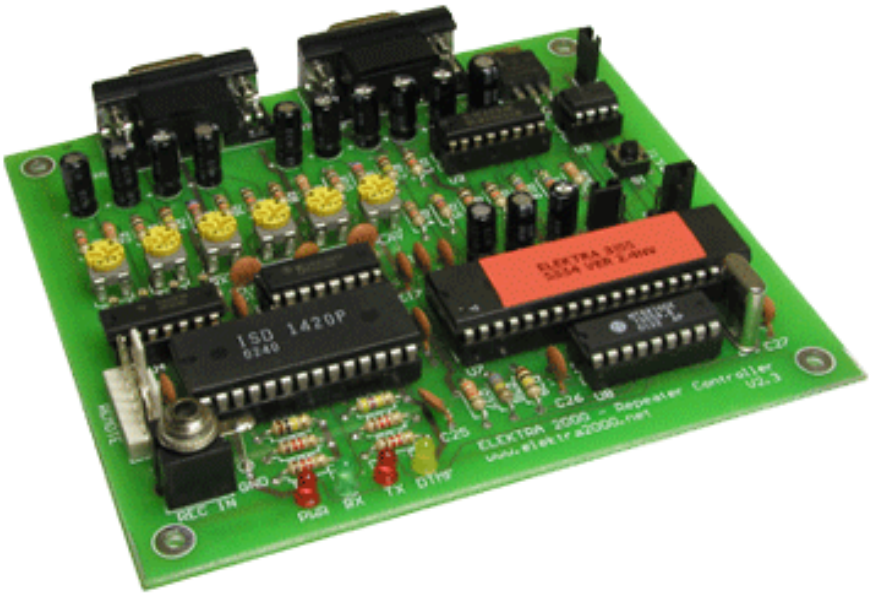
Hamtronix

Repeater Controller

Elektra 2000



Instruction Manual

Software V2.10
Hardware Revision H

TECHNICAL SUPPORT

If any doubt remains after a complete reading of this manual, visit our web site. You will find last minute information and an FAQ section with answers to frequent questions.

You can get support by phone or e-mail:

support@hamtronix.com

Questions by e-mail usually answered in less than 24 hours.

PRECAUTIONS

Please observe the following precaution to prevent radio equipment and controller damage:

- Verify the correct polarity of the power source. Incorrect polarity may destroy the board.
- Do not modify controller circuits unless instructed by this manual or by Hamtronix documentation.
- Do not place the controller in excessively dusty areas, humid areas, wet areas, nor on unstable surfaces that may cause short-circuits.
- If abnormal odor or smoke is detected coming from the board, turn off the power immediately. Contact Hamtronix for support and service.

LIMITED WARRANTY

This Warranty covers all defects in materials and workmanship in Hamtronix boards for the original purchaser. This Warranty will remain in effect for one (1) year from the date of purchase. This Warranty do not covers damage, deterioration or failure resulting from:

1) Accident, misuse, abuse, neglect, unauthorized product modification or failure to follow instruction contained in manual.
2) Water or other elements.
3) Repair or attempted repair by anyone not authorized by Hamtronix.
4) Any unit which is not new when sold to the first end user or upon which the serial number has been defaced, modified or removed.

This board must be interconnected with radio equipment or accessories using connectors. Any sign of direct soldering to the board will void the Warranty.

Hamtronix liability is limited to repair or replacement of any defective product, Hamtronix shall not be liable for any damages, whether incidental, consequential or otherwise, because of any defective Hamtronix product.

If it is necessary to ship the product to us for warranty service, you are responsible for the shipping charges.

Firmware Updates

Firmware updates, when available, will be published at our web site. Update requests, if compatible with your hardware, can be requested and will be free of charge during the Warranty period. The controller must be shipped to Hamtronix for firmware updates. All shipment charges will be paid by customer.

