Service Manual for

TESTMATE models TM3028, TM3064

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Table of Contents

1 Functional Modules

The TESTMATE Dynamic Troubleshooter has extensive selftest routines that permit diagnosis of a fault down to one of eight replaceable modules. The functional circuitry of the tester is divided among the modules as follows:

Micro Board: CPU, operating system EEPROMs, DRC library EEPROMs, Data Cartridge interface, RS232 interface, keyboard interface, Activity Check, Activity Monitor LEDs.

High Speed Board: Fault Mask timing, Frequency measurement, gate circuit, RD test circuits, ZIF socket power relays, RD simulation FPGA, RD/DUT synchronizing circuit, Shadow RAM, simple trigger circuit, gate circuit.

Display Controller: Character generator EPROM and Display driver.

IB28 Buffer Board: 28 channel Test Clip Pullup/down resistors, Reset circuit, Power supply voltage sensing circuit, threshold comparator circuits, channel level translators.

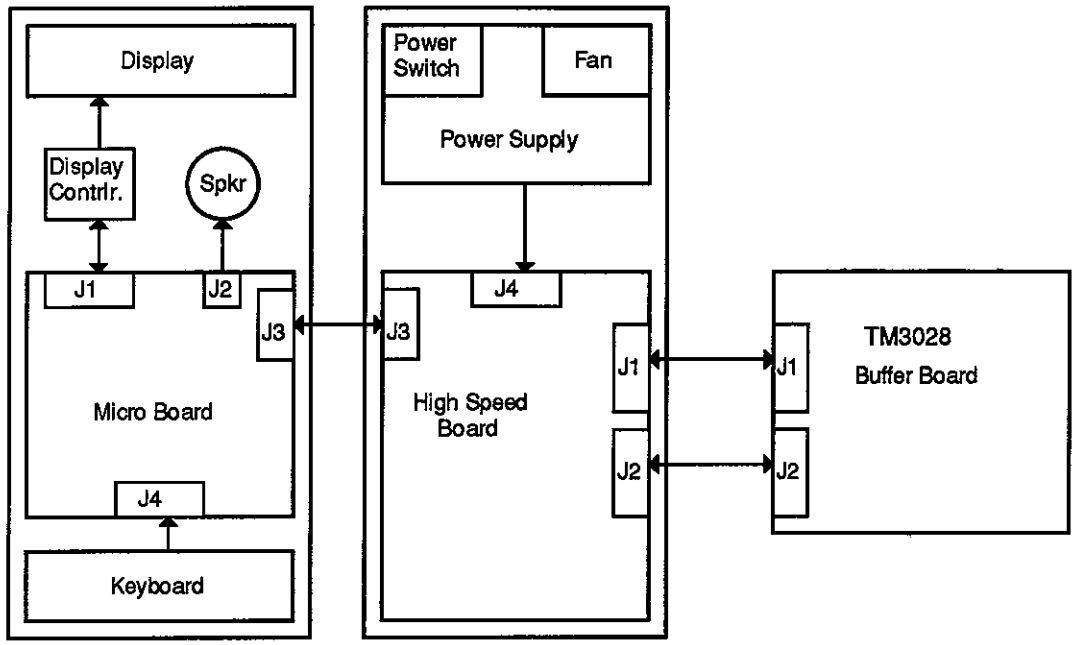
IB64 Trigger Board: 64 state FPA trigger engine, FPA aquisition trace memory.

IB64 Buffer Board: 64 channel Test Clip Pullup/down resistors, Reset circuit, Power supply voltage sensing circuit, threshold comparator circuits, channel level translators, Fmask timing circuits for TM3064 RD Holder.

