

# MUSITEL 52 T, 53T & 61E GSM GATEWAY

SimBox

User Manual

Models: 52T, 53T and 61E

## Checklist

Packaging list, please check the contents of your unit:

Item	Quantity	Notes
GSM Gateway - model corresponding to the order no., refer to the type label on the GSM Gateway backside	1	
Mains (A.C. power supply) cord	1	1)
Telephone line cord	1	
Serial cable	1	4)
Antenna	1	
Holder (for fixing to the wall)	1	
Rawlplugs	2	
Screws	2	
Fuse for battery	1	2)
This manual	1	
Warranty Certificate	1	
Software on floppy or CD-ROM	1	3)

### Notes:

- 1) *versions shipped without mains cord (order no. with different suffix) are available also.*
- 2) *Only for models with battery back up.*
- 3) *Software enclosed:*
  - *GSM program*
  - *SMS program*
  - *Driver for PC*
- 4) *Not for Musitel 52T*

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# 1. Introduction

## 1.1. Purpose

- When connected to a PBX, the *MUSITEL*® - GSM Gateway allows its users to make direct calls via the GSM network. It can work with a telephone set, coin-operated automatic machines, etc.
- The voice mode, i.e. an outgoing or incoming call, is the basic function of the Musitel GSM Gateway.  
The Musitel is equipped with all functions necessary for this purpose and offers ease of use in this mode.
- Moreover, the Musitel Gateway provides (in connection with a PC) data mode and SMS receive/send mode too. With SMS messages, universal inputs and outputs can be used also.  
These additional functions increase the utility value of the product.
- You need no additional equipment (mains adapter, external GSM telephone) to run the Musitel GSM gateway. The installation is so easy that even a non-professional can install it.  
All programmable parameters are set at optimum values by default.  
Once you have connected the telephone line, antenna, power supply and your SIM card, you can start making calls without hesitation.

## 1.2. How to Save GSM Call Costs

- By connecting a Musitel GSM Gateway to your PBX you can make direct calls into a mobile network.  
**This saves PSTN – GSM connection costs.** Mobile telephone calls made by your colleagues from outside to your headquarters will be cheaper too.
- With the GSM Gateway you can use **the most convenient tariff rate of your GSM** operator, because calls of all your GSM Gateway users will be billed together.
- If you use **an answering and recording machine** – a GSM service, you may pay for retrieving messages. If you connect an answering machine of your own to the GSM Gateway, **you pay nothing for the retrieval.**
- With the Musitel GSM Gateway you can eliminate selected numbers.  
**You won't pay for a call that is disabled.**
- You can also get a listing of the time and length of selected calls to **find easily why your bill is higher than it should be.**

## 1.3. Other Advantages and Applications

- You can establish a **telephone connection even where there are no fixed telephone lines available** (exhibitions, fairs, conferences, chalets...).
- You are not exposed to the high-frequency electromagnetic field as with a mobile telephone.
- You can also attach a coin-telephone to the Musitel, as it is able to send tariff pulses.  
You can assess the price for call connections yourself (with profit).

## 2. Basic Installation Instructions

This chapter describes the basic connection of the Musitel - GSM Gateway that can be made in a few minutes.

All you have to do is to connect an antenna, the power supply cable and telephone line, insert your SIM card and the GSM Gateway is ready to work.

### 2.1. Proper Location

- The *Musitel*® - GSM Gateway is a transmitter in principle. You must comply with the local regulations and laws in your country pertinent to usage of mobile phones and transmitters!
- The Musitel - GSM Gateway is designed for vertical mounting. For the required working position see Fig.1.
- The Musitel may be operated in a position other than vertical (on a desk, e.g.) for a short time only – for quick maintenance testing, for example.
- For the acceptable range of operating temperature and humidity refer to the “Technical Parameters”.
- The Musitel 52T, 53T and 61E may not be operated at places exposed to direct solar or heat radiation.
- Exceeding the acceptable operating temperature does not have an immediate impact on the Musitel function, but may result in accelerated ageing (of batteries in particular!) and lower reliability.
- The Musitel is designed for indoor use. It must not be exposed to rain, water, condensed moisture, fog, etc.
- The Musitel must not be exposed to corrosive gas, fumes of acids or solvents, etc., or corrosive liquids, during cover cleaning, for example.
- The Musitel is not intended for use in high vibration locations such as means of transport, machine rooms, etc.
- The Musitel should be located with respect to the GSM signal quality.
- A free space should be left over and under the Musitel - GSM Gateway for cables and flowing air that removes heat produced during the operation.

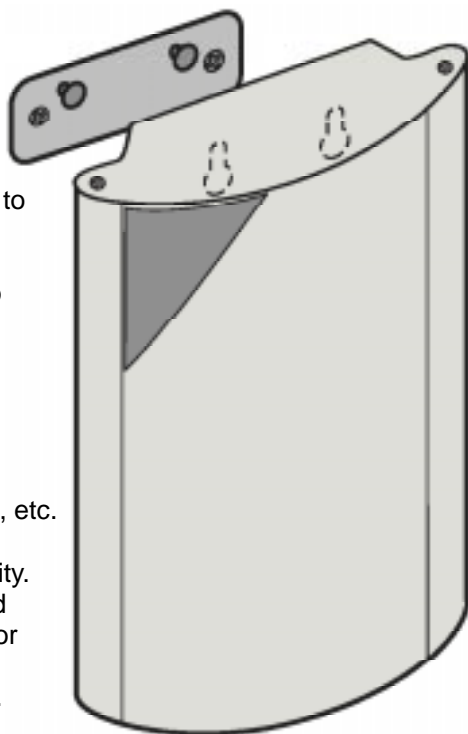


Fig. 1.: Musitel Working Position

### 2.2. Telephone Line Connection

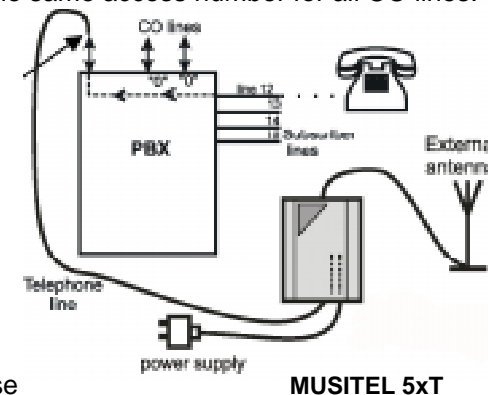
#### 2.2.1. MUSITEL 52T and 53T - Connection to PBX models for external line of PBX

Connect the *Musitel 5xT* to a free external (C.O.) line of your PBX (the Musitel 53T models for external (C.O.) and Musitel 61E for local line (extension) are not interchangeable!).

With a CO line, define a different access number for this line than for the remaining CO lines during the PBX programming.

Musitel 53T and 61E are equipped with the Least Cost Routing (LCR) software, which allows you to use the same access number for all CO lines.

Fig. 2.: Connection to PBX C.O. line including callmaking example



Access to Musitel 5xT, connected this way (to external line of PBX) must be provided by a prefix, different to the prefix for C.O. line access.

Another solution is a LCR (Least Cost Router) inside the PBX - software that is able to choose right direction for every call automatically.

#### 2.2.2. Musitel 52T and 53T - Connection to Telephone Set (Answering Machine, Coin-Operated Automatic Machine) - models for external line of PBX

You can connect any telephone set or some other terminal equipment to the Musitel 52T and 53T; see Fig. 3.

**Note:** If you connect a coin-operated phone, be sure to program the transmission of tariff pulses and pseudo tariff metering properly as well as to bar calls with unpredictable tariff rates!

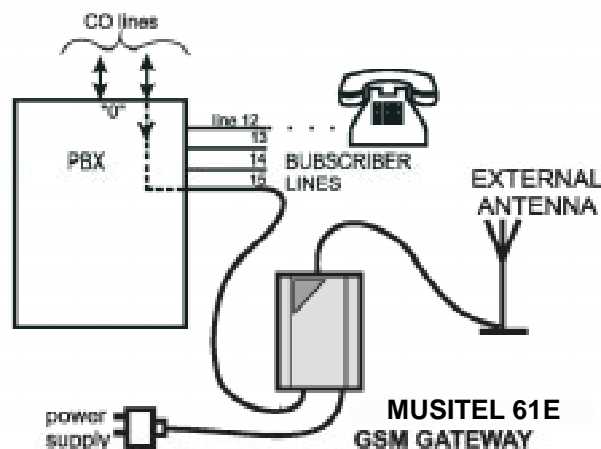
Fig. 3.: Optional Connection of More Terminal Equipment



### 2.2.3. MUSITEL 61E- Connection to PBX models for local line of PBX (extension)

Connect the Musitel 61E to an unused local line of your PBX (extension). Attention! The GSM Gateway models for external (C.O.) and local line (extension) are not interchangeable!

**Attention!** It is highly recommended to set your PBX to disable outgoing calls from this extension to C.O. lines, and to disable access to this extension from C.O. lines. This way you avoid an abuse of GSM gateway from "outside" (making expensive long-distance calls on your bill).



**Fig. 4.:** Connection to PBX local line (extension) including call-making example

### 2.3. External Antenna Connection

Connect an antenna or an external antenna cable into the FME connector. The antenna location should have a good GSM signal. The antenna should be in the vertical position. For antenna and cable parameters refer to the "Technical Parameters". **Tighten an antenna connector gently by hand; do not use any tools!**

### 2.4. SIM Card Set-up and Installation

#### 2.4.1. Operator / SIM Card Selection

To perform this GSM Gateway function you need a SIM card of a GSM network operator, using the 900 MHz or 1800 MHz band (depending on GSM gateway model). The *MUSITEL* -GSM Gateway works with 3V SIM cards. All SIM cards except for the oldest ones meet this condition. If you are not sure, ask your GSM operator about voltage of your old SIM card. If your SIM card is new or you are going to buy a new one, you need not worry – your SIM card will be O.K.

#### 2.4.2. PIN Entering Blocking (Optionally)

The Musitel provides automatic PIN entering by default. You can disable PIN entering on your SIM card (using a mobile telephone into which you insert your SIM card for this purpose). If you do disable, you need not worry as to whether there is a PIN code stored in your Musitel memory. If you enable PIN entering, your GSM Gateway will require a PIN code after the first power-on and if you enter the PIN correctly, the GSM Gateway will store it in its memory and enter automatically in the future.

#### 2.4.3. GSM Network Service Setting (Answering Machine, Call Forwarding)

Before the SIM card installation decide whether you will use the **incoming call forwarding** service provided by GSM networks (call forwarding in the event of busy line, absence, unavailability...). However, it is more convenient to disable all call forwarding modes (the GSM operator's answering machine, e.g.) and use an answering and recording machine of your own. If you have more Musitel's with your PBX, you can forward calls when one GSM Gateway is busy, etc.

#### 2.4.4. Roaming Parameters Setting (Calling via Foreign GSM Networks)

The GSM Gateway disables roaming by default. It is usually convenient because most people do not travel with the Musitel and there is a risk with roaming in foreign countries that, due to a failure in the local GSM network, you might get registered in another network and pay much more for your calls. To enable roaming and set network preferences, complete the list of GSM networks to be preferred using your mobile telephone and then enable roaming while programming the GSM Gateway. The registration of the GSM Gateway in a foreign GSM network is signalled by a special dial tone (refer to the list of tones) and you have to dial numbers including international prefixes that can be easily barred (refer to *Programming, Call Sorting Table*).

#### 2.4.5. SIM Card Insertion in GSM Gateway

Some models have a cover without hole for SIM exchange. In this case, release the two screws and remove the upper cover face (see Fig. 6). To install the SIM card press the yellow button on the SIM holder using a suitable tool (e.g. scissor) to make the drawer slide out. Remove the drawer, insert the SIM card in it, slide the drawer back and click into position. Then replace the cover face and tighten the screws, if removed. This protects the GSM Gateway circuits against dust and damage!

### 2.5. Power Supply Connection

#### 2.5.1. For all GSM gateways models

- Make sure that the voltage in your mains corresponds with the data on the product label.
- Make sure that the antenna has been connected. **If you connect a power supply to the equipment without the antenna, you might cause damage to the GSM module transmitter.**
- Connect your power cord. After a while, the green indicator "AC Supply O.K." should go on.

#### 2.6. Back-Up Battery Connection

This paragraph applies to models Musitel 53T and Musitel 61E. For these models, a back-up battery with cover can be ordered - ordering No. 910121090 (E). This is a maintenance-free lead battery pack 12V / 1,2Ah with metallic cover, whose design matches the GSM Gateway. This cover includes the accessories for wall mounting.

#### Battery installation

While placing the battery pack, avoid exposing it to high temperature if not necessary and mount it to the wall, if possible. Mounting method, holder etc. is the same, as for GSM gateway.

Plug a cable into a fitting connector on GSM gateway. Check a fuse in holder and insert it, if the holder is empty. Switch on.

#### Notes:

- *Circuits in Musitel are designed to handle 12V / 1,2Ah maintenance-free lead battery. Also a different lead battery with a nominal voltage 12V and a capacity of 1 to 2Ah or a set of 10 NiCd or NiMH cells of the capacity from 600 to 1,600mAh can be used too. Of course, a manufacturer cannot guarantee a proper charging, if the battery parameters are too different. Especially, a battery of a higher capacity may not reach an end-of-charge voltage. It may cause a permanent charging, and it may damage the battery! Such battery must be charged externally. In this case, the charging function has to be disabled by software – see chapter 7.1, parameter 170. An external 12V power can be applied too.*
- *The accumulator is charged and checked automatically, and the GSM Gateway indicates the charging and emergency statuses (disconnected, short-circuit, or fully discharged battery) and stores these events in the service buffer. If lamp "charge" is dark (strictly speaking, it flashes shortly with a long period, done by conservation charging), the accumulator is fully charged. End of charging, discharging and all failures, such as disconnected accumulator or short circuit, are stored in service buffer.*
- *See chapter 5.5 for details, as well as for standard battery replacement.*

## 2.7. Functional verification

Recommendation: check GSM gateway functionality prior to connecting it to your PBX and programming.

### 2.7.1. MUSITEL 53T - for GSM gateways for external (C.O.) line of PBX

If you have a GSM gateway model MUSITEL 53T for **external (C.O.)** lines on a PBX, follow these instructions:

1. Connect GSM gateway to previously checked telephone set.  
Verify that this telephone is switched to DTMF and its ringer is ON.  
It is better to check a SIM card too, using a mobile phone. It is not necessary to fix GSM gateway to a wall for testing – it can lie on flat surface as well.  
Excepting this, follow chapters 2.2 to 2.5 to connect all needed.
2. If the inserted SIM card requires a PIN, the red lamp “Enter PIN” will light up. In this case, pick up the handset of connected a phone.  
You will hear a PIN tone .  
Enter PIN as described in chapter 3.9.2 and hang up, the red “Enter PIN” lamp will go out.
3. The GSM gateway will register itself into the GSM network. First, the red “No GSM network” lamp must go out. After a moment, the green “GSM ready” lamp will light up.
4. Pick up the phone; you will hear the dialling tone and the green “Line ready” lamp will start blinking. If it doesn't, the phone or its connection is bad.
5. Now check for signal quality. Enter programming mode according to chapter 6.3.2, skipping step No. 1 (this applies only in the case of connection to a PBX). Indication of GSM signal quality will be turned on automatically.  
As more lamps are lit, signal quality is better.  
If at least one green lamp is lit up, signal quality is excellent.  
Try to find a good place for the antenna.  
Keep the antenna vertical and move it slowly – signal quality information is updated every three seconds.  
Remember that a movement as small as 10 cm may have a considerable effect on signal quality, as well as a position close to your body.  
The best way is to step aside after each relocating of antenna.  
Hang up after positioning the antenna; do not program anything!
6. Make an outgoing call. Call your colleagues mobile e.g. and verify that you hear each other well. In the case of a completely new pre-paid SIM card, one outgoing call is necessary for SIM card activation.  
Until it is activated an incoming call cannot be received! Make an incoming call now.

Call the Musitel 53T; the phone should ring.

7. The Musitel 53T is now checked. You can now connect it to a vacant C.O. line in the PBX.

After connection is completed, check both incoming and outgoing calls again.

This may, of course, necessitate some programming or settings changes of the PBX.

If everything is O.K., you can go to programming, if it is required - see chapter 6.

## 2.7.2. MUSITEL 61E - for GSM gateways for local line (extension) of PBX

If you have a GSM gateway model for a **local line (extension)** in the PBX, follow these instructions:

1. Use an unused, previously checked local line of PBX.  
Special lines, such as lines for so called "key phones", or ISDN lines cannot be used! It is recommended that the PBX will give a busy or permanent tone after call finishing (after hooking up on one side, the other side is advised by this tone).
2. Use a previously checked telephone handset, switched to DTMF and connected to another extension of the PBX. It is best to use a cordless phone; this allows you to closely observe the lamps on the Musitel 61E.
3. Disconnect the phone, which was previously used to check the unused line. Using the same cable connect the Musitel 61E.  
It is recommended that you check the SIM card too, using a mobile phone. Again it is not necessary to fix the Musitel to the wall for testing – it may be placed on a flat surface if necessary.  
After this, follow chapters 2.2 to 2.5 to make all required connections.
4. If inserted SIM card requires a PIN, red "Enter PIN" lamp will light up.  
In this case, pick up the phone connected to another extension (e.g. cordless phone) and call GSM gateway extension. You will hear a PIN tone. Enter pin as described in chapter 3.9.2 and hang up. Red "Enter PIN" lamp will go out.
5. The Musitel 61E will register itself into the GSM network.  
First, red "No GSM network" lamp must go out (if present).  
After few seconds the green "GSM ready" lamp will light up.
6. Pick up the phone connected to another extension (e.g. cordless phone) and call Musitel 61E extension; you will hear dialling tone and green lamp "Line ready" will start blinking. If not, and you hear ringing only, the phone or its connection is bad or you called an invalid extension number.
7. Now check signal quality. Enter programming mode according to chapter 6.3.2. Indication of GSM signal quality will be turned on automatically.  
As more lamps light up, signal quality is better.  
If at least one green lamp is lit, signal quality is excellent.  
Try to find a good place for antenna. Keep the antenna vertical and move it slowly – signal quality information is updated every three seconds.  
Remember that a movement as small as 10 cm may have a considerable effect to signal quality, as well as a position close to your body. The best way is to step aside after each relocating of the antenna. Next, if PBX doesn't support DTMF dialling, program parameter 114; switchboard operator number, i.e. extension to be called in case of incoming call and set parameter 311 - type of dialling, to pulse dialling. Programming can be done by phone - see chapter 6.3, or by

PC. It is not possible to check an incoming call without this setting!

8. Hang up after placing antenna; do not program anything!
9. Make an outgoing call. Call your colleagues mobile e.g. through the Musitel 61E and ensure that you hear well each other.  
In the case of a completely new pre-paid SIM card, one outgoing call is necessary for SIM card activation.  
Until the SIM is activated, an incoming call cannot be made! Check an incoming call now. Call the GSM gateway.  
If PBX doesn't support DTMF dialling, line selected by parameter 114 will be ringing.  
Otherwise, you will hear the dialling tone of your PBX.  
Dial the number of an extension; the phone will ring.
10. The Musitel 61E is now checked.  
If necessary you can go to programming now - see chapter 6.



## 2.8. LED Indicators

### 2.8.1. Table – Basic LED Functions.

	Colour	Comments
AC supply ~ ●	Green	Lights, when GSM module is powered
Battery charge → ●	Yellow	Charging - goes out when battery is fully charged
Battery supply → ●	Yellow	Battery powered (during AC failure)
Battery low ⚠ ●	Red	Short circuit, low or disconnected battery
Signal quality (dBm) ●	Green	Logged on, blinking within roaming
GSM ready ●	Green	Line is on-hook, it is blinking after pick up
Line ready ●	Green	Lights during established call Blinking during dialling and ringing
Call ●	Yellow	Lights during established data connection, blinking during establishing of data connection and ringing
Data mode ●	Yellow	Blinking if 1 or more SMSs are in buffer. Lights if SIM memory is full (10 - 40 SMSs, depending on SMS type)
SMS in buffer ●	Red	SIM card removed
SIM request ●	Red	PIN is not entered
PIN request ●	Red	Line powered down (it is checked again each minute to recover to normal operation)
Line error ●	Red	Lights when GSM module is not logged-on It is blinking during indication of GSM signal level
No GSM network ●	Red	

**Note:** Three LED's destined for battery status indication (Battery charge, Battery supply, Battery low) are unused in models without battery backup.



Attention! If SIM memory is full and a further SMS is received, the oldest one will be erased in order to unblock the path for switch control commands. If switches are not used, erasing can be disabled by parameter 109, see chapter 7.1.

### 2.8.2. Signal Intensity Indication

On models MUSITEL 53T and MUSITEL 61E the bottom group of nine LEDs is used for indicating the GSM signal level.

Using the “GSM Signal Level Indication” (refer to *Programming, Basic Parameters*) you enable the indicating mode where the Musitel displays the signal intensity for 2 seconds every 10 seconds.

In the meantime, the LED's indicate all statuses normally.

When the GSM Gateway is in the programming mode, the LEDs indicate the signal intensity continuously and the information is updated every three seconds. This mode is suitable for searching for the ideal antenna position during installation.

### 2.8.3. LED indicators

This description is applicable to 19" models (on the left) and models Musitel 53T (on the right) (501100E and 501105E).

color, name	Description of statuses
green POWER	Lights always, if power is on. It may go out during GSM signal quality indication only.
green GSM	<ul style="list-style-type: none"> <li>lights = registered into native GSM network</li> <li>blinking = registered into GSM roaming</li> <li>dark = not registered into GSM site</li> </ul>
yellow LINE	<ul style="list-style-type: none"> <li>lights = call</li> <li>blinking = off-hook, dialing or ringing</li> <li>dark = on-hook, or line error</li> </ul>
yellow DATA	<ul style="list-style-type: none"> <li>lights = GSM data connection established</li> <li>blinking = data exchange with PC, GSM data connection not established</li> <li>dark = no activity on serial interface</li> </ul>
red ERROR	<ul style="list-style-type: none"> <li>lights = at least one from these errors: <ul style="list-style-type: none"> <li>line error</li> <li>SIM is not present</li> <li>PIN is not entered</li> </ul> </li> <li>blinking = GSM signal quality indication</li> <li>blinking slowly = GSM module is not powered (c. 6 seconds after switching on)</li> <li>dark = no error (ATTENTION! It doesn't imply, that GSM gateway is registered into GSM network!)</li> </ul>

### 3. User Manual – Description of Basic (Voice) Function

Users mostly use their PBXs and MUSITEL intuitively, without reading any instructions, or follow very simple instructions provided by an authorized person. The following functional description is therefore intended for technicians, who follow the instructions (depending on the PBX set-up) and solve any operational problems.

