Major 6a

ENTWICKLUNG
PRODUKTION
SOFTWARE
HARDWARE
ELEKTRONIK
BERATUNG

FunkTronic
Kompetent für Elektroniksysteme

Content

	Page
Content	2
General Features	3
Display Elements Major 6a	4
Control Elements Major 6a	4
Rear view Major 6a	6
Sockets pin layout Major 6a	6
RS232 Connecting cable for flashing/printing/monitoring	7
Settings RS232 interface	7
Keyboard layout in the programming mode Major 6a	22
Reset	23
EEPROM-addresses	27
EEPROM-addresses (continued)	28
EEPROM-addresses (continued)	29
EEPROM-addresses (continued)	30
EEPROM-addresses (continued)	31
EEPROM-addresses (continued)	32
EEPROM-addresses (continued)	33

General Features

The Major 6a is the newer design of the well-known Major 6. The display is an alphanumeric LC display with background lighting. A gooseneck microphone with high dynamics is standard. All keys can be programmed freely. Two different functions can be assigned to each key.

Up to 4 radios can be connected and used simultaneously by using a multi-core cable (7 cores) for each radio. There is a squelch input, a PTT output, a potential-free AF input and a potential-free AF output for each radio.
A headset and a voice recorder (all 4 radio channels merged on one output) can also be connected. Futhermore there are 3 switching outputs (alarm switching output, recorder control and headset switching) and a serial interface (RS232 or optional RS485) .

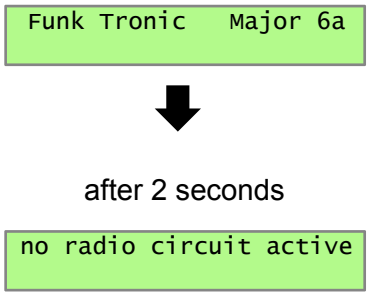
For the exact pinout see section **Sockets pin layout connections**.

The Major 6a can be programmed by using the keyboard. For displaying a protocol a printer or a terminal can be connected to the serial port.The serial port can also be used for service or special applications.

The Major 6a is automatically turned on if connected to power supply. After turning it on <Funk Tronic Major 6a> is displayed for a second , then the device is ready for operation.

Hint : *At initial operation the **Major** has to be leveled to the radio system !*

After turning on the following display appears on the Major 6a



Control Elements Major 6a

Display Elements Major 6a

LC-Display

All alphanumeric displays are shown on a LC-display with background lighting
(2 lines with 24 characters) .
The display lighting can be configured in the **EEPROM-register 009**. For programming the EEPROMs please read the section **Programming mode EEPROM-addresses**. The display lighting is turned on ex factory.

Busy LED

The busy LEDs ▼ (channels 1..4) are programmed in the **EEPROM-register 095 at the digits 1.-4**. To control the busy LED any DC voltage between 0V and 1,25V or between 3,75V and 12V can be used. The operating mode can be configured as follows:

Register 095 1. - 4. digits busy LED

2 = with squelch input < 1,25V (LOW)
4 = with squelch input > 3,75V (HIGH)

TX LED

For each of the four channels there also is a separate TX LED ▲, which lights up when the corresponding transmitter is activated. The transmitter is activated by pushing a PTT button while talking or transmitting a call.
Flashing of the TX LED means that another Major 6a is already using this channel (PTTT output on LOW < 3V).

Loudspeaker LED / Call detection LED

The loudspeaker LED ◀ (channel 1..4) lights up when the loudspeaker of the corresponding channel is activated on operating volume.
A flashing loudspeaker LED means that a call has been detected (call detection LED). The call detection LED disappears when the corresponding channel is actively used for transmitting, or when the channel is activated (register 001/2).

F-Buttons (channel buttons) LED

The function of the F-buttons LEDs is programmed in register 001 at the 1st digit.
The LEDs (LEDs in the selection buttons) flash when there is at least one identified call saved in the identification memory of the corresponding channel. The corresponding LED disappears only after all identifications have been deleted in the corresponding identification memory.
Also see section **Identification Memory** - (register 001/1 = 2).

The LED is turned on if the corresponding channel is activated - (register 001/1 = 1)

The LEDs are always turned off - (register 001/1 = 0)

Ex factory programming of the buttons

This specification is valid for the ex factory programming of the buttons.
As all buttons can be programmed freely the functions of the buttons of individually programmed Major 6a can differ from this description.

Button	***Function short***	***Function long***
F1...F4	channel 1...4 on/off	volume control channel 1...4
0...9	call signal button 0...	none
S1...S3	none	none
S4	last channels on/off	adjust headset volume
*	call signal button A	channel selection
#	displaying the next identification	deleting of the current identification
PTT	transmitting with gooseneck micro	none
CALL	transmit selected call as 5-tone sequence	transmit return call as 5-tone sequence
Z	select short dial and transmit as 5-tone sequence	none
Loudspeaker	turn off loudspeaker	adjust total volume

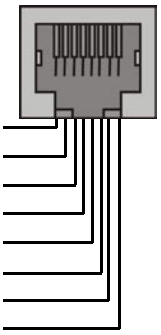
Rear view Major 6a

PWR **ST15** **ST14** **ST12** **ST13** **ST4** **ST3** **ST2** **ST1**

Sockets pin layout Major 6a

All sockets of the Major shown from rear view.

Layout FK 1- 4 (radio channels)
ST1 - 4



RX-AF-input (earphone +)	1
RX-AF-input (earphone –)	2
squelch-input (carrier)	3
GND (ground)	4
output +12V, max. 200mA	5
PTT active low	6
TX-AF-output (Mod +)	7
TX-AF-output (Mod –)	8

The AF- in/outputs are equipped with transformers and therefore are potential-free. An external device (FT630-2, FT6304aC) can be powered with contact 5 (+12V) .

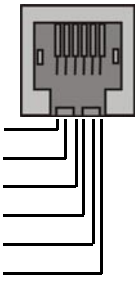
Attention: 200mA are not sufficient for a radio.

Layout Power
PWR

12 VDC, max 1,5 A,
center positive pole, ring ground (GND)

Layout RS 232
ST15

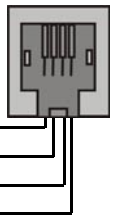
The serial interface can be laid out as RS485 (option)!



input 1	1
Sw, output	2
TxD	3
RxD	4
GND	5
input 2	6

For protocolling a printer can be connected to the RS232.

Layout TB (audio tape)
ST14

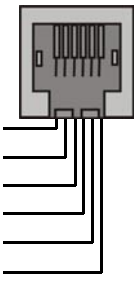


GND (ground)	1
audio tape switching contact	2
AF-output (Mod. +)	3
AF-output (Mod. –)	4

The AF-output is equipped with a transformer and therefore is potential-free.

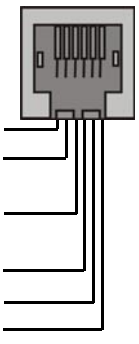
There are two sockets for a headset. The headset is connected to ST13 and an external PTT-button (e.g. a foot switch) can be connected to ST12 or ST13.

Layout HS (Headset)
ST13



PTT input (PTT2, to GND)	1
AF-input (Micro +)	2
AF-output (earphone +)	3
GND AF-output (earphone –)	4
GND AF-input (Micro –)	5
GND (PTT2-GND)	6

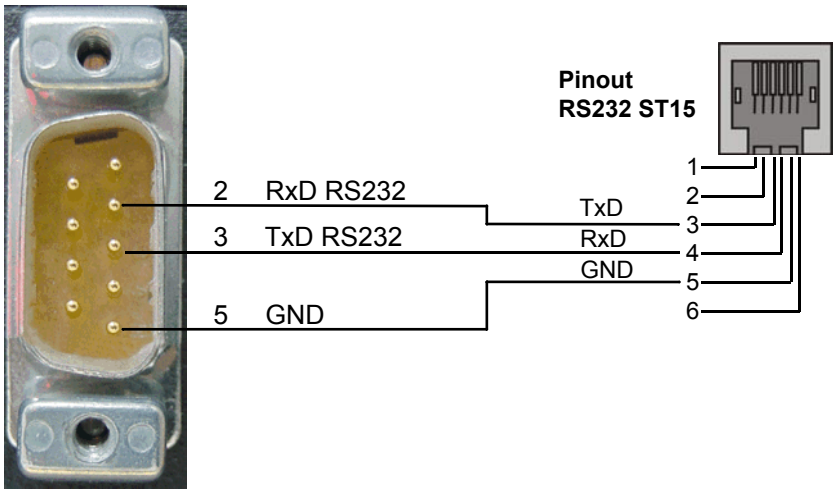
Layout PTT (headset switching)
ST12



PTT input (PTT2, to GND)	1
+battery-out., supply voltage for headset switching PCB	2
control output for headset switching PCB	3
optocoupler input(anode +)	4
optocoupler input(cathode –)	5
GND (PTT2-GND)	6

RS232 Connecting cable for flashing/printing/monitoring

RS232 9-pole plug at the computer



RS232 connector at the Major

Settings RS232 interface

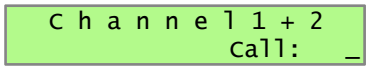
9600 Baud, 8 databits, no parity, 1 Stopbit, no protocol

Calling a radio subscriber

Channel selection

To activate one of the four channels push the corresponding **selection button** F1 to F4. To deactivate a channel again push the same or a different selection button. You can also select several channels simultaneously by keeping the first selected channel button(s) pushed down while additionally selecting more channels. When channels are activated the corresponding **loudspeaker LED** lights up.

Example:



Communicating with the calling radio subscriber

There are three different ways of communicating with a calling radio subscriber:

a) By pushing the red PTT button the transmitter of the selected channel is turned on (the corresponding sending status LED ▲ lights up) and you can talk to the caller through the gooseneck microphone.
After depressing the PTT button the caller can be heard on the loudspeaker in regular operating voulme. The volume of the loudspeaker is adjustable. See section **Switching of the loudspeaker status** and **Regular operating volume.**

b) Or by picking up the handset and pressing the PTT button on the inside of the handset. By doing this the trasmitter of the selected channel is activated (TX LED lights up) and you can talk with the caller through the microphone of the handset. You can hear the caller on the handset. The call is ended by replacing the handset.
The volume of the earphone and the microphone level are each adjustable with a potentiometer. The potentiometer is situated near the earpiece of the handset and is easily accessible from the outside by using a screw-driver through a small opening on the inside of the handset.

c) Or by connecting a compatible headset and pressing the corresponding PTT button (e.g. a foot switch), which has to be connected to the PTT input (connector **ST12/ST13)**. By doing this the transmitter of the selected radio channel is also turned on (TX LED lights up) and you can talk with the caller through the microphone of the headset. You hear the caller on the earphone of the headset.
The volume can be adjusted with the button S4 (long).

The microphone sensitivity can be adjusted separately for all 3 microphones in the setup menu „level adjustment“.

!!) If a PTT button is pushed without having selected a channel, there are two possible reactions of the ***Major 6a,*** depending on the programming of the **3rd digit in the EEPROM-register 001** (0 = latest selected channel; 1 = signal tone) :

a) the latest selected channel is activated automatically. After turning on the radio installation no channel is activated, so that in this case channel 1 is activated automatically, or

b) a signal tone on the loudspeaker draws the user´s attention to the operating error.

After ending the call the activated radio channels can be deactivated by pressing the corresponding selection buttons again or by pushing button S4.

Switching of the loudspeaker status

By selecting a radio channel the loudspeaker is switched to the activated channel in regular operating volume. See section **Regular operating volume.** If no channel is activated the loudspeaker can be switched to the latest activated channel(s) in regular operating volume by pressing button S4.

After that the loudspeaker can switched back to listening volume by pressing the corresponding selection buttons or button S4. See section **Listening-in-volume .**

After detecting a call the loudspeaker is automatically switched to the corresponding channel for an adjustable period of time in the calling volume - unless the channel has already been activated. See section **Calling volume.**

The loudspeaker can be muted by shortly pressing the loudspeaker button.
If the receiver is lifted the loudspeaker is automatically muted. By putting down the receiver the loudspeaker is automatically turned on again.

