INDEX

In 1973 a group of enthusiastic model railroaders got together at an N scale meet in Signal Hill, California, and talked about what they could do to help interest and educate people in N scale. NTRAK is a project that resulted from that meeting.

Originally NTRAK was thought of as just a modular display layout. Modelers from all over the country could build a module, bring it to a show and connect it to the next module and become part of a giant N scale layout. To be sure that each module would fit the next one to it, a set of standards was worked out. This manual is the result of experience gained from building over 300 modules for several NMRA National Convention layouts and many regional and local layouts.

Over 30 clubs around the world are now using the modules for all or part of their club layouts. Some have semi-permanent quarters and others assemble the layout in space rented or borrowed for just that meeting. With careful attention to detail, quick assembly and reliable operation can be achieved. Some of their successful ideas are shown in this manual.

NTRAK is an informal organization run by volunteers and amateurs. Our purpose and objective is to encourage model railroading in N scale. Besides this manual, we keep in touch with N scalers with a Newsletter and help coordinate NTRAK layouts for public showings. The Newsletter is $5/yr.(six issues).

NTRAK layouts combine the beautifully detailed modules with long trains running on the two main tracks. A third track, the branch line, is used for picking up and setting out cars at the many industries along the way. You can be part of this scene by building a module. The length of the module you build will be part of the early planning. The 4' modules fit inside most cars and allow enough room for industrial and city scenes. The 6' modules will fit in most station wagons and are large enough to model many scenes. The big problem with the 8' modules is transporting them. They should be protected from the wind and rain. This means a van or covered trailer. Several modules can be combined to model a complex scene.

Since the modules are moved about, construction is a bit different from home layouts. This manual gives many ideas, but in general remember that there will be great changes in humidity and temperature, as well as vibration. Glues that stay a little flexible and screws are best. Weight is a problem too, so consider plastic foam mountains instead of plaster. Structures should either be well glued in place or packed separately. The key to good operation is good trackwork. One bad piece of mainline will ruin operations for everyone. The Meet Coordinator may order repairs or the module removed from the layout. Check your turnouts for gauge and that the flangeways are clear of ballast.

For more copies of the manual, Newsletter subscriptions or answers to questions, please contact:

Jim FitsGerald
NTRAK Engineering
2424 Alturas Rd.
Atascadero, CA 93422
(805) 466-1758, day & evenings

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NTRAK modules in other countries often use different electrical and size standards to suit local conditions. Check with your coordinator.

Ray Hamilton	Tom Cornelissen	Jim Costello	Kevin Sarney
264 Micklefield Rd	Dorpstraat 48	Box 155 Beaudesert	Box 43100
High Wycombe, Bucks	6365 BE Schinnen	Queensland	Wainuiomata
England HP13 7HT	Netherlands	Australia 4285	New Zealand

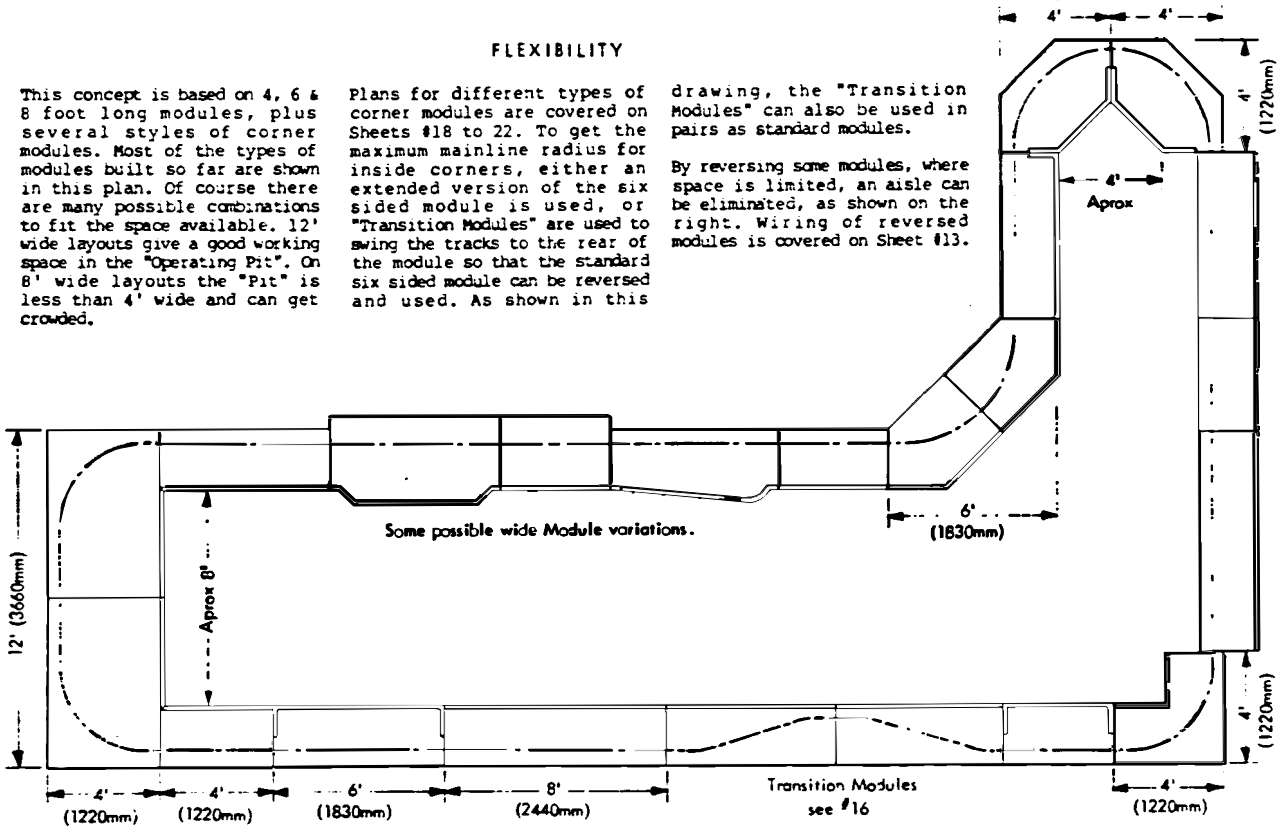
INTRODUCTION TO NTRAK

FLEXIBILITY

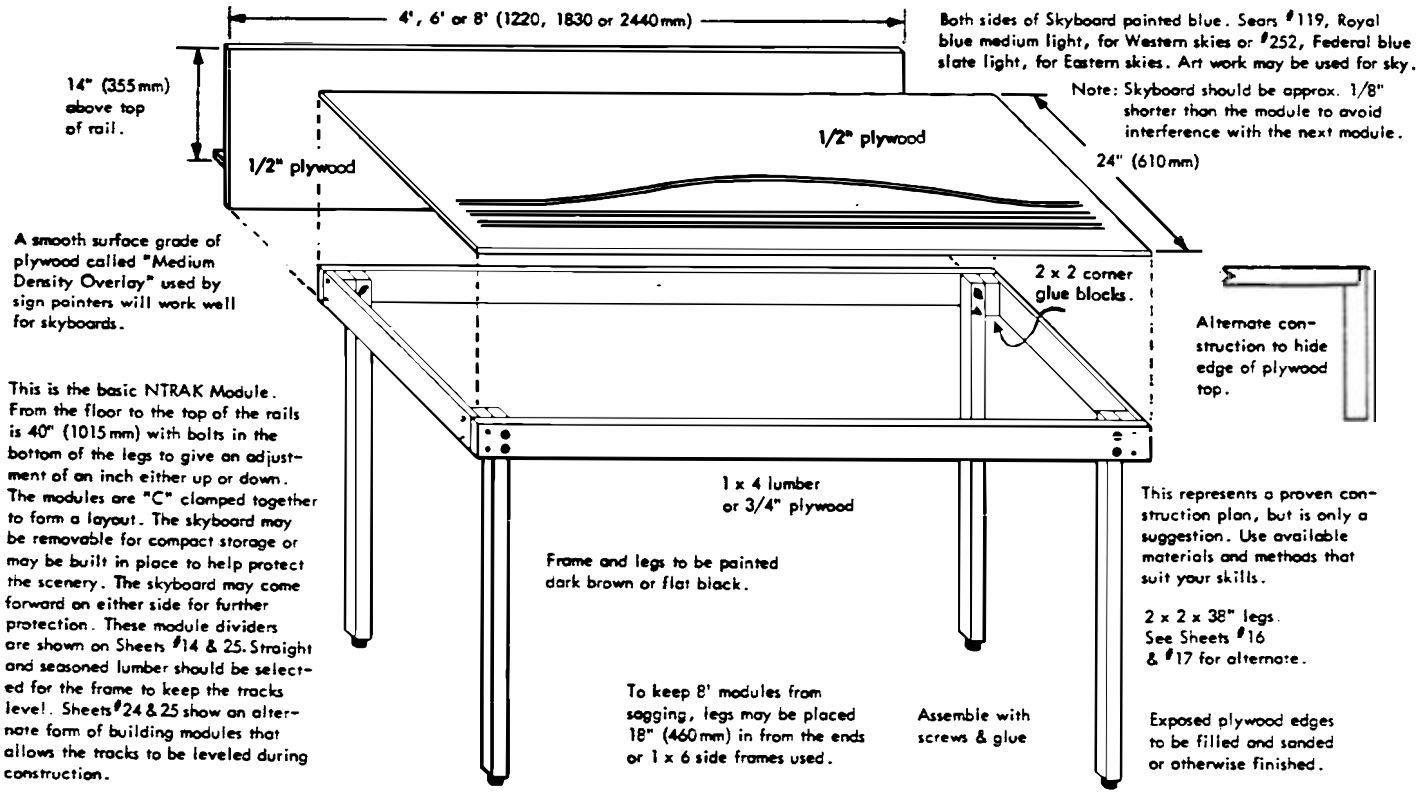
This concept is based on 4, 6 & 8 foot long modules, plus several styles of corner modules. Most of the types of modules built so far are shown in this plan. Of course there are many possible combinations to fit the space available. 12' wide layouts give a good working space in the "Operating Pit". On 8' wide layouts the "Pit" is less than 4' wide and can get crowded.

Plans for different types of corner modules are covered on Sheets #18 to 22. To get the maximum mainline radius for inside corners, either an extended version of the six sided module is used, or "Transition Modules" are used to swing the tracks to the rear of the module so that the standard six sided module can be reversed and used. As shown in this drawing, the "Transition Modules" can also be used in pairs as standard modules.

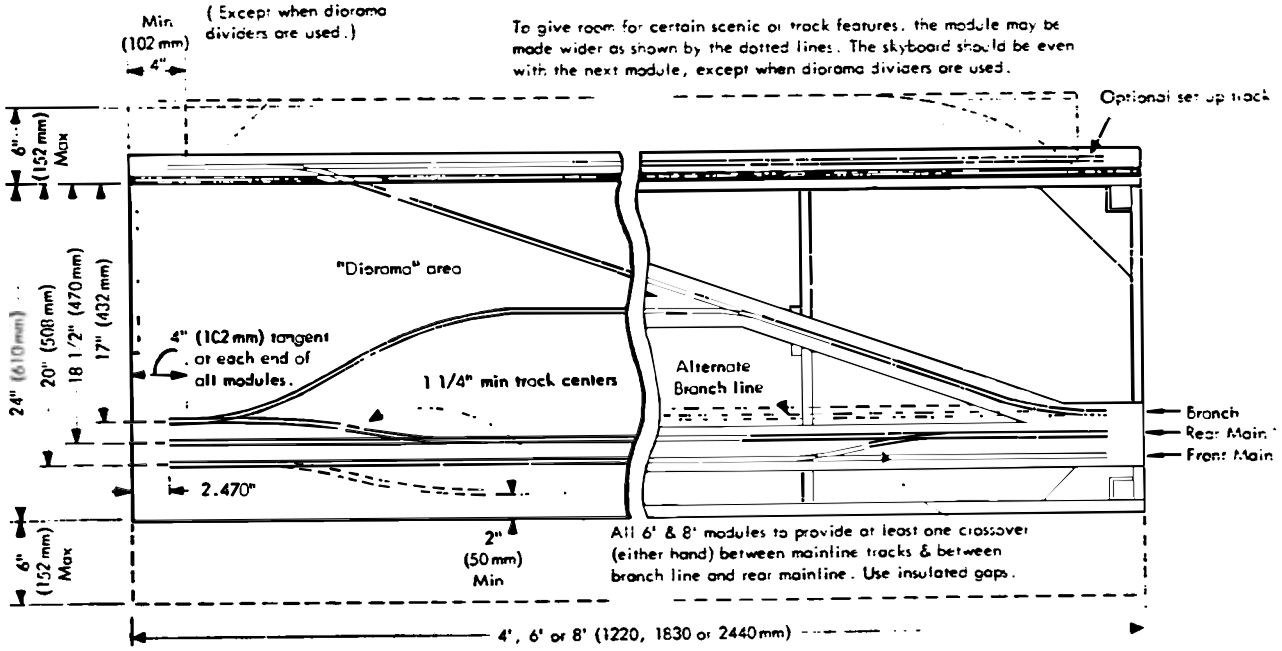
By reversing some modules, where space is limited, an aisle can be eliminated, as shown on the right. Wiring of reversed modules is covered on Sheet #13.



