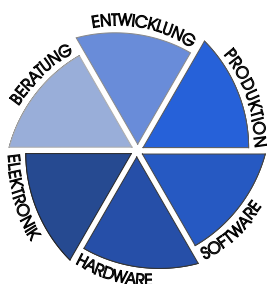


# Major 3 TRC

English Version 1.0



**FunkTronic**

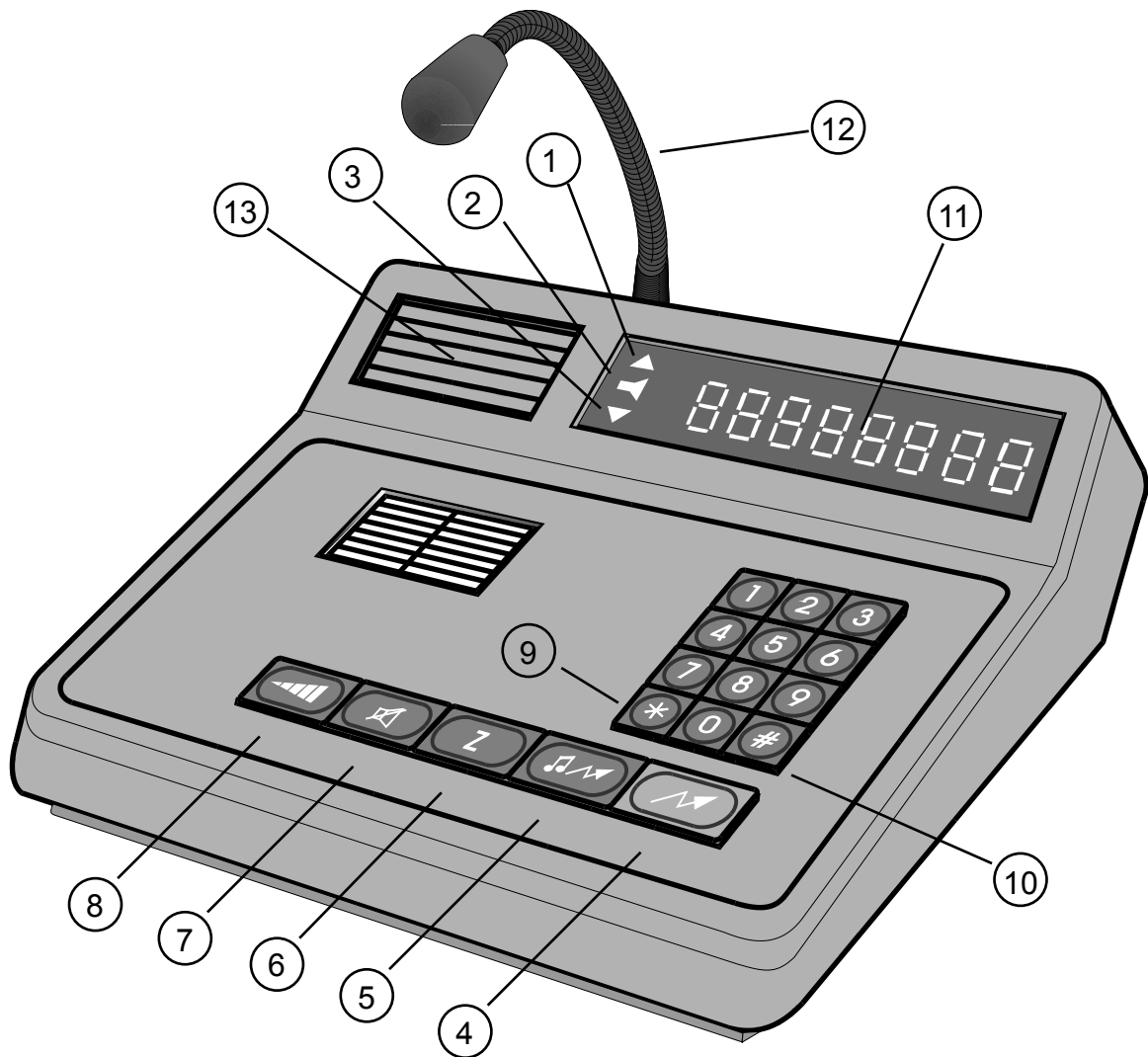
Kompetent für Elektroniksysteme

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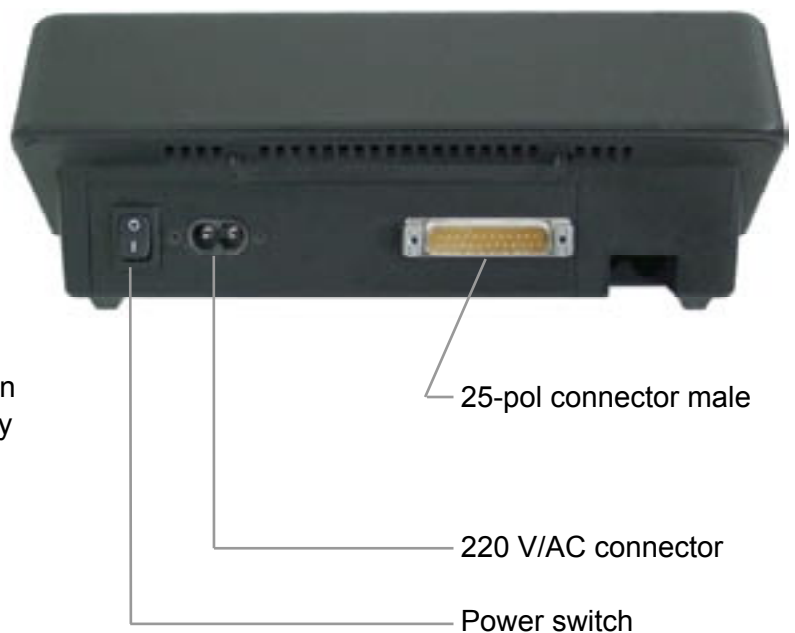
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## Display and Control Elements



## Rear view Major 3

- 1 - PTT Indicator
- 2 - Loudspeaker indicator
- 3 - Busy indicator
- 4 - PTT key
- 5 - Call button
- 6 - Short call button, status key
- 7 - Loudspeaker key
- 8 - Loudspeaker volume key
- 9 - Function key and channel selection
- 10 - Function key and ID-Code memory
- 11 - LED Display
- 12 - Microphone
- 13 - Loudspeaker



25-pol connector male

220 V/AC connector

Power switch

# Major 3 TRC

## General Operating Instructions

The Major 3 is controlled by a micro processor. It is used to control radio systems. To program the Major 3 you use easily the keyboard.

There are two main versions of Major 3. One for use with 12 V DC main power and one with integrated 230 V AC power supply.

On the rear side is 25-pin connector. This is for connecting squelch input, ptt output, audio in/output, 5 plus 1 digital outputs. You can also connect the DC power to this.

The Major 3 with option FFSK/RS232 has an RS232 Interface. You can use it to program the Major 3 or connect a terminal for special purposes.

Only the Major 3 for 230 V AC has an power switch on the rear side. After switching on the display shows for one sec. <Futro>. Then the cursor flashes for input.

Before first use of Major 3, you have to adjust audio levels to the radio.

