Research and Test Department

TEM/RECAP CONTROL PROGRAM (TRCP) Version 1.0

User's Manual

REPORT NO. R-743

Alvaro R. Auzmendi

Washington Systems Center

ASSOCIATION OF AMERICAN RAILROADS

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December 1989

50 F Street N.W.
Washington, D.C. 20001

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13. ABSTRACT

This is the documentation manual for the TEM/RECAP Control Program (TRCP). TEM/RECAP is a computer model consisting of two parts. TEM is a computer model that simulates physical train operations for the purpose of predicting fuel consumption and other train performance factors. RECAP obtains the outputs from TEM and determines the financial benefit of using different fuel-saving train operation alternatives.

TRCP enhances the user's productivity in the task of preparing and verifying inputs when executing the TEM/RECAP model by incorporating many user-friendly features which previous users of TEM/RECAP found desirable. TRCP can be used with an IBM compatible personal computer.

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EXECUTIVE SUMMARY:

The TEM/RECAP Control Program (TRCP) was created to enhance the user's productivity in the task of preparing and verifying inputs when executing the TEM/RECAP model. Many features have been implemented to improve the user's efficiency in creating a TEM/RECAP analysis. The following are some of the more important ones.

The TRCP program logically represents a book with each page being an input file editor. Each editor, is a full-screen editor with labeled inputs. All the fields in each editor are active, therefore, if you make a mistake in one of the previous input fields, you can return to that field without exiting the editor and reentering again.

Two types of help screens are incorporated in each screen. The first one is a field specific help screen to provide the user with more detail information about each input data, and to suggest appropriate default values. The other type of help screen, defines the different programmed cursor movement keys available in TRCP.

TRCP is also a file management utility for TEM/RECAP. When the input field requires a file name to be inserted, a list will automatically appear on the right of the screen, listing all the available files of the same type residing on your directory. Choosing one can be done by the touch of a key. If the user tries to save a file that references other files which do not exist, TRCP will prompt a message indicating so, and will not allow the file to be saved. This way, none of the TEM/RECAP models will stop during execution because of missing input files.

Due to the many complicated relationships between input and output files, TRCP is implemented with a validation of output files

feature. If any of the input files which have previously created an output file are modified, then TRCP will check to see if this change has invalidated the output file. If so, when the output file is needed, TRCP will run the model needed to create a new updated version of the output file. Therefore, if the user runs the economic model for a specific TEM output file, and TRCP finds that the output file is not vaild, then a new output file will be created by running TEM first, and then the economic model will be run using the updated output file.

The user does not have to worry about all of the administrative input files, like TIF's, PIF's, and BIF's, used to communicate from program to program in TEM/RECAP. TRCP will handle all the administrative files. It will also do all the input file renaming and formatting required to run a TEM/RECAP analysis.

Long-term storage requirements have been dramatically reduced. By condensing the larger input and output files into archives, about 80% of the storage space in your hard drive can be reclaimed at the end of a TEM/RECAP session. Also, after each simulation, all the old input files are "cleaned up" (i.e. deleted) from your directory to gain more storage capacity. The newly created files will be condensed and archived.

To keep track of your TEM/RECAP session, the moment you enter TRCP, a LOG file is created where an entry will be appended for every program you run and any messages displayed along the way. If a simulation ends in an unexpected error, it is noted and an attempt is made to write a detailed error message to the LOG file. In this manner, long (overnight), simulations can be carefully traced, and analyzed, without being present when TEM/RECAP is running.

By using TRCP with all these new features, we believe that not only will TEM/RECAP prove to be a good engineering/economic tool, but also your productivity in perfoming analyses will be multiplied.

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LIST OF EXHIBITS

1.0 INTRODUCTION

This manual is designed to enable the user of the Train Energy Model (TEM) and the Rail Energy Cost Analysis Program (RECAP), to get acquainted and comfortable with the many useful features of the new TEM/RECAP Control Program (TRCP). It is not a technical manual. For detailed information for TEM and RECAP, please refer to their respective manuals. (1), (2)

The TEM RECAP Control Program, was created to simplify the task of preparing and running a simulation using TEM/RECAP. It serves many useful functions, including providing the following capabilities:

1 - Formatted Full-Screen Editors for All TEM/RECAP Input Files.

2 - "Pop-up" Help Screens for Quick Reference to Input Fields and Editing Keys.

3 - Complete TEM\RECAP File Management Capability.

4 - Descriptive Log File with Execution and Runtime Messages.

5 - Checking Logical Relationship Between File Inputs.

1.1 Formated Full-Screen Editors for All TEM/RECAP Input Files

TRCP provides full-screen editors for all the input files using TEM/RECAP. One can think of the TRCP file editting function as representing a book. Where, each page of "the book" represents an input file editor. The main menu signifies the title page and from here "paging down" (i.e. PgDn) on a specific file name, will "pop-up" different input file editors.

The system is implemented recursively. That is, from the main menu, one can open up a page for the initialization file editor, from here a page for the consist file editor, and from here a page for a vehicle file editor. Then, to return to the title page (i.e. main menu screen), all one has to do is "page up" the pages and each page will close and return to the previous page.

All "pages" or editors, are full-screen editors with labeled input fields. Within an editor, all the input fields are "active", and can be modified several times before actually saving the input file. For the specifics on how to move from field to field within a specific file editor please refer to Appendix B of this manual.

1.2 "Pop-up" Help Screens for Quick Reference to Input Fields and Editing Keys

TRCP also provides two types of help screens within the editors. They are:

1) Input field specific, and
2) General editing keys

While on any input field of an input file, one can press the "F1" key and obtain a help screen specific for that field. The screen will display more detail information related to the input field like a broader definition, how it is used within the model, or even in some cases, suggest an appropriate "default" value.

The other type of help screen implemented in TRCP, is a more general one. By pressing the function key "F1" twice, a screen with the available editing cursor moves will "pop-up". This key will become very useful, specially, during the first encounters with the program. It will replace having the manual

by one's side, and having to flip pages every time you need help with the editing keys.

1.3 Complete TEM/RECAP File Management Capability

1.3.1 Display of Current Input Files Available

Every "page" of TRCP will display on the right hand side of the screen a directory of the input files available to the user by file type. That is, as the user lands on an input field that requires the name of an input file, on the right hand side of the screen, a listing of all the available same-type-of-file will be displayed. Of course, if the user decides to create a new file, he can do so by just typing the new name of the file and opening up a page to create it. Also, if the input field is restricted to a preditermined set of values, then the allowable set of inputs will be displayed on the right side of the input screen and the user will be restricted to select one of them.

1.3.2 Verify Presence of Input Files before Execution

TRCP will not let the user save a file like the initialization file, which itself defines other input files for a simulation, unless all the input files that it specifies exist in the system. If an input file name in the initialization file is entered and that file does not exist, when the user tries to save the initialization file, an error message will appear on the bottom of the screen identifying this error. This way, it assures itself that any executable program run, will always have all the input files it requires.

1.3.3 Validation of Ouput Files

TRCP, will also make intelligent decisions for the user. If an input file is modified (for example the locomotive S402.PAR), then all the output files created by using the

S402.PAR locomotive will be invalid. These files used a locomotive file that no longer exists, as it was when this existing output file was created. All the PRE train data files, TEM output files, and ECON2 economic report files that used this locomotive will be outdated. If not deleted, then a decision might be based on these output files assuming that the inputs used are the ones on the current directory. Not a correct decision, but certainly an easy mistake to make.

To solve this problem, every time that an output file created by TEM/RECAP is needed for an analysis, TRCP will verify whether it is valid. If it is not valid, then it will first delete the file from the archives, and then run the appropriate model to create a new current output file. For example, if the user runs the economic model, and TRCP finds that the PRE train data file or the TEM output file are outdated, then it will run either model to recreate an updated version of the output file. The old version of the output file will be replaced in the archives by the new one. The user does not have to do anything, TRCP will make all the appropriate model executions and file management decisions to maintain a current valid set of outputs.

1.3.4 No more TIF's, PIF's and BIF's

In the old direct interface between the TEM/RECAP model and the user, there were many administrative files that the user had to create. Their only purpose was to communicate information between programs. With TRCP, the user does not even know that these files exist. All he has to do is specify a name for a simulation and TRCP will create all the necessary administrative files to run the simulation.

1.3.5 Increased Storage Capacity

As an experienced user of the TEM/RECAP model knows, the amount of storage space required to store all the input and

output files is quite large. A typical output file from TEM will normally use between 80K and 120K of disk space. Also, input track geometry files are in the same size range.

In TRCP, this storage problem is solved by compressing all the major data files into archive files. Some of the archive files include: TEM output files, PRE train data files, track geometry files, and other storage hungry files. While the main programs in TEM/RECAP are not running, this files are all stored in a compressed format in archive files. This feature can save between 70 to 80% of storage space. Then, when one of the models needs to be run, the necessary input/output files are decompressed and copied, in their original format, from the archives to the default directory where the models expect them to be. Once the model terminates, the new files created are compressed again and archived. The files that were extracted from archives and used but not modified, are deleted from the directory since a copy already exists in the archives.

1.4 Descriptive Log File with Execution and Run time Messages

A problem that many users encountered while using TEM/RECAP, was that, if any error message appeared, the message displayed by the system was often meaningless to someone not familiar with the source code of the TEM/RECAP program or the Diskette Operating System (DOS). Other times, when running a set of simulation trains in a batch form, due to the length of this type of analysis, many users would leave the program running overnight. Then, the following morning, when the user looked at the results, there would be no way of knowing how each simulation terminated. If it sucessfuly terminated, there was no problem, but if there had been an error message, there was no way of knowing what the error was, unless the user ran the simulation over again.

TRCP handles this problem by generating a descriptive LOG

file of every program run along with its state of termination. Some of the information written to this file include: date and time of when the TEM/RECAP session started and ended, programs that were run during the session, any messages this programs displayed (in many cases this messages will be converted to an "english" version), files decompressed and used in the simulation, and other file maintenance messages.

This log file becomes handy when running multiple simulations. For example, for every TEM analysis, the log file will capture the final condition of the controls of the train and the state of the program termination. This way, after a multiple simulation analysis, the termination state of each individual simulation will be known even if the user was not present at that time.

1.5 Checking Logical Relationship Between File Inputs

Finally, TRCP will make logical "checks" between the information in some of the files. For example, it will verify that a crew operates within the limits of the route the train is traveling on, train starts and stops are within the specified route, input data is within "reasonable" limits, and other similar logical input relationships.

Overall, we think that TRCP will handle many of the problems encountered previously, and simplify the task of creating, verifying, and running the TEM/RECAP model.

2.0 VALIDATION OF FILES:

TRCP is not just a file editor/creator. The program will check the logical relationship between the files and verify if the output files (.OUT and .DAT) present are valid and can be used in a simulation in their current state.

2.1 What is the Validation Process

If you type the DOS command DIR to display a listing of the files that you have in your current drive, you will see the name of the files, a date, and a time of creation of each file. That is, when DOS saves a file, it will also save the time and date of when the file was last modified. TRCP uses this time and date to check to see if the input files used for the creation of an output file (.OUT, .DAT, or .CSM) are older (i.e. were created/modified later) than the date and time of the output file itself using these inputs. If this is true, then the current input files in the system do not represent the associated simulation output file.

The reason for this verification is simple. For example, say you previously run PRE for a train consist we will call LOADED and which is made up in the following way:

Qty	vehicle type	vehicle name	braking	lading
5	locomotive	SD40	TE	12 tons
100	cars	HOPPER		100 tons
1	cars	CABOOSE		0 tons

The input files you will need to run the train preprocessor PRE will be the following:

Following TEM/PRE name conventions:

LOADED.CON	Consist file
SD40.PAR	Locomotive parameters file
HOPPER.PAR	Vehicle parameters file
CABOOSE.PAR	Vehicle parameters file
TEM.AIR	Air brake system file
SD40TE.DYN	Dynamic braking effort file
SD40.THL	Tractive effort file

If everything goes well, after running PRE you should have created a train data file called LOADED.DAT which should have a date and time later than the inputs used above. At this point LOADED.DAT is obviously **VALID**.

Now suppose we run TEM using this data file and see that the geometry of the track is quite extreme with steep grades; therefore, we decide our train is lacking power. To solve this problem, we change the consist file (LOADED.CON) by adding two helpers (of the same type as the leading locomotives) at the end of the train. Therefore, after modifying the consist by adding two helpers, we made our train data file (.DAT) **INVALID**. The date and time in the consist file (.CON) is older than the date and time of the train data file (.DAT). If we were now to run TEM again, without first running PRE, we would be running the same simulation as before (i.e. with no helpers).

The correct procedure is to run PRE again and create a new train data file (.DAT) and consequently run TEM one more time. This should happen if we had modified any of the input files that created the original train data file (**without** the helpers). If any of the input files listed above had been modified then the train data file would have been **INVALID**.

IN TRCP THIS WILL RESULT IN THE DELETING OF THE CURRENT LOADED.DAT FILE WHEN YOU ASK TO USE IT, AND AUTOMATICALLY RUNNING 'PRE' TO CREATE A NEW LOADED.DAT FILE USING THE NEW CONSIST.

This example was quite straight foward. Other times deciding whether to run PRE before TEM may not be as obvious. For example, say you are making a study on the effect of total train weight versus fuel consumption. You will probably be modifying the lading of the vehicles in the consist file quite frequently. Say you just modified the consist file, and you look at your watch and is time to go. You leave everything the way it is and go home. Next time you decide to continue your analysis (could be a few days) you might have a hard time remembering if the current train data file is valid or not. You may actually base a decision on the current output file assuming that it represents the current input files on your system when it does not.

TRCP checks to see that the time of the last update of the .DAT file is later than all the input files which were used to create it. If not, it executes PRE and creates an updated .DAT file. A similar situation occurs with the validation of the output file (.OUT) from TEM. In the next section I will discuss the validation and links between the input files in TEM/RECAP.

2.2 Relationship between TEM/RECAP input/output files

Before we get too deep into the validation process, I think a definition of the modification of a file is in order.

Modifying a file:

A modification of a file within TRCP is not only entering the file and changing inputs. If you enter the editor for a specific file, look at it, and then save it (i.e. hitting the PgUp key and hitting 'Enter') instead of exiting without saving, (i.e. pressing the 'ESC' key) then the file creation date will be changed, and it will affect the validation of resulting output files created by this input file. Any time you do something to change the creation date of the file, you

are modifying the file.

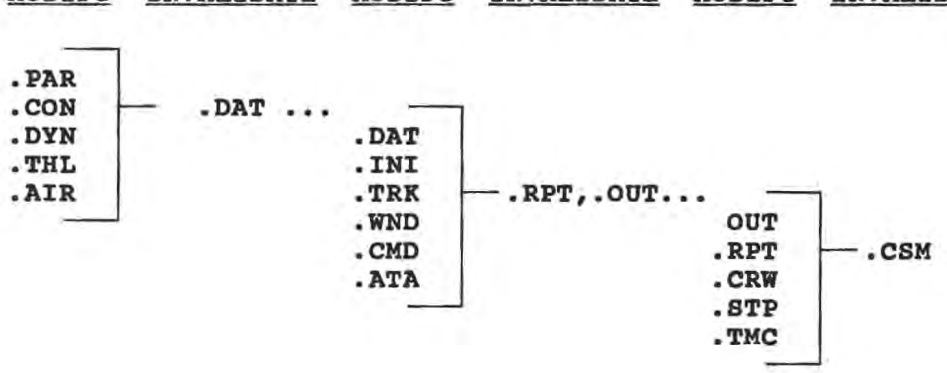
> I STRONGLY RECOMMEND THAT WHEN RUNNING MANY ANALYSES, AND YOU WISH TO KEEP PREVIOUS OUTPUT FILES, USE DIFFERENT NAMES FOR EACH SIMULATION. ALTHOUGH THIS MIGHT SEEM OBVIOUS AT FIRST, SINCE 'DOS' (AND SO WILL TRCP) WILL ALWAYS OVERWRITE ANY FILE WITH THE SAME NAME RESIDING IN THE SAME DIRECTORY WHEN A NEW FILE IS CREATED, ONCE IT DOES HAPPEN, IT WILL PROBABLY NOT BE SO OBVIOUS TO THE USER.

