

**EM34RT GROUND CONDUCTIVITY METER
WITH POLYCORDER 600
OPERATING INSTRUCTIONS**

Version 3.50

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INTRODUCTION

The Geonics EM34RT Data Logging System consists of a Polycorder Digital Data Recorder and Polycode programs used by the Polycorder.

This documentation describes the use of the Polycorder Series 600 with the Geonics EM34RT Ground Conductivity Meter.

The EM34RT system runs programs on the Polycorder called EM34RT, CREATEDIR, and DUMP34RT.

The program EM34RT allows to record data, together with a time stamp at each station. Data file created with this program can be used to position survey according to locations recorded by a Global Positioning System (GPS).

Program EM34RT displays and records survey data under the control of the operator. It also records various field information such as survey line, starting station, increment, comments, etc. Readings are displayed in the real time in mS/m. The program allows the user to check an amount of free memory while taking data, without leaving the program. Over 13,000 (8,700 with GPS option) readings can be stored. This applies to the standard Polycorder with memory of 128 Kilobytes. An optional Polycorder with up to 448 Kilobytes of memory can be used.

The DIR34 is an internal directory file used by the program. Since the file DIR34 has to be present in order to run EM34RT program, the CREATEDIR file is provided to create a directory file DIR34 in case the latter was deleted by mistake or data files were erased manually.

SECTION I - THE POLYCORDER

TURNING THE POLYCORDER ON AND OFF

1. To turn the Polycorder on and off:
 - press the Polycorder key marked ON/OFF

POLYCORDER KEYPAD

The following is a brief description of how to use the Polycorder keypad. It should suffice to enable the operator to use the EM34RT system. More detailed information is available in the Polycorder manual.

<u>KEY</u>	<u>DESCRIPTION</u>
ESC	This key will exit whatever operation the Polycorder is in the process of doing and return to the MODE: prompt (see BUILT-IN POLYCORDER SOFTWARE).
ON/OFF	Turns Polycorder on or off.
SHF	Shift key. Used to access alphabetic and punctuation characters Example: SHF 7 yields A SHF SHF 7 yields B SHF SHF SHF 7 yields C SHF SHF SHF SHF 7 yields 7 SHF SHF SHF SHF SHF 7 yields A again, and so on..
CLR	This key erases what was just typed and repositions the cursor so that the user may begin again.
CTL	Control key. Used to access characters which are not shown on the keyboard. The decimal 3-digit code of the ASCII character desired is entered after the control key is struck. Example: CTL 036 yields '\$' CTL 062 yields '>'
ENTER	This key signals that the user has finished typing the required input.

<u>KEY</u>	<u>DESCRIPTION</u>
7	The back arrow function as a destructive back space when you enter keystrokes from the keypad. Some of the Polycorder built-in software uses this as a left direction key.
6	Some of the Polycorder built-in software uses this as a right direction key.
9	Some of the Polycorder built-in software uses this as a down direction key.
8	The Geonics EM34RT program uses this key to return to the previous prompt. Some of the Polycorder built-in software uses this as an up direction key.

BUILT-IN POLYCORDER SOFTWARE

The Polycorder has a large amount of software permanently installed to control the basic operations of the machine. This software is available whenever the ESC key is struck and the Polycorder displays the MODE: prompt. The following is a short description of the options which may be selected at this prompt by pressing a numeric key (0-7).

<u>OPTION</u>	<u>NAME</u>	<u>DISPLAYS</u>	<u>ALLOWS YOU TO:</u>
0	EXECUTE	EXECUTE PROGRAM FILE: _	Select the name of a program and then execute it when <ENTER> is pressed. Program can be selected using left and right arrow keys.
1	EDIT	EDIT 1, 2, 3 DAT, FMT, PGM_	Edit an existing file or create a new file of the selected type.

Submodes:

- 1-1 Write or change data in a data file
- 1-2 Create or change a format file
- 1-3 Create or change a program file

<u>OPTION</u>	<u>NAME</u>	<u>DISPLAYS</u>	<u>ALLOWS YOU TO:</u>
2	TRANSMIT SERIAL	XMIT SER 1,2,3 DATA,FILE,MEM_	Transmit information from the Polycorder to another device via the RS-232 port

Submodes:

- 2-1 Transmit contents of data file
- 2-2 Transmit a data, format, or program file
- 2-3 Transmit a memory image of the Polycorder

3	LOAD SERIAL	LOAD SER 1,2,3 DATA,FILE,MEM_	Load information from another device via the RS-232 port.
---	----------------	--	---

Submodes:

- 3-1 Load data from another device into a Polycorder data file
- 3-2 Load a data, format, or program file from another device
- 3-3 Load a memory image from another device

4	FILES	FILE 1,2,3 DIR,ERA-F,ERA-D_	Review file directory erase file, erase the the data within a file.
---	-------	--	---

Submodes:

- 4-1 File directory. Shows file names, sizes and related format files (if any).
- 4-2 Erase a file (remember to use Shift key with Y to confirm file name to be erased).
- 4-3 Erase data in file without erasing the file.

5	SET PARAMETERS	SET 1,2 AUTOLOG,PROTOCOL	Set automatic logging parameters or RS-232 communication protocol parameters.
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Submodes:

- 5-1 Set the Polycorder for unattended data logging
- 5-2 Set the parameters for RS-232 communication

6	TEST	TEST 1,2,3,4 PGM,ANA,DIG,MEM_	Test program, or memory.
---	------	--	-----------------------------

<u>OPTION</u>	<u>NAME</u>	<u>DISPLAYS</u>	<u>ALLOWS YOU TO:</u>
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Submodes:

- 6-1 Run program step-by-step and view register contents after each instruction
- 6-2 Not used
- 6-3 Test the digital inputs and outputs
- 6-4 Check to see if all the storage locations are functioning properly

7	MISCELLANEOUS	MISC 1,2,3 CLK,BAT,TERM_	Set system clock/ calendar, emulate a terminal.
---	---------------	---	---

Submodes:

- 7-1 Display and/or set the internal clock
- 7-2 Not used (Polycorder 600 has no option for battery check)
- 7-3 Use the Polycorder as a terminal

SECTION II - GEONICS POLYCODE PROGRAM

Normally Polycorder supplied with the EM34-3 system will contain necessary programs for running the instrument. In case that the programs in Polycorder are lost, the following section describes loading of the programs.