## Busy Indicator and carrier input

The busy indicator and as well the carrier input is programmed with EEPROM register 053 on 1. position. Any voltage from 0 to 2 volt is detected as low and a voltage from 3 to 12 volt as high. If you have an 2-wire connection you can use the carrier input to transmit a programmed tone sequence. In case of a two-wire system the busy indicator is controlled by voice activity.

### Register 053

1. position	busy indicator on when
	0 = carrier input < 2V
	1 = carrier input > 3V
	2 = audio squelch, 2-wire connection
	3 = audio squelch, 2-wire connection, transmitting tone sequence when carrier input is true

## Loudspeaker indicator

Is switched on if the loudspeaker is open. The indicator flashes if an incoming call is detected. In this case the loudspeaker is also switched active.

## Loudspeaker

To change the volume push the button loudspeaker key. The display shows <VOL> and now you can enter a new value from 0 to 9.

You can switch on and off the loudspeaker by pushing the loudspeaker key. The loudspeaker is also active after pushing the PTT, after transmitting a call or if a incoming call is detected.

The loudspeaker is switch of manually by the loudspeaker key or automatically with a programmable timer.

Register 050	loudspeaker mode and timer
1. position	LS-Timer sec. * 100
2. position	LS-Timer sec. * 10
3. position	LS-Timer sec. * 1
4. position	0 = loudspeaker controlled mode 1 = loudspeaker always open

## Call Handling

You can talk to the radio subscriber by pushing the PTT. After releasing the PTT button you will hear the radio subscriber through the loudspeaker. Normally, after call termination, the loudspeaker is switched off by the loudspeaker key.

## Calling Radio Subscriber

At first, the call number is entered via the key pad. 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 by pressing the call button.

## Short Call Numbers

The Major 3 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.

