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16. Abstract <p>ADAR is a user friendly program that is written in Pen Pal™ for automating the Daily Activity Report. This program is developed to be used with pen based field computers. The paper form of the Daily Activity Report was programed into the pen based computers. The electronically filled forms would be transferred to a record computer by disk. This program is intended for use by the maintenance personnel. The final link would have been the connection for loading the information to the mainframe. Mainframe programs could not be changed at this time to facilitate this connection.</p> <p>The CIR is a window based software for automating part of the construction record keeping process. This software was put into production and performed successfully. The project required the automation of the 1257 and 1258 reports. As requested, automation of the daily diary, time charge, contractor, and material information was provided, to give the user a more worthwhile product. The software is intended for use by construction inspectors to help keep up with the progress records.</p> <p>This report has a user's manual for both the ADAR and CIR; also included is some analysis information.</p>					
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**AUTOMATED DAILY ACTIVITY REPORT AND
AUTOMATED CONSTRUCTION INSPECTOR'S REPORT -
USER MANUAL WITH ANALYSIS**

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Research Report 1991F
Research Study Number 7-1991
Research Study Title: Automating Data Collection at the Maintenance Section Level

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IMPLEMENTATION STATEMENT

The Automated Daily Activity Report (ADAR) and the automated Construction Inspector's Report (CIR) systems developed in this study have been implemented at the testing level by the Texas Department of Transportation. The CIR has also been run in the production part of the Texas Department of Transportation's mainframe.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or the policies of the Texas Department of Transportation (TxDOT). This report does not constitute a standard, specification, or regulation. It is not intended for construction, bidding, or permit purposes.

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SUMMARY

ADAR is a user friendly program that is written in Pen Pal™ for automating the Daily Activity Report. This program is developed to be used with pen based field computers. The paper form of the Daily Activity Report was programed into the pen based computers. The electronically filled forms would be transferred to a record computer by disk. This program is intended for use by the maintenance personnel. The final link would have been the connection for loading the information to the mainframe. Mainframe programs could not be changed at this time to facilitate this connection.

The CIR is a window based software for automating part of the construction record keeping process. This software was put into production and performed successfully. The project required the automation of the 1257 and 1258 reports. As requested, automation of the daily diary, time charge, contractor, and material information was provided, to give the user a more worthwhile product. The software is intended for use by construction inspectors to help keep up with the progress records.

This report has a user's manual for both the ADAR and CIR; also included is some analysis information.

CHAPTER 1 INTRODUCTION

The Automated Daily Activity Report (ADAR) is a user friendly software program for collecting Daily Activity Report (DAR) information. ADAR is intended to be used by the maintenance crews to replace the current written forms. Replacing these handwritten forms with the computer reduces errors, saves time, and puts TxDOT one step farther in the governmental trend of a "Paperless Office." Using the computer to collect the DAR information allows for immediate error checking while the form is being filled out; this alone saves the office personnel hours of frustration with common mathematical errors, legibility, and invalid standard operation codes. The office personnel was also able to save valuable time, when using a simulation of TxDOT's mainframe system, by not having to key in the information from the paper form. The ADAR provides an easier convention for archiving and searching old documents, by eliminating the current bulky file cabinet and the possibility of human errors in filing.

After the Automated Daily Activity Report was developed, it was released to four TxDOT sites for testing. To satisfy the needs of the testing, it was required that a simulation of TxDOT's mainframe be developed. The setup of each site included one day of training, the equipment necessary to use the software, and a notebook for the users to report any comments and/or bugs they had regarding the software. After the testing period had elapsed, a survey was generated using the comments of each sites' notebooks. This survey was used in creating the Cost-Effective Analysis Report (see Chapter 4). A meeting was held to determine the requirements of making ADAR interact with TxDOT's Single Entry Screen system. For successful interaction, the current way the Single Entry Screen system works must be altered.

The Automated Construction Inspector's Report (CIR) is a user friendly Windows™ driven software program for collecting daily information that construction inspectors currently record on the 1257 forms and the daily diary. This program is also used by the office administrator to generate the M3, T2, and T3 cards of the monthly estimate. A program was also written to acquire data from TxDOT's mainframe. The CIR program has saved time and reduced errors in both the office and the field. CIR provides most of its savings in the office environment by generating the M3, T2, and T3 card with no extra effort of the office personnel. In the case of a dispute, CIR also provides summary reports that normally require extensive hours of paper research.

The Construction Inspector's Report program was initially introduced to three TxDOT testing sites. Due to the magnitude of information and features involved in the CIR program, the original time deadline was underestimated and an extension was given to complete the program and testing. During the testing period, the user's input on a daily basis helped smooth out what was needed to complete the program. After a testing period had elapsed, the program was ready to be put into production on a restricted basis. Further study is being done on CIR to make it available to all TxDOT districts throughout the state.

1.1 THE ADAR

TxDOT's Daily Activity Report encompasses information that is required in four different data bases kept on TxDOT's mainframe. Each information group is equally important and is used to record the time charged on work areas, equipment used, material used, etc.

The first data set is the Maintenance Management Information System (MMIS). MMIS records the type of maintenance work done, the amount of work done, and the location of the work site. The second data set is the Equipment Operating System (EOS). EOS records the number of hours or miles the equipment is used, the kind of work the equipment is used for, the location where the equipment is used, and the hours or miles at each location. The third data base is Material Supply Management System (MSMS). MSMS records the type and amount of material used and where the material was used. The last data base is the Salary, Labor Distribution System (SLDS). SLDS records the number of man hours worked, type of work preformed, and the location of the work site.

The DAR has evolved from four separate forms. Each one of these forms was filled out and the information keyed into a terminal connected to the mainframe. The old way required duplication of work because some of the information is required on more than one data base. The DAR and the Single Entry Screen (SES) system was developed by TxDOT. The DAR allowed for all of the information for each of the separate data bases to be put on one page, eliminating the writing of duplicated information. The next economizing step is the SES system. This system allowed for the data required for each of the four data bases to be keyed to the mainframe on one screen, allowing a reduction in keying in the same information on each data base. The SES system allows all the information of the DAR to be keyed to the mainframe and a batch program to send the required information to each data base. The next logical step is to automate the DAR, a major part of the research project. The Automated Daily Activity Report (ADAR) is a software written in Pen Pal™.

Meetings were held with the potential users, and equipment was demonstrated. These meetings were necessary to decide what needed to be included in the software to allow the program to be as user friendly as possible. After the basic requirements of the program had been established, software specifications were gathered. At the onset of the project, Pen Pal™ had the most features required to write the ADAR. Pen Pal™ is a software for use on pen based computers. A pen based computer allowed for actual signatures of the employees.

The pen based computers needed to be evaluated to determine the pen based computer that would best suit the needs of TxDOT. The initial search revealed that Grid made a pen based computer that was both economical and rugged. The development was done using this computer. The criteria for deciding which computer to use was price, weather proofing, ruggedness, long battery life, software utilities available, minimum needs for writing, and standard communication port. By the time of implementation, the pen based computer market had radically changed, and the Grid was no longer available; the prices of the pen based computer had increased instead of following the general trend of decreasing computer prices. Upon implementation new evaluations were done and equipment was purchased for both the office and field computers.

Software was written to allow maintenance crew members to record the daily activities. Some error checking and information provided at the field units are: limits of the mile markers

of the roads and highways, equipment lists and codes, etc. The information was then transferred by disk to the office computer which would simulate the mainframe process. It was not feasible to change the mainframe programs to allow for real-time data checking and recording because during the project it was determined that a new system would need to be developed. The simulation of the mainframe process allowed for a completion of the data cycle. Further study is needed to determine the extent of changes to the SES system, to allow for the use of the data uploaded by ADAR.

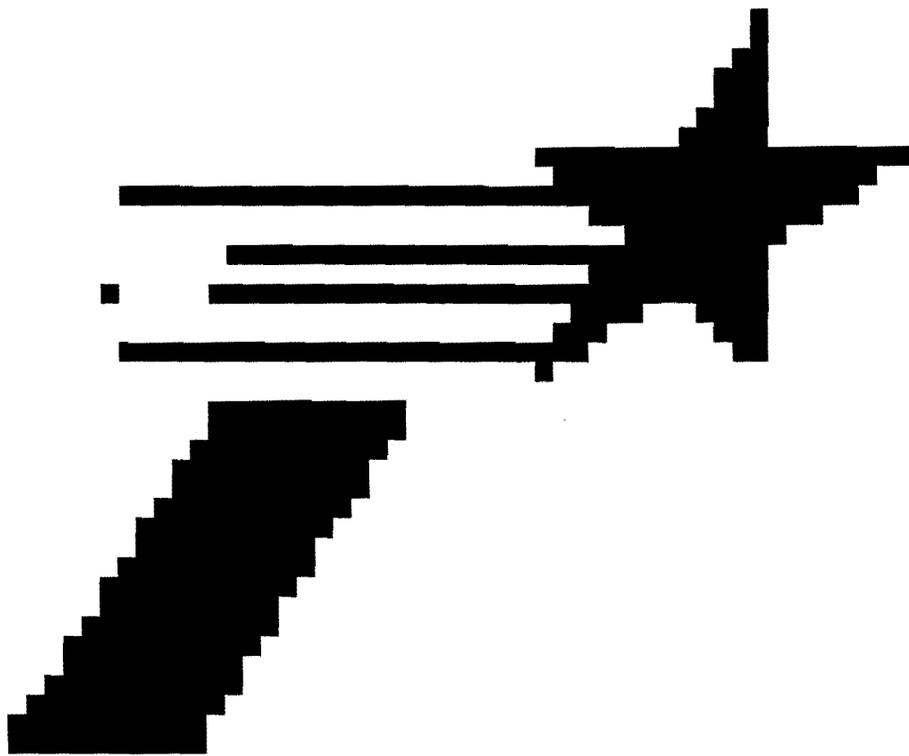
1.2 CIR

The Automated Construction Inspector's Report was added to the research project to provide another testing group for the pen based computer, and as a step forward for TxDOT in the governmental trend of a "Paperless Office".

Meetings were held where sample information was gathered from completed construction inspection reports and diaries. These forms were the basis for deciding the important information to be programed into the forms. The original plan was to develop the system by altering an existing program being used by Michigan DOT, but it was more efficient and effective to write a separate program to fit the exact needs of the state of Texas. At first the system was to be developed using Pen Pal™, but this would not allow for the requirements of the system. A decision was made to go with a Windows™ based software, called Power Builder™. The research project required that the form 1257 and form 1258 be automated. By the end of the project, the form 1257, the form 1258, the daily diary, time charges, contractor information, and material information were incorporated into the project. After developing a program that would work on both the pen based computer and the office PC, mainframe programs were written to handle uploading and downloading of important information. The system was tested in a separate area of the TxDOT mainframe. This caused unforeseen time delays because the test area needed programs and procedures that would not be necessary in production. After a time the test area of the TxDOT mainframe was setup. The software was tested both in the test area and also in the production area. Data from normal computer entries was compared to the resultant data from CIR. The resultant data was the same as the normal data. After this testing was completed, the programs were moved into production on a restricted basis. Further development of CIR is being done to make it available to all TxDOT districts throughout the state.

CHAPTER 2
ADAR - USER MANUAL

(The manual was delivered as a separate document, so the fonts will not be consistent with the rest of the report.)



Daily Activity Report
for Roadway Maintenance

Prepared by:



May 1995

The Computer

Each computer comes with the following:

T200 Toshiba Computer

- AC to DC power adapter
- DC to AC automobile adapter
- Stylus Pen
- Floppy Disk Drive
- Printer Cable
- Protective Slip Cover
- Replacement Pen tips
- Carrying Case

Author Note: Locations on the computer will be designated as follows.

TOP: This is the screen of the computer.

BACK: This is the back side of the computer (where the power button is).

FRONT: This is the front side of the computer (opposite the back).

BOTTOM: This is the opposite side of the screen.

Turning the Computer On and Off

The power button can be found on the back of the computer. In order to turn the computer on or off you must press and hold the power button for one second. Just tapping the power button will not work.

When the computer comes on, it will run several tests that take about one minute to perform. Then the computer will run the Daily Activity Report (DAR) program.

When the computer is turned off, it will beep twice.

The Back of the Computer

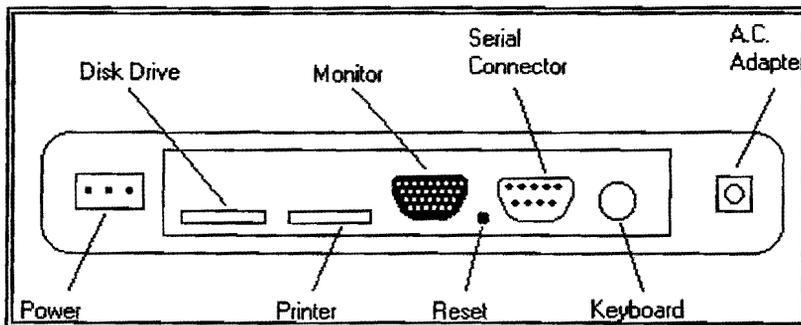


Figure 1

The Screen

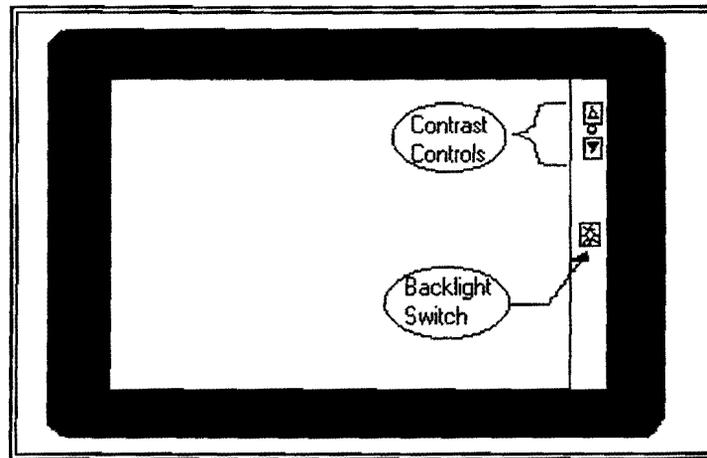


Figure 2

The screen has three buttons on it that control the brightness and the contrast. In order to use these features, you have to press the pen to the button.

The Pen

The Stylus pen is what you use to input data into the computer. You use the pen by pressing it against the screen where you want the data to go.

Using the Pen with the DAR Program....

Throughout the program there will be buttons on the screen that perform different actions. To use these, just press the pen against the button you want, and then lift the pen off the screen.

The DAR Program also recognizes handwriting in the data fields. To use the pen for handwriting recognition, *PRINT* each character on the screen. It is important that you make your handwriting in print and that it is done clearly. The only exception to this are the signature fields; these should be done as you would sign any other form.

The Disk Drive

The disk drive comes with a cable that connects it to the computer. Plug the small end of the cable into the back of the computer (See figure 1) and the large end of the cable into the disk drive.

The AC to DC Adapter

This adapter allows you to plug the computer into any standard wall socket. It is a good idea to plug the computer in when you are not using it so that the battery can charge.

DC to AC Automobile Adapter

This adapter allows you to use the computer on a car battery. To use, plug the adapter into the cigarette lighter, and plug the AC to DC adapter into the socket on the DC to AC automobile adapter.

Replacement Pen Tips

Replacement tips are in a brown box. There will be a small round metal tool with the tips; use it to pull the old tip out. Then insert the new tip completely.

You should only replace the tip if the pen does not respond when you press it to the screen.

Entry Screen



TEXAS DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION AND MAINTENANCE

DAILY ACTIVITY REPORT

17-Apr-1995

ENTER DAR 

>>> Select ENTER DAR for daily report or EXIT to quit.

This is the screen you start in. To start a new activity report, press the <ENTER DAR> button with the pen.

Return to this screen when you are ready to quit. To quit, just turn off the computer.

Edit Old Report

This allows you to bring up a report you have already started so you can change or add to it. When you press this button, it takes you to the Main Screen of the current DAR.

Export Report

Before pressing this button, be sure to connect your disk drive to the computer, and make certain there is a diskette in the drive. This is how you transfer your data to the main office computer.

Exit

Exit returns you to the Entry Screen so you can turn the computer off.

New Report Screen

CREATE NEW REPORT

DATE

CREW NO

>>> Select CONFIRM to create new report or CANCEL .

Date

This is the current date and will be the one used on the DAR. You cannot edit this field.

Crew No

This is the crew number for the DAR. You can edit this field by touching the pen to the box containing C-01. When you press this field it, will display a keypad so you can enter the correct crew number. (See Using Keypads at the back of the manual).

Confirm

This button takes you to the Main Screen of the DAR you are creating.

Delete Report

DELETE REPORT

DATE

CREW NO

>>> Select CONFIRM to delete report or CANCEL.

This screen shows you the report date and crew that you have chosen to delete.

Cancel

Press this button to return to the Status Screen without deleting the report chosen.

Confirm

Pressing this button deletes the chosen report and returns you to the Status Screen.

Main Screen

CURRENT REPORT STATUS		
DATE	<u>17-Apr-95</u>	CREW NO <u>C-01</u>
	COMPLETE	
<input type="button" value="COST DISTRIBUTION"/>	NO	
<input type="button" value="MMIS FUNCTIONS"/>	NO	
<input type="button" value="DAILY TIME"/>	NO	<input type="button" value="SAVE REPORT"/>
<input type="button" value="EQUIPMENT UTILIZATION"/>	NO	
<input type="button" value="MATERIAL"/>	NO	<input type="button" value="EXIT"/>

>>> Select COSTDIST MATERIALS to enter data.

This screen is the Main Screen of the DAR. It has buttons that take you to any section of the DAR you need to edit. Beside each button is a "Complete" column, with either YES or NO. If the column has "YES," this only means that you have been in this section and have done a minimum amount of work in it. "Yes" in this column does not mean you have finished everything that needs to be done to that section.

Cost Distribution

This takes you to the screen that corresponds to the Cost Distribution section of the DAR paper form.

MMIS Functions

This key takes you to the screen that corresponds to the MMIS Functions Only section of the DAR paper form.

Daily Time

This button takes you to the screen that corresponds to the Daily Time section of the DAR paper form.

Equipment Utilization

This takes you to the screen that corresponds to the Equipment Utilization section of the DAR paper form.

Material

This takes you to the screen that corresponds to the Material section of the DAR paper form.

Save Report

This allows you to save the changes you have made to the DAR. If the screen says that all screens are not complete, save report will ask you if this report is complete. If you answer “no” to this question, it will ***not*** save the report.

Exit

Exit warns you if you try to exit without saving the report. If you have saved the report, it will take you back to the Report Status Screen.

Cost Distribution Screen

COST DISTRIBUTION							
Dist./Div. <u>8</u>				Section No. <u>1</u>			
NO	SEG	DETAIL	FUNC	CO	SYS	HWY NO	SF
1	78	1	0	221	BI	20	R
2	70	9625	551	0		0	
3			0				
4			0				
5			0				
6			0				
7			0				
8			0				

Dist./Div. & Section

These fields are empty until a Detail has been chosen. You cannot edit these fields.

Main

This takes you back to the Main Screen.

Next

Next takes you to the MMIS Functions Screen

Detail

Pressing on a Detail number that already exists or the first empty Detail row brings up a picklist of Charges to choose from.

CHARGE LIST						
DD	ID	DETAIL	COU	SYS	HWY	SUF
8	78	1	221	BI	20	N ↑
8	78	1	221	BI	20	P
8	78	1	221	BI	20	Q
8	78	1	221	BI	20	R
8	78	1	221	BU	83	D
8	78	1	221	FM	1082	
8	78	1	221	FM	1085	
8	78	1	221	FM	1086	
8	78	1	221	FM	1235	
8	78	1	221	FM	126	
8	78	1	221	FM	1750	
8	78	1	221	FM	18	
8	78	1	221	FM	2035	
8	78	1	221	FM	2404	
8	78	1	221	FM	2405	
8	78	1	221	FM	2833	↓

>>> Choose a Charge Number: Highlight item and press SELECT.

Return

This returns you to the Cost Distribution Screen without selecting a Detail.

Clear

This button only works if you pressed the pen to an existing detail number when you were in the Cost Distribution Screen. When pressed it deletes the detail that you had chosen from the Cost Distribution Screen from the report. It also deletes any information that was dependent of the detail you chose to delete. This button then returns you to the Cost Distribution Screen.

Select

Before pressing this button, you need to make sure that you have highlighted the Charge that you want in the picklist. (See Using Picklists in the back of the manual). When you press this button, it selects the highlighted Charge and returns to the Cost Distribution Screen.

Func.

This field will only work after a Detail has been chosen. When a Detail has been chosen and you press this field with the pen it will bring up a picklist of Functions.

FUNC CODE LIST				
FUN	DESCRIPTION	MAX	UNIT	
110	Base Repair Removal and Replacement	20000	SY	↑
120	Base Repair In Place	20000	SY	
130	Install and/or Maintain Under-drains	0		
140	Unpaved Road Maintenance	0		
211	Levelling/Overlay W/Laydown Machine	40000	SY	
212	Levelling/Overlay w/Maintainer Drag-box	50000	SY	
213	Levelling by Hand	500	SY	
221	Sealing Cracks and Joints, Asphaltic Rubber	25000	LB	
222	Sealing Cracks and Joints, Other Sealants	3000	GAL	
231	Aggregate Seal Coat (Full Width)	80000	SY	
232	Strip or Spot Seal Coat (Not Full Width)	25000	SY	
233	Fog Seal (Full Width)	200000	SY	
234	Strip or Spot Fog Seal (Not Full Width)	200000	SY	
241	Potholes Semi-Permanent Repair	200	EA	
242	Potholes Permanent Repair Square Cut	200	EA	
245	Adding or Widening Pavement	20000	SY	
252	Milling or Planing	50000	SY	
260	Treat Bleeding Pavement	0		
270	Edge Repair	50000	LF	
315	Slab Stabilization/Jacking	0		↓

RETURN CLEAR SELECT DELETE ADD

>>> Choose a Function Code: Highlight item and press SELECT.

Return

This takes you back to the Cost Distribution Screen without choosing a function.

Clear

This button only works if you pressed the pen to an existing Function when you were in the Cost Distribution Screen. When pressed it deletes the Function Code that you had chosen from the Cost Distribution Screen from the report. This button then returns you to the Cost Distribution Screen.

Select

Before pressing this button, you need to make sure that you have highlighted the Code that you want in the picklist. (See Using Picklists in the back of the manual). When you press this button, it selects the highlighted Code and returns to the Cost Distribution Screen.

MMIS Functions Screen

MMIS FUNCTIONS ONLY											
NO	FUNC	CD	HWY NO	BEG REF	END REF	MAX WORK	TASK WRK ORDER	REF. BEG	MRK. END	WORK PERF	WORK UNIT
1	232	221	20	414	424	25000	0417	414	424	9566	SY
2	551	0	0	0	0	0				0	
3	0					0				0	
4	0					0				0	
5	0					0				0	
6	0					0				0	
7	0					0				0	
8	0					0				0	

BACK
NEXT
MAIN

>>> Not a MMIS function.

The left half of this screen cannot be edited; it is there for your reference when you are filling out the MMIS Functions section of the DAR.

Task Work Order

This number is given by the computer for each Detail/Function combination that requires them. You can edit this number by pressing the pen to the field you want to edit.

Reference Marker--Begin & End

These two fields are required for all Details that have Begin & End References (On the left side of the screen). The values of Reference Marker Begin & End must be between the value of the Begin & End References found on the left side of the screen. When you press the pen to either of these fields, it will pop-up a keypad for you to enter the data. (See How To Use Keypads in the back of the manual).

Work Performed

This field should be a value less than Max Work (On the left side of the screen). If the value is greater than Max Work, the computer will give you a warning and ask if you would like to reedit the value, answer yes if you made a mistake or no if the value is correct. When you press the pen against this field, it will pop-up a keypad for you to enter you data. (See Using Keypads in the back of the manual).

Work Unit

This is filled in by the computer. You cannot edit this field.

Back

This takes you to the Cost Distribution Screen.

Next

This takes you to the Daily Time Screen.

Main

This takes you to the Main Screen.

Daily Time Screen

DAILY TIME

Emps 7-12

NO	LAST NAME	FIRST NAME
1	DOE	JOHN
2		
3		
4		
5		
6		

MAIN

BACK

NEXT

Detail	FUNC	CO	HWY NO	BEG	END	EMP HRS	1	2	3	4	5	6
1	232	221	20	414	424		8	0	0	0	0	0
9625	551	0	0	0	0		0	0	0	0	0	0
	0						0	0	0	0	0	0
	0						0	0	0	0	0	0
	0						0	0	0	0	0	0
	0						0	0	0	0	0	0
	0						0	0	0	0	0	0
	0						0	0	0	0	0	0
TOTAL HOURS							8	0	0	0	0	0

Total SLD

8

>>> Enter Employee Information.

Emps 1-6, 7-12, & 13-15

These buttons are found to the left of the employee name list. Although the figures shown above only show the 7-12 button, the other two will show up after you fill the name list and press the 7-12 button. These buttons are used to scroll through the list of employee names.

Emps Hrs Table

To edit the amount of hours an employee worked on a particular detail, press the pen to the cell that you want. The rows correspond to the detail chart and the columns correspond to the employee number that is on the employee list at the top of the screen.

Total SLD

This field automatically totals the hours worked by all employees. You cannot edit this field.

Main

This button takes you to the Main Screen.

First & Last Name

Pressing on the first empty field from the top or pressing on a current name will bring up the employee picklist.

Back

Back takes you back to the MMIS Screen.

Next

This takes you to the Equipment Screen.

Delete

DELETE EMPLOYEE

SSN

569-61-8445

LAST NAME

DOE

FIRST NAME

JANE

CANCEL

CONFIRM

>>> Press CONFIRM to delete employee shown.

When you choose the Delete button, it will bring up the Delete Employee Screen with the employee information of the employee that was highlighted

Cancel

Cancel takes you back to the picklist without deleting the employee.

Confirm

This deletes the employee from the picklist. This will not affect the report in any way.

Add

ADD EMPLOYEE	
SSN	
<input type="text" value="- -"/>	
LAST NAME	FIRST NAME
<input type="text"/>	<input type="text"/>
<input type="button" value="CANCEL"/>	<input type="button" value="CONFIRM"/>

This screen will be displayed over the picklist when you choose the add button.

SSN

This field is for the new employee's Social Security Number. When you press on this field it will pop-up a keypad to use for entering the employee's SSN.

Last & First Name

These fields are for entering the employee's name. When you press on these fields, they will pop-up a keypad so you can enter the employee's name.

Cancel

Pressing this button will take you back to the picklist without adding a new employee.

Confirm

Pressing this button will add the employee to the picklist and return you to the picklist.

Equipment Screen

EQUIPMENT UTILIZATION												
NO	LAST NAME	FIRST NAME	NO	EQUIP	OP	P1	P2	P3	P4	P5	M/H	SIGN
1	DOE	JOHN	1	01178	1						H	Signed
2			2									
3			3									
4			4									
5			5									
6			6									

EMPS	1-6	7-12	13-15	EQUIP 7-12
------	-----	------	-------	------------

COMMIT/USAGE											
DTL	FUN	CO	HWY	BEG	END	1	2	3	4	5	6
1	232	221	20	414	424	8	5	0	0	0	0
9625	551	0	0	0	0	0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
	0					0	0	0	0	0	0
TOTAL USAGE						5	0	0	0	0	0

Total EOS	5
-----------	---

MAIN

BACK

NEXT

Emps 1-6, 7-12, & 13-15

Pressing these buttons allow you to scroll through the employee list. You cannot edit the employee list from this screen.

Equip 1-6, 7-12, & 13-18

Pressing these buttons allow you to scroll through the equipment list.

Commit/Usage Table

Commit is on the left of each column, and Usage is on the right of each column. The column numbers correspond to the equipment list at the top-right of the screen.

Pressing on these fields will pop-up a keypad. (See Using Keypads at the back of the manual.)

Total EOS

This automatically totals the Usage of all pieces of equipment.

Main

Pressing this will take you to the Main Screen.

Back

This button will take you back to the Daily Time Screen.

Next

This button will take you to the Material Screen.

Equipment Table

Equip

Pressing this field will bring up the equipment picklist which will be discussed on the next page.

Op

This is the number of the employee that will operate and sign for the equipment. The number entered in this field corresponds to the number of the employee list on the left side of the screen.

P1, P2, P3, P4, & P5

These fields are for the number of the employees that are passengers of a piece of equipment. The number entered in this field corresponds to the number of the employee list on the left side of the screen.

