ATS

Advanced Terminal Software

Version 3.0

for Controller-AC

Reference Guide

Catalog # 100123 Rev.02

ESHED ROBOTEC

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Introduction to ATS

ATS—Advanced Terminal Software, version 3.0 and later—is supplied on diskette with the **Controller-AC**, and provides access to the controller's internal **ACL** programming language from any PC computer operating under DOS.

ATS is a full ASCII terminal emulator operating on RS232 communication channels at 9600 baud, 8 data bits, 1 stop bit, no parity, and XON/XOFF protocol.

ATS provides the following features:

- Controller configuration for **ACL** and **SCORBASE** software.

- Definition of connected peripheral axes and inputs/outputs for automatic loading of parameter settings.

- Predefined and user-definable short-cut keys to simplify programming and controller processes.

- A backup manager for saving and reloading programs, positions, variables and parameters.

- A print manager for printing programs and positions.

Activating ATS

Installation

1. Be sure you have made all the required hardware connections, as described in the ***Controller-AC*** User's Manual. Turn on the controller power switch. The green POWER indicator LED lights up.

2. Turn on your computer (boot using your own DOS).

3. If your computer has a hard drive, make a directory for **ATS**, and copy all the files from the **ATS** diskette to that directory.

   If your computer does not have a hard drive, make a backup copy of the **ATS** diskette. Keep the original diskette in a safe place, and use the copy for operation.

Activation

ATS may not function properly under the Windows environment, depending on your computer setup. If you experience difficulties, exit Windows and activate **ATS** directly from DOS (5.0 and later).

1. Make the **ATS** directory or disk drive the current one.

2. At the DOS prompt, activate **ATS**:

   COM1: If the controller is connected to computer port COM1 (default), type:

   ```
   ats  <Enter>
   ```

   COM2: If the controller is connected to computer port COM2, type:

   ```
   ats /c2 <Enter>
   ```

3. Once the software has been loaded, the **ATS** main screen will appear on your screen:

```
      Advanced Terminal Software      version 3.0f     (C) ESHED ROBOTEC

  >




















     <Shift+F10> Backup , <Shift+F8> Print , <Shift+F9> Exit , <Alt+H> Help
  1con↓    2coff↓   3home↓   4run    5move    6movel   7teach  8here    9dir↓    0edit
```
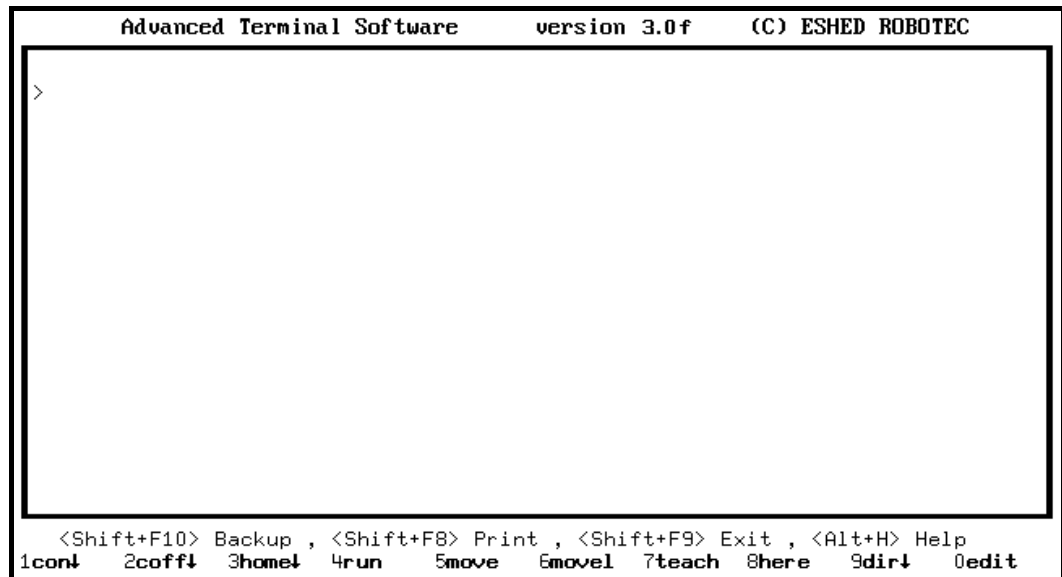
4. Press <Enter> to receive the > prompt, if it is not already displayed.

