

Intermittent Speedo Repair

There appear to be two common faults with the electronic speedo's fitted to XM's. In the first instance the sender on the final transmission appears to become faulty. I have read that this has something to do with water ingress into the inner parts of the sender thus corroding the internals with obvious consequences. In the case of the failure of the sender neither the speedo works nor does the trip/fuel computer. However, it's the second most common fault which this self-help file covers. The second most common fault is a failure of the multiplug on the instrument cluster inside the dashboard. In this case the sender still sends signals to the trip/fuel computer so the miles per gallon etc still work but the speedo does not work (or does but intermittently)

The fault lies in the red coloured multiplug which connects part of the instrument cluster to the outside world. The individual cables terminate in a red multiplug which in turn mates with a socket on the instrument cluster PCB. However, the individual cables are quite stiff and are expected to turn through 90deg just after leaving the multiplug. The instrument cluster is a neat fit inside the dash and the connectors are mounted along the bottom edge of the PCB. When the instrument cluster is mounted in its normal position inside the dash the bottom edge of the PCB is only just above the dash chassis. The cables leaving the multiplug face downwards and must turn sharply through 90degrees to miss the dash chassis. The individual cores are therefore in a permanently stressed state relying on the little knife edges inside the multiplug to keep them connected.

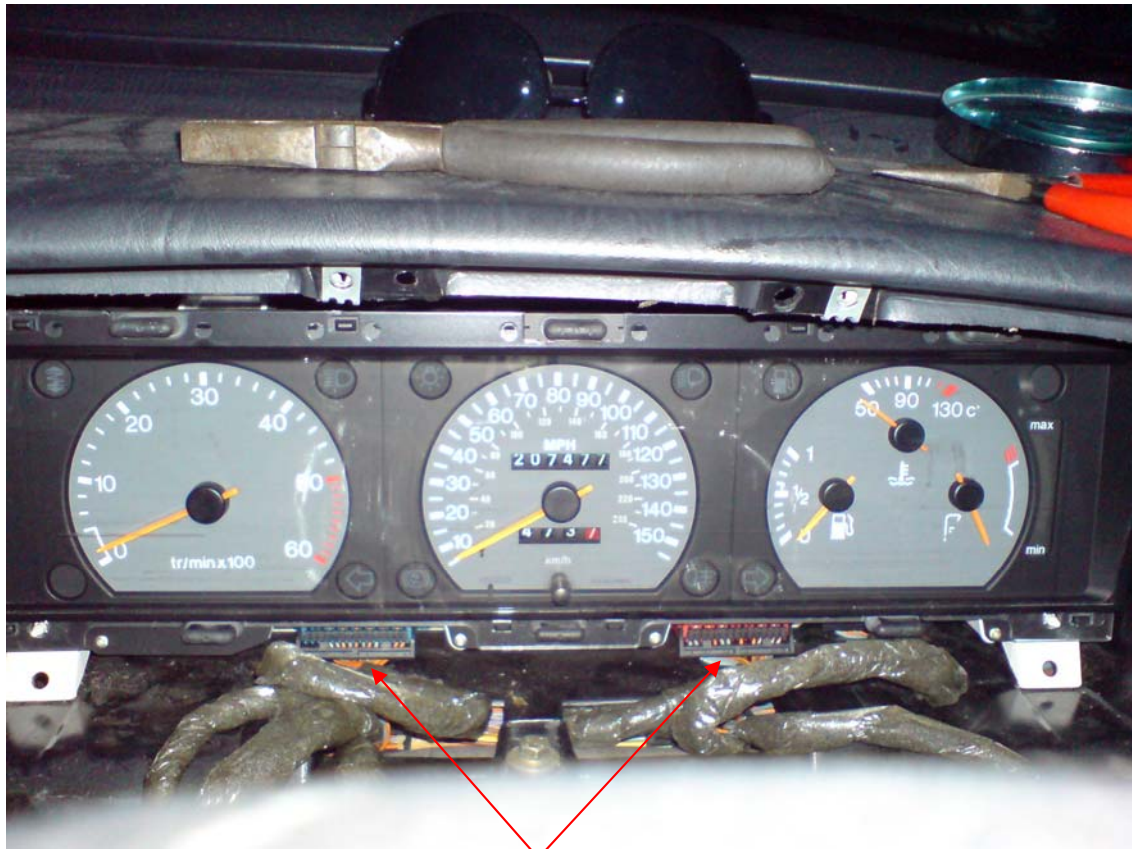


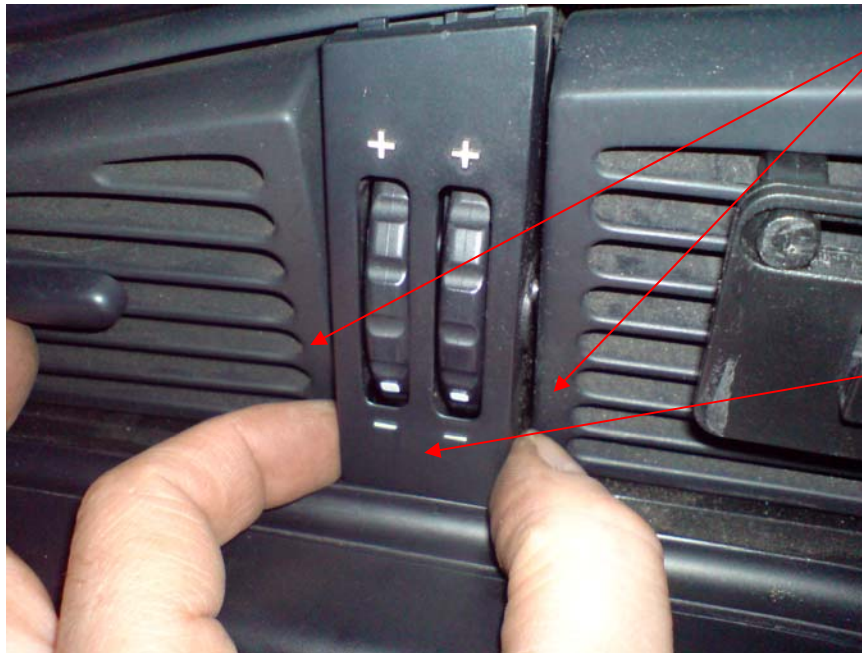
Photo 1

Cables stressed here as they leave the multiplug(s)

I don't know for sure why the core associated with the speedo should be any more stressed compared to any other core but it seems prone to failure. It may be that all cores are stressed by the same amount but because the core to the speedo is carrying only a 1v pulse (compared to other cores carrying nearer 12v) then it is much more vulnerable to degradation in contact quality.

