

The Art of Prototype Operations

ProTrak

The Professional Railroad Operations System

ProTrak

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ProTrak

The Professional Railroad Operations System

The Recipe Book
and
Operations Summary

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1 Introducing *ProTrak*

Thank you for purchasing ProTrak.

Please read this brief introduction about how to use ProTrak to operate your model railroad. Follow along in this book as you install ProTrak on your computer, do an initial setup, and run your first operating session.

ProTrak is about the greater enjoyment of running your railroad 100% realistically. This book, the *ProTrak Recipe Book and Operations Summary*, will help you get ProTrak up and running. It will explain:

- some key points about setting up your railroad within ProTrak; and,
- how to run a basic operating session.

We describe key features on computer-based operations and how those features are incorporated within ProTrak. To get the most out of ProTrak you should read this book. You can get help with ProTrak on the ProTrak website. The website shows you exactly what prototype operations documents look like. There are also summaries of how the prototype uses these documents. The website also contains other demonstration railroads, users' railroads, and a reference library. There is a ProTrak users' chatlist on Yahoo at <<http://groups.yahoo.com/group/ProTrak>>.

As much as possible the ProTrak program is “stand alone”, intended to be self-contained. However you may wish to refer to sections in this book, as you delve deeper into ProTrak.

How to install

ProTrak is installed on your hard drive the same way other Windows (98/NT/2000/ME/XP) software is installed. Put the ProTrak distribution CD in your CD drive. Then either:

a) click the Windows **Start** button, then **Run**, then type the CD drive letter and <*setup.exe*> (such as <*m:\setup.exe*> where “m” is the drive letter for your CD drive);

OR,

b) click the Windows **Start** button, then **Run**, then **Browse**, select the CD drive and then double-click on **setup.exe**. Then click **Run**;

OR,

c) from the Windows Control Panel, select **Add software**, and click the **Install** button. When Windows finds the setup program, “setup.exe”, on the CD drive, click the **Finish** button.

An install program will run. If your version of Windows, Windows 95 in particular, has out-of-date support files (DLLs), you may be prompted to re-start your computer and re-enter install. In this circumstance, the installation program will transfer up-to-date Windows files, and restart your computer. At the end of install, you are prompted whether you want to start ProTrak now, or later.

Check the box beside “Start ProTrak now”, then click the **Finish** button.

ProTrak is Installed

ProTrak is now installed on your computer. The next step is to register ProTrak and load the databases.

If you clicked “Start ProTrak now”, the blue background of the installation program will disappear, and ProTrak will start.

If you chose to start later, when you want to run ProTrak, click on Windows Start, scroll to Programs and click on ProTrak.

Register Now

The ProTrak registration screen will appear. Register your copy of ProTrak by entering the CD key number **exactly** as found on the sticker on the inside front cover of this book, and your name and address. Click the <Register> button.

A second ProTrak screen will appear. This loads the necessary ProTrak support data. There is a prompt for the CD drive.

- Select the CD, and click the <OK> button. The data will be loaded.
- Click the <Exit> button. The ProTrak startup screen will appear, followed by the ProTrak main menu.

Keep your ProTrak distribution CD handy in a safe place. You will need the data stored on it any time you set up a new railroad.

After ProTrak is installed on your computer, go to the Windows Start menu, and select Programs. ProTrak will be listed. Start ProTrak by clicking on the ProTrak program bar.

Re-installation and backups

ProTrak installs databases (catalogue files) and a default railroad. The data are in:

- ABSCTc - signaling data
- Ind_RDC - diesel and steam locomotives, cities, commodities, other railroads
- UMLER - car kinds
- ES - example railroad.

Do not move, or remove, these folders. Data in the default railroad folder does not interact with your railroad data.

Re-installation of ProTrak **will** write over any changes you have made to your catalog files, such as commodities, signal aspects, locomotives, cities, **and any data in the \ES folder**. For this reason you should set up your railroad in a directory other than the \ES folder.

Your railroad will be in a separate folder. You can have as many railroads as you want - as many as your hard drive will hold. You chose and set up a new folder for your railroad at "File/New home railroad". The folder can have any name. See "Setting up your railroad" later in this book.

You should **keep frequent backups** of your railroad data on a floppy disk, tape, or on a CD. After each operating session, and/or after **each time you modify your railroad data**, for example, by adding cars or adding waybills, you should also back up your data. This is done in ProTrak at "File/Export home railroad", or by copying your data to a floppy or CD using another Windows program.

ProTrak at a glance

ProTrak is a railroad **real-time** total operating system. It manages all the information you need to run your railroad exactly like a full-size railroad, in one, complete package. ProTrak is based on professional railroad engineering and professional operations information sources. Further, ProTrak is comparable to the computer-based software used by full-size railroads, with all the necessary prototype rules and procedures built right in. For example, ProTrak will:

- guide you in selecting the procedures and information you need for operations;
- provide a framework for the operation of your railroad and help you answer questions such as:
 - Where does that car go?
 - What trains should be run?
 - How many trains?
- 'model' all the multitudinous staff and clerical functions of your railroad so that you can concentrate on switching and moving cars, and running trains;
- order, load and empty cars;
- automatically route empty cars to their home roads;
- update train positions with only a few mouse-clicks, and
- automatically yard/route cars into the correct train(s).

ProTrak, is also about planning. When you set up your railroad in ProTrak you are planning your operating sessions. ProTrak has many tools and utilities that will help you optimize your operations.

ProTrak is also control software. It can

- read data from a working track weighscale;
- control both digital and analog fastclocks;
- control your signal system by
 - controlling signals and switchmotors;
 - accepting data from detectors, and
 - providing all the logic for a signal system. (When used in conjunction with the *Grapevine* microprocessor databus you have a complete 'plug and play' signal system); and

- be your digital command control (DCC) system. It will
 - adjust and remember command control settings, and
 - send speed commands to decoders in locomotives.
 - You can also use ProTrak to determine and control the prototype speed for your trains.

The structure of ProTrak

We have designed ProTrak with seven sections corresponding to the seven departments of a railroad corporation directly involved in day-to-day operations, and the usual Windows “File”, “Edit” and “Help” menu items.

The seven key railroad menus are:

- * **Transportation:** where the railroad is operated;
- * **Scheduling:** where train jobs and schedules are set up, and crews are called;
- * **Traffic:** where customers, commodities, waybills and car-orders, and rolling stock data are entered;
- * **The Railroad:** where online stations, off-line points (staging tracks), and other railroads are entered;
- * **The Power Desk:** where locomotive and caboose data are entered, where locomotives and cabooses are assigned to trains, and where your digital command control is set up and controlled;
- * **Signaling:** where the fast clock data is set, and signals are set up and controlled;
- * **Administration:** where the era, terminology, and the format of your paper work are defined.

The usual Windows menus are:

- * **File:** where a new home railroad is created/selected; and where data is imported/exported
- * **Edit:** where new data is created, or data is found and/or sorted
- * **Help:** for Help screens and procedures, and where the program version (the “Build number”) is found.

Options and toggles

ProTrak has options and toggles that allow you to operate your railroad in as simple or as complex a manner as you choose.

- ProTrak was designed with special features that make it easy to handle the unique challenges and situations that modelers face.
- As you gain experience in railroad operations, you can gradually make things more realistic and more complex by ‘turning on’ more toggles or adding more data.

Demonstration railroads

You do not have to have your own railroad to run ProTrak. You can use any demonstration railroad, including the *North South* that is part of ProTrak, or any other railroad. The *North South* is an easy-to-use example of how the various features of ProTrak can be set up. Other, more complex, railroads are available on the ProTrak website or you can import a railroad from another ProTrak user.

Creating your railroad in ProTrak

You should create your own railroad in its own folder.

As installed on your computer ProTrak is using the North South railroad in the ES folder. If you re-install ProTrak the data in the ES folder is overwritten. Data in any other folder is not touched, not even when ProTrak is uninstalled.

You create your railroad in ProTrak, from the File menu. Click “File/ New Home Road” menu item and follow the directions on-screen. This makes an exact copy of the template railroad in the \ES directory, or whatever the previous railroad in use was.

Then, to start with a clean slate, erase all the unneeded data at “Administration, Limits”. Also at Administration, set the Era, terminology, spot code format and other options. Then enter your stations, staging tracks, a switching train, online customers, cars, engines, waybills and car-orders. This is outlined in the next chapter.

Start simply. Leave the “Return Empty” option **blank** for all cars.

2 A Quick Recipe for setting up your railroad

Use this recipe to get the basics of your railroad up and running. This recipe assumes you have some understanding of model railroad operations, and that you have ProTrak installed.

You should have created a new railroad, to hold the data for your railroad. You should not modify the railroad in the \ES folder as it will be overwritten if you re-install ProTrak. Follow the instructions in the previous section, or click “File/New home railroad”.

Name of your railroad

Click “The Railroad/Gateways and other railroads”. This brings up a list of railroads.

- Double-click the first railroad, at listing “1”. This opens an edit window, which has a series of datafields.
- Select the present name (“North South”), click the delete key and type the name of your railroad.
- “Tab” (press the ‘Tab’ key on the keyboard) to move to the next datafield; or click on the “Reporting marks” datafield. Erase the NSOU reporting marks and type the reporting marks (initials) of your railroad.
- Click OK. The edit window closes. Click “Close” to close the list of railroads.

Subdivision name, Timetable direction, scale and minimum radius

Click “Administration/... Notes” (the top menu item in Administration).

- Enter the subdivision name for “core” segment (or main line) of your railroad. Note that the core segment can be subdivided into 5 named subdivisions. The name of the core segment can be the name of the main or central subdivision.
- Click the timetable direction of the “core” segment.
- Click the vertical clearance (“Plate”).
- Click the maximum allowable car weight. (Use 263,000 lbs if your railroad is set in 1963 or later, otherwise select 220,000 lbs.)
- Click “bolted rail” (unless you are sure it is welded rail).

In the lower box:

- Click the model scale.
- Enter the largest minimum radius for the railroad as a whole.

Now:

- Click OK. The window closes.

Stations, yards and special tracks

Click “The Railroad/Stations on core segment”. This opens the listing of stations on the core segment (main line). Double-clicking a station in the listing opens the edit window for stations.

Station #1

Station #1 is eastmost (or northmost) station on your railroad. Station #1 is often a staging yard.

- Double-click the first station in the listing.
- Type the station name, and <Tab> to the next datafield.
- Type a 3 letter shorthand for the station name. This is the zonecode for this station and becomes the first three characters of the siding number for all Customers at this station.
- Under “For main track from”:
 - the distance between clearance points is zero (0)
 - the grade is zero
- Under “At the station”:
 - the number of dispatcher controlled tracks, for a staging yard, is set to “S”.
 - the distance between clearance points is the length of the longest staging track
 - For a staging yard there are no services, and no reciprocal switching.
- Click OK. The window closes.

For Station #1, only, a window pops up asking for elevation above the floor. This is the base elevation for your railroad, and the elevation of all other stations is calculated relative to this elevation. Leave this at “40 inches” or enter the reference elevation (benchwork, roadbed, top of rail or any other elevation you chose to measure from).

- Click OK.

All other stations

- Double-click the next station in the listing.
- Type the station name, and <Tab> to the next datafield.
- Type a 3 letter shorthand for the station name. This is the zonecode for this station and becomes the first three characters of the siding number for all Customers at this station.
- Under “For main track from”:
 - the distance between clearance points is the distance from the clearance point of the turnout at the previous station. Type this distance in inches.
 - enter the grade in percent. (A 1” rise in 100” distance is 1/100 or 1%.)
- Under “At the station”:
 - the number of dispatcher controlled tracks is the main, plus the number of passing tracks. Usually this is set to “2”.
 - the distance between clearance points is the length of the main track or passing track (between the clearance points, that is, not including the turnouts.)
 - The vertical clearance “Plate” should be left at “C” for now.

- Zone speed is used in calculating schedules and string diagrams. Zone speed can be set now, or changed later.
- Leave “Services” at “No services” and at “No reciprocal switching”.
- Click OK. The window closes.

New Stations, or delete stations

If you have fewer stations than listed in the default (example) railroad, delete the extra stations:

- open the list of stations
- single click on the station you want to delete
- on the main menu, click “Edit/Delete station”

If you need more stations than listed in the default (example) railroad, create a new station:

- open the list of stations
- on the main menu, click “Edit/New station”
- edit the new station
- click “OK.

Stations on other subdivisions

This section is optional. Use this section if you have multiple subdivisions.

- Stations can be entered on up to 10 other subdivisions.
- There can be up to 50 stations on each other subdivision.
- You create a new subdivision, and then enter the stations as above.
- The first station on a subdivision is always a station on the core segment or a previously defined (data entered) subdivision.

See the detailed discussion later in this Recipe Book.

Staging tracks

Enter data here only after you have entered all your stations.

- Staging tracks are at a station.
- Staging tracks can be at stations on “other subdivisions”.
- Each staging track is entered.
- Staging tracks have several special functions. Generally these special functions are entirely model-oriented (e.g. fiddling) and have no parallel in prototype practice. The “special functions” do attempt to model the impacts and effects of the unmodelled portions of the North American railroad system.

Click “The Railroad/Staging tracks to offline points”. This opens the listing of staging tracks. Double-click a staging track.

- Type the staging track name. Usually this is the name of a distant city.
- Double-click the connecting railroad from the list in the right-hand window. This data controls how empty foreign railroad-owned cars are routed home.
- Set the region to the staging track listing number.
- Type the siding number.
 - The siding number is 5 characters long plus “s” (lowercase “s” for staging.). Usually the siding number is a zonecode plus a number, such as DET01. ProTrak automatically adds the “s”.
- Set the overhead clearance plate.
- Enter the length of the staging track, from the clearance point.
- Enter the junction station. **Double-click the station from the right-hand window. Do not type the name.**
 - The junction milepost can be clicked from the right-hand window, in which case it will be calculated as the midpoint of the station passing siding or main track. Adjust as necessary.
 - Leave occupying trains alone. This is updated by the program.
- Click OK.

Delete or create new staging tracks using the “Edit/Delete” or “Edit/New” menu items.

A main yard

Click “Traffic/Yards and Interchanges”.

- Double-click the first yard listed. This opens the yard/interchange edit window.
- Click the radio button “Yd” A yard with many tracks”.
- Click on the “City/State/Prov” datafield. From the right-hand window, double-click the station where the main yard is located. You must have at least one “Yd” yard on your railroad.
- Note the siding number code for this yard.
- Click on the “yard name” datafield and type the name of the yard.
- Leave “storage yard” at “No storage yard”.
- For now, leave the number of tracks at 5.
- Uncheck “Use Yard Information System at this yard”.
- Click OK.

Click on Administration/SPOT format and special SPOTs”.

- Click “Unlock”.
- Click ”Yes” to the warning message “Unlock settings”.
- In the box labeled “Default yard location”
 - click on the yard siding number for the yard entered above.
 - make sure the datafield “A car’s first location” is highlighted.
- Click ”Apply”. The window closes.

When new cars are added to your car list, or when cars are repaired, the location of the car is set to this yard siding number.

Erasing example railroad data

Before entering any more data, simplify the data, by erasing the example railroad data.¹

- Click “Administration/Limits”.
- Click on the bottom datafield, and set this to 2 (the minimum allowed in ProTrak).
- Click ”OK”.
- To the question “Delete all trains from 3 to 10?”, click “Yes”.
- To the question “Are you absolutely 100% sure?”, click “Yes”.

The “Limits” window closes, and you have two train jobs.

¹ The freight and passenger car, container, caboose, locomotive and waybill data can be erased the same way. Hovering the cursor above a datafield will show a “tooltip”. At the Limits datafields the min’s and max’s are shown. The remaining items are edited to be cars or locomotives etc. on your railroad.