The possibilty of interconnecting the regular operating or the listening volume to the **earphones,** the **loudspeaker** (and/or the **recorder output**) is configurated in the **EEPROM-register 000.**

Register 000 **Configuration for AF interconnections**

1st digit	**RX-AF on receiver / headset**
2nd digit	**RX-AF on recorder output**
3rd.digit	**on loudspeaker, when receiver is put down**
4th digit	**on loudspeaker, when receiver is lifted**
5th digit	**allows RX-AF on loudspeaker during PTT**

valid for all digits:

0 = no AF
1 = AF of activated channels
2 = listening in-AF of deactivated channels
3 = AF of acitvated channels and listening in-AF

Regular operating volume

To change the regular operating volume first press down the loudspeaker button for a longer time. The display now shows <**Total volume**> and next to this on the right side the prompt flashes. The volume can be set between '**0**' and '**9**' . The set volume is saved even after turning off.
But a set **power-on-volume** can be programmed in register 090/1+2.

Listen-in-volume

If a radio channel is not activated,you can „listen in“ on it with the **listen-in-volume**. To change the listen-in-volume (channel x) keep the corresponding selection button F1 to F4 pressed for a moment. The display now shows <**listen-in channel** x **:** > and the prompt flashes. The volume can be selected between '**0**' (listen-in=OFF) and '**9**' (listen-in-volume=operating volume) . The set volume is saved even after turning off.
But a set **listen-in-volume** can be programmed in register 091/1-5.

Call volume

If a channel is not activated the loudspeaker is switched to this channel in call volume for an adjustable length of time after detection of a call. Then the loudspeaker returns to its previous status .
The length of time can be encoded for each of the ten decoders in steps of seconds (0..F = 0..15) in the **EEPROM-registers x30 - x39 at the 4th digit.**
The call volume of the 10 decoders (channel 1..4) can be programmed between '**0**' (call volume = OFF) and '**9**' (call volume = operating volume) in the above mentioned **EEPROM-registers at the 5th digit**.
An adjustable volume can be selected with A - F. „A“ meaning the latest set volume , B (+1) to F (+5) a volume increased by 1 - 5 levels.

Recording of a call

It is possible to record calls with the built in recorder/monitoring interface. The interface has a **potential-free AF-output** and a **switching contact** to ground for controlling the recorder.
The switching contact switches according to the conditions programmed in **register 002 at the 4th and 5th digit** if:
a) a squelch can be detected on a channel or
b) at least one channel is activated (channel selection LED ◀ lights up) and a squelch can be detected on this channel (busy status LED ▼ lights up) and/or
c) the channel is used for transmitting (TX LED ▲ lights up).
After discontinuation of these criteria the contact is turned off with an adjustable **delay time** . This delay time is programmed in steps of seconds in the **EEPROM-register 002 at the 1st - 3rd digit.**

Major 6a‘s in parallel circuit

Several Major 6a´s can be interconnected without any problems as the AF-outputs are only activated during transmitting and the AF-inputs can be switched to high-impedance by disconnecting jumpers **JMP1 / 1 - 4** (see section **Layout**) .
For this purpose all connections with the individual radio channels (TX-AF, RX-AF, squelch and transmitter PTT) only have to be connected in parallel circuit (bus- or hub wiring).

Telephone AF-connection

The audio-frequency-connection is not integrated in the ***Major 6a*** anymore. But by connecting the external headset-adapter the headset can be used as a combined communicating device for telephone and radio. The headset is switched to the telephone by an opto-coupler input, which has to be programmed accordingly **(see section Opto-coupler input).**

Transmitting of calls

To transmit a call at least one channel has to be activated. If no channel has been selected manually a signal tone on the loudspeaker draws the user´s attention to the operating error.

Calling by selective call

First at least on channel has to be selected with a selective call. Then the calling code is entered by using the numerical keys 1 ... 9. The entry is complete when no prompt flashes anymore. The call is transmitted with the call button and can be repeated with it.

Calling by *short dial*

The ***Major 6a*** has 10 codeable short dials per channel. The corresponding short dial for an activated channel is transmitted by shortly pressing the button Z and then entering a number from '**0**'...'**9**' .
The short dials (channel 1..4) are programmed in the **EEPROM-registers x00 - x09**.

Calling by group call

To be able to use the calling system without any restrictions, the special tone '**A**' should be used as a group call signal. This special tone '**A**' is entered with the button * . The group call tone can be entered at any position. By pressing the call button the call is started and can also be repeated by using this button.

Calling by *collective call /single tone call*

It is possible to preselect 9 collective call frequencies (0..8) per channel . The frequency codes of these single tones are calculated according to this formula

$$X = \frac{1.008.000}{F\ [Hz]}$$

and are coded in the **UGA(1..4)-registers 000...008** as four digit hex-numbers. Please read the sections P**rogramming mode UGA** and **Attachment, Conversion table (...)**.

Example: **collective call 1 (channel 2)** has the frequency **2135 Hz**, then this results in:

$$X = \frac{1.008.000}{2135} = 472{,}13 \quad \Longrightarrow \quad \text{hex-value} = \$01D8$$

therefore UGA(2)-reg. 001 = 01D8.

The corresponding collective call signal (single tone) of the activated channel is transmitted by pressing a **collective call** button which has been programmed accordingly.
The number and the duration of the collective call signal **0...8** which is to be transmitted is defined when programming the button.

Ex factory there is no button programmed for collective call .

Status input

By pressing a **status input** button programmed for this purpose you get to the status input of the activated channels. Also see section **Transmit call with status**. Now you can enter a status with up to three digits by using the numerical keys 0...9 or you can use the button * to delete a previously entered status. The input is complete when no prompt flashes anymore. After that the display returns to the standard display.

Ex factory there is no button programmed for status input.

Return call

If you keep the **call** button pressed down for a moment the ID (received call) which is currently shown on the display is transmitted as a call.
Also see section **Identification memory.**

The return call channel can be adjusted in register 001/5.

Signaling when pressing or depressing the PTT button

The signaling has to be defined in the function of the buttons or the inputs (reg. 010-089).
No signalings have been activated ex factory.
Every time when starting and/or ending using a PTT button the own ID (from/in EEPROM-register x15) and/or a „Roger-Peep“-tone (from/in EEPROM-register x53) can be transmitted automatically.

An individual „Roger-Peep“-tone can be preselected for each channel. The frequency code of this single tone is calculated according to the following formula

$$X = \frac{1.008.000}{F\ [Hz]}$$

and is coded as a 4-digit hex-number in one of the **UGA(1..4) - registers 000-008**. Please also read the sections **Programming-mode UGA** and **Attachment, Conversion table (...)**.

Example: **Roger-Peep tone 0 (channel 3)** shall have the frequency **2000 Hz**, therefore:

$$X = \frac{1.008.000}{2000} = 504{,}00 \quad \text{==> hex-value = \$01F8}$$

therefore UGA(3)-reg. 000 = 01F8.

The duration and the relating single-tone register in the UGA is programmed in register x53.

Configuration of the tone sequence encoder

Preadjustment of fixed tones

It makes sense to program the digits of the tone sequence, which shall not be entered with the keyboard. These tones can be set at any position of the tone sequence. Therefore it is possible to fix the 1st, 3rd and 5th position. In this case the 2nd and 4th position is entered by using the keyboard. If there is a sequence of identical tones the repeat tone is automatically inserted at the correct position. The encoders (channel 1..4) are coded in the **EEPROM-registers x10**. Also see section **Programming mode EEPROM.**

The prefixed tones can always be displayed with the call input, so that different quantities of variable digitis can be coded for the encoders. If there are several channels activated at the same time the prefixed tones of the lowest-order channel are used automatically.

The quantity of the displayed tones is programmed in the **registers x55** at the 4th digit.

To turn off the tone sequence encoder use the programming EEEEE.

Transmitting a call with ID

IDs (channel 1..4) are coded in the **EEPROM-registers x15** . (Normally the ID has the same code as the *encoder 1,* but if necessary a different code can be chosen.)

Depending on the configuration the ID is automatically transmitted before or after each call or short dial, and either a ***connecting tone*** or a ***rest*** with adjustable duration is inserted between the two tone sequences of a *double sequence*. The duration is coded in steps of 5ms in the corresponding **UGA(1..4)-register 243 at the 1st+2nd digit** (hex-value !) . The connecting tone resp. the rest (**0..E** = tone 0..E; **F** = rest) is coded at the 5th digit for the **button and enter functions - function 2** (transmit call).

If the ID mode is used with 6-, 7- or 8-tone sequences, the last 1 -3 digits of the ID are attached to the call number.

Transmitting a call with status

The status selection is configurated in the **EEPROM-register 005 at the 1st digit** . If no status selection is necessary please code this position with '**0**'. The status can be configurated with up to three digits and is attached to the end of each 5-, 6-, 7- or 8-tone sequence (not for double sequences !), and the length is increased by up to three digits. If the ID mode is used with *6-, 7- or 8-tone sequences,* an 8-tone sequence for example is turned into a 10-tone sequence when there is a 2-digit status selection.

For information on status input see section **Transmitting calls.**

register 060 1st digit	0 = no status selection
	1...3 = number of digits for status selection

Receiving calls

The ***Major 6a*** can identify up to 10 different decoder programmings per channel. The IDs of the 10 decoders (channel 1..4) are coded in the **EEPROM-registers x20-x29** . Decoders which are not needed have to be coded at the 1st + 2nd digit with '**E**' or at the 8th digit with '**0**'.
The configuration can be adjusted separately for each decoder of the 4 channels in the **EEPROM-registers x30-x49.** The following features can be configured:

- call tone
- call volume
- ID-mode
- alarm switching output and its activation time
- acknowledgement mode

For simplicity the following information always refers to *decoder1 of channel1,* the configuration of which is programmed in the **EEPROM-registers 130+140** . All other decoders (if needed) are programmed in the same manner.

Decoder (1)

The *decoder1 of channel1* is coded in the **EEPROM-register 120 at the digits 1-7**. Please also read section **Programming mode EEPROM.** Variable tones and tones which are not used, have to be programmed with 'F'.
Each received tone sequence is compared with the programming of the decoder, and every tone of the tone sequence at the positions coded with an '**F**' is accepted.
The decoder can be activated or deactivated at the 8th digit in register 120.
After the correct identification of the tone telegram the ID (if available) is saved (if configured), the configured acknowledgement is transmitted, the loudspeaker is activated with the call volume (if the channel has not already been activated) and the configured call tone is started.

If double sequences are used the acknowledgement is delayed by 1 second max. . Also see **Identification memory.**

There is no additional check of the tone sequence by decoders with higher indices. Principally *decoder1* has the highest priority and *decoder 10* the lowest when decoding a telegram.

Call tone

The sound of the call tone can be configured separately for each decoder of each channel in the

EEPROM-registers x30-x39 at the 1st digit.
You can choose between 10 different types of call tones '**1**'...'**9**' and '**A**' . The types 1-5 can be repeated up to 9 times. For this the 1st digit has to be programmed with '**B**' (type 1) ... '**F**' (type 5). If you don´t want a call tone program '**0**' at this digit.
The duration of the call tone can be programmed in the above mentioned **EEPROM-registers at the 2nd digit** in steps of 200ms (0,2...3 sec / 0=infinite) and the volume of the call tone can be programmed at the **3rd digit**(0..9, A...F).

0 - 9 = set volume
A = actual volume
B - F = actual volume + 1(B) - 5(F) steps

ID-mode

The ID-mode for each decoder can be coded separately in the **EEPROM-registers x40-x49 at the 1st digit.** (Also see **EEPROM-addresses**)

register x40 - x49

1st digit **ID-mode**

0 = 5 tone sequence
1 = call, ID (double sequence) (3-7 tone sequence)
2 = ID, call (double sequence) (3-7 tone sequence)
3 = 6 tone sequence
4 = 7 tone sequence
5 = 8 tone sequence
6 = 3-7 tone sequence without ID
7 = 5 tone sequence without ID
8 = 4 tone sequence
9 = 3-7 tone sequence
A = emergency call 5 tone sequence
B = emergency call 5 tone sequence ZVEI
D = emergency call 2 x 5 tone sequence (forest emergency call)

The tone duration of the 3-7 tone sequences is programmed in register x55 at the 4th digit.

