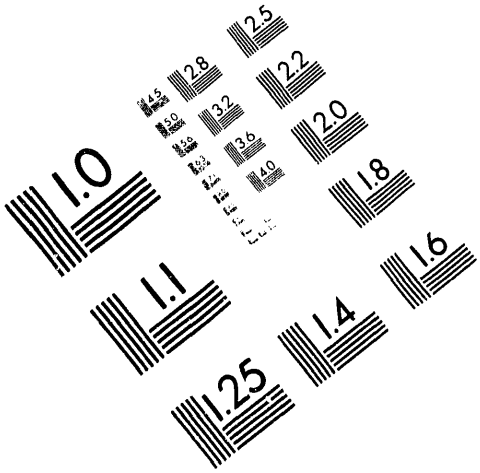

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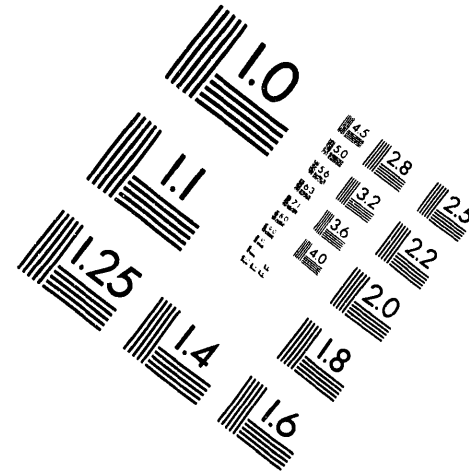

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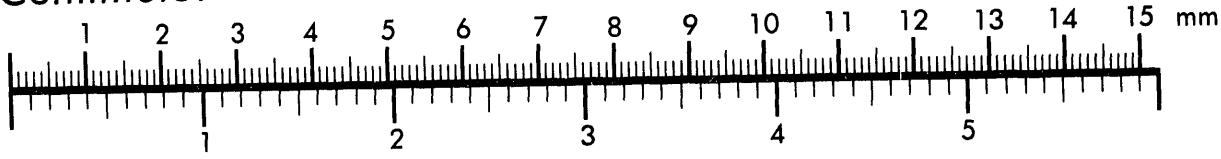

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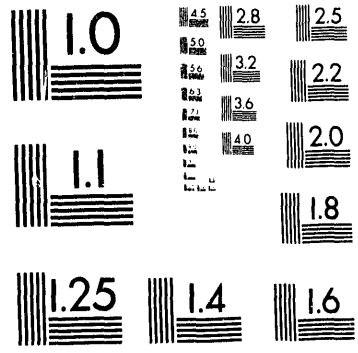

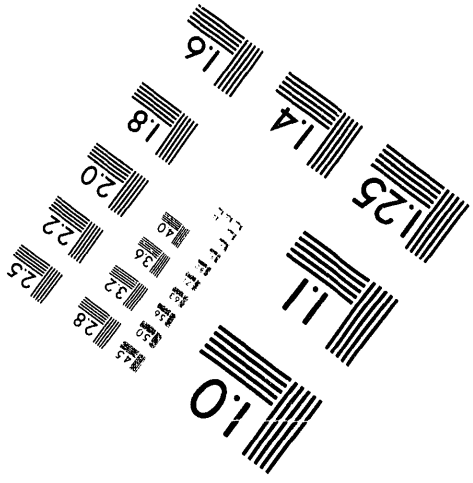

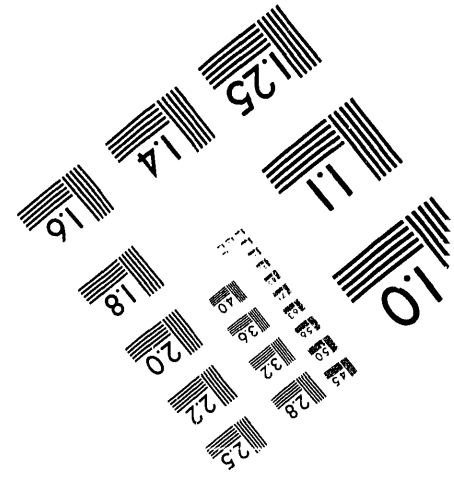

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QUALITY ASSURANCE AND DATA COLLECTION - ELECTRONIC DATA TRANSFER

BY

L. M. Tomczak, W. G. Lohner, E. C. Ray, and J. A. Salesky, FERMCO

and

H. B. Spitz, University of Cincinnati

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Fernald Environmental Restoration Management Corp*
Fernald Environmental Management Project
P.O. Box 398704, Cincinnati, Ohio 45239-8704