Exhibit 2-2 shows the validation relationship between the input files and the output files in TEM/RECAP. As one can see, at the very lowest level, by modifying, for example, a vehicle parameters file the PRE train data files using this type of vehicle will result **INVALID**. By invalidating the PRE train data file, you are also invalidating the TEM output files that used this PRE train data file. Finally, by invalidating the TEM output file, you are also directly affecting the RECAP economic output report (CSM) created using this TEM output file. Therefore, by modifying a low level input file, you have destroyed the relevance of the three output files (.DAT, .OUT, .CSM) created by the TEM/RECAP models that used the input file for their creation.

If you on the other hand modify a second level input file like the initialization file (.INI) then you will only be affecting the foward link output files (.OUT and .CSM) that used this initialization file.

> REMEMBER, IN THE VALIDATION PROCESS, THE ONLY FILES AFFECTED (i.e. deleted) ARE THE OUTPUT FILES WHICH CAN ALWAYS BE RECREATED WITH THE CURRENT INPUTS.

VALIDATION FLOWCHART



Where:

.PAR = Vehicle Parameters File.
.CON = Consist File.
.THL = Locomotive Tractive Effort File.
.DYN = Locomotive Dynamic Brakes File.
.AIR = Air Brake System File.
.DAT = PRE Train Data File.
.INI = TEM Initialization File.
.TRK = Track Geometry File.
.WND = Wind File.
.CMD = TEM Command File.
.ATA = Automatic Train Handler.
.OUT = TEM Output File.
.RPT = TEM Energy Consumption Report.
.CRW = Economic Model Crew File.
.STP = TEM Stop File.
.TMC = Track Maintenance Cost File.
.CSM = Economic Model Output Report.

Exhibit 2-2: Validation Flowchart

2.3 TRCP validation logic:

Although this validation process is quite complicated, TRCP will take care of every validation needed, and will do it, without your assistance. If you instruct TRCP to create you a specific output file, the TRCP program will first check to see if the PRE train data file is valid. If not, it will automatically run PRE first to create the necessary train data file, and then continue to execute TEM using the newly created train data file.

A more interesting case would be if you instruct TRCP to run the economic model for a specific TEM output file. TRCP will then first check to see if the TEM output file you specified is **VALID**. If it is then it will continue foward, and run the economic model to create an output file (.CSM). Otherwise, it will have to create a new TEM output file. To do this, it will have to verify if the PRE train data file (.DAT) is **VALID**. If it is, it will run TEM, and then using its output file run the economic model. However, if the PRE train data file is not **VALID**, then it will have to run PRE, TEM, and then the economic model to give you your results.

The power of TRCP is that all you had to do was ask for an economic report. All the file management and program execution required, will be initiated and controlled by TRCP.

3.0 TRCP: THE ALL-PURPOSE TEM/RECAP CONTROL PROGRAM

3.1 General

As someone once said, '...it's an experience in navigation...'. You can perform file functions such as edit, create, list, and delete while remaining inside the editor. Also, it is a file management utility which, verifies the validity of the output files, makes decisions on whether a program needs to be run over to obtain current results, and runs these programs for you, all within the integrated environment of TRCP.

TRCP has been simplified so that with a few keystrokes, you can create and run a TEM/RECAP analysis. Different pop up screen editors have been customized for each input file along with descriptive field labels. File names are not restricted to have the same name within a sample analysis or a specific PRE/TEM file extension. The only restriction imposed, is the length of the file name (i.e. usually 6 to 8 characters).

The organization of the directories is also well thought, and there for a purpose. The directory TRCP contains nothing but two subdirectories (PGM and DTA). There should be no files residing in the TRCP directory before, during or after a TEM/RECAP run which are of continuing value and need to be saved. Files of temporary value for debugging include: the TRCP.LOG file, and some information files left over from some of the submodels of TEM/RECAP (i.e. .RPT, .TES, .DES, .AER). This means that anything in this directory can be deleted periodically. I suggest doing this at least once a week, specially since the TRCP.LOG is a file that will keep feeding itself and growing with execution messages, every time you execute TRCP.

The PGM subdirectory contains all the executable programs. If you put a PATH statement in your AUTOEXEC.BAT file as we strongly suggest, then you will never need to go inside this subdirectory. No matter where you are in your system, you will be able to access any of these programs. On the other hand, if you do not have a PATH to this subdirectory, then you will be referencing this subdirectory many, many times.

Finally, the DTA subdirectory is reserved for the data files. All the files are compressed, therefore you cannot see them with a regular editor, unless you decompress them (or use the Function Override described in section 3.5) with the programs supplied to you, and explained in appendix A.3. The only time you will probably have to enter this subdirectory, is to load your own files into the archives or into files TRCP.DTA/IDX (see sections 3.3.3 and 3.3.4).

In all, there are many special features and 'Hot Keys' which make running the TRCP model not only a learning experience but also an entretaining one.

3.2 Structure and Executing TRCP

To run TRCP, type the following in the DOS commmand line:

```
TRCP <carriage return>
```

Once you do this, you will see the TRCP logo and menu screens, exhibits 3-2 and 3-2a respectively.

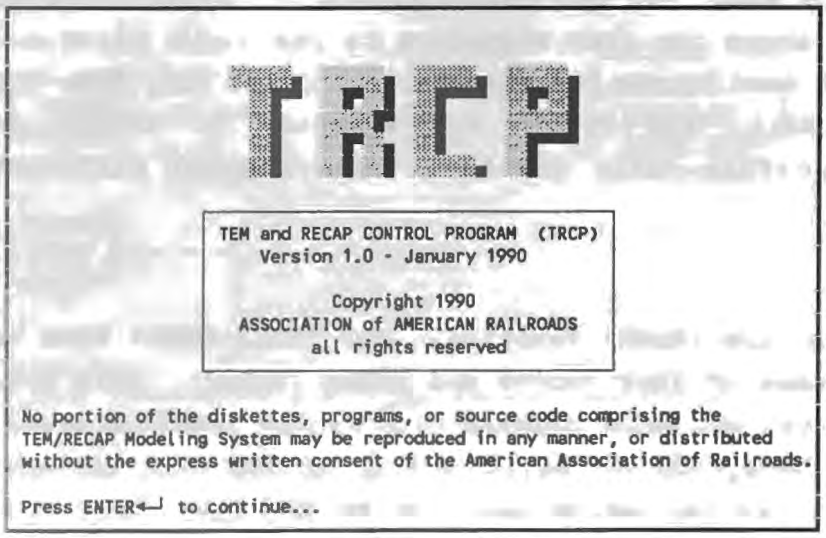


Exhibit 3-2: TRCP logo

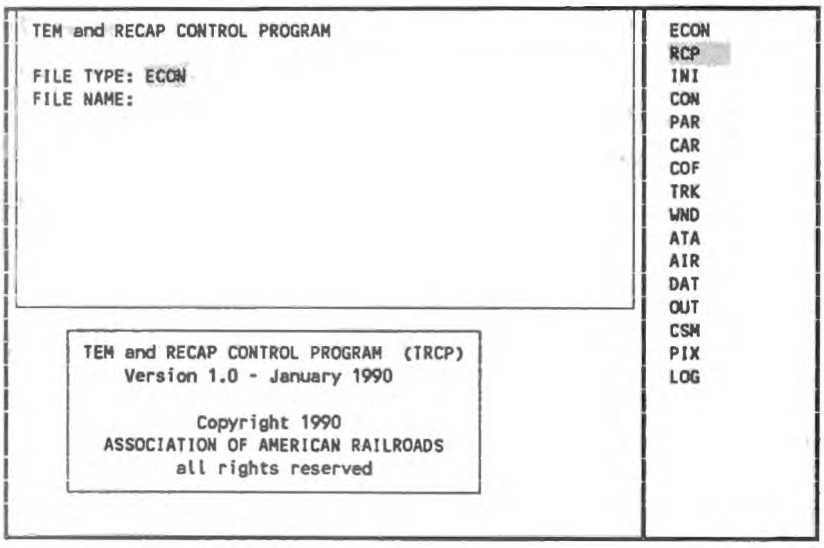


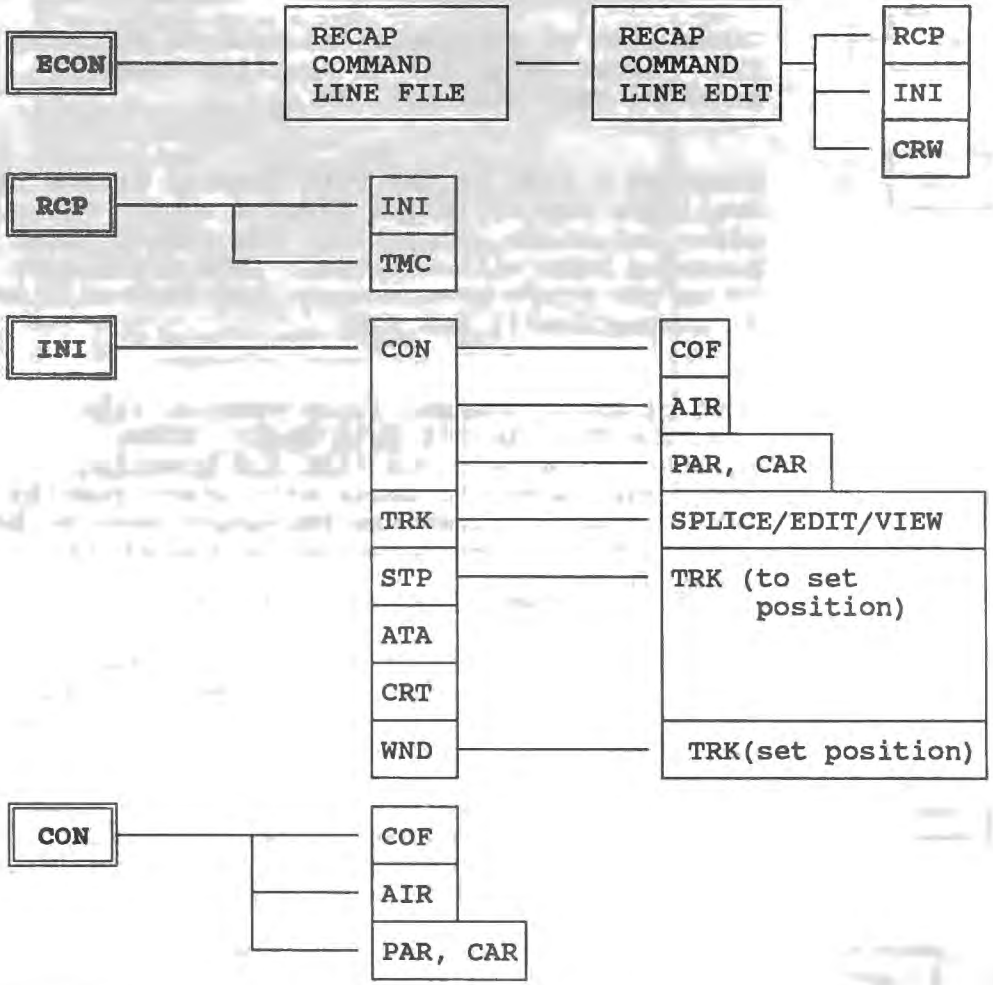
Exhibit 3-2a: Main Menu Screen

From this menu, you can access almost any file directly. Exhibit 3-2b shows the tree structure of the input files and the functions used to run the executable models, PRE, TEM, CSM (economic model), and PIX. For example, to access an initialization file (INI) you have three logical different choices:

1) Select the 'ECON' function. For 'FILE NAME' type in the name of your choice and press 'PgDn'. This will give you the RECAP command line window (Exhibit 3-2c). Once here, you can select either an RCP file (several train simulations at once) or an INI file (only one train simulation). Select INI and then go down to 'Primary file Name'. On the file display window, you will have the list of INI's currently available. Select one and press PgDn on it; you will be in the INI editor.

2) Select the 'RCP' function. This will display all the 'RCP' files you have available. Select the one that contains the INI file you want to view and PgDn on it. Now the 'RCP' editing window will pop-up (Exhibit 3-2d). Go to the INI column and press PgDn on the INI of your choice.

Main Menu Command Functions:



PAR	Locomotive Parameters File.
CAR	Car Parameters File.
COF	Resistance Coefficients.
TRK	Edit Track File.(.TKS files are SPLICE files)
WND	Wind Parameters File.
ATA	Automatic Train Handler.
AIR	Automatic Brake System.

Exhibit 3-2b: Structure of TRCP

Executing Functions

DAT —— Gives list of available consists to run with PRE. After selection of specific consist, pressing PgDn will run PRE.

OUT —— Displays a list in the File Display Window of available TEM valid and invalid output files. After selection of specific TEM output file, pressing PgDn will run TEM. (PRE might have to be run first if necessary, but TRCP will do it automatically for you)

CSM —— List of RECAP command lines created with function ECON in the main menu. After selecting one from the list and pressing PgDn, the economic model will start running. (Again, TEM and possible PRE might have to be run by TRCP before an economic report is created)

PIX —— List of files (.OUT,.TRK,.THL,.DYN,.PAR) you want to unarchive and graph in program PIX. If the TEM output file was not valid, then TEM and maybe PRE might have to be run by TRCP.

LOG —— Selecting this, and carriage return will display the current TRCP.LOG file. Pressing 'F3' within the TRCP.LOG file will let you see any file in your directory.

NOTE: IN THE EXECUTABLE FUNCTIONS: DAT,OUT,PIX, CSM, YOU WILL FIND THAT BESIDES THE FILE NAME IN THE FILE DISPLAY WINDOW, THERE IS A SYMBOL.

└ - MEANS THAT THE OUTPUT FILE IS VALID AN THAT IF RUN, IT WILL BE THE ONLY MODEL RUN, ALL THE INPUT FILES ARE VALID.

¿ - MEANS THAT THE OUTPUT FILE IS NOT VALID AT THIS STAGE BUT CAN BE RECREATED WITH THE CURRENT INPUT FILES. IN OTHER WORDS, MORE THAN ONE MODEL MAY BE RUN TO CREATE THE OUTPUT FILE YOU DESIRE.

Exhibit 3-2b (continued): Structure of TRCP

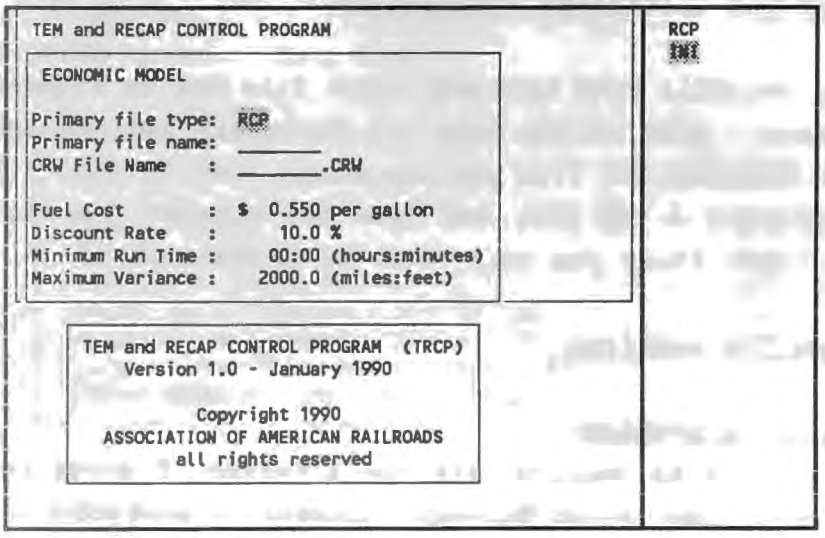


Exhibit 3-2c: Recap Command Line Window

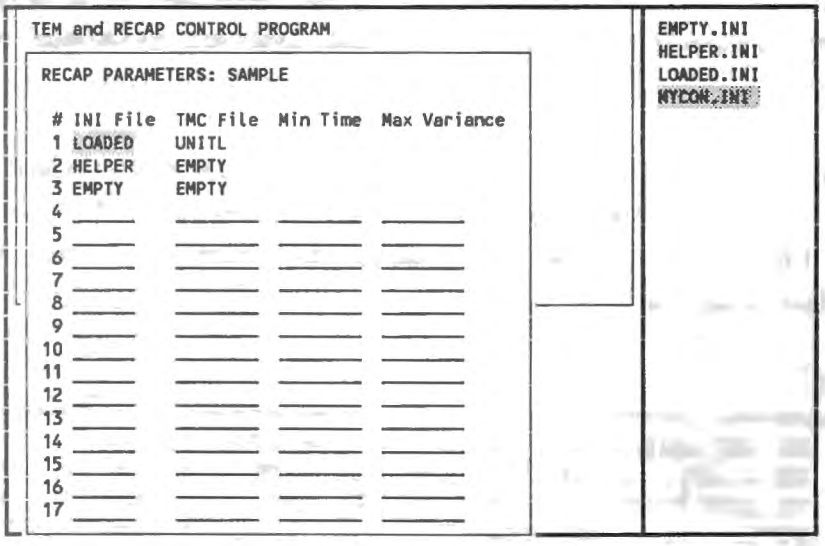


Exhibit 3-2d: RCP File Editing Window

3) Select the 'INI' function and you will automatically be in the initialization editing window.