In any case, after many hours of searching the pcb for a dry solder joint I followed some advice from a fellow club-xm member and attacked the red multiplug. The following sequence of annotated photos guide you through the process of repairing the fault.

Removing the shroud around the instrument cluster



Push both face vents in at the bottom so that you can grab the centre section between forefinger and thumb

Grasp the centre section and pull outwards from the bottom

Photo 2



Top clip

Bottom clips

Photo 3



Remove Torx screw

Photo 4

Next remove the two screws which face upwards into the top part of the dash. One is located above the rev counter and the other above the temperature gauge. Drop the steering wheel height adjustment to its lowest level to expose the two Torx screws above. Remove the screws.



Photo 5



Photo 6

There are a further 5 Torx screws accessed from below as shown above. Remove these screws



Photo 7

Fixing screws

Remove the bezel from around the alarm LED



Remove the bezel around the intruder alarm LED by prising the small clip first with a small screwdriver.

Location of Alarm LED bezel

Photo 8

Remove the Torx screw behind the alarm LED bezel



Torx fixing screws

Photo 9

The lower half of the dash should now be free and it should pull forward at the top edge by about 10mm or so. There should now be enough clearance to be able to remove the shroud that encompasses the instrument cluster. You will find that the left hand side of this shroud gets stuck because there are two tangs which stick downwards behind the lower part of the dash. To get the shroud past the lower dash the lower dash must be prised down and towards the rear of the car by approx 30mm.



The two tangs protrude below the upper level of the lower dash and make it difficult to withdraw the shroud

Photo 10

Once the shroud is pulled free the instrument cluster is exposed. The cluster is held in by 2 screws and two nuts on captive bolts. Firstly remove the two screws one in each of the bottom corners of the cluster.