## 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.

## Transmitting a tone sequence with analog input

By switching the analog input to ground the 5-tone sequence in register 011 is transmitted. This function is activated in register 054.

Register	3. position	analog input
		0 = no function
		1 = transmitting 5-tone

## Transmitting a tone sequence with carrier input

By switching the carrier input to ground the 5-tone sequence in register 012 is transmitted. This function is activated in register 053. See section Busy Indicator and carrier input.

## Call from Radio Subscriber

An incoming call is registered by a bell tone. The loudspeaker is switched on and the loudspeaker LED flashes.

## Input the status code

If you hold down the (Z) key for a moment you enter the status mode. Now you can enter a one or two digit status.

## Transmitting a call by pushing the PTT

You can transmit a 5-tone or FFSK code by pushing the PTT. The code from register 015 is used.

Register 053  
 3. position      0 = no transmission  
                     1 = FFSK code transmitted  
                     2 = 5-tone code transmitted

## Transmitting a call by releasing the PTT

You can transmit a 5-tone or single tone (roger peep) code by releasing the PTT. The 5-tone code from register 015 is used.

Register 053  
 4. position      0 = no transmission  
                     1 = roger peep 2800 Hz  
                     2 = 5-tone code + status transmitted  
                     2 = 5-tone code + status + roger peep transmitted

## 5-Tone Sequence Encoder

### Precoding

The 5-tone sequence encoder is configured according to the application requirements and as well for comfortable operation. Logically, you will permanently code those positions which should not be entered via the key pad. The permanently coded tones can be placed at any position of the tone sequence. Use F for variable positions. 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 key pad. 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 010. See section EEPROM 1 Programming Mode.

## Call with ID code

The ID code is programmed in register 015. Normally the ID code is programmed same as decoder 1. The sequence of ID code and call code is programmed in register 053.

Register 053      2. position      0 = no code  
                                                                                  1 = call code + ID code (double sequence)  
                                                                                  2 = ID code + call code (double sequence)  
                                                                                  3 = call code + ID code (6-tone sequence)  
                                                                                  4 = call code + ID code (7-Tone sequence)  
                                                                                  5 = call code + ID code (8-Tone sequence)

## Transmitting call with status

The status can be one or two digit. It is added on the end of the tone sequence.

Register 054      1. position      0 = no status  
                                                                                  1 = status one digit  
                                                                                  2 = status two digit

## Receiving of calls

The Major 3 has 10 decoders. They are coded in registers 020 to 029. If you don't need a decoder, put in an F on first position. You can also program different modes in the registers 030 to 039. The following modes are possible.

- managing of double sequences
- managing of tone sequences with more than 5 tones
- display of received ID codes
- bell tone
- on time of emergency contact
- acknowledgement
- loudspeaker mode

## Decoder 1

The Decoder 1 is coded in register 020. Every tone sequence is compared with the decoder 1 coding and in case of positions being coded with 'F', every tone of the tone system will be accepted. If the tone sequence has been identified as correct, the loudspeaker is 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. Any further tone sequence check, for example by decoder 2 or the conference call decoder, is not performed.

## Bell Tone

The bell tone volume is according to the basic programmed volume. You have the choice of 10 different bell tones (1 to A). If no bell tone is desired, a '0' has to be programmed at this position.

## Alarm Switching Output

After successful evaluation the bell tone is generated and the alarm contact is switched for n\*1 seconds. The alarm time is programmable for each decoder. The alarm contact time is programmed in one-second intervals in registers 030 to 039 3. position.

## Acknowledgement

The automatic acknowledgement after a selective call can operate in different ways. The acknowledgement mode is programmed at position 4 of register 030 as follows:

- 0 = no acknowledgement
- 1 = standard acknowledgement (from register 017)
- 2 = acknowledgement with a single tone of 600 Hz for 300 msec
- 3 = acknowledgement with a tone sequence from register 015 (ID-code)
- 4 = acknowledgement with the identification last received
- 5 = additionally standard acknowledgement (from register 017), used for FFSK

## Group Call Decoder

The group call decoder for tone A or 0 can be programmed for each of the ten decoders. Program tone A or 0 on the position you want. Don't forget to block acknowledgement.

## Conference Call Decoder

The conference call decoder detects a tone of at least one second duration. After detection the loudspeaker is switched on, the loudspeaker lamp flashes, and the bell tone is activated. No acknowledgement is transmitted. The conference call tone frequency is coded at position 1 of register 044 with the corresponding digit of the tone system ('0' ... 'E') . If this decoder is not required, please code an 'F' at that position.

