

# FOX Transmitter Setup

## Scheduling Language

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# Scheduling Language Background



There was a strong desire to be able to configure a fox transmitter, and do it without the need for a vendor-specific programming *dongle*.

A simple serial connection is universal, a USB UART cable is optimal as they can be had to operate with TTL levels. All we need is 3.3V logic devices in the fox transmitter to effect the connection.

Memory devices that store the fox operating schedule and audio waveforms must be loaded using the serial interface (not the vendor programming *dongle*).

Let us use a simple noun/verb model.

Commands (*the verb*) are all 4-characters to allow a simple table matching scheme.

Arguments (*the noun*) provide the details or variables the verb is to act upon.

# The program loop



The **fox transmitter** program is basically a simple loop.

The main loop:

Looks for incoming command traffic.

Both UARTS in the zNEO are buffered at the interrupt level. They collect a full line (0xD terminated) before passing it back to be processed. If there is not a complete line, the input processing routine does nothing.

When a command arrives, it is processed.

Looks for a scheduling match. (What is MODULAR ARITHMETIC ?)

Calculate Time of Day: (**TOD = System\_time % 86400**)

Calculate the current schedule looking for a match ((**TOD % Period == Offset**)

If a match is found, run the associated commands.

For the **S0** schedule, extract commands from the **S0=** file in the FRAM and execute them.

Runs the zNEO HALT instruction. To reduce power.

The zNEO stops executing instruction, reducing power a bit.

# The interrupts



The zNEO has many interrupt sources, we use only a few...

## UART 0. DRA818/SA818 control

Receive traffic is buffered until a 0x0D is received. Transmit traffic is polled.

Low volume of traffic when commanding DRA818/SA818, otherwise idle.

## UART 1. host commands

Receive traffic is buffered until a 0x0D is received. Transmit traffic is polled.

This is the path used to load commands into the FRAM and audio data into FLASH.

Some overlap may occur during command processing as the next buffer is arriving.

## Time Tick System.time

This interrupt routine updates the **System.time** every 10 milliseconds. There is an 8-bit sub-seconds counter (that runs 0 to 99) and a 32 bit counter counting seconds.

The **System.time** field may be directly loaded with a 32 bit UNIX time. We can also set the time using a truncated time. All we need for scheduling is *seconds of day*.

## CW Timer

Code delivery is managed by this interrupt. The interrupt rate is set to the time required to deliver one **dit** (dot). The code message is delivered based on the **dit** time.

A **dah** (dash) takes 3 interrupt periods to deliver. Inter-character, inter-word, and inter-sentence spacing is built of multiple interrupt intervals.

The timer that drives this interrupt routine is programmed based on the **Word Rate** field in the **CWPM** command.



# Scheduling Language Class



We can casually group commands into several **classes**.

## SYS: System Commands

Fox System Setup. STAR, STAT, CONF, TIME

## SETUP: Fox Setup Commands

Transmitter Identification and Timebase CALL, NICK, TIME

## PGM: Fox Program Commands

Define over-the-air traffic. BEGN, TALK, CODE, DONE

## SCHED: Scheduling definition

Modulus Schedule Set and Clear. MODS, MODC

## DIRECTORY: Audio Directory and Frequency Directory

Define where, in FLASH, that an audio clip resides. TALK

## FRAM: FRAM Memory Load and Maintenance

Save commands to FRAM and erase FRAM. ESAV, EDMP, ERAS, EZER

## FLASH: Flash Memory Load and Maintenance. :hex, HERA

Intel HEX File loaded and device erase.

## TEST: Test Commands TEST

Hardware testing commands.



SYS commands are used to save information about the fox transmitter.

**HELP** *match string*

Prints out a complete list of commands that are currently compiled into the zNEO software.

**ONCE** *Sn=*

Runs the schedule one time.

Allows you to determine the time message delivery requires.

**REM-**

A *Remark* for documentation.

**RUN0** *schedule name*

Enables the indicated schedule.

**STAR** *start time*

This sets the time after which message traffic will be scheduled.

**IDLE**

Stops all message scheduling.

Enterin a blank line interactively does the same thing.



**STAT** "I" to dump module list

Prints out how the system is currently configured.

Adding the "I" argument dumps the version string that embedded in each module in the software image.

**CONF** many arguments

This command is used to setup the RF system.

**CONF HELP** can be used to list all of the keywords.

used to define the RF environment we are operating in.

**TOYC** keywords

This command is used to configure the DS1672 charging mode.

102-73181-10 boards have an external mechanism so do not use this feature.

**TIME** decimal number of seconds

The **TIME** command with a time argument sets the time registers in the DS1672. The host system, providing the time, should deliver the *TIME Command* at a predictable time (i.e. right after the seconds roll). Synchronous load!

# Class: SETUP



SETUP commands are used to save information about the identity of the fox transmitter.

## TIME

Here with no arguments, copies the time registers from the DS1672 into the **System.time** field right after the LSB in the DS1672 time register changes. Synchronous update!

## EPOCH offset in hours

Adjusts times from Zulu (GMT or UT) to local time.  
The U.S. is *earlier* than Zulu, so **EPOCH** is negative.

## CALL FCC assigned callsign

Save callsign for use by the **BEGN** and **DONE** commands.  
They will send this field in code, we remain rules compliant!

