This guide is updated to reflect the software from NavCom which is related to the StarFire satellite and frequency changes. The most recent version of software for both current and legacy NavCom products are as follows:

<table>
<thead>
<tr>
<th>Discontinued Products</th>
<th>Current Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Frequency – SF-2110 Family Products</td>
<td>Multi-Frequency – SF-3050 / Sapphire Family Products</td>
</tr>
<tr>
<td>Multi-Frequency – SF-3040</td>
<td></td>
</tr>
</tbody>
</table>

Update Firmware to the following versions:

<table>
<thead>
<tr>
<th>Software</th>
<th>Dual Frequency Products Update</th>
<th>Single Frequency Products Update</th>
<th>Multi-Frequency Products Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLv3,3,2,2.Bin</td>
<td>SLv5,1,18.Bin</td>
<td>SF-2110_v2_2_12.s19</td>
<td>SP_UFL_v3.5.x.x.s19 StarUtil3000_V1.2.30</td>
</tr>
<tr>
<td>LBMv3,10.hex</td>
<td>LBMv3,10.hex</td>
<td>StarUtil3000_V1.2.30 StarUtil3000_V1.2.30</td>
<td></td>
</tr>
</tbody>
</table>

Please contact your NavCom Dealer or NavCom Customer Support to obtain a copy of the latest software. As always, a copy of the software release notice is available on NavCom’s Support website.

This guide will step you through retuning the StarFire™ receiver to track changed satellite assignments for the StarFire Network via NavCom’s StarUtil program.

**Problem**

- FCC National Broadband Plan asks for more mobile broadband
- The FCC is looking to repurpose underutilized L-band satellite spectrum both above and below the GNSS L1 band
- Moving StarFire™ to a higher L-band frequency to make designing robust filtering less challenging

**Resolution** – Update the receiver to the current release, as defined in the table above. Current products updated with the new firmware (version v3.5.x.x) will include an updated StarFire tracking table and an over-the-air StarFire almanac feature which allows for automatic updating of the tracking table should any satellites or almanac feature for frequency changes which might occur in the future. This feature, the added capability of GLONASS in StarFire, the accuracy improvements to <5cm and further planned improvements (don’t ask, we can’t tell) are all good reasons to consider upgrading from the discontinued products to the current products. The new software table was increased to handle up to 20 StarFire satellites.

**Software for discontinued products does not contain an updated StarFire tracking table.**

Follow the directions below to manually tune a discontinued receiver to the new frequency.

There are two phases of StarFire frequency changes. Net 2 StarFire frequencies were changed on November 1, 2014. Net 1 StarFire frequency changes will take effect June 12, 2015.

Graphical representation of the new global footprint is provided at the end of this document.
Troubleshooting Guide – StarFire™ Satellite Changes

Table 1: Satellite Assignments for Net 2 and Net 1 Change

<table>
<thead>
<tr>
<th>Old Satellite ID</th>
<th>Old Net</th>
<th>Old Frequency (KHz)</th>
<th>New Satellite ID</th>
<th>New Net</th>
<th>New Frequency (KHz)</th>
<th>Start Date</th>
<th>Stop Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>54W</td>
<td>446</td>
<td>1,539,842.5</td>
<td>54W</td>
<td>446</td>
<td>1,545,977.5</td>
<td>11/1/2014</td>
<td>12/15/2014</td>
</tr>
<tr>
<td>15.5W</td>
<td>484</td>
<td>1,539,852.5</td>
<td>15.5W</td>
<td>484</td>
<td>1,545,987.5</td>
<td>11/1/2014</td>
<td>12/15/2014</td>
</tr>
<tr>
<td>64E</td>
<td>564</td>
<td>1,539,872.5</td>
<td>64E</td>
<td>564</td>
<td>1,545,967.5</td>
<td>11/1/2014</td>
<td>12/15/2014</td>
</tr>
<tr>
<td>178E</td>
<td>678</td>
<td>1,539,862.5</td>
<td>178E</td>
<td>678</td>
<td>1,545,987.5</td>
<td>11/1/2014</td>
<td>12/15/2014</td>
</tr>
<tr>
<td>98W</td>
<td>402</td>
<td>1,539,892.5</td>
<td>98W</td>
<td>402</td>
<td>1,545,967.5</td>
<td>06/12/2015</td>
<td>07/15/2015</td>
</tr>
<tr>
<td>25E</td>
<td>525</td>
<td>1,539,872.5</td>
<td>25E</td>
<td>525</td>
<td>1,545,885.0</td>
<td>06/12/2015</td>
<td>07/15/2015</td>
</tr>
<tr>
<td>143.5E</td>
<td>643</td>
<td>1,539,862.5</td>
<td>143.5E</td>
<td>643</td>
<td>1,545,977.5</td>
<td>06/12/2015</td>
<td>07/15/2015</td>
</tr>
</tbody>
</table>

