

Advanced Telemetry Systems

R4500C

(Models: R4500CD or R4500CLD)

Receiver/Datalogger, 12 table version
for use with ATS Coded Transmitters

User Manual



Introduction:

The R4500C is a receiver - data logger combination with built in GPS. (An optional GPS antenna is required to use the GPS feature)

Operationally, the R4500C works by acting as a filter to select a very narrow window in the frequency spectrum. The position of this filter in the frequency spectrum is determined by the frequency selection (tuning). The receiver rejects signals and noise outside the filtered window, and passes signals and noise within the window. Additionally, the receiver translates the signal to a frequency within hearing range that can be heard from the speaker.

The R4500C can store 98304 Stationary data blocks, or 49152 Aerial data blocks or data blocks recorded in the Manual mode. For Aerial Data, and data recorded in the Manual mode, an extra data block is needed for GPS information. The data is stored to memory using a looping format. If the data set is maxed out, the newest data will overwrite the oldest data block. Data blocks consist of the time stamp, frequency, transmitter data, and GPS location if GPS is used.

The Receiver uses DSP (Digital Signal Processing) technology to achieve better sensitivity, and to help filter out noise. The DSP digitally samples the audio signal from the R4500C. When the signal has been digitized, the DSP processor uses internal mathematical calculations to identify signals.

The C suffix indicates the software in this receiver is programmed to detect ATS's 100 code coded transmitters.

Class B Device Statement: (Section 15.105 (b) of the FCC Rules)

“Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
 - o Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - o Consult the dealer or an experienced radio/TV technician for help.”

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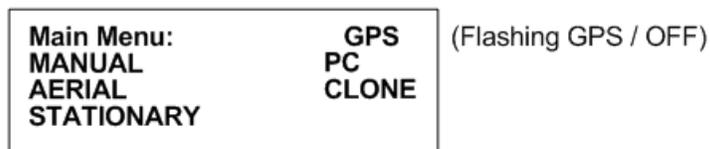
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Getting Started:

When you first turn on the power, the receiver will display Advanced Telemetry Systems, the receiver model and the version number of the receiver software. The display will then proceed to the Main Menu:



Main Menu Items:

GPS indicator: The status of the GPS is displayed in the upper right corner of the screen. The messages indicate the following:

GPS (non flashing) – The GPS is on, and there is a valid GPS fix.

GPS / OFF – The GPS is turned OFF.

NO / FIX – The GPS is attempting to acquire a valid GPS fix.

GPS / ERR – The GPS has not been able to get a valid GPS fix within 5 minutes.

NO / GPS – The GPS has not been able to get a valid GPS fix after 15 minutes.

If a valid GPS fix is found during NO /FIX, GPS / ERR, or NO / GPS the indicator will change to a non flashing GPS indicator.

MANUAL: This mode is used to detect transmitters on an individual frequency. Frequency scanning is not available in this mode. The manual mode does not use pattern matching. The actual pulse rate between any two pulses will be displayed. Without any pattern matching, the manual mode is helpful to identify a transmitter pulse rate if it is not known. To save a target in the manual mode, **Record** would need to be activated. When **Record** is activated, GPS locations are also recorded along with the transmitter data if GPS is activated. An optional GPS antenna is required to use the GPS feature.

AERIAL: Designed for tag location using aircraft. While scanning a table, no information will be recorded unless **Hold** is activated. The **Hold** button is used to toggle between scanning the frequency table, and to hold the scanning of the frequency table. When **Hold** is activated, the scanning of the frequency table stops and is held for the frequency shown in the screen. In **Hold**, all available information will be continually stored. Tag ID, frequency, signal strength and time are stored to memory when the operator exits **Hold** or activates **Record**. In **Hold**, **Record** needs to be activated when no ID is detected but a Tag can be heard. Aircraft location is also recorded if GPS is activated. An optional GPS antenna is required to use the GPS feature.

STATIONARY: This mode is used to monitor transmitters passing a site or presence/absence of transmitters. The time, frequency, signal strength, transmitter ID, and the number of valid transmitter detections per store period are stored. Scanning is enabled, GPS is disabled.

PC: Used to off load data, send/receive frequency tables and to send/receive receiver programming parameters. The supplied ATSWinRec software and serial cable must be used with this option.

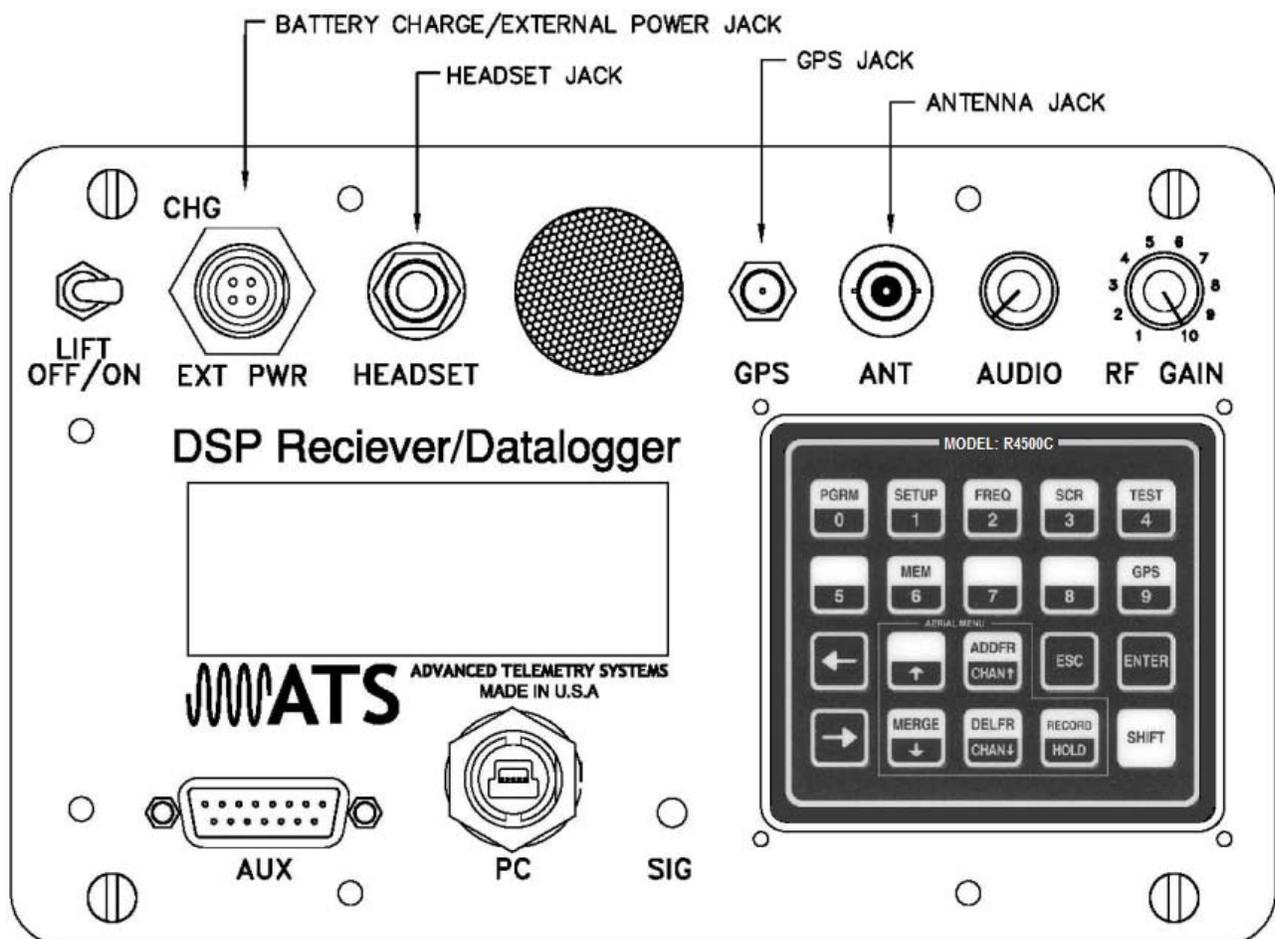
CLONE: Using the optional blue cable, frequency tables and default settings may be cloned from one receiver to another receiver.

Receiver Controls:

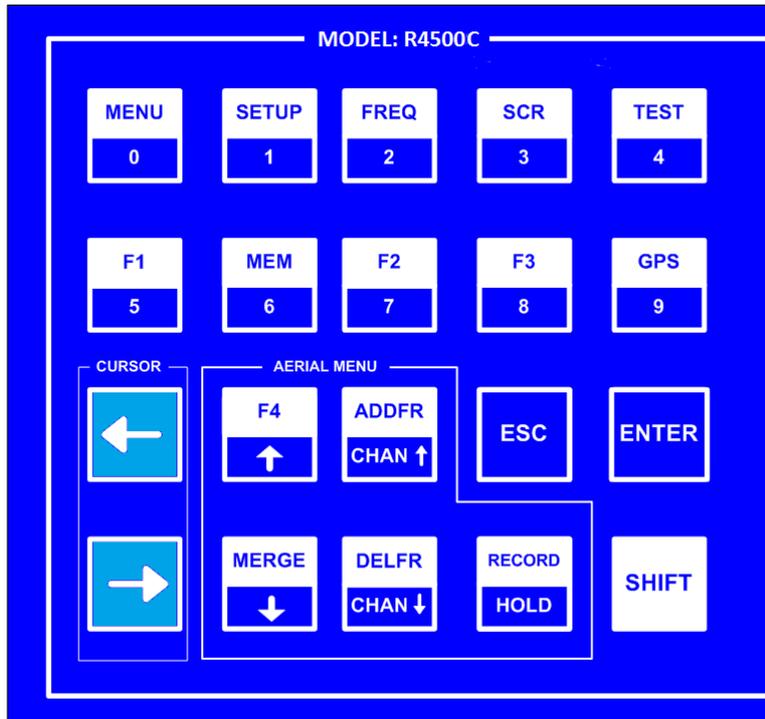
Receiver controls are shown in the figure below. Most are self explanatory. The RF Gain control is normally set to full clockwise for maximum sensitivity. RF Gain may be reduced for close in searching or while direction finding. The Audio control should be set for a comfortable level. Its setting does not affect detection sensitivity. Any monaural headset with a 0.25 inch jack may be used. Most users prefer headsets with muffs to reduce external noise from wind or aircraft. Inserting the headset jack disables the internal speaker.

The AUX connector is used to interface antenna switches or other controlled devices.

The SIG LED will light for every valid pulse detected. See specifications for valid pulse detections.



Most input and control of the receiver is done through the keypad. The keypad is shown below:



Navigation of the Cursor:

At startup in the Main Menu, the cursor will be positioned on the MANUAL menu item.

To maneuver through the menu items, use the  or the  keys to move the cursor to the desired menu item.

Both keys will move the cursor. One key moves the cursor in a forward direction , and the other  in a reverse direction. Once the cursor is on the desired menu item, pressing “**ENTER**” will activate that item.

To access the upper functions on the keypad, first press the “**SHIFT**” key followed by the desired upper function key sequentially.

Note: The “**SHIFT**” key will not be activated if pressed simultaneously with another key.

To stop a scan (Aerial or Stationary), stop a setup sequence, or to return the previous menu, press the “**ESC**” key.

Pressing the wrong key or entering invalid data will produce the response:

NOT an Option

or

Out of Range

Upper Keypad Functions:

To access the upper keypad functions, first press “**SHIFT**” and then press the “**upper function**” key sequentially.

MENU – Enters the Main Menu

SETUP – Enters the Setup Menu

FREQ – Enters the Frequency Menu

SCR – Toggles the display backlight on and off

TEST – Test internal Battery Voltage Level or External Power Supply Voltage Level

MEM – Enters the Memory Menu

GPS – Enters the GPS Menu

MERGE – Merges frequency tables for Aerial or Stationary Scanning

ADDFR – Adds a frequency while Aerial Scanning

DELFR – Deletes a frequency while Aerial Scanning

RECORD – Used to manually record information

F1, F2, F3, F4 – Currently not in use

1.0 FREQ - Frequency Entry Mode



Stationary Mode and Aerial Mode will not function if there are no frequencies in the table selected to scan. The frequencies should be entered into the frequency table or tables first.

