G2110E2 Wildlink GPS- Iridium Collar

Including *Neolink*

User's Manual

IMPORTANT: Your G2110E2 Wildlink GPS Collar HAS NOT BEEN PROGRAMMED for operation. You must program it in order for it to function. In addition, the Iridium Data Service HAS NOT been activated. Contact ATS to activate your data service by collar serial number prior to deployment.

Table of Contents

Section 1 Introduction

Thank you for purchasing an ATS G2110E2 Wildlink/GPS Collar (G2110E2). The G2110E2 you have received has not been programmed. You will need to load a fix schedule program into the G2110E2 to control the collar's operation. The software you received with the G2110E2, ATS*Fixes* for Satellite Collars, will guide you through this process. Complete *help* documentation is available within the different software pages, indicated by the  icon. Click on the icon for *help* details.

The magnet you see attached to the G2110E2 keeps it running at a lower power. While you are not using your G2110E2, leave the magnet attached.

The ATS G2110E2 Wildlink/GPS Collar requires use of a PC/GPS Wildlink module (Wildlink), PN 17621 (Figure 1). The Wildlink module enables the G2110E2 to communicate with a PC for programming and data uploads.

Figure 1. ATS PC/GPS Wildlink module, PN 17621 (with USB cable)

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Section 2 Theory of Operation

The ATS G2110E2 Wildlink/GPS Collar model consists of five different assemblies:

1) the collar belting, or attachment mechanism, 2) an electronics housing, which is attached to the collar belting, 3) a VHF antenna, 4) a GPS antenna, and 5) an Iridium satellite modem antenna.

The electronics housing consists of a battery pack, a VHF transmitter, like those found on traditional VHF beacon collars, a GPS receiver chipset, and an Iridium satellite modem. Each has its own antenna, as noted above.

The collar is shipped with a magnet taped into place with vinyl tape. While the magnet is attached to the collar, it is running at the lowest current drain possible. Removing the magnet from the collar will result in an automatic 5 minutes of VHF beeps regardless of the collar's program.

The G2110E2 stores all location data in the flash memory of the collar's electronics. Location data is sent periodically to the Iridium satellite system according to the schedule selected for the G2110E2. The data is then down- linked automatically to the Iridium's ground based reception and processing center, thence sent via the web to ATS's Hosting Computer. After the data is processed, it is automatically uploaded to the ATS Iridium web database. The data may also be retrieved by PC via the Wildlink module.

The VHF transmitter is used to locate the animal in order to retrieve the collar. The collar may be refurbished at ATS's facility.

Section 3 Programming the G2110E2 via ATS*Fixes*

Installing ATS*Fixes* for Satellite Collars Software

To install ATS*Fixes* for Satellite Collars, double click on the setup file located on the CD sent with your equipment. (If you do not have the CD, download the appropriate software from www.atstrack.com.) The software will be installed on your computer, and you can find it later under the programs list on your computer.

The installation for the ATS*Fixes* for Satellite Collars software will create some folders on the C: (hard) drive of your computer. Once ATS*Fixes* successfully programs a collar, a configuration file will be created and added to the folders. The file contains all the information for the program that was uploaded to a collar, including the serial number of the collar. If you ever have doubts about how you programmed a collar or what VHF frequency the collar is transmitting on, you

can look up the information in this file. This file is stored in the C:/Advanced Telemetry Systems, Inc./GPS/GPS_COLLAR_PROGRAMS folder.

Wildlink Module Setup

The Wildlink module driver must be installed prior to using ATS*Fixes* for Satellite Collars to program the LITE collar. (Administrative rights may be required to install the driver.) To install the driver, double click on the executable that pertains to your PC's operating system and bit size (path as indicated):

- CP210xVCPInstaller_x64.exe (Windows 10; 64-bit; \W100 Driver Windows 10\CP210x_Windows_Drivers)
- CP210xVCPInstaller_x86.exe (Windows 10; 32-bit; \W100 Driver Windows 10\CP210x_Windows_Drivers)
- - CP210xVCPInstaller_x64.exe (Windows XP, 7, 8; 64-bit; \W100 Driver Windows XP_7_8\CP210x_VCP_Windows)
- CP210xVCPInstaller_x86.exe (Windows 10; 32-bit; \W100 Driver Windows XP_7_8\CP210x_VCP_Windows)

Follow the instructions on the screen.

Programming Your G2110E2

The collar program you create for the G2110E2 will control the GPS fix schedule, VHF transmitter operation, and satellite transmission schedule. All settings are the same for each year i.e. different years cannot have unique program schedules.

Life Estimation

The ATS*Fixes* for Satellite Collars Programming Software will estimate the life that you can expect from your G2110E2. If you need more life from your G2110E2 than what is estimated, you can go back and adjust the program to give your G2110E2 a longer life. You might decide to take fewer fixes each day, or you might program the VHF beacon to operate on a limited basis, i.e. place the VHF on a duty cycle.

Note: Calculations for life estimates assume that the batteries are new.

Steps to Start G2110E2 Programming

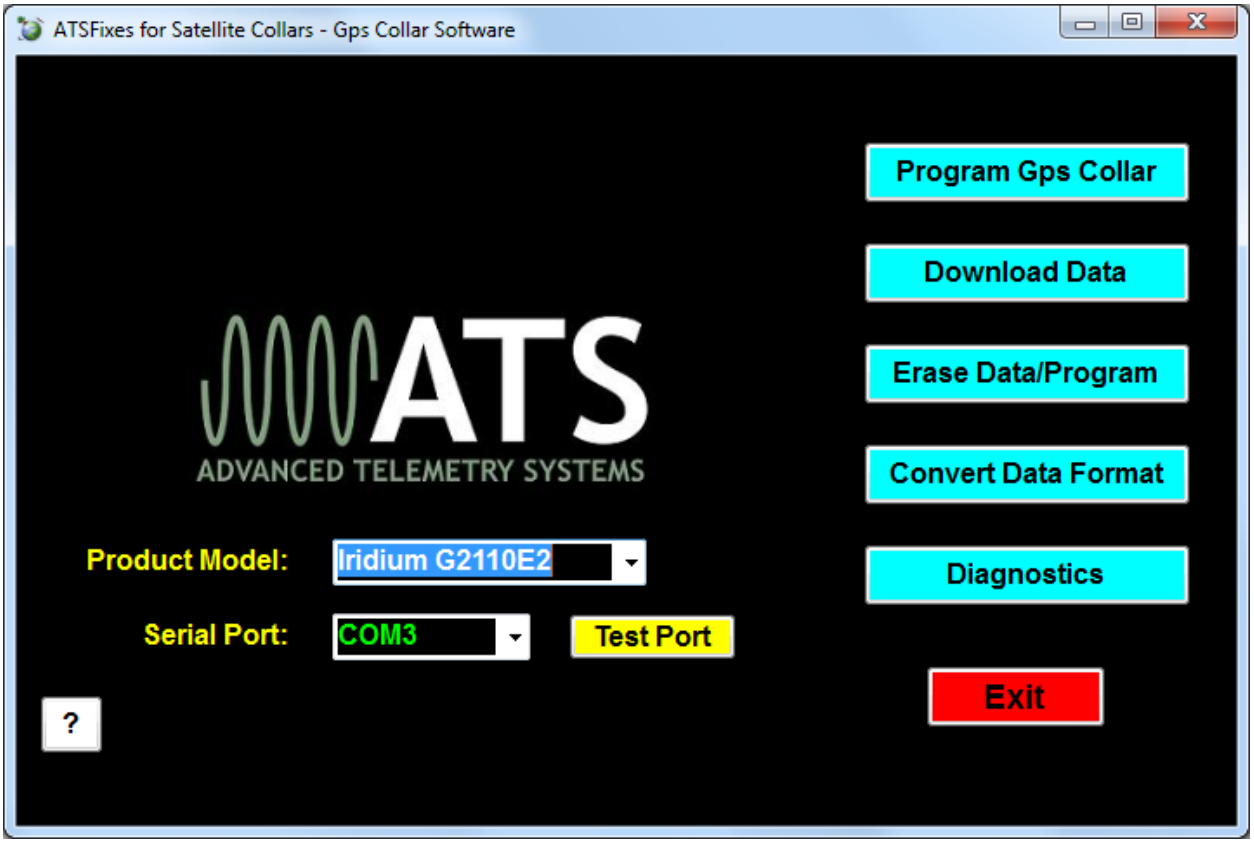

Figure 2. ATS*Fixes* for Satellite Collars – Main Page

To load a program into the G2110E2, the Wildlink module will need to be connected (via USB port) to the PC running the ATS*Fixes* for Satellite Collars software. Connect the Wildlink prior to starting ATS*Fixes* and allow the PC time to detect the Wildlink if necessary. Also, the collar will need to be in range of the Wildlink module (about 200 mm) to successfully upload a fix schedule to the collar. Note: Remove magnet prior to programming.

