MESSER – RADIO PRODUCTS COMPANY

9, ZAOLZIAŃSKA ST.
02-781 WARSAW, POLAND

phone: (+4822) 643 20 23
fax: (+4822) 643 31 30
business hours: 9.00 ÷ 14.00

CONTACT US:

http//www.messer.com.pl

e-mail:
messer@messer.com.pl
marek@messer.com.pl
maciej@messer.com.pl

VER. 20092003 22:47

DECODER / RADIO REPEATER

RPT-2003/1 SYSTEM 3000

(RPT-2003/1-M3000, RPT-2003/1-M3000/LNK, RPT-2003/1-M3000/MOT)

ON-LINE SYSTEM
WITH RADIO SIGNAL LEVEL MEASUREMENT
+ MESSER ENCODING PROTOCOL (UFR-M3000) +

COMPATIBLE WITH
RMV-2002/2 SYSTEM 3000 and RMV-2003/1 SYSTEM 3000
RADIO MONITORING STATIONS

CONTENTS:

CE

1. GENERAL DESCRIPTION:

RPT-2003/1 SYSTEM 3000 Signal Repeater is a digital decoder of the audio signals received from an external radio receiver. Transceiver is not delivered by the Messer as the complete with the decoder and also is not its integral part. Recommended model of the receiver is Motorola GM-340, all the signal levels of the Messer decoders are optimalized to this unit. After connection to the external radio receiver, RPT-2003/1 can realize all the function of the Radio Signal Repeater. But it should be known that any other unit than the radio receiver can be used as the source of the signals to decode if delivered and encrypted with required protocol (Messer M3000).

RPT-2003/1 SYSTEM 3000 Monitoring Repeater unit is an integral part of the MESSER SYSTEM 3000 monitoring network, basing on advanced radio encode protocol Messer UFR-M3000. Whole the System consists of the three types of units:

- UNR-01VHF (UHF) - Message Transmitter with Frequency Synthesizer,
- RPT-2003/1 SYSTEM 3000 - Repeater w/radio signal level measurement,
- RMV-2002/2 SYSTEM 3000 - Monitoring Station w/radio signal level measurement or

In the MESSER UFR-M3000 radio monitoring system maximum account number is 8192 (numbers 8000 and higher are used for repeater unit identification). All the radio units (end transmitters and repeaters) have also additional system marker - Station ID number. Station ID marker system enables for very flexible network configuration. Using the Station ID numbers, a network supervisor can to choose any radio unit group and decide is it visible or not for his Monitoring Station unit. Also the repeaters recognize the end transmitters by the Station ID markers and handles or not – in accordance to the setup settings. What's more the Station ID markers system enables to create several independent radio Systems operating on the same frequency channel. In the theory, a maximal capability of the RMV-2002/2 SYSTEM 3000 Monitoring Station is 8000 end subscribers in each of the sixteen Station ID group.

Repeater RPT-2003/1 SYSTEM 3000 is a multi microprocessor unit with separated receive, analysis, and transmit blocks operating simultaneously in the same real time. Messages are not simply relayed from the receiver to the transmitter, but are also decoded, analyzed, buffered, re-encoded again, and then transmitted to the RMV-2002/2 SYSTEM 3000 Monitoring Station.

Repeater RPT-2003/1 SYSTEM 3000 communicates to the Monitoring Station unit in the on-line (bi-directional) mode. All the messages are acknowledged by the Monitoring Station. When repeater will transmit a message, then waits for an answer with the receive confirmation (ACK signal code). If confirmation will not arrive, a message is sent again. A number of repetitions depend on the repeater setup settings. If the same message is received not by the one but more repeaters simultaneously and waits in its buffers for resending, then ACK signal code from the station will erase this message from all the units buffers – if the same ACK code will be set in all the repeaters setup settings.
All the repeater's parameters are easy programmed using special MESSER Rpt_Terminal software (freeware) or standard Windows Hyper Terminal application.

Repeater unit has its own object number and Station ID marker, generates Periodic test reports, alarm and restore reports about the Tamper switch state, Battery Low level and 220VAC failure and restore information.
Repeater can receive messages with four any selected Station ID markers and resend to the monitoring station (or to the next repeater unit) with new created Station ID marker. Repeater can to resend messages from the transmitters and other repeaters as well, but maximum number of objects is 8192.

Repeater unit is equipped with an advanced radio signal level measuring circuit for all received transmissions. When any signal is received, a radio signal level is measured and its value is resent to the monitoring center together with the main message information.

