Definition of EEPROM storage

Ultimate3S, version v3.12a

Basic Mapping

This is the basic mapping of the EEPROM contents for version v3.12a. The table below shows the start byte address of each variable, length, type and the default value. The default value is what you get with a fresh factory-supplied chip, or a blank chip you have programmed yourself (or upgraded from a previous version), or after a factory reset.

When programming a U3S chip you only need to program the .hex file. When the firmware runs, it will check the EEPROM contents. If the EEPROM is blank, or contains data from a previous firmware version with an incompatible EEPROM mapping, then the firmware does a “Factory Reset” to initialize the EEPROM to the below state.

The field types are listed as Integer or String (both of which are simple), or as “Compound” which is a lot LESS simple… compound fields contain multiple items in the U3S configuration menu. For example the “Frame” field contains both sub-fields in the {Frame Start} configuration parameter.

Below the table I’m going to describe each field in detail.

Anyone wishing to make a PC program to edit an .eep file, would need to make all of the below definitions configurable for example in an XML definition. The mappings, and the interpretation of the fields, can and does change when the firmware is upgraded. **To take on the task of writing a PC program for eep editing is an ongoing commitment, to keep functional definitions for each version of the firmware, now and in future.**

Name	Start	Length	Type	Default
Dummy	0	4	Integer	0
EepromVersion	4	4	Integer	123456798
Locator	8	7	String	Empty
Callsign	15	15	String	Empty
Frame	30	4	Compound	0
GpsModeBaud	34	4	Compound	9600
GpsInfo	38	4	Compound	1
Transmissions	42	128	Compound	0
Refclk	170	4	Integer	27004000
Sysclk	174	4	Integer	20000000
Config	178	4	Compound	2
Speed	182	4	Compound	0
Fsk	186	4	Compound	4
Park	190	4	Compound	0
Ptt	194	4	Integer	0
RaiseCos	198	4	Compound	0
Cal	202	4	Compound	10
Backlight	206	4	Compound	9000
Message	210	512	String	Empty

0: Dummy

This field is just a dummy 4-bytes that are not used at all for anything.

4: EEPROM version

The EEPROM version number is unique to the EEPROM mapping for a particular Ultimate3S firmware version, or group of firmware versions (if they share the same compatible EEPROM mapping). A new firmware version will have a different EEPROM version. When the firmware power up, if it finds an incompatible EEPROM version ID or an absent ID, then it undertakes a Factory Reset to initialize the EEPROM to correct default contents for this firmware version.

This EEPROM version does not need to be editable, it should be viewed as the “key” specifying an EEPROM mapping version for a particular firmware version.

8: Locator

The 6-character Maidenhead grid subsquare, plus 1 null-terminator (7 characters total)

15: Callsign

The operator’s Callsign, 14 characters plus 1 null-terminator (15 characters total)

30: Frame

4-byte integer contains the Frame and Start parameter screen. The value is 100 * Frame + Start. For example: if “{Frame Start}” is “10 04”, the value of the Frame integer is 100 * 10 + 4 = 1004.

34: GpsModeBaud

4-byte integer contains the GPS {Mode Baud} screen information. The value is 1000000 * Mode + Baud. E.g. if using GPS Mode 2, and 9,600 baud, the value is 2 * 1000000 + 9600 = 2009600.

38: GpsInfo

4-byte integer contains the GPS {Info Check} configuration. The value is 10 * Info + Check. Please refer to the operating manual. GPS Info has values 0, 1, 2 or 3. GPS Check has value 0 or 1. For example, if using GPS Info 0, GPS Check 1, then the value is 0 * 10 + 1 = 1.

42: Transmissions

This is the most complicated one. It has 128 bytes. This represents all the information in the transmission definition screens 0] to F]. Each of the 16 transmission screens has 8 bytes (hence the field size, since 16 x 8 = 128).

The first 4 bytes contain the Mode, Enabled flag, Band, Power and Aux fields. The second 4 bytes contain an integer which is simply the frequency of transmission for this mode.

For the 8 bytes of each transmission screen’s definition the encoding is as follows:

Byte 0: the most significant bit, mask 0x80, specifies whether the transmission screen is enabled or not. The lower 7 bits (mask 0x7F) specify the transmission mode.

