TXI-Series GPI Controller Setup

Operation over Ethernet

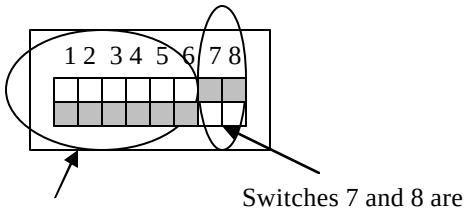
The factory default is to set up each TXI-series GPI controller to work over Ethernet.

Further information on setting up TXI-series GPI controllers to operate serially is below in this document.

DIP switches and GPI Addresses

For Ethernet operation, DIP switches 1-6 are all set to the down position, while DIP switches 7 and 8 are set to the up position.

For Ethernet operation starting GPI input-output addresses are automatically assigned to GPI controllers by IP address in the tally system configuration program. GPI addresses are described elsewhere in this document.



Switches 1 – 6 are all down for normal Ethernet operation.

Switches 7 and 8 are up for Ethernet operation

Procedure

1. From the distribution media that comes with the TXI product, install the Image Video Product Setup Console program onto a PC.

2. Make an Ethernet connection between this PC and the TXI-series controller that is to be put into service.

3. Locate the DIP switches on the back panel of the TXI. Move DIP switches 7 and 8 to the up position and all other switches to the down position. Power-cycle the unit. This sets the TXI controller to operate in Ethernet mode.

4. Launch the Product Setup Console, which will broadcast a UDP request for all TXIs on the network to reply. Each TXI on the network will be listed on a row in the Product Setup Console client window. Among other information, the serial number and current IP address of each TXI will be listed.

5. Clicking on a row in the Product Setup Console client window will cause the corresponding TXI to blink its front panel status lights in an amber-and-off pattern, to indicate the TXI that is being programmed.

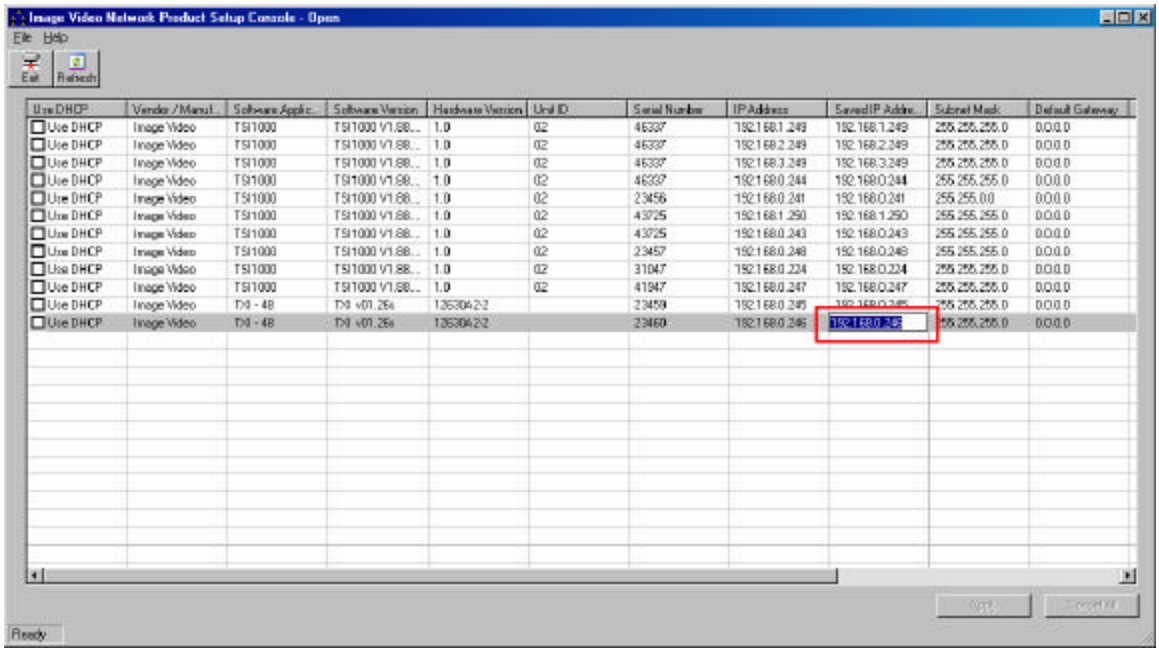
6. Double-click the “Saved IP Address” column of the desired TXI and enter the desired IP address. (Note: this step will not affect the IP address listed in the “IP Address” column).

7. Click the “Apply” button. (the IP address listed in the “IP Address” column will still remain unchanged).

8. Power cycle the TXI.

9. In the Product Setup Console click the “Refresh” button. The TXI should now be listed with the new IP address in the “IP address” column.

10. Repeat the process for other TXIs as required, then exit the Product Setup Console.



Background - GPI Inputs and Outputs

The term GPI stands for "General Purpose Interface" and refers to a set of electrical closures provided by relays, usually under software control.

From the perspective of a GPI controller *GPI outputs* are closures provided to external devices. TXI-series controllers provide these closures via software-controlled relays built into each unit.