M/H

This field shows whether the equipment is monitored by Miles or Hours. You cannot edit this field.

Equipment Picklist

EQUIPMENT LIST				
EQUIP#	DESCRIPTION	HRS	M/H	
00464A	AUTOMOBILES, SEDAN, 100 THRU 112.9 IN.	76521	M	↑
01052	GRADER, MOTOR, CLASS III, 125 TO 149 H.P	0	H	
01116	GRADER, MOTOR, CLASS III, 125 TO 149 H.P	0	H	
01178	GRADER, MOTOR, CLASS III, 125 TO 149 H.P	0	H	
01585	PUMP, ASPHALT TRANSFER, PORT.	0	H	
01620B	GRADER, MOTOR, CLASS II, 80 TO124 H.P.	0	H	
01648	ASPHALT MAINTENANCE UNIT, 1000GALLON, TR	0	H	
02058B	ROLLER, PNEUMATIC TIRED, SELF PROPELLED	0	H	
02059B	ROLLER, PNEUMATIC TIRED, SELF PROPELLED	0	H	
02075A	ROLLER, FLATWHEEL, SELF PROP.,4-6 TON W/	0	H	
02076A	ROLLER, FLATWHEEL, SELF PROP.,4-6 TON W/	0	H	
02143D	ROLLER, FLATWHEEL, SELF PROP.,4-6 TON W/	0	H	
02183	ROLLER, FLATWHEEL, SELF PROP.,4-6 TON W/	0	H	
02190	ROLLER, VIBRATING, SELF PROPELLED	0	H	
02196B	ROLLER, PNEUMATIC TIRED, SELF PROPELLED	0	H	
02306	TRACTOR, PNEUMATIC TIRED, UP TO 49 H.P.	0	H	↓

>>> Choose a Charge Number: Highlight item and press SELECT.

Return

Pressing this button will return you to the Equipment Screen without selecting a piece of equipment.

Clear

This button will clear the piece of equipment you chose from the Equipment Table in the Equipment Screen. This will delete all data that depends on the equipment that you deleted. This will only work if you choose the last piece of equipment from the Equipment Table.

Select

This button selects the highlighted piece of equipment and returns you to the Equipment Screen.

Delete

DELETE EQUIPMENT

EQUIPMENT #

DESCRIPTION

HOURS

Miles/Hours

>>> Press CONFIRM to delete Equipment shown.

Pressing the <Delete> button will display the above screen that includes the information for the equipment that was highlighted in the Equipment Picklist.

Cancel

This button returns you to the Equipment Picklist without deleting the piece of equipment.

Confirm

Pressing this button will delete the piece of equipment from the Equipment Picklist and return you to the picklist. Deleting a piece of equipment will not effect the report in any way. It will only remove it from the picklist.

Add

EQUIPMENT LIST			
EQUIP #	DESCRIPTION	HRS	M/H
00464A	AUTOMOBILES, SEDAN, 100 THRU 112.9 IN.	76521	M ↑
01052	GRADER, MOTOR, CLASS III, 125 TO 149 H.P	0	H
011			
011			
015			
016			
016	EQUIPMENT #	<input type="text"/>	
020	DESCRIPTION	<input type="text"/>	
020	HOURS	<input type="text" value="0"/>	
020	Miles/Hours	<input type="text"/>	
021			
021		<input type="button" value="CANCEL"/>	<input type="button" value="CONFIRM"/>
021			
02306	TRACTOR, PNEUMATIC TIRED, UP TO 49 H.P.	0	H ↓

>>> Choose a Charge Number: Highlight item and press SELECT.

Pressing the <Add> button will display the Add Equipment Screen over the Equipment picklist.

Equipment

This is the number that will be used to identify the piece of equipment. When you press this field with the pen it, will pop-up a keypad. (See Using Keypads in the back of the manual).

Description

This is the description of the piece of equipment. Pressing this field will pop-up a keypad.

Hours

This is the amount of Hours or the Odometer reading of the piece of equipment

M/H

This field determines if the equipment is monitored by Miles or Hours. This field must be either M or H. These are the only valid values. Pressing this field will pop-up a keypad.

Cancel

Pressing this will return you to the Equipment Picklist without adding the new piece of equipment.

Confirm

This button will add the piece of equipment to the Equipment Picklist and will return you to the Equipment Picklist.

Material Screen

MATERIAL						
STOCK ACCT #		8301				
MATERIAL ISSUED BY		Signed				
MATERIAL REC'D BY		Signed				

#	DESCRIPTION	DHT #	LOC
1	PRE-MIX		0
2			0
3			0
4			0
5			0
6			0

Mat 7-12
BACK
MAIN

QUANTITY						
DTL	FUN	CO	HWY	BEG	END	
1	231	221	20	392	395	
9625	551	0	0	0	0	
	0					
	0					
	0					
	0					
	0					
	0					
	0					
	0					

1	2	3	4	5	6
5	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

>>>
Enter Materials Information.

Mat 1-6 & 7-12

These buttons are used to scroll through the list of materials.

Stock Account Number

This field contains the Stock Account Number for your district and division. If you press the pen on this field, it will give you a warning before it allows you to edit the number.

Description

Press on this field to enter the description of the material you are using. Pressing this field will pop-up a keypad. (See Using Keypads at the back of the manual).

DHT

Press this field to enter the DHT # of the material you are using. This field is an optional field. Pressing this field will pop-up a keypad. (See Using Keypads at the back of the manual).

Loc

This field is for the location of the material. Pressing this field will pop-up a keypad. (See Using Keypads at the back of the manual).

Quantity

This table is for the quantity of the material used. The column numbers correspond with the Material list at the top-right of the screen. The row numbers correspond with the Detail list on the bottom-left of the screen. Pressing any of these fields will pop-up a keypad. (See Using Keypads at the back of the manuals).

Back

Pressing this button will take you back to the Equipment Screen.

Main

This button will take you to the Main Screen.

Materials Issued By & Received By

MATERIAL			#	DESCRIPTION	DHT #	LOC
STOCK ACCT # 8301			1			0
			2			0
			3			0
			4			0
			5			0
MATERIAL ISSUED BY Signed						0
MATERIAL REC'D						0

MATERIAL RECEIVED BY			BACK		MAIN	
<i>John Doe</i>						
CLEAR LOCK						

DTL	FUH	CO					5	6
1	231	22					0	0
9625	551						0	0
	0						0	0
	0						0	0
	0						0	0
	0						0	0
	0						0	0
	0						0	0

>>> Enter Materials Information.

Pressing the pen to either of these fields will bring up a Signature Screen like the one above. When this screen is displayed, use the pen to sign the area inside the box.

Clear

This button clears the box so you can redo the signature. This button will not work once the signature has been locked.

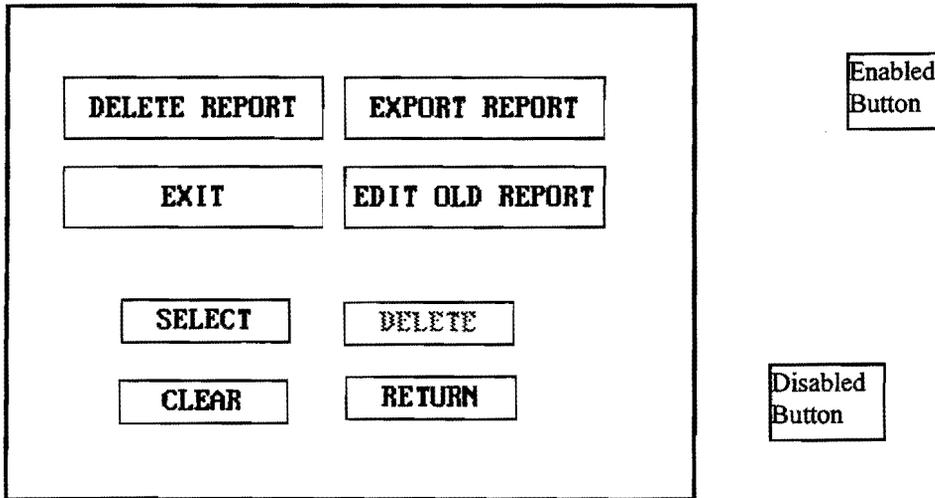
Lock

This saves the signature and prevents anyone from changing or clearing it. After a signature is locked, you will be returned to the material screen, and "Signed" will appear in the field you choose.

Miscellaneous Information

This part of the manual explains the parts of the program that exist on several or all of the screens of the program.

Buttons



Buttons are found on every screen of the program. To use a button, just press the pen on the screen where that button is.

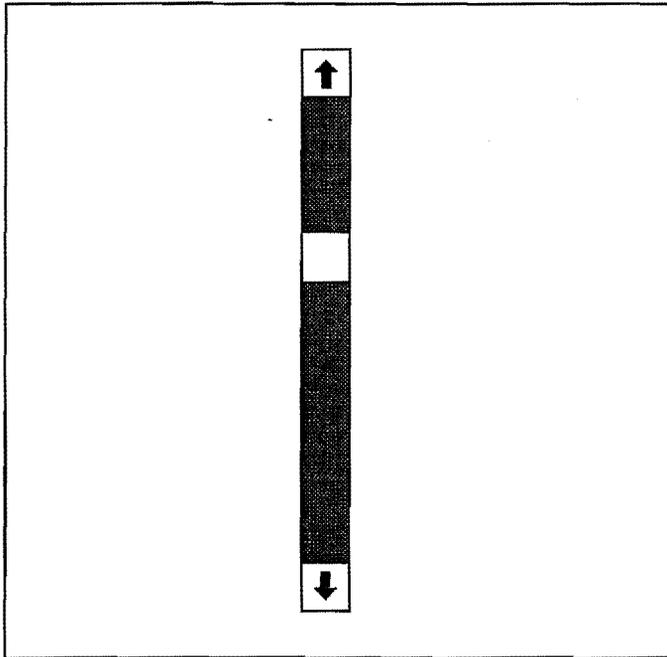
Disabled buttons are distinguished by the color of the text inside the button. If a button is disabled, it cannot be used.

List Boxes

FUNC CODE LIST			
FUN	DESCRIPTION	MAX	UNIT
110	Base Repair Removal and Replacement	20000	SY
120	Base Repair In Place	20000	SY
130	Install and/or Maintain Under-drains	0	
140	Unpaved Road Maintenance	0	
211	Levelling/Overlay W/Laydown Machine	40000	SY
212	Levelling/Overlay w/Maintainer Drag-box	50000	SY
213	Levelling by Hand	500	SY
221	Sealing Cracks and Joints, Asphaltic Rubber	25000	LB
222	Sealing Cracks and Joints, Other Sealants	3000	GAL
231	Aggregate Seal Coat (Full Width)	80000	SY
232	Strip or Spot Seal Coat (Hot Full Width)	25000	SY
233	Fog Seal (Full Width)	200000	SY
234	Strip or Spot Fog Seal (Hot Full Width)	200000	SY
241	Potholes Semi-Permanent Repair	200	EA
242	Potholes Permanent Repair Square Cut	200	EA
245	Adding or Widening Pavement	20000	SY
252	Milling or Planing	50000	SY
260	Treat Bleeding Pavement	0	
270	Edge Repair	50000	LF
315	Slab Stabilization/Jacking	0	

List boxes are used on several screens of the DAR program. These boxes give you a list of items to choose from. To select an item from a list box, all you have to do is press the pen to the item you want. When you select an item, it will be highlighted in the list box. If the list box is full of items, you can view more items by using the scroll bar on the right side of the list box

Scroll Bars



All list boxes have Scroll bars found on the right side of the list box. A scroll bar represents the entire list of items (even the ones not seen). The Thumbnail of a scroll bar represents the position of what you are viewing in the entire list of items. There are many ways to use a scroll bar.

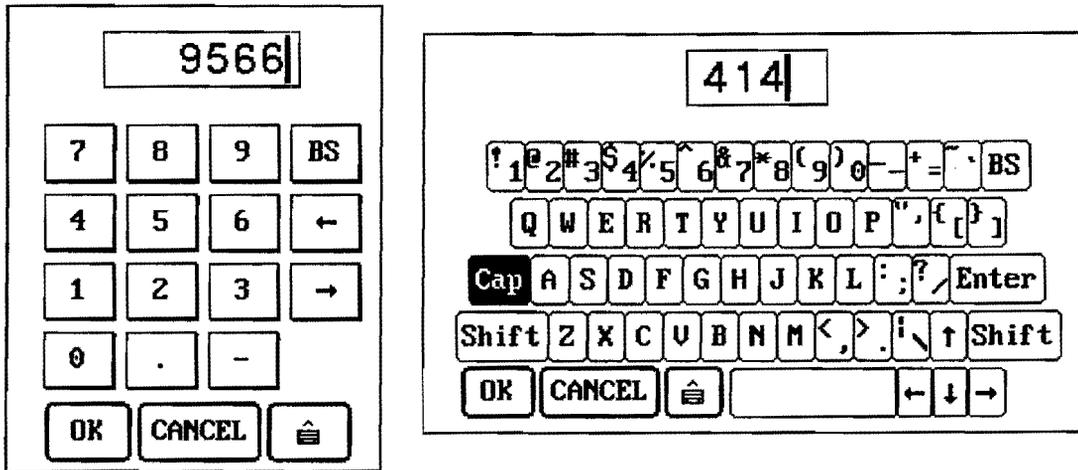
Up & Down Arrows

The up and down arrows move the highlight bar up or down one item. Using the up and down arrows will scroll the list if necessary. Just press the pen to the up or down arrow to use this part of the scroll bar.

Page Up & Page Down Areas

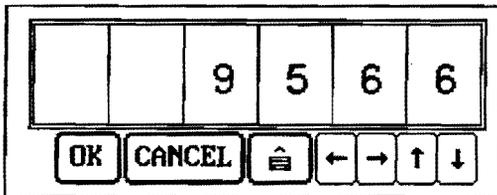
These are the areas between the thumbnail and the arrows. Pressing the pen to one of these areas will scroll the list one full page in the direction you chose.

Key Pads



Keypads are displayed to help you enter data. To use a keypad just press the pen to the keypad buttons. You can also print your data in the box with the cursor in it. When you have entered your data, press the <OK> button to return to the screen you were working on. If you decide you don't want to enter any data, press the <CANCEL> button to return you to the screen you were working on without changing any data. The button next to the <CANCEL> button will take you to a write pad to enter your data.

Write Pads



Write pads are another way to enter data. To use them, just print one letter of your data into each of the boxes. The <OK> and <CANCEL> buttons work just like the keypad <OK> and <CANCEL> buttons. The button beside the <CANCEL> button will take you back to a keypad.

Trouble Shooting

This section is to help you with some minor problems that you may experience.

My data turned into stars(*****)!!!

Problem: I enter my data into the keypad, but when I press <OK>, stars(***) are displayed.

Solution: To fix this problem, choose the field that has the stars(***) in it. When the keypad is displayed, just press <OK> without pressing anything else. Now zero should be in the field. Press the field again, now when the keypad is displayed, enter the value you want and press <OK>.

My Scroll Bars won't work!!!

Problem: I enter a list box and press on the scroll bar but it doesn't do anything.

Solution: Exit the screen with the list box on it. Now go back to the screen with the list box. Press the pen to one of the items in the list box before touching any other part of the screen. Now you can use your scroll bars without any problems.

My Pen won't work!!

Problem: I am on a DAR program screen, but the pen won't work.

Solution A: Some fields and buttons in the program are protected until certain requirements have been met, and others are always protected. Try choosing all the buttons to make sure it is the pen.

Solution B: Turn the computer off, wait 10 seconds, turn the computer back on.

Solution C: If you tried Solution A & B, check the tip of the pen. Make sure that the pen has a tip; if it does make sure that it is in all the way. Finally, if the pen still does not respond, try replacing the pen tip.

I got an error, and the program stopped running!!

Problem: I was working in the DAR program and got an error message. Instead of taking me back to the screen I was on, it stopped the program. Now I have a black screen(DOS prompt), and my pen will not respond at all.

Solution: Turn the computer off, wait 10 seconds, turn the computer back on.

I have a problem not discussed in the manual!!!

Problem: I have encountered a problem that is not explained in the manual, or I keep having a problem with the program quitting.

Solution: Contact one of the people below.

Steven Sutton -- (409) 845-1857 -- TTI
Joey Matesic -- (512) 416-3218 -- TxDOT
John Ragsdale -- (409) 845-9211 -- TTI

CHAPTER 3
CIR - USER MANUAL

(The manual was delivered as a separate document, so the fonts will not be consistent with the rest of the report.)

AUTOMATED CONSTRUCTION INSPECTOR'S REPORTS

*Prepared for
Texas Department of Transportation*

*by
Texas Transportation Institute*

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1

Welcome

The Automated Construction Inspector's Report (CIR) Program was developed to aid construction management in the daily documentation of work activities. CIR automates the collection and storage of the diary information and the 1257 forms. CIR interfaces with TxDOT's existing Construction Information System (CIS) to obtain important information on each CSJ that you will be working with. CIR also automates the M-3, T-2, and T-3 parts of the monthly estimate to work with the current CIS system. The purpose of this software is to provide districts with a software system to be used if they have the hardware available and to provide construction information in a database for easier query and access in the event of a claim or dispute. If you have any question or comments about the software, please call the Division of Construction and Maintenance, George Leuck, (512) 416-2461.

2

Installation

What you need.

- ◆ IBM compatible computer
- ◆ A notebook computer (pen-based preferred)
- ◆ Hard drive on both computers should have 20 MB to install the program and an additional 100 MB per CSJ
- ◆ Windows™ 3.xx (already installed and working)
- ◆ Arbiter (already installed and working)
- ◆ Backup tape drive
- ◆ Six blank 3 ½" diskettes already formatted

What you need to know.

- ◆ Basic DOS commands
- ◆ How to use Arbiter to connect to the TxDOT Bulletin Board
- ◆ What *config.sys* and *autoexec.bat* files are and how to edit them.
- ◆ How to setup a new *Windows™* group and item

Making the Setup diskettes.

From the main menu of Arbiter do the following steps to setup up a virtual drive.

- ◆ Choose 2.) Remote File Server
- ◆ Choose 1.) Use a remote disk on a redirected drive

The screen that appears has several entry boxes on it. Enter TXDOT, BULLETIN, BOARD into the Group, Assart, and Name boxes, respectively. Enter "D" (or another open drive letter) into the Drive entry box and make sure that Access is WRITE. After this press the <ENTER> key. After you do this, some information should appear in the Remote Disks box on the right side of the screen. If information does not show up in this box, try the steps for this screen again.

- ◆ Press the <ESC> key until you are at a DOS prompt.

The following steps assume that you set up the TxDOT Bulletin Board as drive D.

Type in each step as it is shown, and then press the enter key.

- ◆ D:
- ◆ CD DIST17
- ◆ CD CIR

Insert a blank disk into the A: drive.

- ◆ CD DISK1
- ◆ COPY *.* A:
- ◆ CD ..

Remove the disk and label it "CIR Install Disk 1 of 4."

Insert a blank disk into the A: drive.

- ◆ CD DISK2
- ◆ COPY *.* A:
- ◆ CD ..

Remove the disk and label it "CIR Install Disk 2 of 4".

Insert a blank disk into the A: drive.

- ◆ CD DISK3
- ◆ COPY *.* A:
- ◆ CD ..

Remove the disk and label it "CIR Install Disk 3 of 4".

Insert a blank disk into the A: drive.

- ◆ CD DISK4
- ◆ COPY *.* A:
- ◆ CD ..

Remove the disk and label it "CIR Install Disk 4 of 4".

Insert a blank disk into the A: drive.

- ◆ CD DISK5
- ◆ COPY *.* A:
- ◆ CD ..

Remove the disk and label it "CIR Arbiter Files".

Insert a blank disk into the A: drive.

◆ CD UPDATE

◆ COPY *.* A:

◆ CD ..

Remove the disk and label it "CIR Update Disk".

Now that you have created the diskettes, reset your computer by pressing the <CTRL>, <ALT>, and <DELETE> keys simultaneously.

Installing & Updating the CIR Program

Installing

If you are in Windows™, quit, to get to a DOS prompt.

Insert the diskette labeled "CIR Install Disk 1 of 4" into the disk drive.

Type in each step as it is shown and then press the enter key.

- ◆ CD \
- ◆ A:
- ◆ INSTALL

The disk drives will light up and after about one minute (actual time depends on your hardware setup) you will be asked to enter the next disk. After you have entered Disk 4 of 4 and it finishes its processing, you will be asked if you are installing for a Pen Computer or for a Workstation Computer.

Type "P" if you are installing the program on any notebook computer, even if it does not have a pen.

Type "W" if you are installing the program on a desktop computer.

Now you have a working copy of the program on your computer, but, we are going to run an update to get any bug fixes and new features for the program.

Updating

Insert the diskette labeled "CIR Update Disk" into the disk drive.

Type in each step as it is shown and then press the enter key.

- ◆ CD \
- ◆ A:

If you are updating a Pen computer, type the following and press enter.

- ◆ UPDATEP

If you are updating a Workstation computer, type the following and press enter.

- ◆ UPDATEW

CIR Arbiter files

You should only install these files on the Workstation computer that has arbiter installed on it.

Insert the diskette labeled "CIR Arbiter Files" into the disk drive.

To install the files, type in the following command and press enter.

- ◆ COPY A:*.* C:\ARB421

Editing Configuration Files

***** WARNING *****

If you do not know what the *autoexec.bat* and *config.sys* files are and how they work, do not try to do this part of the setup. I am going to assume that you know what you are doing and will not give a step by step procedure. Again, the *autoexec.bat* and *config.sys* files are important to the operation of your computer; **do not** edit them unless you know what you are doing.

SHARE.EXE

The program SHARE.EXE usually found in the C:\DOS directory should be loaded either in the *config.sys* file by using INSTALL or by running it in the *autoexec.bat* file.

PATH

Make sure that C:\CIR is in your path command.

BUFFERS AND FILES

FILES in the *config.sys* file should be at least 50.
BUFFERS should be at least 40.

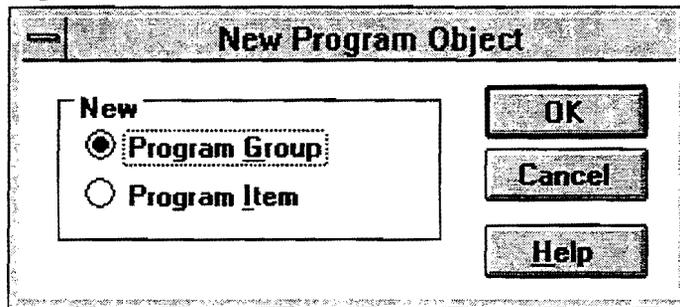
Setting Up Windows™

When you start Windows™ it should start out in the Program Manager. If it doesn't, you need to switch to the Program Manager.

In the Program Manager, choose **New** from the **File** menu.

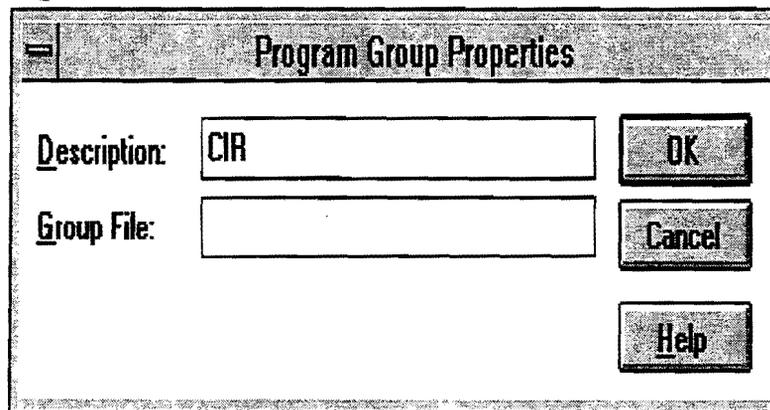
A "New Program Object" window will open, Figure 2.1. Choose **Program Group** then press **OK**.

Figure 2.1



A "Program Group Properties" window will open, Figure 2.2. Type "CIR" into the description box then press **OK**.

Figure 2.2



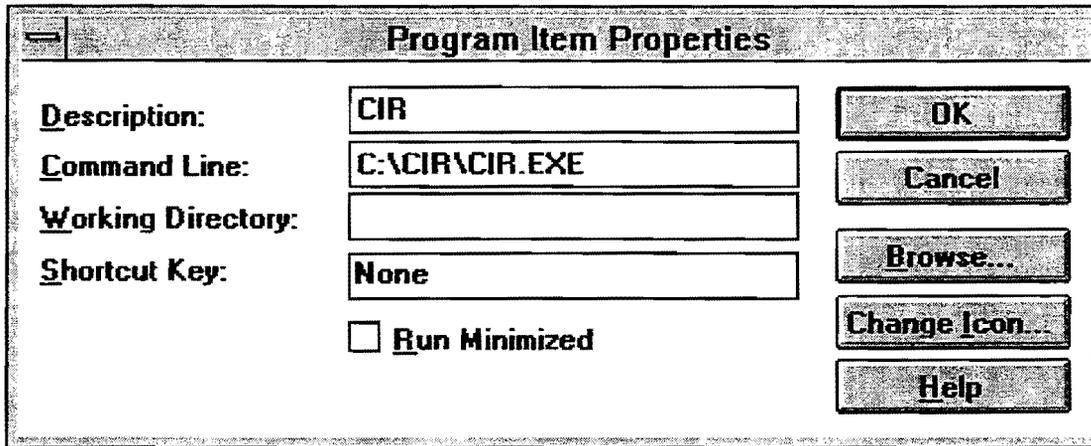
You are now back in program manager with small window labeled "CIR" open with nothing in it.

Choose **New** from the **File** menu.

A "New Program Object" window will open, Figure 2.1. Choose **Program Item** then press **OK**.

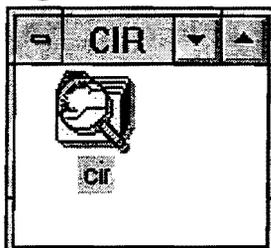
A "Program Item Properties" window will open, Figure 2.3. Type "CIR" into the description box; then type "C:\CIR\CIR.EXE" into the command line box; then press **OK**.

Figure 2.3



You now have an icon in the CIR window that you can double-click on to run the program, Figure 2.4.

Figure 2.4



Mainframe Setup

You can't actually do this yourself. You will have to call George Lueck, (512) 416-2461, to have arrangements made to get this part set up. Before you call George, have the following information ready.

- ◆ Name of the person that does the estimates.
Ex.. John Smith
- ◆ That person's log on ID for Roscoe
Ex.. D170909
- ◆ That person's license plate password
Ex.. ABC123
- ◆ Which Roscoe that person uses.
Ex.. ROSA1
- ◆ Which CSJ's you will be starting with
Ex.. 7499-03-375
- ◆ Phone number where this person can be reached when the setup is completed.
Ex.. (409) 903-1234

3

First Time Setup

What You Need to Know.

- ◆ How to log in to Arbiter.
- ◆ Confirmation that Mainframe Setup has been completed.
- ◆ Basic Windows™.
- ◆ Basic DOS.

Getting Data from Mainframe, the First Time.

- ◆ Log in to Arbiter.
- ◆ Press <ESC> until you are at a DOS prompt.

Type the following at DOS prompt then press enter.

- ◆ GETCIR

Starting the Program.

If you are not in Windows™, start it by typing “WIN” and pressing the <ENTER> key.

Once you are in Windows™, double-click the CIR group, then double-click on the CIR icon. Now the log in window for the program should appear, Figure 3.1.

Logging Into the Program, the First Time.

The first time you log in to the program you will type "tti" in the Inspector box and "TxDOT" in the Password box. Then choose OK.

