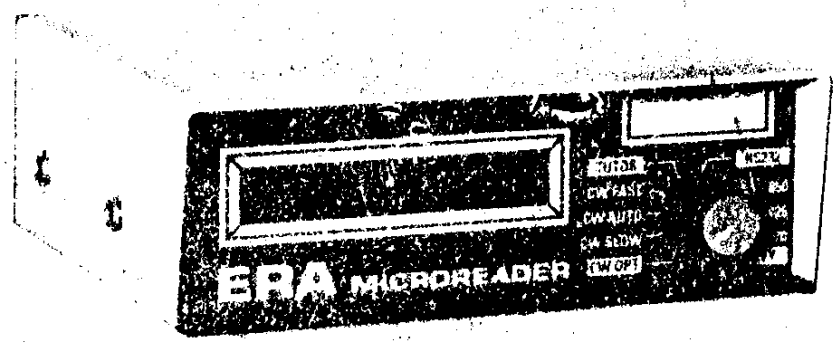
Downloaded by
RadioManual.EU

Space Communications
di Stefano Malaspina
P.zza del Popolo, 38 ☎ 0734/216165
63023 Fermo (AP)
P. I. 01242790440

ERA Mk2 MICROREADER

OPERATING

INSTRUCTIONS



Enterprise Radio Applications Limited
Unit 5, Clarendon Court
Winwick Quay
Warrington
Cheshire
WA2 8QP
Tel (0925) 573118

Downloaded by
RadioManual.EU

ERA Mk2 MICROREADER

OPERATING INSTRUCTIONS

Thank you for purchasing the Mk2 Microreader. You should find it both easy to set up and operate. To obtain the maximum performance from your new reader it is important to understand how it works, even if you have used other Morse/RTTY readers before. We suggest therefore that you take the time to read these intructions before proceeding.

Mk2 Microreader Specification

Display	16 character reflective liquid crystal display (LCD). Right to left scrolling.
Modes	CW,RTTY and Morse tutor.
Filters	Independent analogue mark/space bandpass filters. The 20db bandwidth is 300Hz. Two fixed notch filters plus one 5th order biquad elliptic lowpass on input.
Indicators	One 10 element three colour bargraph LED frequency indicator. Step size is 50Hz. Centre green is 1275Hz. Three red RTTY shift LEDs. Note that centre red LED is also used to show signal trigger level in CW mode.
CW speed	Slow: 5-20 WPM, Auto: 5-45 WPM, Fast:15-80 WPM.
CW edit	Word recognition and auto space insertion.
Baud Rates	Receives 45,50,75 and 100 Baud normal or reversed. 100 Baud automatic only.
Shifts	Target frequency (green on bargraph LED) = 1275Hz 170Hz shift,1445Hz = bottom red LED 425Hz shift,1700Hz = middle red LED 850Hz shift,2125Hz = upper red LED
RTTY Edit	Repeat spaces removed. Limits repeated characters to 4. Has full reverse correction on detection of missed LTR shift.
RS232 O/P	Speeds provided are 600,1200,2400,4800 Baud.
Protocol	1 start bit, 8 data bits, 1 stop bit, no parity, no handshaking. Default is 4800 Baud.

Downloaded by
RadioManual.EU

Morse Tutor	Sends letters, figures, letters and figures mixed, punctuation and procedural codes. 10 groups of 5 characters per session. Speed 8-26 WPM, calculated for normal spacing. Additional character spacing may be selected from 0-9 dot periods between characters.
Tutor Keying	By normal contact closure up to 30 WPM. Sidetone is fixed at 1275 Hz. Editing, other than punctuation OFF.
Power	13.8VDC nominal. Accepts supplies from 12-16VDC. Current consumption less than 150mA. Reverse polarity protection. Over current and thermal shutdown. Fused internally with 500 mA slow blow.
Size	134mm wide, 109mm deep and 51mm high (incl feet). Weighs less than 700 gramms

