SERVICETEKNOTES

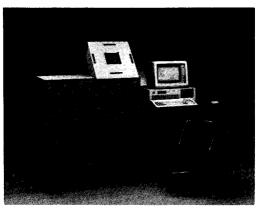
TEKTRONIX—EVER SEARCHING FOR NEW AND BETTER PRODUCTS TO SERVE YOUR NEEDS!

DAS 9200



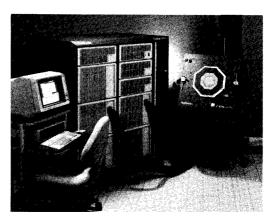
The DAS9200 Personal ASIC Verification System is structured for functional testing of "first silicon" prototypes. In this engineering application, it is one of the most capable and cost-effective systems of its type. And it can be reconfigured as the industry's most advanced digital analysis system for testing products at the circuit board and system level.

The Delta Series VLSI Test System is targeted for incoming inspection, more stringent functional verification, and "lot sample" testing. These applications call for higher capacity and often require timing margin tests, in addition to functional exercises. Occupying the middle bracket in price and performance, the Delta System provides a test solution for the user who needs a compact, powerful test system of moderate throughput.



DELTA

LT-1000



The LT-1000 VLSI Logic Test System is designed for the most demanding high-throughput production test environments. It provides uncompromised QC testing capability while reducing the critical "cost-per-test" figure that has become the dominant portion of IC manufacturing cost. And the LT-1000, although it is the "high end" of the Tek ASIC tester scale, is offered at about 1/2 the price of equivalent competitive products.

SPECIAL ARTICLES

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Featured on this month's cover of SERVICE TEKNOTES are three new Tektronix products recently introduced to the industry; the DAS, the Delta and the LT-1000. To quote their recent brochure, "WHERE DESIGN AND TEST CONVERGE":

Tektronix' DAS 9200 Personal ASIC Verification System

Tektronix' DAS9200 Personal ASIC Verification System is a low-cost, turnkey analysis tool that provides an easy-to-use, focused solution for all your digital ASIC verification needs. It makes testing and debug of your ASIC prototype easy and quick--you can focus on your test problem and not your test equipment.

Tektronix Delta System

The Tektronix Delta System is a compact modular automated test system that provides design and test engineers with an easy-to-use and accurate means of testing VLSI devices. It may be used for detailed functional verification of ASIC prototypes, and serves as a low-cost production test solution for all types of digital devices within its 96 I/O pin capacity. The Delta System has the timing resolution, accuracy, and low skew that rival larger, general purpose testers at a fraction of their cost.

LT-1000 VLSI Logic Test System

The LT-1000 VLSI Logic Test System is a CMOS ASIC production ATE system with an innovative new architecture and features optimized for its market. The LT-1000 serves the unique needs of the production test environment. Here, cost-effectiveness and throughput are paramount, and overall performance must be aimed at maximizing yield. To meet these demands, the LT-1000 has been designed to test the largest and most complex CMOS VLSI devices, while controlling cost on all fronts; initial capital investment, operating cost, program development time (and therefore cost), and maintenance cost.

We hope these short descriptive paragraphs will "whet your appetite" for the more in-depth information that follows.

Tektronix is ready to serve YOU!

Tektronix Announces a New Generation of Digital Analysis Tools

The Logic Analyzer Division of Tektronix, Inc. has announced the Digital Analysis System 9200. The DAS 9200 combines ultra-high speed, unprece-dented channel width, and exceptional memory depth to inaugurate a new generation of modular digital analysis instrumentation. Fully expanded, the 9200 can acquire 540 channels at 20 MHz with 32K deep memory, 432 channels at 200 MHz with 4K memory, 160 channels at 2 GHz with 8K memory, and 1008 stimulus channels at 50 MHz with 8K memory depth.

Application Specific Integrated Circuit (ASIC) prototype functional verification, analysis, and debug are supported by the 9200 and its 92DV application software. This configuration provides acquisition and stimulation hardware, a VLSI test fixture, and utilities for formatting, comparing, and transferring simulation data from CAE host to the 9200. Vector conversion programs that translate vectors from their native format to a format suitable for the 9200 will be provided. These translators will run on the 9200. The current list of simu-lators supported include:

Tektronix IDEAL Mentor SIM Daisy DLS HILO2/3 CADAT LASAR7

In addition, a generic format to accommodate other simulators is provided.

Also included is software control for transferring acquisition data to the pattern generator and a special user interface to automatically format screen display. The ASIC test system is capable of functional testing TTL, CMOS, and ECL logic families of gate array, standard cell, and full custom integrated circuits.

For more information on the DAS 9200 Digital Analysis System, write on letterhead to Logic Analyzer Marketing, Tektronix, Inc., P.O. Box 12132, Portland, OR 97212. Or call toll-free 1-800-245-2036. In Oregon call 231-1220.

Tektronix Delta Series VLSI Test Systems

The Delta Series consists of a family of four VLSI Test Systems that are configurable to your specialized testing requirements.

The Delta System is a solution for engineers who need to verify tight timing margins of IC's for today's high speed systems. For the design or test engineer, the Delta System provides an easy-to-use system for prototype verification after the ASIC's return from the foundry. For Production Engineers, the Delta System provides a cost-effective system for testing commodity parts in high-volume manufacturing.

Included with the Delta System is a graphics-oriented, menu-driven user interface called VIA - Visual Interactive Access. Developed by Tektronix, VIA is an effective means of developing test programs for IC's, without requiring users to have a detailed programming knowledge of the system. VIA runs on the IBM PC/AT (tm) - based Programming Station.

The Delta Architecture

The architecture of the Delta Series is modular, both in hardware and software. The hardware is based on accepted industry standards of bus structure and board modularity. Tektronix selected the VME bus and Eurocard board sizes as the basis for the system architecture, and added extensions for higher performance for the instrumentation modules of the system. The system controller section is composed of plug-in VME components. The instrument, signal conditioning, and Device-Under-Test (DUT) areas also utilize easy-to-access modular components for quick repair and calibration.

The Delta System includes up to four Pattern Generator/Word Recognizer (PG/WR) modules and a precision timing source facilitating 100pS resolution. Each PG/WR is arranged in groups of 24 Input pins and 24 Output pins - a total of 48 pins. A maximum of 96 I/O or 192 pins can be tested.

The PG/WR's can be viewed as the center of the Delta System (see figure 1). The outputs from the PG/WR's are sent to the Signal Conditioners for pulse formatting and timing generation, and finally to the pin drivers located near the Personality Board (DUT Board).

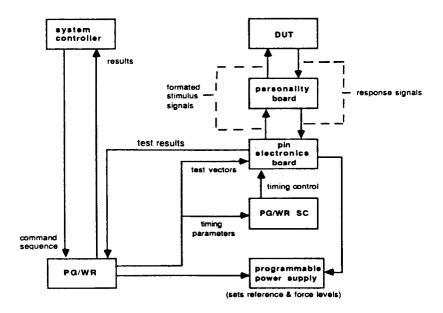


Figure 1 - Delta Series Test Flow

Software Modularity

The Delta System also sports software modularity, beginning with the VIA User Interface, and extending through the Macro library, C language compiler and UniFlex(tm) Operating System.

The VIA Software package provides an interactive graphics package running on the IBM PC/AT(tm). Through the use of a mouse and pull-down menus, the user can easily and quickly create and edit any test sequence. Once the test program is compiled on the system controller, the user may start the test and interactively edit the timing sets or test patterns and view the results on the PC's color monitor as they occur. The user may therefore do "what-if?" timing analysis of IC's and see the point of failure, in 100 pS steps.

Should the user decide, the test program may be developed and edited without the use of VIA and program directly on the system using the C Compiler. Library functions and utilities are available to speed development. After compilation, the programs are run in batch mode.

The Macro Library contains functions commonly used by Engineers to examine parts, such as binary edge search and Shmoo plots. For speed, some of these functions are implemented at the instrument firmware level. Each PG/WR contains an on-board 68010 Processor for speed and performance.

The UniFlex(tm) Operating System is a Unix-like operating system well-suited to the real-time requirements of instrumentation.

A separate software product available for the Delta System, called CAELink(tm) is available to help convert simulator output data to test vectors for the Delta System. Conversion is available for popular ASIC design workstation formats, including Tektronix CAE Systems. Communications with the Design Workstation is typically via RS232C or Ethernet (optional).

Configurations

The Delta System can be configured into standard systems of four different pin counts: 24 I/O pins (10S24), 48 I/O pins (10S48), 72 I/O pins (10S72) and 96 I/O pins (10S96). Total pins tested can therefore range up to 192 pins.

For more information, contact Doug Goodman at (503) 627-7794.

UniFlex is a trademark of Technical Systems Consultants, Inc. IBM PC/AT is a trademark of International Business Machines, Inc. CAELink is a trademark of Tektronix, Inc.

New Tektronix VLSI Test System Cuts Cost OF IC Production

The Semiconductor Test Systems (STS) Division of Tektronix has announced a new VLSI test system targeted for production testing of CMOS application-specific integrated circuits (ASICs). The LT-1000 VLSI Logic Test System is a 256-pin, 50 MHz semiconductor tester that meets all the requirements of production testing and incoming inspection of gate arrays, custom, semicustom and standard CMOS ICs at a price substantially lower than general-purpose testers commonly used in this application.

The LT-1000 Test Station accommodates a wide variety of wafer probers and automated device handlers in a high-throughput environment, and convenient fixturing allows rapid setup changes between production runs. To further reduce the operational cost of ASIC testing, the LT-1000 also provides a highly interactive test development environment with automatic program generation and links to CAE design databases.

Test System Uses Application-Specific ICs

Key to the LT-1000's price-performance is its integrated pin electronics. Most of the circuitry that connects directly to the device under test to provide timing and drive voltages and to acquire response measurements is condensed into two custom monolithic integrated circuits per test channel. These custom ICs enable the LT-1000 to provide dedicated resources for each device-under-test pin with a substantial reduction in tester hardware.

Tektronix couples the LT-1000's integrated pin electronics with a unique calibration technique. A portable computer-controlled Auto-Calibration Station (LT-ACS) automatically measures tester accuracy at the device-under-test mounting fixture to compensate for any errors in timing or voltage levels within the pin ICs. The LT-ACS then determines correction factors that are fed back to the tester to guarantee operation within specifications. Because a single LT-ACS can service many LT-1000 testers, the cost associated with high accuracy is distributed over many systems, rather than being duplicated in each tester.

According to Vince Lutheran, STS Division General Manager, "We were able to achieve extremely good price-performance in the LT-1000 because we started out to build a system optimized for CMOS testing. Our objective was to provide the capabilities needed to do CMOS production testing rather than a general-purpose tester for all families of ICs. As a result, the LT-1000 fills the demand for a tester with the capacity and performance to fully test high pin count ASIC parts, without the \$1 million-plus price tag of typical general-purpose VLSI testers."

To further reduce capital costs, resources for test program development for the LT-1000 have also been broken out from the tester itself. Individual Program Development Stations (LT-PDS) based on the Motorola 68020 microprocessor can be added as needed to accommodate each customer's programming workload. Workstations communicate with the test stations, remote host computers and with each other over an Ethernet (registered) local area network.

Reduced Operational Costs

The LT-1000 addresses the operational costs of testing, as well as capital costs. Factors which affect total operational costs include the time to test and handle each part, set-up time between test runs, routine tester maintenance, unscheduled downtime, and the cost of test program development. Each of these factors was a consideration in the system design.

Actual test time is reduced by the LT-1000's parallel Parametric Measurement Units (PMUs). The LT-1000 has one PMU for each 8 DUT pins, allowing simultaneous parametric measurements on 32 pins in a fully-configured (256-pin) system.

The LT-1000 test head can be interfaced to a wide variety of automatic handlers and wafer probers, making it possible to maximize throughput without sacrificing the accuracy needed for high-yield testing. Because short production runs are common for ASIC devices, the LT-1000's device-mounting fixtures are designed to allow operators to make set-up changes for different parts quickly and conveniently.

Advanced Programming Environment Linked to Design

Because test program development represents a large portion of the operational cost of testing ASICs, Tektronix emphasized program development tools in the LT-1000. An automatic program generator running on the LT-1000 Program Development Station (LT-PDs) takes test vectors and other information from Tektronix' CAE Systems Division, Mentor, Daisy, and other workstations, and converts it to a form required for the LT-1000. The LT-PDS' multiple-window, bit-mapped environment then allows the test engineer to do any required fine-tuning very quickly using intelligent editors and graphical debugging aids such as timing diagrams. Hill maintains, "The programming tools on the LT-1000 enable a test engineer to develop a complete production test for a new IC, including program verification and device debugging, in a matter of hours instead of the typical one to two weeks."

For more information, call the Marketing Communications Department, Tektronix Semiconductor Test Systems Division, (503) 629-1179.

