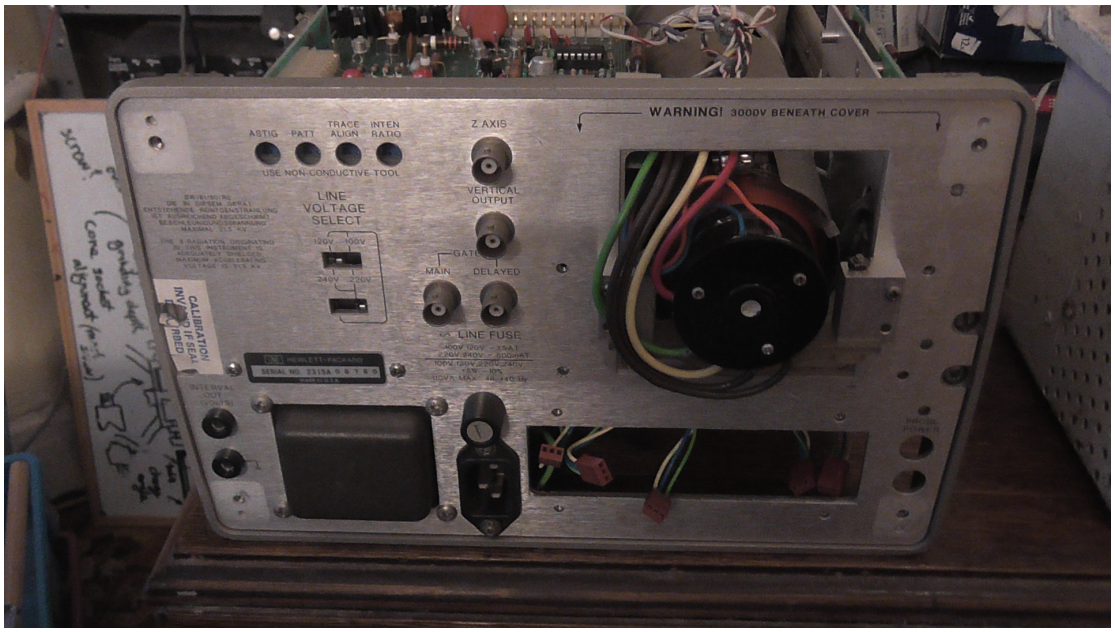
HP1725A Oscilloscope Renovation

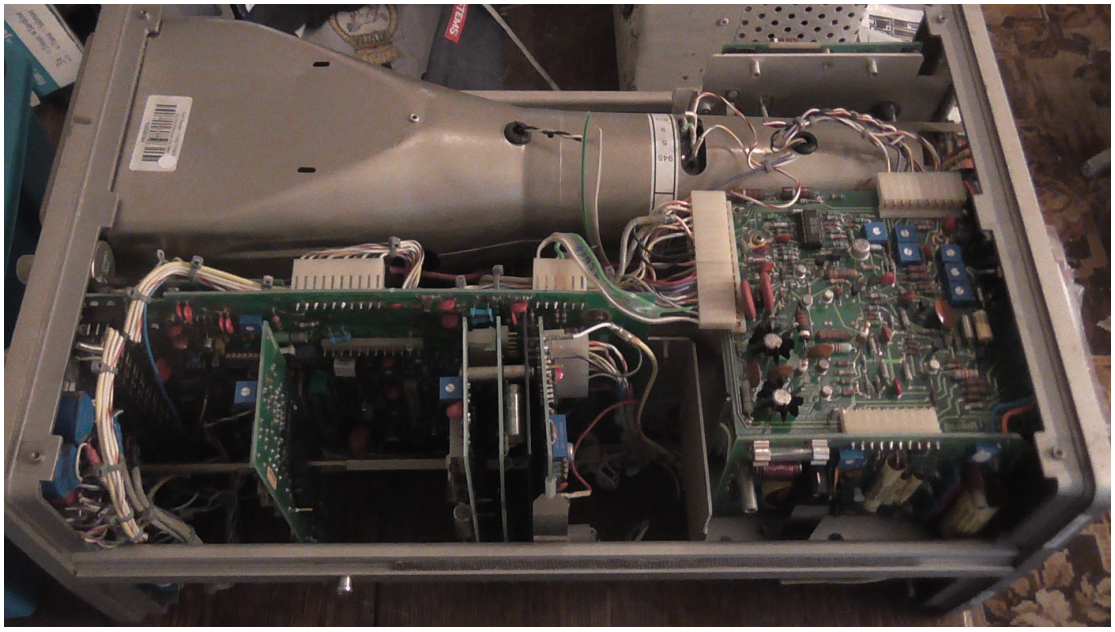
The author has always wanted a fast oscilloscope typically to observe fast pulses from a Geiger tube. The old stand-bye TEK545B whist good for most jobs has only 30MHz bandwidth. Although there have been tasks in the past where the superior high voltage input handling have been an advantage. When a HP1725A came up on E-Bay how could the author resist. From the pictures submitted there were no missing circuit boards



As can be seen above the heat-sink and all the power transistors of the power supply were missing. There is also no protective cap on the rear tube connector.