#### 3.1. Outgoing Calls - MUSITEL 52T and 53T GSM Gateway on PBX's CO line

##### 3.1.1. Picking Up the Line

The PBX picks up a line the moment a subscriber picks up his or her handset and dials a number that is interpreted by the PBX as the "MUSITEL Access code".

This code depends on the PBX type and set-up.

Some PBXs accept the GSM prefix as this code.

Then, the user need have no worry that the call is made via the Musitel.

**Note:** *If the Musitel 5xT is busy, the PBX can either give the caller the busy tone or choose another connection (PSTN, or there may be more GSM Gateways with one PBX).*

##### 3.1.2. Musitel 52T and 53T - GSM Gateway Ready Signalling

The Musitel 5xT registers the off-hook (current inflow) immediately and then, if everything is O.K., starts sending its usual dialling tone .

Now the subscriber can dial the number.

**Note:** *If there is no GSM signal, no SIM card has been inserted, no PIN code has been entered, or if there is another problem, the PBX transmits a special tone (see below – "Telephone Line Tones").*

##### 3.1.3. Dialling Receive

The Musitel 5xT is ready to receive pulse or tone dialling (according to the set-up). As soon as the subscriber starts dialling a number, the Musitel mutes the dialling tone (as with public telephone exchanges).

The user must dial digits in no more than 6 second intervals; otherwise the number is regarded as complete and sent to the GSM network (this timeout is programmable).

**Note:** *Some PBXs analyse the whole number first and then transmit the dialling into the CO line (Musitel). Here, the signalling type and the timeout depend on the PBX set-up!*

##### 3.1.4. Dialling End Recognition

The Musitel 5xT itself can recognize the end of some numbers according to their length.

Moreover, you can set your Musitel in such a way that the Musitel 5xT accepts the '★' or '#' (for tone dialling only) symbols as the end of dialling.

Otherwise, it waits 6 seconds after the subscriber stops dialling (the timeout is programmable).

Then, the subscriber can hear a short tone signalling the dialling end and the Musitel transmits the received number into the GSM network.

If the caller goes on dialling, the Musitel GSM Gateway will not accept the extra digits!

##### 3.1.5. Connection Establishing

In this moment, Musitel is making a connection, and it takes typically 8 seconds.

During this time, the subscriber hears a special "call progress" tone (differs by GSM gateway model and version of software). Next, the subscriber usually hears the ringing tone or another signal transmitted by the GSM network. The connection, however, is not established and paid for until the called party answers the phone.

The GSM network signals this moment and the Musitel 5xT can pass the information to the PBX. If this type of signalling is used (exceptionally), the calling party can hear a click in the earphone.

##### 3.1.6. Call

During outgoing calls, the Musitel 5xT is computing the cost (pseudo tariff metering) and it can send tariff pulses. A call may be terminated forcibly if the GSM signal gets lost, for example, or in similar situations.

##### 3.1.7. Connection Termination (End)

If the caller is the first to hang up, the Musitel registers the on-hook immediately (the current flow stops) and terminates the connection.

If the called party is the first to hang up, the Musitel 52T and 53T gets the information from the GSM network and terminates the connection.

The Musitel can pass the information to the PBX.

The calling party gets the busy tone (or another type depending on the set-up).

**Note:** *With some calls, the called party's on-hook information is considerably delayed by GSM network (30s, e.g.). The subscriber usually registers the on-hook earlier, hangs up, and the Musitel 5xT terminates the connection immediately.*

##### 3.1.8. Subscriber's Disconnection (Power Down)

If a subscriber blocks the Musitel by seizing the line without dialling a number, or fails to hang up after the call, he or she will get the busy tone first and then is disconnected (Power Down status).

## 3.2. Outgoing Call - MUSITEL 61E

### GSM Gateway on PBX's Subscriber Line

#### 3.2.1. Musitel 61E Ringing

The subscriber picks up the line and dials the extension number of Musitel.

The PBX starts ringing this extension; the Musitel 61E registers this and picks up the line after a programmed time.

**Note :** *If the Musitel 61E is busy, the PBX can either give the caller the busy tone or start ringing another extension (there may be more Musitel - GSM Gateways than one with one PBX).*

#### 3.2.2. Musitel 61E Ready Signalling

After picking up the line, the Musitel 61E starts sending the usual dialling tone (if everything is O.K.). Then the subscriber can dial the number.

**Note:** *If there is no signal, no SIM card has been inserted, no PIN code has been entered, or there is another problem, the Musitel transmits a special tone (see below – "Telephone Line Tones").*

#### 3.2.3. Dialling Receive

The Musitel 61E is ready to receive tone dialling. As soon as the subscriber starts dialling a number, the Musitel stops sending the dialling tone (as with public telephone exchanges).

The subscriber must dial digits in no more than 6 second intervals; otherwise the number is regarded as complete and sent to the GSM network (the timeout is programmable).

#### 3.2.4. Dialling End Recognition

The Musitel 61E itself can recognize the end of some numbers according to their length.

Also, you can set your Musitel in such a way that the Musitel accepts the '★' or '#' symbols as the end of dialling.

Otherwise, it waits for 6 seconds after the subscriber stops dialling (the timeout is programmable).

Then, the subscriber can hear a short tone. signalling the dialling end and the GSM Gateway transmits the dialling into the GSM network.

If the caller goes on dialling after this signal, the Musitel 61E will not accept the excessive digits!

#### 3.2.5. Connection Establishing

In this moment, Musitel 61E is making a connection, and it takes typically 8 seconds.

During this time, the subscriber hears a special "call progress" tone (differs by GSM gateway model and version of software).

Next, the subscriber usually hears the ringing tone or another signal

transmitted by the GSM network. The connection, however, is not established and paid for until the called party answers the phone.

#### 3.2.6. Call

During outgoing calls, the Musitel 61E only computes the cost (pseudo-tariff metering) and detects the permanent tone, busy tone or another tone (e.g. ringing) to terminate the call.

A call may be terminated forcibly if the GSM signal gets lost, for example, or in similar situations.

#### 3.2.7. Common Connection End

If the caller is the first to hang up, the Musitel 61E registers the on-hook immediately (usually permanent or busy tone from the PBX) and terminates the connection.

If the called party is the first to hang up, the Musitel gets the information from the GSM network and terminates the connection.

The calling party then gets the permanent or busy tone (depending on the set-up).

**Note:** *With some calls, the called party's on-hook information is considerably delayed by GSM network (30s, e.g.).*

*The subscriber usually registers the on-hook earlier, hangs up, and the Musitel terminates the connection immediately.*

#### 3.2.8. Other Connection End Cases

If a subscriber blocks the Musitel 61E unnecessarily by calling it and not dialling a number, or fails to hang up after a call, the Musitel hangs up after a programmable timeout.

The Musitel 61E also hangs up when it has received the busy tone from the GSM network (when the calling party is busy or refuses the call).



**Caution!** The GSM Gateway on a extension line of the PBX can be called "from the outside" (from PSTN) can be used (or misused) by any person calling successfully to this line "from the outside"! To avoid this, set the PBX and/or the GSM Gateway properly (refer to the Call Sorting Table, „Remove“ and „Add“ selections).

### **3.3. Incoming Call - MUSITEL 52T and 53T GSM Gateway on PBX's CO Line**

#### **3.3.1. Musitel 53T Ringing, Extension Dialling, Extension Ringing and Connection Establishing**

When the Musitel 5xT receives a command from the GSM network and, if available, the CLIP information, it starts ringing (i.e. generating the ringing voltage – whose timing is programmable) into the PBX. The PBX registers the ringing and then, one of the following situations may occur:

##### **3.3.1.1 PBX without DISA = Selected Extension Ringing**

In this case, the selected extension (or several extensions at the same time or sequentially according to the PBX set-up) starts ringing and the calling subscriber will not pay for the call until the ringing extension answers.

##### **3.3.1.2 PBX with DISA, Intelligent Routing Off**

In this case, the PBX answers and starts reproducing the so-called DISA message. The Musitel 5xT establishes connection immediately in order that the caller can hear the message and dial the required extension.

##### **3.3.1.3 PBX with DISA, Intelligent Routing On, and CLIP Present and Known**

In this case, the PBX also answers and starts reproducing the DISA message. The Musitel 5xT, however, has found the caller's number in its Intelligent Incoming Call Routing Table and thus knows the extension to be called. Therefore, the Musitel 5xT does not establish connection immediately, but serves the DISA function (waits and dials the extension number). Then, it establishes the connection and the calling subscriber can hear the ringing tone and the called subscriber.

##### **3.3.1.4 PBX with DISA, Intelligent Routing On, but CLIP Absent or Unknown**

In this case, the PBX also answers and starts reproducing the DISA message. The Musitel 5xT, however, has not found the caller's number in its Intelligent Incoming Call Routing Table (or has not received the CLIP). Then it can (according to its set-up) either work as described in 3.3.1.2, or as described in 3.3.1.3, plus dial the operator's number.

#### **3.3.2. Call**

With incoming calls, the Musitel 5xT waits until the call is terminated, which situation is the same as with an outgoing call. A call may be terminated forcibly if the GSM signal gets lost, for example, or in similar situations.

#### **3.3.3. Connection Termination (End)**

If the called subscriber (extension) is the first to hang up, the Musitel 5xT registers the on-hook immediately (the current flow stops) and terminates the connection.

If the calling party (PSTN) is the first to hang up, the Musitel 5xT gets the information from the GSM network and terminates the connection.

The Musitel can pass the information on the PBX.

The calling party then gets the busy tone (or another tone depending on the set-up).

**Note:** *With some calls, the called party's on-hook information is considerably delayed by GSM network (30s, e.g.).*

*The subscriber usually registers the on-hook earlier, hangs up, and the Musitel terminates the connection immediately.*

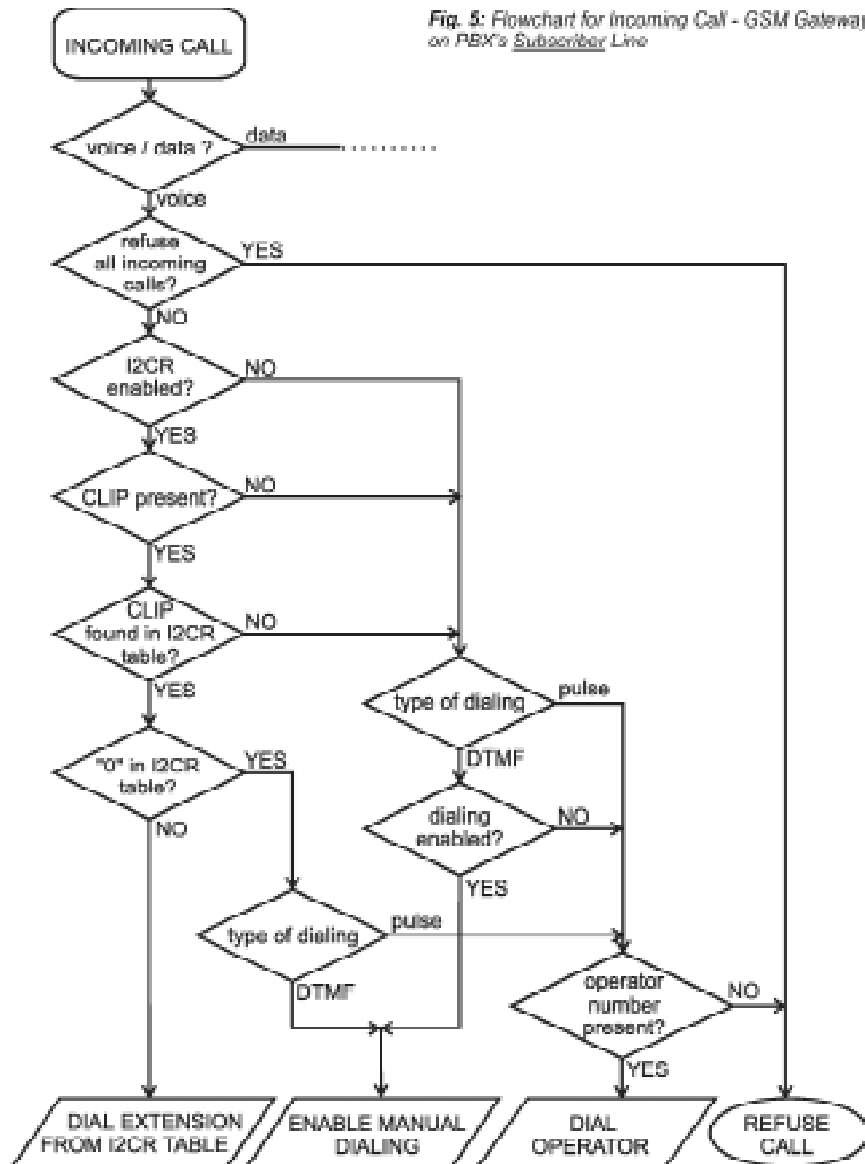
#### **3.3.4. Subscriber Disconnection (Power Down)**

If a subscriber blocks the Musitel 5xT unnecessarily by not hanging up after the call, he or she will get the busy tone first and then is disconnected (Power Down status).

### 3.4. Incoming Call - MUSITEL 61E

#### GSM Gateway on PBX's Subscriber Line

As this procedure is most sophisticated and it may be difficult to understand it, it is described by two forms: flowchart and text. Please, choose a form, which you are more familiar with.



#### 3.4.1. Musitel 61E Ringing

When the Musitel 61E receives a command from the GSM network and the CLIP information, if available, it picks up a subscriber line of the PBX. Then, one of the following two situations may occur:

##### 3.4.1.1 Extension Dialling - Intelligent Routing On, and CLIP Present and Known

The Musitel 61E has found the caller's number in its Intelligent Incoming Call Routing Table and knows the extension to be called. Hence, it dials the extension number.

**Exception:** If 0 (zero) is found in Intelligent Incoming Call Routing Table instead of extension number, Musitel 61E skips dialling, and calling party hears a dialling tone from PBX and dials number of required extension by DTMF.

**Attention!** In this case, PBX must support DTMF. If pulse dialling is selected, and the switchboard operator's number is present (parameter 114), Musitel dials this number.

If the switchboard operator's number is empty, Musitel 61E refuses this incoming call.

##### 3.4.1.2 Extension Dialling - Intelligent Routing Off, CLIP Absent or Unknown

The Musitel 61E has not found the caller's number in its Intelligent Incoming Call Routing Table (or has not received the CLIP, or Intelligent Routing is off).

If a parameter 310, "enable dialling for incoming call" is enabled, GSM gateway only picks up a line, such that a calling party hears a dialling tone of PBX and dials an extension number by himself.

Otherwise, GSM gateway dials the pre-set number, the operator's number, e.g.

**Attention!** If pulse dialling is selected, Musitel 61E ignores a parameter 353 and dials an operator's number.

If operator's number is not programmed, an incoming call is rejected.

#### 3.4.2. Extension Ringing, Connection Establishing

If calling party dials an extension, the Musitel GSM Gateway establishes connection immediately, without waiting for any "connect" handshaking from PBX (if used or not).

If Musitel 61E dials an extension (to switchboard operator, or by I2CR table), then it establishes connection just after dialling extension number (above), or wait for "connect" handshaking from PBX (if used; in this case PBX **must** send it, otherwise call cannot be connected!).

The calling party can hear the ringing tone either from PBX, or from GSM network - it depends on this setting.

### 3.4.3. Call

With incoming calls, the Musitel 61E only detects the permanent tone, busy tone or another tone (e.g. ringing), i.e. waits until the call is terminated, which situation is the same as with an outgoing call. A call may be terminated forcibly if the GSM signal gets lost, for example, or in similar situations.

### 3.4.4. Common Connection Termination (End)

If the called subscriber (extension) is the first to hang up, the Musitel 61E registers the on-hook immediately (usually the permanent or busy tone from the PBX) and hangs up.

If the calling party (PSTN) is the first to hang up, the Musitel 61E gets the information from the GSM network and hangs up.

The calling party then gets the busy tone (or another tone depending on the set-up).

**Note:** *With some calls, the called party's on-hook information is considerably delayed by GSM network (30s, e.g.).*

*The subscriber usually registers the on-hook earlier, hangs up, and the Musitel 61E terminates the connection immediately.*

### 3.4.5. Other Connection End Cases

If the called subscriber blocks the Musitel 61E unnecessarily by not hanging up after the call, the Musitel hangs up after a programmable timeout.

The Musitel 61E also hangs up when it has received the busy tone from the GSM network (when the calling party is busy or refuses the call).

## 3.5. More local calls during one GSM connection with Musitel 61E

This possibility relates only to Musitel 61E for **local line of PBX** (extension).

This is contingent also on PBX's behaviour after end of local call: we assume that an extension, which remain off-hook, after a second one hooks up, hears a dialling tone and can dial another number, without hanging up line and picking up again.

In this case, if local user (any extension of PBX), talking with remote user (mobile, connected with Musitel 61E by GSM network) hangs up, remote user hears a dialling tone and can dial another number.

This possibility applies to both incoming and outgoing calls. It may be advantageous, e.g. if one employee needs to talk from "outside" with more colleagues (in sequence), and a call is charged by flat price (regardless of its duration).

But the same possibility can be abused - e.g. for long, expensive long-distance calls.

Therefore, it is recommended to set your PBX to disable outgoing calls from this extension to C.O. lines.

## 3.6. Automatic dialling ("baby call")

Outgoing calls are described in chapters 3.1 and 3.2 on the assumption that automatic dialling is off (default).

If parameter "Number for automatic dialling" is filled, this function is automatically switched on and Musitel operates as follows:

### Musitel 52T and 53T - Model for external line :

As soon as line is picked up, Musitel 5xT awaits dialling for limited time, defined by parameter "time for automatic dialling".

If user starts dialling within this time, Musitel 53T operates normally, as described in chapter 3.1.

Otherwise, if this time is out, Musitel 5xTgateway automatically makes a call to programmed number.

**Note:** *It is assumed, that Musitel 5xT GSM gateway is connected to phone.*

*If Musitel 5xT is connected to PBX, applicability of automatic dialling function depends on PBX's settings.*

### Musitel 61E - Model for local line :

Musitel 61E detects ringing from line and picks up.

Then awaits dialling, for a time defined by parameter "time for automatic dialling".

If user starts dialling within this time, Musitel 61E operates normally, as described in chapter 3.2.

Otherwise, if this time is out, Musitel 61E automatically makes a call to programmed number.

### 3.7. Intelligent Incoming Call Routing - Musitel 52T, 53T and 61E

This function can be applied to incoming calls (if enabled).

If CLIP (number of calling subscriber) is found in Intelligent Incoming Call Routing Table (see chapter 7.6.), Musitel will call a dedicated extension according to this table.

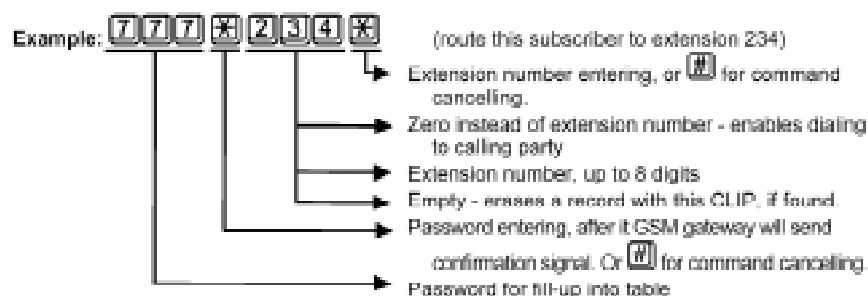
If Musitel 52T or 53T is connected to external (C.O.) line of PBX, DISA function must be used in PBX to serve it.

This function is operating automatically, as described in previous chapters 3.3 and 3.4.

#### 3.7.1. Intelligent Incoming Call Routing Control

From the viewpoint of the user, this function can work completely automatically but moreover it is possible to complete the Intelligent Incoming Call Routing Table during any call by special command:

#### Command for Intelligent Incoming Call Routing fill-up:



If the Musitel executes this command, it will send a confirmation signal as well as sending an error signal in the following events:

- Routing is disabled (error will be sent as soon as password is entered).
- Whole table is "locked" – only programming by PC can modify it.
- CLIP is unknown (error will be sent as soon as password is entered).
- CLIP is already stored in locked part of table; this entry has a priority and cannot be modified.

#### Notes:

- If 0 (zero) is entered instead of extension number, Musitel enables calling party to dial any number. This is a way, how to enable this possibility only to selected persons. Another incoming calls are connected to pre-selected extensions or refused (dependent on a Musitel configuration).
- Only unlocked part of table can be filled-up by this command.

Once it is full, new ones will overwrite oldest entries. Size of available unlocked part is from 0 to 99 entries, depending on size of locked part. Only programming by PC can modify the size of locked part and its content.

- This command is ignored until a connection is established.
- In the case of outgoing calls, the called subscriber number is usually incomplete (without international prefix). In case of incoming call, CLIP is complete and international prefix starts with "+". To make these numbers comparable, incomplete number is completed automatically within writing to the table, using your international prefix – parameter No. 6002, see chapter 7.6, this way:
  - If called number begins with "00" (or with different international prefix defined by parameter 115), it is removed and only "+" character is added to its beginning.
  - If called number begins with one "0" (or with different long distance code defined by parameter 117), it is removed and "+" and your country code is added to its beginning.
  - In other cases, "+" and your country code is added to its beginning.
- While programming by PC, an incomplete CLIP can be entered – e.g. bare international prefix. In this example, incoming calls from each country will be routed to the person who is proficient in the appropriate language etc.
- While programming by PC, each CLIP must begin with country code.

### 3.8. Telephone Line Tones, Ringing Course - Summary

The MUSITEL - GSM GATEWAY transmits tones to the telephone line that signal its operating status. The frequency is 425 Hz for all tones.

#### Common Dial tone:

- Continue tone with break from 100msec.
- The equipment is registered in the domestic GSM network.
- The equipment is ready to receive dialling.
- This tone has the same parameters as the PSTN dial tone.
- The parameters of this tone are programmable.

#### Special Dial tone:

- The equipment is registered in a foreign GSM network – ROAMING.
- The equipment is ready to receive dialling.
- The parameters of this tone are programmable.

### **Ringing Tone:**

- The called subscriber is free and his or her telephone is ringing.
- The GSM network transmits this tone; its parameters are beyond the control of the Musitel.

