Maximum Output Power Limitations

Each zone can supply up to 8 Amps of output current. However, the zones can not simultaneously provide this amount of current because the DC power supply is limited to 8 Amps when set for 15 volts. Thus, if one zone is continuously supply about 5 Amps, the other zone can not supply more than about 3 Amps. Exceeding this value will cause the external power supply to shutdown.

For best operation, design your layout such that any one zone requires no more than about 4 Amps maximum at any one time. This can be accomplished by considering how many trains can be operating at one time within the zone. If the total current required by all the trains exceeds about 4 or 5 amps, consider adding another booster. Using this strategy insures that there is plenty of extra power to start trains, even if the zone is loaded down with 4 Amps.

At any point in time, zone-A can supply up to 8 Amps (or less depending on the AR trip setting) or zone-B can supply up to 8 Amps - they just can't do 8 Amps at the same time. If this is a requirement, you will need to add some additional boosters.

Do not share a power supply among multiple boosters. This is not allowed and can cause problems between ZoneMaster Boosters.

Application Tips and Techniques

Conventional block detectors, used for signaling, are OK for the ZoneMaster Boosters.

Do not connect any cables with power applied. Always make connections to the Booster with power turned off. Under unusual conditions, connecting the modular cable with the power turned on could result in unexpected locomotive operation.

Do not use the ZoneMaster with the Analog Channel 0 feature. Some systems allow a locomotive without a decoder to operate. This feature is not supported by the ZoneMaster.

Always disable the analog conversion feature of your decoders. Consult your decoder manual and set CV29 to "digital only." Loco addresses between 1 and 99 use CV29 value set to 2. Loco addresses between 100 and 9999 use CV29 value set to 34.

Use heavy duty wiring. Because the ZoneMaster has a huge power capacity, your layout needs to be wired properly. Using wire that is too small, or depending only on rail joiners to connect lengths of track will result in the automatic short circuit protection not working.

Test your wiring and trackwork. Go to the end of your bus wiring and place a metal object or coin across the rails. If your wiring is OK, the short circuit beeper will sound immediately. If it doesn't sound, you will need to beef up your wiring.

Zone-A has a variable trip current control and can be used at any time. Although this is normally used to set the auto-reverse sensitivity, it can be used when the auto-reverse is turned off.

Set AR Trip Current to Minimum Value that works with your highest current draw locomotive.

CVP Products P.O. Box 835772 Richardson, TX 75083
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ZoneMaster-Dual User Guide

Warning - DO NOT USE UNREGULATED POWER SUPPLIES

The DZB7 is designed for use **ONLY** with external, regulated, **DC power supplies** like the recommended DCPS120. It is the external power supply voltage value that sets the track voltage. The recommended setting is 15 Volts. Higher voltages can damage decoders. If you intend to operate at a higher voltage, you must first contact your decoder vendor and ask them for the maximum voltage the decoder can withstand and use that as the absolute maximum voltage setting for the external power supply.

WARNING

Never apply AC voltage to the DZB7 power input jack. Doing so will damage the DZB7 which will not be covered by the warranty.

Caution

Short circuit and overload protection of the DZB7 requires proper wiring techniques and suitable wire. Be sure and use the recommended wire size.
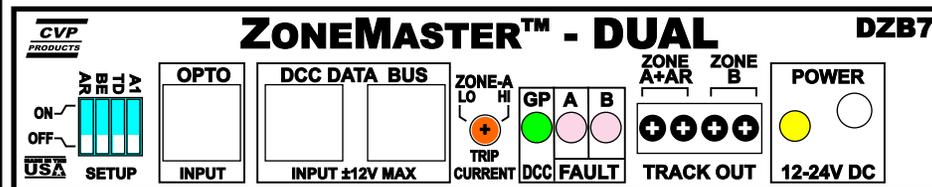
Quick Guide To Front Panel Controls And Connectors

AR: Zone-A Auto-Reverse (On/Off)

BE: Alarm Buzzer On/Off

TD: Time Delay (Long=On, Short=Off)

A1: Test Mode - Off/On

Switch up = feature selected or "on."

GP : On when DCC data present

A-Fault or B-Fault: On when there is a fault in the Zone such as shorted or overloaded.