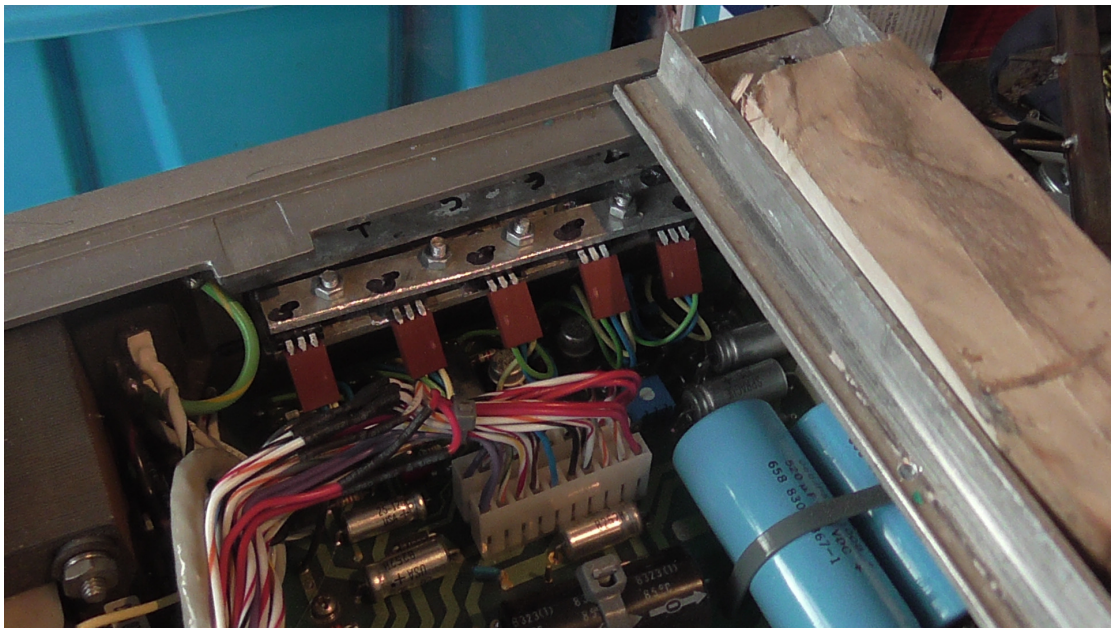
There was also damage to the time-base knob and rotary switch shaft. It looked as if it had been “bashed” with a hammer.

The wiring had been “chopped” to make the instrument unusable. There was no outer case.



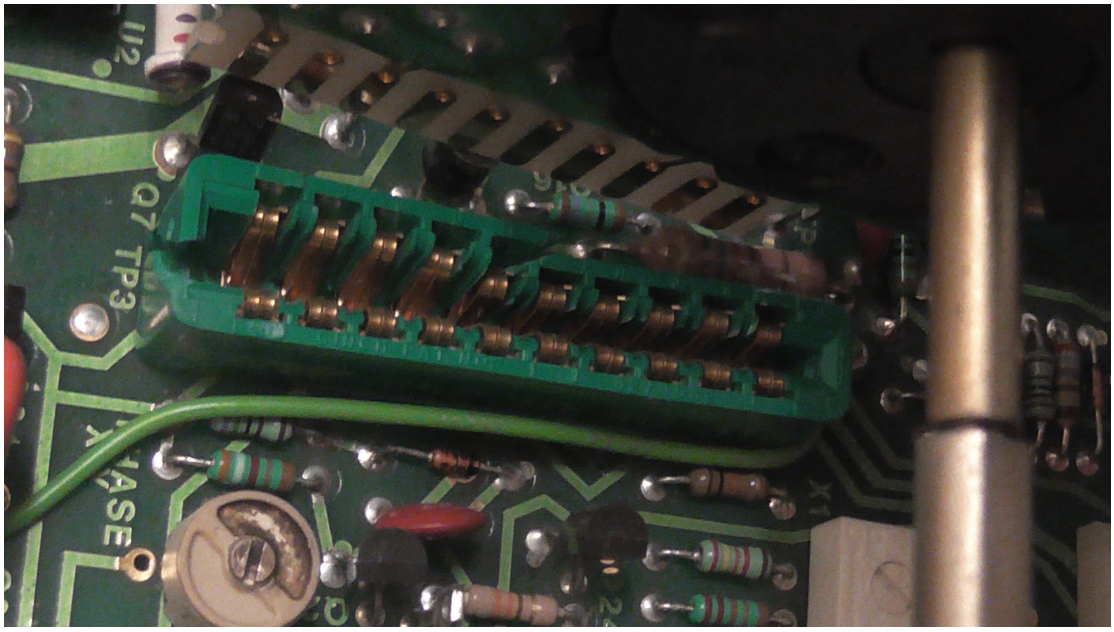
Since all the wires were colour coded it was an easy but tedious task to rejoin and insulated the joints with shrink sleeving.