LOADING THE PROGRAM

The software which controls the Polycorder for Geonics EM34-3 applications is stored on the supplied DAT34RT floppy disk. This software may be downloaded into the Polycorder where it may be executed many times, until the program is lost through battery failure or similar event. Downloading the software from the PC computer is described below.

To successfully use the software, you will need:

- IBM PC, PC/AT, PC/XT and compatibles,
- Minimum 640 K bytes of available memory,
- DOS 2.1 or higher,
- Floppy Drive (5.25 inch or 3.5 inch floppy),
- VGA, EGA, or CGA graphics capability,
- Serial Port (RS-232).

First load the DAT34RT.EXE file to your PC and select the "Load Polycorder from the PC" option from the program Main Menu.

D A T 3 4 R T Geonics Limited		Version 3.50RT
<u>Program Setup</u>	<u>Currently in program</u>	
Video Mode : UGA 640 x 480	Number of profiles : 0	
Colour Display : Colour	Number of data points : 0	
	Number of comments : 0	
Enter Data Files	Copy Files from Polycorder 516	
Plot Data	Copy Files from Polycorder 720	
Write File for Contour Package	Copy Files from Polycorder 600	
Convert DL Files to DAT34 Format	Load Polycorder 516 from PC	
Display/Print Data	Load Polycorder 720 from PC	
Select Colours	Load Polycorder 600 from PC	
Change Video Setup	Real Time Logging	
Polycorder Communication Test	GPS Positioning	
End Program	Clean Program Memory	
Use arrow keys to select mode and <ENTER> to execute		

The Load Polycorder from PC option of the DAT34RT program allows copying of various programs from a PC computer to the Polycorder. The option is used to replace lost or damaged programs in the Polycorder. After selecting this option, the following menu with a list of available files and programs is displayed:

```
**** DAT34RT Load Polycorder 600 from PC ****

Set Polycorder (Mode 5-2) to
Baud Rate 9600, Data Bits 8, Parity N and Mating Call CR
(To enter <CR> in Polycorder (ASCII number 13), use keys: CTL @ 1 3)
(<CR> is represented on Polycorder display as a left arrow)

Files to copy :
FORM34RT - Format files,
EM34RT   - Program EM34RT for Polycorder 600

Load format files only when the Polycorder is reset.
In this case load FORM34RT prior to EM34RT file,
otherwise load only EM34RT file.

Serial Port COM1

Enter file (<Esc> to exit):_
(Press <F1> to change serial port)
```

The following is a short description of Polycorder programs.

File FORM34RT

This file contains format files for data files and DIR34. It can be loaded only when Polycorder is reset. The Polycorder 600 system does not allow overwriting of format files.

File EM34RT

This file contains EM34RT program, and additionally programs: CREATEDIR, and DUMP34RT.

The program sets an active serial port as COM1 by default.

Before proceeding with loading the program

Connect the Polycorder to the computer serial port (RS232). Geonics supplies a cable with the 25 pin connector on each end, along with 25 pin to 9 pin converter. This cable has pins 2 and 3 switched. It is used for a computer with a 25 pin serial port.

If the computer is equipped with a 9 pin serial port use the above cable and 25 pin to 9 pin converter.

If you require, change the serial port number set by default.

Set the Polycorder communication parameters (Polycorder Mode 5-2) as follows:

Baud Rate	- 9600	
Data Bits	- 8	
Parity	- N	
Mating Call	- <CR>	(type on Polycorder CTL 0 1 3, <CR> is presented on Polycorder display as a left pointing arrow).

Prompts

Enter file (<Esc> exit) :
(press <F1> to change serial port)

Enter the name of selected Polycorder program.
If the specified file doesn't exist on your disk, there will be a warning prompt.
<F1> will allow to change serial port number (default is COM1).
<Esc> will return the program to the Main Menu.

When the file is entered there will be this next prompt :

**Set POLYCORDER MODE to 3-2,
then the transmitted line number should appear below**

When MODE 3-2 is selected on the Polycorder, a message such as:

transmitted line : 1 of 1966

will appear at the bottom of the screen. The number of the copied file line will be updated continuously. (If it is not, check the cable and communication parameters).

When the complete file is transferred there will be a beep and a prompt asking for the next file. At this point next file can be transmitted or the program can be returned to the Main Menu.

For proper operation of EM34RT system both files FORM34RT and EM34RT must be loaded in the Polycorder.

Loading EM34RT file from a PC to the Polycorder will not destroy existing data files in the Polycorder.

In case of lack of communication refer to the section of this manual describing Test of Communication.

STARTING THE PROGRAM

1. Get to the MODE: prompt
 - if the Polycorder is turned off, press the **ON** key
 - if the Polycorder is at any other prompt, press the **ESC** key
 - MODE: will be displayed on the 1st line display
2. Execute the program called EM34RT
 - press 0
 - at the FILE: either prompt EM34RT will appear or use the left and right cursor keys to select file EM34RT
 - if the EM34RT program is not in the Polycorder, hit **ESC** and download Polycorder from the computer as described above.
3. When program starts it will display:

```
After Set Up
  press any key
Q:      21.120 mS/m
V/10m
```

At this time logger monitors instrument output. If values of Quad-phase or Inphase are not displayed, check whether the instrument is on. Perform all the functional checks as described in the instrument operating manual. When the instrument is ready, press any key on the Polycorder to proceed to the data acquisition program.

CONFIRMATION OF THE POLYCORDER CLOCK SETTING

1. The date (month, day) and time (hour, minute) is taken from the Polycorder clock and written to the header file each time a new survey line is started. The Polycorder clock is usually set once, at the very beginning of the survey, in response to the **Set Clock? Y/N** prompt.
 - if clock is O.K., answer **N** to this prompt (see YES/NO answers) and next prompt will follow.
 - if clock setting is to be checked, answer **Y** (see YES/NO ANSWERS). The following prompt will be displayed:

```
ESC, MODE 7-1,
  then run EM34RT
```

press **ESC** key, enter MODE 7-1 and adjust the Polycorder clock parameters. Then start the program.

