

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

MODULAR MODELING STANDARDS

INTRODUCTION

The Ophir, Tintic & Western Model Railroad Club (OT&W) was organized in 1991 and is incorporated as a non-profit corporation. It is also a sustaining member of the National Model Railroad Association (NMRA).

In Addition to model railroad events, the club does community service and also works for the preservation of historical railroading. The club is very mobile and displays can be set up at hoby shows and various meets such as schools, malls and other special occasions.

The club has layouts in various scales with a wide selection of module themes. There are modules in the scales of HO, N and G built by the members who model in each of these scales and some who work in more than one. Virtually any size or shape area can be accommodated from as small as 10 x 1 feet to 60 x 80 feet and larger. The layouts may vary in size or shape depending on how many members participate and how much room is available.

Like any active hobby club, the members are delighted and anxious to share their hobby and efforts with the public and visitors. An invitation is open to anyone who is interested in designing, building or operating model railroads. Come and join with us and find out how you might increase your enjoyment of a favorite hobby.

MODULAR RAILROADING

Modular model railroading has become one of the most successful ideas ideas in the hobby and the purpose of this manual is to introduce the basic OT&W standards for the various scales.

There is a place for all modulers in modular railroading. Those with a home layout may find it a change to build a module and participate with the group. Even those hobbyists with limited space have enough room for a module and those who cannot afford to build a full layout may enjoy a satisfying involvement with the hobby.

Modules let you share your modeling skills and layout with more people as you take them out to the public. Modules help you to develop modeling skills because you can concentrate on perfecting one module before moving on to another.

You may also spend more time building rolling stock, structures and locomotives instead of working on a larger layout. So why not try a module? No time like the present to get started on the future.

MODULES

Since the modules are moved about, their construction should withstand changes in temperature and humidity, movement, twisting, vibration and many other kinds of torture.

Each module must meet specific standards for height, length and mainline track according to its particular scale needed to make a member's module compatible with any other member's is included in these standards. Everything else including additional track, scenery or structures is strictly up to the builder.

In building your module, 1x4 pine is recommended for strength and appearance. You may use plywood but end grain plywood does not hold screws very well so corner blocks are a must.

The framework should be assembled with glue and screws. Weight is a

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

problem too, so consider plastic foam mountains instead of plaster. Structures should either be well glued in place or packed separately.

Each module should have four legs of a length to position the module at the specified height. The legs are removable and secured to the frame with bolts passing through the frame and leg. The leg should provide for an adjustment in height of +/- 1" by using adjustable feet or bolts and nuts in the base of the leg.

All switches, turnouts and block controls should be clearly marked so that another person can quickly operate them in your absence.

The module owner is to furnish two C-Clamps (preferably the 3" size) and two connecting track sections for each module. When setting up the C-Clamps are required at each end of the modules to hold them rigidly together and sectional track are to span the joints between modules. Insulated rail joiners are used on one end of each piece of connecting track. This allows the layout to be divided into several operating blocks. Also if there is an electrical problem, it makes it much easier to trace the problem to a specific Module.

TYPES OF MODULES

There are several standard type modules and a couple of special ones. The builder has the option of building straight modules in standard 4', 6' and 8' lengths. Special 2' long bridge modules are sometimes required in certain layouts. The 4' and 6' lengths are the most popular. The 8' modules may offer maximum scenic flexibility but they are difficult to move and transport.

TYPE A: Run-Through Module;

This is the standard module. It is the "Backbone" of the layout and the most common size and shape. It includes the

tracks for the mainlines but no passing sidings or industrial spurs. It includes basic electrical wiring but does not provide for on-module or branch line control and does not require a separate power supply.

TYPE B: Local Control Module;

In addition to the mainlines, an optional branch line, passing siding, industrial spur or main-to-main crossover may be included. It requires the basic wiring plus its own power source, connections and necessary controls to operate extra trackage, accessories and turnout machines. There is no control of the mainlines.

TYPE C: Block Control Module;

This is the same as the Type B module but also has power control for the mainlines.

CORNER Module;

These are the curved sections. They may be a type A, B or C module but they make a ninety degree turn and their design makes them suitable for inside or outside corners.

TRANSITION Module;

Any module with something other than the standard tracks. They may be a Type A, B, C or CORNER Module but they must still match the ends of the standard modules at each end of the transition.

