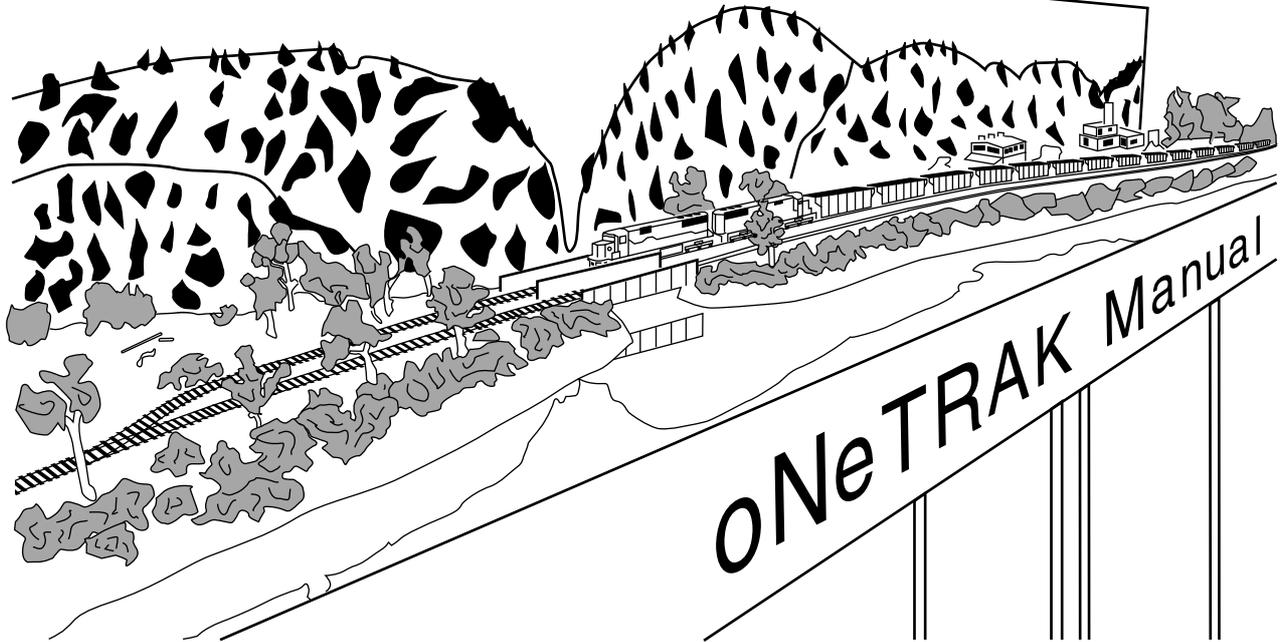


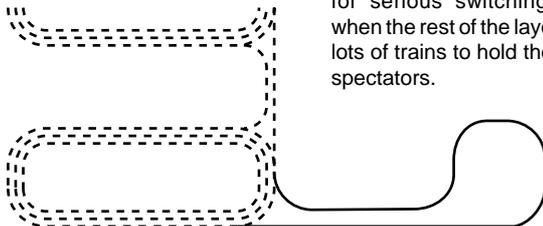
# N-TRAK



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## DEFINITION

oNeTRAK is an NTRAK compatible single-track branch line that can augment NTRAK layouts.



## MAIN GOALS

1. Lightweight, simple to build modules, especially for beginners or those with limited transport capability.
2. Provide an alternative to three track modules that can be connected to an NTRAK layout. Connected layouts encourage team building and enhance fun!
3. Easy home layout integration
4. Extend the NTRAK Red Line Route at shows
5. Provide a branch line for more prototypical operations.
6. Provide an easy way to model scenes with single track and tighter curves.
7. Provides a section of the layout for serious switching operations when the rest of the layout is running lots of trains to hold the attention of spectators.

## INTEGRATION

oNeTRAK modules can be used to build stand alone layouts with emphasis on operation or can be connected with an NTRAK layout using junction modules either to lengthen the “Red Line Route” as seen on the sketch below or to have a branch line with sparse traffic. As the module design should permit both uses, all relevant standards for a conventional NTRAK module must be met by any oNeTRAK module.

## ELECTRICAL ISSUES

NTRAK layouts in general and oNeTRAK modules in particular may be operated using conventional analog technology or digital DCC equipment. A module should conform to both requirements even if its builder or owner only intends to use it in one of the two modes.

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Most of these guidelines are based on NTRAK standards.

**1. HEIGHT OF TRACK** Nominal height is 40 inches. To make grades longer than one module the module interface on grades may need to be changed from the 40 standard height.

**2. FRAME SIZES** Frame lengths in multiples of one foot. Twelve inches is the minimum width. This width may be increased up to an additional foot, front or back for a total maximum width of three feet.

**3. MODULE INTERFACE** Same as NTRAK with one clamp and the standard 4.91" Atlas connector track section. The frame on the module end can be 1x3 or 1x4 lumber or plywood equivalent.

**4. TRACKS** Code 80 track is standard. Code 55 is acceptable with code 80 transitions at module interface. Any Atlas, Peco or Micro Engineering code 80 or code 55 turnouts are acceptable. One track is required, additional through tracks are permitted.

**5. MINIMUM RADIUS** is 18 inches with appropriate easements. To prevent binding the minimum length of tangent between all reverse curves must be 7 inches.

**6. LOCATION OF TRACK** On straight modules the location of the

main has no impact on the loop of modules and is not important, but generally the track is set back 4 to 6 inches from the nominal front so that the Fascia may be reasonably aligned. Bump outs on the modules are permitted, same as NTRAK. Double or triple track should have 1.5-inch center spacing at the module interface.