Two through traffic trains

Your “transportation plan” typically will include trains that move cars (or blocks of cars):

- between distant terminals – “through” trains
- between terminal and local distribution yards – transfer runs
- to and from customers – “switching” trains.

Through trains typically will not service local customers as this will delay other cars in that train.

On a model railroad through trains typically move from staging to a terminal yard, and then back into staging. To setup a typical through train:

- click “Scheduling/Establish Train jobs and yarding”. This opens the listing of train jobs.
- double-click the first train in the list
- type the new symbol (replacing “CHNY”)
- click on the “Origin station” datafield
 - in the right-hand window double-click on the staging track where this train originates
 - note that the first yardsiding changes to the siding number of this staging track.
- click on the “Terminal station” datafield. in the right-hand window
 - click on the “Staging” radio button
 - double-click on the staging track where this train terminates
- click on the second “Yard blocking” datafield
 - in the right-hand window double-click on the station where the main yard is located
- click on the third “Yard blocking” datafield
 - click on the “Staging” radio button
 - in the right-hand window double-click on the staging track where this train terminates

click on the second datafield.

- Leave the “Connecting trains“ datafield alone for now.
- Click OK.

Line-up

A question box appears “Line-up needs to be updated”.

- Click “Yes”. When this question appears, always answer “Yes”.
- (You may also get the question box “Invalid train yard assignment”. You will notice that this is referring to a staging track that no longer exists. Click “No”. The train job is erased, with the symbol being changed to “Other RR”.)
- The program checks the status of the line-up, and may find trains that do not run today. Click “OK”.
- The Line-up is displayed. Click “Close”. The line-up is the list of trains that runs today, listed in the order of time-of-departure. This list of trains is likely different from the list of train jobs, because not all trains will run on the present day-of-the-week.

Repeat this for the other listed train, NYCH (or “OtherRR”), making this second train travel the reverse direction of the first train. That is, reverse the origin and terminal stations, and reverse the first and third yardsidings.

- Make sure you click the “Departure at” “on” to show “Daily”.
- **Click “Yes” to form the line-up again.**

Connecting trains

How does the train that entered staging get out again? In ProTrak this is done with the “Connecting trains” datafield. The two through trains, as entered above, are each other’s “connecting train”.

- click “Scheduling/Establish Train jobs and yarding”. This opens the listing of train jobs. If only two trains show, go to “Administration Limits” and increase the number of trains to ‘3’. Click “OK”. Click “Scheduling/Establish Train jobs and yarding” and all trains will be displayed.
- double-click the first train.
- click on the dropdown “Connecting train” datafield, and click on the train using the reverse route that you set up above.
- click “OK”.
- **Click “Yes” to form the line-up again.**

Repeat the same steps for the reverse route train.

- double-click the second train (the reverse route train)
- click on the dropdown “Connecting train” datafield, and click on the first train, which is the reverse route train for the second train.
- click “OK”.
- **Click “Yes” to form the line-up again.**

A train reporting location

The next step is to set up a switching train that will work online customers. In ProTrak a train works (does setouts and pickups) at all the customers between two reporting locations. Reporting locations are the train yardsidings. The two yardsidings, that are the endpoints of a zone to switched, can be on different subdivisions; the yardsidings do not have to be at adjacent stations.

Trains that switch customers frequently work out and back, operating as turns. ProTrak recognizes that a train is a turn if the first and last yardsiding are the same. A turn requires at least three reporting locations (yardsidings), at the origin, at the terminal and at the turning point. Set up this train to originate at the main yard, and work to another station and back. If you have already entered a “Yd” yard at the other station where you want the train to turn, you may want to revise that yard in reading this section. This section shows you how to create a reporting location that does not require a “Yd” yard or interchange track.

To create a train reporting location, that is not a “Yd” yard

- click “Traffic/Yards and Interchanges”.

-
- click “Edit/New yard”. The edit screen for yards and interchanges opens.
 - click on the radio button for “y A yard for one track”.
 - click on the “City/State/Prov” datafield. From the right-hand window, double-click the station where the reporting location (the “y” track) is located.
 - click on the “SPOT track number” datafield. Set this to ‘2’.²
 - click on yard capacity. Set this to 10 feet.³ A 10-ft track is too short for a car to be set out on.
 - click “OK”.
 - click Close on the list of yards.

The “y” track set up this way, is just an imaginary location used by the program as a place to report a train. The “y” track does not take away from the passing track capacity.

However, if you make a “y” track have some length, then cars may be exchanged between the trains that report at this location. A “y” track can be used to bring cars close to a customer track when the customer track is overloaded.

A switching train as a turn

Before entering Customers it is handy to have a “switching train” defined (data entered).

Click “Scheduling/Establish Train jobs and yarding”. This opens the listing of train jobs. On the main menu, at the top second from left, click “Edit” and click “New train”. This opens the train edit window, and creates this train job.

- Type a symbol for the train. This has a maximum length of six (6) characters.
- Leave the class at “X” (extra).
- Click on the origin station datafield. At the bottom of the right-hand window click the “Stations” radio button. The right-hand window displays all the online stations.
 - In the right-hand window click the station where the main yard is located.
- Click on the terminal station datafield. At the bottom of the right-hand window click the “Stations” radio button.
 - In the right-hand window double-click the station where you will have “y” track reporting location.
- Leave the departure time at “7:00 AM” and at “Daily” (the days the job works).
- The “Yard blocking” datafields are the yards where this train works.

² By convention, the main track is track 01. The passing track is 02. If there are multiple main tracks, these are numbered 02, 03 and 04. The main tracks between stations –the interval– is numbered 05. Interchange tracks and other special service tracks are numbered in the 90s. Customers tracks are numbered from 10 and up. A reporting location track, which actually a runaround using the passing siding, can be numbered ‘02’ giving a siding number ‘AAA-02y’, which is different from track “AAA-02”.

³ Add “i” (lower case i) after a number to indicate an entry in inches. In HO 10 ft can is 1.4i.

- Only yards worked are listed.
- Stations, where customers served are located, are not listed
- the first yardsiding is the main yard.
- click on the second yardsiding datafield.
 - In the right-hand window double-click the “y” track reporting location.
- click on the third yardsiding datafield
 - In the right-hand window double-click the main yard sidingnumber.

Leave all the other datafields as listed

- all traffic
- maximum length 10 cars
- maximum allowed speed 50 mph
- consist report primary
- Click OK.
- **Click “Yes” to form the line-up again.**

Customers: Online industries

Click “Traffic/Customers”. This opens the list of online customers.

- Double-click on the third customer, the team track.
- Click on the “City, State/Prov” datafield.
 - In the right-hand window double-click the station where the main yard is (You can move or delete this Customer later.)
- Click on the “Switching railroad” datafield.
 - In the right-hand window double-click the first railroad listed, which is your railroad.
- Click “OK”.
- Click on the “Switching train” datafield.
 - From the dropdown select the switching train you created earlier.
- Click on the “Cars are placed in switching block” datafield. This number controls the order in the train the cars destined for this track will be placed. The numbers do not have to be consecutive. There can be no duplicates.
 - The right-hand window lists the spurs assigned to this train.
 - “F” indicates the car is switched as a facing point move. The radio button choice below sets this. ‘Facing point’ cars are blocked at the rear of the train, with F1 placed next to the caboose, F2 second next to caboose, etc.
 - Leave the numbers as there are for now.
 - **Leave all other datafields blank, or as they are.**
- Click “OK”.

Repeat these steps with customers 4 to 9.

- When you click OK, you will get the question about “Update waybills to this spot?” Always click “Yes”.⁴
- A window opens showing the waybill origin and destination. Click the radio button to accept the change. If the window stays open the program has found a second waybill relating to this spot. Click the radio button to accept the change. The window stays open until all the related waybills have been checked.
- Customer 35, “Masterfeeds”, has a commodity entered in the “Siding name/commodity” datafield. This was entered here simply to indicate what the spur is used for. This datafield can be left blank.
 - Even though a commodity has been entered here, any car carrying any commodity can be spotted at this spur.
 - If you enter the same name in two spurs for the same customer at same town, the program adds up the spur lengths and treats the spurs as if they were a single longer spur. The program uses the siding number of the first listed spur, but cars can be spotted at either spur.

⁴ Clicking “No” will cause you to have orphan waybills that no longer have a valid origin or valid destination. This may be OK, if you want to change the waybills manually. Waybills assigned to cars are updated regardless.

Weigh Scales

- Double-click on the second customer, the weigh scale. This brings up the “Special tracks” edit window.
 - The “weighscale” radio button is selected.
 - Select the “Station name” from the dropdown list.
 - Select the track number, or leave this at “08”. Note that the spot code is “z”. This means it is a weighscale spot.⁵
 - Leave the track length at 70 feet.
 - Select the “Switching train” from the dropdown list.
 - Select the “Switching block” number.
- Click “OK”.

- A question box appears asking if this is a Working Weighscale. If this scale track is a Grapevine Working Weighscale, click “Yes”. This activates the weighscale options menus under “Signals”.

Passenger Station

- Double-click on the first customer, the passenger station.
 - Change the “City, State/Prov” and “Switching railroad” as before.
- Note that the track number is “01”. Passenger trains work from “01” to “01” tracks⁶ at the various stations.
- Select the population range, and the approximate ridership per day. The program enters a ridership which is based on post-1920 intercity ridership. If this station is for commuters you may want to enter a larger number.
- Click “OK”.

Other online customers

Change the other online customers, or delete them using the “Edit/Delete” menu.

- Remember to change the switching train.

⁵ See “Administration/Special SPOTs”.

⁶ Passenger trains do **not** work “Yd” yards. Only freight trains and mixed trains work “Yd” yards.

Customers: Offline industries

This section is optional.

You can define customers within staging tracks. This is done from the Traffic/Offline shippers and consignees” menu item.

- Open an offline customer
- Check the checkbox datafield (near the bottom) “This customer is an online shipper consignee”
- Click on the datafield “Customer is in staging at”
- Click the staging track from the dropdown list.
- Click “OK”.

Remaining data: Waybills, Cars, Locomotives, Cabooses

Now that you have the basic data all in, you have a choice of which data to enter next. The data you need to add are the cars, and the waybills and car-orders. You can operate without entering or assigning locomotives and cabooses.

Freight Cars

You can edit all the example railroad cars or start from a reduced file of just two cars. Go to "Administration/Limits" and "Freight cars" to delete all but two cars.

Click "Traffic/Freight cars"⁷. This opens the list of all freight and passenger cars. To see just passenger cars, click "Traffic/Passenger cars".

- Have a model freight car in hand.
- Click the first car in the list. This opens the edit window at the "Reporting marks" datafield.
 - In the right-hand window, double-click the railroad, or type the initials (reporting marks). <Tab> to the next datafield.
 - Double-click the car kind.⁸ from the right-hand window. If the car kind is not listed, double the general kind (e.g. "G") then click the "Specific kind" radio button. This brings up all the car kinds for that general kind.⁹
 - <Tab> and <Tab> to the "Number" datafield. Type the number of the car.
 - <Tab> and <Tab> to the "Length" datafield. Type the length of the car, over the couplers. Enter in feet, or enter in inches plus "i" ("6i" gives 44 feet, in HO).
 - <Tab> to the "Volume". Enter the volume as printed on the car, or enter a known value.
 - <Tab> to the "Plate". Most pre-1960 cars are plate "B". Modern 50-ft boxcars are Plate "C". This information maybe printed on the model car.
 - The build date, bearing and light weight are optional at this point. You can change this if you want to get 'detailed' later. The range of bearing sizes is era sensitive. Most pre-1960 cars will be "D" bearing. "E" bearing cars date mostly from post-1963. The light weight (LT WGT) will be printed on the car.
 - <Tab> to "Return empty to". **Erase any data here**¹⁰ ('select' and click the 'delete key'.)

⁷ You can import some car data at "File/Import data", select "Cars". Follow the on-screen directions. Or see the "ProTrak Datafield Instructions" available separately.

⁸ Enter your railroad uses other than the AAR Mechanical kind, enter the mechanical kind for "Car kind" and the railroad class at "Class". The class will be printed on the switchlist. Car Service Directives, etc are based on mechanical kind.

⁹ For car kinds from other eras, see "Edit/Change/Change Car Mechanical Kind list".

¹⁰ After seeing cars load and move for a few operating sessions, then enter destination and commodity loading restrictions. Also, please look at the "Instructions".

-
- “Restrictions on use” is entered by ProTrak based on plate (for example, “H” if plate exceeds the value in “Notes”. “U” means “unrestricted”. “W” is the same as “U” for car loading, except there is some other restriction such as AGE, H, OCS, etc.)
 - Leave the “Waybill” datafield at “0” (zero).
 - At “Location of car”, **double-click the main yard** (the “starting” yard you entered at “Administration/SPOT format and special SPOTs” from the right-hand window. When you are done with this new car for this railroad, place the car at this yard.
 - <Tab> to “Weight of model car”. If this is still a kit and not in operating condition, leave this value at ‘0’. Type ‘nmra’ to get the NMRA recommended weight. Or type in the actual weight in oz. Or run this car over the *Grapevine Working Weighscale*.
 - Leave the “Rolling resistance” at the value in the datafield (1% for HO).
 - Leave other datafields as shown (or adjust if you wish).
 - Click “OK”.

Repeat these steps for your other cars.

- To create a new car listing, click “Traffic/Freight cars” and then click “Edit/New car”.
 - **Use “Multiple copies”** to create up to 12 identical cars which differ by number.
 - This function can be used to create similar cars. Create the 12 copies, and then adjust the other data.
- “Cancel” returns the data to original values. “Inventory” gives access to the detailed inventory functions for cars.
- This list of cars (“Traffic/Freight Cars”) is always displayed by the order you enter your cars. To see a sorted list, and to access the car data sorted, click “Edit/Show/Show cars sorted by road and number”. This list also accesses the car data edit window.

Loads for cars: Bills-of-lading, car-orders and waybills

- A bill-of-lading is a piece of paper that states what the load is, where it originates, what the destination is, and what the charges are.¹¹ The waybill includes this information plus the car initials and number. The word waybill is used in model practice interchangeably with Bill-of-lading.
- A car-order is an order from a customer for a certain number of loads (bills-of-lading, waybills or loads) on a certain day.

Although a car-order may seem an “extra step”:

- this is the prototype practice of how a customer “orders-in” so many cars of a specific kind and capacity to carry his commodity.
- Using explicitly stated car-orders gives you control over your traffic.¹²
- Note that the same bill-of-lading (waybill) can be used for a car-order on “Sunday”, “Monday” or any day of the week. To model the day-of-the-week changes in traffic levels a “car-order” approach is necessary.

Special Bills-of-lading and Waybills

ProTrak reserves the first 20 bills-of-lading (waybills) for its use. Waybills 1, 2, 3 and 18 are used for locomotive fuel and locomotive sand. Waybills 4 to 12 are the user-defined Car Service Directives, and waybills 13 to 17, 19 and 20 are used for track maintenance loads. ProTrak changes the values in these waybills as the number of operations sessions increases.

Bills-of-lading (Waybills)

Click “Traffic/Bill-of-lading and Waybills”. This opens the list of waybills.

- The column “Traf” shows:
 1. “in” for traffic from staging to an online customer
 2. “out” for traffic from an online customer to staging
 3. “local” for traffic from an online customer to another online customer
 4. “*OV” (overhead) for staging to staging traffic.
- The button “Check/correct rates” sets the rates on all waybills to levels to allow waybills to be “always used”.¹³ ProTrak includes rates to provide a goal for operations.
- Waybills that are used in car-orders can be found through “Edit/Show/Show waybills assigned to customers.”