MODULAR LAYOUT IDEAS



BASIC NTRAK MODULE

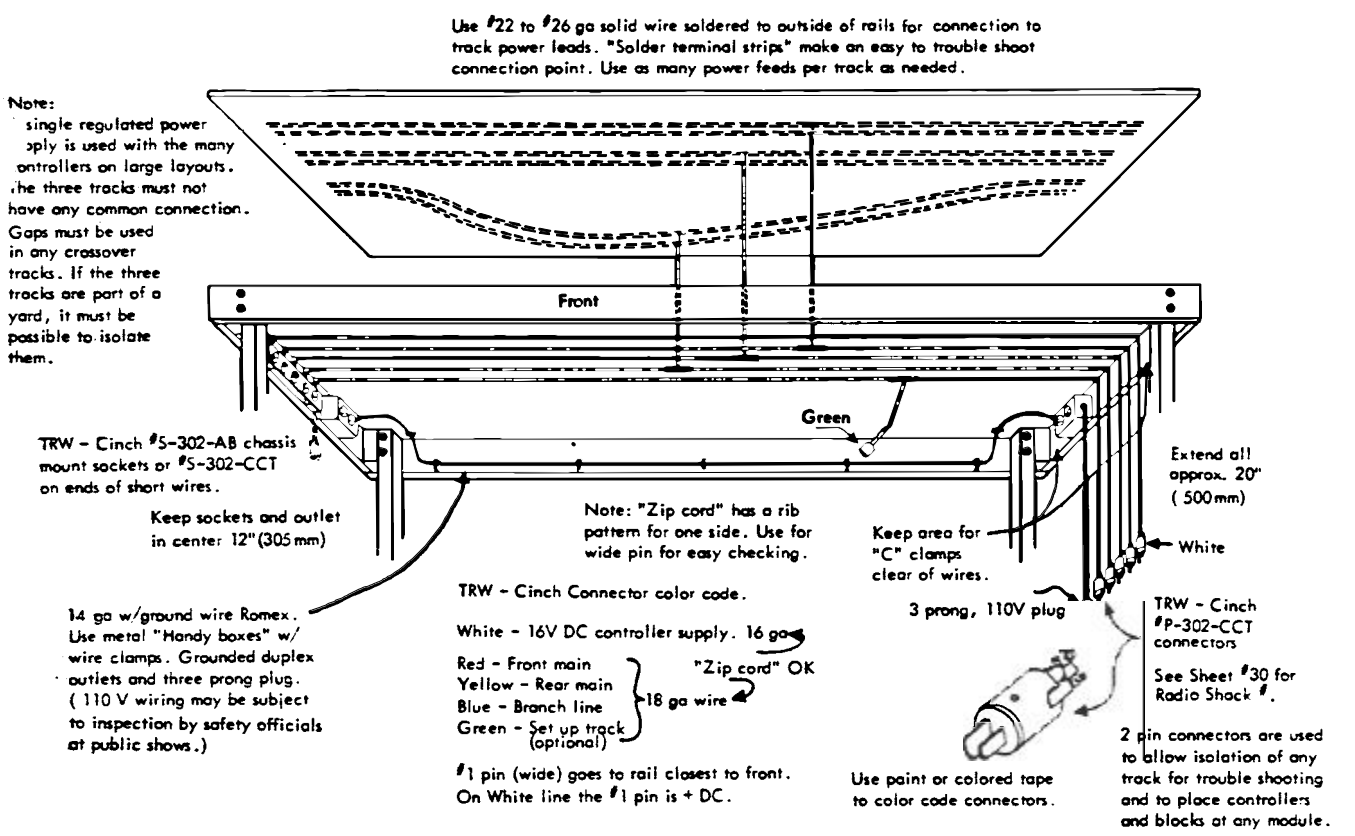


Mainline tracks should be code 70 to 80 rail (such as Peco or Atlas flex track). Crossovers may use Shinohara #6 or Peco #SL-388X (389X) turnouts. The mainline tracks should be the straight side of the turnout. Mainline tracks, 30" min radius, no grades; tunnels are discouraged, but if used should have easy access for clearing derailments. Hi-Cube & Tri level cars should clear.

Branchline tracks may be code 55, but the last few inches at the interface should match the Atlas sections used for connecting tracks, (See Sheet 15) 18" min radius, 1.5% grade (3/16"/ft), Hi-Cube & Tri level cars should clear. #6 turnouts.

Diorama tracks, no min rail size, radius or grade. May be restricted to certain types of cars or engines. Steel rail (Rapido) is discouraged, not permitted on main or branch.

INTERFACE DIMENSIONS



NTRAK MODULE WIRING EXPLAINED

There are several questions that are often asked about NTRAK wiring.
Why 2 pin connectors?
How are the throttles connected?
Why the white color coded wire?
Why not use "common rail" wiring?

We used 6 pin connectors for our first modules and had a lot of trouble finding shorts and reversed wiring. With the 2 pin connectors it is very easy to isolate the offending track. It is also simple to add the throttles in at any point on the layout where the operators vision is best. Block boundries and throttles can be at different points around the layout with the individual 2 pin connectors. For any special units, multi-pin or terminal strips would work just as well. Then use 2 pin connectors on pig-tails to make them compatable with NTRAK modules at a meet. Several overseas groups use RCA phono connectors. These are less expensive but not as rugged as the Cinch connectors. The Cinch type connectors are available from Radio Shack and electronic supply stores in larger cities that TV repair and amateur radio people buy from.

Why the white color coded wire? It has Cinch-Jones connectors at each end, is heavier (#16) gauge wire and doesn't connect to anything. Why is it there?

Let's start the way we did with our first NTRAK layout. It was only 8'x 24' and we used a single power pack for each of the three tracks. Since *each* oval had its own power pack, we were able to run a train on each oval independently of the others. This worked just fine. Adding a second train to one of the ovals would have meant that it had to run at exactly the same speed for any throttle setting. That is not too likely. We had some extra power packs along, so we divided one of the mainlines into four blocks by putting insulated joiners in four places and not connecting the wiring between those modules. Now a second train was added to the same loop, but running in a different block. A different setting was used for it. This way we could keep the proper spacing between the trains. All worked fine except that when an engine went from one block to the next there would be a brief speed up as it drew power from two packs at once. This is a bad feature of a normal power pack. They use a big variable resistor to turn the excess power into heat. It works fine running one train on one loop. The voltage it puts out depends on the current (amps) that are being drawn. The problem is even worse when we, as we often do, run trains with several powered engines. Now, as the train crosses from one power pack to the next, the new block will first have just one engine, then two and then three. At the same time the old block will go from three engines to two, and then to just one. Since one engine draws far less current than three, the voltage will be higher and the trains will speed up. This not only looks bad but can cause uncoupling and derailments.

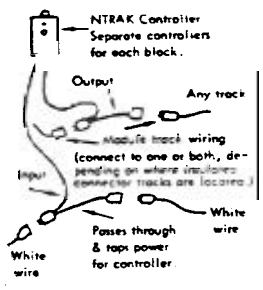
We now use transistorized throttles. At a 50% setting they put out half the voltage going into them, despite the current draw, within its normal limits. If the transistor throttle is combined with a constant voltage DC power supply, it will put out a constant 50% voltage, or whatever its setting. This is how we controlled trains on the second NTRAK layout, the big 12'x72' one at the 1974 San Diego convention. Each of the three tracks were divided into 6 blocks. We used 18 (3x6) transistorized throttles (controllers) all connected to a single, voltage regulated, DC source.

With this setup, and with the controllers at the same setting, even the multi-engine trains ran at a constant speed from one block to the next. This system has been very successful and we continue to use it today.

Now, back to the white coded wiring. It connects to the big DC supply and sends power all around the layout. At any module interface the white connection can be broken and the controller leads inserted. A "Y" arrangement is used that both taps off the power line and continues it on to the next module. A similar "Y" on the output side of the controller is now used to power a track. Because all the controllers are powered by a single source we can't use "common rail" wiring on the three NTRAK tracks. If common rail wiring were used, reversing direction on any of the controllers would connect positive to ground and cause a dead short.

You may not need the white coded wiring at home or for small layouts, but it <u>is needed</u> for our big layouts. It doesn't have to be permanent wiring. It can be just an "extension cord" with Cinch-Jones connectors, but it does have a vital function. One other comment. You should furnish your own DC source for switch machines, lights and operation on the rear tracks of your module. The power in the white line is reserved for the three common tracks. The amount of power available is limited and also we don't want to have the mainlines shut down because of problems with your accessories.

The "Y" Connection



SOME WIRING TIPS

Wiring seems to be a problem for some of the module builders. Here are a few points that we have had questions on.

The "zip cord" wire that we use for the track power is ordinary 18 gauge lamp cord (Radio Shack #278-864) that has a thin section between the two wires and can be "zipped" apart. The connectors are color coded with color tape or paint. The wire itself can be any color. One side of the covering has a rib molded all along and/or one of the conductors is silver colored. This will help you keep track of which wire goes to the wide pin and which to the narrow. It is suggested that you use the rib to identify the wide pin wire. The wire color coded "white" needs to be heavier (#16 gauge).

Radio Shack #274-692, 8 lug solder terminal strips make a convenient way to connect the track leads (#22 ga solid wire) to the zip cord.

When wiring the Cinch 2 pin connectors, the #18 gauge wire can be inserted through the hole in the connector solder lug and then, when all the loose ends are in place, melt rosin core solder onto the heated wire. This is one place to use a solder gun. The heavier #16 wire is difficult to work through the hole, so simply strip back about 1/4" of insulation and "tin" the wire well with solder so that all the wires turn silver. Hold the wire flat against the lug and flow some more solder on. The lug should get hot enough that you see the molten solder flow over the surface. Let it cool without moving the parts. A vise or a helper is useful for this part of the operation.

NOTE ! Be sure to slide the connector shell over the wire before soldering the wires to the connectors. You will have to unsolder the wires to get the shell on if you forget. You seldom forget more than once!

CHECKING MODULE WIRING

At the big meets we use a special tester to make a quick check of wiring before the module is placed in the layout. The tester has a rotary switch, a number of LED lamps, a battery, connectors for the three track wires and the white coded DC power wire, and rail contacts. The unit checks that the wide & narrow pins of the plugs match the wide & narrow pins of the sockets and that the proper rail is connected to each pin. It also shows if one or more rails are connected together. Plans for the tester are available from NTRAK Engineering.

