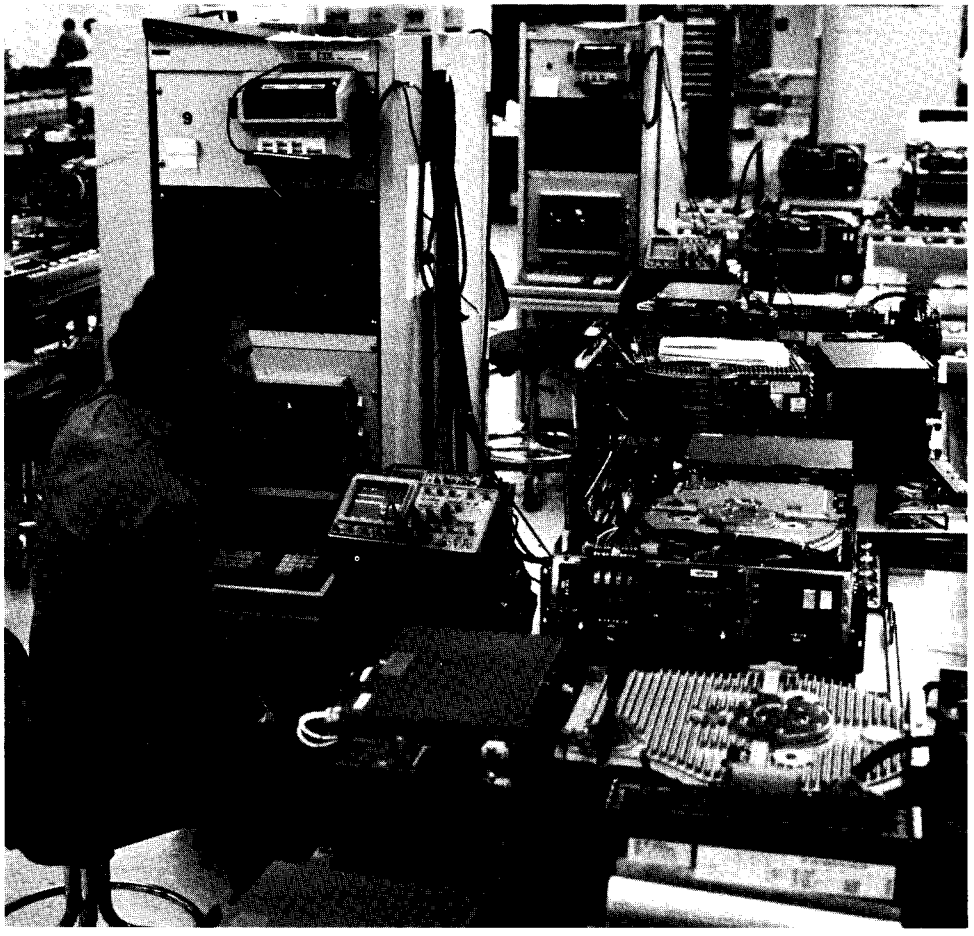
TEK CUSTOMER PRODUCT SERVICING INFORMATION

November 1987, Issue 49

SERVICETEKNOTES

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

AUTOMATED OSCILLOSCOPES SIMPLIFY TESTING



Technicians perform test procedures quickly and efficiently with Tektronix automated oscilloscopes. Manual setups and oscilloscope adjustments are minimized or eliminated with automatic functions.

AUTOMATION FEATURES AND BENEFITS

- Auto Setup
- Cursors
- Counter/timer
- DMM
- Save/recall
- Step sequence
- GPIB Interface

CG5001

Oscilloscope automation reduces testing time and makes testing more reliable.

Published by Tektronix Service Operations Support

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TO OUR CUSTOMERS

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This publication is meant to provide technical information to the customer who has elected to maintain his own Tektronix products. It contains product servicing information and is written for the technician. Reference to W^2 Issue #____ refers to this article having been previously published in an in-house publication known as WIZARDS' WORKSHOP.

Articles are submitted primarily by Corporate Service Support & Planning personnel thoroughly familiar with the products they support.

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Articles for publication should be submitted directly to:

Tektronix, Inc.,
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Beaverton, Oregon 97077

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued.....)

TABLE OF CONTENTS (Continued.....)

AUTOMATED OSCILLOSCOPES SIMPLIFY TESTING

Marshall Pryor, Tektronix, Inc.
Beaverton, OR

Automation is not what it used to be—at least where oscilloscopes are concerned. Recent developments moved automation principles down to the most fundamental levels of oscilloscope operation. As a result, built-in automation is simplifying oscilloscope setup and built-in measurement features are expanding test capabilities. The benefits are numerous:

- Simplification of day-to-day monitoring, test and alignment procedures.
- Faster, more repeatable measurements.
- Extensive measurement capability with fully integrated DMM or counter/timer features.
- Quick changes between front-panel setups.
- Computer-assisted test procedures.

Taking advantage of these benefits requires understanding the basic concepts of oscilloscope automation features and their application.

Most oscilloscope usage is simple waveform observation. Is there a waveform at the test point or not? If it is there, does it look right?

Setting up a waveform observation usually requires several front-panel adjustments—input sensitivity, vertical positioning, horizontal positioning, time base and triggering. The whole process can take several minutes, assuming the operator is skilled.

There are programmable oscilloscopes available for automating test setups, meaning that the oscilloscope setup can be changed by a computer program. The cost of automatic setup is then the cost of the oscilloscope, a computer, software and programming.

Auto setup

Another type of auotmation is that which is built into the oscilloscope. It's generally referred to as *auto setup* and it is implemented by a single button on the oscilloscope. *Auto setup* performs setup adjustments in a second or less, saving hours per day over manual setups and reducing operator skill requirements.

An *auto setup* feature senses a few key parameters of the signal at the oscilloscope's internal microprocessor to automatically set up a basic waveform display. There are no computers or programming required.

Cursors

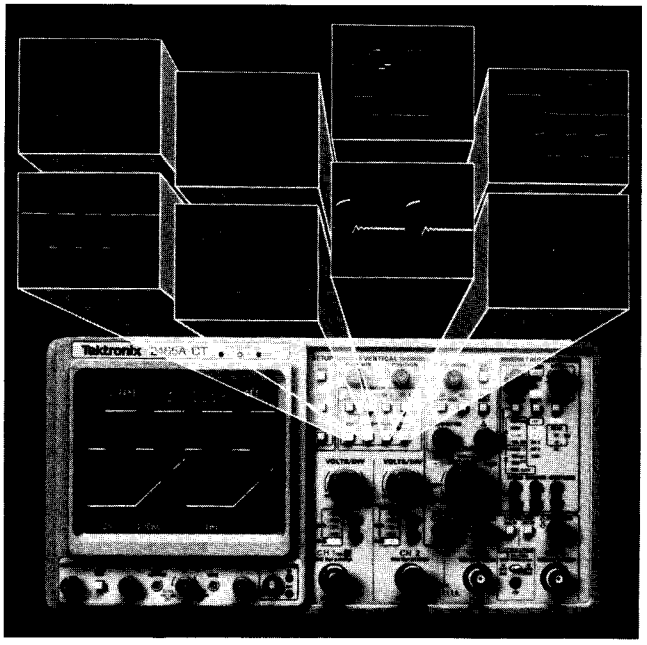
Measurement *cursors* often appear as vertical dashed lines and are positioned on the screen with cursor control knobs. On automatic oscilloscopes, a readout of the signal value between the *cursors* is given depending on the value selected time separation is shown when the time measurement mode is selected or voltage is shown when the voltage measurement mode is selected.

The point here is that *cursors* are a simple, highly visual means of making direct measurements of waveform parameters. They eliminate the conventional time-consuming and error-prone method of counting screen divisions and multiplying by scale factors. With *cursors*, high resolution answers are displayed on the screen.

