

3D RAILROAD CONCEPT AND DESIGN TUTORIAL

Welcome to the 3D Railroad Concept and Design tutorial. This tutorial, as well as the other information in this manual, will give you step-by-step instructions on how to create a sample HO scale layout. Let's get started.

The layout that we will create will be in HO scale since this is the most popular. The principles in this tutorial will also apply to other scales. If you are using a scale other than HO, you may substitute it in the place of HO in this tutorial. The program is set to HO by default.

GETTING STARTED

The first thing you will notice is that we have a blank layout window labeled *Untitled*. The first thing we will do is set up our layout size. Our units of measurement are set to decimal inches by default. If you wish to change the units of measurement, you may select another setting and then save it as a default. Doing this will cause the program to use this setting every time you open it (see *Metrics & Grid*, under Options\Preferences on how to change the default setting in the *What are all those Menus & Buttons?* chapter).

First, select Document Setup, under the File menu. For our sample layout, we will change the layout dimensions to a width of 300.00 and a height of 175.00. Since our default units of measurement are in decimal inches, this would make our layout 300" x 175". Keep in mind that these numbers will always be in whatever units of measurement you choose. To change the measurements of your layout, simply highlight each of the fields and change the numbers accordingly. For this example, we will leave all of the other settings as they are. After you have entered the new dimensions, click OK to exit the document setup. Now press the Caps Lock key on your computer. This will allow the program to automatically switch to the selector tool after you have used any of the other tools. Leaving the Caps Lock off will force the program to lock the tool that you have selected until you select another tool.

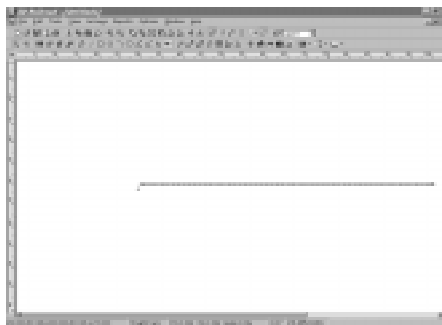
USING THE TRACK TOOLS



The first thing we will do is draw a straight piece of track. Click the Straight Track tool. You will notice that the selector tool turns into a small piece of straight track with a small cross-hair next to it. Move the track tool into the

drawing window and place it at the point on the ruler to where it's at 30" down and 30" across. Holding the left mouse button down, draw a piece of track. It doesn't matter at this time how long a piece you draw. You may also hold the shift key down while drawing a straight piece of track to constrain it into a perfectly straight angle.

Fig. 1

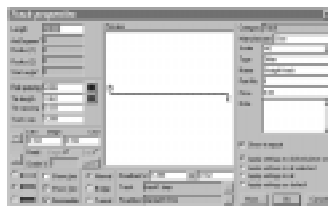


Now, click on the piece of track that you just drew with the right mouse button (you will need to click on one of the rails to select it). Select Properties from the pop up menu by clicking on it with the left mouse button. This will open the Track Properties dialog for the straight piece of track that you just drew (Fig. 2).



The first thing we will do is change the length to 50.00. Now click OK. Select the Curve Track Tool. Holding the left mouse button down, draw a curved piece of track. As with the straight piece of track you drew before, it does not matter how large or small a piece you draw.

Fig. 2



Right click on the curve piece and then select Properties to bring up the Track Properties dialog (Fig. 3). Change the Radius (1) to 36.00 and then click on the

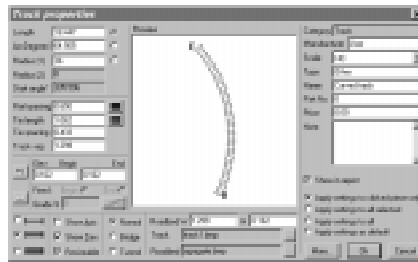


Fig. 3

small selector dot to the right of the Radius (1) number field. Now change the Arc Degrees to 180 and then click on the selector dot to the right of the Arc Degrees number field. You will notice the curve piece in the preview window change to match the new dimensions. Click OK. Now, left click on the curved track piece and drag it, holding the button down, so that one of its ends almost comes into contact with the end of the straight piece. When the pieces are almost touching, let go of the mouse button and you will see the two pieces snap together (Fig. 4).

