WIZARD WORKSHOP ARTICLES

1502 BATTERY PACK INTERMITTENT

The battery pack sometimes doesn't charge when installed in the 1502 case. The problem is that the connector between the 1502 case and the battery pack is not making properly. There is a mod in process to cure the problem, but parts won't be available any time soon.

If you should have a dead battery, check the connector. If it's bad, return the 1502 and battery pack to Factory Service for repair. As soon as the mod is available, we will be able to repair them in the field. I'll publish the mod when it is finalized.

--Dick Butler
74/279 Ext. 5763
Aug. 1975

1502 POWER SUPPLY FAILS TO TURN ON

Dean Turnbaugh from Rockville Service Center pointed out a problem with the 1502. When he turned the power switch off and on quickly, the power supply would not turn on, but if he waited awhile in the off position before he turned it on, the power supply would turn on. This is due to C6443 remaining charged for approximately 10 seconds and keeps the power supply latched in the off mode.

This was cured by adding R0165, a 1K resistor, to the circuit to bleed off the charge quickly. In a few instruments R0165 was left out. The power supply circuit (schematic diagram 6) in the 1502 instruction manual dated September, 1975 shows the correct wiring of R0165. R0165 is located adjacent to the power switch on the schematic. Thanks for the information, Dean.

--Dick Butler
60-298 Ext. 2593
Aug. 1975

1502 CABINET REMOVAL

Due to the tightness of the 1502 cabinet it can be a real struggle to remove it from the instrument, resulting in much straining, broken finger nails, etc. I've found this method to work much easier. After removing the cover and loosening the four (4) screws at the rear of the 1502, lean it on its side, grasp the front casting ear with pipe pliers (wrapped in several layers of cloth to keep from scratching the casting) and pull firmly. It works so easily you'll want to do it again and again!

--submitted by Darrell Brink
Factory Service
Jan 1976
--inserted by Dick Butler
60-298 Ext. 2593

1502 PERFORMANCE CHECK/CALIBRATION, STEP 65, VERTICAL ATTENUATION

Bob Kepler, Albuquerque Service Center, recently had two customers reject the 1502 in their incoming inspection facilities. They were not able to perform Step 65 on page 4-11 in the Maintenance Manual, which tells you to use the 1502 position controls to set up a test point to 1 volt. His customers could only reach 0.85 volts. This is due to using only the vertical position control. In order to get the proper 1 volt setting, you need to use both the vertical position control and the zero reference set control. Thanks for the information, Bob.

--Dick Butler
60-298 Ext. 2593
Jan. 1976

1502 AND 1503 - BATTERY PACK FAILURES

There have been reports of cells shorting out in battery packs installed in 1502's and 1503's (016-0595-00). It has been suggested by Manufacturing that a piece of mylar (PN 002-1164-00) be installed under braid connections around positive terminals. The braid connection is working through the plastic coating and shorting cells. All new battery packs will have a flat piece of metal instead of braid and will be connected to the center of the battery, instead of on the side.

--Jerry Brown
74-279 Ext. 5765
April 1976

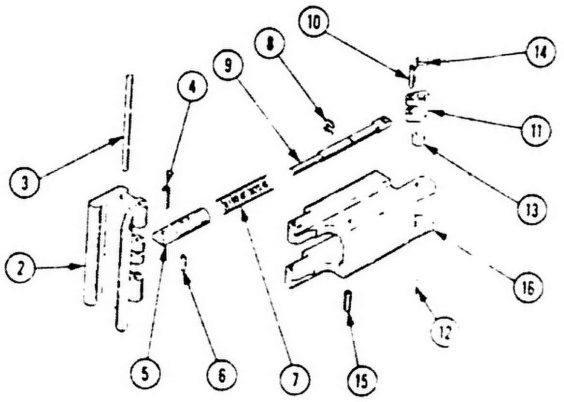
1502 SAMPLING GATE REPLACEMENT

When replacing CR1732, the bridge body will be secured to the board. Apply heat to break the bond to the board, then clean area with freon. After new bridge is installed, apply a thin layer of humiseal (006-1744-00).

Jerry Brown
74-279 Ext. 5765
April 1976

1502-1503 FRONT COVER LATCH INFORMATION

Manufacturing has pointed out a potential problem that can exist concerning the 1502-1503 front cover latch. Item 6, Fig. 1, (Pin-hollow) can break due to the pin being defective and fall out of the shaft. If this happens and the cover latches are closed, they cannot be opened and the cover stays on the instrument.



The check you can perform to see if the pin is loose or broken is as follows:

1. Move the handle to the point where Item 6 (pin) does not rest against the back of Item 5 (guide shaft).

2. Bang the cover to jar the pin loose; if pin does not fall through - it's okay. If pin falls through, replace it with pin (214-1721-00). This is a longer pin and will not come out when latch is in closed position.

Jerry Brown
74/279 Ext. 5765
April 1976

1502-50 OHM STRIP LINE INFORMATION

Darrell Brink in Factory Service has run into a problem when replacing R1701 (48Ω). At first glance the replacement seems pretty simple, just pull out the old part and solder in a new one. After instrument is turned on everything looks normal with a terminated line, but when you un-terminate the line you will have oscillations on the reflected pulse. The problem turned out to be that R1701 needs to be soldered to the top and the "bottom" of the strip line to make proper connections. You need to use a small thin tip on your solder iron and bend the tip to reach under the board. Thanks for the input, Darrell.

Jerry Brown
Ext. 5765 74-279
June 1976

1502 MANUAL CAUTION NOTE FOR INPUT IN EXCESS OF 5V

Operating Instructions—1502

CONNECTING A TEST CABLE TO THE 1502

CAUTION

Do not connect live circuit cables to the input of the 1502. Voltages in excess of 5 V can damage the sampling gate or tunnel diode. If both the sampling bridge and tunnel diodes are destroyed at the same time, an improper use is indicated. If such simultaneous damage occurs, repair charges will be assessed to the customer regardless of the equipment warranty period.

The above is copied directly from the 1502 manual. There are a large number of these being repaired under warranty. They should be chargeable repairs. NOTE: Consult the **cognizant** F.E. before billing customer. He may want to customer accomodate the repair or deliver it personally and provide additional training to the customer.

--Tom Peters
74-279 Ext. 5765
Sept. 1976

1502 - 1503 WATERPROOFING

The new waterproofing manual calls out two tools with an internal part number:
Tool No. 3492-C Clamp No. 3493-C

These tools are not available to the field, nor will they be needed. To install an implosion shield, follow instructions to the letter and, instead of using tool no. 3492-C, make sure implosion shield is pushed down firmly. If you have a small weight around that you can set on the shield to apply a small amount of force to the shield while the R.T.V. is curing, do so.

I am in the process of assembling everything needed for waterproofing into a kit. As soon as I have a number assigned, I will publish it.

If you are called upon to do a complete instrument waterproofing procedure, don't do it. Send the instrument to Beaverton, Del. Station 58-511, Attn: 1502 (1503) Service Support Staff Engineer. We can do it here faster, including shipping time, than it can be done in the service center.

--Tom Peters
58-511 Ext. 5765
Oct. 1976

1502,1503 CHART RECORDER EXTENDER CABLE

Tom Peters, 24 Nov 76

To make a chart recorder extender, order:

1 ea 131-1164-00 Connector
Availability: 60 Days
1 ea 131-1165-00 Connector
Availability: 60 Days
1 ea 200-1666-00 Connector
Availability: Stock
1 pc .18 inch ribbon cable.
(this can be from most any extender)

Install the plastic cover on the 131-1165-00 end of the cable. Do not use it on a 1501. If you do, you need to change the logic line to coax or you will have problems.

1502,1503 CHART RECORDER TIMING

Tom Peters, 24 Nov 76

Set up time mark generator as outlined in manual.

(B) Horizontal Output Amp Preset

(a) Set up

Set: 1503 FT/DIV to 1 x 100
Set: dB/DIV to 0dB
Set: DISTANCE dial to 000
Set: Cable Dielectric buttons out
Set: ZERO REF CW

(b) Horizontal Gain (10DIV of sweep)

Adjust: R3217 and R3213 for a CENTERED TRACE of 10cm. Push and hold the record switch up and note position of dot on left side of CRT in relation to the '0' GRATICULE line.

Adjust: R3217 to position the dot half the distance toward the "0" GRATICULE line

Adjust: R3213 to position the dot the rest of the way to the "0" GRATICULE line.

Release: Record switch, turn 1502 off and then back on. Note where the SWEEP ends. If should end on the 10th GRATICULE line. Repeat if necessary.

Note: This has been a preset and may have to be readjusted to match the chart recorder and timing later on in the Calibration procedure.

Insert 0.5 s and 0.1MS time marks. Set ft/div. to x10 25 ft. Start chart recorder and adjust R1216 for 8, 0.5 s time marks in 7.9 div between 1st and 9th div. Adjust R3217 to match CRT to chart recorder. Sweep start to sweep stop should be no greater than 10.3 div. Now you can set up the rest of the timing.

1502 INPUT PROTECTION

Tom Peters, 29 Oct 76

Help is available to you and your customers. A new BNC input connector is now being installed on all new 1502's effective immediately. The input is now a grounding BNC. It grounds the input device under test until the BNC connector is fully seated. This will prevent electrostatically charged cables from damaging input diodes. Any 1502's that come in for service, I would strongly suggest that you highly recommend replacing the old BNC input with the new one. Old BNC PN 131-1097-00.

Install together:
- New BNC PN 131-2010-00
- New BNC Dust Cover PN 200-2069-00

Do not forget that you will need some Ecco-Bond solder paste PN 252-0008-01.

1502 STRIPLINE REPAIR

Tom Peters, 29 Oct 76

When the stripline shield or front panel BNC are removed or replaced, you must make sure there is good electrical contact between the two. This is done by smearing a small amount of ecco-bond solder paste across the two. This product now has a part number available to the field, PN 006-2513-00. The solder paste has a six-month shelf life. This is due to the evaporation of the solvent. The paste can be reactivated by adding a few drops of toluene. If you cannot obtain toluene locally, the part number is 252-0008-01.

1502 INPUT B.N.C.

Tom Peters, 12 Nov 76

In the last Wizards Workshop, I mentioned a new shorting B.N.C. connector. A word of advice - use your ohm meter and another B.N.C. connector and cycle the connector about 20 times before installing. Some of the connectors are not shorting when they are supposed to. Others are staying shorted. By testing before you install, you will save yourself a lot of grief.

1502, 1503 CHART RECORDER EXTENDER CABLE

To make a chart recorder extender order:

1 each 131-1164-00 connector - availability 60 days
1 each 131-1165-00 connector - availability 60 days
1 each 200-1666-00 connector cover - availability - Stock
.18 inch piece of ribbon cable. This can be from most any extender.

Install the plastic cover on the 131-1165-00 end of the cable. Do not use it on a 1501. If you do, you need to change the logic line to coax or you will have problems.

--Tom Peters
Nov. 1976

1502,1503 CHART RECORDER TIMING

Set up time mark generator as outlined in manual.

(B) HORIZONTAL OUTPUT AMP PRESET

(a) SET UP

SET: 1503 FT/DIV to 1 x 100
SET: db/DIV to 0db
SET: DISTANCE dial to 000
SET: Cable Dielectric buttons out.
SET: ZERO REF CW

(b) HORIZONTAL GAIN (10DIV of sweep)

ADJUST: R3217 and R3213 for a CENTERED TRACE of 10cm. Push and hold the record switch up and note position of dot on left side of crt in relation to the "0" GRATICULE line.

ADJUST: R3217 to position the dot half the distance toward the "0" GRATICULE line.

ADJUST: R3213 to position the dot the rest of the way to the "0" GRAT. line.

RELEASE: Record switch, turn 1502 off and then back on. Note where the SWEEP ends. It should end on the 10th GRATICULE line. Repeat if necessary.

NOTE: This has been a preset and may have to be readjusted to match the chart recorder and timing later on in the Cal Procedure.

Insert .5µs and .1MS time marks. Set ft/div. to x10 25 ft. Start chart recorder and adjust R1216 for 8, .5µs time marks in 7.9 div. between 1st and 9th div. Adjust R3217 to match CRT to chart recorder. Sweep start to sweep stop should be no greater than 10.3 div. Now you can set up the rest of the timing.

--Tom Peters
58-511 Ext. 5765
Nov. 1976

1502 and 1503 ACCESSORY COVERS

Thanks to Jim Hill of Factory Service we have been made aware of an installation problem with the TDR accessory covers.

When not installed on a unit, the sides of the accessory covers are losing their molded curvature. Even though it may cause a slight installation problem, it's not necessary to replace it.

When installing the cover, instead of setting it flat and trying to latch the sides, place one end of the cover in place and latch it, then press on the opposite side, with a rocking motion, until the cover pops into place, then latch.

Make sure to document any cover you may find impossible to install.

--Rich Andrusco
58-511 Ext. 5771
Dec. 1976

1502 - 50 OHM STRIP LINE INFORMATION

JERRY BROWN, 11 JUN 76

Darrell Brink in Factory Service has run into a problem when replacing R1701 (48 ohm). At first glance the replacement seems pretty simple, just pull out the old part and solder in a new one. After the instruments is turned on everything looks normal with a terminated line, but when you try to unterminate the line you will have oscillations on the reflected pulse. The problem turned out to be that R1701 needs to be soldered to the top and the "bottom" of the strip line to make proper connections. You need to use a small thin tip on your solder iron and bend the tip to reach under the board. Thanks for the input, Darrell.

1502 INDICENT PULSE RISE TIME

TOM PETERS, 10 DEC 76

Changed from:

A. $\leq$ .0 55 feet $\leq$ 110 P.S. 10% to 90%

B. $\leq$ .07 feet $\leq$ (140 P.S.)

$\leq$ 2.1 CM for metric

To:

A. Delete

B. $\leq$ .07 feet ($\leq$ 140 P.S. 10% to 90%

$\leq$ 2.1 CM for metric

Per E.I.S. Change #578 effective 10/28/76.

