General Procedure for Configuring
Image Video's TSI1000
Tally System Interface

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General Procedure for Configuring the TSI1000 Tally Display Controller

1 Introduction

The following document outlines a general procedure on configuring a TSI1000 Tally System Interface controller (TSI). This document is not intended to explain in detail the operation of the Tally System Console program, so please refer to the online help for information specific to the TSI1000. In the case of any inadvertent contradictions between this document and the online help, the online help will be considered correct.

The TSI1000 Tally Display System (TDS) is highly configurable, and capable of an almost infinite variety of tally operations. This document concerns itself with the most commonly-used applications. If you have an application in mind which is not covered in this document, please feel free to consult Image Video for further information.

2 General Configuration Procedure

2.1 General Installation

1. To communicate with the TSI1000 for configuration purposes you will need an IBM PC-compatible computer (henceforth called the "configuration PC"), equipped with an RS232 serial port, and running Win95, Win 98 or some later version of Microsoft Windows. You will also need an RS232 null-modem cable (handshake lines not required).

2. Install the Tally System Console Program on the PC which will be used to configure your tally system. Depending on how you receive your software, this will consist of simply running a SETUP.EXE program or other provided executable program.

3. Connect the null-modem cable from COM1 of the TSI1000 to the serial port of the configuration PC.

4. Run the Tally System Console program.

5. In the Tally System Console program, click on Resources > System Resources > Port and select the PC serial port you have connected to the TSI1000 (usually COM1 or Com2). Close the dialog box.

6. Click on the "File" menu item and confirm that "Work offline" is unchecked.

7. Check the front panel of the TSI1000 to confirm that the "Console" LED is on.

2.2 System Configuration

This is a general outline of the steps you will take to configure your tally system. Further instruction on how to carry out each step are given in detail later on in this document.

1. Press F1 to enter the online help. Click on Tally System Design > Supported Resource Devices to read about the router/switching devices of interest to your system. This will tell you important information on which ports may be used, the names or numbering scheme used for that particular router, serial baud rates, and so on. When selecting the port, keep in mind whether it is RS-422, RS-232, or on a network, and also note that COM1 and COM7 are reserved for the TSC and 4211s respectively.

2. Create the routers and switching devices (called "resource devices") which you will be connecting to the TSI1000. For further information on configuring the router/switching devices, read section "Defining Resource Devices". Generally, you will enter a name for the device, "add" it, then select the port it is connected to (COM8, COM9 etc.), it's interface number (usually "2") and the type of device (GVG 7000 router, etc.).

3. If you have displays in your system which will follow and display the names of sources selected by your tallied routing and switching systems, and you wish to display names other than by their physical input numbers or mnemonics, then you will want to enter your own name for each source in your system. For further information, see the section on "Defining Source Names". Note that the TSI1000 receives names automatically from a few of the supporting switcher or routing devices, but in many cases you will need to enter your own source names.

4. If you have sources in your system which feed more than one routing or switching device (for example a camera which is directly connected to a certain router input and als o to a certain switcher input), see the section on "Defining Common sources".

5. If you have fixed connections in your system which route signals from a resource output to one or more resource inputs, (for example a router destination which feeds a switcher input), then read and follow the section on "Adding Resource Interconnections".

6. If you have any sort of text display device in your system, such as the Image Video 1500 series UMDs, then read and follow the section on "Programming Displays".

7. If you want to control GPI outputs which become active when certain conditions are met, (e.g. camera or CCU tallies) then read and follow the section on "Programming GPI outputs".

8. In a typical installation where on-air tally from a production switcher is required, it is necessary to designate an on-air switcher output, (i.e. the “program” bus), and possibly a preset bus, by using the “On-air” and “Next-to-air” resource interconnections. This is covered in the section on “Program and Preset Output Designation”.

3 System Overview

3.1 Tally System Interface Controller

The Tally System Interface controller, known as the TSI1000, or simply the TSI, consists of a two rack-unit controller frame with 10 RS422 ports, two RS232 ports, an Ethernet port, and a Sony SBUS port.

Port name	Type	Connector	Note
COM1	RS-232	DB-9 Male	Reserved for Tally System Console
COM2	RS-232	DB-9 Male	
COM3-COM6 COM7	RS-422/485 RS-422/485	RJ-11 jack DB-9 Female	 Reserved for Image Video 4211 GPI unit.
COM8-COM12	RS-422/485	DB-9 Female	
CTL-1	Sony SBUS	Coax	Use of SBUS disables COM12.
CTL-2	IV Coax	Coax	
Ethernet	Ethernet	RJ-45	

The configuration of the Tally System controller is edited using the Tally System Console program. The configuration is edited using various dialog boxes and display edit fields. Changes are sent to the TSI "on the fly" and take effect immediately whenever a particular dialog box is closed or as characters are typed into display edit fields. The configuration may be saved to the PC disk, and changes are also immediately saved to a flash disk in the TSI1000. Note that configurations cannot be downloaded back off the TSI1000, so it is important to keep track of the configuration file which has been loaded in order to make future changes to the configuration.

3.2 Resource Devices

Resource devices represent the routing devices to which the TSI1000 interfaces in the real world. The details of a resource device are defined in the Configure Resource Devices dialog box. Each device will require the entry of information such as the type of device (Grass Valley 7000 router, Philips DD35 switcher, etc.), the identification number of the TSI1000 to which the device is connected (called the "interface number"), the TSI1000 serial port on which the device will communicate, and so on.

3.2.1 Resource Outputs

Each resource device encompasses a collection of resource outputs which represent real-world router or switcher destinations. Each resource output may select one or more resource inputs. The list of inputs selected by a given output is referred to as the *output status*. The output status for most resource outputs are taken from information provided by a hardware device via a serial port or Ethernet connection and may be displayed as text information on an under-monitor display, used to drive output tallies, and so forth.

It is also possible to create resource devices which do not represent devices in the real world, and which are used for carrying out internal tally functions. These resource devices are specified in the Configure Resource Devices dialog box as “Virtual”. Resource outputs associated with virtual resource devices do not take their status directly from real-world devices, but rather from a set of instructions entered into an edit box by the operator, known as a "control string", which defines their operation. The resource output control string can reference such external devices as signal routers and switchers, and external General Purpose Interface inputs (also known as GPI or parallel inputs). In it’s simplest application, a virtual resource output will appear to select an input whose name is typed into a virtual output control edit box. Typing a number of input names separated by commas into a virtual output control edit box will make the resource output appear to select multiple inputs, rather like a mixer.

3.2.2 Resource Inputs

External devices report selected inputs in the form of a predefined name or number, known as the “native name”. Native names can be directly displayed by the TSI1000, or they can be associated and substituted with a more meaningful name, called a "name override", to be displayed instead. For example a switcher may refer to it’s inputs as a set of numbers from 1 to 64, each of which can be given an arbitrary name override, such as “CAM1”, “VTR2”, “Traffic CAM”, etc. The TSI1000 can be programmed to display either the input number, or the name override. Some resource devices use names instead of numbers, usually in the form of a category and number (CAM1, CAM2, etc.) and these too can be overridden with meaningful display names.

There are two classes of name overrides, "long names" and "short names". The long names are usually chosen to be descriptive and obvious in their meaning, for use in single-source displays where there are lots of characters available. The short names are usually more mnemonic in nature and are normally used in multiple-source displays, such as program bus or mix-effects displays, where character space is at a premium.

Each resource input can also be associated with a priority, which is used to determine the order of display of inputs in tally displays. The priority of each resource input can be set in the Configure Resources dialog box. Zero is the default value of all resource inputs and is the highest priority. The lowest priority is 255.

3.3 Resource Interconnections

Real-world routing and switching devices are often interconnected so that there are several layers of switching which determine the final destination of a given source. An common example is where a production switcher has one or more inputs fed by a router output, allowing switcher buttons to be assigned to various sources.

Such device interconnections are represented by specifying *resource interconnections* in the TSI1000 configuration. Each interconnection is created in the “Resource Interconnections” dialog box, by supplying an arbitrary name for the interconnection, along with a interconnection origin (a resource device output) and one or more interconnection ends (a resource device input).

3.3.1 Resource Interconnection Input and Output Entry Format

The resource device output which constitutes the signal origin of a resource interconnection is specified in particular way.

Suppose, for example, that we have created a resource device called “RTR1” which has an output called “FEED1”, and further suppose that output “FEED1” is connected to the fifth physical input of a switcher called “SW1”. The switcher input is called “5”.

“FEED1” would be considered the signal origin, and it would be entered in the “Origin” field of the Resource Interconnection dialog box as “RTR1::FEED1”. Note that the name of the resource device and the name of the resource output are separated by two colons. It is a common error to supply only a single colon, in which case the resource interconnection would not be successfully created.

Input “5” on switcher “SW1” would be considered the signal “end”, and it would be entered in the “Ends” field of the Resource Interconnection dialog box as “SW1::5”, using the same double colon format described for the signal origin. Note that a resource interconnection may have no end, or any number of ends, allowing a “star” configuration where one signal origin feeds several ends.

There is also an suffix which may be appended to a resource input or output name which specifies a routing level (video, left audio, right audio, SDI level, etc.). This suffix, referred to as a "level specifier" takes the form of a name or number surrounded by square brackets (e.g. RTR1::001[1] where the [1] denotes the first routing level). Whether the level specifier is required and it's format (name, number etc.) is dependent on the type of routing device the resource device represents. Usually the level is a number starting from one, but this is dependent on the type of routing device, and specific information on this is available in the online help.

3.3.2 Program and Preset Output Designation

There is also a special form of a resource interconnection which is used to point to resource outputs in the system which are considered to be "On-air" outputs or "Next-to-air" outputs of the system. These are also referred to as "Program" outputs and "Preset" outputs respectively. Any source which is routed or switched to an "On-air" output is considered to be on-air, and may be tallied as such by the system. Any source which is routed or switched to a "Next-to-air" output is considered to be next-to-air, and may be tallied as such by the system.

A program or preset output may be designated in the configuration by creating a resource interconnection which has that resource output as it's origin, then clicking the "On-air" radio button. No interconnection ends need be defined. A similar procedure is followed to designate a preset output.

3.4 Tally Displays

Tally displays are output devices which present information to the people operating a studio system. Typically these will be Image Video under-monitor displays (UMDs). Other types of displays which may be driven by the Image Video tally system are Kaleido multi-viewer displays, or Ensemble video insertion devices (used to insert tally information directly into a video monitor), among others.

The TSI1000, in combination with the Image Video 4211 General Purpose Interface unit, supports the control of general-purpose outputs (relay contacts or voltage outputs). These could be properly classed as display devices, but are treated in a separate section of this document.

Displays can be configured for connection to any serial port in the controller, except for COM7 which is reserved for GPI use. Image Video under-monitor displays are usually configured to run on one or more of COM3, COM4, COM5 or COM6, because of the convenient RJ-11 connection.

In the simplest possible application, tally displays are programmed by simply entering the text to be displayed into a display configuration dialog box. If the Tally System Console Program is connected and in communication with a TSI1000 which is driving a tally display, text typed into the display configuration dialog box will appear immediately on the display, character-by-character. However, to allow more complex display functions to be programmed, a programming language is recognized by the TSI for the information entered in certain edit fields and dialog boxes within the Tally System Console program. This programming language is introduced in a separate section below.

3.5 General-Purpose I/O

General-purpose I/O ports are parallel ports used for providing contact closures or control voltages to the TSI1000, and for providing contact closures or control voltages out of the TSI1000. The parallel port hardware is contained in a separate optional unit, the Image Video Model 4211 General Purpose Interface unit. The 4211 is serially connected to the TSI1000 COM7 port. Each 4211 has up five parallel I/O connectors, each of which can be loaded with eight inputs, eight outputs, or both. As typically ordered, a 4211 will have 40 inputs and 40 outputs available in groups of 8 on five 37-pin 'D' connectors. The TSI supports a total of 512 inputs and outputs. More than one 4211 can be connected to the same port using a multi-drop serial connection.

Each 4211 unit has a DIP switch on the rear panel which is used to assign the inputs and outputs to a certain block of addresses within the TSI configuration. The address of each box is entered on the DIP switch as a binary address, starting from 0. Each box takes up a number of addresses equal to the number of I/O connectors on the rear panel. Therefore if there are three 40 I/O 4211 units in the system, each with five rear panel connectors, the first box will have a DIP switch setting of zero (binary 00000000) , and it's inputs and outputs will appear in the address range 0-39. The second box will have a DIP switch setting of 5 (binary 00000101), and it's inputs and outputs will appear in the address range 40-79. The third box will have a DIP switch setting of 10 (binary 00001010) and it's inputs and outputs will appear in the address range 80-119.

Inputs to the 4211 are read by the TSI1000 through the serial connection. The TSI1000 uses the active/non-active status of the 4211 inputs in various ways to affect tally displays or 4211 outputs. 4211 inputs are typically used to get tally from production or master control switchers which provide parallel tally.

4211 outputs are typically used to drive tallies for cameras, monitors, or CCUs, or for other purposes such on-air lights or for controlling parallel-controlled routing devices.

4 Tally System Programming Language

In the preceding sections we touched upon tally displays, virtual resource outputs and General Purpose outputs. All of these items can be programmed by entering text into an associated edit field in the Tally System Console program.

For example, the contents of a tally display can be programmed by typing text into an edit field in the Configure Display Units dialog box. A general purpose output can be controlled by typing a “1” or a “0” into the “control” edit field in the Configure GPIs dialog box. A virtual resource output can appear to select an input of a certain name by typing the name of the input into a resource output control edit field.

Within the text programmed to control these various devices, certain predefined character sequences, called "embedded functions", can be included to represent certain special information which must be displayed in the place of the embedded function. These embedded functions have a common format, consisting of a name followed by an opening parenthesis, followed by certain text information of interest to the function, following by a closing parenthesis.

For example, typing “add(1,1)” into a display edit field will cause the display to show the number “2”. The “add( )” function can be combined with normal text to allow something like “One plus one is add(1,1)” to be typed, resulting in the display “One plus one is 2”.

Note that the quotes given in the example will not actually be typed when entering the control strings. In fact pairs of quotes within control string cause enclosed information to be displayed verbatim.

Also note that commas or spaces used within functions act as parameter separators, so if it is necessary to use a comma or a space with a parameter, then the parameter must be enclosed within a pair of quotes. It is preferable to use commas to separate parameters rather than spaces.

A list of the available functions is available in the online help in the tally system console program. There are logical functions (and( ), or( ), etc.), text functions used to manipulate strings of text, math functions, date and time functions, display attribute functions (for changing text color, text justification, etc.), and, of course, specialized functions for obtaining tally information.

Embedded functions can be embedded within other functions. For example "add(1,sub(10,5))" will print "6".