This same test can be made with a multitester (VOM) set on "Rx1" (Resistance times one) and a test cord made by soldering an 8-1/2' length of 2 conductor wire to a male Cinch connector. Aligator clips soldered to the other end make it easier to use, if you don't have clips for your meter probes. Mark which wire goes to the wide pin. Start by plugging the test cord into the White socket and move to the plug end of the module. Touch the two VOM probes together. The meter should swing to zero Ohms. Adjust if needed. Now clip one probe to the wide pin test cord wire and touch the wide pin of the White plug with the other probe. The meter should swing close to zero. If it does and doesn't move when you touch the narrow pin, you are over the first big hurdle. If it moves only when you touch the narrow pin, then you have the wires reversed and you will have to change (at either end). If the meter moves when both pins are touched, then a strand of wire within one of the connectors may be touching the other wire.

Correct any problems and recheck. Now clip to the narrow pin and check as before. You now know that the white wire pins are OK. Next, with one probe clipped to the wide pin and the test wire still connected to the White socket, touch in turn all the pins of the other connectors (Red, Yellow, and Blue). You should get no reading. You have found that there is no connection between the White wire and any other wire.

Now plug the test cord into the Red socket and test the Red plug as above. If that checks OK, then touch the probe to the outside rail of the front track. The meter should go toward zero. You should get no reading as you touch, in turn, each other rail. Repeat, in turn, for the Red narrow pin, Yellow and Blue wide and narrow pins. Check the rails on either side of any turnouts and with the turnouts thrown first in one and then the other direction.

These tests will show if there is poor contact in a turnout or rail joiner, as well as connectors wired backwards or no rail gaps in crossovers.

If trouble develops during use in a layout, a track of the module may be isolated for checking by unplugging the connectors at each end AND removing the connecting tracks for that track. The other two tracks may continue to operate.

While there are certain basic requirements for all modules to be sure that they will connect to and work with the modules next to them in a big layout, there is lots of room for individual construction methods and design ideas. The NTRAK Manual shows some construction ideas that have worked well in the past, but the builder is free to use materials and methods that suit him. If you want to spot weld a module together out of sheet aluminum...fine...as long as it will work with other modules. Many use cork roadbed, but that is up to the builder. Handlaid track is fine, except on the NTRAK mainlines that are shared by everyone in the big layouts. Paint colors are suggested for the skyboard, but if you want to use hand painted backdrops or the commercially printed ones, that is OK. The height of the modules when used in an NTRAK layout is 40", but if you also want to fit a module into your home layout or club layout, there is no reason not to have a second set of legs of a different length to suit the other uses.

If you are thinking of modules for a club situation, the first consideration should be enough modules to form a complete oval. This will give you an operating layout and a portable display layout to help recruit new members. Beyond this, consider having a few modules with excellent scenery that can be used in Regional and National NTRAK meets. For the rest of the club layout you might want special yard modules as shown on the Module Idea sheet or specially designed modules that will interface with NTRAK at one end and then go into a sectional layout. The sections might only go together in one way, but could be taken apart easily if the club has to move...and they very often do. The experience of most clubs has been that once they get past the construction phase, they need a layout that is interesting to operate in order to hold the members. This can mean point to point and single track with passing sidings type of trackage. The "Mountain Division" track shown on sheet 25 can be useful for this, too. Don't be tied to thinking that the NTRAK mainline tracks have to be mainline tracks in a club or home layout. The NTRAK branchline can become the mainline and the other two tracks can be passing sidings, yard tracks or an interchange track to an imaginary railroad.

It all depends on the interests of the members. Some enjoy running long trains for hours at a time on the mainline tracks. For this, the NTRAK modules are very well suited. The branchline track and well designed module track plans can be combined to make an interesting operating layout as well. This may satisfy all the club members. Greater operating possibilities can be had by combining with special or sectional units as outlined above.

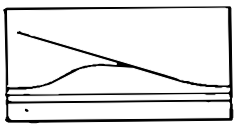
Quite a few variations of the "Mini Layout" concept have been built. One version is shown on sheet 22 of the manual. This one carries the two mainline tracks around to the back to a four track section that acts as a holding track for a second train for each mainline. These rear units could be expanded some and used as a yard for a club as well as in the display layout. Other Mini Layouts have been built with a loop at each end and no rear tracks. The two mainline tracks are connected at each end by the loops and a single train can be run... more if blocks and several controllers are used. The branchline can go into industries at either end or can loop back around and use the optional rear set-up track to complete the second loop. The radius of these loops is below regular NTRAK 30" radius for the mainlines. This will limit the length of trains that can be pulled, but does allow a small, operating, portable layout. By using low scenery and special racks, I am able to get a 3' x 20' mini layout inside my station wagon for set up at regional meets.

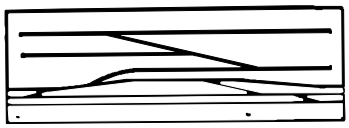
The Phoenix based Sun N Sand Club uses special modules and the Mountain Division tracks, which they originated, in a club layout that can also be part of a big NTRAK layout. They formed one end of the layout at the Denver NMRA Convention in 1977. For club's use they have a wall-in "U" shaped layout made up of two corner modules, a 4' module between them and special 6' modules with loops on each end. One set of loops ties the two mainlines together and the other lets the branchline climb around to meet the mountain division track. See the Mar./Apr '77 and July/Aug '77 NTRAK Newsletter for drawings and photos.

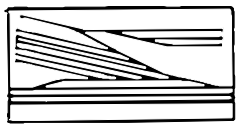
Shown on the next sheet are some track plans of modules that have been built in the past. While most 4' modules have quite simple track plans, it is possible to put a round house and turntable on a 4' module. The mainlines and branchline do not need to be just straight, or even follow the same path. Just remember that the mainline tracks have a min. radius of 30" and there should be no grade. For the branchline the min. radius is 18" and 1-1/2% grades are OK.

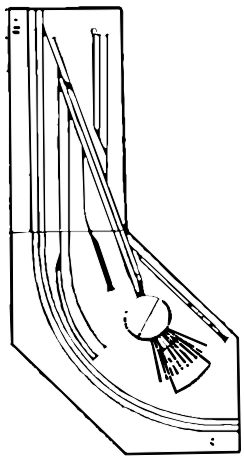
All of the track plans are shown with 24" deep modules, but an extra 6" may be added at the front and the rear of the module (See sheet 5 of the Manual). Keep in mind the need to reach over the skyboard to the mainline tracks to re-rail a car.

BASIC IDEAS





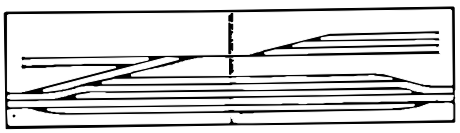


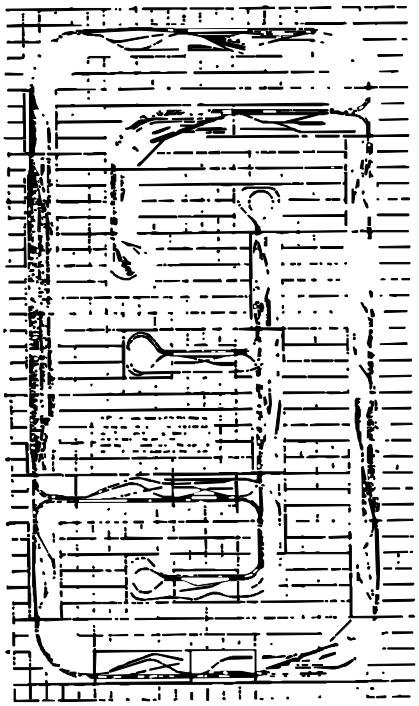


These track plans are among the over 60 plans shown in the Template Set. Plan S-9 shows the branchline swinging away from the mainlines and has a simple siding that leaves ample room for scenery on the four foot module. Plan S-7 on the other hand puts a maximum of track on a four foot module. Plan S-1 gives room for several industries and interesting switching problems on a six foot module.

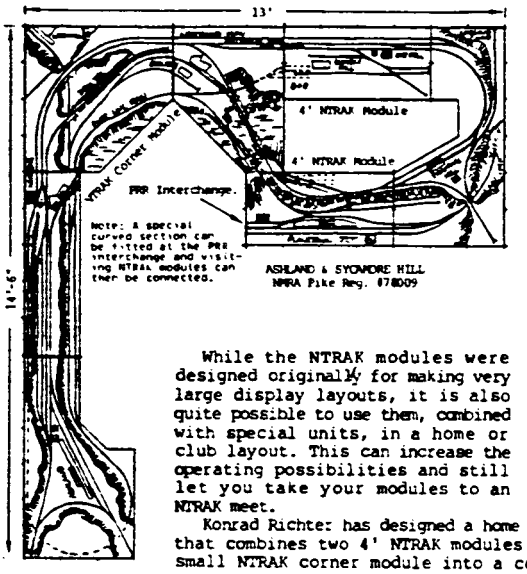
Two or more modules can be combined and always used together. A corner and a four foot module have been combined for a terminal facility. This makes an excellent end for a point to point home layout. Below are two modules combined for a through passenger terminal.

The big layout is 22'x41' is also made from the Template Set and would make an excellent club layout.





NTRAK MODULE IDEAS



While the NTRAK modules were designed originally for making very large display layouts, it is also quite possible to use them, combined with special units, in a home or club layout. This can increase the operating possibilities and still let you take your modules to an NTRAK meet.

Konrad Richter has designed a home layout that combines two 4' NTRAK modules and a small NTRAK corner module into a complex layout with excellent operating possibilities as well as continous running. All of the special units are small enough to make moving them an easy task in case, or I should say when, they have to be moved. It seems that we all make several moves as our fortunes and needs change over the years.

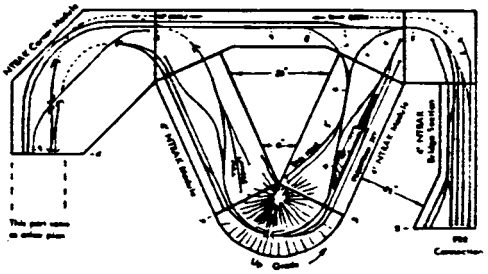
This portability can be especially useful for a club layout. So often a club's decision to stay in one spot is dictated by the thought of tearing apart the old "permanent" layout. The rent can soar and other better suited spots will be passed by, just because it is such a chore to move.

Konrad's "Ashland & Sycamore Hill" is a bridge route between the Pennsy and the B&O in the mid Atlantic states during the 1945-1955 time period. The layout features a "Y" and a hidden loop at each end of basically a "folded dogbone" design. The larger end features two additional loop routes and the hidden loop at that end is three tracks which can be used for hidden storage. Trains can layover there to increase the time involved between their arrival at the other terminal. There are spots for at least a dozen industries around the layout. Track diagrams for the two more or less independent routes are shown.

Planetown Junction is the interchange point with the Pennsy and a temporary curved unit is planned for this spot in the layout so that visiting NTRAK modules can be connected. The hidden three track loop is the interchange point with the B&O. That loop can be used as a reversing loop or can be by-pased for continous running on the outer tracks

Shown below is an alternate plan to fit the same space. It doesn't have the hidden layover tracks and B&O interchange point of the first layout. The two 4' modules are at different elevations in this plan.

These are just two examples of how NTRAK modules can be fitted into a home or club layout. Other plans are featured in the Newslettter from time to time, and we would like to feature your plan.



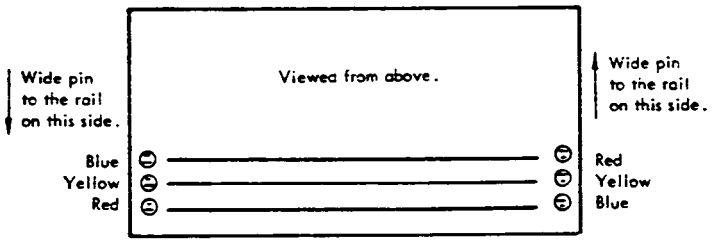
MODULAR LAYOUT IDEAS

Wiring of reversed modules.