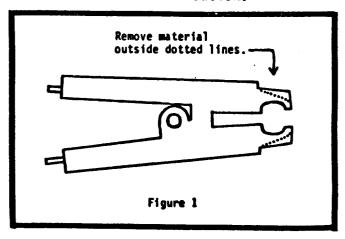
*(Ethernet is a registered trademark of Xerox Corporation)

MODIFY DIP CLIPS FOR USE ON DENSELY POPULATED BOARDS

Some circuit boards are so densely populated with components that there is very little space between them to accommodate DIP clips when trouble-shooting. As future products come out, the component spacing is likely to become denser still.

There are a couple of options available to you to deal with the close component spacing on circuit boards:

1. Modify standard DIP clips (i.e., AP Products TC-14, TC-16, TC-24, etc.) by trimming the outside edge of the plastic fingers which separate the IC leg contacts (refer to Figure 1). These should be carefully shaved down as needed on both sides of the DIP clip for its entire length. An X-ACTO knife works well to perform this modification.



2. There is also a "High Density" line of DIP clips available from Pomona Electronics (i.e., Pomona Part Number 4236A). These clips are somewhat narrower than the standard AP Products clips. They can be made to adapt to an even narrower component spacing by shaving them down in the same manner as described above.

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3. If neither of the two suggestions above will work on a particular IC, the use of grabber tips with flying leadsets might be necessary. These can be used to connect either an oscilloscope probe or a logic analyzer (LA) flying lead to the IC leg. LA Division now has a new variety of grabber tips which capture an IC leg better than the previous style of LA grabbers. The part numbers for these grabbers are as follows:

Single Grabber Tip: 013-0217-00 Package of 12 Tips: 020-1386-00

A set of 10 individual, 8"-long, color-coded leadsets is available for use with these grabber tips. Order Part Number 012-0655-02.

Individual flying leads can be made by applying square pin connectors (P/N 131-0707-00) to the stripped ends of 6" pieces of 23 AWG wire (P/N 175-5026-00, black). Order this wire by the foot. Also, be sure to apply heatshrink tubing (P/N 162-0561-00) to cover the connectors to keep them from shorting to adjacent circuitry. This material should also be ordered by the foot.

W2 Issue 16-16

CG5001/CG551AP RANDOM SELF-TEST MODIFICATION CORRECTION

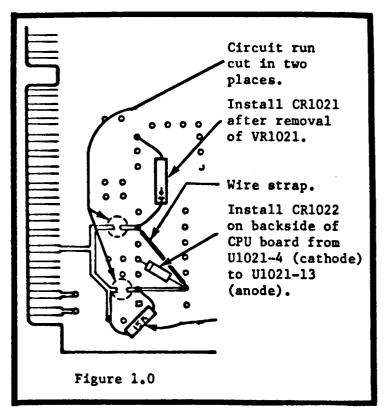
REF: CG5001/CG551AP WIZARD Article Issue 16-8, April 26, 1986

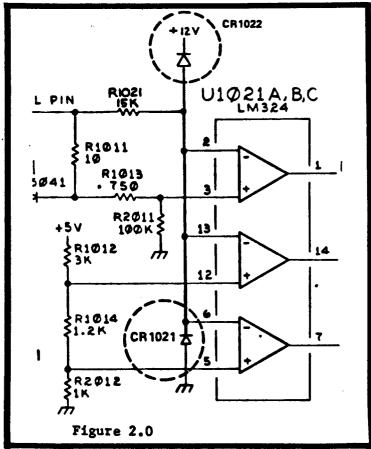
When this modification is installed, using Zener diode Tektronix P/N 152-0175-00, an operator discrepancy is noted. The discrepancy appears when the Pulse Head is not installed on the CG. The operator is able to program the Fast Edge Mode from the front panel without receiving an "Entry Error" message. Also, when the Pulse Head is attached to a powered-up CG it is not being sensed, therefore

CG5001/CG551AP Random Self-Test Modification Correction (continued)

causing no CG relay action to occur. These are the only discrepancies that occur as a result of installing Zener diode VR1021.

To correct this, remove VR1021 and P/N (Tektronix install CR1021 152-0141-02) in its place. Also install CR1022 (Tektronix P/N 152-0141-02) on the backside of CPU U1021-4 board from (cathode) to U1021-13 (anode). Figure 1.0 shows the parts orientation on the backside of the CPU board. Figure 2.0 indicates the schematic changes.





W2 Issue 16-15

DAS 9100 SERIES, INSULATION ADDED UNDER A31L126 AND A31L127

REF: DAS 9100 Service Manual P/N 070-3836-XX

Corporate Mod #61220

AFFECTED CKT BD: A31 670-7294-XX

When replacing either A31L126 or A31L127 on the DAS 9100 Series Main Interconnect Board, an insulator needs to be added between the inductors and the circuit board.

Several Main Interconnect Boards and many inductors have been burned when the core of either L126 and L127 touched the high current pad associated with each part. Safety has determined there is no fire hazard.

DAS 9100 Series, Insulation Added Under A31L126 and A31L127 (continued)

This new part (P/N 342-0802-00) is designed to fit under both L126 and L127 at the same time so only one insulator is necessary per board. Add the insulator when replacing L126 and/or L127 or if the Interconnect happens to be accessible because of some other repair.

The Main Interconnect Board rolls to 670-7294-03.

W2 Issue 16-19

DC5010/DC510 RISETIME MEASUREMENT IMPROVEMENT

REF: M61561

050-2200-00

DC5010/DC510 S/N B041799

It has been discovered that the DC5010 and DC510 may not always provide an accurate reading when measuring rise and fall times. This anomaly is most likely to occur when measuring low repetition rate, fast slew rate waveforms.

A modification kit containing parts and instructions to correct this possible measurement error has been set up. The kit can be ordered as Tektronix P/N 050-2200-00. This kit can be installed in any DC5010 and DC510 that exhibits rise/fall time measurement errors.

The circuit changes accomplished by this kit are installed in new DC5010s and DC510s built after S/N B041799.

W² Issue 16-17

PS5010 LOAD RESISTOR TEKTRONIX P/N CHANGE

Ref: Instruction Manual Tektronix P/N 070-3391-00

The suggested test equipment list (Table 5-1) indicates a 5-ohm, 5%, 25W resistor, Tektronix P/N 308-0177-00. This part is no longer available and is replaced by Tektronix P/N 308-0842-00. The manual will be corrected appropriately.

W² Issue 16-17

S3200/1800 15V TABLE SUPPLY REPLACE-MENT KIT

REF: Corporate Mod #57896

The 119-1085-00 15V table supplies that are used in 1804B, 1804V, and 1807 stations, and the 119-0454-02/03 and 119-0455-02/03 table supplies which are used in the 1805 station are no longer available from Power Mate Corporation.

When ordering a new 15V supply from CMS, use Parts Replacement Kit P/N 050-2165-00 for any of the aforementioned stations. In addition to the new 15V supply from Kepco (P/N 119-1559-00), the kit will include new style terminal lugs, two mounting plates (one for use on vertical stations and one for use on horizontal stations), and installation procedures.

W² Issue 16-18

S3200/1800 DC SUBSYSTEM LOGIC BOARD

REF: 1803 Test Station DC Subsystem P/N 070-3144-02

1804A & 18084B Test Stations Volume 2 P/N 070-3331-00

1805 Test Station, Volume 2 P/N 070-3338-00

1807 Test Station, Volume 2 P/N 070-4134-00

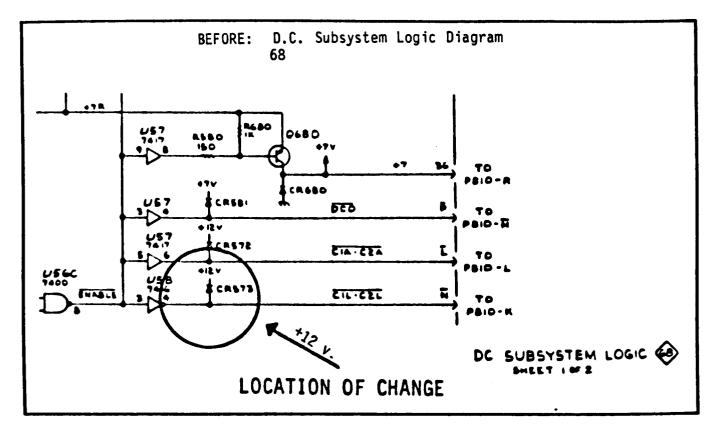
Corporate Mod #59349

To avoid possible erroneous D.C. Subsystem readings caused by reeds C1L and C21 (K110 & K120 located on the D.C. Subsystem Amplifier board) remaining closed after a "SETUP TO MEASURE (VOLTAGE or CURRENT)" state-

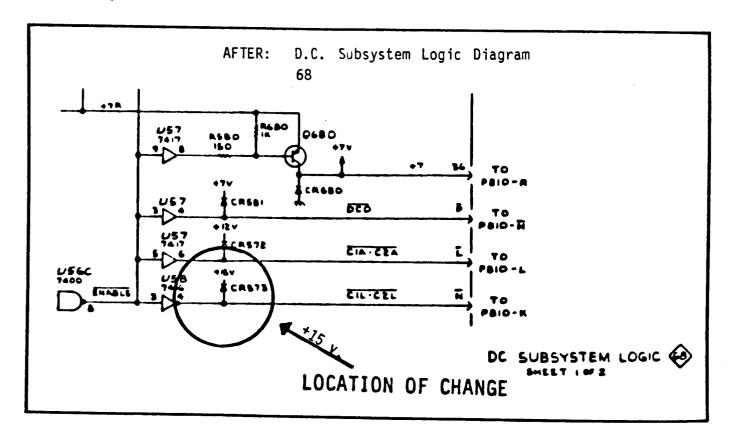
ment has been made, the following modification to the D.C. Subsystem Logic board is recommended:

- 1. Lift the cathode lead end of the diode CR573 (P/N 152-0141-02) located on the D.C. Subsystem Logic Board A28 (see component location schematic).
- Connect the cathode end of the diode to the input side of voltage regulator U27 (P/N 156-0285-00) with approximately 5" of 30 AWG green wire strap. This will replace the +12V reed bias supply with the correct +15v supply.

Installation of this modification requires a change in the D.C. Subsystem Logic board part number from 670-2828-04 to 670-2828-05.

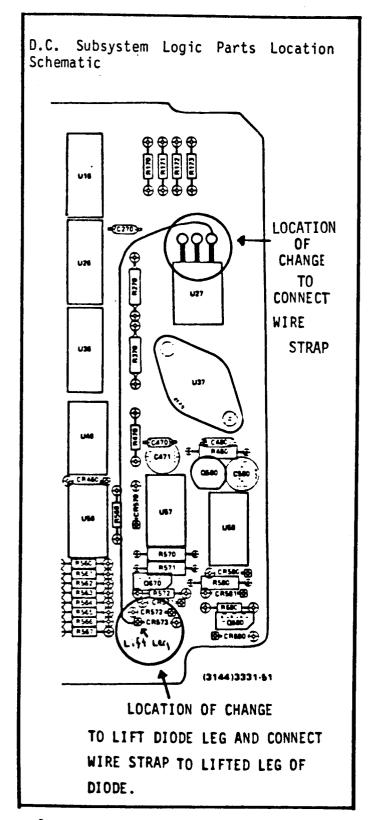


\$3200/1800 DC Subsystem Logic Board (continued)



S3200/1800 DC Subsystem Logic Board - see "D.C. Subsystem Logic Parts Location Schematic" on next page

S3200/1800 DC Subsystem Logic Board (continued)



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S3200/R1340/R1341 TRANSISTOR REPLACE-MENT KIT MODIFICATION M#59700

REF: 1340 Data Coupler P/N 070-3107-00

> R1341 Data Coupler P/N 070-4141-00

The Q140, a power transistor with a heat sink attached (P/N 151-0217-00) located on the R1340/R1341 regulator circuit board is no longer available from the vendor. The transistor has been replaced by a Parts Replacement Kit 050-2156-00, which includes a 151-0266-00 transistor, a 214-3895-00 heat sink, and mounting hardware.

W² Issue 16-17

S3200/S3032 WAVEFORM DIGITIZER GROUND STRAPPING

REF: Corporate Mod #58241

Excessive noise found on digitized signals can be caused by small amounts of current flowing through shields of coax cables going from the test station to the R568 waveform digitizer. This current will flow if the safety earth connection for the station and rack are different in potential by even a few millivolts.

To shunt this current out of each coax' shields, use two mounting brackets (P/N 407-3439-00) and two grounding strap cables (P/N 198-5532-00) that are added between the station and rack.