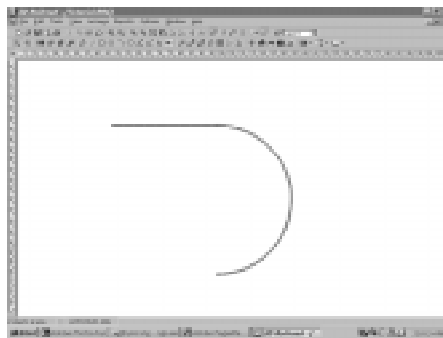
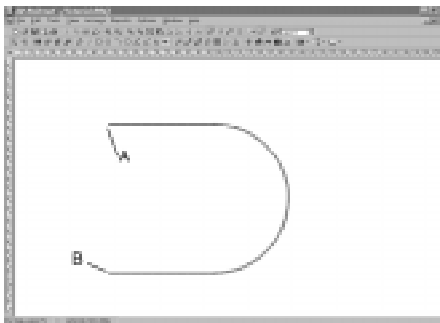


Fig. 4

Now select the straight piece of track that you drew by left clicking on it. Press CTRL-D to duplicate it. Drag this new straight and snap it onto the other end of the curve track (Fig. 5).

Fig. 5

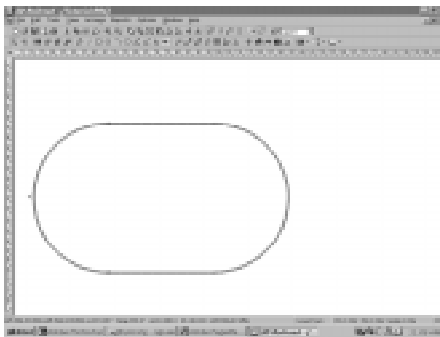


CONNECT USING CURVE-STRAIGHT TOOL



To complete our oval, click on the Connect Using Curve-Straight tool. Place the pointer over the end of the straight piece (point A in figure 5). When the pointer is in the correct spot, it will turn black. Click and hold down the left mouse button. You will see a pink square appear at the point where you click the mouse. While holding the mouse button down, move the pointer to point B in figure 5. You will see a dotted line from point A to point B. When you move the pointer to the end of the track at point B, you will see another pink square appear. This indicates that the connection will be made correctly. Let go of the mouse button and the program will connect the two pieces of track using curved track and if necessary, straight pieces. You should now have a complete oval track (Fig. 6).

Fig. 6





Tip: At this point, you may want to zoom out so that everything fits on the screen better. You can do this by either using the Zoom Out Tool or by pressing the CTRL and Page Down keys at the same time.

LAYING TURNOUTS

We will now add a turnout and a side spur to our layout. There are three different methods for creating turnouts. The first one is as follows:

Draw a straight piece of track that measures twelve inches long and snap it to the right-hand end of the bottom straight piece in Fig. 7. You will see a red line appear where the two track pieces are joined together. This line indicates the direction that the turnout is thrown. So we now have a functioning turnout. The other two methods involve Using Track And Object Libraries and Using The Track Wizard.

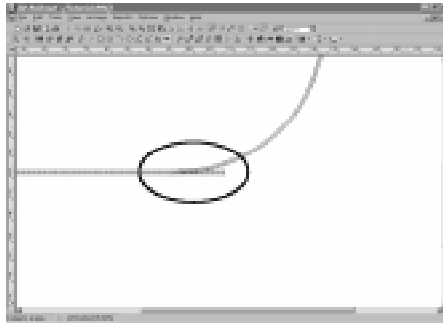


Fig. 7

USING TRACK AND OBJECT LIBRARIES



Click on the Get Object From Library button. You will see an Open dialog (Fig. 8). Scroll to the Track_Atlas.RRL library, select it, and then click Open. You will now see a library window with all of the Atlas track objects and their descriptions (Fig. 9). Scroll down and with the left mouse button, select a 9" Straight Track (Part No. 150). Now click the Add To Plan button. This will paste the straight piece into the center of your layout. Click on the new straight piece with the left mouse button and drag it to the end of the turnout you created so that it snaps together.

