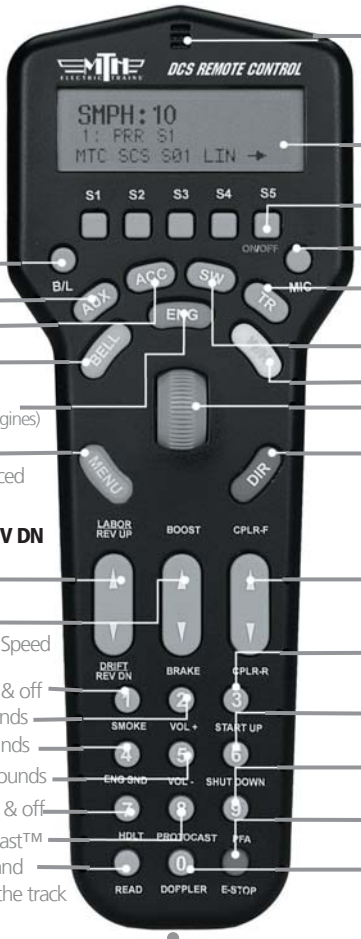
Chapter 1

Introduction To DCS

Introduction To DCS

DCS Remote Control

This is the device you will use the most when controlling your trains. It communicates with the TIU via a 900MHz signal in much the same manner as your cordless phone communicates with its base. The remote does not talk directly to the locomotive or accessory you are controlling.



MICROPHONE

LCD DISPLAY

SOFTKEYS - Activate locomotive features

B/L - Screen backlight on/off

MIC - Turns Proto-Dispatch™ on & off

AUX - Auxiliary menu

TR - Track menu (Access various tracks / blocks on your layout)

ACC - Accessory menu

SW - Switch menu

BELL - Rings bell

W/H - Blows whistle/horn

ENG - Engine menu (to select and control engines)

THUMBWHEEL - Throttle & selection (scroll & press) tool

MENU - Access 4 main menus Sound, Control, System, Advanced

DIR - Changes locomotive direction

LABOR/REV UP OR DRIFT/REV DN Makes an engine sound like it's working harder or easier

