



North American T-TRAK Organization

Tips SCALE Techniques

Using Kato Unitrack for T-TRAK Modules

June 1, 2020

About Kato Unitrack

Kato Unitrack is a sectional track system with the roadbed built in that is the standard track for T-TRAK layouts. A wide variety of pieces are available, including turnouts, a double crossover, straights, curves, crossings, a turntable and more.

The design philosophy of Kato Unitrack is based on a horizontal grid of 62mm, a primary vertical grid of 33mm, a secondary vertical grid of 49.5mm and a radial grid of 15 degrees.

The Horizontal Grid (62mm)

The horizontal grid is 62mm because the length of all the regular straight pieces are multiples of 62mm —62, 124, 186 and 248mm. The other straight pieces are designed to get you back on grid.

- The 60mm and 64mm straight pieces are specifically designed to be used with the #4 turnout.
- The 29mm and 45.5mm straight pieces are specifically designed to be used with the 33mm 90 degree crossing.

The Primary Vertical Track-to-Track Spacing is 33mm

The primary vertical track-to-track spacing is 33mm because the #4 turnouts and the radius of the standard curved tracks are spaced 33mm apart. By keeping the track-to-track spacing at 33mm and on-grid, a 4 track mainline or yard can be bent anyway you desire.

The Secondary Vertical Track-to-Track Spacing is 49.5mm

The secondary vertical track-to-track spacing is 49.5mm because the #6 turnouts and the 15 degree crossings work well on this grid, however, bending parallel tracks is a little tricky. Since the radius of the standard curved tracks is not spaced 49.5mm apart, you must know how to connect converging tracks with the 78mm-to-108mm extendable straight section, or how to cut a straight section to length.

The Radial Grid is 15 Degrees

The radial grid is 15 degrees because all the curved tracks are multiples of 15 degrees and all the turnouts are 15 degrees. It is impossible to get off the radial grid, which is very good. Any two converging tracks can be connected together using the 78mm to 108mm extendable straight pieces, sometimes also with a 29mm or 45.5mm straight piece.

Standards

The following table lists the T-TRAK Standards for the use of Kato Unitrack on T-TRAK modules, as specified on the T-TRAK web site, to the extent necessary for this AppNote.

As with any model railroad or module good track work is essential to smooth operation of trains. Careful planning, design and installation of track and track components is vital. Be especially careful to ensure the overhang at the ends of each module and the spacing between parallel tracks are correct. Errors in these dimensions can make interconnection of modules difficult if not impossible.

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Item	T-TRAK Standard
Track setback distance from front of module	38mm / 1½" from module edge to ballast edge of front track
Track Spacing	33mm / 1½" center-to-center. See note
Space between tracks	8mm / 5/16"
Mainline tracks	100% Kato Unitrack
Other Tracks	All Kato OR Kato for module connectors
Track Ballast (non-Kato track)	User choice
Track Designation	Outer main track (front): Red Inner main track (rear): Yellow

Track Planning

There are some basic rules to follow when planning the layout of track on a T-TRAK module. These are:

- Use only Unitrack #6 turnouts and the Kato double and single crossovers on the Red and Yellow main lines and passing sidings. Unitrack #4 turnouts can cause derailments and must not be used on the main lines unless they have been "tuned"; see below.
- Use the longest section of Unitrack that will fit the space available as this provides for smoother train operation. For example, instead of using 124mm + 62mm sections, use a single 186mm section.

Correct Spacing of Mainlines

To ensure proper connectivity between modules it is essential that the mainline tracks be set at the correct 33mm spacing. The simplest way to do this is to make use of the notches that are part of the Kato 24-000 Unitrack Re-Railer / Track Spacing Tool, as shown below. The notches in the side fit the rail tops and are the correct 33mm distance for track separation. There are three (3) sets of notches so three parallel tracks can be spaced correctly.



This tool can be made even more useful by filing out the area between the sets of notches, as shown in the following photo. This enables track spacing where there are obstructions such that an unmodified re-railer does not sit down on the rails.



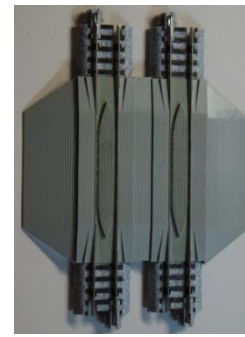
Another method to ensuring the correct track spacing is the use of two of the Kato 128mm Unitrack 20-021 Road Crossings. The Road Crossing comes with a spacer section to make a multi-track road crossing, which gives the proper 33mm track spacing. See photos.



