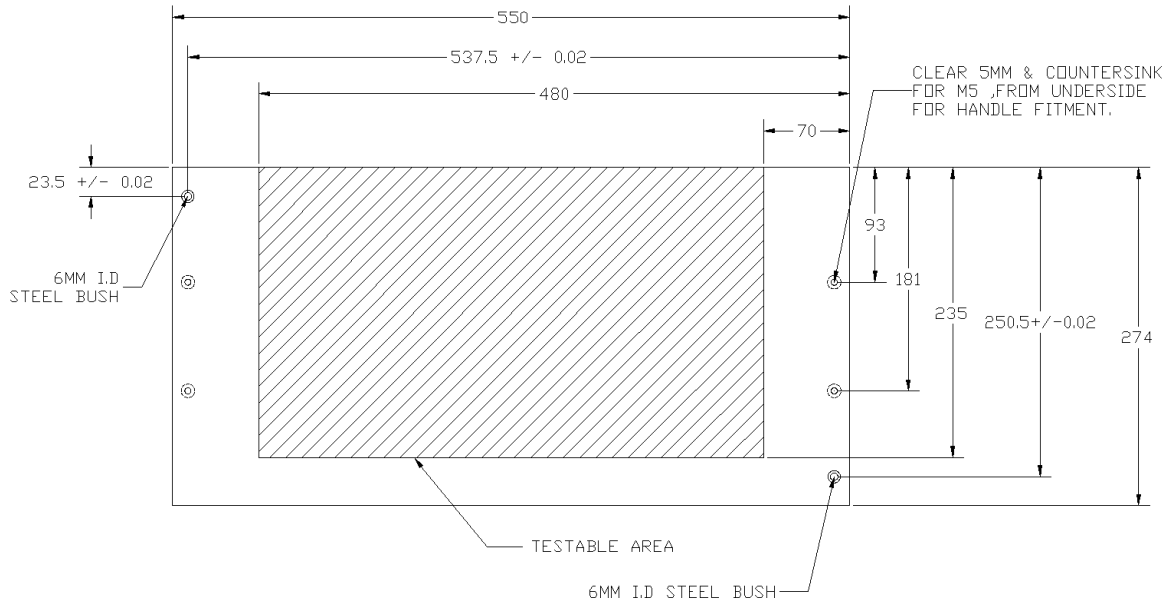
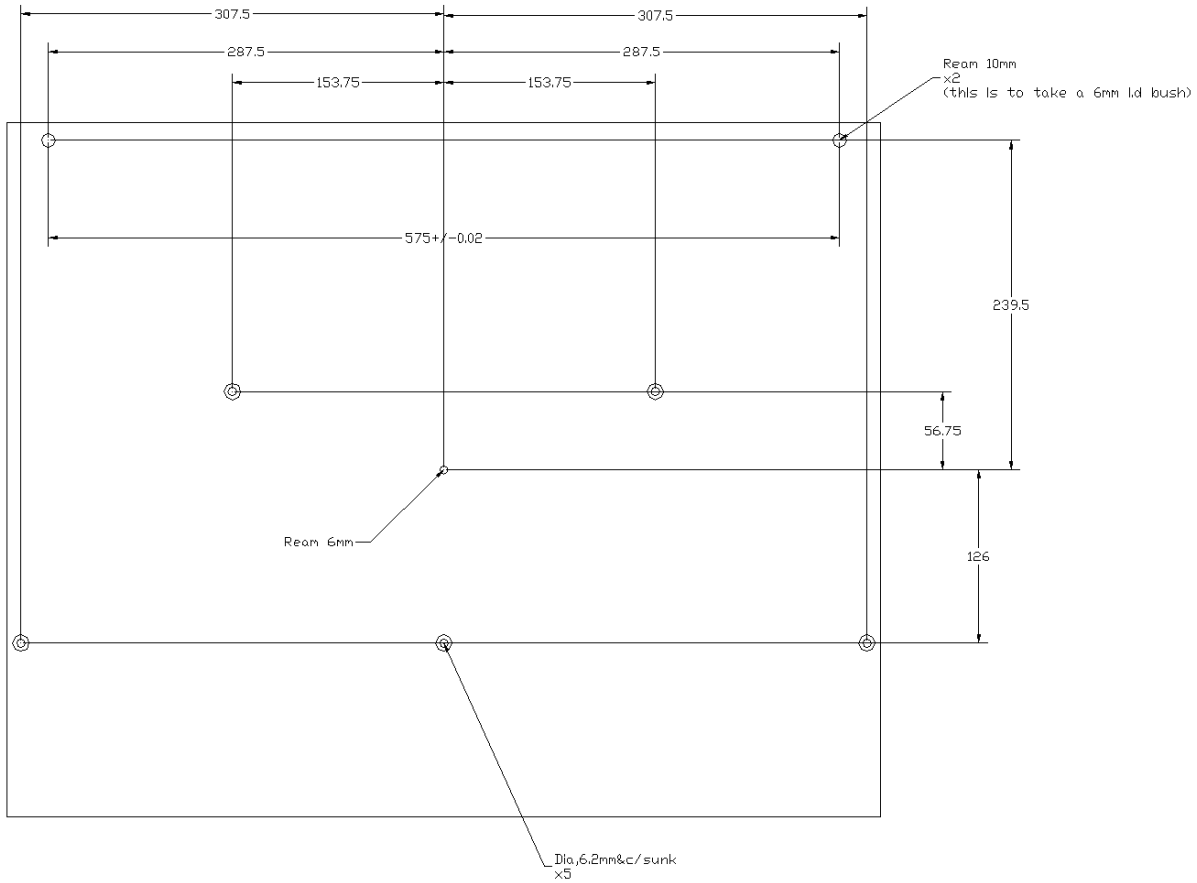
Fixture construction

