BOOM BOX 3

Dynamite Controller

User's Manual

Revision 1.04

Seismic Source

Boom Box 3 Dynamite Controller User's Manual

Printed in U.S.A.

Trademarks

Boom Box 3 is trademark of **Seismic Source Co**.

Seismic Source Co.

2391 E. Coleman Rd.
Ponca City, OK 74604
USA
Telephone: (580) 762-8233
Fax: (580) 762-1785
Email: mail@seismicsource.com

www.seismicsource.com

Table of Contents

1. Safety

Because this equipment is used with explosives, extreme caution must be observed. Make sure you know the safety regulations, and follow them.

- Follow the correct procedures.
- Shooters and helpers must wear hard hats.
- Keep non-essential people well away from the shot point (both members of the public and crew personnel).
- Keep CAP lines shorted together at all times when it is not safe to Fire the shot.
- Only connect CAP lines to the Boom Box 3 when it is safe to Fire the shot.
- Never press the ARM or Charge switch on the Boom Box 3 unless it is safe to Fire the shot.
- Only shoot when ready and safe. Observe local safety regulations.
- Do not shoot in stormy weather.
- Do not fire shots close to power lines without ensuring that there is no possibility of cap wires coming into contact with the power lines.
- Do not shoot close to high-power radio transmitters.
- After the shot:
    - Make sure all the charges at a multiple/pattern shot have detonated.
    - Keep a record of any shots, which it was not possible to fire. They must be disposed of safely.

The Seismic Source Company does not represent that this manual is entirely comprehensive, accurate or covers each and every safety topic or risk which may be encountered by those using this manual and the Seismic Source Company disclaims all responsibility and liability for any such utilization of this information by the users thereof. By receipt of the Boom Box 3 Manual, the recipient/user agrees to release, indemnify and defend the Seismic Source Company from and against any and all claims, demands and liabilities that may arise from the utilization of the Boom Box 3 System by such recipients/users.

The end user uses the Boom Box 3 System at his/her own risk.

The Seismic Source Company does not assume any responsibility for accidental firings or any accident occurring with the Boom Box 3 System.

2. Boom Box 3 System Description

The Boom Box 3 (BB3) is a new generation of Blasters for Seismic Exploration.

The BB3 is specifically designed to operate more efficiently with autonomous continuous Seismic Recording systems.

The BB3's main features are:

- Internal Clock is synchronized to GPS time
- All Shot data including shot times to microsecond accuracy is stored in non-volatile memory in the unit.
- WiFi HTML interface that allows viewing of shot information and setting BB3 parameters on many Cell phones, PCs, or Tablet computer
- Shot timing is synchronized to GPS clock for firing on 8 msec sample boundaries. This assures no sample skew on most autonomous seismic recording systems
- Compatible with older Boom Box units in standard VP radio mode. This allows the newer BB3 units to operate with the older Boom Box equipment on the same crew.
- Multiple Modes of operation
    - Autonomous mode – Decoder unit's use GPS time to fire the shots. No Encoder unit or Radio telemetry is required. Multiple shooters can be used with no overlap of shot times.
    - Standard Radio Mode – (UE/VP Mode) Decoders receive start commands from central Encoder unit via a VHF/UHF radio. Compatible with older Boom Box units operating in VP mode.
    - F3 Radio Mode. The F3 radio mode is used to start the Boom Box 3 on an exact GPS time. The Encoder and radio are still used to send the radio start codes to the Decoder unit. The precise GPS time of the Fire is sent to the Decoder and the Decoder unit fires the shot at the precise time requested. This mode is especially useful when using digital radios with unknown or variable modulation delays.

2.1.1 Boom Box 3 and Boom Box differences

There are important differences between the Boom Box 3 and the older Boom Box unit

Decoder Cable

The BB3 Decoder cable has an added wire for the PPS pulse from the GPS receiver. The BB3 can operate with the older Boom Box decoder cable, but the GPS time will not be set. The BB3 will communicate and operate the same as the older Boom Box unit with the old Boom Box cable. The new BB3 decoder cable should not be used with the older Boom Box units. The PPS pulse from the GPS will be grounded by the older Boom Box units. This could damage the GPS receiver.

Parameter Loading

The basic parameters of the BB3 can be loaded using the older Source Control software. However many of the new parameters of the BB3 must be loaded using either the WiFi interface or the SourceLink software.

GPS Baud Rate
The BB3 is set to use GPS receivers set at 19.2 K baud rate

The older boom box is set to use GPS receivers set at 9600 baud rate

Geophone Test

The BB3 includes a detailed geophone tests. These tests assure that the uphole geophone is planted correctly and is operational. The Geophone tests the following parameters:

- Resistance – measures DC resistance – Geophone must be connected
- Frequency – geophone must be planted in vertical position for frequency to pass
- Damping - geophone must be planted in vertical position for damping to pass
- Sensitivity -geophone must be planted in vertical position for sensitivity to pass

The older Boom Box unit only tested the Geophone resistance

Radio Telemetry

The BB3 uses a new radio telemetry interface. This new interface is designed to provide a robust and reliable connection to most VHF and UHF radios. The BB3 uses the same radio telemetry design as the Force 3 vibrator electronics.

When the BB3 is set to maximum radio modulation level, the radio interface requires a similar interface as the older Boom Box units. The same "Radio Pigtails" should work for both the BB3 and the Boom Box unit.

The BB3 may require different radio polarity than the older Boom Box units. The Microphone and Speaker polarity should be tested for optimum operation.

When different radios or different radio polarities are used with the BB3 units, there may be a start time difference between the BB3 and the older Boom Box units. The "Decoder Delay" entry of the Boom Box 3 can be used to match the start times of the older Boom Box units.

2.2.1 BB3 Autonomous Mode:

The Boom Box 3 can be used in Autonomous mode. In this mode the Decoder units use GPS time to fire the shots. No Encoder unit or Radio telemetry is required. Multiple shooters can be used with no overlap of shots times. The Units and Record length can be assigned using the User Interface software. For further details refer to BB3 autonomous Mode section.

2.3.1 Standard Radio Mode:

The Boom Box 3 system is used to synchronize and control dynamite operation on seismic recording crews. A typical system includes at least one Boom Box 3 set up as a Decoder, and one Universal Encoder II (UE2) for the Encoder.

The Encoder unit interfaces the Seismic Recording System with a radio system, which communicates to the Decoder system. The Recording System sends a start command to the Encoder, which causes the Encoder to send a fire command to the Decoder. The Decoder receives the Fire command, and will fire the CAP if the Decoder unit is ARMED and Charged. At the same time that the Decoder unit fires the CAP, the Encoder issues a Time Break signal to the Recording System. After the shot is fired the Decoder records the signal from the Uphole Geophone and transmits this data along with other QC data to the Encoder.

2.4.1 Encoder System consists of the following:

- Universal Encoder 2
- Recording System Interface:
    - Remote Start – signal from Recording System, which starts Boom Box 3 Encoder.
    - Time Break – T.B. – signal from Boom Box 3 Unit when voltage is applied to High Voltage for Cap firing.
    - Aux 1 – Analog Uphole – Analog line where uphole geophone signal is reproduced at 1.5 seconds after Time Break. An analog pulse at 1.0 second is used to check timing accuracy of system and another analog pulse at 1.25 seconds confirms that current flowed to the CAP.
    - Aux 2 – Timing pulses at 1.0, 1.25, 1.5 seconds after Time Break.
    - COM 2 – Recording System Serial Interface plug. Connects to Recording System for data communication.
    - Ethernet Port
        - Setting Encoder parameters
        - Viewing and storing Shot Status Report
        - Viewing and storing GPS position
        - Monitoring Recording Truck Serial Message
        - Viewing Decoder Ready Messages
        - Monitoring Start Time Errors
- Battery – 9-36 volt DC voltage
- Radio – Encoder - Unit connects to UHF or VHF radio to communicate with the radio connected to the Decoder.
- GPS and cable. Used to synchronize the clock of the UE2 unit.
- UE2 Encoder Cable:

2.4.2 Decoder System consists of the following:

- Boom Box 3 Unit configured as Decoder
- Boom Box 3 Decoder Cable
- Boom Box 3 Decoder backpack. Designed to carry all components of the Decoder System.
- Uphole Geophone – Geophone sensor used to measure time from when shot is fired to when motion is received at surface.
- Battery – 9-36 VDC battery used to power Boom Box 3 Decoder
- Radio – Decoder unit connects to UHF or VHF radio to communicate with the radio connected to the Encoder Unit.
- CAP line – CAP line to fire dynamite is connected to High Voltage post on Decoder Unit.
- GPS receiver – optional –External GPS receiver can be connected to Decoder Unit. GPS position can be acquired prior to shot. Position is sent back to Encoder Unit as part of the Ready Message and Shot Status Report. The Ready Message consists of the GPS position, Unit ID #, CAP resistance, and Geophone resistance.
- GPS PPS pulse from the GPS receiver is used to synchronize the time of the shots. The GPS PPS pulse and GPS unit is required when the BB3 is used in Autonomous mode.
- Autonomous Decoder Fire Switch (required when the BB3 is used in Autonomous mode)

3. Front Panel Description

Boom Box 3 Front Panel contains:

- 2 High Voltage terminals – connect to CAP wire for firing dynamite.
- Red Power/Status LED
    - Decoder Mode – flashes ON in short bursts.
    - Decoder Mode Charging – Flashes Fast when charged
- ARM toggle switch
    - Power up Boom Box 3 – single press powers the box “on”
    - Arm the dynamite CAP line – must hold switch to “ARM” high voltage terminals
    - The ARM switch in the normal position shorts the high-voltage line
- Charge toggle switch
    - Press Charge to charge the High Voltage Capacitor
- Test Push Button
    - Press Test button to test the Geophone
    - Press Test and ARM button to test the dynamite CAP
    - Test LED shows result of test
- GPS Push Button
    - Press GPS button to store the GPS position for the next shot
    - To reacquire GPS for the same shot hold Charge button and then press GPS button
    - GPS LED shows status of GPS position

3.1.1 Display

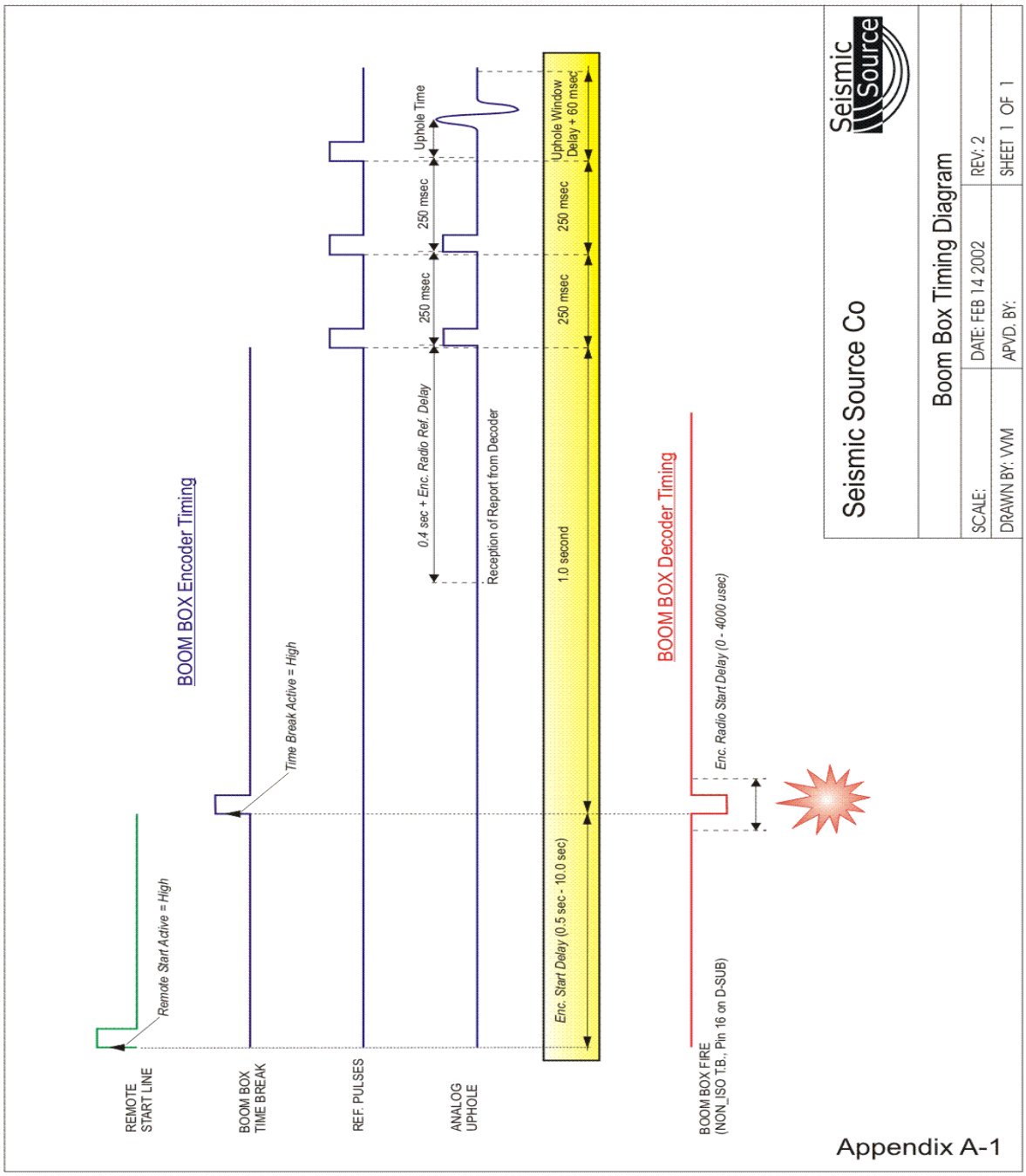
The Boom Box 3 has a graphical display. The display is used to show the setup of the box at power on, the CAP and Geophone resistance, the ready message, the uphole information, and the shot status message. The display shows the following messages:

- **Unit ID #** - Unit ID of the Boom Box 3
- **Crew Code #** - The Crew # of the Encoder must match the Crew Code of the Decoder
- **Start Code #** - The Start Code # of the Encoder must match the Start Code of the Decoder
- **Operating mode** : "ENC"-Encoder, "DEC"-Decoder ,"STN"-Standalone/Autonomous , "AGD"-Air Gun Decoder "MON"-Monitor
- **Battery** : Battery voltage indicator
- **GPS** : Shows the following:
  Quality of the GPS '1' :GPS Fix '2':Differential , p-PPS available
  Time Synchronization: "T: OK" –Time Synchronized, "T:NO" –No time sync
  Lock status:"Lock" -GPS position is locked for the next shot.
- **Cap Resistance**
  Decoder will display Geophone resistance when the Arm and Test button is pressed.
- **Geophone Resistance**
  Decoder will display Geophone resistance when the Test button is pressed.
  Geophone test also provides "Fr"-Frequency "Da"-Damping "Sen"-Sensitivity

4. Encoder Operation

The following Encoders can be used to fire the Boom Box 3 Decoders via radio

- Universal Encoder 1 (in VP mode)
- Universal Encoder 2
- Boombox3 unit with SourceLink™ Software



5. Decoder Operation

5.1 Decoder Operation

The Decoder Mode of operation is used to detonate a blasting cap for seismic dynamite operation. Extreme caution needs to be exercised when working around dynamite and detonation equipment. Review and follow all safety guidelines.