1. Open the ATS*Fixes* for Satellite Collars Software. It should look similar to Figure 2. The software will recognize all serial ports available when starting.

2. For the Product Model listing, select the Iridium G2110E2 option.

3. For the Serial Port option select the COM port associated with the Wildlink module. A guess and check may be used to determine the correct COM port to use (not preferred) or Windows' Device Manager tool can be used to determine which COM port should be selected. The Wildlink module will be associated with whichever port the 'Silicon Labs CP210x' COM port is listed under. If the Wildlink module was not connected to the PC

before ATS*Fixes* was started, the correct COM port will not show up. Be sure to connect the Wildlink module before starting ATS*Fixes*..

4. Click on the "Program GPS Collar" button to start creating a program for the G2110E2.

5. After clicking "Program GPS Collar," you will get the following page (see Figure 3). Select options for each programming section. Each section has a help button [?] that goes over further details related to the section. Note that no offset exists to distinguish between standard time and daylight savings time. Click Next when finished with the page.

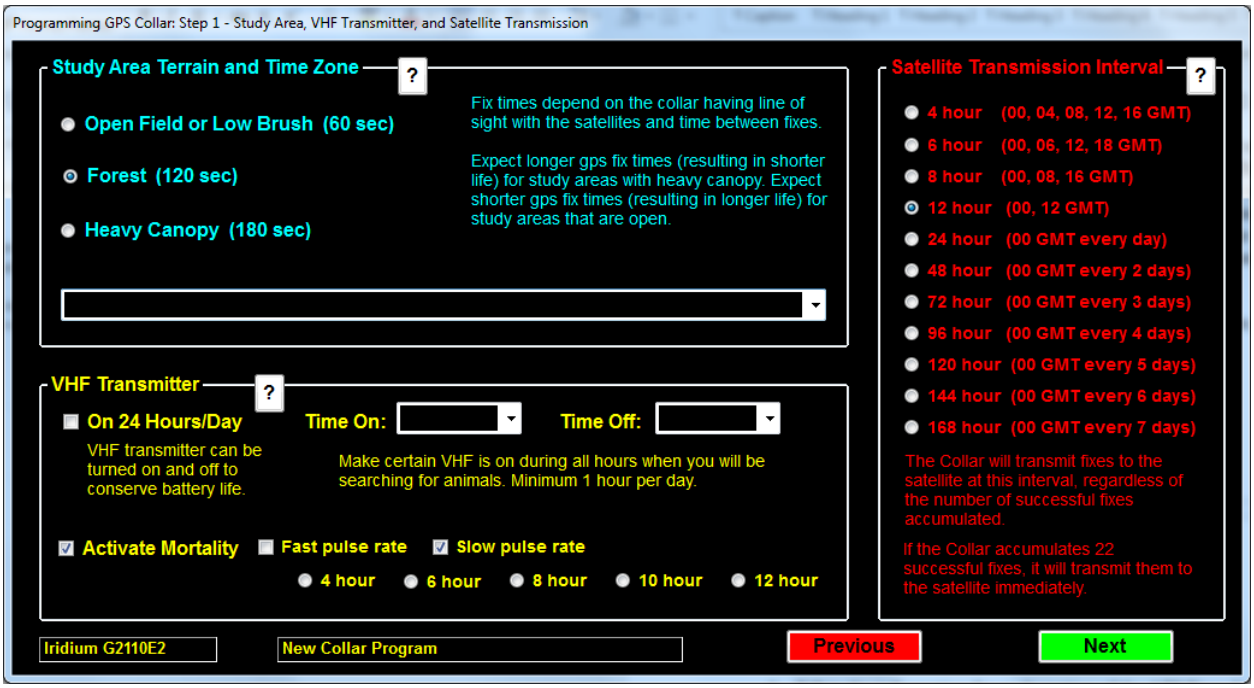

Figure 3. Programming GPS Collar: Step 1.

6. Next, the Fix Schedule, Options, Estimated Life window should appear (see Figure 4). This page contains the GPS fix schedule options. You can also set up alarm options on this page for the *Neolink* system (see Section 12, 13 and 14 for more details). Lastly, a life estimate can be obtained using the life calculator. When the schedule is ready to be uploaded to the collar, click on the Program Collar button. Then touch the magnet to the collar where the magnet stays during off mode and remove the magnet. If done correctly the PC will be begin uploading a schedule to the collar.

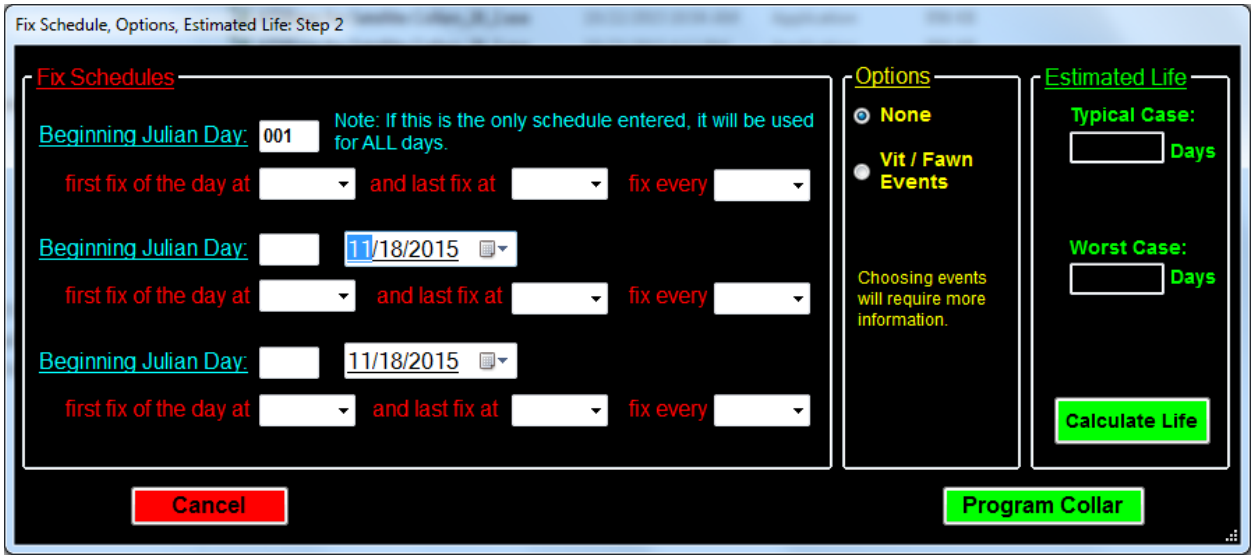

Figure 4. Fix Schedule, Options, Estimated Life.

7. When ATS*Fixes* is done uploading the program, there will be a message to the PC's screen. If it is a success message, programing is complete. If it is an error message, repeat programming.

Reprogramming a G2110E2

If you want to change the program of a G2110E2, you will need to first erase the current program (and any stored data). Use the Erase Data/Program button to erase the G2110E2 program and data before reprogramming it. **Be sure that you have first downloaded any stored data you wish to keep.**

Section 4 G2110E2 Functionality

VHF Beacon Beep Patterns

The G2110E2 includes a VHF transmitter that can be used to locate the collar. The VHF transmitter can be scheduled to run continuously or only during a certain period of hours each day. The VHF transmitter can beep, or pulse, at 48 pulses per minute and 30 pulses per minute (ppm), or 80 ppm depending on the rate selected for mortality. There are different beep patterns to alert you to the status of the collar. Some beep patterns have double or triple pulses, which are used to indicate various operating conditions to the listener. The VHF transmitter will not be operating while the collar is obtaining GPS Fixes, downloading data, or if you are loading a program into the collar.

