

Repair procedures

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DGT 2000

Overview of versions

The DGT 2000 has been produced since 1994. About 4 versions are in market. Main differences between the versions are in the mechanical construction of the electronics, and print layout. The schematic has not been changed but since June 2005.

1994-1996: The first version is not yet called DGT 2000, but just DGT. Main mechanical feature: The LCD displays are soldered on the main PCB. This version will hardly be offered for repair, while very old already. Main error cause will be that the LCD glass is broken. Due to the soldered construction, this is very hard to repair. However, the LCD may be still available on the parts market, while it is a standard layout/pinning and dimensions part. Suggestion: Buy a DGT 2000.

1996-1999: DGT 2000 version. The mechanic construction of the PCB and LCD displays is changed so that the LCD devices contact the PCB by use of conducting polymer. The protective transparent windows covering the LCD are removed, the LCD is brought more to the surface. The LCD opening gets a small embossment.

1999-2002: DGT 2000 with slightly changed PCB layout.

2002-2005: improved top switch (lever) spring construction. The earlier versions have a plastic spring for the lever clicking mechanism. This spring is part of the bottom plastic part of the clock. This plastic spring is subject to relaxation and change of shape. From 2002, the bottom spring is replaced by a more solid construction with spring and ball. In between these batches, a mixed solution has been used shortly, where the spring and ball construction is added to the original plastic spring construction.

2005: An electronic redesign is implemented. The schematic and placement of components on the PCB is changed completely, the package of the microcontroller too. Microcontroller pin names and functions, and internal code stayed the same. Schematics and layout + explanation are not yet published, and will come available soon. No experiences on dropouts and repair are available yet.

Defects and Repair

Several defects do occur with the various versions of the DGT and DGT 2000. In the below overview, the oldest version (1994-1996, not yet called DGT 2000) is not described. As already stated, these will occur rarely, and are difficult to repair.

The defects can be mainly divided in electrical/electronic defects and mechanic defects

- 1) Electrical/electronic defects
 - a) One or more segments do not operate
 - b) The lever does not operate
 - c) The clock can not be switched on/does not start

- 2) Mechanical defects
 - a) Lever does not work
 - b) Breakage of parts
 - c) One or more front buttons do not operate
 - d) One or more segments in the LCD display are dimmed

1) Electrical/electronic defects

a) One or more segments do not operate

This can have electrical or mechanical causes: see 2d) too.

Mostly this defect is caused by broken contact of a MCU (microcontroller pin) with the PCB. This shows up as that the same segment of the left and right display is dimmed. See 1a1) for repair.

Other electrical causes can be: Shortcut between MCU segment I/O pins. Other mechanical causes can be: damaged LCD (glass breakage), broken contact between LCD and PCB.

1) Broken contact between MCU pins and LCD

The same segment(s) in left and right display are malfunctioning. By reading the schematics, the suspicious MCU pin can be determined. Check broken contact by pressing the pin(s) or the whole MCU, while inspecting the display: the display may come up.

Repair: solder with fine point iron. Take care not to short-circuit with neighboring pins.

b) The lever does not operate

Everything works OK, but the clock time of one or both players display does not change as it should.

The most important electrical cause is that (one of) the switches SW1/SW2 is defective, or the soldered connection is bad. Try resolder or replace the switch(es).

There can be mechanical causes: See 2a) for the repair procedure.

c) The clock can not be switched on/does not start

The main causes are:

- corrupted power supply
- non-oscillating crystal CY1
- defective capacitor C7

Procedure:

- 1) Check the voltage of the battery pack (5.5V to 6.5V). Replace with good loaded batteries
- 2) Check whether the battery holder is defect. Quite often one end of the battery holder breaks by tearing of the plastic. Replace the battery holder.
- 3) Check whether the contact + connector to the battery holder is OK. If not: open the clock and replace this item. Check the good polarity.
- 4) Open the clock for further checks
 - (1) With connected batteries, the voltage between MP2 and MP3 must be 5.5 to 6.5 V DC. If not, double check batteries, battery holder and battery connector + wire.
 - (2) If (1) is OK, and still not curing, check the voltage between MP1 and MP4 to be about 0.5 less than MP2/MP3 voltage. If this voltage is too low, replace D1.
 - (3) If (2) is OK, and not curing, replace C9.
 - (4) If (3) is not curing, check voltage between MP1 and MP5. if OK, goto (5)
If not OK, replace C7, if not cured, also replace C3. If not cured, also replace CY1
 - (5) Here the process is not yet defined well enough. T1 may need to be replaced...