YARD Module;

These may be a straight or corner module. Usually two or more modules are coordinated to combine together to make up a holding or switching yard. They are the parallel tracks for storing or switching rolling stock. A set of throat modules feeds them. They include the necessary power source and operating controls to work the yard.

ADD-ON Module;

Sometimes it is necessary to add depth to other modules. Add-on sections attach to the front or back of other modules to provide scenery or

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

other special interest features. The usual depth of an add-on section is 18 inches but anything deeper than 24 inches is too hard to reach across.

BACKBOARDS/DIVIDERS

The back of each module is provided with a backboard (skyboard) of a standard height to provide a scenic background for each scene. The backboard may be painted a simple sky color or it may include an appropriate background.

The dividers are the end pieces of the module used for separating one scene from another and representing distance between them. They also provide additional support for the backboard and protection for the scenery during transportation. Each module should have the dividers except for yard modules or where there are several modules creating a continuous scene.

CONSTRUCTION TIPS

It is recommended that the first time builder complete a type A Module. The other type modules require a certain level of experience in planning and operation before being attempted. (Corner Modules are especially difficult to build).

Make sure your module is square! The ends of modules need to be flat and smooth as well as square with the sides to assure close joining with adjacent modules and overall square assembly of the layout.

Take your time, double check your measurements and make sure your cuts and placement of parts are accurate and square. If you use plywood deck use a factory cut corner to square the framework. If you build on open grid

version, use a plywood sheet as a square during assembly.

Watch the weight of your module as you have to move it around. Particle board is cheaper than plywood but it is heavier and does not hold screws as well.

T-Nuts are an excellent alternative to the nuts used to fasten legs to the module. They simplify set-up and ear down since you don't have to keep track of the extra nuts and washers. They may also be used in the bottom of the legs for height adjustment. Some module owners use threaded pipe legs. Others use fold-up table legs with extensions added to them to make the standard height. There are many good alternatives but remember to allow for the height adjustment.

TRACKS

Each module has tracks that are common to all modules with other optional tracks for passing, storing or operating. The key to good operation is good track work, both the laying of the track and the wiring. Being extra careful at this time will result in smooth operations. It helps to solder sections of flex track together before you lay them on curves.

Hand laid track is not recommended for modules as it is usually too fragile and the wheel flanges on some rolling stock will not clear the smaller rail.

The track centers are measured forward from the backboard at each end of the module. The distance, name and color code for these tracks are listed under each scale.

Rigid support is required for all track work. For subroadbed, use 3/8 or 1/2 plywood for best results. The maximum distance between subroadbed supports or risers should not exceed 16".

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

Roadbed providing ballast slopes is to be used for mainlines and branch lines except in yards or terminal area where it is optional. Cork or milled roadbed is recommended.

Track work should be securely attached to the roadbed for positive alignment and ballasting is recommended. All track work must be accessible for maintenance.

Make sure your track centerline at the interface points are correct, parallel tracks are spaced correctly and curves are smooth and of the proper radius. Make sure the tracks end as close to the standard as possible at the interface points so that the proper sectional track can be used to join the modules each time

WIRING

The electrical system is designed to allow for versatile operation. It is possible for continuous loop running of one train per mainline for small layouts or multi-train lock control for large layouts. The system also provides for branch line and industrial operation as well as yard switching and train make-up.

Two pin connectors, sometimes referred to as Cinch Plugs or Jones Plugs, are available at Radio Shack or other electronics supply stores. These plugs are used between modules for power for each track. The wide pin is wired to the front rail in all cases. Minimum wire size is 18 gauge. When viewed from the front of the module, the male plugs are located at the right end and female connectors are on the left.

A terminal block under the module is used for track feeder connections. Use screw time barrier strips.

Do not use common rail type track wiring. There should be no electrical

connection between any of the rails of the tracks.

Both rails of a crossover should be insulated. Branch line or spur connections to a mainline should be insulated at both rails. Turnouts with all rail frogs should have both frog rails insulated. Frog power should be wired through switch machine contacts.

AC Power uses 14-gauge wire with ground and UL approved multi outlet boxes. Do not splice 110V wires, use additional UL approved extension cords for longer modules. More complex 110V wiring must comply with National Electrical Codes. Modules come under "Temporary Wiring".