¹¹ Optional items are items such as stop-off points for milling and partial unloading.

¹² Car-orders remove the ‘model thought’ element of chance or “dice-throwing”.

¹³ It is possible to set waybill rates low or high enough that the waybill be used only “occasionally”. This function is used to provide a function for occasional use of waybills and variety in traffic. The “Seasonal” and the “make this shipment” datafields are similiary used to provide variety in traffic.

Double-click on Bill-of-lading/Waybill #21. You will be adjusting:

- the shipper
- the consignee
- the load by commodity and weight
- shipping options.
- Click on the “Shipper company” datafield.
- Double-click an online customer from the right-hand window. Note that the “City” and “Siding number” datafields are corrected as well.
- Click on the “Consignee City” datafield.
 - At the bottom of the right-hand window, click the “in staging” radio button.
 - Double-click a staging track in the right-hand window. Note the the siding number datafield is updated.
- Click on the “Load” datafield.
 - Scroll the right-hand window to find a suitable commodity. For example if the customer is “Masterfeeds” scroll to 657, and double-click on “feed, animal”. Note that the related datafields changed:
 1. STCC (Standard Transportation Commodity Code)
 2. weight
 3. volume.
- Change the car kind to “LO”. Type “LO” or double-click from the right-hand window.
- Click on the “make this shipment” datafield, and on the dropdown click “Everytime ordered”.
- Click “OK”

Repeat this for the other 80 existing waybills, creating at least two waybills for each online customer, and at least two bills-of-lading/waybills for each carkind you have. Remember, waybills only become active when called in a car-order, so you can create waybills at any time.

- Optionally, reduce the number of waybills at “Administration/Limits”.
- Create new waybills at “Edit/New Bill-of-lading-waybill”.
- Create at least as many waybills as you have cars.
- Continue to create waybills.
- Create waybills especially for “occasional use” using the “seasonal” and make shipment datafields.

Volume

The “volume” datafield interacts with the “weight” datafield. Typically you do not work with the volume datafield.

- If you adjust for volume, answer “Yes” to change the weight.
- If you select too low a volume or weight, you may see the “Rate not reasonable“ warning.
 - Click “OK and increase the weight/volume.
 - Note that the “Make this shipment” dropdown has changed to “1 in 8” (or some other value). After increasing the weight, click this datafield to “Every time ordered”.

Weight

After you enter data in this field, and Tab/click to another datafield you will see the question “Maximum weight is ## tons. Fill car to capacity?”

- Click “Yes” to fill car that is used for this load to the car capacity. The load weight will be a minimum of ## tons, but may be higher if the car capacity is greater than ## tons.
- Click “No” to fill the loaded car to exactly ## tons, regardless of the car capacity.

The scaling question appears “Was car scaled at customer or is there a Shipper/RR weight agreement?”

- Click “Yes” and car will not be directed to an online weigh scale. Typically, if the waybill originates offline answer “Yes”.
- Click “No” to route the car to the closest online weigh scale. The routing is done by ProTrak and appears on the train journal/switchlist.

Continuing in Transit

- Leave this datafield showing ‘0’ (zero).
- This datafield is used typically for unit trains.
 1. Create a “loaded move” waybill.
 2. Create a empty move waybill.
 3. Assign the ”Continuing in transit” of the two waybills to each other.
 4. Assign the empty move waybill to all cars in the unit train.
- The cars will load and unload when the unit train reaches the origin/destination stations.

Car-orders

You set the traffic level on your railroad at “Car-orders”. Acting for each online customer you “call” a number of loads. The program finds the appropriate car, and loads it.

- Click “Traffic/Car-orders to/from online customers”. This opens the list of online customers.¹⁴
- Double-click a customer. For these instructions click “Masterfeeds”. This opens a “car-order chart”. The chart lists up to 5 loads per day.
- Leave the day at “Monday”.
- Click on the button “Order cars”. This opens the “Rule 15: Agency Record of a Shipper’s Request for Cars”. This is just the ‘Monday’ portion of the chart.
- The cursor is on the datafield for “Load/waybill 1”. From the right-hand window, double-click on the available waybill (#21 which you modified earlier). “Load/waybill 1” now shows “21”. This means one carload of whatever commodity is in waybill #21 will be ordered.
- Clicks on the “carloads” datafield. Increase this to 3.
 - The question “Is this a block of cars?” appears. Click “No”.
 - To delete a carload enter ‘0’ carloads, or delete the waybill.
- Click “OK”.

The chart window re-appears showing “3 carloads of feed grains” ordered for Monday.

Repeat this for your other customers, ordering loads for “Monday”.

Other Datafields on Car-orders

- Open the car-order chart for a customer with carloads ordered.
 - Clicking the “day” dropdown list selects the day-of-week for the car-orders.
 - Clicking the “Show details” radio button provides details about the loads.
 - Clicking “Verify Car-orders” checks all car-orders to make sure the associated waybills still list valid siding numbers. “Verify” offers the option to delete invalid car-orders.
- Click “Order cars” from the car-order chart, opening the “Agency Record of Car-orders”.
 - The “Delivery in” information changes as the program learns how long the travel time is for a waybill. The information may take 5 to 10 sessions to become valid, and may take many more sessions to reach an average value.
 - The “Track length required” datafield includes only loads expected in the next day (operating session). Season or infrequent loads are not included in this total.
 - A “required length” greater than the “available length” can be entered. If there are multiple spots on the same track, the program will ‘borrow’ track length from another spot to allow placement of a car.

¹⁴ Customers you entered using a staging track are listed as well. You can order loads/cars to these customers.

OPTIONAL DATA

From here you can skip to “Operate”. You can operate without entering or assigning locomotives and cabooses.

- If you assign power (locomotives) to a train, the number of cars a train leaves a yard with may be limited. If the train is too long, cars may be dropped or a helper requested. See “Transportation/Operating Conditions”.
- If you want the conductor’s name to be printed on the train journal/switchlist, see “Scheduling/Dispatchers and train crew” and “Scheduling/Callboard – make expected crew calls”.

Locomotives or Units

If you want to delete locomotives, go to “Administration/Limits” and reset this number now.

- Click “Power desk/Motive Power/powering passenger (RDC)”.
- Double-click on the first locomotive.
- Type the reporting marks. <Tab> to the number datafield and enter the number.
- Double-click the “Class/model-type” from the right-hand window.
- Enter the length in scale feet (or inches as ##.##i).
- Skip or click on the “Model weight” datafield.
 - leave this datafield as it; or,
 - enter the known weight in oz.
- Skip or click on the “adhesion” datafield.
 - Leave this value at about 5 to 10% (It’s the adhesion of the model.)
 - The Adhesion Calculator assumes you have a test grade where you test for the number of cars a locomotive can handle. Enter the value of the grade and weight number of cars and click “OK” and “Save”.
 - After you have used the Adhesion Calculator once on this unit, you can manually enter a value in the “Adhesion” datafield.
- Click the “Reset” button, answer “Yes” to zero the “hours run”.
- Click “OK”.

- Repeat these steps with your other units.
- Create new locomotives at “Edit/New locomotive”.

Steam Engines

“Steam” or “diesel” is selected by an entry in the “Class” datafield. From the radio buttons below the right-hand window select “Diesel” or a type of steam locomotive.

Alignment Control

This datafield effects where a unit is placed in the lashup and whether it is used as a helper.

Cabooses

If you want to delete cabooses, go to “Administration/Limits” and reset this number now.

- Click “Power desk/cabooses and end-of-train units”.
- Type or select the reporting marks.
- Change the length, if necessary.
- Select the “Assigned station” from the right-hand window.
- Select the “Location” from the right-hand window.
- Change the “Model weight” if necessary.
- Click “OK”

- Repeat for your other cabooses.
- Create cabooses at ”edit/New caboose”.
- Change what a caboose is called at “Administration/Definitions and Terminology”. If your term is not available write or email us.

Assigning power and cabooses

The locomotive (units) and caboose will appear on a Switchlist/Train Journal only if power is assigned to a train. The same power can be assigned to many trains. These assignments are the planned power assignment, and can be changed completely during Operations.

- Click “Power desk/Assign power and caboose”. The Line-up list of trains appears showing present assignments by train.
- Double-click on a train. This opens the “Motive Power Distribution Desk” window.
- Double-click the lead unit (or the locomotive) from the right-hand window.
- If there are trailing units, click the next unit position and double-click a unit from the right-hand window.
- Repeat as necessary.
- Click on the “Caboose” datafield. Double-click a caboose from the right-hand window.
- Click “OK”.
- Answer “No” (click the “No” button) to the question “Schedule this train to double ruling grade?”.
- Repeat for other trains.
- If you are assigning a unit already in use, you will see the question “Unit is already in use. Assign anyways?” Click “Yes” to assign unit to more than one train.

Throttle number/address

This optional datafield is used various ways with command control. Some users number consists (lashups) and use this number to track and assign a consist (lashup).

All the other menu items

As you no doubt have found, there are a lot of other menu items. These can be left “as is” for now.

Menu items you may wish to look at are:

- “Transportation/Change the operating conditions”.
- “Scheduling/create string diagram”
- “Scheduling/Dispatchers and train crew lists”
- “Callboard/make expected crew calls”
- “Signals/Fast clock settings”
- “Signals/time of day”
- “Power desk/Digital command control/Select Command Control”
- “Administration/Era, Date and Minimum Rates””
- “Administration/Enhanced switchlist features”
- “Administration/Home region overhead traffic”

These menus are where you:

- select the type of dispatching
- create a schedule
- enter your conductors and engineers
- set the fastclock ratio, which effects the length of the “s.mile”
- set the starting time of the operating session
- select a DCC, used in entering locomotive data
- set the era (year)
- set the train blocking criteria
- generate interim overhead traffic until you have staging-to-staging waybills and car-orders.

OPERATIONS

The basic mechanics of “Operations” is

- printing switchlists, or reprinting switchlists
- reporting trains,
- printing yardmaster lists.

As well, you can adapt each session to whatever oddities occur.

Operations

- Click “Transportation/Run an Operations session”. The data is loaded, displayed on the dark blue window. When this is complete
- Click “Continue”.

Switchlists

- Ahead of time, you may wish to print the switchlists of all trains presently in staging that will run today.
 - This may save time.
 - On the other hand, if another conductor runs the train, he may want you to re-print the switchlist with his name on it.
- Click “Switchlists/Print switchlists”.¹⁵ The train line-up window appears.
- Double-click the first train in the list.
 - The “Blocking” progress appears.
 - The switchlist is printed.
 - Note the “*” in the fourth column. This means that
 - the switchlist has been printed at the train’s present location and
 - no more cars can be assigned to this train.¹⁶
- See “**How to use a Switchlist**” in the “Operations” chapter.

Train Locations

- Click “Train movements”.
- Click “Report train location”. The train line-up window appears, but with the “Report” button on the left.
- Double-click the first train in the list.
 - The “Reporting Movements” window opens.

¹⁵ Position the window where you want. “Operations” opens a lot of windows, and you may want to put each window where you want it. The Operations windows stay where you put them.

¹⁶ You can “Open” a train. See “Train Movements/Open train”.

-
- The “location” radio button is on the first yard/location.
 - Click the second radio button.
 - Click “OK”. The train has moved (in the computer) to the second location.
 - Cars to be worked at industry spurs between the two reporting locations have been set off and picked up.
 - Cars to be set off at the second yard have been set off.
 - Cars to be picked up at the second yard have been picked up.
 - Click “Cancel”.

 - Repeat this for the second train, and the third train, moving each train one location.
 - Note how cars appear on one train, and are assigned to a second train or third train.
 - You do not report car locations.
 - Move each train, train-by-train to its final location.
 - When a train reaches its final location that train disappears from the line-up list. Eventually there will be no trains listed; the session is completed.
 - Click “Operations/Exit operations”.
 - Click “Yes” to the question “Request to stop operations. Are you sure?”

See the chapter “Operations” in this Recipe Book for a more complete look at Operations.

Update the railroad for the next session

When a session is complete you update your railroad. This is where cars are “unloaded” and assigned new loads. This is where trains in staging are prepared for the next session.

Note:

The Update can be done when the session is partially complete.

Note:

If you have a railroad where staging tracks are shared with other staging tracks at the “other” end of the railroad, the trains may be “re-used” and the session may not ‘complete’. This more closely models the continuing action of the prototype.

Click “Transportation/Update the railroad”.

- The “Daily Summary and Update” window appears showing the number of trains that have run, or are still running.
- If the session is complete, the day of the week is the next day-of-the-week after the present day.
- Click “OK” to continue with the next day-of-the-week, no printing and complete update.

Or:

- Click the next day-of-the-week dropdown to use the car-orders and train schedule of another day.

Or:

- Click the printing option you want. In most cases all you need to print, if anything, is the “General Manager’s Daily Summary”.

Then click “OK.

The second update window shows any special car movements. If there are no special car movements this window closes automatically.

If cars are can not be delivered, this shows the total. You have the option of printing a list of these cars now. The list can be printed later at “Transporatation/Operations diagnostics”.

Click “OK”.

The third update window shows:

- the cars being unloaded
- a summary of train-hours, locomotive hours and ton-miles. This information is printed on the “General Manager’s Daily Summary”.
- the cars being ordered and loaded for online customers
- intermodal vans and containers being unloaded and loaded
- cars being routed to their home regions through the staging tracks.

When car-order section is complete this window closes, and the fourth update window appears. The “General Manager’s Daily Summary” shows the ratio of loaded/empty cars, the pre-tax income and the operating ratio.

- A good loaded/empty ratio is 60/40.
- Pre-tax income will be low at first and gradually increase, and it will go up and down with the unique conditions of each session. The quality of dispatching has a large effect on the pre-tax income, and your dispatchers may wish to compete to see who can do best. As well, you as the General Manager may wish to fine tune your operations to improve pre-tax income. You may also discover the sessions that make more ‘money’ are also higher quality sessions and more fun to be an engineer, conductor or the dispatcher.
- A good Operating Ratio is in the range of 60 to 75. At values above the mid-80s the net income becomes zero.

Click “Show additional cars to meet traffic demand” to show a listing of cars kinds, and the number of each kind, required to meet the car-orders not filled.

You can check the location of cars at customers at the end of the session. This is a good idea. Click the radio “Yes” to print this listing.

Click “OK”. The summary window closes, and the operations pre-processor runs. The pre-processor makes sure all the files are consistent. This window closes when it is complete. Some sections (routing cars to home regions) may take a few seconds or minutes. Let this complete and let the File Pre-processor window close by itself.