When installing cables, order the following securing hardware:

<u>Qty</u>	Description	Part Number
5	Hex Nut	210-0411-00
6	Lock Washer	210-1026-00
1	Screw .25-20 x 1.00	213-0052-00
1	Screw .25-20 x 0.75	213-0134-00

S3200/S3032 Waveform Digitizer Ground Strapping (continued)

Use the following procedures to add ground cables on S3295's or S3270's which have Waveform Digitizers installed:

1809V/1804V TABLE CONNECTION POINTS:

1) Using 1 each Hex Nut, Lock Washer and 1/4-20 x .75 Screw, add ground bracket to the rail which holds the A.C. Power Controller to the station, placing the lock washer between the rail and bracket. The bracket should be attached as close to the Controller as possible.

NOTE: Access to the rail on an 1809V is easiest from the lower front of the station, while access to the rail on an 1804V is easiest from the side by removing (the smaller of the two) table supply side panels.

2) Secure grounding cables to different posts on the bracket using two Hex Nuts and two Lock Washers ensuring the lock washers are between the cable end connectors and the ground bracket.

HINT: You might find it easier to install if you secure the cables to the bracket first, before attaching it to the rail.

1804B TABLE CONNECTION POINTS:

1) Do not use ground bracket. Attach cables directly to A.C. Controller mounting chassis, using lock washers and the existing screws.

S3295 RACK CONNECTION POINT:

- 1) Add ground bracket onto the left rail, which holds the A.C Power Controller, by removing the original mounting screw and replacing it with a 1/4-20 x 1.00 screw and placing a lock washer between the rail and bracket.
- 2) Secure grounding cables to different post on the bracket using two Hex Nuts and two Lock Washers, ensuring the lock washers are between the cable end connectors and the ground bracket.

S3270 RACK CONNECTION POINT:

- 1) Locate the right section of the A.C. Power Controller (section with Huble connector and breakers). Remove ground braid on back of the controller, and using existing screw add grounding bracket with a lock washer between the bracket and controller. Attach ground braid to the bracket using one locking washer and Hex Nut, placing washer between the cable end connector and the bracket.
- 2) Secure grounding cables to different posts on the bracket using two Hex Nuts and two Lock Wahsers ensuring the lock washers are between the cable end connectors and the ground bracket.

W² Issue 16-17

S3200: STATIC ELECTRICITY PRECAUTIONS FOR IMPROVED RELIABILITY

STS is making a concerted effort to reduce circuit board damage by putting in place strict static awareness rules and precautions.

With static damage, there is a degrading of electrical characteristics and eventual total failure of

(Article Continued on Next Page)

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the effected part. In most cases, the damage is not immediately evident. Cycling or burn-in will not always uncover the defect. Approximately 90% of the static damaged parts fail in 2 - 3 weeks.

Static control also involves removing static generators from the area. These items should not be at a technician's work bench or around a test system:

styrofoam cups
packaging material (styrofoam)
clear plastic bags
non-conductive plastic trays
parts bins
kodagraphs
candy wrappers
scotch tape, etc.

The main culprit is plastic.

Clothing should never contact staticsensitive devices. The wrist strap does not remove static charges from clothing.

W2 Issue 16-19

SC50X INCORRECT DANGER LABELS

REF: SC502 B042200 - B042290 SC503 B040590 - B040700 SC504 B025800 - B025980

The SC502, SC503, and SC504 oscilloscopes have a warning label inside that states: "DANGER - Up to XXX volts on this board". This label is to warn the service technician of hazardous voltages on the circuit boards. Due to an inventory problem, some of the oscilloscopes bear labels stating the incorrect voltage danger level.

Below is a list of the serial numbers of the oscilloscopes that may have incorrect labels, the voltage that should be stated for each oscilloscope, and the Tektronix part numbers for the labels. Any SC50X in the affected serial number range that is sent in for repair should have the labels inspected and replaced as necessary.

SC502 B042200 - B042290 80V 334-2361-00

SC503 B040590 - B040700 200V 334-3300-00

SC504 B025800 - B025980 150V 334-3299-00

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TDC1/TDC2 NEW DIAL TAPE ASSEMBLY

REF: TDC1/2 INSTRUCTION MANUAL P/N 070-2754-00

TDC1/2 OPT. 2, 12 INSTRUCTION MANUAL, P/N 070-3719-00

TDC INSTRUCTION MANUAL P/N 070-2597-01

TDC OPT. 2, 12 INSTRUCTION MANUAL, P/N 070-3525-00

MOD 59199

Due to the assembly and service (alignment) difficulties associated with TDC1/2 Dial Tape Assemblies, the assemblies have been redesigned. The new assembly is available as a kit, P/N 050-2135-00. This kit will contain one new dial tape assembly, P/N 650-0306-01, and a new cover for the TDCx, P/N 200-2120-01. The new cover will also be installed in new fixed-channel TDC's to allow for commonality of parts.

Install the kit on an as required basis.

TDC1/TDC2 New Dial Tape Assembly (continued)

Mod 59199 will be installed in new units from the factory starting with serial numbers B011382 (TDC), B011260 (TDC Opt. 2, 12), B010545 (TDC1), B010391 (TDC2), B010544 (TDC1 Opt. 2, 12), and B010385 (TDC2 Opt. 2, 12).

W² Issue 16-17

TSG170A FAN MOUNTING BRACKET CHANGE

REF: TSG170A Interim Manual P/N 061-3258-00

MOD #60986

Mod #60986 has been implemented in the TSG170A to insure that the fan mounting bracket will remain in its specified location.

The mod consists of adding two small tabs to the bracket, P/N 407-3379-00, which becomes P/N 407-3379-01.

Install this mod on an as required basis.

Mod #60986 is being installed in the new TSG170A's from the factory, starting with S/N #B020556.

W² Issue 16-14

TSG5/TSG15/TSG25 CAL PROCEDURE CHANGE

RE: TSG5 INST. MANUAL, 070-2336-00 TSG15 INST. MANUAL, 070-2479-00 TSG25 INST. MANUAL, 070-4568-00

Enclosed as a pullout supplement "A" are changes to the Performance Checks and Cal Procedures for the TSG5, TSG15 and TSG25.

W2 Issue 16-16

110-S INFO CARDS UPDATED

REF: 110-S Information Reference Cards, P/N 062-7231-01

Mod 54346

The user reference cards which are supplied with the 110-S have been updated to include corrections and improve readability.

The two-card set may be obtained by ordering P/N 062-7231-01.

The updated cards will be shipped with new 110-S Synchronizers from the factory starting with S/N B020810.

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468 SERVICE VOLUME II TEST POINT 464 MISLABELED

The 468 memory board layout (Fig. 8-21) has an error which could cause some confusion. Waveform 101 is shown on a ground point. This test point is actually TP464 and not ground. Please note this in your manual. A manual correction form has been submitted.

Thanks to Verneal Roberts of the Dallas Service Center for bringing this to our attention.

W2 Issue 16-15

528 HEAT SINK MOD

REF: 528 INSTRUCTION MANUAL P/N 070-0800-00

Mod 60850

Mod 60850 has been written to address expense and reliability problems with transistor sockets and certain heat sink types in the 528. The changes made are as follows:

528 Heat Sink Mod (continued)

Power Supply Board - 670-0587-XX

- Sockets removed from Q520, Q590.
- Heat Sinks changed from P/N 214-0668-00 to 214-3136-00 on Q550, 0585.
- Heak Sink, P/N 214-3136-00, added to 0590.
- Insulator Disks, P/N 342-0324-00, added to Q550, Q585 and Q590.

Main Board - 670-0588-XX

- Sockets removed from Q400, Q160, Q360, Q170, Q150, and Q350.
- Heat Sinks, P/N 214-0668-00 on Q160, Q350 and Q360, and P/N 214-0761-00 on Q150 and Q170, were removed and were all replaced by P/N 214-3136-00.
- Insulator Disks, P/N 342-0324-00, were added to Q160, Q350, Q170, Q150 and Q360.

When replacing one of the Heat Sinks in the Field, you must remove the socket under the transistor for cabinet clearance. By using the insulator disk under the transistor, the part is easier to properly space and hold during the soldering process.

W² Issue 16-16

528 INTERNAL GRATICULE CRT KITS

REF: Mod 61939

Because of your requests for an internal graticule on the 528 Waveform Monitor, appropriate kits have been developed.

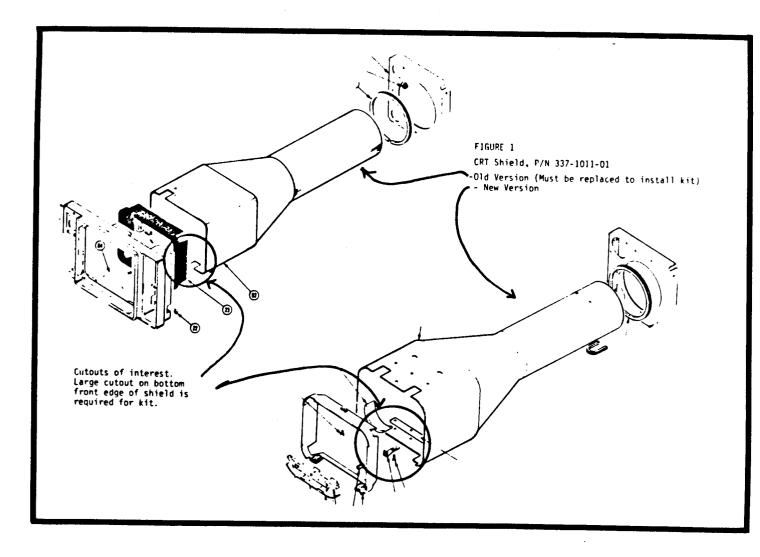
The 528's can now be, at the customer's option, retrofitted with an internal graticule, complete with an improved graticule illumination system for NTSC or PAL applications. The optimum time for considering whether or not to install this feature will be when the CRT requires replacement.

There are some limitations that will need to be kept in mind.

- O Some 528 applications require a CRT without standard NTSC or PAL graticules. For these uses, a plain CRT will still be available, and appropriate.
- O Throughout the 528's production lifetime, there were several improvement modifications. Two of these changes will affect what is needed for a clean kit.
 - o A change to the front subpanel casting that occurred at approximately S/N B238840 predicated the need for two kit levels, "early" and "late".
 - o A change to the CRT shield was made at about S/N B227305. Since this serial number is a "best estimate" only, special ordering procedures will apply.

A Parts Notice will be written for early versions, requiring visual identification of the shape and size of the cutout in the CRT shield that accommodates the lower graticule lamps. A large cutout is required for the Grat Lites in the kit. If a small cutout is present, the CRT shield will require replacement. See Figure 1.

528 Internal Graticule CRT Kits (continued)



NOTE:

 These kits apply only to standard production instruments. Custom modified instruments do not necessarily apply.

The availability of these kits offers the 528 owner several advantages. Besides the internal graticule and improved illumination, those people who own 528's and 582A's will have the opportunity to purchase and stock one type of CRT instead of two.

The part numbers for ordering a kit of parts and instructions are:

040-1219-00 For 528's of S/N B238839 and below, used in NTSC applications.

040-1220-00 For 528's of S/N B238840 and above, used in NTSC applications.

040-1221-00 For 528's of S/N B238839 and below, used in PAL applications.

040-1222-00 For 528's of S/N B238840 and above, used in PAL applications.

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528A IMPROVEMENT MODIFICATIONS

REF: 528A INSTRUCTION MANUAL, P/N 070-3662-00

Mod 57526

Mod 57526 has been implemented in the 528A to make improvements in the following areas:

- 1. To improve the reliability of VR152 and VR172, use new P/N 152-0909-00 when replacing failed parts.
- 2. To insure that the leading edge of the composite video signal is consistently visible after the Burst, change C279 to P/N 281-0546-00 (330 pfd) on an "as required" basis.
- 3. To insure that the 528A consistently meets Horizontal Linearity specifications, remove CR373, and replace it with R373, a 10Kohm resistor, P/N 315-0103-00. R375 is to be added to the board between the emitter of Q265 and the R280 end of R264, on an "as required" basis.

Mod 57526 will be installed in new units from the factory starting with S/N B032186.

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1450 SERIES OSCILLATION FIX

REF: 1450-1 INSTRUCTION MANUAL P/N 070-5568-00

1450-2 INSTRUCTION MANUAL P/N 070-2998-00

1450-3 INSTRUCTION MANUAL P/N 070-3660-00

MOD 60856

Mod 60856 has been incorporated to address a tendency towards low level oscillation as the instrument gets older.

These oscillations may cause a variety of problem symptoms, the most notable of which is a degraded frequency response vs. AGC level.

The solution is to add four 0.1 ufd capacitors, P/N 283-0111-00, in the following areas:

- In parallel with A21C59 on the IF Attenuator-Amp Board.
- In parallel with A70CR20, CR31 and CR81 on the Power Supply Board.