Downloaded by
RadioManual.EU

Initial Setting Up Procedure

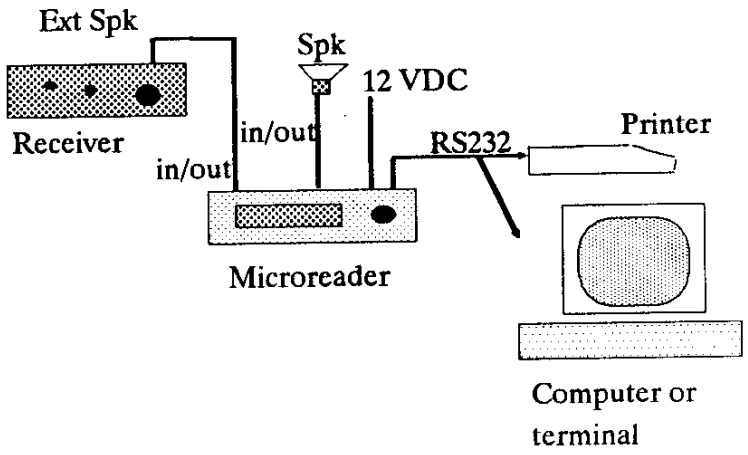
The Mk2 Microreader needs a nominal power supply of 12VDC at about 150 mA. This should preferably be a regulated supply but as the Microreader has its own internal regulators, the only requirement is that the voltage be in the range between 12 to 16 volts and reasonably smooth. A 13.8 VDC supply is ideal, which can be used to power the Microreader and other equipment at the receiving station.

Connect the red wire to the positive of the supply and black to ground. Set the rear panel switch to on and observe the display. Immediately on switch on there should be a short bleep from the tutor sounder and the display should show the revision of the software briefly followed by the mode. It is important to remember that in order for the two micro-pressors to reset or start up correctly, the power switch on the rear should be used. You may at this point like to vary the contrast on the LCD to suite your viewing angle. Use a small screwdriver and adjust the preset control, at the rear, for the best contrast.

Position the Microreader where it will be used. Avoid high temperatures or places of high reflected light that may spoil the readability. Connect a short screened lead from one of the audio IN/OUT jacks on the rear to the headphone or speaker socket on the receiver. With this arrange-ment the majority of sets cut off the internal speaker so that it will be necessary to plug an extension speaker or headphones to the second IN/OUT socket on the rear of the Microreader, do not use the tape recorder socket.Take care not to plug the speaker lead into the RS232 output socket. It will not damage anything but neither will it work.

Downloaded by
RadioManual.EU

Find a good strong morse station. Now switch the reader to CW AUTO and fine tune the set near the signal. The LED bargraph tuning indicator will show when the signal is exactly on tune ie. centre green LEDs are flashing. These indicators are extremely fast and it is quite normal for them to show poor frequency stability (chirps) or appear to show several background signals simultaniously. The intensity of the LEDs is partially governed by the signal strength to improve readability. When a signal is above a certain threshold it will be accepted for reading by the processor. This threshold is shown by the centre red shift LED. Experiment a little to find the best setting of the sets volume control consistant with a good flashing rythmn with the signal and little or no flashing with only background noise. You may adjust the gain of the Microreader if you find the best results occur with the sets volume too high or too low. This adjustment on the rear is not critical and needs only to be done once.



Connections to Microreader

Downloaded by
RadioManual.EU

CW Operation

When using morse code set the receiver to either CW or SSB. You may be surprised to find that the Microreader may work better on SSB than CW. The reason for this is excessive filtering of the signal. This causes the signal to ring or look 'blurred' with the effect that the Microreader does not see the element spaces between dots and dashes. Some signals may have this effect already due to an incorrectly set up transmitter. As all sets are different in their performance the best set up will be found by experimenting. Use the CW AUTO position unless you specifically want to listen to very high or very low speed morse. Although the reader may well read the signal in all three positions, these other two positions provide optimum conditions.

For those who have never decoded morse before, the initial results may at first appear a little confusing but don't worry all will become clear after a while. If you choose to start with a commercial station such as a ship-to-shore station sending out the weather forecast, the reader will probably read this type of morse without any error all day given good conditions. The reason for this is that the morse is either machine sent or it being sent by a professional operator and as such is of a higher quality. Should you decide to try the amateur bands, be ready for less than perfect decoding, some signals will give almost nothing.