Single track crossing



Single track with spacer



Double track crossing at 33mm spacing

Yet another method is to use the Unitrack double track sections, Cat. No. 20-004 (248mm/9³/₄"") and Cat. No. 20-042 (62mm/2-7/16"), Cat. No 20-043 (62mm/2-7/16") with Track Feeders, which feature concrete ties. These are spaced at the correct 33mm apart.

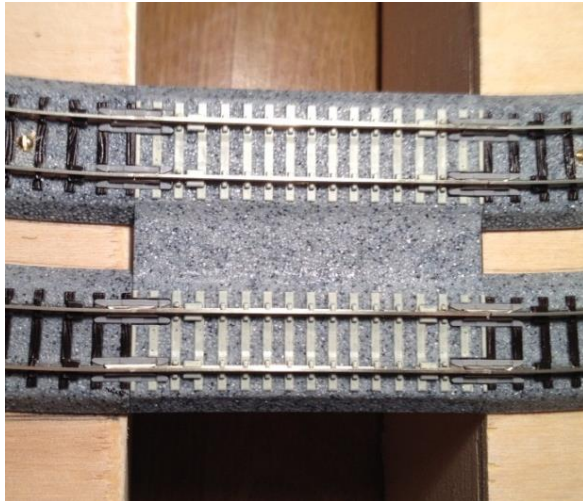


Track Spacing on Corner Modules

As well as using the Unitrack Re-Railer to set the correct track spacing, the following method, using the 62mm double-track sections, can be used, especially when placing track on multiple corner modules:

- Measure and locate the front (red) track; anchor in place.
- Place a 62mm double-track section between the modules.
- Add the rear track by connecting to the 62mm section, which forces the rear track to the correct 33mm spacing.

See the photos below.



Correct Track Overhang at Module Ends

T-TRAK modules are sized such that the track extends about 2mm / 1/16" at each end. It is extremely important that each track connecting to another module extend exactly the same amount at each end. If the track extensions are not identical then the module may have difficulty locking to the next module.

Joining Track at an Angle at Module Ends

Your track plan may require tracks to meet at an angle at the module ends. An example is a crossover track or a yard lead. It is difficult, if not impossible, to join the UniJoiners with the tracks at an angle. The solution is to be sure the rails are anchored securely to the module close to the module end. Then remove the UniJoiners. When the modules are joined together using the UniJoiners on the other tracks, the tracks at the angle will be kept in alignment. You must remember to add power feeds to the track on both sides of the gap.

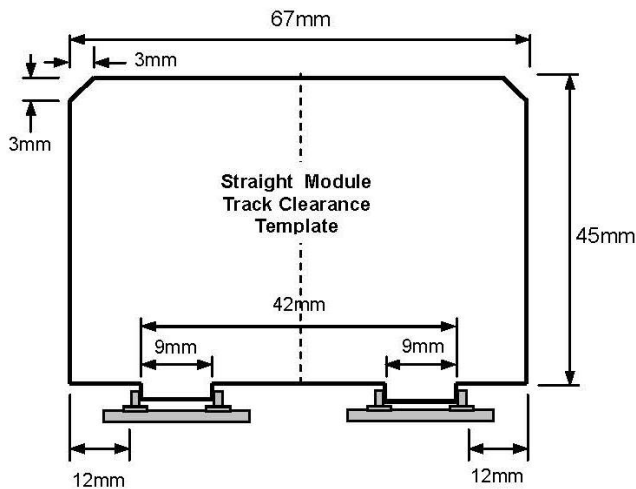
Track Clearances

Track Clearance refers to the minimum distance an edge of an object can be from the track before it is likely to be hit by passing trains. **Vertical Clearance** refers to the minimum distance above the top of the rails for bridges, overpasses, tunnel portals, etc., and **Side Clearance** refers to the minimum distance from the side of the outermost rails. Due to overhang of locomotives and rolling stock the side clearance must be increased on curves. Minimum clearances are listed in the table on the next page:

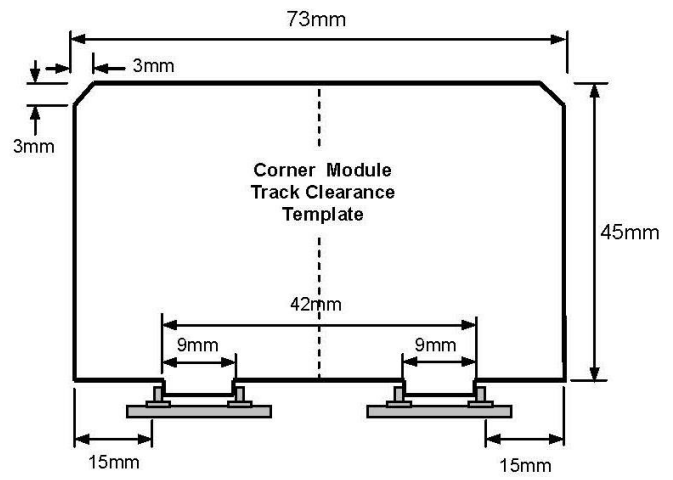
These clearances will accommodate virtually all N scale rolling stock and locomotives including double-stack containers and auto-racks. They must be observed when adding scenery and structures to a T-TRAK module.