The Decoder unit is connected to a detonation Cap, an uphole geophone, a radio, and a battery. Whenever the Decoder is connected to the CAP or whenever a radio is used, the CAP can fire at any time. The unit has been designed to only fire the CAP when both the ARM and the Charge button are held and a valid start code from the Encoder is received. However, potentially there is a chance that the CAP can accidentally fire from either RF noise or a hardware failure. With this in mind the following is the normal A3/UE mode operation procedure:

- The Shooter receives a valid GPS position for the new shot point.
- The Shooter verifies that there is no danger in accidental firing of hole and that all personnel and livestock are clear of the shot hole.
- The "Shooter" connects the unit to the uphole geophone, and Cap at the new shot hole.
- The Shooter normally checks the resistance of both the geophone and the Cap.
- After all tests are satisfactory, the shooter either calls in that he is ready or uses the automatic ready signal to notify the recorder that he is ready to shoot.
- The Shooter then presses the "Arm" and "Charge" switches to get the box ready to fire.
- The Boom Box 3 will automatically send back a "Ready Message" if enabled.
- The Encoder then sends a start code and the Decoder fires the Shot.
- The shooter then releases the "Arm" and "Charge" switch and disconnects from the hole.
- The Decoder unit automatically sends the Shot Status Message to the Encoder.
- The Shooter can check the status of the Box immediately after the Shot is fired.
    - Test LED = Green when Confirmation Time Break is valid.
    - GPS LED = Green when Uphole time is valid
    - The display will show the Uphole time, CTB value, and battery voltage.

5.2 Detailed Decoder Operation

5.2.1 Uphole Geophone Test

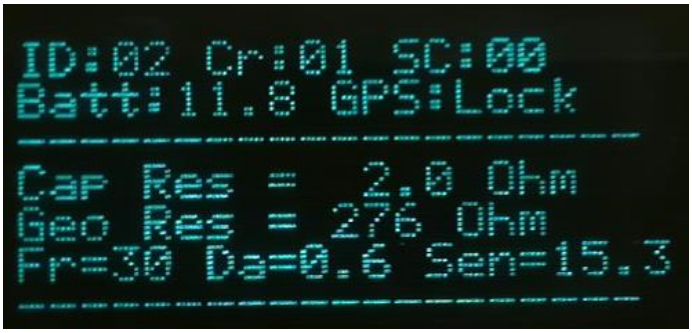
- Press Test button on Front Panel to test Uphole Geophone
- Boom Box 3 Compares reading with internal limits
- Flashes Test LED green 4 times if result is within entered limit
- Flashes Test LED red 4 times if is outside entered limits
- Geophone Test includes
    - Resistance – measures DC resistance
    - Frequency – geophone must be planted in vertical position for frequency to pass
    - Damping - geophone must be planted in vertical position for damping to pass
    - Sensitivity -geophone must be planted in vertical position for sensitivity to pass
- Geophone resistance will be shown on the Armed and Ready display.

5.2.2 CAP Resistance Test

- Press Test button and ARM switch on Front Panel to test CAP resistance
- Boom Box 3 Compares reading with internal limits
- Flashes Test LED green 2 times if result is within entered limit
- Flashes Test LED red 2 times if result is outside entered limits
- CAP resistance will be shown on the Armed and Ready display.

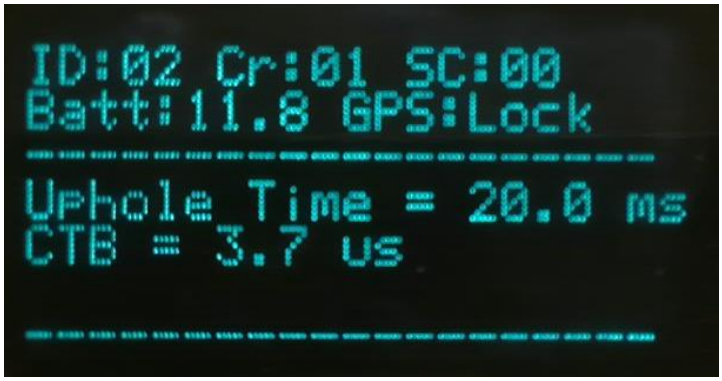
5.2.3 GPS Test

- Press GPS button to acquire new GPS position – 10 seconds.
- GPS LED is RED for the first 4 seconds to show the GPS button was pressed.
- Solid green GPS LED with a differential position.
- Flashing green GPS LED with a non-differential position.
- Solid red GPS LED when a bad position was received.
- No GPS LED when no GPS information is received within 10 seconds of pressing the GPS button.
- The GPS LED's will stay this way until pressing the GPS button again or taking the next shot.
- Note: Boom Box 3 is normally set up for GPS receivers using 19.2 k baud



5.2.4 Fire Sequence – VP/ UE Mode - Decoder

- Press both the Arm and Charge switch to Arm Boom Box 3 and charge internal capacitor.
- If the Ready Message is enabled the Ready Message will be automatically sent when the high voltage capacitor is fully charged and box is ready to fire.
- When valid Start Code is received from the Encoder unit, the shot sequence is started and the High Voltage is applied to the Cap line the Shot is fired.
- Test LED will flash green for 4 seconds after shot if Confirmed Time Break is OK
- Test LED will flash RED after shot if Confirmed Time Break is not detected
- GPS LED will flash green after shot if first break is detected on Uphole geophone
- GPS LED will flash red after shot if first break is not detected
- The display will show Uphole time, CTB value, and Battery voltage.



6. Autonomous Decoder Operation

See Autonomous Mode Setup section of this manual

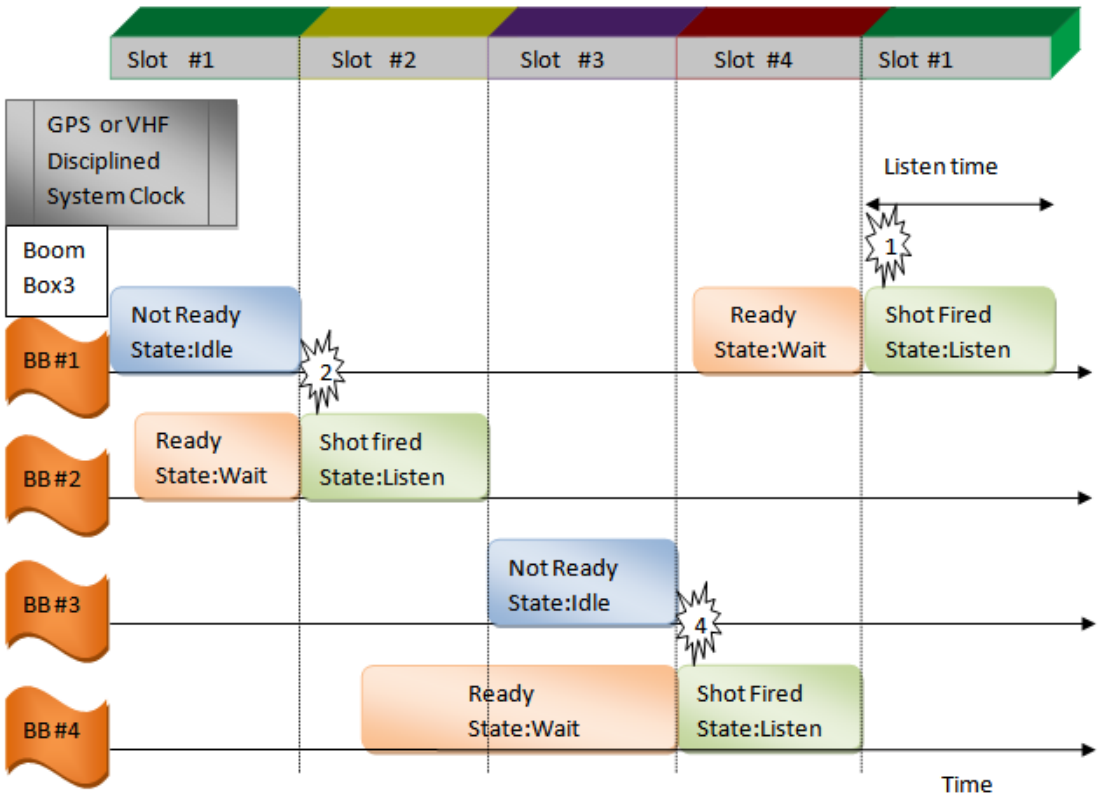
6.1 Autonomous Decoder Operation

The Autonomous Decoder Mode of operation is used to detonate a blasting cap for seismic dynamite operation. Extreme caution needs to be exercised when working around dynamite and detonation equipment. Review and follow all safety guidelines.

The Decoder unit is connected to a detonation Cap, an uphole geophone and a battery. Whenever the Decoder is connected to the CAP or whenever a radio is used, the CAP can fire at any time. The unit has been designed to only fire the CAP when both the ARM and the Charge button are

held .However; potentially there is a chance that the CAP can accidentally fire from either RF noise or a hardware failure. With this in mind the following is the normal operation procedure:

- The Shooter receives a valid GPS position for the new shot point.
- The Shooter verifies that there is no danger in accidental firing of hole and that all personnel and livestock are clear of the shot hole.
- The "Shooter" connects the unit to the uphole geophone, and Cap at the new shot hole.
- The Shooter normally checks the resistance of both the geophone and the Cap.
- After all tests are satisfactory, the shooter calls in that he is ready(optional)
- The Shooter sets the Line/Station information of the shot either manually or automatically using the Wi-Fi or Computer interface.
- The Shooter then presses the "Arm" and "Charge" switches to get the box ready to fire.
- The Shooter then presses the Autonomous Decoder Fire switch to initiate the sequence (For added safety).
- The Boombox 3 will start looking for the next available GPS time Slot, based on the preprogrammed Unit List and Record Length.
- The Unit will pick the nearest available time slot, but if the next slot is less than 10 seconds away, this slot is ignored and the next to next slot (calculated based on units, record length) is picked instead ,for safety reasons.
- The Boombox 3 display will update the remaining seconds for the Fire Slot.
- The Shot will be fired at the Fire Slot GPS Time if the Arm & Charge button are held .
- The Arm & Charge switch must be hold at least for the last 4 seconds before the fire, for the fire to happen. If not the shot will be cancelled for safety reasons.
- The shooter then releases the "Arm" and "Charge" switch and disconnects from the hole.
- The Decoder unit automatically saves the GPS Time,Postion ,Line/Station information, uphole information in the Flash Card.
- The shot information is updated in the Wifi Interface Software.
- The Shooter can check the status of the Box immediately after the Shot is fired.
    - Test LED = Green when Confirmation Time Break is valid.
    - GPS LED = Green when Uphole time is valid
    - The display will show the Uphole time, CTB value, and battery voltage.


BOOM BOX3 AUTONOMOUS (JUNGLE MODE) OPERATION SEQUENCE
Sample with four Boom Box 3 Units
Slot #1
Slot #2
Slot #3
Slot #4
Slot #1
GPS or VHF Disciplined System Clock
Boom Box3
Listen time
1
BB #1
Not Ready State:Idle
2
Ready State:Wait
Shot Fired State:Listen
BB #2
Ready State:Wait
Shot fired State:Listen
BB #3
Not Ready State:Idle
4
BB #4
Ready State:Wait
Shot Fired State:Listen
Time

6.2. Detailed Autonomous Decoder Operation

6.2.1 Uphole Geophone Resistance Test

- Press Test button on Front Panel to test result Uphole Geophone
- Boom Box 3 Compares reading with internal limits
- Flashes Test LED green 4 times if result is within entered limit
- Flashes Test LED red 4 times if is outside entered limits
- Geophone resistance will be shown on the display.