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QUALITY ASSURANCE AND DATA COLLECTION: ELECTRONIC DATA TRANSFER

L. M. Tomczak Senior Staff Scientist, J. C. Gore, Technologist II, W. G. Lohner, Engineer I, E. C. Ray, Meteorologist, and J. A. Selasky, Technologist II, Fernald Environmental Restoration Management Corporation, Radiological Environmental Monitoring group, P.O. Box 398704, Cincinnati, Ohio 45239-8704 and H. B. Spitz PhD, University of Cincinnati, College of Nuclear Engineering, Cincinnati, Ohio 45242-0072

ABSTRACT

The Radiological Environmental Monitoring (REM) group at the Fernald Environmental Management Project is involved in an Electronic Data Transfer practice that will result in the improved quality assurance of collected data. This practice focuses on electronic data transfer from the recording instrument to reduce the manpower normally required for manual data entry and improve the quality of the data transferred.

The application of this practice can enhance any data collection program where instruments with electronic memories and a signal output are utilized. Organizations employing this practice can strengthen the quality and efficiency of their data collection program. The use of these practices can assist in complying with Quality Assurance requirements under ASME NQA-1, RCRA, CERCLA, and DOE Order activities.

Data from Pylon AB-5 instrumentation is typically configured to print data to a tape. The REM group has developed a process to electronically transfer stored data. The data are sent from the Pylon AB-5 field instrument to a Hewlett-Packard portable hand computer, model HP95LX. Data are recorded and stored on a 128 K-byte RAM card and later transferred to a PC database as an electronic file for analysis. The advantage of this system is twofold: (1) Data entry errors are eliminated and (2) considerable data collection and entry time is eliminated. Checks can then be conducted for data validity between recorded intervals due to light leaks etc. and the detection of outliers.

This paper/presentation will discuss the interface and connector components that allow this transfer of data from the Pylon to the PC to take place and the process to perform that activity.

INTRODUCTION

Fifteen continuous radon monitors have been installed at the DOE Fernald Environmental Monitoring Project (FEMP) at both on-site and off-site locations to measure what, if any, contribution to the natural radon background is made by sources of radon located on the Fernald project. On-site outdoor locations for each of the samplers have been selected to provide representative measurements of radon that are either close to the sources of emission (K-65 silos that contain concentrated radium byproducts) or near buildings and areas where production occurred. Several monitors have measured radon at the FEMP fenceline and from two background locations a minimum of 13 miles from the project including one located in the opposite direction of the prevailing wind.

Each monitor prints the results of hourly measurements and also stores the

data in the instrument computer memory. Each result consists of four fields of data: sequence number, hour (24 hour clock), instrument response (counts/hour), and radon concentration (pCi/l). Data is retrieved from each instrument by environmental data collection personnel on a weekly basis. Data collection personnel initial each data paper tape and reset the instrument sequence number to initiate another run. An identification number, calibration factors, and other data constants are printed on the data tape whenever the instrument is reset. Data are also collected/transferred electronically onto a hand held computer at each location. The instrument response is also conducted using a check source on a weekly/monthly basis per established protocol.

The radon collection instruments are housed in environmental enclosures to protect them from the direct adverse effects of the environment but are not heated or sealed in any manner. They operate 24-hours a day and are expected to function properly in all types of weather and generate 168 hourly readings each week. The instruments sample radon in the ambient air based upon the diffusion principle and, thus, have no moving parts or pumps. Other than weekly inspection by the data collection personnel to retrieve data, reset the instrument, and insure that the instrument is still operating, no other operator attention is provided or required. Instrument re-calibration is scheduled on an annual basis contingent upon the satisfactory instrument source check results.