Turning a module end for end is sometimes needed in a layout. Most often it is a corner module used to make an inside corner or with the regular Ncat modules. The wiring of these can be a problem. The normal outside track becomes the inside track, the male connectors are now on the wrong end and the wide pin of the connectors no longer goes to the outside rails.

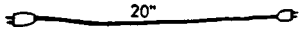
One builder solved this by having all his wires tied just in the center of the module and then routing the connectors to the appropriate ends. A multi contact switch was used to correct the polarity and colors.

Another system that eliminates the complex switch but adds more connectors is shown here. The wiring is simpler than above, but requires special jumper cords. The 115V AC can be taken care of with an extension cord (3 wire) and if the "white" 16V DC line is needed it too can be just an extension cord with a male connector at one end and a female at the other and wired wide pin to wide pin.

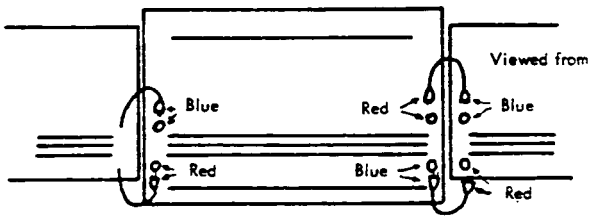


Use chassis mount sockets at both ends.

Make up 3 jumper cables with male connectors at both ends. Wire the wide pin at one end to the narrow at the other.



Color code one yellow at both ends. Color code the other two red at one end and blue at the other end.

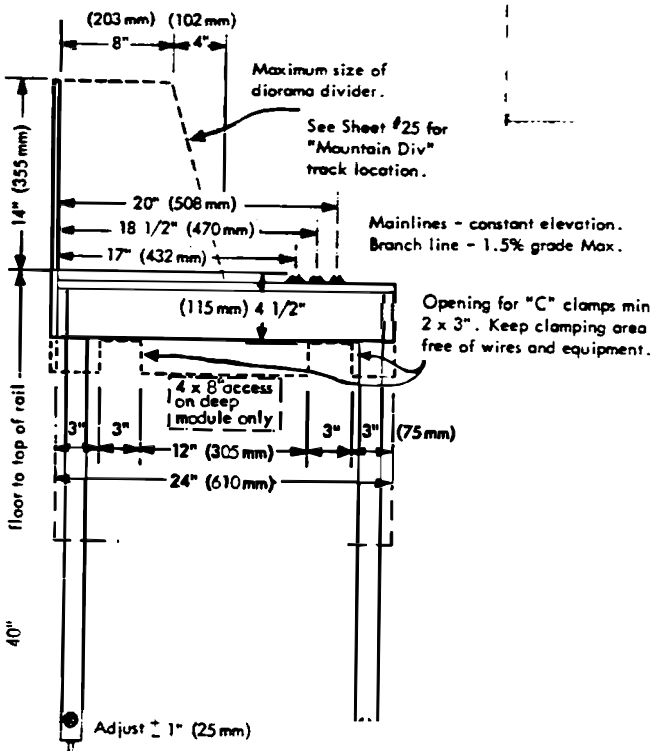


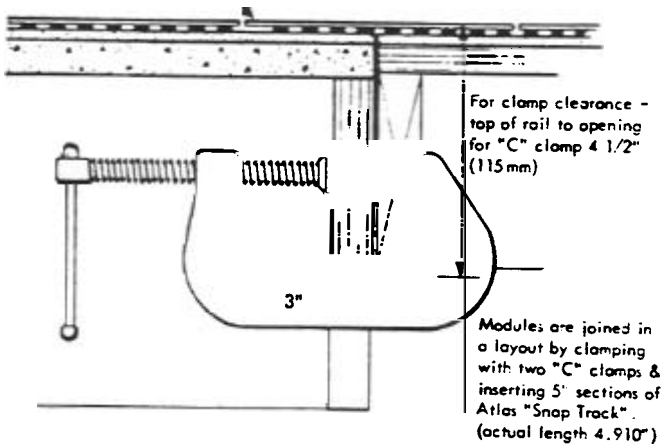
Reversed Ncat module used as a standard module.

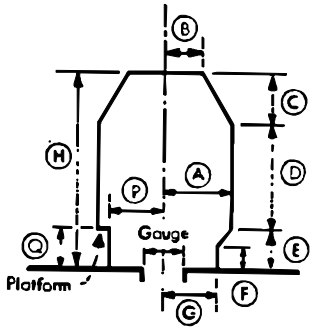
To connect the modules the Male connectors go to the same color sockets. The cross wired patch cords get the wide pin back in the proper order as well.

Yellow goes to yellow but isn't shown

SPECIAL ELECTRICAL





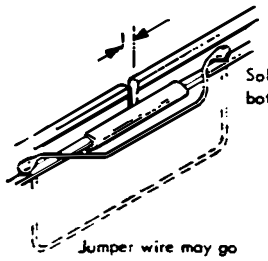


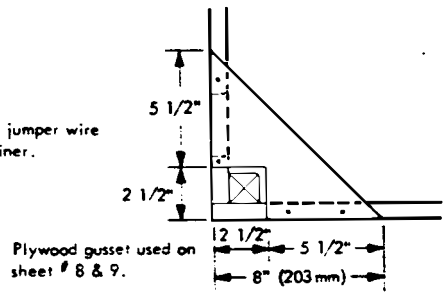
Clearance Gauge Dimensions

	Standard Gauge (9mm)		Narrow Gauge (6.5mm)	
	Proto	N	Proto	N
A	8'-0"	5/8"	6'-3"	.460"
B	4'-0"	5/16"	3'-0"	.225"
C	6'-0"	7/16"	4'-3"	.319"
D	12'-0"	29/32"	10-0"	.750"
E	4'-0"	5/16"	2'-9"	.205"
F	2'-6"	3/16"	1'-6"	.112"
G	6'-9"	1/2"	5'-0"	.375"
H	22'-0"	1-21/32"	17'-0"	1.275"
P	6'-9"	1/2"	4'-9"	.35c"
Q	4'-0"	5/16"	2'-9"	.206"

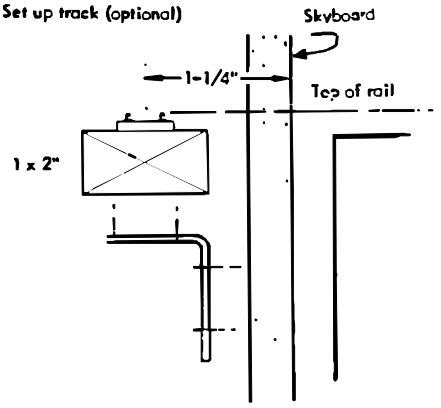
CONSTRUCTION DETAILS

Expansion joint: Recommend at least one per rail near center of module to control expansion & contraction.



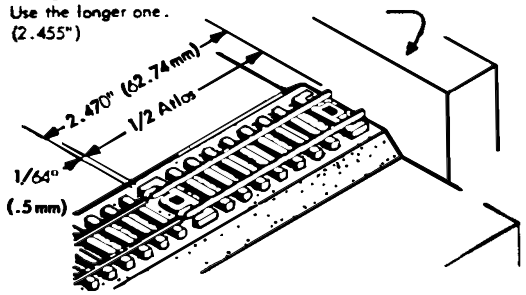


Set up track (optional)



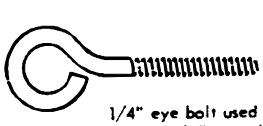
Note: Some Atlas track assortments have two 1/2 sections of slightly different length. Use the longer one. (2.455")

Clamp a scrap of plywood to the end of module.



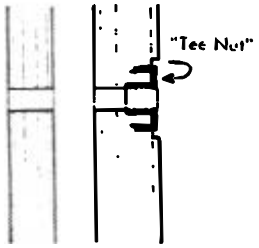
Atlas "Snap Track" straight 5" sections (actually 4.910" long) are used as connecting track between modules. To get the proper track set back, clamp a scrap of plywood to the end of the module, use a 1/2 section of track as a guide. Lay track leaving a 1/64" gap. Repeat at the other end and cut the rail to fit.

A scrap of track could be cut 2.470" (62.74 mm) and used as a guage, including the gap.

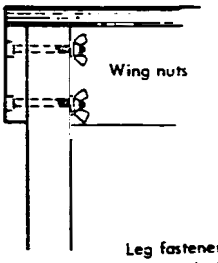


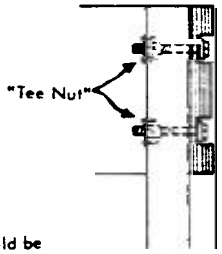
1/4" eye bolt used as a quick "no tools" fastener for Skyboard.

This also makes a handy place to hang a throttle.



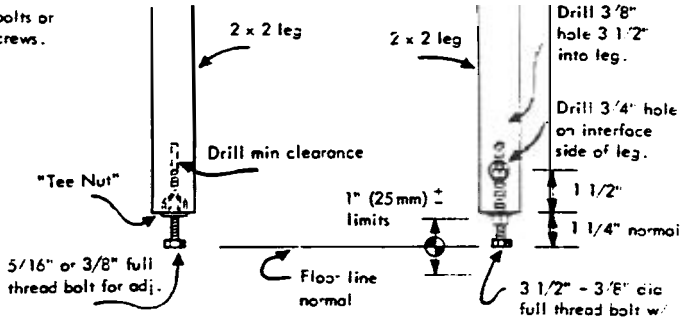
CONSTRUCTION DETAILS





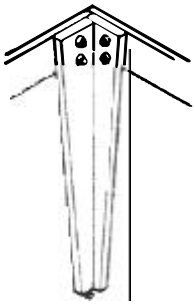
Leg fasteners should be flush with the outside surfaces for a neat and safe assembly.

1/4" Hex bolts or machine screws.



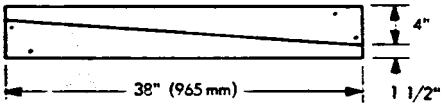
Note: Lag screws have been used, but are very difficult to adjust. Not recommended.

"Redi bolt" threaded rod w/ nut may be used.

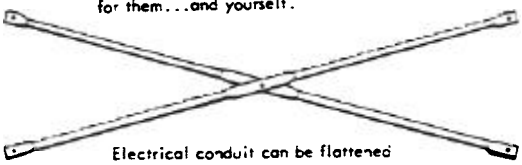


Note: If you want the modules at a different height for home use, a 2nd set of legs is the simplest solution.

Legs can be cut from a 2 x 6 board to give a stiffer leg. "L" shaped legs can be made from 1" lumber and glued and screwed together for a light weight self bracing leg.

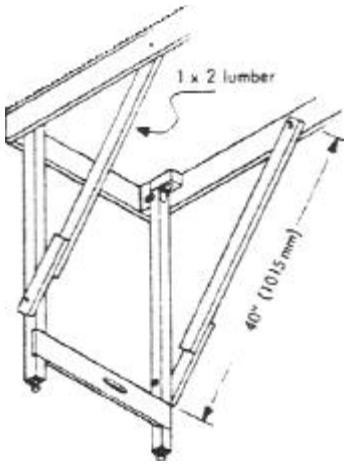


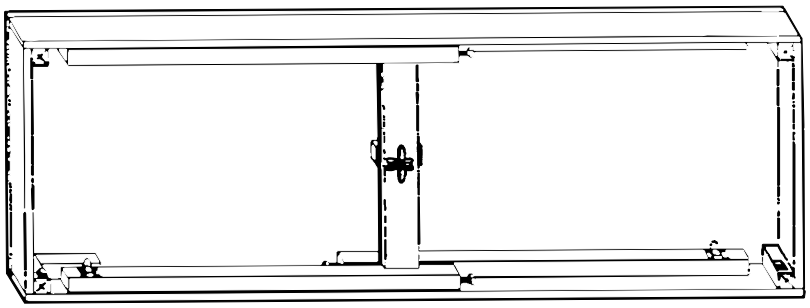
Note: Legs should be coded as to which corner they go in and which module they belong to. Others may have to assemble your module at some time. Make it easy for them...and yourself.



