Major 4

English Version 1.1
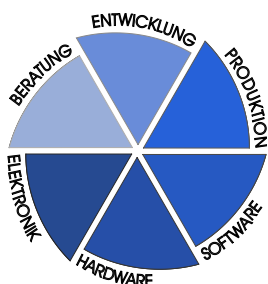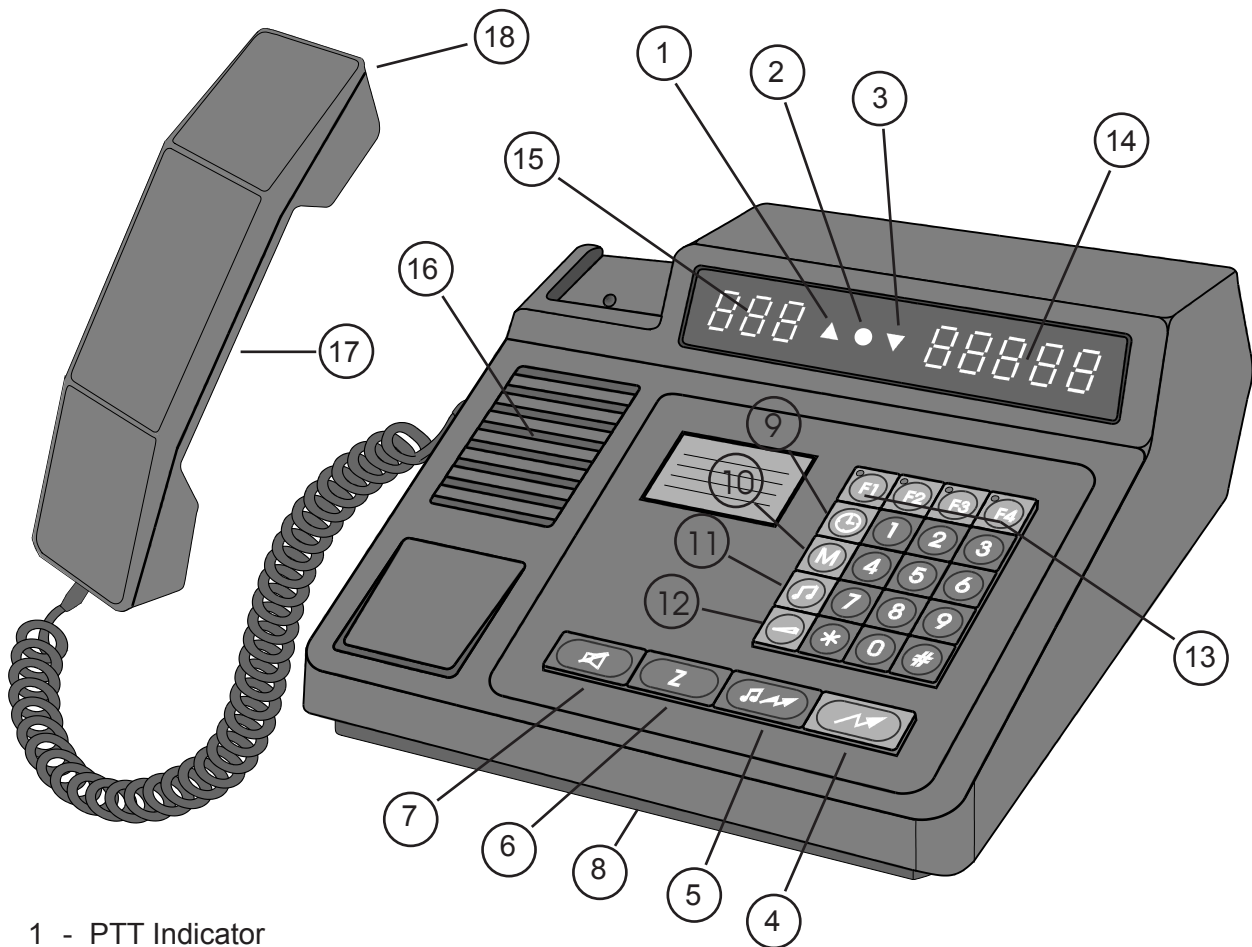
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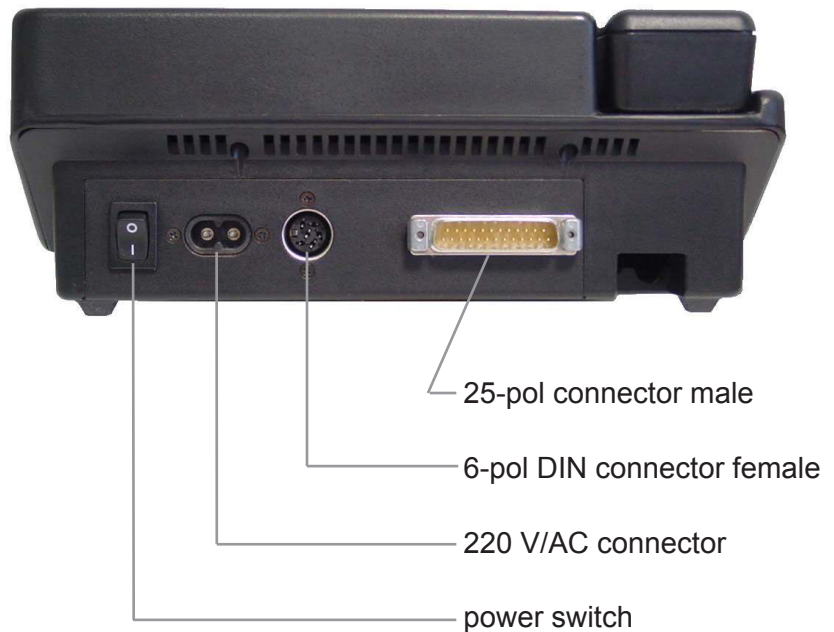
Major 4

General Operating Instructions

The Major 4 is a microprocessor controlled desktop controller for a 2-way radio system. There are two main versions, one for 12 Volt DC and one for 230 Volt AC. As all functions are controlled by a microprocessor, its operation is very simple. The Major 4 is switched on by a power switch on the rearside of the unit. After switching on, the message <Fun ctron> is shown for one second on the display, then the display extinguishes and the cursor flashes at the input digit. Now the unit is ready-to-operate; it is positioned in 5-tone mode.
Before using the Major 4, you have to adjust the input and the output levels of the LF. You can configure it for 2 or 4-wire connection. On the rearside you have a connector with PTT input, squelch input, LF input, LF output, emergency output and 12 outputs for channel switching.

Optional:
On an additional connector you have an RS232 output. You can connect a printer or a terminal for documentation.
Optionaly you can connect the Major 4 on a telephone line using the Telephone Interface. With this option it is possible to connect the radio manually or automatically to the telephone line or visa versa. If you have noisy signals you can improve decodeing of 5-tones by the optionally correlator module.

Calling a Radio Subscriber

At first, the call number is entered via the keypad. The input is complete when the number is right-aligned on the display. None of the input positions is flashing any longer. The call is transmitted automatically or by pressing the call button. See also section 5-Tone Sequence Encoder. If not all call numbers are allowed, the input can also be restricted (see section Call Code Filter).

Call from Radio Subscriber

An incoming call is indicated by a sounding tone like from a telephone. The loudspeaker is switched on and the loudspeaker LED flashes. See also section 5-Tone Sequence Decoder.

Call Handling

There are two possibilities to communicate with the radio subscriber:

If you use the handset you hear the radio subscriber through the handset; for speaking you have to press the PTT button on the handset. When the call is terminated, replace the handset.

