



TM1 Mk3+ Redundancy: Installation and Operation Guide





Version History

| Issue | Date | Change Details |
|-------|----------|---|
| 1 | 05/11/21 | First draft |
| 2 | 23/05/22 | Second draft |
| 3 | 17/06/22 | Third draft |
| 4 | 30/06/22 | Fourth draft |
| 5 | 12/04/23 | Fifth draft |
| 6 | 10/10/23 | Added multi-drop cabling, TMRP pinout information. |
| 7 | 02/09/24 | Corrected the 'IP Address and VIP assignment example' table on page 7 |
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Introduction

TallyMan TM1 MK3+ redundancy allows TallyMan control systems to continue to operate when an unexpected issue occurs, or a system controller needs to be taken offline for maintenance. It operates on an A->B failover basis: if a failover event occurs then the system will automatically deactivate its Primary controller and activate the Backup controller so that operations can continue. This type of failover system offers protection from events such as power failure, network interruptions or system failure and greatly improves the ability to maintain operations in the occurrence of a failover event.

The TallyMan redundancy system has both automatic and manual failover modes, meaning that an operator can change the failover mode from auto to manual to perform maintenance tasks with minimal disruption to operation.

Terminology

The table below lists the terms used in this guide, along with the abbreviations that appear on the TallyMan Redundancy Panel (TMRP) buttons.

| Term | TMRP Term | Meaning |
|--------------------|--------------|--|
| Primary | Primry | The unit that is expected to be in use during normal operation. Even if it fails over to the Backup unit, it is still called the Primary. |
| Backup | Backup | The unit that is ready to take over from the Primary in the event of a failover. Even if it becomes Active, it is still called the Backup, since it is assumed that normal service will eventually be restored, and the Primary will take control again. |
| Active | Active | The Active TM1 (either Primary or Backup) has functional control over the redundancy system. |
| Standby | Stndby | The Standby TM1 is working correctly and ready to take over functional operations when required. Note the ability to take over control is determined by other settings within the system such as the Failover Mode. |
| Activating | Acting | A TM1 that is in the process of becoming Active. |
| Deactivating | Deactg | A TM1 that is in the process of Deactivating to enter Standby mode. |
| Unavailable | Unvail | A TM1 that is not available to be either Active or in Standby mode. |
| Failover Mode | F.Over | The Failover mode, changes between Auto and Manual failover operations. |
| Automatic Failover | Auto | Automatic Failover mode – The system monitors itself to determine if a failover event has occurred and then implements the failover action. |
| Manual Failover | Manual | Manual Failover mode – The user is free to change over the Active unit manually; while in this mode the system will not failover automatically. |
| Auto Armed | Auto: Armed | Failover mode is in Auto AND the system is ready to act in the occurrence of a failover event. This is only available if the Primary is Active. |
| Auto Triggered | Auto: Trggd | Failover mode is in Auto AND the system has triggered a Failover action. The Backup TM1 is the Active unit. |
| Auto Unavailable | Auto: Unavbl | Failover mode is in Auto. However, the system is not able to act in the occurrence of a Failover event. This could be due to a physical connection issue, network issues or errors in the system. |





System overview

This section explains the basic principles behind a redundant system.

Primary and Backup controllers

The Primary system controller is the main system controller and during normal operation will perform the operational functionality. Once designated as the Primary during configuration, the system controller will always be the Primary within the system until the configuration changes.

The Backup system controller is also designated during configuration and is always the Backup system controller in the redundancy system. In normal operation the Backup will operate in Standby mode whereby it is continuously synchronised with the Primary and monitors the Primary's health. In the event of a Failover, the Backup will assume control by Deactivating the Primary and becoming Active.

Note that the synchronisation is from Primary to the Backup. Once the Backup becomes Active then the Primary will not remain synchronised with the Backup. Restoring the Primary to be the Active system controller is a Manual operation, at this point the Backup will return to Standby mode and synchronise itself with the Primary again.

Active system controller

The Active status denotes the system controller that is currently actively controlling the system. Either the Primary or Backup can be active, only one can be Active at any time. Note the Primary is always the Primary and the Backup is always the Backup, it is the Active state that determines which unit is currently in control.

Writing configurations

When using the TallyMan configuration software, unless connected to the system, all configuration is performed offline. Configuration files are always written to the Primary system controller using the NIC1 IP address as defined in the configuration. Upon receiving a new configuration, the Primary will load the configuration file and reconfigure itself accordingly to establish which mode to run in and whether it is designated as Primary or Backup. Once it has determined it is the Primary and finished loading, it will then automatically write the configuration to the Backup unit, which will then go through the same process to determine its mode and function.

Connecting to the system

Each system controller has two Ethernet NICs and can thus support two separate networks. Writing configurations and connecting to the system is performed using the static IP address assigned to these NICs. You **must** use NIC1 to connect to the system.

Within a redundancy system there is also a virtual IP address assigned to each NIC. This is used for communications to equipment outside of the redundancy 'bubble'.

Ethernet

Each TM1-Mk3+ unit can support two separate networks to perform control functions. For a redundant system, both units must use the same subnets for each NIC. For example, if NIC 1 of the Primary TM1-Mk3+ is on the subnet 192.168.10.XXX then the Backup unit's NIC 1 must also use the subnet 192.168.10.XXX. See [IP Address and VIP assignment example](#).

Each NIC port also hosts a Virtual IP address (which must be on the same subnet as the permanent IP address) that is defined in the TallyMan configuration software (as described below). This is different to the static IP addresses that are configured via the front panel of each unit and is used as part of the redundancy operations.



The NIC 1 port is the uppermost Ethernet port on the rear of the TM1-MK3+ system controller. NIC 1 supports the redundancy system and is used for communications between the units. Connection to external equipment can be via either of the NIC ports.

Virtual IP Addresses (VIPs)

The system utilises VIPs to simplify any external communications to either TSL equipment (such as control panels or GPIO expansion) and to third-party equipment (such as routers and switchers). The VIPs (one per NIC) are dynamically applied to the currently active unit. In the event of a failover, either manual or automatic, the VIP is removed from the previously active unit and then applied to the newly active unit. This mechanism allows for an almost seamless transition in the event of a failover, with the same IP address being used so that external equipment can continue to communicate to the TallyMan control system.

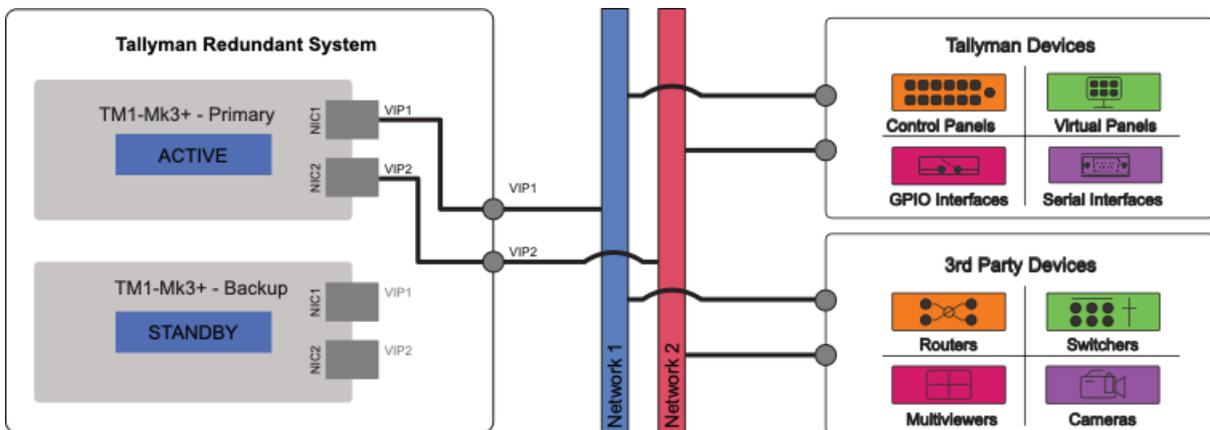
The VIP mechanism has a failsafe to prevent both TM1-Mk3+ system controllers using the same address at the same time. In most cases, the VIP is disabled from the deactivating unit then enabled to the activating unit. The activating unit will not enable the VIPs until it can be certain the VIPs have been disabled on the deactivating unit. If this procedure cannot be completed, the Backup unit can shut down the Primary unit to ensure that the VIPs are not being used.

IP Address and VIP assignment example

The table below shows some example settings for IP addresses and VIPs on TallyMan equipment in a redundant setup.

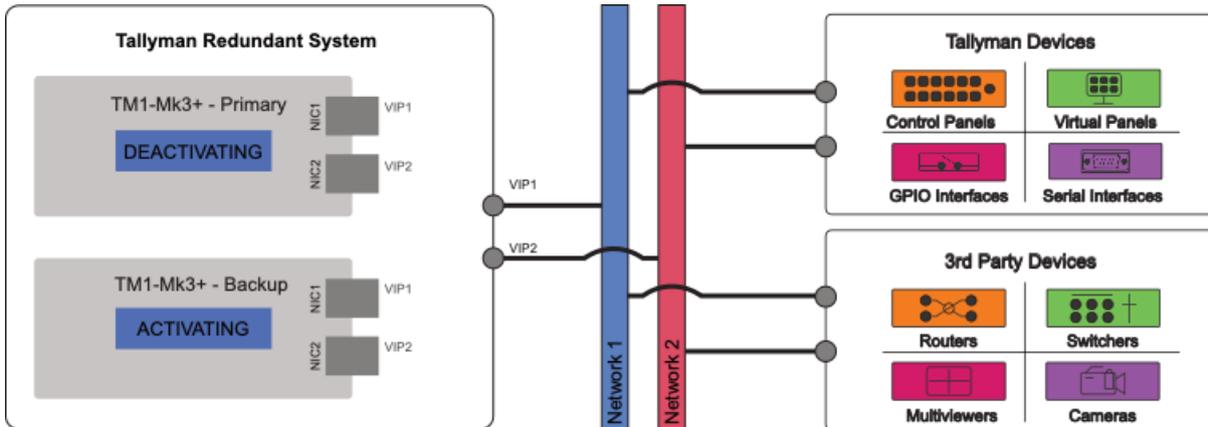
| | Primary | Backup | VIP | TMRP |
|--------------|--------------|--------------|--------------|--------------|
| NIC 1 | 192.168.10.1 | 192.168.10.2 | 192.168.10.3 | 192.168.10.4 |
| NIC 2 | 192.168.20.1 | 192.168.20.2 | 192.168.20.3 | N/A |

Under normal operation, the Primary is Active, and hosts the Virtual IP addresses:

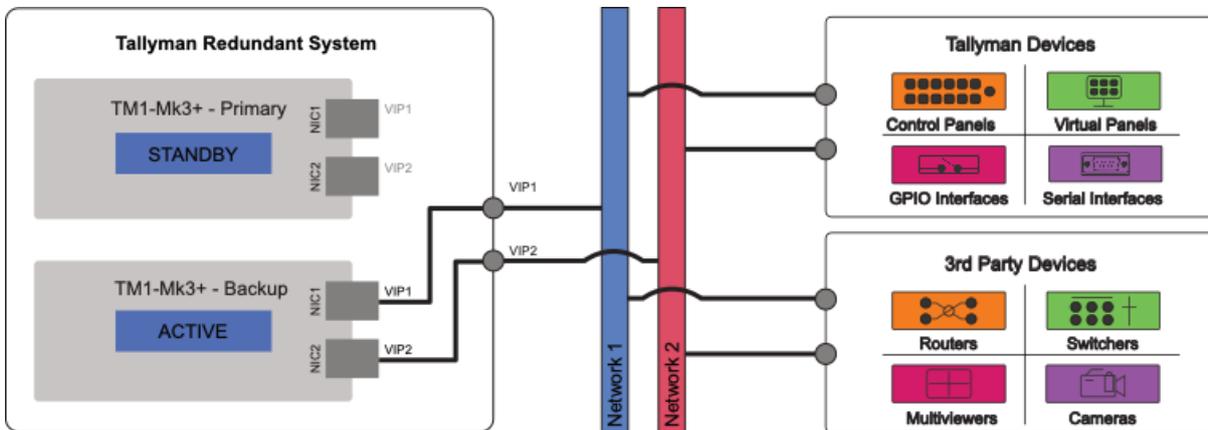




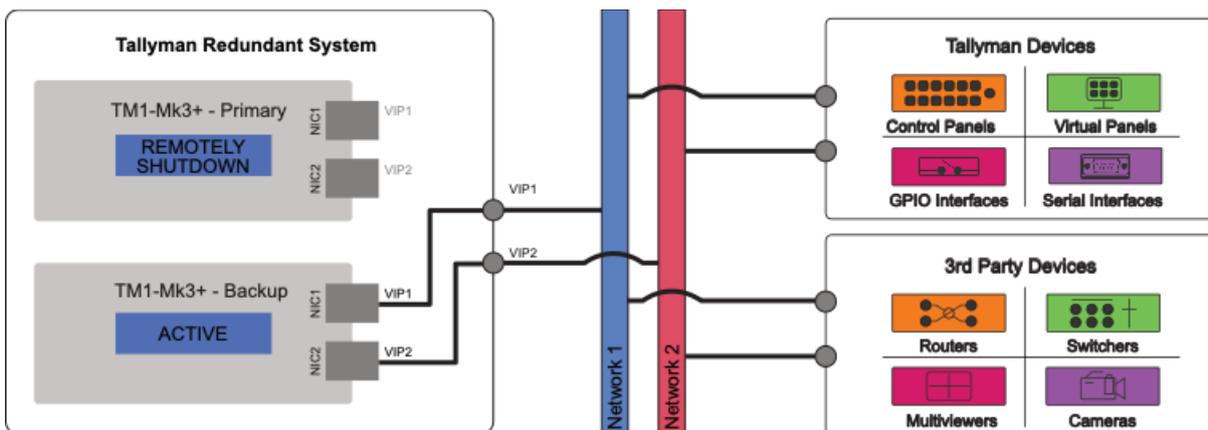
During a transition, the Primary is Deactivating, the Backup is Activating, and there is no direct connection via the VIP:



After failover, the Backup unit is Active and hosts the Virtual IP Addresses, and the Primary unit is in Standby:



During Backup operation, the Backup unit is Active and hosts the Virtual IP addresses; the Primary unit is Remotely Shutdown:

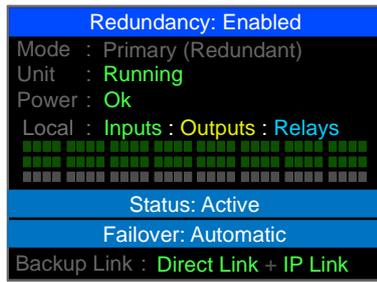


Backup Link

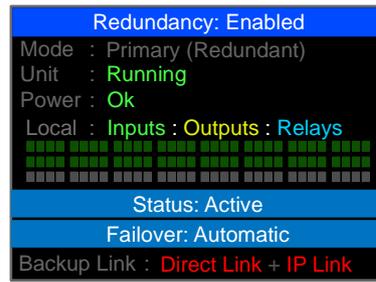
The Primary and Backup system controllers communicate via two links, the Direct Link cable and the NIC 1 Ethernet port (labelled as **IP Link**). These two-communication links allow for the monitoring between the Primary and Backup; both are required for a redundant system to work correctly. The status of both communication links between the system controllers is displayed on the front panel of the TM1-MK3+ when it is configured in redundancy mode:



TM1-Mk3+ Front Panel



Both Backup links are Ok



Both Backup links are showing an error

GPIO and Serial Connections

The GPIO and Serial connections of TM1 in a redundant system can be setup in the following ways:

- Multi-drop cabling
- Using a VIP connection
- Using a Changeover device

Using Multi-drop Cabling

The GPIO and Serial functions in the TM1-Mk3+ can be linked together in a redundant system using cabling, and then provide a single connection for external equipment. This operation is supported because either the Primary or Backup TM1-Mk3+ is not active, its outputs are disabled so will not operate, and set to their 'off' state, inputs are ignored. This means only the active unit is affecting change to the GPIO and Serial connections.