### **Busy Tone!**



- This tone is transmitted if:
- The SIM card has not been installed.
- The GSM Gateway is not registered in the GSM network.
- The equipment is registered in a foreign network, but roaming is disabled.
- The called number has too many digits (over 20).
- The called subscriber is busy.
- The called number is bared by call sorting table.
- The connection has been terminated.
- There is a communication error between the control processor and the GSM module, and a servicing intervention is required.
- This tone has the same parameters as the PSTN busy tone.
- The parameters of this tone are programmable.



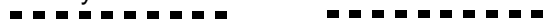
### **Dialling End Signalling:**

- The dialling reception is terminated, and the connection is being established.
- 1 tone, 200 ms (programmable).



### **PIN Tone:**

- Your PIN code is required.
- Transmitted upon power-on if the PIN code has to be entered manually.



### **PUK Tone:**

- Your PUK code is required.
- Transmitted upon repeated incorrect PIN code entering and the subsequent SIM card blocking.



### **PIN/PUK OK:**

- This 2 s long tone signals that the PIN or PUK code was entered correctly.



### **Ringing Course:**

The ringing course (1 s ringing, 4 s pause) is the same as in the PSTN, but can be reprogrammed any time.



### 3.9. PIN/PUK Code Entering

#### 3.9.1. Three Ways of PIN Code Entering

With a common mobile telephone, you have to enter your PIN code after power-on in order to be protected against misappropriation (of your powered-off telephone) and misuse. With the Musitel, this situation may occur after power failure. The difference is that there is often no one to know and enter the PIN code after power recovery.

There are three ways in which to solve this situation:

**a) Enable the SIM card function without PIN code entering:**

This is the simplest solution, but the SIM card can be easily misused when stolen.

**b) Set the automatic PIN code entering:**

The PIN code is entered during programming or after power up of the Musitel as mentioned below and stored in the memory.

The PIN code is then entered automatically after every power-on.


**c) Set the manual PIN code entering:**

This is the safest way, which requires manual entering of the PIN code after every power on.

Therefore, it is useful for backed-up models only where such situations are rare.

#### 3.9.2. PIN, PUK Manual Entering

If the PIN    ■ ■ ■ ■    ■ ■ ■ ■    ■ ■ ■ ■  
or PUK    ■ ■ ■ ■ ■ ■ ■ ■    ■ ■ ■ ■ ■ ■ ■ ■

tone is transmitted after picking up the line, enter the required code using the DTMF and verify the dialling with the  key.

**Example:**

PIN Entering:   
PUK Entering:   
                    Your PUK                      New PIN

If you enter the correct code, you will hear a 2 s long tone . If not, the PIN/PUK tone will go on. An incorrect entering (incorrect PIN or PUK, incorrect number of digits, unacceptable characters) makes the PIN or PUK tone being transmitted repeatedly.

To delete an incorrect code, press '#' or hang up (before entering '★', of course).

#### Notes :

- A four-digit PIN code is used in the example above. An eight-digit PIN code is used exceptionally. The GSM Gateway supports this PIN too, but has no information on how long the PIN should be. Therefore, it transmits the same PIN tone for this PIN code too.
- **The GSM Gateway does not support emergency calling without PIN code!**



#### WARNING!!!

You have a limited number of attempts for PIN and PUK code entering. Any repeated error in PUK entering may cause damage to the SIM card!

#### 3.9.3. Protection against Exhausting All PIN Entering Attempts by Automatic PIN Entering

Every SIM card provides a limited number of PIN and PUK entering attempts.

To avoid exhausting of all PIN-entering attempts, as a result of repeated GSM Gateway power on/off after SIM card replacement, for example, **the automatic PIN entering is disabled temporarily** in case the SIM card refuses the PIN stored in the GSM Gateway memory.

If the PIN is entered manually and is correct, it is stored and the automatic entering is recovered.

#### 3.10. Notes

- **Telephone Line Power Down (Musitel 52T and 53T - Model for External Line of PBX Only)**

Dialling , busy , PIN and PUK tones are transmitted into a line for 60s. When this time elapses, the line is put in the Power Down status (no power supply) until it is hung up.

In the programming mode, the line is put in the Power Down after 180s.

- **DISA**

The DISA service relates to incoming calls only and those Musitel 53T that are connected to the PBX's external (CO) line.

The Musitel 5xT itself is not equipped with the DISA function because it is useless – it is more convenient to use the PBX DISA.

For more details on the function refer to par. 3.3.1 - **“GSM Gateway Ringing, Extension Dialling, Extension Ringing and Connection Establishing”**.

If DISA is used, you are recommended to forward incoming calls at night, during absence or busy line to the operator, mailbox or answering machine, because any connection attempt is billed to the calling subscriber.

Further, remember that the GSM operator usually limits the ringing time

(for 30s, e.g.) and there is not much time for sequential ringing of several lines.

- **“Incognito”**

This function (refer to the “*Programming*” chapter) prevents the called subscriber from seeing the number of your Musitel.

This function can be used, for example, if you want to reduce incoming calls in such cases as:

- Incoming calls from strangers represent no saving for you, but block your Musitel - GSM Gateway for your outgoing calls that can save your telephone costs considerably.
- The subscriber you called (even unsuccessfully) from your Musitel has your Musitel number in his mobile phone without knowing that it is a GSM Gateway number.  
When calling back, he or she may get through to another person (operator, e.g.) and has to try to get to the person who made the call, paying for all this.

- **“Outgoing Calls Only”**

This function allows you to refuse all incoming calls.

You can use it, for example, when your Musitel is busy making outgoing calls but you do not want to use the Incognito function.

- **GSM Gateway Indicators**

GSM Gateway indicators are not necessary for every-day operation. They are used for control purposes and indicate most operational statuses and failures.

Common statuses are green, less common statuses yellow, and failures are red.

Every indicator is provided with a clear text. For details refer to the “*Installation*” chapter.

- **Acoustic Failure Signalling**

There is a small built-in beeper in most of the Musitel - GSM Gateway models, which indicates some failure statuses (according to the set-up). It warns you, for example, that someone tries to take away your SIM card, indicate battery disconnection, etc.

All parameters of this signalling, including full disable, can be programmed. For volume control see chapter 5.3.

- **Backed-Up Power Supply**

Battery is charged automatically; three lamps indicate its status (see chapter 2.7.).

### 3.11. Instructions for Use for Common Users

As previously mentioned, subscribers usually use their PBX and Musitel -GSM Gateway intuitively without reading any instructions, or follow very simple instructions provided by an authorized person.

These instructions may differ in details according to the PBX set-up.

 You can complete and copy the “aid” included below for all users:

### Instructions for GSM Gateway Use

**GSM Gateway Calling:**

- Dial ..... before the number.
- If you will hear the busy tone — — — — —, try later.
- If the GSM Gateway is ready, you will hear the dial tone — — —, dial the number — see below.
- If you hear another tone, do not dial a number and hang up!

**Number Dialling:**



- **Timeout:** If you can hear the dial tone — — —, start dialling within ..... seconds at the latest!
- **Dialling speed:** Do not make pauses longer than... seconds in the dialling!
- **Dialling end:** When you can hear a short beep, do not go on dialling!
- **Connection acceleration:** if you call a number starting with... you can press... after the last digit to accelerate the connection by several seconds.

**Barred Numbers:**

Never dial the following numbers; they are barred:

.....

**Intelligent Incoming Call Routing Command**

.....  Your extension number 

Using this command during a call, you make a rule to forward subscriber, currently talking with you, to the extension specified by you from this time forth.

## 4. User Manual – Description of Data and SMS Functions

### 4.1. Usage of Universal Inputs

Universal inputs are destined primarily for emergency applications. Connected devices must be equipped with suitable outputs, e.g. contact of relay.

As soon as a defined state, or combination of both inputs appear and remain for the programmed time, the Musitel will send SMS messages (a text, which was prepared for this situation) to a programmed number.

#### 4.1.1. Inputs Usage Examples

- **Security** – input is connected to alarm contact of electronic interlocking system.
- **Fire safety** – likewise, or input can be connected to smoke detector directly.
- **Emergency** – e.g. input connected to pushbutton, near patient's bed.
- **Failure message** – for lift or another equipment, which has a suitable output.
- **Water level watching** – e.g. in drainage, tank, etc.

#### 4.1.2. Operation

SMS message is transmitted automatically; any manual maintenance is not required.

If there it is a need for SMS messaging when watched state is terminated as well, it must be programmed individually as another SMS with another conditions.

If there is a risk of repeated transmission of many SMS messages, appropriate settings must be made (e.g. longer trigger time, see chapter 7.4.).

#### 4.1.3. Check of Input and Output Status by SMS Command

Musitel will send a SMS with all actual states as an answer to this command:

**Example:** 1 1 1 1 1 ★ ★

(11111 is a default password for SMS commands)

Answer report will be sent back to that number, SMS command was sent from which. (There is not registered any event, when SMS message was delivered without CLIP.) A report will be transmitted immediately and it will contain actual states of all inputs and outputs.

**Example of SMS report:** IN1 = 1, IN2 = 0, OUT1 = 0, OUT2 = 1

#### Notes:

- For security applications, remember that SMS delivery may be slow and unwarranted by some operators.
- Report contains no time and date nor GSM gateway number, because SMS centre will add this information automatically.

#### 4.1.4. Check of Input (and Output) Status by Phone (DTMF Command)

By listening signals (see table in chapter 4.2.4 "Phone Control – DTMF Commands"),

inputs can be checked by phone too.

**Example No 1:** 1 1 1 1 1 \* \* 1 (check input No. 1)

#### Use:

1. Call a line, GSM gateway is connected on which.
2. Enter a password for input/output functions, and \*
3. If password is valid, GSM gateway will send confirmation signal ♪♪.
4. Enter \* second time
5. Enter input No.
6. GSM gateway will start to signal actual input status periodically (see table).
7. You can enter another input No again (step 5),
8. Or you can enter \* to go to switch control (see chapter 4.2.3).
9. If you stop entering anything, Musitel will send a busy tone as soon as a programmed time-out is expired.
10. Terminate this mode by hang up.

**Example No. 2:** 1 1 1 1 1 \* \* 1 2 \* 1 #

(Read input No. 1, after it input No. 2, go to switch control, open switch No.1.)

#### Note:

DTMF check of inputs during common call is not supported now. This mode will be added in future.

## 4.2. Usage of Universal Outputs

Universal outputs are destined especially for remote control of whichever devices. In the future, a timer function will also be available. Basic controlling method is by SMS message. Another possibility is by line or by daily timer. SMS message or DTMF command (see below) must contain a valid password. Following modes can be selected by programmable parameters (see chapter 7.4.) for each individually:

0	Out of use
1	Basic mode (ON/OFF), OFF state after reset
2	Basic mode (ON/OFF), ON state after reset
3	N.O. (normally open), closing for pre-programmed time
4	N.C. (normally closed), opening for pre-programmed time
5	Basic mode + daily timer

Closing for pre-programmed time: switch is closed by command and released automatically after fixed time, which can be programmed by parameter.

Opening for pre-programmed time: switch is opened by command and closed again automatically after fixed time, which can be programmed by parameter.

### 4.2.1. Universal Outputs Application Examples

- Heating
- Irrigation
- Feeding
- Emergency stop
- Software reset

### 4.2.2. SMS Commands

#### SMS Format:

Example no. 1: 1 1 1 1 1 \* 1 \* (close switch no. 1)

1 for switch no. 1 } \* For switching ON,  
2 for switch no. 2 } # For switching OFF

More commands in one SMS can be entered this way:

Example no. 2: 1 1 1 1 1 \* 1 \* 2 #

This command will close switch no. 1 and open switch no. 2.

#### Notes (valid for both SMS and DTMF control):

- **Output status check** (incl. inputs) is described in chapter 4.1.3.
- When switch is in required state, command has no effect for it.
- In mode "Closing for pre-programmed time", when switch is ON and a new ON command is received, it has an extending effect - full time will be counted again from this moment, when OFF command will come, switch will open immediately.
- By analogy, in mode "Opening for pre-programmed time", when switch is OFF and a new OFF command is received, it has an extending effect - full time will be counted again from this moment, when ON command will come, switch will close again immediately.
- All notes above are valid for both SMS and phone (DTMF) control (bellow).

### 4.2.3. Phone Control – DTMF Commands



DTMF commands are very similar to SMS commands. In addition, there is a possibility of output status check. Moreover, commands can be chained without any limit in this mode, i.e. switches can be closed and opened several times - e.g. as in example No. 4 below.



#### Usage

1. Call a line on which GSM gateway is connected.
2. Enter a password for input/output functions, and \*
3. If password is valid, GSM gateway will send confirmation signal 🎵.
4. Enter a switch No.
5. GSM gateway will start to signal actual switch status periodically (see bellow).
6. If you don't want to change this state, you can enter another switch No. (step 4).
7. You can enter \* for closing, # for opening of selected switch.
8. GSM gateway will start to signal a new switch status periodically.
9. Characters \* and # may be entered repeatedly.
10. You can enter a switch No again (step 4).
11. If you stop entering anything, GSM gateway will send a busy tone as soon as a programmed time-out is expired.
12. Terminate this mode by hanging up.

#### 4.2.4. Status Signalling (equal for both inputs and outputs)

	Switch is closed or input level is high (1)
	Switch is opened or input level is low (0)

##### Another Examples

Example 2: password \*12 check both switches state w/o command

Example 3: password \*1\*#\*# close and open switch No. 1, twice

Example 4: password \*1\*2\*#1# close switch No. 1, close and open switch No. 2 and then open switch No. 1

##### Note:

DTMF commands during common call are not supported now. This mode will be added in future.

#### 4.2.5. Daily Timer (preliminary)

Daily timer can be programmed for each switch individually. Switch will be closed and opened daily in pre-programmed time. Up to two “ON” intervals can be programmed, i.e. two “ON” and two “OFF” times, for each switch. After reset (when GSM gateway power is turned on) a switch, programmed to timer mode, will be closed automatically, if an actual time is corresponding with programmed “ON” interval.

When GSM gateway will receive a valid SMS or DTMF command, so it will be executed and timer will go on (see example bellow):

##### Example:

Switch 1 will control heating in the flat. It will be pre-programmed to burn in the morning from 6:00 to 8:00 and in the evening from 17:00 to 23:00.

Whenever an occupant plans to return home earlier, he can send SMS “close switch No. 1”, e.g. at 15:30. Command will be executed, so that heating will start to burn immediately. At 17:00 nothing will be changed, and switch will be opened normally at 23:00. Whenever an occupant goes to bed earlier, he will switch heating off by phone (saving a cost of SMS), so that at 23:00 nothing will be changed, and heating will burn on at 6:00.

#### 4.3. Use of Data Mode

##### 4.3.1. Destination:

- For data transfer between two computers (second one can have whichever modem)
- For connecting to Internet

##### 4.3.2. Serial interface

Serial interface connector is D-Sub 9 pins, female, see fig. 9, is connected like a common external modem.

All handshake signals are used in data mode.

These signals are not used for programming and SMS program.

These applications use only RxD and TxD signals.

**Interface bit rate** is fixed, **19200 bit/s**, 8 bits, no parity, 1 stop bit (8N1).

##### 4.3.3. Data Rate in data mode

**Data rate** is 9600 bit/sec. High-speed transfer GPRS or HSCSD is not supported. Fax transmitting and receiving is technically possible, but it is not supported by the current version of software yet.

##### 4.3.4. How to combine different modes of serial port

Serial port is used by these applications:

- GSM program
- SMS program
- Your Internet browser, if you choose connection to Internet via GSM gateway
- You Z-modem or another program, if you connect to another computer via GSM gateway

**Basic rule:** All applications listed above are excluding each other. It means if you need to run another one you must terminate current one first. E.g., if you have SMS program running permanently, and you wish to connect to Internet via GSM gateway, you must terminate it.

##### 4.3.5. How switched between voice and data modes works

If enabled, data mode has same priority as voice mode.

Once occupied by a voice (phone) connection, GSM gateway is not ready to handle data as long as this call continues, and vice versa: once occupied by a data connection, GSM gateway is not ready to make a call as long as this data connection lasts.

##### Notes:

- SMS can be transmitted and received during call.

- *SMS program reads all new SMS's stored on SIM card right after start. SMS program automatically erases SMS's from SIM card, if you don't disable it.  
It is adding all new SMS's to file on your PC.  
Almost unlimited number of SMS's can be stored and viewed this way.*
- *Received SMS commands destined for switch control are erased just after execution.  
They are recognized automatically and not forwarded to SMS program.*
- *If any SMS's excluding these for switch control will come during time, when SMS program is not running, it can fill SIM card memory.  
If it will be full and next one will come, an oldest one will be erased in order to not block path for switch control commands.  
If switches are not used, erasing can be disabled by parameter 109, see chapter 7.1*

#### 4.3.6. Installation of driver on your PC

Driver must be installed only if you are using the GSM gateway as a modem – for data transfer between two PC's or for connecting to Internet.

It is not used for SMS program and GSM program.

Install driver from enclosed media (floppy or CD) as a conventional modem driver.

Choose **Phone and Modem Options** in folder **Control Panel**, and then choose **General** and **Add**.

Next browse a path to driver etc.

There are no parameters required.

#### Important note:

- In folder **Diagnostics** button **Diagnostics** is not working (on both versions of driver)

#### 4.3.7. How to adjust connection to Internet

If you have the driver (see above) and Internet browser installed, it remains only to **make new Connection**.

Read all the instructions of your GSM network operator first – settings are very different!

Usually you will find detailed step-by-step instructions on your operator's web site.

It is mainly a number to be dialled and other instructions.

#### 4.3.8. Serial port functions – for experts

- If GSM gateway is ready, it will send back all commands (echo)
- Connection is signalled by DCD output
- Incoming data is signalled by RING output and GSM gateway will transmit: +CRING: <type>+CLIP:"<clip>", 145

- It is possible to select after how many rings the GSM gateway should answer an incoming data call automatically.  
You can set it by parameter 181 or the ATSO command.  
If you used the ATSO command, entered value remains until the GSM gateway is powered up or reset, or until another change by the AT command.  
After the GSM gateway power up or reset, the function value is set according to parameter 181.  
The ATZ and AT&F commands set the function value according to parameter 181 too.  
This function has no effect upon incoming voice calls.
- Incoming voice call is not signalled by RING.
- Multiple AT-commands are not supported.
- SMS's can be handled directly by supported set of AT-commands, including time of voice call.
- During a voice call, all other AT-commands GSM gateway refuses by BUSY or ERROR.

#### 4.3.9. Supported AT-commands

This commands are available on CD and on the Internet,

[www.musitel.com](http://www.musitel.com)

#### 4.4. PC-Based SMS Receive/Send

This program works like common e-mailing software, under Microsoft Windows 95® or Microsoft® Windows® 98.

It can receive, store, edit and send SMS's on the PC, connected to the GSM gateway by serial cable.

This program is freeware and the actual version is available on the Internet, [www.musitel.com](http://www.musitel.com)

#### 4.5. Security Centre

This function is under preparation, will be available later as upgrade.



## 5. Installation Instructions for Advanced Users



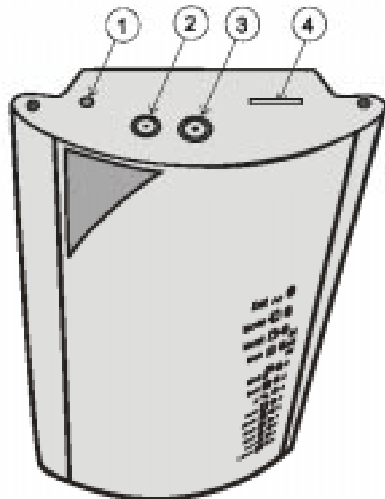
**ATTENTION! DANGER!**  
Draw out an AC mains cord before opening a cover!  
Risk of an electric shock!



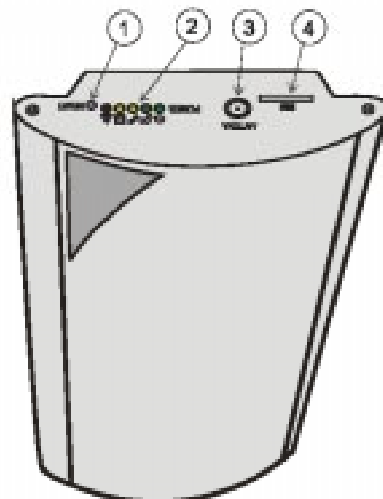
**WARNING!**  
All removable parts of cover are **earthed** with earthing cables!  
We do not recommend that you disconnect these cables.  
If you do so, remember to reconnect all before closing the cover!

This chapter describes primarily the connection of universal inputs and outputs, the serial interface and all situations that a technician may face during common servicing.

### 5.1. Description for GSM gateways excluding 19" rack mounted models



**Fig.6.**  
Upper cover face - models Musitel 61E  
1 – reset pushbutton  
2 – battery socket - models with backup only  
3 – antenna connector  
4 - hole for SIM handling



**Fig.7.**  
Upper cover face - models Musitel 53T  
1 – reset pushbutton  
2 – LED diodes  
3 – antenna connector  
4 - hole for SIM handling

#### 5.1.1. Upper Cover Face

##### Reset Pushbutton:

The button can be pushed using a tool such as a match, pencil, etc. and has the following functions:

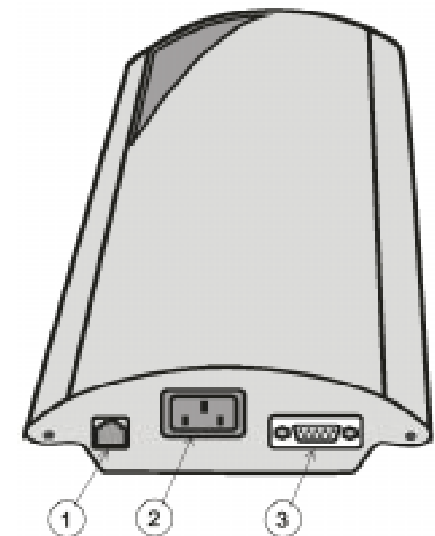
- By pushing the button once during the Musitel Gateway operation you reset the equipment.  
The program is terminated and restarted. This function has no influence on the Musitel set-up stored in the GSM Gateway memory.
- By keeping the button pushed during the Musitel power-on you enter a special mode where you can load a new software version into the GSM Gateway. For details refer to the “*Control Software Upgrade*” chapter.