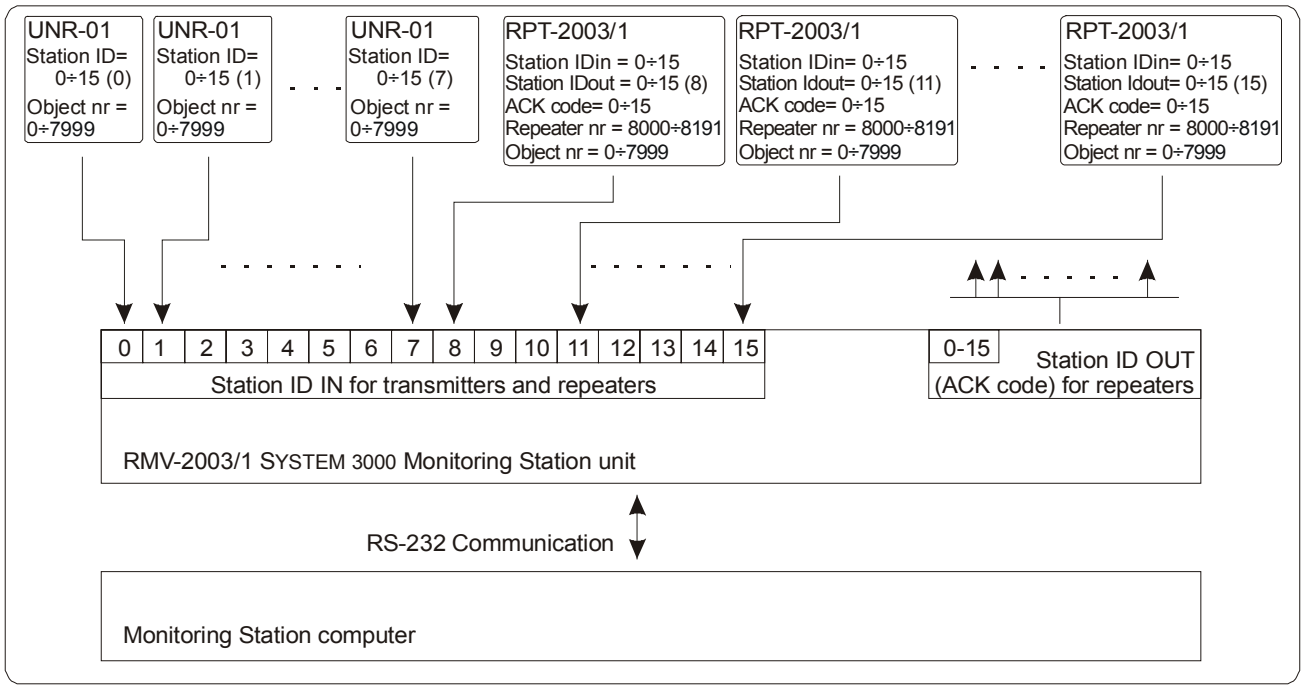
Versions:

RPT-2003/1-M3000 repeaters base on the general purpose radio transceivers operating on frequencies intended for the objects monitoring (security systems). In accordance to the customer request, the repeaters can be delivered in the following versions:

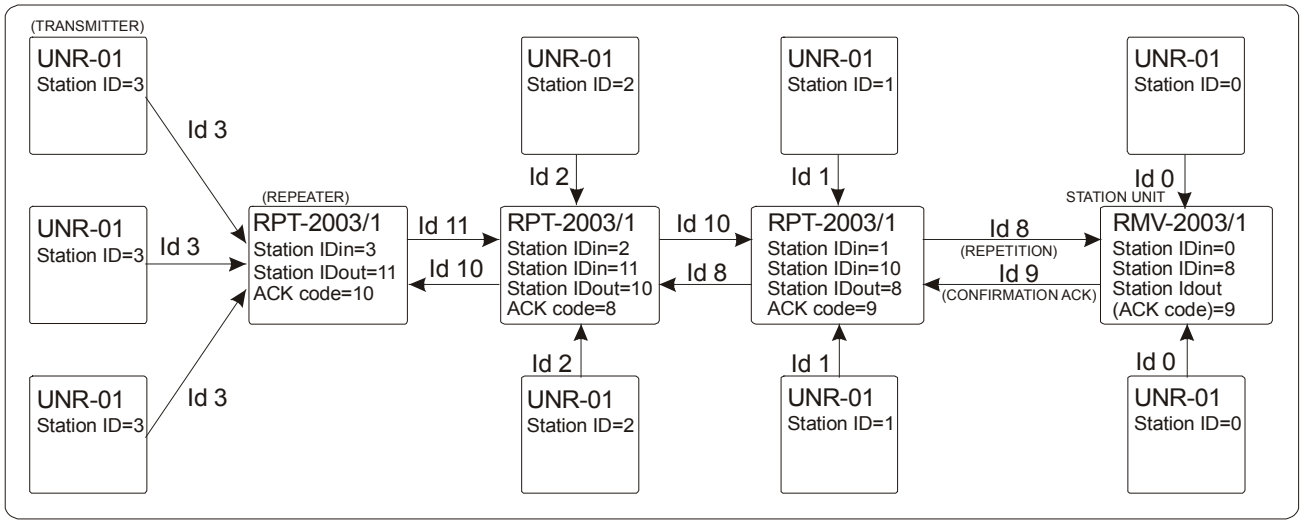
- **RPT-2003/1-M3000. A version without any transceiver,**
- **RPT-2003/1- M3000 /MOT. A version with the Motorola GM-340 (VHF/UHF) transceiver.**

Each of the version may be additionally extended with the second frequency handling unit (named RPT-2003F2) or local transmitter unit (named CMS-16FX).