CONNECTORS

CN1 – Repeater (RPT)

Pin	Signal	Description
1	RX	RX audio (from repeater receiver)
2	GND	Ground
3	MIC	TX audio (to repeater transmitter)
4	PTT[1]	PTT signal output (to repeater transmitter)
5	COR	COR/COS signal input (from repeater receiver)
6	TONE	CTCSS logic input (from repeater receiver or optional CTCSS decoder)
7	5V	Regulated 5V/100mA (power source for CTCSS decoder)
8	FAN[2]	Fan control output
9	VCC	DC Power source (11V ~ 15V/20mA standby)

Note [1]: *Open Collector - max.100 mA (Active in low)*
Note [2]: *Open Collector - max.100 mA (Active in low)*

CN2 – LINK

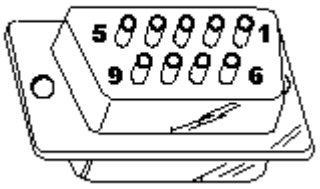
Pin	Signal	Description
1	RX	RX audio (from link transceiver)
2	GND	Ground
3	MIC	TX audio (to link transceiver)
4	PTT	PTT signal output (to link transceiver)
5	COR	COR/COS signal input (from link transceiver)
6	TONE	CTCSS logic input (from link transceiver or optional CTCSS decoder)
7	ALM	Alarm input (active high)
8	MON	Monitor input
9	-	No connected

CN3 – Remote

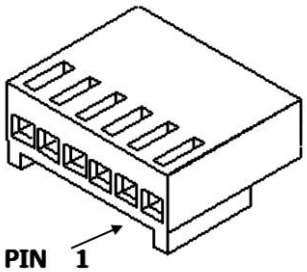
Pin	Signal	Description
1	Output 1	Remote Logic Output 1 (OV=OFF/5V=ON)
2	Output 2	Remote Logic Output 2 (OV=OFF/5V=ON)
3	Output 3	Remote Logic Output 3 (OV=OFF/5V=ON)
4	Output 4	Remote Logic Output 4 (OV=OFF/5V=ON)
5	Output 5	Remote Logic Output 5 (OV=OFF/5V=ON)
6	Output 6	Remote Logic Output 6 (OV=OFF/5V=ON)
7	GND	Ground

Note: *Max.10mA per port.*

PIN OUT



CN1 and CN2



CN3

INSTALATION

It's recommended to enclose the controller board into a shielded box to avoid undesirable radio interference that may cause unstable operation[1].

Pin on CN1	Legend	Connect to
1	RX	Audio output from repeater receiver[2] (discriminator or speaker)
2	GND	Ground (common for power source/receiver/transmitter)
3	MIC	Audio input on repeater transmitter[2] (microphone or modulator)
4	PTT	PTT input on repeater transmitter
5	COR	COR/COS output from repeater receiver
6	TONE	CTCSS logic output from repeater receiver or optional decoder
9	VCC	13.8V power supply

Note 1: *If exposed to high levels of RF without a proper shield, it may present unstable operation.*
Note 2: *Use shielded cables for audio signals to avoid undesirable noises on repeater audio.*

DETERMINING COR LOGIC

Locate your repeater receiver's COR output. This line has a DC voltage that changes state when a signal is being received. If the COR line is 0 volts and goes to a positive voltage when a signal is received it is said to be (positive logic) or active HIGH. If the COR line is a positive voltage, and goes to 0 volts when a signal is received it is said to be (negative logic) or active LOW. Note: 0 volts is any voltage less than 0.8VDC. A positive voltage is any voltage greater than 2.0VDC.

POSITIVE COR (+)
If you receiver has positive COR, jumper J2 should be at 1-2 position.

NEGATIVE COR (-)
If you receiver has negative COR, jumper J2 should be at 2-3 position.

Note: *COR for link port works the same way using at jumper J3.*

AUDIO QUALITY

The fidelity of retransmitted audio won't depend just of the controller's audio circuit, but from where you get the audio from the receiver and where you inject on the transmitter

De-emphasis and Pre-emphasis

Before an FM transmitter transmits the audio on the air, the audio coming from the microphone has to pass through a pre-emphasis circuit. This circuit boosts the audio at 6dB per octave. Pre-emphasis is needed in FM to maintain a good signal to noise ratio. At the receiver side, a de-emphasis circuit takes the unnatural sounding pre emphasized audio and turns it back into its original response. Pre emphasized (discriminator) audio is available directly from the audio demodulation (discriminator) circuitry.

Plain Audio

The main idea is your repeater gets the discriminator audio from the receiver (pre emphasized at origin) and retransmits without any modification injecting this audio at modulator's transmitter (after pre-emphasis circuitry). That way your repeater audio response will be more natural.