CPLR-F/CPLR-R Fires front & rear couplers

BOOST/BRAKE Temporarily Raises or Lowers Speed

START UP - Activates sound, smoke & lights

SMOKE - Turns smoke unit on & off

VOL+ - Globally increases all sounds

SHUT DOWN - Deactivates all sound, smoke & lights

ENG SND - Silences engine sounds

PFA - Activates Passenger/Freight Sounds

VOL- - Globally decreases all sounds

HDLT - Turns headlights on & off

E-STOP - Cuts power to all tracks

PROTOCAST - Activates Proto-Cast™

READ - Search for TIUs, AIUs and Proto-Sound® 2.0 Engines on the track

DOPPLER - Activates Proto-Doppler™

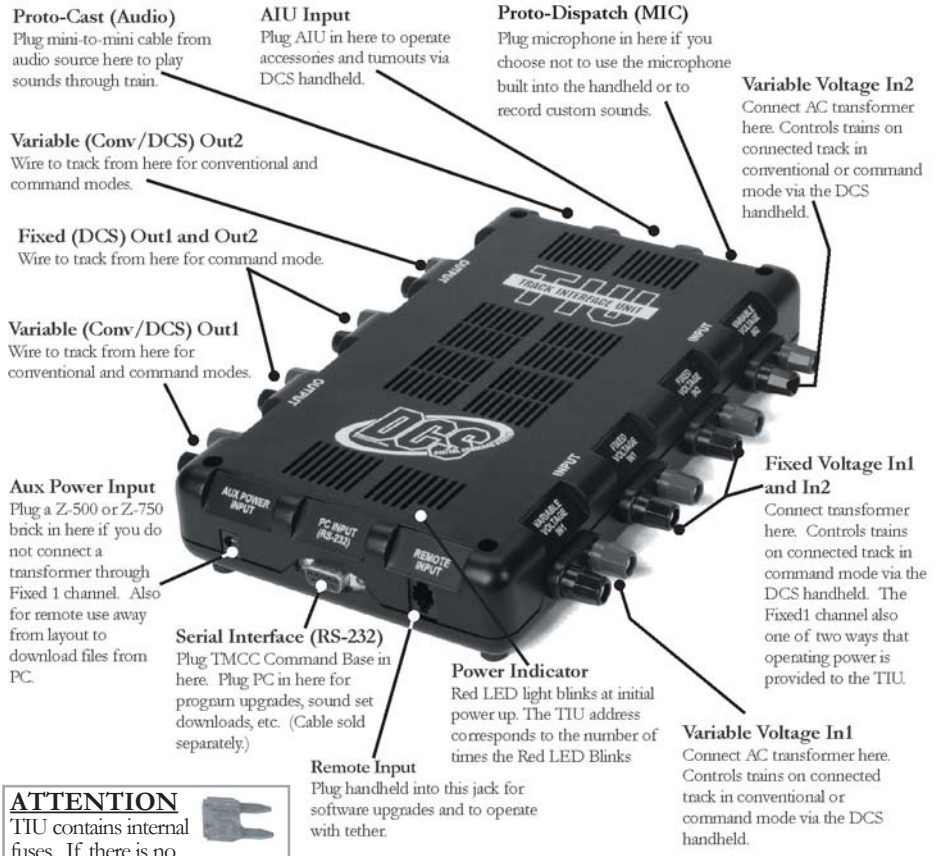
Programming Port - Tether attaches between remote and TIU for programming new software features

Introduction To DCS

The Track Interface Unit

Also known as the TIU, the Track Interface Unit is the brains behind the DCS system. Connected between the transformer and the track, the TIU receives signals from the DCS remote control and relays those signals to each train you are controlling via the rails. The type of signal relayed to the train depends on the operating mode at the time. If operating conventionally, the TIU will raise and lower track voltage to control engine speed. If operating in command mode, the TIU will send a digital signal to each train you are controlling via the track rails.

This digital signal is very powerful and contains a lot of information much like the digital signals used in today's high tech products. These digital signals are what allow DCS to perform the hundreds of functions designed into the system.



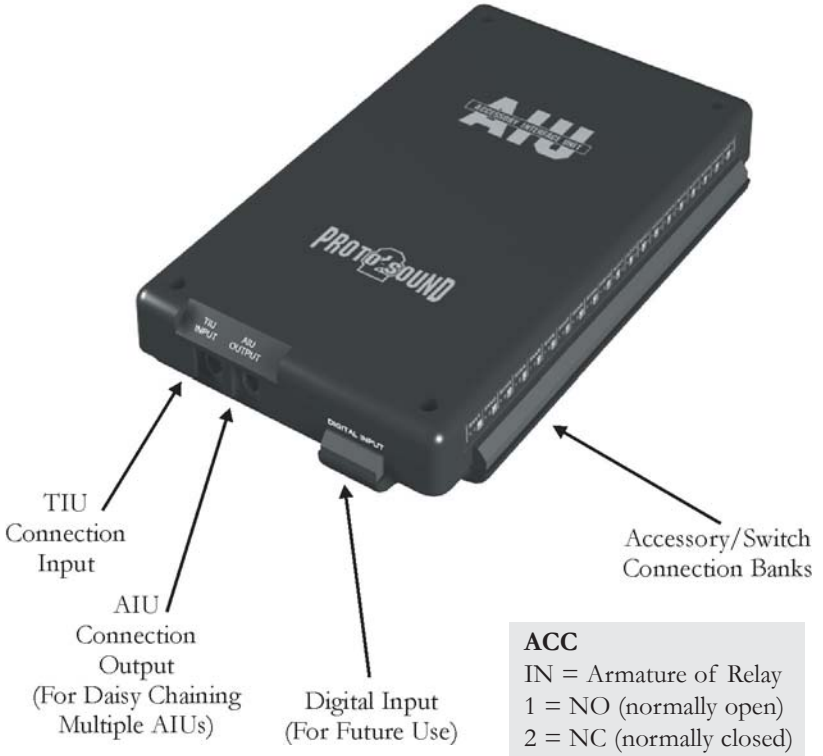
ATTENTION
TIU contains internal fuses. If there is no output, open the case (6 Screws) and check the fuse.
More information on **Page 133.**

The Accessory Interface Unit

The Accessory Interface Unit, also known as the AIU, plugs into the TIU and controls any accessory or switch wired to it. Each AIU can control up to 10 switches and 10 accessories and features the ability to turn the accessory on or off, or activate it momentarily.

