CK4 INSTRUMENT
AND CORRDATA™ CK
SOFTWARE
QUICKSTART GUIDE

CORRDATA™ CK Software
for CK4 CORROSOMETER® instrument,
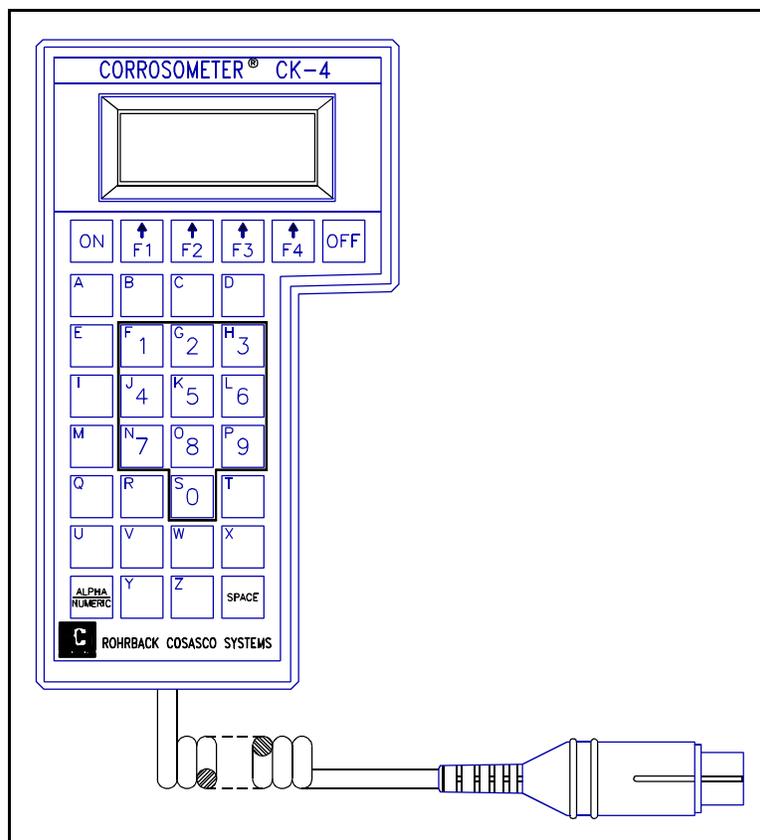CORROSOMETER®, and CORROTEMP™ Probes

CORRDATA™ Corrosion Monitoring System
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Introduction

The CK4 CORROSOMETER and CORROTEMP probe measuring instrument is designed to simplify probe reading and data presentation.   CORROTEMP probes incorporate temperature measurement into the standard CORROSOMETER probes without any additional connections. This additional independent data can be very helpful in correlation of corrosion rated with operating temperature changes.

CK4 CORROSOMETER Instrument

2 CK4 Instrument and CORRDATA CK Software

The CK4 instrument measures CORROSOMETER and CORROTEMP probes and allows readings to be stored for up to 26 probes. This stored data is later retrieved and entered into the CORRDATA CK Graphical Software, which is supplied free of charge with each instrument.

Setup

1.   Load your IBM P.C. or compatible with CORRDATA CK Software.

2.   Configure the P.C. with the CORROSOMETER an CORROTEMP probes to be monitored.

3.   Set the date and time on the CK4.

Data Collection

1.   Plug the CK4 into each CORROSOMETER or CORROTEMP probe, and take the probe reading.

2.   Store the probe reading in one of the twenty-six letter registers.

3.   At the P.C., start the CORRDATA CK software, read back the stored probe readings from the CK4 lettered registers, and enter them into the program.

4.   Select and display the probe graphs as required.

The above steps are explained in more detail on the following pages.

Installing CORRDATA CK Software

1.   Check that your P.C. is an IBM or compatible, with EGA or VGA graphics, a hard and floppy disk drive, and running MS DOS 3.3 or higher (MS DOS 4.01 or 5.0 is preferred for greater graphics print screen flexibility).