Most amateurs when sending morse, use abbreviations to speed up their message throughput. This in itself is not too much of a problem as with a little practice one soon becomes familiiar with the common ones.

for example MNI TNX FER QSO
means: Many thanks for the QSO (contact)

The problems start when the sender, in trying to be quick, fails to send any spaces between the words.

for example MNITNXFERQSOURRST559

Imagine for example, reading a newspaper, if all the words were joined together. not impossible but difficult. Now into this equation, add the possibilities of errors in sending or those caused by interference. Fortunately the microreader is powerful enough to search the resulting text for known words. Missed spaces are re-inserted at the correct location and common mistakes are corrected. Occasionally the word search process will find a word and insert spaces incorrectly. This is difficult to prevent on some words but on the whole the system works very well. For instance, the word 'namely' would appear as 'name ly'. the word search can be disabled via CW options.

Downloaded by
RadioManual.EU

RTTY Operation

For those who are unfamiliar with radio Teletype or RTTY, the best procedure is to try amateur RTTY first. This eliminates the possibility of finding a scambled transmission. The 20m band is normally quite active especially during the evening. The frequencies to listen to are between 14.08 MHz and 14.09 MHz on USB. With the Microreader set first to CW, tune around this section of the band while observing the tune indicator. Each time you tune through an amateur RTTY station you should notice that the two alternating FSK tones that make up the RTTY signal should be clearly visible as a pair of bright lines. The gap between these lines is an indication of the shift being used. Tune the set to put the left hand tone on the centre green LED, the other should be over at the right and quite dim.

Set the mode switch on the Microreader to RTTY OPTIONS. When the prompt to SELECT appears rotate the switch one position clockwise. This selects 45 Baud normal reception which is the correct condition for this mode and band. The screen will now prompt you to select the shift which for amateurs is 170Hz. The reader should immediately start to read the signals and the lower shift indicator should flicker indicating a shift of around 170Hz. When the signal stops transmitting you may need to re-tune slightly for the reply. To re-tune simply adjust the sets tuning dial for the centre green LED again. The Microreader will read off frequency signals but optimim performance occurs when the two internal notch filters are active. For this reason we recommend you tune as accurately as possible.

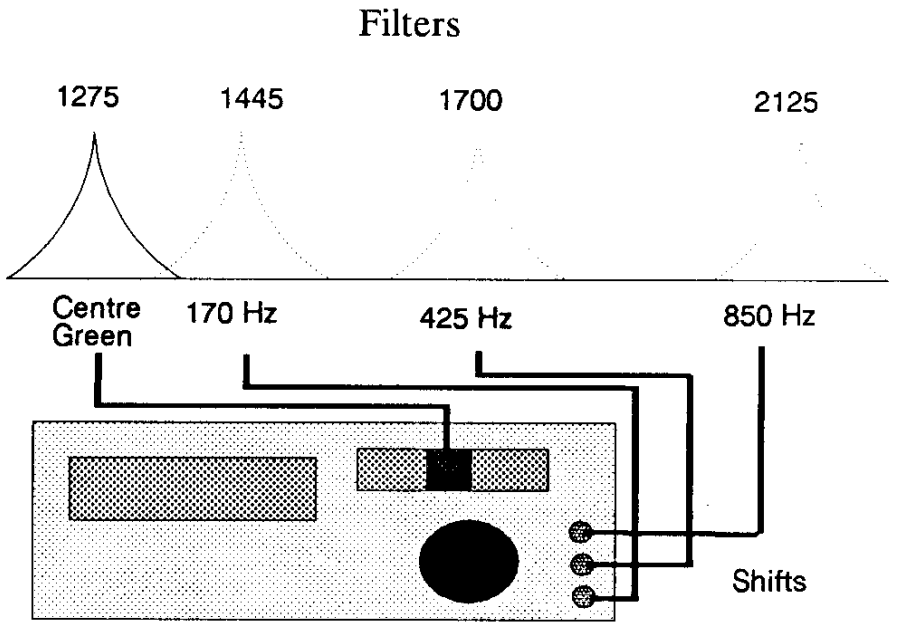
The amateur RTTY performance should give a good idea of the systems capabilities. Try the Microreader on a commercial signal such as a press agency, you will ideally need to know if the station you are tuned to is in fact readable. You can of course go through all the permutations to find one that may work but by far the best way is to obtain a frequency list of stations. These come in the form of books that list the frequencies, shifts and Baud rate of signals. Some even give the times but these are very soon out of date. Magazines often publish more current information about which stations can be heard where. The Short Wave magazine, for example, runs a regular feature called 'Decode'. Times and frequencies of many transmissions are often reported there.