2nd digit **switching output**

0 = none
1 = switching output ST 15/2
2 = tape switching output ST 14/2
3 = headset switching output ST 12/3

3rd digit **switching output** (**0** = off, **F** = on, **1** - **D** = 1 - 13s activation time)

4th digit **acknowledgement**

0 = none
1 = acknowledgement
3 = own ID
4 = received ID

5th digit **loudspeaker / activate LED**

(**0** = no, **1** = loudspeaker, **2** = LED, **3** = loudspeaker + LED)

6th digit **emergency call flag for 3-7 tone sequences**

(only for ID-Mode: 1, 2, 9)

0 = regular call - no emergency call
1-7 = emergency call, display 1 - 7 digits from the right

Between the two tone sequences of a *double sequence* either a **connectiong tone B** or a **rest** can be inserted. The rest can be omitted. If so the two tone sequences are transmitted directly one after the other (instead of a 2x 5 tone sequence, it is then a 1x 10 tone sequence).

Alarm switching output

The ***Major 6a*** has 3 possible alarm switching outputs. But the switching outputs 2 and 3 also have other functions which then cannot be used.
After the identification of a correct tone sequence by a decoder the chosen switching output (see above mentioned 2nd digit) is activated for **N** seconds. The acitivation time **N** can be configured for each decoder (channel 1..4) separately in steps of seconds in the **EEPROM-registers x40 - x49 at the 3rd digit.**(see above).

Acknowledgement

After the correct identification of a tone sequence by a decoder either no acknowledgement, a standard acknowledgement, the own ID or the received ID is transmitted, depending on the configuration.
The standard acknowledgements (channel 1..4) are programmed in the **EEPROM-registers x17** and the own IDs are coded in the **EEPROM-registers x15.**

The acknowledgement mode can be coded for each decoder separately in the **EEPROM-registers x40-x49 at the 4th digit**:

register x40 - x49

4th digit	**Acknowledgement mode decoder**
0	= no acknowledgement
1	= standard acknowledgement
3	= own ID
4	= received ID

Group call decoder

A group call decoder for tone **A** (or **0**) can be implemented with every decoder by coding the group call signal **A** (or **0**) at the desired digit in the tone sequence of the corresponding decoder.
As no acknowledgment can be transmitted, the 4th digit in the corresponding *configuration register 2* has to be coded with '**0**'. Also see sections **Acknowledgement** and **Programming mode EEPROM.**

Example:

A group call decoder is to be realized with *decoder 3 (channel 2)* for the sequence '**1 2 1 0 A**' (group of 10). To do this the following registers have to be programmed as follows:

register 222	= 1 2 1 0 A F F 1
register 242	= 0 x x 0 x 0 0 0

Collective call decoder

The collective call decoder (channel 1..4) decodes single tones of a certain length of time. This length of time can be defined in steps of 5ms in the **UGA(1..4)-register 245 at the 1st + 2nd digit for special call signals and at the 3rd + 4th digit for tone sequence signals**.
After decoding the loudspeaker is turned on with call volume (if the channel has not yet been activated), the configured call tone is started and the programmed acknowledgement is transmitted.
The group call decoder is programmed in the **EEPROM-registers x84 and x85**.
The group call decoder can either decode a tone from a tone sequence or a special call signal. The tone which is to be decoded is programmed at the 1st digit (0-E for a tone of a sequence 0-E, 1 or 2 for call 1 or call 2). For decoding a tone of a tone sequence the 2nd digit has to be programmed with 0-3. For decoding a special call signal the 2nd digit has to be programmed with 8-B.

Identification memory

In **register 001 at the 4th digit** you can program if a common identification memory (20 IDs) or 4 identification memories per channel (5 IDs each) is/are to be used. The identification memories can be adapted to the corresponding application. If all memory IDs are occupied, the memory is refreshed and the oldest ID is dropped.
After selection of a channel the saved identifications can be scrolled by using the key # (press shortly).
The displayed ID can be deleted from memory by using the key # (press long) or the ID can be transmitted as a return call by pressing the **call button** for a longer time.
If the fifo-function is activated the oldest ID is displayed with the **identification memory** -button and only after deleting the next ID it moves up. The fifo-function is programmed in the **EEPROM-registers x86 at the 2nd digit.**
(**0** = OFF, **1** = ON).
The identification memory can be used for all ID-modes with ID (0-5, 8, 9).? See section **Receiving call, ID-mode**.
The ID digits for the ID-modes 3-5 are defined (5 tone sequence + 1-3 digit ID). For the other ID-modes the key tones are used for the identification memory.

Key tones

The key tones are coded in the **EEPROM-registers x16**. The coding of the key tones selects the IDs, which are saved, and determines which digits of the ID are shown on the display. The digits at which all tones are allowed and which are later shown on the display and all unused digits have to be coded with '**F**'. Please also read section **Programming mode EEPROM.**

Memory refresh

If a new ID is received there is a checkup to see if the same ID already exists in the memory. If the ID has already been saved and the refresh function is not activated, the received ID is dropped. If the refresh function is activated the ID is deleted at the former position and is saved again at the first position. The identification memory is always arranged chronologically. The refresh function is programmed in the **EEPROM-registers x86 at the 1st digit** (**0** = OFF, **1** = ON). Also see **Programming mode EEPROM.**

Example:

In the following example an identification memory is configured for channel 3, which saves every ID beginning with '**1 2 1**'. The identification memory is to be refreshed and the fifo-function is turned off:

register 316	*value*
1st - 5th digit	121FFFFF

register 386		*value*
1st digit	0 = refresh function OFF	
	1 = refresh function ON	1
2. digit	0 = fifo-funcion OFF	0
	1 = fifo-function ON	

IDs are only entered in the identification memory if they have been decoded by a decoder whose ID-mode has an ID.

Tone sequence parameter for encoder and decoder

Tone duration (encoder)

The duration of the 1st tone (channel 1..4) is defined in the **UGA(1..4)-register 244 at the 1st and 2nd digit.** The duration of the other tones (channel 1..4) is adjustable in the **UGA(1..4)-register 244 at the 3rd and 4th digit**. The values can be configured in steps of 5ms and are encoded to their exact specifications. Please refer to the section **Tone chart** for the programming of the different tone durations. The duration of the first tone may differ from the other tones. For example: tone duration 1st tone = 1000ms and 2nd to 5th tone = 70ms.

Tone duration (decoder)

Certain tolerances have to be allowed when decoding a tone sequence so that unexact tone telegrams can be decoded reliably.

The minimal duration of each tone of a tone sequence (channel 1..4) is defined in the **UGA(1..4)-register 241 at the 1st and 2nd digit**. The maximum duration of the 1st tone (channel 1..4) is adjusted in the **UGA(1..4)-register 242 athe 1st and 2nd digit**. The maximum duration of the other tones (channel 1..4) is adjustable in the **UGA(1..4)-register 242 athe 3rd and 4th digit**. The values are selectable in steps of 5ms. The tone sequence and the given tolerance determine the minimum and maximum tone durations. The recommended tolerance is about +/- 25%. Please also read section **Tone chart**.

Tone sequence

The tone sequence (channel 1..4) is selected in the **UGA(1..4)-register 240 at the 2nd digit**. See the following chart.

The duration of a tone is not automatically changed when selecting a tone sequence. If, for example, there is a change from "ZVEI1" to "CCIR" the tone duration has to be newly defined. Please also read the sections **Tone duration (...).**

UGA-register 240	2nd digit	**tone sequence**
		0 = ZVEI 1 (ex factory)
		1 = CCIR
		2 = ZVEI2
		3 = EEA

Tone chart

Tone chart				
Tone	ZVEI 1	CCIR	ZVEI 2	EEA
0	2400 Hz	1981 Hz	2400 Hz	1981 Hz
1	1060 Hz	1124 Hz	1060 Hz	1124 Hz
2	1160 Hz	1197 Hz	1160 Hz	1197 Hz
3	1270 Hz	1275 Hz	1270 Hz	1275 Hz
4	1400 Hz	1358 Hz	1400 Hz	1358 Hz
5	1530 Hz	1446 Hz	1530 Hz	1446 Hz
6	1670 Hz	1540 Hz	1670 Hz	1540 Hz
7	1830 Hz	1640 Hz	1830 Hz	1640 Hz
8	2000 Hz	1747 Hz	2000 Hz	1747 Hz
9	2200 Hz	1860 Hz	2200 Hz	1860 Hz
A	2800 Hz	2400 Hz	886 Hz	1055 Hz
B	810 Hz	930 Hz	810 Hz	930 Hz
C	970 Hz	2247 Hz	740 Hz	2247 Hz
D	886 Hz	991 Hz	680 Hz	991 Hz
E	2600 Hz	2110 Hz	970 Hz	2110 Hz
Duration	ZVEI 1	CCIR	ZVEI 2	EEA
min.	52.5 ms	75 ms	52.5 ms	30 ms
typ.	70 ms	100 ms	70 ms	40 ms
max.	87.5 ms	125 ms	87.5 ms	50 ms

Transmitter control

The transmitter of the selected channel is activated with one of the PTT buttons and stays activated as long as the PTT button is being pressed. During transmitting of the call the transmitter is automatically activated.
The transmitter is controlled by open-collector-outputs to **GND**, so that several Major 6a´s can be connected in parallel circuit without any problems.

PTT button lead time

The lead time is defined as the time between the activation of the transmitter and the interconnection of the AF-signaling to the transmitter.
The lead time (channel 1..4) is programmed in the **UGA(1..4)-register 243 at the 3rd + 4th digit** in steps of 5ms. Ex factory the lead time is adjusted to 200ms.

Remote channel operation

The remote control of radio devices can only be used togther with our ***Line-Interface FT634aC/CL.*** For each channel which is to be connected to a remote radio device a separate pair of ***Line-Interfaces FT634aC/CL*** (one for Major 6a and one for a radio device) is needed.
To get to the channel input mode of an activated channel press the button * (push long). The display switches to the channel display and the prompt of the channel number blinks on the right side of the dispaly. The channel can be entered with one or two digits, depending on the programming in the **EEPROM-registers x66** at the **1st digit** (**0** = no/none **1** = one-digit, **2** = two-digit channel selection). Now you enter the new channel with the numerical keys. After the number is completely entered there is a checkup to see if the entered channel is in the valid range. This range is programmed in the **EEPROM-registers x65** at the **1st -4th digit**. If the channel is valid the channel is automatically switched (channel switching telegram is transmitted) and the previous display status is restored.

If no acknowlgedgement is received from the connected AC-control (radio device end) (1st and 2nd digit of the telegram must be swapped), the channel switching telegram is repeated up to two times. If no acknowledgement is then received the display shows <**Channel x interrupted**> .This display can only be deleted by pressing the button # .

The encoder-IDs for the remote channel control are coded in the **EEPROM-registers x63/1-3**.

In the **EEPROM-registers x6 at the 2nd digit** you can configure if the PTT ouput is turned on or off during the channel switching telegram (**6** = without PTT, **5** = with PTT).
Please note: remote channel without PTT can only be used if the AF-in-out of the ***FT634aC*** (Major 6a end) in idle mode is connected to the line. This requires the receiver (RX) AF-in-out of this ***FT634aC*** to be switched by decoding the pilot reference (3300 Hz). This means that the ***FT634aC*** (radio device end) has to generate this pilot reference if a squelch is present (and when acknowledging)!

Menu structure

You reach the menu by pressing the key * and the key # at the same time.