The year number will be taken from the PC computer clock and written to the header file during the transfer of data from the Polycorder.

SPECIFYING THE DATA FILE NAME

1. At the **FILE:** prompt, enter a file name
 - file names are up to 8 alpha-numeric character
 - use file names that are significant and easy to remember, such as the site name or number.
 - do not use the name **ALL** nor **DIR34**
 - do not use "/", "@", "." or other characters that are not accepted as part of a file name by MS DOS. A typical example of such character is +.
 - because the program is executing many internal operations it will take approximately 3 seconds for the next prompt to appear.
2. File name conflicts
 - if the file name (e.g. XXX) already exists the program will beep and display

```
XXX      exists
FILE:
```

- enter another file name

When using DAT34RT computer program any number of data files can be entered.

Once the file name is specified and entered to the program the file is opened and its name is written to log file DIR34. The DIR34 can be considered as an internal directory. For more details about DIR34 and program CREATEDIR see the PROGRAM CREATEDIR section.

3. Erased data files

When files were erased using mode 4-2 they do not exist in Polycorder memory, however they may still be listed in file DIR34 causing message: FILE exists (see above). In such a case enter other file name.

Contents of directory file DIR34 is erased only when this file is erased using mode 4-2 (however the file has to be recreated in order to run EM34RT program or to dump existing data files) or if the logger is reset using supplied RESET module. See CLEAN OUT POLYCORDER AS DESIRED in section III.

ANSWERING PROMPTS

In the following prompts `unchecked' means that it is up to the operator to ensure that the required format is adhered to. Description of each prompt follows. The first description shows the general format of the other descriptions.

<u>PROMPT</u>	<u>DESCRIPTION</u>
displayed	<ul style="list-style-type: none">- permissible format- optional, mandatory or required- additional notes as necessary Description of the field

<u>PROMPT</u>	<u>DESCRIPTION</u>
GPS Option Y/N (Time Stamp at each reading)	<ul style="list-style-type: none"> - 1 character, alphabetic only (Y,N) entry as keys 3 or 5, <u>no SHIFT!</u>. <p>Although entry keys are numerical, they are converted to alphabetic by the program.</p> <ul style="list-style-type: none"> - checked - short display pause after key struck, no ENTER required <p>Selects GPS option.</p> <p>Y - time stamp will be recorded with each reading, N - GPS option will be disabled.</p>
Number of CONFIG 1/2/3/4/5/6	<ul style="list-style-type: none"> - 1 digit, numeric only (1, 2, 3, 4, 5, or 6) - mandatory entry every time this prompt displayed - checked - short pause after key struck, no ENTER required <p>Selects number of dipole modes and coil separations recorded at each recording station.</p> <p><u>Note:</u> This option <u>does not</u> indicate which Coil Modes and Separations will be used. This information will be recorded in the logger at each reading. The good field procedure is to take data always in the same sequence, e.g. V/10m as first reading and H/10 m as a second reading at each station. In case when an operator will forget to set the toggle switch to proper Mode, it will be very easy to correct this during the data elaboration.</p>
Operator Name (max. 7 char.)	<ul style="list-style-type: none"> - up to 7 alpha-numeric characters - optional, unchecked <p>Operator's name or identification symbol</p>
Trigger A/M	<ul style="list-style-type: none"> - 1 character, alphabetic only (A, M) entry as keys 7 or 5, <u>no SHIFT!</u>. Although entry keys are numerical, they are converted to alphabetic by the program. - mandatory, checked - short display pause after key struck, no ENTER required - this prompt won't be displayed if number of dipole modes and coil separations other than 1 has been selected (see Number of CONFIG prompt) - automatic data readings will not be started until the WAIT key is pressed (see MEASURING THE DATA - AUTO MODE below) <p>Selects either Auto (time) Trigger or Manual Trigger,</p> <p>A - readings will be taken at the specified time intervals (maximum 2.5 readings per second),</p> <p>M - readings will be taken only while the manual trigger (switch on the receiver panel) is pressed,</p>

PROMPT

DESCRIPTION

AUTO MODE

Time Interval
(min 0.4s)

- 4 digit, positive numeric only (0.4 to 99.9)
- units of seconds
- displayed when response to AUTO prompt is A
- required, checked for an entry other than zero

This prompt request the interval (in seconds) between data readings, if AUTO mode is selected.

MANUAL MODE

Samples/Reading
(max. 100)

- 3 digits, positive numeric only (1 to 100)
- optional, unchecked

Entered number specifies how many samples will be collected after trigger is pressed. At the end of sampling time (when selected number of samples is taken) an average value will be written in to the file and displayed on the Polycorder screen. During the sampling data are measured at the approximately 5 readings per second. For example by specifying number of samples 10, the sampling time will be about 2 seconds at each station. Maximal number of samples per reading is 100. This option may improve quality of data in areas of high industrial noise, especially if the soil conductivity is relatively low. Current sample number is displayed at the top of the Polycorder screen during the sampling interval.

In case when the multiple sampling is not required ENTER key can be pressed, as well as **0** or **1** can be entered.

LINE:

- up to 8 alpha-numeric characters
 - optional, unchecked
- User's tag number/name for the profile name.

When next line is entered within the same file the name of the previous line is displayed on the top line of the Polycorder display.

Dir W/E/S/N

- 1 character, alphabetic only (**N**, **S**, **E**, **W**) entered as keys **5**, **1**, **8** or **2**, no SHIFT !
- mandatory entry every time this prompt is displayed
- checked
- short pause after key is struck, no ENTER required

A direction character (**N**, **S**, **E**, **W**) indicating the heading of the survey line.

Although entry keys are numerical, they are converted to alphabetic values by the program.