Electrical conduit can be flattened to make light weight but strong bracing for legs. Wooden braces can be made as shown on Sheet #17

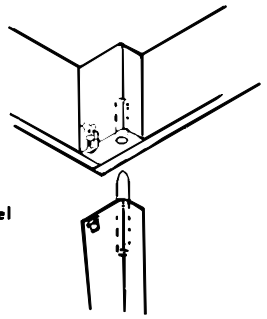
LEG DETAILS





For detailed drawings and instructions on the folding legs send a stamped envelope to NTRAK Engineering.

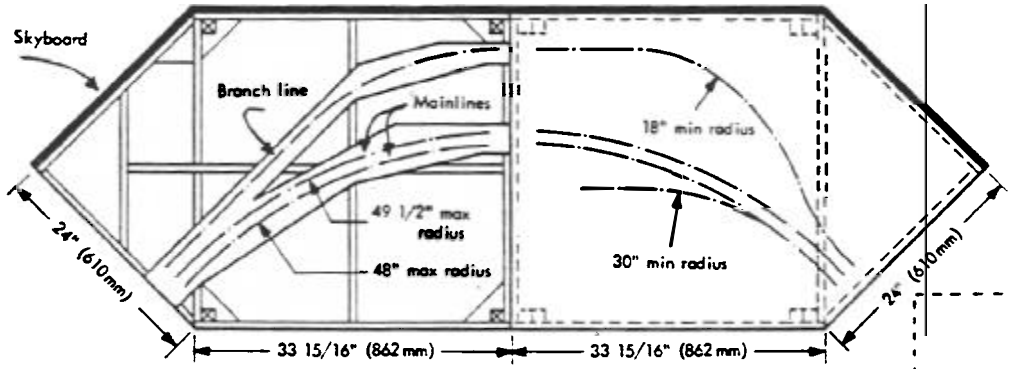
Some clubs set up their modules every few weeks for operating meetings. Quick assembly and break down means just that much more time for running trains. One club calls for modules that can be set up by one person in fifteen minutes without tools. Some use furniture legs that screw in place. Dowels and pins were used on another. The folding legs shown above are self-contained. Bracing may be held in place with thumb screws on the inside and "Tee nuts" in the braces.



Here is another quick method using a metal or wooden dowel and a tapered leg.

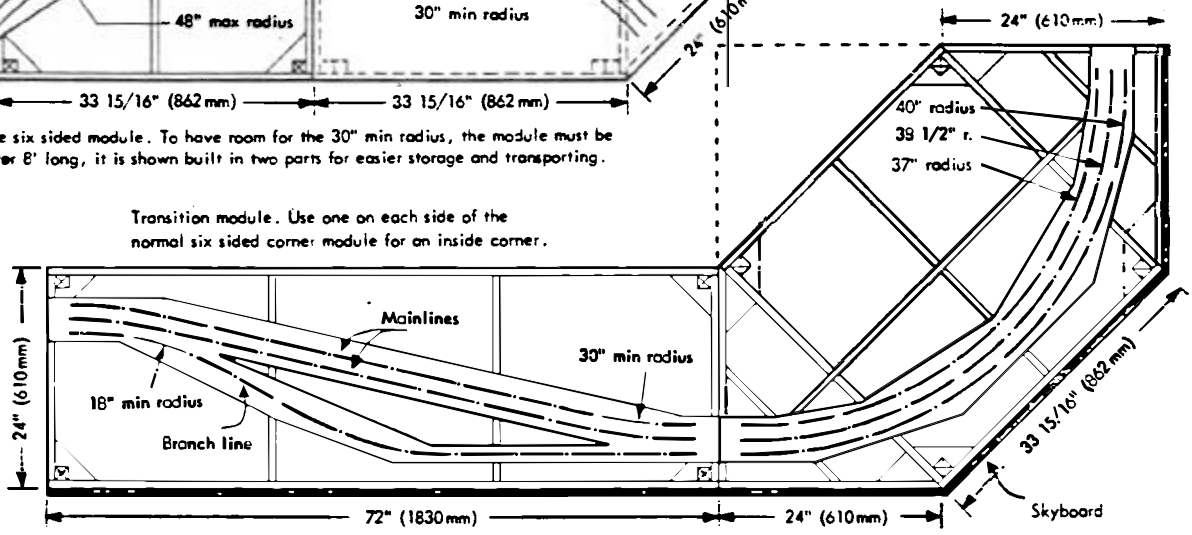
32

LEG DETAILS



The six sided corner module shown below and on sheets #19-22 is the most compact of the corner modules. It is based on a 4' square with two corners cut off. It can be constructed in either the open grid method or as a plywood table top. Their main use is for outside corners, as shown at the top of sheet #3. By adding a 4' module between them, you get a 12' wide layout.

Inside corner version of the six sided module. To have room for the 30" min radius, the module must be extended. Because it is over 8' long, it is shown built in two parts for easier storage and transporting.

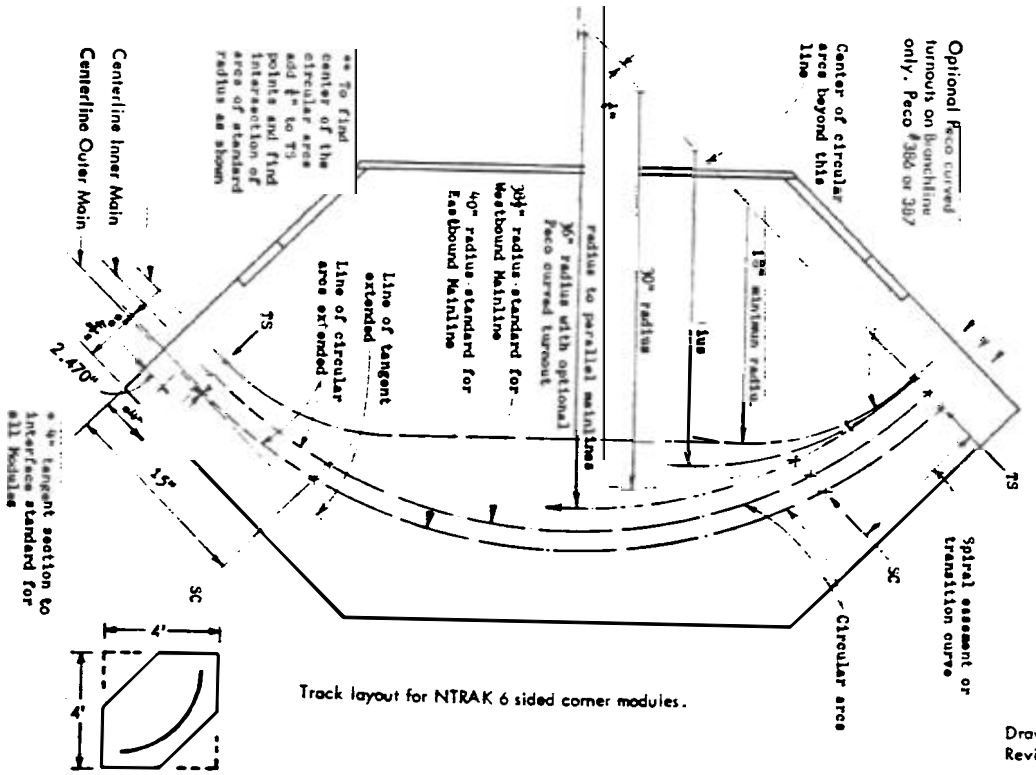


Note: 33 15/16" (862 mm) is the diagonal of a 24" square. It is used to keep the modules on a 2' grid pattern.

Transition module. Use one on each side of the normal six sided corner module for an inside corner.

The Transition Modules can also be used in pairs in the layout when not needed for an inside corner. See Sheet #3.

CORNER MODULES

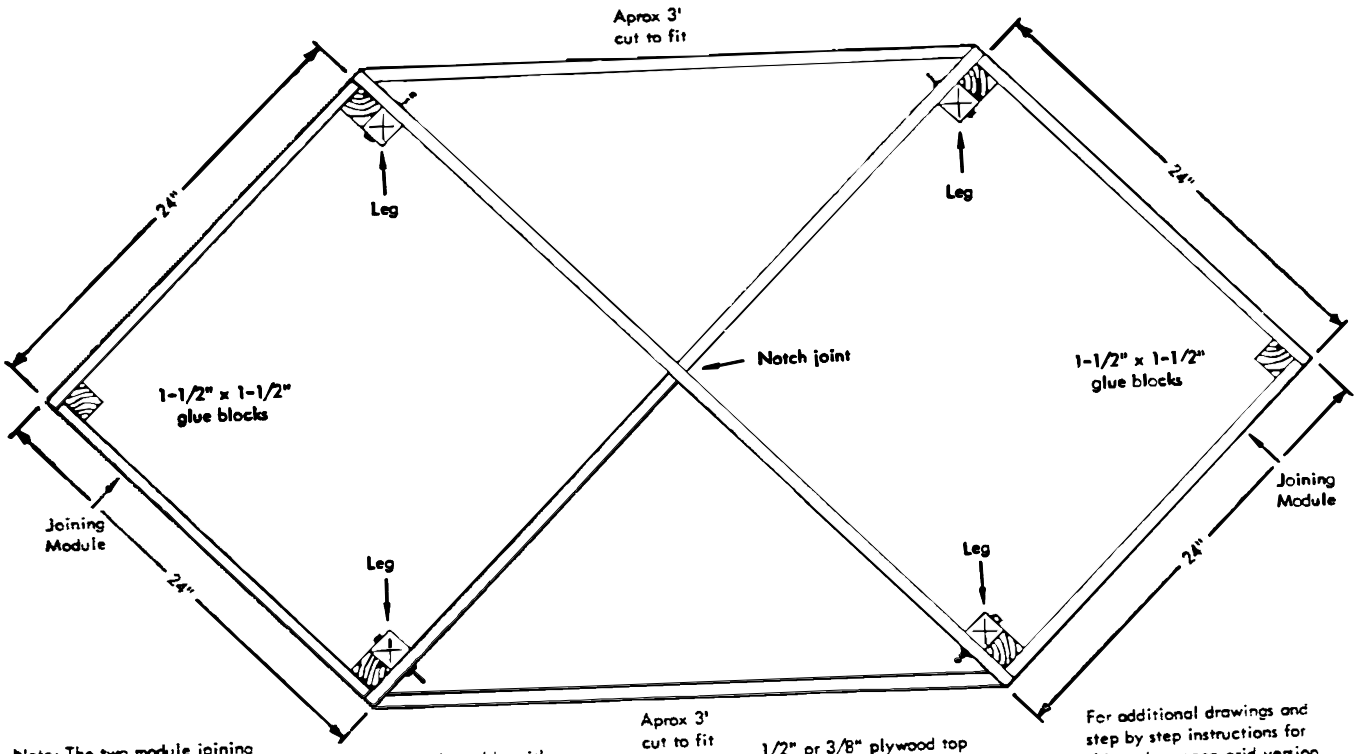


Track layout for NTRAK 6 sided corner modules.

Transition curves adapted from NMRA data sheet D3c. Use bent stick method to establish template for modules. Transition curve then connects the tangent to the circular arc. This is not a true transition curve, however it will function as such and allow the maximum radius for the module.