Register 044	conference call decoder
1. position	frequency of conference call (F for off)
2. position	bell tone
	0 = no bell tone
	1 = bell tone type 1
	2 = bell tone type 2
	.
	.
	.
	A = bell tone type 9
3. position	n * sec. emergency output on
4. position	n/a
5. position	loudspeaker
	0 = always off
	1 = on if call detected

## Emergency Decoder

The emergency call decoder is coded in register 046. If this decoder is not required, please code an 'F' at the first position of the tone sequence. The read in 5-tone sequence is compared with the emergency coding. From the second up to the fifth position those positions being coded with 'F' will accept all tones of the tone system. The 5 tones has to be followed by a 6th tone. This tone is coded in register 046 on 5. position. In case of successful decoding the loudspeaker is switched on. The emergency output is activated. As long as an emergency call is indicated on the display, the key pad is blocked with exception of the PTT button.

## ID-Code Memory

The ID-code memory can be configured so that it is optimal 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 (#) 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 longer. If the "FIFO" function is switched on, always the oldest number is shown on the display by pressing the (#) key and only after deleting this ID-code the next ID-code follows. The "FIFO" function is programmed at the second position of register 043. The ID-code memory can be used for single or double sequences as well as for 6, 7 and 8 tone sequences.

## Key Tones

The key tones are coded in register 016. The coding of these tones selects the ID-codes which are stored, and determines the digits to be displayed. Those positions where every tone is allowed and which are displayed later on, has 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 position 1 of register 021.

## Tone length encoder

The length of the first tone is defined at positions 1 and 2 of register 042. The length of the other tones can be adjusted at position 3 of register 042. The value can be switched in 10 msec intervals. The tone length of the first tone can also deviate from the other tones.

## Tone length decoder

In case of tone identification a tolerance has to be added. This ensures that even inexact 5-tone telegrams are evaluated correctly. The minimum tone length is programmed in register 040 at position 4 and 5. The maximum tone length of the first tone is programmed in register 040 at position 1 to 3. The maximum tone length of the others is programmed in register 041 at position 1 to 3. The values are adjustable in 5 msec steps.

## Tone length of the emergency tone (decoder)

The emergency tone is the 6th tone. The minimum length is defined in register 045 at position 4 and 5. The maximum is programmed in register 045 an position 1 to 3. The values are adjustable in 5 msec steps.

## Tone Systems

The Major 3 can be configured for various tone systems without any hardware modification. The tone system is selected at position 5 of register 046. 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.

Register 041	5. position	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
length					
min.	52.5 msec	75 msec	52.5 msec	30 msec	52.5 msec
typ.	70 msec	100 msec	70 msec	40 msec	70 msec
max.	87.5 msec	125 msec	87.5 msec	50 msec	87.5 msec

## Transmitter keying

The transmitter can be keyed by the red PTT button on the key pad. The transmitter is keyed as long as the PTT button is pressed, except if the TX time out is exceeded. In the multi wire version it is controlled by an open collector output and in AC version by a pilot tone.

## TX time out timer

The TX time out timer is programmed in one second intervals at positions 1 to 3 of register 051. Values of '000' up to '255' are permitted. If the programmed value is '000', the TX time out timer is out of operation.

## Transmitter prerunning time

The prerunning time is preceding every call before connecting the audio. It can be programmed in 10 msec intervals at positions 1 to 2 of register 052. The variable value can be defined freely between '00' and '99'.

## PTT button blocking

The PTT button blocking is programmed at position 5 of register 052.

0 = PTT button blocking is switched off

1 = PTT button is blocked in case of sensed carrier

## Pilot tone and DC remote control

The remote control is configured in position 3 and 4 at register 052.

Register 052

- 3. position AC remote control
  - 0 = no AC remote control
  - 1 = AC remote control with pilot tone 3300 Hz
  - 2 = AC remote control with pilot tone 3000 Hz
  - 3 = AC remote control for Motorola TRC with guard tone 2100 Hz
  
- 4. position level of pilot tone
  - 0 = 0 dBm
  - 1 = -10 dBm
  - 2 = 50 msec 0 dBm, then - 10 dBm

## Channel switching (TRC)

To put in a channel, push the key (\*) until the left digit flashes. The numbers from 1 to 8 are possible.

- Register 066
- 1. position
    - 0 = channel switching off
    - 1 = channel switching on

## Tone/Channel table for TRC

Channel	Frequency/Hz
1	1950
2	1850
3	1750
4	1650
5	1350
6	1250
7	1150
8	1050

## FFSK mode (option)

The Major 3 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 3 operates according to ZVEI recommendation.