Next task was to get the power supplies running. The author had some alloy profile saved by his father from an old greenhouse. Suitable power transistor were procured and fastened with mica discs where needed. Here an extra strap over the bodies of these transistors was incorporated for extra security.

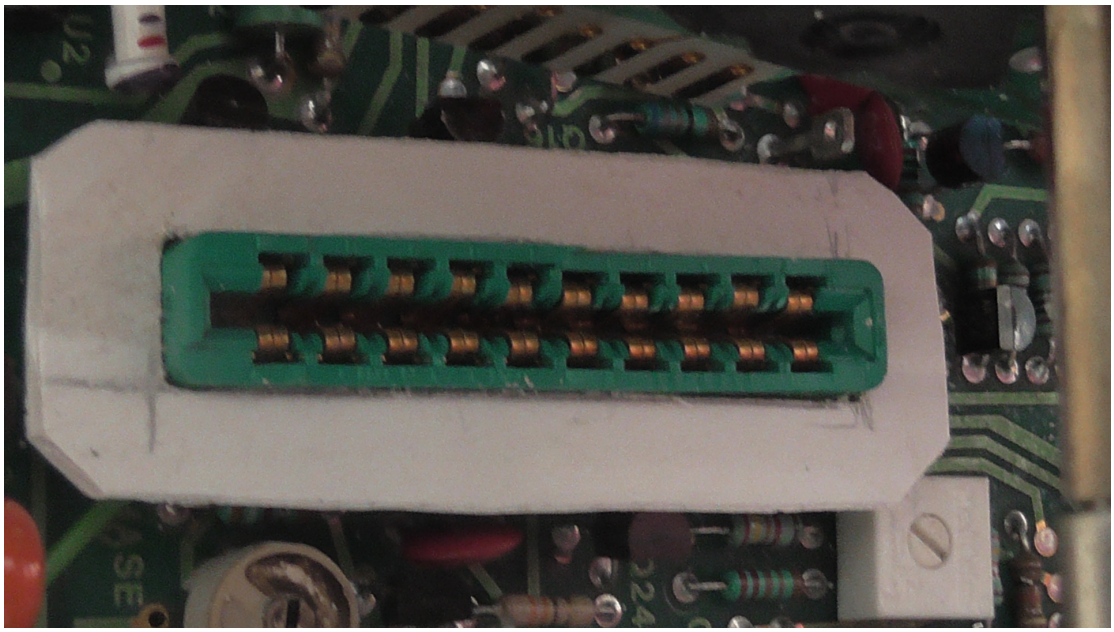


With the power supplies disconnected the voltages were measured. All supplies are referenced to +15v and it turns out that the -15v also needs the +5v which caused a bit of head scratching.

With the power supplies OK and connected a trace was obtained. A time-base gave intermittent operation, it was obvious missing connections to caps (open cct fast ramp). The delay time-base was not working at all. Inspection of the internals revealed why.