##### Antenna Connector:

On models Musitel 53T and Musitel 61E, this connector is not earthed! While the GSM Gateway metal cover is connected with the protective socket wire and thus earthed (as Security Regulations require), the GSM Gateway electronic circuits (on these models) are not earthed. This is advantageous when a PC is connected to the GSM Gateway: by connecting a PC to the RS-232C serial interface (see later) that is earthed to another ground potential (another mains circuit), you earth the GSM Gateway electronic equipment through this PC and data transmission is not interfered by a ground potential difference. **In that case, you need no optocoupler isolation of the serial port even if the PC is tens of metres distant.** This, of course, is possible only if the antenna connector does not get in touch with the GSM Gateway cover or the earthing thereof to another ground potential.

##### SIM Card Holder:

To insert or replace your SIM card remove the upper cover face with a tool (crosshead screwdriver No.1). This gives your SIM card a better protection against misappropriation.



**Fig. 8.: Bottom cover face:**  
1 – telephone line connector  
2 – AC mains connector  
3 – RS-232C serial interface connector

### 5.1.2. Bottom Cover Face

#### Telephone Line Connector:

This RJ-12 connector is identical in all models.

The telephone line is connected to the central pair of pins (two pins nearest to the connector axis).

The polarity is arbitrary. The galvanic isolation of the PBX and GSM Gateway is located as follows:

- In the PBX with the PBX CO line model,
- In the GSM Gateway with the PBX subscriber line model.

#### Mains Supply Connector:

The mains supply connector is used for PCs and is thus identical in practically all countries. In all countries, a power cable is used whose other end (wall socket end) meets local regulations and socket dimensions.

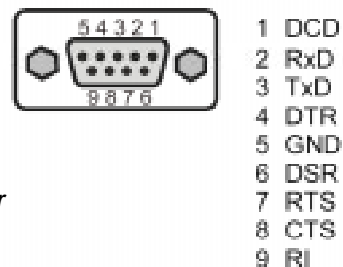
The protective pin (in the middle) is connected with the Musitel cover and used as the first over voltage protection stage for the telephone line circuits. For security and functional reasons, it is necessary that the pins earthed!

#### RS-232C Serial Interface Connector:

Since the GSM Gateway in its data mode is a regular modem, the connector pins are exactly the same as in an ordinary modem, see Fig. 9.

For the PC connection, a non-cross-over (1:1) extension cable – the same as for the connection of a PC and external modem – is used.

The maximum cable length is in excess of 30 metres and depends on the PC – it may be a little trial and error is needed to find an exact maximum length.



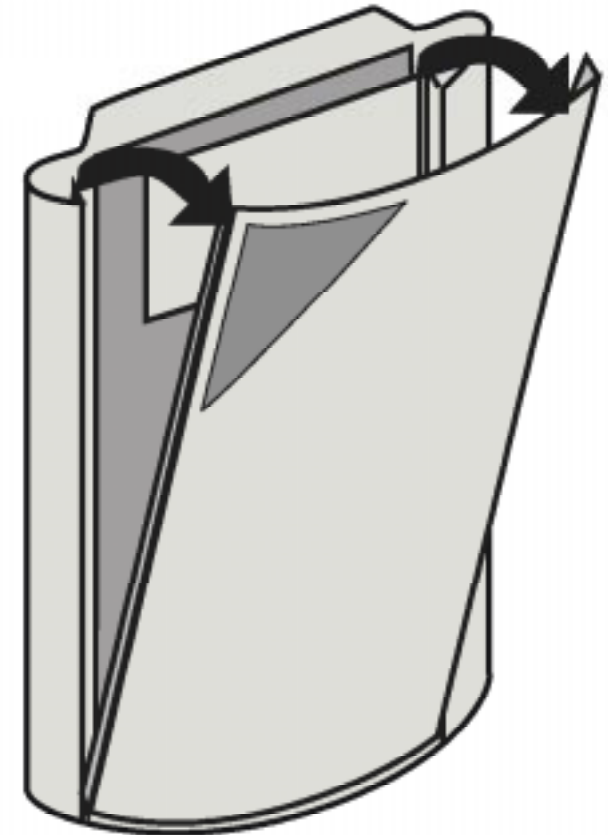
**Fig. 9.:** Serial RS-232C interface connector

### 5.1.3. Front Cover Part Disassembly

The remaining elements such as the fuse or the input and output terminals are not accessible until you remove the front cover part, which is clicked into the bottom cover part slots and held by its own flexibility.

First remove the upper cover face to grasp the front cover part easily and pull it out. The front cover part includes a panel with LED indicators – the connection cable is detachable from the motherboard.

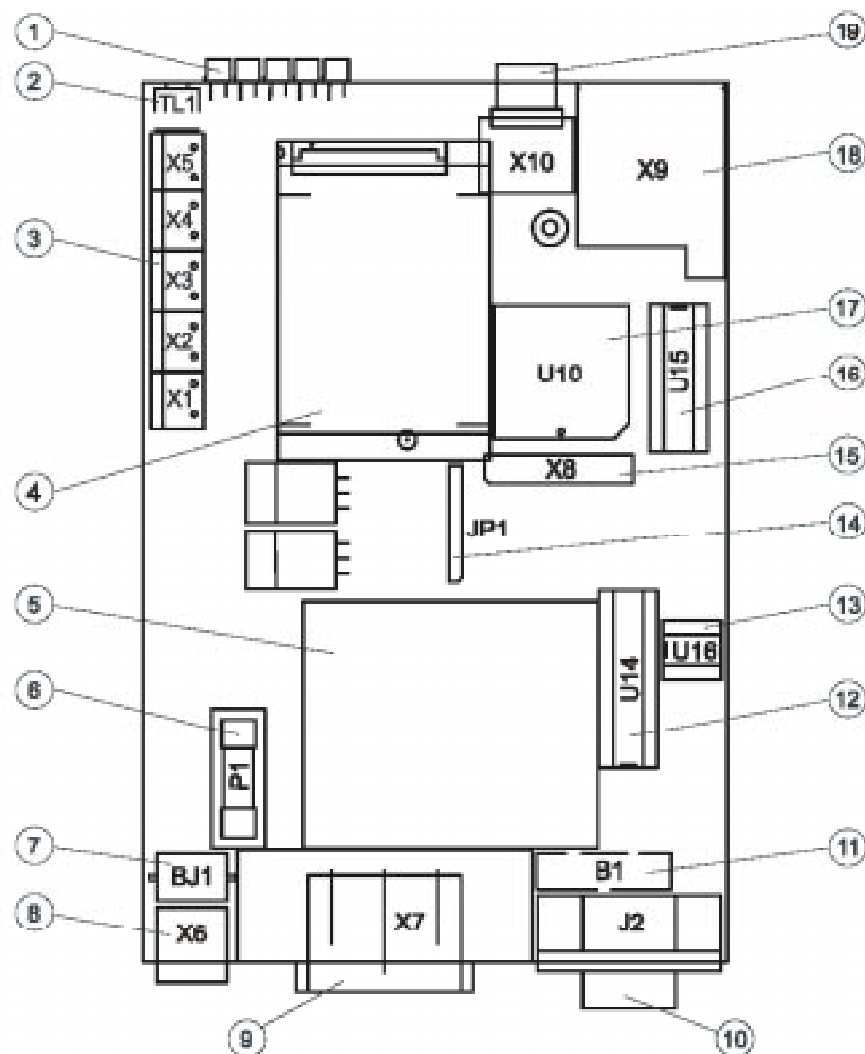
**Fig. 10:** Front cover disassembly





### 5.3. Description of GSM Gateway PCB

**Fig. 12:** Printed Circuit Board (PCB) of GSM Gateway model Musitel 53T (for external line of PBX, **without** battery backup)



### Explanatory Notes

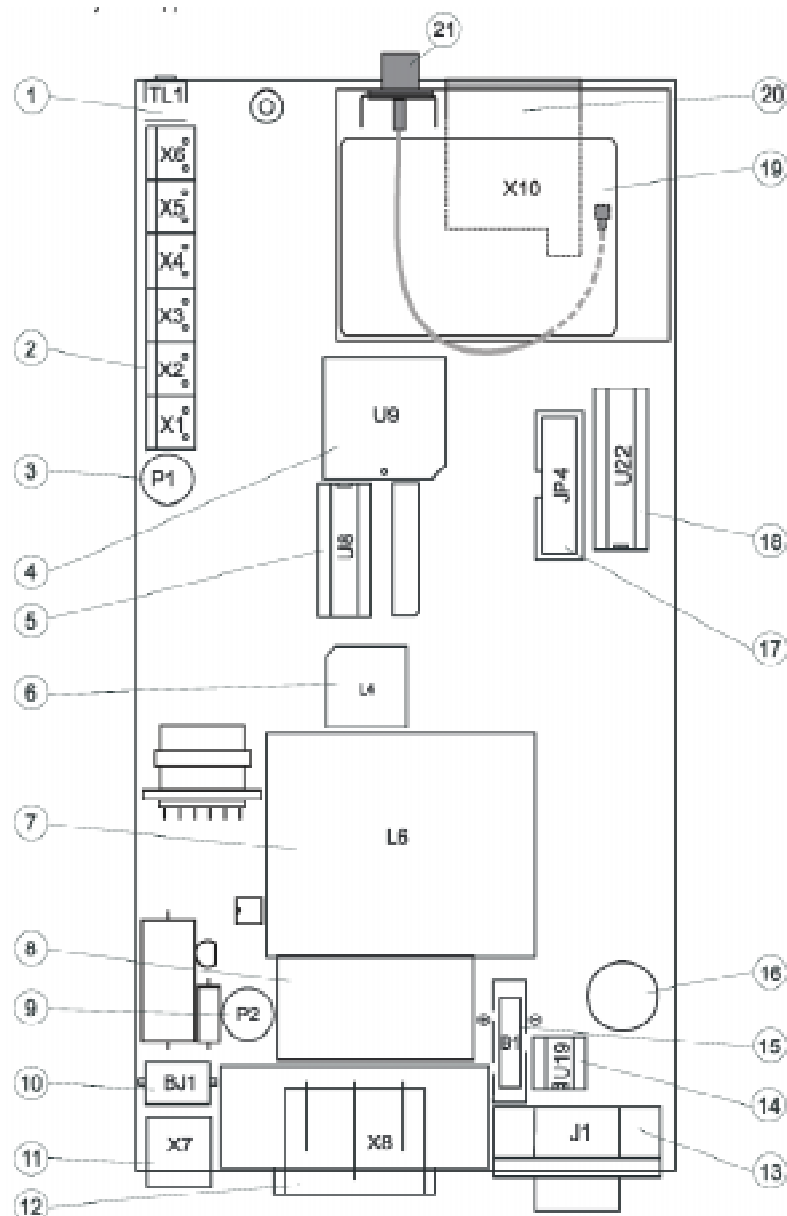
1. LED indicators
2. TL1 – Reset button
3. Input and output terminal block
4. SIEMENS ® GSM module TC35
5. Mains transformer
6. P1 – mains fuse – T 200 mA
7. BJ1 – 2 x 10,000 A surge arrester – first stage of telephone line circuit over voltage protection
8. X6 – telephone line RJ-12 connector
9. X7 – mains supply connector
10. J2 – RS-232C serial interface connector
11. B1 – battery holder with CR2032 type lithium coin battery
12. U14 – programmable serial interface circuit (GAL) in the socket
13. U16 – EEPROM containing GSM Gateway programmed parameters
14. JP1 – diagnostic connector of power part
15. X8 – diagnostic connector of digital part
16. U15 – auxiliary micro controller in the socket
17. U10 – main micro controller in the socket
18. X9 – SIM card holder
19. Antenna connector

### Description of Terminals:

- Universal input No. 2  
 Universal input No. 1  
 Ground  
 DC output +12 V  
 Ground  
 Switch No. 2 – active ON contact (N.O. - Normally Open)  
 Switch No. 2 – contact connected with ground  
 Switch No. 1 – active OFF contact (N.C. – Normally Closed)  
 Switch No. 1 – common contact  
 Switch No. 1 – active ON contact (N.O. - Normally Open)



**Fig. 14.:** Printed Circuit Board (PCB) of GSM Gateway model Musitel 61E  
(for local line of PBX (extension), **with** battery backup)



## Explanatory Notes

1. TL1 – Reset button
2. Input and output terminal block
3. P1 - fuse for battery, in socket, value T1A, type FSKK
4. U9 – main micro controller in the socket
5. U8 – auxiliary micro controller in the socket
6. L4 - DC-DC converter transformer
7. L6 - AC Mains transformer
8. Mains EMC filter circuit
9. P2 - Mains fuse in socket, value T 200 mA, type FSKK
10. 2 x 10,000 A surge arrester – first stage of telephone line circuit over voltage protection
11. X7 – telephone line RJ-12 connector
12. X8 – mains supply connector
13. J1 – RS-232C serial interface connector
14. U19 – EEPROM containing GSM Gateway programmed parameters
15. B1 – battery holder with CR2032 type lithium coin battery
16. Beeper for failure signalling
17. JP4 – LED panel connector
18. U22 – programmable serial interface circuit (GAL) in the socket
19. SIEMENS® GSM module
20. X10 – SIM card holder
21. Antenna connector

## Description of Terminals

Universal input No. 2	X8
Universal input No. 1	X5
Ground	X4
DC output +12 V	X3
Ground	X2
Switch No. 2 – active ON contact (N.O. - Normally Open)	X1
Switch No. 2 – contact connected with ground	
Switch No. 1 – active OFF contact (N.C. – Normally Closed)	
Switch No. 1 – common contact	
Switch No. 1 – active ON contact (N.O. - Normally Open)	
- Terminal of battery (Ground)	
+ Terminal of battery (+12V)	

#### Notes:

- The acoustic converter for failure signalling is provided with a self-adhesive label that can be partially or fully removed to control the signalling volume.
- The + 12V voltage output is non-stabilized. For the maximum load see technical data. This can be used for supplying the PIR sensor, etc.
- The description of output 1 and 2 terminals corresponds to the default GSM Gateway models. Another relay can be added or both relays can be removed according to the customers' wish – the wiring is then different.
- The main microcontroller can be removed with a specialized tool only. Usually, it is not necessary because the microcomputer can be reprogrammed in the GSM Gateway. Using another tool may cause damage to or destroy the PCB!
- The main microcontroller contains a serial number of GSM gateway as well as a protected code. If erased by a programming tool unlike GSM program, it will not work and these data cannot be re-programmed by GSM program again!

### 5.4. Connection of Universal Inputs and Outputs

#### 5.4.1. Connection of Universal Inputs

Both input terminals (location see chapter 5.3, PCB layout description) are compatible with most systems. Usually they are controlled by contact; both N.C. (Normally Closed) and N.O. (Normally Open) contacts can be used. Contact should be connected between selected input terminal and GND terminal. Open contact is evaluated as "1" level, closed contact as "0" level. When a voltage source is connected (e.g. TTL signal), GND terminals of GSM gateway and signal source (e.g. computer) must be connected.

Voltage levels "0" and "1" are TTL-compatible (see technical parameters). Inputs can be driven by higher voltages e.g. 12V (see technical parameters), without damage.

#### 5.4.2. Connection of Universal Outputs

All Musitel GSM gateway models, described in this manual, are equipped with **two universal outputs**.

Output No. 1 is an insulated contact of relay;

Output No 2 is open-collector output (any combination can be provided on request, e.g. two relays etc.)

Application examples see chapter 4.2. Relay output is more flexible, because of its insulation and both N.C. (Normally Closed) and N.O. (Normally Open) contacts option.

But a low-cost, open-collector output is good enough for a lot of applications, too.

Fig. 18 shows an example of relay output application for computer reset. This switch can drive any low-voltage circuit up to 48 V AC or DC - e.g. thermostat, tape recorder, camera etc. Controlled equipment and GSM gateway will remain insulated, but this insulation is **not** designed to insulate against such voltages as 120 or 230V AC mains.

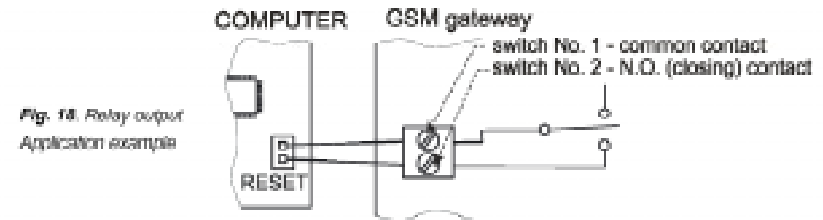


Fig. 18. Relay output Application example



**ATTENTION! Don't connect any output terminals to such voltages as 120 or 230V AC mains!!**

Fig. 19 shows another application example.

A high power can be switched in this way, by SSR (Solid State Relay) module.

A SSR module is a standard product of many semiconductor vendors and it is available for different currents (10A typically); three phase SSRs are available too.

Fig. 19 shows, that open-collector output is good enough for SSR input driving.

GSM gateway +12V DC output terminal provides a necessary supply voltage for SSR module input.

In addition, SSR module provides high-voltage insulation between GSM gateway and current consumer.

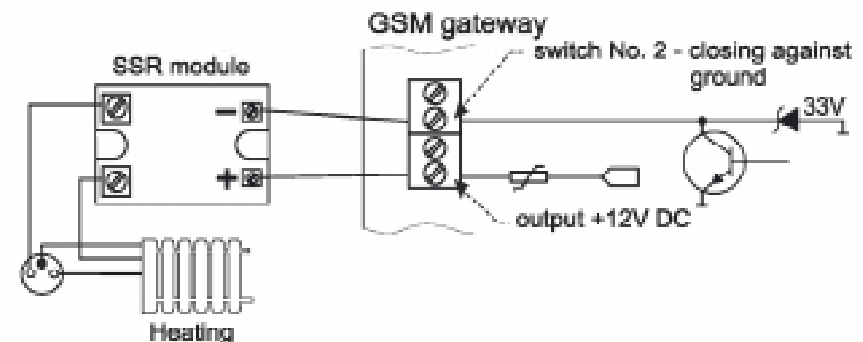


Fig. 19. Open-collector output (switch No. 2) used as a driver for SSR module.

## 5.5. Back-Up Battery, Replacement

This paragraph applies to backed-up models Musitel 61E.

Normally, a back-up battery, ordering No. 910121090, is used. This is a maintenance-free lead battery pack 12V / 1,2Ah (two 6V blocks) with metallic cover. Arrangement of components and cables inside this cover is on drawing no. 20.



**ATTENTION!**  
Accumulators has a very high short-circuit current!  
Don't short it anyway! Risk of explosion!

### Instructions for replacement:

1. Switch off. Draw out an interconnecting cable from GSM gateway.
2. Remove the upper cover face of battery cover, grasp the front cover part and pull it out.
3. Draw out all cables from accumulators.
4. Slacken nuts, which are holding a double U-bolt.
5. Remove double U-bolt and accumulators.
6. Place new accumulators; place the double U-bolt back into proper position.
7. Tighten all three nuts.
8. Connect all cables back to accumulators; see drawing no. 20.
9. **Check** carefully the connection, especially a **polarity** of outgoing cable. **Positive terminal of battery must be connected with a red labelled wire!!!**
10. Place the front cover back and screw up the upper cover face.
11. Connect a cable to the connector on GSM gateway and switch on.

### Fuse:

A tube fuse T 1A, 5x20mm in a fuse holder protects an accumulator against short circuit. Replace this fuse only with proper type!

### Different accumulator:

Circuits in GSM gateway are designed to handle 12V / 1,2Ah maintenance-free lead battery.

This battery is charged and checked automatically, the GSM Gateway indicates the charging and emergency statuses and stores these events in the service buffer.

Also a different lead battery with a nominal voltage 12V and a capacity of 1 to 2Ah or a set of 10 NiCd or NiMH cells of the capacity from 600 to 1,600mAh can be used too.

Of course, a manufacturer cannot guarantee a proper charging, if the

battery parameters are too different. Especially, a battery of a higher capacity may not reach an end-of-charge voltage.

It may cause a permanent charging, and it may damage the battery! Such battery must be charged externally. In this case, the charging function has to be disabled by software – see chapter 7.1, parameter 170.

With software disabled charging, an external 12V power (see technical parameters) can be applied too.

### Connection method:

Terminal X1, see **Description of Terminals** on Fig. 13, is destined for battery connection. This terminal is normally occupied by cable, connected to a connector on GSM gateway cover, for easier connection with standard battery pack. Remove this cable and use X1, if necessary.

In this case, put conductors through the GSM Gateway side hole.

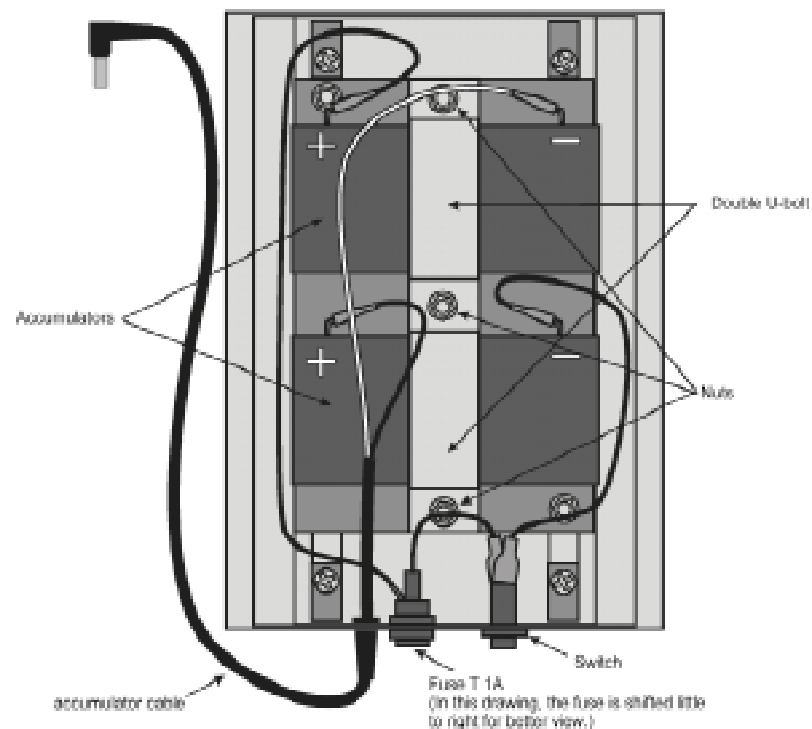


Fig. 20.: Arrangement of components and cables inside battery cover

## 5.6. Fuse Exchange

Spare fuses are enclosed to all backed-up models.

The fuse may blow e.g. when battery is connected in reverse polarity. If a lamp on GSM "Battery error" lights and a battery voltage is good

(ca 12V) and a fuse in a battery cover if good after all, follow these instructions:

1. Draw out an AC power cable.
2. Disconnect an accumulator and open a cover.
3. Remove a battery fuse (see corresponding PCB layout) and check it.
4. Place a good fuse, value T1A, type FSKK into this socket.
5. Close a cover and connect a battery – check a polarity!
6. Connect an AC power cable.