The AIU essentially acts as a large relay and simply replaces the manual switches that are normally used to turn on and off model railroading accessories. Connection to the TIU is done through a special cable (included with the AIU) and up to five AIUs can be daisy-chained to one TIU.

ATTENTION:
Connecting the TIU to the AIU output may cause damage to earlier model AIU's.



ACC
IN = Armature of Relay
1 = NO (normally open)
2 = NC (normally closed)

SW
IN = AC Common
1 = Straight
2 = Curved

Recommended Wiring Method

It is important for good operation to make the most efficient use of the power and digital signal available on your track. Poor wiring and bad connections offer resistance and can interfere with receipt of the DCS signal and limit the number of engines and cars you can run on your track. Be sure to use proper wire (we recommend 16-gauge or larger paired wire, like speaker wire) and good connections (good connections mean crimp or solder).

Because center rail blackening is not conductive, you may find that the blackening on your track creates resistance that drains power and signal. If so, use Scotch-Brite®, fine-grit sandpaper, or an LGB® track cleaning block to clean the blackening off the top of your center rail.

Advanced wiring information and diagrams, including wiring for layouts using blocks for conventional operation, are located in the "Universal Locomotive and Accessory Operation" section of this manual.

Optimal Performance Wiring Principles:

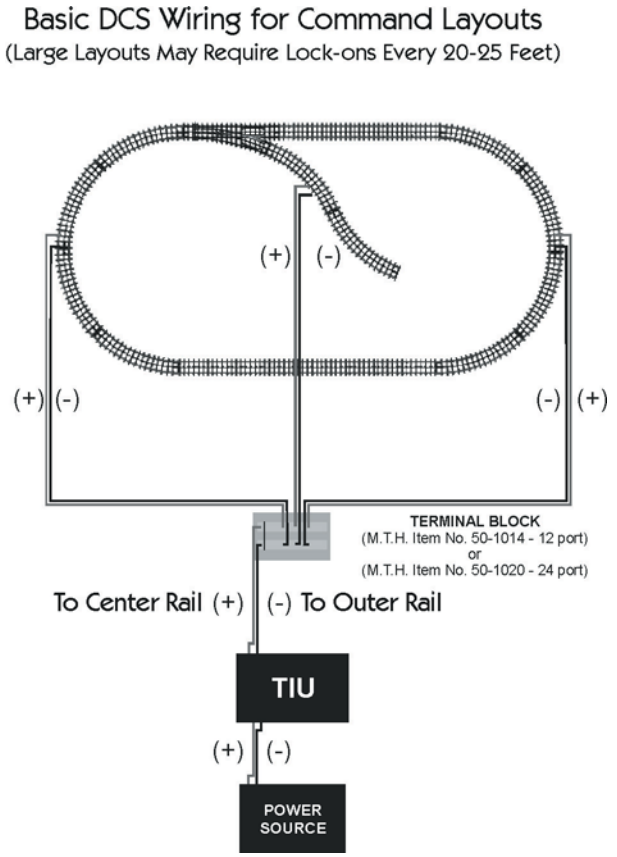
- Use 16-gauge or larger paired wire (such as speaker wire)
- Use a star pattern (home run wiring) to wire directly from the TIU to each lock-on
- Use a terminal block to carry power and signal from one TIU channel to multiple lock-ons
- Avoid common bus wiring
- Solder for tight connections (not required)
- Clean the blackening off the top of the center rail (if necessary)
- Power accessories and turnouts via auxiliary, not track, power
- Place a lock-on (or wire directly to track) approximately every 25 linear feet, both center and one outside rail