1502, 1503 BATTERY PACK RETURNS

TOM PETERS, 14 JAN 77

More than half of the 1502, 1503 Battery Packs that are rejected and sent to Beaverton are good.

There is a simple method to determine if the charger or battery pack is at fault. When the instrument is turned on, plug and unplug the AC power cord into a 110V outlet. If the battery meter needle briefly deflects up then back down the charger is ok. If the needle doesn't move check fuse E6122 and charging circuit.

1502/1503 CABLE PART NUMBER

TOM PETERS, 28 JAN 77

The following wire sets have been set up in the order processing system:

198-2257-00 Final wire kit (1502)
198-2386-00 Chassis wire set (1502/3)
198-2288-00 Final wire set (1503)
198-2940-00 670-3008-02 wire set (1502)
198-3007-00 670-3866-00 wire set (1503)

Final wire kit includes Battery Meter, Trace Rotation Coil, Cable between Power Supply and Logic Board, Power Supply and Vertical Amplifier, Power Supply and Main Board (2 each), Power Supply and High Voltage, 'U' Reference Pot and Main Board.

Chassis Wire Kit includes Cables to Focus Pot, Intensity Pot, and Power Supply to Battery Compartment Switch.

"670's" Wire Kits include Cables from Main Board to other points that are not included in other kits.

The above 198 numbers should be added to the mechanical parts lists for the 1502 and 1503 in the next manual bind.

Availability is not known at this time.

1502 m CASE REMOVAL

The following information comes from Rich Kuhn's, Irvine Service Center:

"I have had a few 1502's come in with the watertight seal damaged because the customer used a screwdriver to remove the case. There is a procedure in the manual that should be emphasized. It is on page 4-7 under 'Preliminary Connections and Set-up'.

The procedure is as follows: Loosen the four screws at the rear of the case and set the unit face up. Push down on the handle to break the seal: then place it face down on a flat surface. Take hold of the sides of the c case and qull free.

This method may save the customer the pr price of a new case.

Tom Peters
November 25, 1977

1502 STRIPLINE MAINTENANCE NOTE

TOM PETERS, 4 MAR 77

To prevent humidity or moisture from degrading resistors or causing aberrations some parts are coated with humi-seal at the factory.

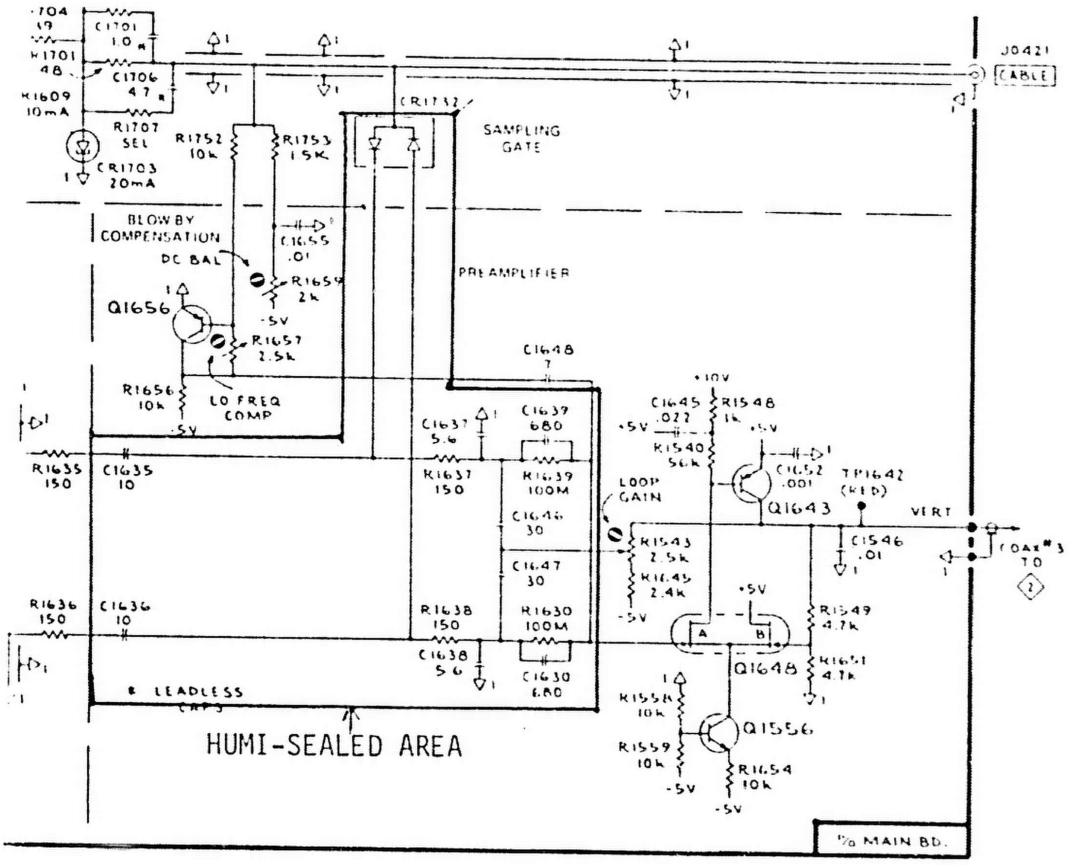
Whenever this coating has been impaired in any way it should be renewed.

NOTE: Until humi-seal is dry (24 hours), do not mane any measurements. The result appears as a leaky bridge, CR1732. (humi-seal pn 006-1744-00.)

Following are the coated components:

C1630	R1630
C1635	R1637
C1636	R1638
C1637	R1639
C1639	CR1732, Bridge
C1646	Also the FET (Q1648) base
C1647	on the solder side of the
C1648	board is sealed

Thanks to Gay Woster, Boston SC, for bringing this to our attention.



Pulser/Sampler 1A

1502 AND 1503 FRONT PANEL PLUG-IN SEAL REPLACEMENT

In order to better facilitate front panel and plug-in seal replacement new part numbers have been generated.

1502	Front Panel Plug-In Seal Assembly Part Number	333-1991-03	
		Availability	12 weeks
1503	Front Panel Plug-In Seal Assembly Part Number	333-2003-02	
		Availability	12 weeks
1502	Opt. 5 Front Panel Plug-In Seal Assembly Part Number	333-2119-02	
		Availability	12 weeks
1503	Opt. 5 Front Panel Plug-In Seal Assembly Part Number	333-2123-02	
		Availability	12 weeks

--Tom Peters
58-511
Ext. 5765
March 1977

1502 MAINTENANCE NOTE

In the March 4 issue of the Wizards Workshop I mentioned the use of HUMISEAL. However, I neglected to mention the part number which is 006-1744-00.

Thanks to Dick Browne, Philadelphia, for bringing this to my attention.

--Tom Peters
58-511 Ext. 5765
April 1977

ADDENDUM TO 1502 STRIP LINE REPAIR

In the October 29 issue of Wizards Workshop, I mentioned using toluene to reactivate an eccobond solder paste. The toluene part number at that time was 006-0613-00. Since then, the part number has been changed to number 252-0008-01 for one-pint quantities. The old number is now deleted.

--Tom Peters
58-511
Ext. 5765
April 1977

1502/1503 BNC REPLACEMENT

TOM PETERS 22 July 77

There seems to be some questions about the proper method to remove and replace the input BNC.

After performing the mechanical disconnection and removal, place the main board with input BNC on a flat surface or in a vise. Use a 50 watt soldering iron (certainly no less that 40 watts), to apply only enough heat to unsolder the BNC connector. Use solder wick to clean up the board. If you have inadvertantly damaged the plating in the slot of the circuit board, you may obtain a double "U" copper repair piece by ordering 131-1894-00. The copper repair piece looks like a cross (+)L using needle nose pliers, bend the legs of the cross so that the result is a unit that resembles two "u's" 90' out of phase with each other and situated back to back. In other words, bend the two arms of the cross forward 90', then bend the two remaining legs backward 90½. This piece may then be insertes into the slot and solder tacked to the board. Trim as necessary. The new BNC is then resoldered on to the board. Make sure the BNC is aligned vertically and horizontally, the legs of the BNC should be flush with the surface of the board slots. Also, see other maintenance articles on BNC and strip line repair for further information.

SAMPLING

1502/1503 LINE FUSE CHANGE

Line fuses have been changed in accordance with Mod M30882. The change is effective serial number B06XXXX for the 1502 and B04XXXX for the 1503.

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

F0401	159-0032-00	FUSE, CARTRIDGE:0.5A,3AG,SLOW-BLOW
F0401	159-0029-01	FUSE, CARTRIDGE:0.3A,3AG,250V,SLOW-BLOW (Option 6)
F0491	159-0032-00	FUSE, CARTRIDGE:0.5A,3AG,SLOW-BLOW
F0491	159-0029-01	FUSE, CARTRIDGE:0.3A,3AG,250V,SLOW-BLOW (Option 6)

The above parts are located on the CHASSIS and shown on diagram 6 POWER SUPPLY CIRCUIT.

Sticky back tags are available for the front panel. At present, contact me for the tags. When a part number is assigned, it will be published in the Wizards Workshop. The fuses should be changed as they come through the service center, because the original fuse was too small.

August 12, 1977 --Tom Peters
58-511
Ext. 5765

1502 MANUAL CHANGE INFORMATION (070-1792-00)

Page 4-10.

Change the following steps to read:

49. CHECK—that the peak-to-peak noise is not greater than 10 mρ (2 divisions).
50. Push the NOISE FILTER button in and check that the peak-to-peak noise is less than 4 mρ (0.8 division).
53. CHECK—that the peak-to-peak noise is less than 4 mρ.
54. Release the NOISE FILTER button and check that the peak-to-peak noise is less than 10 mρ.

Written by--
Manual Department

Inserted by--
Tom Peters
58-511, Ext. 6919
Oct. 1977

1502 - 1503 CAMERA FUNCTION DELETED

1502's and 1503's have been shipped to customers with the camera function deleted but the front panel still says "Camera".

If a customer brings in one of these to repair the camera function *REFER THE PROBLEM TO THE SALESMAN.* The Field Engineer will inform the customer the camera function is no longer available.

This mod started about SN B060960 for the 1502 and B040880 for the 1503. Below these SN's the camera function is supposed to work and above these SN/s it is not supposed to work. However, the break was not clean.

Instruments being shipped now have the new front panel with the word "Camera" deleted or covered by a sticky back tag.

The manual insert that should have been in the customers manual will be available Week 47.

I have a supply of sticky back tags for any Service Center needing to cover up the word "Camera" on the modified instruments.

All older instruments that contain the camera function leave as they are.

Any questions contact Tom Peters, Service Support, Ext. 6507.

PLEASE INFORM ALL TECHNICIANS IN YOUR SERVICE CENTER.

--Tom Peters
58-511
Ext. 6507
Nov. 1977

1502 CASE REMOVAL

The following information comes from Rich Kuhns, Irvine Service Center:

"I have had a few 1502's come in with the watertight seal damaged because the customer used a screwdriver to remove the case. There is a procedure in the manual that should be emphasized. It is on page 4-7 under 'Preliminary Connections and Set-up'.

The procedure is as follows: Loosen the four screws at the rear of the case and set the unit face up. Push down on the handle to break the seal; then place it face down on a flat surface. Take hold of the sides of the case and pull free.

This method may save the customer the price of a new case."

--Tom Peters
58-511, Ext. 6507
Nov. 1977

CAMERA DELETED FROM CABLE TESTERS

The CAMERA function has been deleted from the 1500 Series Cable Testers starting approximately with serial numbers B060960, for the 1502; and B040880 for the 1503.

This function facilitated CRT photography by backlighting the graticule between sweeps when the RECORD/CAMERA switch was pushed down. Back-lighting registered the graticule as dark lines against a fogged background.

With this function gone, we no longer consider the Cable Testers to be suitable for CRT photography; although a white trace on a black background without graticule may still be recorded with the C30A Camera and adapter 016-0327-00. Cable Tester customers generally do not use cameras. They use the chart recorder instead.

Complaints from customers who point out that the CAMERA function was incorrectly deleted from their instrument are being handled through warrenty repair or accommodation, and the Service Centers have received their instructions.

December 12, 1977

1502/1503 HAND TOOLS TORQUE SCREWDRIVER

The 1502 & 1503 requires a torque screwdriver to tighten the case screws to 10 inch pounds. A part number is now set up -- 003-0827-00. This is the *Cal-3C Richmont torque limiting screwdriver.

The unit cost is $105.00

Lead time is 25 days.

--Tom Peters
58-511, Ext. 6507
Dec. 1977

1502-1503 CAMERA FUNCTION

Now that the dust has settled, further explanation is in order. The camera function has been deleted from the 1502 and 1503 due to low usage and a patent problem in Japan. The incorporation of this deletion has caused some misunderstanding and inconvenience. There are ≈120 1502's and 220 1503's in which the function was deleted, but not the word "camera" from the front panel. Some have new front panels with "Camera", some have "Camera" covered with a sticky back tag.

Through all of this the manual insert has been missing.

The manual insert will start being inserted Week 47.

The following courses of action are recommended.

If the customer brings in a unit because the camera function is inoperative and it says "camera" on the front panel. Rewire the unit so the camera function is again operative, and inform the FE immediately. Repair will be performed under warranty.

If the customer brings in a unit because the camera function is inoperative and the front panel does not say camera (or is covered up), contact the FE and let him determine the next course of action. If repaired, it will be customer accommodation.

The following changes are necessary to reactivate the camera function:

1. Remove two bare hard wire straps from back of camera switch.
2. Remove wire (red-black) from center pole and resolder to the center pole on the other half of the switch.
3. Eight inches of three strand ribbon wire, with square pin co-nectors, 131-0707-00 connectors on wire and three pin "Harmonica" 352-0161-XX (00 through 06 is ok) is needed.
4. Locate square pins marked "P26" on Vertical Amp/Slow Ramp board.
5. Remove short between pins 2 & 3 of P26. Also remove excess solder.
6. Connect harmonica connector to P26 and feed wire through mainboard. (next to wiring from "zero reff" pot and P27 on vertical amp board). Removal of X-Y module or chart recorder will help.