## NAME/NICK unit nickname

Save the transmitter *nickname*. **CODE** and **TALK** will use this later!  
A substitution mechanism allows this *nickname* and the *callsign* to be substituted into other commands, such as **TALK <CALL>** or **CODE <NAME>**.



PGM commands are used to send message traffic over the air

TONE KHz

Sets the fundamental frequency for audio when sending code.

CWPM WPM, intra character gap, inter word gap, inter sentence gap.

Sets the parameters for the Morse Code Generator.

Word Rate (words per minute) and character spacing.

FREQ MHz

Saves the carrier frequency. (**BEGN** will send it to the hardware)

May be changed for each message sent (we can jump frequencies).

FOFF MHz

Documents the offset of the Si5351 output clock.

Does **not** affect operation.

5351

Si5351 test routine.

Used to dump the internal frequency table.

May be used to load the Si5351 Multi-Synth registers.



**BEGN** (*silent*)

Begin message traffic.

Turn on the RF carrier and send a signon message with our callsign.

The **SILENT** argument will suppress the signon message (for testing).

**CODE** *message*

Configure tone generator and send *message* in code.

Delivery rate set in the **CWPM** command.

**TALK** *file-name*

Configure PWM block and send audio.

The *file-name* must be loaded into FLASH for this to work!

**WAIT** *decimal-seconds*

Wait, with a quiet carrier, for the indicated time (in seconds).

V3.76 adds a synchronous wait capability!

**WAIT** *period offset*

Fine grained timing, multiple transmitter conversations!



**CHRP** filename/tone, period, offset, duration, count

Wildlife tracker emulation. Specify audio tone, an operating schedule (*period and offset*), audio duration and repeat count.

The audio tone is enabled for *duration* seconds every *period* seconds.

The *period* and *offset* define a synchronous schedule to allow a hunt group to operate concurrently (high level of difficulty).

**DONE** (silent)

End of message traffic.

Send the signoff message (with our callsign) and then turn off carrier.

The **SILENT** argument will suppress the signoff message.

**BATC** channel, trip-point

Battery Report, Code

The *channel* argument selects voltage or current.

The *trip-point* argument provide a voltage setpoint, below which an **SOS** message is sent as part of the report.

The report can be encoded for those not comfortable with code.

**BATV** channel, trip-point

Battery Report, Voice

The arguments are more-or-less the same as BATC

Verbal report for those not comfortable with code



## BATR

### Battery Report

For battery performance analysis.

This command sends a line of text out reporting all analog channels.  
There is also an indication of the transmit state of the RF section.

An external logging program is expected to time-tag the message traffic.

An external analysis program is then used to analyze the report traffic  
and generate a plot of battery performance.

We are looking to estimate how long the battery will last.  
The number of hunts we get out of a set of batteries.

```
sts47,00* Handler_BATR (cmd_battery.c*) V=9.185[03AE] I=105.5[00D8] 5=4.992[0200] State-T3 0.02 Sec
sts47,00* Handler_BATR (cmd_battery.c*) V=9.341[03BE] I=35.2[0048] 5=5.032[0204] State-T0 0.02 Sec
```

```
STS47,00* Handler_BATR (cmd_battery.c*) V=5.275[021D] I=167.0[0156] 5=4.963[01FD] State-T3 0.02 Sec
STS47,00* Handler_BATR (cmd_battery.c*) V=6.085[0270] I=48.8[0064] 5=5.041[0205] State-T0 0.02 Sec
```



## Scheduling Commands.

**MODS Sn Period Offset**

Set/save schedule

Specify the schedule name: S0 .. S9 and the scheduling period (in seconds)  
and the scheduling offset (also in seconds) into the period.

**MODC Sn**

Clear schedule

Specify the schedule name: S0 .. S9

INI=MODS S0 300, 0

INI=MODS S1 360,60

INI=MODS S2 360,240

# Class: Directory



## The *TALK* directory

**TALK** name start length rate

This command (the only one in this class) is used to define the location (if FLASH) of a voice clip.

The *length* and *rate* arguments are not required when an 8-bit WAV file is present in FLASH as these parameters are present in the WAV file header.

TALK=BATTI 0  
TALK=BATTV 4224  
TALK=REG5 8704  
TALK=POINT 13824  
TALK=V\_HZ 15232  
TALK=V\_KHZ 17664  
TALK=V\_MHZ 20864  
TALK=V\_NO 24064

# Class: Directory



## The supplemental frequency table

### 144.150 synthesizer parameters

This provides a mechanism to store the setup tables outside the zNEO program flash (reducing the size of the zNEO flash).

We can take advantage of this to correct frequency errors thereby eliminating the need to trim the synthesizer crystal.

This example FRAM fragment is for the Skyworks SI5351.

```
INI=FOFF -10.000
144.FOFF -10.000
144.100=139D,0DAC0,F4240
144.105=139D,3C8BF,F4240
144.110=139D,6B6C0,F4240
144.115=139D,9A4C0,F4240
144.120=139D,C92BF,F4240
144.125=139E,03E7F,F4240
```

# Class: FRAM



**FRAM is a fast external memory.**

This is where we store all these commands that are used to run the system.

**ESAV** NAM=<text>

Save named record in next free location

This is how we save commands to the FRAM for later use.

