As requested, here are my comments and suggestions. I shall use ***bold italics*** within the body of the document to distinguish my remarks from the original text of the document. Please know that while my comments may, at times, seem harsh, know that they are not meant to reflect poorly on the authors, my model railroading colleagues, but convey my level of dissatisfaction with the content of this document.

Most of the comments I will make will be based from my point of view and I think it is important to state my philosophy to provide context for my statements. As many of you know, I began model railroading with North Texas T-TRAK (NTTT). It is solely a T-TRAK club and not a T-TRAK division of a parent organization. Our club leader was an NTRAK modeler for many years but left it at one point and restarted model railroading with T-TRAK in 2004. And while NTTT is a T-TRAK-N only club, I continue to remind and advocate that T-TRAK is a multi-scale specification and includes more scales (Z, N, HO, S, and O) than any other modular system. As a point of fact, there are T-TRAK Lego modules, G scale modules built similarly to T-TRAK modules, and TT-Track, which is essentially T-TRAK-TT, but due to trademark disagreements in the early days of T-TRAK was rebranded. **I believe all of these scales should be brought under the big tent of T-TRAK and the existing ones continue to be supported.**

Because of this strong belief in a multi-scale T-TRAK universe, **I believe it is illogical to borrow significant (i.e. "standard") terminology from any other modular system**, especially any that are scale specific. **I believe T-TRAK standards should be as minimal as possible** to ensure interoperability but no more, in order to maximize creativity and adaptability.

I believe a T-TRAK organization should be international in its outlook and welcoming in its behavior. Today, the Australians operate under the Australian Guidelines and the Russians operate under T-TRAK-RUS Guidelines. **I believe in a T-TRAK Organization that will work with others to bridge these guidelines so that we may continue to build compatible modules**.

I believe a T-TRAK organization should not be a subsidiary of a larger organization to prevent it from compromising its core values.

I believe a T-TRAK organization should be a strong advocate of T-TRAK to all interested in model railroading, manufacturers, and show promoters. I do not believe it should be negative towards any other group or scale.

I believe a T-TRAK organization should provide support, in some manner, to introduce today's youth to model railroading via T-TRAK.

These beliefs, along with my belief in the great potential of T-TRAK, are what drive me.

My following comments will be critical of this document. So much so that I think this document should be scrapped and the process restarted from scratch, including numerous assumptions upon which this document was based and which polls on the Facebook T-TRAK Forum have refuted.

Sincerely,

Vic McTee

North American T-TRAK Organization

Proposed
Standards and Recommended Practices

T-TRAK Standards & Recommended Practices

VM: What is the "North American T-TRAK Organization"? I have never heard of it. Why would the T-TRAK Standard Committee abdicate world standards? Who on the committee represents modelers in Canada and Mexico? By the end of this document I was wondering who actually represented US T-TRAK modelers.

March 27, 2017

Questions, comments, corrections and suggestions should be addressed to the T-TRAK Standards Committee at Info@T-TRAK.org

Introduction

This document will be permanently maintained and downloadable on the T-TRAK.org web site and will be submitted for adoption by the NMRA to define the T-TRAK format at a national level.

VM: Anyone actually read the NMRA specifications? This document does not look anything like them. For that matter, numerous existing NMRA specifications would need to be amended before a T-TRAK specific proposal could be entertained by the NMRA (e.g. "A module is a portable section of table type structure which is but one part of a large group of like tables…" - INTRODUCTION TO MODULE STANDARDS & RECOMMENDED PRACTICES***). Furthermore, the NMRA supports standards that are manufacturer independent, which as we progress through this document we shall find that this proposal has shifted the T-TRAK standards to purely Kato track. This is the antithesis of the purpose of the NMRA. As such, the reason stated for this document's existence (i.e. submission to the NMRA for adoption) is invalid.***

In this document, standards are printed in black, while recommended practices are printed in blue.

VM: Recommended practices should use a different font to help those that are color blind or may print the standards using a black and white printer.

The standards contained herein should be the basis for operating practices for all clubs, and should be used as a mandatory minimum set of standards for all T-TRAK layouts at public train shows or conventions. The intent of these standards is to provide uniform construction techniques ensuring compatibility between all modules used at public events. Any additional requirements imposed by a club should be compatible with the practices defined by these national standards.

VM: "… for all clubs … for all T-TRAK layouts at public train shows or conventions."? Does this include clubs and events not in North America?

Terminology Used in This Document

The following terminology is used in this document:

- Front, rear, left and right refer to the T-TRAK module when looking at the module from the audience side — typically the two main tracks run side to side across the front of the module.
  - Width or length is the dimension the mainline tracks follow along the top of the module — width is used in this document.
  - Depth is the dimension from the front-edge to the back-edge of the module.
  - Height is the dimension from the bottom edge to the top edge of the module base, not counting the adjusting bolts or vertical scenery. (i.e., The bottom of Unitrack pieces) This is normally 2¾".