Also note that the function names are not case sensitive, i.e. add( ), ADD( ) and Add( ) all mean the same thing.

4.1 Commonly Used Functions

The following functions are just a few of the more commonly used function. See the online help for a full list of embedded functions.

ac(n),aj(n),af(n): text formatting functions for color, justification and font respectively. “n” is a numeric code which selects a particular attribute. Details of these codes can be found in the online help. Embedding one of these functions in text will affect all the text to the right of the function, up until either the end of the text, or until the function is repeated with a different attribute. For example “ac(85)REDac(255)AMBERac(170)GREEN” will display correctly colored names of the three colours available in an Image Video UMD, where 85, 170 and 255 are the Image Video UMD colour codes for red, green and amber respectively. Note that the effect of the text formatting functions are dependent on the type of display being configured.

iv(n): reports either "1" or "0" to indicate the status of a GPI input. "n" is a number between 0 and 511, and includes the inputs from one or more 4211 units. "n" can be calculated as follows:

((DIP switch) x 8) + ((I/O connector) x 8) + (Channel in connector) where:

- "DIP switch" is the DIP switch setting of a 4211 unit from zero to 255
- "I/O connector" is a number from zero to four, in order of the connector numbering on the back of the 4211 unit.
- "Channel in connector" is a number from zero to 7 in order of the pin numbering for the 4211 inputs.

For example, to sense the third input (input #2 starting from 0) on the second connector (connector #1 starting from zero) of a box with a DIP setting of 5:

(5 x 8) + (1 x 8) + 2 = 50.

See Appendix A for a GPI address lookup chart.

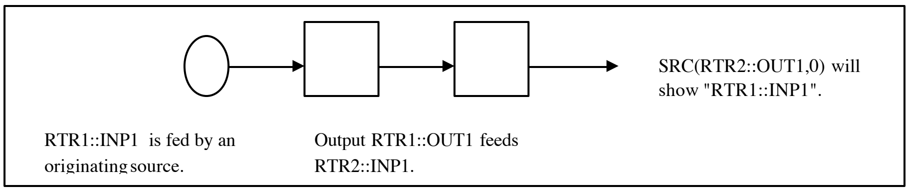
src(dest, index): "dest" is a resource output specified with the double-colon syntax (e.g. RTR::MON5). “Index” is a number starting from zero. The src( ) function is used to display a source on a given destination. “Index” is used to select one of a number of selected sources to display. It can be used for real-world or virtual resource devices.

Try the following. Open the "Configure Resources" dialog box. Enter "V1" in the name field and click on "Add". You have now created a virtual resource device. Click on "Output Control" and "Add" an output called "OUT1". In the "Control" field enter the name "INPUT2,INPUT4,INPUT6". Close the dialog box.

Now click on a display and enter "SRC(V1::OUT1,0)" The display will show "V1::INPUT2". Now enter "SRC(V1::OUT1,1)". The display will show "V1::INPUT4". Now enter "SRC(V1::OUT1,2)". The display will show "V1::INPUT6". The index chooses which of several possible inputs will be shown. When we entered three input names separated by commas, the output in effect selected three inputs. We were then able to show the selected inputs using the SRC( ) function.

Note that this will also work with real-world resource devices (i.e. a routing or switching device connected to one of the TSI serial ports or a set of GPI inputs). This is the basis of the way the tally system can be used to display routing information.

One other thing to note about the src( ) function: this function will always try to find an *originating source*. If we build a system using resource interconnections and several layers of routing (i.e. a router feeding a router) and give the src( ) function a resource output with a source that arrives through a number of crosspoints, the function will display whichever source(s) it finds which have no origin, i.e. the origin of the signal. In other words, it will display only those resource inputs which are not fed by a resource output via a resource interconnection.



xpt(dest): returns the crosspoint(s) taken on a resource output. Unlike the src( ) function, xpt( ) does not trace back beyond the input directly taken by the given resource output. Also unlike the src( ) function, the xpt( ) function returns the entire list of crosspoints selected by the resource output. Furthermore, there is a difference in the way the xpt( ) function behaves in the resource outputs, and the way it behaves when inserted in a tally display or GPI output. In resource displays and GPI outputs, the xpt( ) function returns the crosspoint name in double-colon format just like the src( ) function: e.g. RTR1::OUT1. In output controls, the resource device name and double colons are stripped off, leaving only the name of the resource input. This makes it easy to create a virtual resource output which follows another resource output, by simply inserting the xpt( ) command in it's control string. The xpt( ) function is the only function which will return the input directly taken by the given resource output without tracing back to the originating source.

s(resource,fmt): The s( ) function is used to format a resource input or output name which has the double-colon format, in order to make it readable and "display friendly". "Resource" can be either a resource input or a resource output. "fmt" is one of the characters 0, 1, 2, 3, A, B. 0 and 1 can be used to return the native name of the resource (i.e. the name read directly from the resource device hardware or the input typed into a virtual resource output control). 2 or 3 returns the short and long name assigned to the resource in the Configure Resource Device dialog box. A and B return a name in accordance with the setting of the “Style” fields of the Configure Resource Device dialog box. Note that the s( ) function strips off the leading resource name and double colons and the trailing level specifier.

pgm(src): The pgm( ) function is used to determine whether a source has gone to air. Given a source in the double-colon format, this function returns “1” if the source has been routed to an on-air resource output, otherwise it returns “0”.

pst(src): The pst( ) function is the next-to-air analog of the pgm( ) function.

tsx(dest,fmt,pgm,pst,nrm): The tsx( ) is another function used to return the originating source on a given resource output (the "dest" para meter, in double-colon format), like the src( ) function. The tsx( ) function is used only with resource outputs which select a single source at a time. Resource outputs which select multiple sources will have the highest priority source displayed.

The ts x( ) function combines the functionality of the s( ) , pgm( ) and pst( ) functions. A typical example of it's use in an Image Video UMD is "tsx(RTR1::OUT1,A,ac(85),ac(255),ac(170))". The "fmt" parameter is equivalent to the "fmt" parameter in the s( ) function, and will cause the same formatting effects for the displayed source.

The "pgm", "pst" and "nrm" parameters are text which is inserted before the displayed source name, if certain conditions are met. Not that in the example we have chosen to insert color codes using the ac( ) function. The "pgm" (program) parameter is inserted before the source name if the source is on-air. The "pst" (preset) parameter is inserted before the source name if the source is next -to-air. The "nrm" (normal) parameter is inserted if the source is neither on-air, nor next -to-air. This has the effect, in the example case, of showing the name in red if the source is on air, showing it in amber if it is next-to-air and showing in it green if the source is neither of the above.

Two similar functions are the tss( ) and tsd( ) functions, which instead of showing the name of the source on a given resource output, show the name of a given source, or the name of a given destination respectively.

The tss( ) (tally status for a sourc e) function can tally (i.e. change the color or show some other indicator) the displayed resource input name based on whether the given resource input is on-air or next -to-air.

The tsd( ) (tally status for a destination) function can tally the displayed resource output name based on whether the source on the given resource output is on-air or next -to-air.

sl(dest,fmt,len,pgm,pst,nrm): The sl( ) (source list) function is similar to the tsx function except that it will display a list of all of the sources selected on the given resource output, within the limits of the display. The meanings of the parameters are the same as for the tsx( ) function, with the addition of the "len" parameters, which specifies the total number of characters to display. The function will not show partial source names but will omit entire names at the end of the list, using the "len" parameter as a guide. The names are displayed in order of priority or in alphanumeric order. This function is most commonly used for displaying the status of program or preset buses on production switchers, which are capable of simultaneously selecting multiple sources.

5 Defining Resource Devices

There are two classes of resource devices. Serial resource devices communicate with the TSI1000 via a serial port or network connection. Parallel resource devices communicate with the TSI1000 via parallel wiring and an Image Video General Purpose Interface unit (Model 4211).

5.1 Defining and Testing Serial Resource Devices

1. Press F1 to enter the online help and go to Tally System Design > Supported Resource Devices and read up on the router/switching devices of interest to your system. This will tell you important information about which ports may be used, the names or numbering scheme used for that particular router, serial baud rates, and so on. When selecting the port, keep in mind whether the device requieres an RS-422 or RS-232 port, or is on a network, and also note that COM1 and COM7 are reserved for the TSC and 4211s respectively.

2. Open the Configure Resource Devices dialog box.

3. Enter a name for the device in the Name edit field and press "Add".

4. Click on "Port" and select the device type and select a port for the device. To assist you in selecting a port, take note whether the device requires RS232, RS422/485, SBUS or a network connection, and look up the port description table in the section "Tally System Interface Controller" in order to determine which port to use.

5. If your device is a network device, such as the Grass Valley SMS-7000 router you will need to enter an IP address in the "Port" dialog box. If you are using a Sony router which uses an SBUS connection, there is no port selection to be made: the SBUS connection will be selected automatically. Only one SBUS router may be configured.

6. Set the interface number for the TSI1000 to which the device will be connected. If you have only one TSI1000 in your system, leave "Interface" at 2. If you are using multiple TSI1000s with an Image Video Switchover Unit for redundancy, leave "Interface" at 2. If you are using multiple TSI1000s without a switchover unit, in order to interface a large number of external devices, then set "Interface" to match the interface number setting of the TSI1000 to which the new device will be connected.

5.2 Testing Serial Resource Devices

Once your device is configured and connected, check the relevant LED on the front of the TSI1000. If the LED is off, there is no device configured on that port. If the LED is red the device is configured but not communicating with the TSI1000. This could be due to a cabling problem. If the LED is green, the device is communicating properly with the TSI1000.

Certain devices allow the configuration of more than one device on the same port. In such cases it is possible for an amber LED to be displayed indicating that some but not all of the configured devices are in proper communication with the TSI1000. In the case of a network-connected device, such as the Grass Valley SMS-7000 router or multiple TSI1000s, the amber LED on the "Ethernet" LED indicates that one of the configured devices is offline, while a red LED indicates that either all the configured devices are offline, or that the network is disconnected or not in operation.

Some routing or switcher devices require the configuration of at leastone resource output in order to begin communications with the external device. If you don't have a configuration ready to try out yet, just add a control string to a display or a GPI output which references a resource output on the device in question, such as, for example, "src(R1::002[1])". Make sure that the resource output name you use is valid for the device by checking the specific help article for that device (F1 (help) > Tally System Design > Supported Resource Devices).

5.3 Defining Parallel Resource Devices

1. Open the Configure Resource Devices dialog box.

2. Enter a name for the device in the Name edit field and press "Add".

3. Click on "Port", select the "Virtual" device type, (this is the default setting for a new device) and select "Close".

4. Click on "Output Control", select the name of the resource device, then "Add" a new device with a short descriptive name.

5. In the control section, if you have defined your GPI inputs to be consecutive, you may enter the following control string, or something similar (exclude quotes): "i2n(40,32,1)". In this example, a range of GPI inputs starting from the 40th input and including 32 inputs from 40 to 71 are assigned to represent a set of 32 consecutive inputs numbered starting from one. (NOTE: add a part about name formatting).

   For example, if the above control string is used to form a virtual resource output named V1::OUT1, then the control string src(V1::OUT1) entered into a display will show "V1::1" whenever the 40th GPI input is activated. The 41st GPI input causean indication of "V1::2", etc. If both the 40th and the 41st GPI inputs are activate then a indication of "V1::1 V1::2" would be shown.

6. We now have a set of inputs which can be display numerically. Those inputs which are uniquely associated with sources in the system (i.e. the sources on these inputs which are not also fed to some other resource input in the system,) can be given long and short source names. See the section on "Defining Source Names.

7. Those inputs which are fed by sources which also feed o ther resource inputs elsewhere in the system can be connected to common sources. See the section on "Defining Common Sources".

For situations where GPI inputs are not consecutively numbered, other control strings can be created to handle those cases. Consecutively assigned GPI inputs are not only easier to program, they are also more efficiently evaluated by the TSI1000 under operational conditions.

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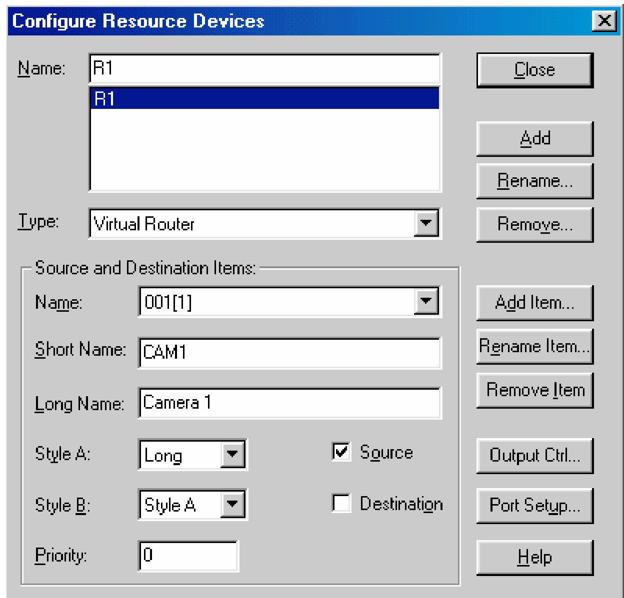
6 Defining source names

Names used at the engineering level to denote router and switcher inputs and outputs are rarely useful to the system operators. For example an engineering input name such as “CAM4” or “10” would likely be required to be displayed in a tally system in a more verbose format, such as "Camera 4 (Bob)". In the Image Video tally system there is a table associated with each resource device which can be used to assign displayable names to each resource input or output. Output names are rarely required to be displayed in tally system, so we will concentrate on source names here.

To enter a displayable source name for a particular resource input:

1. Open the Configure Resource Devices dialog box.

2. Click on "Add Resource Item". Enter the native name of the input you are renaming. The format of this name is dependent on the device type. Some native names will be numeric, others will be numeric with leading zeroes, others will be alphanumeric. Virtual resource input names which are created using the i2n( ) function are usually numeric without leading zeroes. Check the help on the particular device type to find out the format of this name.



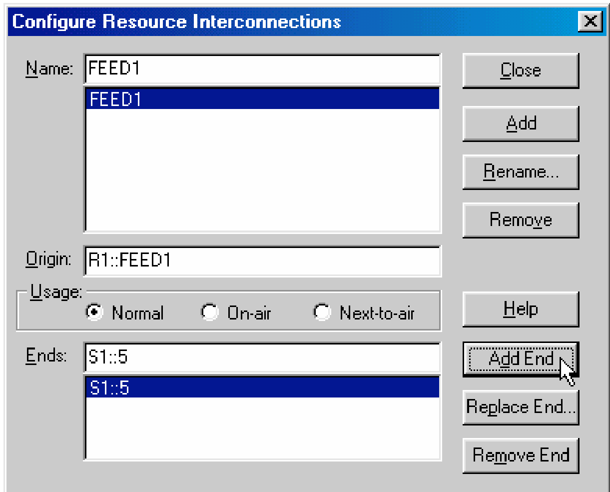
3. When the resource item has been added, fill the required display name into the "Short Name" and "Long name" edit fields. The "Style A" and "Style B" fields can usually be left as is.

