WIZARD WORKSHOP ARTICLES

CG 551AP SHIPPING

Several CG551APs have been received in Beaverton damaged due to being shipped in the mainframe. CG551AP should not be shipped via common carrier in any mainframe.

If the original packing material has not been retained, a new shipping carton and appropriate packing (P/N 065-0282-00) can be ordered. Please alter your shipping and receiving personnel of the hazzards of shipping CG551APs in mainframes.

Terry Turner
Sept. 1980

CG 551AP +5 VOLT SUPPLY LOADING

It is possible that CG 551AP's below SN B010129 may have wires 3 and 4 reversed on connector A1P1330 on the front panel. This causes a loading down of the +5 Volt supply when the Remote Variable Head is connected. This was due to an error in the manufacturing QC procedure that has since been corrected.

Terry Turner
Oct. 1980

SCPDA 1 SOFTWARE PERFORMANCE REPORT

Software Performance Report Forms are now available for SCPDA1. Suggestions for SCPDA1 software corrections should be submitted to TM500 Marketing on an SPR form, P/N 000-5857-00. Send completed form to Stan Griffiths, TM500 Marketing, 94-465.

Submitted by--
Stan Griffiths

Inserted by--
Frank Tucker
Dec. 1980

TROUBLESHOOTING FLOWCHART FOR CG551AP DRIFT

In the event of voltage or current output drift problem with the CG551AP, this troubleshooting flowchart will be helpful in the isolation of the faulty components.

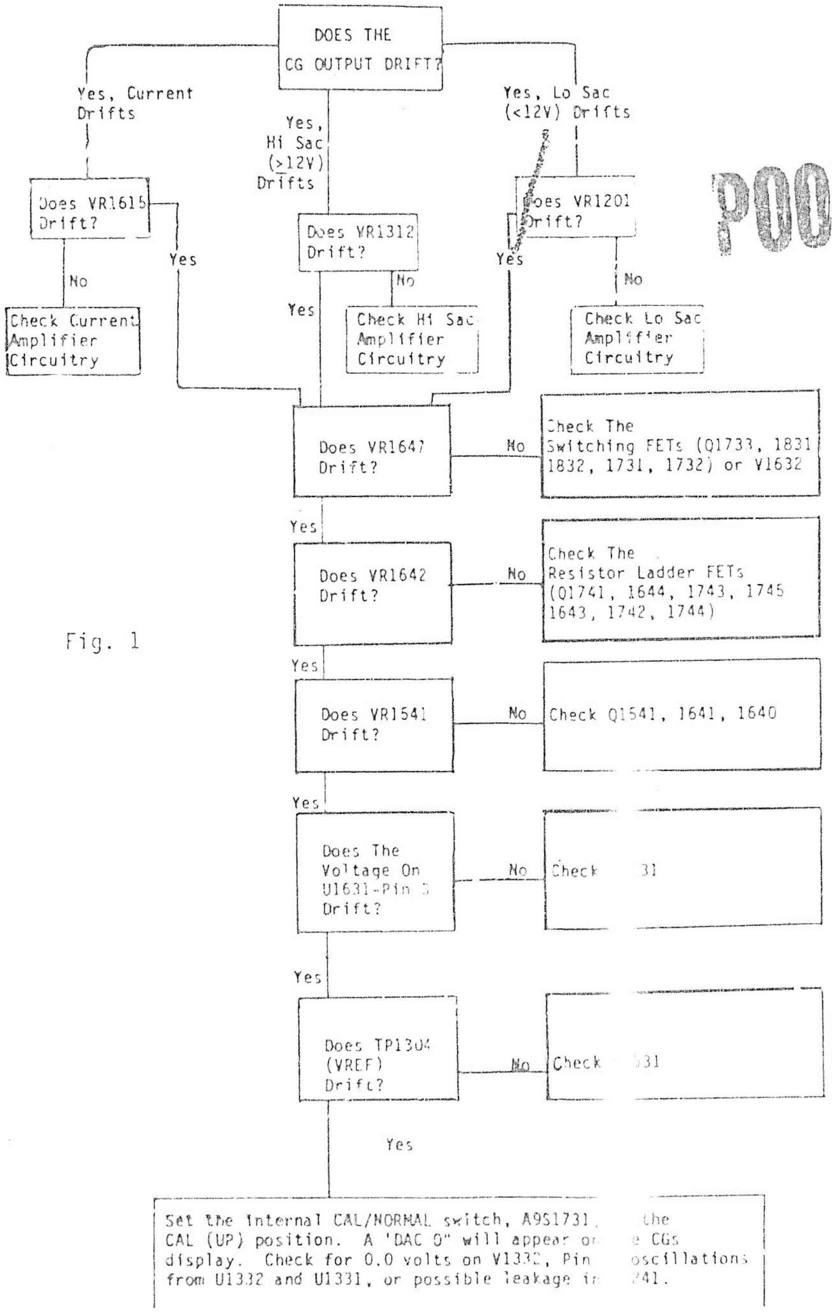


Fig. 1

continued on next page

TROUBLESHOOTING FLOWCHART FOR CG 551AP DRIFT (CONTINUED)

To date, the most common cause of output drift has been the resistor ladder FETs which are used only in the cutoff and saturation modes.

NOTE: These FETs are very susceptible to static discharge, so take the appropriate precautions.

The drift occurs when the defective FET is in the cutoff mode, but allows leakage between source and drain. To isolate the leaky FET, one by one remove the FETs that are in the cutoff mode until the drifting stops. (A low on the FET gate will indicate the cutoff mode.)

Pat Wolfram
May, 1981

CG551AP EXTENDED REPAIR AT NO CHARGE Accounting & Compensation Procedures

CG551AP OPTION 01 FIELD INSTALLATION

The standard CG551AP can be retrofitted to an Option 01 by ordering the 5MHz Precision Time Base, Part Number 119-1187-00, and installing it in the top rear corner of the A4 Time Mark Board. No other circuit modification is necessary. The Automatic Reference Select circuitry detects the Option 01 Time Base.

Thanks to Erik Rutten of EMC for informing us this information is not readily available.

--Terry Turner
92-236, Ext. 1288
June 5, 1981

CG 551AP CALIBRATION VOLTMETER AND TERMINATION RECOMMENDATIONS

Reference: CG 551AP Programmable Calibration Generator
Vol. 2 with Options Manual, Part Number 070-2815-00, Page 5-1, Table 5-1, list of test equipment, Items 3 and 13.

Affected Serial Numbers: All

For calibration of the CG 551AP, the Fluke 8502A is the recommended voltmeter. If another voltmeter is used it should be checked to assure that its measurements are within 0.02% at 100mv and above. The other parameters given in Table 5-1 should be considered, as well as the [illegible] digit count and the temperature coefficients.

At the request of a Field Service Center, the Fluke 8350A was tested and was found not to have necessary accuracy.

The termination (Part Number 011-0129-00) called out in Table 5-1, Item 13 is, at present, the only device known to have the temperature stability required for accurate calibration. There fore no other termination should be used unless degraded performance is acceptable.

Stan Uffner
June, 1981

CG551AP EXTENDED REPAIR AT NO CHARGE - CORRECTION

CG551AP/CG5001 SELF-TEST ERRORS

CG 551AP RESPONSE TO "DSP ON/OFF" COMMAND

Reference: CG 551AP Manual, P/N 070-2690-00, Pg. 3-8, Table 3-1.

When in EDGE or FAST EDGE mode, the CG 551AP will not respond to the single command, "DSP ON/OFF". To use this command it is necessary to send it with another command. For example:

DSP ON;VAR DSP OFF;VAR	turns the display on and off with no other effect.
DSP ON;INC.	turns the display on the increments by 0.1.
DSP OFF: DEC	turns the display off and decrements by 0.1.

Stan Uffner
July, 1981

CG 551AP RESPONSE TO VARIABLE QUERIES

Reference: General

When queried for the percent error, the maximum response of the CG551AP is 9.9%. Any value higher than this will also return 9.9%.

Stan Uffner
July, 1981

CG551AP and 015-0310-01 SERVICE UPDATE PROGRAM

Service Update Plan Number 2005 was implemented to replace the unreliable relays in the CG551AP and its Comparitor Head (015-0310-01). The Service Update Kit (045-0025-00) replaces the previous relay modification. Installation of the 045-0025-00 kit should be implemented only by authorized CG551AP Service Centers, in the U.S. these are: Rockville, Santa Clara, Irvine, and Factory Service. For complete details refer to Service Update Plan Number 2005, dated August 3, 1981.

--Frank Tucker
92-236, Ext. 1286
Aug 17, 1981

CG551AP RELAY MODIFICATION CLARIFICATION

REFERENCE KIT #045-0025-00

Step 4 of the mod kit instructs the installer to remove R1328, a 50.5Ω resistor from the A7 Output Board. The instructions do not, however, tell you to install R1328 on the Attenuator Compensation Board from the kit. R1328 must be installed on the Attenuator Compensation Board before the board is mounted on the A7 Output Board. If you have any questions, please call.

--Terry Turner
92-236, Ext. 1288
Sept. 25, 1981

CG551AP EXTENDED REPAIR AT NO CHARGE

Intent

The intent of this program is to assure our CG551AP customers that all reliability problems have been corrected. Tektronix plans to continue providing quality support on this and other programmable products. It is hoped that this will regain our CG customers confidence and increase future sales. To obtain these goals, we are initiating the Service Update Plan #2006 with an 045 kit and will provide free repairs of all defects to material and workmanship until September 30, 1983.

Overview

All defects in material or workmanship to the CG551AP shall be repaired at no charge to the customer until September 30, 1983. If the CG551AP has been updated per the Update Program #2006, by application of 045-0038-00, or Manufacturing Repair and Return since May 1, 1982, the cost of repairing defects will be recorded as Warranty (02) or Customer Accommodation (03).

Exceptions

Services that are not to be provided free to customers:

- Calibration Service (verfication of specifications if no repairs were made)

- Certification/NBS

- Test Data

- Mechanical Damage

- Customer Abuse

- Cost of shipment from customer to Service Center

The above items should normally be billed to our customer.

Accounting & Compensation Procedures

The U.S. Field Service will report extended-repair-at-no-charge service to Customer Accommodation Service Activity Code 03 on their Time Distribution Sheets (TDS) and Field Service Records. The requesting Responsibility/Cost Center No. is 4142-03.

International should report cost of labor and parts for the CG extended-repair-at-no-charge to the Beaverton Responsibility/Cost Center No. 4142-03 as a customer accommodation.

Summary

All materials and workmanship repairs to the CG551AP are to be repaired free for the customer until September 30, 1983. The repairs should be charged as appropriate to Service Update Plan, Warranty, or Customer Accommodation, in that order of priority.