## Telegram Structure

The call telegram starts with an unmodulated carrier which has to be available at the receiver side for at least 25 msec. 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 3 derives this selection from the call number and automatically transmits the call in the correct call mode.

The 8-digit selective call number is arranged as follows:

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

The encoder is configured according to the application requirements and as well for comfortable operation. Logically, you will permanently code those positions which should not be entered via the key pad. 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 key pad. Usually, the first two or three digits are permanently coded. The positions to be freely entered are always displayed right aligned. The FFSK encoder is programmed in register 010.

## Operating Mode Reference

The operating mode reference ("**B**etriebsartenkennzeichen" = 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. In case of coding a '0', '2', '3' or 'F' every telegram is processed by the FFSK decoder.

## Limit Number

The limit number is programmed at positions 1 to 3 of register 060. 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 position 5 of register 060. Application at disposal.

## FFSK Emergency Call

If a FFSK telegram with status = emergency call is received, the loudspeaker is 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 key pad is blocked (exception PTT). An emergency call can be deleted by pressing the (#) key.

## FFSK Decoder

The decoder 1 to 10 are coded in registers 020 to 029. 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 is 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 017. If no acknowledgement is required, position 4 of register 030 ... 039 is coded with '0'.

Register 030 ... 039	4. position	0 = no acknowledgement
		1 = FFSK standard acknowledgement
		2 = single tone 600 Hz for 300 msec
		3 = ID code
		4 = received ID code
		5 = FFSK standard acknowledgement + 5-tone acknowl.

## Setup Mode

### Setup Menu

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

- 0 = reset program
- 1 = EEPROM programming mode
- 2 = Service mode analog switches
- 3 = Service mode potentiometers
- 4 = transmit levelling tones
- 5 = display software version

### EEPROM Programming Mode

After selecting the EEPROM programming mode, the left display shows the message <Pas>, and the cursor flashes at the input position 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 position of the right display.

Now the register address to be newly coded has to be entered. 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 <co> and the actual coding is shown on the right display. Now that coding can be over written with new values. Generally, in setup mode you confirm the last input by pressing the (#) key. Pushing (#) key again escapes the setup program.

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

1	2	3
4	5	6
7	8	9
A	0	#

B	C	D	E	F
---	---	---	---	---

## EEPROM Addresses

Register	Coding for
000	short call number 0
⋮	⋮
009	short call number 9
010	pre-coding of 5-tone encoder
011	5-tone sequence transmitted after activating analogue input
012	5-tone sequence transmitted after activating carrier input
015	personally ID-code
016	key tones
017	standard acknowledgement
020	decoder 1
⋮	⋮
029	decoder 10
030	setup for decoder 1
	1. position ID-Mode
	0 = 5-tone sequence, saved in ID-code memory
	1 = double sequence, call number followed by ID-code
	2 = double sequence, ID-code followed by call number
	3 = 6-tone sequence
	4 = 7-tone sequence
	5 = 8-tone sequence
	6 = monitor, any tone sequence is displayed
	7 = 5-tone sequence, not saved in ID-code memory
	2. position bell tone
	0 = no bell tone
	1 = bell tone 1
	⋮
	⋮
	9 = bell tone 9
	A = bell tone A
	3. position emergency output activated for n sec.
	4. position acknowledgement
	0 = no acknowledgement
	1 = standard acknowledgement
	2 = tone 600 Hz for 300 ms
	3 = personally ID code
	4 = received ID code
	5 = FFSK standard acknowledgement followed by 5-tone standard acknowledgement
	5. position loudspeaker after decoding
	0 = allways of
	1 = activated after decoding
031	setup for decoder 2
⋮	⋮
⋮	⋮
⋮	⋮
039	setup for decoder 10
040	setup for 5-tone sequence decoder