It is also possible to speak via the red PTT button. In this case you will speak via the built-in microphone, and after releasing the PTT button you will hear the radio subscriber through the loudspeaker. See also section Transmitter Keying. Normally, after call termination the loudspeaker is switched off by the loudspeaker key. It is also switched off by replacing the handset.

The loudspeaker and the handset volume can be set separately. See also section Loudspeaker.

Loudspeaker

The loudspeaker can be switched on by pressing the loudspeaker button. It is switched off by pressing the loudspeaker button again. It is also switched on automatically after call transmission, after pressing the PTT button, and after call identification. The loudspeaker can automatically be swjtched oft by replacing the handset. The automatic switch-off is programmed at the second digit of register 042 (EEPROM 1). The loudspeaker can also be switched off by a timer being programmable in one-second intervals. That timer is automatically started when the loudspeaker is switched on, and is post-triggered when the carrier signal is identified. The timer is programmed at digits 3 to 5 of register 042 (EEPROM 1). If a timer is not required, it can be switched off by programming '000' seconds. If the loudspeaker has to be set for permanent operation, 'open operation' has to be programmed at the first digit of register 042 (EEPROM 1). See section EEPROM 1 Programming Mode.

Register 042
1. digit	1 =	Selective operation
	0 =	Open operation
2. digit	0 =	Loudspeaker off after replacing handset
	1 =	Loudspeaker remains in 'on' position
3. digit	value x 100 sec.	
4. digit	value x 10 sec.	} Switch off loudspeaker after 'value' seconds
5. digit	value x 1 sec.	

In the following example the loudspeaker has to be switched off automatically after two minutes. Selective operation should be switched:

Register 042   Value
1. digit	1 = Selective operation	1
	0 = Open operation	
2. digit	0 = Loudspeaker off after replacing the handset	
	1 = Loudspeaker remains in 'on' position	1
3. digit	After N * 1 second	1
4. digit	} switch off	2
5. digit	loudspeaker	0

Volume Setting

The loudspeaker and handset volume can be set separately. The handset volume is set by potentiometer R610 on the handset. To modify the loudspeaker volume, the volume key has to be pressed first. The message <VOL> is shown now on the left display, and the current volume flashes on the right display. A volume level between '0' and '9' can be selected. After setting the volume the previous display status is restored. The set value is maintained even after switching off the unit.

Noise Suppression

In case of operation via telephone lines and open loudspeaker cross-talk interferences, dialling noise, etc. may be audible via the loudspeaker. This can be eliminated by a noise suppressor switch, if the noise level is not too high. This switch releases the loudspeaker only at normal speech level. The noise suppression can be switched on at digit 2 of register 040 in EEPROM 1 ('0' = off, '1' = on).

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Busy Indicator

The busy indicator is programmed in register 041 (EEPROM 1). For busy indicator control the carrier input is switched to ground. In case of a two-wire system the busy indicator is controlled by voice activity. It is configured as follows:

Register 041   5. digit   0 = audio squelch
                                         1 = Carrier input low   = LED on
                                         2 = Carrier input high = LED on

Simplex/Duplex Mode

To avoid a side tone in case of a two-wire connection the Major 4 has to be programmed for simplex mode. Therefore, the first digit of register 043 (EEPROM 1) has to be programmed with a '1'. In case of duplex mode a '0' has to be programmed.

5-Tone Sequence Encoder

Coding

The 5-tone sequence encoder is configured according to the application requirements and as well for comfortable Operation. Logically, you will permanently code those digits which should not be entered via the keypad. The permanently coded tones can be placed at any position of the tone sequence. For example, it is possible to permanently code positions 1, 3, and 5. In this case only position 2 and 4 are entered via the keypad. The positions to be freely entered are always displayed right aligned. If two subsequent tones are identical, the repeat tone is automatically used at the correct position. The 5-tone sequence encoder is coded in register 001 (EEPROM 1). See section EEPROM 1 Programming Mode. If not all digits are permitted, the input can also be restricted (see section Call Code filter).

Call Start

The call is started either by pressing the call button or automatically after complete input. The call can be repeated in both cases by pressing die call button. If it has to be started automatically, the 4. digit of register 040 (EEPROM 1) has to be programmed as a '1'. See section EEPROM 1 Programming Mode.

Call Code Filter

Via the call code filter you can block special digits at any position of the tone sequence. The call code filter is programmed in the EPROM starting with address 7B80H. For any tone of the tone sequence 16 bytes are reserved, where all permitted tones are listed ('00' H .. '0F' Hex). If one of these tones shall be blocked, the corresponding position has to be programmed with 'FF' Hex. If no suitable programming unit is available, FunkTronic can supply you with the modified EPROM.

Permitted tones for 1. position - start with address 7B80 Hex
Permitted tones for 2. position - start with adoress 7B90 Hex
Permitted tones for 3. position - start with address 7BA0 Hex
Pennitted tones for 4. position - start with address 7BB0 Hex
Permitted tones for 5. position - start with address 7BC0 Hex

Short Call Numbers

The Major 4 is provided with 10 programmable short call numbers. By pressing the (Z) key and the following input of a digit between 0 and 9, a precoded call is transmitted. These short call numbers are coded in registers 000 to 009 (EEPROM 2) and may be changed at any time without password input. See section EEPROM 2 Programming Mode.

Identification

The identification is coded in register 003 (EEPROM 1). See section EEPROM 1 Programming Mode. If no identification number is required, please code the first digit with an 'F'. Usually, the identification is coded exactly as Decoder 1. The identification is transmitted automatically after every call or short call. These two sequences are separated by a pause of one tone length. The pause can also be replaced by a sixth tone. See section 6-Tone Sequence. In this case a tone sequence of 11 tones is transmitted.

Group Call

In order to be able to use the 5-tone sequence call system without any restrictions, tone 'A' should be used as group calling tone. Tone 'A' is entered by the (#) key. The group calling tone may be placed at any position. The call starts by pressing the call button or automatically, depending on the configuration. See section Call Start.

Conference Call

The conference call is transmitted by pressing the conference call button. The call duration is programmed at digit 1 of register 048 (EEPROM 1). The programmed value N refers to the time of N * 200 ms. But, if '0' is set at this digit, the tone will be transmitted as long as the button is pressed. The tone frequency is programmed at digits 3 to 5 of register 048. The tone generator can be programmed for frequencies from 601 Hz up to 3400 Hz or higher. The value to be programmed is calculated using die following formula:

$$x = \frac{8\ 000\ 000}{52 \ * \ f\ (Hz)} - 1$$

In the following example a conference call is programmed with a frequency of 1000 Hz. The call duration should be one second:

$$x = \frac{8\ 000\ 000}{52 \ * \ 1000} - 1 = 152.846 \qquad \text{Value} = 153$$

Therefore, register 048 (EEPROM 1) has to be programmed with '5-153'. See section EEPROM 1 Programming Mode.

5-Tone Sequence Parameters

Transmitter Pre-Running Time

The pre-running timer is preceding every call. It consists of a fixed value of 100 ms and a variable value which can be programmed in 10 ms intervals at digits 3 to 5 of register 046 (EEPROM 1). See section EEPROM 1 Programming Mode. The variable value can be defined freely between '000' and '255'.

Example 1: ....
The variable value is defined as '010'.

The fixed pre-running time value is now 100 ms plus a variable value of 100 ms. Therefore, the total value is 200 ms.

Example 2: ....
The variable value is defined as '255'.

The fixed pre-running time value is now 100 ms plus a variable value of 2550 ms. Therefore, the total value is 2650 ms or 2.65 seconds.