OVERVIEW

Collection of data, albeit an important function, comprises only half of the environmental monitoring activity. Sometimes it can be just as cumbersome to appropriately deal with the data that has been collected, as it can be to collect the data. The Radiological Environmental Monitoring group at the DOE FEMP facility has identified a solution, to at least take some of the dread and monotony out of the voluminous environmental data reduction and reporting activity, without sacrificing quality.

OBJECTIVE

Obtaining a workable electronic file for generating reports from data tapes requires considerable labor intense quality assurance activities. These steps are depicted in Figure 1. To relieve the burden of work related to the data collection and reporting, a method has been devised to transfer the data electronically. These steps are depicted in Figure 2.

There are essentially two steps in the electronic data transfer process. The first step is the transfer of an electronic data file from the Pylon AB-5 unit to RAM card on a handheld computer in the field. The second step is the transfer of field data from the RAM card to an electronic data file back at the office on the hard drive of a PC.

This data is then transferred via disk along with the hard copy data tape of the Pylon AB-5 data to a data previewer, and then to an independent group that produces the environmental reports. This activity should eliminate data errors and data entry form.

MATERIALS NEEDED

The following is a list of equipment that is needed to complete the electronic data transfer from the AB-5 Pylon to a personal IBM disk operating system computer.

- Pylon AB-5 Radon Monitor
- Pylon Model PPT-1 Printer
- Pylon Model CI-55 Computer Interface
- CPRD (radon detector) or a 300A Lucas cell
- DB15 Female A/B Switch Box
- DB15 3 foot M.M. Transfer Cable
- DB15 3 foot M.F. Transfer Cable
- DB25/9 M.M. Gender Changer
- DB15 M.M. Gender Changer
- HP95LX Computer
- HP F1001A Connectivity Pack
- HP F1002A 128 K-byte RAM card
- 128 K-byte RAM card drive linked to PC

METHODOLOGY

Data collection personnel have procedures for performing instrument checks and retrieving data from each of the instruments. They observe instrument operation and determine that the data output tape appears normal. They also initial the data tape, electronically transfer the data, and reset the instrument. Should the instrument appear to be malfunctioning, they will notify management and initiate a service request from the instrumentation group. Periodically, after electronically transferring and collecting the data, the data collection personnel perform an instrument response check by removing the radon sampler and attaching a check source. Following the performance check, the data collection personnel re-attach the radon sampler to the monitor, and reset the instrument.

The following are the steps that are needed to transfer the electronic data file from the Pylon AB-5 unit to a personal IBM disk operating system computer. Each step of transfer will be presented in detail in the Appendix.

QUALITY ASSURANCE OF TRANSFERRED DATA

To ensure that the data are successfully transferred from the Pylon AB-5 to the RAM card, a quality control check is performed each week. During the weekly inspection one data tape from those collected is randomly selected and 10% of the data points are randomly chosen and compared to the same data points on the electronic file. Once each quarter, one data tape is randomly selected and all data tape data points are compared with the electronic file data points.

SUMMARY

Using the electronic data transfer scheme described in this paper, radon data can be easily converted into an electronic file for further processing. Once the data are transferred to a disk, the data can be previewed by the individual assigned the task of quality assurance and data validation. It

will be necessary to parse the data using a lotus function to be able to work with each of the columns. This data translation process would also be required if other software programs (any software capable of handling ASCII) were used in the transfer process. A check of data will then need to be conducted to confirm that the data was correctly transferred and that all data points were valid observations.

By utilizing the electronic transfer of data, considerable time can be saved in both the areas of manual data entry, and the checks that are required to ensure that the data is correct. Activities that had previously taken more than a day can be performed in much less than a day without sacrificing data quality.