    VM: The word "normally" should be deleted. The word "normally" implies the height need not be as stated "some of the time".
- The front main track is referred to as the "Red" track.
- The rear main track is referred to as the "Yellow" track.

VM: There is no logical reason for naming the T-TRAK outer line as the "Red" track, nor the inner line as "Yellow". These names are colloquial terms applied to NTRAK modules but are misnomers per the NTRAK specification (page 23). The actual names of the lines in NTRAK PER THE NTRAK specification are "Front Main" and "Inner Main" respectively. The color coding is for the wires.

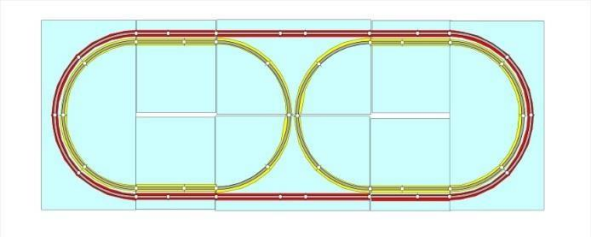
The proposed naming conventions are NTRAK artifacts that have meaning in NTRAK loop layouts but lose logical context when applied to certain T-TRAK layouts such as a dogbone, point to point, or a mobius layout and most T-Trak layouts that employ multiple inner loops. It must be realized that while a module has a front and rear track a T-TRAK layout may not necessarily have one or may have many. In other words, a term for a module does not necessarily hold true as a term for a layout. Using restrictive terminology leads to restrictive thinking.

Real railroads use the terms "Main 1" and "Main 2" (per a BNSF employee). If we really pretend to be modeling railroads should we not model their terminology as well?

And finally, a majority (27-22) of those responding to a Facebook poll did not want to use the terms Red and Yellow for track naming. Was there any thought given to asking the community what it preferred prior to writing the standards?

- Outside rail refers to the front rail on the Red track and the rear rail on the Yellow track.
- Kato wire colors are used to establish connections to the main tracks following the pattern with blue to the outside (i.e. blue — white — white — blue) from front to rear or vice-versa.
- Track Bus refers to the external cable used to carry track current from the control unit or power pack to the various modules.
- Accessory Bus refers to the optional external cable used to carry 12VDC or 15/16VAC to modules for lighting, animation, signaling, and other non-track needs.
- Leveling Bolts refer to the required bolts which allow the module height to be adjusted from 2¾" to 4".
- Inner Loops are isolated loops of the Yellow track when Junction modules are used.

VM: A simple T-TRAK oval has an inner loop but no junction modules were used. Does that mean it is not an inner loop?



Module Standards N Scale

VM: What became of the terminology T-TRAK-N?

Item	T-TRAK Standard	Recommended Practice
Single Straight Module	308mm W x 210-330mm D x 70mm H (12-1/8" W x 8¼ -13" D x 2¾" H)	Depth can be from 5" - 14 3/8" (including skyboard)
Double Module	618mm W x 210-330mm D x 70mm H (24-5/16" W x 8¼ -13" D x 2¾" H)	Depth can be from 5" -14 3/8" (including skyboard)
Triple Module	928mm W x 210-330mm D x 70mm H (36½"W x 8¼ -13" D x 2¾"H)	Depth can be from 5" - 14 3/8" (including skyboard)
Quad Module	1238mm W x 210-330mm D x 70mm H (48¾" W x 8¼ -13" D x 2¾" H)	Depth can be from 5" – 14 3/8" (including skyboard)
Note – straight modules width is a multiple of 310mm less 2mm		
Outside Corner Module	365mm W x 365mm D x 70mm H (14-3/8" x 14-3/8" x 2¾")	
End Cap (double Outside Corner)	732mm W x 365mm D x 70mm H (28-13/16" W x14-3/8" D x 2¾" H")	
Inside Corner Module	559mm W x 559mm D x 70mm H (22" W x 22"D x 2¾"H)	The front and back corners can be truncated to form a 6-sided module for ease of transport and storage
Junction Module (see note)	596mm W x 365mm D x 70mm H (23-7/16" W x 14-3/8" D x 2¾" H)	The outside track requires use of a Kato 20-050 expansion track or cutting a standard piece of track
Leveling Bolts	¼-20 x 2" carriage bolt and ¼-20 threaded T-Nuts installed ¾" inset from edges of module.	¼x20x2" socket set screws with holes in top of module can be used to allow height adjustment from above with a hex wrench.

VM: What happened to metric measurements in the RP column? Canada and Mexico use the metric system (remember the North American part of the name?). Remember the rest of the world that uses it

that the group has abdicated to others? And carriage bolts!!? Those were ridiculed years ago as things you purchase at a big box hardware store until you can get real bolts (i.e. all thread hex head) or set screws.