Figure 3.1

Login

 **Texas Department of Transportation**
Construction and Maintenance Division

 **Texas Transportation Institute**
Materials, Pavements & Construction Division

Construction Inspector's Report

Beta Version for Pen Base PC

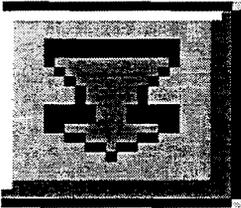
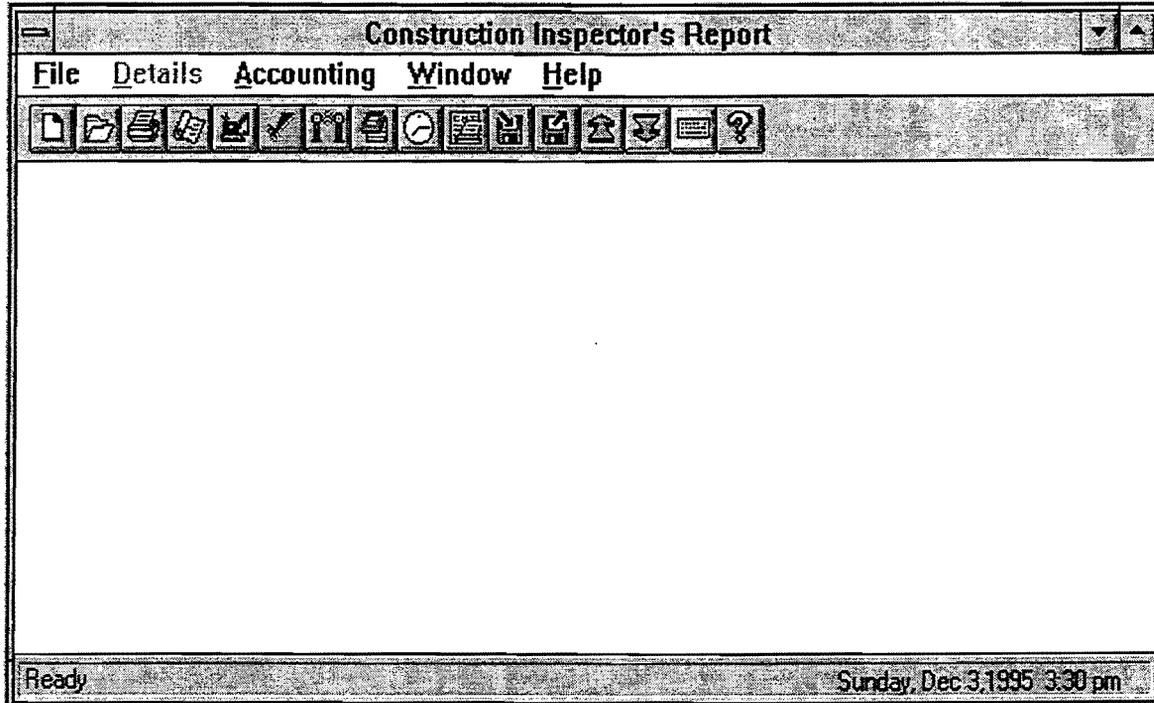
Inspector: Password:



Putting Mainframe Data into PC.

After you have logged into the program, the main window will appear, Figure 3.2.

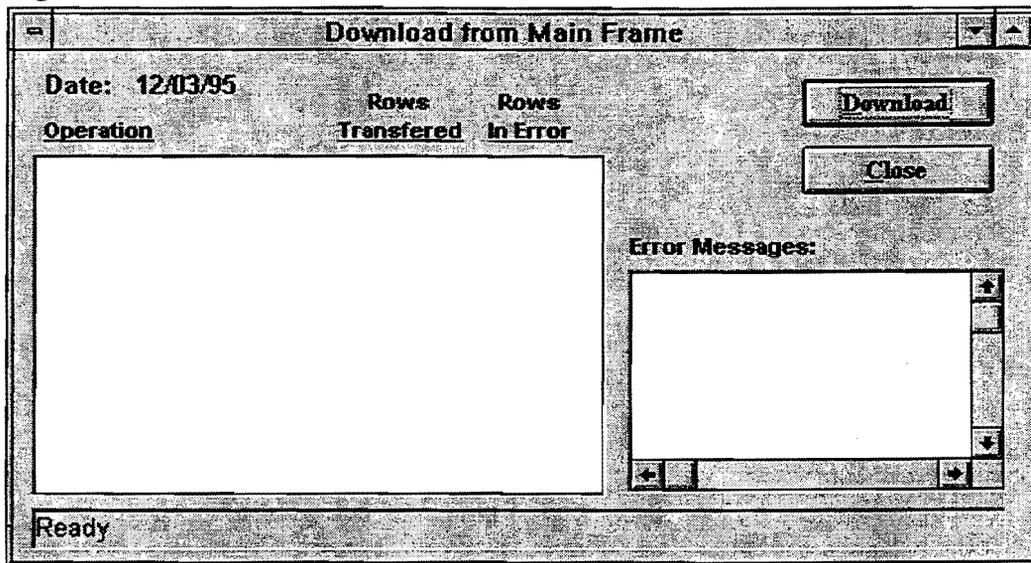
Figure 3.2



The first thing we need to do is get the data from the mainframe into the program. To do this, press the Download button, which is the green arrow pointing down. This option can also be accessed through the Details menu.

After pressing the Download button, the Download from Main Frame window will appear, Figure 3.3.

Figure 3.3



Pressing the Download button found at the right side of this window will begin the data transfer. When the transfer begins you will see a "Wait" window appear, Figure 3.5; and at the bottom of your screen you will see an icon labeled "ISQL", Figure 3.4.

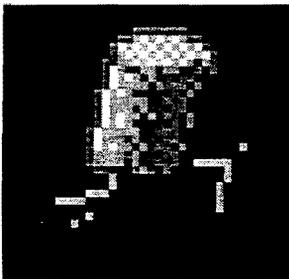


Figure 3.4

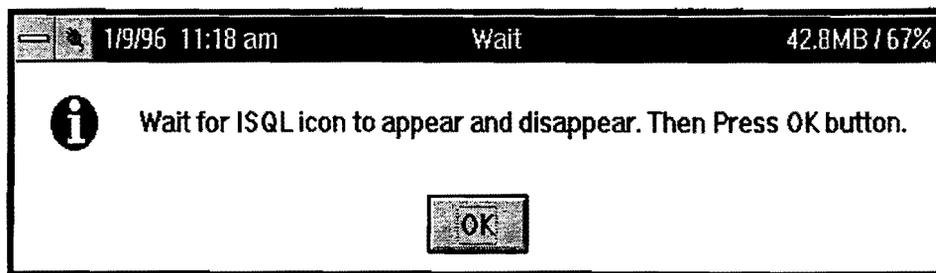


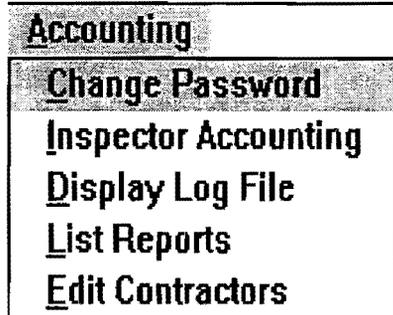
Figure 3.5

This icon appears on the screen and disappears; the time it takes for this icon to disappear varies depending on the speed of your computer and how large the CSJs you are using are. After this icon has left the screen, it is safe to press the "OK" button on the "Wait" window, Figure 3.5.

After you press the “OK,” button the transfer will put the data into a database so you can use it. When the transfer is complete, you will see the word “Done” appear at the bottom of the window in the status line. The status line is where the word “Ready” is located in Figure 3.3. When the “Done” message appears, continue by pressing the “Close” button to close this window.

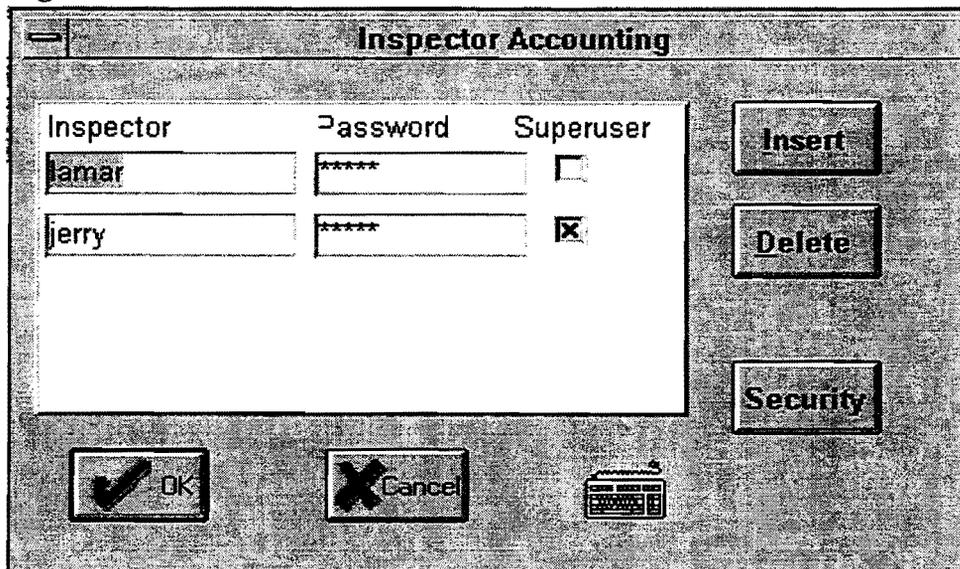
Inspector Security

Figure 3.6



Now that we have the data in the computer, we need to give your Inspectors the security to use it. To do this, we need to choose Inspector Accounting from the Accounting menu, Figure 3.6. Choosing this will open the Inspector Accounting window, Figure 3.7. First, we need to add a Superuser. To do this, press the "Insert" button on the right side of the window. Type the sign-on key for the Superuser into the new row, under the Inspector column. Have the Superuser enter his password into password box, then click the Superuser check box to show that this user is the Superuser. Now we need to get rid of the "tti" Superuser. To do this, click once on the "tti" row, then press the "Delete" button on the right of the window. Now press "Insert" and enter data for the rest of your inspectors, just like you did for the Superuser, without clicking the Superuser check box.

Figure 3.7



CSJ Security

After you have finished adding all your inspectors, you need to set up individual security for each inspector per CSJ. To do this, click on the name of the inspector you want to set up security for and press the "Security" button to open the CSJ Security window, Figure 3.8.

Figure 3.8

The screenshot shows a dialog box titled "CSJ Security". It has a label "Inspector:" followed by a text box containing "Iamar". Below this are two columns. The "CSJ:" column contains a list box with two entries: "139901023" (which is highlighted) and "45701041". The "Level:" column contains four radio button options: "Project Manager", "Project Inspector" (which is selected), "General Inspector", and "Prohibited". At the bottom of the dialog are two buttons: "OK" (with a checkmark icon) and "Cancel" (with an X icon).

Choose the CSJ you want to give the inspector access to. After you have chosen a CSJ, choose the level of access you want to give this inspector for this CSJ. Continue to do this for each CSJ you want this inspector to use. If you do not assign a level to a CSJ, the inspector will not be allowed access to that CSJ. Choose "OK" when you are finished with this inspector. Continue these steps for each inspector.

The security levels allow access as follows:

- Project Manager : All options for that CSJ.
- Project Inspector : All options for that CSJ. **
- General Inspector: Is not allowed to enter Diary, or Time Charges.

**This spot is reserved for later revisions to program.

Editing Sub-Contractor List

The program already has the primary contractor, but each subcontractor must be added manually. To do this, choose "Edit Contractors" from the Accounting menu to open the Edit Contractors window, Figure 3.9.

Figure 3.9

The screenshot shows a window titled "Edit Contractors" with a table of contractor data and four buttons at the bottom: "Insert", "Delete", "OK", and "Cancel".

Csj	Contractorid	Name	Primary	Approval
0457-01-041	6628	YOUNG CONTRACTORS, INC.	yes	yes
0457-01-041	1	EROSION CONTROL, INC	no	yes
0457-01-041	2	J.W. PAVING	no	yes
0457-01-041	3	SAFETY LIGHTS COMPANY	no	yes
0457-01-041	4	J&J TRUCKING	no	yes

Figure 3.10

The screenshot shows a dialog box titled "New" with the text "Choose CSJ to Send to Pen Based Computer!". Below the text is a text field labeled "CSJ:" containing the value "45701041" and a dropdown arrow. At the bottom is an "OK" button with a checkmark icon.

If there is no report loaded into the computer's memory, you will see a window asking for which CSJ you would like to use, Figure 3.10. Choose the CSJ you would like to set up contractor information for; then choose OK.

To add a subcontractor, choose the "Insert" button at the bottom of this window. When the new row appears, enter the information for each subcontractor you have.

CSJ

This is the CSJ you are adding subcontractors to and is not able to be edited.

Contractor ID

These are used by the program, but have no official use by TxDOT. You may set this value to any number you would like as long as none of them are the same. Most users just number them starting at one, as seen in Figure 3.9.

Name

This is the name of the subcontractor.

Primary

This is the primary contractor. There should be only one of these, and it will already be there when you open this window.

Approval

This is whether or not the subcontractor has been approved. In most every case this will be “yes.”

Transferring Data to the Pen Computer.

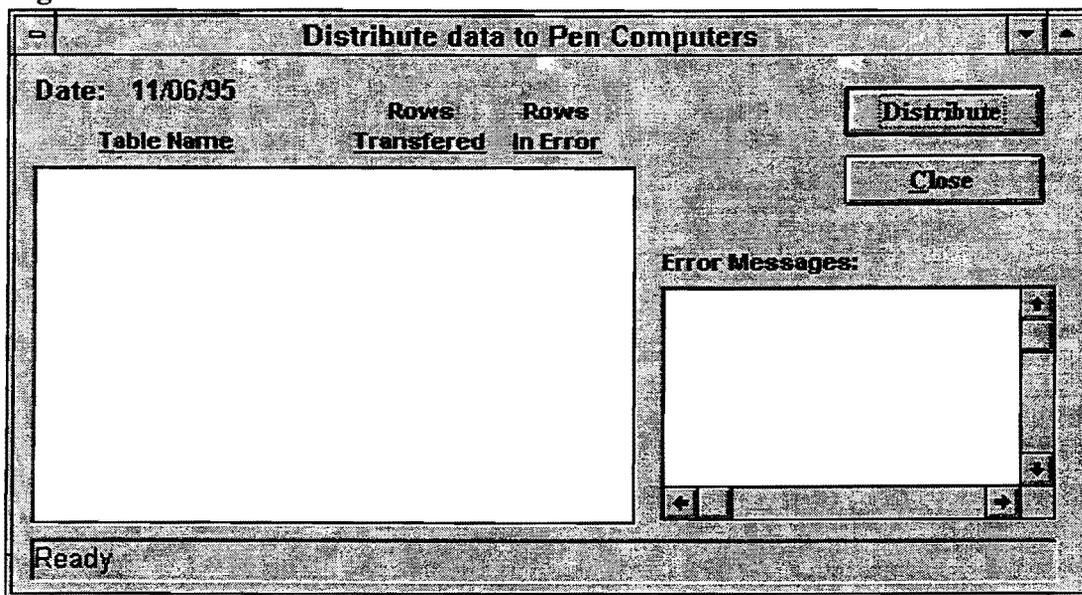
Now that we have all the data setup on the Workstation computer, we need to put that data onto the Pen Based computer using a floppy diskette.

Putting Data on Diskette from Workstation.



To put the data onto the diskette, press the “Distribute” button that has an arrow pointing towards the diskette. You can also choose “Distribute” in the Details Menu.

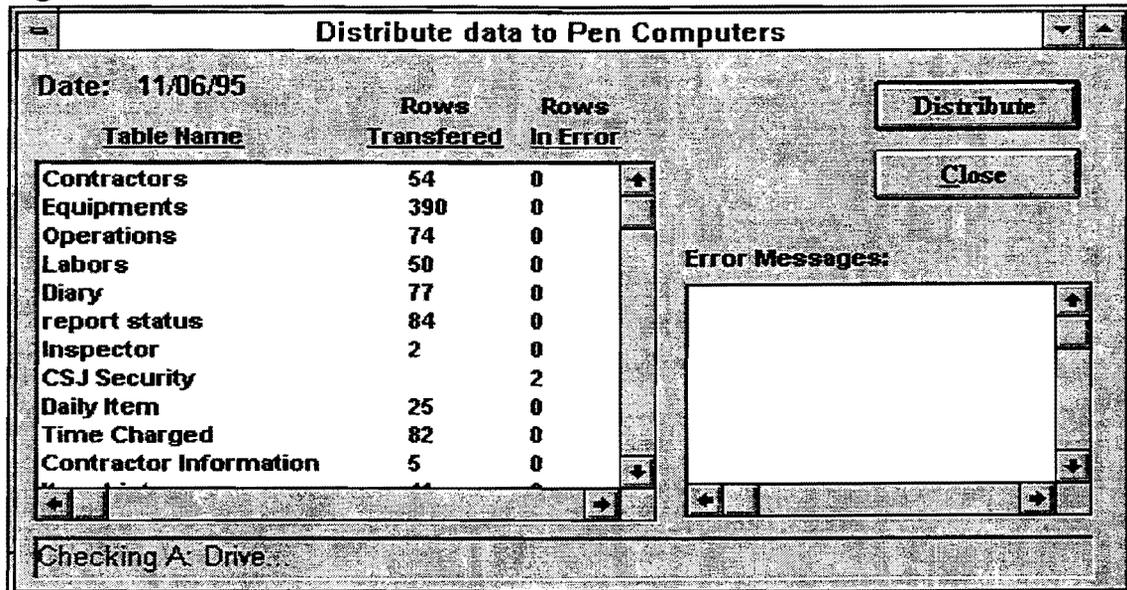
Figure 3.11



After pressing the “Distribute” button, the Distribute data to Pen Computers window will appear, Figure 3.11.

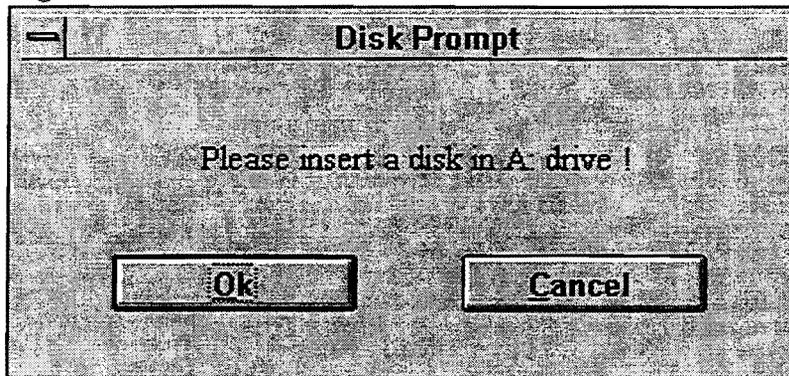
By pressing the Distribute button found at the right side of this window, the data will be set up for transfer to diskette. Soon after pressing the Distribute button, you will see messages fill the box on the left side of the window, Figure 3.12.

Figure 3.12



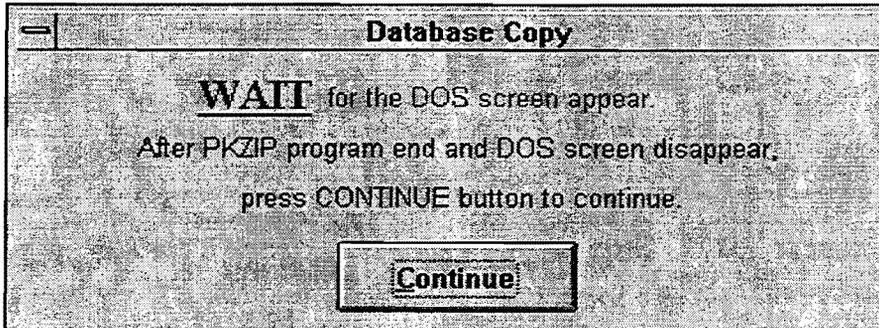
After these messages appear, you will see a window prompting you to enter a diskette into the computer, Figure 3.13. Insert a diskette into the drive and choose OK on the window.

Figure 3.13



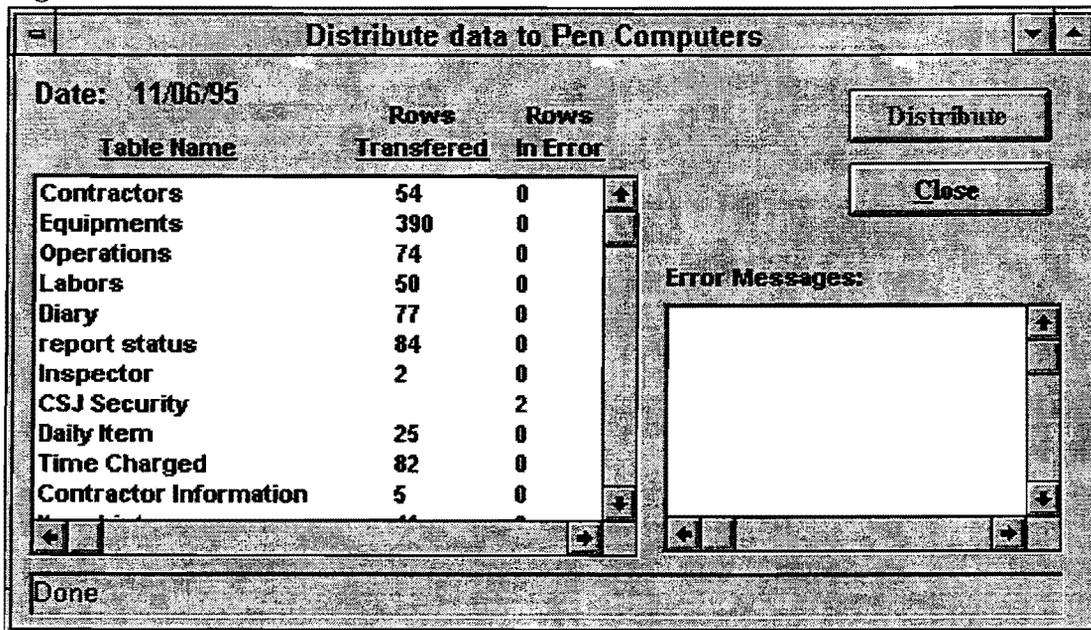
When you press OK on the Disk Prompt window, a warning window will appear, Figure 3.14, and a split-second later the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on. The warning window that appears has a Continue button on it that should not be pressed until after the screen has returned from the DOS screen.

Figure 3.14

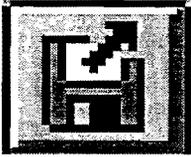


After you press the Continue button, the data has been transferred to the diskette. You will see the word "Done" appear in the status line at the bottom of the window; and the Distribute button will be disabled, Figure 3.15. Now press the "Close" button on the right side of the window, and we will be finished with the first half of the transfer.

Figure 3.15



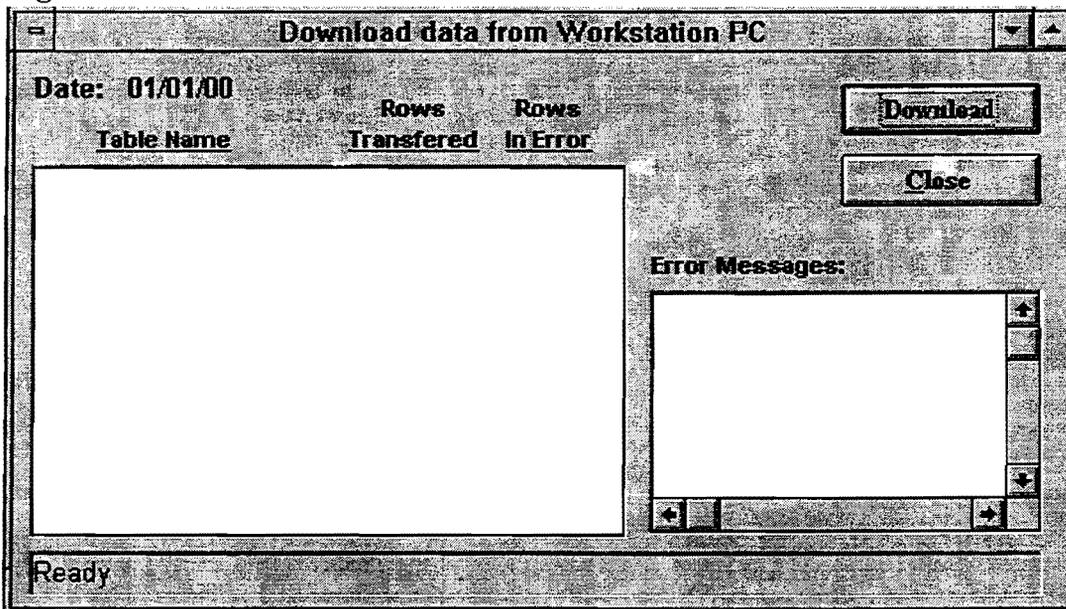
Retrieving Data from Diskette on Pen Computer.



To put the data onto the pen computer, press the “Download” button; it has an arrow pointing away from the diskette. You can also choose “Download” in the Details Menu.

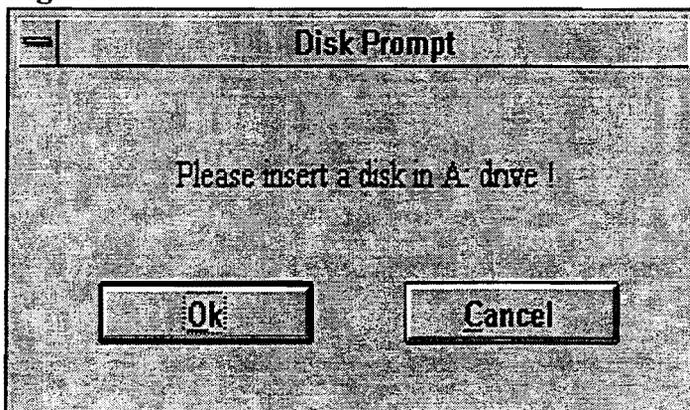
After pressing the “Download” button, the “Download data from Workstation PC” window will appear, Figure 3.16.

Figure 3.16



Pressing the Download button found at the right side of this window will start the retrieval of the data from the diskette, first prompting you to enter a diskette, Figure 3.17.

Figure 3.17



After the Disk Prompt window appears, confirm that the disk you created in the first half of the transfer is in the disk drive, then press OK. When you press the OK button, you will see two warning windows appear, Figure 3.18 and Figure 3.19.

Figure 3.18

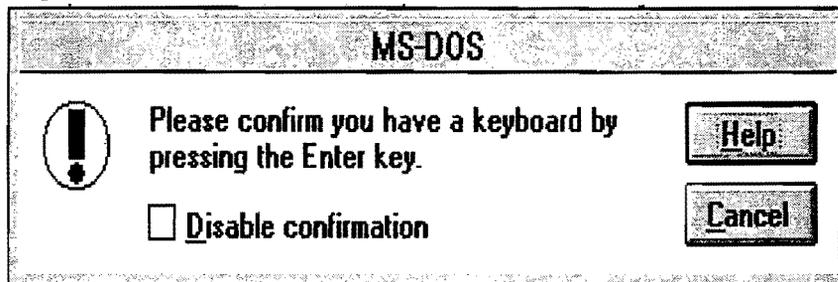
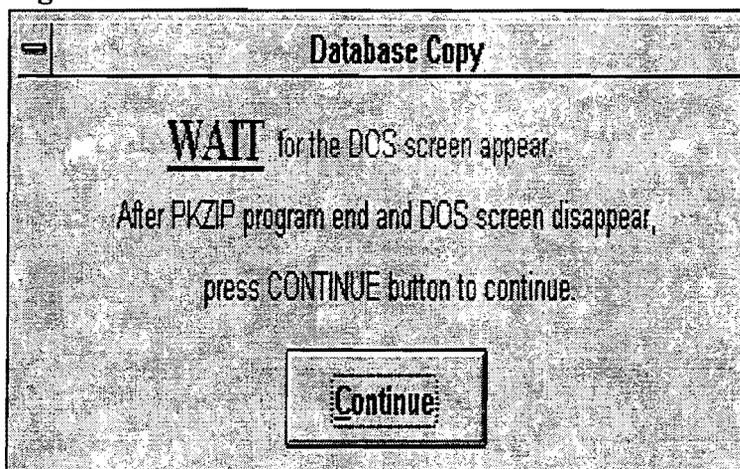
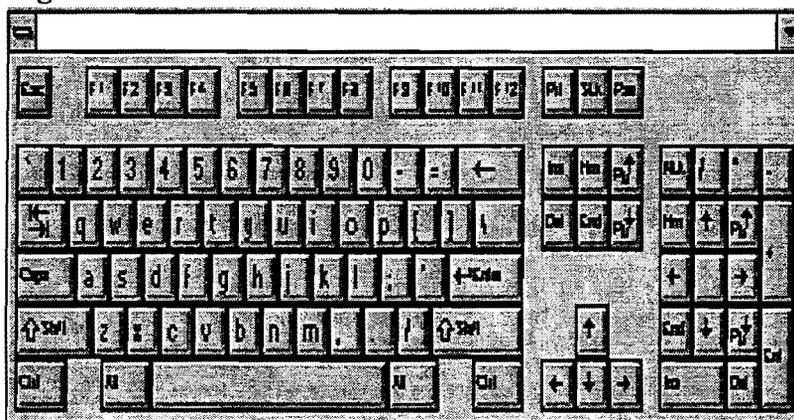


Figure 3.19



To clear the first window, Figure 3.18, use the keyboard window, Figure 3.20, to press the enter key. You should only press the enter key once; after you press the enter key the entire screen will turn black and will show some data on the screen; this is the DOS Screen. It will look a lot like the screens you see when you first turn your computer on. When the DOS Screen disappears, you should press the "Continue" button on the Database Copy window, Figure 3.19.