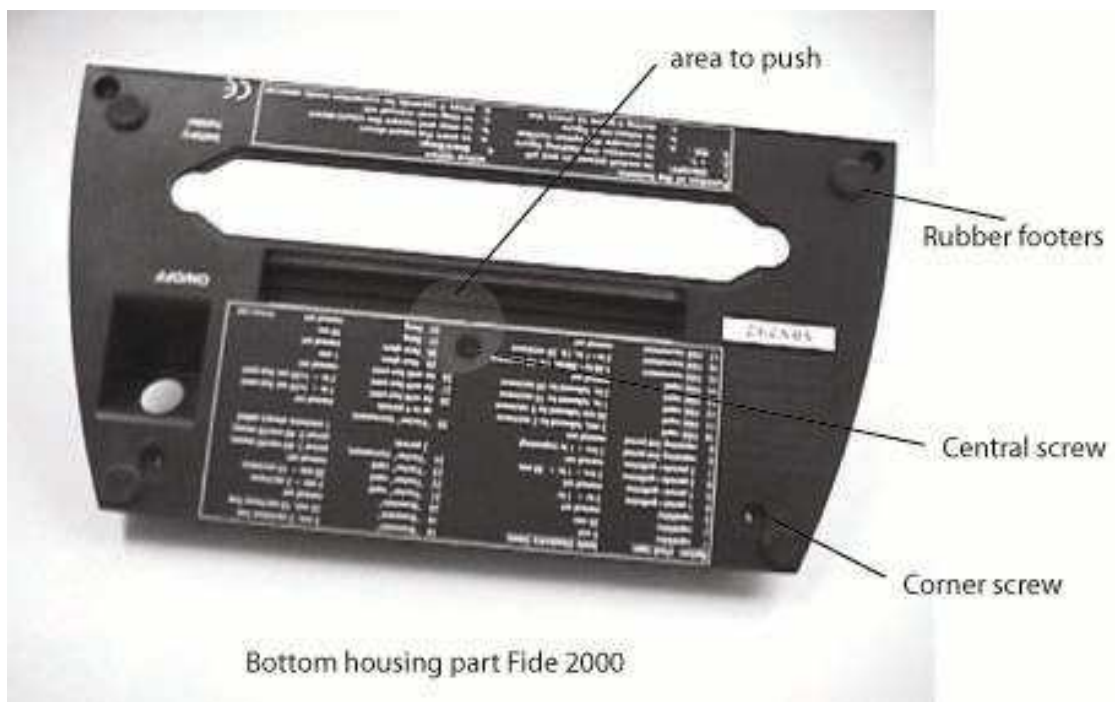
2) Mechanical defects

a) Lever does not work or does not switch neatly

- 1) An important cause is that (one of) the small plastic parts came off the lever/Tumbler (see picture). This part is introduced around 1999. The small parts are glued to the tumbler, and if loose, will cause noise when the clock is shaken, before it is opened. Reposition it with a suitable glue (i.e. acrylic super glue)



- 2) When the lever does not click neatly, it can be caused by malformed or worn clicking mechanism. See Overview of versions, 2002-2005 for a description of the various constructions that have been used in the versions.



In all versions, with these complaints, the tightness of the central screw (see bottom house picture) needs to be checked, it may needed to screw it more tight.
 If this does not solve the problem, the bottom plate needs replacement with a compatible version. Make sure to move the rubber anti slip feet from the old to the new bottom plate.

b) Breakage of parts

Any housing part of the clock may be broken, by any maltreatment, and may need replacement, taken from the spare part stock or spare clocks.

c) One or more front buttons do not operate

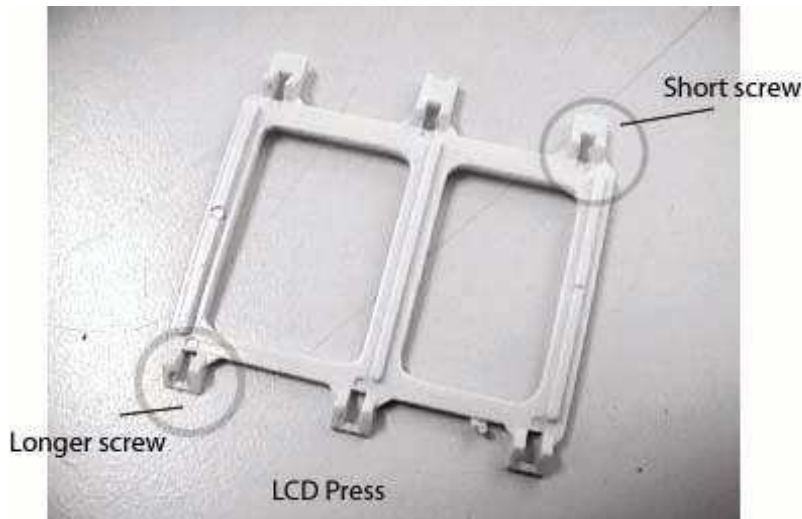
This may be caused by a defective button switch (check with a resistance meter). In such case, a reflow of the solder points of the on-PCB button may cure the problem. Take care to get the button mounted on the PCB without tilting or distance. If this does not solve the problem, replacement of the button is the next step.