HO Scale

VM: What became of the terminology T-TRAK-HO?

Item	T-TRAK Standard	Recommended Practice
Single Straight Module	490mm W x 610mm D x 70mm H (19 3/8" W x 24" D x 2¾" H)	Depth should be 24" Height can be up to 4"
Double Straight Module	1219mm W x 610mm D x 70mm H (48" W x 24" D x 2¾" H)	Depth should be 24" Height can be up to 4"
Outside Corner Module	711mm W x 711mm D x 70mm H (28" x 28" x 2¾")	Height can be up to 4"
Inside Corner Module	?mm W x ?mm D x 70mm H (?" W x ?"D x 2¾"H)	The front and back corners can be truncated to form a 6-sided module for ease of transport and storage
Junction Module	1156mm W x 711mm D x 70mm H (45½" W x 28" D x 2¾" H)	
Leveling Bolts	¼-20 x 2" carriage bolt and ¼-20 threaded T-Nuts installed ¾" inset from edges of module.	¼x20x2" socket set screws with holes in top of module can be used to allow height adjustment from above with a hex wrench.

VM: What happened to metric measurements in the RP column?

VM: What happened to standards for T-TRAK-Z, T-TRAK-S, T-TRAK-O? Where is the leadership on proposing standards for T-TRAK-Lego, T-TRAK-OO, T-TRAK-G, T-TRAK-T and re-uniting TT-Track as T-TRAK-TT?

Special Note for Junction Modules

Junction Modules are not the same width as any other module. This is not a problem when there are two Junction modules on opposite sides of the layout, joined by the curved tracks. But a single Junction placed along one side of the layout will not match the width of the straight modules on the opposite side of the table. The difference in the width must be accounted for within the layout.

VM: I don't understand why this is in a standards document. Not all layouts are double row layouts on a single table. Yes, the usually are, but they don't have to be and should not be forced to by restrictive standards. What about a single row layout with a junction in the middle and three balloon loops? Where is the "Yellow" track or the isolated inner loop? After all, a junction was used. Where is the need for a compensating T-Junction? This is the type of restrictive language that leads to restrictive thinking.

Skyboard

Skyboards are optional backdrops mounted to the rear of the module to provide a visual block behind the module. Skyboards vary in height between 6" to 15" above the surface of the module, but each club should adopt a specific standard to provide continuity throughout the layout. The width of the skyboard should be approximately the width of the module on which it is mounted. There should be no more than a 1/8" gap between modules to provide visual continuity between adjacent modules.

Skyboards should be removable so that modules can be used in layouts with or without skyboards.

Non-Standard Modules

These standards allow T-TRAK modules to be located on a standard 30" folding table. Any module that goes outside the dimensions of the standard modules defined above is considered a non-standard module, even if it still matches up and interfaces with the standard TTRAK base modules. While non-standard modules are allowed, special consideration is required when using them and it is the responsibility of the module owner to deal with these considerations. Non-standard modules include, but are not limited, to the following:

VM: T-TRAK, not TTRAK. Branding was covered in an email when the "First Committee" discussed the website update.

- Larger Corner and Junction Modules - The track radii specified on the T-TRAK Outside Corner, End Cap, and Junction modules may not permit the reliable operation of some longer equipment. Corner modules using larger radius Unitrack can be created as long as such modules interface with standard T-TRAK modules at each mating end. The use of such modules requires special table considerations to accommodate the two parallel sides of the layout, and must be paired with matching corner modules at the opposite end of the layout. The use of non-standard radius curves also prevents the use of standard Junction modules in a cross-table configuration in the layout. Junction modules will still work side-by-side to allow a side loop to branch off of the table, or in a cross-table configuration if a "bridge" module is used to join the two Junctions.

  VM: More evidence of restrictive thinking. Not all layouts need to have parallel sides. By stating in the standards document you infer it is an absolute. When proven wrong it leads to invalidation of the standards. And you don't have to pair large radius curves in a 180 as implied. You can use just one large radius 90 degree curve on one end of an oval as long as you have a matching radii 90 degree curve on the diagonally opposite end of the layout. And I'm not at all convinced it invalidates the use of "standard" junction modules in a "cross-table" configuration and what about building junction modules using matching large radius curves? NTTT has some, or are they considered "non-standard" since it was not in the table of "standard" modules?
- Balloon Modules - These modules reverse trains that are traveling on the one track so they re-transit the same module on the other track. A pair of these modules permits a single row of T-TRAK modules, such as along a wall.