Figure 3.20



After pressing the Continue button, the data has been transferred from the diskette. Now the computer needs to read the data into the program. While this is happening, you will see data fill the box on the left side of the Download data from Workstation PC window. When the computer is done, the word "Data Transfer Finished" will appear in the status line at the bottom of the window, and the Download button will be disabled, Figure 3.21. Now press the "Close" button on the right side of the window, and we will be finished with this transfer.

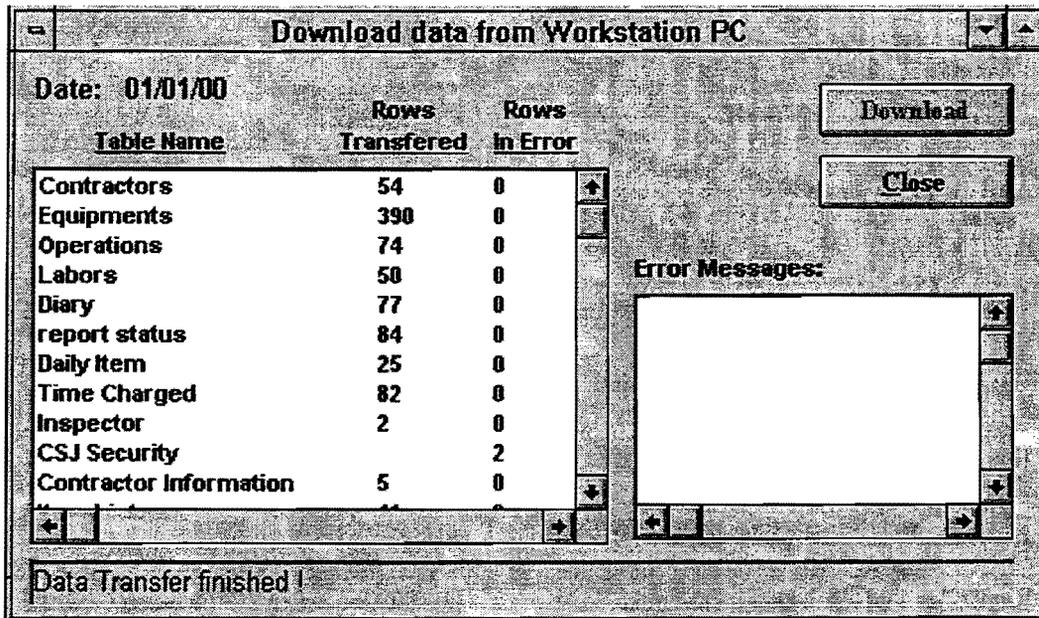


Figure 3.21

be entered, whether the day was credited or charged. You must enter at least one A.M. Weather and one P.M. Weather; you must also enter at least one temperature for the day.

Pressing the save button will give you an error message if you forgot to enter a required field, Figures 4.22 - 4.24.

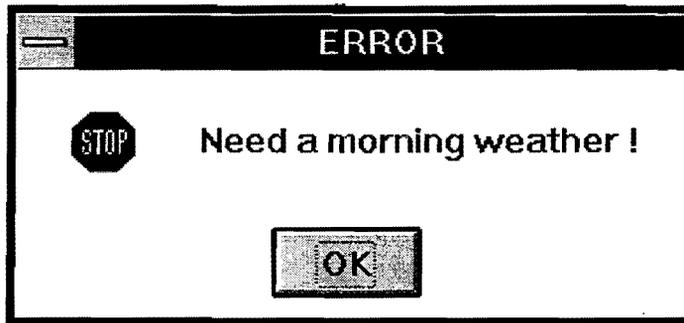


Figure 4.22

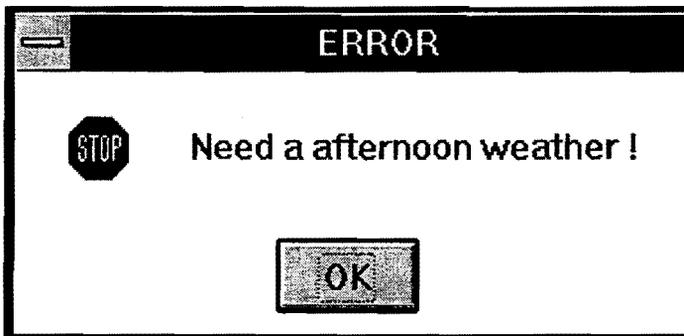


Figure 4.23

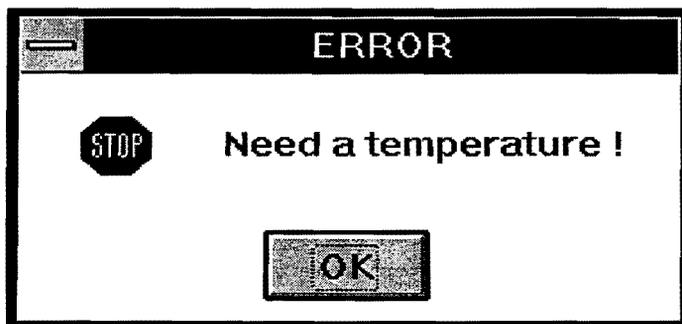


Figure 4.24

Pressing the Quit button will warn you if you have not saved your data, Figure 4.25.

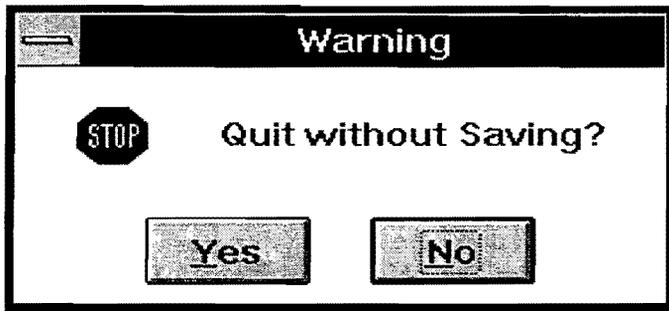
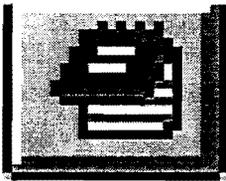


Figure 4.25

Entering Diary Information.



Press the “Diary” button or choose “Diary” from the Details menu to enter your “Green Diary” information. After you press the button you will see the Diary Screen 1 window appear, Figure 4.26.

A window titled "Diary Screen 1" with a dark title bar. Below the title bar is a row of controls: an "Append" button followed by five radio buttons labeled "Original", "Append 1", "Append 2", "Append 3", "Append 4", and "Append 5". Below this is a large, empty rectangular text area with a label "Controlling Item(s) of Work" above it. Below that is another large, empty rectangular text area with a label "Problems and Unusual Conditions:" above it. At the bottom of the window are two buttons: "Next" on the left and "Quit" on the right.

Figure 4.26

This is the first of five Diary windows; each box on the window represents a different section found in the “Green” Diary. To use these screens, just click on the box that you would like to enter data, then you can begin typing in your information. You must enter

something into each box; if you don't enter data into one of the boxes, you will be given an error, Figure 4.27.

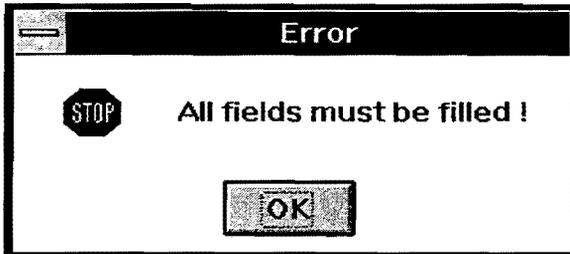


Figure 4.27

When you have entered the data for this screen, choose the next button to go to the next window, Figure 4.28

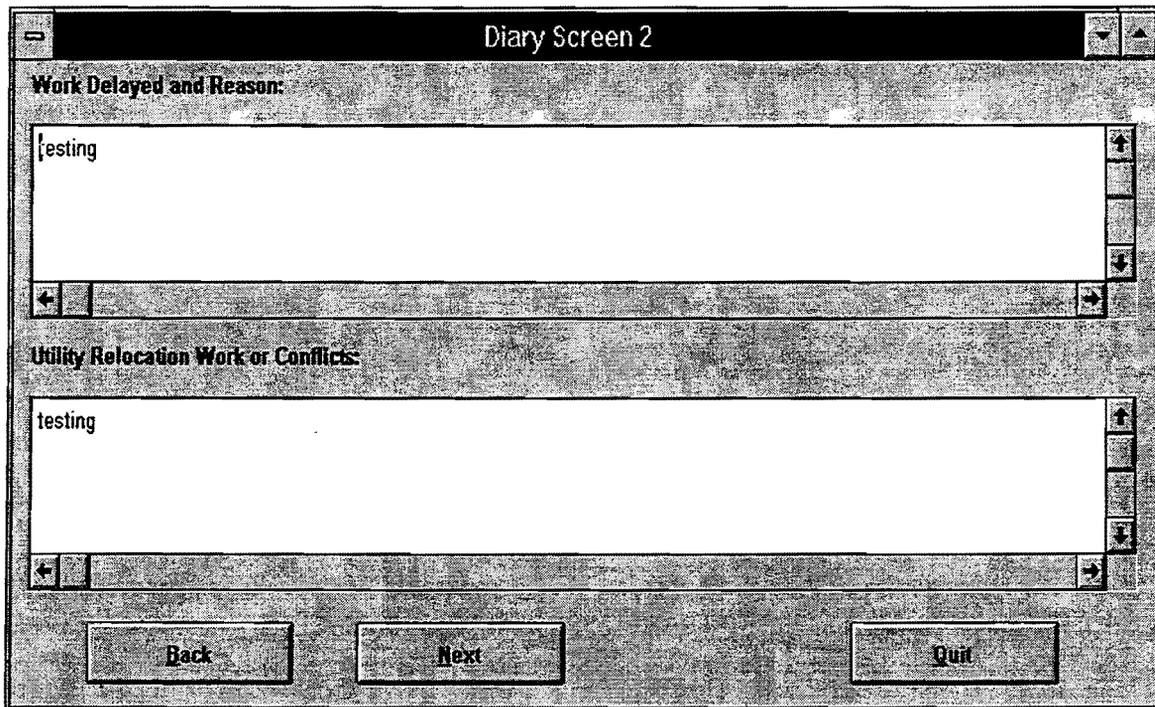


Figure 4.28

Screens two through four work the same as the first screen, except that these screens also have a Back button which allows you to go back to the previous screen. All the screens have a Quit button on them so that you may quit editing the Diary, without saving, at any time. You will be warned if you press the Quit button before you save, Figure 4.29.

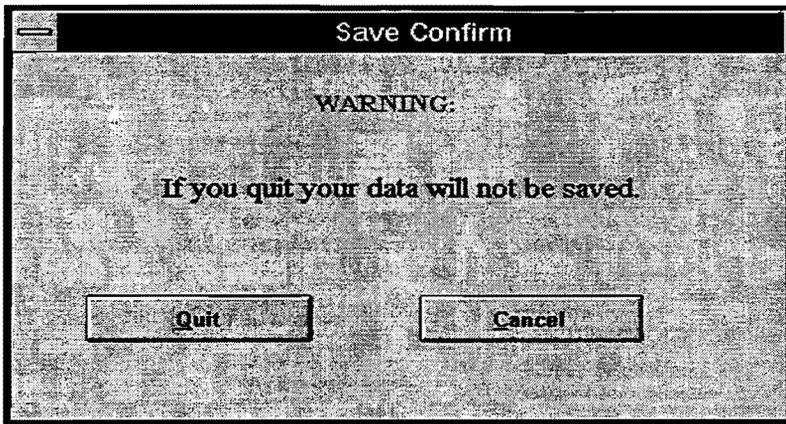


Figure 4.29

The last screen of the Diary has a save button, Figure 4.30.

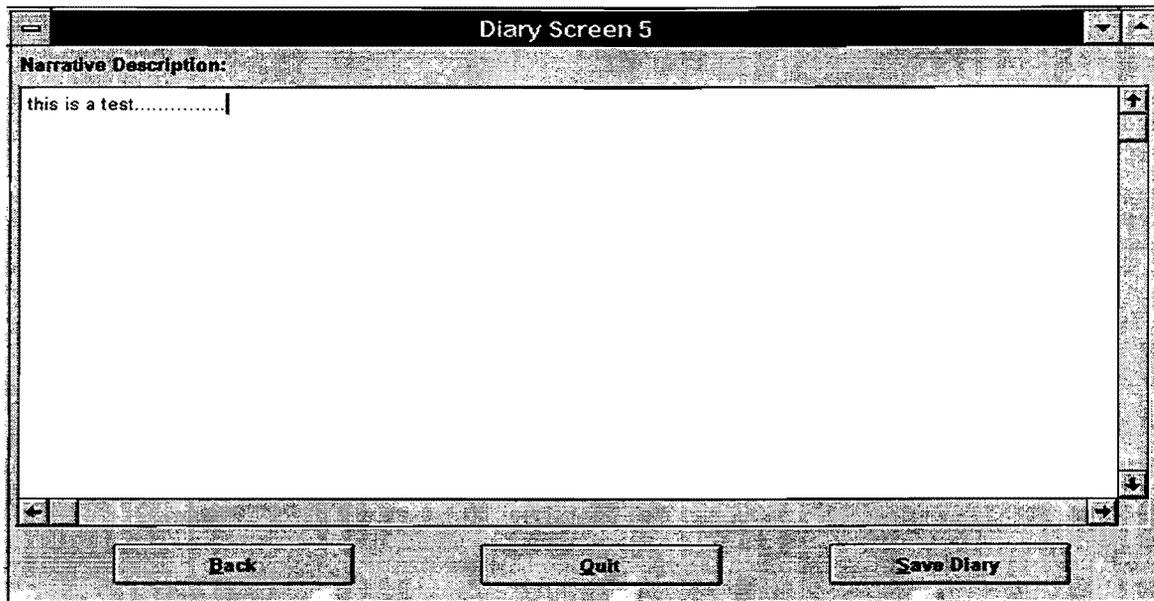


Figure 4.30

If you are satisfied with your data, press the save button, and the Save Confirm window will appear, Figure 4.31. This is just a warning, telling you that after you save you can not edit what you have entered. You can add to what is there, but you will not be able to edit anything. Pressing the "Yes" button will save your Diary information and close the Diary window.

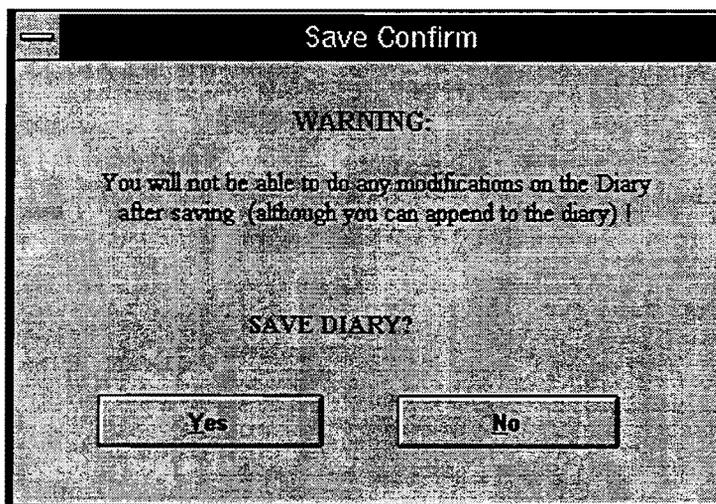
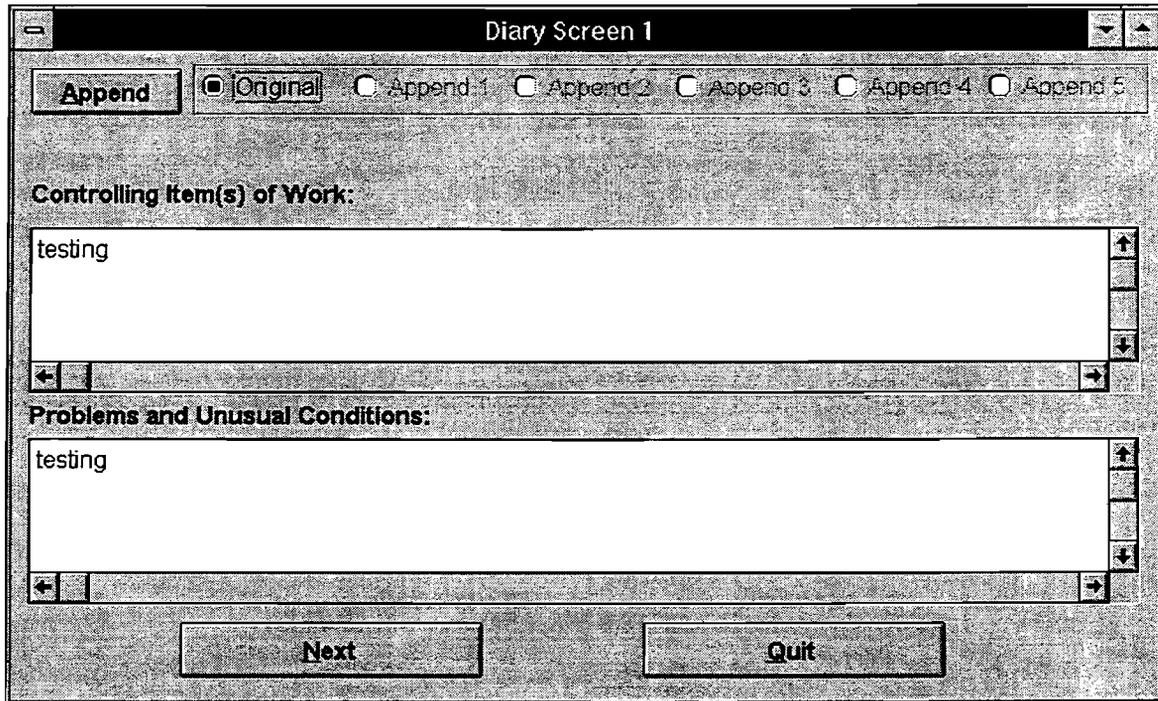


Figure 4.31

Appending the Diary.

Appending the Diary is much like entering your first Diary. After you press the Diary button or choose Diary from the Details menu, you will see the "Diary Screen 1", Figure 4.32.



The screenshot shows a window titled "Diary Screen 1". At the top, there is a row of buttons: "Append", "Original" (selected), "Append 1", "Append 2", "Append 3", "Append 4", and "Append 5". Below this, there are two text input fields. The first field is labeled "Controlling Item(s) of Work:" and contains the text "testing". The second field is labeled "Problems and Unusual Conditions:" and also contains the text "testing". At the bottom of the window, there are two buttons: "Next" and "Quit".

Figure 4.32

This time there will already be data on the screen; notice that if you try to type in the boxes with data in them, you will hear a beep. Pressing the Append button at the top of the screen will clear the boxes and allow you to edit them. You have not lost your data; if you look at the top of the screen, you will notice that the black dot has moved over to one of the Append #'s; the number depends on how many appends you have previously done. The rest of the screens work the same as when you entered your first Diary, with the exception that it is not required to enter something into each box this time; you only have to enter data where you need to. You are allowed to append the Diary up to five times.

Viewing a Diary.

To view a Diary enter the Diary by pressing the Diary button or choosing "Diary" from the Details menu, and the "Diary Screen 1" will appear, Figure 4.33.

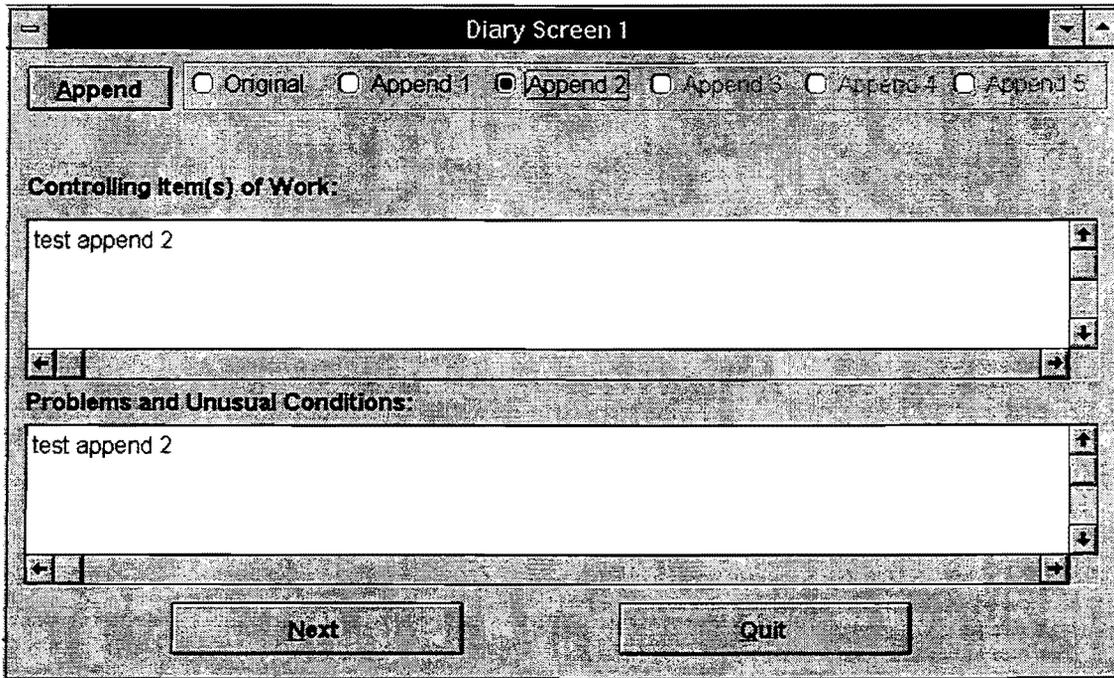
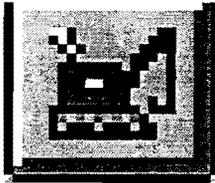


Figure 4.33

When you enter the screen, you are already looking at the last append you did, or the original if you have not done an append yet. To look at the data on the other screens, choose the original or the append that you want to look at. Then use the Next and Back buttons at the bottom of each screen to look through the data. None of the screens will allow you to edit the data; also, the Save button on the last screen is disabled, and the Quit button will not give you a warning.

Entering Contractor Information.



Pressing the Contractor Button or choosing Contractor Information from the Details menu will bring up the Contractors Window, Figure 4.34.

Primary	Id	Approved	Name
<input checked="" type="checkbox"/>	6628	<input checked="" type="checkbox"/>	YOUNG CONTRACTORS, INC.
<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	EROSION CONTROL, INC
<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	J.W. PAVING
<input type="checkbox"/>	3	<input checked="" type="checkbox"/>	SAFETY LIGHTS COMPANY
<input type="checkbox"/>	4	<input checked="" type="checkbox"/>	M&J TRUCKING

Figure 4.34

To enter data for a contractor, choose the contractor on the right side of the window that you would like to use for this day by clicking once on the contractor, then press the Add button, in the middle of the window. You can add more than one Contractor for each day. If you accidentally added a contractor to the left side of the window that you do not need, you can remove the contractor by clicking on the contractor and pressing the Remove button. After you have added a contractor for this day, choose that contractor by clicking once on the contractor. The buttons at the bottom of the window will now be enabled; each button is described in detail on the following pages. After you are done entering all information for each contractor, press the close button to continue with the rest of the daily report.

Entering Operation Information.

Pressing the Operation button found at the bottom of the contractors window will open the Contractor Work window, Figure 4.35.

Operation	Location	Time	
	Station to Station	Start	Stop
testing	100+00 to 65+00	12:00	02:30
testing again	23+00	11:00	03:00

Buttons: Insert, Delete, Close

Figure 4.35

When you first open this window, you will see an empty box with just headings at the top of the box and no data inside. Pressing the Insert button will add an empty data row to the box. Enter the data that corresponds with each heading into each part of the new row. After you finish entering a row, you can press the Insert button again to enter another operation, or you can press the close button to return to the Contractors window. If you accidentally enter a operation that you did not want, click on that operation once; then press the Delete button, and it will erase that row. If you try to close without filling in a row completely, you will get an error, Figure 4.36.

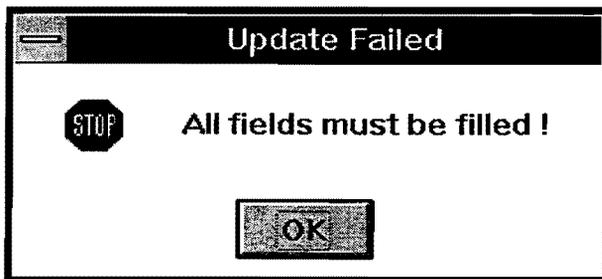


Figure 4.36

Entering Equipment Information.

Pressing the Equipment button found at the bottom of the contractors window will open the Contractor Equipment Usage window, Figure 4.37.

<u>Description</u>	<u>NUM</u>	<u>ID.</u>	<u>USED</u>
dump truck	1	976-ABC	<input checked="" type="checkbox"/>
Pick up truck	2	234-SCD	<input checked="" type="checkbox"/>

Buttons: Insert, Delete, Close

Figure 4.37

When you first open this window, you will see an empty box with just headings at the top of the box and no data inside. Pressing the Insert button will add an empty data row to the box. Enter the data that corresponds with each heading into each part of the new row. After you finish entering a row, you can press the Insert button again to enter another equipment, or you can press the close button to return to the Contractors window. If you accidentally enter an equipment that you did not want, click on that equipment once, then press the Delete button and it will erase that row. If you try to close without filling in a row completely, you will get an error, Figure 4.38.



Figure 4.38

Entering Labor Information.

Pressing the Labor button on the bottom of the Contractors window will open the Contractor Personnel window, Figure 4.39.



The screenshot shows a window titled "Contractor Personnel — SAFETY LIGHTS COMP". Inside the window, there are four input fields for labor information. The first three fields are labeled "Supervisory:", "Skilled:", and "Unskilled:", with values 1, 2, and 5 respectively. A horizontal line separates these from the "Total:" field, which has a value of 8. A "Close" button is located at the bottom center of the window.

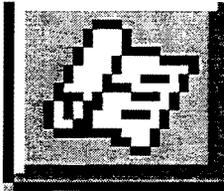
Supervisory:	1
Skilled:	2
Unskilled:	5
<hr/>	
Total:	8

Close

Figure 4.39

To use this window, just enter the number of each type of worker into the box with the corresponding label. The program will give you a total of all workers for that contractor. When you are done, press the Close button to return to the Contractors Window.

Viewing Project Information.



Pressing the Proj. Info button or choosing the Project Information from the Details menu will open the Project Information window, Figure 4.40.

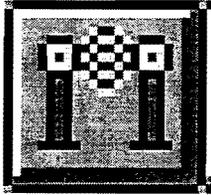
Control Section Job:	0457-01-041	Area Engr:	PATRICK WILLIAMS		
Project:	CSR 457-1-41	Highway:	FM 30	P.O. BOX 3249 BRYAN	
County:	Euzleson	District:	17	Contract Price:	1,904,079.84
Report Date:	1/1/95	Contractor:	YOUNG CONTRACTORS, INC.		
Typework:	REHABILITATE EXISTIN				
Limits:	THE ATSF RR IN CLAY				
	OLD				

Close

Figure 4.40

This window is just a reference; you can only look at the data given; when you are done viewing the information, press the Close button.

Viewing Material Information.



Pressing the Material button, choosing Material from the Details menu, pressing the Material button at the bottom of the Work Item List window, and pressing the Material button at the bottom of the Work Report Window are all ways to open the Material List window, Figure 4.41.

The screenshot shows a window titled "Material List" with a table of materials. The table has three columns: "No", "Material ID", and "Description". Below the table are three buttons: "Group", "Items", and "Close".