The configuration "receiver speaker output"/"transmitter microphone input" can be used, but will required some equalization to allow a natural sound. You can modify the controller's flat audio response using capacitors in your audio circuits. See more details on this on page 5.

TURNING YOUR CONTROLLER ON FOR THE FIRST TIME

Place jumper J1 (ON). A melody should be heard if all transmitter connections were made correctly. Key up on repeater input frequency to check if the received signal is being retransmitted. If the receiver connections were made correctly, you should be able to hear the courtesy tone after transmitter drops. If you hear no melody at power up or you can't access the repeater receiver, remove J1 and check all connections on the CN1.

AUDIO ADJUSTS

Trimpot	Adjust	Description	Where Act
VR1	RX-1	RPT RX input level	Repeater audio coming from repeater receiver
VR2	TX-1	RPT TX output level	Repeater audio going to repeater transmitter
VR3	RX-2	LINK RX input level	Link audio coming from link transceiver
VR4	TX-2	LINK TX output level	Link audio going to link transceiver
VR5	BEEP	Courtesy tone/CW audio level	All tones generated by microcontroller chip
VR6	PLAY	Voice ID playback level	Voice recorded message

Note: *Ideally the level of a coming signal should be retransmitted with the same level. Ask for someone to transmit a tone or a DTMF tone (turn off mute function for this approach) at repeater input frequency. Using a radio with REV/MON/Reverse switch, check the AC voltage at radio speaker or discriminator output. Adjust RX-1 and TX-1 to obtain the same level.*

LEDS

Legend	Color	What means
PWR	Red	The controller is powered
RX	Green	A signal is present at repeater or link receiver
TX	Red	The repeater or link is transmitting
DTMF	Yellow	DTMF tones presence

FAN CONTROL OUTPUT

When the repeater transmits, this output will be on (active low) and will remain on for 2 additional minutes after the TX drops. Use this output to control a fan relay to cool the repeater's transmitter. This is an open collector output and can drive 500mA max. ID messages are not considered for fan control.

AUDIO EQUALIZATION

If you need some audio equalization, experiment with capacitors at C11 for repeater audio and C12 for link audio. A start point could be 1nF until 10uF.

When getting audio from discriminator's receiver and sending that audio directly to the transmitter, equalization maybe unnecessary.

QUICK GUIDE

Function	Description	Option	Page
01	**Repeater Transmitter Enable**	**[0] OFF, [1] ON**	**8**
02	**Hang Time**	**[0]~[9] X 300ms, 500ms, 1s, 2s, 3s, 5s, 7.5s e 10s**	**8**
03	**Time to Courtesy Tone**	**[0]~[9] X 50ms**	**8**
04	**Duration of Courtesy Tone**	**[0]~[9] X 50ms**	**8**
05	**Tone Frequency**	**[0]~[D] X 100Hz starting at 300Hz**	**8**
06	**Tipo do Beep**	**[0]=Single Tone, [1]~[D] Multi Tone**	**8**
07	**Roller Beep**	**[0]=OFF, [1]=1, [2]=10, [3]=20, [4]=40, [5]=60...**	**9**
08	**Courtesy Tone Type**	**[0]=No confirmation, [1]=2 Beeps and [2] melody**	**9**
09	**Time-out Action**	**[0]=No Action and [1]=transmitter drop**	**9**
10	**ID Test**	**[1]=Msg 1,[2]=Msg 2,[3]=CW and [4]=Hw.Version**	**9**
11	**Repeater CTCSS Enable**	**[0]=OFF and [1]=ON**	**9**
12	**Link CTCSS Enable**	**[0]=OFF and [1]=ON**	**9**
13	**Future Use**		**9**
14	**ID Timer**	**[0]~[7] X 5min and [8] for 3s Beacon/Fox Hunting**	**9**
15	**ID Selection**	**[0]=CW, [1]=Msg1 e [2]=Smart**	**10**
16	**CW ID Frequency**	**[0]~[9] X 100Hz starting at 300Hz**	**10**
17	**CW ID Speed**	**[1]~[5] (1 slower/5 faster)**	**10**
18	**CW ID Setup**	**See details on page 10**	**10**
19	**Voice ID Setup**	**[1]=Message 1 and [2]= message 2**	**11**
20	**Alarm**	**[0]=OFF and [1]=ON**	**11**
21	**Monitor**	**[0]=OFF and [1]=ON**	**11**
22	**Repeater Port**	**[0]=OFF and [1]=ON**	**11**
23	**Link Port**	**[0]=OFF, [1]=Aux,[2]=Ctrl, [3]=Link and [4] Cross**	**11**
24	**Transmission Test**	**[0]=OFF, [1]=Carrier and [2]= Carried with Tone**	**11**
25	**Simplex Repeater**	**[0]=OFF,[1]=ON, [2]=ON+beep**	**12**
26	**Repeater Time-out**	**[0]~[9] X 30s**	**12**
27	**Output 1**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
28	**Output 2**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
29	**Output 3**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
30	**Output 4**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
31	**Output 5**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
32	**Output 6**	**[0]=OFF, [1]=ON, [2]=Pulse**	**12**
33	**Repeater DTMF Control Enable**	**[0]=OFF and [1]=ON**	**12**
34	**DTMF Mute Control Enable**	**[0]=OFF and [1]=ON**	**12**
35	**Password Setup**	**See details on page 12**	**12**
36	**RESET**	**Restart with user program**	**13**
37	**REMOTE FULL RESET**	**Restart with default program**	**13**
38	**Voice Recorder Lock**	**[0]=OFF and [1]=ON**	**13**
39	**Multi-Function button**	**[0]=PLAY, [1]=COR/REC , [2]=TX OFF**	**13**
40	**Voice Message Duration**	**[1]=One 20s Messages and [2]=Two 10s messages**	**13**
41	**Voice ID Priority**	**[0]= Low Priority and [1] High Priority**	**13**
42	**Super User Mode**	**[0]=Password Required and [1]= No Password Required**	**13**
43	**Courtesy Tone Editor**	**[Freq] [Dur] [Int] [Freq] [Dur] [Int] [Freq] [Dur]**	**13**

