



## Discreet Analog Device Testing

(October 29, 1998) This procedure will help an in-circuit test programmer obtain the most accurate test possible for a given discreet analog device. It is strongly suggested that the entire document be read before implementing this procedure. There are caveats that you need to be aware of, and an attempt was made to spell these out in as much detail as possible.

As long as the board description is ACCURATE and COMPLETE ([see Note 1](#)), the program generator for the Agilent 3070 (IPG) typically does a very good job of writing accurate analog tests. As necessary, IPG will write tests with 2, 3, 4, 5, or 6-wire measurements. These tests will generally provide the level of accuracy needed for most applications. If you determine that the test for certain components need to be even more accurate, there are additional steps that you as the in-circuit programmer can take.

First, you can set the tolerance multiplier to instruct IPG how accurate of a test it should write. This can be done on a board-level or device-level basis. If there is/are one (or few) component(s) for which this higher level of accuracy is desired, it probably makes more sense to implement this on a device level basis in the device entry form in Board Consultant. To globally change the tolerance multiplier, go to

"View/Edit Test System Data" -  
"Enter IPG Global Options" in Board Consultant.

Again, you should consider the "cost/benefit" relationship of using the global method (cost = more system resources used; benefit = more accurate tests). You should also compare the total node count of the board vs. the maximum node count of the tester, and take into consideration if there is any REAL additional benefit to setting this option globally.

Secondly, you can manually place the sense wires for the given test(s) on separate probes. The most accurate measurement will be obtained when the sense bus (a and b bus connections) are located as close to, or better yet ON the component being tested. This procedure assumes that you either have more than one probe on the node in question, or at least have a drilled alternate hole that can be "promoted" into a probing location. The remainder of this document elaborates on the steps to implement this strategy.

If you know up front (before you run Test Consultant the first time, or more specifically the fixturing software) that you are going to implement the second step (above paragraph), you can be pro-active in the development process. This can be accomplished by marking 2 accessible points on a node as "Mandatory" in Board Consultant. One of these points should be on the target device, if possible. You can, however, go back and implement this process after the initial run of Test Consultant and BEFORE you order/build a fixture. Using this approach will eliminate manual re-work of the fixture since all the changes will be incorporated into the fixturing files from which the fixture will be built.

Finally, you can also implement this process after the fixture has been built, but you will probably need to add probes and wires. If this is the case, you should determine the feasibility of having the fixture modified (for example, will the fixture need to be sent back to the fixture vendor in order to have probes and wires added?).

Note 1: "ACCURATE and COMPLETE" in this sense refers to the analog characteristics of non-discreet devices. In other words, fully describing a device may necessitate the use of a PDL (Parts Description Library) to "tell" IPG about an analog characteristic of an IC (for example a capacitance or resistance between 2 pins of a device). When IPG knows this level of information, you can be assured that these analog characteristics will be accounted for when tests for the devices in parallel are written. In fact, IPG does a COMPLETE nodal analysis when writing analog tests so that all guard points, as well as specific test options, can be optimally chosen.

[Go to Top](#)

Note 2: In an attempt to keep this document generalized and applicable to all situations, the following steps were written to address the implementation on signal (as opposed to power or ground) nodes. The following process will still work on power and ground nodes, but additional analysis on your part will be necessary to ensure that the logic and functionality of the wiring on these nodes is maintained.

[Go to Steps](#)

Note 3: Due to the length of this document, it may appear that this process is difficult; it is not! Sufficient detail has been included so an engineer who has not used fixture consultant to implement wiring changes will be comfortable with the necessary steps.

The steps to implement the second method are as follows:

1. Go through the entire development process.
2. View the wirelist; record (or print) node/BRC information for test in question. If only the wirelist.o exists, the use the BT-Basic command:

```
list object "wirelist.o" to "wirelist"
```

3. Start fixture consultant.
4. Click "Search" - "For Node..." - enter node name for s/a connections, then click "Show Wiring". (If this is a power or ground node, be sure to read and understand [Note 2](#) above).
  - 4a. If there is only one probe (red box) then: (otherwise go to [step 4b](#))
    - 4a1. In the "Search Specification Form" box, click "Show Data" .
    - 4a2. In the "Node Information Form" box, select an alternate probe by clicking the orange box on a probe marked with "<alt>". (It is best to select an alternate ON the device if possible, and if the existing probe is not already located on the device). If there are NO alternate probes holes drilled, you cannot continue with this step.
    - 4a3. On the pull down menu in the "Node Information Form" box, click "Actions" - "Convert Alternate To Probe" (this will update your Fixture Wiring Diagram with a new red "probe" box).
    - 4a4. Next, determine which probe (if either) is ON the device. Ultimately, the following steps are intended to separate the "a-bus" connection to the probe ON the device, and the "s-bus" connection to the "other" probe. If the "original" probe was NOT on the device and the probe that you added in step 4a3

WAS on the device, then follow the instructions 4a5a through 4a5g as shown. If the "original" probe WAS on the device, then replace all references to the "a-bus" in the steps 4a5a through 4a5g with "s-bus".

4a5. In the Fixture Wiring Diagram:

4a5a. Click on the newly added red probe box.