Cursors are more available than a feature such as *auto setup*. They are standard on most digital storage oscilloscopes (DSO's), and they are becoming available on analog oscilloscopes. When combined with *auto setup*, they can reduce total measurement time to 5 or 10 seconds from a minute or more on a manual oscilloscope.

Counter/timer

There are even more automation benefits if the oscilloscope has built-in measurement options such as a *counter/timer*. This allows direct parametric measurements without having to transfer digitized waveforms to a computer for analysis and saves data transfer time.



Tektronix 2465A oscilloscope with auto setup, save/recall and step sequence functions. The oscilloscope allows the technician to perform a preprogrammed series of test procedures by using these functions.

DMM

Another oscilloscope feature to consider is a built-in digital multimeter (DMM) to allow direct measurement of other parameters such as RMS voltage. This can be provided by a separate piece of test equipment, or it can be integrated into the oscilloscope. When integrated, the oscilloscope offers additional economies of reduced equipment inventory as well as a less cluttered test station.

Save/recall

Save/recall allows front panel settings to be saved in memory and recalled when needed. This feature is similar in concept to a programmable calculator—when a formula is saved, the keystrokes are stored in the calculator's memory and are executed when recalled from memory.

Similarly, the front-panel data are stored in oscilloscope memory by pushing a *save* button and activated with a *recall* button.

Oscilloscope Automation Features and Benefits

Auto setup	Provides basic scope displays within seconds. Several scope adjustments ready for use at the push of a button.
Cursors	Direct measurement and readout of basic waveform parameters without counting display divisions and scale factor multiplication.
Counter/timer	Adds frequency, period, event counting and in some cases logic triggering to the scope.
DMM	Adds dc, ac and resistance measurements to the oscilloscope.
Save/recall	Different scope setups can be stored in the oscilloscope memory and recalled by pressing a button.
Step sequence	Allows different setups to be executed in a fixed sequence by pressing one button. Tens, even hundreds of oscilloscope adjustments can be eliminated.
GPIB interface	Allows settings transfers between scopes, downloading of archived setups to scopes, computer-assisted measurement setup and data collection.

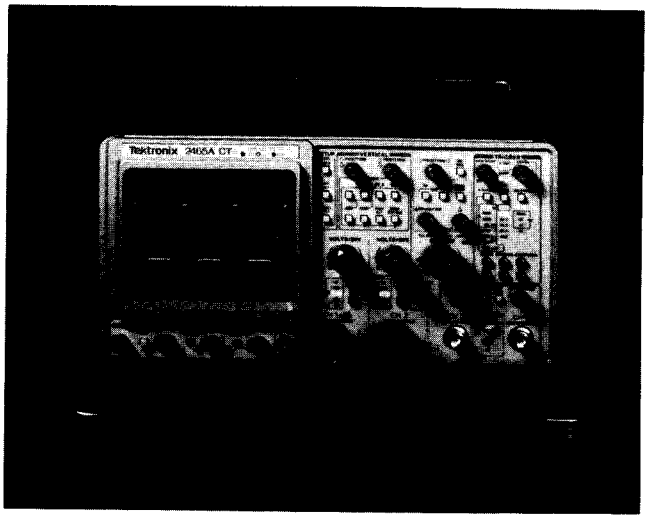
Step sequence

Multiple setups can be saved and then executed as a measurement sequence by pressing a *step* button for each setup. This is similar to a computer programmed measurement sequence like that done with automatic test equipment (ATE) systems. The difference is that no computer or programming is required if the oscilloscope has *step sequence.*

The advantage of *step sequence* is that hundreds of panel adjustments are compressed to a few presses of a *step* button. To protect the saved sequence, the oscilloscope should provide a means of write protecting setup memory. Otherwise, an operator error could overwrite the stored setups.

GPIB interface

Most programmable oscilloscopes will have a GPIB (IEEE-488 bus) instrument control interface as either a standard feature or an option. This feature provides the ability to send setup sequences from one oscilloscope to another. Normally, this feature allows computer-assisted transfers between oscilloscopes. But with Tektronix 2445A and 2465A transfers over a GPIB cable wthout a computer are possible.



Power supply waveform using the cursors to measure the time of the waveform. Technicians no longer have to count grid scales on the face of the oscilloscope.

Computer interfacing

Auto setup, save/recall, step sequence and *GPIB interface* provide oscilloscope automation that can be applied directly from the oscilloscope. They simplify day-to-day measurements that normally could not be justified with ATE approaches. On the other hand, there are cases where a small computer can be justified.

For example, in facilities where a wide variety of tests are being run, it's advantageous to archive oscilloscope setups and sequences on computer disk. Then as different sequences are needed for various product runs, these sequences can be loaded from computer disk to the oscilloscope's setup memory.

With sufficient setup memory in the oscilloscope, test stations can be kept computer-free. The computer simply expedites management and distribution of oscilloscope setups for various test stations. In many cases, this can be done with an inexpensive portable computer that can be carried from station to station, providing another level of automation without the price of dedicated computers.

For more complex test needs, a computer at each test station may be justifiable, allowing blocks of setup sequences to be loaded into the oscilloscope's setup memory at test initialization. Then each setup can be selected from the oscilloscopes front panel or executed with a single command from the computer. The advantage is that the computer does not tie up bus time during testing with transfers of long instrument setup strings. The setup information is already in the oscilloscope and just needs to be selected by memory location or a step command.

In short, there is a whole range of measurement automation depending on the particular oscilloscope features. With an oscilloscope that has *auto setup, save/recall* and *step sequence*, options are open for various levels of automation, beginning with simplifying basic setups and advancing to higher levels of automation as needed. The key, however, is to pick the right feature mix for a given application.

The table summarizes some of the key features and their benefits. By matching application requirements to features, some decisions about the right oscilloscope for the job can be reached easily.

For further information, contact:

Portable Instruments Division (PID)

For Software:
Gerhart (Greg) Dauter,
Marketing Software Manager
627-4331/47-837

For Hardware:
Patrick (Pat) Adamosky,
Product Marketing Manager
627-2889/47-837

CUSTOMER SERVICE TRAINING SCHEDULE

Some of our self-service customers may wish to attend Tektronix customer product service training classes before they repair Tektronix products. The following schedule includes classes offered during the next six months. To register for these classes contact your local field office or call 1-800-835-9433, WR1407.

Additional product service training is available and information may be obtained from Bob Derman (503) 629-1177.

1987-1988 CLASS SCHEDULE
CUSTOMER PRODUCT SERVICE TRAINING

CLASS TYPE	NOV	DEC	JAN	FEB	MAR	APR	MAY
465B/475A $ 975	-	-	-	8-12 IRVN	-	-	2-6 BOSN
2215/35/36 $ 975	-	-	25-29 IRVN	-	-	-	23-27 D.C.
2465A $1,950	9-20 BSON	-	-	-	21-4/1 DALL	-	-
2430 $1,950	-	-	-	22-3/4	-	-	-
7904/7633 $2,100	-	7-18 ATLA	-	-	21-4/1 BOSN	-	-
TM500 Cal Pack $ 975	-	-	-	1-5 IRVN	-	-	-
Television Monitors $2,300	-	7-18 BVTRN	-	-	-	-	-
Television Generators $2,600	-	-	-	15-26 BVTRN	-	-	-
7612D $2,800	-	-	-	8-19 BVTRN	-	-	-
7912AD $2,800	2-13 BVTRN	-	-	-	-	-	-

1987-1988 CLASS SCHEDULE
CUSTOMER PRODUCT SERVICE TRAINING CONTINUED

CLASS TYPE	NOV	DEC	JAN	FEB	MAR	APR	MAY
DAS9200 $2,800	-	-	18-29 BVTRN	-	-	-	-
4014/4631 $1,075	30-12/4 ATLA	-	-	-	14-18 SCLA	-	-
4111 $1,110	-	-	11-15 BVTRN	-	-	-	-
412X $2,400	9-20 BVTRN	-	-	15-26 ATLA	-	18-29 SCLA	-
469X $1,100	2-6 BVTRN	-	-	8-12 ATLA	-	11-15 SCLA	-
85XX MDL $3,600	-	-	-	-	14-4/1 BVTRN	-	-

MAG LATCH RELAY 148-0128-XX RETAINING SCREW TORQUE CHANGE

A Wizard article was published in Issue 17-3, giving a torque spec of 1.25 inch pounds. It has recently been discovered that occasionally the screws will strip out if torqued at this spec.