**7. CORNERS** Standard corners can be 3 by 3 or 4 by 4 feet, etc. On a standard corner the track should be set back 6 inches from the nominal front edge. This makes layout design with inside corners easier. With track set in 6" modules can be used as inside or outside corners and maintain the one foot spacing increments.

**8. CLOSING LOOP LAYOUTS** Due to the wide variety of frame sizes and locations of tracks, some gaps may develop in a loop layout. Most large loops should be flexible enough to close a gap by "scrunching" the modules together. In some cases a temporary bridge may be necessary. This can be made by using a piece of foam, some flex track and a bar clamp to close the gap.

**9. JUNCTIONS** The smallest recommended junction is 3 by 5 feet.

**10. GRADES** 1.5 percent maximum across a dedicated set of modules. Grades on other modules can

be created with shims under legs of modules. Grades suggest addition of a helper district and helper engine facility.

**11. END TURNS** are modules that include a 180-degree curve in the track. They should be a minimum of 2 by 4 feet to allow the 18-inch minimum radius and easements. The distance between the ends of tracks on an end turn must be three feet or more in even foot increments.

**12. TURNOUT SIZES** All turnouts should be number 6 or larger on the mains, passing sidings and interchange tracks. Number 6 turnouts are also encouraged in yards for better operation.

**13. ELECTRICAL** The main line has a red plug fastened the same way as NTRAK. The white and 110 volt requirements are the same as NTRAK. There are no special DCC related wiring requirements. NTRAK standards for wire gauge suffice.

**14. SCENERY** Any realistic scenery is permitted. Round down hills on the ends of modules so the view from an adjacent flat module looks like scenery. Colors for the fascia and skirts should blend with the scenery (generally shades of green or brown). Do not use diorama dividers.

**15. SKYLINE** Skyboards or vertical scenery flats are optional. In many

cases photography is easier if the skyboard is removable.

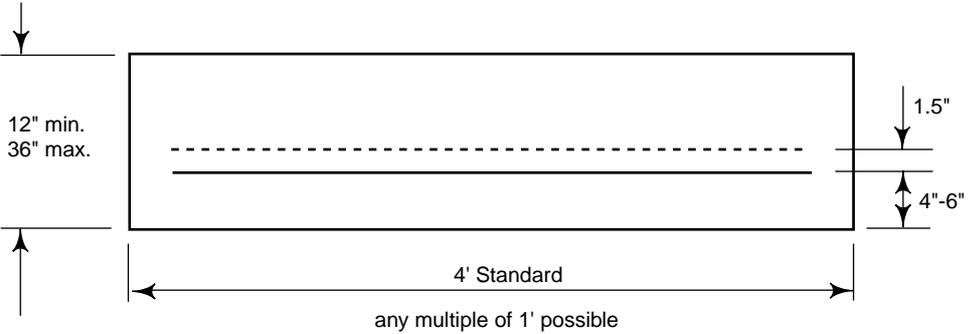
**16. PASSING SIDINGS** To enhance operations most layouts should include several passing sidings. Clubs should try to include one or more standard passing sidings in a layout. A standard passing siding is a set of two 1 by 4 feet modules with turnouts at each end of the pair and double track connecting the turnouts. The resulting passing siding is about seven feet long. Double or triple track modules can be used to extend these sidings.

**17. OFFSET MODULES** provide track offsets in one-foot increments for visual variety. Observe 18-inch minimum radius and tangent track between reverse curves standards.

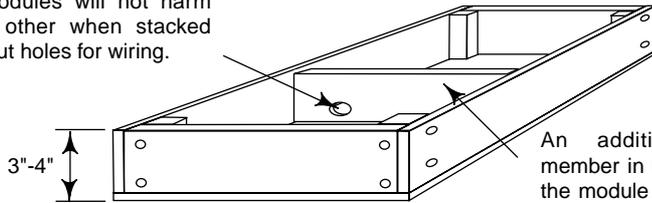
**18. OPERATIONS SCHEME** Although a stated purpose of oNeTRAK is to provide a venue for more prototypical operations, no operational scheme is specified. Clubs and individuals can tailor the operating scheme to their situation. To increase potential for realistic operation, wireless DCC is recommended.

**19. LAYOUT DESIGN** oNeTRAK modules have proven very flexible in layout design both as part of an NTRAK layout or when standing alone. Note that NTRAK modules can be used in a 1T layout.

The basic module construction follows NTRAK specifications. Every module is to have four legs and be free standing to simplify setup and teardown. Modules can have a 1" layer of Styrofoam as deck sheet. Special care must be taken for the module to remain sufficiently stable. It's a good idea to have a sheet of luan plywood on the underside to prevent "punching through" while handling the module. Remember that when modules are clamped together that small gaps usually are filled by "scrunching" sets of modules together.



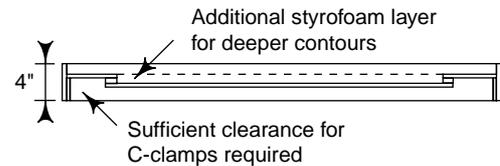
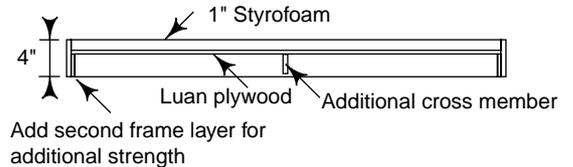
Make the cross member slightly smaller than frame so modules will not harm each other when stacked and cut holes for wiring.



