Remote control and supervision software for RGAM units August 31, 2000

SUMMARY

INTRODUCTION

- General features

The remote control software RGAM.EXE described in this manual allows to connect to a RGAM unit by means of a personal computer with a serial interface. In this way, the following information is obtained:

- Status supervision of all the variables, both digital (inputs/outputs) and analog (measure inputs) in real time
- Access to all front panel functions, with graphic display and possibility of 'pushing' the keys
- Possibility to read and set all the setup parameters (base setup/ advanced setup / user alarms setup)

These parameters can be consulted, modified, saved on disk and subsequently reloaded. The access to parameters is protected by password.

- Visualization of the last 255 events stored in memory, each with date and hour
- Remote access management through standard modem or modem GSM
- Auto-call capability in case of alarm
- Possibility to configure the program in different languages

- Hardware requirements

To use this program, the following minimum hardware resources is to be available:

- Personal computer with 486 processor or faster
- At least 16Mb of RAM
- About 4Mb of free hard disk space
- VGA-compatible graphic card (640x480) or higher resolution
- One standard serial interface
- Windows 95/98/NT operating system
- Mouse

- Installation

To proceed with the installation the personal computer is to have the operative system installed and working correctly.

If you are using floppy disks:

- Close all applications.
- Insert the first disk (1) into drive A :
- Start the setup program by double-clicking on *'setup.exe'*
- Follow the instructions specifying, when requested, the name of the directory in which you want to install the program.
- If the setup program asks you to if you want to replace or keep some shared files, choose keep (default).
- Replace diskettes when necessary.

If you are using CD:

1. Close all applications.
2. Insert the CD into your CD-Rom drive and wait a few seconds.
3. Start the setup program by double-clicking on *'setup.exe'*
4. Follow the instructions specifying, when requested, the name of the directory in which you want to install the program.
5. If the setup program asks you to if you want to replace or keep some shared files, choose keep (default).

At the end of installation, a window (or menu) is automatically added to your desktop to execute the program. At this point it is possible to launch the program by double-clicking on the RGAM icon. It is recommended to connect the RGAM to the PC *before* executing the program (follow the connection instructions in the next chapter). The very first time the program is executed, it ask to specify which serial port has to be used and the language for the program menus and messages.

Activation of the PC-RGAM connection

To operate the remote control program, it is essential the personal computer (PC) and RGAM can communicate by serial interface. The user can make the serial interface connection in various ways

depending on the distance between the PC and the RGAM and the modes required. In any case, a serial port is required on the PC.
The first step is to make sure the PC includes one free RS-232 serial communications interface port. Serial ports are normally indicated by the COM reference. They are usually numbered COM1: to COM4: although the majority of the brands on the market have only two available ports, COM1: and COM2:, identifiable by the 9-pin D-type male connector. Secondly, it is important to choose the port of the PC bearing in mind that one serial port is already used for the mouse in some cases.
The software must be configured to use the selected serial port; this can be done during the installation phase or thereafter through the View-Options-Dialog (see the upcoming section).

Direct connection via RS-232

This type is the simplest and includes the direct connection between the PC serial port and the RGAM (6-pin RJ connector) using the specific cable supplied by Lovato, code 51C2.
This is a connection to exclusively use during the installation, setup or RGAM maintenance only. It is not suitable for permanent connection since the RS-232 interface is inadequate for long distances owing to its sensitivity to industrial ambient disturbances. In case of problems or additional information, see Annex A.

Connection via RS-485

This connection can be used for the permanent link according to industrial RS-485 standards, with the possibility of multipoint connection of up to 32 RGAM units, linked to one PC. To complete this type of connection, each station must have a RS-232/RS-485 converter, that is one converter for the PC and one for each RGAM. Refer to the wiring diagram, given in Appendix A for the relative connection.
This solution provides a reliable and permanent connection, suitable for any industrial ambient for distances up to 1 km.

Connection via standard modem

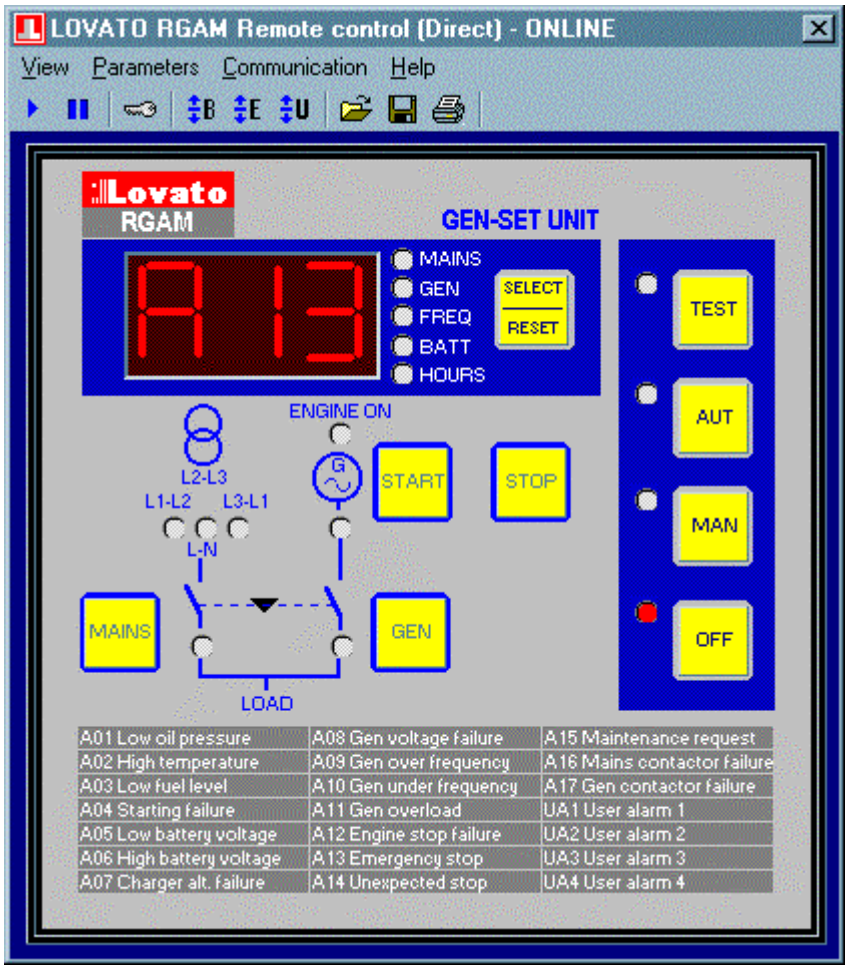
When there is a long distance between PC and RGAM, a remote control can be established using a set of two modems. In this case, the PC must be connected to the modem with the cable supplied with the modem itself, while the RGAM must be connected to the modem using the cable supplied by Lovato, code 51C5.
This type of connection requires an experienced installer, since some modem programming is required depending on the type of modem, telephone line, etc. See Appendix A for additional information.

Connection via GSM modem

The remote control software contemplates the use of GSM modem connected to the RGAM. This equipment comprises a modem and a cellular telephone in one, permitting data transmission also from places without traditional telephone lines. This unit can carry out normal modem functions and provide the possibility of sending SMS messages (Short Message Service) as well, to other GSM cellular phones, an innovative technique for alarm indication. Messages can be sent in E-mail format too, by means of SMS service extension; both RGAM and remote control software are predisposed with this feature.
The installation of this type of system calls requires a certain experience with modems as in the previous case.

MAIN WINDOW

- Front panel



The main window of the program shows the RGAM front panel. On it, the display and the LED's represent the actual ones in real time. Every operation made on the RGAM unit will have the same immediate effect on the 'virtual' panel. Clicking the front keys, it is possible to perform every operation normally accessible from the front panel, except for the ones that require the simultaneous pressing of more than one key (impossible to do with mouse pointer). However, these functions are accessible, with user-friendly specific commands (setup menu access, automatic test enabling and so on).

The front panel is always shown: the other windows of the program can be overlapped or placed side-by-side to it. At the top of the main form, there is the main menu, by means of which you can walk through the program and recall the various functions and windows.

The most commonly used functions can also be activated using the toolbar.

In this manual, every menu item is reported in English, but it is possible to change the language on-line choosing among English, Italian, French, German, Spanish and Portuguese (see Help-Language menu).