WIRING TIPS

Wiring can be a problem for some module builders. Here are a few guidelines to help avoid problems. The "zip cord" wire that is used for the track power is ordinary 18 gauge lamp cord that has a thin section between the two wires and can be "zipped" apart. The connectors are color coded but the wire itself can be any color. One side of the covering has a rib molded all along or the wires are different colors. This will help you keep track of which wire goes to the wide pin and which to the narrow. It is suggested that you use the rib to identify the wide pin wire. The wide pin is connected to the front rail in all cases.

When wiring the 2-pin connector it is very important to make a solid physical connection before applying solder. Strip about 1/2" of wire and "tin" the end. (This is a good place to use a solder gun). You do this by holding wire against the hot solder iron tip until it will melt the solder as it is applied to it. The solder will flow into the wire and make it solid at the end. This end may then be bent at a right angle and inserted from the inside through the hole in the

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

connector solder lug. Continue the bend in the wire until it is folded back flat and then apply the solder iron and some more solder until you see the solder flow smoothly across the connection. Let it cool without moving the parts. If the solder joint looks smooth and shiny it is a good one. If it is rough and dull looking you have a "cold" solder joint and it must be reheated.

NOTE: Be sure to slide the connector shell over the wire before soldering the wires to the connectors. You will have to unsolder the wires to get the shell on if you forget. (You will only forget once).

TESTING THE WIRING

After the wiring is complete you must test it to make sure that the wide and narrow pins of the plugs match the wide and narrow pins of the sockets and that the proper rail is connected to each pin. It is also necessary to check to see if one or more rails are connected together.

The test can be made with a multi tester (VOM) set to "Rx1" (Resistance x 1) and a test cord made by soldering a 2 or 3 foot length of 2 conductor wire to a male connector. Alligator clips soldered to the other end make it easier to use. Mark which wire goes to the wide pin.

Start by plugging the test cord into the red socket and move to the plug end of the module. Touch the two VOM probes together. The meter should swing to zero Ohms. Adjust if needed.

Now clip one probe to the wide pin test cord wire and touch the wide pin of the red plug with the other probe. The meter should swing to zero or close to it. Now touch the narrow pin. If the meter moves then a strand of wire within one of the connectors may be touching the other wire. If it moves only when you touch the narrow pin then you have the

wires reversed and you will have to change the connection (at either end).

Correct any problem and recheck. Next touch in turn all the pins of the other connectors (Yellow, Blue, Green, etc.). You should get no reading. If you do then the wires are shorted together and you will need to make the appropriate correction.

Next, touch the probe to the outside rail of the front track. The meter should go toward zero. You should get no reading as you touch, in turn, each of the other rails. Repeat this test for the narrow pin except it should connect to the inside rail.

You now know that the red wire pins are correct. Check for each of the other connectors in the same way.

Check the rails on either side of any turnout and with the turnouts thrown first in one and then the other direction. These tests will show if there is a poor contact in a turnout or rail joiner, as well as connectors wired backwards or no rail gaps in crossovers.

For information, copies of the standards, answers to questions or to make suggestions please contact:

Doug Lamb
189 N 200 E
Payson, UT 84651
801 465-4303

Dave Turner
1780 Dove Way
Eagle Mountain, UT 84043
801 789-5734

N SCALE STANDARDS

The N scale standards are based on the NTRAK standards with some minor modifications to meet our specific building and operating needs. The modules meet the interface standards for NTRAK modules.

TYPES A, B & C MODULES: These are the most common size and shape modules. They are a standard 24" in depth but may have an optional 6" added to the front and/or rear.

CORNER MODULES: Corner modules are 4' squares with the inside and outside corners removed.

HEIGHT: Module height should be a nominal 34" from the floor to the railhead.

TRACKAGE: There are three tracks. Two mainline tracks are required to form two continuous unbroken loops and a third track for branchline operation. Optional passing sidings may be located on either side of the mainlines. There may be an optional mountain line at the rear of the module.