The frequencies entered in the R4500C are 6 digit numbers. For frequencies below 100 MHz, the frequencies are entered as 5 digit numbers. For example, a frequency of 151.183 MHz will be entered as 151183. A frequency of 48.655 MHz will be entered as 48655.

From the Main Menu screen, press the “**SHIFT**” key followed by pressing the “**FREQ**” key sequentially. To change the numeric value, use the numeric digits on the keypad. For the R4500C to accept a value, press “**ENTER**”.

Screen 1

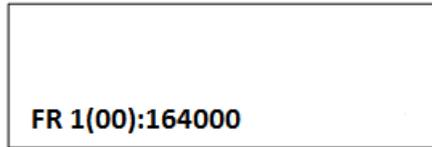
Freq Entry Mode:	
Table #	1
Chan Qty	18

Table # : Selects the frequency table that you will be storing your transmitters' frequencies. There are twelve tables available. Table 1, 2, 3 or 12.

Chan Qty : The number of frequency entries you will be using for the transmitters in this table. Note the first channel is Channel (00). There are 50 channels available for each frequency table.

After entering the Chan Qty, the screen will change to entering the frequencies.

Screen 2



(The default frequency will be the lowest frequency of the receiver)

FR 1 indicates frequency table 1.

(00) represents the first frequency in the list. The next frequency will be FR 1(01), and so on.

The cursor defaults to the 1 MHz position. Use the  or the  keys to move the cursor to the digit that needs changing. When a number is entered in one location, the cursor will move to the right by one. Pressing **“ENTER”** will store the frequency, and move to the next frequency position in the table. When all the frequencies are entered, the screen will jump back to the start of the Frequency Entry Menu.

If you have overlapping frequencies (i.e. 148.000-151.999) move the cursor to the 10 MHz position and then enter the desired numeric value.

You may use the CHAN up  and CHAN down  keys at any time to scroll through the channels. These keys can be used to make corrections or change an individual channel frequency.

2.0 SETUP Menu

The Setup Menu is used to set the clock, select transmitter type, default settings and delay times for the screen, stationary hold, the channel delay and set the external data transfer settings. Setting the defaults first will make starting Aerial or Stationary scans much easier and also reduce potential for errors.

To get into the “Setup Menu”, press the **“SHIFT”** key followed by pressing the **“SETUP”** key sequentially.

Again, to maneuver through the menu items, use the  or the  keys.

This is the view of the “Setup Menu”



To return to the Main Menu from the Setup Menu, press **“ESC”**.

2.1 Clock

To access the clock, position the cursor on **Clock** and press **“ENTER”**.

Here is an example of the Clock Menu:

Year	11
Julian Day	056
Hour	13
Minutes	16

You can press **“ENTER”** to go through each setting, or use the  and the  keys to move forward or backwards to a specific setting.

To change the numeric value, use the numeric digits on the keypad, or you can use the  and  keys to increment the numeric value, up or down. For the R4500C to accept a value, press **“ENTER”**. After the Minutes have been entered, the menu will return to the “Setup Menu”. If no changes are needed in the Clock Menu, pressing **“ESC”** will return you to the “Setup Menu”. If a numeric number has been changed and **“ENTER”** has not been pressed, pressing **“ESC”** will return the value to its original value.

2.2 Defaults

Defaults Menu:
Aerial Defaults
Stationary Defaults

This selection allows you to set **Aerial Defaults** or **Stationary Defaults**. Move the cursor to select either Aerial or Stationary Defaults and press **“ENTER”**.

2.2.1 Aerial Defaults

Move the cursor to the **Aerial Defaults** item and press **“ENTER”**. This menu option sets the default options for aerial tracking, setting the defaults in this option helps reduce unwanted changes or mistakes in having to set the parameters during the tracking survey.

Screen 1

Aerial Defaults	
Table #	1
Scan Rate	002.5
Time Out	001.0

- Table #: Selects the frequency table used for scanning. Twelve tables are available. Multiple tables are used to optimize Aerial surveys in multiple locations.
- Scan Rate: Sets the amount of time the R4500C will stop on each frequency while attempting to detect tags. The number after the decimal point may be a 0 or a 5 to allow half second increments.
- Time Out: The amount of time the receiver will stay on a Frequency while attempting to detect a tag. If no tag is detected in the Time Out period, the receiver will advance to the next frequency in its frequency table. This feature allows faster scanning by truncating the scan time if no tag is detected in the Time Out period. The user defines the parameter (e.g. 003 – 300 seconds). Refer to section **14.0** for information on setting the Time Out value.

Screen 2

Aerial Defaults	
GPS	YES

- GPS: Sets whether the GPS receiver is on or off when an Aerial Scan starts. An optional GPS antenna must be connected to the R4500C for this option to work.

2.2.2 Stationary Defaults

Move the cursor to the **Stationary Defaults** item and press **“ENTER”**. There will be a number of different screens to go through when entering the stationary defaults, depending on your screen selections. Pressing **“ESC”** will bring you back to the previous screen.

Screen 1

Stationary Defaults:		
Time Out	003	sec
Scan Time	010	sec
Store Rate	0010	min

- Time Out:** The amount of time the receiver will stay on a Frequency while attempting to detect a tag. If no tag is detected in the Time Out period, the receiver will advance to the next frequency in its frequency table. This feature allows faster scanning by truncating the scan time if no tag is detected in the Time Out period. The user defines the parameter (e.g. 003 – 300 seconds). Refer to section **14.0** for information on setting the Time Out value.
- Scan Time:** The amount of time to hold on a frequency and attempt to detect tags. The Scan time will override the Time Out time, if a pulse has been detected during the Time Out period. The Scan Time is set to whatever you need this set at (e.g. 003 – 300) seconds. Refer to section **15.0** for information on setting the Scan Time value.
- Store Rate:** This defines how often a tag's detection will be stored for each antenna. For example if the Store Rate is set to 10 minutes and a scan time of 15 seconds, its presence will only be recorded once during that 10 minute period. The data stored will include the time stamp of the strongest signal strength measured in one 15 second scan time during the 10 minute scan period. Stored with it will be all detected ID's for that frequency, and the total count of detections for each ID during the 10 minute store period.

Pressing "**ENTER**" while on the Store Rate setting will advance to the next screen.

Screen 2

```

Stationary Defaults:
Tables(1-12): 1,
, , , , , ,
, ,
  
```

Tables : The frequency tables you want to scan. There are twelve tables available.

Pressing "**ENTER**" while on the Store Rate setting will advance to the next screen.

Screen 3

```

Stationary Defaults:
Antenna # (1-8):      1
EXT Data XFER:      NO
  
```

Antenna # : The number of antennas the receiver will sample. This feature requires an external antenna switchbox connected to the AUX port of the R4500C. If using a 2-way switchbox, this would be set to 2.

EXT Data XFER: This setting is set to **YES** when transferring recorded data every hour to another device. This can be used for retrieving your data remotely. Two example devices are RDP (Remote Data Platform) and GOES (Geostationary Operational

Environmental Satellites). The GOES satellite operation requires an account with NESDIS (National Environmental Satellite, Data and Information Service). Contact ATS for more information regarding GOES and RDPs.

Pressing “**ENTER**” while on the EXT Data XFER setting will advance to the next screen.

Screen 4

Stationary Defaults: Reference Freq: NO
--



To activate the Reference tag feature, use the  or the  key. These two keys are used to toggle between the two choices.

If you entered **YES** for the reference tag, you will be prompted to enter the reference tag frequency, and the store rate of the reference tag.

Screen 5

Stationary Defaults: Reference Freq: 150000 Store Rate: 0060 min

Reference Freq: This is the frequency of a radio tag set up within range of your station used as a check on the system. Since you will not need the same quantity of data you can set up a longer store period to use up less memory. Instead of the strongest signal strength being stored within the storage period, it will be the time of the first valid ID detection.

Note: There is a limit on the number of reference transmitter points that can be collected during each storage period. The maximum number is 16 (I.E. The number of collocated codes on the reference frequency times one plus the number of antennas should not be greater than 16).

An example dataset is shown below:

Date,	Ant,	Fr,	Sig,	Code,	NumDet,	NumMort
7/17/2009 12:47,	0,	150983,	105,	9,	18,	17
7/17/2009 12:47,	0,	150983,	133,	18,	36,	36
7/17/2009 12:47,	0,	150983,	135,	42,	35,	35
7/17/2009 12:47,	0,	150983,	119,	15,	15,	15
7/17/2009 12:47,	0,	150983,	122,	86,	40,	40
7/17/2009 12:47,	0,	150983,	121,	6,	42,	42
7/17/2009 12:47,	0,	150983,	121,	78,	46,	46
7/17/2009 12:47,	0,	150983,	135,	71,	34,	34

7/17/2009 12:47, 0, 150983, 141, 79, 48, 48
7/17/2009 12:47, 0, 150983, 135, 12, 12, 12
7/17/2009 12:47, 1, 150983, 106, 9, 25, 25
7/17/2009 12:47, 1, 150983, 126, 86, 31, 31
7/17/2009 12:47, 1, 150983, 119, 15, 29, 29
7/17/2009 12:47, 1, 150983, 120, 6, 38, 38
7/17/2009 12:47, 1, 150983, 132, 18, 33, 33
7/17/2009 12:47, 1, 150983, 136, 42, 30, 30

For this example there were 2 antennas selected and 10 reference transmitters. The reference transmitter codes were 6, 9, 15, 18, 42, 71, 78, 79, 86. There should have been 30 data points if all the transmitters had been picked up for each antenna during this store period. Instead the data shows detections for all the reference transmitters shown for antenna 0, only 6 shown for antenna 1 and none shown for antenna 2. The maximum number of reference transmitters that can be used when switching between two antennas is five

Store Rate: This defines how frequently the data from the reference transmitter will be stored. A count of the number of detected tag ID's will be stored for the entire store rate.

Note: The data are not stored until the storage period has expired. For example with storage period set up for once an hour the time the first data are collected might be at 6:00 am. Although the data recorded will reflect 6:00 they will not be committed to memory until 7:00 am. This means when the data are offloaded you may have the data for the actual transmitters appearing before the reference tag. This is true even if the animal data were collected at 6:30 am and the reference data were collected at 6:00 am.

2.3 Stat Hold (Stationary Hold)

(This time setting is only used only for a Stationary Scan and is not used for **Hold** during Aerial Scanning)

Stat Hold is abbreviated for Stationary Hold time (Range = 00005 to 65535 seconds). The Stationary Hold time is the number of seconds the **"HOLD"** feature can remain in the **Hold** position when activated during a Stationary Scan. Pressing **"HOLD"** before the **Stat Hold** time has expired will resume the stationary scan. The **"HOLD"** feature may be used to monitor a transmitter for a period of time longer than the Scan Time during a Stationary Scan. If the user does not exit the **"HOLD"** mode, the R4500C will automatically resume scanning after the number of seconds has been reached. This is a safety feature added to prevent the possibility of a stationary scan remaining in Hold at a remote location.

Pressing **"ENTER"** or **"ESC"** from the "Stat Hold" menu will bring you back to the "Setup Menu".

2.4 Channel Delay

During a stationary scan, when switching to a new frequency the "Channel Delay" will be activated. The available delay time is 0-5000 milliseconds. The default Channel Delay time is 1000 milliseconds (1 second). The purpose of the Channel Delay is to filter out unwanted noise pulses when switching frequencies. The R4500C filters out unwanted noise pulses during the Channel Delay time by ignoring all pulses detected during the entered time, 0 – 5000 milliseconds. The scan time of each frequency does not start until the Channel Delay time has expired.

This adjust is available for cases where the noise level changes significantly when frequency channels are changed. The R4500C measures the average background noise level and adjusts the detection level accordingly. If the background noise level changes dramatically between channels, more time is needed to adjust to the new threshold level. When using multiple antennas the system monitors all antennas for the first two seconds (Time Out setting), if there are no pulses present, the search on all antennas is terminated and any other antennas are skipped. This saves scan time and allows all channels to be searched more often.