POWER LED: On when DC power is applied.

Opto Input: For use with any high level input signal or if opto-isolated control bus is required.

DCC Data Bus: For use with EASYDCC system and boosters.

Zone-A Trip Current: Full counter-clockwise equals lowest trip current (~ 1 Amp). Full clockwise equals highest trip current (~7A). A lower setting is best. The setting is only for Zone-A.

Zone A Track Output - connects to the track. It has selectable auto-reverse feature using the AR switch. Trip current for either autoreverse sensing or maximum allowed output current is set with AR-Trip Current control.

Zone B Track Output - connects to a second zone and is independent of Zone-A. It does not have autoreverse. Short circuit or overload current trip current is set at 7 Amps and is not adjustable.

DCPS120 Power Supply Connection

Connecting Power Supply To ZoneMaster: First set the voltage on the Power Supply. 15 volts is the recommended setting. Now insert the power supply plug and push it in completely.
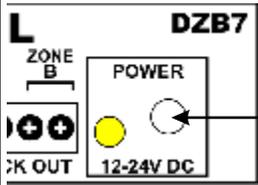
Support the cord to minimize the forces placed on the power jack.

Basic Hookup - EASYDCC System
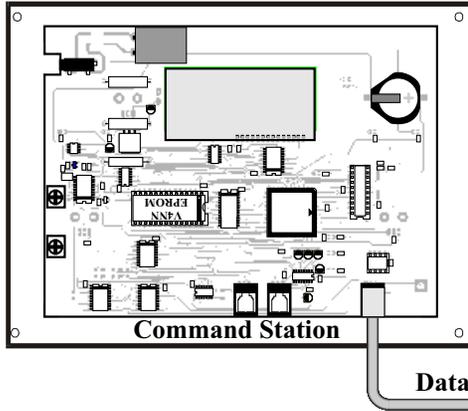
The CS2B Command Station is shown but any version can be used.

Command Station

Data Cable

ZoneMaster - Dual

DC Supply

To Next Booster

To Track Bus Zone 2

To Track Bus Zone 1
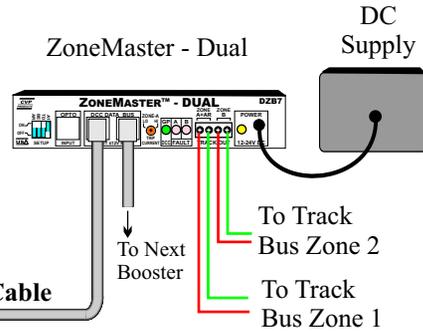
The ZoneMaster connects to either the Command Station booster output or to the DCC output of another booster. For multiple ZoneMaster installations, use the 2nd DCC Data Bus jack to make connection to the next booster in the series.

The ZoneMaster Dual has two independent bus drivers for two independent power zones, districts, or blocks. In the drawing they are shown as going to Zone 1 and Zone 2 but you can use any naming convention you wish.

Modular "DATA" cable should be used for the connection although modular TELCO cable is OK. Do not mix DATA and TELCO cables. Pick one style and use it exclusively for ZoneMaster hookups.

Since either a data or telco cable can be used, you may wonder about the difference. The drawing below shows an easy way to determine the type of cable: check the position of the tabs, relative to the molding ridge running down the center of the cable.

Always plug the modular cable into the jack labeled Booster on the Command Station and into either one of the DCC Data Bus jacks. Do not use the Opto input jack.
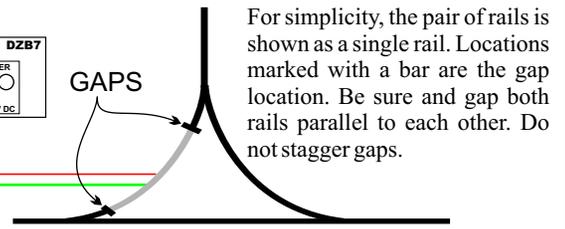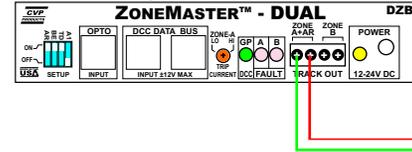
Tab

Data Cable

Telco Cable

Wye Hookup

Junction Wye

GAPS

For simplicity, the pair of rails is shown as a single rail. Locations marked with a bar are the gap location. Be sure and gap both rails parallel to each other. Do not stagger gaps.