**EDMP** "match string"

Dump active records

**EDID**

Flash JEDEC-ID dump (PROG & WAVE) The two memory devices

**ERAS** record\_number or **DEV**

Rewrite <record> to REM- (DEV, QTR, HALF)

**EZER** record\_number

Erase <record> to ZERO

**ETAB**

Dump JEDEC-ID device table

This dumps all devices stored in zNEO program flash.

# Class: FLASH



Large external storage (slow erase performance).

**HERA** ALL

Hex erase (entire WAVE device).

Large device are sloooooow (like 60 seconds).

**HDMP** count start

Hex dump (WAVE device). Diagnostic dump.

**HEND**

Find end of waveform data. Allow appending additional audio.

**H115**

Fast terminal bit rate. Speed up loading process.

**:hex hex\_record**

Intel HEX loader (WAVE device). We tolerate whitespace in the hex record!

This is how we save audio to the FLASH for later digitizing.

:02 0000 04 0000 FA

:20 0000 00 524946465010000057415645666D74201000000001000100A00F0000A00F0000 4F

:20 0020 00 01000800646174612B1000007F8080808080807F7F807F8080808180808180 E4



## **Hardware and Software testing KEEP OUT!!!**

Mess around here and you'll break something!

### **HALT**

Run the zNEO **HALT** instruction. System recovers and continues.

The zNEO halts at the bottom of the main loop,  
so this has no noticeable impact.

### **STOP**

Run the zNEO **STOP** instruction. Hangs the system.

### **REST**

Reset the zNEO. Same as mashing the reset button.

### **TEST**

`test_name`

Here be *dragons*. This can damage things!

Well, I warned you...

# ICARC Fox FRAM dump



For those that are still awake...

---

sts37 ,00*	Handler_EDMP	(	0)	REM— ./FOX_SIMPLE ,	1
sts37 ,01*	Handler_EDMP	(	1)	REM—,—S , FOX2X	2
sts37 ,02*	Handler_EDMP	(	2)	REM—,—F , FOX2X_KC0JFQ	3
sts37 ,03*	Handler_EDMP	(	3)	REM—,2024—NOV—11	4

This is a dump of the most recent load

This is somewhat truncated to allow it to fit while keeping the large text

# ICARC Fox FRAM dump, TALK directory



---

sts37 ,04*	Handler_EDMP	(	4)	TALK=BATTI,0	1
sts37 ,05*	Handler_EDMP	(	5)	TALK=BATTV,4224	2
sts37 ,06*	Handler_EDMP	(	6)	TALK=REG5,8704	3
sts37 ,07*	Handler_EDMP	(	7)	TALK=POINT,13824	4
sts37 ,08*	Handler_EDMP	(	8)	TALK=V.HZ,15232	5
sts37 ,09*	Handler_EDMP	(	9)	TALK=V.KHZ,17664	6
sts37 ,10*	Handler_EDMP	(	10)	TALK=V.MHZ,20864	7
sts37 ,11*	Handler_EDMP	(	11)	TALK=V.N0,24064	8
sts37 ,12*	Handler_EDMP	(	12)	TALK=V.N1,26752	9
sts37 ,13*	Handler_EDMP	(	13)	TALK=V.N2,28544	10
sts37 ,14*	Handler_EDMP	(	14)	TALK=V.N3,30720	11
sts37 ,15*	Handler_EDMP	(	15)	TALK=V.N4,32640	12
sts37 ,16*	Handler_EDMP	(	16)	TALK=V.N5,34560	13
sts37 ,17*	Handler_EDMP	(	17)	TALK=V.N6,36736	14
sts37 ,18*	Handler_EDMP	(	18)	TALK=V.N7,38528	15
sts37 ,19*	Handler_EDMP	(	19)	TALK=V.N8,40448	16

# ICARC Fox FRAM dump, TALK directory



---

sts37 ,20*	Handler_EDMP	( 20)	TALK=V_N9,41984	21
sts37 ,21*	Handler_EDMP	( 21)	TALK=V_MAMP,44416	22
sts37 ,22*	Handler_EDMP	( 22)	TALK=V_VOLTS,48128	23
sts37 ,23*	Handler_EDMP	( 23)	TALK=KC0JFQ,51200	24
sts37 ,24*	Handler_EDMP	( 24)	TALK=W0JV,56960	25
sts37 ,25*	Handler_EDMP	( 25)	TALK=FOX20,63104	26
sts37 ,26*	Handler_EDMP	( 26)	TALK=FOX21,66048	27
sts37 ,27*	Handler_EDMP	( 27)	TALK=FOX22,70272	28
sts37 ,28*	Handler_EDMP	( 28)	TALK=FOX23,74624	29
sts37 ,29*	Handler_EDMP	( 29)	TALK=FOX24,79872	30
sts37 ,30*	Handler_EDMP	( 30)	TALK=FOX25,84608	31
sts37 ,31*	Handler_EDMP	( 31)	TALK=FOX26,90752	32
sts37 ,32*	Handler_EDMP	( 32)	TALK=FOX27,95744	33
sts37 ,33*	Handler_EDMP	( 33)	TALK=FOX28,100352	34
sts37 ,34*	Handler_EDMP	( 34)	TALK=FOX29,104832	35
sts37 ,35*	Handler_EDMP	( 35)	TALK=FOX30,109824	36