The VHF transmitter can be programmed to stay off for up to 23 hours each day in order to extend G2110E2 life. The VHF transmitter also has some obligatory beep patterns which you will hear regardless of whether the transmitter was scheduled to be active.

The different operating modes of the collar and the associated VHF **patterns are as follows:**

Normal operation (with unsuccessful last fix) = 48 ppm single, duty cycle applies

Normal operation (with successful last fix) = 48 ppm single with double every 6th, duty cycle applies

Mortality mode with slow rate enabled = 30 ppm, duty cycle override

Mortality mode with fast rate enabled = 80 ppm, duty cycle override

Collar released successfully = Mortality VHF, if enabled. If mortality is not enabled, 30 ppm. Duty cycle override.

Low Battery = Mortality VHF, if enabled. If mortality not enabled, 30 ppm. Duty cycle override.

After erasing program and data = no VHF.

After removing magnet = After a silent period of up to 30 seconds, VHF pattern will be pattern that was emitted prior to magnet going on to the collar UNLESS the collar was not programmed prior to placement of magnet. The VHF will stay on until the collar next checks it schedule to determine if VHF should be on, which is the beginning of the next hour.

> **IF COLLAR WAS NOT PROGRAMMED WITH A SCHEDULE PRIOR TO PLACEMENT OF MAGNET, THE** VHF **UPON REMOVAL OF MAGNET WILL BE 'NORMAL OPERATION (WITH UNSUCCESSFUL LAST FIX)'. SINCE THE COLLAR WAS NOT PROGRAMMED WITH A SPECIFIC** VHF **SCHEDULE, IT WILL CONTINOUSLY EMIT THIS** VHF **PATTERN. NOTE THAT THIS** VHF **PATTERN ALONE SHOULD NOT BE USED TO DETERMINE IF A COLLAR IS PROGRAMMED OR NOT.**

If there is any concern whether or not a collar is programmed, you can use ATS*Fixes* to determine if a collar is programmed or not. See section 10 Diagnostics for details.

VIT **not synced** (if applicable) – triple pulse within 10 secs. The triple pulse will be emitted in between single pulses.

GPS Operation

During a GPS fix attempt, the VHF transmitter will be silent. A GPS attempt may last as long as the setting that was selected during programming but may also be shorter depending on the collar's view of the sky. Whether the fix attempt was successful or not will be indicated by the VHF beep pattern that follows the attempt. *You will only hear these beep patterns if the* VHF *transmitter was scheduled to beep during this time.*

Satellite Transmission Operation

During a satellite data transmission attempt, the VHF transmitter will be silent for up to 30 seconds. If the transmission was successful, data will be transmitted to the ATS server for processing. If the transmission is not successful, the collar will attempt another transmission in twelve minutes (provided that the transmission attempt does not conflict with a GPS fix attempt). If the collar fails to transmit data for ten consecutive attempts, the collar will enter **Satellite Transmission Suppression** (see Section 9 Satellite Transmission Suppression for more details).

Remote Commands

The GPS fix schedule of your G2110E2 can be adjusted remotely via satellite to a regular interval. Available intervals are (in minutes): 10, 20, 30, 90, 120, 360, 480, 720, and 1440. The schedule can also be adjusted from these intervals back to the original schedule. Note: Adjusting the fix schedule may interfere with the programmed frequency of the email transmissions.

The GPS fix attempt duration can be adjusted remotely via satellite to one of three options: 60 seconds, 120 seconds, or 180 seconds.

The mortality setting of the G2110E2 can be adjusted remotely. Available settings are four hours, six hours, eight hours, ten hours, twelve hours, and mortality disabled. The satellite email schedule can be changed remotely. Available intervals are every 4, 6, 8, 12, 24, 48, 72, 96, 120, 144, or 168 hours.

Finally, the G2110E2 can be released remotely with a command as well.

NOTE: The G2110E2 is automatically configured to release when the main battery voltage is low.

For all remote requests, the changes will take place after the next email transmission, not when the remote command is issued. See Section 8 Remote Commands for more details regarding remote programming.

Mortality

If you choose to use mortality when you program the collar with the ATS*Fixes* for Satellite Collars software, the collar will immediately initiate an email transmission sequence if the collar goes into mortality. If successful, you will receive an email to let you know that the collar is in mortality. In the event of a false mortality, it is possible that the collar may get out of mortality before a successful transmission takes place. The email transmission will still be attempted until ten attempts are reached and if successful will indicate mortality was *not* reached. Also, if the satellite antennas do not have an adequate view of the sky, as may potentially occur with a true mortality, no email may be received immediately following a mortality.

In addition to the mortality email, the VHF will change to the Mortality VHF. The mortality VHF will override a duty cycle if one has been set up.

In order for the G2110E2 to exit mortality mode, the collar must undergo thirty seconds of activity. (The thirty seconds of activity does not have to be consecutive but should be within the mortality period chosen.)

Neolink Events

If your G2110E2 collar is part of a *Neolink* system and is programmed to detect *Neolink* devices, it will regularly attempt to detect the presence of a *Neolink* device such as the M3930U (VIT) or the M4230U (expandable fawn collar). If certain conditions are met for the *Neolink* devices, the G2110E2 will transmit an alarm to the customer to signify the event. See Sections 12, 13, and 14 for more details. If the *Neolink* system is not necessary, it should not be enabled in order to save battery life.

Section 5 Attaching the G2110E2

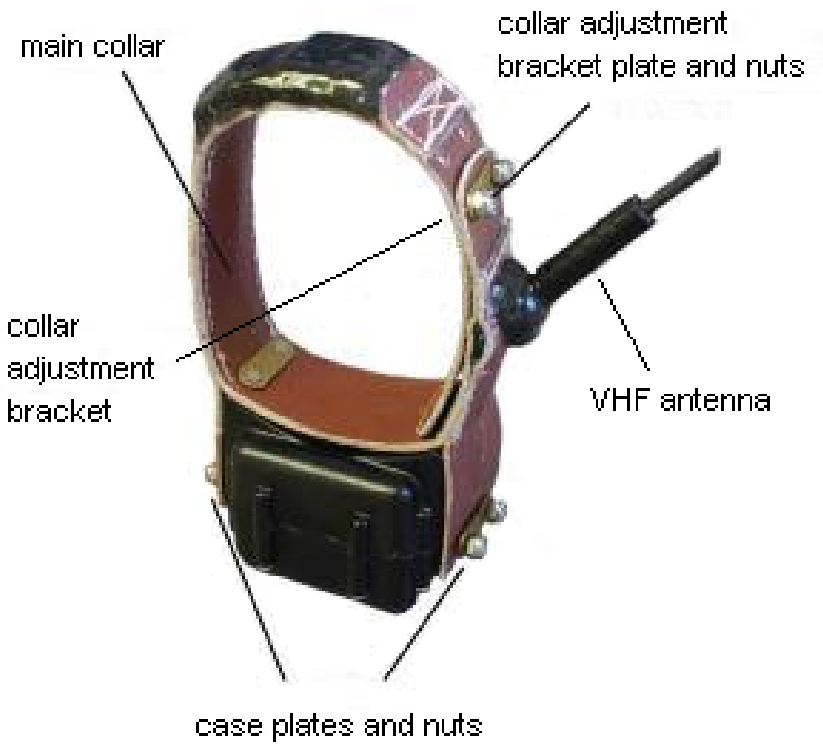

Figure 5. Collar attachment

Your G2110E2 has been optimized according to the collar dimensions specified during ordering. The size of the collar is determined by the collar adjustment bracket and the main collar holes (see Figure 3). To adjust the collar and/or attach the collar to an animal, the procedure is as follows:

1. First remove the collar adjustment bracket nuts and plate from the collar adjustment bracket and remove the collar adjustment bracket from the main collar.