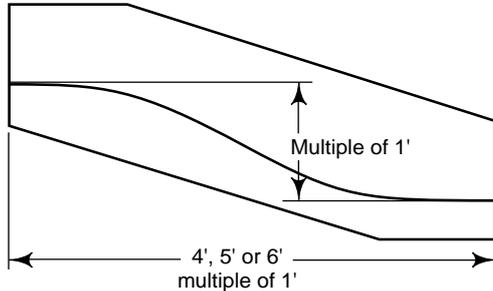
Conventional NTRK Frame Construction  
(as seen from below)

An additional cross member in the middle of the module adds a lot of strength and stiffness, without adding a lot of weight.

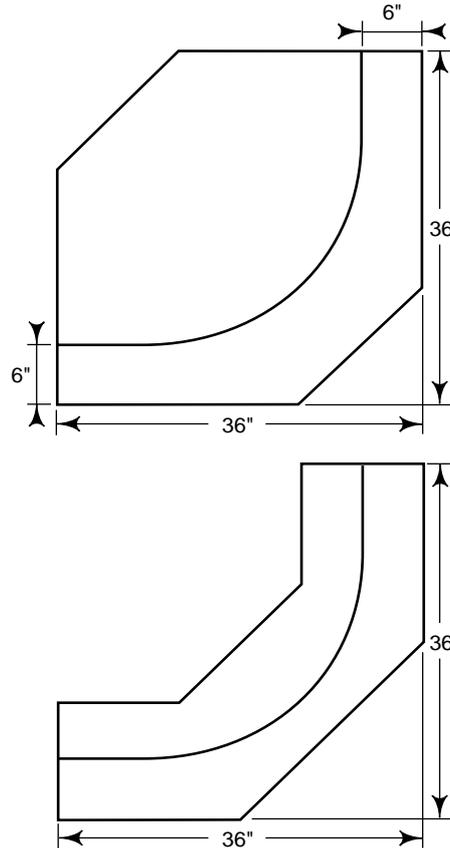
Lightweight Frame Construction



Offset modules add variety to the look of a layout. They will not cause operational rough spots if the minimum radius, easements, and a minimum distance between curves are considered and followed while doing the trackwork.



When a oNeTRAK layout is designed to close a loop special care must be taken to stay with the one-foot grid while building modules. This is especially true with odd shaped or junction modules. When there's no intention to close a loop in the near future, there might be one later... Corners might be used as inside or outside corners. While the dimensional problem can be simplified by sticking to the 6" grid, the electrical connection for both uses can be prepared by providing two connectors on each side, male and female. The polarity of the second set must be switched in order to be right when the module is used with the "wrong" side.



Corner modules may be built as 3'x3' or 4'x4'. Minimum radius must be kept and while bigger modules tend to be heavier and more difficult to transport, a curve with larger radius will always look better.

It is possible to cut out parts of the corner module in order to reduce its weight and space consumption. Special care then must be taken to leave enough strength and stiffness to prevent damage while clamping together the layout! A 4'x4' version of this design will need a stiffer frame, the reduction in size and weight is still remarkable compared with a conventional form (as seen above).

**Appoint a Digital “Master”** This person is fully responsible for all aspects of the digital design for the Show, and for setup and for digital operations during the Show. The Digital Master and his crew must be thoroughly familiar with DCC equipment, its problems and solutions for the layout size being planned.

**Plan the Digital Layout Design as Carefully as the Layout** Determine the number of Power Boosters, Radio/IR Receivers, Universal Panels and amount of LocoNet cable necessary to handle the configuration of the layout and the operations planned for the Show. Know who is supplying what equipment (if not Club-owned) and when it will be available during setup of the layout. Be sure to have a spare Command Station and Radio/IR Receiver.

If you run lighted cars (e.g. Kato passenger cars) be sure to include their current draw in any Booster current calculations.

Each booster will need its own isolated "block" and it's good practice to add a separate fast response circuit breaker so a short does not shut down the whole layout. The benefit is that you do not risk frying expensive rolling stock.

**Don't forget the coin test!** It's a good idea to think ahead of what happens when a short occurs! The first test after the modules and all wiring is in place must be the "coin test". Short between rails close to the power source (booster) and then on the most distant piece of track. This checks that the wiring and connections in each section are

adequate 1) to maintain sufficient voltage so that train control is not lost and 2) to allow the breaker to trip should there be a heavy short, preventing damage to N gauge equipment. If the coin test fails to trip the breaker, a separate jumper cable may be added parallel to the red wire along the modules. Rerun the coin test until successfully completed.

**Reversing Loops and Wyes Have Special Requirements** On NTRAK layouts where there are no reversing loops or wyes, a single LocoNet will generally work fine, handling everything. When reversing loops and/or wyes are present separate LocoNets are mandatory. Further, there must be a ground wire (12 gauge preferred, 14 gauge minimum) between the ground terminals on all Power Boosters including the Command Station, and this ground wire should be connected to the power line ground at one point only. If the ground wiring is insufficient, unpredictable effects are likely to show up.

**Review Electrical Characteristics of All Modules in the Layout** This is extremely important, especially for modules that have not been in a Show with digital operations. Even though the owner may state categorically that he followed the NTRAK rules for wiring modules, this may not be sufficient to ensure trouble free digital operation - what works fine with DC will sometimes not work well with DCC.

**Use Power Supplies Matched to the Power Boosters** Do not use standard DC power packs of any type to supply Power Boosters. Always ensure the power supply is capable of producing at least

the rated power output of the Power Booster it is supplying.