Tone Length

The length of the first tone is defined at digits 3 to 5 of register 045 (EEPROM 1). The length of the other tones can be adjusted at digits 3 to 5 of register 044 (EEPROM 1). See section EEPROM 1 Programming Mode. The value can be switched in 10 ms intervals from '003' up to '255'. In case of ZVEI 1 and ZVEI 2 the tone length is usually 70 ms, and in case of CCIR it is 100 ms. The tone length of the first tone can also deviate from the other tones. For example: Tone length of 1. tone = 1500 ms and 2. to 5. tone = 70 ms. The programmed tone lengths are adhered exactly by the 5-tone encoder. In case of tone identification a tolerance is added to the programmed values. This ensures that even inexact 5-tone telegrams are evaluated correctly.

6-Tone Sequence

For special applications it may be necessary to add a sixth tone to the 5-tone sequence. For every short call <Short Call Button> as well as for normal call <Call Button> the sixth tone can be programmed separately . The sixth tone for normal call is programmed at digit 3 of register 041 (EEPROM 1). The sixth tone for short calls is programmed in registers 014 and 015 (EEPROM 1). If the sixth tone is not used, an 'F' has to be programmed at the corresponding address.

Register 014		Register 015	
1. digit	short call 0	1. digit	short call 5
2. digit	short call 1	2. digit	short call 6
3. digit	short call 2	3. digit	short call 7
4. digit	short call 3	4. digit	short call 8
5. digit	short call 4	5. digit	short call 9

Different Tone Systems

The Major 4 can be configured for various tone systems without any hardware modification. The tone system is selected at the first digit of register 046 in EEPROM 1 (see the following table). See section EEPROM 1 Programming Mode. When a tone system is selected, the tone length is not

automatically adjusted. Therefore, if a change is made from ZVEI 1 to CCIR, the tone length has to be redefined as well. See section Tone Length.

Register 046   1. digit   0 = ZVEI 1
                              1 = CCIR
                              2 = ZVEI 2
                              3 = EEA
                              4 = ZVEI 3

Tone Table

Tone	ZVEI 1		CCIR		ZVEI 2		EEA		ZVEI 3	
0	2400	Hz	1981	Hz	2400	Hz	1981	Hz	2200	Hz
1	1060	Hz	1124	Hz	1060	Hz	1124	Hz	970	Hz
2	1160	Hz	1197	Hz	1160	Hz	1197	Hz	1060	Hz
3	1270	Hz	1275	Hz	1270	Hz	1275	Hz	1160	Hz
4	1400	Hz	1358	Hz	1400	Hz	1358	Hz	1270	Hz
5	1530	Hz	1446	Hz	1530	Hz	1446	Hz	1400	Hz
6	1670	Hz	1540	Hz	1670	Hz	1540	Hz	1530	Hz
7	1830	Hz	1640	Hz	1830	Hz	1640	Hz	1670	Hz
8	2000	Hz	1747	Hz	2000	Hz	1747	Hz	1830	Hz
9	2200	Hz	1860	Hz	2200	Hz	1860	Hz	2000	Hz
A	2800	Hz	2400	Hz	886	Hz	1055	Hz	886	Hz
B	810	Hz	930	Hz	810	Hz	930	Hz	810	Hz
C	970	Hz	2247	Hz	740	Hz	2247	Hz	740	Hz
D	886	Hz	991	Hz	680	Hz	991	Hz	680	Hz
E	2600	Hz	2110	Hz	970	Hz	2110	Hz	2400	Hz

Transmitter Keying

The transmitter can be keyed by the PTT button on the handset or by the red PTT button on the keypad. The difference between these PTT buttons is the function of the microphones. The PTT button on the handset switches on the microphone in the handset, and the PTT button on the keypad switches on the microphone mounted in the housing of the unit. The transmitter is keyed as long as the PTT button is pressed, except if the TX time out is exceeded. See also seotion TX Time Out Timer. In the multi-wire Version the transmitter is controlled by optocoupler 1 and, at the same time, by an open collector output. In the DC Version it is controlled by optocoupler 2, and in AC version by a keying tone. During call transmission the transmitter is keyed automatically.

TX Time-Out Timer

The TX time-out timer is programmed in one-second intervals at digits 3 to 5 of register 047 (EEPROM 1). Values of '000' up to '255' are permitted. If the programmed value is '000', the TX time-out timer is out of operation.

PTT Button Blocking

The PTT button blocking is programmed at the fifth digit of register 040 (EEPROM 1) as follows:

0 = PTT button blocking is switched off

1 = PTT button is blocked in case of sensed carrier

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2 = Transmitter keying is possible only after call transmission or call evaluation. The PTT button release is reset by replacing the handset or by switching off the loudspeaker.

Transmitter Rodger Beep

The pressing of the PTT button may be signalled by transmission of a tone or the identification. The signal can be transmitted when pressing the PTT button, when releasing the PTT button, or when pressing and when releasing the PTT button. The function is programmed at digit 5 of register 033 (EEPROM 1) as follows:

0 = No Signal   (default setting)

1 = Tone when pressing the PTT button
2 = Tone when releasing the PTT button
3 = Tone when pressing and when releasing the PTT button

4 = Identification when pressing the PTT button
5 = Identification when releasing the PTT button
6 = Identification when pressing and when releasing the PTT button

Transmitter Keying Tone

The keying tone is programmed at digits 2 to 5 of register 043 (EEPROM 1). If no keying tone is required the digits have to be programmed with '0000'. The keying tone generator can be programmed for frequencies of 15,4 Hz up to 3400 Hz or higher. The value to be programmed is calculated using the following formula:

$$x = \frac{8\,000\,000}{52 * f\,(Hz)} - 1$$

In the following example a keying tone with a frequency of 3300 Hz is programmed:

$$x = \frac{8\,000\,000}{52 * 3300} - 1 = 45{,}62 \quad \text{Value} = 46$$

The digits 2 to 5 of register 043 have to be programmed with '0046'.

5-Tone Sequence Decoder

Decoder 1

The Decoder 1 is coded in register 000 (EEPROM 1). See section EEPROM 1 Programming Mode. Every 5-tone sequence is compared with the decoder 1 coding and, in case of digits being coded with 'F', every tone of the tone system will be accepted. If the 5-tone sequence has been identified as correct, the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and if you are not operating with double sequences, the acknowledgement is transmitted. After that, the bell tone is activated. If you operate with double sequences, the acknowledgement delay is at most one second. See also identification Memory. Any further tone sequence check, for example by decoder 2 or the conference call decoder, is not performed.

Acknowledgement

The automatic acknowledgement after a selective call can operate in different ways. The acknowledgement mode is programmed at digit 4 of register 033 (EEPROM 1) as follows:

0 = no acknowledgement
1 = acknowledgement with a single tone of 600 Hz, 300 ms
2 = acknowledgement with a tone sequence from register 002
3 = acknowledgement with the identifcation stored last.

Decoder 2

The decoder 2 is coded in register 007 (EEPROM 1). See section EEPROM 1 Programming Mode. Every 5-tone sequence which has not been identified as correct in decoder 1, is compared with decoder 2 coding and, in case of digits being programmed with 'F', every tone of the tone system will be accepted. If the 5-tone sequence bas been identified as correct, the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and then the bell tone is activated. Any further tone sequence check, e.g. by a group call decoder, will not be performed. An acknowledgement is not transmitted.

Bell Tone

The bell tone volume is programmed at the first digit of register 040 (EEPROM 1). The setting   '1' ... '9' corresponds to the volume ('1' = lowest level, '9' = highest level). If no bell tone is desired, a '0' has to be programmed at this digit. See also section EEPROM 1 Programming Mode.