Fig. 8

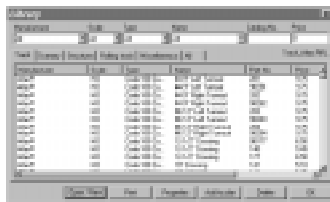
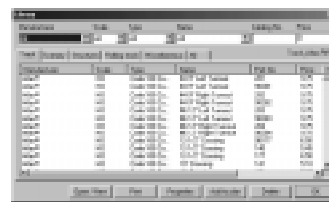
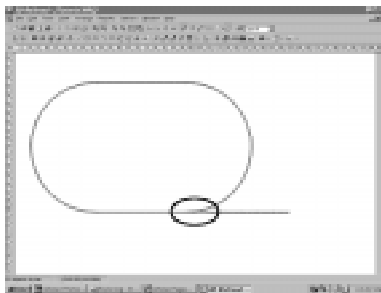


Fig. 9



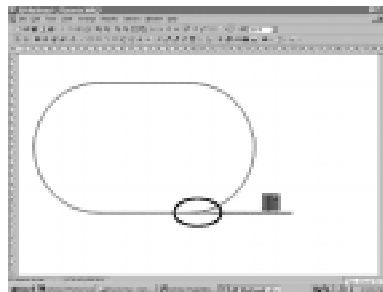
Select the new straight piece and duplicate it four times, using the CTRL-D function. Snap all of these together so that you end up with a continuous straight piece coming off of the turnout (Fig 10).

Fig 10



Click on the Get Object From Library button again. Click on the Open/New button and select the Obs_Walthers library. Now scroll down until you find the Vulcan Manufacturing Co. (Part No. 933-3045). Select this item by left-clicking on it and then click the Add To Plan button. Arrange the building so that it is towards the end of the spur as shown in figure 11.

Fig. 11



Tip: After selecting a library object, you may click on the Properties button to see the Group Properties dialog for that object. From here, you can click on the 3D Properties button to see the object rendered in 3D. From here, you can adjust the elevation, height, and tilt of the object (see the section on editing 3D Properties for more information). To see what you've done so far in 3D, click on the 3D button. For help on navigating in the 3D view, see *Moving Around In 3D Window* on page 112. When you wish to switch back to the 2D view to continue working on your layout, click on the 2D button.

CREATING A MOUNTAIN WITH THE TERRAIN TOOL



Now we'll create a custom mountain object with the Terrain Tool. You should have switched back to the 2D view before proceeding further. First, click on the Terrain button. Now move the crosshair into the drawing window. With the terrain tool, we will draw our mountain object. Each time you click the left mouse button, an anchor point will be dropped.

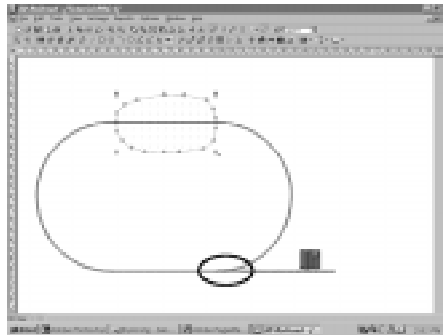


Fig. 12

For this example, just draw an oval shape similar to the one shown in figure 12 and place it so that it sits on top of the track. To finish the mountain, double click with the left mouse button. This will finish the mountain and bring up the Terrain Properties dialog (Fig. 13). From here, you may select line style and width, fill, and line and points colors. If you want this object to show up in your materials report, check the Show in Report box. For this example, we'll leave everything at its default setting. Click on the Terrain tab at the top of the dialog to bring up the next set of options (Fig. 14). In this portion of the terrain editor, we'll be able to really start creating our mountain object.