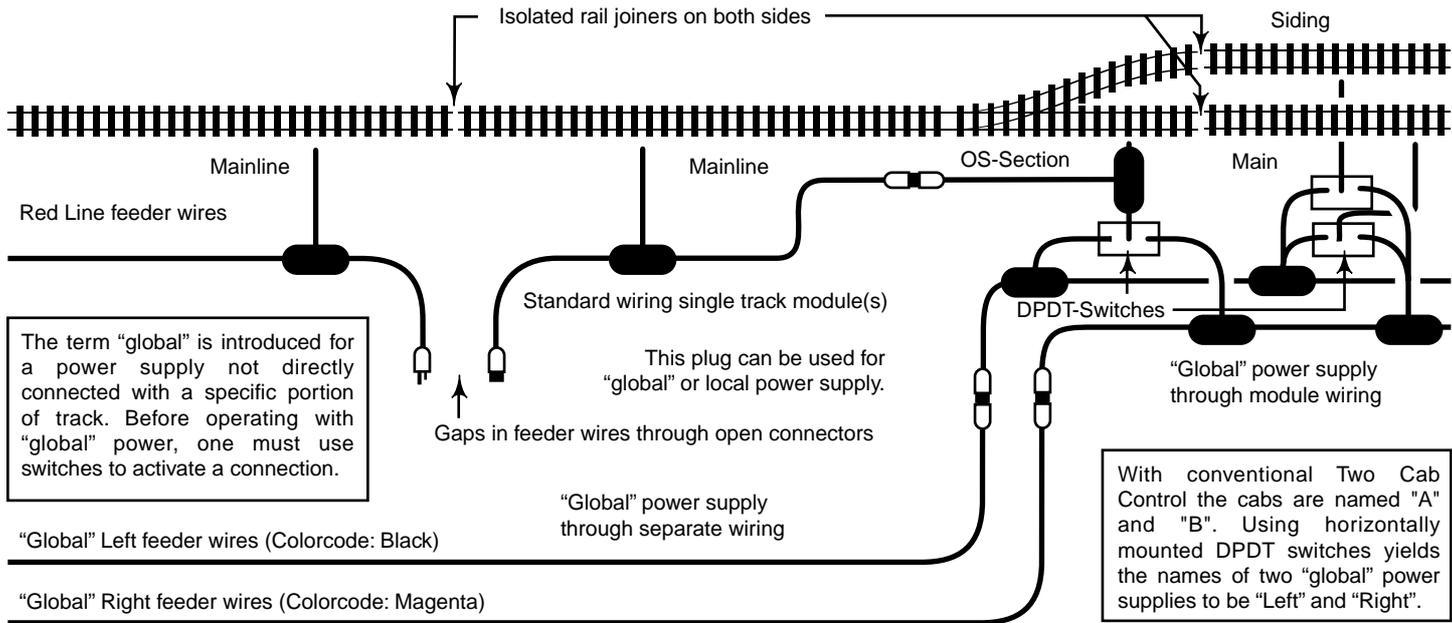
**Only One Command Station Can Command** Be sure there is only one Command Station controlling the entire layout. Any other Command Station/ Power Boosters used on the layout must be set to Booster-only mode. When the layout is REALLY big, the whole layout must be separated into two or more layouts linked with interchange blocks.

It is good operating practice when a locomotive or locomotive consist is removed from the layout to also remove it from the DCC system - break down the consist to its individual locomotives and dispatch each locomotive from the system. This frees up slot memory for additional new locomotives.

**Stress Test the Layout Following Setup** Always test everything before beginning normal operations. Run as many single locomotives as possible over the layout simultaneously. Some problems can only be found with high traffic density.

**Provide a Means of Programming Locomotives** Always have some way to program locomotives. Someone may have just installed a decoder, or there may be a need to check the values of CVs in a decoder to diagnose a problem.

**Identify Ownership of All Digital Equipment** To ensure the equipment is returned to its rightful owner after the Show is over, all digital components and equipment should be labeled with the owner's name or some other well-known clearly identifiable marking. A return address label applied to the item is a simple and adequate means of identification.



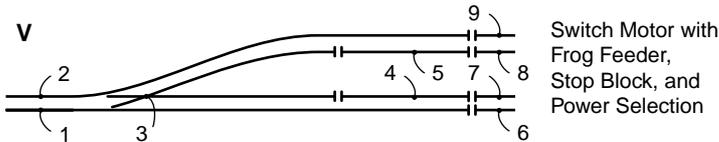
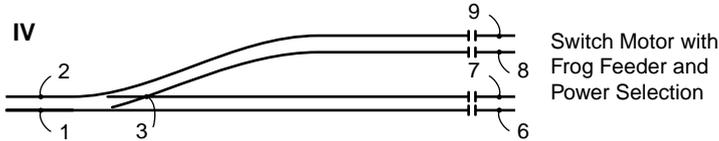
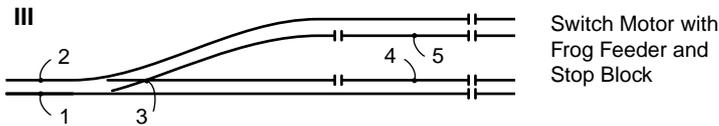
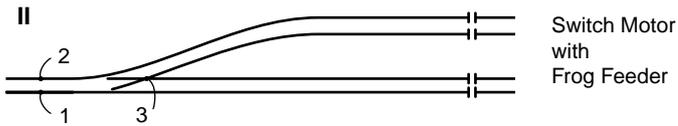
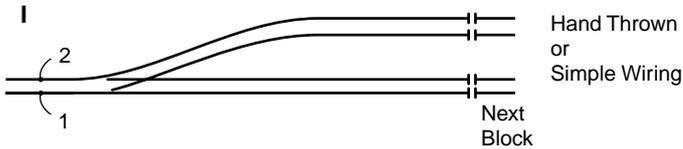
**Standard wiring** The most simple way to control a oNeTRAK layout is to have all tracks fed by the same throttle. This might be a good idea for small layouts. With a growing number of modules there will be a demand to run more than one train simultaneously.