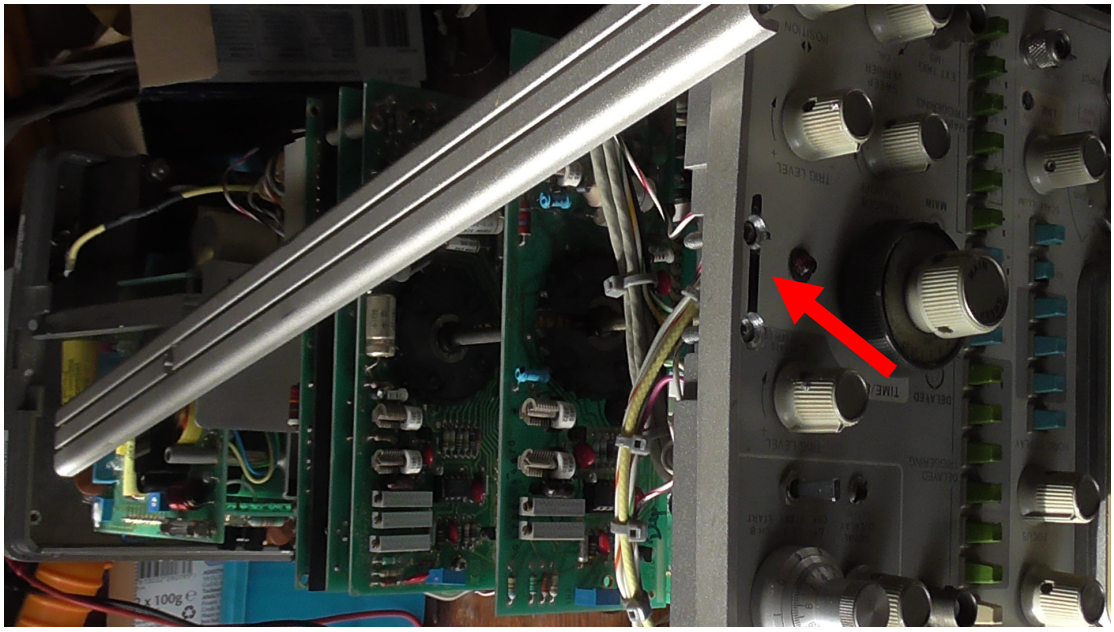


The switch shaft can be removed by releasing a circlip behind the front panel. The shaft was bent and it had broken the edge connector on the front delay time-base board. Removing he main board to replace the connector would have been a horrendous task. These are not double sided so could something could be devised to hold the springs together ?

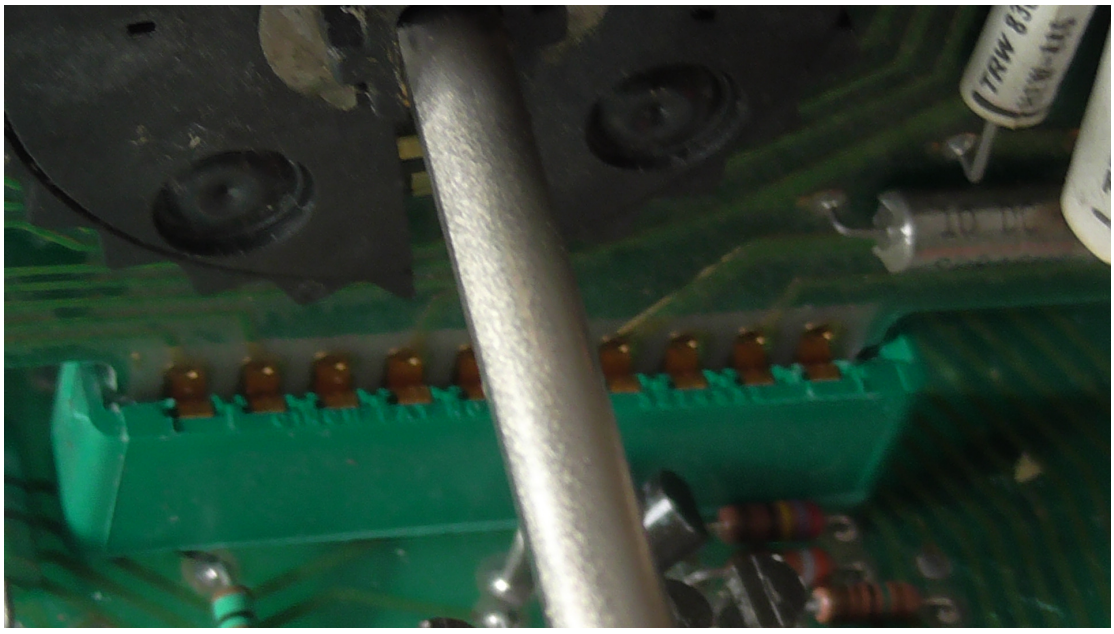


“Just the job” a bit of double glazing plastic from my recently refurbished window sill suitably cut out to keep the connector together.