The recommended new spec is 0.8 inch pounds.

If the instruments have already been set-up for 1.25 inch pounds and no stripping has occurred, then there is no reason to re-torque them.

W2 Issue 17-18

TV PRODUCTS INSTRUCTION MANUAL IMPROVEMENT

REF: 1730 SERIES INSTRUCTION MANUAL
P/N 070-4474-02

SPG170A INSTRUCTION MANUAL
P/N 070-5965-00

With the recent acquisition of new type-setting equipment, a previous request for improvement in Television Products Service Manuals is now being implemented.

The change being undertaken is the data that will appear in the "Effective/Discontinue" column of the EPL and is already evident in the 1730 Series and SPG170A Instruction Manuals.

In previous manuals, this column contained serial numbers where changes to components had been made. It became evident with circuit boards being updated, and now with renewed emphasis on field replaceable assemblies, that serial number data was only useful until the first change of an assembly was made.

The new approach that you are starting to see is that the "Effective/Discontinue" column will now contain the circuit Board/Assembly number revision where a change has occurred within that assembly. (The assembly number itself will still be tied to the instrument's serial number for historical tracking.)

The intended advantage will be for a Service Technician to be able to immediately recognize the correct part for a circuit area that has been through a series of changes by referring to the assembly number that is present in the instrument under test.

This change can be considered as one of several "pilots" for improvement. Your feedback and other suggestions for improvement are highly encouraged.

W2 Issue 17-15

CG551AP/CG5001 ASSEMBLY PRECAUTION

S/N Range: All

When installing the circuit board retaining rod (Index #25, exploded view Fig.1) after removal, first push it lightly into position, then by turning it with the appropriate tool and applying light pressure, slide it into place through all the circuit boards and tighten it appropriately. NEVER FORCE OR POUND IT INTO PLACE. This could result in damage to circuit boards and mechanical hardware.

W2 Issue 17-14

DC509/DC5009 ANALOG CIRCUIT BOARD REPLACEMENT MOD KIT REQUIRED

DC509 S/N B010100-B042069
DC5009 S/N B010100-B041719

When replacing the analog circuit board use mod kit Tek P/N 050-1820-03.

The kit provides for replacement of the old circuit boards Tek P/N's 670-6795-00 and 670-6854-00, that are no longer available, with a new circuit board Tek P/N 670-6854-07, which is not a direct replacement.

If the instruments S/N is greater than those listed, the 670-6854-07 is a direct replacement.

W2 Issue 17-18

RTM506 RACKMOUNT TO CABINET CONVERSION MOD KIT NOW AVAILABLE

S/N's: B010100 and up

Ref: M62195

Now available is a Field mod kit, Tek P/N 040-0762-01, to convert a Rackmount RTM506 Power Module to a cabinet version.

W2 Issue 17-18

SPG2A, WRONG I.C. INSTALLED IN SYNC LOCK BOARD

REF: SPG2A INSTRUCTION MANUAL, P/N 070-2104-00

Due to a mixed stock condition, a few 1410/SPG2A's may have been shipped with incorrect parts in two locations.

The locations of interest are U325 and U220 on the Sync Lock Board. The correct part for these applications is P/N 156-0487-00, a 96L02 IC. The part that was installed by mistake was 96LS02.

The symptom will be sync edge jitter that appears in a few locations as you rotate the Subcarrier Phase Knob, or vary H Delay, with the generator in a Genlock/Synclock mode.

Install the correct part where this problem is encountered.

W2 Issue 17-17

TSG300 MODIFICATIONS

REF: TSG300 INTERIM MANUAL
P/N 061-3302-00

The following is a summary of modifications that have been implemented in the TSG300 as of this issue.

Mod 62320

Mod 62320 was implemented in TSG300's starting at S/N B010102 in order to address the following problems:

1) A timing deficiency in one of the EPROMS.
2) Insufficient processor reset time.
3) To take advantage of a less expensive part.

Item 1 was addressed by cutting the circuit board run from U972 pin 8 on the top of the board near pin 8, cutting the circuit board run from U884 pin 22 on the bottom of the board near pin 22, adding a strap from U972 pin 8 to U884 pin 22, adding a strap from U884 pin 20 to U884 pin 14, and cutting the run near U884 pin 20. Make this change as required.

Item 2 was addressed by changing A2-1C577 from a 1.0 uF capacitor to a 4.7 uF capacitor, P/N 283-0194-00. Make this change as required.

Item 3 was addressed by changing A2-1U270 and A2-1U805 from P/N 156-0067-13 to P/N 156-0067-12. Make this change upon failure.

Mod 62650

Mod 62650 was implemented in the TSG300 starting at S/N B010176 in order to improve the noise immunity of the sync stripper.

Install this mod, as required, by changing A3R712 and A3R714 from 10 kohms 1% resistors to 10 kohms 0.1% resistors, P/N 321-0289-07.

Mod 62652

Mod 62652 is being implemented in the TSG300 (starting serial numbers yet to be announced) to address the following:

1) Improvements in the processor reset circuitry.
2) Timing margins associated with EPROM and RAM access.
3) Disable sync jumper not functioning properly.

Items 1, 2 and 3 will be resolved by a rework of the circuit layout; however, the problems associated with Item 3 can be implemented on present circuit boards by:

- Cutting the circuit board run at J364 pin 3.

- Strapping J364 pin 3 to U868 pin 9.

Now the Sync disable function can be obtained by placing P364 and P363 in their 2-3 positions.

Mod 62865

Mod 62865 has been implemented in the TSG300, starting with S/N B010272, to address the following problems:

1) To insure COMP SYNC amplitude specs.

2) To improve CH3 frequency response adjustment.

Item 1 was addressed by changing A3R323 from a 1.87 kohms resistor to a 2.15 kohms resistor, P/N 321-0225-00.

(Article continued on next page)

TSG300 MODIFICATIONS (Continued....)

Item 2 was addressed by cutting the circuit board run going from R832 to C737 on the back of the Analog Board A3). Cut as close to R832 as possible. Then lift the free end of C737 out of the board and solder it directly to R832. Make both changes as required.

Mod 63212

Mod 63212 has been implemented in the TSG300, starting with S/N B010311 to remove a glitch that appears in the COMP SYNC output while operating in the 50Hz mode.

Install Mod 63212, as required, by changing A21U261 from P/N 160-3617-00 to P/N 160-3617-01.

W2 Issue 17-15

WFM300, CRT INTERNAL GRATICULE CHANGE

REF: WFM300 INSTRUCTION MANUAL
P/N 070-6039-00

Mod 62935

Mod 62935 changes the internal CRT graticule in order to provide some minor corrections.

- The right side Kpb 50% crosshair is corrected.
- 680mV minor mark is added.
- Inside border is changed from square to radiused corners.

Install a new CRT, P/N 156-0909-01, on an as-fails basis.

Mod 62935 is being installed in new instruments from the factory starting with S/N B010413.