   The "long" and "short" names can be selected for display by a format parameter passed to such functions as the "s( )" function, and the tsx( ), tss( ) and sl( ) functions. The possible values of the format parameter used with these functions, and their effects are as follows:

Format parameter value	Display effect
1	Display the native name (usually numeric or a mnemonic).
2	Display the short name
3	Display the long name
A	Display the style set by "Style A" for the resource item in the Configure Resources dialog box.
B	Display the style set by "Style B" for the resource item in the Configure Resources dialog box..

7 Defining Interconnections

In order to correctly model a routing system, it is necessary to be able to define interconnections which join routing matrices. An interconnection from a resource output to any number of resource inputs can be defined in the Image Video tally system.



To define an interconnection:

1. Open the Resource Interconnection dialog box.

2. "Add" a resource interconnection name.

3. Type the name of the resource output into the "Origin" edit field, in double-colon format.

4. If the purpose of the resource interconnection is to register an on-air or a next-to-air output, check the appropriate box.

5. Type the name of a resource input into the "Ends" dialog box, also in double-colon format. "Add" name to the "Ends" list, and add other ends as required. Note that is not necessary to assign ends to resource interconnections which are used to register on-air or next-to-air outputs, although it is permissible.

6. Close the Resource Interconnections dialog box.

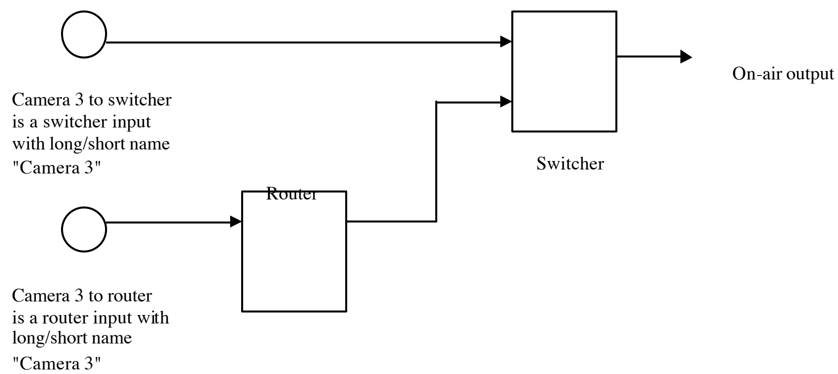
8 Defining common sources

A common source is a source which feeds more than one resource input. Common sources must be handled in special way in the Image Video tally system, in order to allow for the possibility that a source may be taken to air through a number of different paths.

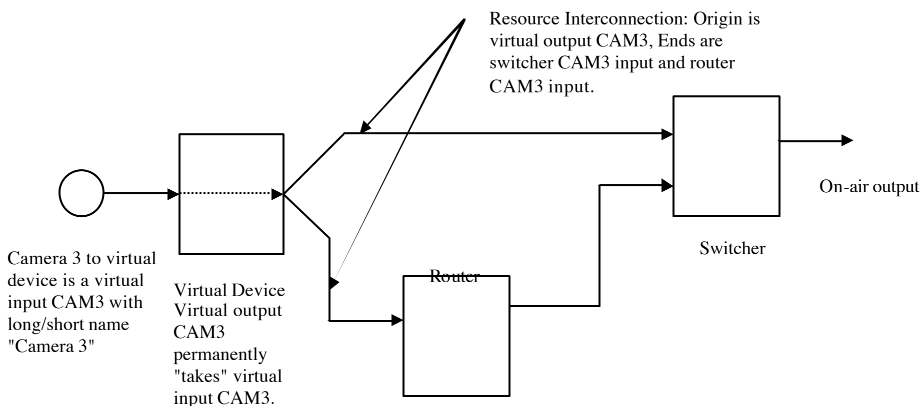
Suppose that a source called CAM3 feeds an input of a router as well as the input to a switcher, and further suppose that the router has an output which feeds the switcher. We could define an resource input on each of the router and switcher, both of which inputs could have the long and short name "Camera 3". Now suppose that the switcher input for "Camera 3" is taken to air, and that a router destination (say a monitor output called MON5) also takes it's own "Camera 3" input. Because of the way the TSI1000 traces paths from the on-air output to the a source to determine whether that source is on-air, the system would not be aware that the two "Camera 3" inputs are in fact connected to the same source, and Camera 3 would not be tallied on-air (say with red text) on the MON5 UMD.

Therefore, for tally consistency, it is often preferable to configure common sources so that they are tied to some common input, which can then be given the long and short display name.

Common Sources



If Camera 3 to the switcher goes to air, Camera 3 to the router will not be tallied when it is displayed, because, as far as the tally system knows, it is a separate input.



By Making Camera 3 a common source to the switcher and router, whether it is on-air directly through the switcher or indirectly through the router, it will be tallied on-air wherever it is displayed.

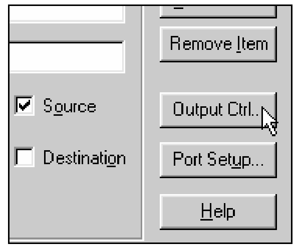
8.1 Defining Common Sources

To set up a number of common sources:

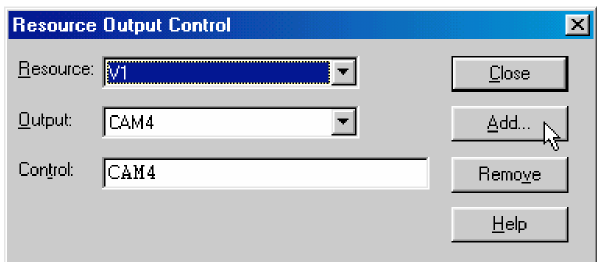
1. Open the Configure Resource Devices dialog box. Enter the name for a new virtual device and "Add" it.

2. Click on "Port" and set the "Type" to "Virtual". Close the "Port" dialog box.

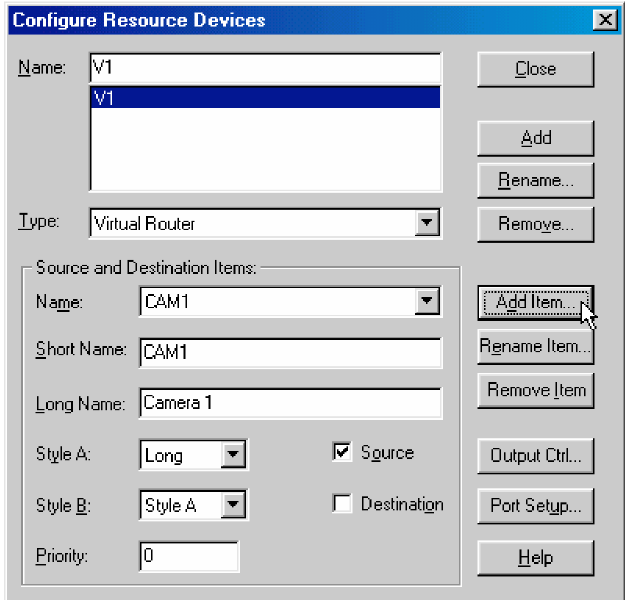
3. Click on "Output Control" to open the Resource Output Control dialog box. Select the name of the new virtual device. "Add" a series of outputs, giving them each a mnemonic that reflects the function of the common source. This not what will be displayed for the source name, so you can use something simple and descriptive, like CAM1, CAM2, VTR1, VTR2, etc. The dialog box will give you an incrementing default value which is helpful for entering these sorts of mnemonics.



4. Note that the "Control" field is automatically filled in with the output name as your create each output. Leave the value of the control field in that state. This means that the virtual output will have a permanent "take" on an input of the same name. (The mnemonics for the input and output don't have to be the same, but it makes it easier to keep track of things).



5. Once all of the common sources you wish to enter are represented in the Output Control dialog box, you may close it.

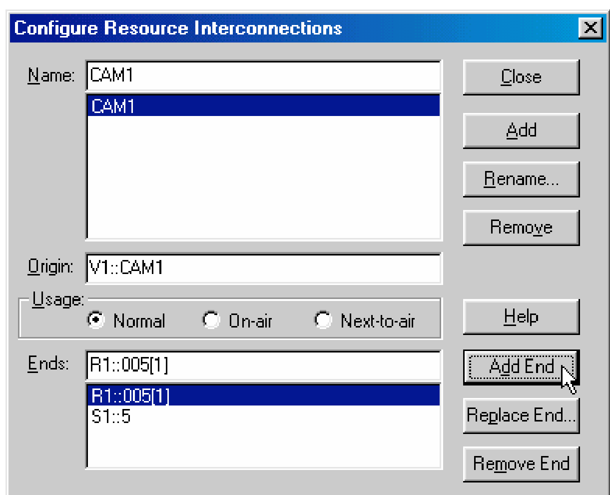


6. You should now be back to the Configure Resource Devices dialog box. We will now enter short and long names for each common source. Click on the name of the virtual device then click on "Add Resource Item". For the 'Name" use the same mnemonic name for each source as we used to create the outputs in the Output Control dialog Box. Make sure that each source has the "Source" box checked. For each source, also add the short and long name which should be displayed for the source.

7. Once all of the common source short and long names are added, close the Configure Resource Devices dialog box.

8. Open the Configure Resource Interconnections dialog box. For each common source "Add" a resource interconnection, using a name desciptive of the common source being entered (you could use the mnemonic for the common source's virtual output). For the origin of each interconnection, enter the mnemonic that we created for the common source's virtual output, in double-colon format. For example if the name of the virtual device was V1, and the mnemonic for a common source was CAM1, then the origin of the resource interconnection will be V1::CAM1.

9. For each resource interconnection, now enter the "ends", in double-colon format. For example if common source CAM1 feeds switcher S1's input "1", and also feeds router R1's input "005[1]", then the two ends added would be S1::5 and R1::005[1]. Be sure to press the "Add Ends" input for each "Ends" entry. You can have any number of ends for each resource interconnection. Once one resource interconnection has been completed for each common source close the Configure Resource Interconnections dialog box.



10. We have now completed the entry of the common sources. For each common source we have created a signal path from a virtual input, which has a mnemonic name and a displayable short and long name, through a virtual output of the same mnemonic name. This virtual output with a fixed input status is fed via a resource interconnection to a number of resource inputs.

    Now whenever any destination takes an input being fed by the common source, the signal path is traced back to the virtual input, and the long or short name programmed for the virtual input will be displayed. Similarly, if an on-air or next-to-air destination takes an input being fed by the common source, the signal path is traced back to the virtual input and the virtual input is marked as being on-air or next-to-air; therefore any other destination which takes the common source will also be properly tallied as on-air or next-to-air.

9 Programming Displays

1. Open the Configure Display Units dialog box. For each display in your system, "Add" a name and enter it's serial number. The display name is arbitrary, but can be named after a rack location o r be descriptive of it's purpose in your system.

   Note the following regarding serial numbers:

Display Type	Note
RDU15xx series	Serial number must match number on unit.
RDU11xx series	Serial number must have three digits and match DIP switch setting.
Kaleido, Zandar	Serial number is arbitrary but must be unique (use the default suggested by editor)

2. For Image Video displays, set the "Width" and "Monitor" settings according to the unit's size and whether the unit is single, dual or triple.

3. Close the Configure Display Units dialog box. For each display, select F6 to select each display, close the selection box and press CTRL -W. Press "1", "2' or "3" to select whether the display is a single, dual or triple and press ENTER.

4. To program the contents of a display, use F6 to select the display, then click in the middle of the display. An alternative method of entering a display string is to open the Configure Displays dialog box, select a display name then click on "details".

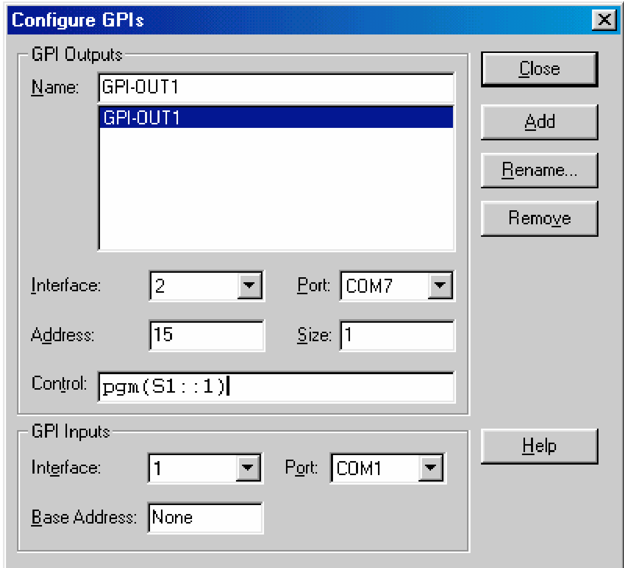
   Although text displays can be programmed in literally thousands of different ways, because of the flexibility of the control language, we will present here a number of the most commonly used configurations:

Display function	Control string for Image Video UMD
Static text "Welcome to Studio 1" in green	Welcome to Studio 1
Static text "Welcome to Studio 1", center-justified and in red . Note that the center-justify command aj(1) will be used more often than not in typical displays, but it is omitted from the other examples for clarity.	aj(1)ac(85)Welcome to Studio 1
Static text "CAM1" in red when source S1::1 goes to air, otherwise green.	if(pgm(S1::1),ac(85),ac(170))CAM1
Static text CAM1 in red when source S1::1 goes to air, in amber if it is on preset, otherwise green.	if(pgm(S1::1),ac(85),if(pst(S1::1),ac(255),ac(170)))CAM1
Display source R1::001[1] in Style A, tallying it red if it goes to air, tallying it in amber if it is next -to-air, otherwise green.	tss(R1::001[1],A,ac(85),ac(255),ac(170))
Display source on destination R1::005[1] in	tsx(R1::005[1],A,ac(85),ac(255),ac(170))

Style A, tallying it red if it goes to air, tallying it in amber if it is next-to-air, otherwise green.	
Show a source list for destination S1::PGMOUT, with sources shown in Style A, allowing up to 26 characters tallying it red if it goes to air, tallying each source in amber if it is next-to-air, otherwise green.	sl(S1::PGMOUT,26,A,ac(85),ac(255),ac(170))
Show a source list for destination S1::PGMOUT, with sources shown in Style A, allowing up to 26 characters, but leave the display always green (no tally).	sl(S1::PGMOUT,26,A)
Show different static text depending on the state of the 20th GPI input. Note that text which includes spaces must be surrounded with double-quotes.	if(iv(19),"ON AIR","OFF AIR")
Show text alternating between two messages every 1/2 second (50 hundredths of a second). Note that up to three different "lines" of alternating text are allowed.	lin(1)dur(50)"Studio 1"lin(2)dur(50)"On Air"
Show text alternating between two messages every 1/2 second (50 hundredths of a second) if GPI input 10 is active, otherwise show only the first line.	lin(1)dur(50)"Studio 1"lin(2)dur(if(iv(9),50,0))"On Air"
Select a resource output tally based on the state of the 5th GPI input. Note that the name of a destination is saved in variable "!D" and read back out of variable "!D" by the tsx( ) function. This control string is useful for switching monitor walls.	sv(!D,if(iv(4),R1::001[1],R1::020[1])tsx(v(!D),A,ac(85),ac(255),ac(170))
Select a resource output tally based on the state of a switcher bus. Here if a switcher bus takes input 5, router output 001[1] is monitored, otherwise router output 020[1] is monitored.	sv(!D,if(eq(src(S1::OUT),S1::5),R1::001[1], R1::020[1])tsx(v(!D),A,ac(85),ac(255),ac(170))

10 Programming GPI outputs

10.1 Single-element control



To control GPI outputs which become active when certain conditions are met (e.g. when a source goes to air):

1. Open the Configure GPIs dialog box. For each GPI output, "Add" a descriptive "Name" for your GPI output. Leave "Interface" and "Port" at 2 and COM7 respectively.