- Main menu

The main menu has the following structure :

- **View** Combines all the menu items that visualize information coming from RGAM
  - **Readings** Opens a window with all the readings with numeric value and bar-graph
  - **I/O status** Displays the digital I/O status
  - **Alarms** Displays the alarm queue status
  - **Automatic test** Visualizes the information concerning the automatic test
  - **Events** Shows the events log recorded by the RGAM
  - **Version** Visualizes the RGAM firmware version, with date and memory checksum
  - **Exit** Quits the program

- **Parameters** Combines all the options concerning the parameters setting
  - **Password** Allows to enter the password for parameters access
  - **Base setup** Allows to view/edit the base setup parameters
  - **Advanced setup** Allows to view/edit the advanced setup parameters
  - **User alarms setup** Allows to view/edit the user alarms setup parameters
  - **Save on disk** Reads the parameters from RGAM and saves them on disk as a recipe
  - **Load from disk** Reloads a recipe from disk and transmits the parameter to the RGAM
  - **Print** Prints the parameters settings
  - **Modem parameters** Allows to view/edit parameters concerning modem/GSM communication

- **Communication** Combines all the menu options concerning the serial communication
  - **Online** Activates the serial communication
  - **Offline** De-activates the serial communication (pause)
  - **Port** Selects the PC serial port among COM1/2/3/4
  - **Address** Allows to select which units you want to communicate with
  - **Modem** Opens the modem manager window
    - **Execute a call** Executes a call
    - **Wait for a call** Waits for an incoming call
    - **Hang up** Closes phone line

- **Help** Combines the help functions for the user
  - **Instructions** Visualizes this manual
  - **Language** Selects the program language
  - **Information on** Shows an information window about Lovato

VIEW MENU

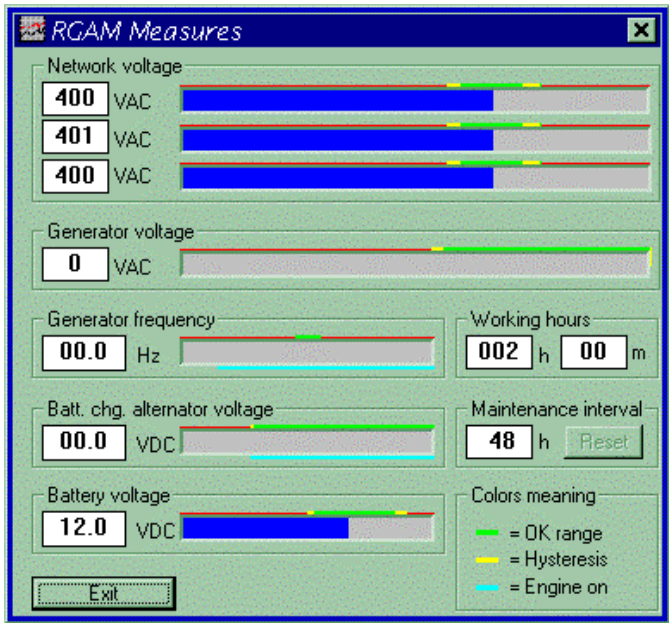
- Readings window

The readings window can be recalled from the View-Readings menu. It shows the status of all the analog readings :

- Three phase-to-phase network voltages
- Phase-to-phase generator voltage
- Generator frequency
- Voltage supplied by the battery charger alternator
- Battery voltage

Moreover, other information is available such as :

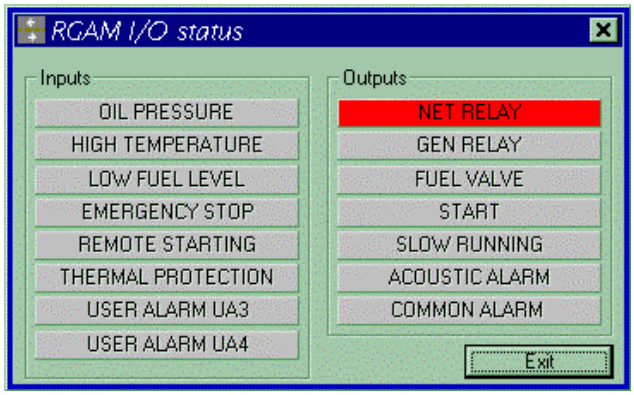
- Engine working time (hours + minutes)
- Hours before the next maintenance request



For each one of these readings, the numerical reading and one bar-graph with colored markings are available and help to understand the right range of the corresponding measurement. These markings are green for the correct range, red for the wrong range and yellow in the hysteresis zone. Moreover, there are some cyan markings to indicate the started engine thresholds, placed close by the battery charger alternator voltage bar-graph, generator voltage bar-graph and generator frequency bar-graph.
In this window, there are two buttons: The first, contained in the Maintenance interval frame, allows to reset the maintenance interval, even before it has elapsed causing the respective alarm. This button is normally disabled to avoid an accidental pushing. It becomes active only after the password has been entered (see Parameters.password menu).
The second button, Exit, quits the readings windows. The operating system always offers an alternative way to close a window, using the Win 3.1 control box or the Win 95 X-button on the top-right.

- I/O status window

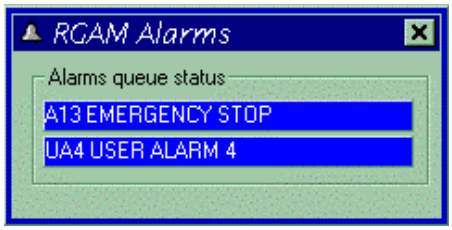
The I/O status window is accessible through the View-I/O status menu. It shows the status of the 8 digital inputs (contacts coming from outside) and of the 7 digital outputs (internal relays of the RGAM unit). The visualization is in real-time and can be activated while other windows are shown. For instance, it is possible to visualize at the same time the front panel, the measure window and the I/O status window, giving the user an overall view of the system. Since 4 of the 8 inputs have a programmable function, in their box appears the function selected by the installer of the system, read from the advanced setup menu settings. The same principle is valid for the 3 programmable function outputs.



When one of these boxes is highlighted in red, it means that the corresponding I/O is active. It is important to understand that the red color does not indicate the status of the contact but the 'active' state, that is the contrary of the one at rest. For instance, the emergency stop input, which is connected to a normally closed contact, will be highlighted in red when the contact opens (condition that generates the emergency condition)

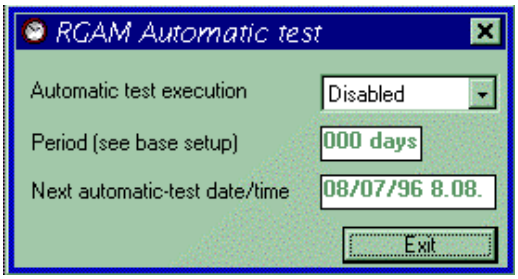
while for instance the External start input will be highlighted when its contact closes (condition that starts the engine).

- Alarms window



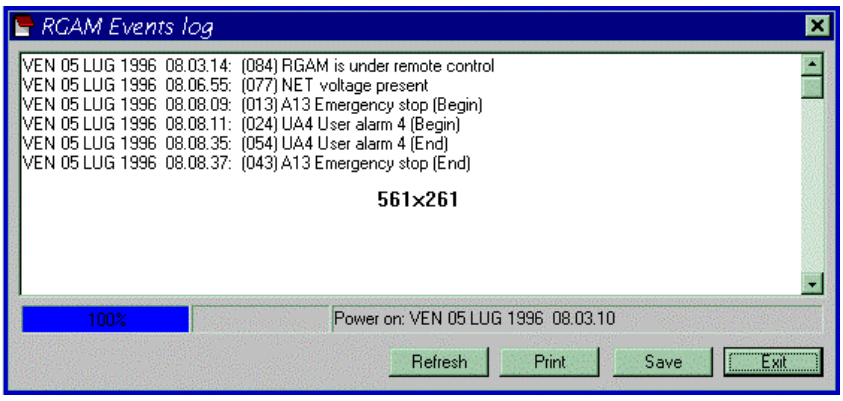
To show the relative window, choose Alarms from the View menu. This window contains a list of alarms that monitors the alarm 'queue' stored in the RGAM memory. The alarms are inserted into this queue considering their priority level (from 1=highest to 4=lowest) and their succession order. The first item in this window, placed at the top of the list, is the active alarm with the highest priority or, in case of the same priority level, the one that occurs first. This window modifies its dimensions according to how many alarms it must contain, and can be showed even if there is no alarms active (in this case, it will be obviously empty). To close this window, use the operating system buttons (the X button on the top-right or the Win 3.1 control box on the top-left of the window).