PROMPT

DESCRIPTION

Start Station

- 7 digit, signed numeric only (-9999.9 to 9999.99)
- required, not checked

Specifies the starting number for the station number display. (See MEASURING THE DATA - AUTO MODE for suggestions on how to use this field in AUTO mode). Used in conjunction with INCREMENT to calculate the current station number for display purposes. By convention positive station numbers signify stations which are on the LINE DIRECTION side of the reference line. Negative station numbers signify stations which are on the opposite of LINE DIRECTION side of the reference line.

Example:

If LINE DIR. was entered as **W** then
a station # of +10 is considered as 10W
a station # of -10 is considered as 10E
If LINE DIR. was entered as **S** then
a station # of +10 is considered as 10S
a station # of -10 is considered as 10N

**Enter Increment
(manual mode)**

- 7 digit, signed numeric (-999.99 to 999.99)
- assumed to be in user units
- required, checked for non-zero

Specifies the amount by which the station number will be incremented/decremented by between each station. (See MEASURING THE DATA - AUTO MODE for suggestions on how to use this field in AUTO mode). When the BOTH phase or mode of operation and/or BOTH orientations is selected (see PHASE Q/I/B, MODE V/H/B and ORIENTATIONS 1/2) the station number will be incremented after all of the readings at the station will be taken. In this case a colon with the proper number of readings will follow the station number.

**INCREMENT (+/-)
(Auto Mode)**

- 1 character only, + or - entered as keys 0 or . , no SHIFT !
- mandatory entry every time this prompt displayed, checked
- short pause after key struck, no ENTER required

A station increment the direction character (+, -) indicating the heading of the survey line.

Selects either increment +1 or -1. Although entry keys are numerical, they are converted to +1 or -1 by the program and written to file as an INCREMENT.

YES/NO ANSWERS

All prompts within the EM34RT Polycorder program which expect YES or NO answers require either the key **3** (unshifted **Y**) or the **5** key (unshifted **N**) to be pressed. All other answers will result in an error beep tone and rejection of the input. This has been done to reduce the key strokes required by eliminating the shift key.

MEASURING THE DATA

When all the prompts have been answered and the EM34RT Polycorder program is ready to record data, it will display

```
READY
<ENTER> to LOG
```

After ENTER is pressed the Polycorder will monitor and display current instrument output (conductivity, Dipole mode and Separation). The screen is updated approximately 5 times per second. Data can be recorded automatically at the selected intervals (AUTO mode), after WAIT key (ENTER) is pressed or manually when the "record" switch is activated. When AUTO mode is selected, the message **ENTER to START** will appear on the top line (and **not logging** on the following line) of the display. If manual mode is selected, the message **Trigger to Log** will appear on the top line, and the Polycorder will display **ST** as well as the current station number on the second line of the display. This is the station number of the station at which data is expected to be recorded.

The Polycorder will record the conductivity (Q/P), vertical or horizontal dipole (mode), dipole separation and the sensitivity range used. The Polycorder will then calculate the next station number (and reading number) and update the **ST** display. The readings will be calculated according to the sensitivity range and displayed in mS/m. Dipole mode and coils separation are displayed as well.

MEASURING THE DATA - MANUAL MODE

1. Connect EM34 to the Polycorder with the supplied cable and turn the instrument ON.
 - select an appropriate EM34-3 scale on the instrument
 - use the EM34-3 range switch to select the appropriate sensitivity
 - Polycorder will record the range used when the data is recorded
2. Select dipole orientation
 - set instrument to the appropriate position
 - Polycorder will record which coil orientation was used for each reading when the data is recorded
3. Select separation
 - set separation switch to **10, 20, or 40 m**

4. Record data

- press the recording switch
- short beep will signal the data is being recorded. When survey is conducted in noisy area (construction site, traffic noise, etc.) observe update of station (ST) on the Polycorder screen to ensure that the reading was recorded.
- program will record only once for each press of the switch. If the switch is pressed again before the program has finished updating the display, the switch press will be ignored

5. Record extra data

- used only with BOTH mode or more than one separation. Re-orient instrument. Record data. Record number will be updated.

6. Advance to next station

MEASURING THE DATA - AUTO MODE

In AUTO mode only one dipole mode (**V** or **H**) and one coils separation (**10**, **20** or **40** m) can be measured during survey. START STATION is used to indicate start point of the survey line. The increment, entered as **+** or **-**, indicates direction along the survey line. It is considered to be **+1** or **-1**. This will result in the ST number display showing the number of data readings that have been taken.

Pressing any action key (see below) or the WAIT key (ENTER on the Polycorder keypad) will update the ST number.

1. Select an appropriate EM34-3 scale on the Geonics instrument

- as above. See manual mode

2. Select dipole orientation

- set instrument to the appropriate position
- Polycorder will record which coil orientation was used for each reading when the data is recorded

3. Select separation

- set separation switch to **10**, **20**, or **40 m**

4. Start AUTO readings

- when AUTO mode was selected the program placed the Polycorder in a 'paused' mode. **ENTER to START** is displayed on the top line of the Polycorder display. Readings are temporarily suspended.
- use WAIT key (see FIELD OPTIONS - WAIT below) to start automatic timed interval readings. A reading will be taken as soon as the WAIT key

is struck, and at TIME INTERVAL intervals thereafter. The message **ENTER to STOP** will be displayed at the top line of the display.

5. Advance along the survey line
6. Stop the AUTO readings when the end of the survey line is reached
 - use the WAIT key to pause/stop the automatic collection of data.

FIDUCIAL MARKER OPTION

In AUTO mode, the trigger switch that is used in manual mode can be used as a fiducial switch. This action places a flag at a desired points along the survey line, such as the location of a visible feature. The PC computer program DAT34RT recognizes these flags as markers. This procedure helps to adjust the station intervals along the survey line more accurately. The character **M** is displayed while the fiducial marker is pressed.

NOTE: The fiducial switch must pressed while reading is taken. It is always safer to press switch longer. If two or more marker flags are recorded consecutively the DAT34RT program recognizes only first as a marked station. However it plots all of them, so some points will appear as double or triple marks.

FIELD OPTIONS

In addition to recording data at the STATION display, the user may also select other actions as described below. The options are selected by pressing the appropriate key on the keypad. Most keys do not require any shift action. Each key is shown in bold and its associated mnemonic is shown in square brackets. These field options are available in both manual and automatic modes of operation.