The "Base" value is a GPI address, which is calculated in the same way as the GPI input address used in the "IV( )" function:

((DIP switch) x 8) + ((I/O connector) x 8) + (Channel in connector) where:

- "DIP switch" is the DIP switch setting of a 4211 unit from zero to 255
- "I/O connector" is a number from zero to four, in order of the connector numbering on the back of the 4211 unit.
- "Channel in connector" is a number from zero to 7 in order of the pin numbering for the 4211 outputs.

See Appendix A for a GPI address lookup chart.

2. In the "Control" edit field enter one of the following control strings, depending on the desired functioning of the GPI output:

GPI requirement	Control String
1. The GPI must be permanently on (useful for test)	1
2. The GPI must be permanently off (useful for test)	0 or leave field blank
3. Activate GPI when source R1::SRC1 goes to air	pgm(R1::SRC1)
4. Activate GPI when the source on destination R1::DST1 goes to air.	pgm(src(R1::DST1))
5. GPI output should follow the 10th GPI input.	iv(9)
6. GPI output should activate if any of GPI inputs 0 to 3 are active.	or(iv(0)iv(1)iv(2)iv(3))
7. GPI output should activate if all of GPI inputs 0 to 3 are active. This could also be done using three embedded AND functions.	eq(iv(0)iv(1)iv(2)iv(3),1111)
8. GPI should activate if source R1::CAM1 appears at any one of destinations R1::VTR1, R1::VTR2, R1::VTR3. This can be used to form an "iso-tally" (used to inform a cameraman he is being recorded). "sid" stands for "source in destinations".	sid(R1::SRC1,R1::DST,R1::DST2, R1::DST3)
9. A variation of the above iso-tally, in which the tally does not appear if the camera is on-air.	eq(sid(R1::SRC1,R1::DST,R1::DST2,R1::DST3)pgm(R1::SRC1),10)

Note that, for reasons explained in the next section, that single element control strings must always resolve to the number "1" or "0". If it is required that any number greater than zero turn on the GPI output, then use the "greater than" function, as in example 6 above. For example the number "24" in the control field will turn the control off, "25" will turn it on, but gt(24,0) and gt(25,0) will both turn the output on. Of course it is more likely that an imbedded function returning a range of numbers would be used in place of the numbers in the above example.

10.2 Multi-element GPI control

Multi-element controls are rarely used in common tally operations, but understanding how they work can help one to better understand GPI output control in general, in order to avoid common pitfalls encountered in even single-element controls.

In the previous section we treated GPI outputs as they are most commonly used: as single-bit values controlling a single hardware output. In such cases the "size" field is set to 1. Furthermore, in such cases of single element control, the control string must resolve to either the number "1" (the "on" condition for a single element control, or the number "0" (the "off" condition for a single element).

If however the "size" field is set to a number greater than one, then several contiguous outputs can be controlled by the control string within a single GPI output control. The control field of a GPI output evaluates a number as a binary value. The number 0 is evaluated as binary "0". The number 1 is evaluated as binary "1". The number 2 is evaluated as binary "10". In this case, if the size field is set to two, then a contiguous pair of GPI outputs are controlled, with the highest numbered output being turned on by the most significant bit of binary "10"and the lowest-numbered output being turned off by the least significant bit of binary "10".

The “size” field instructs the TSI1000 to consider a certain number of contiguous bits within the binary representation of the given value, starting with the least significant bit. Higher bits are ignored. Note that this means that, for example, with a size of 1, that the number 24 in the control field, which is binary 11000, will turn off it's single output, (lowest bit is zero) while 25 (binary 11001) turns on it's single output.

The "base" field sets the starting output for the contiguous set of controlled outputs.

Examples of multi-element GPI output control				
Base	Size	Control field	Binary value	Effect
0	2	2	10	Turns on second output
0	2	3	11	Turns on first two outputs
5	4	15	1111	Turns on outputs 5,6,7,8.
5	4	iv(0)iv(1)	Possible values, depending on the state of the first two GPI inputs, are *decimal* 00,01,10, or 11, (binary 0000,0001,1010,or 1011).	With least significant (right-most) binary bit corresponding to output 5, we find that outputs 5-8 will either be all off, or 5 only on, or 6 and 8 on, or 5, 6 and 8 on. Lesson: control field values are read as decimal numbers but evaluated as binary numbers.
0	4	or(iv(0)iv(1)iv(2)iv(3))	Depends on state of first four GPI inputs	First output will turn on if any of inputs 0,1,2,3 are active. Second, third and fourth outputs are not affected.

11 GPIs in TSI1000 Version 1.84 and higher

The following describes how to set up General-Purpose Interface (GPI) ports on versions of the TSI1000 from V1.84 and higher.

New GPI configuration methods for setting up GPI ports introduced in TSI1000 V1.84 are required only in cases where the Image Video Remote Panel port is used (for example to use the RCP40 or VxV16 control panels) or in cases where multiple Model 4211 ports are being used.

11.1 Overview

The TSI1000 after version 1.84 supports up to 4096 GPI inputs and outputs. Image Video Model 4211 general purpose inputs and outputs, and "Remote Panel" (IVRP) inputs and outputs both "map into" this same space. Up to 512 GPI inputs and outputs can be monitored on a single 4211 or IVRP port.

GPI inputs are read using either the "iv()" function, or the "i2n()" function, and the full range of GPI inputs monitored by these functions are identified by numbers ranging from 0 to 4095.

For either in 4211 units or in IVRP units, GPI outputs are each identified by two pieces of information: the port that the device is being monitored on, and a number between zero and 511.

In this discussion, a "4211 port" is a port defined to operate Image Video 4211 GPI I/O boxes. An "IVRP port" is a port defined to operate Image Video RCP-40 Remote Panels and other devices compatible with the IVRP protocol. Because both 4211 ports and IVRP ports map into the GPI input and output address space, then a "GPI port" refers to a port that is either a 4211 port or a IVRP port.

11.2 Setup Procedures

Configuration of a GPI output is performed in the "Resource" -> "Configure GPIs" dialog box. The TSI1000 Interface Number, the GPI output COM port, the starting GPI output address (starting at zero for each port) and the number of physical GPI outputs controlled (usually 1) must be specified.

Configuration of a GPI input base address is performed in the "Resource" -> "Configure GPIs" dialog box. The TSI1000 Interface Number, the port COM-number and the base address for the port must be specified. The base address must be a multiple of 8

Configuration of an IVRP port is performed by specifying a resource device of "Type" "Image Video Remote Panel" in the "Resource" -> "Configure Resource Devices" dialog box. Click on "Port" to set the location of the IVRP port (specify an Interface Number and a port number). Once the port is set up, an "output control" must be defined for each panel connected to the port.

Configuration of an Image Video Remote Panel is performed after the IVRP port is defined, (see above), in the "Resource" -> "Configure Resource Devices" -> "Output Control" dialog box. Click on the IVRP resource device in the "Configure Resource Devices" dialog box "Name" list, click on

"Output Control", then, for each panel, fill the serial number of the panel into the "Output" field, and fill the GPI address of the panel into the "Control" field. This GPI address directly defines the GPI output number of the first output in the panel, and, when added to the GPI input base address for the port, also defines the GPI input number of the first input in the panel.

11.3 When does a GPI port get set up ?

In general, GPI port is set up whenever the "iv()" or "i2n()" command is used in the configuration, or when a GPI output is set up, or whenever "Image Video Remote Panel" resource device is set up. The GPI Input Base Address specifies which GPI input addresses will address the devices on each port, will not in and of itself set up a GPI port.

1. In the absence an any GPI outputs, GPI input base addresses, or IVRP ports, a 4211 port is set up by default on COM7 if the "iv()" or "i2n()" function is used anywhere in the configuration.

2. A GPI port (either IVRP port or 4211 port) is set up if a GPI output is configured on a given port. If there is a "Image Video Remote Panel" resource device set up on the given port, the port will be an IVRP port, otherwise it will be a 4211 port.

3. If no GPI input base address is specified for any port, and exactly one GPI port has been specified via GPI outputs or an "Image Video Remote Panel" resource device, then either a 4211 port or a RPP port will be set up, and the GPI inputs for the port are accessed with GPI input addressed starting from zero.

4. If no GPI input base address is specified for any port, but exactly one RPP port and exactly one 4211 port has been set up, then the 4211 port's inputs are accessed with GPI input addressed starting from zero, and the RPP port's inputs are accessed with GPI inputs addressed starting from 2048 (one-half of the 4096 GPI inputs and outputs available on a TSI1000).

5. For combinations or numbers of 4211 and GPI ports other than those described in points 3 and 4 above, a GPI input base address must be specified for each GPI port.

11.4 GPI Port Address Mapping

The 4211 port and RPP port GPI input and output addresses are mapped as follows:

For *4211 GPI outputs*: Address = 4211 DIP switch setting multiplied by 8, plus the 4211 output channel number (typically 0-39).

For *4211 GPI inputs*: Address = the port’s GPI input base address, plus 4211 DIP switch setting multiplied by 8, plus the 4211 input channel number (typically 0-39). The port’s GPI input address is set in “Resource” -> “Configure GPIs” -> “GPI Inputs” -> “Base Address”.

For *RPP port GPI outputs*: Address = RCP panel’s GPI address plus the RCP panel output LED number (typically 0-29 or 0-39). The RCP panel’s GPI base address is set in the “Resource Device" -> “Output Control” -> “Control" field.

For *RPP port GPI inputs*: Address = the port's GPI input base address, plus the RCP panel's GPI address, plus the RCP panel button number (typically 0-29 or 0-39).

GPI input addresses are typically used in IV( ) or I2N( ) embedded functions, with valid values from 0 to 4095. The range of valid GPI input numbers are inclusive of the inputs on all GPI ports.

GPI output addresses are used to program the "Address" field in the "Resource"-> "Configure GPIs" dialog box, with valid values from 0 to 511 for each GPI port. While each port can support up 512 GPI outputs, sets smaller than 120-200 outputs per port are preferred.

11.5 RPP Port Device Mapping

Devices on an RPP port are mapped into the GPI address space using "Output Controls" defined for the "Image Video Remote Panel" resource device. The name of each output control is a numeric decimal value designating the serial number of the device, and the "Control" field of each output control is a numeric decimal value designating the mapping of the device into the GPI address space.

Example 1:

Set up a single RPP port on COM8, with no other GPI ports, and no GPI Input Base Address. Create the following output controls:

Name=12345 (serial number) control=0 (device base address)
Name=12346 (serial number) control=40 (device base address)
Name=12347 (serial number) control=80 (device base address)

Then the device I/O mapping will be:

Panel 12345 Input Mapping: GPI input addresses 0-39
Panel 12346 Input Mapping: GPI input addresses 40-79
Panel 12347 Input Mapping: GPI input addresses 80-511

Panel 12345 Output Mapping: COM8 GPI output addresses 0-39
Panel 12346 Output Mapping: COM8 GPI output addresses 40-79
Panel 12347 Output Mapping: COM8 GPI output addresses 80-511

Note that the address range of the last device on each port extends to the 512th input or output (#511), since by definition the address range of the last device is not bounded by the starting address of a higher-addressed device. No single IVRP device/panel can have more than 512 inputs or outputs.

Example 2:

Set up two single RPP ports on COM8, with a GPI Input Base Address of zero and COM9, with a GPI Input Base Address of 160, with no other GPI ports:

Create the following output controls on COM8:

Name=12345 (serial number) control=0 (device base address)

Name=12346 (serial number) control=40 (device base address)

Create the following output controls on COM9:

Name=12347 (serial number) control=0 (device base address)
Name=12348 (serial number) control=40 (device base address

Then the device I/O mapping will be:

Panel 12345 Input Mapping: GPI input addresses 0-39
Panel 12346 Input Mapping: GPI input addresses 40-79
Panel 12347 Input Mapping: GPI input addresses 160-199
Panel 12348 Input Mapping: GPI input addresses 200-511

Panel 12345 Output Mapping: COM8 GPI output addresses 0-39
Panel 12346 Output Mapping: COM8 GPI output addresses 40-79
Panel 12347 Output Mapping: COM9 GPI output addresses 0-39
Panel 12348 Output Mapping: COM9 GPI output addresses 40-511

NOTE that the output mapping restarts at zero for each port, because we specify both a port and a GPI output address for each GPI output set up. But the input mapping is a continuous range of numbers over the entire TSI1000 GPI address space, because no port number is specified when using the "i2n()" or "iv()" functions to read GPI inputs.

Example 3:

Set up a single 4211 port on COM7, and an RPP port on COM8, with no GPI Input Base Addresses specified:

Create the following output controls on COM8:

Name=12345 (serial number) control=0 (device base address)
Name=12346 (serial number) control=40 (device base address

Then the device I/O mapping will be:

4211 Input Mapping: GPI input addresses 0-511
4211 Output mapping: COM7 GPI output addresses 0-511

Panel 12345 Input Mapping: GPI input addresses 2048-2087
Panel 12346 Input Mapping: GPI input addresses 2088-2599
Panel 12345 Output Mapping: COM8 GPI output addresses 2048-2087
Panel 12346 Output Mapping: COM8 GPI output addresses 2088-2599

NOTE that in this case the two ports have been mapped by default at zero and 2048.

12 Programming Resource Output Controls

Resource outputs using have an input selection state based on information received from an associated external device. For example an external Philips router may control the input selection of a resource output called R1::001[1]. However it is also possible to set up virtual resource outputs whose input selection is determined by information generated within the TSI1000 itself. This is accomplished by using an "output control".

