Division 8 MCR NMRA
T-TRAK Module Build Instructions
Engineering Specification Document v2
August 1, 2022

Introduction
One of the beautiful aspects of T-TRAK is the simplicity of the specifications. In actuality, there are very few "formal" specifications for a T-TRAK module, however, if those few specifications are followed, all T-TRAK modules are compatible with each other.

In order to begin the conversation on standards, some definitions must be established. The "length or width" of the module is the axis parallel to the track. The terms length and width are used interchangeably in T-TRAK. The "depth" of the module is the dimension perpendicular to the track and is the distance from the front (nearest the track) of the module to the back. The "height" of the module is measured from the bottom of the module to the base of the track. Deviations from the standards in this document may make it challenging, if not impossible, to connect to modules confirming to these standards.

For a good review of the possibilities see

https://www.ntrak.org/Modules-and-Layouts

The Edges
The first item in the list of formal T-TRAK specifications is that the track at the module edges (left and right) must be Kato Unitrack.

Modules in a layout are not clamped or bolted together in any fashion. The only thing that holds the modules together in a layout is the Kato unijoiners. It is acceptable to use track from other manufacturers between the Kato Unitrack interfaces; however, most T-TRAK builders use Kato Unitrack exclusively on their T-TRAK modules. Builders must ensure the trackwork on their modules will not cause issues while running trains. The first time T-TRAK builder is strongly advised to use Kato Unitrack exclusively on their first few modules.

The Separations
The concept of easy layout assembly requires that the module bases be slightly smaller than the standard length of Kato track sections. This means that the track should overhang the edge of the module by 1mm (3/64”). The module dimensions accommodate this overhang.

The Size of the Modules

The use of Kato track created an early "informal" standard for the length of track on a module to be 310mm (which is 12.25"). A module of this size is typically referred to as a "single". A module with 620mm of track is referred to as a "double". Naturally, those with 930mm of track (3 x 310mm) are known as "triples" and, yes, there are "quads" (1240mm) and even longer T-TRAK modules. The last two stray from the small, easy to store, easy to transport tenets that make T-TRAK attractive. When starting into T-TRAK, the optimum sized module is a double sized module. This choice gives the modeler the best combination of scale and price.

Track Placement

It is required that all track that runs from edge to edge on straight modules be built as a multiple of 310mm units of track for reasons of compatibility. The reason this is advised is because most T-TRAK layouts consist of a double row of modules on a table and a non-standard length module on one side will not permit the loop to be closed. In order for a non-standard length module to be used, another module of equal length must be built and used on the other side of the table, or the layout must be constructed as a single row of modules with return loops on each end. While a non-standard length T-TRAK module can be constructed, the builder should recognize that doing so might limit the usability of that module in any multi-person or possible multi-group layouts.

While on the subject of Kato Unitrack, it should be noted that Kato produces straight track in increments of 62mm. (i.e. 62mm, 124mm, 186mm, 248mm and the double crossover is 310mm) and straight single track is packaged four pieces to the package. For most typical track combinations, (e.g. 124+186; 248+62) two packages of track are enough for two single modules or one double module. Be aware that Kato also builds a 64mm straight piece. Use of that product can cause problems.

There are other combinations that create 310mm of track, but they will require more pieces. Since Kato track is measured in metric units it is easiest to build modules using metric measurements.

