WARNING

If you fail to read the installation instructions properly it is possible that you could accidentally damage your ZTC unit.   Such damage is **NOT** covered by our guarantee.   So to prevent avoidable and potentially expensive mistakes, please take the time to read these instructions before attempting to install your equipment

---

The ZTC System is only intended for controlling model railways by experienced modellers over the age of 14 .
It should only ever be operated by young persons under competent adult supervision.

Issue 1.01

ZTC Controls Ltd
Canvin Court
Somerton Business Pack
Bancombe Road
Somerton,
Somerset TA11 6SB
Tel:- 0870 241 8730 Fax:- 01458 273979
E Mail: sales@ztccontrols.com
Web Site: www.ztccontrols.com

Table of Contents

1.0   ZTC 620 and ZTC 622 Handheld Controllers.

1.1   Introduction

The ZTC 620 and 622 are the latest additions to the ZTC family of DCC model train controllers. The ZTC 620 and 622 are hand held slave controllers that connect to the 'SLAVE CTLS' socket on the rear of the ZTC 511 or ZTC 505 Master Controller. Up to 30 slave devices can be connected to the ZTC 511 or 505, using the networking capabilities of the ZTC DCC system. See section 3.0 for details of connecting slaves to a DCC control network.

True walk around capability can be achieved if network connectors are distributed around your layout. Once a train is under the control of a slave unit, disconnecting the slave unit from the network has no affect on the train – it keeps running. Control is immediately regained when the slave unit is reconnected to the network at another, or the same, network connector.

The ZTC 620 has the traditional rotary speed adjustment knob, with 270 degrees of rotational movement. The ZTC 622 has a regulator lever, similar to the ZTC 511 or 505 Master control unit, that has a 90 degree range of movement. In conjunction with the direction lever, both the regulator lever and the control knob support the RealFeel™ feature of the ZTC line of DCC controllers. The controllers can operate both locomotive and accessory decoders

The ZTC 620 and ZTC 622 controllers do not have the capability to configure (programme) locomotive or accessory decoders.

1.2   Fast Track Set-up – One Controller

You must have a ZTC 511 Master Controller with Version 4.01, or a ZTC 505 Master Controller with Version 1.00 or higher, software installed, or other compatible controller, for the ZTC 620 and ZTC 622 handheld controllers to work.

The ZTC 620 and ZTC 622 hand held controllers can be used directly out of the box. Plug the connector into the 'SLAVE CTLS' socket on the rear of the ZTC 511 or 505 Master Controller. Power up the ZTC 511 or 505 and the hand held will be ready to go. Read and apply the instructions on calling up a locomotive (section 4.0) and you are controlling your locomotive. To gain the most benefit from the many features of the ZTC620 and ZTC 622 controllers, read the rest of this manual.

2.0   ZTC 620 and ZTC 622 - Key to Control Features
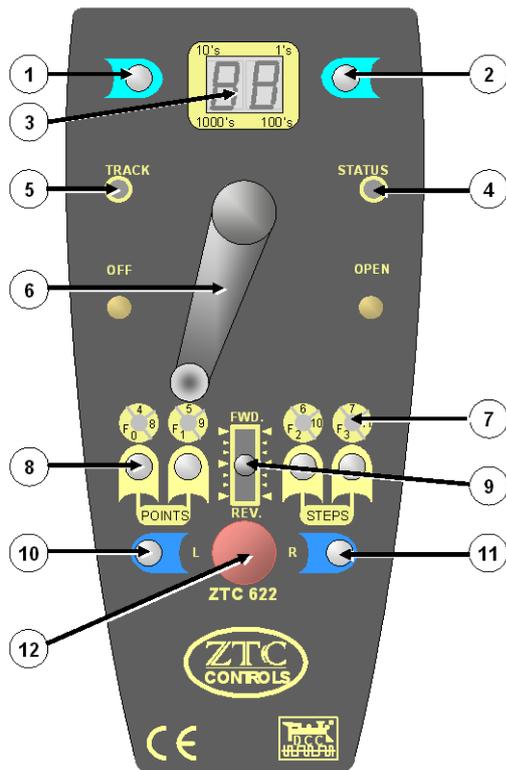
1. 10's and 1000's address button

This button is used to key in either the 10's of a decoder address, or the 1000's of a decoder address.