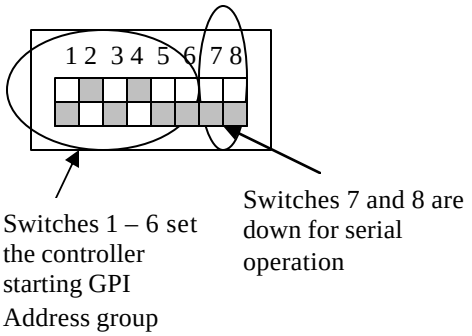
The term *GPI input* refers to an electrical circuit used by software to sense the open or closed state of a closure or voltage source connected to the GPI input circuit. A GPI controller has one such internal sensing circuit for each external circuit that is being monitored by the GPI controller.

Serial Operation

DIP switches

For serial operation DIP switches 7 and 8 are set to the down position.

Also for serial operation DIP switches (1-6) on the back of each TXI-series GPI controller frame assigns a starting GPI address group to the controller frame. See the discussion below for more information on GPI addresses and address groups.



If there is only one TXI-series GPI controller connected to the tally controller, or if each TXI is connected to its own dedicated serial port and not daisy-chained to any other TXI, then all DIP switches 1-6 on each GPI controller can be set to the down position.

If there is more than one TXI unit daisy chained together on the same serial port, the DIP switches need to be set with unique addresses; in this case see further details below on how to set the DIP switches of the respective units.

In the common case where all daisy-chained GPI controllers are model TXI-48, the setting of DIP switches 1-6 can be made as follows (notice that DIP switch binary value is incremented by 6 for each controller):

Controller order	DIP switch binary value (increment of 6 for each controller)	DIP switch positions (1-6, D=down U=up)
First unit	0	DDDDDD
Second unit	6	DUUDDD
Third unit	12	DDUUDD
Fourth unit	18	DUDDUD

In the common case where all daisy-chained GPI controllers are model TXI-80, the setting of DIP switches 1-6 can be made as follows (notice that DIP switch binary value is incremented by 10 for each controller):

Controller order	DIP switch binary value (increment of 10 for each controller)	DIP switch positions (1-6, D=down U=up)
First unit	0	DDDDDD
Second unit	10	DUDUDD
Third unit	20	DDUDUD
Fourth unit	30	DUUUU

NOTE: *After a DIP switch has been changed the GPI controller must be power-cycled.*

For information on other GPI controller daisy-chaining combinations and how to calculate serial DIP switch settings see further details below.

Calculating Unique DIP Switch Settings for Serial Operation

GPI addresses

Each GPI input and output within each GPI controller is referenced and specified using a *GPI address*. A given range of GPI addresses is called a *GPI address space*.

Each TXI-series GPI controller occupies a contiguous set of GPI addresses. The first GPI address of this range of GPI addresses is called the *starting GPI address* for the given controller. Normally the GPI addresses occupied by multiple controllers on the same serial line do not overlap.

For example a GPI controller with 48 GPI inputs and 48 GPI outputs, with a starting GPI address of zero, will contiguously occupy GPI addresses 0 through 47. A second 48 input and output GPI controller on the same serial line will usually be assigned GPI addresses 48 through 95.

GPI address groups

For GPI controllers daisy-chained on the same serial port, controller starting addresses are assigned on boundaries of 8, for example 0, 8, 16, 24, etc. Each group of 8 GPI addresses is called a *GPI address group*. GPI addresses from 0 to 7 are in group 0, GPI addresses from 8 to 15 are in group 1, and so on.

The number of GPI address groups occupied by a GPI controller depends on the number of GPI inputs or GPI outputs in the GPI controller.

A model TXI-48, with 48 GPI inputs and 48 GPI outputs, occupies 6 GPI address groups (48 / 8).

A model TXI-80, with 80 GPI inputs and 80 GPI outputs, occupies 10 GPI address groups (80 /8).

DIP switches and GPI Addresses

DIP switches 1-6 are read by the controller as a 6 bit binary number between 0 and 63.

The 6-bit number read from DIP switches 1-6 sets the starting GPI address group for the controller.

DIP switches in the down position are read as binary zeroes. DIP switches in the up position are read as binary ones. DIP switch 1 is read as bit 0 of the 6-bit binary number, DIP switch 2 is bit 1 of this number, and so on to DIP switch 6, which is bit 5 of the 6-bit binary number.

For example the DIP switch setting for GPI address group 20 would be binary value 010100 (highest bit (5) to the left) and its DIP switch setting would be DDUDUD (bit order is reversed, with the highest bit (DIP switch 6) on the right, because of the physical DIP switch ordering)

Typically the first TXI-series GPI controller unit connected to a serial port is assigned to group 0. In this case DIP switches 1 through 6 are set to the down position.

Subsequent TXI-series GPI controllers may be assigned GPI groups *by counting the total number of groups occupied by all previous GPI controllers on the same serial string.*

For example, in a system comprised of TXI-48 GPI controllers, the controllers can be respectively assigned to group 0, 6, 12, 18, 24, and so on, because each TXI-48 in the serial string occupies 6 GPI address groups (48 / 8).