To determine if extra delay is needed, cycle through the frequency table with no transmitters present to determine if noise pulses cause the receiver to cycle through the multiple antenna sequence. If the receiver scans through all antennas on several or all frequency channels even with no signal present; you may want to increase the Channel Delay time. If noise pulses are present, and the multiple antenna scanning sequence does not start, the Channel Delay time is set correctly.

Setting the Channel Delay time longer gives more time for the R4500C to set a new threshold and optimize sensitivity while at the same time ignoring noise. Setting it longer than necessary means the additional delay will be added to every frequency channel scanned also increasing the time for all channels to be scanned. Thus the goal is to set the delay so most, but not necessarily all noise pulses on every channel are ignored. Occasionally high level noise will still pass no matter how long the delay is made.

Example of scan times with no transmitters present: Number of antennas used = 2. Time out = 3 seconds. Scan time = 10 seconds. Number of frequencies used in table scanned = 10.

If the noise level is higher than the noise threshold level the R4500C has set, the noise will produce signal pulses and the receiver will think transmitters are present and then cycle through the individual antennas. With no transmitters in the area, but with noise pulses indicating possible presence of transmitters, the time for a scan of the complete frequency table will be: Scan Time of antenna 0 + Time Out of antenna 1 + Time Out of antenna 2 = 10 + 3 + 3 = 16 seconds. For the 10 frequencies in the table, the total scan time will be 160 seconds. (When an individual antenna is selected, the noise level decreases and there should not be any noise pulses produced)

When using the default Channel Delay of 1000 milliseconds and there are no noise pulses above the threshold nor are any transmitters present; the time of the frequency table scan will be: Channel Delay time + Time Out of antenna 0 = 1 + 3 = 4 seconds. For the 10 frequencies the total scan time would be 40 seconds. With the Channel Delay set correctly, scan times can be reduced by allowing time for the R4500C to set the correct noise threshold level.

New Channel Delay
1000 Milliseconds

Enter a numeric number from 0 to 5000 and press **"ENTER"**.
Pressing **"ENTER"** or **"ESC"** will return the screen back to the "Setup Menu".

2.5 Ext Data

This optional feature is used when you want to dump data out hourly through a serial port to another device. This screen is used to select the type of device you want to dump to. For this feature to be activated it will need to have been selected for in screen 6 of the Stationary Setup.

```
Ext Data XFER:
1: RDP
2: Goes
Format: 1
```

Enter a 1 or 2 for the type of device and press “**ENTER**”.

2.5.1 RDP – Remote Data Platform

With this setting selected all the data collected during the hour will be dumped out the **AUX** serial port as binary compressed data.

Screen 2

```
RDP Tx baud:
1:9600
2:57600
Tx Rate: 1
```

- 9600 : Sets the serial communication settings for the R4500C’s data output to “baud: 9600, no parity, 8 data bits, 1 stop bit”.
- 57600: Sets the serial communication settings for the R4500C’s data output to “baud: 57600, no parity, 8 data bits, 1 stop bit”.

Enter a 1 or 2 for the desired serial port settings and press “**ENTER**”. The screen will return to the “Setup Menu”

2.5.2 Goes – Geostationary Operational Environmental Satellites

With this setting selected, limited amounts of data collected during the hour will be dumped out the **AUX** serial ports as binary compressed data.

The GOES functionality enables the receiver to send data to a geostationary satellite so that the user can retrieve it later from another location. This system has the advantage of working in remote locations not typically covered by standard cell phone service providers.

To use GOES you first need an account with NESDIS (National Environmental Satellite, Data and Information Service). You also need a GOES Transmitter. Both the SAT HDR GOES and TX312 models sold by Campbell Scientific, Inc are compatible with the data protocol being sent out the **AUX** serial port. The data coming out the **AUX** serial port is standard RS232 with settings: “baud: 9600, no parity, 8 data bits, 1 stop bit”.

Screen 2

```
GOES Tx baud:
1: 1200    2: 300
3: N/A
Tx Rate: 1
```

- 1200:** Informs the R4500C that the GOES satellite will be transmitting data back to Earth at 1200 baud. This value is assigned by NESDIS (National Environmental Satellite, Data and Information Service).

300: Informs the R4500C that the GOES satellite will be transmitting data back to Earth at 300 baud. This value is assigned by NESDIS (National Environmental Satellite, Data and Information Service).

N/A: Informs the R4500C that it doesn't need to worry about the GOES transmission rate. You would select this if you wanted to take advantage of the GOES data format without actually using the GOES transmitter and setup.

Enter a 3 to finish or a 1 or 2 to continue to the next screen and press "**ENTER**".

Screen 3

**Size in Seconds
of the GOES
transmission
window: 020**

Enter the value of the transmit window size assigned by NESDIS and press "**ENTER**".

Screens 2 and 3 are used to limit the amount of data dumped out the serial port. The data size will be a size that can be handled by hourly satellite transmissions. Data that doesn't get sent to the GOES transmitter this hour will be saved for the next hours dump. If you anticipate having intervals where you collect more data than can be sent by a satellite transmission, you will need to make sure you have intervals where you collect limited data so the system can catch up.

2.6 Tx Type

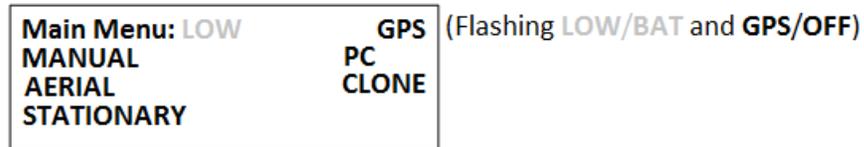
This optional feature allows you to select what type of transmitter type you will be monitoring.

Select Tx Type:
Coded
Coded with Data

Unless this selection is changed the default will be **Coded**. To select move the cursor to select either Coded or Coded with Data and press "**ENTER**".

The with data is used when you want to use tags that have a few extra pulses in their code that translate to some data from some measurement the tag is designed to take such as temperature. The coded pulse stream is decoded into a Tx Id, data type and period. The period can be then plugged into an equation such as a quadratic to give the measurement of interest.

3.0 Main Menu



Move the cursor with the  or the  keys to navigate through the menu items. Once you have the cursor positioned over your selection press “**Enter**” to activate it.

3.1 MANUAL MODE

With the cursor in the **MANUAL** position, press “**ENTER**”.



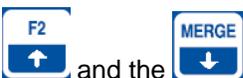
The GPS is normally OFF for the Manual Mode. If the GPS has been turned on previously from the GPS Screen, or an Aerial Scan, the GPS will remain on when entering the Manual Mode.

To change the frequency

The cursor defaults to the 1 MHz position. From here you can enter whatever frequency you are looking for.

You may use the  or the  keys to change the cursor position. More likely you will enter tag frequencies using the keypad. Each time you enter a digit the cursor will move one place to the right. If the cursor is in the 1 kHz position (least significant digit), then it will just remain in that location. Receiver frequency is also updated after each key is entered.

Pressing “**ENTER**” will move the cursor to the default location of the 1 MHz position. It does not change the last entered frequency. You may also use the left and right arrow keys to move the cursor around and change the frequency by entering a new digit.



The  and the  keys can be used to increment or decrement a numeric value while keeping the cursor in the same location.

If the enter frequency that is not within the receiver's range,

“Out of range” error will be displayed.

The Manual mode does not automatically store the data. To store data in the manual mode, pressing “**SHIFT**” and then “**RECORD**”  will store all data that has been detected and is displayed in the screen.

The Manual mode will display ID tags on the display as it decodes them. Other than storing data, all the features described in the Aerial’s **Hold** mode also work here.

The time stamp of all detected tag ID’s will be stored when pressing “**RECORD**” . If no ID’s are available, only the frequency is saved along with the latest time stamp. Note: GPS data will only be stored if an optional antenna is connected to the receiver, the GPS functionality is turned on and a valid GPS fix has been acquired.

Saving targets will flash on the display

To exit the Manual mode, press the “**ESC**” key.

3.2 AERIAL MODE

Move the cursor to the **AERIAL** item and press “**ENTER**”.

Screen 1

Aerial Scan Mode:	
Table #	1
Scan Rate	002.5
Time Out	002.5

- Table #: Selects the frequency table used for scanning. Twelve tables are available. Multiple tables are used to optimize Aerial surveys in multiple locations.
- Scan Rate: Sets the amount of time the R4500C will stop on each frequency while attempting to detect tags. The number after the decimal point may be a 0 or a 5 to allow half second increments. For setting Scan Rate time, see section **13.0**.
- Time Out: The amount of time the receiver will stay on a Frequency while attempting to detect a tag. If no tag is detected in the Time Out period, the receiver will advance to the next frequency in its frequency table. This feature allows faster scanning by truncating the scan time if no tag is detected in the Time Out period. The user defines the parameter (e.g. 003 – 300 seconds). Refer to section **14.0** for information on setting the Time Out value.

If the defaults were set up correctly, just press enter for each item listed, and the cursor will move through each setting in the Aerial Setup windows. When all settings have been entered, the Aerial scan will start.

The default settings are used to pre - enter the values for each item listed for the Aerial Setup. Pressing “**ENTER**” on these values stores them into memory. If there needs to be any changes made to any of the items, pressing “**ENTER**” will store the changed value into memory, and that changed value will be used in the Aerial scan.

When an Aerial Scan has started, the R4500C will start scanning the frequencies in the table at the entered scan rate time. When a tag is heard on a frequency, pressing “**HOLD**”  will stop the scan rate and remain on that frequency until “**HOLD**”  is pressed again. When Hold is pressed the second time, the R4500C will resume scanning through the frequencies in the table at the scan rate time.

You may use the “**CHAN**↑”  and “**CHAN**↓”  keys at any time to scroll through the channels. When the is scanning through the frequencies, pressing the chan up or chan down keys will override the scan rate time, and advance forward or backwards through the frequency table. While in **Hold**, pressing the chan up or chan down keys will advance forward or backwards through the frequency table and remain in the **Hold** state, recording any available information when detected.

While in **Hold**, the tune up  and the tune down  keys can be used to increment or decrement the frequency.

FR 1(00) 151234	Hold	
	LOW	(Flashing LOW/BAT)
	GPS	(Flashing GPS/OFF)

Example 1:

FR 1(00) 151234	Hold	
662-113 694-110 712M100	LOW	(Flashing LOW/BAT)
595-119 082-121 154M120	GPS	(Flashing GPS/OFF)
728-123 742-118 754-114	+	

Example 2:

FR 1(00) 151234	Hold	
126-122 546-122 792-113+	LOW	(Flashing LOW/BAT)
707-122 283-120 052-114+	GPS	(Flashing GPS/OFF)
	+	

Hold: Pressing the “**HOLD**”  key will cause the aerial scanning to stop on the current frequency and store data continually. When this has occurred the “**Hold**” text will appear on the screen. Use this key when you want to store data (i.e. time, frequency, signal strength, tag ID, and GPS location) for the displayed frequency. Pressing the “**HOLD**”  key again will cause the R4500C to resume scanning.

To access functions available to this mode press a “SHIFT” key “VIEW↑”  “VIEW↓” , “MERGE” , “ADDFR” , “DELFR” , or “RECORD”  key.

GPS: This flashing message will indicate the status of the GPS functionality. GPS data will only be stored if an optional antenna is connected to the receiver, the GPS functionality is turned on and a valid GPS fix has been acquired.

ID's: When a transmitter is identified, the ID will appear in the display. The screen has only enough room to display 6 ID's. If more than 6 ID's are detected, there will be a “+” indicator in the bottom

right hand corner of the display. To view the other ID's use the VIEW↑  and the VIEW↓  as scroll keys. Shown in Example 1 is the first page of the detected tag ID list. The most recently detected ID will appear in the upper left hand corner of the display. Note that the first two lines of IDs have no “+” indicator on the right hand side. Example 2 shows all three lines with a “+” indicator. This shows that the list can scroll both up and down. The absence of any IDs in the bottom row indicates that scrolling down will not show any more detected IDs. A “.....+” on the display indicates you've reached the end of the list's storage area. All detected IDs will be stored to memory for downloading to the PC. The ID will be shown on the screen as a three digit number followed by its mortality indicator and its signal strength reading. The first two digits are the tag ID. The third digit is a counter that will increment every time the tag ID is identified. This counter will loop from 0-9. (For example: 127 = ID number 12, and has been detected 7 times.) If a tag is in mortality mode the ID information will show an 'M' where a '-' would normally appear.