W2 Issue 17-14

WFM300, ELECTRONIC GRATICULE CORRECTION

REF: WFM300 INSTRUCTION MANUAL
P/N 070-6039-00

Mod 62934

Mod 62934 addresses two small flaws in the WFM300's electronic graticule.

1) In the Vector/GBR mode with Line Select active, the bottom portion of the "B" was missing.

2) In the 100% GBR mode, the "M" box was not totally closed.

Repair these problems, as required, by changing A4U268 as follows:

WFM300 (std.)
160-4196-01 becomes 160-4196-02

WFM300 Opt. 10
160-4258-01 becomes 160-4258-02

WFM300 Opt. 12
160-4259-01 becomes 160-4259-02

Mod 62934 is being installed in new instruments from the factory starting with S/N B010251.

W2 Issue 17-15

WFM300 GRATICULE ADJUSTMENT RANGE IMPROVED

REF: WFM300 INSTRUCTION MANUAL
P/N 070-6039-00

Mod 62874

In order to provide additional adjustment range for the Horizontal and Vertical Graticule shape, A3R828 and A3R829 have been changed from 15 kohms to 16.2 kohms P/N 321-0309-00.

Install this change on an "as required" basis.

(Article continued on next page)

WFM300 GRATICULE ADJUSTMENT RANGE IMPROVED (Continued....)

Mod 62874 is being installed in new instruments from the factory starting with S/N B010250.

W2 Issue 17-15

WFM300 OSCILLATION DISTORTING TRAILING EDGE OF SYNC PULSE

REF: WFM300 INSTRUCTION MANUAL
P/N 070-6039-00

Mod: #64773

Mod #64773 has been implemented in the WFM300 to address a tendency for an oscillation in the mag amp circuitry. The oscillation will be seen as a distortion on the trailing edge of the displayed sync pulse.

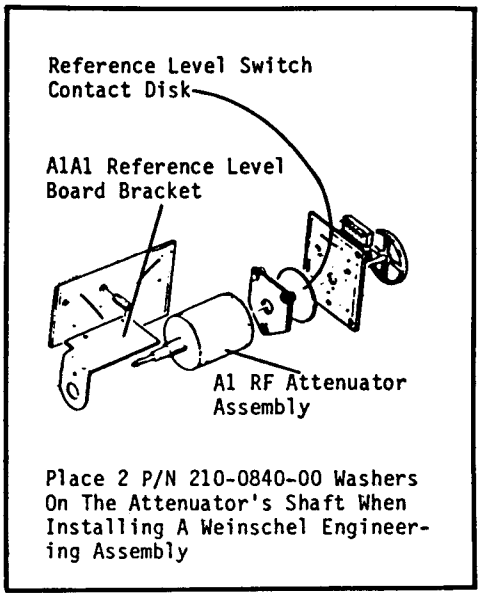
Change A3R634 to 1 KΩ, P/N 315-0102-00 on an "as required" basis.

Mod #64773 is being implemented in new instruments from the factory starting with S/N B010517.

W2, Issue 17-20

7L12 S/N B19XXXX AND ABOVE: INSTALLING A WEINSCHEL ENGINEERING RF ATTENUATOR ASSEMBLY (A1, P/N 119-0871-00)

Two vendors are currently supplying the RF Attenuator Assemblies (A1, P/N 119-0871-00) used in 7L12s S/N B19XXXX and above: Telonic Berkeley and Weinschel Engineering. Assemblies manufactured by Weinschel Engineering have attenuator housings that measure approximately 3 millimeters too short. The result is insufficient mechanical coupling between the attenuator and REFERENCE LEVEL switch contact disk (see figure).



Place 2 P/N 210-0840-00 Washers On The Attenuator's Shaft When Installing A Weinschel Engineering Assembly

This problem can be resolved by placing 2 P/N 210-0840-00 washers onto the attenuator shaft whenever a Weinschel Engineering assembly is installed. The washers should mount between the A1A1 Reference Level Readout board's "L" bracket and the attenuator housing.

W2, Issue: 17-20

118AS; WRONG IC INSTALLED

REF: 118AS Preliminary Instruction Manual, P/N 061-3076-00

If your 118AS exhibits a failure that appears related to a serial port lock-up condition, or an auto-delay lock-up condition, the first item to look for is the correct IC for U925 (A2, Digital Board) or U615 (118RC, A1, Remote Control Board).

The IC type should be Z80A SIO/1. The IC's that exhibit the lock-up problems are Z80A SIO/0 or Z80 SIO/1.

W2 Issue 17-19

118F02 INACCURATE DELAY COMPUTATION

REF: 118AS INSTRUCTION MANUAL
P/N 070-5114-00

Mod 62317

Mod 62317 makes the changes necessary to insure that the 118F02 Video Interface Board will accurately calculate channel delay. The changes shift the gain determination node such that the 118AS input op amps are less sensitive to circuit crosstalk noise.

The modification changes the following:

- A7R222, A7R223, A7R122 and A7R123 are changed from 21.1K ohms to 4.53K ohms, P/N 321-0256-00.

- A7CR118, A7CR119, A7CR125, A7CR126, A7CR218, A7CR219, A7CR225 and A7CR226 are removed. In their place, two zener diodes are teepee'd into the circuit, in a back-to-back configuration, on each of the four input lines. Figure 1 (below) illustrates the circuit before the changes. Figure 2 illustrates the circuit after the changes. The new diodes are P/N 152-0688-00.

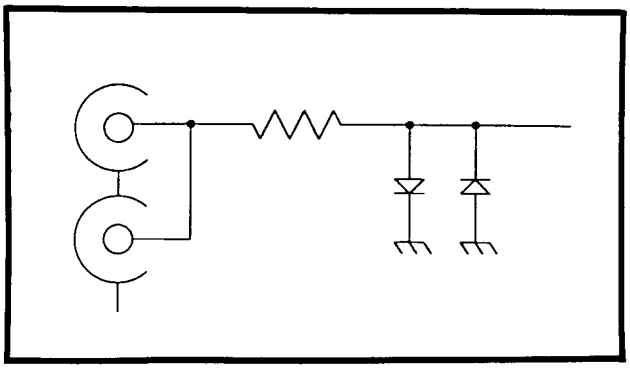


Figure 1

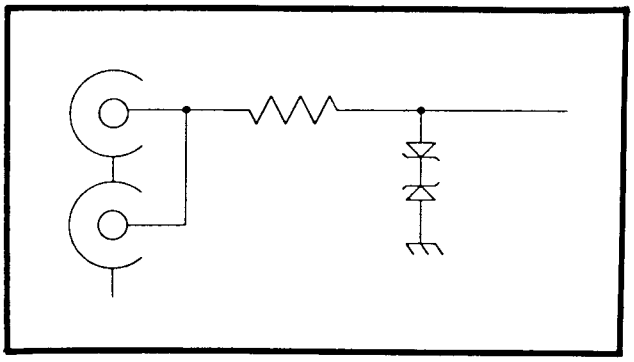


Figure 2

- A6R230, A6R235, A6R331 and A6R340 are changed from 221 ohms to 16.9K ohms, PN 321-0311-00.

These change details are given for information only. The early circuit configuration or the later one will work equally well when the 118AS is used in a system that uses the 110S as the controlling device. This mod is only necessary with the addition of the 118F02, due to its use of video signals for delay computation. 118F02 Field Kits contain the required parts and instructions to put these changes into pre-mod instruments.

Mod 62317 is being installed in new 118AS Audio Synchronizers from the factory starting with S/N B030246.

W2 Issue 17-15

275X/P, 49X/P: HIGH VOLTAGE REGULATION IMPROVED

RE: M64405

The A74 High Voltage circuit board (P/N 670-5559-07) has been modified to improve its output regulation. The high voltage oscillator transistor's (Q1073) current gain may be low, requiring more current to maintain regulation than the regulator IC (U4083) is able to supply. This problem has been resolved by changing the following component values.