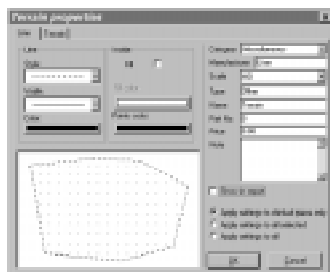


Fig. 13

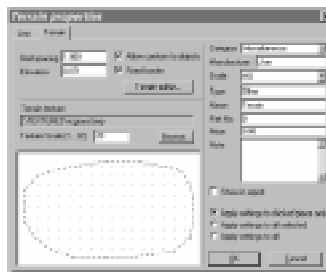


Fig. 14

The first thing we'll do is click on the Terrain Editor button. This will take us to the terrain editor (Fig. 15). With this tool, you will be able to customize your mountain object to your liking.

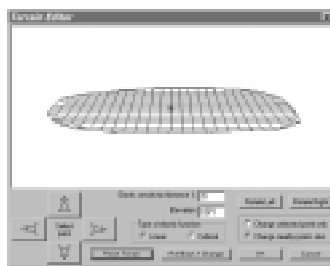


Fig. 15

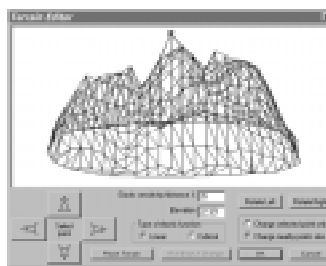


Fig. 16

The first thing you will notice is that the polygon you drew is presented as a grid with a red ball (Fig. 15). To create your mountain, click on the red ball with the left mouse button and hold it down. Now, try moving the mouse up and down. As you move the ball up and down, the number in the elevation field will change to the current height of the red ball. You may click on different points on the grid and change their elevations as well. You may also use the four arrow buttons to move the red ball around to different points on the grid. Change several different points of the object to create a mountain similar to the one shown in figure 16. Don't worry if it's not exactly like the one shown. Just try to create an interesting shape at this point. You may click on the Rotate Left and Rotate Right buttons to spin the object in the editing window. This way, you can see all sides of your mountain as you build it. If your mountain object is too large and you need to zoom out, click anywhere in the white area (but not on the grid object) and then use your up and down arrow keys to zoom in and out. If you wish to make broader peaks, change the

number in the Elastic Sensitivity/Distance % to a higher number. This affects the number of surrounding points that the red ball will grab. Setting the Type of Elastic Function to Cubical will make more rounded peaks. If you only want to pull up an individual point, select the Change Selected Point Only option. Once you are finished creating your mountain, click OK.

Now we will change the texture of your mountain. Click the Browse button under Terrain Texture. This will bring up the texture selection dialog. Choose the texture Hill Grass1.bmp and then click the Open button, followed by the OK button.

Click on the 3D button to take you back to the 3D view of your layout. You should see the mountain object that you created. But wait a minute..... it's sitting right on top of your track! We can't have that. One solution would be to make a tunnel. To do this, switch back to the 2D view and proceed to the next step below.

CREATING A TUNNEL

Creating tunnels in *3D Railroad* is really very simple. First, select the track piece that is under the mountain object (Fig. 17).

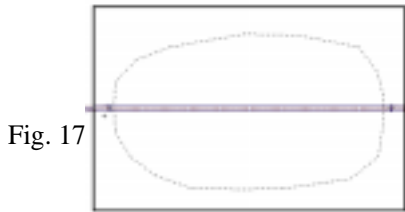


Fig. 17

Right click on this piece and select Properties. Now, in the Track Properties dialog, set the track type to Tunnel. Click the More button to bring up the More properties dialog. Here is where you can specify the tunnel height and width, as well as the texture for the tunnel interior. For now, we'll leave the height and width at their default settings. However, we will change the texture that is used on the interior tunnel walls. First, click on the Use Texture check box, then click on the button with the three dots on it to the right of the texture field. This will bring up the Open Texture dialog. Choose the texture, Stone04.bmp and click Open, then OK. Click OK again to exit the Track Properties dialog.