To stop the Aerial Scan, press “ESC”. This will return the screen to the “Main Menu”

If you desire to start the aerial scan after stopping the scan, a new window will appear when entering the “Aerial Menu”.

Screen 1:

Aerial Scan Mode:
Resume Last Scan
Scan Using Defaults
New Scan

Pressing “ENTER” while the cursor is on **Resume Last Scan**, the following screen will come up:

Screen 2:

Aerial Scan Mode:
Table # 1

Pressing “ENTER” while the cursor is on the table number will start an aerial scan using all the frequencies that may have been added or deleted including any merged tables. Specifying a table number then

pressing “**ENTER**” will perform the same task but first it will clear out the merged tables while maintaining the added and deleted frequencies from the table specified.

Pressing “**ENTER**” while the cursor is on **Scan Using Defaults**, the Aerial Scan will start scanning using the values entered for the Aerial default settings.

If a new scan is started by starting an Aerial Scan from the “Main Menu”, the changed values will be returned to the default values if **Scan Using Defaults** is selected. If any of the scan protocol values need to be changed, you will need to move the cursor to **New Scan** and press “**ENTER**”. The values in the list will show the default values. If you want the values to be remembered for future scans go back to the “Defaults Menu” and make the changes there. With the “ATSWinRec” software, there is the option to offload the data showing the scan parameters. When this option is selected, the values used for the scan will be able to be viewed along with the data.

3.3 STATIONARY MODE

Move the cursor to the **STATIONARY** item and press “**ENTER**”. See section **3.3.3** for viewing the stationary flowchart. The stationary mode has a low battery indicator. The LOW / BAT indicator will flash in the display when the internal battery voltage is below 11.5V. If external power is connected to the receiver, the internal batteries are not used, and the low battery indicator will be for the external power supply.

There will be multiple windows to go through. Moving the cursor with the  or the  will allow movement between screens.

Screen 1

Stationary Setup:	
Time Out	003 sec
Scan Time	012 sec
Store Rate	10 min

- Time Out:** The amount of time the receiver will stay on a Frequency while attempting to detect a tag. If no tag is detected in the Time Out period, the receiver will advance to the next frequency in its frequency table. This feature allows faster scanning by truncating the scan time if no tag is detected in the Time Out period. The user defines the parameter (e.g. 003 – 300 seconds). Refer to section **14.0** for information on setting the Time Out value.
- Scan Time:** The amount of time to hold on a frequency and attempt to detect tags. The Scan time will override the Time Out time, if a pulse has been detected during the Time Out period. The Scan Time is set to whatever you need this set at (e.g. 003 – 300) seconds. Refer to section **15.0** for information on setting the Scan Time value.
- Store Rate:** This defines how often a tag’s detection will be stored for each antenna. For example if the Store Rate is set to 10 minutes and a scan time of 15 seconds, its presence will only be recorded once during that 10 minute period. The data stored will include the time stamp of the strongest signal strength measured in one 15 second scan time during the 10 minute scan period. Stored with it will be all detected ID’s for that frequency, and the total count of detections for each ID during the 10 minute store period.

Pressing “**ENTER**” while on the Store Rate setting will advance to the next screen.

Screen 2

```
Stationary Setup:
Tables(1-12): 1,
, , , , , ,
, ,
```

Tables : The frequency tables you want to scan. There are twelve tables available. All the tables listed will be scanned.

Screen 3

```
Stationary Setup:
Antenna # (1-8): 1
EXT Data XFER: NO
```

Antenna # : The number of antennas the receiver will sample. This feature requires an external antenna switchbox connected to the AUX port of the R4500C. If using a 2-way switchbox, this would be set to 2.

EXT Data XFER: This setting is set to **YES** when transferring recorded data every hour to another device. This can be used for retrieving your data remotely. Two example devices are RDP (Remote Data Platform) and GOES (Geostationary Operational Environmental Satellites). The GOES satellite operation and requires an account with NESDIS (National Environmental Satellite, Data and Information Service). Contact ATS for more information regarding GOES and RDPs.

Period: This setting informs the receiver what the time between coded pulse sets will be. The unit is specified in milliseconds. Codes that come in at a period different than the parameter entered here will be rejected.

Pressing "**ENTER**" while on the Period(ms) setting will advance to the next screen.

Screen 4

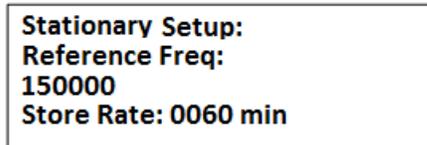
```
Stationary Setup:
Reference Freq: NO
```



To activate the Reference tag feature, use the  or the  key. These two keys are used to toggle between the two choices.

If you entered **YES** for the reference tag, you will be prompted to enter the reference tag frequency, and the store rate of the reference tag.

Screen 5

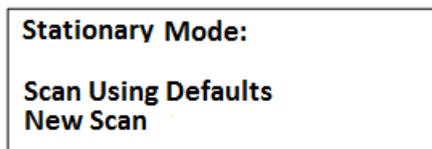


Reference Freq: This is the frequency of a radio tag set up within range of your station used as a check on the system. Since you will not need the same quantity of data you can set up a longer store period to use up less memory. Instead of the strongest signal strength being stored within the storage period, it will be the time of the first valid ID detection. There is a limit on the number of reference transmitter points that can be collected during each storage period. The maximum number is 16 (I.E. The number of collocated codes on the reference frequency * the number of antennas should not be greater than 16).

Store Rate: This defines how frequently the data from the reference transmitter will be stored. A count of the number of detected tag ID's will be stored for the entire store rate.

Note: The data are not stored until the storage period has expired. For example with storage period set up for once an hour the time the first data are collected might be at 6:00 am. Although the data recorded will reflect 6:00 they will not be committed to memory until 7:00 am. This means when the data are offloaded you may have the data for the actual transmitters appearing before the reference tag. This is true even if the animal data were collected at 6:30 am and the reference data were collected at 6:00 am.

If you desire to start the stationary scan after stopping the scan, a new window will appear when entering the Stationary Mode.

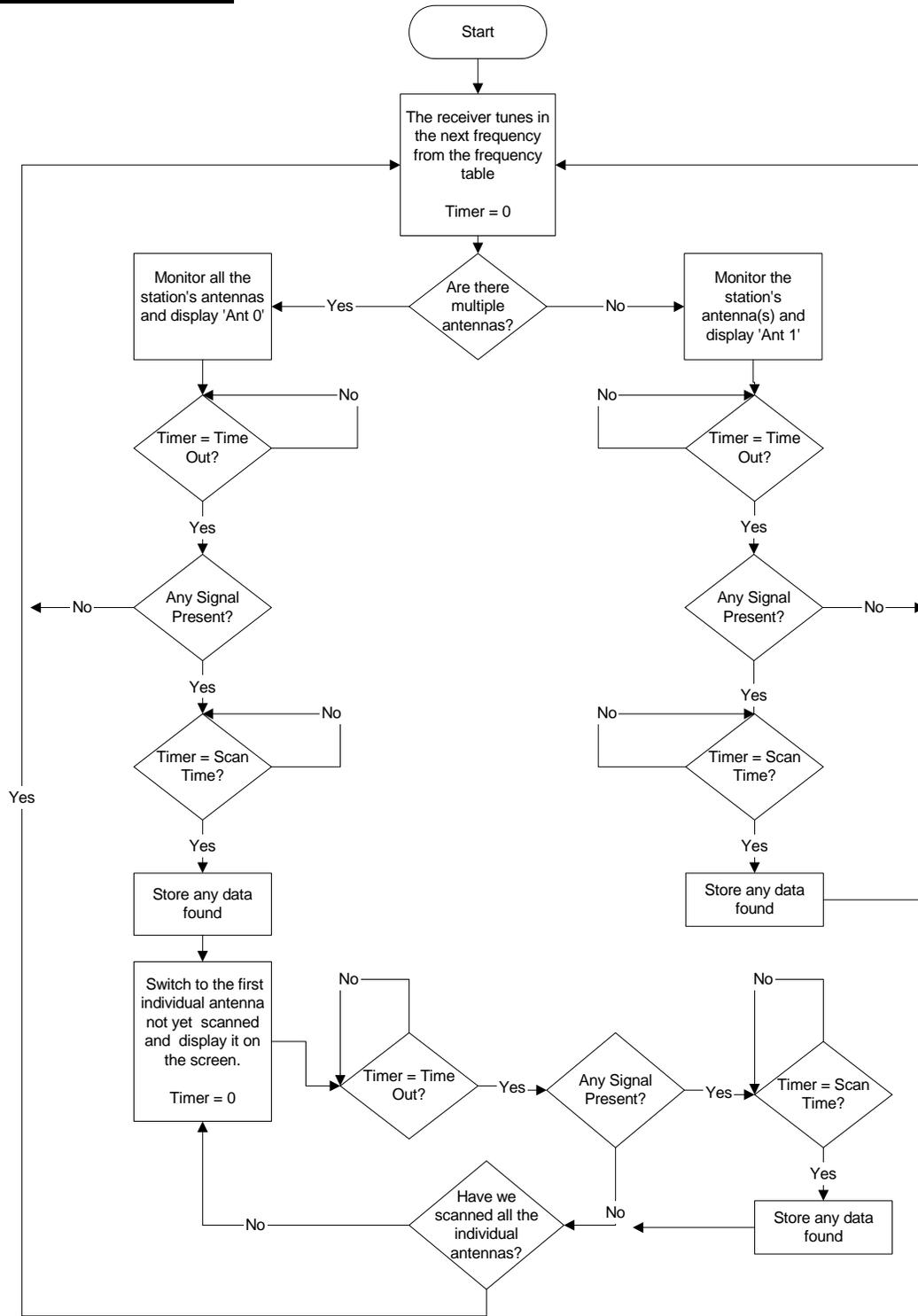


Pressing **"ENTER"** while the cursor is on **Scan Using Defaults**, the Stationary Scan will start scanning using the values entered for the Stationary default settings.

If a new scan is started by starting an Stationary Scan from the "Main Menu", the changed values will be returned to the default values if **Scan Using Defaults** is selected. If any of the scan protocol values need to be changed, you will need to move the cursor to **New Scan** and press **"ENTER"**. The values in the list will show the default values.

If you want the values to be remembered for future scans go back to the “Defaults Menu” and make the changes there. With the “ATSWinRec” software, there is the option to offload the data showing the scan parameters. When this option is selected, the values used for the scan will be able to be viewed along with the data.

3.3.1 The Stationary Logging



Flowchart

3.4 PC MODE

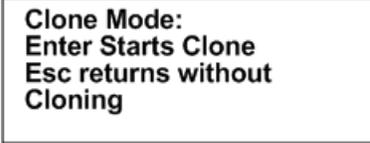
This Mode is used when communicating with a personal computer (PC). The R4500C needs to be connected to a PC using the supplied cable. The PC must currently be running the ATS supplied ATSWinRec communication software. For more information see the sections of this manual covering “Downloading Data” and “ATSWinRec”.

3.5 CLONE

The Clone feature is used to transfer frequency tables and default settings from one receiver to another. The optional blue clone cable with male DB15 connectors on both ends is required to use this function. Use the following procedure:

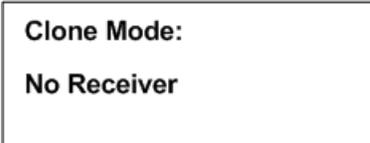
1. Connect the Clone cable between the two receivers.
2. Turn both receivers on.
3. Select **CLONE** on the receiver you want to be the recipient of the data, press “**ENTER**”.

The receiver should respond with:



**Clone Mode:
Enter Starts Clone
Esc returns without
Cloning**

If a connection cannot be made the receiver will respond with:



**Clone Mode:
No Receiver**

If a connection is not made, turn both receivers off and repeat the steps outlined above.