There are two types of output controls: virtual output controls and non-virtual or "real" output controls. A virtual output control is simply an output belonging to a virtual resource device (i.e. a resource device not directly associated with any external hardware). A real output control will actually generated a switch or a "take" message to the external hardware associated with the resource device.

12.1 Virtual Output Controls

Virtual output controls are typically used to tally GPI-driven switcher or to select emergency program buses, though they can be used for many other applications.

12.1.1 Programming a GPI-driven Virtual Device

1. If you are using a GPI-driven switcher which provides a single contact out for each input selected, click on the “Output Controls” button in the Configure Devices dialog box, and select the switcher name in the “Resource” list.

2. “Add” an output with a descriptive name (e.g. PGMOUT). Under “Control” enter the i2n( ) function as described in the section on “Commonly Used Functions”. You will need to specify a starting GPI input, the number of GPI inputs used to tally the switcher, and a starting number for the switcher to be reported on (usually 1). Example: i2n(40,20,1) will create a resource output whose status will be determined by a set of 20 GPI inputs starting at the 41st input, where the activation of the 41st input will cause input "1" to be "taken" on the output, the 42nd input will cause input "2" to be taken and so on. Multiple inputs may be selected simultaneously.

   NOTE: your GPI inputs must be assigned consecutively for this method to work. Other GPI assignment schemes can be accommodated by programming a slightly more complex control string.

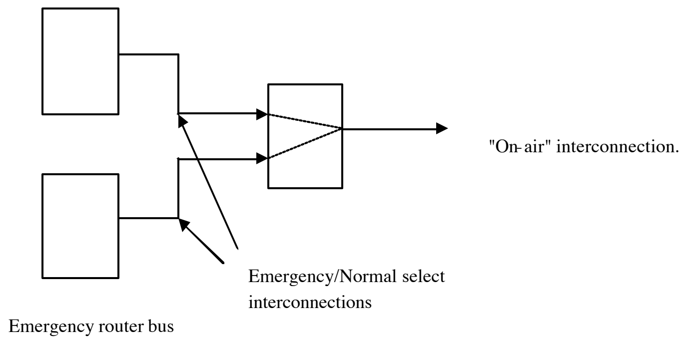
12.1.2 Programming an Emergency Bus

Emergency program buses are often implemented to cover the case of a production switcher going out of service during a critical broadcast interval. Usually a router bus is assigned to take over from the switcher program bus in the event of a switcher failure. The TSI can be informed of this event, so that it can account for emergency conditions in it's tally displays and outputs. This information can be transferred to the TSI1000 via a GPI input, or the TSI1000 can follow a router bus which is used to switch between the switcher program bus and the emergency router bus.

The programming for an emergency bus can be illustrated as follows:

Switcher program output

This resource output, which could be either virtual or real, selects either the switcher or router emergency output.



A source traced through either the switcher program bus or the emergency bus to the "On-air interconnection will be considered on-air, depending on the input selected by theoutput feeding the "On-air" interconnection.

<u>To program a GPI-selected emergency program bus:</u>

1. Press Ctrl-F9 to open the "Configure Resource Devices" dialog box.

2. Open the Configure Resource Devices dialog box.

3. Enter a name, such as "V1" for the virtual device in the "Name" edit field and press "Add".

4. Click on "Port", select the "Virtual" device type, (this is the default setting for a new device) and select "Close".

5. Click on "Output Control", select the "V1" resource device, then "Add" a new resource output with a descriptive name such as "PGMOUT".

6. In the "Control" field add the control string: if(iv(0),EMG,SWR). When the first GPI input (input "0") is activated, the EMG input of virtual device will be selected, otherwise the SWR input will be elected. Use some number other than zero if a different GPI input is preferred.

7. Close the "Output Control" and "Configure Resource Devices" dialog boxes.

8. Press Ctrl-Shift-F9 to open the "Resource Interconnections" dialog box.

7. "Add" resources interconnections as per the following table (names are arbitrary, use your own as required). For details on how to enter the interconnection information, see the section on "Programming Interconnections".

Name of interconnection	Origin	End	Comment
EMG-RTR	R1::EMGOUT	V1::EMG	Normal on-air path
NRM-SWR	SWR::PGM	V1::SWR	Emergency on-air path
PGMOUT	V1::PGM	(none)	Check the "on-air" box.

Note that in the above example the emergency router output is on a real resource device called R1 and the emergency router output is "EMGO UT". The normal switcher program bus is SWR::PGM. The system program out is V1::PGM and any source traced to this resource output will be considered on-air because of the "PGMOUT" on-air interconnection.

8. Close the Resource Interconnections dialog box.

To program a Router-selected emergency program bus:

Suppose that instead of using a GPI input to inform the tally system or an emergency condition we instead have a separate router bus which selects either the switcher program bus or router emergency bus in order to feed the final on-air path. In this case we don't need the virtual output and this can be entered as follows:

1. Press Ctrl-Shift-F9 to open the "Resource Interconnections" dialog box.

2. "Add" resources interconnections as per the following table (n ames are arbitrary, use your own as required). For details on how to enter the interconnection information, see the section on "Programming Interconnections".

Name of interconnection	Origin	End	Comment
EMG-RTR	R1::EMGOUT	R1::EMGIN	Emergency on-air path
NRM-SWR	SWR::PGM	R1::SWRIN	Normal on-air path
PGMOUT	R1::PGMOUT	(none)	Check the "on-air" box.

Note that in the above example the emergency router output is on a real resource device called R1 and the emergency router output is "EMGOUT". The normal switcher program bus is SWR::PGM. The system program out is router output R1::PGMOUT, marked by the "On-air" resource interconnection PGMOUT .

3. Close the Resource Interconnections dialog box.

12.2 Real Output Controls

Output controls can also be used to issue takes to routing hardware. The procedure for setting up a real output control is similar to that for setting up a virtual resource output control. A typical application for real output controls would be to switch one or more monitor buses, based on a GPI input or the state of a master control switcher bus.

12.2.1 Overview

Real output controls should be used with care, as they are performing takes on routing systems which could have an on-air effect. New output controls should be tested off-air first to make sure they work correctly, as a mistake in the control string can cause either no effect or an unintended effect.

The TSI1000 performs takes by evaluating a control string associated with the given real resource output: when the evaluated control string changes, then a take is issued to select the new input name generated by the control string. If the evaluated control string has changed to a an empty string, then no action is performed.

If the take fails for some reason, (possibly because of an incorrect control string, or because of a router system restriction), the TSI1000 will usually (depending on the type of router being switched) retry a three times on 1/2 second intervals, then give up. After the TSI1000 has finished it's selection process, the bus can be switched freely at router panels without effect on or intervention by the TSI1000.

When the TSI1000 restarts, the TSI1000 evaluates all of it's control string once without performing any switches. Switches are disabled for 30 seconds after the TSI1000 has started up, to disallow the possibility of unexpected takes occurring due to startup conditions. Thereafter any changes found in evaluated router output control strings will result in takes being sent to the associated router buses.

To prevent real router output controls from being accidentally created, a special control string is required to be inserted at the beginning of the control string field to enable the control function. The TSI1000 checks for the presence of the special control string to determine whether to proceed with the switch operation, then goes on to process the remainder of the control string to determine which input is to be switched.

12.2.2 Programming Follower Buses

To program a router bus to follow another router bus (in this example R1::001[1] will follow R1::005[1]):

1. Press Ctrl-F9 to open the "Configure Resource Devices" dialog box.

2. Click on "Output Control", select the "R1" resource device, then "Add" resource output 001[1] .

3. In the "Control" field add the control string: sv(*RE,ROC_TAKE)xpt(R1::005[1]).
"sv(*RE,ROC_TAKE)" is a keyword to enable takes on this bus, to prevent take operations from being programmed accidentally. The "XPT" function will return the input taken by resource output R1::005[1].

When the value returned by the XPT function changes, the TSI1000 will use the new value to issue a take to the following router bus. Devices external to the TSI1000 (such as a router control panel) may control the bus separately without interference from the TSI1000.

4. Close the "Output Control" and "Configure Resource Devices" dialog boxes.

Note that in this case, the take is being done on the same router, so the value returned by the XPT function is compatible with the value required for the take. Often a router bus must follow a bus from a totally different router family. For example a router using a mnemonic input and output values may need to follow a router which uses numeric input and output values. For example, suppose we want bus S1::OUT1 to be followed by bus R1::005[1] as per the following table:

Input switched on bus S1::OUT1	Input switched by TSI1000 on bus 005[1]
1	001[1]
2	003[1]
3	005[1]
4	007[1]

In this case, the following control string can be used:

on(eq(xpt(S1::OUT1),1,2,3,4),,001[1], 002[1], 003[1], 004[1])

The numeric input names are used to look up the mnemonic names. Note the two consecutive commas just before "001[1]". This would be the input taken if none of the numeric inputs were selected on S1::OUT1. Leaving the field empty, as shown here, will cause no switch to occur if an unlisted input is selected on S1::OUT1.

12.2.3 Programming Real Buses Controlled by GPIs

To program a real bus which is controlled by GPIs, follow the procedure in the section on "Programming Follower Buses", but use one of the following control strings:

Function	Control String
GPIs 0 to 15 will generate respective takes for inputs 001[1] to 016[1]. The "%3" string causes 3-digit input numbers with leading zeroes to be generated.	sv(*RE,ROC_TAKE)i2n(0,16,%31)[1]
This simple example allows a GPI input to toggle a router bus between router inputs CAM1 and CAM2.	sv(*RE,ROC_TAKE)if(iv(0),CAM1,CAM2)

Note that a common pitfall when programming output controls is to forget to include a router level in the input string when router level is part of the bus name. If a level is used in the bus name, then it must also be used in the input name generated by control string. Inversely, if a level is not used in the bus name then the level must not be included in the generated input name. Also, it is critical that the generated input name be correct: if the router being controlled requires leading zeroes, for example, then a control string which does not include them will fail. Remember that although some input and output names may look like numbers, they are really names, and therefore input names "001" and "1" are not equivalent !

13 Advanced Control String Programming

13.1 Using Variables

Like any programming language, the control strings used to program the Image Video Tally System often require theuse of variables. A variable is a named storage location which can be programmed to remember a value which will be used later. The SV( ) function, as previously mentioned, is used to give a variable a value, while the V( ) function is used to read back the variable. The control string "sv(VAR,10)v(VAR)" inserted as a display control string will display "10". Note that the SV( ) function, unlike most predefined functions, does not produce an output or a display of any sort.

Before we explain how the different classes of variables work, we will first look at how control strings are evaluated by the tally display system. Control strings programmed into the TSI1000 are scanned and evaluated whenever some external event occurs, such as the change in the state of a GPI input or the switching of a crosspoint. For each display or system output device programmed to react to the external event, be it a display, a GPI output or a resource output control, it's control string is read and processed, and a displayed value is produced, which is sent to the output device. When all output devices have been processed, the system waits for the next external event.

During the processing of the control string, variables can be given values and read back. Some variables are only needed as temporary storage during the processing phase and can be discarded after the system output has been produced, to save internal memory. For example, the result of a complex calculation may be needed several times during the control string processing, and is therefore calculated once and then stored for repeated use during processing. These variables are called "temporary" variables. A side effect of the temporary nature of a temporary variable is that their value can be "seen" only by the device for which it is programmed. Other devices reading and writing a variable of the same name will see only the value of it's own named variable.

Other variables must retain their values between system events, but, like the temporary variables, are visible only within the device for which they are programmed. It is useful to limit the visibility of these variables to one device so that the same name can be used for variables belonging to different devices, saving the user from having to make up new variable names for every device.

A third class of variable can be used to permanently store values which can be referenced and modified by any device control string. at any time These variables are "public" variables. Of course all global variables must have unique na mes.

How do we know the difference between the different variable types ? The names of temporary variables start with an exclamation mark. The names of private variables start with an asterisk. The names of public variables start with a character other than an exclamation mark, an asterisk or a dollar sign, which is reserved.

Type	Leading Character	Purpose	Scope	Example
Temporary	Exclamation (!)	To store temporary values within a single control string.	A stored value is retained only within a single device and the variable is deleted after the control string is processed.	sv(!X,10)v(!X) will display "10" but only in one device. v(*X) in another device will not display the stored value of "10".
Private	Asterisk (*)	To store permanent values within a	A stored value is retained only within	sv(*X,10)v(*X)

		single device.	a single device and it's value is retained until it is modified again.	
Public	No prefix character	To store permanent values accessible by all devices.	Any device can read or modify the value, which is retained until it is re-modified.	sv(GLOBAL1,15)v(GLOBAL1)

13.2 Using custom functions

Control strings used to program the operation of displays, resource outputs and GPI outputs can become quite complex. Often the same logic must be replicated in several, or many, places within a configuration. Under these conditions it makes sense to break the task of controlling system outputs into smaller pieces and relegate them to a place outside of the programmed device. This is where custom functions become useful.

Custom functions are just global variables which contain control strings. However using the V( ) function to read such a global variable merely displays the control string itself. In order to evaluate a global variable as a control string, it is necessary to pass it to a special function called FN( ).

The procedure for defining a function is as follows:

1. Open the Global Messages dialog box.

2. "Add" a function name such as "GETCOLOR".

3. Type the desired control string into the "Contents" field of the dialog box. For example you might have something like "if(pgm(S1::1),ac(85),ac(170))" (which would return either a red colour code or a green colour code depending on whether a switcher certain source is onair).

4. Close the dialog box.

5. To use the function in a control string for a display, GPI output or resource output control, type it, for example, as fn(GETCOLOR). In this case the contents of GETCOLOR global variable will be evaluated.

Now if we were to program something like "fn(GETCOLOR)CAM1" into an Image Video display, “CAM1” would be displayed as in red when switcher input 1 goes to air, otherwise it would be displayed as green.

Now this function would be much more useful if we could use it more than one place. However, in it’s current form, it is only useful if we are interested in what switcher input 1 is doing. What if we want the same logic for a number of different inputs on a switcher ?

To do this we can modify GETCOLOR as follows: " if(pgm(v(!S)),ac(85),ac(170))". In this case we are reading the input of interest from a temporary variable called "!S" ("S" chosen arbitrarily, standing for "source"). In a number of displays we could the program:

sv(!S,S1::1)fn(GETCOLOR)CAM1
sv(!S,S1::2)fn(GETCOLOR)CAM2
sv(!S,S1::3)fn(GETCOLOR)CAM3
sv(!S,S1::4)fn(GETCOLOR)CAM4

An advantage of this scheme is that if we should ever change our minds about what colour to use, we could change it in one place and it would change automatically in all displays.

This is a trivial example, and in fact we would more like ly use the TSS( ) function and a long name assigned for each switcher input to do what we have done here. However, it gives an idea as to what can be done with custom functions and variables.