6.2.2 CAP Resistance Test

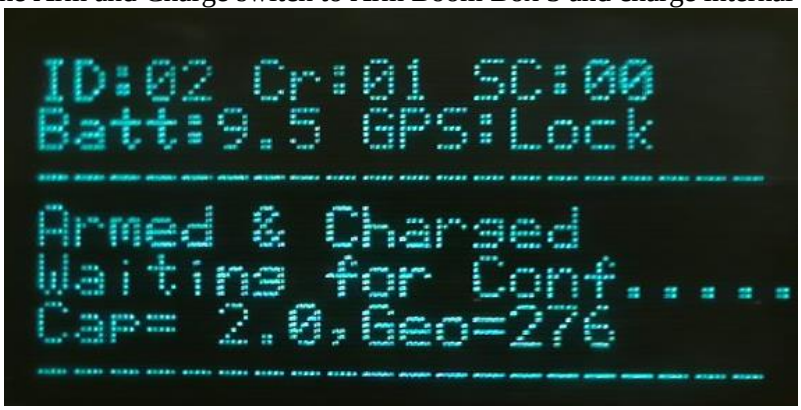
- Press Test button and ARM switch on Front Panel to test CAP resistance
- Boom Box 3 Compares reading with internal limits
- Flashes Test LED green 2 times if result is within entered limit
- Flashes Test LED red 2 times if result is outside entered limits
- CAP resistance will be shown on the display.

6.2.3 GPS Test

- Press GPS button to acquire new GPS position – 10 seconds.
- GPS LED is RED for the first 4 seconds to show the GPS button was pressed.
- Solid green GPS LED with a differential position.
- Flashing green GPS LED with a non-differential position.
- Solid red GPS LED when a bad position was received.
- No GPS LED when no GPS information is received within 10 seconds of pressing the GPS button.
- The GPS LED's will stay this way until pressing the GPS button again or taking the next shot.

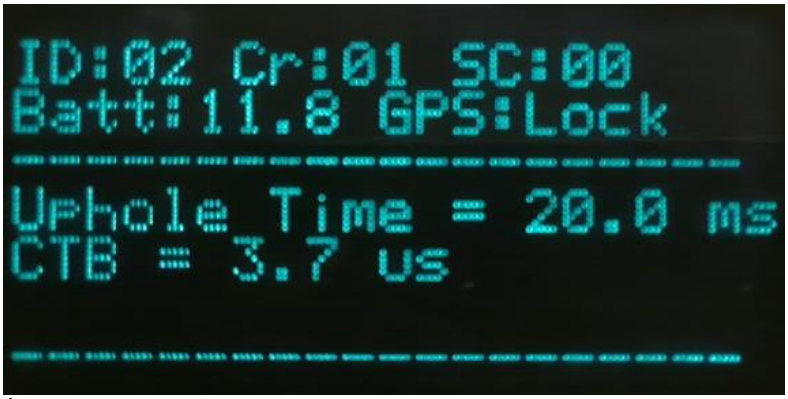
6.2.4 Fire Sequence -Autonomous Decoder

- Set the Line/Station information of the shot either manually or automatically using the using Wi-Fi or Computer interface (refer corresponding sections in manual for details).
- Press both the Arm and Charge switch to Arm Boom Box 3 and charge internal capacitor.



- Press the Autonomous decoder fire switch.

- The Boom Box 3 Unit will fire the shot in the correct GPS time slot.
- The Shooter can check the status of the Box immediately after the Shot is fired.
    - Test LED = Green when Confirmation Time Break is valid.
    - GPS LED = Green when Uphole time is valid
    - The display will show the Uphole time, CTB value, and battery voltage.
- The display will show Uphole time, CTB value, and Battery voltage.



7. Boom Box 3 Parameters

The Boom Box 3 Unit uses internally stored parameters to determine the operation of the unit. All of the parameters are stored in nonvolatile memory and only need to be changed when an operational parameter changes. The internal parameters can only be modified using an external computer. Two different programs and methods are available for changing the operational parameters.

- Cell Phone/Tablet Wifi interface –Refer Wifi Interface section of the manual
- Windows Computer interface – Refer Computer Interface section of the manual

7.1.1 Boom Box 3 Parameters

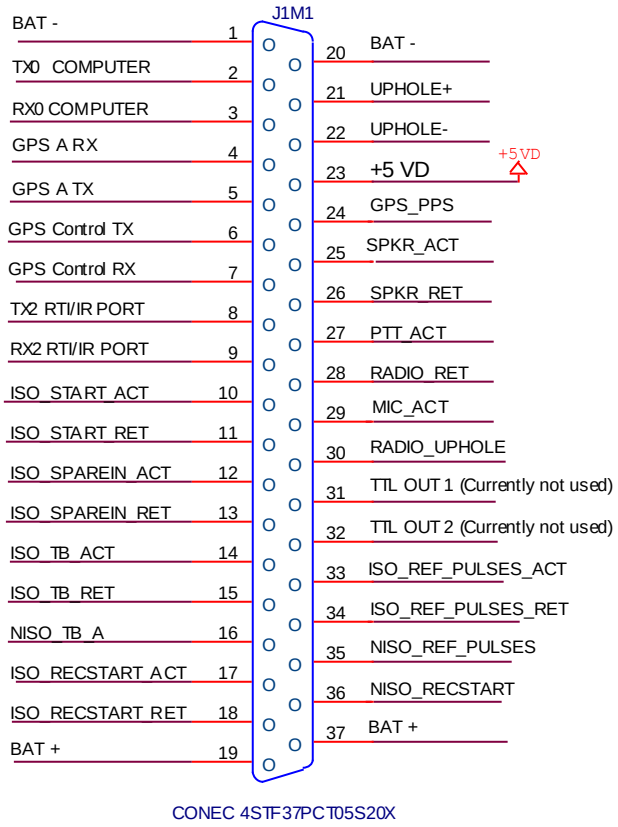
- **Unit ID (1-32)** – Used to set Box ID – ID # is used to identify records.
    - Requested Unit ID in Fire Command from Encoder must match Decoder Unit ID to Fire shot.
    - Other Brand Compatible Mode – When the other brand Encoder has Box ID number 15 in the start code that is sent to the Boom Box 3, the Boom Box 3 decoder will allow <u>any</u> decoder box ID to always fire.
- **Crew ID (0-250)** – Used to set Crew ID.
    - Requested Crew ID in Fire Command from Encoder must match Decoder Unit ID to Fire shot.
    - Other Brand Compatible Mode – Crew ID 15 in Decoder will allow box to fire.
- **Start Code (0-3)** – Used to set Start Code.
    - Requested Start Code in Fire Command from Encoder must match Decoder Unit ID to Fire shot.
- **Password (8 digit)** – Allows Software program to hide the Advanced entries from user.
    - "BoomBox3" – Always allows the user to enter the Advanced entries.Case sensitive password.
- **Decoder Start Delay** – (0 – 4,000 microseconds) used by Decoder Boom Box 3..
    - Allow individual Decoders to be delayed.
    - Normally set to zero.
- **Uphole Blank Time** – 0 – 99 msec, in1 msec increments.
    - Sets the Uphole data to zero for the selected amount of time.
    - Typically set = 0 msec.
- **Uphole Window Delay** – 0 – 127 msec.
    - Delays when the 60 msec Uphole window is recorded. Entry allows recording data up to 127+60=187 msec.
    - Entry of 255 allows automatic Uphole Window Delay. The first pick is placed in the middle of the 60 msec window sent back to the Encoder.
    - Typically set = 0msec.
- **Operating Mode**
    - Encoder
    - Standard Decoder
    - Autonomous Decoder
    - Air Gun Decoder
    - Monitor
- **Auto Shut Down** – (0-255 minutes)

- Decoder unit will automatically power down after this time to conserve battery power.
- Any switch movement will reset the time to shut down.
- Normally set to 10 minutes.
- 0 is always ON.

- **First Break Threshold**
  - 10% of peak Threshold (Data Peak/10 with Backup)
  - 20% of peak Threshold (Data Peak/5 with Backup)

- **Interface Function:**
  - Recorder Start Active – not currently used. High – low to high transition will start external recorder.
  - Time Break Active.
    - High – low to high transition at time 0 when shot is fired.
    - Low – high to low transition at time 0 when shot is fired.
    - Decoder always-active LOW.
  - Remote Start Active – signal to Boom Box 3 Recorder, which starts the Fire Command sequence.
    - High – low to high starts fire command sequence.
    - Low – high to low starts fire command sequence.
  - Speaker Polarity – selects speaker polarity for the radio reception. Typically the Boom Box 3 will receive data better on one polarity than the other. A distance test should be performed to determine optimum performance.
  - Microphone Polarity – Sometimes it is better to switch microphone polarity than speaker polarity.
    - Normally set to Normal.
- **Geophone Limit Min** (0 – 870) ohm. Sets minimum limit in ohms for the uphole geophone resistance measurement. Determines if the Boom Box 3 Decoder test the uphole geophone as good or bad. Flashes Test LED 4 times green for good or flashes 4 times red for bad.
  - Typical = 50 ohm – depends on uphole geophone.
- **Geophone Limit Max** (0 – 870) ohm. Sets maximum limit in ohms for the uphole geophone resistance measurement. Determines if the Boom Box 3 Decoder test the uphole geophone as good or bad. Flashes Test LED 4 times green for good or flashes 4 times red for bad.
  - Typical = 500 ohm – depends on uphole geophone.
- **Cap Limit Min** (0 – 100) ohm. Sets minimum limit in ohms for the blasting cap resistance measurement. Determines if the Boom Box 3 Decoder test the blasting cap as good or bad. Flashes Test LED 2 times green in good or flashes 2 times red for bad.
  - Typical = 2 ohm
- **Cap Limit Max** (0 – 100) ohm. Sets maximum limit in ohms for the blasting cap resistance measurement. Determines if the Boom Box 3 Decoder test the blasting cap as good or bad. Flashes Test LED 2 times green for good or flashes 2 times red for bad.
  - Typical = 30 ohm

8. Hardware Installation



BOOM BOX 3 37-PIN CONNECTOR

PIN	FUNCTION
1	**BAT -** - Battery Ground.
2	**TX0 COMPUTER –** RS-232 serial output. Data from Boom Box 3 to Computer. Connect to COM port of computer running the BBview program. 19200 BAUD.
3	**RX0 COMPUTER** – RS-232 serial input. Data to Boom Box 3 from Computer. Connect to COM port of computer running the BBview program. 19200 BAUD.
4	**See GPS connections at end of this chapter**.
8	**TX2 RTI/IR PORT** – RS-232 output. Data from Boom Box 3 to Recording System. Recording system selected by software menu.
9	**RX2 RTI/IR PORT** – RS-232 input. Data to Boom Box 3 from Recording System. Recording system selected by software menu. For this pin to be active JMP2 has to be shorted on pins 1 and 2.
10	**ISO_START_ACT** – Isolated input. Isolated Start Active. Recorder remotely starts the Boom Box 3 in Encoder mode. Isolated with 6N137 optocoupler. Polarity selected by software menu.
11	**ISO_START_RET** - Isolated Start Return.

12 **ISO_SPARE_IN_ACT** – Isolated input. Isolated Spare IN Active. Used in Weight Drop Mode to start the Weight Drop process. Connected to the start switch. Isolated with 6N137 optocoupler. Polarity selected by software menu.

13 **ISO_SPARE_IN_RET** – Isolated Spare IN Return.

14 **ISO_TB_ACT** – Isolated output. Isolated Time Break Active. Used in Encoder and Decoder modes. Isolated with 4N32 optocoupler. Polarity selected by software menu in Encoder Mode. Polarity is always active low in Decoder mode.

15 **ISO_TB_RET** – Isolated Time Break Return.

16 **NISO_TB_A** – Non-isolated Time Break. Used in Encoder and Decoder modes. Polarity selected by software menu in Encoder Mode. Polarity is always active low in Decoder mode. +3.3 volts to 0 volts.

17 **ISO_RECSTART_ACT** – Isolated output. Isolated Recorder Start Active. Pre-Start pulse in Encoder, Master, Repeater, and Slave modes. Isolated with 4N32 optocoupler. Polarity selected by software menu.

18 **ISO_RECSTART_RET** – Isolated Recorder Start Return.

19 **BAT +** - Not connected on Version 2 cards - Jumper J12 on board if needed.

20 **BAT -** - Battery Ground.

21 **UPHOLE +** - Input. Uphole Geophone connection. –1.566 volts to +1.526 volts.

22 **UPHOLE -** - Input. Uphole Geophone connection.

23 **+5VD** – Output. +5 volts digital.

25 **SPKR_ACT** – Input. Speaker Active to Boom Box 3 from external radio speaker output. .

26 **SPKR_RET** – Speaker return. Speaker return from external radio speaker return.

27 **PTT_ACT** – Output. Push To Talk Active from Boom Box 3 to external radio.

28 **RADIO_RET** – Radio return. Radio return from external radio ground

29 **MIC_ACT** – Output. Microphone Active from Boom Box 3 to external radio microphone input.

30 **RADIO_UPHOLE** – AUX 1 output. Encoder, Master, and Repeater produce the Uphole signal after the decoder fires the shot and returns the post report. -1.65 volts to +1.65 volts.

31 **TTL_OUT 1** – Not currently used.

32 **TTL_OUT 2** - Not currently used.