# ICARC Fox FRAM dump, TALK directory



---

sts37 ,36*	Handler_EDMP	( 36)	TALK=FOX31,113664	37
sts37 ,37*	Handler_EDMP	( 37)	TALK=FOX32,118400	38
sts37 ,38*	Handler_EDMP	( 38)	TALK=V_F144,123264	39
sts37 ,39*	Handler_EDMP	( 39)	TALK=V_F145,128000	40
sts37 ,40*	Handler_EDMP	( 40)	TALK=V_F200,134016	41
sts37 ,41*	Handler_EDMP	( 41)	TALK=V_F225,139776	42
sts37 ,42*	Handler_EDMP	( 42)	TALK=V_F250,145792	43
sts37 ,43*	Handler_EDMP	( 43)	TALK=V_F275,152192	44
sts37 ,44*	Handler_EDMP	( 44)	TALK=V_F300,158080	45
sts37 ,45*	Handler_EDMP	( 45)	TALK=V_F325,163968	46
sts37 ,46*	Handler_EDMP	( 46)	TALK=V_F350,168704	47
sts37 ,47*	Handler_EDMP	( 47)	TALK=V_F375,173312	48
sts37 ,48*	Handler_EDMP	( 48)	TALK=FD_W0JV,177792	49
sts37 ,49*	Handler_EDMP	( 49)	TALK=FD_FOX,227456	50
sts37 ,50*	Handler_EDMP	( 50)	TALK=FD_GAZELLE,240768	51
sts37 ,51*	Handler_EDMP	( 51)	TALK=FD_CATCH,250240	52

# ICARC Fox FRAM dump, TALK directory



---

sts37 ,52*	Handler_EDMP	( 52)	TALK=FOX33,259328	53
sts37 ,53*	Handler_EDMP	( 53)	TALK=FOX34,264960	54
sts37 ,54*	Handler_EDMP	( 54)	TALK=FOX35,270592	55
sts37 ,55*	Handler_EDMP	( 55)	TALK=FOX36,276096	56
sts37 ,56*	Handler_EDMP	( 56)	TALK=FOX37,281472	57
sts37 ,57*	Handler_EDMP	( 57)	TALK=FOX38,286592	58
sts37 ,58*	Handler_EDMP	( 58)	TALK=FD_TUNA,290816	59
sts37 ,59*	Handler_EDMP	( 59)	TALK=FD_SILLY_8K ,301056	60
sts37 ,60*	Handler_EDMP	( 60)	TALK=TS1_LA ,312448	61
sts37 ,61*	Handler_EDMP	( 61)	TALK=TS1R_LA ,322304	62
sts37 ,62*	Handler_EDMP	( 62)	TALK=TS2_NY ,333952	63
sts37 ,63*	Handler_EDMP	( 63)	TALK=TS2R_NY ,343296	64
sts37 ,64*	Handler_EDMP	( 64)	TALK=TS3_SING ,354048	65
sts37 ,65*	Handler_EDMP	( 65)	TALK=TS3R_SING ,363392	66
sts37 ,66*	Handler_EDMP	( 66)	TALK=TS4_BOSTON ,373120	67
sts37 ,67*	Handler_EDMP	( 67)	TALK=CHIRP_UP ,381696	68
sts37 ,68*	Handler_EDMP	( 68)	TALK=CHIRP_DN ,383744	69
sts37 ,69*	Handler_EDMP	( 69)	TALK=CHIRP_UPDN ,385792	70

# ICARC Fox FRAM dump, INI file



---

sts37 ,70*	Handler_EDMP	(	70)	INI=TIME	71
sts37 ,71*	Handler_EDMP	(	71)	INI=WAIT,0.5	72
sts37 ,72*	Handler_EDMP	(	72)	INI=TIME	73
sts37 ,73*	Handler_EDMP	(	73)	INI=EPOC,-5.0	74
sts37 ,74*	Handler_EDMP	(	74)	INI=NAME,FOX17	75
sts37 ,75*	Handler_EDMP	(	75)	INI=CALL,W0JV	76
sts37 ,76*	Handler_EDMP	(	76)	INI=CONF,SI5351	77
sts37 ,77*	Handler_EDMP	(	77)	INI=CONF,8MA,CLK0	78
sts37 ,78*	Handler_EDMP	(	78)	INI=REM-,CONF,DRA818	79
sts37 ,79*	Handler_EDMP	(	79)	INI=FREQ,144.150	80
sts37 ,80*	Handler_EDMP	(	80)	INI=MODS,S0,360,0	81
sts37 ,81*	Handler_EDMP	(	81)	INI=MODS,S1,360,0	82
sts37 ,82*	Handler_EDMP	(	82)	INI=REM-,MODS,S2,360,0	83
sts37 ,83*	Handler_EDMP	(	83)	INI=REM-,MODS,S3,360,0	84
sts37 ,84*	Handler_EDMP	(	84)	INI=REM-,MODS,S4,360,0	85
sts37 ,85*	Handler_EDMP	(	85)	INI=REM-,MODS,S5,360,0	86
sts37 ,86*	Handler_EDMP	(	86)	INI=MODS,S6,360,0	87
sts37 ,87*	Handler_EDMP	(	87)	INI=MODS,S7,360,0	88
sts37 ,88*	Handler_EDMP	(	88)	INI=MODS,S8,360,0	89
sts37 ,89*	Handler_EDMP	(	89)	INI=MODS,S9,360,15	90
sts37 ,90*	Handler_EDMP	(	90)	INI=STAT	91