14 Using the Tally System Console Export / Import functions

14.1 Rules and Caveats

The import / export function in the Tally System Console is powerful but must be used with care. Note the following rules and caveats when using these functions:

1. The spreadsheet file to which you are exporting will not be created by the exp ort function: you must create the spreadsheet file before doing the export. This can normally be done by right-clicking on an open folder and clicking "new" -> "Excel Spreadsheet".

2. All resource interconnections, resource interconnection "ends", displays, resource items, output controls, global messages and GPIs are merged into the existing .TSC document by the import function. Therefore any of the above types of objects which have been removed or renamed in the spreadsheet will still appear in the .TSC document under their original names after the import function is used, when you think you may have deleted or renamed them. In the case of a rename, both the old object and a renamed new object will appear in the .TSC file.

3. Any changes to the content of interconnections, resource interconnection "ends", displays, displays, resource items, output controls, global messages and GPIs will be imported/exported properly. For example a change of programming of the contents of a display done in a spreadsheet will overwrite the original programmng of a display in the .TSC file when the spreadsheet is imported into the .TSC file. As long as only object contents are edited, rather than their names or existances, then caveat #2 can be ignored.

4. None of the resource devices (found in the "Name" list of the "Configure Resource Device" dialog box) are exported by the Tally System console. This means that importing a spreadsheet into an empty .TSC file may result in a .TSC file containing only virtual resource devices with the same names as the original resource devices (the resource devices are created because they are mentioned in the spreadsheet in various places, but the import function cannot know the type of each resource device and so creates them as virtual devices).

5. When adding a line to any page of an exported spreadsheet, attention must be paid to the size of the "Named Range" that encompasses each page of spreadsheet data. Only lines and columns within each named range will be imported by the Tally System Console. The number of columns in each named range is fixed, but the number of rows may expand or contract depending on the number of entries on each page.

   To set or check the size of a page's named range in Excel, click on "Insert" -> "Name" -> "Define". Click on the named range of interest then click on "Refers To". A dotted outline will indicate the size of the range. Using Shift-UpArrow/DownArrow allows you to easily change the number of rows in the range before clicking on "OK".

   Note that using Excel's "Insert Row" or "Delete Row" column will automatically adust the number of rows in the named range. Named range sizes tyically become a problem when information is typed or pasted into the empty line after the last used row on the page. Without adjusting the named range, such a line or lines will be ignored by the import function. Make a practice of checking the size of each named range before exiting and importing your spreadsheet.

6. When creating a configuration from scratch using a spreadsheet, first make a dummy .TSC file containing one of each of a resource interconnection, a display, a resource item, an output control, a global messages and a GPI output, then export the .TSC file to a spreadsheet. This will create one of every possible type of data page in the spreadsheet, and give you some examples to work from.

7. Strings longer that 256 characters in any field will be truncated to 256 characters.

14.2 A Fairly bullet-proof procedure for export / import

1. When creating your configuration for the first time in the Tally System Console, first enter the resource devices, including interface numbers, comm ports, and types, then, *before entering any other configuration data*, save the file as "BASE.TSC". This will be your import base file, containing all of the resource devices which will not be exported by the Tally System Console.

2. On the other hand, if you have already created your complete configuration and wish to do an export / import, make a base file by deleting all resource interconnections, displays, resource items, output controls, global messages and GPIs, then save it out as your base file. Use the keyboard shortcuts to do the removals, which will be much quicker than using the mouse. These resources can be located as follows:

   Resource Interconnections: Ctrl-Shift-F9, click on "Remove" or enter "Alt-V" until all entries are removed.

   Displays: Ctrl-F10, click on "Remove" or enter "Alt-V" until all entries are removed.

   Resource Items: Ctrl-F9, click on "Remove Item" or enter "Alt-I" until all entries are removed.

   Output Controls: Ctrl-F9, click on "Output Controls", click on the first "Output" for each "Resource" and "Remove" all outputs (click "Remove" or enter "Alt-V" until all entries are removed.

   Global Messages: Ctrl_Shift-F8, click on "Remove" or enter " Alt-V" until all entries are removed.

   GPIs: Ctrl-Shift-F10, click on "Remove" or enter "Alt-V" until all entries are removed.

3. Export your configuration .TSC file to an newly-created empty spreadsheet, make your changes to the spreadsheet, then open the BASE.TSC file using the Tally System Console, and import the modified spreadsheet into it. Then save out the Tally System console as a file other than BASE.TSC, overwriting the original .TSC file if you wish.

This procedure will ensure that changes made to remove or rename objects in the Tally System Console are saved accurately.

14.3 Other possible pitfalls in export / import

1. The information in certain columns will be restricted to certain keywords. For columns other than the ones you are interested in changing, copy information from other rows, rather than filling in the information yourself. In situation where you wish to change a keyword, export an example of what you want from the TSC to obtain the correct keyword.

2. Look out for situations such as duplicate object names. For example, there should never be two resource interconnections entries with the same name.

3. The first two colums in the "DisplayUnit" and "DisplaySection" pages must contain identical names and serial numbers. Note that for dual or triple displays, the "DisplayUnit" page will contain one entry for each display, while the "DisplaySection" page will contain multiple entries, one for each section, but with identical names and serial numbers.

4. When creating new displays in the spreadsheet, and if you are interested in using the display layout pages (F3 in the Tally System Console), you should take care of the entries in the "LayoutH" and "LayoutV" columns, which lays out the coordinates for each display in the layout pages. Often it is easier to create the new displays in the Tally System Console, especially if you have a consecutive set of serial numbers to work with, than do it in the spreadsheet, since the TSC will auto-fill the serial numbers and names for you. You can easily rename the displays to your liking in the spreadsheet. Be sure to use the CTRL-W function in the Tally System Console to make your dual or triple displays before exporting your starting configuration.

In general, be careful of information you enter in the spreadsheet, keeping in mind that the Tally System Console does a lot of checking not done by the spreadsheet. For the more repetitive steps of simply adding objects to the configuration, it is often easier to add all of the required objects in the Tally System Console, then edit their contents in the spreadsheet, allowing the advantages of safe creation of information enjoyed in the Tally System Console along with the easy editing of data provided by spreadsheet programs.

Appendix A - GPI Address Chart

The following chart is useful for calculating values used in the GPI outputs dialog box, and in the IV( ) function.

System-wide Connector Number	Channel in Connector	Address	System-wide Connector Number	Channel in Connector	Address	System-wide Connector Number	Channel in Connector	Address	System-wide Connector Number	Channel in Connector	Address
1	1	0	5	1	32	9	1	64	13	1	96
1	2	1	5	2	33	9	2	65	13	2	97
1	3	2	5	3	34	9	3	66	13	3	98
1	4	3	5	4	35	9	4	67	13	4	99
1	5	4	5	5	36	9	5	68	13	5	100
1	6	5	5	6	37	9	6	69	13	6	101
1	7	6	5	7	38	9	7	70	13	7	102
1	8	7	5	8	39	9	8	71	13	8	103
2	1	8	6	1	40	10	1	72	14	1	104
2	2	9	6	2	41	10	2	73	14	2	105
2	3	10	6	3	42	10	3	74	14	3	106
2	4	11	6	4	43	10	4	75	14	4	107
2	5	12	6	5	44	10	5	76	14	5	108
2	6	13	6	6	45	10	6	77	14	6	109
2	7	14	6	7	46	10	7	78	14	7	110
2	8	15	6	8	47	10	8	79	14	8	111
3	1	16	7	1	48	11	1	80	15	1	112
3	2	17	7	2	49	11	2	81	15	2	113
3	3	18	7	3	50	11	3	82	15	3	114
3	4	19	7	4	51	11	4	83	15	4	115
3	5	20	7	5	52	11	5	84	15	5	116
3	6	21	7	6	53	11	6	85	15	6	117
3	7	22	7	7	54	11	7	86	15	7	118
3	8	23	7	8	55	11	8	87	15	8	119
4	1	24	8	1	56	12	1	88	16	1	120
4	2	25	8	2	57	12	2	89	16	2	121
4	3	26	8	3	58	12	3	90	16	3	122
4	4	27	8	4	59	12	4	91	16	4	123
4	5	28	8	5	60	12	5	92	16	5	124
4	6	29	8	6	61	12	6	93	16	6	125
4	7	30	8	7	62	12	7	94	16	7	126
4	8	31	8	8	63	12	8	95	16	8	127

To use the chart, find the system-wide I/O connector number, starting from the first connector on the 4211 unit with the lowest DIP switch setting. Subsequent connector numbers are in order of DIP switch setting and I/O connector number. Then determine a channel number from 1-8 within the connector, in order of pin numbering. Use these two values to look up the GPI input or output address.

For example, to find the address of the fourth channel in the third connector on the second GPI unit (determined as the unit with the second-highest DIP switch setting), where each GPI unit has five connectors:

- The system-wide connector number will be 5 + 3 = 8.
- The channel number within the connector will be 4
- The address looked up will be 59.

Appendix B – Setting The Number of RDU1500/1600 Display Sections

To set a display for Single, Dual or Triple mode:

1. Put the Tally System Console online with the TSI1000. Your PC must be within sight of the display your are setting.
2. Press F6 and select the display you wish to change.
3. Press CTRL-F3.
4. If a menu does not appear on the display, follow the procedure below for enabling the display menus.
5. Press "2" ("setup") and 2 ("width").
6. Press "1" until you get a either (1) a display with all ones (2) a display with ones on the left and twos on the right or (3) a display with ones on the left, twos in middle and threes on the right, corresponding to a Single, Dual or Triple type. Continuing to press "1" will cause the display to cycle through the three types.
7. Press "7" ("Done").
8. Note that you can confirm the type of display (single, double, triple) by pressing 2 ("Select"). You may then press 7 to get the ">Setup" menu back or simply wait for 5 seconds for the menu to return by itself.
9. In the ">Setup" menu, press 1 ("ID").
10. Press 1 ("ID1") and enter three zeroes to clear the ID value to zero. Press Enter.
11. Press 2 ("ID2") and enter three zeroes to clear the ID value to zero. Press Enter.
12. Press 3 ("ID3") and enter three zeroes to clear the ID value to zero. Press Enter.
13. Press ESC to return to ">Setup".
14. Press "8" ("Save ?") and respond with "Y" to the prompt.
15. Press CTRL-F3 to exit the menus.
16. If you had to enable the menus, disable them again as described below.

Enabling and disabling display menus

1. Get the serial number of the display.
2. If you have already pressed CTRL-F3 once in an attempt to enable the menus, press it again to exit the menu mode.
3. Press CTRL-F3.
4. Enter the following string: %5UXXXXX%15N%-15N%254W%-254W, replacing the XXXXX with your serial number. The "5" in %5U is equal to the length of the serial number.
5. To check whether the menu is now enabled, enter %2x to enter the menu and ESC to get back out.
6. Press CTRL-F3 to exit menu mode.
7. To disable the menus follow the above procedure, but enter %5UXXXXX%14N%-14N%254W%-254W, where XXXXX is again a display serial number.

Appendix C – Setting The TSI1000 IP Address

1. Connect a keyboard and a VGA monitor to the TSI1000.

2. With the TSI1000 running normally, enter the keysequence ALT-1-2-3 (hold down the ALT key while pressing key "1" then "2" then "3".

3. Wait for the TSI1000 to reboot to the DOS prompt.

4. Enter "setup" (not including quotes) followed by a space character, followed by an IP address in number-dot format (for example 192.168.1.1), then press ENTER. For example, the set the IP address 192.168.1.1, type "setup 192.168.1.1" and ENTER.

5. Some information will scroll by on the VGA monitor, then six pages, each followed by a prompt to "Press any key", will be presented. Pressing ENTER three times will display a page showing the new IP address. Continue to press ENTER until the DOS prompt is displayed.

6. Type the word "BOOT" (not including quotes) followed by the ENTER key to restart the TSI1000.

Appendix D – Setting The TSI1000 Interface Number

Each TSI1000 has an "interface number" between 1 and 16 stored on it's flash disk. Because it is possible for a number of TSI1000s to be networked together, either for redundancy or to increase the number of available serial interface ports, it is necessary to assign each routing, switching and display device to a particular TSI1000 for connection purposes.

The interface number is used when configuring a TSI1000 tally system to denote the TSI1000 to which a particular device will be connected. For example, when configuring an Image Video RDU1510 under-monitor display, both a serial port number and an interface number is required to be specified. This is also true of all routing and switching devices, as well as GPI outputs.

TSI1000s are normally programmed from the factory with an interface number of 2, and this is the default value set when a new device is programmed. The interface number of a TSI1000 is required to be changed only when more than one or more TSI1000s are networked for the purpose of extending the number of available serial ports. Two TSI1000s networked for the purpose of redundancy will have the same interface number and each of those units may be left with a interface number of "2".

To change the interface number of a TSI1000:

1. With the TSI1000 online and with it's COM1 port directly connected to the Tally System Console PC, open the "Configure System Interface" dialog box. There should be at least one TSI1000 interface number and IP address listed under "Interface".

2. Click on the TSI1000 which needs the interface number changed.

3. Click on "Change". A "Change System Interface" dialog box will pop up.

4. Change the value of "New Number" to the required interface number.

5. Close the pop-up dialog box and the "Configure System Interface" dialog box.

6. The TSI1000 will reboot and have the new interface number when it comes back online.

Appendix E –TSISETUP: The TSI1000 Maintenance Utility

1. Overview

TSIsetup is a program available in TSI1000 version 1.82 and higher and is used to administer the TSI1000 flash disk. The program is operated via the TSI1000's COM1 port (same port as used for the Tally System Console). Files can be transferred to and from the TSI1000's flash disk using a PC equipped with a serial port and a standard serial communications program such as Hyperterm. Note that the communications program must support the ZMODEM file transfer protocol.

The TSIsetup program can be invoked either while the TSI1000 is running or from DOS. The former method requires only a serial connection to COM1, the Tally System Console port. The latter method requires that a VGA monitor and keyboard be connected to the TSI100.

2. Invoking TSIsetup

2.1 Invoking TSIsetup from Hyperterm

This method of invoking Hyperterm works while the TSI1000 is in operation. If the TSI1000 is very busy, this can lead to communications errors when transferring files on and off the TSI1000, in which case it may be preferable to invoke TSIsetup directly as described in section 2.2.

To invoke TSIsetup while the TSI1000 is running:

1. Exit the Tally System Console Program.

2. Start Hyperterm and set the following properties:

   - 115200 baud, 8 data bits, no parity, 1 stop bit.
   - Direct to COM1 or COM2.
   - Zmodem file transfer protocol.
   - Save the setup.

3. When Hyperterm first starts the TSI1000 could still be transmitting in an attempt to contact the Tally System console. This will appear as garbage in Hyperterm because of the differing baud rates. Wait for the transmissions to cease, which should occur within approximately ten seconds.