POWER CONNECTORS: The power connector male plugs are located at the right end with the wiring extended 12" and the female connectors are on the left and may be flush mounted or on short lengths of wire. The connectors are color coded with colored tape or paint to match each track

TRACK COLOR CODE: The following color code shall be used:

- RED – outside (front) mainline.
- YELLOW – inside (second) mainline.
- BLUE – branch line.
- GREEN – mountain division.

GRADES: Mainlines and passing sidings shall maintain a 0% grade level. The branch line no more than 1 ½% (3/16" per foot) and the mountain line 3% (3/8" per foot).

TURNOUTS: Mainline turnouts should be #6 while branch line may be #4.

CONNECTING TRACKS: An atlas 5" sectional track shall be provided for each line to be joined across the module-to-module interface. Two metallic and two insulated rail joiners must be provided for each connector. (An exception may be when two modules belonging to one owner are always joined together).

TRACK STANDARDS: Preferably Atlas flex track.

TRACK CENTERLINE: Track centerline are to be 1 ½" (minimum 1 ¼") on straight track and 1 ½" on curves.

VERTICAL CLEARANCE: Minimum vertical clearance should be 2".

INTERFACE STANDARDS: Mainline track interface centerline shall be 20" and 18 ½" in front of the skyboard. Branch line center shall be 17" and mountain tracks 4" in front of the skyboard and 3 1/8" above the mainline. Tracks should end 2.470" (1/2 section) from the end of the module to allow the use of 5" sectional track to join modules. There should be a minimum of 4" straight track from the edge of the module at the interface to the first deviation in mainline.

TRACK RADIUS: Mainline tracks should maintain a minimum radius of 24" and branch line is 18". The mountain line may be 12". The same standard applies to corner modules.

BALLAST: All ballasting is left to owner's choice. However, for unity in appearance it is recommended that ballast for mainlines and passing sidings shall be black. Branch line and mountain line may be black or owners choice.

BACKBOARD/DIVIDER: The backboards and dividers are a maximum 14" high and a minimum 8" above the mainlines. Dividers extend forward across the ends of the module at the base to 12" from the front of the module and 8" at the top.

**OPHIR, TINTIC & WESTERN
Model Railroad Club**

HO SCALE STANDARDS

The HO scale standards are based on the NMRA standards for modules with some minor modifications to meet our specific building and operating needs. The modules meet the interface standards for NMRA modules.

TYPES A, B & C MODULES: These are a standards 24" in depth but may have an optional 6" added to the front and/or rear.

CORNER MODULES: Corner modules are 4' squares with the inside and outside corners removed.

HEIGHT: Module height should be a nominal 40" from the floor to the railhead per Ntrak or 34" to conform with OT&W.

TRACKAGE: Two mainline tracks shall be provided to form two continuous unbroken loops on a layout. There may be an optional third track for branch line operation. Optional passing sidings may be located on either side of the mainlines.

POWER CONNECTORS: The power connector male plugs are located at the right end with the wiring extended 20" and the female connectors are on the left and may be flush mounted or on short lengths of wire. The connectors are color coded with colored tape or paint to match each track

TRACK COLOR CODE: The following color code shall be used:

- RED – outside (front) mainline.
- YELLOW – inside (second) mainline.
- BLUE – branch line.

GRADES: Except for special situations (pre-approved), mainlines and passing sidings shall maintain a 0% grade level. The branch line may have a maximum of 3% (3/8" per foot).

TURNOUTS: Mainline turnouts should be #6 while branch line turnouts may be #4.

CONNECTING TRACKS: A 9" length of sectional track shall be provided for each module interface. Two metallic and two insulated rail joiners must be provided for each connector. (An exception may be when two modules belonging to one owner are always joined together).

TRACK STANDARDS: Code 100 nickel silver rail is to be used. Preferably flex track.

TRACK CENTERLINE: Track centerline are to be 2" on straight track and 2 1/2" on curves.

VERTICAL CLEARANCE: Vertical clearance should be 4" from the top of the rail.

INTERFACE STANDARDS: Mainline track interface centerline shall be 19" and 17" in front of the skyboard. Branch line center shall be 15" in front of the skyboard. Tracks should end 4 1/2" from the end of the module to allow the use of 9" sectional track to join modules. Tracks shall have a minimum of 3" straight section from the end of the joiner track at the interface to the first deviation in the mainline. I.e., a switch, curve, etc.