CONVENTIONS FOLLOWED IN THIS MANUAL

Instruçtion	What To Do
Press 1.	Press and hold PTT switch, press key 1 momentarily, release PTT switch.
Press 12**.**	Press and hold PTT switch, press key 1 momentarily, press key 2 momentarily and release PTT switch.

BASIC OPERATION

CONTROLLING YOU REPEATER REMOTELY

With exception of audio levels, all functions are controlled remotely with your radio DTMF keypad.

COMMAND SINTAXES

Commands are as following:

PPPPFF0#

Where:	***PPPP***	4 digits password
	FF	2 digits function
	O	1 digit option
	#	Enter

See the command for change the sound of courtesy tone:

1234066#

Your controller will answer valid commands with two high frequency confirmation beeps (function 08 must be enabled). If the entered command is invalid, a long, low frequency tone will be heard. The command must be entered completely in one transmission. If you release PTT switch before you complete a command, the entered numbers will be discarded.

You can enter more than one command without having to release PTT between them. # acts like a command separator. If entering a command and you made a mistake, just press * to clear the entered string and start over.

Note 1: *DTMF commands without a correct password will not generate an error message. They will just be discarded.*

Note 2: *Some commands don't require an option or may require extra procedures. These exceptions will be explained in details at function description.*

Note 3: *Default password is 1234. After get acquainted with the controller commands, change this password.*

WARNING

To get a correct decoding of DTMF tones, the signal must be free of noises or jamming. If the repeater is busy, wait until it becomes free prior to sending commands.

FUNCTION DESCRIPTION

01 – REPEATER TRANSMITTER ENABLE (Default = 1)
This is the master repeater switch. This function must be enabled for normal repeater operation. The Elektra 2000 will continue to respond to DTMF commands even when the repeater's transmitter is disabled. This function will automatically be enabled after a reset or power up.

0 Disable **1** Enable

02 – TRANSMITTER HANG TIME (Default = 4)
When not zero, the repeater's transmitter will remain on the air for a selected period of time before the it drops.

0 Drops Immediately	**3** Hang Time of 1s	**6** Hang Time of 3s	**9** Hang Time of 10s
1 Hang time of 300ms	**4** Hang Time of 1.5s	**7** Hang Time of 5s	
2 Hang Time of 500ms	**5** Hang Time of 2s	**8** Hang Time of 7.5s	

Note: *This time must be greater than the sum of the time for courtesy tone and it's duration or the courtesy tone will be missed.*

03 – TIMER TO COURTESY TONE (Default = 2)
This function determines the delay after COR is lost until the courtesy tone occurs.