2.   Choose the 3½" diskette or the first 5¼" diskette to insert into your floppy drive. At the DOS prompt change to the floppy drive containing the diskette, and type **install**.

3.   Follow the on-screen instructions. The default settings install the files in the CORRDATA directory under the C: drive root directory.

> *__NOTE:__ The install program also requests selection of COM1 or COM 2 serial port. Although the serial port is not used with manual input readings from the CK range of portable instruments, this program is also capable of operating with the CORRDATA Remote Data Collectors, and Mate I and II probe reading and data transfer units. These systems allow fully automated data collection and direct transfer to the P.C. without the need for any manual data transfer. For further details contact Rohrback Cosasco Systems Inc.*

4.   Remove the CORRDATA Software diskette and save as a backup.

Setting the Clock on the CK4

The CK4 has its own clock so that individual probe readings are automatically date and time stamped. To set the CK4 clock:

1.   Install the batteries in the CK4 instrument by first removing the battery compartment cover on the back of the instrument. Ensure that the correct polarity is observed as indicated in the battery compartment.

2.   Switch **ON** the CK4.

3.   Press **TIME** (F4). This will display the current date and time, if already set.

4.   To make changes press the **MONTH** (F1), **DAY** (F2), and **YEAR** (F3) keys as required. Press once for a single change; hold down the key for scrolling; hold down the **ALPHA/NUMERIC** key in addition to reverse the direction of scrolling.

5.   Use the same method to set time. When complete press **Exit** (F4).

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Entering Probe Configuration Information

1.   In the CORRDATA sub-directory type CK to start the CORRDATA program.

2.   Press **Enter** to clear the logo display screen and show the main menu.

3.   From the main menu and sub-menu select **SetUp**, and **Units**. Choose the engineering units desired from **mils** (0.001"), **millimetres** (mm), or **micrometres** (µm), and press **Enter**.

4.   From the main menu and sub-menu select **Configure** and **New** respectively. Select **Manual Co** (Manual CORROSOMETER) for CORROSOMETER probe configuration or **Manual CoT** (Manual CORROTEMP) for a CORROTEMP probe configuration. In either case the entry screen is similar.

> *__NOTE:__   The other selections in this sub-menu are not applicable to use of this program with the CK4 instrument. They are part of the CORRDATA software for the fully automated data collection that may be achieved with Remote Data Collectors (RDC's) and either a Mate I or Mate II data transfer unit. To see a demonstration of the capability of this type of system, retrieve the demonstration graph __DEMO.SAV__ as described later in the section "Archiving and Retrieving Old Data Files".*

```
┌─────────────────────────────────────────────────────────────┐
│              CORRDATA CORROSION MONITORING SOFTWARE          │
├─────────────────────────────────────────────────────────────┤
│ New  Edit  Delete          Load                             │
├──────────────┬────────────────────────────────┬─────────────┤
│ RDC-Co.      │        CORROSOMETER Probe       │             │
│ RDC-Ca.      │                                 │             │
│ Co Probe     │ PROBE    Tag      [AE 1234    ] │   Replace   │
│ CORROTEMP    │          ID  No   [1]           │             │
│ Ca Probe     │          Location [V105 Overhead Condenser] │ │
│ Manual Co    │          Model No [3500-T20-K03005-18-0-0-0]│ │
│ Manual CoT   │          Alloy    [C.Steel]     │             │
│              │          Type     [A] [B] [C]  [D]           │
│              │          Span     [10.00] mils  │             │
│              │          Alarm Rate [15]   mils/year         │
│              └────────────────────────────────┘             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
├─────────────────────────────────────────────────────────────┤
│ F1=HELP         F2=SAVE           ENTER=SELECT              │
└─────────────────────────────────────────────────────────────┘
```

Typical Manual CORROSOMETER Probe Configuration

4.   Complete the CORROSOMETER or CORROTEMP Probe Entry screen with a minimum of **ID** Number (Upper Case A to Z is recommended to match the CK4 memory labels), Probe **Type** and **Span**.