-- Frank Tucker
92-236, Ext. WR 1286

Issue 12-18
Sept. 10, 1982

CG551AP TO CG5001 CONVERSION KIT

Serial Numbers Affected: All

CG551AP's can be converted to CG5001's for use in a TM5000 mainframe by installing kit P/N 040-1041-00. Once a CG551AP is converted for use in a TM5000 mainframe, it will no longer be compatible with a TM500 mainframe.

-Terry Turner
92-236, Ext. 1288 WR

Issue 12-18

Sept. 10, 1982

CG 551AP PROBLEM STATUS

The intent of the following is to notify all concerned field personnel of the current CG 551AP problem status.

Implementation of 045-0025-00 seems to have given us a handle on the problems caused by mercury-wetted relays. However, there remained a number of CG 551APs which would exhibit 50 and 80 series errors on power-up selft test after the 045 kit was installed. This failure could usually be repaired by cleaning the board pads and relay contracts, and resecuring the relays very tightly. Sometimes the failure would recur after a few days or weeks.

The cause of this problem was traced to an excessive out-gassing of the potting material used to hold the relay coils. The out-gassing of the potting material used to hold the relay coils. The out-gassing will cause a film to form on the contacts and circuit board pads. This film results in high contact resistance causing various self test errors. The contacts can be cleaned but since the out-gassing source is still present, the film will return in time.

New relays with a different potting material are in evaluation and initial results look very positive. It will be 2 to 4 weeks before new production parts are available. If you have any CG 551APs in your service center, I would recommend holding the instrument until you can install the new mag latch relays. If the customer must have his instrument returned before the new parts are available, you should advise him of the problem and its solution.

Please notify me by telex or telephone the number of CG 551APs in your center, The serial number of each CG 551AP and the customer. You will be provided with new relays to repair customer instruments now in you center. You will be notified when production quantities of the new relay are in customer service stock and also the plan we will use to rework other existing CG 551APs that are down.

In reference to reworking the comparator head, Part Number 015-0310-01, via Service Update Plan 2005, please notify me in advance that you are sending a comparator in for rework. This allows me to provide you with the best turn-around time.

A problem arose concerning the new board layout for the comparator heads. The sysmptom was an inability to operate via GPIB commands with some CG 551APs. Two resistor value changes solved this problem so all reworked comparators should be compatible with all CG 551APs. If you have an questions, please contact myself or Frank Tucker.

Terry Turner
92-236, Ext. 1288

CG551AP/CG5001 RELIABILITY OF V TO I CONVERTER FET A601744 IMPROVED

CG551AP NOISE IN 40 MICRO-VOLT RANGE WHEN USING COMPARATOR HEAD ELIMINATED

Reference: 015-0310-01 Comparator Head Manual

Serial Numbers Affected: All

Some 015-0310-01 comparator heads may cause a noise problem in voltage mode in the low amplitude ranges. Excessive noise from the CG551AP display cause ground currents that appear on the output due to poor ground isolation in the comparator head. This situation was aggravated by a new board layout that was done to accommodate a different mercury-wetted relay, Part Number 148-0142-00.

Ground isolation is improved by changing R1026 in the comparator head from 10 Ohm to 1K Ohm, Part Number 315-0102-00.

--Terry Turner
92-236, Ext. 1288
Feb. 1982

CG551AP HIGH SAC OUTPUT IMPROVEMENT

Serial Numbers Affected: All

Reference: CG551AP Instruction Manual, Vol. II, Schematic 22

CG551APs may experience intermittent high SAC output, (>12V) usually at operating temperatures greater than 40°C ambient and also intermittent error 54 and 55 on Power Up Self Test.

A large number of these problems have been caused by the positioning of reed switch A6S1101 inside relay coil A6K1101.

Two types of reed switches exist under P/N 260-1112-00. One type of reed positions the contact portion at the end of the glass enclosure rather than the middle.

This causes the contacts to be positioned at the end of the coil where unreliable closures can occur.

If the above symptoms are noted or A6S1101 is replaced, be certain that the contacts are positioned in the center of the coil, A6K1101.

--Terry Turner
92-236, Ex. 1288
Feb. 1982

CG551AP/PG506 PRECISION 50 OHM TERMINATION CORRECTION

Reference: Precision 50 Ohm Terminator PN 011-0129-00

Instruments Affected: CG551AP, PG506 - All Serial Numbers.

Some terminators have been found to be out of specification by as much as 2%, where specified accuracy is ± .1% or better. This can be caused by cold or corroded solder connections from the precision resistor to the ground lug.

If you suspect the accuracy of your precision terminator, check all connections involved before replacing any parts.

Thanks to Joe Rooney in Santa Clara for this information.

--Terry Turner
92-236, Ext. 1288
June 82

CG551AP SERVICE UPDATE PLAN #2006

A Service Update Plan was initiated May 27 for all CG551AP's manufactured before April. The first few months the update will be accomplished by manufacturing. For details refer to plan #2006.

--Frank Tucker
92-236, Ext. 1286
June 18, 1982

CG551AP/CG5001 RELEASE LATCH IMPROVED

CG551AP MAINTENANCE INFORMATION UPDATE, NEW AND REWORKED INSTRUMENTS (REFERENCE PULL-OUT)

Serial Numbers Affected: All Instruments that have been through the Manufacturing Rework Program, new instruments, S/N B030400 and above.

Intent:- To explain technical details of the Manufacturing Rework and provide updated schematics and parts lists. Refer to Service Update Program #2006 for more information.

Identification: Reworked instruments can be identified by the residence of a new A9A2 CPU Oscillator board. This board is located on the back of the A9 CPU board, near the edge connector. See Figure 1.

This rework will be Field installable. Instruments reworked in the Field will be identified by a label showing 045-0038-00.

Description: Several areas of low reliability have been identified and the rework program corrects all known reliability problems.

1. The CPU Clock has been redesigned to provide a stable reference throughout the temperature range. The timing IC, A9U1422, was sensitive to impedance changes in the crystal, A9Y1431, which occurred at higher temperature. The discrete oscillator circuit on the A9A2 board produces a stable signal over the entire temperature range. See Figure 4 for parts removed and Figure 3 for component location, schematic and parts list.

2. Intermittent Rom errors on power-up. These errors have been traced to faulty T.I. IC sockets. Sockets have been removed from Rom and Ram on the A9 CPU board and the A9A2 GPIB board. Mods are being initiated in new instruments to remove nearly all sockets in the instruments. Some Burndy sockets will remain for large parts, high cost parts, high stress parts, and parts to be removed for troubleshooting.

3. Mag-latch Relays, 50 and 80 series errors on power-up. New mag-latch relays, P/N 148-0128-00, from an improved process are much more reliable than previous versions. The latest version of relays can be identified by a 4-digit black date code. A small number of these relays have been placed in customer service stock for CG and TM5000 repair. Please limit relay orders to an "as necessary" basis. Due to limited quantities, relays should not be ordered for bench stock at this time.

4. Low edge generator calibration constant centering. One resistor was changed and one was added to the low edge generator output to prevent the need for entering large cal constants to center the waveform. See Figure 2.

5. Improved Negative Low Edge and Slewed Edge Performance. To improve Negative Low Edge amplitude and front corner waveshape, and to insure the Slewed Edge amplitude is 1V or better A7Q1725, A4Q1024, and A4Q1025 have been changed from a 151-0271-01 to a 151-0271-03.

6. The Uncal light sometimes flashes in current mode. Mod Kit 050-1564-00 is being installed in all instruments. Consult mod summary for details.

7. Power On/Off Detect circuitry changes with the addition of the new CPU oscillator, changes in the Power On/Off Detect circuitry. Also, for use in a TM5000 mainframe, the PWR signal was coupled to the power On/Off detect. See Figure 5 for Schematic, Figure 1 and 4 for component location.