0 Immediately	**3** After 300ms	**6** After 600ms	**9** After 900ms
1 After 100ms	**4** After 400ms	**7** After 700ms	
2 After 200ms	**5** After 500ms	**8** After 800ms	

Note: *This time must be less than the sum of hang time and courtesy tone duration or the courtesy tone will be missed.*

04 – DURATION OF COURTESY TONE (Default = 1)
Determine the duration of courtesy tone.

0 No Courtesy Tone	**3** 150ms long	**6** 300ms long	**9** 450ms long
1 50ms long	**4** 200ms long	**7** 350ms long	
2 100ms long	**5** 250ms long	**8** 400ms long	

Note: *This function only affects the simple courtesy tone (see function 06). The duration of multi courtesy tones are not controlled by user, they are pre-determined by the firmware.*

05 – COURTESY TONE FREQUENCY (Default = 2)
Determine the frequency of courtesy tone.

0 300 Hz	**3** 600 Hz	**6** 900 Hz	**9** 1200 Hz	**C** 1500 Hz
1 400 Hz	**4** 700 Hz	**7** 1000 Hz	**A** 1300 Hz	**D** 1600 Hz
2 500 Hz	**5** 800 Hz	**8** 1100 Hz	**B** 1400 Hz	

Note: *This function only act for simple courtesy tone (see function 06). The frequency of multi courtesy tones are not controlled by user, they are pre-determined by the firmware.*

06 – COURTESY TONE SELECTION (Default = 0)
Determine the type of courtesy tone. Only the simple tone may have it's frequency and duration modified (See function 04 and 05 for details).

0 Simple Tone	**5** Two apart	**A** Double Sweep Tone
1 Courtesy Tone Editor (See Function 43)	**6** Plim-Plim	**B** Four Fast Tones
2 Three Crescent Tones	**7** CW K letter	**C** Sweep Tone
3 Three Decreasing Tones	**8** NASA Quantar	**D** Droplet
4 Fast Tones	**9** Five Crescents Tones	

07 - ROLLER BEEP (Default = 0)
Determine after how many key ups the type of courtesy tone will automatically change.

0 Disable	**2** every 10	**4** every 40	**6** every 80
1 Each transmission	**3** every 20	**5** every 60	**7** every 100

Note: *Options 0 and 1 should only used for demo purposes, since the constant change of courtesy tones can cause some users to key up all the time and bother others. If function 06 is used, Roller Beep will be disabled.*

08 – CONFIRMATION TONE (Default = 1)
Determine the type of confirmation sound.

0 No confirmation sound **1** Two high frequency tones **2** Melody

09 – TIME-OUT ACTION (Default=1)
When time-out is exceeded, you can choose between transmitter drop until the signal that caused the drop disappears or just a melody sound of warning.

0 Timer-out warning sound **1** Transmitter drop

Note: *If the transmitter drops and the signal that caused the drop is still blocking the repeater, if you have a strong signal you can press * to bring the transmitter back.*

10 – ID TEST
This function will allow you to test the IDs and check the controller's version.

1 Voice Message 1 playback **2** Voice Message 2 playback **3** CW ID **4** Software version

11 – REPEATER CTCSS ENABLE (Default = 0)
When enabled, will require a correct CTCSS to operate the repeater port.

0 Disable **1** Enable

Note: *This function should only be activated if a CTCSS decoder (optional) is installed and its logic output is connected to CN1-6. The logic must be low (0V) when a CTCSS is present otherwise high (5V). If the Hamtronix TED200 generic decoder is used, you can remotely change CTCSS codes using remote control outputs. TED200 has 8 extra CTCSS tones not available in all amateur radios for a better security in private or commercial repeaters use.*

12 - LINK CTCSS ENABLE (Default = 0)
When enabled, will require a correct CTCSS to activate the repeater link port.

