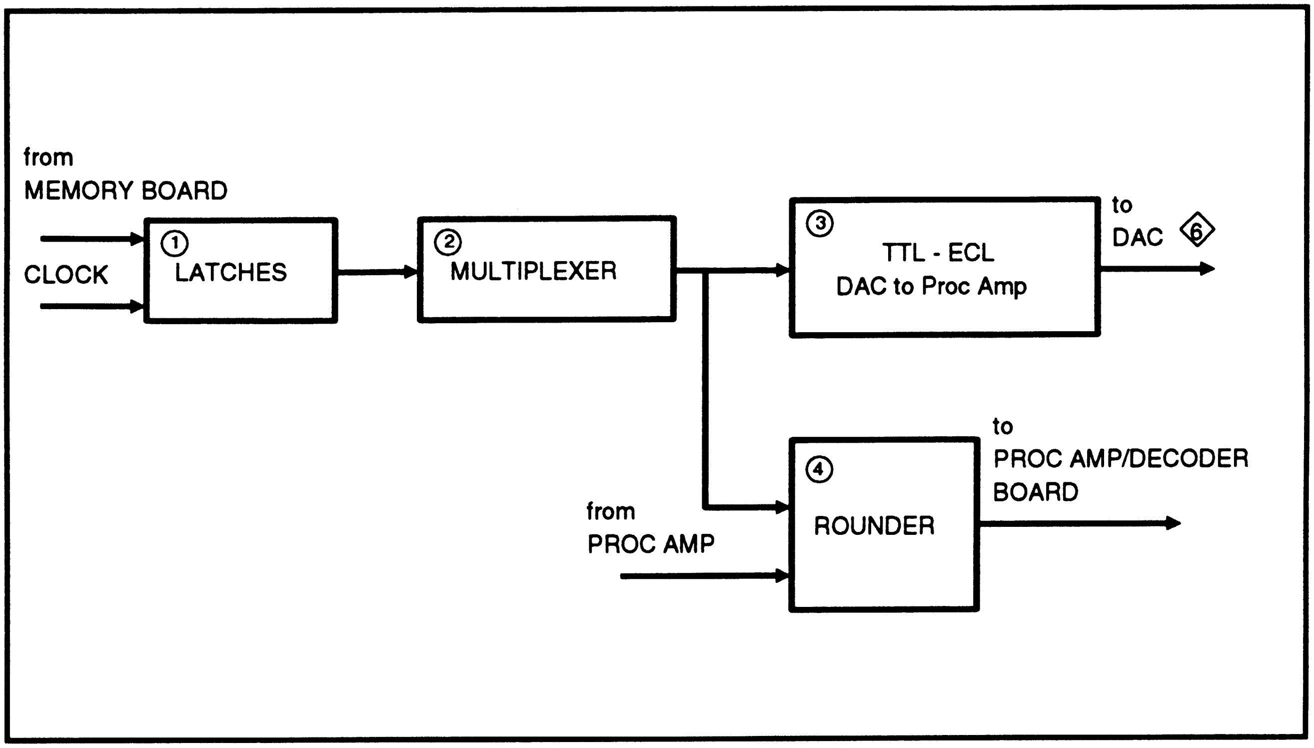


Fig. 2-13. Block Diagram of the Digital Input.

⑤ DIGITAL INPUT (See Fig. 2 -13)

① Latches

U45 and U46 latch the signal from the Memory board and drive it both to the Proc Amp/Decoder board and a second set of latches (U87 and U88). U87 and U88 drive the Rounder.

② Multiplexer

The Multiplexer is a second set of latches (U87 and U88) that selects between the data from the Memory board and the Proc Amp/Decoder board as the data to be processed by the Rounder and TTL-to-ECL converter.

③ TTL → ECL Conversion

U15, U16, and U17 convert the digital signal from TTL (used for bussing) to ECL for the DAC and the COMPOSITE DIGITAL OUTPUT.

④ Rounder

U10 is a PAL configured to convert the 12-bit data to 10-bit or 8-bit data without the artifact of dc level shifting caused by simply dropping the two lowest bits. The Rounder only affects the COMPOSITE DIGITAL OUTPUT, not the PROGRAM OUTPUT.

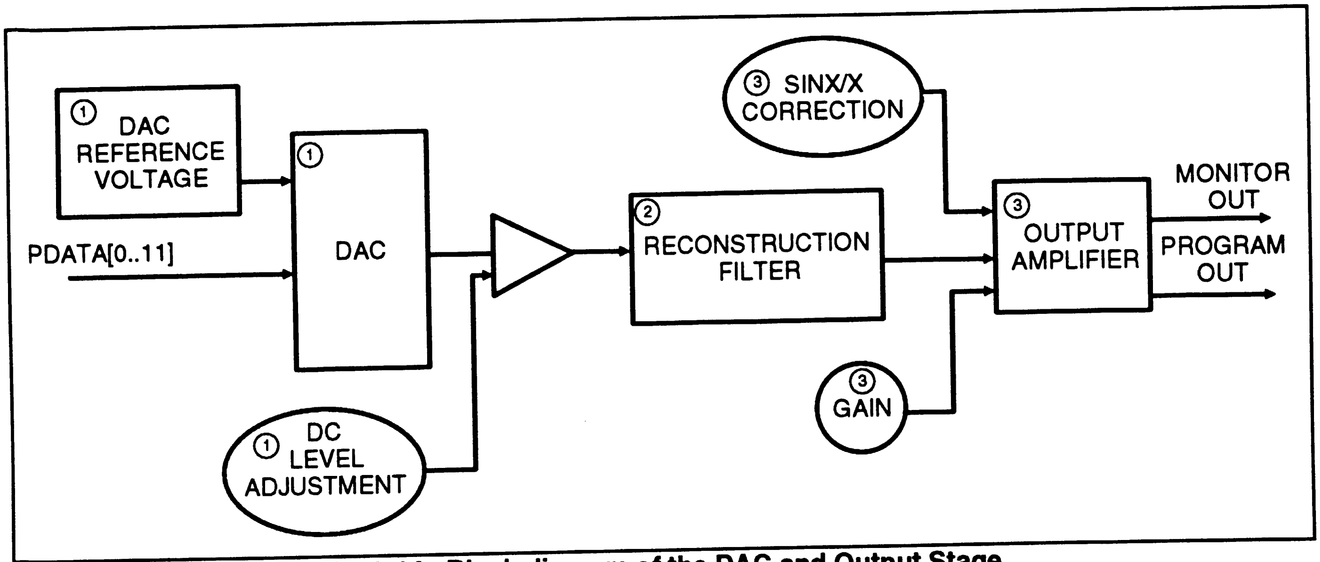


Fig. 2-14. Block diagram of the DAC and Output Stage.

⑥ DAC & OUTPUT STAGE (See Fig. 2-14)

① Output DAC and Reference Voltage

The data from the TTL → ECL converters is sent to the DAC. The DAC (U56) is a Tek-made 12-bit digital-to-analog converter which converts the program signal back into an analog output signal.

U3 regulates the +5 V supply to provide the output circuits with a +2.5 V reference voltage. U58 converts the +2.5 V reference to provide the DAC with a reference voltage of approximately +1.00 V.

The output of the DAC is a voltage with a source resistance of 50 Ω. The DAC output is very gently lowpass filtered through L14, C111-C113, and load resistance R135. The gentleness of the filter limits the slew rate of the signal allowing op amp U89 to cleanly pass the signal.

U89 buffers the signal and drives the reconstruction filter from a source resistance of 75 Ω. The op amp input also provides a summing node into which the output dc adjustment (R144) can correct the dc offset.

② Output Reconstruction Filter

To remove out-of-band signal components, the output signal from the output DAC is filtered by a reconstruction filter that is both source and load terminated in 75 Ω (R140 and R80 respectively).

The first three sections of the filter (L3, L4, and associated capacitors) form a seven-pole elliptic low-pass reconstruction filter. The next section (L13, C55, C95, R125 and associated resistors) is a loss compensator, which helps flatten the total filter response in the center of the frequency band. The last two sections (L5, L6, L9, L10 and associated capacitors) are group delay correctors.

③ Output Amplifier

After filtering, the signal is applied to the Output Amplifier, which is a discrete, non-inverting op amp composed of differential amplifiers and an output stage. The first stage (Q9 and Q10) is an input buffer, the second (Q12 and Q13) is a gain stage, and the third (Q11) is an output driver.

From the emitter of Q11, negative feedback is applied to Q10 through a voltage divider network. At R115, the output gain is adjusted. In this feedback path, an RCL network (connected to C87) provides adjustable sin(x)/x compensation through C87 increasing or decreasing negative feedback in the high end of the video spectrum.

From the emitter of Q11, the amplified and compensated signal is applied to the rear panel connectors through R122 for the MONITOR OUTPUT and R84 for the PROGRAM OUTPUT.

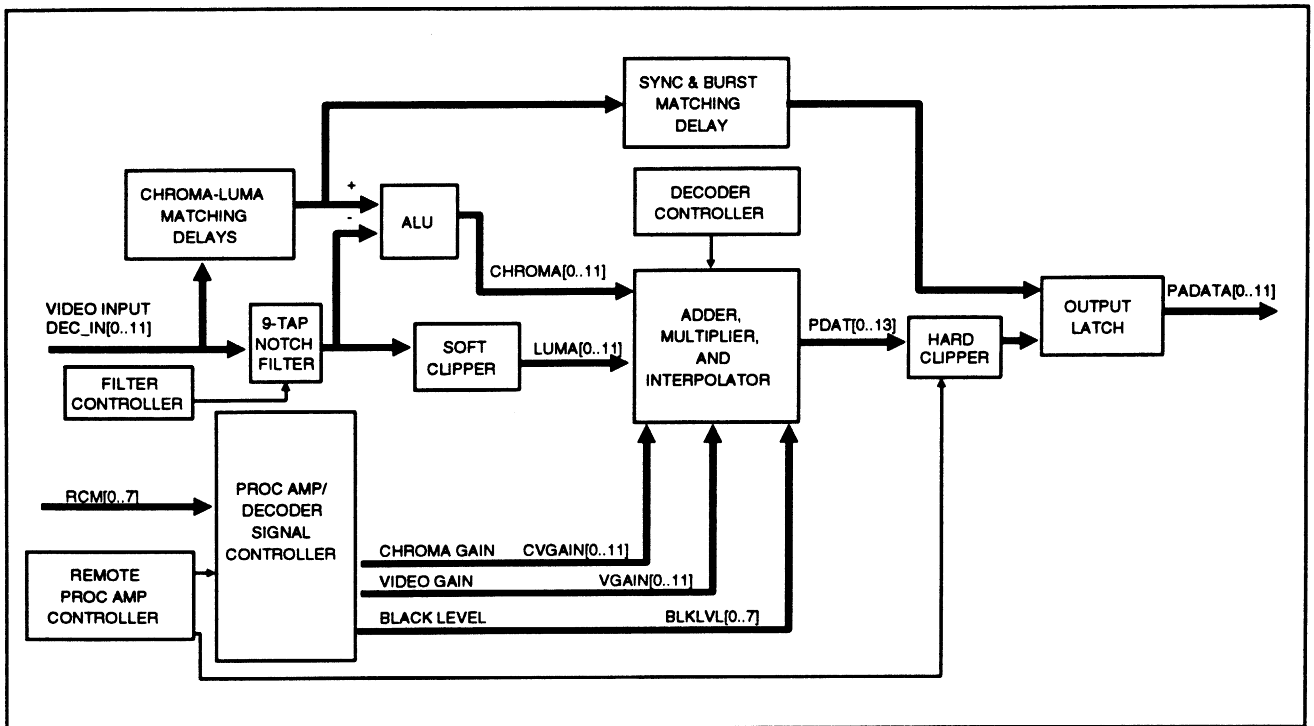


Fig. 2-15. Block diagram of the Proc Amp/Decoder board.

PROC AMP/DECODER BOARD

BLOCK LEVEL DESCRIPTION (See Fig. 2-15)

The function of the Proc Amp/Decoder board is to process the digital signal with Proc Amp information from either the Remote board or the RC 211, then return it to the DAC board.

The digital video data comes from the Memory board, through the Latches on the DAC board, and onto the Proc Amp/Decoder board.

The digital video data is filtered in the 9-Tap Notch Filter to separate the chrominance and the luminance. The filter notches the chrominance band out of the input signal to form the luminance signal. The luminance signal then is subtracted from the input (after a matching delay) to form the chrominance signal. The same luminance signal also goes through the Soft Clip to take out any out-of-limit luminance information.

In the Adder, Multiplier, and Interpolator, the chroma is multiplied by the Chroma Gain and the luma by the luminance gain. The two signals are then added back together along with the dc offset (Black Level). Finally, the composite data is Hard Clipped to fit the legal data range (three clip options are available).

The data is then returned to the DAC board via the Output Latch. The Output Latch also alternated between sync & burst data (not processed by the Proc Amp) and the Proc Amp Data.

LIST OF SCHEMATICS

1 INTERCONNECT AND MISC. CONTROL

2 DIGITAL PROC AMP

3 DECODER

4 REMOTE CONTROL

SCHEMATIC LEVEL DESCRIPTION PROC AMP/DECODER BOARD

1 INTERCONNECT AND MISC. CONTROL

Clock Driver

The Clock Driver takes the decoder clock and converts it to the clock signals needed throughout the board.

Remote Proc Amp Controller

The Remote Proc Amp Controller converts either the local signals or those from the Remote board into the control signals for the Proc Amps.

Decoder Controller

The Decoder Controller gives control of the Decoder Mode to either the Controller board or locally to J3 and J4.

2 DIGITAL PROC AMP (See Fig. 2-16)

① Adder, Multiplier, & Interpolator

U4; the Adder, Multiplier, & Interpolator; is the heart of the Proc Amp. It take the separate luminance and chrominance signals and processes them with the chroma gain, voltage gain and setup levels to produce the processed data signal. This signal is then sent to the Hard Clipper.

② Chroma-Luma Matching Delay

U11-U13 are matching delays. They match the digitized composite video signal, DEC_IN[0..11], to the notched luminance signal LUM[0..11]. This is so the two signals can be processed together in the ALU.

③ Hard Clipper

The Data Clipper consists of three PALs: U37-U39. Using control signals from the remote, these three PALs take the signal from the Adder, Multiplier, & Interpolator and clip the composite video signal to fit in the user-selected range. There are three user selected options. This signal is sent to the Output Latch.

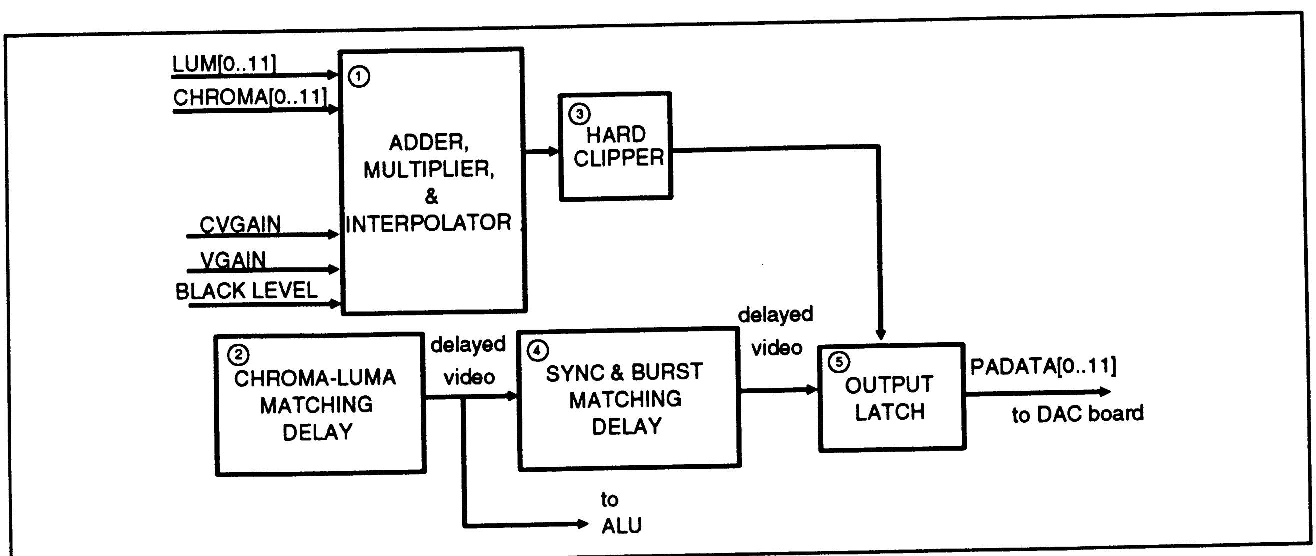


Fig. 2-16. Block diagram of the Digital Proc Amp.

④ Sync & Burst Matching Delay

The sync & burst portion of the video signal is not processed by the Proc Amps, therefore it needs a matching delay so that it can be reinserted in the video signal properly timed. The entire composite video signal passes through the Sync & Burst Match Delay circuit (U48 and U45) but the signal is only sent to the Output Latch during sync & burst time.

⑤ Output Latch

The Output Latch (U46-U47) latches the signals from either the Hard Clipper or Sync & Burst Matching Delay and sends it out onto the DAC board.

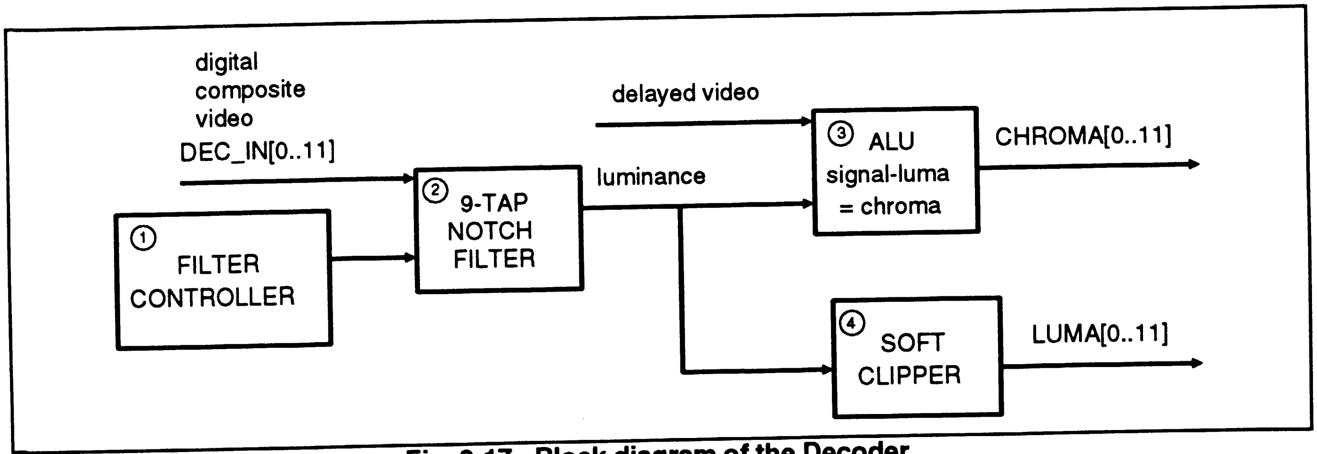


Fig. 2-17. Block diagram of the Decoder.

③ DECODER (See Fig. 2-17)

① Filter Controller

The Filter Controller derives the control signals for the 9-Tap Notch Filter.

② 9-Tap Notch Filter

The 9-Tap Notch Filter, U40, takes the digitized video input signal and notches out the chrominance portion of the signal leaving only the luminance. U40 is controlled by a state machine consisting of U41-U44. These PALs use the decoder enable and decoder clock signals to derive the controlling lines for the Chroma Notch Filter. The luminance signal goes to the ALU and Soft Clipper.

③ ALU (Signal - Luma = Chroma)

The ALU consists of U1-U3. The luma signal is subtracted from the delayed input signal leaving only the chrominance. The eleven-bit, filtered chrominance signal is then used by the 9-Tap Chroma Interpolator to derive the interpolated chroma signal. The chroma signal goes to the Adder, Multiplier, & Interpolator ④.

④ Soft Clipper

The Soft Clipper (U5, U6 and U8) only clips the luminance portion of the signal at user-defined levels. This allows high luminance levels not to interfere with acceptable levels of chrominance. The clipped luminance signal goes to the Adder, Multiplier, & Interpolator ④.

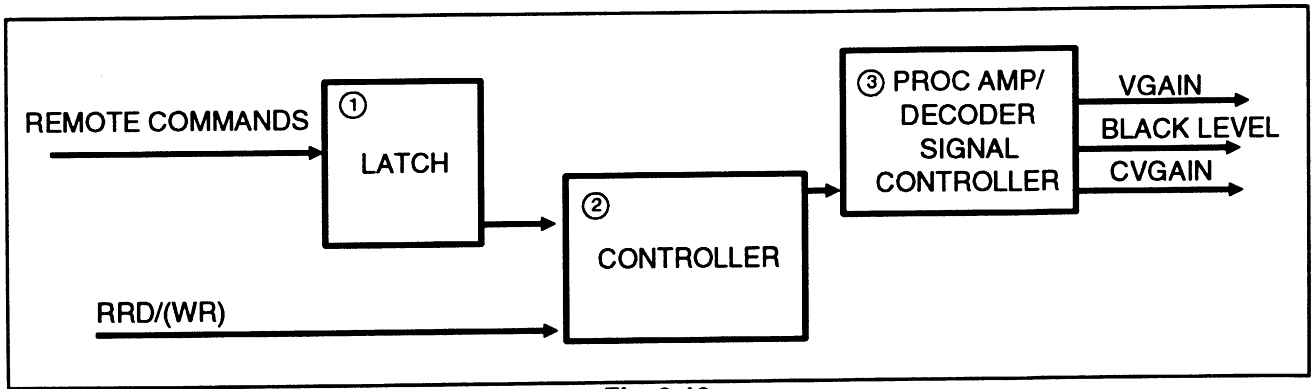


Fig. 2-18.
Block diagram of the Remote Control.

④ REMOTE CONTROL (See Fig. 2-18)

① Latch

U21 latches the control signal from the Remote board for use in Proc Amp/Decoder Signal Controller.

② Controller

The Controller consists of two parts. First, U33 and U53, take the signals from the Latch and convert them to enable signals for the Proc Amp/Decoder Controller.

The second part consists of U34 and jumpers J13 - J20. This part gives control of assorted functions to either the Remote board or locally to the jumpers.

③ Proc Amp/Decoder Signal Controller

U33 is a PAL that take the latched signals from the Remote board and converts them into Proc Amp enable signals. These signals turn on the appropriate chips to decode the remote signal into proc amp control signals. U22-U32 use the remote and enable by signals from U33 to derive the following signals: Chroma Gain, Voltage Gain, and Black Level. These numbers are used in the Adder, Multiplier, & Interpolator ③.

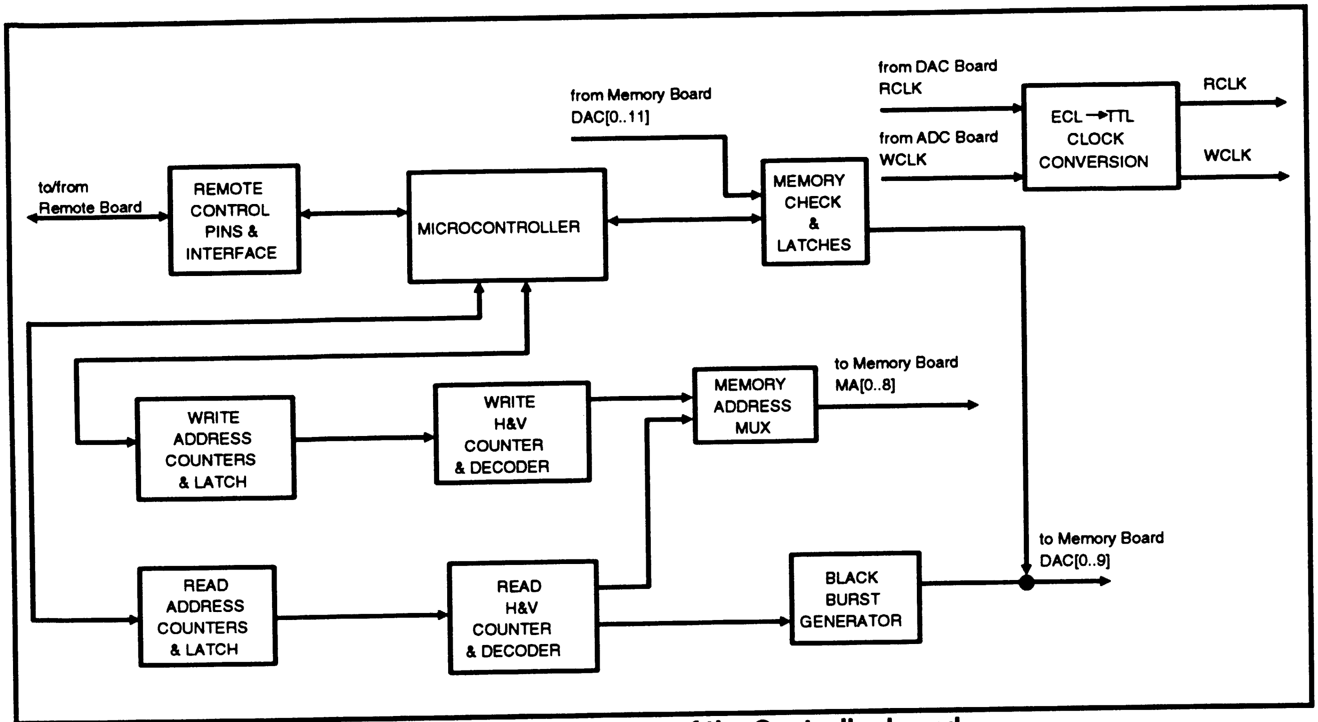


Fig. 2-19. Block diagram of the Controller board.

CONTROLLER BOARD

BLOCK LEVEL DESCRIPTION (See Fig. 2-19)

The Controller board regulates the I/O of the Memory to synchronize the input signal (PROGRAM INPUT) with the REFERENCE. It accomplishes this task by using processing information from the Input Genlock, Reference Genlock, and Remote. This data is then converted into read and write signals for the Memory board.

Write Address Counters and Latch

An 18-bit address space needs to be counted at the rate of WCLK/12. A modulo-12 counter is used to increment the address. In order to provide the time for the address to settle at the Counters' output, a 1 clock delay between the COUNT command and a request to transfer data to or from Memory is put into the design.

The Microcontroller (µC) needs to be able to read where the Write Address Counter is currently located (at specific times related to the input video). This is accomplished by using 8-bit registers with open collector capabilities for the data bus. Due to the setup and hold times, the clock to these parts is 1/2 clock off of the system clock. The counters are loaded only in the event of a freeze (write).

Read Address Counters and Latch

When in operational mode, the Read Counters load once per field with a new address. This address will most often be the "next address" that the Counter would have counted anyway. However, due to the Write Address (and position) creeping up or falling behind, the Read Address may have to move 8 fields to keep the output color framed properly relative to the REFERENCE.

The Read Address Counters normally count what they would have counted anyway. However, when the creeping up or falling behind of the Write Address (and position) the Read Address may have to fall back 8 fields to keep the output color framed properly relative to the REFERENCE.

The address of the Read Counters is latched whenever the Write Latches are loaded. This tells the Controller where the Read Address was at write time. From this data, the amount of audio delay needed to match the audio to the video is derived.

Memory Address MUX

This is a high speed MUX that selects between read and write addresses going to the Memory board from the Read/Write Counters. Because the addresses are multiplexed, each set of addresses (read & write) is sent in two stages. The LSBs of the Address Counter go to the memory array to make the row address, and when the row address is clocked into Memory, the column address is sent to the Memory. Due to timing considerations, there is less than 1 clock cycle for the address to switch and be received at the Memory board Latch.

Memory Check and Latches

Real-time, off-line Memory Checking allows testing of static patterns (all ones, all zeros, etc.). By controlling the input to the Memory over the external data bus and having access to the output of the Memory, a pattern can be written into Memory. The input is compared to the output by enabling the Comparator Error Detection, and reading all the contents of the Memory. When an output pattern differs from an input pattern, the Comparators flag the error and the read freeze (RFREEZE) output is asserted. By registering the output data on the Controller at the time of the error, observation of which bits are not getting to the Controller properly (or not saving in the Memory Array properly) is possible. Predicting where the error occurred is done using the address from read address Counters (frozen by RFREEZE).

When the compare enable signal is disasserted (taken high) then the freeze condition is eliminated and the Read Address Counters are reactivated.

Microcontroller

The job of the μC is to control the location of the read address (and thereby synchronize the program to the reference), perform system diagnostics, and output an audio delay.

The μC has dedicated inputs that determine the current system status. With these inputs, the μC makes decisions on how to control the program signal being processed. By changing control lines, the operation changes from freeze, to synchronize, to test, etc.

The (BYPASS) signal is an output of the μC that directly switches PROGRAM INPUT to PROGRAM OUTPUT. It is an open collector output so the Remote can directly bypass the input to the output.

Remote Control Pins & Interface and ECL → TTL Clock Conversion

The Remote board connects to the Controller using a 40-pin connector. This allows RS-232 remote control operation of the Proc Amp controls. Therefore, the appropriate Remote I/O is needed.

Also the Remote board communicates with the ADC, DAC, and Controller boards within the system so the necessary bi-directional signals and registers are needed on the Controller to communicate with the Remote board.

A Decoder PAL and a bi-directional register are used for the bi-directional communication. The I/O strobes go to the Decoder PAL where arbitration is determined and control given to either the RC 211 or locally.

Clock conversion from differential ECL to TTL is done using 10125 ECL→TTL translators. They are centrally located on the board to minimize clock skew on the board (centrally located for the parts using the system clocks).

LIST OF SCHEMATICS

SCHEMATIC LEVEL DESCRIPTION CONTROLLER BOARD

① READ COUNTER/ DECODER & DELAY COMPARATOR (See Fig. 2-20)

① Read Load Address Latches

The Read Load Address Latches are made up of a bank of three D-Q flip flops (U29, U30, and U31). They latch the Read Address from the External Data bus as clocked by RLOAD[0..2] from the µC. The Read Load Address is latched in three separate blocks, one set at a time. The result is RL[0..21].

② H & V Counter and Decoder

U20 is the Horizontal Counter and Decoder, while U21 is the Vertical Counter and Decoder. They count the RCLK1 pulses and generate the control signals based on the count. These counters keep track of the present field, current line, the occurrence of the vertical interval, and horizontal sync time of the REFERENCE input signal. This information is used by the µC to control the flow of data through the instrument.

The Horizontal Counter counts in clock cycles for an amount of time equal to a half line. For every 156.5 lines a count is added to compensate for the 25 Hz offset between luminance and chrominance.

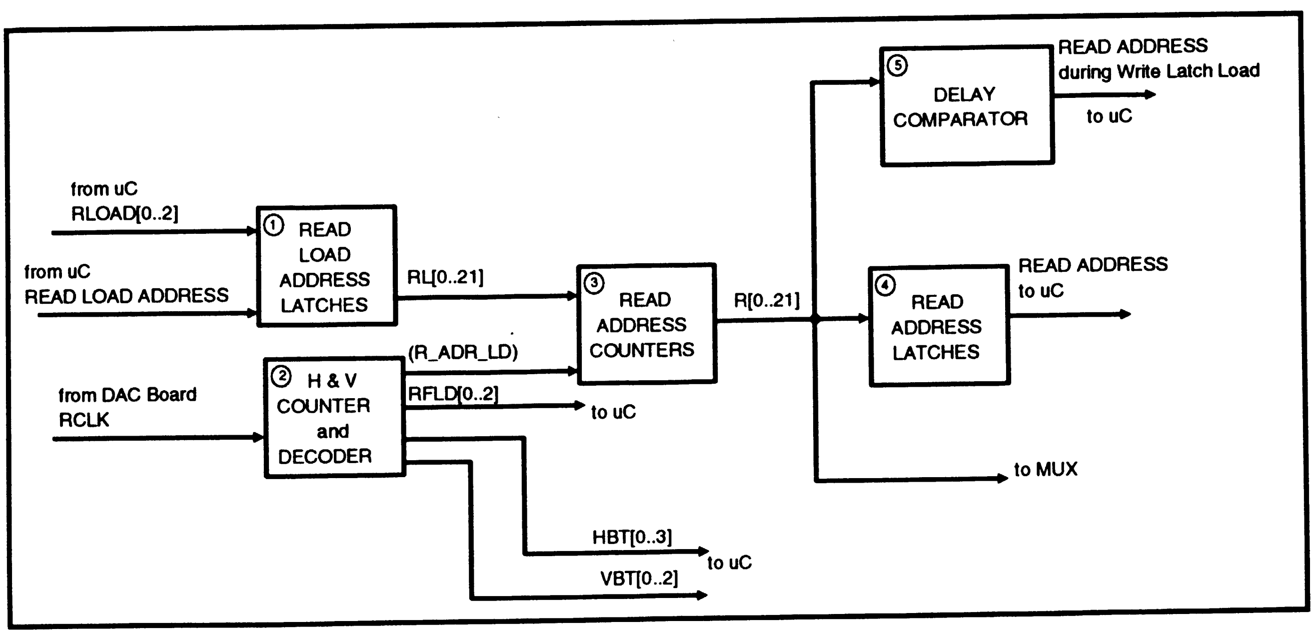


Fig. 2-20.
Block diagram of the Read Counter/Decoder and Delay Comparator.

The Vertical Counter counts in half line increments. It counts a field sequence and then resets itself and increments the field counter.

③ Read Address Counters

The Read Address Counters are made up of U25, U22, U23, and U24.

When in operational mode, the Read Counters load once per field with a new address. This address will most often be the "next address" that the Counter would have counted anyway. However, due to the Write Address (and position) creeping up or falling behind, the Read Address may have to move 8 fields to keep the output color framed properly relative to the REFERENCE.

④ Read Address Latches

The Read Address Latches are a bank of D-Q flip flops (U17, U18, U19, and U72A) that latch the Read Address, R[0..21]. This signal is driven over the external data bus for the µC and the read field counter.

The Microcontroller (µC) needs to be able to read where the Address Counter is currently located (at specific times related to the input video). This is accomplished by using 8-bit registers with open collector capabilities for the data bus. Due to the setup and hold times, the clock to these parts is ½ clock off from the system clock.

The R[0..21] signal comes from the Read Address Counter. It is clocked into the latches with the RLL (Read Latch Load) signal from the H Counter and Decoder. They are enabled by the RLE[0..2] (Read Latch Enable) signal from the µC. One 8-bit set of addresses is read from the External Data bus (coming from the Controller Processor ③) at a time as controlled by RLE[0..2].

⑤ Delay Comparator

The Delay Comparator is comprised of two banks of D-Q flip flops: U26 and U27.

The upper 16 bits of the address from the Read Counter is latched by the Delay Comparator whenever the Write Latches are loaded by the WLL signal from the H Counter and Decoder on ②. This address tells the µC where the Read Address was at write time. The µC uses this information to determine the appropriate audio delay to output to the AUDIO DELAY OUTPUT. This same data is also used for synchronizing the input to the reference.

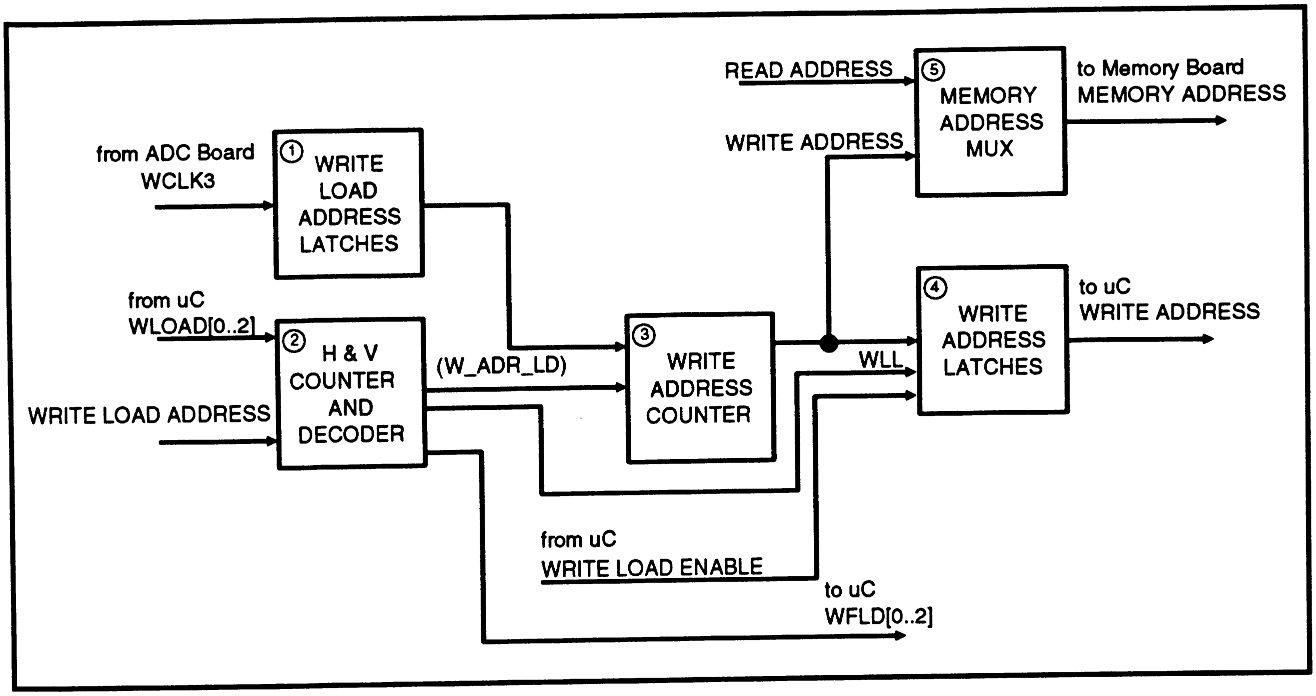


Fig. 2-21.
Block diagram of the Write Counters & Decoders and Memory Address MUX.

WRITE COUNTERS, DECODE, AND MEMORY ADDRESS MUX ② (See Fig. 2-21)

① Write Load Address Latches

The Write Load Address Latches are made of a bank of three D-Q flip flops (U32, U33, and U34). They latch the Write Address from the External Data bus clocked by WLOAD[0..2] from the µC. The Write Load Address is latched in three separate blocks one block at a time. The result is WL[0..21], used in the Write Address Counter.

② H & V Counter and Decoder

U4 is the Horizontal Counter and U5 is the Vertical Counter.

An 18-bit address space needs to be counted at the rate of WCLK/12. So a modulo-12 counter is used to increment the address. In order to provide time for the address to settle at the output of the counters, a 1 clock delay between the COUNT command and a request to transfer write or read data to or from Memory is put into the design.

③ Write Address Counter

The Write Address Counter is comprised of U7, U8, U9, and U10.

The Write Address Counter is very similar to the Read Address Counter. The only difference is the Address Counter is not loaded during a freeze (read) condition, rather only in Diagnostic Mode when testing the Memory and looking for a specific bad Memory location.

④ Write Address Latches

The Write Address Latches are a bank of D-Q flip flops (U1, U2, U3, and U72B) that latch the Write Address W[0..21]. This signal is driven over the external data bus for the µC and the write field counter.

The Microcontroller (µC) needs to be able to read where the Address Counter is currently located at specific times related to the input video. This is accomplished by using 8-bit registers with open collector capabilities for the data bus. Because of the setup and hold times, the clock to these parts is 1/2 clock off the system clock. The counters are loaded only in the event of a freeze (write).

The W[0..21] signal comes from the Write Address Counter. It is clocked into the Latches with the WLL (Write Latch Load) signal from the H Counter and Decoder. The Counter is enabled by the WLE[0..2] (Write Latch Enable) signal from the μC. One 8-bit set of addresses is loaded onto the External Data bus (going to the Controller Processor ◈) controlled by WLE[0..2].

⑤ Memory Address MUX

This is a high speed MUX made up of U11 - U15. It selects between Read and Write Addresses going to the Memory board from the Read/Write Address Counters. Only the 18 MSBs of the address are used.

Because the addresses are multiplexed, each set of addresses (read & write) is sent in two stages. The LSBs of each Address Counter go to the memory array, MA[0..8], to make the row address. As the row address is clocked into Memory, the column address is sent to the Memory. Due to timing considerations, there is less than 1 clock cycle for the addresses to switch and be received at the Memory Board Latch.

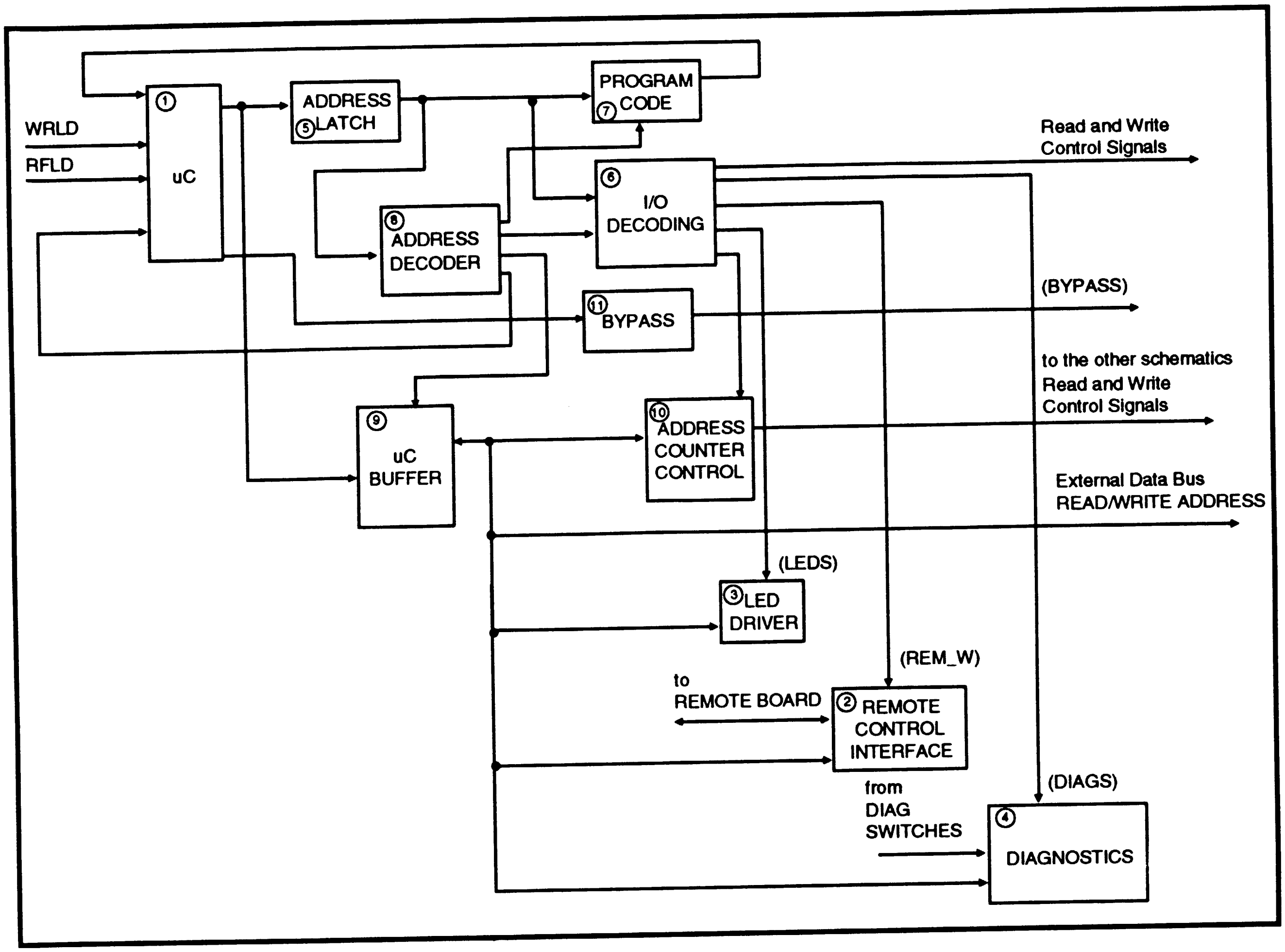


Fig. 2-22. Block diagram of the Controller Processor.

CONTROLLER PROCESSOR ③
(See Fig. 2-22)

① μC

The job of the μC, U60, and its port replacement unit , U59, is to control the location of the read address (and thereby synchronize the PROGRAM INPUT to the REFERENCE), perform system diagnostics, and output the audio delay.

The μC determines the current system status of the VS 211 from the data on the external data bus (via the μC Buffer). With this input, the μC controls the program signal being processed. By changing control lines, the operation of the box changes from freeze to synchronize, to test, etc.

② Remote Control Interface

The Remote board connects to the Controller board using a 40 pin connector (⑤). This allows RS-232 remote operation of the Proc Amp controls.

Also, the Remote board needs to communicate with the ADC and DAC boards. Therefore, bi-directional signals and registers are required on the Controller board to interface between the Remote board and the Lower I/O board.

To accomplish this, a PAL (U68) and a bi-directional register (U67) are used. The I/O strobes go to the Decoder PAL where arbitration is determined and control given to either the RC 211 or the Remote board in the VS 211.

③ LED Driver

LED Driver U69 latches the signals from the External Data bus as clocked by the (LEDS) signal from the I/O Decoder. These signals turn on and off the status LEDs on the front of the Controller board.

④ Diagnostics

The Diagnostics, from switch S2, go through latch (U62). Which test is requested by the user is sent out on the External Data bus when the latch is enabled by the (DIAGS) signal from the I/O Decoder.

⑤ Address Latch

The Address Latch (U70) latches A[0..7] allowing the AD[0..7] bus to be bi-directional.

⑥ I/O Decoding

The I/O Decoder is made of U71 and U64. Getting information from the µC address lines, it decodes the data into I/O control signals for the rest of the Controller board.

⑦ Program Code

The Program Code for the µC is stored in U63. It has memory map locations C000-FFFF. It has a 15-bit address input and 8-bits of output data for the µC.

⑧ Address Decoder

The Address Decoder (U65) acts like a pointer. Using the upper 8 output address bits of the µC, the Address Decoder turns on the appropriate block of circuitry (Program Code, I/O Decoder, or µC Buffer).

⑨ µC Buffer

The µC Buffer (U66) is a bi-directional buffer that separates the µC data bus from the rest of the Controller board and regulates the data flow on the External Data bus.

⑩ Address Counter Controller

The Address Counter Controller (U35) gets data from the µC Buffer and is controlled by the (CONTROL) signal from the µC. This data is latched as control signals for the Read and Write Counters (① and ②).

⑪ Bypass

The BYPASS signal is an open-collector output of the µC that directly switches PROGRAM INPUT to PROGRAM OUTPUT. It is an open collector output so the Remote can directly bypass the input to the output.

U36A inverts the signal from the µC and U36B inverts the signal again. This double inversion allows the operator to use S3 to put the VS 211 into forced Bypass. The result of the Bypass circuitry is the signal (BYP_EN) which is used in three places: in the Diagnostics circuit to control the BYPASS LED, on the Remote board, and on the Lower I/O board to control the actual bypass circuit on the I/O boards.

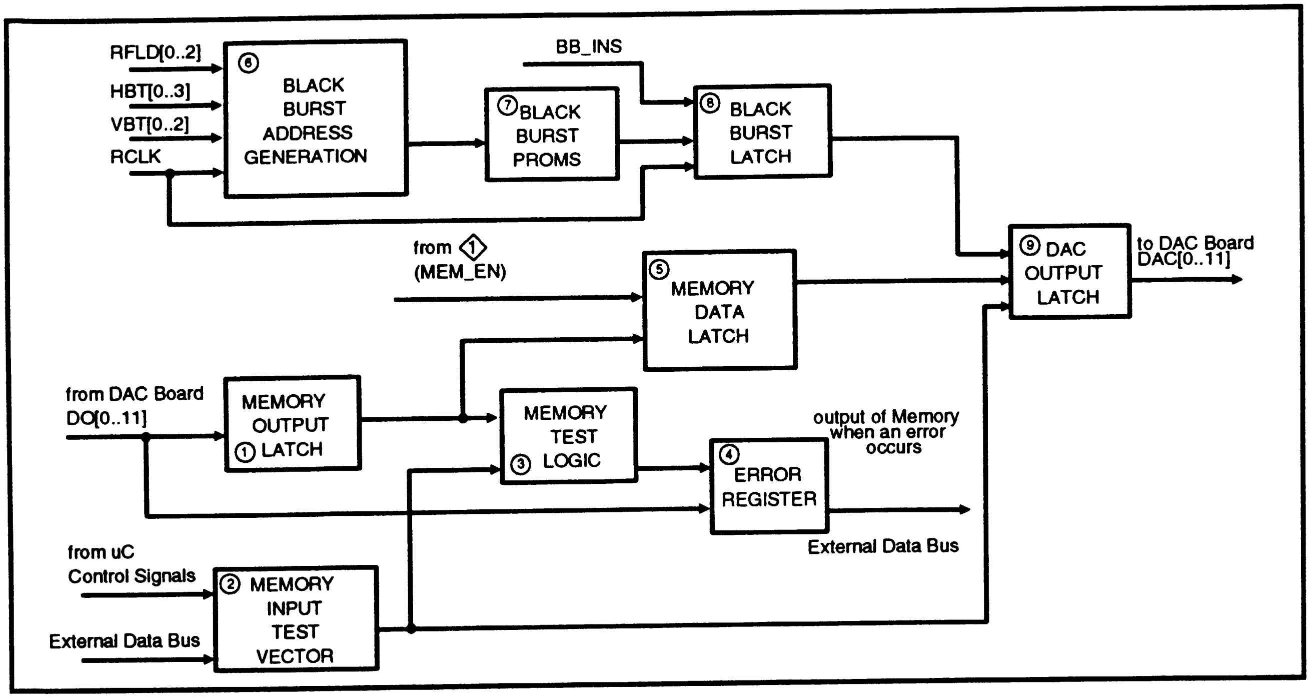


Fig. 2-23.
Block diagram Memory Interface, Test, and Black Burst.

MEMORY INTERFACE, TEST, & BLACK BURST ④ (See Fig. 2-23)

① Memory Output Latches

The Memory Output Latches (U45) is to latch the output of the DAC with timing certainty. DO[0..11] from the DAC board (via the Lower I/O board) is latched in the DAC Output Latch with the RCLK. The output of the latches is OD[0..11]. This signal is used in the Memory Test Logic and Output Test Data Latch.

② Memory Input Test Vector

The real-time Memory Check allows testing of static patterns (all ones, all zeros, or any other pattern). The input to the Memory (from the external data bus) is controlled and the output of the Memory is available.

A pattern is written into Memory, the comparator error detection is enabled, and all the contents of the Memory are read. When an output pattern differs from an input pattern, the comparators flag the error and the read freeze (RFREEZE) output is asserted. This freezes the read address. By also registering the output at the time of the error, which bit is not getting to the Controller properly (or not saving in the Memory Array properly) can be observed.

When the compare enable signal is disasserted (taken high) then the freeze condition is eliminated and the Read Address Counters are reactivated.

③ Memory Test Logic

The Memory Test Logic Circuit (U48 and U47) compares the output from the DAC board with what was sent to Memory from the Memory Input Test Vector. U48 checks the LSBs and U47 checks the MSBs. U47 also checks the error signals during compare enable time and sends error data to the Error Register. If an error is found, ERROR and/or RFREEZE are pulled high. The Error Register uses the ERROR signal as its clock.

④ Error Register

The Error Register (U43 and U44) latches the output from the Memory board whenever an error occurs. The input to the register is always the output from the Memory board. Whenever an error occurs, a clock pulse is sent from the Memory Test Logic. If the Memory Test Mode is enabled, the clock pulse latches the data which allows the user to see the output of the Memory whenever an error occurs as an aid for troubleshooting.

⑤ Memory Data Latch

The Memory Data Latch (U41) latches the data from the DAC Output Latch whenever the Memory is enabled. This data is passed to the Memory Input Latch.

⑥ Black Burst Address Generation

The Black Burst Address Generation circuit consists of a PAL (U56) and an EPROM (U58). They take horizontal and vertical timing information from the Read circuitry ◇1 and produce the address needed for the Black Burst PROM to give the proper timing for the ITS deletion and sync & burst insertion. U52 and U53 latch the black burst address for the column Black Burst PROM.

⑦ Black Burst PROMs

The Black Burst PROMs consist of two multiplexed PROMs, U54 and U55. The PROMs are addressed by the Black Burst Address Generation circuit. They produce the values to be inserted into the Memory for sync and burst insertion.

⑧ Black Burst Latch

The Black Burst Latch (U57) latches the data from the Black Burst PROMs. These values are sent to the DAC Output Latch where sync and burst insertion or ITS deletion is selected.

⑨ DAC Output Latch

The DAC Output Latch (U39) latches the CD[0..9] signal from either the Black Burst Latch, Output Test Data Latch, or the Memory Input Test Vector. This signal drives the DAC[0..11] lines to the Memory and DAC boards.

◇5 INTERCONNECT AND POWER DISTRIBUTION

ECL → TTL Clock Converter

Clock conversion from differential ECL to TTL is done using 10125 ECL→TTL translators (U37 and U38). They are centrally located on the board (for the parts using the system clocks) to minimize clock skew on the board.

Front Panel LED Driver

The Front Panel LED Driver provides the +5 V for the POWER indicator on the front panel and the flash for the SYSTEM STATUS LEDs.

As long as the Power Supply is providing the VS 211 with power, the +5 V will be available and the POWER LED will be lit. If the power is lost for any reason the POWER LED will go out.

As long as all systems are running within limits, the SYS_STATUS (from the μC) will be low. This causes the 555 (U73) to output a steady +5 V and the SYSTEM STATUS LED will remain off. If the SYS_STATUS goes high, the 555 will activate and the SYSTEM STATUS LED will flash.

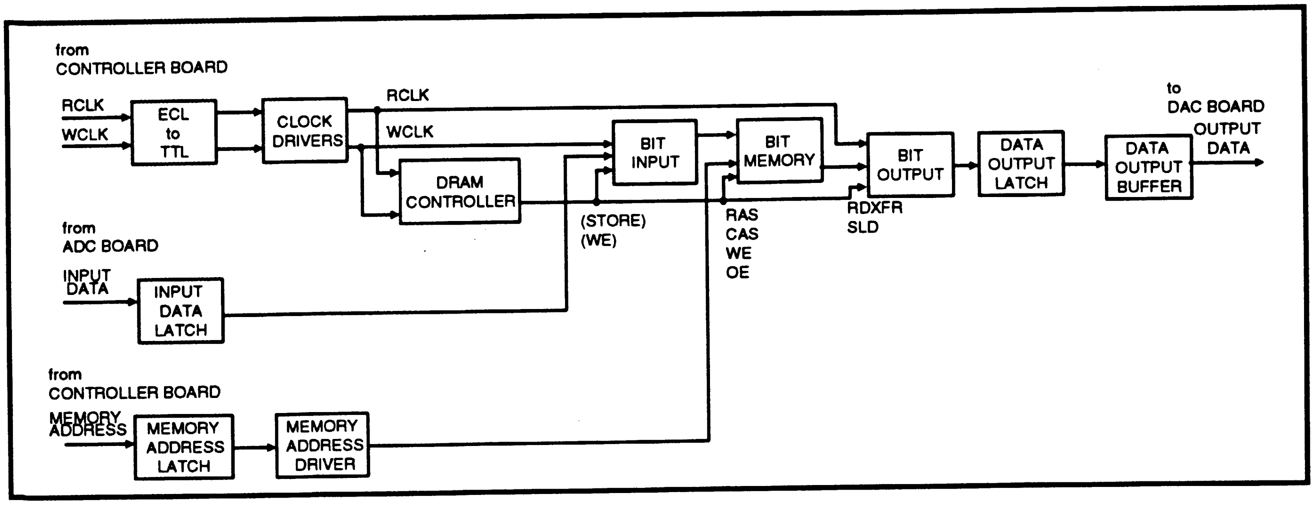


Fig. 2-24. Block diagram of the Memory board.

MEMORY BOARD

BLOCK LEVEL DESCRIPTION (See Fig. 2-24)

The Memory board is the storage device for the synchronizer. It stores up to 8 fields of PAL video and reads it out properly timed with the reference genlock signal. It consists of input, output, control, and 10 identical circuit blocks to store each of the ten bits.

The two main timing signals, WCLK and RCLK, come from the ADC and DAC boards, respectively, via the Upper I/O board. The signals are converted to TTL in the ECL→TTL Converter. Then they go to the Clock Driver which, from each clock signal, creates four duplicate driver signals for use throughout the board. The duplication of signals prevents over loading. The Memory array control signals are derived from the WCLK and RCLK signals in the DRAM Controller.

Meanwhile, the data from the ADC board (via the Upper I/O) is latched in the Input Data Latch.

The memory address (from the Controller board) is latched in the Memory Address Latch and output to the Memory Address Driver. A Memory Address Driver is also used to prevent loading.

The storage section of the Memory board consists of the Bit Input, Bit Memory, and Bit Output. There are ten identical circuits, one for each bit of data. The Bit Input latches the data and holds it for loading into Bit Memory. The Bit Memory stores the data from the Bit Input at locations called for by the memory address. It also reads out the stored data (write) called for by the (read) memory address and timed by output signal, OE. The Bit Output holds the output data for the Data Output Latch. The output data then goes to the Data Output Buffer where it is sent to the DAC board via the Upper I/O board.

LIST OF SCHEMATICS

1. MEMORY BOARD I/O & CONTROL
2. MEMORY BITS 0, 1, 2, & 3
3. MEMORY BITS 4, 5, 6, & 7
4. MEMORY BITS 8 & 9
5. +5 V BYPASS CAPS & TEST POINTS

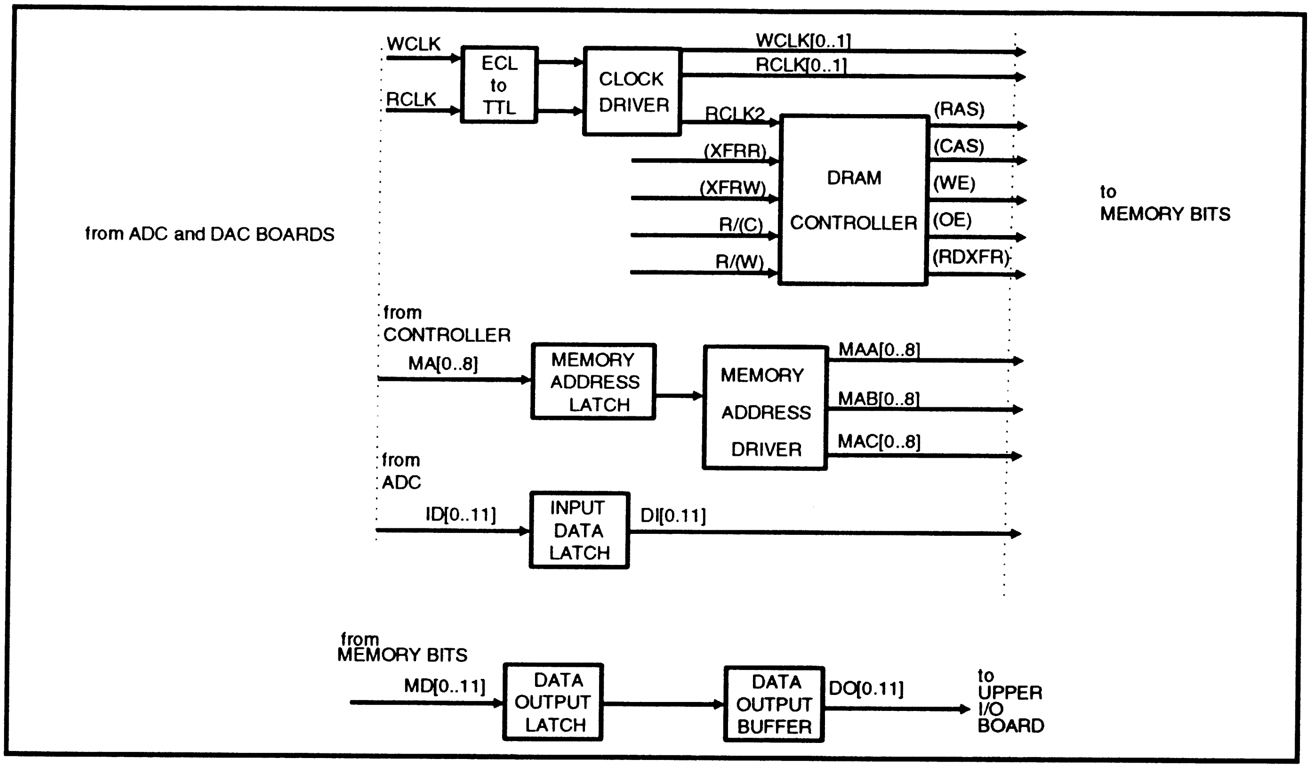


Fig. 2-25.
Block diagram of the Memory I/O and Control.

SCHEMATIC LEVEL DESCRIPTIONS
MEMORY BOARD

MEMORY BOARD I/O & CONTROL ⟨1⟩ (See Fig. 2-25)

The WCKL and RCLK signals, from the ADC and DAC boards, enter the Memory board via the Upper I/O board. These signals are timed to the PROGRAM and REFERENCE inputs, respectively. First they are converted to TTL levels in the ECL→TTL Converter (U107 and U106). Each ECL→TTL Converter also creates three identical signals and one inverted clock signal and sends them to the Clock Driver (U108 and U109). The Clock Driver prevents loading. Outputs WCLK[0..1] and RCLK[0..1] are used to drive the Memory Bits (on Schematics ⟨2⟩ - ⟨4⟩) while the rest of the clocks are used for deriving the Memory board timing and control signals.

The DRAM Controller, U93 and U85, uses the rest of the timing signals along with other control data from the Controller board to derive the Memory board control signals: (RAS) row address strobe, (CAS) column address strobe, (WE) write enable, (OE) output enable, and (RDXFR) read transfer. (See Figs. 2-27 and 2-26.)

The Memory Address, MA[0..8], is latched in the Memory Address Latch (U94) by a clock that is inverted and delayed from RCLK. AM[0..8] is then sent to the Memory Address Driver (U86, U87, and U88) which creates three copies of the signal to prevent loading, undershoot, and overshoot.

The input, ID[0..9], enters the board through the Input Data Latch (U103) where the signal is latched for loading into the Memory Bits (⟨2⟩).

The output, DO[0..9], also leaves the Memory board through this schematic. The output from each of the ten Memory Bits are latched in the Data Output Latches (U101). The signal is sent to the Output Buffer (U111 and U112), then output through the Upper I/O board to the Controller board.

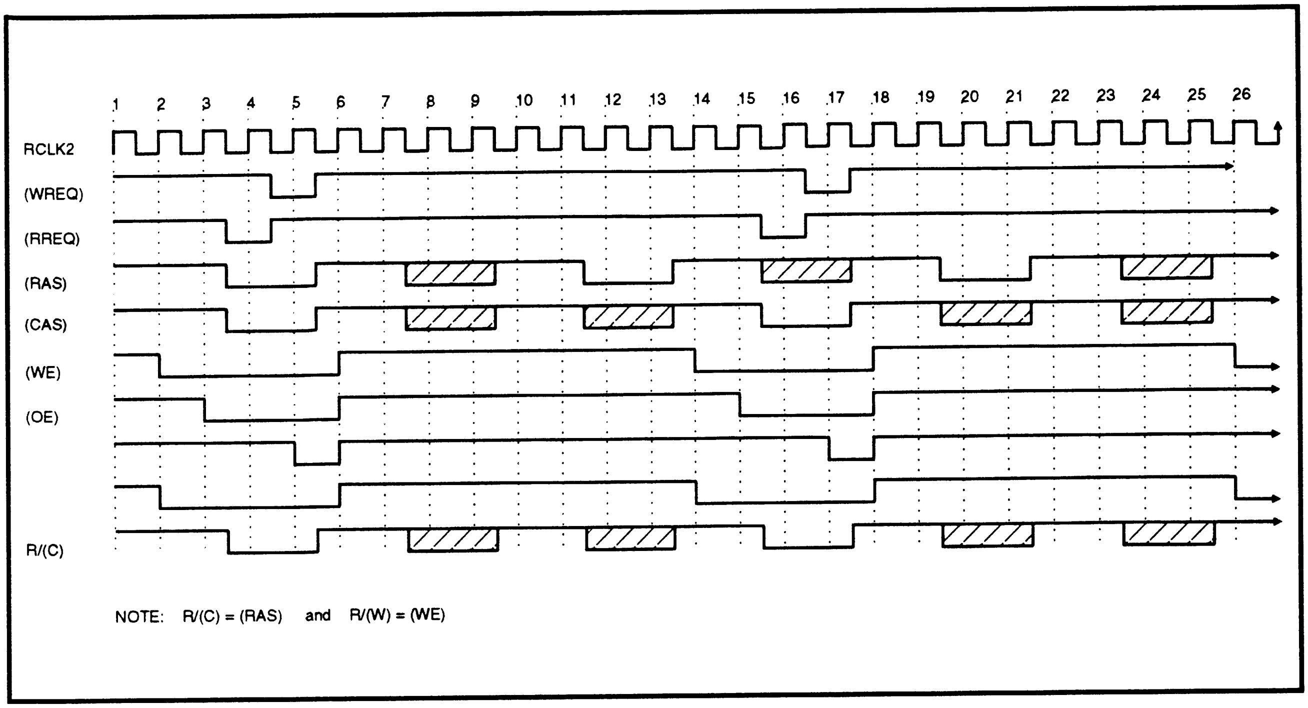


Fig. 2-27.
Timing diagram for U85.

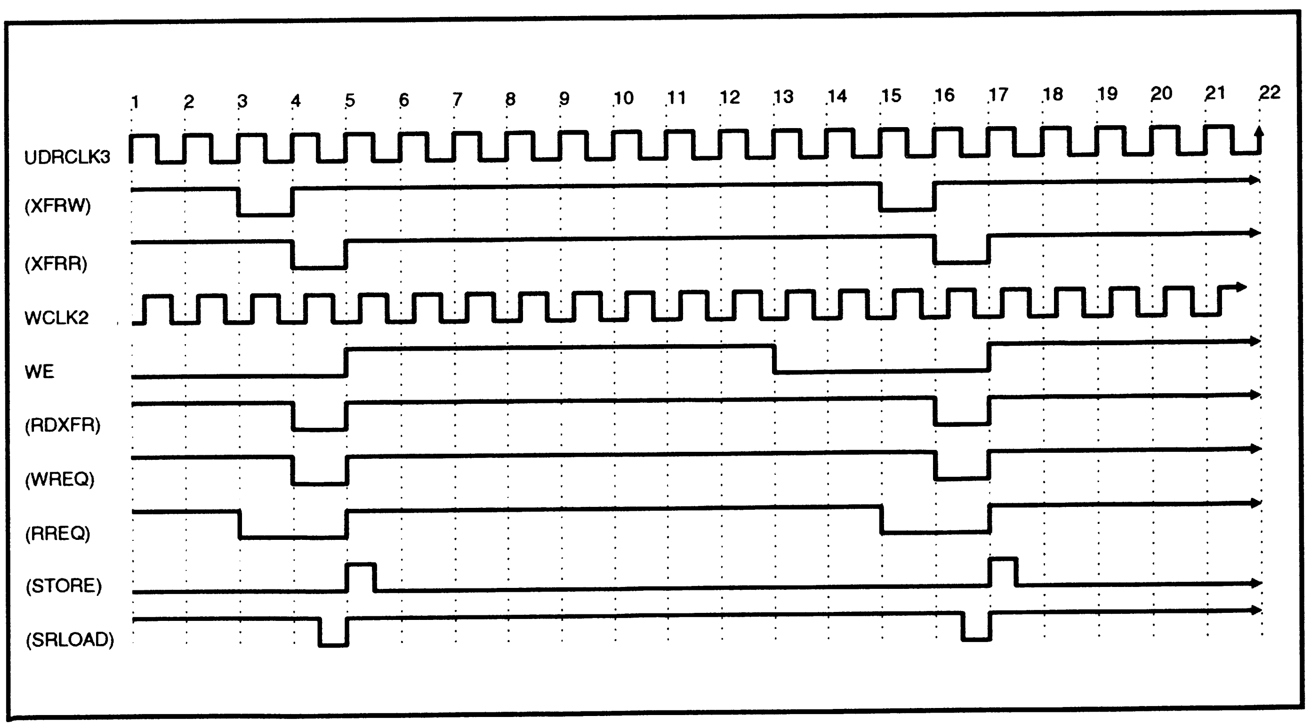


Fig. 2-26.
Timing diagram for U93.

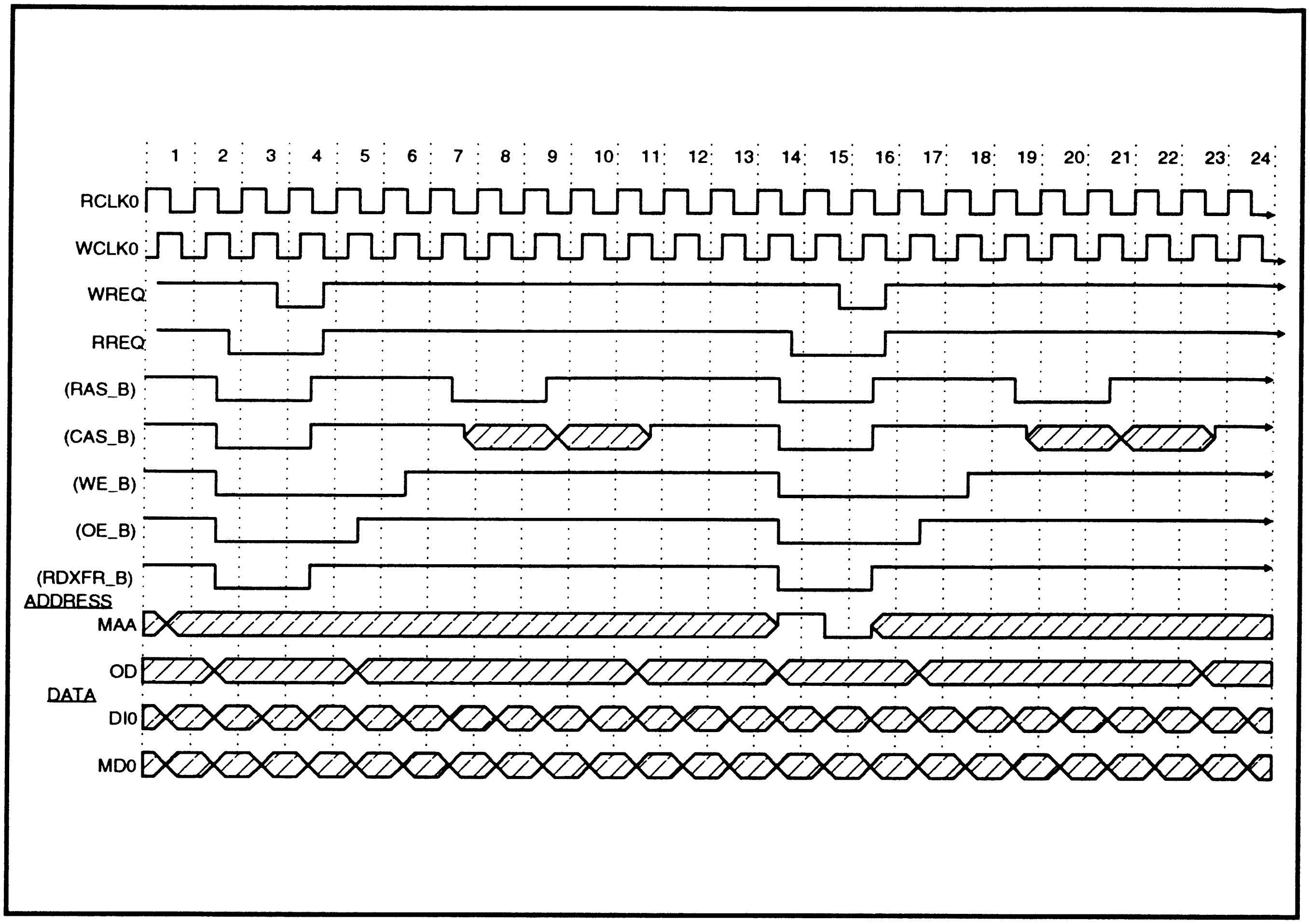


Fig. 2-28. Timing diagram for the Memory Bits.

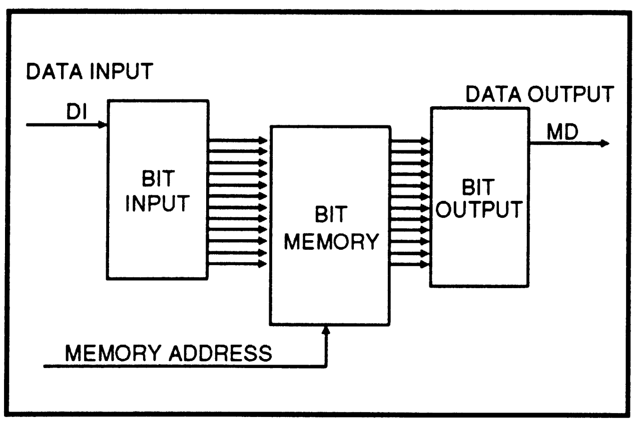


Fig. 2-29.
Simplified block diagram of the Memory Bits.

MEMORY BITS 0-9 ② - ④

Since all ten bits are identical, only Bit 0 will be explained in depth. See Fig. 2-28 for the timing diagram of the Memory Bits and Fig. 2-29 for the block diagram.

The input data from the Input Data Latch is clocked into the Bit Input circuit (U23 and U24). U23 and U24 are shift registers with output latches. The shift register saves each bit's data at a rate of 1 bit/clock until twelve consecutive samples have been saved. The (STORE_B) pulse then loads the data from the shift registers into the Bit Input's output latches as OD[0..11].

OD[0..11] goes to the Bit Memory (U16 - U18) where it is stored using the control pulses from the DRAM Controller ① at the Memory location pointing to the write current address. This write address is sent over a multiplexed address bus MAA[0..8]; first the 9-bit row address is received followed by the 9-bit column address.

In order to output data from the Bit Memory, the loading process is simply reversed. First the memory address on the address line is row addressed [(RAS)], column addressed [(CAS)], then the output enable [(OE)] allows the data stored at that address to be output on the data outputs as OD[0..11].

OD[0..9] is latched by the Bit Output (U35 and U36) by (RDXFR_B). U35 and U36 are the reverse of U23 and U24. They are shift registers with input latches (instead of output latches). The shift register is loaded from its internal latch by (SLD0). The shift register then outputs the data MD[0] at a rate of 1 sample/clock, to the Memory Data Output bus with the rest of the memory data from the other Memory Bit circuits MD[0..9]. MD[0..9] is latched by the Output Latches on Schematic 1.

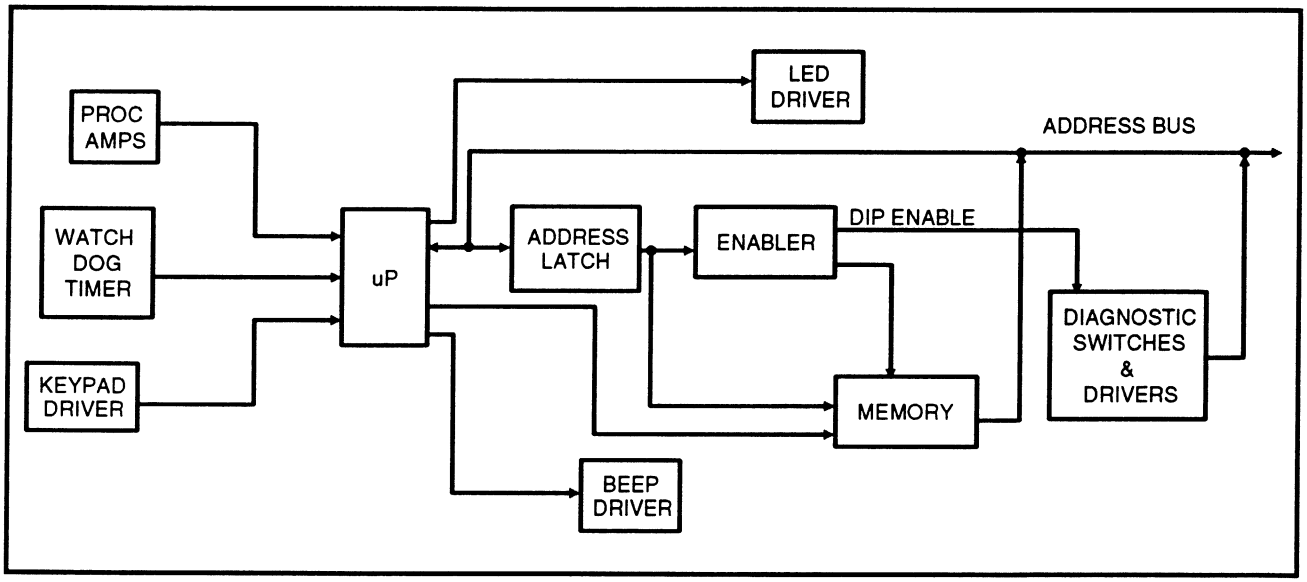


Fig. 2-30.
Block diagram of the Remote Processing Kernel.

REMOTE BOARD

BLOCK LEVEL DESCRIPTION REMOTE BOARD (See Fig. 2-30)

The Remote board provides a platform for the Proc Amp and timing controls. It registers the digital signals from the Proc Amps for the Proc Amp/Decoder board. Most of the set up DIP switches for the VS 211 are also located on this board.

The Proc Amps are a series of two-armed potentiometers (R7, R8, and R9). Their outputs are sent to the µP which converts these values to code that the Proc Amp/Decoder board will use.

The Watch Dog Timer Allows the Remote's µP to be reset with either a local hard reset or a hard reset of the Controller board. J2 enables the Watch Dog Timer and J1 will produce a local hard reset.

The signals from the keypad (switches: S1, S2, and S3) are latched and converted to KPAD[0..4] in U4. This signal is sent to the µP.

The µP controls the Remote board. It gets input from throughout the board and outputs the appropriate response.

If an error is encountered by the µP, the ERR_BEEP and BEEP signals will go high. The ERR_BEEP signal enables the oscillator for the 555 timer (U24) and the BEEP signal resets it. The output of the 555 then turns on the loudspeaker, LS1.

The Address Latch (U1) is a register that latches the signal on the Address Bus whenever it is enabled by the ALE signal from the µP. The latched address is used by the Enabler and the Memory.

The Enabler is a PAL, U23, that takes latched addresses from the A[0..15] line and derives the appropriate enable commands for the Remote board. The Enabler controls: the Memory, the LED Driver, and the Diagnostic Switch Drivers.

The Memory circuitry consists of the SRAM (U5) and the EPROM (U7). Enabled by the Enabler, Memory gets addresses from the A[0..15] line and outputs the data necessary to keep the µP on track.

The LED Driver (U8) registers the data from the Address Bus as enabled by the LED0_E signal from the Enabler. These signals will turn on or off the LEDs (DS1).

The Diagnostic Switch Drivers control the outputs from the DIP switches, one for each DIP switch. The Diagnostic Switch Drivers act as gates, only allowing the signals from the requested DIP to go out on the Address Bus.

LIST OF SCHEMATICS

1 REMOTE PROCESSOR KERNEL

2 REMOTE INPUT/OUTPUT

UPPER I/O BOARD

BLOCK LEVEL DESCRIPTION UPPER I/O BOARD

The Upper and Lower I/O boards provide the interface between the other boards and external signals. Bypass switching and buffering of all input signals is also provided.

The PROGRAM INPUT takes composite video and terminates it or passes the signal to the PROGRAM OUTPUT on the Lower I/O. The video is also buffered and passed to the ADC board.

At the COMPOSITE DIGITAL INPUT, the Upper I/O board relatches the differential ECL data and clock for the ADC board.

Transmitted remote control data is converted to RS-232 and RS-422 levels on the Upper I/O and sent to the RC 211.

The ADC Interface is a 12-bit tri-state multiplexer that switches between the ADC and memory test data from the Controller board. The output is the memory input data. The ADC Interface is controlled from the Controller board.

The Fan Drive provides two speed fan operation and an output to indicate an over temperature condition.

LIST OF SCHEMATICS

<1> ANALOG & DIGITAL INPUTS AND ADC INTERFACE

<2> REMOTE & MEMORY INTERFACE AND FAN CONTROL

SCHEMATIC LEVEL DESCRIPTION UPPER I/O BOARD

ANALOG & DIGITAL INPUTS and ADC INTERFACE <1>

Composite Digital Input Buffer

The Composite Digital Input Buffer consists of a resistor network (R30 through R33) and an IC (U7). The resistor network provides the proper termination for the ECL level input signal. U7 then converts the signal to TTL level for the ADC board.

Program Bypass

If the VS 211 is in BYPASS, K1 switches the signal available at the Program Output to PROG_IN. (The Program Input signal looped through from the Upper I/O board.) If the VS 211 is in normal operation, K1 switches to PROG_OUT signal (from the DAC board).

In normal operation, the (BYPASS) signal from the Lower I/O board is high. This signal is applied to the base of Q1 through R13. When (BYPASS) is high, Q1 is on, causing a +5 V drop across K1's inductor (pins 1 and 16). This turns the switch "on" (the input is available at pins 8 and 9). Pins 8 and 9 are grounded to minimize the amount of noise.

If (BYPASS) is low, Q1 turns off, and there is negligible voltage drop across K1's inductor. This causes the switch to release or turn "off", making the input signal to be available at pins 11 and 6. The signal from pins 6 and 11 is sent to the Video Switch circuit (Lower I/O board <2>) via J11.

In the case of power failure, the (BYPASS) signal will naturally be low, turning K1 to the "off" position, and automatically putting the VS 211 in BYPASS operation. This is a safety response to protect the integrity of the signal path in the event of accidental power loss.

Program Input Buffer

The Program Input takes the Program Input signal and increases the voltage to drive the circuits on the ADC board and buffers the signal from the processing noise on the ADC circuit. U8 acts as the buffer and voltage doubler. The output of this circuit is sent to the ADC board via J1B.

ADC Interface

The ADC Interface acts as a multiplexer which allows either the input from the ADC board or diagnostic test signal data to be sent to the Memory board.

U16 and U17 turn "on" or "off" the Digitized input signal from the ADC as controlled by U13A and the (TEST_EN) signal from the Lower I/O board. If (TEST_EN) is high, then U16 and U17 pass the ADC data through and it becomes the MEMDI[0..9] signal.

If (TEST_EN) is low U14 and U15 are enabled and they pass the MTESTD[0..9] signal from the Lower I/O board as the MEMDI[0..9] signal.

REMOTE & MEMORY BOARD INTERFACE and FAN CONTROL ②

Fan Control

The Fan Control Circuitry has two parts. The first determines the present operating temperature of the VS 211 and the second uses that information to generate the voltage needed to operate the fan under those conditions.

A small resistor network (R19, R20, and R45) creates reference voltages for the two op amps (U9A and U9B). RT1 is a thermistor whose resistance is inversely proportional to the ambient temperature of the VS 211. As the temperature goes up in the instrument, the voltage at the positive input of the op amps drops, therefore the output voltage drops. When U9A goes low, the fan will operate at high speed. When U9A is high (normal operation), the fan will operate at low speed.

As long as U9B is high, the instrument is in normal operation. When U9B goes low the VS 211 is operating above a safe temperature, DS1 will light, and the (HOT) signal will be sent to the Lower I/O board.

Remote Interface

The Remote Interface takes the I/O signals from the RC 211 and converts them from either RS-232 or RS-422 format to two signals, STX and SRX. These signals are sent to the Lower I/O board.

The following tables are a list of the jumper signals on the various connectors on the Upper I/O board.

Table 2-4.
UPPER I/O BOARD TO ADC BOARD
96 PIN DIN FEMALE
J1

ROW A		ROW B		ROW C	
PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	AGND	1	AGND	1	AGND
2	AGND	2	PROG_IN	2	AGND
3	AGND	3	AGND	3	AGND
4		4		4	
5		5		5	
6		6	(CLK_EN)	6	
7		7		7	
8	D2_CLK	8	NOISE	8	(D2_CLK)
9		9	VID_ABS	9	
10		10	(W_F1L7)	10	
11	AGND	11	AGND	11	AGND
12	WCLKB CONTROL BOARD	12	AGND	12	(WCLKB) CONTROL BOARD
13	-5 V	13	-5 V	13	-5 V
14	-5 V	14	-5 V	14	-5 V
15	-12 V	15	-12 V	15	-12 V
16	GND	16	GND	16	GND
17	GND	17	GND	17	GND
18	+12 V	18	+12 V	18	+12 V
19	+5 V	19	+5 V	19	+5 V
20	+5 V	20	+5 V	20	+5 V
21	WCLKA MEMORY BOARD	21	DGND	21	(WCLKA) MEMORY BOARD
22	DGND	22	DGND	22	DGND
23	D2_9	23	(RI/O_0)	23	ADC9
24	D2_8	24	RRD/(WR)	24	ADC8
25	D2_7	25	RMC7	25	ADC7
26	D2_6	26	RMC6	26	ADC6
27	D2_5	27	RMC5	27	ADC5
28	D2_4	28	RMC4	28	ADC4
29	D2_3	29	RMC3	29	ADC3
30	D2_2	30	RMC2	30	ADC2
31	D2_1	31	RMC1	31	ADC1
32	D2_0	32	RMC0	32	ADC0

Table 2-5.
UPPER I/O BOARD TO MEMORY BOARD
96 PIN DIN FEMALE
J2

ROW A		ROW B		ROW C	
PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	WCLKA	1	GND	1	(WCLKA)
2	(XFRR)	2		2	MEMDI9
3	(XFRW)	3		3	MEMDI8
4	R/(C)	4		4	MEMDI7
5	R/(W)	5		5	MEMDI6
6		6		6	MEMDI5
7		7	DGND	7	MEMDI4
8		8		8	MEMDI3
9		9		9	MEMDI2
10		10		10	MEMDI1
11	DGND	11	DGND	11	DGND
12		12	DGND	12	MEMDI0
13	-5 V	13	-5 V	13	-5 V
14	-5 V	14	-5 V	14	-5 V
15	-12 V	15	-12 V	15	-12 V
16	GND	16	GND	16	GND
17		17		17	
18	+12 V	18	+12 V	18	+12 V
19	+5 V	19	+5 V	19	+5 V
20	+5 V	20	+5 V	20	+5 V
21	RCLKA	21	DGND	21	(RCLKA)
22	DGND	22	DGND	22	DGND
23		23		23	MEMDO9
24		24	MA8	24	MEMDO8
25		25	MA7	25	MEMDO7
26	DGND	26	MA6	26	MEMDO6
27	DGND	27	MA5	27	MEMDO5
28	DGND	28	MA4	28	MEMDO4
29	DGND	29	MA3	29	MEMDO3
30	DGND	30	MA2	30	MEMDO2
31	DGND	31	MA1	31	MEMDO1
32	DGND	32	MA0	32	MEMDO0

Table 2-6.
COMPOSITE DIGITAL DATA INPUT
25 PIN FEMALE D CONNECTOR
J3

PIN	SIGNAL	PIN	SIGNAL
1	ICLK	14	(ICLK)
2	GND	15	GND
3	ID9	16	(ID9)
4	ID8	17	(ID8)
5	ID7	18	(ID7)
6	ID6	19	(ID6)
7	ID5	20	(ID5)
8	ID4	21	(ID4)
9	ID3	22	(ID3)
10	ID2	23	(ID2)
11	ID1	24	(ID1)
12	ID0	25	(ID0)
13	GND		

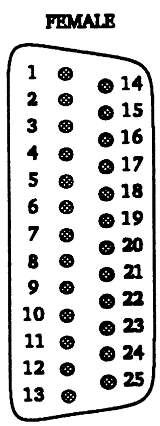


Fig. 2-31. Pinout of the D connector.

Table 2-7.
UPPER-LOWER I/O BOARD
40 PIN 2X20 SQUARE PIN
J4

ROW B		ROW A	
PIN	SIGNAL	PIN	SIGNAL
1	GND	2	
3	GND	4	GND
5	(BYPASS)	6	(W_F1L7)
7	GND	8	(RI/O_0)
9	RMC7	10	RMC6
11	RMC5	12	RMC4
13	RMC3	14	RMC2
15	RMC1	16	RMC0
17	RRD/(WR)	18	(TEST_EN)
19	VID_ABS	20	
21	GND	22	MTESTD9
23	MTESTD8	24	MTESTD7
25	MTESTD6	26	MTESTD5
27	MTESTD4	28	MTESTD3
29	MTESTD2	30	MTESTD1
31	MTESTD0	32	GND
33		34	
35		36	GND
37	SRX	38	STX
39		40	GND

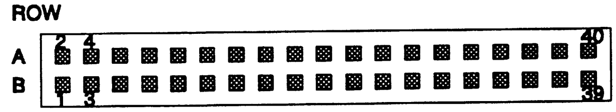


Fig. 2-32. Pinout of the 2x20 square pin

Table 2-8.
UPPER-LOWER I/O BOARD DIGITAL
40 PIN 2X20 SQUARE PIN
J5

ROW B		ROW A	
PIN	SIGNAL	PIN	SIGNAL
1	GND	2	WCLKB
3	(WCLKB)	4	GND
5	GND	6	(XFRR)
7	(XFRW)	8	R/(C)
9	R/(W)	10	GND
11	GND	12	RCLKA
13	(RCLKA)	14	(HOT)
15	GND	16	MEMDO9
17	MEMDO8	18	MEMDO7
19	MEMDO6	20	MEMDO5
21	MEMDO4	22	MEMDO3
23	MEMDO2	24	MEMDO1
25	MEMDO0	26	GND
27	NOISE	28	MA8
29	MA7	30	MA6
31	MA5	32	MA4
33	MA3	34	MA2
35	MA1	36	MA0
37	GND	38	-15 V
39	+15 V	40	GND

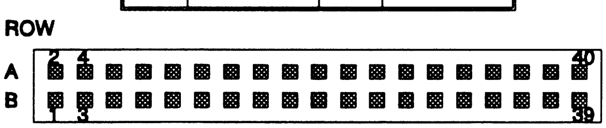


Fig. 2-33. Pinout of the 2x20 square pin

Table 2-9.
UPPER-LOWER BOARD ANALOG CONNECTOR
SMB
J11

ROW A		ROW B	
PIN	SIGNAL	PIN	SIGNAL
A	PROG_IN	B	AGND

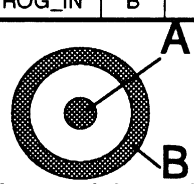


Fig. 2-34. Pinout of the smb connector.

Table 2-10.
UPPER I/O BOARD
REMOTE CONTROL
9 PIN FEMALE D CONNECTOR
J7

PIN	SIGNAL
1	N/C
2	TX
3	RX
4	(CXT)
5	SIG. GND
6	N/C
7	(CRX)
8	CRX
9	CTX

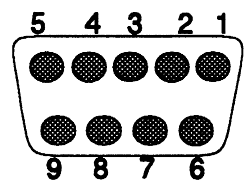


Fig. 2-35. Pinout of the small d connector (J7).

Table 2-11.
UPPER - LOWER I/O POWER SUPPLY
CONNECTOR
10 PIN AMP CONNECTOR
J8

PIN	SIGNAL
1	+5 V
2	+5 V
3	GND
4	-5 V
5	GND
6	-12 V
7	GND
8	+12 V
9	GND
10	GND

LOWER I/O BOARD

BLOCK DIAGRAM DESCRIPTION

The Lower I/O board provides the REFERENCE LOOP-THROUGH, the AUDIO DELAY Driver, the COMPOSITE DIGITAL OUTPUT Driver, and the Line Filtering for the Power Supply board.

The Lower I/O board provides a loop-through for the REFERENCE input to the DAC board. The output video from the DAC board is switched with the bypassed video to give PROGRAM OUTPUT signal. The MONITOR output from the DAC board passes unbuffered through the Lower I/O board.

Parallel data from the DAC board is translated from TTL levels to differential ECL, relatched, and sent with its clock to the COMPOSITE DIGITAL OUTPUT.

The AUDIO DELAY output comes from the Controller board and is used to drive an external audio synchronizer.

AC Main power is rectified and filtered by the Lower I/O board and output to the Regulator board. Power supply voltages from the Regulator board are distributed by the I/O boards. Line voltage selection is done in the off line filtering.

LIST OF SCHEMATICS

1 LINE FILTER

2 LOWER INPUT / OUTPUT

SCHEMATIC LEVEL DESCRIPTIONS

LINE FILTER 1

WARNING

All primary voltages are referenced to a floating ground, not chassis ground. An isolation transformer or a differential amplifier is therefore needed in order to troubleshoot the circuitry in the primary and the Pulse Width Modulator, also in these circuits' supporting circuitry.

The Line Filter circuitry filters and rectifies the input AC voltage, placing approximately 320 V_{dc} across capacitors C2 and C3.

The line current flows through line filter FL1, fuse F1, and EMI filter (C14), and is applied to the rectifiers (CR1, CR2, CR3, and CR4). Line Selector Switch (S1) selects between 115 V and 230 V operation.

If S1 is set to the 230 V position, the rectifiers act as a full-wave bridge rectifier and C2 and C3 appear in series. The rectifiers charge the capacitors to the peak voltage (approximately 230 V).

If, however, S1 is set to the 115 V position, the rectifiers and the capacitors act as a half-wave rectifier and voltage doubler. During the positive half-cycle of the AC input, current flows through CR2 and charges C2 to the peak voltage. During the negative half-cycle, current flows through CR1 and charges C3 to the peak voltage. This process charges each capacitor to the peak voltage of the input. Thus, the total voltage across the series combination of the capacitors is the same as in the 230 V operation described above.

E1 and E2 limit voltage surges on the input which might pass the line filter. RT1 and RT2 limit the inrush current to the capacitors. Resistors R3 and R6 discharge C2 and C3 when the power is off.

T1, C5, C6, and RV15 form a differential-mode filter to prevent switching noise from being conducted out of the instrument on the line cord.

LOWER INPUT / OUTPUT ②

Audio Delay Driver

U4 converts the TTL level DEL_OUT signal from the Controller board to RS-232 to drive the Audio Delay output.

Composite Digital Output Driver

U1 converts the TTL PDATA[0..9] signals from the DAC board to ECL level to drive the Composite Digital output.

Diagnostic Buffer

U2 and U3 take the DAC[0..9] signal from the Controller board and convert it to MTESTD[0..9]. This signal is used as a diagnostic test signal on other boards.

Video Bypass Switch

If the VS 211 is in a BYPASS condition, K1 switches the signal available at the Program Output to PROG_IN. (The PROGRAM INPUT signal from the Upper I/O board Program Bypass circuit ①.) If the VS 211 is in normal operation, K1 switches to the PROG_OUT signal (from the DAC board).

In normal operation, the Controller board sets (BYP_EN) high. This signal is buffered by the Memory Test Driver and converted to (BYPASS). The (BYPASS) signal is applied to the base of Q1 through R5. When (BYPASS) is high, Q1 is on, causing a +5 V drop across K1's inductor (pins 1 and 16). This turns the switch "on" (the PROG_OUT signal at pins 8 and 9 is available at the output). If (BYPASS) is low, Q1 turns off, and there is negligible voltage drop across K1's inductor. This causes the switch to release or turn "off", making the signal at pins 11 and 6 (the PROG_IN signal from J9) to be available at the output.

In the case of power failure, the (BYPASS) signal will naturally be low, turning K1 to the "off" position, and automatically putting the VS 211 in BYPASS operation. This is a safety response to protect the integrity of the signal path in the event of accidental power loss.

**Table 2-12.
DAC BOARD INTERCONNECT
96 PIN DIN FEMALE
J1**

ROW A		ROW B		ROW C	
PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	AGND	1	AGND	1	AGND
2	AGND	2	REF_IN	2	AGND
3	AGND	3	AGND	3	AGND
4	AGND	4	PROG_OUT	4	AGND
5	AGND	5	AGND	5	AGND
6	AGND	6	MON_OUT	6	AGND
7	AGND	7	AGND	7	AGND
8	(R_F1L7)	8	VBLANK	8	
9	DECODE1	9	RRD/(WR)	9	
10	DECODE0	10	(RI/O_3)	10	(CLIP_EN)
11	DGND	11	DGND	11	AGND(
12	PCLKA	12	DGND	12	(C_BLANK)
13	-5 V	13	-5 V	13	-5 V
14	-5 V	14	-5 V	14	-5 V
15	-12 V	15	-12 V	15	-12 V
16	DGND	16	DGND	16	GND
17	RCLKA	17		17	(RCLKA)
18	+12 V	18	+12 V	18	+12 V
19	+5 V	19	+5 V	19	+5 V
20	+5 V	20	+5 V	20	+5 V
21	RCLKB	21	DGND	21	(RCLKB)
22	DGND	22	DGND	22	DGND
23	DAC9	23	(RI/O_1)	23	PDATA9
24	DAC8	24	(REF_ABS)	24	PDATA8
25	DAC7	25	RMC7	25	PDATA7
26	DAC6	26	RMC6	26	PDATA6
27	DAC5	27	RMC5	27	PDATA5
28	DAC4	28	RMC4	28	PDATA4
29	DAC3	29	RMC3	29	PDATA3
30	DAC2	30	RMC2	30	PDATA2
31	DAC1	31	RMC1	31	PDATA1
32	DAC0	32	RMC0	32	PDATA0

Table 2-13.
CONTROLLER BOAD INTERCONNECT
96 PIN DIN FEMALE
J2

ROW A		ROW B		ROW C	
PIN	**SIGNAL**	**PIN**	**SIGNAL**	**PIN**	**SIGNAL**
1	WCLKB	1	GND	1	(WCLKB)
2	(XFRR)	2	RMC0	2	DAC9
3	(XFRW)	3	RMC1	3	DAC8
4	R/(C)	4	RMC2	4	DAC7
5	R/(W)	5	RMC3	5	DAC6
6	(RI/O_3)	6	RMC4	6	DAC5
7	(W_F1L7)	7	RMC5	7	DAC4
8	(R_F1L7)	8	RMC6	8	DAC3
9	DECODE1	9	RMC7	9	DAC2
10	DECODE0	10	VBLANK	10	DAC1
11	DGND	11	DGND	11	DGND
12	(TEST_EN)	12	DGND	12	DAC0
13	-5 V	13	-5 V	13	-5 V
14	-5 V	14	-5 V	14	-5 V
15		15	(HOT)	15	
16	GND	16	GND	16	GND
17	VID_ABS	17	DEL_OUT	17	(BYP_EN)
18		18	NOISE	18	
19	+5 V	19	+5 V	19	+5 V
20	+5 V	20	+5 V	20	+5 V
21	RCLKB	21	DGND	21	(RCLKB)
22	DGND	22	DGND	22	DGND
23	(C_BLANK)	23	RRD/(WR)	23	MEMDO9
24	(CLIP_EN)	24	MA8	24	MEMDO8
25	(REF_ABS)	25	MA7	25	MEMDO7
26	SRX	26	MA6	26	MEMDO6
27	STX	27	MA5	27	MEMDO5
28		28	MA4	28	MEMDO4
29		29	MA3	29	MEMDO3
30	(RI/O_0)	30	MA2	30	MEMDO2
31	(RI/O_1)	31	MA1	31	MEMDO1
32		32	MA0	32	MEMDO0

Table 2-14.
COMPOSITE DIGITAL DATA OUTPUT
25 PIN FEMALE D CONNECTOR
J3

PIN	SIGNAL	PIN	SIGNAL
1	OCLK	14	(OCLK)
2	GND	15	GND
3	OD9	16	(OD9)
4	OD8	17	(OD8)
5	OD7	18	(OD7)
6	OD6	19	(OD6)
7	OD5	20	(OD5)
8	OD4	21	(OD4)
9	OD3	22	(OD3)
10	OD2	23	(OD2)
11	OD1	24	(OD1)
12	OD0	25	(OD0)
13	GND		

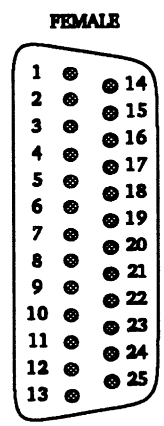


Fig. 2-36. Pinout of the D connector.

**Table 2-15.
UPPER-LOWER I/O BOARD
DIGITAL CONNECTOR 1
40 PIN 2X20 SQUARE PIN
J4**

ROW B		ROW A	
PIN	SIGNAL	PIN	SIGNAL
1	GND	2	
3	GND	4	GND
5	(BYPASS)	6	(W_F1L7)
7	GND	8	(RI/O_0)
9	RMC7	10	RMC6
11	RMC5	12	RMC4
13	RMC3	14	RMC2
15	RMC1	16	RMC0
17	RRD/(WR)	18	(TEST_EN)
19	VID_ABS	20	
21	GND	22	MTESTD9
23	MTESTD8	24	MTESTD7
25	MTESTD6	26	MTESTD5
27	MTESTD4	28	MTESTD3
29	MTESTD2	30	MTESTD1
31	MTESTD0	32	GND
33		34	
35		36	GND
37	SRX	38	STX
39		40	GND

**Table 2-16.
UPPER-LOWER I/O BOARD
DIGITAL CONNECTER 2
40 PIN 2X20 SQUARE PINS
J5**

ROW B		ROW A	
PIN	SIGNAL	PIN	SIGNAL
1	GND	2	WCLKB
3	(WCLKB)	4	GND
5	GND	6	(XFRR)
7	(XFRW)	8	R/(C)
9	R/(W)	10	GND
11	GND	12	RCLKA
13	(RCLKA)	14	(HOT)
15	GND	16	MEMDO9
17	MEMDO8	18	MEMDO7
19	MEMDO6	20	MEMDO5
21	MEMDO4	22	MEMDO3
23	MEMDO2	24	MEMDO1
25	MEMDO0	26	GND
27	NOISE	28	MA8
29	MA7	30	MA6
31	MA5	32	MA4
33	MA3	34	MA2
35	MA1	36	MA0
37	GND	38	-15 V
39	+15 V	40	GND

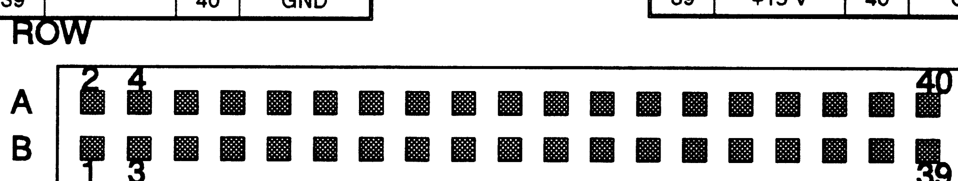


Fig. 2-37. Pinout of the 2x20 square pin connector.

Table 2-17.
POWER SUPPLY CONNECTOR
48 PIN DIN FEMALE
J7

ROW A		ROW B		ROW C	
PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	+5 V	1	+5 V	1	+5 V
2	+5 V	2	+5 V	2	+5 V
3	+5 V	3	+5 V	3	GND
4	GND	4	GND	4	GND
5	GND	5	GND	5	GND
6	-5 V	6	-5 V	6	-5 V
7	GND	7	GND	7	GND
8	-15 V	8	-12 V	8	-12 V
9	+15 V	9	GND	9	GND
10	GND	10	+12 V	10	+12 V
11	GND	11	GND	11	GND
12	BAREHOLE	12	BAREHOLE	12	BAREHOLE
13	BAREHOLE	13	BAREHOLE	13	BAREHOLE
14	-V	14	-V	14	-V
15	BAREHOLE	15	BAREHOLE	15	BAREHOLE
16	+V	16	+V	16	+V

+5 V	@	17.0 AMPS	=	85.0 WATTS
-5 V	@	6.0 AMPS	=	30.0 WATTS
+12 V	@	1.2 AMPS	=	14.4 WATTS
-12 V	@	1.2 AMPS	=	14.4 WATTS
+15 V	@	0.5 AMPS	=	7.5 WATTS
				151.3 WATTS

Table 2-18.
UPPER-LOWER I/O BOARD POWER SUPPLY
10 PIN AMP CONNECTOR
J8

PIN	SIGNAL
1	+5 V
2	+5 V
3	GND
4	-5 V
5	GND
6	-12 V
7	GND
8	+12 V
9	GND
10	GND

Table 2-19.
UPPER-LOWER I/O BOARD ANALOG CONNECTOR
SMB CONNECTOR

ROW A		ROW B	
PIN	SIGNAL	PIN	SIGNAL
1	PROG_IN	1	AGND

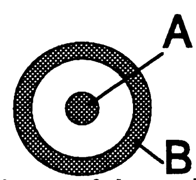


Fig. 2-38. Pinout of the smb connector.

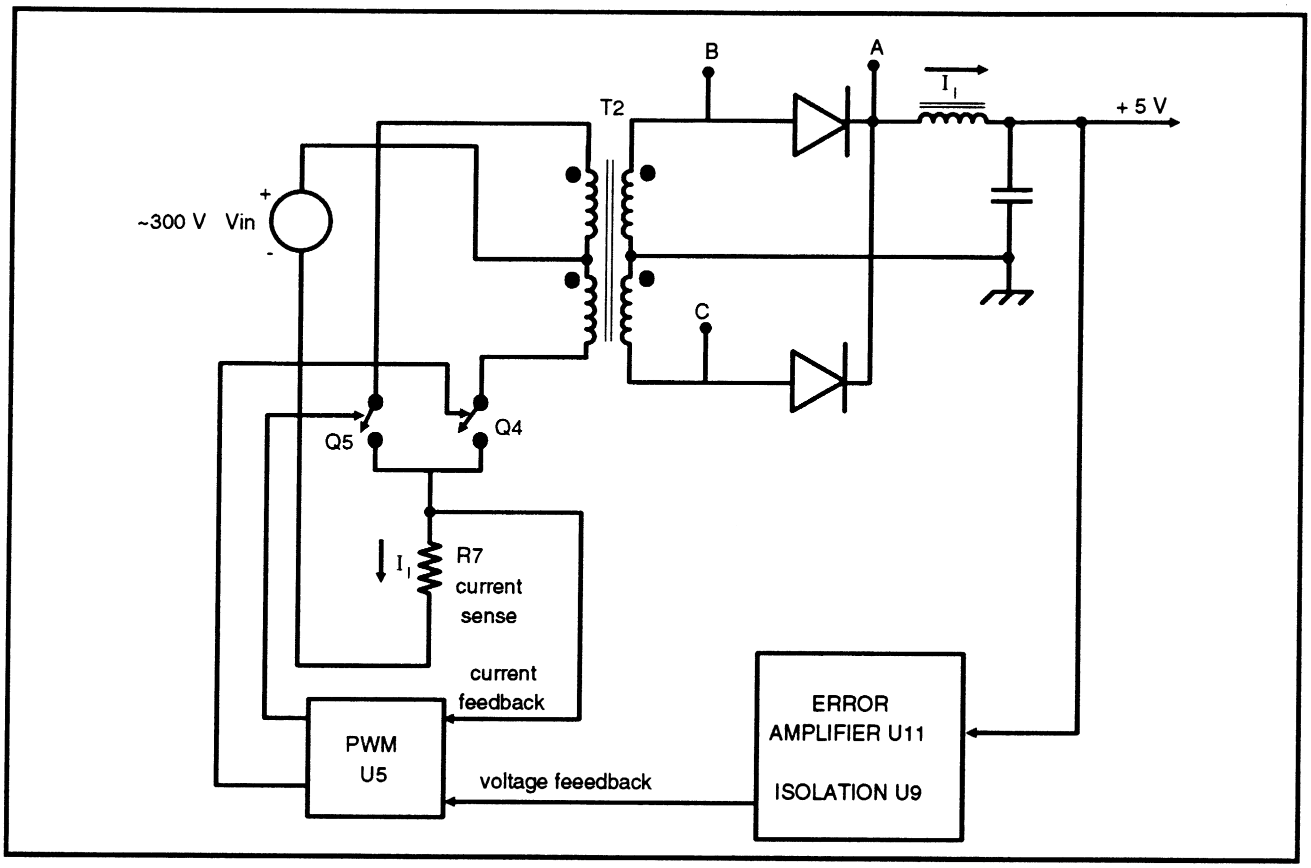


Fig. 2-39. Block diagram for the Power Supply.