   You can now communicate directly with the controller.

Operating Keys

Short-Cut Commands

Note the **ACL** commands listed at the bottom line of the main **ATS** screen.

```
    <Shift+F10> Backup , <Shift+F8> Print , <Shift+F9> Exit , <Alt+H> Help
1con↓    2coff↓   3home↓   4run     5move    6movel  7teach  8here   9dir↓   0edit
```

Pressing the function key which appears next to each command issues the command. For example, F5 writes the command MOVE.

Four sets of ten function keys permit the use of forty short-cut **ACL** commands. Three sets are system-defined sets, and one is user-defined.

A display of the sets of commands can be called from the **ATS** main screen by pressing the hot-key combination:

<Alt> + H

```
    Advanced Terminal Software      version 3.0f      (C) ESHED ROBOTEC

    KEY        SET-1          SET-2          SET-3
    F1         con↓           set            list
    F2         coff↓          print          remove
    F3         home↓          run            listp
    F4         run            moved          delp
    F5         move           moveld         listpv
    F6         movel          movecd         init control↓
    F7         teach          label          listvar
    F8         here           goto           delvar
    F9         dir↓           del            show par
    F10        edit           exit           let par

    <Ctrl+F1>      for Controller Configuration
    <Ctrl+F2>      for SCORBASE Controller Configuration
    <Ctrl+F3>      for PERIPHERAL Setup

    >



    <Shift+F10> Backup , <Shift+F8> Print , <Shift+F9> Exit , <Alt+H> Help
1con↓    2coff↓   3home↓   4run     5move    6movel  7teach  8here   9dir↓   0edit
```

The display of command sets will scroll up and off the screen as you continue entering commands at the > prompt.

Only one set of function keys is active at a time. Set 1 is active by default. To activate a different set, simultaneously press the <Alt> key and the number of the set desired. For example, press <Alt>+3 to use the short cut commands in Set 3. (Do not use the numeric keypad for this purpose.)

When Set 3 is active, for example: F1 issues the command LIST and F2 issues the command REMOVE.

The ↓ (down arrow) after a command indicates that <Enter> (a carriage return) automatically follows the command. For most short-cut commands, however, you must also press <Enter> in order to activate the commands.

User-Defined Short-Cut Keys

When ATS is loaded, it searches in the current directory for the file TERM.MAC. The first 10 lines of that file define function keys F1 through F10 for Set 4.

Use a text editor to create the TERM.MAC file. Since the function key can activate a string of up to 20 characters, the command lines you define should not exceed 20 characters.

To include an <Enter> at the end of the command line, enter ASCII character 25; in some text editors, pressing <Ctrl>+Y will produce the ↓ character. If your editor is unable to produce the ↓ character, type either ^Y or ^y at the end of the command line. When ATS is loaded ^Y or ^y will be translated to the ↓ character and interpreted as <Enter>.

In the example shown here, the six **ACL** commands for RS232 communication were written to the TERM.MAC file, and thereby assigned to Set 4.

```
      Advanced Terminal Software      version 3.0f      (C) ESHED ROBOTEC

   KEY      SET-1        SET-2           SET-3           SET-4
   F1       con↓         set             list            sendcom
   F2       coff↓        print           remove          getcom
   F3       home↓        run             listp           prcom
   F4       run          moved           delp            prlncom
   F5       move         moveld          listpv          readcom
   F6       movel        movecd          init control↓   clrcom
   F7       teach        label           listvar
   F8       here         goto            delvar
   F9       dir↓         del             show par
   F10      edit         exit            let par

   <Alt+1/2/3/4> to use SET-1/2/3/4
   <↑ ↓ →>       to recall previously typed commands

   >



    <Shift+F10> Backup , <Shift+F8> Print , <Shift+F9> Exit , <Alt+H> Help
   1con↓    2coff↓   3home↓   4run     5move    6movel   7teach   8here    9dir↓    0edit
```

Editor Keys

The following keys are recognized by the **ATS** software.

