



TEMPERATURE CONTROLLERS... PORTABLE CHILLERS... CENTRAL CHILLERS... PUMP TANK STATIONS... TOWER SYSTEMS...

**SUBJECT: SPI COMMANDS FOR SENTRA 'SK' & MAXIMUM 'MK' UNITS**

**#1-D-223**

**7/10/1997**

**INTRODUCTION:** In 1987 a group of member companies of the Society of the Plastics Industries began development of a communication protocol for use by their processing and auxiliary equipment. Their goal was to allow the exchange of information between various pieces of equipment from different manufacturers to be simple and reliable. The result of their work was released in 1990 and has made the interconnection of equipment much easier and straightforward. There are now over 40 companies that offer the SPI Protocol in their products.

**PROTOCOL BASICS:** The SPI Protocol is described by a 2 part specification. The largest portion of the SPI Protocol specification deals with how basic information is exchanged between equipment. The second part of the specification details the actual pieces of information exchanged using the protocol. Items such as Process Temperature, Process Setpoint and Process Status are detailed in this part. **This FYI will list the commands that are supported by ADVANTAGE equipment.**

**EQUIPMENT SETUP:** The setup of equipment to be connected in an SPI Protocol network is simple. Each device must have a unique address for its device type and it must use the same data transfer rate as the other pieces of equipment in the network. There are many acceptable ways used to 'set' the device address and data rate. **ADVANTAGE** equipment provides access to the information via the front panel operators and displays. Other manufacturers may use internal DIP switches or jumpers. A typical cell may be configured as follows:

Data Transfer Rate: 9600 bits per second (bps)      Mold Temperature Controller (Qty 2): Addresses 1 and 2      Chiller (Qty 1): Address 1

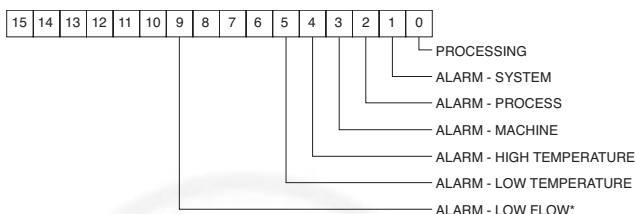
Note in the above example that different device types may have the same address. This is because the SPI Protocol uses the device type as part of its internal address.

**NETWORK TROUBLESHOOTING:** Troubleshooting a network is best done by verifying the setup of each piece of equipment and insuring that the network is installed with the correct electrical interconnection. Here are some basic things to do if equipment isn't 'talking' as expected.

1. Verify that each piece of equipment is properly grounded to its power source.
2. Inspect cables inside and outside the electrical cabinet. Repair or replace as necessary. The cable scheme used by most manufacturers allows the communication signals to 'pass through' each piece of equipment. Therefore, when a piece of equipment is disconnected from the middle of the network, all the equipment 'after' that one will be disconnected, too. If a piece of equipment is being permanently removed, the device cables should be rearranged at the molding machine to reconnect the other equipment.
3. Check the Data Transfer Rate and Address of each piece of equipment. For example, if both Temperature Controllers have the same address, they will both try to 'talk' at the same time and garble each other's data.
4. Verify the network is properly terminated and that it is configured as a 'multi-drop'. This is best achieved by following the molding machine manufacturer's installation instructions and use extension cables provided by them or us.
5. Attach each device, singly, to the molding machine and see if it 'talks'. Add additional devices until a problem is seen.

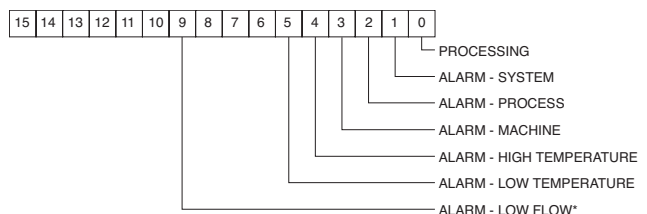
**SENTRA 'SK' TEMPERATURE CONTROLLER SPI COMMANDS**

POLL		SELECT		COMMAND	DESCRIPTION
C1	C2	C1	C2		
20	20	20	21	Echo	Controller integrity command
20	20			Version	Controller version command
20	30	20	31	Setpoint	Desired process temperature
20	32			High temp	Hi temperature deviation alarm
20	34			Low temp	Low temperature deviation alarm
20	36	20	37	Flow Alarm	Low flow alarm setpoint*
20	40			Status Process	



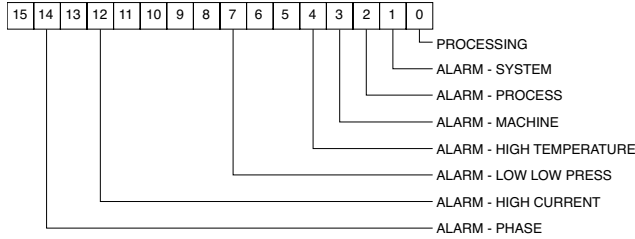
**MAXIMUM 'MK' PORTABLE CHILLER SPI COMMANDS**