33 **ISO_REF_PULSES_ACT** – AUX 2 isolated output. Reference pulses Active. Occurs in Encoder, Master, and Repeater modes at 1, 1.25, and 1.5 seconds after the Fire sequence. Uses a 4N32 optocoupler.

34 **ISO_REF-PULSES_RET** – Reference pulses Return. Pins 33 and 34 are used to enable or disable the infrared port. Pins 33 and 34 shorted and the infrared port is disabled and the data can go the recording system. Pins 33 and 34 open and the infrared port are enabled.

35 **NISO_REF_PULSES** – AUX 2 non-isolated output. Reference pulses. Occurs in Encoder, Master, and Repeater modes after the Fire sequence. 0 to +3.3 volts.

36 **NISO_RECSTART –** Non-isolated output. Recorder Start Active. Pre-Start pulse in Encoder, Master, Repeater, and Slave modes. Polarity selected by software menu. +3.3 volts to 0 volts.

37	**Not connected on Version 2 boxes -BAT + - -** Battery positive – DC power input on Boom Box 3 (10-37 volts DC). Jumper J11 on board if needed.

GPS Connections:
External GPS with external corrections.

4	**GPS A RX** – Not used.
5	**GPS A TX** – RS-232 serial input, 19200 BAUD. GPS data from external GPS Receiver to Boom Box 3. GGA, RMC strings required.
6	**GPS Control TX –** Not used.
7	**GPS Control RX –** Not used.
24	**GPS_PPS** – Input. PPS pulse (Active High) from external GPS receiver.

BOOM BOX 3 10-PIN CONNECTOR

PIN	FUNCTION
A	**GPS_PPS-**Input. PPS pulse (Active High) from external GPS receiver.
B	**BAT + - -** Battery positive – DC power input on Boom Box 3 (10-37 volts DC).
C	**MIC_ACT** – Output. Microphone Active from Boom Box 3 to external radio microphone input.
D	**UPHOLE - -** Input. Uphole Geophone connection.
E	**GPS A TX** – RS-232 serial input, 19200 BAUD. GPS data from external GPS Receiver to Boom Box 3.
F	**UPHOLE + -** Input. Uphole Geophone connection. –1.566 volts to +1.526 volts.
G	**SPKR_ACT** – Input. Speaker Active to Boom Box 3 from external radio speaker output.
H	**BAT - -** Battery Ground.
J	**PTT_ACT** – Output. Push To Talk Active from Boom Box 3 to external radio.
K	**SPKR_RET** – Speaker return. Speaker return from external radio speaker return.

9. Wi-Fi Web Interface

The Boom Box 3 Wifi Interface can be used to

- Load operating parameters
- View uphole data
- View current status of resistance test
- Load and store all uphole information from Boom Box 3

9.1. Software Installation and Setup

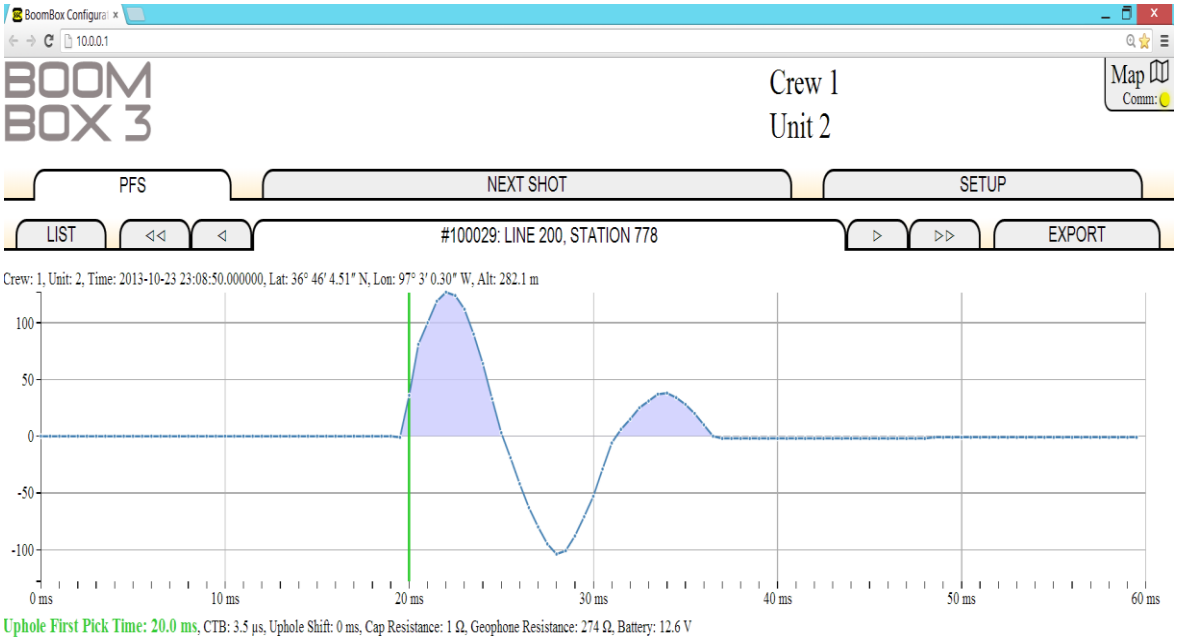
BoomBox3 Wi-Fi interface does not need any installation. The built in Wi-Fi interface of BoomBox 3 unit can communicate with Web Browsers(Internet Explorer ,Safari ,Google Chrome, etc.) in most common Cell phones, Tablets and Computers with Wi-Fi connectivity.

9.1.1 Connecting to a Unit through Web Browser

- Open the Wireless network selection menu in your Cell Phone/Tablet/Computer.
- Connect to the Network with the SSID -"BoomBox6xxx".
- Open your web browser (Internet Explorer ,Safari ,Google Chrome, etc.)
- Type in 192.168.1.1 into your web browser and open the page.
- It is recommended to add this 192.168.1.1 page to your favorites and create an icon.
- Boombox Wi-Fi interface software will be ready to use now.
- For changing any advance parameters a password may be required.The factory set password is "BoomBox3" .Password is case sensitive.

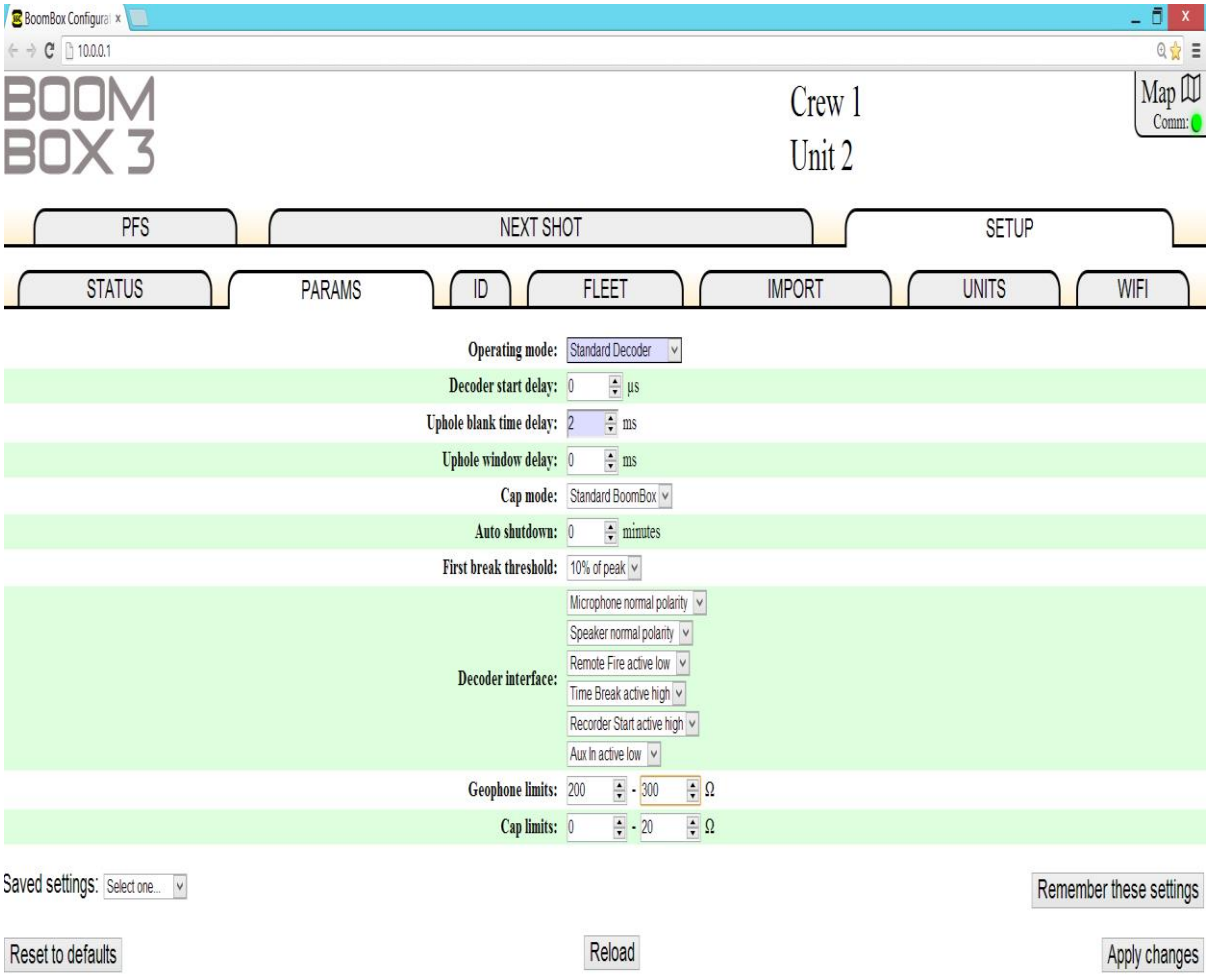
9.2. PFS Information Display

After each shot BoomBox3 automatically sends the PFS Information through wifi interface which can be analyzed in a web browser and stored for future reference.



9.3. Parameter setup

BoomBox3 parameters can be received and sent through the wifi interface. To set advanced parameters ,the software requests a password.The factory set password is “BoomBox3”.

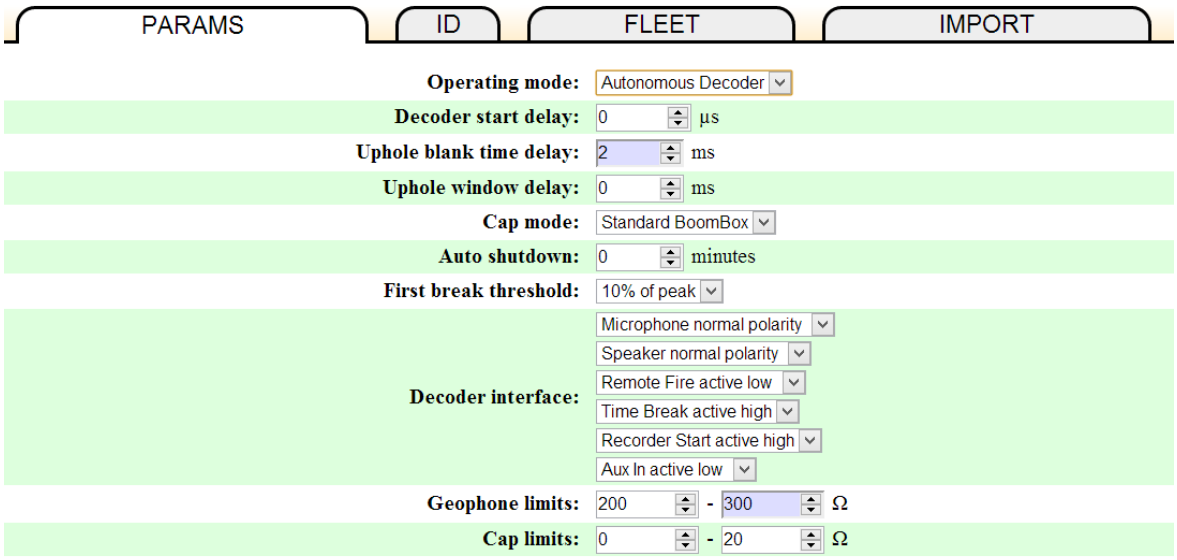


For a detailed description of parameters please refer BoomBox Parameters section of the manual.

9.4. Autonomous Mode Setup

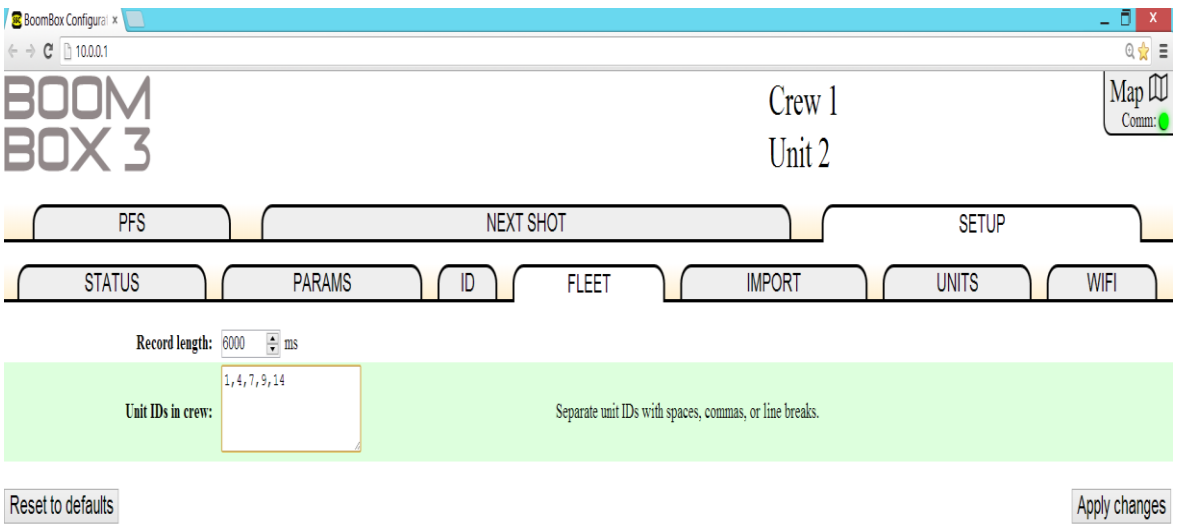
Autonomous mode operation allows shooters to fire shots independently based on dedicated GPS time slots. This mode involves more shooter interaction with user interface software that other conventional modes.