2. Wrap the collar around the animal's neck so that the extra length (if any) of the main collar is tucked inside the main collar end with the VHF antenna. The extra length can also be cut if desired.

3. Observe where the set of holes on the VHF antenna end of the main collar line up with the holes on the other end of the main collar such as to maintain a desired tension level on the animal's neck.

4. Place the collar attachment bracket through both sets of holes and through the brass bracket and tighten the collar adjustment bracket nuts using the provided nut driver. Do not over-tighten as this may damage the collar adjustment bracket.

5. Finally ensure that the case nuts have been tightened before releasing the animal.

Section 6 Downloading Data from the G2110E2

Once GPS position data has been stored in the G2110E2 memory, e.g. after testing or field retrieval, it can be downloaded to your computer. Data is grouped into two categories: originally programmed schedule data and email adjusted schedule data. You may only download one group of data at a time. Note that during data download, the VHF transmitter will be silent even if it was scheduled to beep.

Steps for Downloading Data

1. Connect the ATS Wildlink module to a USB port on the PC.
2. Open the ATS*Fixes* for Satellite Collars Programming Software.
3. Select the correct Product Model (Iridium G2110E2).
4. Select the appropriate COM port. See Section 3 to determine the correct COM port, if necessary.
5. Click the Download Data button.
6. Choose between Degrees, Decimal Minutes and Decimal Degrees for the data format of the GPS data.
7. Choose between originally programmed schedule data and email adjusted schedule data.
8. Click the Continue button.
9. Touch the magnet to the G2110E2 to initiate communication.

After Downloading Data

Data files downloaded from the G2110E2 are stored on your computer in the C:/Advanced Telemetry Systems, Inc/GPS/ folder. The filename is Dxxxxxx_dd_JJJ-HHmm.txt where xxxxxx is the serial number of the G2110E2, dd indicates whether the data is originally programmed schedule data (FS) or email adjusted schedule data (VS), JJJ is the Julian date the data was downloaded, and HHmm is the hour and minutes data was downloaded. For instance, D030086_FS_313-1134.txt represents a data file for collar with SN 030086 for originally programmed schedule data. The date and time of download was on the 313th day of the year at 11:34 local computer time.

Data Block Formats

Degrees, Decimal Minutes ddmm.mmmm,N/S,dddmm.mmm,E/W (d = deg, m = min)

Yr	Day	Hr	Mn	St	Act	T	Blk	Lat	N/S	Long	E/W
aa	bbb	cc	dd	e	ff	gg	hhhhh	ii.iiiiii	j	Kkk.kkkkkk	l
09	001	10	21	2	00	30	00001	17.437810	S	063.098980	W

Cont:

Hdop	#Sat	#sec	Dim
mm.m	nn	ooo	p
11.9	3	23	2

Decimal Degrees +/-dd.ddddd,+/-ddd.ddddd (d = degrees)

Yr	Day	Hr	Mn	St	Act	T	Blk	Lat	Long
aa	bbb	cc	dd	e	ff	gg	hhhhh	+/-ii.iiiiii	+/-kkk.kkkkkk
09	001	10	21	2	00	30	00001	-17.72968	-63.16497

Cont.:

Hdop	#Sat	#sec	Dim
mm.m	nn	ooo	p
11.9	3	23	2

Where:

aa = Year

bbb = Julian day (001-365, or 366 for leap year)

cc = Hour (00-23)

dd = Minute (00-59)

e = GPS fix status (0 = will never be logged, 1 = attempted but timed out, 2 = attempted and successful, 3 = next fix that will be taken, 4 = fix not taken, collar in low batt)

ff = Activity (00-99%). The activity value indicates the percentage of seconds that the collar detected significant movement during the period between the previous fix until the current fix. Every second the collar examines an onboard accelerometer to see if the accelerometer detected movement that exceeds a specific threshold. If the accelerometer detected enough movement during that second, the second in question increases the activity percentage. For example, if the period between GPS fix acquisitions is 1 hour and there were 360 seconds where activity was registered, the activity value would be 10%.

gg = Temperature (degrees Celsius)

hhhhh =Block Number of Data Stored (00000-16381)

iiii.iiii = Latitude (DDmm.mmmm, Degrees, minutes, decimal minutes) or (+/-dd.ddddd, Decimal degrees)

j = Direction of Latitude (N or S)

kkkkk.kkkk = Longitude (DDmm.mmmm, Degrees, minutes, decimal minutes) or (+/-ddd.ddddd, Decimal degrees)

l = Direction of Longitude (E or W)

mm.m = HDop

nn = Number of satellites used in achieving GPS fix

ooo =Number of seconds needed to achieve GPS fix

p = Dimension of GPS fix (2 or 3)

Section 7 Receiving Data from the Deployed G2110E2

While the G2110E2 is active (contact ATS to activate or determine activation status), a programmed G2110E2 will transmit data to ATS via the Iridium satellite system. The transmission interval is determined during collar programming (options include 4 hours to 7 days). Only successful GPS fix acquisitions are transmitted.

Forced full buffer transmissions

Successful GPS fixes are placed into a data transmission buffer. The data transmission buffer only allows 22 *Fixes* to be stored. To prevent data from being lost, if the buffer reaches 22 Fixes before a scheduled data transmission, the collar will immediately transmit the data buffer. On the

other hand, if it is a scheduled transmission time and the collar has no successful fixes to send, the collar will still transmit on schedule.

Note: If a collar transmits data containing GPS fix locations more than 9 days apart, the Julian day and hour of the later data in the email may be incorrect. However, the data stored on the collar will be correct and the next email should have correct data. This situation may arise if you wish to test the collar and wait more than nine days after initial testing before deploying the collar. If this is a concern, deploy the collar as soon as possible after programming/ reprogramming the collar.

Data Access

The G2110E2 is assigned to a specific web account email address. When the collar transmits data, that data is uploaded to the web account. An email will only be sent to the email address if the collar has experienced an alarm-type event (mortality, VIT event, fawn event, low battery, collar release). The email will provide more details on the status of the collar.

NOTE: The email will come from iridium@atsidaq.com. It is an automatically generated email so it is possible that the email will be interpreted as spam. Please allow emails from this address if you wish to view data via emails and check your spam folders when you are not receiving data since security options are constantly updated.

The web account for the collar can be accessed at www.atsidaq.com. If you do not have a username and password, please contact ATS to obtain one. There are multiple features of the web account. You can download GPS data, Google Earth kml files, quickly determine if there are collars that need immediate attention, and request schedule changes. For more information on schedule changes, see Section 8, Remote Commands.

The web account was designed to be self-explanatory. Please contact ATS if you have any questions regarding the web account.

NOTE: ATS does not generally store data older than 1.5 years old. Please make arrangements to store data older than this as necessary.

Section 8 Remote Commands

There are several scheduling options for the G2110E2 that can be changed remotely. To change any of these settings, go to www.atsidaq.com and log in to the web account corresponding to the G2110E2. If you do not know the username and password for the account, please contact ATS to obtain the information.

In the box for the G2110E2, under the options for Remote Commands, possible changes are GPS fix schedule, satellite transmission schedule, maximum GPS fix duration, and mortality period. Each has its own buttons. Click on a button and follow the instructions to issue a remote change.

There is also a command to release the collar. If a release is desired, click on the "Break-Off" button and then confirm the release.

For any remote commands that are requested, you should receive an email indicating whether or not ATS successfully received the request. If you receive an error email or no email and need further assistance, please contact ATS. A log of all remote command requests that have been made for a collar can also be viewed on the web account by clicking the "View Commands Issued" button for the collar.

Once ATS receives the remote command, the command is held in a buffer by the Iridium satellite system until **EITHER** the G2110E2 performs a data transmission, in which case the command will be delivered **OR** until five days elapses, in which case the command is erased from the satellite data buffer per Iridium protocol, whichever comes first. If the latter is likely to occur, issue the command within five days of the expected data transmission.

The G2110E2 will change its schedule after it receives the remote command, not after the command is issued. Only one remote command may be executed per data transmission. If you wish, you may send multiple remote commands to be processed later by the collar but you must wait until you receive a confirmation email for each request before you send another request.