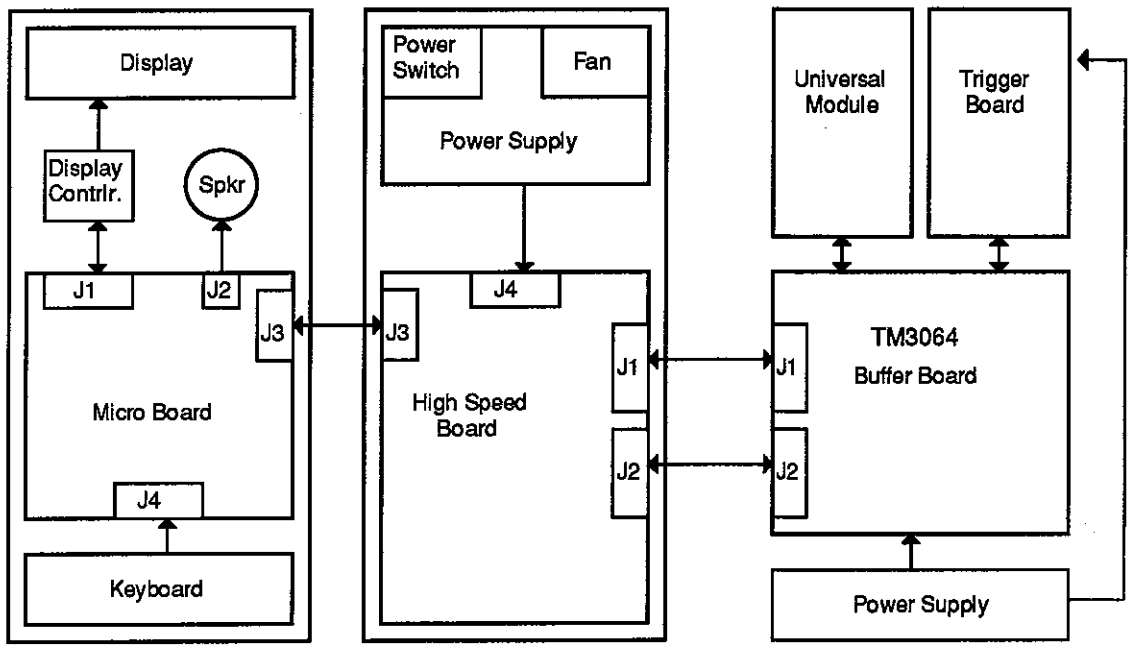
Universal Module: FPA library EEPROMs, channel grouping circuits.

For the two TESTMATE models, TM3028 and TM3064, these modules are interconnected as shown on the next page:

TM3028:



TM3064:



2 Selftest Results

When the TESTMATE is powered on, a series of selftests is automatically executed. They take about 1 minute for the TM3028 model and 3 minutes for the TM3064 model. The Selftest routine may be re-initiated at any time by simultaneously pressing the Cntrl and ESC keys. The Selftest may be truncated during its "hardware tests" phase by simultaneously pressing the Shift and ESC keys.

If there is a problem with the Micro Board that prevents the Selftests from running, the IC Size LEDs near the Reference Device Socket may be lit in a particular pattern that explains the problem. In all cases, the Micro Board or the Power Supply is faulty. The LED error codes are shown below, with the most significant bit representing the 8-LED and the least significant bit representing the 28-LED.

00000001: KEYBOARD CIO PortA. CPU cannot communicate.
00000010: KEYBOARD CIO PortB
00000011: TIME CIO PortA
00000100: TIME CIO PortB
00000101: FREQ CIO PortA
00000110: FREQ CIO PortB
00000111: Display not ready
00001000: ROM checksum error
00001001: SRAM error
00001010: Stack underflow
00001011: Unimplemented interrupt occurred
00001100: Invalid interrupt vector
00001101: Not used
00001110: Incorrect peripheral serviced
00001111: UART transmit error
00010000: UART other errors (special receive conditions)
00010001: UART parity error
00010010: DRAM error
00010011: Overlay error
00010100: Not used
00010101: MAP CIO PortA
00010110: MAP CIO PortB
00010111: Display memory error

2.1 Listing of Selftests

The following table lists the Selftests. They are grouped approximately according to the module that they exercise, however, many tests activate multiple modules. The modules are listed in priority of how much they are involved with a particular test. Refer to the section on Selftest Result Interpretation to find out how to match failing tests to the appropriate faulty module. The modules are designated as follows:

MB = Micro Board
HS = High Speed Board
IB = 28 Channel Buffer Board
IB64 = 64 Channel Buffer Board
TR64 = 64 Channel Trigger Board
UM = Universal Module for TM3064
PS1 = Mainframe Power Supply
PS2 = TM3064 Interface Buffer Power Supply
KB = Keyboard