First the BoomBox3 parameters can be set, with the standard parameters and the mode selected to "Autonomous Decoder".



9.4.1 Fleet Units Assignment

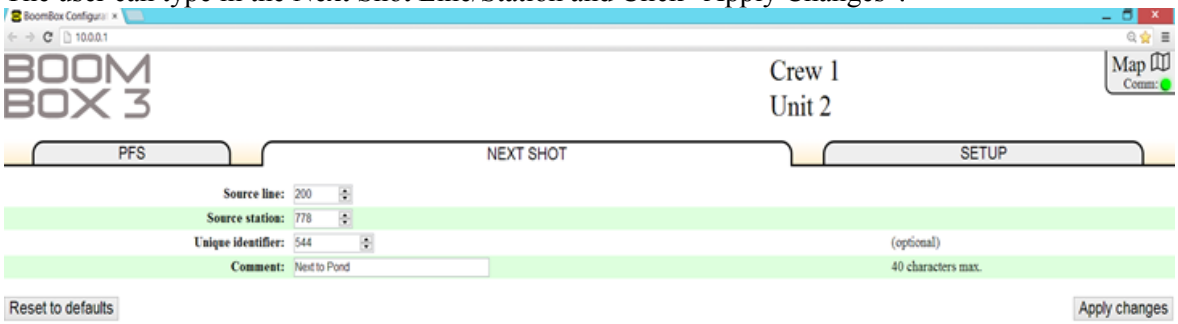
Once the Operation mode is set to Autonomous Decoder, the Units in the fleet and the record length (typically listen time) needs to be setup. This allows the Boombox3 unit to calculate GPS time slots for firing the shots.



9.4.2 Next Shot Assignment

Before each shot the Shooter needs to assign Line/Station associated with the shot. This can be done manually or automatically using the Map feature.

Web Interface Manual:
The user can type in the Next Shot Line/Station and Click “Apply Changes”.



Web Interface Automatic:
If a Shot point file is imported into Web interface, then the nearest flag will be displayed in the top of the screen with the distance to the flag .The nearest flag will be automatically filled in the Line/Station text boxes. The user can just verify the numbers and click “Apply” , and no need to type in the Line/Station.

The user has the option to override this selection if needed, by typing in a Line/Station value manually and click Apply.

BoomBox3 Internal:
Alternatively the Source Points can also be loaded into BoomBox3 hardware memory directly using SourceLink Software. In which case the BB3 display, will show the nearest flag and assign near flag before shot. This operation is explained in detail in the Source Link section. The user can also use the Web interface to modify the source point selected by BB3.

Source Link Harvest Automatic:
Alternatively SourceLink software can also pick near shot points after the shots are taken, based on the Shot GPS location. This is typically done during download process.

9.4.3 Importing Sp1 file into web interface

The Sp1 files can be loaded into web interface which allows finding near flag automatically. Open Setup->Import and either locate the SP1 file or paste the contents into the text box field and apply changes.

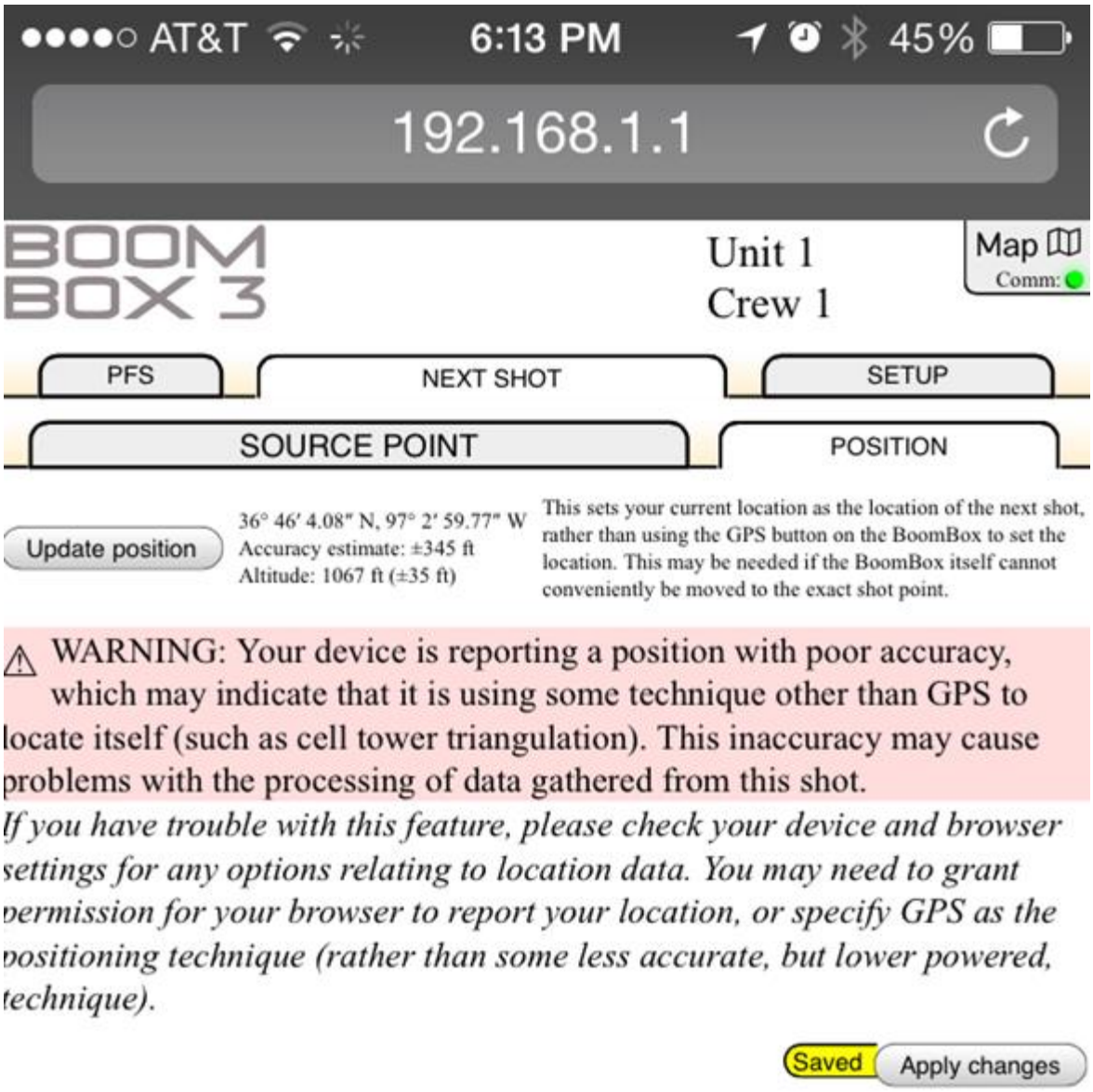
It is recommended to follow the SEG P1 standard as described by SEG.
Please download official SEG P1 documentation from SEG website for further reference:

Direct Download Link as of 8/1/2014:
http://www.seg.org/documents/10161/77915/seg_p1_p2_p3.pdf

Though there are no limits to the number of points that can be loaded. We recommending only loading few hundred source points that are relevant to this shooter.

9.5 Wifi Remote GPS position lock

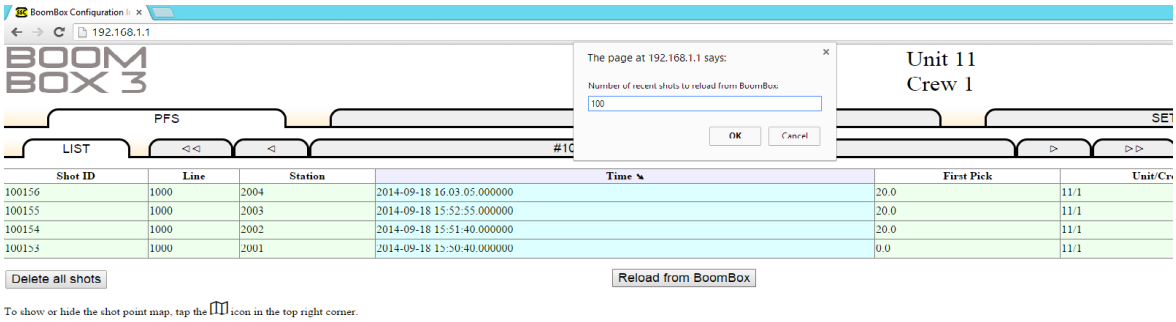
In some terrains where it is difficult to carry the Shooting pack or Shooting pack mounted vehicle near the shot hole,the BoomBox3 wifi interface has an option to lock GPS position in the Tablet/Mobile device and then transfer it to the BoomBox3 unit.



To perform this operation go to Next Shot->Position tab and click “Update position”.This position will be stored in the tablet. The accuracy of the GPS position is also displayed. After the storing process, the user can get to BoomBox3 vicinity and assign this GPS position to the shot by clicking the Apply button.

9.6 PFS recollection through web interface

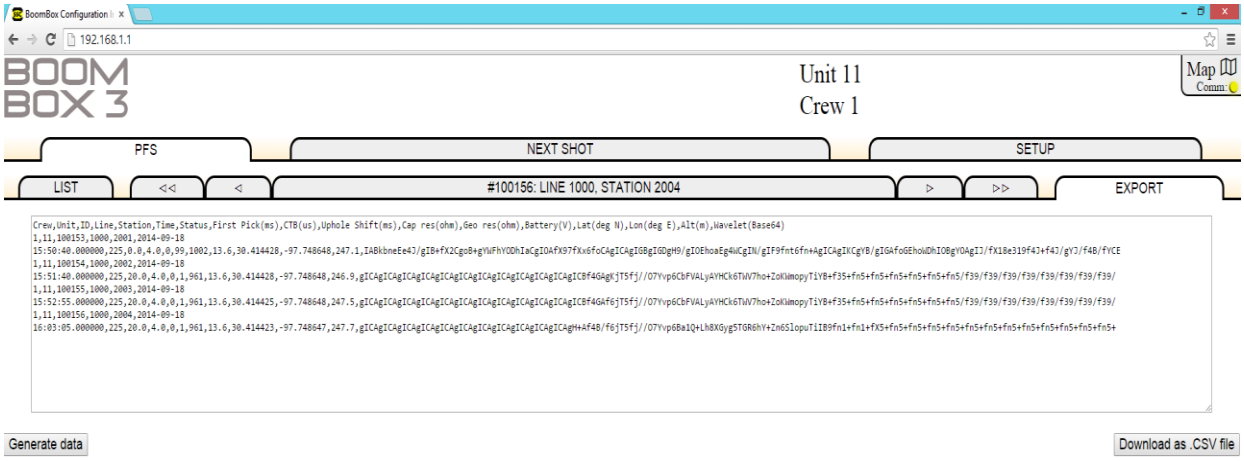
If the user wants to pull the last N shots PFS , it can be easily done by going to the PFS->Lists and clicking “Reload from BoomBox”. This is a very useful feature, especially in Autonomous operation, where user can go to the BoomBox3 at the end of the day and pull the shot information, This information (Line,Station,GPS time,position) can be exported to a CSV file



9.7 Exporting Shot information CSV file

The Web interface can export all the information in the PFS like Line,Station, GPS time of shot, GPS position of shot, Uphole, etc into a Comma Seperated Value file. To export the logs goto Export tab, click generate data and then click Download as .CSV file.

The file will be downloaded to default browser file download location.



10. Computer Software

Boombox3 can be directly interfaced by connecting to a computer through Ethernet port using the 10 pin to RJ45 cable.