In these simple diagrams, the light-colored section is the reversing section and connects to the Zone A output. The AR switch must be up or ON to use the auto-reverse option. The two wires connect to the two rails on the reversing section. Please see the warnings on page 6 about keeping the train completely inside the reversing section for autoreverse to work properly.

Dead-end Wye Hookup
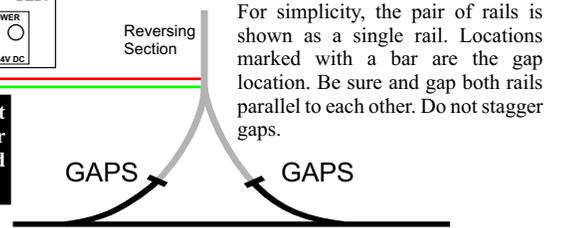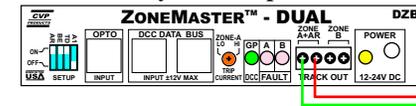
Warning: The autoreverse feature will not correct for poor trackwork, bad wiring or short circuits caused by improperly wired turnouts and switch machines.

Reversing Section

For simplicity, the pair of rails is shown as a single rail. Locations marked with a bar are the gap location. Be sure and gap both rails parallel to each other. Do not stagger gaps.

GAPS   GAPS

Protecting Loco Wiring From Incorrectly Lined Switch

If your locomotive (diesel or steam) runs up against a turnout that is thrown in the wrong direction, a short circuit will occur between the loco's front wheels, touching the frog, and the rear wheels. If this happens, booster current will flow from the frog, through the locomotive wiring and out the rear wheels. Damage can occur to delicate locomotive wiring.

To protect locomotive internal wiring against this type of failure, use the old fashion but highly effective trick of installing an automotive light bulb between the frog and the power feeds. An inexpensive 1156 automotive light bulb will reduce short circuit current to about 2 amps. The 1156 bulb can be purchased from Amazon and sells for about one dollar.
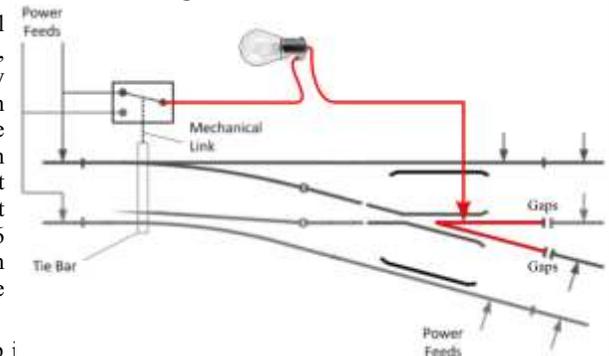
Under normal conditions, the bulb is unimpeded. But should there be a short circuit between the frog and the opposite polarity track, the bulb will start to glow and reduces the amount of the short circuit current.

Bulb Mounting: A pair of wire pigtails can be soldered directly to the bulb. The bulb is installed between the frog and the spare contacts for frog polarity.

More Information: This link takes you to a well written section regarding light bulbs and their ratings. An extensive "theory" of operation can also be found here.

https://sites.google.com/site/markgurries/home/technical-discussions/dcc-circuit-breakers/light-bulbs/breakers/light-bulbs

Illegal Reversing Sections

Back to back reversing sections or two loops, either back to back or inside each other, **CANNOT** use the ZoneMaster Auto-Reverse feature.

When block gaps between the two reversing sections or loops are bridged by a loco, each booster's autoreverse output will reverse polarity at exactly the same time. This means that the polarity mismatch *has not* been corrected; it is possible it might never be correct. Each will flip polarity again and again and again. During this time maximum current [up to the sum of both booster's currents) is flowing between the two boosters *through* the locomotive's wheel set and internal wiring. If this occurs, the internal locomotive wiring can be damaged.

This condition cannot be resolved by the ZoneMaster boosters themselves. However, there are two possible solutions to deal with this issue.

