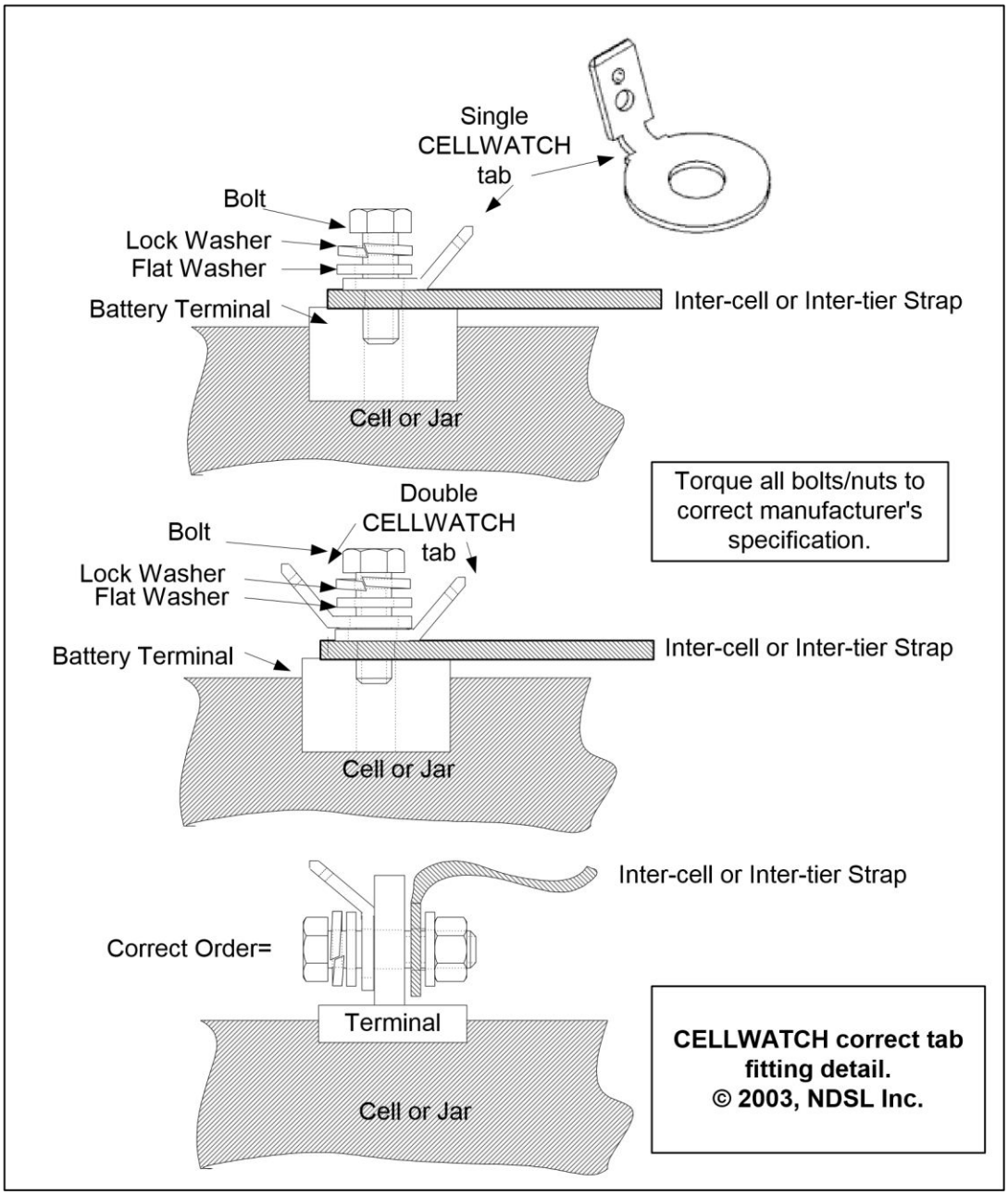
Tech20040405-2-2

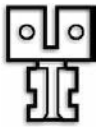
DCM Connection Techniques and Errors.

There is only one approved and recommended technique for connection of a cellwatch DCM to a battery. This employs NDSL supplied ring tabs of the correct hole diameter to suit the jar or cell type, correctly fitted to the jar or cell. This is illustrated below.