Installing several independent blocks, each having its own throttle, will allow multiple train operation. But trains bypassing each other at sidings will cause major headaches for the operators and running trains by time table will not work well.

**Two Cab Control** The sketch on this page shows how two power feeders running through a whole part of the layout can be used to allow usage of the same throttle while passing other trains. By using radio controlled throttles for left and right "global", an engineer will be able to walk along his train and give himself

control for specific parts of the layout by throwing the DPDT switches accordingly. The DPDT switches can, but do not have to be, integrated into the wiring of single track modules. It's recommended to provide for this wiring while building modules with sidings and yards.

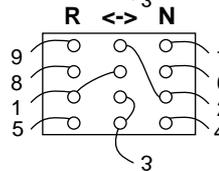
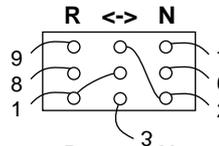
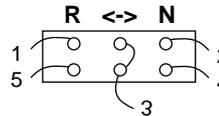
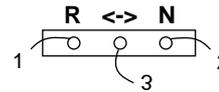
## WIRING TYPES



1 and 2 are the feeder wires for this portion of track unless otherwise stated.

All switches are solid or electrofrog type.

N is the straight position of the switch and the middle contacts are connected with the ones on the right. R is the reverse or turnout position of the switch and the left and middle contacts are connected.



For any discussion about junction, siding or yard wiring it might be useful to get some sort of common wiring schemes for individual switches. Any type is used with Electrofrog Turnouts with power routing through the switch tongue. Type I is the standard case with hand thrown turnouts; Type II - V are most likely used with switch motors. The switch contacts will require a fixed mechanical connection with the turnout tongue or unpredictable results will occur (spelled short circuit).

## WHAT TYPE TO USE

This part is not to be understood as a MUST USE but rather as a help to decide which type best suits your demand. More complicated schemes will later help simplify the use of your module during operation.

The stop block will help during more automatic operations to stop trains more safely (as with scheme I), as there cannot be a short when approaching a closed turnout. Schemes III and V are mainly for reverse loop or wye wiring. Special care must be taken that under no circumstances do two power supplies feed the same portion of track (or any portion of track or wiring in between), or the 'weaker' supply might fry!

## BASIC IDEA

A oNeTRAK Mainline diverging from the Red Line of a standard modules division is basically done with a standard Junction module and a three to one track transition module.

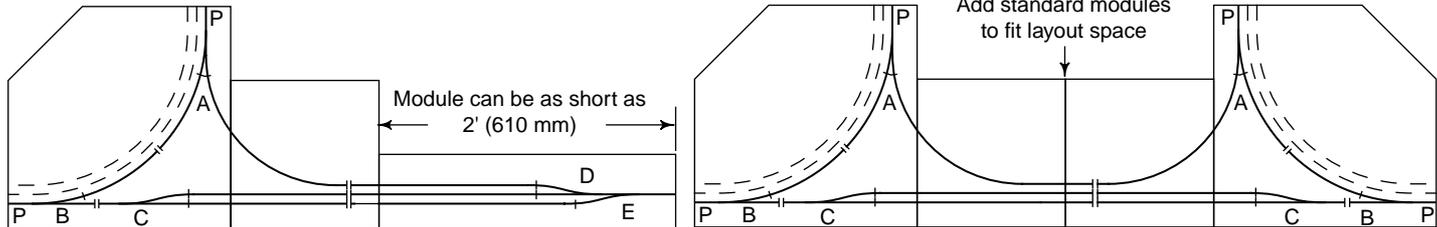
These Junction modules have been around for quite a while and have been mainly used to link two divisions' red line making up what Northern Virginia NTRAK called the "Red Line Route".

When an extension of a loop is desired either two junction modules can be used (as seen on the right), or a combination of a junction module with a special module like Gordonsville is needed (as seen on the track plan on page 14).

## OPERATIONS

A single direction loop style scheme will not require any manipulations during operations. Trains follow each other and are guided either by tower operators, by block indicators or over radio by a dispatcher. Turnouts and electrical routing are preset and need not be remotely controlled.

A more complex scheme permits individual routing of the trains and therefore the turnouts of the junction will be switched frequently. Remote control and automatic electric routing helps prevent mistakes and simplifies the work of the tower operator.



A double line is a block boundary and a single line separates a stop block. P indicates a connection with a power supply.

It is recommended to supply turnouts with the following wiring types:  
A, B: Type III if power supply at both ends, otherwise a V might be used  
C: Type III    D,E: Type V

## BASIC IDEA

The main idea of the junction shown is to have the oNeTRAK subdivision directly connected with the blue line. Usually the blue line has most of the industries and sidings and can be put to good use with the oNeTRAK switching operations. A crossover over the main lines permits branch line operation with minimal interference of the main line activity on those modules.

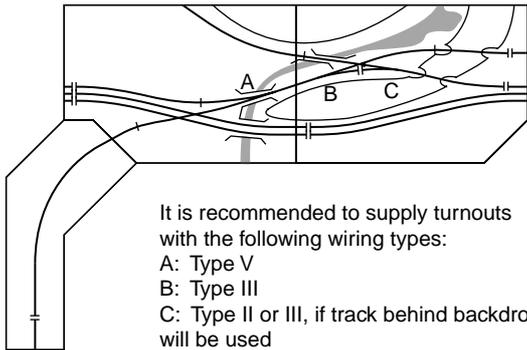
A scheme then can be set up to provide true car forwarding and time table and train order operations on the branch line while leaving the main lines to those that prefer a less strict regime of letting long trains loop for viewing pleasure.

