

**NATIONAL RADIO ASTRONOMY OBSERVATORY  
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**INTERFEROMETER DIGITAL OUTPUT SYSTEM**

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# INTERFEROMETER DIGITAL OUTPUT SYSTEM

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## General

The interferometer digital output system receives data from two voltage-to-frequency converters and from the delay switcher. The data is recorded on magnetic tape by the magnetic tape scanner under control of the interferometer digital output system. The output system also causes the scanner to record standard identification data (SID) at the beginning and the end of each scan.

## Prints

The following digital drawings are required to understand and service this system:

Interferometer Digital Output System--	DL 2350
Magnetic Tape Scanner -----	DL 1950
Delay Switcher -----	DL 2450
Clock Slave I -----	DL 2550

## Operation and Timing

The system is started by moving the switch to START. Refer to the block diagram in Figure 1. At the next 50 second mark the first SID will be recorded. At 00.09 seconds the fortran code, scan number, and the first data word are recorded. This data word represents VFC pulses from 59.99 to 00.09 seconds. Data is recorded each 100 milliseconds until the end of the minute. The SCAN COMPLETE signal that occurs at 59.94 (59.79 to 59.89 integration is recorded) initiates in IRG. The GAP light will burn

Operation and Timing (continued)

during this interval each minute. The data recording process begins again at 00.09 if neither the switch has been moved to STOP nor the OFF TRACK signal has occurred.

Switching to STOP inhibits the next START signal at 00.09 seconds. The STOP information is stored in the scanner as a T3 CORRECT TIME. After the IRG is completed the scanner records the last SID. A copy of Addendum 6 to the memo on "Format for Magnetic Tape at NRAO" is included at the end of this report for your convenience. This addendum covers the data word format in detail.

Voltage-to-Frequency Converter Level and Range

Two Nixie displays are provided on the delay switcher panel of the data in the storage registers of the output system. Refer to Figure 1. These displays are provided to aid in setting the desired level and range of the pulse rate from the VFC's. A two digit octal display is driven by the AGC storage register. The allowable numbers may range from 00 through 77. The fringe display contains only one octal digit. Due to the higher noise to signal level on this source, the number range is limited to an estimated 2 through 5. This range may require correction after the users investigate the instantaneous rate from the VFC. The instantaneous rate must remain between 0 and 10 kHz, if maximum accuracy is to be preserved.

