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PLAYBACK TO CORRELATOR INTERFACE: EARLY IDEAS

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The following memo was an early attempt to specify this interface. It was never formally published. Some of the ideas have now been superceded in discussions, some of the results of which are reported in Acquisition Memos 19 and 28. However, it seems to me that there are ideas in the following which are worth considering, and which have not been much discussed so far. Therefore it seems worthwhile to distribute it at this time.

PLAYBACK TO CORRELATOR INTERFACE SPECIFICATION
(Rough Outline Only)

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This document specifies the signals to be connected between the Data Playback System (DPS) and the Correlator (COR), primarily in terms of their logical content. Many details are left until later, including electrical specifications of the connections and some of the command syntax and semantics.

Please refer to the figure. Six types of signal are specified for this interface; each is described below. The figure suggests possible connections and equipment on each side of the interface, but those are not part of this specification.

DATA: (DPS to COR) Synchronous binary data for 16 separate channels with two bits per channel. Depending on the playback mode, some channels may not be in use, and only one bit per channel may be in use. The data shall contain only samples of receiver outputs, and no auxilliary information such as headers or synchronization patterns.

VALIDITY: (DPS to COR) One synchronous binary signal for each of the 16 DATA channels, indicating that the current sample on that data channel is valid. The VALIDITY signal shall be set false if any of the following occur: (a) the DPS detects a transmission error which affects the sample; (b) the DPS detects a synchronization error which indicates that the sample may not have been taken at the specified time; (c) the recording mode used contained intervals of data blanking, and one of these is now in effect. In general, the validity signal may change state between any two samples and may remain in the false state for any number of samples.

> [Remark: The correlator may wish to blank invalid data by accumulation period, or on some other convenient schedule. In that case, it can then reduce the data rate on the VALIDITY lines by using each one to set a flipflop if it goes false, and then reading and resetting the flipflop at the scheduled time.]

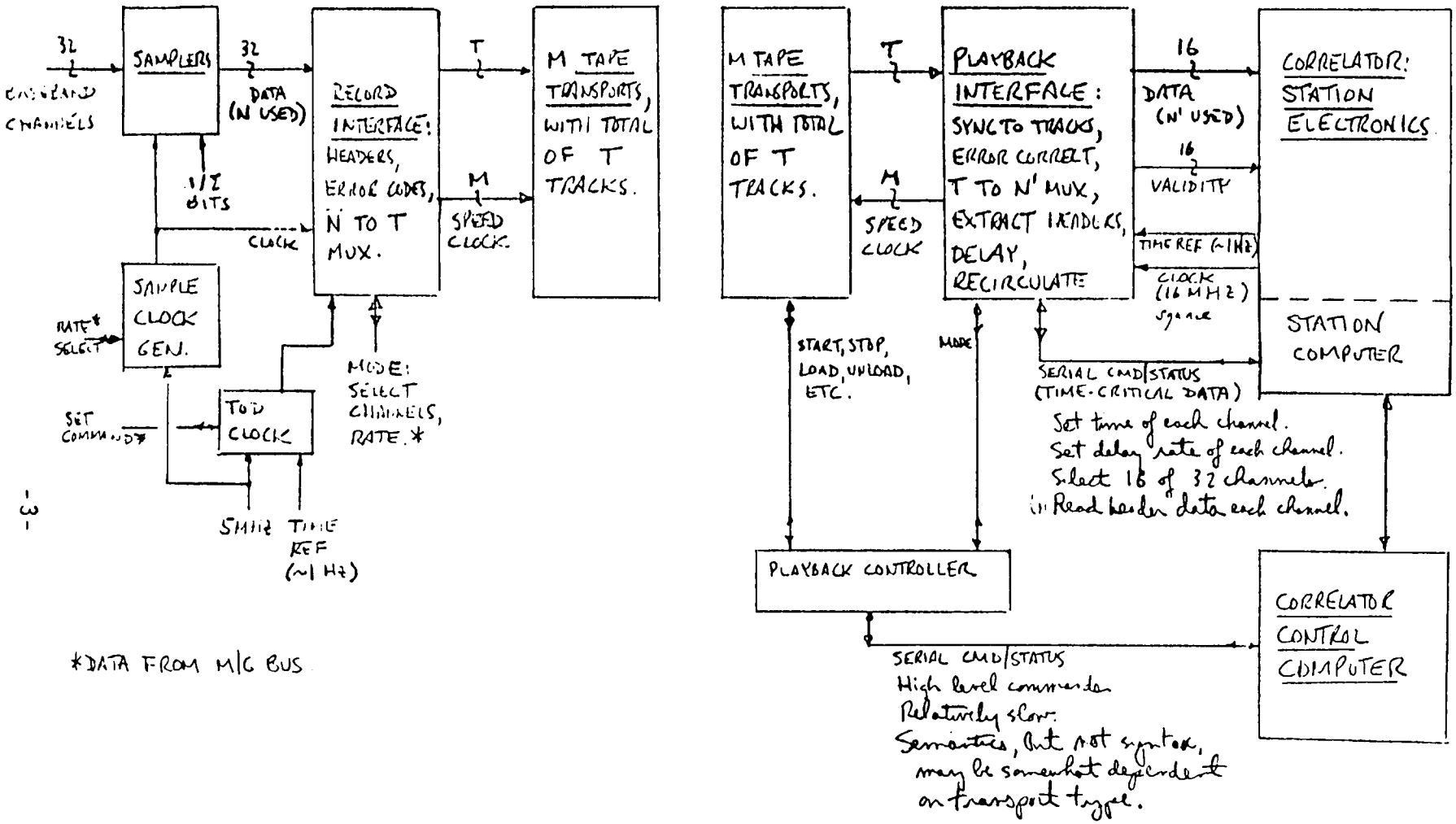
CLOCK: (COR to DPS) A continuous square-wave logic signal at 16 MHz. This is the primary timing reference, to which data bits are to be synchronized; the DATA and VALIDITY lines are to be valid at positive-going transitions of CLOCK (setup and hold times to be specified later). For sampling rates less than 16 MHz, DATA and VALIDITY will remain constant for several CLOCK cycles; but the DPS will maintain a counter based on CLOCK and this counter will be set by commands from COR, so both sides will know on which clock cycles the data can change (see discussion under TIME REF, below).