  VM: Balloon modules reverse trains? This needs to be reworded. And why the restrictive example? Free-MO is predicated on a single row of modules and they don't build layouts "along a wall". They build organic free-form layouts. Why not do that with T-TRAK too?
- Long Modules - Modules longer than Quads are problematic because of transportation and storage issues. All modules should be 2mm short of a multiple of 310mm for compatibility with standard modules.

  VM: Well that was buried.
- Modules that Extend out the Front of a Base Module - Effects such as a yard or a station scene, for example, could require a module to extend outwards more than the 1½" of the standard module. Such modules must be constructed so they can overhang the table front without requiring special bracing, and generally should not extend more than 3" or 4" to the front.

  VM: Why and which is it, 3 or 4? Instead of dictating what can't be done reword the restriction so that the "bad thing" can't happen (i.e. It is imperative that the balance of a module be maintained while in a layout therefore …)
- Deep Modules - Modules deeper than 14-3/8" must have complementary modules of smaller depth to fit on a 30" deep table.

VM: Hmm. What about my module that is 730mm deep and has two sets of track on both sides. Does it need a complementary module and where should it go?

- Transition Modules - A module where the tracks swing from the front to the rear must have complementary modules that bring the tracks back to the normal position at the front of the module.

  VM: More double row, same-old same-old, restrictive thinking. What about a single row layout with a transition module in the middle where the straight modules on either side of the transition module are reversed front to back with respect to each other? Where is the need for the complementary module? "Must" is not the correct word.

- Yard Modules - Yards can be parallel yards or built at an angle to the main module set. They play a very useful role in the staging of trains, especially during a train show. In the design of yard modules consider the following:
  - Use Kato Unitrack # 6 turnouts where ever possible. Their use creates track spacing (49.5mm) that allows for easier placing of rolling stock on the track(s).
  - When Kato #4 turnouts are used, they should be modified to provide smooth operation. The modifications are described as a Wikidot Tutorial or in a YouTube video. ○ Keep all turnouts located on one module at each end (the throat modules). This allows scalability of the yard, simplifies maintenance of the turnouts, and minimizes control issues.

    VM: "… described in a T-TRAK Wiki Tutorial…" , please. Wikidot is the service which hosts many sites. T-TRAK Wiki is the name of the site that contains the information.
  - Include scenery. Yards can be made interesting with the addition of towers, maintenance facilities, yard offices, plus some MOW equipment parked in the yard.
- In almost all cases non-standard modules must be provided in pairs so the layout will match at the opposite side of the table. All other applicable T-TRAK standards (e.g. electrical) must be met.

  VM: More double row, same-old same-old, restrictive thinking.
- On all modules, track must extend at least 1mm beyond the ends of the module. This allows the UniJoiners to lock onto the next module and hold the layout together.

Track Standards N Scale

Item	T-TRAK Standard	Track Used	Recommended Practice
Track Spacing	33mm centerline-to-centerline	Kato 20-042	Use double track on ends to set spacing ***VM: Is this RP actually stating that all modules should affix concrete tie double track on the module interfaces? That's the way it reads.***
Track Setback (from front)	38mm / 1½" to front edge of track bed		
Corner Curve Radii	282mm & 315mm	Kato 20-110 Kato 20-120	
Turnout Type	Kato turnouts on mainline tracks	Kato 20-202/203	Use of #6 turnouts on mainline tracks
Road Crossing Track Use		Kato 20-021	Aids in train deployment and re-railing
Single Straight Module	2 mainline tracks - 310mm	2 – Kato 20-010*	Use of single (wooden tie) track

		2 – Kato 20-020*	
Double Module	2 mainline tracks - 620mm	4 – Kato 20-000* 2 – Kato 20-020*	Use of single (wooden tie) track
Triple Module	2 mainline tracks - 930mm	6 – Kato 20-000* 2 – Kato 20-010*	Use of single (wooden tie) track
Quad Module	2 mainline tracks – 1240mm	10– Kato 20-000*	Use of single (wooden tie) track
Outside Corner Module	90 degree curves of 282mm & 315mm	2 – Kato 20-110 2 – Kato 20-120	Use of single (wooden tie) track
End Cap (double Outside Corner)	180 degree curves of 282mm & 315mm	4 – Kato 20-110* 4 – Kato 20-120*	Super-elevated track (Kato #20-183 & 20-184) can be used
Inside Corner Module	90 degree curves on both tracks	2 - Kato 20-111 6 - Kato 20-121 2 - Kato 20-130	The front and back corners can be truncated to form a 6-sided module for ease of transport and storage
Junction Module	Outside track is straight and Inside track has two 90 degree curves	2 – Kato 20-000 1 – Kato 20-050 4 – Kato 20-110	Outside track requires use of a Kato 20-050 expansion track or cutting a Kato 20-020 straight track

 - Double track equivalents can be used on these modules, but note that tie colors will be different.