If the AUTO mode is in use and if the field option is the type which returns to the STATION display (COMMENT, DELETE, REVIEW, LINE, STATION, and VERIFY MEMORY), the internal clock will be checked to see if the TIME INTERVAL had been exceeded while undertaking the field option. If so, a data reading will be taken immediately and further readings will be taken at the designated TIME INTERVAL from that point on.

NOTE: If the field option exceeds more than one TIME INTERVAL, extra readings will NOT be taken to 'catch up'.

OPTION DESCRIPTION

7 [C] **COMMENT**

Selecting this key causes **Enter Comment** prompt to be displayed. A comment may be entered as described in the PROMPT section of this document. After the comment is entered the program will return to the display. The user must exit the comment mode by pressing ENTER before new data may be collected or additional field options selected.

Maximum 6 characters can be entered as a comment information.

This function is typically used to comment on survey conditions such as presence of power line, fence, pipe, etc.

The message "GPS Option On" or "GPS Option Off" will be displayed at the bottom of the screen to confirm selected entry at the beginning of the program.

8 [D] **DELETE**

This function allows operator to delete previously recorded reading(s). Selecting this key causes the previously recorded data to be displayed. A 'D' will be displayed at the left side of the display signifying the program is in the delete mode. The data will only be deleted when the **8 [D]** key is pressed again. The data will be briefly re-displayed with an 'X' at the left side to show that this data has been deleted. The program will then display the next previous station, and allow it to be deleted in a similar fashion. Pressing any other key will exit delete mode without affecting the displayed data. If no further data are available the program will beep and wait for any other key to exit the delete mode.

It is only possible to delete data and skipped stations (see NEXT). Comments are not displayed, may not be deleted and will remain in the file. The delete mode will not back up past a change in header information (a STATION and a LINE action). If an attempt is made to enter the delete mode when there is no data to delete, the program will beep and return to the STATION display. The user must exit the delete mode (press any key other than (**8[D]**)) before new data may be collected or additional field options selected.

4 [L] **LINE**

Selecting this key allows the operator to enter a new survey line number (or name) and associated information (DIRECTION, INCREMENT and START STATION) as described in the PROMPT section of this document. When all prompts have been answered the program will display the new station number.

OPTION DESCRIPTION

The user must exit the prompt mode (enter all prompts) before new data maybe collected or additional field options selected.

If a second or subsequent line is entered within the file, the previously entered line number (or name) will be displayed on the top line of the display.

The message "GPS Option On" or "GPS Option Off" will be displayed at the bottom of the screen to confirm selected entry at the beginning of the program.

5 [N] NEXT

Selecting this key allows the operator to skip a reading. A special flag is recorded in the data to distinguish skipped data from normal data. The station number or record number advances as appropriate.

6 [R] REVIEW

This key causes the program to enter the review mode and allows the operator to review previously recorded data. The previous station data is displayed with a **R** at the end of the STATION line to indicate review mode.

Q/P data are displayed in mS/m (millisiemens/meter), and I/P data are displayed in ppt (parts per thousand). The recorded dipole mode, component, and fiducial marker (if present) are shown a well.

Recall		R
ST	123.0	:2
Q:	21.120	mS/m
V/10m		

Pressing **6[R]** again will display the next previous station and so on. Only data and skipped data will be shown. Review mode will not back up past a change in header information (STATION or LINE action).

Pressing any other key will return the user to the STATION display. If an attempt is made to enter REVIEW mode when there is no data to display, the program will give an error beep and return to the STATION display. The user must exit the review mode (press any key other than **6[R]**) before new data may be collected or additional field options selected.

OPTION DESCRIPTION

1 [S] STATION
This key allows the user to enter a new START STATION and a new INCREMENT as described in the PROMPT section of this document. After all prompts have been answered the program will display the new station number. The user must exit the prompt mode (enter all prompts) before new data may be collected or additional field options selected.

2 [V] VERIFY (HOW MANY READINGS LEFT)
This key causes the program to display (for about 2 seconds) the number of readings that can be taken to fill the memory of the Polycorder.

ROOM for 2033 READINGS GPS Option OFF
--

The message "GPS Option On" or "GPS Option Off" will be displayed at the bottom of the screen to confirm selected entry at the beginning of the program.

ENTER WAIT
This key toggles the auto timer on and off. If the user has not selected AUTO mode triggering, the program will beep and ignore this key. When AUTO mode triggering has been selected, this key starts and stops (pauses) the trigger timer. The message on the top line of the Polycorder display will show **ENTER to START** or **ENTER to STOP** as appropriate.

E or <ESC> END
This key closes the current data file and returns the user to the **FILE:** prompt, at which point a new data file for data entry may be selected. Note that the shift key must be used to select this option (**E**), to prevent accidental closure of the file. For this reason **<ESC>** key should be avoided as a routine ending of the file.

Z SLEEP
This key closes the current data files and turns off the Polycorder into a power saving sleep mode. Note that the shift key must be used to select this option, to prevent accidental closure of the file.

NOTE:

- a) Battery condition of the EM34-3 instrument can not be checked directly on the Polycorder screen but it can be checked on the instrument display by turning the SEPARATION switch to the BATT position. In case that data is recorded in AUTO mode, the recording should be paused by the WAIT key before turning the switch to the BATT position and restarted not earlier than approximately 2 seconds after returning the SEPARATION switch to the 10, 20, or 40 position to allow settling of the instrument output.
- b) For information on the instrument battery see EM34-3 Operating Instructions.

SECTION III - DATA MANIPULATION

TRANSFERRING DATA FILES TO A PERSONAL COMPUTER

The following section describes how to transfer data from Polycorder to an IBM compatible computer. To successfully use the software, you will need:

- IBM PC, PC/AT, PC/XT and compatibles,
- Minimum 640 K bytes of available memory,
- DOS 2.1 or higher,
- Floppy Drive (5.25 inch or 3.5 inch floppy),
- VGA, EGA, or CGA graphics capability,
- Serial Port (RS-232).