POWER SUPPLY

BLOCK DIAGRAM DESCRIPTION ① (See Fig. 2-39)

The Power Supply board takes the line voltage in (approximately 300 V) and converts it to the voltage levels needed in the VS 211: + 5 V, - 5.2 V, and ± 12 V. Part of what would be considered the Power Supply (the Line Filter) is found on the Lower I/O board.

WARNING

Even with the POWER switch in the "off" position, portions of the Power Supply and Lower I/O boards will still carry high Voltages.

WARNING

All primary voltages are referenced to a floating ground, not chassis ground. An isolation transformer or a differential amplifier is therefore needed in order to troubleshoot the circuitry in the primary, the Pulse Width Modulator, and their supporting circuitry.

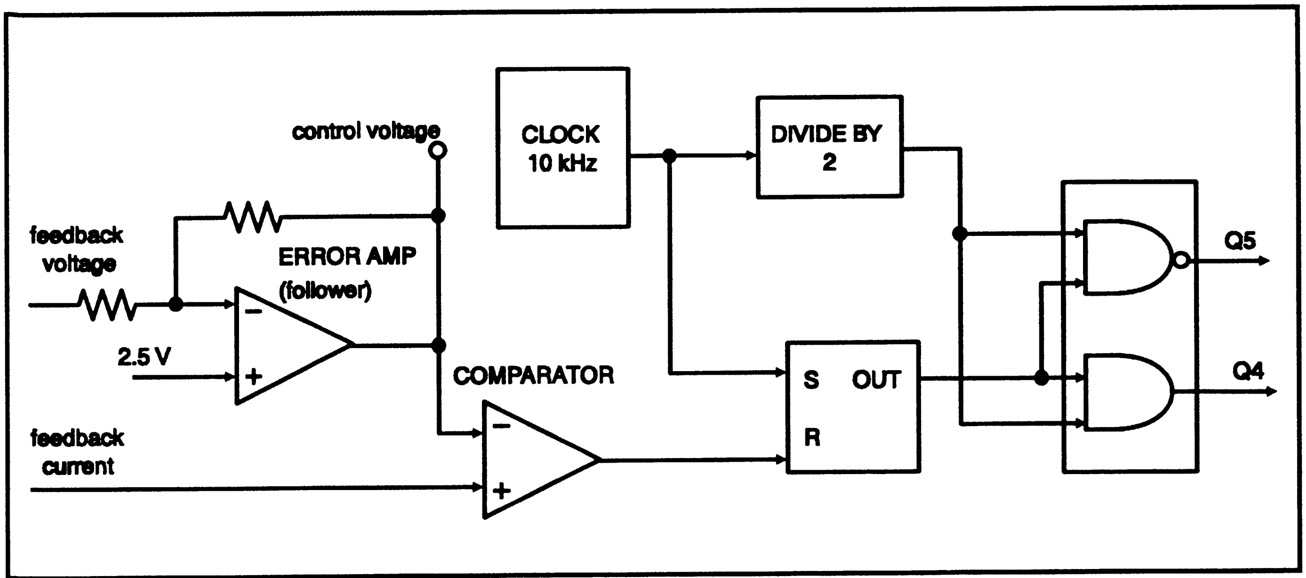


Fig. 2-40. Bloack diagram of the PWM (U5).

NOTE

The Power Supply will disconnect and reconnect itself during power surges.

The Housekeeping Supply supplies the power to start and maintain oscillation of the Pulse Width Modulator (PWM), as long as input voltage is sufficient to maintain output voltage regulation.

The Pulse Width Modulator (PWM) uses its internal clock and the feedback current, I_l, to generated the switching pulses for the switching Circuit. See Fig. 2-40 for a block diagram of the PWM and Fig. 2-41 for the timing diagram.

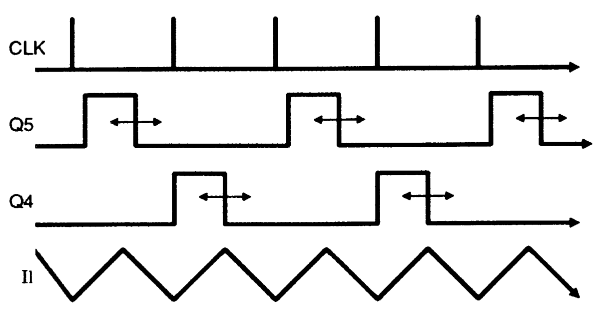


Fig. 2-41. Timing Diagram of the PWM.

The heart of the Switching Circuit is Q4 and Q5. These transistors gate the voltage going the transformer through current controlled feedback.

The voltage gated by Q4 and Q5 is stepped down by the transformer, T2. Using the + 5 Volt Supply as an example, the voltage is rectified by the diodes CR30 - CR33 as shown by the timing diagram in Fig. 2-42. The voltage at A is averaged by the L-C circuit making + 5 Volts available at the output.

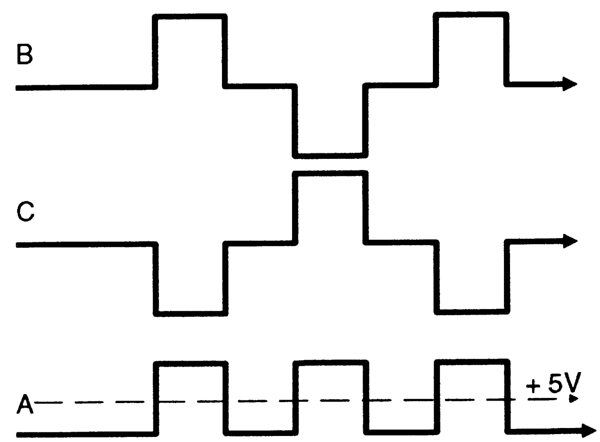


Fig. 2-42.
Timing Diagram on the output side of T2. A, B, and C refer to the test points shown on Fig. 2-39.

SECTION 3
SPECIFICATIONS

Reference Documentation

The following documents were used as references in the preparation of this specification:

Product Classification Environmental Test Summary, 13 June 1977
Tektronix Standard 062-2853-00

Electrostatic Discharge Environmental Test, 20 October 1977
Tektronix Standard 062-2862-00

Electromagnetic Compatibility Environmental Test, 31 March 1977
Tektronix Standard 062-2866-00

Recommendations and Reports of the CCIR, 1978; Transmission of Sound Broadcasting and Television Signals Over Long Distances (CMTT)

IEEE Standard Dictionary of Electrical Terms, Second Edition (1977)
IEEE Standard 100-1977

Safety Standard for Electrical and Electronic Equipment, Draft 6, June 1978
ANSI C39.5

International Electrotechnical Commission Standard, "Safety Requirements for Electronic Measuring Apparatus"
IEC 348

Canadian Standards Association Electrical Bulletin CSA 556B

Factory Mutual Approval Standard "Electrical Utilization Equipment, Class no. 3820"

IEC 60B(Secretariat) 170., "Helical-scan digital composite cassette recording system using 19 mm magnetic tape (format D-2) (NTSC, PAL, PAL-M)"

Performance Conditions

The Performance Requirements are valid within the environmental limits if the instrument is adjusted at 25°C ± 5°C, and a minimum warm-up time of 20 minutes is allowed.

Safety Standards

The following safety standards apply to the VS 211:

- ANSI C39.5
- FM 38-20
- IEC 348
- CSA Bulletin 556B
- VDE 0871.5 (Class B)

NOTE

Shielded cables were used in certifying this instrument, therefore shield cables should be used in its operation. (EC92)

ELECTRICAL SPECIFICATIONS

Table 3-1.
Program Channel
(Measured With Processing Amplifier Control Disabled and ONLY in 8 Field and Zero Studio Delay Modes.)

Characteristic	Performance Requirements	Supplemental Information	Per. Check Step #
Gain			
PROGRAM Output	Unity ± 1%		20.
MONITOR Output	Unity ± 1%	In normal operation, PROGRAM Output Performance Requirements apply to the MONITOR Output (except Gain).	20.
Frequency Response	± 1% to 5.5 MHz	Measured with vertical correlated full field test signal 1 MHz reference.	31.
Signal-to-Noise Ratio	Greater than 60 dB unweighted to 6.0 MHz through 6.0 MHz Low-Pass filter		34.
Dynamic Gain Error (10% - 90% APL)	0.5% maximum		27.
Chrominance/Luminance Gain Error	1% maximum	Measured with vertical correlated full field test signal.	17.
Chrominance/Luminance Delay Error	10 ns maximum		18.
Chrominance/Luminance Intermodulation	0.5% maximum		19.
Differential Gain	1% maximum	Including quantization errors. Measured with the decoder off. Decoder roundoff errors add approximately 0.4% and 0.2°.	32.
Differential Phase	1° maximum		32.
K-Factor (2T pulse)	1% maximum		21.
$K_{pulse\text{-}to\text{-}bar}$ (2T Pulse-to-Bar Ratio) Error	1% maximum		22.
Short Time Distortion	1% maximum		23.
Line Time Distortion	0.5% maximum		24.
Field Time Distortion	0.5% maximum		25.
Input/Output Crosstalk	-70 dB to 2 MHz -60 dB to 5.5 MHz	Operating (5 dB less in bypass).	37.

Table 3-1
Program Channel (cont.)
(Measured With Processing Amplifier Control Disabled)

Characteristic	Performance Requirements	Supplemental Information	Per. Check Step #
Isolation, Program from Monitor	> 30 dB operating, > 60 dB at 2 MHz bypassed.		35. & 36.
Return Loss Program			
Input			
Operating	> 46 dB to 5.5 MHz	75 Ω	41.
Bypassed	> 40 dB to 5.5 MHz	75 Ω	41.
Output			
Operating or Bypassed	> 40 dB to 5.5 MHz	75 Ω	41.

Table 3-2.
Monitor Output
(Measured With Processing Amplifier Controls Disabled)

Characteristic	Performance Requirements	Supplemental Information	Per. Check Step #
Gain			
Processing	Unity ± 1.5%		20.
Bypassed	Unity ± 3%		20.
Frequency Response			
Processing	± 1% to 5.5 MHz	Measured with vertical correlated full field test signal. 1 MHz reference.	31.
Bypassed	± 10% to 5.5 MHz	When terminated in a precision resistor.	31.
Return Loss Monitor Output	> 40 dB to 5.5 MHz	Measured with the instrument on.	41.
Differential Gain			
Processing	± 1%	Measured with decoder off. Decoder will increase error.	32.
Bypassed	± 3%		32.
Differential Phase			
Processing	$\pm 1^\circ$	Measured with Decoder off. Decoder will increase error.	32.
Bypassed	$\pm 3^\circ$		32.

Table 3-3.
Processing Amplifier

Characteristic	Performance Requirements	Supplemental Information	Per. Check Step #
Input Gain Range	± 3 dB		12.
Output Gain Range	± 3 dB		8.
Black Level Range	± 70 mV		9.
Chrominance Gain Range	± 3 dB		10.
Sync and Burst Insertion Amplitude Accuracy	± 1.5 mV		30.
Chrominance Phase Error with Chroma Gain Correction	< 3° change		11.
Signal Correction Timing			
Horizontal	Active line, except 10.54 µsec ± 0.15 µsec horizontal blanking.		16.
Sync and Burst Insertion Timing			
Horizontal Sync Insertion	10.54 µsec ± 0.1 µsec nominal.	When sync and burst is not inserted, the output SC/H phase will be the same as the input SC/H phase. It is recommended that sync and burst always be inserted when the input is analog and the output is digital.	13.
Vertical Sync Insertion	Last 2.5 lines and first 5 lines for a total of 7.5 lines.		13.
Vertical Interval Blanking			
Horizontal Timing	Sync & burst deletion leaves sync as 10.54 µsec ± 0.1 µsec nominal horizontal blanking.		14.
Vertical Timing		Option keeps or deletes video.	
ITS Decoding		If VS 211 decodes the video, the ITS are also decoded. Therefore, the ITS go through the Proc Amp unless ITS deletion is specified.	

Table 3-4.
Program Line Clamping

Characteristic	Performance Requirements	Supplemental Information	Per. Check Step #
Hum Rejection	> 32 dB	Measured with only hum added. Less with white noise present.	29.
Recovery Time		Clamp recovery time is measured 3-4 lines after sync acquisition. 10% to 90% APL or 90% to 10% APL shift (DC Bounce).	
Fast	Within 35.7 mV in 2 - 3 lines.		28.
Medium	Within 35.7 mV in 10 - 30 lines.		28.
Slow	Within 35.7 mV in 30 lines or more		28.
Switch Points			
Fast → Medium	30 - 40 dB S/N		28.
Medium → Slow	20 - 30 dB S/N		28.
Field Time Tilt Correction		25% tilt on input signal can be reduced to 1% or less on a signal with a greater than 40 dB Signal-to-Noise Ratio.	
DC Drift with Clamp Off	< 10 mV from line 7 to line 8, at which time the clamp comes back on.		26.

Table 3-5.
Chrominance Decoder

Characteristic	Supplemental Information
Video Signal Filtering Modes	
Pass	Signal unaltered. Transparent to 10-bit accuracy.
Notch	Chrominance is separated using a 9-tap FIR filter.

**Table 3-6.
Synchronizer Timing**

Characteristic	Performance Requirements	Supplemental Information	Per Check Step #
Output Timing Range			
Horizontal	Nominally 30 µsec advance to 30 µsec delay, center is determined by phase lock.	Output with respect to reference input. May be set in digital increments of 0.2° of subcarrier.	16.
Vertical	1 line advance to 1 line delay.		15.

Table 3-7.
Program Line Genlock

Characteristic	Performance Requirements	Supplemental Information	Per Check Step #
Color Field Detection, based on SC/H Phase	Correct color framing detected for signals having an average SC/H phase $\pm 40^{\circ}$.	Once locked to a color field, the detector will stay locked to that field for an SC/H phase range of at least $0^{\circ} \pm 90^{\circ}$. If a drift of incoming SC/H phase causes a color change, a 30° minimum hysteresis zone prevents chatter between color fields.	33.
Chrominance Phase Error with Frequency Change	$< 0.5^{\circ}$ with an input burst frequency reference change of ± 10 Hz.	Will lock ± 50 Hz at subcarrier.	3.
Video to Inserted Burst Phase Error with Temperature Change		$< \pm 0.5^{\circ}$ with a temperature change of 0°C to 50°C (referenced to 25°C and incoming video 0° SC/H).	
Chrominance Phase Error with Burst Amplitude Change	$< 1^{\circ}$ change with a ± 3 dB amplitude change.	Switches to sync lock when burst amplitude is attenuated by 9 dB.	4.
Acquisition Time		16 fields maximum with clamp and sync stripper working per spec and with input signal > 40 dB S/N and < 1 dB attenuation.	
Timing Jitter		Measured with respect to inserted sync and burst using a noise-free, stable signal (Test Signal Generator).	
Burst Lock	$< 0.5^{\circ}$		7.
Sync Lock	Will maintain sync lock if burst is absent or attenuated.		7.

**Table 3-8.
Reference Input**

Characteristic	Performance Requirements	Supplemental Information	Per Check Step #
Color Field Detection, based on SC/H Phase	Correct color framing will be detected for signals having an average SC/H phase $\pm 40^{\circ}$.	Once locked to a color field, the detector will stay locked to that color field for an SC/H phase range of at least $0^{\circ} \pm 90^{\circ}$. If a drift of incoming SC/H phase causes a color change, a 30° (min) hysteresis zone prevents color chatter between fields.	33.
Chrominance Phase Error with Frequency Change	$< 0.5^{\circ}$ with an input burst frequency change of ± 10 Hz.		5.
Inserted Burst to Reference Phase Error with Temperature Change		$< 0.5^{\circ}$ with a temperature change of 0 - 50°C (referenced to 25°C).	
Chrominance Phase Error with Burst Amplitude Change	$< 1^{\circ}$ with a ± 3 dB amplitude change.	Stays locked to approximately $\pm$ 6 dB.	6.
Phase Jitter			
Burst Lock	$< 0.5^{\circ}$	Measured with a noise-free, stable signal.	7.
Sync Lock	Will maintain sync lock if burst is absent or attenuated.		7.
Return Loss REFERENCE LOOP-THROUGH	> 40 dB to 5.5 MHz.	With instrument turned on.	41.

Table 3-9.
Power Supply

Characteristic	Performance Requirements	Supplemental Information	Per Check Step #
Line Frequency Range		48 - 62 Hz	
Line Voltage Range			
115 V_{ac}	90 - 132 V_{ac}		1.
230 V_{ac}	180 - 250 V_{ac}		1.
Power Consumption		97 VA Typical 240 VA Maximum Limited in the primary.	
Supply Accuracy			
+ 5 V		+ 5 ± 100 mV	1.
- 5.2 V		- 5.2 ± 300 mV	1.
+ 12 V		+ 12 ± 300 mV	1.
- 12 V		- 12 ± 300 mV	1.
Hum		< 10 mV all supplies.	
Current Limits			
+ 5 V		15 A	
- 5.2 V		5 A	
+ 12 V		1A Limited by linear reg.	
- 12 V		1A Limited by linear reg.	
Noise		5 MHz bandwidth	
+ 5 V		50 mV	
- 5.2 V		100 mV	
+ 12 V		10 mV	
- 12 V		10 mV	
Fuse Data			
115 V		4A Med	
230 V		2A Med	

Table 3-10.
Electrical Interface Digital I/O
(COMPOSITE DIGITAL)

Characteristic	Supplemental Information		
Digital Format	Unidirectional, eleven signal pairs. Ten pairs carry data and the eleventh is a synchronous clock.		
Encoding Format	Uniformly quantized PCM. 8 to 10 bits per sample.		
Sampling Structure	Non-orthogonal		
Sampling Frequency	17.73447 MHz ($4F_{SC}$)		
Logic Levels (at 25°C)	10K ECL compatible		
Number of Samples			
Total Line	1135		
Digital Active Line	948		
Correspondence between Video Signal Level and Quantization Levels (see Fig. 3-1)		8 bit levels	10 bit levels
	Blanking Level	40h	100h
	White Level	D3h	34Ch
	Sync Level	01h	004h
	bits/mV	0.21	0.84
	h=hexidecimal Sync, burst and blanking are expected to match the proposed standard ONLY if sync and burst are inserted where the original signal was analog. Use of the digitized version of the analog input is not recommended.		
Clock-to-Data Timing	The positive transition of the clock signal shall occur midway between data transitions.		
Transmission Distance	100 meters over a shielded twisted 12 pair cable.		

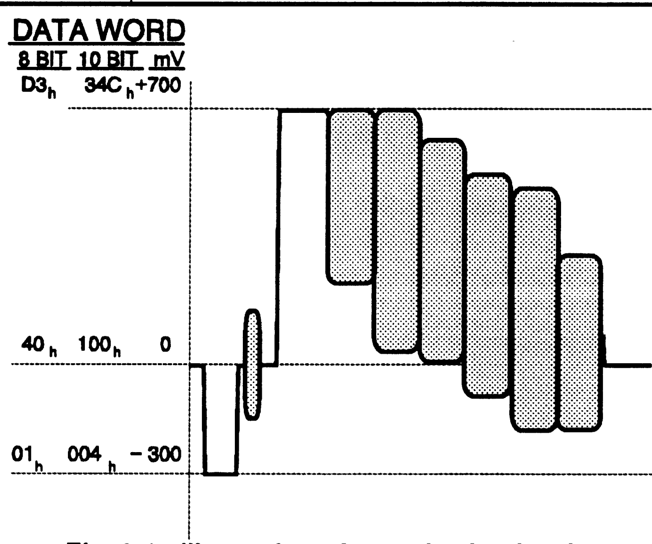


Fig. 3-1. Illustration of quantization levels.

**Table 3-11.
Remote Control Interface - Electrical
(REMOTE)**

Characteristic	Supplemental Information	
Interface	Supports RS-232-C/RS-422 format to the extent shown below:	
REMOTE (to RC 211)	PIN	USE
	2	TX
	3	RX
	4	(CTX)
	5	SIGNAL GROUND
	7	(CRX)
	8	CRX
	9	CTX
Baud	19.2 k, 9.6 k, 4.8 k, or 2.4 k selectable.	
Input	Serial Asynchronous Data	
Output	Serial Asynchronous Data	
Character Length	Eleven Bits Per Character: 1 Start Bit 8 Data Bits (LSB First) 1 Parity Bit (Even Parity) 1 Stop Bit	
Parity		
Input	Even parity is required.	
Output	Even parity is sent.	

Table 3-12. Miscellaneous Remote Board Specifications.

Characteristic	Supplemental Information
Monitor Crystal	17.734375 MHz ± 200 Hz.

Table 3-13.
AUDIO DELAY Output - Electrical.

Characteristic	Supplemental Information
Voltage Levels	Minimum ± 5 V, Typical $\pm$ 8 V. RL = 3k to 7k Ω (RS-232 compatible drive levels.)
Baud Rate	1200 Baud
IDLE Mode Output Level	- 5 V
Signal Components	1 Start Bit 8 Data Bits (LSB First) 1 Parity Bit (Even Parity) 1 Stop Bit

OTHER SPECIFICATIONS

Table 3-14.
Mechanical Interface
Pin Assignment for COMPOSITE DIGITAL I/O

CONTACT	ASSIGNMENT	CONTACT	ASSIGNMENT
1	Clock	14	Clock Return
2	System Ground	15	System Ground
3	Data 7 (MSB)	16	Data 7 Return
4	Data 6	17	Data 6 Return
5	Data 5	18	Data 5 Return
6	Data 4	19	Data 4 Return
7	Data 3	20	Data 3 Return
8	Data 2	21	Data 2 Return
9	Data 1	22	Data 1 Return
10	Data 0 LSB 8-bit system	23	Data 0 Return LSB 8-bit system
11	Data A	24	Data A Return
12	Data B LSB 10-bit system	25	Data B Return LSB 10-bit system
13	Cable Shield		

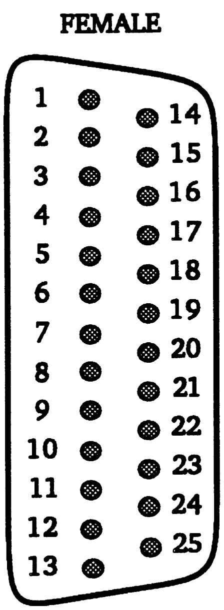


Fig. 3-2. Pinout diagram looking into the

Table 3-15.
Environmental Characteristics

Characteristic	Supplemental Information
Temperature	
Operating	0 to 50°C
Storage	- 55 to 75°C
Humidity Operating or Storage	Withstands 90 to 95% relative humidity for up to five days.
Altitude	
Operating	15,000 feet (4572 meters)
Storage	50,000 feet (15240 meters)
Vibration	0.015 inches (0.4 mm) (10 to 55 Hz sine wave)
Shock — Operating	30 g (11 ms half-sine)
Bench Handling Operating	4 inches (0.1 meter) all significant faces.
Packaged Product	
Vibration	1 inch (25.4 mm) (approximately 270 RPM)
Drop	3 feet (0.91 meter) (10 drops)
	Qualifies under National Safe Transit Assn. Pre-shipment test procedures, Project 1A-B-1. Package design for both instrument and ship alone circuit boards shall allow no more than 30 g.
Electrostatic Immunity	Withstands discharge through 1 kΩ resistance of a 500 pf capacitor charged to 1.5 kV.
Electromagnetic Compatibility	Qualifies under test limits specified in Tektronix Standard 062-2866-00 (controlling standards, MIL-STD-28800 and MIL-STD-461A). Meets VDE 0871.5 (class B).

Table 3-16.
Mechanical Characteristics

Characteristic	Supplemental Information
Height	3.5 inches (89 mm)
Width	19.0 inches (480 mm)
Depth	
Overall	20.50 inches (521 mm)
For Rack Mounting	19.08 inches (503 mm) Measured from the back of the rack mounting ears. (See Fig. 2-2.)
Weight	
Net	19.50 pounds (8.9 kg)
Shipping	36.25 pounds (16.54 kg)

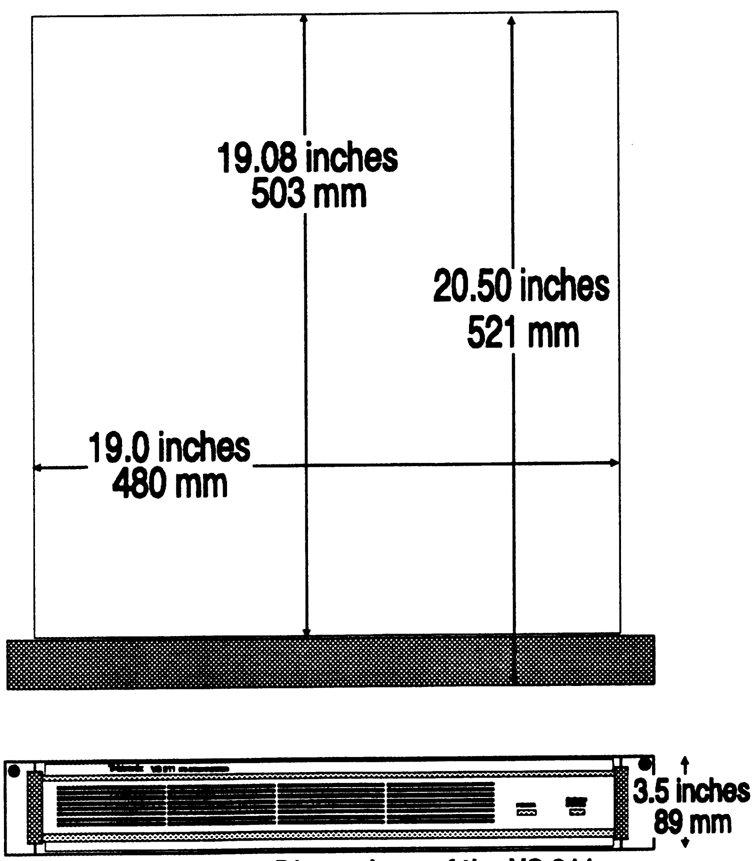


Fig. 3-3. Dimensions of the VS 211.

SECTION 4
PERFORMANCE CHECKS & CALIBRATION PROCEDURES

INTRODUCTION

This section of the manual consists of two separate procedures. The first, the Performance Check, may be used to verify that the VS 211 is working to the Performance Requirements in the Specifications section of this manual (Section 3). The second, the Adjustment Procedure, contains logically sequenced equipment setup and adjustment steps. These steps are intended to restore the VS 211 to its original caliber of operation during routine maintenance or following repairs.

Limits, tolerances, and waveforms given in this section are guides to adjustments, and are not instrument specifications except as listed under the Performance Requirement column of the Specification section in this manual.

TEST EQUIPMENT LIST

The capabilities of the test equipment described in the following list are the minimum required to perform the procedures. Test equipment used in preparing these procedures is given in each example. If equipment other than that given in the examples is used, it must meet or exceed the listed requirements.

1. **Test Oscilloscope**

   Vertical Amplifiers:

   a. 30 MHz bandwidth, 1 mV sensitivity, 5 MHz switchable bandwidth, dc offset.

   b. TEKTRONIX 7A26. If an alternative vertical amplifier is used, it must have the same pulse overdrive recovery characteristics.

   Time Base: 10 ns/div to 5 ms/div sweep speeds, triggering to 5 MHz, and capable of accepting both direct and delayed external triggers (delayed external triggers for trace noise and jitter reduction).

   Example: TEKTRONIX 7704A Oscilloscope with a 7A13 Differential Comparator, 7A26 Dual Trace Amplifier, and a 7B53A Dual Time Base. Also 10X probes, P6106 (Tektronix part number 010-6106-03), and a 1X probe, P6101 (Tektronix part number 010-6101-03).

2. **Digital Video Test Signal Generator**

   The generator must comply with the proposed PAL Composite Digital standards (Proposed Parallel Interface for Composite PAL Digital Video Signals, April 1988). It must be capable of genlocking to an external source and providing several PAL video test signals such as: Linearity Ramp, Color Bars, and Sin(x)/x. It must give digital and analog video outputs.

   Example: TEKTRONIX TSG 273.

3. **Digital Sweep Generator**

   The generator must comply with EBU standards.

   Example: TEKTRONIX Digital Sweep Generator used in a TM 500 Series Power Module.

4. **Television Test Signal Generator**

Capable of providing several PAL video test signals such as: full-field Color Bars, Linearity Staircase, Linearity Ramp, Field Sweep, and Black Burst. In the Black Burst signal, the SC/H burst phase and amplitude should be capable of being readily varied and set.

Also, the field-sweep test signal controls should have the capability of turning "on" and "off" the burst portion of the signal; and the subcarrier portion of the linearity staircase and ramp signals should be easily turned "on" and "off" from the front panel.

Example: TEXTRONIX 1411 Generator with Option AA (modified SPG12), TSG13, TSG15, TSG16, and TSG17.

The 1410 Option AA is a mainframe with a modified SPG12 sync pulse generator having the added features: Variable subcarrier frequency (±20 Hz and ±50 Hz), variable burst amplitude, variable sync amplitude, and SC/H unlock. These features make several checks easier.

NOTE

The 1411 series generators with standard SPG and TSG modules can be used, but this will not allow all checks and adjustments to be made. A standard SPG12 module will not allow checking: lock to changes in sync amplitude, burst lock to changes in burst amplitude, and frequency lock to burst offset frequency changes.

The signal generator can be ordered with the Option AA.

The TSG13 is a linearity test signal generator. It provides a variable APL signal. It also provides a staircase and ramp with switchable subcarrier which can be turned "off".

The TSG15 is a Pulse and Bar test signal generator. It provides T, 2T, or T/2 sine-squared pulse and bar. The Pulse and Bar signals can be modulated or unmodulated.

The TSG16 is a Multiburst and Field Sweep generator. It provides a field rate sweep signal with a switchable burst.

The TSG17 is a color bar signal generator. The composition of the signal can be altered by switching off luminance, B-Y, R-Y, Burst, and Sync.

5. **Spectrum Analyzer**

Capable of measuring signals from 1 MHz to 10 MHz, frequency span per division of 1 MHz, and 300 kHz resolution.

Example: TEKTRONIX 7L13 in a 7704A oscilloscope mainframe.

6. **Vectorscope and Television Waveform Monitor**

Capable of displaying line-rate and field-rate signals, A-B operating mode, have a frequency response of 50 kHz to at least 6 MHz in the A-B mode with no signal in channel B, and have a common mode rejection ratio of at least 66 dB from 25 kHz to 50 kHz. Equipped with a probe input. (The 10X probe listed under oscilloscope can be use with the 1781 Probe input.) Equipped with an internal amplitude calibration signal (an internal VAC). Also capable of measuring phase, differential phase, and differential gain.

Example: TEKTRONIX 1781 Vectorscope/ Waveform Monitor.

7. **White Noise Generator**

Capable of inserting white noise on a composite video signal with a variable signal-to-noise ratio of 60 dB to 10 dB.

Example: NOISE/COM model no. NC 6107.

8. **Voltmeter**

Range: 0 to greater than 100 V_{dc}; accuracy ±0.1%.

Example: TEKTRONIX DM 501A used in a TM 500 Series Power Module.

9. **3-Wide TM 500 Series Power Module**

Used to power the digital sweep generator, video amplitude calibrator, peak-to-peak detector, and digital multimeter. A 4-Wide or 5-Wide TM 500 Power Module may be used in place of the 3-Wide.

Example: TEKTRONIX TM 503 Power Module.

10. **75 Ω Return Loss Bridge**

Range: At least 46 dB return loss sensitivity, 50 kHz to 6 MHz.

Example: Tektronix part number: 015-0149-00. If a 50 Ω signal generator is used with this return loss bridge, the following items must also be used:

a. 50 Ω cable (012-0057-01)

b. 50 Ω to 75 Ω minimum loss attenuator (011-0057-01)

11. **75 Ω Terminators**

Four required: three 0.024% end-line terminators and one feed-through type terminator.

Example: End-line terminator, Tektronix part number 011-0102-01; and a feed-through terminator, Tektronix part number 011-0103-02.

12. **BNC Coax Cables**

Seven required, one 50 Ω cable and six 75 Ω cables.

Examples: a) 42-inch S-300 50 Ω cable (012-0057-01) and b) 42-inch RGU 59 75 Ω cable (012-0074-00).

13. **10X, 75 Ω Attenuator**

Example: Tektronix part number 011-0061-00.

14. **BNC Adapters**

BNC Male-to-BNC Male adapter (103-0029-00) and BNC Female-to-BNC Female adapter (103-0028-00).

15. **Alignment Tool**

For adjustment of small pot coils needing a two-pronged blade.

Example: Tektronix part number 003-0837-00.

16. **Alignment Tool**

For adjustment of coil cores needing a small hex shaft.

Example: Tektronix part number 003-0310-00.

17. **Circuit Board Extender (Optional Accessory)**

Tektronix part number 063-0784-00, order TVA001.

18. **Variable Auto Transformer**

Example: General Radio Metered Auto Transformer W10MT3W. If 220V operation needs to be checked, a different autotransformer or conversion transformer is needed.

19. **Sine Wave Generator**

Capable of providing a 1 Hz to 60 Hz sine wave with a high output impedance compared to 75 Ω and dc offset capabilities.

Example: TEKTRONIX SG502 Oscillator.

20. **Digital Frequency Counter**

Capable of measuring frequencies from 10 MHz to 20 MHz. Accuracy: within 100 Hz at 17 MHz. Input amplitude: 40 mV to 60 mV.

Example: TEKTRONIX DC503A Universal Counter/Timer.

21. **Low-Pass Filter**

Low-pass filter with a 6.0 MHz cutoff frequency.

Example: Tektronix 015-0220-00.

22. Digital Terminator

Refer to Fig. 4-1.

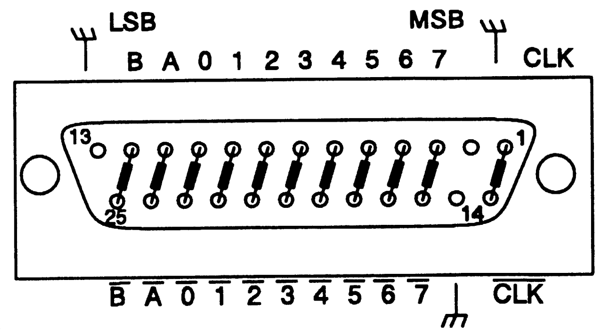
23. DC Block

Used for Return Loss test.

24. RC 211 Remote Control (Only required for the Isolation and Crosstalk Checks)

The RC 211 is an optional accessory, only required for the Isolation and Crosstalk checks.

It is assumed, though, that the user does not have a RC 211 available, therefore, see the RC 211 manual to make changes using the remote. All normal changes and adjustment are made using the controls internal to the VS 211.



Take eleven 110 Ω resistors and a 25-pin male D connector. Solder each resistor between a data line pin and its complement, as shown. Make sure to leave enough room to attach a scope probe at each end of the resistors.

Fig. 4-1. Digital Terminator.

PERFORMANCE CHECKS

SHORT FORM PERFORMANCE CHECK

Power Supply

1. Power Supplies

2. Power-Up Conditions

Video Signals

3. Phase Error with Program Line Burst Frequency Change
(0.5° or less)

4. Phase Error with Program Burst Amplitude Change
(1° or less with amplitude change of ± 3 dB)

5. Phase Error with Change in Reference Burst Frequency
(0.5° or less)

6. Phase Error with Change in Reference Burst Amplitude.
(Within 1° with an amplitude change of ± 3 dB).

7. Timing Jitter
(Burst Lock jitter 0.5° or less peak-to-peak)
(Sync Lock jitter 2 ns or less rms)

8. Video Gain Range
(± 3 dB)

9. Black Level Range
(± 70 mV)

10. Chroma Gain Range
(± 3 dB)

11. Chrominance Phase Error with Chrominance Gain Correction
(3° or less)

12. Input Gain Range
(± 3 dB)

13. Sync and Burst Insertion Timing
(Horizontal Sync Insertion = 10.54 ± 0.15 μsec)
(Vertical Sync Insertion = Last 2.5 lines + first 5 lines for a total of 7.5 lines)

14. ITS Deletion Timing
(Deletion leaves 10.54 ± 0.1 μsec nominal horizontal blanking)

15. Synchronizer Timing — Vertical
(1 line advance to 1 line delay)

16. Synchronizer Timing — Horizontal
(30 μsec advance to 30 μsec delay)

17. Chrominance-to-Luminance Gain
(1% or less)

18. Chrominance-to-Luminance Delay
(10 ns or less)

19. Chrominance-to-Luminance Intermodulation
(0.5% or less)

20. Gain Unity
(Program Channel Operating ± 1%)
(Monitor Channel Operating ± 1.5%
Bypassed ± 3%)

21. K-factor
(0.5% or less)

22. Pulse-to-Bar Ratio (Kpulse/bar)
(1% or less)

23. Check Short Time Distortion
(1% or less)

24. Line Time Distortion
(0.5% or less)

25. Field Time Distortion
(0.5% or less)

26. DC Drift with Clamp Off
(<10 mV from line 7 to line 8)

27. Dynamic Gain Error 10% - 90%
    (0.5% of maximum)

28. Clamp Switch and Recovery Time
    (Switch points:
    Fast-to-Medium = 30 to 40 dB S/N,
    Medium-to-Slow = 20 to 30 dB S/N)
    (Recovery Time:
    Fast — Within 35 mV in 2 to 3 lines,
    Medium — Within 35 mV in 10 to 30 lines,
    Slow — Within 35 mV in 30 or more lines)

29. Hum Rejection
    (32 dB or greater)

30. Sync and Burst Insertion Amplitude Accuracy
    (± 1.5 mV)

31. Frequency Response
    (PROGRAM Output:
    Flat to within 1% to 5.5 MHz
    MONITOR Output:
    Flat to within 1% to 5.5 MHz Processing
    Flat to within 10% to 5.5 MHz Bypassed)

32. Program and Monitor Output Differential Gain and Phase
    (Program Output:
    Within 1% or less Differential Gain
    Within 1° or less Differential Phase)
    (Monitor Output Normal Operation:
    Within 1% or less Differential Gain
    Within 1° or less Differential Phase)
    (Monitor Output in Bypass Mode :
    Within 3% or less Differential Gain
    Within 3° or less Differential Phase)

33. Color Field Detection Based on SC/H Phase
    (0° ± 40°)

34. Signal-to-Noise Ratio
    (> 60 dB to 5.5 MHz)

35. Isolation, Program from Monitor
    (> 30 dB operating)

36. Isolation, Program from Monitor
    (> 60 dB bypassed)

37. Input/Output Crosstalk
    (-70 dB to 2 MHz
    -60 dB to 5.5 MHz)

DIGITAL VIDEO

38. Composite Digital Video Clock Amplitude, Rise, and Fall Times

39. Digital Video Clock to Data Timing

40. Composite Digital Video Output Data

RETURN LOSS

41. Return Loss Basic Setup

42. REFERENCE LOOP THROUGH:
    40 dB or more to 5.5 MHz operating

43. MONITOR Output:
    40 dB or more to 5.5 MHz operating

44. PROGRAM OUTPUT:
    40 dB or more to 5.5 MHz operating

45. PROGRAM INPUT:
    46 dB or more to 5.5 MHz operating,
    40 dB or more to 5.5 MHz bypassed

LONG FORM PERFORMANCE CHECK

Power Supply

1. Power Supplies

WARNING

Even with the POWER switch in the OFF position, portions of the Power Supply and Lower I/O board will still be electrified.

a. **CHECK** — that the proper fuse has been installed in the fuse holder for the setting of the mains voltage selector. Refer to the Power Supply specifications for the line fuse values.

b. Connect power to the VS 211 through the auto transformer.

c. Set the VS 211 POWER switch to ON.

d. Set the Autotransformer to low line voltage output (90 or 180 V_{ac}).

e. **CHECK** — that the POWER LED (green on the front of the instrument) remains lit as the autotransformer is varied from low line to high line voltage (the ac line input voltage varied from either 90 V to 132 V or 180 V to 250 V as determined by the line voltage selector).

f. Return the voltage to 110 V or 220 V.

g. **CHECK** — the power supply accuracy, using a multimeter, at the test points on the Extender board or Power Supply board to the limits given in Table 4-1.

Table 4-1. Power Supply Accuracy.

Supply	Extender Board Test Point Pin #	Accuracy
+5 V	20	+5.1V to +4.9V
-5.2 V	14	-4.9 V to -5.5 V
+12 V	18	+12.3 V to +11.7 V
-12 V	15	-11.7 V to -12.3 V

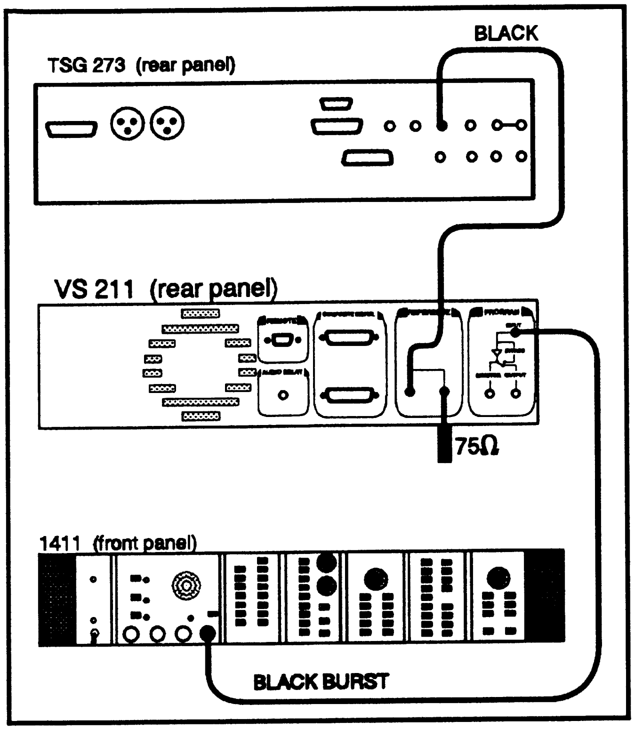


Fig. 4-2. Setup to check power-up conditions.

2. Power-Up Conditions

a. Connect a Black Burst signal from a TSG 273 Test Signal Generator to the VS 211 REFERENCE INPUT and terminate the loop through connector in 75 Ω as shown in Fig. 4-2.

b. Connect a Black Burst signal from a 1411 generator to the VS 211 PROGRAM INPUT.

c. Ensure that all of the diagnostic switches are in the OFF (0) position.

d. Apply power to the VS 211.

e. **CHECK** — that all the LEDs on the front edges of the board flash on for an instant when the power is applied and then go out.

f. Continue monitoring for a minimum of 30 seconds to assure that all the LEDs remain off.

Video Signals

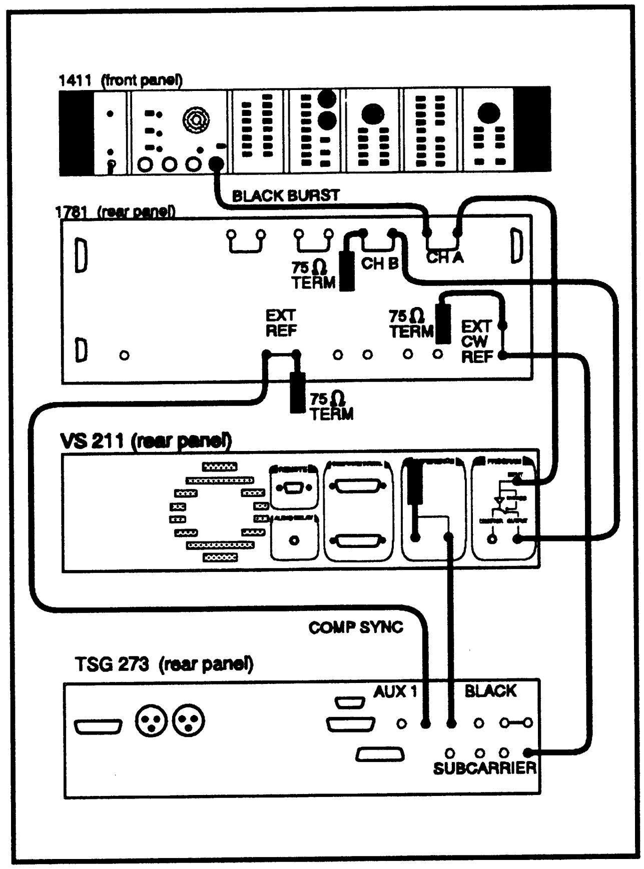


Fig. 4-3.
Equipment setup to check the phase error with PROGRAM burst frequency change and PROGRAM burst amplitude change.

3. Phase Error with Program Line Burst Frequency Change (0.5° or less)

NOTE

These steps check phase errors with the program color burst frequency offset ±20 Hz. The instrument is guaranteed to satisfy the ±10 Hz performance requirement if it meets the ±20 Hz check.

If the instrument does not meet the ±20 Hz check, it must be tested for ±10 Hz offset. In that case, an internal adjustment in the SPG12 (1411 Option AA) must be altered to *provide ±10 Hz offset. Refer to the SPG12 1411 Option AA supplementary manual.*

a. Connect the test equipment as shown in Fig. 4-3.

b. Inhibit sync and burst insertion by setting S5-5 on the Remote board of the VS 211 to 0 or using the RC 211.

c. Set the 1781 vectorscope controls for differential phase measurement of CH B1. Null the signal at the burst location and set that as the reference point.

d. Set the sync pulse generator (SPG12 Mod AA) controls for -20 Hz subcarrier offset.

e. **CHECK** — for a burst phase error of $\leq 0.5^\circ$.

f. Reset the sync pulse generator (SPG12 Mod AA) controls for +20 Hz subcarrier offset.

g. **CHECK** — for a burst phase error of $\leq 0.5^\circ$.

h. Set the sync pulse generator (SPG12 Mod AA) subcarrier frequency offset to OFF.

4. Phase Error with Program Burst Amplitude Change
(1° or less with amplitude change of ±3 dB)

a. Connect the test equipment as shown in Fig. 4-3.

b. Inhibit sync and burst insertion by setting S5-5 to 0 on the Remote board or use the RC 211.

c. Disable the INPUT GAIN control by placing J1 on the ADC board in the 1-2 position.

d. Ensure that the burst amplitude from the sync pulse generator (SPG12 Mod AA) is set to 300 mV (Cal position) with the 1781 Waveform Monitor using its internal calibration signal.

e. Set the 1781 vectorscope controls for differential phase measurement. Use the channel A Phase control on the vectorscope to null the signal at the burst location.

f. Use the sync pulse generator (SPG12 Mod AA) Variable Amplitude Burst control to set the burst amplitude to 212 mV_{p-p}, as measured on the 1781 Waveform Monitor using the internal calibration signal.

g. **CHECK** — that, when the burst amplitude is varied between 212 mV_{p-p} and 424 mV_{p-p}, the change in burst phase is $\leq 1^\circ$.

h. Set the sync pulse generator (SPG12 Mod AA) subcarrier amplitude back to 300 mV_{p-p} (CAL).

i. Enable the INPUT GAIN control by placing J1 on the ADC board to the 2-3 position.

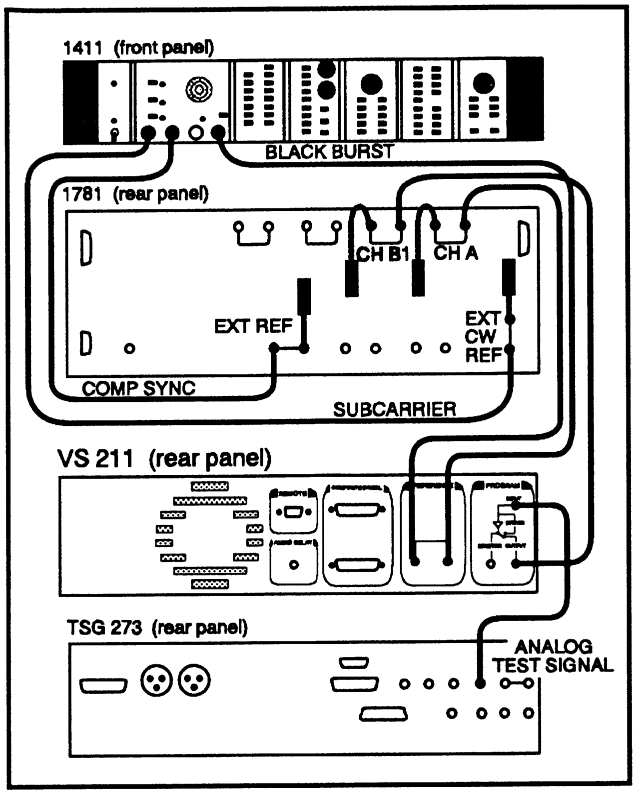


Fig. 4-4.
Set up to check the phase error with change in REFERENCE burst frequency and REFERENCE burst amplitude.

5. Phase Error with Change in Reference Burst Frequency
(0.5° or less)

NOTE

These steps check phase errors with the program color burst frequency offset ±20 Hz. The instrument is guaranteed to satisfy the ±10 Hz performance requirement if it meets the ±20 Hz check.

If the instrument does not meet the ±20 Hz check, it must be tested for ±10 Hz offset. In that case, an internal adjustment in the SPG12 (1411 Option AA) must be altered to provide ±10 Hz offset. Refer to the SPG12 1411 Option AA supplementary manual.

a. Connect the test equipment as shown in Fig. 4-4.

b. Set the full-field output signal of the TSG 273 to VIRS.

c. Set the 1781 vectorscope controls for differential phase measurement. Use the CH B Phase control on the vectorscope to null the signal at the burst location with the calibrated phase control set at 0°.

d. Set the sync pulse generator (SPG12 Mod AA) controls for -20 Hz subcarrier offset.

e. **CHECK** — for a burst phase error of ≤ 0.5° in CH B1.

f. Reset the sync pulse generator (SPG12 Mod AA) controls +20 Hz subcarrier offset.

g. **CHECK** — for a burst phase error of ≤ 0.5° in CH B1.

h. Set the sync pulse generator (SPG12 Mod AA) subcarrier frequency offset to OFF.

6. Phase Error with Change in Reference Burst Amplitude.
(Within 1° with an amplitude change of ±3 dB).

a. Connect the test equipment as shown in Fig. 4-4.

b. Ensure the burst amplitude from the sync pulse generator (SPG12 Mod AA) is set to 300.0 $mV_{p\text{-}p}$ (CAL position) by measuring the 1411's black burst output using a 1781 Waveform Monitor and its internal calibration signal.

c. Set the full-field output signal of the test signal generator TSG 273 to VIRS.

d. Set the 1781 vectorscope controls for differential phase measurement. Null the signal at the burst location and set as the reference.

e. Use the sync pulse generator's Variable Amplitude Burst control to set the burst amplitude to 212 $mV_{p\text{-}p}$, as measured on the 1781 Waveform Monitor with its internal calibration signal.

f. **CHECK** — that the BURST ABSENT LED (LED #4 on the front of the DAC assembly) does not light.

g. **CHECK** — that when the burst amplitude is varied between 212 mV_{p-p} and 424 mV_{p-p} the burst phase changes ≤ 1°.

h. Set the sync pulse generator (SPG12 Mod AA) subcarrier amplitude back to 300 mV_{p-p} (CAL).

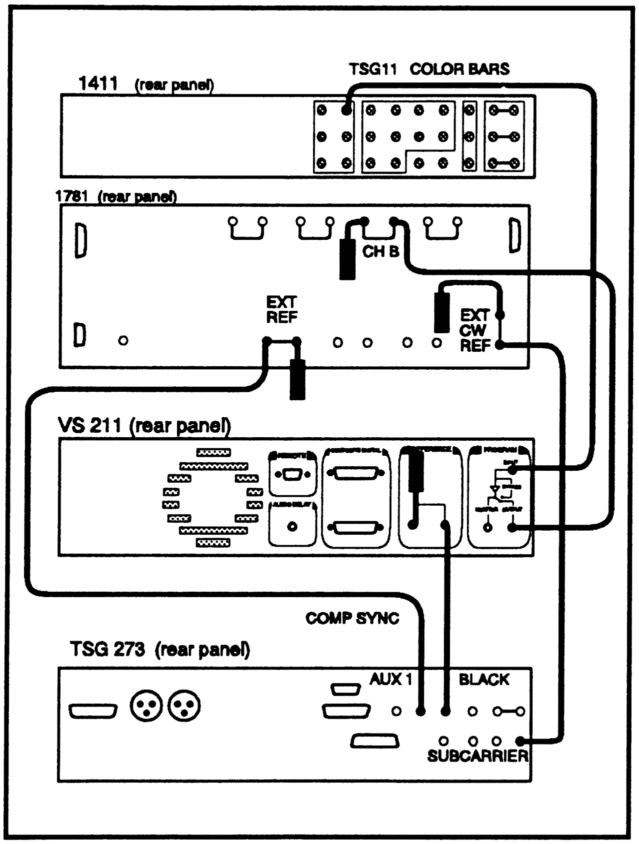


Fig. 4-5. Setup to check timing jitter.

7. **Timing Jitter**
(Burst Lock Jitter 0.5° or less peak-to-peak)
(Signal will Sync Lock if Burst is absent)

a. Connect the test equipment as shown in Fig. 4-5.

b. Set the test signal generator (TSG11) controls for alterable full-field color bars output.

c. Set the 1781 vectorscope controls for external phase reference, external sync, and differential phase measurement. Null the signal at the burst location and set as the reference.

d. **CHECK** — that the burst vector movement (jitter) is ≤ 0.5° peak-to-peak.

e. **CHECK** — that any color bar vector movement (excluding burst) is < 0.5° peak-to-peak.

f. Disable the test signal generator's (TSG11) color burst.

g. **CHECK** — that the signal remains sync locked.

h. Enable the test signal generator's color burst.

i. Swap the REFERENCE and PROGRAM INPUT signals.

j. Set the 1781 vectorscope controls for external phase reference, external sync, and differential phase measurement. Null the signal at the burst location and set as the reference.

k. **CHECK** — that the burst vector movement (jitter) is ≤ 0.5° peak-to-peak.

l. **CHECK** — that any color bar vector movement (excluding burst) is < 0.5° peak-to-peak.

m. Disable the test signal generator's (TSG11) color burst.

n. **CHECK** — that the signal remains sync locked.

o. Enable the test signal generator's color burst.

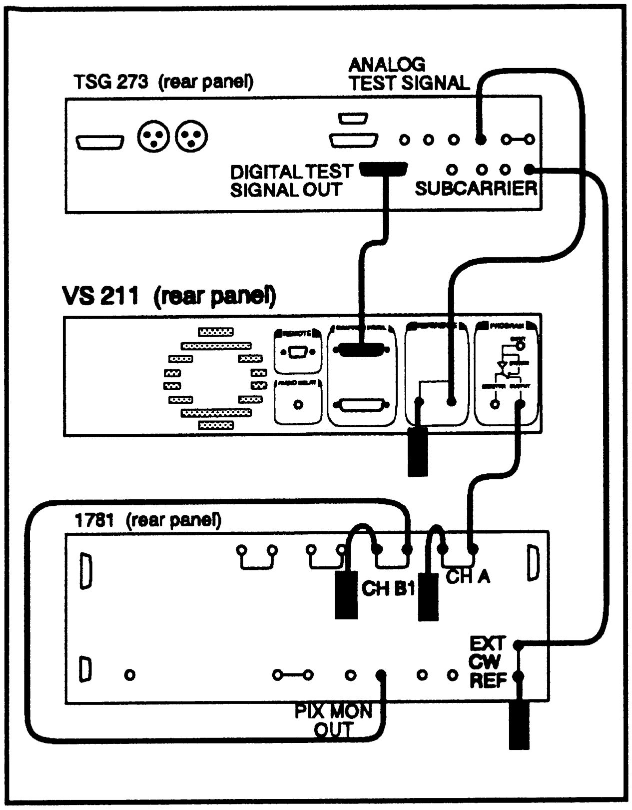


Fig. 4-6.
Setup to check the Video Gain range, Black Level range, and Chroma Gain range.

NOTE

If an RC 211 is attached to the VS 211, do not use the RC 211's Proc Amp controls to do the next five Performance Checks (Video Gain Range, Black Level Range, Chroma Gain Range, Chroma Phase Error with Chroma Gain Correction, and Input Gain Range). If desired, these steps can be repeated using the RC 211 controls to verify their performance, but use the VS 211's Proc Amp controls first.

8. Video Gain Range (±3 dB)

a. Connect the test equipment as shown in Fig. 4-6.

b. Enable the VIDEO GAIN control (J8 on the Proc Amp/Decoder board in the 1-2 position), enable the Proc Amp (S7-2 on the Remote board in position 1), and give control of all VS 211 functions to the VS 211 (S7-6 on the Remote board in position 0).

c. Set the TSG 273 controls for 50% Flat Field output signal.

d. Enable the VS 211's COMPOSITE DIGITAL INPUT (S4-5 on the Remote board to position 1).

e. Place the waveform monitor's voltage cursors at 0 mV (blanking level) and 350 mV (top of the 50% Flat Field signal).

f. Place the voltage cursors in Relative mode and press Reference Set to establish 350 mV as 0 dB.

g. Vary the video gain by using the VIDEO GAIN control on the Remote board.

h. **CHECK** — using the voltage cursors in the Relative mode, that the VIDEO GAIN control will vary the amplitude of the 50% Flat Field signal at least ±3 dB.

i. Reset the VIDEO GAIN control for a signal level of 350 mV with respect to the blanking level or Zero the Proc Amps (S7-1 on the Remote board to position 1, press RESET then return to position 0).

9. Black Level Range (±70 mV)

a. Connect the test equipment as shown in Fig. 4-6.

b. Enable the BLACK LEVEL control (set J8 on the Proc Amp/Decoder board to the 1-2 position and on the Remote board set S7-2 to 1 and S7-6 to 0).

c. Set the TSG 273 for a 0% Flat Field output signal.

d. Enable the VS 211's COMPOSITE DIGITAL INPUT (set S4-5 to 1).

e. **CHECK** — that the BLACK LEVEL control varies the Black Level over a minimum range of ±70 mV. The signal during blanking time should not be affected.

f. Reset the BLACK LEVEL control so the black level and the blanking level match (0 mV) or zero the Proc Amps (momentarily switch S7-1 on the Remote board to 1).

10. Chroma Gain Range (±3 dB)

a. Connect the test equipment as shown in Fig. 4-6.

b. Enable the CHROMA control.

c. Set the TSG 273 controls for the 75% Red output signal.

d. Enable the COMPOSITE DIGITAL INPUT.

e. Display the signal on the waveform monitor using the CHROMA filter.

f. Place the waveform monitor's voltage cursors at the top and bottom of the signal.

g. Put the voltage cursors in Relative mode and press Reference Set to establish the 0 dB point.

h. Vary the chroma gain by using the CHROMA GAIN control on the Remote board.

i. **CHECK** — using the voltage cursors, that the CHROMA control varies the amplitude of the chrominance over a range of ±3 dB.

j. Zero the Proc Amps (momentarily switch S7-1 on the Remote board to 1).

11. Chrominance Phase Error with Chrominance Gain Correction (3° or less)

a. Connect the test equipment as shown is Fig. 4-6.

b. Set the test signal generator's TSG 273 control for the Mod Ramp output signal.

c. Set the 1781 vectorscope controls for differential phase measurements.

d. Enable the CHROMA GAIN control.

e. Set the CHROMA GAIN control fully clockwise.

f. **CHECK** — for a phase error of $\leq 3^{\circ}$.

g. Set the CHROMA GAIN control fully counterclockwise.

h. **CHECK** — for a phase error of $\leq 3^{\circ}$.

i. Reset the CHROMA control for 300.0 mV of chrominance amplitude or zero the Proc Amps (momentarily switch S7-1 on the Remote board to 1).

j. Enable the PROGRAM INPUT, set S4-5 on the Remote board to 0.

k. Disconnect the equipment interconnecting cables.

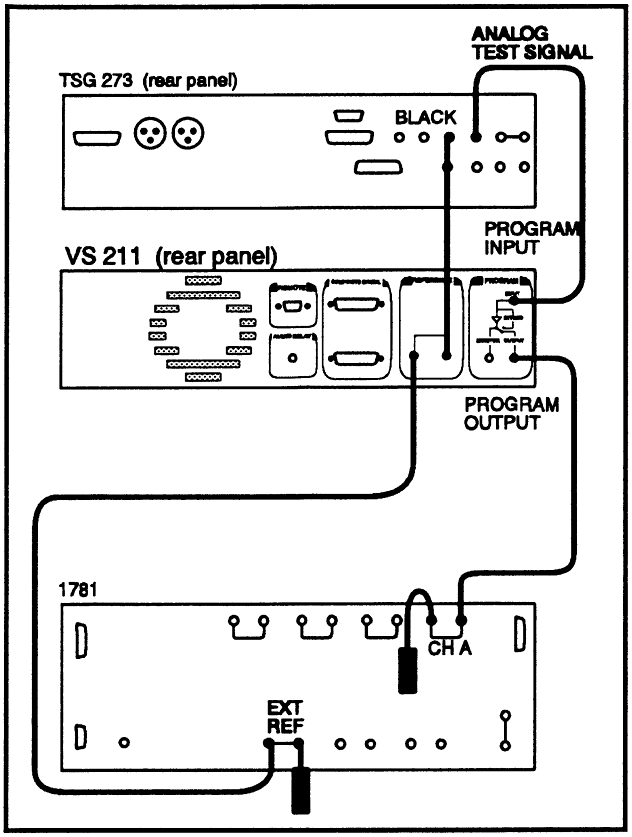


Fig. 4-7. Setup to check the input gain range.

12. Input Gain Range (±3 dB)

a. Connect the test equipment as shown in Fig. 4-7.

b. Set the TSG 273 for a 50% Flat Field output signal.

c. Enable the INPUT GAIN control (set J1 on the ADC board to 1-2). Make sure that the GAIN and BLACK LEVEL controls are not disturbed.

d. Place the waveform monitor's voltage cursors at the top and blanking level of the signal.

e. Put the voltage cursors in Relative mode and press Reference Set to establish the 0 dB point.

f. Adjust the INPUT GAIN potentiometer on the ADC board (R166).

g. **CHECK —** using the voltage cursors in the Relative mode, that the amplitude of the 50% Flat Field signal can be varied at least ±3 dB.

h. Reset the INPUT GAIN control such that the 50% Flat Field signal is 350 mV above blanking.

i. Disable the INPUT GAIN control (J1 on the ADC board to the 2-3 position).

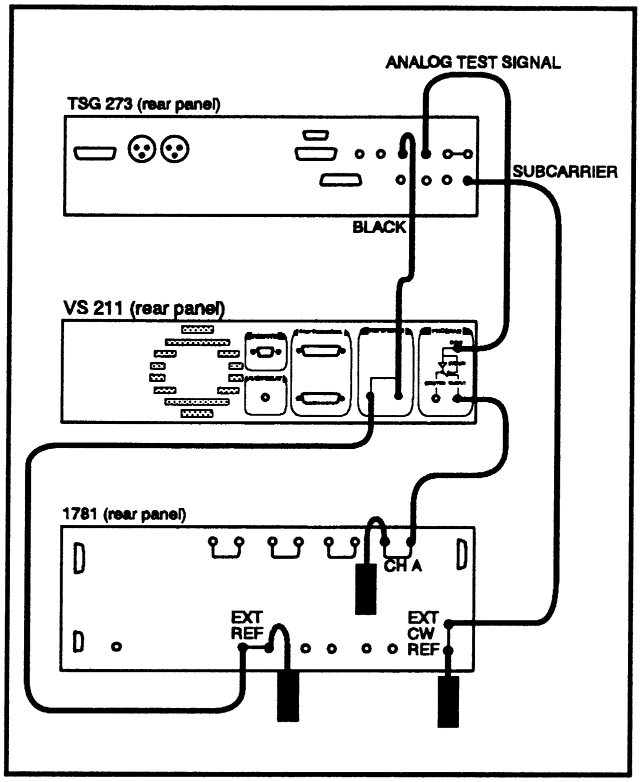


Fig. 4-8.
Setup to check sync and burst insertion timing, ITS deletion timing, and Synchronizer Timing (Vertical and Horizontal).

13. **Sync and Burst Insertion Timing (Horizontal Sync Insertion = 10.54 ±0.15 μs) (Vertical Sync Insertion = Last 2.5 lines + first 5 lines for a total of 7.5 lines)**

   a. Connect the TSG 273's Analog Test Signal output to the VS 211 REFERENCE LOOP-THROUGH and connect the other end to the PROGRAM INPUT. Connect the PROGRAM OUTPUT to the channel A input of the vectorscope/waveform monitor and terminate the loop-through in 75 Ω. As shown in Fig. 4-8.

   b. Set the TSG 273 Analog Test Signal output to 100% Flat Field.

   c. Set the VS 211 to insert sync and burst (S5-5 on the Remote board to position 1).

   d. **CHECK** — for a horizontal blanking period of 10.54 μsec ±0.15 μsec measured at the 50% point of video.

   e. Set the waveform monitor for a 2 field horizontal sweep rate.

   f. Use the horizontal magnification to display part of the vertical interval and the first few lines of the next field.

   g. **CHECK** — for 7.5 lines of equalizing pulses over the last 2.5 lines and the first 5 lines.

14. **ITS Deletion Timing (Deletion leaves 10.54 ± 0.1 μsec nominal horizontal blanking.)**

   a. Connect the test equipment as in Fig. 4- 8.

   b. **CHECK** — for a horizontal blanking interval of 10.54 μsec ±0.1 μsec from line 9 to 10.

15. Synchronizer Timing — Vertical (1 line advance to 1 line delay)

a. Set the TSG 273 to output the Pluge signal.

b. Monitor the VS 211 PROGRAM OUTPUT with a 1781 Waveform Monitor in the one field horizontal mode using the EXT REF timing.

c. Adjust the horizontal magnification to display a few lines, one of which has a signal level transition on it.

d. Put the VS 211 in Bypass (S3 on the Controller board), note the position of a transition line.

e. Return the VS 211 to active mode.

f. **CHECK** — that the "reference" line position changes when switches S7-4 and S7-5 on the Remote board are changed as given in Table 4-2.

Table 4-2. Switch positions to advance or delay.

S7-4	S7-5	Result
0	0	0 line advance
1	0	1 line delay
0	1	1 line advance

g. Return switches S7-4 and S7-5 to their original positions.

16. Synchronizer Timing — Horizontal (30 µsec advance to 30 µsec delay)

a. Drive the VS 211 REFERENCE LOOP-THROUGH with the Black Burst signal from the Analog Test Signal output of the TSG 273 generator. Loop the Black Burst signal to the PROGRAM INPUT. (See Fig. 4-8.)

b. Monitor the VS 211 PROGRAM OUTPUT with a 1781 Waveform Monitor/Vectorscope.

c. Externally trigger the 1781.

d. Externally reference the phase of the 1781 with the SUBCARRIER output from the TSG 273.

e. Press the < or > button on the Remote board of the VS 211. Note the movement of the falling edge of sync, while the button advances or delays as far as possible.

f. **CHECK** — for a monotonic movement of the leading edge of sync.

g. Press the COARSE + < button. Note the movement of the falling edge of sync.

h. **CHECK** — with the vectorscope that phase moves 45° for each press of the coarse button.

i. **CHECK** — using the waveform monitor, for a range of at least ±30 µsec.

j. Return the delay to its original position.

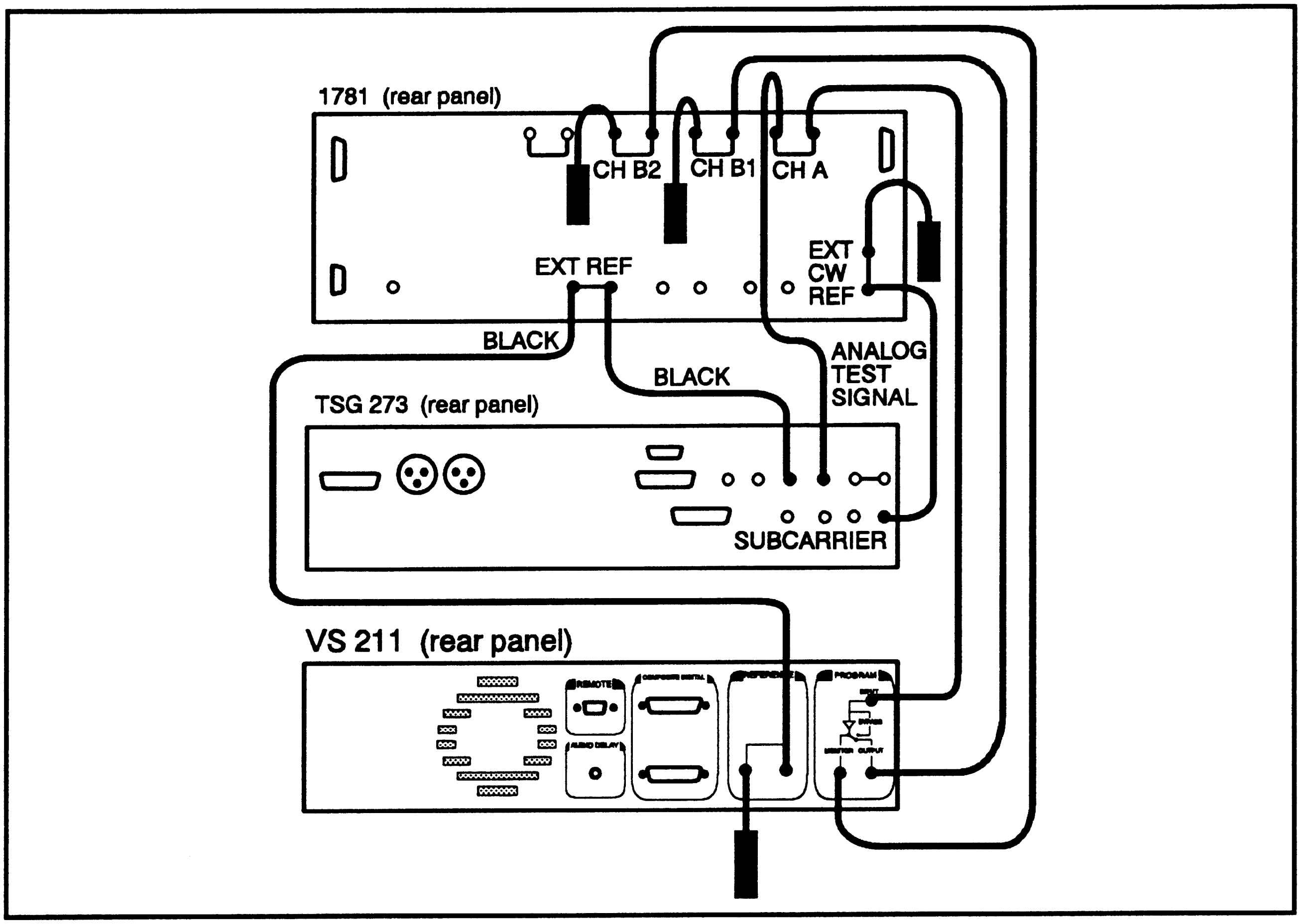


Fig. 4-9.
Setup to check the Chrominance-to-Luminance Gain, Chrominance-to-Luminance Delay, Chrominance-to-Luminance Intermodulation, K-Factor, Pulse-to-Bar ratio ($K_{pulse/bar}$), Short Time Distorurtion, Line Time Distortion, and Field Time Distortion.

17. Chrominance-to-Luminance Gain (1% or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a modulated Pulse and Bar output.

c. Zero the Proc Amps (momentarily set S7-1 on the Remote board to 1).

d. Use the 1781 waveform monitor to measure the chrominance-to-luminance gain error (the separation between the blanking level and chrominance) of the modulated bar on CH A. Make a note of the direction and amount of error.

e. Put the VS 211 in Bypass.

f. Use the 1781 Waveform Monitor to measure the chrominance-to-luminance gain error of the modulated bar. Make a note of the direction and amount of error.

g. Measure the chrominance-to-luminance gain error of the modulated bar through the VS 211 (CH B1). Make a note of the direction and amount of error.

h. Subtract the error value noted in part d from that noted in part g.

i. **CHECK** — that the result of part h (actual VS 211 chrominance-to-luminance gain error) is ≤ 7.1 mV (1%).

j. Measure the chrominance-to-luminance gain error of the MONITOR output (CH B2). Make a note of the direction and amount of error.

k. Subtract the error value noted in part d from that noted in part j.

l. **CHECK** — that the result of part k (actual VS 211 chrominance-to-luminance gain error of the MONITOR output) is ≤ 7.1 mV (1%).

18. Chrominance-to-Luminance Delay (10 ns or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 for a modulated Pulse and Bar output.

c. Use the 1781 Waveform Monitor to measure chrominance-to-luminance delay error (an apparent sine wave at the blanking level) of the 20T pulse on CH A. Make a note of the direction and amount of error.

d. Measure the chrominance-to-luminance delay error of the modulated 20T pulse signal through the VS 211 (CH B1). Make a note of the amount and direction of the error.

e. Algebraically subtract the error value noted in part c from that noted in part d.

f. **CHECK** — that the result of part e (actual VS 211 chrominance-to-luminance gain error) is ≤ 10 ns.

g. Measure the chrominance-to-luminance delay error of the MONITOR output (CH B1). Make a note of the amount and direction of the error.

h. Algebraically subtract the error value noted in part c from that noted in part g.

i. **CHECK** — that the result of part h (actual VS 211 chrominance-to-luminance gain error for the MONITOR output) is ≤ 10 ns.

19. Chrominance-to-Luminance Intermodulation (0.5% or less)

a. Connect the test equipment as shown in Fig. 4-9, except use the Modulated Pedestal as the PROGRAM INPUT signal.

b. Set the Waveform Monitor controls to display CH A at 0.2 V full scale (X5 magnification) and low-pass filter.

c. Set the voltage cursor's reference to the top of the pedestal and the blanking level.

d. Make a note of the amount and direction of the Intermodulation.

e. Display CH B1.

f. Make a note of the amount and direction of the Intermodulation.

g. Subtract the amount noted in part d from that in part f.

h. **CHECK** — that the Chrominance-to-Luminance Intermodulation for the PROGRAM OUTPUT is ≤ 0.5% (1.75 mV).

i. Display CH B2.

j. Make a note of the amount and direction of the Intermodulation.

k. Subtract the amount noted in part d from that in part j.

l. **CHECK** — that the Chrominance-to-Luminance Intermodulation for the MONITOR output is ≤ 0.5% (1.75 mV).

20. Gain Unity (Program Channel Operating ±1%) (Monitor Channel Operating ±1.5% Bypassed ±3%)

a. Connect the test equipment as shown is Fig. 4-9.

b. Set the TSG 273 test signal generator controls for 100% Flat Field output.

c. Zero the Proc Amps (momentarily set S7-1 on the Remote board to position 1).

d. Use the Waveform Monitor and its internal calibration signal (WFM + CAL) to measure the amplitude at the center portion of the bar from the blanking level on CH A. Make a note of the bar amplitude.

e. Use the Waveform Monitor and its internal calibration signal (WFM + CAL) to measure the amplitude at the center portion of the bar from the blanking level on CH B1. Make a note of the bar amplitude.

f. **CHECK** — that the center amplitude of the bar from the PROGRAM OUTPUT matches the source amplitude within 1%.

g. Monitor the MONITOR output (CH B2).

h. **CHECK** — that the center amplitude of the bar from the MONITOR Output matches the source amplitude within 1.5%.

i. Put the VS 211 in Bypass mode.

j. **CHECK** — that the center amplitude of the bar from the MONITOR Output matches the source amplitude within 3%.

21. K-factor (0.5% or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a 2T Pulse and Bar output.

c. Monitor the input signal (CH A) with a Waveform Monitor.

d. Using the 1781's internal graticule, measure the K-Factor of the signal and note its value for later use.

e. Monitor the PROGRAM OUTPUT signal (CH B1) with the waveform monitor.

f. Using the 1781's internal graticule, measure the K-Factor. Note its value.

g. **CHECK** — that the K-factor noted in part f minus the value in part d is ≤ 0.5% or follows these limits:
±4.0 mV at 800 ns (8T)
±7.5 mV at 400 ns (4T)
±15 mV at 200 ns (2T)

h. Monitor the MONITOR output signal (CH B2) with the waveform monitor.

i. Using the 1781's internal graticule, measure the K-Factor. Note its value.

j. **CHECK** — that the K-factor noted in part i minus the value in part d is ≤ 0.5% or follows these limits:
±4.0 mV at 800 ns (8T)
±7.5 mV at 400 ns (4T)
±15 mV at 200 ns (2T)

22. Pulse-to-Bar Ratio ($K_{pulse/bar}$) (1% or less)

a. Connect the equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a 2T Pulse and Bar output.

c. Display CH A (PROGRAM INPUT signal).

d. Use the Waveform Monitor in its WFM + CAL mode to measure the vertical separation of the TSG 273's Pulse and Bar signal. Make a note of this measurement.

e. Display CH B1 (PROGRAM OUTPUT signal).

f. Measure the vertical separation of the Pulse and Bar signal through the VS 211. Make a note of the second measurement.

g. **CHECK** — that the difference between the measurements noted in parts f and d is ≤ 7.0 mV (1%).

h. Display CH B2 (MONITOR output signal).

i. Measure the vertical separation of the Pulse and Bar signal through the VS 211. Make a note of the second measurement.

j. **CHECK** — that the difference between the measurements noted in parts i and d is ≤ 7.0 mV (1%).

23. Check Short Time Distortion (1% or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a 2T Pulse and Bar output.

c. Display CH A (PROGRAM INPUT signal).

d. Measure the amount of ringing, overshoot and/or undershoot at the leading edge (first 1 µs portion) of the 20T Bar. Make a note of the amount and direction.

e. Display CH B1 (PROGRAM OUTPUT signal).

f. Again, measure the amount of ringing, overshoot, and/or undershoot at the leading edge (first 1 µs portion) of the 2T Bar. Make a note of the amount and direction.

g. **CHECK** — that the difference between the measurements noted in parts f and d of this step is ≤ 7.0 mV (1%).

h. Display CH B2 (MONITOR output signal).

i. Again, measure the amount of ringing, overshoot, and/or undershoot at the leading edge (first 1 µs portion) of the 2T Bar. Make a note of the amount and direction of these measurements.

j. **CHECK** — that the difference between the measurements noted in parts i and d of this step is ≤ 7.0 mV (1%).

24. Line Time Distortion (0.5% or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a 2T Pulse and Bar output.

c. Display CH A (PROGRAM INPUT signal).

d. Measure the amount of bar tilt from the midpoint to just 1 µs before the leading and trailing edge of the bar. Make a note of the amount and direction.

e. Display CH B1 (PROGRAM OUTPUT signal).

f. Again, measure the amount of bar tilt from the midpoint to just 1 µs before the leading and trailing edge of the bar. Make a note of this second measurement.

g. **CHECK** — that the difference between the measurements noted in parts f and d of this step is ≤ 3.5 mV (0.5%).

25. Field Time Distortion (0.5% or less)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a 100% Flat Field output.

c. Set the Waveform monitor controls for a two field display.

d. Display CH A (PROGRAM INPUT signal).

e. Measure the amount of tilt of the field square wave. Note the amount.

f. Display CH B1 (PROGRAM OUTPUT signal).

g. Again, measure the amount of tilt of the field square wave. Make a note of the second measurement.

h. **CHECK** — that the difference between the measurements noted in parts g and e is ≤ 3.5 mV (0.5%).

i. Display CH B2 (MONITOR Output signal).

j. Again, measure the amount of tilt of the 100% Flat Field signal. Make a note of this measurement.

k. **CHECK** — that the difference between the measurements noted in parts j and e is ≤ 3.5 mV (0.5%).

26. DC Drift with Clamp Off
(< 10 mV from line 7 to line 8)

a. Display CH B1 (PROGRAM OUTPUT) on the waveform monitor in 2 field full horizontal magnification. Center the display on the PAL pulse (Field 1, Line 7).

b. Set the voltage cursors to 10 mV separation and then set them to track.

c. Adjust the voltage cursors so that they surround the black level of the PAL Pulse.

d. **CHECK** — that the black level of line 8 (the next line) is within the voltage cursors.

27. Dynamic Gain Error 10% - 90%
(0.5% of maximum)

a. Connect the test equipment as shown in Fig. 4-9.

b. Set the TSG 273 test signal generator controls for a fast bouncing, 100% Flat Field output.

c. Display CH A (PROGRAM INPUT signal).

d. Set the Waveform Monitor controls for a 2-Field display with the horizontal expanded 25X. Center the display so that opposite sides of the bounce are visible.

e. Make a note of the signal amplitude after a bounce occurs.

f. Display CH B1 (PROGRAM OUTPUT signal).

g. Make a note of the signal amplitude after a bounce occurs.

h. **CHECK** — that the difference between part f and d is < 0.5%.

i. Display CH B2 (MONITOR output signal).

j. Make a note of the signal amplitude after a bounce occurs.

k. **CHECK** — that the difference between parts j and d is < 0.5%.

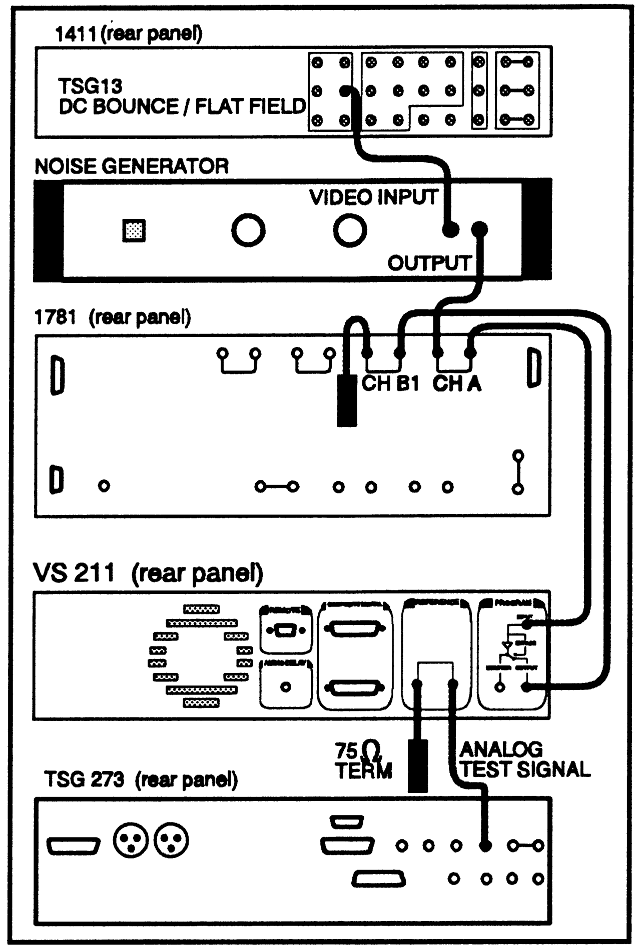


Fig. 4-10.
Setup to check clamp switch points and recovery time.

28. Clamp Switch and Recovery Time
(Switch points:
Fast-to-Medium = 30 to 40 dB S/N,
Medium-to-Slow = 20 to 30 dB S/N)
(Recovery Time:
Fast — Within 35.7 mV in 2 to 3 lines,
Medium — Within 35.7 mV in 10 to 30 lines,
Slow — Within 35.7 mV in 30 or more lines)

a. Connect the test equipment as shown in Fig. 4-10.

b. Set the TSG13 for 0% Flat Field.

c. Put the VS 211 is Bypass mode.

d. Set the noise generator to minimum attenuation.

e. Use the Signal-to-Noise measurement feature of the 1781 Waveform Monitor to measure the noise on the PROGRAM OUTPUT signal.

f. **CHECK** — that the SNR (Signal-to-Noise Ratio) is > 40 dB.

g. Set the SNR on the waveform monitor to 40 dB. Adjust the attenuation on the noise generator until the SNR is at 40 dB. Note the value of the noise generator.

h. Set the SNR on the waveform monitor to 30 dB. Adjust the attenuation on the noise generator until the SNR is at 30 dB. Note the value of the noise generator.

i. Set the SNR on the waveform monitor to 20 dB. Adjust the attenuation on the noise generator until the SNR is at 20 dB. Note the value of the noise generator.

j. Take the VS 211 out of Bypass and return the attenuation on the noise generator to minimum.

k. Set the TSG13 test signal generator controls for a dc bouncing, Flat Field output. Also set the bouncing rate to fast by placing the jumper for P148 in the 1-2 and 4-5 position on the TSG13 Linearity Logic board (A40).

l. Set the Waveform Monitor controls for a 2-Field display with the vertical expanded 5X and the horizontal expanded 25X.

m. Turn on the voltage cursors and set them to track at 35 mV.

n. **CHECK** — that, between 2 and 3 lines after a bounce occurs, the blanking level out of the VS 211 recovers to within 35 mV of its level before the bounce.

o. Slowly increase the amount of white noise inserted in the program signal until the VS 211 clamp switches to medium.

p. **CHECK** — that the amount of inserted noise is between 40 dB and 30 dB (attenuation values noted above) when the clamp switches from fast to medium.

q. **CHECK** — that, between 10 and 30 lines after a bounce occurs, the blanking level out of the VS 211 recovers to within 35 mV of its level before the bounce. Use the variable line selector control on the Waveform Monitor to aid in counting lines.

r. Increase the amount of inserted white noise until the VS 211 switches from medium to slow.

s. **CHECK** — that the amount of the insert noise is between 30 dB and 20 dB (attenuation values noted above) when the clamp switches from medium to slow.

t. **CHECK** — that, in more than 30 lines after a bounce occurs, the blanking level out of the VS 211 recovers to within 35 mV of its level before the bounce. Use the variable line selector on the Waveform Monitor to aid in counting the lines.

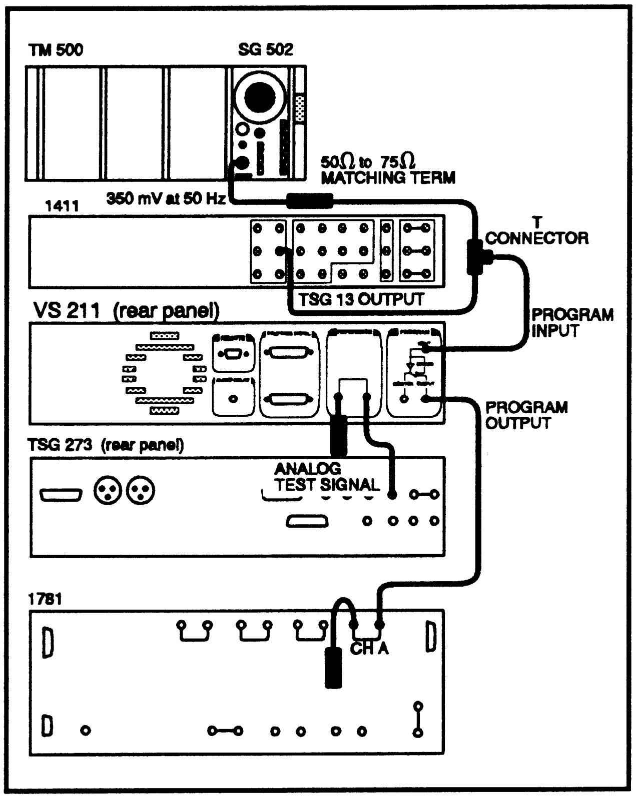


Fig. 4-11. Setup to check hum rejection.

29. Hum Rejection (32 dB or greater)

a. Connect the test equipment as shown in Fig. 4-11.

b. Set the TSG13 test signal generator controls for a 350 mV flat field output.

c. Put the VS 211 in Bypass.

d. Set the Waveform Monitor controls for a 2-Field display.

e. Set the digital sweep generator SG502 for 350 mV of 50 Hz hum as viewed on the waveform monitor.

f. Set the voltage cursors for the peak-to-peak value of the hum. Put the waveform monitor's voltage cursors in Relative Mode and set that value as the 0 dB point.

g. Take the VS 211 out of Bypass.

h. **CHECK** — using the voltage cursors, that the hum on the field square wave display is reduced to ≤ 8.75 mV (≥ 32 dB). Magnification of the display enhances measurement resolution.

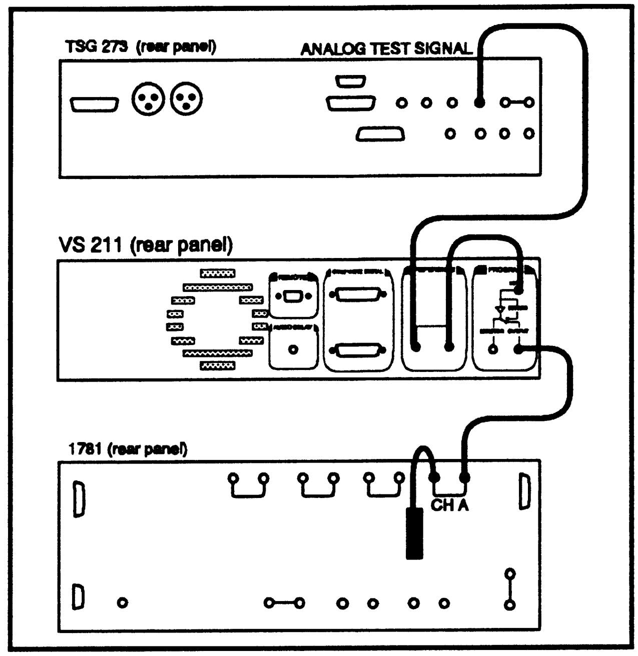


**Fig. 4-12.
Setup to check the sync and burst insertion accuracy.**

30. Sync and Burst Insertion Amplitude Accuracy (±1.5 mV)

a. Connect a full-field output from a test signal generator to the VS 211 REFERENCE INPUT LOOP-THROUGH and terminate the REFERENCE OUTPUT loop-through connector in 75 Ω as shown in Fig. 4-12.

b. Enable sync and burst insertion by either switching S5-5 on the Remote board to position 1 or through the RC 211.

c. **CHECK** — that the sync pulse amplitude is 300.0 mV ±1.5 mV using the waveform monitor and its internal calibration signal.

d. **CHECK** — that the burst packet amplitude is 300.0 mV ±1.5 mV using the waveform monitor and its internal calibration signal.

e. Disable the sync and burst insertion by either switching S5-5 on the Remote board to position 0 or through the RC 211.

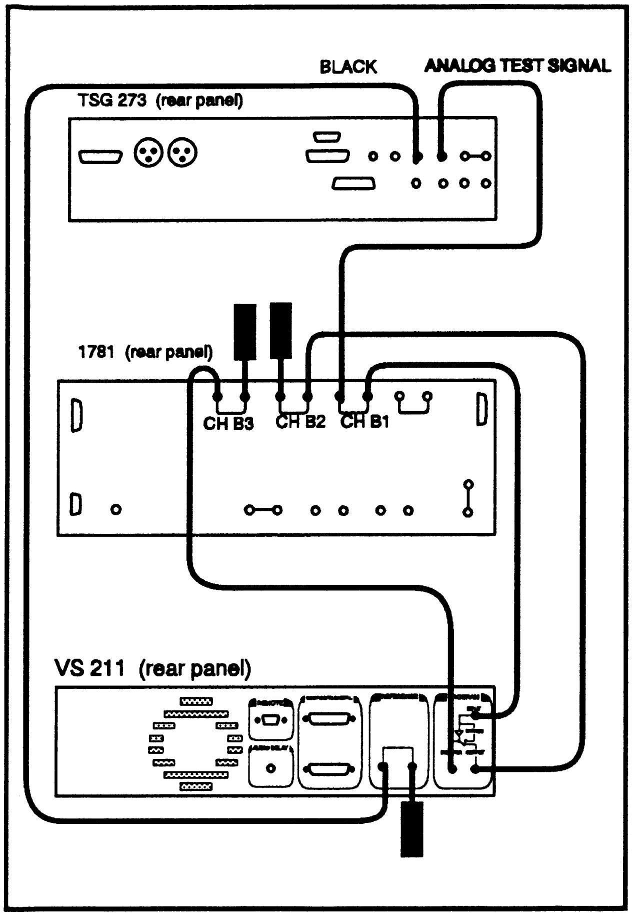


Fig. 4-13.
Setup to check the frequency response and differential gain and phase.

31. Frequency Response
(PROGRAM Output:
Flat to within 1% to 5.5 MHz.
MONITOR Output:
Flat to within 1% to 5.5 MHz Processing
Flat to within 10% to 5.5 MHz Bypassed.)

a. Attach the TSG 273 directly to the waveform monitor (CH B1 input) and loop it through to the PROGRAM INPUT as shown in Fig. 4-13.

b. Set the TSG 273 to output the Line Sweep signal.

c. Zero the Proc Amps (momentarily set S7-1 on the Remote board to position 1).

d. Display CH B1 (PROGRAM INPUT) on the waveform monitor.

e. Measure the flatness of the signal and make a note of the direction and amount of the error.

f. Display CH B2 (PROGRAM OUTPUT signal).

g. Measure the flatness of the Line Sweep signal. Note the amount and direction of any error.

h. Subtract the amount noted in part e from that in part g.

i. **CHECK** — that the difference is flat within 1% (≤ 7 mV) to 5.5 MHz.

j. Switch the Waveform Monitor display to show CH B3 (MONITOR Output).

k. Measure the flatness of the Line Sweep signal. Note the amount and direction of any error.

l. Subtract the amount noted in part e from that in part k.

m. **CHECK** — that the difference is flat within 1% (≤ 7 mV) to 5.5 MHz.

n. Switch the VS 211 into Bypass.

o. Measure the flatness of the Line Sweep signal. Note the amount and direction of any error.

p. Subtract the amount noted in part e from that in part o.

q. **CHECK** — that the difference is flat within 10% (≤ 70 mV) to 5.5 MHz.

r. Take the VS 211 out of Bypass.

32. Program and Monitor Output Differential Gain and Phase
(Program Output:
Within 1% or less Differential Gain
Within 1° or less Differential Phase)
(Monitor Output Normal Operation :
Within 1% or less Differential Gain
Within 1° or less Differential Phase
(Monitor Output in Bypass Mode :
Within 3% or less Differential Gain
Within 3° or less Differential Phase.)

a. Connect the test equipment as shown in Fig. 4-13.

b. Set the TSG 273 for a Modulated Ramp.

c. Display CH B1 (PROGRAM INPUT).

d. Set the 1781 controls for differential gain and phase measurements.

e. Note the amount and direction of the differential gain and phase.

f. Display CH B2 (PROGRAM OUTPUT).

g. Note the amount and direction of the differential gain and phase.

h. Subtract the amount noted in part g from the amount noted in part e.

i. **CHECK** — that the difference in the differential gain measurements is ≤ 1% and the difference of the differential phase measurement is ≤ 1°.

j. Display CH B3 (MONITOR output).

k. Note the amount and direction of the differential gain and phase.

l. Subtract the amount noted in part k from the amount noted in part e.

m. **CHECK** — that the difference in the differential gain measurements is ≤ 1% and the difference of the differential phase measurement is ≤ 1°.

n. Put the VS 211 into Bypass.

o. Note the amount and direction of the differential gain and phase.

p. Subtract the amount noted in part o from the amount noted in part e.

q. **CHECK** — that the difference in the differential gain measurements is ≤ 3% and the difference of the differential phase measurement is ≤ 3°.

r. Take the VS 211 out of Bypass mode.

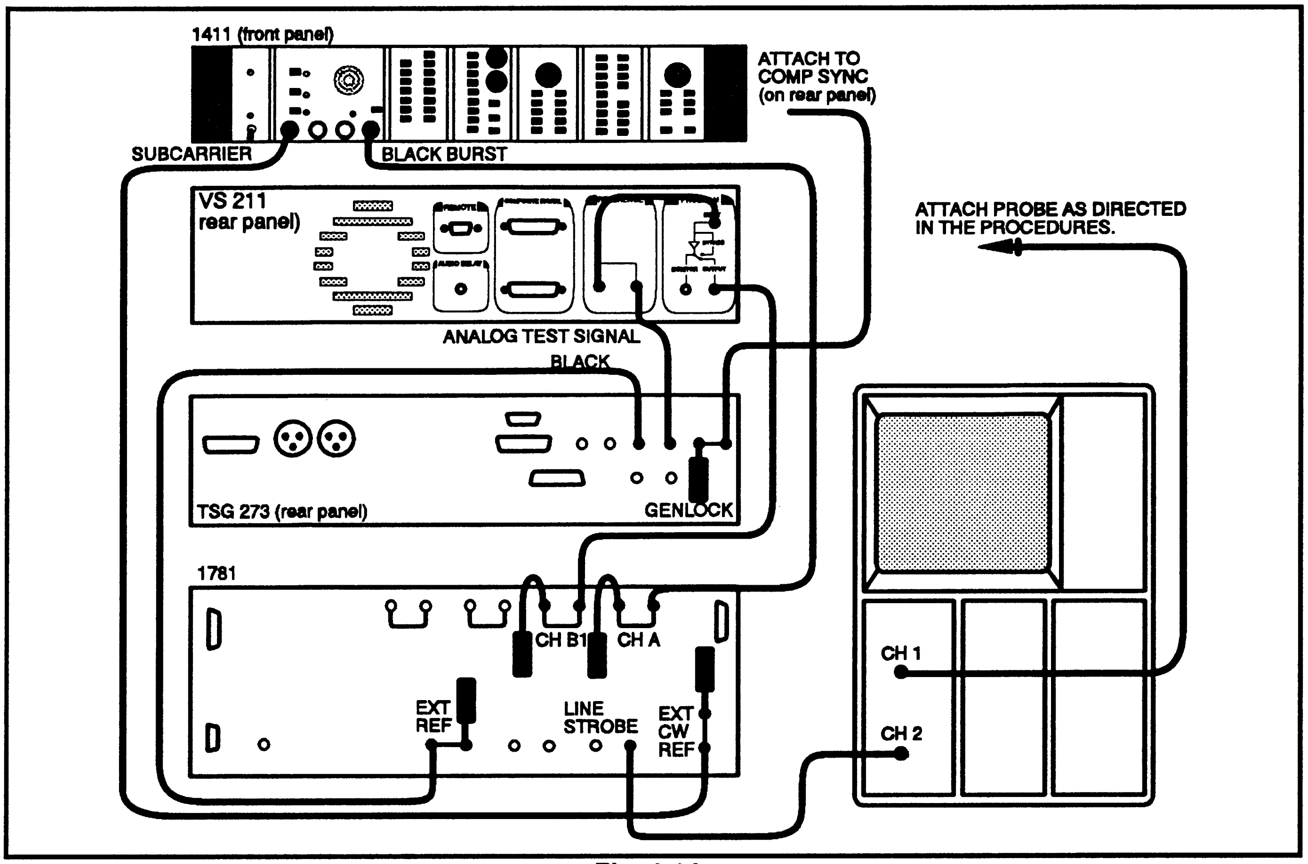


Fig. 4-14.
Setup to check the SC/H Phase detection of the PROGRAM.

33. Color Field Detection Based on SC/H Phase ($0^\circ \pm 40^\circ$)

a. Connect the test equipment as shown in Fig. 4-14.

b. Put the waveform monitor in line select mode and display 2 of 8 fields.

c. Set the vectorscope for external phase reference. Use the vectorscope phase control to set the burst vectors to a convenient reference point.

d. Connect the oscilloscope's CH 1 to the Controller board's U21 pin 19.

e. Trigger the oscilloscope from CH 2 and put it in the add mode. Display one transition.

f. Enable the SPG12 front panel phase control.

g. Move the TSG 273's ANALOG TEST SIGNAL to the VS 211's PROGRAM INPUT. Move the 1411's BLACK BURST to the VS 211's REFERENCE.

h. Use the 1411 Phase Control to move the reference vector 90° past the reference position. At some point between 0° and 90° the VS 211 will switch color fields. This color field switching is indicated by a sudden shift or jump of the waveform on the oscilloscope's display. (The change is very subtle and looks like a quick burst of noise.) To shift back to the original color field, the burst vector must be rotated counterclockwise past the 90° position, but not past the 180° position.

i. **CHECK** — that as the 1411 Subcarrier Phase Control is used to move the vector, the VS 211 switches color fields when the vector is 10° to 40° past the 90° and 270° positions.

j. Return the 1411 Phase Control to the default position (reestablish the reference).

k. Move the oscilloscope probe to U5 pin 4 on the Controller board.

l. Swap the VS 211's PROGRAM INPUT and REFERENCE signals. (Move the TSG 273's ANALOG TEST SIGNAL to the VS 211's REFERENCE. Move the 1411's BLACK BURST to the VS 211's PROGRAM INPUT.)

m. **CHECK** — that as the 1411 Subcarrier Phase Control is used to move the vector, the VS 211 switches color fields when the vector is 10° to 40° past the 90° and 270° positions.

n. Return the 1411 Phase Control to the default position.

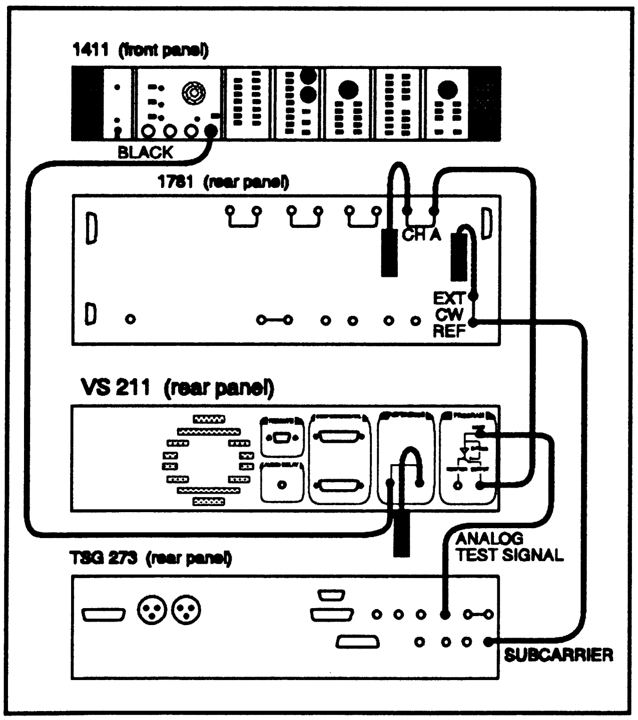


Fig. 4-15.
Setup to check the Signal-to-Noise Ratio.

34. Signal-to-Noise Ratio (> 60 dB to 5.5 MHz)

a. Connect the test equipment as shown in Fig. 4-15.

b. Attach the 6.0 MHz low-pass filter between the PROGRAM OUTPUT of the VS 211 and the CH A input of the waveform monitor.

c. Select 0% Flat Field for the TSG 273.

d. Put the VS 211 in Bypass.

e. Using the Signal-to-Noise measurement feature of the 1781 waveform monitor, check the S/N of the input signal. It must be > 60 dB. (If the S/N is < 60 dB, a different signal source must be found in order to perform this check.)

f. Take the VS 211 out of Bypass.

g. Measure the S/N of the PROGRAM output.

h. **CHECK** — that the Signal-to-Noise ratio is > 60 dB.

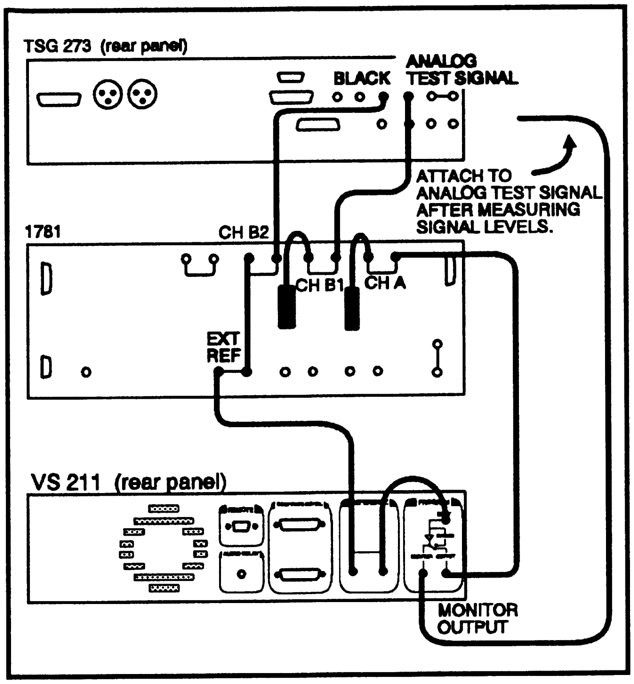


Fig. 4-16.
Setup to check the Isolation (in Operating mode).

35. Isolation, Program from Monitor (> 30 dB operating)

a. Set-up the equipment as shown in Fig. 4-16.

b. Display CH B2 and note any noise on the PROGRAM Input signal.

c. Select the Line Sweep signal from the TSG 273.

d. Display CH B1 (TSG 273 ANALOG TEST SIGNAL) on the waveform monitor.

e. Set the voltage cursors to the peak-to-peak amplitude of the signal (not including sync and burst).

f. Put the voltage cursors in Relative Mode and set the peaks as the 0 dB reference point.

g. Disconnect the TSG 273's ANALOG TEST SIGNAL from the waveform monitor.

h. Connect the MONITOR output to the TSG 273 ANALOG TEST SIGNAL output.

i. Display CH A (VS 211 PROGRAM output) on the waveform monitor.

j. Using the voltage cursors measure the amplitude of any noise on the Black Burst signal (not including sync and burst).

k. **CHECK** — that the voltage level is > 30 dB down from the reference.

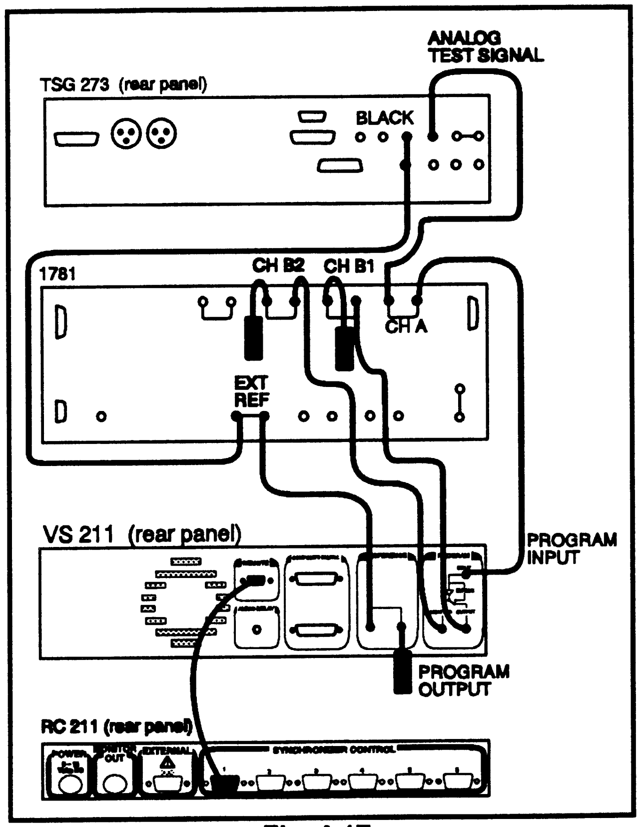


Fig. 4-17.
Setup used to check the Isolation (in Bypass Mode) and Crosstalk.

36. Isolation, Program from Monitor (> 60 dB Bypassed)

a. Set-up the equipment as shown in Fig. 4-17.

b. Select the Line Sweep signal from the TSG 273.

c. Set the 1781 voltage cursors to the peak-to-peak value of the Line Sweep signal (disregard sync and burst).

d. Put the voltage cursors in Relative Mode and set this value as the 0 dB point.

e. Using the RC 211, do an 8 field FREEZE.

f. Select the 0% Flat Field signal from the TSG 273.

g. Put the VS 211 in Bypass. (The PROGRAM output should be 0% Flat Field and the MONITOR Output should be Line Sweep.)

h. Using the voltage cursors, measure the amplitude of the PROGRAM OUTPUT signal (disregard sync and burst).

i. **CHECK** — that any noise on the PROGRAM output is 60 dB down from the established reference.