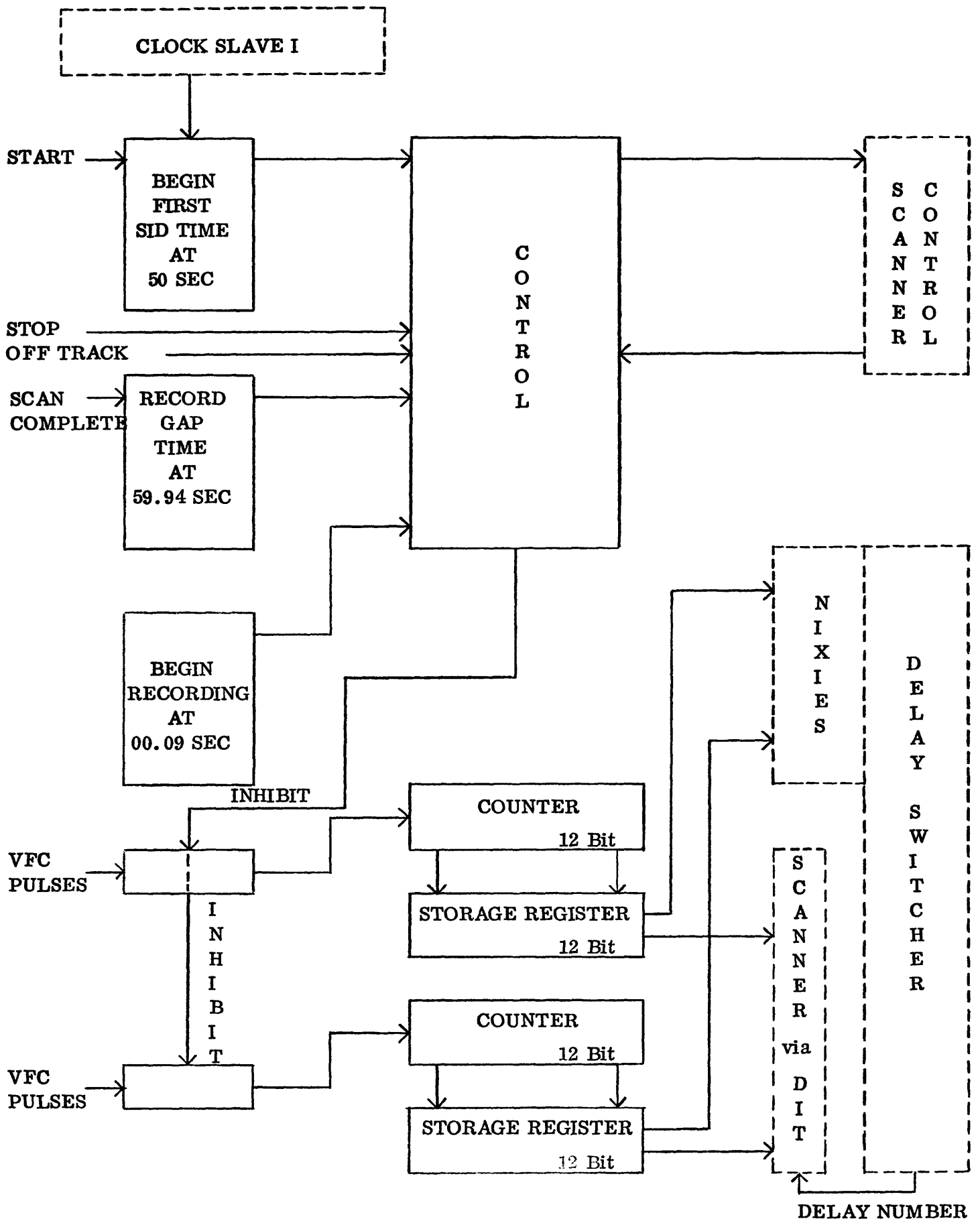


FIG. 1 - INTERFEROMETER OUTPUT SYSTEM

ADDENDUM 6  
(Revised)  
March 17, 1965

(To Memo on "Format for Magnetic Tape at NRAO" dated September 18, 1964)  
Note word "previous" added on page 2, fourth line from bottom.

INTERFEROMETER RECEIVER after January 1965:

SID FORMAT:

Standard SID format 3 with telescope 1 referring to 85-1 will be used. In earlier interferometer data the 85-2 was recorded in telescope 1 location in the format. 85-1 data will be added later in words  $W_1$ ,  $W_8$  and  $W_9$ . The beginning time in the SID  $W_5$  will always be 50 or 51 seconds.

DATA:

Each data record will be 601 words.

Word 1 Fortran code

Word 2 Record Number: The record number added to the hours and minutes specified in  $W_5$  of the beginning SID indicates the beginning time of the record.

Words 3 through 601-Data: One word is recorded each 1/10 second. The word representing the last 1/10 second of the minute is omitted.

	C	B	A	8	4	2	1
Parity	$X_0$	$X_0$	X	X	X	X	X
Parity	X	$X_0$	X	X	X	X	X
Parity	$Y_0$	$Y_0$	Y	Y	Y	Y	Y
Parity	Y	$Y_0$	Y	Y	Y	Y	Y
Parity	$Z_0$	$Z_0$	Z	Z	Z	Z	Z
Parity	Z	$Z_0$	Z	Z	Z	Z	Z

X = fringe output data. Adjust as follows:

No fringe = 512 decimal    1000 octal  
Max fringe = 768 decimal    1400 octal  
Min fringe = 256 decimal    0100 octal  
 $X_0$  = usually zero.

Words 3 through 601-Data (continued):

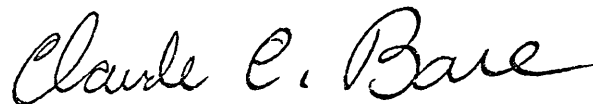
**Y** = AGC output data.

Data recorded during even seconds represents 85-2 AGC and data recorded during odd seconds represents 85-1 AGC data.

**Z** = Delay number.

The most significant  $Z_0$  is a one when the 10 dB attenuator is in use. The least significant  $Z_0$  is not used at the present time. The delay number is recorded in the remaining 10 bits. Two readouts indicating the same delay should be detected before a new delay number is assumed to be correct.

The first integration of data actually begins 10 milliseconds before the minute and ends 90 milliseconds after the minute. The centers of integration intervals occur at the minute + 40 milliseconds +  $N \times 100$  milliseconds, where  $N$  is the number of previous readouts after the inter-record gap. Any additional delay occurring in the analog portion of the system must be added to the 40 milliseconds.



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