No	Material ID	Description
1	110	AC-10 ASPHALT
2	107	AC-5 WITH 2% LATEX ASPHALT
3	120	AC-20 ASPHALT
4	105	AC-5 ASPHALT
5	103	AC-3 ASPHALT
6	187	CRS-2P ASPHALT
7	173	SS-1 ASPHALT
8	153	MC-30 ASPHALT
9	168	MC-800 ASPHALT

Figure 4.41

Clicking on a material will enable the Group and Items buttons. These buttons are described in detail on the following pages. Choose the close button when you are done viewing the Material Information.

Group Information.

Pressing the Group button at the bottom of the screen will open the “Group Items Of Material” window, Figure 4.42.

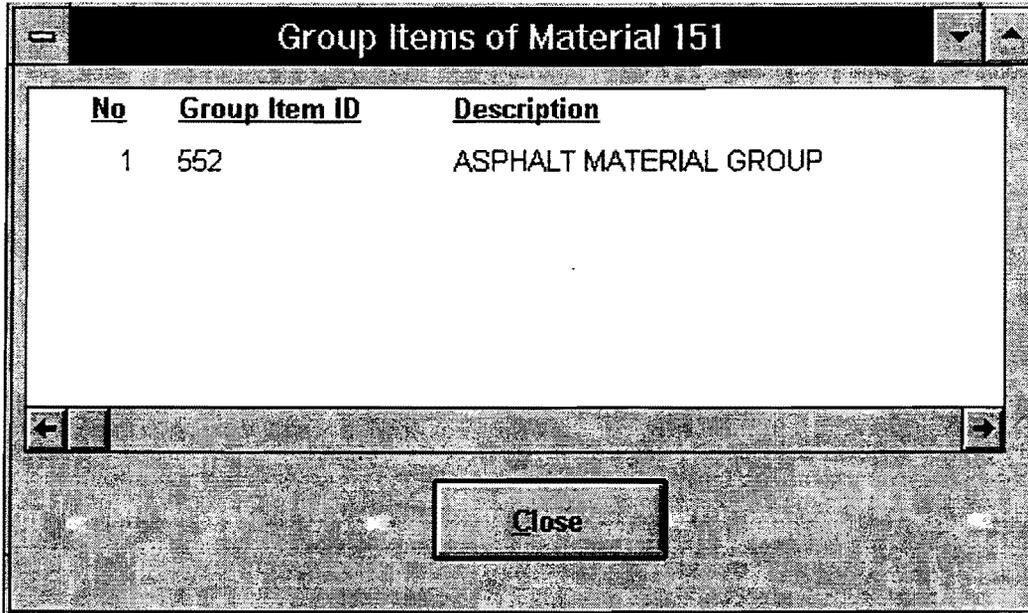
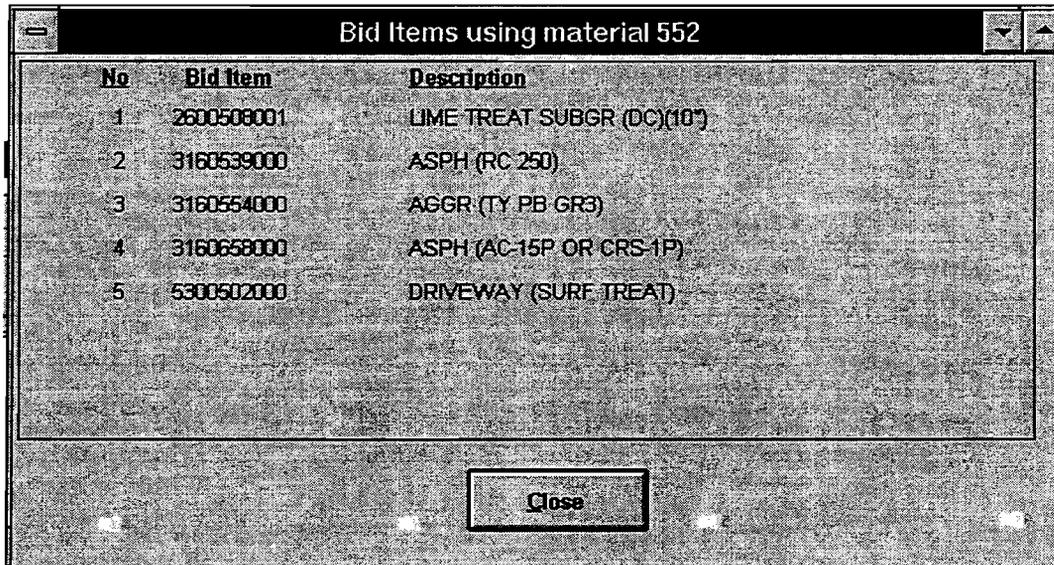


Figure 4.42

This window shows what groups the material you chose, from the material list window, belongs to. After you have viewed this information, press the Close button to return to the Material List window.

Bid Item Information.

Pressing the Items button at the bottom of the Material List window will open the “Bid Item Using Material” window, Figure 4.43.



The screenshot shows a window titled "Bid Items using material 552". Inside the window is a table with three columns: "No", "Bid Item", and "Description". The table contains five rows of data. Below the table is a "Close" button.

No	Bid Item	Description
1	2600508001	LIME TREAT SUBGR (DC)(10")
2	3160539000	ASPH (RC 250)
3	3160554000	AGGR (TY PB GR3)
4	3160658000	ASPH (AC-15P OR CRS-1P)
5	5300502000	DRIVEWAY (SURF TREAT)

Figure 4.43

This window shows what bid items the material you chose, from the material list window, belongs to. After you have viewed this information, press the Close button to return to the Material List window.

5

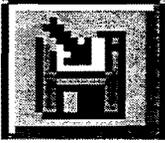
Transferring Data

What you need to know.

- ◆ How to use Arbiter.
- ◆ How to use Roscoe.
- ◆ Basic DOS.
- ◆ Basic Windows™.

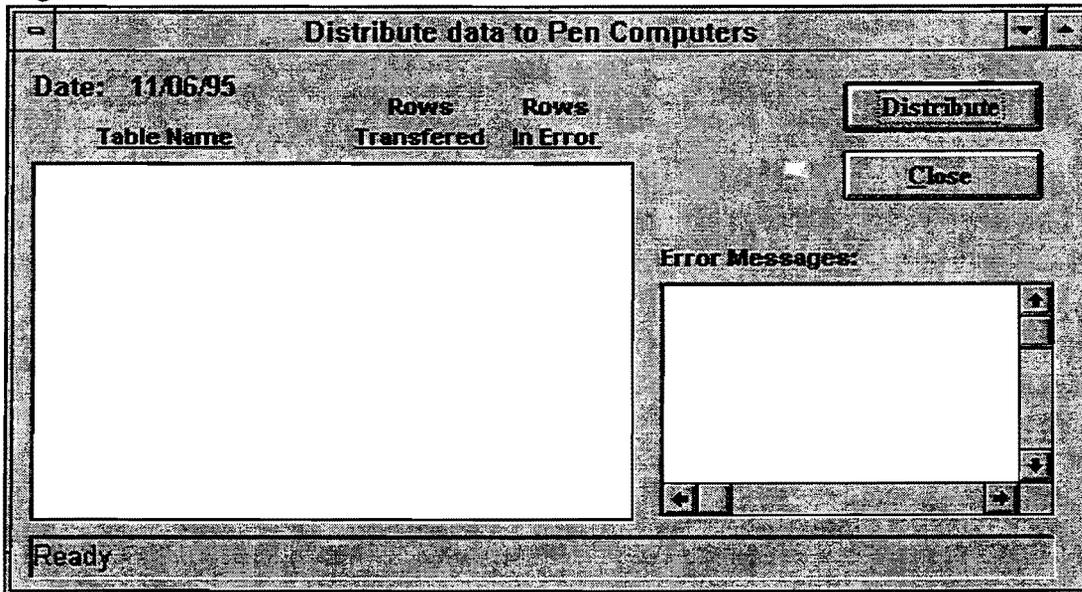
Workstation to Pen Computer.

Putting Data on Diskette from Work Station.



To put the data onto the diskette, press the “Distribute” button that has an arrow pointing towards the diskette. You can also choose “Distribute” in the Details Menu.

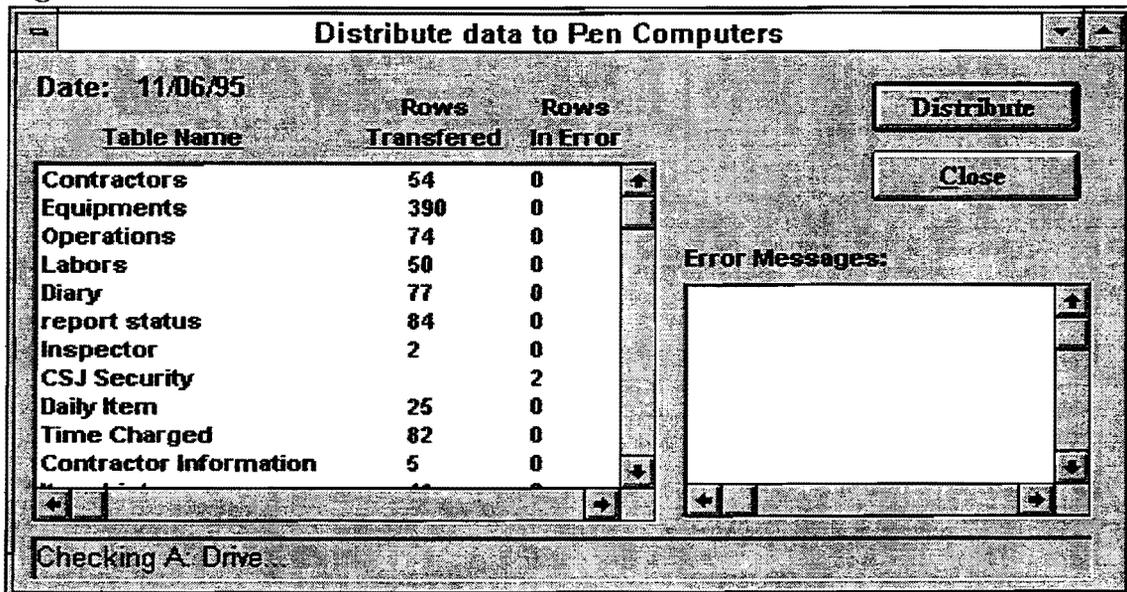
Figure 5.1



After pressing the “Distribute” button, the Distribute data to Pen Computers window will appear, Figure 5.1.

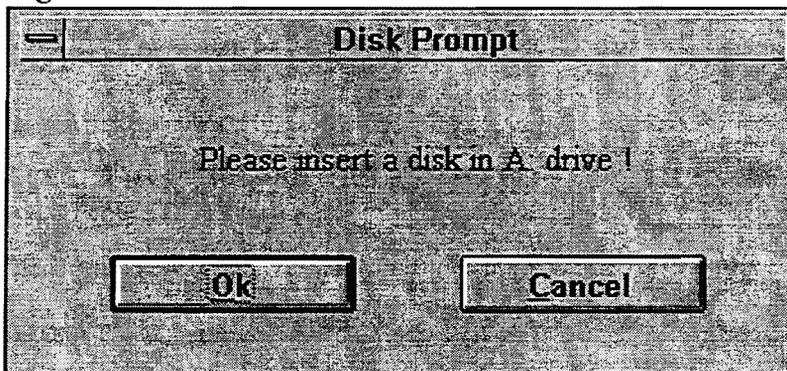
By pressing the Distribute button found at the right side of this window, the data will be set up for transfer to diskette. Soon after pressing the Distribute button, you will see messages fill the box on the left side of the window, Figure 5.2.

Figure 5.2



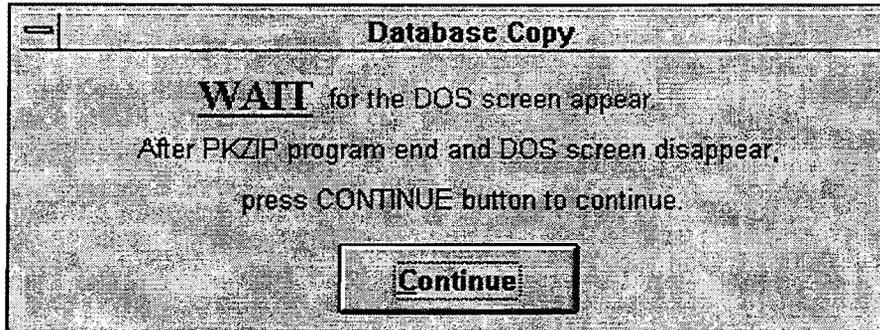
After these messages appear, you will see a window prompting you to enter a diskette into the computer, Figure 5.3. Insert a diskette into the drive and choose OK on the window.

Figure 5.3



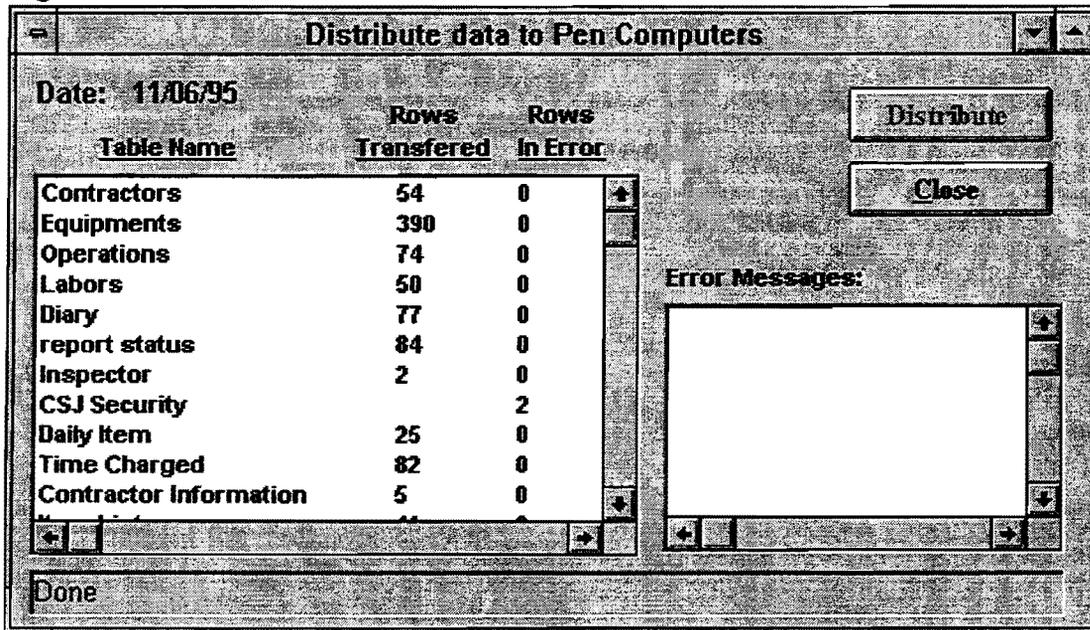
When you press OK on the Disk Prompt window, a warning window will appear, Figure 5.4, and a split-second later the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on. The warning window that appears has a Continue button on it that should not be pressed until after the screen has returned from the DOS screen.

Figure 5.4

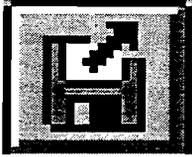


After you press the Continue button, the data has been transferred to the diskette. You will see the word "Done" appear in the status line at the bottom of the window, and the Distribute button will be disabled, Figure 5.5. Now press the "Close" button on the right side of the window, and we will be finished with the first half of the transfer.

Figure 5.5



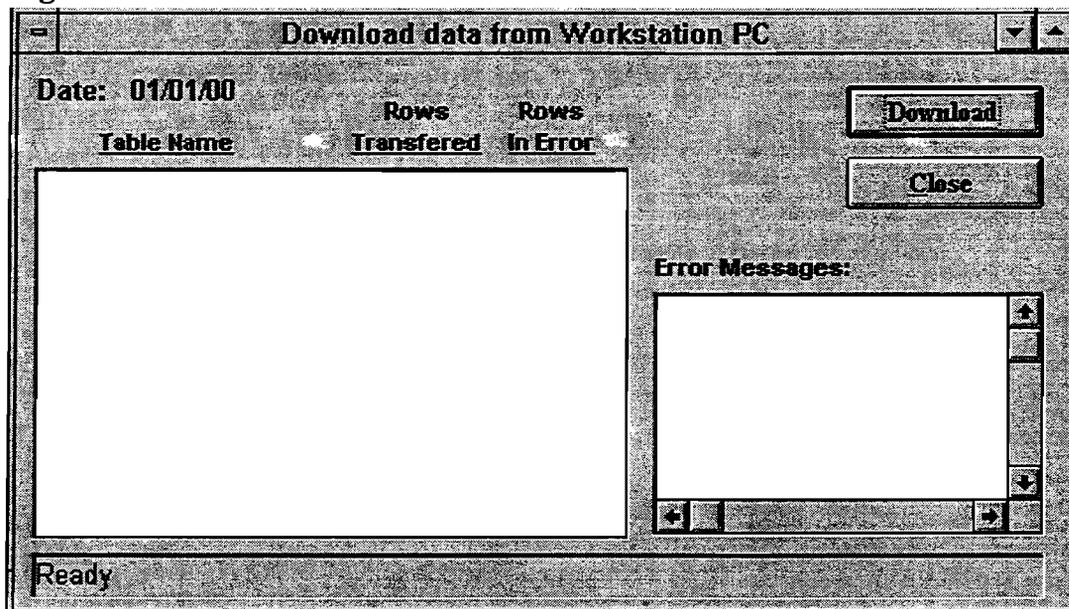
Retrieving Data from Diskette on Pen Computer.



To put the data onto the pen computer, press the “Download” button; it has an arrow pointing away from the diskette. You can also choose “Download” in the Details Menu.

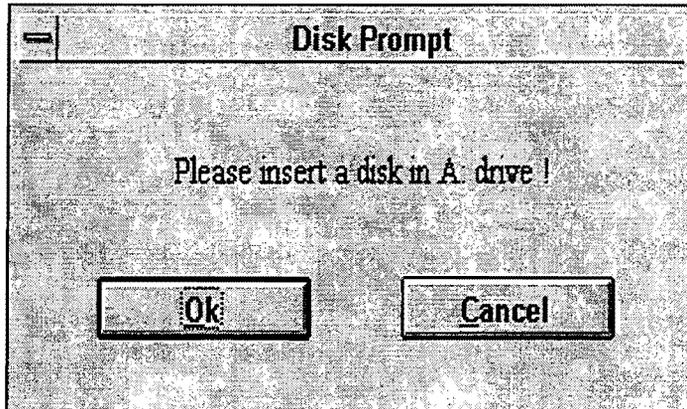
After pressing the “Download” button, the “Download data from Workstation PC” window will appear, Figure 5.6.

Figure 5.6



Pressing the Download button found at the right side of this window will start the retrieval of the data from the diskette, first prompting you to enter a diskette, Figure 5.7.

Figure 5.7



After the Disk Prompt window appears, confirm that the disk you created in the first half of the transfer is in the disk drive, then press OK. When you press the OK button, you will see two warning windows appear, Figure 5.8 and Figure 5.9.

Figure 5.8

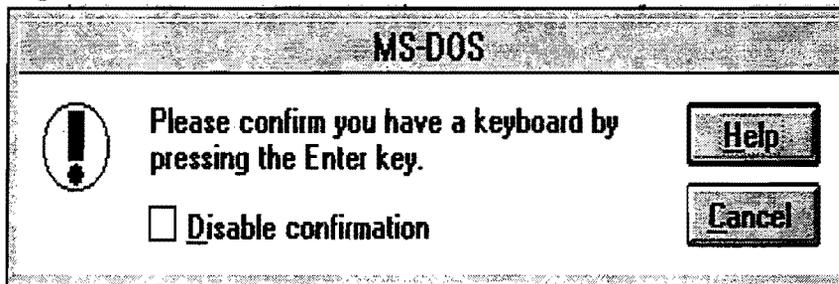
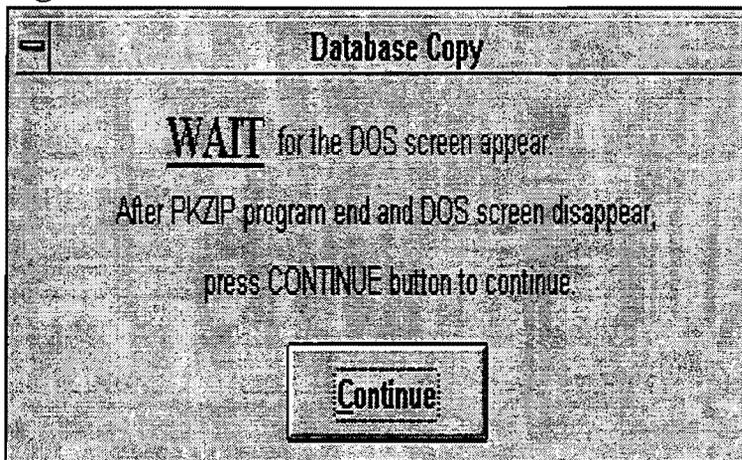


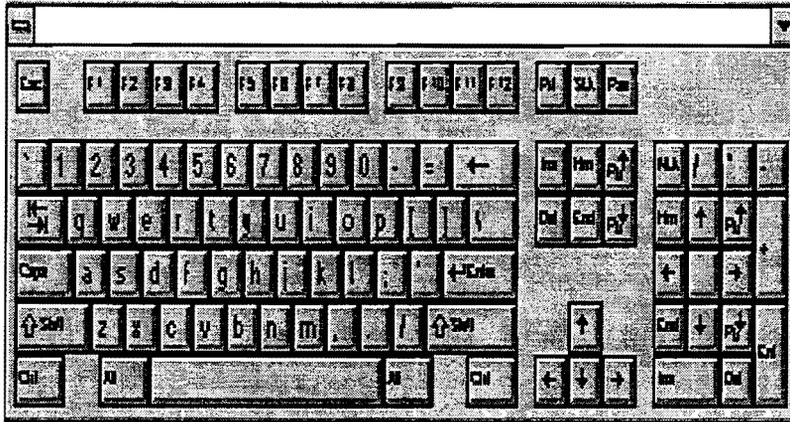
Figure 5.9



To clear the first window, Figure 5.8, use the keyboard window, Figure 5.10, to press the enter key. You should only press the enter key once; after you press the enter key, the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on.

When the DOS screen disappears, you should press the “Continue” button on the Database Copy window, Figure 5.9.

Figure 5.10



After pressing the Continue button, the data has been transferred from the diskette. Now the computer needs to read the data into the program. While this is happening, you will see data fill the box on the left side of the Download data from Workstation PC window. When the computer is done, the word “Data Transfer Finished” will appear in the status line at the bottom of the window, and the Download button will be disabled, Figure 5.11. Now press the “Close” button on the right side of the window, and we will be finished with this transfer.

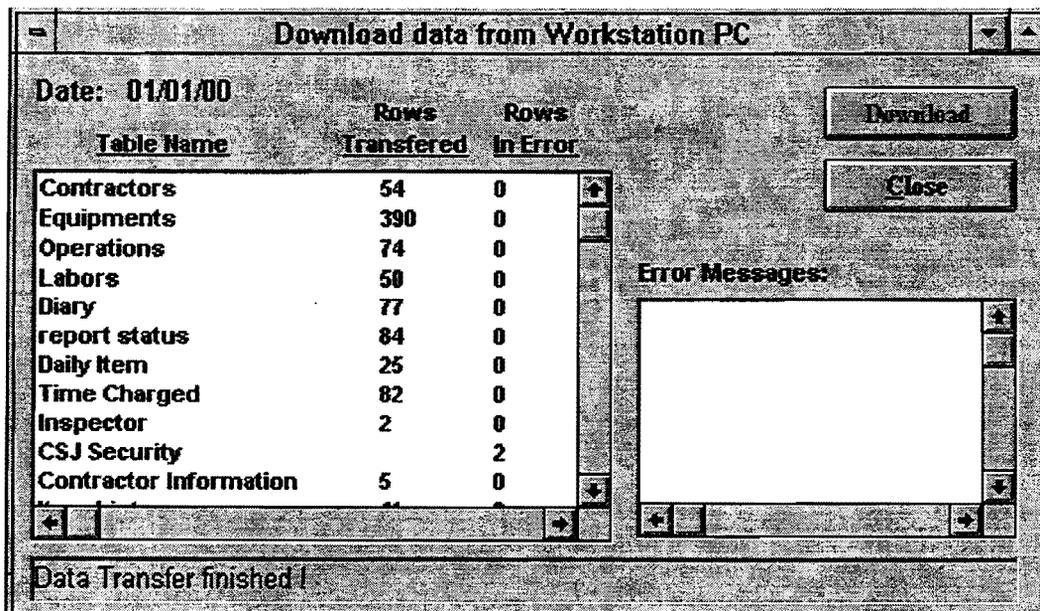
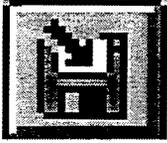


Figure 5.11

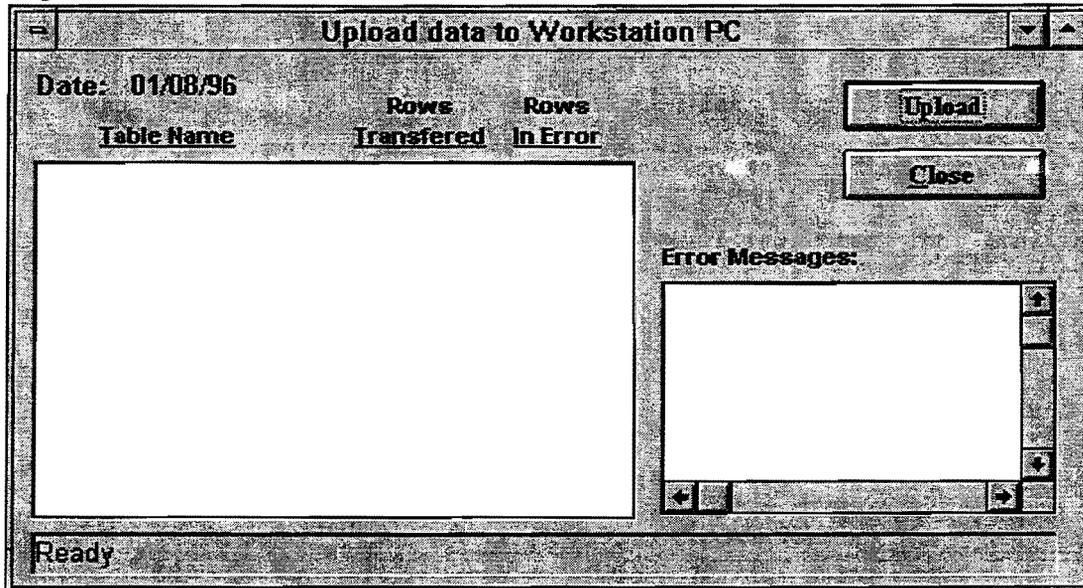
Pen Computer to Workstation.

Putting Data on Diskette from Pen Computer.



To put the data onto the diskette, press the “Upload” button that has an arrow pointing towards the diskette. You can also choose “Upload” in the Details Menu.

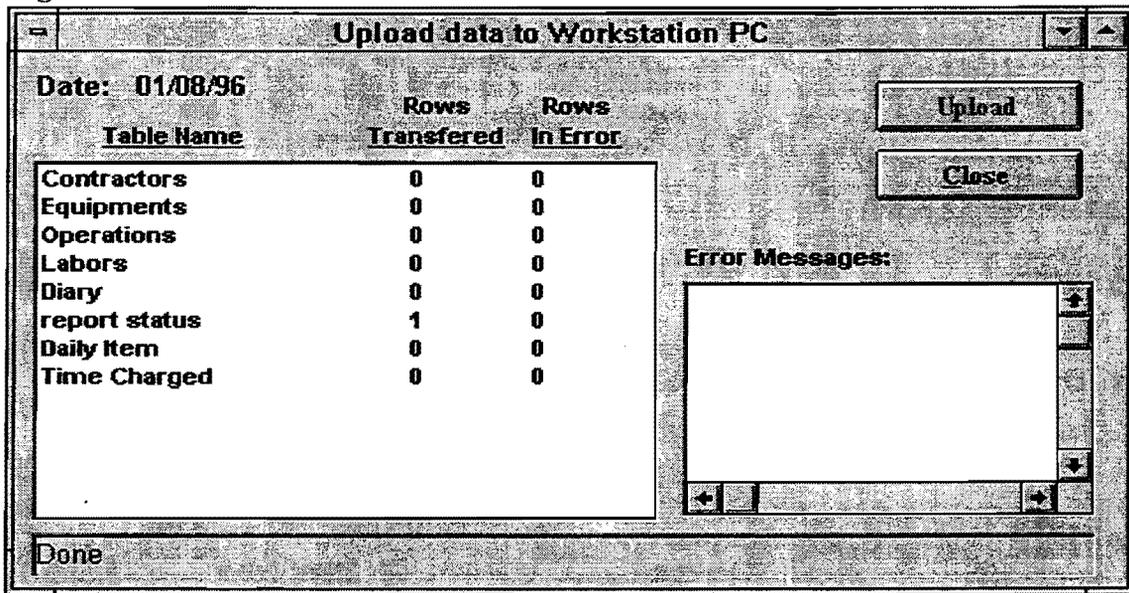
Figure 5.12



After pressing the “Upload” button, the Distribute data to Workstation PC window will appear, Figure 5.12.