To achieve this, a cable is required to be made with a pin-to-pin pinout:

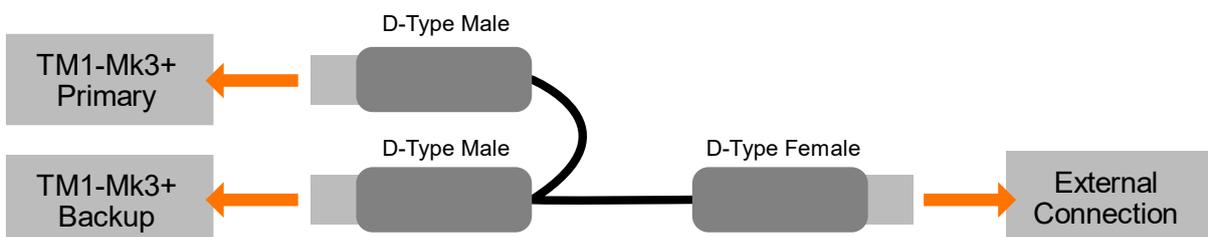
GPIO and Relay Connections:

| Primary – D-37 Male | Backup – D-37 Male | External Connection – D-37 Female |
|---------------------|--------------------|-----------------------------------|
| Pin 1 | Pin 1 | Pin 1 |
| Pin 2 | Pin 2 | Pin 2 |
| ↓ | ↓ | ↓ |
| Pin 36 | Pin 36 | Pin 36 |
| Pin 37 | Pin 37 | Pin 37 |

Serial Connections:

| Primary – D-9 Male | Backup – D-9 Male | External Connection – D-9 Female |
|--------------------|-------------------|----------------------------------|
| Pin 1 | Pin 1 | Pin 1 |
| ↓ | ↓ | ↓ |
| Pin 9 | Pin 9 | Pin 9 |

Cable Configuration:



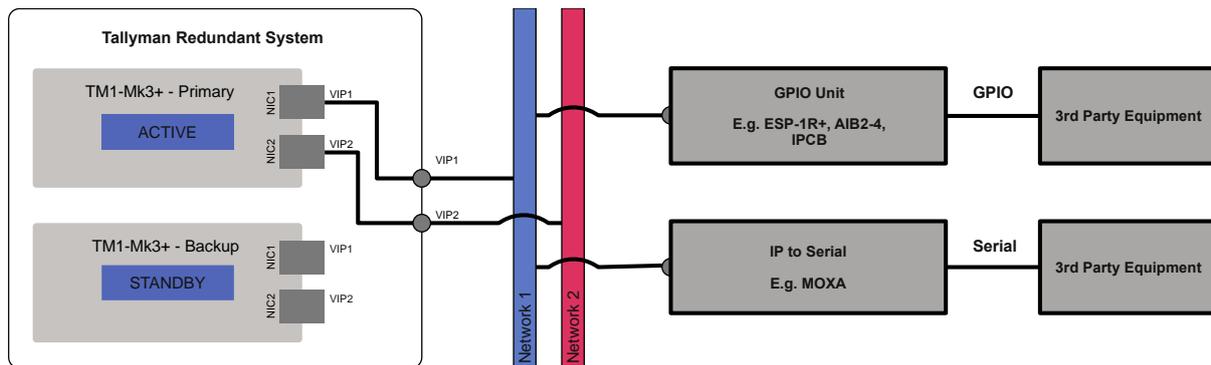


Using a VIP connection

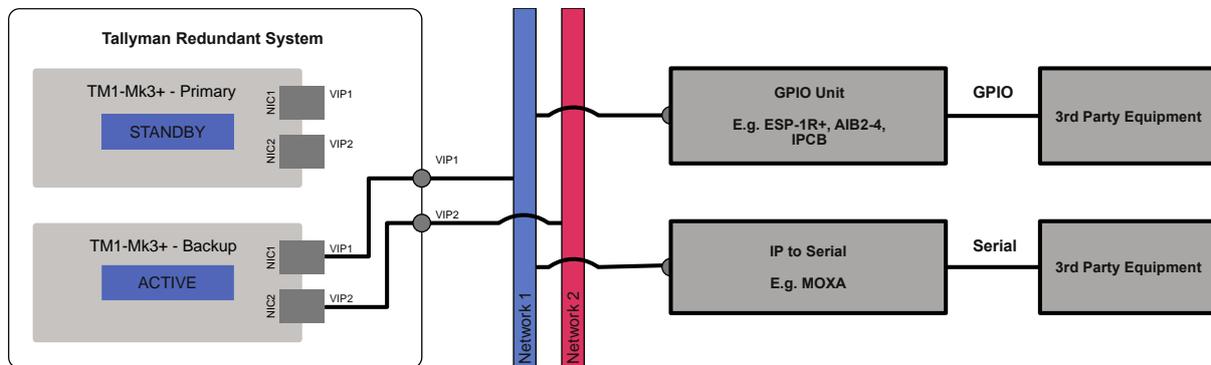
In this approach, the Serial and GPIO are moved outside of the redundancy 'bubble' and interface to the system via the VIPs. To achieve this, we use a GPIO expansion device such as the TSL ESP-1R+. This expansion device will then connect to the system via the VIP address and communicate with the system without any requirement to know which TM1 is currently Active.

Serial devices can be set up in a similar way using an Ethernet-to-Serial convertor. The convertor will communicate to the TallyMan system using a VIP address and continue to operate after a Failover event has occurred.

The diagram below shows the connection of external GPIO and Serial devices to the TallyMan Redundancy system when the Primary is Active and hosting the Virtual IP addresses:



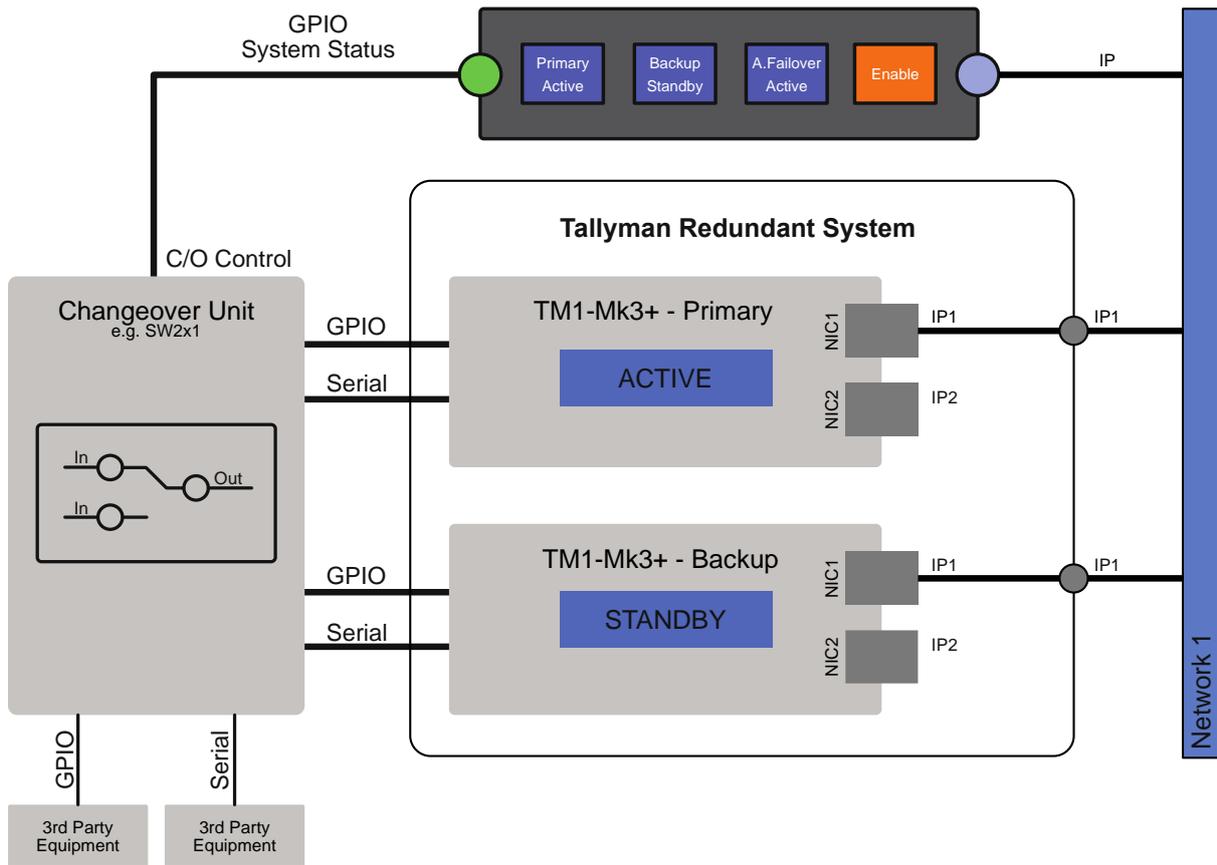
The diagram below shows the connection of external GPIO and Serial devices to the TallyMan Redundancy system when Backup is Active and hosting the Virtual IP addresses:



Using a Changeover device

An alternative approach is to use a changeover device such as the TSL SW2x1 changeover frame. The required GPIO and Serial connections are routed through the changeover device from both the Primary and Backup TM1 units. The output of the changeover device is then connected to the equipment as required. The operation of the changeover unit is controlled by the GPIO of a TMRP that will reflect the status of the current system. The connections from the Active system controller will then be routed to the output of the changeover unit and then on to any third-party devices as required.

The diagram below shows GPIO and Serial connections connected to third-party equipment via a changeover unit, controlled by the GPIO system status of the TMRP. Multiple TMRP units can be paralleled for changeover control redundancy:





What do I need to build a redundant system?

To create a redundant system, you need:

- 1 x Redundancy licence
- 2 x TallyMan TM1-MK3+ controllers
- 1 x Direct Link cable to connect the controllers
- 1 x TMRP unit
- Associated networking, power supplies and cables.

Main hardware requirements

There are two possibilities, depending on whether you already have a system built around a TallyMan TM1-MK3+:

- TallyMan Redundancy Package
- TallyMan Redundancy Kit

TallyMan Redundancy Package

If you do **not** already have a system based on a TallyMan TM1-MK3+ system, you can purchase a complete **TallyMan Redundancy Package**, which contains the following:

- 2x TM1-Mk3+ system controllers
- 1x TallyMan Redundancy Kit (see below)

Tallyman Redundancy Kit

If you already have a system based around a single TallyMan TM1-MK3+ controller, you will need to purchase a **second** TallyMan TM1-MK3+ controller, along with the **TallyMan Redundancy Kit** which contains the following:

- 1 x Redundancy licence
- 1 x Direct Link Cable to connect 2x TM1-MK3+ units for auto negotiation and synchronisation
- 1 x TMRP 4-button LCD control panel to monitor and manage automatic/manual failover from anywhere in your network. Has external triggers for local alarming and controlling external switchboxes to switch physical I/O
- 1x TMRP 1RU mounting panel
- 1x TMRP power supply

The TM1-Mk3+ units are designated by the user as either the Primary or the Backup. The Primary unit is the unit that is expected to be in use during normal operation. The Backup is placed into Standby to monitor the Primary; in the event of a failover the Backup will become active while the Primary will deactivate.

During normal operations the Primary and Backup units are synchronised with all relevant state changes so that in the event of a Failover the Backup can continue the control operations. Note that when the Backup is Active, the Primary unit is no longer synchronised with the Backup so it is possible some states will not be same between the units. When the Primary is restored to being the Active unit the Backup will synchronise with the Primary again.





Direct Link Cable

The Direct Link cable connects the 2x TM1-Mk3+ system controllers together for monitoring and control purposes. The cable connects to the **WatchMan** connector on each unit:



TallyMan Redundancy Panel (TMRP)

The TMRP is a hardware unit dedicated to redundancy operations. It can be mounted onto a 1RU bracket (supplied) for use in technical furniture, or into a racking system. (Other mounting methods are available.)

The unit provides real-time status of the redundancy system as well as offering user controls to change functions such as Failover mode and activating a unit. In addition, the unit has GPO to provide external systems or changeover units with the active status of each TM1-Mk3+ unit in the system.

Note the buttons (with LCD displays) used on the TMRP are limited to 6 characters, so some terms and messages have been abbreviated to ensure they fit on the display.

The TMRP has four buttons:

| Button | Button Label | Description |
|----------|--------------|--|
| Primary | Primry | Functional button dedicated to the status and operation of the Primary TM1 |
| Backup | Backup | Functional button dedicated to the status and operation of the Backup TM1 |
| Failover | F.Over | Functional button dedicated to the status and operation of the failover mode mechanism |
| Enable | Enable | Button dedicated to enabling the operation of the functional buttons |





Hardware installation

Note: At time of writing, redundancy is only supported by the TM1-Mk3+.

Note: This guide focuses on a redundancy setup. For specific information about GPIO and Serial connections, please refer to the appropriate TSL TallyMan manual.

TM1-MK3+

Direct link and Ethernet

To make the hardware connections:

1. Connect the Direct link cable between the **WatchMan** ports on both units.
2. Connect the Ethernet cables for each network connection.