*WARNING!   CORROSOMETER or CORROTEMP probe type and span are designated on the probe and its package label. Probe Span is designated in units of mils only. This probe Span **must** be entered in these same units irrespective of which units have been selected under SetUp. The program then takes care of the different engineering units selected. In fact the display engineering units may be changed at any time.*

The ↑ and ↓ arrows select the individual entry field as indicated by the highlight bar. Press the **Enter** key to enter the field entry box. Type in the required information or select the required preset value. Press **Enter** to complete the field entry.   When complete save the complete Probe Entry screen with **Save** (F2).

5.   Repeat the process for each CORROSOMETER to be monitored.

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Configuring CK4 with Probe Span

This procedure is only necessary if a corrosion <u>rate</u> calculation is required on the CK4 based on the current and last probe reading only.   Normally the probe data is best reviewed on the P.C. If this calculation is not required on the CK4 proceed to the next section.

1.   Switch **ON** the CK4. Press **SPAN** (F3).

2.   Press the key (A-Z) corresponding to the probe label to be configured.

3.   Use the **TENS** (F1) key and the **ONES** (F2) key to change the span. Hold down the key to scroll up through the values; hold down the **ALPHA/NUMERIC** key to scroll down the values. Enter the probe span in <u>mils</u> as marked on the probe.

> *NOTE*:   *A corrosion rate will only be computed on the CK4 instrument display if the probe readings are more than fourteen days apart.*

Reading Probes with CK4 Instrument

1.   Switch **ON** the CK4 instrument, and connect to the CORROSOMETER or CORROTEMP probe to be read.

2.   Press **READ** (F1), and select the probe type, **WIRE** (F1), **T/S** (F2), or **SPEC** (F3). Probe types are labelled on the probes as type **A** for WIRE , type **B** or **C** for T/S, and type **D** for SPEC respectively. Alternatively the lettered keys **A**, **B**, **C**, or **D** may also be used directly to enter the probe type.

3.   Select and press the label (A-Z) corresponding to the configuration label used on the P.C. against which to store the data.

> *NOTE*:   *Mark the probe with label A-Z to ensure correct probe identification for data collection and transfer to the P.C.*

4.   The probe reading will take approximately 2 minutes and 45 seconds. At the end of this time the probe data will be displayed.

> *NOTE*:   *If a probe is near the end of its life a warning message will be displayed. A warning to "Replace Soon" is displayed above 80% of probe life, and "Replace Now" above 95% of probe life.*

5.   If a CORROTEMP probe is being read, press **TEMP** (F4) to read the probe temperature. This reading will take approximately 45 seconds to complete, and then be added to the data display.

6.   Again select the probe label (A-Z) against which to store the reading.

7.   To exit the data display screen either turn **OFF** the CK4, or press any other key except F1 to F4.

8.   The last probe readings from any probe may be reviewed on the CK4 from the main menu by pressing **DISP** (F2), and then the label (A-Z) of the required probe. To read any other probe, press its label (A-Z)

Entering Probe Data into the P.C.