- Automatic test window



In the Automatic test window all the information concerning the corresponding RGAM function are reassumed. It is possible to enable/disable the test execution, to display its period (expressed in days, see the base setup) and the time and date of the next test execution. Remember that in the moment in which the Automatic test is enabled, it is also 'synchronized' with the hour of that moment and will be always executed at the same hour of the day. Clicking the dropdown box of the first row, it is possible to select between Enabled (the test will be performed every '*n*' days if the RGAM unit is in automatic mode) and Disabled (the test will not be executed). Notice the synchronization shown in the third row. To modify the execution period, it is necessary to enter the base setup (see base setup parameters).

- Events log window



The events log window is one of the most interesting functions offered by this program. Recalling the window from the View-Events menu, the last 255 events recorded by the RGAM can be displayed. 'Event' is to be understood as the occurrence of particular situations, such as the lack of network voltage or the RGAM operating mode change or the start/stop of the engine and so on. Each event is followed by the date/time at which it happened and by an event code. The description of the events is displayed in the language chosen by the user. Thanks to this useful function, the technician or the installer of the generating set can become aware of the status of the plant and verify if everything have worked correctly in the period preceding the maintenance intervention. In case of malfunction, important information can be deduced from this kind of 'operation recorder' of the generating set. For instance, the technician can discover which signals have caused a specific alarm, at which moment that situation has happened and how it has been removed.

The various types of events recorded are listed below :

- Power-on of the RGAM unit
- Begin and end of every alarm condition

- Leaving and re-entering the correct range for each analog reading (Network voltage, generator voltage, battery voltage..)
- Contactors closing both in manual and automatic mode
- Operating mode change OFF-MAN-AUT-TEST
- Starting and stopping of the generating set, with recording of the starting attempts
- Remote control begin/end
- Access to setup parameters from front panel or from remote control
- Automatic test execution
- Modem connection attempts

Four buttons are present in the events window :

- **Refresh**

Manual refresh of the events list. This is done automatically every time a new event is added to the list.

- **Print**

Prints the events log on the Windows default printer.

- **Save**

Saves on disk the events log. This could be useful during the test of the equipment, in order to document the test of each input/output and the execution of the test cycles scheduled for the generating set and its control panel.

- **Exit**

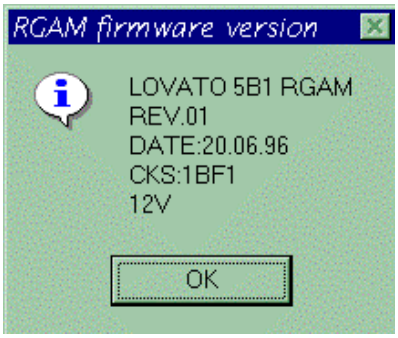
Quits the events window.

In the lower part of the event window, there are three boxes as described below :

- Wait bar that indicates to the user that the program is receiving data from the RGAM unit.
- Status box indicating the window is updating
- Box indicating the reference time for the events, that is the time of the power-on of the RGAM unit. Notice that since the RGAM is not provided with a battery backup RAM, the events log is reset every time the unit is switched off. Moreover, the date/time of each event is calculate using the date/time setting of the personal computer.

- Version window

Using the View-Version option it is possible to display a small window in which the identification information of the internal RGAM firmware is reported, that is the microprocessor software version. This information is also reported on an adhesive label placed on the EPROM memory that contains the software itself, situated inside the RGAM unit, on the processor board. In case of presumed malfunction, it is important to inform the Lovato Customer Service of which firmware version is in use. By means of this window, the information is recoverable without disassembling the RGAM unit. On the last row of the window, the voltage supply type of the RGAM (12V or 24V) is also reported.



PARAMETERS MENU

All the options concerning the parameters setting are combined in the second menu. The parameters allow the installator and the user to customise various functions of the RGAM. Each parameter is identified by the letter 'P. ' plus a two-digit number (see the RGAM operations manual for more details).

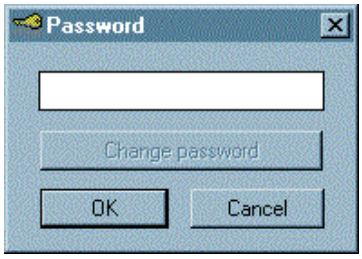
The parameters are divided into three menu called Setup :

- Base setup (parameters related to the user / load and application type characteristics)
- Advanced setup (parameters related to the installer / generating set and switchboard characteristics)
- User alarms setup (parameters related to the user alarms)

By means of the functions of this program it is possible to read and modify the parameters in a more practical way in respect with the normal way that requires the use of the RGAM front panel keys and display. As will be seen in the following chapters, it is possible to display many parameters at a time, each one with its code, description in various languages, numeric value and graphic bar for the setting or dropdown box for the selections.

- Password

Selecting this option, a window pops up, asking the user to enter the password for parameters access. When the RGAM.EXE program is just started it is only possible to read the parameters and to display them, but not to edit/modify and transmit them into the permanent memory of the RGAM unit. Before entering the correct password it is also not possible to save or load parameters recipes from disk. After the parameter access password has been correctly entered, a confirm message is shown and the following functions become available :



- Base setup parameters transmission
- Advanced setup parameters transmission
- User alarms setup parameters transmission
- Save parameters on disk
- Load parameters from disk
- Maintenance interval reset (see Readings window)

When the window pops up, type in the password placing the cursor in the relative text box. For every keystroke, one asterisk will be displayed. It is always possible to delete and correct. When the insertion is complete, click OK button. If the password is correct an 'access opened' message will be displayed, otherwise the access will be denied. The default password is *RGAM*. It can be changed by the user by clicking on *Change password* and then entering the new password twice.

- Base setup
- Advanced setup
- User alarms setup

These three menus are treated in one single chapter because they differ one from the other only for the fact of combining different parameters, while for the operative point of view they have the same functioning. These functions are very important because they represent the part of the program most frequently used. In fact, they permit an easier and faster way to set the parameters and a lower probability to make mistakes in programming the RGAM unit. Once recalled one of these three setup the relative windows pops up. Each window represents the corresponding parameters table reported on the *RGAM operative manual*. We recommend to carefully read *this* manual before using these functions.

In the window, the parameters are organized in rows, each containing :

	Example :
Parameter code	*P.03*
Description	*Network voltage lack delay*
Numeric value	*060*

If the parameter is numeric, the following are also displayed :

- Unit of measure *sec*
- Graphic bar

To modify a numeric parameter the graphic bar must be used. Clicking the left-right arrows, the numeric value is decreased or increased. Pointing the graphic bar cursor with the mouse and dragging it a substantial variation is obtained. The minimum and maximum limits are the same as those which can be set in the traditional way through the front panel of the RGAM unit.

Otherwise, if the parameter is a selection, it is also displayed:

- Description of the function selected

To modify a selection parameter, click the dropdown box button and release the mouse button when the desired function is highlighted. The numeric value changes accordingly (see RGAM operations manual).

The title of the window shows the name of the setup menu and a message that could be :

- (Identical) When the displayed parameters are identical to the ones stored into the RGAM memory
- (Modified) When the parameters have been modified but not yet transmitted to the RGAM

In the lower part of the windows, there are four buttons :

- **Transmit**

This allows to transfer the displayed parameters into the permanent memory (EEPROM) of the RGAM unit. It is enabled only if the parameter access password has already been correctly entered. After pushing this button an ask-for-confirm message pops up. Answering 'Yes' the parameters are transmitted and stored and a 'operation carried out' message is displayed. The RGAM unit resets itself (warm boot).

- **Receive**

This button works in the opposite way of the previous one, and therefore 'reads' the parameters from the RGAM and shows them in the setup window. This operation is done automatically each time the setup window is recalled. This operation can be executed even without entering the parameter access password. To verify its operation, try to modify a parameter (notice the window title changes to 'modified') and then press Receive. The parameters are read and the previous value is restored (the title changes back to 'identical'). If the procedure succeeds, a confirm message is displayed.

