



Installation Instructions


INTERFACE PART NUMBER 14-3147-000

General Purpose Interface for a Tekmar™ 2000/7000/3000/6000/Velociry XPT

This interface is designed to allow the Tekmar unit to operate automatically with any GC/MS which has electronic READY and REMOTE START signals. It allows the GC/MS to send a READY signal to the Tekmar unit. Also, it enables the Tekmar unit to start the GC/MS and data system upon sample transfer or injection.

In order for the interface to work properly, the switches on the 2000/7000 input/output (I/O) board need to be set as shown in the diagram included with these instructions. You do **not** need to set switches for a 3000, 6000, or Velocity XPT; you set up the interface through software. See the following instructions for your particular unit.

	WARNING	
Electrical shock hazard inside. Unplug power cord before removing panels.		

	CAUTION
Circuit board components can be damaged by static discharge. Avoid touching the components unless otherwise noted.	

Connection to the LSC 2000

1. To access and set the switches:
 - a. Locate the I/O board. It has two connectors extending out of its bracket, which can be accessed at the rear of the LSC 2000. (See the photograph in Section 12 of your Purge and Trap Concentrator User Manual.)
 - b. Loosen the two screws that hold the I/O board and slide it out until you see the switches labeled "U012" and "U013".
 - c. Set the switches according to the diagram included with these instructions. (The switches are in the OPEN position when they are pressed *down* at the "OPEN" label.)
 - d. Return the I/O board to its original place, being careful to properly seat it into its connector.
2. Plug the 25-pin connector into the I/O board.

Connection to the 7000

1. To access and set the switches:
 - a. Loosen the two 1/4-turn fasteners on the lower left side panel.
 - b. To remove the panel, pull it **away** from the unit to release the retaining clips from the posts in the chassis, then toward the **front** of the unit to release it from the locating pins (on the rear of the unit).
 - c. There are three sets of four DIP switches on the edge of the board. They are labeled BIAS, OUTPUT and INPUT. Set the switches according to the diagram included with these instructions. (Flip the switches **up** to put them in the OPEN position.)

General Purpose Interface (continued)

Connection to the 7000 (continued)

- d. Reinstall the left side panel by pressing it back onto the locating pins and inserting the retaining clips into the posts in the chassis.
- e. Secure the panel with the two 1/4-turn fasteners.
2. The I/O board has two connectors extending out of its bracket, which can be accessed at the rear of the 7000. Plug the 25-pin connector into the I/O board.

Connection to the 3000/6000/Velocly XPT

1. Turn off the Tekmar unit.
2. Locate the Tekmar unit's interface board. The board has two connectors extending out of its bracket. These connectors can be accessed at the rear of the Tekmar unit.
3. Plug the 25-pin connector from the Tekmar cable into the matching connector on the interface board.

Specifying the GC Port (3000,6000, Velocly XPT only)

1. Turn on the Tekmar unit.
2. At the System Error/System Reset Screen, press ENTER.
3. Allow the system to run through the automatic self-tests.
4. At the first Standby Screen, press the CONF key. The Configuration Screen will appear on the display.

Note: For assistance in understanding the next step, read the last two sections, "Determining the User GC Type Number" and "Determining the User GC Type Number without a Calculator". Reading the next two sections is NOT required to install the General Purpose Interface.

5. At the Configuration Screen, press **A** (GC I/O Port). The GC Port Screen appears on the display.
6. Choose the GC Port. You have two choices: *Standard* or *User*. Choose **Standard**. (Most GC Ports are Standard.) Press any numeric key to cause the display to toggle from Standard to User and vice versa. Press ENTER to save your selection.
7. Turn off the Tekmar unit.

Connection to the GC/MS

One "branch" of the cable has four color-coded leads with spade lug connectors.

1. Connect the white and green leads to the READY signal terminals.
2. Connect the black and red leads to the REMOTE START signal terminals.

To locate the terminals, refer to your GC manual.

Connection to a Peripheral Device (Data System)

The second "branch" of the cable terminates in two spade lugs. These wires are used to start a peripheral device (data system). Refer to your peripheral device manual to locate the terminals to which these two wires attach.

1. Connect the black wire to the ground, common, or negative terminal.
2. Connect the red wire to the other terminal.
3. If you are not using this part of the cable, insulate the bare wires with electrical tape or cut them off to keep them from touching each other.

