

040-0957-03

M45587, M49902

PROGRAMMABLE CONVERSION

For TEKTRONIX® DC509 Universal Counter/Timers

Serial Numbers - All

This modification kit provides parts and instructions to convert a DC509 or a DC509 Option 01, to a DC5009 or a DC5009 Option 01, respectively.

The conversion consists of removing the microprocessor from the A16 Digital circuit board, installing the A14 GPIB board and updating the firmware on the Digital board. In addition, two resistors, R1426 and R1427, are added to the Analog board to make events B during A and ratio A/B work properly when CH B input frequency is below approximately 200Hz. Also, to help ensure the DC509/DC5009 will count 10Hz correctly, a ground contact is added to the electrical shield on the Analog circuit board.

KIT PARTS LIST:

Ckt. No.	Quantity	Part Number	Description
	1 ea	070-3888-00	MANUAL, TECH:INSTR, DC5009
A16CR1221	1 ea	152-0322-00	SEMICONDUCTOR DV, DI:SI, 15V
A16U1312	1 ea	160-1076-02	MICROCKT, DGTL:4096 x 8 EPROM, PRGM
	1 ea	211-0008-00	SCREW, MACHINE:4-40 x 0.250, PNH, POZ
	3 ea	211-0678-00	SCREW, ASSEM WSHR:4-40 x 0.281, PNH, POZ
	1 ea	214-0982-00	CONTACT, ELEC:GROUNDING
	2 ea	214-3089-00	LOCKOUT, PLUG IN:PLASTIC
	1 ea	220-0729-00	NUT BLOCK, 0.5 x 0.25 SQ
A12R1426	1 ea	315-0122-00	RES, FXD, CMPSN:1.2K Ω , 5%, 0.25W
A12R1427	1 ea	315-0511-00	RES, FXD, CMPSN:510 Ω , 5%, 0.25W
	1 ea	-----	MARKER, FIRMWARE VERSION 1.2
	1 ea	-----	MARKER, GPIB INSTRUCTION
	1 ea	-----	PLATE, ID, DC509/DC5009
A14	1 ea	670-6797-03	CKT BOARD ASSY:GPIB
	1 ea	-----	LABEL, 040-0957-XX

PRECAUTIONS:

CAUTION

Static discharge can damage any semiconductor component in this instrument. Static voltages of 1kV to 30kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor- or work-surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special, anti-static desoldering tools.

WARNING

To avoid electric-shock hazard, disconnect the instrument from the power source before attempting to make any repairs.

SOLDERING TECHNIQUE

CAUTION

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques which apply to maintenance of any precision electronic equipment should be used when working on this instrument. Use only 60/40 rosin-core, electronic grade solder.

When soldering on circuit boards or small wiring, use only a 15 watt, pencil-type soldering iron. A higher wattage soldering iron can cause the etched circuit wiring to separate from the board base material and melt the insulation from small wiring. Always keep the soldering iron tip properly tinned to ensure the best heat transfer to the solder joint. Apply only enough heat to remove the component or to make a good solder joint. To protect heat-sensitive components, hold the component lead with a pair of long-nose pliers between the component body and the solder joint. Use a solder-removing wick to remove excess solder from connections or to clean circuit board pads.

CAUTION

The Analog and Digital circuit boards in the DC509 are multilayer-type boards with conductive paths laminated between the top and bottom board layers. All soldering on these boards should be done with extreme care to prevent breaking the connections to these conductive paths. Only experienced service personnel should attempt to repair or modify these boards. Do not allow solder or solder flux to flow under printed circuit board switches. The printed circuit board is part of the switch contacts; intermittent switch operation can occur if the contacts are contaminated.

INSTRUCTIONS:

NOTE

Refer to the exploded mechanical drawing, Fig. 1, while installing this modification. The numbers below, within parentheses, refer to the circled numbers in Fig. 1.