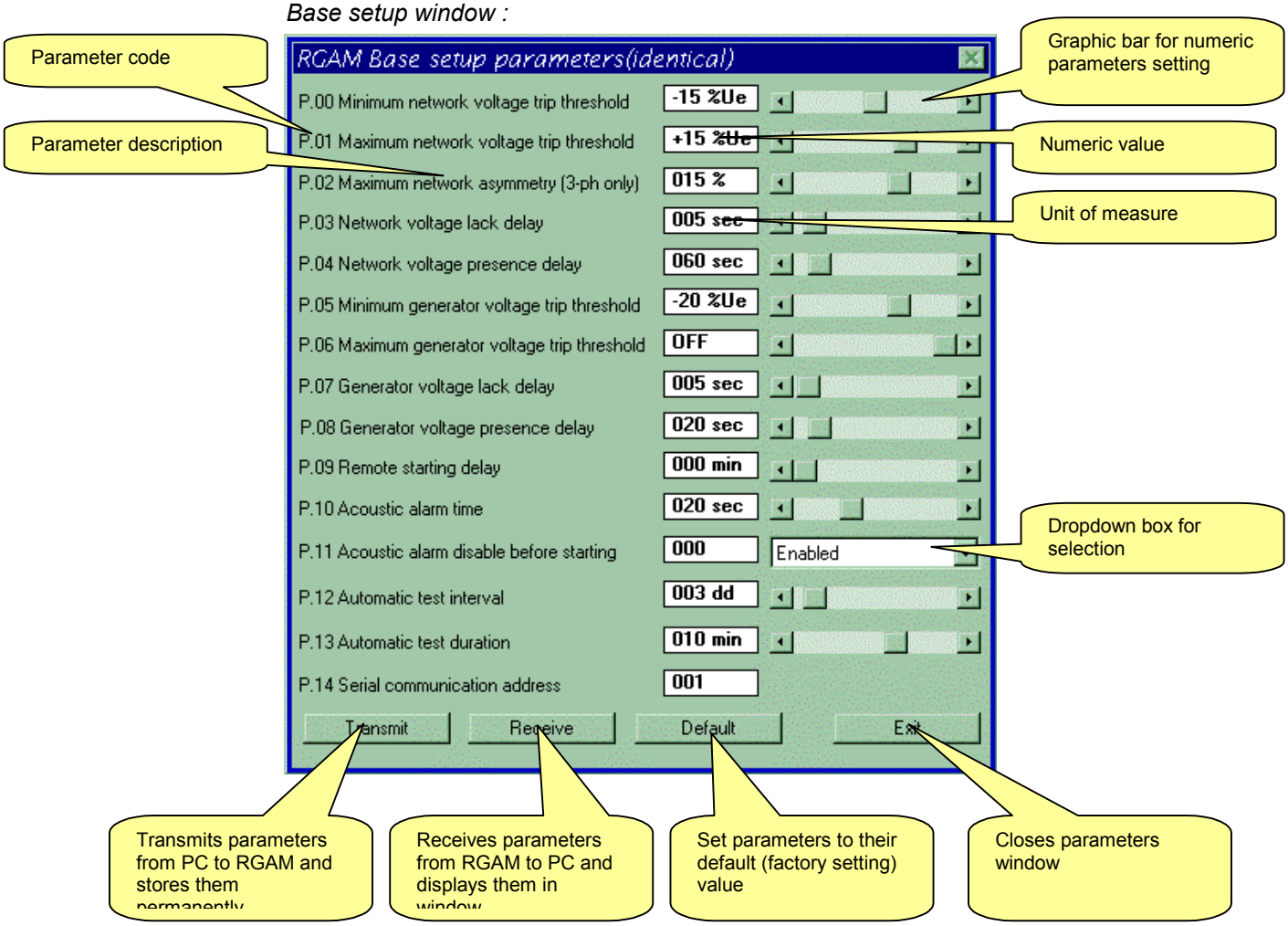
- **Default**

By pressing the Default button, all parameters in the setup window are reset to the Lovato factory default. It is useful to reset the values or to check which parameters have been modified from the standard setting.

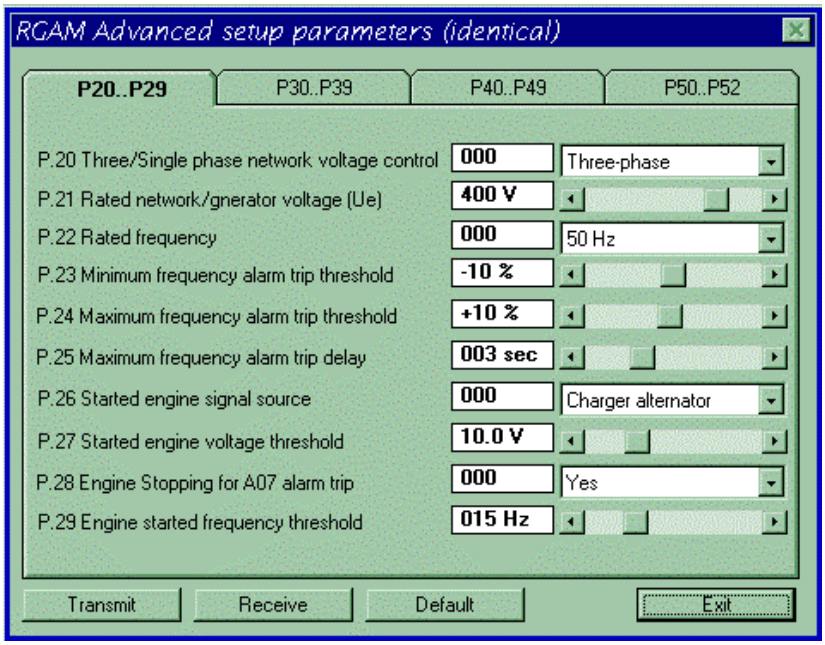
- **Exit**

With this button the setup window is closed. If the parameters have been modified (see the window title bar) but not yet transmitted to the RGAM, an ask-for-confirm window is displayed, where the user is asked to exit discarding changes or not.

Base setup window :

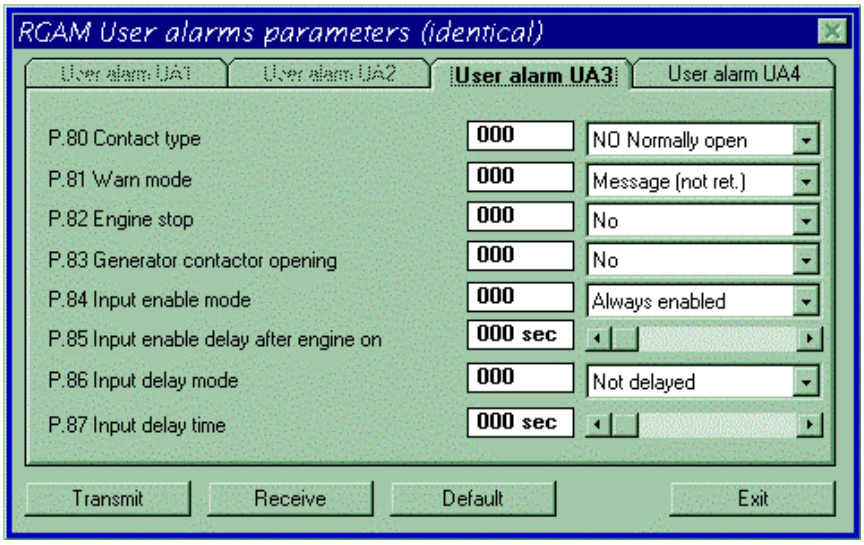


Advanced setup window :



Due to the high number of parameters combined in the Advanced setup menu, the window has been organized in four overlapped 'pages'. To enter each one of these pages, the corresponding tab on the top is to be clicked.

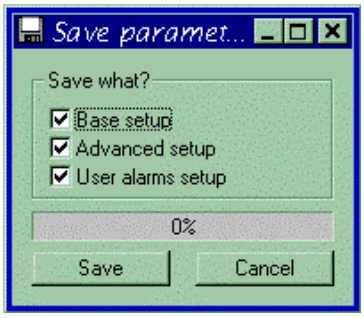
User alarm setup window:



Also in this case the window has been organized on four levels, one for each user's alarm. Notice that in this case the 'pages' can be enabled or not, accordingly to the settings of the corresponding programmable input in the Advanced setup. In fact, if the programmable input has been programmed to a function other than 'User alarm', its settings in the User alarm window are useless.