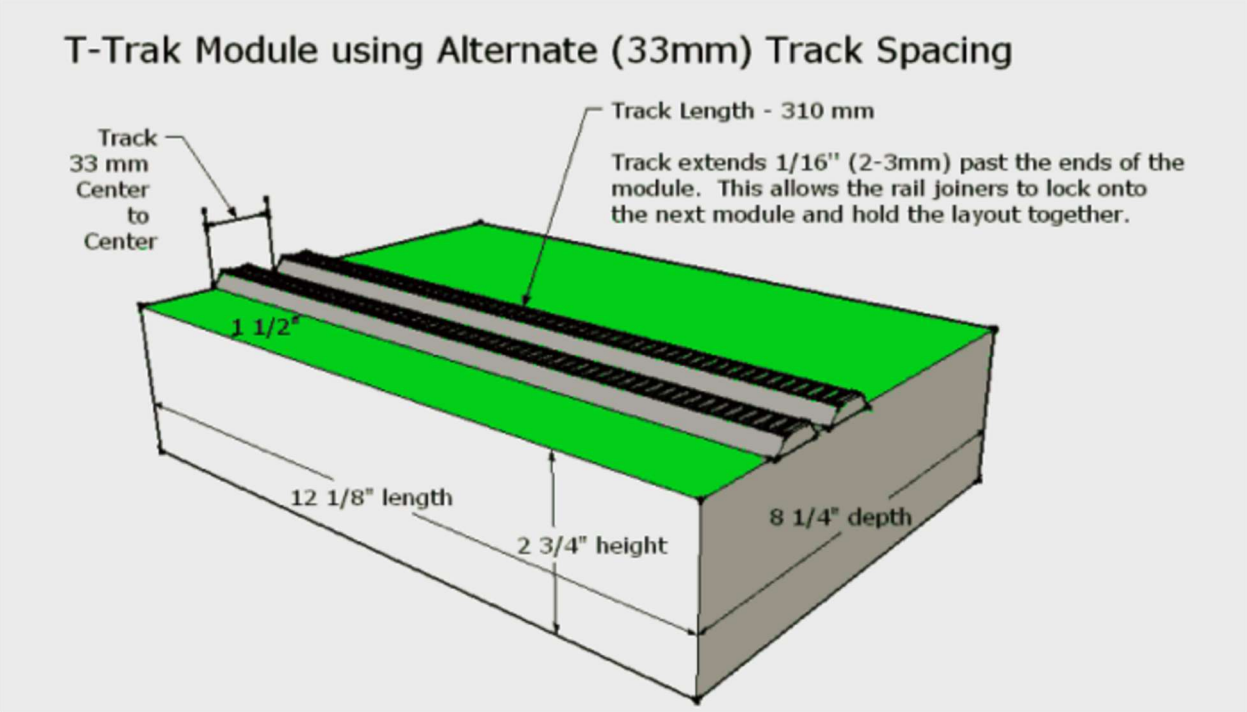
Scratch Built Modules

For those Modelers who wish to build their own modules from scratch, the next several sections give the design requirements necessary to build them from scratch.

The depth of the module is not defined by the standards. Accordingly, the Division 8 standard will be that the straight modules are no deeper than 14".

In a typical double row, oval layout, this depth permits a gap between the backs of modules. Since the Division straight section modules have a 14” (maximum) depth standard, and the two corners have a combined depth of 28.75”, there is room (~ 2 ¾”) to place the bus wires between modules.

The Current Division Formal Standard Straight Module Box Design.