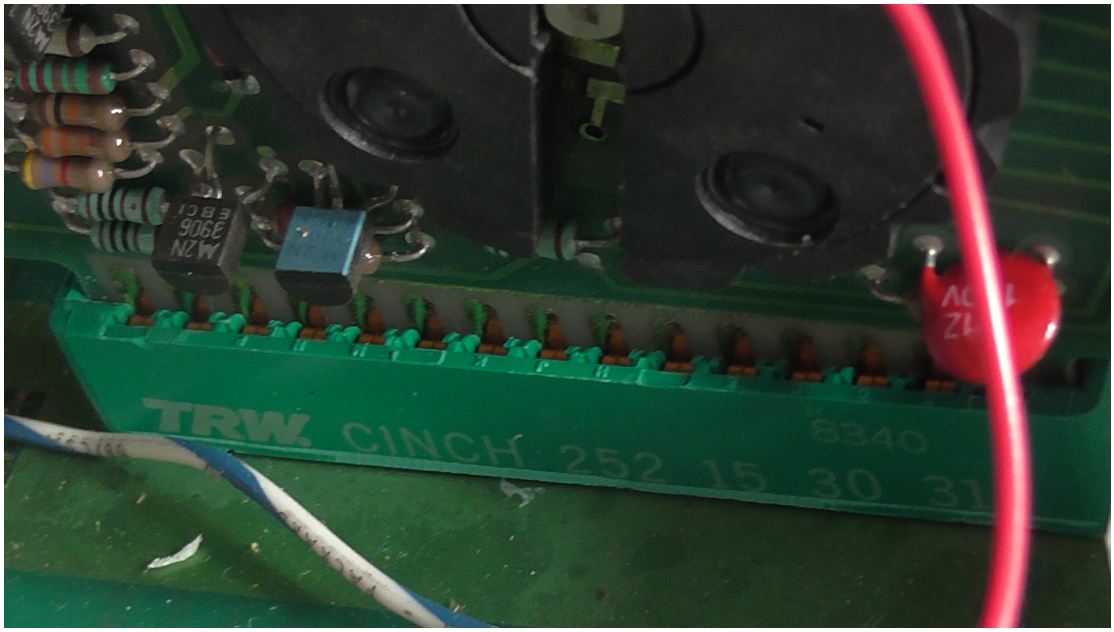
The long time-base switch shafts were straightened out in the jaws of a vice. At this stage the right hand casing spar was removed it ties the front panel to the rear panel and is held at the rear by two screws. The same two screws are present at the front but are obscured by the front panel. To get at these its necessary to drill the front panel.



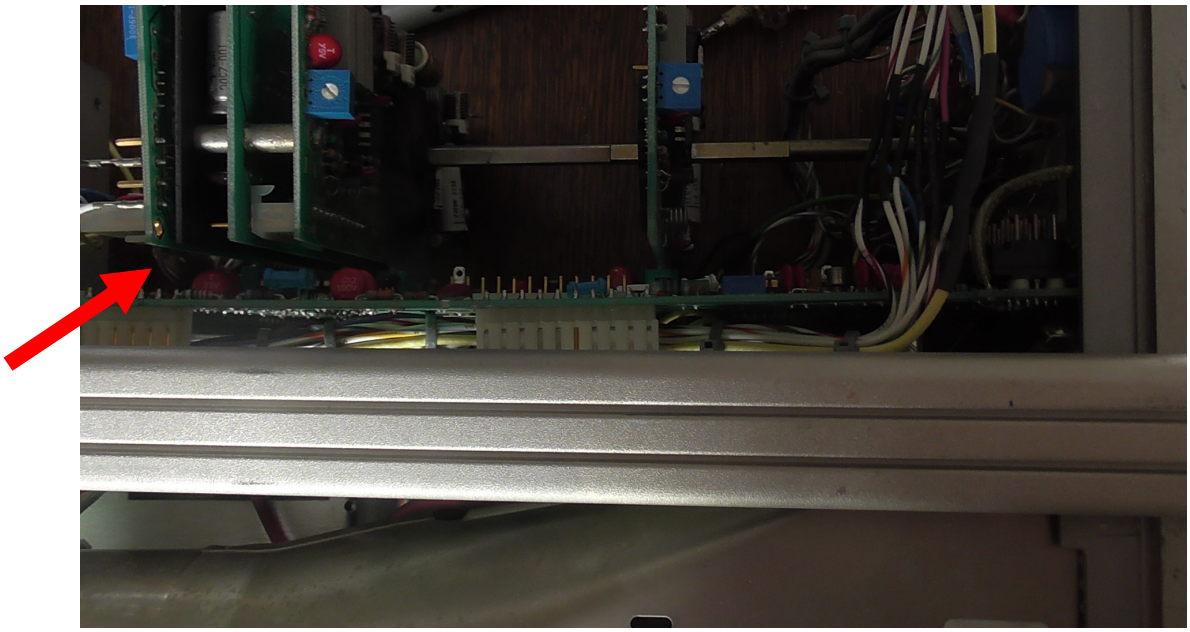
This gave a clear view of what was happening when the newly straightened shaft was inserted.



The shaft is a good length and the difference in insertion between front and rear boards was considerable . This was because the main board was bowed in the middle. The sub-boards were initially tied to the edge connectors so this must have led to considerable mechanical strain against the shaft. Thus causing intermittent operation and leading to the scopes demise. It seemed that un-tethered the connectors made good contact but were prone to move around as the switch was rotated.

