AALogic D105 and DAP105 Tone Experiments

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The Bud Wright Test Fixture

The test fixture is designed with a 50 pair pulp cable. At one end 25 pair has been placed in a module with a PIC pigtail for test set connection to prevent paper damage over several usages. In the center of the PULP section is a PVC pipe sealed at both ends. The top section of the pipe has been removed to allow water to be added, providing similar effects found in the field with a wet PULP section.

Dry Cable

The objective was to determine if the D105 DAP105 (Differentially Amplified Probe) could discern a signal level difference between the actual pair from a pair with bleed-over and if using TriPlex had an advantage. Since the DAP amplifies the difference between the two paddle sides placing the probe between the pair in Simplex mode actually reduces the overall received signal. TriPlex mode sends opposite phase between Tip and Ring therefore increasing received level when placed between the pair.

SIMPLEX, No Sheath Connection

The results depended on how many pairs were on one side of the DAP probe paddle. Using a fixed gain with one pair on one side of the DAP a reading of 10% was seen, 3 pair 18%, 4 pair 20%. The correct pair yielded 17%.

The correct pair could be found if the “squelch” setting was above 10% while probing one pair at a time.

SIMPLEX, D105 connected to Sheath

Using sheath ground elevated the signal received, and reduced bleed-over substantially. Three pair on one side of the probe only yielded 4% while the correct pair was between 24-34% depending on the portion of the pair twist position against the probe paddle.

The correct pair could be easily found without using the “squelch” feature.

TRIPLEX, D105 No Sheath Connection

Very little bleed-over was noticed. With three pair against one probe side only 3-5% signal level was seen. On the outside of the correct pair the level was 30%. When placed between the T and Ring the level changed to 64%.

Although there was a substantial change in amplitude, it was not necessary to insert the probe between the pair to determine the proper pair.

TRIPLEX, D105 Connected to Sheath

Only a slight difference was noticed by connecting the Ground cable to Sheath. With three pair against one side of the probe the level was 2-5%. Outside the pair the percentage was 27%, and between the pair 70%.

While a slight improvement was seen in trying to identify the pair the difference with a ground or without was not substantial.

Wet Cable

The previous chemical residue in water well was unknown, and chemical substance of water added was also unknown. The reservoir was filled with water and allowed to saturate the cable. Several pairs were tested for resistive faults using the D105. The TR resistance ranged between 281 to 495 ohms. Resistance to ground had a larger variance, 325 ohms to several thousand ohms. Two pairs with lower resistance faults were used in the experiment to provide worse case results.

SIMPLEX, No Sheath Connection

The Tip to Ring voltage on the sending unit showed the pair to be shorted. One pair across the probe paddle yielded 14%, 3 pair 28%, and the correct pair 12%.

The correct pair could not be identified.

SIMPLEX, D105 connected to Sheath

There was no change in the Tip to Ring resistance indications. A single pair across the probe yielded 17%, 3 pair 28%, and the correct pair 17%.

While the overall percentages increased, the pair could not positively be identified.

TRIPLEX, D105 No Sheath Connection

Reading shown on the D105 sending unit was approximately 2Vac. It was difficult to determine the correct pair by holding the probe against each pair. Holding 3 pair across the probe yielded approximately 2%, the outside of the correct pair 3%, between the actual pair 6%. The gain was then adjusted to yield 24% on the correct pair.

Inserting the probe between the correct pair produced a noticeable increase. Inserting the probe between other pairs reduced the overall percentage.

Once the pair was identified a short on that pair resulted in the Tip to Ring measurement on the sending D105 to decrease to 0Vac.

TRIPLEX, D105 connected to Sheath

The results observed were similar to those of with D105 Ground not connected.

The D105 sending unit was then replaced with a TriTone unit to determine if higher amplitudes would increase the ease of verifying the correct pair. Using the maximum output the cross coupling increased slightly, making it easier to verify tone was being transmitted. Secondly, the gain on the receiving unit could be reduced to obtain percentage reading within the bar graph.

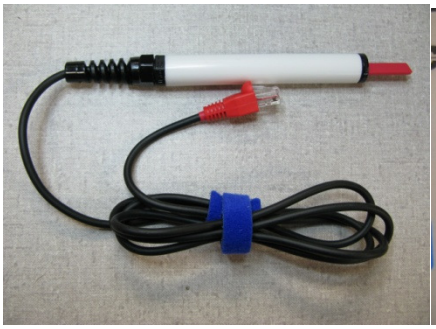
Whether the sending unit was a D105, or the TriTone, placing the probe between the pair positively identified the correct pair. Confirmation at the sending location was seen by shorting the pair on the receive side.

Conclusion

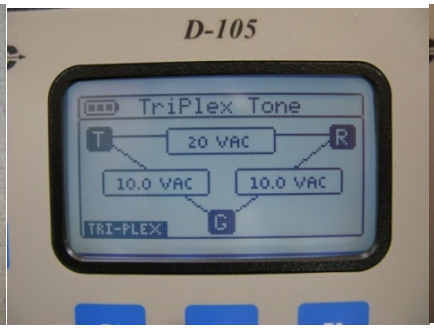
Although the results of the above experiments do not represent all situations that can be experienced in the field, it provided a means to evaluate a rather severe field condition. The use of the DAP105 while sending TriPlex tone allowed positive identification of the cable pair.

Regardless of cable conditions it is best to use sheath ground whenever possible. If Sheath ground is not present bonding several pairs to ground will reduce pair bleed-over.

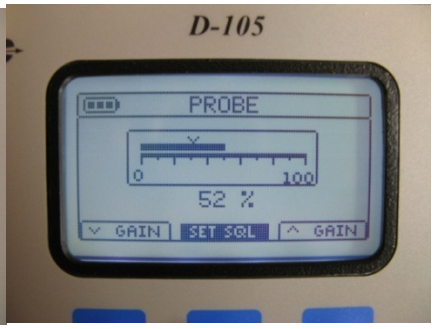
In some cases where the old pairs are grounded to the sheath it may actually be best to isolate the old sheath from the new sheath so sending tone is referenced to the NEW rather than the OLD tied to the NEW. In this scenario the sending unit does not see a ground and can produce a larger signal that can be seen by the far end. Obviously the results obtained will depend largely on the cable fault conditions.



DAP105



Sending D105



Receiving D105