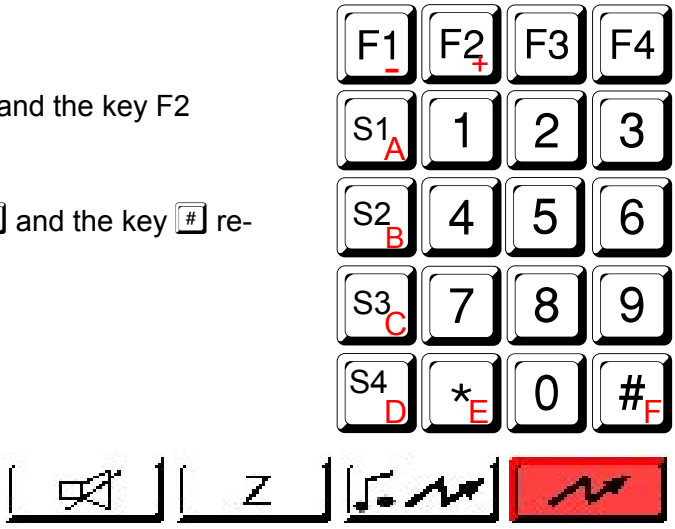
The operation of the ***Major 6a*** is described below.

Function	Major 6a key
next menu	F3
select menu item	F4
exit without change	F3
save and exit	F4
increase value by 1	F2
decrease value by 1	F1

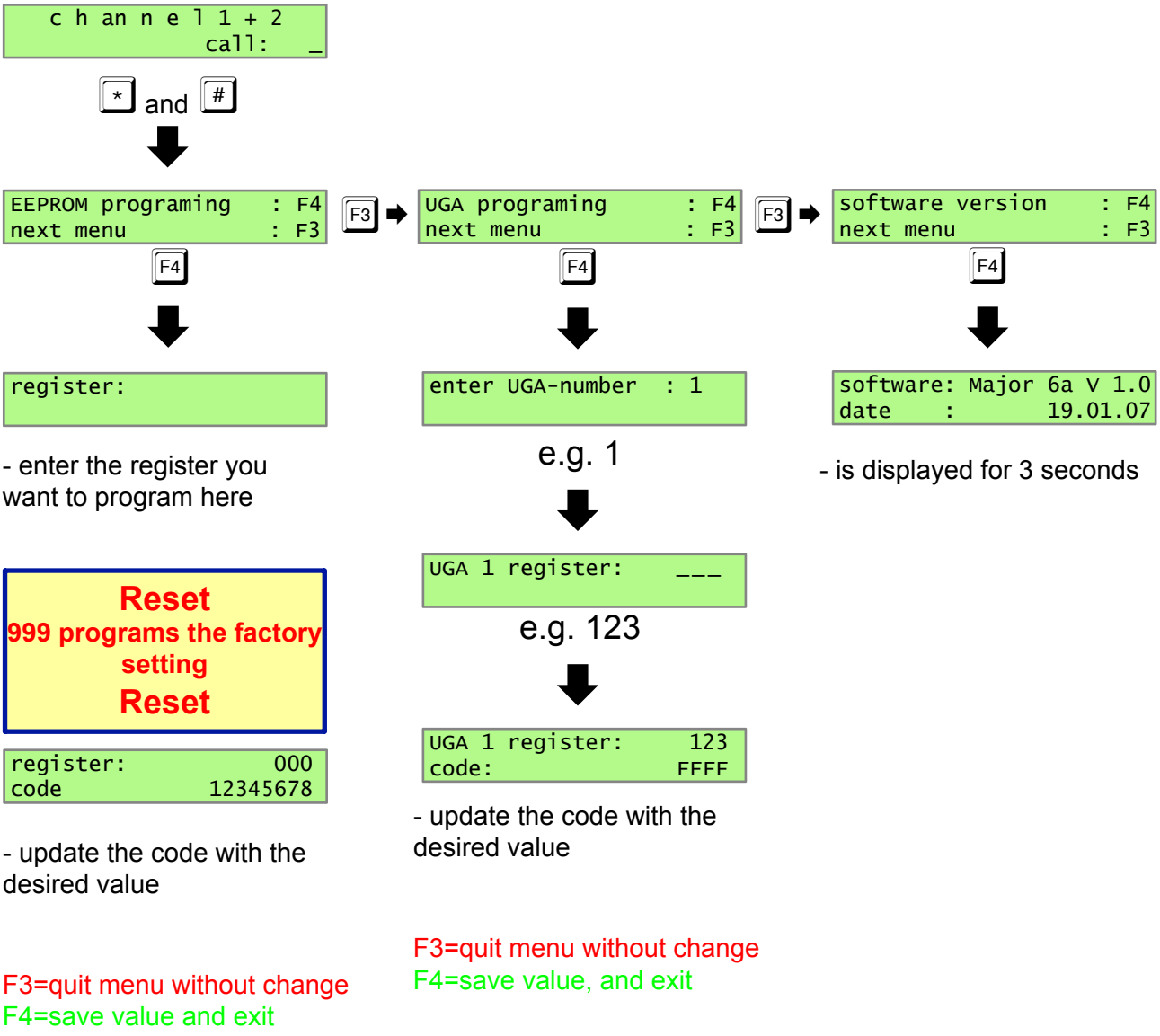
Keyboard layout in the programming mode Major 6a

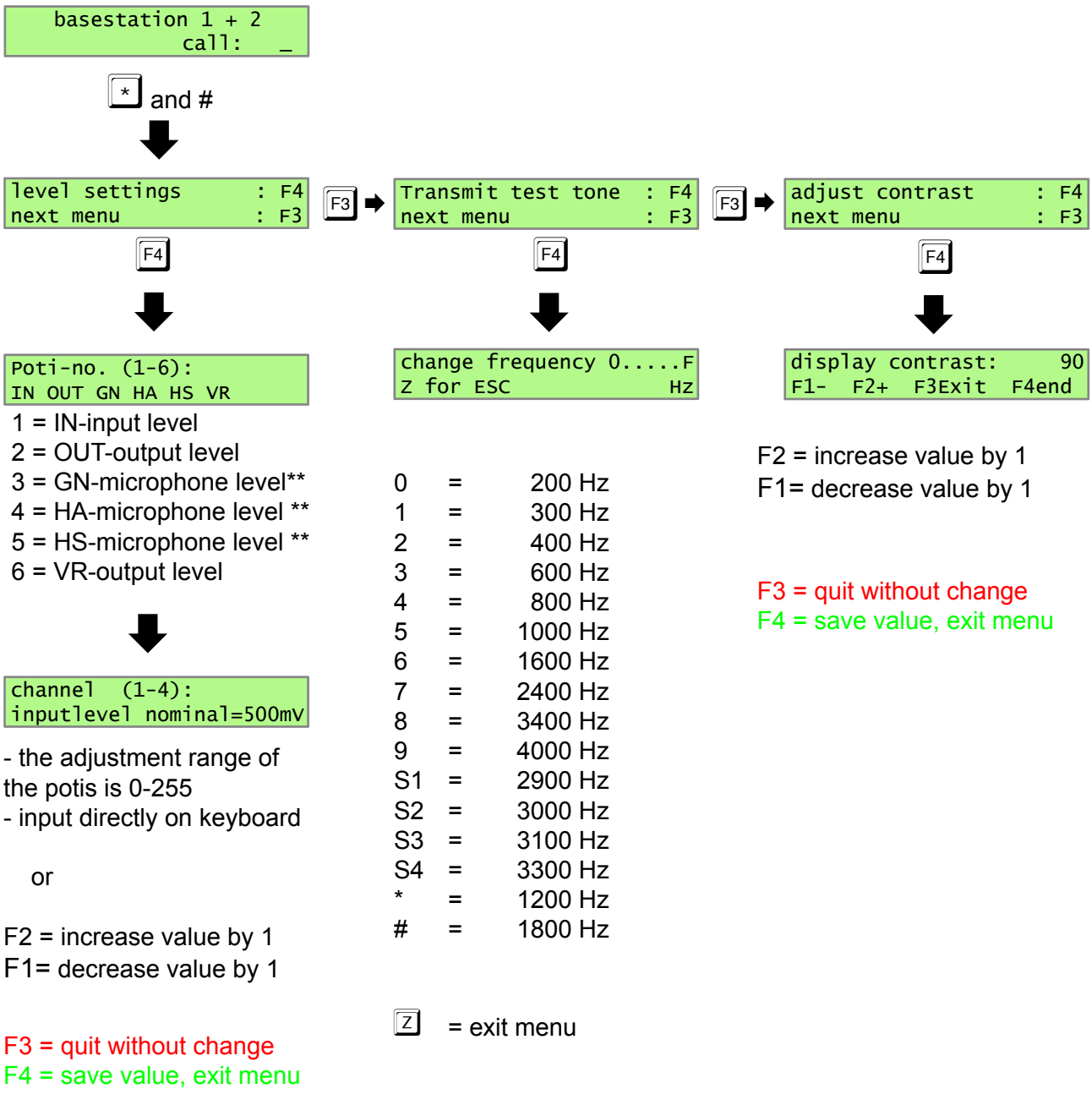
The key F1 decrements by 1 and the key F2 increases by 1.

The keys S1 to S4, the key * and the key # represent the values A to F.

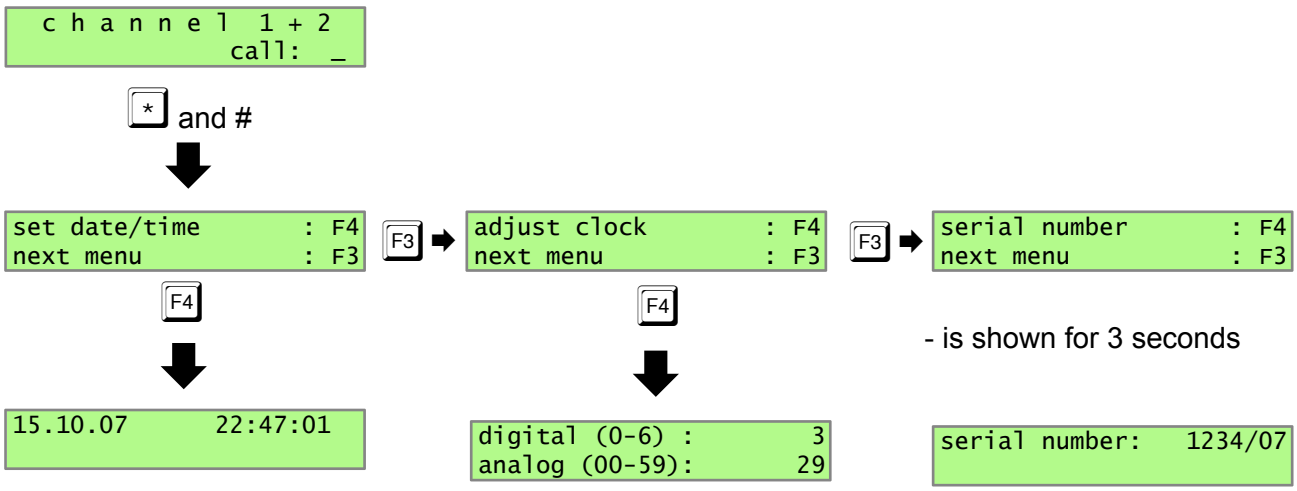


Programming mode





**
GN = gooseneck
HA = handset
HS = headset
VR = Voice Recorder



F1 = one digit to the left
F2 = one digit to the right

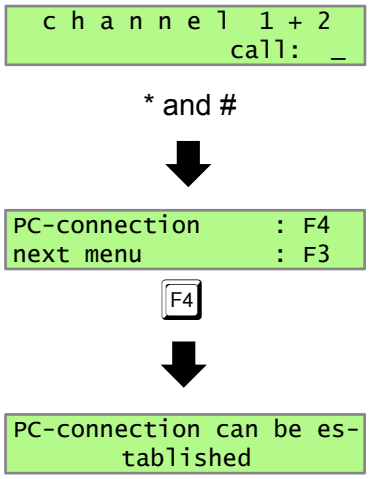
The values can be changed directly with the keys 0 to 9 .

F3 = quit without change
F4 = save value, exit menu

F1 = one digit to the left
F2 = one digit to the right

The clock has already been calibrated ex factory. Note the values for digital and analog. Higher values accelerate, lower values decelerate the clock. Digitally only rough adjustments are possible, the fine adjustment should be made by changing the anolg value.