4. Three or more seconds after exiting the Tally System Console, Press CTRL-BREAK. Wait for the prompt which asks for the entry of three plus sign characters (+++). The characters must be entered within three seconds, or CTRL-BREAK must be pressed again.

5. Enter SETUP and ENTER. The TSI1000 will shut down and the TSIsetup prompt will appear.

2.2 Invoking TSIsetup From the TSI1000 keyboard

To invoke TSISETUP from a keyboard connected directly to the TSI1000, so that file transfers can occur without the TSI1000 firmware running:

1. Start Hyperterm and set the following properties:

   - 115200 baud, 8 data bits, no parity, 1 stop bit.
   - Direct to COM1 or COM2.
   - Zmodem file transfer protocol.
   - Save the setup.

2. Boot the TSI1000 into DOS by entering the ALT-1-2-3 key sequence at the TSI keyboard. Alternately, the TSI1000 can be powered down and back up, and the CTRL-BREAK key repeatedly pressed during boot-up to interrupt the execution of AUOTEXEC.BAT and get the DOS prompt.

3. Type “DOSBOOT TSISETUP.BIN” to start TSISETUP. The TSIsetup prompt will appear.

4. In Hyperterm, press CTRL-BREAK. Wait for the prompt which asks for the entry of three plus sign characters (+++). The characters must be entered within three seconds, or CTRL-BREAK must be pressed again. TSIsetup is now ready to use.

3. TSIsetup commands

The available TSIsetup commands are as follows:

- RZ: Receive a file using the Zmodem protocol.
- SZ: Send a file using the Zmodem protocol.
- DIR: list files, similar to DOS DIR command.
- DEL: delete a file.
- REN: rename a file.
- CRC: get a file CRC, to confirm file integrity.
- EXIT: boot into DOS.
- TSI1000: Start the TSI1000.
- REBOOT: restart the TSI1000 and reenter TSIsetup.

3.1 RZ: Receive a file using the Zmodem protocol.

Syntax: RZ <ENTER>

RZ is entered followed by ENTER to start TSIsetup waiting for a Zmodem file transfer to start. Once RZ has been entered, select the Zmodem file send command, select the file to be sent, then start the transfer. Wildcards can be used in Hyperterm to send multiple files in one transfer session.

3.2 SZ: Send a file using the Zmodem protocol.

Syntax: SZ <filename1> <Filename1> …<ENTER>

Start the Zmodem receive task in the communications program then enter SZ with a list of filenames followed by ENTER. Hyperterm starts the Zmodem reœive task automatically upon receiving the Zmodem file transfer request, so if Hyperterm is used, entry of the SZ command is all that is required to start a file transfer.

3.3 DIR: list files.

Syntax: DIR <filespec> <ENTER>

Th normal DOS (*, ?) wildcards are allowed. The names of files on the flash dish along with their sizes are listed, and the total number of bytes in the listed files is also displayed.

3.4 DEL: delete a file.

Syntax: DEL <filespec> <ENTER>

Th normal DOS (*, ?) wildcards are allowed. Files necessary for the communicating with the TSI1000 or necessary for it basic operation cannot be deleted.

3.4 REN: rename a file.

Syntax: REN <old filename> <new filename> <ENTER>

The given file is renamed.

3.6 CRC: get a file CRC, to confirm file integrity.

Syntax: CRC <filespec> <ENTER>

Th normal DOS (*, ?) wildcards are allowed. The names of files on the flash dish along with their CRCs and sizes are listed. The file CRC is useful for checking the integrity of the files on the disk. A utility is available for checking the CRCs of the original files for comparison purposes, and files released by Image Video for transfer to the TSI1000 are documented with their CRC values for comparison.

3.7 EXIT: boot into DOS.

Syntax: EXIT <ENTER>

The TSI1000 well reboot and restart in DOS.

3.8 TSI1000: Start the Tally System Controller.

Syntax: TSI1000<ENTER>

The TSI1000 will begin to operate its prime function as a tally system controller.

3.9 REBOOT: restart the TSI1000 and reenter TSIsetup.

Syntax: REBOOT<ENTER>

The TSI1000 will reboot and restart TSIsetup.

Appendix F – Upgrading the TSI1000 software

There are several means available for upgrading the TSI1000 software. The usual method is via FTP, described in section 4 of this appendix called "Upgrading TSI1000 software using FTP".

Note: When upgrading TSI11000 software installed before or during July 2003 with software released after that time, it may be necessary to reload your system configuration from the Tally System Console due to changes in the flash-disk file format. After the new software is loaded, see section 7 on "After You Upgrade" at the end of this appendix to complete the upgrade process.

1. Upgrading TSI1000 software using the Tally System Console program

1. Have a PC running the Image Video Tally System Console program running and in communication with the TSI1000.

2. Exit the Tally System Console program.

3. Follow the instructions provided by Image Video to extract a file called TSI1000B.EXE from the release media (disk, email, etc.).

4. Right-click on the console program icon on your desktop, select "Properties" then the "shortcut" tab at the top of the dialog box. Click on the "Find Target" button. A window will pop up, containing TSCONS.EXE.

5. Copy TSI1000B.EXE to the folder containing TSCONS.EXE.

6. Turn off the TSI1000 for about five seconds and turn it back. Wait until the normal running LEDs have come back to normal and the CPU LED has stopped flashing.

7. Start the Image Video Tally System Console program. A prompt asking whether you wish to upgrade the TSI1000 software will be presented. Click on "Yes". A progress box will open up. The transfer will take about fifteen minutes.

8. Once the upgrade has completed, exit the console program and reboot the TSI1000. The new software will now be running.

9. IMPORTANT: delete the TSI1000B.exe file from the TSCONS folder. (Otherwise the software upgrade prompt will occur whenever the console program is restarted).

10. Restart the console program.

11. See the section below on "After You Upgrade" below on any further actions you may need to take to complete the software upgrade process.

2. Upgrading TSI1000 software using Windows "HyperTerminal"

This software upgrade option is available only on TSI1000 versions 1.82 or later.

1. Follow the instructions provided by Image Video to extract a file called TSI1000B.EXE from the release media (disk, email, etc.).

2. Start Hyperterm. If the Hyperterm starts up “connected”, click on “Call” and “Disconnect”.

3. Click on File > Properties and in “Connect Using” select “Direct to COM1” or “Direct to COM2” (depending on which port your PC is using to talk to the TSI1000.

4. Click on “Configure” and set communications parameters 115200 Baud, 8 data bits, no stop bits. Click on “OK”.

5. Click on “Call” to connect to the TSI1000. If any garbage characters are received, wait until they cease.

6. Three or more seconds after exiting the Tally System Console, press CTRL-BREAK. Wait for the prompt which asks for the entry of three plus sign characters (+++). The characters must be entered within three seconds, or CTRL-BREAK must be pressed again. The TSI1000 will respond with “Zmodem installed”.

7. Type “sz TSI1000B.EXE” (no including quotes) and press enter. The TSI1000 will respond with “Zmodem transmitter starting” and Hyperterm will automatically receive the TSI1000B.EXE file from the TSI1000, usually placing it in the "Hyperterm" directory. When done, after about four minutes, the TSI1000 will transmit the "Zmodem transmitter done" prompt. (This step is advisable in order to keep a copy of the currently operational software, just in case it is necessary to return to that software version. Confirm that the file has been received before contin uing.)

8. Type “rz” (no including quotes) and press enter. The TSI1000 will respond with “Zmodem receiver starting”.

9. Click on “Transfer” and “Send File”. Under “Filename” enter the path and file name for your copy of the upgrade TSI1000B.EXE file. You may a lso use the “Browse” function to locate the file.

10. Click on “Send” to start the file transfer, which should take about 4 minutes. When the transfer is done, the HyperTerminal file transfer dialog box will disappear and the TSI1000 will respond with “Zmodem receiver done”.

11. Power off the TSI1000 for five seconds then turn it back on. The new software will begin running.

12. See the section below on “ After You Upgrade” below on any further actions you may need to take to complete the software upgrade process.

NOTE: if there are communications errors using this method, instead of step 6 a more direct method of invoking the Zmodem transmitter on the TSI1000 can be used, using a keyboard and monitor connected to the back of the TSI1000 can be used. This method is described in Appendix E Section 2.2.

3. Upgrading TSI1000 software using Laplink 3

1. Follow the instructions provided by Image Video to extract a file called TSI1000B.EXE from the release media (disk, email, etc.).

2. Attach a keyboard and monitor to the TSI1000, which must be running. Hold down the ALT key and quickly the enter three-key sequence 1-2-3. This should reboot the TSI1000 into DOS. (See note 1).

3. Connect a parallel Laplink cable between the TSI1000 and a Windows computer containing the TSI1000 software. You can also use the serial port for a Laplink transfer. (See note 2)

4. Type LL3 at the TSI1000 keyboard to start LAPLINK.

5. Run Laplink on the PC. You may have to restart the computer in DOS mode (using F8 during the Windows startup and selecting "Command only" mode) in order to run LAPLINK.

6. Use the left/right keys to select PC directory (one Laplink pane will contain the PC directory and the other the TSI1000 directory).

7. Use the up/down arrow keys to select the TSI1000B.EXE file on the PC. To change directories, use the “L” (Log) command.

8. Use the “C” (Copy) command to transfer the TSI1000B.EXE file to the TSI1000.

13. Power off the TSI1000 for five seconds then turn it back on. The new software will begin running.

14. See the section below on “ After You Upgrade” below on any further actions you may need to take to complete the software upgrade process.

NOTE 1: Older software versions may not support this feature, so if the TSI1000 does not reboot as a result of the Alt-1-2-3 sequence, cycle the power on the TSI1000 and press CTRL-BREAK while rebooting in order to break out of the AUTOEXEC.BAT startup.

NOTE 2: LL3 serial mode:
1. Press "O" for "Options".
2. Use down-arrow to get to "Transfer Mode".
3. Use left-arrow to select "serial".
4. Use down-arrow to get to "Port".
5. Use left-right arrow to select the port (See note 3)
6. Press "S" and ENTER to save the new options.
7. Press ESC to leave "Options".

NOTE3: COM1 and COM2 markings on the TSI1000 are opposite the COM1 and COM2 denoted in Laplink: if connected to the TSI1000 COM1, select COM2 in Laplink, and vice versa.

4. Upgrading TSI1000 software using FTP

Before beginning: If the network port of the TSI1000 is not used in your system then the factory setting of the TSI1000 is probably 192.168.0.202. If you are using the network port but do not know the IP address of the TSI1000, check the section below on "Finding the TSI1000's IP address".

1. Make a physical network connection between your TSI and the PC (using a crossover network cable or a hub).

2. Set your PC to be in the same subnet mask as the TSI1000 (the TSI's subnet mask is factory-set to 255.255.255.0 so your PC must have the same first three octets in it's IP address. e.g. if the TSI1000 has an IP address of 192.168.0.202 then your PC must be something like 192.168.0.210). On a Windows PC this means setting the "IP Address" option of your TCPIP network adapter to "Specify an IP Address" with an address, instead of "Obtain a network address automatically".

3. Ping the IP address of the TSI1000 to make sure it is there.

4. If you are running a version of Windows later than Win98, start an internet browser on the PC connected to the TSI1000 and in the "Address" bar enter the "ftp://" then the TSI's IP address: for example, ftp://192.168.0.202 . If you are running an older version of Windows, use a FTP client such as WS_FTP. Some earlier Windows browsers did not allow ftp transfers to the remote client.

   Field Code Changed

5. If you wish to first download the old version of TSI1000B.EXE, and you are using a browser, drag the TSI1000B.EXE file from the client area of the browser to some location other than where the new TSI1000B.EXE file is stored. If you are using an FTP client, point the local directory window to some location other than where the new TSI1000B.EXE file is stored, click on TSI1000B.EXE in the remote window, then click on the transfer button to get the file from the TSI1000.

6. To upload the new software to the TSI1000, if using a browser, drag the TSI1000B.EXE file to the client area of the browser to send the file to the TSI1000. If using an FTP client, point the local directory window to the location of TSI1000B.EXE, click on the file, then click on the transfer button to send the file to the TSI1000.

7. To use the command-line FTP available in most versions of Windows, see the section below.

8. See the section below on "After You Upgrade" below on any further actions you may need to take to complete the software upgrade process.

5. Upgrading TSI1000 software using Command-line FTP

1. Follow steps 1-3 in "Upgrading TSI1000 software using FTP". Your new TSI1000B.EXE file should be stored to a directory other than the current one.

2. Click on the Windows "Start" button, click on "Run" and type "FTP"Open a DOS or command-line window window.

3. Type "FTP" followed a space and the IP address of the TSI1000 and press <Enter> (e.g. FTP 192.168.0.202<Enter>.

4. At the "User" prompt hit Enter, and do the same at the"Password" prompt.

5. Type "Binary"<Enter>

6. If you wish to first download the old version of TSI1000B.EXE, type “Get TSI1000B.EXE”.

7. Assuming that “TSI1000B.EXE” is stored at C:\TEMP, type "Send C:\TEMP\TSI1000B.EXE"<Enter> and wait for the file to be sent.

Type "Bye"<Enter>

9. See the section below on “ After You Upgrade” on any further actions you may need to take to complete the software upgrade process.

To simplify the FTP process, the following 5 lines can be pasted into a batch file (e.g. FTPIT.BAT). This can be done by opening NOTEPAD, pasting and modifying the IP address to the IP address of your TSI1000, then click on “File” and “Save As” to create your batch file. To run the batch file and send the TSI1000B.EXE file to the TSI1000, use Windows Explorer to open the folder containing the batch file and double click on the batch file.

```
echo open 192.168.0.227>ftp.cmd
echo binary>>ftp.cmd
echo send c:\temp\TSI1000B.EXE>>ftp.cmd
echo bye>>ftp.cmd
ftp -A -s:ftp.cmd
```

6. Finding the TSI1000's IP address

Method 1: Get the FTP address from a label on the back or side of the unit. If the IP address has been changed since the TSI1000 was shipped from the factory, the label may be out of date.

Method 2: Connecting a VGA monitor and keyboard to the back of the TSI1000. Press CTRL-PGDN until you get to a screen that says "tsinet events" in the top left corner of the screen. PGDN once to get to "Page 2 of 3". The IP address is on the second line of text on the left (probably pre-pended with "01:" or some other number followed by a colon, which can be ignored).

Method 3: In TSI1000s released after June of 2003, with the Tally System Console online with the TSI1000, create a test UMD display (call it TEST-UMD, do not use the same name as a GPI output). Enter the text “v(_READVAR_TSIADDRESS) into the text area of the display. The display will show the TSI’s interface (ID) number followed by a colon, followed by the IP address.