Switch back to the 3D view. Maneuver the view so that you are looking at one end of the mountain.

Note: You will need to make sure that both ends of the tunnel track extend past the edges of the mountain object, otherwise, the terrain will not conform to the track properly.

CONFORMING TERRAIN TO OBJECTS

Now you should see the mountain you created with track coming out of each side (Fig. 18). Under the Arrange menu, select Conform Terrain to Objects. You will see a tunnel opening appear on each side of your mountain (Fig. 19). Creating tunnels with this method also works with curved and graded track so it's possible to create some really interesting tunnels. If, for any reason, you need to undo the tunnel, select Restore Terrain from the Arrange menu.

Fig. 18

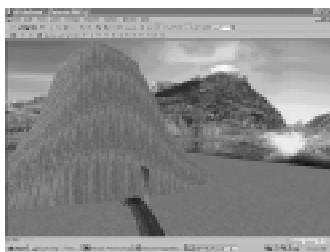
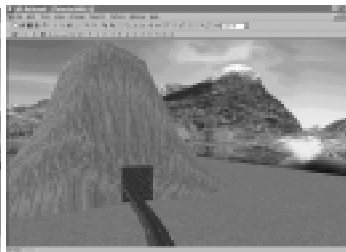


Fig. 19



CREATING GRADES AND ELEVATIONS

The next step in our layout will be to create a grade going up a mountain. The first thing we will need to do is to create some more track. Back in the 2D view, select the Straight Track tool and draw a piece of track. After you've done this, bring up the track's properties (right click and then Properties). Change the length to 24". Select this new piece of track and press CTRL+D to duplicate it. Make two copies of this piece for a total of three. Snap them to the end of the straight piece in figure 20. Now, select the curved track (the one closest to Vulcan Manufacturing) and duplicate it. Snap this to the end of the new straight pieces you drew (Fig. 21).

Fig. 20

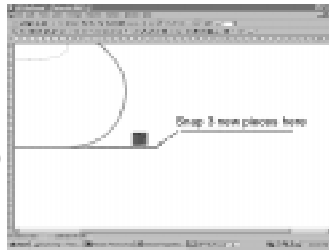


Fig. 21

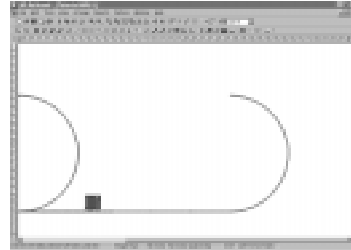
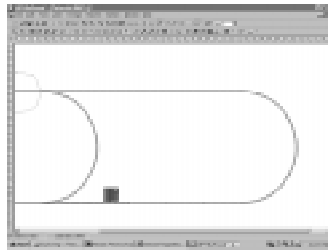
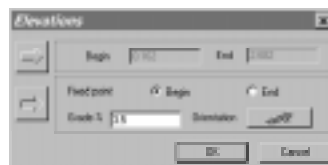


Fig. 22



To finish the second oval, draw a straight piece of track that measures 64.5" long and snap it to the end of the curve you just placed. Now duplicate this piece and snap it to the end of the last straight piece you drew. This will complete the second oval part of the track (Fig. 22). Now we will place a grade over a section of track. Click on the Chain Track Elevations button. You will see the selector tool change into a small triangle with a % sign on top of it. Move the pointer over the first section of track that lies just past the Vulcan Manufacturing building. You will notice that the pointer will change from white to black when you move it over the piece of track. When you see it turn black, click the left mouse button and hold it down. You will see the track piece you clicked on turn light blue. While holding the mouse button down, drag it over the next two pieces of track. You will see these turn blue as well. When the third piece of track turns blue, let go of the mouse button. An elevations dialog will appear (Fig. 23).