Section 9 Satellite Transmission Suppression

Sometimes a satellite transmission cannot be completed at the scheduled time due to satellite positioning and/or the current environment. In this case, the collar will keep attempting a transmission every 12 minutes. If a transmission cannot be completed for 10 consecutive attempts, the collar will enter Satellite Transmission Suppression (STS). In STS, normal satellite

transmission attempts will not be performed. This includes the current scheduled attempt, future scheduled attempts, attempts due to full data buffers, and mortality transmissions (if applicable).

There are two ways a collar can exit STS. First, during STS, GPS fix attempts are still allowed. If a GPS fix is successful, then the collar will return to normal operation including resuming normal satellite transmission attempts. That is the primary mechanism and should work in most cases. If GPS is not functioning, a second method for exiting STS is via a satellite transmission: if the collar is currently in STS and the Julian Day is a multiple of thirty (e.g. Jan 30, Mar 1, Mar 30, etc.), the collar will attempt a satellite transmission to determine if the collar's current environment has become more favorable. It will try a maximum of 10 times with attempts spaced 12 minutes apart. If it is successful, normal collar operation will resume, and if it is not, the collar will return to STS.

Note: The first email transmitted after the collar exits STS may contain GPS fix data points with an incorrect Julian day and hour. However the data is stored correctly on the collar and the next transmission should contain correct data. This error is a result of GPS data points in the transmission buffer that are more than nine days apart as may be the case with prolonged STS periods.

Section 10 Diagnostics

ATS*Fixes* for Satellite collars has a diagnostic function to determine the status of the G2110E2. To perform the check:

1. Connect the Wildlink to the PC.
2. Open ATS*Fixes*.
3. Click on the "Diagnostic" button on the main page.
4. Swipe the magnet across the two white dots on the collar.
5. Wait for the tests to complete.

Upon completion, a window will appear detailing relevant functionality measurements and values. For a successful diagnostic, one of two different windows will appear.

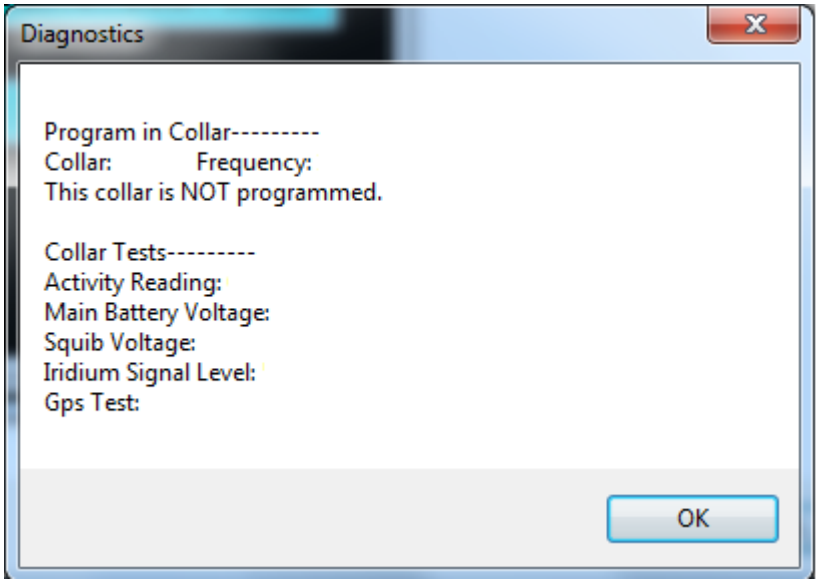

Figure 6. Diagnostic for a board without a program

Figure 6 shows the window for a diagnostic assessment of a board that has not been programmed. For the actual G2110E2, the collar serial number, frequency, battery voltage, etc. will be filled out accordingly.

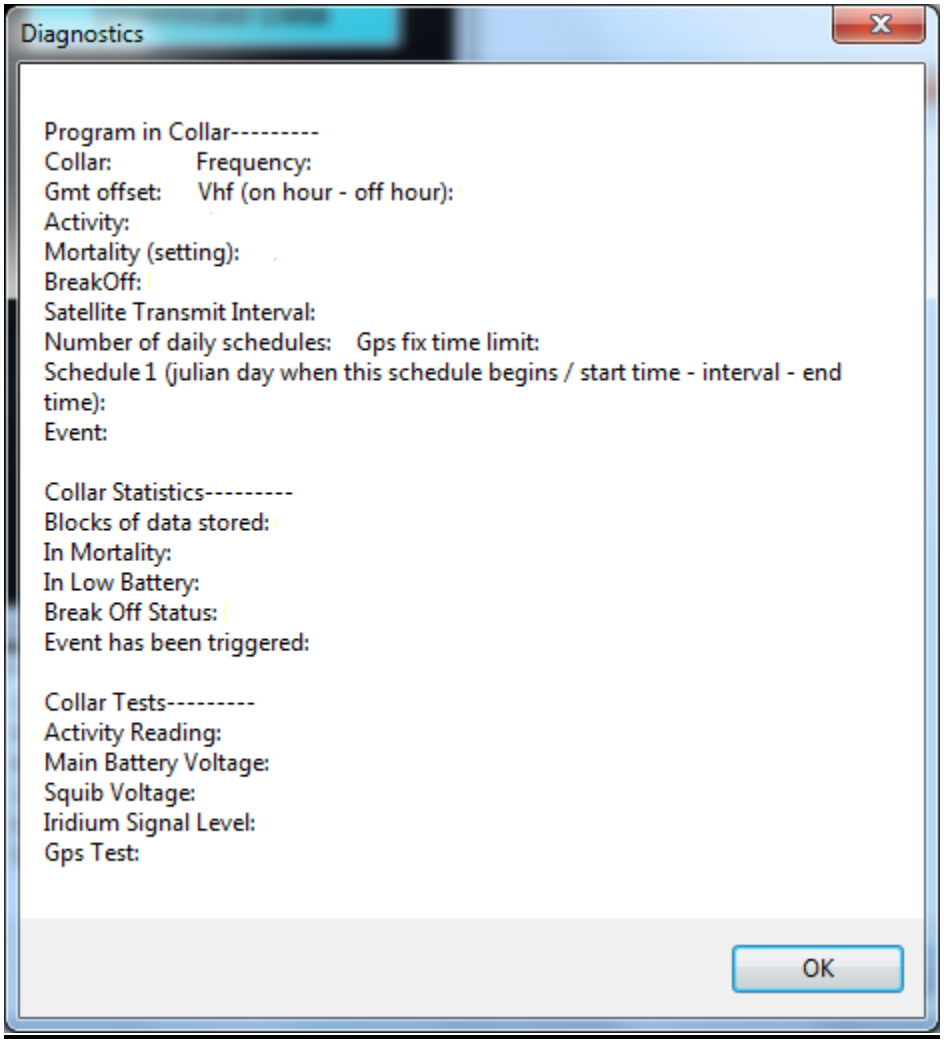

Figure 7. Diagnostic for a programmed board

Figure 7 shows the diagnostic for a collar with a program. The diagnostic in this case reveals specific details of the program in the collar. Again, for an actual collar, the form will be filled out with valid information.

Section 11 Data Conversion

ATS*Fixes* for Satellite Collars provides two data conversion processes for users. One is a Julian day to month/day conversion. This conversion converts the format of the data from Julian day to the month (number) and day of the GPS data. The other conversion ATS*Fixes* provides is an unsuccessful *Fixes* removal from the data. In this conversion, all data for unsuccessful *Fixes* will be removed from the data. In both conversions, the actual data file is not modified. Instead, a new file is generated with the filename of OUTPUTjjj-tttt where jjj is the Julian day when the file was created and tttt is the 24 hour time when the file was created.

To perform either of these conversions:

1. Save the file to be converted under the C:\Advanced Telemetry Systems, Inc\GPS folder.
2. From the ATS*Fixes* home screen click on Convert Data Format.
3. Choose the conversion type between the 'Convert from Julian Day to Month and Day' and 'Remove all non-successful *Fixes* from dataset' options.
4. Under the 'File Name:' prompt, enter the filename of the data file you wish to convert.
5. Click on Continue.