Notice that in this example the third controller starting group number is the sum of the number of groups occupied by the previous two controllers (6+6=12).

In a system comprised of TXI-80 GPI controllers, the controllers can be respectively assigned to group 0, 10, 20, 30, 40, and so on, because each TXI-80 occupies 10 GPI address groups (80 / 8).

Systems consisted of a mix of controller sizes can also be addressed using this method. For example:

TXI type	Groups used by controller	Starting Group (DIP switch setting)
First unit (TXI-48)	**0**-5 (6 groups)	0
Second unit (TXI-48)	**6**-11 (6 groups)	6
Third unit (TXI-80)	**12**-21 (10 groups)	12
Fourth unit (TXI-80)	**22**-31 (10 groups)	22

TIP: It is possible to always assign controllers, regardless of their respective sizes, on group boundaries of 10. This will leave unused addresses in the address space if some of the controllers are TXI-48s, but allows TXI-48s to be easily substituted with TXI-80s later as required, and also eases the task of assigning controller GPI addresses. To do this both TXI-48s and TXI-80s would be entered in the Tally System Console 2 configuration as type “TXI-80”.

Some typical GPI controller group assignment patterns are shown below.

Controllers on same serial port	Group number settings
All TXI-48	0, 6, 12, 18, etc.
All TXI-80	0, 10, 20, 30, etc.
TXI-80, TXI-80, TXI-48, TXI-48	0, 10, 20, 26
TXI-48, TXI-48, TXI-80, TXI-80	0, 6, 12, 22

To convert a starting group number to a DIP switch setting, look up the Group Number in Table 1 below and use the corresponding DIP switch setup pattern .

TXI serial setup procedure

1. Move DIP switches 7 and 8 to the down position and power-cycle the unit. This sets the TXI controller to operate in serial mode.

2. Set DIP switches 1 through 6 to a binary number pattern to locate the TXI frame to a particular GPI address, according to the formula: *binary number = starting GPI address / 8*. See the above discussion on how to calculate controller starting GPI addresses and GPI groups.

3. Power cycle the GPI controller.

A DIP switch in the down position represents binary 0 while a DIP switch in the up position represents binary 1. The DIP switch setting can be calculated using the following chart:

TABLE 1: TXI DIP Switch Settings for serial operation

Starting Address	Group number	Binary Number	DIP switch settings (D=down, U=up)	Starting Address	Group number	Binary Number	DIP switch settings (D=down, U=up)
0	0	00000000	DDDDDDDD	256	32	00110010	DUDDUUDD
8	1	00000001	UDDDDDDD	264	33	00110011	UUDDUUDD
16	2	00000010	DUDDDDDD	272	34	00110100	DDUDUUDD
24	3	00000011	UUDDDDDD	280	35	00110101	UDUDUUDD
32	4	00000100	DDUDDDDD	288	36	00110110	DUUDUUDD
40	5	00000101	UDUDDDDD	296	37	00110111	UUUDUUDD
48	6	00000110	DUUDDDDD	304	38	00111000	DDDUUUDD
56	7	00000111	UUUDDDDD	312	39	00111001	UDDUUUDD
64	8	00001000	DDDUDDDD	320	40	01000000	DDDDDDUD
72	9	00001001	UDDUDDDD	328	41	01000001	UDDDDDUD
80	10	00010000	DDDDUDDD	336	42	01000010	DUDDDDUD
88	11	00010001	UDDDUDDD	344	43	01000011	UUDDDDUD
96	12	00010010	DUDDUDDD	352	44	01000100	DDUDDDUD
104	13	00010011	UUDDUDDD	360	45	01000101	UDUDDDUD
112	14	00010100	DDUDUDDD	368	46	01000110	DUUDDDUD
120	15	00010101	UDUDUDDD	376	47	01000111	UUUDDDUD
128	16	00010110	DUUDUDDD	384	48	01001000	DDDUDDUD
136	17	00010111	UUUDUDDD	392	49	01001001	UDDUDDUD
144	18	00011000	DDDUUDDD	400	50	01010000	DDDDUDUD
152	19	00011001	UDDUUDDD	408	51	01010001	UDDDUDUD
160	20	00100000	DDDDDUDD	416	52	01010010	DUDDUDUD
168	21	00100001	UDDDDUDD	424	53	01010011	UUDDUDUD
176	22	00100010	DUDDDUDD	432	54	01010100	DDUDUDUD
184	23	00100011	UUDDDUDD	440	55	01010101	UDUDUDUD
192	24	00100100	DDUDDUDD	448	56	01010110	DUUDUDUD
200	25	00100101	UDUDDUDD	456	57	01010111	UUUDUDUD
208	26	00100110	DUUDDUDD	464	58	01011000	DDDUUDUD
216	27	00100111	UUUDDUDD	472	59	01011001	UDDUUDUD
224	28	00101000	DDDUDUDD	480	60	01100000	DDDDDUUD
232	29	00101001	UDDUDUDD	488	61	01100001	UDDDDUUD
240	30	00110000	DDDDUUDD	496	62	01100010	DUDDDUUD
248	31	00110001	UDDDUUDD	504	63	01100011	UUDDDUUD