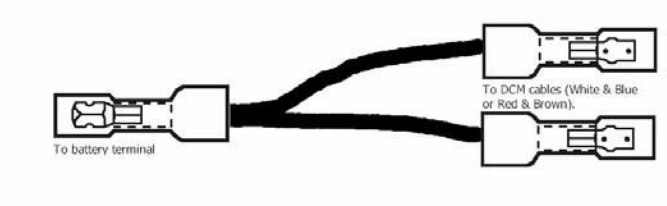
It is understood that for reasons of efficiency or convenience it may be desirable to modify this standard approach to installing Cellwatch tabs in this manner. **This should not be done**. To illustrate the problems caused by a variety of other techniques, this document quantifies some of the errors introduced using 'shortcuts' and in addition discusses some of the safety and reliability hazards.

(a)

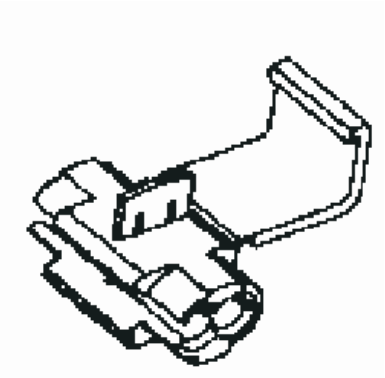


(b)

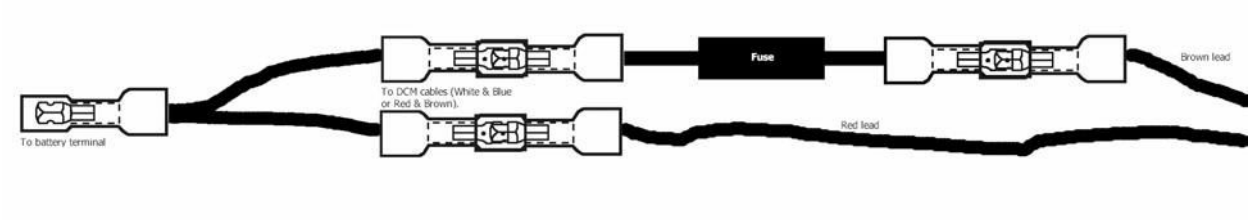
(c)



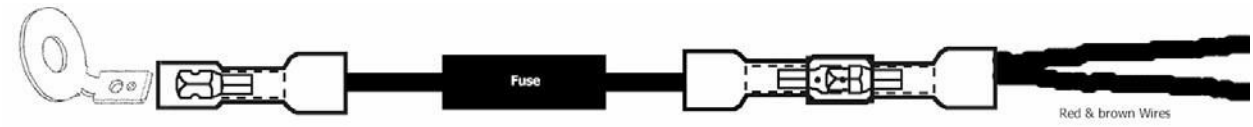
(d)



(c1)



(e)



Brass splitter (a).

The simple brass splitter looks like a good solution for using a single tabbed battery post as a double tab receptacle for either end of a cellwatch DCM. The error introduced will be to increase channel one and channel four ohmic value reading of the DCM by approximately 5%. This 5% error can skew inter-cell or inter-jar comparisons and cause wrong jar or cell diagnosis to take place.

Furthermore, the DCM crimps are tin/lead plated, as are the ring tabs supplied by NDSL. Introduction of a brass finish product between the two tin/lead plated surfaces will cause metallic corrosion and ultimately a higher resistance. This resistance will rise over time and look like a failing cell or jar, thereby adding to battery diagnosis errors.

"Piggy Back" connector (b)

This would require removal of an existing DCM crimp. This is not recommended due to the controlled manner in which these crimps are machine applied. It is envisioned that the error in a correctly placed Piggy Back would be similar to (a) above; 5%.