$\leftarrow$ (or backspace) Removes characters.

$\rightarrow$ Restores characters.

`<Ins>` Inserts characters. Toggles for overwrite.

`<Del>` Erases characters.

`<Esc>` Erases the currently erased command.

`<Ctrl> +` $\rightarrow$ Restores all remaining characters to end of line.

$\downarrow$ Repeats the last command(s) entered.

ATS can recall the last ten commands issued. Press $\uparrow$ (up arrow) and $\downarrow$ (down arrow) to scroll through previously typed commands.

Additional editing functions are activated by **ACL** commands. For more details, refer to the chapter describing the **ACL** commands in the *ACL Reference Guide*.

Special Key Combinations

Additional key combinations provide the following special functions:

`<Ctrl> + <Shift> + C`

Restarts **ATS** and displays a cleared **ATS** main screen.

`<Ctrl> + C`

Stops the controller from sending data to the screen, such as after a SHOW ENCO command. Also halts printing.

During a controller backup or restore operation, pressing <Ctrl>+C will halt the procedure.

`<Alt> + M`

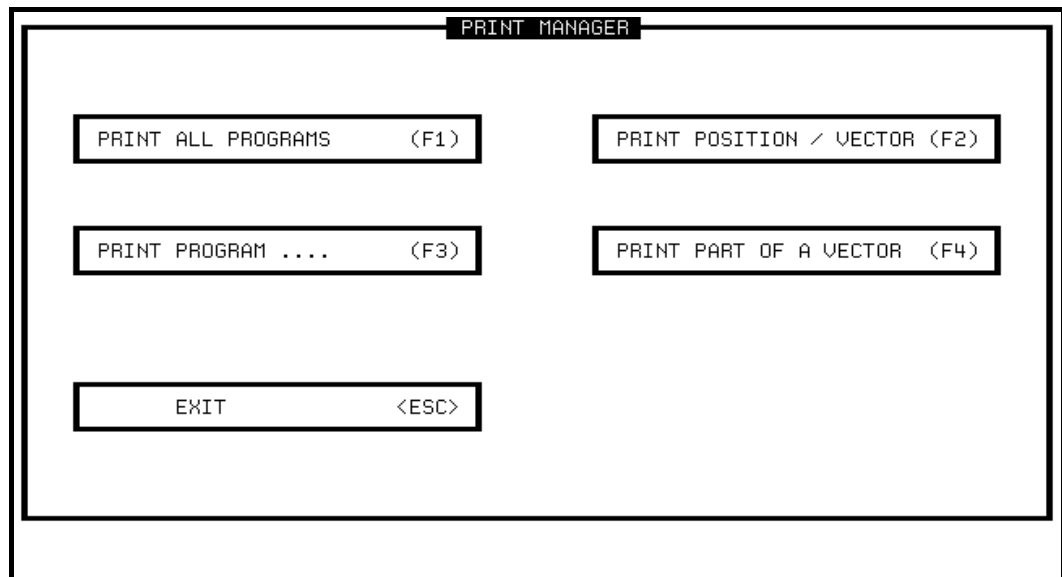Toggles activation of keyboard manual mode. (Sends **ACL** command character ~ to the controller.)

Print Manager

The Print Manager allows you to print copies of the user programs and/or positions currently in the controller's RAM.