#	Test Name	Description	Module Tested
1	PULL0_MON	Walking 0 test of Mon Bus, LEDs	HS,IB28/64,MB
2	PULL1_MON	Walking 1 test of Mon Bus, LEDs	HS,IB28/64,MB
3	PULL0_FLT	Walking 0 test of sync,fault,Mon circuits	HS,IB28/64,MB
4	PULL1_FLT	Walking 1 test of sync,fault,Mon circuits	HS,IB28/64,MB
5	SYNC0_Hres_FLT	Walking 0 test of CMOS RD,fault circuits	HS,IB28/64,MB
6	SYNC1_Hres_FLT	Walking 1 test of CMOS RD,fault circuits	HS,IB28/64,MB
7	SYNC0_Lres_FLT	Walking 0 test of TTL RD,fault circuits	HS,IB28/64,MB
8	SYNC1_Lres_FLT	Walking 1 test of TTL RD,fault circuits	HS,IB28/64,MB
9	PINDIS0_FLT	Walking 0 test of pin latch,fault circuits	HS,IB28/64,MB
10	PINDIS1_FLT	Walking 1 test of pin latch,fault circuits	HS,IB28/64,MB
11	SLFTST0_FLT	Walking 0 test of selftest latch,fault circts	HS,IB28/64,MB
12	SLFTST1_FLT	Walking 1 test of selftest latch,fault circts	HS,IB28/64,MB
13	VccON_FLT	Verifies the RD socket power relay circuit	HS
14	GndON_FLT	Verifies the RD socket power relay circuit	HS
15	PULLPOS_FREQ	Walking pulse on Freq circuit	HS,MB,IB28/64
16	TRIGQAL0_EQUAL	Verifies 0 level on main trigger circuit	HS,MB
17	TRIGQAL1_EQUAL	Verifies 1 level on main trigger circuit	HS,MB
18	QAL0_EQUAL	Verifies 0 level on qualifier latches	HS,MB
19	QAL1_EQUAL	Verifies 1 level on qualifier latches	HS,MB
20	TRIG0_EQUAL	Main Trigger latch verification	HS,MB
21	TRIG1_EQUAL	Main Trigger latch verification	HS,MB
22	PULL0_TRIG-EQUAL	Pullup latch and Trigger verification	HS,MB
23	PULL1_TRIG-EQUAL	Pullup latch and Trigger verification	HS,MB
24	PULL0_TRIGQAL	Verifies pullup,trig,qualifier latches	HS,MB

#	Test Name	Description	Module Tested
25	FM_STAT_NFLT	Static Fault Mask Test for no fault	HS,IB28/64
26	FM_STAT_FLT	Static Fault Mask Test for fault	HS,IB28/64
27	FMASK_WB_TEST	Wide tolerance test of FMASK circuit	HS,IB28/64
28	FMASK_CAL	Calibration setting of FMASK circuit	HS,IB28/64
29	FM40_FLT	Check that 40 ns pulse gives fault	HS,IB28/64
30	FM40_NFLT	Check that 40 ns pulse gives no fault	HS,IB28/64
31	FM80_FLT	Check that 80 ns pulse gives fault	HS,IB28/64
32	FM80_NFLT	Check that 80 ns pulse gives no fault	HS,IB28/64
33	FM120_FLT	Check that 120 ns pulse gives fault	HS,IB28/64
34	FM120_NFLT	Check that 120 ns pulse gives no fault	HS,IB28/64
35	FM160_FLT	Check that 160 ns pulse gives fault	HS,IB28/64
36	FM160_NFLT	Check that 160 ns pulse gives no fault	HS,IB28/64
37	FM200_FLT	Check that 200 ns pulse gives fault	HS,IB28/64
38	FM200_NFLT	Check that 200 ns pulse gives no fault	HS,IB28/64
39	FM240_FLT	Check that 240 ns pulse gives fault	HS,IB28/64
40	FM240_NFLT	Check that 240 ns pulse gives no fault	HS,IB28/64
41	ACT_DIS_CLR	Verify that Activity Check can be cleared	MB,HS,IB28/64
42	PULL0_ACT_TSTON	Verify falling edge Activity Check	MB,HS,IB28/64
43	PULL1_ACT_TSTON	Verify rising edge Activity Check	MB,HS,IB28/64
44	PULL0_ACT_ACTSTR	Verify falling edge Activity Check	MB,HS,IB28/64
45	PULL1_ACT_ACTSTR	Verify rising edge Activity Check	MB,HS,IB28/64
46	FREQ_BIAS_SHORT	Comprehensive test threshold, frequency	IB28/64,HS,MB
48	KEYBOARD_OPEN	Verifies that all keys are in open state	KB
49	TEST_C_ENG	Verifies interrupt control lines	MB,HS
50	UART	Internal RS232 test, omitted in power-on Selftest	MB
51	DGATE_TEST	Verifies Delayed Gate function	HS,MB
52	PULL0_XTRIG	Verifies Shadow RAM triggering	HS,MB
53	PULL0_XTRIG	Verifies Shadow RAM triggering	HS,MB
54	PULL_XEVENT	Verifies Shadow RAM event counting	HS,MB
55	SHAD_INIT	Verifies Shadow RAM initialization	HS,MB
56	DGATE_PRE	Verifies Delayed Gate function	HS,MB