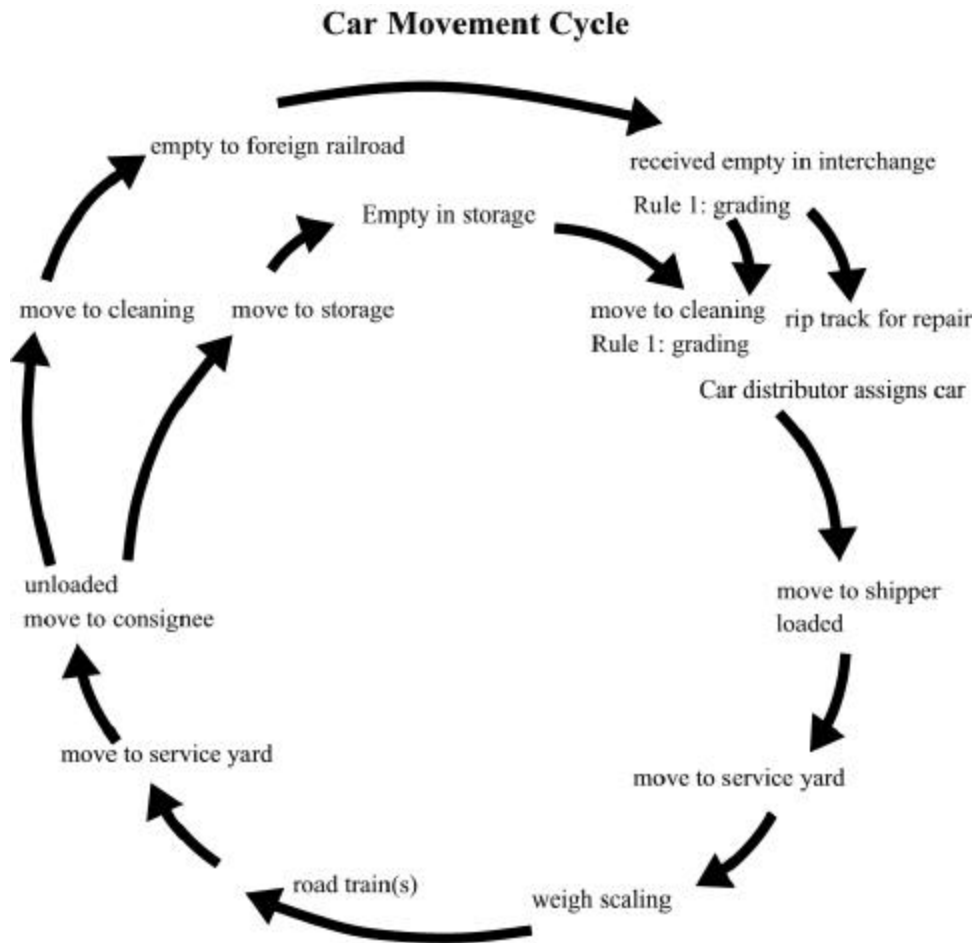
The “Operations Financial Summary “ appears. This graphs a summary of performance over the last 35 sessions. Click “Close”. This completes the “Daily Summary and Update”.

You can see a history of the Operating Ratio, Net Income and loads/empties ratio at “Transportation/Financial Summary”.

3 Basic Car-Service Concepts

The car movement cycle

The car movement cycle – everything that happens to a freight car – appears to be complicated. But it really isn't. However the cycle can be broken down into a number of very simple steps that are illustrated below.



Empty and loaded

The cycle includes an ‘empty movement’ and a ‘loaded movement’. In the drawing above the lower half of the circle is the loaded movement; the upper half, with all its optional paths, is the empty movement. You control the loaded movement. **ProTrak works out the more complicated empty movement.**

In addition to the loaded and empty movements, there are also cleaning, repairing, and weighing steps in the cycle. A freight car, during its complete movement cycle, is:

- empty,
- assigned for loading,
- moved for loading,
- loaded,
- weighed,
- moved in road trains,
- moved to the consignee,
- unloaded,
- cleaned at a cleaning track, and
- returned to the owner.

Variations include being:

- held empty in storage, or received empty from interchange,
- repaired,
- repaired only on assignment for loading,
- cleaned by the shipper,
- weighed by the customer, or there is a 'weight agreement' in place, or
- stored for future loading.

Loaded movements

The Bill of Lading, or waybill, determines the starting and finishing points, or end points, of the loaded part of the cycle. As the waybilled car moves from shipper to yard to road train to consignee, the car moves in trains. The train yard-blocking schedules determine the route that the car takes between the end points of the cycle set by the waybill. You control the waybills and the train schedules.

Based on your train yard-blockings (i.e., the list of yards at which each train works), **ProTrak** automatically assigns cars to trains ('yard sorts') for each segment of the loaded car's movement. Which train is assigned often depends on which trains have moved, and where, earlier in the operating session.

Empty movements

The empty movement will depend on whether a car is:

- a free-runner (not assigned), or
- assigned to:
 - loading a specific commodity,
 - loaded at a specific factory,
 - loaded by a firm at any of its factory locations, or
 - loaded by some combination of commodity and shipper.

There are era-dependent Car Service Rules that govern these empty car movements. Because of the possible complexities of the empty side movement, ProTrak manages the empty car movement for you.

Computer-based car control

The earliest computer-based freight forwarding programs used for model railroads in the 1970s and up to 1984, were batch or pre-set programs, meaning that all the computer work and printing were done before the operating session. No changes could be made during the actual operating session.

ProTrak is a **real-time** system. The computer runs continuously during the operating session. This allows you to:

- print correct switchlists on demand when needed,
- correct car routing because of yard delays,
- re-print corrected switchlists,
- re-assign locomotives,
- re-assign crews,
- call extras,
- run trains out of planned sequence,
- annul and combine trains,
- bad-order, and re-introduce, cars and locomotives,
- provide computer-based dispatching,
- provide and control your signaling system,
- control animation, such as highway crossing flashers,
- control your digital command control (DCC) to set up consists, and
- control your DCC to provide drive-by-wire (control train speed) that is sensitive to the lading weights in your cars and consist horsepower.

Who operates ProTrak during the session?

The dispatcher usually serves as the ProTrak operator. He will want to be able to change the ordering of trains, annul trains, and/or call extra trains -- the primary ProTrak functions during an operating session.

Alternatively, you could have the

- train crews do their own reporting to ProTrak.

Or for larger, more complicated railroads you may have a dedicated

- car-service position, with multiple printers,
- yard operators each with a computer terminal, and a printer,
- power desk hostlers.

Defining Siding numbers

Siding numbers hold everything together on a railroad.

- Every track that a car can stand on has a siding number
 - every industry has a siding number,
 - each yard has a siding number, and
 - every staging track has a siding number.
- Waybills, which are the instructions that direct car movements, have
 - an origin siding number, and
 - a destination siding number.
- Each car has
 - a location by siding number, and
 - a destination by siding number.
- Trains
 - move from staging to staging based on siding numbers,
 - work only yards based on siding numbers, and
 - work only industries assigned to it by siding number.

The siding number is analogous to the postal system's zip code, except that the siding number address gives the *exact* door or postal box to which a car is to be delivered or where it can be found. If a car can stand on a piece of track, then that track should get a siding number. In most cases every piece of track on a railroad is given a single siding number.

ZTS: Zone-Track-Spot

In this system of numbering sidings, spots or any track location the siding number is in three parts:

- zone – which might a town, or an industrial park in a large city
- track – a track in that town
- spot – a specific location along a track.

The system, sometimes by other names, is found on most prototype railroads. However the concept is the same; every location where a car might be located (not just spotted) has a number.

ProTrak siding number format

The siding number is divided into three parts:

Switching zone number: 2 or 3 digits, or characters. We recommend that you use a three-letter code that reflects the station name, e.g. DAL for Dallas or SYR for Syracuse.

Track number: 2 digits. Track numbers can be from '00' to '99'. Usually main track is given number '01'. A main track that is also a passing siding is given '02'. Double track with passing sidings uses '01' to '04'. Numbers '10' to '89' are for industrial spurs.

Position on a track/spur: A single lower case letter.

Using the ProTrak siding number format allows you to have 100 tracks at each of about 8000 possible stations/switching zones. You can define about 20, car-length positions on each track. In HO you can define a car spot for every car on a single 75-ft-long (900 scale feet) spur. This is a total capacity of about 16,000,000 spots on a single railroad.

ProTrak uses four siding track numbers for **interchange tracks**. As delivered, tracks 96, 97, 98 and 99 are set, but you can set these to any value.

In ProTrak certain **track position** codes have special meanings.

- 'y' = a yard track
- 'z' = an active weigh scale
- 'x' = a cleanout track
- 'r' = a rip track
- 's' = a staging track. For example, code 'CIN19s' indicates a staging track.

Nugget: The computer can follow any system of siding numbering you choose. However, for easy operation it is recommended that you adopt a single, consistent, simple track numbering system.

The ProTrak Databases

Within ProTrak there is an enormous amount of data about all aspects of railroading, both the physical characteristics and the Rules and Tariffs that are the framework for realistic operations. The details of the clearance plates, freight truck bearing capacities, Interchange Rules and Car Service Rules are coded directly into ProTrak.

ProTrak also includes large data files on rolling stock (steam and diesel units), industries served, and commodities carried by railroads. This data can be merged into the files that describe your railroad.

As well, any new data that you enter becomes part of your ProTrak files, so you only have to enter new data once. Most of these major data files can be customized for the era of your railroad. Further, you can extract and import data. This allows you to exchange data with other ProTrak users.

Commodities

ProTrak includes a list of commodities carried by railroads following the Standard Transportation Commodity Code, or **STCC**. Also included are special files for identifying contaminating and hazardous material (hazmat) loads.

The commodity files include typical load weights for each commodity. The load weight is related to the required freight car volume by the accompanying density data, providing a complete picture of each

commodity. As well, the files suggest the car type that would be used to transport the commodity. There are two commodity files. One is listed by STCC that groups like commodities together. The other file lists the commodities alphabetically.

Rolling stock

Cars: ProTrak contains files on cars classified by AAR mechanical-type ('kind') for several eras. You can further customize these lists of car types to fit precisely the year and characteristics of your railroad.

Steam locomotives: ProTrak includes data for geared locomotives, such as Shays, Heislors, and Climax, and for all basic classes of rod locomotives from 0-4-0, through 2-8-0 up to 4-8-8-4s.

You can also enter specific performance data for any steam locomotive. ProTrak will calculate the tractive effort or horsepower when you can enter piston diameter, piston stroke, boiler pressure, and/or driver diameter. If you know some of the data you can iterate on various values until you get known values of tractive effort.

Diesel units. ProTrak contains files on types, power and other characteristics of diesel locomotives used in North American railroading. These files include data on number of units built and when, horsepower, length and weight

The railroad map of connections

ProTrak includes a list and interconnecting map of all the railroads in North America. These maps can be customized for your era, and for your railroad's geographic location.

Cities and Business Economic Areas (BEAs)

ProTrak includes two listings of the major cities and towns in North America. The US and Canadian governments have conveniently classified these major cities into BEAs. We have supplemented the BEAs with additional cities, towns and villages. Your favorite city, town or village is added to this list automatically the first time you type its name. There is also a city file, listed alphabetically.

Customers and industries

A list of about 1500 customers and industries is included with the demonstration railroad supplied with ProTrak. You can add to this list yourself. By extracting/merging from/to this list you can add additional industries supplied to you in ProTrak format.

Also provided on the ProTrak CD is the CBIIndustry directory that contains files for an additional 7000 industries in ProTrak format. These lists can be browsed and you can individually select industries to import.

4 Entering data in ProTrak

Summary Lists and Templates

Data is organized in ProTrak in lists, and entered into ProTrak through edit templates.

There is a summary list for each type of item (freight cars, stations, staging tracks, waybills, etc.). To create a new item, New is selected under the Edit menu. To change an item, the item is selected from the summary list and the data changed in a template.

The New, Copy, Delete, Move menus under the Edit main menu are active when the summary list is showing. Data for each individual item is changed in the data template.

The template screen is divided into two parts. On the left side you enter the data, datafield by datafield. The "on-line" data appears on the right hand side of the screen. The on-line data displayed depends on which datafield you have made active. The datafield you clicked on is the active datafield. You select online data by double clicking the on-line data.

ProTrak checks each data item you enter for correctness and consistency with other data. This automation may overrule your entries. In all cases where this happens you will be advised, or warned. As well, where there are only a limited number of possible choices, you will be selecting data from a dropdown list.

You save any changes by clicking on the "OK" button. Clicking on the "Cancel" button makes the data revert back to its original condition.

Selecting or typing data

If at all possible you should select from existing "on-line" data. You should need to type in original, new data only for: station names and staging track names, and their siding zone codes, customer names, car numbers and light weight and volume, waybill weights and volumes, train symbols, and engine and caboose numbers. Other similar data such siding dimensions, and track lengths and grades will also need to be typed in.

On-line Data

Check the "Manual entry" checkbox to see the on-line data. The on-line data is sensitive to which datafield you are working on. In some cases you must select an item from the online data list, and in this case ProTrak will turn on the on-line data. For example, suppose you are entering siding numbers on a waybill template. Plainly the siding number must be a siding number for a piece of track somewhere on

your railroad. This siding number will be a siding number for a customer, and interchange or a staging track. Therefore you should have to select from an existing siding number.

How to select data

Data is selected for the on-line data list by double-clicking on the item in the on-line data.

Manual data entry

At some datafields, e.g. reporting marks and car kind, you can type in data over the existing default data. In other cases you may have the option of turning off the on-line data and entering data manually. Uncheck the "Manual entry" checkbox to turn off the on-line data. Type the data that you want. In some cases you will have to type in new data. The on-line data screen will show "No on-line data".

A note about dimensions

Dimensions shown in the various datafields in ProTrak are in scale dimensions, that is, in scale feet. The exceptions are for **track radius**, **station-to-station distances** and **at-station siding lengths**. These latter measurements are more familiar to modelers expressed in inches.

A unit is shown after the datafield. If the measurement unit is "feet", then ProTrak expects an entry in scale feet. You can also enter this length in inches by adding the letter "I" to the length. If the shown measurement unit is "inches", then ProTrak expects an entry in full-size (1:1) inches.

**All data entries for length are in scale feet or full-size (1:1) inches.
Check the unit after the datafield.**

Build from existing data

ProTrak uses existing data to help you build up new data. This means that you type a piece of data **only once**.

Add or change at any time

You can easily add and/or change data in ProTrak **at any time**. If you change the name of a town or industry or other item, ProTrak updates that change across the entire railroad. ProTrak searches all the data and looks for all other places where a particular station, industry, train, or siding number is used and changes the data to the new value. ProTrak pays particular attention to siding/spur spot codes and siding numbers.

5 Setting up Your Railroad

Starting with a clean slate

You should start with a 'clean slate'. A new railroad is set up by copying an existing railroad. The new railroad will have all the data of the original railroad. To avoid mixing up the original railroad and the new railroad, the unwanted data from the original railroad should be erased. This is done by setting the **Limits** as low as necessary/possible. After creating the new railroad, from the main menu go to Administration, Limits. For each item select the minimum value shown on screen and answer the questions about deleting the unwanted data.

Starting up - Keep it simple

When first setting up your railroad with ProTrak you might wish to keep it simple at first and follow the suggested order for entering data. If possible, you might wish to run the first few sessions just in the computer, and bring things on stream slowly. Get comfortable with the parts of ProTrak that describe aspects of railroad operation that are familiar to you. If you are not familiar with certain aspects of railroad operations, leave that aspect alone for now and come back to it later.

- Keep any restricting conditions **off**.
- Do not set up any car pools (i.e. No "When empty Return to...")
- Operate in **Clear** and **Sunny Weather**.
- Turn all the '**Enhanced Switchlists**' features to '**No**'.
- Set the Train, Traffic datafield to "All Traffic".

Make backup copies of your railroad frequently.

Preferred setup order

ProTrak builds up data based on the data that you have already entered:

- * Customer spur numbers (spot codes) are based on station names and station spot codes.
- * Waybills and car-orders are based on customer sidings spot codes.
- * Train routing and blocking patterns (destination siding numbers) are based on station spot codes and staging siding spot codes.