1.   From the CORRDATA main menu select **File**, and from the sub-menu **Man Input**. This will display the listing of configured probes.
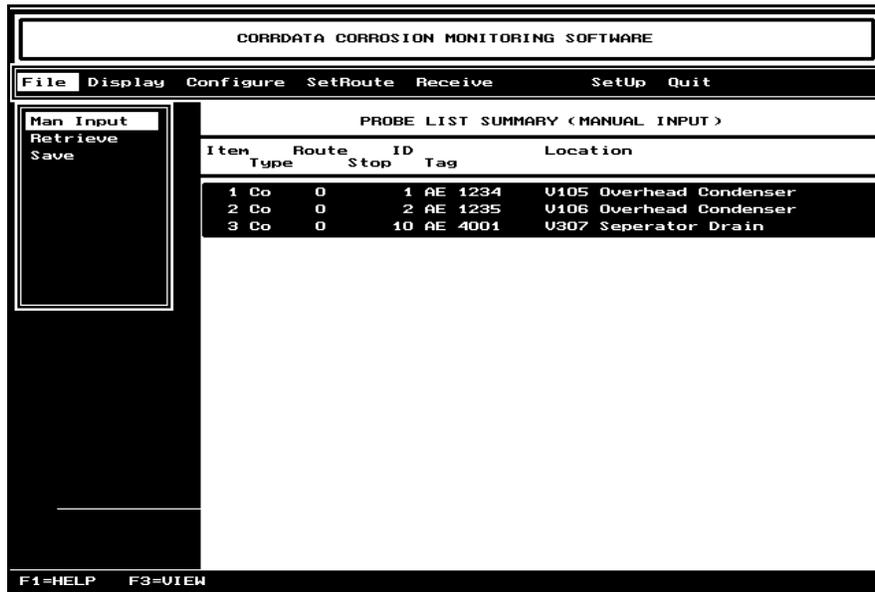

```
CORRDATA CORROSION MONITORING SOFTWARE

File  Display  Configure  SetRoute  Receive        SetUp  Quit

Man Input                PROBE LIST SUMMARY <MANUAL INPUT>
Retrieve
Save          Item   Route   ID              Location
                  Type      Stop   Tag

              1 Co    0        1 AE 1234    V105 Overhead Condenser
              2 Co    0        2 AE 1235    V106 Overhead Condenser
              3 Co    0       10 AE 4001    V307 Seperator Drain

F1=HELP   F3=VIEW
```

Typical Manual Input Probe List

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> *NOTE:*   *If this program is used as an add-in to the CORRDATA program for Mate I or Mate II to permit additional input from a CK3 or CK4 instrument, this list will only display probes that have been configured for manual input. This simplifies selection of manual entry probes, and avoids confusion with fully automated data entries.*

2.   For guidance on the data entry keys, see the menu bar at the base of the screen.

3.   Use the ↑ and ↓ keys to select the probe for which data is to be input.

4.   Switch **ON** the CK4 and press **DISP** (F2), and select the probe label corresponding to probe selected on the P.C.

5.   On the P.C. press **Enter**, to bring up the data entry screen.

```
┌──────────────────────────────────────────────────────────────┐
│           CORRDATA CORROSION MONITORING SOFTWARE               │
├──────────────────────────────────────────────────────────────┤
│ File  Display  Configure  SetRoute  Receive      SetUp  Quit   │
├──────────────┬───────────────────────────────────────────────┤
│ Man Input    │           CORROSOMETER Probe                   │
│ Retrieve     │                                                │
│ Save         │ PROBE    Date        00/00/00                  │
│              │          Time        12:00                     │
│              │          Check       0                         │
│              │          Measure     0                         │
│              │                                                │
│              │ 01/17/93    11:00      807      109            │
│              │ 01/21/93    12:00      809      163            │
│              │ 01/25/93    11:00      806      170            │
│              │ 01/27/93    14:00      804      173            │
│              │ 02/01/93    10:00      806      198            │
│              │ 02/04/93    14:30      807      242            │
│              │ 02/06/93    12:00      806      283            │
│              │ 02/08/93    16:00      806      289            │
│              │                                                │
│ F1=HELP        F2=SAVE         ENTER=SELECT                    │
└──────────────────────────────────────────────────────────────┘
```

Typical CORROSOMETER Probe Data Input Screen

6.   For a CORROSOMETER probe, the input fields are **Date**, **Time**, **Check** reading, and **Measure** reading. Use the ↑ and ↓ keys to select the required field, and the **Enter** key to enter and leave each data entry box. At initial entry the cursor is set to the overwrite mode as indicated by the thick cursor. On a CORROTEMP probe an additional data entry box for temperature will also appear.

