TELEDYNE
INSTRUMENTS
Advanced Pollution Instrumentation

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Service Note

CONTROLLING A COIL RELAY USING THE CONTROL OUPUTS FROM AN M700E OR M703E

I.   PURPOSE:

The purpose of this document is to describe one method of using the Control Outputs to switch an external AC powered device. TAPI recommends using a Panasonic; SP2-DC5V or an Optically Isolated Solid State Relay. The relay referenced in this procedure is a Panasonic; SP2-DC5V (the exact model will depend on your application) which are available through Mouser Electronics, http://www.http://www.mouser.com/

II.   TOOLS:

Philips screwdriver, small straight slot screwdriver, wire cutters/Strippers capable of stripping 22 gauges wire.

III.   PARTS:

- Panasonic; SP2-DC5V (the exact model will depend on your application)
- Relay Sockets FOR SP SCREW TERMSP2-SF (SP2-SF)
- Diode 1N4007
- 22 gauge insulated wire.

IV.   PROCEDURE:

The M700E and M703E are equipped with Control Outputs. This feature allows the calibrator to control devices that accept logic-level digital inputs, such as PLC's, data loggers or digital relays/valve drivers.
    The Control Outputs can be used as:
- 12 separate ON/OFF switches assigned to separate calibration sequences.
- A 12-bit wide bus allowing the user to define activation codes for up to 4095 separate calibration sequences.

They can be set to:
- Be activated/deactivated whenever a particular calibration sequence is operating.
- Activate/deactivate as individual steps within a calibration sequence are run.

The SP2-DC5V and SP2-SF should be mounted in a secure location.

1.   Determining the number of CONTROL OUTPUTS required for your relay.

Each CONTROL OUTPUT is capable of switching a load of less than 50mA. The relay that you have chosen may require more than 50mA to actuate the contacts. To attain a current supply greater than 50mA, it will be necessary to use more than one of the CONTROL OUTPUTS. The exact number of CONTROL OUPUTS will depend on the current rating of your relays coil up to a maximum of 300mA or a total of 6 connections.

Example:

Tyco, KHA, 27E166
Coil = 5V, 32 Ohm
I=5V/32 Ohm I = 0.15625
Individual CONTROL OUTPUT = 0.05A Max

Calculate the number of control outputs required = 0.15625/0.05
So, the total number of CONTROL OUPUTS required is = 3.125
Round the calculated number up to 4.

Example 2:

Panasonic; SP2-DC5V
Coil = 5V, 300mW
I = P/V so: I = 300mW/5V, I = 0.06
Calculate the number of control outputs required = 0.06/0.05
So, the total number of CONTROL OUPUTS required is = 1.2
Round the calculated number up to 2.

2. Tying together the "E" (Emitter) of the CONTROL OUTPUTS to the ground connection see Figure A.

Locate the two connectors "STATUS" and "CONTROL OUTPUTS" on the rear panel of the instrument.
On the CONTROL OUTPUTS, locate the individual connection labeled "E" and secure one end of a length of 22-gauge wire.
On the CONTROL OUTPUTS, locate the individual connection labeled with the digital ground symbol "↓" and secure the other end of the 22-gauge wire connected to the "E" connector.

3. Connecting the Control side of the Relay to the CONTROL OUTPUTS, see Figure A.

On the STATUS connector, locate the individual connection labeled "+5VDC and secure one end of a length of 22-gauge wire.
On the Relay Socket (SP2-SF), locate the coils positive tie-down and secure the second end of 22-gauge wire.
On the CONTROL OUTPUTS, locate and select one (or more) of the individual connectors labeled "1 through 12" and secure one end of the 22 gauge wire to each CONTROL OUTPUT to be used. A maximum of 6 connections may be used to power your relay with a total that cannot exceed 300mA.
Secure the loose end of these 22 gauge wires to the negative side of the relay coil.
Install a back EMF suppressing 1N4007 diode across the coils positive and negative inputs of the relay. Insure that the white band (Cathode) on the diode is installed on the positive side.