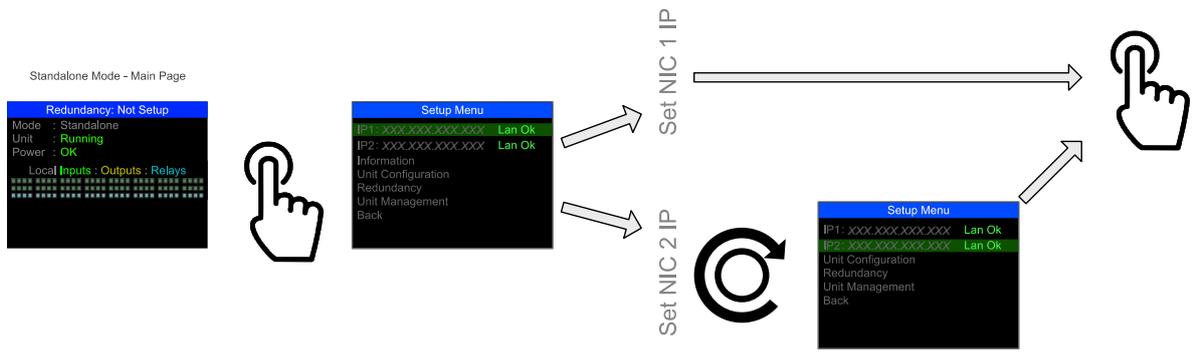
IP addressing

To set up IP addressing, use the encoder and display on the front panel of each unit:

1. On the first unit, press the encoder to enter the **Setup Menu**.
2. Set up IP addressing for NIC 1 on the unit:
 - a. Scroll the encoder to the **IP 1** item and press to display the **IP Address 1 Menu**.
 - b. Scroll the encoder to the **Address** item and press to highlight the first octet.
 - c. Scroll the encoder to set the value for the first octet, then press to highlight the next octet.
 - d. Repeat to set the other two octets; the final press of the encoder will deselect the **Address** item.
 - e. Repeat to set the **Netmask** and **Gateway** for NIC 1 on the unit.
 - f. Scroll to **Save** and press the encoder. The display will return to the **Setup Menu**.
3. If using a second network interface, repeat step 2 using the **IP 2** menu item.
4. In the **Setup Menu**, scroll the encoder to **Back** and press to return to the main display.

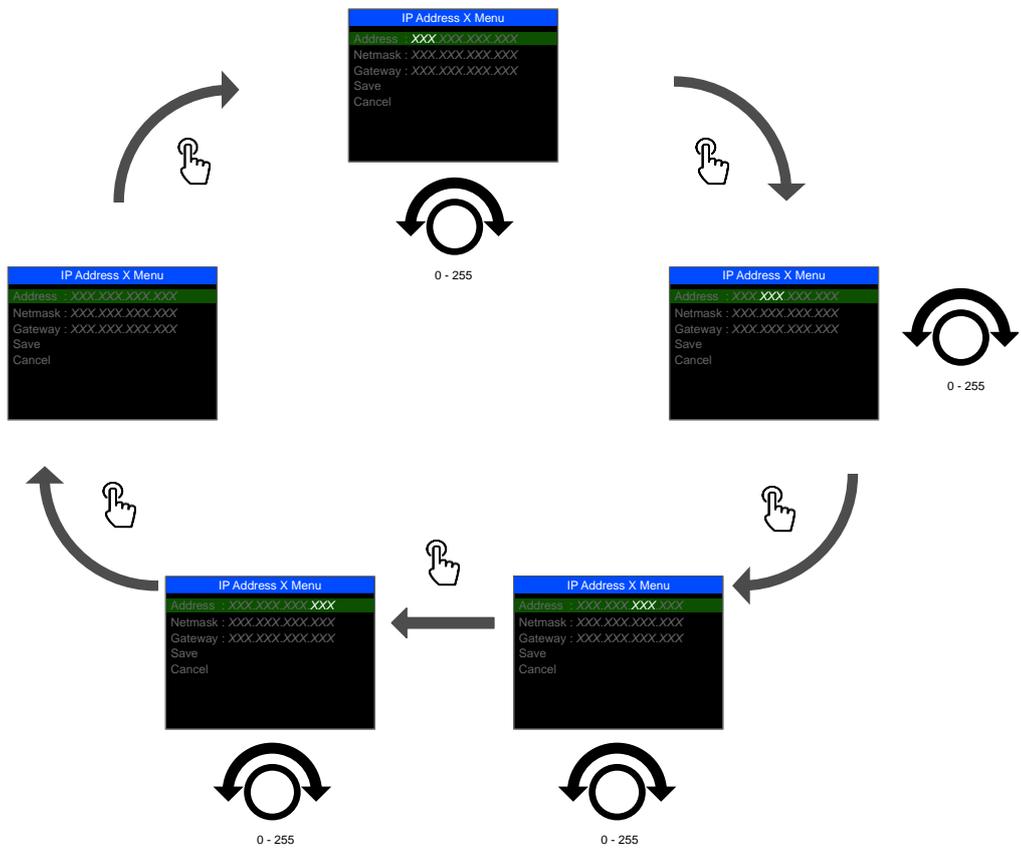


1 Select the NIC



2 Set IP Address

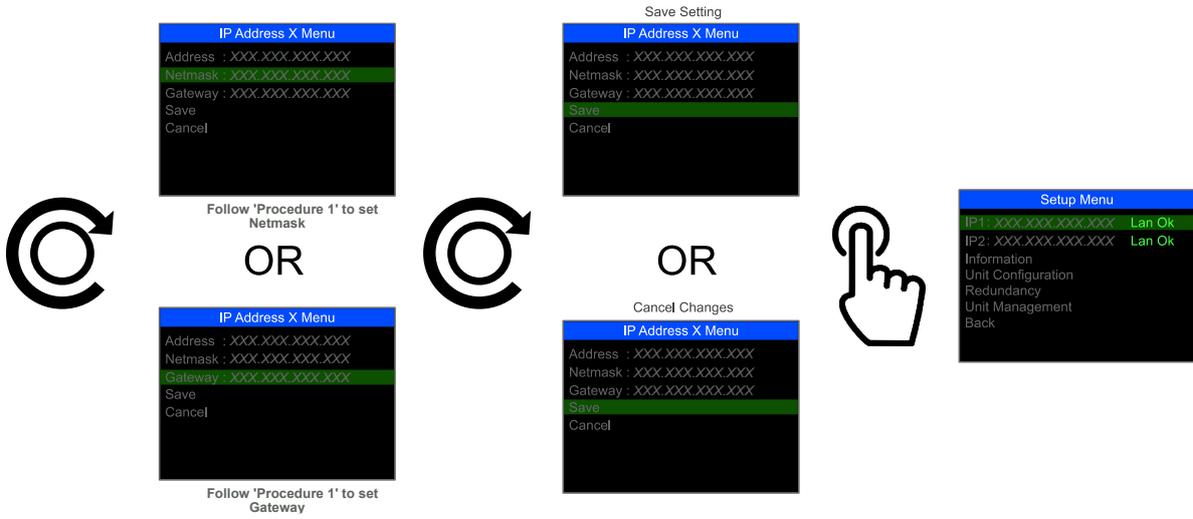
Procedure 1: Setting IP address, Netmask and Gateway Procedure





3

Save Changes





TMRP

The TMRP is a compact switch button unit that is dedicated to display status and control of the redundant system.



Mounting

The unit is supplied with a 1RU mounting bracket and two blanking plates. The TMRP can be mounted in any one of three positions.

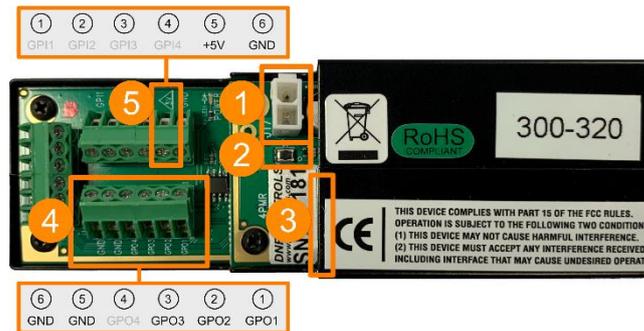


Power

The TMRP has both a DC power input for use with the supplied 12Vdc PSU and PoE (Power over Ethernet) to receive power from a PoE enabled ethernet switch. Either power method can be used, or both can be used in conjunction to provide resilient power for the unit.

Connections

The TMRP has several connections available. Power (either 12Vdc or PoE) and ethernet are required to be able to operate with the TallyMan Redundancy system however, in addition, there is GPO available that can be used to trigger external changeover units or feed status into a monitoring system.

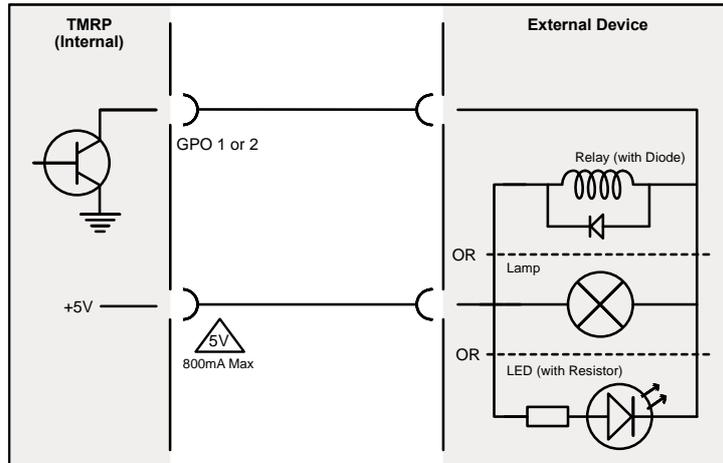


| | | | | |
|---|--------------------------|--|---------------|-----------------|
| 1 | DC Power Input Connector | 12Vdc | | |
| 2 | Factory Restore Button | Restores factory settings – Resets IP address and password of unit | | |
| 3 | Ethernet (PoE) Connector | 100Base-T Full Duplex, PoE Class 3, 12 Watt | | |
| 4 | GPO Connector | Open Collector Outputs | Pin 1 - GPO 1 | Primary Active |
| | | | Pin 2 - GPO 2 | Backup Active |
| | | | Pin 3 - GPO 3 | System is Armed |
| | | | Pin 5 - GND | |
| 5 | 5V Output | +5Vdc (800mA Max) | Pin 6 - GND | |
| | | | Pin 5 - +5Vdc | |
| | | | Pin 6 - GND | |



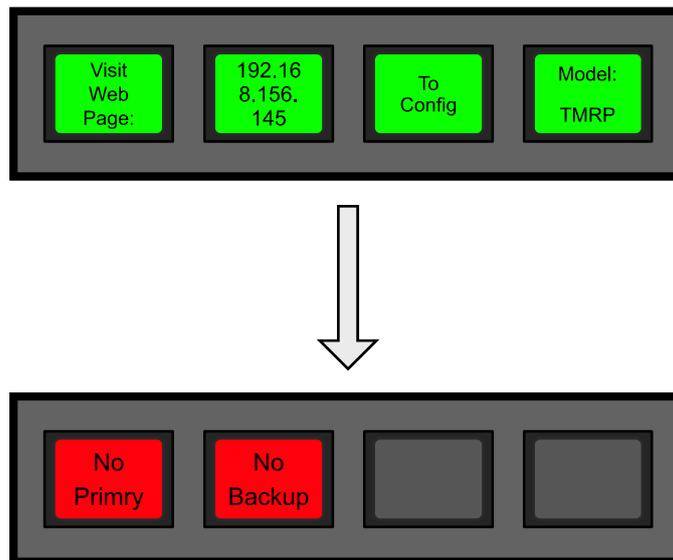
Open Collector Connections and Circuit

Using Internal Power



Setup

When first powered the TMRP will display its current IP settings and model number for a few seconds before completing its boot process. Once fully powered the unit will display the status on the TallyMan redundancy system. In its default state the TMRP is unconfigured, the buttons will show the following:



This display shows the TMRP currently has no connection to either the Primary or the Backup system controllers. To configure the TMRP as part of the redundant setup it must have an IP address assigned that is within the same subnet as the Primary and Backup's NIC 1 port and be included in the system configuration that is written to the Primary and Backup system controllers.

You set up the TMRP using a web page.



To access the TMRP webpage and log in:

1

Navigate to the TMRP Web page:
a) Power the TMRP
b) Note the IP address
c) Enter the IP address into web browser

The first image shows a control panel with four buttons: 'Visit Web Page', '192.168.156.145', 'To Config', and 'Model TMRP'. An arrow points from the IP address button to the second image, which shows a Google search bar with '192.168.156.145' entered. Another arrow points from the search bar to the third image, which shows the TMRP Settings webpage. The webpage has sections for 'Login Details', 'Network Settings', 'TMRP' (with Serial Number, Model, Unit Version, Web Version, and Unit Label), 'Configuration', and 'Upgrade'.

2

Login to the TMRP:
a) Click Login
b) Enter User Name and Password
c) Click Login

Note: The user name is always 'tsluser' and the default password is 'controls'

The screenshot shows the TMRP Settings webpage with a 'Login' dialog box overlaid. The dialog box has a 'User Name' field pre-filled with 'tsluser', a 'Password' field, and a 'LOGIN' button. An arrow points from the 'Login' button in the dialog box to the 'Login' button in the top right corner of the webpage.



Changing the password:

You should always change the default password, make sure to note the new password down for future use!

- Change the Password
- a) Enter the Current Password
- b) Enter the New Password
- c) Confirm the New Password
- d) Click Save
- e) Click Continue



The new password will take effect when you next login

To change the IP settings:

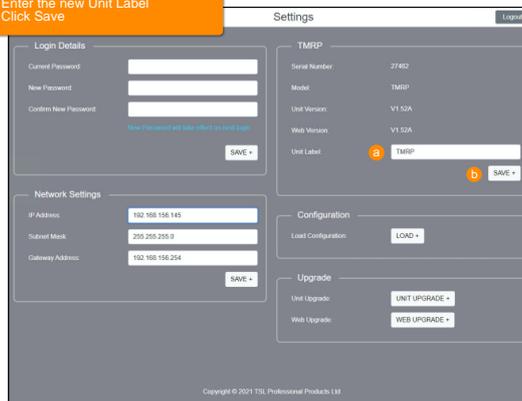
- Change the network settings:
- a) Enter the new IP address
- b) Enter the new Subnet Mask
- c) Enter the new Gateway address
- d) Click Save
- e) The TMRP reboots
- f) Check the button display to confirm new address



Note: The TMRP must be on the same subnet as the Primary and Backup's NIC 1 port.