VM: Shouldn't the items in the Track Used column be blue (i.e. a Recommended Practice)? Or are track selections now standardized? The way this reads makes all 248/62 singles, 186/124 x 2 doubles, and 186/124 x 3 triples non-standard as well as any module with flex track between Kato interfaces. May as well toss in the towel for NMRA manufacturer independence. Also, what about a cautionary warning for the concrete-tie, double track pieces? Some of those were 0.5mm short causing issues on longer modules.

HO Scale

Item	T-TRAK Standard	Track Used	Recommended Practice
Track Spacing	60mm centerline-to-centerline		
Track Setback (from front)	3.25" to front edge of track bed		
Corner Curve Radii	550mm & 610mm	Kato 20-210 Kato 20-220	
Turnout Type	Kato turnouts on mainline tracks	Kato 20-860/861	Use of #6 turnouts on mainline tracks

Road Crossing Track Use		Kato 20-142	Aids in train deployment and re-railing
Single Straight Module	2 mainline tracks - 492mm	2 – Kato 20-150	Use of wooden tie track
Double Straight Module	2 mainline tracks - 984mm	2 – Kato 20-120 6 – Kato 20-180	Use of wooden tie track
Outside Corner Module	90 degree curves of 550mm & 610mm	4 – Kato 20-210 4 – Kato 20-220	Use of wooden tie track
Junction Module	Outside track is straight and Inside track has two 90 degree curves	1 – Kato 20-130 1 – Kato 20-150 2 – Kato 20-180 8 – Kato 20-210	

VM: Ditto on the track combinations for HO. And where are the standards for T-TRAK-Z, T-TRAK-S, T-TRAK-O??

Electrical Standards

Electrical problems are the predominant problem encountered in setting up a new layout, and the hardest to diagnose and resolve. For this reason, it is important that compliance with a strict set of standards is enforced.

VM: This is a statement of opinion being used as a justification for the following mayhem. I do not agree electrical problems are the hardest to diagnose and resolve.

Electrical systems to run a T-TRAK layout consist of 3 basic components:

1. **Control Unit** – This is some combination of power packs for tracks running in DC mode, and/or a DCC control system for those tracks running in DCC mode. Since the two tracks in a T-TRAK layout are electrically isolated, DC mode will require a power pack for each track, while a single DCC control system can be used for multiple circuits.
   VM: Numerous misconceptions in this section. There are not always two tracks in a T-TRAK layout as they range from one to "a lot" (infinite in theory). Also, even when there are two tracks on a layout they are not always isolated. If they were we would not have so many discussions about double crossovers. And finally, DC mode does not require a power pack for each track. Per the T-TRAK website: "At the time, this was considered to be a benefit because it permitted running a train on each loop (inner and outer) in opposite directions with one DC throttle".
2. **Track Bus** – The power to the tracks is carried from the control unit to the layout through a heavy (12 gauge) cable usually in the form of a zip cable. The track bus normally lays in the trough created between the backs of the modules placed on either side of the layout table. There should be a Track Bus for each track (Red and Yellow) to maintain electrical isolation between the tracks. Feeder Connectors come off the Track Bus to allow connection to individual modules. Note: On smaller layouts, the Track Bus may consist of Kato electrical components.
   VM: This section implies you have to have a heavy gauge cable for every track on any T-TRAK layout. This precept is ridiculous. Most T-TRAK layouts are small and can easily use Kato

electrical products without issue. Large layouts may need a larger gauge track bus but that is not necessarily true for the smaller inner loops in the layout. Again, each of those smaller inner loops could easily use Kato products with a local power pack. And then the paragraph ends with what I said. It should lead off with that paragraph and define what "smaller" means in terms of layout length or number of modules.

3. **Module Connectors** – Modules are connected through the use of wires which are attached to the tracks and come out from the module to plug into the connectors on the Track Bus cables. While not all modules in a layout need be connected to the Track Bus, the recommended practice to equip all straight modules with feeder cables so that the layout does not have large gaps where no power connection is available.

   VM: Again, modules need not be connected to a heavy gauge track bus as described in section 2 in order to electrify a T-TRAK layout. The previous three sections overly complicate the task of wiring a layout.

Control Unit

There are two predominant modes of control in model railroading, Direct Current (DC) and Digital Command Control (DCC). When setting up layouts for use by numerous people and clubs, it is often necessary to accommodate both modes of operation at the same time.

VM: For different lines, yes, or the same line at different times, but not both modes on the same line at the same time.

This is facilitated by the fact that the 2 mainline tracks are independent of each other. Many clubs have built control systems that can handle either mode on each track. At their core, these systems simply have a DPDT toggle switch to change a given track from one power source to another.

VM: It is not a fact as they are not necessarily isolated and again, there are not always two mainline tracks on a T-TRAK layout. Another example of module contextual information incorrectly extrapolated to the layout context.