37. Input/Output Crosstalk (-70 dB to 2 MHz -60 dB to 5.5 MHz)

a. Set-up the equipment as shown in Fig. 4-17.

b. Select the Line Sweep signal from the TSG 273.

c. Set the 1781 voltage cursors to the peak-to-peak value of the Line Sweep signal (disregard sync and burst).

d. Put the voltage cursors in Relative Mode and set this value as the 0 dB point.

e. Select the 0% Flat Field from the TSG 273.

f. Set the RC 211 for an 8 field freeze.

g. Reselect the Line Sweep signal from the TSG 273.

h. Using the voltage cursors, measure the relative peak-to-peak amplitude of the PROGRAM OUTPUT signal (disregarding sync and burst).

i. **CHECK** — that the amplitude is at least 70 dB down to 2 MHz and 60 dB down to 5.5 MHz.

DIGITAL VIDEO

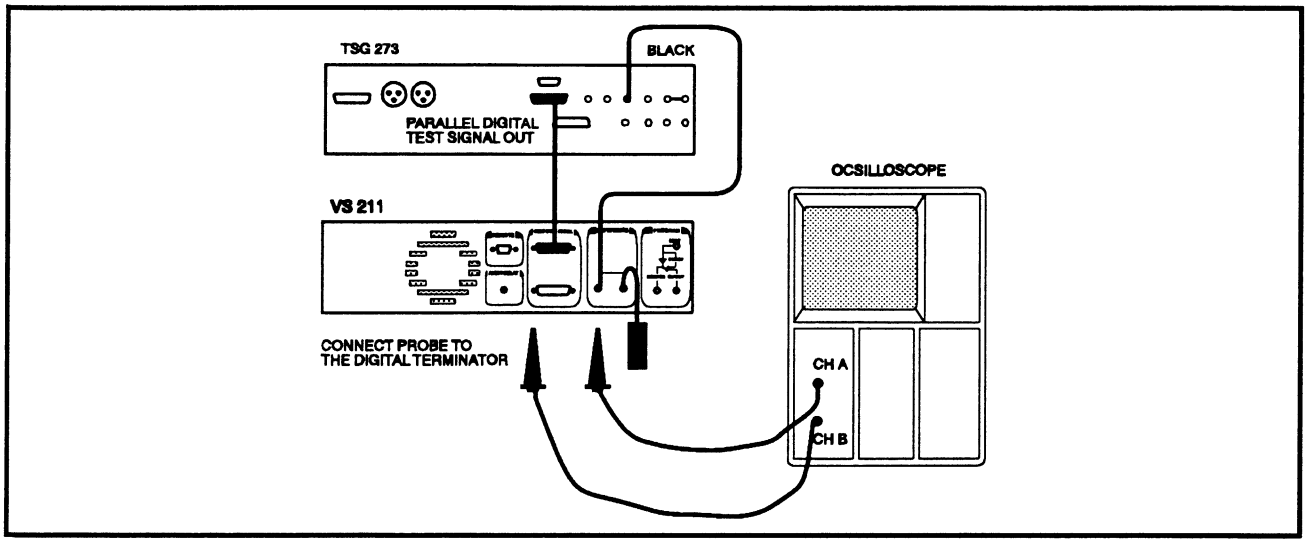


Fig. 4-18. Setup to check the Composite Digital clock.

38. Composite Digital Video Clock Amplitude, Rise, and Fall Times

a. Connect the digital output termination fixture (see Fig. 4-19) to the Composite Digital output.

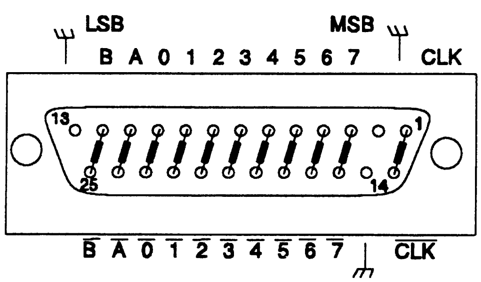


Fig. 4-19. Digital Termination. (Resistors values are 110 Ω.)

b. Connect a 10X probe from the oscilloscope CH A input to the CLK connection on the termination fixture and another 10X probe from the CH B input to the LSB connection. Make sure to ground each of the probes. (See Fig. 4-18.)

c. Set the controlls according to Table 43-:

Table 4-3. Oscilloscope setup.

Vertical (7A13)		Time Base (7B53A)	
+ Input	DC	Slope	—
— Input	DC	Mode	Auto
Volts/Div	200 mV	Coupling	AC
BW	Full	Source	EXT
		Time/Div	50 ns
		Mag	10X

d. Trigger the oscilloscope from the CH B input (LSB signal).

e. **CHECK** — that the waveform amplitudes are between 0.8 and 2.0 V_{p-p}.

f. Use the oscilloscope Vertical Var control to adjust the waveforms for a display that is five divisions in height.

g. **CHECK** — that the waveform rise and fall times are ≤ 5 ns, measured between 20% and 80%.

h. Return the Volt/Div to the CAL position.

39. Digital Video Clock to Data Timing

a. Select the Luminance Ramp from the TSG 273.

b. Center the clock waveform vertically, and set the midpoint of its rising edge at a convenient reference at the right hand side of the screen.

c. Overlay the CLK and LSB waveforms.

d. **CHECK** — that the CLK rising edge follows the LSB data crossover point by 35 ±5 ns.

e. Move the CH B probe to the other data lines.

f. **CHECK** — that the crossover points for the remaining data pairs occur at the same time as the LSB crossover point within 5 ns.

40. Composite Digital Video Output Data

a. Use the same equipment setup as in the previous steps.

b. Reconnect the LSB to CH B.

c. **CHECK** — that the CLK and the LSB signal has the same number of transitions.

d. Move the CH B probe to the LSB + 1 signal.

e. **CHECK** — that the LSB + 1 signal has 1/2 the number of transitions as the CLK signal.

f. Continue to move the probe to the other data lines.

g. **CHECK** — that with each data bit the number of clock cycles need to match the data transitions doubles.

RETURN LOSS

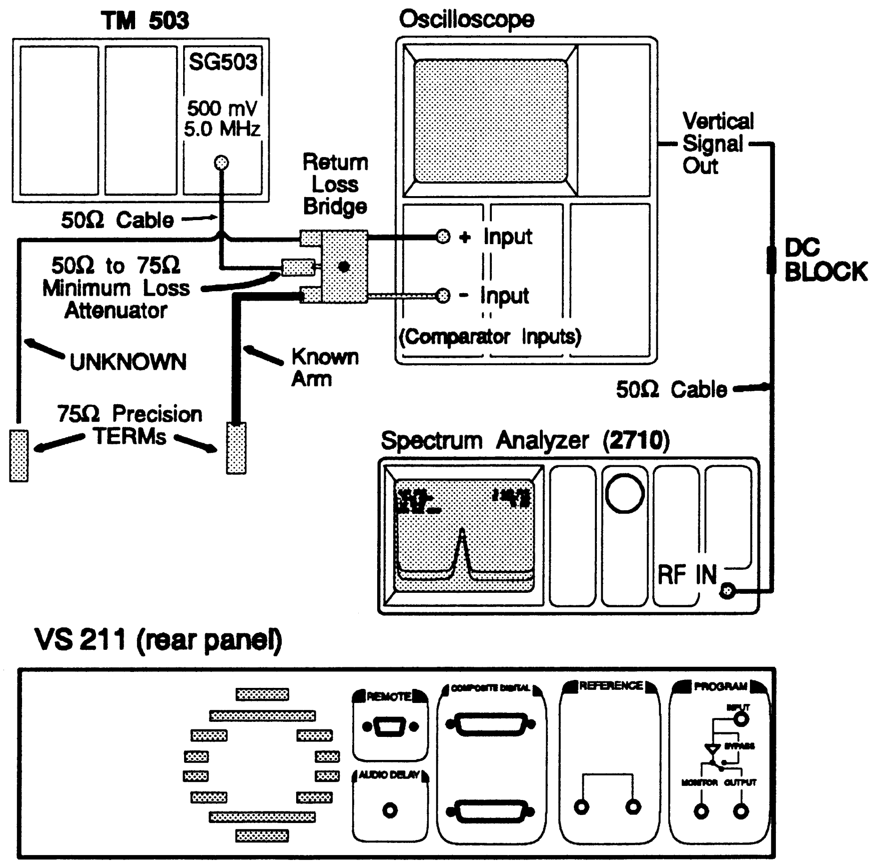


Fig. 4-20. Setup to measure return loss.

Table 4-4. Equipment Setup for Return Loss Check.

OSCILLOSCOPE	
Vertical Mode	Left
Trig Source	Left
COMPARATOR (7A13)	
+ Input	DC
- Input	DC
Bandwidth	Full
Volt/Div	50 mV
SPECTRUM ANALYZER	
Freq Start	0 MHz
Freq Stop	10 MHz
Ref Level	-10 dB
Display Mode	10 dB/Div
Freq Span/Div	1 MHz
Resolution	300 kHz
Video Filter	ON
SINE WAVE GENERATOR	
Amplitude	500 mV
Frequency	5.5 MHz

41. Return Loss Basic Setup

a. Connect the equipment as shown is Fig. 4-20.

b. Set the controls according to the following Table:

NOTE

If a 2710 is not available, a TEKTRONIX 7L12 or 7L13 Spectrum Analyzer installed in a 7603 Oscilloscope mainframe can be used with the 7A13 to check return loss.

c. With both precision terminators connected, adjust the Return Loss Bridge to null the 5.5 MHz response displayed on the spectrum analyzer.

d. Remove the terminator from the UNKNOWN cable.

e. Place the peak of the displayed 5.5 MHz response at the top line of the graticule by choosing the "marker reference level" from the MKR/FREQ menu of the 2710.

NOTE

All return loss measurements will be measured in dB from this reference level.

42. REFERENCE LOOP THROUGH:
(40 dB or more to 5.5 MHz operating)

a. Connect the precision terminator to one of the reference loop through inputs.

b. Connect the UNKNOWN cable to the other input.

c. **CHECK** — that the return loss is 40 dB (4 major divisions) as the SG503 frequency is varied between 5.5 MHz and 500 kHz.

43. MONITOR Output:
(40 dB or more to 5.5 MHz operating)

a. Select diagnostic 08 on the Controller board and press the reset button.

b. Connect the UNKNOWN cable to the MONITOR input.

c. **CHECK** — that the return loss is 40 dB (4 major divisions) as the SG503 is varied from 5.5 MHz to 500 kHz.

44. PROGRAM OUTPUT:
(40 dB or more to 5.5 MHz operating)

a. Connect the UNKNOWN cable to the PROGRAM OUTPUT.

b. **CHECK** — that the return loss is 40 dB (4 major divisions) as the SG503 is varied from 5.5 MHz to 500 kHz.

c. Return the diagnostic switch on the Controller board to position 0 and press the RESET button.

45. PROGRAM INPUT:
(46 dB or more to 5.5 MHz Operating,
40 dB or more to 5.5 MHz Bypassed)

a. Put the VS 211 in Bypass and place the 75 Ω precision resistor on the PROGRAM OUTPUT.

b. Connect the UNKNOWN cable to the PROGRAM INPUT.

c. **CHECK** — that the return loss from the PROGRAM INPUT is 46 dB as the SG503 is varied from 5.5 MHz to 500 kHz.

d. **CHECK** — that the return loss from the PROGRAM INPUT is 40 dB as the SG503 is varied from 5.5 MHz to 500 kHz.

e. Take the VS 211 out of Bypass.

Calibration Procedure

Short Form Procedure

Power Supply

1. Power Supply Error Amplifier Adjustment — R29

ADC Board

2. ADC Reference Voltages (+VREF, ¾REF, ½REF, ¼REF) — R19, R12, R13, and R118
3. Input Loss Compensator — R173
4. ADC VCO Adjustment — C90
5. Clamp DC Level and Input Gain (no RC 211) — R68 and R166
6. Clamp DC Level and Input Gain (RC 211) — R68 and R177
7. Input Frequency Response — L7, L8, L9, L10, L11, L12, & L13
8. Group Delay — L10, L11, L12, & L13
9. Clamp Loop Response — R69

DAC Board

10. DAC Board Oscillator Frequency — C46
11. DAC Reference Voltage — R92
12. Output Loss Compensation — R144
13. Output Gain — R115
14. Sin(x)/x Correction — C87
15. Output Frequency Response — L3, L4, L5, L6, L7, L10, & L11
16. Group Delay — L6, L10, L5, and L11

RETURN LOSS

17. Return Loss Adjustment for PROGRAM OUTPUT and MONITOR — C20 & C21

Long Form Procedure

Power Supply

NOTE

The Power Supply adjustment is not part of the normal calibration procedure. Only perform when the voltages are out of spec.

WARNING

High voltages are on the Power Supply and Lower I/O boards. Do not service alone. Only qualified technicians should perform this adjustment.

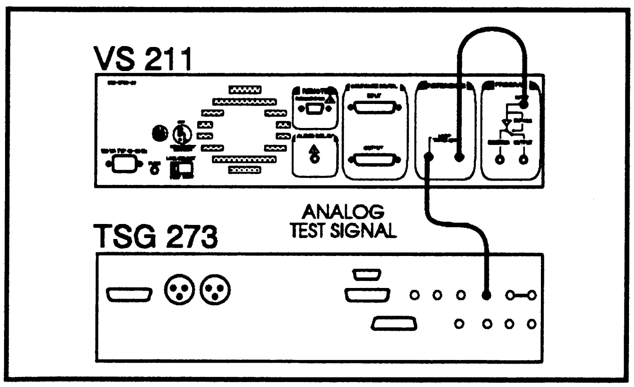


Fig. 4-21.
Setup providing load to the VS 211 for adjusting the Power Supply.

1. **Power Supply Error Amplifier Adjustment — R29**

   a. Set up the VS 211 with a PROGRAM INPUT and REFERENCE signal as shown in Fig. 4-21.

   b. Connect the DMM as shown in Fig. 4-22.

   c. Adjust R29 for + 5.000 V at the + 5 V test point on the Extender board.

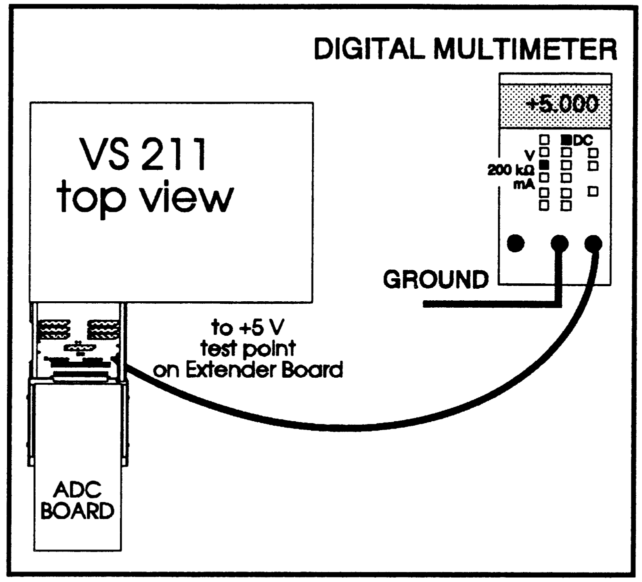


Fig. 4-22. Setup to adjust the +5 V supply.

ADC Board

NOTE

Remove the top cover instead of using the extender board for more accurate ADC board adjustments.

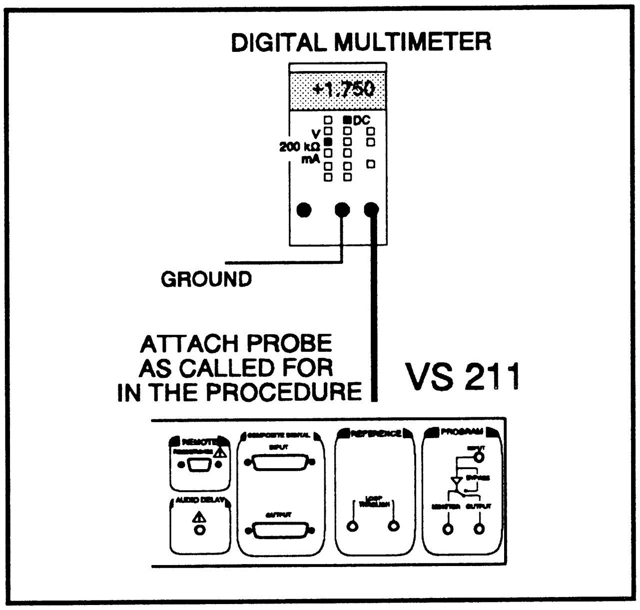


Fig. 4-23. Setup to adjust the ADC reference voltages.

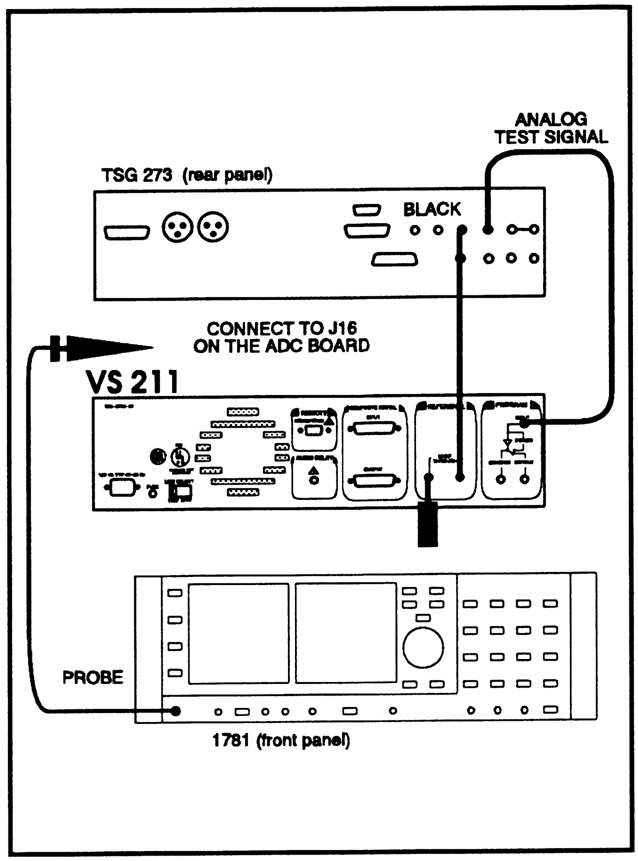


Fig. 4-24. Setup to adjust the input DC level (R173).

2. **ADC Reference Voltages (+VREF, ¾REF, ½REF, ¼REF) — R19, R12, R13, and R118**

   a. Connect the test equipment as shown in Fig. 4-23.

   b. Connect the probe to TP14 (+1.75 V).

   c. Adjust R19, using the DMM, for +1.75 V at TP14.

   d. Connect the probe to TP10.

   e. Using the DMM, adjust R12 for +0.875 V.

   f. Connect the probe to TP11.

   g. Using the DMM, adjust R13 for 0.0 V.

   h. Connect the probe to TP12.

   i. Using the DMM, adjust R118 for -0.875 V.

3. **Input Loss Compensator — R173**

   a. Connect the test equipment as shown in Fig. 4-24.

   b. Set the TSG 273 to output a 0% Flat Field signal.

   c. Move J3 to pins 3-4, to disable the rest of the input circuitry.

   d. Connect probe or cable to J16 and to the waveform monitor.

   e. Display the burst at 5X magnification.

   f. Put the waveform monitor in WFM + CAL and adjust the CAL for 300 mV.

   g. Adjust R173 for a 300 mV_{p-p} burst.

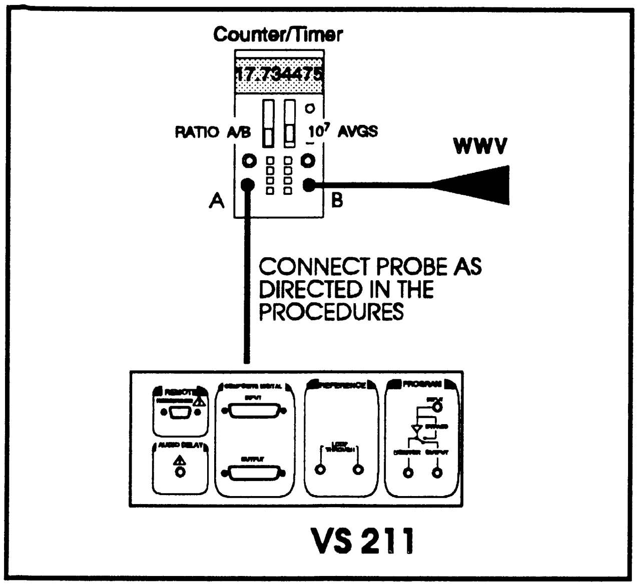


Fig. 4-25. Setup to adjust the ADC frequency.

4. ADC VCO Adjustment — C90

a. Connect the equipment as shown in Fig. 4-25.

b. Move jumper J12 to the 2-3 position and move jumper J11 to the 1-3 position.

c. Attach the probe to U55 pin 1 as shown in Fig. 4-26.

d. Adjust C90 (front edge of the ADC board) for 17.734475 MHz.

e. Return jumper J12 to the 1-2 position and J11 to the 2-3 position.

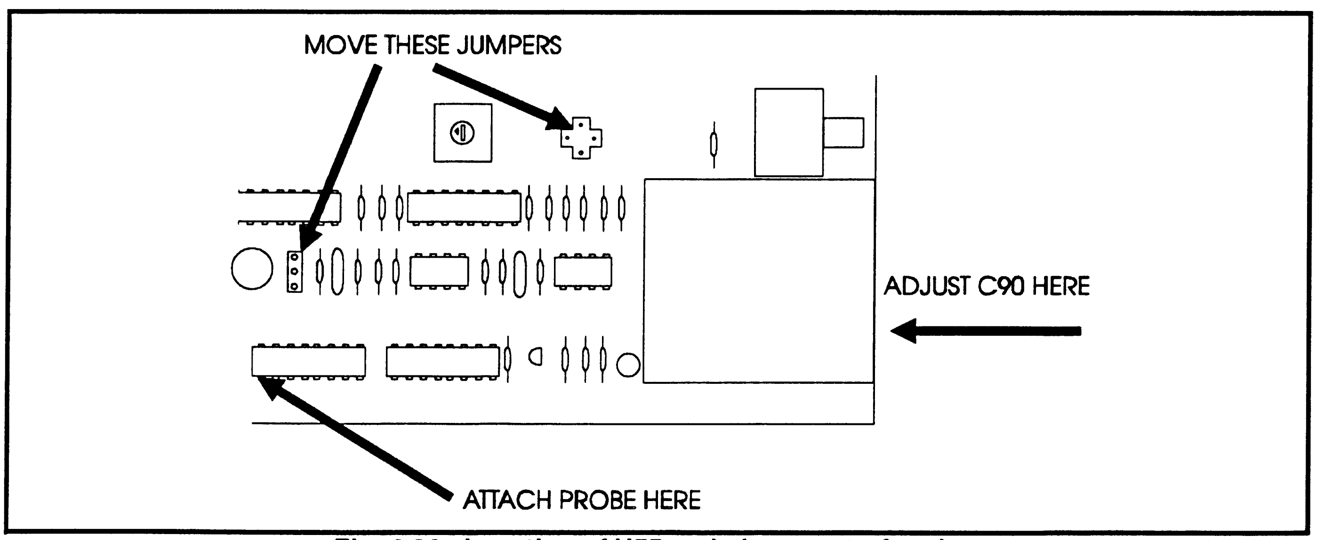


Fig. 4-26. Location of U55 and placement of probe.

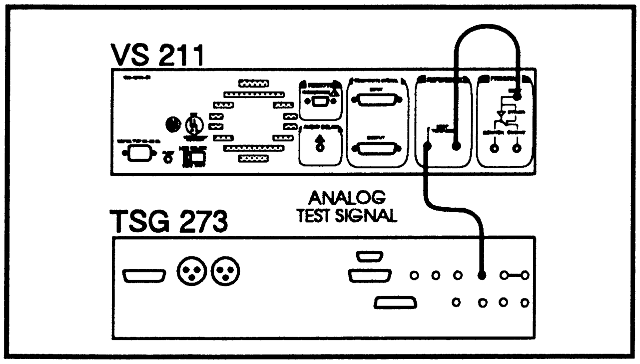


Fig. 4-27.
Setup to adjust the ADC clamp level and the input gain, if NOT using an RC 211.

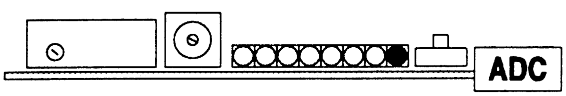
5. Clamp DC Level and Input Gain (no RC 211) — R68 and R166

a. Connect the equipment as shown in Fig. 4-27.

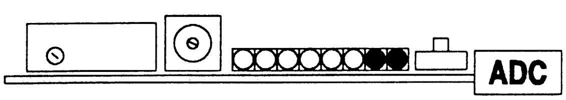
b. Set the ADC board Diagnostic Switch (S2) to "5".

c. Press the RESET button (S1). This puts the VS 211 in Diagnostic mode.

d. Adjust R68 until the far right LED on the edge of the circuit board comes on. Continue to adjust until the LED is as bright as possible.



e. Check that jumper J1 is in the 2-3 position. (Give local control to the Input Gain.)



f. Adjust R166 (Input Gain) to light the second from the right LED. Continue adjusting until it is as bright as possible.

g. Go back and adjust R68 to turn both LEDs on and off together. Leave it adjusted so that both LEDs are as bright as possible.

h. Return the Diagnostic Switch (S2) to the "0" position.

i. Press the RESET button (S1) to return the VS 211 to normal operation.

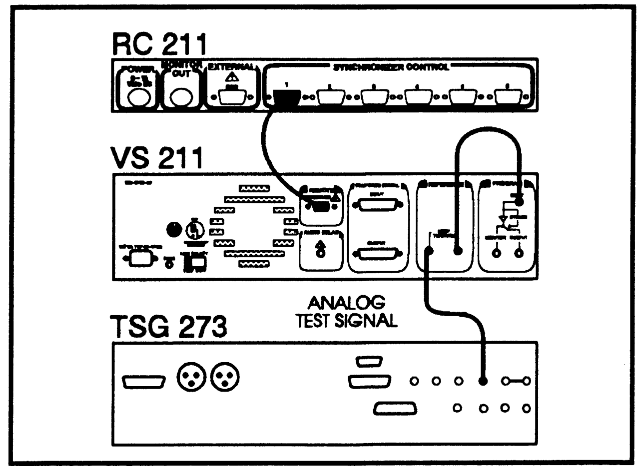


Fig. 4-28.
Setup to adjust the ADC clamp DC level and Input Gain if using an RC 211.

6. Clamp DC Level and Input Gain (RC 211) — R68 and R177

a. Connect the equipment as shown in Fig. 4-28.

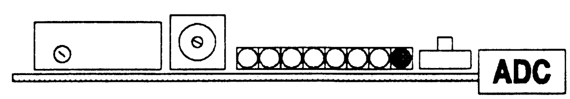
b. Give control of the VS 211 to the RC 211 by setting S7-6, on the Remote board, to 1.

c. Set the Input Gain to midrange using the RC 211 (≈ 75h.)

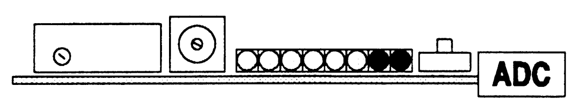
d. Set the ADC board Diagnostic Switch (S2) to "5".

e. Press the RESET button (S1). This puts the VS 211 in Diagnostic mode.

f. Adjust R68 until the far right LED on the edge of the circuit board comes on. Continue to adjust until the LED is as bright as possible.



g. Check that jumper J1 is in the 1-2 position. (Give remote control to the Input Gain.)



h. Adjust R177 (Remote Gain Calibration) to light the second from the right LED. Continue adjusting until it is as bright as possible.

i. Go back and adjust R68 to turn both LEDs on and off together. Leave it adjusted so that both LEDs are as bright as possible.

j. Return the Diagnostic Switch (S2) to the "0" position.

k. Press the RESET button (S1) to return the VS 211 to normal operation.

l. Return J1 to the 2-3 position (give gain control back to the ADC board).

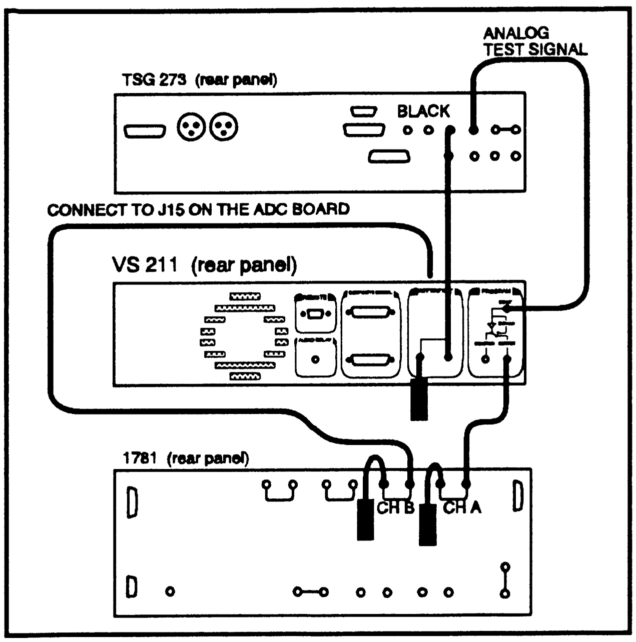


Fig. 4-29. Setup to adjust the ADC frequency response.

NOTE

The following inductors are factory set. Only make these adjustments if the instrument is out of spec.

NOTE

Steps 7 and 8 are interactive. Repeat both steps, in order, until satisfactory results are obtained.

7. Input Frequency Response — L7, L8, L9, L10, L11, L12, and L13

a. Connect the test equipment as shown in Fig. 4-29.

b. Select Line Sweep from the TSG 273.

c. Move J4 to disable the rest of the ADC board.

d. Connect the waveform monitor to J15.

e. Adjust L7, L8, L9, L10, L11, L12, and L13 for as flat a frequency as possible.

8. Group Delay — L10, L11, L12, & L13

a. Select Multipulse from the TSG 273.

b. Adjust L10, L11, L12, and L13 so that the bottom of each pulse is as flat as possible.

c. Re-select Line Sweep from the TSG 273.

d. **CHECK** — that the frequency response is still as flat as possible.

e. If the frequency response is no longer flat go back and repeat Step 5.

f. When both frequency response and group delay are within spec, move J4 back to the 1-2 position.

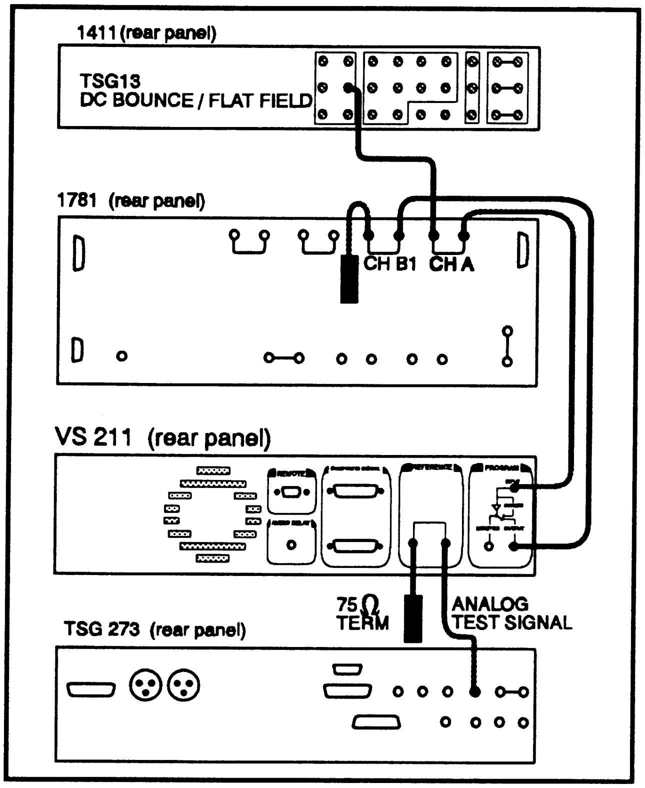


Fig. 4-30. Setup to adjust the Clamp Loop

9. Clamp Loop Response — R69

a. Set up the equipment as shown in Fig. 4-30.

b. Attach the waveform monitor to J14.

c. Set the TSG13 for 0 mV Flat Field with a fast dc bouncing rate.

d. Adjust the waveform monitor for a two-field display, with the horizontal magnification set to display a 100% to 0% transition.

e. Adjust R69 for the least amount of ringing on the transition. (A small amount of overshoot is preferred to undershoot.)

DAC Board

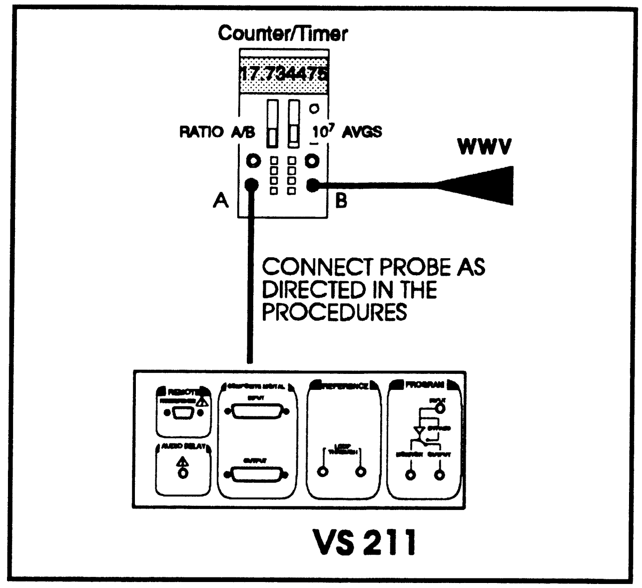


Fig. 4-31. Setup to adjust the DAC frequency.

10. DAC Board Oscillator Frequency — C46

a. Setup the equipment as shown in Fig. 4-31.

b. Move jumper J7 to the 1-3 position.

c. Attach the probe to R58 as shown in Fig. 4-32.

d. Adjust C46 (located on the front edge of the DAC board) for 17.734475 MHz.

e. Return jumper J7 to the 2-3 position.

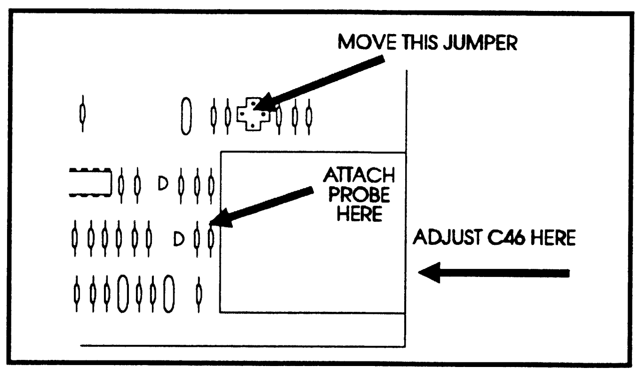


Fig. 4-32. Location of R58 and placement of the probe.

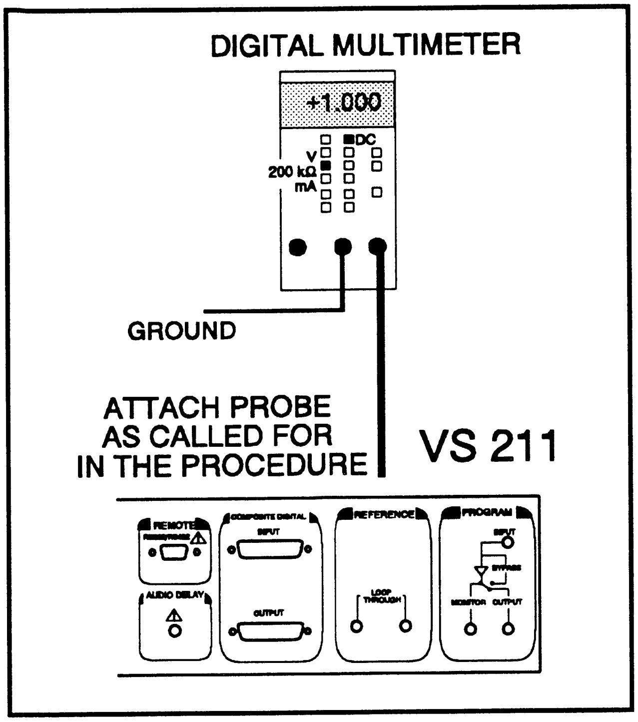


Fig. 4-33. Setup to adjust the DAC reference voltage.

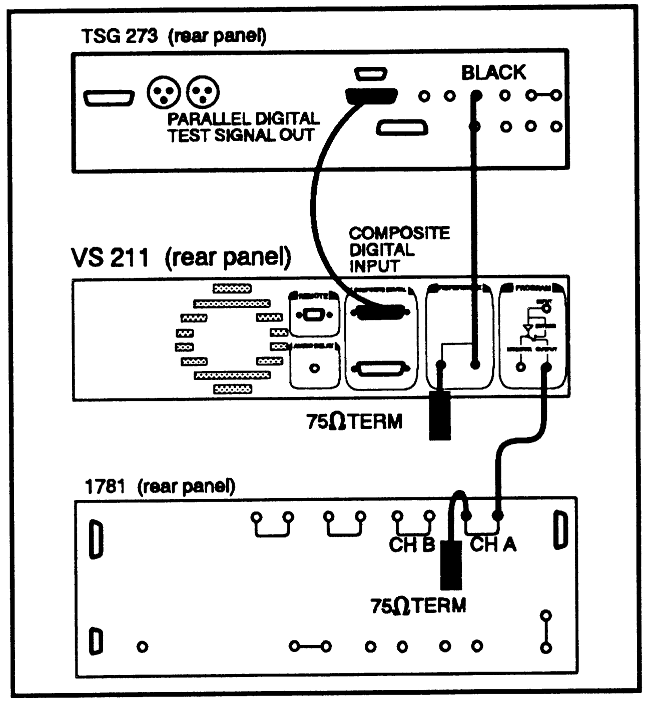


Fig. 4-34. Setup to adjust the DC level and gain.

11. DAC Reference Voltage — R92

a. Connect the equipment as shown in Fig. 4-33.

b. Connect the probe to TP12.

c. Adjust R92 for a +1.000 V reading on the DMM.

NOTE

Steps 12 and 13 are interactive. They should be repeated in sequence until satisfactory results are obtained.

12. Output Loss Compensation — R144

a. Connect the equipment as shown in Fig. 4-34.

b. Enable the COMPOSITE DIGITAL INPUT by setting S4-5, on the Remote board, to 1.

c. Zero the PROC AMPs (S7-1 on the Remote board to position 1) and disable them (S7-2 on the Remote board to position 1).

d. Select 0% Flat Field from the TSG 273.

e. Display the burst at 5X magnification.

f. Put the Waveform Monitor in WFM + CAL and adjust the CAL for 300 mV.

g. Adjust R144, so the burst is 300 mV_{p-p}.

13. Output Gain — R115

a. Keep the same setup used in the previous procedure.

b. Place the waveform monitor in WFM+CAL mode.

c. Select 100% Flat Field from the TSG 273.

d. Adjust R114, using the internal calibration signal, so the signal is 1.000 $V_{p\text{-}p}$.

e. **CHECK** — that the value of the 0% Flat Field signal remains at 0.00 V and the burst is still 300 $mV_{p\text{-}p}$.

f. If the waveform no longer has a 0.0 V_{dc} level or the burst is not at 300 $mV_{p\text{-}p}$, repeat steps 12 and 13 in sequence until the waveform has 1.00 $V_{p\text{-}p}$ amplitude, 0 V setup level, and 300 $mV_{p\text{-}p}$ burst.

NOTE

Steps 14, 15, and 16 are interactive. Repeat them in sequence until the best possible result is obtained.

14. Sin x/x Correction — C87

a. Use the same equipment setup as the previous procedures.

b. Put the waveform monitor in WFM+CAL mode with the CAL set at 300 mV.

c. Display the burst so it fills the whole screen.

d. Adjust C87 so that the burst is 300 $mV_{p\text{-}p}$, using the calibration signal.

15. Output Frequency Response — L3, L4, L5, L6, L7, L10, & L11

a. Select Line Sweep signal from the TSG 273.

b. Adjust L3, L4, L5, L6, L7, L10, & L11 for as flat a frequency response as possible,

16. Group Delay — L6, L10, L5, and L11

a. Select Multipulse from the TSG 273.

b. Adjust L5, L6, L10, and L11 to flatten the bottoms of the pulses as much as possible.

c. **CHECK** — that the burst is still 300 $mV_{p\text{-}p}$.

d. **CHECK** — that the frequency response is still as flat as possible, using the Line Sweep signal.

e. If any of the checks fail repeat steps 14, 15, and 16 until the best possible response is obtained.

RETURN LOSS

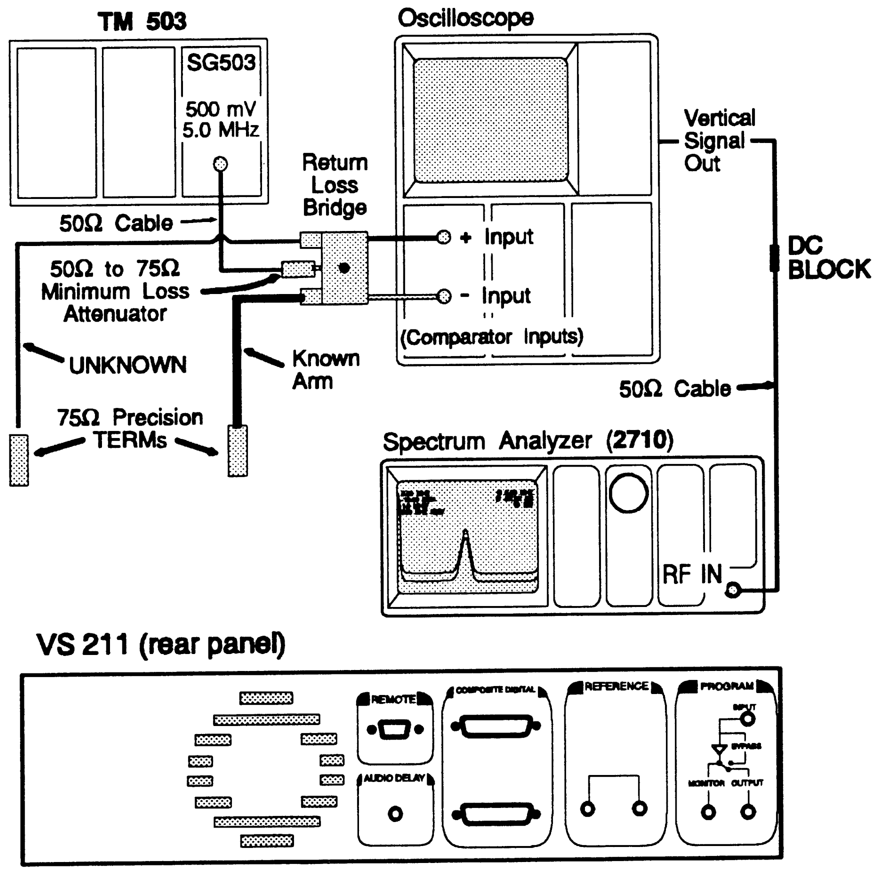


Fig. 4-35. Setup to measure return loss.

Table 4-5. Equipment Setup for Return Loss Cal.

OSCILLOSCOPE	
Vertical Mode	Left
Trig Source	Left
COMPARATOR	
+ Input	DC
- Input	DC
Bandwidth	Full
Volt/Div	50 mV
SPECTRUM ANALYZER	
Freq Start	0 MHz
Freq Stop	10 MHz
Ref Level	-10 dB
Display Mode	10 dB/Div
Freq Span/Div	1 MHz
Resolution	300 kHz
Video Filter	ON
SINE WAVE GENERATOR	
Amplitude	500 mV
Frequency	5.5 MHz

NOTE

These adjusts are not part of the normal calibration procedure. They are only to be made if the instrument is found to be out of spec.

17. Return Loss Adjustment for PROGRAM OUTPUT and MONITOR — C20 & C21

a. Connect the equipment as shown is Fig. 4-20.

b. Set the controls according to the following Table:

NOTE

If a 2710 is not available, a TEKTRONIX 7L12 or 7L13 Spectrum Analyzer installed in a 7603 Oscilloscope mainframe can be used with the 7A13 to check return loss.

c. With both precision terminators connected, adjust the Return Loss Bridge to null the 5.5 MHz response displayed on the spectrum analyzer.

d. Remove the terminator from the UNKNOWN cable.

e. Place the peak of the displayed 5.5 MHz response at the top line of the graticule by choosing the "marker reference level" from the MKR/FREQ menu of the 2710.

NOTE

All return loss measurements will be measured in dB from this reference level.

f. Put the VS 211 in Bypass and select diagnostic "8" on the Controller board.

g. Press the RESET switch on the Controller board.

h. Connect the UNKNOWN cable to the MONITOR input and connect a 75 Ω termination to the PROGRAM OUTPUT.

i. **CHECK** — that the return loss is > 40 dB (4 major divisions) as the SG503 is varied from 5.5 MHz to 500 kHz.

j. If the return loss for the MONITOR is found out of spec, adjust C21 (access under the instrument) on the Lower I/O board until the return loss is 40 dB.

k. Connect the UNKNOWN cable to the PROGRAM OUTPUT and the termination to the MONITOR output.

l. **CHECK** — that the return loss is > 40 dB (4 major divisions) as the SG503 is varied from 5.5 MHz to 500 kHz.

m. If the return loss for the PROGRAM OUTPUT is found out of spec, adjust C20 (access under the instrument) on the Lower I/O board until the return loss is 40 dB.

n. Take the VS 211 out of Bypass and return the diagnostic switch on the Controller board to position "0".

SECTION 5
TROUBLESHOOTING

The VS 211 Synchronizer contains a self diagnostic system to monitor the program video signal, reference signal, and general instrument operation. Non-standard conditions are flagged by the front panel SYSTEM STATUS indicator.

When the SYSTEM STATUS indicator is blinking, one or more of the internal red diagnostic indicators will be on. The internal indicators are located behind the front panel on the front edge of the circuit board assemblies. The indicator positions are shown in Fig. 5-1.

This section describes functions represented by the diagnostic indicators when the VS 211 is in both the normal, operational mode and diagnostic mode. By using this information and checking possible external causes, a decision can be made as to whether the instrument is faulty or the problem is external. If the VS 211 is faulty, the diagnostic routines can then be used to determine the faulty assembly. Then either Tektronix board exchange service can swap boards or, if preferred, the board can be serviced in-house with help from the Theory of Operation and the Schematics.

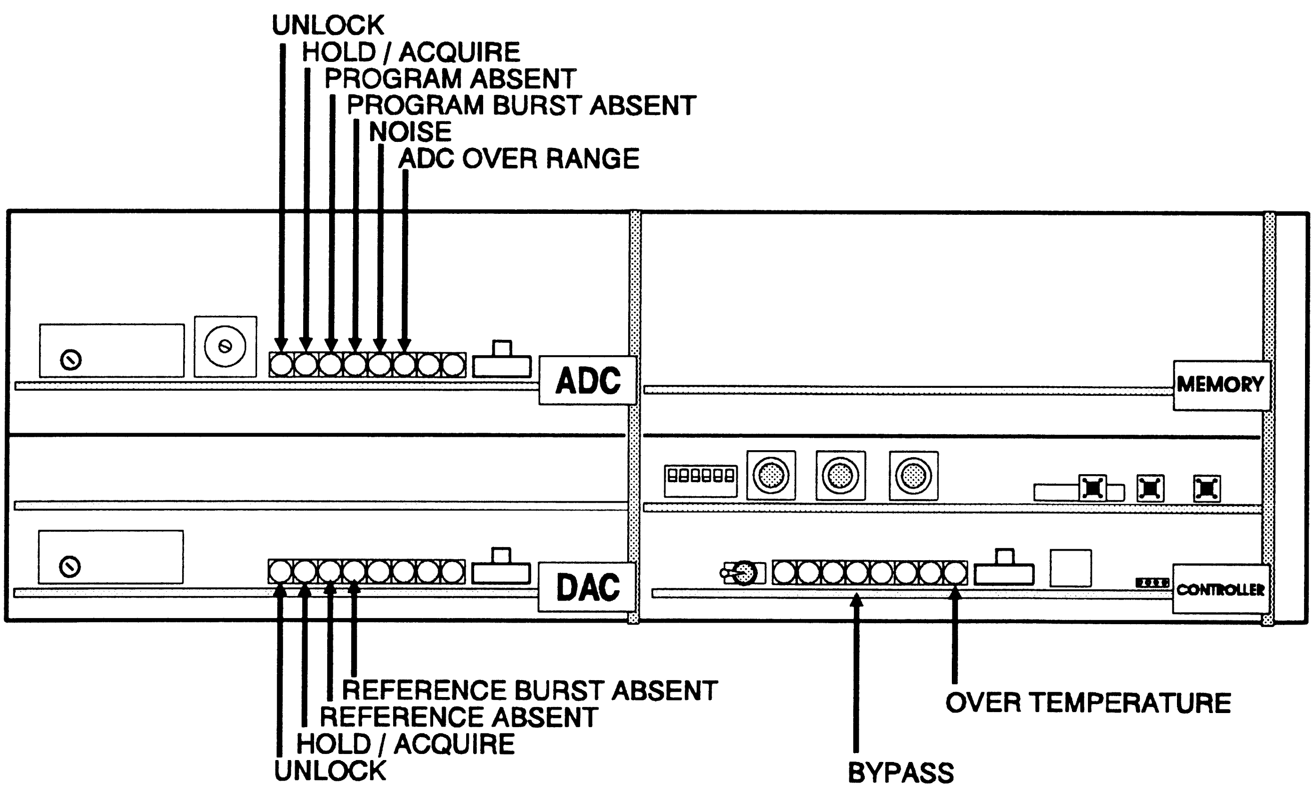


Fig. 5-1. Location of the Diagnostic Indicators.

DIAGNOSTIC INDICATORS (NORMAL OPERATION)

FRONT PANEL (See Fig. 5-2)

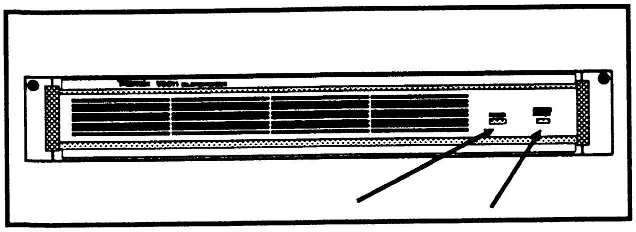


Fig. 5-2. Location of the front panel indicators.

POWER -- A green LED indicates ac power is applied and the +5 V supply is operating (normal condition).

SYSTEM STATUS — A red flashing LED indicates an abnormal signal or circuit condition within the instrument. Refer to the LEDs on the front of circuit board assemblies for additional diagnostic information.

ADC

Table 5-1 lists the meanings of the Diagnostic Indicators when the VS 211 is in normal operation. See Fig. 5-3 for the location of the Diagnostic Indicators.

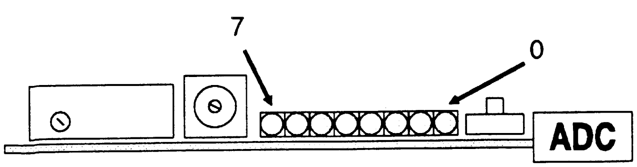


Fig. 5-3. The Diagnostic Indicators on the ADC board.

Table 5-1.
Meaning of the Diagnostic Indicators on the ADC board when the VS 211 is in Operational Mode.

DIAG LED	INDICATION	
7	Unlock	Indicates that burst is present and the input clock is not locked to the incoming burst.
6	Program Acquire	Indicates the VS 211 is attempting to acquire a lock on sync but has not been able to do it.
5	Program Absent	Indicates that the instrument is not receiving a PROGRAM INPUT signal.
4	Program Burst Absent	Indicates the incoming PROGRAM signal either does not have a burst or it is attenuated by >12 dB.
3	Noise	Indicates noise on the PROGRAM INPUT signal exceeds the signal to noise ratio detection level (24 dB S/N). The VS 211 automatically inserts clean sync & burst when the noise threshold is exceeded.
2	ADC Over Range	Indicates the input signal is too large for the ADC to properly process.

DAC

Table 5-2 lists the indicators for the DAC board and their meanings. See Fig. 5-4 for the location of the Diagnostic Indicators.

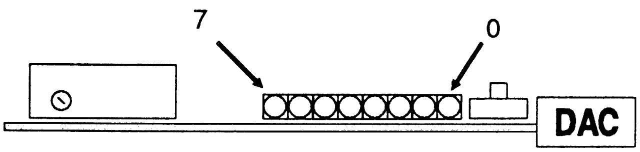


Fig. 5-4.
Location of the Diagnostic Indicators on the DAC board.

Table 5-2.
The indicators for the DAC board and their meanings (in Operational mode).

DIAG LED	INDICATION	
7	Unlock	Indicates burst is present and the input clock is not locked to the incoming burst.
6	Reference Acquire	Indicates the VS 211 is attempting to acquire a lock on sync on the REFERENCE signal but has not been able to do it.
5	Reference Absent	Indicates that there is no valid signal at the reference input or that it is severely attenuated.
4	Reference Burst Absent	Indicates the incoming REFERENCE signal either does not have a burst or it is attenuated by 6 to 12 dB.

CONTROLLER

Table 5-3 lists the meaning of the Controller board's Diagnostic LEDs when the instrument is set for normal operation. Other LEDs may light if a non-standard condition exists. An example is: if COMPOSITE DIGITAL INPUT is selected and there is no signal at the COMPOSITE DIGITAL INPUT, then CONT ERR (6), BYPASS (4), and 3 light. In general, LED 7 is a Memory Error, LED 6 is a Controller Error, and LED 5 is a Remote Communications Error. For more information on the other LEDs or the Diagnostics see "Controller Board Diagnostics" later in this section. Fig. 5-5 shows the location of the Diagnostic Indicators.

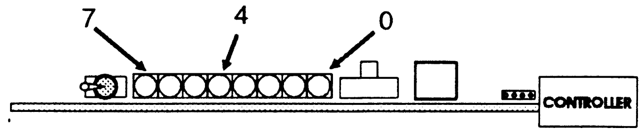


Fig. 5-5.
Location of the Controller board Diagnostic Indicators.

Table 5-3.
The meaning of the Controller board's Diagnostic LEDs when the instrument is set for normal operation.

DIAG LED	INDICATION	
7	MEM ERR	Memory Error
6	CONT ERR	Controller Error
5	REM ERR	Remote Communications Error
4	BYPASS	Indicates the VS 211 is in BYPASS mode.
0	0	OVER TEMPERATURE Internal temperature is > 70°C

REMOTE

The Remote board does have Power-up diagnostics so an error LED could be lit on Power-up, but these are not run continuously. For more information, see the Diagnostic Routines section.

DIAGNOSTIC ROUTINES

The VS 211 has built in diagnostic routines to aid the user in troubleshooting the instrument. These diagnostics can be used if the instrument is performing below par or one of the Diagnostic LEDs has come on, indicating a failure.

DAC BOARD

Overview

The VS 211 DAC diagnostics are split into two levels: the Power-up diagnostics and the User diagnostics. The Power-up diagnostics are executed each time power is cycled to the instrument or the microprocessor is reset. If the tests are successfully passed then the operation of the software continues on to normal instrument operation (i.e. remote control service routines and genlocking). If the tests fail, then the software turns on front panel LEDs and continues running diagnostic routines.

Power-Up Diagnostics

The Power-Up diagnostics are a set of routines that the processor runs to verify that the processor kernel is functional. It verifies that the microprocessor RAM, the genlock sample RAM, the Arctangent EPROM, the CTC, and the NVRAM are functional.

A description of each of the Power-up diagnostics can be found in the descriptions of the User diagnostics. Power-up diagnostics are selected by setting S1 to position 0 (default) and resetting the microprocessor (pressing S2, the RESET button) or cycling the power.

User Diagnostics

When the User Diagnostic mode is selected (S1 is set to a position other than 0), the diagnostics are then selected one at a time (see Table 5-4). If an invalid switch setting is selected, a scanning pattern will appear on the front panel LEDs.

Table 5-4. DAC board Diagnostics.

DIAG SETTING	DIAGNOSTIC TEST SELECTED
00	No Diags Selected — Normal Operation
01	EPROM Checksum — continuous pass/fail
02	RAM Tests — continuous pass/fail
03	ARCTAN PROM Test — continuous pass/fail
04	CTC Test — continuous pass/fail
05	NVRAM TEST — continuous pass/fail
06	NVROM TEST & INITIALIZE — one time pass/fail
07	Port Test — continuous interactive
08	VCO DAC Test — continuous interactive
09	Sampler Test 1 — continuous interactive
0A	Sampler Test 2 — continuous interactive
0B	spare
0C	Reset Test — continuous interactive
0D	No diagnostics selected
0E	Proc Amp/Decoder disable
0F	Cycle Test — continuous pass/fail

The User diagnostics can be classified as two types: pass/fail and interactive. The pass/fail tests require the user to simply set the diagnostic switch and watch the front panel LEDs for an indication of pass or fail. The pass/fail tests are the EPROM checksum test, RAM and sample RAM tests, the Arctangent EPROM test, the CTC test, the NVRAM test, and the NVROM test. A complete explanation of these tests is given below.

The interactive tests exercises the VS 211 hardware to allow the user to verify and troubleshoot specific features of the instrument. Each of the interactive tests are explained in detail below.

User Diagnostics Test Definitions

EPROM Test — Computes the checksum of the system EPROM (U24) and compares the value with one that has been written in the EPROM. Lights LED 5 on error. See Fig. 5-6.

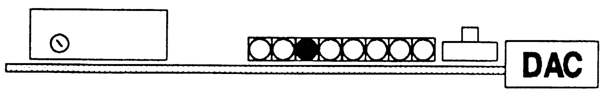


Fig. 5-6. EPROM Test Failed.

RAM Test — Writes to and then reads from all microprocessor RAM locations in the genlock IC (GLIC) (U83) and checks to see if the two compare. Writes to and then reads from all sample RAM locations in the GLIC and checks to see if the two compare. These tests are run continuously. During Power-up diagnostics this same tests are run once. Lights LED 4 on error. See Fig. 5-7.

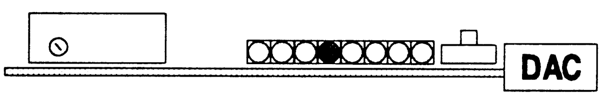


Fig. 5-7. RAM Test error.

ARCTAN EPROM Test — Computes the checksum of the arctangent EPROM (U19) and compares the value with one that has been written in the processor EPROM. This test is run continuously. During Power-up diagnostics this same test is run once. Lights LED 3 on error. See Fig. 5-8.

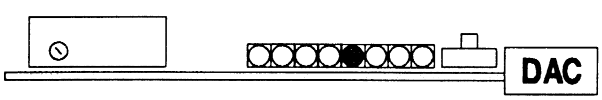


Fig. 5-8. ATAN EPROM Test error.

CTC Test — This test sets up the Counter Timer Chip (CTC) (U22) as timers and checks to see that they can generate interrupts. Each of the CTC's four sections are set up to interrupt after 4096 processor clock cycles. If any of the CTC's sections have not interrupted within the allocated time, an error is logged. This test is run continuously. During Power-up diagnostics, this same test is run once. Lights LED 2 on error. See Fig. 5-9.

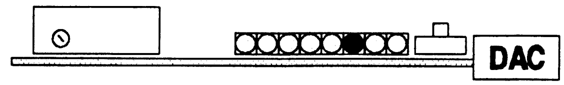


Fig. 5-9. CTC Test error.

NVRAM Test & Initialize — Writes to and then reads from all locations in the NVRAM (U83) and checks to see if the two compare. This test is run continuously. During Power-up diagnostics this same test is run once. Lights LED 1 on error. See Fig. 5-10.

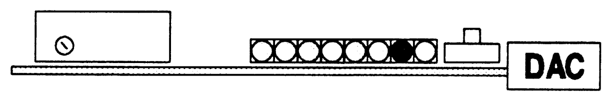


Fig. 5-10. NVRAM Test error.

NVROM Test — This test copies the contents of the NVROM (U83) to RAM, writes all zeros and then all ones, verifying that the data is correctly stored in NVROM. If the test is successful, the data is copied from RAM back into the NVROM. This test is run only once. Lights LED 0 on error. See Fig. 5-11. This test also initializes timing.

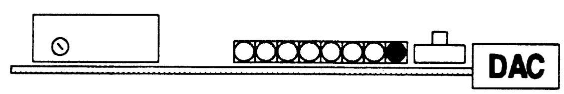


Fig. 5-11. NVROM Test error.

Port Test — Counts from 0-255 on the I/O ports of the microprocessor system. This is the ED0-ED7 bus.

VCO DAC Test — Generates a field rate ramp at the genlock DAC for checking the genlock DAC and integrator. Move J11 to the 2-3 position. Look for the signal on U37 pin 7.

Sampler Test 1 — Acquires a sample of sync and burst via the genlock input and then reconstructs the sampled sync and burst at equivalent time through the genlock DAC (U37 pin 7). Move J11 to the 2-3 position. The pulse occurring at U18 pin 7 provides a trigger and zero address reference for the signal.

Sampler Test 2 — Sets up the genlock acquisition system to sample incoming video continuously for checking acquisition timing. Trigger on input video and check genlock timing pulses (on CTC U22 pins 20-23).

Reset Test — This test checks both the software and hardware resets.

It tests the software reset by setting up the GLIC, allowing it to pull the NMI line on the microprocessor low. The software test requires setting J5 to the 1-2 position and setting J6 to the 2-4 test position and monitoring J5 or U23 pin 17 with a scope. When the test is running one should see a 5-30 µsec low true pulse occurring at a 30 msec rate.

The Reset test also checks the hardware processor reset circuitry. To check the hardware, set J5 to the 2-3 position and set J6 to the 1-2 position. Select the hardware Reset test and check J6 or U23 pin 26 with a scope and verify that there's a 600 msec low true pulse occurring at a 1200 msec rate.

Cycle Test — Continuously cycles through the EPROM, RAM, ARCTAN EPROM, CTC, and NVRAM tests and then turns on all the LEDs. On a failure, the error is logged by turning on the appropriate front panel LED and stopping execution of the test. The genlock DAC is set to max and then min at the same rate the LEDs are turned on and off.

ADC BOARD

Overview

The VS 211 ADC diagnostics are split into two levels; the Power-up diagnostics and the User diagnostics. The Power-up diagnostics are executed each time power is cycled to the instrument or the microprocessor is reset. If the tests pass successfully, then the operation of the software continues on to normal instrument operation (i.e. remote control service routines and genlocking). If the tests fail, then the software turns on the front panel LEDs and continues running the diagnostic routines.

Power-up Diagnostics

The Power-up diagnostics is a set of routines that the processor runs to verify that the processor kernel is functional. It verifies that the microprocessor RAM, the genlock sample RAM, the Arctangent EPROM, and the CTC are functional. A description of each of the tests in the Power-up diagnostic can be found in the description of the User diagnostics. Power-up diagnostics are selected by setting S2 to position 0 (default) and resetting the microprocessor (pressing S1, RESET) or cycling the power.

User Diagnostics

When the User Diagnostic mode is selected (S2 is set to a position other than 0), the diagnostics are selected one at a time (see Table 5-5). If an invalid switch setting is selected, a scanning pattern will appear on the LEDs.

Table 5-5. ADC board Diagnostics.

DIAG SETTING	DIAGNOSTIC TEST SELECTED
00	No Diags Selected — Normal Operation
01	EPROM Checksum — continuous pass/fail
02	RAM Tests — continuous pass/fail
03	ARCTAN PROM Test — continuous pass/fail
04	CTC Test — continuous pass/fail
05	ADC Setup — continuous interactive
06	E^2PROM Test/Initialize — one time pass fail
07	Port Test — continuous interactive
08	VCO DAC Test — continuous interactive
09	Sampler Test 1 — continuous interactive
0A	Sampler Test 2 — continuous interactive
0B	No Diagnostics Selected
0C	Reset Test — continuous interactive
0D	No Diagnostics Selected
0E	D-2 Test — continuous interactive
0F	Cycle Test — continuous pass/fail

The User diagnostics can be classified as two types: pass/fail and interactive. The pass/fail tests require the user to simply set the diagnostic switch and watch the front panel LEDs for an indication of pass or fail. The pass/fail tests are the EPROM Checksum Test, RAM and Sample RAM Tests, the Arctangent EPROM Test, and the CTC Test. A complete explanation of these tests is given below. The interactive tests exercises the VS 211 hardware to allow the user to verify and troubleshoot specific features of the instrument. Each of the interactive test are explained in detail below.

User Diagnostics Test Definitions

EPROM Test — Computes the checksum of the system EPROM (U25) and compares the value with one that has been written in the EPROM. This test is run continuously. Lights LED 5 on error. See Fig. 5-12.

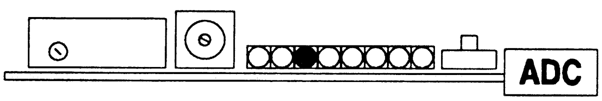


Fig. 5-12. ADC EPROM Test Failed.

RAM Tests — Writes to and then reads from all microprocessor RAM locations in the genlock IC (GLIC) (U37) and checks to see if the two compare. Writes to and then reads from all sample RAM locations in the GLIC and checks to see if the two compare. These tests run continuously. During Power-up diagnostics these same tests are run once. Lights LED 4 (BURST ABS) on error. See Fig. 5-13.

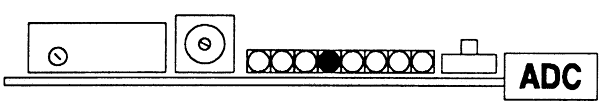


Fig. 5-13. RAM Tests error.

ARCTAN EPROM Test — Computes the checksum of the arctangent EPROM (U26) and compares the value with one that has been written in the processor EPROM. This test runs continuously. During Power-up diagnostics this same test is run once. Lights LED 3 (PGM NOISY) on error. See Fig. 5-14.

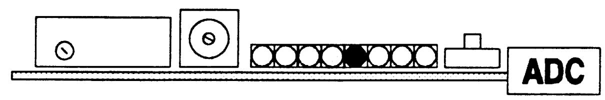


Fig. 5-14. ATAN EPROM Test error.

CTC Test — This test sets up the Counter Timer Chip (CTC) (U23) as timers and checks to see that it can generate interrupts. Each of the CTC's four sections are set up to interrupt after 4096 processor clock cycles. If any of the CTC's sections have not interrupted within the allocated time, an error is logged. This test runs continuously. During Power-up diagnostics, this same test is run once. Lights LED 2 (ADC OVRNG) on error. See Fig. 5-15.

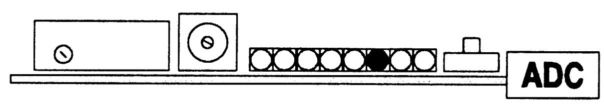


Fig. 5-15. CTC Test error.

ADC Setup — This diagnostic is used to adjust the ADC clamp's DC level (R68) and input gain (R166 or R177). With J1 in the appropriate position (for either R166 or R177 calibration), these potentiometers are adjusted until the two far right LEDs on the ADC board are both lit equally and as brightly as possible. This test runs continuously. See Fig. 5-16.

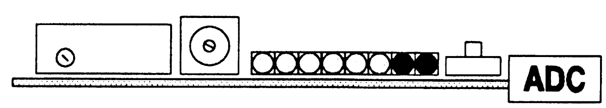


**Fig. 5-16.
ADC Clamp DC Level and Input Gain set to proper levels using the ADC Setup diagnostic.**

E²PROM TEST / INIT — This test initializes the E²PROM to move the half line delay originally on the ADC board to the Memory board. This test should only need to be run once during the original setup. The second from the right LED is lit when the test is completed / passed. See Fig. 5-17.

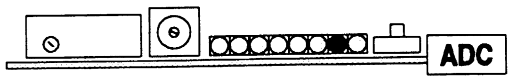


Fig. 5-17.
E²PROM setup completed and passed.

D-2 Test — (This test is similar to Sampler Test 2 except the video source is the Composite Digital input instead of the analog genlock input.) This test sets up the genlock acquisition system to sample incoming video continuously for checking acquisition timing. Trigger on input video and check genlock timing pulses (on CTC U23 pins 20-23).

Port Test — Counts from 0-255 on the I/O ports of the microprocessor system. This is the ED[0..7] bus.

VCO DAC Test — Generates a field rate ramp at the genlock DAC for checking the genlock DAC and integrator. Move J12 to the 2-3 position. Look for the signal on U53 pin 7.

Sampler Test 1 — Acquires a sample of sync and burst via the genlock input and then reconstructs the sampled sync and burst at equivalent time through the genlock DAC (U53 pin 7). J12 is moved to the 2-3 position. The pulse occurring at U18 pin 7 provides a trigger and zero address reference for the signal.

Sampler Test 2 — Sets up the genlock acquisition system to sample incoming video continuously for checking acquisition timing. Trigger on input video and check genlock timing pulses (on CTC U23 pins 20-23).

Reset Test — This test checks both the software and hardware resets.

It tests the software reset by setting up the GLIC, allowing it to pull the NMI line on the microprocessor low. The test requires setting J5 to the 1-2 position and setting J6 to the 2-4 test position and monitoring J5 or U24 pin 17 with a scope. When the software Reset test is running, a 5-30 µsec low true pulse occurs at a 30 msec rate.

The Reset test also checks the hardware processor reset circuitry. The hardware part of the Reset test requires setting J5 to the 2-3 position and J6 to the 1-2 position. Select the hardware Reset test and check J6 or U24 pin 26 with a scope and verify that there's a 600 msec low true pulse occurring at a 1200 msec rate.

Cycle Test — Continuously cycles through the EPROM, RAM, ARCTAN EPROM, and CTC tests and then turns on all the LEDs. On failure, the error is logged by turning on the appropriate front panel LED and stopping execution of the test. The genlock DAC is set to maximum and then minimum at the same rate the LEDs are turned on and off.

Controller Board Diagnostics

Table 5-6. Controller board Diagnostics.

DIAG SETTING	DIAGNOSTIC TEST SELECTED
00	No Diagnostics Selected — Normal Operation
01	R&W Vertical Test
02	spare
03	Port Test & Audio Delay Output Test
04	Memory Address Test
05	Automatic Memory Test
06	Manual Memory Test (00h)
07	Manual Memory Test (FFh)
08	Manual Memory Test (55h)
09	Manual Memory Test (AAh)
0A	Remote Communications Test
0B	Cycle Test
0C	spare
0D	spare
0E	spare
0F	spare

The Controller board has four types of tests available. They are:

- Controller Test
- Memory Test
- Remote Communications Test
- Cycle Test

Controller Tests

Port I/O Test — sends a series of 000, 0FF, 055, 0AA.

Delay Output Test — sends either 55_h or AA_h to the AUDIO DELAY output, at approximately a 20 ms rate.

R&W Vertical Count Test — checks field counting of each vertical counter. Lights CONT ERR (LED 6) on error. Also lights LED 0 (far right) if the error is on the read side or LED 1 if it is on the write side. See Figs. 5-18 and 5-19.

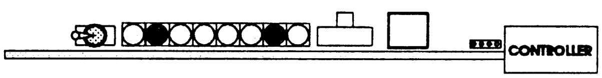


Fig. 5-18. Vertical Count Test error — error on the write side.

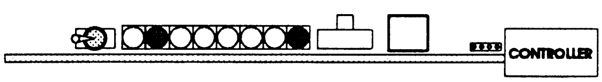


Fig. 5-19. Vertical Count Test error — error on the read side.

Memory Tests

NOTE

This set of tests will put the VS 211 in BYPASS mode. Therefore LED 4 (BYPASS) will always be lit.

Address Test — This test checks for each bit toggling, R&W. Lights CONT ERR (LED 6) on error. LED 2 is also lit if the error is on the read side or LED 3 is lit if the error is on the write side. See Figs. 5-20 and 5-21.

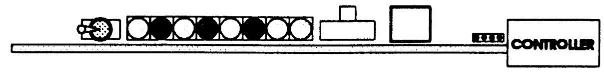


Fig. 5-20. Address Test error — error on the read side.

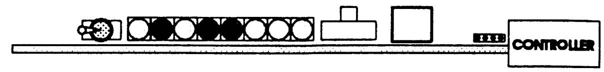


Fig. 5-21. Address Test error — error on the write side.

Automatic — This test is used for checking the Memory board down to the bit level. If this test fails the MEM ERR (LED 0) LED will be lit along with some of the four rightmost LEDs. The four right LEDs display (in binary) the bit location which failed the test (1-10). See Fig. 5-22 for an example. Which position of the bit can be determined by turning the diagnostic switch to 04 (do not press the reset button). The right four LEDs will now read out (in binary) the position that failed the test. See Fig. 5-23 for an example.

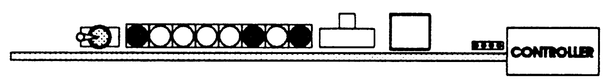


Fig. 5-22. Example: how to read the Automatic Memory Test results of a failure. In this case, bit 5 (0101) has failed.

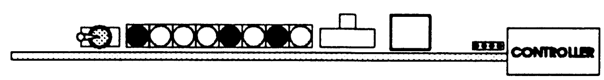


Fig. 5-23. If the test fails, the failed position can be displayed by turning the diagnostic switch to 04 (do not press the reset button). The right four LEDs (0-3) will then read out (in binary) the position (1-12) that failed the test. In this case, position 10 (1010) has failed.

Manual — These tests put out patterns to the Memory input. There are four patterns to choose from: 00, FF, 55, and AA. The user can then manually probe for the signals, to look for bit errors.

Remote Test

Remote Communications Test — Checks to see if the Remote responds with the correct word at RESET. Lights REM ERR (LED 5) on error. See Fig. 5-24.

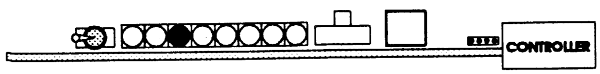


Fig. 5-24. Remote Communications Test error.

Cycle Test

Cycle Test — Cycles continuously through the following tests: R&W Vertical Test, Memory Address Test, and Automatic Memory Test.

REMOTE BOARD DIAGNOSTICS

Table 5-7. Diagnostics routines for the Remote board.

SWITCH SETTING	DIAGNOSTIC TEST SELECTED
0	Diagnostics Off (no diags selected)
1	Switches Test
2	Pots Test
3	RS-232 Test
4	S4 Test
5	S5 Test
6	S6 Test
7	S7 Test
8	Board Communication Test
9	spare
A	spare
B	spare
C	spare
D	spare
E	RAM & NVRAM Test
F	spare

Overview

The VS 211 RCIO board diagnostics are split into two levels: the Power-up diagnostics and the User diagnostics. The Power-up diagnostics are executed each time power is cycled to the instrument or the microprocessor is reset. If the tests are successfully passed then the operation of the software continues on to normal instrument operation (i.e. remote control and board servicing routines). If the tests fail then the software turns on the LED segment that represents the failure and continues running the diagnostic routines.

Power-up Diagnostics

The Power-up Diagnostics verify that all of the microprocessor RAM and the stack portion of the NVRAM are functional. One NVRAM location is tested to ensure the battery held during power off condition. Also, communication with the ADC board, DAC board and Controller board is checked. If any Power-up test fails, the LEDs will light indicating which test failed. (See Figs. 5-25 to 5-30.)
LED 1 — Processor RAM error
LED 2 — NVRAM error
LED 5 — Proc Amp board communication error
LED 6 — ADC board communications error
LED 7 — DAC board communications error
LED 8 — Controller board communications error
The Power-up Diagnostics are selected by setting the Diagnostic Switch to position 0 and either resetting the microprocessor or cycling the power.

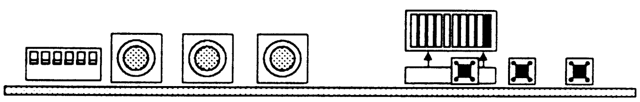


Fig. 5-25.
Processor RAM error. LED 1 lit.

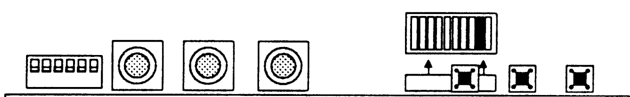


Fig. 5-26.
NVRAM error. LED 2 lit.

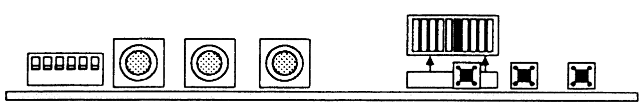


Fig. 5-27.
Proc Amp/Decoder board communications error. LED 5 lit.

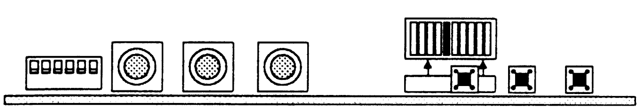


Fig. 5-28.
ADC board communications error. LED 6 lit.

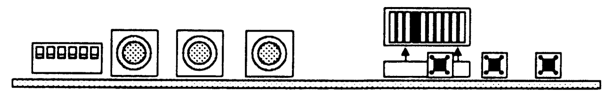


Fig. 5-29.
DAC board communications error. LED 7 lit.

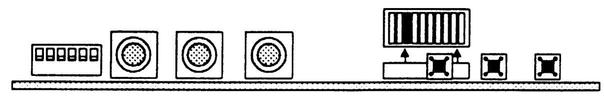


Fig. 5-30.
Controller board communications error. LED 8 lit.

User Diagnostics

User Diagnostics results are indicated on the LED bank. Some are simple pass/fail (indicated on the LEDs) and some are interactive. If a Diagnostic Switch selection is made that does not have a diagnostic defined for it nothing will happen.

Switches Test. The three timing keys toggle LEDs 1, 2 and 3 respectively when pressed. See Figs. 5-31, 5-32, and 5 -33.

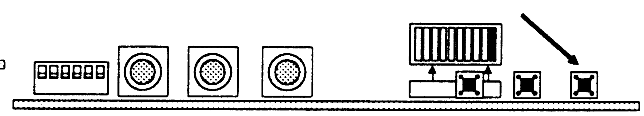


Fig. 5-31. Press switch S1 and LED 1 should light.

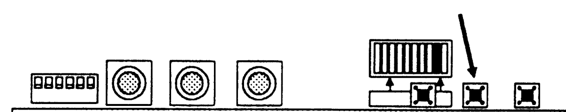


Fig. 5-32. Press S2 and LED 2 should light.

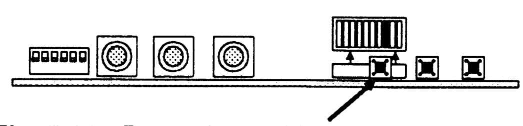


Fig. 5-33. Press S3 and LED 3 should light.

POTs Test. Slowly turning any one of the pots will shift an illuminated segment across the LED bank. See Figs. 5-34 and 5-35.

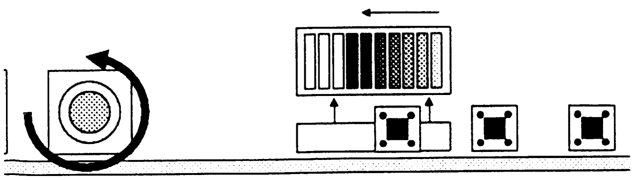


Fig. 5-34.
How the LEDs should respond to a pot rotation to the left (counterclockwise).

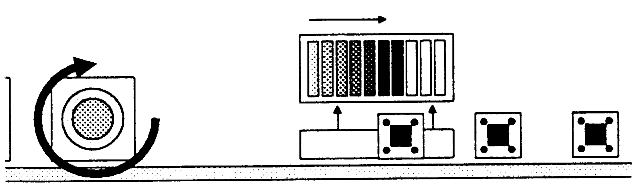


Fig. 5-35.
How the LEDs should respond to a pot rotation to the right (clockwise).

RS-232 Test. With a Null Terminator connected to the 9 pin D-connector, an attempt will be made to transmit then receive a character. No LEDs lit on error. All LEDs lit when passing. See Fig. 5-36.

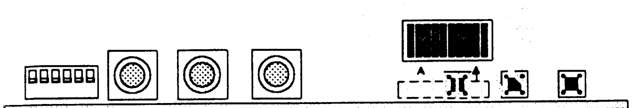


Fig. 5-36. RS-232 Test Passing.

S4 - S7 Tests. The state of the selected DIP switches is displayed on the LED bank using LEDs 1-8. For example, if S4 Test is chosen and S4 is set to: 1=0, 2=1, 3=1, 4=0, 5=0, 6=0, 7=0, and 8=0; then the LEDs will display 0000000110. (0=off and 1=on.) See Fig. 5-37.

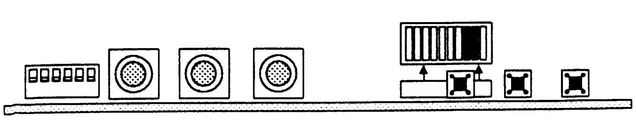


Fig. 5-37. Example of the S4 Test.
Only S4-2 and S4-3 are turned on.

Board Communications Test. The Remote board writes a test word to the ADC, DAC, and Controller boards. If the proper response is returned, the respective LED will light. If the test fails the corresponding LED will not light. The LEDs are defined as follows:

LED 5 — Proc Amp/Decoder board
LED 6 — ADC board
LED 7 — DAC board
LED 8 — Controller board

See Figs. 5-38 through 5-42 for examples.

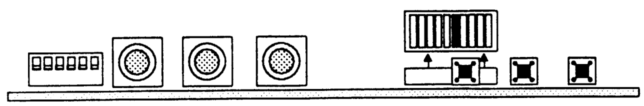


Fig. 5-38.
Proc Amp/Decoder board passing. LED 5 lit.

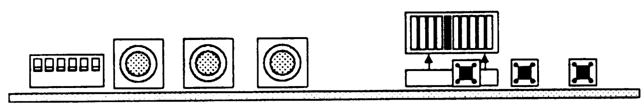


Fig. 5-39.
ADC board passing. LED 6 lit.

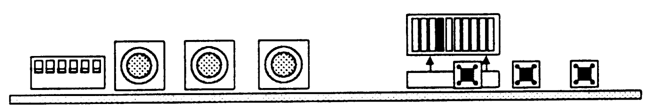


Fig. 5-40.
DAC board passing. LED 7 lit.

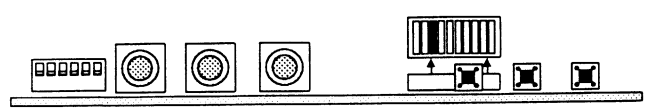


Fig. 5-41.
Controller board passing. LED 8 lit.

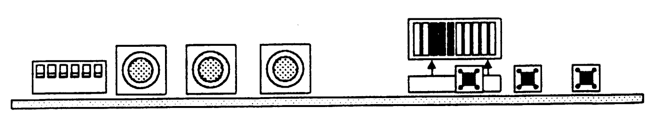


Fig. 5-42.
Three boards passing the Board Communications Test.

RAM & NVRAM Test. Writes and reads all locations of the Processor RAM and tests by comparing. Lights LED 1 on error. Checks that the battery test word in the NVRAM is correct. Writes and reads all locations of the NVRAM to check that the two compare. Lights LED 2 on error. All LEDs flash when passing. See Figs. 5-43, 5-44, and 5-45.

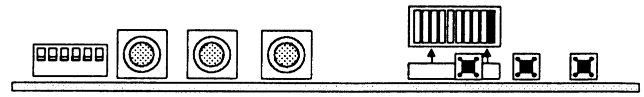


Fig. 5-43. Processor RAM Error.

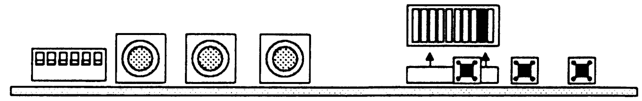


Fig. 5-44. NVRAM Error.

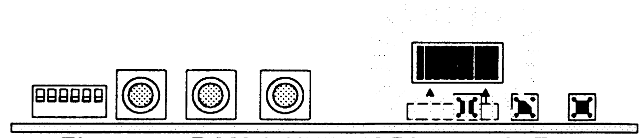


Fig. 5-45. RAM & NVRAM Diagnostic Test Passing.

USING THE RC 211 TO TROUBLESHOOT

The RC 211 also has access to the VS 211 diagnostics. Please see the RC 211 Instruction Manual for information on troubleshooting the VS 211 with the RC 211.

SECTION 6
MAINTENANCE

The maintenance information included in this section is divided into three subsections: Preventive Maintenance, Corrective Maintenance, and Replacement and Disassembly Instructions. Troubleshooting information is contained in Section 5 of this manual.

The Preventive Maintenance subsection covers instructions for cleaning, lubricating, and inspection. Corrective Maintenance provides instructions for performing the corrective tasks in a manner to avoid damaging the circuit boards and other components. The Replacement/Disassembly Instructions provide procedures for removing the major assemblies of the VS 211.

NOTE

The multi-layer circuit boards used in the VS 211 contribute to the accuracy and signal quality of the instrument. Therefore, they ***REQUIRE CARE*** *during soldering and unsoldering.* ***BEFORE SOLDERING*** *refer to "Soldering/ Desoldering Techniques" later in this section.*

PREVENTIVE MAINTENANCE

Preventive Maintenance consists of cleaning, lubricating, visual inspection, checking performance, and recalibrating the VS 211 on a regular schedule. The preventive maintenance schedule should be established based on the amount of use and the surrounding environment of the VS 211. Under average conditions, a preventive maintenance check should be performed every 2000 hours of instrument operation (severe environment conditions may dictate a shorter time interval).

Cleaning

Dust accumulating in the instrument acts as an insulating blanket, preventing proper cooling, and possibly causing overheating and component breakdown. Under high humidity conditions, accumulated dust can also provide an electrical conduction path.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics used in the instrument. Avoid using organic cleaning solutions such as benzene, toluene, xylene, acetone, freon, or other halogenated hydrocarbon solvents. Use a non-residue type of cleaner, preferably isopropyl alcohol.

Exterior. Remove accumulated dust with a soft cloth or small paint brush. The brush is particularly useful around the connectors. Hardened dirt can be removed with a soft cloth, dampened in a mild detergent and water solution. Do not use abrasive cleaners.

Interior. The best way to remove accumulated dust inside the instrument is to blow it off with dry, low-velocity air. Remaining dust can be removed with a small paint brush, followed by a soft cloth dampened in a mild detergent and water solution.

Air Filter. If the VS 211 filter element is dirty, it should be washed or replaced. The filter element is located between the back of the front panel and the aluminum EMI (electromagnetic interference) shield.

To clean or replace the filter element, unplug the cable from the front panel LED board and loosen the six screws along the sides of the EMI shield. Slide the EMI shield over and lift the shield and filter element out. If replacement is necessary, the part number of the filter element can be found in the Replaceable Mechanical Parts List of this manual.

Visual Inspection

Visually inspect the instrument during the preventive maintenance routine for signs of damage, scorched components, and loose or disconnected pin connectors. If heat damaged parts are discovered, try to determine the cause of the overheating before the damaged parts are replaced; otherwise, the damage may be repeated.

Static-Sensitive Components

CAUTION

Static discharge can damage or degrade many semiconductor components.

This instrument contains electrical components that are susceptible to damage or degradation from static discharge. See Table 6-1 for relative susceptibility of various classes of semiconductors. Higher static discharge voltages than the levels listed in Table 6-1 can degrade the performance and reliability of the semiconductor components. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Table 6-1.
Relative Susceptibility to Static Discharge Damage

Semiconductor Classes	Relative Susceptibility Levels*
MOS or CMOS microcircuits or discrete, or linear microcircuits with MOS inputs (most sensitive)	100 to 500 V
ECL, 74F, 74ALS, and 155- P/N parts	200 to 500 V
Schottky signal diodes	250 V
Schottky TTL	500 V
High-frequency bipolar transistors & ICs	400 to 600 V
JFETs	600 to 800 V
Low-frequency linear microcircuits	400 to 1000 V
Low-power Schottky TTL	900 V
TTL (least sensitive)	1200 V

* Relative Susceptibility is defined as voltage discharged from a 100 pF capacitor through a resistance of 100 Ω

NOTE

Static discharge of less than 2 kV are seldom felt.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

2. Transport and store static-sensitive components or assemblies in their original containers or on non-conductive surfaces.

3. Discharge the static voltage from your body by wearing a grounded wrist strap while handling these components. Service static-sensitive components or assemblies only at a static free work station by qualified personnel. If soldering is involved, use a soldering iron connected to earth ground and special antistatic desoldering tools.

4. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge. Carpeted floors should be sprayed to reduce static problems. Also nothing capable of generating or holding a static charge should be allowed on the work station surface.

Performance Check and Readjustment

The instrument performance should be checked to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. Instructions for performing the Performance Checks are found in Section 4: Performance Checks and Calibration Procedure.

Failure to perform within the limits stated in the Performance Check indicates a need for readjustment. Section 4 also contains instructions for calibrating the VS 211.

CORRECTIVE MAINTENANCE

Repair Services for Faulty VS 211 Assemblies

Tektronix has developed two service options to meet the needs of the VS 211 customers: the Priority Module Exchange Service and the Repair and Return Service. The Priority Module Exchange Service provides quick response for customers with critical down time requirements, while the Repair and Return Service is for customers not needing as quick a response. For additional information about these service options refer questions to the local Tektronix field office or representative.

Repackaging for Shipment

To ship the VS 211 instrument or assembly to the Tektronix Service Center for service or repair, attach a tag showing: the owner's name and address, name and phone number of an individual that can be contacted during business hours, complete instrument serial number (for instrument only), and a description of the service required. Save and reuse the package in which the instrument or assembly was shipped. Repackage the instrument or assembly in the original manner for maximum protection. If the original packaging is unfit for use or is not available, contact the local Tektronix field office or representative for ordering new shipping cartons.

Obtaining Replacement Parts

Replacement parts are available from or through the local Tektronix, Inc. field office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to provide the benefit of the latest circuit improvements. Therefore, it is important when ordering parts to include the following information in your order:

1. Tektronix part number
2. Description of the part (if an assembly, include assembly number)
3. Instrument type or number and serial number
4. Any option or modification number (if applicable)

If a part that has been ordered is replaced with a new or improved part, the local Tektronix field office or representative will contact the customer concerning any change in the part number.

Circuit readjustments may be required after any part is replaced.

Integrated Circuit Replacement

Socketed Dual-In-Line Packages. When removing or replacing integrated circuits in sockets, care should be exercised to avoid damaging the pins. When removing the integrated circuit, pull or pry slowly and evenly on both ends of the device. Try to avoid having one end disengaged from the socket before the other, because this may damage the pins. When reinserting the integrated circuit, avoid forcing the pins into the socket. Always align the pins prior to attempting to seat them in the socket.

Soldered Dual and Single In-Line Packages. To avoid damaging the circuit board when replacing IC packages that are soldered into the circuit board, cut all of the leads next to the body of the device, then individually unsolder each lead from the circuit board.

Flat Packages. To remove a flat package from its socket, slide the hinged bar at the front of the socket off the tabs on the heat sink. Then lift the heat sink up and forward. To reinsert the flat package, place the flat package in the socket so the index positions match and the flat surface is up. Insert the narrow tabs of the heat sink into the holes at the back of the socket. Press the front of the heat sink down so the hinged bar of the socket can slide over the wide tabs of the heat sink.

Circuit Board Interconnect Socket Replacement

The interconnect sockets on the plug-in circuit board assemblies can be replaced. The procedure to remove and replace an interconnecting socket from an etched circuit board assembly is similar to removing any other soldered in component.

1. Cut the socket leads as near the body of the socket as possible.
2. Unsolder each lead individually from the circuit board.
3. Remove as much solder as possible from the mounting hole.
4. Install the new socket and solder it in, applying heat primarily to the socket leads near the circuit board.
5. Trim the lead extending through the back side of the circuit board.

Soldering/Desoldering Techniques

WARNING

Disconnect the instrument from its power source before replacing or soldering components.

Due to the complexity of the instrument, the circuit boards are multi-layer with small pads. Therefore extreme care should be exercised in soldering and desoldering components from the boards. Avoid excessive heat; apply only enough heat to remove the component or make a good solder joint quickly.

CAUTION

Only an experienced maintenance person, proficient in soldering techniques, should attempt to repair any of the boards in this instrument.

Use the Proper Size Solder Iron and Tip. The desoldering and removal of parts is especially critical and should be done with a temperature limiting iron in the 30 to 40 watt range, such as the Weller Soldering Station (WTCPN) with the TC201 iron. A chisel (screwdriver) edge tip should be used in the iron. The width of the tip should be slightly less than the diameter of the pad on the circuit board. To obtain and maintain the proper tip temperature, a number 7 iron-clad tip should be used, except on large ground planes, on which a number 8 iron should be used. DO NOT USE SMALL 20 WATT IRONS.

The following soldering techniques should be used to replace a component on any of the circuit boards:

NOTE

Some components are difficult to remove from the circuit boards due to a bend placed in each lead during machine insertion of the components. The purpose of the bend leads is to hold the components in position during the solder flow process. To make removal of machine inserted components easier, straighten the component leads on the back of the circuit board using a small screwdriver or pliers.

When removing multi-lead components that are rigid, cut each component lead and then unsolder each lead from the board individually. Do not try to unsolder an IC with pins intact. When removing the leads of a multi-lead component, do not heat adjacent pads consecutively (see Fig. 6-1). Allow the circuit board to cool before proceeding to the next pin.

CAUTION

Excessive heat can cause the circuit board runs to separate from the board base material.

Never allow the soldering iron tip to remain on the circuit board or the circuit board pad for more than two seconds. If the job is not complete within this time, allow the board to cool for a few minutes before reapplying the heat.

1. Grip the component lead with thin, long-nosed pliers. Touch the end of the soldering iron tip to the lead and the flat surface of the chisel edge to the pad on the circuit board.

2. When the solder melts, pull the lead out gently. If the hole is blocked with solder, remove using a vacuum-type desoldering tool.

3. Bend the leads of the replacement components to fit the holes in the circuit board. Insert the leads into the holes in the board so that the component is firmly seated against the board, or as originally positioned.

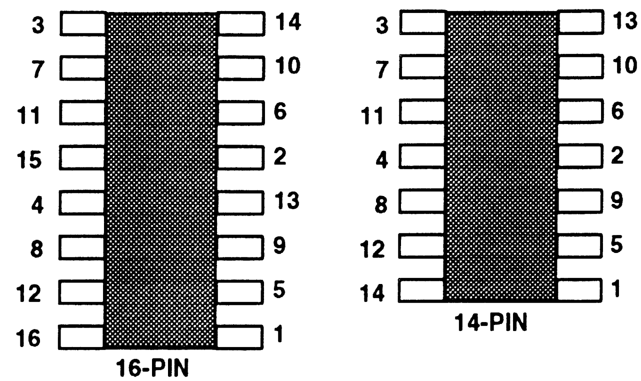


Fig. 6-1.
Recommended desoldering sequence for multipin DIP packages.

4. Touch the iron to the connection and apply enough solder to make a firm solder joint. Use rosin core solder, 63% tin and 37% lead.

5. Do not scrape away flux. Use a good quality flux remover solvent to remove flux from around the solder joint. Be careful not to remove information printed on the circuit board.

REPLACEMENT & DISASSEMBLY INSTRUCTIONS

Replacing the Front Panel

The front panel of the VS 211 can easily be removed. Lower the front panel and disconnect the cable connected the front panel LED board to the front of the Controller board. Once the cable has been disconnected, loosen the screw at the front of each side panel. When the screws have been loosened, pull the front panel forward. It should remove easily, if not, loosen the screws further. (No damage will occur if the screws are removed.) To reinstall the front panel, reverse the process.

Replacing the Air Filter

In order to replace the air filter, the EMI shield needs to be removed from the inside of the front panel. Loosen the six screws holding the shield to the front panel. Slide the shield to the left and the shield can be easily removed. Lift the air filter out. It can either be cleaned or replaced.

Replacing the Front Panel LEDs

The front panel LEDs are mounted on a small circuit board attached to the front panel. To replace the LEDs, the circuit board must be removed from the front panel. Disconnect the LED board from the Controller board by removing the cable at J9 on the Controller

Board. Remove the LED board from the front panel by unscrewing the screw in the center of the board. The LED board can now either be repaired or replaced.

Replacing Circuit Boards

The extractor on the front of each circuit board should always be used to disengage the board from the instrument.

CAUTION

The plug connectors used to mate the circuit boards to the VS 211 Upper and Lower I/O boards were selected for their reliability. In order to preserve reliability, care must be taken not to damage them.

CAUTION

All circuit boards contain static-sensitive devices, which makes it necessary to handle and repair them with care. Refer to Static-Sensitive Components in the Preventive Maintenance portion of this section.

To reinstall circuit boards from the front of the instrument, place the board in the correct slot and carefully slide it in. Boards should slide in smoothly with only a slight amount of resistance encountered when the connectors meet. If resistance seems excessive, pull the board all the way out and check slots and connectors for foreign material or damage, realign the board and try again.

Disassembling Boards

Both the Remote & Controller boards and the Proc Amp/Decoder & DAC boards are assembled together. They are hinged so there is easy access to the lower boards but if one of the boards needs to be replaced they will need to be disassembled.

1. Remove the boards (DAC & Proc Amp/Decoder or Controller & Remote) from the VS 211.
2. Remove the cable at P40 (on the Remote board) or P1 and P2 (on the Proc Amp/Decoder board) by slipping a flat screwdriver in the notch at the bottom of the connector to loosen the cable so that it can be easily removed. Do not pull on the cable itself.
3. Remove the screws at the four corners of the upper board.
4. Replace the screws in their holes on the lower board to prevent them from getting lost.

To reassemble the boards simply reverse the procedure.

The I/O Assembly

WARNING

Make sure that all power is disconnected (do not just turn the power off) before removing the I/O Assembly. Parts of the Lower I/O remain energized even when the power switch is in the "off" position.

WARNING

Do not start to remove the I/O Assembly until DS1 on the Lower I/O board has stopped blinking. DS1 warns that there is still charge on the Lower I/O board capacitors.

The rear panel, Upper I/O board, and Lower I/O board are considered one unit for the Board Exchange Program but individual boards can also be replace at the user's discretion. Therefore, first are instructions for removing the I/O Assembly from the VS 211, then there are instructions for removing the Upper and Lower I/O boards from the assembly. The Upper I/O needs to be removed to access the Lower I/O board.

Removing the I/O Assembly

1. Open the front panel and disengage all of the circuit boards from the I/O boards (ADC, DAC, Memory, Controller, and Power). They do not need to be removed from the instrument.

2. Remove the four screws from the corners of the rear panel.

3. The I/O assembly can now be easily removed from the instrument by pulling straight out.

Disassembling the I/O Assembly

1. Using a 3⁄16 inch hex driver, remove the 4 hex nuts holding the COMPOSITE DIGITAL INPUT and REMOTE connectors to the rear panel.

2. Using a wrench, remove the nut holding the PROGRAM INPUT BNC connector to the rear panel.

3. Disconnect all cables between the Upper and Lower I/O boards (J4, J5, J8, and J11). If J4 and J5 are difficult to remove by hand, insert a flat screwdriver in the slot at the bottom of the connector and carefully pry up to loosen the connector. Take care not to pull on the cables themselves.

4. Disconnect the fan (J10).

5. Remove the four screws holding the Upper and Lower I/O boards together. Three are located along the front of the circuit board and the fourth is near the fan.

6. Carefully slide the Upper I/O board straight back until the connectors clear the rear panel.

7. As the Upper I/O is removed from the assembly, carefully feed the interconnect cables through the holes.

8. Using a 3⁄16 inch hex driver remove the hex nuts for the COMPOSITE DIGITAL OUTPUT.

9. Use a wrench to remove all the nuts from the BNC connectors (PROGRAM OUTPUT, MONITOR, and EXTERNAL REFERENCE) on the rear panel.

10. Use a screwdriver to disconnect the line filter from the rear panel.

11. Carefully slide the Lower I/O board forward until the connectors clear the rear panel.

Reassembling the I/O Assembly

To reassemble the I/O Assembly, reverse the procedure used for taking it apart.

Replacing the Fan

Remove the top cover from the VS 211. Disconnect the fan from the Upper I/O board by removing the connection at J10. The fan can then be removed by removing the four screws on the rear panel holding the fan in place.

SECTION 7
OPTIONS

This is a summary of the catalog options available for the Tektronix VS 211 Frame Synchronizer. Custom modifications are negotiated (and documented) on an individual basis.

POWER OPTIONS

The standard power configuration is 220 V. If 110 V operation is desired, order Option 52.

Power Cords

The standard power cord for the VS 211 is a 120 V, 15 Amp cord equipped with standard North American three-prong power plug, as shown in Fig. 7-1. It is possible to order instruments with other power options.

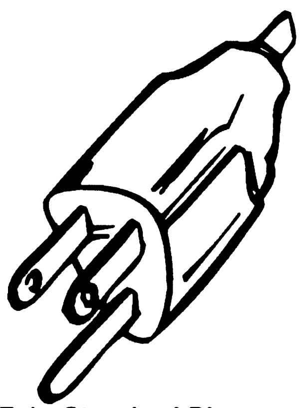


Fig. 7-1. Standard Plug.

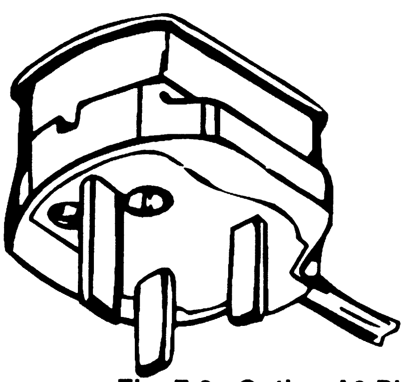


Fig. 7-3. Option A2 Plug.

The other power options are:

Option A1 (Fig. 7-2) uses a 220 V, 16 amp rated power cord with the Universal European three-prong power plug.

Option A2 (Fig. 7-3) uses a 240 V, 15 amp rated power cord with the United Kingdom three-prong power plug.

Option A3 (Fig. 7-4) uses a 240 V, 10 amp rated power cord with the Australian three-prong power plug.

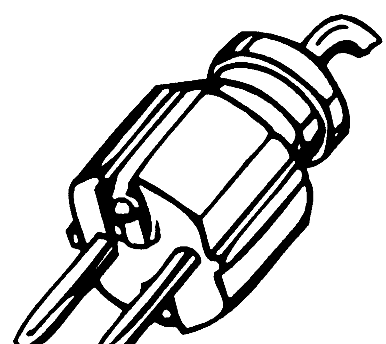


Fig. 7-2. Option A1 Plug.

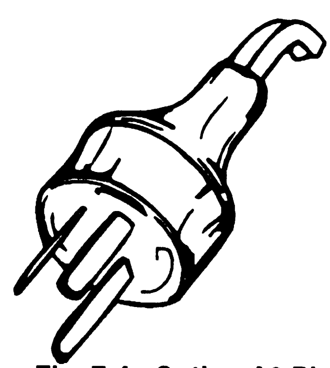


Fig. 7-4. Option A3 Plug.

Package Options

VS 211 Opt. 1A

The VS 211 Opt. 1A is a VS 211 plus a 118-AS Audio Synchronizer.

VS 211 Opt. 2A

The VS 211 Opt. 2A is a VS 211 plus a 118-AS F01 which is an Audio Synchronizer with two audio channels installed.

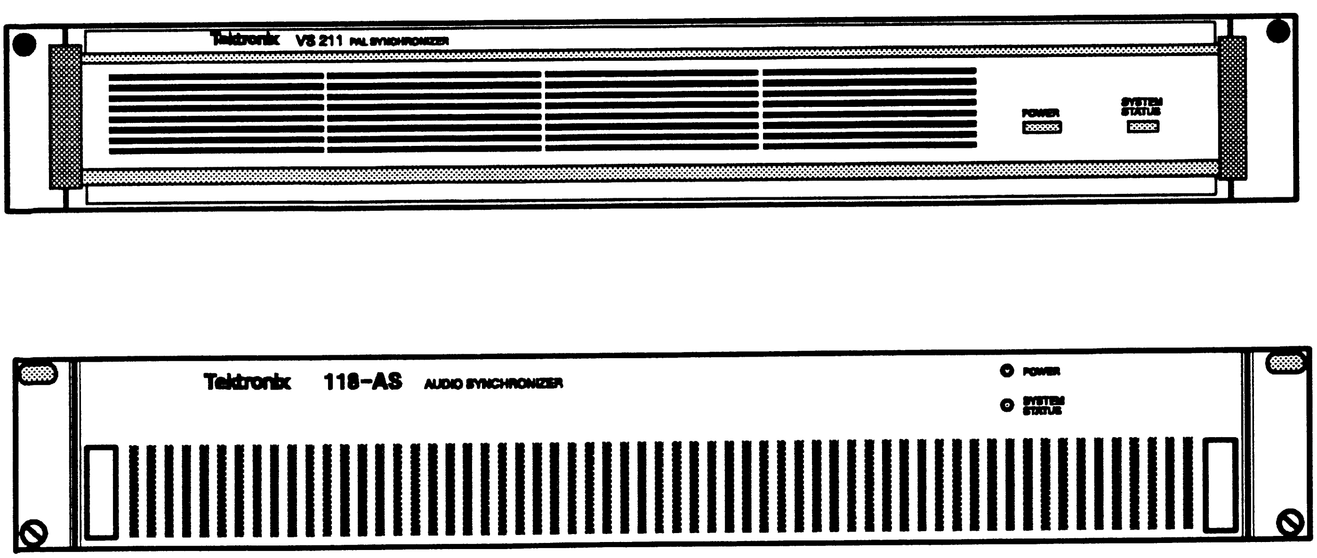


Fig. 7-5. The Package Option.

SECTION 8
INSTALLATION

This section contains information on the mechanical and electrical installation of the VS 211. The installation jumpers are listed in this section under Operating Mode Selection. There is also a short functional performance check to ensure that the VS 211 is properly installed and will not degrade the program signal.

Mechanical Installation

Unpacking and Initial Inspection

Before unpacking the VS 211 from its shipping container or carton, inspect for signs of external damage. If the carton is damaged, notify the carrier.

The shipping carton contains the basic instrument and its standard accessories. Optional or non-standard accessories are shipped in separate containers. Refer to the accessories section of this manual for a list of non-standard accessories.

If the contents of the shipping container are incomplete, there is mechanical damage or defect, or the instrument does not meet operational check requirements, contact your local Tektronix field office or representative. If the shipping container is damaged, notify the carrier as well as Tektronix.

The instrument was inspect both mechanically and electrically before shipment. It should be free of mechanical defects and should meet or exceed all electrical specifications. The Functional Performance Check, near the end of this section, provides information to quickly check for correct operation of the VS 211. A detailed electrical Performance Check is provided in Section 4.

NOTE

At installation, save the shipping carton and packaging material for repackaging in case reshipment becomes necessary.

Repackaging for Shipment

Refer to Section 6, Maintenance, for repackaging instructions.

Rack Mounting Instructions

Rack Dimension

The VS 211 is shipped with hardware for rack mounting. The instrument fits in a standard 19 inch (480 mm) rack. Spacing between the inside of the front rails of the rack must be at least 17¾ inches to allow clearance for the instrument and slide out track assemblies. See Fig. 8-1.