Alarm Switching Output

After successful evaluation the bell tone is generated and the alarm contact is switched for n*1 seconds. The alarm contact time is programmed in one-second intervals in register 020 (EEPROM 1) as follows:

1. digit	Alarm contact time for emergency call
2. digit	Alarm contact time for normal call (Decoder 1)
3. digit	Alarm contact time for normal call (Decoder 2)
4. digit	Alarm contact time for group call
5. digit	Alarm contact time for conference call

Group Call Decoder 0

The group call decoder 0 is coded in register 005 (EEPROM 1). If this decoder is not required, please code an 'F' (blank) at the first digit of the tone sequence. The group call decoder is usually coded with the same tones as decoder 1. The read-in tone sequence is compared with the coded tone sequence whereby tone '0' is also accepted. In case of successful decoding the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and the bell tone is started. An acknowledgement is not transmitted.

Group Call Decoder A

The group call decoder A is coded in register 006 (EEPROM 1). If this decoder is not required, please code an 'F' (blank) at the first digit of the tone Sequence. The group call decoder is normally coded with the Same tones as decoder 1. The read-in tone sequence is compared with the coded

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tone Sequence whereby tone 'A' is also accepted. In case of successful decoding the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and the bell tone is started. An acknowledgement is not transmitted.

Emergency Call Decoder

The emergency call decoder is coded in register 004 (EEPROM 1). If this decoder is not required, please code an 'F' at the first digit of the tone sequence. The read in 5-tone sequence is compared with the emergency coding. From the second up to the fifth digit those positions being coded with 'F' will accept all tones of the tone system. In case of successful decoding the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and a time window with a duration of three seconds is opened. The first tone sequence to be received within the time window closes the time window, and is then stored as emergency call, and flashes on the right display. As long as an emergency call is indicated on the display, the keypad is blocked with exception of the PTT button and the 'F1' key. The emergency call number can be deleted only with the 'F1' key.

Conference Call Decoder

The conference call decoder detects a tone of at least one second duration. After detection the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, and the bell tone is activated. No acknowledgement is transmitted. The conference call tone frequency is coded at digit 2 of register 046 (EEPROM 1) with the corresponding digit of the tone system ('0' ... 'E') . If this decoder is not required, please code an 'F' at that digit.

ID-Code Memory

Function

The ID-code memory can be configured so that it is optimally adapted to current use. Up to 16 ID-codes can be stored. If all memory positions are engaged, the memory is updated by deleting the oldest ID-code. The stored ID-codes can be scrolled through by pressing the (M) key in such way that the ID-code stored last is displayed by the first key pressing. The currently displayed ID-code can be deleted from the memory by pressing the (*) key. If the "FIFO" function is switched on, always the oldest number is shown on the display by pressing the (M) key, and only after deleting this ID-code the next ID-code follows. The "FIFO" function is programmed at the first digit of register 033 in EEPROM 1 ('0' = off, '1' = on). The ID-code memory can be used for single or double sequences. In case of double sequences the first or the second tone sequence is stored according to the "ID-Mode" switch. The "ID-Mode" is programmed at digit 3 of register 033 in EEPROM 1 ('0' = 2nd tone sequence, '1' = 1st tone sequence). The storing of an ID-code can be signalled by a beep tone which can be programmed at digit 2 of register 033 in EEPROM 1 ('0' = off, '1' = on). The ID-code memory can also be used as call-back memory. In order to avoid acknowledgement sequences to get into the memory, the ID-code memory can be blocked for n * 100 ms after every call transmission. The blocking time is programmed at digit 2 of register 041 (EEPROM 1).

Monitor

If every ID-code has to be stored, digit 3 of register 021 (EEPROM 1) has to be programmed with a '1'. Now every ID-code is compared with the key tones and, if the test is positive, it is transferred to the ID-code memory. But if the system is operating with double sequences, the monitor switch must remain in "off" position ('0').

Double Sequences

If the system has to operate with double sequences, digit 1 of register 021 (EEPROM 1) has to be programmed with a '1'. Now after every evaluation of decoder 1, a time window of 1 second is opened. The first ID-code, within the time window, which fits the key tones, closes the time window. The first or the second ID-code can be transferred to the ID-code memory (according to the "ID-Mode" switch). Therefore, the acknowledgement transmission is delayed.

Key Tones

The key tones are coded in register 008 (EEPROM 1). The coding of these tones selects the ID-codes which are stored, and determines the digits to be displayed. Those digits where every tone is allowed and which are displayed later on, have to be coded with 'F'.

Memory Updating

Before an ID-code is accepted by the ID-code memory, the software checks if the same ID-code has already been stored in the memory. If the ID-code has already been stored and if the updating has not been activated, the ID-code is rejected. If the updating is switched on, the ID-code at the old position is deleted in order to be stored again at the first position. Therefore, the ID-code memory is always arranged in chronological order. The memory updating is programmed at digit 5 of register 021 in EEPROM 1 ('0' = off, '1' = on).

Display

The ID-code can be shown on the left as well as on the right display. In case of up to 3-digit ID-codes the left display should be chosen. The ID-code is always displayed right aligned. If the ID-code display is requested on the left display, digit 4 of register 021 (EEPROM 1) has to be programmed with a '1'. If the ID-code shall be shown on the right display, please code a '0'. If an ID-code is shown on the right display, it can be transmitted via the call button. If the ID-codes shall be shown on the display automatically after storage, digit 2 of register 021 (EEPROM 1) has to be programmed with a '1'.

Example:

The following example shows the configuration of an ID-code memory which stores and displays automatically every ID-code beginning with 1 2. The ID-code memory should be "updated":

Register 008	1. digit	1
	2. digit	2
	3. digit	F
	4. digit	F
	5. digit	F
Register 021	1. digit	0
	2. digit	1
	3. digit	1
	4. digit	1
	5. digit	1

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Setup Mode

Setup Menu

The setup menu is selected by pressing the (F1) key and the (F4) key simultaneously for one second. Now the message <SET> is shown on the left display and the cursor flashes at the input digit of the right display. Now it is possible to call the different programs by entering a two digit number (see the following table). The input is terminated by pressing the (F4) key.

```
00 =    Reset Program
01 =    EEPROM 1 programming mode
02 =    EEPROM 2 programming mode
03 =    Time setting of built in real time clock
04 =    Printout of EEPROM registers EEPROM 1
05 =    Printout of EEPROM registers EEPROM 2
06 =    Software Version display
50 =    Service mode processor board
51 =    Service mode telephone interface
```

EEPROM 1 Programming Mode

After selecting the EEPROM 1 in the setup menu, the left display shows the message <Pas>, and the cursor flashes at the input digit of the right display. Now you have to enter your 5 digit password. Units leave the factory without password, so that you can immediately start with the programming. In this case or after you have entered your password, the left display shows the message <Adr>, and the cursor flashes at the input digit of the right display.

Now the register address to be newly coded has to be entered (see the following table). If, instead of a valid address, '222' is entered, all registers are programmed with default values. Immediately after complete input the left display shows the message <Cod>, and the actual coding is shown on the right display. Now that coding can be overwritten with new values. If the coding shall not be modified, you can skip the coding by pressing the (F3) key and select a new address. Generally, in setup mode you confirm the last input by pressing the (F4) key, and by pressing the (F3) key you go to the next step of the program.

All values from 0 ... 9 and A ... F can be used for coding. Value F is shown on the display as '-'.

```
(F1)(F2)(F3)(F4)
(A)(1)(2)(3)
(B)(4)(5)(6)
(C)(7)(8)(9)
(D)(E)(0)(F)
```

After complete coding the EEPROM is programmed by pressing the (F4) key. Now the Major 4 shows the word <donE> on the right display for half a second. Then the left display shows the message <Adr>, and the cursor flashes at the input digit of the right display. Now the next address can be entered.

If no further coding are requested, you have to quit the programming mode by pressing the (F3) key. Now the Major 4 is executing a warm start; during this warm start all registers are read in and the programming mode is terminated.