F3 = quit without change
F4 = save value, exit menu



future option for
configuration with PC

F3 = exit menu without change
F4 = save value, exit menu

EEPROM-addresses

general configurations

register ***coding for***

000 **configuration for RX-AF-interconnections**

1st digit **RX-AF on earphone / headset**
2nd digit **RX-AF on tape recorder output**
3rd digit **on loudspeaker when receiver is down**
4th digit **on loudspeaker when receiver is lifted**
5th digit **allows RX-AF on loudspeaker while PTT pushed**
valid for all digits:
0 = no AF
1 = AF of activated channel
2 = listen-in-AF of deactivated channels
3 = AF of activated channels and listen-in-AF

001 **configuration (div.)**

1st digit **F-keys LED-function**
0 = OFF
1 = display activated channels
2 = existent ID in the ID memory
2nd digt **call-LEDs (LS-LEDs) off with activating (off-on) of the radio channel**
0 = no
1 = yes
3rd digit **PTT without selected channel**
0 = activating of latest selected channel
1 = error message (signal tone)
4th digit **ID display**
0 = per channel
1 = mixed
5th digit **return call**
0 = on all activated channels
1 = on this radio channel
2 = activate radio channel and transmit there
3 = switching to radio channel and transmit there

002 **Configuration of the tape relais**

1st-3rd **follow-up-time**
000-999 = nnn * 100ms
4th digit **relais with TX on (PTT)**
0 = no
1 = yes
5th digit **relais on with SQL (squelch)**
0 = no
1 = on every channel
2 = on active channel

EEPROM-addresses (continued)

general configurations

register	*coding for*		
003	**configuration for RS 232**		
	1st digit	**received calls to RS232**	(**0** = no, **1** = yes)
	2nd digit	**transmitted calls to RS232**	(**0** = no, **1** = yes)
	3rd digit	**channel to RS232**	(**0** = no, **1** = yes)
	4th digit	**RS232 - address**	(**F** = none)
004	**configuration 2 for RS 232**		
	1st digit	**RS 232 on when starting**	(**0** = off, **1** = on)
005	**configuration status**		
	1st digit	**no status / 1digit/ 2digit / 3digit**	**(0 / 1 / 2 / 3)**
	2nd -4th. digit	**start status after turning on**	(**FFF** = no status)
006	**configuration headset**		
	1st-3rd digit	**threshold level for AD-converter for headset detection** 000-999 = nnn * 5mV (lower voltage = headset is connected)	
008	**configuration printer parameter**		
	1st digit	**printing of heading**	(**0** = no, **1** = yes)
	2nd -3rd digit	**number of lines per page**	(without heading)
009	**configuration display**		
	1st-3rd digit	**Duration illumination** 000-999 = nnn * 1sec 000 = off 001 = always on	
	4th digit	= **brightness when on**	(**0** - **4**)
	5th digit	= **brightness when off**	(**0** - **4**)
	6th digit	= **language** 0 = German 1 = English 2 = French 3 = Dutch 4 = Italian	
	7th digit	= **delay for programming mode start (* + #)** 1-E = n * 1sec 0 = none F = disabled	

EEPROM-addresses (continued)

general configurations

reg.	*function*		*reg.*	*function*	
010	**INP1 active**				activation
011	**INP1 passive**		050	**key 5**	**short**
012	**INP2 active**		051	**key 5**	**long**
013	**INP2 passive**		052	**key 6**	**short**
014	**headset PTT active**		053	**key 6**	**long**
015	**headset PTT passive**		054	**key 7**	**short**
016	**optocoupler active**		055	**key 7**	**long**
017	**optocoupler passive**		056	**key 8**	**short**
018	**TX1 active**		057	**key 8**	**long**
019	**TX1 passive**		058	**key 9**	**short**
020	**TX2 active**		059	**key 9**	**long**
021	**TX2 passive**		060	**key S1**	**short**
022	**TX3 active**		061	**key S1**	**long**
023	**TX3 passive**		062	**key S2**	**short**
024	**TX4 active**		063	**key S2**	**long**
025	**TX4 passive**		064	**key S3**	**short**
026	**SQL1 active**		065	**key S3**	**long**
027	**SQL1 passive**		066	**key S4**	**short**
028	**SQL2 active**		067	**key S4**	**long**
029	**SQL2 passive**		068	**key ***	**short**
030	**SQL3 active**		069	**key ***	**long**
031	**SQL3 passive**		070	**key #**	**short**
032	**SQL4 active**		071	**key #**	**long**
033	**SQL4 passive**		072	**key F1**	**short**
			073	**key F1**	**long**
		activation	074	**key F2**	**short**
040	**key 0**	**short**	075	**key F2**	**long**
041	**key 0**	**long**	076	**key F3**	**short**
042	**key 1**	**short**	077	**key F3**	**long**
043	**key 1**	**long**	078	**key F4**	**short**
044	**key 2**	**short**	079	**key F4**	**long**
045	**key 2**	**long**	080	**several F-keys**	**short**
046	**key 3**	**short**	081	**several F-keys**	**long**
047	**key 3**	**long**	082	**key PTT**	**short**
048	**key 4**	**short**	083	**key PTT**	**long**
049	**key 4**	**long**	084	**key CALL**	**short**
			085	**key CALL**	**long**
			086	**key Z**	**short**
			087	**key Z**	**long**
			088	**key LS**	**short**
			089	**key LS**	**long**

EEPROM-addresses (continued)

general configurations
key and input functions (reg. 010 - 089)

Functions overview Major 6a

1st digit
- 0 = no function
- 1 = transmit single tone
- 2 = transmit call
- 3 = PTT
- 4 = volume
- 5 = channel selection / switching outputs / channel switching
- 6 = Identification memory
- 7 = call signal input
- 8 = status input
- 9 = external inputs
- F = functions depending on channel

Function 1 (transmit single tone) (1st digit = 1)

2nd digit
- 0 = transmit as long as key is pushed
- 1-F = tone duration n * 100ms

3rd digit
- 0-8 = single tone call 0-8 start
- A = end single tone call

The single tone frequency is programmed in the UGA in register 000-008.

Function 2 (transmit call) (1st digit = 2)

2nd digit
- 0 = transmit entered call
- 1 = transmit return call
- 2 = transmit short dial

3rd digit on return call (2nd digit = 1)
- 0 = no deleting of ID
- 1 = delete ID

3rd digit on shot dial (2nd digit = 2)
- 0-9 = transmit short dial n
- F = enter short dial

4th digit

ID mode:
- 0 = 5 tone sequence
- 1 = double sequence call, ID (3-7 tone sequence)
- 2 = double sequence ID, call (3-7 tone sequence)
- 3 = 6 tone sequence
- 4 = 7 tone sequence
- 5 = 8 tone sequence
- 6 = free
- 7 = free
- 8 = 4 tone sequence
- 9 = 3-7 tone sequence

FFSK-mode:
- 0 = only call
- 1 = double sequence call, ID

The tone duration of the 3-7 tone sequences is programmed in register x55 at the 4th digit.
The 4th digit can be overwritten by the ID-mode in the short dial register or the encoder.

5th digit

ID mode:
- 0-E = connecting tone for double sequence
- F = rest for double sequence

FFSK-mode:
- 0-F = BAK

EEPROM-addresses (continued)

general configurations
Key and input functions (reg. 010 - 089)

Function 3 (PTT) (1st digit = 3)

2nd digit
- 0-3 = PTT started with key (end by letting go of key)
- 4-7 = PTT started with input (end with function PTT off)
- 0, 4 = gooseneck micro
- 1, 5 = headset micro
- 2, 6 = handset micro
- 3, 7 = gooseneck or headset micro
- 8 = switching SH / HS micro
- F = PTT off (if started with input)

on PTT (2nd digit = 0-7)

3rd digit
- 0 = no ID when PTT begins
- 1 = Rogerbeep
- 2 = own ID and status
- 4 = transmit short dial (5th digit)

4th digit
- 0 = no ID when PTT ends
- 1 = Rogerbeep
- 2 = own ID + status
- 4 = transmit short dial (5th digit)

5th digit
- 0-E = short dial 0 - E

when switiching SH- / HS - (2nd digit = 8)

3rd digit
- 0 = SH-micro on
- 1 = HS-micro on
- 2 = automatic HS detection (standard after power on)
- E = SH / HS toggel
- F = input

4th digit
- 0 = no text display
- 1-F = n * 100ms display text

Function 4 (volume) (1st digit = 4)

2nd digit
- 0 = toggle loudspeaker
- 1 = volume
- 2 = listen-in volume channel 1
- 3 = listen-in volume channel 2
- 4 = listen-in volume channel 3
- 5 = listen-in volume channel 4
- 6 = headset volume
- 7 = muting on / off

for volume (2nd digit = 1-6)

3rd digit
- 0-9 = volume
- A = 1 step louder
- B = 1 step lower
- F = enter volume

4th digit (for volume input)
- 0-9 = minimal volume

5th digit (for volume input)
- 0-9 = maximum volume

for muting (2nd digit = 7)

- 3rd digit: RX-AF on handset off
- 4th digit: RX-AF on tape off
- 5th digit: RX-AF on loudspeaker off

3rd -5th digit
- 0 = nothing off
- 1 = active channels off
- 2 = listen-in channels off
- 3 = active channels and listen-in channels off

EEPROM-addresses (continued)

general configurations
key and input functions (reg. 010 - 089)

Function 5 (channel selection / switching outputs / channels)

(1st digit = 5)

when selecting channel (2nd digit = 0-9)

2nd +3rd digit
- 00-99 = channel nn
- FE = working channel
- FF = enter

when switching channels (2nd digit = D)

2nd digit D = channel switching
3rd digit 0 = summarize channels with F-key
4th digit 0-F = allowed channels

or

2nd digit D = switching of channel
3rd digit 1-F = channels (hex)
4th digit 0, 4 = off
1, 5 = on
2, 6 = on / off toggel
3, 7 = all off / last on toggel
0-3 = other channels off
4-7 = other channels unchanged

Function 6 (ID memory) (1st digit = 6)

2nd digit 0 = drop ID
1 = display next ID
2 = display current ID

Function 7 (call signal input) (1st digit = 7)

2nd digit 0 = **delete entry** ***or***
3rd digit 0 = delete call completely
1 = delete last entry

2nd digit 1 = **new entry**
3rd digit 0-E = enter call signal 0 - E
F = enter rest

Function 8 (status input) (1st digit = 8)

2nd digit 0= **delete status** ***or***

2nd digit 1= **set status**
3rd -5th digit
- 000-999 = set status
- FFF = entry

Function 9 (external inputs) (1st digit = 9)

2nd digit 0 = **squelch input** ***or***
3rd digit 0 = squelch off
1 = squelch on
5th digit 1-4 = channel 1 - 4

2nd digit 1 = **external muting**
3rd digit 0 = muting off
1 = muting MH-AF
2 = muting active AF
3 = muting MH-AF + active AF
4th digit 0 = TX-LED off on idle
1 = TX-LED blinks on idle
5th digit 1-4 = channel 1 - 4

Function F (functions depending on channel) (1st digit = F)

2nd +3rd digit register 00-99 (intended for 70-74)
Depending on the selected channel the new function of e.g. register 170, 270, 370, 470 is used.

EEPROM-addresses (continued)

general configurations

register ***coding for***

090 **configuration volume**

1st digit **save latest volume value** (**0** = no, **1** = yes)
2nd digit **volume value when turning on**
3rd digit **save latest headset volume value** (**0** = no, **1** = yes)
4th digit **headset volume value when turning on**

091 **configuration listen-in volume**

1st digit **save latest listen-in volume value** (**0** = off, **1** = on)
2nd digit **listen-in volume value channel 1 when turning on**
3rd digit **listen-in volume value channel 2 when turning on**
4th digit **listen-in volume value channel 3 when turning on**
5th digit **listen-in volume value channel 4 when turning on**

094 **configuration TX-in-/outputs**

1st digit **channel 1**
2nd digit **channel 2**
3rd digit **channel 3**
4th digit **channel 4**
valid for all digits:
0, 4 = nothing
1, 3 = output low active
2, 3 = input low active
5, 7 = output high passive (external pullup)
6, 7 = input high passive (external pullup)

095 **configuration inputs**

1st digit **squelch input channel 1**
2nd digit **squelch input channel 2**
3rd digit **squelch input channel 3**
4th digit **squelch input channel 4**
5th digit **headset PTT**
6th digit **input INP1**
7th digit **input INP2**
8th digit **input optocoupler**
valid for all digits:
0 = no input
2 = input low active
4 = input high active

097 **configuration service password (masterpassword)**

1st-5th digit **password**
The password cannot be read and can only be changed after entering the password.