7. In the **Date** field type the month, day, year from the CK4 screen in the form indicated on the P.C. screen. When complete press **Enter** again to leave that data entry box.

8. The **Time** entry box is set to a default of 12:00 mid-day. This may be left unchanged if the time of day that readings were taken are not significant, such as for low corrosion rates. Otherwise type the time from the CK4 screen in the format indicated.

9. Type the probe **Check** reading from the CK4 screen. The very first probe entry is the most critical as it is the one against which all the others will be compared, to determine if the check reading has gone bad. This is based on ± 20 divisions from the initial reading, and is indicated by a thinner graph line than the normal.

    WARNING!   Once the first reading has been saved with the F2 key the initial check reading cannot be reset without first deleting the probe in the Configure menu. This applies even if the Edit command is used to change the check reading as displayed.

10. Type the probe **Measure** reading from the CK4 screen.

11. For a CORROTEMP probe type the **Temperature** reading from the CK4 screen. When satisfied with all the entries for that probe reading pres **F2** to save the data.

    NOTE: At least two probe readings must be entered to be able to display a graph.

12. From the manual probe list summary, or the individual probe data list, the graphical display may be viewed by the shortcut key **F3**. **Esc** will then return back to the same place. The full display features are available under **Display** on the main menu.

13. When one probe entry has been completed, press **Esc** return to the manual probe summary list, and select the next probe for data entry. When all the probes have been completed press **Esc** as required to return to the main menu.

14. To edit any probe data from the manual probe summary list, use the **Insert** key instead of the **Enter** key. To remove a line of probe data use the **Delete** key.

    NOTE: The date of a probe reading may only be edited to within the range of dates of the readings on either side of it, otherwise the graph will "turn back" on itself when viewed. It is not possible to delete the

*last two probe readings. If this is required, the whole probe must be deleted from the **Configure** menu.*

Displaying CORROSOMETER Probe Graph

1. From the CORRDATA Main Menu select **Display** and then **List** to show a complete list of probes on the system.

2. Use the ↑ and ↓ arrows to move the highlight bar to the selected entry.

3. Press **Esc** and **View** to display the probe graph.

4. To select any other probe press **Esc** and **List**. Repeat steps 2 and 3.

Displaying CORROTEMP Probe Graphs

Displaying CORROTEMP probe graphs is the same as for CORROSOMETER probes as far as metal loss data is concerned. To display the probe temperature readings, press "T" on the keyboard. Press "T" again to toggle back to metal loss.

> *NOTE: With CORROTEMP probes only one parameter of metal loss or temperature may be zoomed at a time in the y-axis. Zooming in the x-axis always is applied to both measured parameters to provide accurate correlation.*

Zooming Probe Graphs

1. Graphs initially show all the probe data up to 1131 points for CORROSOMETER probes. The range of interest may be zoomed in by using **X-Select** and **Y-Select** from the **Ranges** sub-menu.

2. To zoom in on Y-axis range press **Esc**, select **Range**, and **Y-Select**.

3. Move the selection cursors with the ↑ and ↓ arrows. Use the **Space bar** to toggle between the cursors (Note the cursors initially start on the top and bottom edges of the graph, and the initial selection is the bottom cursor).

4. When satisfied with the selected range press **Esc**.

5.   To zoom in on the X-axis select **X-Select**. The graph will reappear with vertical cursor lines. Move these cursors using the → or ← arrow keys, and use the **Space bar** to toggle between the two cursors (Note the cursors start initially at the sides of the graph and the initial selection is the left cursor).