FAST SERIAL DATA: (bi-directional) Serial commands from COR to DPS and monitor/status information from DPS to COR. Commands shall be provided so that the following quantities may be set separately for each of the 16 interface channels: (a) selection of one of 32 recorded channels; (b) sampling rate; (c) time of the sample to be supplied at the next TIME REF edge; (d) number of samples thereafter at which the time is to be incremented by one sample time. (Certain commands are discussed in more detail under TIME REF, below.) For each command received, the DPS shall return a code indicating that the command has been executed, or that it is pending, or that it cannot be executed for a specified reason (e.g., an attempt to select a channel which was not recorded). Upon request, the DPS shall supply for any channel a copy of its current header. Additional status information may be available, including error rate monitors for each channel. This interface should be channel-oriented, and should be independent of recorder technology.

> [Remark: This specification is more general than we expect will actually be used. We do not plan to implement separate sampling rates for each channel, and arbitrary differences in times among the channels are usually not possible. However, two or more groups of channels with different parameters may be possible. The interface definition can be kept general by allowing the DPS to return an error code if an impossible command is received.]

SLOW SERIAL DATA: (bi-directional) Serial commands from COR to DPS and monitor/status information from DPS to COR. This interface differs from FAST SERIAL DATA in that it transmits information which is not as time-critical, and it may transmit information which is dependent on the recording technology. The data transmitted shall be ASCII characters only, and the syntax shall be at a fairly high level (English words for commands). All transport-related information should use this interface. Examples of commands include: (a) specifying the playback mode (if the record mode has been written on the tapes, the DPS should check this for compatability with the requested playback mode); (b) assign logical transport number to a physical transport; (c) display tape mounting message to operator; (d) get transport status (e.g., on/off line, BOT, EOT, etc.).

TIME REF: (COR to DPS) A continuous square-wave logic signal at 1 Hz, with a rise time of less than 33 nsec (so that transitions of CLOCK can be resolved). This signal provides synchronization for the time setting commands on the FAST SERIAL DATA interface. A Time Set command specifies the full time word of a frame and the sample number within the frame; that sample is to be supplied on a specified DATA channel at the next CLOCK transition following the next TIME REF positive-going transition following receipt of the command. Successive bits are to be supplied every R clock transitions thereafter, where R is the ratio of 16 MHz to the current sampling rate of the channel. Another type of command, called the Delay Rate command, specifies that every D samples on a given channel, either one sample shall be skipped or the present sample shall be duplicated, so that the time changes by plus or minus one sample period. The first such change occurs on the Kth sample following the next CLOCK transition following the next TIME REF transition following receipt of the command. Thus, the command specifies the channel number, D, and K. (It may be convenient to send Time Set and Delay Rate commands so that they are effective on the same CLOCK transition, in which case K can be zero.)



RECORD & PLAYBACK INTERFACES

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