Remember to select **CLONE**, and then press “**ENTER**” on the receiver you want to clone the information to.

4.0 SCR – Turning the Screen Backlight On and Off

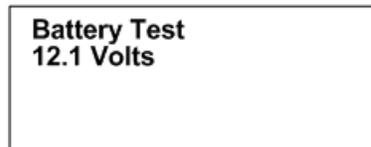


Pressing the “**SHIFT**” key followed by pressing the “**SCR**” key sequentially will turn the backlight on or off depending on its current state.

5.0 TEST - View of the “Battery” Voltage



Pressing the “**SHIFT**” key followed by pressing the “**TEST**” key sequentially will display the receiver’s power source voltage. If the power source is the internal battery it will be the internal battery voltage. If it is an external power source it will be the voltage of the external power source.



6.0 MEM - View of the “Memory Menu”

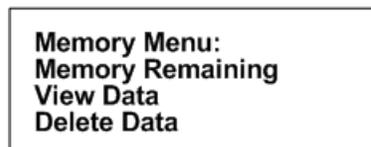


The Memory Menu is used to view the amount of data storage you have left, look at your stored data and reset your data pointer.

To get to the “Memory Menu” press the “**SHIFT**” key followed by the “**MEM**” key sequentially.

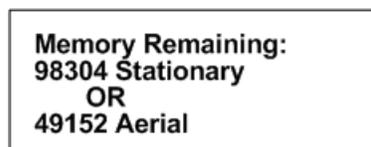
Again to maneuver through the menu items, use the  or the  keys to choose Memory Remaining, View Memory, or Delete Memory.

This is the view of the “Memory Menu”



6.1 Memory Remaining

This screen displays the number of data blocks the R4500C can still write before the memory is full. It list two numbers, one for Aerial data and one for Stationary data. The number of Aerial data blocks will always be half as much as the number of Stationary data blocks. The maximum number of data blocks available for storage is shown below.



6.2 View Data

This series of screens allows you to view all your previously stored data block by block. The format of the data to be viewed will depend on the selected "TX Type" and whether it was Aerial or Stationary Logging.

Screen 1

```
View Data at
Block: 000000
Valid Data Block
Range: 0 to 000010
```

Block: The number of the first data block you want to view. The first data block is zero.
Range: This is the number of data blocks you want to scroll through.

Screen 2

```
Block Num: 000000
Scan Parameter Block
```

This represents a block of saved parameter data that was used during the following data block saves. It is not viewable here but can be viewed when offloaded from the PC.

To scroll through the screens displaying the blocks of data, use the  or the  keys.

Screen 3

```
Block Num: 000001
04 030 15:57 Ant: 00
150255 SS:091
Tag:120 #M:011
```

After the Block Number, the next row has the Year, Julian Day, Time, and Antenna used.
Next row: Frequency, and Signal Strength.
Next row: Tag ID (2digit ID followed by a 0, 3 or a 6 where; "0"- non mortality, "3"-weak mortality signal and "6":strong mortality signal) , # of detected matches for the ID listed.

For Aerial Data only:

(A block number is not shown for the 2nd screen of Aerial Data)

```
Lat: 45 29.7200 N
Lon: 093 14.8300 W
GPS Age (sec): 001
```

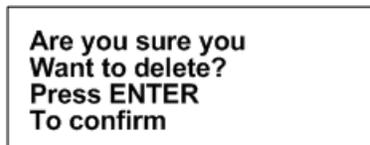
GPS Age: The amount of time in seconds that have passed since this GPS data had been recorded.

This sequence of screens will repeat until you have viewed all the data blocks listed in your range or you press the “**ESC**” key.

6.3 Delete Data

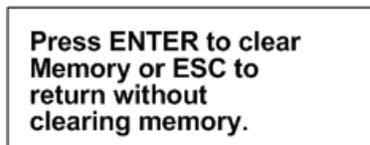
This instructs the R4500C to reset the data pointer back to the beginning of memory effectively deleting all the stored data blocks.

Screen 1



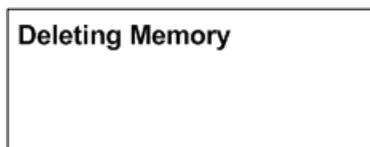
Are you sure you
Want to delete?
Press ENTER
To confirm

Screen 2



Press ENTER to clear
Memory or ESC to
return without
clearing memory.

Screen 3



Deleting Memory

This message flashes momentarily then returns you back to the “Memory Menu”.

7.0 GPS – Viewing / Activating GPS Data



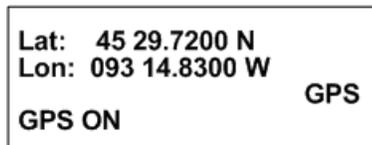
Pressing the “**SHIFT**” key followed by pressing the “**GPS**” key sequentially allows you to view the GPS data as the data are collected and it allows you to turn the GPS functionality on or off.

The optional GPS antenna needs to be connected to the R4500C to use the GPS feature.

Note: The GPS functionality uses a lot of power. Make sure to turn off the GPS when you are not using it in order to extend your battery life.



The  and the  keys are used to turn GPS on or off. The coordinates are displayed as Degrees – Decimal Minutes. **DD MM.MMMM**. The GPS locations saved in memory are stored as Decimal Degrees, or converted to UTM (NAD83) when using the ATSWinRec software.



GPS (non flashing) – The GPS is on, and there is a valid GPS fix.

GPS / OFF – The GPS is turned OFF.

NO / FIX – The GPS is attempting to acquire a valid GPS fix.

GPS / ERR – The GPS has not been able to get a valid GPS fix within 5 minutes.

NO / GPS – The GPS has not been able to get a valid GPS fix after 15 minutes.

If a valid GPS fix is found during NO /FIX, GPS / ERR, or NO / GPS the indicator will change to a non flashing GPS indicator.

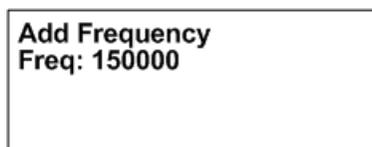
The GPS requires a current Almanac to obtain a GPS fix (a current almanac is within 6 months). If a current almanac is needed to be downloaded, this process may take longer than 15 minutes and a fix will not be obtainable until a current almanac is downloaded.

8.0 ADDFR – Adding a Frequency to the Scan Table



(Used only in Aerial Mode)

Pressing the “**SHIFT**” key followed by pressing the “**ADDFR**” key sequentially activates the add frequency feature. This allows you to append frequencies to your current scan table. Changes will be maintained if you exit Aerial Mode and return to the Aerial Scan using the Resume Last Scan option.



9.0 DELFR - Deleting Frequencies



(Used only in Aerial Mode)

Pressing the “**SHIFT**” key followed by pressing the “**DELFR**” key sequentially activates the delete frequency feature. This allows you to delete frequencies from your current scan table. Changes will be maintained if you exit Aerial Mode and return to the Aerial Scan using the Resume Last Scan option.

Delete Frequency
Freq: 150000

10.0 MERGE – Merging Frequency Tables



(Used in Stationary and Aerial Modes)

Pressing the “**SHIFT**” key followed by pressing the “**MERGE**” key sequentially activates the merge frequency feature. This allows you to merge an additional frequency table into to your current scan table. Changes will be lost once you exit the Stationary scan but maintained if you exit Aerial Mode and return to the Aerial Scan using the Resume Last Scan option.

Merge Table 2

11.0 RECORD – Recording Data



(Used only in Aerial and Manual Modes)

Pressing the “**SHIFT**” key followed by pressing the “**RECORD**” key sequentially activates the record feature. This forces a save to be preformed when a save would not ordinarily be done. The R4500C will save the data it has currently available.

12.0 PC - Downloading Data

12.1 Establish communication between the R4500C and the Computer

First install the provided software, ATSWinRec, and the USB drivers located in the CP210x_VCP folder (choose the one right for your operating system) onto your computer. This program needs to be operating on the computer first, for the R4500C to recognize a PC connection.

The setup should start automatically, if it does not, select START, RUN, BROWSE to find the SETUP file on the CD, then OPEN and OK. Run the setup to install the ATSWinRec program. It will install a short cut icon on your desktop.

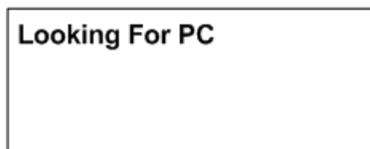
12.2 Com Port (Settings Menu)

This is the communications port (Com Port) that you have selected to communicate from your personnel computer to the R4500C. You will need to use a standard USB A Male to USB Mini communication offload cable which is provided to you by ATS. The first time you start ATSWinRec after installation you'll be asked to select a Com port from a provided list. This is a list of communication ports currently residing on your computer. After the selection is made it will be the default Com port selected during subsequent sessions using ATSWinRec. The Com Port can be changed by selecting "Com Port" from the "Settings" menu and selecting a new Com Port from the list provided. This selection will then be the new default selection.

Connect the provided USB Serial Cable to a USB port on the computer, and to the PC connector on the R4500C.

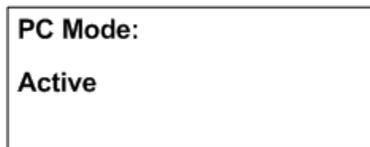
With the ATSWinRec program running on the computer, move the R4500C cursor to the PC position while in the R4500C Program Menu. Presses "**ENTER**" on the R4500C.

The R4500C display will change to:



Looking For PC

And then to:



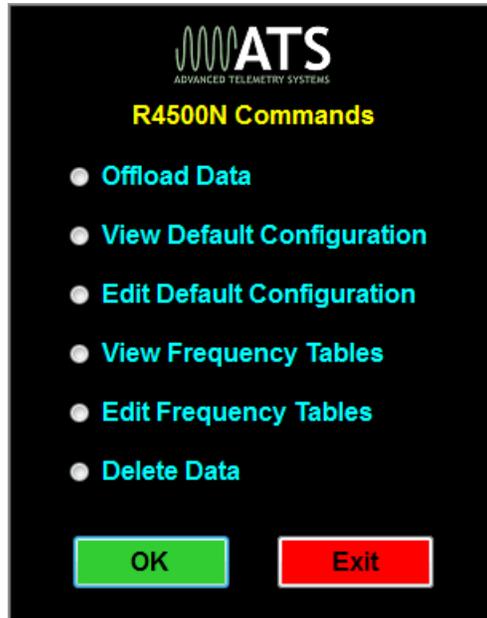
PC Mode:
Active

If communication is not successful:

1. Check that both ends of the offload cable are plugged in. The male end of your cable plugs into a USB port of your computer and the USB Mini end plugs into the R4500C's USB connector labeled "PC".
2. Verify that the selected Com Port matches the PC Com Port that is currently assigned to your USB serial convertor. This can be done by going into your Device Manager and looking under the Ports (COM & LPT) directory.
3. Make sure that the R4500C is powered up.
4. Make sure that you are in the R4500C's "PC Mode" and that the screen reads "Active". Choose "PC Mode" by selecting "PC" from the "Program Menu" of the R4500C. This needs to be done while you are connected to your PC and after you have booted up the ATSWinRec program.

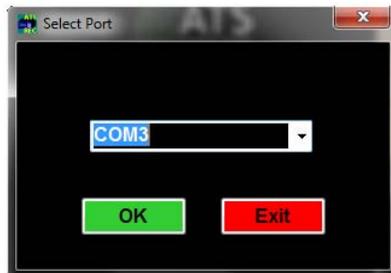
12.3 ATSWinRec

The main screen of the ATSWinRec program has the following command box that will appear in the center of the screen:

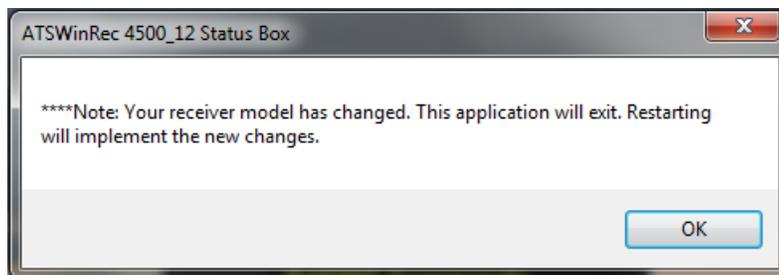


12.3.1 First Time Start Up

When starting the ATSWinRec program for the first time you will be prompted for a com port with the following dialog box:



It is also possible that you may also get the following dialog box:



This is a notification that the software has readjusted to the R4500C receiver model.