Mod 60856 is being installed in new instruments from the factory starting with S/N B020430 (1450-1), B020209 (1450-2), and B010278 (1450-3).

W² Issue 16-19

1480 SERIES CABLE CLAMP SCREW CHANGE

REF: 1480 SERIES INSTRUCTION MANUAL P/N 070-2338-00

Mod 61638

Mod 61638 replaces the screw shown as item #74 in exploded view Fig. 2 with a longer screw, P/N 211-0540-00. This change was made to provide assembly ease when the cable clamp that the screw holds needs to be replaced.

Install a new screw on an as required basis.

Mod 61638 is being installed in new instruments starting with S/N B105492.

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1480 SERIES MOD W5F MANUALS

REF: 1480 Series Instruction Manual, 070-2338-00

1480 Series MOD W5F Supplement, 070-5844-00

The 1480 Series Mod W5F manual insert has been completely overhauled and is now available as a supplemental manual, P/N 070-5844-00.

This supplement addresses the differences in configuration, specification and calibration for the parts of the 1480 Series that are changed as a result of Mod W5F.

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1710B SERIES MICROPROCESSOR CHANGE

REF: 1710B SERIES INSTRUCTION MANUAL P/N 070-5522-00

Mod 60391

Mod 60391 changes the 1710B Series to provide a less expensive and more reliable microprocessor.

The change will remove the present processor and EPROM, plus some other components, and will provide a processor that has the program built in to it. The change will be accomplished using a kit, P/N 050-2181-00.

Install 050-2181-00 on an as required basis.

Mod 60391 will be installed in new units from the factory starting with S/N B021134 (1710B) and B020228 (1711B).

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1710B/1711B PART CHANGE

REF: 1710B Series Instruction Manual, 070-5522-00

Mod #61608

A1DS185, a P/N 150-0050-00 lamp is being replaced by P/N 150-0035-00 because the new part doesn't need a socket.

The socket that is in present instruments can be removed at the user's option when a new lamp is installed. The new part will fit either way.

Replace AlDS185 with the new part upon failure.

Mod #61608 is being installed in new units from the factory starting with S/N B021134 (1710B) and B020227 (1711B).

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1720 REFERENCE OSCILLATOR CRYSTAL PROBLEMS

REF: 1720 Series Manual, 070-5846-00

A 1720 that has difficulty remaining locked to subcarrier (especially at elevated temperatures) may have one of a small batch of crystals (P/N 158-0317-00) that are exhibiting problems.

The affected serial numbers are unknown, and the crystals are not date coded, so the only method of identifying a possible defect is by circuit performance.

The VCO control voltage at U734 pin 1 should have a nominal value of approximately +4.5 VDC when 3.579545 MHz is applied. +50 Hz of subcarrier frequency should cause a corresponding control voltage change of about 2 volts.

Defective crystals in two 1720's exhibited quiescent control voltages of +5.5 volts.

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1730 SERIES 2 FIELD TILT

REF: 1730 Series Instruction Manual

P/N 070-4474-00

Mod 61232

Mod 61232 has been implemented in the 1730 Series instruments to improve 2 Field Tilt.

The change consists of removing A3C571 and Changing A3C574 to 4.7ufd, P/N 290-0782-00. Install this change on an as required basis.

Mod 61232 is being installed in new instruments from the factory starting with S/N B010529 (1730) and S/N B010223 (1731).

W² Issue 16-14

1730 SERIES A-B OSCILLATIONS AND DC RESTORER GAIN SHIFT

REF: 1730 Series Instruction Manuals, 070-4474-00 MOD 61744

Mod 61744 has been implemented in the 1730 and 1731 to address two problems.

- 1. Input channels (A&B) may oscillate with different cable lengths.
- 2. A change in Flat Response Gain with the DC Restorer on or off.

The first problem has been addressed by adding a 22 ohm resistor (P/N 315-0220-00) in series with C294 (CHAN A), and another 22 ohm resistor (same P/N) in series with C595 (CHAN B). The resistor should be added to the circuit "teepee" fashion, preferably on the end of the capacitor that connects to the base of each stages output transistor.

THE SECOND PROBLEM HAS BEEN ADDRESSED BY ADDING A 10 UFD CAPACITOR (P/N 290-0974-00) TO PINS 8 AND 12 OF U578

(positive end to pin 12), and by adding a series RC network in parallel with R675. The series RC consists of a 200K ohm resistor (P/N 315-0204-00), and a 33 pfd capacitor (P/N 283-0642-00).

Install Mod 61744 on an "as required" basis.

Mod 61744 is being installed in new instruments from the factory starting with S/N B010808 (1730) and B010332 (1731).

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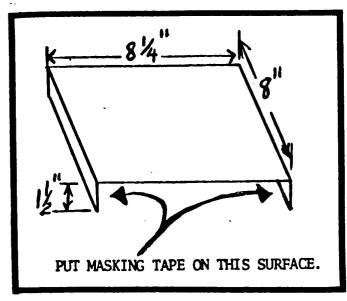
1740 NOISE ON CH "A" INPUT

REF: 1740 SERIES INSTRUCTION MANUAL P/N 070-4473-00

When calibration/repair of a 1740 Series instrument is being done, the technician may notice an abnormally high amount of noise on CHAN A input.

The noise is a result of power supply to video input crosstalk, and should not be apparent with the case on.

In order to quickly determine if the noise is related to a "case off" condition, an aluminum shield can be constructed using the picture below.



(Article Continued on Next Page)

1740 Noise on CH "A" Input (continued)

Placing this shield over the top rear of the 1740 will quickly determine whether or not further troubleshooting for noise problems is necessary.

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1740 SERIES/1750 SERIES SCREW CHANGE

REF: 1740 SERIES INSTRUCTION MANUAL P/N 070-4473-00

1750 SERIES INSTRUCTION MANUAL P/N 070-5664-00

Mod 61212

To alleviate thread stripping problems, the screws shown in Fig. 3-140 (1740 Series) and Fig. 2-32 (1750 Series) have been changed to P/N 211-0313-00.

Install on an as required basis.

Mod 61212 is being installed in new units from the factory starting with S/N B013256 (1740), B011109 (1741), B010146 (11742), B031324 (1750) and B030633 (1751).

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1750 SERIES DUAL DISPLAY WAVEFORM JITTER

REF: 1750 Series Instruction Manual MOD 61723

MOD 61723 addresses a small amount of display jitter that may be noticed when the 1750 Series is used in the Dual-Display mode with 1 line magnified.

A4U670 is reprogrammed, and the part number becomes 160-2431-02.

Replace A4U570 with the new part on an as required basis.

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1750 SERIES HV REGULATION AND LINE SELECT

REF: 1750 Series Instruction Manual

070-4472-00

1750 Series Instruction Manual 070-5664-00

Mod 60572

There have been a few reported instances of the high voltage going out of regulation when the 1750 is switched out of the Line Select mode. The most apparent symptom is trace blooming.

Mod 60572 addresses this problem by changing A1C754 to a 0.1ufd cap, P/N 283-0167-00, and A1R754 to a 7.5Kohm resistor, P/N 315-0752-00.

Install mod 60572 on an as required basis to address the stated problem.

Mod 60572 is being installed in new instruments from the factory starting with S/N B031223 (1750) and S/N B030583 (1751).

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1750 SERIES POWER SUPPLY LOAD

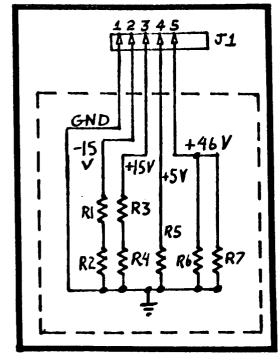
REF: 1750 SERIES INSTRUCTION MANUAL P/N 070-4472-00

067-0998-00 MINIMUM LOAD MANUAL P/N 070-3929-00

In order to extend the 1750 Series Low Volt Power Supply board for trouble-shooting purposes, unless an extension cable to the Main Interface board is constructed, an alternate load must be provided for the DC supplies to regulate properly.

1750 Series Power Supply Load (continued)

The Schematic shown below provides a load for the supplies that should approximate the maximum expected current draw from a 1750 Series Low Volt power supply.



1750 L.Y. LOAD

R1-R4	15 ohm 25W	308-0133-00
R5	3 ohm 20W	308-0188-00
R6, R7	500 ohm 20W	308-0096-00
J1	Connector	131-2265-00
Cable	2 Feet	175-5061-00
Heat Shrink	1 Foot	162-0531-00

An easy method for supporting, connecting and enclosing these load resistors is available. Obtain a copy of the manual for the 067-0998-00 Minimum Load Unit (P/N 070-3929-00). Pages 4 and 5 give an exploded view and a parts list for a satisfactory enclo-

sure. With a few minor changes, construction should be very straight forward from the information given. The changes are:

- An additional resistor is required, so a set of holes drilled in the angle brackets is necessary.
- A different cable and connector are required. Suggested parts are listed with the schematic (above).
- Delete items #1, 2, 3, 7, 8, 9, 10
 and 12.

NOTE: When troubleshooting this switching power supply, always use an isolation transformer.

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2213/2213A/2215/2215A/2220/2230/2235/ 2236 POWER CORD WRAP MODIFICATION KIT

RE: Mod: #59733

S/N: 2213A B023200 2215A B020030 2220 B010100 2230 B010624 2235 B077930 2236 B022100

A power cord wrap is now available for the 2200 series. Order this kit under Tektronix P/N 040-1196-00.

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2220/2230 CHANNEL TWO DIGITAL NOISE

REF: Mod #61574

S/N: 2220 B020112 2230 B020242

Digital noise could be seen in Channel 2 due to the long cabling from the storage board to the sweep reference board.

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2220/2230 Channel Two Digital Noise (continued)

To prevent the noise on the horizontal reference line from being coupled into Channel 2, a by-pass capacitor, A16C7502, Tektronix P/N 281-0770-00, has been added. Install this capacitor on the back of A16, the sweep reference board, between Pins 1 and 3 of J5201.

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2335, 2336, 2336YA, 2337 PART NUMBER MISSING IN MANUAL

The plastic spacer which fits between the cabinet and pouch is not pictured or part numbered in the manual. The Tektronix P/N is 361-1172-00. A manual correction form has been submitted.

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2236 INCORRECT PART NUMBERS IN MANUAL

The Tektronix P/N's for the chassis-mounted J9100 and J9510 are incorrect in the Electrical Parts List. The correct Tektronix P/N for J9100 is 131-0679-02 and 131-0126-00 for J9510.

The Mechanical Parts List Fig. 2-20 should show channel 1 BNC as Tektronix P/N 131-0679-02 and channel 2 BNC as Tektronix P/N 131-0126-00.

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2337 DM RANGE/FUNCTION KNOB RUBBING ON PANEL

Mod #61048

S/N B011453

A washer which is used as a spacer under the DM Range/Function knob is

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2430 FIRMWARE INFORMATION

REF: Version 2.0

Tektronix P/N 050-2134-01

REF: 2430 Operators Manual

P/N 070-4918-00

REF: 2430 Instrument Interfacing

Guide

P/N 070-5705-00

REF: 2430 Manual

P/N 070-4917-00

The recent firmware release fixed most bugs remaining in VS 1.07/1.03 and added some feature enhancements. The enhancements are marked (*). These changes may be of value to a customer. If they want the corrections, replace all five system ROMs and two waveform ROMs from the kit. The following list of fixed bugs and enhancements is to be used as a reference for changing firmware.

ACQUISITION

- 1. The trace moves off of the ground dot without an input signal. This can be seen when switching CCDs from FISO to SISO (short pipe). Switch the T/D from 50 us to 100 us to see the bug.
- 2. Rapid rotation of the vertical position can result in the trace jumping up and down and failing to stay aligned with the ground reference. Slow positioning will show some offset but no jumping. Doing a self-cal or SAVE will restore the trace to ground reference. Use the following setup to see this bug.

ACQUIRE AVG 2 T/D 200 us/div (short pipe)

3. Misplaced waveform data points may be displayed 20 ns early. Perform the following setup to see the bug.

T/D A and B 5 ns

HMODE B
B TRIG MODE B RUNS AFTER

ACQUIRE NORM

REPET ON
EVENTS ON (any count)
DELAY (TIME) (any value)

Apply a 10 MHz sinewave to CH1, set amplitude for six divisions, and examine for misplaced points.

- 4. The waveform normalizing system may cause a shift in a high amplitude signal and result in distortion. Acquire a full screen ramp and look for abnormalities. NOTE: A bad successive approximation A/D converter (where U560 is a TDC1001J) can also cause lost bits which can appear as distortion.
- 5. A saved waveform should be recoverable up to three days after a power-off. However, one save mode failed to compute checksums during powerdown; thus, the waveform was considered invalid at power-up. This "bug" can be seen using the following setup.