The REV 3.2 firmware fitted to your Microreader allows for automatic selection of the Baud rate and polarity. This is done by setting the mode switch first to RTTY OPTIONS. Then, when the prompt to SELECT appears, rotating the switch anti-clockwise for the desired shift. The Microreader will test the incoming signal to determine the Baud rate. The Microreader may make mistakes here if the station stops sending during the check or if normal text is not being sent. Once established, reading is tried first in normal mode but if this fails to produc good text,

Downloaded by
RadioManual.EU

the reverse mode is automatically selected. Repeated bad data will eventually turn off the dispaly and also the RS232 output.

Occasionally while reading text, the Microreader may miss a letter shift character. The outcome of this is that the display will start to fill with punctuation and numbers. this condition is sensed and the whole screen is automatically converted to the text that should have been received. Please note that 100 Baud is only availble in the auto mode and cannot be manually selected.



Downloaded by
RadioManual.EU

Morse Tutor

Before using the tutor function remove all audio leads from the rear of the Microreader, otherwise the loudspeaker will be mistaken for a morse key. With the mode switch, select the TUTOR position. This takes you into the TUTOR MENU which allows you to send or receive.

Receiving Practice

In this mode, the Microreader will send 10 groups of 5 random characters for you to write down. The type of characters, the speed and spacing are all adjustable. If you select receive practice and make no changes to the switch, then the Microreader will set itself to letters at twelve words per minute with normal spacing between each letter. To make changes, simply rotate the switch when the display prompts you for it.

The only thing you may find out of the ordinary are the procedural codes. These are special morse characters often used to indicate certain conditions and are displayed on the Microreader by lower case letters. These codes, although used extensively on the air, are not a requirement for the UK morse test. Consequently, many having just passed this test may be surprised to find quite a few characters they don't understand. These codes are mixed in with the punctuations and are as follows:

(b)	(BK)	Used in break-in operation
(c)	(CL)	Closing down station
(e)	(AR)	End of message
(f)	(SK)	Finish work with station
(k)	(KN)	Only station called reply
(w)	(AS)	Please wait
(←—)		Error
(ä)		Continental letters
(ö)		" "
(ü)		" "

When learning morse, most people would advise to have the characters sent at the normal speed but with large gaps between each letter. The minimum speed setting for the Microreader is 8 words per minute (WPM) which some may say is fast but this of course is only the character speed. When set to give longer gaps between letters, the actual speed in WPM is considerably reduced.

Downloaded by
RadioManual.EU

Sending Practice

Insert your morse key into one of the IN/OUT sockets on the rear panel. Incidently, it should not be fitted with any spark supression capacitors as this will affect the performance. When first switched to sending practice, it will be necassary to let the Microreader become familiar with your sending. This is best achieved by keying a series of repeated letters such as VVV's until correct reading results. Any letter sent repeatedly must contain both dots and dashes otherwise the memory of the reader will fill with dots or dashes only and errors will result.

Try to send normally, avoiding the temptation to watch and wait for each letter. Only check occasionally, looking for errors in spacing. A dot between words or in the middle of a word occurs when the space could have been either a word or a letter space.

(a) T H E Q U I C K B R O W N F O X.... Letter spacing too long

(b) T-H-E-Q-U-I-C-K-B-R-O-W-N-F-O-X... Better, but still long

(c) THE-QUICK-BROWN-FOX....Word spacing slightly short

(d) THEQUICKBROWNFOX.....Word spacing much too short

All of the above examples are problems associated with spacing that result in the letters still being displayed correct. If the space between each letter is made too short then strange things start to happen.

(e) 6E QUICK BR_N FOX....

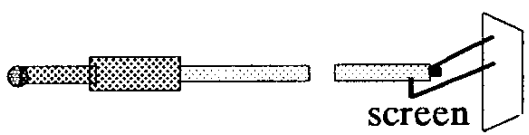
In this example, the T and H have joined together due to an insufficient character space between them. This forms a perfect figure 6, which the Microreader then displays. If the 'O' and 'W' join together a none existant character is created which is displayed as _ (underline), a none existant character.