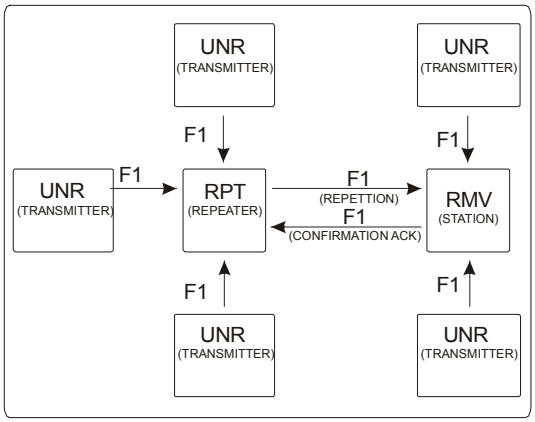
2. EXAMPLES OF THE SYSTEM CONFIGURATION:



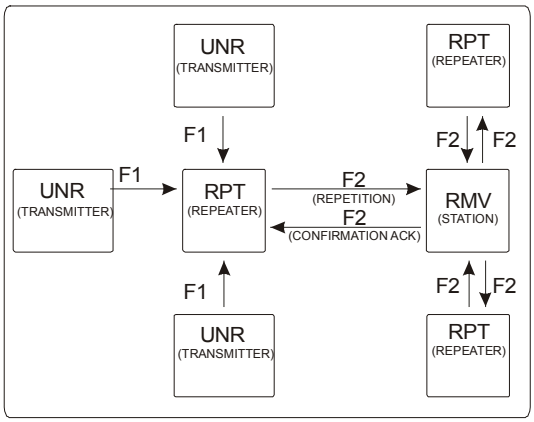
MAXIMAL SYSTEM CONFIGURATION



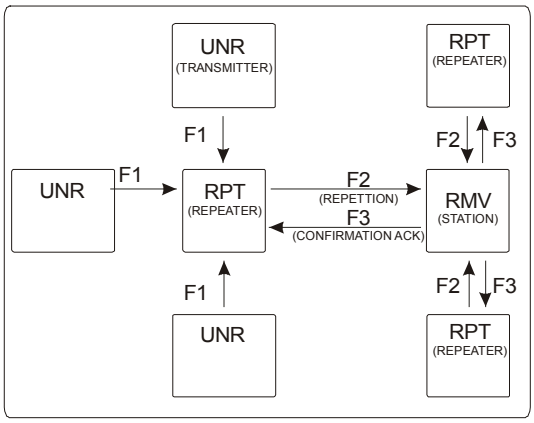
SAMPLE OF THE STATION ID NUMBERS CONFIGURATION



ONE-FREQUENCY OPERATING SYSTEM



TWO-FREQUENCY OPERATING SYSTEM



THREE-FREQUENCY OPERATING SYSTEM

3. REPEATER UNIT CONSTRUCTION:

RPT-2003/1 SYSTEM 3000 Repeater is provided as the complete unit. It consists of the follow modules:

- digital coder/decoder module RPT-2003 with special (CANNON-9) input/output terminals to connect external transceiver, tamper and power supplier,
- certified power supplier (battery charger for 17Ah back-up battery) MZA-13.8/2A,
- transceiver Motorola GM-340 – supplied optionally,
- wall mounted metal box,
- antenna and optional radio filtering system - is not supplied in the complete,
- 17Ah back-up battery - is not supplied in the complete,

4. REPEATER VERSION UPGRADE:

There are three modes of repeater's operating depending on the number of the frequency channels used in the created MESSER M3000 system:

- 1 frequency mode: Repeater receives messages, resends to the Monitoring Station and gets the confirmations on the same, single frequency channel.
- 2 frequency mode: Repeater receives messages at separated frequency, but resends its to the Monitoring Station and gets the confirmations on the different, secondary frequency channel. Additional module handling second frequency channel RPT-2003F2 and additional receiver are required.
- 3 frequency mode: Communication is realized on three frequency channels in full duplex. As above and also additional transmitter maybe required .

In any time is possible to make a hardware upgrade of the repeater version. It is easy and fast procedure.