# ICARC Fox FRAM dump, TEST and MAS files



---

```
sts37 ,91* Handler_EDMP  (  91) TEST=CWPM,35,-1,-1,-1,-1      92
sts37 ,92* Handler_EDMP  (  92) TEST=TIME                         93
```

---

```
sts37 ,93* Handler_EDMP  (  93) MAS=CWPM,35,-1,-1,-1,-1      94
sts37 ,94* Handler_EDMP  (  94) MAS=STAT                         95
```

# ICARC Fox FRAM dump, ANN file



---

sts37 ,95*	Handler_EDMP	(	95)	REM—,FOX_ANN_V2025.FOX	96
sts37 ,96*	Handler_EDMP	(	96)	ANN=TONE,1.0	97
sts37 ,97*	Handler_EDMP	(	97)	ANN=CWPM,30,—1,—1,—1,—1	98
sts37 ,98*	Handler_EDMP	(	98)	ANN=BEGN	99
sts37 ,99*	Handler_EDMP	(	99)	ANN=TALK,<CALL>	100
sts37 ,100*	Handler_EDMP	(	100)	ANN=TALK,<NAME>	101
sts37 ,101*	Handler_EDMP	(	101)	ANN=WAIT,1.0	102
sts37 ,102*	Handler_EDMP	(	102)	ANN=BATV,V	103
sts37 ,103*	Handler_EDMP	(	103)	ANN=BATV,I	104
sts37 ,104*	Handler_EDMP	(	104)	ANN=WAIT,0.3	105
sts37 ,105*	Handler_EDMP	(	105)	ANN=TALK,V_F144	106
sts37 ,106*	Handler_EDMP	(	106)	ANN=TALK,V_F225	107
sts37 ,107*	Handler_EDMP	(	107)	ANN=TONE,1.0	108
sts37 ,108*	Handler_EDMP	(	108)	ANN=CWPM,30,—1,—1,—1,—1,—1	109
sts37 ,109*	Handler_EDMP	(	109)	ANN=DONE	110
sts37 ,110*	Handler_EDMP	(	110)	ANN=FREQ,144.225	111
sts37 ,111*	Handler_EDMP	(	111)	ANN=STAT	112
sts37 ,112*	Handler_EDMP	(	112)	ANN=RUN0,S0	113

# ICARC Fox FRAM dump, S0=



OK, here is the start of the **S0=** message sequence.

---

sts37 ,113*	Handler_EDMP	( 113)	S0=BATR	114
sts37 ,114*	Handler_EDMP	( 114)	S0=CONF,AM	115
sts37 ,115*	Handler_EDMP	( 115)	S0=TONE,1.0	116
sts37 ,116*	Handler_EDMP	( 116)	S0=CWPM,30,-1,-1,-1,-1,-1	117
sts37 ,117*	Handler_EDMP	( 117)	S0= <b>BEGN</b>	118

We set the audio tone and word rate the same for the **BEGN** and **DONE** message fragment. The signon and signoff sounds the same on all units.

# ICARC Fox FRAM dump, S0=



---

sts37 ,117*	Handler_EDMP	( 117)	S0= <b>BEGN</b>	118
sts37 ,118*	Handler_EDMP	( 118)	S0= <b>TALK,&lt;CALL&gt;</b>	119
sts37 ,119*	Handler_EDMP	( 119)	S0= <b>TALK,&lt;NAME&gt;</b>	120
sts37 ,120*	Handler_EDMP	( 120)	S0=WAIT, 0.5	121
sts37 ,121*	Handler_EDMP	( 121)	S0=TONE, 1.0	122
sts37 ,122*	Handler_EDMP	( 122)	S0=CWPM,25,-1,-1,-1,-1	123
sts37 ,123*	Handler_EDMP	( 123)	S0=WAIT, 0.15	124
sts37 ,124*	Handler_EDMP	( 124)	S0=BATC, EV, 7.2	125
sts37 ,125*	Handler_EDMP	( 125)	S0=WAIT, 0.5	126
sts37 ,126*	Handler_EDMP	( 126)	S0= <b>CODE,IOWA,CITY</b>	127
sts37 ,127*	Handler_EDMP	( 127)	S0= <b>CODE,AMATEUR,RADIO</b>	128
sts37 ,128*	Handler_EDMP	( 128)	S0= <b>CODE,CLUB,FOXHUNT</b>	129
sts37 ,129*	Handler_EDMP	( 129)	S0= <b>CODE,F,W,KENT,PARK</b>	130
sts37 ,130*	Handler_EDMP	( 130)	S0=REM-	131
sts37 ,131*	Handler_EDMP	( 131)	S0=REM-	132
sts37 ,132*	Handler_EDMP	( 132)	S0=REM-	133
sts37 ,133*	Handler_EDMP	( 133)	S0=BATR	134
sts37 ,134*	Handler_EDMP	( 134)	S0=TONE, 1.0	135
sts37 ,135*	Handler_EDMP	( 135)	S0=CWPM,30,-1,-1,-1,-1	136
sts37 ,136*	Handler_EDMP	( 136)	S0= <b>DONE</b>	137