	Clearance	
	Straight Module	Corner Module
Minimum Width of Right-of-Way	67mm / 2.64"	73mm / 2-7/8"
Vertical Clearance	45mm / 1¾"	45mm / 1¾"
Side Clearance	12mm / 0.5"	15mm / 0.6"

The Australian T-TRAK-N group has published the following Track Clearance Templates (not full size). Note that these templates should not be used for setting track spacing.



Straight Module Clearance



Corner Module Clearance

Fastening Kato Unitrack to T-TRAK Modules

For reliable train operation the tracks on a T-TRAK module must be anchored to the module. There are several methods of doing this; which method to use is the modeler's choice. Remember that the North Raleigh Model Railroad Club has adopted the 33mm track spacing as standard.

Fastening Using an Adhesive (Not Recommended)

The term "adhesive" includes both glues and caulks. Be sure to use a glue or caulk that will not damage either the wood surface of the module or the plastic base of the Unitrack. Glue sparingly. The entire length of the track does not need to be glued, just the ends, and on longer pieces also the center.

Suitable glue is Loctite PL Premium Polyurethane Construction Adhesive. It is recommended for wood and plastic. Track anchored with this Loctite can be removed. Carefully slide a putty knife underneath the track then tap it with a hammer — this should release the track. White glue can also be used; run a bead along the roadbed and the module to hold the tracks to the module. Use heavy objects to hold the tracks in place while the glue dries or the caulk sets.

Another glue that can be used is Hot Glue. It does an excellent job of positioning the track quickly, and can be softened again with a hair dryer if it needs to be repositioned or removed. Liquid Nails for Projects can also be used.

If you anchor your Unitrack with glue or caulk **DO NOT** use these materials to anchor Unitrack turnouts, as any glue or caulk that seeps into the mechanism could lock up the turnout and render it useless. Since turnouts are the least reliable part of track work this enables easier removal and replacement.

Be very careful **NOT** to get glue on the rails or in the pockets where the joiners snap, or in the control slot of turnouts; stray adhesive will either glue the existing joiner in place, or prevent the other joiner from clicking in place.

Fastening Using Track Nails (Not Recommended)

Each Unitrack section has a molded location(s) that can be drilled up from the bottom to create a hole in the roadbed where an anchor can be used to fasten the track section to the T-TRAK module. Use a 1/16" drill. Place the track in place then drill down through the hole to make a dimple in the module base. This will prevent the track nail from wandering as it is inserted.

Once the hole is drilled out you can use Atlas track nails (or equivalent) to anchor the Unitrack to the T-TRAK module. Be sure you do not drive the nail below the natural surface of the track base. This will cause the base to bow inward narrowing the track gauge.

You should also leave the nail in each track closest to each end of the module slightly loose. This will allow a slight horizontal movement of the track ends, and could aid in easier joining to the adjacent module.

Fastening Using Wood Screws (Preferred)

Each Unitrack section has a molded location(s) that can be drilled up from the bottom to create a hole in the roadbed where an anchor can be used to fasten the track section to the T-TRAK module. Use a 1/16" or No. 60 drill. Place the track in place then drill down through the hole to make a dimple in the module base. This will prevent the wood screw from wandering as it is inserted.

Once the hole is drilled use a suitably-sized wood screw to fasten the Unitrack to the T-TRAK module. There are two alternatives:

- Steel countersunk Phillips-head screws, anodized black. These fit flush after a small countersinking. (Marklin screws for Kato Unitrack Type C 13mm long or Type K, available in two lengths – 3/8" x 1/2"). These require a Phillips #00 screwdriver (e.g. Wiha No. 96100 or equivalent) to drive the screws.



Use a larger Phillips screwdriver to create the countersink so these screws lie flat in the Unitrack, and thus are almost invisible. The downward pressure and the number of turns it takes to create the countersink must be determined by trial and error. Once done making the countersink is quick.

Be sure to drill a small pilot hole into the wood base to start the screws; use a No. 62 drill. Be sure you do not drive the screw below the natural surface of the track base. This will cause the base to bow inward narrowing the track gauge.