2. 1's and 100's address button

This button is used to key in either the 1's of a decoder address, or the 100's of a decoder address.

3. Dual Numerical Display

The numerical display shows the numbers selected by the address buttons. It also indicates two dashes ('- -') when there is no locomotive selected.

4.   Locomotive Status Indicator

The Locomotive Status Indicator is a tri-colour (red, green and orange) light emitting diode (LED). It indicates the availability and direction of travel of any called up locomotive.

5. Track Status Indicator

The Track Status Indicator is a red light emitting diode (LED). If track voltage is present, this LED will be off. If an 'emergency stop' has been initiated by this, or by any controller on the ZTC system, then the Track Status Indicator LED will flash. If an overload condition exists, or the track has been turned off then the ZTC 511 or 505 master controller will signal all controllers on the system and cause this LED to stay on continuously. In this second case, an audible tone will sound periodically. The Track Status Indicator LED will go off again when normal operations are resumed.

6. Regulator Lever/ Control knob

To control the speed of a locomotive, the ZTC 620 has a round control knob. With the knob turned completely counter clockwise the locomotive under control will be stopped. Rotating the knob clockwise will increase the speed.

The ZTC 622 has a regulator lever, in place of the control knob, to control the speed of a locomotive, similar to a real steam locomotive. With the regulator lever moved to the far left the locomotive under control will be stopped. Moving the lever to the right will increase the speed.

7. Function LED's

Above each of the four function buttons is a function LED. As a function button is pressed the associated LED will either flash momentarily or remain on for as long as you hold down the function button, depending on how the function buttons have been configured. This behaviour depends on how the function buttons have been configured (see section 6.2).

8. Function Buttons

There are four function buttons. In combination with the 'ENTER L' button these four buttons can control up to 12 separate functions. Each function can be configured to operate either as a momentary on (horn or whistle etc.), or to toggle between on and off (lights etc.).

9. Direction Lever

The Direction Lever determines the direction of travel of the locomotive under control. It can be configured to operate as a forward/reverse switch with a centre off position, or as a progressive control, which controls the speed and direction of the locomotive up to a maximum speed set by the Regulator/Control Knob.

In forward/reverse switch mode, moving it to the upper position sets the direction of travel to forward. The Regulator/Control Knob then controls the speed. Moving to the lower position sets the direction of travel to reverse. In its mid position the locomotive would be stopped, regardless of the setting of the Regulator/Control Knob.

In progressive mode, the Direction Lever sets the maximum speed of travel and the direction. The Regulator/Control Knob sets the speed up to the set maximum. Moving the Direction Lever progressively towards the upper position, progressively increases the speed of the locomotive.

10. and 11. 'Enter R' and 'Enter L' buttons

These buttons are used in conjunction with the other controls or buttons on the slave controller to enter data or control settings, clear overload alarms and restore power after an emergency stop.

Pressing both the ENTER L and ENTER R buttons at the same time and holding them for at least one second will send a request to the master controller to restore power to the track, or resume normal operations and allow all locomotives to be under control as they were prior to the Emergency Stop button being pressed.

12. Emergency Stop

The red Emergency Stop button provides two functions.

Pressing the button once sends a signal to the master controller which stops all trains running, but maintains power to the track. This allows accessory module circuits to still operate e.g. points can still be set.

Pressing the button twice will signal the master controller to turn off all power to the track and accessories.

3.0 Networking Slave Controllers to the ZTC 511 or 505 Master

Up to 30 slave devices can be connected to the ZTC 511 or 505 Master Controller. The slave controllers are networked to the ZTC 511 or 505 using the X-Bus Ⅲ, which is available at the 'SLAVE CTLS' socket on the rear of ZTC 511 or 505.