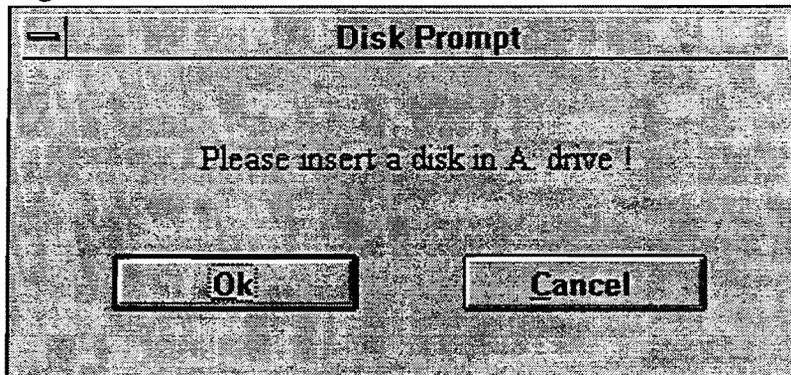
By pressing the Upload button found at the right side of this window, the data will be set up for transfer to diskette. Soon after pressing the Upload button, you will see messages fill the box on the left side of the window, Figure 5.13.

Figure 5.13



After these messages appear you will see a window prompting you to enter a diskette into the computer, Figure 5.14. Insert a diskette into the drive and choose OK on the window.

Figure 5.14



After the Disk Prompt window appears, confirm that there is a disk in the disk drive, then press OK. When you press the OK button, you will see two warning windows appear, Figure 5.15 and Figure 5.16.

Figure 5.15

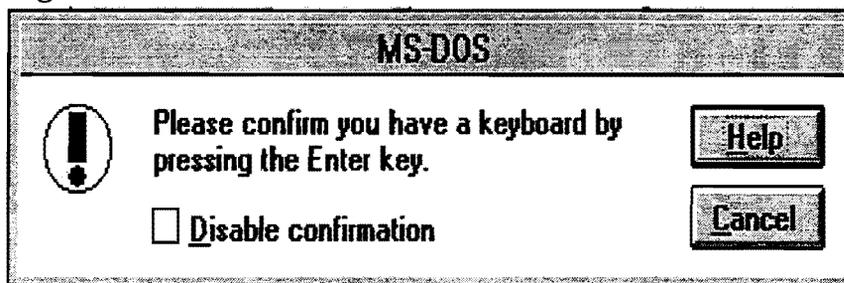
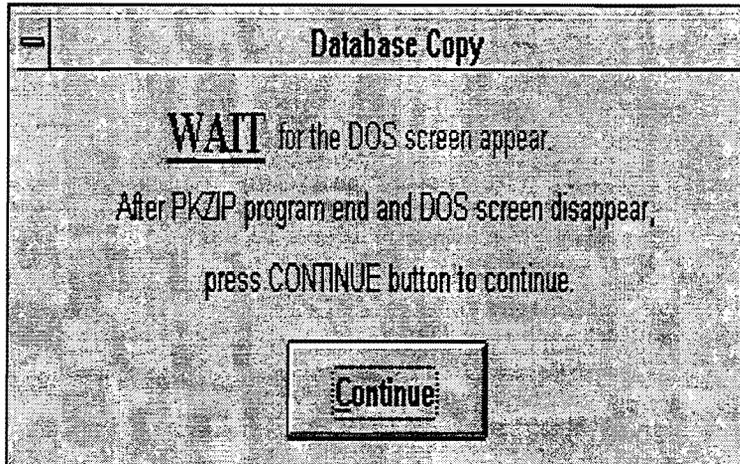
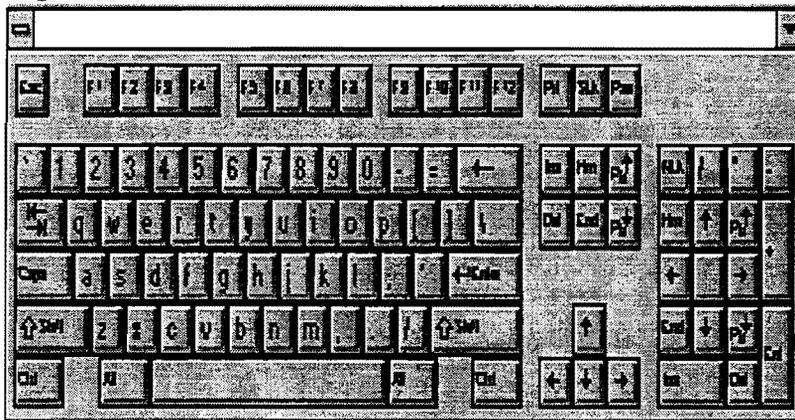


Figure 5.16



To clear the first window, Figure 5.15, use the keyboard window, Figure 5.17, to press the enter key. You should only press the enter key once; after you press the enter key, the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on. When the DOS screen disappears, you should press the "Continue" button on the Database Copy window, Figure 5.16.

Figure 5.17



After pressing the Continue button, the data has been transferred to the diskette. Now the computer is done, and the Upload button will be disabled, Figure 5.18. Now press the "Close" button on the right side of the window, and we will be finished with this transfer.

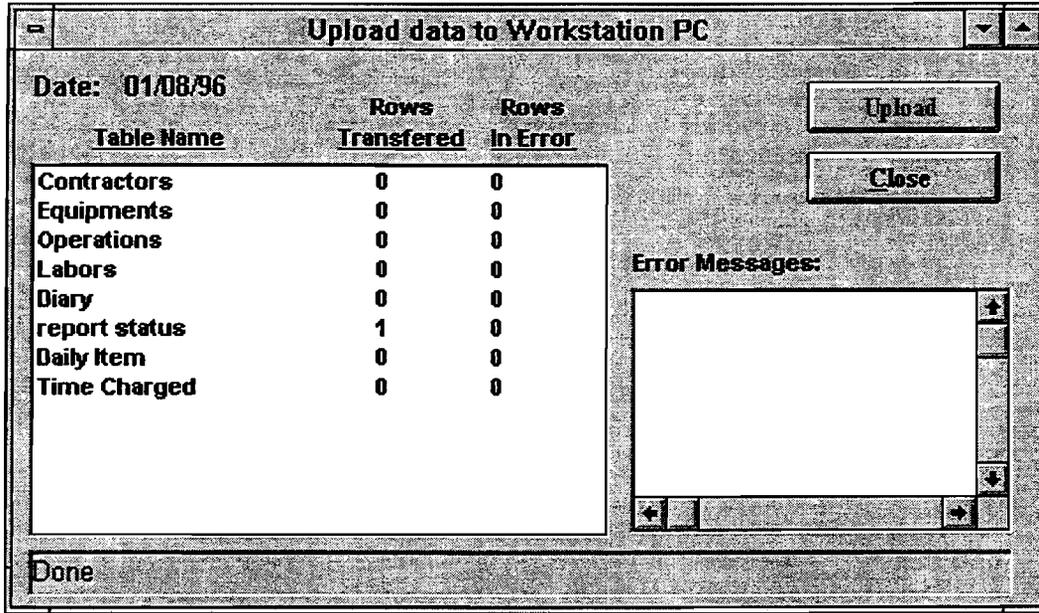
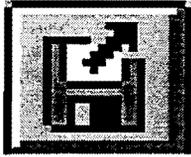


Figure 5.18

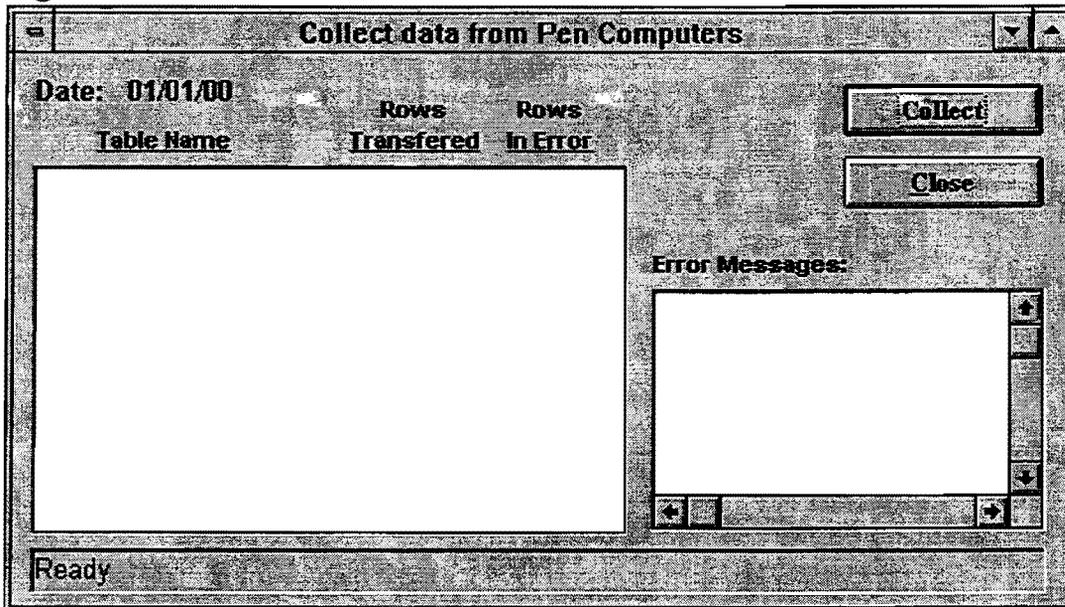
Retrieving Data from Diskette on Work Station.



To put the data onto the work station computer, press the “Collect” button; it has an arrow pointing away from the diskette. You can also choose “Collect” in the Details Menu.

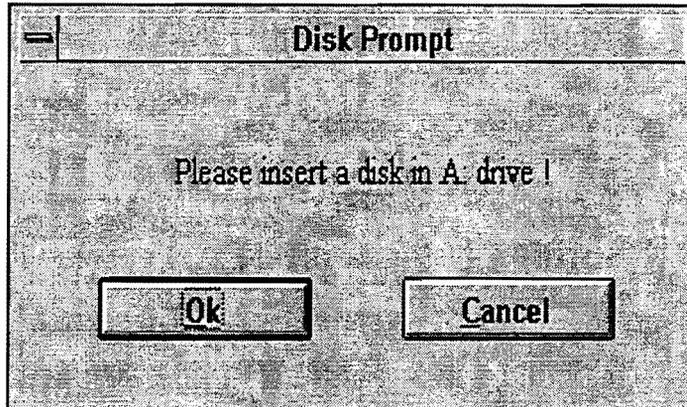
After pressing the “Collect” button, the “Download data from Workstation PC” window will appear, Figure 5.19.

Figure 5.19



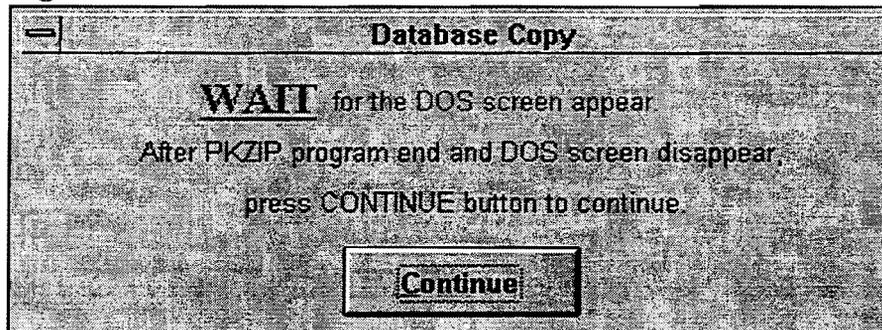
Pressing the Collect button found at the right side of this window will start the retrieval of the data from the diskette, first prompting you to enter a diskette, Figure 5.20.

Figure 5.20



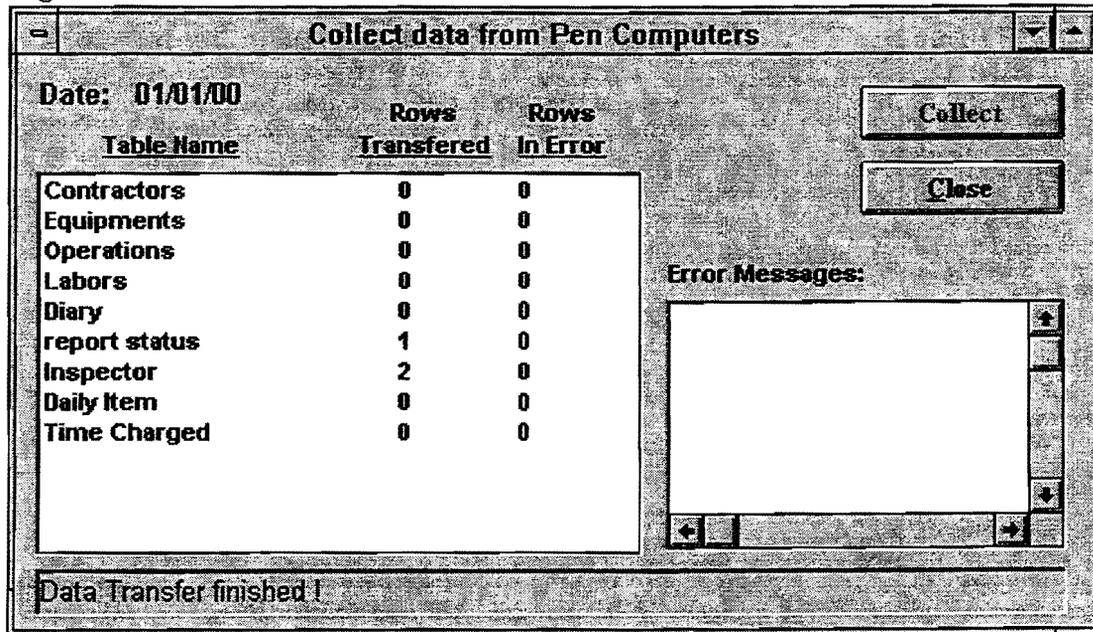
When you press OK on the Disk Prompt window, a warning window will appear, Figure 5214, and a split-second later the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on. The warning window that appears has a Continue button on it that should not be pressed until after the screen has returned from the DOS screen.

Figure 5.21



After pressing the Continue button, the data has been transferred from the diskette. Now the computer needs to read the data into the program. While this is happening, you will see data fill the box on the left side of the Collect data from Pen Computer window. When the computer is done, the word "Data Transfer Finished" will appear in the status line at the bottom of the window, and the Collect button will be disabled, Figure 5.22. Now press the "Close" button on the right side of the window, and we will be finished with this transfer.

Figure 5.22



Workstation to Mainframe.

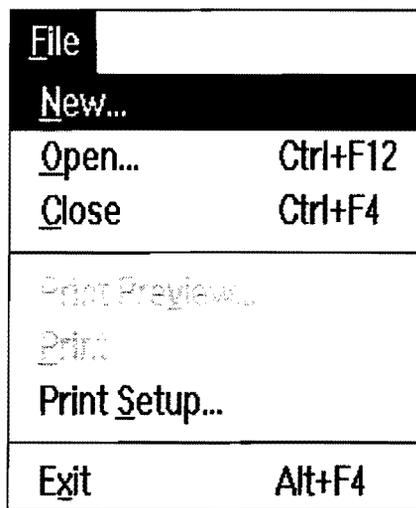


Figure 5.23

The first thing you need to do is quit the CIR program. To do this, choose the File menu and choose Exit, Figure 5.23. When you choose to quit, you will be asked if you are sure, Figure 5.24.

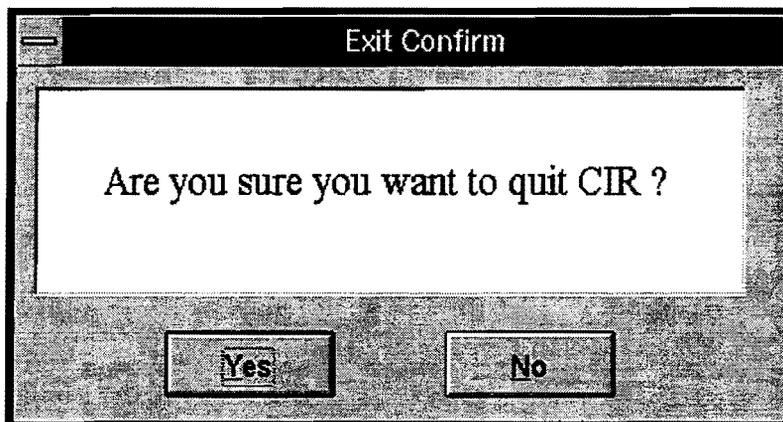
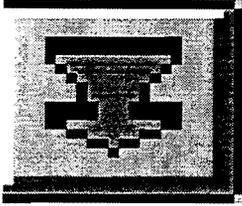


Figure 5.24

- ◆ After you have quit the program, quit Windows™ and reset the computer.
- ◆ Some computers are set up to have a menu that allows you to choose different setups when you start your computer. If you have this option, choose the Arbiter setup; if you do not have this option, don't worry about it, just continue with the rest of the steps.
- ◆ If your computer started Windows™ when you turned it on, you need to quit Windows™.
- ◆ Log in to Arbiter.
- ◆ From the main menu of Arbiter press the “Esc” key until you are at a Dos prompt.
- ◆ Type “PUTCIR ???????” and press enter (replacing the ? with your sign on key for Arbiter)
ex. PUTCIR D170402
- ◆ Log in to Roscoe.
- ◆ Type “sn.arbxfer” and press enter.
- ◆ You will be given two choices; you need to choose GetPC Members by putting an uppercase “X” in the parenthesis. You will now see a screen asking for the filenames you want to transfer. Type “CIRCARD” on the first line and press enter. You should now be at a regular Roscoe screen.

Mainframe to Workstation.

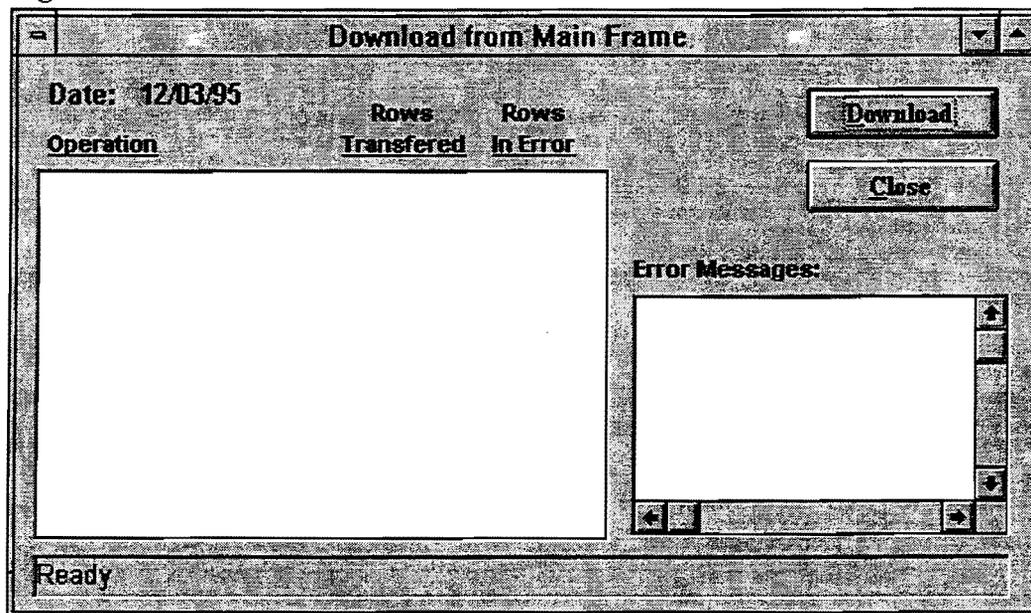


To get the data from the mainframe into the program press the Download button, which is the green arrow pointing down. This option can also be accessed through the Details menu.

After pressing the download button, the Download from Main Frame window will appear,

Figure 5.25.

Figure 5.25



Pressing the Download button found at the right side of this window will begin the data transfer.

When the transfer begins you will see a "Wait" window appear, Figure 5.27, and at the bottom of your screen you will see an icon labeled "ISQL," Figure 5.26.

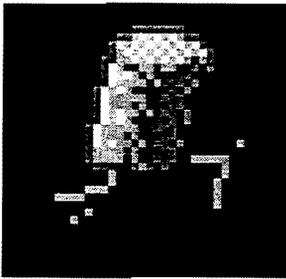


Figure 5.26

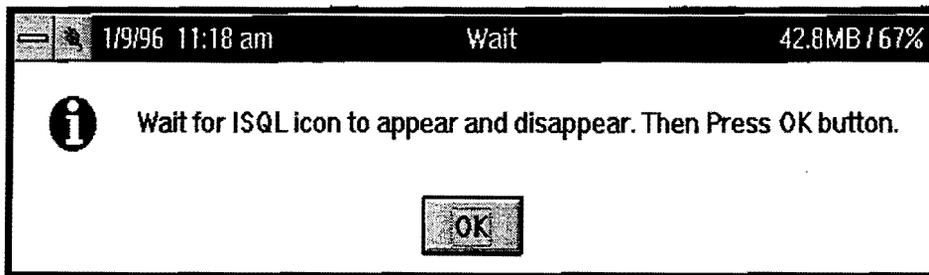


Figure 5.27

This icon appears on the screen and disappears; the time it takes for this icon to disappear is varied depending on the speed of your computer and how large the CSJs you are using are. After this icon has left the screen, it is safe to press the “OK” button on the “Wait” window, Figure 5.27. After you press the “OK” button, the transfer will put the data into a database so you can use it. When the transfer is complete, you will see the word “Done” appear at the bottom of the window in the status line. The status line is where the word “Ready” is located in Figure 5.25. When the “Done” message appears, continue by pressing the “Close” button to close this window.

6

Displaying Summaries

This part of the manual is not yet available because the summary reports are still under major revision.

Overall Summaries.

All Inspectors in One Day.

One Inspector in One Day.

Work Performed Summaries.

One Bid Item.

Whole Project.

One Inspector.

One Day.

Time Charge Summary.

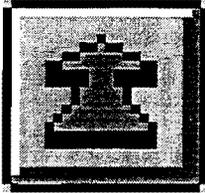
7

Running Estimates

What you need to know.

- ◆ How to log in to Arbiter.
- ◆ How to use Roscoe.
- ◆ Basic Windows™.
- ◆ Basic DOS.
- ◆ How to run an estimate on the current system.

Creating M3, T2, and T3 Information.



To create the data to be sent to the mainframe, press the Upload button on the workstation computer. Pressing the Upload button will open the Write files for uploading to Main Frame window, Figure 7.1.

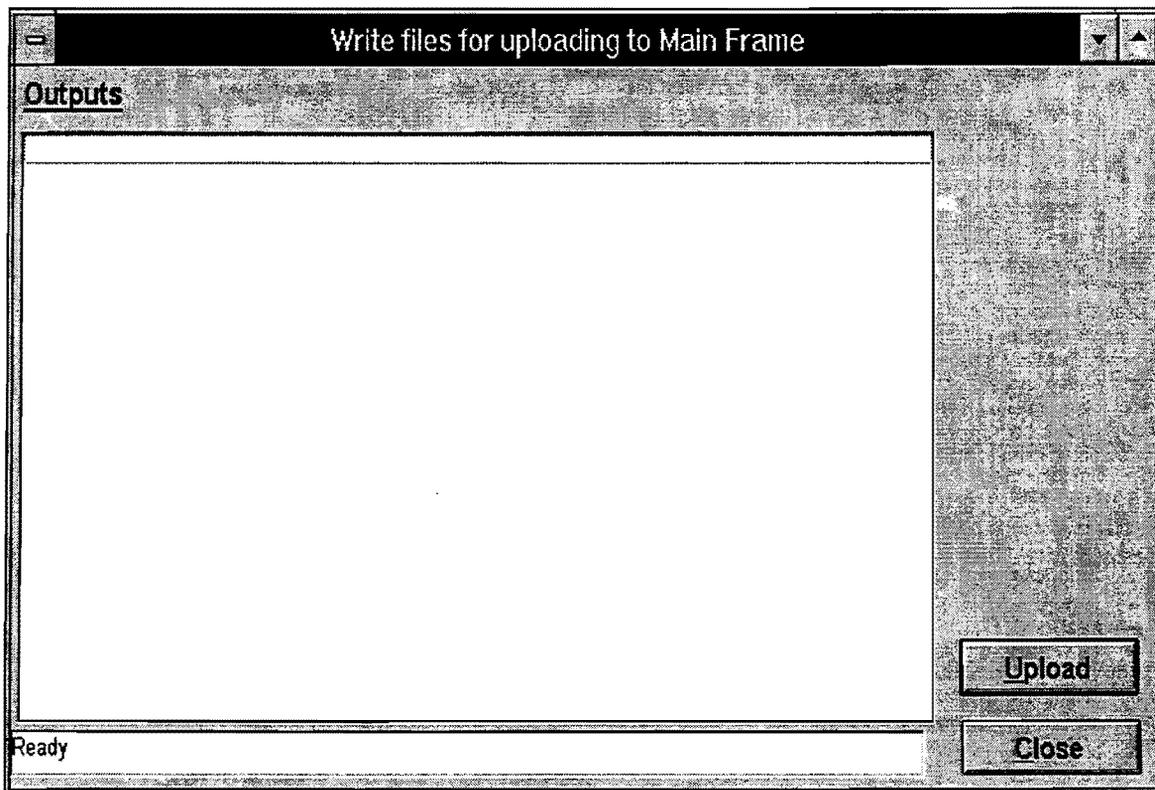


Figure 7.1

Pressing the upload button at the bottom-right corner of the window will make the computer start calculating the data needed for the estimates. This can take quite a while, depending on the number of bid items in your CSJ and the speed of your computer; the time to compute can exceed 45 minutes. When the computer is done calculating the data, you will see the data appear in the Output box and the word Done appear in the status bar at the bottom of the window, Figure 7.2.

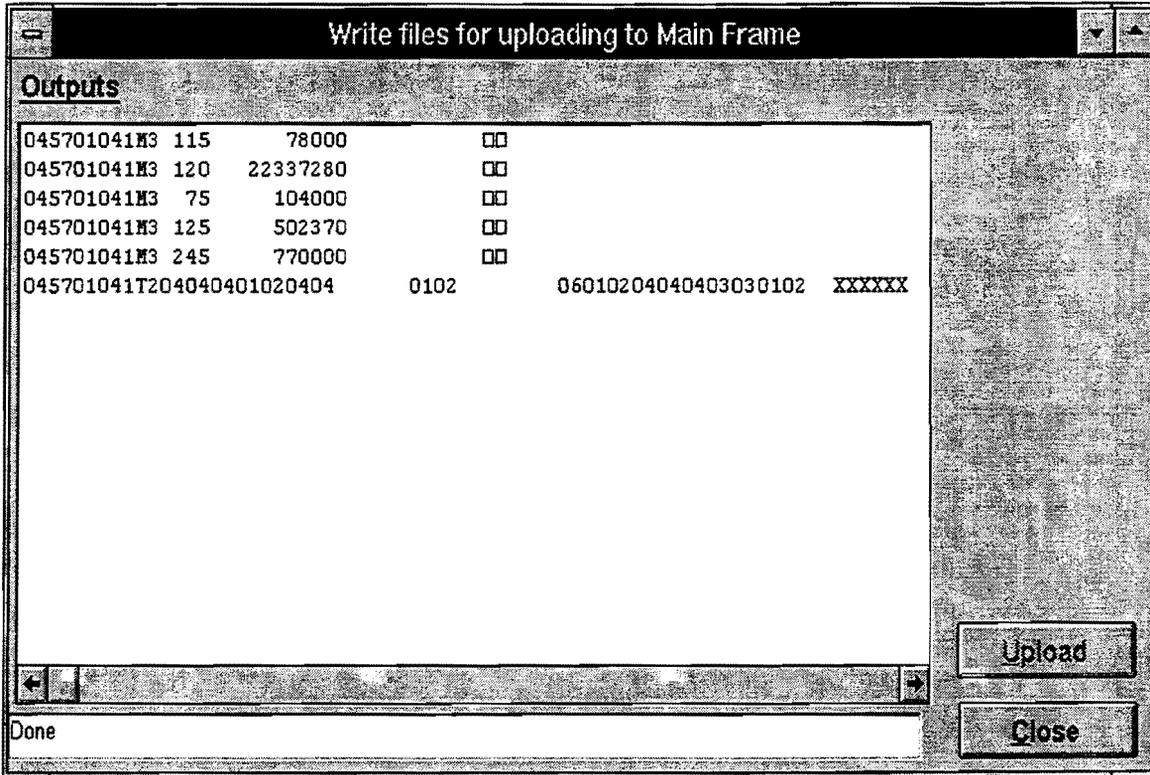


Figure 7.2

Pressing the close button will close this window.

