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## Re: Frankentracker 1 off the air - rebuilt Stella16 with uBlox GPS on the air



Michael Babineau ([/g/AriesHAB/profile/@ve3wmb](https://ovmrc.groups.io/g/AriesHAB/profile/@ve3wmb))

Dec 21  (<https://ovmrc.groups.io/g/AriesHAB/message/1177>)

On Thu, Dec 19, 2019 at 10:33 AM, Graham, VE3GTC wrote:

```
> 2019-12-16 16:45:31 Sampled Freq Hz x 100 : 0320000000 Old Corr factor : -9130 New Corr factor : -9130
> 2019-12-16 16:47:1 ** Calibration Fail **: No GPS PPS
> 2019-12-16 16:47:1 >> orion PRE sm trace: curr_state: 2 curr_event: 2
> 2019-12-16 16:47:1 << orion POST sm trace: curr_state: 3 event_just_processed: 2 action: 0
> 2019-12-16 16:49:1 >> orion PRE sm trace: curr_state: 3 curr_event: 4
> 2019-12-16 16:49:1 << orion POST sm trace: curr_state: 4 event_just_processed: 4 action: 2
> 2019-12-16 16:49:1 Telem Grid:FN25IG, alt_m:62, spd_kn:0, num_sats:3, gps_stat:3, batt_v_x10:34, ptemp_c:8, temp_c:-127
> 2019-12-16 16:49:1 >> orion PRE sm trace: curr_state: 4 curr_event: 5
> 2019-12-16 16:49:1 << orion POST sm trace: curr_state: 5 event_just_processed: 5 action: 0
> 2019-12-16 16:50:1 >> orion PRE sm trace: curr_state: 5 curr_event: 6
> 2019-12-16 16:50:1 << orion POST sm trace: curr_state: 6 event_just_processed: 6 action: 3
```

Things that make you go hmmm .....

Graham : So if we assume this could be a software issue, I have tracked this down to the function `encode_and_tx_wspr_msg()` which I have tacked on at the bottom.

We have to be making it at least as far as `si5351bx_setfreq(SI5351A_WSPRTX_CLK_NUM, (g_beacon_freq_hz * 100ULL), SI5351_CLK_ON);` as you are seeing a solid carrier.

The other option is that we could be a bit further down in the "for loop" and for some reason the call to `si5351bx_setfreq()` blew up or something odd is happening with the interrupt service routine that sets "g\_proceed" to true and it is not triggering for some reason. Maybe this path through the code somehow didn't

properly reset the interrupts ?? This seems like it could be the most probable scenario to me.

Here is the "for loop" and you can see that if g\_proceed doesn't get set by the ISR then we are stuck at

```
while (!g_proceed);
```

which could explain what you observed.

```
for (i = 0; i < SYMBOL_COUNT; i++)
{
  si5351bx_setfreq(SI5351A_WSPRTX_CLK_NUM, (g_beacon_freq_hz * 100ULL) + (g_tx_buffer[i] * TONE_SPACING), SI5351_CLK_ON);
  g_proceed = false;

  // We spin our wheels in TX here, waiting until the Timer1 Interrupt sets the g_proceed flag
  // Then we can go back to the top of the for loop to start sending the next symbol
  while (!g_proceed);
}
```

Note that Timer1 is used to count pulses during calibration, so Timer1 has to get reconfigured after Calibration to drive the WSPR transmission. If that isn't happening properly that could certainly explain this.

See the ISR code below. It is pretty simplistic so if it is an interrupt problem it has to be something with the setup/enabling :

```
// Global variables used in ISRs
volatile bool g_proceed = false;

// Timer interrupt vector. This toggles the variable g_proceed which we use to gate
// each column of output to ensure accurate timing. This ISR is called whenever
// Timer1 hits the WSPR_CTC value used below in setup().
ISR(TIMER1_COMPA_vect)
{
  g_proceed = true;
}
```

Michael VE3WMB

P.S. I will try to reproduce this the best I can by disconnecting the GPS antenna during iteration 9 of calibration and see. I am certain that I tried this scenario tons of times.

I'll also look at how the Timer1 interrupt gets reconfigured after GPS LOS and see if there is anything different as compared to the setup after a normal Calibration completion, or if there is anything dodgy in general with how this interrupt gets set up.

---

```
void encode_and_tx_wspr_msg() {
  /*****
   Transmit the Primary WSPR Message
   Loop through the transmit buffer, transmitting one character at a time.
   * *****/
  uint8_t i;

  // Encode the primary message paramters into the TX Buffer
  jtencode.wspr_encode(g_beacon_callsign, g_grid_loc, g_tx_pwr_dbm, g_tx_buffer);

  // Reset the tone to 0 and turn on the TX output
  si5351bx_setfreq(SI5351A_WSPRTX_CLK_NUM, (g_beacon_freq_hz * 100ULL), SI5351_CLK_ON);

  // Turn off the PARK clock
  si5351bx_enable_clk(SI5351A_PARK_CLK_NUM, SI5351_CLK_OFF);

  // If we are using the TX LED turn it on
  #if defined(TX_LED_PRESENT)
  digitalWrite(TX_LED_PIN, HIGH);
  #endif

  // We need to synchronize the 1.46 second Timer/Counter-1 interrupt to the start of WSPR transmission as it is free-running.
  // We reset the counts to zero so we ensure that the first symbol is not truncated (i.e we get a full 1.46 seconds before the interrupt handler sets
  // the g_proceed flag).
  noInterrupts();
  TCNT1 = 0; // Clear the count for Timer/Counter-1
  GTCCR |= (1 << PSRSYNC); // Do a reset on the pre-scaler. Note that we are not using Timer 0, it shares a prescaler so it would also be impacted.
```

```
interrupts();
// Now send the rest of the message
for (i = 0; i < SYMBOL_COUNT; i++)
{
  si5351bx_setfreq(SI5351A_WSPRTX_CLK_NUM, (g_beacon_freq_hz * 100ULL) + (g_tx_buffer[i] * TONE_SPACING), SI5351_CLK_ON);
  g_proceed = false;

  // We spin our wheels in TX here, waiting until the Timer1 Interrupt sets the g_proceed flag
  // Then we can go back to the top of the for loop to start sending the next symbol
  while (!g_proceed);
}

// Turn off the WSPR TX clock output, we are done sending the message
si5351bx_enable_clk(SI5351A_WSPRTX_CLK_NUM, SI5351_CLK_OFF);

// Re-enable the Park Clock
si5351bx_setfreq(SI5351A_PARK_CLK_NUM, (PARK_FREQ_HZ * 100ULL), SI5351_CLK_ON); // Turn on Park Clock

// If we are using the TX LED turn it off
#ifdef TX_LED_PRESENT
  digitalWrite(TX_LED_PIN, LOW);
#endif

  delay(1000); // Delay one second
} // end of encode_and_tx_wspr_msg()
```

---

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