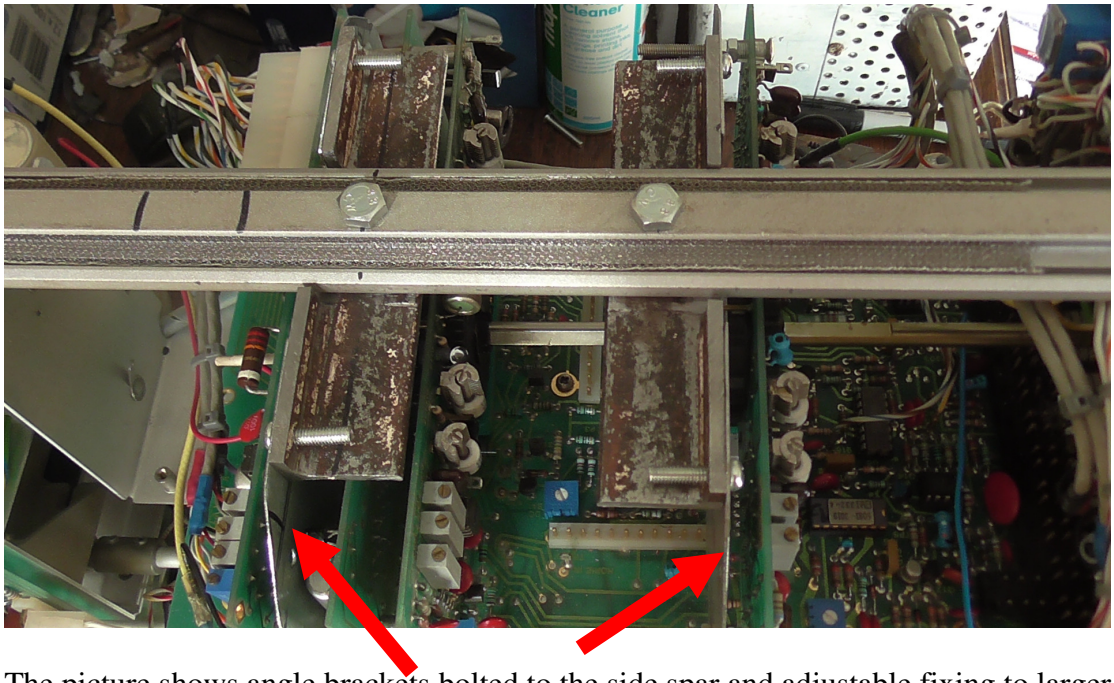


Bow in the main board.

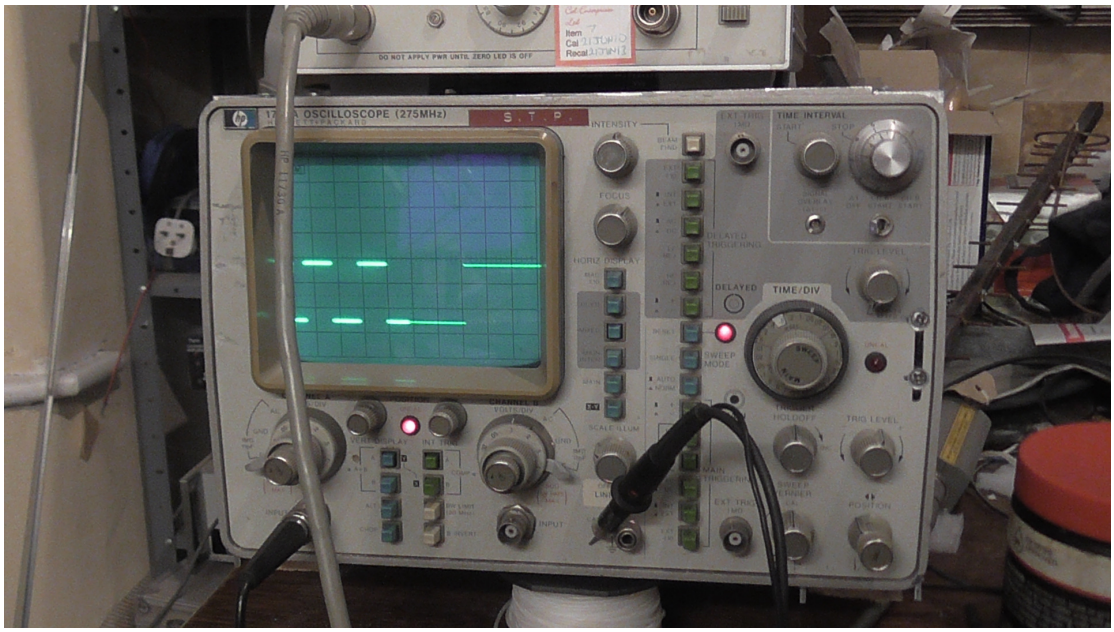


Another factor was found to lead to intermittent operation of the main time-base. The same shaft is used to switch the back board which is a sort of time to analogue used to generate a voltage proportional to the time interval between two display blips. Using the main and delay time-base gate pulses to control a counter is a superior method to this, so this is not needed. The individual indexing on this rotary switch “fights against the main time-base switch for all but perfect alignment. It is easy disable by “popping” the spring.