In the DCC mode, several options exist to allow the operator to control his/her train(s). Most popular among these are the wireless throttles that allow the operator to follow their train around the layout. While DCC systems are proprietary and for any given brand of system, all the throttles used on that system must be from that manufacturer, there are "front end" components which can be used to interface with most major brands. Chief among these is the JMRI software available for most computer platforms and mobile devices.

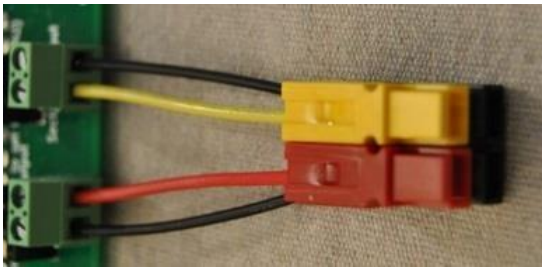
VM: What does this have to do with T-TRAK standards?

Track Bus

Connecting the Control Unit to the Track Bus

An adaptor connector is used to connect the Control Unit to the standard Track Bus Powerpole connectors. The gauge of the cable used in this adaptor should be compatible with the connectors on the Control Unit, and should be as short as possible to avoid voltage loss when using the smaller wire required to connect to most units. It is also critical that both Track Bus cables be connected independently to isolated circuits coming from the control unit. And because the polarity of the two mainline tracks on the layout have opposing polarity (from the B-W-W-B wiring standard), it is recommended that the adaptor from the Yellow track bus cross the wire polarity to prevent cross-over tracks from shorting out the layout. If this is done, care must be taken that it is only done once for each power district, and it only applies to the Yellow track.

VM: This paragraph should be scrapped entirely, rethought, and likely discarded again. Since the control units are not specified this section is superfluous. As previously mentioned, a track bus as previously described is not always needed for a T-TRAK layout. And then the recommendation to reverse the polarity of the "Yellow track bus" to prevent cross over tracks from shorting out the layout is just bizarre. Connecting the outputs of two or more power sources may work for some units but it is not a given that it will work for all. Short detection is more likely to be built into a power source than it being engineered to sink power.



Wire for the Track Bus

Track bus cables should be constructed of 12 gauge "zip" wire with Anderson Powerpole 30A connectors on each end.

VM: What if it is not zip wire? Non-standard even though it may be 12 gauge? As stated previously, this is overkill and overly complex for simple layouts.

There must be a cable supplied for each circuit used in the layout.

VM: I tend to not agree with this statement but "circuit" has not been defined so I'm not exactly sure what this statement is trying to state. I first interpreted it to mean a track bus cable is required for every line in a layout. If so, this statement is not true. A track bus cable as described is only necessary for long runs. If the power source is within 30 feet of the most distant point of rail line then Kato wiring is sufficient thus the heavy gauge track bus is not needed. Specifying something as mandatory when it is not needed is not prudent.

In a simple layout, this would be one cable for the Red track, and one for the Yellow track.

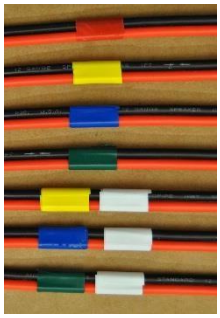
VM: In a simple layout a heavy gauge track bus is not needed or required. Nor would I recommend one.

When multiple inner circles are created in the layout, each of the inner circuits must be independently cabled.

VM: Not necessarily. But if it so chosen it need not be a track bus cable as described.

Track Buses should be identified by color as to which track they service to avoid crossing the circuits. A simple piece of colored tape or Velcro strap around each end of the Track Bus will accomplish this. The following is a suggested set of color/circuit identification pairs:

Circuit	Color
Red Track	Red
Yellow Track (Inner Loop 1)	Yellow
Inner Loop 2	Blue
Inner Loop 3	Green
Inner Loop 4	Yellow & White
Inner Loop 5	Blue & White



Inner Loop 6	Green & White

VM: And what of loops 7, 8, 9, … The record breaking WGH San Antonio layout had 13 inner loops and none of those were problems to wire. What club or person is ever going to build all of these color-coded bus cables? This many track buses are impractical, costly, but more importantly unnecessary. I have wired numerous large layouts, and debugged the mess of others, and never, ever, have I found the need or desire to wire an inner loop with a track bus as described. But at least I see the word "circuit" is used to imply an independent rail line on a layout. But I do think it funny that Yellow track had to be defined as Inner Loop 1 for the independent inner loops. It proves the terminology is flawed and should be reconsidered.