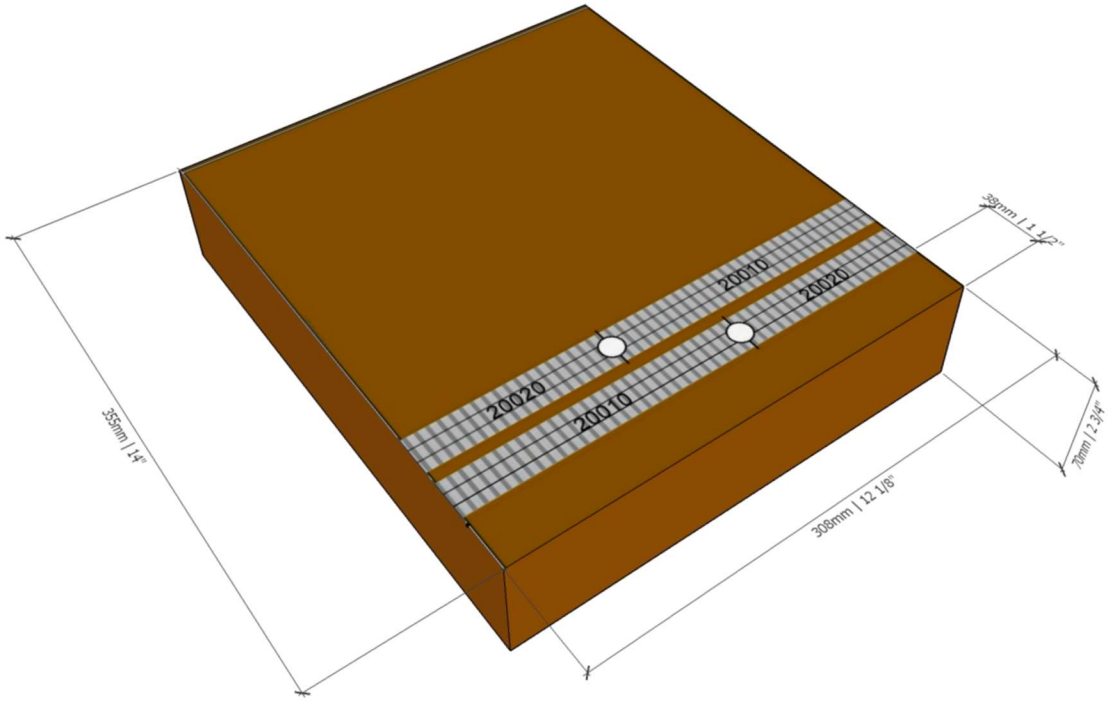


For a module of single length (i.e. 310mm of track), the box should be no more than 308mm (12 1/8") wide.

The formal standard height of the module is 70mm (2¾") and is adjustable to a height of 100mm (4") by using leveling bolts. The height measurement is from a flat surface to the base of the Kato track. There is no formal specification for the depth of a module.

The new T-TRAK standard depth will be 14” deep, not the 8 1/4” deep as shown in the drawing.