To change the TMRP label:

- Change the Label
- a) Enter the new Unit Label
- b) Click Save





To load a new configuration:

The configuration dictates the behaviour of the TMRP, this is not user definable, but in the case where a new configuration is issued it may be necessary to load the new one.

Load a configuration:
a) Click Load
b) Choose File
c) Locate and select file
d) Click Open
e) Click Upload
f) Unit will reboot

The diagram illustrates the steps to load a new configuration on a TMRP unit. It starts with the 'Settings' page where the 'LOAD +' button is highlighted with an orange circle 'a'. An arrow points to the 'Configuration Load' page where the 'Choose File' button is highlighted with an orange circle 'b'. Another arrow points to a file explorer window showing the file 'TMRP_V1_S2A.tst' selected, with the 'Open' button highlighted with an orange circle 'd'. A third arrow points to the 'Configuration Load' page where the 'UPLOAD +' button is highlighted with an orange circle 'e'. A final arrow points to the 'Reboot' page where the 'Reboot In Progress...' message is displayed, with an orange circle 'f' next to the TSL logo.



To upgrade the firmware of the TMRP:

Firmware upgrades may be issued to improve the TMRP's functionality, performing an upgrade is a two-part process where the unit is put into an upgrade mode and then upgraded via a PC application.

1 Unit upgrade - Prepare the unit:
a) Click Unit Upgrade
b) Click Upgrade

The screenshot shows the 'Settings' page of the TMRP web interface. It includes sections for Login Details, Network Settings, TMRP information (Serial Number, Model, Unit Version, Web Version, Unit Label), Configuration, and Upgrade. The 'Upgrade' section contains 'UNIT UPGRADE +' and 'WEB UPGRADE +' buttons. An arrow points from the 'UNIT UPGRADE +' button to the 'Unit Upgrade' page below. The 'Unit Upgrade' page contains instructions: 'Click on Upgrade to start the upgrade process.', 'NOTE: This web page will not refresh and your web browser will report an error.', 'Launch the Windows® TMRP Upgrade application provided by TSL to do the actual software upgrade.', and 'To exit upgrade, you MUST reboot the TMRP.' Below the instructions is an 'UPGRADE +' button.

2 Upgrade the TMRP - On PC:
a) Open TMRP_P1_Upgrade
b) Check the IP address of the TMRP is displayed
c) Or enter the IP address of the TMRP and click Connect
d) Click Program
e) Progress of programming
f) When complete, click Ok
g) Click OK to reboot the TMRP

The sequence of screenshots shows the TMRP_P1_Upgrade application on a PC. Step a) shows the application window. Step b) shows the IP address field. Step c) shows the 'Connect' button. Step d) shows the 'Program' button. Step e) shows the 'Loading firmware' progress bar. Step f) shows the 'Ok' button. Step g) shows the 'Information' dialog box with the message 'Congratulations! Your device has been upgraded and restarted.' and an 'Ok' button.



To perform a web upgrade:

The web upgrade determines the user interface for the TMRP. It is not user definable but, in the case, where a new web upgrade is issued it may be necessary to upgrade the web interface.

Web Upgrade:
a) Click Web Upgrade
b) Locate file
c) Locate and select file
d) Click Open
e) Click Upload

To log out of the TMRP web page:

It is good practice to log out of the TMRP web page when you have completed your tasks.

Logout of TMRP:
a) Click Logout



Software installation

Once the hardware has been set up correctly, you need to configure the TallyMan system as a redundant system. The steps are slightly different if you are creating a new configuration or adding redundancy to an existing configuration. Both operations are shown below:

Note: You can always download the latest version of the TallyMan software from the Support page on the TSL website. Once installed:

Opening the TallyMan software

To open the TallyMan software:

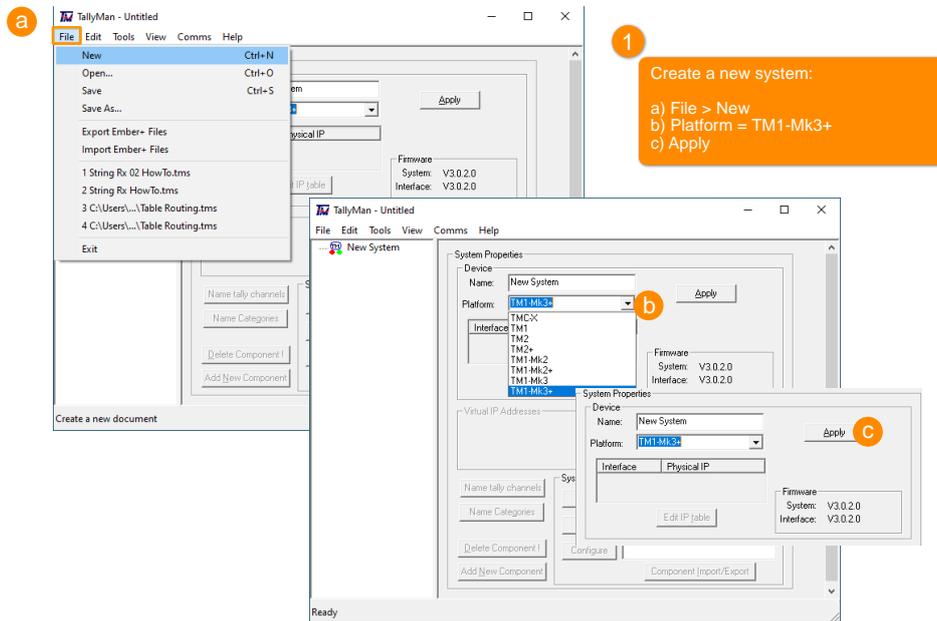
Open the TallyMan Software

- a) Double Click the TallyMan icon
- b) Configuration
- c) OK



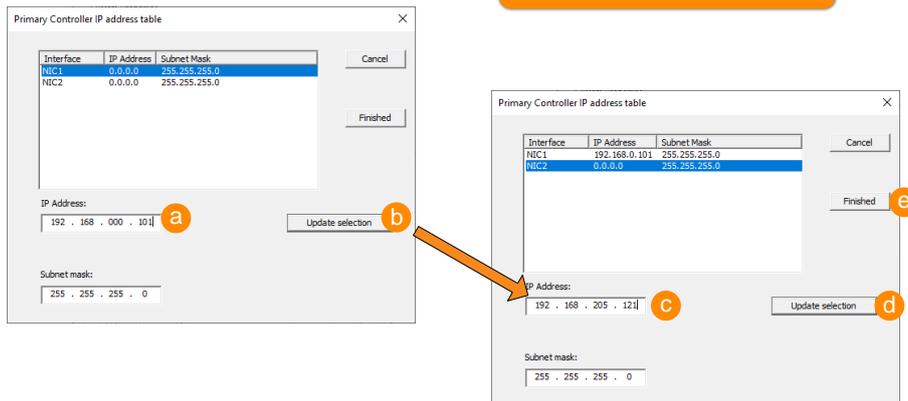
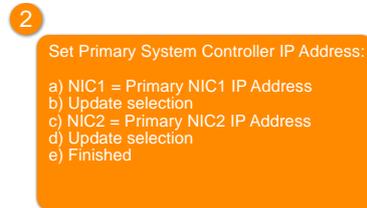
Creating a new configuration

1. Create a new configuration/set system controller.



2. Set the Primary IP addresses.

Note: If both NICs are used in the configuration then ensure both NICs are cabled correctly, a missing connection may cause issues during the writing of the configuration to the TM1-Mk3+ unit.





3. Add the Backup unit.

3

Add a Backup:

- a) Add backup system controller? = Yes
- b) NIC1 = Backup NIC1 IP address
- c) Update selection
- d) NIC2 = Backup NIC2 IP address
- e) Update selection
- f) Finished

4. Set the VIP addresses.

4

Define the Virtual IP Addresses:

- a) NIC1 = NIC1 VIP address
- b) Update selection
- c) NIC2 = NIC2 VIP address
- d) Update selection
- e) Finished



5. Set the TMRP addresses.

5

Add the TMRP IP Addresses:

- a) IP Address = TMRP IP address
- b) Add to list
- c) Finished

| Interface | Physical IP | TMRP IP Address List |
|-----------|-----------------|----------------------|
| NIC1 | 192.168.0.101 | |
| NIC2 | 192.168.205.121 | |

| Interface | IP Address |
|-----------|-----------------|
| NIC1 | 192.168.0.104 |
| NIC2 | 192.168.205.105 |

6. Write the configuration.

6

Write the configuration:

- a) Write Configuration
- b) Yes
- c) Download and Restart

Writes the current configuration to the target system.

Note: The configuration is automatically written to the Backup by the Primary unit once fully operational.



7. Connect to the system (you can optionally save your config file before connecting).

7

Connect to the system:

- a) Connect to System
- b) Yes
- c) Enter file name and Save
- d) Connect

The image illustrates the process of connecting to a TallyMan system. It shows several windows from the TallyMan software:

- TallyMan - Untitled:** The 'Connect to System' dialog is open, with the 'Connect to System' button highlighted by an orange arrow labeled 'a'. Below it, a 'Save current offline file?' dialog is shown with the 'Yes' button highlighted by an orange arrow labeled 'b'.
- Save As:** A 'Save As' dialog is open, showing the file name 'Redundant-01.tms' and the 'Save' button highlighted by an orange arrow labeled 'c'.
- Connect to TallyMan System:** A 'Connect to TallyMan System' dialog is open, showing 'Default System Interface' selected and the 'Connect' button highlighted by an orange arrow labeled 'd'.

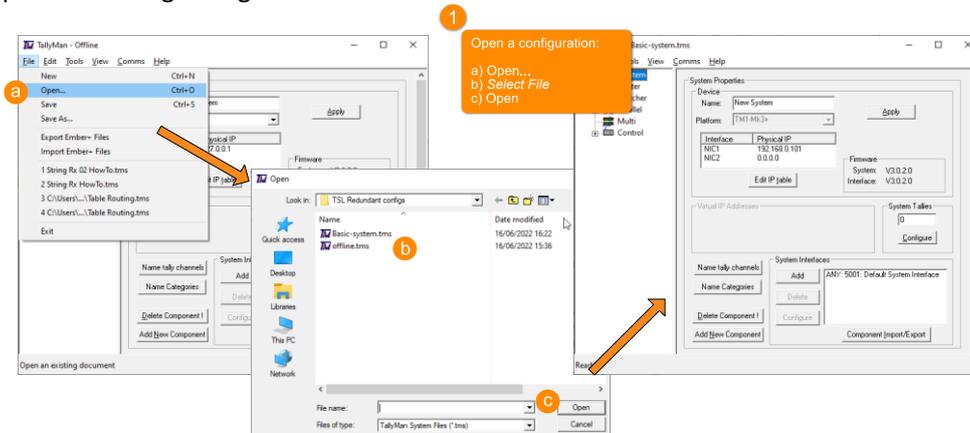
The background shows the main TallyMan interface with the 'Redundant System' selected in the left-hand pane.



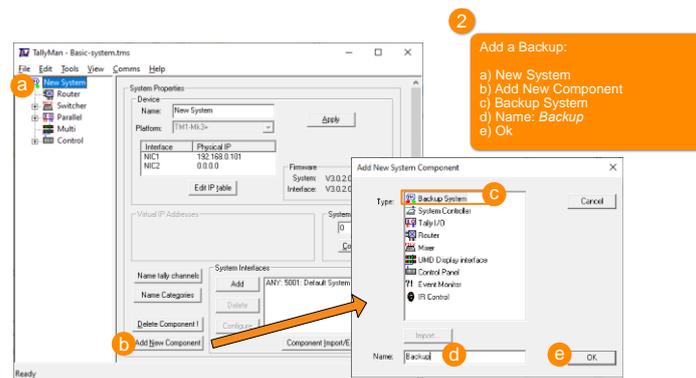
Modifying an existing configuration

To modify an existing system configuration:

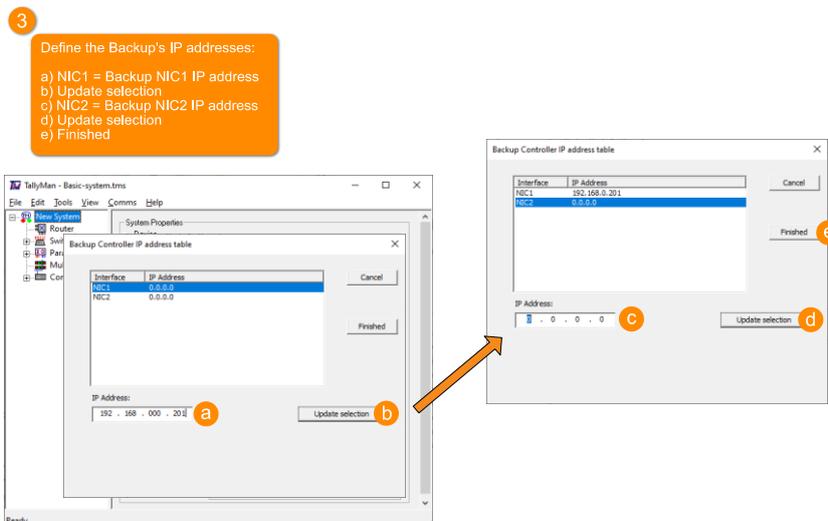
1. Open an existing config.



2. Add a Backup component.



3. Set the Backup unit's IP addresses.





4. Set the Backup unit's VIP addresses.

4

Define the VIP addresses:

- a) NIC1 = NIC1 VIP address
- b) Update selection
- c) NIC2 = NIC2 VIP address
- d) Update selection
- e) Finished

5. Set the TMRP addresses.

5

Add a TMRP Panel:

- a) TMRP IP Address List
- b) IP Address: TMRP IP address
- c) Add to List
- d) Finished

6. Write the configuration.

6

Write the configuration:

- a) Write Configuration
- b) Yes
- c) Download and Restart



7. Connect to the System.

7 Connect to the system:

- a) Connect to System
- b) Yes
- c) Enter file name and Save
- d) Connect

Note: When adding redundancy to an existing configuration, you must check and possibly modify all other connected devices to use the Virtual IP addresses instead of the static system controller IP address.