- () 1. Remove the left and right instrument side covers.
- () 2. Make the following changes on the Digital circuit board, A16:
 - () a. Remove U1311, pn 156-1482-00, a microcircuit located next to J1211.
 - () b. Replace U1312, pn 160-1076-XX, with the new EPROM, pn 160-1076-02, from the kit.

NOTE

Some components are difficult to remove from the circuit boards due to a bend placed in each lead during machine insertion of the component. The purpose of the bent leads is to hold the component in position during a flow-solder manufacturing process which solders all components at once. To make removal of machine inserted components easier, straighten the leads of the component on the back of the circuit board, using a small screwdriver or pliers, while heating the soldered connection.

- () c. Replace the diode, CR1221, with the new diode from the kit.

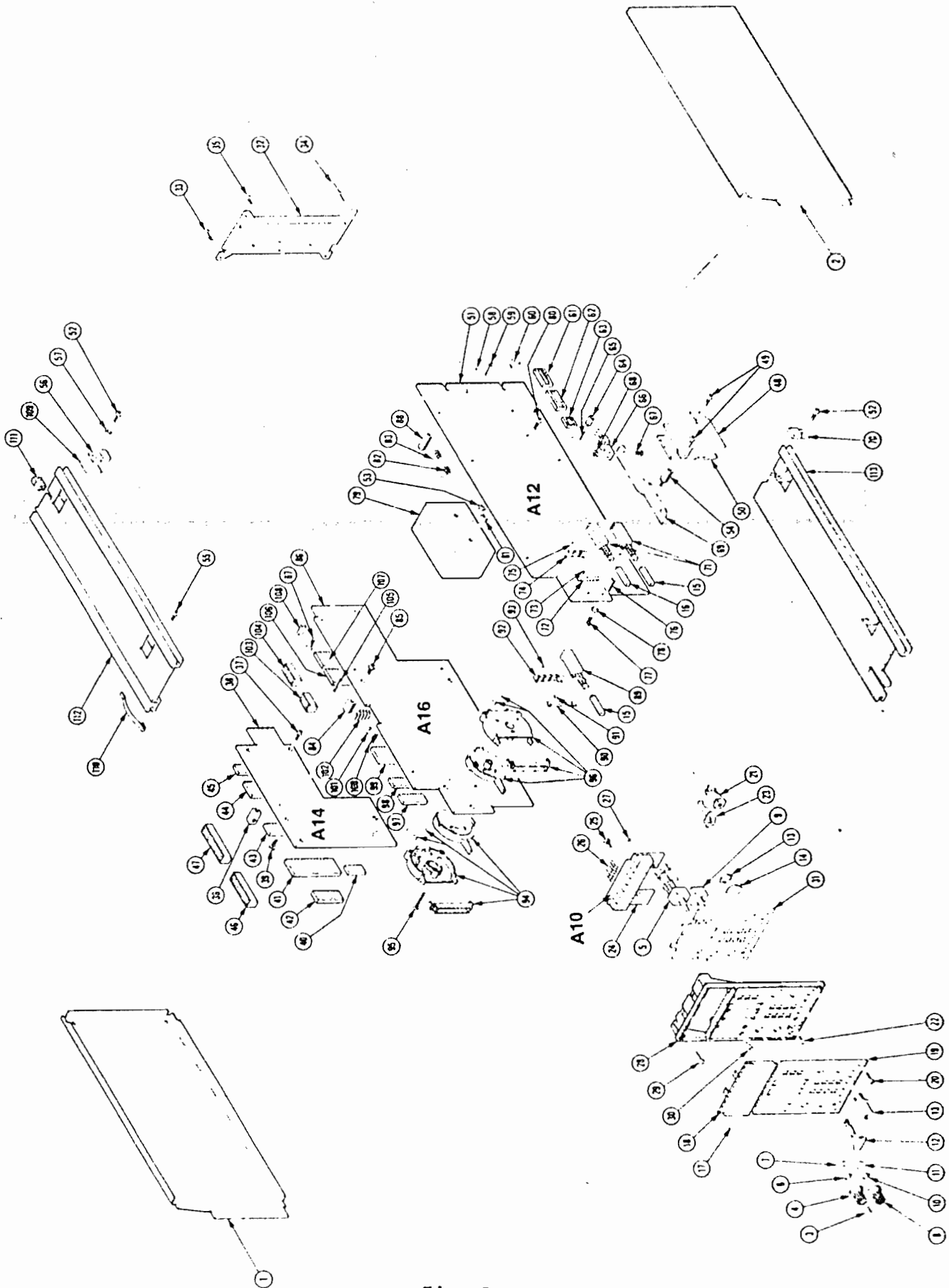


Fig. 1

- () 3. Make the following changes on the Analog board, A12:
- () a. Solder the ground contact to the electrical shield near the front of the board, as shown in the diagram below, Fig. 2.

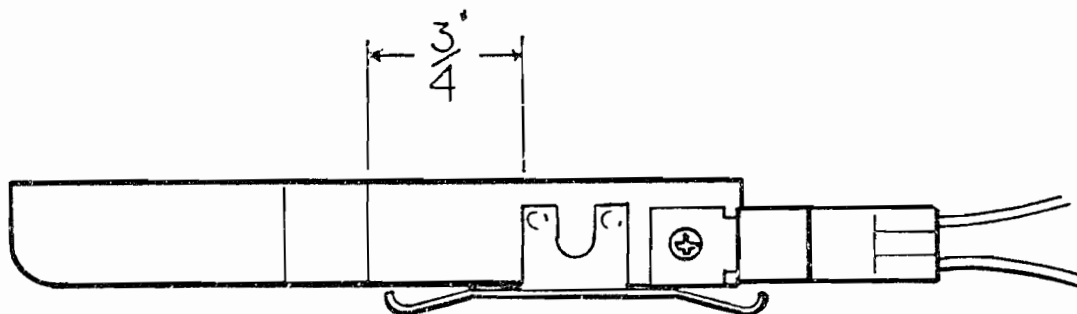


Fig. 2

- () b. Add R1426, a 1.2k Ω , 5%, 0.25W resistor. Solder one lead of the resistor to pin 3 of U1421 and solder the other lead of the resistor to the lead of R1433, nearest Q1433.
- () c. Add R12427, a 510 Ω , 5%, 0.25W resistor. Solder one lead of the resistor to pin 3 of U1421 and solder the other lead of the resistor to the lead of C1441, nearest R1433.
- () 4. Remove the two screws (33) and the two plug-in supports (34), which fasten the rear panel (32) to the top and bottom frame sections (112) and (113), and remove the rear panel.