Downloaded by
RadioManual.EU

RS232 Output

The Microreader can output its decoded data to external equipment via the inbuilt RS232 serial interface. This might be to a computer, printer, terminal unit or any equipment fitted with that type of interface. Only two wires are required, data and ground, making the connection very simple. A short screened lead should be used for minimum interference. Handshaking procedures will not be needed with this system, because the rate at which the data is output on RS232 is always higher than the rate of individual characters being received, up to the maximum of 100 baud. The Mk2 Microreader will not directly interface or connect to domestic TV sets, monitors or parallel printers.

When the Microreader is switched on, the Baud rate defaults to 4800 Baud. Therefore if the external equipment is also set to 4800 Baud then no further action needs be taken. If for some reason the speed of the external equipment is fixed at something other than 4800 Baud, the speed can be changed on the Microreader. To do this first switch to BAUD RATE SELECT. Once into the menu, select the desired speed. The screen will show the Baud rate selected before returning to normal operation. The Baud rate remains at this new setting untill the power is removed.. If the external device does not respond correctly, you may need to change some of the settings to match those of the Microreader (see specifications)



3 data input RXD
7 Ground GND

25 way D type

Diagram of connection to 25 way RS232

If the Microreader is connected to a PC or terminal unit the characters will be displayed on the screen in real time for RTTY, but around 6 characters behind for CW. The reason for this delay is to allow text editing on the screen since it is not possible to correct errors once the data has been sent out. The output is formatted to wrap around on an eighty column display or printer, by automatically inserting a CRLF (carriage return& line feed sequence)

Downloaded by
RadioManual.EU

Appendix

Should you have any problems finding RTTY or CW stations sending plain English, we might suggest the following frequencies as being quite good. The two examples given are good at the time of writing but may be subject to change and or propagation effects depending on your location and the time.

RTTY

Try around 8.050 MHz mid evening for IRNA PRESS using 50 baud with a shift of 425 Hz. This is normally received good strength in the U.K. though at times the station might not be transmitting any data. During such periods a constant tone may be transmitted. Before the start of news bulletins, repeated R's and Y's are sent along with the stations call sign and frequency. This station does occasionally transmit languages that the Microreader will not be able to read so please be patient. Between 7.5 and 8.5 and also around 10MHz should give quite a few stations in the evenings while earlier in the day, higher frequencies may be more rewarding.

CW

For CW you may like to try around 7.503 MHz. This station, callsign (GXH) is located in Thurso Scotland and sends good quality CW in plain English for the best part of the day with only short breaks of a few minutes. The text is mainly weather and shipping reports from American coastguard stations along the U.S. east coast. Occasionally lists of call signs are sent out but in general it's plain text with just a few abbreviations. When you have good copy from this station, try turning the volume up and down to see the effects of too little or too much volume on the Microreader.

Downloaded by
RadioManual.EU

Amateur Abreviations

ABT	about
AGN	again
BC	broadcast
BCL	broadcast listener
BD	bad
BK	break in
CANS	headphones
CK	check
CNT	cannot
CONDX	conditions
CRD	card
CUAGN	see you again
CW	continuous wave
DR	dear
ES	and
FER	for
GA	good afternoon
GM	good morning
GND	ground
HAM	amateur
HPE	hope
HRD	heard
HW	how
LSN	listen
MOD	modulation
MTR	metre
OB	old boy
OM	old man
OT	old timer
PWR	power
RPT	repeat
RX	receiver
SKED	schedule
SRI	sorry
SW	shortwave
TFC	traffic
TMW	tomorrow
TRX	transceiver
TX	transmitter
UR	your
W	watts
WKD	worked
WL	will
WX	weather
XYL	wife
YF	wife
73	good wishes

ADR	address
ANT	antenna
BCI	broadcast interfernce
BCNU	be seeing you
BFO	beat frequency osc.
BUG	semi automatic key
CC	crystal control
CLD	called
CO	crystal osc
COSER	counterpoise
CUD	could
CUL	see you later
DF	direction finder
DX	distance
FB	fine business
FREQ	frequency
GB	goodbye
GN	good night
GUD	good
HI	laughter
HR	hear or here
HVY	heavy
II	repeat
MNI	many
MSG	message
NR	number
OC	old chap
OP	operator
PSE	please
RCVR	receiver
RPRT	report
SED	signal
SN	soon
SUM	some
SWL	short wave listener
TKS	thanks
TNX	thanks
TVI	television interference
U	you
VY	very
WID	with
WKG	working
WUD	would
XMTR	transmitter
XTAL	crystal
YL	young lady
88	love and kisses

Downloaded by
RadioManual.EU

Common Problems

Should the Microreader not perform correctly, please check through the following points:

No Power: Check for reversed power leads or try the supply on another piece of equipment.