- #0 x 3/8" brass round-head wood screws (Micro-Mark #60742, 40/pack or equivalent) also work well. Be sure to drill a small pilot hole into the wood base to start the screws; use a No. 62 drill. Also be sure you do not drive the screw below the natural surface of the track base. This will cause the base to bow inward narrowing the track gauge.

With the correct diameter and length screw it is also possible to screw-anchor Unitrack from the bottom, by screwing into the molded location at each end of the track section.

You should also leave the screw in each track closest to each end of the module slightly loose. This will allow a slight horizontal movement of the track ends, and could aid in easier joining to the adjacent module.

Connecting Track Feeders to Kato Unitrack

Track feeders provide power to the individual tracks (red, yellow, others) from the main power supply (DC or DCC) via the Track Bus. Although it is recommended, not every T-TRAK module requires track feeders, but enough modules in a layout must have power feeds so that trains do not encounter low-voltage as they get further from feeders.

At the least, all corner modules should have track power feeds. If there are more than eight (8) feet between corner modules, then additional track power feeds should be installed.

Feeder Track Strain Relief: Track feeder wires connected to the track by any of the methods below are somewhat fragile and can be easily broken if tugged hard. Always provide a strain relief for the track feeder wires; this could take the form of a 4-position dual-row Barrier Strip (as shown at left top), Digi-key WM5671-ND

or equivalent), a 12-position European-Style Terminal Strip (shown at left bottom, All Electronics TB-7 or equivalent, easily cut into three 4-position terminal strips as shown), or other anchor that securely fastens the feeders leaving a little slack between the strain relief and where the feeder attaches to the track.



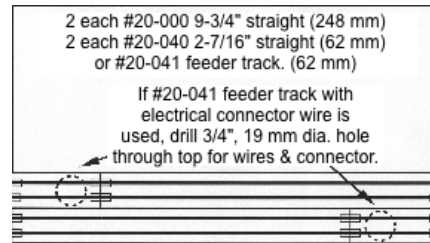
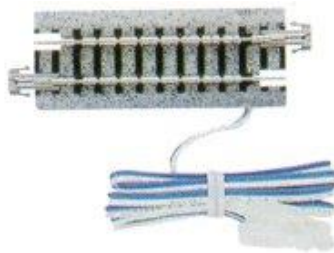
In this example the terminal block is fastened in place using two-sided foam tape or appropriately sized wood screws. The blue and white wires are connected to terminal UniJoiners in the track. They are dressed and anchored in place using the clips shown. Insulation is stripped from the ends and the wires are wrapped around the screws; spade lugs could be used if desired.

Note the color coding for the red and yellow tracks. The wiring corresponds to the standard blue — white — white — blue configuration.

The bundle of wires held together with the elastic band has a male Kato plug at the ends to connect to the track bus; they are also color coded near the plugs to match the Red and Yellow at the terminal block.

The red and black wires connected to the Red track terminals provide track power to a Digitrax DS52 stationary decoder, which controls the turnouts on this module.

Using the 20-041 62mm Feeder Track



This is the method normally recommended at t-trak.org for feeding track power to T-TRAK modules. One feeder track is used for each of the main tracks on the module. In order to maintain the convention of blue wire to the outside these feeder tracks must be oriented in the opposite direction in the second track; see the diagram above right for the orientation. Drill a 3/4" hole under each track so the connector will fit through.

If you use this method it is recommended you use five-minute epoxy, or equivalent, to cement the miniature plug to the underside of the feeder track. This prevents the plug from being pulled out of the socket when the feeder wires are pulled through the holes that have been drilled in layout surface.

Using the 24-818 Terminal UniJoiner (Preferred)

There will probably be places on T-TRAK modules where using the 20-041 Feeder Track will not be suitable, such as where a 62mm track section will not fit and on corner modules. The Terminal UniJoiner, shown below, is the answer, and provides the most flexibility to supply track power to a module.



In order to use the Terminal UniJoiner, you must first remove the existing UniJoiner from the sections of Unitrack that will be connected using the Terminal UniJoiner. To do this use the UniJoiner Remover tool that came in the Terminal UniJoiner package, as follows:

- Insert the UniJoiner through the hole in the remover (Kato logo facing out).
- Slide down and lock the UniJoiner with the latches
- Pull out on the tab.

Now install the Terminal UniJoiners being careful to watch polarity — joiner with blue wire to the outside, i.e. front of the red track and rear on the yellow track.

Be careful when handling the Terminal UniJoiners not to pull the wires where they are attached to the joiners as they can be pulled loose without too much effort. Once in place leave a little slack in the wires, and then anchor so they cannot be pulled.

Note that you can make your own Terminal UniJoiners using standard UniJoiners. See the references for a link to a page that describes how this can be done.

