THE MDHDS PROJECT:
Coupling the MFTM Telemetry Box to the T2P

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Jackson School of Geosciences
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Objective:

Initiate a program on the T2P, feed the signal into the MDHDS telemetry box, termed “MFTM”, and observe the signal on an instance of Hypterminal running out of the MFTM.

Participants:

Eric Meissner – LDEO
Kris Darnell – UT
Walter Masterson – LDEO
Geetika Kapoor – LDEO

Location:

Lamont-Doherty Earth Observatory
Borehole Research Group Testing Facility
Palisades, NY 10964

Setup:

Kris Darnell arrived at Lamont on Monday, May 10, 2010 after shipping all the necessary T2P equipment to Lamont the previous week. He then spent some time to prepare his tool, then initiated the program T2PLOGGR.RUN and provided data output access via an RS-232 female connector.

The RS-232 connector was spliced into an RG-174 (PVC-jacketed, 50 ohm) 0.11” coaxial cable and terminated on the opposite cable end into a 6-pin mini-DIN. The 6-pin mini-DIN then connected to the T2P allowing a pathway for the T2P output string data. Kris Darnell had two cables of this connection configuration in lengths of 94ft and 206ft.

The Lamont team had already assembled the MFTM in a nearby space with connections to a separate computer available. After initiation of the T2P logging program, the RS-232 connector was fitted to an RS-232 connector permanently housed on the MFTM. The MFTM was then powered and its output line connected to a computer running Hyperterminal.

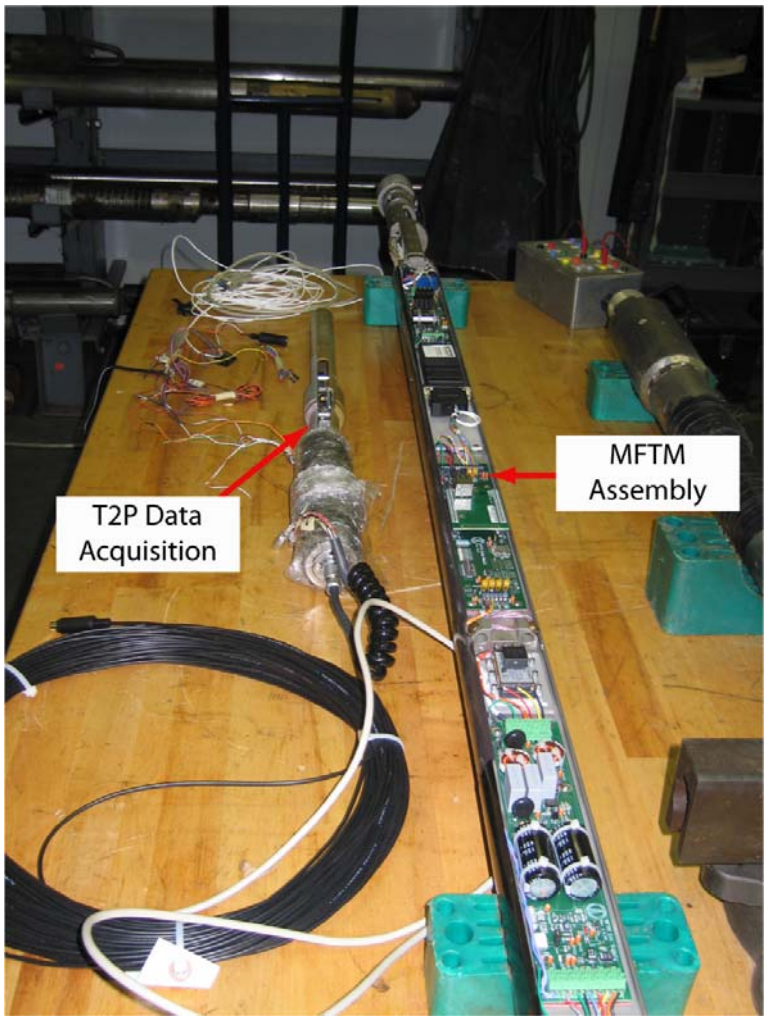

Figure 1: Setup for T2P & MFTM Systems Test

Results:

Immediately after fully connecting the system, Hyperterminal displayed the results of the T2P program. However, data output only resembled, rather than replicated T2P output. A typical T2P line looks as follows, with the MFTM converted data shown as well:

T2P Lines:

```
 14:35:04.62   16777215.000   12.4 10.0 159033.000 159087.000
 14:35:05.62   16777215.000   12.2 10.0 159030.000 159091.000
 14:35:06.62   16777215.000   12.1 10.0 159028.000 159084.000
```

MFTM Converted lines Lines:

```
 14:35:84.62<<816777215.888<<<<12.4818.8<<159833.888<159087.000■■

      14:35:85.62<8<16777215.888<<<<12.2818.8<<159838.888<159091.000■■14:35:8
6.62<8<16777215.888<<<<12.2818.8<<159838.888<159091.000
```

The MFTM converted lines retained much of the data from the T2P, but appeared to be doing several odd things.

1. The MFTM converted “0” to “8”.
2. The MFTM converted [space] to either an “8” or an “<”.
3. At the end of a line, the MFTM sporadically inserted additional characters.
4. The new line and line feed operations were not being appropriated correctly.

Many causes were possibly attributed these effects, and the investigators inspected these items.

1. Changing the variables in the string data from space allocated float variables to digit allocated double variables.
2. Ensuring physical spaces were present in the string.
3. Inserting a carriage return operator into the string data (\r).
4. Decreasing the length of the coaxial cable.
5. Using a different type of coaxial cable.

After much investigation, it was determined the cause of the data distortion was the RS-232 pin reversal. The RS-232 protocol has dedicated Send and Receive signal lines, and the MFTM to T2P connection was not properly ordered. A null modem, or a converter which flips the Send and Receive signal lines was inserted into the line and the T2P data outputted from the MFTM in its correct form.

Conclusion:

Under normal circumstances, this pin reversal is an easier problem to diagnose. If the pins are not coordinated, then data is never received through a COM port. However, the MFTM has an internal conversion between RS-232 and RS-485, where the signals are maneuvered. The end result of this protocol conversion seems to be a moderate distortion of data rather than a complete void of data.

After correction of the RS-232 signal, both coaxial configurations were used as data transmission and neither suffered from losses. It was determined that even the 206 ft strand was a viable connection for data transmission, and thus, not a distance limited protocol as originally thought.

It will be critical in the assembly of the MDHDS to determine the situation where a null modem is necessary for the coupling of the T2P and the MFTM. Such determination should be made shipboard, prior to deployment, and never assumed to always exist in one state or another.