EEPROM 1 Addresses

Register	Coding for
000	Decoder 1
001	permanently coded positions of 5-tone encoder
002	Acknowledgement
003	Identification
004	Emergency call 1
005	Group call decoder 0
006	Group call decoder A
007	Decoder 2 (without acknowledgement)
008	Key tones for ID-Code memory
009	Printer code
010	Short form tone call within telephone mode
011	Direct dialling within telephone mode
012	Touchtone dialling within telephone mode
013	Clear back call within telephone mode

014   6th Tone for short call

1. digit	6th tone for short call 0
2. digit	6th tone for short call 1
3. digit	6th tone for short call 2
4. digit	6th tone for short call 3
5. digit	6th tone for short call 4

015   6th Tone for short call

1. digit	6th tone for short call 5
2. digit	6th tone for short call 6
3. digit	6th tone for short call 7
4. digit	6th tone for short call 8
5. digit	6th tone for short call 9

017   Code for direct dialing with tone sequence (radio --> telephone)

019   Emergency call 2 ("Forstfunk")

020   Alarm contact hold time

1. digit	Emergency call
2. digit	Normal call (Decoder 1)
3. digit	Normal call (Decoder 2)
4. digit	Group call
5. digit	Conference call

021   Flags for ID-code memory

1. digit	Double sequences on/off --> 1/0
2. digit	Display ID-code immediately on/off --> 1/0
3. digit	Monitoring on/off --> 1/0
4. digit	ID-code on the left display on/off --> 1/0
5. digit	Update memory on/off --> 1/0

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029   Telephone settings
- 1. digit   Check dial tone before dialling on/off --> 1/0
- 2. digit   Call from Telephone to the radio
  - 0 = only call
  - 1 = call and ID-code
  - 2 = call and clear back call
- 3. digit   Call starts without key # on/off --> 1/0
- 4. digit   Flash hold time (n * 10 msec * 10)
- 5. digit   Flash hold time (n * 10 msec * 1)

030   Intercom, telephone setting, awake tone
- 1. digit   Intercom on/off --> 1/0
- 2. digit   number of periods for the awake tone
- 3. digit   Dial tone check
  - 0 ... 9 = number before dialing on main line
  - F = no prior checking of dial tone

031   FFSK Parameters
- 1. digit   Raute
- 2. digit
- 3. digit   Limit number hundreds
- 4. digit   Limit number tens
- 5. digit   Limit number ones

032   FFSK Parameters
- 1. digit   FFSK identification on/off --> 1/0
- 2. digit
- 3. digit   BAK for encoder
- 4. digit   BAK for decoder
- 5. digit

033   Special Flags, acknowledgment, TX keying
- 1. digit   FIFO mode   (ID-code memory)   on/off --> 1/0
- 2. digit   Beep tone   (ID-code memory)   on/off --> 1/0
- 3. digit   ID-mode for encoder and decoder   (ID-code memory)
  - 0 = call and ID-code
  - 1 = ID-code and call
- 4. digit Acknowledgment mode
  - 0 = no acknowledgment
  - 1 = single tone 600 Hz for 300 msec
  - 2 = normal acknowledgment
  - 3 = received code
- 5. digit Transmitter keying signal
  - 0 = no transmitter keying signal
  - 1 = tone when pushing PTT key
  - 2 = tone when releasing PTT key
  - 3 = tone when pushing and releasing PTT key
  - 4 = ID-code when pushing PTT key
  - 5 = ID-code when releasing PTT key
  - 6 = ID-code when pushing and releasing PTT key

034   Telephone Parameters
             (only if equipped with telephone interface)
             1. digit $n * 8$ sec dial tone until cut-off
             2. digit   0 = Pulse dialling
                               1 = DTMF dialling
             3. digit   Single tone '0' ... 'D' for clear back
             4. digit   Remote programming EEPROM 1 on/off --> 1/0
             5. digit   Remote programming EEPROM 2 on/off --> 1/0

035   Scanner Parameters
             1. digit $n * 20$ ms dwelling time per channel
             2. digit   Wait time after call (sec): tens
             3. digit   Wait time after call (sec): ones
             4. digit   Stop scanning if carrier   on/off
             5. digit

036   Scanner Parameters
             1. digit   Scanner on/off
             2. digit   Scanning up from channel: tens
             3. digit   Scanning up from channel: ones
             4. digit   Scanning up to channel: tens
             5. digit   Scanning up to channel: ones

037   Telephone Parameters
             (only if equipped with telephone interface)
             1. digit   0 = Telephone mode off
                               1 = Manual telephone mode, telephone --> radio
                               2 = Automatic telephone mode with short call 0, telephone --> radio
                               3 = Telephone mode with touchtone dialling, telephone --> radio
             2. digit Mode of TX keying
                               0 = Simplex mode, voice controlled
                               1 = Duplex mode, permanent
             3. digit $n * 10$ sec. TX time out without modulation
             4. digit $n * 5$ sec. TX time out in simplex mode
             5. digit $(n + 1) * 60$ sec. TX time out

038   Channel Parameters
             1. digit   0 = No channel selection
                               1 = One digit channel selection
                               2 = Two digit channel selection
             2. digit   1 = Channel output decimal
                               2 = Channel output binary-1
                               3 = Channel output binary
                               4 = Channel output 2 * BCD
                               5 = Channel remote control with keying tone/PTT
                               6 = Channel remote control without keying tone/PTT
             3. digit   0 = Channel output ordinary
                               1 = Channel output inverted
             4. digit   0 = Short channel display
                               1 = Permanent channel display
             5. digit   0 = acknowledge for remote channel selection ($K_1K_2K_3XY$)
                               1 = acknowledge for remote channel selection ($K_2K_1K_3XY$)

039   Printer Parameters

1. digit	Print transmitted code	on/off --> 1/0
2. digit	Print received code	on/off --> 1/0
3. digit	Print within telephone mode	on/off --> 1/0
4. digit	Print transmitted conference calls	on/off --> 1/0
5. digit	Print received conference calls	on/off --> 1/0

040

1. digit   Bell tone volume for ordinary calls, 1 to 9
2. digit   Noise switch on/off --> 1/0
3. digit   Bell tone volume for emergency calls, 1 to 9
4. digit   Automatic call transmission on/off --> 1/0
5. digit   PTT button blocking
                0 = allways off
                1 = on when carrier is detected
                2 = off only after call or call detecting

041

1. digit   break after double sequence, n * 20 msec
2. digit   Blocking time for ID-code memory, n * 100 msec
3. digit   6th tone for ordinary calls
4. digit   Correlation module yes/no --> 2/0
5. digit   Carrier display, carrier input
                0 = depenting on modulation, for 2-wire
                1 = carrier input low
                2 = carrier input high
                3 = depenting on modulation, carrier input is
                    used for ext. PTT key
                4 = depenting on modulation, carrier input is
                    used for ext. short call key

042   Automatic Loudspeaker Switch-Off

1. digit   0 = open mode
                1 = selective mode
2. digit   0 = Loudspeaker remains off after put back handset
                1 = Loudspeaker on after put back handset
3. digit   Loudspeaker timer   hundreds
4. digit   Loudspeaker timer   tens
5. digit   Loudspeaker timer   ones

043   Keying tone   Mode and frequency

1. digit   Mode
                0 = Duplex
                1 = Simplex
2. digit   Keying tone   thousands
3. digit   Keying tone   hundreds
4. digit   Keying tone   tens
5. digit   Keying tone   ones

044   Tone sequence setting

1. digit
2. digit
3. digit   Tone length   2. to 5. tone   hundreds
4. digit   Tone length   2. to 5. tone   tens
5. digit   Tone length   2. to 5. tone   ones