5. FREQUENCY RANGE:

OPERATING FREQUENCY

Repeater operating frequency channel and all its radio perimeters depend of the external transceiver Motorola GM-340 and its settings, only. Messer Company doesn't feel responsible for its wrong operating and unrequired effects issing from the radio transceiver connected by the user.

All the Motorola's settings can be modified with an original Motorola's software (np. ENVN 4005E), only. Because the settings are strongly important to keep required radio parameters, Messer recommend to change its at the authorized Motorola service only!

Frequency range can be modified within the VHF 136÷174MHz (subtype: MW-304Ax) or 403÷470MHz (subtype: MW-504Ax) ranges.

TRANSCEIVER-TO-REPEATER CONNECTION

Signal description		Motorola	RPT -2003
RSSI	(signal level)	15	7
OUT	(TX audio)	11	2
IGNITION	(auto Power ON)	10	1/6
IN (0-0.7V)	(RX audio)	5	3
PTT	(transmit switch)	3	4
SQL	(squelch, carrier detect)	8	8
GND	(common ground)	7	5/9

CONNECTOR CANNON-9 FEMALE type.

Power Supply must be taken directly from the supplier using serial fuse!!! Its value depend on transmitt power programmed into Motorola transceiver.

6. RPT-2003/1 SYSTEM 3000 REPEATER FEATURES:

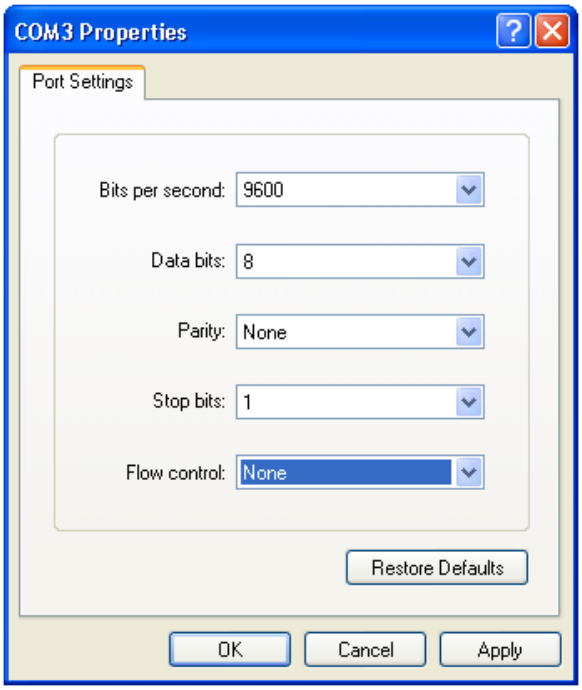
RPT-2003/1 SYSTEM 3000 Repeater has following features:

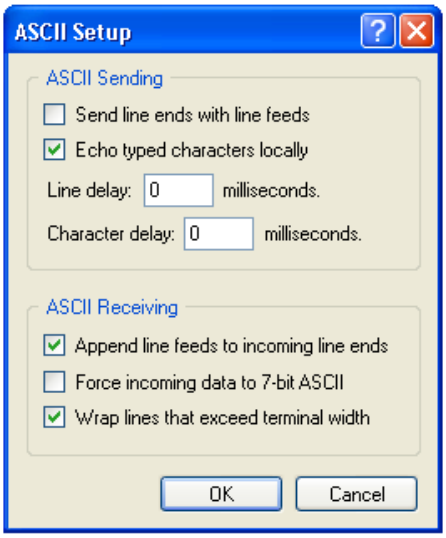
- receive and decode messages encoded with Messer radio protocol method (UFR-M3000),
- receive the messages from the transmitters and/or other repeaters as well,
- **measure the radio signal level for all the periodic test transmissions. Level information is resent to the Monitoring Station within the each periodic test standard message,**
- three levels of the message priorities: standard, low (lastly reported message) and high (firstly reported) priority.
- resend the messages marked with all the Station ID identifiers available in the MESSER UFR-M3000 protocol (Station ID-IN from 0÷15 range), or only with selected numbers (maximum four) Station ID identifiers if required,
- resend the messages with automatic Station ID number conversion into Station ID OUT identifier number,
- advanced bi-directional transmission with confirmation system for all messages sent between RPT-2003 repeater and RMV-2002 Monitoring Station unit. When repeater will resend a message to the Monitoring Station, then wait for the answer with the receive confirmation (ACK signal code). If confirmation will not arrive, a message is repeated again and again, whereas the repetitions number depends on the repeater setup settings,
- One, two or three frequencies operating modes (additional digital RPT-2003F2 module is requested - option),
- **two modes of message receive filtering system:**
    - advanced and dynamic message receive mode. When there is many signals handled by the unit, repeater doesn't receive the message if the same type of message already waits in buffer for resending realization. **Use the Dynamic mode when there are no less than 15 received signals in every minute only!!! This mode is intended to use in large systems with high radio signals movement. In small systems with low movement it will be a cause of uncontrolled delays in messages delivery!**
    - Static message receive mode with programmed time,
- handles 8-input alarm module CMS-16FX (option),
- two alarm inputs:
    - tamper switch supervising (S1 alarm input),
    - AC supply failure (S2 alarm input),
- battery state supervising,
- sending messages with:
    - AC supply failure and restore - within programmed intervals reported,
    - Low battery state and restore - within programmed intervals reported,
    - Tamper opening and closing - immediately reported,
- easy to program with the download software. Programming mode protected by the password,
- **watch-dog function.**