If by resistance test the button appeared OK, the connection to the controller may be bad. Check the connector pins soldering.

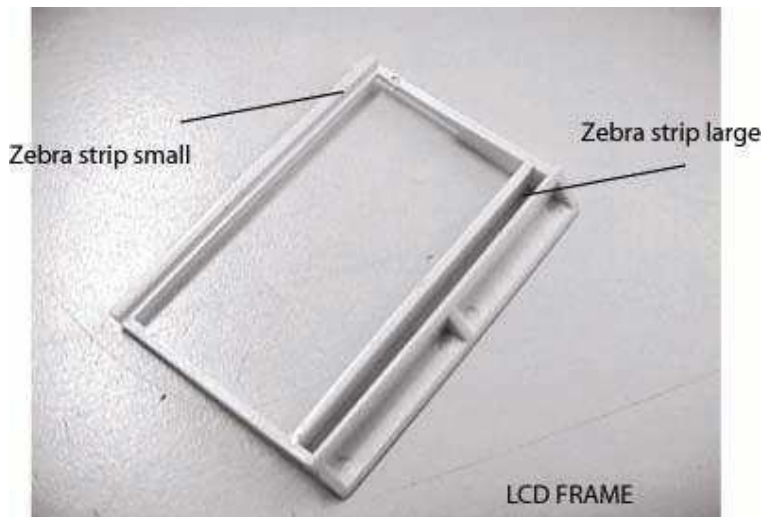
d) One or more segments in the LCD display are dimmed

If the test for electrical causes (see 1a)) does not give evidence, the following causes may apply:

- 1) The contact pressure between LCD and PCB is too low
Tighten the screws of the LCD Press frame (see picture). Sometimes, due to bending of the PCB, it is needed to add extra material (i.e. a small length of polymer strip) between LCD press frame and PCB, to enable good contact.

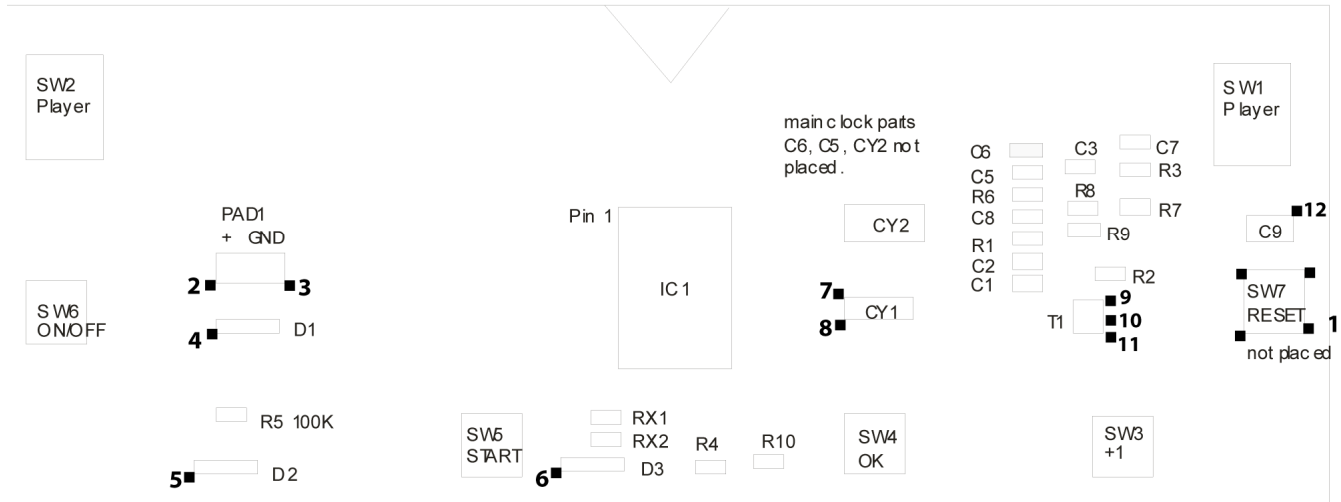


- 2) The LCD glass is broken
Remove all 12 screws of the two LCD Press frames (see picture) and remove the LCD press frames.



Take out the PCB, the (pink) polymer stripes, the display frames and the LCD glass bodies. Replace the LCD glass body that is broken (check on background color: they may differ from series to series. Replacement of both LCD's may be needed to get identical colors). Check all contact areas on dirt, and reassemble. Take care to mount the LCD's in the right orientation.

Digital Game Timer Component placement (not on scale) FIDE 2000 Measure points 2005



Measure Points (MP)

Normal operation DC Voltages on measure points:

2	:	6,45	8	:	1,94
4	:	6,45	9	:	5,89
5	:	3,08	10	:	5,25
6	:	1,56	11	:	5,89
7	:	2,89	12	:	5,93

Layout of DGT 2000 PCB and DC Voltages on measurement points