ACQUIRE AVG, count >64 REPET ON

Input a sinewave, allow it to clean up, and SAVE. Vertically expand 10X, then cycle power. The waveform will now be a squarewave. This lost waveform "bug" could show as a customer complaint.

- 6. When a vertically expanded waveform is positioned up or down, portions of the signal wrap to the top or bottom of the display. This bug can be seen in all save modes.
- 7. If the bottom three readout lines are written by user GPIB alphas and the menu is off and the Volts/Div is changed, these three lines are overwritten by normal display information.
- 8. Pressing ACQUIRE twice, while in single sweep and with no trigger, will cause the scope to go into SAVE mode. Setup:

ACQUIRE NORM
TRIGGER MODE SINGLE SEQUENCE
REPET OFF

Press ACQUIRE twice and the mode changes to SAVE.

- 9. Capturing a glitch in Envelope mode appears intermittent with varying horizontal position. The fix was to change the way the waveform is interpolated. One remaining side effect is that the last minor division, at 200 ns, is a replication of the last good sample. Therefore, this last minor division is invalid data. (This is with VS 2.0.)
- 10. A change in vertical bandwidth may cause loss of accuracy. Acquisition is now re-calibrated when bandwidth is changed.
- 11. *The acquisition mode, just prior to power-off, is restored at power-on. If in ACQUIRE, it acquires; if in SAVE, it powers up in SAVE with the following message:

2430 is in SAVE mode Press ACQUIRE to begin acquiring new waveforms

12. A multiplied waveform's amplitude can be affected by rapid movement of a vertical position control. This "bug" is demonstrated by setting:

CH2 COUPLING GND VERT MODE MULT

Input a signal into CH1 and rapidly rotate CH2 position. Note the MULT display is now a reduced copy of CH1 and it is shifted from its ground reference.

13. *The INIT function, in V2.0, sets all system functions to NOs, which now includes the trigger 'T'. Also, COLD START will init REF4 and TV SYS to YES, but a future INIT will return them to NO.

New INIT Table

POWER ON	NO
BELL	NO
PREFLT	NO
REF4	NO*
TV SYS	NO*
T	NO**

* Changed ** Added

HORIZONTAL/SWEEPS

- 1. The AUTO repetition rate is too slow for faster sweep speeds. The new firmware modified the rate to be similar to the 2465.
- If you are operating Delta-Delay, while in REPET, toggle the Delta-Delay and the system may lock up.

- 3. If you are operating Delta-Delay, while CCD is in FISO mode (at 50 us and REPET off), toggle the Delta-Delay and the trace will drift.
- 4. The waveform shown by B-INTENSIFIED zones will not be present when re-acquiring from the same delay reference in horizontal mode "B".
- 5. *The stored waveforms can now be horizontally positioned in common with the "live" waveform. The DISPLAY REF menu changed Switch 5 to select either independent or lock. When INDEPENDENT, all horizontal positioning operates as before the change. When switched to LOCK:
 - a. All waveforms line up with the "live" horizontal position (and remain there when/if the mode is changed to INDEPENDENT).
 - b. If the "live" waveform is horizontally expanded, the displayed save REF waveforms will be lined up with either the beginning or ending edge, whichever is displayed on the screen.
 - c. Any GPIB REFPOS REFm command positions all waveforms the same as the front panel control. LOCK and INDEPENDENT are GPIB switchable using the REFPOS MODE command.
- 6. *When Delta-Delay is turned on, the cursor control will control the Delta-Delay time. Previously the user needed to press the select button to run Delta-Delay.
- 7. The jitter ramp counters were not returning to "zero base", resulting in the absence of the beginning of some waveforms.

8. Misplaced points may occur at random when in the following setup.

HORIZ MODE B
REPET ON
B SWEEP SPEED 200ns or
faster

TRIGGERS

- 1. *The trigger point indicator ('T') can now be turned on and off from a menu button. INIT will turn the 'T' off. See the third menu level of Extended Functions, Systems, Misc.
- 2. The trigger point indicator ('T') was incorrectly placed when utilizing REPET. A 'T' placement correction table was added to affect the jitter ramps and, as as result, the 'T'.
- 3. The TRIG LED may come on when in AUTO, even if not triggered.
- 4. When using TV sync and only one channel is inverted, changing the trigger source from the inverted channel to the non-inverted one causes the loss of sync.
- 5. *Users of interlaced PAL can now select, via menus or GPIB, line count on both fields or only one field.
- 6. The 2430 will lock up in the READY state if Delay-by-Events is turned off while the acquisition state is both READY and Triggered. A MAN TRIGG, AUTO LEVEL, or ACQUIRE will clear the lock-up.
- 7. The scope may lock up if the input signal trigger point is coincident with the 'B' clocks.

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SAVE

1. A grounded input will show excessive noise in Envelope mode. To see it set:

ACQUIRE ENVELOPE 1 T/D 500 ns/div

Save the trace and set the Time/Div to 5 ns. Notice some small (.2 div) downward-sloped ramps along the waveform. These ramps will decrease in size as the Time/Div slows down.

- 2. The SAVE second-level menu for Delta-Delay by Time now displays the selected source channel. In this case, the scope now matches the manual. See Page 3-27 in the operator's manual.
- 3. The 2430 will ignore GPIB activity if Save-on-Delta (SOD) is performed. The controller will think the scope is busy and could result in locking up the bus.
- 4. *The scope will now ring the bell on SOD. The BELL needs to be set ON in the SYSTEM third-level menu.
- 5. The 2430 is now assured of displaying the event that caused SOD. Previously, there was a 50% chance of missing the event.

CAL/DIAG

- 1. The FORCE DAC test function changes the calibration values for troubleshooting purposes. Prior to VS 2.0, pressing MENU OFF failed to restore DAC GAIN, DAC OFFSET, and CAL CURSOR attributes, which are used for self-calibration.
- 2. The system processor will stop communicating with the front panel processor if the Horizontal Mode "A" button is pushed while adjusting any FORCE DAC attribute.

2430 Firmware Information (continued)

- 3. A front panel calibration or self-test could be interrupted by GPIB commands. Version 2.0 locks out GPIB if CAL/DIAG is performed at the front panel.
- 4. The 2430 should put the present waveform into SAVE when entering self diagnostics. This allows restoring data when leaving SELF Very early firmware versions may show this bug. It was fixed by VS 1.07.
- The extended calibration menu changed DISPLAY to ADJUSTS when tweeks were added to affect CCD gain. A second line was added to the display which says "SEE SER-VICE MANUAL". The service manual information is included at the end of this section. Note: If you have a 2430 with a serial number below B010823, the CCD adjustments may not be present. Use the selectable resistor values on the second insert to approximate the pots.
- *Some failures may cause a system abort, which appears as a lock-On abort, in VS 2.0, the trigger LEDs are flashed three times, then the abort code is displayed from the trigger LEDs. TRIG is LSB.

Code	Meaning	Possible <u>Cause</u>
1	Initialized to this value at power-on	Bad ROM/RAM
2	Unknown code rec'd from front panel pro- cessor	Bad data path between FP processor and system processor

3	Too many bytes rec'd from front processor	Bad handshake logic or data path between FP processor and system processor
4	SWI2/SWI3 instruction executed	Bad ROM/RAM
5	GPIB ter- minator value for query re- sponse per- muted	Bad ROM/RAM (may require COLD START)
6	GPIB event code to be reported is unknown	Bad ROM/RAM (may require COLD START)
7	GPIB delim- iter found by scanner has changed and is in- valid	Bad ROM/RAM (may require COLD START)

GPIB

- 1. FASTXMIT: The delta waveforms may be marked invalid. could appear as a lost stored delta waveform.
- 2. FASTXMIT: The delay waveforms are invalid. This was caused by a base address error which caused the processor to look for a waveform in ROM.
- 3. ATRIGGER POSITION: ATR POS:31 does not trigger at the correct point. This was corrected by changing the range to 1 to 30.
- CHANNEL POSITION: Example, CH 1 POS:0.01 will not accurately position. The error is very small and varies with the set-(Article Continued on Next Page)

ting. Version 2.0 changed the position argument conversion to a rounding process (it was truncated).

- 5. SETUP RECALL: SETU REC:2,3,4,or5 will cause the scope to lock up. Debug must be on to demo this problem.
- 6. *MENUOFF: User menus can now monitor via GPIB when to be displayed. When MENUOFF is pushed or MEN command is issued, the scope responds with a SRQ event 652. Six-fifty-two means the menu space is available.
- 7. EXECUTE: If Debug is on and the CAL/DIAG EXE command is issued, the 2430 locks up. To see this bug, turn Debug on before entering CAL/DIAG.
- 8. *PRINTer: A think-jet GPIB command is now in place. Enter PRI and the 2430 outputs a header and waveform formatted to an HP2225A Thinkjet printer.
- 9. PRINT: If the PRI command is issued or the menu button is pressed, the front panel is locked out but the LOCK light does not come on. The exception is if the front panel was locked prior to a PRI.
- 10. *PRINT: PG SIZE:11or12: A front panel menu button now allows selection of 11- or 12-inch paper. The 12-inch selection is for use with 30cm paper length. See the third level in Extended Functions SYSTEM. MISC.
- 11. *PRINT: The 2430 will now draw vectored or dot think-jet waveforms. This feature is automatically selected with the command or menu button that switches VECTORS ON: OFF.

See Pullout "B" for 2430 Operators' Manual Change Information.

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2430 V2.0 INSTALLATION

REF: P/N 050-2134-01

When this kit is installed, a complete calibration must be performed. Perform these steps:

- 1. Remove J156, install the cabinet, and power-on the 2430.
- 2. Do a COLD START.
- 3. After the NOT WARMED UP is deleted from the readout, perform a SELF CAL.
- 4. Perform an Extended Cal REPET cal.
- Then an ATTEN cal using appropriate signals.
- 6. Then a TRIGG cal using appropriate signals.
- 7. Do another SELF CAL to complete the calibration.

While in the Extended Cal, you noticed that the DISPLAY label has changed to ADJUSTS. The difference is the addition of semi-automatic adjustments for the CCDs. If the CCDs have not been changed, this adjustment should not be attempted. See the WIZARDS WORKSHOP articles on Version 2.0 firmware information and on CCD/ACQUISITION for additional information.

W² Issue 16-16

2445/2465 CRT ANODE ARCING/MULTIPLIER FAILURE

The anode lead (CRT half) may have very small pinholes that can develop into a path for high voltage arcing. All CRT leads are tested for insulation leaks prior to installation. However, if the lead is repeatedly flexed, an arc path may develop. If actual arcing occurs, the load can cause a multiplier failure. If you have a bad multiplier (U1830), check the CRT lead for pinholes or cuts and the metal frame, near the cable dress, for white powder deposits.

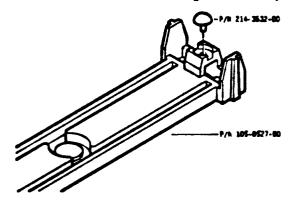
W2 Issue 16-16

4115B/4125P TRAY LATCH REPLACEMENT

REF: 4115/4120 Series System Unit Manual, 070-5271-0X

4115B Service Manual Volume 2, 070-4667-00

When replacing a tray latch that no longer locks into place, order the tray latch, Tektronix P/N 105-0527-00, and one plastic plug. Tektronix P/N 214-3532-00. Before installing the tray latch, the plastic plug must first be inserted into the hole on one end of the latch (refer to the figure below).



Without this plastic plug, the tray latch won't lock the keyboard tray into place and the tray will excessively squeak when moved.

Refer to Figure 1, Top Assy Pullout, within the Replaceable Mechanical Parts section of the 4115/4120 Series System Unit manual, for parts breakdown of the pedestal section. Note that item 39 is the tray latch and item 46 is the plastic plug. The plastic plug's location is incorrect and should be located beneath the rear end of the tray latch. Also, in the Replaceable Mechanical Parts section, item 46 shows a quantity of three; the correct quantity is one.

The correction to both the Replaceable Mechanical Parts section and the pull-out should be corrected in the next manual update.

In the 4115B Service Volume 2 manual, in the Replaceable Mechanical Parts section, the tray latch is item 38 and the plastic plug is item 45. The 4115B Service Volume 2 manual won't be corrected because this manual has been replaced by the 4115/4120 Series System Unit manual.

W² Issue 16-17

4125 RUNNING MEDUSA SOFTWARE

Prime Computer uses MEDUSA software called "Interactive Shaded Viewer". Versions below 3.1 of this software work correctly with the 4115B, which has a minimum of two dual plane memory boards installed (standard configuration). However, this software will not work with a 4125 unless four dual plane memory boards are installed. The standard 4125 has only one dual plane memory board installed and Options 22 and 23 must be installed to have four dual plane memory boards.

Version 3.1 of this software corrects this incompatibility with the standard 4125.