Remove 2 no screws



Photo 11

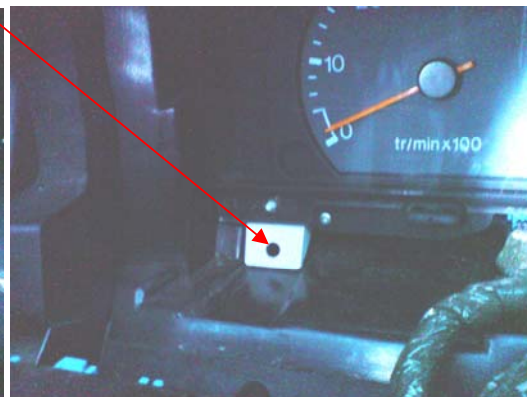


Photo 12

The two nuts securing the top part of the instrument cluster are set to the back of the instrument bay and are difficult to reach. I used a flexible drive on my 1/4" drive socket set with a 7mm A/F socket. Be careful. The nuts and the washers can be hard to find again if you drop them. Use a magnetic bit or screwdriver to fish the nuts and washers out to a safe place. Replacement of these is very tricky especially the right hand one. My fingers are just long enough to grab the nut between first and second finger and just reach the end of the threaded captive bolt. With a bit of patience you can get them back on.



Photo 13

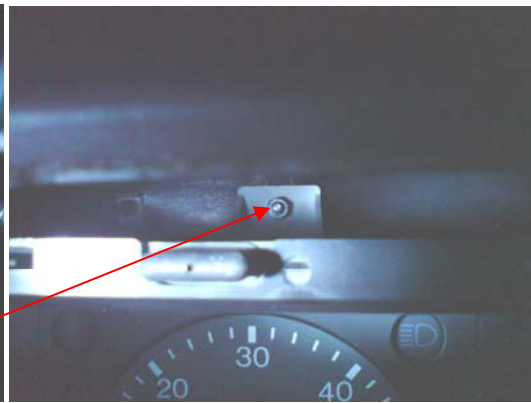


Photo 14

**Securing
nut**

**Flexible socket driver
c/w 7mm socket**

Now the instrument cluster should be free of all fixings. To remove the instrument cluster from the dash you must first tilt the top of the cluster towards you. The two top fixings will come off the two captive bolts.



Photo 15

**Tilt top of instrument
cluster towards you**

**Pull bottom of
instrument cluster
out slightly too**



Pull the left hand edge of the cluster out further than the right hand side.

Pull it far enough so that the back left edge of the cluster clears the dash structure

Photo 16

Now move the instrument cluster to the left until the right edge of the cluster clears the top part of the dash. When it is clear it should be possible to pull the cluster free from the dash but still with the cables attached.



With the cluster moved to the left the right edge will squeeze past the edge of the dash at this point

Photo 17

Next, disconnect the plugs from the Instrument cluster PCB.



This is the normal
"Locked" position of
the plug handle.