As seen from the Start date column, all new StarFire are currently broadcasting on the new satellite / frequency combination. The Stop date is the date StarFire will stop broadcasting the current satellite / frequency combination. During the time between the start and stop dates both the new and old frequencies/satellites will be active.

The table below provides a quick overview of affected products and a brief summary of the impact to the receiver model by software version number. The table is divided into 2 categories: 3-Satellite StarFire constellation base for those customers who have not updated software recently and 6-Satellite StarFire constellation base for those customers who have updated software recently.

Table 2: Model Impact on Old Firmware

<table>
<thead>
<tr>
<th>Product</th>
<th>3-Satellite Network Software Versions</th>
<th>Impact</th>
<th>6-Satellite Network Software Versions</th>
<th>Impact</th>
<th>New Software Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCT-2000D</td>
<td>No StarFire Module</td>
<td>None</td>
<td>No StarFire Module</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>NCT-2100D</td>
<td>No StarFire Module</td>
<td>None</td>
<td>No StarFire Module</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>NCT-2030(M)</td>
<td>No StarFire Module</td>
<td>None</td>
<td>No StarFire Module</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>RT-3010S</td>
<td>No StarFire Module</td>
<td>None</td>
<td>No StarFire Module</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>RT-3020S</td>
<td>No StarFire Module</td>
<td>None</td>
<td>No StarFire Module</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>SF-2040G</td>
<td>GPS v3.1.17 and earlier LBM v1.5 and earlier</td>
<td>Manual tuning of Channel ID; No auto-transition globally</td>
<td>GPS v3.2.9 to v5.1.13 LBM v3.0 and later</td>
<td>Manual tuning of frequency to acquire globally No auto-transition globally between regions</td>
<td>GPS v3.2.12 and v5.1.18 with LBM v3.10 and later</td>
</tr>
<tr>
<td>SF-2050G/M/R</td>
<td>GPS v3.1.17 and earlier LBM v1.5 and earlier</td>
<td>Manual tuning of Channel ID; No auto-transition globally</td>
<td>GPS v3.2.9 to v5.1.13 LBM v3.0 and later</td>
<td>Manual tuning of frequency to acquire globally No auto-transition globally between regions</td>
<td>GPS v3.2.12 and v5.1.18 with LBM v3.10 and later</td>
</tr>
<tr>
<td>SF-2110</td>
<td>Not Applicable</td>
<td>None</td>
<td>v1.5.71 or 2.2.8</td>
<td></td>
<td>v2.2.12 and later</td>
</tr>
<tr>
<td>Sapphire</td>
<td>Not Applicable</td>
<td>None</td>
<td>v2.2.9.0</td>
<td></td>
<td>v3.5.XX and later</td>
</tr>
<tr>
<td>SF-3050</td>
<td>Not Applicable</td>
<td>None</td>
<td>v2.2.9.0</td>
<td></td>
<td>v3.5.XX and later</td>
</tr>
<tr>
<td>SF-3040</td>
<td>Not Applicable</td>
<td>None</td>
<td>v2.1.7.0</td>
<td></td>
<td>v3.5.XX and later</td>
</tr>
</tbody>
</table>