W2 Issue 16-16

4510A SERVICE UPDATE PROGRAM ANNOUNCEMENT

This is to announce the start of a Mandatory Safety 4510A Service Update Program. The program was published July 31, 1986. Please refer to this update plan for details.

4644 RS-232/XON XOFF FLAGGING

REF: 4644 Dot Matrix Printer Users Manual, 070-5433-00

4644 Dot Matrix Printer Service Manual, 070-5434-00

Reason For Wizard Article

I have received input from the field indicating that XON/XOFF flagging appears to not work on every installation.

IT WORKS!!

This article will explain the theory of XON/XOFF (sometimes called IN/OUT or DC1/DC3) flagging, the mechanical connections required and a means of verifying that flagging is occurring.

XON/XOFF Theory

RS-232 XON/XOFF Flagging is a method of controlling data flow from the host device to the printer using common ASCII characters sent from the printer. The 4644 printer uses the ASCII characters DC1 (start) and DC3 (stop) to control the data flow from the host. When the printer's input buffer becomes seventy- five percent (75%) full, the printer sends to the host a DC3 character (XOFF) to stop the host from sending any more data. The host then waits until it receives a DC1 (XON) character from the printer before it resumes sending data to the printer. The printer will send the DC1 when its buffer decreases to twenty-five percent (25%) full. As you can see, the

printer is the controlling (talking) device and the host is the controlled (listening) device. Note: to use this type of data flow control, the host must be able to recognize DC1/DC3 characters and be able to act upon them.

Mechanical Connection

The 4644 printer is different than most printers in that it requires certain control lines in the RS-232 cable to be "true". Engineering has informed me that even though the RS-232 port will work with just a three (3) wire cable (ground, transmit data and receive data), to use the XON/XOFF flagging features other pins in the RS-232 cable must be wired (straight through). These are: pin 1 (Protective ground), pin 2 (Transmit Data), pin 3 (Received Data), pin 4 (Request to Send), pin 5 (Clear to Send), pin 6 (Data Set Ready), pin 7 (Signal Ground) and pin 20 (Data Terminal Ready). Be aware that the host computer must implement these signal lines also.

cable for The this suggested application is Tek part number 012-1119-00. I suggest that the pins be checked in the cable for correct There have been a few cases wirina. reported where this cable incorrectly wired.

Also note that the Centronics and the RS-232 cables cannot be connected to the 4644 at the same time.

Verification of Flagging

I have verified that the 4644 does implement XON/XOFF Flagging over the RS-232 interface.

The verification was accomplished using an 834 in-line on the RS-232 line between a 6130 and the 4644. The 834 was set up to Monitor. Switch settings for the 4644 RS-232 board were: swl-on, sw2-off, sw3-off, (sw1, sw2 & sw3 set baud rate to 9600), sw4-off, sw5-off

4644 RS-232 XON/XOFF FLAGGING (continued)

(sw4 & sw5 set Parity to Non), sw6-on (sw6 sets Data Word Length to 8), sw7-on (sw7 sets Stop Bit Length to 1), sw8-off (sw8 sets the Protocol to XON/XOFF). Be sure to set the appropriate modes on the 834.

Note that any of these settings may be different. That is okay, just be sure that all three units (host, printer and 834) are set the same.

Send a print file from the host and monitor the 834 display. Note that for best test results the file sent should be at least one page long. You should see the the display pause, see the DTE LED flash on periodically and see the DC1 and DC3 character on the 834 display.

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7612D/7A16P ENHANCEMENT MODIFICATIONS SUMMARY

REF: Manual Change Information M60644, M60688, M60167, & M60235

The information contained in this article on the 7612D/7A16P instruments will provide the following:

- Specific symptoms that would indicate a need for the modifications.
- 2. Modification data including:
 - corporate mod numbers;
 - effective S/N's;
 - manual change reference information numbers:
 - field mod kit numbers when applicable; and
 - brief mod descriptions.
- 3. Specific instrument operating guidelines that should be followed.

SYMPTOM #1

- POOR 7612D/7A16P TRIGGER LEVEL SETABILITY
- 7612D GAIN ADJUSTMENT IN VERTICAL AMPLIFIER HAS INSUFFICIENT RANGE
- 7612D VERTICAL AMPLIFIER DC LEVELS UNSTABLE

If any of these symptoms are encountered then the following mods to the 7612D and 7A16P should be installed:

Mod Numbers

M60235 & M60167

Effective S/N's

7612D -- B041615 7A16P -- B044400

Manual Change Ref.

M60235 & M60167

*Field Mod Kits

7612D -- 040-1189-00 7A16P -- 040-1200-00

**Updated Cal/QC Software

062-8873-00 (5 1/4")
062-8874-00 (8" S.D.)
062-8875-00 (8" D.D.)

Mod Descriptions: M60235

The purpose of this mod is to insure optimum Trigger Level Setability is achieved. The mod will insure that the front panel Trigger Level indication closely resembles the actual trigger level that occurs. Also improvements to the 7612D Vertical Amplifier, including Gain Adjustment Range and DC stability, results. (Reference the attached Manual Change Information M60235 and M60167.)

7612D/7A16P Enhancement Modifications Summary (continued)

- * Orderable internal only.
- **Also will be provided on hard disk to accommodate RL01, RL02, and RK05 by the ISI Marketing Group located in building C1 in Vancouver, Washington.

SYMPTOM #2

- INTERMITTENT DROPPING OF BITS
- TIMEBASE LOCKUP

If the 7612D is noticed to be dropping bits or displaying a timebase lockup condition, then this modification is recommended. The timebase condition would be indicated when the front panel "ARM" lights, either A or B or both, are illuminated and the 7612D cannot be triggered either on manually or under program control.

The dropping of bits would be indicated on the display device (e.g. XYZ monitor) or when the digitized data is transferred to the controller for analysis.

Mod Number

M60688

Effective S/N

B041720

Manual Change Reference

M60688

Field Mod Kit

None

Mod Description

The changes effect the 7612D Timebase and Clock Buffer Boards. The Timebase changes consist of heatsinks installed on U547, U737, U831 and U841. (NOTE: These parts will be installed on all Timebase boards that go through the Module Exchange Center.)

The changes to the Clock Buffer Board consist of adding a 50 ohm coax cable, P/N 175-7371-01, from A12J428 to A20J658 (CH A Timebase) and from A12J328 to A20J658 (CH B Timebase). Also resistors A12R322 and A12R324 were changed to p/N 315-0111-00 and A12W226 was removed and replaced with A12R226, P/N 315-0240-00. (Reference the attached Manual Change Information M60688.)

SYMPTOM #3

- INSTRUMENT INTERNAL AIR FLOW IMPROVEMENT

This modification is only field installable by Factory Service at this The mod will improve the internal air flow characteristics of the 7612D. The modification changes various mechanical parts, adds an internal fan and installs heatsinks on specific locations inside the 7612D. This mod will also require a full calibration/verification of the instrument after installation. The air flow configuration can be set-up for Forward or Reverse air flow. Reverse air flow is specified as Option 6 and is orderable by customers at time of purchase. If an instrument is configured with Forward air flow and a customer now desires Reverse, this can be accomplished simply by reconfiguring both fans appropriately. (This procedure will be documented in the instrument's Service Manual Maintenance Section.)

7612D/7A16P Enhancement Modifications Summary (continued)

It should be noted that if a modified instrument's power supply module is replaced with a module from the Exchange Center, the air flow configuration of the mainframe's internal fan be verified prior to installing the module. The Option 6 stickers will be installed on 7612D's manufactured with the Reverse air flow. All power supply modules shipped from the Exchange Center will be configured for forward air flow.

Mod Number -- M60644

Effective S/N -- B050000

Manual Change Reference -- M60644

Field Mod Kit -- Installable and orderable by Factory Service only.

Mod Description -- The changes to the 7612D are as follows:

- Front and rear card cages are removed and directly replaced with modified parts.
- Power supply cover removed and directly replaced with modified part.
- Air flow deflector on bottom chassis removed.
- Side covers removed and directly replaced with modified parts.
- Internal DC fan added to rear card cage assembly.
- Heatsinks installed on selected locations (40 total).
- Miscellaneous changes to associated retaining hardware such as screws and clamps.

7612D Operating Guidelines W2 Issue 16-16

The information contained in this publication is covered under "License Authorization General Technical Data Restricted (GTDR)" in accordance with Tektronix' program to comply with government export laws and regulations.

7612D/7A16P ENHANCEMENT MOD KITS NOW AVAILABLE

The enhancement modification kits are as follows:

7612D/7A16P Trigger Enhancement Mod

040-1189-00: 7612D

040-1200-00: 7A16P (one mod kit

is required

per plug-in)

7612D Air Flow Modification

040-1205-00: 7612D

These mod kits are now available to customers and Tektronix field service personnel.

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Tektronix COMMITTED TO EXCELLENCE	MANUAL CHANGE INFORMATION Group Code 20 Date: 5-15-86 Change Reference: C4/586
Product: TSG5	Manual Part No: 070-2336-00
	DESCRIPTION

TEXT CHANGES

SECTION 2 SPECIFICATION, Performance Check Procedure Page 2-6, Test Equipment.

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of < = 66 dB, a frequency response flatness at 3.58 MHz of $\pm 0.5\%$, and a clamp tilt of < = .05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.

Page 2-9, CHANGE Table 2-4 TO READ:

Table 2-4 BAR AMPLITUDES, SETUP OFF

Bar	Amplitude	Check for
MOD (chrominance)	Half	357.1 mV <u>+</u> 7.1 mV
MOD (chrominance)	Full	714.3 mV <u>+</u> 14.3 mV
Turn on Luminance	Set Waveform Monitor to Lowpass	·
MOD (luminance)	Full	357.1 mV <u>+</u> 3.6 mV
MOD (luminance)	Half	178.6 mV <u>+</u> 1.8 mV
2 T	Half	357.1 mV <u>+</u> 3.6 mV
2 T	Full	714.3 mV <u>+</u> 7.1 mV
Т	Full	714.3 mV <u>+</u> 7.1 mV
Т	Half	357.1 mV <u>+</u> 3.6 mV
T/2	Half	357.1 mV <u>+</u> 3.6 mV
T/2	Full	714.3 mV <u>+</u> 7.1 mV

Date: <u>5-15-86</u>	Group Code 20	Change Reference: C4/586
Product: TSG5		Manual Part No: <u>070-2336-00</u>

CHANGE Table 2-5 TO READ:

Table 2-5
BAR AMPLITUDES WITH SETUP

Bar	Amplitude	Check for
T/2	Full	660.7 mV <u>+</u> 6.6 mV
Т/2	Half	330.4 mV <u>+</u> 3.3 mV
Т	Half	330.4 mV <u>+</u> 3.3 mV
Т	Full	660.7 mV <u>+</u> 6.6 mV
2/T	Full	660.7 mV <u>+</u> 6.6 mV
2/T	Half	330.4 mV <u>+</u> 3.3 mV
MOD (luminance)	Half	165.2 mV <u>+</u> 1.7 mV
MOD (luminance)	Fuli	330.4 mV <u>+</u> 3.3 mV
Furn on Luminance	Set Waveform Monitor to flat	
MOD (chrominance)	Full	660.7 mV <u>+</u> 13.2 mV
MOD (chrominance)	Half	330.4 mV <u>+</u> 6.6 mV

SECTION 4 CALIBRATION

Page 4-1, Test Equipment

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of <=66 dB, a frequency response flatness at 3.58 MHz of \pm 0.5%, and a clamp tilt of <=.05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.

Tektronix	MAN	NUAL CHA	NGE INFORMATION	Group Code 20
COMMITTED TO EXCELLENCE	Date: 5-20-86		Change Reference: C4	/586
Product: TSG15	· .		Manual Part No:	070-2479-00
		DESCRIP	TION	

TEXT CHANGES

SECTION 2 SPECIFICATION, Performance Check Procedure Page 2-6, Test Equipment.

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of < = 66 dB, a frequency response flatness at 3.58 MHz of $\pm 0.5\%$, and a clamp tilt of < = .05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.

Page 2-8, CHANGE Table 2-3 TO READ:

Table 2-3 BAR AMPLITUDES

Bar	Amplitude	Check for
MOD (chrominance)	Half	350 mV <u>+</u> 7.0 mV
MOD (chrominance)	Full	700 mV <u>+</u> 14.0 mV
Turn on Luminance	Set Waveform Luminance Monitor to Lowpass	
MOD (luminance)	Full	350 mV <u>+</u> 3.5 mV
MOD (luminance)	Half	175 mV <u>+</u> 1.8 mV
2T	Half	350 mV <u>+</u> 3.5 mV
2T	Full	700 mV <u>+</u> 7.0 mV
Т	Full	700 mV <u>+</u> 7.0 mV
T	Half	350 mV <u>+</u> 3.5 mV
T/2	Half	350 mV <u>+</u> 3.5 mV
T/2	Full	700 mV <u>+</u> 7.0 mV

Date: <u>5-20-86</u>	Group Code 20	Change Reference:M42003 Addendum
Product: TSG15		Manual Part No: <u>070 2479-00</u>

SECTION 4 CALIBRATION

Page 4-1, Test Equipment

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of <=66 dB, a frequency response flatness at 3.58 MHz of \pm 0.5%, and a clamp tilt of <=.05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.