Before proceeding, connect the Polycorder to the computer serial (RS232) port with the appropriate cable. Geonics supplies cable with the 25 pin connectors on each end, along with 25 pin to 9 pin converter. This cable has pins 2 and 3 switched. It is used for a computer with a 25 pin serial (RS232) port. If the computer is equipped with a 9 pin serial port use the above cable and 25 pin to 9 pin converter.

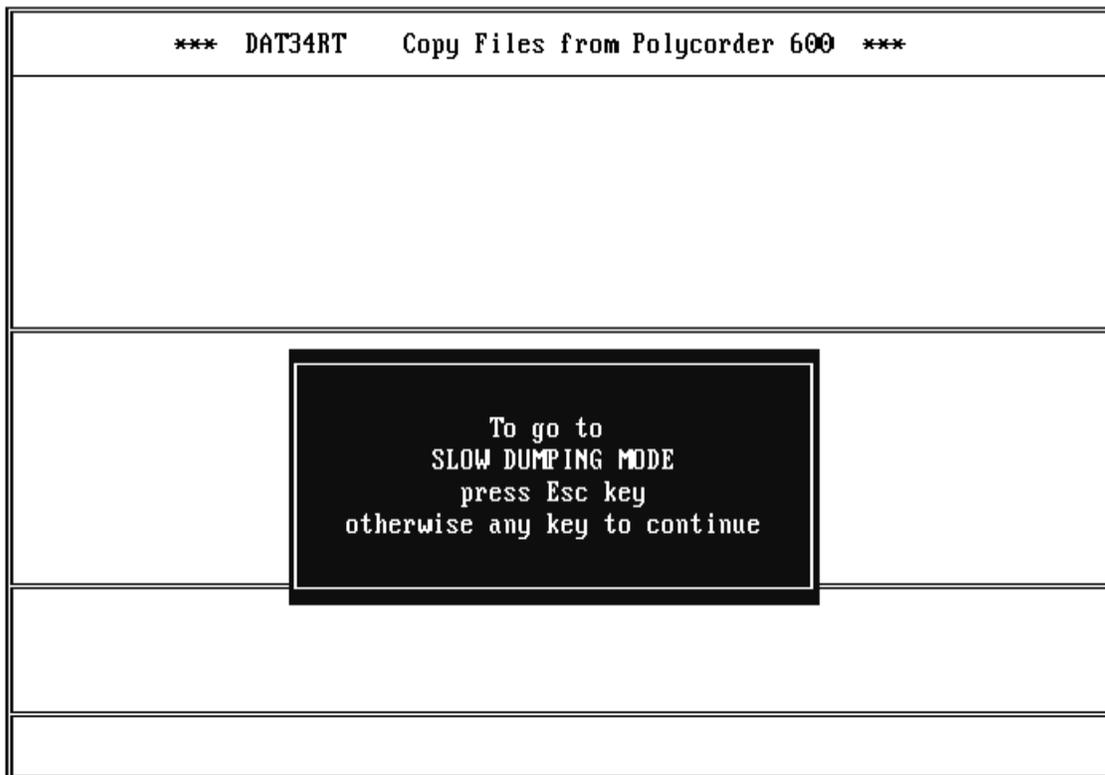
<div style="border: 1px solid black; display: inline-block; padding: 5px;">D A T 3 4 R T Geonics Limited</div>		Version 3.50RT
<u>Program Setup</u>	<u>Currently in program</u>	
Video Mode : UGA 640 x 480 Colour Display : Colour	Number of profiles : 0 Number of data points : 0 Number of comments : 0	
Enter Data Files P l o t D a t a Write File for Contour Package Convert DL Files to DAT34 Format Display/Print Data Select Colours Change Video Setup Polycorder Communication Test End Program	Copy Files from Polycorder 516 Copy Files from Polycorder 720 Copy Files from Polycorder 600 Load Polycorder 516 from PC Load Polycorder 720 from PC Load Polycorder 600 from PC Real Time Logging GPS Positioning Clean Program Memory	
<div style="background-color: black; color: white; display: inline-block; padding: 2px 10px;">Use arrow keys to select mode and <ENTER> to execute</div>		

There are two modes for copying of data files: Fast and Slow. Each mode uses different protocol for communication and conversion of the Polycorder internal format. In case that the Fast Mode fails to work due to the some communication incompatibility a more generic Slow Mode can be used.

In order to transmit data in Fast Mode, about 500 bytes of free memory in the Polycorder is required. This corresponds to about 50 records.

Load the DAT34RT program and select "Copy Files from Polycorder" option.

After the "Copy Files from Polycorder" option is executed the following text window will appear:



If Esc key is pressed the program will go to the Slow Dumping Mode menu. The Fast Dumping Mode will be described first (Slow Dumping Mode should be used only in case of difficulties in communication between Polycorder and PC, when Polycorder program DUMP34RT is unavailable or when there is not enough memory to run Polycorder program DUMP34RT).

Fast Dumping

After any (except Esc) key is pressed, next text window is displayed :

```
Set Polycorder (Mode 5-2) communication
  Baud rate - 9600
  Data Bits - 8
  Parity - N
  Mating call - <CR>
                (type CTL 0 1 3)

Then run Polycorder program DUMP34RT
and wait for prompt READY
(from now on Polycorder is driven by PC),

press any key to continue...
```

The Polycorder communication parameters are usually properly set, due to the earlier loading of the program EM34RT. If not sure, set the Polycorder communication parameters using mode 5-2 (usually only Mating Call is to be set, rest of communication parameters are Polycorder default).

```
Baud Rate - 9600
Data Bits - 8
Parity - N
Mating Call - <CR> Type CTL 0 1 3
                (<CR> is represented on Polycorder display by left arrow).
```

To run program DUMP34RT in the logger, select MODE 0 and find DUMP34RT program using left or right arrow keys. When the name DUMP34RT is on the Polycorder display, press ENTER. Wait for Polycorder prompt:

```
DATA FILE COPY
READY
  Waiting for
  entry in PC
```

From this point, the rest of the Data Transfer procedure is driven by PC.

After any key on PC is pressed the above text window will disappear and the Fast File Copy Menu will be displayed.