A new file will be generated with the filename described above under the C:\Advanced Telemetry Systems, Inc\GPS folder.

Section 12 *Neolink* VIT System

The ATS *Neolink* VIT system is designed to provide an event/alert message when a birth event occurs. It consists of a G2110E2 host and an ATS *Neolink* Vaginal Implant Transmitter (VIT). To provide an alert, the G2110E2 host monitors an implanted *Neolink* VIT that periodically broadcasts a wireless message regarding its current temperature (internal doe temperature) and light level to the G2110E2 host. When the *Neolink* VIT transmitter is expelled during a birth, it will broadcast a birth message to the G2110E2 host when its temperature drops below a predetermined threshold temperature (default 32C) and/or it detects light. Upon reception of this birth message, the G2110E2 host takes a GPS fix and will attempt to transmit a birth alarm satellite message to let the user know of the birth event.

In addition to a temperature or light trigger, the G2110E2 host will also send a birth alarm if it fails to receive a message from the VIT for one hour (in the scenario that the VIT has been expelled but is too far from the host to successfully transmit a birth message).

Each *Neolink* VIT must be programmed with a serial number that corresponds with the host G2110E2. The host G2110E2 will listen for a message from only one *Neolink* VIT (i.e. messages from other *Neolink* VITs will be ignored). The serial number of the *Neolink* VIT must be the same number as the serial number of the host. For example, a G2110E2 with serial number 031234 will only listen to a *Neolink* VIT with serial number 031234.

The *Neolink* VIT's VHF beep pattern is a slow single pulse (about 30ppm). Once the *Neolink* VIT detects a birth, the VHF beep pattern will change to a double beep pattern (still at about 30 ppm).

After a temperature event (*Neolink* VIT temperature drops below programmed threshold temperature), the VHF beep pattern will be a faster single pulse (about 60ppm) beep pattern. After a light event (*Neolink VIT* detects significant light), the VHF beep pattern is not changed.

The *Neolink* VIT uses a VHF duty cycle to increase its life. After the magnet is removed from a *Neolink* VIT, the VHF will be on for 24 hours per day for 2 days. The next 28 days, the VIT VHF duty cycle will stay on for 8 hours only per day. The 8 hours start the count when the magnet is removed. After these first 30 days, the VHF will once again be on for 24 hours per day.

If you want to test how the VIT is reading the temperature data, you can use the Fawn or VIT button in the ATS*Fixes* for Satellite Collars software. The Read Fawn/VIT button will give you the temperature the VIT is reading currently.

A *Neolink* birth alarm can be reset by swiping a magnet across the on/off location of the *Neolink* VIT. Whenever a magnet is swiped across or removed from the on/off location, the VIT will hold off on broadcasting a birth alarm for 24 hours.

Neolink VIT Initialization

The *Neolink* system must be properly initialized prior to deployment. Initialization involves programming a *Neolink* VIT with the correct serial number (SN) and synchronizing the *Neolink* VIT to the G2110E2 to make sure they are properly communicating. The following are the key steps in making sure the system is setup to detect a birth event:

1. Program the G2110E2 for VIT/Fawn Events.
    i. Begin programming the G2110E2 according to Section 3, but do not select "Program Collar" button yet.
    ii. On the "Fix Schedule, Options, Estimate Life: 2" page, click on the VIT/Fawn Events in the Options box. This will take you to the following screen:

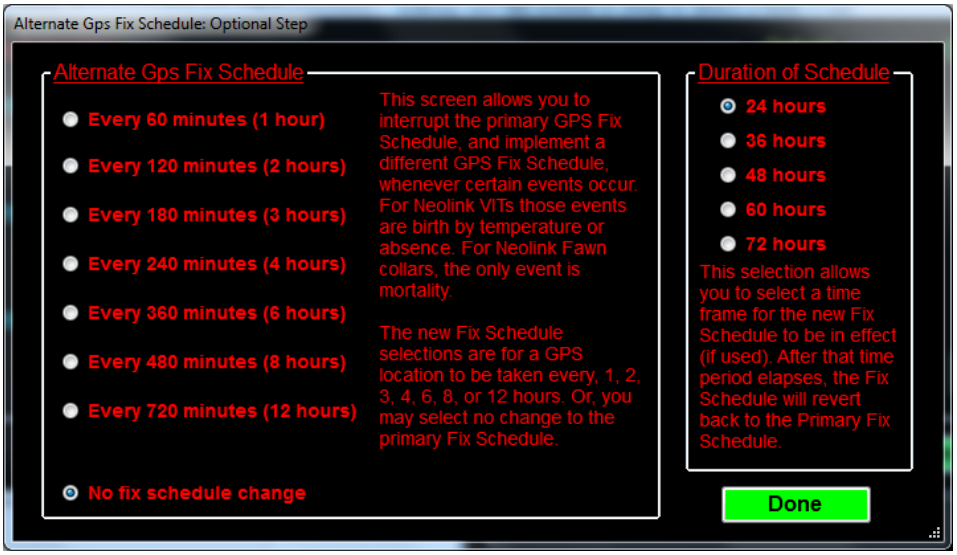

Figure 8. Events – Alternate schedule setup options

iii. Select options for GPS fix interval and duration and click Done. These selections indicate if the G2110E2 will switch to a different schedule if an event (birth) occurs and if so, what and how long the schedule will be.

iv. Finally, click on the "Program Collar" button and follow the onscreen instructions.

2. Place a magnet on the G2110E2 at the magnet location until collar and VIT are ready to be deployed.

3. Upload a SN into the ATS *Neolink* device. See Section 14 for details.

4. Shortly before deploying, remove magnet from the G2110E2. This forces the collar to listen for a VIT sync communication.

5. Then remove magnet from the *Neolink* VIT. This forces the VIT to send a sync transmission to the G2110E2.

6. With a receiver, verify that the VIT is emitting VHF beeps. (If it does not emit VHF beeps within 10 seconds, consider tapping the VIT against a hard surface to open the magnetic on/off switch.)

7. Once the VIT is emitting VHF (single pulse at 30 ppm), listen to the G2110E2 VHF. The G2110E2 should begin emitting VHF soon after the VIT emits VHF. If the G2110E2 does not begin emitting VHF within five seconds of the VIT being heard, place a magnet on the VIT, then repeat steps 4-6. Repeat until VHF beeps are audible from both units.

IMPORTANT:

- If the G2110E2 VHF emits a triple beep within a span of ten seconds, then synchronization was not successful. Steps 2-6 must be repeated until no triple beeps are detected.

- If the G2110E2 VHF emits only single or double beeps, then synchronization was successful. Keep the G2110E2 and *Neolink* Fawn within range of each other (<2 m) to maintain synchronization prior to deployment (if they can't sync it will be an absence birth event in one hour's time).

- **IMPORTANT: VIT deployment must occur within 24 hours of removing the magnet from the VIT unit. If the units are not deployed within 24 hours, the VIT may emit a birth event signal since the temperature of the unit will likely drop below the threshold temperature (32 degrees C).**

Neolink VIT Data

A G2110E2 paired with a *Neolink* VIT will deliver data messages containing the birth status of the *Neolink* VIT. This status is available on the user web account at www.atsidaq.net and can be found in the information box for the specific G21102E2 collar. If a birth is detected, an email will also be sent to the email address provided for the collar to alert the user of the birth event.

When a G2110E2 GPS Collar is set up to operate using the *Neolink* capability, it will attempt to communicate with the *Neolink* device every 20 minutes. The transmitted dataset for a G2110E2 in a *Neolink* system will display the number of successful *Neolink* communications that have occurred between GPS fixes in the dimension column of the data download (up to a maximum of 15). For example, if GPS fixes are scheduled for every 3 hours, then you can expect to see a 9 in the dimension column of the data download, if all communication attempts were successful. A 0 would mean that no successful communications occurred between the G2110E2 and the *Neolink* device (VIT or fawn, again are we lumping fawn with the VIT in the VIT section when there is also a Fawn section).