0 Disable **1** Enable

Note: *This function should only be activated if a CTCSS decoder (optional) is installed and its logic output is connected to CN2-6. The logic must be low (0V) when a CTCSS is present otherwise high (5V). If the Hamtronix TED200 generic decoder is used, you can remotely change CTCSS codes using remote control outputs. TED200 has 8 extra CTCSS tones not available in all amateur radios for a better security in private or commercial repeaters use.*

14 – ID TIMER (Default = 1)
Determine how often the ID (voice or CW) will be transmitted.

0 No ID	**2** Every 10 min	**4** Every 20 min	**6** Every 30 min	**8** every 3s
1 Every 5 min	**3** Every 15 min	**5** Every 25 min	**7** Every 35 min	

Note: *Option 8 is available for beacon and fox hunting applications. Prefer to use the 3s intervals for sending command to controller.*

15 – ID SELECTION (Default = 0)
Determine which ID will be transmitted. Option 0 and 1 will be transmitted following the time programming on function 14. Option 2 will not play the ID after the time is exceeded until someone keys up the repeater, when the message 1 will be played. If repeater is busy at the time of ID, message 2 will be played as soon COR is lost.

0 CW ID **1** Voice Message ID **2** Smart Voice Message ID

Note: *If repeater is busy at the time of ID for option 1, the voice will give a place for CW ID. This behavior can be changed with function 41. Option 2 will only be available if two messages are selected at function 40.*

16 - CW ID FREQUENCY (Default=7)
Determine the CW ID Tone Frequency.

0 300 Hz	**3** 600 Hz	**6** 900 Hz	**9** 1200 Hz	**C** 1500 Hz
1 400 Hz	**4** 700 Hz	**7** 1000 Hz	**A** 1300 Hz	**D** 1600 Hz
2 500 Hz	**5** 800 Hz	**8** 1100 Hz	**B** 1400 Hz	

17 –CW ID SPEED (Default = 4)
Determine the speed for CW ID.

1 Slowest **2** Slow **3** Medium **4** Fast **5** Faster

18 – CW ID SETUP
A maximum of 20 characters is available for CW ID message.
See an example for programming the word "TEST" in CW:

Enter: **123418#2005192005#**

If the entered string is valid, you will hear the ok confirmation and the CW ID will play.

Note: *If you make a mistake when entering the string, just press * to clear the string and start over.*

CODES FOR CW PROGRAMMING

LETTER	CODE	CW	LETTER	CODE	CW	LETTER	CODE	CW
A	**01**	**.-**	**T**	**20**	**-**	**. (AAA)**	**39**	**.-.-.-**
B	**02**	**-...**	**U**	**21**	**..-**	**space**	**40**	**Space**
C	**03**	**-.-.**	**V**	**22**	**...-**	**= (BT)**	**41**	**-...-**
D	**04**	**-..**	**X**	**23**	**-..-**	**: (OS)**	**42**	**---...**
E	**05**	**.**	**Y**	**24**	**-.--**	**; (KR)**	**43**	**-.-.-.**
F	**06**	**..-.**	**W**	**25**	**.--**	**((KN)**	**44**	**-.--.**
G	**07**	**--.**	**Z**	**26**	**..--**	**) (KK)**	**45**	**-.--.-**
H	**08**	**....**	**1**	**27**	**.----**	**# (HH)**	**46**	**.....**
I	**09**	**..**	**2**	**28**	**..---**	**/ (DN)**	**47**	**-..-.**
J	**10**	**.---**	**3**	**29**	**...--**	**" (AF)**	**48**	**.-..-.**
K	**11**	**-.-**	**4**	**30**	**....-**	**$ (SX)**	**49**	**...-..-**
L	**12**	**.-..**	**5**	**31**	**.....**	**` (WG)**	**50**	**.----.**
M	**13**	**--**	**6**	**32**	**-....**	**_ (IQ)**	**51**	**..--.-**
N	**14**	**-.**	**7**	**33**	**--...**	**+ (AR)**	**52**	**.-.-.**
O	**15**	**---**	**8**	**34**	**---..**	*** (SK)**	**53**	**...-.-**
P	**16**	**.--.**	**9**	**35**	**----.**	**? (IMI)**	**54**	**..--..**
Q	**17**	**--.-**	**0**	**36**	**-----**	**> (CT)**	**55**	**-.-.-**
R	**18**	**.-.**	**- (DU)**	**37**	**- ..-..-**			
S	**19**	**...**	**, (MIM)**	**38**	**--...--**			

19 – VOICE ID MESSAGE RECORDING
The maximum recording time is 20s. If you choose Smart ID (function 15-2), this time will be split in two, resulting in two 10s messages each. After sending the command, release PTT switch and the next key up will be recorded and played back after recording. The voice ID time interval is the same as function 14.