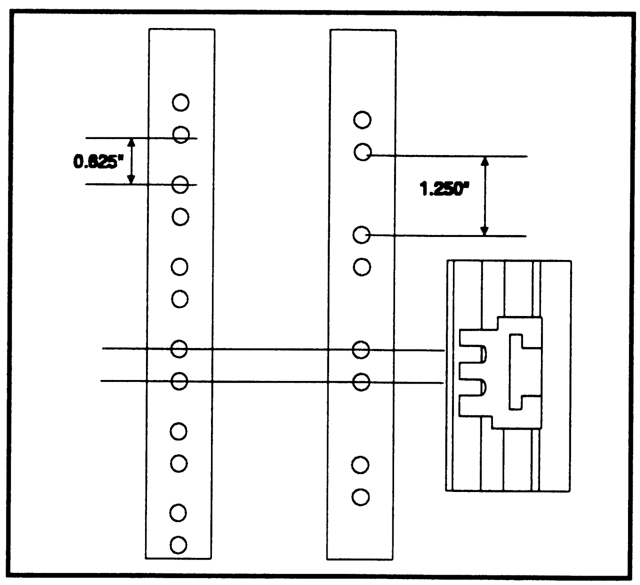


Fig. 8-1. Rail details for mounting slide tracks.

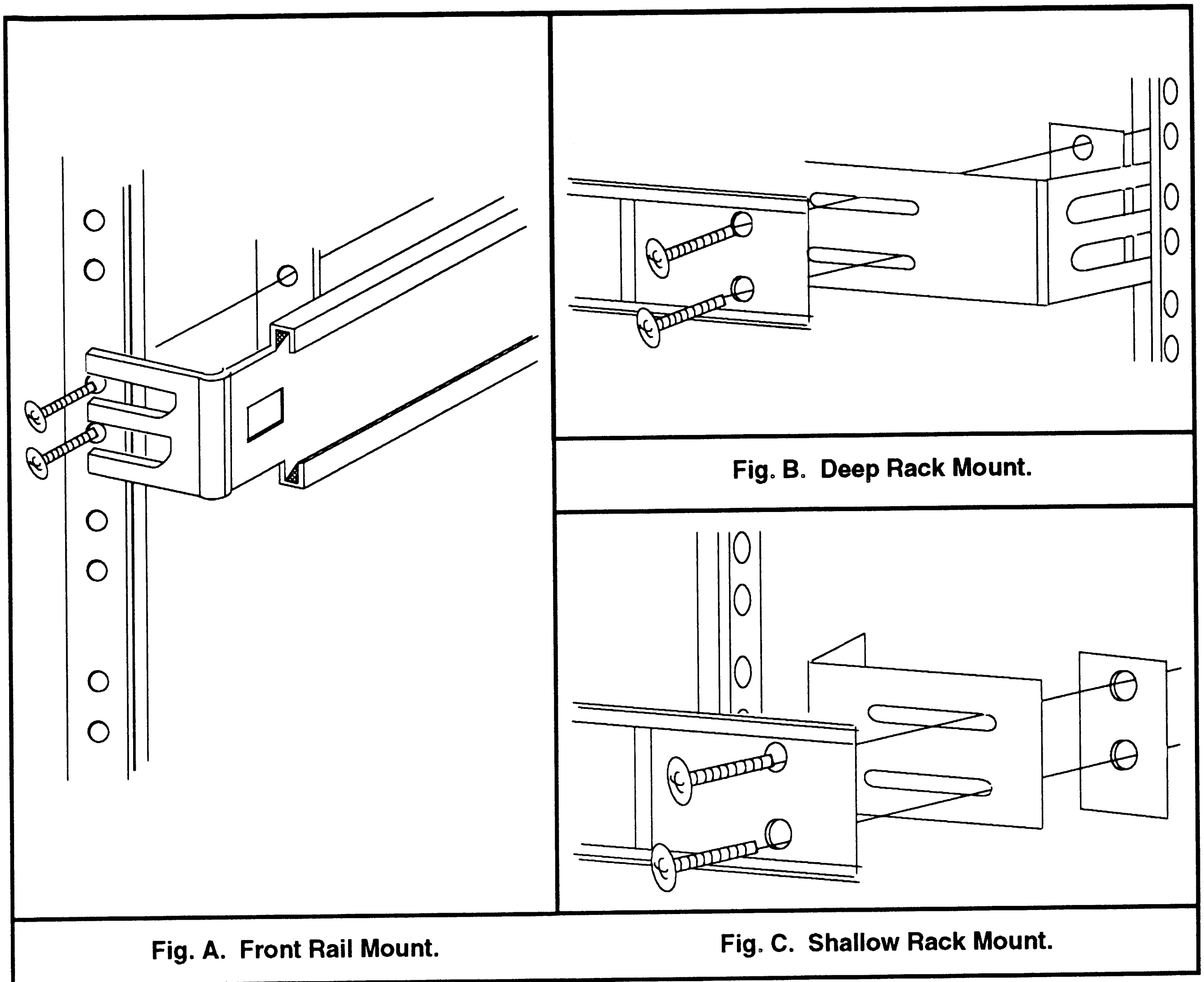


Fig. B. Deep Rack Mount.

Fig. A. Front Rail Mount.

Fig. C. Shallow Rack Mount.

Fig. 8-2. Mounting stationary track sections.

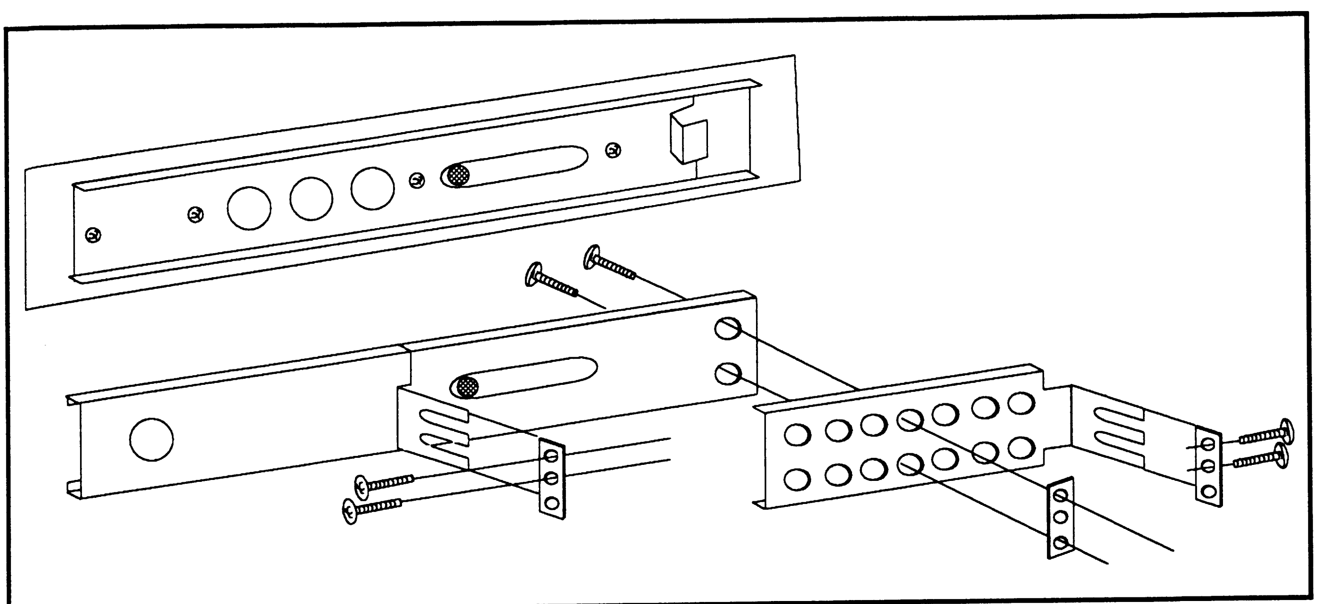


Fig. 8-3. Assembly of rack mounting hardware.

Slide-out track assemblies conveniently mount in any rack that has front-to-rear spacing between 15½ and 28 inches. A clearance of 6 inches behind the instrument's rear panel is required for cable connections and for adequate air circulation.

Mounting the Slide-Out Track Assemblies to the Rails

Locate the proper rack holes, as shown in Fig. 8-1. Notice that the hole spacing varies with the type of rack. When installing the slide-out track assemblies in EIA type racks, make certain that the assemblies are attached to the ½ inch spaced holes.

Mount the slide-out tack assemblies using the enclosed hardware as shown in Fig. 8-3. Fig. 8-2 shows the mounting details for both deep and shallow racks. Make sure that the stationary sections are horizontally aligned and level.

Installing the Instrument in Rack Slides

Pull the intermediate sections of the slide-out track assembly out as far as they will go. See Fig. 8-4. Insert the instrument chassis sections into the intermediate sections. Next press both buttons protruding from the stop latch holes in the intermediate sections, and simultaneously push in on the instrument. When the latches clear the stop latch holes, push the instrument all the way into the rack. The latches holding the intermediate sections to the stationary sections are automatically operated by the instrument as it is pushed into the rack.

Rack Adjustments

After installation, binding may occur if the slide-out track assemblies are not properly adjusted. To adjust the assemblies, slide the instrument out about 10 inches, slightly loosen the screws holding the assemblies to the front rails, and allow the assemblies to seek an unbound position. Retighten the screws and check for smooth operation by sliding the instrument in and out of the rack several times.

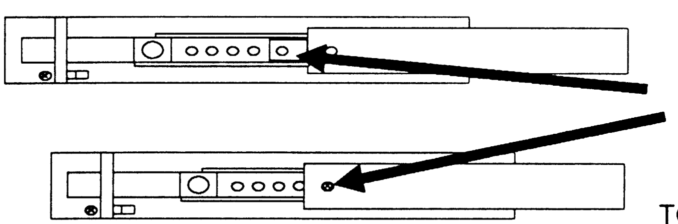
Once the instrument is in place within the rack, tighten the knurled retaining screws to fasten it securely into the rack.

Rack Slide Maintenance

The slide-out track assemblies do not require lubrication. The dark grey finish on the tracks is a permanent, lubricating coating.

Removing the Instrument

Before removing the instrument, disconnect all cables connected to it. First loosen the front-panel knurled retaining screws. See Fig. 8-4. Grasp the front panel "ears" and pull the instrument out until the stop latches snap into their holes. The instrument is firmly held in this position.



TO INSTALL:
1. Pull the slide out track section to the fully extended position.
2. Insert the instrument chassis sections into the slide-out sections.
3. Press the stop latches and push the instrument towards the rack until the latches snap into their holes.
4. Again press the stop latches and push the instrument fully into the rack.
5. Tighten the front-panel retaining screw.

TO REMOVE:
1. Loosen retaining screw and pull instrument outward until the stop latches snap into the holes.
2. Press stop latches and remove instrument.

Fig. 8-4. Installing the VS 211 in rack slides.

To completely remove the instrument, press both release latch buttons (visible in the stop latch holes) and carefully slide the instrument free from the slide-out track assemblies.

Operating Mode Selection

Selection of the operating mode options for the VS 211 is accomplished by jumpers or switches on the circuit boards. Fig. 8-5 shows the location of the circuit boards.

Tables 8-1 and 8-2 lists VS 211 operating mode options that can be selected by changing internal jumpers.

NOTE

Only GREEN jumpers should be moved to change operating parameters. Factory set positions for each jumper are marked on the circuit board by a line around the factory set pins. RED jumpers are for test purposes only.

A complete list of jumpers is given in Appendix A.

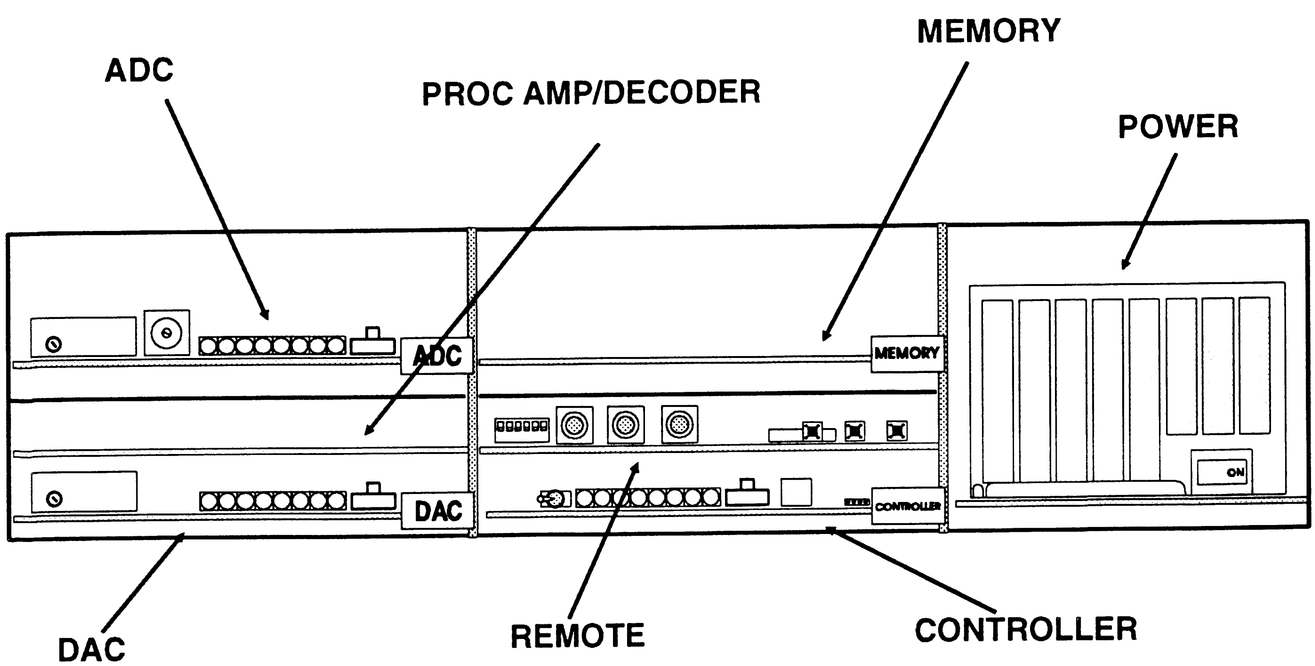


Fig. 8-5. Location of the boards in the VS 211.

Installation Jumpers & Switches

Table 8-1. DIP switches on the Remote Board.

DIP #	SWITCH NUMBER	DEFINITION OF SWITCH SETTINGS	
S4	1	Synchronizer Mode 0	**21** 00 = 8 fields 01 = Zero Studio Delay 10 = 2 fields 11 = unused
	2	Synchronizer Mode 1	
	3	Force Reference Sync Lock	0 = no 1 = yes
	4	Force Program Sync Lock	0 = no 1 = yes
	5	Program Input	0 = analog 1 = digital
	6	unused	
	7	unused	
	8	unused	
S5	1	Proc Amp Clip 0	**21** 00 = off 01 = soft 10 = hard 11 = auto
	2	Proc Amp Clip 1	
	3	Proc Amp White Clip	0 = disable 1 = enable
	4	Proc Amp Black Clip	0 = 0% 1 = -10%
	5	Sync & Burst Insertion	0 = no 1 = yes
	6	ITS Handling	0 = pass 1 = delete
	7	SIS (Sound-in-Sync) on Program	0 = no 1 = yes
	8	Digital Output	0 = 10-bit 1 = 8-bit

Table 8-1. cont.

DIP #	SWITCH NUMBER	DEFINITION OF SWITCH SETTINGS	
S6	1	Program Error Handling 0	**321** 000 = Freeze 001 = Bypass 010 = Black 011 = Freeze for 5 sec → Black 100-111 = unused
	2	Program Error Handling 1	
	3	Program Error Handling 2	
	4	Reference Error Handling	0 = Bypass 1 = use internal reference
	5	unused	
	6	unused	
	7	Baud Rate 0	**87** 00=19.2k 01=9600 10=4800 11=2400
	8	Baud Rate 1	
S7	1	Zero Proc Amps (reset)	0 = Proc Amp Operate 1 = Proc Amp Reset
	2	Proc Amp Knobs	0 = disable (freeze value) 1 = enable
	3	Timing Keys	0 = disable (freeze value) 1 = enable
	4	Vertical Timing	**54** 00 = 0 line 10 = +1 line 01 = -1 line 11 = unused
	5		
	6	Control	0 = local 1 = remote

Table 8-2. ADC Board Installation Jumpers.

FUNCTION	JUMPER #	DESCRIPTION	
Input Gain Select (green)	J1	1-2	Gain Controlled by the RC 211
		2-3	Gain Controlled by R166 on ADC board

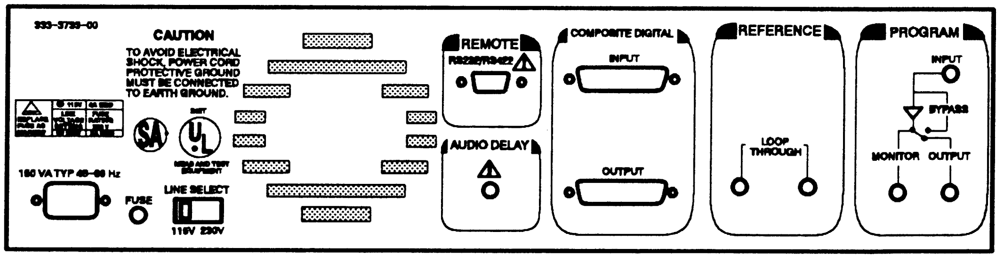


Fig. 8-6. Rear panel of the VS 211.

Electrical Installation

Installation in the Program Line

All input and output connections for the VS 211 are through the rear panel. See Fig. 8-6. To install the VS 211 in the program line, connect the program input signal to the PROGRAM INPUT connector. The PROGRAM INPUT connector is terminated in 75 Ω by the VS 211 (except in the Bypass mode, when the termination is provided following the PROGRAM OUTPUT).

If this is a digital studio, connect a parallel composite digital signal to the COMPOSITE DIGITAL INPUT 25-pin connector.

Connect a composite video reference signal, containing sync and burst plus correct SC/H phase to one of the REFERENCE LOOP-THROUGH connectors. Terminate the other side in 75 Ω.

Remote control connections to the RC 211, are made through the 9-pin REMOTE connector on the rear panel.

TYPICAL INSTALLATION

The simplest installation of a VS 211 Video Synchronizer is illustrated in Fig. 8-7. The measurement equipment shown in the illustration is used for check-out and is not required for normal operation.

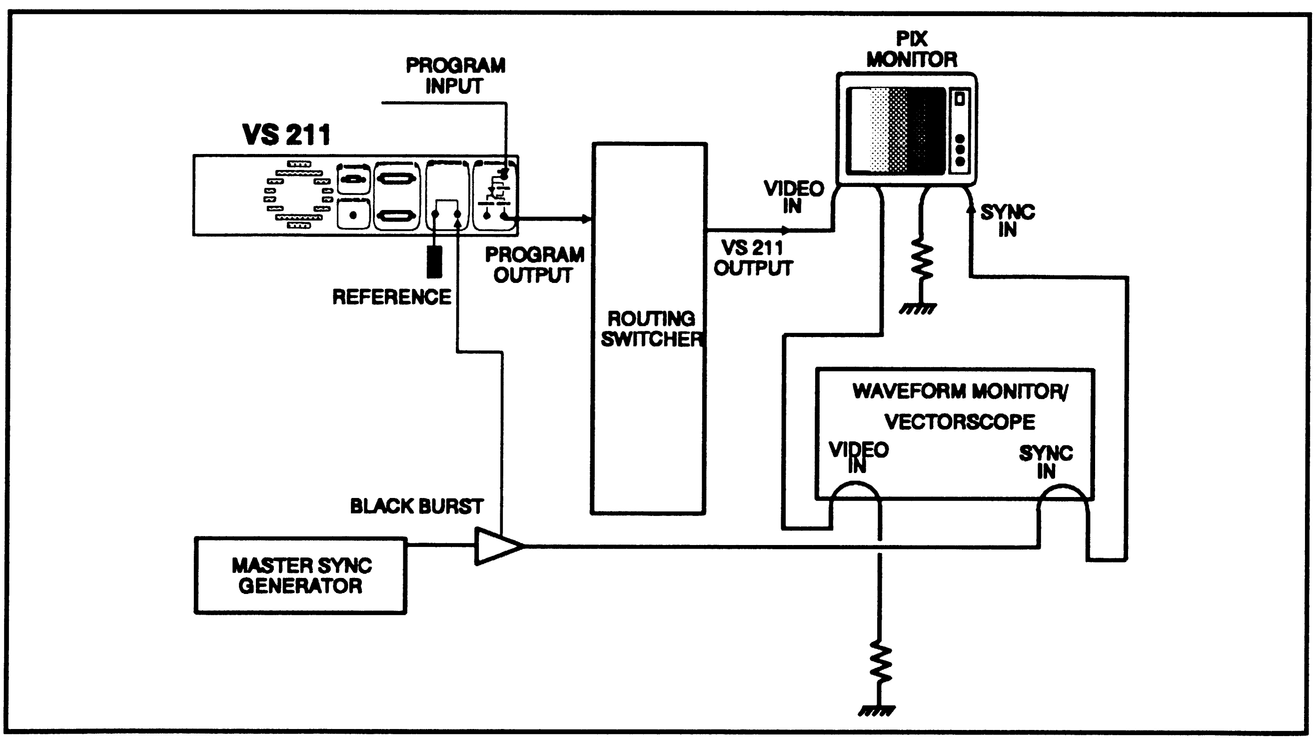


Fig. 8-7. Basic Installation of the VS 211.

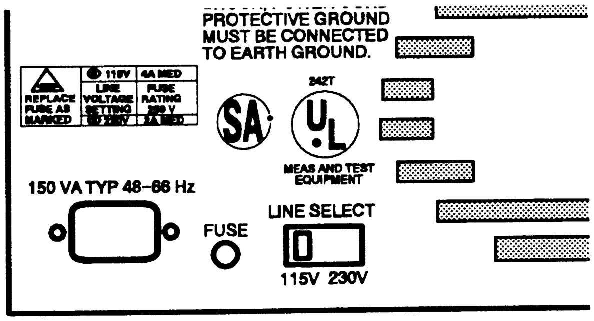


Fig. 8-8. Loction of the Line Selector Switch & Fuse.

POWER-UP

The standard line voltage configuration is for 230 V. If 115 V operation is desired as the standard, order Option 52. Check the voltage configuration on the rear panel (see Fig. 8-8). If it is not in the proper position, flip the Line Selector Switch and change the fuse.

The VS 211 power switch is located behind the front panel, on the power supply module. See Fig. 8-9.

The following procedure assumes that the VS 211 has a reference signal and that the video input is already connected to the program line.

Power Up Procedure

1. If powering up for the first time, check that the rear panel line selector switch is set to the correct line voltage before connecting the power mains.
2. Lower the front panel.

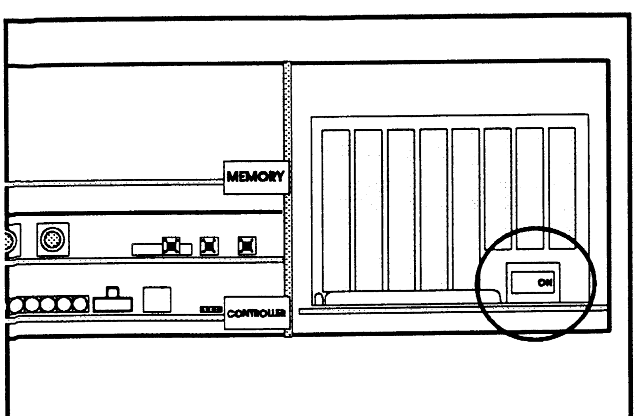


Fig. 8-9. Location of the POWER switch.

3. Set the power switch to on.
4. Close the front panel.
5. Check that the green POWER indicator is on.
6. Check that the red SYSTEM STATUS indicator is off.

NOTE

If there is no PROGRAM INPUT or REFERENCE signal then the SYSTEM STATUS indicator will be blinking.

Interpreting Front-Panel Indicators

If the green POWER indicator did not come on, check that:

1. The power switch is on.
2. The power cord is plugged in.
3. The line selector switch is in the correct position.
4. The power supply fuse is good.
5. The power supply module is firmly plugged into the instrument housing.
6. The cable from the front panel LED board to the Controller board is firmly plugged in.

If all of the above items check out and the POWER indicator is still off, consult the TROUBLESHOOTING section of this manual.

If the SYSTEM STATUS indicator is flashing, check the LED indicators on the front edge of the circuit boards to determine the cause of the error. For assistance in interpreting the LED indicators, see Troubleshooting, in Section 5.

INSTALLATION ADJUSTMENTS

To ensure no timing error is introduced when the VS 211 is inserted into the program chain, it is necessary to perform a set of timing adjustments.

Vertical Timing

The vertical phase jumpers are used to make the timing adjustments. Vertical timing is factory set to make the output signal coincident with the

REFERENCE signal. It is possible to advance vertical by one line or delay it by one line. Vertical timing is set by two DIP switches on the Remote board.

Horizontal Timing

Setting the VS 211 Horizontal Timing and System phase requires a signal source (such as a Tektronix TSG 273), a television waveform monitor and vectorscope (such as the Tektronix 1781) and a television picture monitor. In addition, up to three 75 Ω terminators and enough 75 Ω cabling to make the required connections are needed.

Connect the test equipment as shown in Fig. 8-7. (The PROGRAM INPUT, PROGRAM OUTPUT, and REFERENCE are all connected for normal operation.) All timing adjustments are made to match the VS 211 to its surrounding environment and MUST be performed with the instrument in its operating configuration. In order to get the following procedure to work, the vertical phase must be set correctly and all of the reference signals used to time the VS 211 into the system must meet RS-170A specifications for SC/H Phase.

Procedure:

1. Externally sync the waveform monitor (0.1 µs/division sweep rate) and the vectorscope.
2. Get an externally referenced vector display on the vectorscope.
3. Set the switcher for black or other reference timing signal.
4. Position the leading edge of sync to a major graticule division near the middle of the waveform monitor screen.
5. Position the burst vectors on the vectorscope graticule burst axes.
6. Select the VS 211 on the Switcher.
7. Press the system Phase Fine Adjustment (< or > on the Remote board) to place the vectors directly on the Burst axes.
8. Check to see that the leading edge of sync is still on the reference graticule.

If the VS 211 cannot be timed into the system, check the SC/H phase of the REFERENCE and the PROGRAM INPUT signal. An incorrectly SC/H-phased REFERENCE will cause the VS 211 output to match either the sync or the burst, but not both simultaneously.

PROC AMP SETUP

The Proc Amp controls are factory set to unity. They are located on the ADC and the Remote boards (see Fig. 8-10). Internal Proc Amp controls are factory set enabled; if any other operating mode is desired, consult the Jumper Tables given earlier in this section.

In normal operation, the Proc Amp controls are adjusted to set the PROGRAM INPUT signal to optimum levels. However, if it is desired to set the controls to unity, simply flip a DIP switch on the Remote board to reset them to unity.

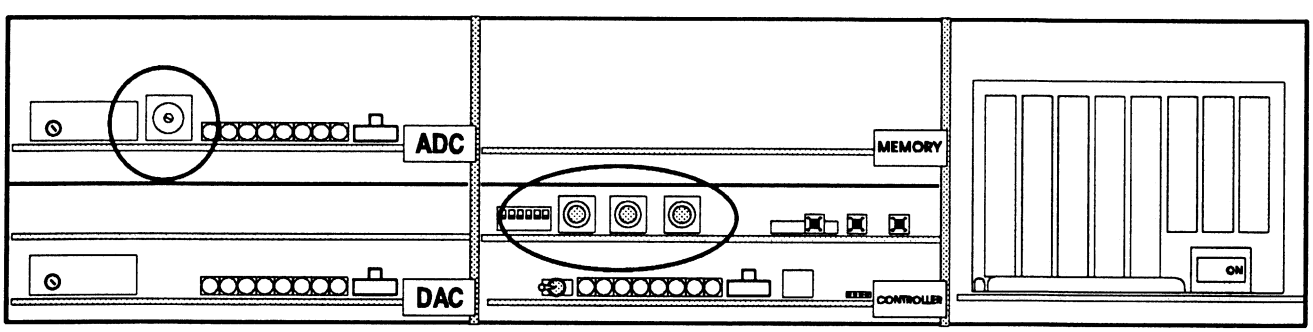


Fig. 8-10. Location of the Proc Amps.

FUNCTIONAL PERFORMANCE CHECK

This short performance test assures that the VS 211 is functional and will not degrade program video. This check is simple enough to be performed often. If substandard operation is noted, refer to Section 5, Troubleshooting, for assistance.

The functional performance of the VS 211 should be checked in its operating environment, or under conditions simulating it. A full, off-line performance verification procedure can be found in the Performance Check and Calibration Procedure in Section 4.

Note that digital differential gain and phase measurements differ from their analog counterparts.

Equipment Required

This procedure requires a vectorscope (such as a Tektronix 1781), a picture monitor, and a television signal generator capable of generating Modulated Ramp and Black Burst Signals (such as a Tektronix TSG 273). Also required are three 75 Ω terminations and enough 75 Ω cable to connect the equipment.

Connect the equipment as shown in Fig. 8-11. A routing switcher is shown in the illustration but is not necessary to perform the procedure.

Procedure

1. Set the test signal generator controls to obtain a Modulated Ramp signal.
2. Switch the VS 211 to BYPASS mode (the BYPASS switch is on the Controller board).
3. Set the vectorscope for an externally referenced full field vector display of maximum gain.
4. Measure the differential gain.
5. Switch the VS 211 out of BYPASS mode and again measure the differential gain.
6. The actual differential gain caused by the VS 211 is the difference between the bypassed and unbypassed measurement. The difference should be ≤ 1%.
7. Switch to bypass mode and measure differential phase.
8. Switch out of bypass mode and again measure differential phase.
9. The actual differential phase caused by the VS 211 is the difference between the bypassed and unbypassed measurements. The difference should be ≤ 1°.

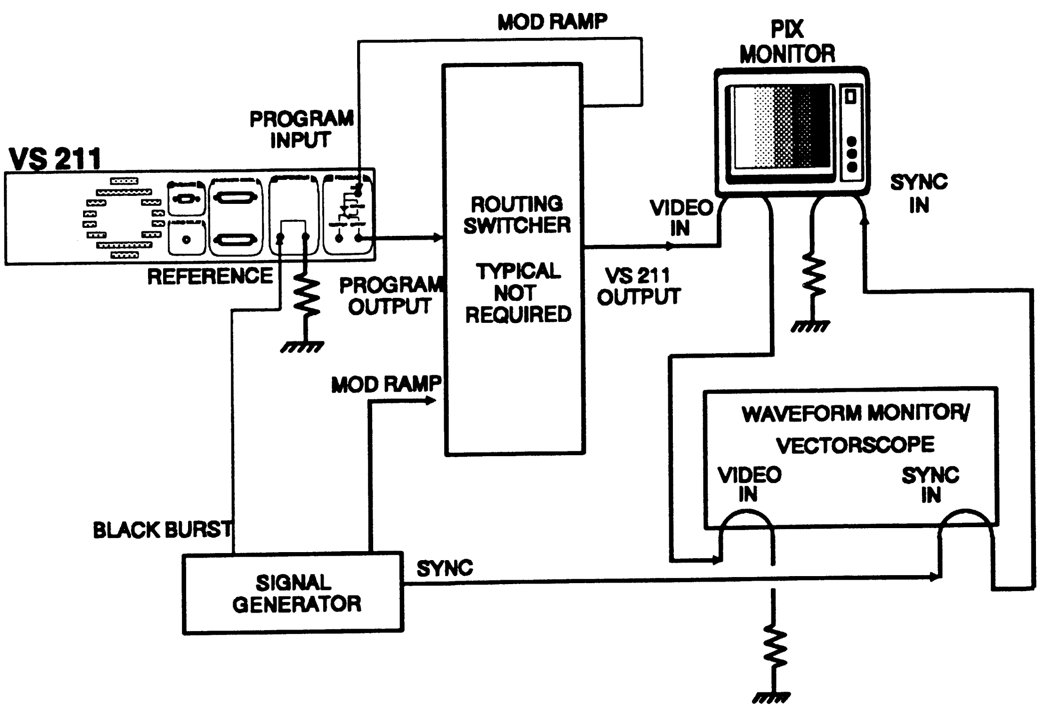


Fig. 8-11.
Equipment setup for the Functional Performance Check of the VS 211.

REPLACEABLE ELECTRICAL PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc., field office or representative.

It is important, when ordering parts, to include the following information in your order. Part number, instrument type and 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 1 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. A23R1234 **component**

A23 **R1234**

Assembly Number → **A23**; **R1234** ← **Circuit Number**

Read: Resistor 1234 of Assembly 23.

Example B. A23A2R1234 **component**

Assembly Number → **A23** **A2** **R1234**

Subassembly Number → **A2**; **R1234** ← **Circuit Number**

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).

Mechanical subparts to the circuit boards are listed in the Electrical Parts List. These mechanical subparts are listed with their associated electrical parts. For example, fuse holder follows fuse.

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

TEKTRONIX PART NO.
(Column 2 of the Electrical Parts List)

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

SERIAL/ASSEMBLY NO.
(Columns 3 and 4 of the Electrical Parts List)

Column 3 indicates the serial or assembly number at which the part was first used. Column 4 indicates the serial or assembly number at which the part was removed. No serial or assembly number entered indicates part is good for all serial numbers.

NAME AND DESCRIPTION
(Column 5 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. The Mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column 5.

MFR. CODE
(Column 6 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 7 of the Electrical Parts List)

Indicates actual manufacturer's part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
00853	SANGAMO WESTON INC COMPONENTS DIV	SANGAMO RD PO BOX 128	PICKENS SC 29671-9716
01121	ALLEN-BRADLEY CO	1201 S 2ND ST	MILWAUKEE WI 53204-2410
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655012	DALLAS TX 75265
02735	RCA CORP SOLID STATE DIVISION		
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
04426	ITW SWITCHES DIV OF ILLINOIS TOOL WORKS INC	6615 W IRVING PARK RD	CHICAGO IL 60634-2410
04618	AMP PRODUCTS CORP AMP SPECIAL INDUSTRIES DIV	400 W SWEDESFORD RD	BERWYN PAG PA 19312-1164
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
05828	GENERAL INSTRUMENT CORP GOVERNMENT SYSTEMS DIV	600 W JOHN ST	HICKSVILLE NY 11802
06665	PRECISION MONOLITHICS INC SUB OF BOURNS INC		
07088	KELVIN ELECTRIC CO	5907 NOBLE AVE	VAN NUYS CA 91411
09353	C AND K COMPONENTS INC	15 RIVERDALE AVE	NEWTON MA 02158-1057
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
09969	DALE ELECTRONICS INC	EAST HIGHWAY 50 P O BOX 180	YANKTON SD 57078
0JR03	ZMAN AND ASSOCIATES	7633 S 180th	KENT WA 98032
11236	CTS CORP BERNE DIV THICK FILM PRODUCTS GROUP	406 PARR ROAD	BERNE IN 46711-9506
14552	MICROSEMI CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704-5948
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054-1516
18324	SIGNETICS CORP MILITARY PRODUCTS DIV	4130 S MARKET COURT	SACRAMENTO CA 95834-1222
19396	ILLINOIS TOOL WORKS INC PAKTRON DIV	1205 MCCONVILLE RD PO BOX 4539	LYNCHBURG VA 24502-4535
20933	KAPPA NETWORKS INC	765 ROOSEVELT AVE	CARTERET NJ 07008
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT ELECTRONICS DEPT	515 FISHING CREEK RD	NEW CUMBERLAND PA 17070-3007
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
24355	ANALOG DEVICES INC	RT 1 INDUSTRIAL PK PO BOX 9106	NORWOOD MA 02062
25088	SIEMENS CORP	186 WOOD AVE S	ISELIN NJ 08830-2704
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834-2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
32436	SYSCON INTERNATIONAL INC	1701 S MAIN ST	SOUTH BEND IN 46613-2211
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507-2114
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537-5268
34361	OMRON ELECTRONICS INC.		SUNNYVALE CA
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769-2963
54937	DEYOUNG MANUFACTURING INC	12920 NE 125TH WAY	KIRKLAND WA 98034-7716
55285	BERGQUIST CO INC THE	5300 EDINA INDUSTRIAL BLVD	MINNEAPOLIS MN 55435-3707
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195-4526
56845	DALE ELECTRONICS INC	2300 RIVERSIDE BLVD PO BOX 74	NORFOLK NE 68701-2242
57668	ROHM CORP	8 WHATNEY PO BOX 19515	IRVINE CA 92713
58361	QUALITY TECHNOLOGIES CORP	3400 HILLVIEW AVE	PALO ALTO CA 94304-1319
59659	REMTEK CORP	46107 LANDING PKY	FREMONT CA 94538-6407
60395	XICOR INC	851 BUCKEYE CT	MILPITAS CA 95035-7408
61441	SARONIX	4010 TRANSPORT ST	PALO ALTO CA 94303-4913
61529	AROMAT CORP	250 SHEFFIELD ST	MOUNTAINSIDE NJ 07092-2303

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
71744	CHICAGO MINIATURE LAMP INC	CHEVY CHASE BUSINESS PARK 1080 JOHNSON DRIVE	BUFFALO GROVE IL 60089
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076-9749
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525-5914
81312	WINCHESTER ELECTRONICS DIVISION OF LITTON SYSTEMS INC	400 PARK RD	WATERTOWN CT 06795-1612
85471	BOYD CORP	13885 RAMOMA AVE	CHINO CA 91710
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703-2417
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
95354	METHODE MANUFACTURING CORP		
D5243	ROEDERSTEIN E SPEZIALFABRIK FUER KONDENSATOREN GMBN	LUDMILLASTRASSE 23-25	8300 LANDSHUT GERMANY
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0515	ERICSSON COMPONENTS INC	403 INTERNATIONAL PKY PO BOX 853904	RICHARDSON TX 75085-3904
TK0858	STAUFFER SUPPLY CO (DIST)		
TK0961	NEC ELECTRONICS USA INC		
TK1066	STAR MICRONICS		
TK1134	TUSONIX INC	2155 N FORBES BLVD	TUCSON AZ 85705
TK1345	ZMAN & ASSOCIATES		
TK1450	TOKYO COSMOS ELECTRIC CO LTD	2-268 SOBUDAI ZAWA	KANAGAWA 228 JAPAN
TK1483	TEKA PRODUCTS		
TK1913	WIMA THE INTER-TECHNICAL GROUP IND	ONE BRIDGE ST PO BOX 23	IRVINGTON NY 10533
TK2058	TDK CORPORATION OF AMERICA	2254 N FIRST ST	SAN JOSE CA 95131
TK2133	SCHAFFNER		
TK2278	COMTEK MANUFACTURING OF OREGON (METALS)		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	671-1275-00			CIRCUIT BD ASSY:ADC	80009	671-1275-00
A2	671-1277-00			CIRCUIT BD ASSY:MEMORY	80009	671-1277-00
A3	671-1272-00			CIRCUIT BD ASSY:MEMORY CONTROLLER	80009	671-1272-00
A4	671-1276-00			CIRCUIT BD ASSY:DAC	80009	671-1276-00
A5	671-1273-00			CIRCUIT BD ASSY:DECODER/PROC AMP	80009	671-1273-00
A6	671-1649-00			CIRCUIT BD ASSY:REMOTE CONTROL	80009	671-1649-00
A7	672-0300-00			CIRCUIT BD ASSY:UPPER AND LOWER I/O WIRED	80009	672-0300-00
A7A1	671-1267-00			CIRCUIT BD ASSY:LOWER I/O	80009	671-1267-00
A7A2	671-1274-00			CIRCUIT BD ASSY:UPPER I/O	80009	671-1274-00
A8	671-1268-00			CIRCUIT BD ASSY:POWER SUPPLY	80009	671-1268-00
A9	671-1635-00			CIRCUIT BD ASSY:FRONT PANEL LED	80009	671-1635-00
A1	671-1275-00			CIRCUIT BD ASSY:ADC	80009	671-1275-00
				ATTACHED PARTS		
	105-0792-00			EJECTOR,CKT BD:PLASTIC	80009	105-0792-00
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
	337-1417-00			SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
	337-3655-00			SHIELD,ELEC:BRASS	80009	337-3655-00
				END ATTACHED PARTS		
A1C1	283-0339-00			CAP,FXD,CER DI:0.22UF,10%,50V	04222	SR305C224KAA
A1C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C4	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A1C5	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A1C6	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	05397	C330C273K1R5CA
A1C7	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	05397	C330C273K1R5CA
A1C8	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A1C9	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	05397	C330C273K1R5CA
A1C10	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A1C11	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	05397	C330C273K1R5CA
A1C12	283-0339-00			CAP,FXD,CER DI:0.22UF,10%,50V	04222	SR305C224KAA
A1C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C14	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A1C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C17	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A1C18	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C21	283-0639-00			CAP,FXD,MICA DI:56PF,1%,500V	80009	283-0639-00
A1C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C23	285-1062-00			CAP,FXD,PLASTIC:0.005UF,1%,200V	19396	502F02PP460
A1C24	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C26	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A1C27	283-0680-00			CAP,FXD,MICA DI:330PF,1%,500V	80009	283-0680-00
A1C28	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A1C29	283-0640-00			CAP,FXD,MICA DI:160PF,1%,500V	80009	283-0640-00
A1C30	283-0668-00			CAP,FXD,MICA DI:184PF,1%,100V	80009	283-0668-00
A1C31	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A1C32	283-0698-00			CAP,FXD,MICA DI:390PF,1%,500V	80009	283-0698-00
A1C34	283-0669-00			CAP,FXD,MICA DI:360PF,1%,500V	80009	283-0669-00
A1C35	283-0728-00			CAP,FXD,MICA DI:120PF,1%,500V	80009	283-0728-00
A1C36	283-0784-00			CAP,FXD,MICA DI:40PF,2%,500V	80009	283-0784-00
A1C39	283-0667-00			CAP,FXD,MICA DI:420PF,1%,500V	80009	283-0667-00
A1C40	283-0775-00			CAP,FXD,MICA DI:1764 PF,1%,500V	80009	283-0775-00
A1C41	283-0770-00			CAP,FXD,MICA DI:300 PF,1%,500V	80009	283-0770-00
A1C43	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	05397	C330C332J1G5CA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1C44	281-0819-00			CAP,FXD,CER DI:33 PF,5%,50V	04222	SA102A330JAA
A1C45	281-0819-00			CAP,FXD,CER DI:33 PF,5%,50V	04222	SA102A330JAA
A1C46	281-0814-00			CAP,FXD,CER DI:100 PF,10%,100V	04222	SA101A101KAA
A1C47	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A1C48	283-0339-00			CAP,FXD,CER DI:0.22UF,10%,50V	04222	SR305C224KAA
A1C49	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C50	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C51	283-0212-00			CAP,FXD,CER DI:2UF,20%,50V	05397	C340C205M5U1CA
A1C52	283-0194-00			CAP,FXD,CER DI:4.7UF,20%,50V	05397	C350C475M5UICA
A1C53	285-1062-00			CAP,FXD,PLASTIC:0.005UF,1%,200V	19396	502F02PP460
A1C54	281-0760-00			CAP,FXD,CER DI:22PF,10%,500V	04222	MA107A220KAA
A1C55	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C56	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C57	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C58	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C59	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C60	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C61	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C62	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C63	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C64	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C65	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C66	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C67	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C68	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A1C69	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A1C70	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A1C71	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A1C72	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C73	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C75	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C76	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C77	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C78	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C79	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C81	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C82	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C83	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C84	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C85	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C86	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C88	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C89	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C90	281-0165-00			CAP,VAR,AIR DI:0.8-10PF,250V	80009	281-0165-00
A1C91	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C92	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A1C93	283-0625-00			CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A1C94	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A1C95	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A1C96	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C97	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C98	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C99	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C100	290-0534-00			CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
A1C101	290-0534-00			CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
A1C102	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C103	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C104	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A1C105	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1C106	283-0779-00			CAP,FXD,MICA DI:27 PF,2%,500V	80009	283-0779-00
A1C107	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A1C108	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C109	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C110	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C111	283-0256-00			CAP,FXD,CER DI:130PF,5%,100V	TK1134	8111A100P3K0131J
A1C112	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A1C113	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	05397	C330C273K1R5CA
A1C114	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C115	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C116	283-0785-00			CAP,FXD,MICA DI:250PF,1%,500V	80009	283-0785-00
A1C117	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A1C118	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C119	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A1C150	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C151	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C152	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C153	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A1C154	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C155	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C156	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C157	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C158	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C159	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C160	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C161	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C162	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C163	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C164	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C165	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A1C166	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C167	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C168	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1CR5	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1CR6	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1CR7	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1CR8	152-0269-01			SEMICOND DVC,DI:VVC,SI,33PF,5%,35V,DO-7	04713	SMV1263-1
A1CR9	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1CR10	152-0141-02			DIODE,SIG:,ULTRA FAST;40V, MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1CR11	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A1DS2	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A1DS3	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A1J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A1J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A1J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A1J4	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A1J5	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1J6	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A1J7	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A1J11	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 5)	80009	131-0608-00
A1J12	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A1J15	131-2866-00			CONN,DIN:PCB,;MALE,RTANG,3 X 32,0.1 CTR,0.2 09 MLG X 0.104 TAIL,30 GOLD;,, *MOUNTING PARTS*	80009	131-2866-00
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	1183-302
A1J17	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131-0608-00
A1L1	108-0184-00			COIL,RF:FIXED,3.35UH	TK1345	108-0184-00
A1L2	108-0184-00			COIL,RF:FIXED,3.35UH	TK1345	108-0184-00
A1L3	108-0184-00			COIL,RF:FIXED,3.35UH	TK1345	108-0184-00
A1L4	108-0184-00			COIL,RF:FIXED,3.35UH	TK1345	108-0184-00
A1L6	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A1L7	114-0351-02			COIL,RF:VAR,2.0-2.2UH,PRESET/SECURED TO 2.0 1UH,+/-1%,POT CORE	80009	114-0351-02
A1L8	114-0453-01			COIL,RF:VAR,1.26-1.50UH,PRESET TO 1.367UH,+ /-1%,Q=190,POT CORE	80009	114-0453-01
A1L9	114-0453-02			COIL,RF:VAR,1.26-1.50UH,PRESET TO 1.453UH,+ /-1%,Q=190,POT CORE	80009	114-0453-02
A1L10	114-0463-00			COIL,RF:VAR 0.90UH - 1.07UH, PRESET/SECURED TO 0.98 UH, +/- 1%Q=160, POT CORE	54937	500-4752
A1L11	114-0410-00			COIL,RF:VARIABLE,0.185-0.95UH	80009	114-0410-00
A1L12	120-1854-00			TRANSFORMER,RF:VAR,2.55UH-2.81UH,POT CORE	54937	500-4732
A1L13	120-1901-00			TRANSFORMER:VAR,1.20-1.36UH,Q=150,RATIO 1:1 ,POT CORE	80009	120-1901-00
A1L15	108-0368-00			COIL,RF:FIXED,9.7UH	TK1345	108-0368-00
A1P1	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A1P2	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P3	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P4	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P5	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P6	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P11	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1P12	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A1Q1	151-0407-00			TRANSISTOR:NPN,SI,TO-39 *ATTACHED PARTS*	80009	151-0407-00
	342-0324-00			INSULATOR,DISK:TRANSISTOR,NYLON *END ATTACHED PARTS*	80009	342-0324-00
A1Q2	151-0406-00			TRANSISTOR:PNP,SI,TO-39 *ATTACHED PARTS*	80009	151-0406-00
	342-0324-00			INSULATOR,DISK:TRANSISTOR,NYLON *END ATTACHED PARTS*	80009	342-0324-00
A1Q7	151-0711-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ, AMPLIFIER;MPSH10,TO-92 BEC	80009	151-0711-00
A1Q8	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A1Q9	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A1Q10	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A1R1	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R2	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R3	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A1R4	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R5	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A1R6	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9	80009	322-3289-07
A1R7	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9	80009	322-3289-07
A1R8	322-3039-00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322-3039-00
A1R9	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R10	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R11	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A1R12	311-2232-00			RES,VAR,NONWW:TRMR,2K OHM,20%,0.5W LINEAR	TK1450	GF06UT 2K
A1R13	311-2232-00			RES,VAR,NONWW:TRMR,2K OHM,20%,0.5W LINEAR	TK1450	GF06UT 2K
A1R14	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R15	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R16	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 499E
A1R17	322-3198-00			RES,FXD,FILM:1.13K OHM,1%,0.2W,TC=T0	80009	322-3198-00
A1R19	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A1R20	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A1R21	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A1R22	322-3205-00			RES,FXD,FILM:1.33K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K33
A1R23	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A1R24	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A1R25	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A1R26	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A1R28	322-3139-00			RES,FXD,FILM:274 OHM,1%,0.2W,TC=T0	80009	322-3139-00
A1R29	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A1R30	322-3098-00			RES,FXD,FILM:102 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 102E
A1R31	322-3112-00			RES,FXD,FILM:143 OHM,1%,0.2W,TC=T0	80009	322-3112-00
A1R32	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2W,TC=T0	80009	322-3135-00
A1R33	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R34	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R35	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R36	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A1R39	322-3314-00			RES,FXD,FILM:18.2K OHM,1%,0.2W,TC=T0	80009	322-3314-00
A1R40	322-3204-00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0	80009	322-3204-00
A1R41	322-3300-02			RES,FXD,FILM:13K OHM,0.5%,0.2W,TC=T2	57668	CRB20 DYE 13K0
A1R42	322-3389-00			RES,FXD,FILM:110K OHM,1%,0.2W,TC=T0	56845	CCF-50-2-1103F
A1R43	322-3400-00			RES,FXD,FILM:143K OHM,1%,0.2W,TC=T0	80009	322-3400-00
A1R44	322-3378-00			RES,FXD,FILM:84.5K OHM,1%,0.2W,TC=T0	91637	CCF50-2F84501F
A1R45	322-3182-00			RES,FXD,FILM:768 OHM,1%,0.2W,TC=T0	91637	CCF50-2F768R0F
A1R46	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A1R47	322-3066-00			RES,FXD,FILM:47.5 OHM,1%,0.2W,TC=T0	09969	CCF502G47R50F
A1R48	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A1R49	322-3163-00			RES,FXD,FILM:487 OHM,1%,0.2W,TC=T0	91637	CCF50-2G487R0F
A1R50	322-3294-00			RES,FXD,FILM:11.3K OHM,1%,0.2W,TC=T0	80009	322-3294-00
A1R51	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A1R52	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A1R53	322-3402-00			RES,FXD,FILM:150K OHM,1%,0.2W,TC=T0	80009	322-3402-00
A1R54	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A1R55	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A1R56	322-3303-00			RES,FXD,FILM:14K OHM,1%,0.2W,TC=T0	80009	322-3303-00
A1R57	322-3233-00			RES,FXD,FILM:2.61K OHM,1%,0.2W,TC=T0	91637	CCF50-2
A1R58	322-3233-00			RES,FXD,FILM:2.61K OHM,1%,0.2W,TC=T0	91637	CCF50-2
A1R59	322-3303-00			RES,FXD,FILM:14K OHM,1%,0.2W,TC=T0	80009	322-3303-00
A1R60	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A1R61	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A1R62	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R63	322-3322-00			RES,FXD,FILM:22.1K OHM,1%,0.2W,TC=T0	80009	322-3322-00
A1R64	322-3322-00			RES,FXD,FILM:22.1K OHM,1%,0.2W,TC=T0	80009	322-3322-00
A1R65	322-3333-00			RES,FXD,FILM:28.7K OHM,1%,0.2W,TC=T0	80009	322-3333-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R66	322-3190-00			RES,FXD,FILM:931 OHM,1%,0.2W,TC=T0	80009	322-3190-00
A1R67	322-3259-00			RES,FXD,FILM:4.87K OHM,1%,0.2W,TC=T0	80009	322-3259-00
A1R68	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A1R69	311-2231-00			RES,VAR,NONWW:TRMR,1K OHM,20%,0.5W LINEARTA PE & REEL	TK1450	GF06UT 1K
A1R70	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A1R74	307-0637-00			RES NTWK,FXD,FI:5,2K OHM,2%,0.125W	01121	206A202
A1R75	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R76	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R77	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R78	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R79	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R80	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R82	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A1R91	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R92	322-3215-00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16900F
A1R93	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=T0	80009	322-3134-00
A1R94	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A1R95	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A1R96	322-3269-00			RES,FXD,FILM:6.19K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 6K19
A1R97	322-3254-00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K32
A1R98	322-3335-00			RES,FXD,FILM:30.1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 30K1
A1R99	322-3356-00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0	80009	322-3356-00
A1R100	322-3356-00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0	80009	322-3356-00
A1R101	322-3143-00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A1R102	322-3230-00			RES,FXD,FILM:2.43K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A1R103	322-3426-00			RES,FXD,FILM:267K OHM,1%,0.2W,TC=T0	91637	CCF50-2F26702F
A1R104	322-3226-00			RES,FXD,FILM:2.21K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K21
A1R105	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R106	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A1R107	322-3250-00			RES,FXD,FILM:3.92K OHM,1%,0.2W,TC=T0	91637	CCF50-2F39200F
A1R108	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=T0	80009	322-3134-00
A1R109	322-3215-00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16900F
A1R110	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A1R111	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100K
A1R112	322-3273-00			RES,FXD,FILM:6.81K OHM,1%,0.2W,TC=T0	80009	322-3273-00
A1R113	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A1R114	322-3389-00			RES,FXD,FILM:110K OHM,1%,0.2W,TC=T0	56845	CCF-50-2-1103F
A1R115	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R116	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R117	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A1R118	311-2232-00			RES,VAR,NONWW:TRMR,2K OHM,20%,0.5W LINEAR	TK1450	GF06UT 2K
A1R119	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A1R120	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A1R121	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A1R122	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R123	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A1R124	322-3300-02			RES,FXD,FILM:13K OHM,0.5%,0.2W,TC=T2	57668	CRB20 DYE 13K0
A1R125	322-3339-00			RES,FXD,FILM:33.2K OHM,1%,0.2W,TC=T0	91637	33.2K OHM
A1R126	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A1R127	322-3294-00			RES,FXD,FILM:11.3K OHM,1%,0.2W,TC=T0	80009	322-3294-00
A1R128	322-3117-00			RES,FXD,FILM:162 OHM,1%,0.2W,TC=T0	80009	322-3117-00
A1R129	322-3141-00			RES,FXD,FILM:287 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 287E
A1R131	322-3210-00			RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A1R132	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R133	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R134	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R135	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R140	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R141	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R142	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R143	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R144	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A1R145	322-3143-00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A1R146	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A1R147	322-3162-00			RES,FXD,FILM:475 OHM,1%,0.2W,TC=T0	80009	322-3162-00
A1R148	322-3152-00			RES,FXD,FILM:374 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 374E
A1R149	322-3068-00			RES,FXD,FILM:49.9 OHM,1%,0.2W,TC=T0	80009	322-3068-00
A1R150	322-3210-00			RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A1R151	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A1R152	322-3265-00			RES,FXD,FILM:5.62K OHM,1%,0.2W,TC=T0	80009	322-3265-00
A1R153	322-3097-00			RES,FXD,FILM:100 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100E
A1R154	322-3469-00			RES,FXD,FILM:750K OHM,1%,0.2W,TC=T0	80009	322-3469-00
A1R155	322-3329-00			RES,FXD,FILM:26.1K OHM.1%,0.2W,TC=T0	57668	CRB20 FXE 26K1
A1R156	322-3339-00			RES,FXD,FILM:33.2K OHM,1%,0.2W,TC=T0	91637	33.2K OHM
A1R157	322-3354-00			RES,FXD,FILM:47.5K OHM,1%,0.2W,TC=T0	80009	322-3354-00
A1R158	322-3261-00			RES,FXD,FILM:5.11K OHM,1%,0.2W,TC=T0	80009	322-3261-00
A1R160	322-3261-00			RES,FXD,FILM:5.11K OHM,1%,0.2W,TC=T0	80009	322-3261-00
A1R161	322-3287-00			RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=T0	80009	322-3287-00
A1R162	322-3354-00			RES,FXD,FILM:47.5K OHM,1%,0.2W,TC=T0	80009	322-3354-00
A1R163	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=T0	80009	322-3134-00
A1R164	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0	80009	322-3232-00
A1R165	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A1R166	311-2205-00			RES,VAR,NONWW:CKT BD,50K OHM,10%,0.5W	80009	311-2205-00
A1R167	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R168	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R169	322-3287-00			RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=T0	80009	322-3287-00
A1R170	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A1R171	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A1R172	322-3287-00			RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=T0	80009	322-3287-00
A1R173	311-2231-00			RES,VAR,NONWW:TRMR,1K OHM,20%,0.5W LINEARTA PE & REEL	TK1450	GF06UT 1K
A1R174	322-3050-00			RES,FXD,FILM:32.4 OHM,1%,0.2W,TC=T0	80009	322-3050-00
A1R175	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A1R177	311-2236-00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5W LINEAR	TK1450	GF06UT 20K
A1R178	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A1R179	322-3044-00			RES,FXD,FILM:28 OHM,1%,0.2W,TC=T0	57668	CRB20FXE9K35
A1R180	322-3044-00			RES,FXD,FILM:28 OHM,1%,0.2W,TC=T0	57668	CRB20FXE9K35
A1R181	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R182	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1R183	322-3044-00			RES,FXD,FILM:28 OHM,1%,0.2W,TC=T0	57668	CRB20FXE9K35
A1R184	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A1S1	260-2280-00			SW,PUSH BUTTON:MINIATURE MOMENTARY,SPST,NOR MALLY OPEN	80009	260-2280-00
A1S2	260-2535-00			SWITCH,ROTORY:HEXADECIMAL,16 POS,0.380 SQ	80009	260-2535-00
A1TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP10	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP11	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP12	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP13	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1TP14	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A1U1	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A1U2	156-1437-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIV E,5V,1.0%,25PPM,SERIES;MC1404AU5,DIP08.3	80009	156-1437-00
A1U3	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A1U4	156-6015-00			IC,CONVERTER:ECL,A/D;10 BIT,FLASH,75MHZ;906 0,LCC68	80009	156-6015-00
				MOUNTING PARTS		
	136-0848-00			SKT,LCCC:PCB,JEDEC A,B,D;68 POS,0.275 H X 0 .110 TAIL,W/O COVER;,,	80009	136-0848-00
	214-3789-00			HEAT SINK,ELEC:CKT,BD,68 PIN	00779	55358-3
				END MOUNTING PARTS		
A1U5	156-4137-00			IC,LINEAR:	80009	156-4137-00
A1U6	156-3599-00			MICROCKT,LINEAR:BIPOLAR,AMPLIFIER,CURRENT	80009	156-3599-00
A1U7	156-1312-00			MICROCKT,LINEAR:SAMPLE/HOLD AMPLIFIER	06665	SMP11-004Y
A1U8	156-1226-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLL ECTOR,80NS;LM319N,DIP14.3	18324	LM319F
A1U9	156-0853-02			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 853-00,DO NOT USE;LM358N,DIP08.3	80009	156-0853-02
A1U10	156-0411-00			IC,LINEAR:BIPOLAR,COMPARATOR;QUAD,SINGLE SU PPLY,300NS;LM339N,DIP14.3	80009	156-0411-00
A1U12	156-1850-00			IC,MISC:CMOS,ANALOG SWITCH;QUAD;DG211,DIP16 .3	17856	SDG21107
A1U13	156-1850-00			IC,MISC:CMOS,ANALOG SWITCH;QUAD;DG211,DIP16 .3	17856	SDG21107
A1U14	156-0854-01			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 854-00,DO NOT USE;LM308AN,DIP08.3	27014	LM308AJ-8A+
A1U15	156-0854-01			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 854-00,DO NOT USE;LM308AN,DIP08.3	27014	LM308AJ-8A+
A1U16	156-0733-02			IC,DIGITAL:LSTTL,MULTIVIBRATOR;DUPLICATE OF 156-0733-00;74LS221,DIP16.3,TUBE	80009	156-0733-02
A1U17	156-0742-00			IC,LINEAR:BIPOLAR,OP-AMP;HIGH SLEW RATE;LM3 18N,DIP08.3	01295	LM318P
A1U18	156-3050-00			IC,MISC:	80009	156-3050-00
A1U19	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W /CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A1U20	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W /CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A1U21	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W /CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A1U22	156-1754-02			IC,DIGITAL:ALSTTL,BUFFER/DRIVER;OCTAL NONIN V, 3-STATE;74ALS244-1,DIP20.3,TUBE	80009	156-1754-02
A1U23	156-3715-00			IC,PROCESSOR:CMOS,PERIPHERAL;COUNTER/TIMER CIRCUIT,8MHZ;84C30,DIP2 8.6	80009	156-3715-00
				MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A1U24	156-3728-00			MICROCKT,DGTL:CMOS,MICROPROCESSOR,8MHZ	80009	156-3728-00
				MOUNTING PARTS		
	136-0757-00			SKT,PL-IN ELEK:MICROCIRCUIT,40 DIP	09922	DILB40P-108
				END MOUNTING PARTS		
A1U25	160-7642-00			MICROCKT,DGTL:PROGRAMMED,156-4004-00	80009	160-7642-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A1U26	160-7643-00			MICROCKT,DGTL:PROGRAMMED,156-3381-00	80009	160-7643-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A1U27	156-1712-00			MICROCKT,DGTL:ECL,HEX D MA-SLAVE,FF,SCRN	04713	MC10H176 P
A1U28	156-1712-00			MICROCKT,DGTL:ECL,HEX D MA-SLAVE,FF,SCRN	04713	MC10H176 P
A1U29	156-0632-00			IC,DIGITAL:ECL,MUX/ENCODER;QUAD 2-INPUT MUX /LATCH;10173,DIP16.3,TUBE,CER PACK	80009	156-0632-00
A1U30	156-0632-00			IC,DIGITAL:ECL,MUX/ENCODER;QUAD 2-INPUT MUX /LATCH;10173,DIP16.3,TUBE,CER PACK	80009	156-0632-00
A1U31	156-0632-00			IC,DIGITAL:ECL,MUX/ENCODER;QUAD 2-INPUT MUX /LATCH;10173,DIP16.3,TUBE,CER PACK	80009	156-0632-00
A1U32	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE,SCRN	80009	156-0368-03
A1U33	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A1U34	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A1U35	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A1U37	156-6117-00			IC,ASIC:CMOS,CUSTOM;Z80 GENLOCK IC,ADG236;V F4697,PLCC84	80009	156-6117-00
				MOUNTING PARTS		
	136-0965-00			SKT,PL-IN ELEK:PLCC,PCB,84,0.360 H X 0.125 TAIL,TIN	80009	136-0965-00
				END MOUNTING PARTS		
A1U39	156-1661-00			IC,DIGITAL:LSTTL,TRANSCEIVER;OCTAL W/MUX RE GISTER, NONINV, 3-STATE;74LS646,DIP24.3,TUB E	80009	156-1661-00
A1U46	156-2493-00			IC,CONVERTER:	80009	156-2493-00
A1U47	156-1850-00			IC,MISC:CMOS,ANALOG SWITCH;QUAD;DG211,DIP16 .3	17856	SDG21107
A1U48	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,D IP16.3,TUBE,SCRN	80009	156-0860-02
A1U49	156-1437-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIV E,5V,1.0%,25PPM,SERIES;MC1404AU5,DIP08.3	80009	156-1437-00
A1U50	156-1529-00			MICROCKT,LINEAR:3-TERM ADJ OUT POS V RGLTR	80009	156-1529-00
A1U51	156-2223-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIV E,ADJUSTABLE,100MA,4%;LM337LZ,TO-92	80009	156-2223-00
A1U52	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,D IP16.3,TUBE,SCRN	80009	156-0860-02
A1U53	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A1U54	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A1U55	156-0746-01			IC,DIGITAL:ECL,MUX;QUAD 2-INPUT MUX;10158,D IP16.3,TUBE	80009	156-0746-01

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1U56	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A1U58	156-1457-00			IC,MISC:BIPOLAR,MISC;TRUE RMS TO DC CONVERT ER;AD536AJH,TO-100	24355	AD41127
A1U59	156-4142-00			IC,MISC:,;LED CONTROLLED RESISTOR,150-500 O HM;VTL5C4/2	80009	156-4142-00
A1U60	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A1U61	156-3599-00			MICROCKT,LINEAR:BIPOLAR,AMPLIFIER,CURRENT	80009	156-3599-00
A1U62	160-7638-00			MICROCKT,DGTL:PROGRAMMED,156-3211-00	80009	160-7638-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A1U63	156-4140-00			IC,MEMORY:CMOS,EEPROM;2K X 8,70NS;28HC16,DI P24.3	80009	156-4140-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A1U64	160-7639-00			MICROCKT,DGTL:PROGRAMMED,156-3825-01	80009	160-7639-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A1U65	160-7640-00			MICROCKT,DGTL:PROGRAMMED,156-3825-01	80009	160-7640-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A1U66	155-0144-01			MICROCKT,LINEAR:16 LEAD DUAL IN INLINE TV	80009	155-0144-01
				MOUNTING PARTS		
	136-0729-00			SKT,PL-IN ELEK:DIP,PCB,16 CONTACT,2 X 8,0.3 X 0.1 CTR,TIN,0.175 H X 0.130 TAIL,STR	09922	DILB16P-108T
				END MOUNTING PARTS		
A1U67	160-7641-00			MICROCKT,DGTL:PROGRAMMED,156-3825-01	80009	160-7641-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A1U68	156-1529-00			MICROCKT,LINEAR:3-TERM ADJ OUT POS V RGLTR	80009	156-1529-00
A1U69	156-3436-00			IC,LINEAR:BIPOLAR,COMPARATOR;TTL OUT,14NS,L ATCH;LT1016CN8,DIP08.3	80009	156-3436-00
A1VR1	152-0227-00			DIODE,ZENER:,;6.2V,5%,0.4W;1N753A FMLY,DO-3 5 OR 7,TR	80009	152-0227-00
A1VR2	152-0227-00			DIODE,ZENER:,;6.2V,5%,0.4W;1N753A FMLY,DO-3 5 OR 7,TR	80009	152-0227-00
A1W1	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A1W2	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A1W3	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A1Y1	158-0391-00			OSC,XTAL CLOCK:8.0 MHZ,+/-0.01% HCMOS,CL 15 PF,4 PIN 14 PIN COMPATIBLE PKG	80009	158-0391-00
A1Y2	158-0384-00			XTAL UNIT,QTZ:17.734475 MHZ,+/-0.0005%,PARA LLEL,CL=32PF,HC-43/U PKG	61441	158-0384-00
				MOUNTING PARTS		
A1Y2	253-0176-00			TAPE,PRESS SENS:VINYL FOAM,0.5 X 0.062,	85471	ORDER BY DESCR
				END MOUNTING PARTS		
A2	671-1277-00			CIRCUIT BD ASSY:MEMORY	80009	671-1277-00
				ATTACHED PARTS		
	105-0792-00			EJECTOR,CKT BD:PLASTIC	80009	105-0792-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
				END ATTACHED PARTS		
A2C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C4	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C6	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C8	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C9	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C12	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C13	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C14	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C21	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C36	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C37	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C38	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C39	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C40	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C41	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C43	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C44	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C45	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C46	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C47	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C48	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C49	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C50	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C51	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2C52	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2C53	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2C54	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2C55	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2C62	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C63	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C64	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C65	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C66	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C67	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C68	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C69	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C70	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C71	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C72	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2C73	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C74	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C75	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C76	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C77	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C78	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C79	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C80	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C81	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C82	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C83	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C84	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C85	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C86	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C87	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C88	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C89	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C90	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C91	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C92	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C93	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C94	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C95	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C96	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C97	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C98	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C99	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C100	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C101	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C102	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C103	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C104	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C105	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2C106	281-0767-00			CAP,FXD,CER DI:330PF,20%,100V	04222	SA102C331MAA
A2CR1	152-0322-00			SEMICOND DVC,DI:SCHOTTKY,SI,15V,1.2PF,DO-35	TK0961	1SS97(2)T
A2CR2	152-0322-00			SEMICOND DVC,DI:SCHOTTKY,SI,15V,1.2PF,DO-35	TK0961	1SS97(2)T
A2DL1	119-1446-00			DELAY LINE,ELEC:25NS,TAPPED,8 PIN SPCL PKG	20933	00T167
A2J1	131-2866-00			CONN,DIN:PCB,;MALE,RTANG,3 X 32,0.1 CTR,0.2 09 MLG X 0.104 TAIL,30 GOLD;,,	80009	131-2866-00
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2)	TK0435	1183-302
				END MOUNTING PARTS		
A2J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131-0608-00
A2J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131-0608-00
A2J4	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A2J5	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A2J6	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A2J7	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A2R8	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A2R9	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A2R10	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R11	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R12	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2R13	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R14	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R15	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R16	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R17	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R18	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R19	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP9	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP10	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP11	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP12	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2U1	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U2	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U3	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U4	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U5	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U6	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U7	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U8	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U9	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U16	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U17	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U18	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U23	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U24	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U25	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U26	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U27	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U28	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U29	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U30	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2U35	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U36	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U37	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U38	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U39	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U40	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U41	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U42	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U43	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U44	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U45	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U46	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U47	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U48	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U49	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U50	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U51	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U52	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U53	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U54	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U55	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U56	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U57	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U58	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U59	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U60	156-3546-00			MICROCKT,DGTL:CMOS,262144 X 4 DRAM	80009	156-3546-00
A2U61	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U62	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U63	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U64	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U65	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U66	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U67	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U68	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2U69	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U70	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U71	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U72	156-2349-00			IC,DIGITAL:HCMOS,REGISTER;8-BIT SIPO, LATCHED 3-STATE;74HC595,DIP16.3,TUBE	80009	156-2349-00
A2U73	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U74	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U75	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U76	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U77	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U78	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U79	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U80	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U81	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U82	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U83	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U84	156-4134-00			IC,DIGITAL:FTTL,REGISTER;8-BIT SHIFT REGISTER WITH INPUT LATCHES;74AHCT597,DIP16.3,TUBE	80009	156-4134-00
A2U85	160-8367-00			IC,DIGITAL:PROGRAMMED 156-3923-00	80009	160-8367-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A2U86	156-4141-00			IC,DIGITAL:BICMOS,DRIVER;10 BIT BUS/MOS DRIVER,3-STATE;74BCT2827,DIP24.3,TUBE	80009	156-4141-00
A2U87	156-4141-00			IC,DIGITAL:BICMOS,DRIVER;10 BIT BUS/MOS DRIVER,3-STATE;74BCT2827,DIP24.3,TUBE	80009	156-4141-00
A2U88	156-4141-00			IC,DIGITAL:BICMOS,DRIVER;10 BIT BUS/MOS DRIVER,3-STATE;74BCT2827,DIP24.3,TUBE	80009	156-4141-00
A2U90	156-4091-00			IC,DIGITAL:ALSTTL,LINE DRIVER;OCTAL MOS DRIVER,3-STATE;74ALS2541,DIP20.3	80009	156-4091-00
A2U91	156-4091-00			IC,DIGITAL:ALSTTL,LINE DRIVER;OCTAL MOS DRIVER,3-STATE;74ALS2541,DIP20.3	80009	156-4091-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2U92	156-4091-00			IC,DIGITAL:ALSTTL,LINE DRIVER;OCTAL MOS DRI VER,3-STATE;74ALS2541,DIP20.3	80009	156-4091-00
A2U93	160-8366-00			IC,DIGITAL:PROGRAMMED 156-3906-00	80009	160-8366-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A2U94	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A2U101	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A2U103	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A2U106	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A2U107	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A2U108	156-3716-00			IC,DIGITAL:ACTCMOS,BUFFER;NONINV, OCTAL;74A CT541,DIP20.3,TUBE	80009	156-3716-00
A2U109	156-3716-00			IC,DIGITAL:ACTCMOS,BUFFER;NONINV, OCTAL;74A CT541,DIP20.3,TUBE	80009	156-3716-00
A2U111	156-4141-00			IC,DIGITAL:BICMOS,DRIVER;10 BIT BUS/MOS DRI VER,3-STATE;74BCT2827,DIP24.3,TUBE	80009	156-4141-00
A3	671-1272-00			CIRCUIT BD ASSY:MEMORY CONTROLLER	80009	671-1272-00
				ATTACHED PARTS		
	105-0792-00			EJECTOR,CKT BD:PLASTIC	80009	105-0792-00
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
				END ATTACHED PARTS		
A3C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C4	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C6	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C8	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C9	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C12	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C14	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C18	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C21	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C23	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C24	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C28	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C36	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C37	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C38	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C39	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C40	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C41	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C43	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C44	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C45	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C46	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C47	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C48	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C49	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C50	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C51	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C52	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C53	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C54	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C55	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C56	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C57	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C58	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C59	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C60	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C61	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C62	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C63	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C64	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C65	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C66	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C67	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C68	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C69	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C70	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C71	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C72	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C73	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A3C74	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A3C75	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A3C76	283-0190-00			CAP,FXD,CER DI:0.47UF,5%,50V	04222	SR305C474JAA
A3C77	281-0814-00			CAP,FXD,CER DI:100 PF,10%,100V	04222	SA101A101KAA
A3CR1	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A3DS1	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A3DS2	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A3J1	131-2866-00			CONN,DIN:PCB,;MALE,RTANG,3 X 32,0.1 CTR,0.2 09 MLG X 0.104 TAIL,30 GOLD;,,	80009	131-2866-00
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2)	TK0435	1183-302
				END MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3J4	131-3323-00			CONN,HDR:	22526	66506-025
A3J5	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A3J9	131-2919-00			CONN,HDR:PCB,;MALE,RTANG,1 X 4,0.1 CTR,0.318 MLG X 0.110 TAIL,30 GOLD,0.035 DIA PCB;,,	80009	131-2919-00
A3P5	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A3R1	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A3R2	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=T0	91637	CCF50-1-G33200F
A3R9	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A3R10	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A3R11	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=T0	91637	CCF50-1-G33200F
A3R12	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=T0	91637	CCF50-1-G33200F
A3R13	307-0637-00			RES NTWK,FXD,FI:5,2K OHM,2%,0.125W	01121	206A202
A3R14	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A3R15	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A3R16	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=T0	91637	CCF50-1-G33200F
A3R17	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A3R18	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=T0	91637	CCF50-1-G33200F
A3R19	322-3377-00			RES,FXD,FILM:82.5K OHM,1%,0.2W,TC=T0	91637	CCF50-2F82501F
A3R20	322-3469-00			RES,FXD,FILM:750K OHM,1%,0.2W,TC=T0	80009	322-3469-00
A3R23	322-3139-00			RES,FXD,FILM:274 OHM,1%,0.2W,TC=T0	80009	322-3139-00
A3R24	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A3R33	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A3R34	322-3050-00			RES,FXD,FILM:32.4 OHM,1%,0.2W,TC=T0	80009	322-3050-00
A3R35	307-1430-00			RES NTWK,FXD,FI:(8)51 OHM,2%,0.12W,DIP16	80009	307-1430-00
A3R36	322-3050-00			RES,FXD,FILM:32.4 OHM,1%,0.2W,TC=T0	80009	322-3050-00
A3S1	260-2280-00			SW,PUSH BUTTON:MINIATURE MOMENTARY,SPST,NORMALLY OPEN	80009	260-2280-00
A3S2	260-2535-00			SWITCH,ROTORY:HEXADECIMAL,16 POS,0.380 SQ	80009	260-2535-00
A3S3	260-2130-00			SWITCH,TOGGLE:SPDT,100MA,5VDC,ON-NONE-ON	09353	T101-A
A3TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP9	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP10	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP11	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP12	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3U1	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U2	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U3	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U4	160-8373-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8373-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U5	160-8371-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8371-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U6	156-3060-00			IC,DIGITAL:ACMOS,FLIP FLOP;DUAL D-TYPE;74AC 74,DIP14.3,TUBE	27014	74AC74PC
A3U7	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4
A3U8	160-8376-00			IC,DIGITAL:PROGRAMMED 156-3211-00	80009	160-8376-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U9	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4
A3U10	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4
A3U11	156-4090-00			IC,DIGITAL:ACTCMOS,MUX/ENCODER;DUAL 4-TO-1, MUX;74ACT153,DIP16.3,TUBE	80009	156-4090-00
A3U12	156-4090-00			IC,DIGITAL:ACTCMOS,MUX/ENCODER;DUAL 4-TO-1, MUX;74ACT153,DIP16.3,TUBE	80009	156-4090-00
A3U13	156-4090-00			IC,DIGITAL:ACTCMOS,MUX/ENCODER;DUAL 4-TO-1, MUX;74ACT153,DIP16.3,TUBE	80009	156-4090-00
A3U14	156-4090-00			IC,DIGITAL:ACTCMOS,MUX/ENCODER;DUAL 4-TO-1, MUX;74ACT153,DIP16.3,TUBE	80009	156-4090-00
A3U15	156-4090-00			IC,DIGITAL:ACTCMOS,MUX/ENCODER;DUAL 4-TO-1, MUX;74ACT153,DIP16.3,TUBE	80009	156-4090-00
A3U17	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U18	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U19	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U20	160-8374-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8374-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U21	160-8372-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8372-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U22	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4
A3U23	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U24	156-2389-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8-BIT UP/DOW N, ASYNCH CLEAR;74AS867,DIP24.3	01295	SN74AS867NT3/JT4
A3U25	160-8376-00			IC,DIGITAL:PROGRAMMED 156-3211-00 *MOUNTING PARTS*	80009	160-8376-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A3U26	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U27	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U28	160-8365-00			IC,DIGITAL:PROGRAMMED 156-3211-00 *MOUNTING PARTS*	80009	160-8365-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A3U29	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U30	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U31	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U32	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U33	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U34	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U35	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U36	156-0724-02			IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-072 4-00;74LS05,DIP14.3	80009	156-0724-02
A3U37	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A3U38	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A3U39	156-4141-00			IC,DIGITAL:BICMOS,DRIVER;10 BIT BUS/MOS DRI VER,3-STATE;74BCT2827,DIP24.3,TUBE	80009	156-4141-00
A3U41	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A3U43	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U44	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U45	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A3U47	160-8364-00			IC,DIGITAL:PROGRAMMED 156-3211-00 *MOUNTING PARTS*	80009	160-8364-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A3U48	156-2238-00			IC,DIGITAL:ALSTTL,COMPARATOR;8-BIT IDENTITY , /(P=Q);74ALS521,DIP20.3,TUBE	80009	156-2238-00
A3U50	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U51	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U52	156-2382-00			IC,DIGITAL:ASTTL,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74AS374,DIP20.3,TUBE	01295	SN74AS374 N/J
A3U53	156-2382-00			IC,DIGITAL:ASTTL,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74AS374,DIP20.3,TUBE	01295	SN74AS374 N/J
A3U54	160-8379-00			IC,DIGITAL:PROGRAMMED 156-3907-00 *MOUNTING PARTS*	80009	160-8379-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U55	160-8380-00			IC,DIGITAL:PROGRAMMED 156-3907-00	80009	160-8380-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U56	160-8370-00			IC,DIGITAL:PROGRAMMED 156-1804-00	80009	160-8370-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A3U57	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STAT E;74F821,DIP24.3,TUBE	80009	156-4113-00
A3U58	160-8369-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8369-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A3U59	156-6234-00			IC,PROCESSOR:CMOS,PERIPHERAL;PORT REPLACEME NT UNIT;68HC24,PLCC44	80009	156-6234-00
				MOUNTING PARTS		
	136-1047-00			SOCKET,PLCC::PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN;,,	04618	821575-1
				END MOUNTING PARTS		
A3U60	156-6239-00			IC,PROCESSOR:CMOS,MICROCOMPUTER;8-BIT,2MHZ, EEROM,ROMLESS,RAM,TIMER,A/D;68HC11E1,PLCC52 ,TUBE	80009	156-6239-00
				MOUNTING PARTS		
	136-0959-00			SKT,PL-IN ELEK:PLCC,52,PCB,0.361 H X 0.147 TAIL,TIN	53387	252-6233-00-3877
				END MOUNTING PARTS		
A3U61	156-3050-00			IC,MISC:	80009	156-3050-00
A3U62	156-3351-00			IC,DIGITAL:ACMOS,BUFFER;OCTAL,BUFFER/DRIVER , 3-STATE,74AC244,DIP20.3,TUBE	02735	74AC244E
A3U63	160-8363-00			IC,DIGITAL:PROGRAMMED 156-3503-00	80009	160-8363-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A3U64	156-3934-00			IC,DIGITAL:FTTL,DEMUX;4-TO-16 DECODER;74F15 4,DIP24.3,TUBE	80009	156-3934-00
A3U65	160-8378-00			IC,DIGITAL:PROGRAMMED 156-3211-00	80009	160-8378-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U66	156-1921-00			IC,DIGITAL:HCTCMOS,TRANSCEIVER;OCTAL, 3-STA TE;74HCT245,DIP20.3,TUBE	18324	74HCT245N
A3U67	156-1661-00			IC,DIGITAL:LSTTL,TRANSCEIVER;OCTAL W/MUX RE GISTER, NONINV, 3-STATE;74LS646,DIP24.3,TUB E	80009	156-1661-00
A3U68	160-8375-00			IC,DIGITAL:PROGRAMMED 156-3211-00	80009	160-8375-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U69	156-3881-00			IC,DIGITAL:ACTCMOS,FLIP FLOP;OCTAL D-TYPE, 3-STATE;74ACT574,DIP20.3,TUBE	80009	156-3881-00
A3U70	156-2356-00			IC,DIGITAL:HCTCMOS,LATCH;OCTAL D-TYPE TRANS PARENT,3-STATE;	80009	156-2356-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U71	156-3934-00			IC,DIGITAL:FTTL,DEMUX;4-TO-16 DECODER;74F15 4,DIP24.3,TUBE	80009	156-3934-00
A3U72	156-3060-00			IC,DIGITAL:ACMOS,FLIP FLOP;DUAL D-TYPE;74AC 74,DIP14.3,TUBE	27014	74AC74PC
A3U73	156-1408-00			IC,MISC:CMOS,TIMER;;ICM7555IPA,DIP08.3	80009	156-1408-00
A3U74	156-3060-00			IC,DIGITAL:ACMOS,FLIP FLOP;DUAL D-TYPE;74AC 74,DIP14.3,TUBE	27014	74AC74PC
A3Y1	158-0391-00			OSC,XTAL CLOCK:8.0 MHZ,+/-0.01% HCMOS,CL 15 PF,4 PIN 14 PIN COMPATIBLE PKG	80009	158-0391-00
A4	671-1276-00			CIRCUIT BD ASSY:DAC *ATTACHED PARTS*	80009	671-1276-00
	105-0792-00			EJECTOR,CKT BD:PLASTIC	80009	105-0792-00
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
	337-0896-00			PLATE,ELEC SHLD:B SWEEP CKT BD	TK2278	ORDER BY DESCR
	337-3655-00			SHIELD,ELEC:BRASS *END ATTACHED PARTS*	80009	337-3655-00
A4C2	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C6	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C8	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C9	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C12	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C14	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C17	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C18	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C20	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C21	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C23	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C24	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C25	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A4C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C28	283-0625-00			CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A4C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C34	283-0772-00			CAP,FXD,MICA DI:497 PF,1%,500V	80009	283-0772-00
A4C35	283-0647-00			CAP,FXD,MICA DI:70PF,1%,100V	80009	283-0647-00
A4C36	283-0594-00			CAP,FXD,MICA DI:0.001UF,1%,100V	80009	283-0594-00
A4C37	283-0190-00			CAP,FXD,CER DI:0.47UF,5%,50V	04222	SR305C474JAA
A4C38	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A4C39	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A4C40	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C41	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C43	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A4C44	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4C45	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A4C46	281-0165-00			CAP,VAR,AIR DI:0.8-10PF,250V	80009	281-0165-00
A4C47	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A4C48	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A4C49	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C50	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C51	283-0625-00			CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A4C52	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A4C53	283-0779-00			CAP,FXD,MICA DI:27 PF,2%,500V	80009	283-0779-00
A4C54	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C55	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A4C56	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C57	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C58	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C59	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C60	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A4C61	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A4C62	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C67	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A4C68	283-0640-00			CAP,FXD,MICA DI:160PF,1%,500V	80009	283-0640-00
A4C69	283-0646-00			CAP,FXD,MICA DI:170PF,1%,100V	80009	283-0646-00
A4C70	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A4C71	283-0698-00			CAP,FXD,MICA DI:390PF,1%,500V	80009	283-0698-00
A4C72	283-0667-00			CAP,FXD,MICA DI:420PF,1%,500V	80009	283-0667-00
A4C73	283-0775-00			CAP,FXD,MICA DI:1764 PF,1%,500V	80009	283-0775-00
A4C74	283-0770-00			CAP,FXD,MICA DI:300 PF,1%,500V	80009	283-0770-00
A4C75	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A4C77	283-0728-00			CAP,FXD,MICA DI:120PF,1%,500V	80009	283-0728-00
A4C78	283-0784-00			CAP,FXD,MICA DI:40PF,2%,500V	80009	283-0784-00
A4C79	283-0669-00			CAP,FXD,MICA DI:360PF,1%,500V	80009	283-0669-00
A4C80	283-0680-00			CAP,FXD,MICA DI:330PF,1%,500V	80009	283-0680-00
A4C81	283-0223-00			CAP,FXD,CER DI:3PF,+/-5PF,50V	TK1134	835XXXC0J0309D
A4C82	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C83	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C84	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C85	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A4C86	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C87	281-0153-00			CAP,VAR,AIR DI:1.7-10PF,250V	80009	281-0153-00
A4C96	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C97	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C98	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C99	283-0663-00			CAP,FXD,MICA DI:16.8PF,+/0.5PF,500V	80009	283-0663-00
A4C100	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C101	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C102	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C103	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C104	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C105	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C106	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C107	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C108	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C109	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C110	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C111	283-0635-00			CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A4C112	283-0635-00			CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A4C113	283-0663-00			CAP,FXD,MICA DI:16.8PF,+/0.5PF,500V	80009	283-0663-00
A4C114	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C115	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C116	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4C118	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C119	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C120	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C121	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C122	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C123	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C124	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C125	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C126	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C127	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C128	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C129	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C130	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C131	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C132	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C133	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C134	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C135	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4C136	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A4CR1	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR2	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR3	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR4	152-0269-01			SEMICOND DVC,DI:VVC,SI,33PF,5%,35V,DO-7	04713	SMV1263-1
A4CR6	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR7	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR8	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR9	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR10	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4CR11	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A4DS1	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A4DS2	150-1255-00			DIODE,OPTO:,LED;ARRAY,RED,635,10MA,4 LED,90 DEG;PCL2004-BR5V	80009	150-1255-00
A4J1	131-3323-00			CONN,HDR:	22526	66506-025
A4J2	131-3323-00			CONN,HDR:	22526	66506-025
A4J3	131-2866-00			CONN,DIN:PCB,;MALE,RTANG,3 X 32,0.1 CTR,0.2 09 MLG X 0.104 TAIL,30 GOLD;,,	80009	131-2866-00
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2)	TK0435	1183-302
				END MOUNTING PARTS		
A4J5	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A4J6	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A4J7	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 5)	80009	131-0608-00
A4J10	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4J11	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A4J12	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A4J13	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A4L1	108-0103-01			COIL,RF:FIXED,2.5UH,2%	80009	108-0103-01
A4L2	108-1212-00			COIL,RF:FIXED,9UH,2%	TK1345	108-1212-00
A4L3	114-0351-02			COIL,RF:VAR,2.0-2.2UH,PRESET/SECURED TO 2.0 1UH,+/-1%,POT CORE	80009	114-0351-02
A4L4	114-0453-01			COIL,RF:VAR,1.26-1.50UH,PRESET TO 1.367UH,+ /-1%,Q=190,POT CORE	80009	114-0453-01
A4L5	120-1854-00			TRANSFORMER,RF:VAR,2.55UH-2.81UH,POT CORE	54937	500-4732
A4L6	120-1901-00			TRANSFORMER:VAR,1.20-1.36UH,Q=150,RATIO 1:1 ,POT CORE	80009	120-1901-00
A4L7	114-0453-02			COIL,RF:VAR,1.26-1.50UH,PRESET TO 1.453UH,+ /-1%,Q=190,POT CORE	80009	114-0453-02
A4L10	114-0463-00			COIL,RF:VAR 0.90UH - 1.07UH, PRESET/SECURED TO 0.98 UH, +/- 1%Q=160, POT CORE	54937	500-4752
A4L11	114-0410-00			COIL,RF:VARIABLE,0.185-0.95UH	80009	114-0410-00
A4L12	108-1212-00			COIL,RF:FIXED,9UH,2%	TK1345	108-1212-00
A4L14	108-0734-00			COIL,RF:FIXED,163NH	TK1345	108-0734-00
A4L15	108-1263-00			COIL,RF:FXD,10UH, 10%,Q=70,SRF 27 MHZ,DCR 0 .043 OHM,I MAX 2.1ARADIAL LEAD	80009	108-1263-00
A4P5	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P6	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P7	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P10	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P11	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P12	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P13	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4Q2	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q3	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q4	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q5	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q6	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q7	151-0711-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ, AMPLIFIER;MPSH10,TO-92 BEC	80009	151-0711-00
A4Q8	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A4Q9	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A4Q10	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A4Q11	151-0103-02			TRANSISTOR,SIG:BIPOLAR,NPN;DUPLICATE OF 151 -0103-00,DO NOT USE;2N2219A,TO-39	80009	151-0103-02
A4Q12	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4Q13	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A4R2	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A4R3	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A4R4	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A4R5	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9	80009	322-3222-07
A4R6	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9	80009	322-3222-07

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4R7	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9	80009	322-3222-07
A4R8	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R9	322-3044-00			RES,FXD,FILM:28 OHM,1%,0.2W,TC=T0	57668	CRB20FXE9K35
A4R10	322-3044-00			RES,FXD,FILM:28 OHM,1%,0.2W,TC=T0	57668	CRB20FXE9K35
A4R11	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R12	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A4R13	322-3237-00			RES,FXD,FILM:2.87K OHM,1%,0.2W,TC=T0	80009	322-3237-00
A4R14	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R15	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R16	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A4R17	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A4R18	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A4R19	322-3201-00			RES,FXD,FILM:1.21K OHM,1%,0.2W,TC=T0	80009	322-3201-00
A4R20	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 499E
A4R21	322-3180-00			RES,FXD,FILM:732 OHM,1%,0.2W,TC=T0	91637	CCF50-2F732R0F
A4R22	322-3145-00			RES,FXD,FILM:316 OHM,1%,0.2W,TC=T0	80009	322-3145-00
A4R23	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A4R24	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R25	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A4R26	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A4R27	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A4R28	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R29	322-3218-00			RES,FXD,FILM:1.82K OHM,1%,0.2W,TC=T0	80009	322-3218-00
A4R31	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A4R32	322-3260-00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A4R33	322-3210-00			RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A4R38	307-0541-00			RES NTWK,FXD,FI:(7)1K OHM,10%,1W	01121	108A102
A4R39	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A4R42	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A4R43	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A4R44	322-3226-00			RES,FXD,FILM:2.21K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K21
A4R45	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A4R46	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R49	322-3250-00			RES,FXD,FILM:3.92K OHM,1%,0.2W,TC=T0	91637	CCF50-2F39200F
A4R50	322-3230-00			RES,FXD,FILM:2.43K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A4R51	322-3215-00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16900F
A4R52	322-3215-00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16900F
A4R53	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100K
A4R56	322-3356-00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0	80009	322-3356-00
A4R57	322-3143-00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A4R58	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A4R59	322-3356-00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0	80009	322-3356-00
A4R60	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A4R61	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A4R62	322-3385-00			RES,FXD,FILM:100K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100K
A4R63	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A4R64	322-3273-00			RES,FXD,FILM:6.81K OHM,1%,0.2W,TC=T0	80009	322-3273-00
A4R65	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=T0	80009	322-3134-00
A4R66	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=T0	80009	322-3134-00
A4R67	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R70	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A4R71	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A4R80	322-3085-07			RES,FXD,FILM:75 OHM,0.1%,0.2W,TC=T9,TAPE & REEL,SMALL BODY	91637	CCF502-C75R00BT
A4R81	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R82	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R83	322-3242-00			RES,FXD,FILM:3.24K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K24

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4R84	322-3085-07			RES,FXD,FILM:75 OHM,0.1%,0.2W,TC=T9,TAPE & REEL,SMALL BODY	91637	CCF502-C75R00BT
A4R85	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A4R86	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R89	308-0426-00			RES,FXD,WW:470 OHM,5%,3W	07088	
A4R92	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A4R94	322-3239-00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A4R95	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A4R99	322-3012-00			RES,FXD,FILM:13 OHM,1%,0.2W,TC=T0	57668	CRB20FXE301E
A4R100	322-3012-00			RES,FXD,FILM:13 OHM,1%,0.2W,TC=T0	57668	CRB20FXE301E
A4R101	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R109	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R111	322-3147-00			RES,FXD,FILM:332 OHM,1%,0.2W,TC=T0	80009	322-3147-00
A4R112	322-3133-00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50-2F237R0F
A4R113	322-3230-00			RES,FXD,FILM:2.43K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A4R114	322-3230-00			RES,FXD,FILM:2.43K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A4R115	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A4R120	307-0539-00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	80009	307-0539-00
A4R121	307-0539-00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	80009	307-0539-00
A4R122	322-3085-07			RES,FXD,FILM:75 OHM,0.1%,0.2W,TC=T9,TAPE & REEL,SMALL BODY	91637	CCF502-C75R00BT
A4R126	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R127	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R128	322-3139-00			RES,FXD,FILM:274 OHM,1%,0.2W,TC=T0	80009	322-3139-00
A4R129	307-0541-00			RES NTWK,FXD,FI:(7)1K OHM,10%,1W	01121	108A102
A4R130	307-0526-00			RES NTWK,FXD,FI:5,510 OHM,10%,0.125 W	80009	307-0526-00
A4R131	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A4R132	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A4R133	322-3152-00			RES,FXD,FILM:374 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 374E
A4R135	322-3068-00			RES,FXD,FILM:49.9 OHM,1%,0.2W,TC=T0	80009	322-3068-00
A4R136	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R137	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A4R138	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A4R139	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2W,TC=T0	80009	322-3135-00
A4R140	322-3085-07			RES,FXD,FILM:75 OHM,0.1%,0.2W,TC=T9,TAPE & REEL,SMALL BODY	91637	CCF502-C75R00BT
A4R142	322-3068-00			RES,FXD,FILM:49.9 OHM,1%,0.2W,TC=T0	80009	322-3068-00
A4R143	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0	80009	322-3232-00
A4R144	311-2230-00			RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
A4R145	322-3051-00			RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=T0	57668	CRB20FXE301K
A4R146	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R147	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R148	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R149	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R150	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R151	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R152	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R153	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R154	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R155	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R156	322-3269-00			RES,FXD,FILM:6.19K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 6K19
A4R157	322-3254-00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K32
A4R158	322-3335-00			RES,FXD,FILM:30.1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 30K1
A4R159	322-3426-00			RES,FXD,FILM:267K OHM,1%,0.2W,TC=T0	91637	CCF50-2F26702F
A4R160	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R161	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R162	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4R163	322-3069-00			RES,FXD,FILM:51.1 OHM,1%,0.2W,TC=T0	80009	322-3069-00
A4S1	260-2535-00			SWITCH,ROTORY:HEXADECIMAL,16 POS,0.380 SQ	80009	260-2535-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4S2	260-2280-00			SW,PUSH BUTTON:MINIATURE MOMENTARY,SPST,NOR MALLY OPEN	80009	260-2280-00
A4TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP9	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP10	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP11	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP12	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4U1	156-3599-00			MICROCKT,LINEAR:BIPOLAR,AMPLIFIER,CURRENT	80009	156-3599-00
A4U2	156-2800-00			IC,CONVERTER:TTL,A/D;8-BIT,25MSPS,FLASH;103 19,DIP24.6	80009	156-2800-00
A4U3	156-1173-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIV E,2.5V,1.0%,40PPM,SERIES;MC1403U,DIP08.3	80009	156-1173-00
A4U5	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A4U6	156-1191-01			MICROCKT,LINEAR:BIFET,DUAL OPNL AMPL,SCRN	80009	156-1191-01
A4U7	156-1324-00			IC,LINEAR:BIPOLAR,COMPARATOR;TTL,20NS,COMPL EMENTARY OUTPUT,W/STROBES;LM361N,DIP14.3	27014	LM361N/GLAA054
A4U8	156-0912-01			MICROCKT,LINEAR:OPNL AMPL,SCREENED	80009	156-0912-01
A4U9	160-7540-00			IC:PROGRAMMED 156-3825-01	80009	160-7540-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A4U10	160-7541-00			IC:PROGRAMMED 156-3825-01	80009	160-7541-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A4U15	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE,SCRN	80009	156-0368-03
A4U16	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE,SCRN	80009	156-0368-03
A4U17	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE,SCRN	80009	156-0368-03
A4U18	156-3050-00			IC,MISC:	80009	156-3050-00
A4U19	160-7511-00			IC:PROGRAMMED,156-3381-00	80009	160-7511-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A4U20	156-2491-00			MICROCKT,DGTL:NOVRAM,128 X 8 X2001	60395	X2001 P OR D
				MOUNTING PARTS		
	136-0751-00			SOCKET DIP::	09922	DILB24P108
				END MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4U21	160-7512-00			IC:PROGRAMMED,156-3229-00	80009	160-7512-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A4U22	156-3715-00			IC,PROCESSOR:CMOS,PERIPHERAL;COUNTER/TIMER CIRCUIT,8MHZ;84C30,DIP2 8.6	80009	156-3715-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CTR,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A4U23	156-3728-00			MICROCKT,DGTL:CMOS,MICROPROCESSOR,8MHZ	80009	156-3728-00
				MOUNTING PARTS		
	136-0757-00			SKT,PL-IN ELEK:MICROCIRCUIT,40 DIP	09922	DILB40P-108
				END MOUNTING PARTS		
A4U24	160-7510-00			IC:PROGRAMMED,156-4004-00	80009	160-7510-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CTR,0.175 H X 0.13 TAIL,BECU,TIN;,,	09922	DILB28P-108
				END MOUNTING PARTS		
A4U25	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W/CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A4U26	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W/CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A4U27	156-1998-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL D-TYPE, W/CLEAR;74ALS273,DIP20.3	01295	SN74ALS273
A4U28	156-1754-01			IC,DIGITAL:ALSTTL,BUFFER;OCTAL NONINV BUFFER/DRIVER, 3-STATE;74ALS244,DIP20.3,TUBE	01295	SN74ALS244AN3
A4U29	156-2493-00			IC,CONVERTER:	80009	156-2493-00
A4U30	156-1850-00			IC,MISC:CMOS,ANALOG SWITCH;QUAD;DG211,DIP16.3	17856	SDG21107
A4U33	156-1437-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE,5V,1.0%,25PPM,SERIES;MC1404AU5,DIP08.3	80009	156-1437-00
A4U34	156-1529-00			MICROCKT,LINEAR:3-TERM ADJ OUT POS V RGLTR	80009	156-1529-00
A4U35	156-2223-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE,ADJUSTABLE,100MA,4%;LM337LZ,TO-92	80009	156-2223-00
A4U37	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A4U38	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;10125,DIP16.3,TUBE	04713	MC10125P/L
A4U39	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,DIP16.3,TUBE,SCRN	80009	156-0860-02
A4U40	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,DIP16.3,TUBE,SCRN	80009	156-0860-02
A4U56	155-0316-01			IC,ASIC:BIPOLAR,12 BIT D/A CONVERTER;FULL CUSTOM,M460B;,68TEQ,BOX	80009	155-0316-01
				MOUNTING PARTS		
	136-0871-00			SOCKET,PLCC::	80009	136-0871-00
				END MOUNTING PARTS		
A4U58	156-1338-00			IC,LINEAR:BIPOLAR,OP-AMP;HIGH OUTPUT DRIVE;NE5534N,DIP08.3	80009	156-1338-00
A4U60	156-3599-00			MICROCKT,LINEAR:BIPOLAR,AMPLIFIER,CURRENT	80009	156-3599-00
A4U83	156-6117-00			IC,ASIC:CMOS,CUSTOM;Z80 GENLOCK IC,ADG236;VF4697,PLCC84	80009	156-6117-00
				MOUNTING PARTS		
	136-0965-00			SKT,PL-IN ELEK:PLCC,PCB,84,0.360 H X 0.125 TAIL,TIN	80009	136-0965-00
				END MOUNTING PARTS		
A4U85	156-1661-00			IC,DIGITAL:LSTTL,TRANSCEIVER;OCTAL W/MUX REGISTER, NONINV, 3-STATE;74LS646,DIP24.3,TUBE	80009	156-1661-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4U89	156-3432-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK,200MHZ;CLC400AJP,DIP08.3	80009	156-3432-00
A4U90	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STATE;74F821,DIP24.3,TUBE	80009	156-4113-00
A4U91	156-4113-00			IC,DIGITAL:FTTL,REGISTER;10-BIT NINV,3-STATE;74F821,DIP24.3,TUBE	80009	156-4113-00
A4W2	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A4Y1	158-0391-00			OSC,XTAL CLOCK:8.0 MHZ,+/-0.01% HCMOS,CL 15 PF,4 PIN 14 PIN COMPATIBLE PKG	80009	158-0391-00
A4Y2	158-0384-00			XTAL UNIT,QTZ:17.734475 MHZ,+/-0.0005%,PARALLEL,CL=32PF,HC-43/U PKG *ATTACHED PARTS*	61441	158-0384-00
	253-0176-00			TAPE,PRESS SENS:VINYL FOAM,0.5 X 0.062, *END ATTACHED PARTS*	85471	ORDER BY DESCR
A5	671-1273-00			CIRCUIT BD ASSY:DECODER/PROC AMP	80009	671-1273-00
A5C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C2	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A5C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C4	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C6	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A5C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C8	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C9	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C12	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C14	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C17	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C18	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C21	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C23	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C24	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C28	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C36	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C37	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C38	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C39	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C40	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C41	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C43	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C44	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A5C45	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C46	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5J1	131-3181-00			CONN,HDR:	80009	131-3181-00
A5J2	131-3181-00			CONN,HDR:	80009	131-3181-00
A5J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J4	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J8	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A5J10	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A5J13	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J14	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J15	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J16	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J17	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J18	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J19	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J20	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A5J200	131-3362-00			CONN,HDR:	80009	131-3362-00
A5J300	131-3362-00			CONN,HDR:	80009	131-3362-00
A5P3	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P4	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P8	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P10	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P13	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P14	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P15	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P16	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P17	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P18	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P19	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5P20	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A5R1	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A5R2	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A5R3	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A5R4	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A5R5	307-0651-00			RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	80009	307-0651-00
A5TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A5U1	156-1703-00			IC,DIGITAL:ASTTL,ALU;4-BIT BIT, WITH FUNCTI ON GENERATOR;74AS881,DIP24.3,TUBE,SCRN	01295	SN74AS881NP3/JP4