3.1 Single Slave Controller

The connector on the slave controller is plugged into the 'SLAVE CTLS' socket on the rear of the ZTC 511 or 505.
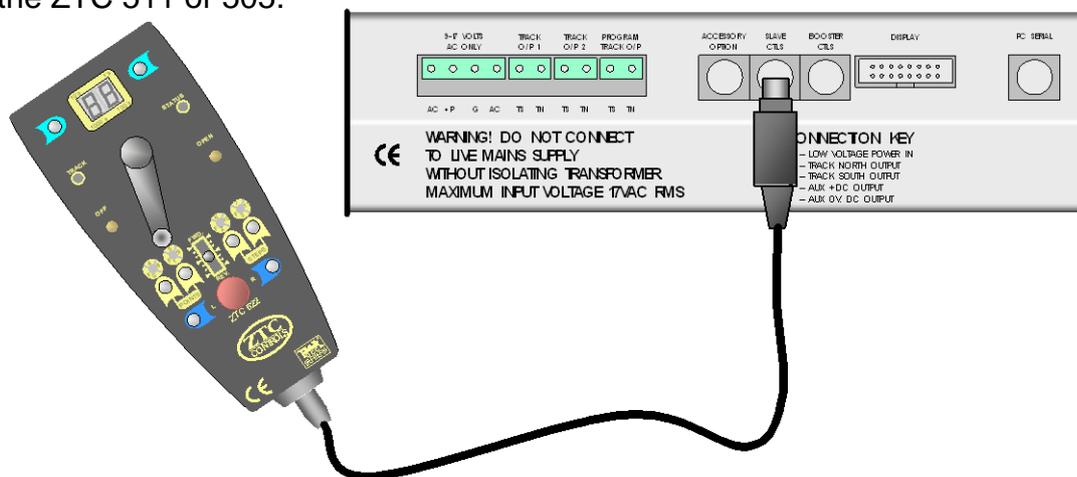
3.2 Two Slave Controllers

To connect two slaves to the master controller you need a 3-way X-Bus Ⅲ Adapter (ZTC 308), and a connecting cable (ZTC 309) as shown below. Slave controllers, or connecting cables, can be plugged into any of the three outlets on the adapters.
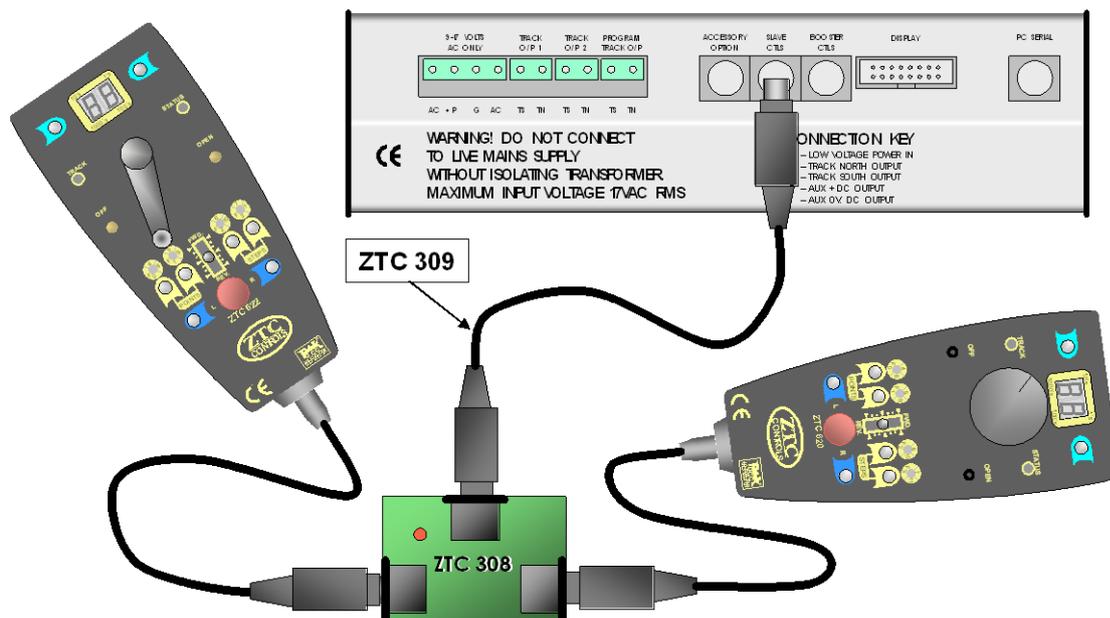
3.3   Three or More Slave Controllers

Three slave controllers would require two ZTC 308 X-Bus III Adapters and two ZTC 309 connecting cables. The ZTC 309 cables allow the ZTC 308's to be "daisy chained" together and distributed about your layout allowing controllers to be positioned at different key areas. The basic rule for adding controllers is that you need one less adaptors and connecting cables than you have slave controllers. So, for six slaves you need five three way adaptors and five connecting cables.