Change C3076 to 0.1 uF,
P/N 283-0167-00

Change R3071 to 220 Ohms,
P/N 315-0221-00

Change R3072 to 3.9K Ohms,
P/N 315-0392-00

Install this mod on an "as required" basis.

A parts replacement kit (P/N 050-2302-00) is available for Field replacement of Q1073 in products manufactured prior to this mod. The kit provides a P/N 151-0423-00 for replacing Q1073, and the components needed to update the A74 assembly. M64405 will be installed into new products beginning with the following serial numbers.

492/P	S/N B056120
492/P Opt. 6	S/N B621840
492A/P	S/N B010585
494A/P	S/N B010220
494/P	S/N B011137
495/P	S/N B010255
496/P	S/N B021840
2753P	S/N B010126
2754/P	S/N B010180
2755/P	S/N B010270
2756P	S/N B010175

W2 Issue 17-18

275X/P, 49X/P: SPURIOUS RESPONSE AT 320MHz

RE: M63756

The A32 110MHz I.F. Amplifier (P/N 119-1015-01) has been modified to prevent oscillations which generate a spurious response at 320 MHz. The oscillation is temperature sensitive, producing higher output levels when cold. A ferrite bead (E4053, P/N 276-0569-00) has been added to the base lead of Q4053 to stabilize the I.F. amplifier over its operating temperature range.

Install this mod on an "as required" basis.

W2 Issue 17-18

380, 381 INTERMITTENT SYNC STRIPPER

REF: 380 INSTRUCTION MANUAL,
P/N 070-3421-00
381 INSTRUCTION MANUAL,
P/N 070-3211-00

Due to internal changes in Sync Stripper IC's, P/N 155-0144-00, the following change has been made to support circuitry to insure proper operation.

In the 380 or 381, C955 on the Display Board, A4, is changed to a 0.22 uF capacitor, P/N 283-0339-00.

This change is recommended for installation concurrent with the replacement of a defective Sync Stripper IC.

W2 Issue 17-17

650 SERIES LV POWER SUPPLIES, AVAILABILITY

REF: 650 SERIES INSTRUCTION MANUAL P/N 070-1161-00

The 650 Series LV Power Supply board, P/N 670-1606-00 or -01, that was applicable for serial numbers through B170000 is no longer available due to normal instrument obsolescence criteria.

However, P/N 670-1606-03, which was appropriate for 650's with S/N B170000 and above, is still in limited availability. This power supply board will work in older 650's if a new EHT, P/N 119-0320-03 or -05, has been previously installed via kit P/N 050-0662-XX or 050-0711-XX. These kits provided the parts required to make early LV Power Supply boards compatible with newer EHT's. 670-1606-03 will have the necessary parts installed.

W2 Issue 17-19

650HR ANALOG COMPONENT UPGRADE KIT

REF: 650HR Instruction Manual, P/N 070-2646-02

A kit of components has been set up to allow customers to add Analog Component Inputs to certain 650 Series Monitors.

The kit number is C4M, and is ordered through TV Marketing via a Modified Product Quote (MPQ).

The kit is applicable to 650HR's, 651HR's, 655HR's and certain 650A Series Monitors. It is not available for 650 Series, 652HR, or 656HR.

TV Marketing at 627-2612, 58-699, is to be contacted for price and delivery and in the case of the 650A Series, for feasibility.

W2 Issue 17-14

690SR TRANSISTOR CHANGE DUE TO VENDOR ALTERATION

REF: 690SR INSTRUCTION MANUAL P/N 070-3821-00

690SR OPT. 40, 48 INSTRUCTION MANUAL, P/N 070-2870-00

Mod 62892

Due to a change in a transistor die by the vendor, P/N 151-0482-00 no longer functions properly in circuit location A11A1Q230. This part is located in the Horizontal Raster Centering section of the Horizontal Deflection Board.

Replace A11A1Q230 with P/N 151-0482-03 on an "as fails" basis.

W2 Issue 17-15

760 REAR PANEL CHANGE

REF: 760 INSTRUCTION MANUAL,
P/N 070-5992-00
MOD 62528

The rear panel for the 760 has been modified to eliminate unused subparts, and ease assembly problems.

Mod 62528 removes two 6-32 Pem Nuts that were once used to fasten the instrument into a cabinet that is no longer used. Additionally, the Pem Nuts that accepted the screws securing the input connectors have been removed. New instruments will have self-tapping screws installed in the 6 affected locations. (P/N 213-0012-00)

Install the new rear panel (P/N 333-3321-01) with 6 new screws on an "as fails" basis.

Mod 62528 is being installed in new instruments from the factory starting with S/N B010461.

W2 Issue 17-18

1480 SERIES INTERMITTENT VERTICAL JITTER

REF: 1480 SERIES INSTRUCTION MANUAL,
P/N 070-2338-00
MOD 64561

In order to prevent an intermittent vertical jitter, a 10K ohm resistor (R1692) has been added to the 1480 Series Vertical Board.

Add the new resistor (P/N 315-0103-00) from base to emitter of Q1691 as required.

Mod 64561 is being installed in new instruments from the factory starting with S/N B094559 (1480C Series) and B106115 (1480R Series).

W2 Issue 17-19

1705 ERRONEOUS FREQENCY READOUT AT HIGH TEMPERATURE

REF: 1705 INSTRUCTION MANUAL,
P/N 070-6355-00

MOD 64371

A few 1705 Spectrum Monitors have exhibited a tendency for the frequency readout to jump several MHz when they get up to operating temperature.

This has been resolved by changing the program of A3U718 so that A3U505 receives an adequate number of pulses for proper conversion.

Replace A3U718 with P/N 160-4524-02 as required to address the stated symptoms.

Mod 64371 is being installed in new instruments from the factory starting with S/N B010271.

W2 Issue 17-16

1705 IC OSCILLATION FIX

RE: 1705 INSTRUCTION MANUAL,
P/N 070-6355-00

MOD 63433

In order to prevent A3U766 from oscillating, Mod 63433 has added a 100pf capacitor, P/N 281-0765-00, in parallel with A3R766.

Install Mod 63433 as required.

Mod 63433 is being installed in new instruments from the factory, starting with S/N B010150.

W2 Issue 17-14

1710B, 1720, 1730, 1740, SERIES INTERCONNECT CABLE IMPROVED

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

1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

1730 SERIES INSTRUCTION MANUAL
P/N 070-4474-02

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

Mod 61980

The cable that connects the Main Boards to the Front Panel Boards has been changed to provide a better fit. This was done to address a tendency for the cable to come loose during shipment.

The following table lists locations to use P/N 175-9773-01 to address loose fit or cable failure problems as required. The table also lists starting serial numbers for installation of Mod 61980 in new instruments from the factory.

Instrument	Figure #	Serial Number
1710B	1-19	B021135
1711B	1-19	B020258
1720	1-17	B011354
1721	1-17	B010554
1730	1-16	B011893
1731	1-16	B010603
1735	1-16	B010100
1740	3-104	B013795
1741	3-104	B011352
1742	3-104	B010162

W2 Issue 17-15

1720 SERIES CRT DISPLAY COLLAPSE AT TOP OF SCREEN

REF: 1720 SERIES INSTRUCTION MANUAL,
P/N 070-5846-00
MOD 63327

A condition may exist where a CRT's electrical center approaches maximum negative limits, which will cause the display to collapse at the top of the screen.

Mod 63327 addresses this condition by changing A3R574 from 2K ohms to 2.2K ohms, P/N 315-0222-00.

Install this change as required.

Mod 63327 is being installed in new instruments from the factory starting with S/N B011973 (1720) and B010690 (1721).

W2 Issue 17-19

1720 SERIES CRT GRATICULE CHANGE

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

Mod 62601

Mod 62601 makes the following improvements to the 1720 Series CRT Graticules.