(Continued on following page)

1502-1503 CAMERA FUNCTION (continued)

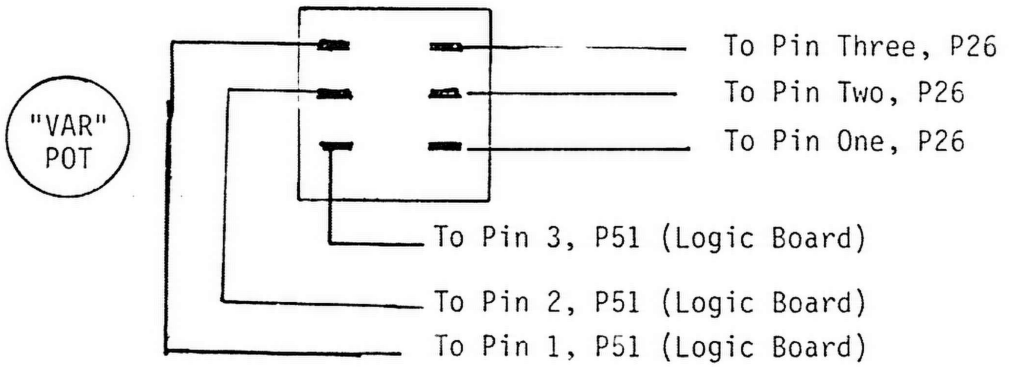
7. Connect wire from pin one of P26 (marked with a small triangle) to lower unused pole of "Camera" switch.

8. Connect center wire (pin 2) of P26 to unused center pole of "camera" switch.

9. Connect remaining wire (from Pin 3 of P26) to remaining unused pole.

10. Turn on 1502-1503 and obtain a trace.
Press and hold switch to "record". Check to see that dot remains stationary at left hand side of CRT until record switch is released.
Press and hold switch to "camera". Adjust R3237 on OUTPUT AMP board for flooding of entire CRT. Trace should return to normal when camera switch is released.

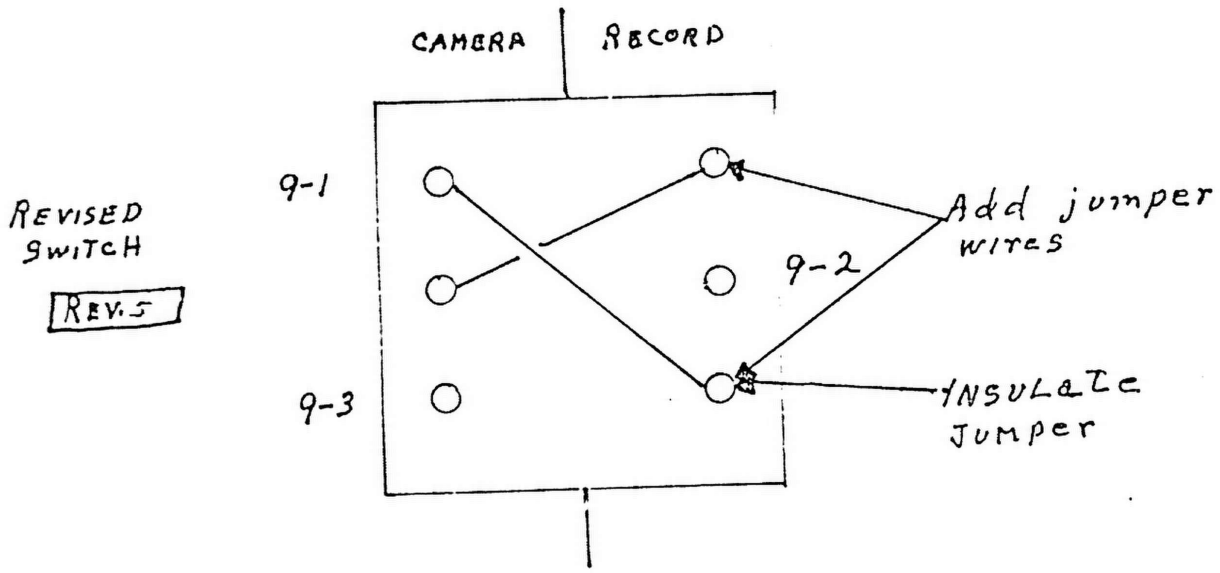
Camera Switch



(continued on following page)

1502-1503 CAMERA FUNCTION (continued)

CAMERA FUNCTION DELETED



Written by--
Dana Bradfish
1500 Manufacturing

Inserted by--
Tom Peters
December 23,1977

1502/1503 HAND TOOLS TORQUE SCREWDRIVER

The 1502 & 1503 requires a torque screwdriver to tighten the case screws to 10 inch pounds. A part number is now set up -- 003-0827-00. This is the *Cal-3C Richmont torque limiting screwdriver.

The unit cost is $105.00

Lead time is 25 days.

For above problem, refer to waterproofing manual 070-2178-00.

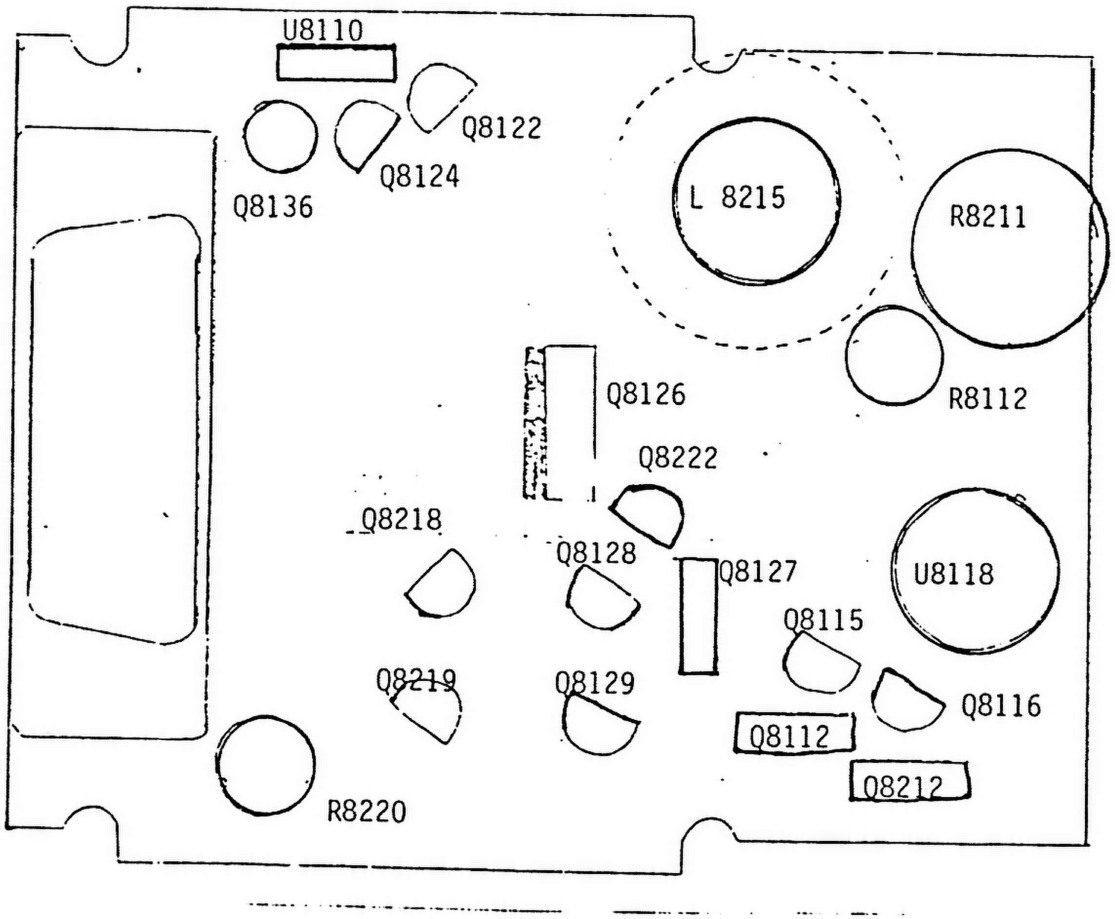
--Tom Peters
December 16, 1977

1502, 1503 CHART RECORDER

The 1502 and 1503 chart recorder circuit board 670-1742-03 has been relayed out. It is now 670-1742-04. Following is the new semiconductor location. I recommend ordering a new manual.

CHART RECORDER

670-1742-04



--Tom Peters
58-511, Ext. 6507
January 27, 1978

1502 ABBERRATIONS

The following mod has been added to 1502"s on an as needed basis:

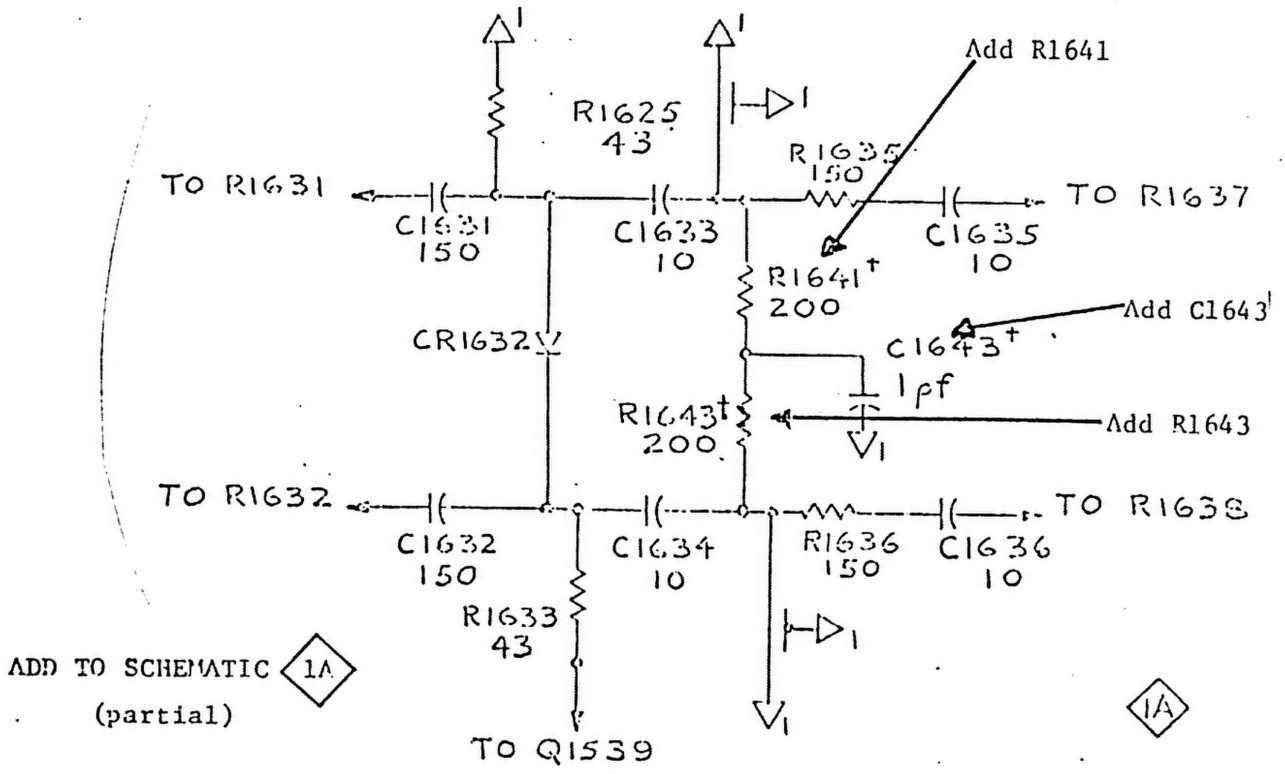
DESCRIPTION OF CHANGE: add a test selected damper, when needed, that will attach to stripline cover and to 10pF leadless caps & 150Ω resistors (C1633, R1635 and C1634, R1636 connections).

Dampener is made with R1641, R1643 317-0201-00, C1643 283-0320-00 and grounding strap 346-0160-00. Located on Main Bd. Ass'y 670-3008-02. See drawing and schematic.

Add test selected Dampener Ckt. (when need) consisting of the following Comp.