The problem of the boards moving around when the time-base switch was rotated remained. It was noticed that the main time-base had a screening plate (shown by the red arrow). There were in fact holes in the delay time-base board where a similar screen could be added. Larger screening plates were made up so that these boards could be tied to the front-to-back side spar.



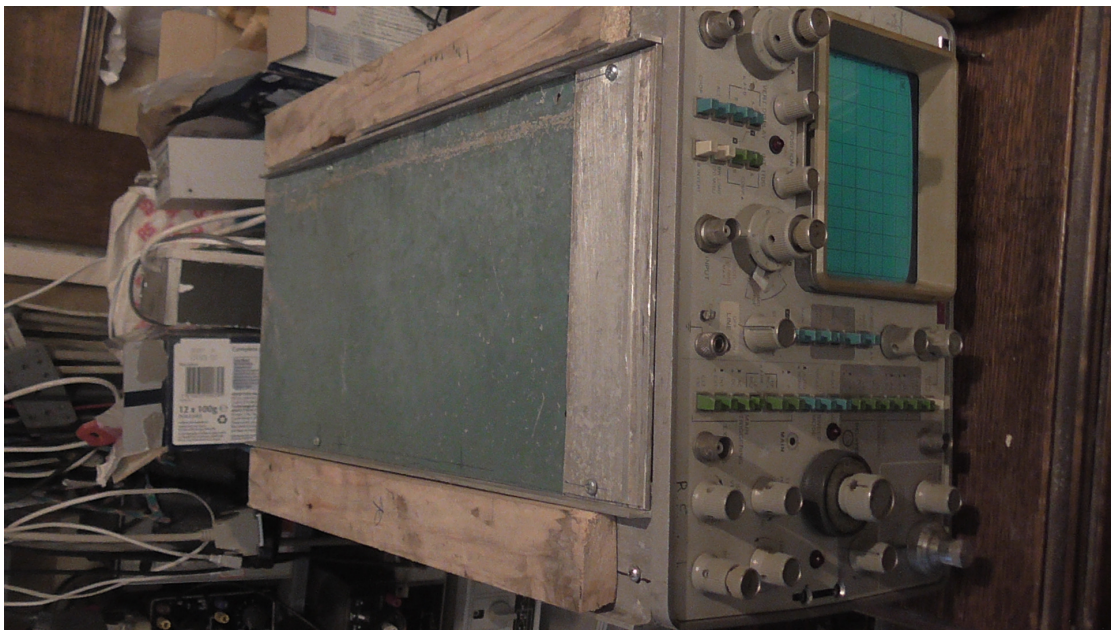
The picture shows angle brackets bolted to the side spar and adjustable fixing to larger screening plates. Some experimenting is needed to get the best results but it stops the side connectors from flopping around. These connectors being single sided are perfectly reliable while not being fully inserted.



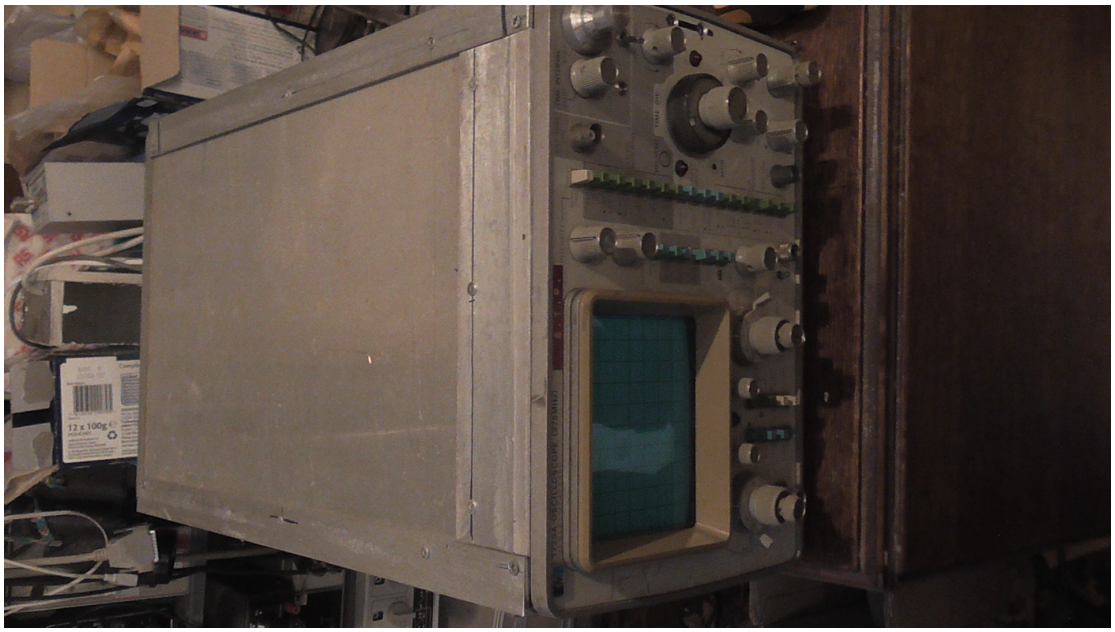
It was verified that both time-bases worked before repairing the case.

