

System Checkout Instructions

The System Checkout Instructions are to be used only after having received and assembled the MP-A Microprocessor/System board, MP-B Mother board, MP-C Serial Control Interface and the MP-P Power Supply. Set these instructions aside until you have completed the above assemblies.

The first board that must be checked out is the MP-P Power Supply. You must make absolutely sure that the voltages on the power supply board's output connector, J1 are correct as outlined in the following instructions. An error here could cause total disaster.

Set the MP-A Microprocessor/System board, MP-B Mother board, and the MP-C Serial Control Interface aside temporarily and work only with the MP-P Power Supply. The supply should already be attached and wired to the chassis base plate as it was at the completion of the MP-P Power Supply assembly instructions. The chassis front panel should be positioned with its lower edge against but not attached to the front edge of the base plate. The three power switch plug-on wires should already be attached to the front panel's POWER switch and there should be no connections to the front panel's RESET switch. The MP-B Mother board should not be clipped onto the chassis and its power connector must not be plugged onto the power supply board connector J1.

- () Check the power supply over with the Power Supply Wiring Diagram to make sure all connections have been made correctly.
- () Check to see that all wiring connections have been soldered and that there are no "cold" solder joints.
- () Check to see that fuses F1 and F2 are installed and are in their proper location.

NOTE: When going thru the following tests, do not proceed thru the checkout sequence if you have something that does not check correctly. Remove power and check the wiring first. If it looks OK, then reapply power and make whatever voltage measurements necessary to pin point the source of the problem.

- () WITH THE LINE CORD PLUG UNPLUGGED, use an ohmmeter to measure the resistance between lug strip TS-1 lug B on the chassis and each side of the line cord. It should measure infinite resistance (no continuity).
- () Remove the ohmmeter and plug the line cord into a wall outlet and check to see if the POWER switch lense is lit. If not depress the power switch. It should light. If not, unplug the unit and recheck your wiring.

NOTE: On this and following checks, when the power is ON, be sure not to come into physical contact with any AC power line connections such as those to the power switch on the front panel.

- () With the POWER still on measure the DC voltage across the, large electrolytic capacitor C3, which is clamped to the chassis. It should read somewhere between 7.5 to 9.5 volts DC.

- () Now, with the POWER still on, check the +7 to +8, -12 and +12 voltages right at the power supply board connector J1 using pin 9 as the ground reference. The MP-P Power Supply Schematic shows the pin configuration for the connector. The +7 to +8 voltage should measure between +7.5 to +9.5 VDC. The -12 and +12 voltages may vary from 12 to 15 VDC. When making the voltage measurements on the power supply connector, be sure not to short any of the pins together.
- () Unplug the unit and use the extra 100 ohm 1/2 watt resistor supplied with the power supply kit to discharge the large electrolytic capacitor, C3 mounted on the chassis base plate. Hold the resistor right across the capacitor's lugs for about ten seconds to fully discharge it.
- () Check over the MP-B Mother board to see that all connections have been soldered and that there are no solder "bridges" or foil "breaks."
- () Orient the MP-B Mother board so its power connector so it aligns with J1 on edge of the chassis base plate and snap the board onto the nylon PC board supports. Make sure the board locks into place.
- () Orient the MP-B Mother board's power connector so it aligns with J1 on the power supply board and press it on. Make sure the plug-on connector seats firmly against its mate on the power supply board.
- () Take the two as yet unattached wires with the lug connectors on the end and attach each to one of the terminals on the RESET switch. It does not matter which wire connects to which terminal on the RESET switch S1 but YOU MUST NEVER GET ANY OF THESE WIRES INTERCHANGED WITH THOSE GOING TO THE "POWER" SWITCH, S2.
- () Use an extra wire tie supplied with the MP-P power supply kit to secure the two wires going to the RESET switch, S1.
- () Use three evenly spaced wire ties to bundle the wiring harness going from the MP-B Mother board to the power supply connector plugged onto the power supply board.
- () Having no boards plugged onto the MP-B Mother board again apply AC power to the unit. This time measure the power supply voltages right at the male connector pin row along the front edge of the MP-B Mother board. The functions of the various pins are labeled right on the PC board just behind the first connector pin row. Using one of the GND pins as a reference, the +7 VDC UNR buss should read from 7.5 to 9.5 VDC, the +12 buss should read from 12 to 15 VDC and the -12 buss should read from -12 to -15 VDC. Do not continue thru the checkout procedure if the measurements are not right. There is too great a possibility of damaging some rather expensive components.
- () With AC power still applied, measure the power supply voltages at the interface male connector pin row along the right rear edge of the MP-B Mother board. The functions of the various pins are labeled right on the PC board just to the left of the edge connector strip. Using one of the GND pins as a reference, the +8 UNR buss (same as 7 -8 VDC UNR buss) should read from 7.5 to 9.5 VDC, the +12 buss should read from 12 to 15 VDC and the -12 buss should read from -12 to -15 VDC.