#	Test Name	Description	Module Tested
81	POD_COM_ST	Verifies communication to IB64	IB64, MB, HS
82	PULL64_W0	Tests pulldown resistors in IB	IB64
83	PULL64_W1	Tests pullup resistors in IB	IB64
84	ACT64_W0	Verifies Activity Check circuit	IB64
85	ACT64_W1	Verifies Activity Check circuit	IB64
86	EOT64_W0	Verifies End of Test latches	IB64
87	EOT64_W1	Verifies End of Test latches	IB64
88	POD_ROM	Verifies IB64 ROMs	IB64
89	POD_RAM	Verifies IB64 RAM	IB64
90	POD_RD_RAM	Verifies Reference Device RAM on IB64	IB64
91	POD_CONTROLLER	Tests Reference Device controller	IB64
92	TRIG_SHAD_RAM	Tests Trigger Board Shadow RAM	TR64
93	TRIG_MEM_0	Tests trace memory on Trigger Board	TR64
94	TRIG_MEM_1	Tests trace memory on Trigger Board	TR64
95	TRIG_MEM_2	Tests trace memory on Trigger Board	TR64
96	TRIG_MEM_3	Tests trace memory on Trigger Board	TR64
97	TRIG_MEM_4	Tests trace memory on Trigger Board	TR64
114	TRIG_W0	Walking 0 test of Trigger function	TR64
115	TRIG_W1	Walking 0 test of Trigger function	TR64

2.2 Reading Selftest Results

After TESTMATE is powered on, a check of the power supply voltages is made. If they are out of range, a screen appears immediately showing the DAC settings that measure the voltages. For example:

```
                Hardware Failure
        Power supply voltage out of range

*Ch7 (+5v)  = -19   | Ch4 (-5v)  = 2
 Ch6 (+12v)=  7     | Ch3 (Vpp) = 0
 Ch5 (-12v) = -18   |
```

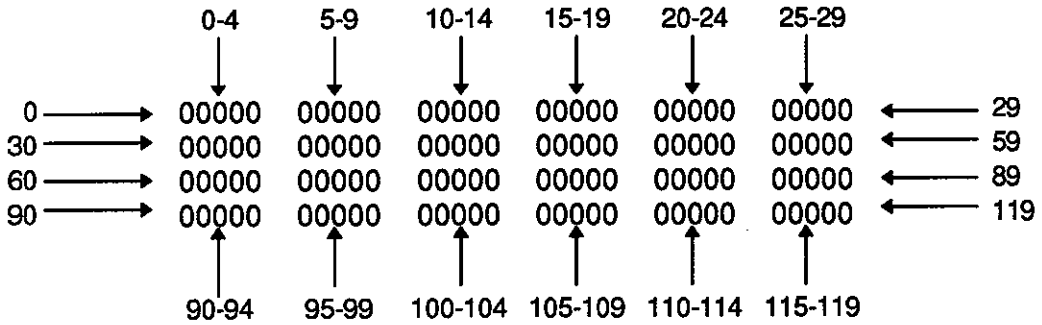
Pressing any key will cause the Selftest to continue executing. If a PASS result is then obtained, the tester may be used with confidence, although the Power Supply should eventually be calibrated. In the example above, the +5V supply is slightly out of range, which is a noncritical calibration problem. Refer to Section 3.1.2 for a procedure to calibrate the Mainframe Power Supply.

A failed Selftest will produce a screen similar to the following:

x1111	11111	111oo	ooooo	ooooo	ooooo
ooooo	ooooo	oo111	1oxoo	xoooo	ooxxx
xxxxx	xxxxx	xxxxx	xxxxx	xo11o	ooooo
ooooo	oooxx	xxxxx	xxxxx	xxxx1	1xxxx

The character "o" represents a test that was executed and the result was a pass.
The character "1" represents a test that was executed and the result was a fail.
The character "x" represents the fact that no test was executed.

The test numbers may be read by counting from left to right across the columns.



