

Surface Cable Connector Issues from the 2004-05 Pole Season

John Kelley and Johan Lundberg
January 16, 2005

1. Introduction

In addition to the known issues with the soldering of the MS connectors on the Ericsson surface cables, we have found a number of other issues with the connectors on both the Ericsson and JDR surface cables which should be addressed for next season. These include broken or missing connectors, miswired connectors, connectors with the wrong gender, and connectors with bent pins.

2. Broken Connectors

Upon inspecting the JDR surface cable after it was deployed in the trench, we immediately found issues with the Marincos IceTop tank power connectors, RIP1A and RIP2A. RIP1A was seriously damaged, and RIP2A was completely missing, with the bare wires exposed. We are not sure if this happened during cable deployment, in shipping, or at some prior point, but clearly the cable was mishandled or mispackaged at some point.



Figure 1: Broken and Missing Marincos Connectors on JDR Cable

We replaced both connectors with spares from the IceTop Smurf setup.

3. Miswired Connectors

While repairing the Marinco connectors on the JDR cable, we checked the wiring of the connectors at the other end of the cable in the temporary counting house (TCH). We found that PIP2A was miswired, with the very thin common wires connected to V-. These connectors should not in principle be carrying a large current, but this is still suboptimal. We rewired the connector to correct the problem.

While checking the communications on the JDR cable through IceTop quad IQ1, we found that the connector was miswired on both ends. Electrically, the correct pins were connected, but the wrong pairs in the quad were used, increasing crosstalk and causing communications to fail. Both connectors were rewired to correct the problem.



Figure 2: Miswired IQ1 connector — blue and green wires should be used with A/D pair, not A/B (JDR cable)

4. Connectors with Wrong Gender

Upon inspection, we found that the IceTop RS-485 quad (IQ3) MS connectors on both ends of the JDR surface cable were incorrect.

The surface junction box (SJB) end of IQ3 should have a female, cable-end MS connector with pentagonal+1 pin pattern. Instead, the JDR cable had a female, *panel-end* MS connector with pentagonal+1 pin pattern.



Figure 3: Wrong Connector on IQ3, JDR Cable, SJB End

The TCH end of IQ3 should have a female, panel-end MS connector with pentagonal+1 pin pattern. Instead, the JDR cable had a *male*, panel-end MS connector with *hexagonal* pin pattern.



Figure 4: Wrong Connector on IQ3, JDR Cable, TCH End

We corrected the connector at the SJB, and we made a custom cable for the TCH with a mating connector.

4. Connectors with Bent or Missing Pins

Upon unwrapping the MS connectors of the surface cable at the TCH and placing them in the patch panel, we noticed that a significant fraction (at least 10%) of the connectors had visibly bent pins. The pins are not so badly bent that they can't be straightened; however, this makes connections much trickier, and if the same situation occurs at the SJB, the detail work required outside could be quite difficult. Even inside, one patch cable connection took 1/2 hour, because the pins were bent in a symmetric way that was difficult to detect.

With the Ericsson cables, it was clear that this was the first time the connectors had been unwrapped since delivery, indicating that the pins were bent at some point prior to shipment.

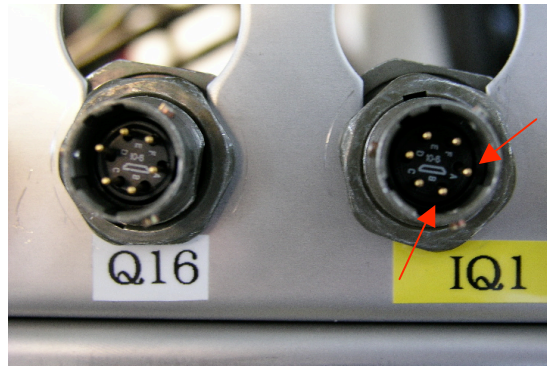


Figure 5a: Example of Connector with Bent Pins (Ericsson Cable)

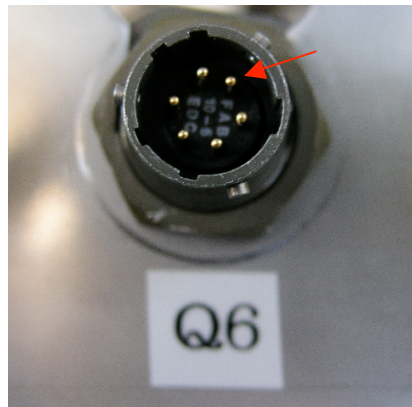


Figure 5b: Example of Connector with Bent Pins (Ericsson Cable)

Additionally, we found one MS connector on the JDR cable at the TCH end that had two missing pins. Luckily, the missing pins of the 6-pin connector are the two that aren't used.



Figure 6: Connector with Missing Pins (Ericsson Cable)

5. Summary

In summary, we found multiple problems with the connectors on both the Ericsson and JDR surface cables, including broken connectors, miswired connectors, connectors with the wrong gender and/or pin configuration, and connectors with bent pins. We suggest the following steps to avoid similar problems in the future:

- Better quality control after production, including checking the gender and pins of all connectors
- Sturdier packaging of connectors during transport, and/or more careful handling during deployment
- Shipping spare connector kits of all genders and pin configurations to the pole for use in fixing any of these problems that occur in the future