*** DAT34RT Fast File Copy from the Polycorder 600 ***	
<pre> Polycorder file name : Disk file in Polycorder format : Created file in DAT34 format : Serial port : COM1 C O P Y F I L E S Return to Main Menu End Program </pre>	
Use arrow keys to select mode and <ENTER> to execute	

In the following description of data transfer, data files previously recorded in the Polycorder will have to be specified, followed by selection of names under which selected files will be stored in the computer.

After above steps are finished Polycorder formatted data files will be converted into the DAT34 format (EM34-3 computer program format).

Parameters and prompts

Polycorder file names

Enter file (<Esc> to exit):

Enter file name as it was entered to the logger (use the same letter case in the Polycorder).

Disk files in Polycorder format

Press <ENTER> if Polycorder's names are desired
Enter file name (<Esc> to exit):

Files to be copied from the Polycorder will be saved on the disk under the entered name. If the same names as in the Polycorder are desired, press <ENTER>. When a file name is entered the program checks whether or not this exists on the default disk drive. If it already exists, the following prompt will appear :

File already exists on the disk. (O)verwrite or (N)ot :

The file can be overwritten or the program will return to the second prompt.

Created file in DAT34 format

Enter name of file to be created (default is *.G34):

The Polycorder file is converted in the DAT34 format during the transmission. The default name is always given as a Polycorder name with the extension .G34. If the specified name is entered for the disk file it is recommended that extension name G34 is specified.

Serial port

Select port COM(1), COM(2), COM(3) or COM(4) (default is 1):

Select the serial port number to which Polycorder is connected.

COPY FILES

No prompt. When copying starts, the header file is transmitted first, followed by the data file. When the copying is finished, the files copied from the Polycorder and created on the disk drive are displayed in proper windows at the top of the screen. All messages in the prompt window disappear, and next file can be copied.

If files listed in DIR34 were not found in the logger (e.g. they could be deleted from the Polycorder memory) the window with the list of these files will be displayed.

If message NO CONNECTION will appear while executing above option, refer to section describing program COMTEST as a method for checking the RS232 cable.

RETURN TO MAIN MENU

No prompt. The program will return to the Main Menu.

End program

No prompt. The program will stop.

Slow Dumping

If the Slow Dumping mode is selected as mentioned at the beginning of Section III, and after <Esc> key is pressed, a text window describing the Polycorder communication settings is displayed.

The Polycorder communication parameters are usually properly set (because of the preceding loading of the program EM34RT). If not sure, set the Polycorder communication parameters using mode 5-2 (usually only Mating Call is to be set, rest of communication parameters are Polycorder default).

Baud Rate - 9600
Data Bits - 8
Parity - N
Mating Call - <CR> Type CTL 0 1 3
(<CR> is represented on Polycorder display by left arrow).

After any key is pressed the following menu will appear:

*** DAT34RT Copy Files from Polycorder 600 *** Slow Mode	
File name to store data : Created file in DAT34 format : Serial port : COM1 C O P Y F I L E S Return to Main Menu End Program	
Use arrow keys to select mode and <ENTER> to execute	

Parameters and prompts:

File name to store data

Enter file name to store data (<Esc> exit):

The copied file will be saved under the specified name.

If the specified file exists in the computer, the following prompt will appear :

File already exists on the disk. (O)verwrite or (N)ot :

File can be overwritten or the program will return to the former prompt, if the overwriting is not desired.

Created file in DAT34 format

Enter file to be created in DAT34 format
Enter file name (default is *.G34):

The Polycorder data file is converted to the DAT34 format during the transmission. The default name is always given as a Polycorder name with extension .G34. It is recommended that extension name G34 is specified.

Serial port

Select port COM(1), COM(2), COM(3) or COM(4) (default is 1):

Select the serial port to which Polycorder is connected, by pressing 1, 2, 3 or 4 on the computer terminal.

COPY FILES

After this option is executed, the next prompt will follow.

**Set POLYCORDER MODE to 2-2 (unless already done),
select file (use arrow keys or type) and press Polycorder <ENTER> key,
Wait until Polycorder display will change, and then press any key in PC**

To select the desired file in the Polycorder use the left or right arrow keys. When the file's name is displayed by Polycorder, press ENTER on the Polycorder.

Shortly after file is selected its name will disappear from the Polycorder display and some characters and numbers will appear. After that moment (not earlier !) press <ENTER> on the computer. Number of transmitted lines of file should appear on the computer display. If not, check the RS-232 cable and Polycorder Baud Rate.

RETURN TO MAIN MENU

No prompt. The program will return to Main Menu.

End program

No prompt. The program will stop.

CLEAN OUT POLYCORDER AS DESIRED

Specific data files may be deleted from the Polycorder using Polycorder mode 4-2. While using this mode remember that during confirmation of the name to be deleted key with character Y is to be used with <SHF> key.

OR

all files can be cleaned out by turning the Polycorder ON with the RESET module in 25 pin port. In this case Mating Call has to be reset to <CR> in Polycorder mode 5-2, and FORM34RT and EM34RT files have to be loaded to the Polycorder. For more information see beginning of this section.

SECTION IV - EM34RT FILE DESCRIPTION

THE DATA FILE IN DAT34 (G34) FORMAT

The first row the DAT34RT data file contains name of the instrument: EM34R (or GP34R if GPS option was enabled during data acquisition), number of version, original name of file, and name of an operator (not used if file is created after editing).

The row started with L specifies beginning of the survey line, it is followed by the line name, and line parameters:

- 1st number of configurations (1 to 6),
- 2nd direction (N, S, E, W),

The next field specifies line direction W, E, N, or S.

At the end of this row two parameters indicate mode of data acquisition Y-Auto Mode and it is followed by time increment in seconds, N-Manual Mode is followed by 0).

The following row starts with T and contains time and date of line creation.

The rows containing data start with the four character sequence (e.g. SV10), meaning of these characters is as follows:

- 1st S - reading and station,
R - reading, it appears only when more than one reading was taken at one station,
N - start of new segment of the line,
D - deleted reading.
C - comment, the text of comment follows this field.
- 2nd V - reading with Vertical dipole mode,
H - reading with Horizontal dipole mode.
- 3rd 1 - coil spacing 10 meters,
2 - coil spacing 20 meters,
4 - coil spacing 40 meters.
- 4th 0 - no fiducial marker
1 - fiducial marker pressed at this station (only in AUTO mode).