Alternatively, you can use a single ZTC 307 X-Bus III Hub Controller and one ZTC 309 to connect up to five network devices to the network at a single location. The diagram below shows three controllers connected to the ZTC 314.Two more controllers, or other network devices, can be connected to the unused outlets.
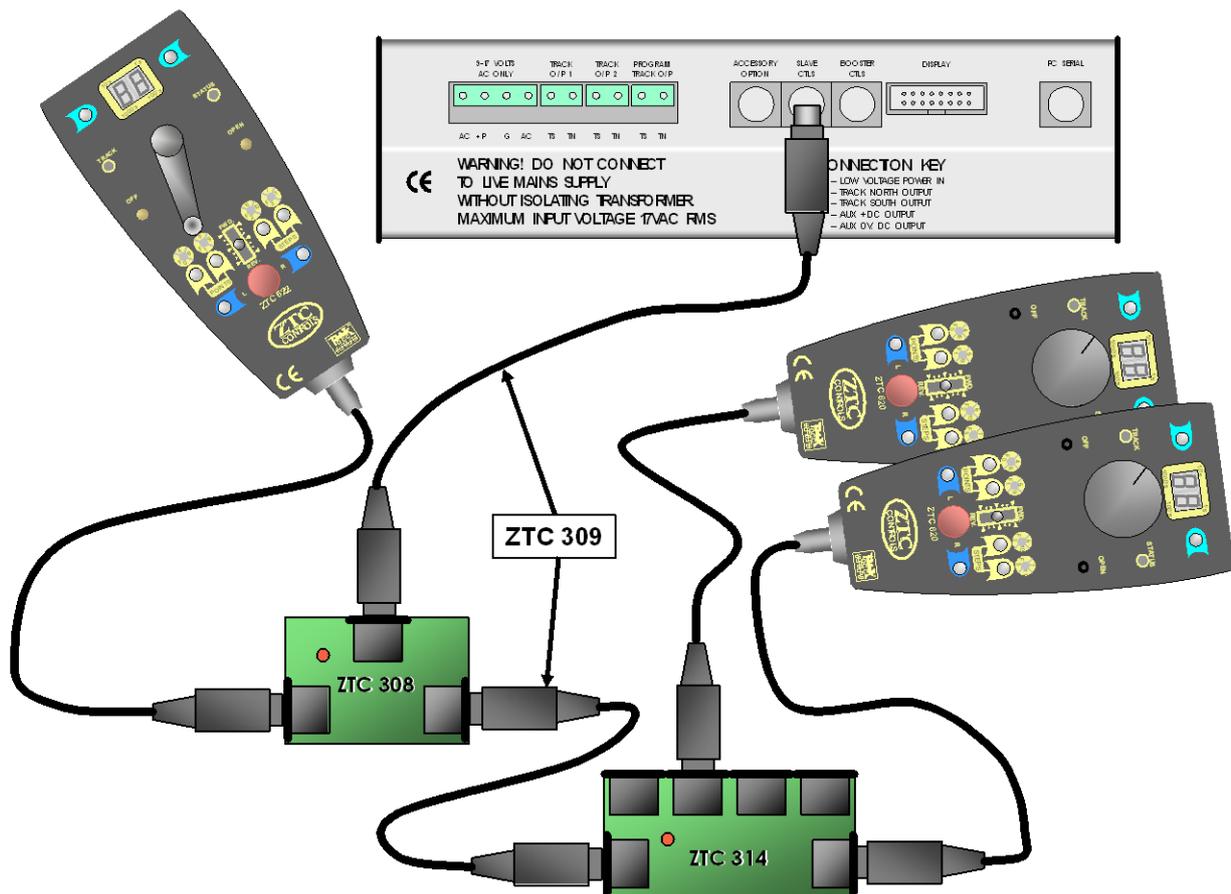
4.0　Controlling Locomotives

Any locomotive on your layout may be controlled by the slave controller. To take control of a locomotive you must first know its address.