Based on the table above, identify the software in your unit and refer to the appropriate section below.
LBM v1.5 Instructions

Please follow the procedure below to manually tune the StarFire receiver to the new frequency. *This instruction applies to LBM v1.5 and earlier.*

This instruction assumes that the receiver is currently licensed for and tracking StarFire satellite signals. If after completing this instruction, the receiver is not tracking StarFire signals, please refer to the **StarFire Tracking Troubleshooting Guide**.

- **View → AE – Version Information**

- **View → D0-LBM Identification Block**
Select **Receiver → Messages → NCT output** from the menu bar. The NCT Binary Messages window opens.

- Ensure that these default messages are scheduled for output:
  - 86 – On Change
  - A0 – On Change
  - AE – Every 600 Seconds
  - B1 – On Change

- Schedule this message for output:
  - 30 – On Change

Schedule messages for output that are pertinent to the StarFire L-Band Module (LBM).

- Select **Receiver → Setup → StarFire → Configure Message Output**. The LBM Messages window opens.

- Schedule these messages for output:
  - D0 – Every 600 Seconds
  - D1 – Every 600 Seconds
  - D2 – On Change
  - D3 – On Change
  - D5 – On Change

**View → D3**
LBM Software v1.5 or Earlier and GPS Software Version 3.1.17 or Earlier

- LBM DSP Status
  - Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

The C/No value varies based on the distance between the StarFire satellite and the receiver.

- Set the Alternate Satellite
  - Select Receiver → Setup → StarFire → Alternate Channel

- Set the Alternate Channel based on the Table 3 below

### Table 3: Satellite ID’s and Channel No’s for New Satellites

<table>
<thead>
<tr>
<th>Location</th>
<th>Net</th>
<th>Satellite ID</th>
<th>Channel No</th>
<th>Frequency (KHz)</th>
<th>New Service on-air</th>
</tr>
</thead>
<tbody>
<tr>
<td>54W</td>
<td>2</td>
<td>446</td>
<td>41955</td>
<td>1,545,977.5</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>15.5W</td>
<td>2</td>
<td>484</td>
<td>41975</td>
<td>1,545,987.5</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>64E</td>
<td>2</td>
<td>564</td>
<td>41935</td>
<td>1,545,967.5</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>178E</td>
<td>2</td>
<td>678</td>
<td>41975</td>
<td>1,545,987.5</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>98W</td>
<td>1</td>
<td>402</td>
<td>41935</td>
<td>1,545,967.5</td>
<td>06/12/2015</td>
</tr>
<tr>
<td>25E</td>
<td>1</td>
<td>525</td>
<td>41770</td>
<td>1,545,885.0</td>
<td>06/12/2015</td>
</tr>
<tr>
<td>143.5E</td>
<td>1</td>
<td>643</td>
<td>41955</td>
<td>1,545,977.5</td>
<td>06/12/2015</td>
</tr>
</tbody>
</table>
- Check *Use Alternate Channel*
- Check *Ack/Nak*

- Click OK

- **View → D3**

- After a few minutes, the receiver should be tracking the new StarFire Satellite

  - LBM DSP Status
  - Check SF Channel Number (see Table 3 above)
  - Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

If the receiver is moved from one StarFire region to another, the receiver will not automatically tune to the new receiver frequency. When this occurs, repeat the initial steps with the appropriate new Channel ID.
Troubleshooting Guide – StarFire™ Satellite Changes

✓ View → B1 – Solution
  o dGPS mode: 11 RTG Dual
LBM v3.0 and later

Please follow the procedure below to manually tune the StarFire receiver to the new frequency. *This instruction applies to LBM v3.0 and later.*

This instruction assumes that the receiver is currently licensed for and tracking StarFire satellite signals. If after completing this instruction, the receiver is not tracking StarFire signals, please refer to the [StarFire Tracking Troubleshooting Guide](#).