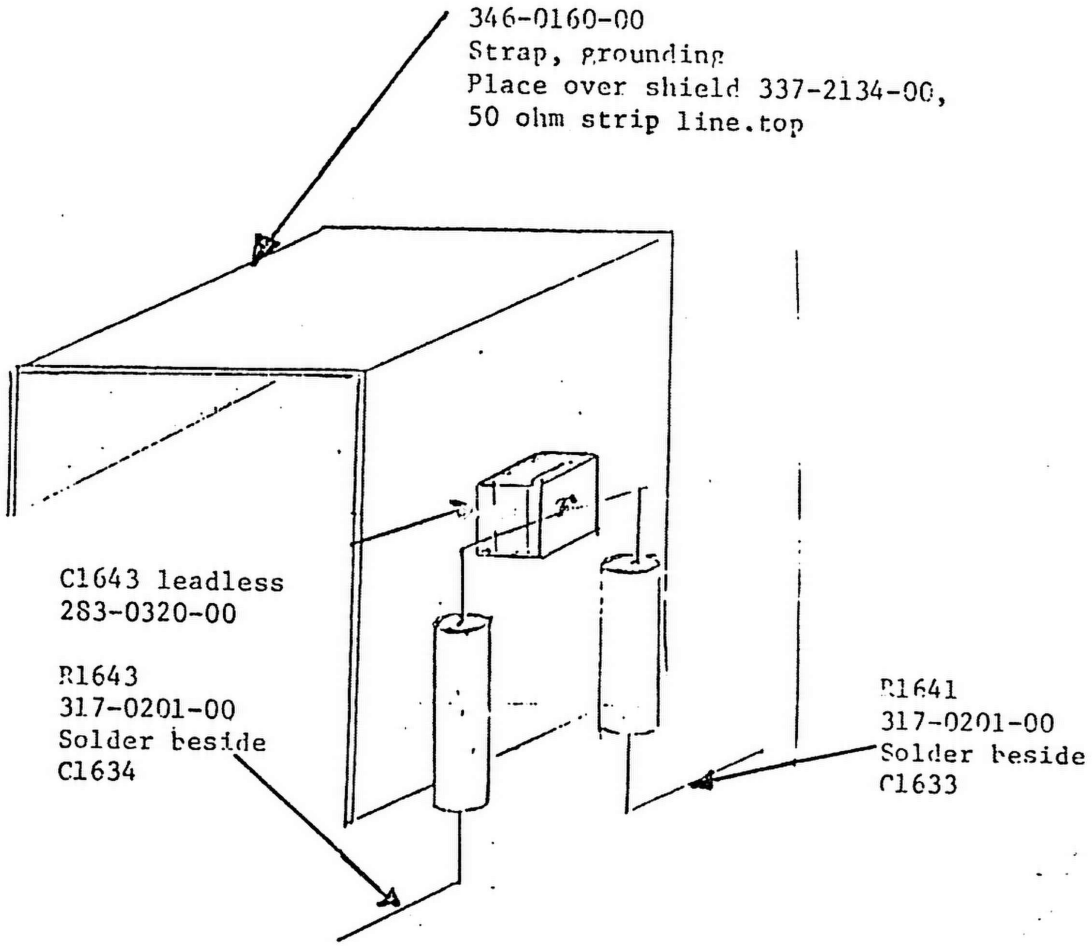
ADD:

CKT NO.	QUANT.	PART NO.	DESCRIPTION	PN STATUS	KIT	INST
C1643	1	283-0320-00	Cap. 1pF		670-3008-02	1502
R1641,1643	2	317-0201-00	Resistor 200Ω			
	1	346-0160-00	Strap, Grounding			



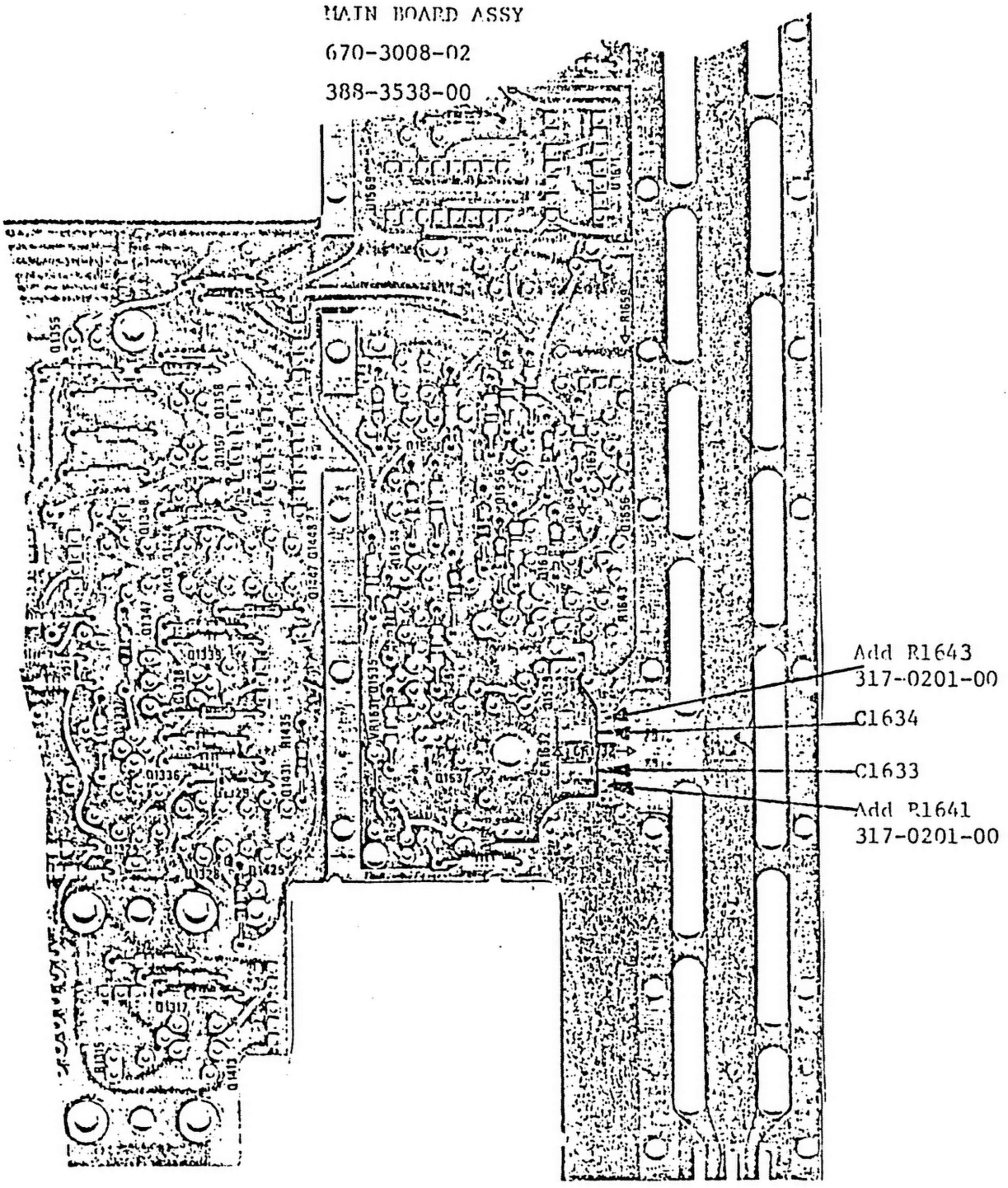
1502 ABERRATIONS (continued)

DAMPENED COMBO



(continued on following page)

1502 ABERRATIONS (continued)



--Tom Peters
February 3, 1978

1502 BNC CONNECTOR (INPUT)

1502's are presently being shipped with a new vendor's (King) BNC.

King BNC shorting strap is anchored to the BNC barrel by a ring inside. The assembly area is soldering the ring to the BNC barrel to maintain good electrical connection.

About a dozen (12) of these were inadvertently shipped without being soldered, about s/n B071400. The symptom of a malfunction of the input to a shorted input and anywhere inbetween. This is without anything connected to the input BNC.

The solution is to solder the connector where the rivet hole is on the BNC barrel, being very careful not to interfere with normal operation and to be cosmetically acceptable.

Tom Peters
April 7, 1978

1502 AND 1503 CHART RECORDER FUSING

Reference: Wizard's Workshop, Issue 8-16

The fuse (F6123) was deleted from the power supply board of the 1502 and 1503, as per Mod M30656. The approximate serial numbers the mod was started are B060962 (1502) and B040850 (1503).

Gary Ellsworth
June 9, 1978

1502 AND 1503 - CASES CRACKING

Several 1502 & 1503's have developed cracks in the case. The cracks occur around the screws which pass through the rear feet and secure the instrument inside the case. If the instrument is removed, tiny hairline cracks may be visible inside the case. The cracks are usually visible on the outside only when the instrument is in the case and the screws are tightened.

Our recommendation, at this time, is to replace the case. We cannot guarantee a water-tight seal when cracks are present.

Gary Ellsworth
August 4, 1978

1502 & 1503 INTENSITY PROBLEMS

All 1502 & 1503's that exhibit intensity problems, intermittent intensity loss, or dim trace, should have the CRT socket heater contacts (pins 12 & 14) replaced with gold contacts. Replace all 1502 and 1503 subject contacts as they come through the service center. There is no charge for non-warranty instruments.

1502's below SN B011000 and 1503's below SN B011000 do not have to have gold contacts added.

If gold contacts are needed, contact Gary Ellsworth or myself at Delivery Station 58-511, or call Extension 6507.

Tom Peters
August 4, 1978

1502-1503 CHART RECORDER MANUAL

There is a new manual out to cover the chart recorder as a seperate item. The P/N 070-2554-00. It covers both the old and new recorders.

Tom Peters
March 1978

1502 & 1503 INTENSITY PROBLEMS CORRECTION

In the Wizards Workshop, August 4, 1978, Issue 8-24, there was an error in the first sentence of this article. I am reprinting the entire article below for your information:

All 1502 & 1503's that exhibit intensity problems, intermittent intensity loss, or dim trace, should have the CRT socket heater contacts (pins 12 & 14) replaced with gold contacts. Replace all 1502 and 1503 subject contacts as they come through the service center. There is no charge for non-warranty instruments.

1502's below SN B011000 and 1503's below SN B011000 do not have to have gold contacts added.

If Gold contacts are needed, contact Gary Ellsworth or myself at Delivery Station 58-511, or call Extension 6507.

--Tom Peters
58-511, Ext. 6507
Aug. 1978

1502/1503 - LIMITED INTENSITY

We are in the process of preparing 050 Mod Kits to improve the intensity of the 1502 and 1503. We will inform you when they are available.

--Gary Ellsworth
58/511, Ext. 6507
Oct. 1978

1502 CALIBRATION PROCEDURE REWRITTEN

Reference: 1502 Manual, 070-1792-00

The 1502 calibration procedure has been rewritten. It is presently in the form of a manual insert. One copy has been sent to each service center. If you haven't received yours by the end of September, order the manual (070-1792-00). If you have any customers complaining about the 1502 not passing their incoming inspection, give them a copy.

Tom Peters
October 13, 1978

1502/1503 - CHANGE IN TORQUE FOR THE CASE SCREWS

Reference: Wizard's Workshop, Issue 7-31, Page 19, Dec. 16,1977

The torque on the 1502/1503 case screw has been changed from 10 pounds (as stated in Wizard's Workshop 7-31) to 8 inch pounds. This was done to try to prevent the case from cracking.

Gary Ellsworth
October 27, 1978

1502/1503 ZERO REFERENCE POT MOD

Reference: 1502 Manual, P/N 070-1792-00
Fig. 2 Chassis pullout. Pg 8-5, number 27
1503 Manual, P/N 070-1865-00
Fig. 2 pullout, pg. 8-6, number 29

Serial Numbers: 1502 B090000
1503 B080000

The single turn zero reference adjustment pot (311-1806-00) is susceptable to accidental movement during normal operation of the instrument, and makes fine adjustment at narrow horizontal spans difficult. This MOD (M32748) changes the zero reference pot and switch assembly R0151 and S0151 from 311-1806-00 to 311-2010-01. This resistor/switch assembly will be installed in all instruments in the factory after serial #090000 for the 1502 and B080000 for the 1503 This resistor is a ten turn pot which makes minor adjustments much easier. The new assembly is directly replaceable with the old assembly.

Gary Ellswoth
October 27, 1978

1502 & 1503 PROBLEM -- CRACKED CASES

1502 & 1503 cases manufactured between January of 1978 and August of 1978 may develop cracks around the four corner screws. These are the screws that fasten the case to the instrument. Tiny hairline cracks are appearing, most noticeable when the screws are tightened down. They are also visible inside the case around the screw holes.

If a customer complains about a cracked case between now and September, 1979, replace the case at no charge to the customer -- (warranty or out of warranty), if the defect is due to defective material or workmanship as determined by the service technician after inspection. Use Customer Accommodation for non-warranty instruments.

--Tom Peters
58-511, Ext. 6507
Oct. 1978

1502/1503 - CHANGE IN TORQUE FOR THE CASE SCREWS

Reference: Wizard's Workshop, Issue 7-31, Page 19, December 16, 1977

The torque on the 1502/1503 case screws has been changed from 10 inch pounds (as stated in Wizard's Workshop 7-31) to 8 inch pounds. This was done to try to prevent the cases from cracking.

--Gary Ellsworth
58/511, Ext. 6507
Oct. 1978

1502/1503 ZERO REFERENCE POT MOD

Reference: 1502 Manual, P/N 070-1792-00
Fig. 2 Chassis pullout. Page 8-5, number 27

1503 Manual, P/N 070-1865-00
Fig. 2 pullout, page 8-6, number 29

Instrument Modification Notice M32748

Serial Numbers: 1502 B090000
1503 B080000

The single turn zero reference adjustment pot (311-1806-00) is susceptable to accidental movement during normal operation of the instrument, and makes fine adjustment at narrow horizontal spans difficult. This Mod (M32748) changes the zero reference pot and switch assembly R0151 and S0151 from 311-1806-00 to 311-2010-01. This resistor/switch assembly will be installed in all instruments in the factory after serial number B090000 for the 1502 and B080000 for the 1503. This resistor is a ten turn pot which makes minor adjustments much easier. The new assembly is directly replaceable with the old assembly.

--Gary Ellsworth
58/511, Ext. 6507
Oct 1978

1502/1503 CHART RECORDER MANUAL

Reference: Wizard's Workshop, Issue 8-9, Page 15

A new manual, (P/N 070-2554-00), that covers the Chart Recorder as a separate item is located in the microfiche under the 1500 series tab.

Gary Ellsworth
November 10, 1978

1502/1503 POTENTIAL INTENSITY LOSS/DEGRADATION

Reference: Wizard's Workshop, Issue 8-25, Page 9, and Issue 8-24, Page 22

In the Wizard's Workshop, Issues 8-24 and 8-25, we recommended replacing CRT socket pins 12 & 14 with gold contacts for improving 1502/1503 intensity. This fixed many instruments, but even with the new gold contacts some instruments exhibited intensity degradation. Extensive corrosion was discovered on the Berg maxi-harmonica connectors is very difficult, the production area is cutting the wires in the harmonica connectors (P42 & P43) as close as possible, stripping the wires and soldering them directly to the base of the appropriate Berg pins. We recommend a similar procedure in the field.

Thank you to Barry Rosenow, FDI Engineering, for this information.

Gary Ellsworth
November 10, 1978

1502 NON-LINEARITY ON XO. 1 RAMP

Reference: 1502 Manual, P/N 070-1792-00
Schematic Diagram 1B
Main Board Parts Layout; Mod #34978

Serial Number: B081981

When using the 1502 in XO.1 feet/div. mode, short cables may read short (out of spec.) and long cables may read long (out of spec.) due to the non-linearity on the XO.1 ramp.