The first solution is to power the two loops with two 3rd party auto-reverse (AR) modules that are specifically designated as suitable for adjacent or nested reversing loops or sections. There is usually a switch setting on the AR module for this condition. If this solution is selected, power the two modules from the same ZoneMaster booster that is set for NO-AUTOREVERSE. Just keep in mind that you are depending on the two AR modules to reliably work 100% of the time with all of your locomotives.

Arguably the best solution is to eliminate the illegal reversing sections. If you can't do this, then consider using only simple reversing loops and sections. This is the only way you can ensure 100% reliable operation of the AR feature of the ZoneMaster booster.
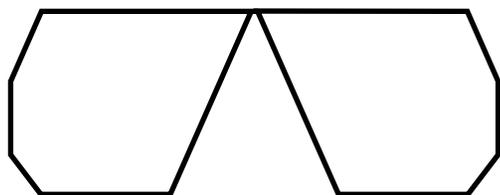
**Illegal
Back-to-back
Reversing loops**
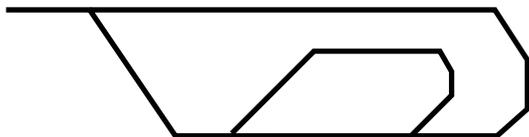
**Illegal
Nested
Reversing loops**

Simple Reversing Loops and Sections

reversing loop

reversing section
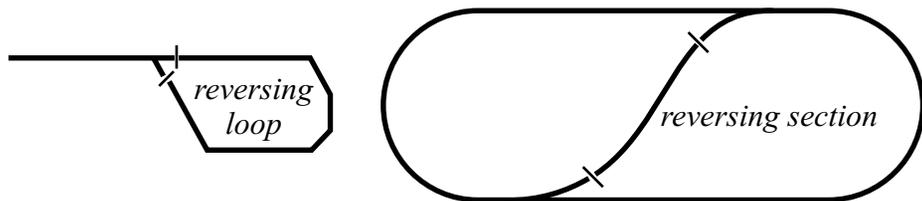
ZoneMaster Indicators

The GP LED turns on bright green when a proper DCC signal is applied to either the DCC Data Bus inputs or the Opto Input. Use it as verification of a good connection between the ZoneMaster and your Command Station, or another ZoneMaster.

The A-Fault LED flashes on and off in time with the fault buzzer whenever an overload has been detected and the built-in circuit breaker has been tripped. The moment the circuit breaker has been tripped, the track output is disabled and remains disabled for about 3 seconds. After the short circuit is cleared, the ZoneMaster automatically resets the circuit breaker and resumes normal operation.

The B-Fault LED flashes on and off in time with the fault buzzer whenever an overload has been detected and the built-in circuit breaker has been tripped. The moment the circuit breaker has been tripped, the track output is disabled and remains disabled for about 3 seconds. After the short circuit is cleared, the ZoneMaster automatically resets the circuit breaker and resumes normal operation.

Upon first application of power, both the A and B fault lights turn on while the ZoneMaster goes through its own set of internal diagnostics. If the DCC signal is plugged in, the GP light will turn on and the A and B fault lights will turn off.

The POWER LED turns on anytime DC voltage is applied to the ZoneMaster. When the current load supplied by the ZoneMaster is near the limit of 7 Amps from either output, this light may become dim. If some kind of fault causes the external power supply to shut down, the LED will be dark. Determine the cause of the fault and fix it. In rare cases, the external DC supply may need to be unplugged and allowed to cool before it will resume normal operation. If this condition happens on a regular basis, it is a sign that you need to add additional ZoneMasters to your layout.
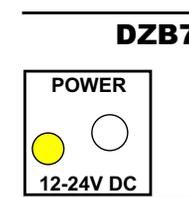
ZoneMaster Setup Options

AR - Zone-A AutoReverse Feature: When switch 1 is ON, Zone A will have autoreverse for use with reversing loops and reversing sections. As the wheel crosses a gap between Zone A and another zone [either the B output or another booster], a short circuit is sensed and the polarity of Zone-A is reversed. If the short doesn't clear, Zone-A shuts down, the fault LED turns on, and the alarm buzzer sounds.