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A5U2	156-1703-00			IC,DIGITAL:ASTTL,ALU;4-BIT BIT, WITH FUNCTI ON GENERATOR;74AS881,DIP24.3,TUBE,SCRN	01295	SN74AS881NP3/JP4
A5U3	156-1703-00			IC,DIGITAL:ASTTL,ALU;4-BIT BIT, WITH FUNCTI ON GENERATOR;74AS881,DIP24.3,TUBE,SCRN	01295	SN74AS881NP3/JP4
A5U4	156-3156-00			MICROCKT,DGTL:CMOS,DIGITAL QUADRATURE MIXER /MODULATOR	80009	156-3156-00
				MOUNTING PARTS		
	136-0904-00			SOCKET,PGA::	80009	136-0904-00
				END MOUNTING PARTS		
A5U5	160-8417-00			IC,DIGITAL:PROGRAMMED 156-3205-00	80009	160-8417-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A5U6	160-8418-00			IC,DIGITAL:PROGRAMMED 156-3205-00	80009	160-8418-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A5U7	160-8419-00			IC,DIGITAL:PROGRAMMED 156-2993-00	80009	160-8419-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A5U8	160-8368-00			IC,DIGITAL:PROGRAMMED 156-3243-00	80009	160-8368-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A5U10	160-8358-00			IC,DIGITAL:PROGRAMMED 156-3825-01	80009	160-8358-00
				MOUNTING PARTS		
	136-1038-00			SKT,PL-IN ELEK:DIP,PCB,28 POS,2 X 14,0.1 X 0.3 CTR,TIN,0.185 H X 0.130 TAIL,W/BD RETEN TION	00779	2-641873-1
				END MOUNTING PARTS		
A5U11	156-6146-00			IC,ASIC:CMOS,CUSTOM;12-BIT,32 STAGE PIPELIN E REGISTER,ADG234; VF4680,PLCC44	80009	156-6146-00
				MOUNTING PARTS		
	136-1047-00			SOCKET,PLCC::PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN;,,	04618	821575-1
				END MOUNTING PARTS		
A5U12	156-1911-00			IC,DIGITAL:FTTL,FLIP FLOP;HEX D-TYPE, CLEAR ;74F174,DIP16.3,TUBE	04713	MC74F174S
A5U13	156-1911-00			IC,DIGITAL:FTTL,FLIP FLOP;HEX D-TYPE, CLEAR ;74F174,DIP16.3,TUBE	04713	MC74F174S
A5U20	156-1962-00			IC,DIGITAL:FTTL,BUFFER;OCTAL NONINV BUFFER/ DRIVER, 3-STATE;74F244,DIP20.3,TUBE	80009	156-1962-00
A5U21	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A5U22	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A5U23	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A5U24	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A5U25	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A5U28	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U29	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U30	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U31	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A5U32	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U33	160-8415-00			IC,DIGITAL:PROGRAMMED 156-1805-00 *MOUNTING PARTS*	80009	160-8415-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U34	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U37	160-8361-00			IC,DIGITAL:PROGRAMMED 156-3205-00 *MOUNTING PARTS*	80009	160-8361-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U38	160-8360-00			IC,DIGITAL:PROGRAMMED 156-3205-00 *MOUNTING PARTS*	80009	160-8360-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U39	160-8359-00			IC,DIGITAL:PROGRAMMED 156-3243-00 *MOUNTING PARTS*	80009	160-8359-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U40	156-4089-00			IC,MISC:CMOS,MULTIPLIER;12 X 10 BIT,30MHZ;2 250,PPGA120 *MOUNTING PARTS*	80009	156-4089-00
	136-0904-00			SOCKET,PGA:: *END MOUNTING PARTS*	80009	136-0904-00
A5U41	160-8420-00			IC,DIGITAL:PROGRAMMED 156-2993-00 *MOUNTING PARTS*	80009	160-8420-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A5U42	160-8362-00			IC,DIGITAL:PROGRAMMED 156-3229-00 *MOUNTING PARTS*	80009	160-8362-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U43	160-8351-00			IC,DIGITAL:PROGRAMMED 156-3229-00 *MOUNTING PARTS*	80009	160-8351-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U44	160-8352-00			IC,DIGITAL:PROGRAMMED 156-3229-00 *MOUNTING PARTS*	80009	160-8352-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A5U45	156-6146-00			IC,ASIC:CMOS,CUSTOM;12-BIT,32 STAGE PIPELIN E REGISTER,ADG234; VF4680,PLCC44 *MOUNTING PARTS*	80009	156-6146-00
	136-1047-00			SOCKET,PLCC::PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN;,, *END MOUNTING PARTS*	04618	821575-1
A5U46	156-1704-00			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D-TYPE, 3-S TATE;74F374,DIP20.3,TUBE	18324	74F374(NB OR FB)
A5U47	156-1704-00			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D-TYPE, 3-S TATE;74F374,DIP20.3,TUBE	18324	74F374(NB OR FB)
A5U48	160-8416-00			IC,DIGITAL:PROGRAMMED 156-2993-00 *MOUNTING PARTS*	80009	160-8416-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A5U49	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03
A5U50	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03
A5U51	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A5U52	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03
A5U53	160-8357-00			IC,DIGITAL:PROGRAMMED 156-3229-00	80009	160-8357-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A5U54	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A5U55	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03
A5U56	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A6	671-1649-00			CIRCUIT BD ASSY:REMOTE CONTROL	80009	671-1649-00
A6C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C3	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C4	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C5	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C6	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C7	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C8	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C9	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C10	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C11	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A6C12	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A6C13	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A6C24	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A6C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C28	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C36	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C37	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C38	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C39	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C41	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A6C45	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A6C46	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A6C47	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C48	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6C49	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C50	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A6C51	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A6C53	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A6CR1	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A6DS1	150-1083-00			DIODE,OPTO:,LED;RED,655NM,10 ELEMENT BAR GR APH ARRAY;HDSP-4820,DIP	80009	150-1083-00
A6J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A6J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A6J40	131-3181-00			CONN,HDR:	80009	131-3181-00
A6LS1	119-2101-00			XDCR,AUDIO:	TK1066	SMX-06
A6P1	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A6P2	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A6Q1	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A6Q2	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A6R1	307-0636-00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125 W	80009	307-0636-00
A6R3	307-0499-00			RES,FXD,FILM:9,100K OHM,5%,0.125W	91637	CSC10A-01-104G/J
A6R4	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A6R5	307-0637-00			RES NTWK,FXD,FI:5,2K OHM,2%,0.125W	01121	206A202
A6R6	311-2442-01			RES,VAR,NONWW:PNL,10K +/-10%,DUAL,WIPER PHA SE 180 DEG,0.875 SHAFT	80009	311-2442-01
				ATTACHED PARTS		
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A6R7	311-2442-01			RES,VAR,NONWW:PNL,10K +/-10%,DUAL,WIPER PHA SE 180 DEG,0.875 SHAFT	80009	311-2442-01
				ATTACHED PARTS		
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A6R8	311-2442-01			RES,VAR,NONWW:PNL,10K +/-10%,DUAL,WIPER PHA SE 180 DEG,0.875 SHAFT	80009	311-2442-01
				ATTACHED PARTS		
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A6R10	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A6R11	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A6R20	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A6R23	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A6R24	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A6R39	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A6R40	322-3310-00			RES,FXD,FILM:16.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 16K5
A6R41	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A6R47	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A6R48	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A6S1	260-2301-00			SWITCH,PUSH:SPST,25MA,15VAC	34361	B3F3152
				ATTACHED PARTS		
	366-0720-00			PUSH BUTTON:BLACK,0.156 X 0.156 X 0.218 H	80009	366-0720-00
				END ATTACHED PARTS		
A6S2	260-2301-00			SWITCH,PUSH:SPST,25MA,15VAC	34361	B3F3152
				ATTACHED PARTS		
	366-0720-00			PUSH BUTTON:BLACK,0.156 X 0.156 X 0.218 H	80009	366-0720-00
				END ATTACHED PARTS		
A6S3	260-2301-00			SWITCH,PUSH:SPST,25MA,15VAC	34361	B3F3152
				ATTACHED PARTS		
	366-0720-00			PUSH BUTTON:BLACK,0.156 X 0.156 X 0.218 H	80009	366-0720-00
				END ATTACHED PARTS		
A6S4	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A6S5	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A6S7	260-2064-00			SWITCH,ROCKER:(6)SPST,125MA,30VDC	81073	76YYXXXS
A6S8	260-2535-00			SWITCH,ROTORY:HEXADECIMAL,16 POS,0.380 SQ	80009	260-2535-00
A6TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A6TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6TP9	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A6U1	156-2134-00			IC,DIGITAL:HCTCMOS,LATCH;OCTAL D-TYPE, 3-ST ATE;74HCT373,DIP20.3,TUBE	02735	CD74HCT373E
A6U2	156-3050-00			IC,MISC:	80009	156-3050-00
A6U4	156-1215-01			IC,DIGITAL:CMOS,MUX/ENCODER;20-KEY ENCODER; 74C923,DIP18.3,TUBE,SCRN	27014	MM74C923JA+
A6U5	156-2671-00			IC,MEMORY:CMOS,NVRAM;2K X 8,200NS,SRAM,INTE GRAL BATTERY;,DIP24.6SAFETY CONTROLLED *MOUNTING PARTS*	80009	156-2671-00
	136-1158-00			SOCKET,DIP::PCB;24 POS,2 X 12,0.1 X 0.6 CTR ,0.095 H X 0.095 TAIL,GOLD/TIN;,, *END MOUNTING PARTS*	80009	136-1158-00
A6U6	156-4081-00			IC,PROCESSOR:CMOS,MICROPROCESSOR;16-BIT,15M HZ,8-BIT/8-CH A/D;78C10,DIP64.75.07,TUBE *MOUNTING PARTS*	80009	156-4081-00
	136-1166-00			SOCKET,DIP:PCB,;FEMALE,2 X 32,14 POS,0.07 X 0.750,0.770 H X 0.120 TAIL,TIN;,, *END MOUNTING PARTS*	80009	136-1166-00
A6U7	160-8354-00			IC,DIGITAL:PROGRAMMED 156-3381-00,27C512 *MOUNTING PARTS*	80009	160-8354-00
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,, *END MOUNTING PARTS*	09922	DILB28P-108
A6U8	156-0913-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0913-00;74LS377,DIP20.3,TUBE	80009	156-0913-02
A6U11	156-1748-02			IC,DIGITAL:ALSTTL,TRANSCEIVER;OCTAL NONINV, 3-STATE;74ALS245,DIP20.3,TUBE	01295	SN74ALS245AN3
A6U13	156-2100-00			IC,DIGITAL:ALSTTL,DEMUX/DECODER;3-TO-8 LINE DECODER;74ALS138,DIP16.3,TUBE	01295	SN74ALS138N3
A6U18	156-3110-00			IC,DIGITAL:HCMOS,BUFFER;NONINV OCTAL, LINE DRIVER, 3-STATE;74HC244,DIP20.3	80009	156-3110-00
A6U19	156-3110-00			IC,DIGITAL:HCMOS,BUFFER;NONINV OCTAL, LINE DRIVER, 3-STATE;74HC244,DIP20.3	80009	156-3110-00
A6U20	156-0728-02			IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-072 8-00;74LS09,DIP14.3,TUBE	80009	156-0728-02
A6U23	160-8353-00			IC,DIGITAL:PROGRAMMED 156-2250-00 *MOUNTING PARTS*	80009	160-8353-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A6U24	156-0402-00			IC,MISC:BIPOLAR,TIMER;;LM555CN,DIP08.3	80009	156-0402-00
A6U26	156-3110-00			IC,DIGITAL:HCMOS,BUFFER;NONINV OCTAL, LINE DRIVER, 3-STATE;74HC244,DIP20.3	80009	156-3110-00
A6U27	156-3110-00			IC,DIGITAL:HCMOS,BUFFER;NONINV OCTAL, LINE DRIVER, 3-STATE;74HC244,DIP20.3	80009	156-3110-00
A6W38	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A6W43	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A6W44	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A6Y1	158-0135-00			XTAL UNIT,QTZ:14.7456 MHZ 0.01%,SERIES	33096	CCAT101124
A7	672-0300-00			CIRCUIT BD ASSY:UPPER AND LOWER I/O WIRED	80009	672-0300-00
A7B10	119-3551-02			FAN TUBEAXIAL:	80009	119-3551-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A7W4	174-2614-00			CA ASSY,SP,ELEC:40,28 AWG,4.5 L,RIBBON,0.25 RCPT X 0.25 RCPT,NON PLZ (CONNECTED FROM A7A2J4 TO A7A1J4)	80009	174-2614-00
A7W5	174-2614-00			CA ASSY,SP,ELEC:40,28 AWG,4.5 L,RIBBON,0.25 RCPT X 0.25 RCPT,NON PLZ (CONNECTED FROM A7A2J5 TO A7A1J5)	80009	174-2614-00
A7W8	174-0835-00			CA ASSY,SP,ELEC:10.26 AWG,6.0 L,RIBBON (CONNECTED FROM A7A2J8 TO A7A1J8)	00779	87-1534-33-1
A7W9	174-2603-00			CABLE ASSY,RF:50 OHM,4.5 L,9-4 (CONNECTED FROM A7A2J11 TO A7A1J9)	80009	174-2603-00
A7A1	671-1267-00			CIRCUIT BD ASSY:LOWER I/O *ATTACHED PARTS*	80009	671-1267-00
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2) *END ATTACHED PARTS*	80009	131-0157-00
A7A1C1	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC	D5243	F1772-415-2000
A7A1C2	290-1074-00			CAP,FXD,ELCTLT:470UF,200V	00853	380471M200K04
A7A1C3	290-1074-00			CAP,FXD,ELCTLT:470UF,200V	00853	380471M200K04
A7A1C4	283-0211-00			CAP,FXD,CER DI:0.1UF,10%,200V	05397	C340C104K2R5CA
A7A1C5	285-1246-00			CAP,FXD,PPR DI:0.022UF,20%,250VAC	TK0515	PME 265 MB 522
A7A1C6	285-1246-00			CAP,FXD,PPR DI:0.022UF,20%,250VAC	TK0515	PME 265 MB 522
A7A1C7	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A7A1C8	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A7A1C9	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A7A1C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C11	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A7A1C12	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C13	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A7A1C14	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC	D5243	F1772-415-2000
A7A1C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C17	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C18	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A1C19	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A7A1C20	281-0332-00			CAP,VAR,CERAMIC:SINGLE-TURN TRIMMER;5.0-30.OPF,100V,TOP ADJ;ECB MOUNT,0.80 MAX THICK	80009	281-0332-00
A7A1C21	281-0332-00			CAP,VAR,CERAMIC:SINGLE-TURN TRIMMER;5.0-30.OPF,100V,TOP ADJ;ECB MOUNT,0.80 MAX THICK	80009	281-0332-00
A7A1CR1	152-0661-00			DIODE,RECT:,FAST RCVRY;600V,3A,200NS;TR	80009	152-0661-00
A7A1CR2	152-0661-00			DIODE,RECT:,FAST RCVRY;600V,3A,200NS;TR	80009	152-0661-00
A7A1CR3	152-0661-00			DIODE,RECT:,FAST RCVRY;600V,3A,200NS;TR	80009	152-0661-00
A7A1CR4	152-0661-00			DIODE,RECT:,FAST RCVRY;600V,3A,200NS;TR	80009	152-0661-00
A7A1CR5	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,TR	80009	152-0141-02
A7A1DS1	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	71744	A1B-120
A7A1E1	119-0181-00			ARSR,ELEC SURGE:230,GAS FILLED,+/-15%	25088	B1-A230T
A7A1E2	119-0181-00			ARSR,ELEC SURGE:230,GAS FILLED,+/-15%	25088	B1-A230T
A7A1E3	276-0818-00			COIL,EM:100MHZ,FERRITE,BEAD ON LEAD, IMP: 100 OHM @ 100MHZ,	80009	276-0818-00
A7A1E4	276-0818-00			COIL,EM:100MHZ,FERRITE,BEAD ON LEAD, IMP: 100 OHM @ 100MHZ,	80009	276-0818-00
A7A1F1	159-0173-00			FUSE,CARTRIDGE:3AG,4A,250V,5 SEC *MOUNTING PARTS*	71400	MTH-CW-4
	200-2264-00			CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0906-00			BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES *END MOUNTING PARTS*	S3629	TYPEFAU031.3573
A7A1FL1	119-3835-00			FILTER,RFI:3A,250V,400HZ W/PC TERMINALS	TK2133	FN 326-3/02
A7A1FL2	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A1J1	131-3113-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 32,0.1 CTR,0.209 MLG X 0.109 TAIL,30 GOLD;,, *MOUNTING PARTS*	TK1483	073-96914-390

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	1183-302
A7A1J2	131-3113-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 32,0.1 CTR,0 .209 MLG X 0.109 TAIL,30 GOLD;,, *MOUNTING PARTS*	TK1483	073-96914-390
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	1183-302
A7A1J3	131-3396-00			CONN,D-SUB:	80009	131-3396-00
A7A1J4	131-3323-00			CONN,HDR:	22526	66506-025
A7A1J5	131-3323-00			CONN,HDR:	22526	66506-025
A7A1J7	131-3439-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 16,0.1 CTR,0 .209 MLG X 0.114 TAIL,30 GOLD;,, *MOUNTING PARTS*	81312	48S-6043-0731-0
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	1183-302
A7A1J8	131-4884-00			CONN,HDR PWR:	95354	3102-8-110-01
A7A1J9	131-0391-00			CONN,RF JACK:	80009	131-0391-00
A7A1J10	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A1J11	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A1J12	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A1J13	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A1J14	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A1K1	148-0148-00			RELAY,ARMATURE:2 FORM C,COIL 5 VDC 62.5 OHM ,CONTACT 220 VDC 2A 60W,	61529	DS2E-M-DC5V
A7A1L1	108-0241-00			COIL,RF:FIXED,63NH,10%,5 TURN OF #33 WIRE,F ORM 276-0153-00	80009	108-0241-00
A7A1L2	108-0241-00			COIL,RF:FIXED,63NH,10%,5 TURN OF #33 WIRE,F ORM 276-0153-00	80009	108-0241-00
A7A1L3	108-0241-00			COIL,RF:FIXED,63NH,10%,5 TURN OF #33 WIRE,F ORM 276-0153-00	80009	108-0241-00
A7A1L4	108-0719-00			COIL,RF:FIXED,805NH	TK1345	108-0719-00
A7A1L5	108-0719-00			COIL,RF:FIXED,805NH	TK1345	108-0719-00
A7A1L6	108-1477-00			COIL,RF:FXD,400NH,+/-10%,DCR 0.3 OHM,I MAX 17A,AIR CORE,0.55	0JR03	108-1477-00
A7A1L7	108-1477-00			COIL,RF:FXD,400NH,+/-10%,DCR 0.3 OHM,I MAX 17A,AIR CORE,0.55	0JR03	108-1477-00
A7A1L19	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A7A1Q1	151-0207-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0207-00
A7A1R1	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A7A1R2	301-0100-00			RES,FXD,FILM:10 OHM,5%,0.50W	01121	EB1005
A7A1R3	301-0474-00			RES,FXD,FILM:470K OHM,5%,0.5W	01121	EB4745
A7A1R4	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A7A1R5	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A7A1R6	301-0474-00			RES,FXD,FILM:470K OHM,5%,0.5W	01121	EB4745
A7A1R7	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A7A1R8	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A7A1R11	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A7A1RT1	307-0746-00			RES,THERMAL:5 OHM,10%,7A/DEG C *ATTACHED PARTS*	80009	307-0746-00
	162-0031-00			INSUL SLVG,ELEC:HT SHRINK,0.50 ID *END ATTACHED PARTS*	59659	CFR 125
A7A1RT2	307-0746-00			RES,THERMAL:5 OHM,10%,7A/DEG C	80009	307-0746-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				ATTACHED PARTS		
	162-0031-00			INSUL SLVG,ELEC:HT SHRINK,0.50 ID	59659	CFR 125
				END ATTACHED PARTS		
A7A1RV15	307-0456-00			RES,V SENSITIVE:250VAC,20W,METAL OXIDE	03508	MOV-V250LA20A
A7A1S1	260-2116-00			SWITCH,SLIDE:DPDT,10A,125VAC,LINE SEL	04426	18-000-0019
A7A1T1	120-1449-00			TRANSFORMER,RF:COMMON MODE,2.7MH,2A	80009	120-1449-00
A7A1U1	156-5966-00			MICROCKT,DGTL:BIPOLAR,10-BIT VIDEO LINE DRI VER,SMPTE RP-125 COMPATIBLE	80009	156-5966-00
				MOUNTING PARTS		
	136-0959-00			SKT,PL-IN ELEK:PLCC,52,PCB,0.361 H X 0.147 TAIL,TIN	53387	252-6233-00-3877
				END MOUNTING PARTS		
A7A1U2	156-2786-00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL, LIN E DRIVER, 3-STATE;74FCT244,DIP20.3,TUBE	80009	156-2786-00
A7A1U3	156-2786-00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL, LIN E DRIVER, 3-STATE;74FCT244,DIP20.3,TUBE	80009	156-2786-00
A7A1U4	156-4015-00			IC,DIGITAL:TTL,TRANSCEIVER;RS232 DRIVER/REC EIVER,W/INPUTTHRESHOLD CNTRL;75155,DIP08.3	80009	156-4015-00
A7A2	671-1274-00			CIRCUIT BD ASSY:UPPER I/O	80009	671-1274-00
A7A2C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C4	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C6	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C8	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A7A2C9	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A7A2C10	290-0367-00			CAP,FXD,ELCTLT:70UF,20%,6V NONPOLARIZED	24165	30D1802
A7A2C11	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A7A2C12	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A7A2C13	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A7A2C14	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A7A2C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C17	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A7A2C18	281-0788-00			CAP,FXD,CER DI:470PF,10%,100V	04222	SA102C471KAA
A7A2C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C21	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A7A2C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C23	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C24	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A7A2CR1	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A7A2CR2	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A7A2CR4	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A7A2CR5	152-0066-00			DIODE,RECT:,;400V,1A,30A IFSM;GP10G,DO-41,T R	05828	GP10G-020
A7A2CR6	152-0066-00			DIODE,RECT:,;400V,1A,30A IFSM;GP10G,DO-41,T R	05828	GP10G-020
A7A2CR7	152-0066-00			DIODE,RECT:,;400V,1A,30A IFSM;GP10G,DO-41,T R	05828	GP10G-020
A7A2CR8	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A7A2CR9	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A7A2DS1	150-1014-00			LT EMITTING DIO:RED,695NM,100MA MAX	58361	Q6444/MV5054-1
A7A2FL1	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2FL2	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2FL3	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2FL4	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2FL5	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2FL6	119-3580-00			FILTER,EMI:	TK2058	ZJSR-5101-102
A7A2J1	131-3113-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 32,0.1 CTR,0 .209 MLG X 0.109 TAIL,30 GOLD;,,	TK1483	073-96914-390
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2)	TK0435	1183-302
				END MOUNTING PARTS		
A7A2J2	131-3113-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 32,0.1 CTR,0 .209 MLG X 0.109 TAIL,30 GOLD;,,	TK1483	073-96914-390
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2)	TK0435	1183-302
				END MOUNTING PARTS		
A7A2J3	131-3396-00			CONN,D-SUB:	80009	131-3396-00
A7A2J4	131-3323-00			CONN,HDR:	22526	66506-025
A7A2J5	131-3323-00			CONN,HDR:	22526	66506-025
A7A2J6	131-3378-00			CONN,RF JACK::	00779	227677-1
A7A2J7	131-3925-00			CONN,D-SUB:	80009	131-3925-00
A7A2J8	131-4884-00			CONN,HDR PWR:	95354	3102-8-110-01
A7A2J10	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A7A2J11	131-0391-00			CONN,RF JACK:	80009	131-0391-00
A7A2J12	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A7A2K1	148-0148-00			RELAY,ARMATURE:2 FORM C,COIL 5 VDC 62.5 OHM ,CONTACT 220 VDC 2A 60W,	61529	DS2E-M-DC5V
A7A2L1	108-0241-00			COIL,RF:FIXED,63NH,10%,5 TURN OF #33 WIRE,F ORM 276-0153-00	80009	108-0241-00
A7A2Q1	151-0207-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0207-00
A7A2Q2	151-0207-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0207-00
A7A2R1	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A7A2R2	307-1266-00			RES NTWK,FXD,FI:160-240 OHM,8 PIN,SIP	80009	307-1266-00
A7A2R3	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A7A2R4	307-1266-00			RES NTWK,FXD,FI:160-240 OHM,8 PIN,SIP	80009	307-1266-00
A7A2R5	322-3165-00			RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 511E
A7A2R7	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A7A2R8	322-3114-00			RES,FXD,FILM:150 OHM,1%,0.2W,TC=T0	91637	CCF50-2-G1500F
A7A2R9	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A7A2R10	322-3181-00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A7A2R11	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A7A2R12	322-3180-00			RES,FXD,FILM:732 OHM,1%,0.2W,TC=T0	91637	CCF50-2F732R0F
A7A2R13	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A7A2R14	322-3246-00			RES,FXD,FILM:3.57K OHM,1%,0.2W,TC=T0	80009	322-3246-00
A7A2R15	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A7A2R18	322-3354-00			RES,FXD,FILM:47.5K OHM,1%,0.2W,TC=T0	80009	322-3354-00
A7A2R19	322-3330-00			RES,FXD,FILM:26.7K OHM,1%,0.2W,TC=T0	80009	322-3330-00
A7A2R20	322-3294-00			RES,FXD,FILM:11.3K OHM,1%,0.2W,TC=T0	80009	322-3294-00
A7A2R21	322-3453-00			RES,FXD,FILM:511K OHM,1%,0.2W,TC=T0	91637	CCF50-2F51102F

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A7A2R22	322-3241-00			RES,FXD,FILM:3.16K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A7A2R23	322-3147-00			RES,FXD,FILM:332 OHM,1%,0.2W,TC=T0	80009	322-3147-00
A7A2R24	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A7A2R25	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A7A2R26	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0	80009	322-3481-00
A7A2R27	322-3189-00			RES,FXD,FILM:909 OHM,1%,0.2W,TC=T0	57668	CRB 20 FXE 909E
A7A2R28	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A7A2R29	322-3030-00			RES,FXD,FILM:20 OHM,1%,0.2W,TC=T0	80009	322-3030-00
A7A2R30	307-1220-00			RES NTWK,FXD,FI:8,110 OHMS,2% 16 DIP PKG	01121	316B111
A7A2R31	322-3101-00			RES,FXD,FILM:110 OHM,1%,0.2W,TC=T0	91637	CCF50-2G110R0F
A7A2R32	322-3101-00			RES,FXD,FILM:110 OHM,1%,0.2W,TC=T0	91637	CCF50-2G110R0F
A7A2R33	322-3101-00			RES,FXD,FILM:110 OHM,1%,0.2W,TC=T0	91637	CCF50-2G110R0F
A7A2R34	322-3106-00			RES,FXD,FILM:124 OHM,1%,0.2W,TC=T0	80009	322-3106-00
A7A2R35	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A7A2R36	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A7A2R42	321-0819-07			RES,FXD,FILM:84 OHM,0.1%,0.125W,TC=T9	91637	MFF1816C84R00B
A7A2R43	322-3325-00			RES,FXD,FILM:23.7K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 23K7
A7A2R44	322-3350-00			RES,FXD,FILM:43.2K OHM,1%,0.2W,TC=T0	91637	CCF50-2F43200F
A7A2R45	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A7A2R46	307-1339-00			RES NTWK,FXD,FI:(8)62 OHM,DIP16	80009	307-1339-00
A7A2R47	322-3077-00			RES,FXD,FILM:61.9 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 61E9
A7A2R48	322-3077-00			RES,FXD,FILM:61.9 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 61E9
A7A2RT1	307-0472-00			RES,THERMAL:100K OHM,5%,DISC NTC	80009	307-0472-00
A7A2TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A7A2TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A7A2TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A7A2TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A7A2U6	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,D IP16.3,TUBE,SCRN	80009	156-0860-02
A7A2U7	156-5933-00			MICROCKT,DGTL:ECL,10KH,10 BIT VIDEO LINE DR IVER,SMPTE RP-125 COMPATIBLE	80009	156-5933-00
				MOUNTING PARTS		
	136-0959-00			SKT,PL-IN ELEK:PLCC,52,PCB,0.361 H X 0.147 TAIL,TIN	53387	252-6233-00-3877
				END MOUNTING PARTS		
A7A2U8	156-3599-00			MICROCKT,LINEAR:BIPOLAR,AMPLIFIER,CURRENT	80009	156-3599-00
A7A2U9	156-1225-01			IC,LINEAR:BIPOLAR,COMPARATOR;DUPLICATE OF 1 56-1225-00,DO NOT USE;LM393N,DIP08.3	80009	156-1225-01
A7A2U10	156-1161-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIV E,ADJUSTABLE,1.5A,4%;LM317T,TO-220	04713	LM317T
A7A2U11	156-4015-00			IC,DIGITAL:TTL,TRANSCEIVER;RS232 DRIVER/REC EIVER,W/INPUTTHRESHOLD CNTRL;75155,DIP08.3	80009	156-4015-00
A7A2U12	156-3453-00			MICROCKT,INTFC:BIPOLAR,RS-422A/485 DIFF	80009	156-3453-00
A7A2U13	156-2256-00			IC,DIGITAL:HCMOS,GATE;QUAD 2-INPUT NAND;74H C00,DIP14.3,TUBE	80009	156-2256-00
A7A2U14	156-2786-00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL, LIN E DRIVER, 3-STATE;74FCT244,DIP20.3,TUBE	80009	156-2786-00
A7A2U15	156-2786-00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL, LIN E DRIVER, 3-STATE;74FCT244,DIP20.3,TUBE	80009	156-2786-00
A7A2U16	156-4105-00			IC,DIGITAL:ECL,TRANSLATOR;OCTAL ECL-TO-TTL BUS DRIVER,3-STATE;10KHT5541,DIP24.3,TUBE	80009	156-4105-00
A7A2U17	156-4105-00			IC,DIGITAL:ECL,TRANSLATOR;OCTAL ECL-TO-TTL BUS DRIVER,3-STATE;10KHT5541,DIP24.3,TUBE	80009	156-4105-00
A7A2VR1	152-0265-00			DIODE,ZENER:,;24V,5%,0.4W;1N970B,DO-7 OR 35 ,TR	80009	152-0265-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A8	671-1268-00			CIRCUIT BD ASSY:POWER SUPPLY *ATTACHED PARTS*	80009	671-1268-00
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
	211-0244-00			SCR,ASSEM WSHR:4-40 X 0.312,PNH STL (QUANTITY 3)	TK0858	211-0244-00
	214-4381-00			HT SK,PWR SPLY:ALUMINUM *END ATTACHED PARTS*	80009	214-4381-00
A8C1	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A8C2	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A8C4	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A8C5	290-1069-00			CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A8C6	290-1069-00			CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A8C7	290-0942-00			CAP,FXD,ELCTLT:100UF,+100-10%,50V	24165	672D107H025CG2C
A8C8	290-0942-00			CAP,FXD,ELCTLT:100UF,+100-10%,50V	24165	672D107H025CG2C
A8C9	290-1069-00			CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A8C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C12	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C14	285-1421-00			CAP,FXD,PLASTIC:1.0UF,10%,400V	TK1913	MKS-4
A8C15	285-1329-00			CAP,FXD,PLASTIC:METALIZED FILM;680PF,10%,16 00V,POLYPROPYLENE,.70X.43; RADIAL,T/A	80009	285-1329-00
A8C16	290-0942-00			CAP,FXD,ELCTLT:100UF,+100-10%,50V	24165	672D107H025CG2C
A8C17	283-0103-00			CAP,FXD,CER DI:180PF,5%,500V	80009	283-0103-00
A8C18	283-0103-00			CAP,FXD,CER DI:180PF,5%,500V	80009	283-0103-00
A8C19	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	05397	C330C332J1G5CA
A8C20	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C22	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A8C23	290-0943-00			CAP,FXD,ELCTLT:47UF,+50-20%,25V	55680	UVX1V470MPA
A8C24	283-0032-00			CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A8C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C27	283-0059-00			CAP,FXD,CER DI:1UF,+80-20%,50V	04222	SR305C105MAA
A8C28	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C30	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A8C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C32	290-1069-00			CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A8C33	290-1069-00			CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A8C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A8C36	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	SA101C102KAA
A8C37	283-0211-00			CAP,FXD,CER DI:0.1UF,10%,200V	05397	C340C104K2R5CA
A8CR1	152-0066-00			DIODE,RECT:,;400V,1A,30A IFSM;GP10G,DO-41,T R	05828	GP10G-020
A8CR2	152-0066-00			DIODE,RECT:,;400V,1A,30A IFSM;GP10G,DO-41,T R	05828	GP10G-020
A8CR3	152-0198-00			SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
A8CR4	152-0198-00			SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
A8CR6	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR7	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR8	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR9	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR13	152-0897-00			SEMICOND DVC,DI:1000PRV,FAST RCVY	80009	152-0897-00
A8CR14	152-0897-00			SEMICOND DVC,DI:1000PRV,FAST RCVY	80009	152-0897-00
A8CR15	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00
A8CR16	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00
A8CR17	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00
A8CR18	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A8CR19	152-1085-00			SEMICOND DVC,DI:RECT,SI,1000V,1A	80009	152-1085-00
A8CR20	152-1085-00			SEMICOND DVC,DI:RECT,SI,1000V,1A	80009	152-1085-00
A8CR21	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR22	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A8CR23	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR24	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR25	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR26	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR27	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR28	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR29	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A8CR30	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG *ATTACHED PARTS*	04713	MBR1635
	211-0578-00			SCREW,MACHINE:6-32 X 0.438,PNH,STL (ATTACHED TO CR30 & CR31)	93907	ORDER BY DESCR
	342-0676-00			INSULATOR,XSTR:SILICON RUBBER,0.006 THK (ATTACHED TO CR30 & CR31)	80009	342-0676-00
	343-0527-00			RETAINER,XSTR:POLYCARBONATE (ATTACHED TO CR30 & CR31) *END ATTACHED PARTS*	80009	343-0527-00
A8CR31	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG (SEE CR30 FOR ATTACHED PARTS)	04713	MBR1635
A8CR32	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG *ATTACHED PARTS*	04713	MBR1635
	211-0578-00			SCREW,MACHINE:6-32 X 0.438,PNH,STL (ATTACHED TO CR32 & CR33)	93907	ORDER BY DESCR
	342-0676-00			INSULATOR,XSTR:SILICON RUBBER,0.006 THK (ATTACHED TO CR32 & CR33)	80009	342-0676-00
	343-0527-00			RETAINER,XSTR:POLYCARBONATE (ATTACHED TO CR32 & CR33) *END ATTACHED PARTS*	80009	343-0527-00
A8CR33	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG (SEE CR32 FOR ATTACHED PARTS)	04713	MBR1635
A8DS1	150-1017-00			LT EMITTING DIO:GREEN,550NM,55MA MAX	80009	150-1017-00
A8DS2	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	71744	A1B-120
A8J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A8J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A8J7	131-3440-00			CONN,DIN:PCB,;MALE,RTANG,3 X 16,0.1 CTR,0.4 98 X 0.114 TAIL,30 GOLD,SAFTEY CONTROLLED;, , *MOUNTING PARTS*	81312	48P-6033-0731-0
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0159-00			SCREW,MACHINE:2-56 X 0.375,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	1183-302
A8J10	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A8L2	108-0972-00			COIL,RF:FIXED,500UH	80009	108-0972-00
A8L3	108-1478-00			COIL,RF:FXD,4 WINDINGS,2-10UH +/-10%	80009	108-1478-00
A8P1	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A8P2	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A8P10	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A8Q1	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A8Q2	151-1171-00			TRANSISTOR,PWR:MOS,N-CH;50V,12A,0.12 OHM;BU Z71A/IRFZ22,TO-220	80009	151-1171-00
A8Q3	151-1171-00			TRANSISTOR,PWR:MOS,N-CH;50V,12A,0.12 OHM;BU Z71A/IRFZ22,TO-220	80009	151-1171-00
A8Q4	151-0908-00			TRANSISTOR,PWR:BIPOLAR,NPN;500V VCEO,1000V VCEV,5A,SWITCHING;MJH16002A,TO-218	80009	151-0908-00
				MOUNTING PARTS		
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	211-0244-00			SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
	214-4411-00			HT SK,PWR SPLY:ALUMINUM (ATTACHED TO Q4 & Q5)	80009	214-4411-00
	342-0354-00			INSULATOR,PLATE:TRANSISTOR	55285	7403-09FR-52
				END MOUNTING PARTS		
A8Q5	151-0908-00			TRANSISTOR,PWR:BIPOLAR,NPN;500V VCEO,1000V VCEV,5A,SWITCHING;MJH16002A,TO-218	80009	151-0908-00
				MOUNTING PARTS		
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	211-0244-00			SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
	342-0354-00			INSULATOR,PLATE:TRANSISTOR	55285	7403-09FR-52
				END MOUNTING PARTS		
A8Q6	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER;2N3906,TO-92 EBC	80009	151-0188-00
A8Q7	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A8Q8	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A8Q9	151-0324-00			TRANSISTOR:PNP,SI,TO-126	80009	151-0324-00
A8Q10	151-0528-00			SCR:SI,TO-220	80009	151-0528-00
A8Q11	151-0323-00			TRANSISTOR,PWR:BIPOLAR,NPN;80V,4.0A,2.0MHZ, AMPLIFIER;2N5192,TO-126	80009	151-0323-00
A8R1	308-0953-00			RES,FXD,WW:0.005 OHM,1%,5W	80009	308-0953-00
A8R2	308-0953-00			RES,FXD,WW:0.005 OHM,1%,5W	80009	308-0953-00
A8R3	301-0101-00			RES,FXD,FILM:100 OHM,5%,0.5W	01121	EB1015
A8R7	308-0755-00			RES,FXD,WW:0.75 OHM,5%,2W	91637	CPF-1-0R75JT1
A8R8	303-0154-00			RES,FXD,CMPSN:150K OHM,5%,1W	80009	303-0154-00
A8R9	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A8R10	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A8R11	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A8R12	303-0560-00			RES,FXD,CMPSN:56 OHM,5%,1W	01121	
A8R13	303-0560-00			RES,FXD,CMPSN:56 OHM,5%,1W	01121	
A8R14	303-0204-00			RES,FXD,CMPSN:200K OHM,5%,1W	80009	303-0204-00
A8R15	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A8R16	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A8R17	322-3271-00			RES,FXD,FILM:6.49K OHM,1%,0.2W,TC=T0	91637	CCF502G64900FT
A8R18	322-3265-00			RES,FXD,FILM:5.62K OHM,1%,0.2W,TC=T0	80009	322-3265-00
A8R19	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A8R20	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A8R21	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A8R22	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A8R23	322-3314-00			RES,FXD,FILM:18.2K OHM,1%,0.2W,TC=T0	80009	322-3314-00
A8R24	322-3147-00			RES,FXD,FILM:332 OHM,1%,0.2W,TC=T0	80009	322-3147-00
A8R25	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A8R26	322-3250-00			RES,FXD,FILM:3.92K OHM,1%,0.2W,TC=T0	91637	CCF50-2F39200F
A8R27	322-3310-00			RES,FXD,FILM:16.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 16K5
A8R28	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A8R29	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-1-102

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A8R30	322-3235-00			RES,FXD,FILM:2.74K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K74
A8R31	322-3119-00			RES,FXD,FILM:169 OHM,1%,0.2W,TC=T0	80009	322-3119-00
A8R32	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A8R33	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A8R34	322-3210-00			RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A8R35	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A8R36	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A8R37	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A8R38	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A8R39	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0	80009	322-3175-00
A8R40	322-3162-00			RES,FXD,FILM:475 OHM,1%,0.2W,TC=T0	80009	322-3162-00
A8R41	322-3198-00			RES,FXD,FILM:1.13K OHM,1%,0.2W,TC=T0	80009	322-3198-00
A8R42	322-3162-00			RES,FXD,FILM:475 OHM,1%,0.2W,TC=T0	80009	322-3162-00
A8R43	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A8R44	322-3246-00			RES,FXD,FILM:3.57K OHM,1%,0.2W,TC=T0	80009	322-3246-00
A8R45	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0	80009	322-3232-00
A8R46	322-3246-00			RES,FXD,FILM:3.57K OHM,1%,0.2W,TC=T0	80009	322-3246-00
A8R47	322-3282-00			RES,FXD,FILM:8.45K OHM,1%,0.2W,TC=T0	80009	322-3282-00
A8R50	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	80009	315-0751-00
A8R51	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A8R53	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A8R54	322-3258-00			RES,FXD,FILM:4.75K OHM,1%,0.2W,TC=T0	80009	322-3258-00
A8R55	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A8R56	315-0823-00			RES,FXD,FILM:82K OHM,5%,0.25W	80009	315-0823-00
A8R57	315-0683-00			RES,FXD,FILM:68K OHM,5%,0.25W	80009	315-0683-00
A8R58	315-0623-00			RES,FXD,FILM:62K OHM,5%,0.25W	80009	315-0623-00
A8R59	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A8R60	315-0332-00			RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A8R61	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A8R62	322-3119-00			RES,FXD,FILM:169 OHM,1%,0.2W,TC=T0	80009	322-3119-00
A8R63	322-3162-00			RES,FXD,FILM:475 OHM,1%,0.2W,TC=T0	80009	322-3162-00
A8R64	322-3108-00			RES,FXD,FILM:130 OHM,1%,0.2W,TC=T0	80009	322-3108-00
A8R65	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A8R66	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2W,TC=T0	80009	322-3135-00
A8R69	301-0274-00			RES,FXD,FILM:270K OHM,5%,0.5W	80009	301-0274-00
A8R70	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A8R71	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322-3126-00
A8R72	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A8RT67	307-1599-00			RES,THERMAL:	80009	307-1599-00
A8RT68	307-1599-00			RES,THERMAL:	80009	307-1599-00
A8S1	260-2557-00			SWITCH,PUSH:DPDT,6A,250VAC,36A SURGE,SNAP I N PC MOUNT	80009	260-2557-00
				ATTACHED PARTS		
	366-1160-00			PUSH BUTTON:CHARCOAL,0.523 X 0.253 X 0.43	80009	366-1160-00
				END ATTACHED PARTS		
A8T2	120-1879-00			XFMR,PWR RF:	80009	120-1879-00
A8TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A8U1	156-0285-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIV E,12V,1.0A,4%;MC7812CT,TO-220	80009	156-0285-00
				ATTACHED PARTS		
	211-0578-00			SCREW,MACHINE:6-32 X 0.438,PNH,STL (ATTACHED TO U1 & U2)	93907	ORDER BY DESCR
	342-0676-00			INSULATOR,XSTR:SILICON RUBBER,0.006 THK (ATTACHED TO U1 & U2)	80009	342-0676-00
	343-0527-00			RETAINER,XSTR:POLYCARBONATE (ATTACHED TO U1 & U2)	80009	343-0527-00
				END ATTACHED PARTS		
A8U2	156-0872-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIV E,-12V,1.0A,4%;MC7912CT,TO-220	04713	MC7912CT

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(SEE U1 FOR ATTACHED PARTS)		
A8U5	156-3827-00			MICROCKT,LINEAR:BIPOLAR,SW REG CONTROLLER,P WM,CURRENT MODE,PUSH PULL OUTPUTS	80009	156-3827-00
A8U6	156-1225-01			IC,LINEAR:BIPOLAR,COMPARATOR;DUPLICATE OF 1 56-1225-00,DO NOT USE;LM393N,DIP08.3	80009	156-1225-01
A8U7	156-1226-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLL ECTOR,80NS;LM319N,DIP14.3	18324	LM319F
A8U8	156-1226-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLL ECTOR,80NS;LM319N,DIP14.3	18324	LM319F
A8U9	156-0885-00			CPLR,OPTOELECTR:LED,5KV ISOLATION	04713	SOC 123A
A8U10	156-0885-00			CPLR,OPTOELECTR:LED,5KV ISOLATION	04713	SOC 123A
A8U11	156-1631-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;SHUNT,A DJUSTABLE,100MA;TL431CLP,TO-92	01295	TL431C-LP
A8U12	156-1631-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;SHUNT,A DJUSTABLE,100MA;TL431CLP,TO-92	01295	TL431C-LP
A8VR1	152-0175-00			DIODE,ZENER:,;5.6V,5%,0.4W;1N752A,DO-7 OR 3 5,TR	14552	TD3810976
A8VR2	152-0175-00			DIODE,ZENER:,;5.6V,5%,0.4W;1N752A,DO-7 OR 3 5,TR	14552	TD3810976
A8VR4	152-0647-00			DIODE,ZENER:,;6.8V,5%,0.4W;1N957B,DO-7 OR 3 5,TR	04713	1N957B
A8VR5	152-0662-00			DIODE,ZENER:,;5V,1%,0.4W;1N751 FMLY,DO-7 OR 35,TR	04713	SZG195RL
A8VR6	152-0520-00			DIODE,ZENER:,;12V,5%,1W;1N4742A,DO-41,TR	80009	152-0520-00
A9	671-1635-00			CIRCUIT BD ASSY:FRONT PANEL LED	80009	671-1635-00
A9DS1	150-1109-00			LT EMITTING DIO:GREEN,30MA	80009	150-1109-00
A9DS2	150-1138-00			LT EMITTING DIO:RED,RECTANGULAR SOLID STATE	80009	150-1138-00
A9J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
W1	174-2615-00			CA ASSY,SP,ELEC:40,28 AWG,2.0 L,RIBBON (CONNECTED AT A4J1 AND A5J1)	80009	174-2615-00
W2	174-2615-00			CA ASSY,SP,ELEC:40,28 AWG,2.0 L,RIBBON (CONNECTED AT A4J2 AND A5J2)	80009	174-2615-00
W19	174-2623-00			CABLE ASSY:RIBBON,;4,26 AWG,6.5 INCH L,0.02 5 SQ RCPT X 0.025 SQ RCPT;,, (CONNECTED AT A3J19 AND A9J1)	80009	174-2623-00
W40	174-2615-00			CA ASSY,SP,ELEC:40,28 AWG,2.0 L,RIBBON (CONNECTED AT A3J4 AND A6J40)	80009	174-2615-00

DIAGRAMS/CIRCUIT BOARD ILLUSTRATIONS

Symbols

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

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

Both overline and parenthesis indicate a low asserting state.

Example: $\overline{\text{ID,CONTROL}}$ or (ID CONTROL)

Abbreviations are based on ANSI Y1.1-1972.

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

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

American National Standard Institute
1430 Broadway, New York, New York 10018

Component Values

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

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

The following information and special symbols may appear in this manual.

Assembly Numbers

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the diagram (in circuit board outline), circuit board illustration title, and lookup table for the schematic diagram.

The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:

Component Number
A23 A2 R1234
Assembly Number — Subassembly Number (if used)

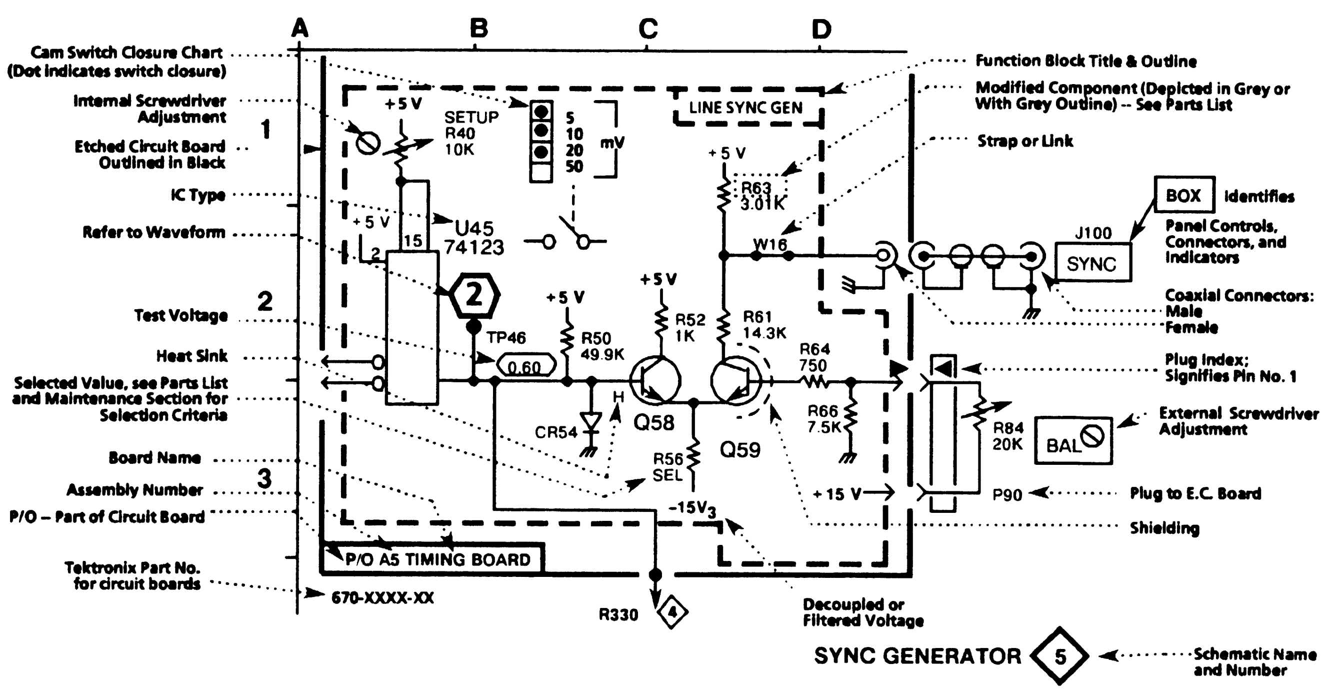
Chassis-mounted components have no Assembly No. prefix. See end of Replaceable Electrical Parts List

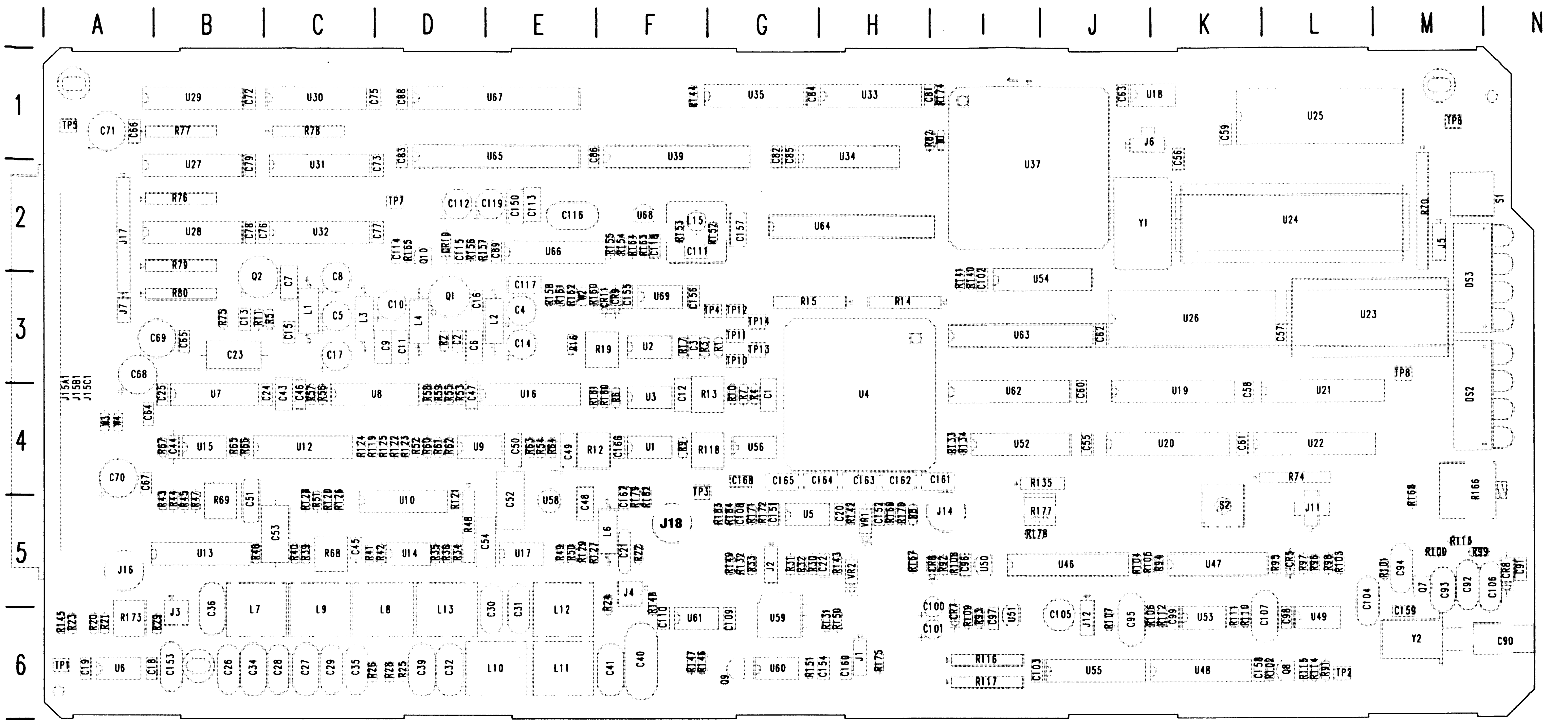
Schematic Circuit Number

Grid Coordinates

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table.

When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.





A1 ADC BOARD

Static Sensitive Devices
See Maintenance Section

ADC BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 2, 3, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C18	A1	B6
C19	A1	A6
C20	F1	H5
C21	G2	F5
C22	F2	H5
C23	G2	B3
C24	G2	C4
C25	G2	B4
C26	B1	B6
C27	C1	C6
C28	C1	C6
C29	C1	C6
C30	D1	E6
C31	D1	E6
C32	D1	D6
C34	B1	B6
C35	C1	C6
C36	B1	B6
C39	D1	D6
C40	D1	F6
C41	D1	F6
C43	H2	C4
C44	H2	B4
C45	G4	C5
C46	A4	C4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C47	B3	D4
C48	E4	E5
C49	C4	E4
C50	C4	E4
C51	F5	B5
C52	D4	E5
C53	G4	C5
C54	H4	E5
C109	E1	G6
C110	E1	F6
C151	F1	G5
C152	F2	H5
C153	A2	B6
C154	C3	H6
C160	B2	H6
J1	B2	H6
J2	F2	G5
J3	B1	B5
J4	D1	F5
J16	B1	A5
J18	E1	F5
L6	G2	F5
L7	B1	B5
L8	C1	C5

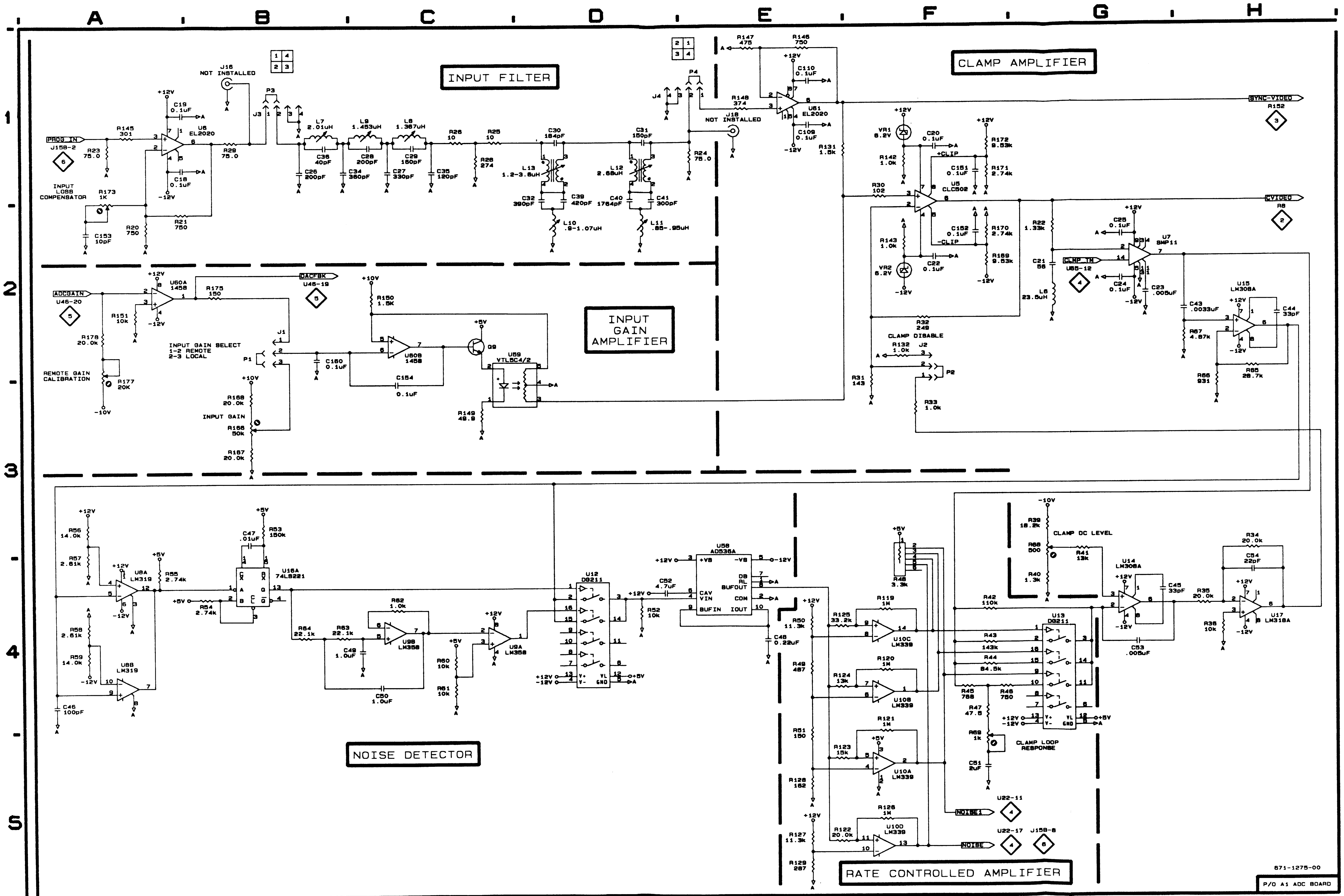
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
L9	C1	C5
L10	D2	E6
L11	D2	F6
L12	D1	E5
L13	D1	D5
P1	B2	
P2	F2	
P3	B1	
P4	E1	
Q9	C2	G6
R20	A2	A6
R21	A2	A6
R22	G2	F5
R23	A1	A6
R24	E1	F6
R25	C1	D6
R26	C1	D6
R28	C1	D6
R29	B1	B6
R30	F1	G5
R31	F2	G5
R32	F2	G5
R33	F3	G5
R34	H3	D5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R35	H4	D5
R36	H4	D5
R39	G3	C5
R40	G4	C5
R41	G3	C5
R42	F4	D5
R43	F4	B5
R44	F4	B5
R45	F4	B5
R46	F4	B5
R47	F4	B5
R48	F3	D5
R49	E4	E5
R50	E4	E5
R51	E4	C5
R52	D4	D4
R53	B3	D4
R54	B4	E4
R55	A4	D4
R56	A3	C4
R57	A3	C4
R58	A4	D4
R59	A4	D4
R60	C4	D4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R61	C4	D4
R62	C4	D4
R63	B4	E4
R64	B4	E4
R65	H2	B4
R66	H2	B4
R67	H2	B4
R68	G3	C5
R69	F5	B4
R119	F4	D4
R120	F4	C5
R121	F4	D5
R122	E5	D4
R123	E5	D4
R124	E4	C4
R125	E4	D4
R126	F5	C5
R127	E5	F5
R128	E5	C5
R129	E5	E5
R131	E1	H6
R132	F2	G5
R142	F1	H5
R143	F2	H5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R145	A1	A6
R146	E1	F6
R147	E1	F6
R148	E1	F6
R149	C3	G5
R150	C2	H6
R151	A2	G6
R166	B3	M5
R167	B3	H5
R168	B3	M5
R169	F2	H5
R170	F2	H5
R171	F1	G5
R172	F1	G5
R173	A1	A5
R175	B2	H6
R177	A2	J5
R178	A2	I5
U5	F1	G5
U6	A1	A6
U7	G2	B4
U8A	A4	C4
U8B	A4	C4
U9A	C4	D4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U9B	C4	D4
U10A	F5	C5
U10B	F4	C5
U10C	F4	C5
U10D	F5	C5
U12	D4	B4
U13	G4	B5
U14	G4	D5
U15	H2	B4
U16A	B4	E4
U17	H4	E5
U58	E4	E4
U59	C2	G5
U60A	A2	G6
U60B	C2	G6
U61	E1	F6
VR1	F1	H5
VR2	F2	H5

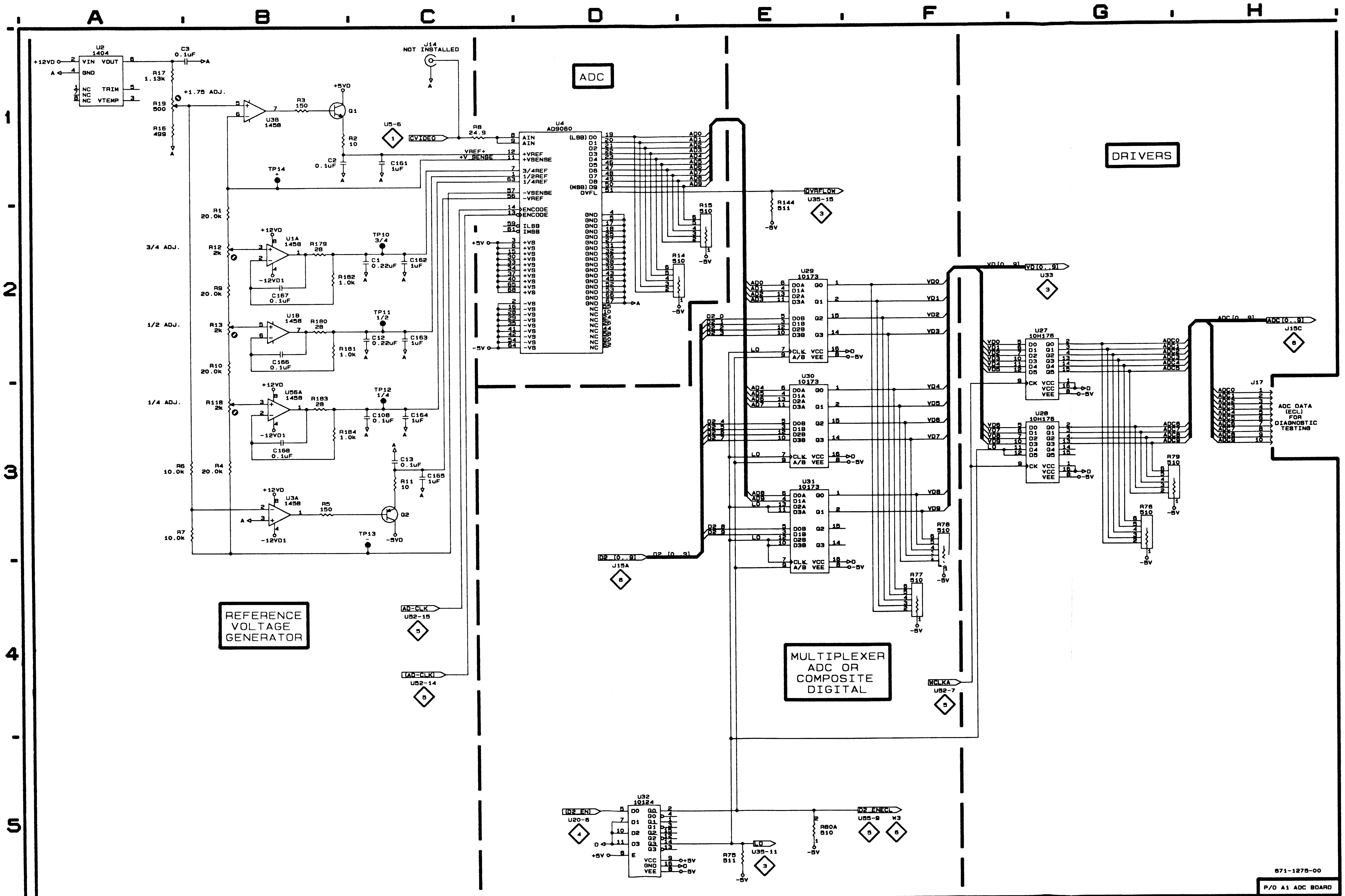

INPUT FILTER
CLAMP AMPLIFIER
INPUT GAIN AMPLIFIER
NOISE DETECTOR
RATE CONTROLLED AMPLIFIER
SYNC-VIDEO
CVIDEO
PROG IN
ADCGAIN
DACFBK
NOISE1
NOISE
INPUT LOSS COMPENSATOR
INPUT GAIN SELECT
1-2 REMOTE
2-3 LOCAL
REMOTE GAIN CALIBRATION
INPUT GAIN
CLAMP DISABLE
CLAMP DC LEVEL
CLAMP LOOP RESPONSE
871-1275-00
P/O A1 ADC BOARD

ADC BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 1, 3, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	C2	G4	R78	F3	C1
C2	B1	D3	R79	G3	A2
C3	B1	F3	R80A	E5	A3
C12	C2	F4	R118	B3	F4
C13	C3	B3	R144	E1	F1
C108	C3	G5			
C161	C1	I4	R179	B2	F5
			R180	B2	F4
C162	C2	H4	R181	B2	F4
C163	C2	H4	R182	B2	F5
C164	C3	G4	R183	B3	G5
C165	C3	G4	R184	B3	G5
C166	B2	F4			
C167	B2	F5	TP10	C2	G3
C168	B3	G4	TP11	C2	G3
			TP12	C3	G3
J14	C1	H5	TP13	C3	G3
J17	H3	A2	TP14	B1	G3
Q1	B1	D3	U1A	B2	F4
Q2	C3	B2	U1B	B2	F4
			U2	A1	F3
R1	B2	G3	U3A	B3	F4
R2	B1	D3	U3B	B1	F4
R3	B1	G3	U4	D1	H3
R4	B3	G4			
R5	B3	C3	U27	G2	A2
R6	B3	F4	U28	G3	A2
			U29	E2	A1
R7	B3	G4	U30	E3	B1
R8	C1	H5	U31	E3	C2
R9	B2	F4	U32	D5	C2
R10	B2	G4	U56A	B3	G4
R11	C3	B3			
R12	B2	E4			
R13	B2	F3			
R14	D2	I3			
R15	E2	H3			
R16	A1	E3			
R17	A1	F3			
R19	A1	E3			
R75	E5	B3			
R76	G3	A2			
R77	F4	A1			



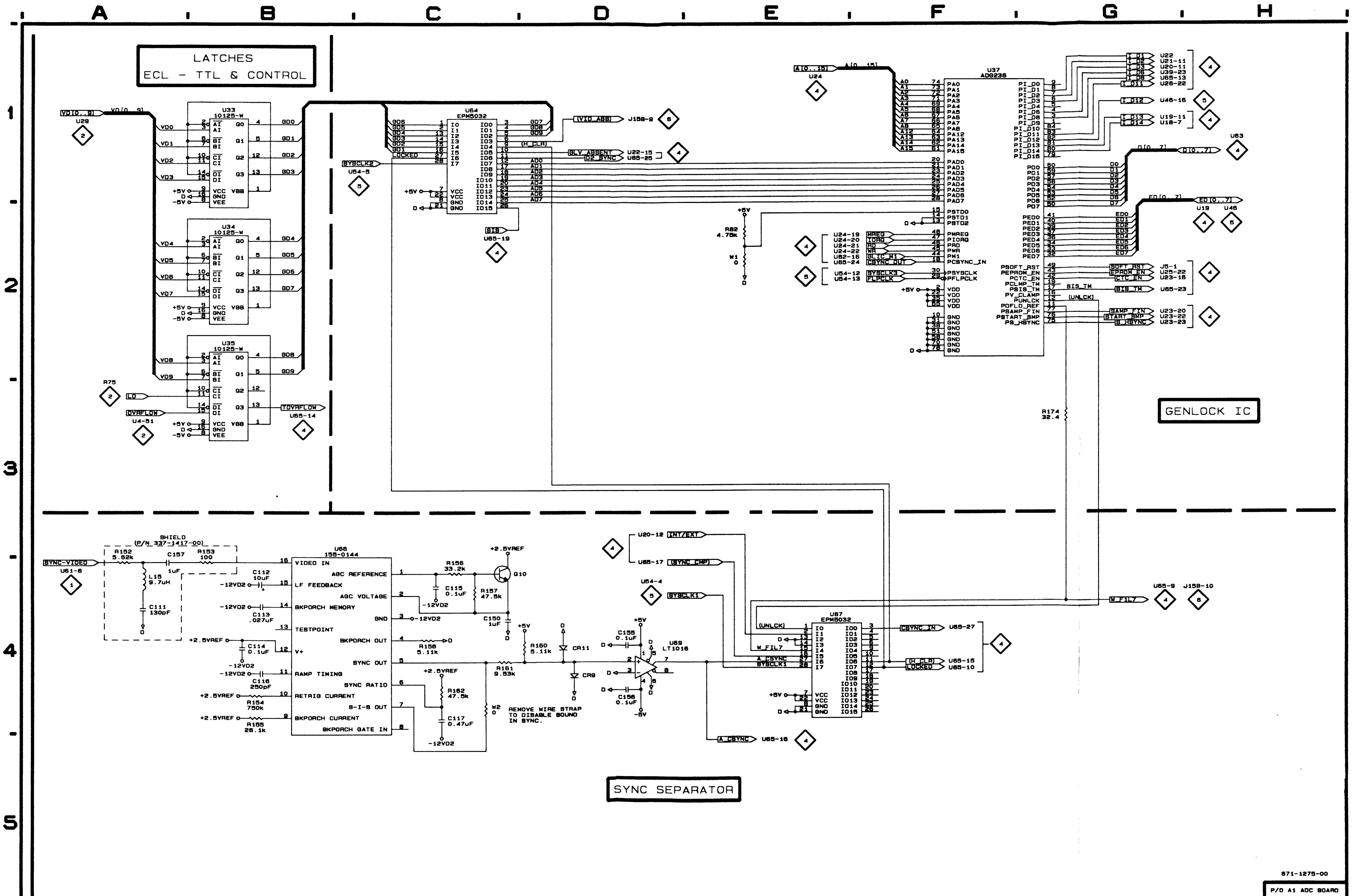
ADC, DATA MUX AND LATCHES 2

ADC BOARD
Schematic <3> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 1, 2, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C111	A4	F2
C112	B4	D2
C113	B4	E2
C114	B4	D2
C115	C4	D2
C116	B4	E2
C117	C4	E3
C150	C4	E2
C155	D4	F3
C156	D4	F3
C157	A4	G2
CR9	D4	F3
CR11	D4	F3
L15	A4	F2
Q10	C4	D2
R82	E2	I1
R152	A4	G2
R153	B4	F2
R154	B4	F2
R155	B4	F2
R156	C4	D2
R157	C4	E2
R158	C4	E3
R160	D4	F3
R161	C4	E3
R162	C4	E3
R174	G3	I1
U33	B1	H1
U34	B2	G2
U35	B2	G1
U37	F1	I1
U64	C1	G2
U66	B4	E3
U67	E4	D1
U69	D4	F3
W1	E2	I1
W2	C4	E3

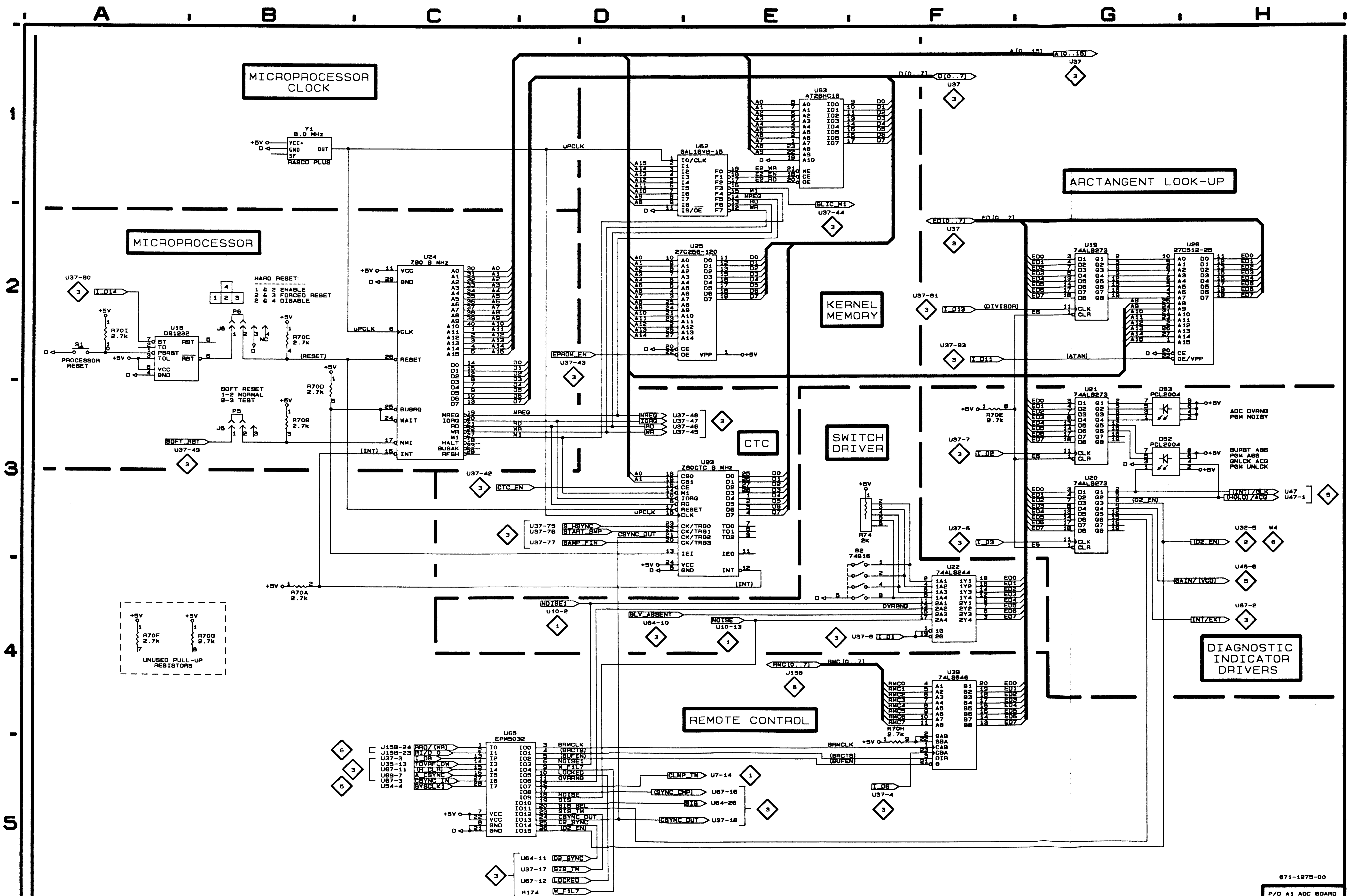

LATCHES
ECL - TTL & CONTROL
GENLOCK IC
SYNC SEPARATOR
671-1275-00
P/O A1 ADC BOARD

ADC BOARD
Schematic <4> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 1, 2, 3, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
DS2	G3	N4
DS3	G3	N3
J5	B3	M2
J6	B2	J1
P5	B3	
P6	B2	
R70A	B4	M2
R70B	B3	M2
R70C	B2	M2
R70D	B3	M2
R70E	F3	M2
R70F	A4	M2
R70G	B4	M2
R70H	F5	M2
R70I	A2	M2
R74	F3	L4
S1	A2	N2
S2	E3	K5
U18	A2	J1
U19	G2	J4
U20	G3	J4
U21	G3	L4
U22	F4	K4
U23	D3	L3
U24	C2	K3
U25	D2	K2
U26	G2	J3
U39	F4	F2
U62	D1	I4
U63	E1	I3
U65	C5	D2
Y1	B1	J2



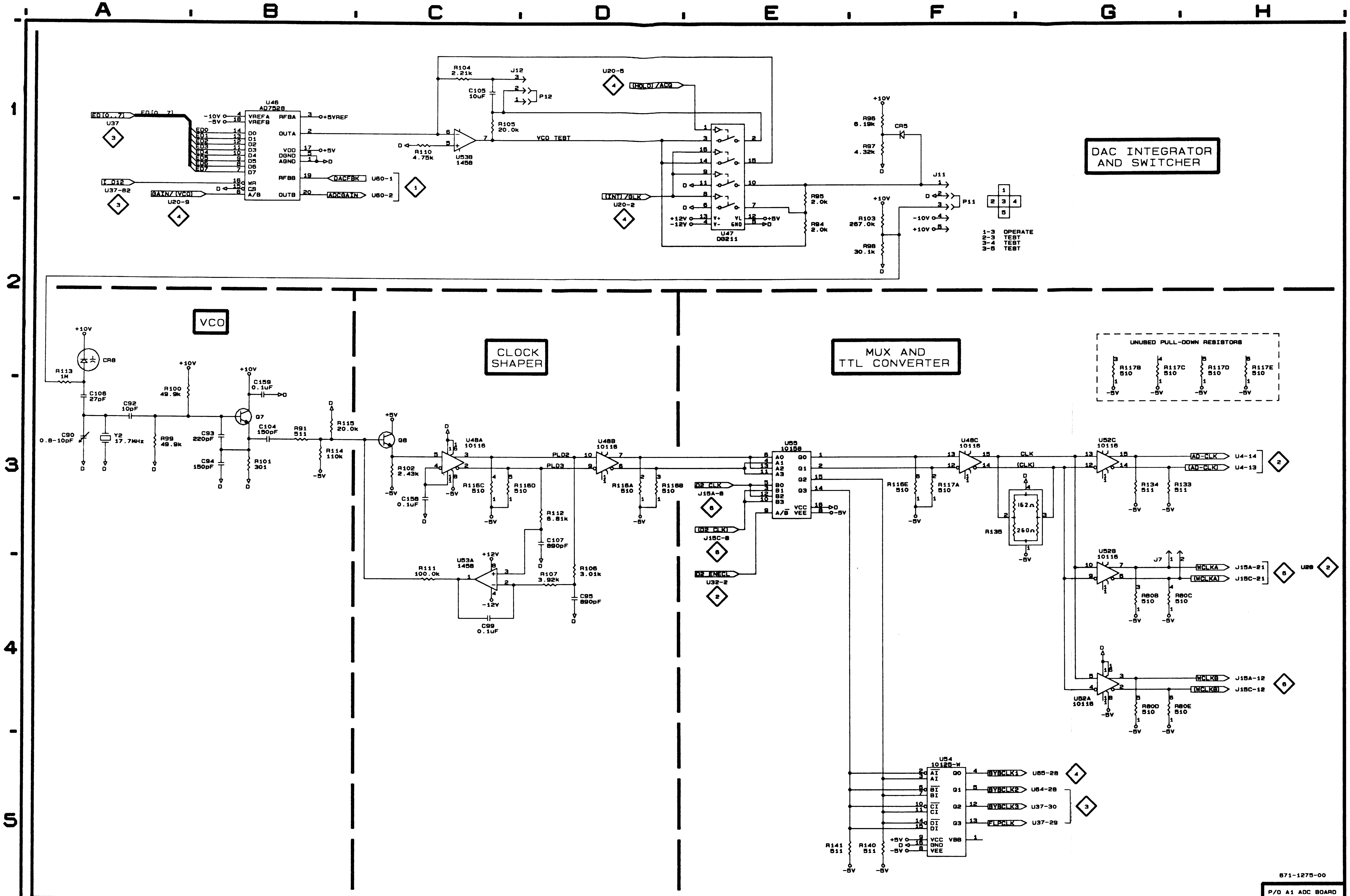
GENLOCK PROCESSOR KERNEL

ADC BOARD
Schematic <5> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 1, 2, 3, 4, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C90	A3	N6
C92	A3	M5
C93	B3	M5
C94	B3	M5
C95	D4	J6
C99	C4	K6
C104	B3	L6
C105	C1	J6
C106	A3	N5
C107	D3	L6
C158	C3	L6
C159	B3	M6
CR5	F1	L5
CR8	A2	N5
J7	G3	A3
J11	F1	L5
J12	D1	J5
P11	F1	
P12	D1	
Q7	B3	M5
Q8	C3	L6
R80B	G4	A3
R80C	G4	A3
R80D	G4	A3
R80E	G4	A3
R91	B3	L6
R94	E2	K5
R95	E1	L5
R96	F1	L5
R97	F1	L5
R98	F2	L5
R99	A3	M5
R100	A3	M5
R101	B3	M5
R102	C3	L6
R103	F2	L5
R104	C1	J5
R105	C1	K5
R106	D4	K6
R107	D4	J6
R110	C1	K6
R111	C4	K6
R112	D3	K6
R113	A3	M5
R114	B3	L6
R115	B3	L6
R116A	D3	I6
R116B	D3	I6
R116C	C3	I6
R116D	C3	I6
R116E	F3	I6
R117A	F3	I6
R117B	G2	I6
R117C	G2	I6
R117D	H2	I6
R117E	H2	I6
R133	G3	I4
R134	G3	I4
R135	F3	I4
R140	F5	I3
R141	E5	I3
U46	B1	I5
U47	E1	K5
U48A	C3	K6
U48B	D3	K6
U48C	F3	K6
U52A	G4	I4
U52B	G4	I4
U52C	G3	I4
U53A	C4	K6
U53B	C1	K6
U54	F5	I3
U55	E3	J6
Y2	A3	M6



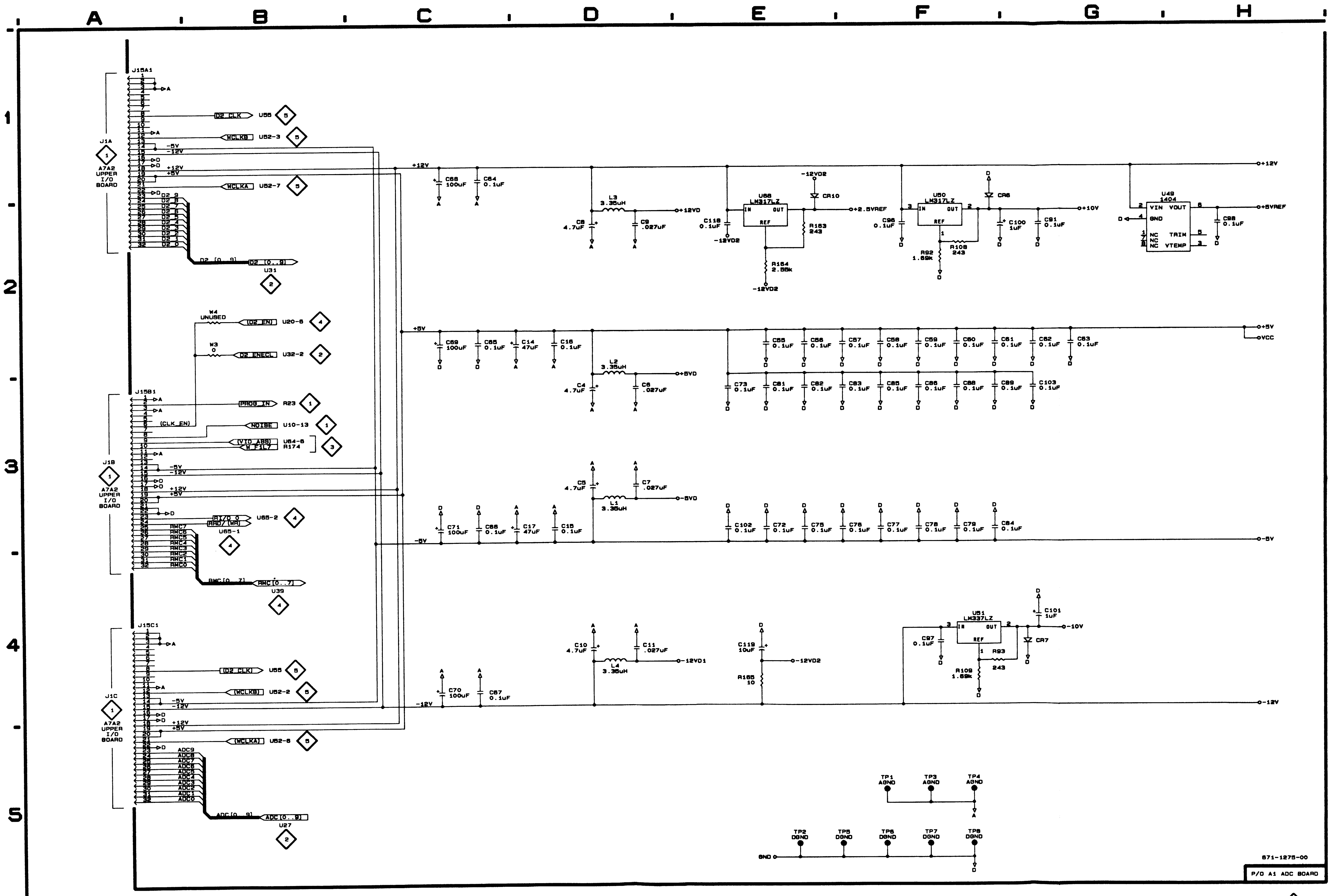
VCO AND CLOCK DISTRIBUTION 5

ADC BOARD
Schematic <6> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematics 1, 2, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C4	D3	E3
C5	D3	C3
C6	D3	D3
C7	D3	C3
C8	D2	C2
C9	D2	D3
C10	D4	D3
C11	D4	D3
C14	D2	E3
C15	D3	C3
C16	D2	D3
C17	D3	C3
C55	E2	J4
C56	E2	K2
C57	F2	L3
C58	F2	K4
C59	F2	K1
C60	F2	J4
C61	F2	K4
C62	G2	J3
C63	G2	J1
C64	C1	A4
C65	C2	B3
C66	C3	A1
C67	C4	A4
C68	C1	A3
C69	C2	A3
C70	C4	A4
C71	C3	A1
C72	E3	B1
C73	E3	D2
C75	E3	D1
C76	F3	C2
C77	F3	D2
C78	F3	B2
C79	F3	B2
C81	E3	I1
C82	E3	G2
C83	F3	D2
C84	F3	G1
C85	F3	G2
C86	F3	F2
C88	F3	D1
C89	F3	E2
C91	G2	N5
C96	F2	I5
C97	F4	I6
C98	H2	L6
C100	F2	H6
C101	G4	H6
C102	E3	I3
C103	G3	J6
C118	E2	F2
C119	E4	E2
CR6	F1	I5
CR7	G4	I6
CR10	E1	D2
J15A	A1	A5
J15B	A3	A5
J15C	A4	A5
L1	D3	C3
L2	D2	E3
L3	D2	C3
L4	D4	D3
R92	F2	I5
R93	F4	I6
R108	F2	I5
R109	F4	I6
R163	E2	F2
R164	E2	F2
R165	E4	D2
TP1	F5	A6
TP2	E5	L6
TP3	F5	F4
TP4	F5	G3
TP5	F5	A1
TP6	F5	M1
TP7	F5	D2
TP8	F5	M3
U49	G2	L6
U50	F2	I5
U51	F4	I6
U68	E2	F2
W3	B2	A4
W4	B2	A4


J15A1
J1A
A7A2 UPPER I/O BOARD
D2 CLK
WCLKB
WCLKA
D2 [0..9]
U31
J15B1
J1B
W4 UNUSED
W3 0
D2 ENECL
PROG IN
NOISE
RMC [0..7]
U39
J15C1
J1C
ADC [0..9]
U27
+12V
+5V
-5V
-12V
C88 100uF
C64 0.1uF
L3 3.35uH
+12VD
U68 LM317LZ
+2.5VREF
R153 243
R154 2.55k
-12VD2
U50 LM317LZ
+10V
R92 1.69k
R108 243
U49 1404
VIN VOUT
GND
TRIM
VTEMP
+5VREF
VCC
L2 3.35uH
+5VD
L1 3.35uH
-5VD
L4 3.35uH
-12VD1
U51 LM337LZ
-10V
R109 1.69k
R93 243
TP1 AGND
TP3 AGND
TP4 AGND
TP2 DGND
TP5 DGND
TP6 DGND
TP7 DGND
TP8 DGND
GND
671-1275-00
P/O A1 ADC BOARD

A2 MEMORY BOARD

Static Sensitive Devices
See Maintenance Section

MEMORY BOARD
Schematic <1> Look-Up Chart

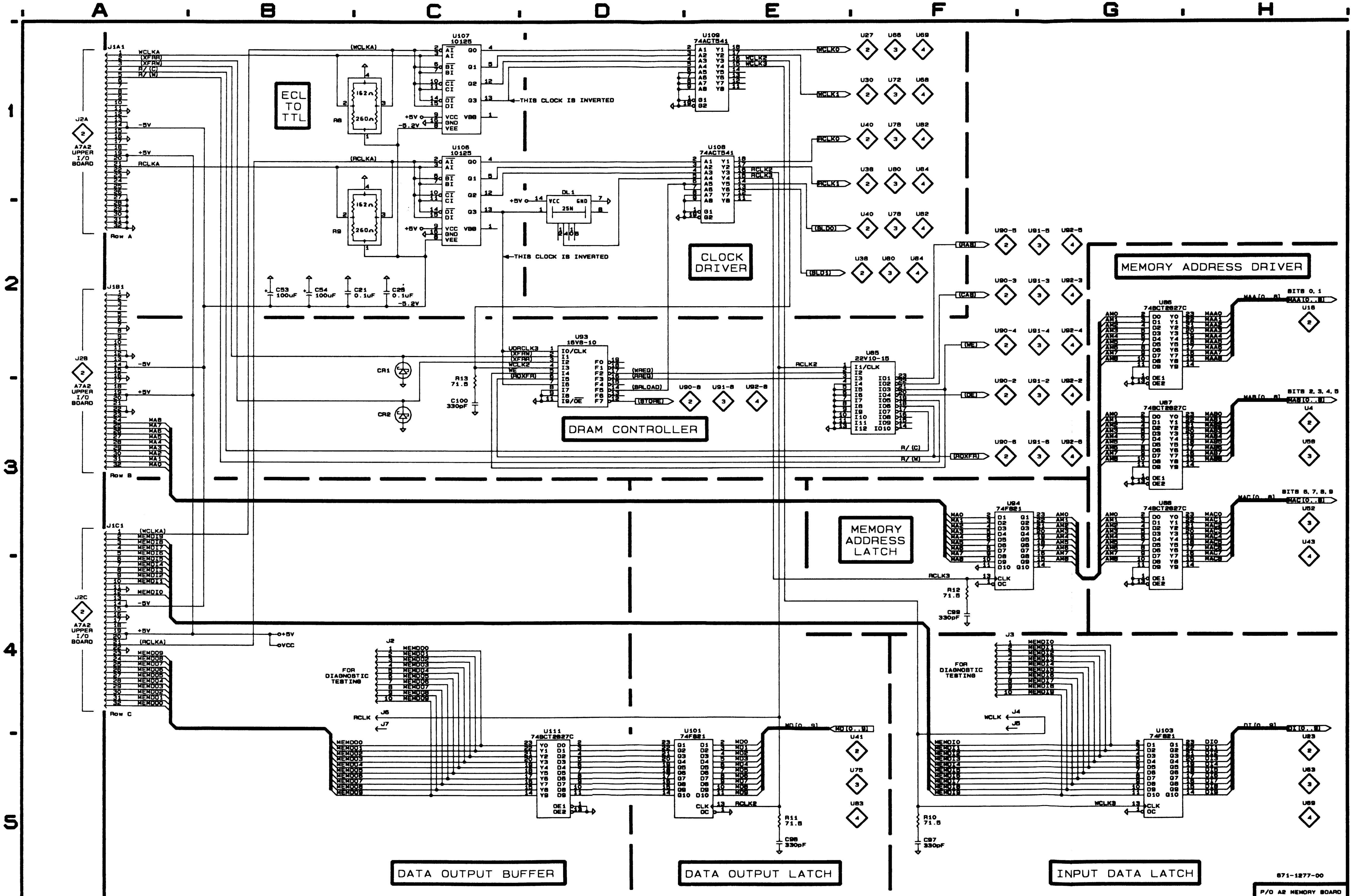
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A2. *Partial A2 also shown on Schematics 2, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C21	B2	D4
C25	C2	C3
C53	B2	A4
C54	B2	B4
C97	F5	B4
C98	E5	B2
C99	F4	D2
C100	C3	D5
CR1	C2	D5
CR2	C3	D5
DL1	D1	D2
J1A1	A1	A4
J1B1	A2	A4
J1C1	A3	A4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J2	C4	A1
J3	F4	A5
J4	F4	A4
J5	F4	A5
J6	C4	A2
J7	C4	A2
R8	B1	B4
R9	B1	B3
R10	F5	B4
R11	E5	B2
R12	F4	D2
R13	C2	D5
U85	F2	D5
U86	G2	L6
U87	G3	I6
U88	G3	F6

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U93	D2	D4
U94	F3	C2
U101	D5	D1
U103	G5	B5
U106	C1	C3
U107	C1	C4
U108	E1	D4
U109	E1	D3
U111	D5	B1

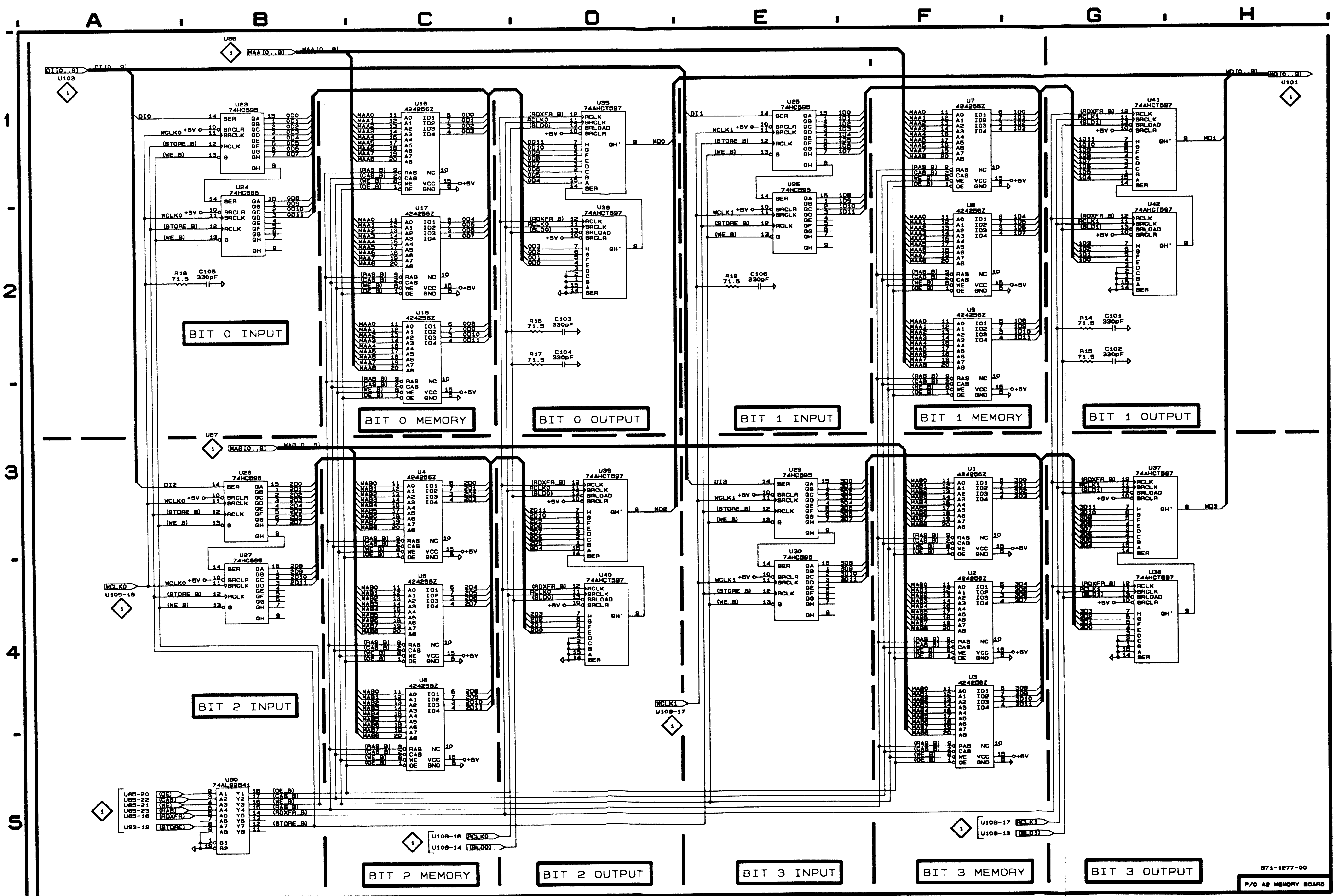

ECL TO TTL
CLOCK DRIVER
MEMORY ADDRESS DRIVER
DRAM CONTROLLER
MEMORY ADDRESS LATCH
DATA OUTPUT BUFFER
DATA OUTPUT LATCH
INPUT DATA LATCH
A7A2 UPPER I/O BOARD
FOR DIAGNOSTIC TESTING
THIS CLOCK IS INVERTED
871-1277-00
P/O A2 MEMORY BOARD

MEMORY BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A2. *Partial A2 also shown on Schematics 1, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U43	C2	F4
U44	C3	F4
U45	C3	F4
U46	F2	F2
U47	F3	F2
U48	F3	F2
U67	E2	F1
U68	E3	F1
U69	B2	F5
U70	B3	F5
U81	D2	F3
U82	D3	F4
U83	G2	F3
U84	G3	F2
U92	B4	E6

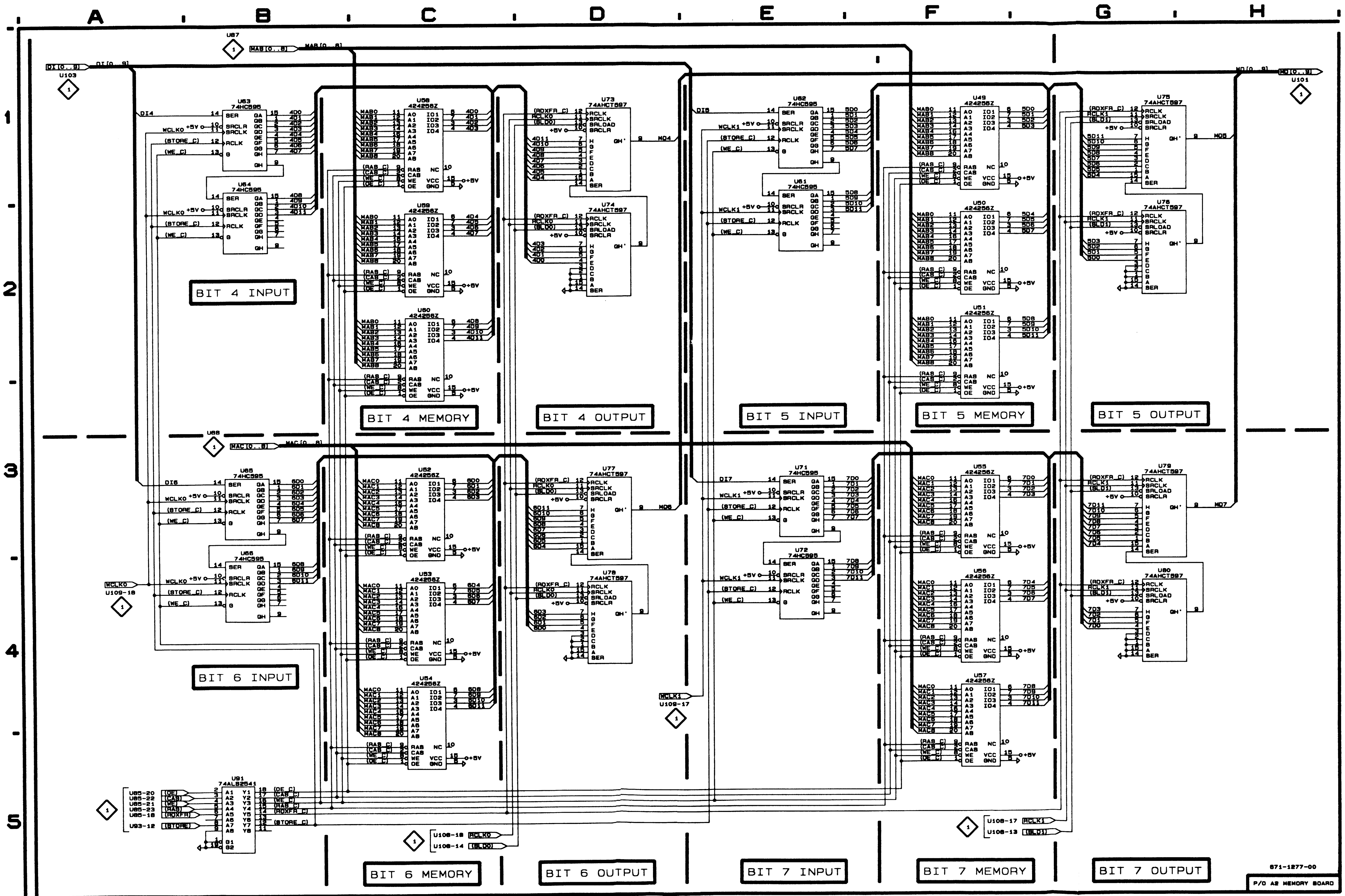

BIT 0 INPUT
BIT 0 MEMORY
BIT 0 OUTPUT
BIT 1 INPUT
BIT 1 MEMORY
BIT 1 OUTPUT
BIT 2 INPUT
BIT 2 MEMORY
BIT 2 OUTPUT
BIT 3 INPUT
BIT 3 MEMORY
BIT 3 OUTPUT
871-1277-00
P/O A2 MEMORY BOARD

MEMORY BOARD
Schematic <3> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A2. *Partial A2 also shown on Schematics 1, 2, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C101	G2	L3
C102	G2	L3
C103	D2	L4
C104	D2	L4
C105	B2	L5
C106	E2	L1
R14	G2	L3
R15	G2	L3
R16	D2	L3
R17	D2	L3
R18	A2	L5
R19	E2	L1
U1	F3	J2
U2	F4	J2
U3	F4	J2
U4	C3	J4
U5	C4	J4
U6	C4	J4
U7	F1	K2
U8	F2	K2
U9	F2	K2
U16	C1	K4
U17	C2	K4
U18	C2	K4
U23	B1	K5
U24	B1	K5
U25	E1	K1
U26	E1	K1
U27	B4	J5
U28	B3	J5
U29	E3	J1
U30	E4	J1
U35	D1	K3
U36	D2	K4
U37	G3	J3
U38	G4	J2
U39	D3	J3
U40	D4	J4
U41	G1	K3
U42	G2	K2
U90	B5	J6

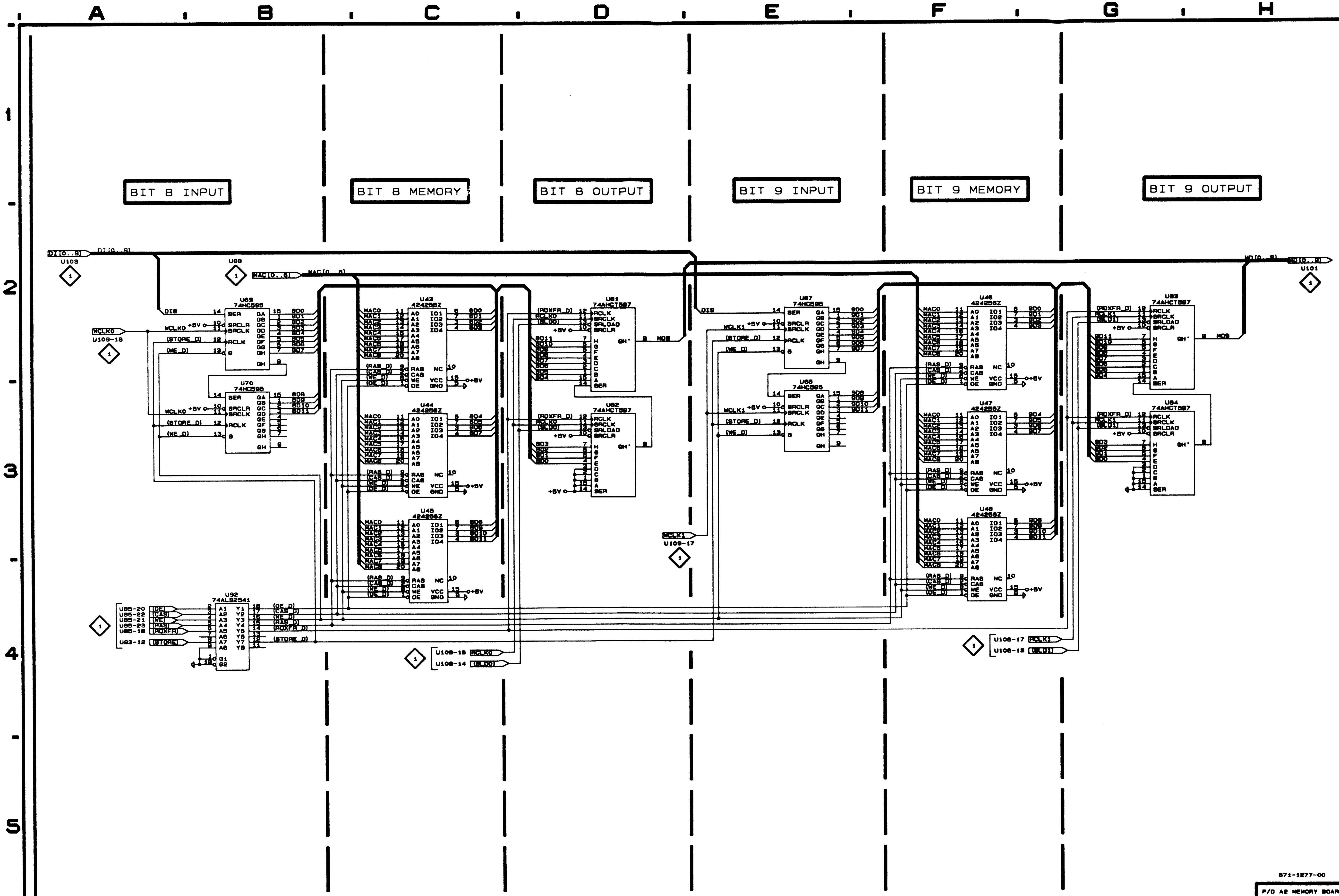

A
B
C
D
E
F
G
H
BIT 4 INPUT
BIT 4 MEMORY
BIT 4 OUTPUT
BIT 5 INPUT
BIT 5 MEMORY
BIT 5 OUTPUT
BIT 6 INPUT
BIT 6 MEMORY
BIT 6 OUTPUT
BIT 7 INPUT
BIT 7 MEMORY
BIT 7 OUTPUT
871-1277-00
P/O A2 MEMORY BOARD

MEMORY BOARD
Schematic <4> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A2. *Partial A2 also shown on Schematics 1, 2, 3, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U49	F1	H2
U50	F2	H2
U51	F2	H2
U52	C3	G4
U53	C4	G4
U54	C4	G4
U55	F3	G2
U56	F4	G2
U57	F4	G2
U58	C1	H4
U59	C2	H4
U60	C2	H4
U61	E1	H1
U62	E1	H1
U63	B1	H5
U64	B1	H5
U65	B3	G5
U66	B4	G5
U71	E3	G1
U72	E4	G1
U73	D1	H3
U74	D2	H4
U75	G1	H3
U76	G2	H2
U77	D3	G3
U78	D4	G4
U79	G3	G3
U80	G4	G2
U91	B5	H6

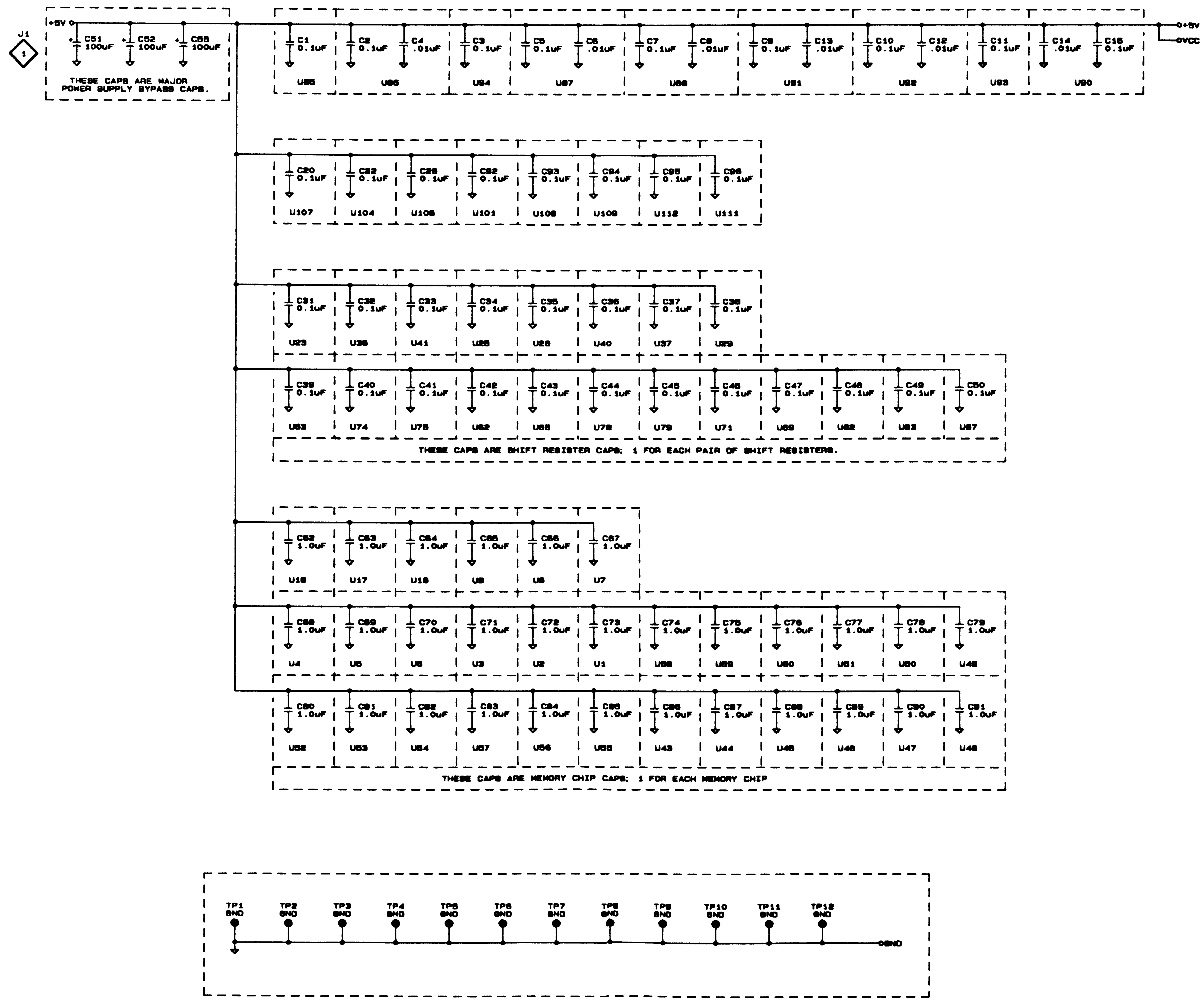

BIT 8 INPUT
BIT 8 MEMORY
BIT 8 OUTPUT
BIT 9 INPUT
BIT 9 MEMORY
BIT 9 OUTPUT
671-1277-00
P/O A2 MEMORY BOARD

MEMORY BOARD
Schematic <5> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

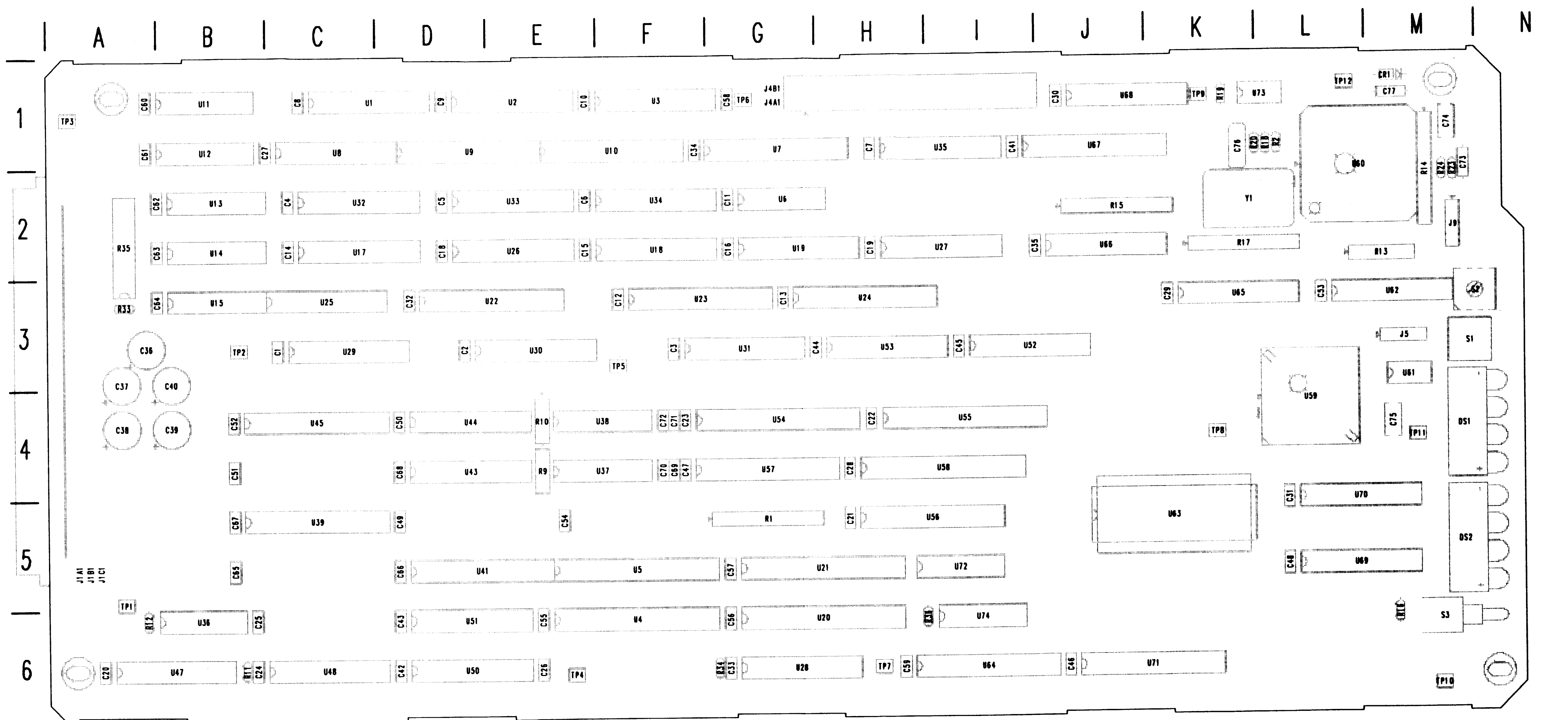
Assembly A2. *Partial A2 also shown on Schematics 1, 2, 3, and 4 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	C1	D5
C2	C1	K6
C3	C1	B2
C4	C1	K6
C5	D1	H6
C6	D1	H6
C7	D1	F6
C8	D1	F6
C9	E1	G6
C10	E1	D6
C11	F1	D4
C12	E1	D6
C13	E1	G6
C14	F1	J6
C16	F1	J6
C20	C2	C4
C22	C2	B5
C26	C2	D3
C31	C2	K5
C32	C2	K4
C33	C2	K3
C34	C2	K1
C35	D2	J5
C36	D2	J4
C37	D2	J3
C38	E2	J1
C39	C3	H5
C40	C3	H4
C41	C3	H3
C42	C3	H1
C43	D3	H5
C44	D3	H4
C45	D3	H3
C46	E3	H1
C47	E3	E5
C48	E3	E4
C49	E3	E3
C50	F3	E1
C51	B1	A3
C52	B1	A3
C55	B1	B3
C62	C3	L5
C63	C3	L4
C64	C3	L4
C65	C3	L2
C66	D3	L2
C67	D3	L2
C68	C4	J5
C69	C4	J4
C70	C4	J4
C71	C4	J2
C72	D4	J2
C73	D4	J2
C74	D4	I5
C75	E4	I4
C76	E4	I4
C77	E4	I2
C78	E4	I2
C79	F4	I2
C80	C4	H5
C81	C4	H4
C82	C4	H4
C83	C4	H2
C84	D4	H2
C85	D4	H2
C86	D4	F5
C87	E4	F4
C88	E4	F4
C89	E4	F2
C90	E4	F2
C91	F4	F2
C92	C2	C1
C93	D2	D4
C94	D2	D3
C95	D2	A1
C96	E2	B1
TP1	B5	A1
TP2	C5	B4
TP3	C5	A6
TP4	C5	E6
TP5	C5	B4
TP6	D5	E1
TP7	D5	H1
TP8	D5	H3
TP9	D5	H6
TP10	E5	M2
TP11	E5	M3
TP12	E5	M5