Drawing by Ken Peck
Revised March '76

CORNER MODULES



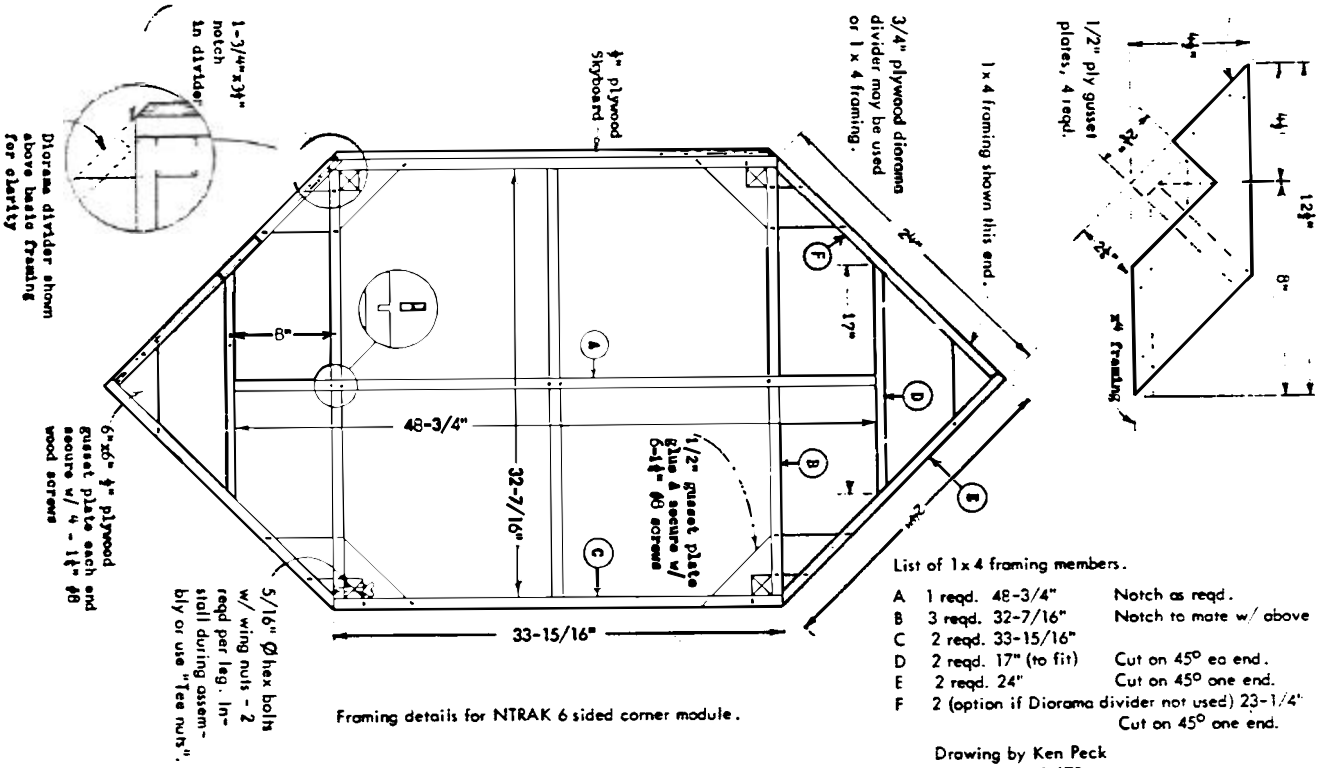
Note: The two module joining faces must be square with each other.

Assemble with screws and glue

1/2" or 3/8" plywood top
1x4 or 1/2" ply framing

For additional drawings and step by step instructions for this and an open grid version, write to NTRAK Engineering

CORNER MODULES



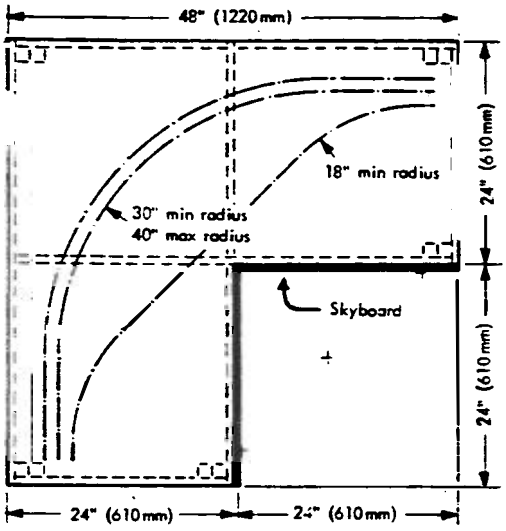
Framing details for NTRAK 6 sided corner module.

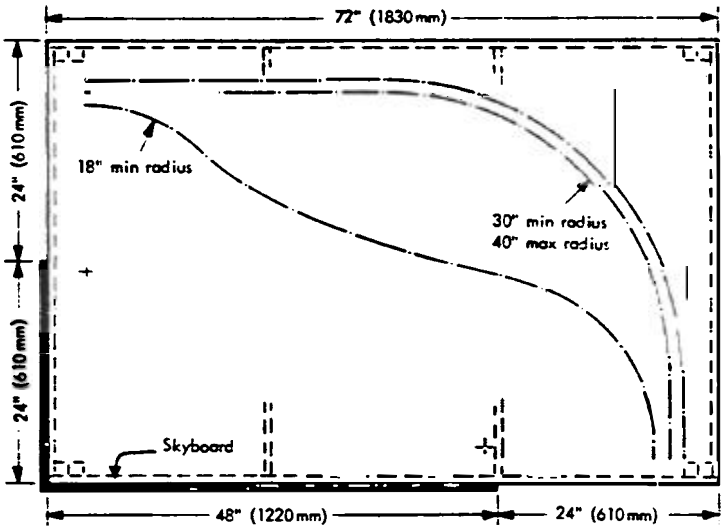
List of 1 x 4 framing members.

A	1 reqd. 48-3/4"	Notch as reqd.
B	3 reqd. 32-7/16"	Notch to mate w/ above
C	2 reqd. 33-15/16"	
D	2 reqd. 17" (to fit)	Cut on 45° ea end.
E	2 reqd. 24"	Cut on 45° one end.
F	2 (option if Diorama divider not used) 23-1/4"	Cut on 45° one end.

Drawing by Ken Peck
Revised March '78

CORNER MODULES



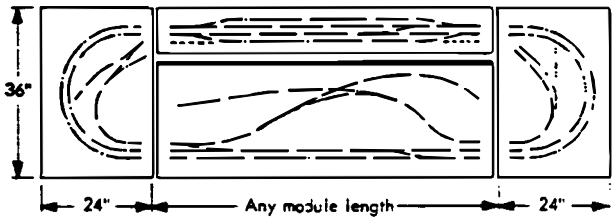


Several of the "L" shaped corner modules have been built and used. They are simple to build, but are bulkier than the six sided corner modules and so are harder to move and store. The 4 x 6' corner modules were used in early NTRAK layouts. They allow complicated scenery. The BS Lines had a mountain logging line built into theirs. Even with foam mountains it takes at least six people to move these into place.

"Mini Layout" made up of one or more modules plus these special end units & a "plank" across the back. Trains can be run on the mainlines and switching operations done on the Branch line. If extra tracks are added on the "plank" then trains could layover and a variety of trains could be run on the mainlines. If a third track is continued through as shown by the dashed lines, then the rear unit can be used as a "bridge" in a big layout as well.

This can be the basis for a home layout as well.

Simple plank or plywood table top unit.
9 1/2" wide will hold four tracks easily.



CORNER MODULES

SPECIAL UNITS

The standard NTRAK corner module is basically a 4' square with two corners cut off. They are almost 6 feet long and 34" wide, making them large for home layouts, some club layouts and bulky to transport. A similar corner module based on a 3' square is shown here. The outside mainline tracks will have a radius of 28", just short of the 30" minimum called for in the NTRAK specifications. The smaller corners were used in the Calgary layout with no problems.

A layout could also be assembled with 4' corners diagonally opposite each other and 3' corners for the other two.

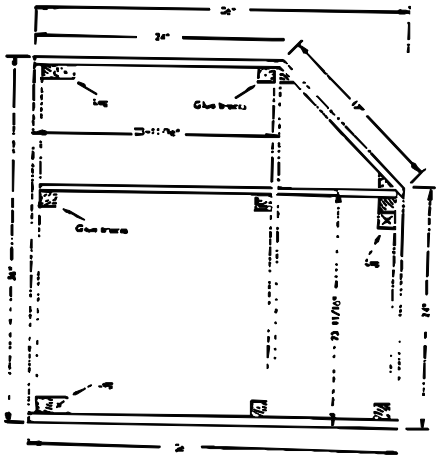
All key dimensions are given, but some dimensions are not given since they are governed by the thickness of the materials used. Where the two braces cross, they could be notched to fit together, or one could be solid and the other in two pieces that butt against it.

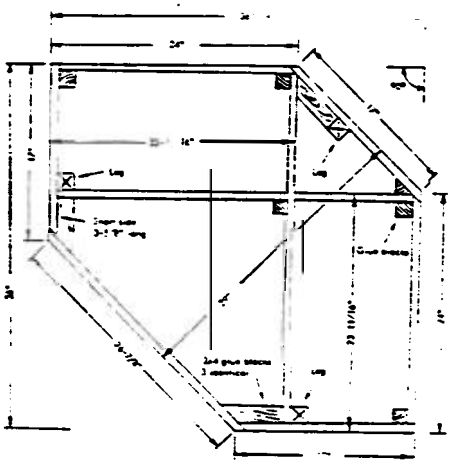
Here are drawings for building the smaller corner modules and the 3' sq. unit used for loops and "T"s. To save weight, the tops could be 3/8" ply and frame 1/2" ply.

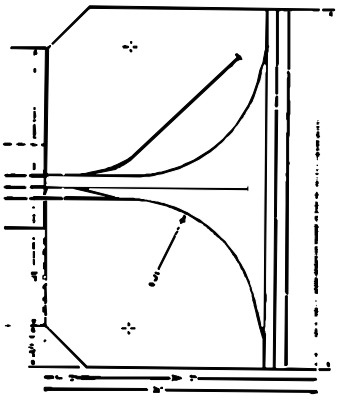
A datasheet with full instructions is available from NTRAK Engineering.

For other trackplan ideas for the corners and 3' square units, see the Template set. Available from Jim FitzGerald, 2424 Alturas Rd, Atascadero, CA 93422, $1.25 ea pp.