#### General rules:

- Use only a fuse of the same value and type.
- Disconnect the AC power cable and the accumulator while replacing any fuse.
- Fuse for AC power can be replaced only by service which is able to check such parameters as power consumption, DC voltages etc.
- If a fuse fails again, manufacturer must repair equipment.

### 5.7. Lithium Battery Exchange



**ATTENTION!**

Explosion risk when the lithium battery is replaced incorrectly. Replace only by the same or equivalent type according the producer's recommendation. Handle the used batteries according to the producer's instructions.

On-board lithium battery is used for RTC (Real Time Clock) during AC main failure only.

It is not necessary for GSM gateway operation.

A totally discharged battery may have such effects as wrong time information (which is displayed after running GSM program in right top corner of window).

Wrong time and date information will be in service buffer records, too.

Lifetime of battery is more than three years.

After this time, a battery change is recommended, or its check (min. voltage 2.9V) at least.

To replace lithium battery, disconnect GSM gateway from mains, open its cover (see chapter 5.1.3.), then remove an old battery using a proper tool and insert a new one.

**Battery type: CR2032.**

## 6. Programming

### 6.1. How to Program

You can program your Musitel in three ways: with a telephone, PC, or remote by PC as listed in the table below:

Programming method:		Phone	PC	PC, remote
Programming:	Parameters with exception of I2CR table and SMS texts:	✓	✓	✓
	I2CR table and SMS texts:	✓	✓	✓
Reading of all parameters:			✓	✓
Service buffer read:			✓	✓
Upgrade of GSM Gateway firmware:			✓	

### 6.2. Before Programming





- Using the chapter 2.8, make sure, that the Musitel Gateway works.
- Learn the default set-up of programmable parameters.  
Keep them as they are unless you need to change them.
- Decide in which way you will program the GSM Gateway.  
If you can use a PC, then use it.  
Select the most convenient of the initialising files.  
Open it with the appropriate program, study the notes therein and change those parameters only that you are not satisfied with.
- If you use the telephone programming, fill all values to be changed into the parameter table fields (chapter 7).
- If the GSM Gateway is not brand-new, make sure that you know the correct service password.  
If you are not quite sure, perform the full initialisation!



## 6.3. Handset-Based Programming

### 6.3.1. Requirements and Recommendations

- You need a tone-dialling telephone set for programming.  
Usually, another PBX extension is used, but you can also use connection from “the outside” (even from a mobile telephone) if one can call the Musitel from the outside too.
- Use the telephone-based programming only if you do not want to set up many parameters.  
Remember that you do not have any feedback with a telephone!
- Complete the prepared form first – think before programming!

### 6.3.2. Entering Programming Mode


- Pick up the handset.  
If you have a phone connected directly with Musitel, go to next step. Otherwise, dial the number to access Musitel GSM Gateway \*
- Wait until you can hear the dial tone . You cannot program during the current call, or if the Musitel requires a PIN or PUK code.
- To get into the programming mode enter the service password and the  character.  
The GSM Gateway transmits a confirmation  or rejection  signal (refer to the signalling overview in the programming mode).
- If you make a mistake while entering the password, cancel the entering by hanging up (the  character cannot be used) and start again.
- The service password is ‘12345’ by default.  
We recommend changing the password to protect your equipment against unauthorized persons. If you forget the password, your data will not get lost, but you will have to contact the manufacturer.
- If you enter an incorrect password that is not bared by sorting table, the Musitel dials the number and may get through somewhere.  
This, however, is almost improbable.

**Example:**    
correct password ,                      you enter incorrectly,  
the number is dialled and you will get through to the emergency line 112.



**\*) Note:** You must access Musitel - GSM gateway by its line interface.  
Programming by GSM connection (incoming call) is not possible.


### 6.3.3. Telephone-Based Programming



Once you have entered the programming mode, you can change all parameters or more parameters in any sequence, except for SMS message texts or I2CR table parameters.

It is easy – just enter the parameter number and then the parameter value.  
Use the  as separator ("Enter").


Each parameter number has three to four digits (refer to the *Parameter Tables*).

After the number and  are entered, the GSM Gateway sends a confirmation  signal if such parameter exists and is available in the particular model and software version.

If it is not available, the GSM Gateway transmits a rejection signal .

After the value and another  are entered, the GSM Gateway sends a storing  signal if the value lies in the allowed interval.

If not, the GSM Gateway transmits a rejection signal .

The programmed values are stored immediately during the storing signal  transmission.

#### Programming Example:



Sets the GSM Gateway clock at 12 o'clock, 30 minutes, 0 seconds.















**Important warning!!!** While setting time parameters note the units they are set in – seconds or milliseconds. Since you cannot enter the decimal point from your telephone, milliseconds must be used wherever seconds are too rough. However, you cannot enter any number in the allowed interval (173 ms, e.g.), but you have to respect the **step** prescribed for the particular parameter. If one step is 100 ms, e.g., your value must end with two zeroes.

#### Example:

Parameter 243, tariff pulse length, has a step of 10 ms. Hence you cannot enter 66 ms, e.g., but 70 ms. To set 1 second, you have to enter 1000.

### 6.3.4. Programming of Multi-Parameter Line Tables

Some parameters constitute a two-dimension table (the Call Sorting Table, e.g.). In the table, one line has a three-digit number and can contain up to 10 parameters. The individual parameters on the line have a four-digit number, differing in the last digit. They can be entered as follows:





- **Each parameter separately:** follow the preceding procedure, but use a four-digit parameter number;
- **More parameters in sequence:** this method is quicker and is as follows:
  - 1) First enter a three-digit number of the parameter line.
  - 2) After the number and  are entered, the Musitel sends a confirmation signal  if such parameter line exists and is available in the particular model and software version. If it is not available, the Musitel transmits a rejection signal .
  - 3) Then enter the first parameter and . The Musitel transmits a storing signal 2  if the parameter is in the allowed interval. This signal is different from the common storing signal  (refer to the *Signalling During Programming Table*) and indicates that the value has been stored and the following parameter is awaited.
  - 4) The programmed value is stored immediately during transmission of the storing signal 2  or .
  - 5) Then, you can enter the next parameter and . The procedure is the same.
  - 6) To signal that this was the last parameter to be programmed, press  and .
  - 7) The remaining parameters on the line will not be changed.
  - 8) If you enter all parameters, the Musitel transmits a common storing signal  after the last one.
  - 9) Therefore, you cannot pass onto the next line by simply entering parameters; you have to enter the line number.
  - 10) To program a table line in the above-described way, you always have to start with the first parameter.

Example:






Stores the first 3 parameters into line 501 (to be specific, the 0602 prefix is allowed and the call will not be stored in the buffer).

### 6.3.5. Programming Error

- If you make a mistake while entering a number (no matter whether a parameter number or a value) and find it before you press , you can cancel the whole programming step using the  character.
- If the Musitel transmits a rejection signal , you have to re-enter the parameter number even if the value was incorrect.
- If, while programming more parameters at the same time (table line) using the above mentioned procedure, you make a mistake in the third parameter, e.g., and the Musitel transmits a rejection signal , all correctly entered parameters have already been stored and you need not re-enter them. You can either re-enter the whole line or enter the remaining parameters individually.
- If you program and the Musitel stores a value that you do not want, you can re-enter the value correctly, of course, i.e. re-enter the parameter number, etc.






### 6.3.6. Erasing of parameters

- To erase parameter, enter its number,  and once again .
- Only parameters, which can be empty (see Parameter Tables, chapter 7), can be erased this way. In case of parameter, which cannot be empty (defined range, e.g. receiving volume and the like), GSM Gateway transmits a rejection signal .
- Erasing parameters in the Call Sorting Table: If you will erase some prefix, i.e. the first parameter on the row, all parameters on this row will be erased (or initialized). If you will enter row number (e.g. 501) or number of first parameter (e.g. 5011), it has the same effect. But, if you will enter number of another parameter (e.g. 5010), only this parameter will be erased.

### 6.3.7. Programming End

Hang up to terminate programming. After the programming end make sure that the GSM Gateway works as you want it to. Store the completed programming form of configuration file safe.

### 6.3.8. Signalling During Telephone-Based Programming

Signal	Name	Meaning
	Confirmation	<ul style="list-style-type: none"><li>• After valid service password</li><li>• After valid parameter No.</li></ul>
	Rejection (error)	<ul style="list-style-type: none"><li>• After invalid password</li><li>• After invalid parameter No.</li><li>• After invalid parameter value</li><li>• After cancelling of anything by </li></ul>
	Storing	<ul style="list-style-type: none"><li>• Value is valid and stored</li></ul>
	Storing 2	<ul style="list-style-type: none"><li>• Value is valid and stored, next parameter may be entered</li></ul>



## 6.4. PC - Based Programming via serial interface

### 6.4.1. Connecting to PC, starting of GSM program

Connect Musitel and your PC or notebook by RS-232C Serial Interface. Use an enclosed serial cable or another common 1:1 male/female serial cable.

Run GSM program (actual version is available on internet). Program works without connected GSM gateway too (prearrangement of set-up, demo...). It has three basic functions, described below.

### 6.4.2. Programming tool

Basic function of GSM program is to view and edit all parameters of GSM gateway. Parameters are grouped in windows, which are according with parameter tables in chapter 7 of this manual. Help and hints are available for all parameters, as well as a choice of basic set-up. You can add your own notes and save all settings as a file for future use. Parameters can be up- or downloaded, but some are read-only or write-only; e.g. passwords cannot be read, and serial number cannot be overwritten.

### 6.4.3. Viewing of service buffer

Complete content of service buffer can be viewed on PC and stored as a file - all monitored events (up to 200 in all) incl. time and date of each. When service buffer is full, oldest events are overwritten by newest; i.e. buffer is permanently full of "fresh" information. Watched event types can be selected by mask, see chapter 7.8.

### 6.4.4. Upgrade of GSM gateway firmware

Musitel is equipped with ISP (In System Programming) feature. You can "upgrade" it whenever you wish. Actual version of firmware is available on Internet (free).

#### How to upgrade your GSM gateway firmware:

- 1) Download actual version of GSM program and Hex file for upgrade from [www.musitel.com](http://www.musitel.com)
- 2) Install GSM program on your PC, connect GSM gateway to serial port
- 3) Run GSM program and select used COM
- 4) Check connection - GSM program must be able to read settings from GSM gateway
- 5) **Turn Musitel gateway OFF** (in a case of model with battery back-up, disconnect battery too)
- 6) **Press RESET button and hold it** while turning Musitel ON
- 7) Most lamps on Musitel must light up - upgrade mode is activated
- 8) **Make an upgrade** now - button **Hex** in the top toolbar of GSM program window.

## 6.5. Remote Programming by PC

### 6.5.1. Remote Supervision Purpose

Remote supervision allows reading and changing the Musitel - GSM gateway configuration remotely as well as reading the contents of the service buffer, thus saving time of servicing technicians enabling them to solve some problems remotely. For remote supervision, the same GSM software is used as for local setting using a serial interface. All features are absolutely identical with the exception of the GSM gateway firmware upgrade, which **cannot be done** remotely.

### 6.5.2. What You Need to Run Remote Supervision

#### On client's premises:

1. The GSM gateway must be equipped with a **SIM card supporting data transmission**.
2. The GSM gateway must contain firmware of version 2.36 and up.
3. Parameters required for remote supervision must be selected in the GSM gateway.

#### In Supervision Center:

1. You need to know the client's GSM gateway service password.
2. A GSM program of version 1.05 or up must be installed in the PC.
3. The PC must be equipped with a reliable modem (analog, ISDN, or GSM), or a GSM gateway made by 2N, which works in the data mode. If the PC is equipped with an analog modem, it has to be connected to a CLIP-sending exchange (calling line identification presentation).
4. The 'incognito' function **may not** be activated on the Supervision Center side.

#### Important warning!

Once programmed for remote supervision by selected line, client's GSM gateway cannot receive an ordinary call from this line. The GSM gateway with the said selection regards every call containing the Supervision Center CLIP as a remote supervision attempt. Hence, to make such a call, you should use another line or another SIM card, or the 'incognito' function, or make a call in direction from client's GSM gateway to the Supervision Center.

#### Important recommendations

1. Select a reliable telephone line or SIM card for connection whose number will not be changed in the future (will not be renumbered).
2. You are recommended to use another GSM gateway or a GSM modem rather than a fixed line modem to establish connection much more quickly.
3. The GSM gateway or GSM modem in the Supervision Center should be



equipped with a SIM card with a separate number for data connections (necessary if you use remote supervision with callback to a GSM gateway of different operator).

4. A connection within one GSM network is more reliable than a connection between different operators.
5. If you are forced to use two different operators for remote supervision, read the "Data Connection Problems" chapter carefully.

### 6.5.3. What Is "Callback"

In case of normal supervision call, the calling party, i.e. the Supervision Center covers data transmission costs. To avoid billing complications, the GSM gateway can establish remote supervision connection on the account of the client's GSM gateway. It is the so-called callback:

1. The Supervision Center GSM gateway or modem "calls" the client's GSM gateway.
2. The called GSM gateway identifies the Supervision Center CLIP as a callback request and rejects the incoming call immediately. Therefore, this request is free.
3. Right after that, the called GSM gateway calls the Supervision Center number that sent the request. If unsuccessful, it retries several times later.
4. The Supervision Center GSM gateway or modem waits for this callback. Having received it, it establishes data connection. Remote supervision is possible upon entering of the valid service password.

### 6.5.4. Remote Supervision from 2N Supervision Center

You need not configure anything for this service; all you have to do is to set parameter 930 to enable remote supervision. Necessary parameters are hidden (cannot be programmed). Callback is always used for this connection.

### 6.5.5. Overview of Remote Supervision Parameters

One common parameter enables / disables remote supervision, and four sets of parameters follows:

- CLIP - number of remote supervision center,
- callback enabled / disabled,
- number for callback.

These four sets enables to make remote supervision call from up to four different sites.

Parameters are described in details in chapter 7.9 - *Service parameters*.

### 6.5.6. Data Connection Problems

GSM data transmission is different from analog CO line data transmission: it is necessary to specify in advance whether the case will be voice, data or fax connection. With the connection once established, the connection mode cannot be changed. Therefore, the calling party should select the required connection before establishing it and this information should get to the target GSM network operator through all networks involved.

Experience from other countries and operators show that this is quite impossible in some cases and not fully reliable in other cases.

For an overview of remote supervision options with/without callback see the table below.

Service	Client's GSM Gateway	No Callback	With Callback
GSM gateway	One and the same GSM operator	No problems	No problems, you need not select the data number for callback.
GSM gateway	Another GSM operator, SIM <u>has no</u> special data number.	No guarantee; it works if both operators are able to establish data connection between each other, in the direction from service to client.	No problems if the callback data number is used.
GSM gateway	Another GSM operator, SIM <u>has</u> a special data number.	No problems if the called GSM gateway data number is used.	No problems if the callback data number is used.
ISDN modem	Any GSM operator	No guarantee; it works only if both operators are able to establish data connection between each other, in the direction from service to client.	No guarantee; it works only if both operators are able to establish data connection between each other, in the direction from client to service.
Analog modem *)	Any GSM operator, SIM <u>has</u> a data number.	No problems if the called GSM gateway data number is used.	No problems
Analog modem *)	Any GSM operator, SIM <u>has no</u> data number.	Not applicable	No problems

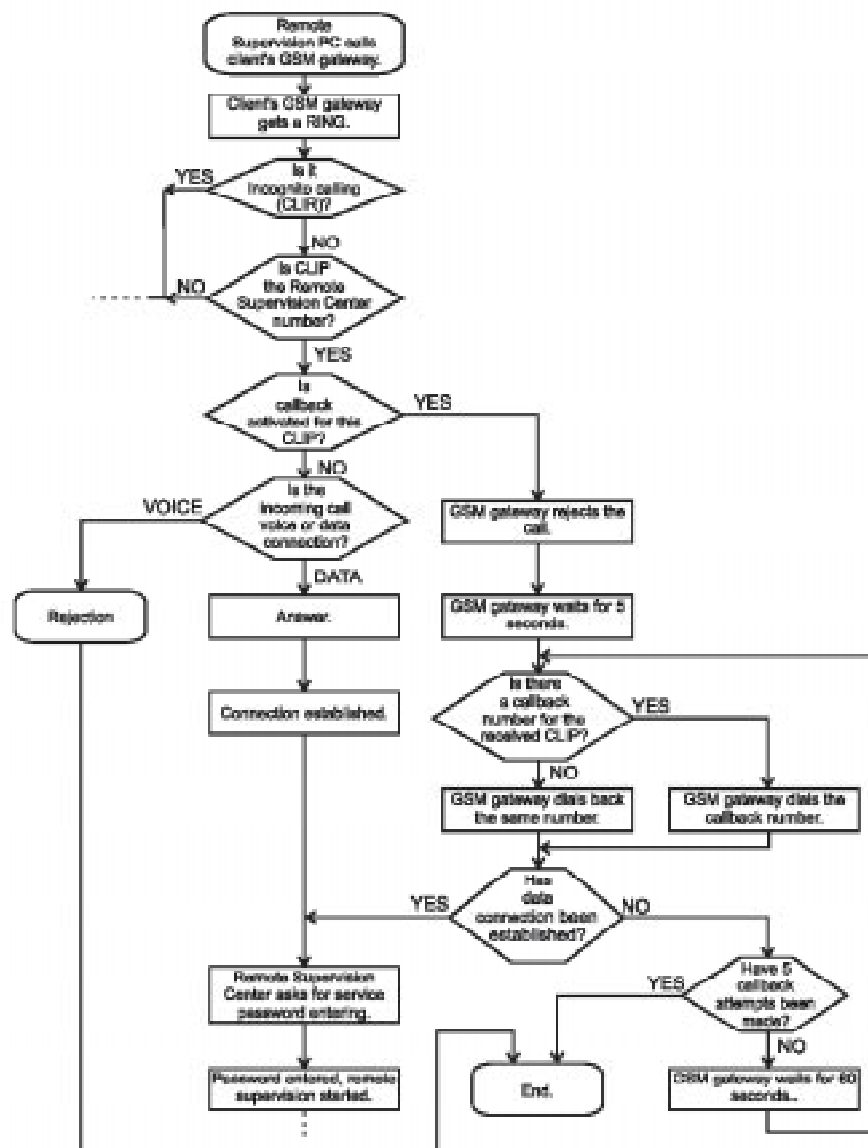
\*) The analog modem must be connected to a CLIP-sending PBX.

Table – SIM Card Identification Options for Outgoing Calls:

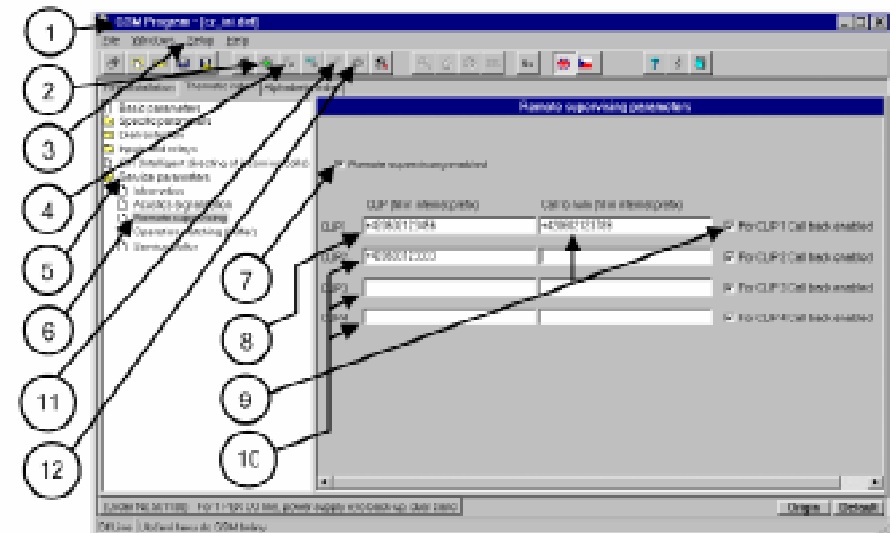
Voice number	Data number	Number used for outgoing call identification:
YES	NO	voice number
YES	YES	voice number
NO	YES	data number

*Note: The SIM card can have another number for fax calls, which is no important for remote supervision.*

### 6.5.7. Remote Supervision Establishing – Flow Chart



### 6.5.8. How to make GSM Gateway ready for Remote Supervision

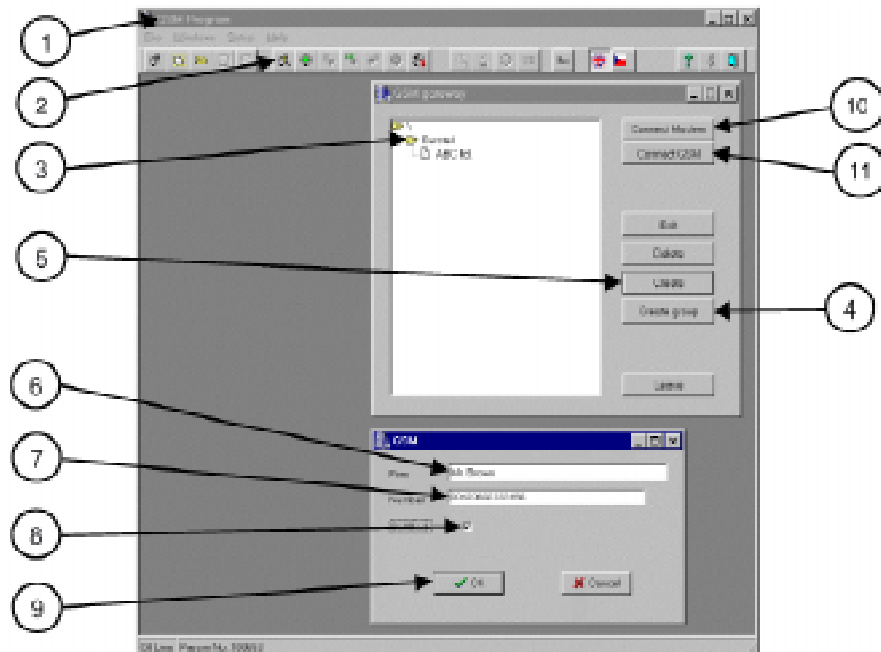


1. Connect the GSM gateway to your PC and run the GSM program.
2. Switch into the on-line mode.
3. If the connection fails, select the correct serial port number in the 'Setting' menu.
4. Read the GSM gateway setup.
5. Open the 'Service Parameters' item.
6. Open the remote supervision parameter folder.
7. Make sure that remote supervision is enabled. If not, enable it.
8. Enter the number of the modem or GSM gateway, which is used for remote supervision.
9. If you select the callback item, and the GSM gateway, which is used for remote supervision, has a separate data number, enter the data number in the right-hand column.
10. You can enter up to 4 numbers to be used for remote supervision.
11. Remember to save the setup back into the GSM gateway.
12. Switch into the off-line status.