099 **configuration masterpassword**

1st-5th digit **password**

EEPROM-addresses (continued)

Configurations per channel

register	*coding for*	
+100	= **channel 1**	(1xx)
+200	= **channel 2**	(2xx)
+300	= **channel 3**	(3xx)
+400	= **channel 4**	(4xx)

configuration short dial

x00 **short dial 0**
x01 **short dial 1**
x02 **short dial 2**
x03 **short dial 3**
x04 **short dial 4**
x05 **short dial 5**
x06 **short dial 6**
x07 **short dial 7**
x08 **short dial 8**
x09 **short dial 9**

valid for all short dial calls:
1st-7th digt **preset digits for short dial**
8th digit **ID-code** (see register x10)

x10 **configuration encoder**

1st-7th digit **preset digits for encoder**
unused digits have to be programmed with **0** ,
selectable digits have to programmed with **F**.
example:
5-tone sequence with 2 selectable digits = 12100-12199 : 121FF00

8th digit **ID-code**
F = ID-code programmed like key

ID mode:
0 = 5-tone sequence
1 = double sequence call, ID (3-7 tone sequence)
2 = double sequence ID, call (3-7 tone sequence)
3 = 6 tone sequence
4 = 7 tone sequence
5 = 8 tone sequence
6 = empty
7 = empty
8 = 4 tone sequence
9 = 3-7 tone sequence

FFSK-mode:
0 = only call
1 = double sequence call, ID
The duration of the 3-7 tone sequences is programmed in register x55 at the 5th digit.

EEPROM-addresses (continued)

Configurations per channel

register	*coding for*
x15	**own ID**
x16	**key tones for ID decoder** variable and unused tones have to be programmed with F.
x17	**standard acknowledgement**
x19	**key tones for printer output** variable und unused tones have to be programmed with F.
x20	**decoder 1**
x21	**decoder 2**
x22	**decoder 3**
x23	**decoder 4**
x24	**decoder 5**
x25	**decoder 6**
x26	**decoder 7**
x27	**decoder 8**
x28	**decoder 9**
x29	**decoder 10**

valid for all decoders:

1st -7th digit	**tone sequence to be decoded** variable and unused tones have to be programmed with F.	
8th digit	**decoder active**	(**0** = no, **1** = yes)

x30	**configuration 1 for decoder 1**
x31	**configuration 1 for decoder 2**
x32	**configuration 1 for decoder 3**
x33	**configuration 1 for decoder 4**
x34	**configuration 1 for decoder 5**
x35	**configuration 1 for decoder 6**
x36	**configuration 1 for decoder 7**
x37	**configuration 1 for decoder 8**
x38	**configuration 1 for decoder 9**
x39	**configuration 1 for decoder 10**

valid for all configurations 1 for decoder:

1st digit	**ring tone type**	
2nd digit	**ring tone duration * 200ms**	
3rd digit	**ring tone volume**	(0-9, A..F = Offset +0...5)
4th digit	**duration of call volume**	
5th dgit	**call volume**	

EEPROM-addresses (continued)

Configurations per channel

register ***coding for***

x40 **configuration 2 for decoder 1**
x41 **configuration 2 for decoder 2**
x42 **configuration 2 for decoder 3**
x43 **configuration 2 for decoder 4**
x44 **configuration 2 for decoder 5**
x45 **configuration 2 for decoder 6**
x46 **configuration 2 for decoder 7**
x47 **configuration 2 for decoder 8**
x48 **configuration 2 for decoder 9**
x49 **configuration 2 for decoder 10**

valid for all configurations 2 for decoder:

1st digit **ID-mode**
- 0 = 5 tone sequence
- 1 = call, ID (double sequence) (3-7 tone sequence)
- 2 = ID, call (double sequence) (3-7 tone sequence)
- 3 = 6 tone sequence
- 4 = 7 tone sequence
- 5 = 8 tone sequence
- 6 = 3-7 tone sequence without ID
- 7 = 5 tone sequence without ID
- 8 = 4 tone sequence
- 9 = 3-7 tone sequence
- A = emergency call 5 tone sequence
- B = emergency call 5 tone sequence ZVEI
- D = emergency call 2 x 5 tone sequence forest emergency call

The duration of the 3-7 tone sequences is programmed in the register x55 at the 4th digit.

2nd digit **switching output**
- 0 = none
- 1 = switching output ST 15/2
- 2 = tape recorder switching output ST 14/2
- 3 = headset switching output ST 12/3

3rd digit **switching output** (**0** = off, **F** = on, **1** - **D** = time adjustable in sec.)

4th digit **acknowledgement**
- 0 = none
- 1 = acknowledgement
- 3 = own ID
- 4 = received ID

5th digit **activate loudspeaker / LED**
(**0** = no, **1** = ldspk., **2** = LED, **3** = Ldspk. + LED)

6th digit **emergency call flag for 3-7 tone call** (ID: 1, 2, 9)
- 0 = normal call - no emergency call
- 1-7 = emergency call, display 1 - 7 digits from the right

x51 **configuration Simplex / Duplex, decoder blocker**

4th digit 0 = Simplex, 1 = Duplex
5th digit decoder blocker n * 200 ms after start of tone sequence

EEPROM-addresses (continued)

x53 **configuration Rogerbeep on PTT**

1st-3rd digit	**duration Rogerbeep**	(nnn*5ms)
4th digit	**single tone register from UGA for Rogerbeep**	(0 - 8)

Configurations per channel

register coding for

x55 **configuration call input**

4th digit **number of displayed call input digits**
- 0 = only input digits
- 1 - 7 = digits 1 - 7 of register x10
- F = correspondent to ID-code from x10/8 (mustn´t be **F**)

5th digit **number of tones for 3-7 tone sequence** (ID-mode 1, 2, 9)
- 3 - 7 = tone sequences 3 - 7

x56 **configuration squelch**

2nd digit	**AF-muting without SQL**	(**0** = no, **1** = yes)
3rd digit	**SQL-LED blinks in follow-up time**	(**0** = no, **1** = yes)
4th +5th digit	**SQL follow-up time**	(nn*100ms)

x58 **configuration printer parameter 2**

1st digit	**print transmitted call**
2nd digit	**print received call**
3rd digit	**print received emergency call**
4th digit	**print received collective call**

x63 **configuration remote channel control**

1st-3rd digit	**channel remote control tone sequence**	(BCD)

x65 **configuration channel selection range**

1st + 2nd digit	**lowest selectable channel**	00 - 99
3rd + 4th digit	**highest selectable channel**	00 - 99

x66 **configuration channel control**

1st digit
- 0 = no channel selection
- 1 = channel selection single-digit
- 2 = channel selection double-digit

2nd digit
- 5 = remote channel control with TX
- 6 = remote channel control without TX

x75 **short dial A**
x76 **short dial B**
x77 **short dial C**
x78 **short dial D**
x79 **short dial E**

valid for all short dials:

1st-7th digit	**preset digits for short dial**
8th digit	**ID-code see register x10**

EEPROM-addresses (continued)

Configurations per channel

register ***coding for***

x84 **configuration 1 collective call decoder**

1st digit **collective call / special call signal** (**F** = collective call off)
2nd digit **switching output** (**0, 8** = none, **1-3, 9-B** = switching output 1 - 3)
(**0-3** = collective call signal, **8-B** = special call signal (call 1/2))
3rd digit **switching output** (**0** = off, **F** = on, **1** - **D** = time adjustable in sec.)
4th digit **acknowledgement**
0 = none
1 = acknowledgement
3 = own ID
4 = received ID
5th digit **activate loudspeaker / LED**
(**0** = no, **1** = lspkr., **2** = LED, **3** = lspkr. + LED)

x85 **configuration 2 collective call decoder**

1st digit **ring tone type**
2nd digit **ring tone duration * 200ms**
3rd digit **ring tone volume** (0-9, A..F = offset +0...5)
4th digit **duration of call volume**
5th digit **call volume**

x86 **configuration ID memory**

1st digit **update** (**0** = no, **1** = yes)
2nd digit **FIFO** (**0** = no, **1** = yes)
4th digit **display FFSK-ID** (**0** = no, **1** = yes)

x90 **configuration FFSK (ZVEI)**

1st-3rd digit **maximal number FFSK-tone sequence**
4th digit **call < maximal number** (**1** = tone sequence, **0** = FSK)
5th digit **rhombus**

x91 **configuration FFSK (ZVEI)**

1st digit **FFSK - activate emergency call** (**0** = no,**1** = yes, **2** = reg. x94)
2nd digit **BAK RX**

x92 **configuration 1 FFSK-emergency call** (same as register x3x)
x93 **configuration 2 FFSK-emergency call** (same as register x4x)
x94 **configuration key tones for FFSK-emergency call**

1st-5th digit **filter for FFSK-emergency call** (F = variable, display)

Programming mode UGA

After selecting *"UGA programming"* in the *menu setup* the display shows <**enter password**> . Now please enter your 5-digit password. (The password is coded in the **EEPROM-register 099**.) Brand-new devices do not have a password yet, so that you can start coding directly.
In this case or after having entered your password you first have to enter the corresponding channel number **(1..4)** of the UGA-module. The Major 6a automatically displays the number of the first found UGA-module.
Then the display shows <**UGA** x **register**> and the cursor blinks at the prompt. Now enter the address of the UGA-register which is to be newly coded. See section **EEPROM(UGA)-addresses**.
After entering the address the lower display row shows the actual coding (4-digit). The old coding can now be overwritten with new values.
If you don´t want to save the new coding it can be skipped with the **F3**-key. After pushing the **F4**-key the UGA is programmed (the coding is saved).
After that the top display row shows <**UGA** x **register**> again and the cursor blinks at the prompt. Now you can select a new address or stop the programming of the UGA by pushing the **F3**-key or the **F4**-key. The setup mode is ended by pushing the **F3**-key again.

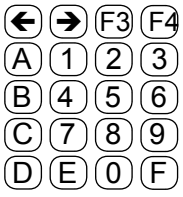
Hint 1: Please note that the UGA settings are only valid for the selected channel.

Hint 2: To avoid malfunctions please don´t program any UGA registers whose meaning is unknown to you or which are not listed in the following EEPROM(UGA) address list !

Hint 3: Almost all values which are adjustable in the UGA (e.g. times etc.) have to be programmed as hex-numbers. See section **EEPROM(UGA)-addresses** !
For a conversion table and a conversion formula for hex numbers please read the section **Attachment**!

Key layout in the *programming mode UGA:*

All values from 0...9 and A...F can be used for coding.



EEPROM (UGA) - addresses

register	*coding for*	
	frequency code (1008000 / f) (4-digit hex) for	
000	single tone 0	(Roger-Peep)
001	single tone 1	(collective call 1)
002	single tone 2	(collective call 2)
003	single tone 3	(collective call 3)
004	single tone 4	(collective call 4)
005	single tone 5	(collective call 5)
006	single tone 6	(collective call 6)
007	single tone 7	(collective call 7)
008	single tone 8	(collective call 8)

240 **Address and tone sequence**

1st digit **UGA-address** (1..4)
2nd digit **tone sequence (encoder and decoder)**
0 = ZVEI 1
1 = CCIR
2 = ZVEI 2
3 = EEA
4th digit **must be 1 !**

241 **Reference values tone sequence decoders**

1st digit min. duration all tones [N∗5ms] 16^1er
2nd digit min. duration all tones [N∗5ms] 16^0er

242 **Reference values for tone sequence decoders**

1st digit max. duration 1st tone [N∗5ms] 16^1er
2nd digit max. duration 1st tone [N∗5ms] 16^0er
3rd digit max. duration from 2nd tone on [N∗5ms] 16^1er
4th digit max. duration from 2nd tone on [N∗5ms] 16^0er

243 **Configuration for encoder**

1st digit rest duration on **'F'** in tone sequence [N∗5ms] 16^1er
2nd digit rest duration on **'F'** in tone sequence [N∗5ms] 16^0er
3rd digit PTT activation lead time [N∗5ms] 16^1er
4th digit PTT activation lead time [N∗5ms] 16^0er

244 **Configuration for encoder**

1st digit duration 1st tone [N∗5ms] 16^1er
2nd digit duration 1st tone [N∗5ms] 16^0er
3rd digit duration from 2nd tone on [N∗5ms] 16^1er
4th digit duration from 2nd tone on [N∗5ms] 16^0er

245 **Reference values for single tone decoders**

1st digit min. duration for special tones list [N*5ms] 16^1er
2nd digit min. duration for special tones list [N*5ms] 16^0er
3rd digit min. duration for tones of a tone sequence [N*5ms] 16^1er
4th digit min. duration for tones of a tone sequence [N*5ms] 16^0er

Transmit test tones

To simplify adjustments diverse test tones with different frequencies can be transmitted. The test tones can only be transmitted on channel circuits with UGA-modules!