Never use Terminal UniJoiners in any rail at the end of a module. Joining and separating modules can cause strain on the Terminal UniJoiners and possibly cause a break in the wire.

Using Atlas Code 80 Terminal Rail Joiners



In order to use the Atlas terminal rail joiner, you must first remove the existing UniJoiner from the sections of track that will be connected using the Atlas joiner. To do this use the UniJoiner Remover tool that came in the Terminal UniJoiner package, as follows:

- Insert the UniJoiner through the hole in the remover (Kato logo facing out).
- Slide down and lock the UniJoiner with the latches
- Pull out on the tab.

Now install the Atlas Terminal Joiners. Since both wires are black it will be necessary to mark one for “blue” and the other for “white” to correspond with Unitrack color codes — joiner marked as “blue” to the outside, i.e. front of the red track and rear on the yellow track.

You must also create a channel for the wires in the Unitrack base so the two pieces of Unitrack will fully close together.

The use of Atlas joiners removes the locking effect of the Kato UniJoiners. If you use Atlas joiners be sure to anchor both adjacent sections of track to the module base and/or solder the rail joiner in place.

Soldering Track Feeder Wire Directly to the Unitrack Rails

Track feeder wires can be soldered to Kato Unitrack in the same manner they are soldered to flex track. Drill holes in the roadbed between ties and close to the rail. Feed the wire up through the hole and solder to the nickel silver rail.

When soldering remember that the Unitrack roadbed is plastic and can be easily distorted or otherwise damaged by too much heat or an errant soldering iron. Proceed with caution. See “preferred Soldering Technique . . .” below.

It is recommended the modeler use blue and white colored feeder wires to match the standard Unitrack color coding.

Soldering Rail Joints within Modules

Unitrack UniJoiners are reliable and conduct electricity well as long as you are careful when scenicking not to get glue, paint, scenery stuff, etc. in the joiner. If you prefer to solder all your rail joints then do it as soon as you are finished installing and testing the track, and before you start scenery. **Do not solder the UniJoiners at turnouts as turnouts are the most likely track component to fail, and need replacing.**

If you choose to ignore this advice and get “stuff” in your UniJoiners, and conductivity becomes a problem then you can add feeder wires directly to the Unitrack rails, as described in the previous section.

Preferred Soldering Technique for Soldering Feeder Wires to Unitrack Rails

Following is the preferred method for soldering feeder wires to Unitrack:

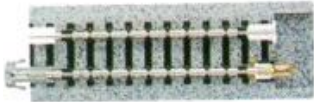
- Drill a tiny (1/16”) hole between two ties, on the outside of the rail, and through the roadbed and the module base. Poke a short length of 18-gauge or 20-gauge solid wire through the hole; the wire does not need to be insulated. Bend the top tip of this wire into a hook shape that will rest on the base of the rail.

- Use a tiny wire brush to clean and brighten the rail to be soldered, being sure that any ballast or paint that adheres to the rail is scraped off. Apply a small amount of resin flux to the rail and the tip of the wire.
- Make sure that the wire will stay put while soldering. The way soldering works is to make a mechanically-sound joint (one that stays together without solder), heat the joint, and let the solder flow into the joint by capillary action. The soldering iron is not used to push the solder around.
- Use only fine gauge (0.062") resin-core solder for electrical and electronics work. Acid core solder is intended for soldering copper pipes and will corrode wiring and electronic circuitry.
- Use a 25-watt maximum soldering iron with a fine pointed tip. Be sure the tip is clean and freshly tinned, and hot. Heat sinks, damp cotton or other heat limiting devices are not needed.
- Press the soldering iron to the junction of the rail and wire for 1 – 3 seconds, touch the tip of the solder to the wire making sure the solder wets the rail and wire, and then remove the soldering iron and solder. Do not touch the joint until the solder cools.
- Observe the joint after it has cooled down. The solder should be shiny. If it is dull you have a cold-solder joint, which does not ensure good contact. A cold-solder joint is normally caused by movement of one of the parts being soldered while the solder is cooling. Heat the solder again to the point of melting, and then let cool being very careful that the wire does not move.

Connecting Unitrack to Other Brands of Track

Unitrack was designed in a manner that allows connection to other brands of track, such as Atlas, Peco, Model Engineering, etc. Since Unitrack uses Code 80 rail the easiest connection will be to other brand Code 80 rail, although it is fairly simple to adapt the connection for Code 55 or 65 rails.

Using the 20-045 62mm Sectional Track Conversion Track



The 20-045 62mm Sectional Track Conversion Kit is marketed as a means to connect with Unitrack on one end and with Code 80 sectional or flex track on the other end. Normal nickel silver rail joiners are used at the sectional track end. The sectional or flex track will need a cork or other suitable roadbed to maintain the same height as the Unitrack rail.