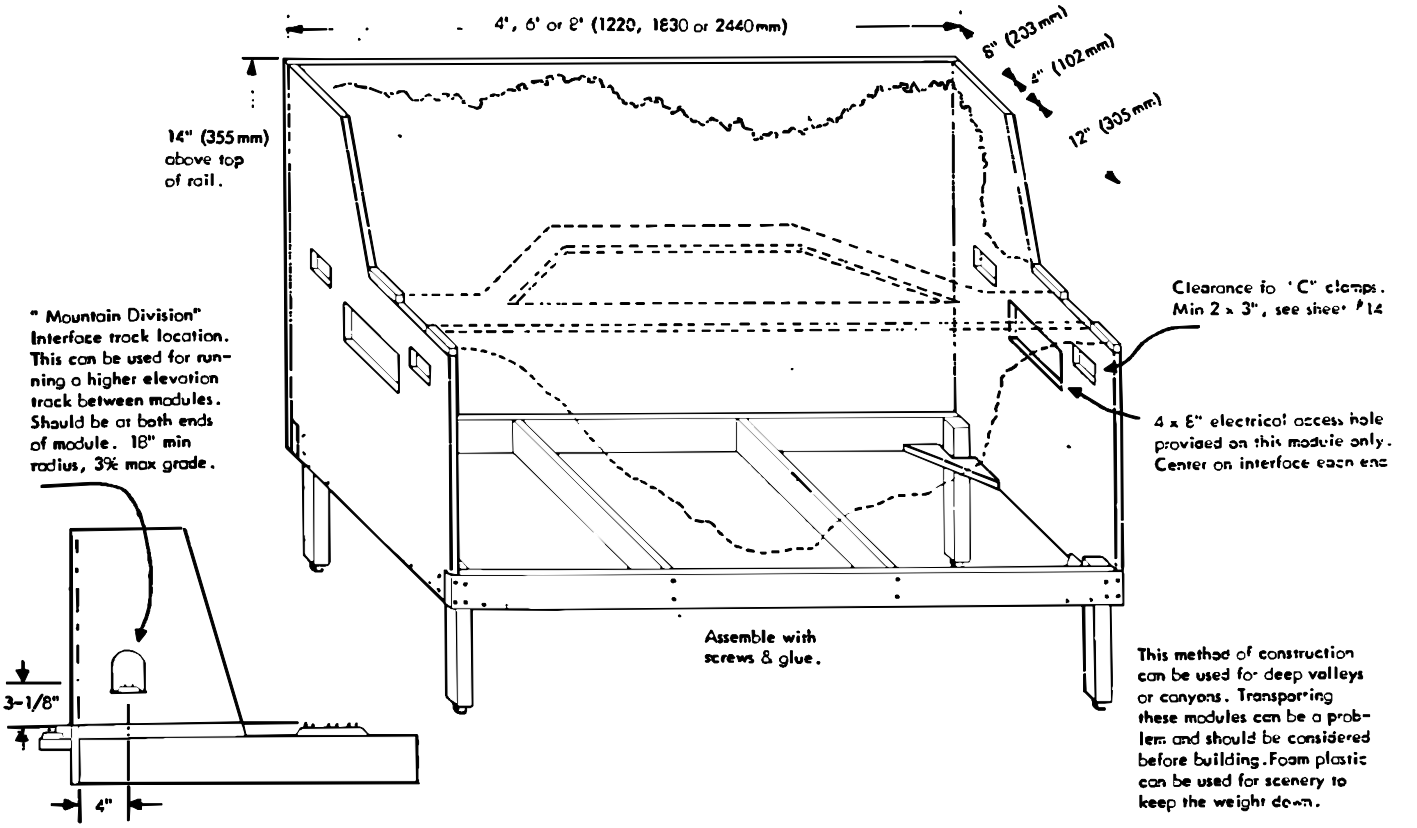
This "T" unit is also a standard 4' NTRAK module. Other NTRAK modules can be attached for behind the scenes work. If the wiring scheme shown on sheet 13 of the NTRAK Manual is used, then the rear module can face in either direction, as shown by the dotted lines.







SPECIAL FRAMEWORK



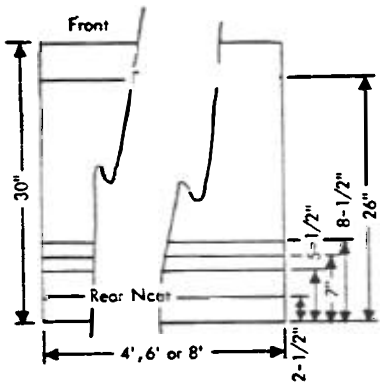
CANYON/VALLEY MODULE

Ncat Specifications
[For pantograph operation only]

Module design can follow any of the regular NTRAK module construction methods. All Ncat modules are 30" deep, the extra 6" is added to the front of the module. An additional 6" may be added to the rear of the module, if desired.

Interfaces: The rear of the standard 24" deep NTRAK module is zero dimension. The rear Ncat track center (with overhead wire) is 2-1/2" forward; the branch line track center is 5-1/2" forward; the two mainline tracks are 7" and 8-1/2" forward respectively. The front Ncat track is 26" forward.

Track Locations

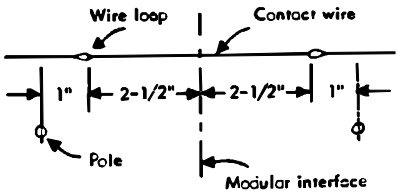


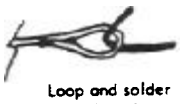
Not shown here are the special Ncat modules used at either end of the Ncat section. They have the return loops for the Ncat tracks and they swing the NTRAK mainlines from the front to the rear of the modules. This puts the mainlines where they are easier to reach and puts the catenary "out front" where it can be seen. The goal is to keep the overhead wires away from the regular NTRAK operations and track cleaning crews. This is also why Ncat tracks cross under the mainlines.

All track interfaces are made as specified in the NTRAK manual and are code 70 rail. Other rail sizes may be used within the module on Ncat tracks (only) provided unmodified locomotive and rolling stock wheels will negotiate such track properly.

Turnouts: May be used anywhere on the front Ncat track with spurs or sidings, overhead powered or not. Overhead powered track connecting to branch or mainlines is discouraged. If module depth is 36", turnouts may be used on rear Ncat track connecting it to trackage in front of branch and mainline tracks. Any such crossing must be made under branch and mainline tracks. Allow a minimum clearance of 1-3/4" between railhead and underside of top track support. (Please correspond with Ncat engineering if such a track plan is contemplated.)

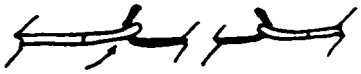
Contact wire interfaces: Poles should be set 3-1/2" in from the module ends. Loops are to be formed and soldered in the ends of the contact wire about 2-1/2" in from the ends of the module. A length of contact wire is then used to make the connection. It is not soldered in place. This type of connector is suitable for pantograph operation only.





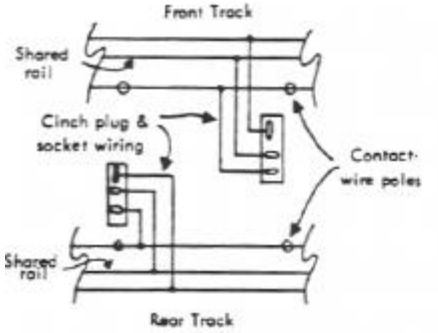
Loop and solder
Keep loop horizontal

Contact wire, .010" phosphor bronze.
Use 5-1/2" length between Ncat modules.



Electrical: Wiring follows that specified in the NTRAK manual. In addition there is wiring for the Ncat tracks. One Cinch-Jones three prong plug is used for each Ncat track and overhead, at the right hand end of the module. One Cinch-Jones three prong receptacle is used for each Ncat track at the left hand end of the module.

N CAT SPECIFICATIONS



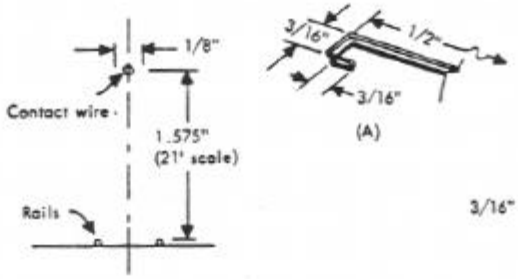
The electrical system for Ncat tracks is the "shared rail" type. Two throttles, properly connected, will independently operate an electric and another locomotive. The front rail of the front Ncat track is connected to pin No1 of the Cinch-Jones connectors, while the rear rail of the rear Ncat track is attached to pin No1. The shared rail is attached to the center pin and the overhead wire to pin No3. Electrical "blocks" are created by gaps in the shared rail.

Two throttles, separate from the regular NTRAK throttles, will be used for the group of Ncat modules and will be placed into the wiring between any two modules, where convenient.

Overhead wire: May be purchased (such as Sommerfeldt or Vollmer) or hand made. If the latter, .010" phosphor bronze wire is recommended for best appearance. Pole-hanger-ear may be purchased or made by the modeler. 6" max. pole spacing along straight track, with closer spacing on curves. Power connections to overhead at intervals of not more than 5'.

Contact wire limits: Nominal height 1.575" or 21 scale feet. Min.= 1.425" (19'), max.= 1.65" (22'). Sideways deviation of wire from above rail center, 1/8", except around curves. Depending on the tightness of curve and the position of the pantograph on the loco relative to the forward bolster, overhead will likely have to be to the outside of the rail center.

Pantographs on locomotives must be able to extend 1.725 (23') above railhead and must not compress closed above 1.350" (18').



Suggested pole for overhead trolley wire.

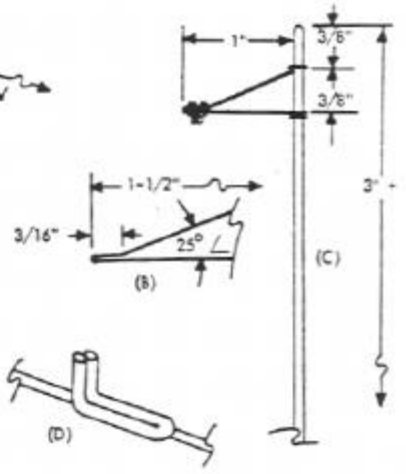
(A) Combination "ear/hanger", .015" phosphor bronze wire, bent double & then with two bends as shown. Wrap around the arm end in a vertical position and solder.

(B) "Arm" of .020" phosphor bronze wire bent as shown and wrapped around pole and soldered.

(C) "Pole" of 1/16" brass welding rod with a rounded top and long enough to extend at least 1/2" below layout for power feed connections.

(D) Shows how contact wire of .010" phosphor bronze wire is soldered underneath ear/hanger. This design provides a very strong solder joint.

Poles are inserted along the track in holes drilled in the layout base, slightly smaller than 1/16", to provide a tight fit. Adjustment vertically made with pliers. Pole scales out to 12" dia. It is flexible for adjustment and will "give" if contact wire is accidently struck, rather than joints breaking. (See pg 21, Oct.'77 NMRA Bulletin.)



Please include a SASE (self addressed stamped envelope) with any correspondence to Ncat engineering.

Hal Riegger, 11009 Spenceville Rd
Penn Valley, CA 95946

N CAT SPECIFICATIONS

National NTRAK Specifications

PURPOSE: To establish a uniform set of specifications for the construction of Modules based on the objectives of NTRAK.

CONCEPT: Provide through simple modular construction an N scale model railroad layout system that meets the following criteria:

1. Expandable in all directions
2. All Modules fully portable
3. All modules relatively equal in size
4. Only a few basic modular shapes
5. Realistic elevations possible
6. Large radius curves
7. Three continuous loops possible for display purposes
8. Realistic operation with prototype length trains
9. Constructed of readily available materials
10. Quickly assembled and operational
11. Compatible with earlier NTRAK construction concepts
12. Designed for (1) Individual home layouts where mobility is a factor, (2) Club members to gather together and set up a temporary layout, (3) Regional and National meets where a large space could be available
13. Provides a basic foundation for all modelers, regardless of skill, to display their talents and likes
14. Flexible to change with all new innovations and developments. These specifications will continuously be revised and updated

GLOSSARY:

Connecting Tracks - 5" Atlas "Snap Track" sections. Nominal length is 4.910". Used to join Modules' mainline & branch line tracks together

Diorama dividers - End pieces of framework made of 3/4" plywood. May be used for separating one scene or diorama from another and representing distance between scenes

Interface - The end surface of the Module. The surface which is held flush with an adjacent Module's interface.

Meet - The assembling of Modules into a layout for display and/or operating a model railroad

Module - The basic unit of NTRAK. A repetitive standardized section of a model railroad layout

NTRAK Meet Coordinator - Person(s) responsible for all final decisions relative to a meet.

Skyboard - Backdrop board of 1/2" plywood painted to represent the sky. Sky and background art work may be added.

Diorama dividers and skyboards may be removable for compact storage and shipping

BINS — British Isles NTRAK Specifications conform to the Manual except as follows: — BINS

Lengths of 38"(960mm) and 57"(1440mm) are alternates to the Manual lengths. The 38" will fit into most cars. An 8'x4' sheet of plywood will make top, sides and skyboard for one 38" and one 57" module. Corner modules to be as in Manual.

Skyboard colour, Woolworth silk vinyl, Hydranger (Western) or Sky Blue(Eastern)

Mains connectors to be 13amp type(BS1363), wiring to be 15amp rating with earth.

Low voltage connectors to be RCA type Phono Plugs and Jacks. Center pin is pin #1, Skirt tag is pin #2. Use heat sink when soldering. Provide insulated stowage for plugs when not in use (four holes). Low voltage wiring to be 18 SWG (.048"dia).

SPECIFICATIONS

CONSTRUCTION

Framing - Shall be 1 x 4 construction grade or better, straight & solid material free of excessive knots. Selected for strength and appearance.