Byte 1: Band (value 0 to 5)

Byte 2: Aux value (value 0 to 15, or hex 0 to F)

Byte 3: WSPR Power – for WSPR modes, the value must be one of 0, 3, 7, 10, 13, 17 etc to 60 dBm. For any mode allowing a free-format text transmission, such as CW, this field specifies the sub-message index into the Message string (see operating manual for full discussion).

Bytes 4-7: 32-bit integer specifying the transmit frequency

The MODE lookup list specified by the lower 7-bits of byte 0 (see above) is:

Mode	ID	Comment
RX	0	Receive only
FSKCW	1	FSK CW (slow)
QRSS	2	Plain QRSS (slow)
DFCW	3	DF CW (slow)
SHELL	4	MFSK Hellschreiber (slow)
HELL	5	Hellschreiber (standard speed)
DXHELL	6	Hellschreiber (standard speed, DX=double)
CW	7	CW (standard speed)
CWID	8	CW ID (Callsign sent at 12wpm)
FSK	9	FSK (standard CW-speed)
WSPR	10	Standard 2-minute WSPR
WSPR15	11	15-minute, 1/8th shift WSPR
TX_CW	12	Manually keyed transmitter mode: CW
TX_FSK	13	Manually keyed transmitter mode: FSK
OPERA05	14	Opera 05
OPERA1	15	Opera 1
OPERA2	16	Opera 2
OPERA4	17	Opera 4
OPERA8	18	Opera 8
OPERA32	19	Opera 32
OPERA65	20	Opera 65
OPERA2H	21	Opera 2H
PI4	22	PI4
JT91	23	JT9-1
JT92	24	JT9-2
JT95	25	JT9-5
JT910	26	JT9-10
JT930	27	JT9-30
ISCATA	28	ISCAT-A
ISCATB	29	ISCAT-B
JT65A	30	JT65A
JT65B	31	JT65B
JT65C	32	JT65C

170: Refclk

4-byte integer, the Ref Clk parameter for the Si5351A

174: Sysclk

4-byte integer, the 20MHz system clock setting

178: Config

A 4-byte integer containing the configuration screen contents, “XW x2 Tn Iv TxS”. It contains a number of flags. The value is made up of:

100000 * Extended WSPR flag (“XW”) +

10000 * x2 Freq flag (“x2”) +

1000 * tune Enable flag (“Tn”) +

100 * Inverted Output flag (“Iv”) +

TX Screens (“TxS”)

Note that the first four of these flags are 1 or 0, whereas TxS configures the maximum Tx mode screen shown, and defaults to 2. That means three screens are shown, 0] 1] and 2]. TxS should be in the range 0..15.

182: Speed

Speed is made up of the three parameters in the speed screen, which are the CW speed (words per minute), Slow speed (dit duration in seconds) for QRSS, DFCW, FSKCW; and Slow-hell pixel speed.

The number is made up of:

1000000 * Fast (CW speed, range 1..99) +

1000 * Slow (QRSS speed, range 1..200) +

Hell speed (range 1..200)

186: Fsk

4-byte integer that contains FSK {Fine Hz} screen parameter. It is made up from two parts:

1000 * Fine FSK flag (0 or 1) +

FSK size (range 0..999)

190: Park

Contains Park {Mode Freq} parameter. Park mode is a value in the range 0..5. Park Freq can be

1MHz to 150MHz. The value stored in the 4-byte number is

1000000000 * Park Mode + Park Freq

194: Ptt

4-byte integer that contains Ptt Delay configuration parameter

198: RaiseCos

4-byte integer that contains Shaping {ms Max} configuration parameter. It is made up of two parts:

1000 * ms (envelope rise/fall time, range 0..99 milliseconds) +

Max (8-bit DAC max value, range 0..255)

202: Cal

4-byte integer with the contents of the Cal {Step Time} screen. The value stored is made up of two parts:

1000 * Cal Step (range 0..99) +

Cal Time (range 0..250 seconds)

206: Backlight

4-byte integer with the contents of the {Bright Timeout} configuration screen. The value stored is made up of two parts:

1000 * Timeout (range 0.999 seconds) +

Bright (range 0..9)

210: Message

512 bytes long message string parameter. The message is terminated by a 0 byte. Note it is potentially split into submessages using the submessage delimiter character as described in the operating instructions.