Tektronix COMMITTED TO EXCELLENCE	MANUAL CHANGE INFORMATION Group Code 20 Date: 5-20-86 Change Reference: C1/586
Product: TSG25	Manual Part No: 070-4568-00
	DESCRIPTION

TEXT CHANGES

SECTION 2 SPECIFICATION, Performance Check Procedure Page 2-6, Test Equipment.

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of < = 66 dB, a frequency response flatness at 3.58 MHz of $\pm 0.5\%$, and a clamp tilt of < = .05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.

Page 2-8,

CHANGE Table 2-4 TO READ:

Table 2-4
BAR AMPLITUDES, SETUP OFF

Bar	Amplitude	Check for
MOD (chrominance)	Half	350 mV <u>+</u> 7.0 mV
MOD (chrominance)	Full	700 mV <u>+</u> 14.0 mV
Turn on Luminance	Set Waveform Monitor to Low Pass	
MOD (luminance)	Full	350 mV <u>+</u> 3.5 mV
MOD (luminance)	Half	175 mV <u>+</u> 1.8 mV
2 T	Half	350 mV <u>+</u> 3.5 mV
2 T	Full	700 mV <u>+</u> 7.0 mV
T	Full	700 mV <u>+</u> 7.0 mV
Т	Half	350 mV <u>+</u> 3.5 mV
T/2	Half	• 350 mV <u>+</u> 3.5 mV
T/2	Full	700 mV <u>+</u> 7.0 mV

Date: <u>5-20-86</u>	Group Code 20	Change Reference: C1/586
Product: TSG25		Manual Part No: <u>070-4568-00</u>

CHANGE Table 2-5 TO READ:

Table 2-5
BAR AMPLITUDES, SETUP OFF

Bar	Amplitude	Check for
T/2	Full	650 mV <u>+</u> 6.5 mV
T/2	Half	325 mV <u>+</u> 3.3 mV
T	Half	325 mV <u>+</u> 3.3 mV
Т	Full	650 mV <u>+</u> 6.5 mV
2 T	Full	650 mV <u>+</u> 6.5 mV
2T	Half	325 mV <u>+</u> 3.3 mV
MOD (luminance)	Half	178.6 mV <u>+</u> 1.8 mV
MOD (luminance)	Full	357.1 mV <u>+</u> 3.6 mV
Turn off Luminance	Set Waveform Monitor to Flat	
MOD (chrominance)	Full	714.3 mV <u>+</u> 14.3 mV
MOD (chrominance)	Half	357.1 mV <u>+</u> 7.1 mV

SECTION 4 CALIBRATION

Page 4-1, Test Equipment

CHANGE Item 1. Waveform Monitor TO READ:

1. Waveform Monitor. Capable of viewing line-rate and field-rate signals, with a magnifier to measure rise time and pulse duration. The instrument should have a common-mode rejection ratio of <=66 dB, a frequency response flatness at 3.58 MHz of \pm 0.5%, and a clamp tilt of <=.05%, 25 Hz to 50 kHz. For example, a TEKTRONIX 1485 Mod W5F Waveform Monitor.



2430 OPERATORS

MANUAL CHANGE INFORMATION

C4/0486 (REV) 4-24-86 Date: _ Change Reference: _

070-4918-00 Manual Part No.: .

DESCRIPTION

Product Group 37

EFFECTIVE SERIAL NUMBER: B011410

PAGE 3-12

Product:

Add the following paragraph to the PRINTER information.

A selection of either 11 inch or 12 inch paper width (to be used in the printer) is determined by the setting of the PG SIZE 11; 12. Each press of the menu button toggles the paper size.

PAGE 3-25

MENU OFF/ EXTENDED FUNCTIONS	Turns off any men menus. See Appe	nu being displayed ndix B for the Ext	or, if none are ended Functions	on, calls up the Exter calibration and Diagr	nded FUNCTIONS nostics menus.	
	EXT FUNCT		SYSTEM	SPECIAL	CAL/DIAG	
	Second-level men	u for SYSTEM.				
	PANEL	MISC	PREFLT ON;OFF		TV OPT	
	Third-level menu f	or SYSTEM PAN	īL.			
	PWR ON LAST ; INIT	REF4 REF PNL			†	
	Third-level menu for SYSTEM MISC.					
	BELL ON!OFF	TRIG T ON LOFF	PG SIZE 11 12		•	
	Third-level menu for SYSTEM TV OPT.					
	TV SYS M NON/M	CNT RST BOTH F1			†	
		u for SPECIAL. G: SERVICE ONL ED-SEE MANUAL		LL (if enabled)		
	COLD START	•		CAL PATH ON!OFF	FORCE DAC	
	Second-level men	u for CAL/DIAG.	•			
	<status></status>	<status></status>	<status></status>	NOT WARMED UP		

	DESCRIPTION		
PAGE 3-27			
Replace the second-level menu for DISPLAY	REF with the following:		
·			
Second-level mer	nu displayed when HORIZ POS	REF is called.	
 RFF1P	HORIZONTAL POSITION	REF4P	REF HPOS

4-24-86

C4/0486 (REV)

Change Befores

PAGE 4-7

In the list of Front-Panel control settings, replace the Extended Functions settings with the following:

Extended Functions

SYSTEM PANEL
SYSTEM MISC

REF4—PNL TRIG T—ON

PAGE 7-4

Replace the section "Setting a Line Number" with the following:

Setting a Line Number—BOTH | F1

2430 OPERATORS

In the EXTENDED FUNCTIONS menu under SYSTEM TV OPT, a method of counting the line numbers in FIELDS 1 and 2 can be made. Under CNT RST (Count Reset), the menu button toggles between BOTH and F1.

Selecting BOTH causes the line count readout to reset to 1 when advancing the line count from the last line of one field to the first line of the next field. In the F1 setting, the line count will only reset to 1 when the first line of Field 1 is selected. Advancing to the first line of Field 2 in this mode simply increments the line count to one greater than the count of the last line of Field 1.

When changing from one field to another, the underscored FIELD choice in the SET TV control menu switches to reflect the correct field. If alternate (ALT) field triggering is selected, further rotation of the LEVEL/FIELD LINE # control past the maximum or minimum line number only resets the line count to the beginning (line 1) or the end (maximum line count common to both fields).

When the Video Option is on, the A TRIGGER LEVEL/FIELD LINE # control knob is used for selecting a specific horizontal line within a field. For line number selection within a specific field, the field and line numbers are displayed in the upper-right corner of the crt screen in place of the normal A Trigger Level readout.

Rotating the LEVEL/FIELD LINE # control knob clockwise increases the selected line number in a field; rotating it counterclockwise decreases the line number. (The LEVEL/FIELD LINE # control still sets the B Trigger Level when the A/B TRIG button is pressed to select B Trigger operation.)

Product 2430	OPERATORS	Date	: <u>4-24-86</u>	Change Reference	C4/0486
		DESC	CRIPTION		
PAGE A-	10				
Add the fol	llowing arguments to t	the header SETTv.			
SETTV	LCNTReset	F1Only		reset only on Field 1 (F10 or PAL systems).	only is typically the
*		BOTh		and Field 2 reset the line co pically used for NTSC syste	
Page A-1	E				
•				·	
Add the foll	lowing header and ar	rguments to Table A-6.	,		
ı					
REFPos	MODe	INDependent	mand to be p	EF selected by the REFP positioned independently or SAVEd displays.	os REF[1-4] com- of the unselected
		LOCk	or SAVEd displication	zontal position of all REFs to blays (the HORizontal POSis changes via the HORizontal 1-4] commands will reposite	ition setting). Horital POSition or the
PAGE A-	19				
Add the foll	lowing header to Tabl	le A-8			
•	_				
PRint			matted for the	y. Causes the 2430 to outp	ter when the 2430
			is Talk Addres Clear aborts the	ssed after receiving this of	command. Device
PAGE A-2	20				
Add the foli	lowing header to Table	e A-9.			
BUSY?			Query only. Will 2430 is busy if returned.	Il return on if 2430 is busy a doing a task for which an	and off is not busy. OPC SRQ can be
			Shows same st	tate as busy bit in status b	oyte.
		B-3	3		

D J	2430 OPERATORS	
Deaduct	Z430 OF ENAI ONS	

4-24-86

Change Reference _

C4/0486

DESCRIPTION

Date:

PAGE B-1

Replace the paragraph under the heading SPECIAL and the paragraphs under the heading SYSTEM CONTROLS with the following.

SPECIAL

The menu choices under SPECIAL are normally disabled, and if the SPECIAL button is pressed, the message "DISABLED—SEE MANUAL" is displayed. If the functions are enabled, pressing the SPECIAL choice of EXTENDED FUNCTIONS calls up the display "WARNING: SERVICE ONLY—SEE MANUAL" with the choice of COLD START, CAL PATH ON LOFF, and FORCE DAC. All three choices are special diagnostics functions that should not be called up by the uer. COLD START eliminates all the previous calibration constants. After a COLD START, a partial re-calibration is required to return the instrument to its previous state. CAL PATH ON LOFF and FORCE DAC are special diagnostic tools that permit the service technician to change the value of selected constants as an aid in trouble-shooting parts of the internal circuitry.

SYSTEM CONTROLS

PANEL

PWR ON—Gives the user a choice of how the front-panel controls are set at power-on as either LAST (the control settings at power-off) or INIT (a factory setup of initialized front-panel settings). In general, powering up in INIT produces a simple setup with CH 1 only ON for display in SAVE acquisition mode, and all special functions (such as Delay by Events, Cursors, and Envelope or Average acquisition) OFF. (The complete list of controls and states of the INIT feature is found in Table C-16 of APPENDIX C). The INIT PANEL menu selection found on the front-panel SAVE/RECALL SETUP control menu produces exactly the same front-panel conditions as PWR ON INIT.

REF4—Gives the user the choice of selecting either to use some available memory space as the location of SAVEREF memory number 4 (REF) or to use it to save four additional front-panel setups (PANEL). If used for front-panel setups, the numbers 2 through 5 will appear in the front-panel SAVE/RECALL SETUP menu when that button is pressed. The memory location for front-panel 1 is long-term nonvolatile storage space; for numbers 2 through 5, the storage is short-term nonvolatile memory (three to five days).

MISC

BELL—The BELL ON OFF feature is self explanatory. With the BELL ON, any warnings to the user regarding system operating errors (especially with GPIB interface) can be signaled by an audible tone.

TRIG T—Allows the user to enable or disable the Trigger Point Indicator for displaying.

PG SIZE—When using a printer via the GPIB interface, this feature allows the user a choice of either 11 or 12 inch wide printer paper.

PREFLT

The usual setting for the Prefilter menu choice is ON. Its effect occurs only on interpolated data to reduce the filter overshoot in the sinx/x interpolator seen when viewing fast-rise and fast-fall signals. If viewing very narrow pulses, the user may wish to turn off the prefilter to eliminate its effects.

roduct_	2430 OPERATORS	Date:	4-24-86	Change Reference	C4/0485
		DESCRIF	PTION		
TV OP	т				
SYSM (counter	SYS—Choice of operating the syn NON-M menu button. Setting the will not count the lines correctly. V encountered. When nonsystem-M	choice for the wrong When System-M is se	protocol does elected, the line	not prevent TV Triggering count begins three lines b	g, however the line efore the field-sync
reset to count w	RST—This gives the user a choice 1 when advancing the line count froil only reset to 1 when the first limits the line count to one greater the	om the last line of one ne of Field 1 is select	field to the first ed. Advancing	t line of the next field. In the to the first line of Field 2 i	F1 setting, the line
				×	
			·		



MANUAL CHANGE INFORMATION

Change Reference: C1/0486 (REV) Date: 4-24-86

2430 Instrument Interfacing Guide Product: __

Manual Part No.: .

DESCRIPTION

Product Group 37

070-5705-00

EFFECTIVE SERIAL NUMBER: B011410

PAGE 13

Replace the Description of the Argument "POSition" with the following:

Sets number of data points which are acquired prior to the trigger with 1023-(<NR1>*32) points acquired after the trigger. <NR1> can range from 1 through 30, where 1 is all but 32 points post-trigger and 30 is all but 64 points of pre-trigger. If necessary, <NR1> is limited to the nearest legal setting and, if EXW is ON, a warning SRQ is issued.

PAGE 21

Under the Header "CURsor?", remove the Argument "CDKnob" and the Link Arguments and Description associated with It.