- |     |                                                   |                                                                |
|-----|---------------------------------------------------|----------------------------------------------------------------|
|     | 1. position                                       | max. duration 1. tone, $n * 5 \text{ msec} * 100$              |
|     | 2. position                                       | max. duration 1. tone, $n * 5 \text{ msec} * 10$               |
|     | 3. position                                       | max. duration 1. tone, $n * 5 \text{ msec} * 1$                |
|     | 4. position                                       | min. duration all tones, $n * 5 \text{ msec} * 10$             |
|     | 5. position                                       | min. duration all tones, $n * 5 \text{ msec} * 1$              |
| 041 | setup for 5-tone sequence decoder                 |                                                                |
|     | 1. position                                       | max. duration from 2. to last tone, $n * 5 \text{ msec} * 100$ |
|     | 2. position                                       | max. duration from 2. to last tone, $n * 5 \text{ msec} * 10$  |
|     | 3. position                                       | max. duration from 2. to last tone, $n * 5 \text{ msec} * 1$   |
|     | 4. position                                       |                                                                |
|     | 5. position                                       | tone types of encoder and decoder                              |
|     |                                                   | 0 = ZVEI 1                                                     |
|     |                                                   | 1 = CCIR                                                       |
|     |                                                   | 2 = ZVEI 2                                                     |
|     |                                                   | 3 = EEA                                                        |
|     |                                                   | 4 = ZVEI 3                                                     |
| 042 | setup for 5-tone sequence encoder                 |                                                                |
|     | 1. position                                       | duration 1. tone, $n * 10 \text{ msec} * 10$                   |
|     | 2. position                                       | duration 1. tone, $n * 10 \text{ msec} * 1$                    |
|     | 3. position                                       | duration from 2. to last tone, $n * 10 \text{ msec}$           |
|     | 4. position                                       |                                                                |
|     | 5. position                                       |                                                                |
| 043 | setup for ID code memory                          |                                                                |
|     | 1. position                                       | update on/off                                                  |
|     | 2. position                                       | FIFO on/off                                                    |
|     | 3. position                                       | display counter on/off                                         |
|     | 4. position                                       | display ID code immediately on/off                             |
|     | 5. position                                       |                                                                |
| 044 | setup for conference call decoder                 |                                                                |
|     | 1. position                                       | tone for conference call, F = off                              |
|     | 2. position                                       | bell tone                                                      |
|     |                                                   | 0 = no bell tone                                               |
|     |                                                   | 1 = bell tone 1                                                |
|     |                                                   | .                                                              |
|     |                                                   | .                                                              |
|     |                                                   | 9 = bell tone 9                                                |
|     |                                                   | A = bell tone A                                                |
|     | 3. position                                       | emergency output activated for n sec.                          |
|     | 4. position                                       | n/a                                                            |
|     | 5. position                                       | loudspeaker after decoding                                     |
|     |                                                   | 0 = allways of                                                 |
|     |                                                   | 1 = activated after decoding                                   |
| 045 | setup for 5-tone sequence decoder, emergency call |                                                                |
|     | 1. position                                       | max. duration 6. tone, $n * 5 \text{ msec} * 100$              |
|     | 2. position                                       | max. duration 6. tone, $n * 5 \text{ msec} * 10$               |
|     | 3. position                                       | max. duration 6. tone, $n * 5 \text{ msec} * 1$                |
|     | 4. position                                       | min. duration all tones, $n * 5 \text{ msec} * 10$             |
|     | 5. position                                       | min. duration all tones, $n * 5 \text{ msec} * 1$              |
| 046 | setup for 5-tone sequence decoder, emergency call |                                                                |
|     | 1. to 4. position                                 | key tones for emergency decoder                                |
|     | 5. position                                       | emergency tone, 6th tone                                       |

- 047 setup for 5-tone sequence decoder, emergency call
1. position n/a
  2. position n/a
  3. position time in sec. for emergency output
- 050 loudspeaker timeout
1. position n \* sec \* 100
  2. position n \* sec \* 10
  3. position n \* sec \* 1
  4. position loudspeaker allways active on/off
- 051
1. position transmitter timeout, n \* sec \* 100
  2. position transmitter timeout, n \* sec \* 10
  3. position transmitter timeout, n \* sec \* 1
  4. position blocking after timeout, n \* sec \* 10
  5. position blocking after timeout, n \* sec \* 1
- 052 transmitter keying
1. position transmitter pre running time, n \* 10 msec \* 10
  2. position transmitter pre running time, n \* 10 msec \* 1
  3. position AC remote control  
0 = no AC remote control  
1 = AC remote control with 3300 Hz  
2 = AC remote control with 3000 Hz  
3 = AC remote control with Motorola TRC, 2100 Hz
  4. position level of pilot tone for remote control  
0 = 0 dBm  
1 = -10 dBm  
2 = 50 msec 0 dBm, then -10 dBm
  5. position PTT blocking  
0 = off  
1 = PTT blocked if carrier is detected
- 053 setup for encoder
1. position carrier display and carrier input  
0 = carrier input < 2V = LED on  
1 = carrier input > 3V = LED on  
2 = audio squelch  
3 = audio squelch + transmitting tone sequence from register 012 if carrier input
  2. position ID-Mode  
0 = 5-tone sequence without ID code  
1 = double sequence, call + ID code  
2 = double sequence, ID code + call  
3 = 6-tone sequence, call + ID code  
4 = 7-tone sequence, call + ID code  
5 = 8-tone sequence, call + ID code
  3. position transmitting ID code when pushing PTT  
0 = no ID code transmitting  
1 = ID code transmitted as FFSK code  
2 = ID code transmitted as 5-tone sequence
  4. position transmitting ID code when releasing PTT  
0 = no ID code transmitting  
1 = roger peep  
2 = ID code + status  
3 = ID code + status + roger peep