1) The size of the Vector pattern was increased in 1720 and 1721 CRTs.

2) The 1721 CRT had marks added for burst.

Install a new CRT P/N 154-0901-01 (1720) or P/N 154-0902-01 (1721) on an as fails basis.

Mod 62601 is being installed in new instruments from the factory starting with S/N B010603 (1720) and B011645 (1721).

W2 Issue 17-15

1720 SERIES EXT SUBC INPUT CROSSTALK

REF: 1720 SERIES INSTRUCTION MANUAL,
P/N 070-5846-00

If the 1720 is used with a signal source applied to CHAN A, and a subcarrier source applied to EXT SUBC that is non-synchronous to CHAN A's signal, circuit crosstalk may be visible as a small amount of phase jitter.

Most, if not all of this phase jitter can be nulled by dressing the EXT loop-thru wire that connects to the main board.

Apply a color bar signal from your bench generator, and a one volt subcarrier frequency signal from a sine wave generator to EXT SUBC. Null as necessary by wire dressing.

W2 Issue 17-17

1720 SERIES MICROPROCESSOR KERNAL CHANGE

REF: 1720 SERIES INSTRUCTION MANUAL,
P/N 070-5846-00
MOD 60690
MOD 64205

Mod 60690 changed the 1720 Series Microprocessor Kernal Circuit by changing the base part of U613 and eliminating U620, U624, R722 and W717.

The effective S/N's for Mod 60690 were B011973 (1720) and B010690 (1721).

Recently, the replacement part used for U613 has shown a tendancy to not start properly at high temperatures. To address this problem on a temporary basis, the circuitry removed by Mod 60690 has been reinstated by Mod 64205.

The effective S/N's for Mod 64205 are B012271 (1720) and B010790 (1721).

To address a heat related start-up symptom for S/N's between Mod 60690 and Mod 64205, install kit 050-2297-00 as required.

W2 Issue 17-19

1720 SERIES, PHASE-LOCK LOOP RECENTERED

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

Mod 63143

In order to recenter the operating window of the 1720 Series Subcarrier Regenerator Phase-Lock Loop, thereby accommodating a wider range of crystals, Mod 63143 changes A3C235 from 20pf to 16.8pf, P/N 283-0663-01.

Install the new capacitor, as required, when a new crystal doesn't appear to have sufficient range.

Mod 63143 is being installed in new instruments from the factory starting with S/N B011737 (1720) and B010619 (1721).

W2 Issue 17-14

1720 SERIES SUBCARRIER LOCK-UP TIME

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

Due to some inconsistencies being seen in crystals used in the 1720 Subcarrier Regenerator circuit, some units may take longer than 1 second to lock to changes to incoming reference signals.

Try changing the crystal first if a long lock-up time is the only failure system.

W2 Issue 17-18

1720/1730 SERIES INPUT-TO-ECB WIRES

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

1730 SERIES INSTRUCTION MANUAL
P/N 070-4474-02

Mod 62465

Mod 62465 changes the leads that connect the BNC connectors to the Main Board from bulk wire to P/N 196-3146-00 "Flex-Strip" wires.

This change was made solely for ease and consistency in the manufacturing process. For this reason, should one of these wires require replacement in the Field, #22 AWG insulated wire is an electrically and mechanically acceptable replacement substitute.

The replacement wire is to be cut to a length equal to the piece being replaced to insure proper performance.

Mod 62465 is being installed in new instruments from the factory starting with the following serial numbers:

1720	B011018
1721	B010446
1730	B010650
1731	B010319

W2 Issue 17-14

1721 PHASE JITTER WITH 2 V NON-SYNCHRONOUS EXTERNAL SUBCARRIER

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

There are some customer applications where a 1721 locked to 2 Volt Non-synchronous Subcarriers will exhibit an excessive amount of phase jitter (about one degree).

In order to improve performance in this mode, the customers have been advised to replace the Ext. Loop-Thru to ECB wire with a 20 KΩ 1/8 watt resistor. This value will permit operation with either CW or normal Black Burst as external reference signals, with a remaining phase jitter of less than 0.1 degree.

If Black Burst external reference will never be used, the resistor can be as much as 60 KΩ, and jitter will be even less.

With this change, the 1721 must be operated with J699 and J796 in the "normal" positions (Pins 1 & 2).

To perform normal performance check/adjustment procedures, all that will be necessary will be for the technician to jumper the resistor for those checks involving Ext. Ref inputs.

W2, Issue: 17-20

1730 BT SERIES UNSTABLE DISPLAY OR WRONG SEQUENCE IN A/B MODE

REF: 1730 BT SERIES INSTRUCTION MANUAL, P/N 070-6514-00

MOD 64208

Mod 64208 addresses an unstable display condition in the 1730 BT Series instruments. This condition has been observed in YRGB applications using A/B mode. A/B may also appear in the wrong sequence.

The changes listed below should be installed on an "as required" basis.

1) Change A4C130 from 0.1 uF cap to a 0.47 uF cap, P/N 283-0221-00.

2) A4C433, a new 100 pF CAP, P/N 281-0814-00, IS ADDED IN PARALLEL WITH A4R433.

3) A3C907, is a new 1 uF cap, P/N 290-0183-00, is added in series with A3R907, by lifting the Q806 end of R907 and adding C907 in the break thus created.

Mod 64208 is being installed in new 1730 BT Series instruments from the factory starting with S/N B022601 (1730 BT), B020776 (1731 BT), and B010135 (1735 BT).

W2 Issue 17-15

1730 SERIES CAPACITOR MADE TEST SELECTABLE

REF: 1730 SERIES INSTRUCTION MANUAL, P/N 070-4474-02
MOD 62906

Due to a change in the plate capacitance of the CRT's used in the 1730 series, A3C389 has been made test selectable. The nominal value is 95 pF, P/N 283-0631-00, with a selection range of ± 10%.

The selection criteria is to achieve frequency response specs in the 6 MHz to 10 MHz region.

(Article continued on next page)

1730 SERIES CAPACITOR MADE TEST SELECTABLE (Continued)

This change is only applicable to Main boards in S/N B020000 and above, and will most likely be necessary when instruments between B020000 and the effective serial numbers (below) require a CRT change.

Mod 62906 is being installed in new instruments from the factory starting with S/N B022018 (1730) and B020613 (1731).

W2 Issue 17-17

1730 SERIES INTERMITTENT CIRCUIT BOARD SHORT

REF: 1730 SERIES INSTRUCTION MANUAL, P/N 070-4474-02
MOD 63328

In order to prevent an occasional short from the output amp to a nearby 5 V ECB run, Mod 63328 adds a fiber washer, P/N 210-0812-00, under the circuit board mounting screw that is located near A3Q387. Add this mod as required.

Mod 63328 is being installed in new instruments from the factory starting with S/N B022240 (1730), B0210672 (1731) and B010111 (1735).

W2 Issue 17-19

1730 SERIES MOD BT PIX MONITOR OUT OSCILLATION

REF: 1730 SERIES MOD BT INSTRUCTION MANUAL, P/N 070-6514-00

Mod 64171

To prevent the 1730 Series Mod BT Pix Monitor Out from oscillating when DC restorer is on, A3R982 has been changed from 10 ohms to 47 ohms, P/N 315-0470-00.

Install this mod as required.

Mod 64171 is being installed in new instruments from the factory starting with S/N B022601 (1730 BT), B020776 (1731 BT) and B010135 (1735 BT).

W2 Issue 17-14

1730 SERIES TRANSISTOR NOISE CAUSING TRACE JITTER

REF: 1730 SERIES INSTRUCTION MANUAL P/N 070-4474-02

Mod 62526

Transistors in the following locations within the 1730 Series have been changed to a new part to address internal noise that was causing a small amount of trace jitter.