871-1277-00

P/O A2 MEMORY BOARD



A3 CONTROLLER BOARD

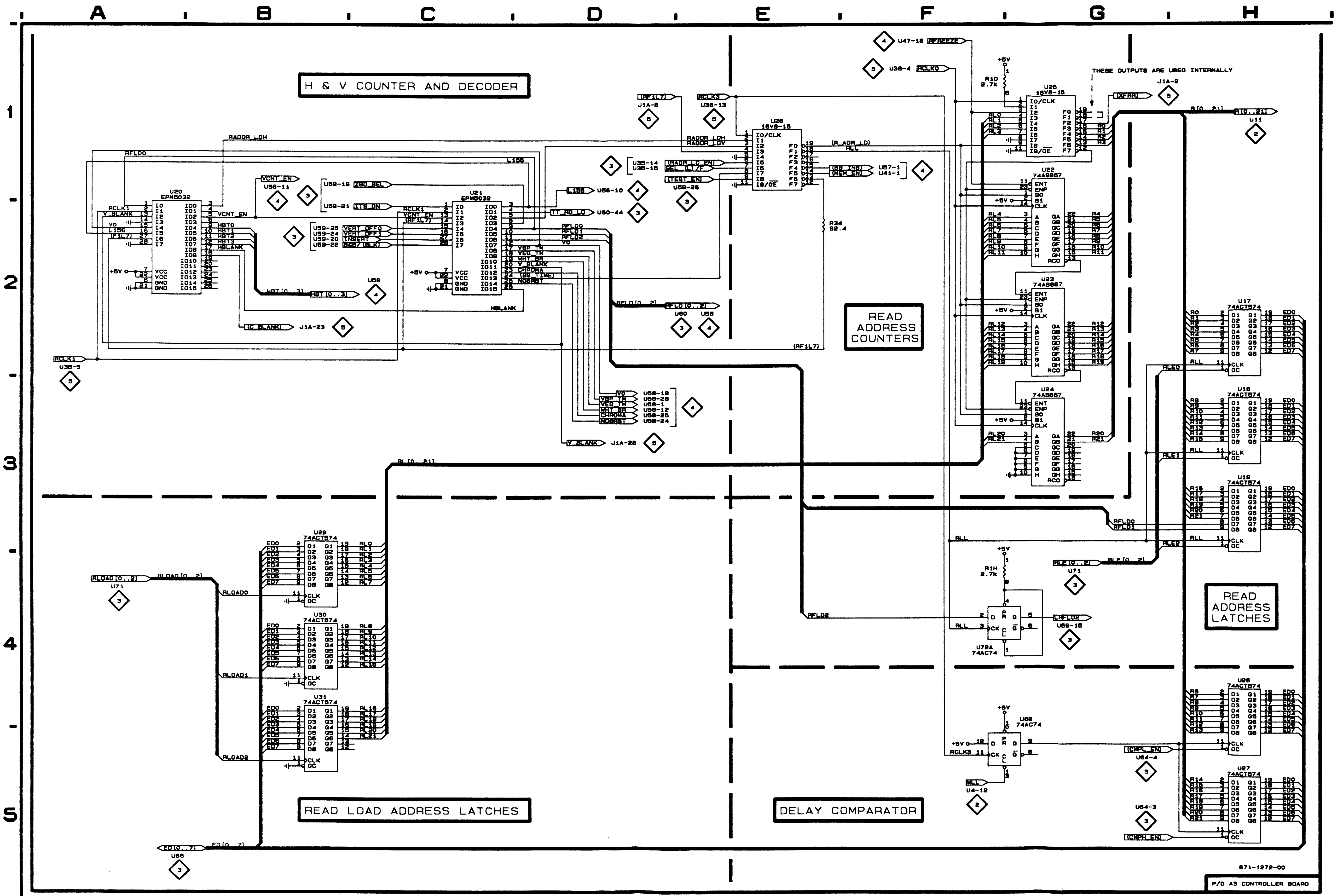
Static Sensitive Devices
See Maintenance Section

CONTROLLER BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A3. *Partial A3 also shown on Schematics 2, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R1D	F1	F5	U28	E1	G6
R1H	F4	F5	U29	B3	C3
R34	E2	G6	U30	B4	D3
U6B	F5	G2	U31	B4	F3
U17	H2	C3	U72A	F4	H5
U18	H3	F3	U25	G1	C3
U19	H3	G3	U26	H4	D3
U20	A2	G6	U27	H5	H3
U21	C2	G5	U28	E1	G6
U22	G1	D3	U29	B3	C3
U23	G2	F3	U30	B4	D3
U24	G3	G3	U31	B4	F3
U25	G1	C3	U72A	F4	H5
U26	H4	D3			
U27	H5	H3			

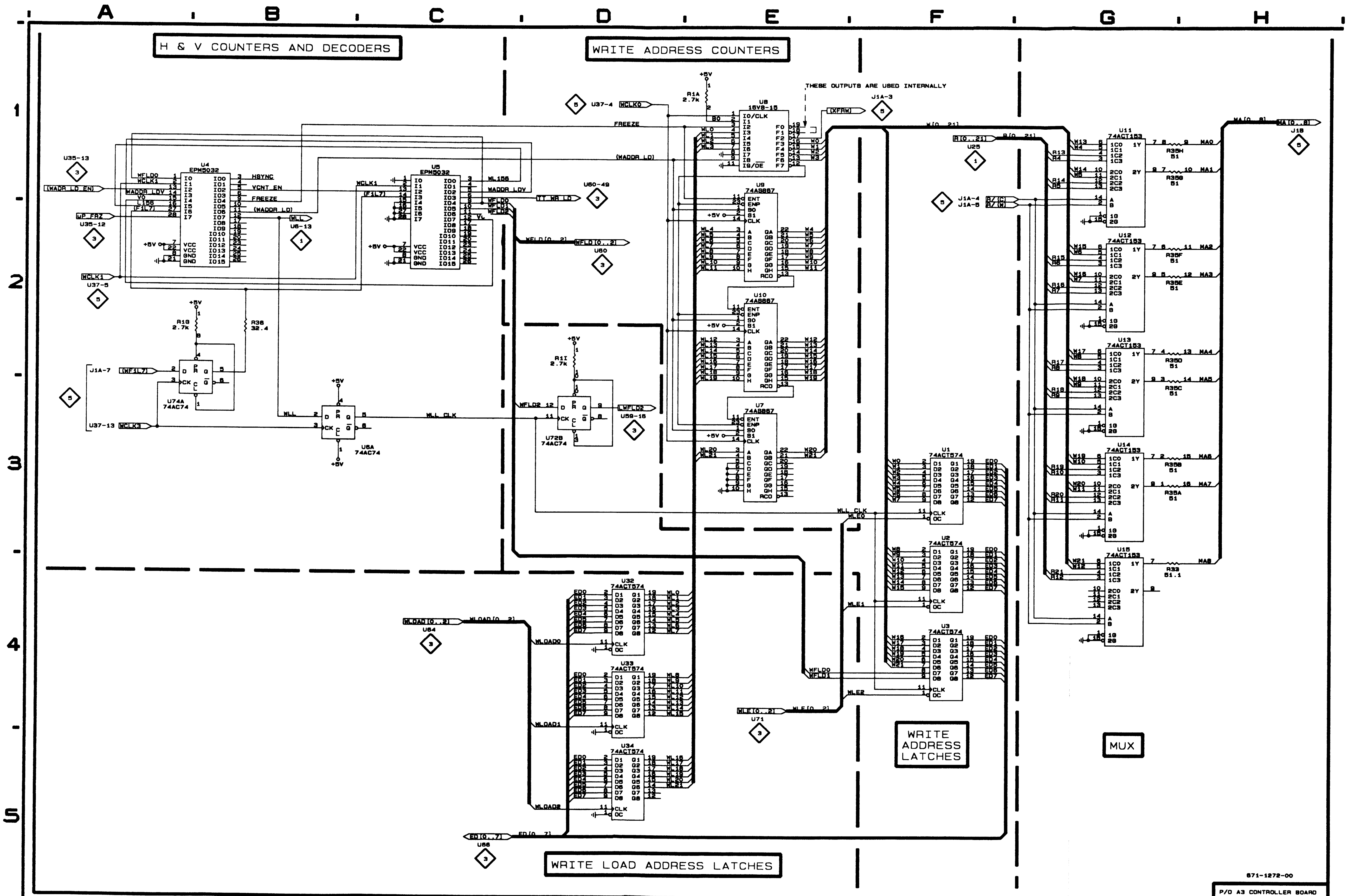

H & V COUNTER AND DECODER
READ ADDRESS COUNTERS
READ ADDRESS LATCHES
READ LOAD ADDRESS LATCHES
DELAY COMPARATOR
THESE OUTPUTS ARE USED INTERNALLY
P/O A3 CONTROLLER BOARD
671-1272-00

CONTROLLER BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A3. *Partial A3 also shown on Schematics 1, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R1A	E1	F5
R1G	B2	F5
R1I	D2	F5
R33	G4	A3
R35A	G3	A2
R35B	G3	A2
R35C	G2	A2
R35D	G2	A2
R35E	G2	A2
R35F	G2	A2
R35G	G1	A2
R35H	G1	A2
R36	B2	I6
U1	F3	C1
U2	F3	D1
U3	F4	F1
U4	A1	E6
U5	C1	E5
U6A	B3	G2
U7	E3	G2
U8	E1	C2
U9	E1	D2
U10	E2	E2
U11	G1	B1
U12	G2	B2
U13	G2	B2
U14	G3	B3
U15	G4	B3
U32	D4	C2
U33	D4	D2
U34	D5	F2
U72B	D3	H5
U74A	A2	I6



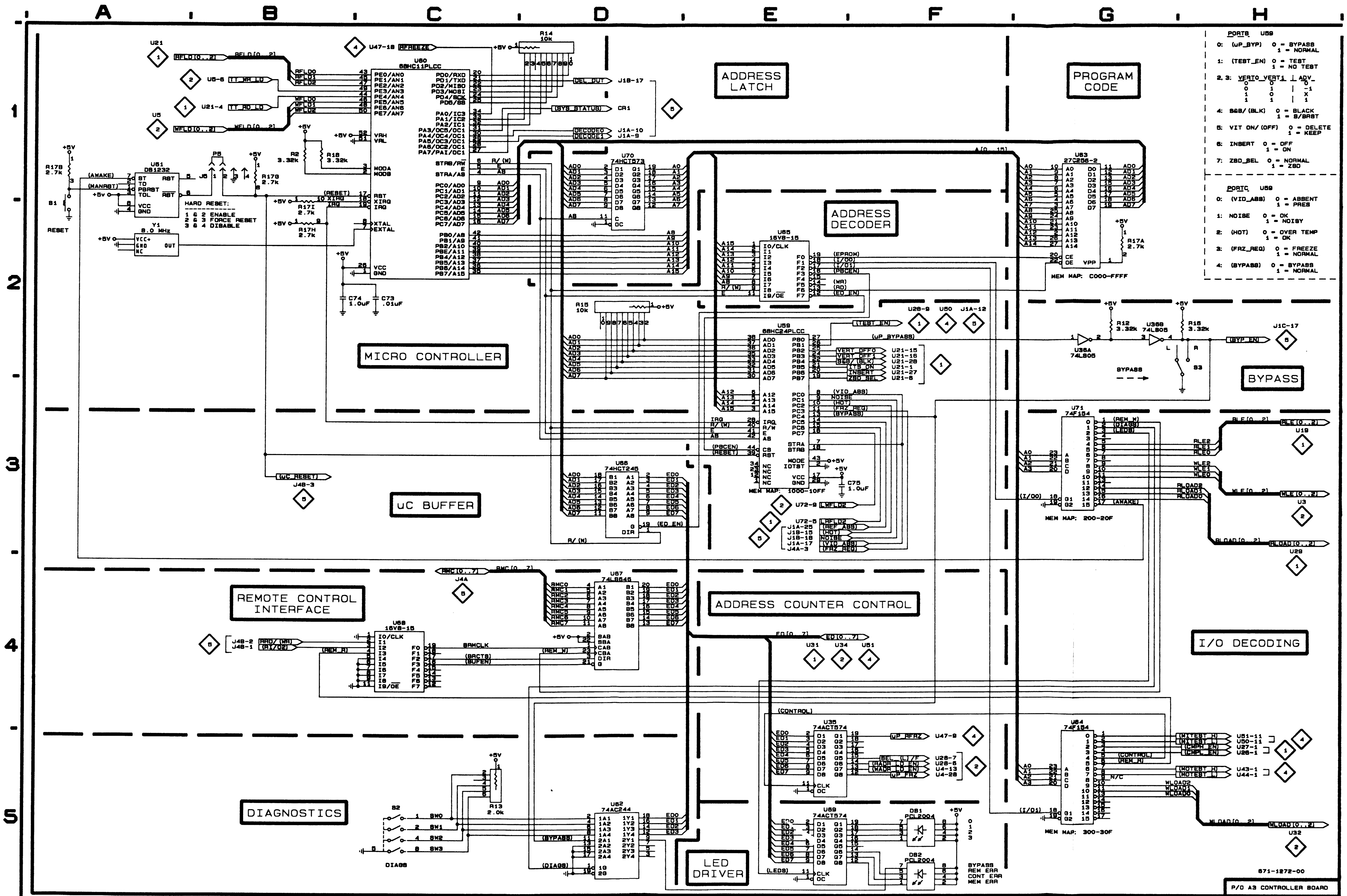
WRITE COUNTER/DECODER AND MEMORY ADDRESS MUX

CONTROLLER BOARD
Schematic <3> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A3. *Partial A3 also shown on Schematics 1, 2, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C73	C2	M2
C74	B2	M1
C75	E3	M4
DS1	F5	M4
DS2	F5	M5
J5	B1	M3
P5	B1	M3
R2	B1	L1
R12	G2	A6
R13	C5	L2
R14	D1	M1
R15	D2	J2
R16	H2	M6
R17A	G2	K2
R17B	A1	K2
R17G	B1	K2
R17H	B2	K2
R17I	B1	K2
R18	B1	L1
S1	A1	M3
S2	C5	M2
S3	G2	M5
U35	E5	H2
U36A	G2	B6
U36B	G2	B6
U59	E2	L4
U60	C1	L2
U61	A1	M4
U62	D5	L3
U63	G1	J5
U64	G5	H6
U65	E2	K3
U66	D3	J3
U67	D4	I2
U68	C4	J1
U69	E5	L5
U70	D1	L5
U71	G3	J6
Y1	A2	K2

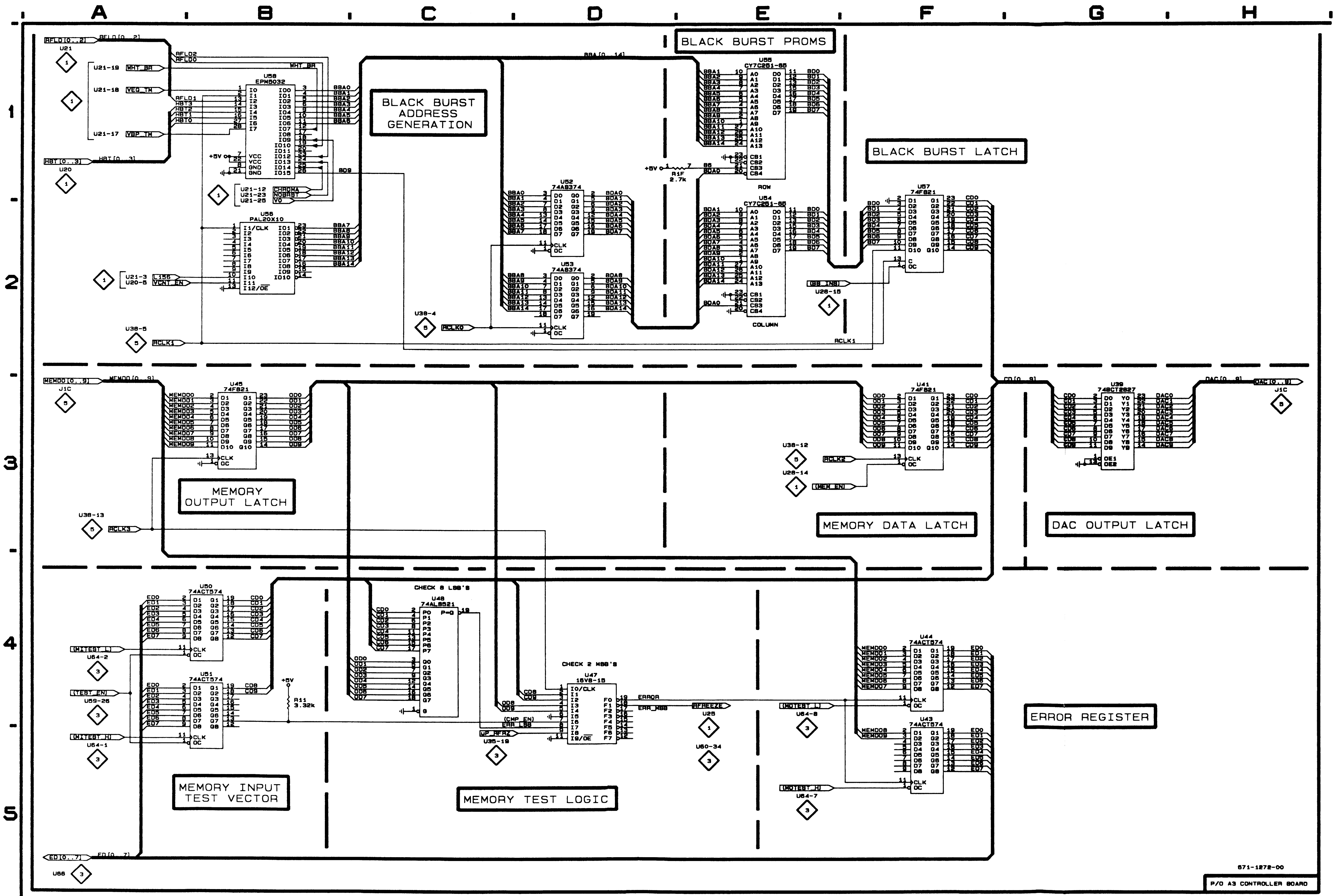

MICRO CONTROLLER
ADDRESS LATCH
ADDRESS DECODER
PROGRAM CODE
BYPASS
uC BUFFER
REMOTE CONTROL INTERFACE
ADDRESS COUNTER CONTROL
I/O DECODING
DIAGNOSTICS
LED DRIVER
871-1272-00
P/O A3 CONTROLLER BOARD

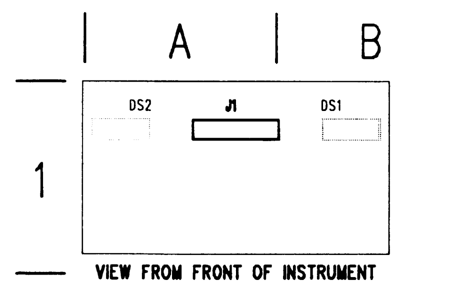
CONTROLLER BOARD
Schematic <4> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A3. *Partial A3 also shown on Schematics 1, 2, 3, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R1F	D1	F5
R11	B4	B6
U39	G3	B5
U41	F3	D5
U43	F5	D5
U44	F4	D4
U45	B3	B4
U47	D4	A6
U48	C4	C6
U50	B4	D6
U51	B4	D6
U52	D1	I3
U53	D2	H3
U54	E2	F4
U55	E1	H4
U56	B2	H5
U57	F1	F5
U58	B1	H5


BLACK BURST PROMS
BLACK BURST ADDRESS GENERATION
BLACK BURST LATCH
MEMORY OUTPUT LATCH
MEMORY DATA LATCH
DAC OUTPUT LATCH
MEMORY INPUT TEST VECTOR
MEMORY TEST LOGIC
ERROR REGISTER
671-1272-00
P/O A3 CONTROLLER BOARD



A9 FRONT PANEL LED BOARD

Static Sensitive Devices
See Maintenance Section

CONTROLLER BOARD
Schematic <5> Look-Up Chart

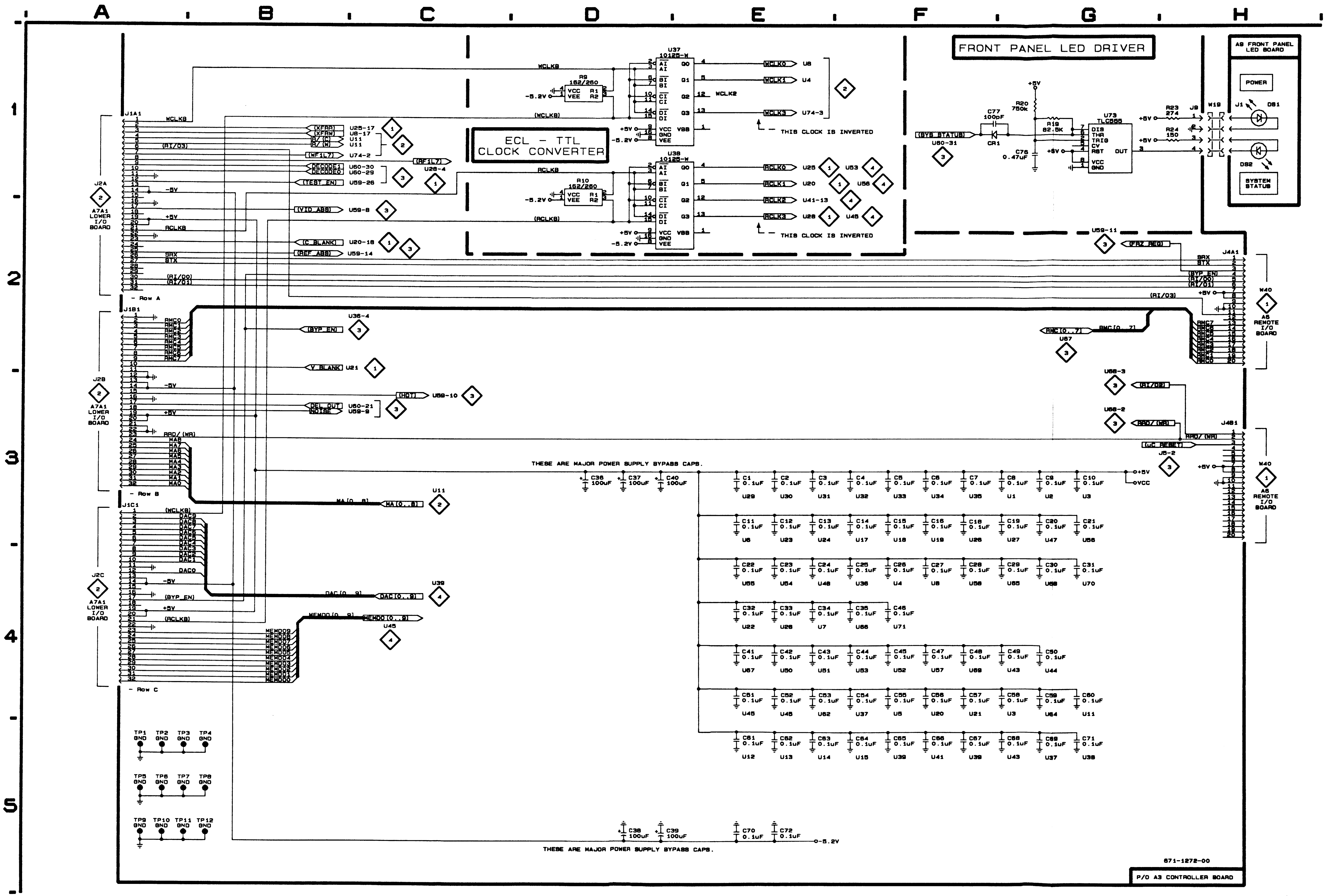
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A3. *Partial A3 also shown on Schematics 1, 2, 3, and 4 .*

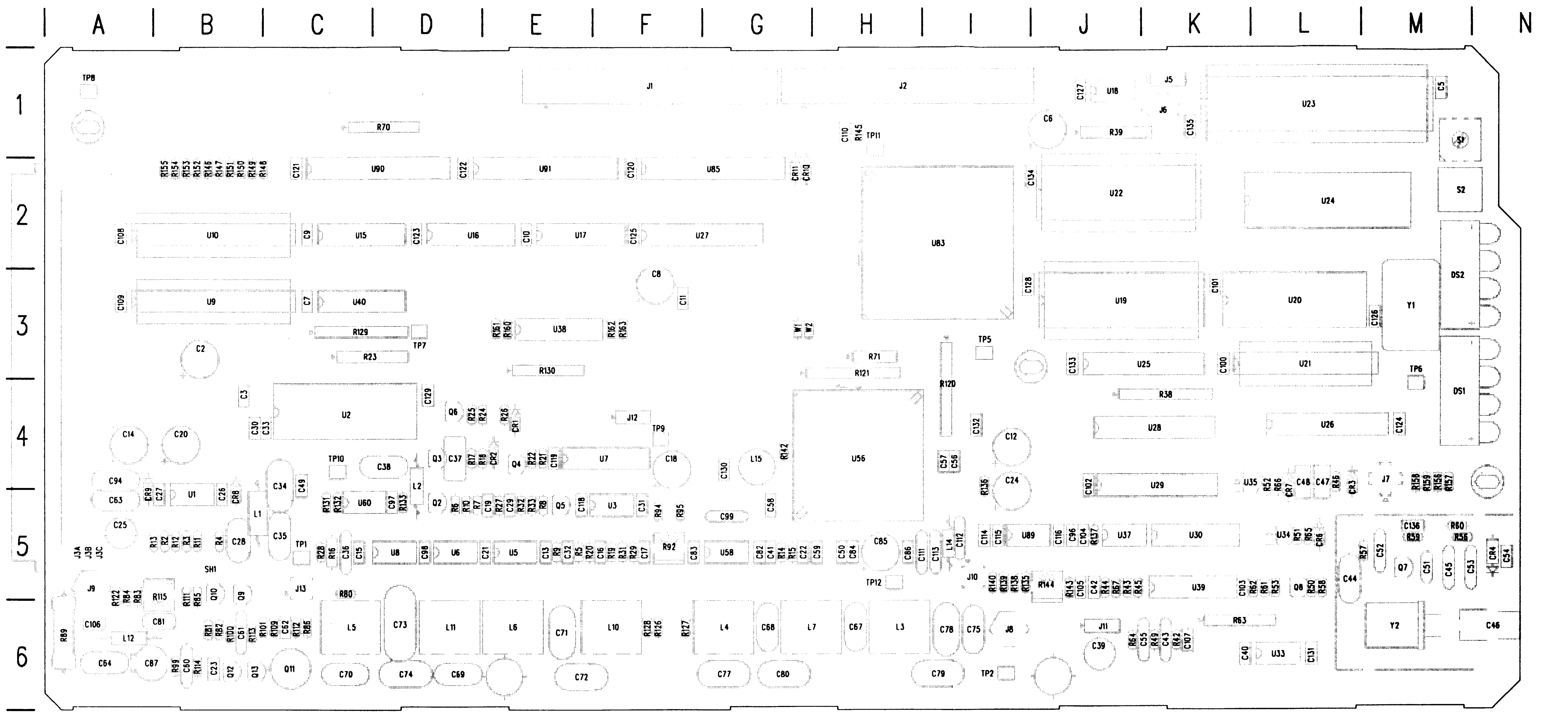
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
A3 Controller Board		
C1	E3	C3
C2	E3	D3
C3	E3	F3
C4	F3	C2
C5	F3	D2
C6	F3	E2
C7	F3	H1
C8	G3	C1
C9	G3	D1
C10	G3	E1
C11	E3	G2
C12	E3	F3
C13	E3	G3
C14	F3	C2
C15	F3	E2
C16	F3	G2
C18	F3	D2
C19	G3	H2
C20	G3	A6
C21	G3	H5
C22	E4	H4
C23	E4	F4
C24	E4	B6
C25	F4	B6
C26	F4	E6
C27	F4	C1
C28	F4	H4
C29	G4	K3
C30	G4	J1
C31	G4	L5
C32	E4	D3
C33	E4	G6
C34	E4	F1
C35	F4	J2
C36	D3	A3
C37	D3	A3
C38	D5	A4
C39	D5	B4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C40	D3	B3
C41	E4	I1
C42	E4	D6
C43	E4	D6
C44	F4	H3
C45	F4	I3
C46	F4	J6
C47	F4	F4
C48	F4	L5
C49	G4	D5
C50	G4	D4
C51	E4	B4
C52	E4	B4
C53	E4	L3
C54	F4	E5
C55	F4	E6
C56	F4	G6
C57	F4	G5
C58	G4	G1
C59	G4	H6
C60	G4	A1
C61	E5	A1
C62	E5	B2
C63	E5	B2
C64	F5	B3
C65	F5	B5
C66	F5	D5
C67	F5	B5
C68	G5	D4
C69	G5	F4
C70	E5	F4
C71	G5	F4
C72	E5	F4
C76	G1	K1
C77	F1	M1
CR1	F1	M1
J1A1	A1	A5
J1B1	A2	A5
J1C1	A3	A5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J4A1	H2	G1
J4B1	H3	G1
J9	H1	M2
R9	D1	E4
R10	D1	E4
R19	G1	K1
R20	G1	L1
R23	H1	M2
R24	H1	M2
TP1	A5	A5
TP2	A5	B3
TP3	A5	A1
TP4	B5	E6
TP5	A5	F3
TP6	A5	G1
TP7	A5	H6
TP8	B5	K4
TP9	A5	K1
TP10	A5	M6
TP11	A5	M4
TP12	B5	L1
U37	D1	E5
U38	D1	E4
U73	G1	K1
A9 Front Panel LED Board		
DS1	H1	A1
DS2	H1	A1
J1	H1	A1



INTERCONNECT AND POWER DISTRIBUTION 5



A4 DAC BOARD

Static Sensitive Devices
See Maintenance Section

DAC BOARD Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 2, 3, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2	C3	B3
C3	D3	B4
C5	D3	M1
C6	C3	J1
C7	C4	C3
C8	C4	F3
C9	D4	C2
C10	D4	E2
C11	D4	F3
C12	C4	I4
C13	D5	E5
C14	C5	A4
C15	D5	C5
C16	D5	F5
C17	D5	F5

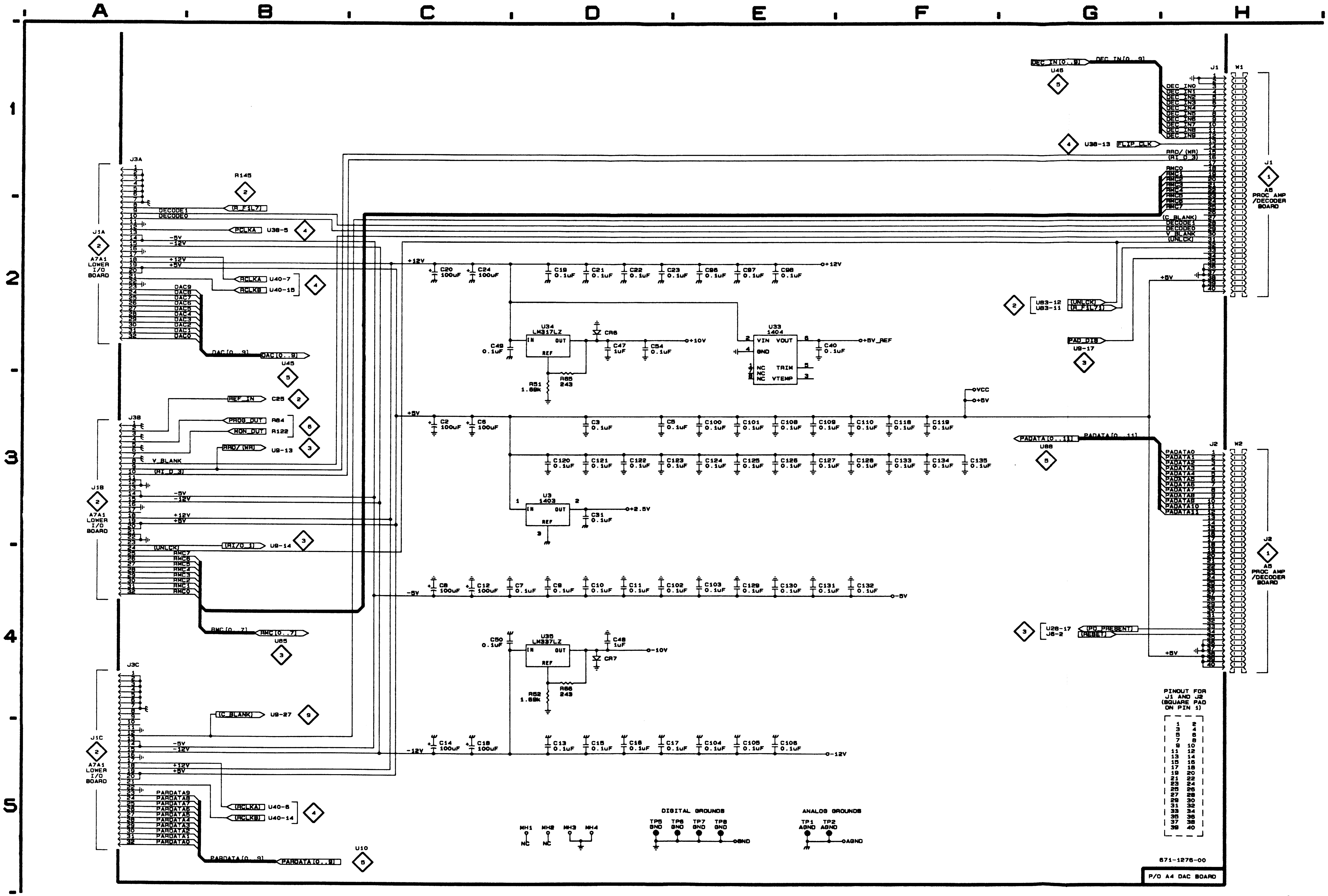
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C18	C5	F4
C19	D2	E5
C20	C2	B4
C21	D2	E5
C22	D2	G5
C23	D2	B6
C24	C2	I4
C31	D3	F5
C40	E2	K6
C47	D2	L4
C48	D4	L4
C49	C2	C5
C50	C4	H5
C54	D2	N5
C96	E2	J5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C97	E2	D5
C98	E2	D5
C100	E3	K3
C101	E3	K3
C102	D4	J5
C103	E4	K5
C104	E5	J5
C105	E5	J5
C106	E5	A6
C108	E3	A2
C109	E3	A3
C110	F3	H1
C118	F3	E5
C119	F3	E4
C120	D3	F2

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C121	D3	C2
C122	D3	D2
C123	D3	D2
C124	E3	M4
C125	E3	F2
C126	E3	M3
C127	E3	J1
C128	F3	J3
C129	E4	D4
C130	E4	G4
C131	E4	L6
C132	F4	I4
C133	F3	J3
C134	F3	J2
C135	F3	K1

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR6	D2	L5
CR7	D4	L5
J1	H1	F1
J2	H3	H1
J3A	A1	A5
J3B	A3	A5
J3C	A4	A5
MH1	D5	
MH2	D5	
MH3	D5	
MH4	D5	
R51	D3	L5
R52	D4	L5
R65	D2	L5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R66	D4	L5
TP1	E5	C5
TP2	E5	I6
TP5	D5	I3
TP6	E5	M3
TP7	E5	D3
TP8	E5	A1
U3	D3	F5
U33	E2	L6
U34	D2	L5
U35	D4	K4



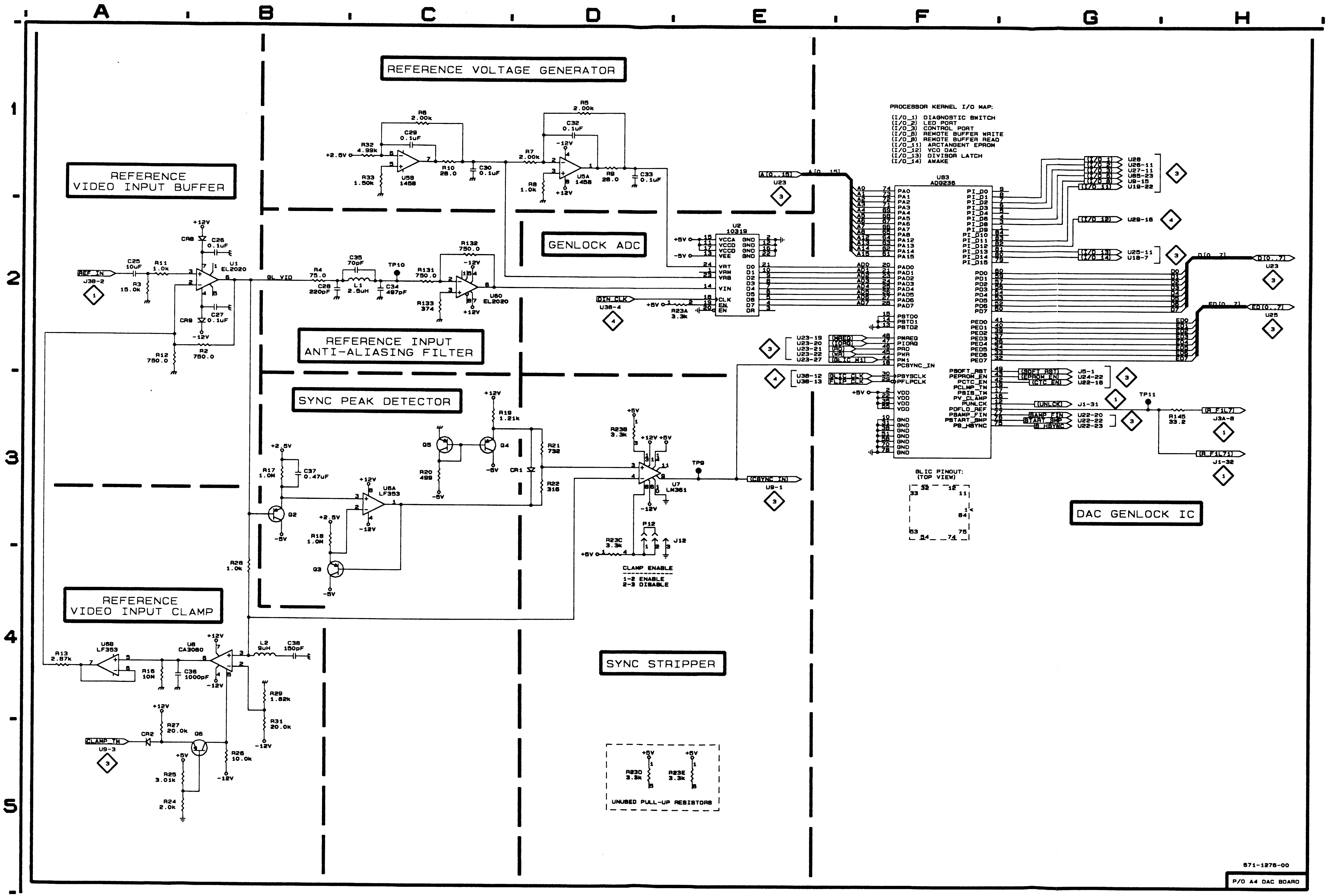
INTERCONNECT AND POWER DISTRIBUTION 1

DAC BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 1, 3, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C25	A2	A5	R13	A4	B5
C26	B2	B5	R16	A4	C5
C27	B2	B5	R17	B3	D4
C28	B2	B5	R18	B3	E4
C29	C1	E5			
			R19	C3	F5
C30	C1	B4	R20	C3	F5
C32	D1	E5	R21	D3	E4
C33	D1	C4	R22	D3	E4
C34	C2	C5	R23A	E2	C3
C35	C2	C5			
			R23B	D3	C3
C36	A4	C5	R23C	D4	C3
C37	B3	D4	R23D	D5	C3
C38	B4	D4	R23E	E5	C3
			R24	A5	E4
CR1	D3	E4	R25	A5	D4
CR2	A5	E4			
CR8	B2	B5	R26	B5	E4
CR9	B2	A5	R27	A5	E5
			R28	B4	C5
J12	D3	F4	R29	B4	F5
			R31	B4	F5
L1	C2	B5			
L2	B4	D5	R32	C1	E5
			R33	C1	E5
P12	D3		R131	C2	C5
			R132	C2	C5
Q2	B3	D5	R133	C2	D5
Q3	B4	D4	R145	H3	H1
Q4	C3	E4			
Q5	C3	E5	TP9	E3	F4
Q6	B5	D4	TP10	C2	C4
			TP11	G3	H1
R2	B2	B5			
R3	A2	B5	U1	B2	B5
R4	B2	B5	U2	E2	C4
R5	D1	E5	U5A	D1	E5
R6	C1	D5	U5B	C1	E5
			U6A	C3	D5
R7	D1	D5			
R8	D1	E5	U6B	A4	D5
R9	D1	E5	U7	D3	F4
R10	C1	D5	U8	B4	D5
R11	A2	B5	U60	C2	C5
R12	A2	B5	U83	F1	I2



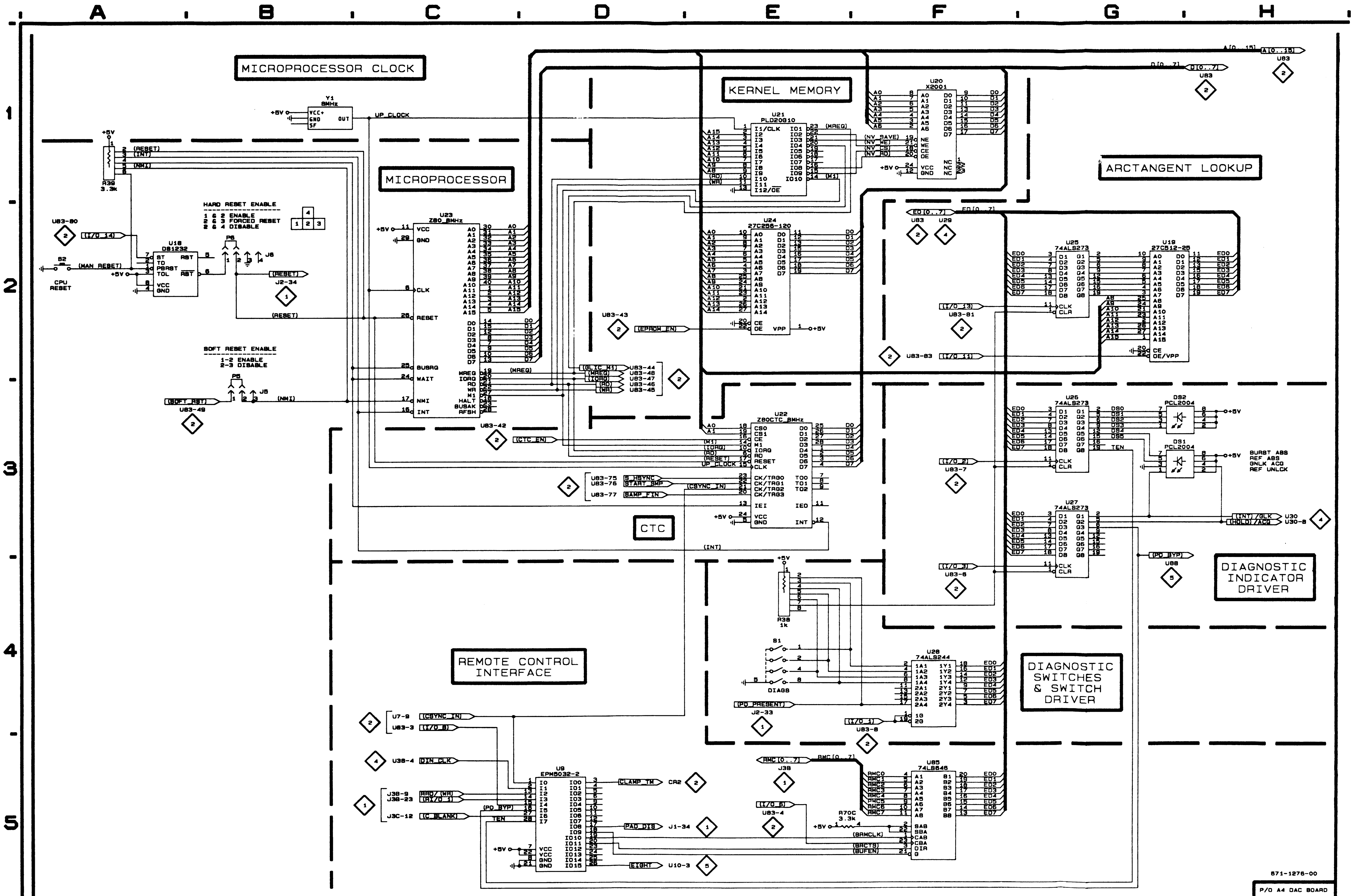
A
B
C
D
E
F
G
H
1
2
3
4
5
REFERENCE VOLTAGE GENERATOR
REFERENCE VIDEO INPUT BUFFER
GENLOCK ADC
REFERENCE INPUT ANTI-ALIASING FILTER
SYNC PEAK DETECTOR
REFERENCE VIDEO INPUT CLAMP
SYNC STRIPPER
DAC GENLOCK IC
PROCESSOR KERNEL I/O MAP:
UNUSED PULL-UP RESISTORS
CLAMP ENABLE
1-2 ENABLE
2-3 DISABLE
GLIC PINOUT: (TOP VIEW)
671-1276-00
P/O A4 DAC BOARD

DAC BOARD
Schematic <3> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 1, 2, 4, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
DS1	G3	M4
DS2	G3	M3
J5	B3	K1
J6	B2	K1
P5	B3	
P6	B2	
R38	E4	K4
R39	A1	J1
R70C	E5	D1
S1	E4	M1
S2	A2	M2
U9	D5	B3
U18	A2	J1
U19	G2	J3
U20	F1	L3
U21	E1	L3
U22	E3	J2
U23	C2	L1
U24	E2	L2
U25	G2	J3
U26	G3	L4
U27	G3	F2
U28	F4	K4
U85	F5	G2
Y1	B1	M3

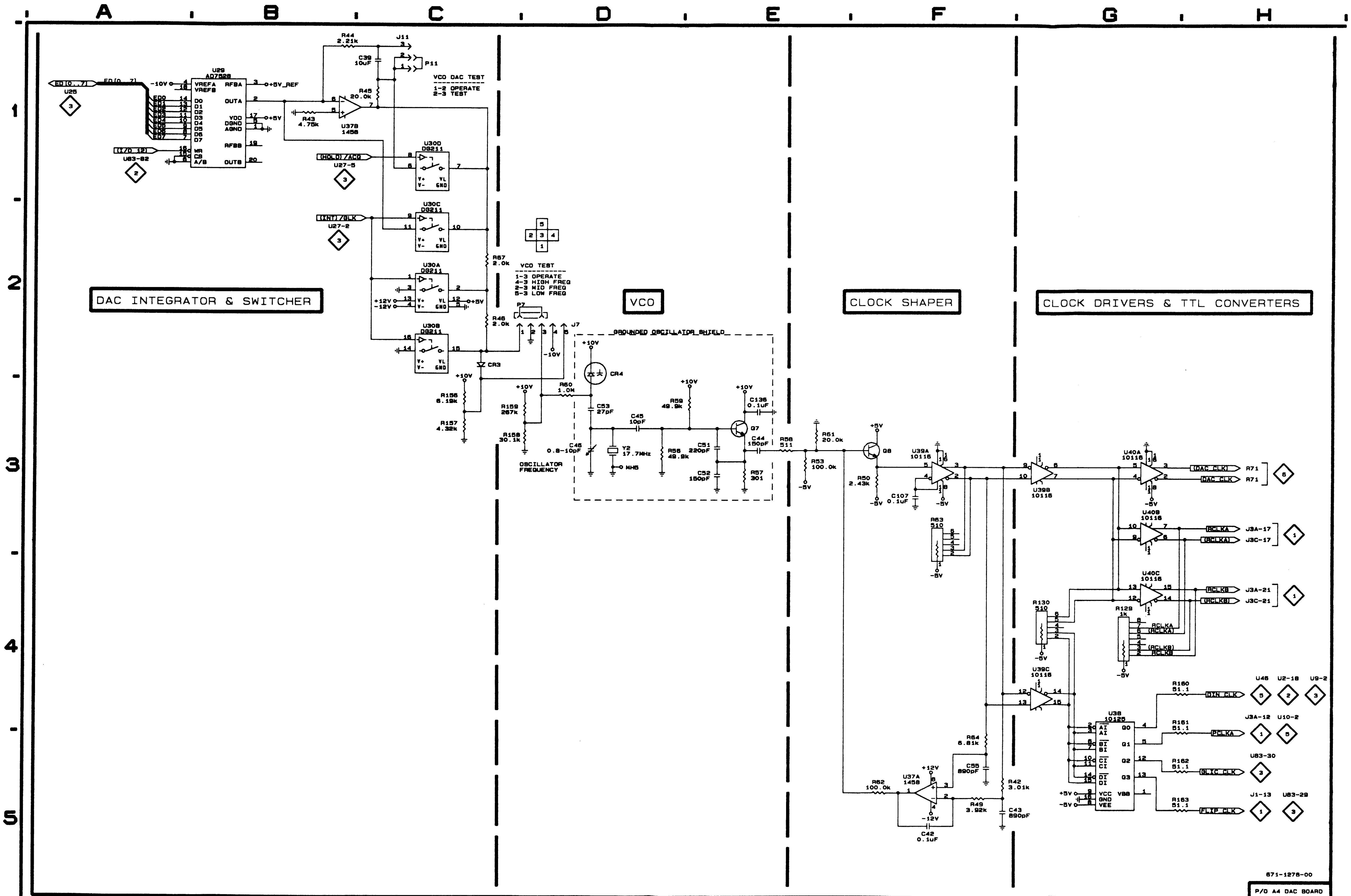

MICROPROCESSOR CLOCK
KERNEL MEMORY
MICROPROCESSOR
ARCTANGENT LOOKUP
CTC
DIAGNOSTIC INDICATOR DRIVER
REMOTE CONTROL INTERFACE
DIAGNOSTIC SWITCHES & SWITCH DRIVER
671-1276-00
P/O A4 DAC BOARD

DAC BOARD
Schematic <4> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 1, 2, 3, 5, and 6 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C39	C1	J6	R61	E3	L5
C42	F5	J5	R62	F5	L5
C43	F5	K6	R63	F3	K6
C44	E3	L5	R64	F5	J6
C45	D3	M5	R67	C2	J5
C46	D3	N6			
C51	E3	M5	R129	G4	C3
			R130	G4	E3
C52	E3	M5	R156	C3	M5
C53	D3	N5	R157	C3	M5
C55	F5	K6	R158	D3	M5
C107	F3	K6			
C136	E3	M5	R159	D3	M5
			R160	G4	E3
CR3	C2	L5	R161	G4	E3
CR4	D2	N5	R162	G5	F3
			R163	G5	F3
J7	C2	M4			
J11	C1	J6	U29	B1	K5
			U30A	C2	K5
MH5	D3		U30B	C2	K5
			U30C	C2	K5
P7	C2		U30D	C1	K5
P11	C1		U37A	F5	J5
			U37B	B1	J5
Q7	E3	M5	U38	G4	E3
Q8	F3	L5			
			U39A	F3	K5
R42	F5	K6	U39B	G3	K5
R43	B1	J5	U39C	G4	K5
R44	B1	J5	U40A	G3	C3
R45	C1	K5	U40B	G3	C3
R46	C2	L5	U40C	G4	C3
R49	F5	K6			
			Y2	D3	M6
R50	F3	L5			
R53	E3	L5			
R56	D3	M5			
R57	E3	M5			
R58	E3	L5			
R59	E3	M5			
R60	D3	M5			



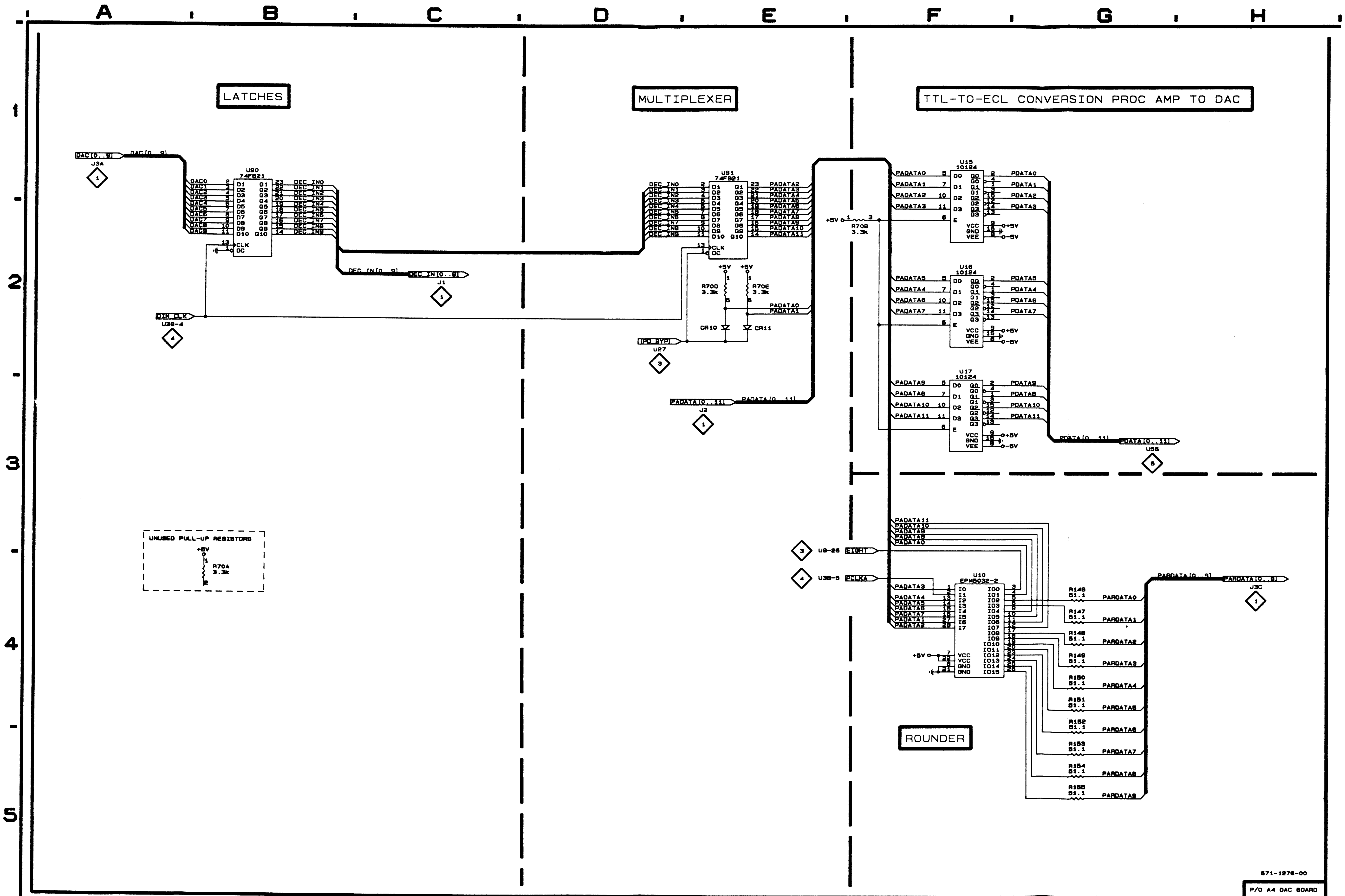
DAC INTEGRATOR & SWITCHER
VCO
CLOCK SHAPER
CLOCK DRIVERS & TTL CONVERTERS
VCO DAC TEST
1-2 OPERATE
2-3 TEST
VCO TEST
1-3 OPERATE
4-3 HIGH FREQ
2-3 MID FREQ
5-3 LOW FREQ
GROUNDED OSCILLATOR SHIELD
OSCILLATOR FREQUENCY
671-1276-00
P/O A4 DAC BOARD

DAC BOARD
Schematic <5> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 1, 2, 3, 4, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR10	E2	G2
CR11	E2	G2
R70A	B4	D1
R70B	F2	D1
R70D	E2	D1
R70E	E2	D1
R146	G4	B2
R147	G4	B2
R148	G4	C2
R149	G4	B2
R150	G4	B2
R151	G4	B2
R152	G4	B2
R153	G5	B2
R154	G5	B2
R155	G5	B2
U10	F4	B2
U15	F1	C2
U16	F2	D2
U17	F3	E2
U90	B1	D2
U91	E1	E2



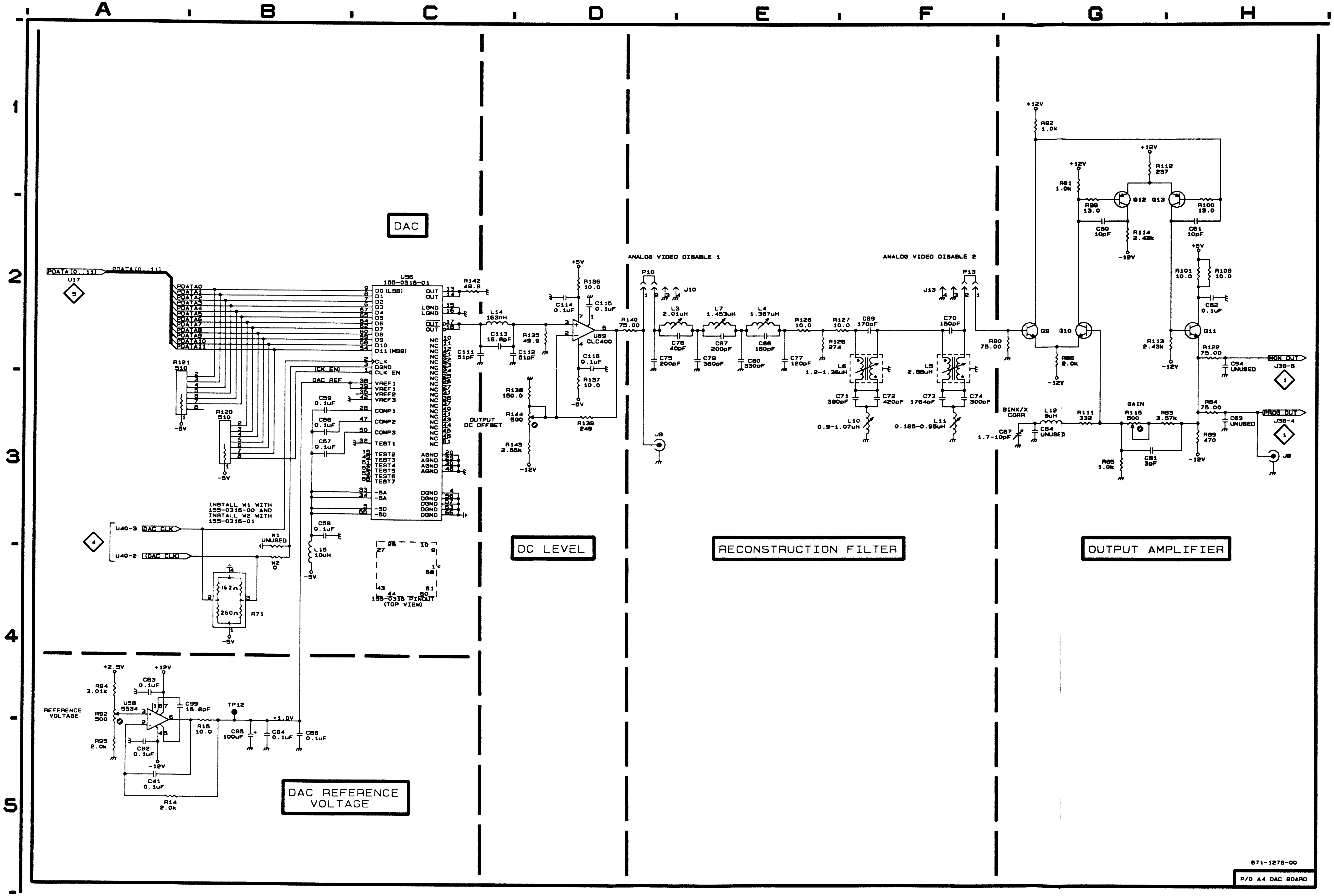
LATCHES
MULTIPLEXER
TTL-TO-ECL CONVERSION PROC AMP TO DAC
ROUNDER
UNUSED PULL-UP RESISTORS
U90 74F821
U91 74F821
U15 10124
U16 10124
U17 10124
U10 EPM5032-2
671-1276-00
P/O A4 DAC BOARD

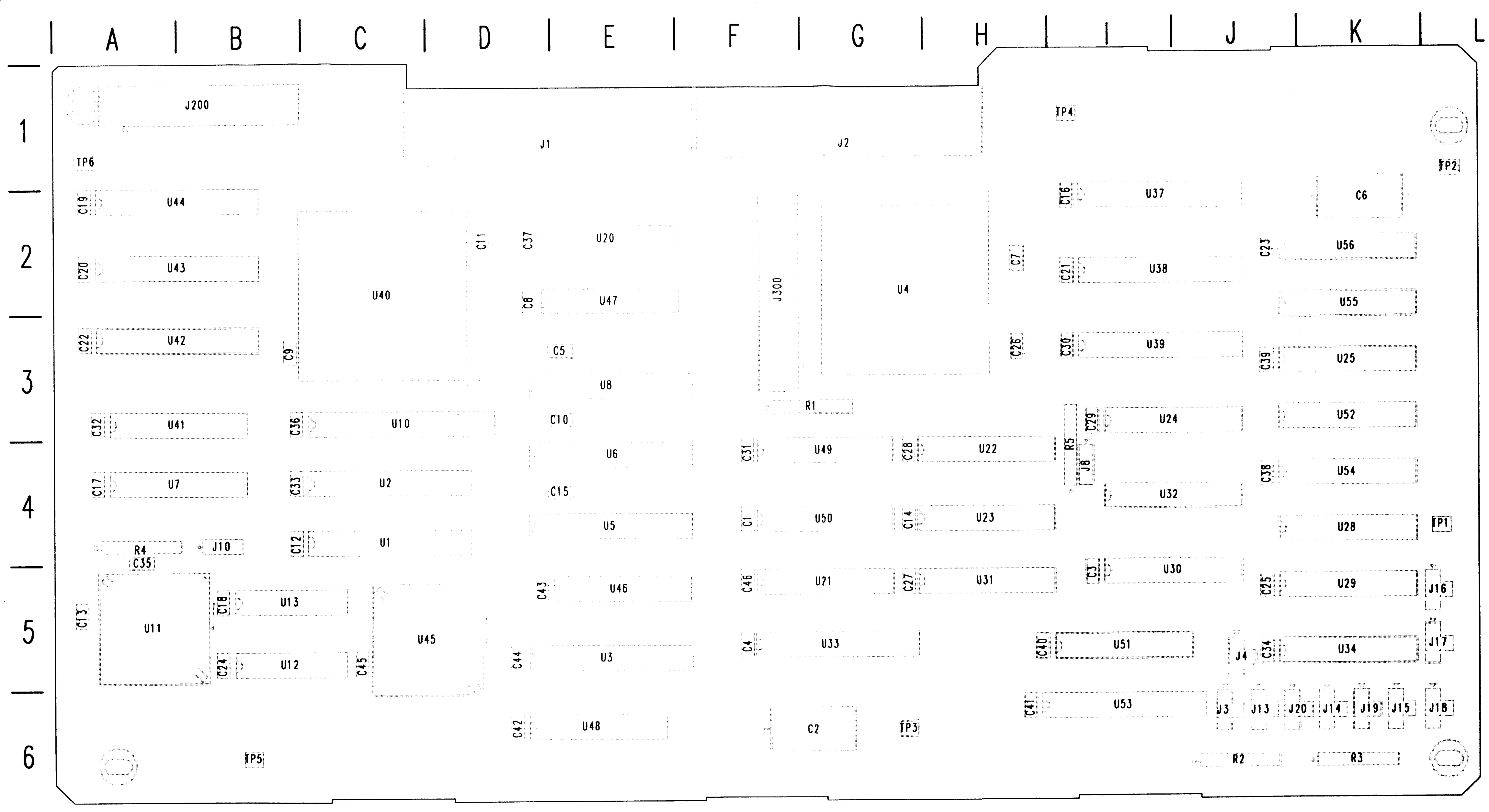
DAC BOARD
Schematic <6> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A4. *Partial A4 also shown on Schematics 1, 2, 3, 4, and 5 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C41	A5	G5
C56	B3	I4
C57	B3	I4
C58	B3	G5
C59	B3	H5
C60	G2	B6
C61	H2	B6
C62	H2	C6
C63	H3	A5
C64	G3	A6
C67	E2	H6
C68	E2	G6
C69	F2	D6
C70	F2	C6
C71	F3	E6
C72	F3	E6
C73	F3	D6
C74	F3	D6
C75	D2	I6
C77	E2	G6
C78	E2	I6
C79	E2	I6
C80	E2	G6
C81	G3	B6
C82	A5	G5
C83	A4	F5
C84	B5	H5
C85	B5	H5
C86	B5	H5
C87	G3	A6
C94	H2	A4
C99	A4	G5
C111	C2	I5
C112	C2	I5
C113	C2	I5
C114	D2	I5
C115	D2	I5
C116	D2	J5
J8	D3	I6
J9	H3	A5
J10	D2	I5
J13	F2	C5
L3	D2	H6
L4	E2	G6
L5	F2	C6
L6	F2	E6
L7	E2	G6
L10	F3	F6
L11	F3	D6
L12	G3	A6
L14	C2	I5
L15	B3	G4
P10	D2	
P13	F2	
Q9	G2	B6
Q10	G2	B6
Q11	H2	C6
Q12	G1	B6
Q13	H1	B6
R14	A5	G5
R15	B4	G5
R71	B4	H3
R80	G2	C5
R81	G1	B6
R82	G1	B6
R83	G3	A6
R84	H3	A6
R85	G3	B6
R86	G2	C6
R89	H3	A6
R92	A4	F5
R94	A4	F5
R95	A5	F5
R99	G1	B6
R100	H1	B6
R101	H2	C6
R109	H2	C6
R111	G3	B6
R112	G1	C6
R113	H2	B6
R114	G2	B6
R115	G3	B6
R120	B3	I4
R121	A3	H3
R122	H2	A6
R126	E2	F6
R127	E2	F6
R128	E2	F6
R135	D2	I5
R136	D2	I5
R137	D3	J5
R138	D3	I5
R139	D3	I5
R140	D2	I5
R142	C2	G4
R143	D3	J5
R144	D3	J5
TP12	B4	H5
U56	C2	H4
U58	A4	G5
U89	D2	I5
W1	B3	G3
W2	B4	H3





A5 PROC AMP / DECODER BOARD

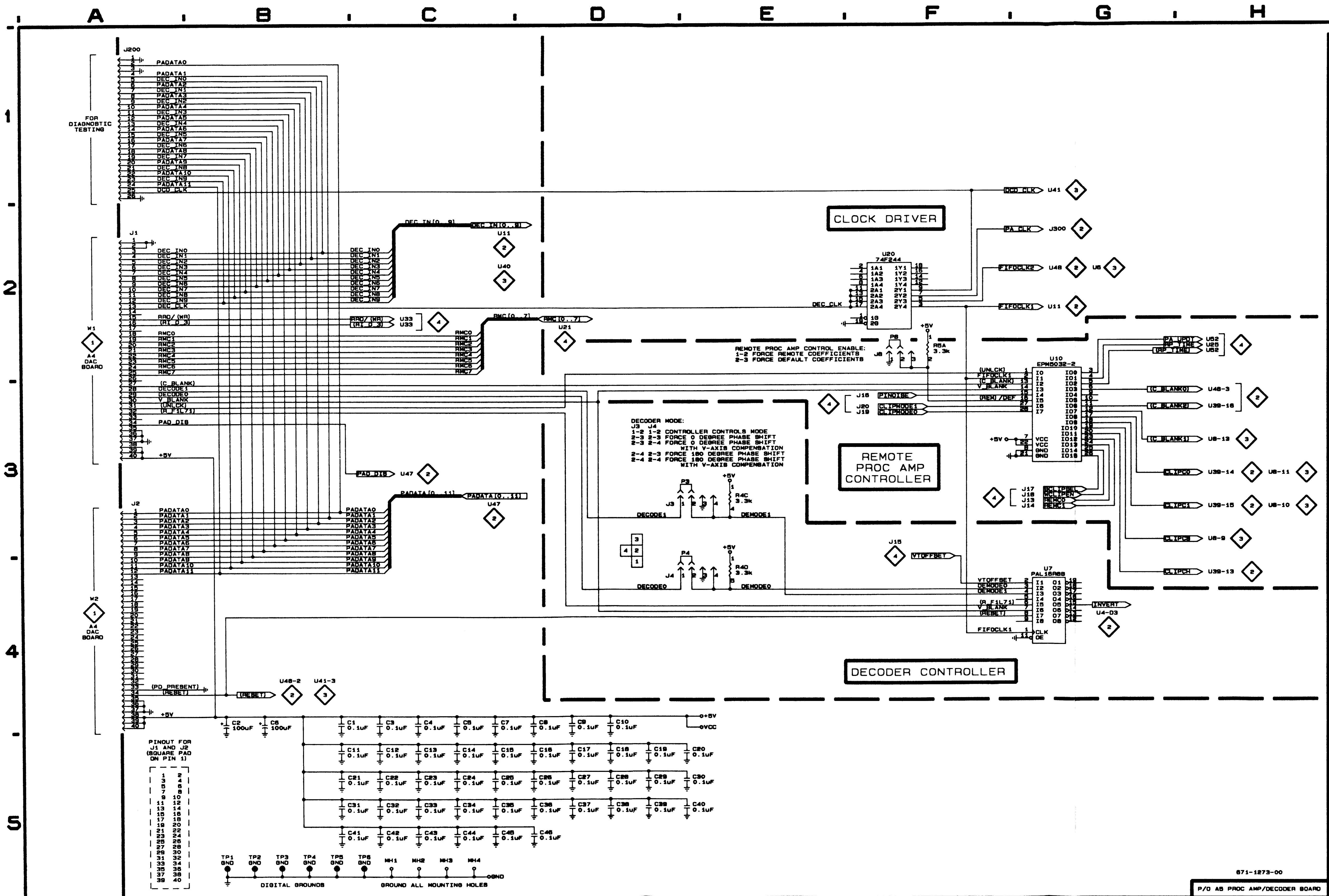
Static Sensitive Devices
See Maintenance Section

PROC AMP / DECODER BOARD Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A5. *Partial A5 also shown on Schematics 2, 3, and 4.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	B4	F4	C20	E5	A2	C39	D5	J3	R4C	E3	A5
C2	B4	G6	C21	B5	I2	C40	E5	H5	R4D	E4	A5
C3	C4	I5	C22	C5	A3	C41	B5	H6	R5A	F2	I4
C4	C4	F5	C23	C5	J2	C42	C5	D6			
C5	C4	E3	C24	C5	B5	C43	C5	D5	TP1	B5	L4
C6	B4	K2	C25	C5	J5				TP2	B5	L2
						C44	C5	D5	TP3	B5	G6
C7	C4	H2	C26	D5	H3	C45	C5	C5			
C8	D4	D3	C27	D5	G5	C46	D5	F5	TP4	B5	I1
C9	D4	B3	C28	D5	G4				TP5	B5	B6
C10	D4	E3	C29	D5	I4	J1	A2	D1	TP6	C5	A1
C11	B5	D2	C30	E5	I3	J2	A3	G1			
C12	C5	B5				J3	D3	J6	U7	G4	A4
			C31	B5	F4				U10	G2	C4
C13	C5	A5	C32	C5	A4	J4	D4	J5	U20	F2	E2
C14	C5	G4	C33	C5	B4	J8	F2	I4			
C15	C5	E4	C34	C5	J5	J200	A1	B1			
C16	D5	I2	C35	C5	A5						
C17	D5	A4	C36	D5	B4	P3	D3	J6			
C18	D5	B5	C37	D5	D2	P4	D4	J5			
C19	D5	A2	C38	D5	J4	P8	F2	I4			



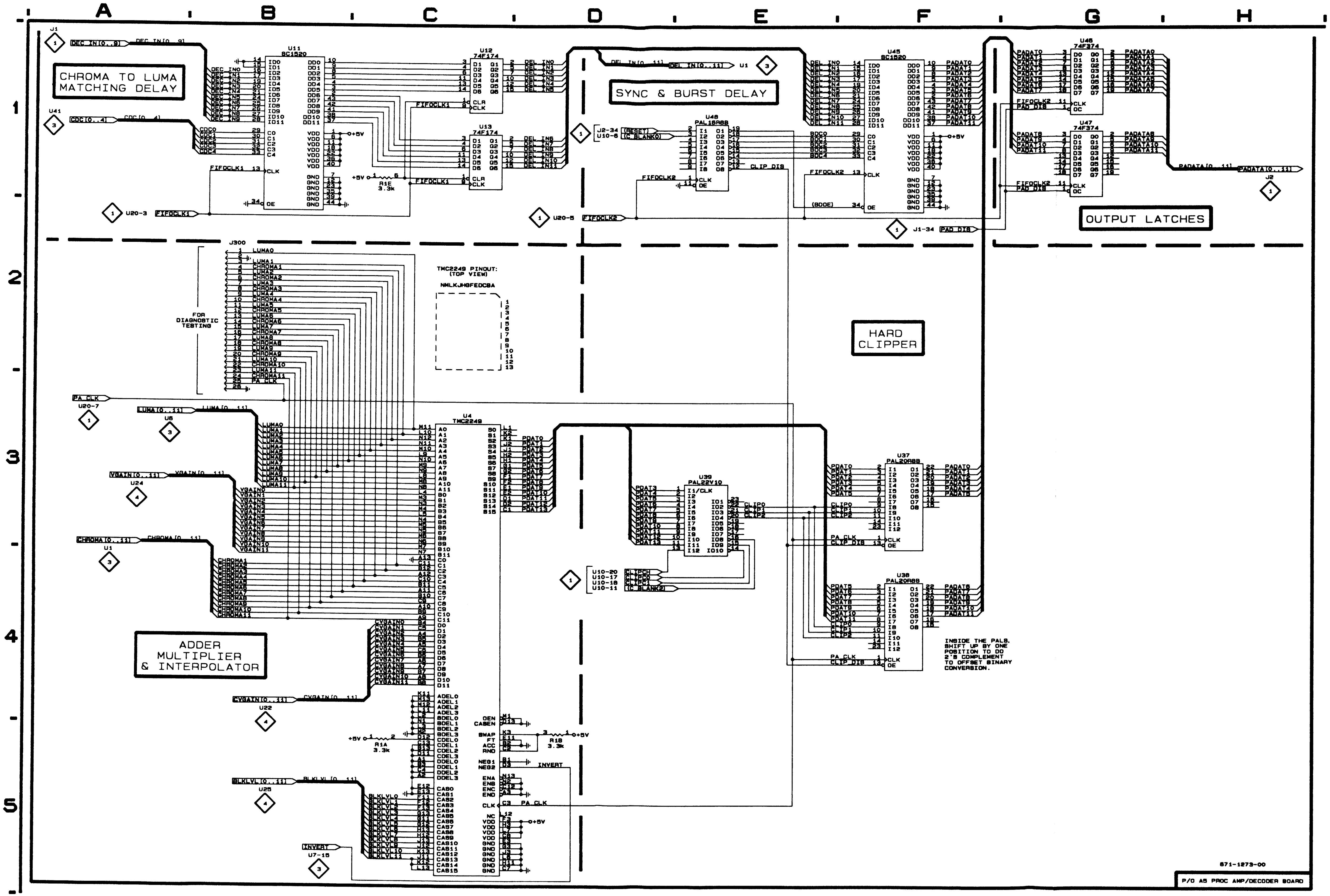
INTERCONNECT AND MISC. CONTROL

PROC AMP / DECODER BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A5. *Partial A5 also shown on Schematics 1, 3, and 4.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J300	B2	F3
R1A	C5	G3
R1B	D5	G3
R1E	C1	G3
U4	C3	G2
U11	B1	A5
U12	C1	B5
U13	C1	B5
U37	F3	I2
U38	F4	I2
U39	E3	I3
U45	F1	C5
U46	G1	E5
U47	G1	E3
U48	E1	E6



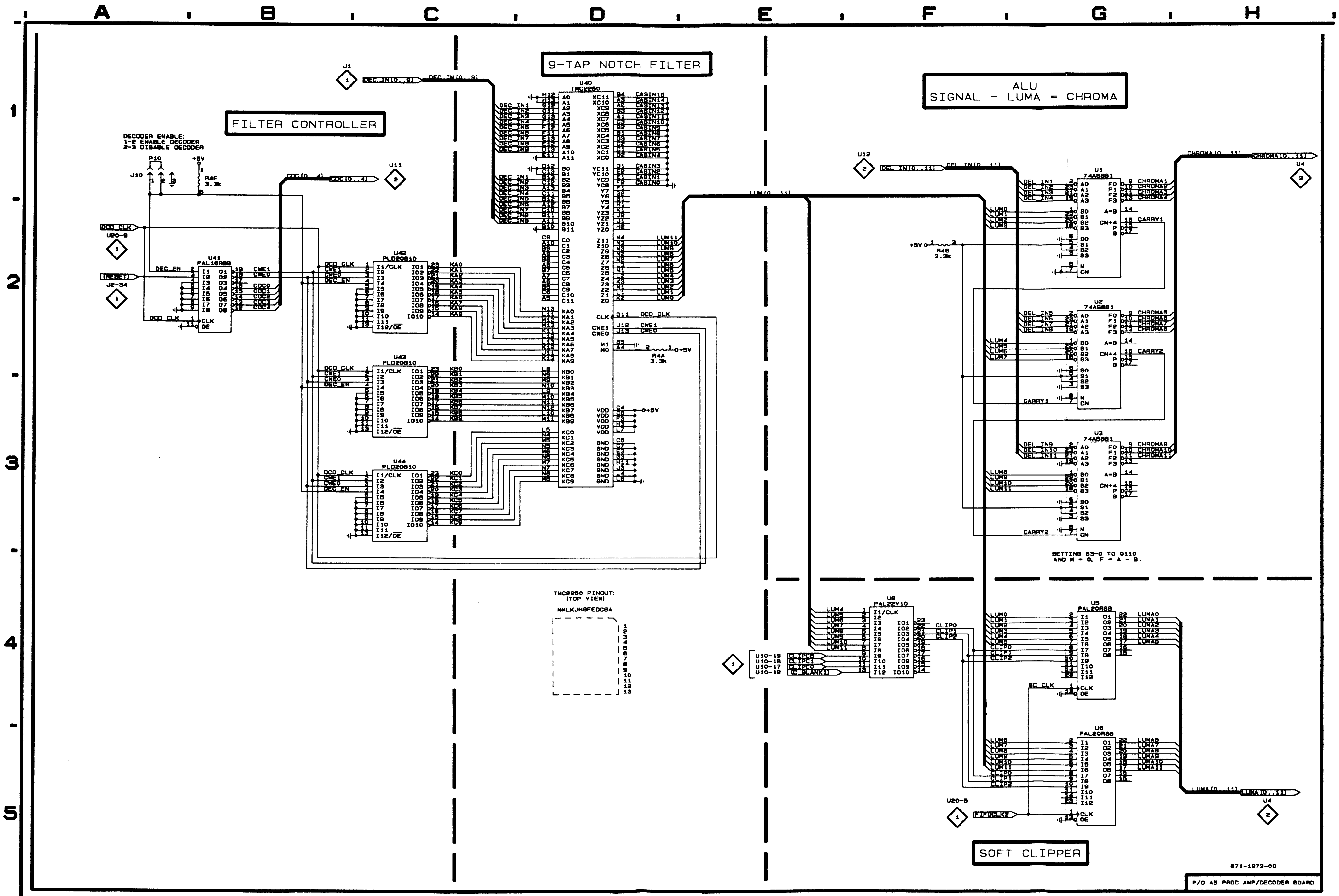
CHROMA TO LUMA MATCHING DELAY
SYNC & BURST DELAY
OUTPUT LATCHES
HARD CLIPPER
ADDER MULTIPLIER & INTERPOLATOR
TMC2249 PINOUT: (TOP VIEW)
FOR DIAGNOSTIC TESTING
INSIDE THE PALS, SHIFT UP BY ONE POSITION TO DO 2'S COMPLEMENT TO OFFSET BINARY CONVERSION.
671-1273-00
P/O A5 PROC AMP/DECODER BOARD

PROC AMP / DECODER BOARD Schematic <3> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A5. *Partial A5 also shown on Schematics 1, 2, and 4.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J10	A1	B4
P10	A1	B4
R4A	D2	A5
R4B	F2	A5
R4E	B1	A5
U1	G1	C4
U2	G2	C4
U3	G3	E5
U5	G4	E4
U6	G5	E4
U8	F4	E3
U40	D1	C2
U41	B2	A4
U42	C2	A3
U43	C2	A2
U44	C3	A2



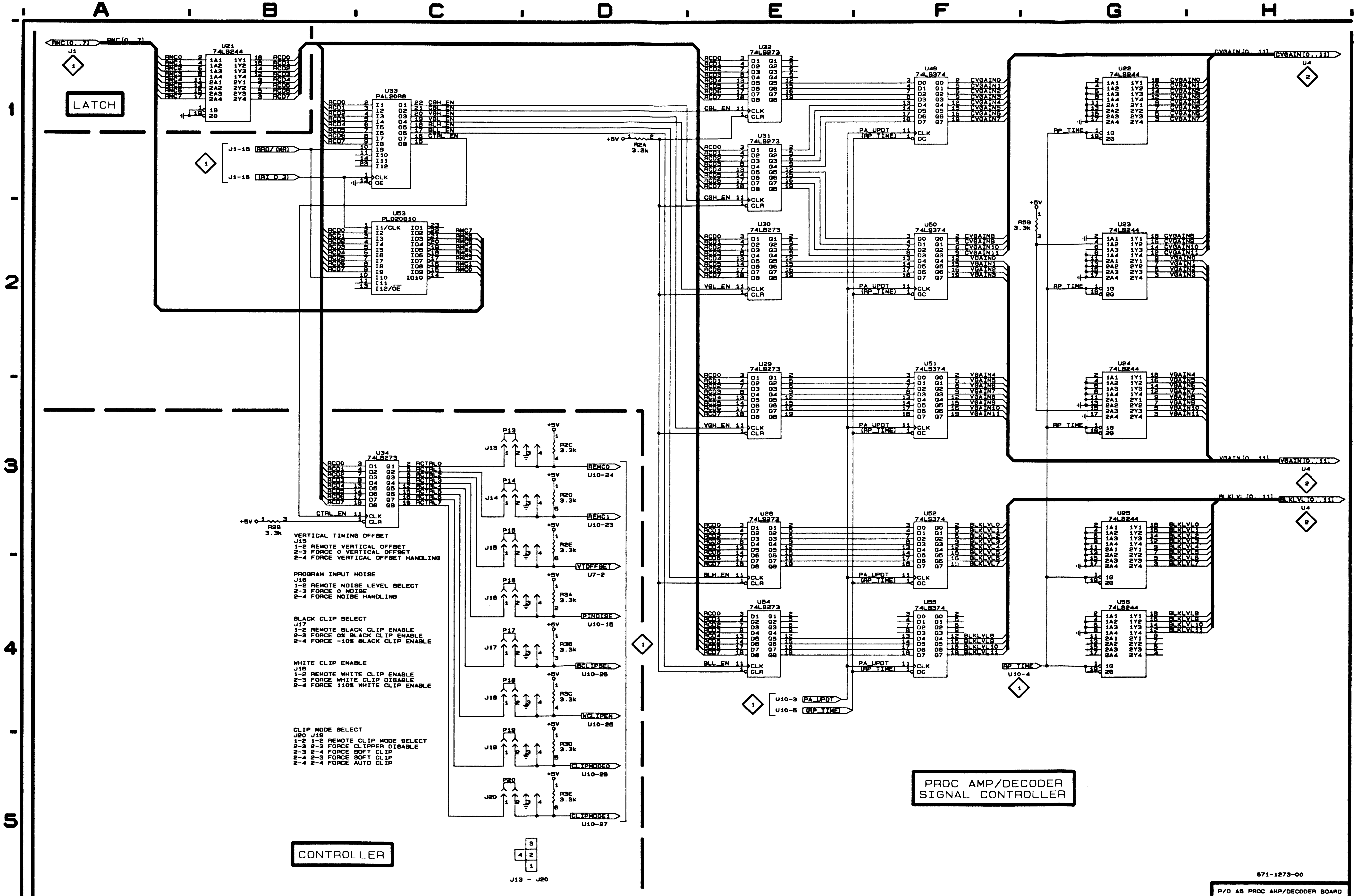
FILTER CONTROLLER
9-TAP NOTCH FILTER
ALU
SIGNAL - LUMA = CHROMA
SOFT CLIPPER
DECODER ENABLE:
1-2 ENABLE DECODER
2-3 DISABLE DECODER
TMC2250 PINOUT:
(TOP VIEW)
SETTING S3-0 TO 0110
AND M = 0, F = A - B.
671-1273-00
P/O A5 PROC AMP/DECODER BOARD

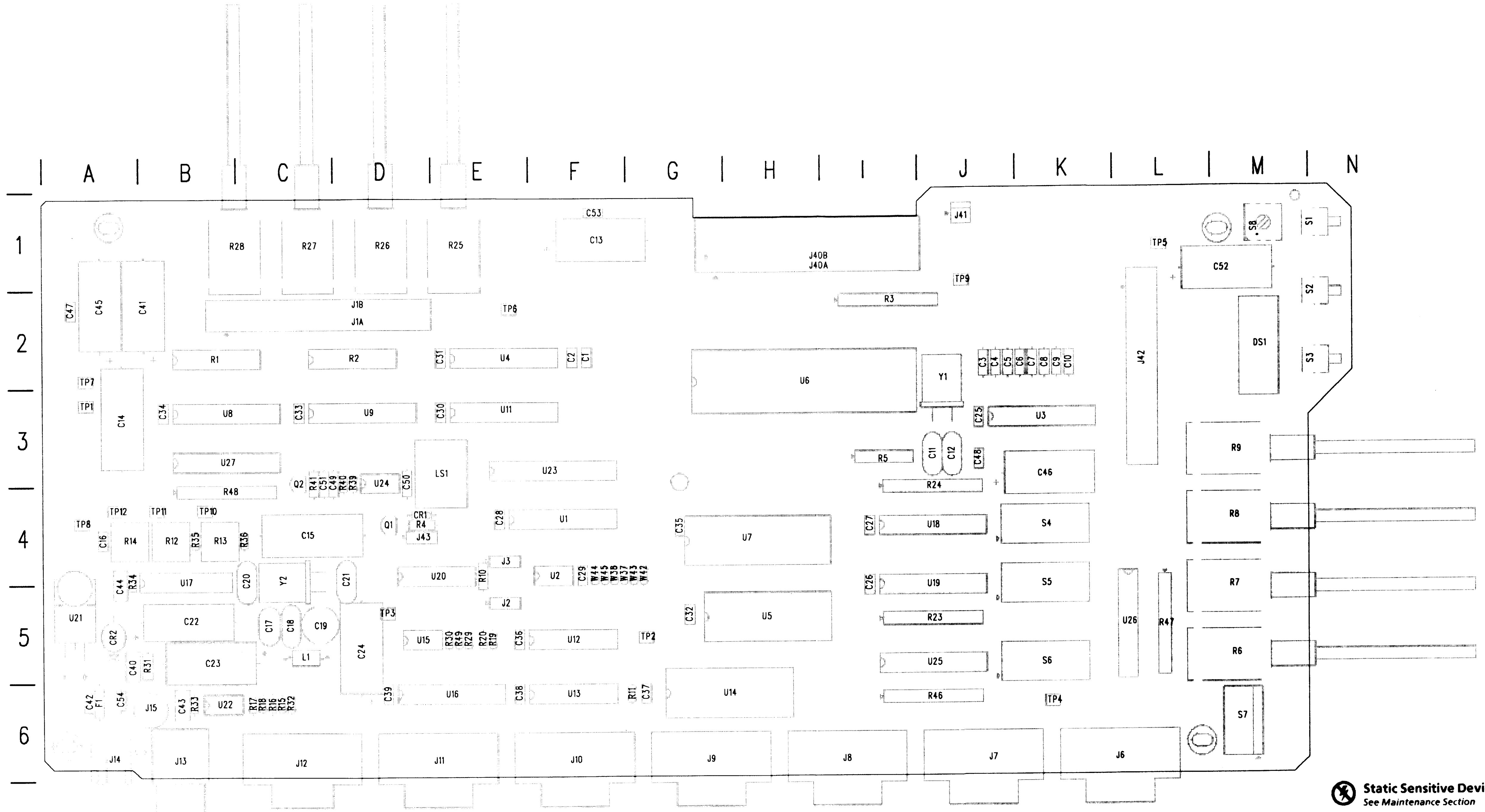
PROC AMP / DECODER BOARD
Schematic <4> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A5. *Partial A5 also shown on Schematics 1, 2, and 3.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J13	C3	J6
J14	C3	K6
J15	C3	K6
J16	C4	L5
J17	C4	L5
J18	C4	L6
J19	C5	K6
J20	C5	J6
P13	C3	J6
P14	C3	K6
P15	C3	K6
P16	C4	L5
P17	C4	L5
P18	C4	L6
P19	C5	K6
P20	C5	J6
R2A	D1	J6
R2B	B3	J6
R2C	D3	J6
R2D	D3	J6
R2E	D3	J6
R3A	D4	K6
R3B	D4	K6
R3C	D4	K6
R3D	D5	K6
R3E	D5	K6
R5B	G2	I4
U21	B1	G5
U22	G1	H4
U23	G2	H4
U24	G2	I4
U25	G3	K3
U28	E3	K4
U29	E2	K5
U30	E2	I5
U31	E1	H5
U32	E1	I4
U33	C1	G5
U34	C3	K5
U49	F1	G4
U50	F2	G4
U51	F2	I5
U52	F3	K3
U53	C2	I6
U54	E4	K4
U55	F4	K3
U56	G4	K2


LATCH
CONTROLLER
PROC AMP/DECODER
SIGNAL CONTROLLER
VERTICAL TIMING OFFSET
J15
1-2 REMOTE VERTICAL OFFSET
2-3 FORCE 0 VERTICAL OFFSET
2-4 FORCE VERTICAL OFFSET HANDLING
PROGRAM INPUT NOISE
J16
1-2 REMOTE NOISE LEVEL SELECT
2-3 FORCE 0 NOISE
2-4 FORCE NOISE HANDLING
BLACK CLIP SELECT
J17
1-2 REMOTE BLACK CLIP ENABLE
2-3 FORCE 0% BLACK CLIP ENABLE
2-4 FORCE -10% BLACK CLIP ENABLE
WHITE CLIP ENABLE
J18
1-2 REMOTE WHITE CLIP ENABLE
2-3 FORCE WHITE CLIP DISABLE
2-4 FORCE 110% WHITE CLIP ENABLE
CLIP MODE SELECT
J20 J19
1-2 1-2 REMOTE CLIP MODE SELECT
2-3 2-3 FORCE CLIPPER DISABLE
2-3 2-4 FORCE SOFT CLIP
2-4 2-3 FORCE SOFT CLIP
2-4 2-4 FORCE AUTO CLIP
J13 - J20
671-1273-00
P/O A8 PROC AMP/DECODER BOARD



Static Sensitive Devices
See Maintenance Section

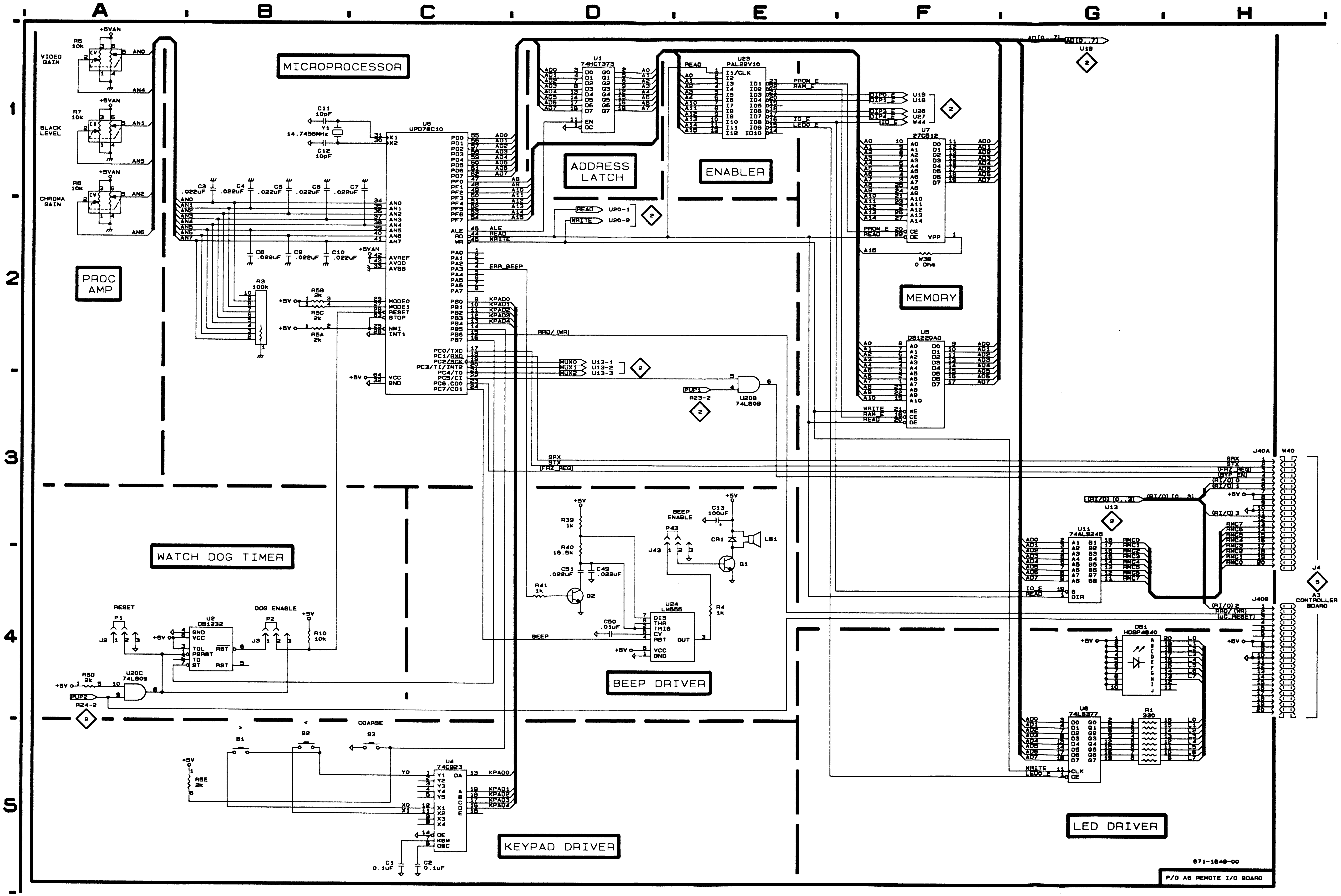
A6 REMOTE I/O BOARD

REMOTE I/O BOARD Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A6. *Partial A6 also shown on Schematic 2 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	C5	F2
C2	C5	F2
C3	B1	J2
C4	B1	J2
C5	B1	J2
C6	B1	K2
C7	C1	K2
C8	B2	K2
C9	B2	K2
C10	B2	K2
C11	B1	J3
C12	B1	J3
C13	E3	F1
C49	D4	D4
C50	D4	D4
C51	D4	C4
CR1	E3	D4
DS1	G4	M2
J2	A4	E5
J3	B4	E4
J40A	H3	H1
J40B	H4	H1
J43	D3	D4
LS1	E3	E3
P1	A4	
P2	B4	
P43	D3	
Q1	E4	D4
Q2	D4	C4
R1	G4	B2
R3	B2	I2
R4	E4	D4
R5A	B2	I3
R5B	B2	I3
R5C	B2	I3
R5D	A4	I3
R5E	B5	I3
R6	A1	M5
R7	A1	M5
R8	A1	M4
R10	B4	E4
R39	D3	D4
R40	D3	D4
R41	D4	C4
S1	B5	N1
S2	B5	N2
S3	C5	N2
U1	D1	F4
U2	B4	F4
U4	C5	E2
U5	F2	H5
U6	C1	H2
U7	F1	H4
U8	G4	B3
U11	G3	E3
U20B	E3	E4
U20C	A4	E4
U23	E1	F3
U24	D4	D4
W38	F2	F4
Y1	B1	J2



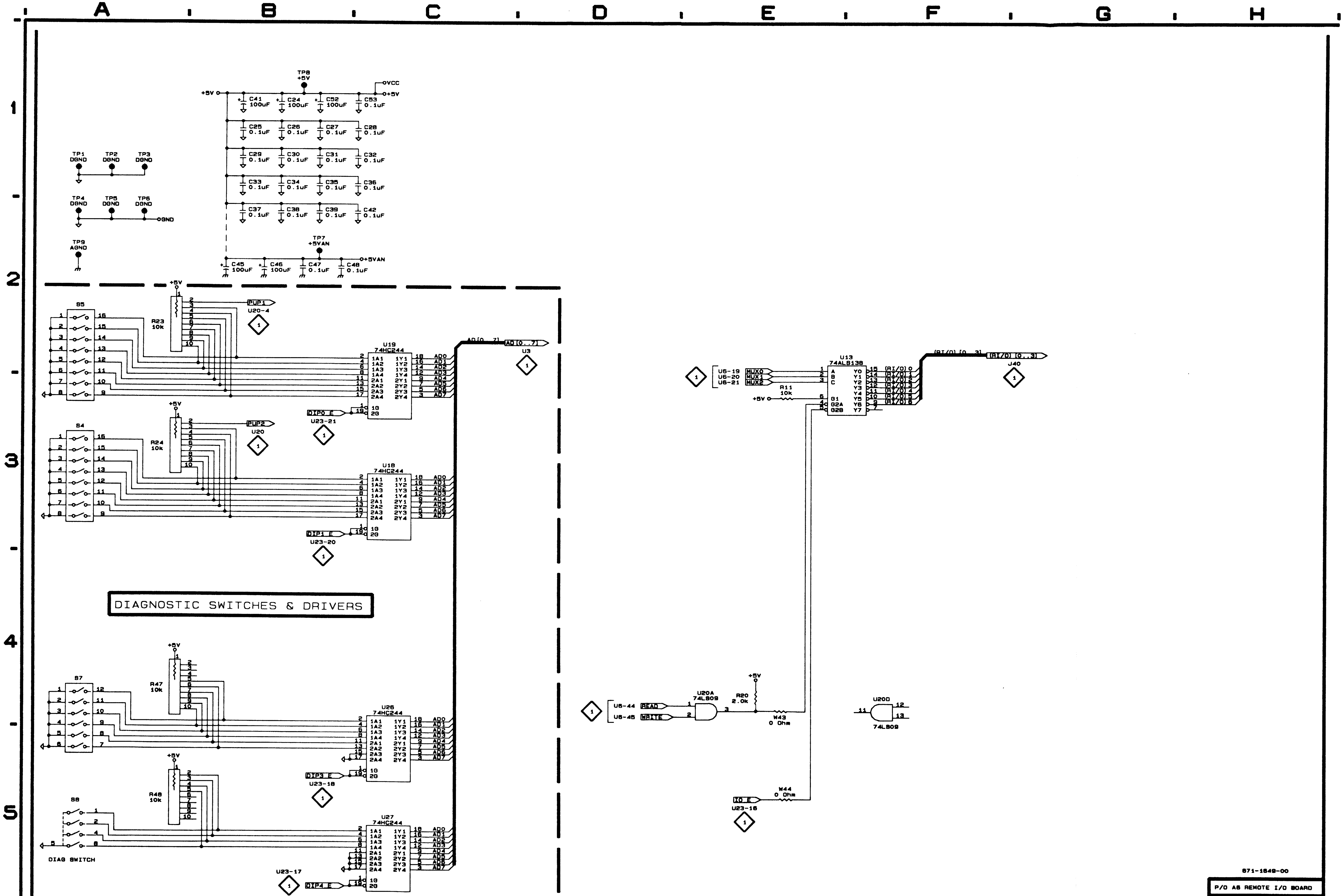
REMOTE PROCESSOR KERNEL 1

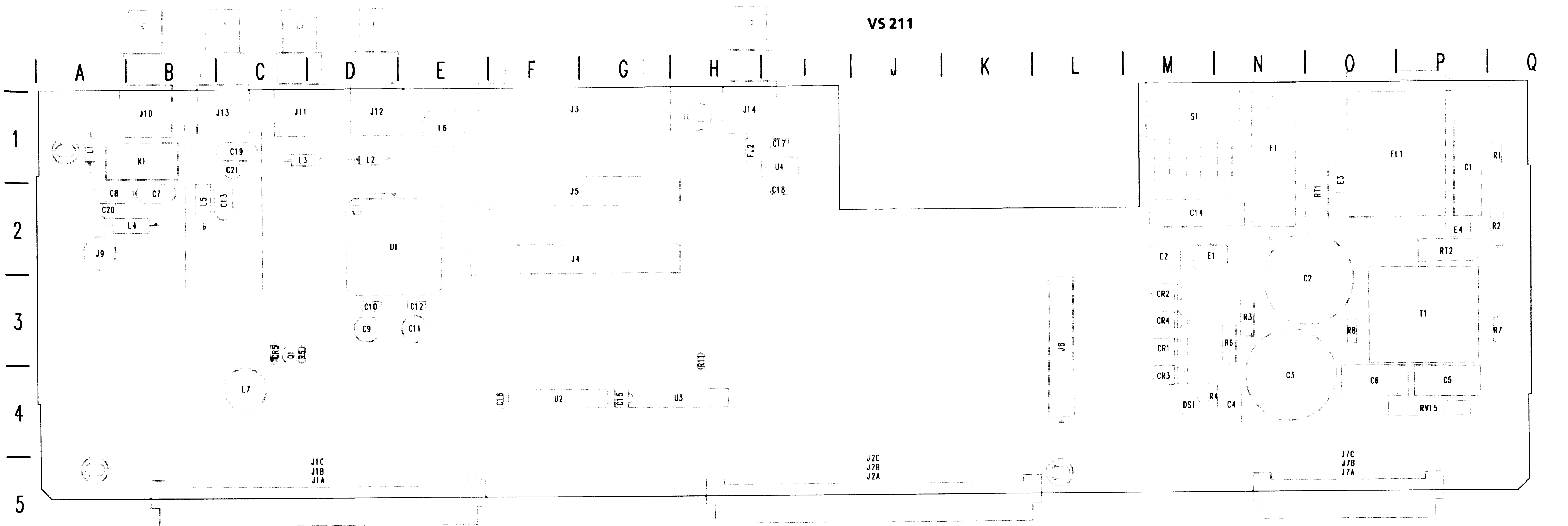
REMOTE I/O BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A6. *Partial A6 also shown on Schematic 1.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C24	B1	D5
C25	B1	J3
C26	B1	I5
C27	B1	I4
C28	C1	E4
C29	B1	F4
C30	B1	E3
C31	B1	E2
C32	C1	G5
C33	B1	C3
C34	B1	B3
C35	B1	G4
C36	C1	E5
C37	B2	G6
C38	B2	E6
C39	B2	D6
C41	B1	B2
C42	C2	A6
C45	B2	A2
C46	B2	K3
C47	B2	A2
C48	B2	J3
C52	B1	M1
C53	C1	F1
R11	E3	G6
R20	E4	E5
R23	A2	J5
R24	A3	J4
R47	A4	L5
R48	A5	B4
R47	A4	L5
R48	A5	B4
S4	A3	K4
S5	A2	K5
S7	A4	M6
S8	A5	M1
TP1	A1	A3
TP2	A1	G5
TP3	A1	D5
TP4	A2	K6
TP5	A2	L1
TP6	A2	E2
TP7	B2	A2
TP8	B1	A4
TP9	A2	J1
U13	E2	F6
U18	C3	J4
U19	C2	J5
U20A	E4	E4
U20D	F4	E4
U26	C4	L5
U27	C5	B3
W43	E4	G4
W44	E5	F4