2.3 Interpreting Selftest Results

2.3.1 Verifying a True Failure

If a power-on selftest fails, there are three things to check before you consider it to be a service problem:

1. The Test Clip should not be clipped onto an IC.
2. There should be no Reference Device in the TESTMATE ZIF socket.
3. The EXT Patch Lead on the Interface Buffer should not be connected to a board.

If any any these things are present, correct it and restart the selftest. Simultaneously pressing the TESTMATE CNTR and ESC keys will accomplish this as will pressing F2(restart)or powering off and on the TESTMATE toggle switch.

2.3.2 Pre-Selftest Failures

Within the first few seconds after power-up, the following messages may appear on the screen:

1. "Power Supply Voltage Out of Range"
   A table of voltage supply channels appears with associated numbers beside them. These numbers refer to steps on a DAC, not volts. The offending channel will have an asterix beside it.

   If the +5 channel has the asterix and its value is outside of the -12 to +12 range, perform the calibration adjustment described in Section 3.1.2. The +5 supply is the only one that is adjustable and all other voltages are related to it. During factory configuration all units are adjusted to have a setting within + or - 12 on the +5 channel. Different TESTMATE units will have a different setting of the +5 channel DAC calibration, so it is not possible to define an absolute number that is correct for all units.

   If another channel has an asterix beside it, such as the -5V channel, there is a fault with the power supply or its white connector that attaches to the High Speed board. Open the mainframe unit and reseat the white power connector to verify a proper connection.

2. "Input Buffer not responding"
   The Interface Buffer should be checked to see that its J1/J2 ribbon cable connectors are correctly inserted and , for the TM3064, that its power-on toggle switch is set to 1 (i.e. powered on). A faulty TM3064 Interface Buffer power supply will also cause this symptom.

3. "initializing hardware"
   If the status line of the TESTMATE display is stuck on the message, "initializing hardware", this indicates that the IB64 Buffer board should be replaced. Normally this message is present for only 2 seconds before the message, "hardware test" appears for the rest of selftest.

2.3.3 Selftest Results

The pattern of ones and zeros on the selftest result screen provides clues to the faulty module(s). The modules interact and affect one another, so a fault in one module may also cause the selftest of another module to fail. Therefore, the user must observe the pattern of 1s on the selftest screen to decide which module has the most failures and is likely causing the other apparent failures.

Tests associated with a specific module are shown below:

0	x HHHH	HHHHH	HHHHH	HHHHH	HHHHH	HHHHH
30	HHHHH	HHHHH	HMMMM	MPxKM	x HHHH	HH xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x BBBB	BBBBB
90	BBTTT	TTTxx	xxxxx	xxxxx	xxxx T	T xxxx

Legend: H - High Speed Board
M - Micro Board
P - Mainframe Power Supply
B - Buffer Board
T- Trigger Board
K - Keyboard

There are some general rules which may be used to interpret certain failing groups of tests:

1.

0	x0000	00000	00000	00000	00000	00000
30	00000	00000	00000	00x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x0000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx1	1xxxx

If only tests 114 and 115 are failing, then the Trigger Board is good, but needs to be reseated according to the procedure described in Section 3.2.9. If tests 93 - 97 are failing as well as 114,115, then the Trigger board is faulty. Note that if the Trigger Board is removed from the TM3064 Interface Buffer, tests 92 - 97 and 114,115 should show "x" and all other tests should pass on a good machine.

2.

0	x0000	00000	00000	00000	00000	00000
30	00000	00000	00000	00x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x0111	11111
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

A bad Buffer Board will cause most or all of tests 82 - 89 to fail. Trigger tests 114,115 may also fail, as well as the High Speed board and Micro board tests as well.

3.

0	x0000	00000	00011	00000	00000	00000
30	00000	00000	00000	00x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x0000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

If tests 13 and 14 are failing, regardless of other apparent faults, the High Speed Board is usually the problem.

4.

0	x0000	00000	00000	00000	00000	00111
30	11111	11111	10000	00x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x0000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

Tests 27 - 40 are Fault Mask calibration tests and failures here indicate a problem with the High Speed board, if these are the only failing tests. They may also fail, however, due to interaction with a bad Buffer board or Micro board, in which case other failing tests should be interpreted first.

5.

0	x0000	00000	00000	00000	00000	00000
30	00000	00000	01111	10x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

The five tests 41 - 45 are associated with the Micro board. When it is bad, four or five of these tests will fail. Note that several tests may also fail when there is a good Micro board, due to interaction with a bad High Speed or Buffer board.

6.