--Terry Turner
92-236, Ext. 1288-WR

September 10, 1982

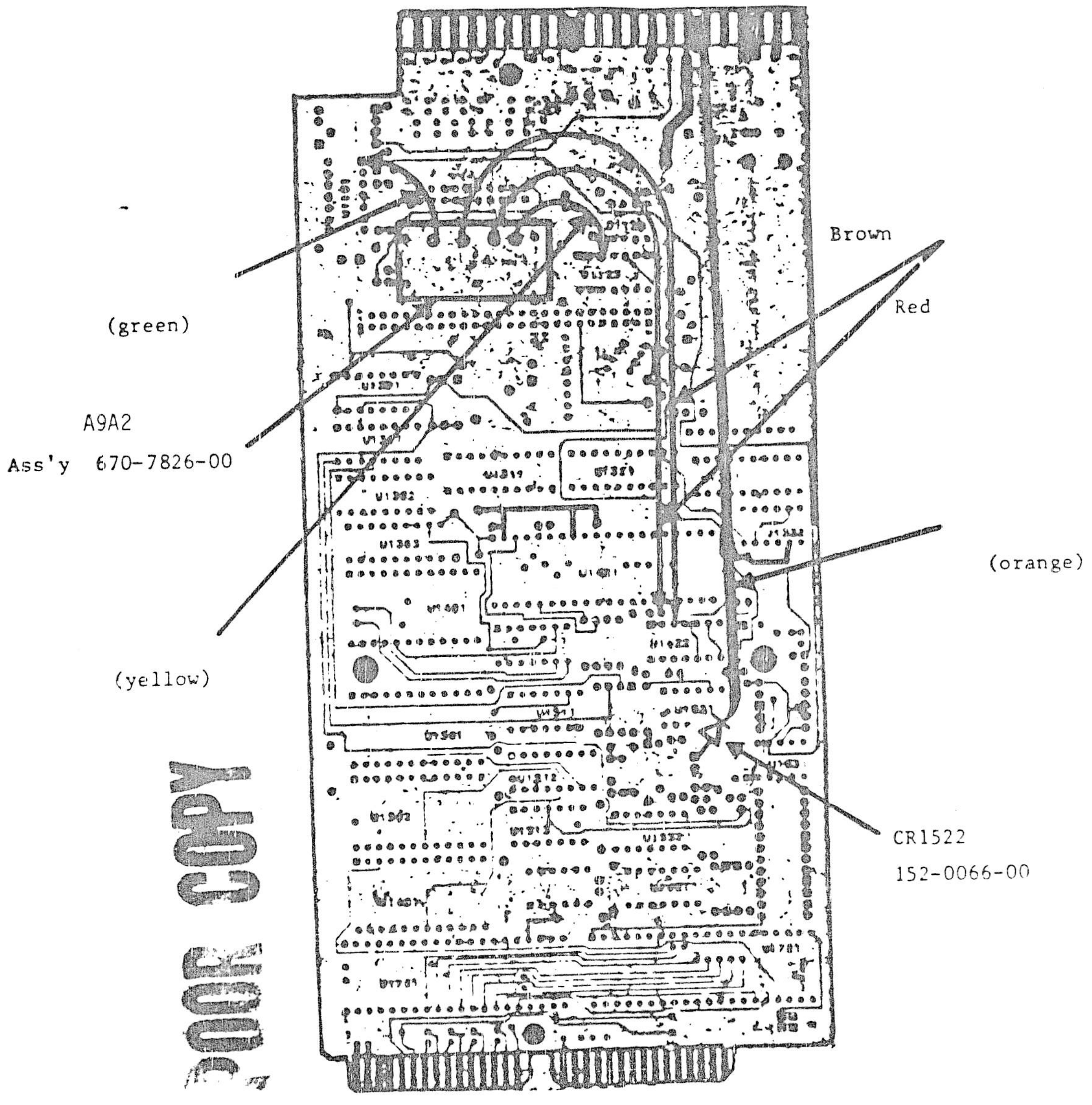
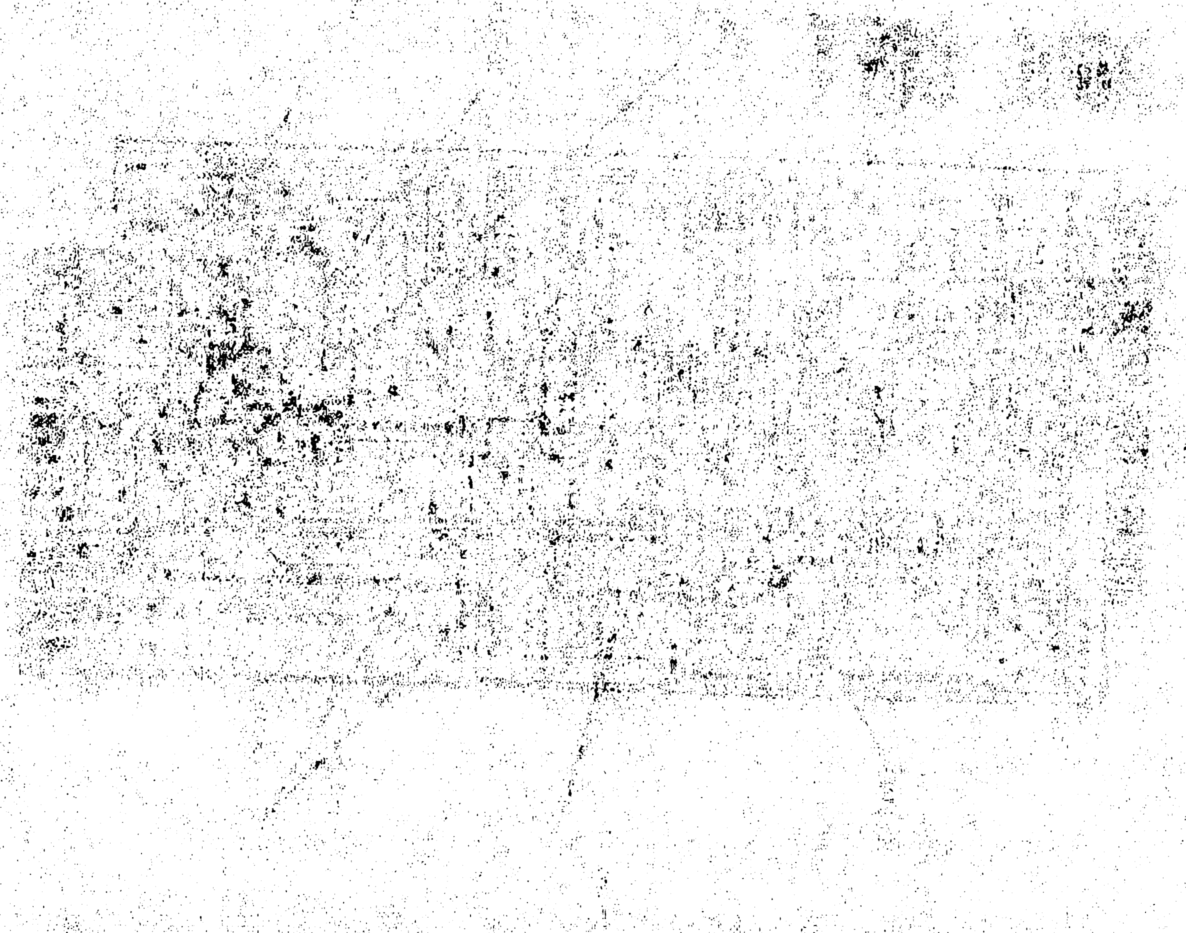


FIGURE 1

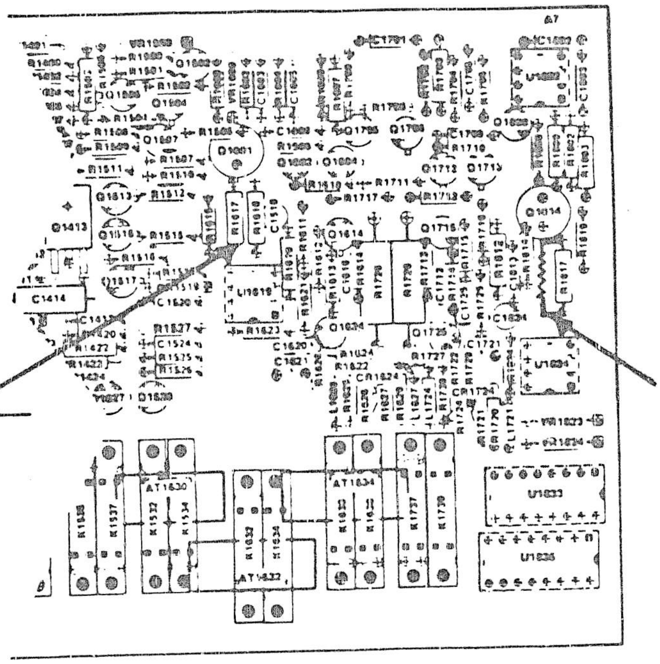
(A9) CPU Circuit Board (Back side)
Assembly 670-6091-02



(A7) Partial Output Circuit Board

Assembly 670-6089-02

FIGURE 2



R1617

~~321-0033-00~~

321-0032-00

R1816

315-0511-00

315-0511-00

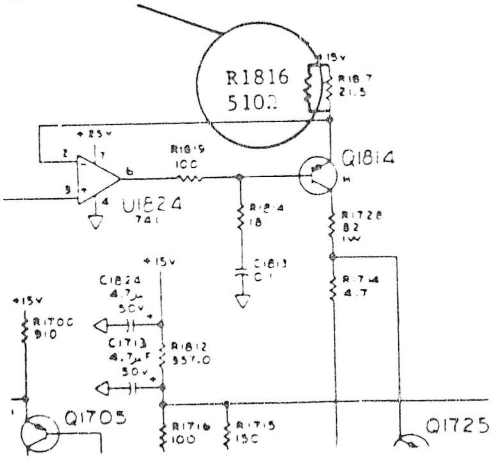
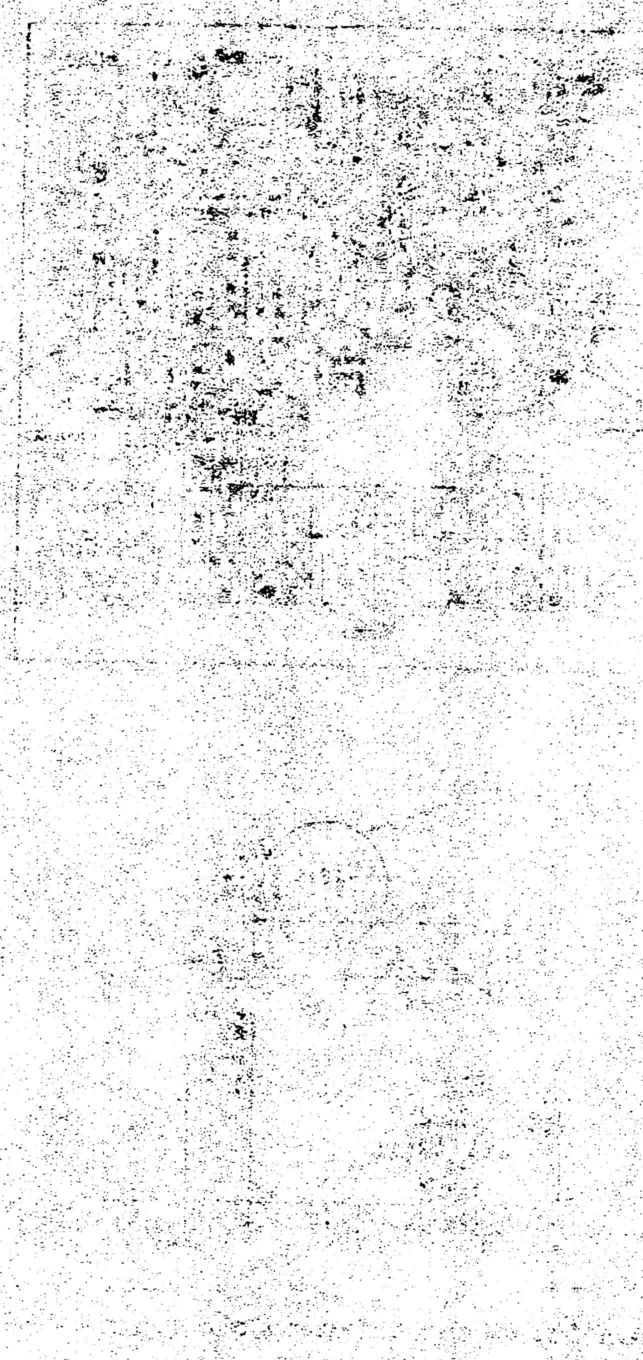


DIAGRAM 23 LOW EDGE GENERATOR & CHOP ISOLATOR - Partial

[illegible]



Product: CG551AP/CG5001 Date: 5-19-82 Change Reference: M45507

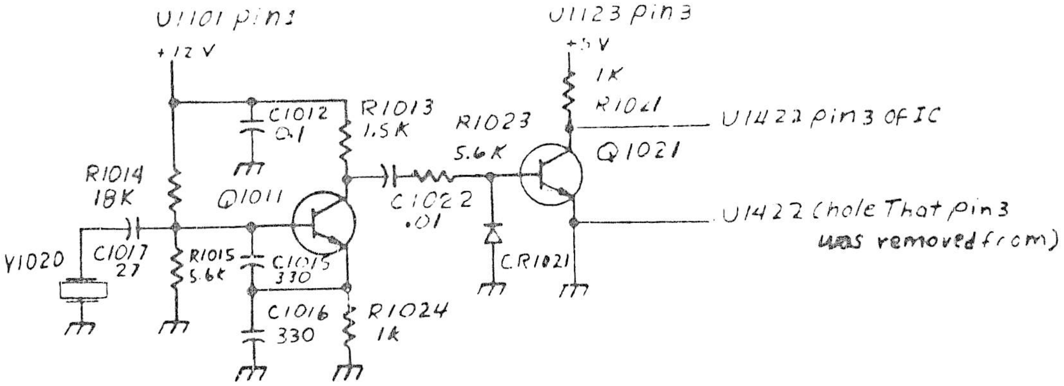
DESCRIPTION

Add:

A9A2	670-7826-00	CKT.BD.ASSY;CPU OSCILLATOR
A9A2Q1011	151-0190-00	TRANSISTOR;SILICON,NPN
A9A2Q1021	151-0190-00	TRANSISTOR;SILICON,NPN
A9A2CR1021	152-0141-02	SEMICOND DEVICE;SILICON,30V,150MA
A9A2Y1020	158-0056-00	XTAL UNIT QTZ;4MHz,0.003%,Series
A9A2C1017	281-0762-00	CAP,FXD,CER DI;27pF,20%,100V
A9A2C1015	281-0767-00	CAP,FXD,CER DI;330pF,20%,100V
A9A2C1016	281-0767-00	CAP,FXD,CER DI;330pF,20%,100V
A9A2C1022	281-0773-00	CAP,FXD,CER DI;.01uF, 10%,100V
A9A2C1012	281-0775-00	CAP,FXD,CER DI;0.1uF,20%,50V
A9A2R1012	315-0102-00	RES, FXD, CMPSN; 1K, 5%,0.25W
A9A2R1024	315-0102-00	RES, FXD,CMPSN; 1K, 5%,0.25W
A9A2R1013	315-0152-00	RES, FXD, CMPSN;1.5K,5%,0.25W
A9A2R1014	315-0183-00	RES, FXD, CMPSN; 18K,5%,0.25W
A9A2R1015	315-0562-00	RES, FXD, CMPSN; 5.6K, 5%,0.25W
A9A2R1023	315-0562-00	RES, FXD, CMPSN; 5.6K, 5%,0.25W

A9A2 circuit board is located on the back side of the CPU board.

A9A2 Circuit and Board layout:



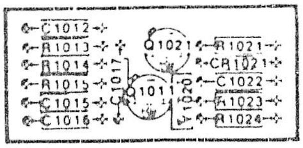
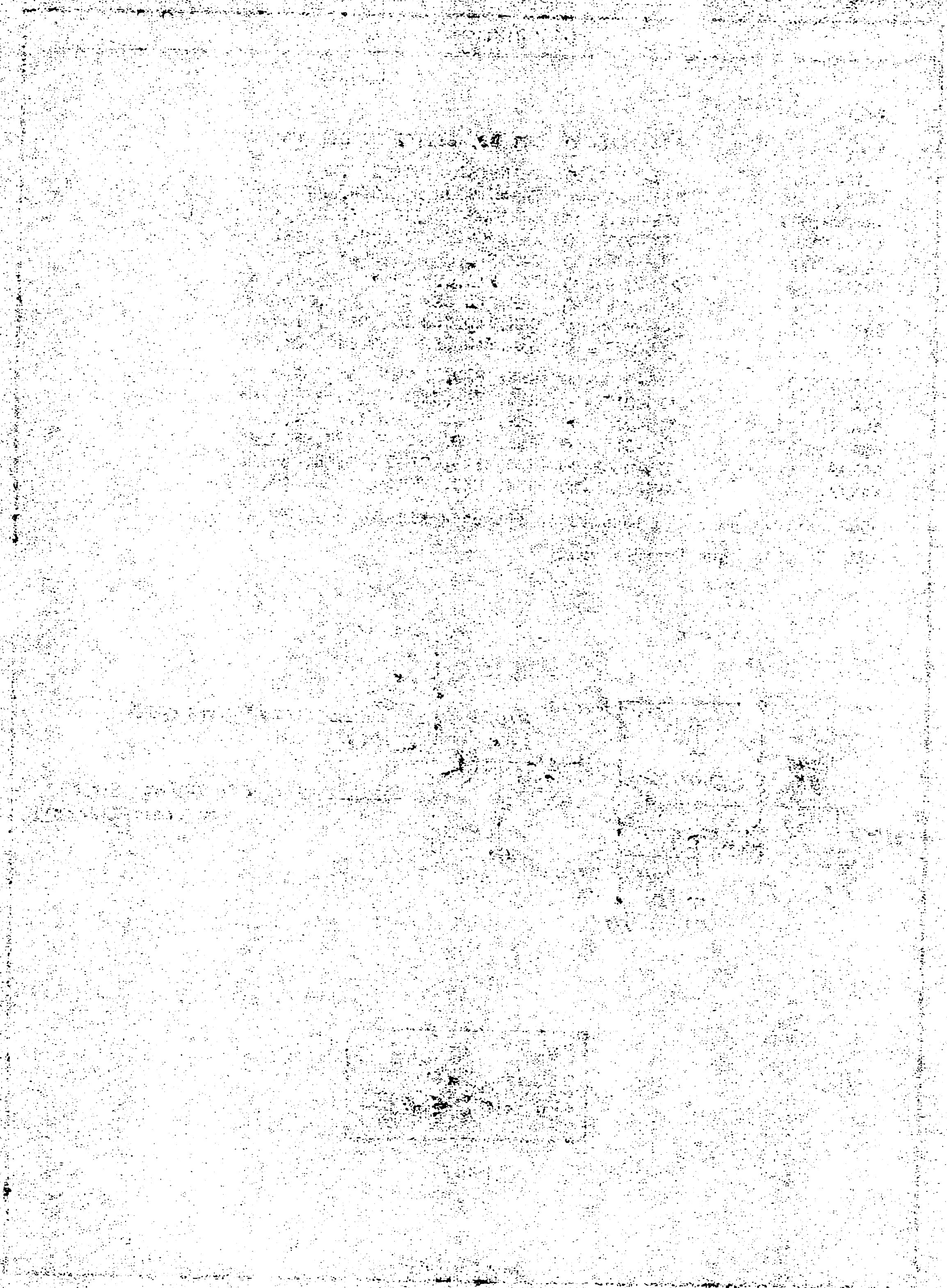
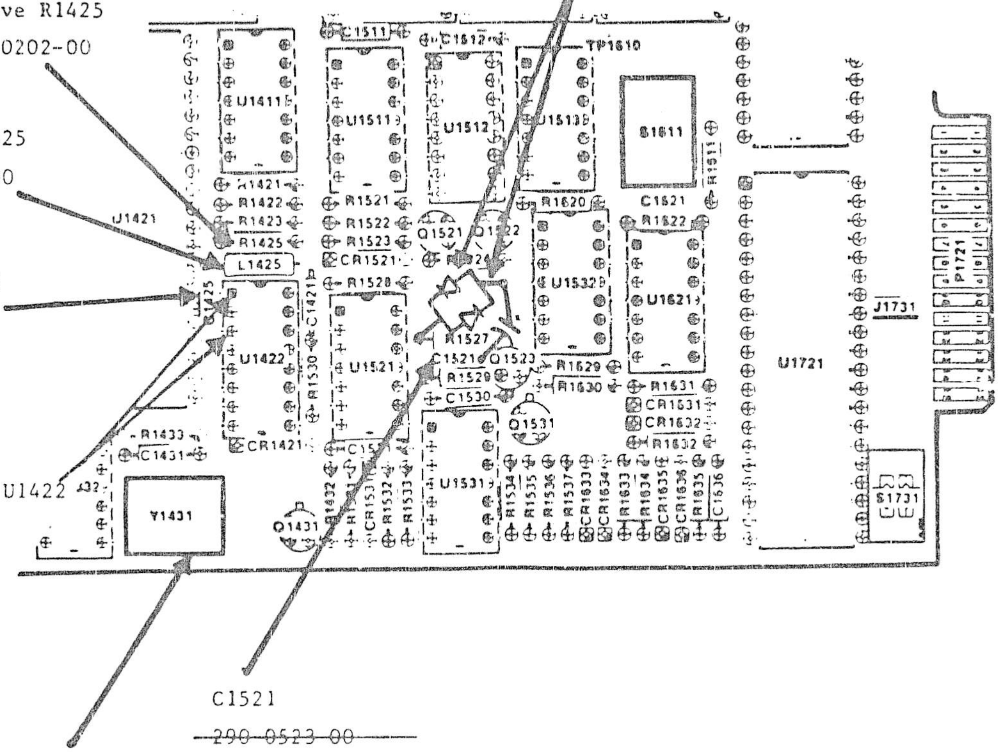