Mod #34978 corrects this by using a more linear portion of the ramp. This mod will be installed in the factory in instruments B081981 and above. The mod can be installed in instruments prior to this serial number by changing the following resistors. Change R1138 from a 315-0121-00, 120 ohm resistor to 321-0172-00, a 640 ohm resistor: R1235 from 315-0472-00, a 4.7K ohm to 321-0255-00, a 4.42K ohm; and R1342 from 321-0164-00, a 499 ohm resistor to 321-0210-00, a 1.5K ohm resitor, all located on the main circuit board.

Gary Ellsworth
November 10, 1978

1502/1503 CHART RECORDER - SECURING ROD

Reference: 1503 Manual, P/N 070-1865-00, Fig. 4, Opt. 4
1500 Series Chart Recorder Manual, P/N 070-2554-00, Fig. 1 Exploded

The present rod (P/N 384-0824-00) used to secure the 1502/1503 chart recorders is too short. It is being replaced by a long rod, P/N 384-1349-00. If you have problems securing a chart recorder in a 1502 or 1503 we recommend using the longer rod.

Gary Ellsworth
February 2, 1979

1502/1503 - SEALING WITH RTV

The 1502/1503 use RTV Silicon Rubber for a sealant. Some RTV's contain and emit acetic acid, which may cause corrosion, even at remote distances. To avoid this corrosion, use only these RTV's with approved Tek part numbers.

RTV	3144	(Dow Corning)	006-2302-00
RTV	3145	(Dow Corning)	006-1171-00
	738		006-1923-00
GE	162		006-1171-00

Gary Ellsworth
March 16, 1979

1502/1503 - INTENSITY RANGE IMPROVEMENT

A Field Modification Kit, P/N 040-0882-00, that provides parts and instructions for the modification of the high voltage and Output Amp. boards is now orderable. This mod will allow greater CRT beam current, which improves the intensity range.

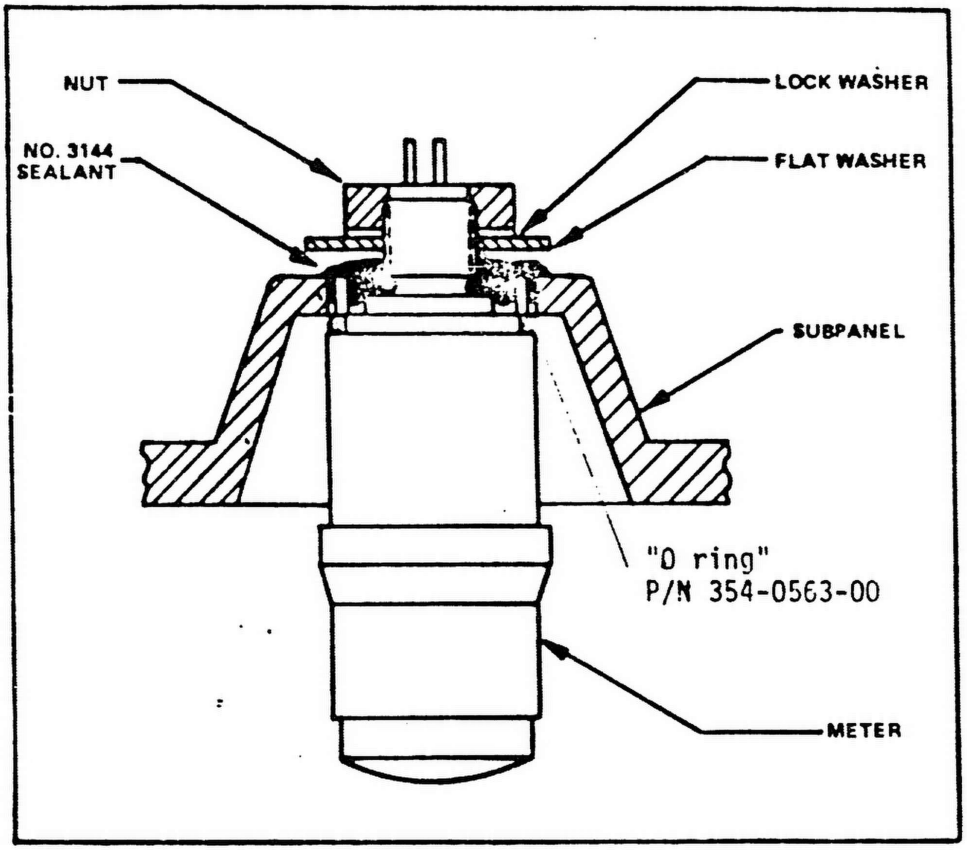
There will be a modest charge to the customer for the 040 kit, plus labor for installation and recalibration; however, the FE may elect to process the mod on a Customer Accommodation (Domestic).

--Gary Ellsworth
58/511, Ext. 6507
March 1979

1502/1503 DISTANCE METER "O" RING PART NUMBER (354-0563-00)

Reference: 1502/1503 Sealing Manual, P/N 070-2178-00

The sealing Ring between the subpanel and the Distance Meter was omitted from the 1502/1503 Sealing Manual. The part number is 354-0563-00.



Thanks to Dean Huster, Oklahoma Service Center, for bringing this to my attention.

Rich Kuhns
May 18, 1979

1502,1503 MANUALS REPRINTED

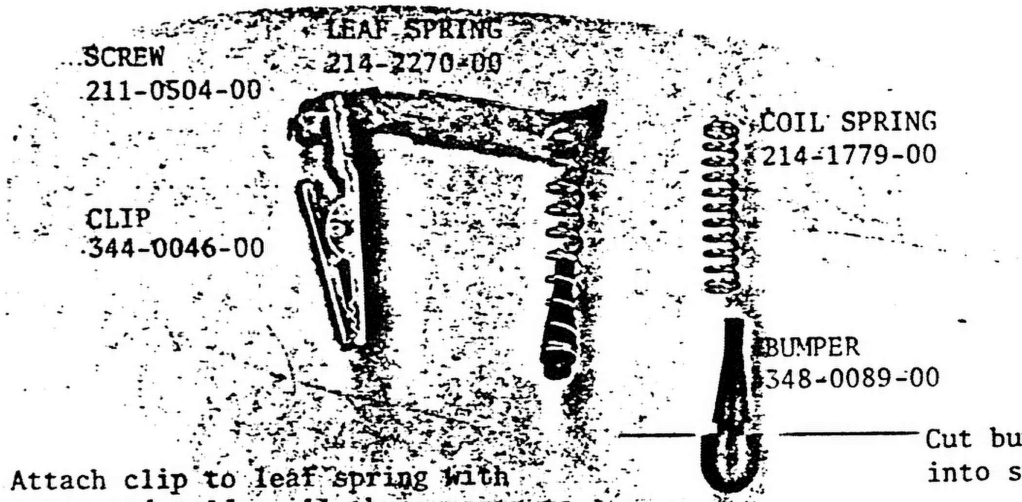
The 1502 manual was reprinted in January 1979; the part number is 070-1792-00. The 1503 manual was reprinted in May 1979; the prat number is 070-1865-00. The manuals were extensively corrected in the calibration and performance procedure. This information will be in the 1502, 1503 microfiche at the next update.

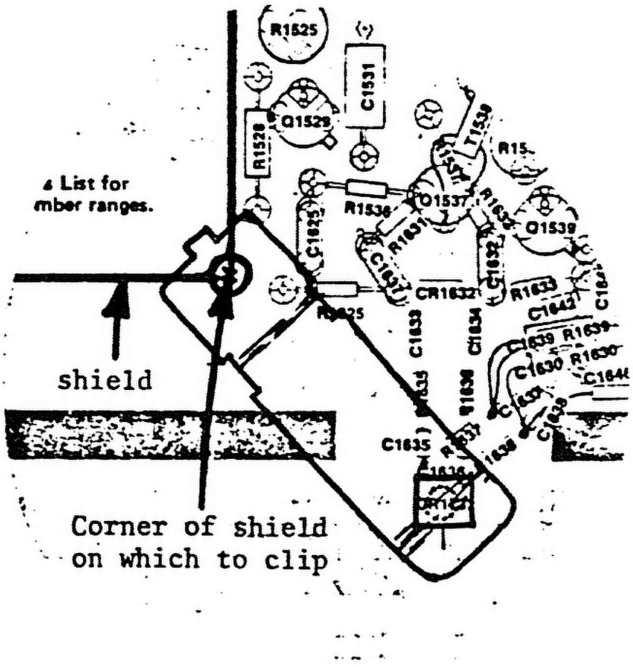
Rich Kuhns
August 24, 1979

1502 SAMPLING BRIDGE INSTALLATION AID

When constructed, this little jig looks to be straight out of a five-year-old's Tinker Toy box, but it works; and it saves a lot of aggravation and heat damaged sampling bridges (CR1732).

This is a "hold-down" device, and the clip mounts right at the corner of the plated brass shield near the bridge. The bridge is set into place and held there with the corner of a screwdriver tip or a scribe as the jig is placed over it. The jig will hold the bridge in place while it is being soldered; the bridge is so small and light that the steel leads are attracted to a magnetic soldering iron tip, making it nearly impossible to work with without this "third hand." In fact, even the surface tension of the solder has sufficient grip to move an unanchored bridge along with the iron.





1502/1503, IMPROPER CHARGING OF BATTERY PACKS

Reference: 1502 Manual P/N 070-1792-00
1503 Manual P/N 070-1865-00

It has been brought to our attention that charging the battery pack in 1502 and 1503 TDR's with a power inverter can cause severe damage to the power supply board and battery pack. Similar independent complaints confirm the problem.

The normally operating charging circuit charges the battery pack with a 120Hz current pulse that is triggered by the rectified sine wave from the line. Tests on the Tripplite PV 250 FC square wave inverter confirmed the obvious result that rectifying a square wave produces DC, which prohibits proper triggering of the charging circuit, which dumps relatively large amounts of current through SCR Q6155 and into the battery pack. For similar, but more unclear reasons, stepped inverters have reportedly caused the same kind of damage in the field.

It may be possible with proper filtering of the square wave, or slowly switching it, to prevent damage, but we will not be pursuing it.

Charging the batteries with a power inverter is not a guarantee that damage will occur, but customers should be warned of the high probability of instrument damage by using a square wave inverter. FEN and Wizard Workshop articles will be written to spread the word.

Submitted by--
Rick Wilson

Inserted by--
Steve Schmelzer
58-511, Ext. 6507

Jan 1980
Issue 10-2

1502, 1503, OUTPUT AMPLIFIER CIRCUIT BOARD REPLACEMENT

Reference: 1502 Manual P/N 070-1792-00
1503 Manual P/N 070-1865-00
Modification M33929, M35729

Output amplifier circuit board P/N 670-3130-03, replaces P/N 670-3130-00, which is no longer available. The new circuit board requires several changes on the high voltage power circuit board. Order P/N 050-1125-00 which contains parts and instructions.

Units Affected:

1502 B010100 - B099999
1503 B010100 - B099999

--Steve Schmelzer
58/511, Ext. 6507
Feb. 1980
Issue 10-4

1502, 1503 INTENSITY RANGE IMPROVEMENT

Reference: 1502 Mnl P/N 070-1792-00
1503 Mnl P/N 070-1865-00
Modification M33929

A modification kit is available to increase cathode-ray tube (CRT) beam current. It will improve CRT display, especially in high ambient light conditions. Order P/N 070-0882-00.

Units Affected: 1502 B010100 - B099999
1503 B010100 - B099999

Steve Schmelzer
Feb. 1980
ISSUE 10-4

1502,1503 HIGH VOLTAGE POWER CIRCUIT BOARD REPLACEMENT

Reference: 1502 Mnl P/N 070-1792-00
1503 Mnl P/N 070-1865-00
Modification M33929, M35279

High voltage power circuit board, P/N 670-3010-02, replaces P/N 670-3010-00, which is no longer available. The new circuit board requires changes on the output amplifier board. When replacing the high voltage power circuit board order P/N 050-1124-01 which contains parts and instructions.

Units Affected:

1502 B010100 - B099999
1503 B010100 - B099999

Steve Schmelzer
Feb. 1980
ISSUE 10-4

1502, 1503 VERTICAL AMP/SLOW RAMP CIRCUIT BOARD REPLACEMENT

Reference: 1502 Manual P/N 070-1792-01
1503 Manual P/N 070-1865-01
Modification M35279

Replacement of the Vertical Amp/Slow Ramp circuit board requires replacement of M1071, battery level meter. To replace the Vertical Amp/Slow Ramp circuit board, order appropriate kit from the following table.

INSTRUMENT	NEW CIRCUIT BOARD	REPLACE	KIT NUMBER
1502	670-3009-02	670-3009-00, 01	050-1169-00
1503	670-3895-02	670-3895-00, 01	050-1170-00

Effective Serial Numbers: 1502 - B010100 & Up
1503 - B010100 & Up

--Steve Schmelzer
58/511, Ext. 6507
May 1980
ISSUE 10-11

1501, 1502, 1503, BATTERY METER REPLACEMENT KITS

Reference: 1501 Manual P/N 070-1206-00
1502 Manual P/N 070-1792-00
1503 Manual P/N 070-1865-00

Modification: M30462, S32321, C31446

Battery meter, P/N 149-0044-05, replaces the battery meter, P/N 149-0031-00, in the 1501, 1502, and 1503. See the following chart for kits required to change the meter.

INSTRUMENT	NEW METER	REPLACES	KIT NUMBER
1501	149-0044-05	149-0031-00	050-1073-01
1502	149-0044-05	149-0031-00	050-0988-01
1503	149-0044-05	149-0031-00	050-0988-01

--Steve Schmelzer
58/511, Extl 6507
May 1980
Issue 10-11

1502/1503 FUSED BATTERY PACKS

The battery pack for the 1502 and 1503 was modified to include a 3 amp fuse, P/N 159-0124-00, and a fuse protection plate, P/N 337-2762-00. During calibration or repair of the 1502/1503, the battery pack is inserted into the instrument without the cover on the instrument. The fuse protection plate on the battery pack may possibly cut the cable harness in the 1502/1503. To prevent cutting the cable harness, I suggest extending the battery pack during repair and calibration. You can do this with the following parts:

BNC male to dual binding post adapter	P/N 103-0035-00
BNC female to BNC female adapter	P/N 103-0028-00
50Ω coaxial cable, 42 in.	P/N 012-0057-01
BNC female to dual banana adapter	P/N 103-0090-00

--Rich Kuhns
November 21, 1980
Issue 10-23

1502 STATIC SUPPRESSOR

To achieve the 1502's resolution, the sampling diodes are connected directly to the BNC connector. This makes the 1502 sensitive to static discharges which will damage the sampling diodes. A Static Suppressor (P/N 011-0132-00) will help to avoid static damages to the 1502. However, the static suppressor causes some degradation of performance and may not be effective in every case. If you have a customer in a static environment, the static supposer may save him costly repair bills.