The top plate or fixture on the RITS520a is usually made from ¼" thick FR4 / G10 material.

The mechanical drawings for the RITS500s4 and RITS520a bare top plate follow:



Mechanical drawing for the RITS500s4 bare top plate.



Mechanical drawing for the RITS520a bare top plate.

Two 6mm steel dowel pins accurately index the top plate to the underlying table via matching steel bushes inserted into the top plate material.

Board Mounting Height

The optimum height for the board under test is the same height as the small contact pcb that is used to connect the probe to the Verification Airline ±3mm (1/8").

The reason for this optimum height is the restricted depth of field in the high magnification camera that is used within the RITS system.

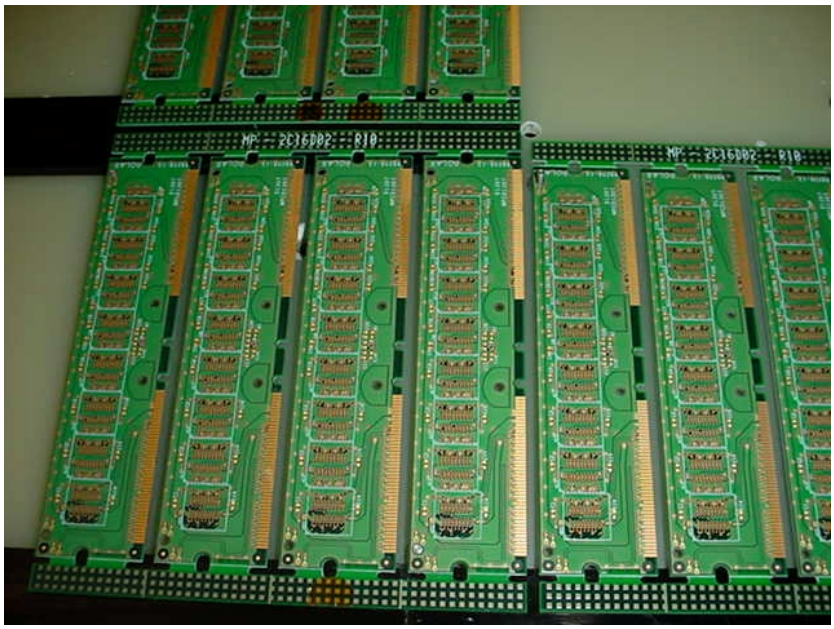
Deviating from the optimum height will result in probing inaccuracy.