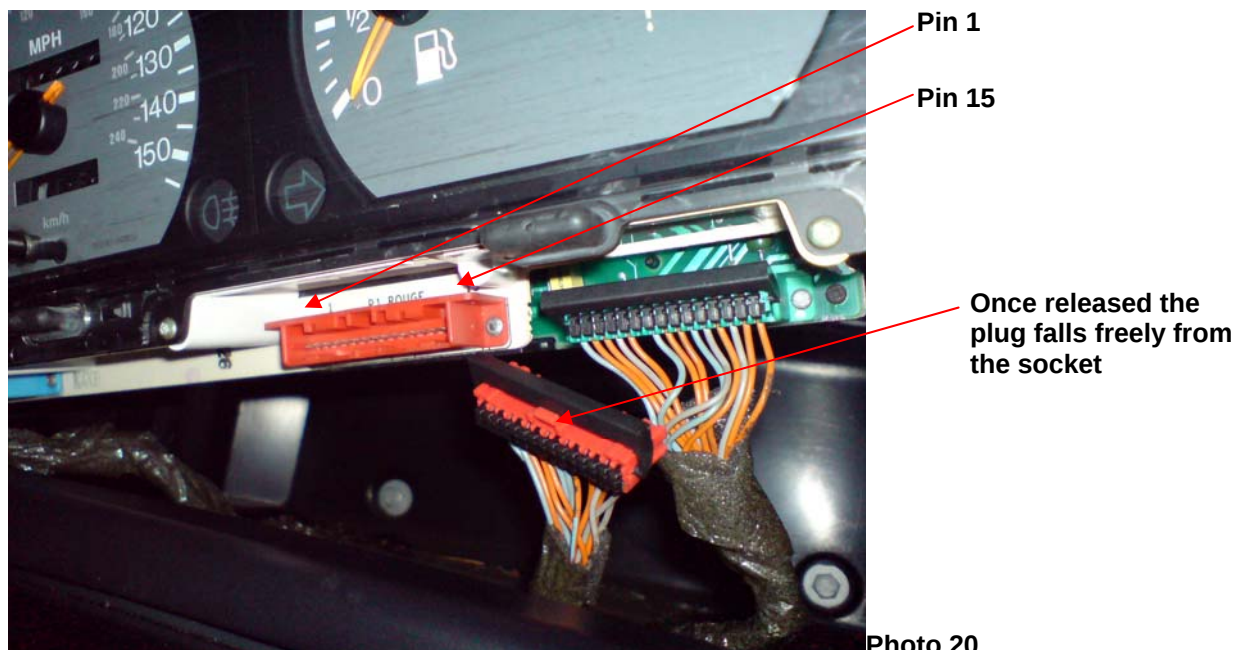
Photo 18



Rotate the plug
handle upwards and
you will feel a click
when the plug
releases from the
socket.

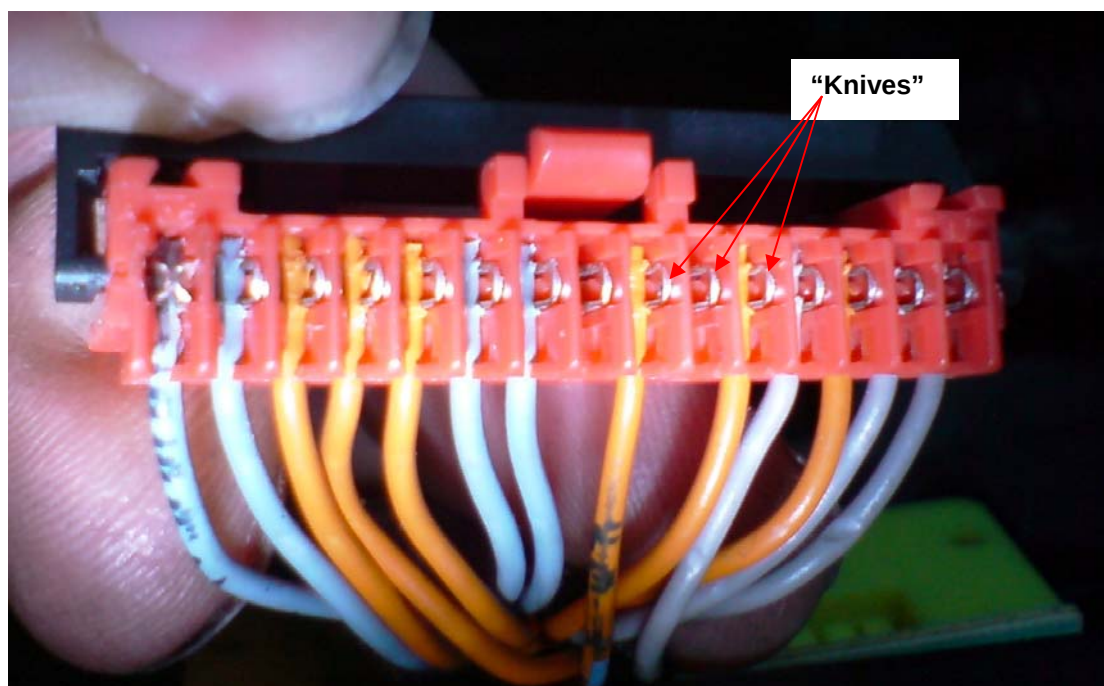
Black plastic "comb"
which covers the
cable terminations.
This needs to be
removed as
described below

Photo 19



Disconnect all three plugs and remove the instrument cluster from the dash. This would be a good time to test all the lamps on the instrument cluster and replace any broken/missing ones. Please note some may be deliberately missing if the feature is not installed on your particular model. At this point it is also possible to access the rear of the Warning Lamp panel which houses the lamps for the ignition, handbrake, stop lamp etc etc. Check all lamps and replace as necessary.

Pry the black plastic comb as shown in Photo19 out of the plug with a small screwdriver. What you see at the back of the plug looks like this (sorry for the quality of the photograph, macro photography is very difficult with these digital cameras. There's no manual control over focus)



The cables are pressed into each cable groove by a crimping tool. As each cable enters its respective groove the sharp edges of the "knives" slice through the insulation and the copper

core of the cable is trapped at the bottom of the two tapering knife edges. This is where the electrical connection is made. The cable relies on the friction between the insulation and knives to keep the cable in its groove. The black plastic comb also helps to keep them in place. However, the stress on the cables due to inadequate turning space causes the insulation to slip on the knives allowing the cable to rise out of the tapering knife edges. As it does so it loses electrical contact.