PAGE 25

in the Description column under STORAGE, change:

From:

STORAGE Mode

SAVE

To:

STORAGE Mode

ACQUIRE

PAGE 40

In Table 18, add the following new Events and their descriptions.

259

Envelope is not available in ADD or MULT

260

No GPIB commands are accepted while doing front panel initiated calibrations.



MANUAL CHANGE INFORMATION

	COMMITTED TO EXCELLENCE	Date:07-14-86	Change Reference: _	M60696
Product:_	2430		Manual Part No.:	070-4917-00
		DESCRIPTION		PRODUCT GROUP 37

EFFECTIVE SERIAL NUMBER: B011410

TEXT CHANGES

Page 5-6

Replace part ad and add parts ae through aj with the procedure given here.

- ad. Exit the ADJUSTS display by pressing the MENU OFF button and reinstall jumper J156 if an External Calibration is not to be performed.
- ae. Skip to Step 2 Sample Skew Adjustment unless the instrument did not meet the LF linearity requirements as specified in the Performance Check and Functional Verification Procedure.

IMPORTANT

READ THE FOLLOWING NOTE BEFORE CONTINUING WITH THIS PROCEDURE

NOTE

The CCD gain adjustments (R768, R769, R877, & R688) as called out in the following steps should only be performed if the instrument did not meet the LF linearity specifications as checked in the Performance Check and Functional Verification Procedure. These adjustments were preset at the factory to their optimum setting and further adjustment may result in reduced instrument performance.

If it has been determined that the CCD gains need to be adjusted, jumper J156 will need to be removed and a COLD START of the instrument will have to be done to preset the CM11, CM13, CM21, and CM23 DAC values to 1400. If a COLD START is performed, this ADJUSTMENT PROCEDURE must be followed with the SELF CAL and EXT Calibration procedures.

- af. Push the MENU OFF button once or twice to bring the CRT Display Menus on screen. Perform a COLD START on the instrument and then return to the ADJUSTS displays. Advance through the displays to reach the first CCD gain adjust display, (Display #7).
- ag. Adjust the Channel 1 CCD gains (R768 and R769) for approximately four-divisions of each display.
- ah. Press any menu button to advance to the Channel 2 CCD gain adjust display.
- ai. Adjust the Channel 2 CCD gains (R877 and R688) for approximately four-divisions of each display.
- aj. Recheck the LF linearity as described in the Performance Check procedure to see if the instrument now meets specifications. If the instrument passes this check, continue with this Adjustment Procedure. If LF linearity still fails; decrease the CCD gains of the failing channel by approximately one minor division and recheck linearity.

NOTE

For best instrument performance, keep the CCD gains adjusted as close to 4 divisions as possible while meeting the LF linearity checks.

_ Date: ___07-14-86

C

DESCRIPTION

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

ADD:

Product_

A10CR550	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA
A10CR650	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA
A10R548	315-0102-00	RES,FXD,FILM:1K OHM,5%,0.25W
A10R650	315-0102-00	RES,FXD,FILM:1K OHM,5%,0.25W
A10R688	311-2231-00	RES, VAR, NONWW:TRMR, 1K OHM, 20%, 0.5W LINEAR
A10R768	311-2231-00	RES, VAR, NONWW:TRMR, 1K OHM, 20%, 0.5W LINEAR
A10R769	311-2231-00	RES, VAR, NONWW:TRMR, 1K OHM, 20%, 0.5W LINEAR
A10R877	311-2231-00	RES.VAR.NONWW:TRMR.1K OHM,20%,0.5W LINEAR

CHANGE:

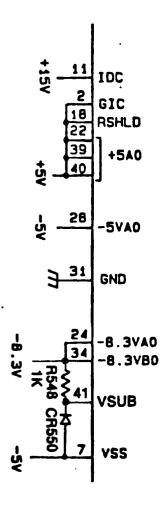
A10	670-8163-04	CIRCUIT BD ASSY:MAIN
A10R679	321-0222-00	RES,FXD,FILM:2K OHM,1%,0.125W
A10R767	321-0222-00	RES,FXD,FILM:2K OHM,1%,0.125W
A10R867	321-0222-00	RES,FXD,FILM:2K OHM,1%,0.125W
A10R878	321-0222-00	RES,FXD,FILM:2K OHM,1%,0.125W
A10U350	165-2074-01	MICROCKT, HYBRID: CCD/DRIVER ASSEMBLY
A10U450	165-2074-01	MICROCKT, HYBRID: CCD/DRIVER ASSEMBLY
A12U480	160-2556-02	MICROCKT,DGTL:2048 X 8 EPROM,PRGM
A12U490	160-2557-02	MICROCKT,DGTL:2048 X 8 EPROM,PRGM
A12U670	160-2555-02	MICROCKT, DGTL: 2048 X 8 EPROM, PRGM
A12U680	160-2551 -02	MICROCKT, DGTL: 2048 X 8 EPROM, PRGM
A12U682	160-2552-02	MICROCKT, DGTL: 2048 X 8 EPROM, PRGM
A12U690	160-2553-02	MICROCKT, DGTL: 2048 X 8 EPROM, PRGM
A12U692	160-2554-02	MICROCKT,DGTL:2048 X 8 EPROM,PRGM

DIAGRAM CHANGES

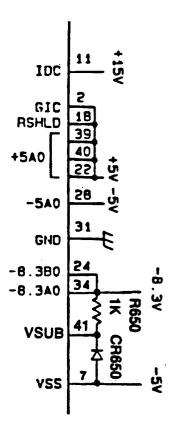
DIAGRAM (10) PEAK DETECTORS & CCD/CLOCK DRIVERS

Add a diode CR550 and a 1K Ω resistor R548 (location 7L) to U350. Add a diode CR650 and a 1K Ω resistor R650 (location 2L) to U450.

(Changes are illustrated below.)



U350 CCD/CLOCK DRIVER



U450 CCD/CLOCK DRIVER

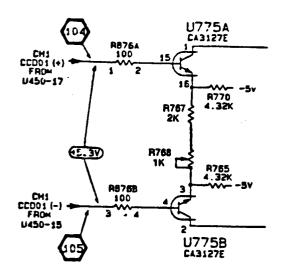
DIAGRAM (14) CCD OUTPUT

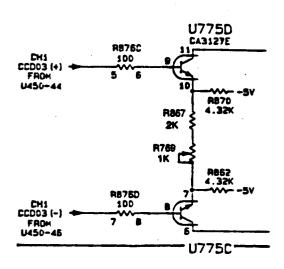
2430

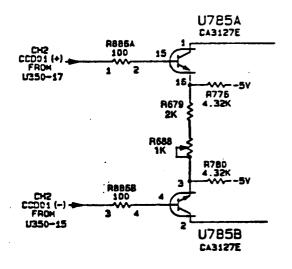
Add R688 (location 6C), R768 (location 2C), R769 (location 3C) and R877 (location 8C), $1K \Omega$ variable resistors.

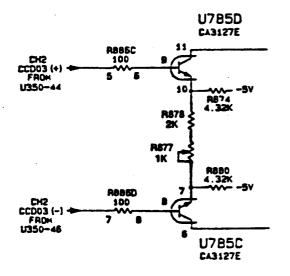
Change R679, R767, R867 and R878 from a 2.43K Ω resistor to a 2K Ω resistor.

(Changes are illustrated below.)











Tektronix MANUAL CHANGE INFORMATION

Date: 07-16-86 Change Reference: M59992

2430 SERVICE 070-4917-00 Manual Part No.:____ Product:___

DESCRIPTION

PRODUCT GROUP 37

SEE BELOW FOR EFFECTIVE SERIAL NUMBERS

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

ADD:

A10C351	283-0158-00	B010823	CAP,FXD,CER DI: 1PF,+/-0.1PF,50V
A10C352	283-0158-00	B010823	CAP,FXD,CER DI: 1PF,+/-0.1PF,50V
A10C353	283-0158-00	B010823	CAP,FXD,CER DI: 1PF,+/-0.1PF,50V
A10C354	283-0158-00	B010823	CAP,FXD,CER DI: 1PF,+/-0.1PF,50V

CHANGE TO:

A10C351	283-0348-00	B011520	CAP,FXD,CER DI: 0.5PF,+/-0.1PF,50V
A10C352	283-0348-00	B011520	CAP,FXD,CER DI: 0.5PF,+/-0.1PF,50V
A10C353	283-0348-00	B011520	CAP,FXD,CER DI: 0.5PF,+/-0.1PF,50V
A10C354	283-0348-00	B011520	CAP,FXD,CER DI: 0.5PF,+/-0.1PF,50V

Below are the selectable values for R679, R767, R867, R878 previous to SN B010823.

A10R679	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R679	321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R679	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R767	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R767	321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R767	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R867	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R867	321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R867	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R878	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R878	321-0230-00	B010127		RES.FXD.FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R878	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC-T0

Below are the selectable values for R679, R767, R867, R878 including the values up to and added by SN B010823.

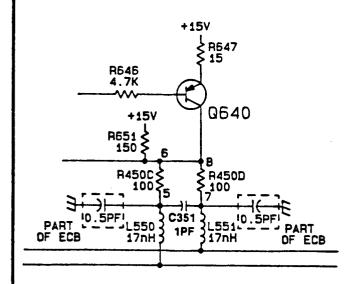
A10R67	9 321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R67	9 321-0227-00	B010823		RES,FXD,FILM: 2.26K OHM,1%,0.125W,TC=T0
A10R67	9 321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R67	9 321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R67	9 321-0235-00	B010823		RES,FXD,FILM: 2.74K OHM,1%,0.125W,TC=T0
A10R67	9 321-0236-00	B010823		RES,FXD,FILM: 2.80K OHM,1%,0.125W,TC=T0
A10R76	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R76	321-0227-00	B010823		RES,FXD,FILM: 2.26K OHM,1%,0.125W,TC=T0
A10R76	321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R76	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R76	321-0235-00	B010823		RES,FXD,FILM: 2.74K OHM,1%,0.125W,TC=T0
A10R76	321-0236-00	B010823		RES,FXD,FILM: 2.80K OHM,1%,0.125W,TC=T0
A10R86	321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC=T0
A10R86	321-0227-00	B010823		RES,FXD,FILM: 2.26K OHM,1%,0.125W,TC=T0
A10R86	321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R86	321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R86	321-0235-00	B010823		RES,FXD,FILM: 2.74K OHM,1%,0.125W,TC=T0
A10R86	321-0236-00	B010823		RES,FXD,FILM: 2.80K OHM,1%,0.125W,TC=T0
A10R8	78 321-0226-00	B010100	B010126	RES,FXD,FILM: 2.21K OHM,1%,0.125W,TC-T0
A10R87	78 321-0227-00	B010823		RES,FXD,FILM: 2.26K OHM,1%,0.125W,TC=T0
A10R8	78 321-0230-00	B010127		RES,FXD,FILM: 2.43K OHM,1%,0.125W,TC=T0
A10R8	78 321-0233-00	B010420		RES,FXD,FILM: 2.61K OHM,1%,0.125W,TC=T0
A10R8	78 321-0235-00	B010823		RES,FXD,FILM: 2.74K OHM,1%,0.125W,TC=T0
A10R8	78 321-0236-00	B010823		RES,FXD,FILM: 2.80K OHM,1%,0.125W,TC-T0

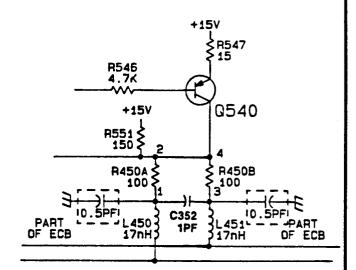
DIAGRAM CHANGES

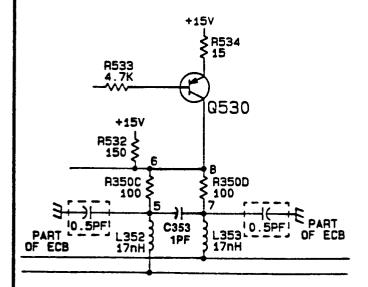
DIAGRAM (10) PEAK DETECTORS & CCD/CLOCK DRIVERS

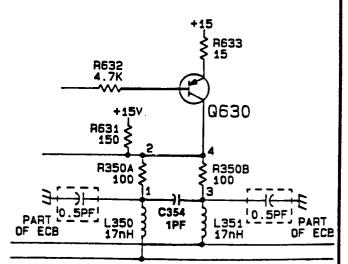
Add 1 pF capacitors C351, C352, C353, and C354 as shown below.

B010823









Change the above capacitors, C351, C352, C353, and C354, to 0.5 pF capacitors.

B011520

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Articles for publication should be submitted directly to:

Tektronix, Inc. P.O. Box 500, M/S 53-102 Beaverton, Oregon 97077

Attention: Mary Ellen Zander SERVICE TEKNOTES Editor

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