We suggest that you:

1. Choose and type in your railroad name and reporting marks.
2. Select your SPOT Format Code.

3. Enter your station names and select the spot code for each station.
4. Define a yard (with a xxx-Yd siding number).
5. Change the 'Fiddleyard', at Spot Format, by selecting the siding number of your largest yard.
6. Enter your staging tracks.
 - a. Type in a name for the staging track.
 - b. Type in a siding number.
 - c. Select a junction station.
7. Define (create) a switching train.
 - a. Select the range of yardsidings so that all stations are served.
 - b. Have this train work the main (largest) yard.
 - c. Create a Lineup.
8. Define trains that serve each staging track destination by region, and the main yard.
9. Describe a customer.
 - a. Give the customer a SPOT code (siding number).
 - b. Set the siding length longer than a car, or longer.
 - c. Set the switching train to the switching train defined earlier.
 - d. Set the switching block number.
10. Repeat as necessary for the customers you have at present. You can add many more customers at any later time.
11. For each customer:
 - a. set up waybills for the customer.
 - b. set up car-orders for the customer.

Any time, enter data for:

- cars
- engines
- cabooses
- containers and vans

The following is the order for entering data for a new railroad.

- 1) Stations**
- 2) Staging tracks**
- 3) Yards**
- 4) Switching trains**
- 5) Customers**
- 6) Bills of Lading (waybills)**
- 7) Car-orders for online customers**
- 8) Assigned cars after customers and staging tracks.**

Setting the Basic Options

There are a few basic options that need to be set now. The remaining data, such as station siding numbers, yard sidings, train blocking pattern codes, all depend on your selections for these options. The key options that need to be set now are:

- * the spot (siding number) format; and,
- * the scale of the model railroad.

Other options that should be set now are:

- * the era of your railroad; and,
- * the minimum radius.

The options setting are found in one location within ProTrak under Administration.

Spot Format

By far the most important option you need to select is the "spot format". Do you want to use an alphanumeric siding number code? How many digits do you want to use for the switching zone code portion of the siding number?

Switching zone code

Next select "Spot Format, special SPOTs". It is important that you give the selection of the switching zone code some thought. Although you can change this setting later, and ProTrak will attempt to match all changes automatically, you may have to make some changes manually.

We suggest that you continue to use alphanumeric siding codes. This will give you siding numbers that look like "DNV-10". A switching zone prefix such as "SYR" for Syracuse is considerably easier to remember than a zone codes such as "16", especially for your guest operators. Also a three letter code such as "SYR" is easier to associate with "Syracuse" than "SC". We suggest that you leave this setting at "3".

As well, ProTrak was designed to use the industry standard 6-digit siding numbers. You will get 6-digit siding numbers if you use a 3-character switching zone code and a 2-digit track number.

Other Options: Era, Operating Day and Month

You should set your operating era or the year that your model railroad represents. Select the year in which you deem your railroad to be operating.

Perhaps your railroad only operates during a certain month or even on a certain day of the year. To activate this option for the day or month uncheck the two boxes. If the boxes are checked the date on the computer's internal clock will be combined with the specified "year" to generate the date on your railroad's paperwork

Core Segment Notes

Minimum radius

Type in the minimum radius, in inches, for the core segment of your railroad.

Scale, and Session duration

The scale and duration of the operating session are used by ProTrak to convert full-size dimensions to model (scaled) dimensions.

Clocks and Fast Clock Ratio

At **Signals, Fast Clocks**, enter the duration of a single 12-hour or 24-hour day operating session.

The Railroad: Stations

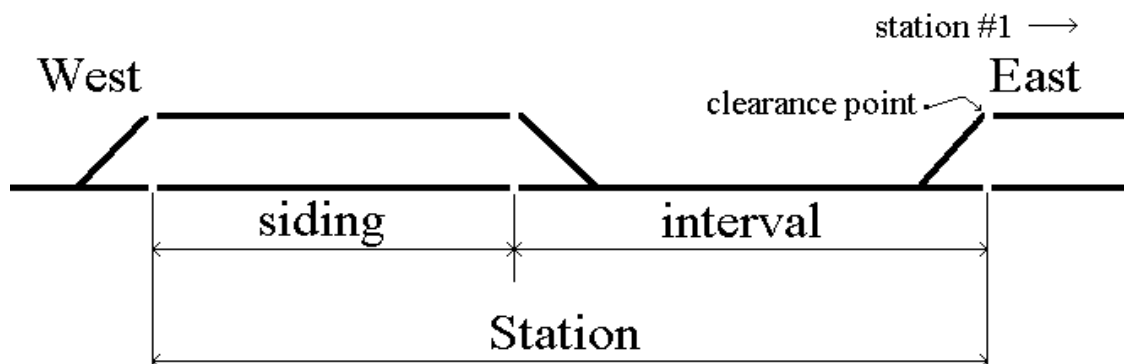
What is a Station?

In railroad engineering and operations the word "station" has several meanings. It can mean the location of a siding, the location and services at the station (the building), or the sequence of benchmarks that form the mainline profile (the surveying term).

- * **In railroad operations rules** a station is "A **place** designated in the time table by name." Some Operating Rulebook definitions also add "A place identified by a station name **sign**."
- * **In surveying**, a station is a location whose horizontal and vertical position is known. This is sometimes called a **benchmark**.
- * **In model railroad operations** station can mean, as well as the building and location, the passing **siding**. This is probably a result of a simplification of Operating Rule 5 which defines that "the time listed in a time table applies, on single track, to the siding switch where an opposing train clears."

Definition of Station, Interval and Siding

The interval is the distance from the previous station to this station. The "length of the main" is the distance from the clearance point of the previous passing siding to the clearance point of the present station. In other words, the length of the main includes the adjoining turnouts at both sidings. This is sketched below.



Station #1

- * Stations are numbered east to west (or north to south).
- * Station #1 is to the east (or north).
- * If your railroad runs north-south then Station #1 is to the north.

Relation between Station #1 and Staging

Station #1 is usually a staging yard. If Station #1 is a staging yard then the interval from the previous station is zero, and the station length is the length of the shortest staging track.

Number of stations on core segment

ProTrak allows for 50 stations on the core segment and another 500 stations on other subdivisions. You can divide the core segment (stations) into as many as five named subdivisions. Stations are named point on a railroad. If there is no building, then the station location is shown by a sign. Stations, in ProTrak, can also be survey benchmarks, to denote where grades start or crest.

Station Name

Select each station in turn and change the name, switching zone code and the number of tracks. If you know the dimensions of your trackage you can change that data too as you go along.

Station Switching Zone Code

When you change the station name, ProTrak selects a default switching zone code for you. If there are no spurs or loading points at this station type <---> at this field. If you want a switching zone code different from the default, type it in.

If you have changed the switching zone code, or the station name, ProTrak checks all occurrences of this switching zone code and changes that data to the new names and values. It is suggested that you answer <Y> to all confirmation questions.

Number of Tracks

The number of dispatcher-controlled tracks at this station is the main track + passing tracks. If the station is a staging yard, by definition there are zero dispatcher-controlled tracks. If the station has only the

mainline and no passing tracks, enter <1>. If the station has passing tracks, enter the number of passing tracks, plus 1. For example 1 main-track plus 1 passing/siding is <2> tracks.

Double Track

Double track is defined by entering stations with interval = 0 (zero).

However, it does not matter to the car-routing portions of ProTrak whether the trackage is double, triple or single track. The order of the stations is what matters. The presence of double track is used in this part of ProTrak mostly to draw the manual dispatching screens. Details of the trackage do matter to the signaling system, and the signaling system has its own 'track drawing' data entry routines.

Staging Tracks

Staging tracks on your model railroad simulate the rest of the 200,000 miles of the North American rail network that you haven't actually physically modeled. Staging tracks can be thought of as representing:

- * unmodeled portions of the core segment of the home road;
- * unmodeled subdivisions of the home road;
- * unmodeled branchlines of the home road;
- * rail lines to specific cities;
- * connections to particular railroads; or just
- * rail lines to other regions relative to the modeled road.

Each staging track can represent something different. You can be quite specific about what is on each staging track. You can have fully defined industries on those staging tracks, so-called "staging online industries". Or you can be quite general about what a staging track represents, "everything southwest over there". It simply depends on how much information you have, and how much you want to specify at the moment.

Minimum number of staging tracks

ProTrak requires that you define a minimum of two staging tracks (one for traffic to the east and the other for traffic in the other direction). Both tracks can be at the same end of your railroad, or they can be anywhere else along the core segment or on another subdivision. The staging tracks must join either the mainline or another subdivision at a station.

Minimum staging track data

The minimum data for a staging track are the staging track name, siding number and length. When you enter the staging track name, a default siding number is provided by ProTrak which is based on the name and listing number. You can override this value.

Regions: Grouping staging tracks, Loading cars at staging tracks

In loading cars standing in staging tracks, ProTrak groups the staging tracks by the region number. This region has nothing to do with the region number assigned by the AAR for returning empty cars to their home road. Staging tracks which have the same region number are treated, for car-loading and car-routing purposes, as if they were all one track. All waybills in a region are considered when cars standing in staging are to be loaded. However, waybills assigned to the staging track where the car is standing are considered first. The next waybills considered are those assigned to the next track in the listing of staging tracks.

Initially, you should assign a unique region number to each staging track.

Yards and interchanges

A yard is where trains exchange cars. As well, freight trains can originate and terminate in yards.

Two kinds of yards in ProTrak

There are two kinds of yards in ProTrak:

- 1) yards with many tracks, so-called “Yd” yards.

The “Yd” yard has an unlimited capacity, and many tracks. You can specify how many tracks there are. Each individual track in a “Yd” yard is numbered automatically by ProTrak as a “y” track.

- 2) yards with one track, so-called “y” yards.

The “y” track has a specified length, and therefore a specified capacity.

Each kind of yard has its special uses.

Yards and the online customers list

Yards and Interchanges are defined at Traffic, Yards and Interchanges. Yards and Interchanges are also listed on the online Customers list, which in ProTrak is actually just a list of all the named tracks.

At least one “Yd” Yard

You must have at least one “Yd” yard defined in ProTrak for your railroad.

The “base”, “fiddle” or “default” yard

Where are cars first place onto your railroad? Where are repaired cars returned to? You may add a car at any yard, staging track or customer but it may be convenient to add or return a car at specific yard. This is the “default yard”. Select this yard at “Administration/Special spots”. Select the yard from the dropdown list and click “Apply”.

If for some reason cars get lost, the program will put a lost car at this yard.

Interchanges

Interchanges are where two railroads exchange cars. Very specific rules apply as to how the cars are interchanged, including how the cars are inspected and how the data regarding the car movements is exchanged. Interchanges and yards are quite different.

6 Train Jobs and Blocking Plans

Each train has a definite purpose, either in the route or destinations that it serves or the traffic that it carries. A train may be completely unique, or it may be duplicated by other trains, later or earlier in the line-up.

ProTrak advances cars to use the **first available train** in a session, but also recognizes the need to keep trains intact as much as possible.

Train options

ProTrak includes an extensive set of options for describing train jobs. For each train job you can:

- define two movements with changing labels/symbols;
- define a schedule or running time. The schedules can be individually printed or shown as a string diagram. Second (and additional) sections can be predefined and/or called during an operating session.
- assign traffic by commodities or car kinds;
- assign passenger, intermodal or unit-train equipment; and/or
- assign power and caboose(s).

Helper jobs can be defined and assigned lashups. As well, **scheduled ‘doubling the hill’** can be defined for specified segments of a train’s route.

Train symbol or label

The train symbol or number is the label by which this train is known. You can use numbers or combinations of letters and numbers. Regular trains (those with schedules) always are known by number. Extra trains can carry numbers or an alpha-character code. One common practice is to use the initial letters of the origin and terminating cities to form the train symbol. Additional letters may be added to represent the importance of the train, or the traffic that the train carries.

In ProTrak the train symbol, or label, is used to identify the train.

Notes

- 1) Train symbols can be changed at will and this will not create a new train in ProTrak. If the initial terminal, final terminal, and call-time are the same as for the old label, ProTrak treats this new train (label) as being the same train. The Line-up remains the same. To force a new Line-up change the call-time of any train by one minute (and back, if needed).
- 2) Each train listing within ProTrak can represent 2 trains or 2 train movements. This is useful if two trains share the same equipment (units and caboose). For instance if train #82 exits staging,

travels to a main yard, then reverses to become train #81, you can specify this train as "82/81". During the operating session, when the train reaches its **turning point**, ProTrak will change the train label from "82" to "81".

Insert a "/" between the two parts of the label.

You can use symbols. For instance train "MADE" can become train "DEMA" by specifying the train label as "MADE/DEMA".

Foreign trains can be specified the same way. For instance BN trains BN 63 and BN 66 would be labeled here as "BN 63/66".

3) You can define up to an additional 14 symbols for each train in ProTrak – which is actually just a blocking pattern for a set of movements, pickups and setouts.

Blocks and blocking

The prototype moves freight cars in blocks. Blocks have an origin and a destination and may have many other characteristics such kinds of cars allowed, commodities allowed, empties only or loads only, consignee or interchange railroad allowed, maximum length, maximum car weight or any of many other possible restrictions. If traffic changes, then blocks may go out of use or new blocks may be established. The underlying organization of the pattern of traffic on the railroad is based on blocks of cars.

Blocks are assembled together to form trains. Blocks may be assigned to specific trains, or trains may be called to move blocks. A train may operate over a short distance (one or two subdivisions) but a block may move in several trains over many subdivisions.

ProTrak forms blocks for you. The minimum number of blocks required are formed based on the traffic moving (waybill origin, destination, commodity, weight) and restrictions on blocks and traffic entered for trains. ProTrak forms blocks and move cars in blocks as on the prototype.

The main controls on blocks are the train yardsidings and traffic, and the waybill destination and commodity. Similar commodities with similar destinations are blocked together.

Train Blocking Patterns, Yard Siding Numbers

The key data for a train-job description is the list of yard sidings that this train services, or works at. Each yard has one "customer" siding number, a code which ProTrak uses to recognize a yard and route cars.

In ProTrak, each train can service up to 10 yards, including the origin. The order of these yard sidings is important in ProTrak as the order of the yard siding numbers defines the train's routing. For train routing purposes a staging track/yard is also considered a "yard". The first yard siding is for the Originating

Station (or a staging track). The second siding number is for the second yard on the train's run, and so forth. The last yard siding number must be the siding number for the Terminating Station/yard or staging track.

Not all ten siding numbers need to be used; more usually a train on a model railroad might have three yard sidings (origin staging, one on-line yard, destination staging).

Enter only those yards that a train works at. If a train travels through a yard, or past a yard, but **does not pick up or set off cars**, then **do not list that yard**.

Turns

A "Turn" is a train that starts its run at one yard, does its work, and then returns to the starting yard. For a turn the final yard siding number will be the same as the first yard siding number.

For a turn, a series of radio buttons appear beside the yardsiding numbers. The selected radio button is the location of the turning point. ProTrak calculates where it thinks the turning point is and you can override this selection by clicking any other button. However the turning point must be the yardsiding furthest from the terminal station.

If you want to be sure that no cars get left at the turning point, then set up a "y" track at the turning point station that is 1 inch long. This is shorter than any car and no car will be setoff at such a short track.

Connecting train

This datafield is used only when the terminating station (the final yard-siding) is a staging track. The "connecting" train symbol is the symbol of the train into which the engine, cars and caboose of this train will be placed, within the computer, at the "update" done during the Operations/Daily Summary.

For example, a train terminates in a staging track. Between operating sessions, the train is backed out of staging, turned and placed back in staging. It consists of the same cars, engine and caboose. **But**, at the next session, it will not be the same train by number or symbol: it will run as another train. That other train is the "connecting train". You might think of the connecting train as being the opposite train in the Line-up.

Notes about trains

- 1) You do not need to specify **yard-switcher jobs** as trains, unless these jobs work the spurs for the locomotive fueling racks or locomotive traction sand.
- 2) A train specified **with one yard-siding** will not "complete" and so will remain on the list of active trains during an operating session. It can be run as many times as required.