4.1　Taking Control of a Locomotive

Depending on the type of decoder installed in the locomotive, or your desired numbering scheme, some locomotives will have single, double, triple or four digit address numbers. The ZTC620 and ZTC622 controllers only show 2 or 4 digit addresses. This means that single and triple digit addresses must be preceded with a leading zero.

Example:　　Locomotive address 3, will need to be entered as 03 and 140 will be entered as 0140.

Note: Locomotive 0 (locomotive without a DC decoder installed) is entered as a two digit address '00'.

4.1.1　Set the direction lever to the middle position.

4.1.2　Set the regulator/control knob to the closed position.

4.1.3　**Two digit address** – set the locomotive address using the address buttons (left button for tens, right button for units) and press ENTER R .

4.1.4　**Four digit address** – first set the two high address digits using the address buttons (left button for 1000's and right button for 100's) and press ENTER L .

Then set the two low address digits (left button for tens, right button for units) and press ENTER R .

4.1.5　If control of the locomotive is established the status LED will show steady orange.

4.1.6　If control of the locomotive is established, set the Reversing Lever to the desired direction.

4.1.7　If the locomotive is already running and the direction lever has been set to the opposite direction to that in which the locomotive is running, then the Status LED will flash red or green depending on the direction in which the selected locomotive is currently moving (green for forward, red for reverse). Adjust the direction lever accordingly.

4.1.8　Set the regulator/control knob to the desired speed. If the selected speed does not match that already set for the locomotive, the function LED's above the function buttons will indicate the direction in which the Regulator/Control knob needs to be moved in order to match the locomotive speed. e.g. F0 and F1 LED's will flash together to indicate that the Regulator/Control knob needs to be set at a slower speed and F2 and F3 will flash together to indicate that the control needs to be set at a higher speed in order to match the speed of the locomotive.

4.1.9   Once the direction and speed have been matched then the Status LED will illuminate steadily. Green if the locomotive is running forward and red if running in reverse. The locomotive will now be under control.

If desired the ZTC 620 and ZTC 622 can now be unplugged and plugged into another X-Bus III socket, without affecting the operation of the locomotive, and will still be able to control the same locomotive.

4.2   Calling up Another Locomotive

Once the locomotive that you are controlling is running to your satisfaction, you may call up another locomotive and set it running too.

4.2.1   Set the desired locomotive address as shown in 4.1.3, or, 4.1.4.

4.2.2   The previously controlled locomotive will continue to run at its set speed.

4.2.3   If the second locomotive is already stationery, select the desired direction with the Direction Lever and adjust the speed with the regulator/control knob.

4.2.4   If the second locomotive is already running, then the Status LED will flash either red or green until the Direction Lever matches the current set direction, and the appropriate pair of Function LEDs will flash together until the Regulator/Control knob matches the current speed of the locomotive. See 4.1.8

4.3   Setting Speed Step Modes

The ZTC 620 and ZTC 622 controllers can operate in either 28 or 128 speed step modes. To see what mode you are currently operating in, press the F2 and F3 function buttons simultaneously and hold for about a second. The numerical display will show 'Lo' if set for 28 step mode and 'Hi' if set for 128 step mode. To change between the two modes, continue to press and hold down the F2 and F3 function buttons until the numerical display toggles between 'Hi' and 'Lo' (about 3 seconds). When the mode displayed changes, release the function buttons.

To change back to the previous mode, repeat the above.

4.4   Operating Functions

The ZTC 620 and ZTC 622 both have the capacity to control up to twelve (12) functions. The functions are numbered F0 through F11. These functions can operate such features as the locomotive whistle, locomotive or carriage lighting, uncoupler, sound effects or smoke generator etc.. The type of decoder that is in your locomotive/rolling stock will determine how many functions are available. How the various features are wired up will determine which function controls what feature.

To operate functions F0 to F3, simply press the respective function button.

To operate functions F4 to F7, press `ENTER L` followed by the chosen function button. The 'Enter L' button has to be pressed immediately before each function F4 to F7 operation. Which button operates which function is indicated at the top of the circle above the button.