FIGURE 3





CR1523
CR1524
152-0141-02

Remove R1425
315-0202-00

Remove L1425
108-0249-00

Remove C1425
283-0256-00

Lift Pins
1 and 3 of U1422

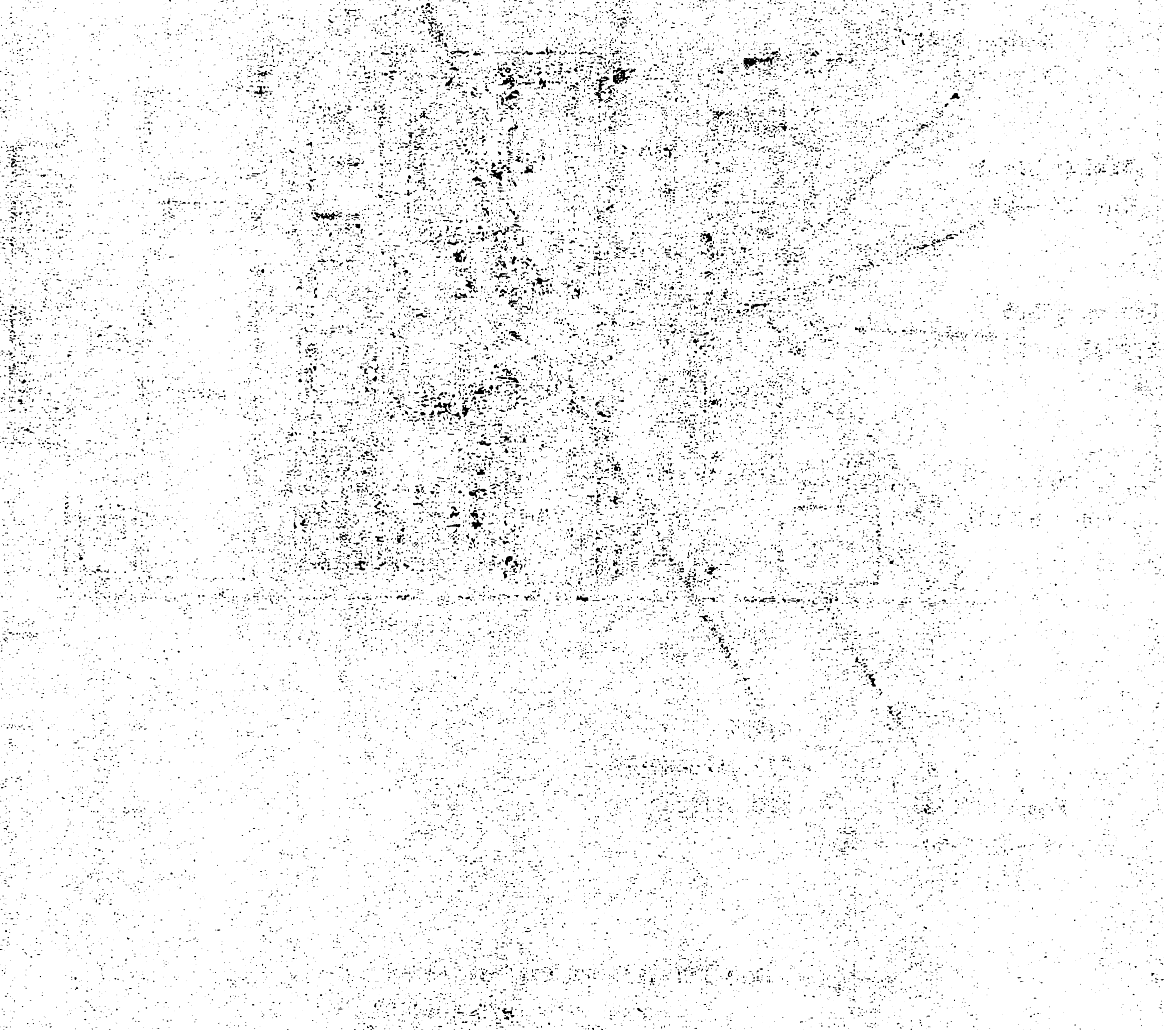
C1521
~~290-0523-00~~
290-0512-00

Remove Y1431
158-0056-00

(A9) Partial CPU Circuit Board
Assembly 670-6091-02
FIGURE 4

WIZARD WORKSHOP ARTICLES

CG551AP/5001 BERG SOCKET FAILURE CORRECTION



A9	670-6091-02	
A9C1521	290-0512-00	CAP.,FXD,ELCLT;22µF,20%,15V,TANTALUM

Remove:

A9R1425	315-0202-00	RES,FXD,CMPSN;2K OHM,5%,0.25W
A9L1425	108-0249-00	COIL,RF;12µH
A9C1425	283-0526-00	CAP.,FXD,CER DI:130PF,5%,100V
A9Y1431	158-0056-00	XTAL UNIT, QTZ;4MHz,0.003%,Series

Add:

A9CR1522	152-066-00	SEMICOND DEVICE;SILICON,400V,750MA
A9CR1523	152-0141-02	SEMICOND DEVICE;SILICON,30V,150MA
A9CR1524	152-0141-02	SEMICOND DEVICE;SILICON,30V,150MA

DIAGRAM 29 MEMORY AND POWER ON/OFF DETECT - PARTIAL.

POWER ON/OFF DETECT

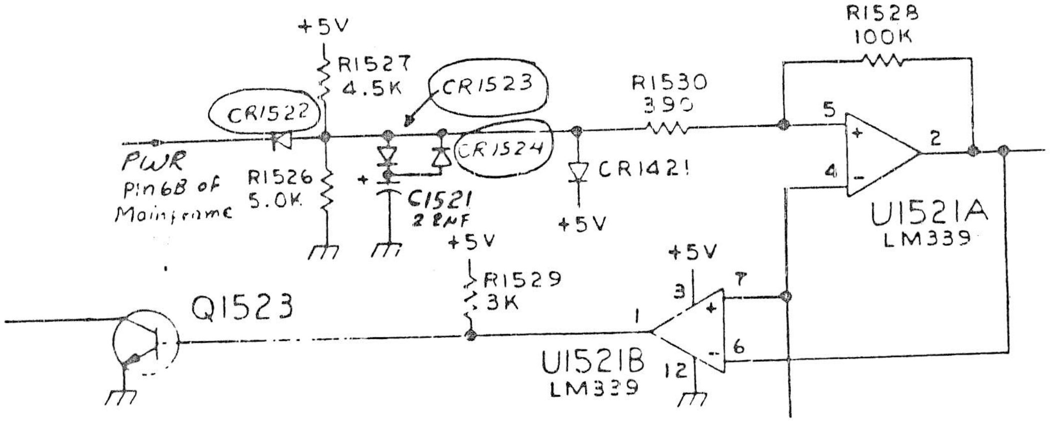


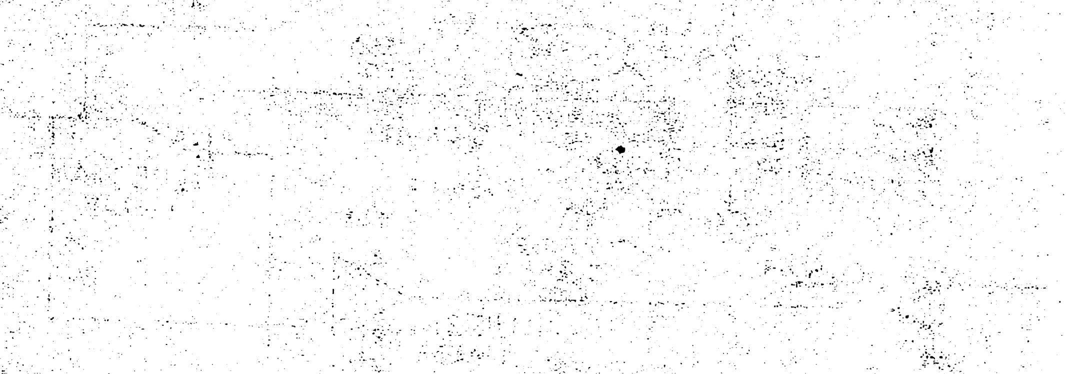
FIGURE 5

[illegible]

[illegible]

[illegible]

[illegible]



CG551AP - RECOMMENDED DMM'S FOR CALIBRATION

Reference: Instruction Manual Volume II, Page 5-1

Serial Numbers Affected: All

The recommended DMM for calibrating CG551APs is the Fluke 8502A. The Fluke 8375A and the Dana 5900 are acceptable if a proper calibration interval is maintained.

The recommended calibration interval is ninety (90) days for the Fluke 8375A and one (1) year for the Dana 5900.

The reason such tight accuracy specs are needed is the input offset voltage of A6U1311 must be nulled within a certain region to insure the drift of this device is minimized. The drift of this device becomes significant if the input offset voltage is not nulled accurately. Using an improper meter or one not calibrated can result in unwanted drift in lower voltage modes.

The Fluke 8800A, which is the example given in the manual, is marginally acceptable. A manual change notice has been submitted to update the example to the Fluke 8500A/8502A.

--Terry Turner
92-236, Ext. 1288
November, 1981

ISSUE 11-22

WIZARD WORKSHOP ARTICLES

CG551AP EXTENDED REPAIR AT NO CHARGE - CORRECTION

Reference: CG551AP Service Update Program #2006, dated August 19, 1982, page 7; Wizard's Workshop Issue 12-18, page 5.

In paragraph titled Accounting and Compensation Procedure change the Responsibility/Cost Center No. from 4142-03 to 4142-01.

--Frank Tucker
92-236, Ext. 1286
Issue 12-21
Oct. 22, 1982

CG551AP/CG5001 SELF-TEST ERRORS ONLY WITH NO OUTPUT CABLE ATTACHED

Serial Numbers Affected: All

Reference: CG551AP Instruction Manual, Vol. II, Diagram #25

If the "A" side of mag-latch relay, A7K1432, is stuck open, the CG551AP will exhibit 50 and 80 series errors on power-up. However, if an output cable or accessory head is attached, the instrument will pass self-test.

This is caused by the fact that the Power-On Test circuitry is ground referenced, and the SAC circuitry is floating. Relay K1432 ties the two grounds together only during self-test to provide the proper voltage reference. Connecting an output cable or an accessory head serves the same purpose.

A manual error has been uncovered because of this problem. Both grounds connecting to the "A" side contacts of K1432 are shown to be the same which is incorrect. One of the grounds should be shown as the Time Shield, which is connected to chassis ground.

Thanks to Jim Mauck in Rockville for identifying this problem.

--Terry Turner
92-236, Ext. 1288
Issue 12-22
November 5, 1982

CG551AP/CG5001 SOLUTION TO INSTRUMENTS INTERMITTENTLY ENTERING SELF TEST

Reference: SOB, Issue 52-82, 10-28-82

Affected Instruments: CG551AP's between S/N B030400 and B030490, and all instruments that have had 045-0038-00 installed in the Field or in GPI Manufacturing. CG5001's between S/N B030500 and S/N B030550 and all that have 045-0038-00 installed.

To correct the problem of CG's intermittently entering Self-Test, a 0.01 uf capacitor, P/N 283-0204-00 was added between pins 4 and 5 of A9U1521A. This enables the Power On/Off Detect circuit to ignore momentary negative going spikes that may occur on the +5V supply or the PWR signal from the TM5000 mainframe.

Please add this capacitor when installing 045-0038-00 in any instrument or when servicing an instrument in the above serial number range. Corrections to the 045 kit will be submitted.

--Terry Turner
92-236, Ext. 1288-WR
Issue 12-23
November 19, 1982

CG551AP/CG5001 LOW AMPLITUDE SAC OUTPUT CAUSES UNSTABLE OSCILLOSCOPE TRIGGERING

Serial Numbers Affected:

CG551AP STD - Below B030480
CG551AP OPT. 01 - Below B030320
CG5001 STD - Below B30540
CG5001 OPT. 01 - Below B030560

Reference: CG551AP Instruction Manual, Schematic #1, Front Panel - A1, Figure 1 Exploded View, Items 12 and 13.

Some CG551AP's/CG5001's may cause a double trigger when using internal scope triggering. This problem occurs in Voltage Mode at 20 MV or less output.

The cause of the problem is that high frequency noise on the signal becomes large enough at low output levels to cause double triggering.

After some investigation it was found that C520 on the Output Connector had been installed incorrectly on a large number of instruments below the listed serial numbers. The solder lug that capacitor C520 connects to (Item 13 on exploded view) should be in contact with the front subpanel (Chassis ground). Instead a plastic spacer (Item 12 on exploded view) was being installed between the solder lug and the subpanel, providing no connection to chassis ground. The solder lug and spacer are part of the Current Loop connecting hardware, and are shown in the correct order of assembly in the Exploded View Figure 1.