Rich Kuhns

December 12, 1980
Issue 10-24

1502, U1575 SOLDERED TO CIRCUIT BOARD

U1575 should be installed into a socket to allow for calibration of horizontal timing. If you receive an instrument in which U1575 has been soldered directly to the circuit board, remove U1575 and add a socket (P/N 136-0269-02).

--Rich Kuhns
April 10, 1981

1502/1503 CHART RECORDER WITH A TIGHT FIT

A chart recorder may not fit into a 1502 or 1503. This may be caused by the chart recorder rails being out of alignment or the 1502 or 1503 sub panel having a rolled off corner in the plug-in compartment. To correct a chart recorder being oversized, loosen the screws holding the side panels and set the recorder on a flat surface. Squeeze the side panels together and retighten the screws. If you have a 1502 or 1053 sub panel with rounded corners in the plug-in compartment, carefully square them off with a file; be sure not to get metal shavings into the instrument.

Thanks to Doug Williams of the Seattle Field Office for this information.

--Rich Kuhns
April 24, 1981

1502 WARRANTY EXCEPTION FOR THE SAMPLING BRIDGE AND TUNNEL DIODE

When the sampling bridge and the tunnel diode have failed, it is due to customer abuse. If the instrument is under warranty, the customer should be charged for that portion of the repair. The 1502 manual, P/N 070-1792-01 Revision B, Feb. 1980, informs the customer of this exception to the warranty.

CONNECTING A TEST CABLE TO THE 1502

CAUTION

Do not connect live circuit cables to the input of the 1502. Voltages in excess of 5 V can damage the sampling gate or tunnel diode. If both the sampling bridge and tunnel diodes are destroyed at the same time, an improper use is indicated. If such simultaneous damage occurs, repair charges will be assessed to the customer regardless of the equipment warranty period.

Bleeding of cables before connecting them to the 1502 will remove static charge from them. The 50 Ω termination and BNC adapter supplied may be used to bleed any cable charge.

When testing antennas, be sure that you are not close to transmitters that can be keyed at the antennas receiving frequency. Keying of transmitters in close proximity can cause damage to the 1502.

--Rich Kuhns
July, 1981

1502/1503 FRONT PANEL PLUG-IN SEAL REPLACEMENT (REVISION #1)

In the March 18, 1977 WIZARD WORKSHOP Issue 7-6, it was mentioned that four new part numbers were set-up to facilitate front panel and plug-in seal replacement. The WIZARD has generated some confusion on the procedure on installing these parts. The WIZARD should have read:

> In order to better facilitate front panel and plug-in seal replacement, and to eliminate the need for special sealing tools, four new part numbers were generated.

P/N 333-1991-03 - 1502 Front panel (P/N 333-1991-00) with plug-in seal assembled.

P/N 333-2003-02 - 1503 Front panel (P/N 333-2003-00) with plug-in seal assembled.

P/N 333-2119-02 - 1502 Opt. 5 Front panel (P/N 333-2119-00) with plug-in seal assembled.

P/N 333-2123-02 - 1503 Opt. 5 Front panel (P/N 333-2123-00) with plug-in seal assembled.

Thanks to Jack Moffatt, Tektronix Ltd., Guernsey, for this information.

Rich Kuhns
53/108, Ext. 8693
Dec. 1981

1502/1503 COUPLING GENERATED WIDE TRACE

RE: Mod 46221

The large amplitude signal on the lead from the Power Switch to P29-1 is coupling signal into U2143 (0 dB SET) in the vertical amplifier. This produces a wide trace.

Remove this lead from the wiring harness and reconnect to original terminals. If you require field replacement of the complete wiring harness, use Wiring Harness 179-2178-02 and ELec Lead 195-7239-00.

--Gary Richey
53/108, Ext. 8693 MR
Issue 12-22

1502/1503 CODE 18 CONTINUATION

Serial Numbers: 1502 SN B010100 - B109999
1503 SN B010100 - B089999

The code 18 program that installs a fuse and fuse shield, using modification kit 040-0971-00, in the battery pack of a 1502 or 1503 will continue indefinitely.

--Gary Richey
53-108, Ext. 8693 MR
Issue 13-5

1502 ECONOBOND #59C BONDING MATERIAL

To help prolong the shelf life and sometimes rejuvenate Econobond #59C Bonding Material (used in Tunnel Diode (CR 1703) replacement procedure), add a small amount of Toluline.

Gary Richey
53-108, 642-8693
Issue 13-13

1502 PERFORMANCE CHECK REVISIONS

The data in Step 17 and 19 (Step 45 and 47 for Option 5) of the Performance Check for the 1502, located in Instruction Manual 070-1792-01, has been found to be in error.

The following is the correct data to be used when performing these checks.

STEP 17

GRATICULE LINE/DISTANCE DIAL READING

8	000
7	020 +/- .9
6	040 +/- 1.3
5	060 +/- 1.7
4	080 +/- 2.1
3	100 +/- 2.5
2	120 +/- 2.9
1	140 +/- 3.3
0	160 +/- 3.7

STEP 19

Data for Solid PTFE should be 164.1 to 171.9.

Data for Other-Var CW should be 234.7 to 245.3.

STEP 45

GRATICULE LINE/DISTANCE DIAL READING

8	000
7	005 +/- .6
6	010 +/- .7
5	015 +/- .8
4	020 +/- .9
3	025 +/- 1.0
2	030 +/- 1.1
1	035 +/- 1.2
0	040 +/- 1.3

(ARTICLE CONTINUED ON THE NEXT PAGE)

1502 PERFORMANCE CHECK REVISIONS (CONT.)

STEP 47

Data for Solid PTFE should be 40.7 to 43.3.

Data for Other-Var CW should be 58.3 to 61.7.

The CNA Business Unit is in the process of incorporating the above information into the instruction manual.

--Gary Richey
53/108, 642-8693
Issue 13-18

1502/1503 BATTERY PACK--SECOND SOURCE VENDOR

Service Support has received complaints recently concerning battery packs for the 1502 and 1503 that were defective upon receipt (batteries wired backwards, improper fit in the instrument). The complaints were from military sources. An investigation revealed that the battery packs were in fact manufactured by a company other than Tek.

The above information is being made available to make the Service Centers aware that the military has a second source for the battery pack and if a concern arises regarding a battery pack, the source of manufacture should be determined.

A Tek battery pack can be identified by the Tek part number (016-0595-01) stamped on the instrument side of the battery pack front panel, the letters TEK visible on the power fuse jack circuit board, and possibly a Tek "tested by" sticker affixed to the side of the battery pack.

--Gary Richey
53/108, 642-8693
Issue 13-18

1502/1503 CRT SOCKET PINS REPLACEMENT

REF: Wizard's Workshop Issue 8-24, 8-25, & 8-31

In Wizard's Workshop Issue 8-24, 8-25, and 8-31 reference was made to replacing CRT socket pins 12 and 14 with gold contact pins. This procedure is not necessary because the primary reason for intensity degradation related to the CRT socket and cable assembly was discovered to be poor contact in connectors P42 and P43. Repair of these connectors is outlined in Wizard's Workshop Issue 8-31.

Service Support no longer has gold contact socket pins available and they are no longer being used in current production instruments.

--Gary Richey
53/108, 642-8693
Issue 13-18

1502/1503 DEFECTIVE CHART RECORDER PAPER

The possibility exists that some defective rolls of chart recorder paper (006-1658-01) may be in stock in the Service Centers. The defect involves the cardboard center of the roll being slightly longer than the width of the paper. This causes binding of the roll in the recorder and inability of the motor to properly advance the paper.

Stock should be checked and purged if necessary.

--Gary Richey
53/108, 642-8693
Issue 13-18

1502 DEFECTIVE TUNNEL DIODE 152-0489-00

Between January and July 1983, the 1502 Tunnel Diodes 152-0489-00 were processed in such a way that they could possibly be defective from stock and inoperable, or of marginal performance when installed in an instrument.

It is suggested that all diodes in stock be checked using the following procedure and purged from stock if they fail any of the specs.

Using a curve tracer, set up to measure tunnel diodes (see Instruction Manuals for 576 and 577), determine the peak and valley currents. Minimum peak current should be 15ma and there should be at least a 5:1 ratio of peak current to valley current.

Gary Richey
53/108, 642-8693
Issue 13-25

1502/1503 POWER SUPPLY EVALUATION

CNA Engineering is in the process of evaluating the power supply in the 1500 Series. One area of concern is the occasional failure that involves the smoking of the power transformer T0389 (120-0978-00) and the burning of the power supply board A6 (670-3520-XX).

If you incur a failure of this type that requires the replacement of the power supply board, it would greatly assist the Engineering Evaluation if the board was returned to Beaverton.

Please return any applicable board, along with any information you have concerning the board and instrument, to Reliability Information Services, Delivery Station 53/114. This return program will continue until June 15, 1984.

Gary Richey
53/108, 642-8693
Issue 14-2

1502/1503 BATTERY PACK PRECAUTIONS

The CNA Business Unit recommends discontinued use of the practice of applying 1 to 2 amp pulses to recharge the 1502 and 1503 battery packs.

Although a high current pulse will rejuvenate the battery pack, the benefits are temporary at best. One reason sealed NiCad batteries fail is that small metal bridges form between the electrodes, causing one or more cells to short out. The high current will vaporize the shorts, but it will also burn some of the electrolyte, thus adding to the degradation of the cells and shortening their life expectancy.

If a battery pack will not recharge by use of the prescribed 150mA, 16 hr. charge rate, then the best solution is to replace the battery set. Refer to the operating instructions section of the 1502 Manual page 2-2 and 1503 page 2-8 with special attention to recommended charge and discharge cycles, ambient operating, charging and storage temperatures.

At this time it is recommended that the battery pack be removed from the instrument during storage whenever conditions permit.

Modifications to the instrument are currently being evaluated that will improve the battery reliability and the results of this evaluation will be made available to the Field when complete.

Gary Richey
53/108, 642-8693
Issue 14-2

1502 OPT. 5 DEFECTIVE DISTANCE DIALS

REF: CPN 02628

Some distance dial assemblies, P/N 311-1800-01, for the 1502 Opt. 5, have been found to be defective. The defect involves the dial not being able to read 000 or below when turned in a CCW direction.

All existing stock should be checked and replacements ordered if necessary.

Gary Richey
53/108, 642-8693
Issue 14-3

1502/1503 POWER SUPPLY EVALUATION ADDENDUM

REF: Wizard's Workshop Issue 14-2

CNA Engineering requests that all 1502/1503 power supplies sent to Beaverton under the Power Supply Evaluation Program (see Wizard's Workshop Issue 14-2, February, 1984, Page 8) include the serial number of the instrument from which the power supply came. This information is important to their evaluation.

Gary Richey
53/108, 642-8693
Issue 14-5

1502 STRIPLINE SHIELD PART NUMBER CORRECTION

REF: 1502 Instrument Manual
P/N 070-1792-01

Fig. 2 Chassis, Pg. 9-7 RMPL

On the chassis exploded view (Fig. 2), the index numbers for the top and bottom stripline shields are reversed.

Index #109 is listed as P/N 337-2134-00, top, but should be P/N 337-2133-00, bottom.

Index #103 is listed as P/N 337-2133-00, bottom, but should be P/N 337-2134-00, top.

Jessica Brooks
73/185, 923-4452
(Redmond)
Issue 14-13

1502 INSTRUCTION MANUAL CORRECTION

REF: 070-1792-01

1502's will not meet step 19 on page 4-3 of the performance check unless the horizontal gain R3217 and horizontal positioning (R3213) adjustments are adjusted to a specific point. Do steps 38-42 on page 4-9 of the adjustment procedure. Change step 42 as follows:

42. Push and hold the record switch, adjust-R3217 (Horiz. Gain) so that the dot at the start of the sweep is on or just to the left of the graticule area. Release the record switch, after the sweep returns to normal, check that the trace covers the 10 divisions of the graticule area.

Thomas Fisher
73/185, (503) 923-4471 REDMOND
Issue 15-1

1502/1503 BATTERY PACK SEAL

REF: 016-0595-01

Occasionally, battery pack gaskets do not form a water tight seal when the screws are finger tight. To determine if the battery is sealing properly, remove the battery from the cabinet. Check for contact between the gasket (on all four faces) and the cabinet. If the gasket does not make contact, then tighten the battery screws with a screw driver approximately 3/4 of a turn past finger tight.

Thomas Fisher
R1/000, 923-4471
(Redmond)
Issue 15-3

1502/1503 TDR CABINET SEALING

Several Service Centers have received TDRs with improperly sealed cabinets. The cabinets have been sealed with RTV sealant instead of silicone grease. The RTV makes it impossible to remove the cabinet without destroying the gasket and sometimes the cabinet too.

When resealing the cabinet after a repair, follow the procedure on pages 4-18 (1502) and 4-13 (1503) of the Service Manuals. Step 4 in the manual states to use a waterproof lubricant (G.E. G-661 silicone grease, 006-2207-00).

Thomas Fisher
R1-000, (503) 923-4471

Issue 15-18

1502 10MA TD MIXED STOCK

REF: 1502 Manual, P/N 070-1792-01
TD, P/N 152-0140-01

Some 1mA tunnel diodes were found mixed with the 10mA TD manufacturing stock. Some 1502's may have been shipped with 1mA TD's in them. If you get an instrument with aberration or falltime problems, check the marking on CR1609; it should be a 10mA TD. If you are unsure, replace it with P/N 152-0140-01.