10.1 SourceLink Software setup

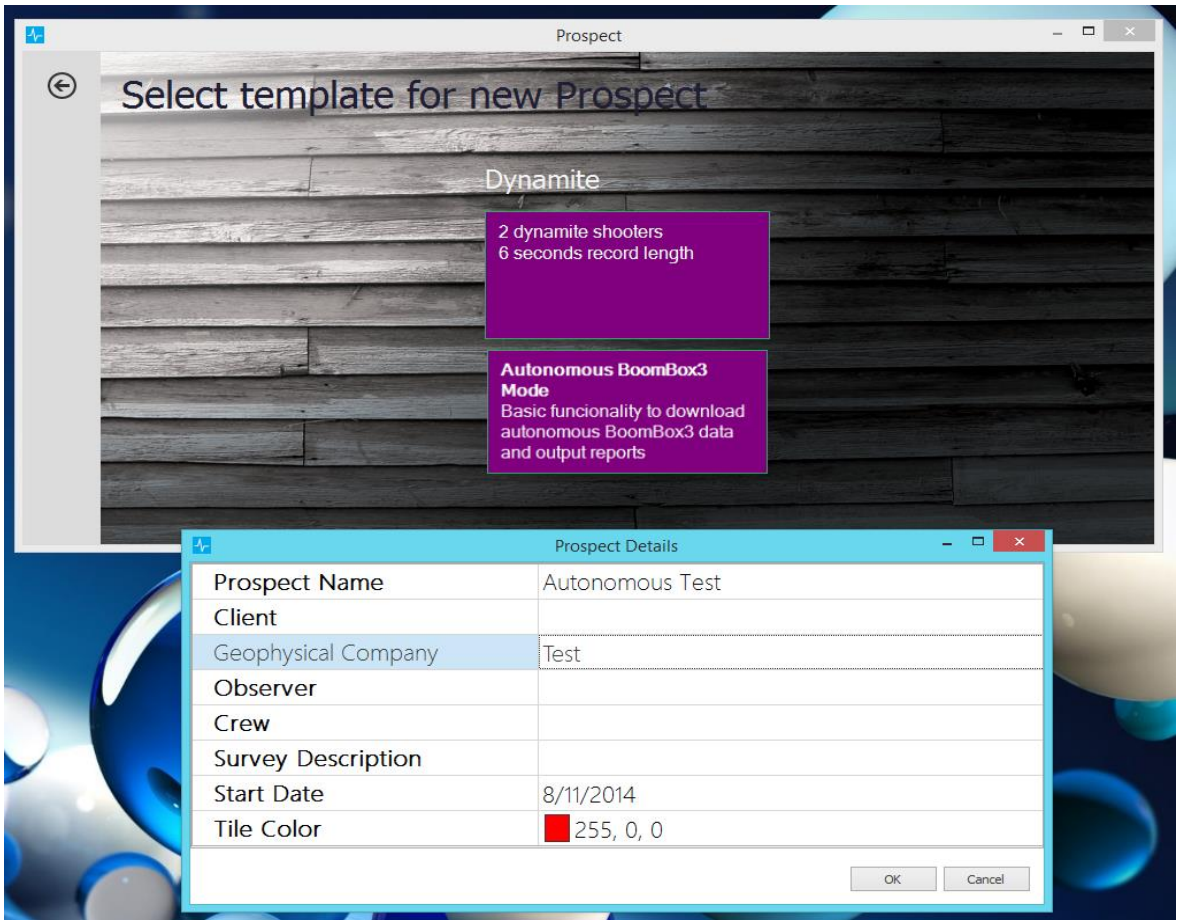
SourceLink software can be used to communicate with BoomBox3 directly. SourceLink software has a wide variety of features to support all recording system requirements.

Boombox3 to RJ45 cable needs to be connected to the computer.
The IP Address of the computer needs to assigned a static IP address as 10.x.x.x and Subnet Mask 255.0.0.0.
All Firewalls and Anti Virus needs which could block Ethernet communication needs to be turned off.

For complete instructions please refer to SourceLink Reference Manual.

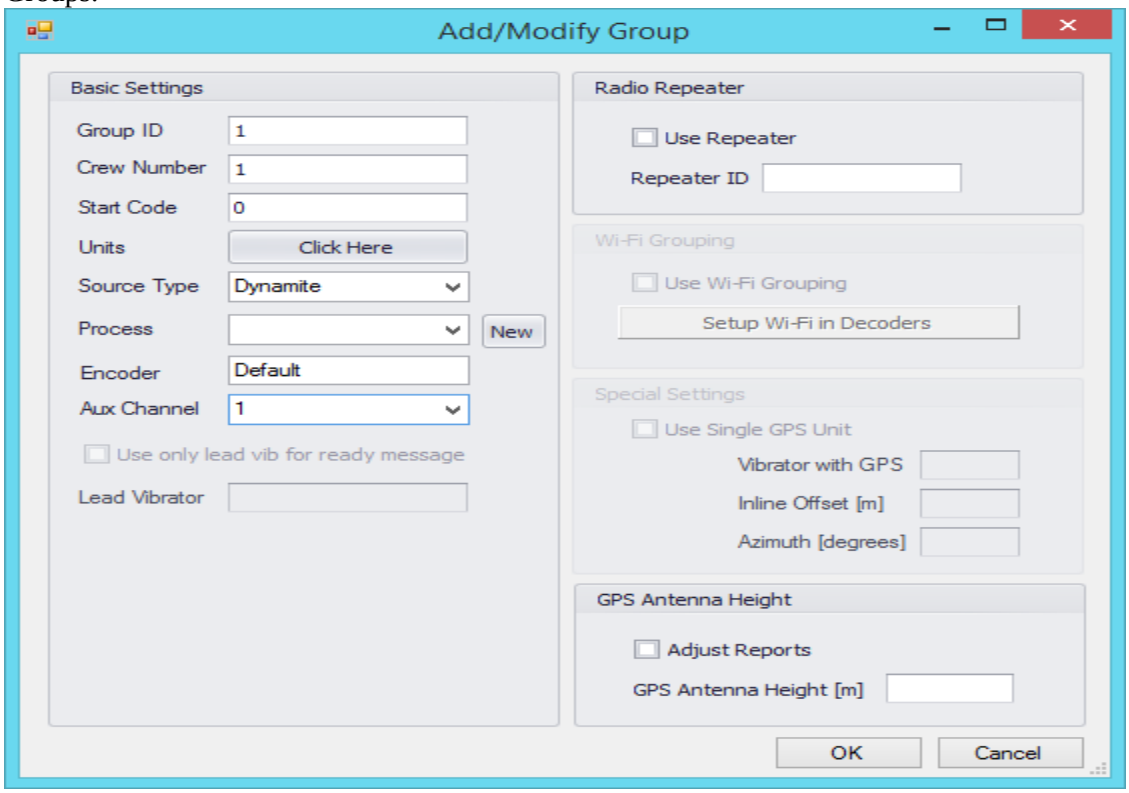
10.2 SourceLink Prospect and Group Setup

Open SourceLink and create a new Dynamite Prospect.For Autonmous operation ,creating an Autonomous BoomBox3 prospect is recommended.



Create a new Prospect day for each production day/shift.

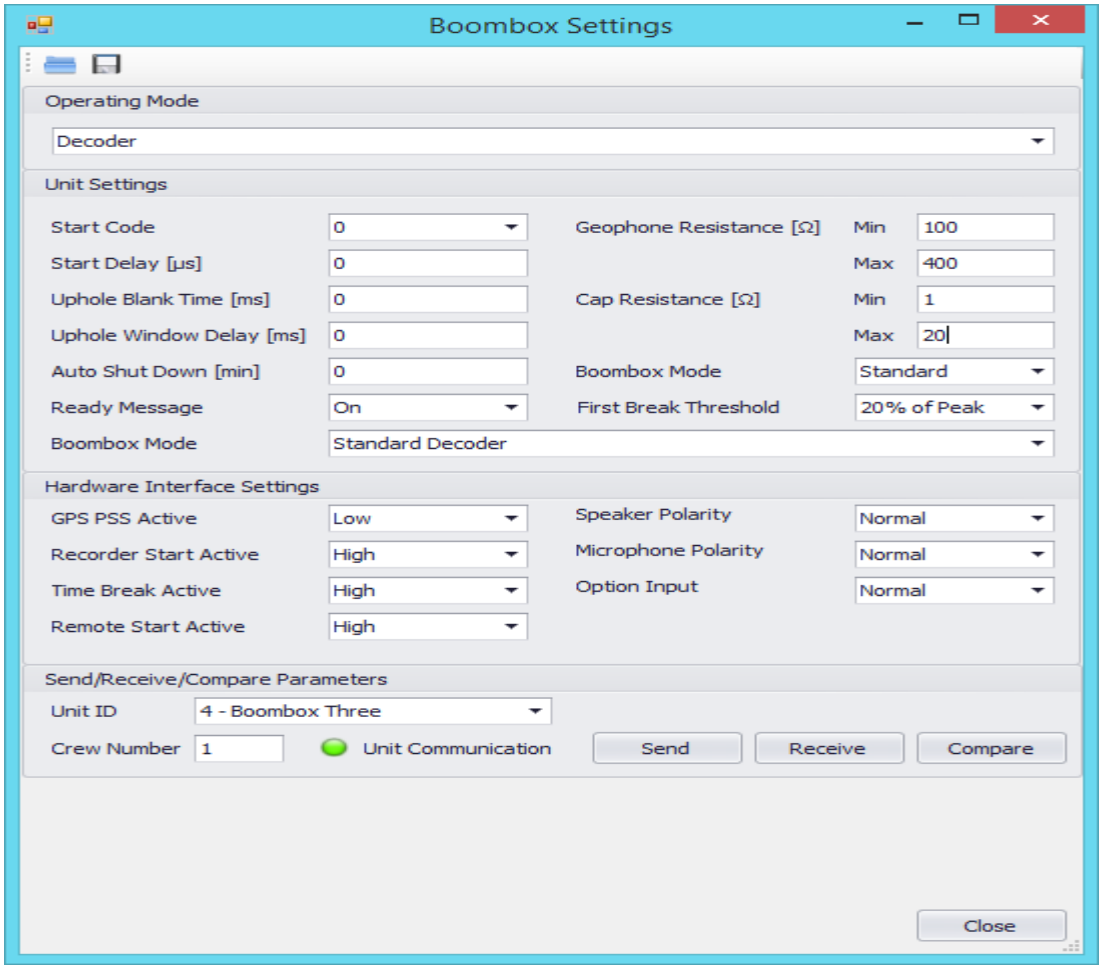
Goto Encoder/Decoder ->Groups and add new groups.
Only one shooter should be added to each group. It is recommended to give the group number to be same as the shooter number. Before assigning the units to groups make sure to select the Source Type to “Dynamite”.Process can be left blank or a new process can be created and assigned to all Groups.



Open Encoder/Decoder->Units and drag and drop units to corresponding groups. Groups must be defined as dynamite group as in the above mentioned step first before assigning units to group.

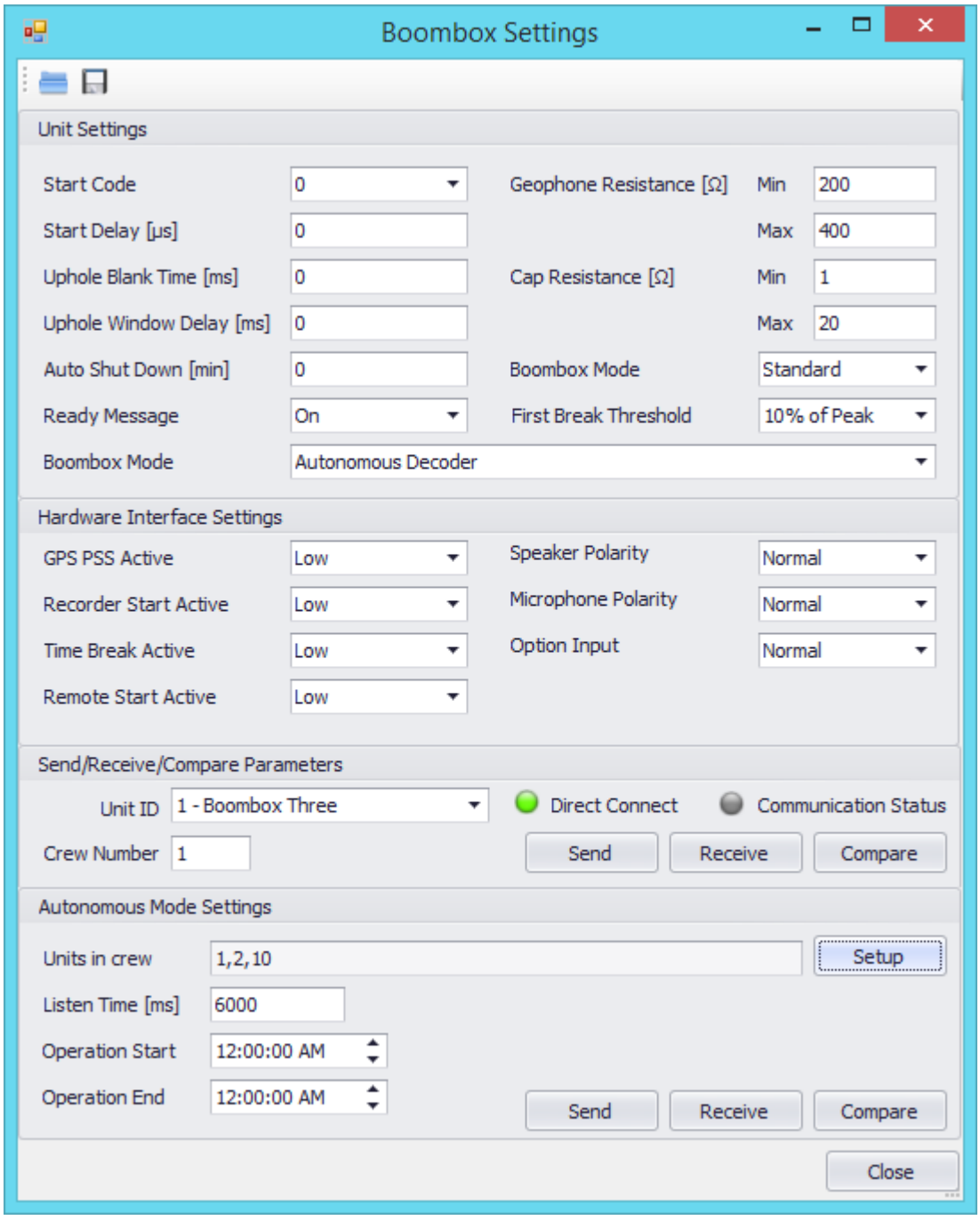
10.3 Parameter Setup

Open Encoder/Decoder->BoomBox Parameters in SourceLink. You can receive/send or compare parameters. Make sure the Unit ID/Crew ID matches the connected BoomBox.