To operate functions F8 to F11, press and hold down the `ENTER L` key while pressing a function button. Which button operates which function is indicated at the right of the circle

above the button. Release the 'Enter L' button after releasing the chosen function button. The 'Enter L' button must be released before operating another function.

4.5   De-allocating a Locomotive

When you are operating more than one locomotive from a single controller, any locomotive(s) that you have left running, while you directly control another, is said to be de-allocated. A de-allocated locomotive is not under the direct control of any controller in the system. De-allocated locomotives are free to be controlled by any other controller on the system, without being 'stolen' from another operator. To de-allocate a locomotive without calling up another locomotive, call up the equivalent of a four digit locomotive zero (0).

First, set the two high address digits to '00', using the address buttons (left button for 1000's and right button for 100's) and press ⬚ ENTER L ⬚ . Then set the two low address digits to '00' (left button for tens, right button for units) and press ⬚ ENTER R ⬚ . The numeric display will show two dashes '- -' to indicate that there are no locomotives allocated to the controller.

4.6   Double Heading

Double heading or multiple units can only be assembled using the ZTC 511 or 505 master controller. To take control of a double headed or multiple unit train with the ZTC 620 or ZTC 622, call up the address of the lead locomotive.

5.0   Controlling Points or Signals (Accessories)

Accessory decoders can be called up and controlled as follows:

5.1.1   Press function buttons ⬚ F0 ⬚ and ⬚ F1 ⬚ simultaneously, and hold down.

5.1.2   When the corresponding F0 and F1 LEDs flash, set the accessory address using the address buttons (01 to 99 only).

5.1.3   Press ⬚ ENTER L ⬚ or ⬚ ENTER R ⬚ to operate points, signals or other accessories as desired.

5.1.4   By keeping function buttons F0 and F1 held down, other accessory addresses can be entered and operated.

5.1.5   When all the desired accessories have been operated, release function buttons F0 and F1.

Note that the currently selected locomotive can still be controlled with the Direction Lever and the Regulator/Control Knob, while the controller is in the accessory control mode.

6.0   Configuring the Controller

When new, the ZTC 620 and ZTC 622 are preconfigured with a number of default settings. For example, the slave controller address is set to 1. The default values can be changed to suit the way that you run your layout. The following paragraphs show how the various features can be adjusted.

6.1 Setting the Slave Controller Address

Each slave connected to the master controller must have a unique slave address or number. The factory set (default) slave number for a ZTC 620 or ZTC 622 is 1. If you only have one slave this need not be changed. For two or more slaves, each slave number must be unique. You change the slave number as follows:

6.1.1   Ensure that the slave is disconnected from the X-Bus III

6.1.2   Hold down the   `ENTER L`   button and plug the slave into the X-Bus III. The STATUS indicator will now be flashing red/green and the current slave number will show briefly on the numeric display.

6.1.3   Release the   `ENTER L`   button and the numeric display will show '00', ready to accept a new slave number.

6.1.4   Using the two address buttons select the desired address number (valid addresses are between 1 and 30)

6.1.5   Press   `ENTER R`   to confirm the change

6.1.6   To change the slave number again, unplug the slave from the X-Bus III for at least 10 seconds, then repeat the above procedure.

6.2 Configuring Function Buttons

Function buttons can be configured to operate devices that only need to be active for as long as the function button is depressed (momentary - locomotive whistle or horn), or for devices that are activated on one push and deactivate on a second push (toggle - lights, motorized effects etc.). There are 12 virtual function buttons, all being accessed by the four physical function buttons on the controller, in conjunction with the ENTER R or ENTER L buttons. By default all the function buttons are set for toggle operation. To configure the function buttons proceed as follows:

6.2.1   Press the F0 and F3 buttons together until (about 3 seconds) all the function LED's above the function buttons begin to flash.

6.2.2   Release the F0 and F3 buttons - function buttons F0 to F3 are now ready to be configured.

6.2.3   Press each function button that you wish to change - the LED above the button will turn on when set for momentary, or go out for toggle action. Buttons can be pressed again to reverse the selection.

6.2.4   To accept these changes go to 6.2.8. Otherwise press   `ENTER L`   to continue to configure the F4 to F7 buttons. All the function LED's above the function buttons will begin to flash again.