Thomas Fisher
R1-000, (503) 923-4471

Issue 16-1

1500 SERIES FRONT SUBPANEL INFORMATION

REF: 1502 SERVICE MANUAL
P/N 070-1792-02

1503 SERVICE MANUAL
P/N 070-1865-01

To ease in the replacement of the 1500 Series front subpanels, the following assemblies will be made available with the waterproof seals and the implosion shields already installed.

1502 Standard - 614-0134-00
1503 Standard - 614-0132-00
1503 Option 01 - 614-0198-00

This will hopefully ease and shorten the time required to install these assemblies.

Thanks to Tom Griffin of the Chicago Field Office and Mike Enstrom of Factory Service for their input in this matter.

John Breeden
Redmond Service Support
R1-000, 923-4521
Issue 17-1

WIZARD WORKSHOP ARTICLES

1502 STRIPLINE CONFIGURATION

REF: 1502 SERVICE MANUAL
P/N 070-1792-02

On page 4-17 in the 1502 Service Manual, there is an error in one of the diagrams of the dressing of the stripline. In Figure 4-15, R1703 and R1704 have been reversed. If one was to dress the rear of the stripline in the manner described in the current figure, the 1502 would not show any display at all. Please change your manual accordingly.

Thanks to Mike Enstrom of Factory Service for bringing this to our attention.

John Breeden
Redmond Service Support
R1-000, 923-4521
Issue 17-1

1502 MANUAL CHANGE INFORMATION

Please see Pullout "A" for manual change information on the 1502.

Jessica Brooks
Redmond Service Support
R1/000, 923-4452
Issue: 18-1

1500 TDR BATTERY PACK CHANGE

REF: Corporate Mod #65270

Serial Number 1st affected:
1502 R118365
1503 R097969

Instruction Manuals:
1502 P/N 070-1792-02
1503 P/N 070-1865-01

A 1800 mA hour battery pack P/N 016-0595-01 used with the 1500 Series TDR's has been replaced with a 200 mA hour battery pack P/N 016-0813-00. The 016-0813-00 is the pack being used in the new 1500B TDR's. The 016-0595-01 consists of 9, 1.2 V, 150 mA C cells. The 016-0813-00 consists of 9, 1.2 V, 200 mA D cells.

The 016-0595-01 battery pack and 146-0018-01 battery cells will no longer be available for customer service. The new 146-0065-00 is not a direct replacement for the 146-0018-01.

P/N 050-2345-00 has been set up for replacement of the 146-0018-01. The 050-2345-00 consists of a 146-0065-00 and 2 each 343-0349-01.

The new style battery sets are slightly larger in diameter. To accommodate this increase, the clearance holes on the side panel retaining clamps were enlarged from a diameter of 0.197 to a diameter of 0.312 inches. The revision to the retaining clamp was done in February of 1987 with no serial number break given. This means that there are 016-0595-01 battery packs in the Field with 146-0018-01 battery sets that already have the retaining clamps with the larger diameter holes. For these battery packs, the 146-0065-00 is a direct replacement, but there is no good way of identifying these packs other than measuring the holes. If in doubt, use 050-2345-00 when replacing 146-0018-01 battery sets.

Jessica Brooks
Redmond Service Support
R1/000, 923-4452
Issue: 18-2

WIZARD WORKSHOP ARTICLES

1502 FUSE CHANGE

REF: P/N 070-1792-02
Mod M62672 & M65403

Affected Serial Numbers:
R117576 and Above

The above referenced mod changed the fuseholders and front panel fuses. This was done to improve the watertightness of the fuseholder. Following is a list of the effected components.

PAGE 9-9

Item 31 --
352-0362-00 B010100 - R117575
352-0766-00 R117576

Item 32 --
210-1245-00 B010100 - R116634
210-1419-00 R116635 - R117575
Deleted R117576

PAGE 7-25

F0401 --
159-0032-00 B010100 - R117575
0.5A, Slow Blow, 0.25" x 1.25"
159-0282-00 R117576 - R118372
0.5A, Slow Blow, 5MM x 20MM
*159-0182-00 R118373

** 159-0282-00 and 159-0182-00 are identical parts. Mod #M65403 removed 159-0282-00 because of part number duplication.*

F0491 --
159-0029-01 B010100 - R117575
0.3A, Slow Blow, 0.25" x 1.25"
159-0281-00 R117576
0.25A, Slow Blow, 5MM x 20MM

This data is provided for information only.

Jessica Brooks
Redmond Service Support
R1/000, 923-4452
Issue: 18-2

1500 and 1500B Series: Bad Batch of Battery Cells

Ref: 146-0065-00

There have been several failures in the replacement battery cells used in the 1502, 1503, 1502B, and 1503B Time Domain Reflectometer battery, part number 016-0595-01 or 016-0813-00. The cells, part number 146-0065-00, are in a pack of 6 welded together with metal straps. In several batches, lot dates 8840 to 8850, there are weak welds that can break when put into the battery pack frame or when receiving a mechanical shock.

Until current stock in used up, you need to visually inspect the welds, and pull on them to make sure they won't come lose before assembling the battery pack. The bad welds will pull off the cell. If batteries are found with bad welds they should be returned to Customer Service for credit. A Component Problem Notice will be initiated. Newer batteries have been tested for weak welds by the manufacturer.

Curtis Smith
CNA Service Support
R1-000, (503) 923-4417
Issue: 19-5

1500 Series: Instrument MOD - Updates *(Pullout B)*

In an effort to provide service technicians with basic information on changes to the 1502 and 1503 instruments, we have developed a synopsis of MODS.

The 1500 series is in long term support and has been replaced by the 1500B series, so there should be no other changes.

For more information on individual changes refer to the MOD Summaries, look at the MOD kits listed in ***Pullout B*** of this issue, or contact CNA Service Support.

Curtis Smith
CNA Service Support
R1-000, (503) 923-4417
Issue: 19-7

1500B Series: Instrument MOD - Updates *(Pullout B)*

The service updates on the 1500 series Metallic Time Domain Reflectometers have fallen behind. In an effort to provide service technicians with basic information on changes to the 1502 and 1503 instruments we have developed a synopsis of MODS done. The 1500 series is in long term support and has been replaced by the 1500B series so no other changes should come through. For more information on individual changes refer to the MOD Summaries (they will be updated soon), look at the MOD kits listed below, or contact Jessica Brooks (503) 923-4452, or Curtis Smith (503) 923-4417, at CNA Service Support.

1502s ONLY

CHANGE TO METAL FILM RESISTOR TO REDUCE NOISE MOD # 61690

Serial # 1502 R117428
A1R1540 was changed from a carbon to a metal film resistor. On some instruments the carbon resistor would cause noise, appearing as a fuzzy trace at high vertical gain levels. Changing to a metal resistor, 321-0361-00 56 K Ohm, eliminated this possibility. Also refer to MOD #58936, #56662 (1502 only) and MOD #58317 for other noise problems.

LONGER SCREW ON SAMPLER SHIELD MOD # 61613

Serial # 1502 R116795
The original screws for the Sampler Shield (Fig. 2 #90 & 92) were too short. Use part # 211-0108-00 when replacing the 211-0136-00 screws.

SLIDE RULE APPLICATION NOTE ADDED MOD # 59858

A guide to using the 1502 Slide Rule (Slide Rule # 003-0700-00, Book: TDR Slide Rule Instr 062-8344-00) was added to the standard accessories. The Slide Rule is used when a very accurate distance measurement is needed, the book explains how to use the Slide Rule.

670- MAIN BOARDS DO NOT HAVE 20 mA TDs, ORDER 672- MOD # 59046

The replacement 1502 main boards do NOT come with 20 mA TDs (A1CR1703 152-0489-00). If you need both the board and TD order the proper 672- assembly.

Board without TD

Board#	Board	Instrument
670-4338-04	Metric Main Board	1502 opt 5 (Metric)
670-3008-09	Stand. Main Board	1502 standard

Assembly containing Vert Ampl/Slow ramp board, cam switches,mounting hardware, and battery meter, but NO TD.

(Continued on the following page)

1500B Series: Instrument MOD - Updates *(Pullout B)*

Board #	Assembly	Instrument
670-4338-04	672-0570-03	1502 opt 5 (Metric)
670-3008-09	672-0487-03	1502 standard

Board with 20 mA TD

Board #	Assembly	Instrument
670-4338-04	672-1220-00	1502 opt 5 (Metric)
670-3008-09	672-1221-00	1502 standard

SEVERAL RESISTORS CHANGES FOR NOISE REDUCTION MOD # 58936

Serial # 1502 R116352

Several carbon resistors in the Sampling and Stripline circuits were changed to metal film resistors of the same value. This reduced noise on the trace at high vert gain levels by as much as half and reduced the chance of the noise degrading as the instrument aged. The change also improved aberrations and falltime. Changed parts are:

Ckt #	Old Part #	New Part #
A1R1536	317-0332-00	322-3243-00
R1537	317-0332-00	322-3243-00
R1606	317-0103-00	322-3289-00
R1607	317-0470-00	322-3066-00
R1608	317-0391-00	322-3154-00
R1625	317-0430-00	322-3062-00
R1631	317-0120-00	322-3009-00
R1632	317-0120-00	322-3009-00
R1633	317-0430-00	322-3062-00
R1635	317-0151-00	322-3114-00
R1636	317-0151-00	322-3114-00
R1637	317-0151-00	322-3114-00
R1638	317-0151-00	322-3114-00
R1641	317-0201-00	322-3126-00
R1642	317-0201-00	322-3126-00
R1702	317-0221-00	322-3130-00
R1704	317-0390-00	322-3058-00
R1707	317-0751-00	322-3181-00
R1752	317-0103-00	322-3289-00
R1753	317-0152-00	322-3210-00

The most critical resistors for noise reduction are:

R1702 R1707 R1637 R1638 R1635 R1636

R1635 and R1636 are very difficult to change. Changing R1637 and R1638 will do the most good for the least effort. Refer to mods # 61690 above, 56662 (1502 only), and 58317 for other noise problems/fixes.

(Continued on the following page)

1500B Series: Instrument MOD - Updates *(Pullout B)*

OPTION 02 - STATIC PROTECTION - CREATED MOD # 56699

Serial # R115723
Option 02 was created to replaced Custom MOD ea. and to become an internal version of the optional accessory Static Suppressor 011-0132-00 which is still available as an external adapter. The option is 2 diodes on the strip line. If installed in the factory there will be an identification sticker placed on the rear chassis frame on the rear on the bucket by the caution sticker. The option is not available as a kit.

The diodes help protect the 20 mA TD (A1CR1703) and the Sampling Bridge (A1CR1732) from static damage but adversely affect the resolution of the instrument (see special aberration and falltime checks in the instruction manual). Make sure the customer understands there will be a large aberration on the pulse and the falltime and thus the resolution will be cut from .6 inch to about 2 inches before installing this option! If you install Option 02 charge for parts and time used. When in doubt recommend the customer try the external static Suppressor first.

To install an Option 02:

1. Remove the instrument from the case and remove the mainboard shield (the bottom shield). Refer to the Maintenance section of the 1502 Instruction Manual (070-1792-02) for more disassembly details.
2. Remove the Sampler and Stripline shields.
3. Dress 2, 152-0333-00 diodes by bending the leads as close to the body of the diode as possible and cutting the leads so there is only about .2 inches of lead.
4. Solder the anode of one diode to where the center conductor of the Front Panel BNC is soldered to the strip line (front on the main board) keeping the leads as short as possible. Solder the cathode of the diode to where the outer, ground, part of the BNC is soldered to the outer, ground, part of the strip line.
5. Solder the cathode of the second diode to where you soldered the anode of the first diode. Solder the anode of the second diode to the outer, ground, part of the BNC on the opposite side of the BNC from the first diode.
6. Replace the stripline and sampler shields.
7. Calibrate the instrument. Make sure to use the special aberration and falltime checks instead of the regular checks!

TRANSISTOR CHANGED - ORIGINAL NO LONGER AVAILABLE MOD # 56662

Serial # 1502 B081650
The original screened part in A1Q1537, 153-0556-01, is no longer available. It has been replaced by 151-0108-01. Note: This part can cause the noise level to increase. If you have changed this part it may affect the Loop Gain, LF Comp, Snapoff, and Avalanche levels (refer to the calibration and repair sections of the manual). If you have readjusted all these tweaks and still cannot get the noise back in spec., you may have to try another 152-0108-01. Refer to mods #s 61690, 58936 (1502 only above), and 58317 for other noise problems/fixes.

(Continued on the following page)

1503 ONLY

LAST MANUAL UPDATE MOD # 68765

The 1503 manual has been updated as the instrument is being obsoleted and replaced by the 1503B. The last update of the 1503 manual, part # 070-1865-02, is currently available.

1503 SLIDE RULE PART # CHANGED MOD # 64580

Serial # 1503 R097911
The old part number for the 1503 standard accessory Slide Rule was 003-0700-01. The new number is 003-1419-00. The part was changed to allow the Slide Rule to be used with the 1503B.

PARTS IN RET LOSS (SENSITIVITY) CAM CHANGED MOD # 45051

Serial # 1503 B094550
2 parts, an O-ring and spacer, on the 263-1125-00 Cam Switch Actuator Assembly were changed to prevent the variable Fine Ret Loss pot from turning with the main Ret Loss knob. The pot is Fig 2-118, on the end of the cam shaft or ckt # R2126, the O-ring goes on the shaft of the pot and is not shown in older manuals. The ring provides friction on the pot to prevent it from turning when the main Ret Loss knob is turned. The old O-ring part number is 354-0561-00 the new number is 354-0240-00. The spacer holding the pot, Fig 2-124, has been changed from 126-0586-01 to 126-0586-03. The spacer's threaded part was lengthened for easier assembly.

Note: The Ret Loss control is labeled as the Sensitivity control on 1503-Opt 01s.