7. DOWNLOAD SOFTWARE:

All the repeater's parameters are easy programmed using special MESSER Rpt_Terminal software (freeware) or standard Windows HyperTerminal application. MESSER Rpt_Terminal software is operating in the in the Windows system environment (only the English Windows versions from '95 to XP were tested). Copy Rpt_term.exe file into the new created directory on the hard disc space and run the program without any additional installation process.

If to operate with Windows HyperTerminal application is required, then the following settings have to be applied into HyperTerminal ASCII setup (File/Properties/Settings/ASCII Setup) and communication properties:





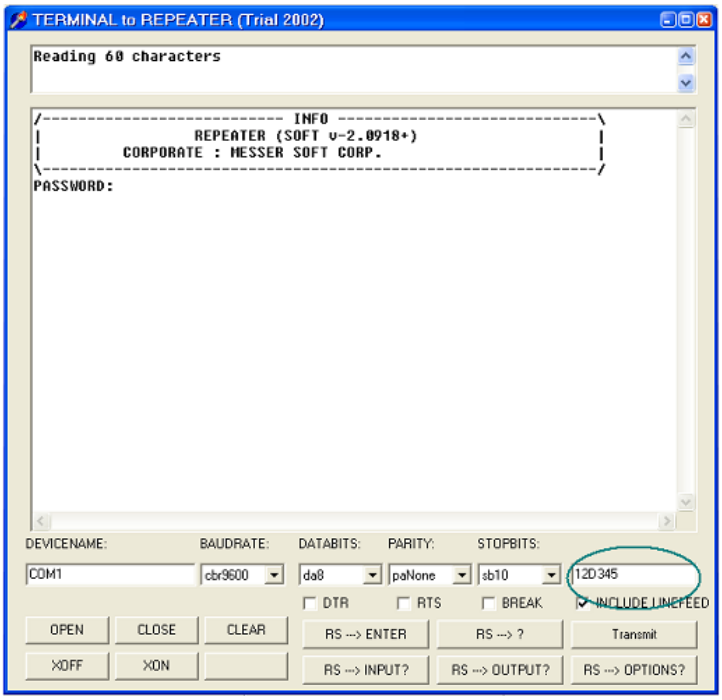
List of commands:

ENTER ENTER	-	enter the setup mode,
? ENTER	-	help (list of commands),
INPUT? ENTER	-	input parameters list,
OUTPUT? ENTER	-	output parameters list,
OPTIONS? ENTER	-	miscellaneous parameters list,
Parameters set	-	see. p.8 **SETUP MODE/ PARAMETERS SETTINGS**

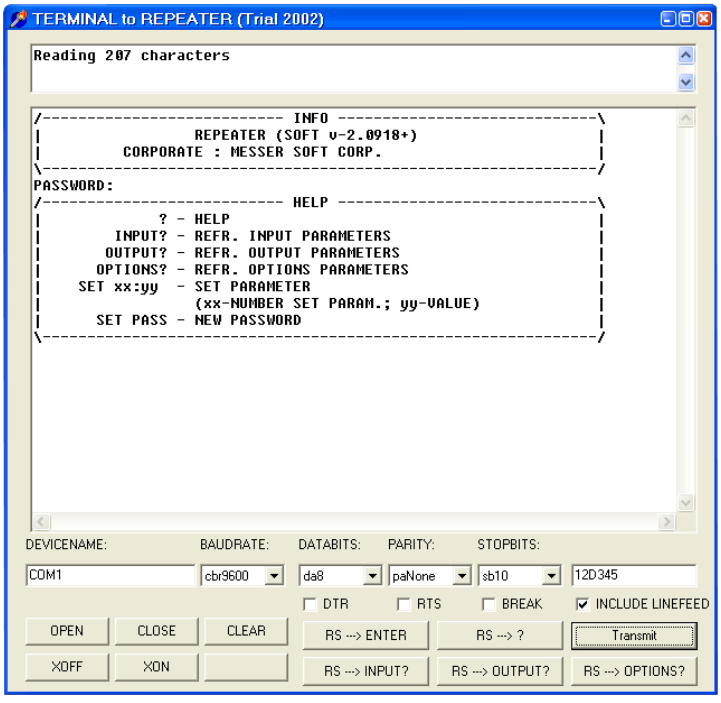
8. SETUP MODE:

To set the communication between RPT-2003/1 unit to the computer, follow the manuals:

- connect PC1 repeater terminal (see p.10 **INPUT / OUTPUT TERMINALS)** to the required Com port using a standard NULL-MODEM type cable,
- switch on the repeater power supply,
- run the MESSER Rpt_Term.exe software,
- select proper Com port number in the **DEVICENAME** window,
- select 9600bps transmission speed (cbr 9600 in the **BAUDRATE** window),
- press the **OPEN** icon to open the Com port ,
- press the **RS → ENTER** icon to communicate to the repeater unit. Green LED indicator (**READY**) should start to flash quickly informing the communication is SET ON successful. Repeater unit is waiting for the password to run the setup mode:



Set the password in the Command Window (factory default 12D345 is shown above) and press the **TRANSMIT** icon.
NOTE THE LARGE AND SMALL CHARACTERS ARE RECOGNIZED IN THE PASSWORD (!)
Repeater answers with the screen:



Now, repeater setup settings are ready to modify. All the parameters are divided into three main groups:

- input signal parameters – press the **RS → INPUT?** icon,
- output signal parameters – press the **RS → OUTPUT?** icon,
- additional options – press the **RS → OPTIONS?** icon,

The list of contents of the each parameters group is available after required icon is pressed. The full list of parameters is as follows:

PARAMETERS LIST

```
/---------------------------------------- INFO - Master ----------------------------------------\
|         REPEATER (SOFT v-3.0905)                                                              |
|       CORPORATE : MESSER SOFT CORP.                                                           |
\-----------------------------------------------------------------------------------------------/
PASSWORD: 12D345
/---------------------------------------- HELP ----------------------------------------\
|              ?      -      HELP                                                      |
|         INPUT?      -      REFR. INPUT PARAMETERS                                   |
|       OUTPUT?       -      REFR. OUTPUT PARAMETERS                                  |
|      OPTIONS?       -      REFR. OPTIONS PARAMETERS                                 |
|       SET xx:yy     -      SET PARAMETER                                            |
|                            (xx - NUMBER SET PARAM.; yy-VALUE)                       |
|      SET PASS       -      NEW PASSWORD                                             |
\-----------------------------------------------------------------------------------------/

/---------------------------------------- INPUT : ----------------------------------------\
|                    FORMAT : UFR_M --> UFR_M                                    A1      |
|                             ID STATION 1    :   001          [0...15]          A2      |
|                             ID STATION 2    :   001          [0...15]          A3      |
|                             ID STATION 3    :   001          [0...15]          A4      |
|                             ID STATION 4    :   001          [0...15]          A5      |
|                          ID STATION ACK     :   008          [0...15]          A6      |
| STATIC MESSAGE RECEIVE FILTER   :   030  sec  [0..255]         A7      |
|  LOCAL TRANSMITTER OBJECT NR    :   2639         [0000..7999]      A8      |
\-----------------------------------------------------------------------------------------/

/---------------------------------------- OUTPUT : ----------------------------------------\
|                  REPEATER OBJECT NR    :   8001         [8000..8191]      B1      |
|                        ID STATION OUT    :   010          [0....15]         B2      |
|                   TAMPER ALARM CODE      :   FFh          [00...FF]         B3      |
|                 TAMPER RESTORE CODE      :   1Fh          [00...FF]         B4      |
|                    AC FAIL ALARM CODE    :   EEh          [00...FF]         B5      |
|                  AC FAIL RESTORE CODE    :   1Eh          [00...FF]         B6      |
|             LOW BATTERY ALARM CODE       :   DDh          [00...FF]         B7      |
|             LOW BATTERY ALARM CODE       :   1Dh          [00...FF]         B8      |
|                    PERIODIC TEST CODE    :   00h          [00...FF]         B9      |
|                       TRANSMIT DELAY     :   00001        [10...65535]      BA      |
|           SUPPLY & AC TEST INTERVAL      :   03600  sec   [10...65535]      BB      |
|                PERIODIC TEST INTERVAL    :   03600  sec   [10...65535]      BC      |
|                   CLEAR ETHER DELAY      :   002    sec   [0...255]         BD      |
| LO & NORMAL PRIORITY REPETITION          :   03           [1....12]         BE      |
|                  HI PRIORITY REPETITION  :   05           [1....12]         BF      |
\-----------------------------------------------------------------------------------------/

/---------------------------------------- OPTIONS : ----------------------------------------\
|      RECEIVE ALL ID STATION              :   OFF                            F1      |
|      TRANSPARENT IN.->OUT.               :   OFF                            F2      |
|      STATIC/DYNAMIC RECEIVE FILTER       :    ON    (ON-DYNAMIC)           F3      |
|      RESERVE                             :    ON                           F4      |
|      RESERVE                             :    ON                           F5      |
|      RESERVE                             :    ON                           F6      |
|      RESERVE                             :    ON                           F7      |
|      SSSRESERVE                          :    ON                           F8      |
\-----------------------------------------------------------------------------------------/
```