Clearance under the Board

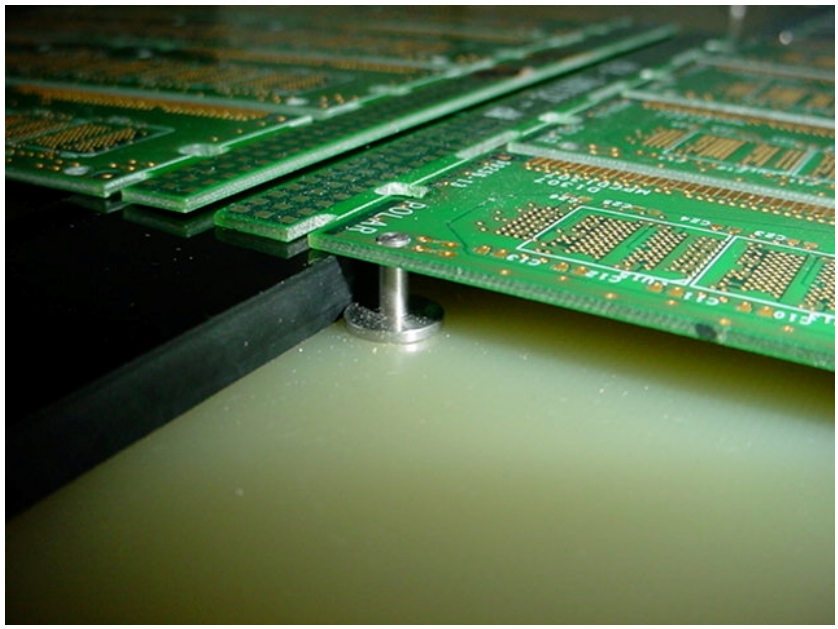
With all of the mounting systems described, adequate clearance or air gap is required between the top plate and any surface microstrip structures or coupon test contact points (often via holes). Failing to provide this clearance may affect measurement accuracy of the test system.

Unless low impedance surface microstrip structures are being tested (< 40 Ohms) a clearance of 6mm (¼") is usually sufficient.

Often this clearance can be provided in the form of a small strip of material that the edges of the board under test sit on, as in the following photographs.



Top view of fixture plate with three boards fitted for testing.



Air gap created under the board by using acetyl strips. Note also the use of tooling pins to index the board under test.

How to Index the boards under test ?

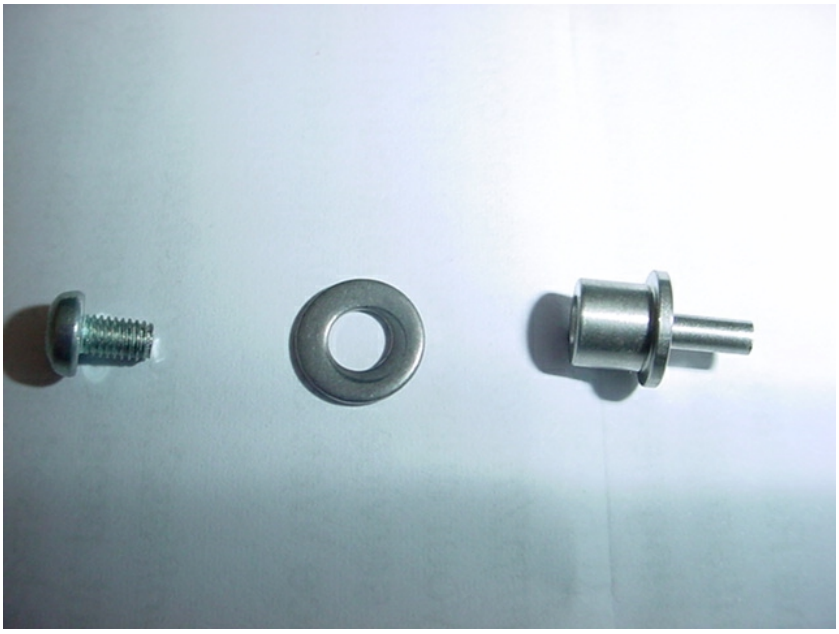
A number of options have been used to hold boards during testing — all of which have their own set of advantages and disadvantages. Options include
Tooling pins
Pockets in top plate material

Double-sided adhesive tape (not recommended)
The options are discussed below.