This substitution only happens in the website data download and only if the G2110E2 receives communication from the *Neolink* device. Recovering a mother's collar and downloading the data directly from the collar will show the normal dimension data stored.

Also note that when using a *Neolink* VIT, the HDOP and NumSats column will no longer represent the GPS fix HDOP and the number or satellites used for the GPS fix, respectively. The

data in those columns will be 0 until *Neolink* communications are no longer detected or until *Neolink* Fawn communication is detected. When *Neolink* Fawn communication is detected, the number of successful communication attempts for a "Fawn1" will be in the Number of Satellites column. Similarly, successful communication attempts for a "Fawn2"will be in the HDOP column.

Warning emails will be sent for any transmission showing fixes with no successful communication attempts. The warning email will give you a count of the fixes that had no successful communication attempts. Remember that unsuccessful VIT communication attempts are very costly to the G2110E2 battery life. If the VIT is no longer communicating with the G2110E2 collar, you should send the remote command, "*Neolink* Stop communication". You can locate this remote command on the atsidaq.net website by going to the collar's serial number, and clicking the *Neolink* commands button under the Remote Commands menu.

If you are using only *Neolink* VITs for a study, it is important that the "*Neolink* Stop Communication" remote command be issued once the birth is confirmed to conserve the G2110E2 battery life.

It is also recommended that the "*Neolink* Stop communication" command be used if a VIT is expelled before birth. If, in the future, you need to restart the *Neolink* communication, you can use the "*Neolink* Start Communication" remote command. For example, if the VIT is prematurely expelled from a G2110E2 host, and the "*Neolink* Stop communication" command is sent, the "*Neolink* Start Communication" command may be sent later if a *Neolink* VIT is redeployed in the same host or if the host's fawn is collared with a *Neolink* Fawn collar

Temperature and Light Data in *Neolink* VIT's

When used in a *Neolink* VIT system, the G2110E2 will also transmit the last temperature and light reading it last received from the *Neolink* VIT. In normal operation, the temperature column in a G2110E2 data set is the temperature of the G2110E2, but in a *Neolink VIT system, when the Neolink* VIT is communicating with the G2110E2, the temperature column is the last reported *Neolink* VIT temperature reading (in degrees C). In normal operation, the FixTime column contains the GPS receiver on time during a particular fix but in a *Neolink* VIT system, this number contains the light reading from the VIT (on a scale from 0-102). A 100% dark reading will show a value of 102. If there is light, that number will drop, with increasing amount of light indicated by a smaller number. You can monitor both of these values for additional information regarding the current placement of the VIT, whether it remains within the doe, or has possibly been expelled. This data can also be useful to confirm a birth.

When the G2110E2 is no longer communicating with the *Neolink* VIT, i.e. a birth has occurred and the *Neolink* VIT is not in range of the G2110E2 or *Neolink* Fawn collars are being used, both the Temperature and FixTime column will revert back to their normal data.

Section 13 *Neolink* Fawn Collar System

The *Neolink* Fawn system is designed to provide the proximity and mortality status of a *Neolink* fawn collar to a G2110E2 host collar in a doe-fawn(s) pair. Specifically, it is designed to let the user know the following information about a fawn: 1) whether it is in the general area of its corresponding G2110E2 host or not, and 2) whether the fawn has gone into mortality due to inactivity or not.

In order to accomplish this, the *Neolink* fawn collar periodically broadcasts either a presence message, or an alarm message. A presence message is intended to let a G2110E2 collar know that the *Neolink* fawn collar is nearby. An alarm message lets the G2110E2 collar know that the *Neolink* Fawn collar is nearby, but has also gone into mortality. If the G2110E2 collar is close enough to the *Neolink* fawn collar when it listens for incoming broadcasts, the E2 will register the broadcast, and may or may not transmit the collar status, depending on the actual status of the fawn collar, and what the previous status was. When the G2110E2 determines that the status of a *Neolink* Fawn collar has changed, it will transmit a satellite message to let the user know.

The normal VHF pattern for the *Neolink* Fawn collar is a 30 ppm single beep. Once the *Neolink* fawn collar goes into mortality and begins broadcasting a mortality message, the VHF pattern will be a 30 ppm double beep. Also, after going into mortality, the *Neolink* Fawn collar will stay locked in mortality mode for a preprogrammed lock period. Mortality can be reset sooner than the lock period by swiping a magnet across the designated magnetic on/off position.

Each G2110E2 host may have up to three different *Neolink* Fawn collars that it registers information from. All *Neolink* fawns must be given a six digit serial number (SN) that corresponds to an E2 host. The first fawn MUST be given a SN beginning with a 0. A second fawn MUST be given a SN beginning with a 1. A third fawn MUST be given a SN beginning with a 2. For all three possible fawns, the next five digits will be the same as the last five digits of the host. For example: the possible fawn SN's for E2 host 031234 are: 031234, 131234, and 231234.

Neolink Fawn Collar initialization

Neolink Fawn collars can be deployed with or without access to the host. The following are steps to make sure the *Neolink* Fawn system works correctly.

1. Program the G211E2 collar host for VIT/Fawn Events. See Section 14 for details. NOTE: If the G2110E2 was previously programmed for VIT/Fawn Events for use with a *Neolink* VIT, the programming will carry over, as long as the *Neolink* system has not been disabled with a remote command.

2. If deploying the G2110E2 collar host at the same time as the fawn collars, place a magnet on the G2110E2 collar until ready for deployment. Otherwise, no further action is necessary with the E2.

3. Upload a SN into the *Neolink* fawn(s). See Section 14 for details.

4. If deploying two or three fawn collars, they should be synchronized together before deploying. Fawn collar '0', which is the fawn that has serial number starting with '0', is the lead fawn. The other fawns will synchronize to it.

   To synchronize them, remove or swipe the magnet on a *Neolink* Fawn with the serial number that begins with a '0'. Leave the collar turned on by keeping the magnet off of fawn '0' until deployment.

   Next, listen to the VHF beep pattern of 'fawn1', the *Neolink* Fawn with serial number beginning with '1'. Swipe the magnet of 'fawn'1. There will be silence until it synchronizes. When it synchronizes, there will be a very long beep. If you do not hear this very long beep, repeat the process. Listen to 'fawn1', swipe the magnet on 'fawn1', and again, listen for the long beep. Once the long beep is heard, 'fawn1' is synchronized. Make sure 'fawn1' remains turned on by keeping the magnet off of the collar until deployment.

   If there is third *Neolink* Fawn which will be the fawn that has its serial number beginning with a '2', remove the magnet at this time. The process is the same. Listen to the VHF of 'fawn2', then swipe the magnet on 'fawn2'. Listen for the long beep that tells you 'fawn2' is also synchronized. Make sure 'fawn2' is not turned off by leaving the magnet off until deployment.

   Fawns broadcast every 20 seconds, so listening to a synchronization attempt should only take approximately 20 seconds. Remember, if you have troubles hearing the VHF beeps, consider tapping the potted part of the fawn collar against a hard surface to open the magnetic on/off switch, and then reattempt synchronization. This step will set the *Neolink* Fawn broadcasts so that there will be no initial interference issues.

   After synchronizing the devices, in order to maintain synchronization, DO NOT apply magnet(s) to the *Neolink* Fawn Collar(s). **IMPORTANT: Be sure to deploy the collar before the mortality period is reached. Otherwise, the collars will go into mortality**

mode, and will stay locked in mortality for the Mortality lock period or until it is reset with a magnet swipe.

5. When ready to deploy the system: if deploying a G2110E2 collar at the same time as the *Neolink* Fawn collar(s), remove the magnet from the G2110E2 collar in the presence of the Fawn Collar(s) and verify that in 20 seconds, the VHF for the collar comes on.

   - If VHF comes on, the *Neolink* system is ready to be deployed.

   - If the VHF does not come on, then consider tapping the G2110E2 against a hard surface to open the magnetic on/off switch on the G2110E2.

   If deploying the *Neolink* Fawn collar(s) without access to the G2110E2 collar, simply deploy the Fawn collar(s), preferably before the mortality period is reached. When the already deployed G2110E2 collar hears the *Neolink* Fawn collar(s), it will immediately recognize the changeover to *Neolink* Fawn communication.