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045	Tone sequence setting			
	1. digit			
	2. digit			
	3. digit	Tone length	1. tone	hundreds
	4. digit	Tone length	1. tone	tens
	5. digit	Tone length	1. tone	ones

046	Tone sequence setting		
	1. digit	Tone system	
		0 = ZVEI 1	
		1 = CCIR	
		2 = ZVEI 2	
		3 = EEA	
		4 = ZVEI 3	
	2. digit	Tone for conference call decoder (0 ... E)	
	3. digit	Transmitter pre-running time	hundreds
	4. digit	Transmitter pre-running time	tens
	5. digit	Transmitter pre-running time	ones

047	Transmitter time out		
	1. digit		
	2. digit		
	3. digit	TX time out	hundreds
	4. digit	TX time out	tens
	5. digit	TX time out	ones

048	Conference call encoder		
	1. digit	Conference call tone duration, n * 200 msec	
	2. digit		
	3. digit	Conference call frequency	hundreds
	4. digit	Conference call frequency	tens
	5. digit	Conference call frequency	ones

049	Password

051	I²C port short call 1
.	.
.	.
.	.
058	I²C port short call 8

222	Load factory default values for EEPROM 1

EEPROM 2 Addresses

Register	Coding for
000	Short call 0
.	.
.	.
009	Short call 9
010 ... 012	Phone number 00
013 ... 015	Phone number 01
. .	.
. .	.
199 ... 201	Phone number 63

Service Mode

Function

During service work it can be necessary to switch a certain signal path. Since the processor controls all switches, all analogue switches and relays can be switched by the service program.

Processor Board

After selecting "Service Mode Processor Board" within the setup menu, the message <Sch> is shown on the left display and the input digit flashes on the right display.

Now the switch number has to be entered. The switch number is indicated in the circuit diagram for every analogue switch (e.g. s3). Immediately after number input '=' is shown in the middle of the display and the input digit for the switching status flashes on the right. Digit '0' or '1' is accepted as switching status. After the switch has been set, the next switch can be selected with the (F3) key or the service program can be quit by pressing the (F4) key.

analogue switch no.	function
1	audio enable to radio on/off --> 1/0
2	microphon audio to radio on/off --> 0/1
3	FFSK encoder/telephone to radio on/off --> 0/1
4	tone sequence encoder to radio on/off --> 1/0
5	tone sequence and FFSK decoder from radio to telephone on/off --> 1/0
6	earpiece audio handset from radio to telephone
7	loudspeaker audio from radio to telephone on/off --> 1/0
8	loudspeaker audio from audio oscillator on/off --> 1/0
9	microphone audio from handsfree microphone/handset on/off --> 1/0

Telephone Interface

After selecting "Service Mode Telephone Interface" within the setup menu, the message <tEL> is shown on the left display and the input digit flashes on the right display.

Now the switch number has to be entered. The switch number is indicated in the circuit diagram for every analogue switch (e.g. T7). The relays A, B and C are addressed by '1', '2' and '3'. Immediately after number input '=' is shown in the middle of the display and the input digit for the switching status flashes on the right. Digit '0' or '1' is accepted as switching status. After the relay respones, the analogue switch has been set, the next switch or relay can be selected with the (F3) key or the service program can be quit by pressing the (F4) key.

analogue switch no.	function
1	audio oscillator to telephone on/off --> 1/0
2	receiver audio from radio to telephone on/off --> 1/0
3	microphone audio from handset to telephone on/off --> 1/0
4	loudspeaker and earpiece audio from radio/telephone --> 0/1
5	DTMF decoder from radio/telephone --> 1/0
6	connect to telephone line on/off --> 1/0
7	tape switch on/off --> 1/0

Printer Interface

Data Format

The Major 4 unit is provided with an RS-232 serial Interface with the following specification:

> 9600 Baud, 1 start bit, 8 data bits, no parity, 2 stop bits.

Connector

The serial printer is connected to the Major 4 via a 6 pin DIN connector. The connector is wired as follows: Pin 1 = RXD, Pin 3 = TXD, Pin 5 = GND. If a printer with Centronics interface has to be used, we recommend our V24 Centronics interface (article no. 902000).

Function

The printer control operates in the background without affecting other functions. In order to be able to process a data stream quickly and efficiently, the Major 4 is provided with a 3-line printer buffer. Every received 5-tone sequence is filtered by the printer code and if the ID-code fits, it is transmitted to the printer, provided that the relevant switch ("print received code") is turned on. The printer code is programmed in register 009 (EEPROM 1). Those positions where every tone is allowed are coded with 'F'. See section EEPROM 1 Programming Mode. Transmitted 5-tone calls are printed also if the appropriate switch is turned on. In case of 5-tone sequences one line each is printed. In case of telephone mode, the last five digits of the telephone number are printed at the beginning of the call; after call termination the actual time is printed together with the message <end>.

Printer Switches

The printer switches are programmed in register 039 in EEPROM 1. See section EEPROM 1 Programming Mode. Optional switches can be combined.

The following functions are controlled by the individual switches:

Register 039	1. digit	transmitted call code, print/do not print --> 1/0
	2. digit	received call code, print/do not print --> 1/0
	3. digit	telephone number dialed, print/do not print --> 1/0
	4. digit	transmitted conference call, print/do not print --> 1/0
	5. digit	received conference call, print/do not print --> 1/0

Print Format

A headline is printed at the top of every page. The headline is followed by the title and the print lines follow below. Every line contains a current number as well as date, time, tone code response, telephone number and a remark. The current number is automatically reset at midnight according to the change of date and a new page is started. If a page is complete, a paper feed command is automatically sent to the printer. The new page again starts with headline and title. For example, a standard printout could look like this:

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```
*****    FunkTronic GmbH Dokuprinter  *****