The color coding for the wires of a Track Bus are the following:

- Inner Rail = Kato white wire = red wire (when using red/black zip cable)
- Outer Rail = Kato blue wire = black wire (when using red/black zip cable)

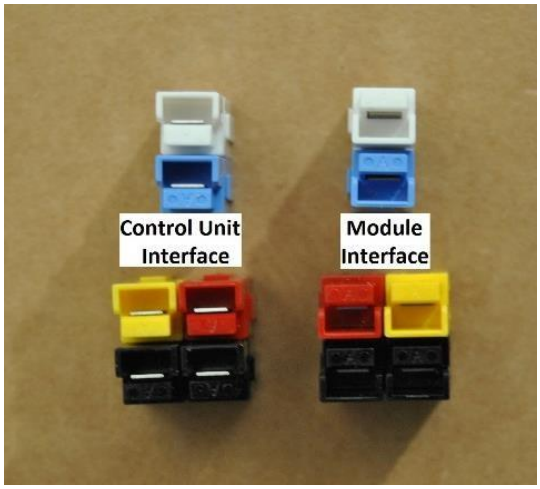
VM: The beauty of T-TRAK is (or has been) the utter simplicity of its specifications. The proposed wiring above is not simple (For the red track bus the blue Kato wire is the black wire and the white wire is the red wire???). Use the North Virginia NTrak bus cable specification with low voltage lighting cable and blue & white Anderson Powerpole connectors (just guess which one connects to what). Use the NVNTrak specified pigtail with Kato connectors or Kato 3-way connectors. Reduce it to one track bus cable and then, only if you must, specify some other stupid color Velcro cable wrap to identify different bus lines. I'll only be using one so it won't matter to me. THIS greatly simplifies everything and gets back to the T-TRAK philosophy of simplicity abandoned with this document. Though the following sections warrant more comments I will resist because it's just more of the same unnecessarily over-engineered, under thought mess.

Connecting Track Buses to Each Other

The Track Bus connectors to be used for T-TRAK layouts are the 30 Amp Anderson Powerpole connectors. The connector shell colors shall be blue and white for single cable bus wire or red/yellow and black if the buses are connected into a single cable. All connectors must be aligned vertically with the end facing the control unit configured with the white (or red/yellow) connector on top and the blue (or black) connector on the bottom. The opposite end of the cable will have the connectors reversed so that the ends of the Track Bus connect to each other and the colors match.

The following table is a summary of the Powerpole configuration.

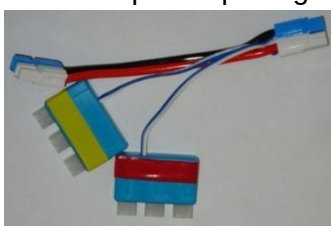
Application	End	Stacking	Configuration
Single Bus	Control Unit	Vertical	White over Blue
	Module	Vertical	Blue over White
Red Track Bus	Control Unit	Vertical	Red over Black
	Module	Vertical	Black over Red
Yellow Track Bus	Control Unit	Vertical	Yellow over Black
	Module	Vertical	Black over Yellow



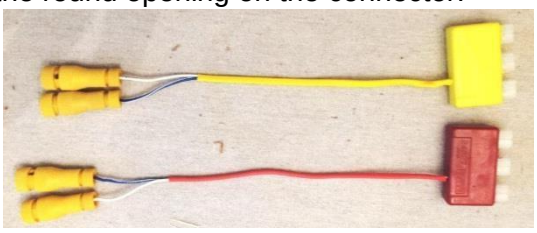
Connecting Modules to the Track Bus

The module connection points on the Track Bus must be compatible with the connectors provided by Kato with their Unitrack line. The most common source for plugs to attach to the Track Bus are the Kato Terminal Adapter Cord (part #24-843) and the Kato 3-way extension cables (part # 24-827) which allows for multiple modules to connect to a single feeder cable.

Note that when connecting Kato blue/white cable to a red/black bus cable, the blue wire should always connect to the black wire of the bus. When using the Tamiya (female) connector on the Track Bus Feeder pigtail, the blue wire goes to the square opening and the white wire to the round opening on the connector.



Track Bus Feeder Cables (hardwired to bus)



Track Bus Feeder Cables (attached with cable taps)

Connectors in Europe and Australia
Many T-TRAK modelers in Europe and Australia have adopted RCA jacks and plugs instead of Kato and Powerpole connectors. If you plan to use your modules in those areas, refer to the "Australian T-TRAK-N Guidelines".

VM: Appears to be another abdication of leadership. How about working with them to ensure a compatible adapter is specified to connect Kato to RCA should anyone want to take a module to Australia or Europe and specifying an RCA to NVNTrak bus cable adapter should they be brave enough to visit us.