The print menu is activated from the **ATS** main screen by pressing the hot-key combination:

> **<Shift> + <F8>**

```
┌─────────────────────────────┤ PRINT MANAGER ├──────────────────────────────┐
│                                                                             │
│                                                                             │
│                                                                             │
│    ┌──────────────────────────────┐     ┌──────────────────────────────┐   │
│    │ PRINT ALL PROGRAMS     (F1)  │     │ PRINT POSITION / VECTOR (F2) │   │
│    └──────────────────────────────┘     └──────────────────────────────┘   │
│                                                                             │
│                                                                             │
│    ┌──────────────────────────────┐     ┌──────────────────────────────┐   │
│    │ PRINT PROGRAM ....     (F3)  │     │ PRINT PART OF A VECTOR  (F4) │   │
│    └──────────────────────────────┘     └──────────────────────────────┘   │
│                                                                             │
│                                                                             │
│    ┌──────────────────────────────┐                                        │
│    │      EXIT            <ESC>    │                                        │
│    └──────────────────────────────┘                                        │
│                                                                             │
└─────────────────────────────────────────────────────────────────────────────┘
```

Make sure a printer is properly connected and ready for operation. If your printer is not fully IBM compatible, you may see the message:

> POSSIBLE PRINTER ERROR, PRINT ANYWAY?(Y/N)? N

The print menu contains the following elements. To activate an option, press the corresponding function key.

PRINT ALL PROGRAMS (F1)

Prints all user programs.

ATS prompts you to confirm before printing will begin:

```
ARE YOU SURE (Y/N)?
```

PRINT POSITION/VECTOR (F2)

Prints the coordinates of a specified position or of all the positions in a specified vector.

- For absolute robot positions, coordinates are printed in both joint (encoder) and Cartesian values.

- For relative robot positions, offset values are printed in either joint (encoder) or Cartesian values, according to how the position was recorded.

- For peripheral device positions, all coordinates are in join (encoder) values.

ATS prompts you for the name of a position or vector. Type the name and press <Enter>.

PRINT PROGRAM (F3)

Prints the program specified.

ATS prompts you for a program name. Type the program name and press <Enter>.

PRINT PART OF VECTOR (F4)

Prints part of a position vector.

ATS prompts you for a vector name. Type the name and press <Enter>. You are then prompted to specify the indices:

```
FROM_____  TO_____
```

Type the indices and press <Enter> after each entry.

EXIT <Esc>

Returns to the main **ATS** screen.

<Ctrl>+C

Use the hot-key combination <Ctrl>+C to halt printing.

Backup Manager

The Backup Manager allows you to perform a complete or partial backup of the controller RAM. Similarly, it can restore to the controller the contents of a previously created controller backup (.CBU) file.

The backup utility is activated from the **ATS** main screen by pressing the hot-key combination:

       <Shift> + <F10>

```
┌──────────────────────────────┤ BACKUP MANAGER ├──────────────────────┐
│  Backup directory:c:\ats_____        │
│                                                                        │
│  Backup / Restore : ALL / ▉PROGRAMS▉ / POSITIONS / PARAMETERS          │
│                                                                        │
│  During restore : ADD TO / ▉ERASE▉ controller contents.                │
│                                                                        │
│  File name : _____   ┌──────────────────────────────────────┐  │
│   ┌─────────────────────┐   │                                      │  │
│   │ BACKUP    to disk (F3)│  │                                      │  │
│   └─────────────────────┘   │                                      │  │
│   ┌─────────────────────┐   │                                      │  │
│   │ RESTORE from disk(F5)│   │                                      │  │
│   └─────────────────────┘   │                                      │  │
│   ┌─────────────────────┐   │                                      │  │
│   │   DELETE       (F7) │   │                                      │  │
│   └─────────────────────┘   │                                      │  │
│   ┌─────────────────────┐   │                                      │  │
│   │   CATALOG      (F9) │   │                                      │  │
│   └─────────────────────┘   │                                      │  │
│   ┌─────────────────────┐   │                                      │  │
│   │    EXIT      <ESC>  │   └──────────────────────────────────────┘  │
│   └─────────────────────┘                                             │
└───────────────────────────────────────────────────────────────────────┘
```

The backup menu contains the following elements. Use the arrow and <Enter> keys to move the cursor and enter your selections. To activate an option, press the corresponding function key.