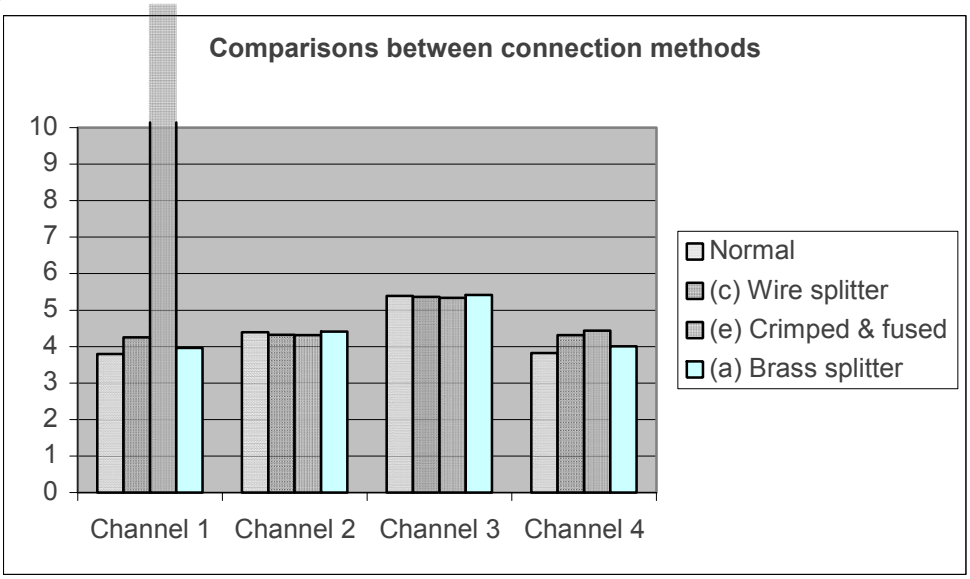
Wire Splitter (c)

A correctly manufactured wire splitter using shrouded plastic ¼" terminals for safety would introduce in the region of a 12% error in the ohmic value readings of the DCM, channel 1 and 4. Little or no change would be noticed for channels 2 and 3. Illustration (c1) shows how the fuse was also included in the circuit.

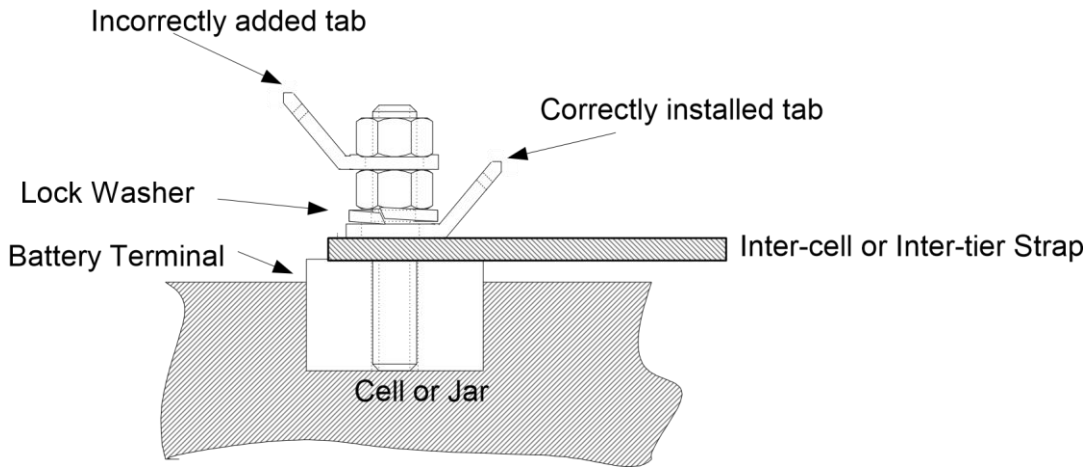
Tap-Splice (d)

The use of this is not practical at the red and brown end of the DCM as the fuse would have to be inserted in the common to both red and brown wires introducing an even bigger error in channel 1 ohmic readings. This sort of arrangement is typified by the illustration in (e) above.

Looking at a set-up of 4 FR12-270 12v jars we can do a comparison between these methods. The graph below shows the results of these.



Finally, detail studies have been carried out on the effect of installing the second ring tab used by channels 1 and 4 on a DCM above the existing torqued nut and single tab on a battery terminal stud as in the illustration, below.



This technique is attractive to use where the battery comes ready installed from the factory with only one ring tab fitted to each terminal throughout and the installation technician does not want to break down the battery to install the second tab.

Again this method is not recommended due to the need to torque down the second, upper nut to the same specification as the lower nut. This torquing is necessary to avoid introducing a contact resistance between the upper ring tab and the terminal. Torquing down this nut onto the lower nut reduces this resistance but effectively locks them together making eventual removal more difficult.

Short term research has shown, however, that if correctly torqued, the results are acceptable.

NOTE: This advice is aimed at the use of Cellwatch on VRLA jars where the ohmic value is greater than 1 milli ohm. For large wet cell applications, nothing should be done to compromise the Cellwatch specified connection method.