RELCOM Inc. Modicon Tap Phase Application Note

Phase of Signals Through Relcom 2, 4 and 8 Port Taps

Investigation of the CBT-2XXXXX, CBT-4XXXXX and CBT-8XXXXX taps for phase change of signals resulted in the following information: A signal was applied first to the T1 trunk port, and the phase measurements were made at the T2 port and each of the drop ports as well. The test was then repeated with the signal applied to the T2 trunk port with the phase measurements being made at the T1 trunk port and each of the drop ports again. The results of those measurements follows in Table 1:

Signal Applied To	Opposite Trunk Port	Drop Port 1	Drop Port 2	Drop Port 3	Drop Port 4
2 Port T1	T2 0° phase	0° phase	0° phase		
2 Port T2	T1 0° phase	0° phase	180° phase		
4 Port T1	T2 0° phase	0° phase	180° phase	0° phase	0° phase
4 Port T2	T1 0° phase	180° phase	0° phase	0° phase	0° phase
8 Port T1	T2 0° phase	0° phase	0° phase	0° phase	0° phase
		Drop Port 5	Drop Port 6	Drop Port 7	Drop Port 8
8 Port T1	T2 0° phase	0° phase	0° phase	0° phase	0° phase
		Drop Port 1	Drop Port 2	Drop Port 3	Drop Port 4
8 Port T2	T1 0° phase	180° phase	180° phase	180° phase	180° phase
		Drop Port 5	Drop Port 6	Drop Port 7	Drop Port 8
8 Port T2	T1 0° phase	0° phase	0° phase	0° phase	0° phase

For those systems that may be phase dependent, it is suggested to use only the ports that are shown above to have 0° phase shift when driven from both T1 and T2. The reason for this is the combination of autotransformer(s) and standard transformer(s) coupling used within the tap itself. Since the current changes direction depending upon which trunk port is driven, a standard transformer will also change phase, while the autotransformers will not change phase. This means only using drop port 1 on 2 port taps, and only using drop ports 3 & 4 on 4 port taps. On the 8 port taps, only use drop ports 5, 6, 7 and 8. Should additional drop ports be necessary, more 2, 4 or 8 port taps may be added to the system.

Another item that could be useful is the Terminating Tap. This tap gives extra signal level to each of the drop ports. The signal level from a terminating tap is –16.5 dB from the trunk. This is 3.5 dB more signal than is seen at the drop ports from a normal tap. It is a purely resistive device and all ports can be used without concern for phase shift. However, it should be noted that it can only be used at the end of a trunk line since there is no T2 port on the tap. The extra signal level comes from not wasting the signal power in the terminating resistor. All unused ports on a terminating tap MUST be properly terminated or system degradation will occur due to reflections from the unterminated ports.

For Modicon customers note the following:

- Order the CBT-22300T, CBT-42300T or CBT-82300T taps for isolation and surge protection.
- For terminating taps, order CBT-4320TT
- See the application note on our web page for important information on the installation of isolated taps.
  http://www.relcominc.com/carrier-band/cbappnotes.htm
- The trunk to drop port attenuation is 20 dB, not the 14 dB that Modicon has with their taps. Please insure that your system can handle the extra 6 dB loss.
- Use drop port 1 on the two port taps, drop ports 3 and 4 on the four port taps and drop ports 5, 6, 7 and 8 on the eight port taps.
- Please terminate the unused drop ports to aid in system reliability.
- Use the T suffix rather than the G suffix for increased system reliability. The G suffix relates to Gold inner contacts on the cable pins and connectors. Modicon systems typically use Tin contacts. One should not mix Gold and Tin contacts or problems will occur over time due to their differing levels of activity.