0	x0000	00000	00000	00000	00000	00000
30	00000	00000	00000	00x00	x1000	01xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

Tests 51 and 56 verify the Gate circuit on the High Speed Board. If only these tests are failing, it is definitely a bad High Speed board.

7.

0	x1111	11111	111oo	00000	00000	00000
30	00000	00000	00000	00x00	x0000	00xxx
60	xxxxx	xxxxx	xxxxx	xxxxx	x000	00000
90	00000	000xx	xxxxx	xxxxx	xxxx0	0xxxx

Tests 1 - 12 fail with a bad High Speed board, but they also commonly fail due to interaction with other faulty modules. Therefore, if other tests are failing, interpret the other tests first to find the bad module.

2.3.4 Other Types of Failures

Tests for the Universal Module are not performed during the power-on selftest. The main symptom of a faulty Universal Module is that, when a user selects a common FPA test such as 8255_1, the message on the screen is "Chip not found". The Universal Module may be replaced by prying up with the handle at the end of the module and inserting a new one on the top of the TM3064 Interface Buffer (while it is powered down).

3 Adjustments and Disassembly Instructions

3.1 Adjustments

3.1.1 Fuse Replacement

The power supplies in both the TESTMATE Mainframe and 64 Channel Interface Buffer operate from 120 or 240 volts AC with no changes. Note that the small card under the fuse in the Mainframe Corcom AC connector is labeled 120 on one side and 240 on the other. It does not matter which way this card is installed - it has no effect.

There is a line fuse located in a recessed compartment next to the power cord receptacle of the Mainframe unit and the TM3064 Interface Buffer. The proper rating for replacement fuses is 3A, 250 V.

To replace the Mainframe fuse, remove the power cord and slide the clear plastic panel over, exposing the fuse receptacle. Pull the black plastic lever to pop out the fuse.

To replace the TM3064 line fuse, pry open the cover of the Corcom on/off switch by inserting a slot-head screwdriver near the toggle switch. Pull out the white fuse holder and replace the fuse. Reinsert the fuse holder, taking care to have the arrow pointing down.

3.1.2 Adjustment to Vcc

The Vcc level is adjustable over a narrow range around 5.0 volts from a potentiometer located on the power supply module. It may be reached through a hole in the top of the power supply cover located in the middle of the edge closest to the center of the unit.

With the unit face-down and power off, remove the four screws from the bottom of the unit which hold the upper and lower halves together. Turn the unit face-up. The right side of the top half may be raised up and to the left, somewhat like opening a book, while still maintaining electrical connections between the two halves. This permits access to the potentiometer through a hole in the power supply enclosure.

Power up the TESTMATE main unit (after first powering up the 64 Channel Interace Buffer, if present). If there is a power supply calibration problem, the normal selftest stops and the following screen appears:

Hardware Failure
Power supply voltage out of range

*Ch7 (+5v) = -19	Ch4 (-5v) = 2
Ch6 (+12v)= 7	Ch3 (Vpp) = 0
Ch5 (-12v) = -18	

The +5V channel should be set to between -12 and +12 and then all the other channels will also be within range. Note that the numbers refer to steps on a DAC, not volts.

The screen showing power supply channel DAC settings can be brought up, even for a passing configuration, by holding down any key while powering up the mainframe. After a diagnostic screen appears, press F3(test_HW) and then F2(power) to reveal the calibration table.

3.1.3 Adjustment to Display Contrast

The Display contrast is adjustable from the keypad. First put the TESTMATE into adjustment mode by powering on the Mainframe while depressing a key. After a couple of seconds, a screen appears that shows "select the desired function" on the Status Line. At this point pressing the up arrow key will darken the Display and pressing the down arrow will lighten the Display.

3.2 Disassembly Instructions

Before replacing any system modules, turn the unit off, remove the power cord and disconnect the Interface Buffer.

3.2.1 Microprocessor Board

1. With the unit face-down, remove the four screws from the bottom of the unit which hold the upper and lower halves together.

2. Turn the unit face-up and raise the right side of the top half up and to the left, somewhat like opening a book. This will expose a connector (J3) which attaches the two halves.

3. Press the ejectors at either end of the male connector and remove the mating female connector. The two halves should now be completely separated.

4. Remove the connector (upper left area of top half, component side) attaching the Micro Board to the Display Controller Board.

5. Remove the two speaker wires from their mating jacks (upper left area of top half, component side).

6. Remove the five screws and one nut which fasten the Micro Board to the top half of the unit and carefully lift the board out slightly. Note that the LEDs around the ZIF socket may adhere to the keyboard decal and require gentle pressure to separate.