The tube base had been protected up until now with a temporary cover. Looking round the shop an old tobacco box was found most beloved for past ham radio projects. This was sweated to a plate with an oblong hole and painted matt black. It was almost identical to the tube guard on the HP182T. .

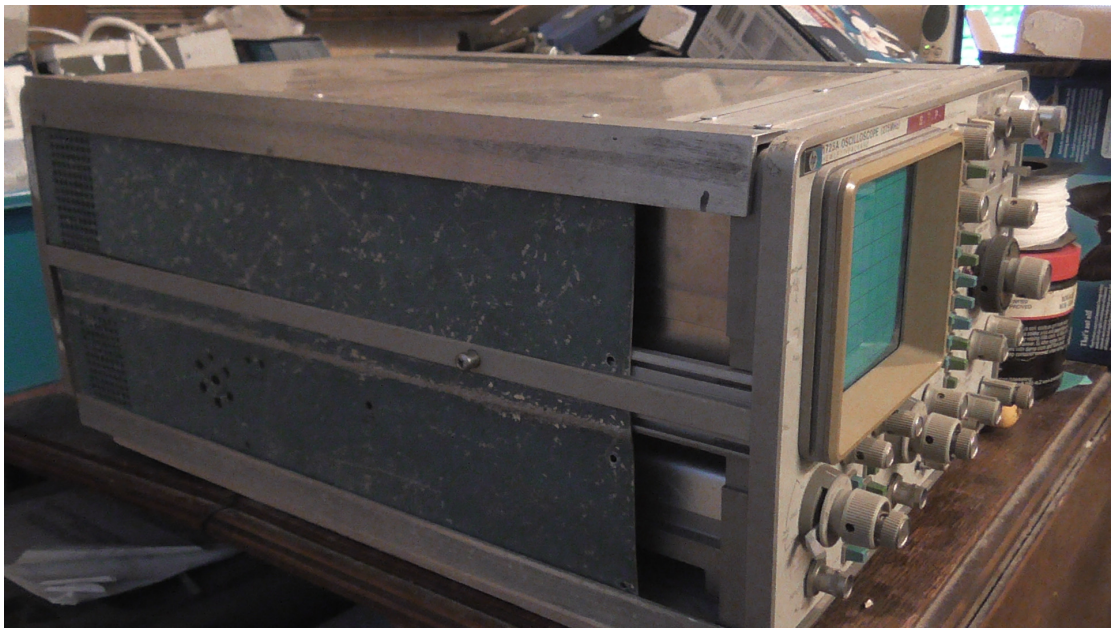
The original casing for this scope was sheet bent over at the corners, not very robust. In particular it would bend inwards on some components. It was noticed the mil version was better constructed .The lack of it provided the opportunity for a better construction.
The bottom had two runners in the manner of the TEK545B made out of my dads old greenhouse extrusion. The wooden bits stop it scratching the bench surface



The top had two pieces of alloy angle from the same old greenhouse source.



The sides were any old smaller pieces which could be cut to slot into the heavier corner frame.



This method of construction has a lot to commend it as it uses up lots of scrap pieces of aluminium sheet.

Viva La 1725

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The author has 25 years experience of the repair and calibration of test instruments for the UK strategic submarine program. Experience ranging from standards to RF work and the ability to repair any instrument needed for this vital program. On retiring he put together an array of test equipment based on this experience intending to do similar work. However UKAS compliance is expensive and not justified for a start-up. Using basic traceability and ratio methods however can circumvent this issue and it is noted that advanced programs use redundancy to reduce measurement uncertainties.
Good test equipment is essential for any research program, so this has been a worthwhile endeavour.

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