## ELECTRICAL ISSUES

The crossing between the main lines and the diverging branch lines requires an interlocking mechanism to prevent collisions. One solution is to allow switching off a portion of all tracks leading to the junction. This is easily done on the module itself and it would be a good idea to increase the security distance on the left side by having the first module to the left included in the stop block as well. A tower operator will then ensure the crash-free passage of the trains by aligning the turnouts, cutting off power at conflicting tracks, and communicating with the train engineers.

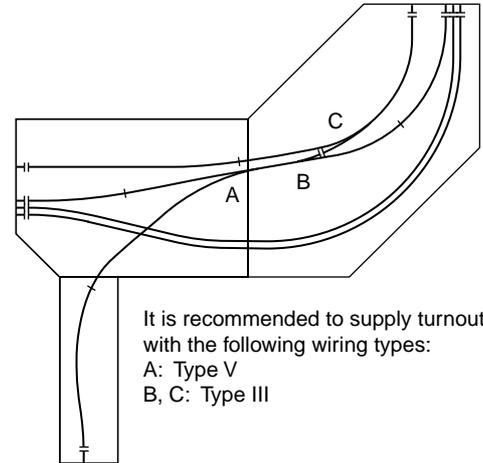
A good place for the tower operator is at the back of the module overlooking all three approaching sides free of obstructions such as operators or visitors while being out of the way of passing operators. A tall chair with the required electrical switches and push buttons mounted on a panel within a comfortable reaching distance makes a perfect working environment. It is recommended to have the panel separate from the module for easier transportation and handling.

While it is possible to have the turnouts thrown by hand it is recommended to install switch motors with the wiring type indicated. Adding turnout position feedback would even allow a remote CTC-like control.



It is recommended to supply turnouts with the following wiring types:  
A: Type V  
B: Type III  
C: Type II or III, if track behind backdrop will be used

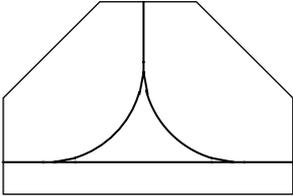
These two track plans use grade crossings over the main lines. While that has an impact on operation, it is far easier than building an overpass for the branch line.



It is recommended to supply turnouts with the following wiring types:  
A: Type V  
B, C: Type III

## GENERAL DESIGN

From the track planning point of view a junction module consists of two corner modules linked by a straight module. If the planning grid is kept, there is no problem closing several loops with junctions without scrunching any gap.



The minimum size of a junction is 3 by 5 feet. The minimum radius can be met and there's even space for curve easements.

As the wiring of a junction involves the reverse loop problem it is good practice to have all three approaching tracks on separate circuits. By throwing switches the current scheme of traffic then can be aligned.

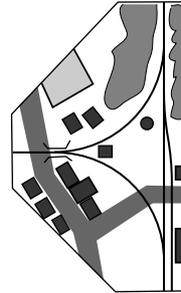
## GORDONSVILLE JUNCTION

Gordonsville Junction is the first oNeTRAK junction module and provides an example of how to adapt a prototype location to a modular layout system.

The prototype Gordonsville has been an important rail junction since the 1850s when the Orange and Alexandria made a connection there with the Virginia Central.

The prototype track plan at Gordonsville is relatively simple. The conventional wye has tracks heading north to Alexandria, south to Richmond and west to Charlottesville. Today, only one additional track, a siding along the north-south leg, still stands. A brick tower, no longer used, stands at the west end, and the center of the wye contains the abandoned C&O water tower which is used for storage by the city of Gordonsville. Gordonsville's main street cuts diagonally through the wye. The west leg passes over the street on a low girder bridge, allowing a view of 19th century business structures from the rails.

It took a few compromises to fit the track on a four-foot by 30-inch module. The west wye switch sits on the wrong side of the highway overpass, and the remaining siding to the outside of the wye. The track is isolated electrically into seven blocks which are connected together to suit the layout configuration. In most cases, no reverse loop wiring is needed.



One of the features of the track plan is that the module can function in several different configurations: Junction (the usual mode); Corner; Straight; and Branch line connection.

Because we forced the wye into a four-foot length, the curved legs have an effective radius of two and a half feet. oNeTRAK modules are designed in even foot increments. This means that six inches needs to be made up somewhere when the module is part of a loop. We have managed so far by making temporary six-inch bridges out of Styrofoam and by building a 2.5-foot module to compensate.

To come out even, the module ought to be five feet by three feet, which is large for a oNeTRAK element. North Raleigh NTRAK has built some three track Junction modules in two sections, which could work for oNeTRAK as well. If the module were this size, in one or two sections, there would be room for a couple of industries. A run-around track would also help to make operations more interesting.

**1.** Try to get longer sidings for operating flexibility. A switching scheme can be made up with a 6' maximum train length, but longer sidings with industries spread around make operations more interesting and planning them more flexible.

**2.** Test out modules ahead of time. It's far too late to find a short circuit in your track work when the modules are to be clamped together at a Show! To be sure that all modules work flawlessly it's a good idea to have a test set up with all new or rebuilt modules. Don't forget to check all sidings and spurs.

**3.** The planning of an operating scheme needs as much preparation as the planning of the layout itself. Special care should be taken to meet the expectations of the attending operators. An all-digital or all-analog layout is only a valid option if everybody agrees on doing so. The same applies to an all switching layout. The key idea for most cases is to have the layout split up into a digital and an analog district, and into portions with trains looping and others with local switchers at work.