The capacitor can be checked for correct installation by removing the right side [illegible] the bottom frame. All CG's coming in for service should be checked for this problem and corrected if found.

Thanks to Jim Mauck in Rockville for identifying this problem.

--Terry Turner
92-236, Ext. 1288 -WR
Issue 12-25
Dec. 17, 1982

CG551AP/CG5001 ABERRATIONS IN STANDARD AMPLITUDE VOLTAGE AND CURRENT MODES

Serial Numbers Affected:

CG551AP - Below B030490
CG5001-Below 030550

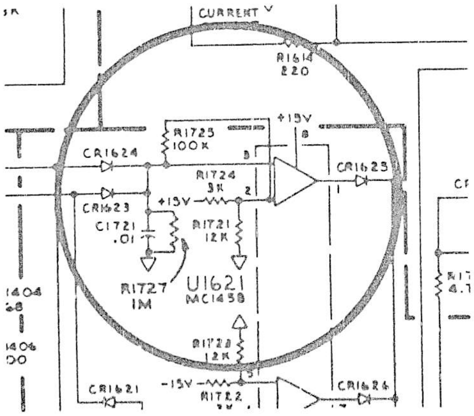
Aberrations in voltage and/or current mode may exceed the ± 15% specifications in some instruments. The problem is best observed in voltage mode, 10V x 1Div, 100 Hz.

Make the following changes on the A6 Reference Board:

- Change Diode A6CR1802 from P/N 152-0141-02 to P/N 152-0536-00.

- Change Diodes A6CR1524 and A6CR1528 from P/N 152-0324-01 to P/N 152-0245-00.

- Lift the end of the 100K ohm resistor, A6R1725 nearest A6R1616, and connect it to the end of A6R1724 nearest A6CR1723.



PARTIAL DIAGRAM ⟨22⟩

- Add a new 1 Mohm resistor A6R1727, P/N 315-0105-00 in parallel with A6C1721.

See the partial diagram 22 Schematic for more detail.

Please call if you have any questions.

--Terry Turner
92-236, Ext. 1288-WR
Issue 13-2

Jan. 21, 1983

CG551AP/CG5001 HANDLE ONLY AT STATIC-FREE WORK STATIONS

Serial Numbers Affected: All

Because of the static sensitive nature of several circuit boards in the CG551AP/CG5001, instruments should be disassembled and individual boards handled only at static-free workstations with wrist strap attached.

The boards most likely to be damaged are the A6 Reference Board and the A9 CPU Board. Because of the low turn-on resistance required of the MOSFET's on the A6 Board, no diode protection is used and these devices can be static-damaged while in the circuit board. To avoid unnecessary call backs and troubleshooting time, please handle these boards properly.

-- Terry Turner
92-236, Ext. WR 1288
Issue 13-2

Jan. 21, 1983

MAG LATCH RELAY 148-0128-XX RETAINING

WIZARD WORKSHOP ARTICLES

CG551AP AND 015-0310-01 SERVICE UPDATE PROGRAM TERMINATION

Service Update Program #2005 has been terminated as of March 18, 1983. Orders for kit no. 045-0025-00 will not be accepted after this date. For more information, refer to the Service Update Plan Termination, dated February 15, 1983.

-- Frank Tucker
92-236, Ext. 1286 WR
Issue 13-6
March 18, 1983

CG551AP/CG5001 REPLACE BATTERY EVERY TWO YEARS

Reference: Diagram 29 of CG551AP/CG5001 Instruction Manual, Vol. II

Serial Numbers Affected: All

As a preventative maintenance measure, all CG551AP/CG5001's sho d have the battery (A9BT1231) repla d every two years.

When the new battery is installe the instrument should be run continuously for at least 24 hou to ensure an adequate level of charge. The date installed shoul be written on the battery with a permanent marker.

Please contact me, if you have any questions.

--Terry Turner
92-236, Ext. 1288-WR
Issue 13-7
April 8, 1983

WIZARD WORKSHOP ARTICLES

CG551AP/CG5001 RELIABILITY OF V TO I CONVERTER FET A6Q1744 IMPROVED

Serial Numbers Affected: CG551AP Below B040645; CG5001 Below B040609

Reference: Diagram #21, CG551AP/CG5001 Instruction Manual, Vol. II 070-2815-01

The internal source (S) to substrate (C) breakdown voltage for 151-1098-00 has been lowered to 7V by the vendor. The configuration of A6Q1744 exceeds this specification and should be modified to maintain good reliability.

An FET in location Q1744 which has had its source to substrate voltage exceeded will become leaky. When Q1744 has leakage, the CG may show Error Codes 51,54,81,83,87, as well as 1V and 10V amplitudes reading out of tolerance.

If Q1744 is replaced or you suspect some or all of the above failures perform the following modification on the A6 Reference Board before installing a new FET.

On the component side of the board, cut the run at Q1744 which leads to C1641. A good place for cutting the run can be found under the lead of R1647 closest to the rear of the board. On the backside of the board, add a 26 AWG bare wire strap that connects the "S" lead to the "C" lead. This modification makes the configuration of Q1744 identical to the rest of the FETs in the V to I Converter.

Note that the A6 Reference Board should only be removed from the CG and handled at a static-free work station.

Please contact me if you have any questions.

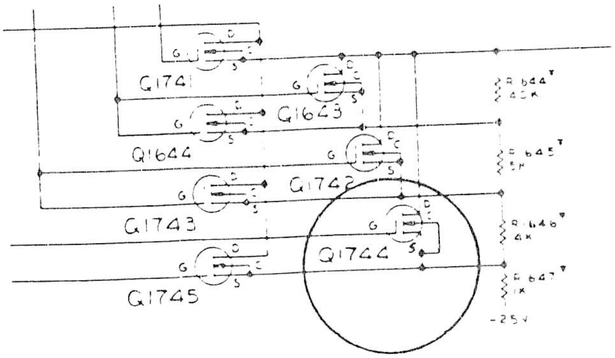
DIAGRAMS ON THE FOLLOWING PAGE

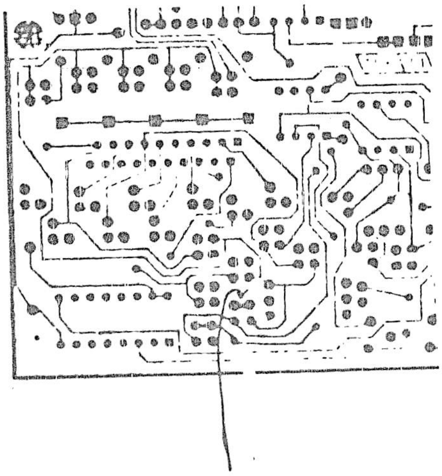
-- Terry Turner
92-236, Ext. WR 1288
Issue 13-10

CG551AP/CG5001 RELIABILITY OF V TO I CONVERTER FET A6Q1744 IMPROVED (cont.)

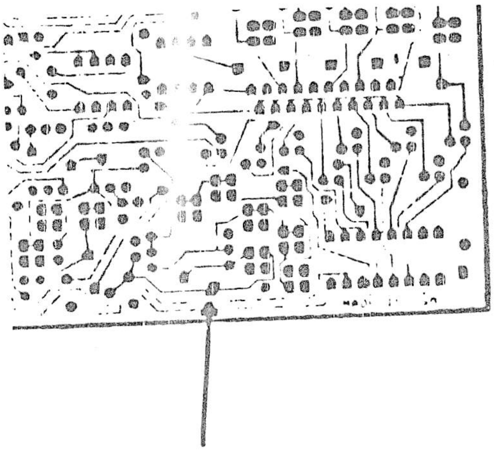
DIAGRAM ⟨21⟩ PRECISION DIVIDER—A6
V-I CONVERTER—A6

CHANGE—the connection of the collector of Q1744 (location J8)
as shown below:




ADD #26 BARE WIRE

Back View of Reference Ckt. Bd.


CUT RUN

Front View of Reference Ckt. Bd.

May 13, 1983

WIZARD WORKSHOP ARTICLES

CG551AP/CG5001 RELEASE LATCH IMPROVED

A new release bar, P/N 105-0967-01 is now orderable. This should help eliminate the problem of broken retaining latch pieces. The new part does not allow over bending of the plug-in retaining latch, which was the major cause of breakage.

-- Terry Turner
92-236, Ext. 1288 WR
Issue 13-11

TM5000 INSTRUMENT INTERFACING GUIDES AVAILABLE

Instrument Interfacing Guides which contain useful programming and GPIB information for all TM5000 instruments are now orderable. These reference guides should be a valuable training aid for those who are learning TM5000 instruments or have not done much programming with TM5000/4041 or 405X.

CG5001:	070-4616-00
DC5009:	070-4612-00
DC5010:	070-4611-00
DM5010:	070-4603-00
FG5010:	070-4613-00
MI5010:	070-4614-00
PS5010:	070-4610-00
SI5010:	070-4615-00

-- Terry Turner
92-236, Ext. WR 1288
Issue 13-10

May 13, 1983

WIZARD WORKSHOP ARTICLES

CG551AP/CG5001 CPU POWER SUPPLY PROTECTION IMPROVED

Serial Numbers Affected: All instruments below B041000

Reference: CG551AP/CG5001 Instruction Manual PN 070-2815-01, CPU Power Supply Schematic

To be certain that the crowbar circuit will fire consistently when an overvoltage situation occurs on the +5V CPU supply, several parts were changed and added.

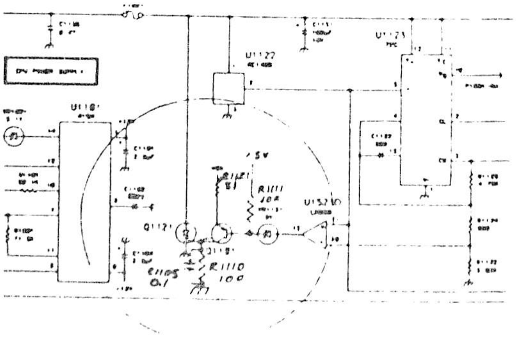
Make the following changes on the A9 CPU board:

1. On the back of the A9 CPU board locate the connections for the SCR, Q1121.

2. Add a parallel combination consisting of a new 100 OHM resistor, R1110 PN 315-0101-00 and a new 0.1uf capacitor, C1105 PN 281-0775-00 between the gate and the cathode of Q1121. (The outside leads) Be sure to dress these parts toward the front of the board to allow clearance for the rear panel.

3. On the front of the board, change R1121 to a 51 OHM resistor, PN 315-0510-00.

4. Also on the front of the board, add a new 10K OHM resistor, PN 315-0103-00 from the cathode of VR1131 to the +5V side of R1121. See the revised schematic below for details.