Straight Modules

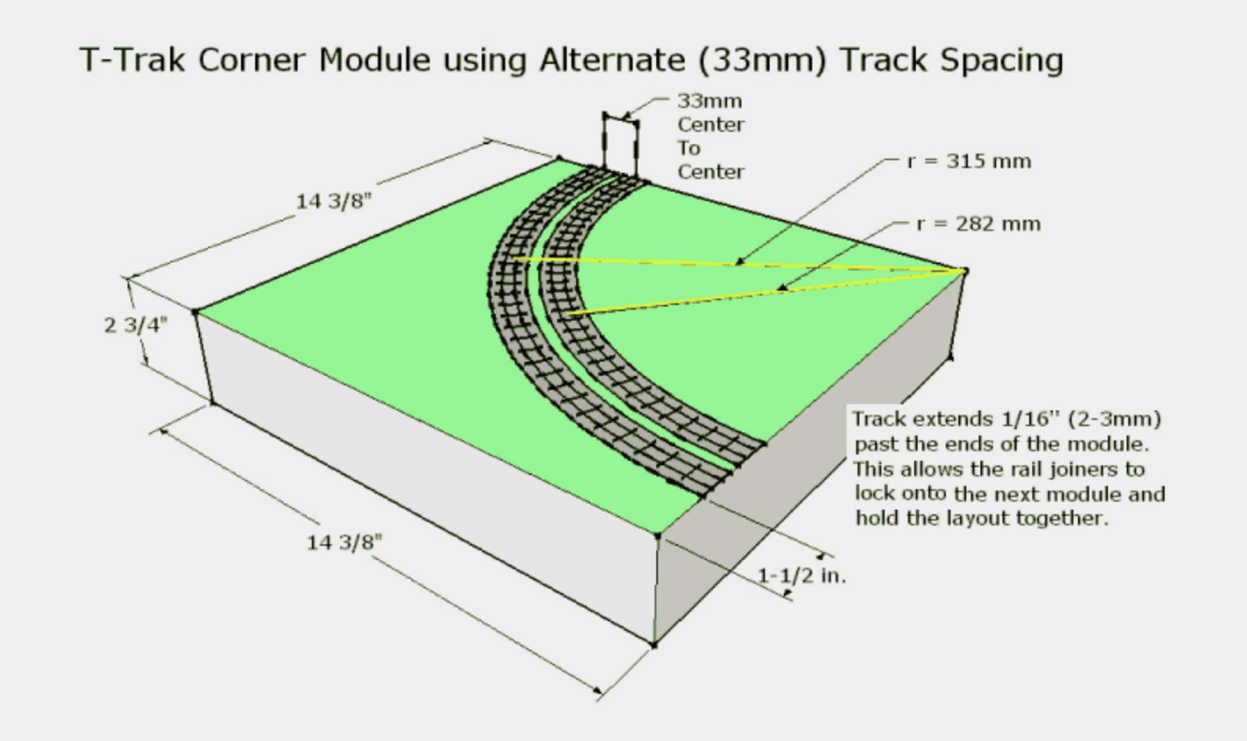


Single Straight Module Dimensions

The single straight module outside dimensions are 14” deep x 12 1/8” wide.

The double straight module outside dimensions are 14” deep x 24 5/16” wide. This is the most popular module.

The Current Division Formal Standard Corner Box Design.



The outside corner module (compatible with T-TRAK) corner specifications have dimensions of 14 3/8" (365.12mm) x 14 3/8" (365.12mm) x 2 3/4". The formal standard of 1mm (3/64”) of track overhang on each side of the module is built into this dimension.

The Division 8 track placement standard for T-TRAK modules is the same as the T-TRAK standard, and is an outcome of the use of Kato Unitrack at the module edges.

The mandatory offset from the front fascia to the nearest edge of the ballast (not track center) of the front track, or outer main, is 1 1/2".

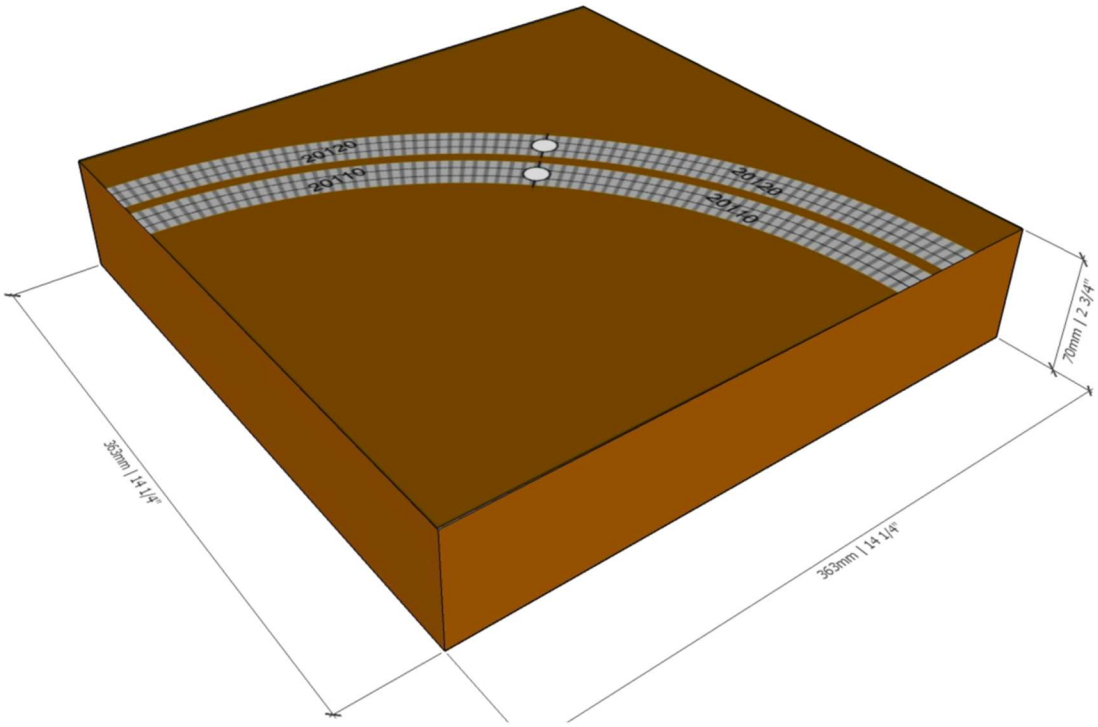
The track should extend 1mm (3/64”) over the edge of the modular box. This gap provides for 2mm (3/32nd “) of track overhang between adjacent modules. This overhang is part of the formal T-TRAK standards. It was implemented to allow flexibility when connecting to other modules that may not be built squarely, or for modules that are warped or flexed.