7. After You Upgrade

When upgrading TSI11000 software installed before or during July 2003 with software released after that time, it may be necessary to reload your system configuration from the Tally System Console due to changes in the flash-disk file format:

1. Update your system software as per the instructions in this appendix (above). Whichever method you have chosen to upgrade the software will specify that the TSI1000 to be rebooted to invoke the new software.

2. When the new software is running, it will check the flash disk format and will remove any files which are out of date from the TSI1000 flash disk. This has no effect on the configuration stored on the configuration PC which runs the Tally System Console.

3. If out of date files are removed from the flash disk, the TSI1000's "CPU" LED will go to a flashing amber state. If the CPU LED remains green after the reboot, no further action is required.

4. If the CPU LED is in the flashing amber state, put Tally System Console online with your TSI1000 as you usually would, allowing it to load the configuration, then reboot the TSI1000. The TSI1000 will come back with a green CPU LED.

5. If you need to revert to your old software (and have first downloaded a copy of the TSI1000B.EXE file), delete the configuration files from the flash disk by attaching a keyboard to the lower PS2 port on the back of the TSI1000, hold down the "ALT" key and quickly enter the key sequence "1,2,C" (no quotes or commas). The TSI1000 will reboot and come back with only the CPU and COM1 LEDs on, and possibly the ENET LED. Then reload your old TSI1000B.EXE file and reload your system configuration from the Tally System Console.

Appendix G – Device-specific setup tips

1. Philips Saturn Switcher Setup

To set up the Philips end of an interface between the Image Video Tally Display System and a Philips Saturn Master Control Switcher, open the Philips Jupiter Configuration Editor, select "Configure" and "MPK Devices". Go to "Edit" and "Add" one line to the device list for each Saturn switcher, as per the following:

Devname: an arbitrary unique name suggestive of the Saturn/Image Video tally system interface (e.g. IMGTLY or SW1TLY).

Devtype: Select MI3040IO.

Exp: Select "No"

Board: The name given to the switcher frame hardware given in the "Network Description" section of the Jupiter Configuration Editor.

Address: A arbitrary unique hexadecimal MPK address which will match the "Device Address" entered for the Saturn switcher in Video Tally Display Console program.

When the MPK port is set up, close the MPK device editor, then go to "Configure", "Switcher output" and select the Venus router. Fill in "Outname" with a router destination name (usually called MAINA and MAINB) for each of the "A" and "B" inputs to the switcher. Also fill in a physical output number under the appropriate level (usually SDV). The other columns are left blank.

Compile and load the configuration into the Jupiter system. See the Philips manual for further details on loading Jupiter configurations.

The TSI1000 will be connected to the MPK bus which interconnects the Philips video processor frame with the Philips master control panel.

To set up the TSI1000 to interface with the Saturn switcher:

1. Start the Tally System Console program online with the TSI1000,

2. Open the "Configure Resource Devices" dialog box.

3. Enter a name for the Saturn switcher under "Name" (e.g. "S1") and click "Add".

4. Click on "Port" and select "BTS Saturn Master Swr. MPK (COM port)" in the "type" dialog box.

5. Set "Interface" to match the interface number of the TSI1000 (usually 2).

6. Set the port to which the Saturn switcher will be connected.

7. Set the “Device Address” to the hexadecimal MPK address entered into the Jupiter configuration editor.

8. “Format” can probably be ignored, as current versions of the TSI1000 have a fixed setting of 38400 baud, 8 data bit, even parity, 1 stop bit, which is the default setting for the Philips MPK port.

9. Repeat steps 3 to 6 to set up a BCS3000/Jupiter/Venus router, which will be required to tally the “MAIN-A” and “MAIN-B” buses serving as external Program/Preset buses for the Saturn switcher.

10. In the “Resource Interconnections” dialog box, setup up interconnections to switcher inputs “A” and “B” from the “MAIN-A” and “MAIN-B” router buses. The physical numbers for these can be found in the Jupiter control panel sets used for the Image Video tally system interface to the BCS3000/Venus/Jupiter router. For example, if the switcher is called S1 and the router is called R1, and the MAINA/B router buses are 000 and 001 on the first level, then setup interconnections which could be called MAINA and MAINB, with origins of R1::000[1] and R1::001[1] and ends of S1::A and S1::B respectively.

2. Sony MVS8000 Setup

1. Go to "Engineering Setup" (button on MVS8000 console control panel).

2. Go to Switcher -> Output and find the physical output to which "P/P PGM" is assigned. Also find "P/P Pvw"'s output if you need Preview tally. The number and name of each bus is in the list headed "Out#/Output". Take note of these output numbers for to use in the next step.

3. Go to Router/Tally -> Tally Enable and assign each of the outputs found for the P/P buses (in step 2) to one of tallies R1,R2,R3,R4 or G1,G2,G3,G4. The four "Red" tallies and the four "Green" tallies in Sony switcher correspond to switcher buses GP1RED, GP2RED, GP3RED, GP4RED, and GP1GRN, GP2GRN, GP3GRN, GP4GRN in the Image Video switcher configuration.

4. Usually Program is assigned to R1 (Red 1) and Preview is assigned to G1 (Green 1). To do this assignment, for each output, use "New" or "Modify" to put the required output numbers into the tally output list (if they are not already there).

5. For each output in the tally output list use the "Enable No." button on the right to assign the tally type for each output in the list. The tally types are entered as numbers 1 to 8 into the Enable keypad as follows: R1=1, G1=2, R2=3, G2=4, etc.

6. Go to Router/Tally -> Serial Tally. Set the tally types which will be used on the serial port. Usually at least R1 and possibly G1 are required. The port to be selected in this menu will be one of DCU1 port 1 or 2, DCU2 port 1 or 2 or Editor Panel port, depending on the Sony switcher port that the TSI1000 will be connected to.

7. Go to Router/Tally -> Router and select "Device" SWR1 or SWR2 (usually SWR1). Select each of Source, Destination and Level keys down the right side of the page and set each to "1" to map the switcher I/O.

8. The RS422 cable to the TSI1000 must cross the Receive and Transmit lines.

3. Pesa Router setup

1. The Pesa Router must use COM2 on the TSI1000 and must be set up as an RS-232 connection, with wiring in place to support RTS/CTS handshaking.

2. The Pesa router interface is a numeric interface using 3-digit values with leading zeroes for all input and output numbers. The first input and the first output are numbered "001". Levels are designated with non-leading-zero numbers starting from 1 enclosed in square brackets at the end of the input/output number (e.g. 001[1] is a valid Pesa I/O number).

3. Note that the I/O numbers are not physical numbers corresponding to the router wiring, but logical numbers taken from the Pesa configuration GUI. To get a list of the numbers, go to the Pesa GUI and navigate to Configuration > Source or Configuration > Destination. Click on "View by Number" and use the numbers in the left column of the listing to set up the TSI1000 configuration for the Pesa router.

1. Use COM1 or COM2 on the Pesa router.

4. Ensemble Avenue 5250 SDI-to-Analog-Video Converter Interface

The Ensemble Avenue 5250 provides a video output containing a text field which can be programmed via an RS422 serial port. The 5250 is treated as a UMD by the Image Video TSI1000.

Although there can be a number of Avenue chassis containing 5250 D/A cards, the serial connection from the TSI1000 to the Avenue system is made to a single chassis. The Avenue system is responsible for distributing the serial data to the other chassis, each of which has an individual serial address.

Each Avenue chassis contains up to 10 5250 slots. Each 5250 card contains 5 D/A channels.

In order to program a 5250 display, use the Tally System Console program to create a UMD display on the TSI1000 serial port which will be connected to Avenue system. To create the display, enter CTL-F10 to invoke the "Configure Display Units" dialog box. Set the display type as "8-color display (Ensemble Avenue 5250)", and click on "Port" to set the TSI1000 serial port to be used for the display.

The name of the display has a specific format which specifies the address of the corresponding display hardware within the Avenue system. The format is:

<Chassis Address><Separator><Module (slot) address><Separator> <Channel address>

Each address is a decimal numeric value. The separators are non-decimal strings, usually a single slash or some other punctuation character. Chassis address values range from 1 to 100. Module address values range from 1 to 10. Channel address values range from 1 to 5. The chassis address is set up using a programming switch and display built into each Avenue chassis.

Example: Display "3/8/4" is the 5250 display at chassis 3, slot 8 channel 4.

To program the contents of the text display, enter a text string into the UMD represented in the Tally System Console as would be done for an Image Video UMD. The text will be displayed in the 5250 channel in white characters.

Text colours and tally blocks may be controlled by using the display extension ("*DE") variable at the beginning of the UMD text edit area. A three-section control string saved to the "*DE" variable will program the left and right tally blocks and the text colour. An example control s tring:

sv(*DE,2;5;1)TEST

This command saves the text string "5;2;1" to the command variable. The text string is divided into three parts by the semi-colons. The first numeric value in the string sets the color of the left tally block. The middle numeric value sets the text colour. The last numeric value in the string sets the color of the right tally block.

The text block colour codes used in the control string are as follows: 0=white, 1=cyan, 2=green, 3=magenta.

The tally block colour codes used in the control string are as follows: 0=white, 1=yellow,2=cyan, 3=green, 4=magenta, 5=red, 6=blue, 7=black. If a tally block colour field is left blank (e.g. sv(*DE,,5,) has both tally block fields blank) then that tally block is turned off.

In the example string given above, "sv(*DE,2;5;1)TEST", the left tally block is green, the text "TEST" is red and the right tally block is cyan.

The usual control strings can be embedded in the display text:

sv(*DE,if(iv(0),2,);if(iv(1),5,0);if(iv(2),2,))TEST

In this exa mple, the three control fields are controlled by the first three GPIs. The left tally block is green if the first GPI input is active, otherwise the left tally block is off. The text goes red if the second GPI is active, otherwise the text is white. The right tally block is green if the third GPI input is active, otherwise the right tally block is off.

The Ensemble 5250 interface is available under license, and the option to use the interface must be purchased from Image Video.

5. Kaleido "Classic" setup

The Kaleido G2 multiviewer in interfaced using the RS422 interface in place of the G2's remote panel port. To set up the G2 RS422 interface, at the Kaleido's keyboard:

1. Press 'M' to open the menu.

2. In "Window Options" set "Text ID" to "On".

3. In "Input Options" set "Settings" to "Global" and "Tally" to "GPI".

4. In "System Options" -> "Options" set "UMD Protocol" to "TSL", "UMD Port" to "Disabled" and Control Port" to "RS422".

5. Use the "LTC RS-422/485" card DB-9 connector to interface the TSI1000. The Receive and Transmit lines of the RS422 cable will need to be crossed.

6. Kayak Production Switcher setup

1. Start the DD35 "SidePanel" program.

2. Right-click on SidePanel to bring up the general menu and click "Install".

3. Click "E-box" and click the "Tally" tab.

4. Check "Red" to set up the program tally.

5. Click a line with "None" in the port column and set the port number to desired physical port.

6. Right-click on each of the Box1, Box2, Box3 columns and set each of them to the unique MPK address to be used to address destinations in the Image Video tally system.

7. To tally the preset bus, check "Yellow" and repeat steps 4-6, again giving each column a unique MPK address.

8. Right-click on SidePanel to bring up the general menu and click "Config".

9. Click on "E-box" and on the "Tally In" tab.

10. Set "PP Main" to the inactive state (defaults to active).

Appendix H – PINOUTS

The pinout for the TSI000 DB9 connectors (COM7-COM12) is as follows:

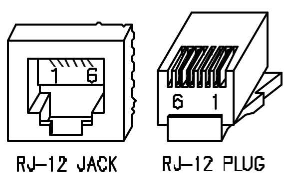
3 - TX+
8 - TX-
4 - TX gnd
7 - RX+
2 - RX-
6 - RX gnd
1 - Chassis gnd
9 - Chassis gnd

The pinout for the 4211 DB9 connector is as follows:

3 - RX+
8 - RX-
4 - RX gnd
7 - TX+
2 - TX-
6 - TX gnd
1 - Chassis gnd
9 - Chassis gnd

<u>TSI1000 RJ12 pinouts</u>

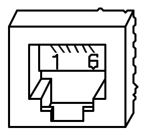
Pin	*Function*
1	Rx-
2	Gnd
3	Tx+
4	Tx-
5	Not used
6	Rx+



NOTE: RDU1500's connected to COM3-COM6 use only the center four conductors, and are a pin-to-pin connection (pin2 to pin2, pin3 to pin 3, etc.)

RDU1500 RS232 connection for testing from a PC

RDU1500 RJ11 connection	*Standard PC RS232 DB-9 port*
1	No Connection
2	No Connection
3	5
4	3
5	No Connection
6	No Connection



RJ-12 JACK

TSI1000 DB9-to-RJ12 Connections for the Image Video Alarm Tally System

For interconnection of the one of the TSI1000 DB9 connectors to the RJ12 connectors on the alarm system, the TSI1000 must receive on the center two pins of the RJ-12 cable coming from the alarm system and will transmit on the two outermost pins of the 6-pin connection. DB9-to-RJ12 adapter (IV Part# 110-0696-02) is available for this purpose. The wiring of the adaptor is as follows:

DB9 pin 3 TX+ to RJ12 pin 6 (Brown*)
DB9 pin 8 TX- to RJ12 pin 1 (Orange)
DB9 pin 7 RX+ to RJ12 pin 3 (Red)
DB9 pin 2 RX- to RJ12 pin 4 (Green)
DB9 pin 1 ground to RJ12 pin 2 (Yellow or Black)

*Standard Telco colours.

The numbering of the Alarm detector RJ12 connector pins is the same as that pictured above for the TSI1000 RJ12 pins in the section on *TSI1000 RJ12 pinouts*.

Model 4211 Parallel Wiring

INPUTS		OUTPUTS	
Pin	Function	Pin	Function
11	Parallel input 1+	3	contact closure output 1
29	Parallel input 1 -	21	contact closure output 1
12	Parallel input 2+	4	contact closure output 2
30	Parallel input 2 -	22	contact closure output 2
13	Parallel input 3+	5	contact closure output 3
31	Parallel input 3 -	23	contact closure output 3
14	Parallel input 4+	6	contact closure output 4
32	Parallel input 4 -	24	contact closure output 4
15	Parallel input 5+	7	contact closure output 5
33	Parallel input 5 -	25	contact closure output 5
16	Parallel input 6+	8	contact closure output 6
34	Parallel input 6 -	26	contact closure output 6
17	Parallel input 7+	9	contact closure output 7
35	Parallel input 7 -	27	contact closure output 7
18	Parallel input 8+	10	contact closure output 8
36	Parallel input 8 -	28	contact closure output 8
1	Model 4211 chassis ground		
20	Model 4211 circuit ground		
19	current limited +5V supply		
37	Model 4211 circuit ground		

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