It is recommended that this mod be installed in all CG551AP's and all CG5001's below the above serial number.

Please contact me if you have any questions.

Terry Turner
C1-866, 253-5616
Clark County Service Support
Issue 13-18

CG551AP/CG5001 DC CURRENT IN CURRENT LOOP OPERATION IMPROVED

Serial Numbers Affected: All instruments below B041000

Due to a firmware error, the current loop will not output DC current but will operate normally in chopped mode.

If a customer complains of this problem, A9A1U1014 should be changed to 160-1709-01. Due to the extremely low usage of this mode it is not recommended that this EPROM be replaced in every instrument that comes in for service or calibration.

Please contact me if your have any questions.

Terry Turner
Clark County Service Support
C1-866, 253-5616
Issue 13-21

CG5001/CG551AP SAC ATTENUATOR RELAYS IMPROVED

REF: CG551AP/CG5001 Instruction Manual, Vol. II 070-2815-01 Schematic Numbers 22 and 25. 015-0310-01 Comparator Head Instruction Manual, P/N 070-2817-00

S/N Affected: CG551AP - All Instruments below B040695
CG551AP Option 01 - All instruments below B041715
CG5001 - All instruments below B041745
015-0310-01 Comparator - All instruments below B120581

Four relays in the SAC Attenuator (A7K1300, A7K1312, A7K1314, A7K1323) and one relay in the LOW SAC output (A6K1111) have been changed to 148-0142-01.

Because the 148-0142-01 relay coil changes from 100 OHMS to 67 OHMs, A6R1113 must be replaced by a 1.5K OHM resistor P/N 315-0152-00 when A6K1111 is replaced. Kit number 050-1819-00 has been set up to replace A6K1111. The 148-0142-01 is a direct replacement for the four attenuator relays on the A7 output board.

This change also affects the 015-0310-01 comparator head. Relays A10K1100 and A10K1120 change to P/N 148-0142-01. Resistors A10R1100 and A10R1120 change to P/N 301-0121-00, 120 OHMS, .5W and must be replaced when the 148-0142-01 relays are installed. Kit number 050-1831-00 has been set up to replace A10K1100 and A10K1120.

Terry Turner
Clark County Service Support
C1-866, (206) 253-5616
Issue 13-25

[illegible]

WIZARD WORKSHOP ARTICLES

CG551AP/5001 BERG SOCKET FAILURES

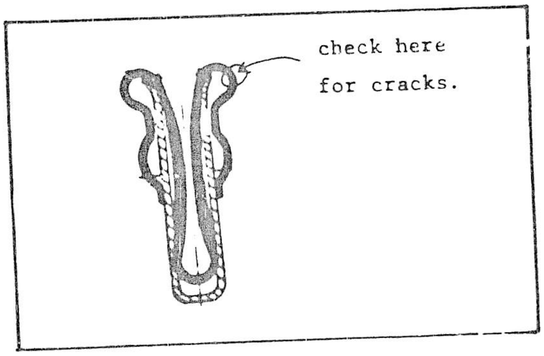
REF: A7 Output board
All serial numbers.

A reliability problem has been discovered with the Berg sockets used under the magnetic latch relays on the output board of the CG551AP/5001. Many of these sockets were installed incorrectly, causing intermittent operation of the relays. Some of the sockets have broken solder joints or lifted circuit board solder pads, and some of the sockets themselves are damaged.

The broken solder joints and lifted solder pads can be observed and repaired from the bottom of the board. The relays must be removed to check for damaged Berg sockets. Using the highest magnification available, a microscope if possible and a strong light, examine the sockets for fractures in the areas indicated on the drawing. All damaged sockets must be replaced.

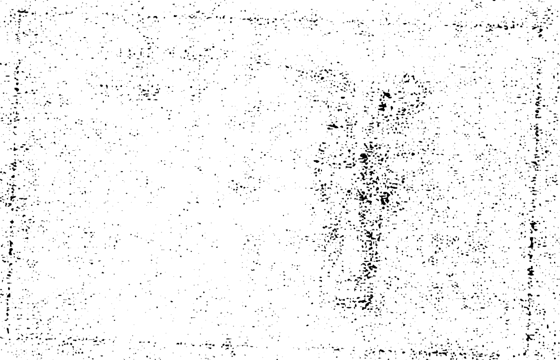
When replacing these sockets, it is suggested that adhesive tape be applied over the gold relay contact pads to prevent solder from adhering to the contact areas. Use a thin, stiff wire, such as a straight pin, to insert the new Berg sockets into the holes. Do not apply force to the top of the socket, as this will damage it. After replacing all the damaged sockets, remove the adhesive tape and clean the contact areas with isopropyl alcohol.

All CG551AP/5001's that come in should be inspected for damaged Berg sockets. The factory is reworking all units in stock and has taken steps to prevent recurrance of this problem. Although these magnetic latch relays and sockets are used in other products, this problem has been observed only in the CG.



Thanks to Jim Mauck, D.C. Field Office for alerting us to this problem with a SAR.

Craig E. Vogel
C1-866, (206) 253-5616 March 16, 1984
Issue 14-4



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CG5001/551AP SLEWED EDGE PERFORMANCE IMPROVEMENT

Ref: Mod 53906
SN B042000

Some CG's may not appear to give the correct output when performing step 29 (Slewed Edge Accuracy) of the performance check procedure at elevated temperature. This is due to interaction of the CG and the averaging function of the counter and does not usually indicate a failure. A modification was implemented at serial number B042000 to correct this, and can be installed into older units that exhibit this characteristic.

Using the drawing as a reference, make the following changes to the A3A5 Slewing Counter board:

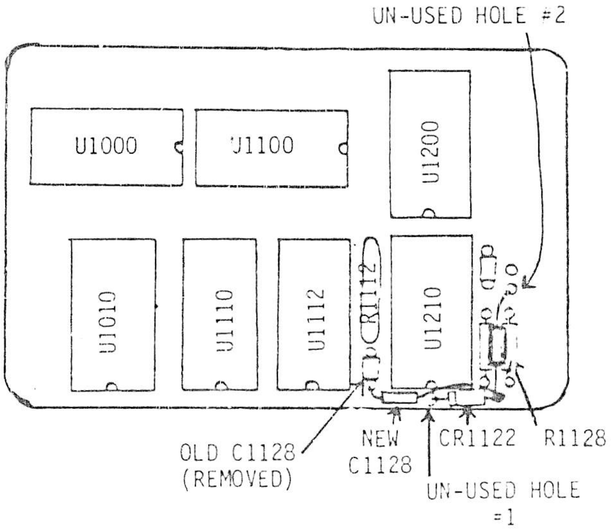
1) Remove C1128
2) Install the cathode lead of CR1128 (152-0322-00) into the previously unused hole #1.
3) Install one lead of the new C1128 (281-0823-00) into the old C1128 hole nearest the edge of the board.
4) Install one lead of R1128 (315-0222-00) into the previously unused hole #2.
5) Teepee the three remaining leads together as shown, keeping the leads as short as possible. Make sure the leads and component bodies do not extend beyond the edge of the board, and then solder the leads.

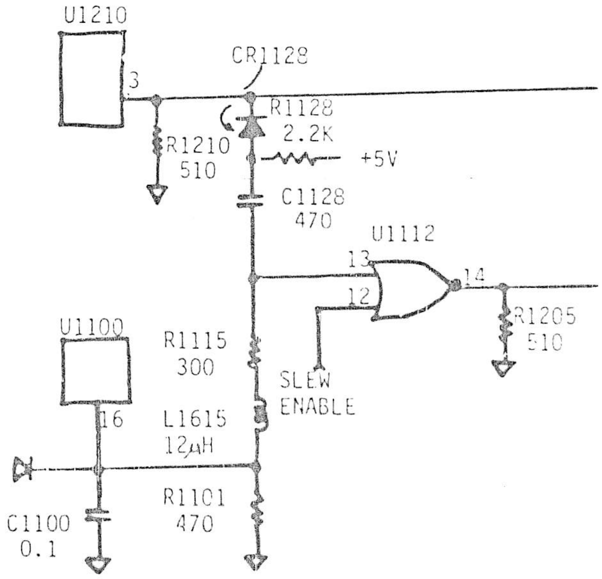
The schematic drawing shows the circuit changes made to the A3A5 board.

Craig E. Vogel
Clark County Service Support
C1-866, (206) 253-5616
Issue 14-7

March 15, 1984

670-6080-00
(TOP VIEW)





WIZARD WORKSHOP ARTICLES

CG551AP/5001 BERG SOCKET FAILURE CORRECTION

The Wizard article of March 16, 1984 recommended using adhesive tape to protect the gold contact pads from solder during socket replacement. This can cause problems if the adhesive residue is not completely washed off after the tape is removed.

We now have set up a part number of a tape designed for this application, PN 253-0145-00. All tapes leave some residue, this tape leaves such a small amount as to be insignificant in normal situations. This tape is also resistant to soldering iron heat, and may be used anytime it is desired to protect a contact surface.

Craig E. Vogel
Clark County Service Support
C1-866, (206) 253-5616
Issue 14-9

CG551AP/CG5001 RELAY RELIABILITY IMPROVEMENT

Units effected - B063791 and below

Concerns:

The following relays A6K1111, A7K1300, A7K1312, A7K1314 and A7K1323 can cause the SACC output voltage to drift. A new supplier of these relays has been found.

Symptom:

After powering up the unit program 100mv, DC RANGE and turn OUTPUT ON. If a drift of 100 or more micro volts is noted then it is recommended that these relays be changed. SPECIAL NOTE: It is possible that noise on this range can be reduced by installation of these new relays.

Recommended Procedure:

Install mod kit 050-2027-00 which contains five relays, an electrical shield and instructions.

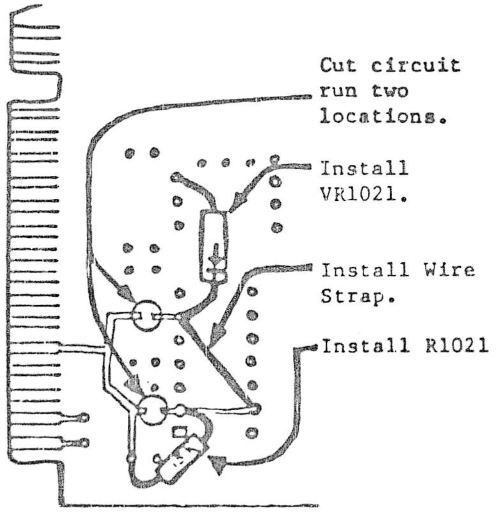
Martin DeLuke
C1-866, (206) 253-5617

WIZARD WORKSHOP ARTICLES

CG5001/CG551AP RANDOM SELF TEST PREVENTION

The modification (M60339) will suppress negative spikes caused by the 015-0311-00 Programmable Pulse Head. Typically, the only time these spikes occur is when the Pulse Head is installed after the CG is powered-up. These spikes, without this modification, will cause the CG to initiate self-test.