REFERENCES

HP 95LX User's Guide, Hewlett-Packard Co., 1991, Corvallis, OR

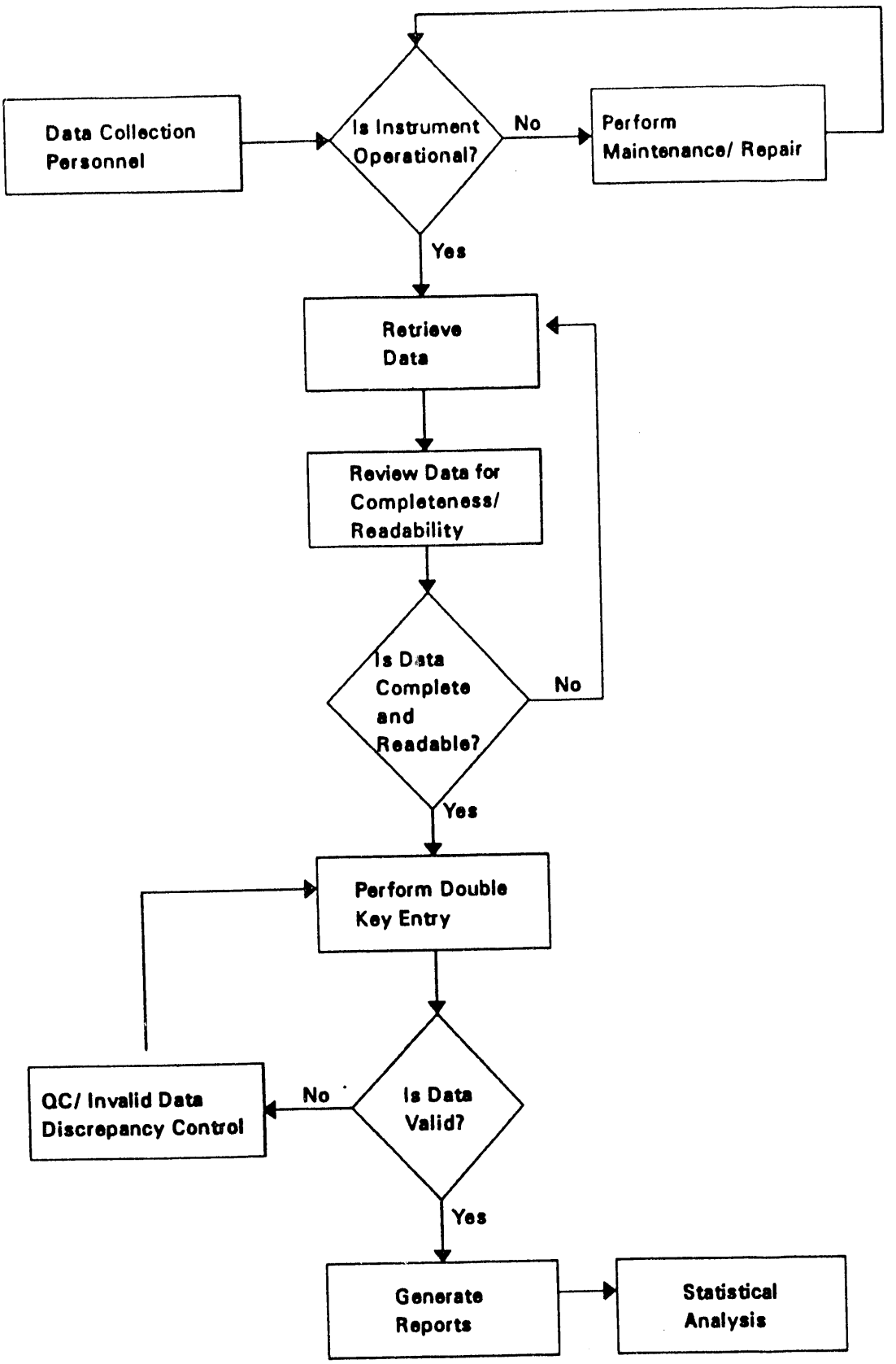

FIGURE 1

Manual Data Collection and Data Entry

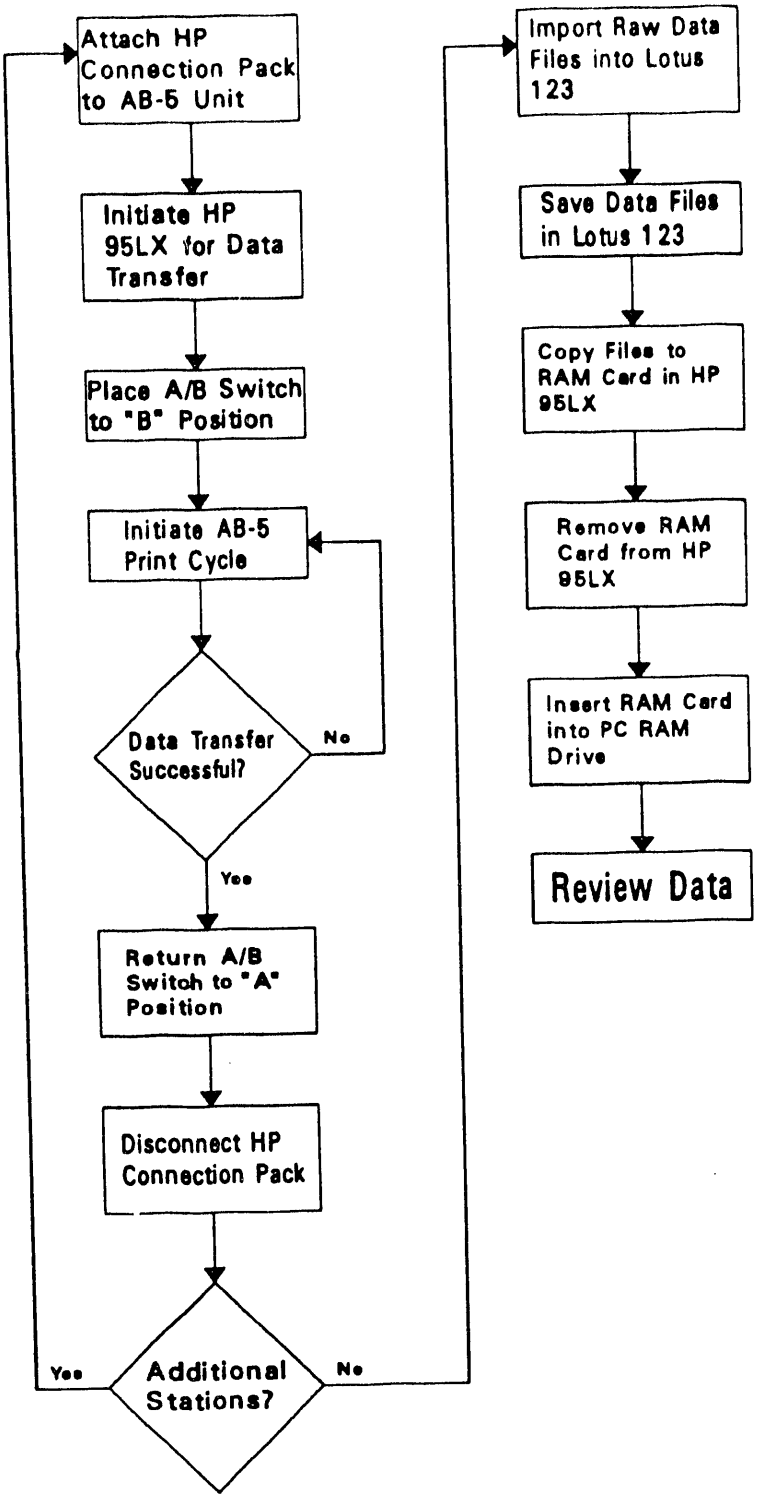

FIGURE 2

Data Transfer from AB-5 to HP 95LX
Data Transfer from HP 95LX to PC

APPENDIX

TRANSFERRING DATA FROM THE PYLON MONITOR TO THE HP95LX COMPUTER

1) Hook up the HPF100A1 Connectivity Pack to the HP95LX and the CI-55 Computer Interface
   Connect the CI-55 to a DB-15 M.M. Transfer Cable.