7. Disconnect the two keyboard connectors from the Micro Board and remove the board completely.

To reinstall the Micro Board, first connect the two keyboard connectors to the new Micro Board. Put the new board in place. Follow steps 7 through 1 (reversing the instructions).

3.2.2 Display Controller

Follow steps 1 through 7 in Section 3.2.1.

1. Remove the 4 screws which attach the Display Controller Board to the top cover.

2. Move the cables from the old Controller Board to the new one, maintaining their orientation. Ensure that the new Controller Board has the correct character generator installed. Replace if necessary.

3. Position the board onto its mounting holes and install the 4 mounting screws.

Reassemble as described in Section 3.2.1.

3.2.3 Display

Follow steps 1 through 7 in Section 3.2.1.

1. Remove the 4 screws which fasten the display to the top cover.
2. Move the cable attached to the old display to the new display.
3. Ensure that the plastic window (top cover) is clean.
4. Position the new display against the plastic window and insert the 4 screws in their previous mounting position. Screw them in only lightly.
5. Power up the unit and verify that the bottom line of the display lines up properly with the edge of the keyboard. If not it may be repositioned before a final tightening of the 4 mounting screws.

Reassemble as described in Section 3.2.1.

3.2.4 High Speed Board

Follow steps 1 through 3 in Section 3.2.1.

1. Remove the 10 screws fastening the High Speed Board to the bottom cover.
2. Disconnect the power connector (J4) and remove the board.
3. Place the new board into position, reconnect power and install the 10 mounting screws.

3.2.5 Mainframe Power Supply

Follow steps 1 through 3 in Section 3.2.1.

1. Remove the 4 screws fastening the power supply top cover to the bottom enclosure.
2. Remove the 4 corner screws fastening the bottom enclosure to the standoff pillars. Remove the fifth screw on the bottom enclosure that is found between the fan and corcom AC connector.
3. Disconnect the power connector from the High Speed Board.

Reverse the preceding instructions to reinstall.

3.2.6 Fan

Remove the Power Supply as described in Section 3.2.5.

1. Remove the 4 screws fastening the fan to the PS bottom enclosure.

2. Cut the red and black fan power wires about one inch from the fan.

3. Discard the old fan and connect new power wires to the red and black wires. Note: Connections are to be soldered and covered with heat shrinkable tubing to insulate them.

4. Attach the new fan to the PS enclosure with its 4 screws.

Reinstall the Power Supply as described in Section 3.2.5.

3.2.7 TM3028 Buffer Board

With the unit turned off, disconnect the J1 and J2 connectors which attach the Interface Buffer to the main unit. Note that they are not polarized, so you should make sure to put them back in the proper connectors when you reassemble the Interface Buffer

1. Remove the top cover from the Interface Buffer by unscrewing the 4 corner allen screws.

2. Remove the 4 screws securing the old board to the bottom cover and remove it.

Place new board in position and fasten it to the bottom cover with the 4 screws. Replace the top cover.

3.2.8 TM3064 Universal Module

The Universal Module may be removed from the TM3064 Interface Buffer after powering down the unit. Pull up the handle on the end of the Module to pry it free of the Interface Buffer.

3.2.9 TM3064 Trigger Board

With the Mainframe unit and the Interface Buffer turned off, disconnect the J1 and J2 connectors which attach the Interface Buffer to the main unit.

1. Remove the 2 screws on the bottom of the front plate of the IB3064. Remove the 2 screws on the bottom of the back of the IB3064.

2. Place the Interface Buffer upside down and take off the bottom cover.

3. Remove the 6 screws that hold the Trigger Board. Grasp the two opposite corners of the board that have grounding pads and move the board up and down to loosen it. Lift the board out with its power connection in place.

4. Remove the white power connector.

Reinstall a new board by reversing the previous steps.