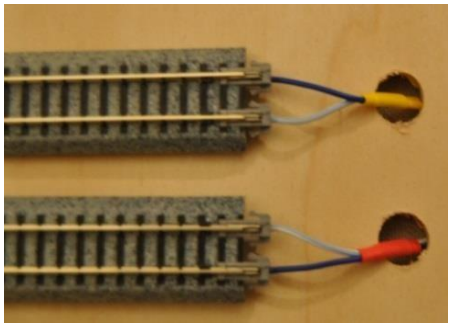
Module Connectors

The only electrical components connected to the module are the Module Connectors. The recommended connector is the Kato
Terminal UniJoiner (part #24-818). Other similar connectors are available, but their reliability has been proven to be lower than the UniJoiner.

VM: Do you mean other Kato connectors (i.e. Kato feeder track) are inferior to part #24-818 or other Tamiya connectors are inferior? And where exactly is this proof you declare to exist for these unreliable connectors?

The ends of the Module Connectors must be clearly marked to indicate whether they provide a connection to the Red or Yellow line on the module.

Item	T-TRAK Standard	Recommended Practice
Track Feeder Connector	Kato Compatible	Kato 3-way extension cable (#20-827)
Modules with Power Feed	At least 1 on each side of table ***VM: Horrible, just horrible. Throughout this document the context of the module has been confused with the context of the layout and in the one place that is truly module specific the SPECIFICATION dictates a BAD layout specification. Not only because it is in the wrong place but because it is not specific in a meaningful way. What if the modules are setup on the floor or on a shelf? What if the layout is really small? What if it is a single row layout?*** ***Why not specify the type of connector (i.e Kato male)? That would be a really good idea.***	All straight modules should be equipped with Track Feeders. Modules with lighting, animation, or DCC accessory decoders should also have independent 12V Accessory Power Feeds.
Track Bus Connectors	Anderson Powerpole 30A	When using blue/white connectors, cables should be identified as red or yellow circuits with colored tape, paint, or heat shrink.
Track Feeder Color Code	Blue–White-White-Blue	



Tracks must be wired **blue-white-white-blue**

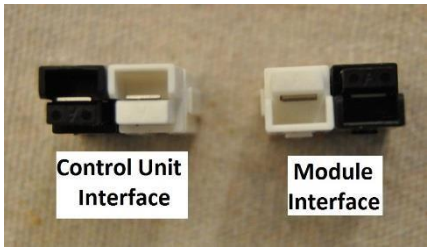
Accessory Bus

Some T-TRAK modules will include operating accessories (such as building and street lights, animated scenes, etc.) that require low voltage power to operate. Rather than having individual power supplies such as wall-warts, an Accessory Bus should be available. It is run in the trough parallel to the Track Bus(es), color coded and configured as shown in the table. Local option can determine whether this bus will be 12VDC power or 15/16VAC power. If using DC, the cable should be labeled as a White cable. If using AC, the cable should be labeled as Brown.

In layouts with AC accessory power buses, modules that need DC must use a bridge rectifier circuit to convert the power to DC. Voltage regulators should be mounted on the module(s) as required to provide the correct voltage to specific accessories. (e.g., Miller Engineering signs require 4.5V AC/DC.)

Item	T-TRAK Standard	Recommended Practice
Bus Connectors	Anderson Powerpole 30A	White=positive, black=neutral
Bus Cable	12-gauge cable	zip cable
Supplied Power	12VDC or 15/16 VAC	Each module must provide conversion to needed voltage for accessories
Accessory Power Feed Connectors	Anderson Powerpole 30A	

Application	End	Stacking	Configuration
Accessory Bus	Control Unit	Horizontal	White/Brown on right, hood up
	Module	Horizontal	White/Brown on left, hood down



Accessory Bus Feeder

The Accessory Bus Feeder will follow the design of the Track Bus Feeder, i.e. a short (6” – 8”) pigtail bus constructed just like a normal accessory bus It is the responsibility of the module owner to provide the Accessory Bus Feeders for their module(s) with appropriate connectors, voltage regulators and/or bridge rectifiers mounted to the bottom of the module at the module end of the pigtail cable.

VM: Uh, no thanks. If wiring a layout is such a problem I'm certainly not going to trust my animation devices to this haphazard suggestion. Who is going to ensure that whatever power supply used has the ability to provide enough current to ensure all connected devices will work? And what if a module down the row shorts out the accessory bus? Will it have some sort of short detection and protection? And although the document specifies an accessory power bus it did not even mention an accessory power source.

References

- "Standards and Recommended Practices", North Raleigh Model Railroad Club
- T-TRAK.org web site
- T-TRAK Wikidot web site
  VM: T-TRAK Wiki web site (thanks!)
- The Unofficial T-TRAK Handbook web site
- "T-TRAK PowerPole Bus Wires", Glenn McLain & Steve Jackson, Northern Virginia NTRAK
  "NTRAK Manual", NTRAK Publishing, Templeton, CA.