# ICARC Fox FRAM dump, S1=



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sts37 ,137*	Handler_EDMP	( 137)	S1=CONF,—AM	138
sts37 ,138*	Handler_EDMP	( 138)	S1=TONE,1.0	139
sts37 ,139*	Handler_EDMP	( 139)	S1=CWPM,30,—1,—1,—1,—1	140
sts37 ,140*	Handler_EDMP	( 140)	S1=BEGN	141
sts37 ,141*	Handler_EDMP	( 141)	S1=TALK,<CALL>	142
sts37 ,142*	Handler_EDMP	( 142)	S1=TALK,<NAME>	143
sts37 ,143*	Handler_EDMP	( 143)	S1=CHRP,1.3,6,3,0.30,55	144
sts37 ,144*	Handler_EDMP	( 144)	S1=TONE,1.0	145
sts37 ,145*	Handler_EDMP	( 145)	S1=CWPM,30,—1,—1,—1,—1	146
sts37 ,146*	Handler_EDMP	( 146)	S1=DONE,SILENT	147

# ICARC Fox FRAM dump, S6=



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sts37 ,147*	Handler_EDMP	( 147)	S6=TONE,1.0	148
sts37 ,148*	Handler_EDMP	( 148)	S6=CWPM,30, -1, -1, -1, -1, -1	149
sts37 ,149*	Handler_EDMP	( 149)	S6=CONF, -AM	150
sts37 ,150*	Handler_EDMP	( 150)	S6=BEGN	151
sts37 ,151*	Handler_EDMP	( 151)	S6=TALK,<CALL>	152
sts37 ,152*	Handler_EDMP	( 152)	S6=TALK,<NAME>	153
sts37 ,153*	Handler_EDMP	( 153)	S6=CONF,CW	154
sts37 ,154*	Handler_EDMP	( 154)	S6=WAIT,3	155
sts37 ,155*	Handler_EDMP	( 155)	S6=CHRP, CHIRP_UP,12,0,0.05,13	156
sts37 ,156*	Handler_EDMP	( 156)	S6=CHRP, CHIRP_DN,12,0,0.05,13	157
sts37 ,157*	Handler_EDMP	( 157)	S6=WAIT,3	158
sts37 ,158*	Handler_EDMP	( 158)	S6=CONF, -AM	159
sts37 ,159*	Handler_EDMP	( 159)	S6=TONE,1.0	160
sts37 ,160*	Handler_EDMP	( 160)	S6=CWPM,30, -1, -1, -1, -1, -1	161
sts37 ,161*	Handler_EDMP	( 161)	S6=DONE	162

# ICARC Fox FRAM dump, S7=



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sts37 ,162*	Handler_EDMP	( 162)	S7=CONF,AM	163
sts37 ,163*	Handler_EDMP	( 163)	S7=TONE,1.0	164
sts37 ,164*	Handler_EDMP	( 164)	S7=CWPM,30, -1, -1, -1, -1, -1	165
sts37 ,165*	Handler_EDMP	( 165)	S7= <b>BEGN</b>	166

# ICARC Fox FRAM dump, S7=



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sts37 ,165*	Handler_EDMP	( 165)	S7=BEGN	166
sts37 ,166*	Handler_EDMP	( 166)	S7=TALK,<CALL>	167
sts37 ,167*	Handler_EDMP	( 167)	S7=TALK,<NAME>	168
sts37 ,168*	Handler_EDMP	( 168)	S7=WAIT,1.0	169
sts37 ,169*	Handler_EDMP	( 169)	S7=TALK,FD_W0JV	170
sts37 ,170*	Handler_EDMP	( 170)	S7=WAIT,1.0	171
sts37 ,171*	Handler_EDMP	( 171)	S7=CWPM,30,-1,-1,-1,-1	172
sts37 ,172*	Handler_EDMP	( 172)	S7=TONE,1.5	173
sts37 ,173*	Handler_EDMP	( 173)	S7=CODE,IOWA,CITY	174
sts37 ,174*	Handler_EDMP	( 174)	S7=CODE,AMATEUR,RADIO,CLUB	175
sts37 ,175*	Handler_EDMP	( 175)	S7=CODE,FIELD,DAY,OPERATIONS	176
sts37 ,176*	Handler_EDMP	( 176)	S7=CODE,AT,F,W,KENT,PARK	177
sts37 ,177*	Handler_EDMP	( 177)	S7=WAIT,1.0	178
sts37 ,178*	Handler_EDMP	( 178)	S7=TALK,FD_GAZELLE	179
sts37 ,179*	Handler_EDMP	( 179)	S7=WAIT,1.0	180
sts37 ,180*	Handler_EDMP	( 180)	S7=REM-	181
sts37 ,181*	Handler_EDMP	( 181)	S7=REM-	182
sts37 ,182*	Handler_EDMP	( 182)	S7=REM-	183
sts37 ,183*	Handler_EDMP	( 183)	S7=TONE,1.0	184
sts37 ,184*	Handler_EDMP	( 184)	S7=CWPM,30,-1,-1,-1,-1	185
sts37 ,185*	Handler_EDMP	( 185)	S7=DONE	186

# ICARC Fox FRAM dump, S8=



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sts37 ,186*	Handler_EDMP	( 186)	S8=TONE,1.0	187
sts37 ,187*	Handler_EDMP	( 187)	S8=CWPM,30,-1,-1,-1,-1,-1	188
sts37 ,188*	Handler_EDMP	( 188)	S8=CONF,—AM	189
sts37 ,189*	Handler_EDMP	( 189)	S8=BEGN	190