When switch 1, AR, is OFF, the autoreverse feature of Zone A is turned off. The drawing shows the white tab for AR in the off position. This is used when no autoreverse is needed and you only want Zone A to behave like the Zone-B track driver.
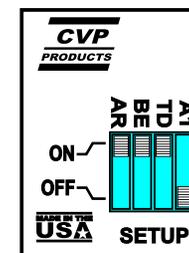
BE - Alarm Buzzer Feature: When switch 2, BE, is ON, the alarm buzzer will sound. Zone A and Zone B have different sounds. Zone-A has a quicker on-off sound than Zone-B. Try a momentary short on each one to hear the difference between each zone's fault buzzer.

When switch 2 is OFF, both A and B zone buzzer sounds are shut off. Fault protection and the fault LEDs will work normally. The drawing shows the BE tab in the off position.

TD - Time Delay Feature: When switch 3, TD, is ON, the time delay from short circuit sense to track output shutdown is about 50ms. This time delay works well to prevent nuisance tripping due to momentary shorts caused by hot frogs, metal wheels touching hot switch rails and starting up high current locomotives, especially sound decoder equipped locomotives. The time delay applies to both A and B zones.

When switch 3 is OFF, the time delay is about 10ms. Use this setting if the ZoneMaster doesn't shut down, after testing both your motive power and track work. The shorter time offers better protection against wheel and rail pitting at zone boundaries, especially when autoreverse is in use.

A1 - TEST: This switch is for testing. When ON, the short circuit shutdown is disabled. The zone outputs will not be shutdown during a short circuit or overload. **Always** leave this switch in the OFF

Zone-A Trip Current Control

The Zone-A output offers a user selectable trip current. Use a small screwdriver to reach through the front panel to the small orange wheel. The small plastic wheel rotates from about the 7:00 position (LO) to about the 4:00 position (HI).

Setting the control full clockwise to the 4:00 position sets the current trip value to its highest setting which is about 7 Amps.

Setting the control full counter-clockwise to the 7:00 position sets the current trip value to its lowest setting which is about 1.5 Amps.

The default setting is mid way which sets the trip current level at about 3 Amps.

The trip current control is typically used to set the point at which the autoreverse feature of Zone-A is activated. Select a trip current that allows your longest multi-unit consist or your old and favorite high-current locomotive to start and run normally without tripping the overload protection circuit. But if the trip current is set too high, it is possible for Zone-A not to autoreverse and the locomotive will stall at the reversing loop gaps or the polarity will switch back and forth or the proceeding booster will shutdown. This won't hurt anything but it can cause decoder problems. The simple solution is to rotate the control counter clockwise, which selects a lower value for the trip current.

Using The Pluggable Terminal Strips

The pluggable header accepts wire sizes ranging from 12AWG to 26AWG. If using stranded wire, it must be twisted and tinned. Cut the stripped and tinned wire so that it is completely inside the clamp area and keep the insulated portion outside the clamp for a good connection.

To remove the plug from the socket, gently rock the plug back and forth horizontally to release the locking tabs.

Replacement plugs are available from CVP Products.
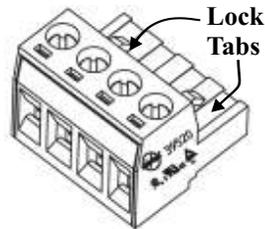
Using the Opto Input

Almost any foreign DCC system can use a ZoneMaster. You must use the Opto input jack for all foreign DCC systems as well as any system which is using block detectors.

Use any 6 conductor modular cable. Strip the end opposite of the plug, exposing the wires. Only the two middle wires, red and green, of the 6 conductor cable are used. The remaining wires are not used and may be trimmed and discarded. **DO NOT USE EITHER OF THE ZoneMaster DCC DATA BUS JACKS WHEN USING THE OPTO INPUT.**