12.3.2 Offloading Data

If you select **Offload Stored Data** followed by **OK**, the following screen then appears:

Offload Data

Data Blocks

Offloads can contain both Aerial/Manual and Stationary targets.

Offload Stored Data Recover Deleted Data

Number of 11 byte data blocks to offload:
(Stationary target: 11 bytes, Aerial/Manual target:22 bytes)

Starting data block of offload:

Aerial/Manual Target GPS Format

Universal Transverse Mercator (UTM) WGS84
 Latitude and Longitude

Frequency Display Format

4 digit frequency
 Full frequency

Show Parameters in Offloaded Data

No Yes

Date Format

Julian Standard

Offload **Close**

You can select some of the offload parameters. Most are self explanatory.

Recover Deleted Data allows you to recover deleted data. When deleting data, a data pointer that is used to store memory in the R4500C is reset, and when recovering deleted data, the data pointer can be returned to the previous location. Thus data can be recovered if the data has not been overwritten by resetting the pointer. When the R4500C memory is maxed out, the newest data will start writing over the oldest data blocks. Recovering deleted data will only work for the last data set deleted.

You may also set the starting data block to be greater than zero. For example you may only want to check the most recent data.

You can select the coordinate for the GPS data.

You can select the frequency data displayed with all six digits or with the two most significant digits suppressed.

Showing parameters in the offloaded data. This feature allows the data to include the scan parameters for each scan started when offloading the data. When this feature is not selected, the offloaded data will not have any scan parameters showing in the offloaded data.

The figure below shows downloaded data with first an Aerial Scan, then a Manual Scan, then a Stationary Scan. The last column is an index into the parameter table displayed at the end of the data. The parameter number 0 appears here in lines 8 – 16. The parameter settings for those data points are displayed on line 33. To have this extra information appear in your offloaded data you need to select yes in the “Show Parameters in Offloaded Data” box of the offload screen.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Advanced Telemetry Systems' R4520C Series Receiver-Data Logger															
2	Csv Data File: C:\Program Files\Advanced Telemetry Systems Inc\ATSWinRec_R4520C\Data\fd7_29_2009_13_58_42.csv															
3	Generated: 7/29/2009															
4	Program: ATSWinRec_R4520C			Version: R4520C_1.0.3495.22408				Source:PC								
5																
6																
7	Yr	Day	Hr	Mn	Sec	Ant	Fr	Sig	Code	NumDet	NumMort	Latitude	Longitude	GpsAge	PrmNum	
8	9	210	8	14	21	NA		3995	108	12	1	0	45.44088	-93.3021	1	0
9	9	210	8	14	21	NA		3995	108	12	1	0	45.44088	-93.3021	1	0
10	9	210	8	14	22	NA		3995	108	12	1	0	45.44088	-93.3022	0	0
11	9	210	8	14	23	NA		3995	108	12	1	0	45.44088	-93.3022	0	0
12	9	210	8	14	25	NA		3995	108	12	1	0	45.44088	-93.3022	0	0
13	9	210	8	14	26	NA		3995	108	12	1	0	45.44088	-93.3022	0	0
14	9	210	8	14	27	NA		3995	108	12	1	0	45.44088	-93.3022	1	0
15	9	210	8	14	28	NA		3995	107	12	1	0	45.44088	-93.3022	1	0
16	9	210	8	14	29	NA		3995	108	12	1	0	45.44088	-93.3022	0	0
17	9	210	8	14	43	NA		3995	108	12	1	0	45.44089	-93.3022	0	1
18	9	210	8	14	43	NA		3995	108	12	1	0	45.44089	-93.3022	0	1
19	9	210	8	14	44	NA		3995	108	12	1	0	45.44089	-93.3022	0	1
20	9	210	8	14	44	NA		3995	108	12	1	0	45.44089	-93.3022	0	1
21	9	210	8	14	45	NA		3995	108	12	1	0	45.4409	-93.3022	1	1
22	9	210	8	14	46	NA		3995	108	12	1	0	45.4409	-93.3022	0	1
23	9	210	8	15	NA		1	3995	108	12	9	0	NA	NA	NA	2
24	9	210	8	15	NA		1	3995	108	12	10	0	NA	NA	NA	2
25	9	210	8	16	NA		1	3995	108	12	9	0	NA	NA	NA	2
26	9	210	8	16	NA		1	3995	108	12	9	0	NA	NA	NA	2
27	9	210	8	16	NA		1	3995	108	12	10	0	NA	NA	NA	2
28	9	210	8	16	NA		1	3995	108	12	9	0	NA	NA	NA	2
29																
30	***PrmNum Key***															
31																
32	PrmNum	Block_Type	Scan_Type	TimeOut	Scan	Tables	GPS	StoreRate	Antennas	ExtData	Reference_Frequency					
33	0	Aerial	NA	NA		3	1 Yes	NA	NA	NA	NA					
34	1	Manual	NA	NA	NA	NA	NA	NA	NA	NA	NA					
35	2	Stationary	NA	3	12	1	NA	0	1	No	NA					
36																
37																

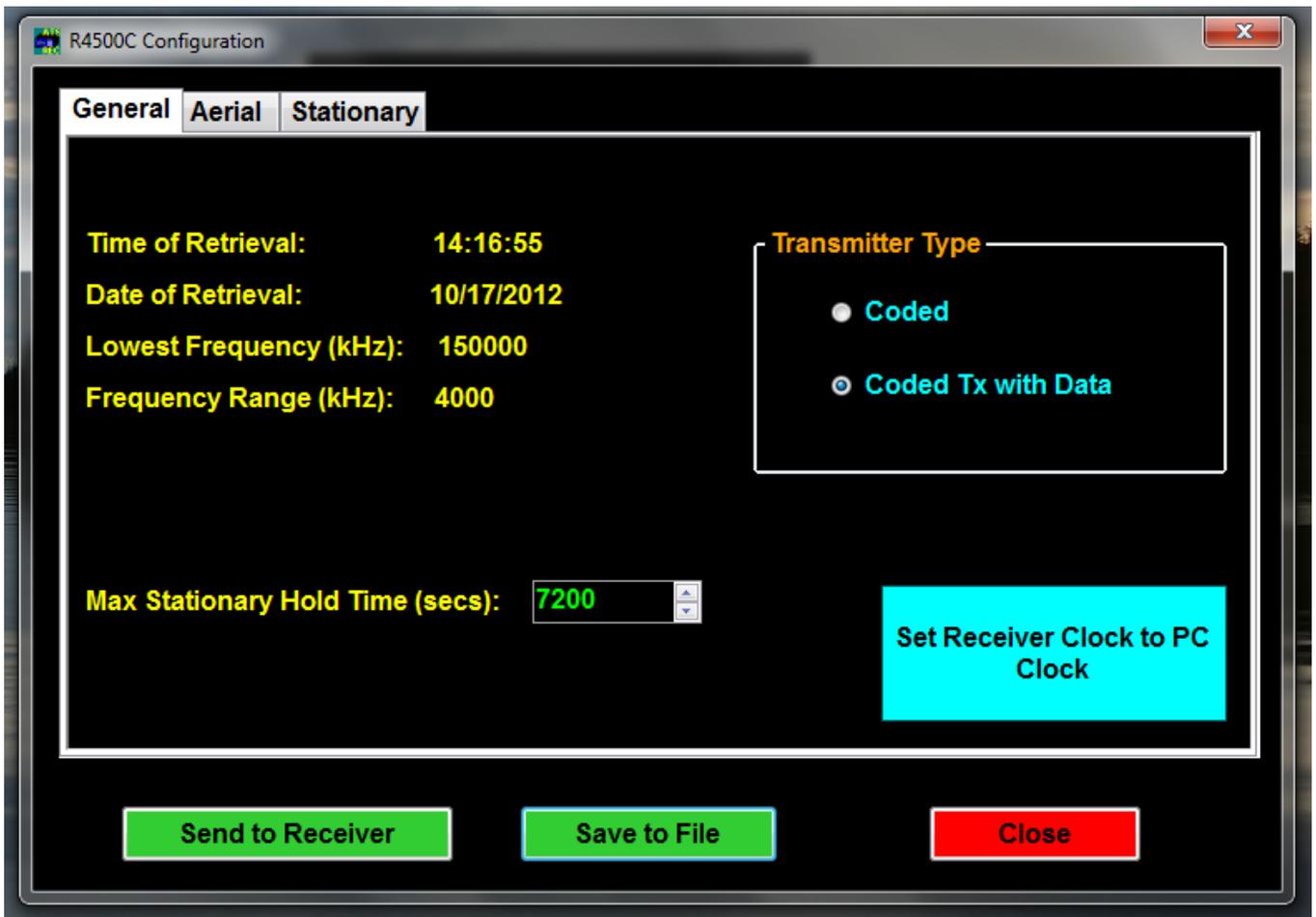
Steps for Offloading:

1. To offload the data, make sure the **Offload Stored Data** button is checked (default position on start up). Select any other format options and select “OK”.
2. Selecting the “OK” button will start the data download. Another window will pop up showing the progress of the download.

3. When the Data Download is complete, a window will appear asking if you would like the data deleted from the receiver. If you do delete the data, and later realize that you did not want to delete the data, the “**Recover Deleted Data**” tab can be used to recover the last data set deleted. The deleted data is only retrievable as a downloaded file using ATSWinRec.
4. Next will be a window that prompts the user for a file name. The default file name is a date stamped file name. The file is stored in a Data folder. The location will be where the ATSWinRec was installed to. The default location is:

C:\ Advanced Telemetry Systems, Inc\ATSWinRec_4500_12\Data
5. After saving the file, a new window will appear displaying the downloaded data. A spreadsheet program can be used to display the downloaded data. When viewing offloaded data with the ATSWinRec software, sorting data or filtering data is not available and printing is not available. Using a spreadsheet program (e.g. Excel) will allow sorting and filtering of data.

12.3.3 View / Edit Default Configuration



The screens will be the same for viewing or editing the default configuration. In the *View Default Configuration* mode, no parameters can be modified.