3) Do **not** assign **staging tracks** in the **same region** as consecutive "yards". Use the staging track region number to associate staging tracks with each other. When a train is reported at an intermediate staging track, all the cars are unloaded, and re-loaded.

Train Lineup

On the prototype the line-up is the list of trains, that are expected to operate, ordered by direction of movement and time, and may provide authority to occupy main track. In ProTrak, the Line-up is the list of trains that are expected to operate on the present day, ordered by time. It may not include all trains listed under "Train Jobs" as certain trains listed there may run on only certain days.

The Line-up is ordered by time, with the earliest train listed first. The Line-up is displayed on screen during the operating session at "Train movements/Report trains". As each train 'completes' it is dropped from the Line-up. Calling an extra adds that extra to the Line-up.

Whenever you change data about a train, you will be asked to form a "Line-up". You should always answer "Yes". A check mark appears on the menu beside "Scheduling/Line-up" if the Line-up is current.

All other data that requires information about trains (e.g. Customers' switching trains, assigning cars to unit trains) is based on the trains shown in the Line-up. If a train does not appear in the right hand data window, form a new Line-up at "Scheduling/Line-up". If the train still does not appear, check the day of operation for the train comparing to the present day-of-the-week (see Transportation/Operating conditions).

7 Traffic

Online Customers

This is where you define the loading/unloading points. This is also where you define:

- which switching trains switch each customer,
- the order in which those customers are switched, which also is the order in which cars for those customers are blocked in the train.

Essential customer data

The essential customer data are the

- siding number,
- siding length,
- switching train, and
- switching order.

To enter the siding number enter only the track number as <##>, or <##a> if necessary. The switching zone code is found for you, if you have entered the station name and spot code. The spot code is displayed to the left of the siding number.

Enter either the known, measured siding length, as <###> in scale feet or as <##.##i> for a length in inches. If the precise length is not known, or if this is an estimate for design purposes, enter any value greater than 87 ft.

Cars will be routed to a customer only if you select switching train(s). A “NO SPOT” message will appear on the Undeliverable Cars List if there is no switching train. Select the switching train from the online listing of trains. This list of trains is the Train Lineup. If the trains appear to be incorrect, go to Scheduling and form a new Lineup. You must also assign a unique switching block number for this train. The numbers already in use will appear on the righthand side of the screen. If you attempt to use duplicate blocking numbers, ProTrak will override your choice and then notify you. You can correct the choice made by ProTrak.

Switching, pickups and setoffs

A plan for which trains switch which customers needs to be set up (not all trains work all customers) and the prototype uses several different ways of doing this:

- by district. All customers in the district between any two stations are switched.
- by station. All customers at a station are switched.
- by station zone. All customers within a zone at a station are switched.
- by customer. A specific customer is worked by a specific train

Combinations of switching plans may be used. Specific customers in zones at stations may be switched by a specific train. For example, a train might switch a group of tracks at one auto plant (a zone at that station) then deliver those cars to second plant (another zone) at another station.

You can use any system of switching you want in ProTrak. The method you use will depend in part on the number of customers within a district and the specific traffic at your customers. You can even use different switching plans at different stations on your railroad. To set up switching:

- by district
 - assign all customers in a district to be switched by the same train.
- by station
 - assign all customers at a station to be switched by the same train.
- by station zone. Either
 - subdivide the station into zones (each with its own “zone” code) and assign all customers within a zone to be switched by the same train; or,
 - assign specific customers at a station to be switched by the same train. This, in effect, sets up a zone, but keeps the same zone code for the entire station.
- by customer
 - assign specific customers at any station to be switched by the same train.

ProTrak reports cars as being switched when you report a train at a location. The train locations are the yard sidings you entered at Scheduling/Train jobs.

The customer spurs or locations between any pair of yardsidings are a “reporting zone”. The reporting zone extends from the previous yardsiding station (but does not include that yardsiding station) up to and including the new yardsiding station. All customers within the present reporting zone are switched (within the program).

Notes:

- 1) Cars at customers not within the present reporting zone are not switched. **It is important that customers assigned to a train be within a reporting zone for that train.**
- 2) A switching reporting zone can extend from a yard to a staging track; but a reporting zone can not extend through a staging track.
- 3) Reporting zones can extend across subdivisions. The reporting zone can include several subdivisions, including the core segment. There is no limit on the extent of a zone (other than staging.)
- 4) You can further control which trains switch which customers by using the train “Traffic” setting.

For example, to avoid restrictions you may wish to pick up loaded gravel hoppers with one train but be able to return empty hoppers with any other switching train. To do this set the “traffic” for the pickup switching train to “Commodity specific”, with the commodity double-clicked as “14412 gravel”.

Summary

Switching of pickups and setoffs is controlled by:

- assigning the customer to a switching train;
- the customer must be within one of the switching train's reporting zones;
- assigning the train reporting zone (train yardsidings);
- assigning the traffic assignment (if any) for the train;
- for setouts, track capacity at customer, or "y" tracks;
- the train length, at the moment the car pickup/setoff routine runs. The car pickup/setoff routine runs
 - anytime a train is reported at a location and
 - when "Yardmaster/Update yards" is clicked. All cars at all customer spurs are checked when this option is clicked.

Before pickups are limited by train length, cars to be setout are subtracted from the train length, first. If there is a secondary switching train, cars are assigned first to the maximum length of the primary train, then to the maximum length of the secondary train, and then all remaining cars are assigned to the primary train. If the primary switching train has run, cars are assigned to a secondary switching train (if any).

Show switching trains

You can check the customer-to-switching train assignments by clicking "Edit/Show switching trains". ProTrak stores this information as a separate file. Clicking this menu item initializes and re-calculates this file. This file is re-checked by ProTrak automatically during other data operations that involve changes in train lineup or customers.

You should check this file occasionally to be sure that you do not have duplicate blocking numbers for switching trains. If cars to be switched appear in unusual trains, then you should check this file at "Edit/Show switching trains". As well, if you use secondary switching trains (not recommended) then examining this file will indicate how complex your switching plan has become.

Understanding the Industry Limit

The lists of customers are viewed through the Online Customers List, the Offline Customers List, and the Yards and Special Tracks List. Yards and Special tracks are also listed with the Online Customers.

However there actually is just one list; both online and offline customers are in a single list which is divided into two parts. Your railroad's online customers are ordered first in the list, from Customer # 1 up to a "Limit". Possible offline shippers/consignees, that may/may not be generating offline traffic for your railroad, are listed beyond the **Industry Limit**.

New online customers are inserted at bottom of the online customer part of the list. Sorting the online customers will move that new customer into its town-ordered position in the list of online customers.

ProTrak automatically increments the Limit when a new online customer is added. New Offline Customers are placed at the end of the Offline Customers list.

Optionally, you can have a third part to your total customers list. You can assign a staging track as the siding number for an offline customer. ProTrak then views this customer as a type of Online Customer, which allows you to assign online car-orders to this customer. These “Staging Online Customers are sorted, by ProTrak, to be at the end of the list of Online Customers. Also, they will show on the Online Customers Summary list when you select “Car-orders for Online Customers”. ProTrak will reset the Industry Limit, if it detects a customer with a siding number that is a staging track. You are notified when this happens.

You can set the Customer Limit at Administration, Limits: but the **Limit should be set correctly**, not at some arbitrary high number.

Bills-of-Lading (Waybills) and Car-orders

Traffic

Traffic directed from the model-railroad home-road to any non-modeled railroad is simulated by using staging tracks. Customers on the visible portion of the model railroad are termed **on-line**; customers who are served via staging tracks are termed **off-line**.

There are four possible routings for model railroad traffic:

- 1) on-line to on-line;
- 2) on-line to off-line;
- 3) off-line to on-line; and,
- 4) off-line to off-line.

The first three routings involve a least one on-line customer, who either terminates or originates a freight movement. The fourth routing is from staging to staging. This traffic comes in from one side of the railroad and "disappears" off at some other location along the visible part of the railroad. This traffic is called **bridge** or **overhead** traffic.

Defining Traffic

Once a customer has been defined, the second step is to identify what loadings or commodities that customer ships or receives by rail. In ProTrak this is defined under **Bills of Lading/Waybills**. The third step is to define how much and when that customer ships and/or receives freight. In ProTrak this schedule is defined under **Car-Orders**.

Defining Traffic

- | |
|---|
| <ol style="list-style-type: none">1) Define a customer (shippers/consignees in Customer)2) Define what/how is shipped (commodities, cars in Waybill)3) Define when/quantity (Car-orders) |
|---|

Bill of Lading/Waybill

The Bill of Lading/Waybill directs the movement of a shipment from a shipper to a consignee. The Bill of Lading is the contract between the shipper and the originating railroad. The waybill is the contract between the railroad companies forwarding the shipment. The Waybill is compiled by the railroad based on information shown on the Bill of Lading, plus information in the railroad's computer.

ProTrak also summarizes the waybill on the Switchlist (Train Journal). All the waybill data, except freight charges, can be printed on the Switchlist.

Ordering rail transportation services

When a customer wants to ship a commodity, the customer contacts the railroad's Agent, or car distribution desk. The customer specifies:

- * car kind, including special load restraining features;
- * car length, weight capacity and cubic capacity;

The customer will also specify the day for delivery of the empty car. The routing is optional, however if the customer specifies a routing it must be followed.

Some waybill data is necessary, so you must specify at least the:

- * Shipper's siding-number;
- * Consignee's siding-number;
- * the load/commodity;
- * ordered car kind, length, volume; and,
- * the weight of the shipment.

Special Waybills for model railroads

Loads-In/Empties-Out

A loads-in empties-out routing scheme is strictly a modeler's artifice to deal with open-top cars such as coal hoppers. In this scheme a loaded car is routed from a loading point, such as coal mine to a consumer industry, such as a chemical plant. The loaded cars are switched into the consuming industry, such that they become hidden. Similarly, empty cars from the coal mine "appear" on an adjacent track, and these cars are routed on-line back to the source (loading) industry. You have two traffic flows: one is all empty cars, and one is all loaded cars. The hidden trackage, connecting the consuming and source industries, is arranged such that the loaded cars are spotted on a consuming-industry track that becomes the "loading" track of the source industry.

You don't have to do anything special in ProTrak to set up this routing. The cars **"do it"** for you. For example, suppose you set out a loaded hopper car on Giant Chemical's track GC-10. That car is eventually shoved through to the source industry, Fred's Coal on what is track FC-36. Track FC-36 was where the car was originally "loaded". The car continues in a cycle from Fred's Coal to Giant Chemical. To set up this routing specify a waybill such as:

Shipper:	Fred's Coal
Shipper's siding:	FC-36
Consignee:	Giant Chemical
Consignee's siding:	GC-10 , where track GC-10 physically leads into track FC-36.

It is not necessary for there to be separate tracks for loaded and empty cars, but that is the recommended way to go. A loads-in/empties-out routing requires that source and consuming industries be back-to-back on the railroad-layout. If this arrangement is not possible you can still accomplish the same thing, a one way routing of loaded open-top cars, using a "reset to origin" waybill.

Reset to origin

A **reset-to-origin** routing scheme is strictly a modeler's artifice to deal with open-top cars. In this scheme a loaded car is routed from a loading point, such as coal mine, to a consumer industry, such as chemical plant, much as above. But in this case, rather shoving loaded cars through the consuming industry along a hidden connecting track to the source loading track, cars are returned to the source industry *between* operating sessions. There is no physical, hidden connection between the pairs of industries.

This routing is used when one of the industries is in staging. As well, the same track at each industry can be used for both empty and loaded car movements. To set up this routing specify a waybill for the loaded movement in the usual way. However, at the "Continuing in transit" datafield enter the current waybill number. At the question "Is this an loads-in/empty-out waybill?" answer <No>.

A reset routing can be used for just one car, or for a train-load of cars.

Between sessions, The *ProTrak Daily Summary* will ask if you want to print a "**List of Reset Cars**". We recommend that you print this list as a reminder to you to reset both the empties and the loaded cars to their respective points of origin.

Automation Note

ProTrak counts the number of cars presently involved in this reset traffic pattern to avoid doubling up on car-orders. If a car involved in this traffic is unusually "delayed", however, additional cars are added. The extra cars are later removed from this traffic automatically when they reach their destination.

Waybills used by ProTrak

Fuel and Sand waybills

Waybills #1, #18, and #2 are used by ProTrak to order cars for locomotive fuel (coal/diesel) and sand. Sand is used by locomotives to increase traction on greasy, leaf-covered or otherwise slippery rail. The

quantities of fuel and sand are calculated by ProTrak. You can change the shippers. The shipper is changed or selected as described earlier.

User-defined Car Service Directives

Waybills #3 to #12 are used by ProTrak for you to define Car Service Directives (CSD). These CSDs are intended to be used to direct empty cars to staging tracks. Once there those empty cars may be loaded for online customers or in overhead traffic. You can define a car kind (mechanical type), the number of cars, and the destination siding. CSDs are defined at Administration.

Weigh scale test cars

ProTrak automatically moves weigh scale test cars from scale to scale for the required calibration of weigh scales. No waybills need be defined.

Car Orders for an on-line Customer

Car-orders for a shipper/consignee are made by filling in a chart showing the daily and weekly schedule of shipments. There is a car-order schedule for each day of the week, plus the eighth day "All".

Days of the Week

In ProTrak the day of the week can be called in any order. You can go along a week as:

- * the usual Monday, Tuesday, Wednesday, and so on; or,
- * Monday, Monday, Monday, and so on; or,
- * Monday, Friday, Sunday, and so on; or,
- * any other ordering of the days.

With the default ordering of the usual Monday, Tuesday the days of the week can be considered as representing the actual cycle of a 7-day week. Orderings, other than the usual Monday to Sunday, allow you to consider these seven car-order days as representing seven different traffic schedules. The traffic schedule might vary in:

- * the number of carloads ordered; or,
- * the commodity mix.

Car-order Nugget:

- * In ProTrak the days of the week can occur in any order. You can run all Mondays, just Monday, Wednesday and Friday, or some other combination of days.
- * You can schedule your industry car-orders, for example, so that Sunday generates no new traffic. This would be a light traffic day, for operation by yourself, or a day to catch up. You could order Saturdays for a traffic level suitable for two operators; and Mondays to Friday with various levels of traffic for operation with a full crew.
- * You might also use different days to experiment with various traffic levels to find what is comfortable, or challenging, for your railroad.

Number of Waybills and Car-orders per day

For each day of the week, you can specify five different shipments, either inbound or outbound. Each shipment (waybill) can be for up to 99 carloads. If you need more than five different waybills for a single spur (which is highly unlikely), you can make an additional track position spot (using copy) and continue with waybills 6 to 10.

Making Car-orders

From the ProTrak Main Menu select "Cars ordered by Online Industries". From the Summary Listing, select the industry. The display will show the waybill assignment chart for the selected customer.

- * Select the day from the dropdown list, and click the "Order" button.
- * Select/double-click a valid waybill from on-line data.
- * Enter the number of carloads as a <##> from <1> to <99>
- * Click <OK>.

At the bottom of the screen there is the prompt for available siding-length. If the cars ordered arrive as expected you may have ordered more cars than will fit on the spur.

Verify Button

The verify button is used to correct all car-orders assignments by customer number. Car-orders for all customers are examined and corrected as necessary. Cross-spot car-orders are identified and you are given the opportunity to correct incorrect cross-spot car-orders.

View Details

This radio button will show the details of car-orders and waybills for that day at that spot.