#### Important recommendation:

You are recommended to make this setup before installing the GSM gateway at the client's. With older types of GSM gateways already installed, you are advised to make this setup immediately after software upgrade to a version supporting remote supervision – 2.36 and up.

### 6.5.9. How to Run Remote Supervision



establish connection with one GSM gateway and cancel the attempt before getting through, and then you try to make connection with another GSM gateway, you should make sure from which of the gateways the callback is coming!

1. Run the GSM program on the Remote Supervision Center PC.
2. Click on this icon to open the list of supervised GSM gateways.
3. The list may include subfolders in multiple levels.
4. Click on this key to create a subfolder.
5. Click on this key to create a new item in the list.
6. Enter client's name, company etc. here.
7. Enter the respective GSM gateway telephone number here.
8. **WARNING!** Settings here must correspond with the respective GSM gateway setup in order that the remote supervision connection can be established successfully!
9. Click on this key to save the record in the list.
10. Click on this key to establish remote supervision through your modem.
11. Click on this key to establish remoter supervision through your GSM gateway.

#### Important cautions:

- Connection establishing is the quickest without callback or with a GSM – GSM connection made within one and the same GSM network, which usually takes only a few seconds. With callback and different GSM operators, the establishing may take up to several minutes.
- With call-back, the PC does not check whether the callback comes from the GSM gateway you sent the request to. Hence, if you, e.g., try to

## 7. Parameter Tables

### 7.1. Basic Parameters

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Remarks
PIN entering mode	101	0	1	1		0 = manually, 1 = automatically
PIN – value	102	4 dig.	8 dig.	-		Write-only parameter!
CLIR – incognito	103	0	2	0		0 = by operator setting 1 = no CLIR, 2 = send CLIR
Volume - direction to GSM	104	1	5	3		1 = minimum, 5 = maximum
Volume - direction from GSM	105	1	5	3		1 = minimum, 5 = maximum
Roaming enable/disable	106	0	1	0		0 = disabled, 1 = enabled
Incoming calls rejection	107	0	1	1		0 = reject all incoming calls, 1 = normal operation
GSM signal level indication	108	0	1	0		0 = disabled, 1 = enabled
Delete SMS when SIM is full	109	0	1	1		0 = disabled, 1 = enabled
Echo cancelling – VoxGain only for M20 modules	110	0	255	150		Default value for Grace is 8
Silence after dialing	111	0	25500	0	e.g. 10000	Time [ms], step is 100. Recommended value = 10000
End of dialling signal length	112	0	2550	200		Beep length [ms], step 10
Dialling end time-out	113	2000	15000	6000		In milliseconds! Step = 100 ms
Switchboard operator number	114	Max. 8 digits				
Interantional prefix	115	1 dig.	4 dig.	00		Usually 00 Equal to "+" on GSM networks.
Country code	116	1 dig.	4 dig.	*)		Sooner parameter 0002 Enter without "00" prefix, "+" will be added automatically.
Long distance code	117	0 dig.	2 dig.	0		It may be empty in some countries, it is not used
Operator prefix	118	1 dig.	4 dig.	-		Reserved for future use.
Tone after end of call	121	0	2	2		0 = silence, 1 = continuous, 2 = busy tone – – – – –
Busy tone	1st tone	122	0	2550	320	Step = 10 [ms]
	1st pause	123	0	2550	320	
Dialling tone	1st tone	131	0	2550	320	Step = 10 [ms]
	1st pause	132	0	2550	320	
	2nd tone	133	0	2550	640	
	2nd pause	134	0	2550	640	
	3rd tone	135	0	2550	0	
	3rd pause	136	0	2550	0	
Dialling tone during roaming	1st tone	141	10	2550	320	Step = 10 [ms]
	1st pause	142	10	2550	320	
	2nd tone	143	0	2550	320	
	2nd pause	144	0	2550	320	
	3rd tone	145	0	2550	640	
	3rd pause	146	0	2550	640	
DTMF receiver timing	Min. burst	151	30	200	40	Step = 10 [ms]
	Min. pause	152	30	200	40	
DTMF transmitter timing	Tone	153	30	1000	100	Step = 10 [ms]
	Pause	154	30	1000	100	
Receiving DTMF during a call	155	0	1	1		0 = disabled, 1 = enabled

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Remarks
Number for automatic dialing	156	-	18 dig.	-		Empty = automatic dialing OFF
Time-out for automatic dialing	157	0	15	7		[sec]. 0 = instantly after pick up
SMS centre number	160	-	20 dig.	-		Necessary for SMS reports
COM – Data mode	161	0	1	1		0 = disabled, 1 = enabled
COM – SMS mode	162	0	1	1		0 = disabled, 1 = enabled
SMS – switch control	163	0	1	1		0 = disabled, 1 = enabled
SMS – input triggered messages	164	0	1	1		0 = disabled, 1 = enabled
Alarm function	165	0	1	1		0 = disabled, 1 = enabled
Battery charging	170	0	1	1		0 = disabled, 1 = enabled
Automatic data calls answering	181	0	15	0		Number of rings before automatic answer. 0-do not answer automatically

#### Notes to Basic Parameters:

##### • Parameters connected with SIM-card protection

The “PIN” parameter is used only if “Enter Automatically” is selected and the SIM card requires the PIN. If you enable the SIM-card function without PIN entering, you will not need this parameter.

If “Enter Automatically” is selected and you do not enter the PIN, enter a wrong PIN, or replace the SIM card without entering the new PIN, the Musitel will try to enter the old PIN once, identify its invalidity, and invite you, if you try to dial, to enter the PIN manually (by PIN tone ).

If you enter the new PIN correctly, it will be saved without programming. If you select the “Enter PIN Manually” mode, you will have to enter the PIN upon every power-on and the Musitel will not store it anywhere.

##### • Parameters connected with GSM network

**CLIR** (number of the calling extension, i.e. of your Musitel ) is normally sent to the called party.

The “Incognito” option should be applied for with your GSM operator (usually for a single fee).

**WARNING!!!** If you have not activated this service with your GSM operator and set the “Incognito” function at 1 = Do Not Send Number, no outgoing calls will be established in some GSM networks!!!

There is a risk with **roaming** in frontier areas that, due to a failure in your native GSM network, the Musitel might get registered in a GSM network of the neighbouring country and all GSM calls will be much more expensive. If you enable roaming, you should set your SIM card properly and activate the service with your operator!

If you disable roaming here, it is an unambiguous barring command that depends on nothing else.

**Incoming call enable:** The Musitel - GSM Gateway is designed for outgoing calls primarily, because you mostly do not pay for incoming calls and thus cannot cut your telephone costs.

If, however, incoming calls occupy the Musitel for a considerable period of time, this might make your outgoing calls more difficult and diminish the expected cost cuts.

Should your Musitel be too busy, you are advised to bar incoming calls. To cut incoming call costs too (from employees moving outside the company, e.g.), you can install another GSM Gateway for incoming calls only using a SIM card with pre-paid services (no monthly lump sum will be paid).

- **Volume and echo canceller setting**

Parameters 104 and 105 allow changing of volume by +/- 6 dB around its nominal value in 3dB steps.

Moreover, version 2.22 of GSM gateway firmware (and higher) has a new parameter **110**.

Default value is **150**, but it is different for some GSM operators; e.g., recommended value for Greece GSM networks = **8**.

Echo suppression is a built-in function of GSM gateway. It is able to reduce an echo effect, caused by delay of GSM network.

A greater value of this parameter can reduce the echo, but herewith it can cause some distortion of speech, such as ineligible sounds during pauses in speech.

This parameter must be used with high caution, and only in exceptional events! Complete initializing or initializing of basic parameters changes this parameter to 150.

If done, use initializing files, enclosed to GSM program (e.g. Co\_Greece.def) to initialize GSM gateway in accordance with local requirements!

**IMPORTANT:** Only a second party can hear the echo, which is done by GSM gateway.

If a local user of GSM gateway hears an echo, it is done by mobile phone of second party and it cannot be reduced by this parameter!

- **Silence after dialling**

During an outgoing call, Musitel with TC35 engine sends a "connecting tone" after dialling. This is similar to common mobile phones.

- **Target applications:**

Connecting tone can cause a wrong functioning of some special devices, which evaluates call progress tones - e.g. some call centers and like. Also some users prefer to hear ringing tone only, as well as in case of common PSTN call.

- **Important note:**

Default value of this parameter is zero.

To mute connecting tone, set a silence time, e.g. 10 sec.

- **Parameters for dialling supervision and intelligent incoming call routing**

**Dialling end identification:** If the Musitel does not identify the end of the dialled number by any faster method (refer to the Call Sorting table), it waits for a pre-set timeout.

Then (or immediately if it identifies the dialling end by a faster method), it sends a short beep, whose length can be adjusted, and starts establishing the connection with the called party.

- **Parameters of all tones transmitted by Musitel to line**

These parameters can change basic Musitel tones that are heard by the connected extension.

It is mainly the busy tone and dial tone.

The course of these tones may be important for such automatic devices as the answering and recording machine or telephone set with automatic Redial.

If roaming is activated, the special roaming dial tone is used to warn the subscriber that the connection is more expensive.

The pre-set tones meet the requirements of European standards.

Tones coming from the GSM network, of course, cannot be changed and may differ from the pre-set tones.

- **Tone dialling parameters**

The Musitel both receives and transmits tone dialling.

Time parameters for reception of tone dialling must be 20 ms shorter at least than the fastest tone dialling to be received by the Musitel (some telephones transmit 70 ms pulses and 70 ms spaces).

Time parameters for tone dialling (sending) are used for outgoing calls only if the Musitel dials the extension number.

The pre-set parameters meet the requirements of European standards.

- **Parameters enabling data functions**

These parameters enable or disable the use of serial port as a modem for sending and reading of SMS on a PC, execution of SMS commands for switches, and transmitting of SMS on input statuses and "Security Centre" function. Each mode of use can be disabled individually.

- **Help for parameters:**

101 = the parameter is only used if the SIM card requires the PIN.

102 = is used for automatic entering.

103 = Can disable your number presentation to the called party.

104 = Volume control option by +/- 6 dB to the GSM network.

105 = Volume control option by +/- 6 dB from the GSM network.

106 = Disables roaming in frontier areas to prevent the GSM Gateway from registering, in the event of a fault in the own GSM network, in a GSM

network of the neighbouring country.

107 = Disables all incoming calls.

108 = Displays the GSM signal intensity every 10 seconds.

109 = If SIM memory is full, oldest SMS will be erased when new one will come in – to enable receiving commands for switches.

110 = A greater value can reduce the echo, but it can cause some distortion of speech – only for GSM gateways with module SIEMENS M20.

111 = Value tells, how long silence will be after end of dialling.  
Very long value can "cut" begin of ringing tone, but not begin of call. 112 = Sets the length of the beep announcing the dialling end.

113 = Timeout for the GSM Gateway to wait for further dialling.

114 = Extension number to ring upon an incoming call, except for intelligent routing. On a PBX C.O. line used only if DISA is available in the PBX.

115 = This parameter is used for CLIP conversion within Intelligent Incoming call routing and programming by phone (entering phone numbers).

116 = It is used for Intelligent Incoming call routing for CLIP conversion. This parameter is accessible also as parameter 6002 in section Intelligent Incoming Call Routing.

117 = It is used for Intelligent Incoming call routing for CLIP conversion.

118 = Reserved for future use.

121 = If a remote extension hangs up earlier the extension connected to the GSM Gateway can hear the tone selected here.

122-123 = Using these two parameters you can change the busy tone rate.

131-136 = Using these six parameters you can change the dial tone course.  
It is a tone signalling that the GSM Gateway is ready for dialling.

141-146 = Using these six parameters you can change the roaming dial tone course. This tone should be different from the normal dial tone to signal that the connection is much more expensive.  
If roaming is disabled, these parameters are not used.

151-152 = Using these two parameters you can change the tone dialling receiver features.  
Higher values may make the receiver not receive all dialled digits!

153-154 = these parameters can accelerate the transmission of tone dialling. They are only used for incoming calls if the GSM Gateway dials the extension number.

155 = receiving of DTMF during a call is necessary for function "write to I2CR table".

156 = Number for automatic dialling ("baby-call). Automatic dialling is OFF as long as this parameter is empty.

157 = Time-out for user to start dialling, in case of present number for automatic dialling. If this time is over and user is not dialling any number, GSM gateway starts automatic dialling.

158 = Time after that outgoing call is automatically interrupted. 30s before end you can hear warning tone. During last 10s short tone repeats every second. 0 = no limit.

159 = Time after that incoming call is automatically interrupted. 30s before end you can hear warning tone. During last 10s short tone repeats every second. 0 = no limit.

160 = the number necessary for the sending of any SMS.

161 = this parameter can disable or enable the data mode, i.e. the use of the serial port as a modem.

162 = this parameter can disable or enable the use of the serial port for SMS sending and reading on a PC.

163 = this parameter can disable or enable the execution of switch commands coming in the SMS format.

164 = this parameter can disable or enable the transmission of SMS on input statuses.

165 = Using this parameter you can disable or enable the "Security Centre" function.

170 = Disable it when external DC power supply is connected instead if battery or if (big) battery is charged anyway.

181 = This parameter defines after how many rings an incoming data call will be answered automatically. If set at zero, the function is disabled.

## 7.2. MUSITEL 53T - Model for PBX's CO Line Interface Parameters

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Remarks
Received dialling (DTMF / pulse)	201	0	1	0		0=DTMF, 1=pulse
Time parameters for pulse dialling receiver	Make min.,	204	-	-	20	Time parameters are <b>fixed</b> : make 20 to 80 ms, break 30 to 90 ms.
	Break min.,	205	-	-	30	
Flash min.	206	10	2550	100		
On-hook min.	207	10	2550	500		
Time parameters for ringing	1st ring pulse	211	0	25500	1000	Step = 100 [ms]
	1st pause	212	0	25500	4000	
	2nd ring pulse	213	0	25500	0	
	2nd pause	214	0	25500	0	
	3rd ring pulse	215	0	25500	0	
	3rd pause	216	0	25500	0	
Max time of ringing	224	0	255	0		[s], 0 = unlimited
Max off-hook time without action	Busy tone	225	1	255	30	Step = 1 [s]
	Power down	226	0	255	60	0 = power down disabled
Signalisation of begin of GSM connection	Type	231	0	4	0	See notes below
	Time	232	10	2000	100	Step = 10 [ms]
Signalisation of end of GSM connection	Type	233	0	4	0	See notes below
	Time	234	10	2000	100	Step = 10 [ms]
Frequency of signalisation pulse for begin or end of connection	235	0	9	6		See notes below
Pseudo-tariff pulses transmit or no	241	0	1	0		0 = no, 1 = yes
Level of pulse transmitter	242	0	1	1		0 = low, 1 = high
Length of tariff pulse	243	10	1000	100		Step = 10 [ms]
Min. pause between tariff pulses	244	10	1000	200		
Frequency of tariff pulses	245	0	9	6		See notes below
DISA dialling start time	251	100	25500	4000		Step = 100, [ms]
Dial switchboard operator number in the course of DISA	252	0	1	0		0=no, 1=yes

### Notes:

231 and 233: Signalling of connection start or end:

0	None signalling
1	Current break for time specified by par. 232 or 234
2	Polarity change (without return)
3	Polarity change with return, time of inverted polarity specified by parameter 232 or 234
4	Frequency impulse (typically 16 kHz), length see parameter 232 or 234, frequency see parameter 235

235 and 245: Frequency of tariff pulses or signalisation pulse for begin and end of connection:

2	12 kHz
6	16 kHz
Other	Reserved

## Notes to PBX CO Line Interface Parameters - MUSITEL 53T:

It is very **important** not to interchange dialling **receive** and **send** parameters! Dialling send parameters meet the applicable standards; while dialling receive parameters must be set with a sufficient reserve to receive even considerably damaged dialling. This applies generally to both tone and pulse dialling modes.

**The maximum timeout for a passively seized line** is a pair of parameters determining the time for delay in dialling after picking up the line, or delay in hang-up after hang-up by the other subscriber.

Parameter 226 is usually set at a higher time value than parameter 225. Then, the Musitel 53T first transmits the busy tone and then, if you do not hang up, disconnects the line current. After that, it tests the line every minute until the line is hung-up.

**Parameters 231 – 235 – Dialling start and end signalling** are used only if the PBX requires this signalling, for call cost billing, e.g.

**Parameters 241 – 245 – Pseudo-tariff rating** is used only in case the PBX requires this signalling or if a coin-operated device is connected.

### Help for parameters:

201 = Selects the dialling type to be received by the Musitel 53T from the PBX or a telephone set. Gateway receives only dialling of selected type; different dialling is ignored!

204-205 = Using this parameter you can change the pulse dialling reception features. Higher values may make the receiver not receive all digits dialled!

206 = Minimum line current interruption time that is identified as "Flash" by the Musitel 53T.

The parameter is not used yet.

207 = Minimum line current interruption time to be identified as "Hang-Up" by the Musitel 53T.

211-216 = Using these six parameters you can change the ringing course.

Use 2, 4, or 6 parameters as needed, leaving zeroes for the remaining ones. (The selected course is repeated.)

224 = Maximum ringing time – but it is also limited by the GSM network (30 seconds, e.g.).

225 = If you do not start dialling after picking up the line, or do not hang up after call termination, the Musitel 53T will start sending the busy tone after this timeout.

226 = If you do not start dialling after picking up the line, or do not hang up after call termination, the Musitel will disconnect the line current after this timeout.

231 = Method of informing of the PBX by the Musitel 53T that the connection has been established.

232 = Signal time used for informing of the PBX by the Musitel that the

connection has been established.

233 = Method of informing of the PBX by the Musitel 53T that the connection has been terminated.

234 = Signal time used for informing of the PBX by the Musitel that the connection has been terminated.

235 = The signal frequency time used for informing of the PBX by the Musitel 53T that the connection has been established or terminated – if frequency signalling is selected.

241 = Using this parameter you can disable or enable the transmission of tariff pulses to be counted by the Musitel according to the Call Sorting table data.

242 = Tariff pulse intensity selection – use more intensive signals unless they disturb calls.

243-244 = Using these two parameters you should select the highest tariff pulse transmission rate.

245 = Using this parameter you can select the tariff pulse frequency.

251 = Time after seizure, when PBX is able to receive CO line tone dialling (DISA).

252 = By selecting NO you allow the calling subscriber (except for intelligent routing) to hear the PBX DISA message and to dial the extension itself.

### 7.3. MUSITEL 61E - PBX Subscriber Line (extension) Model Interface Parameters

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Remarks
Automatic ring to pick-up delay	301	0	25500	2000		[ms], 0 = no pick up
Min. length of ringing for detection	302	50	2550	100		[ms], step = 10 [ms]
Max. pause between ring pulses	303	1000	25500	6000		[ms], step = 100 [ms]
Min. line on-hook time	304	100	25500	1500		[ms], step = 100 [ms]
Type of dialling (DTMF or pulse)	311	0	1	0		0=DTMF, 1=pulse
Time between pick-up and start of dialling	312	100	25500	800		Step = 100 [ms]
Pulse dialling - time parameters	Make	313	10	100	40	Step = 10 [ms]
	Break	314	10	100	60	
	Interdigit pause	315	100	2550	800	
„Flash“ time	316	100	2550	600		
Pause (in dialling)	317	100	2550	1000		
Pause (in dialling) in fixed position	318	0	7	0		Position, 0 = none
Time for permanent tone detection	321	0*)	25500	1500		[ms], step = 10 [ms]
Busy tone detection	322	0**)	255	4		Period count
Min. busy tone period	323	100	2550	250		Step = 10 [ms]
Max. busy tone period	324	100	2550	800		
Detection of other tones, e.g. ringing tone	Period count	331	0**)	255	10	Small count can disable switchover!
	Min. tone time	332	10	2550	250	Step = 10 [ms]
	Min. time of longest pause	333	100	25500	800	Step = 100 [ms]
	Max. time of longest pause	334	100	25500	6000	
	Deaf time after pick-up	335	0	255	30	
Time-out for start of dialling etc.	341	10	255	30		Step = 1 [s]
Busy tone transmitting time	342	0	255	10		0 = hook up (don't pick up)
Signalisation of connection beginning	Type	343	0	3	0	See notes below
	Min. time	344	10	2550	100	Step = 10 [ms]
Signalisation of end of connection	Type	345	0	3	3	See notes below
	Min. time	346	10	2550	100	Step = 10 [ms]
Ring to switchboard operator after timeout	351	0	1	0		0 = no, 1 = yes
Ringing timeout for switching to switchboard operator	352	10	255	20		[s]
Dialling enabled for unknown CLIP	353	0	1	0		Used if parameter 114 is empty (operator number)
Time-out for dialling during an outgoing call if PDX transmits a permanent tone	354	0	255	10		Enables to call more extensions during one incoming GSM call

\*) 0 = don't detect; minimal value for detection is 500.

\*\*) 0 = don't detect; minimal value for detection is 2. Value 1 is not applicable!



## Notes:

- **Pulse dialling** is applicable only for incoming calls, which are forwarded automatically to an extension by the intelligent incoming call routing or to the operator. If there is no CLIP and extension number in the I2CR table and the switchboard operator number is not available, the Musitel 61E refuses the call.

- Meaning of parameters 343 and 345:

0	No signalisation
1	Line break for time chosen by parameter 344 or 346
2	Polarity change (without return)
3	Polarity change (with return, for time chosen by parameter 344 or 346)

- The type of received dialling is not selectable – PBX's can transmit only DTMF dialling on extension lines.
- **Parameters 331 to 335 – detection of other tones:**  
These parameters allow detecting of, e.g., the ringing or dialling tone (or both). This is important, e.g., where the local user tries to make switch-over during the call, but the chosen line does not pick up the line. The Musitel 61E detects the ringing tone, and, after a selected count of periods (see parameter 331), hangs up.
- **Parameter 335 - Deaf time after pick-up:**  
Some setting of "other tones detection parameters" may be useful during a call, but it may cause hang-up during ringing even before the connection is established. Parameter 335 disables detection of "other tones" for a selected time after pick-up to avoid this effect.