Dim Lamps: Supply voltage below 12 VDC. A constant buzzing noise may also be present due to a high ripple on the power supply. Replace power supply.

No signal: Check the input lead is not open circuit or faulty. Check on another piece of equipment if possible. Check also that the gain adjustment on the rear is not at zero.

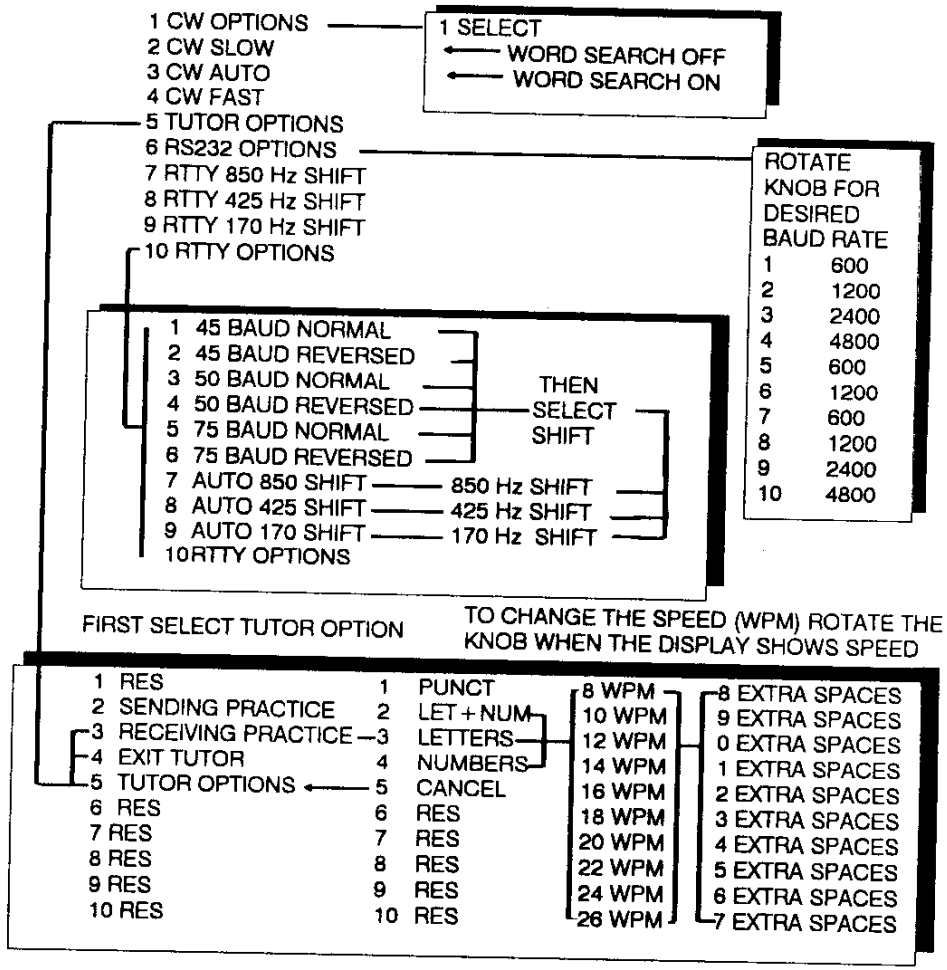
No CW: Check speaker or phones socket is being used and not the record socket. Ensure receiver is not using a narrow 800 Hz filter.

Crackling sound: Caused by very loud signals reaching buzzer circuit. Occurs if high impedance phones or no speaker is connected at the rear.

Downloaded by
RadioManual.EU

Switch Settings

Rotating the switch selects the mode required. If the switch is left in any one of 4 option positions, then a 'K' tone will sound before the unit jumps to one of the four option menus shown below. Turning the knob through these option positions at normal speed will not select them.



Note RES = reserved for future use. WPM = Words per minute

© Published by Compaid Graphics 1990

Downloaded by RadioManual.EU