The center-to-center spacing for the second, or inner main, will be 33mm. Track spacing of 33mm is the most common spacing for existing modules and is identical to Kato's double track pieces (e.g. concrete tie track, double cross over, etc.).

It is imperative that both front and back tracks are even and square with respect to each other and the box upon which they are affixed. It is a best practice to use Kato's double

track sections as alignment tools when affixing the two sections of track to both ends of a module.

Inside Corner Modules



Outside Corner Dimensions

The inside corner module dimensions are 14 1/4” deep x 14 1/4” wide.

Modules made from Manufacturer’s Kits

The above descriptions all relate to those builders who wish to create their own modules from scratch. In recent years, several manufacturers, led by CRM and Masterpiece have begun to offer precision laser cut designs for modules to be assembled from those parts. Serious consideration should be given to this opportunity but price to some may be a deterrent. The kits come with detailed instructions, most of which will not be repeated here.

The kits come in a variety of formats, inspired by modules scratch built by the early adoptors.

The most notable options are those that provide for a solid base (most popular) and a 1” foam base (actually a box with a top lowered about an inch), popular with those modelers who seek subbase detail, such as culvert, streams and lakes. The opening is usually filled with I” of polyfoam and then hot knife cut to the desired subbase contours.

I think it's safe to say that the **beginning T-TRAK modeler should start** with a solid base module since it can be built much more structurally sound. As the modeler advances in skill, the open top form can be used to allow for a more varied scenery diorama.

Division Painting Standards
All edges that are exposed to the air shall be primed and painted with Latex Paint primer. The standard final coat of paint shall be Valspar Zero VOC, sample size container, 3010-8, Cowboy Hat, Satin, Base C (purchased from Lowes). If there is foam on the top, it shall also be painted with Cowboy Hat.

Division Electrical Standards
All Division modules will be permanently wired with power wiring.

The modules will be wired for track power using standard Kato track connectors. The standard is that the rails, beginning with the front rail on the front track, be wired in a Blue, White, White, Blue order. The outside track will also be identified by placement of a band of red tape at the connector. Similarly, the inside track will also be identified by placement of a band of yellow tape at the connector.

If your module uses 12v dc power for animations, terminate your Red and Black wires on a 5.5/2.1mm power receptacle. If you have done this correctly, you should be able to put a 12v wall-wart on the jack and test your module at home.

All Division modules will use the Kato Part, #24-818, terminal joiner, which replaces the standard unijoiners (4) positioned between the two track sections near the middle of the module. This will provide us with the maximum flexibility to power the layout.

It is a best practice to have a power drop every six to eight single modules (approximately every 2 meters, or 6 to 8 feet) around a layout. The Kato wiring accessories (e.g. Unitrack DC Extension cord, Unitrack 3-Way Extension Cord) are sufficient to power layouts that are three tables in length. Our bus cables are capable of an unlimited capacity, constrained only by length.

Before the track is permanently attached to the base, the track (straight or curved) should be placed on the module according to the placement standards.

Determine the location where the two sections of each track join each other and mark those spots on the foam or plywood.

After locating this location <u>for each track</u>, drill a 5/16 inch wire hole through the foam and base (and foam if used). This is where the Terminal Unijoiner Cable Kato 24-818 (2 required one for each track) will be installed.

The inside Unijoiners that came with the track now needs to be removed. To remove the existing unijoiners, grab the ends of the plastic Unijoiner with pliers and carefully pull the

Unijoiner away from the track. Place the Kato 24-818 terminal joiners on the track, one at a time, **making sure that the wire follows the standard, (beginning with the front rail on the front track, the tracks are wired in a Blue, White, White, Blue order)**. Check that this is correctly wired, then double-check, and finally triple-check to verify it is correct. This is a critical assembly so make absolutely certain it is correct.