8. Check/modify device IP assignment.

8 Check/modify device assignment:

- a) Select a device in the tree
- b) Set Communications
- c) Select NIC1 or NIC2 VIP
- d) Ok
- e) Repeat for all devices



Operation

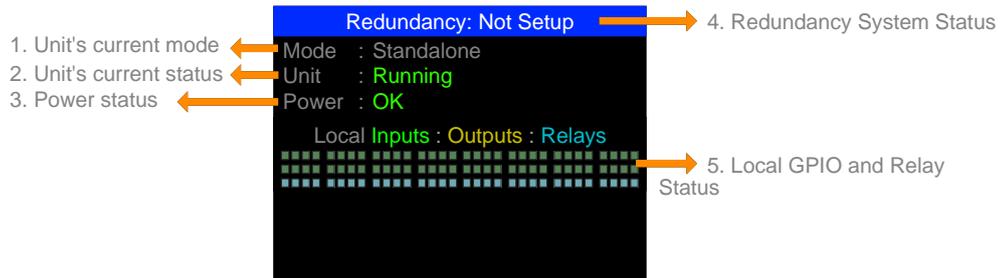
This section describes the front panel display for standalone and redundant systems. It also lists each the options and parameters on the display.

TM1-Mk3+ Front Panel

The front panel display on the TM1-MK3+ units give the status and control over the redundancy system. The main display changes depending on the current redundancy configuration.

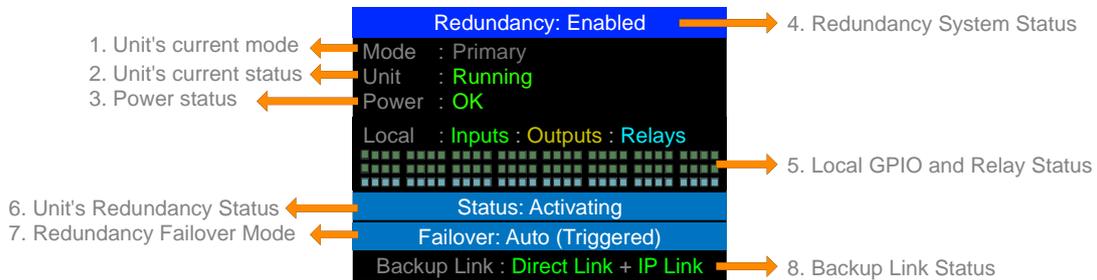
TM1-MK3+ Display – Standalone Mode

A TM1-Mk3+ unit that is **not** set up for redundancy (default) will display the following elements:



TM1-MK3+ Display – Redundancy Mode

A TM1-Mk3+ unit that **is** set up for redundancy will display the following elements:





Status Descriptions

| | Menu item | Description | Possible values | Description |
|----|-------------------------------------|---|--------------------------|--|
| 1. | Mode | Current configured mode of a unit | Standalone | Unit is in Standalone mode |
| | | | Primary | Unit is the designated Primary in a redundant pair |
| | | | Backup | Unit is the designated Backup in a redundant pair |
| 2. | Unit | The unit's status | Booting | Unit is booting its operating system |
| | | | Starting | Unit is starting its application |
| | | | Config Error | There is an issue with the configuration |
| | | | Interface Fault | There is an internal device issue |
| | | | Running | Unit is working correctly |
| | | | Running (Activating) | Unit is working and activating to be the Active redundant unit |
| | | | Running (Deactivating) | Unit is working and deactivating from being the Active redundant unit |
| | | | REMOTELY SHUTDOWN | Unit has been remotely shutdown by its redundant partner |
| 3. | Power | Current power status of the unit's power supplies | OK | Power supplies are functioning correctly |
| | | | Fault | There is a fault with one of the power supplies |
| 4. | Redundancy | Status of the redundancy system | Enabled | Units are set up as a redundant system and is enabled |
| | | | Not Setup | Not running a configuration with redundancy system defined |
| | | | Error | Configuration error/no comms |
| | | | Unavailable | Redundancy setup but cannot communicate to paired device |
| | | | No Primary | There is no Primary available within paired units (via Direct Link Cable) |
| | | | No Backup | There is no Backup available within paired units (via Direct Link Cable) |
| 5. | Local Inputs: Outputs: Relays | Status of unit's GPIO and Relays | Inputs | Input Off Input On |
| | | | Outputs | Output Off Output On |
| | | | Relays | Relay Off Relay On |
| 6. | Status | Unit's current redundancy status | Active | Unit is currently the Active controller in redundant pair |
| | | | Standby | Unit is currently in Standby ready to become the Active controller in the redundant pair |
| | | | Activating | Unit is becoming the Active unit in the redundant pair |
| | | | Deactivating | Unit was the Active controller and is deactivating |
| | | | Error | There is an error with the unit's status in the redundant pair |
| 7. | Failover | The failover mode of the redundant pair (both units should reflect the same status) | Auto (Armed) | System is in Auto and 'Armed' ready to failover in the occurrence of a failover event |
| | | | Auto (Triggered) | System is in Auto but has already failover over |
| | | | Auto (Unavailable) | System is in Auto however there is a problem with one of the units in the redundant pair |
| | | | Manual | The system is in Manual and can be manually failed over, the system will not automatically failover in this mode |
| | | | Unavailable | There is an issue with the system and failover is unavailable |
| 8. | Backup Link | Link between Primary and Backup units for redundancy communications | Direct Link (Green = Ok) | Status of communication to paired unit via the dedicated Direct Link Cable |
| | | | IP Link (Green = Ok) | Status of communication to paired unit via IP connection (only via NIC 1) |

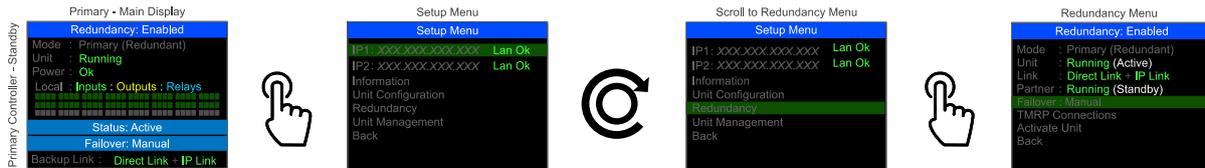


Redundancy Menu

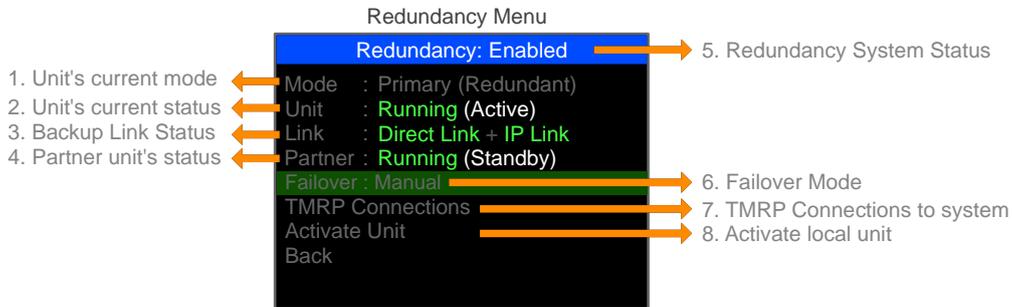
There is a redundancy menu that provides additional feedback to the status for the redundancy system and control over the key aspects of the system. To access the redundancy menu the system must already have been configured as a redundant system via the configuration software as described in the [Software installation](#) section. The redundancy menu is not available when the units are configured as Standalone.

To navigate to the Redundancy menu:

1. Press the encoder on the front panel to enter the **Setup** menu.
2. Scroll the encoder and press to select the **Redundancy** option.



Redundancy Menu:



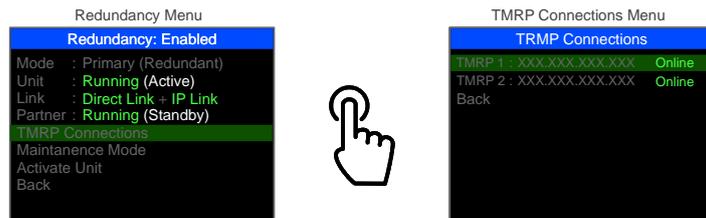
| | Menu item | Description | Possible values | Description |
|----------------------|--|---|------------------------|---|
| 1. | Mode | The unit's current configured mode | Standalone | (Appears if redundancy not configured) |
| | | | Primary (Redundant) | Unit is configured as the Primary in the redundant pair |
| | | | Backup (Redundant) | Unit is configured as the Backup in the redundant pair |
| 2. | Unit | The unit's status | Booting | Unit is booting its operating system |
| | | | Starting | Unit is starting its application |
| | | | Config Error | There is an issue with the configuration |
| | | | Interface Fault | There is an internal device issue |
| | | | Running | Unit is working correctly |
| | | | Running (Activating) | Unit is working and activating to be the Active redundant unit |
| | | | Running (Deactivating) | Unit is working and deactivating from being the Active redundant unit |
| REMOTELY SHUTDOWN | Unit has been remotely shutdown by its redundant partner | | | |
| 3. | Link | Link between Primary and Backup units for redundancy communications | Direct Link | Status of communication to paired unit via the dedicated cable link |
| | | | IP Link | Status of communication to paired unit via IP connection (only via NIC 1) |
| 4. | Partner | The partner unit's status | Booting | Unit is booting its operating system |
| | | | Starting | Unit is starting its application |
| | | | Config Error | There is an issue with the configuration |
| | | | Interface Fault | There is an internal device issue |
| | | | Running | Unit is working correctly |
| Running (Activating) | Unit is working and activating to be the Active redundant unit | | | |



| | Menu item | Description | Possible values | Description |
|----|---------------------------|---|------------------------|--|
| | | | Running (Deactivating) | Unit is working and deactivating from being the Active redundant unit |
| | | | REMOTELY SHUTDOWN | Unit has been remotely shutdown by its redundant partner |
| 5. | Redundancy | Status of the redundancy system | Enabled | Units are set up as a redundant system and is enabled |
| | | | Not Setup | Not running a configuration with redundancy system defined |
| | | | Error | Configuration error/no comms |
| | | | Unavailable | Redundancy setup but cannot communicate to paired device |
| | | | No Primary | There is no Primary available within paired units (via Direct Link Cable) |
| | | | No Backup | There is no Backup available within paired units (via Direct Link Cable) |
| 6. | Failover (Option) | The failover mode of the redundant system | Auto (Armed) | System is in Auto and 'Armed' ready to failover in the occurrence of a failover event |
| | | | Auto (Triggered) | System is in Auto but has already failover over |
| | | | Auto (Unavailable) | System is in Auto however there is a problem with one of the units in the redundant pair |
| | | | Manual | The system is in Manual and can be manually failed over, the system will not automatically failover in this mode |
| | | | Unavailable | There is an issue with the system and failover is unavailable |
| 7. | TMRP Connections (Option) | TMRP connections and status as specified by the configuration | Online | The TMRP is connected and communicating correctly |
| | | | Offline | The TMRP is not connected to the system |
| 8. | Activate Unit (Option) | Option to Activate current unit | | |

TMRP Connections

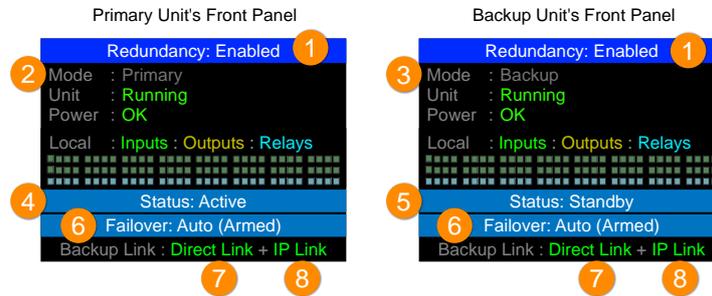
To view the TMRPs that have been configured and their status, enter the **TMRP Connections** menu. The display will show the IP address and status of any TMRPs that have been configured in the redundancy system (see the [Hardware installation](#) section). Note a maximum of three TMRP units can be connected to the redundancy system.





Normal Operation

Once the redundancy system has been configured correctly the front panels of the TM1-Mk3+ units will show this display:



The TRMP will show the same state information:



These displays are telling us the following information about the redundancy system:

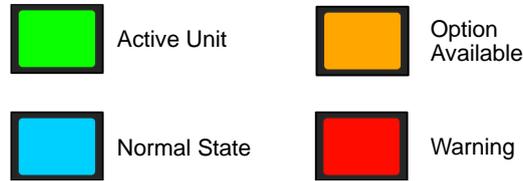
1. Redundancy is Enabled
2. The left unit is the Primary
3. The right unit is the Backup
4. The Primary is Active
5. The Backup is in Standby
6. The Failover Mode is set to Auto and is Armed
7. The Direct Link cable is OK
8. The IP Link is OK

This should be considered the 'normal' state for the redundancy system. The Primary is Active and the Backup ready to take over, the Failover mode is set to Auto and is Armed waiting for a failover event to occur and both Backup Links are Ok (green) showing the units are communicating.

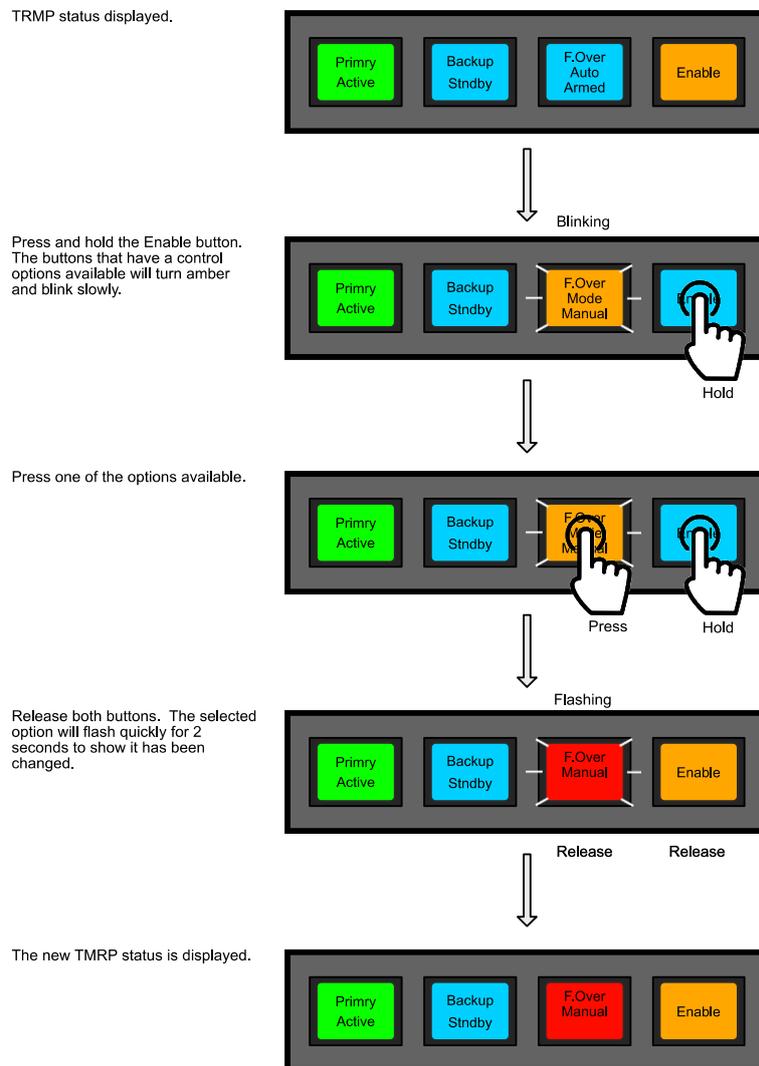


TMRP Operation

The TMRP both provides information about the status of the redundancy system and certain controls over the operation. The information and controls are a mirror of those on the TM1-Mk3+ front panel. The coloured buttons change to reflect their status:



The unit has an Enable button to protect the buttons of the TMRP from accidental operation. The Enable button must be pressed and held to show the current control options available, these options will depend on the current state of the redundancy system.