After selecting „*Transmit test tones“* in the *setup menu* you can select any channel (equipped with UGA) with the **F1**...**F4** keys. A **1000Hz** test tone is transmitted now through the selected channels.
The frequency of the test tone can be switched with the keyboard according to the following list:

0 = 200 Hz	5 = 1000 Hz	* = 1200 Hz	S1 = 2900 Hz
1 = 300 Hz	6 = 1600 Hz	# = 1800 Hz	S2 = 3000 Hz
2 = 400 Hz	7 = 2400 Hz		S3 = 3100 Hz
3 = 600 Hz	8 = 3400 Hz		S4 = 3300 Hz
4 = 800 Hz	9 = 4000 Hz		

The test tone frequency and the activated channels can be entered at any time. The transmitter is turned on and switched with the PTT key.
The service program can be ended by pushing the key Z .

(Also see: Programming mode)

Overview Jumper

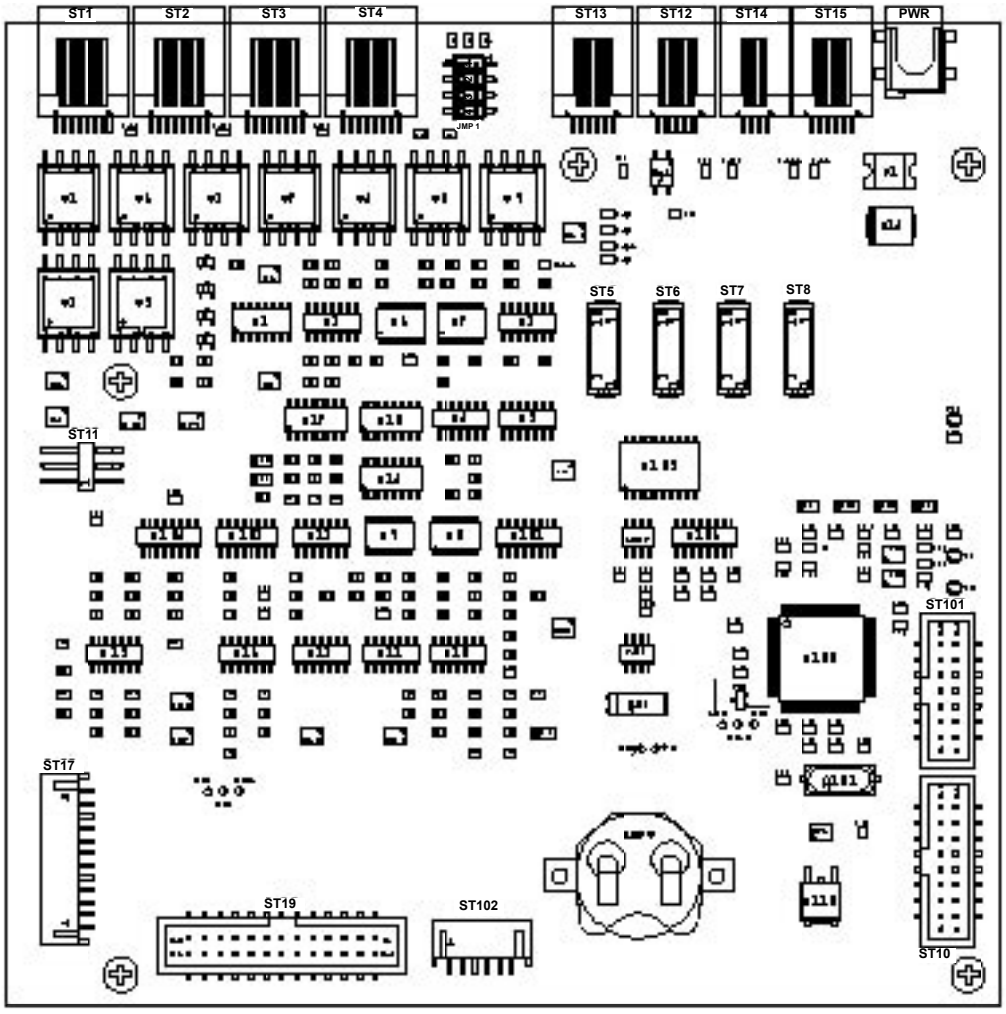
If necessary the input of the channels can be adjusted with the jumpers 1 - 4.

jumper	*function*	
JMP1/1	RX-AF-input channel 1 is	**600Ohm/3kOhm** (plugged/unplugged)
JMP1/2	RX-AF-input channel 2 is	**600Ohm/3kOhm** (plugged/unplugged)
JMP1/3	RX-AF-input channel 3 is	**600Ohm/3kOhm** (plugged/unplugged)
JMP1/4	RX-AF-input channel 4 is	**600Ohm/3kOhm** (plugged/unplugged)

(see **Layout**)

Layout

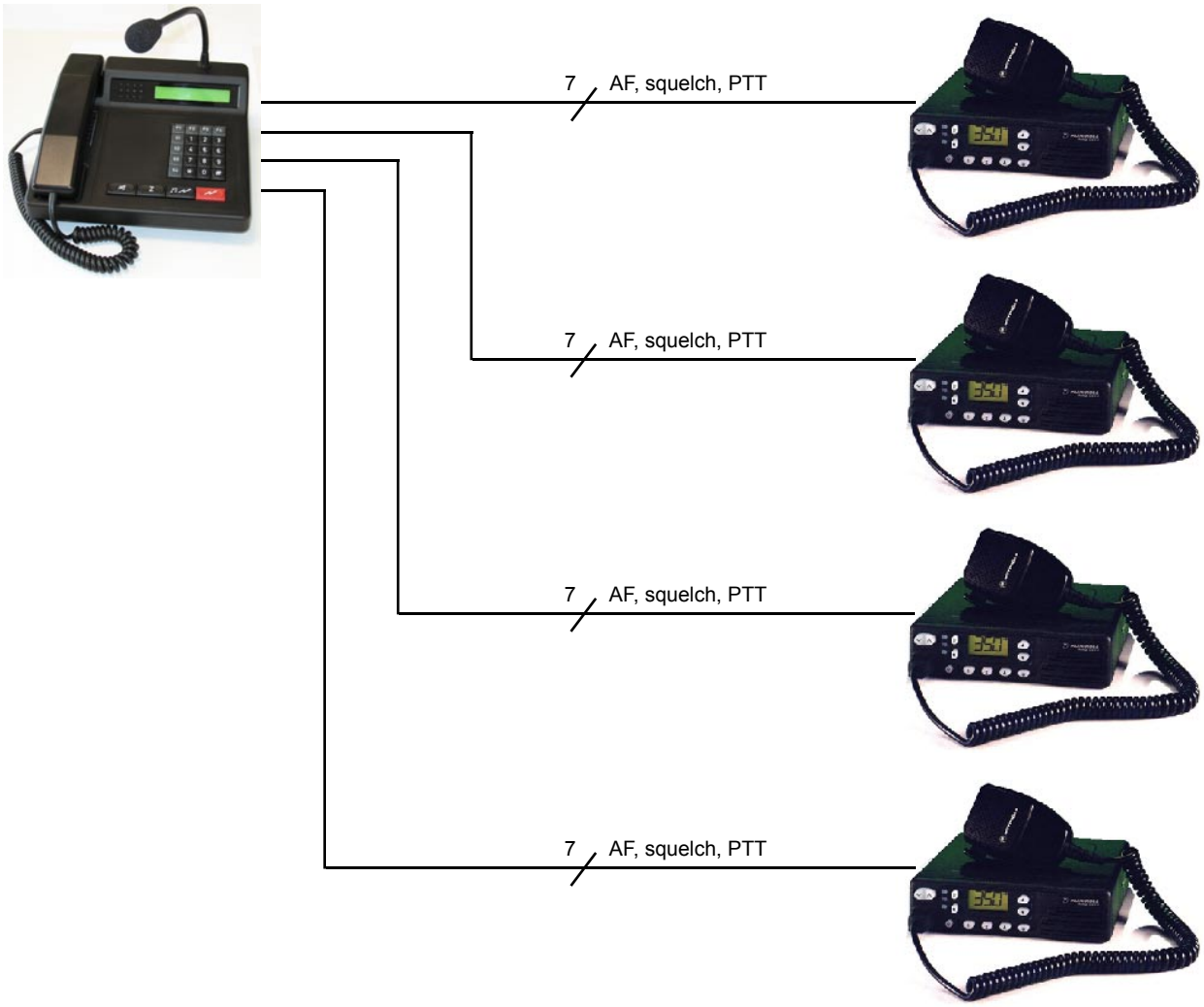
Jumper



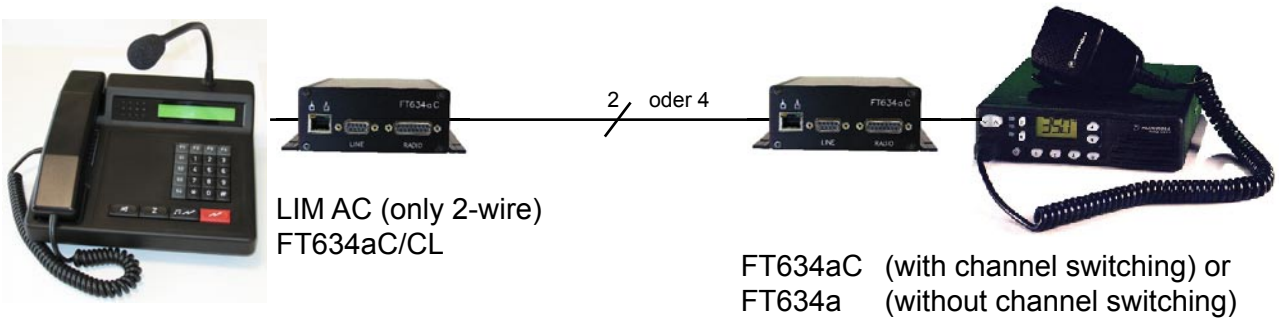
Examples for different Major 6a circuits

The following scheme shows the simplest way to remotely control a radio device with the Major 6a.