- A3Q298
- A3Q299
- A3Q498
- A3Q499

Replace the transistors with P/N 151-0190-00 on an "as fails" basis.

(Article continued on next page)

1730 SERIES TRANSISTOR NOISE CAUSING TRACE JITTER (Continued....)

Mod 62526 is being installed in new instruments from the factory starting with S/N B011693 (1730) and B010603 (1731).

W2 Issue 17-15

1740 SERIES COIL CHANGE FOR RELIABILITY

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

Mod 64077

Mod 64077 changes A4L813 and A4L825 from 820 mH parts to 56 mH parts, P/N 108-1268-00, to obtain a more reliable part.

Replace L813 and L825 with the new part on an "as fails" basis.

Mod 64077 is being installed in new instruments from the factory starting with S/N B014311 (1740), B011564 (1741), and B010171 (1742).

W2 Issue 17-15

1740 SERIES POWER CONNECTOR ASSEMBLY CHANGE

REF: 1740 SERIES INSTRUCTION MANUAL,
P/N 070-4473-00
MOD 63579

Mod 63579 adds a small circuit board, P/N 388-9692-00, to the mains power connector to reduce manufacturing costs, rejects and errors.

The new board is only required when the affected area of an instrument containing this board needs repair.

Pre-Mod instruments should have power connector repairs done in a manner that returns them to original (Pre-Mod) condition.

Mod 63579 is being installed in new instruments from the factory, starting with S/N B014331 (1740), B011590 (1741), and B010171 (1742).

W2 Issue 17-17

1740 SERIES/1750 SERIES GAIN CELL BANDWIDTH & OSCILLOSCOPE PROBLEMS

REF: 1740 SERIES INSTRUCTION MANUAL,
P/N 070-4473-00
1750 SERIES INSTRUCTION MANUAL,
P/N 070-5664-00
MOD 63832

Gain Cell IC's (P/N 155-0279-00) have changed such that they may exhibit a tendancy to oscillate or may have low bandwidth.

To address this problem, several circuit changes were made to 1740 and 1750 series instruments via Mod 63832.

The changes made are available in a kit, P/N 050-2299-00, and should be installed as necessary to address the listed symptoms, or when the Gain Cell IC is changed due to failure. This kit addresses the changes for both 1740's and 1750's.

Mod 63832 is being installed in new instruments from the factory, starting with S/N B014179 (1740), B011523 (1741), B010161 (1742), B031923 (1750), and B031020 (1751).

W2 Issue 17-19

1750 LOW VOLT POWER SUPPLY NOMINAL CURRENTS

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

The following table gives some nominal voltages and currents measured on several 1750's. These can be used to assist in determing the answer to a "power supply or elsewhere" problem.

DC LINE	NOMINAL VOLTAGE	NOMINAL CURRENT
+46 V	46.9 to 47.5 V	200 mA
+15 V	14.55 to 14.72 V	460 mA
+12 V	11.90 to 11.92 V	25 to 25.2 mA
-15 V	-14.6 to -14.7 V	410 MA
-12 V	-12.01 to -12.02 V	27.3 to 27.9mA
+5	5.02 to 5.06 V	1.21 to 1.75 A

NOTE - The wide current variation in the +5 V supply depends upon the setting of the Graticule Illumination control.

W2 Issue 17-15

1750 SERIES LOW VOLTS POWER SUPPLY RELIABILITY IMPROVEMENT

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MOD 64056

The present capacitor used in circuit location A6C342 has been shown to have an excessive Equivalent Series Resistance (ESR). This characteristic has contributed undesirable amounts of heat dissipation and component failure.

Mod 64056 is changing A6C342 to P/N 290-1193-00 in order to achieve a more desirable ESR spec.

It is recommended that this cap be replaced using the new part number on any 1750, or 1751 returned for service.

Mod 64056 is being installed in new instruments from the factory, starting with S/N B031973 (1750) and S/N B031053 (1751).

W2 Issue 17-15

1750 SERIES POWER SUPPLY NOISE ON PIX MON OUT

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MOD 64447

In order to prevent excessive power supply noise from appearing on the PIX MON Out, MOD 64447 adds a ground lug, P/N 210-0255-00, under the PIX MON Out BNC connector.

This ground lug becomes the solder point for the rear CRT shield ground wire.

Add this change on an "as required" basis.

Mod 64447 is being installed in new instruments from the factory, starting with S/N B031955 (1750) and B031048 (1751).

W2 Issue 17-16

1910 POWER SUPPLY CURRENTS

REF: 1910 SERVICE MANUAL,
P/N 070-4523-00

The manufacturing line has suggested the following as nominal currents being used in a properly operating 1910.

-15	0.58A
-5.2	1.73A
+5A	0.32A
+5D	5.8A
+15	0.5A

W2, Issue 17-20

2230 OPTION MEMORY BATTERY PART NUMBER

The chassis mounted battery used by the option memory board is not printed in the manual.

The Tektronix P/N is 146-0056-01.

W2 Issue 17-20

2756P SERVICE MAINTENANCE INFORMATION

A Service Maintenance article regarding the 2756P Spectrum Analyzer has been included in pullout "A" of this issue of WIZARDS' WORKSHOP.

Due to similarities between the 494AP and 2756P Spectrum Analyzers, many references are made to the "494A and 494AP Service Maintenance Information" article published in Issue 17-12 of WIZARDS' WORKSHOP.

W2 Issue 17-14

4041 SYS VER TAPE ANOMALIES

REF: 062-5828-XX

There are some performance anomalies on the 4041 System Verification tape. This article will characterize the anomalies, and suggest some work-arounds.

When performing the tape test, if Soft Errors are reported and a Different Tape is used, either Long or Short Test, the test will run, and then report "TAPE TEST INVALID". This occurs on all versions of the Sys Ver tape. As a workaround, do not select Different Tape from the menu. The Sys Ver tape itself will be used for the tape read/write test, but no data will be lost, and error reporting will be correct.

If the Sys Ver tape is used to configure an external terminal, the 4041 appears to "hang" when the configuration program is exited. This occurs with all versions of the tape. A two line add/change modification to the "TERMIN" program will prevent this "hang". Make changes to the "TERMIN" program as follows (version 2.8 was used for this example):

Change line	2410 Load "sysver"
Add line	2420 End

(Line 2410 is changed from 'End')

An alternative is to LOAD and RUN "SYSVER" when the 4041 appears to "hang" at this point.

W2 Issue 17-14

7000 SERIES CARRYING HANDLE SCREWS

Spot checking numerous older 7000 Series mainframes has shown a tendency for the handle securing screws to work loose. There is a small possibility they could back-out completely while being carried and allow the unit to drop.

To prevent this situation, Lab Instruments is now securing the screws during assembly with Loctite 222-21 screw-lock (P/N 006-2517-00).

We recommend that when servicing any 7000 Series or 5000 Series oscilloscope, remove the plastic caps from the ends of the carrying handle and remove and reinstall the attaching screws using Loctite 222-21 screw-lock (P/N 006-2517-00).

W2 Issue 17-16

7612D PERFORMANCE VERIFICATION S/W NOW AVAILABLE

The specifications that are accomplished with the 7612D Calibration S/W are 5 to 10 times tighter in tolerance than the products advertised specifications. Due to this extremely tight adjustment window the instrument can fall out of the calibration specification while still remaining well within the advertised specification.

The solution was to provide performance verification S/W that is more in line with the products advertised specifications. These new routines are now included with the Calibration S/W package. The new P/N's are:

062-8873-02	(5 1/4")
062-8874-02	(8" S.D.)
062-8875-02	(8" D.D.)