# ICARC Fox FRAM dump, S8=



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sts37 ,189*	Handler_EDMP	( 189)	S8=BEGN	190
sts37 ,190*	Handler_EDMP	( 190)	S8=TALK,<CALL>	191
sts37 ,191*	Handler_EDMP	( 191)	S8=TALK,<NAME>	192
sts37 ,192*	Handler_EDMP	( 192)	S8=CONF,CW	193
sts37 ,193*	Handler_EDMP	( 193)	S8=CODE,SING ,SING	194
sts37 ,194*	Handler_EDMP	( 194)	S8=WAIT,120/40	195
sts37 ,195*	Handler_EDMP	( 195)	S8=TALK, TS1_LA	196
sts37 ,196*	Handler_EDMP	( 196)	S8=WAIT,120/50	197
sts37 ,197*	Handler_EDMP	( 197)	S8=TALK, TS2_NY	198
sts37 ,198*	Handler_EDMP	( 198)	S8=WAIT,120/60	199
sts37 ,199*	Handler_EDMP	( 199)	S8=TALK, TS3_SING	200
sts37 ,200*	Handler_EDMP	( 200)	S8=WAIT,120/70	201
sts37 ,201*	Handler_EDMP	( 201)	S8=TALK, TS4_BOSTON	202
sts37 ,202*	Handler_EDMP	( 202)	S8=WAIT,120/80	203
sts37 ,203*	Handler_EDMP	( 203)	S8=CONF,—AM	204
sts37 ,204*	Handler_EDMP	( 204)	S8=TONE,1.2	205
sts37 ,205*	Handler_EDMP	( 205)	S8=CODE,BEEN,LISTENIN ,TO	206
sts37 ,206*	Handler_EDMP	( 206)	S8=CODE, THE, THREE, STOOGES	207
sts37 ,207*	Handler_EDMP	( 207)	S8=TONE,1.0	208
sts37 ,208*	Handler_EDMP	( 208)	S8=CWPM,30,—1,—1,—1,—1	209
sts37 ,209*	Handler_EDMP	( 209)	S8=DONE	210

# ICARC Fox FRAM dump, S9=



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sts37 ,210*	Handler_EDMP	( 210)	S9=TONE,1.0	211
sts37 ,211*	Handler_EDMP	( 211)	S9=CWPM,30,-1,-1,-1,-1,-1	212
sts37 ,212*	Handler_EDMP	( 212)	S9=CONF,—AM	213
sts37 ,213*	Handler_EDMP	( 213)	S9=BEGN	214

# ICARC Fox FRAM dump, S9=



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sts37 ,213*	Handler_EDMP	( 213)	S9= <b>BEGN</b>	214
sts37 ,214*	Handler_EDMP	( 214)	S9= <b>TALK,&lt;CALL&gt;</b>	215
sts37 ,215*	Handler_EDMP	( 215)	S9= <b>TALK,&lt;NAME&gt;</b>	216
sts37 ,216*	Handler_EDMP	( 216)	S9=CONF,CW	217
sts37 ,217*	Handler_EDMP	( 217)	S9= <b>CODE,SING ,SING</b>	218
sts37 ,218*	Handler_EDMP	( 218)	S9=WAIT,120/44	219
sts37 ,219*	Handler_EDMP	( 219)	S9= <b>TALK, TS1R_LA</b>	220
sts37 ,220*	Handler_EDMP	( 220)	S9=WAIT,120/54	221
sts37 ,221*	Handler_EDMP	( 221)	S9= <b>TALK, TS2R_NY</b>	222
sts37 ,222*	Handler_EDMP	( 222)	S9=WAIT,120/64	223
sts37 ,223*	Handler_EDMP	( 223)	S9= <b>TALK, TS3R_SING</b>	224
sts37 ,224*	Handler_EDMP	( 224)	S9=WAIT,120/74	225
sts37 ,225*	Handler_EDMP	( 225)	S9= <b>TALK, TS3R_SING</b>	226
sts37 ,226*	Handler_EDMP	( 226)	S9=WAIT,120/100	227
sts37 ,227*	Handler_EDMP	( 227)	S9=CONF,—AM	228
sts37 ,228*	Handler_EDMP	( 228)	S9=TONE,1.6	229
sts37 ,229*	Handler_EDMP	( 229)	S9= <b>CODE,BEEN,LISTENIN ,TO</b>	230
sts37 ,230*	Handler_EDMP	( 230)	S9= <b>CODE, THE, THREE, STOOGES</b>	231
sts37 ,231*	Handler_EDMP	( 231)	S9=TONE,1.0	232
sts37 ,232*	Handler_EDMP	( 232)	S9=CWPM,30,—1,—1,—1,—1	233
sts37 ,233*	Handler_EDMP	( 233)	S9= <b>DONE</b>	234

# ICARC Fox FRAM dump, SI5351 Frequency Table



SI5351 frequency table, adjusted for crystal offset.