Neolink Fawn Data

A G2110E2 collar host in *Neolink* Fawn mode will deliver data messages containing the status of all fawns it believes are deployed. Initially, the G2110E2 collar may search for a *Neolink* device for up to five minutes until it hears a *Neolink* Fawn. Once it determines that a *Neolink* Fawn is sending a message, it will enter *Neolink* Fawn mode. In this mode, when a change such as proximity or mortality for a collar occurs, the G2110E2 will take a GPS fix automatically and transmit a satellite message with the GPS fix, and a status update of what the change was.

Possible status updates that would prompt this sequence are: 1) a *Neolink* Fawn collar coming into proximity of a G2110E2 collar after a 12-hour absence from the G2110E2, 2) a *Neolink* collar absence from G2110E2 host collar for a period longer than 12 hours, and 3) a *Neolink* fawn mortality being successfully sent via radio-link to the G2110E2 host.

Once a G2110E2 system is deployed, if there is more than one Fawn collar being deployed, the G2110E2 host collar should be remotely commanded to search for more than one collar, to expedite the communication process. This can be done at the www.atsidaq.com website, by clicking on the *Neolink* Fawns button associated with the appropriate G2110E2 collar, and selecting the appropriate options. A screen shot of the Fawn control selections from the website is shown in Figure 9.

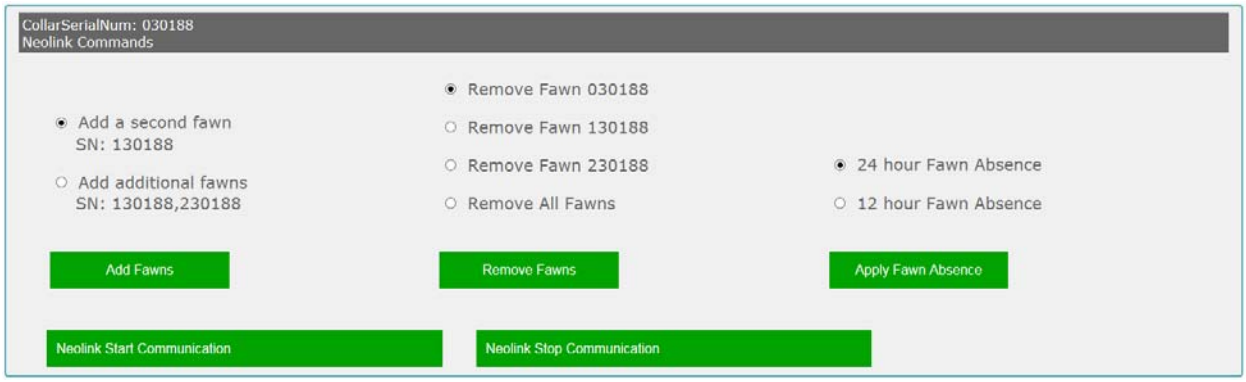

Figure 9. *Neolink* Fawn Remote Command Options

You may also turn off *Neolink* communication between Fawn collars and the G21010E2 collar by using the Remove Fawns button.

Lastly, you may change the Fawn Absence default setting of 12 hours, to 24 hours, and then select the Apply Fawn Absence button to initiate the change.

Be sure to consult Section 12, *Neolink* VIT System, *Neolink* VIT Data, and Temperature and Light Data in *Neolink* VIT's, for additional information pertaining to the operation of *Neolink* Fawn collars.

Section 14 Programming a *Neolink* Device

Any transmitter device operating as part of a *Neolink* system must be programmed with a valid serial number before being used. The following are the steps necessary to program a serial number into a device. When possible, place magnets on all *Neolink* devices not currently being programmed to prevent issues with programming.

1. Connect *Wildlink* Comm module to a Windows PC.
2. Run ATS*Fixes* for Satellites software.
3. From the Product Model drop-down pick list, select "Fawn or VIT".
4. For Serial Port, select the COM port associated with the *Wildlink* Comm module.
5. Click on the "Fawn or VIT" button. The following screen should appear:

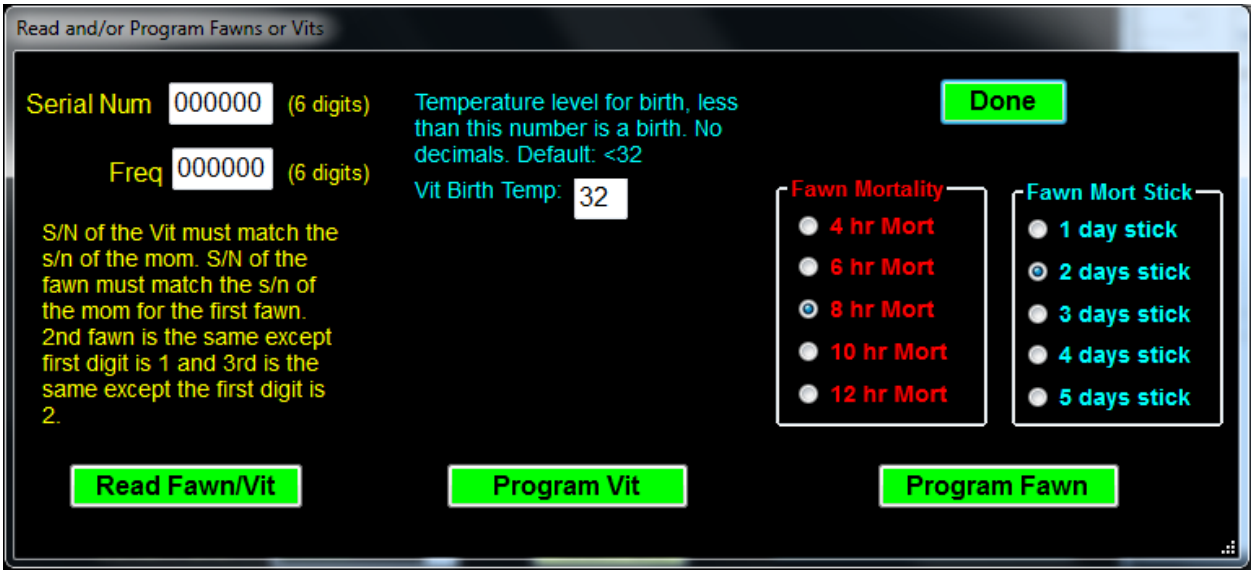

Figure 10. *Neolink* Programming

6. Enter in a six digit serial number in the "Serial Num" field. For *Neolink* VITs, this number will be the same as the G2110E2 collar that it will be pared with. For *Neolink* Fawns, this number will contain a first digit of 0, 1, or 2, and the remaining 5 digits will be the same as the last five digits of the G2110E2 host collar.

7. For a *Neolink* Fawn, select the desired options for the Fawn mortality period, and also the fawn mortality lock ("Mort Stick") period. These settings do not apply to the *Neolink* VIT.

8. For VIT programming, click on the "Program VIT" button, and for fawn programming, click on the "Program Fawn" button.

9. Swipe the magnet over the designated on/off magnet location on the *Neolink* device and wait for a "Success" response from the software. If an error message appears, e.g. "Error in setting up Fawn!!" recycle power on the *Wildlink* device by removing the USB cable from the device, and plugging it back in. Once you hear VHF beeps being emitted from the *Neolink* device, click on the appropriate button to reprogram the unit again. Repeat this process as necessary to program remaining devices.

10. Click on the 'Read' option under 'Model VIT/Fawn and swipe the magnet over the on/off location again.

11. Verify that a window appears with the information that was just entered. If the information displayed is not correct, repeat steps 6 through 10.

12. Place and tape a magnet on to the designated on/off location of the device.

Section 15 Warranty and Service

The model G2110E2 collar is warranted for one year from the time of shipment, and for one refurbishment cycle. The unit may be refurbished up to three cycles.

Should you encounter any difficulty during programming or operation of your collars, please contact ATS Sales and Service at 763.444.9267 during normal business hours. This and other ATS User Manuals are available for download from the ATS website, at www.atstrack.com.