Attaching the track to the Module when the top is plywood.
The manufacturers have generously supplied small diameter holes that correspond to the holes on the bottom of the Kata Unitrack assembly.

Locate the track placement on the module. The end of each track should extend 1 mm (3/64 inches) over the edge of the module. This allows the rail joiners to lock onto the next module.

It's highly recommended that the builder lay the track loosely on the module so that the holes for the power busses can be cut in the top of the module.

Place the power wire down into the two holes (drilled above) and out the bottom of the Module. Use a drinking straw as a conduit if the wires bind in the foam.

It's also highly recommended that the edge sections on the straight modules be terminated with Kato Track sections (20-042 Double Track Straight at both ends of the module. Using these sections ensures that the 33mm track separation that is part of the standard will absolutely be correct. Remember that the edges of these track sections shall overhang the edge of the module by 1mm (3/64 inches).

To repeat the above guideline in a different way, use a 62mm piece of double track as a mounting template to ensure proper track separation. The edge of the template should be 1mm (3/64 inches) past the edge of the module. Use the template first on one side then on the other side. Be sure to provide the 1 ½" distance from the front edge of the module to the edge of the ballast of the outside track on the Kato track piece.

All of this is enhanced by using the module manufacturer supplied screws (typically #2x3/8" self-tapping screws) inserted from inside the bottom of the module and into the Kato track pieces. This method of assembly best assures that the track is correctly assembled onto the modules.

Seal up the power holes in the plywood with silicone sealant providing a stress relief for the wires.

Attaching the track to the Module when the top is foam
Locate the track as described above, drill a half inch hole where each terminal joiner is attached to the track though the foam and the plywood bottom. Feed the jack end of the joiner wire through the hole

Feed the power wire down into the two holes (drilled above) and out the bottom of the Module. Use a drinking straw as a conduit if the wires bind in the foam.

Locate the track onto the module. The end of each track should extend 1mm (3/64 inches) over the edge of the module. This allows the rail joiners to lock onto the next module.

Again, use a 62mm piece of double track as a mounting template to ensure proper track separation. The edge of the template should be 1mm (3/64 inches) past the edge of the module. Use the template first on one side, and then on the other side. Be sure to provide the 1 ½" distance from the front edge of the fascia to the edge of the ballast of the outside track on the Kato piece.

Now you will need to glue the tracks down with small beads of silicone sealant placed on the foam. Attach the rail section(s) to the foam piece on the module. Use the holes you drilled into the track bed for the wire. Weight the track down with heavy objects like a brick or equivalent and let dry overnight.

Seal up the power holes in the plywood with silicone sealant providing a stress relief for the wires.

Levelers
The modern manufacturers all use a module leveling system that consists of four mechanical parts in each of the four corners of the module. The provided materials consist of ¼"-20 threaded inserts to be installed in each of the four foot brackets. These are sometimes referred to as tee nuts. They also provide a special ¼-20 x 2 1/2" long nylon leveling screw. While this combination is better than the older t-nut and carriage bolt assembly that had all sorts of problems, the nylon parts are not built for a lot of wear and tear.

Randy Coffman from Division 10 and the owner of Coffman Engineering has a kit that can replace the nylon leveling screw with a stronger stainless steel ¼"-20 assembly that solves many problems. The leveling screws are available at this link: https://www.coffmaneng.com/product-page/tt-2-3-standard-3-4-pc-screwset-w-nylon-feet

To make his system work best the modeler should enlarge the hole in each corner of the module top to 3/16"in diameter.

Turnouts
The use of functioning turnouts on most modules is not a great idea. Spectators love to flip those turnouts when the "boss is not looking" and the result can be troublesome! That being said, if a turnout is desired it should not be on the edge of the module. Your module could be located next to a corner and unless everything is perfectly aligned between the two modules, the lead wheels of the engine (pilot) sometimes loses

tracking and the engine will derail. Placing a 62mm section on the module edge removes this problem.

Skyboards
Division 8 has not yet standardized on the use or design of Skyboards.

I hope all of this makes sense and thanks for agreeing to build one or two modules to operate with the Division 8 T-TRAK group. Now you are ready to enjoy the satisfaction of operating modular layouts.

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