Backup Directory

The first time this prompt appears, it shows the DOS directory from which the **ATS** software was activated.

For Restore operations, the Backup directory must be the directory which contains the parameter (.CBU) files.

If you change the directory definition, it is written to a file named SETUP.DIR. Thereafter, whenever **ATS** is loaded, the Backup directory is set according to the definition in the SETUP.DIR file. Similarly, the SETUP.DIR file determines the definition of the Working directory displayed during the controller configuration procedure. SETUP.DIR is updated when either the Backup directory or Working directory definition is changed.

You may change the directory definition by typing any valid DOS directory; for example:

```
B:
A:\PROGBU
C:\ROBOT
```

Backup/Restore: ALL / POSITIONS / PARAMETERS / PROGRAMS

Select the items you want to backup or restore. The options are:

ALL:	Includes all data elements: programs, positions, variables, parameters.
PROGRAMS:	Includes all data except parameters.
POSITIONS:	Includes only the positions.
PARAMETERS:	lncludes only the parameters.

During restore: ADD TO/ERASE CONTROLLER CONTENT

Select the manner in which data will be restored. The options are:

ADD TO:	Adds the restored data to the existing data in the controller RAM.
	Only new data is restored. If an element already exists in the controller, it will not be changed. The only exception is in restoring positions. If a position is defined but has not been assigned coordinate values, it will receive the coordinates from the backup file.
ERASE:	Replaces all existing data in the controller with the new data.
	The ERASE option erases all data elements except parameters, regardless of the elements being restored.

File Name : _____

>Type the name of the file containing the backup data. Do not use an extension. **ATS** adds the extension **.CBU** to all backup files.

BACKUP to disk (F3)

>The backup procedure reads the selected data from the controller and writes it to the specified backup file. If the specified file already exists, you are warned and prompted to confirm the overwrite. If you choose to overwrite the existing file, the original CBU file is copied and saved with the extension BAK.

>When you perform a controller backup, a two-line header is written at the top of the (.CBU) file which is created during the backup; for example:

```
# Configured robot, version number and version data
$ver 9 F2.26.02 21/02/94
```

>At the end of the backup procedure, after the controller has sent all data to the host computer, the controller also sends the line $CHK nnnn (where nnnn is the controller calculated CHECKSUM value).

>Meanwhile, as the host computer receives the data, it also calculates CHECKSUM, and compares it to the CHECKSUM received from the controller. If the two values are not equal, an error message is displayed.

```
CHECKSUM ERROR
Continue Backup (Y/N)?N
```

>Press Y to save the backup file, which may contain errors.

>Press N or <Enter> to abandon the backup. You may then reattempt the backup.

RESTORE from disk (F5)

Reads the selected data from the backup file and loads it into the controller RAM.

When you begin to restore the backup file to the controller, **ATS** compares the information in the header of the CBU file (see above) with the controller's current configuration and version. You are warned of any differences, and prompted to confirm the restore procedure.

DELETE (F7)

Deletes the specified file from the backup directory.

CATALOG (F9)

Displays the list of backup files in the backup directory.

EXIT <Esc>

Returns to the main **ATS** screen.

Command Line Options

Two controller functions can be performed from the DOS command line without
activating **ATS**: controller backup, and restore to controller.

In addition, switches for a number of options can be included in the command line when
ATS is activated from either the batch file or the executable file TERM_ACL.

To see a list of the options and format, type **ATS /?** from the **ATS** directory. The
following is displayed:

```
Advanced Terminal Software   version 1.9  (C) ESHED ROBOTEC
Syntax : TERM_ACL [/options] [filename]
/?              displays options
/Cn             n=COM #
/On             n=printer port #
/T[A/B]         controller type for off-line
/B or /R        Backup or Restore
   /ADD            Adds to existing data during Restore
   /ERASE          Erases existing data during Restore
   /ALL            Programs, positions, variables and parameters
   /PROGRAM        Programs, positions and variables
   /POS            Positions only
   /PAR            Parameters only
   [filename]   File to be backed up or restored
/CONFIG         Controller configuration
   /Xn             n=number of axes installed
   /RS232          Auxiliary multiport RS232 board installed
   /SCOR           SCORBASE controller configuration
      /CONV          Speed controller conveyor installed
   /ROBOT_TYPE=xx  xx=type of robot: 5, 5+, 7, 9, 14, 2, 0
/PRF            Loads peripheral parameters

C:\ATS>
```

Note: The /CONFIG options are *not available* for **Controller-AC**.