6.2.5   Press each function button that you wish to change - the LED above the button will turn on when set for momentary, or go out for toggle action. Buttons can be pressed again to reverse the selection.

6.2.6   To accept these changes go to 6.2.8. Otherwise press `ENTER L` to continue to configure the F8 to F11 buttons. All the function LED's above the function buttons will begin to flash again.

6.2.7   Press each function button that you wish to change - the LED above the button will turn on when set for momentary, or go out for toggle action. Buttons can be pressed again to reverse the selection.

6.2.8   To save the changed configurations press `ENTER R`. All four function LED's will flash twice to acknowledge the completion of the process.

6.3   Direction Lever Mode Setting

There are two modes in which the Direction Lever can operate. These are the Progressive Mode and the Switch Mode. The default setting is the Progressive mode.

In the Switch Mode, the Direction Lever acts as a forward/reverse switch, with a centre off position.

In the Progressive mode, the Direction Lever works in conjunction with the Regulator Lever or Control Knob to determine the speed and direction of the locomotive. In this mode, provided that the Regulator Lever or Control knob is not set at closed/off, if the Direction lever is moved slowly in either direction the locomotive will pull away in the direction selected. The further the lever is moved the faster the locomotive will move. Its maximum speed is determined by the position of the regulator or control knob.

To change the mode to the Switch Mode option hold down both function switches F1 and F2 until the green LED's above the function switches flash twice together.

To change back to the Progressive Mode, repeat the above.

6.4   Enabling and Disabling the Button Press Beep

By default, with the exception of the address buttons, the button press beep is turned off, or disabled. Enabling this feature allows a beep to be heard, each time a button is pressed. This gives audible feedback to the operator that the button has been properly operated.

This feature can be turned on (enabled) by holding down the F0 and F2 function switches together until the green LED's above the function switches flash twice together.

To turn the beep feature off, repeat the above.

6.5   Disabling the Audible Warning

By default, the audible warning sounds in the handheld controller if there is an overload condition detected by the Master controller, or the track voltage has been turned off (pressing Emergency Stop button twice). The red warning LED on the ZTC 620 or ZTC 622 will be lit continuously when this occurs.

The audible warning sound can be turned off (disabled) by holding down both function switches F1 and F3 until the green LED's above the function switches flash twice together.

To turn the audible warning back on, repeat the above step.

Note: The visual and audible (if enabled) warning indication will always remain on until the overload condition is cleared and the track power restored. The system can be reset from any ZTC 620 or ZTC 622 connected to the network by pressing the 'Enter L' and 'Enter R' buttons simultaneously and holding for at least one second. Alternatively, it can be reset from the ZTC 511 or 505 Master Controller by pressing the 'Clear' button.

7.0   Calibrating the Direction Lever and Regulator/Control Knob

From time to time you may feel that the direction and regulator controls need recalibrating. This is achieved as follows.

7.1   Press all four function buttons F0 through F3 simultaneously and hold (approximately 3   seconds) until the STATUS LED is flashing red, orange and green.

7.2   Release the function buttons.

7.3   Set the Regulator or Control Knob to the CLOSED position.

7.4   Set the direction lever to fully forward.

7.5   Press   `ENTER R`   . The F0 LED will flash twice.

7.6   Set the direction lever to the fully reversed position.

7.7   Press   `ENTER R`   . The F1 LED will flash twice.

7.8   Set the direction lever to the mid position.

7.9   Set the Regulator or Control knob to the CLOSED position.

7.10   Press   `ENTER R`   . The F2 LED will flash twice.

7.11   Set the regulator or control knob to the fully open position.

7.12   Press   `ENTER R`   . The F3 LED will flash twice.

7.13   All four function LED's will then flash twice to indicate that the calibration function is complete.

8.0   Resetting the Controller to Factory Presets

To clear all customized controller settings and return the controller configuration to that which it had when leaving the factory, hold down the   `ENTER L`   and   `ENTER R`   buttons simultaneously, while connecting the controller to the X-Bus Ⅲ. Once the controller is connected to the X-Bus Ⅲ it will perform a factory reset. It may then be necessary to perform the calibration procedure as detailed in section 7.0.