PARAMETERS DESCRIPTIONS

INPUT PARAMETERS

ID STATION 1	- 1st Station ID marker number selected to be handled by the unit,
ID STATION 2	- 2nd Station ID marker number selected to be handled by the unit,
ID STATION 3	- 3rd Station ID marker number selected to be handled by the unit,
ID STATION 4	- 4th Station ID marker number selected to be handled by the unit,
ACK CODE	- acknowledgement code from the Monitoring Station meaning receive confirmation (to stop the next message repetitions),
STATIC MESSAGE RECEIVE FILTER	- a time period within the same renewed message will not be handled by the unit,
LOCAL TRANSMITTER OBJECT NR	- local 8 input alarm module (option) connected directly to the repeater (3 wire),

OUTPUT PARAMETERS

REPEATER OBJECT NUMBER	- repeater object number attached to its own messages,
ID STATION OUT	- a new Station's marker number attached to all the messages outgoing from the repeater,
TAMPER ALARM CODE	- tamper (input S1) opening alarm code,
TAMPER RESTORE CODE	- tamper restore code,
AC FAIL ALARM CODE	- 220VAC failure (input S2) alarm code,
AC FAIL RESTORE CODE	- 220VAC restore code,
LOW BATTERY ALARM CODE	- low battery state code,
LOW BATTERY ALARM CODE	- normal battery restore code,
PERIODIC TEST CODE	- periodic test code,
SUPPLY & S2 TEST INTERVAL	- battery and 220VAC test interval,
TRANSMIT DELAY	- time of transmit delay after message receiving,
PERIODIC TEST INTERVAL	- periodic test interval,
EAR ETHER DELAY	- delay between receive to resend of message,
LO & NORMAL PRIORITY REPETITION	- number of repetitions for low and standard priority messages,
HIGH PRIORITY REPETITIONS	- number of repetitions for high priority messages,

OPTIONS

RECEIVE ALL ID STATION	- all the Station ID markers selected to be received by the unit,
TRANSPARENT IN→ OUT	- messages repetition process without Station ID IN into Station ID OUT replacement.
STATIC / DYNAMIC RECEIVE FILTER	- type of message receive filter activated in the unit. Use the Dynamic mode when there is more than 10-15 transmitted signals in every minute only!!!

PARAMETERS SETTINGS

To change required parameter, a proper address and data have to be set in the main Command Window on the Rpt_term.exe screen. All the data ranges and parameters addresses are displayed in the columns when proper parameter group icon is pressed (**RS → INPUT?** to get the input parameters etc…). Example:

RS → INPUT?

ID STATION 1 :	001	[0...15]	A2	data range is 0÷15, an address is A2
ID STATION 2 :	002	[0...15]	A3	data range is 0÷15, an address is A3
ID STATION 3 :	003	[0...15]	A4	data range is 0÷15, an address is A4
ID STATION 4 :	004	[0...15]	A5	data range is 0÷15, an address is A5
ID STATION ACK :	008	[8...15]	A6	data range is 0÷15, an address is A6
MESSAGE RECEIVE FILTER :	020 sec	[0..255]	A7	data range is 0÷255, an address is A7

If **ID STATION 1** number is 3 required to set, then type a follow string in the Command Window:

SET A2:3

Characters size (small or large) and data format (3, 03,003) – are not important. When command is done successfully repeater is answering with a **DONE!** information. To check a programming, parameter group icon should to be pressed (**RS → INPUT?**):

ID STATION 1 : 03 [0....15] A2

END OF PROGRAMMING

To end the programming and leave a setup mode:

- press the CLOSE icon to close RS-232 communication port,
- disconnect RS-232 cable,
- press the RESET switch on the repeater panel. Green LED ″READY″ flashes slow to indicate a normal operating mode.

9. MESSAGE PRIORITY SYSTEM:

In the MESSER UFR-M3000 radio encode protocol, the messages are divided into three groups with different level of importance priority: standard, low or high. A priority of the message is identified by its report code. RPT-2003/1 SYSTEM 3000 Repeater uses an advanced algorithm for the different messages support:

LO priority – the lowest priority have the messages with the report codes: 00,11,22,33,44,55,66,77,88,99. These messages are repeated as the last, when all other type of messages are already resent to the Monitoring Station before,

HI priority – the highest priority is reserved for the messages with report codes: AA,BB,CC,DD,EE and FF. These messages are repeated at once when received, even if some other earlier received messages are waiting in the repeater buffer for resending. Messages with HI level priority have its own number of repetitions programmed in the repeater setup settings.