## Help to parameters

- 301 = The Musitel 61E waits for this time after the beginning of ringing. Moreover, it waits for the beginning of the next ring signal, if it is not present just at the end of this delay. E.g., the default value of 2s is longer than the conventional ringing signal, so the Musitel 61E waits for the beginning of the second ringing signal and then picks up the line.
- 302 = This parameter defines a non-sensitivity for very short ring signals, which are ignored.
- 303 = This parameter defines the maximum pause during continual ringing. In this way, the Musitel 61R can identify a situation when one user calls to the Musitel 61E, then hooks up earlier than the Musitel makes pick-up, and another user calls to the Musitel 61E shortly after it.

304 = The Musitel 61E keeps this limit in all situations.

311 = The Musitel 61E uses DTMF or pulse dialling according to this parameter. DTMF dialling is faster, so pulse dialling is used only if some old PBX doesn't support DTMF.

312 = In general, this parameter ensures that the Musitel 61E should not start dialling until the PBX is ready to receive it. In case of DISA function on a PBX extension line (rare situation), this parameter can make the proper delay to wait until the PBX is able to receive dialling.

313 = Time between breaks. Most national standards are 40 or 33 ms.

314 = Break time of pulse dialling. Most national standards are 60 or 66 ms.

315 = Pause between two numbers – only for pulse dialling!

For DTMF dialling, a pause is defined by "global parameters".

316 = Line break time, which is used by PBX's for some services. Flash is not used by the Musitel 61E at present.

317 = A prolonged pause between numbers is used, e.g., where it is necessary to wait for establishing of connection with the superior PBX. This parameter is applicable for both DTMF and pulse dialling.

318 = This parameter allows to set a number of digits before the interdigit pause. This parameter is applicable for both DTMF and pulse dialling.

321 = This parameter defines how long a tone is considered as a permanent tone. Some PBX's send the permanent tone after the end of call, so the GSM gateway hooks up the line in this case. The permanent tone after pick-up (till the end of dialling) is ignored, of course.

322 = This parameter defines the required number of periods for busy tone detection. After detection, the Musitel 61E hooks up.

The minimum value of this parameter (for detection) is 2, 0 means "don't detect busy tone". The busy tone after pick-up (till end of dialling) is ignored.

323 = This parameter must be smaller than the inverted value of the busy tone cadence (number of busy tones per sec).

The value of 250 ms detects a busy tone of up to 4 periods per sec.

324 = This parameter must be greater than the inverted value of the busy tone cadence (number of busy tones per sec).

The value of 800 ms detects a busy tone of 1.25 periods per sec and more.

331 = This parameter defines the required number of periods, usually for the ringing tone. After a selected number of periods, the Musitel 61E hooks up. This allows to watch, e.g., the ringing tone: the Musitel is able to "listen" to the ringing tone, and hooks up after a selected number of ringing periods.

332 = This parameter defines a non-sensitivity for very short tones, which are ignored. If the PBX ringing tone is composed of more "beeps", then at least one beep must be longer than this parameter.

333 = This parameter is important for counting of ringing tone periods.

- If the PBX ringing tone is composed of more "beeps" followed by one longer pause, this long pause must be longer than this parameter, but the other short pauses must be shorter than this parameter.
- 334 = This time must be longer than longest pause of the ringing tone, e.g. The Musitel 61E uses this parameter to detect when ringing was interrupted. If the Musitel 61E detects ringing again, during switchover, e.g., it counts ringing periods again from zero.
- 335 = This parameter defines what time will not be detected after pick-up and end of the dialling ringing tone (e.g.). In this way, the Musitel way allows longer ringing at the beginning of a call, but shorter ringing during a call - e.g. during switchover.
- 341 = Maximum time from pick-up to the beginning of dialling, and time-out for any activity during switch control, programming by phone etc. If this time expires, the Musitel 61E starts transmitting a busy tone or hooks up.
- 342 = Busy tone transmitting time. If set to 0, the Musitel 61E hooks up without transmitting the busy tone (the user hears a tone from the PBX after it), and in the case of outgoing call, the Musitel doesn't pick up the line at all if it is not ready (e.g., if it is busy with the data mode).
- 343 = The Musitel 61E on a PBX extension **receives** this signalisation. This parameter can be used only if PBX transmits it. In this case, in the case of incoming call, the GSM gateway waits for it and picks up an incoming GSM call as late as this signalisation from the PBX comes, saving the call cost.
- 344 = This parameter is used if the PBX sends "connect" information using a short polarity reverse or current break. The Musitel 61E on a PBX extension line **receives** this signal, therefore the value of this parameter must be shorter than the real time of the polarity reverse or current break transmitted by PBX.
- 345 = The Musitel 61E on a PBX extension **receives** this signalisation. This parameter can be used only if the PBX transmits it. In this case, the GSM gateway hangs up the call as soon as this signalisation from the PBX comes, saving the call cost.  
Note: if the line current is interrupted for more than 5s, the Musitel evaluates it as a line error.
- 346 = This parameter is used if the PBX sends "disconnect" information using a short polarity reverse or current break. The Musitel 61E on a PBX extension line **receives** this signal, therefore the value of this parameter must be shorter than the real time of the polarity reverse or current break transmitted by PBX.
- 351 = Defines that the Musitel should dial the switchboard operator after a set timeout if an extension is still on-hook. If disabled, the Musitel 61E continues ringing the same extension.
- 352 = Defines the timeout after which the Musitel 61E should dial the switchboard operator instead of an extension.
- 353 = If enabled, the calling party hears a dialling tone of the PBX and can

dial an extension number. In this way, he or she can call "outside" the PBX if unless the extension is barred.

If disabled, the Musitel 61E dials the switchboard operator number and if this number is not programmed, the Musitel refuses the call.

- 354 = If the calling party can directly dial an extension during an incoming call, this is a time-out for this dialling. If expired, the Musitel 61E hooks up.

In other words, the calling party must start dialling in time to discontinue the permanent tone.

As soon as the called extension hooks up, the calling party can dial another extension without breaking an established GSM call.

For this feature, the PBX must be able to receive another dialling not wanting to hook-up both extensions.

## 7.4. Universal Input and Output Parameters

### 7.4.1. Universal Output Parameters

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Notes
Password for all SMS and DTMF commands	400	3 digits	8 digits	11111		Wrong password will be dialled, if entered!
Switch No. 1 mode	401	0	5	1		See table below.
Switch No. 2 mode	402	0	5	1		
Switch No. 1 ON/OFF time	411	100	2550, 000	1000		Time [ms], step 100, Maximum is approx. 40 min.
Switch No. 2 ON/OFF time	412	100	2550, 000	1000		
CLIP No. 1 for "eco" control	421	-	20 digits			
CLIP No. 2 pro "eco" control	422					
CLIP No. 3 pro "eco" control	423					
Switch Nr. for CLIP No. 1	424	1	2	1		
Switch Nr. for CLIP No. 2	425					
Switch Nr. for CLIP No. 3	426					
Action for CLIP No. 1	427	0	1	2		See table below.
Action for CLIP No. 2	428					
Action for CLIP No. 3	429					
Switch No. 1 ON time (1 <sup>st</sup> )	431	0000	2359	0000		Format: hhmm hh: 00 to 23 mm: 00 to 59
Switch No. 1 OFF time (1 <sup>st</sup> )	432	0000	2359	0000		
Switch No. 1 ON time (2 <sup>nd</sup> )	433	0000	2359	0000		
Switch No. 1 OFF time (2 <sup>nd</sup> )	434	0000	2359	0000		
Switch No. 2 ON time (1 <sup>st</sup> )	435	0000	2359	0000		
Switch No. 2 OFF time (1 <sup>st</sup> )	436	0000	2359	0000		
Switch No. 2 ON time (2 <sup>nd</sup> )	437	0000	2359	0000		
Switch No. 2 OFF time (2 <sup>nd</sup> )	438	0000	2359	0000		

#### Switch modes - parameters 40x:

0	Out of use
1	Basic mode (ON/OFF), OFF state after reset
2	Basic mode (ON/OFF), ON state after reset
3	N.O. (normally open), closing for pre-programmed time set by parameter 41x
4	N.C. (normally closed), opening for pre-programmed time set by parameter 41x
5	Basic mode + timer, see parameters 431 to 438

#### "Eco" commands - parameters 427 to 429:

0	No action different from any other CLIP
1	CLOSE (in modes 1, 2 and 5 permanently, in modes 3 and 4 for pre-programmed time, in mode 5 till next opening by timer.
2	OPEN (in modes 1, 2 and 5 permanently, in modes 3 and 4 for pre-programmed time, in mode 5 till next closing by timer.

#### Help for parameters:

400 = This password is used in commands for switch control and input read.  
 Passwords are not changed by initialisation!  
 401 = Enables to select a switch No. 1 mode.  
 402 = Enables to select a switch No. 2 mode.  
 411 = A time of closing or opening for some modes of switch No. 1.  
 412 = A time of closing or opening for some modes of switch No. 1.  
 421-423 = If an incoming call comes with this CLIP, it causes a specified action with a specified switch instead of ringing and call.  
 424-426 = Switch No. to be controlled by this CLIP.  
 427-429 = Action to be done by this CLIP.  
 431-434 = Terms for daily timer function, for switch No. 1.  
 435-438 = Terms for daily timer function, for switch No. 2.

#### Notes for SMS command receiver:

- Double security (by password + CLIP) – not available for the present
- Automatic confirmation (SMS reply after command execution) - not available for the present
- Order of received commands is not checked. When user will send e.g. command "close switch No. 1" and command "open switch No. 1" one minute later, and SMS operator will deliver these messages in reverse order, GSM gateway will execute these command in this improper order, so final result will be closed switch" (delayed delivery is relatively common, but this phenomenon - improper order - wasn't observed yet.)
- Message duration (validity) in case of delayed delivery is not checked - delay in delivery not cause a refuse of command.  
 If this can be a hazardous in some application, user can set "expiration time" of SMS on your own mobile. Some operators offer a special service – "express" delivery in warranted time, e.g. 30s.
- SMS command for closing or opening for selectable time (i.e. time, specified by command) - not available for the present.

## 7.4.2. Universal Input Parameters

### SMS message texts:

Parameter	Par. No.	Max.	Your text
SMS text No. 1	441	80 char.	
SMS text No. 2	442	80 char.	
SMS text No. 3	443	80 char.	
SMS text No. 4	444	80 char.	
SMS text No. 5	445	80 char.	
SMS text No. 6	446	80 char.	
SMS text No. 7	447	80 char.	
SMS text No. 8	448	80 char.	

### Notes:

- Programming texts by phone is not possible.
- Default content = empty (no text).
- When text is empty, SMS is not transmitted.

### Condition mask for sending SMS

	Parameter No.	45x1	45x2	45x3
	Meaning	Mask (form ab)	Min. trigger time	Deaf time after SMS sending
	Value range	00 – 33	0 – 25500 s	0 – 25500 s
Par. No. 45xy	Default value	33	1s	3600s
451y	Parameters for SMS No. 1			
452y	Parameters for SMS No. 2			
453y	Parameters for SMS No. 3			
454y	Parameters for SMS No. 4			
455y	Parameters for SMS No. 5			
456y	Parameters for SMS No. 6			
457y	Parameters for SMS No. 7			
458y	Parameters for SMS No. 8			

### Mask - parameters 45x1

0	Watch "0"	Mask form: <b>ab</b> <b>a</b> – 1 <sup>st</sup> digit – value for switch No. 1 <b>b</b> – 2 <sup>nd</sup> digit – value for switch No. 2 Value 33 = never send this SMS
1	Watch "1"	
2	Watch any change	
3	Don't watch this input	

### Min. trigger time – parameters 45x2:

- Levels corresponding with appropriate mask must take this time to cause SMS transmitting.
- If there is "2" (watch any change) used in some position of mask, min. trigger time is ignored.
- If there is a mask "22", SMS will be transmitted after any change on any input, and min. trigger time is ignored too.

### Examples:

- 01 = Send SMS, when "0" at input No. 1 and "1" at input No. 2 will take a time....
- 12 = Send SMS, when "1" is at input No. 1 and any change at input No. 2 will appear.
- 13 = Send SMS, when "1" at input No. 1 will take a time... regardless of input No. 2 status.
- 22 = Send SMS, when any change at input No. 1 or 2 will appear.  
(Here is an exception in evaluation: or instead and is used.)

### Deaf time after SMS sending – parameters 45x3:

This parameter tells, when the **same** SMS can be re-transmitted **again**, if the trigger condition appears again. Without this parameter, the Musitel - GSM gateway may start to emit SMS's chaotically if the monitored device "goes mad". This parameter can protect the user against this situation. After sending a SMS, the appropriate mask is not monitored until deaf time is expired. All other masks are monitored continuously, so any other SMS can be transmitted.

### Telephone numbers for SMS sending:

Parameter	Par. No.	Max.	Your choice	Note
Tel. number for SMS No. 1	461	20 dig.		If some number is empty, appropriate event will be stored in service buffer instead of SMS sending – if enabled by par. No. 852.
Tel. number for SMS No. 2	462	20 dig.		
Tel. number for SMS No. 3	463	20 dig.		
Tel. number for SMS No. 4	464	20 dig.		
Tel. number for SMS No. 5	465	20 dig.		
Tel. number for SMS No. 6	466	20 dig.		
Tel. number for SMS No. 7	467	20 dig.		
Tel. number for SMS No. 8	468	20 dig.		

### Input noise rejection:

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Notes
Anticlutter time for input No. 1	471	10	2550	100		[ms], step = 10, useful for noise suppression.
Anticlutter time for input No. 2	472	10	2550	100		

Parameters 47x provides immunity against input interferences. Short "glitches" (shorter, than chosen value) has no effect. If there is a clear signal on input, its change will be accepted with delay equal to chosen anticlutter time. In case of heavy interference, used function has so-called integrating effect, i.e. when some value ("0" or "1") will be dominant, this value is passed as valid one. Of course, if this value's dominance is small, it can be accepted with delay much longer, than chosen anticlutter time.

## Help for parameters:

- 441-448 = SMS texts to be transmitted if an appropriate condition comes.
- 45x1 = A value entered here must match for both input to cause a SMS transmitting.  
Exception: If "Watch any change" is selected for both inputs, a change on anyone input is accepted.
- 45x2 = A duration of selected values, which is necessary to cause a SMS transmitting.  
This time is used only if a value 0 or 1 is a condition for at least one input.
- 45x3 = For this time period after transmitting of SMS, a condition which caused SMS transmitting is not monitored.  
This is a protection against repeated transmission of the same SMS.
- 461-468 = Phone number (GSM network only), to which an appropriate SMS is transmitted.

## Notes for SMS message transmitter:

- Instead of SMS sending or together with it, SMS message transmitter can store watched events into service buffer, too.  
Leave appropriate telephone number empty for storing to buffer only.  
This mode is advantageous because it works free of charge.  
Stored events can be viewed on PC, using GSM program.
- Tip: some SMS messages can have the same mask and different trigger tome only. E.g., when failure of watched machine would take 5 minutes, SMS will be sent to serviceman.  
When this failure will take two hours, SMS will be sent to director.
- SMS reports of GSM gateway problems (such as no SIM card, no GSM signal, A.C. power failure) - not available for the present.
- A special mode "security centre" (watching for inputs is controlled by "arm" and "away" commands, phone is used for this) - not available for the present (under preparation).

## 7.5. Call Sorting Table

### 7.5.1. Purpose

Almost every application requires that the Musitel 's behaviour (during outgoing calls) somehow depends on the called number. Usually, it is not difficult to recognize, according to a few first digits (the prefix), an international call, mobile network call, special service call, emergency call, etc. It is possible to enter a line into this table for each such group of numbers to define:

- Whether this number can be dialled or is barred (call restriction);
- How to detect when the dialling is complete;
- How to bill the call (the so-called pseudo tariff metering);
- Whether and how the called number is to be modified before being sent to the GSM network;
- Whether the record on this call is to be stored in service buffer.

These "rules" can be written into the table, for more details see below.

### 7.5.2. Sorting Principle

Every table line contains one prefix (of variable length) plus parameters that describe the behaviour of the Musitel, if the beginning of the called number is identical to this prefix.

However, there is often an exception to the rule – a number that starts identically but has to be served in a different way.

**Example 1:** Trunk calls usually start with **0**, but international calls with **00**. It is possible to define a trunk call by one of the following three ways:

1. The trunk call starts with **01, 02, 03, 04, 05, 06, 07, 08, or 09** – very demanding.
2. The trunk call starts with **0[1...9]** – a more convenient way.
3. The trunk call starts with **0**, except for **00**, which is an international call.

The table uses the last of the three ways cited above. There may be any number of exceptions and the description is very easy: **any table line that starts with the same prefix but includes one or more additional digits is considered an exception.**

**Example 2:** To bar all international calls except for calls to the France and Germany, complete 3 table lines – in any sequence – as follows:

00	– international calls	– barred
0033	– France	– allowed
0049	– Germany	– allowed

The said setting has the following advantages:

- Any further line can be added any time without modifying or checking the remaining ones. The new line becomes automatically „an

exception“ to any of the preceding ones if it starts with the same prefix.

- There may be more exceptions to one line and there may be an exception to an exception again, etc.

### Example 3:

0 – international calls – allowed  
 00 – international calls – barred  
 0033 – France – allowed  
 00336 – Added value services“ – barred

In this example, there are 3 levels of exceptions, but there are even more complicated situations in reality.

Nevertheless, the table is still quite comprehensible.

### 7.5.3. Table Structure and Parameter Ranges

Par. No.	xxx1 Begin of number	xxx2 Call enable	xxx3 Store to buffer	xxx4 Number length	xxx5 End #	xxx6 End *	xxx7 Initial tariff	xxx8 Impulses per [ms]	xxx9 Take away	xxx0 Append
501	Max. 16 digits 0...9, ".", #	0 = no 1 = yes	0 = no 1 = yes	0,3...16	0 = no 1 = yes	0 = no 1 = yes	0... ...255	0 or 100 to 999900	0 – 16	Max. 16 digits 0...9, ".", #
:	:	:	:	:	:	:	:	:	:	:
530	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
:	-	-	-	-	-	-	-	-	-	-
599	Other	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-

### Values after Initialisation:

Par. No.	xxx1 Begin of number	xxx2 Call enable	xxx3 Store to buffer	xxx4 Number length	xxx5 End #	xxx6 End *	xxx7 Initial tariff	xxx8 Impulses per [ms]	xxx9 Take away	xxx0 Append
501 to 530	Empty	1 = yes	0 = no	0	1 = yes	0 = no	0	0	0	Empty

The table also includes a special line (500), where setting a few parameters can disable the whole table or some columns. It is a quick way to the „emergency operation“ if there is an error in the table and you have no time to identify it.

### Line 500 – Table Blocking Parameters

Par. No.	5001	5002	5003	5004	5005	5006	5007	5008	5009
Meaning	General enable	Call enable	Store to buffer	Number length	End #	End *	Initial tariff	Impulses per [ms]	Take off and append
Value range	0 = no 1 = use table	0 = no 1 = use table 2 = all	0 = no 1 = use table 2 = all	0 = no 1 = use table	0 = no 1 = use table 2 = yes	0 = no 1 = use table 2 = yes	0 = no 1 = use table	0 = no 1 = use table	0 = no 1 = use table
Default value	1	1	1	1	1	1	1	1	1

General enable: if you disable the whole table with a zero, all numbers will be governed by line 599 – „Others“.

### Remarks and Explanatory Notes to Parameters

- If you program the GSM Gateway using a PC, on each line you can add a comment that is saved but not sent to the Musitel.
- The table has now 30 lines (501 to 530); lines 531 to 598 are reserved for future needs.
- Since the table is shared by several functions, the sorting must be detailed enough to cover all purposes: if, for example, pseudo tariff metering is used, calls with different cost have to be distinguished even if all of them are allowed.

**1 – Number Beginning:** used for call type identification (GSM, trunk, free, etc.). The „Number Beginning“ field in line 599 cannot be filled - the parameters on this line are used automatically for all numbers, which are not found in table.

**2 – Call Barring:** the parameter says whether the dialled number is allowed or barred.

**3 – Store to buffer:** This parameter tells, which calls are to be stored in the service buffer.

**4 – Number Length:** The parameter defines how long the number can be expected to be for the given prefix.  
 Therefore, the dialling into GSM network can start as soon as the required number of digits is dialled.  
 0 means do not observe the number length – enter zero here, if the number length is not fixed. If, however, the maximum number length is known at least, you can enter it too.

**5, 6 – Dialling End with ‘\*’ or ‘#’:** These characters can be a part of dialling with some prefixes (GSM services, e.g.). Here they cannot be used for terminating the dialling. With other prefixes (fixed PSTN, e.g.) they are not used as a part of dialling, and here they can be used for terminating the dialling. The Musitel can then start dialling as soon as the ,\*’ or ,#’ character appears in the number.

**Note:** If ‘★’ or ‘#’ or the number length cannot be used for terminating the dialling, then a timeout will be used (programmable).

**7 – Starting Tariff:** Represents the minimum call cost. It is the number of tariff pulses that are sent upon the call connection **additionally** (the pulses are transmitted closely one after another).

- 8 – Tariff Pulse:** It is a time between two pulses – hence, the more expensive the call, the lower the value. It is set in milliseconds to be as precise as possible – one step is 100 ms. a zero means do not send tariff pulses.  
**Note:** *It is safer to complete tariff rates with barred numbers too in case you enable these numbers later. Moreover, enter the tariff rates even if no tariff pulses are transmitted – the cost of (selected) calls is stored in the buffer.*
- 9 – „Remove“ and 0 – „Add“:** These parameters help forward calls automatically to the Internet Call, e.g., or translate emergency numbers (PSTN to GSM), etc. The „Remove“ item says how many characters are to be removed from the number beginning, the „Add“ item contains the characters to be added – the number of these characters can be different, of course.  
 For example, you remove nothing, and add ,42‘, or remove ,150‘ and add ,112‘, etc.  
 Moreover, you can use the parameter for your Musitel access protection: add a „password“ for selected calls (international, e.g.) and then remove it. Those, who don't know the password, cannot dial this prefix. See row 513 in table 7.5.5. for example.

#### **Help for parameters:**

- 5001 = This parameter can disable searching in the table. In this case, last row „Other“ is used for all numbers.
- 5002 = This parameter can disable an use of a the column „Call enable“. In this case, all numbers can be enabled or bared by this parameter; but a fitting row is searched and the other parameters are used.
- 5003 = This parameter can disable an use of a the column „Store to buffer“. In this case, all calls can be stored or not.
- 5004 = This parameter can disable an use of a the column „Number length“.
- 5005 = This parameter can disable an use of a the column End #. In this case, a character # is not interpreted as an end of dialling generally.
- 5006 = This parameter can disable an use of a the column End ★. In this case, a character ★ is not interpreted as an end of dialling generally.
- 5007 = This parameter can disable a transmitting of initial tariff pulses on the beginning of a call.
- 5008 = This parameter can disable a transmitting of tariff pulses during a call.
- 5009 = This parameter can disable an use of columns "Take away" a "Add".