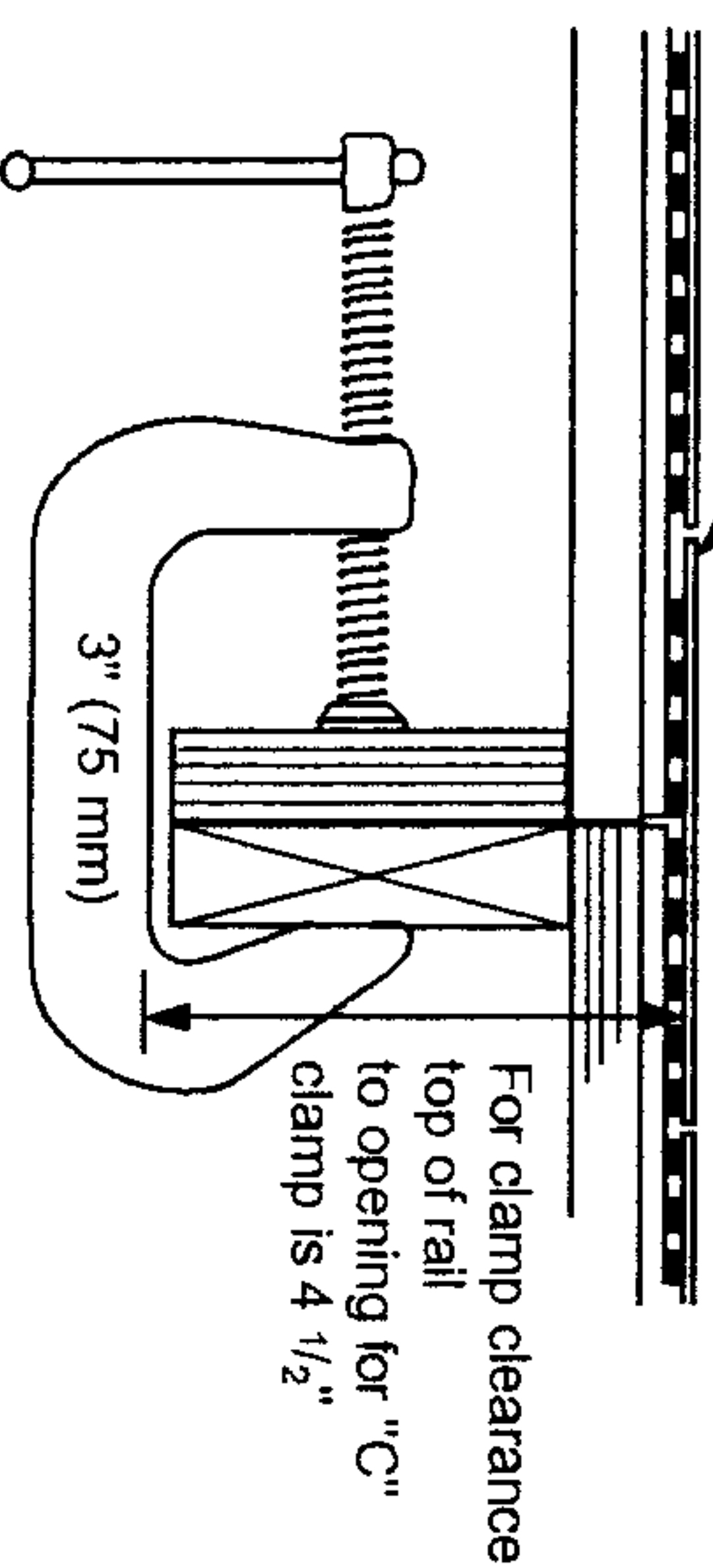
TRACK RADIUS: Mainline tracks should maintain a minimum radius of 32" and branch line is 24". On corner modules the mainline radius at the top of the arc shall be 35 1/2" for the red line and 33" for the yellow line.

BALLAST: Ballast for mainlines and passing sidings shall be Gray. Branch line may be black or owners choice.