No:    date           time           base no.       remark

0037   15:03:94       14:27:59       12310          incoming call
0038   15:03:94       14:29:32        2634          telephone
0039   15:03:94       14:32:45                       end
0040   15:03:94       14:35:22       12312          call to mobile
0041   15:03:94       14:39:05       12316          call to mobile
```

Printer Text

All the printer text can be edited to provide the headline, for example, with a company related text or to print the text in the language of the corresponding country. The text of the headline is placed in EPROM addresses 7C02H to 7C45H. The text of the title is placed at addresses 7C4AH to 7C8AH. The remaining text start with EPROM address 7D00H. If no suitable EPROM programmer is available, modifications can also be done by FunkTronic. Those modifications are placed to account.

Real Time Clock

Function

The built in real time clock is supplied by a NC battery and doesn't require any maintenance. If the printer interface is used, the time should occasionally be checked since date and time are printed out on every line.

Setting Time

The time setting is selected within the setup menu. At first, the date is shown on the display (e.g. 29-03-98). Now the date can be overwritten by using the numeric keys. After pressing the (F3) key the current time is displayed (e.g. 13-45-20). Now the time can be overwritten. The input is confirmed by pressing the (F4) key and the setup is terminated. If the time shall not be modified, you can quit the setup menu by pressing the (F3) key.

Display Time

By pressing the (Time) key the time is shown on the right display as long as the key is pressed. A call previously stored in the display will not be changed. After releasing the key the previous display contents will be restored.

Channel Selection

Entering Channel Number

The (F2) key has to be pressed to enter the channel input mode. The current channel is shown on the left display and the input digit flashes. If an ID-code had been displayed there, it will not be lost.

Now the new channel is entered by using the numeric keys. After complete input a check is made, using the channel table, in order to verify if the channel is permitted to be switched. If the selected

channel is blocked, the operator is requested by a short tone through the loudspeaker to enter a new value. After the input is completed the channel change is transmitted automatically to the channel interface. According to the configuration the operating channel or the old display content is shown now on the left display.

Configuration

Units leaving the factory are configured for one digit channel selection. The channel output is in "binary-1" format. If required, the channel selection can also be modified for two digit selection. In case of single channel radio units the channel selection should be switched off. The channel output can be in "decimal", "binary-1", "binary" or "2 * BCD" format and the channel output can be inverted, if necessary. In the following example a two digit channel selection is realized with inverted decimal channel output. The channel will be displayed only for a short time.

Register 038			Value
1. digit	0 = No channel selection		2
	1 = One digit channel selection		
	2 = Two digit channel selection		
2. digit	1 = Channel output decimal		1
	2 = Channel output binary-1		
	3 = Channel output binary		
	4 = Channel output 2 * BCD		
	5 = Channel remote control		
3. digit	0 = Channel output normal		1
	1 = Channel output inverted		
4. digit	0 = Short channel display		0
	1 = Permanent channel display		

Channel Table

In the EPROM, starting with address 7B00H, a total of 100 bytes is reserved for the channel table. Every single channel can be blocked by '00'H or released by 'FF'H. The table starts with channel 00 at address 7B00H and ends with channel 99 at address 7B63H. In units leaving the factory, channel 00 is blocked and all other channels are released.

Channel Scanning

Function

The scanner is activated by replacing the handset. It can be stopped at any time by switching on the loudspeaker, by call transmission or by pressing the PTT button. In this case the channel entered last (working channel) is switched. The area pre-programmed in the EEPROM is being scanned, skipping those channels which are blocked according to the channel table. If a carrier is detected, the scanner waits for one second for an incoming call and then continues with the scanning. If a call is evaluated, the scanner waits for a programmable period of time (1 sec intervals) before continueing. If the PTT or the call button is pressed during the waiting period, the scanner stops at the calling channel and will remain there. The scanner can be activated again by replacing the handset. The channel interface is programmed in register 038 (EEPROM 1). See section Channel Selection (Configuration).

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Configuration

The scanner is programmed in registers 035 and 036 (EEPROM 1) . The following example shows the configuration of a scanner, scanning the channels 1 to 32, waiting for 100 ms on each channel and in case of selective call stopping for 20 seconds on the calling channel.

Register 036   value

1. digit	0 = Scanner is switched off		
	1 = Scanner is switched on		1
2. digit	Scan from channel	tens	0
3. digit	Scan from channel	ones	1
4. digit	Scan up to channel	tens	3
5. digit	Scan up to channel	ones	2

Register 035

1. digit	Dwell time per channel N * 20 ms		5
2. digit	Wait after call (sec)	tens	2
3. digit	Wait after call (sec)	ones	0
4. digit	0 = Don't stop if carrier		0
	1 = Stop if carrier		

FFSK Mode

The Major 4 can be used in combined networks if it is provided with FFSK option. In this case an FFSK modem operates simultaneously with the 5-tone modem. The Major 4 operates according to ZVEI recommendation (Digital transmission method for call code, selective call and data transmission in the non-public mobile radio network, dated December 21, 1987).

Telegram Structure

The call telegram starts with an unmodulated carrier which has to be available at the receiver side for at least 25 ms (see section Transmitter Pre-Running Time). It is followed by telegram reload with a 16 bit 1/0 sequence and the block synchronization. For block synchronization a 15 bit "barker word" with a preceding '1' is used. The now following selective call number is built as decade. It always consists of 8 digits. The telegram is saved by an additional 8 bit redundancy.

FFSK Encoder

While the 5-tone and the FFSK decoder are ready for detection simultaneously, it has to be decided for call transmission whether a 5-tone or FFSK telegram shall be transmitted. The Major 4 derives this selection from the call number and automatically transmits the call in the correct call mode (see section Limit Number). The 8-digit selective call number is arranged as follows:

1.	digit	fixed	operating mode reference (BAK)
2.	digit	fixed	status
3.	digit	fixed	rhomb
4 ... 5.	digit	variable	manufacturer reference
6 ... 8.	digit	variable	Call code

The encoder is configured according to the application requirements and as well for comfortable operation. Logically, you will permanently code those digits which should not be entered via the keypad. The permanently coded tones can be placed at any position of the manufacturer reference and call code. For example, it is possible to permanently code positions 4, 6, and 8. In this case only positions 5 and 7 are entered via the keypad. Usually, the first two digits (manufacturer reference) or the first three digits (manufacturer reference and first call number digit) are permanently coded. The positions to be freely entered are always displayed right aligned. The FFSK encoder is programmed in register 001 (EEPROM 1). See section EEPROM 1 Programming Mode. If not all digits are permitted, the input can also be restricted (see section Call Code Filter).

Operating Mode Reference

The operating mode reference ("Betriebsartenkennzeichen" = BAK) is the criterion for different telegram forms:

0		At disposal
1	Q	Call to mobile
2	Q	Call to master station
3		Identification
4		Acknowledgement
5		Following telegram
6	Q	Break call
7		Reserved
8	Q	Priority call
9	Q	Status report
A		Reserved
B		Reserved
C		Reserved
D		At disposal
E		At disposal
F		Emergency call

BAKs marked with Q require an acknowledgement. For call transmission the BAK is coded at the third digit of register 032 in EEPROM 1 (usually '1' --> call to mobile).