5. position      time slot between double sequence,  $n * 20$  msec
- 054    setup other functions
1. position      setup status  
                     0 = no status  
                     1 = status one digit  
                     2 = status two digit
2. position      n/a
3. position      analogue input  
                     0 = no action  
                     1 = transmitting 5-tone sequence from register 011 if input low
- 060    FFSK setup
1. position      limit number hundreds
2. position      limit number tens
3. position      limit number ones
4. position      call system if number  $\geq$  limit number  
                     0 = tone sequence  
                     1 = FFSK code
5. position      rhomb
- 066    setup channel switching
1. position      0 = off  
                     1 = on
- 099    Password
- 222    load factory default values

## Service mode analog switches

During service work it can be necessary to switch a certain signal path. Since the processor controls all analog switches they can be switched by the service program.

After selecting the service mode analog switches put in the number of the switch to control. Now the input is flashing and waiting for a 0 or a 1 (0=off, 1=on).

With the # key you can enter the next switch. If you enter # key again, the service mode is escaped.

## Service mode potentiometer

During service work it can be necessary to adjust a certain signal path. Since the processor controls all potentiometers they can be adjusted by the service program.

If you use a password, you have to enter when the display shows <Pas>.
















Enter the potentiometer number to adjust. Now put in a 0 to adjust anticlockwise or a 1 for clockwise. Steps from 0 to F are possible.

For adjusting TX output level (CS3) a 1000 Hz tone is transmitted automatically.

Potentiometer	Function	Poti number
CS1	loudspeaker volume	1
CS2	RX input level	2
CS3	TX output level	3

## Transmit leveling tones


For leveling the Major 3 it is possible to transmit different tones. Enter setup mode number 4. The display shows now <ton>. Push a key according to the table below.

 = 200 Hz	 = 1000 Hz	 = 2900 Hz
 = 300 Hz	 = 1600 Hz	 = 3000 Hz
 = 400 Hz	 = 2400 Hz	 = 3100 Hz
 = 600 Hz	 = 3400 Hz	 = 3300 Hz
 = 800 Hz	 = 4000 Hz	 = 1200 Hz

To change the frequency push an other key. To escape the mode push # key.