Transferring Data to Mainframe.

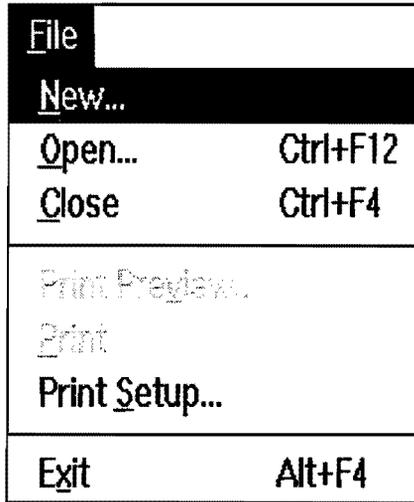


Figure 7.3

The first thing you need to do is quit the CIR program. To do this, choose the File menu and choose Exit, Figure 7.3. When you choose to quit, you will be asked if you are sure, Figure 7.4.

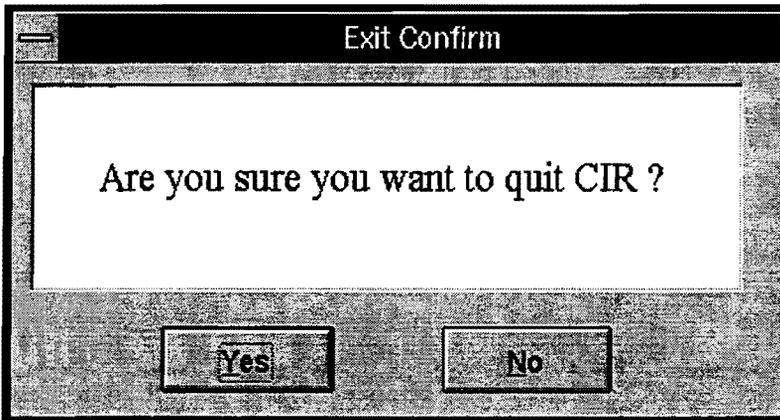


Figure 7.4

- ◆ After you have quit the program, quit Windows™ and reset the computer.
- ◆ Some computers are set up to have a menu that allows you to choose different setups when you start your computer. If you have this option, choose the Arbiter setup; if you do not have this option, don't worry about it, just continue with the rest of the steps.
- ◆ If your computer started Windows™ when you turned it on, you need to quit windows.
- ◆ Log in to Arbiter.
- ◆ From the main menu of Arbiter, press the “Esc” key until you are at a DOS prompt.
- ◆ Type “**PUTCIR ????????**” and press enter (replacing the ? with your sign on key for arbiter) **ex. PUTCIR D170402**
- ◆ Log in in to Roscoe.
- ◆ Type “**sn.arbxfer**” and press enter.
- ◆ You will be given two choices; you need to choose GetPC Members by putting an uppercase “X” in the parenthesis. You will now see a screen asking for the filenames you want to transfer. Type “**CIRCARD**” on the first line and press enter. You should now be at a regular Roscoe screen.

Putting Data into CSJ Card.

- ◆ Type **"RJEJCL 11 14"**; then create the header card for the CSJ you are running the estimate for. Take note of the CIS member name at the bottom right of the screen, ex. CIS27.
- ◆ Exit RJEJCL; then Fetch and Attach to the CIS member.
Example: F CIS27
 A
- ◆ Type **"C CIRCARD 1"** and press enter. The M3, T2, and T3 information will now be shown.
- ◆ Type **"U *"** to save the changes to the CIS member.
- ◆ Type **"RJEJCL 11 14"** and finish the estimate as normal. Don't forget to do the T1 card!
- ◆ After you have finished the estimate for this CSJ, start from the beginning of the chapter and run estimates for the rest of your CSJs. After you have finished running the estimates for each CSJ, go on to the next section.

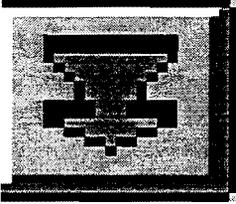
Getting Updated CSJ Information.

- ◆ After you have finished running the estimates for every CSJ, you need to gather the new data to be sent to the PC computers.
- ◆ From Roscoe Fetch and Attach to RUNMAIN
Example: **F RUNMAIN**
A
- ◆ A Roscoe file opens up on the screen. Insert the CSJ numbers you want to be downloaded by scrolling down to line 32 and typing over the CSJ that is in the file. If you want to download more than one file at a time, you will have to insert a line after 32 by typing “**I 32**” at the top of the screen. The line after the last CSJ number must be a 0. For example, the screen might look like this:

000031	EXEC P415450
000032	005306023
000033	139901023
000034	0
000035	FIN
- ◆ Save your changes by typing “**U ***” at the top of the screen.
- ◆ Type “**SUB**” at the top of the screen to submit the job for processing. Take note of the job number that appears in the top left of the screen.
- ◆ Type “**D J N**” then type “**DOUT**”. Scroll down to the job number that you just submitted. When that job is done processing, you will see “Waiting to be printed” to the right side of the ID number; you are now ready to quit Roscoe.
- ◆ Press **F1** to get out of the job listings.
- ◆ Type “**DEL**”
“**OFF**”
and press enter to quit Roscoe.
- ◆ You are now back in the list of Roscoe sessions. Press the “**ALT**” and “**+**” keys at the same time; make sure you use the “**+**” key on the numeric keypad. This should take you back to the Arbiter main menu. If this doesn’t work, you need to ask you automation or Arbiter expert how to get out of this screen.
- ◆ Now that you are back to the Arbiter main menu, press the “**ESC**” until you are at a Dos prompt.
- ◆ Type “**GETCIR ????????**”; where question marks are you log in key for Arbiter.

- ◆ The screen will appear to process information. When it stops flashing, then the Dos prompt will reappear. Now you need to reboot your computer, start Windows™, and enter the CIR program.

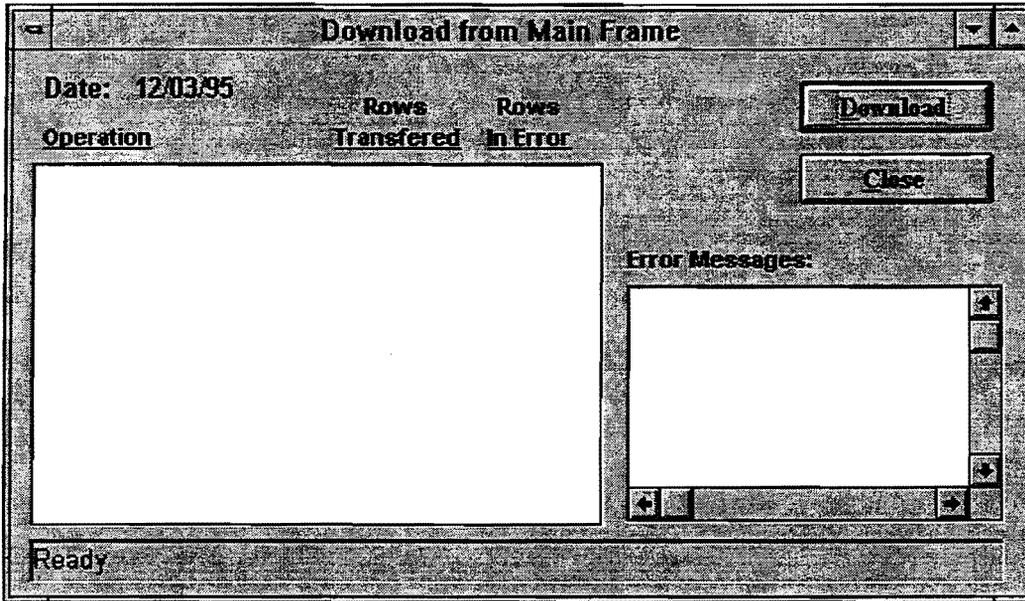
Transferring Data from Mainframe.



To get the data from the mainframe into the program press the Download button which is the green arrow pointing down. This option can also be accessed through the Details menu.

After pressing the download button, the Download from Main Frame window will appear,
Figure 7.5.

Figure 7.5



Pressing the Download button found at the right side of this window will begin the data transfer.

When the transfer begins, you will see a "Wait" window appear, Figure 7.5, and at the bottom of your screen you will see an icon labeled "ISQL", Figure 7.6.

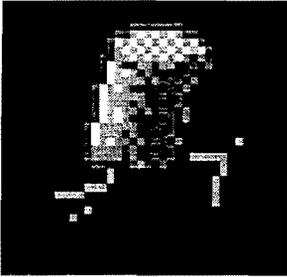


Figure 7.6

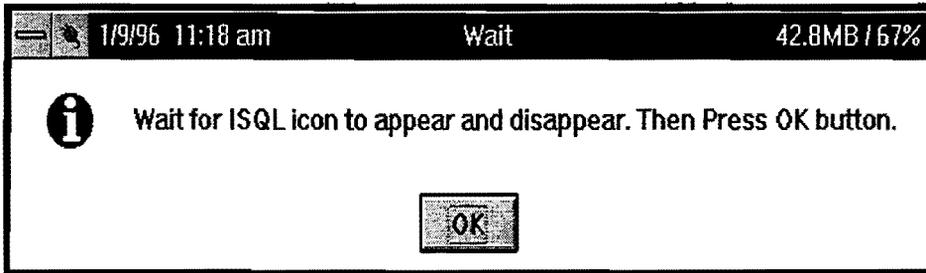
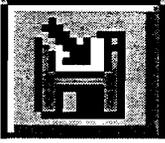


Figure 7.7

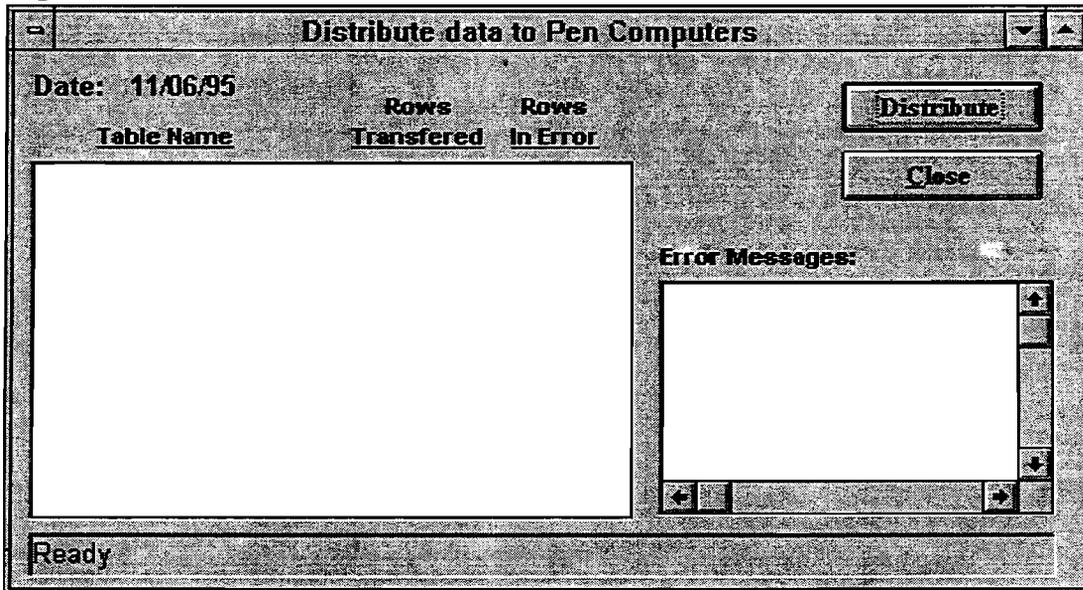
This icon appears on the screen and disappears; the time it takes for this icon to disappear is varied depending on the speed of your computer and how large the CSJs you are using are. After this icon has left the screen, it is safe to press the “OK” button on the “Wait” window, Figure 7.7. After you press the “OK” button, the transfer will put the data into a database so you can use it. When the transfer is complete, you will see the word “Done” appear at the bottom of the window in the status line. The status line is where the word “Ready” is located in Figure 7.5. When the “Done” message appears, continue by pressing the “Close” button to close this window.

Transferring Data to Pen Based.



To put the data onto the diskette, press the “Distribute” button that has an arrow pointing towards the diskette. You can also choose “Distribute” in the Details Menu.

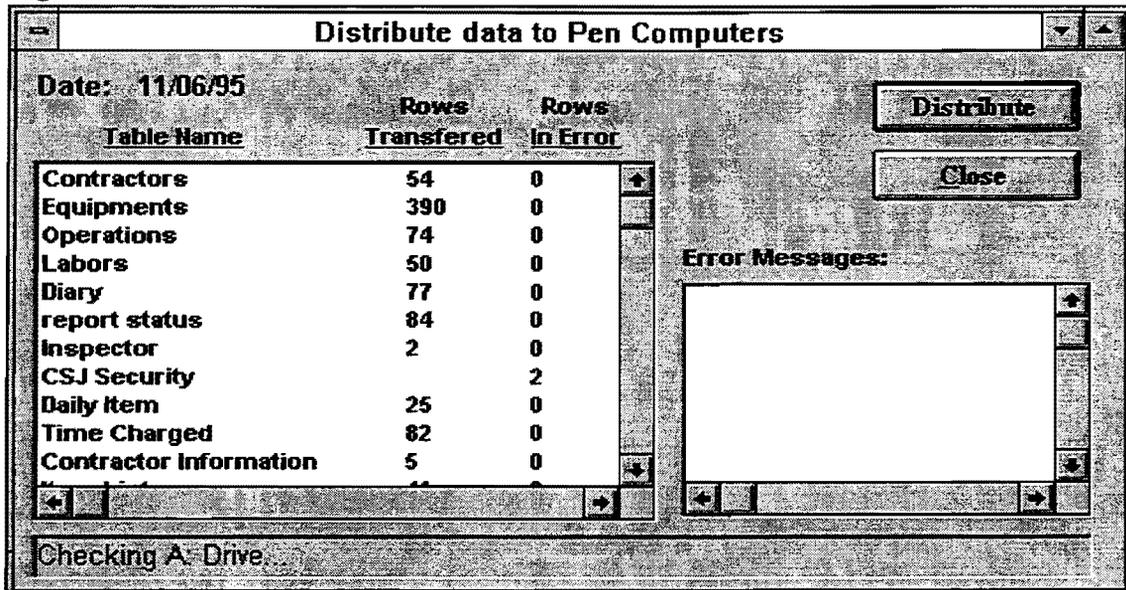
Figure 7.8



After pressing the “Distribute” button, the Distribute data to Pen Computers window will appear, Figure 7.8.

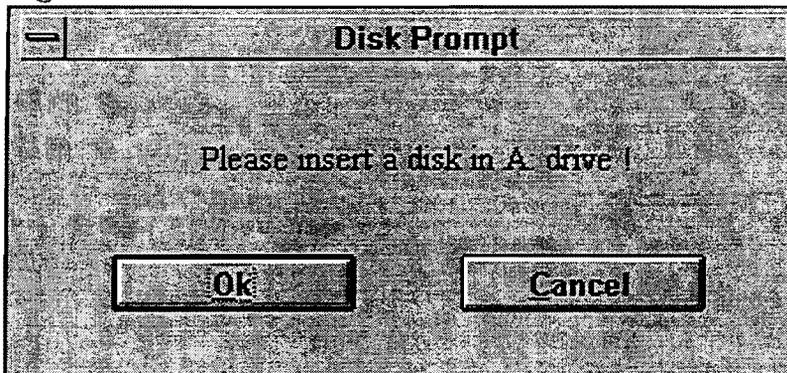
By pressing the Distribute button found at the right side of this window, the data will be set up for transfer to diskette. Soon after pressing the Distribute button, you will see messages fill the box on the left side of the window, Figure 7.9.

Figure 7.9



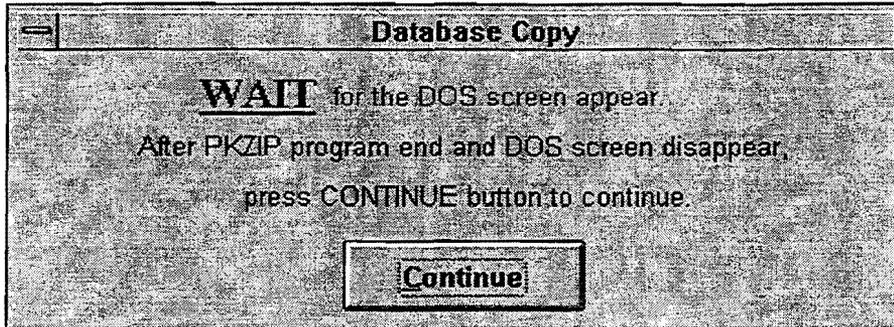
After these messages appear you will see a window prompting you to enter a diskette into the computer, Figure 7.10. Insert a diskette into the drive and choose OK on the window.

Figure 7.10



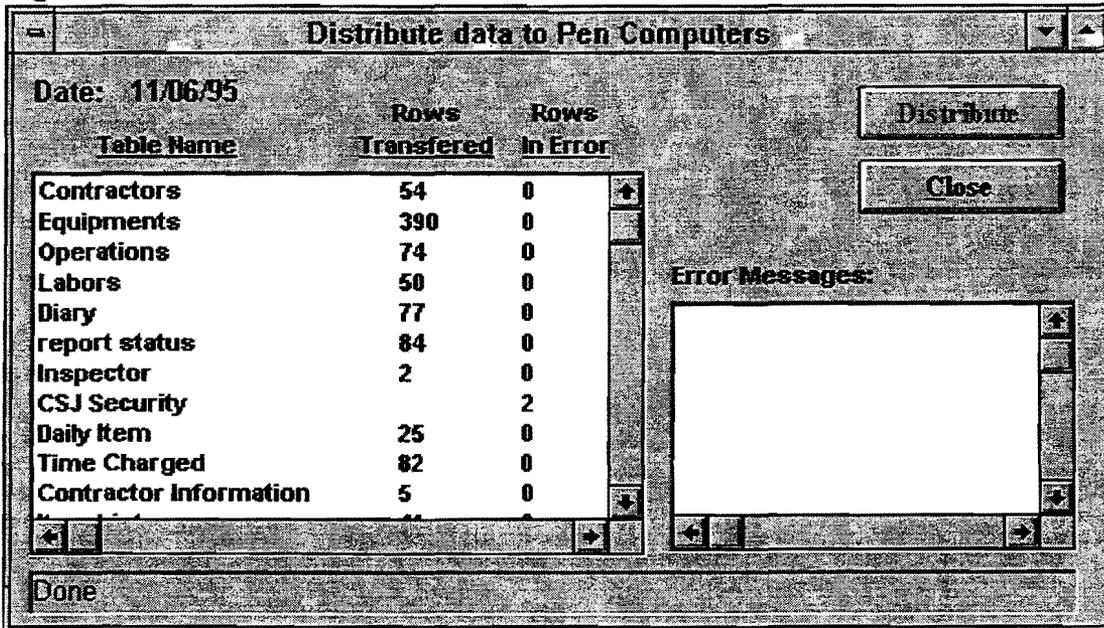
When you press OK on the Disk Prompt window, a warning window will appear, Figure 7.11, and a split-second later the entire screen will turn black and will show some data on the screen; this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on. The warning window that appears has a Continue button on it that should not be pressed until after the screen has returned from the DOS screen.

Figure 7.11

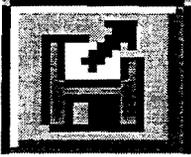


After you press the Continue button, the data has been transferred to the diskette. You will see the word "Done" appear in the status line at the bottom of the window, and the Distribute button will be disabled, Figure 7.12. Now press the "Close" button on the right side of the window, and we will be finished with the first half of the transfer.

Figure 7.12



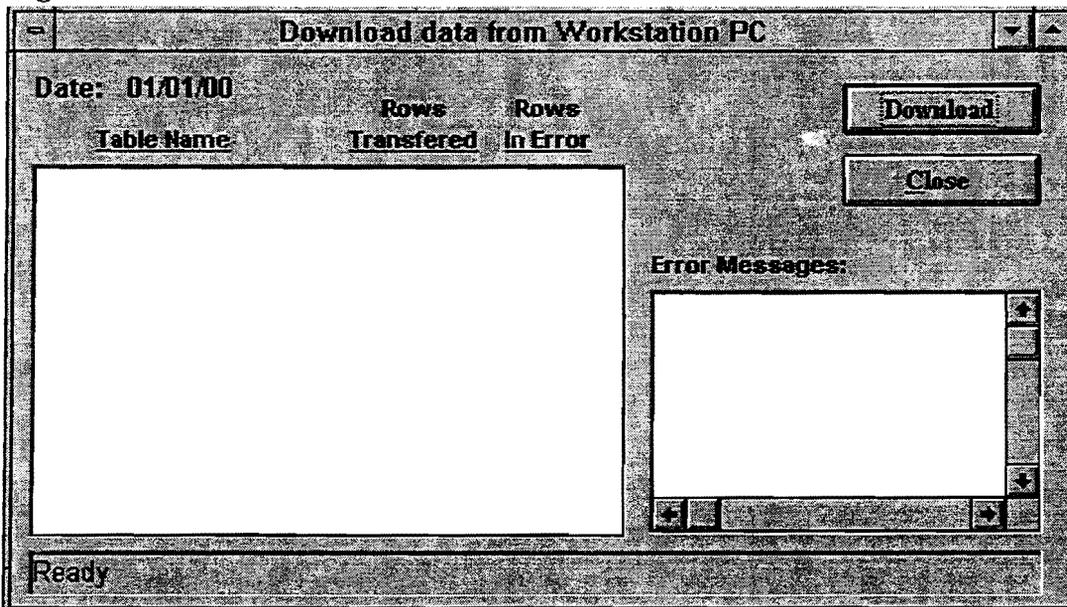
Retrieving Data from Diskette on Pen Computer.



To put the data onto the pen computer, press the “Download” button; it has an arrow pointing away from the diskette. You can also choose “Download” in the Details Menu.

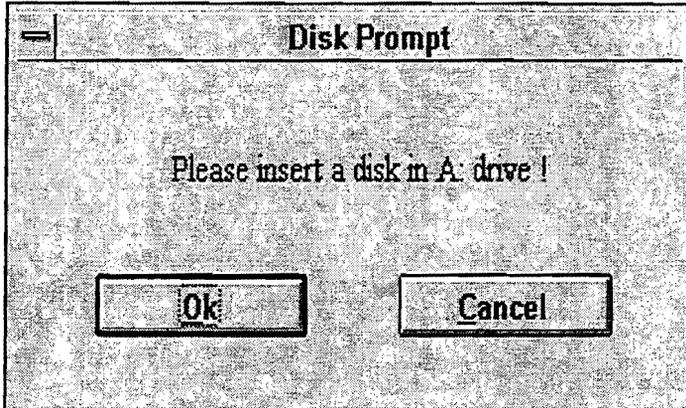
After pressing the “Download” button, the “Download data from Workstation PC” window will appear, Figure 7.13.

Figure 7.13



Pressing the Download button found at the right side of this window will start the retrieval of the data from the diskette, first prompting you to enter a diskette, Figure 7.14.

Figure 7.14



After the Disk Prompt window appears, confirm that the disk you created in the first half of the transfer is in the disk drive; then press OK. When you press the OK button, you will see two warning windows appear, Figure 7.15 and Figure 7.16.

Figure 7.15

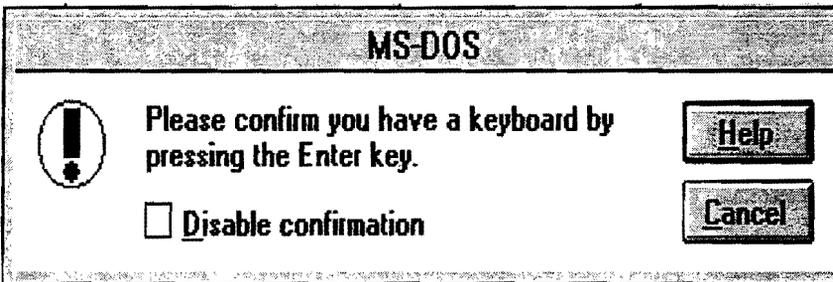
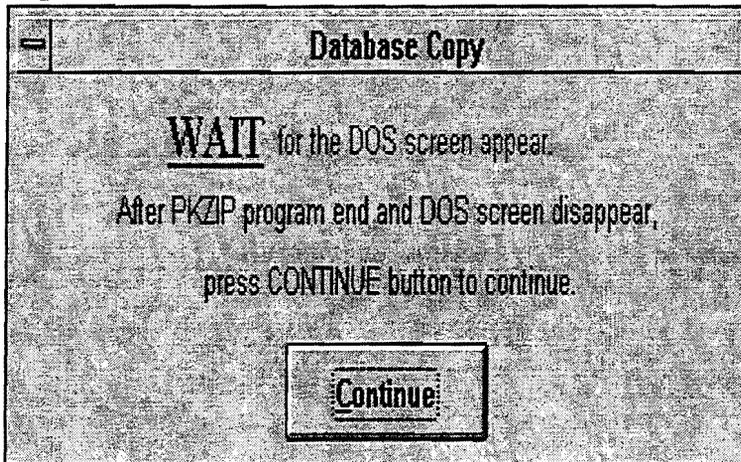


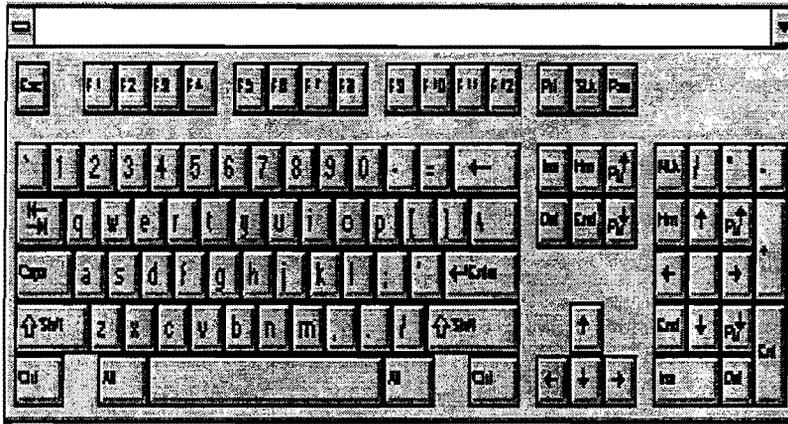
Figure 7.16



To clear the first window, Figure 7.15, use the keyboard window, Figure 7.17, to press the enter key. You should only press the enter key once; after you press the enter key the entire screen will turn black and will show some data on the screen, this is the DOS screen. It will look a lot like the screens you see when you first turn your computer on.

When the DOS screen disappears, you should press the “Continue” button on the Database Copy window, Figure 7.16.

Figure 7.17



After pressing the Continue button, the data has been transferred from the diskette. Now the computer needs to read the data into the program. While this is happening, you will see data fill the box on the left side of the Download data from Workstation PC window. When the computer is done, the word “Data Transfer Finished” will appear in the status line at the bottom of the window, and the Download button will be disabled, Figure 7.18. Now press the “Close” button on the right side of the window, and we will be finished with this transfer.