- Save on disk

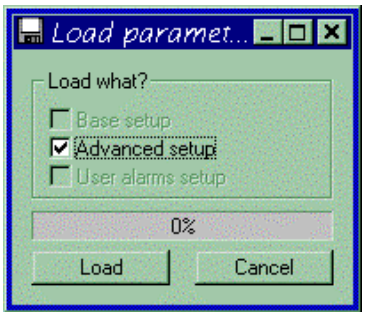
With this option, it is possible to save on disk all the parameters stored in the RGAM unit in a file in ASCII format.



Thanks to this possibility, the installer can create a group of files with the typical settings for his customers, speeding up the RGAM setting-up operation. This function is particularly useful in the panel test phase too, when is necessary to drop all the delay settings to minimum in order to perform the testing cycle in reasonable time. After the testing is complete, all the delay presets are to be set again at their normal (operative) value. This operation, that will take a long time if done manually using the front panel, can be done in a few seconds using a personal computer and this software. Furthermore, in case of replace of the RGAM unit, the technician will be able to program the new unit with the same settings of the old one.

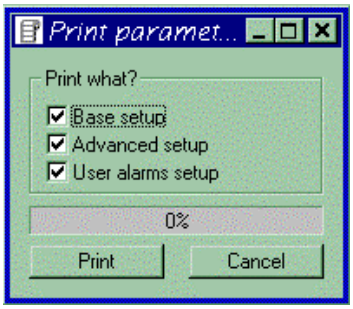
After choosing Save on disk from the menu Parameters, the given window in picture will pop up, where it is possible to specify which of the three setups are to be included in the ASCII file. After having pushed the Save button, the user is prompted for the file name (default extension is .DAT). Push OK to start the saving procedure. Opening the file just created with a common text editor, simple and linear structure is evident.

- Load from disk



Using this function, the parameters previously saved on disk can be reload in the permanent memory of the RGAM. First of all, one window, by means of which it is possible to browse the disk and find the file to load, is displayed . After the OK, the program analyzes the content of the file and shows the window in picture, putting the checkmarks near the items it has found present in the file. The user at this point can decide to disable the loading of some of the data by switching off the corresponding checkmark. To proceed, press the Load button. The program will load the parameters into the permanent memory of the RGAM. If the loading procedure ends regularly, a confirm message will be displayed.

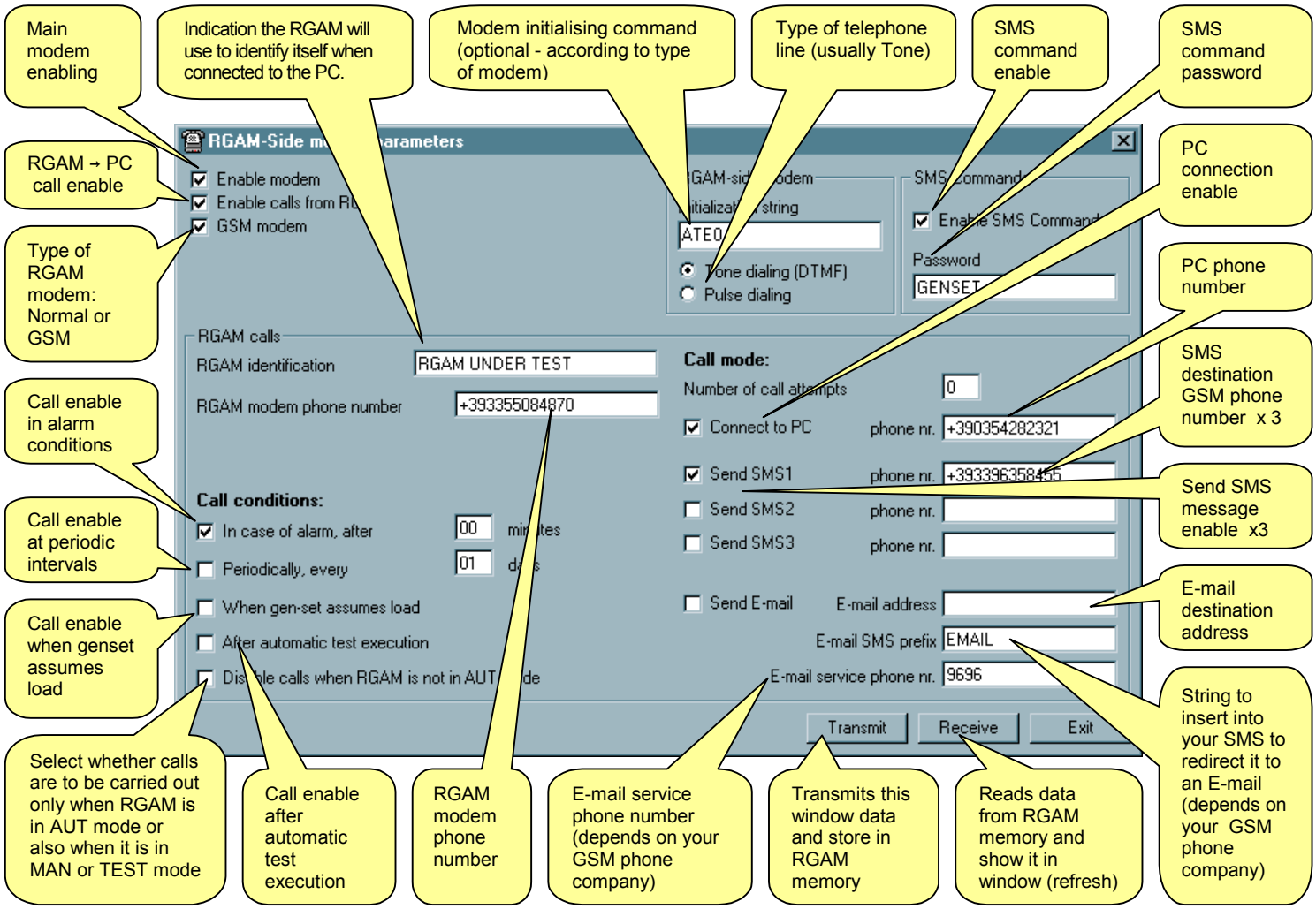
- Print



By means of this option it is possible to print a summary table of the current settings of all the parameters. Also in this case, the user can select which of the three setup he wants printed. This function is very useful because it permits the installer to include with the control board a table with the original settings. This can be used by the generating set user or by a technician as a reference for the operational tests and/or the maintenance interventions.

- Modem parameters

If modems are used to obtain remote control, one must program some RGAM parameters, needed to supervise the RGAM modem. Owing to their special configuration, these parameters are not available on the RGAM display keypad and can be regulated by the PC or the remote control software only.
Since they must be programmed *before* the modem is used, this is normally done by directly connecting the PC and the RGAM directly with the RS-232 serial cable.
When a modem is used, the RGAM can be possibly configured to answer calls from the PC only or to call the PC autonomously in case of particular events (alarm conditions or at periodic intervals).
In addition, the RGAM can be connected to a GSM modem, that is a device comprising a traditional modem and a cellular telephone in one. In this circumstance, it is also possible the RGAM can also send SMS messages or electronic mail, always after an alarm event or at periodic intervals.
All the parameters needed to carry out the operations described above are indicated in the frame given below.



COMMUNICATION MENU

- Online

By means of this option, it is possible to activate the communication between the personal computer and the RGAM unit. When the RGAM.EXE program is launched, it automatically activates the serial communication. The communication can be paused (disabled) manually, using the Offline option, or automatically every time a communication error occurs (the RGAM does not answer or answers incorrectly for three times consecutively). When the title bar of the main window shows the message ONLINE, the communication is active.

- Offline

Selecting Offline from the Communication menu, the serial communication is paused. This condition is highlighted by the message OFFLINE on the title bar of the main window and by the switching off of all LED's and the display on the front panel synoptic. The program enters automatically the Offline mode if it detects contiguous communication errors.

- Port

Pointing with the mouse the Communication-Port menu, a sub menu is displayed where the user can select which serial port of the personal computer is to be used for the serial communication. It is possible to choose among COM1, COM2, COM3 or COM4. The serial port in use is highlighted with a checkmark. If the chosen port is not available on the personal computer, an error message is generated. When a serial port is selected, the setting is stored on disk and is maintained even if the user quits the program (the selection is stored into the RGAM.INI file). As already said, it is possible to change the serial port in use only when the program is in Offline mode.