The modification consist of a clamp circuit at the input of A9U1021. It is comprised of adding A9R1021 (P/N 315-0153-00) and A9VR1021 (P/N 152-0175-00) on the backside of the A9 (CPU) circuit board (see figure 1.0). The schematic drawing changes are indicated in Figure 2.0.



Cut circuit run two locations.

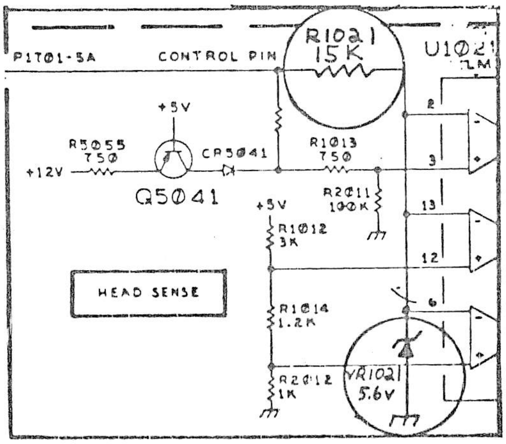
Install VR1021.

Install Wire Strap.

Install R1021

Figure 1.0

Partial view, A9 CKT. Bd. (Back Side)



CG5001/CG551AP

Figure 2.0

Head Sense Circuit (Schematic 30)

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue 16-8

WIZARD WORKSHOP ARTICLES

CG551AP/CG5001 FET 151-1098-00 REPLACEMENT

S/N: B063949

REF: M57730

The 151-1098-00 parts are no longer available. They are directly replaced by the parts indicated below and at the following locations:

A6Q1731, A61732, A61744, A6Q1831, and A6Q1832 are replaced with part number 151-1121-00.

A6Q1733 is replaced by part number 151-1103-00. To prevent possible oscillations by using this part, which may cause discrepancies to the High SAC output--primarily the leading edge--add capacitor A6C1633, part number 281-0765-00. The part should be added to the back of the A6 Reference board from A6U1632 pin 6 to A6U1632 pin 7.

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue 16-12

CG551AP/CG5001 FET 151-1098-00 REPLACEMENT: INCORRECT PART NUMBER

S/N: B063949

REF: M57730, WIZARD WORKSHOP
Article, Issue 16-12

Please be aware that the part number attributed to capacitor A6C1633, should be 281-0770-00 instead of the part number incorrectly quoted in the article.

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue 16-14

WIZARD WORKSHOP ARTICLES

CG5001/CG551AP RANDOM SELF-TEST MODIFICATION CORRECTION

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

When this modification is installed, using Zener diode Tektronix P/N 152-0175-00, an operator discrepancy is noted. The discrepancy appears when the Pulse Head is not installed on the CG. The operator is able to program the Fast Edge Mode from the front panel without receiving an "Entry Error" message. Also, when the Pulse Head is attached to a powered-up CG it is not being sensed, therefore causing no CG relay action to occur. These are the only discrepancies that occur as a result of installing Zener diode VR1021.

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

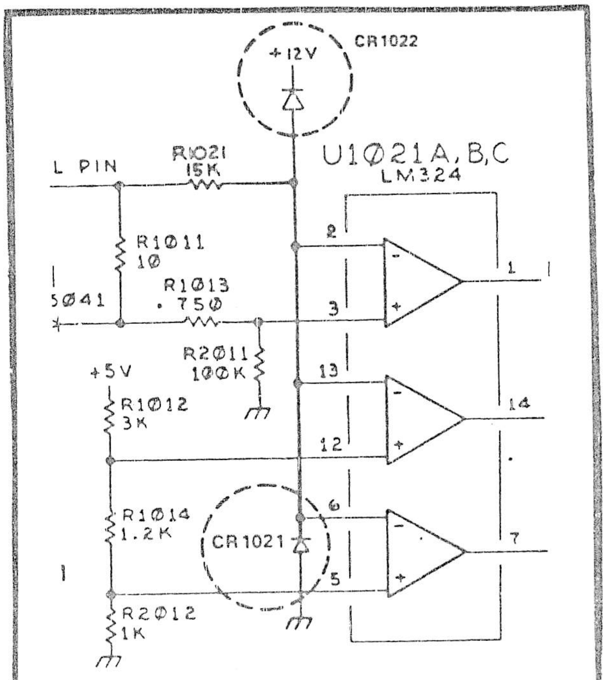


Figure 2.0

Martin DeLuke
Clark County Service Support
C1/866, (206) 253-5617
Issue 16-15

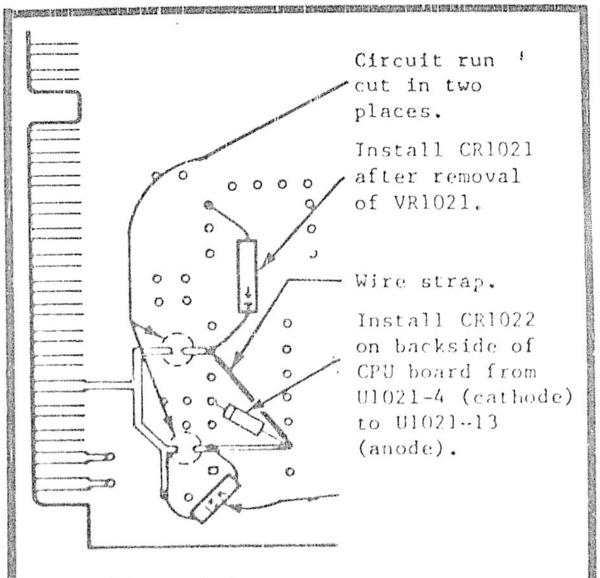


Figure 1.0

CG551AP/CG5001 POWER-UP ERRORS 83 AND 84

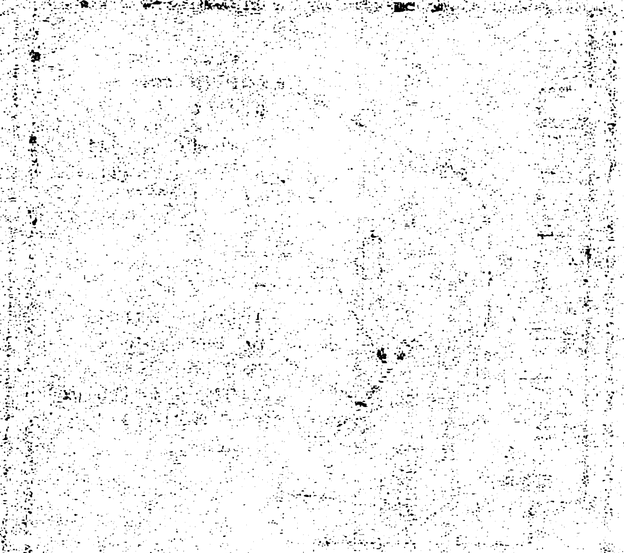
If errors 83 and 84 are displayed at power-up, it is possible that A7C1620 is shorted. If this capacitor developes internal low resistance, then these error codes will be displayed along with a decrease in the amplitude of the Lo Edge signal.

Martin DeLuke
Clark County Service Support
C1-866, 253-5617
Issue 17-1

[illegible]

[illegible]

[illegible]



WIZARD WORKSHOP ARTICLES

CG551AP/CG5001 100mV SAC AT 100KHZ ABERRATION MODIFICATION

EFF. S/N: B064185

REF: M62994

If excessive aberrations are noted on the 100mV SAC waveform at 100KHZ on S/N's below B064185, then the following modification should be performed, with the exception of removing and replacing A6U1241. (See pullout "A") This part was changed because of a vendor change and is not directly related.

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue 17-7

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.

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue 17-14

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.

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue: 17-18

CG551AP/CG5001 EDGE OUTPUT SIGNAL WILL NOT SUPPLY 10 mA WHEN PROGRAMMED FOR 16 V @ 100 kHz

S/N B064228

Mod #M63791

When the CGXXXX is programmed for Edge Mode, 16 V @ 100 kHz, it may not supply the required 10 mA of current.

To correct this, change A7R1414 to Tek P/N 315-0330-00, A7R1525 to Tek P/N 315-0513-00 and on the back side of the A7 board add R1517, Tek P/N 315-0512-00, from A4Q1517 collector to ground.

All instruments below S/N B064228 with the exception of the following, may display this discrepancy:

B064200
B064212
B064216
B064217
B064222
B064224
B064225

Martin DeLuke
Clark County Service Support
C1-866, (206) 253-5617
Issue: 18-1

WIZARD WORKSHOP ARTICLES

CG5001: WRONG PART MAY HAVE BEEN INSTALLED

REF: CG5001, SN B064400 to B064420,
A9Q3063

We discovered that a wrong part may have been installed in a limited number of CG5001's. With this wrong part installed, the CG5001 will function normally, except that the CMOS RAM battery will fail after a few months. The affected CG5001's are believed to all be in the serial number range of B064400 to B064420.

If you receive a CG5001 with a failed battery, or if you service a CG5001 in this serial number range, be sure to inspect A9Q3063. This transistor should be NPN, Tektronix part number 151-0190-00. A few PNP parts, marked either 151-0188-00 or 2N3906 were inadvertently installed. The PNP part creates a discharge path for the battery while the CG5001 is turned off, substantially reducing battery life.

Thanks to Pete Newfeld of the DC field office for alerting us to this easy-to-miss condition.

Craig E. Vogel
Murdock Park Division
C1-065, (206) 253-5616
Issue: 18-11

MAG LATCH RELAY SCREW LATCH SCREW CHANGED

REF: Mod #66632

CG5001	B064433
CG551AP	B064433
DC5010	B052265
DC510	B052238
DC5009	B064023
DP509	B064003
DP501	B010826
FG5010	B052311

The mounting screw for the 148-0128-03 Mag Latch relay has been changed to Tek part number 213-1028-00. The new screw is longer than the screw it replaces. The longer length allows for more secure fastening of the relay without stripping out the plastic housing. This screw is a direct replacement for all screws previously used to mount the relay. The products listed at the beginning of this article have the new screw installed at the factory starting at the serial numbers listed above.

This screw requires a TORX screwdriver for installation. A TORX head bit to fit magnetic screwdriver handles is available as Tek part number 003-1413-00. It is recommended the screw be tightened to 1.25 inch pounds of torque.

Craig E. Vogel, PAE
Murdock Park Division
C1-065, (206) 253-5616
Issue: 18-14