Recommended Wiring Method

Maximum Power Input
0-22VAC,190VAC, 10AMP
OR
0-24VDC, 10AMP

Note: *This very quick wiring scheme (through the Fixed In 1 and Fixed Out 1 inputs) allows for operation of the connected loop of track in DCS command mode only. Please see the "Advanced Connection" section of this manual in the "Universal Operation" chapter for all the wiring options if you have more complex wiring and operational needs, including conventional mode and TMCC operation.*

Recommended Wiring Method



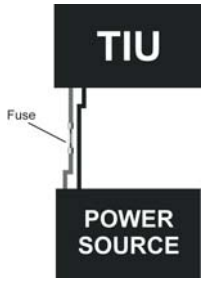
Optional Additional Equipment Shown:

M.T.H. Terminal Block (Item No. 50-1014)

The screws in each terminal strip of this terminal block are electrically connected to one another, making it easy to wire the TIU's output into the binding posts and then wire out to several lock-ons from different terminal pairs.

Transformer Note: *Although we do not recommend using the DCS System with home-made transformers or those that put out more than 12 amps, virtually any commercial AC hobby power supply will work with DCS.* *(See Transformer Compatibility Chart, p. 114)* *Bear in mind that as you begin to run more and longer trains together, you need to have lots of power on the track. For this reason, we recommend that railroaders with large layouts and long trains use M.T.H.'s Z-4000®(Item No. 40-4000), which is the most powerful UL-rated transformer on the market.*

Recommended Wiring Method - Older Transformers

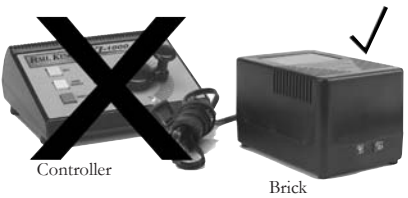


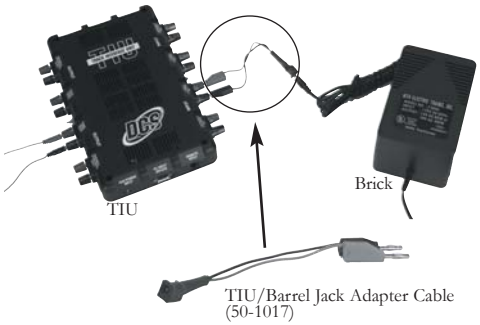
Older transformers, like the Lionel postwar ZW or KW models employ a bi-metallic strip to act as a circuit breaker. The strip responds to heat as high current flows through the transformer. If enough heat is generated by the high current, the strip will open the circuit and prevent further current from flowing out of the transformer. The bi-metallic strip is not a precise overload protection device and does not measure the current. As a result, it may not trip when excessive amps are being generated by the short circuit. Should the strip thus fail to trip, excessive and potentially harmful current could be sent through the TIU.

MTH therefore recommends that any user employing an older transformer that does not meet today's U.L. standards install inline fuses or circuit breakers between the transformer and the TIU input channels. An AG3C "fast-acting" or "fast-blow" fuse rated at 15 amps would be suitable protection. These can be obtained from most hardware or electronic stores including Radio Shack. Users will also need an inline fuse holder to house the fuse. Radio Shack sells a heavy duty model, part number 27-1217.

Recommended Wiring Method - Electronic Transformers

Any transformer employing two parts, a brick (step down transformer) and a controller (used to vary the voltage output) may cause operational problems due to low power or poor DCS signal. To correct this problem, MTH recommends connecting only the brick to the TIU inputs. In addition, check the output voltage of the transformer; it should not exceed 22 volts (or 18 volts if lighted cars are used on the track).





When using the Z-500, Z750 or Z1000 electronic type transformer use an adapter cable, MTH item 50-1017, to connect the brick directly to the TIU input as shown below. DO NOT use the controller portion of an electronic type transformer.