Example with multi-wire connection



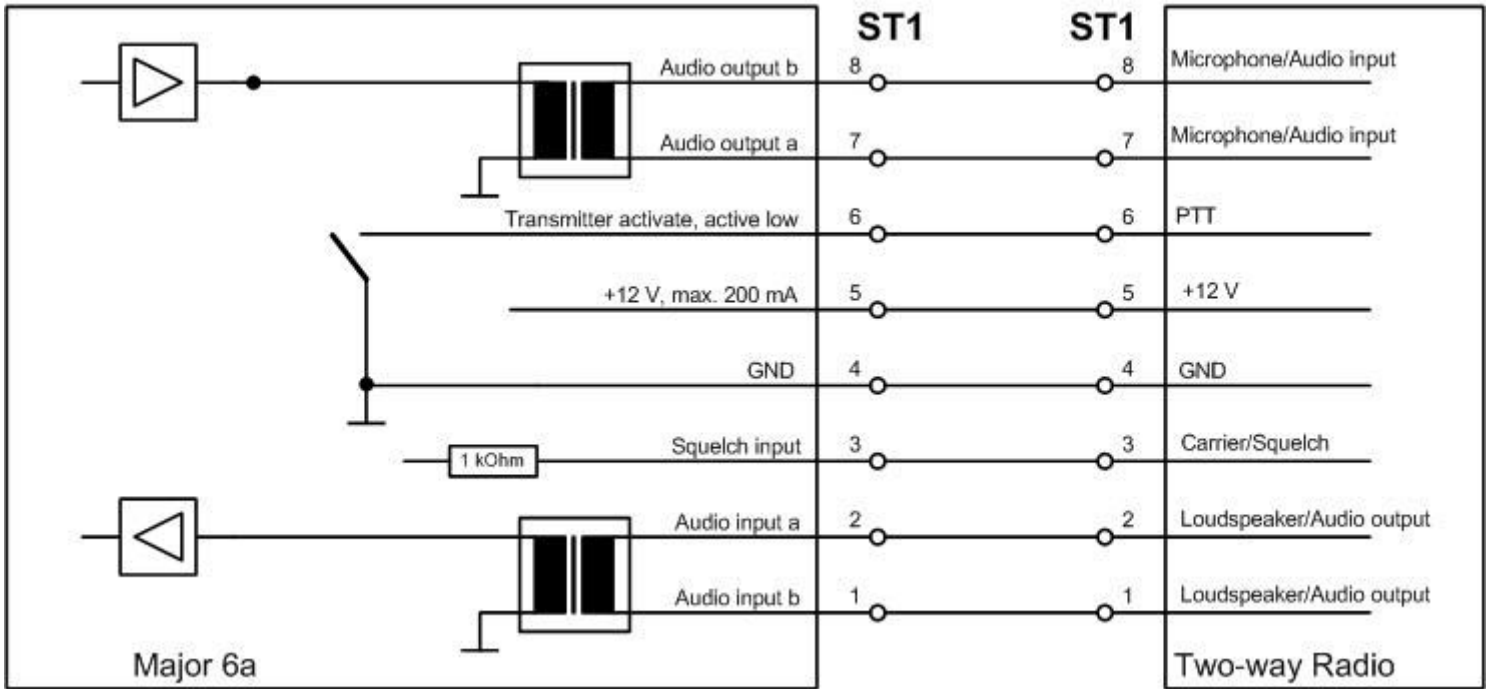
Example with 2- or 4 wire remote control via public network



LIM AC (only 2-wire)
FT634aC/CL

FT634aC (with channel switching) or
FT634a (without channel switching)
FT634aCL (with line monitoring)

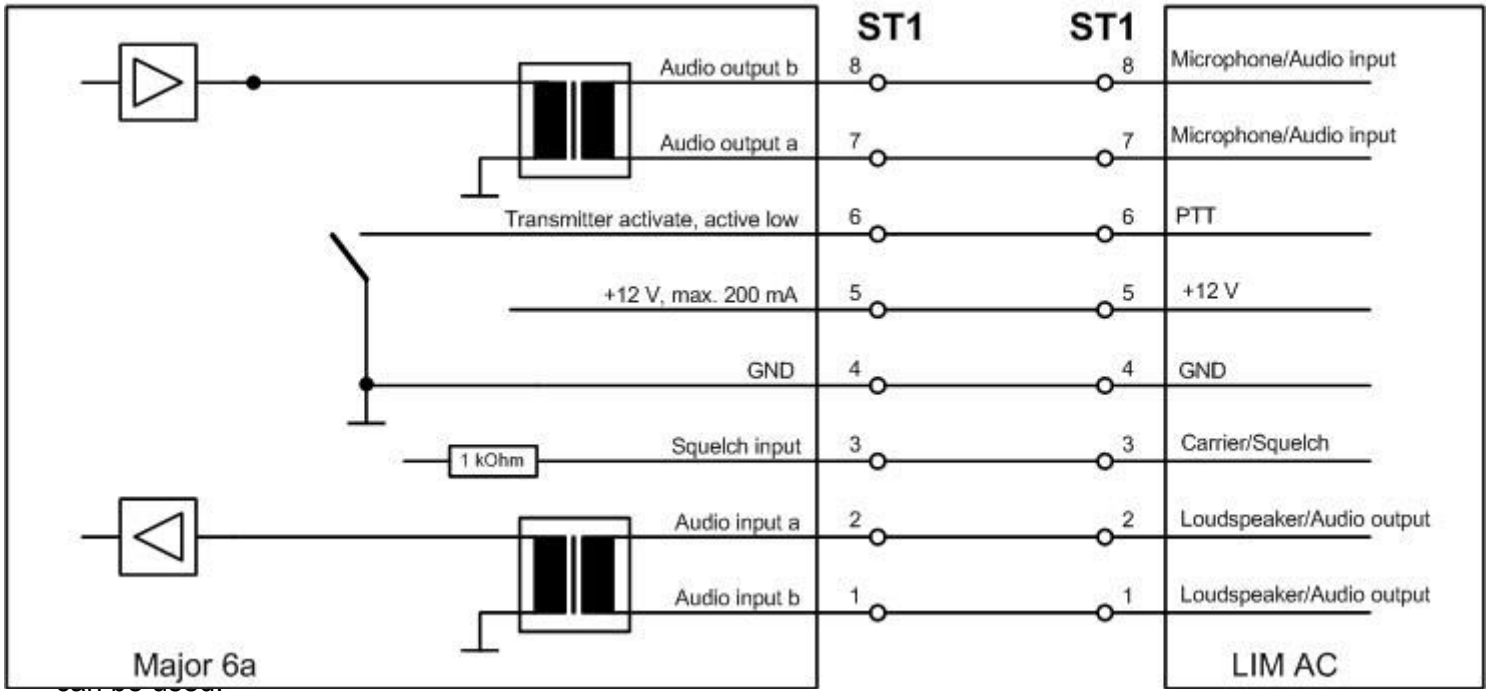
Connection Major 6a --> Radio device via multi-wire



The Major 6a AF- in/outputs are equipped with transformers and therefore are potential-free. If there are no potential-free in/outputs on the radio device one pin of every AF has to be connected to GND. Preferably pin 1 and 8 are connected to GND pin 4.

Pin 5 (12 Volt) is intended for power supply of external devices (LIM-AC, FT634aC).
Attention: you cannot supply a radio device with it.

Connection Major 6a --> LIM-ACT



Technical Data

Power supply

voltage		+12V_{DC} -15% +25%
consumption of current	without UGAs, without AF	ca. 200 mA
consumption of current	with 4 UGAs, without AF	ca. 325 mA
consumption of current	with 4 UGAs, with AF	ca. 650 mA

Input level (RX-In), (from radio channel 1..4)

ex factory set to	500 mV (= - 3,8 dBm)
adjustment range	- 17 dBm bis + 7 dBm
input impedance (**J1/1-4** plugged)	600 Ohm
input impedance (**J1/1-4** unplugged)	ca. 3 kOhm

Output level (TX-Out), (to radio channel 1..4)

ex factory set to 200 Ohm at?	500 mV (= - 3,8 dBm)
adjustment range with load 200 Ohm	- 24 dBm bis +1 dBm
adjustment range with load 600 Ohm	- 20 dBm bis +5 dBm
output impedance (when **Transmitting**)	ca. 200 Ohm
output impedance (when **Receiving**)	high-impedance (open)

Earphone output level (RX-Out, routed to headset)

ex factory set to	- 19 dBm (100 Ohm)
adjustment range	- 44 dBm bis - 8 dBm (100 Ohm)
output impedance	ca. 150 Ohm

Microphone input MIC2 (TX-In, Electret, routed from headset)

ex factory set sensitivity	5 mV (= - 46 dBm)
adjustment range	- 52 dBm bis - 41 dBm
input impedance	ca. 700 Ohm

Weight ca. 1550 g

Dimensions (without gooseneck microphone)

width x depth x height	245 x 225 x 105 mm

Ordering Information

Order No	Item
720010	Major 6a (without UGA-Module)
631300	UGA00-Module
900012	Power Supply 230/12 Volt for Major 6a

Delivery Contents

Major 6a incl. earphone and gooseneck microphone
Low voltage jack

No power supply included!

General Safety Instructions

Please read the operating instructions carefully before installation and setup.

The relevant regulations must be complied to when working with 230V line voltage, two-wire-lines, four-wire-lines and ISDN-lines. It is also very important to comply to the regulations and safety instructions of working with radio installations.

Please comply to the following safety rules:

- All components may only be mounted and maintained when power is off.
- The modules may only be activated if they are built in a housing and are scoop-proof.
- Devices which are operated with external voltage - especially mains voltage - may only be opened when they have been disconnected from the voltage source or mains.
- All connecting cables of the electronic devices must be checked for damage regularly and must be exchanged if damaged.
- Absolutely comply to the regular inspections required by law according to VDE 0701 and 0702 for line-operated devices.
- Tools must not be used near or directly at concealed or visible power lines and conductor paths and also not at and in devices using external voltage – especially mains voltage - as long as the power supply voltage has not been turned off and all capacitors have been discharged. Electrolytic capacitors can be still charged for a long time after turning off.
- When using components, modules, devices or circuits and equipment the threshold values of voltage, current and power consumption specified in the technical data must absolutely be complied to. Exceeding these threshold values (even if only briefly) can lead to significant damage.
- The devices, components or circuits described in this manual are only adapted for the specified usage. If you are not sure about the purpose of the product, please ask your specialized dealer.
- The installation and setup have to be carried out by professional personnel.

Factory returning of old equipment

According to German law concerning electronic devices old devices cannot be disposed off as regular waste. Our devices are classified for commercial use only. According to § 11 of our general terms of payment and delivery, as of November 2005, the purchasers or users are obliged to return old equipment produced by us free of cost. FunkTronic GmbH will dispose of this old equipment at its own expense according to regulations.

Please send old equipment for disposal to:

FunkTronic GmbH
Breitwiesenstraße 4
36381 Schlüchtern

>>> Important hint: freight forward deliveries cannot be accepted by us.

February 2nd , 2006

Subject to change, Errors excepted

Revision remarks

Modifications made are only mentioned in note form in this section. For detailed information please read the corresponding chapters.

23.04.2008 - 2 minor corrections on page 34 and 40 (FFSK-mode, register 240)

18.12.2009 - configuration details for register x51

Appendix

Conversion table (HEX <--> Decimal)

The hex-number (two-digit!) relevant for a decimal-number (< 256) can be taken directly from the following table :

HEX	$x**0**	$x**1**	$x**2**	$x**3**	$x**4**	$x**5**	$x**6**	$x**7**	$x**8**	$x**9**	$x**A**	$x**B**	$x**C**	$x**D**	$x**E**	$x**F**
$**0**x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$**1**x	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
$**2**x	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
$**3**x	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
$**4**x	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
$**5**x	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
$**6**x	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
$**7**x	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
$**8**x	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
$**9**x	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
$**A**x	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
$**B**x	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
$**C**x	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
$**D**x	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
$**E**x	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
$**F**x	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Decimal numbers (255 < x < 65.536) can also be converted into the corresponding 4-digit hex-numbers ($\mathbf{h_3h_2h_1h_0}$) by using this conversion table :

hex-number($\mathbf{h_3h_2}$) = decimal number **DIV** 256 (high-byte)
hex-number($\mathbf{h_1h_0}$) = decimal number **MOD** 256 (low-byte)

DIV meaning a integer division (integral part of the division)
and **MOD** meaning the rest of the integer division (integral rest).

To check:

decimal number = $\mathbf{h_3}$ x 4096 + $\mathbf{h_2}$ x 256 + $\mathbf{h_1}$ x 16 + $\mathbf{h_0}$

Example: decimal number = **4800** --> hex-number = ?

1) hex-number($\mathbf{h_3h_2}$) = 4800 DIV 256 = 18 (decimal) = $**12** (hex) (high-byte)
2) hex-number($\mathbf{h_1h_0}$) = 4800 MOD 256 = 192 (decimal) = $**C0** (hex) (low-byte)

==> hex-number($\mathbf{h_3h_2h_1h_0}$) = $**12C0**