6.   When satisfied with the selected range press **Esc** twice and then **View** to display the zoomed in graph.
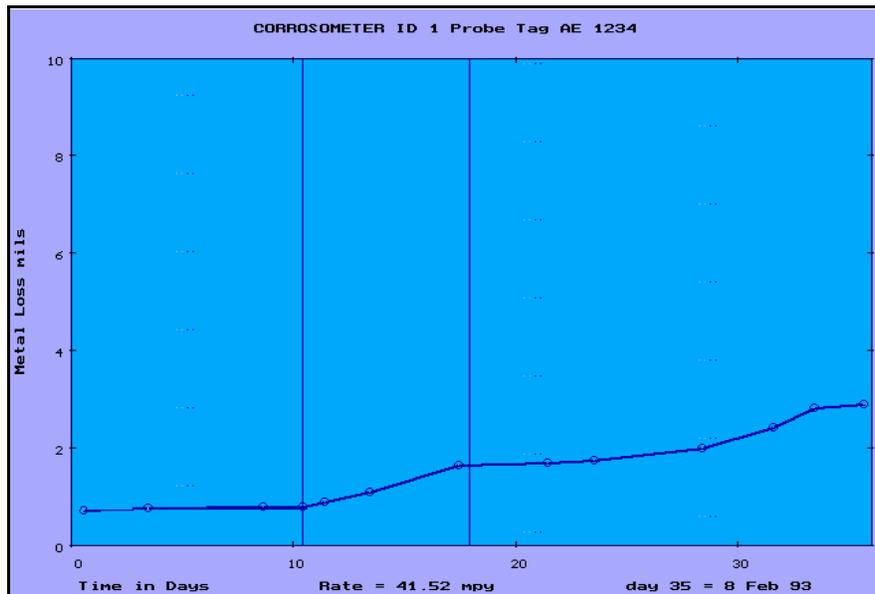
Typical CORROSOMETER Probe Graph

Automatic Calculation of Corrosion Rates

1.   In the **View** mode with a CORROSOMETER or CORROTEMP probe metal loss graph, any part of the graph may be selected for automatic computation of corrosion rate. Move the cursors with the → and ← keys and use the **Space bar** to toggle between cursors. Select the area of interest and press the **Enter** key. After a short period the corrosion rate will be displayed based on linear regression of all the data points between the cursors.

      NOTE: *The left hand cursor is selected initially. No corrosion rate is calculated until the **Enter** key is pressed.*

2.   If the cursors are positioned between data points, the CORRDATA program calculates the point at the cursor based on the straight line connecting the data points on either side. This point is then used in the linear regression formula.

3.   With CORROTEMP probes displaying temperature, the cursors calculate the average temperature between the cursors.

Printing Corrosion Graphs

1.   The MS DOS **graphics** file must be loaded BEFORE graphs can be printed from the CORRDATA program. If the program has already been loaded without the DOS graphics file and a graph print-out is required, quit the program, load the graphics file as described below and restart the CORRDATA program.

2.   With MS DOS 4.01 or 5.0, loading the appropriate **graphics** file from the DOS prompt before running CORRDATA software, enables **Shift** + **Print Screen** for printing.

2.   MS DOS 5.0 provides the widest range of printer compatibility, including laserjet, and inkjet. The common commands are as follows:

graphics/r	- IBM Proprinter, Epson FX and compatibles
graphics laserjet/r	- HP Laserjet and compatibles
graphics laserjetii/r	- HP Laserjet II and compatibles
graphics paintjet/r	- HP Paintjet
graphics deskjet/r	- HP Deskjet

NOTE: *The "/r" prints the screen as it appears on the P.C. monitor screen with a white background. If "/r" is omitted the background will be black, thereby increasing ribbon, toner, or ink consumption.*

For other options or more detail see the MS-DOS Manual.

Archiving and Retrieving Old Data Files

The basic CORRDATA software provides for saving of files one at a time for archiving purposes, and for retrieving files for viewing one at a time. Any files saved are automatically given the extension .SAV to avoid any overwriting of data files even if they are saved to the CORRDATA directory. For archiving purposes, set up sub-directories for the required time periods (such as CD_MAR93) and save the archive data to this sub-directory. Each file will store up to 9,000 data points.