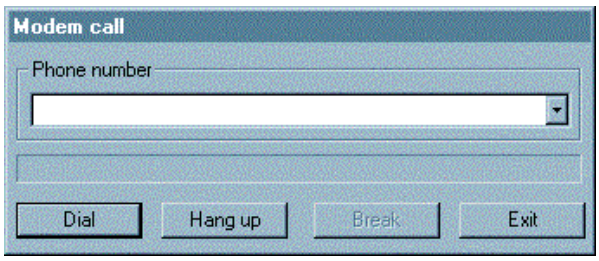
- Address

This option is useful only in RS-485 multidrop applications. It allows to select the address of the RGAM unit with which the personal computer must 'talk'. In such an application, each RGAM unit must have an address different from each other connected on the same communication network. To set the RGAM address, see the parameter 'Serial communication address' in the base setup menu. After this window has been invoked, the program executes a polling cycle, calling all the possible units (from 01 to 32) and enabling the relative button, only for the active units that answer correctly. If a button is grayed (disabled), that RGAM unit cannot be selected. If the user wants to repeat the polling cycle manually, he has to click the Detect button. To select the desired address, press one of the active buttons and then confirm with OK.

- Modem

This menu is enabled only if the RGAM.EXE program, during startup, has detected a modem connected to the serial port. In this case, both the Communication-Modem menu and the toolbar modem buttons will be shown.

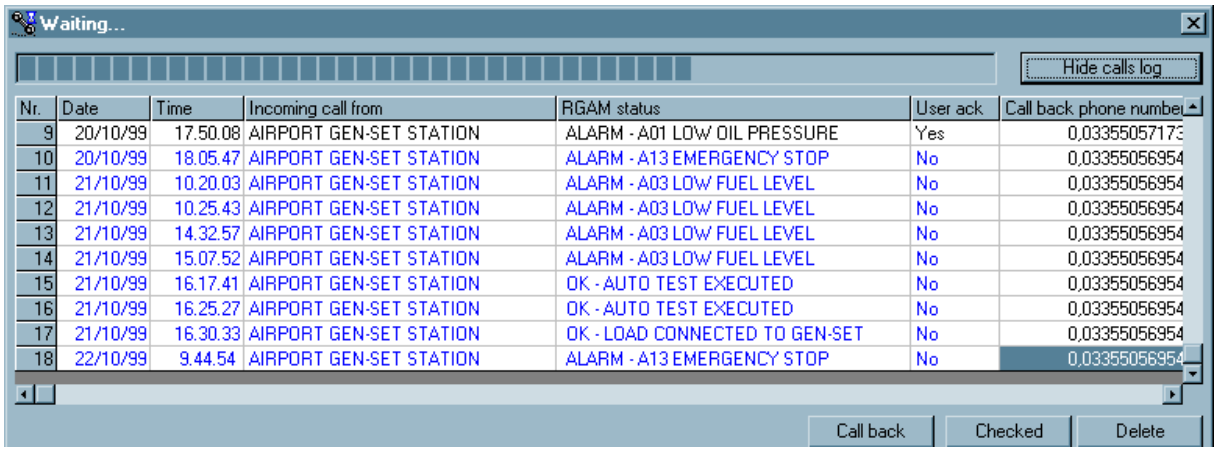
- Modem - Execute a call



Using this menu choice, it is possible to call from the PC one RGAM station equipped with its own modem (standard or GSM). Once the window, as shown, is opened, type the number to call in the relative space (if the number has already been previously called, by pushing the down key it is possible to select from the list of the previous numbers without having to retype them). When the number is inserted, click the Call button to begin dialling. At this point, the program instructs the modem to call. During the dialling, the blue bar of maximum admissible time for connection link scrolls. The modem being called links to the line and interchanges with the calling modem the usual handshaking messages. At the end of this procedure, if all has been correctly done, a box indicating the linkup will appear on the PC screen and the program will automatically continue in Online mode.
If there are errors, one must carefully check the connections and eventually follow the instructions given in the troubleshooting section reported in the last part of this manual. Usually, the connection is not a critical point since very common and standard procedures are used. Using the *Break* button the call procedure can be stopped, while *Hang up* terminates the communication already in course.

- Modem - Wait for a call

By choosing this option, the program enters attend call mode, in which the PC answers to incoming calls on the modem. In this case, it is presumed there are one or more RGAM units in the field, programmed to independently call the PC in alarm conditions or at periodic intervals (*See the previous section for RGAM modem parameters).*



When a RGAM calls, the PC in attend call mode connects itself and logs the time, date and calling identification in a text file, which can be eventually displayed through the *Show calls log* button. If the user is present in front of the PC when a call comes in, there is the possibility to remain linked with the RGAM and check the type of event.
Contrarily if there is no one, the PC will automatically hang up after a few seconds. In this case, the call will be shown in highlighted blue color, with the *User ack* field set to No.
By selecting one recorded call, the user will be able to:

- Call back the RGAM to check what's happened using *Call back* button.
- Set the call to normal state (black colour, User ack field = Yes) using *Checked* button
- Definitively delete the record by means of *Delete* button.

The list of calls is stored on hard disk in the ASCII file 'Modemcal.txt' , in the same directory of the RGAM.exe application.

- Modem - Hang up

This function terminates the connection via modem, cutting the telephone line off. This is like hanging up in a normal telephone call. This is made automatically every time one closes the program.

HELP MENU

- Instructions

By means of the Instructions option, the user can visualize this manual on the PC screen. The graphic quality can depend on the type of graphic adapter used in the personal computer.

- Language

With this useful function it is possible to recall a window where the user can choose the language of the program. All messages, windows, parameters, and menus are displayed with variable text coming from an ASCII text file. The files with the various languages are the following :

- RGAM_ENG.TXT English
- RGAM_ITA.TXT Italian
- RGAM_DEU.TXT German
- RGAM_FRA.TXT French
- RGAM_ESP.TXT Spanish
- RGAM_POR.TXT Portuguese

The language setting is stored and maintained until it is changed.

- About

This options visualizes a window with information about LOVATO S.P.A. with address, telephone and fax numbers, Internet URL and E-Mail address.

Appendix A - CONNECTION TYPES

The following pages show the typical connection modalities between the personal computer and the RGAM unit. It is important to notice that all the subsequent information are referred to software and hardware systems supplied by Lovato.

Direct connection through RS-232 interface

The direct connection PC-RGAM through RS-232 interface is possible using a special cable with adapter, indicated in the picture with the Lovato order code 51C2 (for more information about this cable, please contact Lovato Customer Service). As already explained , this type of connection is to be intended as temporary, useful for the RGAM first setting during installation or for troubleshooting and maintenance purposes. This type of connection is NOT suitable for an industrial environment. There is no harm in connecting this cable while RGAM and PC are switched on. After executing RGAM.EXE software, if everything is correct, will automatically activate communication (Online mode).

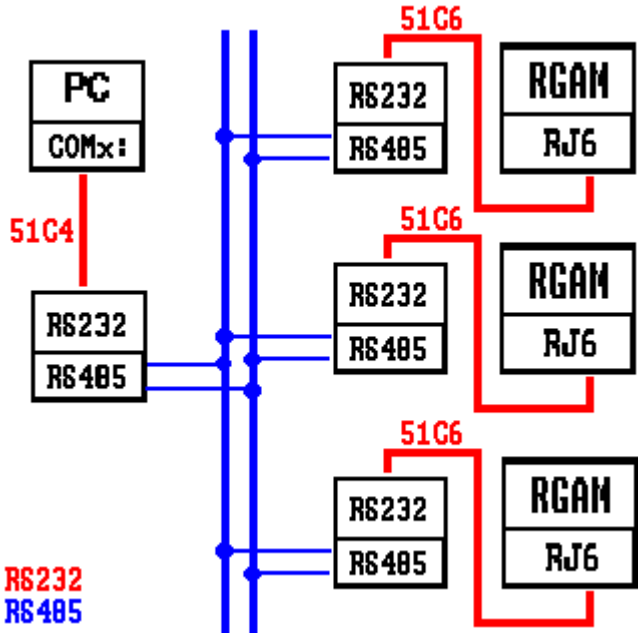
Troubleshooting

If the connection does not work (trying to enter Online mode the program emits some beep and passes automatically in Offline mode) please check carefully the following points:

- The PC COM port used for connection must match the one selected in Communication-Com port menu. That port must NOT be configured as a serial mouse port on the PC.
- The serial addresses set on the PC and on RGAM must be the same (usually 01 for both).
- The cable must be securely connected on both ends.
- RGAM must be switched on
- This type of connection does not work if the RGAM unit is in the version RGAM..RC with internal RS-485 interface.