The minimum input voltage is about 7 volts. The maximum is about 25 volts. Do not exceed these limits or the ZoneMaster will not operate properly. If the foreign system has only track outputs, then connect the ZoneMaster-Single OPTO input jack to the track output connections. Polarity doesn't matter. The two diagrams below show how to connect the red and green wires to either the Lenz terminal block or to the Digitrax modular connector.
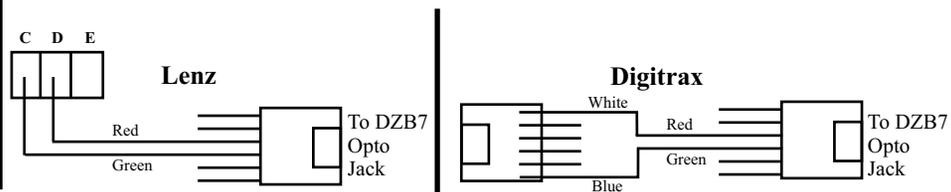
Heavy Duty Track Wiring Is A Must

Use #16 AWG wire or larger. Stranded or solid does not matter although stranded bus wire is a little easier to use. Feeders between bus and track should be #18 or #20 AWG and attached every few feet. Each zone, or power district must have both the bus wires and the rail gapped. Inadequate wiring will not allow the short circuit sensor to work correctly and can pose a safety hazard.
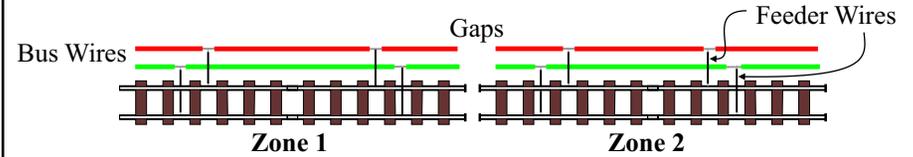
Reverse Loop Hookup

The Zone-A output has a built in automatic reverse loop feature. The moment the first wheel of the locomotive or a metal car wheel crosses the reverse loop gap, the loop track polarity is automatically reversed and the train continues running without hesitation. The AR switch must be **ON [SW1 up]** to enable this feature.

Your longest train must fit entirely inside the reverse loop. Only one train at a time can cross and occupy the gaps into the reversing section no matter how complex the trackwork is within the reversing section. The autoreverse feature only works with DCC decoder equipped locomotives.

The trip current can be set using the Trip Current Control. See page 4 for details.
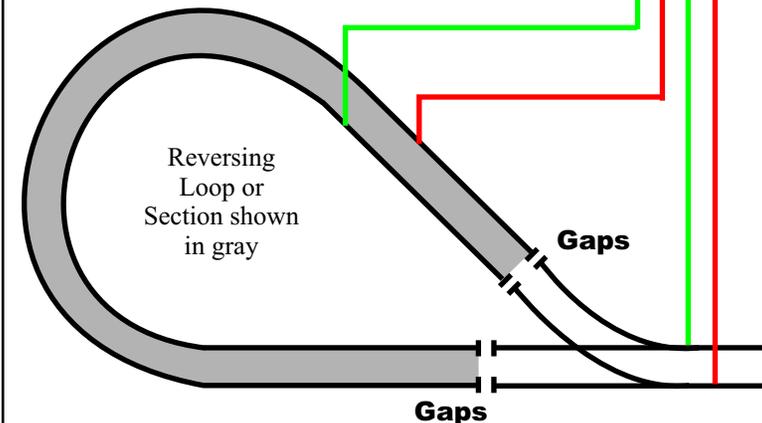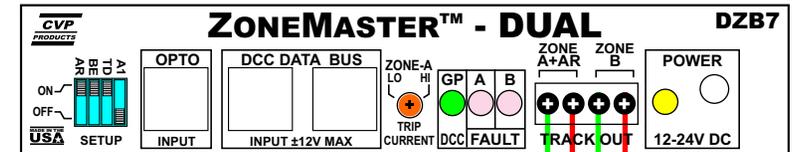
Warning: the reversing section must be at least as long as your longest powered train. Short sections will be a problem if you have a lighted caboose or lighted passenger trains. If you are using multi-unit consists or pusher-locomotives, all must fit inside the reversing section. If this is not possible, redesign your trackwork. Failure to observe this basic limitation of reversing sections will result in a short circuit when the train crosses the gaps.

Warning: When Zone-A is used as an autoreverse booster, it must only be used to feed a single reversing section or reversing loop. Use either the Zone-B output or a another, separate booster to feed the track leading to the isolated and separately fed reversing loop or section.