Fig. 23



Click on the lower arrow button. This will activate the Grade % field. Type 3.5 into this field. This will apply a constant 3.5% grade to the 3 straight pieces of track. So now you have a 3.5% grade on your straight pieces of track but they are connected to an ungraded curve. No problem. Grab the curved track (the one on the furthestmost right-hand side), move it just a little bit, and then snap it back to the graded straight section. It will now take on an elevation of 2.682, which is the elevation of the end of the last straight piece of graded track. So what we have now, is a graded straight section of track which levels off when it reaches the curve. Now all we have to do is create a descending grade to take us back to ground level. The first thing we will need to do is use the Cut Track tool to cut the straight piece of track that creates our turnout (the one that sits right at the tunnel exit). Click on the Cut Track tool and then cut the straight piece of track as shown in figure 24 by clicking on the actual track piece in the appropriate spot.

Fig. 24

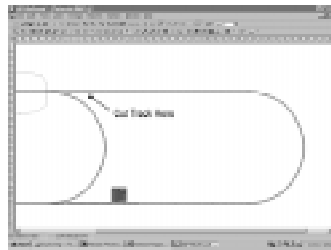
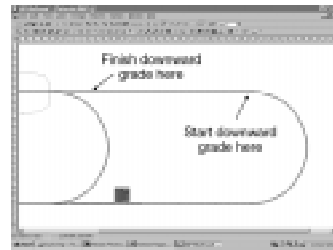


Fig. 25



Once the track is cut, click on the Chain Track Elevations tool and left click on the straight piece at the end of the curved track (Fig. 25). Hold the left mouse button down and move the pointer to the left, over the second straight piece. Let go of the button and when the Track Elevations dialog comes up, enter the number 2.682 (The elevation of the curved piece of track) in the Begin box. The figure in the End box should read, 0.162. Click OK to set this grade. Now click on the 3D button. You should see your grade as shown in figure 26.

Fig. 26



GRADED TRACK AND MOUNTAINS

Now that we have our graded track laid, let's try putting a mountain over it and then conform the mountain. This will give a nice effect of the track gradually going up the mountain.

The first thing we'll do is to create another mountain object. Click on the Terrain button and draw a mountain similar to the one shown in figure 27. Place the same texture on it as you did on the last mountain you drew (Hill Grass1.bmp). Place it over the track as shown and then select Conform Terrain to Objects from the Arrange menu. Now go to the 3D view. You should see that the track has carved out the portion of the mountain that was in its way (Fig. 28).

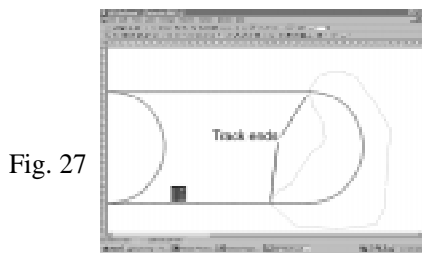


Fig. 27

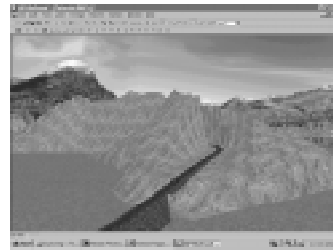


Fig. 28

USING THE TRACK WIZARD



The Track Wizard can be used to create almost any type of complex track piece with ease. For this example, we will construct a right-hand turnout and place it into our layout. First, click on the Track Wizard button. Once the wizard is opened, click on the Turnout tab. You will see a turnout with the lengths of each track piece that make up the turnout.

Fig. 29

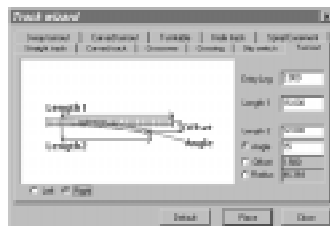


Fig. 29b

The first thing we will do is check the Right option which will change the orientation of the turnout. Next, change the Entry Length to 1". This is the piece of track that is just prior to the point where the other two pieces join together. Now change Length 1 to 10", Length 2 to 8", and the Angle to 15. You'll notice that the turnout in the window changes as you make changes to the numbers in the editor dialog. Click the Place button to place the new turnout in the center of your layout. To place this new turnout, we will need to edit your layout a bit. Using the Cut Track tool, cut the straight piece on the bottom of the first oval in the middle. Using the zoom tool, zoom up on the spot where you just performed the track surgery. With the selector tool, right click on the leftmost straight piece and select Properties with the left mouse button. Set the length of this piece to 7.0. You should now have a gap in the lower part of your layout (Fig. 30). Drag the turnout you created earlier and snap it to the end of the left-hand straight piece (Fig. 31).