Usually you will find that any input file can be accessed in several ways. Most of the ways are logically implemented. For example, from the INI file you can access most of the files you would need for a TEM run, and from the consist CON file, most of the input files you will need for a PRE run.

3.3 Updating the archives:

3.3.1 What is an archive:

Before we get to dealing with the archives, I think that a definition of one would be very helpful. Basically, an **archive** is a file that contains in it, numerous other files in a compressed format. That is, all the files stored in the archive file have been through a compression process, in which all the non-essential (i.e. blank spaces) have been stripped out, to save disk storage space. Approximately, the files contained in an archive have been reduced between 60 and 80% of their original size, depending on the type of file and its original size.

This compression feature, on files like track geometry or TEM output files, can be appreciated. For example, a 150k byte TEM output file (not a rare size) would be stored in only 40K bytes of disk storage space.

NOTE: WE RECOMMEND YOU KEEP A BACKUP COPY OF YOUR ARCHIVES, SPECIALLY LARGE ONES THAT WOULD BE HARD TO RECREATE, LIKE THE TRACK (TRK.ZIP) AND THE TMC (TMC.ZIP). THE REASON BEING, THAT IF SOMETHING WERE TO HAPPEN TO THESE ARCHIVE FILES, YOU WILL NOT ONLY BE LOOSING ONE FILE BUT MANY FILES.

3.3.2 The TRCP Archives

TRCP uses archives to store seven major files used in the TEM/RECAP model. They are:

Files	Archive Name
Track Files	TRK
TEM Train Ouput Files	OUT
PRE Train Data Files	DAT
Track Maintenance Cost Files	TMC
Locomotive Dynamic Brake Files	DYN
Locomotive Throttle Control Files	THL
Curve Resistance Tables Files	CRT

They are all identified by their common file extension xxx.ZIP.

3.3.3 The TRCP.DTA and TRCP.IDX files

The TRCP.DTA file is similar to an archive in that it also stores files in a compressed format. The difference is that the files are smaller in size and are of different types. The files stored in the TRCP.DTA file are the following:

Files	Type	
Initialization Files	INI	TRCP.DTA
Consist Files	CON	
Automatic Train Handler Files	ATA	
Stop Files	STP	
Air Brake System Files	AIR	
Wind Files	WND	
Vehicle Parameters Files	PAR	
Economic Model Crew Files	CRW	
Recap Command Files	RCP	

The TRCP.DTA file also contains information regarding the files in the archives. This information includes:

```
File Name, Date Created, Location within the archive
```

The TRCP.IDX file contains indices of the location of each file within the TRCP.DTA file. This being an entire file or in the case of an archive file, just the above information.

3.3.4 Using your current TEM/RECAP files with TRCP

When you receive the RECAP distribution diskette with TRCP, you will discover that some sample files already reside in the archives and the TRCP.DTA file. To incorporate your current TEM/RECAP files into the TRCP system you have to load the files to their respective archives and then update the TRCP.IDX file.

To do this for a file belonging in the TRCP.DTA file, you will be using the TRCPLOAD program in your PGM subdirectory. Go to the DTA subdirectory and type the following:

```
{path}TRCPLOAD {path}{files to add to TRCP.DTA}
```

If you did as we suggested in Appendix A.2, and you put a PATH statement in your AUTOEXEC.BAT file of the form '\TRCP\PGM' then you do not need to put the first {path} in the previous command since the operating system will find program TRCPLOAD on its own. Otherwise, you will have to put '..\PGM\TRCPLOAD'.

For example, if you wanted to add all the initialization (.INI), Crew (.CRW), and Consist (.CON) files in your TEM/RECAP subdirectory to the TRCP.DTA file all you would need to do is go to subdirectory DTA and issue the following command at the prompt:

```
TRCPLOAD \TEM1_5\*.INI \TEM1_5\*.CRW \TEM1_5\*.CON
```

Then, you will see all the .INI, .CRW, and .CON files being loaded into the TRCP.DTA file and **at the same time the indices in the TRCP.IDX file will be updated to account for the new files you added.**

FROM HERE ON DOWN IN THIS MANUAL, I WILL ASSUME THE FOLLOWING TWO THINGS:

1) MOST OF YOUR TEM/RECAP FILES ARE LOCATED IN YOUR HARD DRIVE 'C:' UNDER SUBDIRECTORY TEM1_5

2) YOU HAVE INSERTED A PATH STATEMENT IN YOUR AUTOEXEC.BAT FILE TO SUBDIRECTORY 'PGM' OF THE FORM 'PATH C:\TRCP\PGM'

To add one of your own files which belongs to a TRCP archive, like a track file, you need to do two things:

a) Add the file to the archive

b) Update the TRCP.IDX/.DTA files to incorporate the new archive information.

a) To add a file to one of the archives, you will need to go to the DTA subdirectoy and issue the following command:

PKZIP -A (archive name) (path and file to be added)

For example, to add all track geometry files to the track archive (i.e. TRK.ZIP) the command would look like this:

```
PKZIP -A TRK \TEM1_5\*.TRK
```

Then messages indicating the compression of the track files and addition to the TRK archive will appear on your screen.

b) To update the TRCP.IDX/.DTA files to account for the change in the archives, you will need to use the same procedure discussed earlier. However, instead of adding files to the TRCP.DTA file, you will be updating the indices and writing information about the files to the TRCP.DTA file. The data in the files in the archive will not be transferred. The only information used, is the name of each file in the archive, the date created, and an index of where it is located within the archive.

For example, to update the addition of all the track geometry files added to the track archive in the previous example, you will need to issue the following command:
Assuming you are in the DTA subdirectory,

```
TRCPLOAD TRK.ZIP  (carriage return)
```

After hitting the carriage return, you will see the names of all the track files in the track archive being transferred to the TRCP.DTA file, and **at the same time the TRCP.IDX indices will be updated.**

For more information on how to use the program PKZIP or PKUNZIP, type the name of the program without parameters and hit the return key. A menu of the different options to use will be displayed.

REMEMBER, WHEN ADDING OR DELETING (i.e. PKZIP -D (name of file to delete)) A FILE FROM AN ARCHIVE, IT ALWAYS TAKES A TWO STEP PROCESS, ADDING/DELETING AND UPDATING THE INDEX FILE.

To unarchive a file, a similar procedure is used. Instead of using program PKZIP, you will be using program PKUNZIP. For example, to unarchive a file called 'SAMPLE.TRK' from the 'TRK' archive, the following statement needs to be issued.
From the DTA subdirectory type the following:

```
PKUNZIP -X TRK.ZIP SAMPLE.TRK
```

3.4 Setting up and Running a multiple Simulation Analysis

On ocassion, the user will want to run TEM/RECAP for multiple simulations. To set up a multiple simulation run, there are two distinct ways of doing it. One runs only the physical simulation model, TEM, for all the cases. The other runs TEM for all the simulations and then compiles all the individual output files and runs the economic routine to calculate costs.

For running only the TEM model for a multiple simulation analysis, select function 'PIX' from the main menu. Under 'FILE NAME' select any list of your choice or type in a new one. Press PgDn and the PIX window will appear. With the cursor under the 'OUT' heading, you will see a list of all the TEM output files that you have available, either valid (└) or invalid (¿). Select all the files you want to run and then press the PgDn key to start the multiple simulation analysis.

Once all the individual simulations have ended, you will be prompt with the PIX menu screen. If you do not want to use PIX at this time, exit by selecting option '0' and you will return to TRCP.

If you also like to calculate costs, then the appropriate way of running a multiple simulation analysis would be using the 'ECON' function in the main menu. To do this, select

'ECON' from the main menu and for 'FILE NAME' type in the name you want to call your analysis. Press 'PgDn' and you will see the RECAP command line editor. Fill in the appropriate fields, making sure that the .RCP file you choose is the one with all the initialization files (.INI) you want to run, and 'PgUp' to save the ECON commmand line file.

Next, to run the analysis, select 'CSM' (i.e. the extension of the economic output file) from the main menu screen and for 'FILE NAME' choose the one you just created (i.e. the name should appear on the file display window on the right). Press 'PgDn' and you will see that all the TEM output files will be generated first and the economic model will follow.

3.5 Unarchiving a PRE-TEM-RECAP simulation and saving it on a diskette

Due to the file compression utility of TRCP, the user is not able to view the input files to a TEM/RECAP simulation in their original format. For the purpose of saving storage space, most of the input/output files to TEM/RECAP are compressed and archived into separate files which are not in ASCII (readable) format. The user can always look at the contents of these files through the user-friendly editors within TRCP.

While any of the models is running, the input files required for that model are unarchived and copied to the default directory (i.e. TRCP). Once the model finishes execution, only the files that have changed are archived again while the remaining input/output files are deleted from the directory. In a sense, the user never has to deal with the original format of the input files.

However, sometimes the user may want to send a complete simulation with all the input/output files to another TEM/RECAP user. To do this without sending all the archived files, there is a pocedure that the user has to follow. For the purpose of this demonstration, I will customize this procedure to unarchiving a PRE run but the same procedure, with different file names and types, follows for a TEM or RECAP simulation.

1 - From the main menu of TRCP, activate the Function Override feature by holding down the 'Alt' key and typing the number '252' in the notepad and then releasing the 'Alt' key. (see Appendix B) You should see the following message on the bottom of the screen:

> Function OverRide is ON

2 - Select function 'DAT' for 'FILE TYPE' so as to generate a PRE train data file.

3 - Move down to field 'FILE NAME' and select the file of your choice from the available 'DAT' files displayed. (i.e. 'HOP100')

4 - Press 'PgDn' to start creating the PRE 'DAT' file

5 - You will see that all the input files needed to generate the 'DAT' file of your choice are unarchived and copied to your 'TRCP' directory. Also, due to the Function Override being ON, the execution will temporarily stop and prompt you to select from the menu of choices (Exhibit 3-5)

6 - Press Ctrl-F1 to temporarily exit TRCP and return to DOS. Once in DOS, you can go to the TRCP directory and you will find all the input files required to run PRE for your specific case.

> NOTE: It is recommended that before you engage in this process you delete all the files from your TRCP subdirectory. This way, when you finish step 6 all you will have in the TRCP subdirectory is the files you will need to run your specific 'DAT' file.

7 - Copy all the input files to a diskette.

8 - Finally, type 'EXIT' and you will return to TRCP at the place where you left off. Pressing ESC will get you back to the main menu.

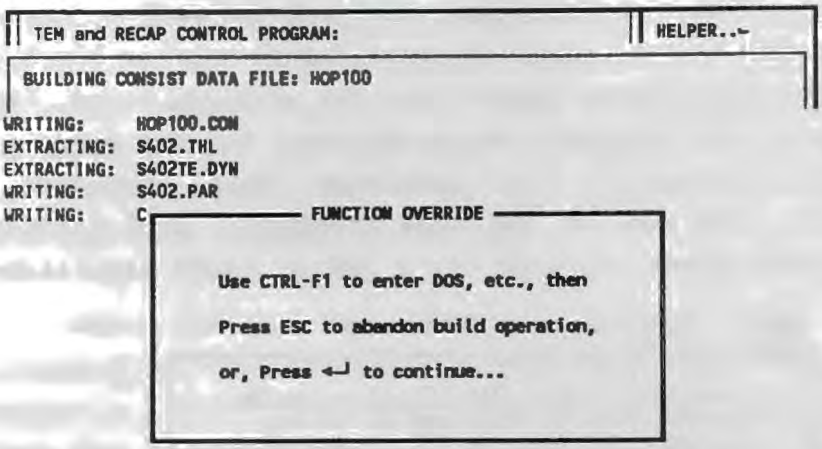
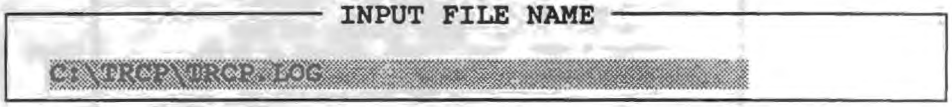


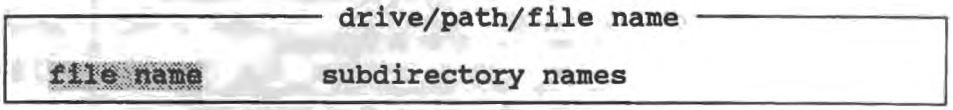
Exhibit 3-5: Function Override Menu

3.6 Viewing any file in your storage device

Built into TRCP is an all-purpose browser called TRCPBROW. This browser can be accessed by selecting function 'LOG' in the main menu of TRCP. By default, once in the bowser, the TRCP.LOG file will be displayed. If you would like to view another file, press the 'F3' function key and you will be prompt for a path along with a file name.



Insert the drive, path and file name of your choice and if the file you selected exists, you will see the following screen:



Pressing 'carriage return' will display the contents of the file. If however, the file does not exist, all you will see is the subdirectory name listings that reside in the directory that you chose.

Within the browser, you can use the arrow keys, PgUp/PgDn keys, and tab keys to browse the current file. When you are done viewing the file or if you like to exit the browser at any time, press the 'ESC' key and you will return to TRCP.

Note: An archived file cannot be viewed without first unarchiving it.

3.7 Getting On-line Help

TRCP was developed with help screens throughout the program. By pressing a key (F1), the user can get more detailed information regarding the field in which the user is currently at within TRCP. There are two types of information available to the user. One is a definition of the general cursor movements throughout TRCP, and the other is a more descriptive technical explanation of the current input field.

The user can access the technical help screen for the current field by pressing the 'F1' key. From this screen, pressing 'F1' one more time displays the general cursor movement help screen. One can switch between these two help screens by pressing the 'F1' key. The 'ESC' key takes you out of the help mode.

3.8 Using Templates for Creating New Files

TRCP lets the user create a new file with the defaults of another file. This is very convenient, since in most cases, when performing a TEM/RECAP analysis, the user will only change

1 or 2 parameters in a file and run the model over again. By using a template, the user can edit a file that closest resembles the new file he would like to create, make the necessary changes to the file and when prompt to save the file, change the name to the name he wants the new file to be called.

For example, if you have an initialization file (.INI) called 'HELPER' that uses track-side lubricators and would like to create a new one that runs the same traffic and has the same conditions but runs dry, then, you would do the following. First, edit the INI 'HELPER'. Then change the field 'Track Lubricators' to ON and specify the values for 'Track Lube Distance' and 'Resistance Reduction'. The file now looks like the one you wanted to create, therefore, save it by pressing the PgUp key. The following message will prompt:

```
Save TEM Initialization (INI) File: HELPER
```

Change the name HELPER to one of your own and your new file will be automatically created. The file HELPER.INI will remain in its original form and you will not have affected any of the output files generated by HELPER.INI. If you had saved the new file as HELPER, and HELPER.INI was previously used to generate an output file, then a message would have appeared warning you that by saving this file under the name HELPER, you will invalidate the output files generated by HELPER.INI. if a request is made for these output files in a later date, they will have to be rebuilt using the new HELPER.INI you just created.