DIAGNOSTIC SWITCHES & DRIVERS
871-1849-00
P/O A8 REMOTE I/O BOARD



A7A1 LOWER I/O BOARD

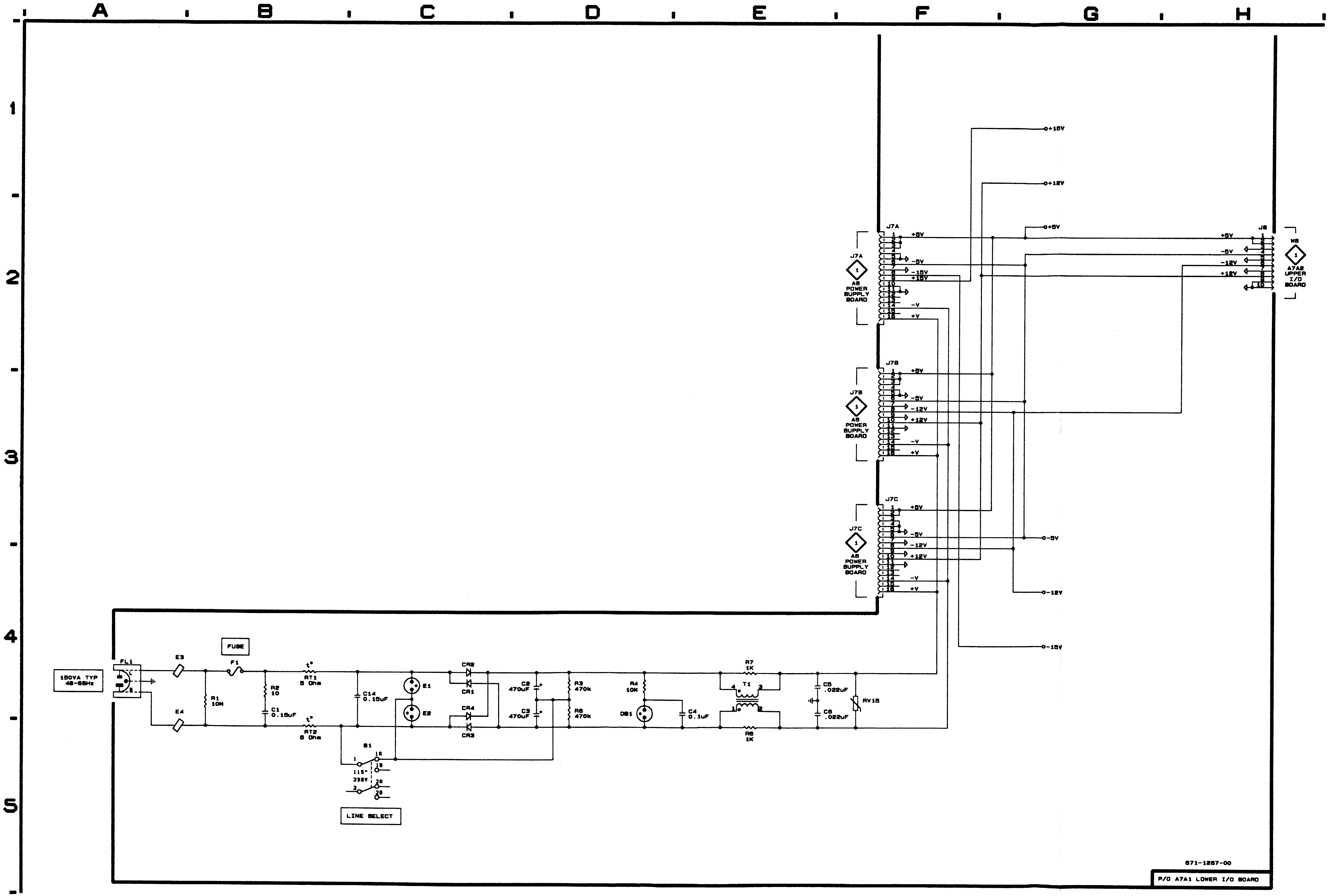
Static Sensitive Devices
See Maintenance Section

LOWER I/O BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A7A1. *Partial A7A1 also shown on Schematic 2.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	B4	P1	J7A	F2	O5
C2	D4	N3	J7B	F2	O5
C3	D4	N4	J7C	F3	O5
C4	E4	N4	J8	H2	L3
C5	E4	P4	R1	B4	Q1
C6	E4	O4	R2	B4	Q2
C14	C4	M2	R3	D4	N3
CR1	C4	M3	R4	D4	M4
CR2	C4	M3	R6	D4	N3
CR3	C5	M4	R7	E4	Q3
CR4	C4	M3	R8	E5	O3
DS1	D4	M4	RT1	B4	O2
E1	C4	M2	RT2	B4	P2
E2	C4	M2	RV15	F4	P4
E3	A4	O2	S1	C5	M1
E4	A4	P2	T1	E4	P3
F1	B4	N1			
FL1	A4	O1			



VS 211

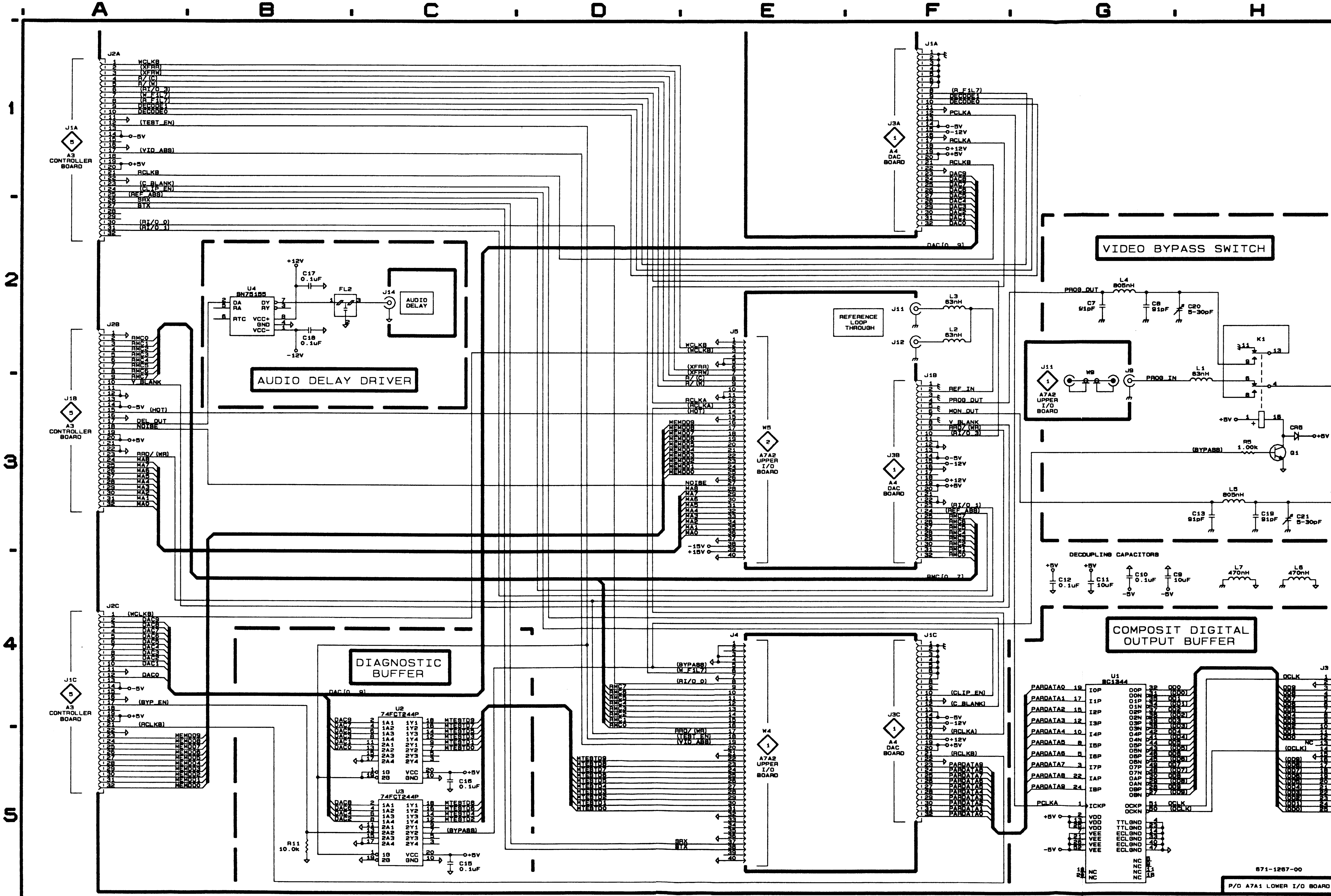
LINE FILTER 1

LOWER I/O BOARD
Schematic <2> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

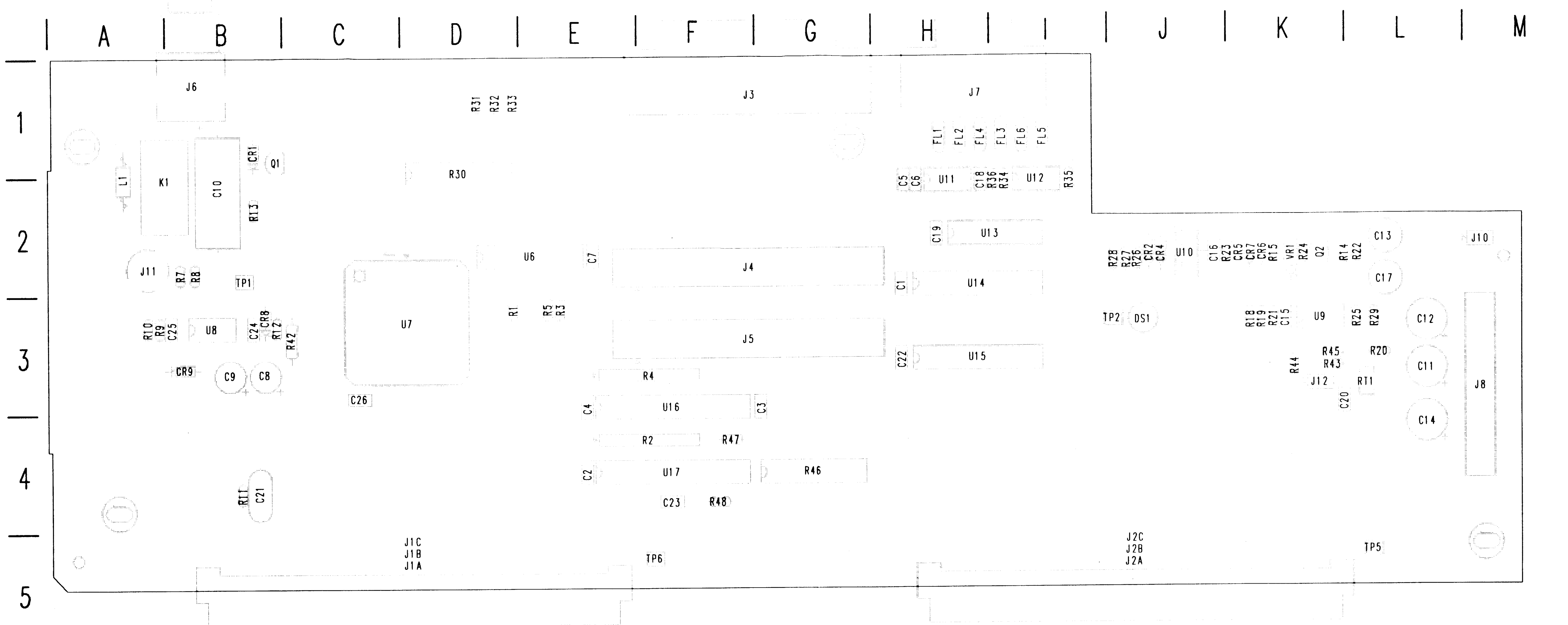
Assembly A7A1. *Partial A7A1 also shown on Schematic 1.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C7	G2	B2
C8	G2	A2
C9	G4	D3
C10	G4	D3
C11	G4	E3
C12	G4	E3
C13	H3	C2
C15	C5	G4
C16	C5	F4
C17	B2	I1
C18	B2	I2
C19	H3	C1
C20	H2	A2
C21	H3	C1
CR5	H3	C3
FL2	B2	H1
J1A	F1	D5
J1B	F3	D5
J1C	F4	D5
J2A	A1	J5
J2B	A2	J5
J2C	A4	J5
J3	H4	F1
J4	E4	F2
J5	E2	F2
J9	G2	A2
J10	H3	B1
J11	F2	C1
J12	F2	D1
J13	H3	C1
J14	C2	H1
K1	H2	B1
L1	H3	A1
L2	F2	D1
L3	F2	C1
L4	G2	B2
L5	H3	B2
L6	H4	E1
L7	H4	C4
Q1	H3	C3
R5	H3	C3
R11	B5	H4
U1	G4	D2
U2	C4	F4
U3	C5	H4
U4	B2	I1



VIDEO BYPASS SWITCH
AUDIO DELAY DRIVER
DIAGNOSTIC BUFFER
COMPOSIT DIGITAL OUTPUT BUFFER
DECOUPLING CAPACITORS
REFERENCE LOOP THROUGH
A3 CONTROLLER BOARD
A4 DAC BOARD
A7A2 UPPER I/O BOARD
PROGRAM OUTPUT
PROGRAM MONITOR
COMPOSITE DIGITAL OUTPUT
AUDIO DELAY
871-1267-00
P/O A7A1 LOWER I/O BOARD

VS 211



A7A2 UPPER I/O BOARD

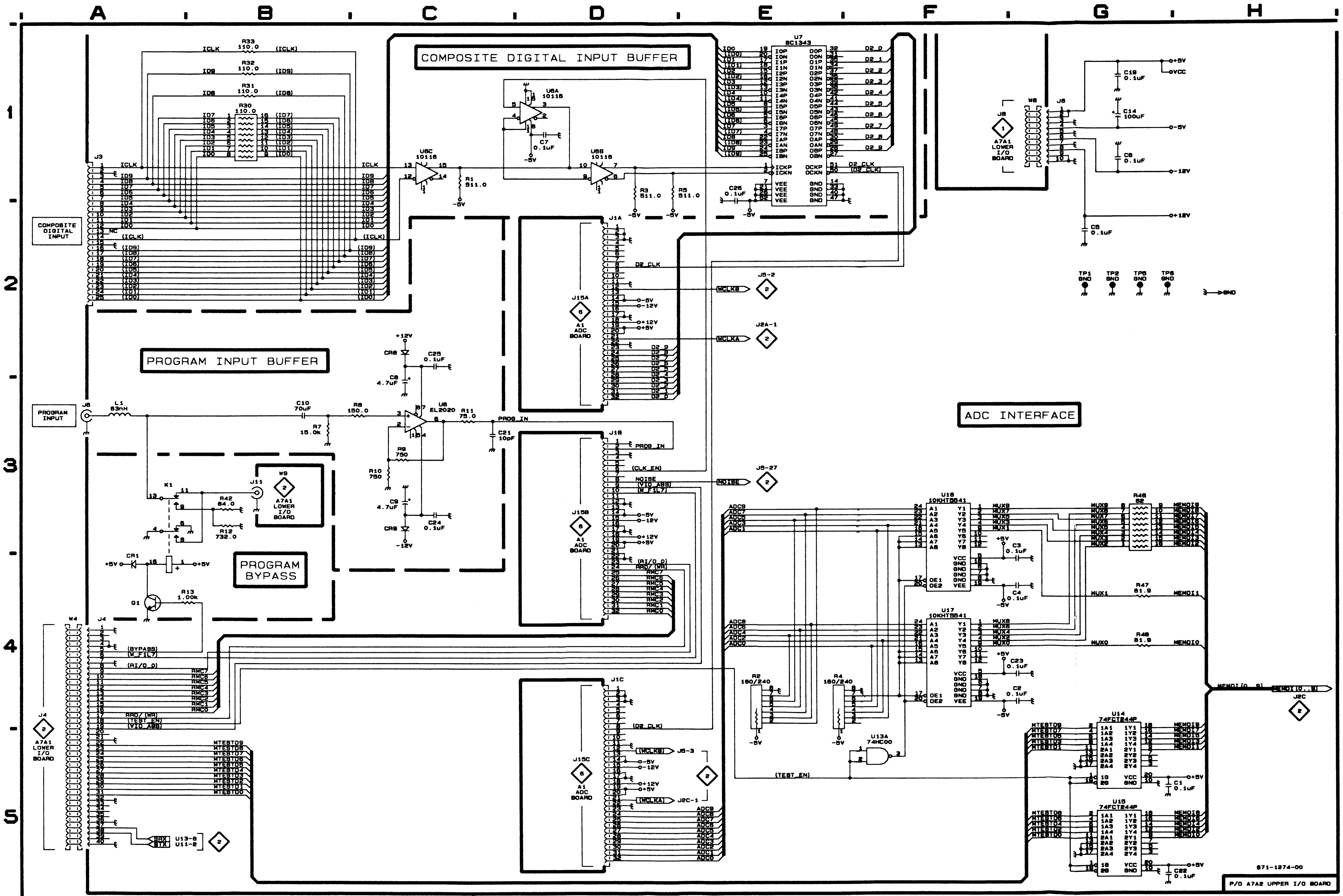
Static Sensitive Devices
See Maintenance Section

UPPER I/O BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A7A2. *Partial A7A2 also shown on Schematic 2.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	G5	H2	CR1	A4	B1	R2	E4	E4	R48	G4	F4
C2	G4	E4	CR8	C2	B3	R3	D1	E3	TP1	G2	B2
C3	G4	G3	CR9	C3	B3	R4	E4	E3	TP2	G2	I3
C4	G4	E3	J1A	D2	B5	R5	D1	E3	TP5	G2	L5
C5	G2	H2	J1B	D3	B5	R7	B3	B2	TP6	G2	F5
C6	G1	H2	J1C	D4	B5	R8	C3	B2	U6A	D1	D2
C7	D1	E2	J3	A1	F1	R9	C3	A3	U6B	D1	D2
C8	C3	B3	J4	A4	E3	R10	C3	A3	U6C	C1	D2
C9	C3	B3	J6	A3	A1	R11	C3	B4	U7	E1	D2
C10	B3	B2	J8	G1	L4	R12	B3	B3	U8	C3	B3
C14	G1	L4	J11	B3	A2	R13	A4	B2	U13A	F5	H2
C19	G1	H2	K1	A3	A1	R30	B1	D2	U14	G4	H3
C21	C3	B4	L1	A3	A2	R31	B1	D1	U15	G5	H3
C22	G5	H3	Q1	A4	C1	R32	B1	D1	U16	F3	E4
C23	G4	F4	R1	C1	D3	R33	B1	D1	U17	F4	E4
C24	C3	B3				R42	B3	C3			
C25	C2	B3				R46	G3	G4			
C26	E1	C3				R47	G4	F4			

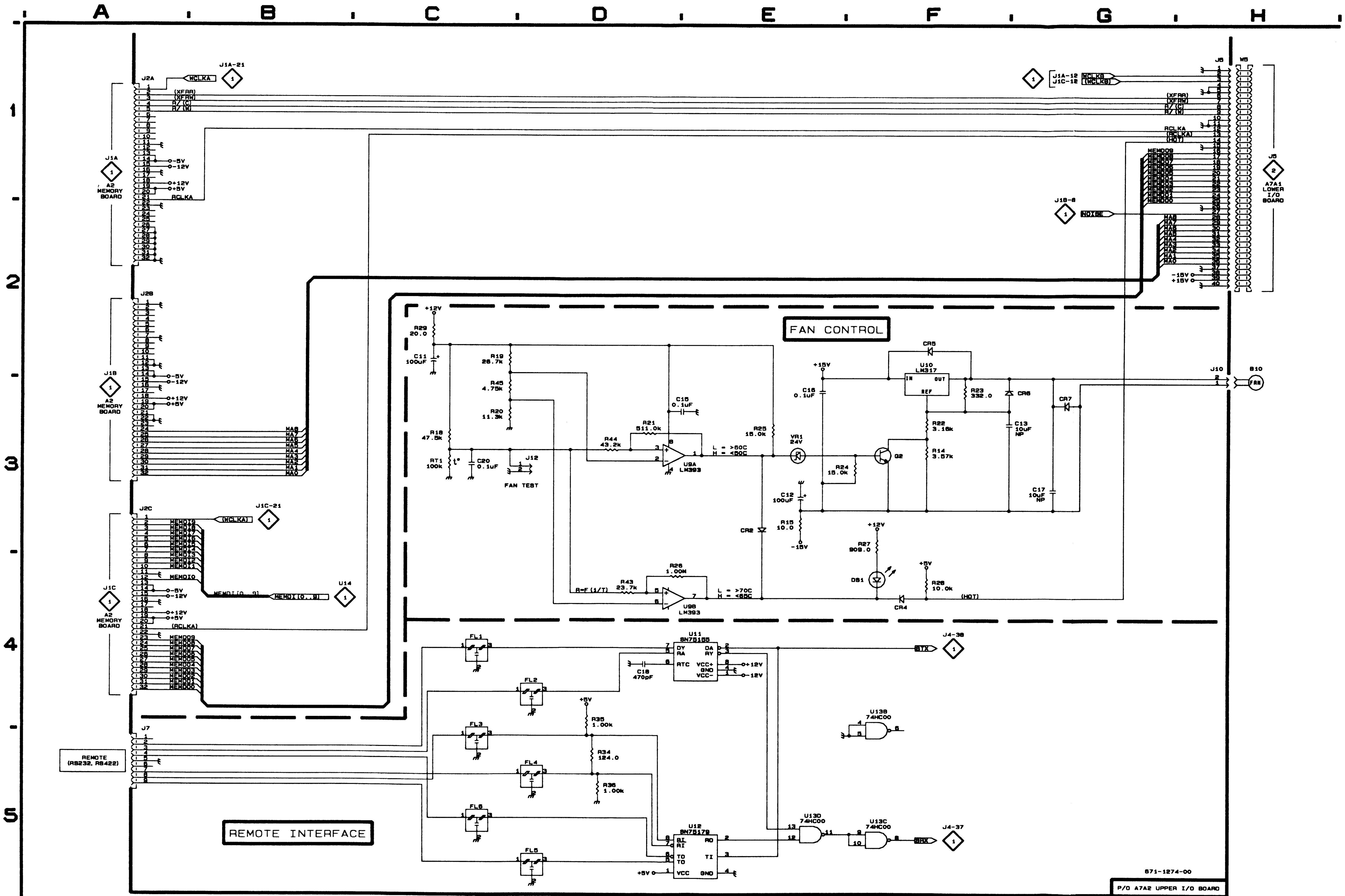

COMPOSITE DIGITAL INPUT BUFFER
PROGRAM INPUT BUFFER
PROGRAM BYPASS
ADC INTERFACE
COMPOSITE DIGITAL INPUT
PROGRAM INPUT
A7A1 LOWER I/O BOARD
A1 ADC BOARD
P/O A7A2 UPPER I/O BOARD
671-1274-00

UPPER I/O BOARD
Schematic <2> Look-Up Chart

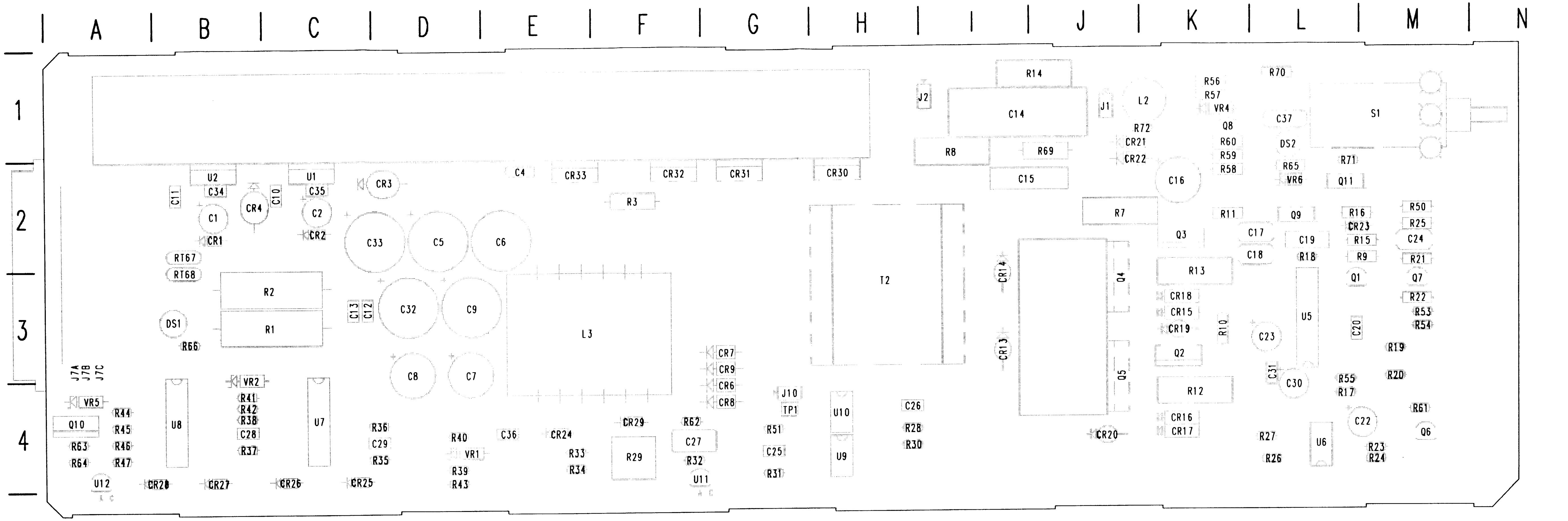
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A7A2. *Partial A7A2 also shown on Schematic 1.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C11	C2	L3
C12	E3	L3
C13	F3	L2
C15	E3	K3
C16	E3	J2
C17	G3	L2
C18	D4	H2
C20	C3	L3
CR2	E3	J2
CR4	F4	J2
CR5	F2	K2
CR6	F3	K2
CR7	G3	K2
DS1	F4	J3
FL1	C4	H1
FL2	D4	H1
FL3	C4	I1
FL4	D5	H1
FL5	D5	I1
FL6	C5	I1
J2A	A1	H5
J2B	A2	H5
J2C	A3	H5
J5	H1	E3
J7	A5	H1
J10	H2	M2
J12	D3	K3
Q2	F3	K2
R14	F3	L2
R15	E3	K2
R18	C3	K3
R19	C2	K3
R20	C3	L3
R21	D3	K3
R22	F3	L2
R23	F3	K2
R24	F3	K2
R25	E3	L3
R26	D4	J2
R27	F3	J2
R28	F4	J2
R29	C2	L3
R34	D5	I2
R35	D4	I2
R36	D5	I2
R43	D4	K3
R44	D3	K3
R45	C3	K3
RT1	C3	L3
U9A	D3	K3
U9B	D4	K3
U10	F2	J2
U11	D4	H2
U12	D5	I2
U13B	F4	H2
U13C	F5	H2
U13D	E5	H2
VR1	E3	K2



REMOTE AND MEMORY INTERFACE, FAN CONTROL 2



A8 POWER SUPPLY BOARD

Static Sensitive Devices
See Maintenance Section

POWER SUPPLY BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A8.

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	F1	B2
C2	F1	C2
C4	D2	E2
C5	F2	D2
C6	F2	E2
C7	E1	D3
C8	E1	D3
C9	F2	D3
C10	F1	C2
C11	F1	B2
C12	F2	C3
C13	F2	C3
C14	D2	I1
C15	C2	I2
C16	B2	K2
C17	C2	L2
C18	C2	L2
C19	A4	L2
C20	B3	M3
C22	B5	L4
C23	B4	L3
C24	C4	M2
C25	E3	G4
C26	D5	H4
C27	F3	F4
C28	F5	B4
C29	F5	D4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C30	A3	L4
C31	B5	L4
C32	F2	D3
C33	F2	C2
C34	G1	B2
C35	G1	C2
C36	E4	E4
C37	C1	L1
CR1	F2	B2
CR2	F1	C2
CR3	F1	D2
CR4	F2	B2
CR6	E1	G4
CR7	E2	G3
CR8	E1	G4
CR9	E2	G3
CR13	C2	I3
CR14	C2	I3
CR15	C2	K3
CR16	C2	K4
CR17	C2	K4
CR18	C2	K3
CR19	C2	K3
CR20	C3	J4
CR21	C1	J1
CR22	D1	J2
CR23	C3	L2

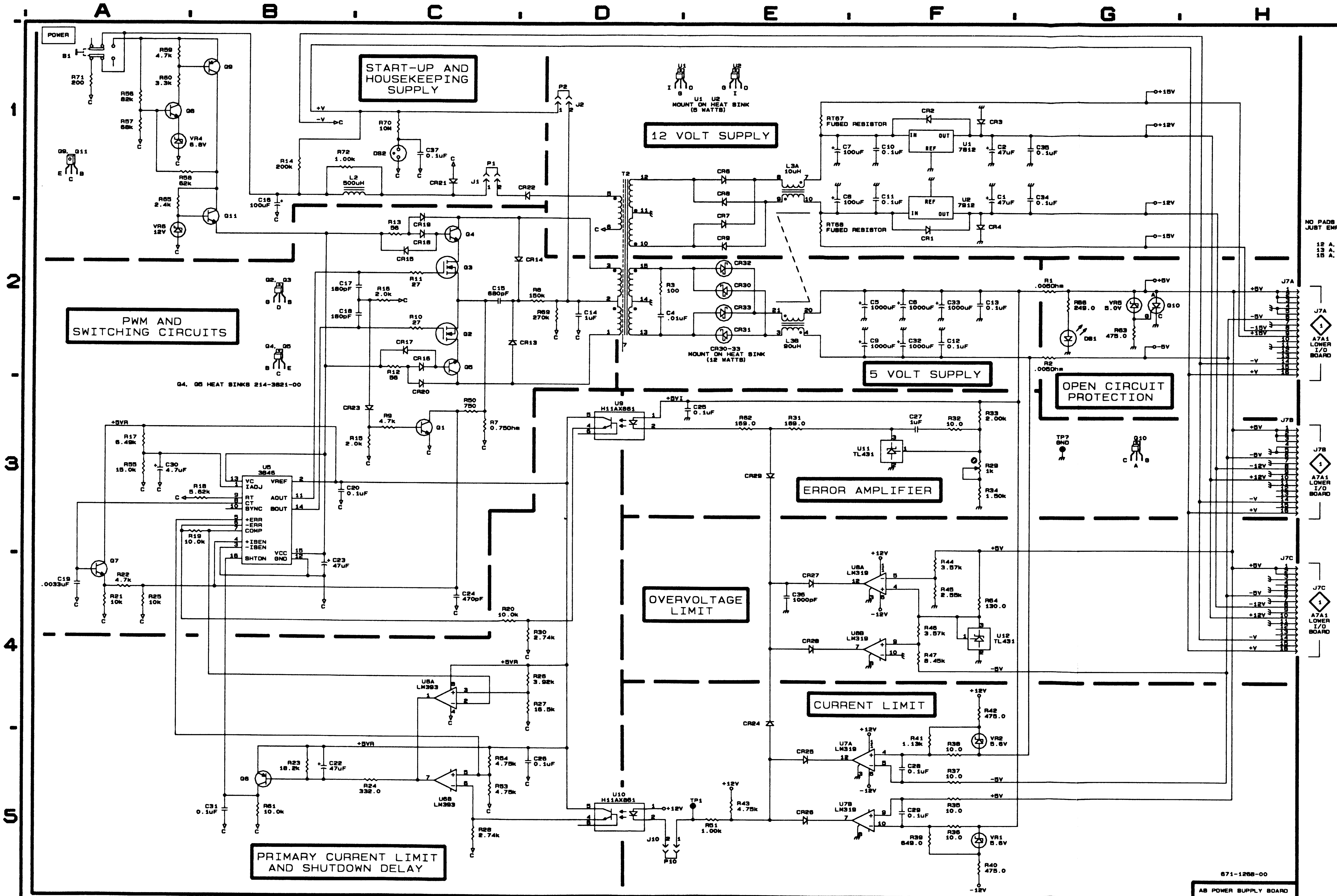
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR24	E4	E4
CR25	E5	C4
CR26	E5	C4
CR27	E4	B4
CR28	E4	A4
CR29	E3	F4
CR30	E2	H2
CR31	E2	G2
CR32	E2	F2
CR33	E2	E2
DS1	G2	B3
DS2	C1	L2
J1	C1	J1
J2	D1	H1
J7A	H2	A3
J7B	H3	A3
J7C	H4	A3
J10	D5	G4
L2	B1	K1
L3A	E1	F2
L3B	E2	F2
P1	C1	J1
P2	D1	H1
P10	D5	G4
Q1	C3	L3
Q2	C2	K3

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
Q3	C2	K2
Q4	C2	K2
Q5	C2	K4
Q6	B5	M4
Q7	A4	M3
Q8	A1	K1
Q9	B1	L2
Q10	G2	A4
Q11	B2	M2
R1	G2	C3
R2	G2	C3
R3	D2	F2
R7	C3	J2
R8	D2	I1
R9	C3	M2
R10	C2	K3
R11	C2	K2
R12	C2	K4
R13	C2	K3
R14	B1	J1
R15	C3	L2
R16	C2	L2
R17	A3	L4
R18	B3	L2
R19	B3	M3
R20	C4	M4
R21	A4	M2
R22	A4	M3

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R23	B5	M4
R24	C5	M4
R25	A4	M2
R26	D4	L4
R27	D4	L4
R28	C5	H4
R29	F3	F4
R30	D4	H4
R31	E3	G4
R32	F3	F4
R33	F3	E4
R34	F3	E4
R35	F5	D4
R36	F5	D4
R37	F5	B4
R38	F5	B4
R39	F5	D4
R40	F5	D4
R41	F5	B4
R42	F4	B4
R43	E5	D4
R44	F4	A4
R45	F4	A4
R46	F4	A4
R47	F4	A4
R50	C3	M2
R51	E5	G4
R53	C5	M3
R54	C5	M3

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R55	A3	L4
R56	A1	K1
R57	A1	K1
R58	A1	K2
R59	A1	K2
R60	A1	K1
R61	B5	M4
R62	E3	F4
R63	G2	A4
R64	F4	A4
R65	A1	L2
R66	G2	B3
R69	D2	J1
R70	C1	L1
R71	A1	L2
R72	B1	J1
RT67	E1	B2
RT68	E2	B3
S1	A1	M1
T2	D1	I3
TP1	E5	G4
U1	F1	C2
U2	F1	B2
U5	B3	L3
U6A	C4	L4
U6B	C5	L4

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U1	F1	C2
U2	F1	B2
U5	B3	L3
U6A	C4	L4
U6B	C5	L4
U7A	F5	C4
U7B	F5	C4
U8A	F4	A4
U8B	F4	A4
U9	D3	H4
U10	D5	H4
U11	F3	F4
U12	F4	A5
VR1	F5	D4
VR2	F5	B4
VR4	A1	K1
VR5	G2	A4
VR6	A2	L2


START-UP AND HOUSEKEEPING SUPPLY
12 VOLT SUPPLY
PWM AND SWITCHING CIRCUITS
5 VOLT SUPPLY
OPEN CIRCUIT PROTECTION
ERROR AMPLIFIER
OVERVOLTAGE LIMIT
CURRENT LIMIT
PRIMARY CURRENT LIMIT AND SHUTDOWN DELAY
NO PADS OR PLATE-THRU JUST EMPTY HOLES
A7A1 LOWER I/O BOARD
671-1268-00
A8 POWER SUPPLY BOARD

REPLACEABLE MECHANICAL PARTS LIST

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
Mounting parts for Assembly and/or Component
MOUNTING PARTS/*END MOUNTING PARTS*
    Detail Part of Assembly and/or Component
    Mounting parts for Detail Part
    MOUNTING PARTS/*END MOUNTING PARTS*
        Parts of Detail Part
        Mounting parts for Parts of Detail Part
        MOUNTING PARTS/*END MOUNTING PARTS*

Mounting 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.

Mounting parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

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

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
06666	GENERAL DEVICES CO INC	1410 S POST RD PO BOX 39100	INDIANAPOLIS IN 46239-9632
07416	NELSON NAME PLATE CO	3191 CASITAS	LOS ANGELES CA 90039-2410
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
71468	ITT CANNON DIV OF ITT CORP	666 E DYER RD	SANTA ANA CA 92702
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
79136	WALDES KOHINOOR INC	47-16 AUSTEL PLACE	LONG ISLAND CITY NY 11101-4402
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
80126	PACIFIC ELECTRICORD CO	747 W REDONDO BEACH PO BOX 10	GARDENA CA 90247-4203
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201-2431
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0858	STAUFFER SUPPLY CO (DIST)		
TK1373	PATELEC-CEM (ITALY)	10156 TORINO	VAICENTALLO 62/45S ITALY

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	200-3740-00			1	COVER,TOP:	80009	200-3740-00
					MOUNTING PARTS		
-2	211-0541-00			17	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-3	407-4052-00			1	BRKT,RACKMOUNT:LEFT,ALUMINUM	80009	407-4052-00
					MOUNTING PARTS		
-4	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					END MOUNTING PARTS		
-5	407-4053-00			1	BRKT,RACKMOUNT:RIGHT,ALUMINUM	80009	407-4053-00
					MOUNTING PARTS		
-6	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					END MOUNTING PARTS		
-7	105-1041-00			2	LATCH,SPRING:BERYLLIUM COPPER W/NYLON PIECE MOLDED ON	80009	105-1041-00
-8	213-1070-00			1	THUMBSCREW:6M X 1.0 L,0,375 OD,SST,BLACK	80009	213-1070-00
-9	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESCR
-10	354-0175-00			1	RING,RETAINING:TYPE E EXT,U/O 0.188 ID SFT	79136	5133-18-MI
-11	351-0893-00			2	SLIDE,DOOR:STAINLESS STEEL	80009	351-0893-00
					MOUNTING PARTS		
-12	211-0244-00			2	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
-13	210-1002-00			2	WASHER,FLAT:0.125 ID X 0.25 OD X 0.022,BRS	86928	5714-147-20N
-14	214-4380-00			2	PIN,HINGE:0.25 DIA,ALUMINUM	80009	214-4380-00
-15	354-0350-00			2	RING,RETAINING:EXT E TYPE,U/O 0.094 DIA SFT	79136	5133-9-S-ZD-R
					END MOUNTING PARTS		
-16	337-3584-00			1	SHIELD,ELEC:ALUMINUM	80009	337-3584-00
					MOUNTING PARTS		
-17	211-0503-00			6	SCREW,MACHINE:6-32 X 0.188,PNH,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-18	337-3803-00			2	SHIELD,EMI:CLIP ON,FINGER STOCK STRIP,0.300 X 16 IN LONG	80009	337-3803-00
-19	378-0372-00			1	FILTER,AIR:13.5 X 2,FOAM,ELEMENT	80009	378-0372-00
-20	----- -----			1	CIRCUIT BD ASSY:FRONT PANEL LED (SEE A9 REPL)		
					MOUNTING PARTS		
-21	211-0503-00			1	SCREW,MACHINE:6-32 X 0.188,PNH,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-22	200-3921-01			1	DOOR:PLASTIC,VS211	80009	200-3921-01
-23	334-0097-00			1	EMBLEM:SLATE GRAY W/STUD	80009	334-0097-00
-24	----- -----			1	CIRCUIT BD ASSY:ADC (SEE A1 REPL)		
-25	----- -----			1	CIRCUIT BD ASSY:DECODER/PROC AMP (SEE A5 REPL)		
					MOUNTING PARTS		
-26	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-27	----- -----			1	CIRCUIT BD ASSY:DAC (SEE A4 REPL)		
					MOUNTING PARTS		
-28	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-29	129-1407-00			2	SPACER,POST:0.750 SPACING,4-40 INT THD BOTH ENDS,0.250 HEX,ALUM,CHROMATE COATING	80009	129-1407-00
-30	129-1397-00			2	SPACER,STANDOFF:0.750 L X 0.375,4-40 TAPPED HOLE BOTH ENDS,W/SWIVEL HINGE,ZINC PLATE	80009	129-1397-00
-31	----- -----			1	CIRCUIT BD ASSY:REMOTE CONTROL (SEE A6 REPL)		
					MOUNTING PARTS		
-32	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-33	----- -----			1	CIRCUIT BD ASSY:MEMORY CONTROLLER (SEE A3 REPL)		
					MOUNTING PARTS		
-34	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-35	129-1407-00			2	SPACER,POST:0.750 SPACING,4-40 INT THD BOTH ENDS,0.250 HEX,ALUM,CHROMATE COATING	80009	129-1407-00
-36	129-1397-00			2	SPACER,STANDOFF:0.750 L X 0.375,4-40 TAPPED HOLE BOTH ENDS,W/SWIVEL HINGE,ZINC PLATE	80009	129-1397-00
-37	----- -----			1	CIRCUIT BD ASSY:MEMORY		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-					(SEE A2 REPL)		
-38	----- -----			1	CIRCUIT BD ASSY:POWER SUPPLY		
					(SEE A8 REPL)		
-39	337-3680-00			1	.SHIELD,ELEC:GRID,3.0 X 4.0	80009	337-3680-00
					MOUNTING PARTS		
-40	211-0244-00			3	.SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-41	----- -----			1	CIRCUIT BD ASSY:UPPER AND LOWER I/O WIRED		
					(SEE A7 REPL)		
					MOUNTING PARTS		
-42	211-0541-00			9	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-43	----- -----			1	.CIRCUIT BD ASSY:UPPER I/O		
					(SEE A7A2 REPL)		
					MOUNTING PARTS		
-44	211-0244-00			4	.SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
-45	220-0497-00			1	.NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	80009	220-0497-00
-46	210-1039-00			1	.WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
-47	131-0890-00			4	.LOCK,CONNECTOR:4-40 X 0.312 L HEX HD,STL	71468	D 20418-2
					END MOUNTING PARTS		
-48	----- -----			1	.CIRCUIT BD ASSY:LOWER I/O		
					(SEE A7A1 REPL)		
					MOUNTING PARTS		
-49	211-0244-00			4	.SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
-50	220-0497-00			5	.NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	80009	220-0497-00
-51	210-1039-00			5	.WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
-52	131-0890-00			2	.LOCK,CONNECTOR:4-40 X 0.312 L HEX HD,STL	71468	D 20418-2
-53	337-3796-00			1	.SHIELD,ELEC:LINE FILTER,ALUMINUM	80009	337-3796-00
-54	211-0012-00			2	.SCREW,MACHINE:4-40 X 0.375,PNH,STL	93907	ORDER BY DESCR
-55	210-0457-00			1	.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					END MOUNTING PARTS		
					.CKT BD A7A1 INCLUDES:		
-56	210-0202-00			1	..TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2
-57	195-0652-00			1	..LEAD,ELECTRICAL:18 AWG,4.0 L,5-4	80009	195-0652-00
-58	129-0114-00			4	.SPACER,POST:1.625 L,4-40 BOTH ENDS,AL,0.25 .HEX	80009	129-0114-00
-59	----- -----			1	.FAN TUBEAXIAL:		
					.(SEE A7B10 REPL)		
					MOUNTING PARTS		
-60	211-0511-00			4	.SCREW,MACHINE:6-32 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
-61	210-0457-00			4	.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					END MOUNTING PARTS		
-62	334-3379-00			1	.MARKER,IDENT:MARKED GROUND SYMBOL	07416	ORDER BY DESCR
	131-3573-00			1	.CONN,PLUG,ELEC:MALE,W/LOCKING ADAPTER	80126	B-0779
-63	333-3733-00			1	.PANEL,REAR:	80009	333-3733-00
-64	351-0104-03			1	SL SECT,DWR EXT:12.625 L,W/O HARDWARE	06666	C-720-3
					MOUNTING PARTS		
-65	210-0458-00			8	NUT,PL,ASSEM WA:8-32 X 0.344,STL CD PL	78189	511-081800-00
					END MOUNTING PARTS		
-66	441-1985-00			1	CHASSIS ASSY:ALUMINUM	80009	441-1985-00
					STANDARD ACCESSORIES		
	070-7501-00			1	MANUAL,TECH:USERS,VS211	80009	070-7501-00
	159-0023-00			1	FUSE,CARTRIDGE:3AG,2A,250V,SLOW BLOW	71400	MDX2
	351-0636-00			1	SLIDE,DWR,EXT:20.0 X 1.69,PAIR,R&L	80009	351-0636-00
-67	161-0216-00			1	CABLE ASSY,PWR,:3,18 AWG,2.5M L,BLACK (STANDARD ONLY)	80126	C7120-25M-BL
					OPTIONAL ACCESSORIES		
-68	161-0215-00			1	CABLE ASSY,PWR,:3,0.75MU,2.5MM L,GREY (EUROPEAN OPTION A1 ONLY)	80009	161-0215-00
-69	161-0066-10			1	CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5 ME TERS LONG,UNITED KINGDOM (UNITED KINGDOM OPTION A2 ONLY)	TK1373	24230
-70	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (AUSTRALIAN OPTION A3 ONLY)	80009	161-0066-11
	070-8164-00			1	MANUAL,TECH:SERVICE,VS211	80009	070-8164-00

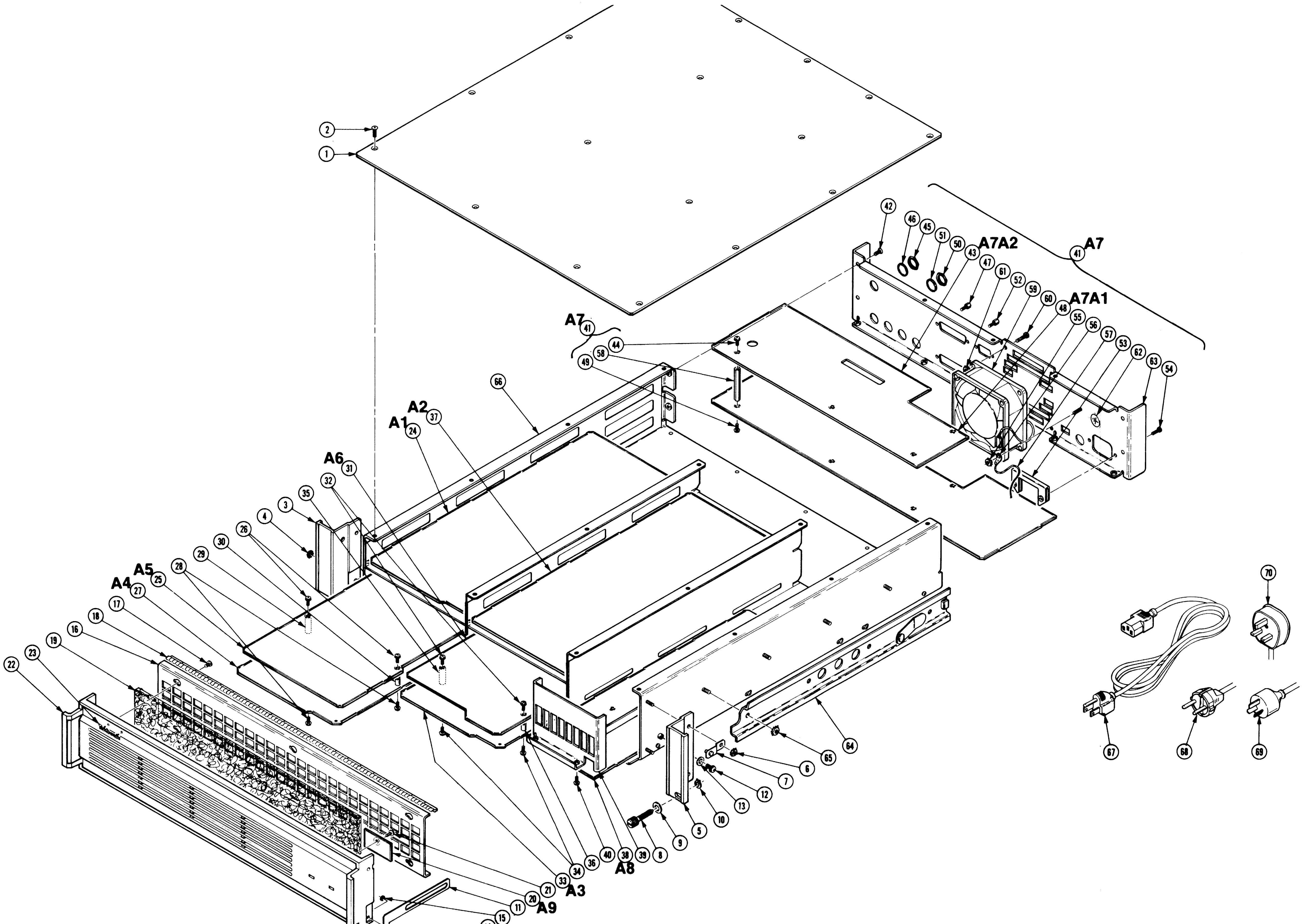


FIG 1 EXPLODED VIEW

APPENDIX A
LIST OF JUMPERS & SWITCHES

This section superceeds any information contained in any of the other sections.

Table A-1. Remote Board DIP Switch Functions.
(All switches initially set to 0.)

DIP #	SWITCH NUMBER	DEFINITION OF SWITCH SETTINGS	
S4	1	Synchronizer Mode 0	**21** 00 = 8 Field Synchronizer Mode 01 = Zero Studio Delay 10 = 2 Field Synchronizer Mode 11 = unused
	2	Synchronizer Mode 1	
	3	Force Reference Sync Lock	0 = no 1 = yes
	4	Force Program Sync Lock	0 = no 1 = yes
	5	Program Input	0 = analog 1= digital
	6	unused	
	7	unused	
	8	unused	
S5	1	Proc Amp Clip Mode 0	**21** 00 = off 01 = Soft (only clip luma) 10 = Hard (clip both luma and chroma) 11 = Auto (Soft Clip unless PROGRAM INPUT is noisy then Hard Clip.)
	2	Proc Amp Clip Mode 1	
	3	Proc Amp White Clip	0 = disable 1 = enable
	4	Proc Amp Black Clip	0 = 0 mV 1 = 10 mV
	5	Sync & Burst Insertion	0 = no 1 = yes
	6	ITS Handling	0 = pass 1 = delete
	7	SIS (Sound-in-Sync) on Program	0 = no 1 = yes
	8	Digital Output	0 = 10-bit 1 = 8-bit

Table A-1. cont.

DIP #	SWITCH NUMBER	DEFINITION OF SWITCH SETTINGS	
S6	1	Program Error Handling 0	**321** 000 = Freeze 001 = Bypass 010 = Black 011 = Freeze for 5 sec → Black 100-111 = unused
	2	Program Error Handling 1	
	3	Program Error Handling 2	
	4	Reference Error Handling	0 = Bypass 1 = use internal reference
	5	unused	
	6	unused	
	7	Baud Rate 0	**87** 00 = 19.2k 01 = 9600 10 = 4800 11 = 2400
	8	Baud Rate 1	
S7	1	Zero Proc Amps (reset)	0 = Proc Amp Operate 1 = Proc Amp Reset
	2	Proc Amp Knobs	0 = disable (freeze value) 1 = enable
	3	Timing Keys	0 = disable (freeze value) 1 = enable
	4	Vertical Timing	**54** 00 = 0 line 10 = +1 line 01 = -1 line 11 = unused
	5		
	6	Control	0 = local 1 = remote

Table A-2. Remote Board Jumpers.
(These jumpers are for Service use ONLY.)

FUNCTION	JUMPER #	DESCRIPTION	
Reset	J2	1-2	Normal
		2-3	Reset
Watch Dog Enable	J3	1-2	Enable
		2-3	Disable
Beep Enable	J43	1-2	Beep Enabled
		2-3	Beep Disabled

Table A-3. Remote Board Diagnostics (S8).

SWITCH SETTING	DIAGNOSTIC TEST SELECTED
0	Diagnostics Off (no diags selected)
1	Switches Test
2	Pots Test
3	RS-232 Test
4	S4 Test
5	S5 Test
6	S6 Test
7	S7 Test
8	Board Communication Test
9	spare
A	spare
B	spare
C	spare
D	spare
E	RAM & NVRAM Test
F	spare

Table A-4. ADC Board Jumpers.

FUNCTION	JUMPER #	DESCRIPTION	
Input Gain Select (GREEN)	J1	1-2	Gain controlled by the RC 211
		2-3	Gain controlled by R166 on ADC board
Reset Select (RED — Service ONLY.)	J6	1-2	Normal
		2-3	Reset
		2-4	No Reset for troubleshooting Microprocessor system.
VCO Test (RED — Service ONLY)	J11	1-2	Center Frequency
		2-3	Normal Operation
		2-4	High Frequency Max
		2-5	Low Frequency Max
Anti-aliasing Filter Testing (RED — Service ONLY)	J3 & J4	1-2	Normal Removed for testing
Soft Reset (RED — Service ONLY)	J5	1-2	Normal Operation
		2-3	Test (Used to test soft reset function used with diagnostics.)

Table A-5. ADC Board Diagnostic Switch (S2).

DIAG SETTING	DIAGNOSTIC TEST SELECTED
0	No diags selected — normal operation
1	EPROM Checksum — continuous pass/fail
2	RAM Tests — continuous pass/fail
3	ARCTAN PROM Test — continuous pass/fail
4	CTC Test — continuous pass/fail
5	ADC Setup — continuous interactive
6	E^2PROM Test/Initialize — one time pass fail
7	Port Test — continuous interactive
8	VCO DAC Test — continuous interactive
9	Sampler Test 1 — continuous interactive
A	Sampler Test 2 — continuous interactive
B	No diagnostics selected
C	Reset Test — continuous interactive
D	No diagnostics selected
E	D-2 Test — continuous interactive
F	Cycle Test — continuous pass/fail

Table A-6. Proc Amp/Decoder Board Jumpers.
(These jumpers are for Service use only.
They mimic the DIP switches on the Remote board.)

FUNCTION	JUMPER #	DESCRIPTION		
Decoder Mode	J3 & J4	J3	J4	
		1-2	1-2	Controller Controls Mode
		2-3	2-3	Force 0° Phase Shift
		2-3	2-4	Force 0° Phase Shift with V-Axis Compensation
		2-4	2-3	Force 180° Phase Shift
		2-4	2-4	Force 180° Phase Shift with V-Axis Compensation

Table A-6. cont.

FUNCTION	JUMPER #	DESCRIPTION		
Remote Proc Amp Control Enable	J8	1-2	Force Remote Coefficients	
		2-3	Force Default Coefficients	
Decoder Enable	J10	1-2	Disable Decoder	
		2-3	Enable Decoder	
Freeze Decoder Mode	J13 & J14	J13	J14	
		1-2	1-2	Enable Remote Board Control
		2-3	2-3	Decoder Mode 0 (no decoding)
		2-3	2-4	Decoder Mode 1 (2 field)
		2-4	2-3	Decoder Mode 2 (1 field)
		2-4	2-4	Decoder Mode 3 (not used)
Vertical Timing Offset	J15	1-2	Remote Vertical Offset	
		2-3	Force 0 Vertical Offset	
		2-4	Force Vertical Offset Handling	
Program Input Noise	J16	1-2	Remote Noise Level Select	
		2-3	Force 0 Noise	
		2-4	Force Noise Handling	
Black Clip Select	J17	1-2	Remote Black Clip Enable	
		2-3	Force 0 mV Black Clip Enable	
		2-4	Force -10 mV Black Clip Enable	
White Clip Enable	J18	1-2	Remote White Clip Enable	
		2-3	Force White Clip Disable	
		2-4	Force 110% White Clip Enable	
Clip Mode Select	J20 & J19	J20	J19	
		1-2	1-2	Remote Clip Mode Select
		2-3	2-3	Force Clipper Disable
		2-3	2-4	Force Soft Clip (only clip luma)
		2-4	2-3	Force Hard Clip (clip both chroma and luma)
		2-4	2-4	Force Auto Clip (Soft Clip unless the PROGRAM INPUT is noisy then Hard Clip.)

Table A-7. DAC Board Jumpers.
(These jumpers are for Service use ONLY.)

FUNCTION	JUMPER #	DESCRIPTION	
Soft Reset Enable	J5	1-2	Enable
		2-3	Disable
Hard Reset Enable	J6	1-2	Enable
		2-3	Forced Reset
		2-4	Disable
VCO Test	J7	2-3	Operate
		4-3	Low Frequency
		1-3	Mid Frequency
		5-3	High Frequency
Analog Video Enable	J10	1-2	Enable
		2-3	Disable
VCO DAC Test	J11	1-2	Operate
		2-3	Test
Reference Input Clamp Enable	J12	1-2	Enable
		2-3	Disable
Analog Video Enable	J13	1-2	Enable
		1-4	Disable

Table A-8. DAC Board Diagnostic Switch (S1).

DIAG SETTING	DIAGNOSTIC TEST SELECTED
0	No Diags Selected — Normal Operation
1	EPROM Checksum — continuous pass/fail
2	RAM Tests — continuous pass/fail
3	ARCTAN PROM Test — continuous pass/fail
4	CTC Test — continuous pass/fail
5	NVRAM Test & Initialization — continuous pass/fail
6	NVROM Test — one time pass/fail
7	Port Test — continuous interactive
8	VCO DAC Test — continuous interactive
9	Sampler Test 1 — continuous interactive
A	Sampler Test 2 — continuous interactive
B	Sampler Test 3 — continuous interactive
C	Reset Test — continuous interactive
D	No diagnostics selected
E	Proc Amp/Decoder disable
F	Cycle Test — continuous pass/fail

Table A-9. Controller Board Jumpers.
(This jumper is for Service use ONLY.)

FUNCTION	JUMPER #	DESCRIPTION	
µC Reset	J5	1-2	Normal Operation
		2-3	Forced Reset
		3-4	Disable Watchdog and Power-on reset.

Table A-10. Controller Board Diagnostics (S2).

DIAG SETTING	DIAGNOSTIC TEST SELECTED
0	No Diagnostics Selected — Normal Operation
1	R&W Vertical Test
2	spare
3	Port Test & Audio Delay Output Test
4	Memory Address Test
5	Automatic Memory Test
6	Manual Memory Test (00h)
7	Manual Memory Test (FFh)
8	Manual Memory Test (55h)
9	Manual Memory Test (AAh)
A	Remote Communications Test
B	Cycle Test
C	spare
D	spare
E	spare
F	spare

APPENDIX B
PC COMMANDS

At the present time the PC Commands are not supported for general use.

APPENDIX C.1
RC 211 SERVICE INFORMATION

NOTE
This Section assumes that the user is familiar with the RC 211 and has the RC 211 Operator's Manual available for reference.

TROUBLESHOOTING & DIAGNOSTICS

Troubleshooting

If a VS 211 encounters an error condition, the system status indicator on the synchronizer will flash. The information is relayed to the RC 211 and causes the LED on the corresponding Synchronizer Select key to flash. This error message does not effect the operation of the RC 211 with any other attached VS 211.

To begin troubleshooting, follow this procedure:

a. Press the flashing SYNCHRONIZER SELECT key (1-6) to select the synchronizer. The RC 211 will automatically enter the Frame Sync Status submenu. The status category and error message will be displayed. For a list of possible status/error messages, see Appendix A, Menu Functions in the RC 211 Manual.

b. Take note of the error message to determine if the fault is with the VS 211, the RC 211, or is external to both (e.g., with the program input, genlock reference, or the RC-to-VS cable).

c. If no external cause is found, run the appropriate diagnostics as outlined below. If the problem appears to be with either the synchronizer or the remote, please refer it to qualified service personnel for repairs.

Complete troubleshooting information is contained in the Troubleshooting Section of this Manual.

The Diagnostics Menu

Diagnostic tests available through the RC 211 front panel apply primarily to the selected VS 211. Any error encountered will be reported through the RC 211 display. To run a diagnostic routine, first confirm that the diagnostics are unlocked (in the Panel Lockout submenu). Then move to the Diagnostics submenu, scroll to the desired test, and press ENTER to begin the routine.

NOTE
Running the diagnostics will interrupt normal operation of the VS 211 and may cause all synchronizer setup information to be lost; be sure to re-activate the diagnostic lockout before returning to normal operation.

The available diagnostic routines are described below:

(A) RS-232 Port Test — Writes characters and reads them back over the six RS-232 busses one port at a time. Will flag and report any "no connection" conditions.

Table C.1-1. Errors indicated by "failure bits".

bit	ADC Board Diagnostic	DAC Board Diagnostic	Memory Bd Diagnostic	I/O Board Diagnostic
0*	n/a	n/a	n/a	n/a
1	NVRAM	NVRAM	n/a	n/a
2	CTC	CTC	n/a	n/a
3	Arctan EPROM	Arctan EPROM	n/a	n/a
4	RAM	RAM	n/a	n/a
5	EPROM	EPROM	n/a	ADC Board communication
6	n/a	n/a	Controller	DAC Board communication
7	n/a	n/a	Memory	Mem. Controller communication

* Bit 0 and all others indicated as "n/a" are always high (1).

(B) ADC Board Cycle Diagnostics — Continuously cycles through the RAM, ARCTAN EPROM, and CTC tests at the ADC board of the selected synchronizer. After a time, the results of the test will be displayed on the RC 211. Failure will be reported as illustrated in Fig. C.1-1. The nature of the failure will be indicated by the low (0) bits in the binary number as listed in Table C.1-1 (bit 0 is the LSB; bit 7 is the MSB). Note that it is possible to report more than one failure mode at a time. In Fig. C.1-1, for instance, both NVRAM and EPROM errors are indicated. For details, see the Troubleshooting section of the VS 211 Service Manual.

```
ADC BD CYCLE DIAGS
FAILURE     11011101
```

Fig. C.1-1. An example diagnostic failure display.

(C) DAC Board Cycle Diagnostics — Continuously cycles through the RAM, ARCTAN EPROM, CTC, and NVRAM tests at the DAC board of the selected synchronizer. Failures are reported as with ADC board diagnostics (see Table C.1-1). For details, see the Troubleshooting section of the VS 211 Service Manual.

(D) Memory Board Cycle Diagnostics — Continuously cycles through tests at the Memory board of the selected synchronizer. Failures are reported as with ADC board diagnostics (see Table C.1-1). For details, see the Troubleshooting section of the VS 211 Service Manual.

(E) I/O Board Cycle Diagnostics — Continuously cycles through tests at the I/O board of the selected synchronizer. Failures are reported as with ADC board diagnostics (see Table C.1-1). For details, see the Troubleshooting section of the VS 211 Service Manual.

(F) Software Version — Lists which software version is installed in the RC 211 and VS 211. The display will report all software versions installed in the remote and the selected synchronizer, by board. The display will resemble Fig. C.1-2. This function is especially convenient during updates or troubleshooting.

ADC	DAC	CTRL	RCIO
1.0	1.2	1.1	1.1

Fig. C.1-2. The Software Versions displayed.

RC 211-Only Diagnostics

There are two types of diagnostic tests which apply only to the RC 211: Power-up and User. The tests are selected with the rotary hex switch, S8, on the Main board of the RC 211.

The **Power-up** diagnostic test is run whenever S8 is set for normal RC 211 operation (position 0) and the instrument is reset.

NOTE

The RC 211 is reset by either momentarily disconnecting the power supply or by moving jumper J2 to position 2–3, then back to pins 1–2.

This test verifies that all of the microprocessor (μP) RAM, and the stack portion of the NVRAM, is functional. When the test is passed, the RC continues on to normal operation. If an error is detected the test will continue and the appropriate Synchronizer Select LED will light. The LED on key 1 indicates a RAM error; that on key 2 indicates an NVRAM error.

The **User Diagnostics** are selected with S8 positions 1–7. The switch positions and the associated tests are listed in Table C.1-2 and described below:

Table C.1-2. RC 211 Internal Diagnostics.

DIAG SETTING	DIAGNOSTIC TEST SELECTED
0	Normal Operation
1	Audio Delay Test
2	Keys/LEDs Test
3	Pots Test
4	RS-232 Test
5	RC 211 Display Test
6	Video/Monitor Test
7	unused
8	unused
9	unused
0A	unused
0B	unused
0C	unused
0D	unused
0E	RAM Test
0F	unused

0 —Normal operation.

1 —Audio Delay Test. Select S8 position 7. The RC 211 display will report the audio delay (in ms) in effect at the selected VS 211.

2 —Keys/LEDs Test. Used to check the operation of the RC 211 front panel keys and LEDs. This test is available whenever S8 position 2 is selected. To conduct the test, simply press each key twice; the LED should toggle on and off.

3 —Pots Test. Used to check for proper operation of the RC 211 proc amp controls. It is available whenever S8 position 3 is selected. In this test, slowly turning a proc amp pot will sequence the

Select-key LEDs. The LEDs will light in ascending numerical order on clockwise rotation, descending order on counterclockwise rotation.

4 —**RS-232 Test.** Checks the synchronizer control ports and is available when S8 position 4 is selected. Connect a Null Terminator (a 9-pin female "D" connector with pins 2 and 3 connected through a 110 Ω connector) to each of the six ports in turn. The RC will attempt to send and receive an echoed character; the corresponding Select-key LED will light if no error is detected.

5 —**RC 211 Display Test.** Select S8 position 5. The RC 211 turns on all of the pixels of each display segment to confirm that they are operational.

6 —**Video/Monitor Test.** Select S8 position 6. The RC 211 should write a white rectangle to every character position used on the (optional) attached video monitor.

E —**RAM Test.** Writes and reads all locations of processor RAM and compares; lights Select key 1 LED on RAM error. Checks that the battery test word in NVRAM is correct; writes and reads all locations of NVRAM and compares; lights Select key 2 LED on NVRAM error. All six Select LEDs will flash once if the test is passed. To initiate this routine, set S8 to position 1 and reset the RC.

Positions 7–D and F are unused.

To return the RC 211 to normal operation, return the rotary diagnostic switch to position 0 and remove power momentarily (or reset the µP with jumper J2).

CALIBRATION

Calibration of the RC 211 is limited to the video levels on the external monitor and do not effect the accuracy or performance of either the RC 211 or the VS 211's associated with it. The three parameters affected by the pots are: peak-to-peak video level (R14), menu character outline level (R13), and character fill level (R12). These adjustments may be made with the aid of a PAL Video Measurement set, such as the Tektronix 1781R, or any PAL Waveform Monitor. The equipment setup for these adjustments is illustrated in Fig. C.1-3.

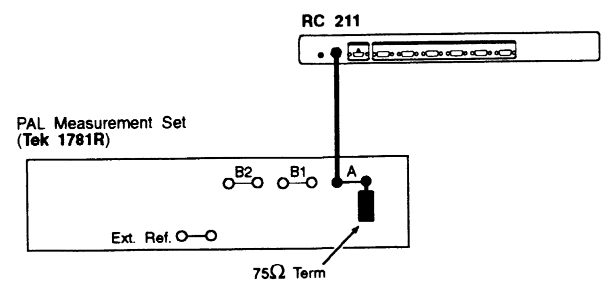


Fig. C.1-3.
Setup for calibrating the MONITOR OUT levels.

PROCEDURE:

a. Select the DEFAULT settings from the PRESET menu of the 1781R. Change the WFM HORIZONTAL setting to ONE, LINE.

b. Adjust R14 so the sync and burst are as close as possible to their preferred values of 300 mV. Use the 1781R voltage cursors to assist in this adjustment.

c. With the controls of the Measurement Set, position the black level of the waveform on the 0 V graticule. Adjust R13 to match the character outline level to 0 V.

d. Adjust R12 for a character fill level of 700 mV.

The results of these adjustments may be viewed with an external video monitor, or on the 1781R Vector display by selecting PIX with the LEFT DISPLAY buttons.

REPLACEABLE ELECTRICAL PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc., field office or representative.

It is important, when ordering parts, to include the following information in your order. Part number, instrument type and 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 1 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. A23R1234 **component**

A23 **R1234**

Assembly Number → A23   R1234 ← **Circuit Number**

Read: Resistor 1234 of Assembly 23.

Example B. A23A2R1234 **component**

Assembly Number → **A23** **A2** **R1234**

Subassembly Number → A2   R1234 ← **Circuit Number**

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).

Mechanical subparts to the circuit boards are listed in the Electrical Parts List. These mechanical subparts are listed with their associated electrical parts. For example, fuse holder follows fuse.

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

TEKTRONIX PART NO.
(Column 2 of the Electrical Parts List)

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

SERIAL/ASSEMBLY NO.
(Columns 3 and 4 of the Electrical Parts List)

Column 3 indicates the serial or assembly number at which the part was first used. Column 4 indicates the serial or assembly number at which the part was removed. No serial or assembly number entered indicates part is good for all serial numbers.

NAME AND DESCRIPTION
(Column 5 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. The Mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column 5.

MFR. CODE
(Column 6 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 7 of the Electrical Parts List)

Indicates actual manufacturer's part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01121	ALLEN-BRADLEY CO	1201 S 2ND ST	MILWAUKEE WI 53204-2410
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655012	DALLAS TX 75265
02735	RCA CORP SOLID STATE DIVISION		
04072	BELL INDUSTRIES JW MILLER DIVISION		COMPTON CA 94539
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
12697	CLAROSTAT MFG CO INC	LOWER WASHINGTON ST	DOVER NH 03820
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067-0760
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT ELECTRONICS DEPT	515 FISHING CREEK RD	NEW CUMBERLAND PA 17070-3007
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834-2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507-2114
33095	SPECTRUM CONTROL INC	2185 W WEIGHT ST	ERIE PA 16505
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537-5268
57668	ROHM CORP	8 WHATNEY PO BOX 19515	IRVINE CA 92713
61964	OMRON ELECTRONICS INC	650 WOODFIELD ST	SCHAUMBURG IL 60195-5008
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703-2417
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632
TK1066	STAR MICRONICS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	671-1705-00			CIRCUIT BD ASSY:FRONT PANEL	80009	671-1705-00
A2	671-1648-00			CIRCUIT BD ASSY:REMOTE CONTROL	80009	671-1648-00
A3	119-4078-00			DISPLAY,VF:,;VACUUM FLOURESCENT MODULE;FC20 X21A-BB	80009	119-4078-00
A1	671-1705-00			CIRCUIT BD ASSY:FRONT PANEL	80009	671-1705-00
A1S1	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S2	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S3	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S4	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S5	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S6	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S7	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S8	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S9	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S10	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S11	260-2401-00			SWITCH,KEY:NO LED,B3E-1000	61964	B3E-1000
				ATTACHED PARTS		
	366-0683-00			PUSH BUTTON:SWITCH CAP	80009	366-0683-00
				END ATTACHED PARTS		
A1S12	260-2401-00			SWITCH,KEY:NO LED,B3E-1000	61964	B3E-1000
				ATTACHED PARTS		
	366-0683-00			PUSH BUTTON:SWITCH CAP	80009	366-0683-00
				END ATTACHED PARTS		
A1S13	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S15	260-2548-00			SWITCH,PUSH:SPST,MOM,NO,150 GRAM,RED LED,NO SEAL,0.236 X 0.236	80009	260-2548-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1S16	260-2402-00			SWITCH,PUSH:W/LED	80009	260-2402-00
				ATTACHED PARTS		
	366-0682-00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366-0682-00
				END ATTACHED PARTS		
A1S17	260-2401-00			SWITCH,KEY:NO LED,B3E-1000	61964	B3E-1000
				ATTACHED PARTS		
	366-0683-00			PUSH BUTTON:SWITCH CAP	80009	366-0683-00
				END ATTACHED PARTS		
A1W42	174-2619-00			CA ASSY,SP,ELEC:40 PIN,3.5 L	80009	174-2619-00
A2	671-1648-00			CIRCUIT BD ASSY:REMOTE CONTROL	80009	671-1648-00
				ATTACHED PARTS		
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL	80009	131-0157-00
				END ATTACHED PARTS		
A2C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C3	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C4	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C5	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C6	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C7	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C8	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C9	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C10	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C11	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A2C12	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A2C13	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C14	290-0287-00			CAP,FXD,ELCTLT:47UF,20%,25V	24165	30D476X0025CC4
A2C15	290-0287-00			CAP,FXD,ELCTLT:47UF,20%,25V	24165	30D476X0025CC4
A2C16	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C17	283-0599-00			CAP,FXD,MICA DI:98PF,5%,500V	80009	283-0599-00
A2C18	283-0639-00			CAP,FXD,MICA DI:56PF,1%,500V	80009	283-0639-00
A2C19	281-0167-00			CAP,VAR,CER DI:9-45PF,200V	33095	53-717-001 D9-45
A2C20	283-0639-00			CAP,FXD,MICA DI:56PF,1%,500V	80009	283-0639-00
A2C21	283-0639-00			CAP,FXD,MICA DI:56PF,1%,500V	80009	283-0639-00
A2C22	290-0367-00			CAP,FXD,ELCTLT:70UF,20%,6V NONPOLARIZED	24165	30D1802
A2C23	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C24	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C28	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C32	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C36	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C37	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C38	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C39	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C40	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C41	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C43	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C44	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A2C45	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C46	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C49	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2C50	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A2C51	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA201E223MAA
A2C52	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2C53	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2CR1	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,TR	80009	152-0141-02
A2CR2	152-0198-02			SEMICOND DVC,DI:RECT,SI,200V,3A,A249G	80009	152-0198-02
A2F1	159-0208-02			FUSE,WIRE LEAD:2A,125V AC/DC,5 SEC,AXIAL LE AD,T & R,SAFETY CONTROLLED	80009	159-0208-02
A2J1	131-3323-00			CONN,HDR:	22526	66506-025
A2J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2J6	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J7	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J8	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J9	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J10	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J11	131-3926-00			CONN,D-SUB::	80009	131-3926-00
A2J12	131-3925-00			CONN,D-SUB:	80009	131-3925-00
A2J13	131-3378-00			CONN,RF JACK::	00779	227677-1
A2J14	131-4368-00			JACK,POWER DC:	80009	131-4368-00
A2J15	131-0391-00			CONN,RF JACK:	80009	131-0391-00
A2J41	131-5356-00			CONN,HDR:PCB,;MALE,STR,1 X 2,0.98 CTR,295 M LG X 0.137 TAIL,PLZ WALL,TIN;,,	80009	131-5356-00
A2J42	131-3364-00			CONN,HDR:	80009	131-3364-00
A2J43	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2L1	108-0249-00			CHOKE,RF:FIXED,12MF	04072	B-4992
A2LS1	119-2101-00			XDCR,AUDIO:	TK1066	SMX-06
A2P2	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2P3	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2P43	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2Q1	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A2Q2	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A2R1	307-0636-00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125 W	80009	307-0636-00
A2R2	307-0636-00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125 W	80009	307-0636-00
A2R3	307-0499-00			RES,FXD,FILM:9,100K OHM,5%,0.125W	91637	CSC10A-01-104G/J
A2R4	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2R5	307-0637-00			RES NTWK,FXD,FI:5,2K OHM,2%,0.125W	01121	206A202
A2R10	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A2R11	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A2R12	311-1228-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386F-1-103
A2R13	311-1228-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386F-1-103
A2R14	311-1228-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386F-1-103
A2R15	322-3335-00			RES,FXD,FILM:30.1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 30K1
A2R16	322-3306-00			RES,FXD,FILM:15K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 15K0
A2R17	322-3261-00			RES,FXD,FILM:5.11K OHM,1%,0.2W,TC=T0	80009	322-3261-00
A2R18	322-3083-00			RES,FXD,FILM:71.5 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 71E5
A2R19	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A2R20	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A2R23	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A2R24	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A2R25	311-2442-00			RES,VAR,NONWW:PNL,10K,DUAL,180 DEG OUT OF P HASE	12697	CM45273
				ATTACHED PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A2R26	311-2442-00			RES,VAR,NONWW:PNL,10K,DUAL,180 DEG OUT OF P HASE	12697	CM45273
				ATTACHED PARTS		
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A2R27	311-2442-00			RES,VAR,NONWW:PNL,10K,DUAL,180 DEG OUT OF P HASE	12697	CM45273
				ATTACHED PARTS		
	366-1701-01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366-1701-01
				END ATTACHED PARTS		
A2R29	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A2R30	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A2R31	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A2R32	322-3318-00			RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A2R33	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A2R34	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A2R35	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A2R36	322-3289-00			RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A2R39	322-3193-00			RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A2R40	322-3310-00			RES,FXD,FILM:16.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 16K5
A2R41	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2R48	307-0446-00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	80009	307-0446-00
A2R49	322-3106-00			RES,FXD,FILM:124 OHM,1%,0.2W,TC=T0	80009	322-3106-00
A2S8	260-2535-00			SWITCH,ROTORY:HEXADECIMAL,16 POS,0.380 SQ	80009	260-2535-00
A2TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP9	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP10	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP11	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2TP12	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2U1	156-2134-00			IC,DIGITAL:HCTCMOS,LATCH;OCTAL D-TYPE, 3-ST ATE;74HCT373,DIP20.3,TUBE	02735	CD74HCT373E
A2U2	156-3050-00			IC,MISC:	80009	156-3050-00
A2U3	156-2584-00			IC,DIGITAL:HCMOS,FLIP FLOP;OCTAL D-TYPE, CL EAR;74HC273,DIP20.3,TUBE	80009	156-2584-00
A2U4	156-1215-01			IC,DIGITAL:CMOS,MUX/ENCODER;20-KEY ENCODER; 74C923,DIP18.3,TUBE,SCRN	27014	MM74C923JA+
A2U5	156-2671-00			IC,MEMORY:CMOS,NVRAM;2K X 8,200NS,SRAM,INTE GRAL BATTERY;,DIP24.6SAFETY CONTROLLED	80009	156-2671-00
				MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	136-1158-00			SOCKET,DIP::PCB;24 POS,2 X 12,0.1 X 0.6 CTR ,0.095 H X 0.095 TAIL,GOLD/TIN;,, *END MOUNTING PARTS*	80009	136-1158-00
A2U6	156-4081-00			IC,PROCESSOR:CMOS,MICROPROCESSOR;16-BIT,15M HZ,8-BIT/8-CH A/D;78C10,DIP64.75.07,TUBE *MOUNTING PARTS*	80009	156-4081-00
	136-1166-00			SOCKET,DIP:PCB,;FEMALE,2 X 32,14 POS,0.07 X 0.750,0.770 H X 0.120 TAIL,TIN;,, *END MOUNTING PARTS*	80009	136-1166-00
A2U7	160-8356-00			IC,DIGITAL:PROGRAMMED 156-3381-00,27C512 *MOUNTING PARTS*	80009	160-8356-00
	136-0755-00			SOCKET,DIP::PCB,;28 POS,2 X 14,0.1 X 0.6 CT R,0.175 H X 0.13 TAIL,BECU,TIN;,, *END MOUNTING PARTS*	09922	DILB28P-108
A2U8	156-0913-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0913-00;74LS377,DIP20.3,TUBE	80009	156-0913-02
A2U9	156-0913-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0913-00;74LS377,DIP20.3,TUBE	80009	156-0913-02
A2U12	156-0994-00			IC,DIGITAL:LSTTL,MUX/ENCODER;8-TO-1, T&F OU TPUTS;74LS151,DIP16.3,TUBE	80009	156-0994-00
A2U13	156-2100-00			IC,DIGITAL:ALSTTL,DEMUX/DECODER;3-TO-8 LINE DECODER;74ALS138,DIP16.3,TUBE	01295	SN74ALS138N3
A2U14	156-3456-00			IC,DIGITAL:CMOS,RS-232 LINE DRIVER/RECEIVER ,5 EA,+5V VCC,NO EXT CAP,MAX235,DIP24.6	80009	156-3456-00
A2U15	156-3453-00			MICROCKT,INTFC:BIPOLAR,RS-422A/485 DIFF	80009	156-3453-00
A2U16	156-2755-00			IC,DIGITAL:CMOS,DUAL RS-232 LINE DRIVER/REC EIVER,+5V VCC,NO EXT CAP,MAX233,DIP20.3	80009	156-2755-00
A2U17	156-4056-00			IC,MISC:	80009	156-4056-00
A2U20	156-0728-02			IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-072 8-00;74LS09,DIP14.3,TUBE	80009	156-0728-02
A2U21	156-0277-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIV E,5.0V,1.0A,4%;MC7805CT,TO-220	80009	156-0277-00
A2U22	156-3226-00			IC,LINEAR:BIPOLAR,OP-AMP;35 MHZ,UNITY GAIN STABLE;LM6361N,DIP08.3	80009	156-3226-00
A2U23	160-8355-00			IC,DIGITAL:PROGRAMMED 156-2250-00,PAL22V10 *MOUNTING PARTS*	80009	160-8355-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A2U24	156-0402-00			IC,MISC:BIPOLAR,TIMER;;LM555CN,DIP08.3	80009	156-0402-00
A2U27	156-3110-00			IC,DIGITAL:HCMOS,BUFFER;NONINV OCTAL, LINE DRIVER, 3-STATE;74HC244,DIP20.3	80009	156-3110-00
A2W38	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A2W42	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A2W45	131-4566-00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131-4566-00
A2Y1	158-0135-00			XTAL UNIT,QTZ:14.7456 MHZ 0.01%,SERIES	33096	CCAT101124
A2Y2	158-0327-00			XTAL UNIT,QTZ:17.734380 MHZ,32 PF,HC43/U	33096	TO BE ASSIGNED
A3	119-4078-00			DISPLAY,VF:,;VACUUM FLOURESCENT MODULE;FC20 X21A-BB	80009	119-4078-00
W41	174-2383-00			CA ASSY,SP,ELEC:2,26 AWG,8.0 L,RIBBON (CONNECTED FROM A1J41 TO A3)	80009	174-2383-00
W42	174-2184-00			CA ASSY,SP,ELEC:34,28 AWG,4.5 L,RIBBON,2 X 17,0.1 CTR,RCPT X 2 X 17,0.1 CTR,RCPT (CONNECTED FROM A1J42 TO A3)	80009	174-2184-00

DIAGRAMS/CIRCUIT BOARD ILLUSTRATIONS

Symbols

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

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

Both overline and parenthesis indicate a low asserting state.

Example: $\overline{\text{ID,CONTROL}}$ or (ID CONTROL)

Abbreviations are based on ANSI Y1.1-1972.

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

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

American National Standard Institute
1430 Broadway, New York, New York 10018

Component Values

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

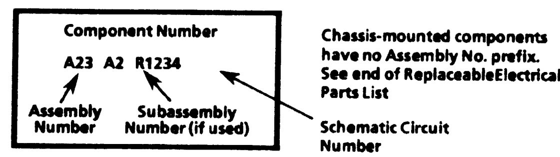
Capacitors:
Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

The following information and special symbols may appear in this manual.

Assembly Numbers

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the diagram (in circuit board outline), circuit board illustration title, and lookup table for the schematic diagram.

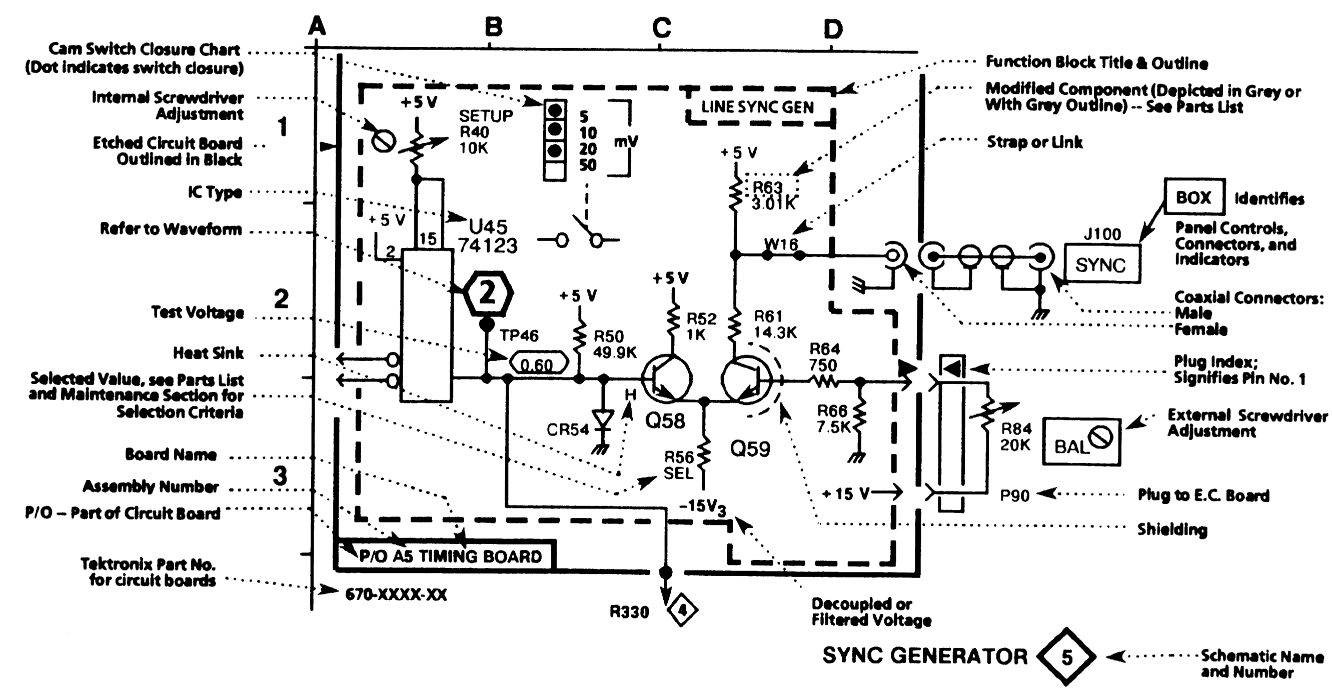
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:

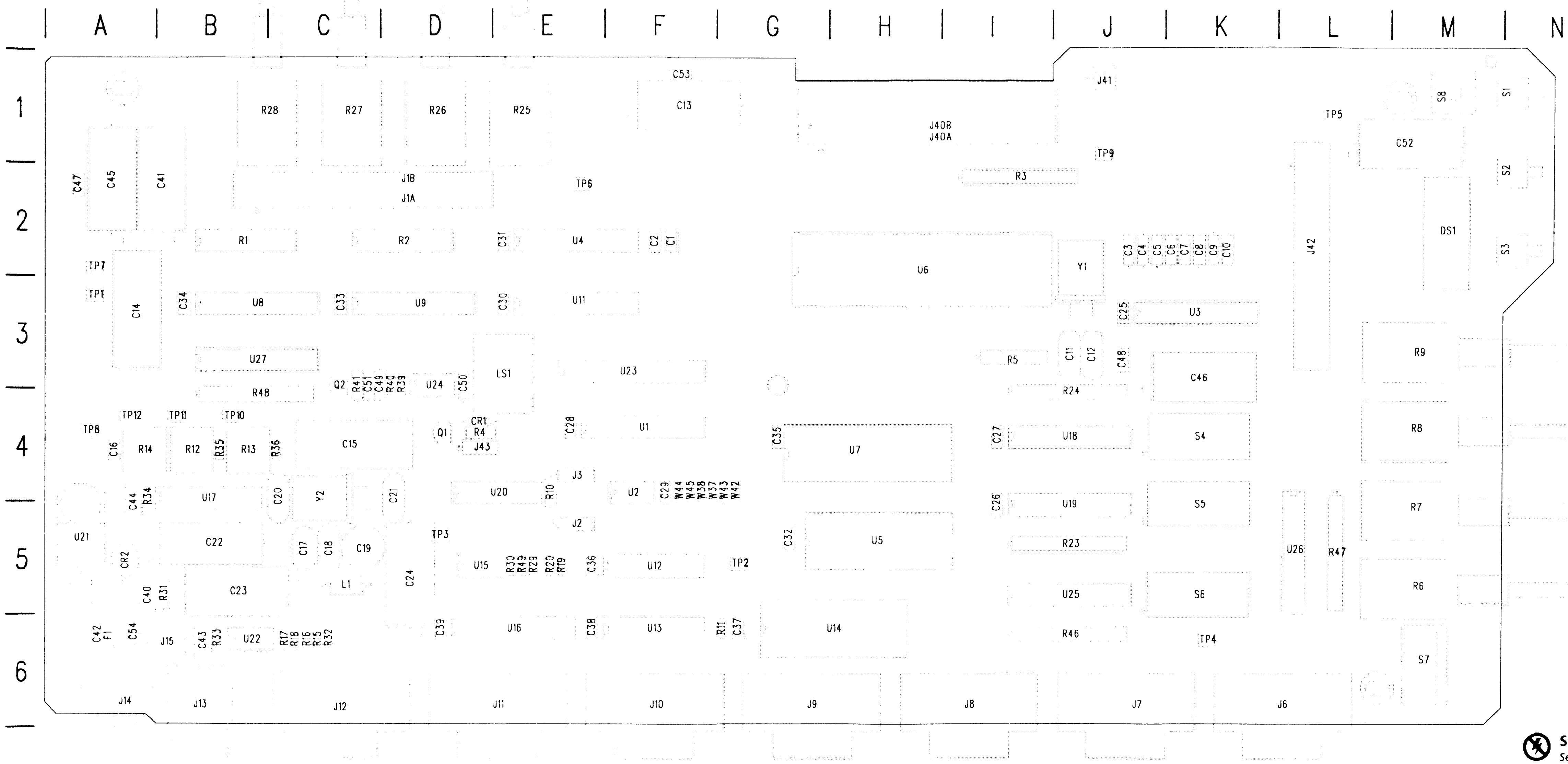


Grid Coordinates

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table.

When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.





Static Sensitive Devices
See Maintenance Section

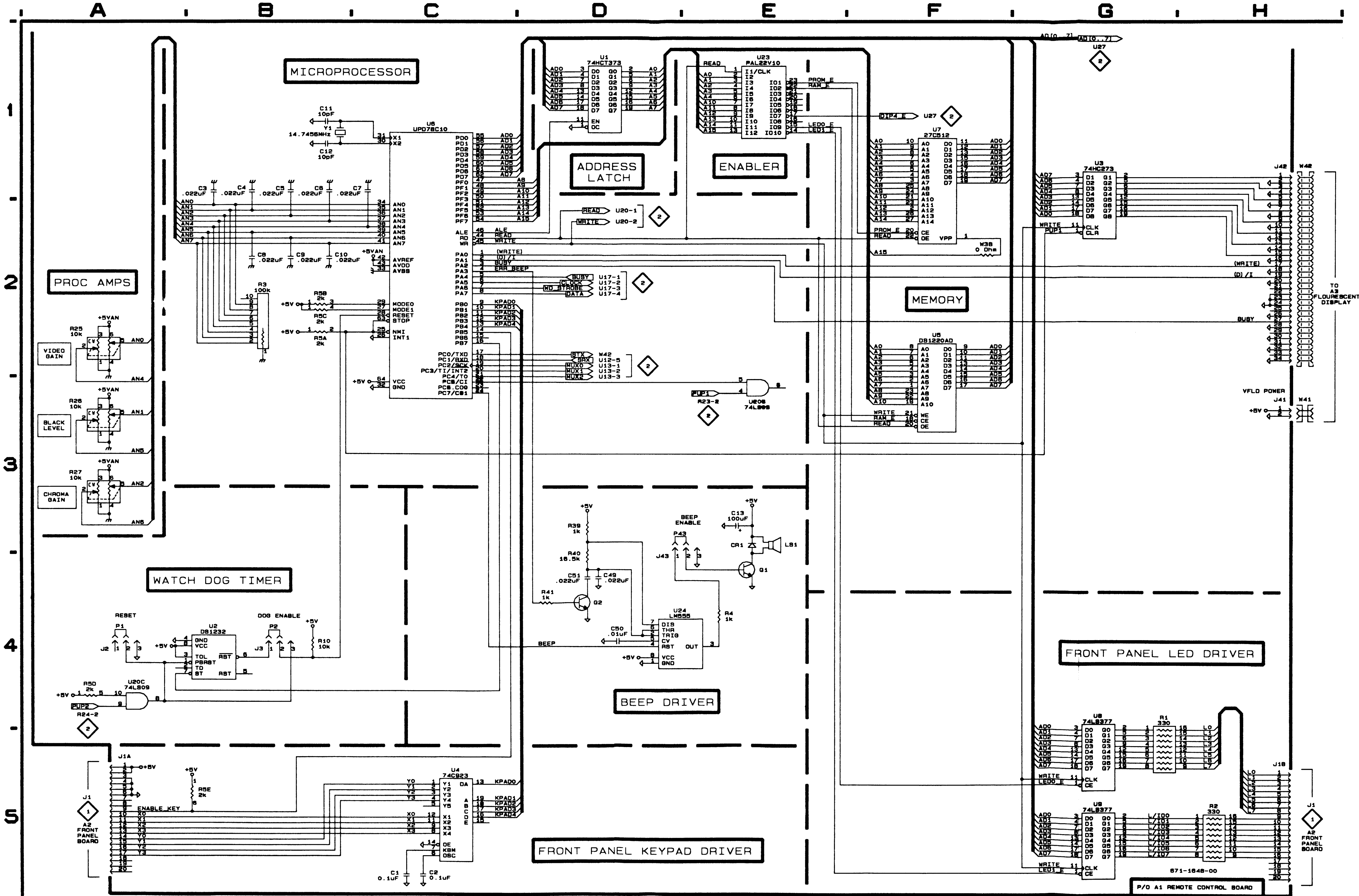
A1 REMOTE CONTROL BOARD

REMOTE CONTROL BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematic 2 .*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	C5	F2
C2	C5	F2
C3	B1	J2
C4	B1	J2
C5	B1	J2
C6	B1	K2
C7	C1	K2
C8	B2	K2
C9	B2	K2
C10	B2	K2
C11	B1	J3
C12	B1	J3
C13	E3	F1
C49	D4	D4
C50	D4	D4
C51	D4	C4
CR1	E3	D4
J1A	A5	D2
J1B	H5	D2
J2	A4	E5
J3	B4	E4
J41	H3	J1
J42	H1	L2
J43	D3	D4
LS1	E3	E3
P1	A4	
P2	B4	
P43	D3	
Q1	E4	D4
Q2	D4	C4
R1	G4	B2
R2	H5	D2
R3	B2	I2
R4	E4	D4
R5A	B2	I3
R5B	B2	I3
R5C	B2	I3
R5D	A4	I3
R5E	B5	I3
R10	B4	E4
R25	A2	E1
R26	A3	D1
R27	A3	C1
R39	D3	D4
R40	D3	D4
R41	D4	C4
U1	D1	F4
U2	B4	F4
U3	G1	K3
U4	C5	E2
U5	F2	H5
U6	C1	H2
U7	F1	H4
U8	G4	B3
U9	G5	D3
U20B	E3	E4
U20C	A4	E4
U23	E1	F3
U24	D4	D4
W38	F2	F4
Y1	B1	J2



REMOTE PROCESSOR KERNEL

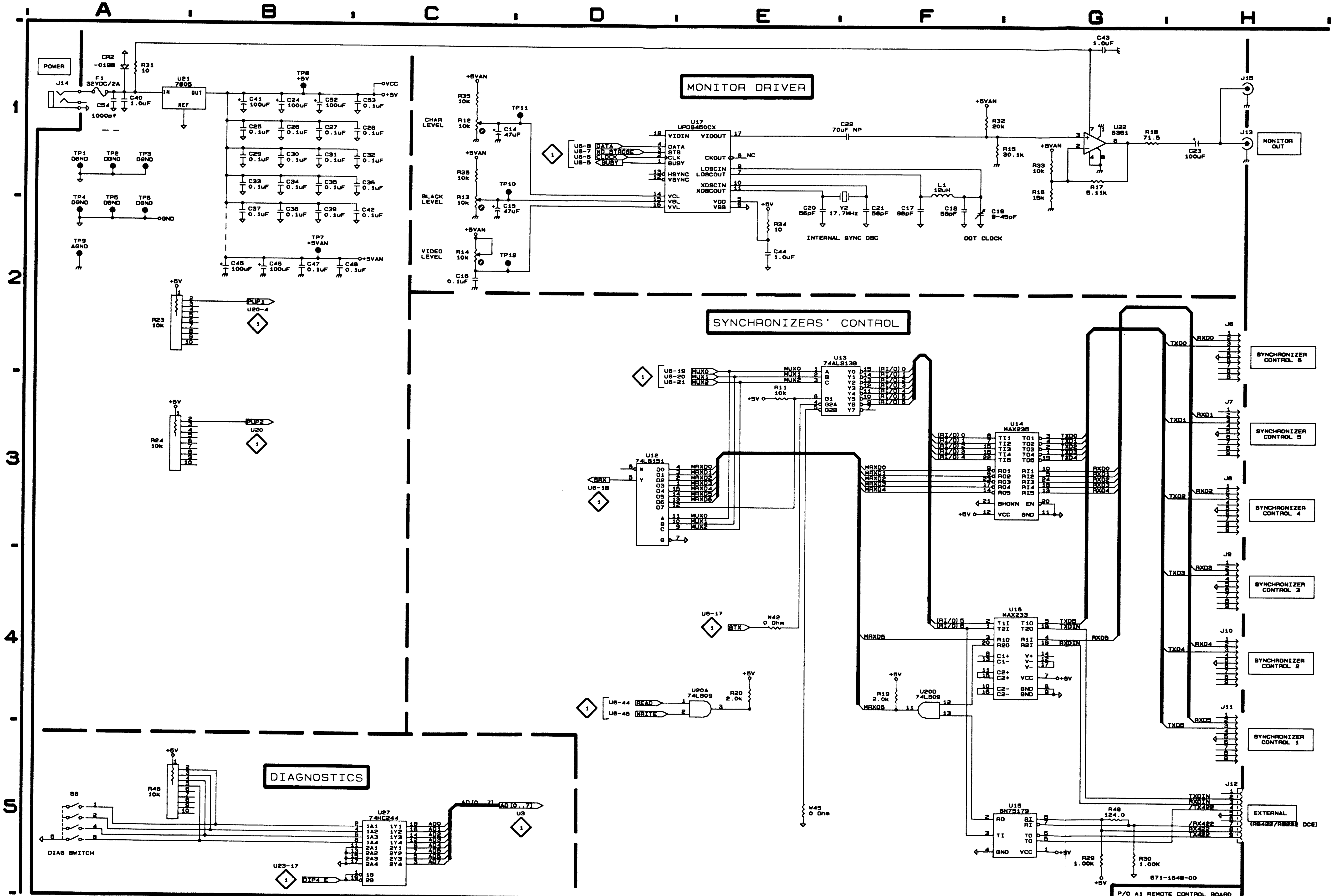
1

REMOTE CONTROL BOARD
Schematic <2> Look-Up Chart

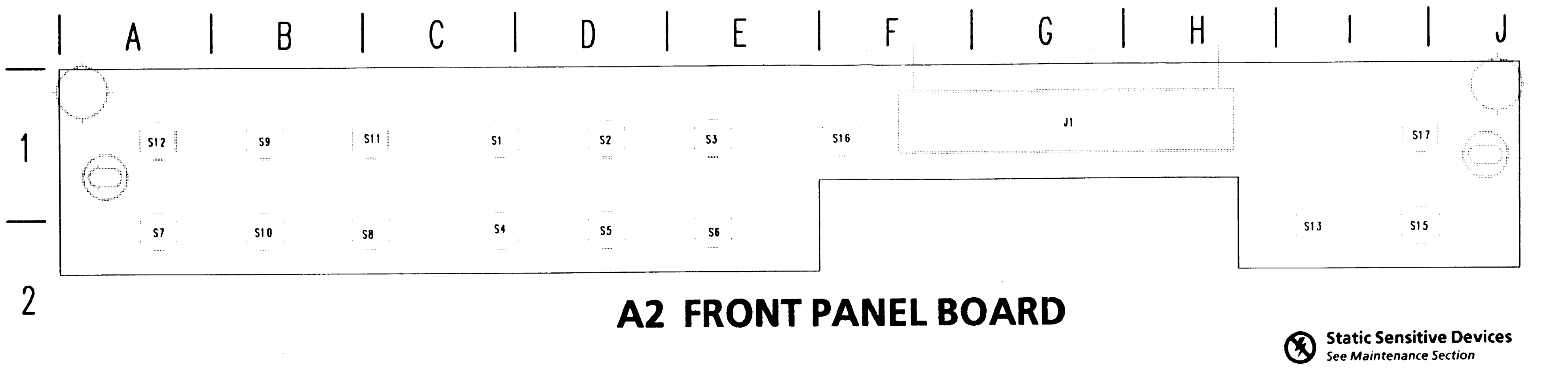
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A1. *Partial A1 also shown on Schematic 1.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C14	C1	A3	L1	F1	C5
C15	C2	C4			
C16	C2	A4	R11	E3	G6
C17	F2	C5	R12	C1	B4
C18	F2	C5	R13	C1	B4
C19	F2	C5	R14	C2	A4
C20	E2	C5	R15	F1	C6
C21	F2	D5	R16	G1	C6
			R17	G1	C6
C22	F1	B5	R18	G1	C6
C23	H1	B5	R19	F4	E5
C24	B1	D5	R20	E4	E5
C25	B1	J3	R23	A2	J5
C26	B1	I5	R24	A3	J4
C27	B1	I4	R29	G5	E5
C28	C1	E4	R30	G5	E5
C29	B1	F4	R31	A1	B5
C30	B1	E3	R32	F1	C6
C31	B1	E2	R33	G1	B6
C32	C1	G5	R34	E2	A5
C33	B1	C3	R35	C1	B4
C34	B1	B3	R36	C1	C4
C35	B1	G4	R48	A5	B4
C36	C1	E5	R49	G5	E5
C37	B2	G6	S8	A5	M1
C38	B2	E6			
C39	B2	D6	TP1	A1	A3
C40	A1	A5	TP2	A1	G5
C41	B1	B2	TP3	A1	D5
C42	C2	A6	TP4	A2	K6
C43	G1	B6	TP5	A2	L1
C44	E2	A5	TP6	A2	E2
			TP7	B2	A2
C45	B2	A2	TP8	B1	A4
C46	B2	K3	TP9	A2	J1
C47	B2	A2	TP10	C1	B4
C48	B2	J3	TP11	D1	B4
C52	B1	M1	TP12	C2	A4
C53	C1	F1			
C54	A1	A6	U12	D3	F5
			U13	E2	F6
CR2	A1	A5	U14	F3	H6
			U15	F5	D5
F1	A1	A6	U16	F4	E6
			U17	D1	B5
J6	H2	L6	U20A	E4	E4
J7	H3	J6	U20D	F4	E4
J8	H3	I6	U21	A1	A5
J9	H4	G6	U22	G1	B6
J10	H4	F6	U27	C5	B3
J11	H4	E6			
J12	H5	C6	W42	E4	G4
J13	H1	B6	W45	E5	F4
J14	A1	A6			
J15	H1	B6	Y2	F1	C5



POWER
MONITOR DRIVER
CHAR LEVEL
BLACK LEVEL
VIDEO LEVEL
INTERNAL SYNC OSC
DOT CLOCK
MONITOR OUT
SYNCHRONIZERS' CONTROL
SYNCHRONIZER CONTROL 6
SYNCHRONIZER CONTROL 5
SYNCHRONIZER CONTROL 4
SYNCHRONIZER CONTROL 3
SYNCHRONIZER CONTROL 2
SYNCHRONIZER CONTROL 1
EXTERNAL
(RS422/RS232 DCE)
DIAGNOSTICS
DIAG SWITCH
871-1648-00
P/O A1 REMOTE CONTROL BOARD



A2 FRONT PANEL BOARD

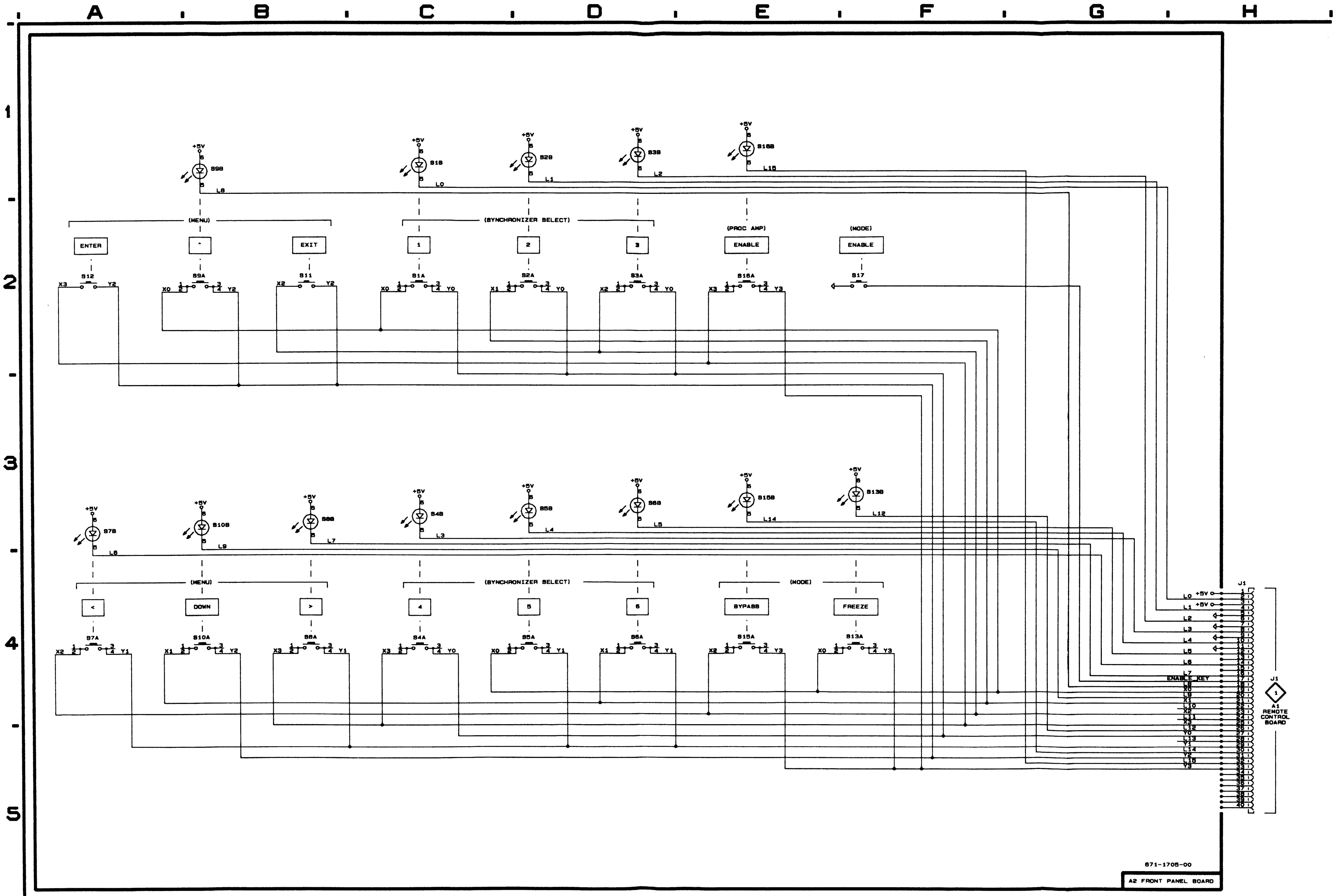
Static Sensitive Devices
See Maintenance Section

FRONT PANEL BOARD
Schematic <1> Look-Up Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

Assembly A2.

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J1	H4	H1	S8A	B4	C2
			S8B	B3	C2
S1A	C2	C1	S9A	B2	B1
S1B	C1	C1	S9B	A1	B1
S2A	D2	D1			
S2B	C1	D1	S10A	B4	B2
			S10B	A3	B2
S3A	D2	E1	S11	B2	C1
S3B	D1	E1	S12	A2	A1
S4A	C4	C2			
S4B	C3	C2	S13A	F4	I2
			S13B	E3	I2
S5A	D4	D2	S15A	E4	I2
S5B	C3	D2	S15B	E3	I2
S6A	D4	E2			
S6B	D3	E2	S16A	E2	F1
			S16B	E1	F1
S7A	A4	A2	S17	F2	I1
S7B	A3	A2			


(MENU)
(SYNCHRONIZER SELECT)
(PROC AMP)
(MODE)
ENTER
EXIT
ENABLE
BYPASS
FREEZE
DOWN
ENABLE KEY
A1 REMOTE CONTROL BOARD
671-1705-00
A2 FRONT PANEL BOARD

REPLACEABLE MECHANICAL PARTS LIST

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
Mounting parts for Assembly and/or Component
MOUNTING PARTS/*END MOUNTING PARTS*
    Detail Part of Assembly and/or Component
    Mounting parts for Detail Part
    MOUNTING PARTS/*END MOUNTING PARTS*
        Parts of Detail Part
        Mounting parts for Parts of Detail Part
        MOUNTING PARTS/*END MOUNTING PARTS*

Mounting 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.