The BAK for call evaluation is programmed at digit 4 of register 032 in EEPROM 1 (usually '2' --> call to master Station). In case of coding a '0', every telegram is processed by the FFSK decoder.

Limit Number

The limit number is programmed at digits 3 to 5 of register 031 (EEPROM 1). Call codes lower than the limit number are transmitted as 5-tone sequence; call codes higher or the same as the limit number are transmitted as FFSK telegram.

Rhomb

The rhomb is programmed at the first digit of register 031 (EEPROM 1). Application at disposal.

FFSK Identification

If FFSK identification is switched on, a FFSK identification code is transmitted any time the PTT button is pressed. As ID-code the decoder 1 coding (register 000) is transmitted. The FFSK identification is switched on at the first digit of register 032 in EEPROM 1 ('0' = off, '1' = on).

FFSK Emergency Call

If a FFSK telegram with status = emergency call is received, the Major 4 will stop any channel scanning. The loudspeaker and the handset are switched on, the loudspeaker lamp flashes, the emergency call ID-code is stored and flashes on the display. As long as an emergency call is displayed, the keypad is blocked. An emergency call can be deleted by pressing the (F1) key.

FFSK Decoder

At first, the BAK of every telegram is checked. If the BAK equals to the BAK coded at digit 4 of register 032 (EEPROM 1), the decoder is released.

The decoder 1 is coded in register 000 (EEPROM 1). See section EEPROM 1 Programming Mode. The telegram detected is compared with the decoder 1 coding and in case of positions being coded with 'F', any digit is accepted. If the FFSK telegram has been identified as correct, the loudspeaker and the handset are switched on, the loudspeaker lamp flashes, the FFSK acknowledgement is transmitted and the bell tone is started. No further telegram check will be performed.

The decoder 2 is coded in register 007 (EEPROM 1). See section EEPROM 1 Programming Mode. The telegram detected is compared with the decoder 2 coding and in case of positions being coded with 'F', any digit is accepted. If the FFSK telegram has been identified as correct, the loudspeaker and the handset are switched on, the loudspeaker lamp flashes and the bell tone is started. No further telegram check will be performed. An acknowledgement is not transmitted.

FFSK Acknowledgement

After detection by decoder 1 the FFSK acknowledgement is transmitted. The acknowledgement is coded in register 002 (EEPROM 1). If no acknowledgement is required, digit 1 of register 002 is coded with 'F' (blank).

Connector

Connector 1

| Pin | 5 | audio output |
| Pin | 18 | audio output |

| Pin | 16 | Alarm contact, open collector max. 100 mA |

| Pin | 3 | Transmitter keying, open collector max. 100 mA |

| Pin | 4 | audio input |
| Pin | 17 | audio input |

| Pin | 2 | Transmitter keying, optocoupler collector |
| Pin | 15 | Transmitter keying, optocoupler emitter max. 1 mA |

| Pin | 14 | Alarm contact, optocoupler collector |
| Pin | 1 | Alarm contact, optocoupler emitter max. 1 mA |

| Pin | 13 | Squelch (carrier input) |

| Pin | 19 | Reference voltage for channel switch output |

Pin	6	Switch output Q0
Pin	20	Switch output Q1
Pin	7	Switch output Q2
Pin	21	Switch output Q3
Pin	8	Switch output Q4
Pin	22	Switch output Q5
Pin	9	Switch output Q6
Pin	23	Switch output Q7
Pin	10	Switch output Q8
Pin	24	Switch output Q9
Pin	11	Switch output QA
Pin	12	Switch output QB

| Pin | 25 | GND (ground potential) |

Adjustments

1a) Adjusting RX input (audio from radio):

    a) Connect a signal of 1000 Hz at nominal level to the RX input.
    b) Connect a audio level meter to ST9 PIN1 (signal) and PIN4 (GND).
    c) Adjust the level to - 5 dBm with R8. If you can´t reach the level, you have to use the optionaly equalizer module. On the equalizer you can adjust the level with P802.

1b) Adjusting RX input and equalizing with connected line

    a) Do the steps 1a above.

    b) Turn P801 fully anticlockwise

    c) Adjust the level to - 5 dBm with R8. If you can´t reach the level, you have to adjust the level with P802 on the equalizer.

    d) Now Connect a signal of 3400 Hz at nominal level to the RX input. The level on ST9 PIN1 should be also - 5 dBm.

   e) Adjust the frequency response with P801. The maximum gain for 3400 Hz is about 20 dB.

2) Adjusting TX ouput (audio to radio):

    a) program the conference call encoder to 1000 Hz
       EEPROM-Register 048 = 153

    b) connect a dB-level meter and a radio to the TX output
       The output level for
       the levels should be for 2-wire: - 8 dBm for Major 4 and - 10 dBm for Major 4 T
       the levels should be for multiwire: as for the radio needed

    c) transmitt the conferce call

    d) adjust the level with R3

    e) if not needed, deactivate the conference call encoder

Positions of R8, R3 and the module mounting place ST9. ST9 is for the notch filter module or for the equalizer.
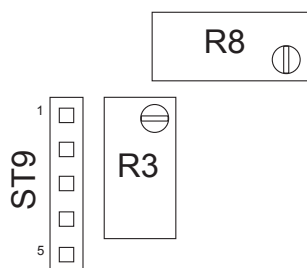
Sketch of the equalizer module.
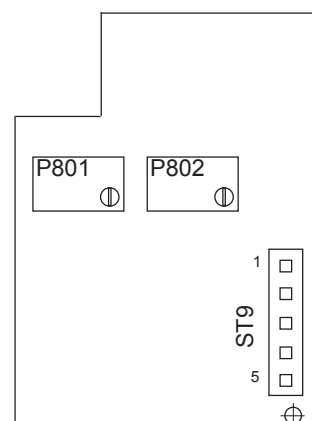
Order information

Type	Description	Voltage	Order No.
Major 4T Multiwire AC	Major 4 Multiwire AC, impedance 600 Ohm,	230 VAC	680021
	with connector plug, approval for Austria	12 VDC	680011
Major 4T Multiwire AC with FFSK	Major 4 Multiwire AC, with FFSK, impedance 600 Ohm,	230 VAC	680121
	with connector plug, approval for Austria 12VDC	12 VDC	680111
Major 4 AC with FFSK	Major 4 AC, with FFSK, impedance 600 Ohm,	230 VAC	681120
	with connector plug, approval for Germany 12VDC	12 VDC	681110
Major 4 DC2	Major 4 DC2, DC 2-wire, impedance 600 Ohm,	230 VAC	682020
	with connector plug	12 VDC	682010
Major 4 DC2 with FFSK	Major 4 DC2, DC 2-wire, impedance 600 Ohm, with FFSK,	230 VAC	682120
	with connector plug	12 VDC	682110
Major 4T Multiwire AC	Major 4 T Multiwire AC, impedance Zr	230 VAC	683020
	with connector plug, approval for Germany	12 VDC	683010
Major 4T Multiwire AC with FFSK	Major 4 T Multiwire AC, impedance Zr	230 VAC	683120
	with FFSK, approval for Germany	12 VDC	683110
Major 4T Multiwire AC with option phone interface	Major 4 T Multiwire AC, impedance Zr, with option phone interface BZT, with connector plug, approval for Germany	230 VAC	683021
		12 VDC	683011
Major 4T Multiwire AC with option phone interface, FFSK	Major 4 T Multiwire AC, impedance Zr, with option phone interface BZT, with connector plug, FFSK, approval for Germany	230 VAC	683121
		12 VDC	683111

Order information options

M4 phone interface	for connecting telephone line to radio and visa versa		
version BZT	approval for Germany		690410
version NL	approval for Netherland		690411
version CZ	approval for Czech		690412
version A	approval for Austria		690413

Correlation module	for better 5-tone decoding of noisy signals		691500
Equalizer	adjustible gain for higher frequencies, up to 20 dB at 3300 Hz		901000
I²C module	input module for 8 digital signals		901100
Notch filter module	to suppress the pilot tone if more than one M4 are used on AC-line		901200
Relais module	with two relais to connect PTT and emergency contacts		901400
Gooseneck microphone	length 28 cm		691401
Printer interface	RS232 to Centronics with 2 m cable		902000
EBW1	mounting tub		904000

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Technical Data	Major 4 Multiwire, AC, DC	Major 4 T Multiwire (AC possible)
Supply		
230V version	230V AC +/- 10%	230V AC +/- 10%
12V version	+12 V DC -10% +20%	+12 V DC -10% +20%
Current with max. volume	max. 800 mA from +12 V DC	max. 800 mA from +12 V DC
Input Level (RX-In)		
Factory adjusted at	- 8 dBm	- 10 dBm
Range of adjustment	- 25 dBm to - 5 dBm	- 25 dBm to - 5 dBm
Input impedance	600 Ohm	Z_R (AC) / 600 Ohm (Vieldraht)
Output Level (TX-Out)		
Factory adjusted at	- 8 dBm	- 10 dBm
Range of adjustment	- 25 dBm bis - 5 dBm	- 25 dBm bis - 5 dBm
Output impedance	600 Ohm	Z_R
Weight		
230V version (without/with Phone Interface)	1950/2100 g	1950/2100 g
12V version (without/with Phone Interface)	1730/1880 g	1730/1880 g
Dimensions		
B x T x H	245 x 220 x 90 mm	245 x 220 x 90 mm

Technical Data of Phone Interface	BZT version	NL, A version	CZ version
Supply	from Major	from Major	from Major
Mounting	inside Major	inside Major	inside Major
Input Level (Tel-In)			
Factory adjusted at	- 10 dBm	- 10 dBm	- 10 dBm
Range of adjustment	- 13 dBm to - 5 dBm	- 15 dBm to - 7 dBm	- 15 dBm to - 7 dBm
Input impedance	Z_R	600 Ohm	600 Ohm
Output Level (Tel-Out)			
Factory adjusted at	- 10 dBm	- 10 dBm	0 dBm
Range of adjustment	- 19 dBm to - 6 dBm	- 22 dBm to - 8 dBm	- 22 dBm to + 3 dBm
Output impedance	Z_R	600 Ohm	600 Ohm
Gewicht	150 g	150 g	150 g

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