3.9 Using TEM 1.5 or TEM 1.6

Version 1.0 of TRCP is compatible with both versions of the Train Energy Model. The difference between the two models is in the Initialization file. TEM 1.6 requires two additional inputs for its graphics, namely the sound effects and the

display scene distance. The way TRCP handles this difference is by ignoring these two additional inputs if the user is running verision 1.5 of TEM. The only requirement is that the Train Energy Model be called 'TEM' and reside in the 'PGM' subdirectory.

3.10 Cleaning Your TRCP Directory

It is a good practice to periodically erase all the files in the TRCP directory. None of the files residing in the TRCP directory before and after a TEM/RECAP session should be valuable. If they are valuable, then a copy of them should reside in an archive.

TRCP will leave in the TRCP directory, files that are for information purposes and are generated by the main models of the TEM/RECAP package. Some examples include the Air Brakes Equilibrium Ressistance file (.AER), the Throttle Equilibrium Speeds file (.TES), the Dynamic Brakes Equilibrium file (.DES), and a few more. None of these files yield any information the user will want to keep for later reference. They can all be deleted once the simulation has terminated.

The TRCP.LOG file is another file which is present in this directory and which is 'self-feeding', meaning that it will grow larger and larger as the user runs more simulations. Therefore, it is a must to erase this file periodically to avoid generating a massive file.

The other two subdirectories, namely DTA and PGM, will not be affected and 'cleaning' them will not be necessary since no new files should be added to this subdirectories.

APPENDIX A: INSTALLATION PROCEDURE

A.1 Hardware Requirements

The hardware requirements for TRCP are the same as for TEM/RECAP. You will need an IBM or compatible computer equipped with a hard disk, a math co-processor, any type of monitor (for TEM 1.6 an EGA monitor is required), and 640K of usable memory. Due to the degree of intensive computations performed in TEM the preferred (not required) hardware is an Intel 80386 with a 80387 math co-processor based system.

Another piece of hardware that you will need to have installed in your computer is a rewind clock. Usually, this piece of hardware comes with the computer when you purchase it, but if you do not have one functioning properly, installing one will be a small required investment.

A.2 Installation

TRCP is distributed in one double sided, high density diskette. Inside it, you will find two subdirectories. One called PGM where all the executable programs are located, and the other DTA which contains the compressed input/output archive files. Along with the two subdirectories, you will also find in your distribution diskette a file named 'TRCPINST.BAT'. This file installs the TRCP software in your hard disk for you. All you do is insert the distribution diskette in drive A: (high density required) and type:

```
TRCPINST <carriage return)
```

This batch program will create the subdirectories in your hard disk necessary for the TEM/RECAP model, and also copy all the files from the distribution diskette to your hard disk. The TEM executable files (TEM, PRE, PIX, EQUIP, PENSET) will have to be copied by you separately, since the DOS commands you use, will depend on where this programs are located in your

system (i.e. subdirectory name for model TEM). An example on how to do this is also shown in the TRCPINST.BAT batch file. A graphic representation of the TRCP directories follows:

TEM/RECAP DIRECTORY SETUP

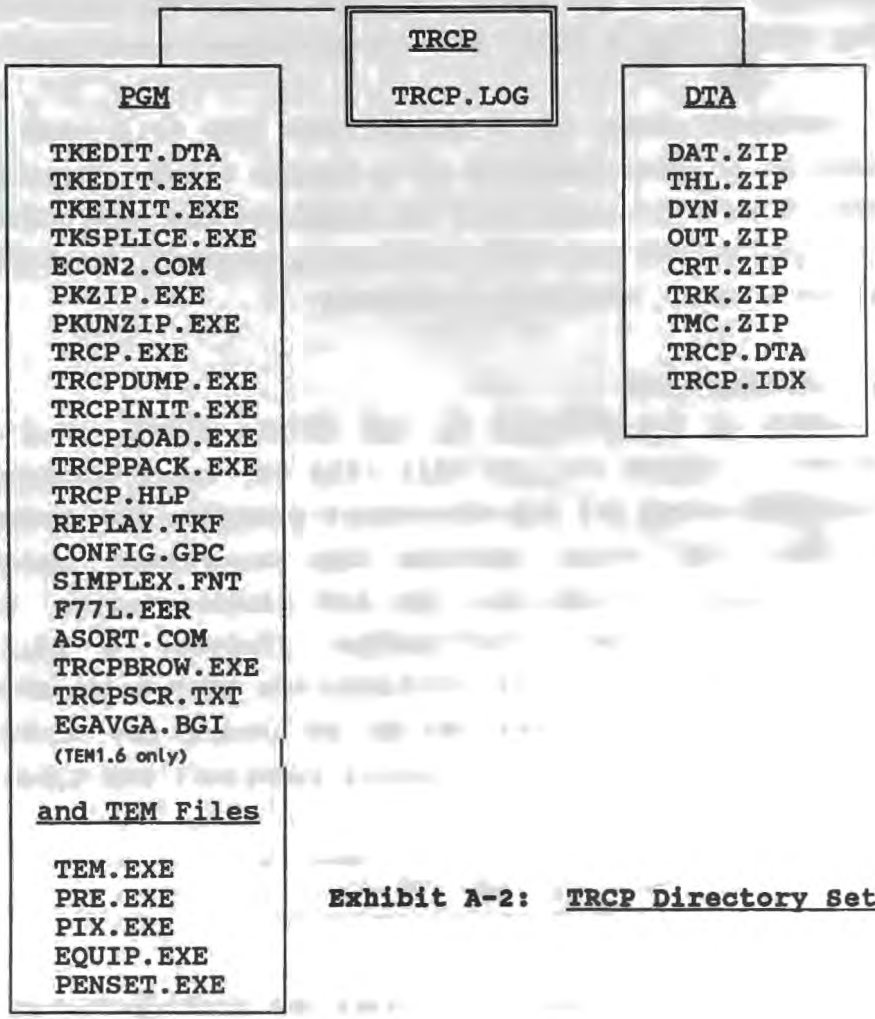


Exhibit A-2: TRCP Directory Setup

Due to the large amount of files required to be open simultaneously by the economic model, you should modify your CONFIG.SYS file in your default directory to have the following two lines:

```
buffers=20
files=30
```

The last installation requirement is to add to your AUTOEXEC.BAT file residing in your default drive and directory, a SET command of the following format:

```
SET GPC=C:\TRCP\PGM
```

This command will reside in your DOS environment and will indicate to TRCP where the PIX program is located.

A nice feature to have also in your environment is the power to execute TRCP from anywhere in your system (i.e. from any subdirectory). To have this ability, what you need to do is modify your AUTOEXEC.BAT file in the following way. If the AUTOEXEC.BAT already has a PATH command then add to it (i.e at the end of the same line) the following statement:

```
;C:\TRCP\PGM
```

If there is no PATH statement already present in the AUTOEXEC.BAT file, then add the following line:

```
PATH = C:\TRCP\PGM
```

Without a PATH command to PGM in your AUTOEXEC.BAT file the only way to execute TRCP is to go to the PGM subdirectory and type TRCP. We do highly recommend putting a path to the

PGM subdirectory so that you can run the TEM/RECAP model from anywhere in your system without worrying about switching subdirectories.

A.3 Programs in Distribution Diskette

After successfuly running TRCPINST.BAT you should have a directory setup in your hard disk like Exhibit A-2. There should be a main directory called TRCP and two subdirectories PGM and DTA. The files in each directory are the following:

PGM Directory:

TKEDIT.DTA - This file contains initialization data for program TKEDIT.

TKEDIT.EXE - This is the track geometry editor/creator program.

TKEINIT.EXE - This program is used to initialize TKEDIT the first time used. Creates TKEDIT.DTA.

TKSPLICE.EXE - Program that 'splices' (i.e. reverses, extracts pieces, etc.) the track file.

ECON2.COM - Economic model for TEM/RECAP.

PKZIP.COM, PKUNZIP.COM - Programs used to compress and extract files from the archives.

TRCP.EXE - Main TEM/RECAP control program. It drives all the TEM/RECAP modules.

TRCPDUMP.EXE - Utility used to view all the names of the files inside the archives. Information displayed is contained in TRCP.IDX.

TRCPINIT.EXE - Utility that creates a new index and data file for TRCP. (i.e. TRCP.IDX, TRCP.DTA)

TRCPLOAD.EXE - Utility for loading input files and archives into the TRCP.DTA file. (Note: for archives, only the file name and an index of its location within the archive is loaded.)

TRCPPACK.EXE - Utility for 'getting the air' out of the

archives. Current TRCP.DTA and TRCP.IDX files are replaced with compressed new ones. (Note: Usually if you experience problems, like files missing from archives, or not shown in the 'TRCP File Display Window', then, it probably means that your TRCP.IDX file is not updated correctly. Solution is to run this program.

TRCP.HLP - Text file that contains help menu messages.

EGAVGA.BGI(TEM 1.6)
REPLAY.TKF,F77L.EER
CONFIG.GPC
SIMPLEX.FNT - Files used with PIX and TEM.

TRCPBROW.EXE - Browser for displaying the TRCP.LOG file or any other file within TRCP. (Note: In order to look at any file within TRCP, you must first look at TRCP.LOG through the main menu 'LOG' function and then once inside the browser press 'F3')

ASORT.COM - Use this utility before using TKEDIT for a TEM to RECAP file. It fix formats each record in the TEM file to 70 characters.
i.e.: ASORT < (input trk name) > (output trk name) 1X70 80X1
i.e.: ASORT <C:\TEM\A.TRK >C:\TEM\B.TRK 1X70 80X1
For more on ASORT, type ASORT at the command line without any parameters and a listing of the available options to ASORT will be displayed.

TRCPSCR.TXT - TRCP logo screen text.

TEM, PIX, PRE
EQUIP, PENSET- Simulator, graphics utilities, and the train preprocessor.

DTA Directory:

DAT.ZIP - Archive for storing train data files.

THL.ZIP - Archive for storing locomotive tractive effort files.

DYN.ZIP - Archive for storing locomotive dynamic brakes performance file.

OUT.ZIP - Archive for storing output (.OUT) files

from TEM.

CRT.ZIP - Archive for storing curve resistance tables files.

TRK.ZIP - Archive for storing track geometry files.

TMC.ZIP - Archive for storing track maintenance cost input files.

TRCP.DTA - This file contains input files for TEM/RECAP in a compressed format. The files included are: Crew (.CRW), Air (.AIR), Consist (.CON), Initialization (.INI), Vehicle Parameters (.PAR), Automatic Train Handler (.ATA), Stop (.STP), Wind (.WND), Recap Command Line (.RCP), and Resistance Coefficients (.COF). Also, the names, dates, and location in archives of the archive files is included.

TRCP.IDX - This file contains indices of where to find the data of each file within either an archive or the TRCP.DTA file. Basically, this file contains all the available input/output file names and indices of where to find their data.

TRCP Directory:

TRCP.LOG - This file contains everything that happens within a session of TRCP. When running TEM, PRE, PIX or the economic model, messages will be written to this file of what occurred during these runs. During the run, if an error was detected by either of these programs, it will appear in the .LOG file along with an 'english' explanation of the error when possible.

For help information on programs PKZIP and PKUNZIP, type PKZIP followed by a carriage return, and a help screen will be displayed describing all the possible commands available.

APPENDIX B: TRCP MOVEMENT KEYS

> **Note:** For clarity, when a minus sign (-) is used between two denotation of keys (i.e. Ctrl-C) it means that while holding the first key down, press the second and then let go of both. Also, if numbers are used in the key combination (i.e. Alt-252), these numbers should be typed from the number pad on the right of your keyboard (in most machines).

MAIN MENU FUNCTION DISPLAY WINDOW

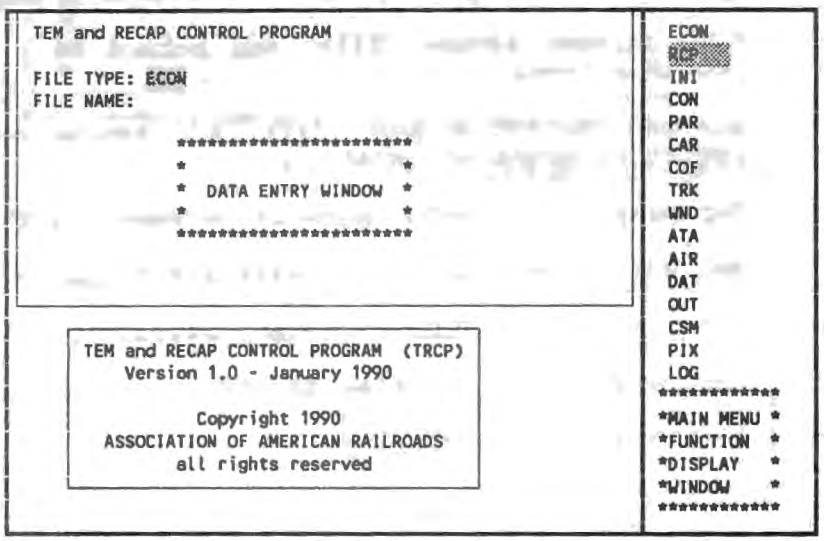


Exhibit B-1: **Main Menu Function Display, and Data Entry Window**

- (Pad)	Move the bar up 1 item (function)
+ (Pad)	Move the bar down 1 item (function)
SPACE BAR	Select the current item (move name to entry window) and advance select bar down 1 item
FIRST LETTER	By pressing the first letter of a function, the selection bar will move straight to the closest function starting with the typed letter

DATA ENTRY WINDOW

←	move 1 character to the left in a data field
→	move 1 character to the right in a data field
↑	move up 1 line(field) in a data entry window
↓	move down 1 line(field) in a data entry window
TAB, Enter, Ctrl-→	move to next field within a data entry window
Shift-TAB, Ctrl-←	move to previous field in a data entry window
PgDn	Open a window to view, edit, or create a file
PgUp	Save current window (file) and return to previous level
ESC	Abandon current window (file) w/o saving and return to previous level
F1, Alt-H	Pop help screen menu (general movement keys)
F1 twice	Pop help screen menu (specific field info.)
Alt-255(Pad)	Quick exit from TRCP (from any level)
Alt-252(Pad)	Toggle Function Override ON/OFF
Alt-254(Pad)	Available Memory Display

FILE DISPLAY/SELECT WINDOW (Right side of Screen)

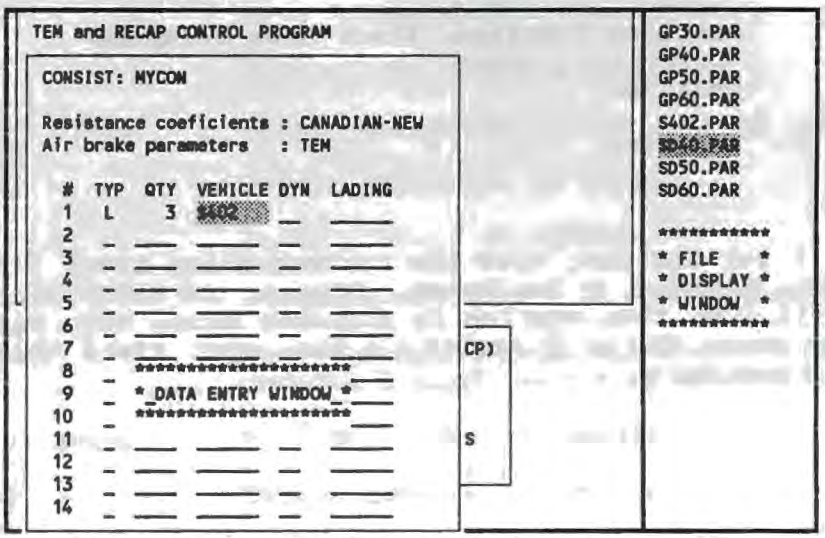


Exhibit B-2: File Display Window

- (Pad)	Move the bar up 1 item (file)
+ (Pad)	Move the bar down 1 item (file)
SPACE BAR	Select the current item (move name to entry window) and advance select bar down 1 item
*, Alt-D	Delete current item from select list
Alt-P	Print current item in the select list
Alt-V	View current item in the select list

EDITORS: .RCP, .CRW, .CON

INS	Insert a blank line into a list (cursor must be at first column)
DEL	Delete an entry line from a list (cursor must be at first column)

EDITOR	FIELD(S)
.CRW	Position
.INI	Starting Position, Track Lube Distance
.STP	Position
.WND	Position

Key PgDn will let the user view the corresponding track file and select the position in the track. Once in the track file, PgUp/PgDn will jump from station to station; arrow keys will move line by line; ESC will return to the input field which invoked the track file.