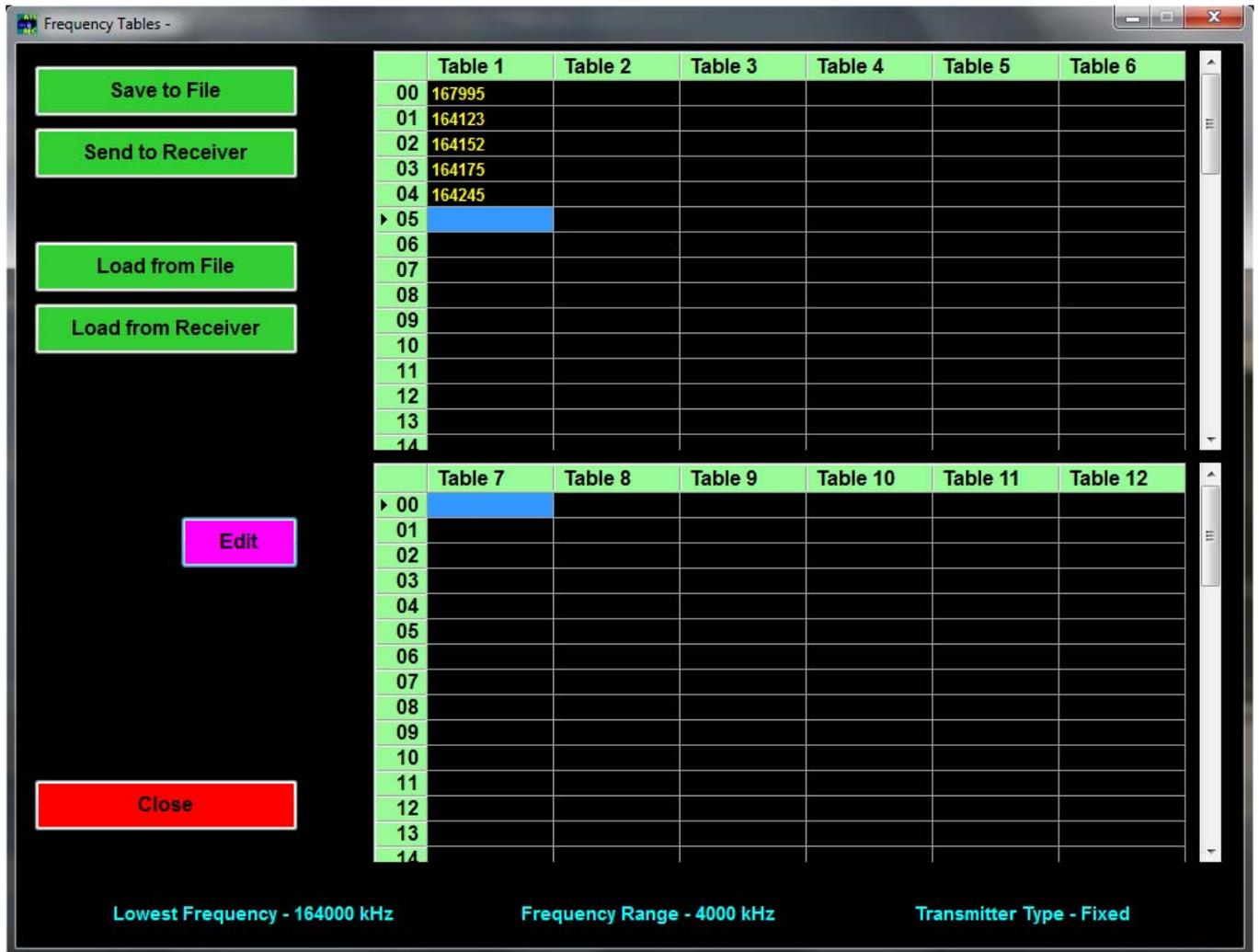
Only the selections in blue and the numeric entries in green can be modified. No information will be saved, unless the green or blue buttons are selected; **Save to File**, **Send to Receiver** or **Set Receiver Clock to PC Clock**. See section **2.3 Defaults** for information on each configuration parameter.

All default configurations can be retrieved from the receiver or from a file, and sent to the receiver or saved to a file.

If no configuration was sent to the receiver or saved to a file, selecting **Close** will not save any changed values.

When selecting the **Set Receiver Clock to PC Clock** button, the PC time is sent to the R4500C and is converted to: Year, Julian Day, and 24 hour time format.

12.3.4 View / Edit Frequency Tables



The screens will be the same for viewing a frequency table or editing a frequency table. In the **View Frequency Tables** mode, no parameters can be modified.

When editing a frequency table the source can be; from a file, from a receiver connected the PC, or a new frequency table can be created using ATSWinRec. A group of twelve tables can be entered for editing, or a single table can be entered for editing.

The frequency files are saved as a group (12 tables) – FileName_grp.csv or as a single table – Filename_tbl.csv.

Group Frequency Tables

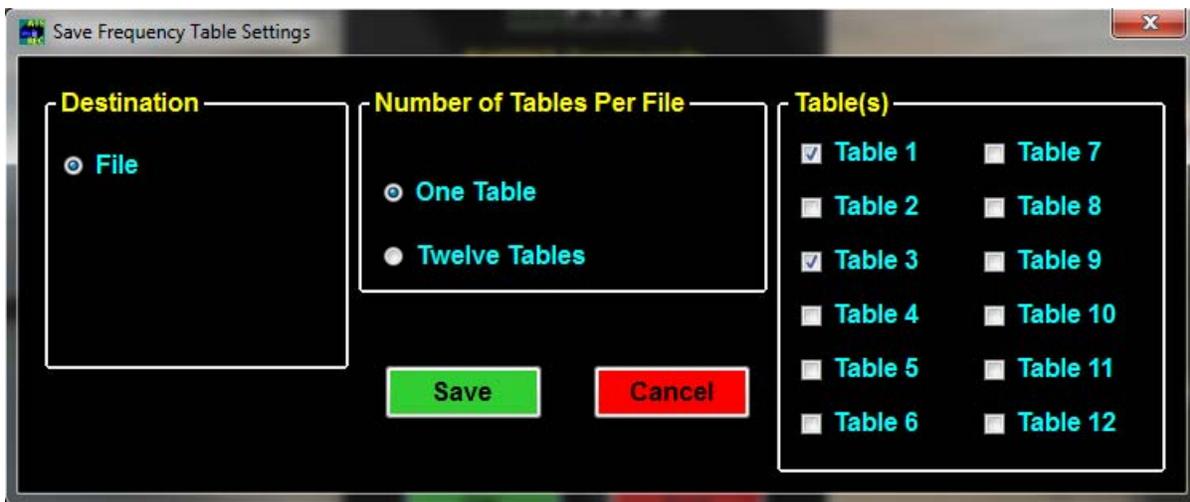
When opening a file of 12 frequency tables, ATSWinRec will be looking for a file with the extension *_grp.csv. A single frequency table file (file name with extension *_tbl.csv) will not be allowed to be opened.

When sending a group (12 tables) of frequency tables to the receiver only tables with frequencies will be sent. Also, the option to only send selected tables to the R4500C is available by deselecting any frequency table tabs not wanting to be sent.

Single Table Frequencies

When opening a file for a single frequency table, ATSWinRec will be looking for a file with the extension *_tbl.csv. A group table file (file name with extension *_grp.csv) will not be allowed to be opened.

If a file is saved as a single table, the file can be loaded to any selected frequency table and sent to the receiver by selecting the corresponding frequency table checkbox. When loading a single table from a file or saving a single frequency table to a file, each table selected to be loaded or saved, will have a “Windows” open file dialog box for each file. The figure below is selecting the frequency tables 1 and 3 to be handled as single tables.



If a receiver is not connected to the PC when a new frequency table is created, the lowest frequency of the receiver will need to be entered. If the wrong lowest frequency is entered when creating a new frequency table, the table will not be sent to the receiver and an error message will appear indicating that the lowest frequencies do not match.

12.3.5 Delete Data

Selecting **Delete Data** will delete the data in the receiver. Warning messages will appear in case if the tab was accidentally selected.

12.3.6 EXIT

To exit from the ATSWinRec program select:

Exit, then **OK**

13.0 Setting Aerial Scan Rate

The minimum Aerial Scan Rate should be set to allow for a single code from the transmitter to be heard. So, for a transmitter with a period of 2000 ms, the minimum scan rate should be set for 2 seconds so at least one code will be heard.

You may use the CHAN up  and CHAN down  keys at any time to scroll through the channels while scanning or while in **Hold**. The Chan up and Chan down keys override the Scan Rate time.

The SIG LED should not be used to detect pulses while in the Aerial Mode. The DSP requires 2 pulses to verify a signal. The first pulse heard will not be shown with a flashing LED, only the second pulse and all other consecutive pulses will have an LED flash corresponding to a detected pulse. Only when **Hold** is used or a long enough scan rate is used, will there be enough time for multiple pulses and for the SIG LED to flash for every detected pulse.

14.0 Setting Stationary Time Out

The minimum stationary Time Out time should be set the same way as setting the Aerial Scan Rate. At least one coded pulse burst (three beeps) is needed to be detected during the Time Out time, to trigger the Scan Time. If a full pulse burst is not detected during the Time Out, the R4500C will not determine a tag is present, and move on to the next frequency during a stationary scan.

The Time Out can be set for longer than the recommended minimum setting. Setting the right Time Out will depend on the size of the frequency table, and how quickly the table should be cycled through.

15.0 Setting Stationary Scan Time

The minimum stationary Scan Time needs to be set for a valid tag ID to be detected, and to take into consideration how many tags are expected to be co located. The more tags located in the same area, the longer the scan time is needed to identify all of the tags.

For a single tag to be identified, three pulse bursts are required. For an ID code 24 transmitter, the period length is $1310 \text{ (ms)} / 1000 = 1.310$ seconds. For three pulse bursts, the time would be $3 * 1.310 = 3.93$ seconds. The minimum scan rate should be set for 4 seconds to allow decoding of the ID for a single transmitter. If more tags are located in the same area on the same frequency, the scan time would need to be set longer than 4 seconds. To identify 6 tags, 12 seconds should be used. To identify more than 6 tags, a longer scan time will be needed. The more tags located at the same time, the more time is needed to process all of the incoming pulses to identify transmitter ID's.

16.0 Offloaded Data Format

Heading – The offloaded file heading identifies the file

<i>Model:</i>	The model of the receiver that was offloaded.
<i>Filename:</i>	The name of the file with the personal computer drive and folders included.
<i>Version:</i>	The version of ATSWinRec used to create this file.
<i>Date:</i>	The date the file was originally created.
<i>Source:</i>	Indicates whether the data was offloaded via a PC or a PDA.

Column Headers – Lists the name of each column field.

Date – The date each point was recorder.

YY,JJJ,HH,mm, or MM/DD/YYYY HH:mm,	The offload used the Julian Date Format. The offload used the Standard Date Format.
YY:	A number from 0-99 representing the last two digits of the year.
YYYY:	A number from 0-9999 representing the year.
JJJ:	A number from 1-366 representing the Julian day (1-366 for a leap year, otherwise 1-365).
MM:	A number from 1-12 representing the month.
DD:	A number from 1-31 representing the day of the month.
HH:	A number from 0-23 representing the hour.
mm:	A number from 0-59 representing the minute.

Stationary Data – The data stored while the R4500C was logging data in Stationary Mode.

A:	A number from 0-8 representing the antenna being used. A '0' indicates all antennas were turned on.
(FF)FFFF:	A number representing the transmitter's frequency. Either it will be 6 digits representing the entire frequency or it will be a number from 0-9999 representing the last four digits of the frequency.
nn:	A 2 digit number from 0-99 representing the tag ID.
mmm:	A 3 digit number from 0-255 representing the number of detections with a mortality indicator.
TTT:	A number from 40-154 representing the signal strength.
ddd:	A number from 1-255 representing the duplicate count for the ID during the store period.

Aerial Data – The data stored while the R4500C was logging in either Aerial or Manual Mode.

SS:	A number from 0-59 representing the second.
(FF)FFFF:	A number representing the transmitter's frequency. Either it will be 6 digits representing the entire frequency or it will be a number from 0-9999 representing the last four digits of the frequency.
nn:	A 2 digit number from 0-99 representing the tag ID.
mmm:	A 3 digit number from 0-255 representing the number of detections with a mortality indicator.
TTT:	A number from 40-154 representing the signal strength.
(-)LL.LLLLLLL: or XXXXXXXX.X:	A number representing either Latitude or the X coordinate for UTM's (Universal Transverse Mercator).
(-)III.IIIIII: or YYYYYYYY.Y:	A number representing either Longitude or the Y coordinate for UTM's (Universal Transverse Mercator).
ZZZ:	This will appear only if UTM's were selected and represents the UTM zone.
AA:	A number in seconds from 0-119 representing how long ago the GPS coordinates were recorded.

When offloading data and showing parameters in the offloaded data, there will be a parameter number appearing in the last column. Find that number under the "****PrmNum Key ****" appearing at the bottom of the offload. Cross referencing this will let you know what parameters was used for each data point that was recorded. Each column has a short descriptive header. Expand the columns to read what each parameter field is.

Below are the column headers followed by some examples:

Column Headers:

PrmNum, Block_Type, Scan_Type, TimeOut, Aerial_TimeOut, Scan, Tables, GPS, StoreRate, Antennas, ExtData, Reference_Frequency

Parameter Examples:

0, Aerial, Coded Tx, NA, 2, 3.5,1, Yes, NA, NA, NA, NA

1, Stationary, CodedTx, 2 , NA, 12, 1, NA, 0, 1, No, No

2, Stationary, CodedTx, 3, NA, 12, 2 3, NA, 10, 1, Yes, No

17.0 Charging the Batteries

The R4500C is using NiMH (Nickel Metal Hydride) batteries. The capacity of the battery pack is 4.0 Amp hours. The R4500C will operate from internal batteries for approximately 18 hours for stationary mode, and approximately 11 hours for manual and aerial modes while using the GPS.