STANDARD – all the rest messages are treat as the standard and repeated in the order of receiving.

10. INPUT / OUTPUT TERMINALS:

RPT-2003/1 SYSTEM 3000 Repeat unit is equipped with following input/output connectors:

PC 1 - CANNON-9 MALE - RS-232 terminal for the setup programming;

PC 2 - CANNON-9 MALE - For the basic radio transceiver communication link

1,6	-	SUPPLY +13.8VDC	5,9	-	COMMON GROUND
2	-	INPUT (RX Audio)	8	-	CARRIER DETECT
3	-	OUTPUT (TX Audio)	7	-	SIGNAL LEVEL
4	-	PTT (RX/TX Switching)			

PC 3 - CANNON-9 FEMALE - optional connector (not used in new RPT-2003 nor RPT-2003F2 modules version);

PC 4F2 - CANNON-9 FEMALE - optional connector available on the additional RPT-F2 module in the RPT-2003F2 repeater version only. For the second frequency servicing radio transceiver communication link (See description of PC2 wiring above);

F 2 - 7PIN MALE - connector for additional module RPT-F2 module or for local transmitter CMS-16FX;

POWER - 5PIN -

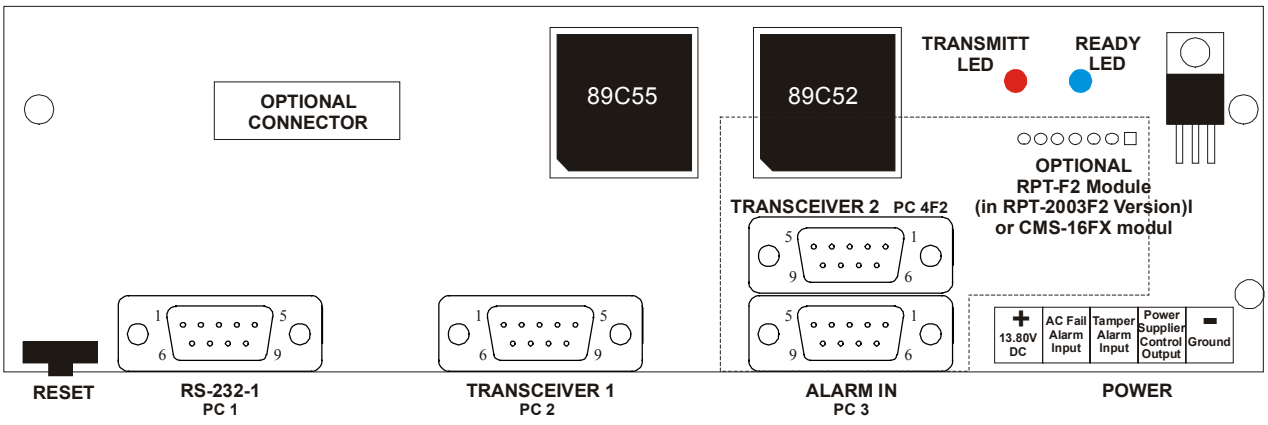
+ – +13.8VDC power supply (stabilized);

AC Fail – N.C. type alarm input connected by the wire to the Power Supplier AC Fail alarm output (“NC” signed connector);

Tamper – N.C. type alarm input connected by the wire to the metal case tamper switch. Second switch cable should be conncted to the GND (Ground);

Control Output – N.O. type output for power supplier control, connected by the wire to the Power Supplier (to the P1 potentiometer);

– (Ground) – common ground **(GND).**



INPUT / OUTPUT TERMINALS

11. LED INDICATORS

"READY" - green/blue LED - flashes slow to indicate normal operating mode,
flashes quickly to indicate setup programming mode.

"TRANSMITT" - red LED - flashes in transmit mode (PTT)

12. WARRANTY AND EXPLOITATION:

Messer warrants this product to be free from defects in materials and workmanship under normal use and service for a period of one year from the purchase date.

Messer's obligation is limited to repairing or replacing this product, at its option, free of charge for materials or labor, if it is proved to be defective in materials or workmanship under normal use and service. Messer shall have no obligation under this Limited Warranty or otherwise if the product is altered or improperly repaired or serviced by anyone other than Messer.

Messer does not represent that this product will prevent any person injury or property loss or damage by burglary, robbery, fire or otherwise; or that this product will in all cases provide adequate warning or protection. Purchaser understands that product is not insurance or a guarantee that fact of burglary, robbery or other events will not occur.

Purchaser understands that the product is basing upon the other units activity responsible to give information from the secured object. Consequently, Messer shall have no liability for any personal or object injury, property damage or any other loss based on claim that proper information was not delivered from the object because of this fact doesn't mean precisely that any Messer product failed to give an information.