TRCP BROWSER (invoked by LOG function in main menu)

↑	Scroll up
↓	Scroll down
←	Scroll left 20 columns
→	Scroll right 20 columns
PgUp	Page up
PgDn	Page down
Home	Top of File
End	Bottom of File
Ctrl-QF	Find Text
Ctrl-QL	Goto Line
Ctrl-QN	Toggle line numbers
F3	Browse another file
F1	Help Screen
ESC	Exit

TKEDIT (TRCP track editor)

←	Move cursor left 1 character
→	Move cursor right 1 character
BACK SPACE	Delete character to the left of cursor
DEL	Delete character at cursor
Ctrl-Y	Delete record at cursor
Ctrl-N	Insert blank record in front of current record
Enter	Move cursor to next selected field (Also inserts a blank record at the end of the file)
Ctrl-Enter	Move the cursor to the start of the next record
INS	Toggle between insert and override mode
↑	Move cursor up one line
↓	Move cursor down one line
PgUp	Page back one screen (lesss 4 lines)
PgDn	Page foward one screen (less 4 lines)
Ctrl-L	Find next (Ctrl-QB or Ctrl-QF) occurance
Ctrl-P	Program function keys (start/end)
Ctrl-QS	Move cursor to first field of current record
Ctrl-QD	Move cursor to last field of current record
Ctrl-QL	Goto line (i.e. record number)
Ctrl-QV	Validate records from cursor to end of file
Ctrl-PgDn	Move cursor foward to next non-blank field
Ctrl-PgUp	Move cursor backwards to next non-blank field
Ctrl-QF	Find text in current field scanning foward
Ctrl-QB	Find text in current field scanning backwards
Ctrl-Home	Move cursor to top of file
Ctrl-End	Move cursor to the end of the file

Home	Move cursor to the top line on the screen
End	Move cursor to the bottom line on the screen
Ctrl-KR	Toggle cursor field replacement (Replacement ON displays double headed arrow)
Ctrl-KC	Toggle cursor field copy (copies into blank field). Copy ON displays single headed arrow)
Ctrl-KV	Toggle cursor field verify. (Verify OFF displays black box or character)
Ctrl-KQ	Quit Edit without saving changes
Ctrl-KX	Exit after saving changes
Ctrl-KS	Save changes and continue edit
Ctrl-KM	Toggle field selection for carriage return. (Field NOT selected displays half intensity)
Ctrl-K=	Toggle field ON/OFF for automatic verification of grade or elevation. (i.e. to automatically calculate the grade with the current elevation and position in the track, place the cursor in the grade field and type 'Ctrl-K=' (an equal sign will appear on top), then type 'Ctrl-QV' to validate/replace the grade automatically.
F1	Display help screen
F2..F10, Alt-F1..Alt-F10, Ctrl-F1..Ctrl-F10	User Programmable keys (i.e. Ctrl-P)

APPENDIX C: TRCP SAMPLE RUNS

To familiarize you with TRCP, I will present a few examples on how to organize a sample simulation and then run it. I will create four examples that cover most of the normal situations you will encounter when performing analyses with the TEM/RECAP package.

The four examples I will explain are:

1) Creating a new PRE train data file.

2) Generating a TEM output file for the previous PRE data file, and then graph the results using PIX.

3) Running the economic model for the previous TEM output file.

4) Modifying a vehicle parameters file in the previous train consist (i.e. invalidating all previous output files) and then from function CSM attain the same result as step 3 automatically (i.e. TRCP will do all the work of deciding which models to run during the process).

C.1 Creating a new PRE train data file

During this example and all the other examples, I will use the TRCP program in the same condition that you will have it after completing the installation procedure. The only input files in the archives will be the ones distributed to you by us.

In this example, we will create a consist file and then run it through the PRE consist preprocessor to obtain a train data file (i.e. .DAT). To start TRCP, go to your TRCP directory and type the following at the prompt:

```
TRCP  <carriage return>
```

Immediately, you will see the TRCP logo and main menu window which look like exhibits 3-2 and 3-2a. The prompt will

be located at the FILE TYPE entry. To create a consist (CON) file, press the letter 'C' and you will see the selection bar in the function display window jump to function 'CON'. You will notice that in the FILE TYPE input cell, the CON label is also displayed. Next, press the down arrow key (↓) to specify the name of the file to create/select/edit. On your screen, you should have a window like Exhibit C-1. On the file display

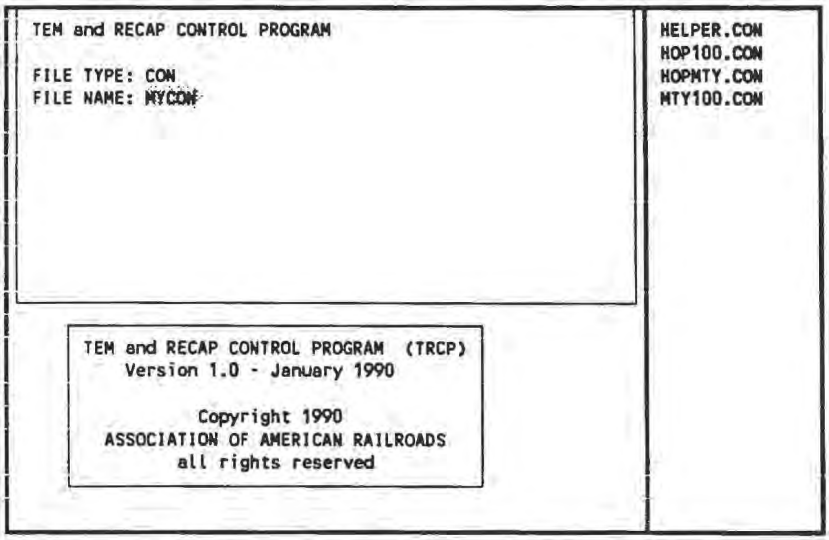


Exhibit C-1: Consist File Display Window

window you should have the available consist files you have on your directory. You can select one of these by marking it with the +/- keys in the notepad and pressing the SPACE BAR, or write, in the FILE NAME input cell, a new name to create one of your own.

For this example, we will create a new consist file, named 'MYCON'. To do this, write 'MYCON' into the 'FILE NAME' entry cell and press 'PgDn' to create it. After pressing 'PgDn' a message will appear indicating that file MYCON.CON does not exist and prompt you to create a new one (Exhibit C-1a).

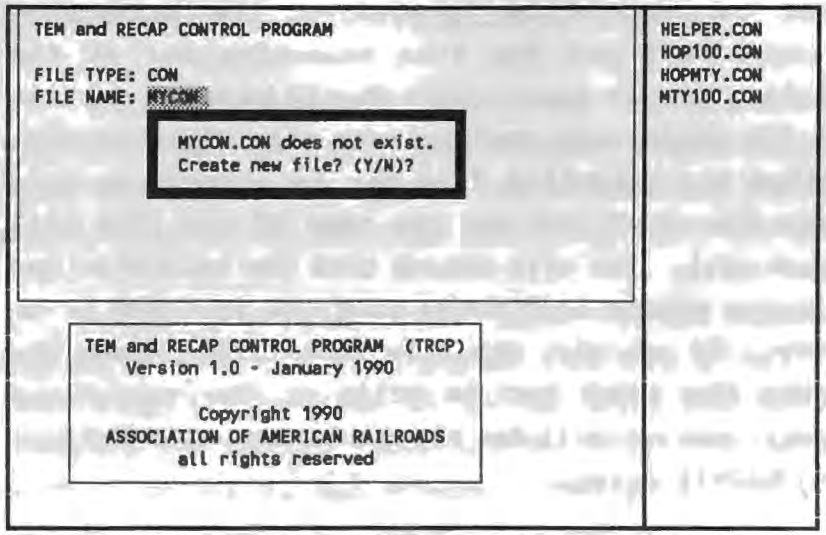


Exhibit C-1a: Creating a new Consist File

Answer 'Y' and the next thing you will notice is that you are inside the consist file editor (Exhibit C-1b).

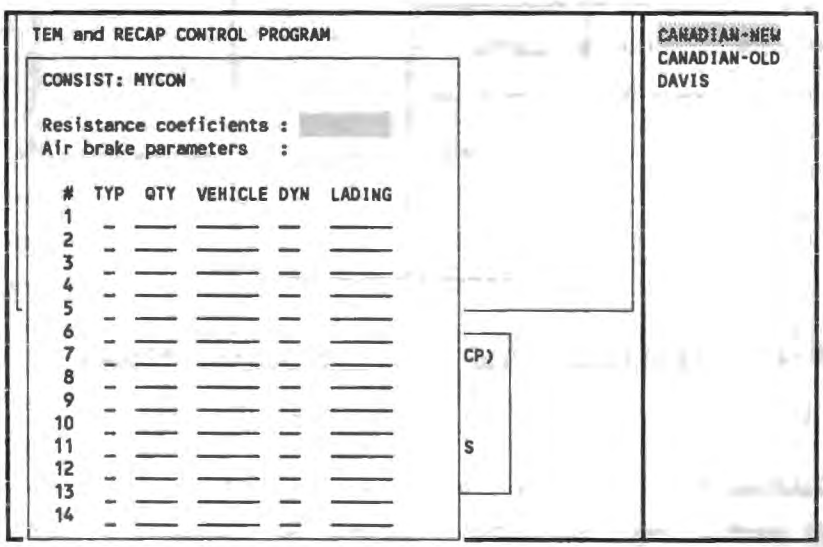


Exhibit C-1b: Consist File Editor

The prompt bar should be located at the Resistance Coefficients input cell and the file selection bar at the CANADIAN-NEW file. All the input cells should be blank. First we will select the resistance coefficients file CANADIAN-NEW. To do this, since the selection file bar is already on this file, just press the SPACE BAR and the name of the file will jump to the input cell. You will notice that the selection bar in the file display window also moved down one slot and is on CANADIAN-OLD now. To see what the file looks like, press the 'PgDn' key while the input bar is still in the resistance coefficients cell, and you will see the resistance coefficients editor window (Exhibit C-1c).

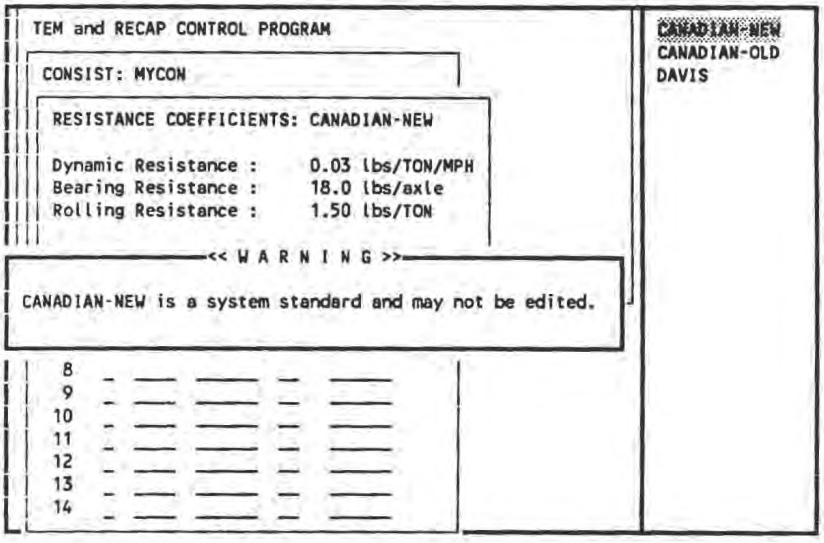


Exhibit C-1c: **Resistance Coefficients Editor Window**

Since CANADIAN-NEW, CANADIAN-OLD, and DAVIS, are system standards from past research, they cannot be modified. Any other file with a different name will let you modify the coefficients. Press 'ESC' to exit without saving and you will

be back at the consist file editor window.

Next, with the input bar at the 'Air Brake Parameters' you will see that the input file display window only displays one file 'TEM.AIR'. Select this one by pressing the SPACE BAR, and again the name of the file will jump into the input cell.

To see this file, press 'PgDn' and the Automatic Air Brake System file editor will pop-up (Exhibit C-1d). You can edit this file if you like by moving with the editing keys and changing the inputs. However, for this time, we will keep the current defaults, and escape (press ESC) this window without saving, to return to the CONSIST editor.

Exhibit C-1d: Automatic Air Brake System Editor

Next, in the CONSIST editor press the down arrow key (↓) to start describing the cars in MYCON.CON. First, under TYP you will see that there are two possibilities: a car (C), or

a locomotive (L). Lets create a train with three S402 leading locomotives and 40-100 ton hoppers. Since the selection bar in the selection window is on 'locomotive', just press the SPACE BAR and the car type will change to 'L'. Press the 'return key' to go to the 'QTY' input cell. Here we will enter a '3' and go to the 'VEHICLE' input column. Your screen should look like Exhibit C-1e.

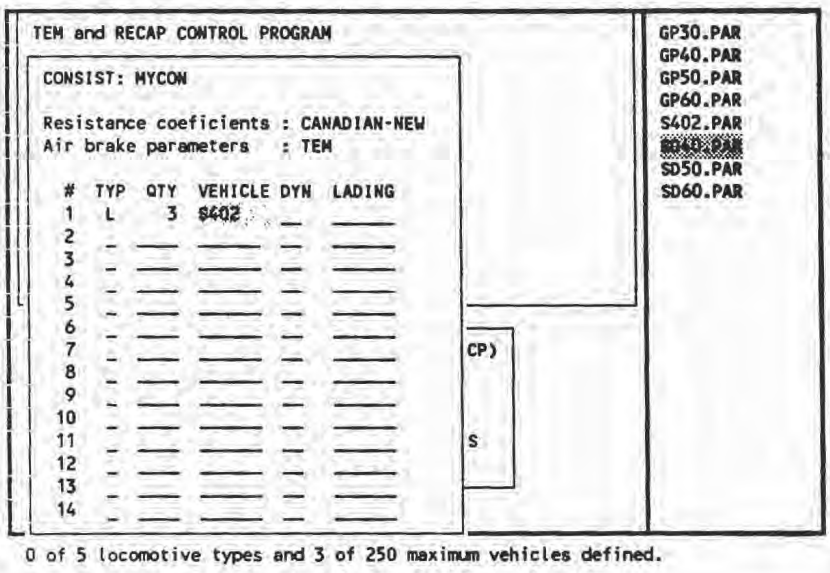


Exhibit C-1e: Temporary Consist Editor Screen

To select a S402 locomotive out of the set of locomotives displayed in the file selection window, press the '+/-' keys in your notepad to position the selection bar on top of the S402 locomotive and press the SPACE BAR, to move the name into the VEHICLE column.