However, this item is inappropriately labeled, and is actually not needed to connect to standard brands of Code 80 track. To join regular Code 80 track simply remove the UniJoiner from the Unitrack, place regular metal rail joiners on the rail ends, join the tracks and shim up the regular track to support it.

The 20-045 Sectional Track Conversion Track was specifically designed to connect Unitrack to the track of Kato's larger Japanese competitor, Tomix. The shelf on the end of the conversion track is just wide enough and high enough to support the Tomix track roadbed.

Directly Connecting Other Brand Track to Unitrack

Simply remove the UniJoiner from the end of a section of Unitrack and replace it with a standard nickel silver rail joiner into which the conventional sectional or flex track to the Unitrack. To remove the existing UniJoiner use the UniJoiner Remover tool that came in the Terminal UniJoiner package, as follows:

- Insert the UniJoiner through the hole in the remover (Kato logo facing out).
- Slide down and lock the UniJoiner with the latches
- Pull out on the tab.

Note that cork or other suitable roadbed will be required to maintain the same rail height as the Unitrack.

A little bit of Unitrack 240-039 ballast should blend another manufacturer's track into the end of the Unitrack rails.

Cutting Unitrack to a Non-Standard Length

Sometimes you will need a piece of Unitrack with a length different from the standard available lengths. If that length cannot be accommodated using the Unitrack 20-050 78–108mm Expansion Track you must cut a longer piece of Unitrack down to the needed length. There are three methods:

- Using a razor saw, such as X-Acto or Atlas.
 - Measure the length of track needed. Double-check the measurement.
 - Using the razor saw, saw the Unitrack piece to a length very slightly less than the measured length.
 - Cut notches in the cut end of the track similar to the gaps at the uncut end of the track.
 - Use standard Atlas metal joiners to connect to the adjacent piece of Unitrack.

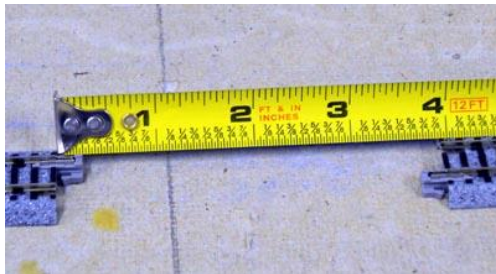
Do not use the cut end at the end of a module as the Atlas joiners do not hold as tight as the Kato UniJoiners. If the cut piece of track is very short consider soldering the joints as these short pieces of rail may move out of position.

- The following method is from the T-TRAK Email list on Yahoo Groups, by Andrew George:
 - Look carefully at a piece of Unitrack. Notice that at one end there are a couple of stake marks on the rail to fix the rail to the base. Call this the fixed end.
 - With a razor saw, cut just the base about $\frac{1}{2}$ of the total length desired, from the fixed end. Do this in the ballast area, rather than the tie area.
 - Slide the base off the free end and cut the removed base section to the remaining desired length. File the ends of the base for an exact fit, if necessary.
 - Slide the free base back on and glue the base sections together with liquid styrene cement. If necessary, reinforce with lengths of styrene strip. Let dry at least two hours.
 - Cut of the rails flush to the end with rail nippers, and file smooth if necessary.
 - Cut notches in the cut end of the track similar to the gaps at the uncut end of the track.
 - Use standard Atlas metal joiners to connect to the adjacent piece of Unitrack.

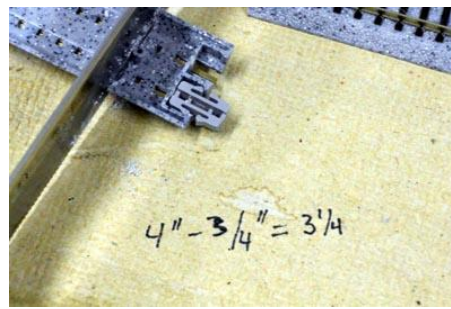
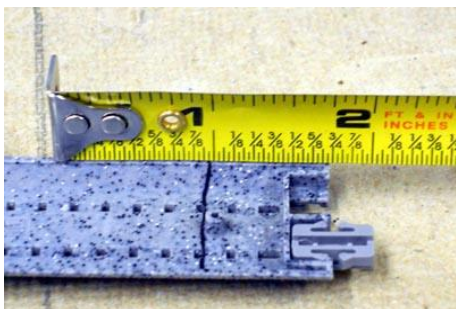
This procedure can be done with both straights to get custom lengths and curves to get odd angles of curvature.