2) Prepare the HP95LX for use

Turn on the HP95LX
Press: **ON/OFF** key

Press: **BLUE FILER** key
Select PRN (DIR)
Press: **CURSOR DOWN** key
Note: Delete all PRN files to start off the day. This will ensure that sufficient memory will be available on the unit to collect the data.

Press: **F9** key to tag the old file to be deleted

Press: **F3** key
Y key (to delete)
MENU key

Press: **Q** key to quit
Press: **COMM** key
Press: **MENU** key
Press **S** key for **SETTINGS** selection
Press: **U** key for **USE** selection

Press: Cursor Arrow ---> key over to File (PYL.DCF)
Press: **ENTER** key
Check the following setup information:

Port:

Inter.	1
Baud	3
Stop	1
Parity	none
Char	8

Dial:

Type	Pulse

Press: **Q** key for **QUIT** selection

Hold **CTRL** key and press F-5 key simultaneously

Backspace to **DAT** and delete by using the <---(Break) key
Type **PRN\name.prn**
Press: **ENTER** key

Note: 8 characters max. name

Press: **MENU** key

Press: **C** key for **CONNECT** selection
(at this point set up the pylon to send data)

3) Transferring data from the pylon unit to the HP95LX:

Pylon Monitor
Press: **START/STOP** key to stop current run

Switch Box
Place **A/B** switch to **B** position

Pylon AB-5 unit
Press: **RECALL** key

Press: **PROG STEP** key, this will show the most current run.
.. it is necessary to collect a different run use the **PUMP** key to change the first digit and the **START/STOP** key to change the second digit. After the **RUN** is selected press the **PROG/STEP** key 3 times.

Press and hold: **STATUS** key
Display will show the run, cycle, and interval.

Press: **PROG/STEP key** while holding the **STATUS** key
This will start the data transfer.

Release: **PROG/STEP** and **STATUS** key.
When the data transfer is complete the Pylon AB-5 display will display the word "ready" .

Switch Box
Reposition **A/B switch** to the **A** position
Disconnect CI-55 Computer Interface cable from transfer cable on switch box.

HP96LX Computer
Press: **MENU** key to exit program
Press: **Q** key for **QUIT** selection

4) Checking data transfer
Press: **FILER** key
Select the **PRN (dir) ENTER** key
(check if file and data exists)

Press: **MENU** key
Press: **Q** key for **QUIT** selection
Turn off instrument
Press: **ON/OFF** key
Note: Prepare for next station. At the next location it is not necessary to repeat step #2, but step #1, the hookup is still applicable.

DATA TRANSFER FROM THE INTERNAL DRIVE OF THE HP95LX TO THE RAM CARD

1) Transfer data from the HP95LX capture file to the HP95LX Lotus 123 Directory on the RAM Card

   Turn on the HP95LX
   Press: **OFF/ON** key
   Press: **LOTUS 123** key
   Press: **MENU** key
   Press: **F** key for **FILE** selection
   I key for **IMPORT** selection
   T key for **TEXT** selection
   Arrow to ---> **_PRN** enter
   Search for file of interest
   Press: **ENTER** key

2) Saving the file

   Press: **MENU** key
   F key for **FILE** selection
   S key for **SAVE** selection

   Press **ESC** key two times
   Type in A:\file name
   Press: **ENTER** key
   Press: **R** key for **REPLACE** selection if necessary to write over previous data
   Press: **ENTER** key
   Repeat this step to transfer the files to the LOTUS (dir Drive A RAM card)
   Transfer data from the 128 K-byte RAM Card to the PC via the RAM Card Drive

   Press: **MENU** key
   Press: **Q** for **QUIT** selection
   Press: **Y** for **YES** selection
   Turn off the HP95LX
   Press: **ON/OFF** key

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