- () Using one of the GND pins as a reference, check the voltage of the far right pin (as viewed from the front of the chassis) of the mother board's voltage regulator, IC2. The reading should be +5 VDC ±5%. If not, something is wrong.
- () Remove AC power and give the large power supply capacitor about ten seconds to discharge down. There is no need to use the 100 ohm 1/2 watt "bleeder" resistor since the current drawn by the mother board components is sufficient to discharge the capacitor.

NOTE: Whenever installing or removing any of the system's plug-on boards, be sure the system is turned OFF and has been so for at least ten seconds. It is also a good idea to unplug the AC wall plug for added safety. Avoid touching the conductors on the various plug-on boards to reduce the possibility of static electricity damage to the various MOS semiconductors.

- () Check over the MP-A Microprocessor/System board to see that all connections have been soldered and that there are no solder "bridges" or foil "breaks". Integrated circuits ICI and IC2 of the MP-A board should not yet be installed on the circuit board.
- () Looking at the MP-B Mother board from the front of the chassis and with the MP-A Microprocessor/System board oriented so you are viewing the "TOP" side, set the board down lightly on the second connector pin row from the front of the Mother board. This is for convenience only, electrically the board may be plugged onto any one of the seven main board positions. Check to see that the index pin on both the MP-A board and MP-B board align. They should align, if not there is a mistake.
- () Assuming the index pin aligns, press the MP-A board down perpendicularly onto the mother board. Be sure the MP-A board seats firmly against the mother board.
- () Again apply AC power to the unit. Using one of the GND pins on the mother board as a reference, measure the voltage on the right most lead of voltage regulator IC17 on the MP-A board. The reading should be +5 VDC ±5%. If not, something is wrong.
- () Remove AC power.
- () Check over the MP-C Serial Control Interface to see that all connections have been soldered and that there are no solder "bridges" or foil "breaks".
- () Looking at the MP-B Mother board from the front of the chassis and with the MP-C Serial Control Interface board oriented so its "BOTTOM" side may be viewed from the left side of the chassis, set the board down lightly on the interface card connector row ail. The #1 position is the second connector row from the far left going from left to right while the first is #0. This is very important! Each of the interface connector rows is numbered right on the MP-B Mother board along its back edge adjacent the connector row.
- () Assuming the index pin aligns, press the MP-C board down perpendicularly onto the mother board. Be sure the MP-C board seats firmly against the mother board.

- () Double check to see that you just installed the MP-C Serial Control Interface on interface card connector position #1, the second connector position from the left.
- () Again apply AC power to the unit. Using one of the GND pins on the mother board as a reference, measure the voltage of the uppermost lead of the voltage regulator, IC2 on the MP-C Serial Control Interface board. The reading should be +5 VDC \pm 5%. If not, something is wrong.
- () If you have an oscilloscope, use one of the GND pins on the mother board as a reference and look at the signals on the 110b, 150b, 300b, 600b and 1200b buss lines on the mother board. You should see semi-square waves possibly with some glitches, switching between 0 and +5 VDC. The frequencies should be 1758.8, 2400, 4800, 9600, 19200 Hz respectively $\times \pm$ 5%. These frequencies as well as the processor clock are all generated by the baud rate generator IC4 on the MP-A board and must be present for the system to work. If your system is not generating the various clock signals and you have checked the board over for solder "bridges", foil "breaks", correct board assembly, etc., try changing resistor R1 on the MP-A Microprocessor/System board to a 10 Meg ohm 1/4 watt resistor. In any case, do not continue assembly until the oscillator is working.
- () Remove AC power.
- () Remove the MP-A Microprocessor/System board by pulling up slightly on one corner, then the other, alternating back and forth until the entire board is loose. Try to avoid touching any of the connections on the board to reduce the possibility of damage to the MOS semiconductors.

NOTE: MOS integrated circuits are susceptible to damage by static electricity. Although some degree of protection is provided internally within the integrated circuits, their cost demands the utmost in care. Before opening and/or installing any MOS integrated circuits you should ground your body and all metallic tools coming into contact with the leads, thru a 1 M ohm 1/4 watt resistor (supplied with the MP-A kit). The ground must be an "earth" ground such as a water pipe and not the circuit board ground. As for the connection to your body, attach a clip lead to your watch or metal ID bracelet. Make absolutely sure you have the 1 Meg ohm resistor connected between you and the "earth" ground, otherwise you will be creating a dangerous shock hazard. Avoid touching the leads of the integrated circuits any more than necessary when installing them, even if you are grounded. On those MOS IC's being soldered in place; the tip of the soldering iron should be grounded as well (separately from your body ground) either with or without a 1 Meg ohm resistor. Most soldering irons having a three prong line cord plug already have a grounded tip. Static electricity should be an important consideration in cold, dry environments. It is less of a problem when it is warm and humid.