Fig. 30

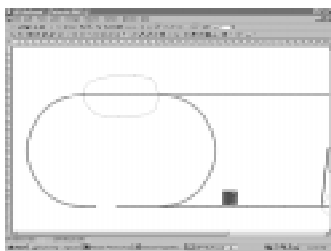
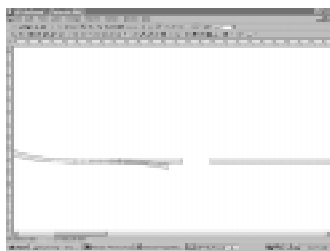


Fig. 31



CONNECT USING SPLINE TOOL



You will notice that there is now a gap at the end of the turnout. One way to correct this is to use the Connect Using Spline tool. This is an easy way to close up any gaps you may have in your layout. To use this option, first click on the Connect Using Spline button and then move the pointer to the end of the straight track on the turnout. Click and hold down the left mouse button and draw a line to the end of the track piece that you wish to join up with. As soon as you start moving the mouse towards the other piece of track, you will see a pink square appear at the end of the turnout. As you move the mouse closer to the piece that you wish to join with, you will see a dotted line. When you reach the other side, you will see a pink square appear at the end of the second track piece. When you see this second pink square, let go of the mouse button and a

piece of flex track will be placed into the gap (Fig. 32). You may use this option anywhere that a piece of flex track would normally work.

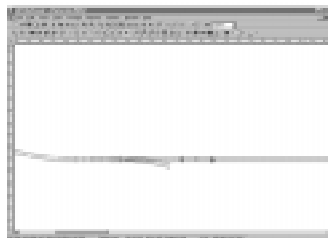


Fig. 32

CREATING PARALLEL TRACK



Now let's add a parallel track section to the new turnout we just placed. Click on the Parallel Track button. The selector tool will turn into a parallel track tool. Move this pointer over the section of track that you wish to parallel. For this demonstration, we'll select the second piece of straight track after the right-hand turnout (Fig. 33). Left click anywhere on this straight section of track and hold the mouse button down. You will see the track turn light blue in color, much the same as the Chain Track Elevation tool. While continuing to hold the mouse button down, run the pointer to the right over several more straight pieces. Stop when you get just past the Vulcan Manufacturing building. At this point, let up on the mouse button and move the mouse slightly down, away from the building. You will see a dimension line with two arrows, along with the separation of the track in inches. Set it as close to 2" as you can and then click the left mouse button. You will now see a Parallel Track dialog with the current separation distance of the parallel track that you just created. You may now type in the exact number that you want.

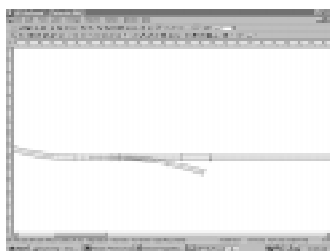


Fig. 33

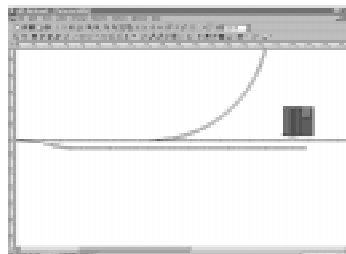


Fig. 34

The program will measure center to center and place the parallel track on the layout for you. For this example, set the track separation to exactly 2". You will now see your parallel track section appear on your layout.

We will now need to close up the gap in the track between the parallel section and the turnout. Use the Connect Using Spline tool to accomplish this. When completed, you should end up with the equivalent of figure 34. The last thing we need to do to finish the layout is to add a bumper to the parallel track we just created. Click on the Get Object From Library button and open the Track_Bumpers library. Select any HO bumper and then click the Add to Plan button. With the bumper selected, go to the Arrange menu and select Rotate Right (90). Snap the rotated bumper to the end of the parallel track (Fig. 35) to complete the sample layout.