W2 Issue: 17-15

2756P SERVICE MAINTENANCE INFORMATION

INTENT: Provide supplementary or additional technical information not available in the Service Implementation Plan or Service Manuals. Reference should be made to the published Service Implementation Plan dated May 11, 1987, and the "494A and 494AP Service Maintenance Information" article published in Wizards' Workshop Issue 17-12.

ORIGINATOR: Bob Schiedler, Performance Assurance Engineer
Beaverton Service Support
53-108, 642-8693
Issue **17-14**

1. PRODUCT DESCRIPTION

The 2756P is a new benchtop spectrum analyzer designed for the laboratory environment. It provides frequency coverage from 10kHz to 21GHz in coax, continuing to 325GHz using waveguide mixers. The 2756P combines the 2755/P mechanical package with the 494AP instrument hardware, resulting in a very high performance benchtop spectrum analyzer.

New product features in the 2756P are similar to those introduced with the 494A/P. They include 3MHz and 10Hz Resolution Bandwidth Filters, Multi-Band Sweep Capability, a Reduced Gain Mode, and a 90dB Display Dynamic Range. The available filters are 3MHz, 1MHz, 100kHz, 10kHz, 1kHz, 100Hz, and 10Hz. Multi-Band Sweep allows the operator to select start and stop frequencies on Bands 2 through 5 that overlap the edges of individual bands. The maximum range is 1.7GHz to 21GHz in a single display. The Reduced Gain Mode allows for an additional 10dB of decoupling between the RF attenuator and I.F. gain settings. When MIN NOISE and Reduced Gain are activated simultaneously, REF. LEVEL settings of up to +50dBm can be achieved **(the maximum safe input is +30dBm)**. A 90dB Display Dynamic Range increases the calibrated portion of the display when operating in Vertical Scales greater than 10dB/DIV.

Please note that the 2756P is only available as a programmable instrument.

2. ELECTRICAL CHANGES

Major electrical changes from previous 275X/P products that are incorporated into the 2756P include the 110MHz I.F. filtering circuits, V.R. Assembly and associated filters, Log Amplifier, Z-Axis circuit, and the GPIB Interface. These changes are identical to those described in the "494A and 494AP Service Maintenance Information" (see Wizards' Workshop Issue 17-12) with the following exceptions:

The A69 10Hz/100Hz Filter Assembly replaces a 100Hz Filter (P/N 119-2033-00) previously used for FL680 in the 2755/P.

The 2756P only has 1 A30A57 GPIB Interface circuit board (P/N 670-9806-00), because non-programmable instruments are not available.

3. OPTIONS

The 2756P is available with many of the traditional 275X/P options. Following is a complete listing of the available options.

Opt. #	Description
A1-A5	Power Cord Options
B1	Service Volume 1 and 2
07	75 Ohm RF Input
08	Delete External Mixer Capability
21	Waveguide Mixers To 40GHz
22	Waveguide Mixers To 60GHz
30	19 Inch Wide Rackmount Version
31	19 Inch Wide Rackmount Version With Rear Access To Connectors Previously Located On The Front Panel
39	Non-Lithium NV RAM Back-up Batteries
41	Digital Radio
42	110MHz I.F. Output
45	CIIL Language
52	North American Power Cord

A rackmount conversion kit (P/N 040-1230-00) for Field installation of Option 30 is available from Customer Service. This kit is compatible with all 275X/P products.

-Estimated U.S. Domestic Catalog price is $300.

-Estimated installation time is 1 hour.

4. SERVICE MANUALS

Service Volume 1	P/N 070-6318-00
Service Volume 2	P/N 070-6319-00
Operator's	P/N 070-6317-00
Programmer's	P/N 070-6320-00

5. SERVICE MANUAL CORRECTIONS

Service Volume 1 (P/N 070-6318-00)

TABLE 5-3 (Page 5-18): Adjust R1065 to level the 3MHz filter, then adjust R1027 to level the 1MHz filter.

Service Volume 2 (P/N 070-5561-00)

Delete FL680 P/N 119-2033-00 from the EPL. It has been replaced by the A69 10Hz/100Hz Assembly.

Change A30W560 from P/N 175-3405-00 to P/N 174-0447-00.

Change V100 from P/N 154-0809-00 to P/N 154-0910-00.

The part number for A34A2 is P/N 670-7905-00.

6. TEST EQUIPMENT

No new test equipment should be required to perform the Perfomance Check and Adjustment procedures. An extender cable may be required if the A56 GPIB circuit board needs to be placed onto extenders and remain connected to the A30A57 GPIB Interface board. Currently, this may be accomplished by removing the A30A57 board from the instrument's rear panel and installing a P/N 174-0447-00 interface cable between the extended A56 GPIB board and the A30A57 GPIB Interface board.

7. CALIBRATING THE A69 10HZ/100HZ ASSEMBLY

Use the precautions and calibration hints described in the "494A and 494AP Service Maintenance Information" with the following exception:

> Enter the TOGGLE EOS CORRECTION MODE at adjustment procedure step 11 by pressing <SHIFT> 8, and select #3.

8. FIRMWARE/DIAGNOSTICS

The 2756P firmware and diagnostics are similar to previous 275X/P products. Proper operation of instrument options such as 7, 8, and 41 depend upon the position of switches on the Z-Axis and Memory circuit boards (see page 6-50 of the Service Volume 1). Also, calibration menus for the Frequency Control system and Digital Storage are provided.

The A54 Memory (P/N 670-9680-00) and A56 GPIB (P/N 670-9770-00) circuit boards are the same as those used in the 494A/P and 2753P. The microprocessor reads the Memory board switch and Front Panel at power-up to determine which instrument operating system must be selected.

Memory Board Switch (A54S1050)

Switch #6 selects between 2756P and 2753P operation. CLOSE switch #6 for 2756P operation and OPEN switch #6 for 2753P operation.

Front Panel Board

The processor reads the Front Panel to determine whether the instrument is a 49X/P or a 275X/P. When the firmware version is displayed on the CRT at power-up, an additional field (PANEL VER. 1.X) follows the firmware version readout indicating which front panel version (49X/P or 275X/P) has been recognized by the processor. For 49X/Ps, the complete readout is as follows:

49X/P VER. X.X PANEL VER. 1.1

For 275X/Ps, the readout changes as follows:

275X/P VER. X.X PANEL VER. 1.2

Please note that the 49X/P and 275X/P firmware versions may be the same, but the panel versions will always be different.

Firmware Versions

The 2756P has been shipped with 1 version of instrument firmware: Version 4.7. The 2756P firmware does not have the Frequency Control system calibration bugs that currently prevent this routine from running in 2754/Ps and 2755/Ps.

Diagnostics

One new menu of special function modes is available on the 2756P. The menu (listed below) can be accessed by pressing <Shift> 8. A detailed description of each item was included in the "494A and 494AP Service Maintenance Information" article.

0-TRACKING GENERATOR MODE TOGGLE

1-SIDEBAND ANALYZER MODE TOGGLE

2-REDUCED GAIN MODE TOGGLE

3-EOS CORRECTIONS MODE TOGGLE

4-ZERO-SPAN TIME MODE TOGGLE

9. MODS

At the time of this printing, 3 mods have been incorporated into the 2756P. Following is a summary of the completed mods.

M63504 (S/N B010115)
Added a P/N 015-1053-01 to P127, the 1st L.O. input port of the A12 First Converter Assembly to improve Band 4 frequency response.

M63532 (S/N B010122)
Modified the A19 110MHz I.F. Assembly (Opt. 42) to reduce 3rd Order I.M. Distortion by reducing the signal gain.

M63618 (S/N B010123)
Replaced screws used in the A22 Phaselocked 2nd L.O. Assembly to secure the RF circuit boards with P/N 211-0162-00 screws and P/N 210-0001-00 washers. The screws used previously caused a grounding problem that may result in sidebands approximately 350kHz from the displayed signal.