- 5991 = This parameter not exists! Row 599x is used for numbers, which are not matching with any row in the table.
- 5992 = This parameter enables or disables all numbers, which are not matching with any row in the table.
- 5993 = This parameter tells, if calls are stored in buffer or not. It is used for all numbers, which are not matching with any row in the table.
- 5994 = This parameter can define a maximum length of all numbers, which are not matching with any row in the table.
- 5995 = This parameter defines, if a character # is interpreted as an end of dialling for all numbers, which are not matching with any row in the table.
- 5996 = This parameter defines, if a character ★ is interpreted as an end of dialling for all numbers, which are not matching with any row in the table.
- 5997 = This parameter can set a number of initial tariff pulses on the beginning of a call. It is used for all numbers, which are not matching with any row in the table.
- 5998 = This parameter can set a period of tariff pulses during a call. It is used for all numbers, which are not matching with any row in the table.
- 5999 = This parameter can remove a selected number of digits from the beginning of number. It is used for all numbers, which are not matching with any row in the table.
- 5990 = This parameter can contain a number to be added to the beginning of number. It is used for all numbers, which are not matching with any row in the table.

## 7.5.4. Example of a Table

**Note:** I'm sorry this example (GSM Gateway Paegas, location Czech republic, Prague) is not very helpful for other countries; better one is under preparation.

Par. No.	xxx1 Begin of number	xxx2 Call enable	xxx3 Store to buffer	xxx4 Number length	xxx5 End #	xxx6 End *	xxx7 Initial tariff	xxx8 Impulses per [ms]	xxx9 Take away	xxx0 App end	Notes
501x	0	Yes	No	-	Yes	Yes	1	30	0	-	Trunk calls
502x	02	No	Yes	-	Yes	Yes	1	30	0	-	Prague
503x	0603	Yes	No	10	No	No	1	120	0	-	GSM
504x	00420603	Yes	No	14	No	No	1	120	0	-	Paegas
505x	060	Yes	No	10	No	No	1	60	0	-	Other GSM
506x	0042060	Yes	No	14	No	No	1	60	0	-	
507x	0609	No	Yes	-	Yes	Yes	1	1.5	0	-	"VAT services"
508x	00420609	No	Yes	-	Yes	Yes	1	1.5	0	-	Telecom "green lines"
509x	0800	Yes	No	10	Yes	Yes	0	0	0	-	Germany via Internet call
510x	0049	Yes	Yes	-	Yes	Yes	1	10	0	42	USA via Internet call
511x	001	Yes	Yes	-	Yes	Yes	1	10	0	42	Other international
512x	00	No	Yes	-	Yes	Yes	1	5	0	-	International via password
513x	7531	Yes	Yes	-	Yes	Yes	1	5	4	00	Emergency call
514x	112	Yes	No	3	Yes	Yes	0	0**)	0	-	Paegas Internet call
515x	4200	Yes	Yes	-	Yes	Yes	1	10	0	-	
516x											
517x											
518x											
519x											
520x											
521x											
522x											
523x											
524x											
525x											
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537x											
538x											
539x											
540x											
541x											
542x											
543x											
544x											
545x											
546x											
547x											
548x											
549x											
550x	Other	Yes	Yes	6			1	120	0	-	Empty

### Notes :

- The example in the table above does not take into consideration the fact that columns 3, 9, and 0 are not available in today software version.
- The above-mentioned tariff rates are fictitious, not corresponding to any real situation!!!

## 7.5.5. Call Sorting Table – Form for Your Needs

Par. No.	xxx1 Begin of number	xxx2 Call enable	xxx3 Store to buffer	xxx4 Number length	xxx5 End #	xxx6 End *	xxx7 Initial tariff	xxx8 Impulse [ms]	xxx9 Take away	xxx0 App end	Your notes
Range	0 / 1	0 - 2	0 - 2	0 / 1	0 - 2	0 - 2	0 / 1	0 / 1	0 / 1	0 / 1	0 = no, 1 = use table, 2 = yes
500x											
Range	*)	0 = no 1 = yes	0 = no 1 = yes	0,3... 16	0 = no 1 = yes	0 = no 1 = yes	0 - 255	0 - 999999	0 - 16	*)	*) Max. 16 digits 0...9, *, #
501x											
502x											
503x											
504x											
505x											
506x											
507x											
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536x											
537x											
538x											
539x											
540x											
541x											
542x											
543x											
544x											
545x											
546x											
547x											
548x											
549x											
550x	Other										



**The Intelligent Incoming Call Routing** (refer to the User Manual) allows the GSM Gateway to call a specific extension upon having found the caller's number (CLIP) in the Intelligent Incoming Call Routing table. This saves the switchboard operator's time and the calling party's time and money.

### Basic Parameters for Intelligent Routing:

Par. No.	Parameter	Range	Def.	Your Value	Note
6001	Intelligent routing enable	0 - 1	1		0=no, 1=yes
6002	Your international prefix	1-4 digits	-		enter without "00". "+" is added
6003	Table recording password	3-8 digits	777		No password deletion by initialisation!
6004	Number of locked records	0 - 99	0		Locked area starts at 601x

Operator number	114	<b>Note:</b> If operator number is not entered and dialing for incoming call is not enabled, all incoming calls with unknown CLIP are rejected.
Interational prefix (usually 00 - default)	115	
Your international prefix (accessible also as 6002)	116	
Long distance code (usually 0 - default)	117	
DISA beginning timeout	251	
Dial operator number with DISA	252	
Enable dialing for incoming call	310	
Ring to switchboard operator after timeout	351	
Ringin timeout for switching to switchboard operator	352	

### Intelligent Routing Table Structure:

Meaning	CLIP	Caller's Name	Extension Number	Extension Name
Range	Max. 20 digits, * or #	Max. 32 characters	Max. 8 digits	Max. 32 characters
Par. No.	... .. 1		... .. 2	
601x				
...	...		...	
699x				

- The whole table (601x through 699x) is blank and unlocked after initialisation.
- CLIP numbers are entered including international prefixes, starting with +, not 00.
- If 0 (zero) is entered, calling party with this CLIP can dial any extension (by DTMF).
- The text fields for “Caller’s Name” and “Extension Name” are available on the PC only; they are not saved in the GSM gateway but in a file. They are used for a better orientation in the table.

- 6001 = Enables the Intelligent Incoming Call Routing according to the caller's number if included in the Intelligent Routing table.
- 6002 = your own international prefix is used for the completion of the called number to be included in the Intelligent Routing table.
- 6003 = Defines the password for the "Forward this caller to extension ... next time" command.
- 6004 = Locked records (starting from the table beginning) are protected against overwriting and have priority.

## 7.7. Acoustic Failure Signalling Parameters

**ATTENTION!** These parameters are not applicable on models without beeper!

Parameter	Par. No.	Min.	Max.	Def.	Your choice	Notes
Loud signalisation time	801	10	2550	60		Step 10 [s]
Quiet signalisation time	802	10	2550	600		Maximum = ca. 40 min
Loud signalisation	Tone time	803	100	25500	300	In milliseconds! Step = 100 [ms]
	Pause time	804	100	25500	200	
Quiet signalisation	Tone time	805	100	25500	300	
	Pause time	806	100	25500	10000	
Min. GSM signal level	811	1	10	1		Used for storing into buffer too (par. 821)
GSM network failure	812	0	3	0		Even if no call
Tel. line failure	813	0	3	0		
SIM card removed	814	0	3	3		
Only battery version	AC power failure	815	0	3	3	0 = no signalisation 1 = quiet only 2 = loud only 3 = loud, then quiet
	Battery failure	816	0	3	3	
Alarm function - "away" and "arm" events		0	3	2		
Alarm function - alarm event		0	3	3		

### Help for parameters:

801 = "Loud" signalisation time for selected events, which runs directly after event.

802 = "Quiet" signalisation time for selected events, which runs after "loud" signalisation time.

803-804 = Time of beep and pause between beeps can be modified - for "loud" signalisation.

805-806 = Time of beep and pause between beeps can be modified - for "quiet" signalisation.

812 = Type of signalisation if GSM network fails (loss of signal).

813 = Type of signalisation if telephone line fails (no current).

814 = Type of signalisation if SIM card is removed.

815 = Type of signalisation if AC power fails (for back-up models only).

816 = Type of signalisation if battery fails (disconnected or low, for back-up models only).

## 7.8. Operation Monitoring Parameters

(This table defines what to store in service buffer: 0 = no, 1 = yes.)

Parameter	Par. No.	Def.	Your Choice	Parameter	Par. No.	Def.	Your Choice
Weak GSM signal	821	1		Battery connection or disc.	838	1	
GSM registering	822	1		Battery full or empty	839	1	
GSM roaming	823	1		Banned call try-out	841	1	
SIM card plug-in or eject	824	1		Call longer than....	842	0	
SIM card - PIN entered	825	0		Call cost higher than....	843	0	
SIM card - wrong PIN	826	1		Each incoming call	846	0	
SIM card block	827	1		Time limit for call storing	847	30	
Tel. line failure	831	0		Cost limit for call storing	848	30	
Power ON	832	1		SMS triggered by inputs	851	0	
Reset	833	1		Virtual SMS	852	1	
GSM module power ON	834	1		SMS command for switch	853	0	
Gateway programming	835	1		DTMF command for switch	854	0	
Firmware upgrade	836	1		Alarm - "away" and "arm"		0	
AC power failure	837	1		Alarm - alarm event		0	

### Help for parameters:

821 = Defines, if a GSM signal drop under selected value is stored to buffer.

822 = Defines, if a successful logon into a GSM network is stored to buffer.

823 = Defines, if a logon into a foreign GSM network (roaming) is stored to buffer.

824 = Defines, if SIM card removing and inserting is stored to buffer.

825 = Defines, if a correct PIN entering is stored to buffer.

826 = Defines, if an incorrect PIN entering is stored to buffer.

827 = Defines, if a SIM blocking by repeated incorrect PIN entering is stored to buffer.

831 = Defines, if a telephone line failure (no current) is stored to buffer.

832 = Defines, if an every AC power ON is stored to buffer.

833 = Defines, if an every manual reset is stored to buffer.

834 = Defines, if an every DC power ON/OFF is stored to buffer (if GSM module is removed, DC power in not switched on).

835 = Defines, if an every programming mode entrance and exit is stored to buffer.

836 = Defines, if an every program download (upgrade) is stored to buffer.

837 = Defines, if an every AC power failure is stored to buffer (for back-up models only).

838 = Defines, if an every battery failure is stored to buffer (for back-up models only).

839 = Defines, if a full or empty battery state is stored to buffer.

841 = Defines, if a try-out co call a bared number is stored to buffer.

842 = Defines, if a call longer than selected value is stored to buffer.

843 = Defines, if a call with pseudo-tariff higher than selected value is stored to buffer.

846 = Defines, if an every incoming call is stored to buffer.

847 = Minimal time of call, which have to be stored to buffer.

- 848 = Minimal count of pseudo-tariff pulses of call, which have to be stored to buffer.
- 851 = Defines, if transmission of SMS message (triggered by universal inputs) is stored to buffer.
- 852 = Defines, if a "virtual transmission of SMS message" (triggered by universal inputs, but without a phone number programmed), is stored to buffer.
- 853 = Defines, if a control command receive (for universal switches) is stored to buffer.
- 854 = Defines, if is stored to buffer.

#### Notes:

- *Parameter 5003 and column 3 of the Call Sorting Table define which outgoing calls are to be stored – refer to chapter 7.5.*
- *Parameters 837, 838 and 839 are used only for models with battery backup*
- *Parameter 847 - Time limit for call storing - value in minutes, range 1 to 255*
- *Parameter 848 - Cost limit for call storing - in pseudo-tariff pulses, range 1 to 255*
- *The buffer capacity accepts approximately 200 records. The more events you have recorded, the more quickly the buffer will be filled. Once it is full, the oldest events will be overwritten with the latest ones. Hence, you get more details but less history.*
- *Viewing the buffer on your PC you can see the whole contents. However, if you read the buffer remotely using SMS messages, then we recommend you to read the last events only, because you would need tens of SMS messages to transfer the whole buffer!*
- *To locate a particulate operational problem (GSM Gateway blocking with excessively long calls, e.g.), use this parameter. Reading the buffer, you will not get information you are not interested in.*

## 7.9. Service Parameters

Parameter	Par. No.	Range, format	Def.	Your choice	Notes
Service password	901	3 – 8 digits	12345		Write only parameter!
Time	902	hhmmss			
Date	903	ddmmyy			
HW version	911	0-255			Read only parameter!
SW version	912	1.0 – 9.99			Read only parameter!
Serial No.	913				Read only parameter!
GSM module serial No.	914				Read only parameter!
Password for upgrade No. I.	921				Write only parameter!
Password for upgrade No. II	922				
Password for upgrade No. III.	923				
Remote supervision enable	930	0 / 1	1		Applies to 2N Supervision Center too.
CLIP – Supervision Center number*)	number 1	9311	max. 18 dig.	-	Dial the number including international prefix, e.g. +420261301111
	number 2	9321	max. 18 dig.	-	
	number 3	9331	max. 18 dig.	-	
	number 4	9341	max. 18 dig.	-	
Callback enable / disable	for number 1	9312	0 / 1	1	
	for number 2	9322	0 / 1	1	
	for number 3	9332	0 / 1	1	
	for number 4	9342	0 / 1	1	
Callback numbers **)	for number 1	9313	max. 18 dig.	-	
	for number 2	9323	max. 18 dig.	-	
	for number 3	9333	max. 18 dig.	-	
	for number 4	9343	max. 18 dig.	-	

\*) It is the main SIM card number to identify the calling SIM card. It is because the SIM card can have one or more (up to three) numbers. In case of calls incoming from an analog network, the GSM operator differentiates, according to the required number, which service is required by calling party - voice, data or fax connection. With outgoing calls, these numbers are not needed because only one is used for identification.

\*\*) If different than numbers 1 to 4, i.e. data numbers, if exists

#### Help to Parameters:

930 = this parameter can disable remote supervision including the 2N Supervision Center.

9311, 9321, 9331, 9341 = Number to identify the calling Supervision Center. If the Supervision Center SIM card has two numbers (voice and data), enter the voice number.

9312, 9322, 9332, 9342 = These parameters selects individually for each number, if call-back will be used or not.

9313, 9323, 9333, 9343 = Number to be called in case the callback function is on. If it is identical with the number requesting callback, you need not fill this parameter. If the Supervision Center SIM card has two numbers (voice and data), enter the data number.

Commands for initialising:	No.	Parameter
Basic parameters	991	Valid service password must be entered as a parameter as verification to avoid inadvertent initialisation e.g. when this function is entered by mistake. Default value of service password is 12345.
Interface for external line of PBX	992	
Interface for local line of PBX	993	
Universal inputs and outputs	994	
Call sorting table	995	
Intelligent Incoming Call Routing Table	996	
LCR table	997	
Operation monitoring and signalling	998	
Complete initialisation	999	

#### Notes:

**901 – Service Password:** *If you change the password, remember it well. If you forget it, contact the GSM Gateway manufacturer. The service password is not changed by initialisation!*

#### Warning:

*GSM gateways, shipped to some customers, may contain pre-programmed values for use in target country, to make installation as easy as possible. Commands 995, 996 and 999 erases these settings, i.e. local GSM operator prefixes in call sorting table and international prefix - parameter 6002.*

## 8. Miscellaneous

### 8.1. Telephone Cost Saving Tips

- Select the appropriate GSM tariff rate while purchasing your SIM card. Since a high outgoing load is expected, select higher lump-sum rates that mostly offer lower fees per called time unit.
- If your employees are equipped with mobile telephones, they will be able to call your company more cheaply via the GSM network than through the fixed PSTN.
- To make the best of your Musitel - GSM Gateway for outgoing calls, you can bar incoming calls or keep your GSM Gateway number secret.
- Decide, depending on your load, whether to purchase a higher number of Musitel - GSM Gateways.
- Sometimes it is convenient to install a separate Musitel for incoming calls. Here you just need a SIM card with pre-paid credit and you need not pay a monthly lump sum. Incoming calls then do not block your “main” favourable-rate GSM Gateway.
- If your PBX allows so, set up the automatic seizure of a mobile network by the *Musitel*® to maximize your savings.
- With advanced PBXs, it is possible to set up call barring statuses for each user separately.  
To maximize your GSM telephone cost economy divide the users into the following three groups:
  1. No calls into the GSM network (busy tone when the user tries to call).
  2. Calls into the GSM network only via the Musitel - GSM Gateway (busy tone when the GSM Gateway is busy).
  3. Calls into the GSM network also via PSTN lines if the Musitel is busy.
- You can bar selected telephone numbers directly on your Musitel .
- Find how many “free minutes” and what types of calls are provided by the selected tariff rate.  
If, for example, the rate provides free minutes into the fixed network and you allow the subscribers to call only via the GSM network with the GSM Gateway, you will lose these minutes.

## 8.2. Trouble Shooting

If, after the GSM Gateway's power-on, all LED's are on (except for the 1st and 4th from the upper end), any the following situations has occurred:

- If the GSM Gateway does not beep, you have probably pressed the RESET button during the power-on and the GSM Gateway is waiting for software reprogramming.
- If the GSM Gateway gives a permanent tone, some inapplicable software has been loaded (for a different GSM Gateway model).
- If the GSM Gateway beeps intermittently, there is an EEPROM error.

If you forget the service password, remove the EEPROM, erase it in a programmer and it push back into the socket.  
The default values, including the service password, will be reset.  
Retrieval of stored settings is possible but it is necessary to contact manufacturer.

## 8.3. List of abbreviations

- **CLIP** - Calling Line Identification Presentation
- **COM** - serial port of computer
- **DCD** - Data Carrier Detect - signal which indicate established data connection
- **DISA** - PBX's function allowing calling party to enter (by DTMF only) a required extension number
- **DTMF** - Dual Tone Multifrequency - (worldwide standard of dialling)
- **EEPROM** - Electrically Erasable Programmable Read Only Memory - Memory independent of power supply (non-volatile memory)
- **FXO** - line interface dedicated to ordinary phone devices (worldwide standard)
- **FXS** - line interface electrically equivalent with ordinary phone (complementary to FXO)
- **GND** - Ground - contact or line connected with ground, or common reference point of whole electronic circuit, which may be connected with ground
- **GSM** - Group Switched Mobile system - today's digital mobile cellular phone network standard, used in Europe another parts of word, excluding USA and Japan
- **HW** - Hardware - in this context we mean any electronic equipment, circuit, board, component etc.
- **IN** - Input - input terminal or contact
- **I2CR** - Intelligent Incoming Call Routing
- **LCR** - Least Cost Routing - software function which finds a cheapest path to make required connection

- **OUT** - Output - output terminal or contact
- **PBX** or **PABX** - Personal (Automatic) Branch Exchange
- **PC** - Personal Computer - computer compatible with IBM PC standard
- **PIN** - Personal Identification Number - a short password, used to protect SIM against unauthorized usage; after a few wrong attempts SIM card block itself automatically
- **PUK** - Personal Unblocking Key - long password, used to unblock SIM if blocked (see PIN) and enter a new PIN value
- **RS-232C** - worldwide standard for serial port
- **SIM** - Subscriber Identity Module - module with chip, which is a carrier of information about subscribers phone number in GSM network
- **SMS** - Short Message Service - more often it is used for this message itself
- **SSR** - Solid State Relay - semiconductor switch, used like a relay
- **SW** - Software (any program)
- **TTL** - Transistor-Transistor Logic - standard for digital circuits, definition of voltages for levels 0 a 1
- **PSTN** - Public Switched Telephone Network

## 9. Technical Parameters

### GSM:

GSM network type	GSM phase II
SIM card	plug-in 3 V, „small“
Transmitter power	2 W / 900 MHz 1W / 1800 MHz
Receiver sensitivity	-104 dBm

### Antenna:

Frequency	900 / 1800 MHz
Impedance	50 $\Omega$
Power	2W
Antenna connector type	FME (male)
Cable length	3 to 10 m or without cable

### Mains:

230V AC, tolerance:	230 V $\pm$ 10%, 50 or 60 Hz
Power consumption	Max. 15 VA
Mains connector	Euro connector (PC)
Lithium battery type	CR2032
Back-up battery (for models with back-up only)	Lead, maintenance-free, 12V / 1.2Ah

### Tel. line interface - model for PBX external line:

Interface type	2-wire, FXO
Connector type	RJ-12, 6/2
Off-hook AC impedance	600 $\Omega$
On-hook line voltage	24 V DC
Off-hook line current	Max. 30 mA
Line loop resistance	Max. 800 $\Omega$
Dialing tone frequency	425 Hz
Dialing type	Tone (DTMF) or pulse
Ringing voltage	45 V <sub>RMS</sub> , 50 Hz
Surge current	2x 10.000 A (8/20 $\mu$ s)

### Tel. line interface - model for PBX internal line (extension):

Interface type	2-wire, FXS
Connector type	RJ-12, 6/2
Off-hook AC impedance	600 $\Omega$
On-hook quiescent current	Max. 100 $\mu$ A @ 60V
Off-hook line current	10 - 65 mA
Off-hook line voltage	typ. 4V @ 30 mA
Dialing tone frequency	425 Hz
Dialing type	Tone (DTMF) or pulse
Ringing voltage	min. 20 V <sub>RMS</sub> , 25 - 50 Hz
Ringing impedance	4 - 10 k $\Omega$ @ 50 Hz
Surge current	2x 10.000 A (8/20 $\mu$ s)

### Universal inputs and outputs:

Inputs - level "0"	Max. + 0.8V DC
Inputs - level "1"	Min. + 2,1V DC
Inputs - maximal voltage	Max. +/- 24V
Switch No. 1 current	Max. 1 A AC or DC
Switch No. 1 voltage	Max. 48V AC or DC
Switch No. 1 voltage to GND	Max. 48V AC or DC
Switch No. - current	Max. + 50 mA (sink)
Switch No. - voltage	Max. + 24V
Output +12V – max. current	Max. 100 mA

### Serial Interface:

Interface type	RS-232C
Connector	D-Sub 9 pins, female
Interface data rate	19200 bit / sec

### Other:

Dimensions (w/o connectors)	150 x 150 x 55 mm
Operating temperature	0°C to 45°C
Air humidity	5 to 95%

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