☑️ View → AE – Version Information

![Version Information](image1)

☑️ View → D0-LBM Identification Block

![Identification Block](image2)
Select Receiver → Messages → NCT output from the menu bar. The NCT Binary Messages window opens.

- Ensure that these default messages are scheduled for output:
  - 86 – On Change
  - A0 – On Change
  - AE – Every 600 Seconds
  - B1 – On Change

- Schedule this message for output:
  - 30 – On Change

Schedule messages for output that are pertinent to the StarFire L-Band Module (LBM).

- Select Receiver → Setup → StarFire → Configure Message Output. The LBM Messages window opens.

- Schedule these messages for output:
  - D0 – Every 600 Seconds
  - D1 – Every 600 Seconds
  - D2 – On Change
  - D3 – On Change
  - D5 – On Change
  - DB – Every 600 Seconds
  - DD – Every 600 Seconds
Troubleshooting Guide – StarFire™ Satellite Changes

✓ View → D3
✓ LBM Software v3.0 or Later and GPS Software Version 3.2.9 or Later.

- LBM DSP Status
- Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom's office in Southern California)

The C/No value varies based on the distance between the StarFire satellite and the receiver.

✓ Define Satellite
  o Select Receiver → Setup → StarFire → Define Satellite
    o Check Enter User-Defined Satellite
    o Set the Frequency(KHz) to Satellite ID per Table 3 for the appropriate area of operation
    o Check Ack/Nak
Click OK

- Set the Alternate Satellite
  - Select Receiver → Setup → StarFire → Alternate Channel
    - Set the Alternate Channel to the appropriate Satellite ID in Table 4 above
    - Check Use Alternate Channel
    - Check Ack/Nak
Troubleshooting Guide – StarFire™ Satellite Changes

- Click OK
  - View → D3

- After a few minutes, the receiver should be tracking the new StarFire Satellite

<table>
<thead>
<tr>
<th>Messages</th>
<th>Naixs</th>
<th>Input</th>
<th>D3 - LBM DSP Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last: 02/25/2008 10:46:23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>526</td>
<td>SF satellite id</td>
<td>2</td>
<td>Authorization status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>Use alternate satellite</td>
</tr>
<tr>
<td>868 256</td>
<td>Tracked baseband freq</td>
<td>8</td>
<td>SF signal C/No</td>
</tr>
<tr>
<td>8.3024</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- LBM DSP Status
- Check SF Channel ID (refer Table 3 for the appropriate channel ID per area of operation)
- Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

If the receiver is moved from one StarFire region to another, the receiver will not automatically tune to the new receiver frequency. When this occurs, repeat the initial steps with the appropriate new frequency and ID.
- View → B1 → Solution
  - dGPS mode: 11 RTG Dual
SF-2110 – All versions

Please follow the procedure below to manually tune the StarFire receiver to the new frequency for the satellite located at 25.5° East. *This instruction applies to SF-2110, all versions.*

This instruction assumes that the receiver is currently licensed for and tracking StarFire satellite signals. If after completing this instruction, the receiver is not tracking StarFire signals, please refer to the [StarFire Tracking Troubleshooting Guide](#).

✓ View → AE – Version Information

![Version Information](image1)

Select Receiver → Messages → NCT output from the menu bar. The NCT Binary Messages window opens.

- Ensure that these messages are scheduled for output:
  - 86 – On Change
  - A0 – On Change
  - AE – Every 600 Seconds
  - B1 – On Change
  - D1 – Every 600 Seconds
  - D3 – On Change
  - DB – Every 600 Seconds

![Binary Messages](image2)
✓ View → D3

- LBD DSP Status
- Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

The C/No value varies based on the distance between the StarFire satellite and the receiver.