To save the current data to a sub-directory, first create the sub-directory in DOS at the required location before entering the CORRDATA program. Start the CORRDATA program and select **Save**, and press **Enter** to display the following screen.
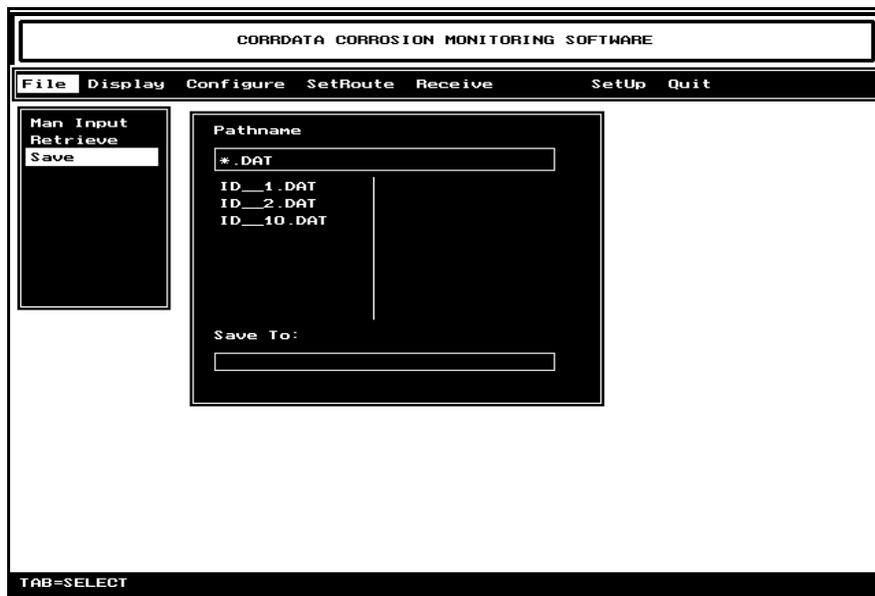
```
┌──────────────────────────────────────────────────────────┐
│            CORRDATA CORROSION MONITORING SOFTWARE          │
├──────────────────────────────────────────────────────────┤
│ File  Display  Configure  SetRoute  Receive     SetUp  Quit│
├──────────────────────────────────────────────────────────┤
│ Man Input  │    Pathname                                   │
│ Retrieve   │                                               │
│ Save       │    *.DAT                                       │
│            │                                               │
│            │    ID__1.DAT                                   │
│            │    ID__2.DAT                                   │
│            │    ID__10.DAT                                  │
│            │                                               │
│            │                                               │
│            │                                               │
│            │    Save To:                                    │
│            │                                               │
│            │                                               │
│                                                            │
│ TAB=SELECT                                                 │
└──────────────────────────────────────────────────────────┘
```

Fig 5. CORRDATA Software File Saving Sequence

The .DAT files are the data files in the current program directory. Press the **Tab** key to switch from the cursor in the pathname box to a highlight bar in the file list below. Use the ↑ or ↓ keys to make the required selection, and press the **Tab** key. This will display the selected file into the "Save to" box with the cursor and a .SAV file extension, and leave a gray highlight bar at the selected probe in the file box above. Modify the pathname as necessary for the destination sub-directory (such as c:\CORRDATA\MAR 93\ID__1.SAV) already created in DOS. Press **Enter** to save the file , or use **Esc** to leave this screen without saving.

> ***NOTE:*** *Data files can only be saved to an archive directory one at a time.*

Archived data files may also be retrieved for the full viewing and analysis capability of the CORRDATA program from the **Display** menu. Only one data file at a time may be viewed from the archive files.   Range zooming and rate calculations on graphs are fully operational on the retrieved file until exiting back to the probe list summary. Exiting the **View** or **Range** on the **Display** sub-menu to **List** or back to the main menu will automatically cancel the archived data file selection.