General Purpose Interface (continued)

Determining the User GC Type Number (3000, 6000 ,Velocity XPT only)

If you choose User for the GC Port, you must specify a *User GC Type Number*. At the Configuration Screen, press the NEXT PAGE key to access the *Special GC Type* Screen. This screen asks you for a User GC Type Number. The User GC Type Number represents a set of electronic control signals used when the Tekmar unit and the GC "communicate". This number can be any number from 0 to 63. To choose the User GC Type Number, you must know the characteristics of the input and output signals traveling to and from the GC.

The table below explains the characteristics of these input and output signals. Each signal is characterized by a *bit*. The first column of the chart gives the bit number. The second column of the chart gives the pin number(s) of the 25-pin connector through which the signals travel. The third column tells if the signal is **received** by the Tekmar unit (input) or **sent** by the Tekmar unit (output). The fourth column of the chart gives the function of the signal. You determine the contents of the fifth column. Through the Tekmar unit's software, you can customize input and output signals so that the Tekmar unit can operate with any GC. To do this, you must first determine what your GC uses when interfacing to the Tekmar unit. For each signal, your GC may use:

- A normally-closed contact closure.
- A normally-open contact closure.
- Active-high TTL.
- Active-low TTL.

Assign the number 1 to a normally-open contact closure or active-high TTL. Assign the number 0 to a normally-closed contact closure or active-low TTL. Put the number 1 or 0 into the appropriate block in the fifth column of the table.

Bit Number	Pin Number(s)	Input or Output	Function of the Signal	Normally-closed (0) or Normally-open (1) contact closure/Active-high (1) or Active-low (0) TTL
0	19 and 20	Output	Begin sample transfer	Specific to your GC
1	21 and 22 23 and 24	Output	Start GC/MS and Data System	Specific to your GC
2	17 and 18	Output	Sample Transfer Ready	Specific to your GC
3	15 and 16	Output	For the 6000, no function For the 3000, Purge Ready	If using a 6000, assign the number 1*; If using a 3000, the number is specific to your GC
4	2	Input	Start	Specific to your GC
5	4	Input	Ready/Continue	Specific to your GC

Table 1 Characteristics of Input and Output Signals

* This bit is a *don't care bit* for the 6000. In other words, it does not matter whether it is a 1 or a 0. For the sake of simplicity, the number 1 is assigned to the don't care bit throughout these instructions.

General Purpose Interface (continued)

Determining the User GC Type Number (3000 , 6000, Velocity XPT only-continued)

The fifth column is used to determine the User GC Type Number. Suppose the fifth column is filled with ones. If you place the ones in the fifth column into a horizontal position, you have a six bit binary number. See the resulting binary number below.

1	1	1	1	1	1
Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

You have the binary number 111111. Put a scientific calculator into binary mode, then key in the number 111111. Convert this number to decimal. The result is the decimal number 63. Therefore, 63 is the User GC Type Number. Incidentally, choosing Standard for the GC Port is the same as designating 63 for the User GC Type Number in the Tekmar unit's software, since the Standard GC uses all normally-open contact closures. However, if you choose User for the GC Port (whether you are using a Standard GC or not), you must insert the appropriate number into the User GC Type field.

Determining the User GC Type Number without a Calculator

The position of the 1 or 0 in a binary number indicates its *weight* or value within the number. The right-most bit in a binary number is called the *least significant bit* and has a weight of two to the zero power. With each successive bit in a binary number (from right to left), the weight increases by a power of two. See the table below.

Binary Number:	1	1	1	1	0	1
Binary Weight:	2⁵	2⁴	2³	2²	2¹	2⁰
Weight Value:	32	16	8	4	2	1

Table 2 Weight Values of Binary Numbers

To determine the decimal equivalent of the binary number 111101, add the weight value of each binary digit that is a one. Follow this reasoning:

Bit 0=1; $2^0 = 1$; (Any number to the zero power equals one.)

Bit 1=0

Bit 2=1; $2^2 = 4$; ($2 \times 2 = 4$)

Bit 3=1; $2^3 = 8$; ($2 \times 2 \times 2 = 8$)

Bit 4=1; $2^4 = 16$; ($2 \times 2 \times 2 \times 2 = 16$)

Bit 5=1; $2^5 = 32$; ($2 \times 2 \times 2 \times 2 \times 2 = 32$)

Adding each weight value results in:

$$1 + 0 + 4 + 8 + 16 + 32 = 61$$

Therefore, the decimal equivalent of the binary number 111101 is 61.



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