✓ Define Satellite

  o Select Receiver → Setup → StarFire → Define Satellite

  o Check Enter User-Defined Satellite

  o Set the Frequency(KHz) to Satellite ID per Table 3 for the appropriate area of operation
Click **OK**

Set the Alternate Satellite

- Select **Receiver → Setup → StarFire → Alternate Channel**

- Set the Alternate Channel to the appropriate *Satellite ID* in Table 5 above

- Check **Use Alternate Channel**

- Click **OK**
View → D3

- After a few minutes, the receiver should be tracking the new StarFire Satellite

- LBD DSP Status
- Check SF Satellite ID (refer to Table 3)
- Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

If the receiver is moved from one StarFire region to another, the receiver will not automatically tune to the new receiver frequency. When this occurs, repeat the initial steps with the appropriate new frequency and ID.
View → B1 – Solution

- dGPS mode: 6 RTG Single
Sapphire, SF-3040, and SF-3050 – All versions

Please follow the procedure below to manually tune the StarFire receiver to the new frequency. *This instruction applies to Sapphire, SF-3040, and SF-3050 all software versions.*

This instruction assumes that receiver is currently optioned and licensed for and tracking StarFire satellite signals. If after completing this instruction, the receiver is not tracking StarFire signals, please contact NavCom Customer Support.

- **Detailed Views → Firmware Info**

- If the Navigation version number is lower than **03.05.XX**, perform the following steps which follow
✓ Detailed Views → StarFire

- Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

The C/No value varies based on the distance between the StarFire satellite and the receiver.
✓ Define Satellite
  o Select Detailed Views → StarFire
  o Check Enter User-Defined Satellite
  o Set the Frequency(KHz) to Satellite ID per Table 3 for the appropriate area of operation

☐ Older versions of StarUtil 3000 will not allow decimal place value to be entered. When this happens, utilize the Input Terminal window and the command [DEFINESFSAT]:

Example:

<table>
<thead>
<tr>
<th>Command:</th>
<th>[DEFINESFSAT] define_delete, {satellite_id}, {frequency}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>Definition</td>
</tr>
<tr>
<td>Define_delete</td>
<td>Keyword (DEFINE, DELETE, NONE)</td>
</tr>
<tr>
<td>Satellite_id</td>
<td>Satellite ID number (integer) (320 to 680)</td>
</tr>
<tr>
<td>Frequency</td>
<td>Satellite frequency in kHz (min. = 1525000 kHz, max. = 1560000 kHz)</td>
</tr>
</tbody>
</table>

[DEFINESFSAT] define, 525, 1545885.0

○ Click Save
Set the Alternate Satellite

- Select Receiver → Setup → StarFire → Alternate Channel
- Set the Alternate Channel to the appropriate Satellite ID as shown in Table 3 above

- Click the Refresh button
- After a few minutes, the receiver should be tracking the new StarFire Satellite
  - Check SF Satellite ID (refer to Table 3 for proper Satellite ID)
  - Check StarFire signal C/No Value which should be above 0dB (>9dB is typical at NavCom’s office in Southern California)

If the receiver is moved from one StarFire region to another, the receiver will not automatically tune to the new receiver frequency. When this occurs, repeat the initial steps with the appropriate new frequency and ID.

- Observe the operational mode and correction age
  - dGPS mode: StarFire Dual RTG or StarFire Dual GNSS

This coverage map shows the coverage after all frequencies are changed:
Does not include the footprint for the 15.5W satellite

Back to 1st page
NOTE: This document relates to a legacy product that is no longer in production. The document may contain references to technology or marks, such as RTG or Real Time Gypsy, that are owned by the Jet Propulsion Laboratory of the California Institute of Technology or the National Aeronautics and Space Administration (NASA). As of July 15, 2015, current production NAVCOM products and services no longer utilize any technology of these entities.