Plywood - Type A/D "good one side" graded by recognized plywood association, ie DFPA. Provide solid wood edging, veneer tape or fill & sand all exposed edges.

Particle Board - Standard 5/8" underlayment & cabinet material. Available in shelving widths as well as 4 x 8 sheets. Sub roadbeds to be one piece where practical.

Hardware - As indicated on drawings. Available at national outlets, ie Sears, True Value Hardware etc.

Assembly - Code all legs to appropriate corners for bolt connection. Provide sufficient data for assembly in order that persons other than builder may assemble.

Diorama dividers - May be used to visually separate individual scenes for a more uniform transition, provide additional rigidity and a means of protection for the scenery.

Skyboards and Diorama dividers may be removable for easier shipping and storage.

C - clamps - 3" nominal size, clamp holes may be enlarged slightly if necessary.

TRACKWORK

Conventions - Clockwise direction, Westbound
Counterclockwise, Eastbound
North is the operating side of the Module

Interface - Mainlines and branch line tracks shall be continuous and form three (3) unbroken loops of track.

Mainline and branchline tracks shall be as located and detailed on drawings for positive alignment at assembly. The only exception shall be when two (2) or more Modules are designed to be a continuous diorama and must remain adjacent.

Grades & Radius - Mainlines, 0 grade & constant elevation (0"), 30" min radius
Branch line, 1.5% max grade (3/16" per ft), 18" min radius
Other tracks, no restrictions on grade or radius

Spacing of Centerlines - Mainlines, 1 1/2" Standard, 1 1/4" min. (2" min setback from Module front edge)
Branch line, 1 1/2" at interface only.
Other tracks, no restrictions.

Turnouts (PECO or equal) - Mainlines, #SL-388X & SL-389X (long) #SL-386X & SL-387X (curved) Shinohara #6
Branch line, #SL-391X & SL-392X (med)
Other tracks, no restrictions

Construction - Rail ends near Interface shall be securely attached to the roadbed for positive alignment.

Provide access to all trackage for maintenance, (Including tunnels).

Uncouplers - To be mounted in or under track & be of magnetic or solonoid type. Only solonoid or drop away mounted permanent magnets permitted on Mainline and Branch line.

Track - Mainline, nickle silver flex track such as Peco or Atlas.
Branch line, same or code 55 flextrack with rail to match the Atlas connecting track at the interfaces.
Diorama tracks, no restrictions, may be hand laid.

Steel track (Rapido) is discouraged and is not allowed on the Mainline or Branch line.

SPECIFICATIONS

ELECTRICAL

JMRA & NTRAK Meets - All modules shall comply with these specifications and shall be approved for inclusion by the NTRAK Meet Coordinator. Sections, Blocks and type of control to be announced prior to assembling the layout. Major power packs may be provided at these meets by NTRAK.

Conventions - Rails of all track sections shall be known as "N" for rail closer to Operating side and "S" for rail closer to Viewing side. "N" rail will always be inside rail of loop and wired to #2 (narrow) pin.

Construction - Each module to supply own power pack(s) for use with Diorama trackage if operating is planned. Also will power all accessories.

If only minimum operation is planned for module, power may be taken from (blue) track supply with a DPDT switch.

All electrical connections, other than 110V within protected "Handy Boxes", shall be soldered. Splices shall be soldered and taped.

Securely fasten all wiring to framing material. Cable wherever possible & protect from damage.

Assembly - Recommend all module power packs be equiped with 2 pin plugs and sockets for convenient connection and removal. Provide some method for hanging or fastening to module.

Finished modules to be provided with two (2) C clamps, three (3) 5" connecting tracks with metal joiners and one (1) 5" connecting track with insulated gaps (both rails) for use where needed on the layout for block boundries.

Insulating Gaps - Location varies with type of control and layout design for mainlines and branch lines.

Insulating gaps (both rails) shall be located at all crossovers and all makeup and branchline connections. Diorama trackage as required.

All cut rail gaps shall be held in gauge with epoxy or equal.

All white or yellow plastic insulating rail joiners to be painted to match color of ties or rails.

Multi-Conductor Connectors - Shall be "TRW, Cinch-Jones" or equal.

2 pin Plug w/ Cable Clamp = #P-302-CCT
2 pin Socket w/ Cable Clamp = #S-302-CCT
2 pin Chassis Mount Socket = #S-302-AB

Alternate (will mate with "TRW, Cinch-Jones" connectors). "Archer" as supplied by Radio Shack store. (Some have corroded in high moisture areas.)

2 pin Plug w/ Cable Clamp = #274-201
2 pin Socket w/ Cable Clamp = #274-202
2 pin Chassis Mount Socket = #274-203

Track Diagram & Labeling - Provide color coded diagram on back of skyboard.

Color code to be:

Front mainline	- Red
Rear mainline	- Yellow
Branch line	- Blue
Set up track	- Green
Diorama tracks	- Any other color(s)

All switches and controls shall be clearly labeled and keyed to Track Diagram. Diagram & Labeling to be clearly understood and should enable them to operate Mainlines and Branch line tracks unaided.

Color code all connectors. Color to be visable at all times.

Safety - All power packs should be fused for protection of units.

15 amp Fuses or Circuit Breakers to be installed in 110 V AC line within corner modules.

110 V AC "LIVE" bare plugs (ie. plug to plug patch cords) are NOT PERMITTED.

Protect all low voltage "LIVE" plug ends when not in use. Tape or other acceptable means to be used.

Codes - All wiring carrying 110 V AC to comply with National Electrical Code. Modules may be subject to inspection in places of public assembly.

SPECIFICATIONS

MATERIALS NEEDED FOR A 6' NTRAK MODULE

Where less is needed for a 4' Module (④) or more for an 8' Module(⑧), these are indicated below.

Track: (Minimum for Mainlines and Branch line, no spurs, sidings etc)

18' - Flex track, PECO or equal. ④= 12', ⑧= 24'

4 - Turnouts, PECO, large radius, #SL-388X, RH or #SL-389X, LH ④= none required

4 - 5" Atlas "Snap Track" sections. Insulating gaps to be cut and filled with epoxy in one section, for use where needed on layout.

1 - 2 1/2" Atlas "Snap Track" section. Used as spacing jig only. Scrap track may be accurately cut for this purpose. (2.470")

Ballast and cork roadbed as required.

Electrical:

4 - #P-302-CCT, TRW-Cinch connectors, or equal.

4 - #S-302-AB, TRW-Cinch connectors (#S-302-CCT for optional pig tail)
(6 ea of both above if optional set up track & skyboard disconnect is used.)

2 -"Handy Box"w/ grounded duplex outlets & box wire clamps.

1 - 3 prong, 110 V AC plug, w/ wire clamp.

8' - #14 Romex w/ ground wire. ④= 6', ⑧= 10'

8' - #16 "Zip" cord. ④= 6', ⑧= 10'

24' - #18 "Zip" cord. ④= 18', ⑧= 30'
(35' w/optional set up track. ④= 29', ⑧= 41')

2' - #22 to #26 solid wire, for track power drops.

Wire clamps as needed and a panel for the S-302-ABs if used.

Lumber: This depends on the construction method used. For the plywood table top construction you would need:

1 - Skyboard, Plywood, 1/2 x 18 x 72". ④= 48", ⑧= 96"

1 - Table top, Plywood, 1/2 x 24 x 72". ④= 48", ⑧= 96"

4 - Legs, 2 x 2 x 38"

4 - Corner glue blocks, 2 x 2 x 3 1/2"

2 - Frame ends, 1 x 4 x 22 1/2"

2 - Frame sides, 1 x 4 x72", ④= 48", ⑧= 96"
(3/4" Ply may be used for frame.)

Hardware: Again this depends on construction method, but should include:

4 - Leg leveling bolts w/ nuts or "TEE" nuts.

8 - Leg attachment bolts w/ nuts and washers.

2 or more bolts to mount Skyboard.

Misc flat head wood screws for assembly of frame.

Glue

Paint, dark brown or flat black for legs and frame. For Skyboard, both sides with Sears #119 Royal blue light, for Western skies or #252 Federal slate light, for Eastern skies.

This manual represents the experience and learning of many modelers since the NTRAK idea started in 1973. This is the seventh printing and revision of this version of the manual. There were three previous versions of the manual as well. We hope to keep any further changes to a minimum, but before starting a module it would be wise to check with NTRAK Engineering about later revisions.

Jim FitzGerald, May 1981

MATERIALS LIST

THINGS TO CHECK BEFORE YOU GO TO A MEET

1. Be sure that your module meets the current NTRAK Specifications.
2. Have all flangeways clear of ballast and turnouts working properly.
3. Check wheel gauge and couplers. Try your engines and long cars to be sure everything operates and that you have the proper clearances.
4. Have your controls working, clearly marked and color coded.
5. Your scenery should look so great that you don't have to apologize!

THINGS TO TAKE ALONG

1. For each module: two "C" clamps, four connecting tracks, one w/ insulating gaps. (Remove one tie or undercut so that rail joiners go fully on at one end of all connecting track sections.)
2. Any tools needed for assembly and any tools, glues, paint, etc for last minute repairs of the module. Have your name on everything!
3. Controller and cords, if needed.
4. Cars and engines all marked for easy identification with your personal code. An inventory list can be a big help. Don't leave engines on the layout overnight or on a siding in easy reach during the show. Be very watchful of your things during teardown. Security is lax then, and, in the confusion, things can disappear.
5. If you plan to enter your module in a contest, it may have to be in the contest room for judging. You should furnish a three track "bridge" so the layout can operate while your module is being judged.

IF YOU ARE COORDINATING A MEET

1. Confirm the space for the layout either by measuring it yourself or have someone do it for you. The hotel or exhibit hall drawings are often quite optimistic. One room was about two feet smaller in both directions than advertised. While you are setting up is NOT the time to find out about this. Note locations of pillars that might interfere with the layout, visitors entrance and the loading dock area.
2. Check the location of electrical outlets. Avoid having cords across an aisle if possible. In some exhibit halls they can place outlets overhead to suit.
3. Find out when you can start setting things up and the hours of the show. Start set up as early as possible so that the layout is running smoothly for the visitors.
4. Be sure that everyone knows when layout teardown will start. One person can't pull his module out ahead of time and leave without advance warning and planning. The NTRAK layout shouldn't be torn down while other exhibits are still open.
5. For a good appearance, the legs of the modules and the boxes of tools and junk should be hidden by a drape. These are often furnished by the convention, or tablecloths can be thumbtacked in place. Check ahead of time. For public shows a barrier about two feet out from the layout is a necessity.
6. Have a layout plan made up ahead of time. Copies should go to all participants. The first persons to get to the set up should know where the layout will be and the arrangement of the modules.
7. The modules should be checked electrically before they are connected together. See sheet 8 for details.
8. If the floor is level, start with all modules at 40" height. Floor tiles or carpet patterns can be a big help in getting the layout square. A fishing line pulled taut can be used in leveling modules. An "eyeball" check for dips, humps, zigs and zags is also helpful. On very large layouts a transit or builders level is useful, if you have people who know how to use them. Cumulative errors can make one side of the layout longer than the other. Two foot lengths of 2x4, 1x4 and 1/2" plywood can be clamped between modules as needed to even things up.
9. A 2' and 4' three track "bridge" can be useful in case some module doesn't show, or if the module lengths that are available don't come out even. The bridge makes a good "duck under" entrance to the operating pit.
10. If any of the modules are to be moved into the contest room for judging, then the builder should furnish a "bridge" while his module is out of the layout.

SET UP SEQUENCE

1. Get module legs in place and rail to floor @40".
2. Make electrical check before connecting to other modules.
3. "C" clamp modules together.
4. Put gapped rail connector tracks at block boundries.
5. Put in all other connector tracks.
6. Connect 110 and track wiring between modules. (Don't plug in for gapped rail tracks.)
7. Connect controllers.
8. Have fun!!!

BASIC IDEAS