1 – Message 1 record **2** – Message 2 record

Ex: To record a message press: **1234191**#

Note: *Don't exceed the maximum time selected or the messages may become overlapped. Function 38 (Voice Message Lock) must be disabled in order to record the voice message or you will get an error alert. Besides over the air recording, you can use an external source of audio by using the K1 audio jack. Use the same commands like you would by on the air recording, but when pressing the PTT, the external audio will be recorded instead.*

20 – ALARM INPUT (Default = 0)
This alarm input is available for violation detection for windows, doors or repeater cabinet. Using any kind of detector or sensor, a GND signal must be present all the time connected to alarm input (CN2-7) in order to not trigger the alarm. If this ground signal is missing, the alarm will be triggered and stay in alarm until a command is sent to turn it off. A siren sound will be transmitted over the air.

0 Disable **1** Enable

Note: *Even with alarm activated the repeater will still be available for communication, but the siren sound will return as soon as the communication ends.*

21 – MONITOR INPUT (Default = 0)
A monitor input is available for lost AC voltage or logic state monitoring. When this input (CN2-8) is open or high (5V), a short tone will precede the regular courtesy tone otherwise (low) nothing happens.

0 Disable **1** Enable

Note: *Due to a pull-up resistor this input will be considered high if not connected.*

22 – REPEATER PORT (Default = 1)
If disabled, the repeater will only accept signals coming from link port.

0 Disable **1** Enable

Note: *This function only can be disabled if link port is enabled.*

23 - LINK PORT (Default = 0)

0 – Disable Signals from link port will be discarded
1 – Auxiliary Allow access to repeater coming from another frequency (high priority)
2 – Control Allow control access coming from another frequency (high priority)
3 – Link Link operation (no hang time for signals coming through this port)
4 – Cross Cross repeater operation

24 – TRANSMITTER TEST (Default = 0)

0 Disable **1** Carrier **2** Carrier with Tone

Note: *This option has no time-out. Make sure your transmitter can stay keyed up for extended periods without overheating. The tone frequency will be the same as simple courtesy tone (function 5)*

25 – SIMPLEX REPEATER (Default = 0)
Do not require separate receiver and transmitter. Even an HT can be used for this. When enabled, any incoming signal will be recorded and played back. The duration of each transmission should not exceed 20s or it will be cropped. Due to its low cost, can be invaluable for emergency and expedition purposes.

0 Disable **1** Enable **2** Enable with courtesy tone

Note: *As use the space for voice message ID, all prior contents will be lost. Function 38 must be disabled in order to use this function.*

26 – REPEATER TIME-OUT (Default = 6)
Determines the maximum allowed time for each transmission. 10 seconds before the time is up, a short beep will indicate that the time-out time has almost been reached. After time-out, a melody will be heard and the transmitter may or may not drop depending on the setting of function 09. If dropped, will remain that way until the COR that caused the time-out is dropped.

0 No time-out	**2** 60s (1min)	**4** 120s (2min)	**6** 180s (3min)	**8** 240s (4min)
1 30s	**3** 90s	**5** 150s	**7** 210s	**9** 270s

Note: *The timer counter is reset at courtesy tone. If the signal that caused the time-out drop is still on the receiver holding the transmitter keyed, you can send * to bring it back(your signal must be stronger in order to gain control).*

27 ~ 32 – REMOTE OUTPUTS 1 ~ 6 (Default = 0)
6 remote outputs are available for general purpose use.

0 Disable **1** Enable **2** Pulse (inverts state for 100 ms)

Example: To enable output 5 press: **1234311#**

Note: *These outputs are CMOS logic and can drive a maximum of 10mA each. If you need to interface with a relay, use a transistor as a buffer.*

33 – REPEATER DTMF CONTROL ENABLE (Default = 1)
You can disable the repeater port from accepting DTMF commands when the link port is up and you can control it by another frequency on the link port.

