



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

#1-D-223

7/10/97

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. **This document details the implementation of the SPI Protocol available in the SENTRA 'SK' temperature controllers and MAXIMUM 'MK' portable chillers with HE instruments.**

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

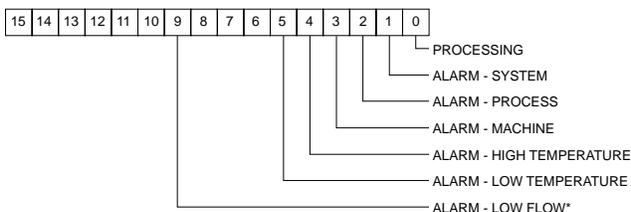
Note in the above example that different device types may have the same address. This is because the SPI Protocol uses the device type as part of its internal address.

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.

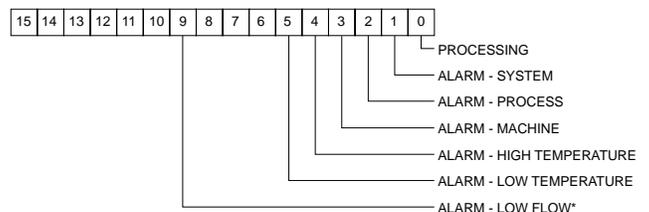
SENTRA 'SK' TEMPERATURE CONTROLLER SPI COMMANDS

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	20 33	High temp	Hi temperature deviation alarm
20 34	20 35	Low temp	Low temperature deviation alarm
20 36	20 37	Flow Alarm	Low flow alarm setpoint*
20 40		Status Process	



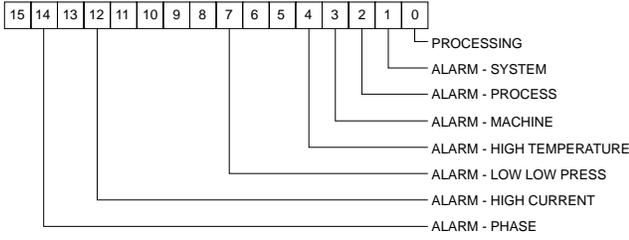
MAXIMUM 'MK' PORTABLE CHILLER SPI COMMANDS

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	20 33	High temp	Hi temperature deviation alarm
20 34	20 35	Low temp	Low temperature deviation alarm
20 36	20 37	Flow Alarm	Low flow alarm setpoint*
20 40		Status Process	

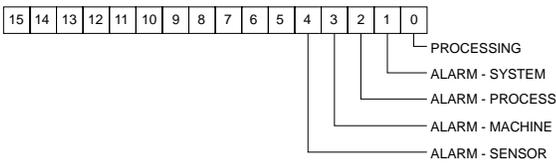


SENTRA 'SK' TEMPERATURE CONTROLLER SPI COMMANDS

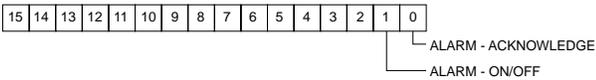
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	42		Status Machine 1



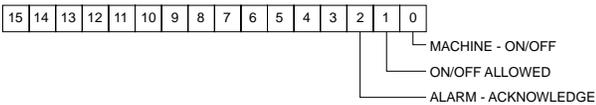
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	44		Status Machine 2



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



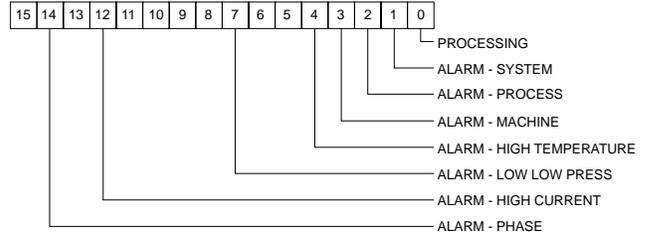
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	4A 20 4B		Protected mode - machine



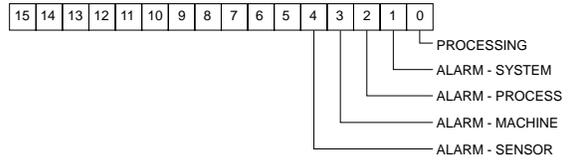
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	70		Temperature to process
20	72		Temperature from process*
20	78		Flow rate from unit GPM*
20	E0		Blanket Poll
Returns:			20 30 Setpoint
Returns:			20 32 High alarm deviation
Returns:			20 34 Low alarm deviation
Returns:			20 40 Status process
Returns: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

MAXIMUM 'MK' PORTABLE CHILLER SPI COMMANDS

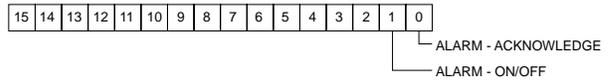
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	42		Status Machine 1



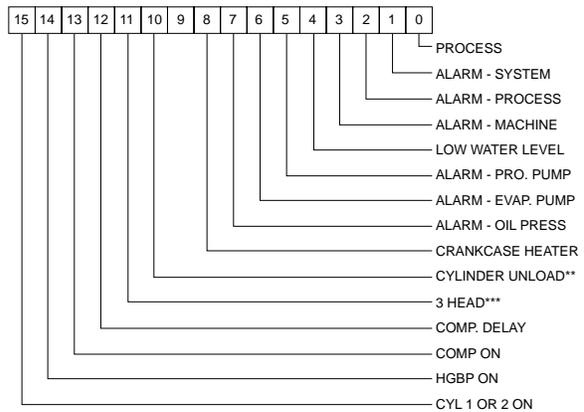
POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	44		Status Machine 2



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



POLL	SELECT	COMMAND	DESCRIPTION
C1 C2	C1 C2		
20	70		Temperature to process
20	72		Temperature from process
Returns:			20 30 Setpoint
Returns:			20 32 High alarm deviation
Returns:			20 34 Low alarm deviation
Returns:			20 40 Status process
Returns:			20 70 To process temperature
20	78		Flow rate from unit*
20	E2		Maximum chiller status (version 1.12 and above)



*Available in 'HE' only
 ** Cylinder unloading is 0x400. Standard chiller is 0
 *** This is valid for cylinder unloading only. 3 head is 0x0x800. 2 head is 0