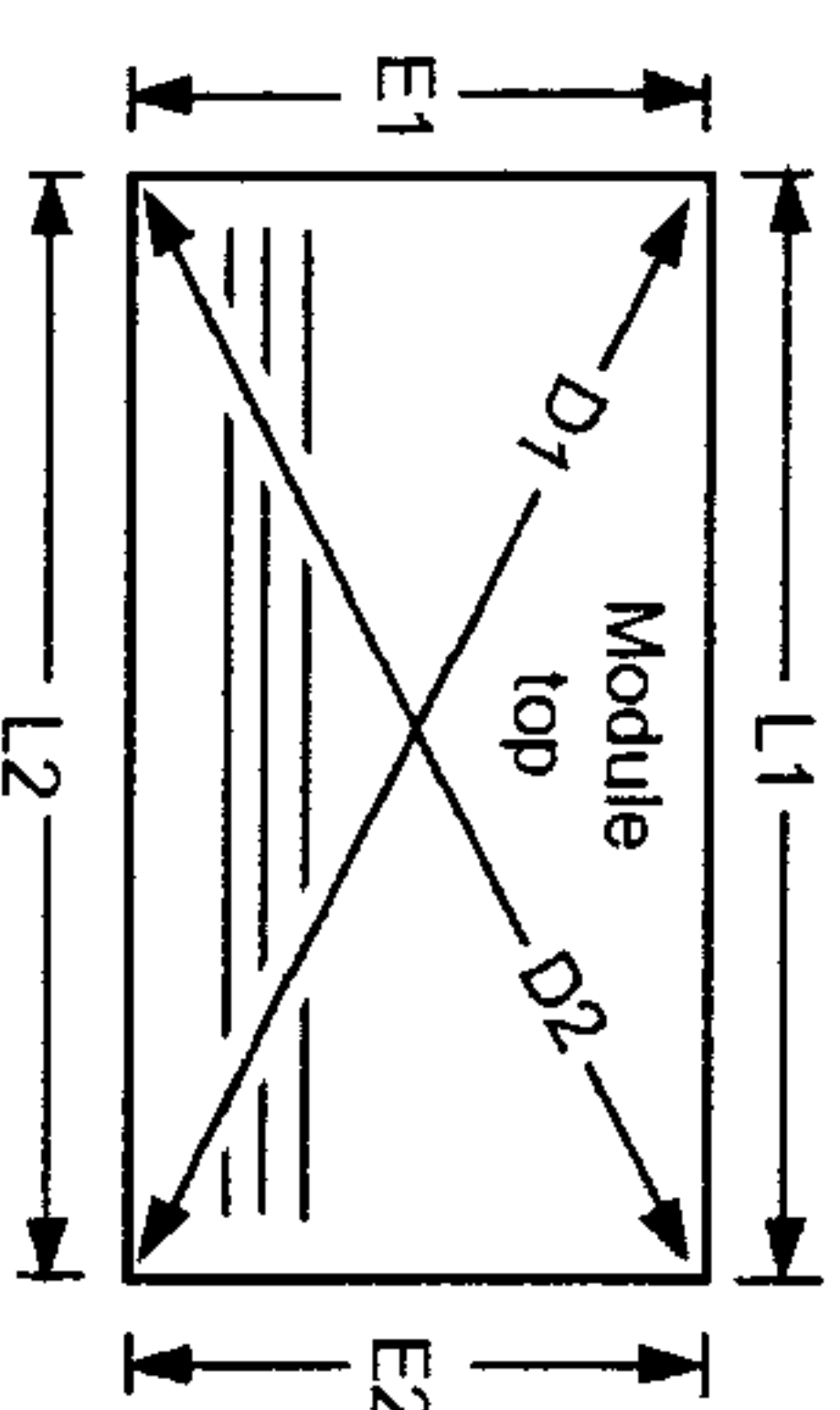
BACKBOARD/DIVIDER: The back boards and dividers are a maximum 14" high and a minimum 8" above the mainlines. Dividers extend forward across the ends of the module at the base to 12" from the front of the module and 8" at the top.

Modules are joined in a layout by clamping with two "C" clamps & inserting 5" sections of Atlas "Snap Track"®. (actual length 4.910")

Remove the tie from one end so the rail joiners (Atlas preferren) will slide fully on. Place joiners on other end, put in place and then, with tweezers, slide joiners into position.