POLL		SELECT		COMMAND	DESCRIPTION
C1	C2	C1	C2		
20	20	20	21	Echo	Controller integrity command
20	20			Version	Controller version command
20	30	20	31	Setpoint	Desired process temperature
20	32			High temp	Hi temperature deviation alarm
20	34			Low temp	Low temperature deviation alarm
20	36	20	37	Flow Alarm	Low flow alarm setpoint*
20	40			Status Process	

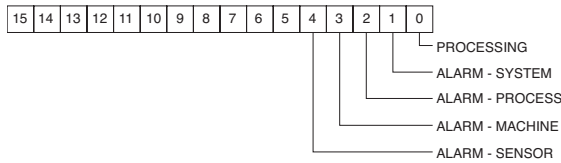


SENTRA 'SK' TEMPERATURE CONTROLLER SPI COMMANDS

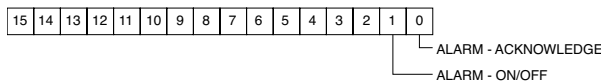
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 42			Status Machine 1



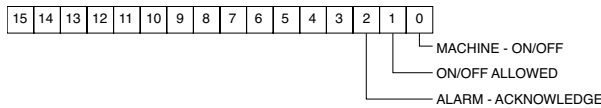
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 44			Status Machine 2



POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 48	20 49		Machine



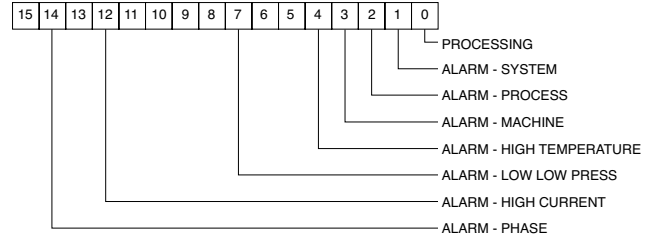
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 4A	20 4B		Protected mode - machine



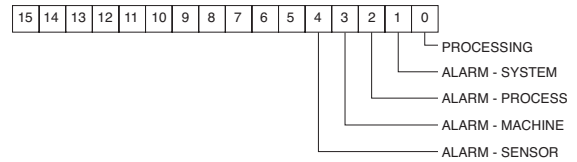
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 70			Temperature to process
20 72			Temperature from process*
20 78			Flow rate from unit GPM
20 E0			Blanket Poll
			Returns:
		20 30	Setpoint
		20 32	High alarm deviation
		20 34	Low alarm deviation
		20 40	Status process
		20 70	To process temperature

MAXIMUM 'MK' PORTABLE CHILLER SPI COMMANDS

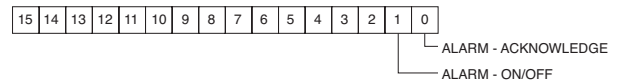
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 42			Status Machine 1



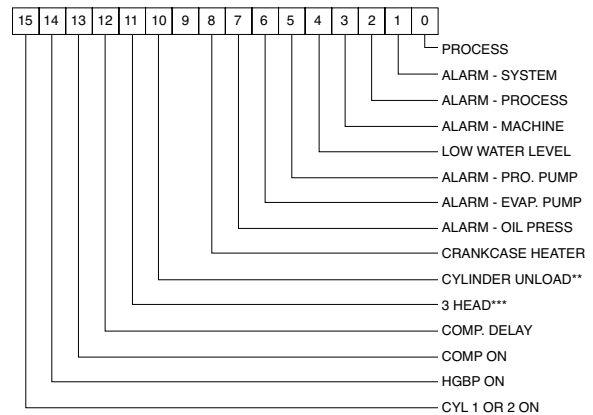
POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 44			Status Machine 2



POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 48	20 49		Machine



POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 70			Temperature to process
20 72			Temperature from process
			Blanket Poll
			Returns:
		20 30	Setpoint
		20 32	High alarm deviation
		20 34	Low alarm deviation
		20 40	Status process
		20 70	To process temperature
20 E2			Maximum chiller status (version 1.12 and above)



POLL C1 C2	SELECT C1 C2	COMMAND	DESCRIPTION
20 E4			Remote temperature (version 1.12 & above)
20 E6			Evaporator temperature (version 1.12 & above)
20 E8			Media temperature (version 1.12 & above)
20 EA	20 EB		Freezestat temperature (version 1.12 & above)

\*\* Cylinder unloading is 0x400. Standard chiller is 0  
 \*\*\* this is valid for cylinder unloading only. 3 head is 0x0x800. 2 head is 0