Car Orders for Off-line Industries (Staging Tracks)

This section is used to simulate overhead bridge traffic. This traffic is different from the scheduled on-line traffic in two ways:

1. there is no delay for unloading/loading time
2. staging tracks have no say on which car-types they receive and send out.

Car-orders are filled by the standing-order of the cars on a staging track. The search for a suitable shipment (waybill) is "Have a car, what waybill fits?" The waybills assigned to this staging track are arranged in an ordered list. Once one waybill is assigned, the search for the next car starts at the following waybill. This distributes the car-orders over all the waybills.

If several **cars of the same kind** are standing in order, you can order that the same shipment (waybill) should be assigned to each of these cars. That way you get a cut of cars all waybilled to the same destination. This is done by setting the number of car-orders.

You can **bias** the distribution of waybills (get more car-orders for a waybill) by placing the same waybill at many places in the car-order (waybill) listing.

Automatic Assignment of Waybills

When you create a repetitive waybill that describes an overhead traffic movement, you are given the option of assigning the new waybill to a staging track. The new waybill is always assigned to the shipper staging track, and always for a single car. You can modify this car-order in this section, by deleting it, by changing the number of car-orders at the original listing point, or by re-assigning the same waybill to additional points along the staging-track car-order listing.

Deleting traffic at staging tracks

Set the number of car-loads to zero. Or set the waybill number to zero, or clear that datafield.

Rolling stock: Cars

New car descriptions can be entered individually, or as a series of up to twelve identical (including numbers) cars at any time. If you choose to enter a series of cars with different numbers, you can enter the specific numbers yourself or have the computer select the intermediate numbers (you specify the lowest and highest numbers). This is done at the "Edit: Multiple new cars" command.

Nugget: As much as possible use the Copy command to enter new cars.

Note: Multiple unit articulated cars, such as well-container cars, are considered one car in ProTrak.

Articulated cars are considered one car, but the length is over one unit. You enter the number of wells and ProTrak multiplies that by one well length to get the total length of the car. ProTrak calculates train/car dynamics for each unit of an articulated car individually, depending on the weight of the containers/vans carried as load.

Length

Car length is used to determine train length, staging track occupancy and industrial spur occupancy. The required data is the length over the pulling faces of the couplers. The pulling face is the inside of the knuckle. Measure this distance with the couplers in a relaxed position, that is with the car uncoupled. You can place a car directly on a ruler to do this measurement.

You can enter the length in scale feet as <##>, or in actual inches by adding "i" to the measured length as <##.##i>.

For loading purposes ProTrak follows Rule 34, which groups cars into general lengths. About 4 feet is subtracted from the overall length to get the length for loading purposes.

Car Load Limit

Car load limit (LD LMT) is determined primarily by the size of the axle bearings. These bearing sizes have been standardized to just six values. The precise value for allowable weight for three of these bearing sizes was adjusted upward in the early 60s to account for changes in freight-car design, and again in the 1990s. The **total weight** of the car, the tare or empty weight plus the weight of the lading, must not

exceed the **capacity of the axle bearings** (Interchange Rule 70). Therefore the car capacity is determined by subtracting the car light-weight (stenciled LT WT on the car) from the bearing capacity.

Car Capacity

$$\text{Car capacity} = \text{Bearing capacity} - \text{Car lightweight}$$

The car load limit (LD LMT) is measured in pounds to the nearest hundred pounds (100 lbs). In ProTrak car load-limit is entered by selecting the bearing size and entering the car lightweight in pounds.

Lessee, Return to ... when empty

ProTrak routes empty cars home automatically.

For assigned cars, leased cars and all private cars (reporting marks ending in "X" or as listed in the Private Car Owners list), a siding-number must be inserted here. ProTrak needs to know where to send these cars when they are empty. Private cars without a home siding are sent by default to staging track #1.

For **railroad-owned cars** this datafield should be **left blank**. Railroad owned cars are handled automatically by ProTrak based on the car ownership, the Railroad map of connections and valid Car Service Rules.

Railroad-owned cars with a siding number listed here are assumed to be assigned to a pool. These cars can, and will, be **loaded only at that siding**. If a customer is listed then the car will be **loaded only for a shipment to or from that customer**. The spelling of the customer's name on the waybill and for the car-restriction must match exactly. Assign a car to a pool for a customer only by selecting the customer name and location from the on-line data. The waybill shipper/consignee and location also should be selected only by selecting from the same on-line data.

Unless a car is assigned to a pool this datafield should be left blank.

Restrictions, Load restricted to...

Use these datafields to assign a car to a pool or to restrict the commodity for loading. The correct pool type is determined automatically by ProTrak depending on the commodity, the car type and era, and how the **empty return** is specified. To restrict the commodity for loading only, press "X" or "Z" at "**Restrictions**". When this entry has been made, the second-following field will display "Load restricted to ...". To specify a particular lading, select the lading from the on-line commodity listing. To specify an

OCS (On Company Service) car, enter "X" or "Z" at "Restrictions". Depending on car condition and car age ProTrak will adjust this to the correct transportation code, "X" or "Z".

“Restrictions” and “Return to ... when empty” affect car loading

Cars with assigned restrictions can only be loaded in accordance with **all those restrictions**. If you assign a car to return empty to a staging track, that car can be loaded only at that staging track. Similarly, if for some reason you assign a car to return empty to a yard that car can be loaded only at that yard. But yards cannot issue car-orders therefore any cars restricted this way will never be loaded.

As much as possible leave the **“Return to ... when empty”** datafield **blank**, or set at **“Via connections”**.

8 Power Desk

Motive Power: Units, Locomotives and Engines

Steam Engines

You can use steam engines. Data is included for rod steam engines, as well as for Shays, Heislars, and other geared locomotives.

To define a locomotive as a steam engine click on the “class” datafield. At the lower right click on the “steam” option button. The data template is now specific for a steam engine. To state that the locomotive is a geared locomotive select the option button for the correct type. To get data for power and tractive effort you enter boiler pressure, wheel diameter, cylinder diameter and piston stroke. Tractive effort (TE) and peak horsepower are calculated. If you know the TE, but not stroke, you can try several values of stroke until the calculated TE is correct.

Adhesion

ProTrak uses the adhesion factor, combined with the model-weight, to determine if the engine consist can pull all the cars assigned to a train over the railroad profile without stalling. If the train would stall, ProTrak may limit train length to that which can be pulled on the scheduled routing.

Exceptions to this are set at:

1. Transportation, Today’s Operating Conditions where you can tell ProTrak that additional power will be added;
2. Scheduling Helpers, where you can tell ProTrak that helpers will be used on specific ruling grades;
3. Scheduling, Doubling the Hill where you can specify that a train will be doubled between sidings at each end of the ruling grade; and,
4. Power desk, Assign power where power was not assigned to a train.

The tractive effort (the pulling force that the unit can exert) is the product of the unit weight and the adhesion factor. Adhesion is expressed as either a number between 0 and 1, or in percentage terms. Units with conventional wheel slip or adhesion control were dispatched at 18%, or 0.18 of the unit weight. Units with modern adhesion controls were dispatched at adhesion factors of 25% or even over 30%.

However model railroad diesel units do not have suspensions that allow such high factors of adhesion; a value of around 10% seems to be more usual. Model steam engines may have even lower adhesion.

Assign motive power and caboose

If power is **not** assigned to a train:

1. the switchlist routines in ProTrak do **not** limit train length due to tractive effort and train resistance; and,
2. train speed at each point on the railroad, which is based on locomotive power, is not calculated.

If you want to use these features in ProTrak you must assign power to a train.

You should to assign motive power to a train. Although the actual power assignments may change during a session it is best to start off a session with a plan of what power will go on what train. This plan will show you:

- how many units are needed for each Line-up; and,
- how you might optimize the use of the units that you presently have.

Select the train from the lineup listing. The Power Distribution Desk appears showing the train symbol, throttle, and a list of assigned units and cabooses. The total assigned horsepower is indicated at the bottom of the template. Select the units and caboose.

Units in use

ProTrak checks units for use to prevent conflicting double-dipping on power assignments. If ProTrak determines that the unit is already in use, you are prompted for a possible override. To override and assign a unit already in use, answer "Yes" to "Unit is in use. Assign?"

Ordering Helpers

Helper jobs must be established before an operating session. Select the helper job from the summary listing. Select the base station (at the bottom of the helper district) and the top station (the station at the other end of the helper district). Select the units. If the helper district is long enough to require a caboose (a conductor) a message will be printed on screen. Usually a conductor is required if the helper district is more than 20 miles long.

9 Crew Management

Switchlists and Clearances show the name of the Conductor and Engineman (C&E) who are in charge of the train. Train Orders are addressed to the C&E. Train Registers are checked in the name of the train crew. As well orders from the Dispatcher (DS) are sent over his initials. ProTrak should have the names of the operating crews.

You may also wish to keep a record of visitors who have operated on your railroad. At the scheduling menu select "Dispatchers and Operating Crew".

Which crew?

ProTrak maintains crew information in three summary lists:

1. your regular Operating Crew list;
2. your Summary operators list; and,
3. an Associates/Occasional operators List.

The Operating Crew List is based on the names of the operating crew at the last session. The Summary List can be or may supplement your guest book. You might use the Associates List for a second crew or occasional operators. Any name entered in the Associates or Operating Crew List is automatically added to the Summary List.

Seniority

ProTrak calculates and assigns a "Seniority" on an individual basis scaled from "Z" up to "A". Factors included are the qualifications and number of sessions. More than one person can have the same "seniority" rating. However ProTrak always lists the crew in order; a tie in seniority-rating being broken by the number of operating sessions. The number of sessions is automatically updated during the *Update/Daily Summary*.

Call

The **call** column is used to indicate that the individual will be available for the next operating session. You can also use this column to indicate which assignments this person wishes to be assigned to.

Keeping Operators busy

ProTrak includes special routines that will help your operators enjoy a session on your railroad even more. This section includes a planning tool that you can use to determine how many crew you need, and how to keep the all the operators as busy as possible.

From the ProTrak scheduling menu, select "Show expected Crew Assignments". The Line-Up of Train Movements is examined to see how many trains are moving at the same time, minute by minute over the whole session. This graph is displayed. For this graph you can determine the number of throttles you need, how many crew you need, and whether the Line-up is efficient. For example, if the graph shows a long period of the session with only 2 trains moving and at other times 10 trains moving, then one should modify the schedules to even out the traffic density. This is done by changing call times so that some trains are moved from 'busy' periods to 'dull' periods.

Number of crew

The display asks for 'time between assignments' with a default of 30 minutes. This is the time between finishing one train job, and starting the movement on the next train job. The time is fast time 30 minutes or about 5 minutes in real time. In this time the crew will need to collect a new switchlist, find the train and think about what is about to happen.

The display next shows a graph of crew assignments by train with time during the session. This is a graph of the most efficient use of the assigned crew. The maximum number of crew will in most cases be larger than the number shown in the previous graph. This is because the time required to move from job to job.

This graph can be used by crew to bid on jobs, by the dispatcher to call crews, and to plan operations.

Calling Crew for Expected Assignments

From the ProTrak scheduling menu, select "Making expected Crew Assignments". Trains are shown along with the call-times, release time, and conductor's name. On selecting a train the section on the right has dropdown lists of available and qualified crew for this job. The required qualification for the job is listed at the top of the Available Crew list.

10 The Operations Summary

How to run an operations session

Operations is about directing and reporting:

- the movements of trains, by the “Dispatcher”
- the movements of cars in trains, by the “Conductor”
- the movements of cars in yards, by the “Yardmaster”,

and

- running trains, by the engineer.

There are other operating roles, such as making decisions about changes in the operating plan (General Manager), controlling the assignment of power (Power desk, hostler), or doing track maintenance (Roadmaster, foreman).

When operating you mostly, at the computer keyboard:

- report train locations “Dispatching”;
- print switchlists, “Car Control”;
- print yardmaster reports “Yardmaster”.

Occasionally you may also:

- report exceptions, where a car is or why a car cannot be delivered;
- determine when to call extras/annul jobs.

Most of these functions are directly related to jobs normally done by the dispatcher. However, in the absence of a dispatcher all this can all be done by the train crews, or by a car-service operator.

Starting an operations session

You can proceed directly to the Operations session at start-up by clicking on the ProTrak icon. Or click on “Transportation/Run an Operations Session”.

The Operations Session menu has dropdown menus grouped for:

1. controlling the clocks, and exiting operations;
2. dispatching functions;
3. reporting train-movements;
4. updating, previewing and printing switchlists;
5. reporting cars at the yards;
6. reporting cars weigh scaled, and,
7. locating and correcting the movements of individual cars.

Reporting train locations

Select Report Train Movements. A list of trains will appear showing the train's Line-up number, the train symbol, and the number of cars. The four columns of cars list:

1. the number of cars currently in the train;
2. the number of cars currently assigned as pickups;
3. the number of cars currently extra; (which will change as the train setouts cars), and,
4. the number of cars for tomorrow's train (cars behind the train's current location).

Cars with a '+' are scheduled to be picked up; and cars with an '*' are **currently** extra.

Select the train to report. A screen listing the yards served by this train will appear with radio buttons beside yards yet to be worked. You report the train at a subsequent yard by selecting the radio button and clicking OK.

When a train is updated, ProTrak automatically:

1. Checks industries between the former location and the new location.
 - a. Cars, that are ready, are picked up;
 - b. car for setout are placed on the industry spur
2. Moves all cars in the train to the specified yard;
 - a. sets out cars as necessary;
 - b. sorts those cars into the next appropriate train in that car's schedule
 - c. picks up all available cars as limited by train length or tractive effort;
3. If the new location is an intermediate (on the train's schedule) staging track, all the cars are unloaded and re-loaded, if possible.
4. If the new location is the last yard, then the engines and cabooses are released.

All these actions are, of course, within the computer. Your crews should report "exceptions" to the planned actions as listed on the switchlist.

Suggestion

Report the movement of trains as they occur on the railroad. This assures that cars are reported as being transferred from one train to the next correctly.

Switchlists (Train Journal)

In these instructions “switchlist” means the train consist or train journal. You can change the name of this instruction at “Administration/Terminology”. For the purpose of this instruction, “switchlist” is used herein.

How to use the switchlist (train journal): 1

**Look at the car number and initials;
the SPOT column says where the car is;
the NxtLoc column says where to put the car.**

Some more about using a switchlist (train journal): 2

The switchlist is a list of cars in the train, and what to do with them. It also includes instructions about train handling and routing.

1. There is one line for each car.
2. The cars are listed on the switchlist in the same order as the cars stand in the train.
3. There are columns that describe the car, where it is, where it is going, and restrictions.
4. There may be two listing of cars.
 - **“Cars in train”**. This listing is for cars in the train when you leave the yard where the switchlist was printed. This list includes cars you set out and car you take to the next destination.
 - **“Cars to Pickup”**. If there are cars to be picked up there is a second list after this heading. These cars are listed by the order of work. You place them in the train as per other instructions, but generally towards the middle of the train.

What the Columns tell you

- A) The first columns identify the car
 - by initials and number
 - by details: kind, whether empty or loaded, length
- B) The “Consignee” column provides guidance as to what to do with a car.
 - a customer name, or
 - yard to yard
 - return to agent at a later station
- C) The two spots, SPOT and NxtLoc, list

- where the car now “SPOT” (unless you changed it)
- what to do with the car “NxtLoc” (next location)

1. Under “**SPOT**”, where the car is:

- If the SPOT is the train symbol, the car is in the train.
- If the SPOT is a staging track, the car is in the train about to leave that staging track.
- If the SPOT is a customer siding number, the car is at that location and you are expected to pick up that car at that customer. The “Consignee” will be this customer.
- If the SPOT is a yard siding number (“y” or “Yd”), the car is in that yard and you are expected to pick up that car at that yard.