Mounting parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

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

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
71468	ITT CANNON DIV OF ITT CORP	666 E DYER RD	SANTA ANA CA 92702
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
79136	WALDES KOHINOOR INC	47-16 AUSTEL PLACE	LONG ISLAND CITY NY 11101-4402
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
85480	BRADY W H CO CORP H Q INDUSTRIAL PRODUCTS DIV	2221 W CAMDEN RD PO BOX 2131	MILWAUKEE WI 53209
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
TK0858	STAUFFER SUPPLY CO (DIST)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	200-3928-00			1	COVER,TOP:ALUMINUM	80009	200-3928-00
					MOUNTING PARTS		
-2	211-0538-00			10	SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-3	367-0437-02			1	HANDLE,LEFT:ALUMINUM	80009	367-0437-02
					MOUNTING PARTS		
-4	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-5	367-0437-01			1	HANDLE:ALUMINUM	80009	367-0437-01
					MOUNTING PARTS		
-6	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-7	213-1070-00			2	THUMBSCREW:6M X 1.0 L,0,375 OD,SST,BLACK	80009	213-1070-00
-8	210-0940-00			2	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESCR
-9	354-0175-00			2	RING,RETAINING:TYPE E EXT,U/O 0.188 ID SFT	79136	5133-18-MI
-10	426-2434-00			1	FRAME,FRONT:ALUNINUM	80009	426-2434-00
					MOUNTING PARTS		
-11	211-0538-00			3	SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
-12	----- -----			1	CIRCUIT BD ASSY:FRONT PANEL (SEE A1 REPL)		
					MOUNTING PARTS		
-13	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-14	----- -----			1	DISPLAY,VF: (SEE A3 REPL)		
					MOUNTING PARTS		
-15	211-0244-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-16	378-0384-00			1	FILTER,DISPLAY:POLYMER	80009	378-0384-00
-17	333-3844-00			1	PANEL,FRONT:RC211	80009	333-3844-00
-18	----- -----			1	CIRCUIT BD ASSY:REMOTE CONTROL (SEE A2 REPL)		
					MOUNTING PARTS		
-19	211-0244-00			3	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
	211-0534-00			1	SCR,ASSEM WSHR:6-32 X 0.312,PNH,STL,CD PL,P OZ	01536	ORDER BY DESCR
-20	131-0890-00			14	LOCK,CONNECTOR:4-40 X 0.312 L HEX HD,STL	71468	D 20418-2
-21	220-0497-00			1	NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	80009	220-0497-00
-22	210-1039-00			1	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
					END MOUNTING PARTS		
-23	343-0081-00			1	STRAP,RETAINING:0.125 DIA,NYLON	85480	CPNY-172BK
					MOUNTING PARTS		
-24	210-0457-00			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					END MOUNTING PARTS		
-25	441-1987-00			1	CHASSIS:ALUMINUM	80009	441-1987-00
					STANDARD ACCESSORIES		
	119-4242-00			1	POWER SUPPLY:PLUG-IN WALL MOUNT,IN 115VAC,USA TYPE,OUT 9VDC 1A, (STANDARD ONLY)	80009	119-4242-00
	174-2604-00			1	CA ASSY,SP,ELEC:9,24 AWG,72.0 L	80009	174-2604-00
	070-8075-00			1	MANUAL,TECH:RC211	80009	070-8075-00
					OPTIONAL ACCESSORIES		
	070-8164-00			1	MANUAL,TECH:SERVICE,VS211	80009	070-8164-00
	119-4240-00			1	POWER SUPPLY: (EUROPEAN OPTION 1C ONLY)	80009	119-4240-00
	119-4239-00			1	POWER SUPPLY: (UNITED KINGDOM OPTION 2C ONLY)	80009	119-4239-00
	119-4238-00			1	POWER SUPPLY:PLUG-IN WALL MOUNT,IN 240VAC,AUSTRALIA TYPE,OUT 9VDC (AUSTRALIAN OPTION 3C ONLY)	80009	119-4238-00
	119-4241-00			1	POWER SUPPLY:PLUG-IN WALL MOUNT,IN 100VAC,JAPAN TYPE,OUT 9VDC 1A, (JAPANESE OPTION 9C ONLY)	80009	119-4241-00

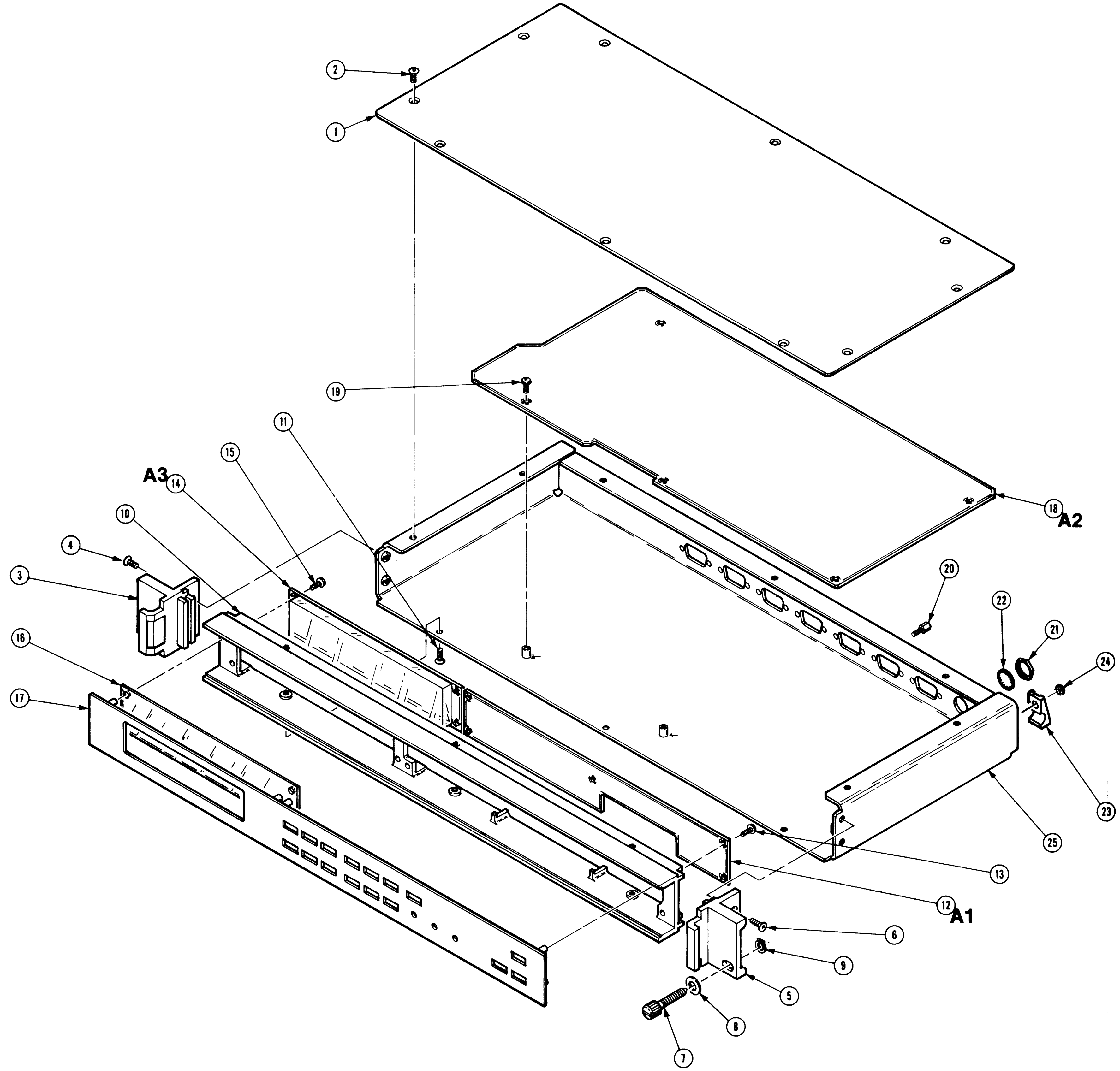


FIG 1 EXPLODED VIEW

MANUAL CHANGE INFORMATION

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

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

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

Tektronix MANUAL CHANGE INFORMATION

Date: 10/12/93 | **Change Reference:** None

Product(s): VS 211 | **Manual Part No:** 070-8164-00

DESCRIPTION

TEXT CHANGES

CHANGES TO MANUAL INSERT (Provided with VS211F3 UPGRADE)

Page 2–11
Sync Separator and Sync Control
DELETE FROM EXISTING TEXT the following:

U42 also generates the timing for Sound in Sync, ASIS_TM.

SIS Mode is entered by the remote control via the μP [SIS_SEL)–0]. When this line is low, the analog sound in sync lines are effectively wire–or'd to gate out the sound data from the internal sync detector (U44).

Page 4–7
6. Clamp Loop Response – R56

Step 6c and Step 6d. Change TSG3 references **to read** TSG13.

CHANGES TO APPENDIX A (Provided with VS211F3 UPGRADE)

Page A–2
Jumpers and Switches:

Table A–1. cont.

DIP #	SWITCH NUMBER	DEFINITION OF SWITCH SETTINGS	
S5	7	unused	Always set to position 0

SECTION 6 MAINTENANCE

ADD AS FOLLOWS:

SELECTABLE PARTS

A1 ADC Board
R256 selection

Adjust the VCO as detailed in the adjustment procedure. After adjusting the frequency, and before returning J31 to the pins 1–2 position, measure the VCXO CNTRL Voltage at TP21. If the voltage is outside of the range of 2.4 V to 2.6 V, add R256 to the back of the board as follows:

Voltage at TP21	Use R256 value	Connect R256 from U56–2 to
2.15 V to 2.2 V	221 Ω	U56–17 (+5V)
2.2 V to 2.4 V	332 Ω	
2.6 V to 2.8 V	332 Ω	U56–18 (–5V)
2.8 V to 2.85 V	221 Ω	

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

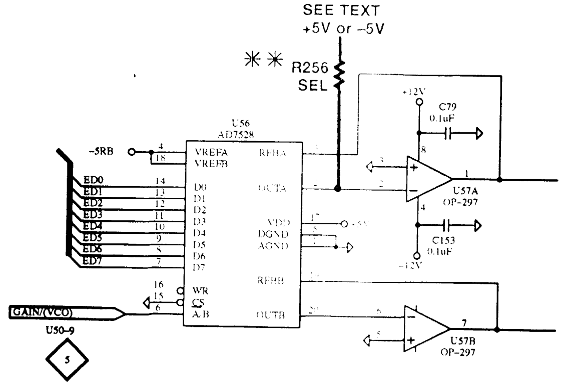
CHANGE TO READ:

A1	671-2857-02	CIRCUIT BD ASSY: ADC BOARD
A1R132	321-0207-07	RES,FXD,FILM:1.4K OHM,0.1%,0.125W

ADD:

A1R256	322-3418-00	RES,FXD,FILM:221K OHM,1%,0.2W (TEST SEL, NOM VALUE)
	322-3435-00	RES,FXD,FILM:332K OHM,1%,0.2W (TEST SEL, MAX VALUE)

Added Part is Shown In The Following Partial Schematic:



PART of A1 ADC board schematic 6, **showing added part.**

Tektronix® COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 7/19/91

Change Reference: CPC1/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

INCORPORATING TO PARSER

The parser has been implemented and the following changed need to be made to the text to reflect that.

TEXT CHANGE:

- Section 1 Introduction
  to page 1-5
  Remove the following note:

NOTE

Operation with a pc is a non-standard and non-supported mode of operation.

- Section 1 Introduction
  to page1-5
  before the note deleted above change from:

See Appendix B for the PC Commands.

to:

See Appendix B for the Parser Commands.

- Table of Contents
  Page vii
  Replace:

Appendix B PC COMMANDS

with:

APPENDIX B PARSER COMMANDS

- Table of Contents
  Page vii
  Add to APPENDIX B PARSER COMMANDS:

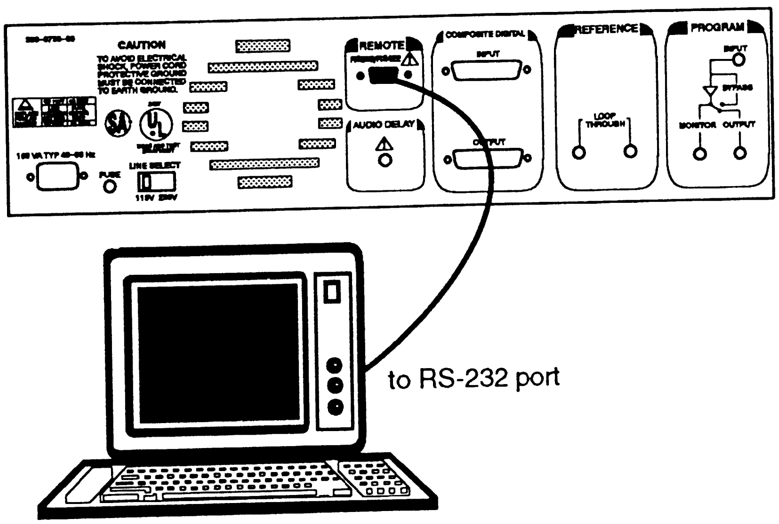
- List of Tables
  page xvi
  Add before Appendix C Information:

Appendix B
Parser Commands

- Appendix B PC Commands
  Replace the entire section with the following pages:

APPENDIX B
PARSER COMMANDS

Many of the commands that the RC 211 generates for the VS 211 are accessible using a dumb terminal and the REMOTE port on the VS 211. These commands conform with 1991 SCPI (Standard Commands for Programmable Instruments). The following Section explains how to install the terminal and how to use the commands.



The VS 211 REMOTE port (9-pin female) supports RS-232-C/RS-422 format to the extent shown below:

PIN	USE
2	TX
3	RX
4	(CTX)
5	SIGNAL GROUND
7	(CRX)
8	CRX
9	CTX

Fig. B-1. Connecting the VS 211 to the terminal.

INSTALLATION

An RS-232 cable is needed to connect the terminal's port to the VS 211's REMOTE port. Order a cable that will support both the terminal and the REMOTE port (information given in the above figure) from a supply company.

1. Attach the cable to the terminal's RS-232 port and to the VS 211's REMOTE port, as shown in Fig. B-1.

2. Set the terminal baud rate to 9600 baud, even parity, and ECHO REMOTE. (Use the instructions provided with terminal to make these changes.)

3. Set the VS 211 to be controlled by the Parser commands. This is done by setting Remote board switches:

   S6-6 (parser selection to terminal) to 1
   S7-6 (control to remote) to 1
   S6-7 (baud rate to 9600) to 1
   S6-8 (baud rate to 9600) to 0

4. Press the RESET button (S1) on the Controller board or cycle the power to reset the Controller board.

When the terminal is ready, a prompt will appear on the terminal.

VS211>

The Parser is now ready to accept commands.

The following pages give the Parser Tree, which is the hierarchy of the command strings.

PARSER TREE

When the command ends with square bracket [ ], one of the items will be printed as a result of the command. When the command ends with the greater/less-than symbols < >, these are the options for the command. One of these options should be typed after the command string. See ***Explanation of Parser Commands*** for more information.

- **:STAT**us
  - **:PROG**ram
    - **:INP**ut [*good; absent; low; high; noisy; no burst, low; no burst, high; no burst, noisy; low, noisy; high, noisy; no burst, low, noisy; no burst, high, noisy*]
    - **:LOCK**ed [*yes, no, acquired mode, sync locked only*]
  - **:REF**erence
    - **:INP**ut [*good; absent; low; high; noisy; no burst, low; no burst, high; no burst, noisy; low, noisy; high, noisy; no burst, low, noisy; no burst, high, noisy*]
    - **:LOCK**ed [*yes, no, acquired mode, sync locked only*]
  - **:TEMP**erature [*normal high*]
  - **:BYP**ass [*yes no*]

NOTE

All :STAT command strings below this line are not implemented as of this printing.

- **:OPER**ation
  - **:EVEN**t?
  - **:COND**ition
  - **:ENAB**le
- **:QUES**tionable
  - **:EVEN**t?
  - **:COND**ition?
  - **:ENAB**le
- **:PRES**et

- ***IDN** <xxxxx>
- **:SMOD**e **< 2 8 0 2PS >**
- **:INP**ut
  - **:SOUR**ce
    - **:ANAL**og
    - **:AGA**in **< UP DOWN UP=xx DOWN=xx >** range = +70% to -30% of nominal in 1% steps
    - **:DIG**ital
  - **:SISP**in **< YES NO >**

CAUTION

The **:INP:TIM** *commands are* ***NOT*** *intended for the casual user* ***ONLY*** *for service technicians. They are available as an aid for calibrating the ADC board.*

- **:TIM**ing
  - **:HCO**arse **< UP DOWN UP=xx DOWN=xx >** range = ± 27 μs in 0.028 μs steps
  - **:HFIN**e **< UP DOWN UP=xx DOWN=xx >** range = ± 27 μs in 0.0125 ns steps

```
:OUTPut
    :TIMing
        :PRESets < 1 2 3 4 >
        :VERTical < 1 0 -1 >
        :HCOarse < UP DOWN UP=xx DOWN=xx > range = ± 27 µs in 0.028 µs steps
        :HFINe < UP DOWN UP=xx DOWN=xx > ± 27 µs, 0.125 ns in steps
    :ZPAMplifier
    :CLIPping
        :VIDeo < EN DIS >
        :WHITe < EN DIS >
        :BLACk < 0 -10 >
        :MODe < HARD SOFT AUTO >
    :SBINsert < YES NO >
    :ITSignal < PASS DELETE >
    :MODe < 8 10 >
    :VGADjust < UP DOWN UP=xx DOWN=xx > range = ± 30% in 1% steps
    :BLEVel < UP DOWN UP=xx DOWN=xx > range = ± 70 mV in 1 mV steps
    :CGAin < UP DOWN UP=xx DOWN=xx > range = ± 40% in 1% steps
:BYPass < ON OFF >
:OERRor
    :PROGram
        :GO < BLACK BYPASS FREEZE AUTO5 >
    :REFerence
        :GO < BYPASS IREF >
:FREeze
    :NFIeld
        :ONE < 1 2 3 4 5 6 7 8 >
        :TWO < 1 2 3 4 >
        :EIGHt
    :STATe < ON OFF >
:DIAGnostics
    :ADC
    :DAC
    :MEMory
    :IO
:ECHO
*RST
:SYStem
    :VERSion?
```

NOTE

The all command strings below this line are not implemented as of this printing.

```
    :ERRor?
*CLS
*ESE
*ESR?
*OPC
*SRE
*STB
*TST?
*WAI
```

GENERAL COMMAND INFORMATION

The following are some general guidelines for using the Parser:

1. All SCPI commands begin with a colon ":" and all IEEE 488.2 commands begin with a "*".

2. The Parser is built on a tree structure. In order to access commands lower on the tree, the entire command string must be entered.

3. There should be no spaces between levels of the command string (like a DOS directory).

4. The Parser is case-insensitive (it does NOT care about capitalization). The user can enter all capitals, all lower case, or a mixture and the Parser will continue to operate properly. (All capitals are used in the examples only for clarity.)

5. Either the entire command word given in the tree or the abbreviation which is the capitalized letters from the tree can be used. Using the first command in the tree as an example:

   ```
   VS211>:STAT
   VS211>:STATUS
   ```

   Both are equally valid and will produce the same results. All examples use the abbreviations.

6. There should be a space between the command string and option. For example, to advance the output timing by one line the user enters:

   ```
   VS211>:OUTP:TIM:VERT 1
   ```

   Note the space between the option (1) and the command string (:OUTP:TIM:VERT). Also note that there are no spaces in the command string. Note that there is NOT a space between the command string and the "?" option.

7. Most commands have a query form. The option "?" can be used after almost any command string to find out the present state of the VS 211. There is NOT a space between the command string and the "?". For example, to find out the current setting of the output vertical timing, enter:

   ```
   VS211>:OUTP:TIM:VERT?
   1 LINE ADVANCE
   VS211>
   ```

8. More than one command can be entered on a line by using a ";" semicolon. There is NOT a space between the command string and the ";". This is especially useful for echoing back the changes made. For example, to change the ID and then double check it, enter:

   ```
   VS211>*IDN ID NAME;*IDN?
   ID NAME
   VS211>
   ```

   If the semicolon is separating commands from the same branch of the Parser Tree, the entire command string does not need to be reentered after the semicolon. For example, to check the status of both the PROGRAM Input and its genlock:

   ```
   VS211>:STAT:PROG:INP;:STAT:PROG
   :LOCK
   ```

   and

   ```
   VS211>:STAT:PROG:INP;LOCK
   ```

   are equivalent statements.

   If the two commands come from different branches of the tree, then there is no shortened form and the entire string needs to be entered. For example: to check the status of the PROGRAM input and the REFERENCE input:

   ```
   VS211>:STAT:PROG:INP;:STAT:REF:INP
   ```

EXPLANATION OF PARSER COMMANDS

The Parser Commands are listed here in the same order as they are given in the tree. Only the abbreviations are listed here but the entire word given in the Parser tree may be used. The possible user's choices or options are given in the greater than and less than brackets < > after the command.

STATUS Commands

:STAT?
This command will return all the status information from the VS 211.

:STAT:PROG?
This command will return all the status information for the PROGRAM INPUT (both signal condition and genlock status).

:STAT:PROG:INP
This command returns the PROGRAM INPUT signal quality.

:STAT:PROG:LOCK
This command returns the status of the PROGRAM INPUT genlock.

:STAT:REF?
This command will return all the status information for the REFERENCE signal (both signal condition and genlock status).

:STAT:REF:INP
This command returns the REFERENCE input signal quality.

:STAT:REF:LOCK
This command returns the status of the REFERENCE input genlock.

:STAT:TEMP
This command returns with the internal temperature of the VS 211(either normal or high).

:STAT:BYP
This command tells if the instrument is in bypass mode.

NOTE

All :STAT command strings below are not implemented as of this printing.

:STAT:OPER
Not implemented as of this printing.

:STAT:OPER:EVEN?
Not implemented as of this printing.

:STAT:OPER:COND?
Not implemented as of this printing.

:STAT:OPER:ENAB
Not implemented as of this printing.

:STAT:QUES
Not implemented as of this printing.

:STAT:QUES:EVEN?
Not implemented as of this printing.

:STAT:QUES:COND?
Not implemented as of this printing.

:STAT:QUES:ENAB
Not implemented as of this printing.

:STAT:PRES
Not implemented as of this printing.

ID Commands

***IDN < xxxxxxx or ? >**
Allows the user to give the instrument an ID (xxxxxx) or find out the current ID of the instrument. To use type:

VS211>*IDN VS 211 ID

This will set the VS 211's ID to *"VS 211 ID"*. Or, to find out what the current ID, type:

VS211>*IDN?

The VS 211 will respond with:

VS 211 ID
VS211>

SYNCHRONIZER MODE Commands

:SMOD < 2 8 0 ? 2PS >
Synchronizer mode selection. Choice of 2 field (2), 8 field (8), zero studio delay (0), or 2 field with pixel shift (2PS). There are two ways to use this command. First the user can select the synchronizer mode by entering:

VS211>:SMOD 2

This selects 2 field synchronizer mode. Second the user can determine the present synchronizer mode by entering:

VS211>:SMOD?

The response will be:

Synchronizer is in 2-field decode.
VS211>

INPUT Commands

:INP?
This command will return all the present status information for the input signal: the input source and the sound-in-sync settings. It will also give the input gain, if the source is analog (PROGRAM Input).

:INP:SOUR?
The response will be if the input source, either analog (PROGRAM Input) or digital (COMPOSITE DIGITAL INPUT). It will also give the input gain, if the source is analog.

VS211>:INP:SOUR?
Current input mode is analog.
Analog Input Gain is at +56% of nominal.
VS211>

:INP:SOUR:ANAL
Sets the input signal as the PROGRAM INPUT.

NOTE

If the **:INP:SOUR:AGA** *command is used and the VS 211 is presently using digital input (COMPOSITE DIGITAL INPUT); the VS 211 will automatically switch from COMPOSITE DIGITAL INPUT to PROGRAM INPUT.*

:INP:SOUR:AGA< UP DOWN ? UP=xx DOWN=xx>
This command sets the Analog Input Gain on the ADC board. The user can either set the gain or find out the present level. Each time the command is entered the gain is raised (UP) or lowered (DOWN) by ≈ 1% for a total range of +70% to -30% from nominal. For example, if the present gain is at +55% and the user wants to increase it, enter:

VS211>:INP:SOUR:AGA UP

The VS 211 will respond with:

VS211>

In order to find the current setting of the input gain, type:

VS211>:INP:SOUR:AGA?

The response will be the present gain.

Analog Input Gain is at +56% of nominal
VS211>

NOTE

*The Analog Input Gain amplifier is not linear, therefore the steps are ≈1%, not **exactly** 1%. If an exact amount of gain is required, double-check the present value with the **?** command after making any changes.*

If the gain needs to be raised by more than ≈ 1%, the UP=xx command can be used, where xx if the number of steps. (Conversely, if the gain needs to be dropped by more than ≈1%, the DOWN=xx command is used.) For example, the input gain is presently at +56% and it needs to be raised to +66% (10 steps), enter:

VS211>:INP:SOUR:AGA UP=10

Check the new input gain value:

VS211>:INP:SOUR:AGA?
Analog Input Gain is at +67% of nominal.
VS211>

Because the Input Gain Amplifier is not linear, the gain was set a little higher than expected. Set the gain one step lower and double-check it:

VS211>:INP:SOUR:AGA DOWN
VS211>:INP:SOUR:AGA?
Analog Input Gain is at +66% of nominal.
VS211>

The Analog Input Gain is now set to +66%, where the user wanted it.

If this command string is entered without an option (< UP DOWN ? UP=xx DOWN=xx>), no changes will be made to the signal.

:INP:SOUR:DIG
Sets the COMPOSITE DIGITAL INPUT signal as the input signal source.

:INP:SISP < YES NO ? >
Sets whether or not there in sound in sync on the input signal. Can either be set by using YES(sound-in-sync is on the PROGRAM INPUT) or NO (sound-in-sync is not on PROGRAM INPUT).

CAUTION

*The **:INP:TIM** commands are **NOT** intended for the casual user **ONLY** for service technicians. They are available as an aid for calibrating the ADC board.*

:INP:TIM?
Returns with the present input timing offsets (for the ADC).

:INP:TIM:HCO < UP DOWN ? UP=xx DOWN=xx >
Advances (UP) or delays (DOWN) the input timing by coarse steps. The steps are in 0.028 μs intervals for a total range of ± 27 μs. Using the UP or DOWN option without specifying the number of steps will default to one step (0.028 μs change). UP=xx allows the user to move more than one step at a time. The xx is replaced by the number of steps that the user needs to move.

:INP:TIM:HFIN < UP DOWN ? UP=xx DOWN=xx >
Advances (UP) or delays (DOWN) the Input Timing by fine steps. The steps are in 0.0125 ns intervals with a total range of ± 27 μs. UP=xx allows the user to move more than one fine step at a time. The xx is replaced by the number of steps that the user needs to move.

OUTPUT Commands

:OUTP
There is not enough information at this level for the VS 211 to respond. The VS 211 will simply respond with another prompt.

:OUTP:TIM?
Will display the present amount of advance or delay on the output signal.

:OUTP:TIM:PRES < 1 2 3 4 ? >
This command changes the timing to one of the four (1 2 3 4) timing presets saved in memory. Any changes made to the timing are automatically saved as the current preset.

For example, PRESET 1 has a 25 ns delay and PRESET 2 has a 30 ns advance. Now the following Parser Commands are made (the current timing is in parentheses):

VS211>:OUTP:TIM:PRES 1
(25 ns delay)
VS211>:OUTP:TIM:HFIN UP=100
(12.5 ns delay)
VS211>:OUTP:TIM:PRES 2
(30 ns advance)
VS211>:OUTP:TIM:HFIN UP=100
(42.5 ns advance)
VS211>:OUTP:TIM:PRES 1
(12.5 ns delay)
VS211>:OUTP:TIM:PRES 2
(42.5 ns advance)

Note that all changes made are saved by the current preset and are present when the preset is recalled.

:OUTP:TIM:VERT < 1 0 -1 ? >
Will advance or delay the output signal (PROGRAM OUTPUT) by 1, 0, or -1 lines. The ? can be used to find the preset state.

:OUTP:TIM:HCO <UP DOWN ? UP=xx DOWN=xx>
Will advance (UP) or delay (DOWN) the output signal up to 27 µs in 0.028 µs steps. The ? command can also be used to find the current amount of advance or delay in the system. UP=xx allows the user to move several steps at a time. The xx is replaced by the number of steps the user needs to move. If UP or DOWN is used without the "=xx", then one step is assumed and the timing will be advanced or delayed by 0.028 µs.

:OUTP:TIM:HFIN < UP DOWN ? UP=xx DOWN=xx>
Will advance (UP) or delay (DOWN) the horizontal timing of the output signal in fine steps (0.125 ns) for a total range of 27 µs. UP=xx and DOWN=xx allows the user to move more than one step at a time. The xx is replaced by the number of steps that the user would like to move. If UP or DOWN is used without the "=xx", then one step is assumed and the timing will be advanced or delayed by 0.125 ns.

:OUTP:ZPAM < ? >
Zeroes the Proc Amp. Once this command is entered the Proc Amp is zeroed. There is also a query level available which returns if the Proc Amp has been zeroed.

:OUTP:CLIP?
Returns the clipping status of the VS 211.

OUTP:CLIP:VID < EN DIS ? >
Will enable or disable the video clip options. The "?" command will display the current clip settings for the VS 211.

OUTP:CLIP:WHIT < EN DIS ? >
Enable or disable white clipping. Enable will cause clipping at 110% of white level (770 mV). The query is available to find the present state.

:OUTP:CLIP:BLAC < 0 -10 ? >
This command defines the black clipping levels. The choices are 0% or -10%.

:OUTP:CLIP:MOD: < HARD SOFT AUTO ? >
Clipping Mode choice of hard, soft, or auto clipping. Hard clipping acts on both chrominance and luminance; soft clipping will affect luminance only; auto clipping is soft when the program input signal is clean and hard when the input is noisy.

:OUTP:SBIN < YES NO ? >
Determines whether or not to insert a new, digitally generated sync and burst. The present state can be queried by "?". If the COMPOSITE DIGITAL OUTPUT is in use, it is recommended that sync and burst are always inserted in order to guarantee meeting the digital specifications for sync and burst levels.

:OUTP:ITS < PASS DELETE ? >
Will pass or delete all ITS signals. The present state can be queried by ?

:OUTP:MOD < 8 10 ? >
Determines if the digital output is at 8 or 10 bit resolution. Will also query the present state using "?".

:OUTP:VGAD < UP DOWN ? UP=xx DOWN=xx >
Sets the output VIDEO GAIN level higher (UP) or lower (DOWN) in 1% steps for a total range of ± 30%. The present setting can be queried using the ? command. The UP=xx is used to move xx steps at a time. For example, if the user wants to raise the gain by 10%:

VS211>:OUTP:VGAD UP=10

:OUTP:BLEV < UP DOWN ? UP=xx DOWN=xx>
Adjusts the BLACK LEVEL up or down in 1 mV steps with a total range of ± 70 mV. The present level can be queried through the ? command. The BLACK LEVEL can be moved several levels at a time by using the UP=xx option. For example, if the Black Level needs to be lowered by 10 mV:

VS211>:OUTP:BLEV: DOWN=10

:OUTP:CGA < UP DOWN ? UP=xx DOWN=xx>
Adjusts the CHROMA GAIN of the output signal. It will raise (UP) or lower (DOWN) the gain in 1 % steps for a total range of ± 40%. The present level can also be queried by entering the ?. The CHROMA GAIN can be moved several levels at a time by using the UP=xx option. For example, if the CHROMA GAIN needs to be raised by 15%:

VS211>:OUTP:CGA UP=15

BYPASS Commands

:BYP < ON OFF ? >
Puts the VS 211 into (ON) or out (OFF) of BYPASS. The present state can be queried through the ? command.

NOTE

If the synchronizer has been manually bypassed by the BYPASS switch (S3) on the Controller board, neither the Parser or the RC 211 commands can override it.

OUTPUT on ERROR Commands

:OERR?
This command will give all the information about what the synchronizer will do in the event of an error condition on both the input (PROGRAM) and REFERENCE sides.

:OERR:PROGRAM?
If an output error condition is encountered in the PROGRAM INPUT, this condition will show how the synchronizer will respond. There are four choices: BLACK, BYPASS, FREEZE, or AUTO5.
BLACK — the synchronizer will output Black Burst.
BYPASS — the PROGRAM Input signal will be directly routed to the PROGRAM Output. (The Composite Digital signals are not bypassed under any circumstances.)
FREEZE — the synchronizer will freeze on the last good frame.
AUTO5 — the synchronizer will freeze on the last good frame for 5 seconds then go to Black Burst.

:OERR:PROG:GO < BLACK BYPASS FREEZE AUTO5 >
If an output error condition is encountered this command will set what course of action the synchronizer will take on a PROGRAM INPUT error. There are four choices: BLACK, BYPASS, FREEZE, or AUTO5.
BLACK — the synchronizer will output Black Burst.
BYPASS — the PROGRAM Input signal will be directly routed to the PROGRAM Output. (The Composite Digital signals are not bypassed under any circumstances.)
FREEZE — the synchronizer will freeze on the last good frame.
AUTO5 — the synchronizer will freeze on the last good frame for 5 seconds then go to Black Burst.

:OERR:REF?
If there is an error in the REFERENCE input, this query will show the preset course of action the VS 211 is programmed to take. The Responses are: BYPASS or use INTERNAL REFERENCE.

:OERR:REF:GO < BYPASS IREF >
If there is an error in the REFERENCE input, this command will set the course of action for the VS 211. The choices are: BYPASS or use internal reference (IREF).

FREEZE Commands

:FRE?
This command returns the current freeze settings for the VS 211 (number of field and which ones).

:FRE:NFI?
The VS 211 will respond with how it is programmed to respond to a FREEZE command — the number of fields and the frames selected.

:FRE:NFI:ONE < 1 2 3 4 5 6 7 8 ? >
Sets the response of a freeze command. This level chooses one field and which field (1-8). The query is available at this level.

:FRE:NFI:TWO < 1 2 3 4 ? >
Sets the response of the VS 211 to a freeze command. The options available at this level (two field freeze) are 1 - 4. The query is also available at this level to find out the current settings of the synchronizer.

:FRE:NFI:EIGH < ? >
Sets the response of the VS 211 to a freeze command to eight field freeze. The query is available.

:FRE:STAT < ON OFF ? >
This command turns the freeze on and off. The query is available.

DIAGNOSTIC Commands

NOTE

All of the Diagnostics are off-line tests. Running the Diagnostic Commands will put the VS 211 into BYPASS.

:DIAG
There is not enough information at this level for the VS 211 to respond. The VS 211 will simply respond with another prompt.

:DIAG:ADC
ADC Board Cycle Diagnostics — Continuously cycles through the RAM, ARCTAN EPROM, and CTC tests at the ADC board of the synchronizer. After a time, the results of the test will be displayed on the terminal. A passing test is shown:

VS211>:DIAG:ADC
Diagnostic result is FFh
VS211>

Passing is always indicated by FF_h or 11111111_b.

Failures are reported as 0's in the binary string. Failures will be reported as shown below:

VS211>:DIAG:ADC
ADC BOARD FAILED DBh
VS211>

The nature of the failure will be indicated by the low (0) bits in the binary number as listed in Table B-1 (bit 0 is the LSB; bit 7 is the MSB). Note that it is possible to report more than one failure mode at a time. In the example, DB_h converts to binary as 11011011 indicating both CTC and EPROM errors. For details, see the Troubleshooting section of the VS 211 Service Manual.

:DIAG:DAC
DAC Board Cycle Diagnostics — Continuously cycles through the RAM, ARCTAN EPROM, CTC, and NVRAM tests at the DAC board of the synchronizer. Failures are reported in the same format as the ADC diagnostics. See Table B-1 for the binary error code. For details, see the Troubleshooting section of the VS 211 Service Manual.

Table B-1. Errors indicated by "failure bits."

bit	ADC Board Diagnostic	DAC Board Diagnostic	Memory Bd Diagnostic	I/O Board Diagnostic
0*	n/a	n/a	n/a	n/a
1	n/a	NVRAM	n/a	n/a
2	CTC	CTC	n/a	n/a
3	Arctan EPROM	Arctan EPROM	n/a	n/a
4	RAM	RAM	n/a	Proc Amp Board communication
5	EPROM	EPROM	n/a	ADC Board communication
6	n/a	n/a	Controller	DAC Board communication
7	n/a	n/a	Memory	Mem. Controller communication

* Bit 0 and all others indicated as "n/a" are always high (1).

:DIAG:MEM
Memory Board Cycle Diagnostics — Continuously cycles through tests at the Memory board of the synchronizer. Failures are reported in the same format as the ADC and DAC boards. See Table B-1 for the binary failure code. For details, see the Troubleshooting section of the VS 211 Service Manual.

:DIAG:IO
I/O Board Cycle Diagnostics — Continuously cycles through tests at the I/O board of the synchronizer. Failures are reported in the same format as the ADC and DAC boards. See Table B-1 for the binary error code. For details, see the Troubleshooting section of the VS 211 Service Manual.

ECHO Command

:ECHO < ? >
This command will toggle the echo feature of the Parser. The query is also available for this command.

With the echo on, and the terminal's echo set correctly (ECHO REMOTE), the terminal will display both keyboard entries and Parser responses. For example:

VS211>:SMOD?
Synchronizer is in 2-field decode.
VS211>

If the Parser echo is turned off, the terminal will not display anything. The Parser accepts commands and returns the appropriate response, but nothing is displayed on the terminal.

If the terminal is not set with the proper echo response (ECHO LOCAL), there will be different problems with the display. If the Parser echo is set "ON" in this state, entering "ECHO?" will display:

VS211>::EECCHHOO??

If the echo is set "OFF", the terminal will appear to display correctly but this is not the preferred mode of operation. In this mode, the user cannot be sure that the commands were properly received by the VS 211, since it is not echoing back the commands.

Table B-2 lists the possible echo combinations and their results.

Table B-2. Possible ECHO combinations and results.

TERMINAL ECHO	PARSER ECHO	RESULT
REMOTE	ON	Works correctly. Preferred operating mode.
REMOTE	OFF	Nothing appears on the display.
LOCAL	ON	Double print of keyboard entries.
LOCAL	OFF	Works coorectly, but not the preferred operating mode.

Use the manual provided with the terminal to change the terminal's echo, if necessary, to correct echo related problems.

RST Commands

***RST**
Puts the VS 211 is its default state (zero state). This command sets all selected hardware devices to their preset values.

SYS Commands

:SYS
There is not enough information at this level for the VS 211 to respond. The VS 211 will simply respond with another prompt.

:SYS:VERS
Software Version — Lists which software version is installed in the VS 211. The display will report all software versions installed in the synchronizer, by board. The display will resemble the following:

VS211>:DIAG:SVER

SOFTWARE VERSION

ADC	DAC	CTR	IO
1.0	1.4	1.1	1.0

VS211>

This function is especially convenient during updates or troubleshooting.

NOTE

The rest of the command strings are not implemented as of this printing.

:SYS:ERRor?
Not implemented as of this printing.

***CLS**
Clear Status Command. Not implemented as of this printing.

***ESE**
Standard Event Status Enable Command. Not implemented as of this printing.

***ESR?**
Standard Event Status Register Query. Not implemented as of this printing.

***OPC**
Operation Complete Command. Not implemented as of this printing.

***SRE**
Service Request Enable Command. Not implemented as of this printing.

***STB**
Read Status Byte Query. Not implemented as of this printing.

***TST?**
Self Test Query. Not implemented as of this printing.

***WAI**
Wait-to-Continue Command. Not implemented as of this printing.

Tektronix® COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 7/26/91

Change Reference: CTT2/691

Product: VS 211 PAL Video Synchronizer

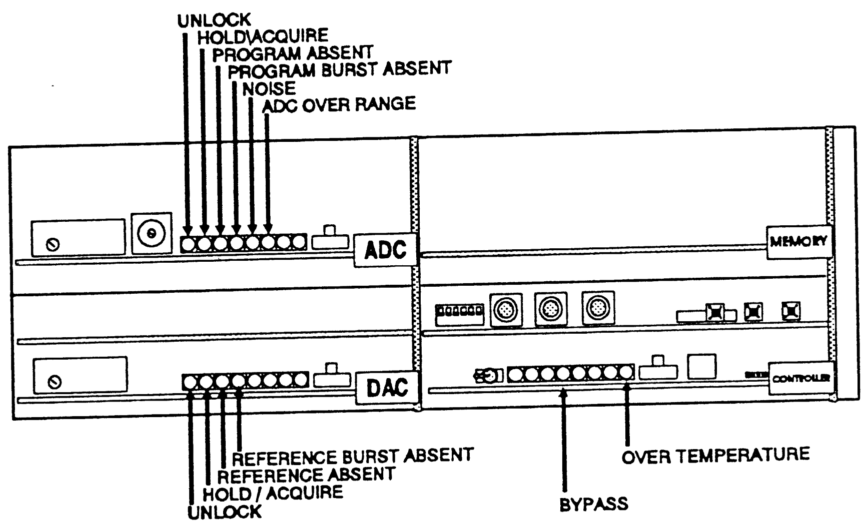
Manual Part No: 070-8164-00

DESCRIPTION

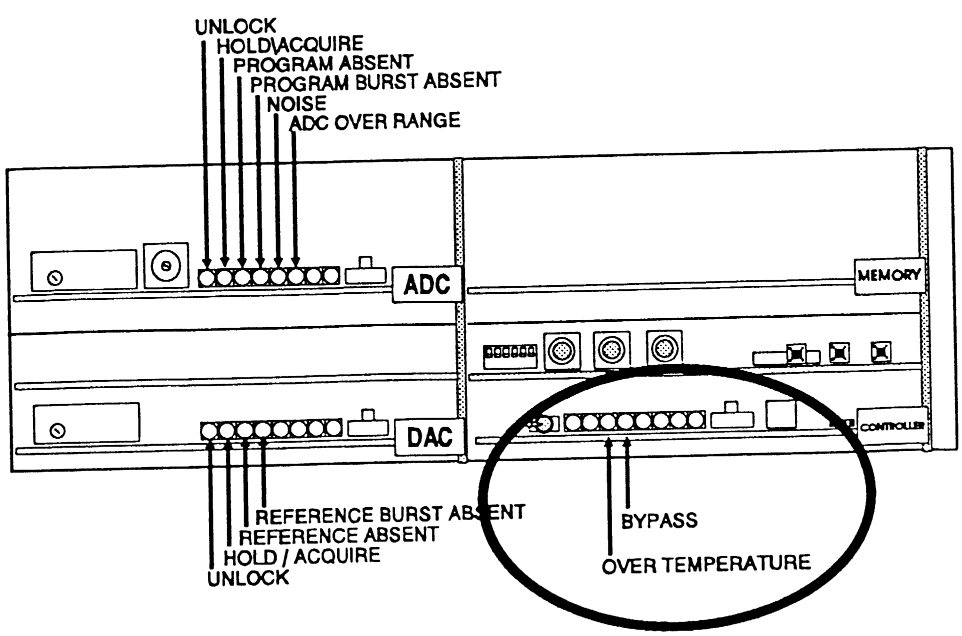
Remove the Remote Communications error indication from the Controller board and move the Over Temperature indication to that LED position.

Figure Change:

- Section 5 Troubleshooting page 5-1



Change Fig. 5-1 from:



to (change is circled):

Text, Figure, and Table Change:

- Section 5 Troubleshooting
  page 5-3
  Change to following from:

CONTROLLER

Table 1-3 lists the meaning of the Controller board's Diagnostic LEDs when the instrument is set for normal operation. Other LEDs may light if a non-standard condition exists. An example is: if COMPOSITE DIGITAL INPUT is selected and there is no signal at the COMPOSITE DIGITAL INPUT, then CONT ERR (6), BYPASS (4), and 3 light. In general, LED 7 is a Memory Error, LED 6 is a Controller Error, and LED 5 is a Remote Communications Error. For more information on the other LEDs or the Diagnostics see "Controller Board Diagnostics" later in this section. Fig. 1-5 shows the location of the Diagnostic Indicators.

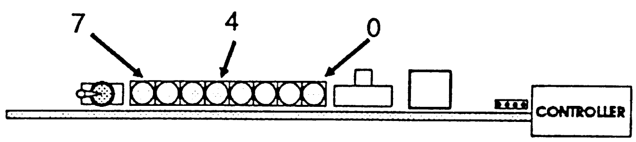


Fig. 1-1.
Location of the Controller board Diagnostic Indicators.

Table 5-3.
The meaning of the Controller board's Diagnostic LEDswhen the instrument is set for normal operation.

DIAG LED	INDICATION	
7	MEM ERR	Memory Error
6	CONT ERR	Controller Error
5	REM ERR	Remote Communications Error
4	BYPASS	Indicates the VS 211 is in BYPASS mode.
0	0	OVER TEMPERATURE Internal temperature is > 70°C

to (changes underlined or highlighted):

CONTROLLER

Table 1-3 lists the meaning of the Controller board's Diagnostic LEDs when the instrument is set for normal operation. Other LEDs may light if a non-standard condition exists. An example is: if COMPOSITE DIGITAL INPUT is selected and there is no signal at the COMPOSITE DIGITAL INPUT, then CONT ERR (6), BYPASS (4), and 1 light. In general, LED 7 is a Memory Error, LED 6 is a Controller Error, and LED 5 is an Over Temperature condition. For more information on the other LEDs or the Diagnostics see "Controller Board Diagnostics" later in this section. Fig. 1-5 shows the location of the Diagnostic Indicators.

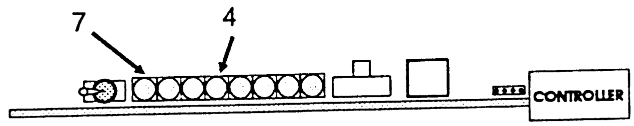


Fig. 5-5.
Location of the Controller board Diagnostic Indicators.

Table 5-3.
The meaning of the Controller board's Diagnostic LEDswhen the instrument is set for normal operation.

DIAG LED	INDICATION	
7	MEM ERR	Memory Error
6	CONT ERR	Controller Error
5		OVER TEMPERATURE Internal temperature is > 70°C
4	BYPASS	Indicates the VS 211 is in BYPASS mode.

Change Table:

- Section 5 Troubleshooting
  page 5-8
  change Table 5-6 setting 0A from:

0A	Remote Communications Test

to:

0A	Spare

Change Text:

- Section 5 Troubleshooting
  page 5-9
  Change the following text from:

The Controller board has four types of tests available. They are:

- Controller Test
- Memory Test
- Remote Communications Test
- Cycle Test

to:

The Controller board has three types of tests available. They are:

- Controller Test
- Memory Test
- Cycle Test

Remove Text and Figure

- Section 5 Troubleshooting
  Page 5-10
  Remove the following:

Remote Test

Remote Communications Test — Checks to see if the Remote responds with the correct word at REST. Lights REM ERR (LED 5) on error. See Fig. 5-24.

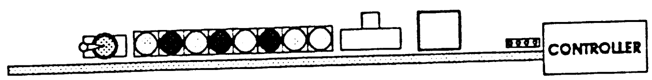


Fig. 5-24. Remote Communications Test error.

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MANUAL CHANGE INFORMATION

Date: 8/13/91 Change Reference: C1/891

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

PICN 12,13,15

ELECTRICAL PARTS LIST and SCHEMATIC CHANGES

ADD:

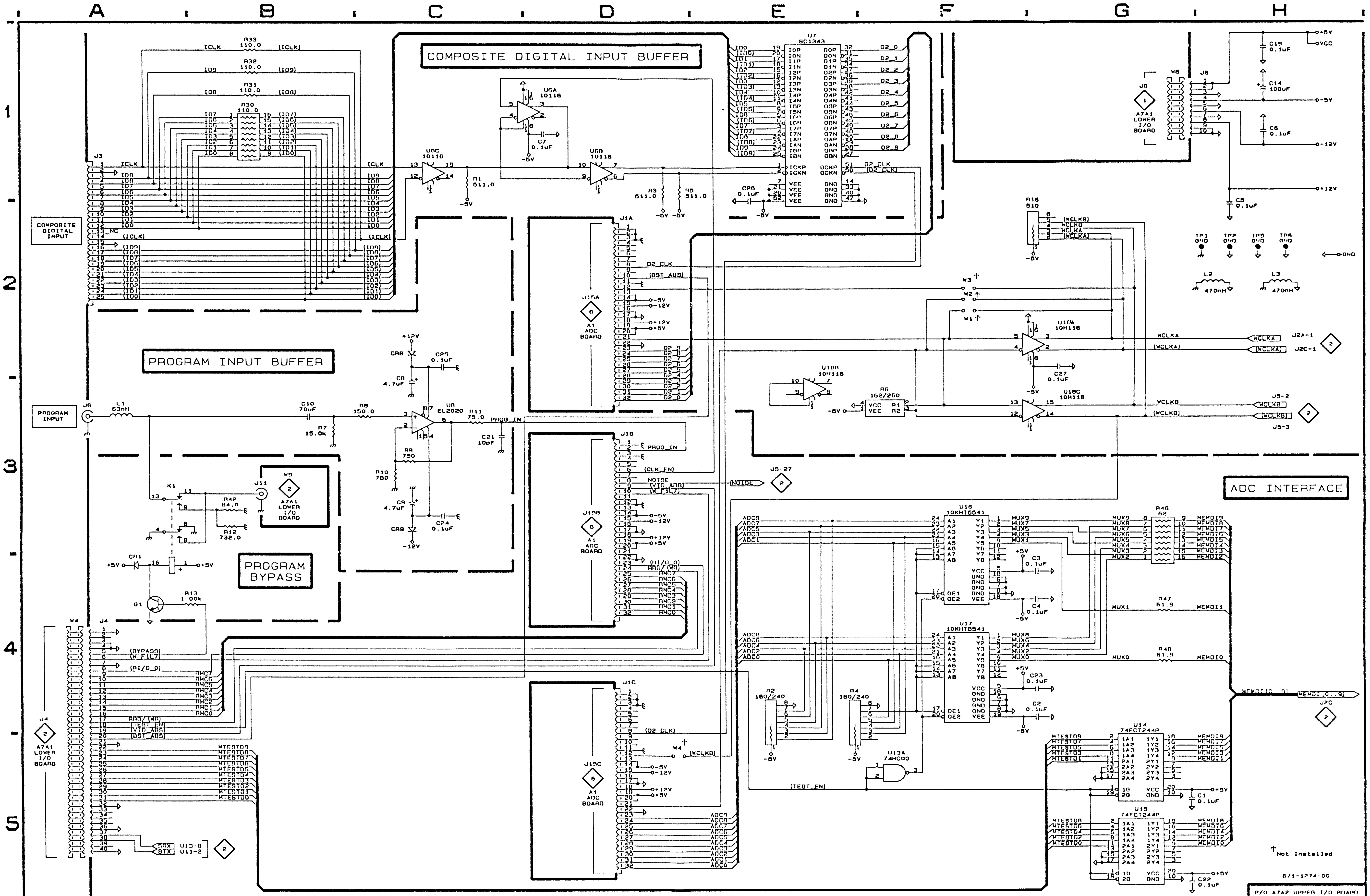
- Section 9 Replaceable Parts List

A7A1U5	156-1640-00	IC, 10H116
A7A1R9	307-1318-00	RES NTWK, FXD, FI:(2) 162 OHM, (2) 260 OHM, 2%
A7A1R10	307-0526-00	RES NTWK, FXD, FI:5, 510 OHM, 10%, 0.125 W
A7A1C22	281-0775-01	CAP, FXD, CER DI: 0.1UF, 20%, 50V
A7A2U18	156-1640-00	IC, 10H116
A7A2R6	307-1318-00	RES NTWK, FXD, FI:(2) 162 OHM, (2) 260 OHM, 2%
A7A2R16	307-0526-00	RES NTWK, FXD, FI:5, 510 OHM, 10%, 0.125 W
A7A2C27	281-0775-01	CAP, FXD, CER DI: 0.1UF, 20%, 50V
A7A2L2	108-1477-00	COIL FIXED, 470NH
A7A2L3	108-1477-00	COIL FIXED, 470NH
A3CR2	152-0141-02	DIODE, SIG:,ULTRA FAST; 40V, 150MA, 4NS, 2PF;1N4152, D0-35, TR Schematic Location: H1
A3CR3	152-0141-02	DIODE, SIG:,ULTRA FAST; 40V, 150MA, 4NS, 2PF;1N4152, D0-35, TR Schematic Location: H1

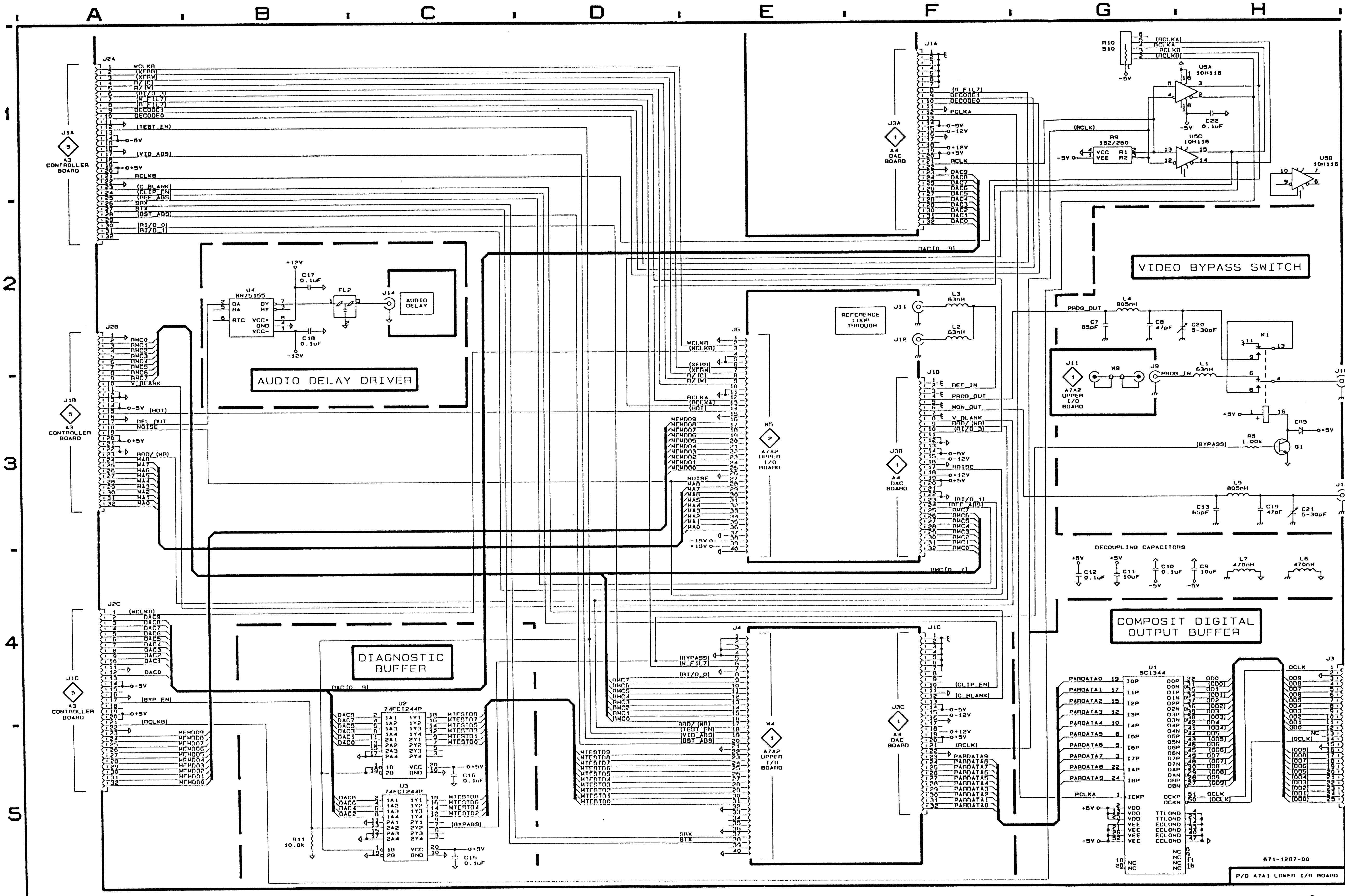
REPLACE THE FOLLOWING:

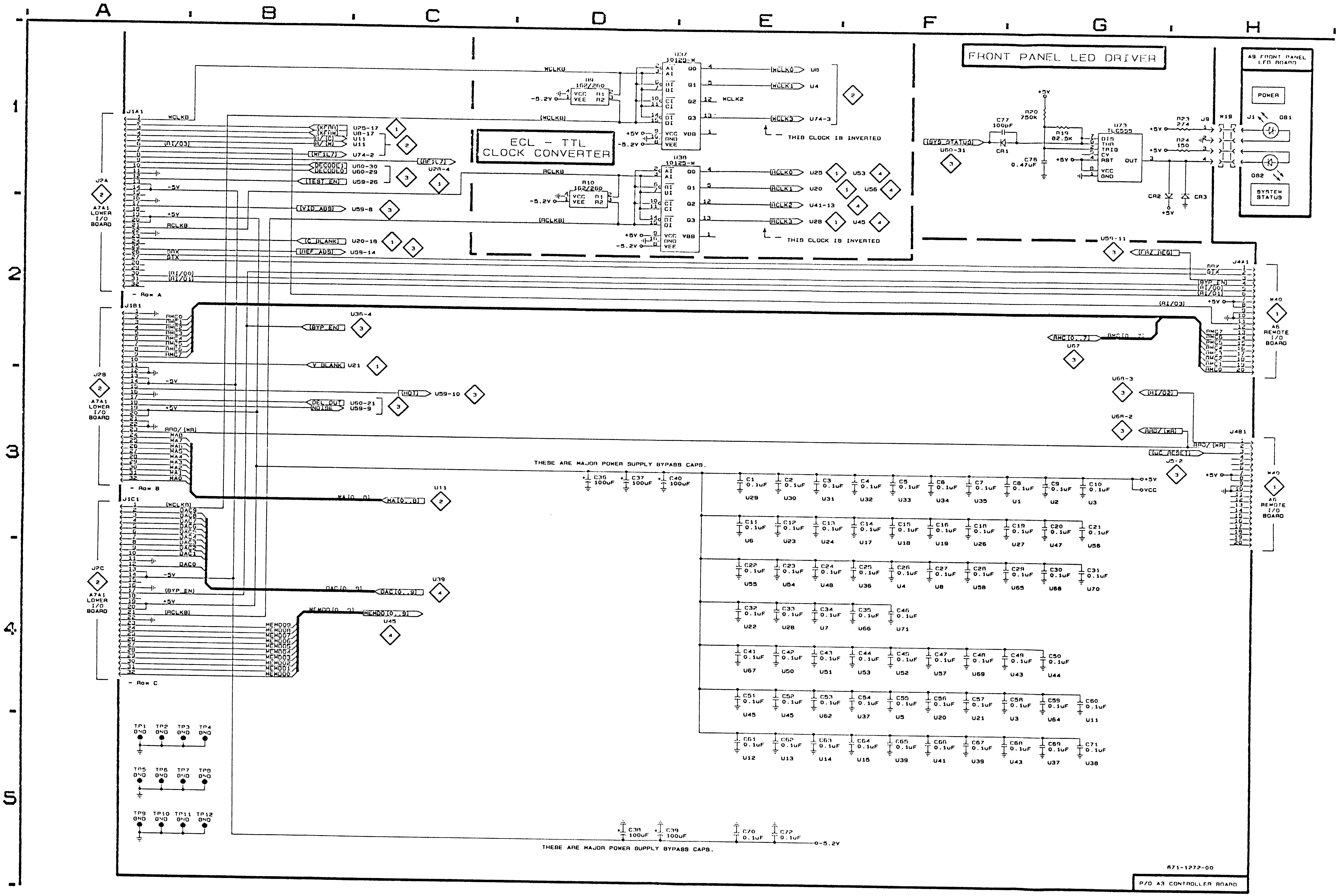
- Section 10 Diagrams/Circuit Board Illustrations
  Replace the following with the attached (reflects the part additions) pages:

A3 <5>, A7A1<2>, and A7A2<1>



ANALOG & DIGITAL INPUTS, AND ADC INTERFACE


AUDIO DELAY DRIVER
DIAGNOSTIC BUFFER
VIDEO BYPASS SWITCH
COMPOSIT DIGITAL OUTPUT BUFFER
DECOUPLING CAPACITORS
REFERENCE LOOP THROUGH
AUDIO DELAY
PROGRAM OUTPUT
PROGRAM MONITOR
COMPOSITE DIGITAL OUTPUT
A3 CONTROLLER BOARD
A4 DAC BOARD
A7A2 UPPER I/O BOARD
871-1287-00
P/O A7A1 LOWER I/O BOARD



VS 211

INTERCONNECT AND POWER DISTRIBUTION

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MANUAL CHANGE INFORMATION

Date: 7/12/91

Change Reference: CTS2/791

Manual Part No: 070-8164-00

Product: VS 211 PAL VIDEO SYNCHRONIZER

DESCRIPTION

CHANGE OUTPUT TIMING RANGE SPECIFICATION

The Output timing Range spec should be 27 µsec advance to 27 µsec delay.

TEXT CHANGE:

- Section 3 Specifications
  page 3-7
  Change the following:

Output Timing Range Horizontal	Nominally 30 µsec advance to 30 µsec delay, center is determined by phase lock.	Output with respect to reference input. May be set in digital increments of 0.2° of subcarrier.

to:

Output Timing Range Horizontal	Nominally 27 µsec advance to 27 µsec delay, center is determined by phase lock.	Output with respect to reference input. May be set in digital increments of 0.2° of subcarrier.

TEXT CHANGE:

- Section 4 Performance Checks & Cailbration Procedures
  page 4-5
  Change the following:

16. Synchronizer Timing — Horizontal
(30 μsec advance to 30 μsec delay)

to:

16. Synchronizer Timing — Horizontal
(27 μsec advance to 27 μsec delay)

TEXT CHANGE:

- Section 3 Specifications
  page 3-7
  Change the following:

16. Synchronizer Timing — Horizontal
(30 μsec advance to 30 μsec delay)

i. **CHECK** — Using the waveform monitor, for a range of at least ± 30 μsec.

to:

16. Synchronizer Timing — Horizontal
(27 μsec advance to 27 μsec delay)

i. **CHECK** — Using the waveform monitor, for a range of at least ± 27 μsec.

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MANUAL CHANGE INFORMATION

Date: 7/12/91 Change Reference: CDK3/791

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

ADDITION OF 2 FIELD MODE TYPE TO REMOTE BOARD DIP SWITCHES

S4-6 on the Remote board has been given a function: 2 Field Mode Type.

TEXT CHANGE:

- Section 8 Installation
  page 8-5
  change:

S4	1 2	Synchronicher Mode	**21** 00 = 8 field 01 = Zero Studio Delay 10 = 2 field 11 = unused

to:

S4	1 2	Synchronicher Mode	**21** 00 = 8 field 01 = Zero Studio Delay 10 = 2 field decode 11 = 2 field pixel shift

- Appendix A List of Jumpers and Switches
  page A-1
  change:

S4	1	Synchronicher Mode	<u>**21**</u> 00 = 8 field 01 = Zero Studio Delay 10 = 2 field 11 = unused
	2		

to:

S4	1	Synchronicher Mode	<u>**21**</u> 00 = 8 field 01 = Zero Studio Delay 10 = 2 field decode 11 = 2 field pixel shift
	2		

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MANUAL CHANGE INFORMATION

Date: 9/5/91

Change Reference: C31/991

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

Reference PICN 31, 32, 33, 34, & 37

MECHANICAL & ELECTRICAL REPLACEABLE PARTS LIST & SCHEMATIC CHANGES

TEXT CHANGES:

- Section 9 Electrical Replaceable Parts List
  Add:

A6J43	131-0608-00	GOLD PINS
A6P43	131-0993-02	RED JUMPER
A4CR10	152-0141-02	DIODE

- Section 9 Electrical Replaceable Parts List
  Change to:

A1R17	322-3241-00	3.16 K Ω
A1R16	322-3222-00	2.0 K Ω

- Section 11 Mechanical Replaceable Parts List
  Change to:

-12	2	211-0080-00	SCREWS

- Section 11 Mechanical Replaceable Parts List
  Remove:

-13	2	210-1002-00	FLAT WASHERS

- Section 11 Mechanical Replaceable Parts List
  Add:

	2	210-0801-01	WASHERS — put one under each retaining clip on the door hinge.
	1	337-3825-00	EMI SHIELD (DAC board)

Manual Change Information
Change Number: C31/991

- Section 11 Mechanical Replaceable Parts List
  Replace:

337-0896-00	with	337-3813-00	DAC board output amplifier shield
337-3655-00	with	337-3820-00	DAC board oven circuit cover

- Section 10 Diagrams/Circuit Board Illustrations
  Add:

To DAC Board A4 <2> add CR10. Tie the anode to U7-3 and the cathode to the emitter of Q5.

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MANUAL CHANGE INFORMATION

Date: 8/20/91 | Change Reference: C27/891

Product: VS 211 PAL VIDEO SYNCHRONIZER | Manual Part No: 070-8164-00

DESCRIPTION

Reference PICN 27, 28, 29, & 30

REPLACEABLE PARTS LIST & SCHEMATIC CHANGES

TEXT CHANGES:

- Section 9 Replaceable Parts List
  Change From:

A1	671-1275-00	CIRCUIT BD ASSY: ADC
A1R2	322-3001-00	RES, FXD, FILM: 10 OHM, 1%, 0.2W, TC=T0

to:

A1	671-1275-01	CIRCUIT BD ASSY: ADC
A1R2	322-3030-00	RES, FXD, FILM: 20 OHM, 1%, 0.2W, TC=T0

- Section 9 Replaceable Parts List
  Remove:

A7A2W1	131-4566-00	BUS, CONDUCTOR: 0 OHM, 300 SPACING, SM BODY
A7A2W2	131-4566-00	BUS, CONDUCTOR: 0 OHM, 300 SPACING, SM BODY
A7A2W3	131-4566-00	BUS, CONDUCTOR: 0 OHM, 300 SPACING, SM BODY
A7A2W4	131-4566-00	BUS, CONDUCTOR: 0 OHM, 300 SPACING, SM BODY
A7A2L2	108-1477-00	COIL, RF FIXED: 470 NH.
A7A2L3	108-1477-00	COIL, RF FIXED: 470 NH.
A7A1L2	108-1477-00	COIL, RF FIXED: 470 NH.
A7A1L3	108-1477-00	COIL, RF FIXED: 470 NH.

- Section 9 Replaceable Parts List
  Add:

A1TP9	214-4085-00	TERM, TEST POINT: .070 ID,0.22 H, 0.063 DIA PCB, 0.015 X 0.032 BRASS, W/ RED NYLON COLLAR (add to <6> DGND)
A1R200	307-1318-00	RES NTWK, FDX, FI: (2) 162 OHMS, (2) 260 OHM, 2%, 0.125W (Add to <5> pin 1 to -5V, pin 4 to DGND, pin 2 to U55 pin 10, and pin 3 to U55 pin 5)

Manual Change Information
Change Number: C27/891

- Section 10 Diagrams/Circuit Board Illustrations
  Add:

To ADC Board A1<6> TP9 DGND

To ADC Board A1 <5> Add R200 (pin 1 to -5V, pin 4 to DGND, pin 2 to U55 pin 10, and pin 3 to U55 pin 5)

- Section 10 Diagrams/Circuit Board Illustrations
  Change:

To Remote I/O Board A6 <1> Connect J3-2 to U20-4.

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MANUAL CHANGE INFORMATION

Date: 9/13/91 Change Reference: C41/991

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

Reference PICN 39A, 42, 41, 43, 44, 45, & DK.

Assorted Additions and Corrections

- Section 9 Replaceable Electrical Parts List
  Change:

A4L1	108-0103-01	2.5 uH
A4C28	283-0625-00	220 pF
A4C35	283-0647-00	70 pF
A4C34	283-0772-00	497 pF
A4C53	283-0779-00	27 Pf
A1C30	283-0668-00	184 pF
A1C106	283-0779-00	27 pF

TO:

A4L1	108-1326-00	2.1 uH
A4C28	283-0668-00	184 pF
A4C35	283-0639-00	56 pF
A4C34	283-0667-00	420 pF
A4C53	283-0639-00	56 pF
A1C30	283-0646-00	170 pF
A1C106	283-0639-00	56 pF

- Section 10 Diagrams/Circuit Board Illustration
  On <2> of the DAC Board Change the following part values:

L1 from 2.5 uH to 2.1 uH
C28 from 220 pF to 184 pF
C35 from 70 pF to 56 pF
C34 from 497 pF to 420 pF

On <4> of the DAC board change the following part values:

C53 from 27 pF to 56 pF

On <1> of the ADC Board Change the following part values:

C30 from 184 pF to 170 pF

Manual Change Information
Change Number: C41/991

On <5> of the ADC Board Change the following part values:

C106 from 27 pF to 56 pF

- Section 11 Replaceable Mechanical Parts List
  Add to the ADC board:

	1	337-3825-00	EMI SHIELD

- Section 11 Replaceable Mechanical Parts List
  Change from:

-70	1	161-0279-00	Australian power cord - option A3 only

to:

-70	1	161-0066-11	Australian power cord - option A3 only

- Section 5 Troubleshooting
  To page 5-10
  Table 5-7 Change switch setting 9:

From: Spare

To: ADC Timing Test

- Appendix A List of Jumpers and Switches
  To page A-4
  Table A-3 Change switch setting 9:

From: Spare

To: ADC Timing Test

- Section 5 Troubleshooting
  To page 5-13
  Add:

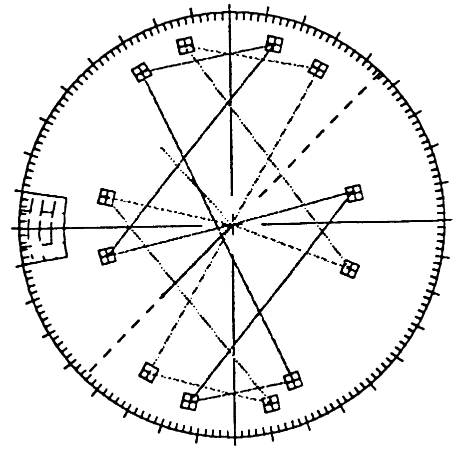

Fig. 5-37. A good display.

ADC Timing Test. When this diagnostic is selected the COARSE, <, & > keys on the Remote board are used to adjust the fine ADC timing. The COARSE button toggles between 2 Field Freeze and normal synchronize mode. The < & > adjust the fine ADC Timing.

NOTE

This is not a part of any calibration procedure and should not be used unless it is obviously out of spec. It is provided for Factory use.

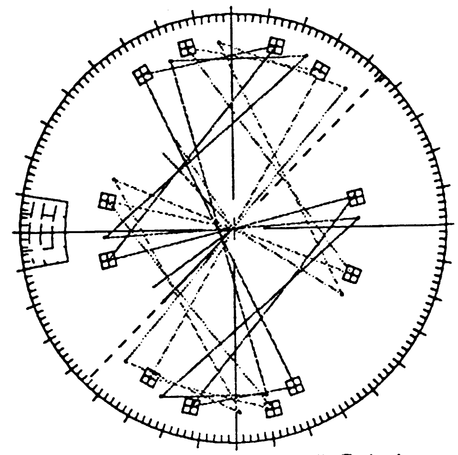

Fig. 5-38. A display with an ADC timing error.

In order to perform this adjustment follow this procedure:

1. Attach a 75% Color Bars source to the PROGRAM INPUT and a signal to the REFERENCE loop-through.
2. Connect the PROGRAM OUTPUT to a vectorscope and display the color bars.
3. Set the Remote board diagnostic switch to "9".
4. Cycle the VS 211 power to reset the synchronizer.
5. Press the COARSE button on the Remote board to cause a 2 field freeze.
6. **CHECK** — the vectorscope display for a doubled trace. (See Figs. 5-37 and 5-38.)
7. If the trace is not doubled this adjustment is finished, leave the diagnostic mode by setting the diagnostic switch back to 0 and cycle the power to reset the instrument.
8. If it is doubled, press the COARSE button again to return to normal synchronize mode.
9. Press the < & > buttons to adjust the fine ADC timing.
10. Press the COARSE button to freeze the vector display.
11. **CHECK** — for double trace. (See Figs. 5-37 and 5-38.)
12. If the trace is not doubled this adjustment is finished, leave the diagnostic mode by setting the diagnostic switch back to 0 and cycle the power to reset the instrument.
13. If it is doubled, repeat steps 9-11 until it is no longer doubled.

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MANUAL CHANGE INFORMATION

Date: 7/30/91 Change Reference: CPICN20/791

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

PARTS LIST CHANGES

TEXT CHANGE:

- Section 9 Replaceable Parts list
  Change From:

A7A2U9	156-1225-01	IC, LINEAR: BIPOLAR, COMPARATOR; DUPLICATE OF 156-1225-00, DO NOT USE; LM393N, DIP08.3

to:

A7A2U9	156-1225-00	IC, LINEAR: BIPOLAR, COMPARATOR

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MANUAL CHANGE INFORMATION

Date: 7/12/91 Change Reference: CTS1/791

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

CORRECTING INCONSISTENT SPECS

The 2T Pulse spec should be 0.5%.

TEXT CHANGE:

- Section 3 Specifications
  page 3-2
  Change the following:

K-Factor (2T Pulse)	1% maximum		21.

to:

K-Factor (2T Pulse)	0.5% maximum		21.

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MANUAL CHANGE INFORMATION

Date: 7/12/91 Change Reference: CBC1/791

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

SIMPLE TROUBLESHOOTING

Boards can come loose during transportation causing easy to fix errors..

TEXT ADDITION:

- Section 5 Troubleshooting
  page 5-1
  Add after the last paragraph:

NOTE

If powering up for the first time and diagnostic indicators are lit, boards may have simply loosen during shipment or rack mounting installation. Before calling for service:

Turn the power off.
Reseat each board.
Power back up.

If this does not fix the problem, continue with the troubleshooting procedures given in this section.

TEXT CHANGE:

- Section 8 Installation
  page 8-8
  Change to last paragraph under "Interpreting Front-Panel Indicators" from:

If the SYSTEM STATUS indicator is flashing, check the LED indicators on the front edge of the circuit boards to determine the cause of the error. For assistance in interpreting the LED indicators, See Troubleshooting, in Section 5.

to:

If the SYSTEM STATUS indicator is flashing, check the LED indicators on the front edge of the circuit boards to determine the cause of the error. If powering up for the first time and diagnostic indicators are lit, boards may have simply loosen during shipment or rack mounting installation. To eliminate this possible cause: turn the power off, reseat each board, power back up. If this does not fix the problem, interprete the LED indicators using Section 5, Troubleshooting, to narrow down the problem.

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MANUAL CHANGE INFORMATION

Date: 9/17/91 | Change Reference: C42/991

Product: RC 211 REMOTE CONTROL | Manual Part No: 070-8164-00

DESCRIPTION

Reference PICN RC12

CHANGES TO RC 211 MECHANICAL PARTS LIST

- Appendix 4.3 RC 211 Replaceable Mechanical Parts list
  page C.4 - 3.
  Change:

-2	211-0538-00	10	SCREW

To:

-2	211-0541-00	10	SCREW

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MANUAL CHANGE INFORMATION

Date: 7/30/91

Change Reference: CPICN1/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

MISC. PARTS LIST CHANGES

- Section 9 Replaceable Parts list
  Change From:

A1U26 160-7643-00 MICROCKT, DIGTL: PROGRAMMED, 156-3381-00

to:

A1U26 160-7511-00 MICROCKT, DIGTL: PROGRAMMED, 156-3381-00

- Section 9 Replaceable Parts list
  Change From:

A6R4 315-0102-00 RES, FXD, FILM: 1K OHM, 5%, 0.25W

to:

A6R4 322-3193-00 RES, FXD, FILM: 1K OHM, 1%, 0.2W, TC=T0

- Section 9 Replaceable Parts list
  Change From:

A6R41 315-0102-00 RES, FXD, FILM: 1K OHM, 5%, 0.25W

to:

A6R41 322-3193-00 RES, FXD, FILM: 1K OHM, 1%, 0.2W, TC=T0

- Section 9 Replaceable Parts list
  Change From:

A6R10 315-0103-00 RES, FXD, FILM: 10K OHM, 5%, 0.25W

to:

A6R10 322-3289-00 RES, FXD, FILM: 10K OHM, 1%, 0.2W, TC=T0

Manual Change Information
Change Number: CPICN1/791

- Section 9 Replaceable Parts list
  Change From:

A6R6	311-2442-01	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG, 0.875 SHAFT
A6R7	311-2442-01	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG, 0.875 SHAFT
A6R8	311-2442-01	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG, 0.875 SHAFT

to:

A6R6	311-2248-00	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG
A6R7	311-2248-00	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG
A6R8	311-2248-00	RES, VAR, NONWW: PNL, 10K +/-10%, DUAL, WIPER PHA SE 180 DEG

- Section 9 Replaceable Parts list
  Change From:

A7A1C7	283-0706-00	CAP, FXD, MICA, DI: 91PF, 1%. 500V
A7A1C8	283-0706-00	CAP, FXD, MICA, DI: 91PF, 1%. 500V
A7A1C13	283-0706-00	CAP, FXD, MICA, DI: 91PF, 1%. 500V
A7A1C19	283-0706-00	CAP, FXD, MICA, DI: 91PF, 1%. 500V

to:

A7A1C7	283-0634-00	CAP, FXD, MICA, DI: 65PF, 1%. 500V
A7A1C8	283-0766-00	CAP, FXD, MICA, DI: 47PF, 1%. 500V
A7A1C13	283-0634-00	CAP, FXD, MICA, DI: 65PF, 1%. 500V
A7A1C19	283-0766-00	CAP, FXD, MICA, DI: 47PF, 1%. 500V

- Section 9 Replaceable Parts list
  Change From:

A4R143	322-3232-00	RES, FXD, FILM: 2.55K OHM, 1%, 0.2W, TC=T0

to:

A4R143	322-3236-00	RES, FXD, FILM: 2.80K OHM, 1%, 0.2W, TC=T0

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MANUAL CHANGE INFORMATION

Date: 7/16/91

Change Reference: CTT1/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

CORRECTING A CONTROLLER BOARD LED DESCRIPTION

The LED lit on the error of requesting digital input and not having a signal available, has changed from 3 to 1.

TEXT CHANGE:

NOTE: Text changes are underlined.

- Section 5 Troubleshooting
  page 5-3
  Under CONTROLLER change the last sentence of the first paragraph from:

An example is: if COMPOSITE DIGITAL INPUT selected and there is no signal at the COMPOSITE DIGITAL INPUT, then CONT ERR (6), BYPASS (4), and 3 light.

to:

An example is: if COMPOSITE DIGITAL INPUT <u>is</u> selected and there is no signal at the COMPOSITE DIGITAL INPUT, then CONT ERR (6), BYPASS (4), and <u>1</u> light.

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MANUAL CHANGE INFORMATION

Date: 6/28/91

Change Reference: CDK1/691

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

DIP SELECTION NOTES FOR THE REMOTE BOARD

S4, S5, and S6 selections are registered only when the VS 211 is set to LOCAL control (S7-6 to 0) and the Remote board processor is reset by a Controllers board reset (S1 or power-up). This allows the user to switch between LOCAL and REMOTE control without overwriting the selections made from the RC 211. Only when the VS 211 is set to LOCAL control are the states of S7 registered.

The diagnostistic switch (S8) is the same. Changes to the diagnostic switch are registered when the Remote board's processor is reset, either through the Controller board (S1) or on power-up.

TEXT CHANGE:

- Section 8 Installation
  to page 8-5
  (before Table 8-1) add:

NOTE

S4, S5, and S6 selections are registered only when the VS 211 is set to LOCAL control (S7-6 to 0) and the Remote board processor is reset by a Controllers board reset (S1 or power-up). This allows the user to switch between LOCAL and REMOTE control without overwriting the selections made from the RC 211. Only when the VS 211 is set to LOCAL control are the states of S7 registered.

- Section 5 Troubleshooting
  to page 5-10
  (before Table 5-7) add:

NOTE

Changes to the diagnostic switch are registered when the Remote board's processor is reset, either through the Controller board (S1) or on power-up.

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MANUAL CHANGE INFORMATION

Date: 7/31/91

Change Reference: CRC1/791

Product: RC 211 SYNCHRONIZER CONTROL

Manual Part No: 070-8164-00

DESCRIPTION

RC 211MISC. PARTS LIST CHANGES

- Section C.2 RC 211 Replaceable Parts list
  Change From:

A2R10	315-0103-00	RES, FXD, FILM: 10K OHM, 5%, 0.25W

to:

A2R10	322-3289-00	RES, FXD, FILM: 10K OHM, 1%, 0.2W, TC=T0

- Section C.2 RC 211 Replaceable Parts list
  Change From:

A2R4	315-0102-00	RES, FXD, FILM: 1K OHM, 5%, 0.25W

to:

A2R4	322-3193-00	RES, FXD, FILM: 1K OHM, 1%, 0.2W, TC=T0

- Section C.2 RC 211 Replaceable Parts list
  Change From:

A2R41	315-0102-00	RES, FXD, FILM: 1K OHM, 5%, 0.25W

to:

A2R41	322-3193-00	RES, FXD, FILM: 1K OHM, 1%, 0.2W, TC=T0

- Section C.2 RC 211 Replaceable Parts list
  Change From:

A2R31	315-0102-00	RES, FXD, FILM: 100 OHM, 5%, 0.25W

to:

A2R31	322-3193-00	RES, FXD, FILM: 100 OHM, 1%, 0.2W, TC=T0

- Section C.2 RC 211 Replaceable Parts list
  Delete:

A2J15	131-0391-00	CONN, RF JACK:

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MANUAL CHANGE INFORMATION

Date: 7/23/91 Change Reference: CPC2/791

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

CHANGES TO PARSER

Two changes have been made to the list of Parser Commands.

TEXT CHANGE:

- Appendix B Parser Commands
  to page B-2
  Change from:

  :ANALog

  to:

  :ANAlog

- Appendix B Parser Commands
  to page B-3
  Change from:

  :STATe <ON OFF>

  to:

  :STATus <ON OFF>

- Appendix B Parser Commands
  to page B-6
  Change from:

  :INPSOUR:ANAL

  to:

  :INP:SOUR:ANA

Tektronix® COMMITTED TO EXCELLENCE	MANUAL CHANGE INFORMATION	
	Date: 6/28/91	Change Reference: CDK2/691
Product: VS 211 PAL VIDEO SYNCHRONIZER		Manual Part No: 070-8164-00

DESCRIPTION

ADDITION OF PARSER SELECTION TO REMOTE BOARD DIP SWITCHES

S6 on the remote board has been given a function: Parser Selection. S6-6 0 is RC 211, 1 is terminal (PC).

TEXT CHANGE:

- Section 8 Installation
  page 8-6
  change:

S6	6	unused	

to:

S6	6	Parser Selection	0 = RC 211 1 = Terminal

- Appendix A List of Jumpers and Switches
  page A-2
  change:

S6	6	unused	

to:

S6	6	Parser Selection	0 = RC 211 1 = Terminal

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MANUAL CHANGE INFORMATION

Date: 7/31/91

Change Reference: CDK4/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

POWER DOWN AFTER USING DIAGNOSTICS

The VS 211 should be powered down after using the User Diagnostics and returning to normal operation to guarantee that all memory is reset and ready for normal operation.

Add Text:

- Section 5 Troubleshooting
  Add to the following headings (DAC User Diagnostics, ADC User Diagnostics, Remote User Diagnostics, and Controller Board Diagnostics):

NOTE

When using the User Diagnostics always power the VS 211 down for an few seconds when returning to normal operating mode. This guarantees that the entire instrument is reset and ready for normal operation.

- Appendix A List of Jumpers and Switches
  Add to the following Tables A-3, A-5, A-8, and A-10:

NOTE

When using the User Diagnostics always power the VS 211 down for an few seconds when returning to normal operating mode. This guarantees that the entire instrument is reset and ready for normal operation.

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MANUAL CHANGE INFORMATION

Date: 8/22/91 | Change Reference: CDK5/891

Product: VS 211 PAL VIDEO SYNCHRONIZER | Manual Part No: 070-8164-00

DESCRIPTION

Change Text:

- Appendix A List of Jumpers and Switches
  Page A-9
  Change:

DIAG SETTING	DIAGNOSTIC TEST SELECTED
05	NVRAM Test & Initialization — continuous pass/fail
06	NVROM Test — one time pass/fail

To:

DIAG SETTING	DIAGNOSTIC TEST SELECTED
05	NVRAM Test — continuous pass/fail
06	NVROM Test & Initialization — one time pass/fail

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MANUAL CHANGE INFORMATION

Date: 8/1/91

Change Reference: CPICN6/891

Product: RC 211 SYNCHRONIZER CONTROL

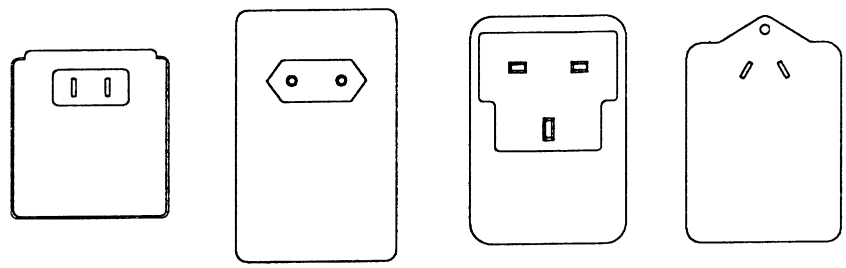
Manual Part No: 070-8164-00

DESCRIPTION

NOMENCLATURE CHANGE

TEXT CHANGE:

- RC 211 Operators Manual
  Appendix B Options
  page 37
  Change From:



a b c d

Option	Figure	Nominal Input	Plug/Voltage Configuration
Standard	a	120 V	North America
C1	b	220/230 V	Europe
C2	c	240 V	U.K.
C3	d	240 V	Australia
C9	a	100 V	Japan

to:

Option	Figure	Nominal Input	Plug/Voltage Configuration
Standard	a	120 V	North America
A1	b	220/230 V	Europe
A2	c	240 V	U.K.
A3	d	240 V	Australia
A6	a	100 V	Japan

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MANUAL CHANGE INFORMATION

Date: 7/30/91

Change Reference: CPICN8/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

PARTS LIST CHANGES

TEXT CHANGE:

- Section 9 Replaceable Parts list
  Change From:

A7A1RT1	307-0746-00	RES, THERMAL: 5 OHMS, 10%, 7A/DEG C
A7A1RT2	307-0746-00	RES, THERMAL: 5 OHMS, 10%, 7A/DEG C

to:

A7A1RT1	307-0450-00	RES, THERMAL: 2.5 OHMS, 10%, 7A/DEG C
A7A1RT1	307-0450-00	RES, THERMAL: 2.5 OHMS, 10%, 7A/DEG C

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MANUAL CHANGE INFORMATION

Date: 7/30/91

Change Reference: CPICN16/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

PARTS LIST CHANGES

TEXT CHANGE:

- Section 9 Replaceable Parts list
  Change From:

A8U6	156-1225-01	IC, LINEAR: BIPOLAR, COMPARATOR; DUPLICATE OF 156-1225-00, DO NOT USE; LM393N, DIP08.3

to:

A8U6	156-1225-00	IC, LINEAR: BIPOLAR, COMPARATOR

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MANUAL CHANGE INFORMATION

Date: 7/30/91

Change Reference: CPICN18/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

PARTS LIST CHANGES

TEXT CHANGE:

- Section 9 Replaceable Parts list
  Change From:

A4U6	156-1191-01	MICROCKT, LINEAR BIFET, DUAL OPNL AMPL, SCRN

to:

A4U6	156-1191-00	MICROCKT, LINEAR BIFET, DUAL OPNL AMPL, SCRN

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MANUAL CHANGE INFORMATION

Date: 7/31/91

Change Reference: CPICN24/791

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

MISC. PARTS LIST CHANGES

- Section 9 Replaceable Parts list
  Change From:

A7 672-0300-00 CIRCUIT BD ASSY: UPPER AND LOWER I/O WIRED

to:

A7 672-0300-01 CIRCUIT BD ASSY: UPPER AND LOWER I/O WIRED

- Section 9 Replaceable Parts list
  Change From:

A7A1 671-1267-00 CIRCUIT BD ASSY: LOWER I/O

to:

A7A1 671-1267-01 CIRCUIT BD ASSY: LOWER I/O

- Section 9 Replaceable Parts list
  Change From:

A7A2 671-1274-00 CIRCUIT BD ASSY: UPPER I/O

to:

A7A2 671-1274-01 CIRCUIT BD ASSY: UPPER I/O

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MANUAL CHANGE INFORMATION

Date: 9/6/91

Change Reference: C39/991

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

Reference PICN: VS 39 & RC 10

MECHANICAL REPLACEABLE PARTS LIST & SCHEMATIC CHANGES

TEXT CHANGES:

- Section 11 Mechanical Replaceable Parts List
  Remove:

1	337-3655-00	ADC board oscillator shield

- Section 11 Mechanical Replaceable Parts List
  Add:

1	337-3820-00	ADC board oscillator shield grounded to chassis

- Section 10 Diagrams/Circuit Board Illustrations
  Add:

To Remote I/O board <1> add the description "RED" to:
Plugs P2, P3, & P43.

- Appendix C.3 RC 211 Diagrams/Circuit Board Illustrations
  Add:

To Remote Control board <1> add the description "RED" to:
Plugs P2, P3, & P43.

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MANUAL CHANGE INFORMATION

Date: 9/10/91

Change Reference: C40/991

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

Reference LF & 9-9-91 meeting

Add Information to the Remote Board Jumper Tables

- Section 8 Installation & Appendix A List of Jumpers and Switches
  Table 8-1 and A-1
  Add:

To: Sound In Sync

It is recommended that this flag only be set if necessary. If SIS is set and the instrument goes into sync lock the quality of the output signal will be greatly reduced.

To: Header

0 is rocker switch with high side towards "OPEN" or switch "DOWN" for S7.

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MANUAL CHANGE INFORMATION

Date: 9/19/91

Change Reference: C43/991

Product: VS 211 PAL VIDEO SYNCHRONIZER

Manual Part No: 070-8164-00

DESCRIPTION

Reference pc 9-19-91

CHANGES TO PARSER COMMANDS

- Appendix B Parser Commands
  Change the following commands:

1. The value of the incremental steps is no longer defined for the following commands:
   :INP:SOUR:AGA
   :INP:TIM:HCO
   :INP:TIM:HFIN
   :OUT:TIM HCO
   :OUT:TIM:HFIN
2. UP, DOWN, UP=xx, and DOWN=xx are no longer used by the following commands:
   :INP:TIM:HCO
   :INP:TIM:HFIN
   :OUT:TIM HCO
   :OUT:TIM:HFIN

   They have been replaced with ADV, DELAY, ADV=xx, and DELAY=xx.
3. If Digital Input is selected, the ADC (input) Timing commands are no longer accessible.
4. "Processing ..." is no longer displayed on the screen during long operations.
5. :SYST? will display the current software version installed on each board of the VS 211.

Tektronix COMMITTED TO EXCELLENCE	**MANUAL CHANGE INFORMATION**	Group Code 20
	Date: 3/6/92	Change Reference: M77010 Rev 1
Product: VS 211 Service		Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N: B010414

ELECTRICAL PARTS LIST and SCHEMATIC CHANGES

SECTION 9 REPLACEABLE ELECTRICAL PARTS LIST

CHANGE TO READ:

			Located on A1 Schematic
A1	671-1275-04	CKT BD ASSY:ADC BOARD	
A1R152	322-3311-00	RES,FXD,FILM:16.9K OHM,1%,0.2W	3
A1U65	160-7640-02	MICROCKT,DGTL:CMOS,PLD;OPT32 MACROCELL,PRGM	4

Tektronix COMMITTED TO EXCELLENCE	**MANUAL CHANGE INFORMATION**	Group Code 20
	Date: 2/20/92	Change Reference: M77011
Product: VS 211 Service		Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N: B010440

ELECTRICAL PARTS LIST and SCHEMATIC CHANGES

SECTION 9 REPLACEABLE ELECTRICAL PARTS LIST

CHANGE TO READ:

			Located on A2 Schematic
A2	671-1277-01	CKT BD ASSY:MEMORY	
A2U35	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U36	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U37	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U38	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U39	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U40	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U41	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U42	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	2
A2U73	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U74	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U75	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U76	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U77	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U78	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U79	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U80	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	3
A2U81	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	4
A2U82	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	4
A2U83	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	4
A2U84	156-4235-00	IC,DGTL:FTTL,SHIFT REGISTER,8-BIT,74F597	4

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MANUAL CHANGE INFORMATION Group Code 20

Date: 11/22/91 Change Reference: M76290

Product: VS 211 Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N: B010124

MECHANICAL PARTS LIST CHANGES

SECTION 11 VS 211 REPLACEABLE MECHANICAL PARTS

CHANGE TO READ:

1-15	354-0163-00	2	RING,RETAINING:TYPE E EXT,U/O 0.125 ID SFT

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MANUAL CHANGE INFORMATION

Group Code 20

Date: 10/18/91 Change Reference: M76333 Rev 1

Product: VS 211 Synchronizer, RC 211 Synchronizer Control Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N:
VS 211 B010133
RC 211 B010112

ELECTRICAL PARTS LIST CHANGES

SECTION 9 VS 211 Replaceable Electrical Parts List

CHANGE TO READ:

			Shown on VS 211
A1	671-1275-02	CKT BD ASSY:ADC BOARD	
A3	671-1272-01	CKT BD ASSY:MEMORY CONTROL BOARD	
A4	671-1276-01	CKT BD ASSY:DAC BOARD	
A6	671-1649-01	CKT BD ASSY:REMOTE CONTROL BOARD	
			A1 Schematic
A1U25	160-7642-01	IC,DGTL:PROGRAMMED 156-4004-00	4
A1U64	160-7639-01	IC,DGTL:PROGRAMMED 156-3825-01	3
			A3 Schematic
A3U21	160-8372-01	IC,DGTL:PROGRAMMED 156-3825-01	1
A3U63	160-8363-01	IC,DGTL:PROGRAMMED 156-3503-00	3
			A4 Schematic
A4U24	160-7510-01	IC,DGTL:PROGRAMMED 156-4004-00	3
			A6 Schematic
A6U7	160-8354-01	IC,DGTL:PROGRAMMED 156-3381-00,27C512	1

APPENDIX C.2 RC 211 Replaceable Electrical Parts List

CHANGE TO READ:

			Shown on RC 211 A1 Schematic
A1	671-1648-01	CKT BD ASSY:REMOTE CONTROL BOARD	
A1U7	160-8356-01	IC,DGTL:PROGRAMMED 156-3381-00,27C512	1

ADD:

A1C54	290-0922-00	CAP,FXD,ELCTLT:1000 UF,20%,50V	2

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MANUAL CHANGE INFORMATION

Group Code 20

Date: 11/22/91 Change Reference: M76395

Product: VS 211 and RC 211 Manual Part No: 070–8164–00

DESCRIPTION

Eff S/N: B010156

MECHANICAL PARTS LIST CHANGE

APPENDIX C, RC211 SERVICE INFORMATION

CHANGE TO READ:

1-13	211–0012–00	5	SCR,MACHINE:4–40 X 0.375,PNH,STL CD PL,POZ
-15	211–0012–00	4	SCR,MACHINE:4–40 X 0.375,PNH,STL CD PL,POZ

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MANUAL CHANGE INFORMATION

Group Code 20

Date: 11/26/91 Change Reference: M76439

Product: RC 211 Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N: B010177

MECHANICAL PARTS LIST CHANGES

Appendix C RC211 REPLACEABLE MECHANICAL PARTS

CHANGE TO READ:

1-10	426-2434-01	1	FRAME,FRONT:ALUMINUM

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MANUAL CHANGE INFORMATION

Group Code 20

Date: 11/22/91 Change Reference: M76497

Product: VS 211 and RC 211 Manual Part No: 070-8164-00

DESCRIPTION

Inst	Eff S/N
VS 211	B010180
RC 211	B010176

MECHANICAL PARTS LIST CHANGES

SECTION 11 VS 211 REPLACEABLE MECHANICAL PARTS

CHANGE TO READ:

1-12	211-0661-00	2	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-26	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-28	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-32	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-34	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-40	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ
-49	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ

APPENDIX C, RC211 REPLACEABLE MECHANICAL PARTS

CHANGE TO READ:

1-19	211-0661-00	4	SCR,ASSEM,WSHR:4-40 X 0.25,PNH,STL,POZ

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MANUAL CHANGE INFORMATION

Date: 12/30/91

Change Reference: M76700

Product: VS 211/RC211 Service

Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N:

VS 211	B010266
RC 211	B010177

ELECTRICAL PARTS LIST CHANGES

SECTION 9 REPLACEABLE ELECTRICAL PARTS

CHANGE TO READ:

A1	671-1275-03	CKT BD ASSY:ADC
A4	671-1276-02	CKT BD ASSY:DAC
A6	671-1649-02	CKT BD ASSY:REMOTE CONTROL
A1U25	160-7642-02	MICROCKT,DGTL:PROGRAMMED 156-4004-00
A1U65	160-7640-01	MICROCKT,DGTL:PROGRAMMED, 156-3825-01
A4U24	160-7510-02	IC:PROGRAMMED, 156-4004-00
A6U7	160-8354-02	IC,DIGITAL:PROGRAMMED, 156-3381-00,27C512

APPENDIX C RC 211 REPLACEABLE ELECTRICAL PARTS

A2	671-1648-02	CKT BD ASSY:REMOTE CONTROL
A2U7	160-8356-02	IC,DIGITAL:PROGRAMMED, 156-3381-00,27C512

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MANUAL CHANGE INFORMATION

Date: 12/30/91 Change Reference: M76697

Product: VS 211 PAL Video Synchronizer Service Manual Part No: 070-8164-00

DESCRIPTION

TEXT and ELECTRICAL PARTS LIST CHANGES

SECTION 5 TROUBLESHOOTING

Page 5-8,
Controller Board Diagnostics

Table 5-6 Controller Board Diagnostics

CHANGE Diag Setting 02 entry **TO READ:**

02	Digital Pass Through

CHANGE Diag Setting 0A **TO READ:**

0A	Spare

Page 5-9,
CHANGE first paragraph of Controller Board Diagnostics discussion **TO READ:**

The Controller board has three types of tests and one adjustment aid available the diagnostics switch. The available tests are:
- Controller Test
- Memory Tests
- Cycle Test

And the adjustment aid is:
- Digital Pass Through

Page 5-10,
Remote Test

DELETE Remote Test heading, Remote Communications Test discussion, and Figure 5-24.
DECREMENT remaining figure numbers by 1.

ADD THE FOLLOWING:

Adjustment Aid

Digital Pass Through - This aid disables sync and burst insertion when applying a non-composite signal to the DIGITAL IN connector. The input signal is still routed through the operating signal path; this is not a bypass function. This allows a continuous digital sweep signal to be used when adjusting the DAC output filter.

SECTION 9 REPLACEABLE ELECTRICAL PARTS

CHANGE TO READ:

A3	671-1272-02	CKT BD ASSY:MEMORY CONTROLLER
A3U63	160-8363-02	IC,DIGITAL:PROGRAMMED 156-3503-00

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MANUAL CHANGE INFORMATION

Date: 8/19/91 Change Reference: CBB1/891

Product: VS 211 PAL VIDEO SYNCHRONIZER Manual Part No: 070-8164-00

DESCRIPTION

CHANGES TO THE PERFORMANCE CHECK / CALIBRATION PROCEDURE

These changes have been made to the Performance Check & Calibration Procedure.

CHANGES:

- Section 4
  on page 4-1
  Change:

  7704A

  to:

  7603

- Add
  to page 4-1
  Digital Sweep Generator description:

  (part number 067-1011-00)

- Change
  on page 4-2

  TSG 17

  to:

  TSG11

- Change
  on page 4-2

  7L13

  to

  2710

- Change
  on page 4-2

  DM501A

  to:

  DM504A

- Change
  on page 4-3 sine wave generator

  SG502

  to:

  SG503

Manual Change Information
Change Number: CBB1/891

- Correct the figure
  on page 4-23 to show the change from SG502 to SG 503.

- Add to the Return Loss Bridge
  on page 4-3

  50 Ω cable (012-0482-00)

- Delete the following from the Extender board description
  on page 4-3

  063-0784-00

- Add the part number to the DC Block
  on page 4-4

  015-0221-00

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MANUAL CHANGE INFORMATION

Date: 8/19/91 | Change Reference: CPC3/891

Product: VS 211 PAL VIDEO SYNCHRONIZER | Manual Part No: 070-8164-00

DESCRIPTION

CHANGES TO PARSER

These changes have been made to the list of Parser Commands.

TEXT CHANGE:

- Appendix B Parser Commands
  on page B-6 & B-2
  Add to the :IDN description:

The ID has a twenty character limit.

- Appendix B Parser Commands
  to page B-7 & B-2
  Change from:

:INP:SISP <YES NO>

to:

:INP:SISP <ON OFF>

- Appendix B Parser Commands
  to page B-8 & B-3
  Change from:

:OUTP:SBIN <YES NO>

to:

:OUTP:SBIN <ON OFF>

- Appendix B Parser Commands
  on page B-12
  Change the description of :SYST? to:

The VS 211 will respond with the current version of each board.

Tektronix® COMMITTED TO EXCELLENCE	MANUAL CHANGE INFORMATION	Group Code 20
	Date: 2/15/92	Change Reference: M77037
Product: VS 211		Manual Part No: 070–8164–00

DESCRIPTION

Eff S/N: B010414

ELECTRICAL PARTS LIST ADDITIONS

SECTION 9 V2 211 REPLACEABLE ELECTRICAL PARTS

ADD:
at A3U2

	MOUNTING PARTS
136–0751–00	SKT,PL-IN:24 DIP,LOW PROFILE
	END MOUNTING PARTS

at A3U60

	MOUNTING PARTS
136–0727–00	SKT,PL-IN,ELEK:8 DIP,LOW PROFILE
	END MOUNTING PARTS

MANUAL CHANGE INFORMATION

Tektronix® COMMITTED TO EXCELLENCE

Date: 2/25/92

Change Reference: M77082

Product: VS 211/RC 211

Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N
VS 211: B010414
RC 211: B010195

TEXT and ELECTRICAL PARTS LIST CHANGES

SECTION 8 INSTALLATION and APPENDIX A LIST OF JUMPERs and SWITCHES

Page 8-6, and *Page A-2*
Table 8-1 DIP switches on the Remote Board
Table A-1 Remote Board DIP Switch Functions

CHANGE DIP # S6 entry **TO READ:**

S6	1	Program Error Handling 0	**321** 000 = No Action[1] Freeze[2] 001 = Bypass 010 = Black 011 = Freeze for 5 sec → Black 100 = Freeze[1] 101 - 111 = unused
	2	Program Error Handling 1	
	3	Program Error Handling 2	
	4	Reference Error Handling	0 = Bypass 1 = use internal reference
	5	Manual Freeze[1]	0 = 1 Field 1 = 2 Field
	6	Parser Selection[1]	0 = RC 211 1 = Terminal (PC)
	7	Baud Rate 0	**87** 00 = 19.2k 01 = 9600 10 = 4800 11 = 2400
	8	Baud Rate 1	

[1] Ver 1.3 and above [2] Ver 1.2 and below

SECTION 9 VS 211 REPLACEABLE ELECTRICAL PARTS LIST

CHANGE TO READ:

A3	671-1272-03	CLT BD ASSY:CONTROLLER BOARD
A6	671-1649-03	CKT BD ASSY:RCIO BOARD
A3U21	160-8372-02	IC,DGTL:PRGM
A3U53	160-8363-03	IC,MEMORY:PRGM 27C256
A6U7	160-8354-03	IC,MEMORY:PRGM 27C512

APPENDIX B PARSER COMMANDS

Page B-3
CHANGE :OERRor entry **TO READ:**

:OERRor

:PROGram

:GO <BLACK BYPASS FREEZE AUTO5 NOACT[1]>

:REFerence

:GO <BYPASS IREF>

[1] Ver 1.3 and above

Page B-9

ADD to end of :OERR:PROGRAM? discussion **AS FOLLOWS:**

NOACT– the synchronizer auto clips and inserts sync and burst unconditionally. Therefore, the signal will always pass through the synchronizer no matter how noisy or garbled. (Version 1.3 and above.)

CHANGE :OERR:PROGRAM:GO <BLACK BYPASS FREEZE AUTO5>discussion title **TO READ:**
:OERR:PROGRAM:GO <BLACK BYPASS FREEZE AUTO5 NOACT>

ADD to end of discussion **AS FOLLOWS:**

NOACT– the synchronizer auto clips and inserts sync and burst unconditionally. Therefore, the signal will always pass through the synchronizer no matter how noisy or garbled. (Version 1.3 and above.)

Tektronix
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Group Code 20

Date: 2/20/92 Change Reference: M76960

Product: VS 211 Service Manual Part No: 070-8164-00

DESCRIPTION

Eff S/N: B010372

ELECTRICAL PARTS LIST and SCHEMATIC CHANGES

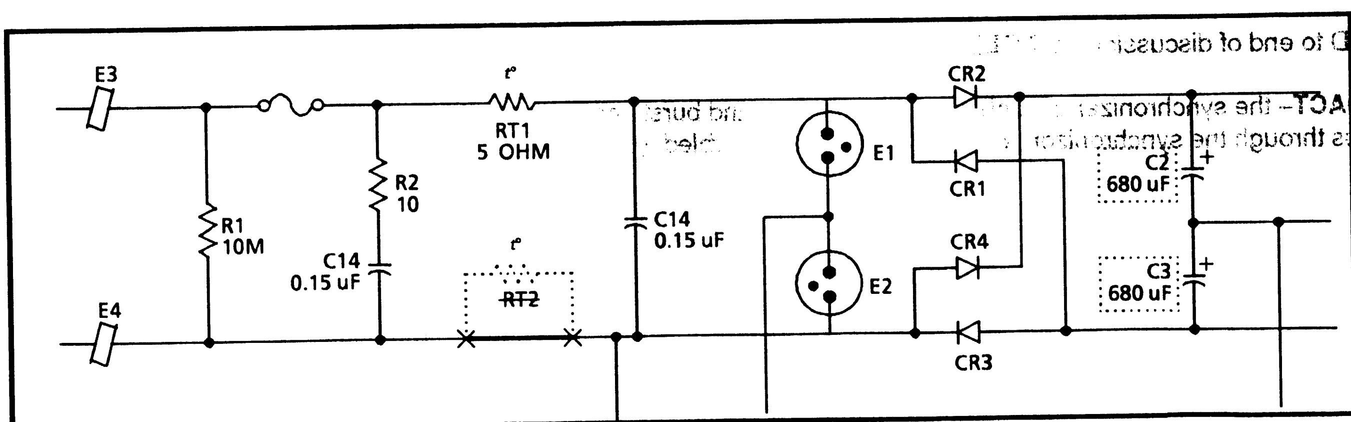
SECTION 9 REPLACEABLE ELECTRICAL PARTS

CHANGE TO READ:

A7A1	671-1267-03	CKT BD ASSY:LOWER I/O ASSY
A7A1C2	290-1298-00	CAP,FXD,ELCTLT:680 UF,20%,200V,105° C
A7A1C3	290-1298-00	CAP,FXD,ELCTLT:680 UF,20%,200V,105° C

DELETE:

A7A1RT2



Part of A7A1 Schematic 1, showing circuit change.