> ***NOTE:*** *A retrieved file is never added to the probe list in the current CORRDATA program directory. This may only be achieved by changing the filename outside the program to an unused ID number, installing the file in the CORRDATA program directory, and then selecting this ID number only through the **NEW** entry screen in the **Configure** mode, and **View** in the **Display** mode.*

To Retrieve an archived file, select **File** from the main menu, and **Retrieve** from the sub-menu. The box that appears will show a pathname box with a cursor present, and a blank file box. Modify the pathname as required to select the required directory and files using wildcards and extensions as convenient to simplify the displayed list of files (example: C:\CORRDATA\CD_MAR93*.SAV).   This will produce a display similar to the following.
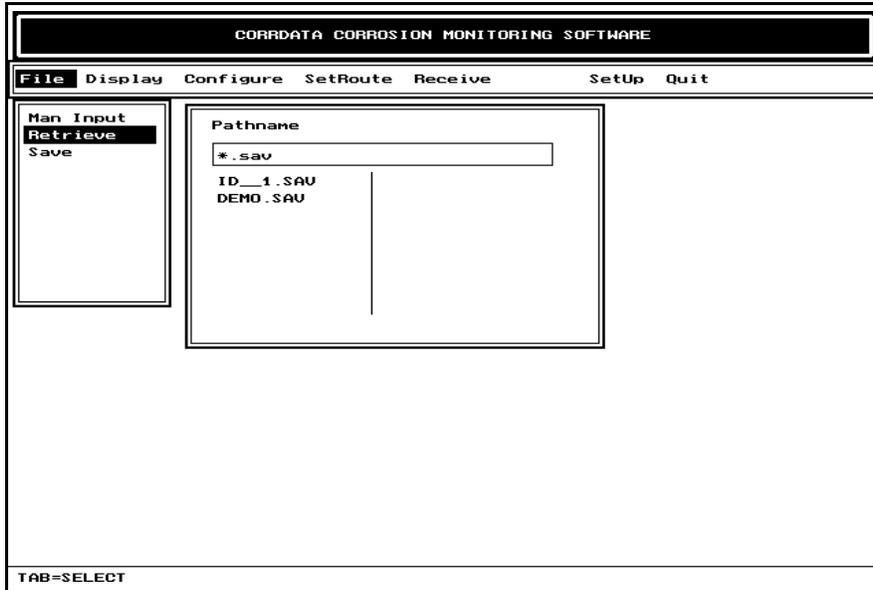
```
┌────────────────────────────────────────────────────────────────┐
│  ███████████████████████████████████████████████████████████   │
│  █        CORRDATA CORROSION MONITORING SOFTWARE          █     │
│  ███████████████████████████████████████████████████████████   │
│  ┌────────────────────────────────────────────────────────┐    │
│  │ File  Display  Configure  SetRoute  Receive     SetUp  Quit │
│  └────────────────────────────────────────────────────────┘    │
│  ┌──────────────┐  ┌──────────────────────────────────────┐    │
│  │ Man Input    │  │  Pathname                            │     │
│  │ █Retrieve   █│  │  ┌─────────────────────────────────┐ │     │
│  │ Save         │  │  │ *.sav                           │ │     │
│  │              │  │  └─────────────────────────────────┘ │     │
│  │              │  │    ID__1.SAV    │                    │     │
│  │              │  │    DEMO.SAV     │                    │     │
│  │              │  │                 │                    │     │
│  │              │  │                 │                    │     │
│  │              │  │                 │                    │     │
│  └──────────────┘  └──────────────────────────────────────┘    │
│                                                                 │
│                                                                 │
│  TAB=SELECT                                                     │
└────────────────────────────────────────────────────────────────┘
```

Fig 6. CORRDATA Software File Retrieval Sequence

Press **Tab** to switch from the pathname box to a highlight bar in the file list box. Use the ↑ or ↓ arrows to select the required RDC and press **Enter**. Press **Display** and **View** to display the graph. The graph may be zoomed as required, and corrosion rates displayed with the cursor keys and **Enter**. To return to the current operating probe list, press **Esc** and **List**.