When installing integrated circuits ICI and IC2 into the zero force sockets on the MP-A Microprocessor/System board as shown in the pictures in the System Checkout Instructions you must exercise extreme care. Before inserting either of the integrated circuits into the sockets, snap and unsnap each zero force IC socket at least twice to loosen the pins. Before inserting the integrated circuits into their sockets, carefully bend their leads so they will slide easily into the sockets using a pair of long nose pliers grounded thru a one meg ohm resistor. When pressing the IC's into place, apply only light pressure as shown in Step 3 of the pictures. Heavier pressure required to lock each end of the socket should be applied to the exposed white plastic ends of the carrier (pointed to by the pen in the lower left-hand picture in the System Checkout Instructions) using a common blade screwdriver.

- () Install MOS integrated circuits IC1 and IC2 of the MP-A Microprocessor/System board into the integrated circuit sockets following the precautions outlined in the preceding note. Orient the integrated circuits so the "dot" or notch on the package matches with that shown in the board's component layout drawing. Insert the integrated circuits following the instructions and diagrams shown in figure 1 of this instruction set. Install IC2 first and then IC1. Be very careful! IC1 is very expensive.
- () Re-insert the MP-A Microprocessor/System board onto the mother board.
- () Plug your terminal device onto the I/O connector along the "TOP" edge of the MP-C Serial Control Interface board. The terminal and MP-C board should already have been configured for one another as detailed in the MP-C Serial Control Interface instructions.
- () Apply AC power to the terminal, for CT-1024 customers, you should have the CT-E screen read function (if applicable) turned off and have the CT-S serial interface RECEIVE ON/OFF turned ON, the TRANSMIT ON/OFF turned ON and the ECHO ON/OFF turned OFF.
- () Apply AC power to the computer system.

If you were lucky, the computer should have come back with a carriage return, line feed and a "*" displayed on the terminal. This is due to the power-up restart circuit on the board. If your system did not do this, then depress the manual RESET button on the front panel. Each time the button is depressed the computer should send a carriage return, line feed and "*" to the terminal.

If the terminal's cursor moves any at all, printing anything, especially question marks, there is a good chance the computer is working and your problem is not having the terminal's parity, bit format, or baud rate configured correctly.

If there is no cursor movement, using GND as a reference, look at the output of ICI pin 2 on the MP-C Serial Control Interface with an oscilloscope. Each time the RESET switch is depressed you should see the transmitted bit train of pulses (serialized CR, LF and "*") come out this pin. If you do, then you should be able to trace the signal to the output connector of the MP-C interface, where if still present indicates a problem with the terminal or its connections to the computer. If you do not see the bit train coming out of IC1 pin 2, then your problem is probably somewhere within the computer system.

Final Chassis assemble

After you have installed and checked all of the boards within the system including of course the MP-M memory board(s) and optional interface cards you should complete the chassis assembly.

- () Unplug the unit.
- () Attach the front and rear panels to the chassis base plate using #6 - 32 x 1/4" screws, lockwashers and nuts. Orient the rear panel so the four large holes are directly behind the interface card slots. The line card should be brought out the hole directly behind the power transformer.
- () Snap the five large plastic bushings into the rear panel from the outside of the panel.
- () Route any interface I/O cables thru the large holes in the rear panel.
- () You should have 5 wire ties left over from the MP-P assembly. Distribute them anywhere necessary to keep the wiring in neat bundles.
- () Snap the tinnerman clips over the holes on the front and rear panel edges.
- () Set the cover over the unit, tucking the lower edge on each end inside the chassis base plate.
- () Position the cover so its holes align with those on the front and rear panels.
- () Place the metal trim strips around the front and rear panels sandwiching the cover between the trim strip and panel. Secure with #6 - 32 x 3/8" screws.

In Case of Problems

Due to the complexity of the system, it is very difficult to troubleshoot, even if you have the proper equipment. The best suggestion is to remove power and recheck the entire assembly procedure for each of the boards within the system. Check all of the boards with a magnifying glass if necessary for incomplete etching, solder "bridges" and foil conductor "breaks". These problems are much more likely than component failure. If you cannot find the problem we do have repair services available for the unit to those customers who have purchased the system boards including parts. We cannot repair those units where the customer has bought the boards only and has supplied his own components.