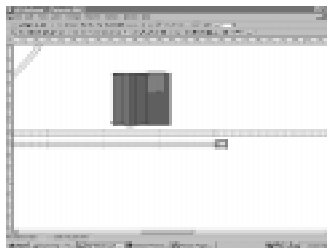


Fig. 35

CREATING ROADS WITH THE TRACK TOOLS



Okay, it's been brought to our attention that Vulcan Manufacturing is in need of a parking lot and, more importantly, a road so that their employees can get to work. To do this, we'll use the track tool.

The first thing we'll create is the parking lot. Draw a short section of straight track. Right click on it to bring up the Track Properties and change the following measurements:

Length:	18.00
Rail Spacing:	14.00
Track Sep:	14.00
Roadbed W:	14.50
H:	0.100

Elev. Begin: 0.100

Elev. End: 0.100

Show Ties: This should be unchecked. Simply click on the check box to uncheck it.

Click on the Track Texture button (Fig. 29 b) and then select the texture named Road03.bmp. Click Open, then click the Roadbed Texture button and select the texture named Ballast Gray.bmp. Click Open, followed by OK. You now have a parking lot. You can experiment with these settings and try placing different textures on this type of track piece for different effects. To create a piece of road, use the following specifications:

Length: 9.00

Rail Spacing: 2.00

Track Sep.: 2.00

Roadbed W: 2.50

H: 0.100

Elev. Begin: 0.100

Elev. End: 0.100

Show Ties: Unchecked

Track Texture: Road02.bmp

Roadbed Texture: Ballast Gray.bmp

Keep in mind that these numbers are only a guideline. You can experiment with these to create your own unique road pieces. This method will also work with curve and spline track. These road pieces can be snapped together just like track pieces. It is also normal for road pieces to appear in the 2D window as a hollow line.

RUNNING A TEST TRAIN



We're now ready to run a test train on our layout to make sure that all of our track connections are valid. Click on the Run Test Train button. The selector tool will change into a train icon with a small crosshair next to it. Place it close to a track join and click the left mouse button. This will open the Train Properties dialog. From here, you can select the train and car objects, the speed of the train, and the number of cars. You may also select the color of the train on the 2D layout. Once you have made your choices, click okay to place the

train. If you want to stop the train, click on the pull-down menu (located to the right of the Test Train button) and select the Stop Train button.

Tip: When running a test train, you can throw switches by clicking on the red lines of the turnouts. You will see it move to indicate which direction the switch is thrown.

NAVIGATING IN THE 3D WORLD



By clicking on the 3D button, we can once again enter our layout from a 3D perspective. Navigation can be accomplished by using the mouse, keyboard, or navigation buttons on the top of the 3D screen.

Mouse:

To navigate with the mouse, it is easiest to think of the 3D window as a clock face. Holding the left mouse button down and moving the pointer toward 12 o'clock will result in your moving forward. The farther you go toward the top of the window, the faster you will move in 3D space. Moving the pointer downward toward 6 o'clock will result in your moving backwards. Right and left movements are achieved by moving the pointer toward 3 o'clock and 9 o'clock.

Tip: It is possible to change the altitude of objects in the 3D window by clicking on them with the right mouse button and then moving the mouse up and down. This will not work with track or scenery (mountain) objects.

Keyboard:

To navigate with the keyboard, use the arrow keys (usually located next to the numbered keypad) to move forward, backward, left and right. To move the camera up and down, use the Page Up and Page Down keys. To tilt the camera, hold down the CTRL key in conjunction with the arrow keys. Holding the Shift key down while using the left and right arrow keys will result in sidestepping instead of turning in place.

Navigation Buttons:



You may also navigate in the 3D window by using the navigation buttons located at the top of the screen. These buttons allow you to gain many different perspectives of your layout. For more information on what the specific buttons do, see the section on View Menu Items in the *What Are All Those Menus and Buttons?* chapter.