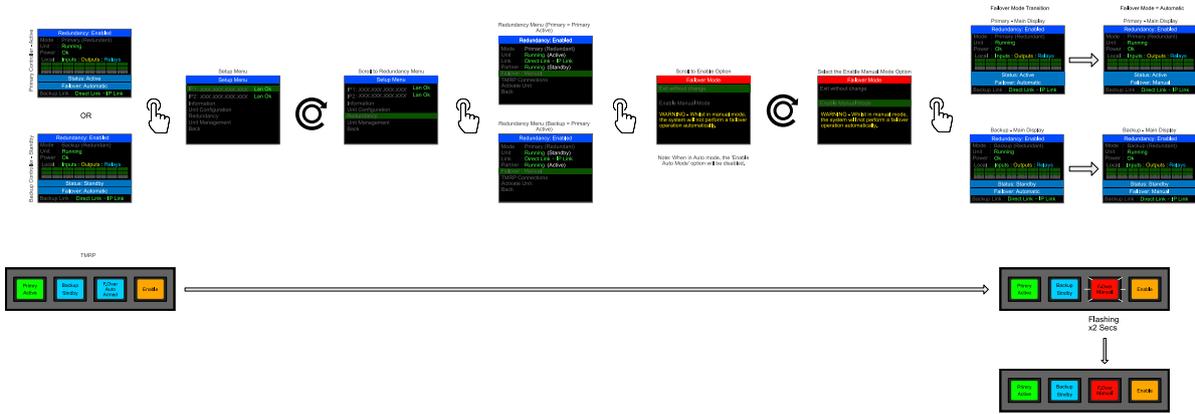




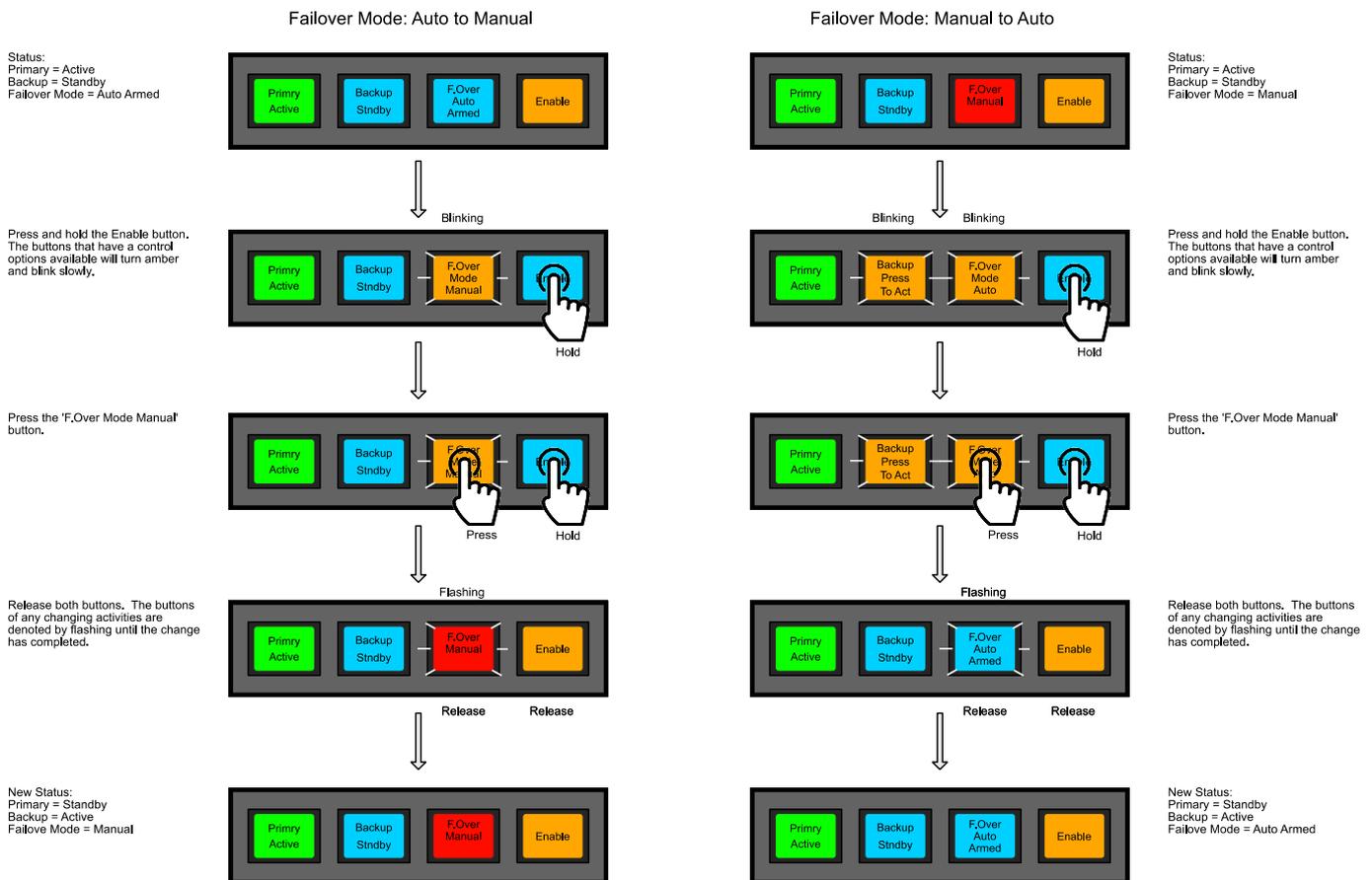
Failover Mode

The Failover Mode dictates the behaviour of the redundancy system and can be changed between Auto and Manual operations. To change the Failover mode via the front panel of the TM1-Mk3+ unit use the following procedure:

Change Failover Mode - From Front Panel - Auto to Manual



To change the Failover mode using the TMRP us the following procedure:

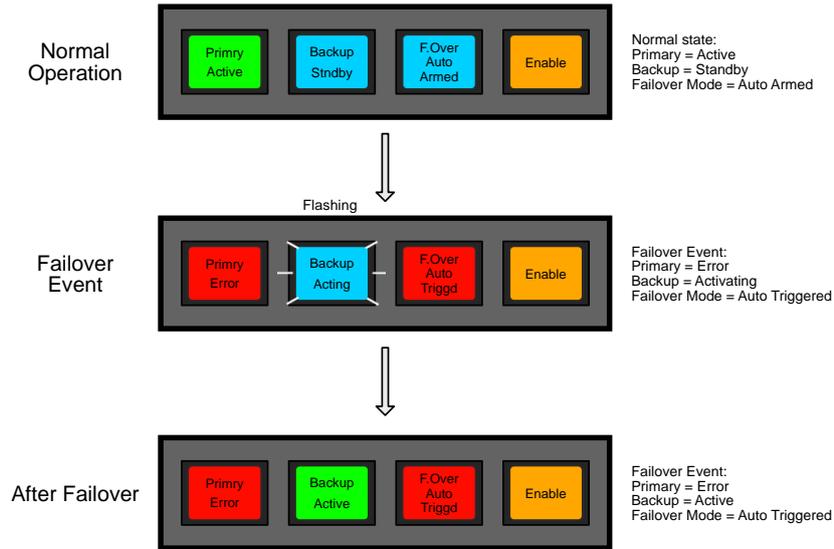




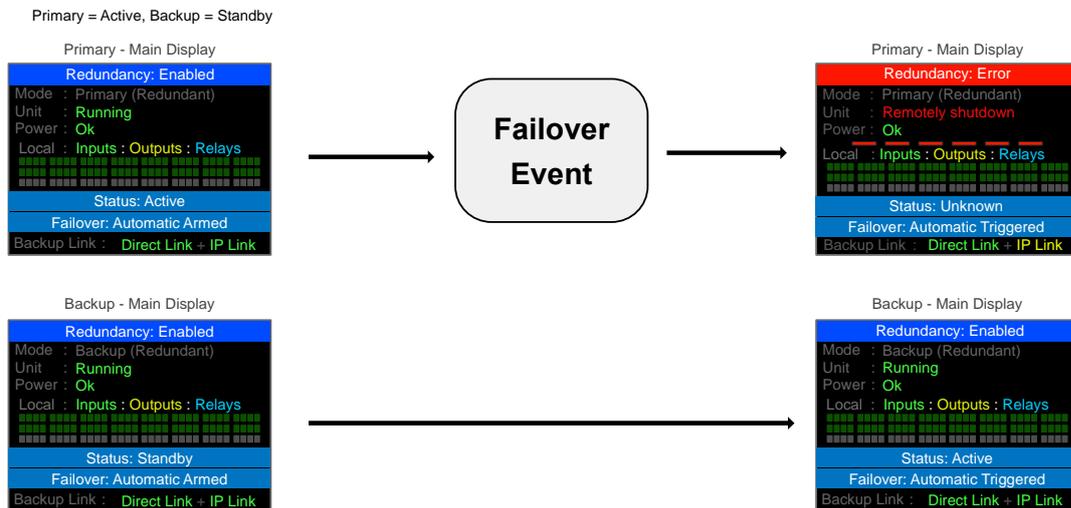
Automatic Mode

The auto mode has a few different states related to the current failover status. The redundancy system is a one-way failover system meaning a failover can only occur from the Primary to the Backup. Once a Failover has occurred, restoring the Primary as the Active unit is a manual operation and as such the Failover mode is required to be set to Manual to perform this operation. Once the Failover mode is returned to Auto and the Primary is Active as well as the Backup being in Standby, then the Failover mode will show Auto Armed meaning it is ready to Failover when a Failover event occurs. Once the Failover event has occurred and the system has failed over, the Failover mode will still be in Auto however will display 'Auto Triggered' to show a Failover has taken place.

TMRP:



TM1-Mk3+ Front Panel:



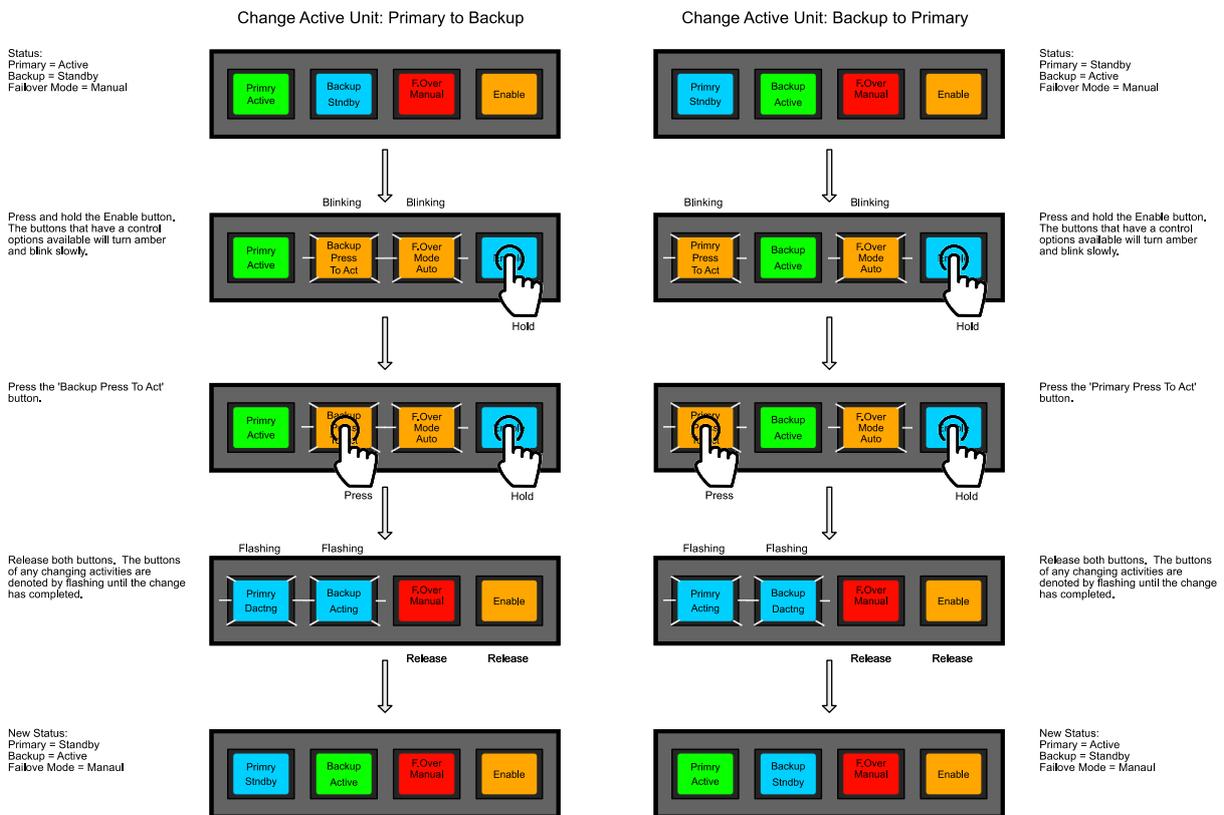
If a Failover is not available due to an issue such as the Backup not being in Standby, then the Auto mode will display an 'Unavailable' message on both the TM1-Mk3+ front panel and the TMRP.



Manually changing the Active Unit

It is possible to change which unit is currently Active when the Failover mode is in Manual (as described in the Failover Mode section). If the Failover mode is currently in Auto, then you must change the Failover mode to Manual to change the Active unit. Note when the system is in Manual mode it is no longer in a redundancy failover mode, you must make sure the Primary is Active and the Failover mode is set to Auto to return the system to a redundancy failover mode.