PC-RGAM connection via RS-485 interface

The connection through RS-485 interface requires one RS-232/RS-485 interface converter for the PC side, plus one RS232/485 converter for each RGAM unit (for RGAM..RC units, see next chapter).
To connect the PC to the interface converter use Lovato 51C4 cable. The connection between RGAM units and the RS-232/485 converter is done with 51C6 cable. All the converters must be connected in parallel on the RS-485 bus. See the converter manual for more details.

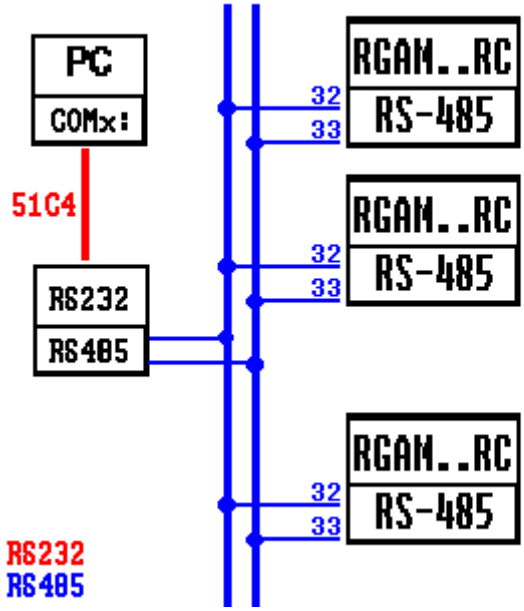


Troubleshooting
If the connection does not work (trying to enter Online mode the program emits some beep and passes automatically in Offline mode) please check carefully the following points:

- The PC COM port used for connection must match the one selected in Communication-Com port menu. That port must NOT be configured as a serial mouse port on the PC.
- If on the RS-485 bus there are more than one RGAM, then each RGAM must have a serial address different from the other (01, 02 03 etc.). To set the serial address, enter the base setup from the front panel of the RGAM and modify parameter P.14
- The serial address set on the PC must match with one of the addresses of the RGAMs. That RGAM must be switched on.
- The maximum distance between the two most distant units on the RS-485 bus must not exceed 1000 m.
- The interface converter must be switched on and correctly set (see its technical sheet for correct jumper setting)

PC-RGAM..RC connection via RS-485 interface

The connection through RS-485 interface requires one RS-232/RS-485 interface converter for the PC side. To connect the PC to the interface converter use Lovato 51C4 cable. The connection between RGAM..RC units and the RS-485 bus is done directly with a twisted-pair cable. See the converter manual for more details.



Troubleshooting

If the connection does not work (trying to enter Online mode the program emits some beep and passes automatically in Offline mode) please check carefully the following points:

- The PC COM port used for connection must match the one selected in Communication-Com port menu. That port must NOT be configured as a serial mouse port on the PC.
- If on the RS-485 bus there are more than one RGAM..RC, then each RGAM..RC must have a serial address different from the other (01, 02 03 etc.). To set the serial address, enter the base setup from the front panel of the RGAM and modify parameter P.14
- The serial address set on the PC must match with one of the addresses of the RGAMs. That RGAM must be switched on.
- The RS-485 teminal A of the interface converter has to be connected to terminal 32 of RGAM, while terminal B has to be connected to terminal 33.
- The 120-ohm termination resistor should be connected between terminals 32 and 33 of the most distant RGAM..RC unit
- The maximum distance between the two most distant units on the RS-485 bus must not exceed 1000 m.
- The interface converter must be switched on and correctly set (see its technical sheet for correct jumper setting)

Connection via standard modem

To realize a remote connection through a telephone line it is necessary to use two modems, one on the PC-side and the other on the RGAM-side. Lovato guarantees the correct functioning of the connection using modems of the following type:

- 3-Com U.S. Robotics 56K mod. 5630

Even if the connection is possible with modems of different brand/type, in this manual all the configuration commands and the wiring diagram refer to the above type/brand.

The connection via modem is very simple from a conceptual point of view but implies the user must have at least minimal experience with inconveniences related to serial communications, modem programming, type of phone lines and so on. To simplify the configuration procedure, the operations have been divided into the following steps:

1. ***RGAM-side modem configuration***
   The modem of the RGAM must be configured before use. The configuration is needed to implement the following functions:

- Disable the echo.
- Adjust communications speed to a fixed 9600-baud rate.
- Permanently store the two previous settings as default at power on.

To make all these configurations, the modem to be connected to the RGAM is to be temporarily connected to the PC with its standard cable. Then start the PM.EXE program (supplied with this software) and press the Program s*tandard modem* key. Attend the confirm message and then disconnect the modem from the PC.

PM.EXE transmits to the modem the following configuration string:

AT E0 &N6 &U6 &W0 <CR> (commands valid for modem model 5630)

If the user has familiarity with terminal emulation programs (such as HyperTerminal on windows) he can do this configuration manually without using PM.EXE. In this case the serial interface of the PC should be set to 9600 bps, 8 data bit, no parity, 1 stop bit. Then the above string must be entered using the keyboard. When Enter is pressed, the modem should answer with OK.

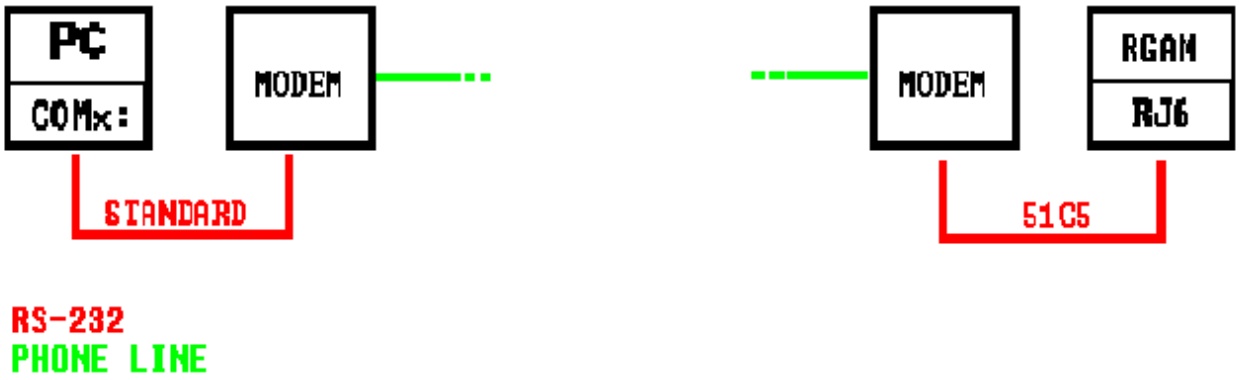
2. ***RGAM configuration***
   The generating set control unit also requires a configuration to dialog with the modem.

- Connect the PC to the RGAM with the direct RS-232 cable.
- Check that the firmware revision of the RGAM unit is Rev.16 or higher.
- Enter the password.
- In Online mode, select the *RGAM modem parameters* (see the description given in the previous pages) under *Parameters* menu.
- Confirm the modem main enabling (first option on the top left).
- If the RGAM is required to call the PC autonomously, confirm the *RGAM call enable* and *Connect PC* options, typing the PC modem number in the *telephone number* line and programming the conditions which determine a call (alarm conditions and/or periodic intervals).
- Transmit the setting with *Transmit* key.
- Set the serial address to the same value programmed at the PC (normally *01*).
- Confirm with the *Transmit* key.

3. ***System connection***

- Connect the programmed modem, as per item 1, to the RGAM using the cable code 51C5.
- Connect the second modem to the PC with the standard supplied cable.
- Supply both modems

- We suggest to do the first tests using two internal telephone lines in your office. This will allow you to control the call procedure and simplifies troubleshooting.