- Mike Fifer of Fifer Hobby Supply has published on his web site a third method of making your own lengths of Unitrack. Go to http://www.fiferhobby.com/html/how_to_make_your_own_lengths_o.html or follow the steps below (used with permission):

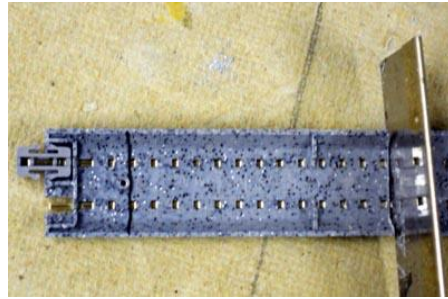
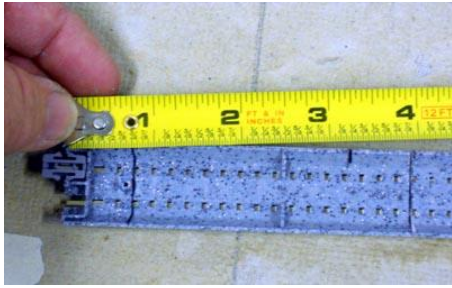
You will need a tape measure, a razor saw, rail nippers, a small flat file and some Testor's plastic cement. The first thing to do is to determine what size piece of track you will need.



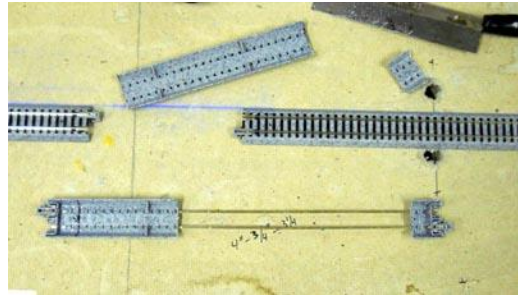
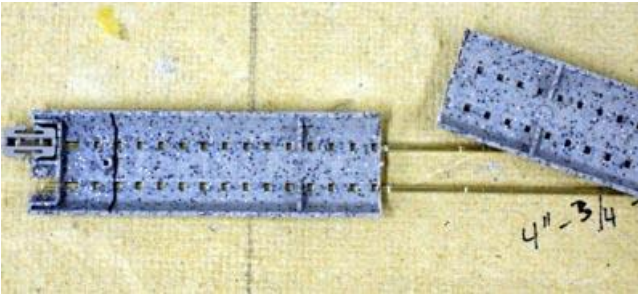
In this case I needed a 4" piece and using a fine point sharpie or pencil mark the length on any piece of longer Kato Unitrack.



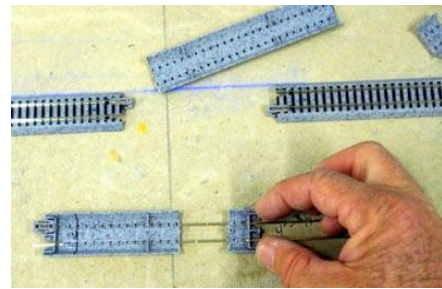
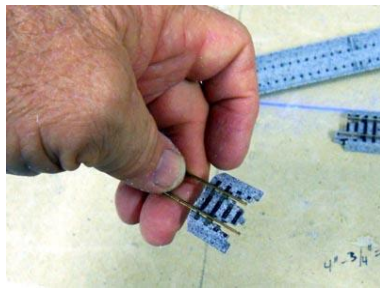
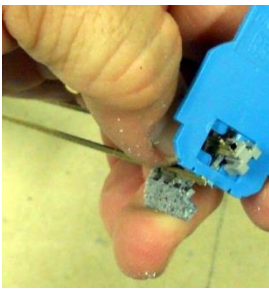
Our first cut to be made will be one either end of our track piece to be cut and you can see that we need to leave $\frac{3}{4}$ " of the end to retain our joiner section. You can also see that I subtracted the $\frac{3}{4}$ " from our original measurement and the remainder of $3 \frac{1}{4}$ " is the next length to cut from the other end of the piece.



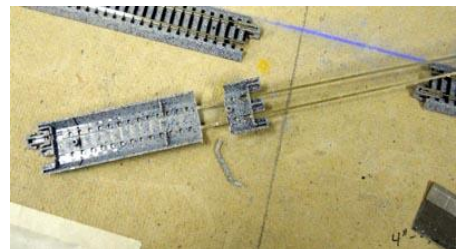
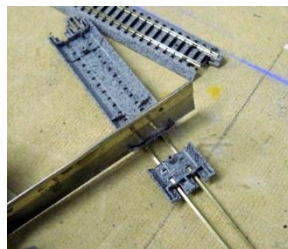
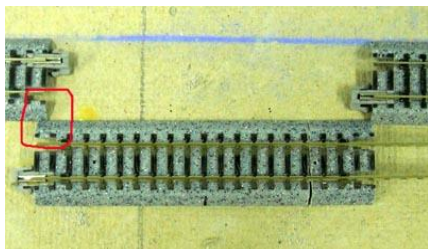
Once the second cut is made the piece of roadbed to be removed is now carefully popped off the rail.