Above 4 character field is followed by station number [user units] and Conductivity in mS/m.

If a file was created (in Polycorder or computer) using GPS option it will contain an additional column that indicates time that reading was recorded (in 24 hour clock format).

Conductivity (Quad-phase) values of 8000.000 indicate skipped reading.

The DAT34-3 data file can be easily edited using any text editor, however care should be taken on preserving proper placement of all parameters.

Example of EM34-3 File in DAT34-3 Format

EM34R V3.50 H34TEST JOHN
FORMAT)

(OR GP34R V3.50 ... IN GPS OPTION

L 10 2 W
T 10/11/1998 15:31
SV10 0.000 20.100
RH10 0.000 20.200
SV10 1.000 20.200
RH10 1.000 20.200
SV10 2.000 20.400
RH10 2.000 20.620

line 10 starts

C GRASS STARTS
SV10 3.000 20.820
RH10 3.000 20.820
SV10 4.000 20.680
RH10 4.000 20.620

comment

L 20 3 E
T 10/11/1998 15:54
SV10 45.000 17.580
RV20 45.000 7.110
RH20 45.000 7.760
SV10 55.000 17.640
RV20 55.000 7.520
RH20 55.000 7.440
SV10 65.000 17.700
RV20 65.000 7.990
RH20 65.000 6.140
SV10 75.000 16.510
RV20 75.000 6.080
RH20 75.000 6.690
SV10 85.000 16.520
RV20 85.000 5.080
RH20 85.000 7.890

line 20 starts

L 30 2 S
T 10/11/1998 16:10
SV10 0.000 20.580
RV20 0.000 20.680
SV10 1.000 20.620
RV20 1.000 20.880
SV10 2.000 20.880
RV20 2.000 21.040
SV10 3.000 21.000

line 30 starts

EM34RT file with time stamp (GPS option) will contain one more column
Hour:Minute:Second/Hundreds of seconds (24 hour clock)

eg.

SV10 2.000 20.880 16:14:12.17

The Data File in the Polycorder Format

The EM34RT Polycode program records a set of data in one file. The file name is supplied by the user at the **FILE:** prompt (xxxx). (There is no Header and Data file as in Geonics EM34 program). The example of data file and the format of the file is as follows.

DAT:1995 Initial line of data file
DON1 Name of the file as specified by the user
RT34 (or GP34) The Polycorder format file (RS34 - standard, GP34 - GPS format)
Q Quad-phase component (not used for conversion)
2 Number of Configurations at each station
1 Not used
JOHN Operator name
M Mode (here Manual, can be A for Auto)
1.0 Samples/Record (if Auto this value indicates selected time interval)
L1 Name of Line (name follows letter L)
06/20/9 Date (year will be taken from the top line of the file)
13:16 Time (it is the time when line was specified, hours and minutes)
E Direction (East)
0.000 Start Station
I 0.500 Increment between readings (follows letter I)
TR+0319 Each reading starts with letter T, and it is followed by a single character (information byte). The ASCII number of this character indicates dipole mode, range (scale), and Marker in Auto mode.
TB+0332 The information byte is followed by two fields (5 places each including sign) indicating readings for Quad-phase and Inphase.
Tr+0123 Divide these values by 4 to get the actual readings in mV.
Tr+0351
Tr+0376
Tr+0298
Tr+0228
T{+0407 Information byte interpretation
T{+0512

Bit	Decimal	Value and Meaning
7	128	1 not used
6	64	Marker (=1 trigger pressed, =0 otherwise)
5	32	Mode (=0 for vertical operation, =1 for horizontal operation)
4	16	Sep 3
3	8	Sep 2
2	4	Range 3
1	2	Range 2
0	1	Range 1

Range 1 and Range 2 represent sensitivity as follows:

Sensitivity	Range 1	Range 2	Range 3
3 mS/m	0	0	0
10 mS/m	0	1	0
30 mS/m	1	1	0
100 mS/m	0	0	1
300 mS/m	1	0	1
1000 mS/m	0	1	1

Sep 2 and Sep 3 represent coil separation as follows:

Separation	Sep 2	Sep 3
10 m	0	1
20 m	0	0
40 m	1	1

T{+0432
Tx+0432
Tx+0432
T{+0427
TR+0376
TR+0420
TR+0418
Tr+0407
Tr+0388
TP+0378
TR+0376
TR+0372
TR+0412
Tr+0668
Tr+0868
Tr+0376
L25
06/20/92
13:19:37
W
20.000
I -1.000
T%+0868
T%+0887
.....

EM34RT file with time stamp (GPS option) will contain two more columns Seconds/Hundreds of Seconds and Hour/Minute
eg. line **Tb+0906 1215 1614** means: Reading, time (24 h clock) is 16:14:12.15

SECTION V - PROGRAM CREATEDIR

The file DIR34 contains all entered data file names. This file is contained by the EM34RT file and is present in the Polycorder after downloading the logger. The empty DIR34 contains just one line, **DIR34**. In order to run the EM34RT program the DIR34 has to be present in the Polycorder.

The program CREATEDIR can be used to create DIR34 in case DIR34 was deleted for any reason. After the program is run the Polycorder displays for 1 second:

```
FILEDIR created
OK.
```

If the program is run by mistake it doesn't destroy the existing DIR34.

In case the data files are erased one by one (using MODE 4-2) the erased names are still present in the DIR34 and therefore can't be entered into the program. If all files are deleted using MODE 4-2 and same names are to be used, the DIR34 can be erased using the same MODE 4-2. Then this file has to be created by running program CREATEDIR.

If the directory file DIR34 is erased by mistake it can be created using the CREATEDIR program. However, the newly created file will not contain the data files created prior to running the CREATEDIR program. In this case SLOW DUMP mode has to be used. It is also up to operator to remember which names were already entered. Logger directory can be verified using the Polycorder MODE 4-1.