4. *RGAM.exe program configuration*

- Start the RGAM.exe program from the PC.
- Switch on the PC-side modem
- From the *Communication-Com port* menu , select the port connected to the modem
- Verify that the program detects the modem presence (modem buttons diplayed on the toolbar)

5. *Online connection*

- Select in the *Communication* menu the *Modem call* option.
- Type the telephone number for data transmission of the RGAM modem.
- Click *Dial*.
- Now, the PC modem calls the RGAM modem. After a few rings, the RGAM modem answers and the program automatically continues to online mode.
- To suspend the connection, select the *Modem hang up* option in the *Communications* box.

Troubleshooting:

Whenever the RGAM modem does not ring during the call attempt, this signifies the call can not reach destination. Consequently, check the following:

- The PC-side modem is supplied, connected to the PC with its standard cable, connected to the correct serial port (the one selected with Communications-Com port).
- To check the PC-side modem, try to dial a different phone number (for instance one phone line in your office) and see if that phone rings or not. If it rings, the problem is on the RGAM-side; If not, the problem is on the PC side.

If the modem, being called, rings continuously but the connection is not completed (the box with “Connection OK” indication is not shown):

- Check the RGAM modem parameters (see previous item 2 above).
- Control the RGAM-modem cable, code 51C5.

If the “Connection OK” indication is displayed but the program then goes in Offline:

- Try to directly connect the PC to the RGAM with the cable, code 51C2, and conduct all the controls described in the RS-232 direct connection section.
- Check if the RGAM-side modem is programmed correctly as stated in item 1.

Connection through GSM modem

To make a remote connection through the GSM cellular system, a GSM modem must be connected to the RGAM and a second modem, traditional or GSM type, to the PC.
Lovato warrants reliable operation using GSM modems of the following type:

- Funkanlagen Falcom A2-1 or A2D-1

This type of modem is very versatile and allows access to functions, which are normally not possible with a traditional modem (SMS, Email). However, wireless communications, although conducted with 9600 bps, require longer signal transfer times, which can be disadvantageous for communications speed.

The connection via GSM modem is very simple from a conceptual point of view but implies the user must have at least minimal experience with inconveniences related to serial communications, modem programming, type of phone lines and so on. To simplify the configuration procedure, the operations have been divided into the following steps:

1. ***RGAM GSM modem configuration***
   The GSM modem of the RGAM must be configured before use. The configuration is needed to implement the following functions:

- Disable the echo.
- Adjust communications speed to a fixed 9600-baud rate.
- Disable the PIN request after power on.
- Confirm the telephone number of the SMS exchange server.
- Adjust SMS mode to “Text”.
- Set the communication protocol
- Disable handshaking
- Permanently store the two previous settings as default at power on.

To make all these configurations, the GSM modem connected to the RGAM is to be temporarily connected to the PC with its standard cable. Then start the PM.EXE program (supplied with this software) and press the *GSM modem program* key. Attend the confirm message and then disconnect the GSM modem from the PC.

Important:
The SIM-CARD must be enabled for data transmission when used with GSM modem. A normal SIM-CARD for cellular telephone does not work. Consult any SIM-CARD supplier for obtain this feature. When calling the GSM-Modem, you have to use the ‘Data transmission telephone number’ instead of the normal ‘Voice telephone number’.

2. ***RGAM configuration***
   The generating set control unit also requires a configuration to dialog with the modem.

- Connect the PC to the RGAM with the direct RS-232 cable.
- Check that the firmware revision of the RGAM unit is Rev.16 or higher.
- Fix the password.
- In Online mode, select the *RGAM modem parameters* (see the description given in the previous pages) in the *Parameters* frame.
- Confirm the modem main enabling (first option on the top left).
- Confirm the *GSM Modem* option.
- If the RGAM is required to call the PC autonomously, confirm the *RGAM call enable* and *Connect PC* options, typing the PC modem number in the *telephone number* line and programming the conditions which determine a call (alarm conditions and/or periodic intervals).
- If the RGAM is required to send a SMS message whenever the preset conditions take place, confirm the *Transmit SMS* option and type the cellular telephone number to which the message is to be transmitted.
- In the same way, if the RGAM is to transmit an electronic mail, confirm the *Transmit Email* option and type the receiver mailbox in the relative space.
- Transmit the setting with *Transmit* key.
- Set the serial address to the same value programmed at the PC (normally *01*).

- Confirm with the *Transmit* key.

3. *System connection*

- Connect the programmed GSM modem, as per item 1, to the RGAM using the cable code 51C7.
- Connect the second modem to the PC with the standard supplied cable.
- Supply the GSM modem and wait 30 seconds for the initialisation.

4. *RGAM.exe program configuration*

- Start the RGAM.exe program from the PC.
- Switch on the PC-side modem
- From the *Communication-Com port* menu , select the port connected to the modem
- Verify that the program detects the modem presence (modem buttons diplayed on the toolbar)

5. *Online connection*

- Select in the *Communication* menu the *Modem call* option.
- Type the telephone number for data transmission of the RGAM GSM modem.
- Click *Dial*.
- Now, the PC modem calls the RGAM GSM modem. After a few rings, the RGAM modem answers and the program automatically continues to online mode.
- To suspend the connection, select the *Modem hang up* option in the *Communications* box.

Troubleshooting:

Whenever the RGAM GSM modem does not ring during the call attempt, this signifies the call can not reach destination. Consequently, check the following:

- The GSM modem signal is sufficiently loud enough (> 40%). To complete this operation, use the PM.EXE program.
- The PC-side modem is supplied, connected to the PC with its standard cable, connected to the correct serial port (the one selected with Communications-Com port).
- To check the PC-side modem, try to dial a different phone number (for instance one phone line in your office) and see if that phone rings or not. If it rings, the problem is on the RGAM-side; If not, the problem is on the PC side.

If the modem, being called, rings continuously but the connection is not completed (the box with “Connection OK” indication is not shown):

- Check the RGAM modem parameters (see previous item 2 above).
- Control the RGAM-modem cable, code 51C7.

If the “Connection OK” indication is displayed but the program then goes in Offline:

- Verify the GSM signal quality.
- Try to directly connect the PC to the RGAM with the cable, code 51C2, and conduct all the controls described in the RS-232 direct connection section.
- Check if the GSM modem is programmed correctly as stated in item 1.

Appendix B – GSM Modem SMS commands

If a GSM modem is used, it is possible to control the RGAM from a cellular phone by means of SMS messages (Short Message Service). From the mobile phone, the user must send a SMS with the desired commands, dialling the phone number of the GSM modem connected to the RGAM. The commands syntax is very simple, as most of them reflect the keystrokes possible from the front panel. In this way, it will be possible to operate the RGAM from a mobile phone, anytime, without problems regarding distance from the gen-set location.
To avoid unauthorized access, commands are protected by a password. If the command message is not preceded by the correct password, the commands will be ignored. If the originating mobile phone number is stored into the RGAM memory as destination of the alarm messages, then no password will be necessary.
The possible commands are listed in the following table:

COMMAND	FUNCTION
OFF	Switch to OFF mode
MAN	Switch to MAN mode
AUT	Switch to AUT mode
TEST	Switch to TEST mode
START	Simulates START key pressing
STOP	Simulates STOP key pressing
MAINS	Simulates MAINS key pressing
GEN	Simulates GEN key pressing
RESET	Simulates RESET key pressing
PWD=<password>	Enters command password
TIMExx	Waits xx seconds before executing following commands

Commands can be concatenated and separated by a pause:

Example (assuming 'GENSET' as the user password):

Example:

To enable SMS commands processing, the dedicated checkbox in *Modem parameters* window must be enabled (see Modem parameters chapter). In the same window the user must specify the password that he want to use. As stated before, if the mobile phone used to send commands is the same as the one designated as destination for RGAM calls, then commands will be executed even if not preceded by the password. In this case the GSM phone number must be specified in international format in modem parameter window, for example +393359609600.

Example:

When one command sequence has been executed, the RGAM will send a confirmation message to the mobile phone that has originated the command message, even if it is not the one specified in the modem parameters window.
The confirm message structure is the following:

- RGAM identification
- Working mode
- Mains voltage x3
- Generator voltage
- Generator frequency
- Battery voltage
- Hour counter
- Engine status
- Mains contactor status

- Gen contactor status
- General RGAM status

Example:

RGAM answers with:

If the password entered by the user does not correspond to the one stored into RGAM memory, then an Invalid password message will be returned.
The SMS commands function works together and with the same wiring as the normal Autocall function. Please refer to *Modem parameters* and *Connection through GSM modem* chapters for details and troubleshooting.