Common to 1502 and 1503

POWER SUPPLY CHANGE - PREVENT POWER UP FAILURE MOD # 67961

Serial # 1502 B118459, 1503 B098100
Some instruments were having problems with initial power up failures. Occasionally when the power switch was turned on the instrument failed to power up. To prevent this problem A6R6558 was changed from 1K to 10K (315-0103-00) and A6R6356 is changed from 56K to 75K (315-0753-00). This changes the power supply board # to 670-3520-03. To replace the two affected resistors use kit 050-2463-00. Instruments 1502 serial # B010100 to B020394, 1503 B010100 to B020245 should order the board update kit # 050-0806-02 instead of the resistor kit if the power supply board is a 670-3520-00.

BATTERY WARNING LABEL CHANGED MOD # 67397

Serial # 1502 B118459, 1503 B098099
The battery compartment label (334-2529-01) was removed and a new label (334-7109-00) has been added. The new label is put on just below the rear AC receptacle. It warns the user NOT to plug the instrument into AC without the battery installed. If the battery is not installed when the 1500 is plugged into AC damage to the power supply will result, the new sticker is an effort to better inform the user of this fact. Older instruments are not required to have this sticker, however it is available to be added.

(Continued on the following page)

1500B Series: Instrument MOD - Updates *(Pullout B)*

WARNING - NO PART # ON NEW BATTERIES MOD # 67202

Refer to *Wizards' Workshop* article in issue 18-2 and MOD # 65270 below
The battery for the 1500 series was changed from a 016-0595-01 to a longer life 016-0813-00 battery pack. The new battery uses different cells and side panels. The old packs were marked with the 016-0595-01 number, the new packs do not have a part number written on them. New packs can be identified by white warning stickers on the rear heat shield and by larger holes in the side rails (the old side rails have 3/16 inch holes the new have 5/16 inch). If you have an older pack you must order kit # 050-2345-00 to replace the battery cells.

VISOR NO LONGER STANDARD ACCESSORY MOD # 67174

Serial # 1502 R118452, 1503 R098080
The vendor can no longer supply the instrument visor (standard accessory # 016-0297-00). Since the instrument would soon be phased out and the visor is not necessary for operation, a new supply of visors was not found. This part is no longer a standard accessory but is still available as a replacement part until the customer service supply runs out.

HARDWARE CHANGES ON LID DOOR MOD # 66873, 63174, 59986, 56357

Serial # see below
There have been several hardware changes to the 1500 lids.

Fig #	Old Part #	New Part #	Serial # Range
Screw too long for hole in lid, would break or loosen.			
1-25	213-0264-00	213-0838-00	1502 R118452+ 1503 R098080+
Changed to allow the lid to close better.			
1-25	213-0119-00	213-0264-00	1502 R117144 1503 R097313
1-28	213-0068-00	213-0839-00	1502 R117144+ 1503 R097313+
New hinge using unbeveled screw.			
1-22	211-0538-00	211-0007-00	1502 R116861+ 1503 R097243+
1-24	214-0001-00	214-0001-03	1502 R116861+ 1503 R097243+
1-25	211-0102-00	213-0119-00	1502 R116861 1503 R097243
Screw with lock washer, prevents Pin Actr from loosening			
1-20	211-0008-00	211-0033-00	1502 R116469+ 1503 R096850+
Machine screw changed to self-tapping screw.			
1-28	211-0102-00	213-0068-00	1502 R115680 1503 R096035

(Continued on the following page)

SELECTED/TESTED PARTS CHANGED TO COMMON PARTS MOD # 66091

Serial # 1502 R010273, 1503 R010356
Several selected or tested parts were changes to common parts to reduce inventory and instrument cost on several instruments. The 1500 parts affected are:

Inst.	Old Part #	New Part #
150X	156-0067-01	156-0067-00
1503	156-0158-04	156-0158-00

OPTION A3 (AUSTRALIAN) POWER CORD CHANGED MOD # 65798

Serial # 1502 R117781, 1503 R097676
The old part number for the A3, Australian power cord 161-0227-00, is no longer available. The new part, which has a straight connector instead of angled, is 161-0066-11.

BETTER BATTERY USED - LONGER OPERATING TIME MOD # 65270

Serial # 1502 R118365, 1503 R097969
The battery changes from a 016-0595-01 part to a 016-0813-00. The new battery has a longer operating time and is common to the 1500B series. Refer to the Wizard article in issue 18-2 for details. Note: also refer to MOD # 67202 above.

IC IN LOGIC CIRCUIT CAUSING CHART TIMING PROBLEMS MOD # 65028

Serial #s 1502 R118178 to R118310, 1503 R097835 to R097921
A previous MOD replaced all 156-0350-00 and 156-0350-02 parts in the 1500 series with a 156-0350-05 IC to reduce inventory. It was later discovered that the -05 ICs were not totally compatible with the -00 and -02 parts, they did not have an internal buffer. The part was changed back to 156-0350-02 but not before some instruments were shipped, these units may have the -05 or -02 part. The -05s only cause a problem if put in A5U5166, they can be identified by the vendor # MC14011BCLD were the -02s are MC14011UBCLD. If you find an instrument with a -05 in A5U5166 (they are OK in other locations) please change it to a -02. The 156-0350-05 cause an oscillation in the Chart Speed Sense circuit (A5U5166A B C and D) making the chart recorder timing change intermittently.

The Sense circuit takes the signal from the chart recorder (seen at TP5272) and converts it to a pulse seen at TP5145 and counted by A5U5147. When the IC oscillates it puts extra pulses into U5147 making the chart timing change. The problem can be seen on the chart recordings as a nonlinear chart when checking the timing with timemarks. Ex: marks 1 division apart on screen can appear 1 division, 1/2 division apart, or 2 divisions apart on the same chart. Onscreen you will see changes in the rate the Record dot moves across the screen, it will speed up and slow down as the instrument tries to match the record speed with what it sees at U5147 as the chart speed.

(Continued on the following page)

CHART RECORD BOARD CHANGED TO -08, -07s CAUSE PROBLEMS MOD # 64028

No Serial Number - identify by board suffix number.
When the Chart recorder board 670-1742-06 was relayed out 3 separate ground lines were tied together. This caused a ground loop that increased the noise level when the Chart recorder was plugged in. To fix this the grounds were separated and the board rolled to 670-1742-08. At the same time R1027 was changed from 390 to 240 Ohms (315-0241-00) to increase the amplitude of signal to the Chart Speed Sense circuit compensating for weak LEDs.

There were only a few -07 boards shipped and they only caused a problem on some 1500s. If you have a -07 board that is causing noise problems the quickest fix to reduce the noise is by cutting the ground braid from the chart recorder chassis to the 670-1742-07 board, the better, but more expensive fix is to replace the -07 board with a -08. Cut the ground braid only on -07 boards with problems! The problem can be seen when checking the noise level. Plug and unplug the Chart Recorder to see if it affect the noise level.

Note: The -07 board can be used for direct replacements for -04 to -07 boards. Boards with a -00 to -03 need to use replacement kit # 050-1530-00.

TOO TALL SCREW CHANGED ON YT CHART RECORDER MOD # 63150

Serial # 1502 R118180, 1503 R097835
The old screw (YT manual Fig 1-35 211-0602-00) for the chart recorder had a built in lock washer and was assembled with a flat washer and the ground lug for the main Chart Recorder board. This arrangement could interfere with the swing of the chart stylus so it would not write to the edge of the paper. The screw was changed to 211-0589-00, the same size screw without the lockwasher.

EXTRA WIRES REMOVED FROM CRT WIRE HARNESS MOD # 62570

Several wires were removed from the CRT Wire Harness 136-0644-00 to improve reliability, and to reduce noise and cost. These wires were not used for any circuits in the instrument. The part number did not change. Wires removed were (from schematic 7):

Line from	To
J0196 pin 5	J0396 pin A2
P37 pin 4	J0396 pin B6
J0396 pin B6	J0396 pin B9
P37 pin 2	J0396 pin B7
J0396 pin B7	J0396 pin B8
P18 pin 3	J0396 pin A7
P18 pin 1	J0396 pin A6
P18 pin 7	J0396 pin B5
P18 pin 5	J0396 pin A4

(Continued on the following page)

1500B Series: Instrument MOD - Updates *(Pullout B)*

PARTS CHANGED TO REDUCED COST mods # 62284, 61761, 61483, & 61288

The following list of parts were changed on the 1500 series to common or lower priced parts reducing inventory and costs. All New parts are direct replacements for Old parts.

Old Part #	New Part #	Description
156-0067-12	156-0067-01	IC, Op-Amp
131-0513-03	358-0699-00	Pin & Bushing
358-0329-00	358-0699-00	Pin & Bushing
159-0124-00	159-0266-00	3A Battery Fuse

PARTS REMOVED FOR UNUSED FUNCTION MOD # 61090

Serial # 1502 R116611, 1503 R087098
The jumper at A3P26 was used to disable the horizontal sweep. This function was not accessible to the customer and could possibly damage the CRT. The jumper and pins were removed and A3R2149 was replaced by a 0 ohm dummy resistor 131-0566-00. If you have a problem with this jumper in older instruments just solder pins 2 and 3 of P26 together to short across R2149.

SETSCREW TO PREVENT LOOSE KNOBS ON XY AND CHART MODULE MOD # 60977

Serial # 1502 R117092, 1503 R097288
The Front Knob Setscrew on the XY modules and YT Chart Recorders were changed to prevent the knob from coming loose. The setscrew was changed from a 366-1368-00 to a 366-0650-00. The shaft the knob goes on was also improved but the part number was not changed. Some older instruments had the knob glued on to prevent loosening, this prevented disassembly for repair.

PARTS REMOVED FROM UNUSED CIRCUIT MOD 58711 and 58036

Serial # 1502 R116254, 1502 R096484
The Camera function was removed from the instrument at serial number 1502 B060960, 1503 B040880 (refer to Wizard articles in November and December 1977 issues) but the internal parts for the function were not removed from the Output Amp board (670-3130-04). The following parts were removed from this unused circuit:

Ckt #	Part #
A3R3237	311-1554-00
Q3137	151-0341-00
C3132	283-0067-00
R3124	315-0203-00
R3131	315-0103-00
R3136	315-0104-00
R3138	315-0104-00
R3225	315-0104-00
R3229	315-0105-00

(Continued on the following page)

A resistor was added, A6R3127 315-0104-00 100K, to tie the U3123A inputs low. The resistor goes from where the collector of Q3137 was to a through hole under where R3225 was, tieing the input to U3123A to -5V. The pins 1 and 2 of U3123 were shorted together to make sure the output of the gate was high. This keeps U3123 from oscillating and affecting the retrace. The part number of the board (670-3130-04) was not changed as the circuit removed was non-functional before the change.

Note: This part is a direct replacement for -01 to older -04 boards. If the board is a 670-3130-00, serial # 1502 B010100 to B099999 1503 B010100 to B069999, you should use replacement kit # 050-1125-01 which includes parts to upgrade the High-Voltage board to an 670-3010-02 to match the upgraded Output Amp Board.

PLASTIC ADDED TO PROTECT POWER SUPPLY PARTS MOD # 58601 and 56338

Serial # 1502 R115630, 1503 R095979
A 1.25 inch square of plastic was added beneath 2 - 470 µF capacitors, A6C6415 and A6426, to protect the cap from shorting to component leads sticking through the board. A plastic square was also put under the transformer A6T6535. These parts are on the back of the power supply board. The part number for the plastic squares is 006-1939-01.

WIRE STRAP REMOVED FROM SOME POWER SUPPLY BOARDS MOD # 58317

There is a ground wire on A6P66 pin 3 to a ground lug on the chassis. On some instruments this wire has been removed to reduce noise spikes caused by the AC battery charging circuit. This problem can be seen when looking at the noise level. Plug and unplug the AC power. If this affects the noise remove the ground wire. However removing this wire may cause worse regular noise problems on some instruments, so pick the best condition.

SHORTER SCREWS IN XY MODULE MOD # 54646

Serial # 1502 B095640
The screws, 3-24 211-0101-00, into the board support nutblock were too long and would bind up with the other screw in the nutblock. The screw was changed to a shorter screw 211-0105-00.

Curtis Smith
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Issue: 19-7

1502: Replacement Main Boards

If you replace a Main board for an old 1502 (with CRT display) be aware that all parameters have not been tested. The Pulse Generator and Sampler circuits cannot be thoroughly tested without installing the board into the instrument. The following calibration steps are not fully checked, the circuits involved may not work even though it is a new board!

- TD Bias
- Double Strobing
- Aberrations
- Falltime
- Noise

Performing the above calibration steps may involve selecting components on the strip line Pulser and Sampler circuits. You may also have to move strip line components around for the best circuit response. This is not an easy repair, if you have not done it before get help!

Part number for the boards involved are:

Standard

670-3008-09	Main Board – Does not in-clude A1CR1703
672-1221-00	Main Board with CR1703
672-0487-03	Main Board Assembly (with Vert Amp Board)

Option 05 (Metric)

670-4338-04	Opt 05 Main board without A1CR1703
672-1221-00	Main Board with CR1703
672-0487-03	Main Board Assembly (with Vert Amp Board)

Some options available if you feel the Main board needs to be replaced or work needs to be done on the strip line:

- Let someone else do it...
  Send the instrument to Redmond Factory Service. They have extensive experience on strip lines. Sending it in is highly recom-mended if you don't have experience on 1502's.

- If you do it yourself...
  Refer to the Strip Line Troubleshooting Guide in the service manual. If you have an older manual that does not have the Guide (current manual part number is 070-1792-02) get one before continuing.

- In either case...
  Call for Help! Call Mike Enstrom, (503) 923-4433 Redmond Service, or Curtis Smith, (503) 923-4417 FAX (503) 923-4434 Redmond Service Support. You can also refer customers with questions to the Redmond Support Line (800) 833-9200.

If you work on a 1502 strip line, be aware that the five calibration steps above will not be normal until the board and all strip line shields are installed in the instrument. If you have to replace components on the strip line-sampling circuits, even if you don't replace the board, get help from someone with experience on 1502's.

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