4. Connecting the SP2-DC5V to the AC powered device you wish to control.

The exact control condition that you desire will determine which of the relays AC contacts, Normally Closed (NC) or Normally Open (NO) you will use.
A licensed electrician should perform these connections. The relay model and the gauge of wire chosen will depend on the amount of current that your AC powered device pulls.
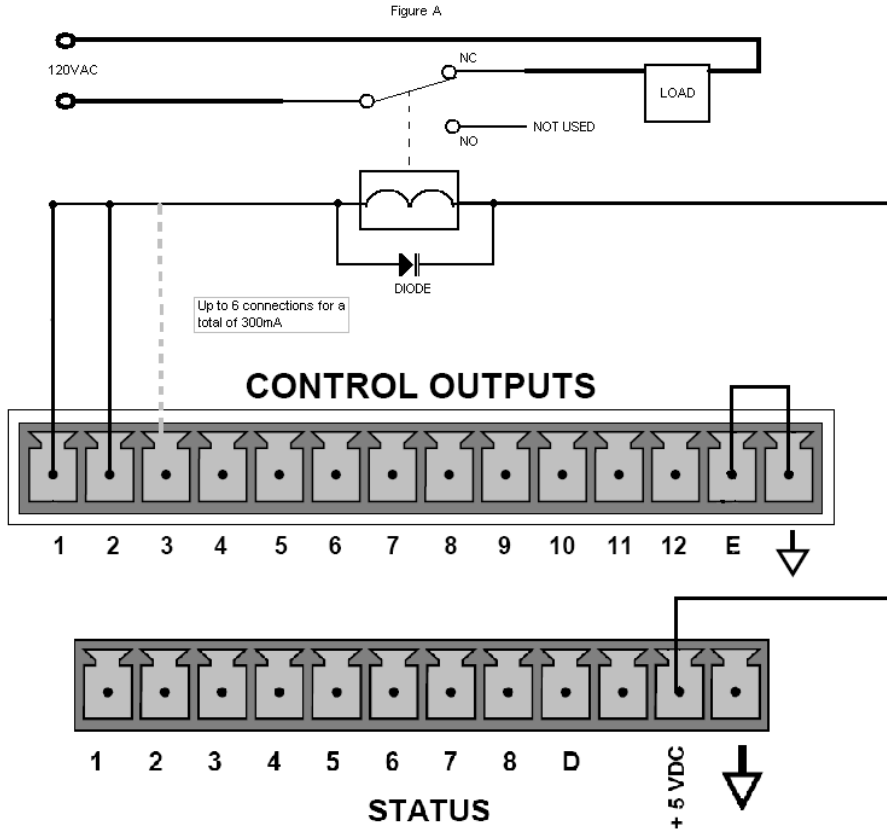
Figure A

5. Programming the **CONTROL OUTPUTS**:

Make sure that the M700E/M703E is in **STANDBY** mode
Press **SETUP** – **PRIMARY SETUP MENU** will be displayed
Press **SEQ** - **SEQUENCE CONFIGURATION** will be displayed
Press **EDIT** - **END OF SEQUENCES** - this only appears if no sequences are currently
programmed. To program a sequence, please see *section 6.5* of your instruction manual.
If you already have a sequence programmed, the display will show:
1) SEQ [NAME], [X] STEPS - will be displayed.
Press **EDIT** - **1) SEQ [NAME], [X] STEPS** will be displayed.
Press **SET>** - until **SETUP X.X CC OUTPUT:** DISABLED is displayed.
Press **EDIT** – **OFF** will be displayed.
Press **OFF** - Toggling this key turns the **CONTROL OUTPUTS ON/OFF**, it should now be
ON.
Press **ENTER - SETUP X.X CC OUTPUT: [0]00000000000** will be displayed.
Press **<CH CH>** - Moves the cursor one character left or right. Each bit shown on the display
represents one of the **CONTORL OUPUT** pins located on the back of the M700E, The left
most bit is Bit 1, the next bit to the right, bit 2, progressing rightward to bit 12 (see Figure A)
[0] -Toggle this key to turn the selected bit ON/OFF (0 or 1).
Press **ENTER - SETUP X.X CC OUTPUT: [1]10000000000** will be displayed.
Press **EXIT** four times to return to the main display screen.

In this example, when the auto sequence initializes, bit 1 and 2 of the **CONTROL OUTPUT** will go HI
(5 volts), activating the relay.
NOTE: Use Signal I/O for Checkout.