To see the contents of the S402 locomotive file just press the 'PgDn' key and the locomotive editing window will pop-up with the S402 locomotive defaults (Exhibit C-1f). At this

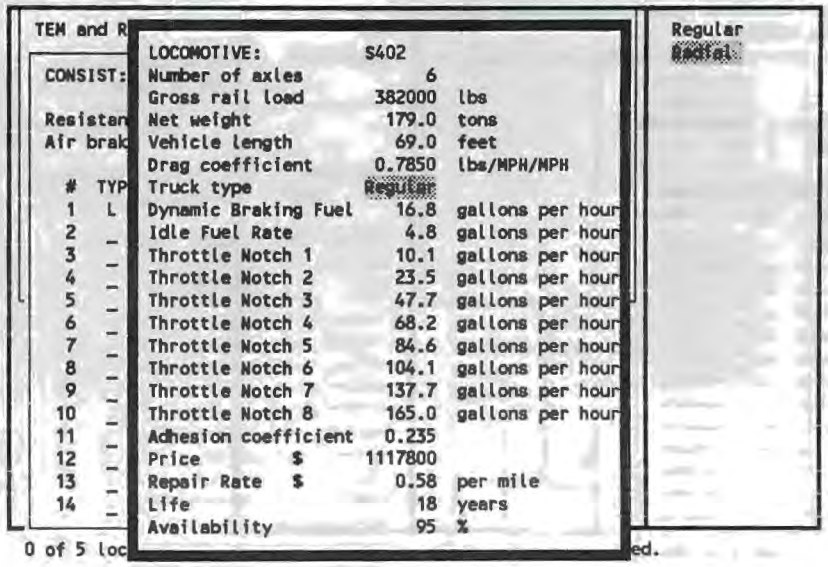
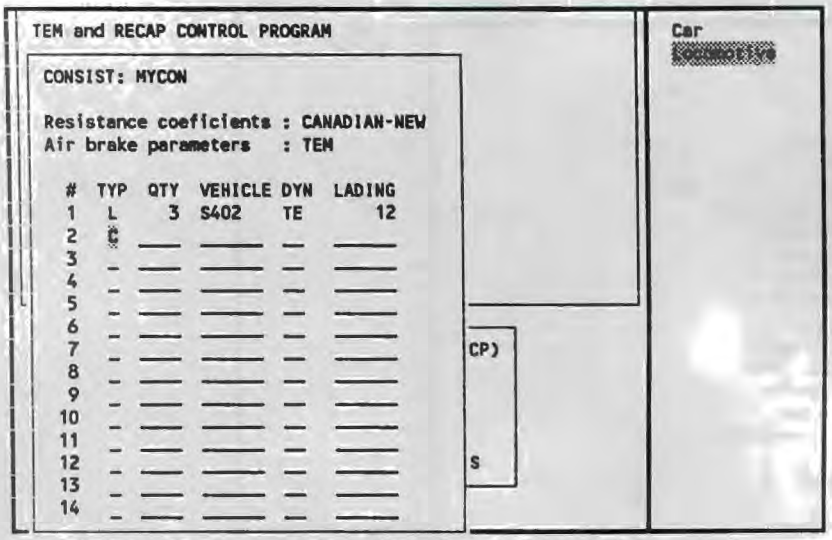


Exhibit C-1f: Locomotive Parameters Editor Screen

point you can edit any of the defaults. For this example, we will leave all the inputs unchanged and press the ESC key to exit the locomotive editor without saving the file, and return to the CONSIST editor.

Press the return key to go to the DYN column input. Here you have four different types of dynamic brakes to choose from. They are: TE (tapered extended), FE (flat extended), TN (tapered non-extended), and FN (flat non-extended). Put the selection bar on TE and press the space bar to move the name to the DYN field.

Go to the 'LADING' field and put '12' tons of fuel. At this point, your screen should look like Exhibit C-1g.



1 of 5 locomotive types and 3 of 250 maximum vehicles defined.

Exhibit C-1g: Leading Locomotive Specification

Now, we will go to the second line and describe the type of cars this consist has. We will put 40 hoppers with 100 tons lading each.

> NOTE: IN THE CONSIST FILE EDITOR, YOU CREATE THE CONSIST BY DESCRIBING UNIQUE BLOCKS OF CARS OR LOCOMOTIVES. FOR EXAMPLE, IF YOU HAVE A CONSIST THAT IS CARRYING HOPPERS WITH 100 TONS AND 80 TONS, THEN YOU WILL HAVE TO MAKE TWO BLOCKS, ONE FOR THE 80 TONS AND ANOTHER FOR THE 100 TONS.

To do this, place a 'C' under the TYP column, a '40' under the QTY column, select HOP100 for the VEHICLE type and indicate '100' as the lading. (You probably noticed that the DYN category was skipped because of obvious reasons) Your screen should look like Exhibit C-1h.

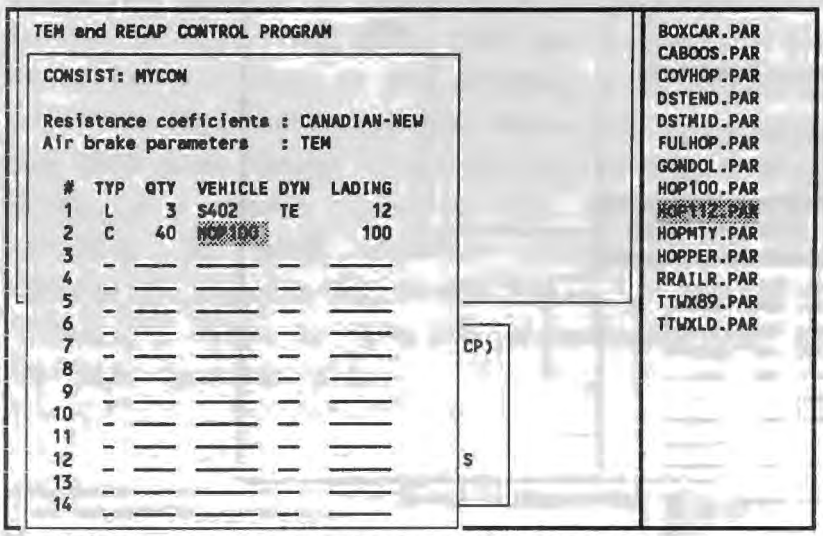


Exhibit C-1h: Final MYCON Description

If at any time you want to go to a previous input cell in the same line, just press the Ctrl-← key or the Shift-Tab key and you will move to the left. For more editing movement keys refer to Appendix B of this manual.

Once we have finished describing the consist, we can now save it by pressing the 'PgUp' key. A prompt will ask you if you want to save this file (i.e. Exhibit C-1i) (a precaution so that an invalidation of another output file will not occur without your full consent. Refer to sections 2.1,2,3).

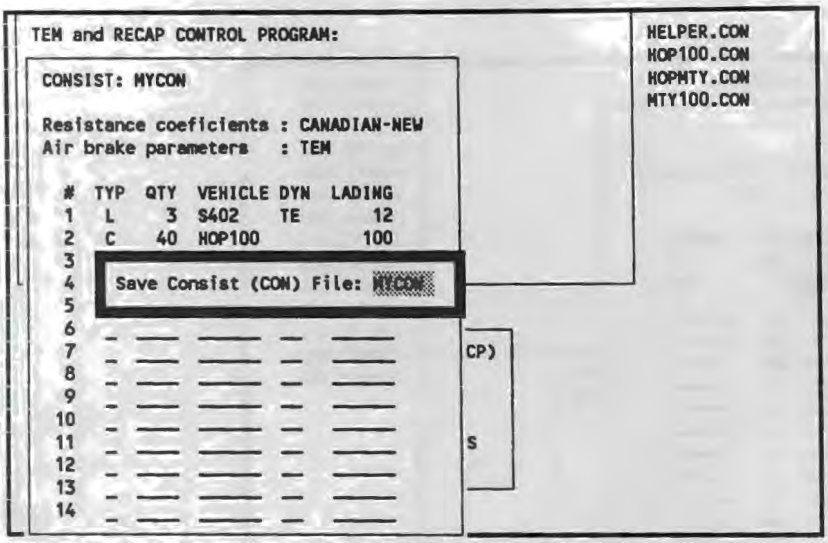


Exhibit C-1i: Saving the Consist File

Press the return key and the file 'MYCON.CON' will be saved. On the main menu screen you will see that MYCON.CON has been added to the list of available consists (Exhibit C-1j).

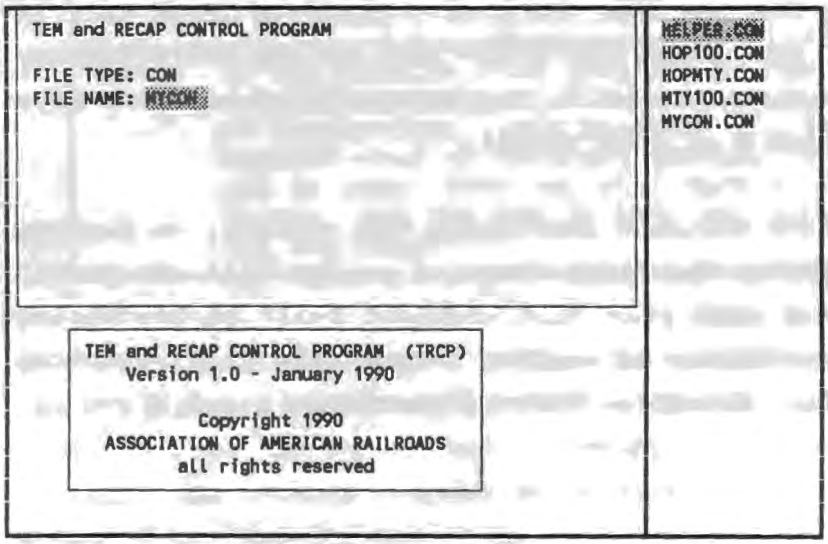


Exhibit C-1j: Addition of MYCON to the Consist List

Now we can generate the PRE train data (DAT). To do this, press the up arrow key (↑) to go to FILE TYPE and then type the letter 'D' to select DAT. Now, go to the FILE NAME input cell. Using the +/- keys in the notepad, position the selection bar on MYCON.CON, and press the space bar to transfer the name to the FILE NAME field. You will notice that beside each consist there is a symbol (i.e. ¿, └). These symbols identify the validity of each consist (refer to section 2.1,2,3). Logically, consist MYCON.CON has a '¿' beside it, indicating 'invalid', since we have not yet executed PRE, and there is no DAT file (Exhibit C-1k).

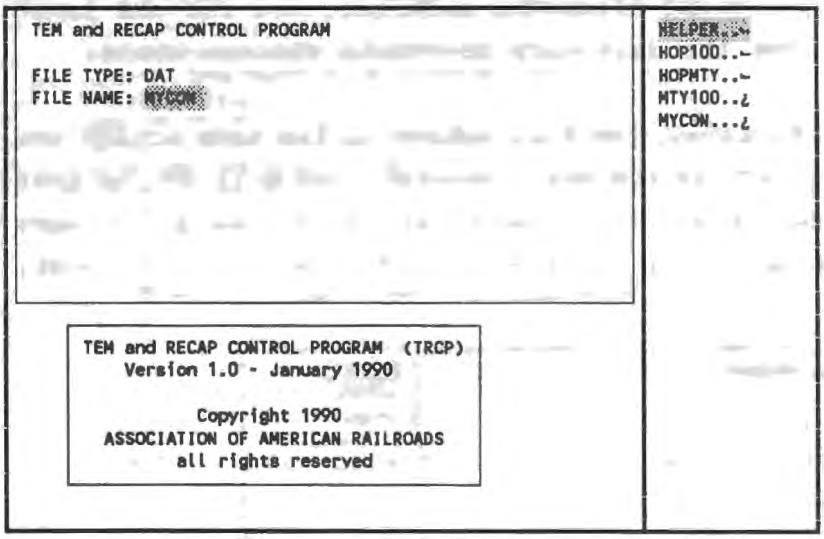


Exhibit C-1k: Invalid state of MYCON

To create a DAT file or run PRE, press the 'PgDn' key and PRE will start running.

Before PRE is invoked, you will see in your screen messages like Exhibit C-1l indicating that TRCP is

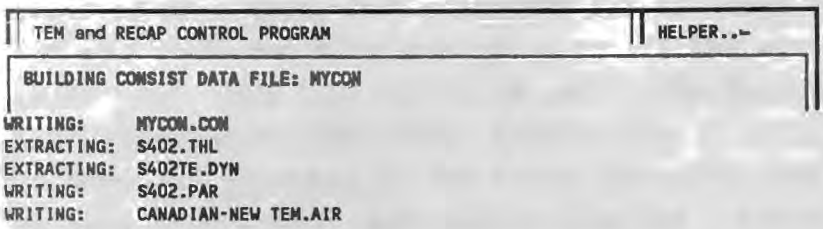


Exhibit C-1l: Decompressing of Archive Files

decompressing the input files necessary for this run out of the archives and copying them into the default directory where PRE needs them. Any time a model is run, the necessary input files are unarchived and temporarily copied to the default directory TRCP. Then, when the model terminates, before returning to TRCP, the newly created files are archived, and the old input files deleted from the directory to regain storage space.

After PRE finishes, you will return to the same screen and place where you left to run PRE. However, you will notice that in the file display window, consist MYCON.CON has a 'L' next to it, indicating that it is a valid DAT file (Exhibit C-1m).

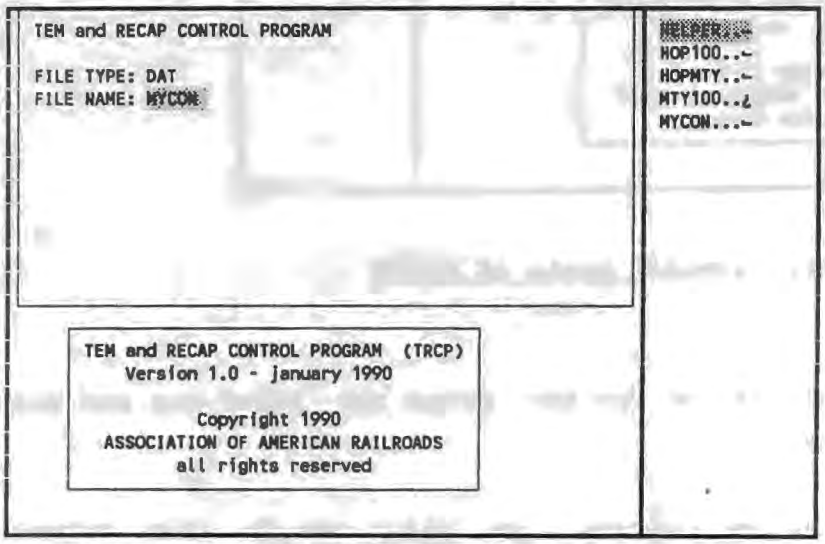


Exhibit C-1m: Valid State of Consist MYCON

To exit out of TRCP, just keep pressing the 'ESC' key until you are back to DOS.

Every program that you run, and the condition of its termination is recorded in the TRCP.LOG file. For example, the TEM/RECAP session we just completed, would look like Exhibit C-1n.

```
TRCP SESSION STARTED: 06/02/89 10:03:06
-------------------------------------------------
BUILDING CONSIST DATA FILE: MYCON
STARTED: 06/02/89 10:03:21
>>-> c:\trcp\pgm\PKUNZIP.EXE -o c:\trcp\DTA\THL S402.THL
>>-> c:\trcp\pgm\PKUNZIP.EXE -o c:\trcp\DTA\DYN S402TE.DYN
>>-> c:\trcp\pgm\PRE.EXE
   Program PRE terminated.
>>-> c:\trcp\pgm\PKZIP.EXE -a DTA\DAT MYCON.DAT
   Copyright 1989 PKWARE Inc. All Rights Reserved.
   PKZIP/h for help
   Updating ZIP: DTA/DAT.ARC
   Adding: MYCON.DAT shrinking (86%), done.
MYCON.DAT COMPLETED 06/02/89 10:05:55
TRCP SESSION ENDED: 06/02/89 10:05:57
```

Exhibit C-1n: Sample TRCP.LOG File

First, the time and date of the TEM/RECAP session is recorded. Next, all the files needed for the PRE run are extracted from the TRCP.DTA file, or out of archives and placed in the default directory TRCP, where PRE expects them to be. Next, PRE is executed. Since no errors occurred, the message 'Program PRE terminated' is displayed and the new output file MYCON.DAT is condensed, (to save storage space) and added to the DAT archive, in the DTA subdirectory. Since the archives were modified, the index files TRCP.DTA/.IDX are updated to reflect the change. Finally, the date and time of when we exited TRCP is also recorded.