4a5b. Click on the (aqua) brc box for the "a-bus" connection (consult wirelist).

4a5c. Click on the button "Add New Wire".

4a5d. Click on the "old" wire for the "a-bus" connection to the "old" probe.

4a5e. Click on the button "Delete Selected Wire".

4a5f. Close all "pop-up" information entry boxes.

>4a5g. Go to step 5.

4b. If there is MORE than one probe (red box) then:

4b1. Verify that one of the probes in the "Fixture Wiring Diagram" is connected to the "a-bus" and the other is connected to the "s-bus" (reference the wirelist).

4b2. Next, determine WHICH probe is connected to the "a-bus". If it is the probe that is ON or CLOSER TO the device in question, then continue with [step 5](#).

4b3. If the "a-bus" connection is NOT on the probe that is ON or CLOSER TO the device in question then:

4b3a. Note the connections as shown in the "Fixture Wiring Diagram".

4b3b. Click on either one of the wires in the "Fixture Wiring Diagram", and then click on "Delete Selected Wire".

4b3c. Click on the remaining wire in the "Fixture Wiring Diagram", and then click on "Delete Selected Wire".

4b3d. Referencing the note made in step 4b3a, click on one of the (red) probe boxes.

4b3e. Click on the (aqua) brc box opposite of that recorded in step [4b3a](#), then click on the "Add New Wire" button.

4b3f. Click on the remaining (red) probe box.

4b3g. Click on the remaining (aqua) brc box, then click on the "Add New Wire" button.

4b3h. Close all "pop-up" information entry boxes.

>4b3i. Go to step 5.

5. Click "Search" - "For Node..." - enter node name for i/b connections, then click "Show Wiring". (If

this is a power or ground node, be sure to read and understand [Note 2](#) above).

5a. If there is only one probe (red box) then: (otherwise go to [step 5b](#))

5a1. In the "Search Specification Form" box, click "Show Data" .

5a2. In the "Node Information Form" box, select an alternate probe by clicking the orange box on a probe marked with "<alt>". (It is best to select an alternate ON the device if possible, and if the existing probe is not already located on the device). If there are NO alternate probes holes drilled, you cannot continue with this step.

5a3. On the pull down menu in the "Node Information Form" box, click "Actions" - "Convert Alternate To Probe" (this will update your Fixture Wiring Diagram with a new red "probe" box).

5a4. Next, determine which probe (if either) is ON the device. Ultimately, the following steps are intended to separate the "b-bus" connection to the probe ON the device, and the "i-bus" connection to the "other" probe. If the "original" probe was NOT on the device and the probe that you added in step 5a3 WAS on the device, then follow the instructions 5a5a through 5a5g as shown. If the "original" probe WAS on the device, then replace all references to the "b-bus" in the steps 5a5a through 5a5g with "i-bus".

5a5. In the Fixture Wiring Diagram:

5a5a. Click on the newly added (red) probe box.

5a5c. Click on the button "Add New Wire".

5a5d. Click on the "old" wire for the "b-bus" connection to the "old" probe.

5a5e. Click on the button "Delete Selected Wire".

5a5f. Close all "pop-up" information entry boxes.

5a5g. Go to [step 6](#).

5b. If there is MORE than one probe (red box) then:

5b1. Verify that one of the probes in the "Fixture Wiring Diagram" is connected to the "b-bus" and the other is connected to the "i-bus" (reference the wirelist).

5b2. Next, determine WHICH probe is connected to the "b-bus". If it is the probe that is ON or CLOSER TO the device in question, then continue with [step 6](#).

5b3. If the "b-bus" connection is NOT on the probe that is ON or CLOSER TO the device in question then:

5b3a. Note the connections as shown in the "Fixture Wiring Diagram".

5b3b. Click on either one of the wires in the "Fixture Wiring Diagram", and then click on "Delete Selected Wire".

5b3c. Click on the remaining wire in the "Fixture Wiring Diagram", and then click on "Delete Selected

Wire".

5b3d. Referencing the note made in step 5b3a, click on one of the red probe boxes.

5b3e. Click on the (aqua) brc box opposite of that recorded in step 5b3a, then click on the "Add New Wire" button.

5b3f. Click on the remaining (red) probe box.

5b3g. Click on the remaining (aqua) brc box, then click on the "Add New Wire" button.

5b3h. Close all "pop-up" information entry boxes.

5b3i. Go to step 6.

6. In the main Fixture Consultant Pull-down menus, click "File" - "Save", then click "File" - "Exit" to save the changes to your fixture, and close fixture consultant.

7. Re-run Test Consultant to completion. Note that you will NOT be warned that the fixture has changed (wires/probes) because you manually input the changes.

8. Implement fixture changes as shown in the "fixture/details" file. Note that since these changes were implemented via Fixture Consultant, you should search for "HP3070 FIXTURE CONSULTANT WIRE CHANGE REPORT", and "HP3070 FIXTURE CONSULTANT PROBE CHANGES".

You will have to search UP from the END of the "fixture/details" file - they will not be at the end of the file.

9. Debug the test.

[Return to top of page](#)