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DIGIRACK, TDIF INTERFACE
INTERFACING WITH NON-TASCAM RECORDERS & INTERFACES
& GENERAL INTERFACING ISSUES

Soundtracs cannot support or system engineer TDIF interfacing for products other than the Tascam family of 8 track recorders. If the TDIF interface can be demonstrated to operate correctly with a known Tascam recorder, then it is considered (and indeed proved) that the interface is functioning as it should and is not faulty. The reasons are explained below together with system engineering advice.

Introduction

Several users of Soundtracs large format digital mixers have experienced problems related to clocking/noise etc. in TDIF interfacing. It should first be confirmed the system works without the use of the TDIF signals. This may also be the case with Tascam recorders initially. i.e. Check the problem is related to the use of TDIF interfaces only.

Soundtracs have much experience of interfacing to Tascam machines and the system is known to work with Tascam brand recorders. We will support users with interfacing to these machines. Refer to Technical Bulletin 72 for further notes relating to this.

Use of TDIF

It is interesting to note that the one machine using the Tascam Hi8 tape format that never has clocking problems is the Sony PCM800. This is based on the DA88 chassis and was actually made by Tascam but badged Sony. It does not have a TDIF connection but AES-EBU digital audio connections. These always work!

It has been noted that some users try to use the TDIF interface on the third party system because this (and the Soundtracs interface) is cheaper than AES-EBU. In the context of the cost of the whole mixer, this is a small saving and a false economy when one considers the potential difficulty in making the system work. Wherever possible, use AES-EBU, it is almost guaranteed to work first time!

Technical Background

The "Tascam Digital InterFace" was devised by Tascam for dubbing between their recorders. It has developed in an uneven way with differences (initially undocumented) between Tascam models and even within different serial numbers of the same model. In other words this is not really a "standard" at all.

Here are some examples of some of the issues that have been found by Soundtracs that illustrate the problems.

Certain machines introduced a clock input that could not be driven by any real world clock driver. Because this was not used for dubbing, the factory did not notice this problem. Their clock input had a 75 ohm pull-up resistor, which is impossible to drive down. This would even part power the Soundtracs rack if turned on before the Digirack!

1 in every 50 "play" commands some examples of the DA88 will lock up out of phase - outputting inverted audio. This sounds like full scale noise! Even Tascam were unaware of this until we pointed it out. You only hear this with a digital mixer not analogue, so no one noticed until our customers started to use the TDIF interface for real mixing.

The external clock line is normally 90 degrees out of phase with the audio - a strange design feature, compared to other systems. However, this clock input on different examples of different models need various clock input phase shifts to work. Soundtracs provide clock "skew" of 4 different values (selectable in software) to take account of this. We certainly would not do this unless we found it necessary.

Several problems have been related to the use of long 25way interface cables. Tascam branded cables are not available over 3m long. There is a reason for this. They do not work if made longer! This due to timing issues.

Cont/.....

There are several cable makers who claim to make TDIF cables. Whilst some may work, Soundtracs have experience of some that clearly do not. Even with Tascam Recorders we insist on the use of "real" Tascam cables. Users should not be tempted to make even short cables. The cable itself is highly specialised and not available on the general market. Machines therefore must be located alongside the Digirack. Some studio designers may not like this but it is a fact of life with this interface.

It can be seen this is not a simple issue. We are happy to say our mixers can be made to work reliably with all the variations of Tascam machine using the TDIF system. It will be clear from the above that the system will quite probably not work first time. However with adjustments to suit the individual machine it will work. It follows, however, that it often is not possible for a user to swap their Tascam recorders around within the studio as each interface is individually "tuned" to its machine.

A comment often heard is that "it worked OK with my 02R, my 1:1 dubbing set-up" or whatever. Invariably these are simple 1 machine systems where clocking is simple. The Soundtracs mixer is often the first time a user has put several Tascam machines in use with many other pieces of digital equipment and is then faced with "system engineering" for the first time also. This is similar to the hum problems in analogue – mixers do not hum but systems may do, digital mixers do not click but systems may do. This is particularly the case with anything related to the TDIF system because of the variability of the Tascam "standard".

This problem becomes critical when trying to use the TDIF system with non-Tascam product. Sound cards, other recorder systems etc. These are all designed by their respective manufacturers to try to overcome all the various issues such as those noted above (or possibly not designed to do this at all). As a result system engineering becomes a case of dealing with many variables for each individual system. This is generally resolved by trial and error.

Technical notes relating to Soundtracs TDIF interface

The following notes are intended to aid system engineers trying to interface the Soundtracs TDIF module with third party systems, other than Tascam. Refer to the maker of the third party system for further information on their own product.

The Soundtracs TDIF interface provides 25 D connection conforming to Tascam's published spec. providing 4 pairs (8 tracks) of audio input and output and a sample clock output (CLK or LRCKO) line in phase with the audio samples. The clock is high for the left word, low for the right word, the leading edge corresponding to MSB. In addition there is a clock input (LRCKI).

The mixer can be synchronised to this digital input from the recorder or (more commonly) the recorder will sync to the mixer output. This output will in turn be synchronised to another source (e.g. house clock) or internal reference.

Note the above comments regarding choice of cable type and length.

The TDIF module provides an independent BNC sample clock output (WCLK) 5V 48kHz. This is synchronised to, but not usually in phase with, the 25D connector clock line. This in turn is in sync with the console, whatever that is locked to. Do NOT use the local BNC clock output on the main rack madi interface.

This clock output defaults to -160nS delay (i.e. _ word late) on the audio sample (90 deg out of phase). This can be changed to a -80, 0 or +80nS "skew" for each individual TDIF module in the Madi declaration of the mixer sockets file. Refer to the current version of DS3DOC.WRI or DPCDOC.WRI for those to mixers or Setup.doc for the D4 mixer for syntax to introduce the required skew.

This BNC clock should be connected with an equally short 75 ohm coax cable of good quality.

The correct skew is determined by trial and error for the particular external machine, rebooting the console after editing the socket file to a new value of skew.

It can be noted that the main clock output on the mixer worksurface should not normally be used for clocking TDIF interfaces. However there is the possibility to increment the phase of this in 1.4 deg steps if this is relevant. This is a software setting in the relevant "BOOT.***" file

The Soundtracs TDIF module defaults to 24bit input/output. This can be changed to 16,18,20 or 24 for each individual TDIF module in the Madi declaration of the mixer sockets file. See above for document references.

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