0 Disable **1** Enable

Note: *You can't enable this function if the link port is down.*

34 - DTMF MUTE ENABLE (Default = 0)
When enabled, anytime a DTMF tone is received, the audio will be muted to the Repeater's transmitter. The transmit audio will remain muted for 2s after the last DTMF tone is received. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to pass the DTMF tones through the repeater and you can disable this function.

0 Disable **1** Enable

Note: *Do not use excessive levels at RX-1 trim pot because saturated audio with high tone voices may fool the DTMF decoder and cause an undesirable mute over a voice communication.*

35 – PASSAWORD SETUP (Default = 1234)
To change the password.

If the actual password is 1234 and you want 5678 press: **123435#56785678#**

Note: *The new password is entered twice for security purposes.*

36 - RESET
Restart the microcontroller with user programmed values. A melody is heard to indicate a successful reset. Has the same effect as power up.

Ex: 123436#

Note: *The voice message and CW programming are not affected.*

37 – REMOTE FULL RESET
Restart the microcontroller and all functions with default values.

Ex: 123437#

Note: *The voice message and CW programming are not affected.*

38 – VOICE MESSAGE LOCK (Default =1)
This is a security measure to protect the voice message from being erased by mistake. To be able to record a voice message or use the Simplex Repeater function, this function must be disabled.

0 Voice Lock Disable **1** Voice Lock Enable

39 – MULT-FUNCTION BUTTON (Default = 2)
Determine the action of button S1.

0 PLAY Starts message 1 playback
1 COR/REC COR simulation (acts like a REC button after function 19 to record a message)
2 TX OFF Drops transmitter (Useful when checking for duplexer desense)

40 – VOICE MESSAGE DURATION (Default = 1)

1 One 20s message **2** Two 10s messages

41 – VOICE ID PRIORITY (Default = 0)
When repeater is busy and the ID time is up or the voice is playing back and a signal is received, the voice will be replaced by CW ID. If this option is enabled, the voice message will not be replaced.

0 Disable **1** Enable

42 – SUPER USER MODE (Default = 0)
If enabled, the password will not be required. Just enter the function and option.

0 Disable **1** Enable

Note: *The Master Reset is not available in this mode.*

43 – COURTESY TONE EDITOR (Default=611 611 61)
You can create you own exclusive courtesy tone. The courtesy tone can be composed by 3 tones and you can control the interval, duration and frequency of each one. This function acts on the simple tone (Function 06-1).

0	**300 Hz**	**3**	**600 Hz**	**6**	**900 Hz**	**9**	**1200 Hz**	**C**	**1500 Hz**
1	**400 Hz**	**4**	**700 Hz**	**7**	**1000 Hz**	**A**	**1300 Hz**	**D**	**1600 Hz**
2	**500 Hz**	**5**	**800 Hz**	**8**	**1100 Hz**	**B**	**1400 Hz**		

[F][D][I] [F][D][I] [F][D]#
F=Frequency, D=Duration e I=Interval

Try the following combinations: 830 330 62, 230 430 62 and 722 742 00 (CW letter A).
To enter the first example press: 1234 43 # 830 330 62#

Note: *Zero duration tone will not be transmitted.*

MASTER RESET
Restart the microcontroller with default values. Acts the same way as FULL RESET (Function 37), but can be done even without the programmed password.

Press: **NNNN123#**

Where NNNN is a 4 digit password available at the back cover of this manual

Example of command: 6986123#

Note: *This password is not user programmable, so keep it secret. The voice message and CW programming are not affected.*

FULL RESET
Restart the microcontroller with default values. Acts the same way as FULL RESET (Function 37), but can be done even without the programmed password or MASTER RESET password.

- Remove J1 to power off;
- Press and hold button S1
- Place J1 to power on;
- When green led (RX) become light release button S1;
- A melody will be heard and the microcontroller will restart with all default values.

Note: *The voice message and CW programming are not affected.*

CONTACT AND SERVICE

If you need support, service or have any suggestion, contact us:

For technical support & suggestions: suporte@hamtronix.com.br
For information or to buy our products: sales@hamtronix.com
To learn more about our products visit: www.hamtronix.com

Repair address

Hamtronix
Rua Romano Nardini 112
Americana, SP 13478-520
BRAZIL
55 (19) 3601-8540

Serial Number	
Software Version	**V2.10**
Master Reset	

Hamtronix
55 (19) 3601-8540

www.hamtronix.com