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Datacom Interface to Magnet Power Supplies

Control and monitoring of devices in experimenters beam lines will be accomplished over a communication link called a DATACOM [1,2,3]. Use of the system for this application requires definition of the device dependent portions of the transmitted and received words. The definitions and their explanation are given below.

Datacom Format

Transmissions between the central module and the remote receiver consist functionally of 3 fields. (Figure 1) The 8 bit address field is the standard DATACOM address which identifies the remote receiver. The COMMAND/STATUS field defines the commands to a device and the status received from a device. The MAGNITUDE field contains the set point data sent to a device on a SET command and the digitized analog voltage received from the device in any cycle.

Datacom Function SET

The detailed bit assignments for this function are shown in Table 1 and Figure 2.

Datacom Function READ

Following standard Datacom conventions, the READ function does not affect conditions in the power supply, but returns status and magnitude information to the central module. The bit definitions for READ are given in Figure 3.

Datacom Function READ and SET CHANNEL

This function is used to both return status and magnitude for a channel and to set a new value into the multiplexer sub-address. The new analog voltage will not be digitized until the next conversion by the ADC. The ADC invalid bit will be set until this conversion is complete. Bit assignments are given in Figure 4.

* Indicates corrections

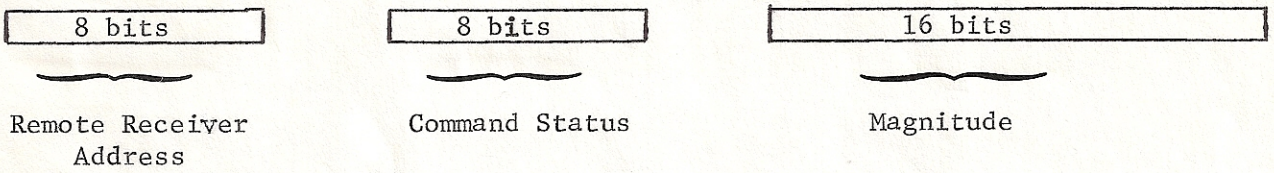
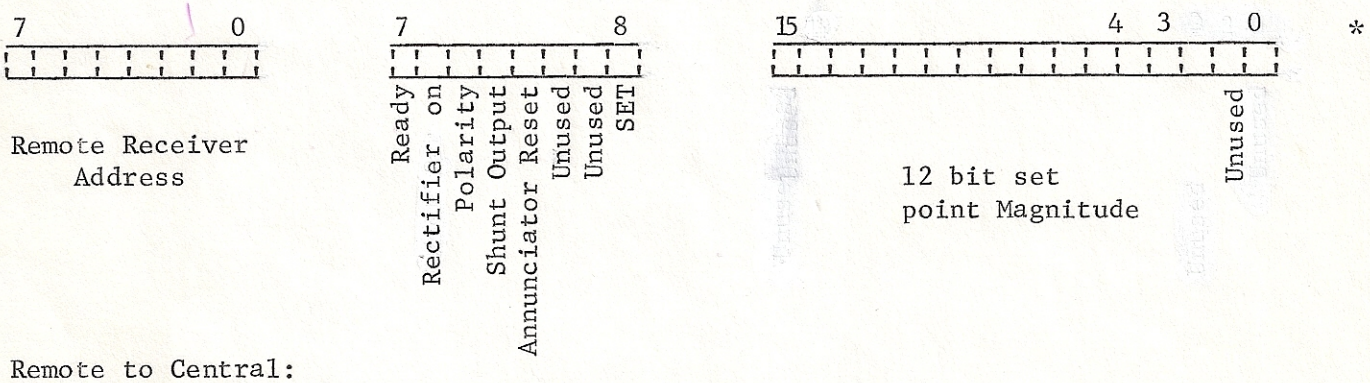


FIGURE 1 Datacom Word Format

Central to Remote:



Remote to Central:

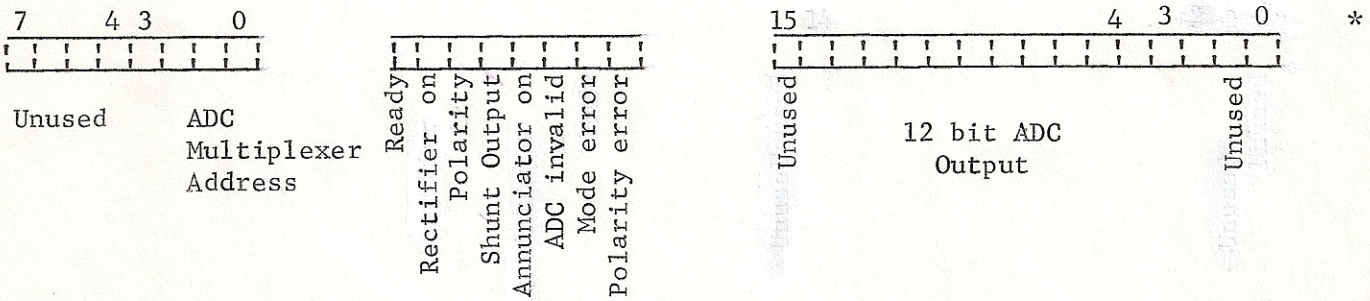
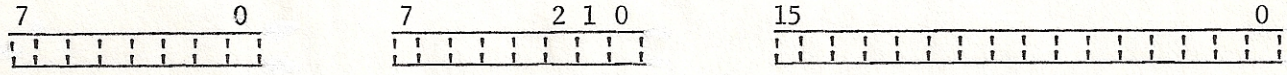


FIGURE 2 Datacom Function SET bit definitions

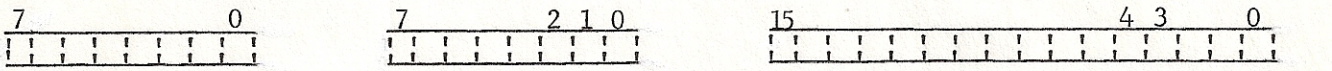
Central to Remote:



Remote to Central : As for SET

FIGURE 3 Datacom Function READ bit Definitions

Central to Remote:



Remote Receiver Address	Unused	1 0 =READ & SET CHANNEL	Unused	Multiplexer Sub-Address

Remote to Central : As for SET

FIGURE 4 Datacom Function READ & SET CHANNEL bit Definitions.

References

1. EP & S Division Technical Note 49, Single Wire Datacom Link V.J. Kovarik

2. EP & S Division Technical Note 53 PDP-11 Datacom Interface B.B. Culwick

3. EP & S Division Technical Note 52 Datacom Serial Transmission System for the PDP-11 B.B. Culwick

TABLE 1

Central to Remote:

FIELD	BIT	NAME	DESCRIPTION
Address	7-0	DATACOM ADDRESS	Defines the binary address of a remote receiver on this datacom line.
Command	7	READY	Commands power supply to the READY state when set.
	6	ON	Commands power supply to the ON state when set.
	5	POLARITY	Commands power supply to polarity A when set*.
	4	SHUNT OUTPUT	Commands power supply to place its shunt voltage on the common shunt leads when set.
	3	ANNUNCIATOR RESET	Clears the fault annunciator when set and no fault present.
	2	Unused	
	1	Unused	
	0	SET	Datacom cycle is a SET cycle when this bit set.
MAGNITUDE	15	Unused	
	15-4	SET POINT	Reference input to supply, a 12 bit binary integer on a scale of 4000_{10} = 100 mV. *
	3-0	Unused	*

* Polarity A is such that a bending magnet bends positive particles in the same sense as the AGS ring and that a quadrupole focusses positive particles in the horizontal plane.

TABLE 1 continued:

Remote to Central:

FIELD	BIT	NAME	DESCRIPTION	
Address	7-4	Unused		
	3-0	SUB-ADDRESS	Analog multiplexer address of analog input. 0 = shunt, 1 = ¼ scale reference 2 = 3/4 scale reference. Others undefined at present. (The address read always corresponds with the magnitude read, even when status bit 2 is set.) See READ & SET CHANNEL.	
Status	7	READY	The state defined in the corresponding command bit exists in the power supply when these bits set.	
	6	ON		
	5	POLARITY		
	4	SHUNT OUTPUT		
	3	ANNUNCIATOR	Fault annunciator is set.	
	2	ADC ADDRESS INVALID	The current magnitude does not correspond to the latest sub-address sentwhen this bit set.**	
	1	MODE ERROR	An illegal mode transition (eg. OFF - ON no READY) has been requested.	
	0	POLARITY ERROR	An illegal polarity state exists or transition under load was requested.	
Magnitude	15	Unused		
	15-4	READING	Analog to digital converter output, a 12 bit binary integer on a scale of 4000_{10} = 100 mV.	*
	3-0	Unused		*

** The analog to digital converter operates continuously and asynchronously with request to the DATACOM. The conversion time (dual slope ADC, 1/60 S integration time) is about 30 ms. Thus the MAGNITUDE received from the remote is the last conversion result and corresponds to the sub-address received. Switching to a new sub-address is synchronized with the start of a new conversion and completion of this conversion clears the ADC INVALID flag bit.

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