To change the Active unit, use the following procedure:





Manual Activation - Primary to Backup - From TM1 Front Panel

Note: This operation can only be performed if the system is set to Manual mode.



Manual Failover - Backup to Primary - From TM1 Front Panel





Failover Events

In the occurrence of a Failover event the TallyMan system will move the Active status from the Primary system controller to the Backup system controller.

Both units of a redundant pair monitor themselves and their partner for health. If a unit is deemed unhealthy, then the redundancy will not be able to function correctly. For a unit to be deemed healthy and therefore able to be part of a redundant pair it must meet the following criteria:

- The units are powered and fully booted
- Have stable network connections on the same LAN for each NIC. The second NIC will depend on network configuration; if a configuration only has one NIC specified the second NIC will be ignored.
- Both Backup Links, the Direct Link, and IP Link, are connected
- The units have a valid configuration that includes a redundant setup.
- The unit is in a 'Running' state meaning the internal system processes and services are running and communicating correctly.

A failure on any one of these points will result in a system failover. The table below lists possible failover scenarios:

| Scenario: | Description: |
|----------------------|--|
| Network failure | A network cable used by the system controller is either removed from the switch or system controller, the cable is severed or partially severed, or the network abruptly becomes either unavailable or partially unavailable (e.g. no return comms). |
| Software failure | The TallyMan software becomes unresponsive on the Primary unit, |
| Power failure | Power is lost from the Primary system controller. |
| Switch failure | The network switch becomes unavailable either due to power loss or failure. |
| Processor choke | The system controller is overloaded with processing functions and is temporarily unresponsive. |
| Network separation | A system controller's network segment is disconnected from the network segments hosting the other system controller either virtually or physically. |
| Hardware Failure | The Primary system controller experiences a hardware error that prevents it from functioning correctly. |
| Communications Delay | There is a delay in communications between the redundant pair. |

During a Failover event various actions take place within the system to ensure the Primary is correctly removed from service, the Virtual IP addresses have been removed and it is safe to apply them to the Backup.

There are three resulting scenarios that depend on the failover event, the state of the Primary and the network:

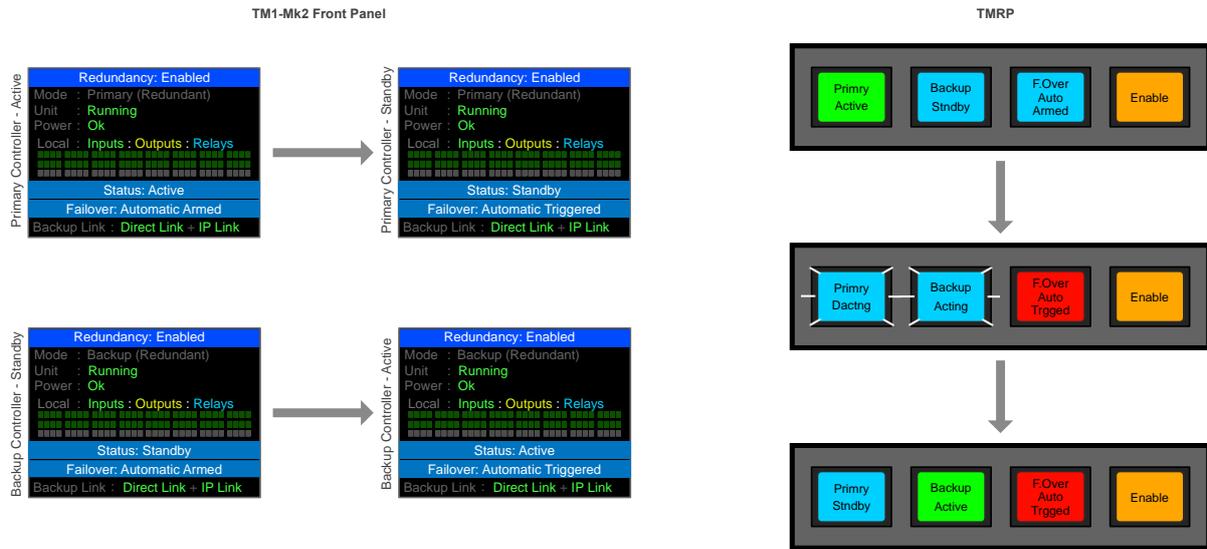
- Normal
- Error
- Remote Shutdown





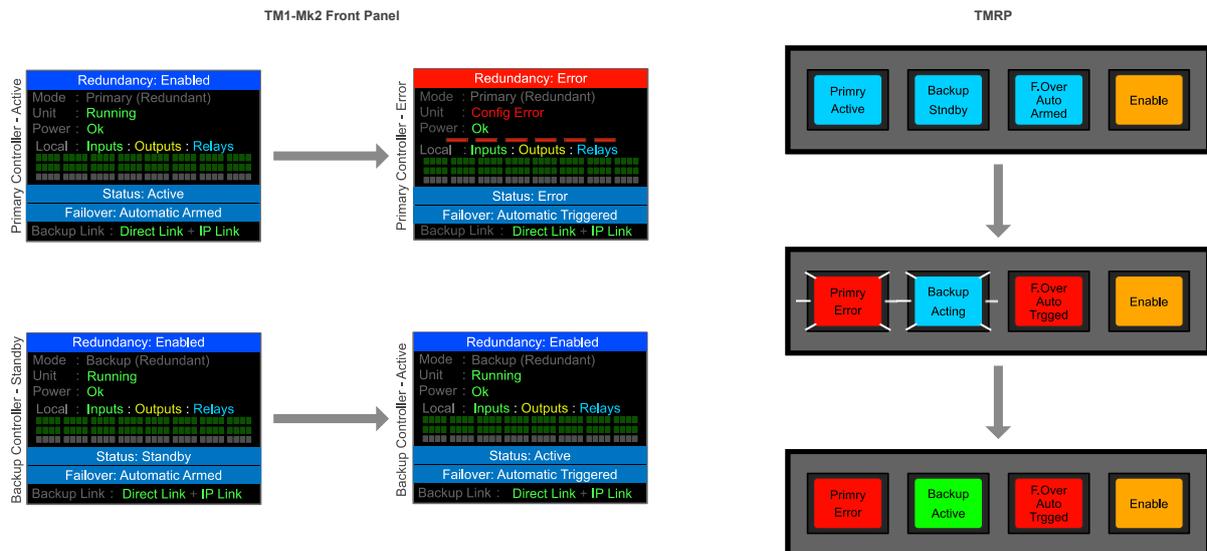
Normal

Failover is completed with all communications and actions acting in accordance the failover procedure.



Error

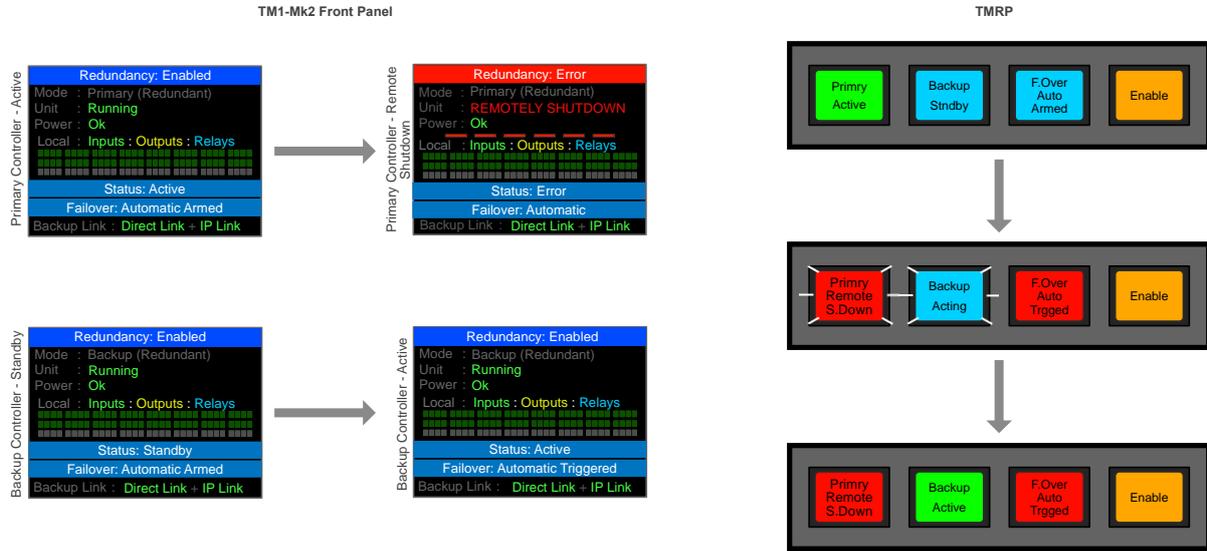
Failover is completed with all communications and actions acting in accordance the failover procedure however the Primary cannot communicate with the internal application process.





Remote Shutdown

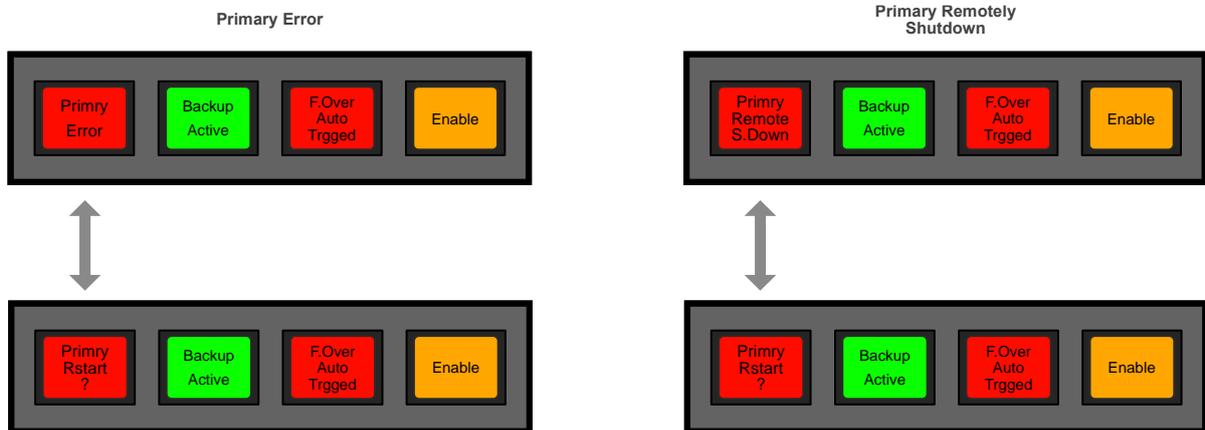
The Failover is completed but the communications and actions have not responded correctly according to the Failover process, so the Primary unit has been Shut down by the Backup to ensure the Primary has relinquished the VIPs and communications have been closed before the Backup becomes Active.



Error and Remote Shutdown Resolution

If an error state is displayed or a system controller has been remotely shutdown then the resolution is to restart the system controller. A unit in error state or that has been remotely shutdown can be restarted from either the TMRP or the TM1-Mk3+ front panel.

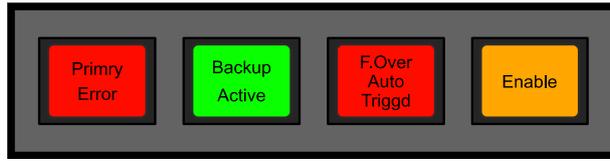
The TMRP will show the error state of the system controller. The key will illuminate red to show there is an issue, the display will alternately show the state of the system controller and ask if you would like to restart the device.





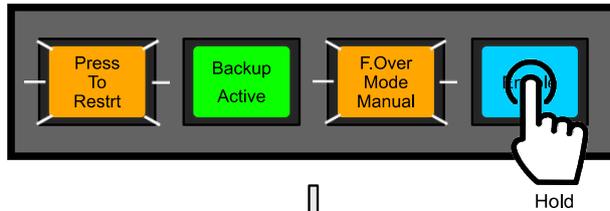
To restart the system controller from the TMRP:

TRMP status displayed.



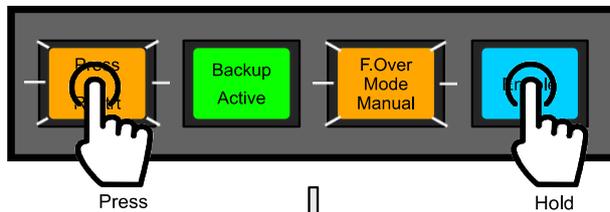
Blinking

Press and hold the Enable button. The buttons that have a control options available will turn amber and blink slowly.



Hold

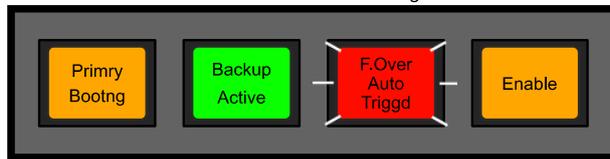
Press one of the options available.



Press Hold

Flashing

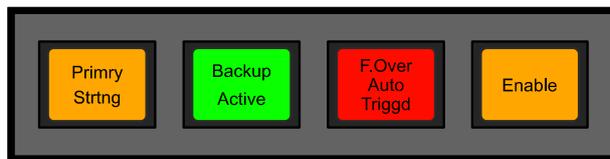
Release both buttons. The selected option will flash quickly for 2 seconds to show it has been changed.



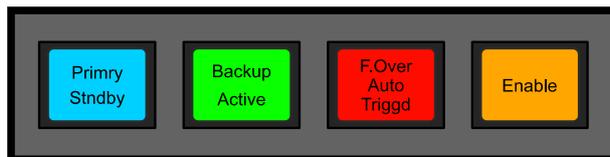
Release Release

Release

The new TMRP status is displayed.