**4.** When car switching operation is desired, car cards or switching lists need to be made up in advance. A car pool must be collected and it must be certain that selected cars show up. For smaller schemes it is a good idea that the one preparing the switching operation uses his own cars exclusively.

**5.** Prototypical operation needs a vast number of people! One single engineer per train is fine when the scheme is very simple and the engineer has some experience. When cars are to be switched a conductor is imperative. When the chosen switching scheme is new to the majority of the attendees, a three man crew will solve most problems. Staff planning is vital for a successful operating session. Five trains with a two man crew makes ten people. Add a dispatcher and a superintendent and you will need a dozen operators to fill the callboard for one session.

**6.** Name everything! As with the prototype every location with relevance to operation needs a specific name, preferably being unique throughout the layout. If industries are to be served they need names too.

**7.** Make sure that you have a system to identify the owner of all rolling stock. An easy solution is to color code the kingpin of the cars and the underside of the locomotives. Each member is assigned a unique color (or combination of two colors for larger clubs). The club keeps track of the colors already taken.

**8.** Clean the Track and Clean the Wheels. This is good practice whether DC or DCC. The important message in this rule is to be sure that the track has dried from any liquid track cleaner (such as Goo Gone or 409) and that any residue has been removed. If trains are run while the track is still wet, then the train will spread any dirt that is coming off wheels or the residue of the cleaner all over the layout. Then you have a real problem. There are two ways to clean the track - use two Centerline cars with a wet cloth on the front roller and a dry cloth on the rear roller, or wipe the track with a wet rag or Q-tip then follow up with a dry rag. Clean wheel sets with a paper towel laid on a track and wetted with Goo Gone or 409. Roll the car back and forth and the gunk will come off. For locomotives, do one truck at a time on the towel with power applied so the wheels are turning.

# A Gallery of oNeTRAK Modules and Ideas



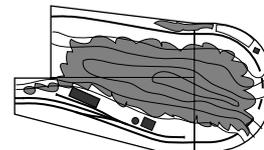
## Moose Lake, Saskatchewan, CA

Bernard Kempinski's 14 feet long by 18 Inches wide provides room for a long Passing Siding.



## Gordonsville, VA

John Drye's Junction Module.



## Monica, WV

Brian Brendel's End Turn Module Set Central Ridge Acts as a View Block. Also used as part of a home layout.



## Wingate, IN

NTRAK version of a track plan published in MRP 1995.



## Rickey Tick Junction

Mike Langford's module based on a location on the Soo Line Northern Division



## Wilmore, KY

Mark Franke's Small Town Module.



## CP321, VA

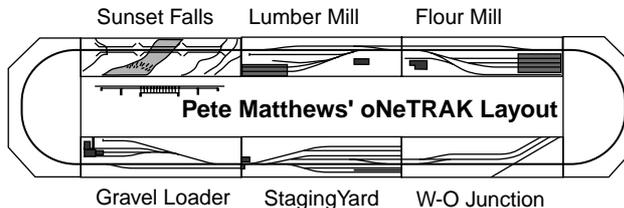
Dave Davies' oNeTRAK-to-NTRAK Adapter Module used as a lead to a NTRAK yard.



## Baxter's Farm, GA

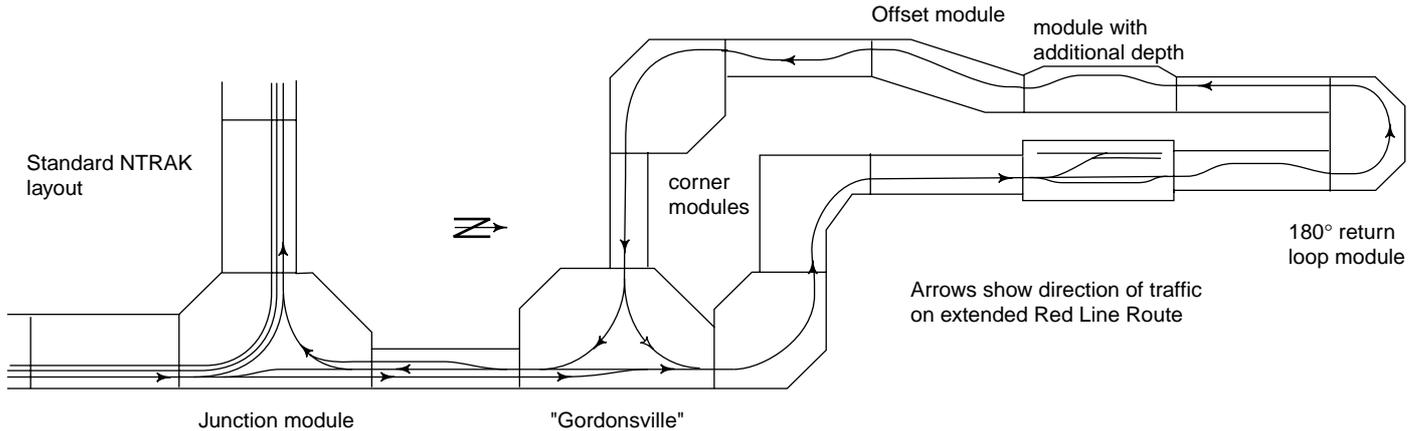
Bill Baxter's NTRAK-to-oNeTRAK Adapter Module features four crossovers

Sarah's End Turn  
(Future Alaska Scene)



Susan's End Turn  
(Future Town)