My solution was simply to bend over the tops of the pair associated with the cable with the problem. In the case of the faulty speedo the cable carrying the pulse signal from the speed sender on the final drive is connected to Pin 1. I took a pair of very small pointed nose pliers and bent over the two loops at the tops of the knives towards each other. This has the effect of pushing the cable further into the tapering knives and prevents them from coming back out.

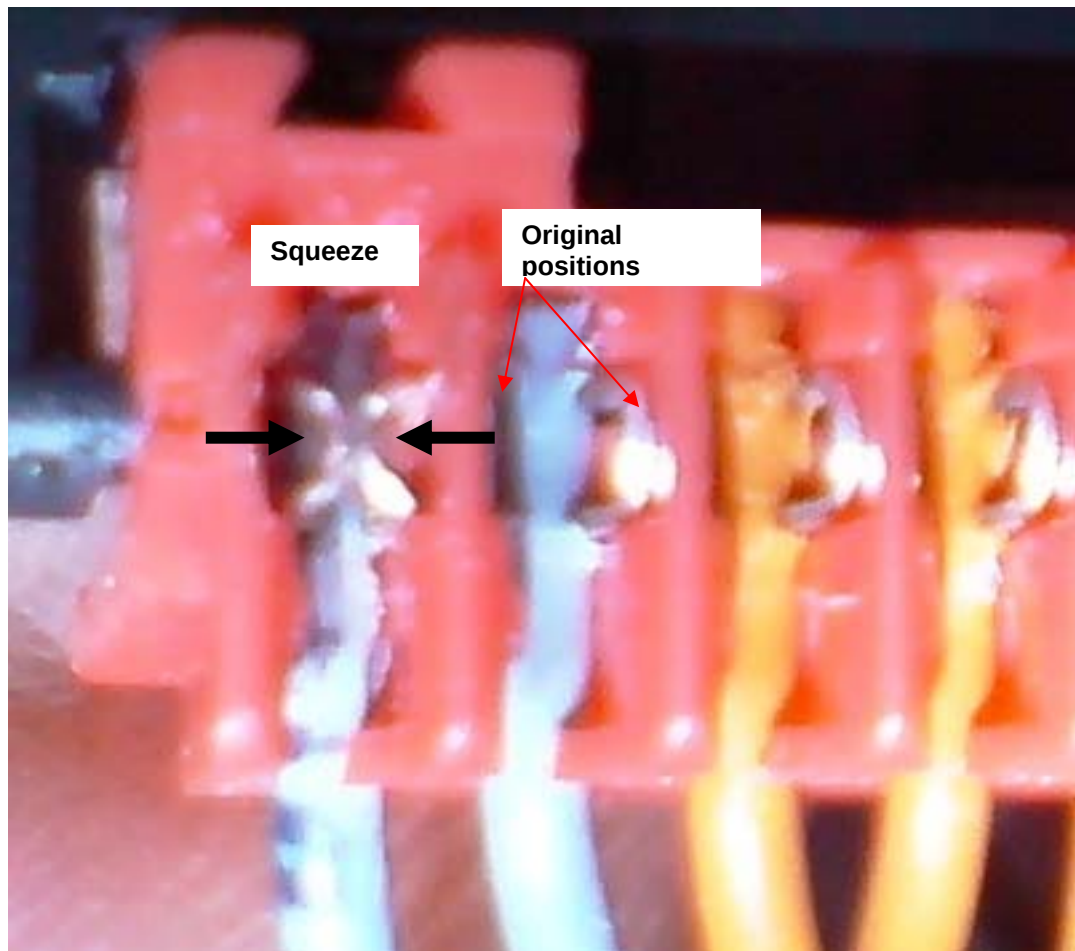


Photo 22

I only crimped the cable associated with the speedo fault. I suppose you could do the same with all of the cables on all three of the plugs. I didn't know at the time if this would fix the problem otherwise I would have done it myself.

Reassembly is the reverse of the above procedure. Remember to push the handle on each multiplug downwards to lock them into the sockets.

Many thanks to XMExclusive and Peter.N. of club-xm.com for their guidance and help in tracing the original problem.