## Adjustment

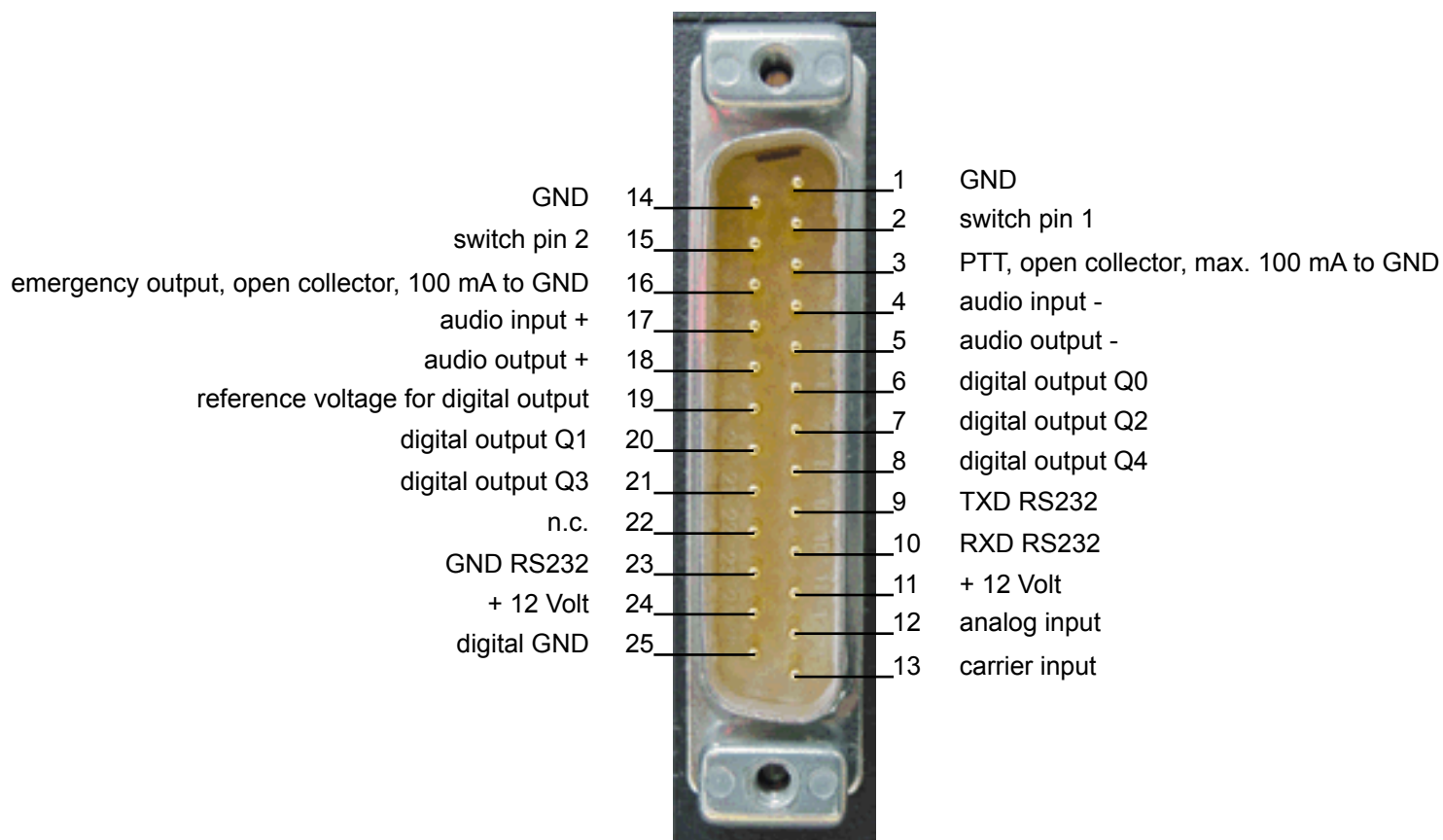
### 1) Adjusting audio input

- Connect a signal of 1000 Hz at nominal level to the input
- Disconnect the loudspeaker, connect a 8 Ohm resistor instead and level meter
- Adjust the volume to max. level (9)
- Switch on the loudspeaker by pushing  key
- Adjust the level with poti no. 2 (CS2), nominal level is + 10 dBm

## 2) Adjusting audio output

- connect a level meter and the radio (line) to the audio output, the nominal level of the level tones should be - 6 dBm for 2-wire connection; for multi wire connection adjust to reach the nominal deviation of the radio
- use poti no. 3 (CS3) for adjustment, 1000 Hz level tone is transmitted automatically

## Connector male, view from rear Major 3 TRC



- switch on pin 2 and 15 only in version without power supply, otherwise n.c.
- use pin 5 and 18 for 2-Wire connection
- RS232 (pin 9, 10, 23) only with option FFSK/RS232

**Technical Data****Supply**

230V version

12V version

Current with max. volume

**Input Level (RX-In)**

Factory default levelling

Range of adjustment

Input impedance

**Output level (TX-Out)**

Microphone audio default

Microphone audio adjustment range

Signalling audio default

Signalling audio adjustment range

Output impedance

**Weight**

220V version

12V version

**Dimensions**

B x T x H

**Major 3**

230V AC +/- 10%

or

+12 V DC -10% +20%

+12 V DC -10% +20%

max. 600 mA from +12 V DC

- 6 dBm

- 28 dBm to +14 dBm

600 Ohm

- 8 dBm

- 21 dBm to - 7 dBm

- 8 dBm

- 21 dBm to - 7 dBm

600 Ohm

1700 g

1200 g

245 x 220 x 95 mm

**Major 3 TRC**

230V AC +/- 10%

or

+12 V DC -10% +20%

+12 V DC -10% +20%

max. 600 mA from +12 V DC

- 6 dBm

- 28 dBm to +14 dBm

600 Ohm

- 8 dBm

- 22 dBm to - 8 dBm

- 6 dBm

- 20 dBm to - 6 dBm

600 Ohm

1700 g

1200 g

245 x 220 x 95 mm

## Change notices

**Change from 29.01.02 (Zier) / (Date of last version: 08.01.02):**  
- page 4, picture M3 rear new