- () 5. Insert one plug-in lockout (111) in the slot on the top frame section (112) and one in the slot in the bottom frame section (113) and reinstall the rear panel.
- () 6. Install the nut block (36) on the GPIB board, A14, using one of the 4-40 x 0.281 screws. See (37) for proper location of the nut block.
- () 7. Insert the edge connector of the GPIB circuit board through the slot in the rear panel, line up connectors P1210 and P1211 on the GPIB circuit board with J1210 and J1211 on the Digital circuit board, and press in place.
- () 8. Fasten the GPIB circuit board in place with two 4-40 x 0.281 screws (with washers) (39) inserted through the GPIB circuit board into the HEX spacers (84) which are mounted on the Digital board, A16.
- () 9. Install one 4-40 x 0.250 screw (35) through the rear panel into the nut block (36).

- () 10. Remove the DC509 identification plate (17) from the slot in the LED display (18) and install the DC509/DC5009 identification plate in its place.
- () 11. Remove the protective backing from the GPIB instruction marker and place the marker on the rear panel below the edge connector of the GPIB circuit board.
- () 12. Remove the protective backing from the firmware version ID marker and affix it to a clean area of the top frame section near the serial number tag.
- () 13. Remove the protective backing from the 040-0957-XX label and affix it to a clean area of the top frame section near the firmware version ID marker.
- () 14. Refer to the Calibration section of your DC5009 Instruction Manual, test instrument performance and recalibrate as necessary.
- () 15. Reinstall the instrument side covers.

CM:pa