3.2.10 TM3064 Buffer Board

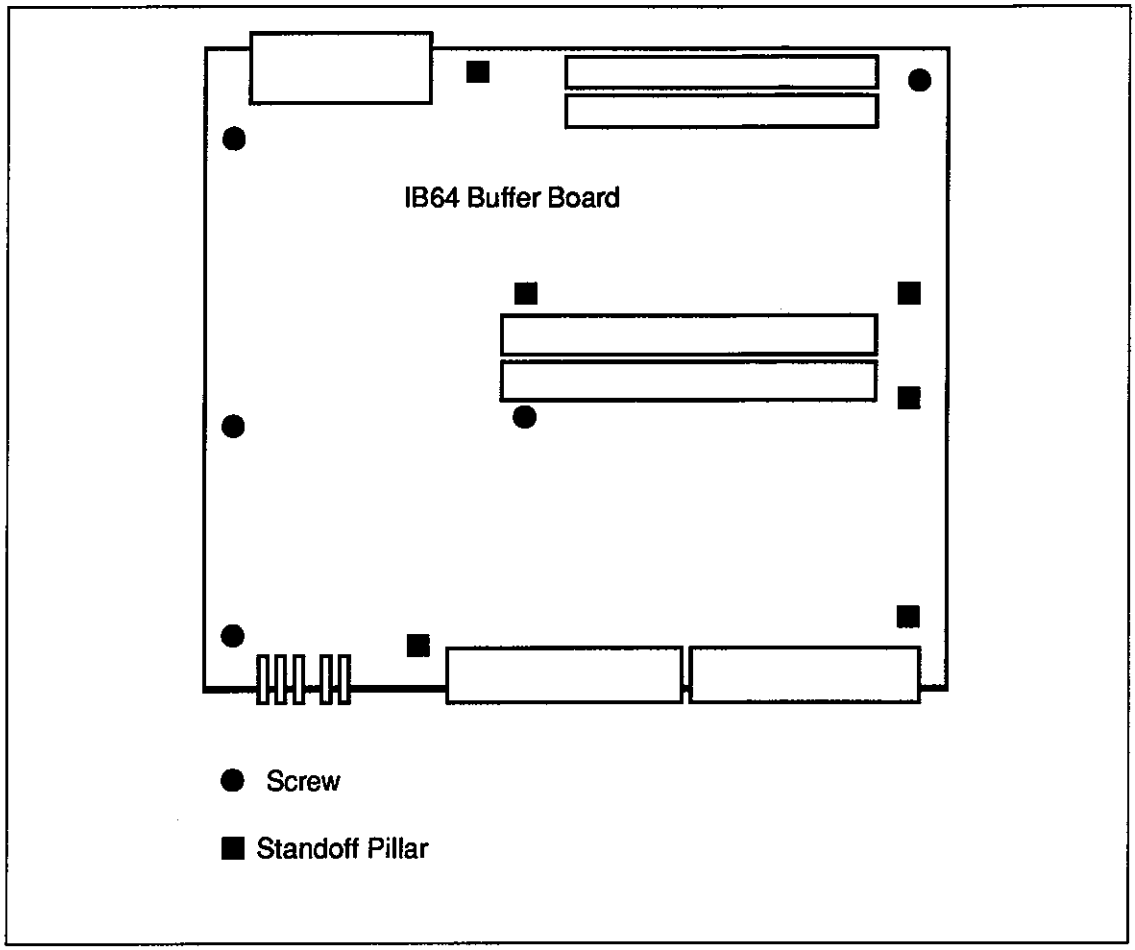
With the Mainframe unit and the Interface Buffer turned off, disconnect the J1 and J2 connectors which attach the Interface Buffer to the main unit. Perform steps 1 to 4 of Section 3.2.9 to remove bottom cover and the Trigger Board. Remove the Universal Module from the Interface Buffer.

1. Remove the label on the front plate of the Interface Buffer. It reads "TESTMATE TM3064 Interface Buffer". There is no easy way to do this without causing some damage to the lable.

2. Remove the 2 faceplate screws under the label.

3. Unplug the white power connector from the Buffer Board. Unplug the ribbon cable connectors.

4. Unscrew the 6 standoff pillars. Unscrew the 5 mounting screws. See diagram on the next page.



5. Remove the board by lifting so the Universal Module connectors are out of their hole in the case, and then sliding the board in the direction of the fan.

When replacing a new board, take care to install the standoff pillars and screws in their proper locations. If a pillar is installed in a screw location, it may short an adjacent signal trace.

3.2.11 TM3064 Power Supply

Perform the procedures described in Sections 3.2.9 and 3.2.10 to remove the Trigger Board and the Buffer Board.

1. Remove the 4 countersunk screws holding the Power Supply bottom plate.
2. Lift up the entire plate which still has the Power Supply mounted on it.
3. Disconnect the white AC line connector and the white DC connector near the fan from the PC board.
4. Remove the 4 corner screws from the Power Supply Board.

Reinstall a new Power Supply by reversing the previous steps.