Tooling Pins

In this system small steel pins are accurately machined to fit into reamed holes in the top plate material.

It is advantageous to secure these pins from the rear of the top plate using small machine screws — this stops them falling out if the fixture is violently jarred while out of the machine.



Typical tooling pin. The pin is secured from the rear of the top plate with screw and washer shown. The pin fits securely into reamed hole in top plate and is pulled down into position with the screw.

Advantages — accurate (as long as the tooling holes on the target circuit board were drilled as part of the same drill sequence as the board's via holes).

Fiducial points (0.4mm / 0.015” works well) can be drilled directly into the end of two opposing pins.

Disadvantages — Can be awkward for operators to load/unload boards.

‘Pockets’ in Top plate material

In this system the top plate itself is routed to enable the board to drop into a recess of exactly the same size and shape.

If this method were employed we suggest that fiducial alignment points be machined into the fixture plate itself rather than using features directly on the loaded boards. One way of providing these alignment points is to insert two steel pins directly into the top plate with 0.4mm (0.015”) holes drilled into the end.

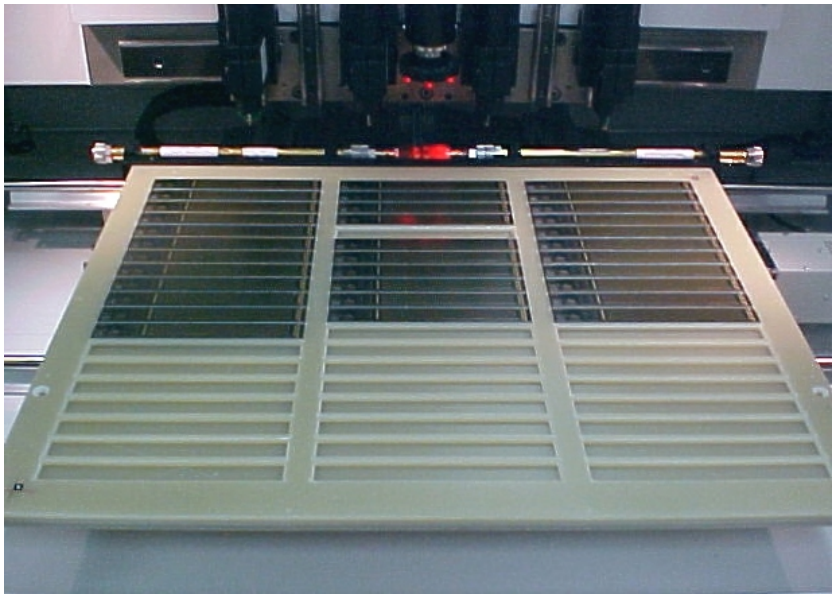
Often when using this method the pocket is stepped so that only the outer 1mm/0.050” of the board is in contact with the pocket — the inner portion of the pocket providing the air gap.

Advantages — Ease of operator loading / unloading.

Disadvantages — Not suitable if the contact points on the target board are small or have a fine pitch. The reason for this is that the board itself is being indexed/aligned/held in position by its outer edges which are often not as accurate as internal features.

To allow ease of operator load and unload a degree of clearance is required in the ‘pockets’ — this further degrades positional accuracy.

As the fixture is used in the long term the clearances above can get larger due to wear.



Typical pocketed fixture plate

Double Sided Sticky Tape

We have seen it done ! It may have its uses in a tight situation, but cannot be recommended for volume production.

Advantages — Very quick!

Disadvantages — Numerous! Poor indexing/repeatability, does not maintain adequate clearances between test points/surface traces and top plate, generally messy and unreliable.

Removable Coupon Trays

If required, removable coupon trays can be used so that while the RITS is testing a batch of coupons a second tray can be being loaded/unloaded, minimising the amount of time that the RITS is idle.

Coupons are located on the removable tray by one of the methods described above.

Care needs to be taken when manufacturing the coupon trays to ensure that they are dimensionally matched with each other.

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