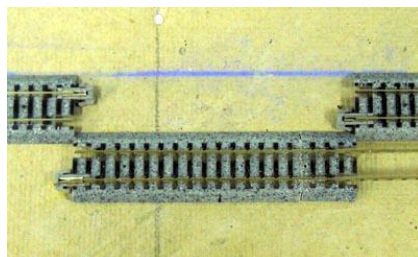
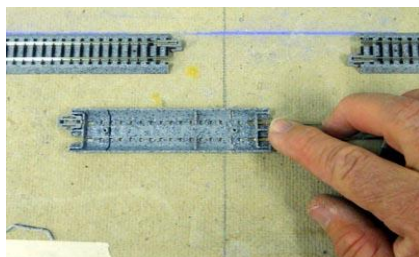
Now remove the Unijoiner from the $\frac{3}{4}$ " end section and slide it towards the longer end.



Now we need to test fit the piece we have made, and oops it is still a little long so we need to cut a small slice out to shrink it some more.



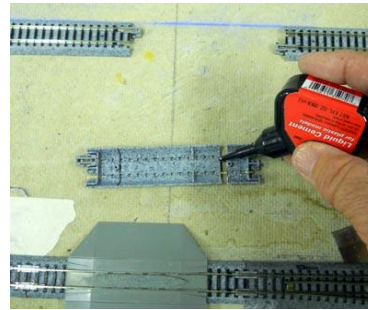
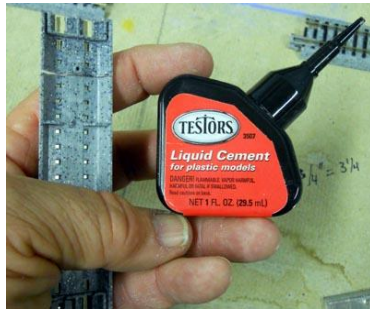
Now that our slice has been cut out slide the short end back down and re-test fit. Now the piece fits perfect.



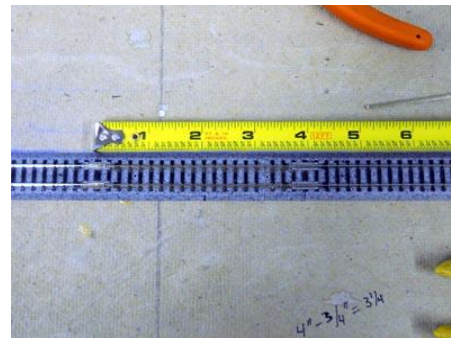
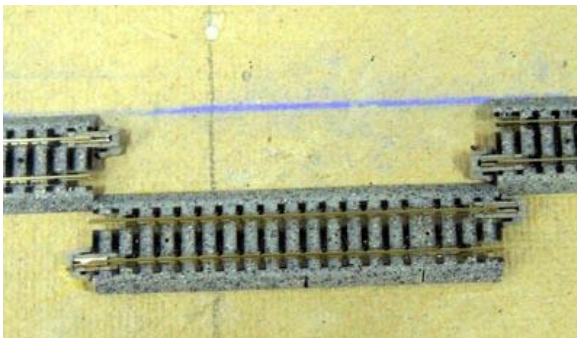
Now using your rail nippers cut the track flush with the end of the short cut end and file smooth with an emery board or small flat file.



At this point you have the option of gluing or not gluing the road bed together. The section will work either way but I prefer to glue them and I find that Testors liquid cement works well and bond pretty fast.



Once glued you can re-install the UniJoiner that you took off to slide the small section and you have now created your own 4" section of track and it looks and fits perfectly!



This same procedure can be used to get specific degrees of radius to meet certain needs as well.

The Kato Unitrack “Blue Tool”

The Kato Unitrack “Blue Tool” that is packaged with various components has two functions:

- It is a clearance gauge. Place the two small slots on the rails and see if things are clear.
- It is a UniJoiner removal tool. The hole is shaped like a plus (+) sign. Place the flat side of the tool over the UniJoiner. The tool goes sideways over the UniJoiner and slides so two of the thin prongs on the tool fit under the wings on the UniJoiner. The push or pull on the tab on the tool to pry the UniJoiner out of the track section.

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Source

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