C.2 Generating a TEM output file

In this example, we will use the consist created in example 1 and run it through a semi-tangent, level track called SAMPLE.TRK.

To start, in the main menu screen select the INI function to create an initialization file for TEM. Using the down arrow key (↓), go to the FILE NAME field. Immediately, you should see the names of all the initialization files already residing in the system (Exhibit C-2).

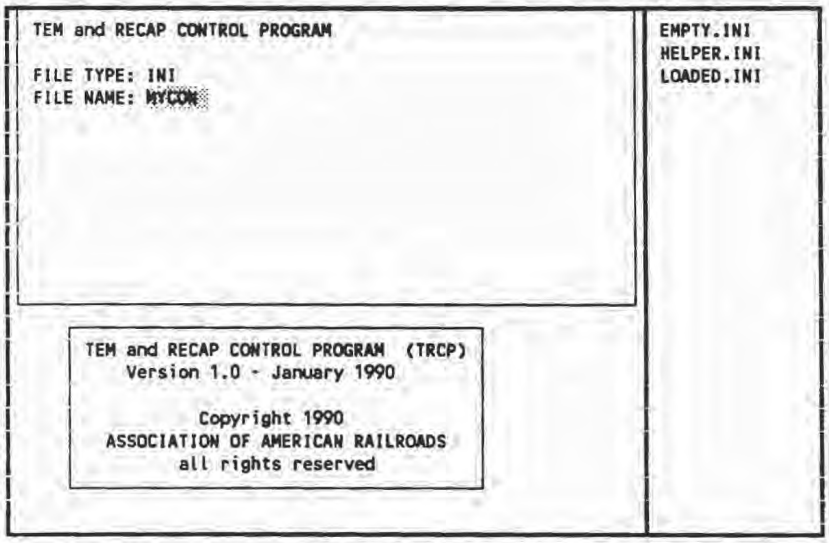


Exhibit C-2: Sample INI Files Currently on the System

We will call this run MYCON therefore type this name in the FILE NAME field and press the PgDn key to create it. After you answer 'Y' to creating a new INI file, you will see a screen that looks like Exhibit C-2a.

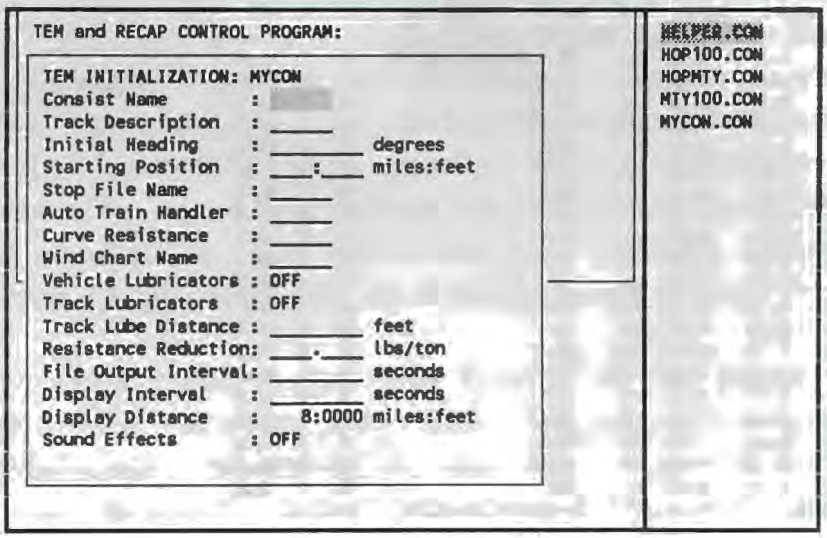


Exhibit C-2a: Initialization File Editing Screen

In this screen like in the previous versions of TEM/RECAP, you declare the input files you will be using for a TEM run. Select MYCON for the consist to be used, by placing the selection bar on top of MYCON, (do this with the +/- key in the notepad) and then pressing the SPACE BAR. Go to the Track Description field and select SAMPLE.TRK as the track file. To see the track file, press the PgDn key while on the track description field. Exhibit C-2b displays a sample track editor screen. This is the same editor that was provided with the previous version of TEM/RECAP. For the editing cursor moves please refer to Appendix B in the back of this manual.

C:\TRCP\SAMPLE.TRK

POSITION	ELEV	GRADE	CURVE	MPH	MILE	LOCATION	OVERSTRIKE L	R	MGT
0.00	980.1	0.09	0.00	50.	57.5	80 WOODLAND DR.	0	1	16.2
800.00	980.8	0.06	0.00	50.	57.7		0	1	16.2
2000.00	981.5	0.09	0.00	50.	57.9		0	1	16.2
2800.00	982.2	0.10	0.00	50.	58.1		0	1	16.2
4800.00	984.2	0.11	0.00	50.	58.5		0	1	16.2
5800.00	985.3	0.08	0.00	50.	58.7		0	1	16.2
7000.00	986.3	0.02	0.00	50.	58.9		0	1	16.2
8200.00	986.5	-0.27	0.00	50.	59.1		0	1	16.2
8800.00	984.9	-0.28	0.00	50.	59.2		0	1	16.2
8958.80	984.5	-0.28	-0.91	50.	59.2		0	1	16.2
9300.00	983.5	-0.18	-0.91	50.	59.3		0	1	16.2
9800.00	982.6	0.20	-0.91	50.	59.4		0	1	16.2
10300.00	983.6	0.43	-0.91	50.	59.5		0	1	16.2
11200.00	987.5	0.10	-0.91	50.	59.7		0	1	16.2
11653.80	988.0	0.10	0.00	50.	59.8		0	1	16.2
12300.00	988.6	-0.01	0.00	50.	59.9		0	1	16.2
13900.00	988.4	-0.16	0.00	50.	60.2		0	1	16.2
14400.00	987.6	-0.22	0.00	50.	60.3		0	1	16.2
16000.00	984.1	-0.10	0.00	50.	60.6		0	1	16.2
16300.00	983.8	0.24	0.00	50.	60.7		0	1	16.2

Cursor is on Line Number 1: at 0 Miles, 0 Feet

Exhibit C-2b: Sample Track Editing Screen

For now, press the Ctrl-KQ keys and you will be back to TRCP. Go to the field 'initial heading' and just enter '0'. Next, go to the 'Starting Position' field, and just for fun, press the PgDn key. You will see that the track file appears on half a screen, with a page wide selector bar (Exhibit C-2c).

TEM and RECAP CONTROL PROGRAM

TEM INITIALIZATION: MYCON

Consist Name : MYCON
Track Description : SAMPLE
Initial Heading : 0 degrees
Starting Position : 0:0000 miles:feet

SAMPLE TRACK DESCRIPTION

POSITION	ELEV	GRADE	CURVE	MPH	MILE	LOCATION	L	R	MGT
0.00	980.1	0.09	0.00	50.	57.5	80 WOODLAND DR.	0	1	16.2
800.00	980.8	0.06	0.00	50.	57.7		0	1	16.2
2000.00	981.5	0.09	0.00	50.	57.9		0	1	16.2
2800.00	982.2	0.10	0.00	50.	58.1		0	1	16.2
4800.00	984.2	0.11	0.00	50.	58.5		0	1	16.2
5800.00	985.3	0.08	0.00	50.	58.7		0	1	16.2
7000.00	986.3	0.02	0.00	50.	58.9		0	1	16.2
8200.00	986.5	-0.27	0.00	50.	59.1		0	1	16.2
8800.00	984.9	-0.28	0.00	50.	59.2		0	1	16.2

Exhibit C-2c: Choosing a Starting Position on the Track

Here you can select the starting position on the track, by just moving the bar with the arrow keys, or PgUp/PgDn keys (station to station) in the notepad. As you move the selector bar, the starting position in the editing screen will specify the miles:feet of where the bar is at. To define the starting position, press the RETURN key and the position where the bar is at will be selected. For this example, select 0:0000 or WOODLAND DR. terminal as a starting position.

Move down to the Stop File field and press the PgDn key to create the stop, STP, file. The stop file screen shows the following: 'position' of the stop, state of the locomotives (i.e. idle/off), delay (minutes) of stop, and type of control (i.e. limit or constant speed (i.e. 35)) to be used until reaching this stop. For this run, insert the following information:

```
POSITION = 49 miles
DWELL    = 30 minutes
SETTING  = idle
SPEED    = limit
```

> Note: To select the position, you can also press the PgDn key and the track file will appear for your convenience.

After inputting the above information, press the PgUp key to save the stop file.

Next specify the Auto Train Handler file to be used. For this example select LOADED.ATA from the already created files in the file display window. As a curve resistance file and the

wind file, select TEM.CRT and NOWIND.WND, respectively, which are the only ones present there at this time.

For this sample run, we will not use lubricators therefore select 'NO' for both of them and skip the lube distance and resistance reduction fields for obvious reasons. For 'File output interval' and 'Display interval', type 30 seconds for each. Your screen should look like Exhibit C-2d. PgUp to save

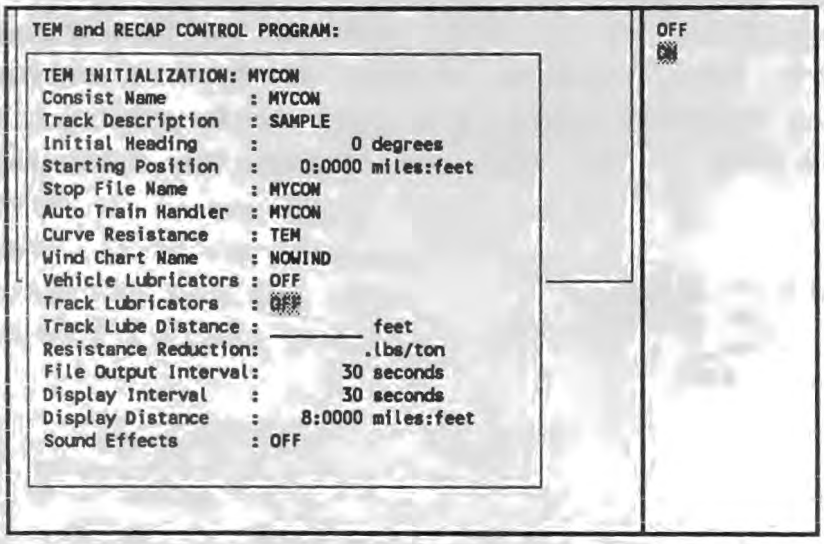


Exhibit C-2d: Initialization File for MYCON.OUT

the INI file and return to the main menu. From here, go to FILE TYPE and select OUT, to create a TEM output file. Move to the FILE NAME field, and you will see in the file display window, the valid (└) OUT files already created, and the ones that can be created with the current inputs but are not valid (¿) yet. You will notice that MYCON has a '¿' beside it meaning that it has not yet being created (Exhibit C-2e).

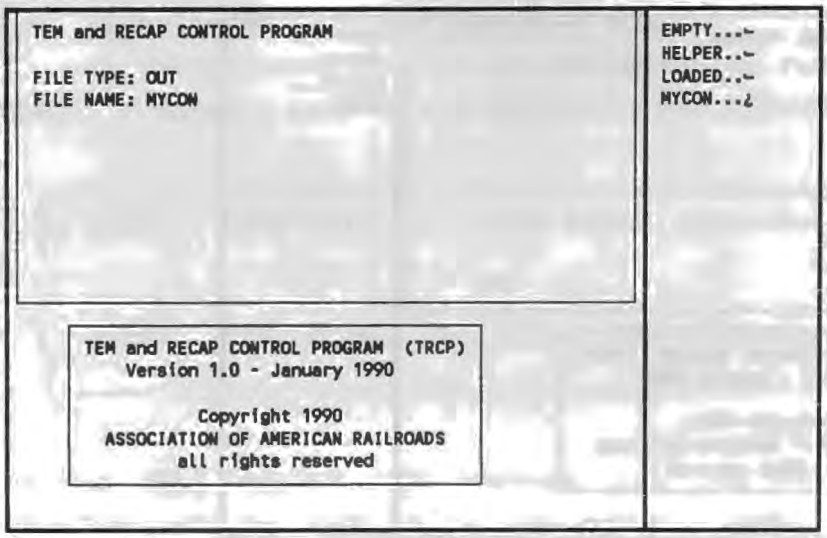


Exhibit C-2e: Invalidation State of MYCON.OUT

With the selection bar in the FILE NAME field, and the name MYCON in it, press the PgDn key to execute TEM. Notice that before TEM starts executing, all the input files needed are uncrunched, and copied into the TRCP directory.

Once TEM finishes execution, a 'clean up' (except .TES,.DES,.AER) of the directory is done and the files that you do not need anymore will be deleted. The ones you do need (.OUT) will be archived. When you return to TRCP, you will see that the ¿ symbol beside MYCON has now changed to └, indicating that it is a valid OUT file (Exhibit C-2f). If now we were to look at the output file MYCON in graphical display, the procedure would be the following.

First, go to the main menu screen by putting the selection bar of the editing screen, on field FILE TYPE. Select function PIX off the menu. Instantly, you will see the pre-PIX screen which prompts you to select the files you would like to analyze in graphical format. The choice of files you can graph are:

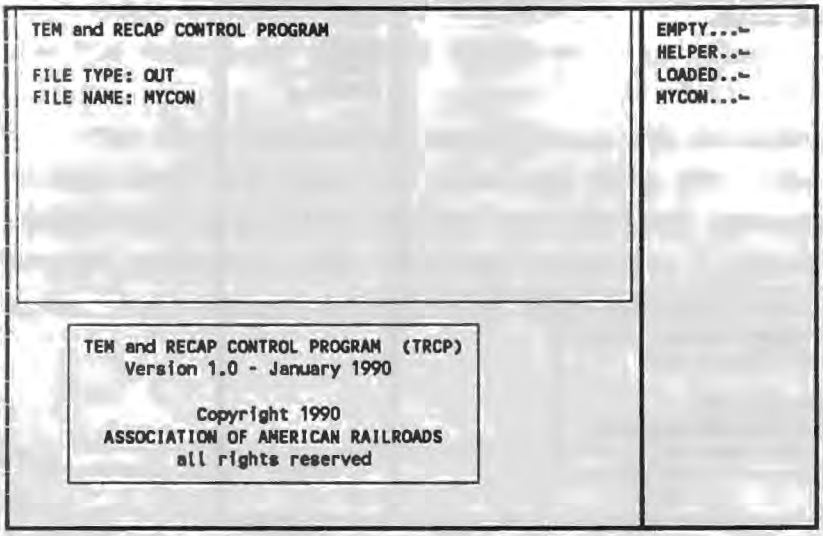


Exhibit C-2f: Valid Representation of MYCON.OUT

```
.OUT =  TEM output File
.TRK =  Track Geometry File
.THL =  Locomotive Tractive Effort File
.DYN =  Locomotive Dynamic Brake File
.PAR =  Vehicle Parameters File
```

The purpose of this screen is to let TRCP know which files to decompress or take out of the archives and copy to the TRCP directory where PIX requires them to be.

You will notice that when the prompt bar is under the OUT field, all available output files are displayed on the right screen. Even the files which are not valid (¿) will also be displayed on this screen. If you were to select an invalid file, then TRCP will execute the appropriate models and create one for you. For this example, select MYCON and press the PgDn key and you will be in program PIX. From here on, everything is as it used to be in previous versions. (Refer to (1))

C.3 Creating an Economic Report (.CSM)

In the previous version of TEM/RECAP, to run the Economic Model, a command line of the following two formats was needed:

```
ECON2   (RCP file) (.) (CRW file) (options)

                    or

ECON2   (INI file) (TMC file) (CRW file) (options)
```

In this TRCP version, the command lines are saved in a file. This way when you want to run the economic model, you can just specify a file name, and not have to type the entire command line. The command line file is created with the main menu function 'ECON'. For this example, we will first create an ecomomic model command line, and then run the Economic model for the consist and TEM output file, we created in the previous two examples.