Backup / Restore Options

These options are the same as those in the Backup Manager screen. For a complete explanation, refer to the section which describes the backup and restore procedures.

To backup the controller or restore data without activating **ATS**, use the following format:

ATS *filename* /b   Backup operation.

ATS *filename* /r   Restore operation.

You must include a file name:

filename   Name of file to be saved or restored.

You may specify the following options, or assume the defaults (shown in parentheses).

(/add)	Adds data to existing data during restore.
/erase	Erases existing data during restore.
/all	Programs, positions, variables, and parameters.
(/program)	(Programs, positions, variables.)
/pos	Positions only.
/par	Parameters only.

Example **ATS poslist /b /pos**

Backs up the positions currently in the controller to a file named POSLIST.

Peripheral Option

/prf When **ATS** is loaded, the parameters for the peripheral equipment are automatically loaded according to the peripheral definition last performed.

Device Options

/C Defines the computer's RS232 port to be used for communication with the controller.

      (/C1)   (COM1 port)
      /C2   COM2 port

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/O   Defines the computer's parallel port to be used for printing.

(/O1)	(PRN1)
/O2)	PRN2
/O3	PRN3

Example   `ATS /C2`

Loads **ATS** with communication on COM2.

Off-Line Options

When loaded, the **ATS** software automatically recognizes the type of controller with which it is operating. Accordingly, **ATS** knows which robots are compatible with the controller, and displays the proper screens and menus.

If you are working off-line (not communicating with controller), and want **ATS** to display the proper screens, load the software with the following option:

`ATS /TB`   Simulates communication with **Controller-AC**.

When running off-line, **ATS** continually attempts to establish communication with the controller. As soon as the controller responds to **ATS**, the actual controller type is recognized, and the switch is cancelled; the switch will subseqently be ignored, even if communication fails.

The SEND Utility Program

The SEND.EXE utility program contained on the **ATS** diskette can be used to send **ACL** commands to the controller from the DOS command line. This is useful if you do not want to activate **ATS**.

In addition to this utility, **ACL** commands can be sent to the controller from programs written in high-level languages, such as C or Pascal, by directing them to the serial port by means of a communication driver.

The controller's responses to the commands are automatically displayed on your computer screen.

To send an **ACL** command to the controller by means of the SEND utility, use the following command line format:

```
SEND message [/Ccom] [/N] [/R] [/Ttime] [/F filename]
```

The switches are optional, as indicated by the square brackets.

Options

message   The **ACL** command you want to transmit to the controller.

/C   Defines the RS232 port used for communication with the controller. Default is COM1(/C1).

/N   Controller responses will not be displayed on the computer screen.

/R   Controller responses will be displayed on the computer screen until a key is pressed.

/T   The maximum pause between controller responses. Value is in tenths of a second. If the pause exceeds the defined value, it is assumed that the controller has completed its response. Default value is 1 second (/T10).

/F *filename*   The controller response is sent to a file (and not displayed on monitor).

/F PRN   The controller response is sent to the printer (and not displayed on monitor).

/?   Displays the Help lines.

Examples

SEND SET OUT[1]=1	Turns on output #1.
SEND OPEN	Opens the gripper.
SEND RUN PAINT	Activates execution of a program named PAINT.
SEND LISTVAR	Displays a list of all variables currently in the controller's memory.
SEND LISTP /F POSITS	Creates a file named POSITS, which contains a list of all the defined positions in the controller's memory. This list will not be displayed on the computer screen.