Summary:

- Yard or customer, pick up car
- Otherwise car is in train.

2. Under “**NxtLoc**”, for what to do with a car:

- If the NxtLoc is a customer, set off the car. The “Consignee” will be this customer.
- If the NxtLoc is a yard (“y” or “Yd”), get the outbound switchlist (the next switchlist for this train). If the car is not listed, set off the car at that yard. Generally at a yard you will arrive on an arrival track and the local yardmaster will provide instruction.
- If the NxtLoc is a staging track the car goes into the staging track with this train.

Summary:

- Yard or customer, set off car.
- Otherwise car stays in train.

3. The “**Consignee**” column gives guidance about where the car is going (in English). A car will have one of four routings:

1. If the car is going to from one yard to the next yard for setoff at the next yard, the consignee is shown as “Yard->Yard”.
2. If the car is being picked up, the customer name is shown.
3. If the car is being set off, the customer name is shown.
4. If the car is going into staging with this train, the customer name will be shown. If the customer is unknown (no data) the staging track name is shown.

Consignee

What to do with car

Yard->Yard

set off at NxtLoc yard

Customer name and SPOT is spot pick up car

Customer name and NxtLoc is spot

set off car at customer

Staging track

car is going with train into staging

Customer name and NxtLoc is staging

car is going with train into staging

What is a Switchlist: The details

Printing the switchlist (train consist) is what this is all about. The switchlist used in ProTrak is identical to those used on the full size railroads. The reason is simple: the switchlist is the simplest way of communicating all the necessary information to the train crew. All the information on the switchlist is used, even in model railroad operations.

The switchlist is the piece of paper that identifies the train:

- what its routing is;
- who are the persons in charge (the conductor and engineer);
- what restrictive orders exist; and,
- what equipment has been assigned.

At the bottom of the switchlist there will be summary data such as:

- how many empty and/or loaded cars, and
- the total length and total weight of the train.

As well there might be a speed limit, tractive effort comparisons or other special handling measures stated (such as helpers required or notifications of dangerous loads).

The switchlist describes what cars are in a train:

- the order that those cars are in;
- if a particular car is to be picked up;
- where that car can be found; and,
- where each car is going.

Other information found on a switchlist for each car might be:

- the car type (Kind, or **KND**);
- length (**Lgth**),
- whether it is empty or loaded (**E/L**),
- the consignee and/or shipper by name and siding number (**SPOT**),
- the gross weight of the car in tons (**Tons**),
- the commodity carried, and
- any special handling (**HDG**) that is required or prohibitions.

Each car may be listed on more than one line, depending on the number of prohibitions or required actions such as: **Weigh Now**, **Do Not Hump**, or **Dangerous Empty**.

The order the cars are in is important for several reasons:

- blocking by destination
- train dynamics
- possible car to car load interactions.

Blocking for train dynamics is typically overlooked but may be more important on a model railroad than on the prototype, because our model curves are sharper and cars do not roll as readily.

How to use the switchlist details

1. Use the train symbol and date to tell the dispatcher who you are.
2. Use the routing information to locate where you are going, where you will do work, and where you will pick up your next switchlist.
3. Use the equipment information to identify your train and set your DCC controls. Make sure all the assigned equipment is there.
4. Use the orders and clearance information to know whether you are cleared to occupy main track, and what restrictions you may face.
5. Use the car listing information to identify cars and where you will find them and what you are to do with those cars.
6. Use the car kind (KND) to identify cars, and any related restrictions.
7. Use the car length (LGTH) to identify cars and check clearances at tight curves, or customer's spurs.
8. Use car empty/load (E/L) to identify blocking issues, especially cars for customers that have been blocked out-of-block because of train dynamics or lading restrictions.
9. Use the car plate to check clearances at bridges, tunnels or customers.
10. Use the "block" (B#) to identify car destination.
11. Use the car gross weight (TONS) to identify when your train will start to speed up on cresting a grade.
12. Check the handling information for "light" or heavy cars, or other special handling.
13. The **4 mph** warning appears if you are doing any switching, at yards or customers.
14. The "movement on other than main tracks" warning appears if you are doing local switching.
15. Use the train length to know what sidings you can clear at, or which arrival tracks you must use.
16. Use the train weight information to know how your train will handle on grades. If you are using "drive-by-wire" this weight is used in calculating train speed. This weight will give you guidance about how your train will bog down on up grades and speed up on down grades.
17. Use the "average weight per car" and "tons/brake" warnings to indicate how effective your brakes will be. If the tons/brake are too high for a subdivision or the locomotive you may have to set off certain heavy cars, and or double the hill downgrade.
18. Train speed will be limited by "average weight per car", as per your railroads train handling instructions.
19. Use the tractive effort numbers to indicate whether you need more units in your locomotive to avoid stalling. Insist on more units, unless a helper is assigned.
20. Use the helper location to place the helper within the train according to operating instructions. The helper station warning indicates where on the route a steep grade limits car-in-train stability if a helper is not used. Stringlining of cars likely will occur at some point beyond the indicated location. Insist on a helper, or set off cars to reduce train length and tractive effort.
21. Use the "Pick up next switchlist at" warning to identify where to report and pick up a switchlist, but also as an indicator of where you will/can do a lot of yard work. The train will be re-blocked at these locations.

Printing Switchlists

Printing a switchlist ‘closes’ a train at a yard, preventing any more cars from being assigned to that train. However on occasion you may wish to add cars to a train already printed, and closed. You can do this in two ways, either by re-setting, or by reporting that the train is still at a yard. Both are done from the train position reporting menu.

Changing the conductor, engine or caboose

The assigned conductor, consist and caboose can be changed during the session, even after the switchlist has been printed.

- If the switchlist has been printed, reset the train/switchlist (“Train movements/Open train at yard”).
- Select Preview Switchlist, and select the train.
- Buttons for changing conductors, engines and cabooses appear at the bottom of the on-screen switchlist.
 - Use “Update assignments” to change the conductor, individual units in a lashup or the caboose.
 - Use “Change consist” to change/select the entire locomotive consist, or assign a new handheld throttle.

The Yardmaster Reports

The Yardmaster has access to a variety of lists, reports and windows. You will likely use only some of these reports, and which one you use will depend on the yard, the traffic through that yard and the personal preference of the yardmaster.

The Yardmaster Reports show the trains (blocks) to which all cars in a yard are assigned. The “preview” reports also show the make-up of trains arriving and departing a yard. The Yardmaster uses these reports to sort the yard, to block whole trains ready for departure and to prepare blocks of cars for pick-up by enroute trains. The Yardmaster TAG List (Inventory Report) also shows what cars are in storage.

The Yardmaster lists

The three main lists are:

- the Cut List, which may be used to break down an incoming train. To use this report you will want to have as many classification tracks as there are blocks (trains) working this yard.
- the Workorder, which may be used to build an outgoing train;
- the TAG list, which is the ongoing standing inventory of cars in a yard. This list is typically run before an operating or when a new yardmaster comes on duty.

Printing the Yardmaster lists

- Select Yards and the report you want. A list of yards will appear at the lower right of the screen.
- Select the yard.
- Select which report you wish to print or view.

A Cut List is available only if the train was previously delayed in sorting.

Other Operations Session Commands

Other Operations menu commands allow you to

- annul trains,
- call extra trains, and
- call out helpers to assist heavy trains.

As well you can

- pause and restart the fastclock
- open and close bridges, or operate other similar devices
- weighscale cars
- locate individual cars and
- change car location or car routing
- show cars in trains or at customers spurs.

The dispatcher menus allow you to dispatch your railroad

- using various forms of CTC
- using TWC/DTC
- set trainorder signals for T&TO operation.

Other train commands

Annul a train

Annulling a train simply means canceling the train. A train can only be annulled at its starting point, or at a yard (register station). If the train is at a yard, when annulled, the cars in the train are dispersed and assigned if possible to other trains. To annul a train select Annul train. Select the train and confirm to annul.

Call an extra train

Calling extra trains is an advanced operations technique. Not only do you need to collect the cars together, but you also need to have adequate power (an engine) at the origin station/yard. In addition, you must determine that there is main track capacity sufficient to handle the extra train. If the train is to terminate in a staging yard, then there must be adequate track space for the extra train. On a busy railroad this level of planning may exceed the time available during the operating session itself.

In most cases model railroad operators carefully pre-schedule all trains. This would include any anticipated "extras". If the volume of car movements does not warrant calling what would otherwise be an extra train, that train can be "annulled".

ProTrak determines which trains have extra cars. From this list, you select the blocking pattern (train) to call an extra for. This extra train appears on the usual list of trains at the Train-movement and Switchlist-print menus. Print the switchlist and move the train as you would any other train.

Call helpers

Helpers can only be assigned if you have set up a helper job before the session, and if trains are heavy enough to warrant assistance. To call a helper job to assist a train select Helper. ProTrak determines which helper jobs are available and which trains require helpers. Select the train to assist from this list. Select the helper job. A train-movement order is printed for the helper job.

Making Adjustments and Corrections

Printing switchlists, updating train locations, and printing yard-switching lists are the three most common actions during an operating session. If all goes smoothly those actions are all that has to be done.

However, every operating session has its little twists. A crew member may forget to set off or pick up a single car. A car may go "bad-order" and have to be set out at a spur other than the track it was directed to. When something "out of the ordinary" happens you need to be able to:

- correct car setup locations;
- look for misplaced cars;
- transfer loads from an over-sized car to smaller ones.

To facilitate "debugging" car movements, you also will want to be able to quickly:

- show what cars are in each train; and/or,
- show the status of an individual car.

What happens if a car is not set out as listed on the switchlist? Suppose a car is left on a close-by spur rather than the assigned destination spur? Fortunately, there are several easy ways to report these somewhat common occurrences.

Query a car

The "Query" menus are used for finding cars, showing cars at customers spurs, and correcting car routings. To find out about a car, select Exceptions, Query Car. Enter the car number, or any number of the last digits of the car number. The reporting marks are found for you. Confirm that this is the car by clicking the <OK> button. The car status appears on screen. You can re-assign car location, the next yard, or the destination yard from this menu. Use the Change menu. You can also transfer the load in this car to another car.

A bad-ordered car will not appear on any paperwork until the car is reported repaired.

Transferring a load

On some occasions, as on real railroads, a car will be loaded by an off-line shipper on a foreign railroad for delivery on the home road (your railroad) that cannot be delivered because either the car is too heavy or the car exceeds clearances. ProTrak checks for vertical clearance (the "Plate") and curve radius ("car length") to see if a car can be set out at a customer's spur. If it cannot be delivered then the load must be transferred to other cars.

Show cars by zone or by train

Cars will be located at one of three places:

1. on an industrial spur (in a switching district);
2. in a train (assigned); or
3. sitting in a yard, unassigned. Yardmaster reports are used to show cars in yards.

Cars at a switching district

Cars are listed by station order and by industry siding order. You can change the reporting order at each station or switching district by re-sorting the customers'/industry spurs.

Cars assigned to trains

Cars with no special symbol are in the train; cars with a '+' are scheduled to be picked up; and cars with an '*' are currently extra.

The Daily Summary: After the Session

The Operations Cycle

The operations cycle consists of running an operating session followed by updating your railroad at the Daily Summary. The **Daily Summary** is used to update the railroad between operating sessions. A session does not need to be complete -- that is, every scheduled/listed train does not have to be run. If you run one train at a time by yourself, you can choose to, or choose not to, update the railroad after that train has run. This is one way to catch up on your local industry switching on heavy-traffic days.

The Daily Summary

After the operating session is complete it is necessary to update the railroad, which includes, for example, "unloading", distributing, and "loading" cars. Car distribution in ProTrak is exactly as on full-size railroads, with the exception that ProTrak has completely automated this function. The Daily Summary prepares the Daily Interchange reports that must be submitted (in simulation only!) to the AAR and connecting railroads. As well, management of the home road will want to know how things are going. Strictly as a modeling function, it is also necessary to "return" trains to their starting points in staging, or at yards.

Select Update from the Transportation menu. The Daily Summary initial page and menu will appear. The first screen shows the date and session number, the number of trains that have run and whether the session is complete. The present and next "day" of the week are shown. The specified level of detail of the printed reports is shown. You can change the day and the amount of printing.

Day of the Week

The "day of the week" selected here corresponds to the day of the week used to enter the car-orders for each online shipper and to specify the daily schedule of trains. For each day of the week you can have:

- a different set of car-orders; and,
- a different Line-up of Train Movements.

This allows you to have different traffic densities at your operating sessions. This is useful if the number of operators varies, or if you need to "catch up" on local deliveries.

ProTrak automatically increments the day of the week when a session is complete. However you can run the days of the week in any order you wish. To change the day of the week, select the "day of the week" from the dropdown list.

Reporting Detail

The Daily Summary can output reports about the status of the railroad in increasing detail. The "base case" report is the General Manager's Daily Summary. This is a one-page summary of how many car-orders were filled, how many cars were moved, how many train movements there were, and how much money was earned that day. The bottom line is the *Operating Ratio*.

The more detailed Daily Summary Reports are intended as diagnostic tools that you can use to maximize the financial health and operating practices on your railroad. The "unfilled car-order" report lists those shippers whose car-orders could not be filled. An insufficient number of cars of the needed type, volume, capacity or quality are the reasons why an order was not filled.

Undeliverable Cars: Debugging

If there are cars that could not be delivered "yesterday", ProTrak will ask if you wish a print-out of this list of cars. This list includes a reason why each car could not be delivered. When you first add a new shipper or new train connections, this list can be a useful diagnostic tool.

The ProTrak Automatic Car Distributor

Most of the remaining portion of the Daily Summary calculations are automatic. The cars are "unloaded", distributed, and "re-loaded". Empty cars are routed back as per the AAR Car Service and Car Hire Rules and/or any Car Directives. Note that the AAR Car Hire Rules and Car Directives are era-sensitive. You can specify the year, and ProTrak will apply the correct Rules for your era. After the cars are distributed the bookkeepers do their thing.

General Manager's Daily Summary

If you asked for a print-out of the General Manager's Daily Summary, that report is printed as the bookkeepers complete their work. When this is complete a graph of Operating Ratio for the last 20, 40 or so sessions will appear. Also plotted is the percentage of cars unloaded in each session. After examining this plot press any key to continue. You can see this plot any time from the ProTrak Main menu. Select Transportation, Financial Results.

Financial Performance

A key indicator of successful railroad operations is the Operating Ratio (*OR*). The Operating Ratio is defined as "the money or expenses required to operate" divided by "the money or gross income earned through operations". If you are running a healthy railroad the *OR* (Operating Ratio) will be plotted bright

green. If your railroad is just moderately solvent, the **OR** is in the mid-80's to low 90's, the results are graphed in dark green. Losses are plotted in shades of red. Note that the lower the **OR**, into the 70's, the better. Because of fixed expenses, loan payments and taxes, "break-even" is lower than an **OR** of 100.

The broken yellow line shows the percentage of cars unloaded on that day. "Unloading" cars is the only way your railroad has of generating income. Generally you may be running about 60% of the cars loaded and 40% unloaded. As well, it may take several "days" between the time a car is loaded and when it is unloaded. Therefore only a fraction of 60% of your cars will be unloaded on any one day. If you can get cars to your customers quickly (in terms of days between loading and unloading) you will unload more of your cars, make more income, and have a better bottom line - a lower **OR**. Cars that enter staging are considered "unloaded" that day. In general you will make more money with overhead traffic (staging to staging) than with traffic unloaded at online shippers, or with short-haul, strictly online traffic. However, there is "loads of money" to be made originating traffic.