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sts37 ,234*	Handler_EDMP	( 234)	INI=FOFF, -10.000	235
sts37 ,235*	Handler_EDMP	( 235)	144.FOFF, -10.000	236
sts37 ,236*	Handler_EDMP	( 236)	144.100=139D,0DAC0, F4240	237
sts37 ,237*	Handler_EDMP	( 237)	144.105=139D,3C8BF, F4240	238
sts37 ,238*	Handler_EDMP	( 238)	144.110=139D,6B6C0, F4240	239
sts37 ,239*	Handler_EDMP	( 239)	144.115=139D,9A4C0, F4240	240
sts37 ,240*	Handler_EDMP	( 240)	144.120=139D,C92BF, F4240	241
sts37 ,241*	Handler_EDMP	( 241)	144.125=139E,03E7F, F4240	242
sts37 ,242*	Handler_EDMP	( 242)	144.130=139E,32C80, F4240	243
sts37 ,243*	Handler_EDMP	( 243)	144.135=139E,61A7F, F4240	244
sts37 ,244*	Handler_EDMP	( 244)	144.140=139E,90880, F4240	245
sts37 ,245*	Handler_EDMP	( 245)	144.145=139E,BF680, F4240	246
sts37 ,246*	Handler_EDMP	( 246)	144.150=139E,EE47F, F4240	247
sts37 ,247*	Handler_EDMP	( 247)	144.155=139F,2903F, F4240	248
sts37 ,248*	Handler_EDMP	( 248)	144.160=139F,57E3F, F4240	249
sts37 ,249*	Handler_EDMP	( 249)	144.165=139F,86C3F, F4240	250

# ICARC Fox FRAM dump, SI5351 Frequency Table



sts37 ,250*	Handler_EDMP	( 250)	144.170=139F , B5A40 , F4240	251
sts37 ,251*	Handler_EDMP	( 251)	144.175=139F , E483F , F4240	252
sts37 ,252*	Handler_EDMP	( 252)	144.180=13A0 , 1F3FF , F4240	253
sts37 ,253*	Handler_EDMP	( 253)	144.185=13A0 , 4E1FF , F4240	254
sts37 ,254*	Handler_EDMP	( 254)	144.190=13A0 , 7CFFF , F4240	255
sts37 ,255*	Handler_EDMP	( 255)	144.195=13A0 , ABDF , F4240	256
sts37 ,256*	Handler_EDMP	( 256)	144.200=13A0 , DAC00 , F4240	257
sts37 ,257*	Handler_EDMP	( 257)	144.205=13A1 , 157BF , F4240	258
sts37 ,258*	Handler_EDMP	( 258)	144.210=13A1 , 445BF , F4240	259
sts37 ,259*	Handler_EDMP	( 259)	144.215=13A1 , 733BF , F4240	260
sts37 ,260*	Handler_EDMP	( 260)	144.220=13A1 , A21BF , F4240	261
sts37 ,261*	Handler_EDMP	( 261)	144.225=13A1 , D0FBF , F4240	262
sts37 ,262*	Handler_EDMP	( 262)	144.230=13A2 , 0BB80 , F4240	263
sts37 ,263*	Handler_EDMP	( 263)	144.235=13A2 , 3A97F , F4240	264
sts37 ,264*	Handler_EDMP	( 264)	144.240=13A2 , 6977F , F4240	265
sts37 ,265*	Handler_EDMP	( 265)	144.245=13A2 , 9857F , F4240	266
sts37 ,266*	Handler_EDMP	( 266)	144.250=13A2 , C737F , F4240	267
sts37 ,267*	Handler_EDMP	( 267)	144.255=13A3 , 01F3F , F4240	268
sts37 ,268*	Handler_EDMP	( 268)	144.260=13A3 , 30D40 , F4240	269
sts37 ,269*	Handler_EDMP	( 269)	144.265=13A3 , 5FB3F , F4240	270

# ICARC Fox FRAM dump, SI5351 Frequency Table



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sts37 ,270*	Handler_EDMP	( 270)	144.270=13A3,8E93F , F4240	271
sts37 ,271*	Handler_EDMP	( 271)	144.275=13A3,BD73F , F4240	272
sts37 ,272*	Handler_EDMP	( 272)	144.280=13A3,EC53F , F4240	273
sts37 ,273*	Handler_EDMP	( 273)	144.285=13A4,270FF , F4240	274
sts37 ,274*	Handler_EDMP	( 274)	144.290=13A4,55F00 , F4240	275
sts37 ,275*	Handler_EDMP	( 275)	144.295=13A4,84CFF , F4240	276
sts37 ,276*	Handler_EDMP	( 276)	144.300=13A4,B3AFF , F4240	277
sts37 ,277*	Handler_EDMP	( 277)	144.305=13A4,E28FF , F4240	278
sts37 ,278*	Handler_EDMP	( 278)	144.310=13A5,1D4BF , F4240	279
sts37 ,279*	Handler_EDMP	( 279)	144.315=13A5,4C2BF , F4240	280
sts37 ,280*	Handler_EDMP	( 280)	144.320=13A5,7B0BF , F4240	281
sts37 ,281*	Handler_EDMP	( 281)	144.325=13A5,A9EBF , F4240	282
sts37 ,282*	Handler_EDMP	( 282)	144.330=13A5,D8CBF , F4240	283
sts37 ,283*	Handler_EDMP	( 283)	144.335=13A6,1387F , F4240	284
sts37 ,284*	Handler_EDMP	( 284)	144.340=13A6,4267F , F4240	285
sts37 ,285*	Handler_EDMP	( 285)	144.345=13A6,7147F , F4240	286
STS37 ,286*	Handler_EDMP	4.00	Sec	287