To begin, select ECON from the main menu and go down to 'FILE NAME' and type the name you want to call this analysis (i.e. MYCON). Press 'PgDn' and the economic command line editor will appear (see Exhibit C-3).

In field 'Primary Type' select INI, since we will be calculating costs for a single simulation. Move down to 'Primary File Name' and you will see a listing of possible INI files to select on your file display window. Choose MYCON.INI and move down to the crew file name. Here, we will create our own hardworking crew file. To do this, type 'HARDWORK' in this field and press the PgDn key to create it. A screen like Exhibit C-3a will appear.

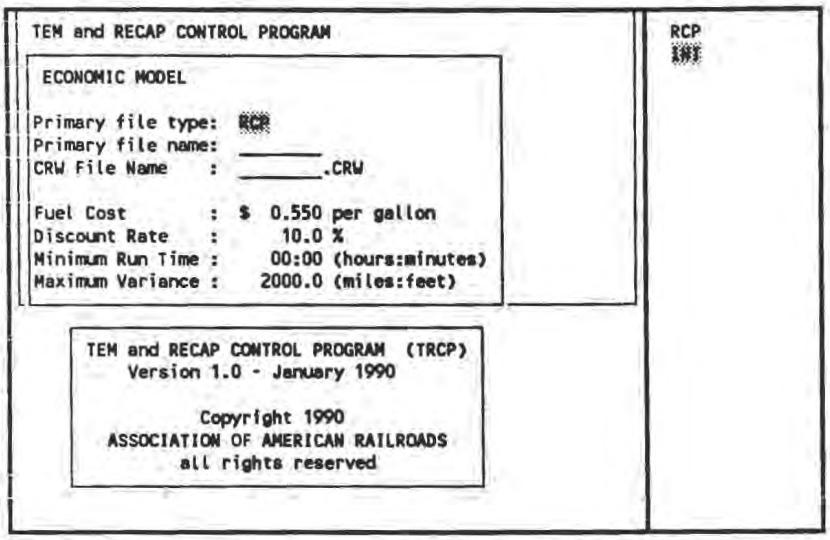


Exhibit C-3: RCP Command Line Editor

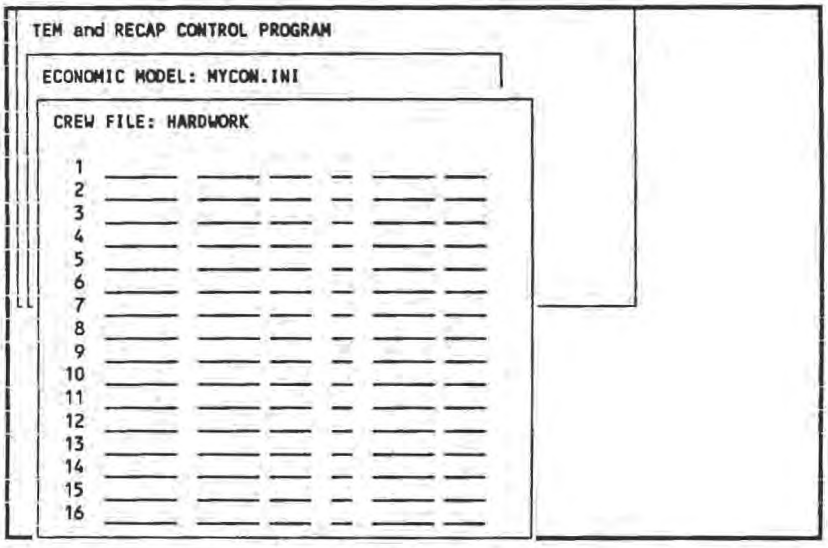


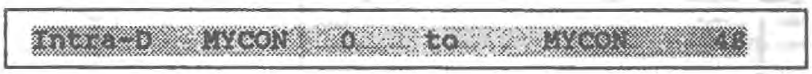
Exhibit C-3a: Sample Listing of Crews Active in a Simulation

This screen gives you a summary of the number of crews and their active locations in your simulation. Since we have not created a crew file yet, it is of no surprise that the screen is blank. Press PgDn one more time and you will be in the crew file editing window. All the parameters of the crew file are displayed along with their labels. For this example, lets use the following defaults:

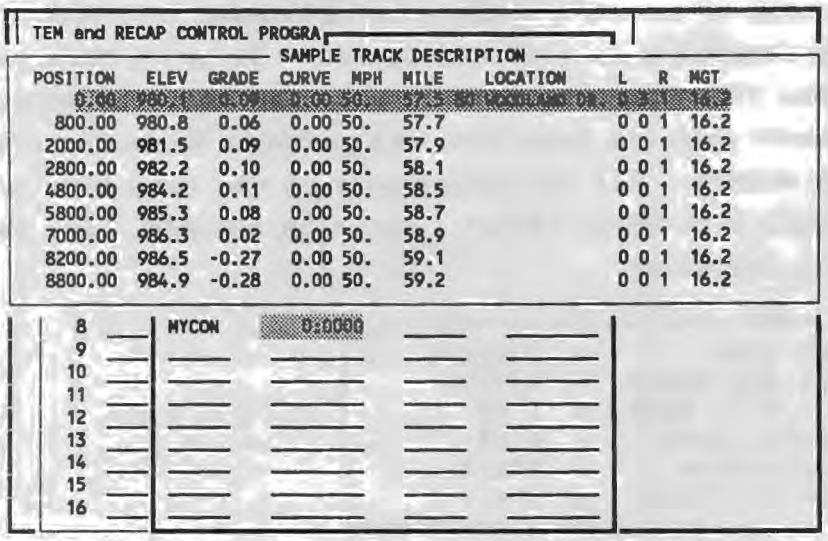
Crew Type	=	Inter-D
Base Day Wages	=	410.35
Over Mile Rate	=	2.95
Benefit Rate	=	0.28
Arbitraries	=	100.0
Base Day Miles	=	106.0

After inputting the payroll data, the next step is to declare where the crew started, (INI file and position in track) and where it ended. To facilitate this, while on the position field press PgDn and the track file will appear. Here, you can position the wide selection bar on top of the place where you would like to stop the train. In this example, we will start the crew on mile 0:0000 and release the crew on mile 48. (See Exhibits C-3b, C-3c)

Once the position of where the crew is active has been specified, all you need to do is save the file. This is done by pressing the PgUp key. You will notice now that the crew summary screen displays a line that reads:



If you like to add a previous crew to the list, you can do this by pressing the insert key (INS) while the bar is on the current crew, and a blank line will be added to the list. Pressing PgDn while on the blank crew line will create the new crew.



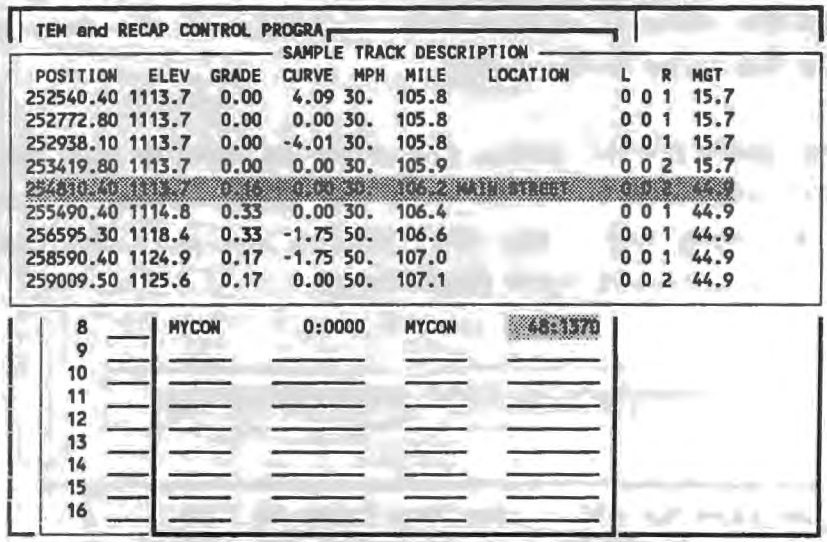
TEM and RECAP CONTROL PROGRA

SAMPLE TRACK DESCRIPTION

POSITION	ELEV	GRADE	CURVE	MPH	MILE	LOCATION	L	R	MGT
800.00	980.8	0.06	0.00	50.	57.7		0	0 1	16.2
2000.00	981.5	0.09	0.00	50.	57.9		0	0 1	16.2
2800.00	982.2	0.10	0.00	50.	58.1		0	0 1	16.2
4800.00	984.2	0.11	0.00	50.	58.5		0	0 1	16.2
5800.00	985.3	0.08	0.00	50.	58.7		0	0 1	16.2
7000.00	986.3	0.02	0.00	50.	58.9		0	0 1	16.2
8200.00	986.5	-0.27	0.00	50.	59.1		0	0 1	16.2
8800.00	984.9	-0.28	0.00	50.	59.2		0	0 1	16.2

8	MYCON	0:0000		
9				
10				
11				
12				
13				
14				
15				
16				

Exhibit C-3b: Choosing a Starting Point for a Crew



TEM and RECAP CONTROL PROGRA

SAMPLE TRACK DESCRIPTION

POSITION	ELEV	GRADE	CURVE	MPH	MILE	LOCATION	L	R	MGT
252540.40	1113.7	0.00	4.09	30.	105.8		0	0 1	15.7
252772.80	1113.7	0.00	0.00	30.	105.8		0	0 1	15.7
252938.10	1113.7	0.00	-4.01	30.	105.8		0	0 1	15.7
253419.80	1113.7	0.00	0.00	30.	105.9		0	0 2	15.7
254810.40	1113.7	0.00	0.00	30.	106.2	MAIN STREET	0	0 2	44.9
255490.40	1114.8	0.33	0.00	30.	106.4		0	0 1	44.9
256595.30	1118.4	0.33	-1.75	50.	106.6		0	0 1	44.9
258590.40	1124.9	0.17	-1.75	50.	107.0		0	0 1	44.9
259009.50	1125.6	0.17	0.00	50.	107.1		0	0 2	44.9

8	MYCON	0:0000	MYCON	48:1370
9				
10				
11				
12				
13				
14				
15				
16				

Exhibit C-3c: Choosing an Ending Point for a Crew

To save the crew we just created, just press the PgUp key and the crew will be saved and you will return to the command line editor. Save this command line file, by pressing the PgUp key once more, and the command line file will be saved as MYCON. Lastly, press the 'ESC' key, and you will be back to the main menu.

Finally, to run the economic model, choose option CSM from the main menu, and under FILE NAME, select MYCON.INI. Pressing PgDn now will start executing the Economic Model for simulation MYCON. The output from the economic model, will be written to file MYCON.CSM. This file can be viewed within TRCP by selecting the LOG function in the main menu and then pressing 'F3' to select the file MYCON.CSM.

C.4 Running all the Models Automatically

In this last example, we will demonstrate TRCP'S ability to recognize that some of the input files may have been modifed, therefore, rending their respective output files INVALID. To do this, we will modify one of the vehicle parameter files, specifically the S402.PAR locomotive, and then run the economic model for the output file MYCON.

By looking at the validation flowchart (Exhibit 2-2), we can see that by modifying the S402 locomotive, the PRE train data file will be INVALID. By making the DAT file invalid, the TEM .RPT and .OUT, files will also become INVALID. And lastly, by making the TEM output file invalid, the economic report will also be INVALID.

Normally, if we wanted an economic report (CSM file), we would have to run first PRE (i.e. to create MYCON.DAT), then TEM (i.e. to create MYCON.OUT), and finally ECON2 (i.e. to create the MYCON.CSM). However, with TRCP, all you have to do is say you want to create an economic report (CSM) and all the appropriate executions will be taken care.

To start, select function PAR from the main menu, and go to field FILE NAME. Select the S402 parameters file, and PgDn on it to edit it. PgUp again and save the file. (Remember, modifying a file can be done by just saving the file, and therefore, changing its creation date, no inputs need necessarily to be changed.) Before the file is saved, a warning will appear specifying that by saving this PAR file under the same name, the DAT and the OUT files will have to be rebuilt. Answer YES for demonstration purposes. Next, from the main menu, select function DAT to verify that the TEM DAT file is no longer valid. Exhibit C-4 shows that the symbol for valid (└) besides MYCON has now changed to (¿) for invalid.

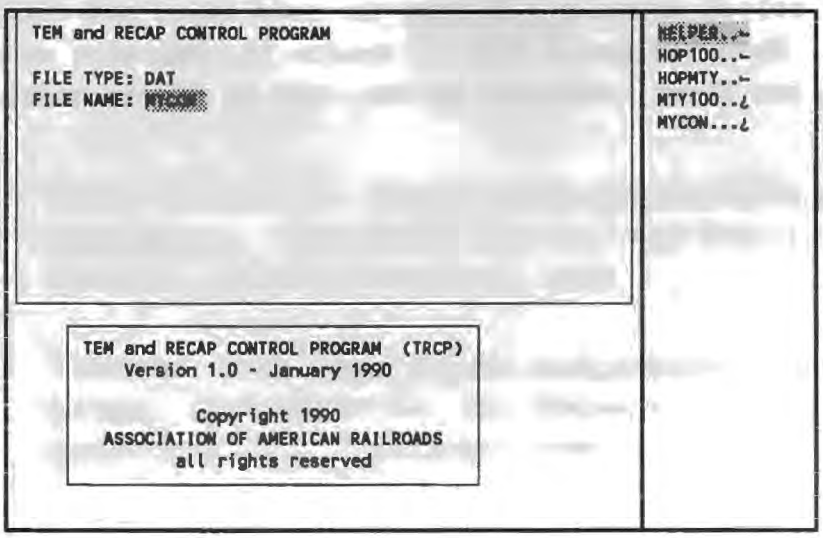


Exhibit C-4: Invalid MYCON.DAT after Modification of S402.PAR

Next, select OUT from the main menu and you will notice the same phenomenon. The MYCON.OUT file is now invalid (¿ -- Exhibit C-4a).

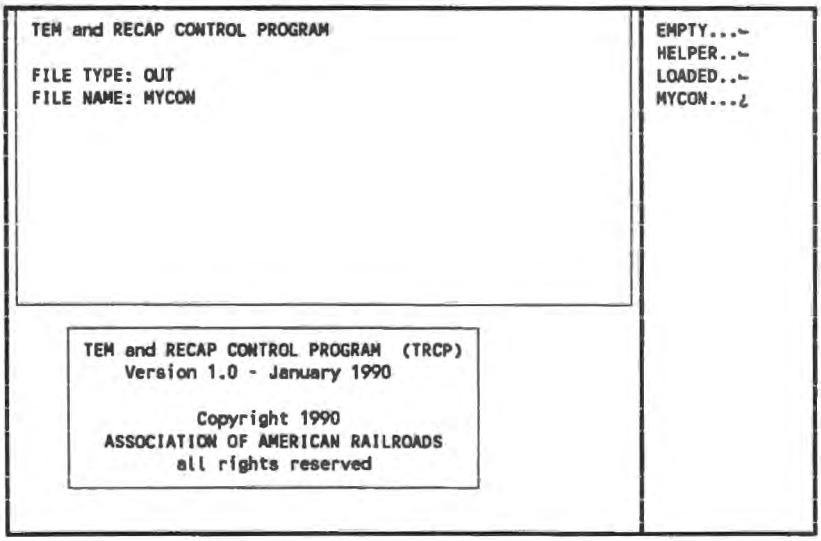


Exhibit C-4a: MYCON.OUT is Invalid Due to DAT Being Invalid

Finally, select function CSM from the main menu, and FILE NAME 'MYCON'. When you press PgDn to create it, you will see that PRE will run first, followed by TEM, and by the economic model ECON2.

REFERENCES

1 - Drish, William F., Train Energy Model User's Manual Version 1.5. AAR Report No. 711; AAR Technical Center, Chicago, Illinois; February, 1989.

2 - Stephens, Greg, Rail Energy Cost Analysis Program User's Manual. AAR Report No. 740; Research and Test Dept, AAR. Washington, D.C.; September 1989.