10.4 Autonomous mode parameters

Open Encoder/Decoder->BoomBox Parameters in SourceLink.Set BoomBox mode to Autonmous decoder.Send this mode to the unit. Assign the Autonmous mode units and Listen Time (or Record Length) to program slots using the Autonomous Mode settings.

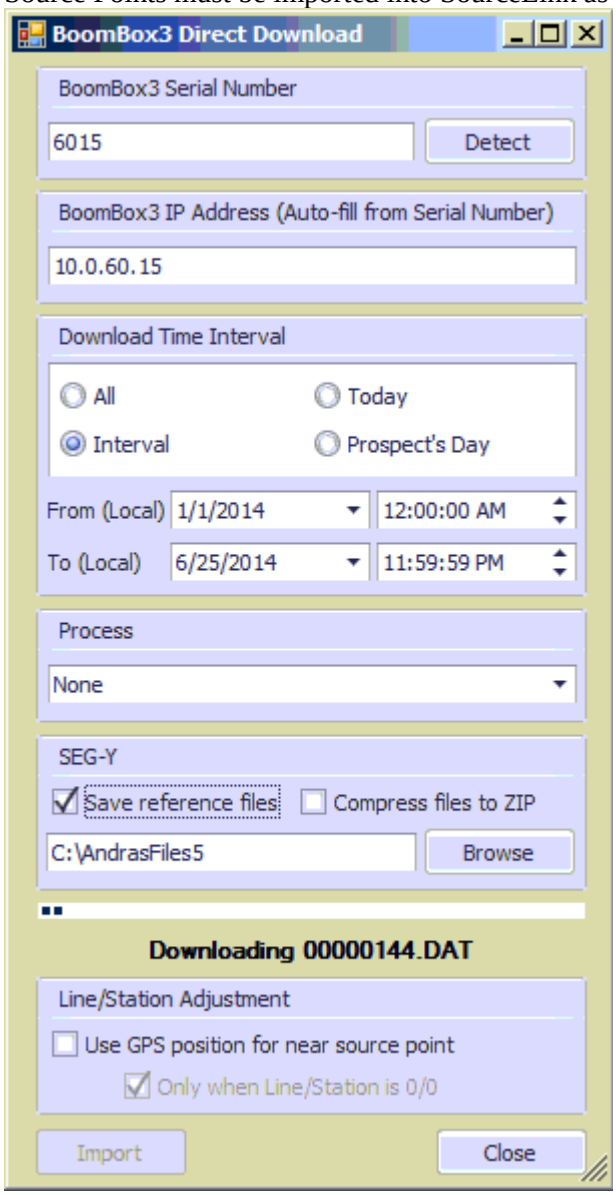


10.5 Shot Information (PFS) Download-SourceLink

SourceLink can be used to download the Shot information from multiple BoomBox3, process and export advanced reports.

Open Download BoomBox3 menu option. Press detect button. SourceLink will detect the BoomBox3 unit connected to it directly.
Specify the time and date range for the download.

If needed SourceLink can find the nearest Source Flag automatically for all the downloaded shots based on the Shot GPS position. This can be done using the Line/Station adjustment field options. Source Points must be imported into SourceLink as described in Source Point Import Section.

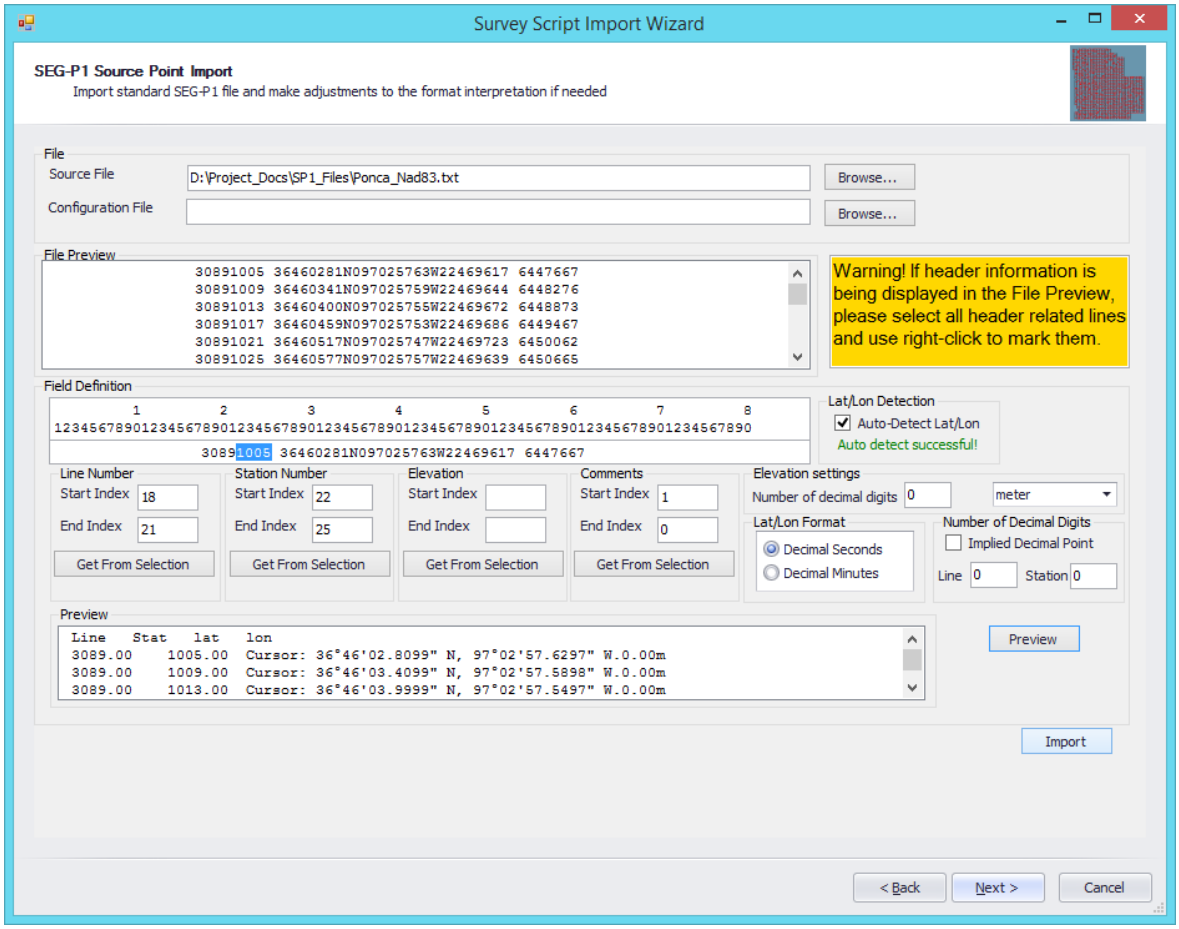


10.6 Importing Source Point Flags

SourceLink allows the user to import Source Flags into its map
To Avail the automatic near point pick feature in the Shot Information (PFS) download , the source points need to be imported to SourceLink first.

This can be done using the following step:
Survey ->Script Import Wizard
Open one shotpoint ,Highlight the columns and press Get from Selection to have SourceLink load the points.It is recommended to press the preview first and the press the import button.

.

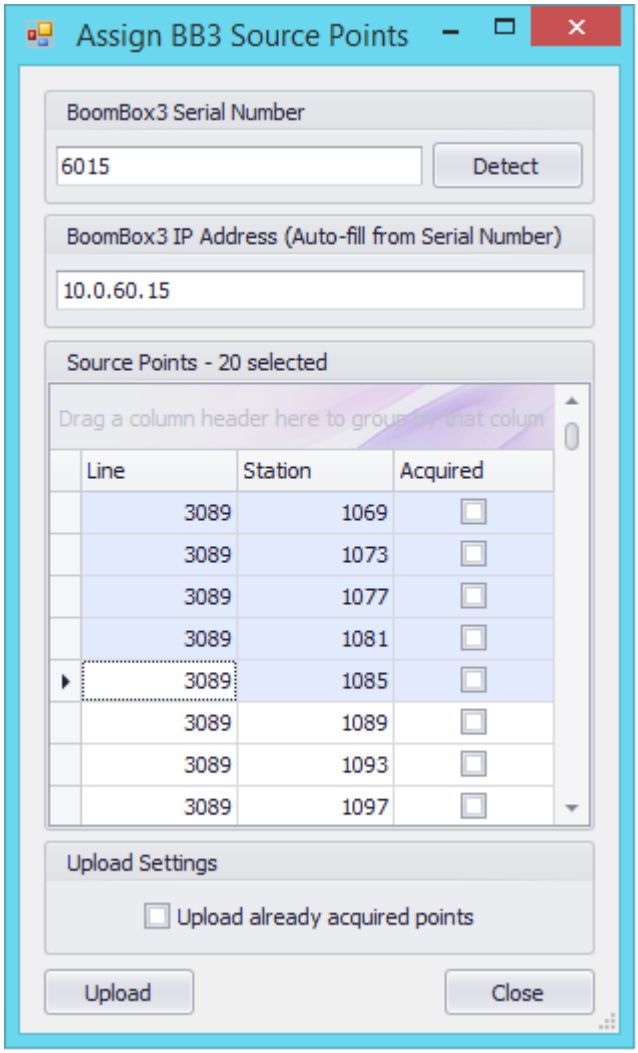


10.7 Uploading Source Points into BB3 Internal Memory

BoomBox3 allows loading Source Points to its internal memory. When the points are loaded into the BB3 memory,BB3 can find the nearest shot point and distance real time and display/use the Source point for reporting. Alternatively The user can also use the Tablet/Mobile device to find or set the Source Point , in which case loading the flags into BB3 internal memory is not necessary.

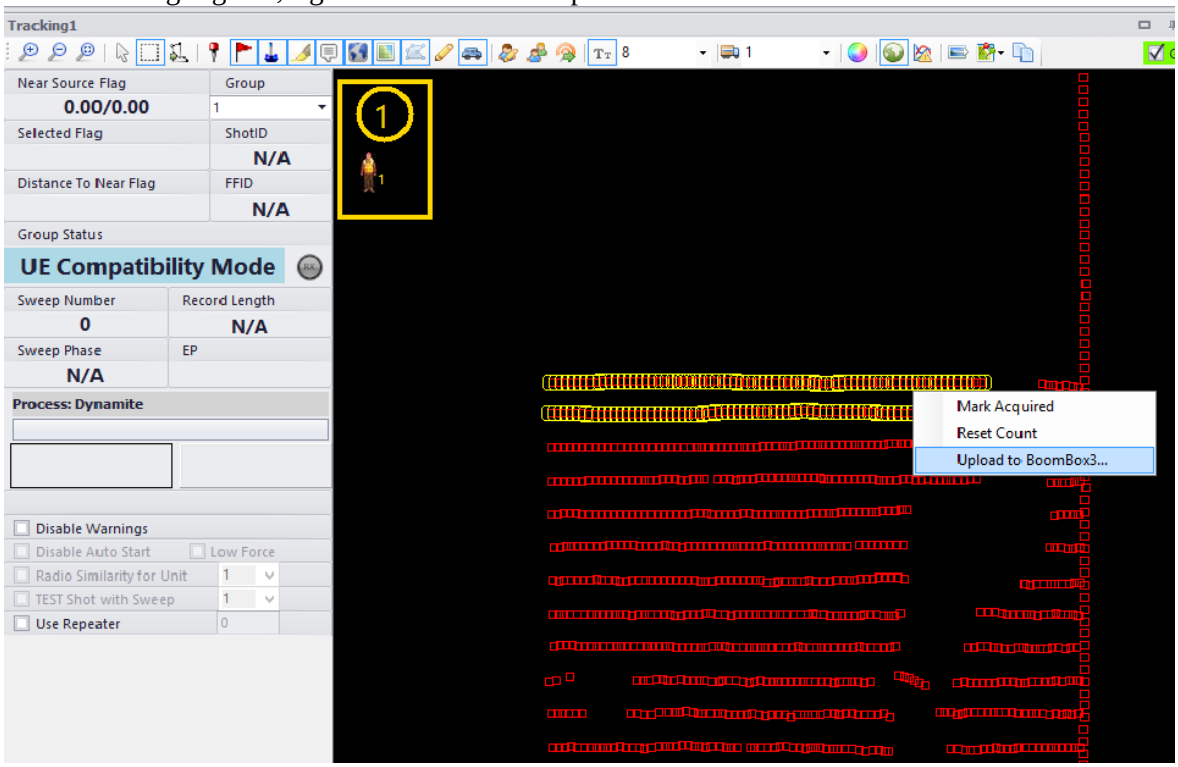
10.7.1 Using Selection window

Cntrl +Click on the points that are to be loaded into a BoomBox3 and and then hit upload.