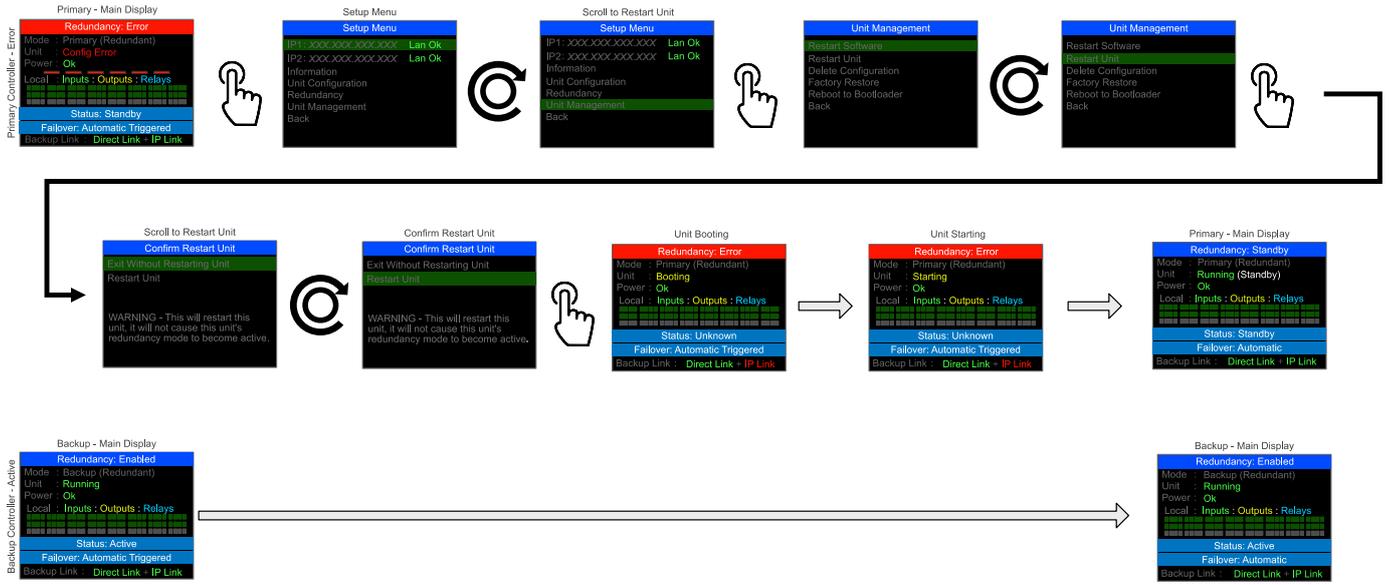


Release

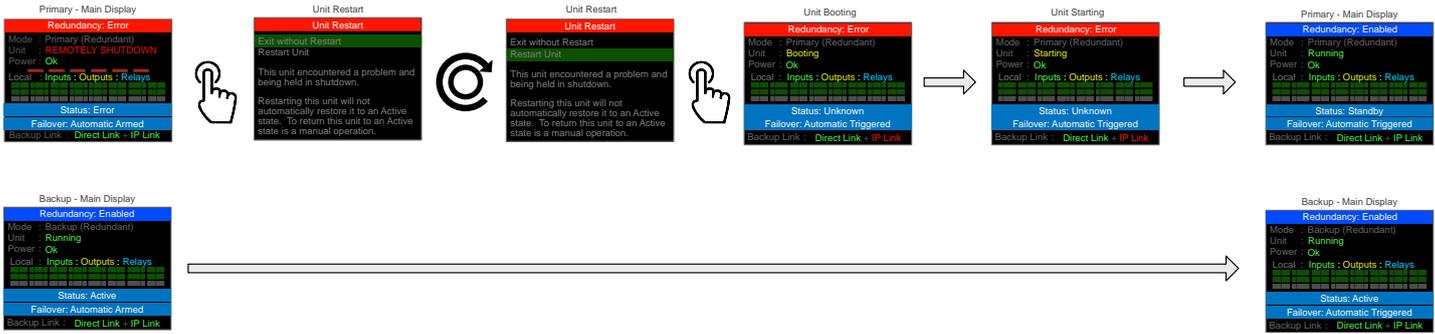




To restart the system controller from the TM1-Mk3+ front panel whilst in the error state:



To restart the system controller from the TM1-Mk3+ front panel whilst remotely shutdown:



Note if the error is caused by an external such as loss of network, then the system controller will still report an error until the issue has been resolved.



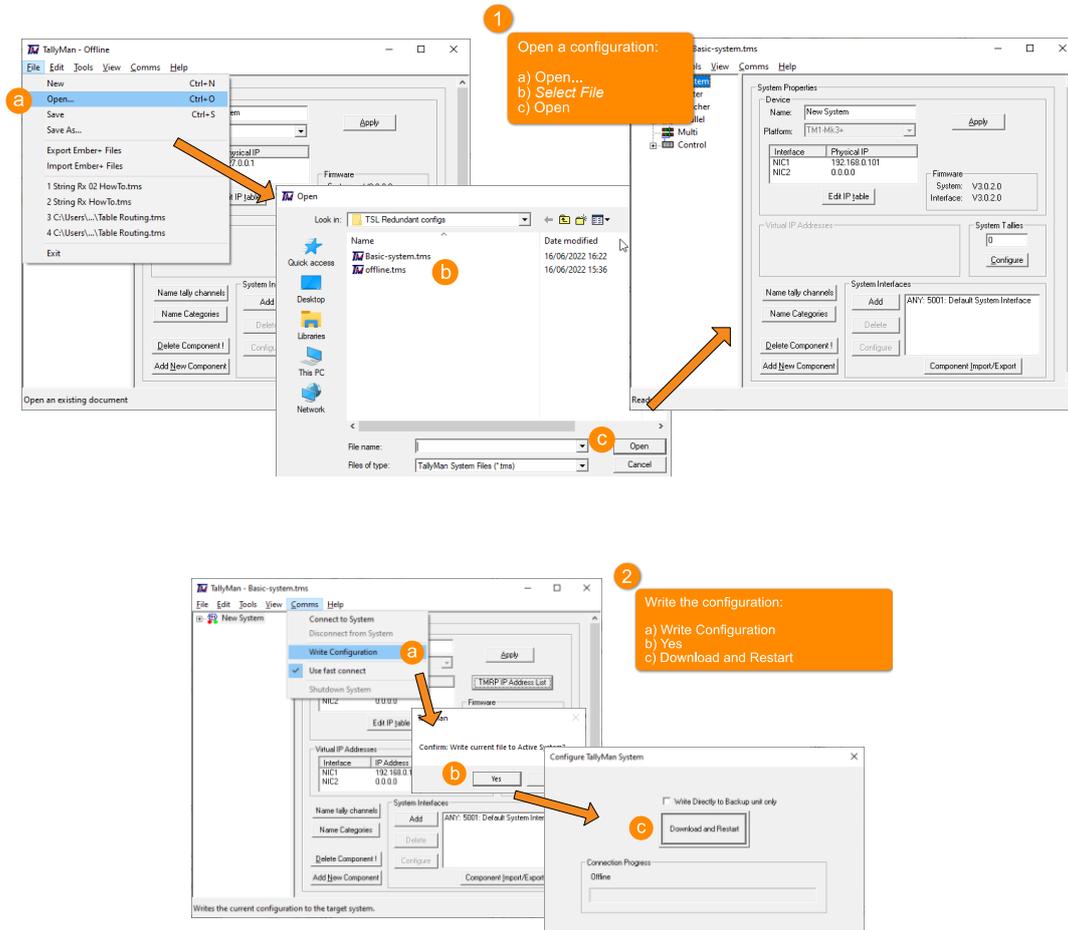
Replacing a System Controller

Primary System Controller

To replace the Primary system controller and maintain system operations the Backup must be Active and the Primary either in Standby or Remotely Shutdown.

To manually activate the Backup:

1. If the Failover mode is currently in Auto, then follow the instructions in the [Failover Mode](#) section to change the Failover mode to Manual.
2. Follow the instructions in the [Manually Changing the Active Unit](#) section.
3. Disconnect and remove the system controller.
4. Install the replacement system controller, ensuring all the connections are correctly inserted.
5. Power the system controller.
6. Set the units IP addresses to match the removed system controller, you can follow the instructions in the [Installation > TM1-Mk3+](#) section.
7. WARNING: The next operation will interfere with the operation of the Backup system controller and should be performed during a period of planned maintenance.
8. From the TallyMan configuration software, load and write the configuration:



This action will cause the replacement system controller to take up the role of Primary in the redundancy system. As such it will re-write the configuration to the Backup system controller to ensure synchronicity and then become the Active controller. If the system is in the Manual Failover mode, then you may need to change the failover mode to Automatic to re-enable the redundancy system.



Backup System Controller

To replace the Backup system controller, ensure the Primary system controller is Active. This operation can be performed without any interruption to the operation of the system.

1. If the Failover mode is currently in Auto, then follow the instructions in the [Failover Mode](#) section to change the Failover mode to Manual.
2. Follow the instructions in the [Manually Changing the Active Unit](#) section.
3. Disconnect and remove the system controller.
4. Install the replacement system controller, ensuring all the connections are correctly inserted.
5. Power the system controller.
6. Set the units IP addresses to match the removed system controller, you can follow the instructions in the [Installation](#) section.

This action will cause the Primary to recognise the Backup, the Primary will then automatically write the configuration to the Backup. Once loaded the Backup will assume Standby mode. If the system is in the Manual Failover mode, then you may need to change the failover mode to Automatic to re-enable the redundancy system.

TMRP

A TMRP can be replaced at any time without disruption to the operation of the TallyMan system. Note that if you are using the GPIO status control to manage a changeover solution or to interface with other third-party equipment then that functionality will be offline until the replacement is complete.

1. Disconnect and remove the TMRP.
2. Install the replacement TMRP, ensuring all the connections are correctly inserted, take special care with the GPIO connections to ensure they wired correctly.
3. Power the TMRP and note the IP address displayed on the buttons during the boot cycle.
4. Set the TMRPs IP addresses to match the removed unit, you can follow the instructions in the [Installation](#) section.

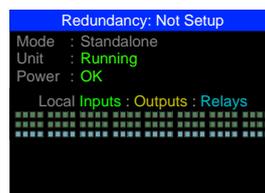
This action will cause the TMRP to join the redundant system, the buttons will display the status of the system.

Deleting the configuration

To delete the configuration on a system controller from the TM1-Mk3+ front panel:

1. On the display main page, press the encoder to display the **Setup Menu**.
2. Use the encoder to scroll and select the following options:
Unit Management > Delete Configuration > Delete Configuration.
(Note the second option to confirm the action.)

A **Command Sent** message will be displayed, then the unit will revert to a standalone setup:



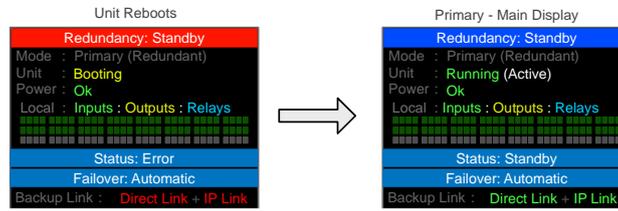
Restarting a unit

To restart the system controller from the TM1-Mk3+ front panel:



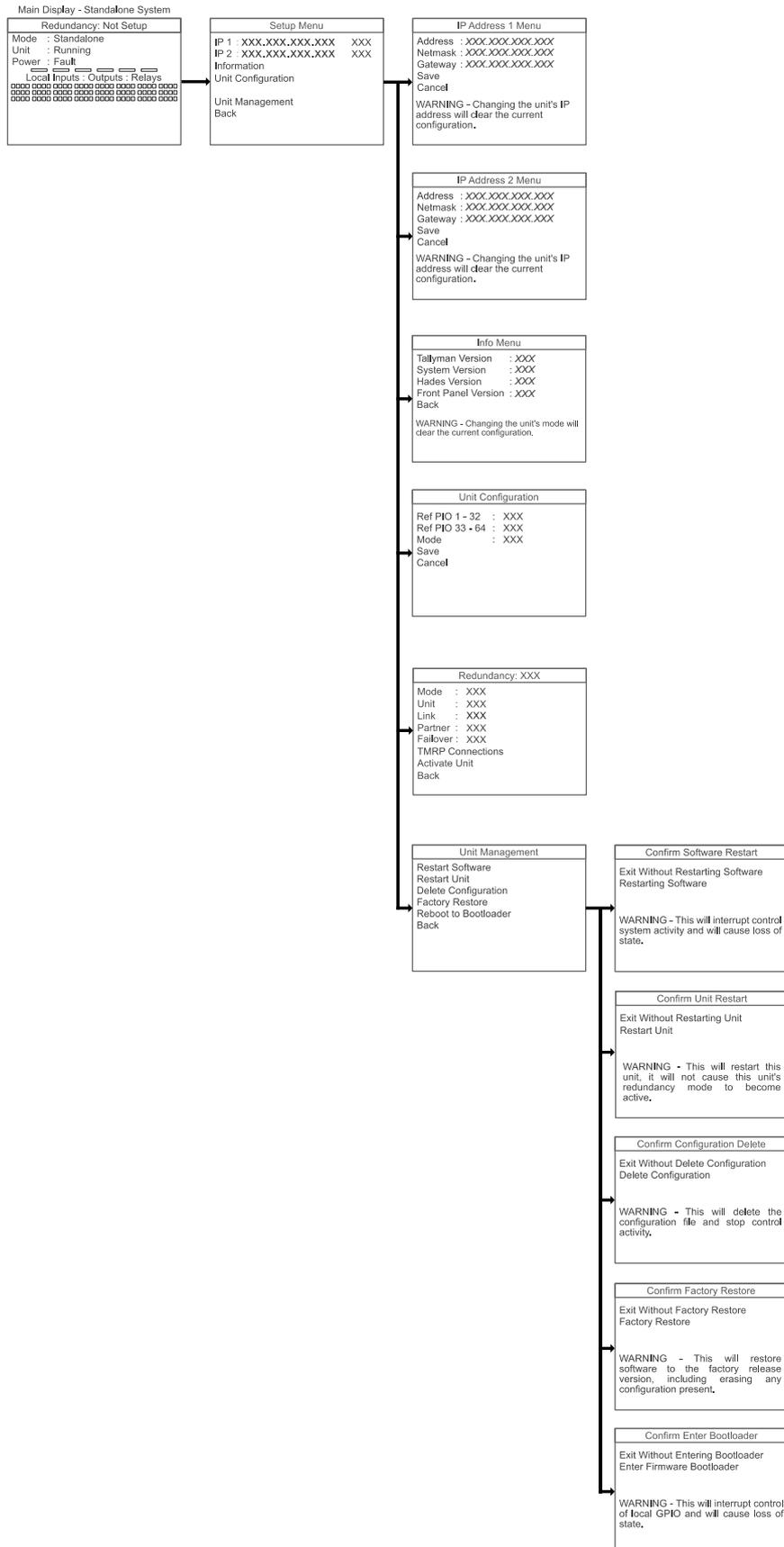
1. On the display main page, press the encoder to display the **Setup Menu**.
2. Use the encoder to scroll and select the following options:
Unit Management > Restart Unit > Restart Unit
(Note the second option to confirm the action.)

The unit will reboot:





TM1-Mk2 Menu Layout - Standalone Mode





TM1-Mk2 Menu Layout - Redundancy Mode