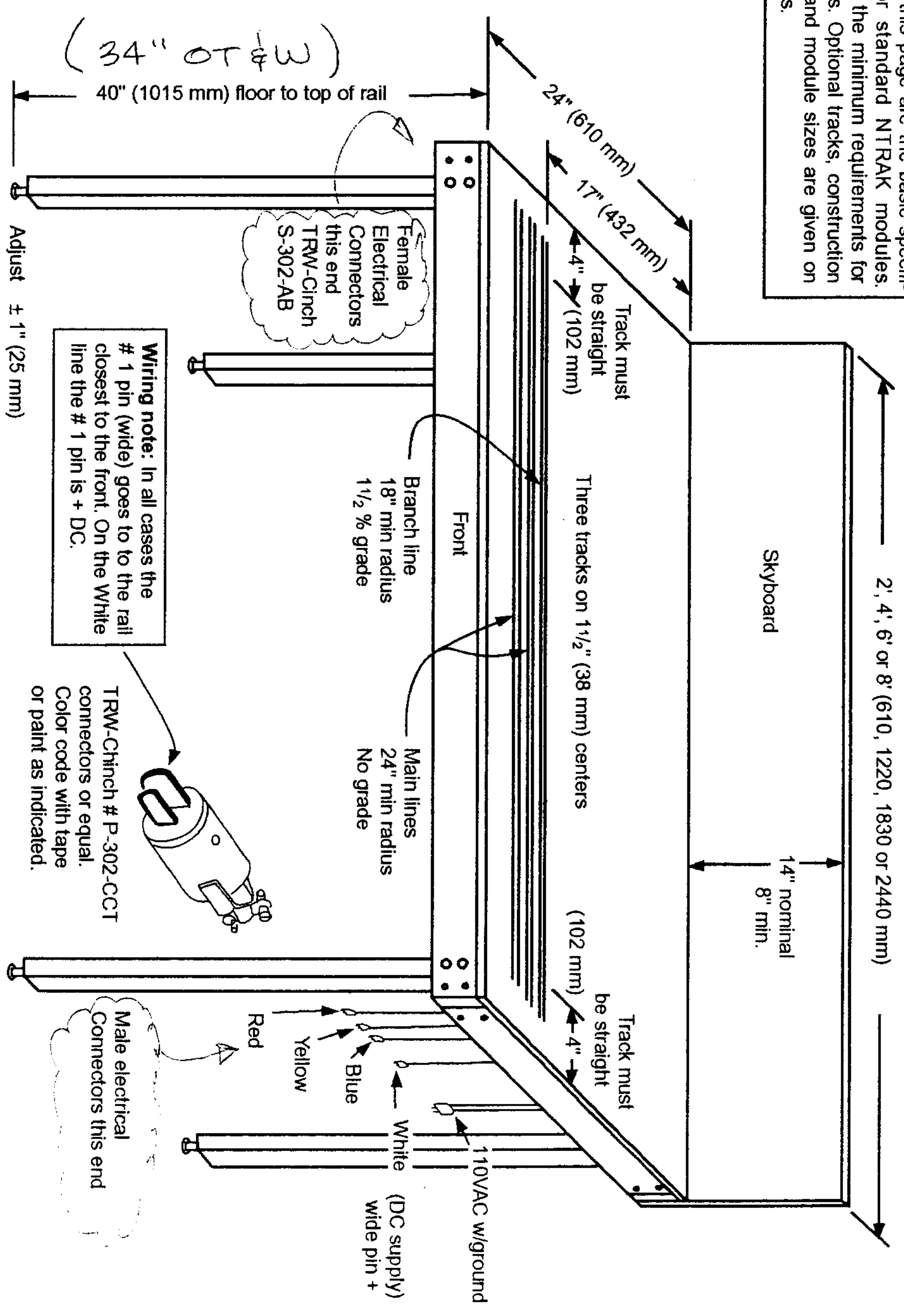
The corners of your module must be square.



Lengths L1 & L2 should be equal, as should Ends E1 & E2. Diagonal dimensions D1 & D2 should be the same.

Shown on this page are the basic specifications for standard NTRAK modules. These are the minimum requirements for all modules. Optional tracks, construction methods, and module sizes are given on other pages.

Several units of any length may be combined to form a "module" that is a standard length (8', 14', etc.) See page 15.



BASIC NTRAK MODULE

The NTRAK Manual