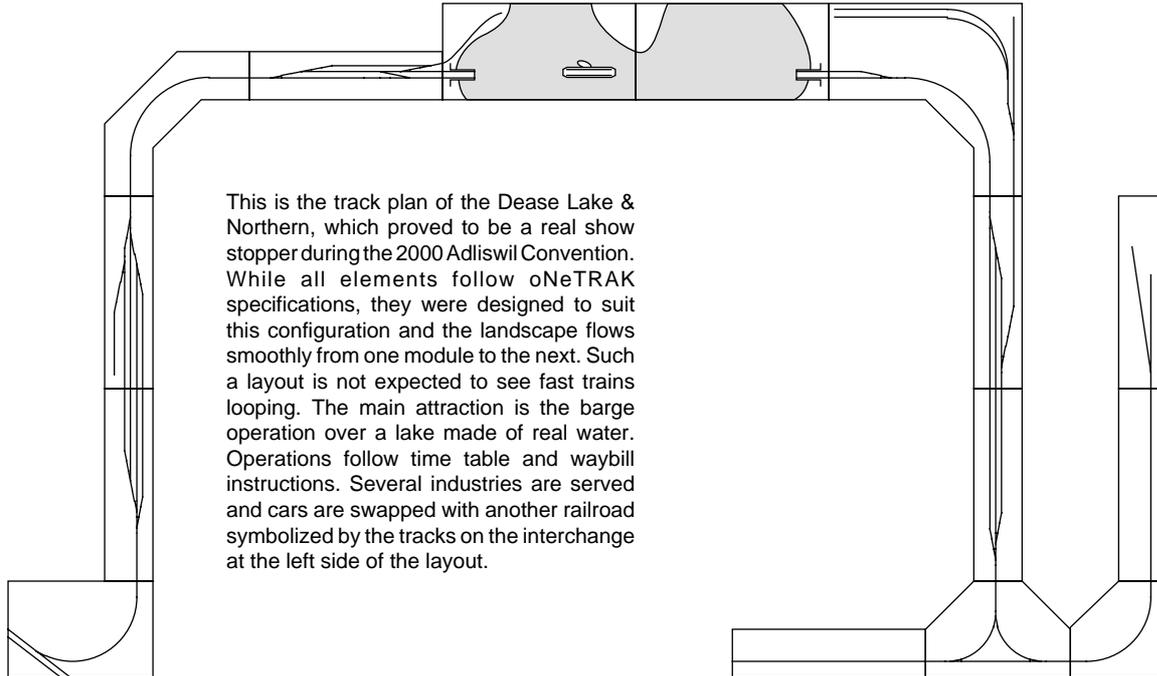
## oNeTRAK part of the Orlando '98 Convention layout



This was the first appearance of oNeTRAK in large scale. The operating scheme extends the Red Line Route through this part of the layout. The Junction module (Gordonsville) permits both legs of the Route to pass through. Trains enter Gordonsville from the south on the right-hand track. They pass through a turnout and head north on single track. The engineer loops round oNeTRAK's main and reenters Gordonsville from the west. The train takes the right hand leg of the wye and continues off the module back to the

south, this time on the second track. The straight leg of the wye (at the front of the module) is never used, so there is no reversing loop. An empty boxcar is usually parked on this leg, awaiting interchange and preventing operators from using the track. Trains that remain on the oNeTRAK loop during local operations can use the third leg of the wye.

## oNeTRAK layout at Adliswil 2000 Convention



## CONNECTIONS TO OTHER SINGLE TRACKED STANDARDS

While oNeTRAK has proven to be a popular standard for single track modules, it is not the only standard. This page shows the differences and similarities among several standards to aid in tailoring various standards to a particular situation. Some standards, such as oNeCat, follow U.S. prototype. Others follow European prototype and are popular in Europe. There are even proposed standards for narrow gauge modules, but they have been omitted because of obvious problems connecting narrow gauge with standard gauge trackwork. There are several more standard descriptions published over the last few years but have not been included in the list as they either are no longer alive or are used by very few individuals only. If the authors of this manual did forget one of the rising stars, please give us a note!

### ONECAT

The origin for these modules comes from NCat or those NTRAK modules that feature traction track along with the original three tracks. You will find a narrow minimum radius of 6" and steep grades of up to 4% as well as Catenary all along the tracks (hence the name...). Both the manual and sketches for interface-modules are to be published soon on the Internet.

## FREMO

FREMO is a group which is mainly based in Germany with some activists in other European countries. There are standards for several scales and some of them (HO) are specialized for US prototype. A similar one for N scale has not yet been finalized. The main aim for FREMO is prototypical operation. There are no loop-style layouts. Modules therefore are relatively free in their form and only the end sides of a module are standardized.

### MAS 60

Another mainly European standard with an emphasis on geometry. Lengths are in multiples of 60 cm (~2') and the standard angle is 60°. Operations usually follow prototypical schemes but might be loop style on occasion. Module geometry is more strict than with FREMO but "multiple-segment-modules" are possible. The main theme follows European prototype, and standards are written for several scales. Currently, there are HO and N scale groups.

## ADDRESSES

oNeCat:

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FREMO:

[www.fremo.org](http://www.fremo.org)  
[www.free-mo.org](http://www.free-mo.org)

MAS 60:

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### DISTRIBUTION OF THE ONETRAK MANUAL

The current On-Line version of this manual will be found at:

[www.ntrak.org](http://www.ntrak.org)  
[www.ntrak.ch](http://www.ntrak.ch)  
[www.nvnttrak.org](http://www.nvnttrak.org)

A metric version of the oNeTRAK specifications for Australian conditions can be found at:  
[homepages.pickknowl.com.au/austnscale](http://homepages.pickknowl.com.au/austnscale)