The batteries can self drain to 80% capacity during a 6 month shelf life.

It is recommended to maintain a charge cycle when storing the receiver for long periods of time. If the charge capacity of the batteries does not seem to be at full capacity, a couple charge cycles can bring the battery pack back to full capacity (discharge – charge – discharge – charge)

The charger supplied with the R4500C is a “smart charger”. There is a thermal sensor to detect a full charge, and to shutdown the charge process if the battery pack overheats.

Turn OFF the power to the R4500C when charging the batteries.

When the charger is connected to the R4500C, the charging sequence will start.

A fully depleted battery pack should be charged to full capacity within 5 hours.

18.0 EXT – External Data Output

If the EXT option has been selected the R4500C will send data once an hour out the **AUX** and the **PC/CLONE** ports while stationary logging. If using GOES (Geostationary Operational Environmental Satellites) option, the data will be sent to the GOES transmitter's buffer thru a cable attached via the **AUX** port. While the R4500C is sending data out its serial ports one or two status screens will be displayed.

Screen 1

```
Preforming EXT
Data Transfer
Total blocks
to process: 8
```

This screen indicates the R4500C is starting to send data out. The example above has 8 data blocks in memory to process. Only valid data blocks will be sent. The number of blocks the R4500C sends may actually be less than 8. For example there could be informational blocks that contain programming information for your R4500C that would not be sent.

Screen 2 (GOES option only)

```
Total Verified
106
Total Possible
106
```

This screen indicates the number of bytes that were sent over versus the number of bytes that the GOES transmitter sent acknowledges for. If these numbers do not match a "**CHECK**" will flash on the screen indicating a probable system problem. If this happens check your connections. Also make sure your GOES transmitter is turned on and operating correctly. The GOES transmitter should display the same number of bytes in its buffer.

If the R4500C determines there were more bytes of data to be sent over to the GOES buffer than the GOES transmitter can transmit, it will save this data for the next hour's transmission cycle. You should try to set up your system so that it does not log more data than it can transmit in a 24 hour period. For fixed period logging each data point will use 11 bytes. For variable period logging each data point will use 11-12 bytes depending on the type of data being transmitted. Assume an extra 29 bytes overhead for the header and footer of the transmission block. Check with NESDIS to determine how many bytes your transmission assignment will allow.

Note: When using the GOES option and as long as the R4500C has not filled up it will not lose the data. It will always try to catch up. In order to save transmission space, the day the data is collected is attached to the transmission and not to the individual data point. If the back log becomes too large the date information will not match the day the data was collected.

When using the RDP (Remote Data Platform) option the R4500C will always dump all the data recorded during the previous hour's logging.

Even after the R4500C has filled up it will continue logging. The newest data will be written over the oldest data.

In order for data to actually be lost the data back log would have to be the entire capacity of the data logger which is over 90,000 data blocks.

You can connect to the **PC** port using your USB cable or to your **AUX** port using a special ATS supplied cable from your PC. By using a communication software such as Microsoft® HyperTerminal or Symantec's Procomm Plus

and the serial settings “baud: 9600, no parity, 8 data bits, 1 stop bit” or “baud: 57600, no parity, 8 data bits, 1 stop bit” you can monitor the data that is sent out. This data comes out in a compressed format that if using GOES is the same as that you will see when downloading your data from NESDIS or if using the RDP is a compressed format that when uncompressed is the same as your normal offloaded data.

18.1 Data Format and Translation

18.1.1 BINARY DATA

To maximize the amount of data you can send in a transmission, your data has been compressed into binary data. The binary data is sent as ASCII text that is viewable in a text editor. The downloaded data will appear in the same form that it was sent.

Some example GOES data:

```
350/11:00 122
@@PA@@J@@
A@@@@HB@@
@ATLKhGKy
@ATLkPHKy
@ATLkPHKy
@ATLkPHKy
@ATLkPGKz
@ATLKhHKz
@ATLKhGKz
@ATLkPHKz
@ATLKhHKz
@ATLKhGK{
@ATLkPGK{
@ATLKhGK{
@ATLKhGK{
@ATLKhHK{
@ATLKhHK{
END
Bytes Verified: 0 Total Bytes: 396
```

Some example RDP data:

```
350/11:00 124 RDP_C Dump
@P@@@@PA@_`@@@@B
@Kxl?qU^BsdA@DD
@KyE?qU^BsdA@DG
@KyF?qU^Bsd@@DG
@Kxp?qU^BsdB@DE
@KyE?qU^BsdA@DE
@KyF?qU^Bsd@@DF
@Kxl?qU^BshA@DE
@KyF?qU^Bsh@@DF
@KyE?qU^BshA@DG
@KyF?qU^Bsh@@DG
@KyF?qU^Bsl@@DG
@KyE?qU^BslA@DI
@KyF?qU^Bsl@@DG
@Kxl?qU^BslA@DE
@KyE?qU^BslA@DH
END
```

Total Bytes: 629

To view this as more meaningful data you need to run translator program that is provided by ATS on request. The translated data for the RDP style dump is the same as a normal offloaded data file.

18.1.2 GOES Translated Output Format

1533C4CE08261161223G43+1NN180WFF00424`

Day/Hr:Min	Volts	Freq	Code	Ant#	Signal	Hr:Min	#Matches
261/07:00	12.6	150684	16	0	119	7:01	15
261/07:00	12.6	150684	16	1	126	7:08	15
261/07:00	12.6	150684	16	2	95	7:02	5
261/07:00	12.6	150684	16	0	121	7:19	10
261/07:00	12.6	150684	16	1	114	7:19	14
261/07:00	12.6	150684	16	2	106	7:19	12
261/07:00	12.6	150684	16	0	125	7:25	7
261/07:00	12.6	150684	16	1	137	7:25	8
261/07:00	12.6	150684	16	2	120	7:25	7
261/07:00	12.6	150684	16	0	129	7:38	13
261/07:00	12.6	150684	16	1	137	7:38	16
261/07:00	12.6	150684	16	2	122	7:31	15
261/07:00	12.6	150684	16	0	140	7:49	15
261/07:00	12.6	150684	16	1	142	7:49	15
261/07:00	12.6	150684	16	2	121	7:45	8
261/07:00	12.6	150684	16	2	136	7:59	22
261/07:00	12.6	150684	16	0	138	7:59	14
261/07:00	12.6	150684	16	1	137	7:54	15

END

Day: A number from 1-366 representing the Julian day (1-366 for a leap year, otherwise 1-365). This appears in the transmission header of R4500C and it indicates the day the data was processed for transmission.

Hr: A number from 0-23 representing the hour. This appears in the transmission header of the R4500C and it indicates the hour the data was processed for transmission. The data is sent from the R4500C at the top of the hour over to the GOES transmitter. This hour represents the hour previous to the hour the data is sent. If the transmissions are keeping up with the data collection this will be the same hour as the hour the data was collected.

Volts: Voltage to the tenths of volts representing the system voltage at the time the data was sent over to the GOES transmitter. This appears in the transmission header of R4500C.

Freq: A number representing the transmitter's frequency. It will be a number from 0-9999 representing the last four digits of the frequency.

Code: The number representing the code of the detected transmitter.

Ant#: A number from 0-8 representing the antenna being used. A '0' indicates all antennas were turned on.

Hr: Min: A number representing the hour and minute this data point was saved to memory.

#Matches: A number from 1-255 representing the number of codes detected during the scan.

END: The END appears at the end of the data sent to the GOES. If it does not appear you know the data transmission was incomplete and some data was lost.

JULIAN DATE CALENDAR (PERPETUAL)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	001	032	060	091	121	152	182	213	244	274	305	335	1
2	002	033	061	092	122	153	183	214	245	275	306	336	2
3	003	034	062	093	123	154	184	215	246	276	307	337	3
4	004	035	063	094	124	155	185	216	247	277	308	338	4
5	005	036	064	095	125	156	186	217	248	278	309	339	5
6	006	037	065	096	126	157	187	218	249	279	310	340	6
7	007	038	066	097	127	158	188	219	250	280	311	341	7
8	008	039	067	098	128	159	189	220	251	281	312	342	8
9	009	040	068	099	129	160	190	221	252	282	313	343	9
10	010	041	069	100	130	161	191	222	253	283	314	344	10
11	011	042	070	101	131	162	192	223	254	284	315	345	11
12	012	043	071	102	132	163	193	224	255	285	316	346	12
13	013	044	072	103	133	164	194	225	256	286	317	347	13
14	014	045	073	104	134	165	195	226	257	287	318	348	14
15	015	046	074	105	135	166	196	227	258	288	319	349	15
16	016	047	075	106	136	167	197	228	259	289	320	350	16
17	017	048	076	107	137	168	198	229	260	290	321	351	17
18	018	049	077	108	138	169	199	230	261	291	322	352	18
19	019	050	078	109	139	170	200	231	262	292	323	353	19
20	020	051	079	110	140	171	201	232	263	293	324	354	20
21	021	052	080	111	141	172	202	233	264	294	325	355	21
22	022	053	081	112	142	173	203	234	265	295	326	356	22
23	023	054	082	113	143	174	204	235	266	296	327	357	23
24	024	055	083	114	144	175	205	236	267	297	328	358	24
25	025	056	084	115	145	176	206	237	268	298	329	359	25
26	026	057	085	116	146	177	207	238	269	299	330	360	26
27	027	058	086	117	147	178	208	239	270	300	331	361	27
28	028	059	087	118	148	179	209	240	271	301	332	362	28
29	029		088	119	149	180	210	241	272	302	333	363	29
30	030		089	120	150	181	211	242	273	303	334	364	30
31	031		090		151		212	243		304		365	31

FOR LEAP YEAR USE OTHER CHART

JULIAN DATE CALENDAR

(FOR LEAP YEARS ONLY)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	001	032	061	092	122	153	183	214	245	275	306	336	1
2	002	033	062	093	123	154	184	215	246	276	307	337	2
3	003	034	063	094	124	155	185	216	247	277	308	338	3
4	004	035	064	095	125	156	186	217	248	278	309	339	4
5	005	036	065	096	126	157	187	218	249	279	310	340	5
6	006	037	066	097	127	158	188	219	250	280	311	341	6
7	007	038	067	098	128	159	189	220	251	281	312	342	7
8	008	039	068	099	129	160	190	221	252	282	313	343	8
9	009	040	069	100	130	161	191	222	253	283	314	344	9
10	010	041	070	101	131	162	192	223	254	284	315	345	10
11	011	042	071	102	132	163	193	224	255	285	316	346	11
12	012	043	072	103	133	164	194	225	256	286	317	347	12
13	013	044	073	104	134	165	195	226	257	287	318	348	13
14	014	045	074	105	135	166	196	227	258	288	319	349	14
15	015	046	075	106	136	167	197	228	259	289	320	350	15
16	016	047	076	107	137	168	198	229	260	290	321	351	16
17	017	048	077	108	138	169	199	230	261	291	322	352	17
18	018	049	078	109	139	170	200	231	262	292	323	353	18
19	019	050	079	110	140	171	201	232	263	293	324	354	19
20	020	051	080	111	141	172	202	233	264	294	325	355	20
21	021	052	081	112	142	173	203	234	265	295	326	356	21
22	022	053	082	113	143	174	204	235	266	296	327	357	22
23	023	054	083	114	144	175	205	236	267	297	328	358	23
24	024	055	084	115	145	176	206	237	268	298	329	359	24
25	025	056	085	116	146	177	207	238	269	299	330	360	25
26	026	057	086	117	147	178	208	239	270	300	331	361	26
27	027	058	087	118	148	179	209	240	271	301	332	362	27
28	028	059	088	119	149	180	210	241	272	302	333	363	28
29	029	060	089	120	150	181	211	242	273	303	334	364	29
30	030		090	121	151	182	212	243	274	304	335	365	30
31	031		091		152		213	244		305		366	31

(USE IN 2016, 2020, 2024, ETC.)