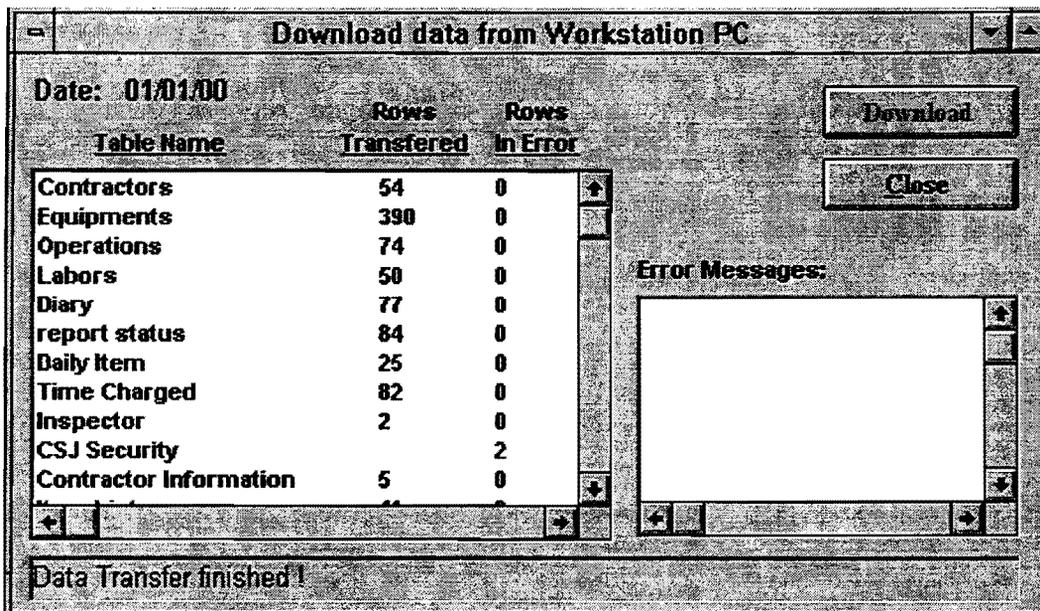


Figure 7.18

CHAPTER 4 COST-EFFECTIVE ANALYSIS REPORT

4.1 ADAR

The purpose of this section is to compare the Pen Display Pad (PDP) data collection technique with the existing maintenance paper form, the Maintenance Daily Activity Report (DAR), by analyzing feedback from the participating maintenance crews and evaluating the benefits and costs of implementing the PDP system statewide. The projected benefits of the PDP system were: an increase in productivity in terms of time savings, a reduction of input errors and paperwork, and a decrease in validations.

4.1.1 Methodology

To compare the PDP system with the existing manual paper system, surveys were sent to both participating maintenance sections and non-participating sections. The survey that was sent to sections using the PDP ascertained their experience with the device in terms of acceptability, accuracy, time requirements of the PDP versus the existing system, ease of mastering the PDP, and preference of system. The survey that was sent to the other maintenance sections obtained more in-depth data about the time requirements of the existing manual system. Once the time requirement data was gathered for each system, a benefit-cost evaluation of the PDP system was undertaken.

4.1.2 Evaluation of Pen Display Pad (PDP)

PDP Satisfaction and Accuracy

The overall satisfaction with the device and the accuracy of the PDP system, when compared to the existing system, was favorable. The survey questions and the participants' responses pertaining to satisfaction and accuracy were as follows:

In your opinion, **overall** how was the Pen Display Pad to use compared to the existing written paper form? Please circle your response on the following scale:

Superior to existing paper form	Better than existing paper form	About the same as existing paper form	Worse than the existing paper form	Very poor compared to existing paper form
4	3	2	1	0

Individual Estimates: 4,3,3,1

Median rating is 3

Average rating is 2.75

In your opinion, how accurate in terms of mistakes is the Pen Display Pad compared to the existing written paper form? Please circle your response on the following scale:

Superior	Better	About the same	Worse	Much worse
4	3	2	1	0

Individual Estimates: 3,3,3,1 Median rating is 3 Average rating is 2.5

In each case, the median response was a 3. The PDP system was rated better than the existing paper form overall and in accuracy as well. One maintenance section, the Bryan section, consistently rated the PDP system worse than the existing system.

Training Required

The amount of training it would take to master the PDP was estimated by the participants to be between 5 and 7 days. However, only three sections responded. The Bryan section reported that it never was able to master the PDP system. This appears to be at least one reason why their ratings were consistently lower than the others. The survey question and answers were:

Please estimate the amount of time it took you to “master” the Pen Display Pad.

Individual Estimates: 5,5,10 Median estimate is 5 days Average is 6.67

Preference: PDP vs. Existing Handwritten System

Preference for the PDP versus the existing system was mixed, however, as the following responses reveal:

After using the Pen Display Pad, would you like to go back to the manual system? Please circle YES or NO . If your answer is yes, please PRINT your reason in the space below.

Individual Estimates: 2 yes, 2 no for an average of 50%

“We discovered one major flaw in the PDP. That was the inability to enter more than one digit in the “committed time” field for equipment. During the time we tested, we worked a lot of 10+ hour days and had some equipment, such as arrow boards, that operated 24 hours per day. They had to be entered 3 times on one report to get all the time in. This took a lot of extra unnecessary time that did not occur on the paper form. We did not use

the PDP on days when we worked 10 hours or more simply because it took too long.”

“Entire process of using Pen Base and PC takes more time, generates more paper, confusing to crew members.”

Apparently the “flaw” in the PDP system caused one respondent to choose the existing system over the PDP system. Once that problem is addressed, however, the implication from the respondent was that his preference would change. He wrote:

“Still, I feel the PDP can save time once the bugs are worked out. This, after all, is the reason for testing.”

In summary, the participants judged the PDP system to be better than the existing system overall, committed fewer errors, and would be preferred to the existing system when perfected. The complete survey along with the participants responses is included in the Appendix and labeled as Exhibit 1.

4.1.3 Time Estimates under the PDP and Existing Systems

Recall that under the existing system, the following process takes place:

- maintenance crew chief transcribes the activity on form 1757, the DAR
- maintenance section personnel review the DAR, make corrections, and enter the DAR data into the Single Entry Screen (SES)
- the DAR is then stored for safekeeping and auditing purposes

Under the PDP system, the process is:

- the maintenance crew chief enters the DAR data directly to the PDP, where the data is error-checked and validated
- the data in the PDP is uploaded to a PC and transmitted to the mainframe

Thus, the opportunity exists for the following savings:

- time savings of initial entry of DAR data from the crew chief (i.e., the time requirement to enter DAR data into the PDP versus the time requirement to transcribe the same data onto a DAR)
- time saving from data entry to SES system, since the PDP system eliminates this manual entry
- savings from form usage and storage-- the PDP system eliminates the DAR form as well as costs associated with storage.

Both PDP participants and non-participants were asked to estimate the time requirements

of the existing system. The PDP participants also estimated the time requirements of the PDP system. In addition, a time study was conducted at the Bryan Maintenance Section, chiefly to verify some of these estimates.

Table 1 shows the Time Study, Participants' and Non-Participants' estimates of the various tasks. The PDP participants estimated that the amount of time required to transcribe maintenance activity onto a DAR was 0.18 hours, while the other maintenance sections estimated this time to be 0.20 hours, for a weighted average of 0.20 hours. In a time study, the same information directly entered into the PDP was 0.1962 hours, while PDP participants estimated 0.20 hours, for a weighted average of 0.20 hours. Thus, the amount of time savings from entering information directly into the PDP, rather than onto a DAR, was nil.

A time study of SES entry revealed that it required 0.1023 hours, while both the PDP participants and the Non-participants estimated that it required 0.13 hours. The weighted average estimate for this task was 0.13 hours (i.e., $1/236 (0.1023) + 235/236 (.13)$). In this case, the time savings is 0.13 hours, since this task is eliminated by using the PDP.

Table 1. Mean Time to Complete Tasks

Task	Time Study	PDP		Non-PDP		Sample Size	Weighted Average
		Sample Size	Participants' Estimate	Sample Size	Participants' Estimate		
Handwritten DAR	NA		0.18	4	0.20	232	0.20
PDP Entry	0.1962	1	0.20	4	NA		0.20
SES Entry	0.1023	1	0.13	4	0.13	231	0.13

4.1.4 Pen Display Pad (PDP) Savings Benefits and Implementation Costs

Savings benefits and implementation costs are estimated in the following sections. The general method of comparing the savings benefits to the costs associated with those benefits is to use an annual cost comparison. In this case, the savings benefits occur annually, over the life of the PDP; however, the costs of implementation are one-time, initial costs that require annualizing over the life of the PDP at the appropriate rate of discount. Then the ratio of benefits (i.e., annual benefits) to costs (i.e., annualized costs) is computed. The project provides net economic benefits if this ratio is greater than or equal to one. Table 2 summarizes the key values employed in this analysis.

Table 2. Data for Savings Benefits and Implementation Costs Analysis

Description	Unit	Value	Reference/Comment
Current estimated initial cost of PDP	dollars	2028	TTI
Net estimated initial cost of PDP, after government/quantity discount	dollars	1879	Above times (1- discount of 7.36%) see government discount below
Current estimated salvage value of PDP	dollars	0	TxDOT
Average cost of 1 DAR sheet	dollars	0.12	TxDOT
Estimated storage costs	dollars per m ³ per year	18.25	Appendix, Table A1
Net Current Cost of PC	dollars	1416	Inmac Master Catalog, 1995
Cost of training per maintenance section crew	dollars	415	Appendix, Table A2
Life of PDP	years	7	TxDOT computer life estimate
Average number of crews per maintenance section	number	4.252155	Appendix, Composite of Exhibits 1 and 2
Average number of DAR per crew per day	number	1	
Discount rate (cost recovery interest rate)	percent	8.00	TxDOT
Governmental/quantity discount	percent	7.36	Appendix, Table A3
Average time to complete 1 DAR (handwritten)	hours	0.20	Table 1
Average time to enter DAR in PDP	hours	0.20	Table 1
Average time to enter DAR in SES	hours	0.13	Table 1
Average working days in year	days	242	Assumes 8 paid holidays + 10 days paid vacation
Composite wage rate, crew chief	dollars per hour	20.50	TxDOT
Composite wage rate, office manager	dollars per hour	19.20	TxDOT

Pen Display Pad (PDP) Savings Benefits

The following calculates the estimated annual benefits of using the PDP system.

1. Annual Savings per Crew

- a. Time savings to enter DAR data = $h \text{ saved}/\text{DAR} \times \text{Labor cost}/h \times \text{DAR}/\text{yr}$
= $0 \times 20.50 \times 242 = 0$
- b. Time savings entering SES = $h \text{ saved}/\text{DAR} \times \text{Labor cost}/h \times \text{DAR}/\text{yr}$
= $0.13 \times 19.20 \times 242 = 604.03$
- c. Savings due to form reduction = $\text{cost}/\text{DAR} \times \text{DAR}/\text{yr}$
= $0.12 \times 242 = 29.04$
- d. Storage cost savings = $\text{cost}/\text{m}^2 \times \text{m}^2/\text{DAR} \times \text{DAR}/\text{yr}$
= $18.25 \times 7.66 \times 10^{-6} \times 242 = 0.03$
- e. Total annual savings per crew = $a + b + c + d$
= $0 + 604.03 + 29.04 + 0.03$
= 633.10

2. Annual Savings per Maintenance Section = $\text{savings}/\text{crew} \times \text{average crews}/\text{section}$

$$= 633.10 \times 4.252155$$
$$= 2692.04$$

3. Annual Statewide Savings

$$= \text{savings} / \text{section} \times \text{sections}$$
$$= 2691.94 \times 300$$
$$= \underline{807612}$$

In summary, it is estimated that the PDP system will save TxDOT \$807,612 annually, over the life of the PDP.

Annualized Costs of Implementing PDP System in 1995

1. Annualized PDP costs per crew (APDPC)

$$\text{a. annualized cost factor (F)} = (I \cdot (1+I)^n) \div ((1+I)^n - 1)$$

where

I = annual discount rate

n = life of PDP

$$\begin{aligned} &= (0.08 \cdot (1.08)^7) \div ((1.08)^7 - 1) \\ &= 0.13710594 \div 0.71382427 \\ &= 0.1920724 \end{aligned}$$

$$\text{b. APDPC} = F \cdot \text{PDP initial cost, net}$$

$$\begin{aligned} &= 0.1920724 \cdot 1879 \\ &= 360.90 \end{aligned}$$

$$\begin{aligned} \text{2. Annualized training costs per crew (ATC)} &= F \cdot \text{training cost /crew} \\ &= 0.1920724 \cdot 415 \\ &= 79.71 \end{aligned}$$

$$\begin{aligned} \text{3. Annualized PC cost per section (APC)} &= F \cdot \text{Initial PC cost, net} \\ &= 0.1920724 \cdot 1416 \\ &= 271.97 \end{aligned}$$

$$\begin{aligned} \text{4. Total annualized cost per section (TAC)} &= (\text{APDPC} + \text{ATC}) \cdot \text{crew/section} + \text{APC} \\ &= (360.90 + 79.71) \cdot 4.252155 + 271.97 \\ &= 2145.51 \end{aligned}$$

$$\begin{aligned} \text{5. Total statewide costs} &= \text{TAC} \cdot \text{sections} \\ &= 2145.51 \cdot 300 \\ &= \underline{643653} \end{aligned}$$

In summary, it is estimated that the annualized implementation costs are \$643,653. Therefore, the benefit/cost ratio is 1.25. We conclude that the PDP system has economic benefits that exceed its costs. But this does not include the cost of mainframe changes which was beyond the scope of this study.

4.2 CIR Analysis

The overall opinion of CIR is very favorable; the users believe after the software is fully implemented, the overall system will produce a significant time savings and allow for less errors in the inspector's reports of construction projects. After the testing period of the CIR program, evaluation and feed back from the users were collected by a verbal survey on the following aspects of the data collection automation efforts:

1. Productivity and time savings.
2. Data quality and reliability.
3. Data accessibility.
4. User friendliness.

Productivity and time savings.

The CIR project was done, ultimately, for one reason, and that was to save the users time and make them more productive, resulting in saving money. The original plan of the project was just to automate the 1257 and 1258 reports; as development commenced, it was decided to also add the ability to view materials and automate the daily diary. With these extra features included, CIR more than met the initial time saving predictions. All the users reported some time savings and saw many ways they would like to expand on the CIR program to make them more productive.

The inspectors' major concern was the use of the pen based computer. They all seemed to agree that it took longer to get the computer to recognize their handwriting than it did to "hunt and peck" on a keyboard. In fact, most pen based users, in the end, used a small on screen keyboard to "hunt and peck" their data into the program. Using the pen based, computers the inspectors found that they were actually losing time rather than saving. However, the inspectors that used a laptop computer that had a keyboard on it agreed that they had actually saved time by using the computer. The inspectors also complained that entering aggregate information into the sketch option of the 1257 report was too laborious. It was decided that aggregate information would still be done on paper, and the inspector would give reference to the paper in the 1257 report on the computer. Time saving features, such as the recall of a previous day's equipment and operations, were all commended by the inspectors.

The office managers' major concern when testing began was with the difficulty of checking the inspectors' 1257 reports. This was eliminated by providing a summary report which the office manager could use to find the 1257 reports the inspectors had done for that day. The CIR program also generates a summary report that accumulates all the information found in the 1258 report. The greatest amount of time savings are seen in the fact that the estimate cards M3, T2, and T3 are generated by just a click of a button. In some cases on slower computers, it took quite some time to generate these cards, but the office manager

could go onto other things and was not tied down doing the calculations themselves. Also it was found that by using the CIR program, estimate errors are greatly reduced in these cards. The office managers also liked the availability of the materials, saving them the time of looking them up on paper.

The inspectors showed a strong interest in adding other features to the CIR program, such as automating the change order form and mobilization calculations to increase their productivity. The office managers displayed an interest in a few more features, such as adding materials on hand to automate the M6 card and as many other estimate cards as possible. The possibility of including a spreadsheet into the CIR program was mentioned, to solve the problem with the aggregate form. After discussing these request, it was determined that the features could be added in future updates to the program.

Data quality and reliability.

The development of the CIR program not only went out of its way to please the user but it also had to follow the rules set by the auditors. The data that CIR automates needed to be as accurate as the paper forms and also allow for an audit trail. After demonstrations of the program to TxDOT personnel, it was concluded that these goals had been met. The user's comments on the program were all taken into account on the basis that they did not break any of the audit constraints.

The inspector's only complaint on data quality was the sketch feature in the 1257 report. The problem here was that Windows™ Paintbrush program was too primitive and did not allow the inspector to include as much detail as would be liked. It was decided that it was not feasible to replace the sketch program at this time but that it would be addressed in further updates of the CIR automation program. During testing there were some data transfer problems that plagued the program; however, they were remedied soon after their discovery.

The office managers had no complaints about the data quality and reliability, save the transfer problems that were mentioned earlier. The office managers all mentioned that illegibility was not a problem with the data on the computer but that it had been a major concern with the written diary and work reports. Office managers also liked the fact that parts of the diary cannot simply be skipped, and that all information has to be entered on the 1257, including the contractor that did the work, which was often left off by the inspector. There is also no need to decipher the reason the inspector credited a day into the correct reason code because the inspector has already chosen the correct reason code from a list inside the program. Also, the security involved in the CIR program greatly reduces the chances of altering a form or diary without a detailed audit trail.

Data accessibility.

During the development of the CIR program, a major goal was to make as much useful information available to the users. TxDOT personnel were asked what they would like to incorporate into the program, and as much of this information was made accessible to the user as time would permit. Inspectors and office managers alike seemed pleased with the data that was made available to them.

The inspectors and the office managers were enthusiastic about the amount of information that was found in the CIR program. The inspectors are able to look at other inspectors' reports when they are needed. They also have a complete list of materials and bid items for the CSJ they are working on. The bid item list includes line number, item ID, description, the previous month's pay quantity, the estimated quantity, and the unit for each bid item. The material list includes a description of the material, material ID, estimated quantity, factor, item unit, component quantity, and material unit for each material. CIR is also capable of cross referencing what materials belong to which bid items. The computer provides the office managers with all the data for all CSJ's in one place; it is not necessary to have four files of papers for four different CSJ's. The only problem mentioned was the inability to archive a job when it is finished. This oversight was noted and will be made available at a later date. It was also discussed that for archiving purposes data could be moved to a CD to provide higher record security and save system space. In the future the users would like to see more data accessible to them such as TxDOT standard tables, construction plans, and materials on hand, to name a few. These additions to the CIR program were discussed and attainable goals for future updates to the CIR program were determined.

User friendliness.

The program was developed with the users in mind. TxDOT personnel would review the screens as they were being written, constant changes were made during this process to incorporate the suggestions given. The software was also demonstrated continually to construction personnel thus giving more input to the requirements of the users. After the software was put into testing and personnel had a chance to use the CIR, further changes were made. The general consensus of the inspectors and office managers was that the overall interface of the program was easy to use and followed the Windows™ standards, but as stated above, using a keyboard was preferred to the electronic pen for entering information.

When the CIR program was originally released into testing, users complained that the log in screen was case sensitive and how tedious it was to transfer data to and from the mainframe. After discussing these problems with TxDOT personnel, the program was altered so that all log ins would be forced into capitalized characters, and that a more automated procedure for transferring the data to and from the mainframe was developed. Complaints about the difficulties with the diary were mentioned by inspectors, and it was decided that a new diary interface would be created. The users were pleased with the other aspects of the program, such as the 1257 report resembling the actual paper form as closely

as possible. They also liked the fact that on all the forms there were warnings against forgetting anything important, and warnings to prevent them from accidentally losing their data. As a future addition, a graphical interface that would replace buttons with a picture of a work area to provide an easier interface with the program's features has been discussed.

After the testing period of the CIR program feed back from the users seemed very positive. There were a few complaints, especially about the pen based computers, but that is to be expected in a project of this size. Overall the users showed a strong support for the CIR program and its future possibilities.

APPENDIX

COST ANALYSIS

Exhibit 1. PDP Participants Survey and Responses

1. In your opinion, **overall** how was the Pen Display Pad to use when compared to the existing written paper form? Please circle your response on the following scale:

Superior to existing paper form	Better than existing paper form	About the same as existing paper form	Worse than the existing paper form	Very poor compared to existing paper form
4	3	2	1	0

Individual Estimates: 4,3,3,1 Median rating is 3 Average rating is 2.75

2. In your opinion, how accurate in terms of mistakes is the Pen Display Pad compared to the existing written paper form? Please circle your response on the following scale:

Superior	Better	About the same	Worse	Much worse
4	3	2	1	0

Individual Estimates: 3,3,3, Median rating is 3 Average rating is 2.5

3. In your opinion, HOW MANY MINUTES does it take to fill out the current written paper form, on the average? Please circle your response:

0-2 3-5 6-8 9-11 12-14 15-17
 18-20 21-23 24-26 27-29 30-32 33-35
 36-38 39-41 42-44 45-47 48-50 51-53

Individual Estimates: 13,10,13,7 for an average of 11

4. In your opinion, HOW MANY MINUTES does it take to enter the same information as in question 3 into the Pen Display Pad, on the average? Please circle your response:

0-2 3-5 6-8 9-11 12-14 15-17

18-20 21-23 24-26 27-29 30-32 33-35

36-38 39-41 42-44 45-47 48-50 51-53

Individual Estimates: 13,7,22,4 for an average of 12

5. Under the existing written paper system, HOW MANY MINUTES does it take to enter the information contained on one Daily Activity Report into the SES system, on the average? Please circle your response:

0-2 3-5 6-8 9-11 12-14 15-17

18-20 21-23 24-26 27-29 30-32 33-35

36-38 39-41 42-44 45-47 48-50 51-53

Individual Estimates: 13,7,22,4 for an average of 8

6. How many maintenance crews do you typically have? Please circle your response.

1 2 3 4 5 6 Other_____

Individual Estimates: 5,6,5,4 for an average of 5

7. How many Daily Activity Reports does your section generate in a typical day, on the average?

Please circle your response:

1 2 3 4 5 6 7 8 9 10 11 12 13

14 15 16 17 18 19 20 21 22 23 24 25 26

Other _____

Individual Estimates: 8,14,5,6 for an average of 8

8. Please estimate the amount of time it took you to “master” the Pen Display Pad.

Individual Estimates: 5,5,10 Median estimate is 5 days Average is 6.67

9. After using the Pen Display Pad, would you like to go back to the manual system? Please circle YES or NO . If your answer is yes, please PRINT your reason in the space below.

Individual Estimates: 2 yes, 2 no for an average of 50%

“We discovered one major flaw in the PDP. That was the inability to enter more than one digit in the “committed time” field for equipment. During the time we tested, we worked a lot of 10+ hours days and had some equipment, such as arrow boards, that operated 24 hours per day. They had to be entered 3 times on one report to get all the time in. This took a lot of extra unnecessary time that did not occur on the paper form. We did not use the PDP on days when we worked 10 hours or more simply because it took too long.”

“Entire process of using Pen Base and PC takes more time, generates more paper, confusing to crew members.”

10. Please provide any additional comments you wish to make in the space provided below.

From a user that voted YES in question 9: “Still, I feel the PDP can save time once the bugs are worked out. This, after all, is the reason for testing.”

“1) need a D.H.T. Menu; 2) Should be able to list all equipment and materials before moving to next screen; 3) Need to be able to enter alpha and numerical in job functions; 4) Need to be able to enter one field without going through entire system. Most crews work under one function. Sign men may have as many as eight functions and/or roads.”

“ As supervisor, I believe this system has the potential to provide many benefits to TxDOT. In the long term there will be cost savings and increased efficiency as crews and office personnel become proficient in using the equipment. I expect and can tolerate the short-term lag we will see as crews become familiar with a new system. Accuracy will improve, time will be saved, less paper used-all leads to better efficiency. Initial cost for equipment will be high, but I believe there will be a return on the cost in the long term.”

“ There is no system of detecting input errors on the Pen Base, so some information could be processed incorrectly without our knowledge.

· If errors are detected on printouts from the PC, the error can not be corrected until we get the Pen Base back from the crew.

- It is difficult to find a time of day for the crew leader to input data on the Pen Base.
- Mileage on equipment is not current in the Pen Base and does not detect mileage/hours errors.
- There are no original documents with signatures for auditing purposes.
- If the Pen Base were taken out on the road with a crew, mileage for equipment on different jobs has to be allocated to each job and roadway; therefore, there were problems with each employee inputting multiple mileages for one piece of equipment.. In addition, this could not be completed on the roadway, they had to enter the final mileage after returning to the office.
- On large crews, getting each employee's signature for mileage and time was a problem.
- Getting employees motivated to use the Pen Base was difficult and they felt it was a waste of their time. They also feared that taking the Pen Base onto the job site may increase the chances of it getting damaged."

Exhibit 2. Non-PDP Participants Survey and Responses

1. In your opinion, HOW MANY MINUTES does it take to fill out the current written paper form, on the average? Please circle your response:

0-2 3-5 6-8 9-11 12-14 15-17

18-20 21-23 24-26 27-29 30-32 33-35

36-38 39-41 42-44 45-47 48-50 51-53

Average estimate: 12

Number of responses: 228

2. Under the existing written paper system, HOW MANY MINUTES does it take to enter the information contained on one Daily Activity Report into the SES system, on the average? Please circle your response:

0-2 3-5 6-8 9-11 12-14 15-17

18-20 21-23 24-26 27-29 30-32 33-35

36-38 39-41 42-44 45-47 48-50 51-53

Average estimate: 8

Number of responses: 227

3. How many Daily Activity Reports does your section generate in a typical day, on the average?

Please circle your response:

1 2 3 4 5 6 7 8 9 10 11 12 13

14 15 16 17 18 19 20 21 22 23 24 25 26

Other _____

Average estimate: 7

Number of responses: 230

4. How many maintenance crews do you typically have? Please circle your response.

1 2 3 4 5 6 other _____

Average estimate: 4.282895

Number of responses: 228

5. Would you consider participating in a “experimental” project? Please circle YES or NO.

67.7% YES

Number of responses: 226

Table A1. Storage Costs

Location	m ³	Annual cost	Annual cost/m ³
B-CS Self Storage	42.4755	\$768	\$18.08
Amazing Space Self-Storage	42.4755	\$600	\$15.54
Allspace Ministorage of Texas	42.4755	\$720	\$16.95
Watson & Taylor Mini-Storage	42.4755	\$780	\$18.36
Etheridge Storage	28.317	\$624	\$22.04
Longmire Self-Storage	42.4755	\$840	\$19.78
Total	240.6945	\$4392	
Average			\$18.25

Table A2. Training Costs for 5 Days

Item	Value
Cost of PDP trainer @ \$40 /h	\$1600
Pupils per trainer ratio	40
Total cost of instruction per pupil	40
Food cost per pupil per day	20
Total food cost per pupil	\$100
Lodging cost per pupil per day	\$55
Total lodging cost per pupil	\$275
Total cost per pupil	\$415
Pupils per crew	1
Total cost per crew	\$415

Table A3. Calculation of Government Discount

Company	Model	Government		
		Retail Prices	Discount	Discount %
Apple	Performa 631 8/500/CD	\$1,249	\$1,320	-5.68
Apple	Performa 640 12/500/CD/DOS	\$1,849	\$1,781	3.68
Apple	Performa 6116 8/700/CD(Bundle)	\$1,699	\$1,588	6.53
Apple	Performa 6300 16/1200/CD	\$2,799	\$2,616	6.54
Apple	PowerMac 7200/75 8/500/CD	\$1,699	\$1,446	14.89
Apple	PowerMac 7200/90 8/500/CD	\$1,899	\$1,585	16.54
Apple	PowerMac 7500/100 16/500/CD	\$2,699	\$2,552	5.45
Apple	PowerMac 7500/100 16/1000/CD	\$2,999	\$2,836	5.44
Apple	PowerMac 8500/120 16/1000/CD	\$3,999	\$3,777	5.55
Apple	PowerMac 8500/120 16/2000/CD	\$4,499	\$4,249	5.56
Compaq	Compaq DeskPro X1 5 series	\$3,599	\$3,245	9.84
Compaq	Compaq LTE Elite 4/40CX	\$3,279	\$3,028	7.65
Compaq	Compaq 400C	\$3,294	\$2,923	11.26
	Totals	\$35,562	\$32,946	
		Average discount percentage		7.36

Sources:

MacMall Catalog (Apple Retail Prices)

PC Magazine (Compaq Retail Prices)

Compaq Company (Government Discount prices on Compaq)

Microcomputer Center at Texas A&M University
(Government Discount on Apple Products)