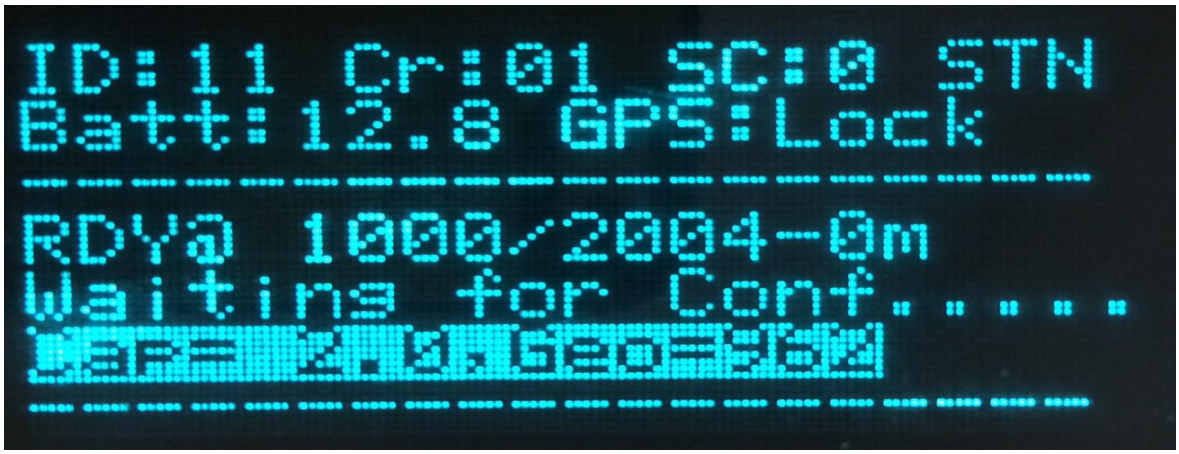
10.7.2 Using map

Select point using rectangular or polygon selection toolbar and then choose “Sources” , when the sources are highlighted, rightclick and choose Upload to BoomBox3.



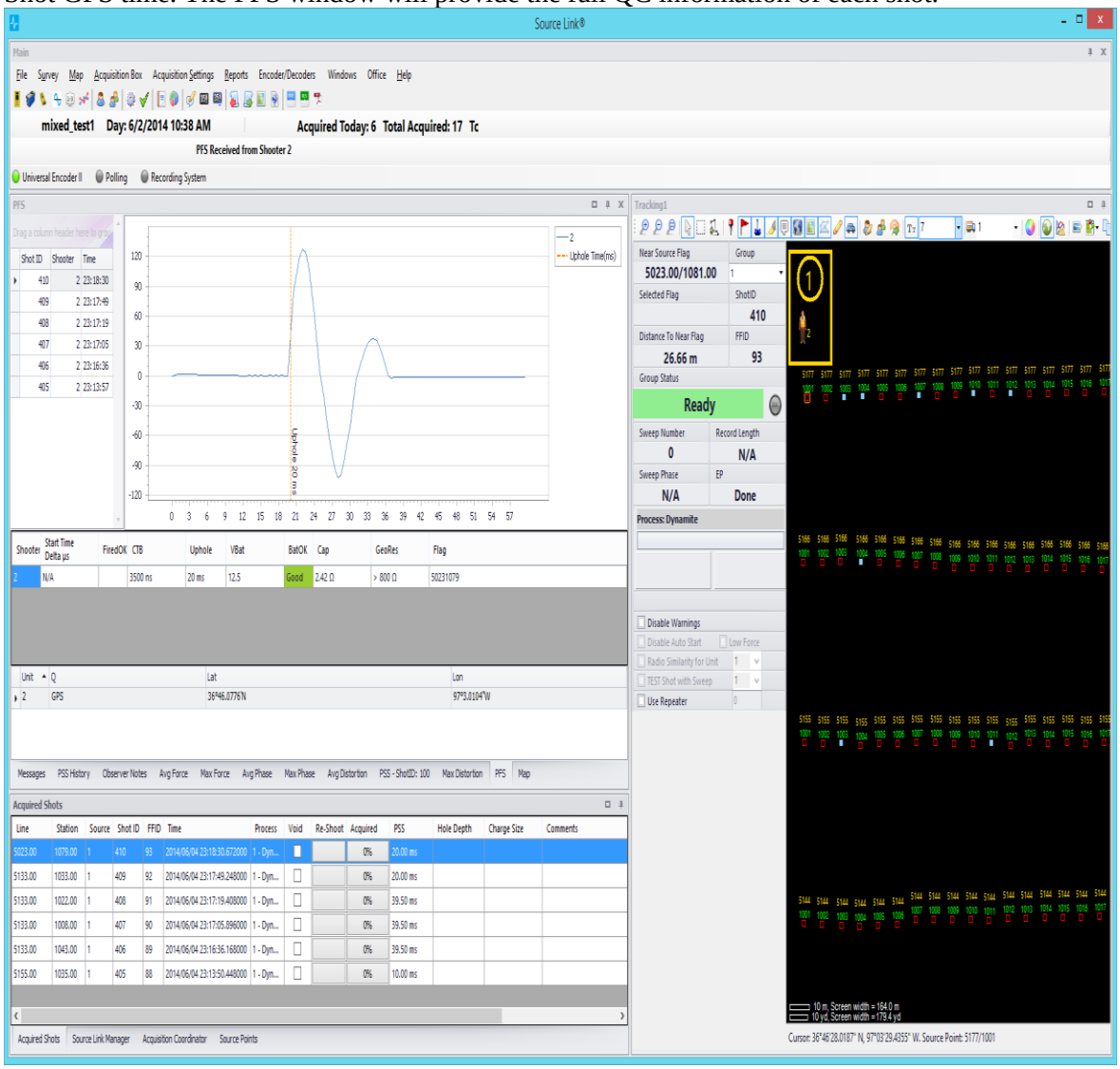
10.7.3 BB3 Display updates

When the Shot points are loaded into BB3 memory, BB3 will automatically display the nearest flag and its distance in the display updated every 5 seconds while the shooter is moving to his location. If the user has navigated to the point and then reached the flag, user has to press the GPS button as part of the standard shooting sequence, now if the shooter holds the ARM & Charge buttons, the display will show the actual point selected for this shot and the distance to the point.



10.8 Shot Information (PFS) display

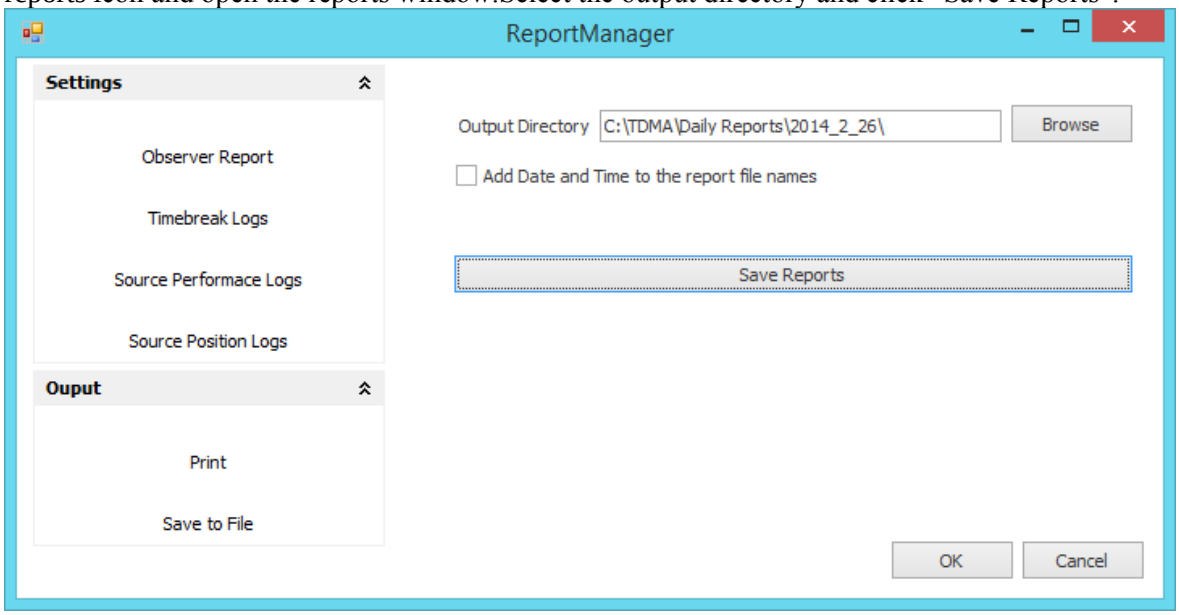
After a BoomBox3 Shot information (PFS) download, the PFS information can be analyzed using SourceLink. The acquired shots window will provide a list view of the Shot ID, Source Flag and Shot GPS time. The PFS window will provide the full QC information of each shot.



The map window will also display the acquired shot positions.

10.9 Report generation

To export all these shot information to required recording system report formats, Click on the reports icon and open the reports window.Select the output directory and click “Save Reports”.



11. Cable & Interface Diagrams

11.1 –BB3 Decoder Cable

10 pin Decoder Cable

4 feet long

B Red	Battery plus
H BLK	Battery minus
F Red	Uphole +
D BLK	Uphole –
C Red	Mic Act
A BLK	PPS Input
J	White PTT Active
	BLK no connect
G Green	Speaker Pos
K BLK	Speaker Return

5 pin Radio Cable Wiring

Mic Active –	A
Radio Return -	C
Speaker Act-	B
Speaker Ret-	E
PTT	D

11.2 DECODER CABLE with GPS

10 pin Decoder Cable

4 feet long

B Red	Battery plus
H BLK	Battery minus
F Red	Uphole +
D BLK	Uphole –

GPS input

B White	Battery plus – (optional 9 pin Female) pin 9
H Shield	GND (Battery minus) - (optional 9 pin Female) pin 5
E BLK	GPS input to Boom Box 3 - (optional 9 pin Female) pin 2
A BLK	PPS Input

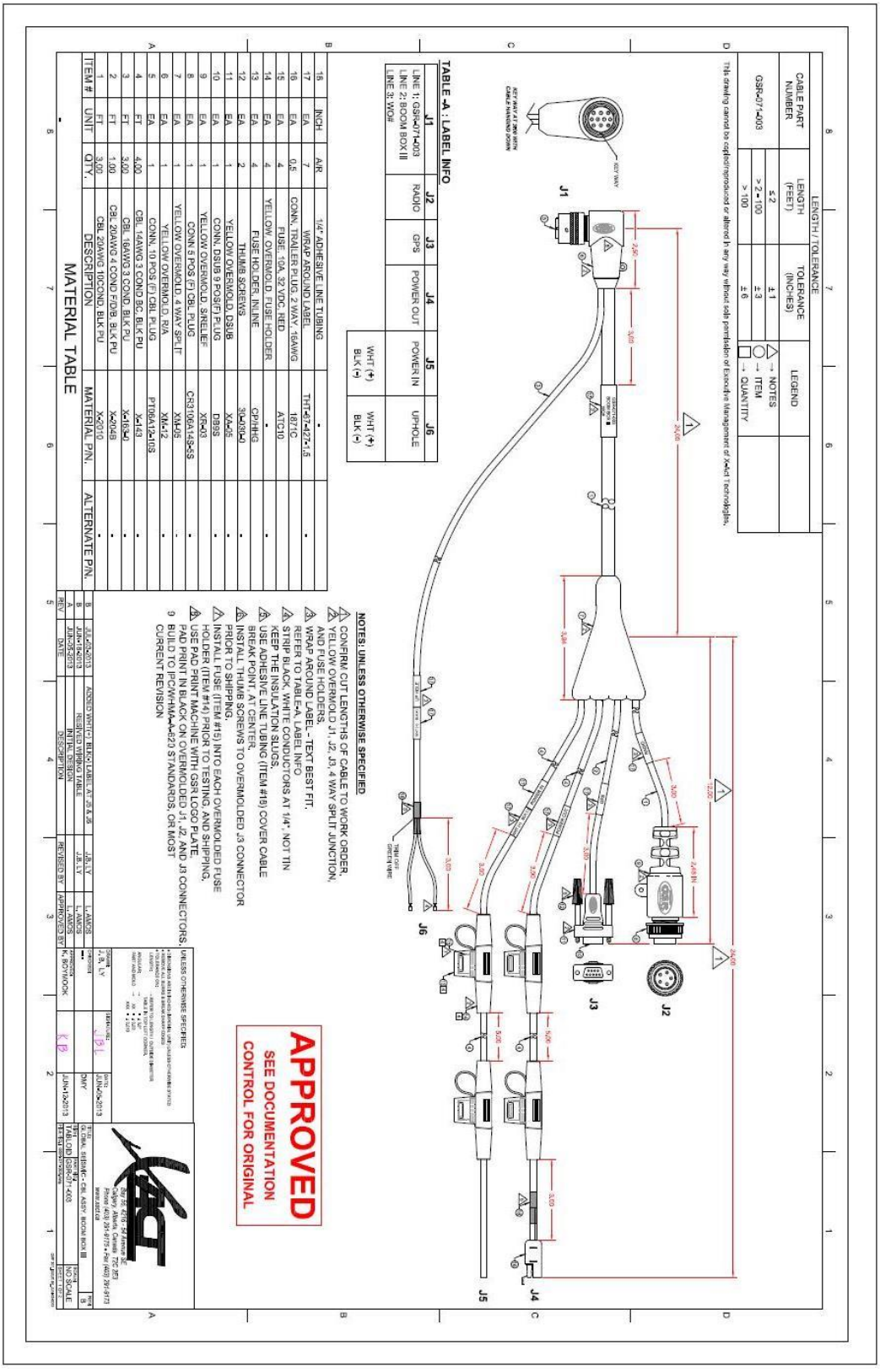
RADIO

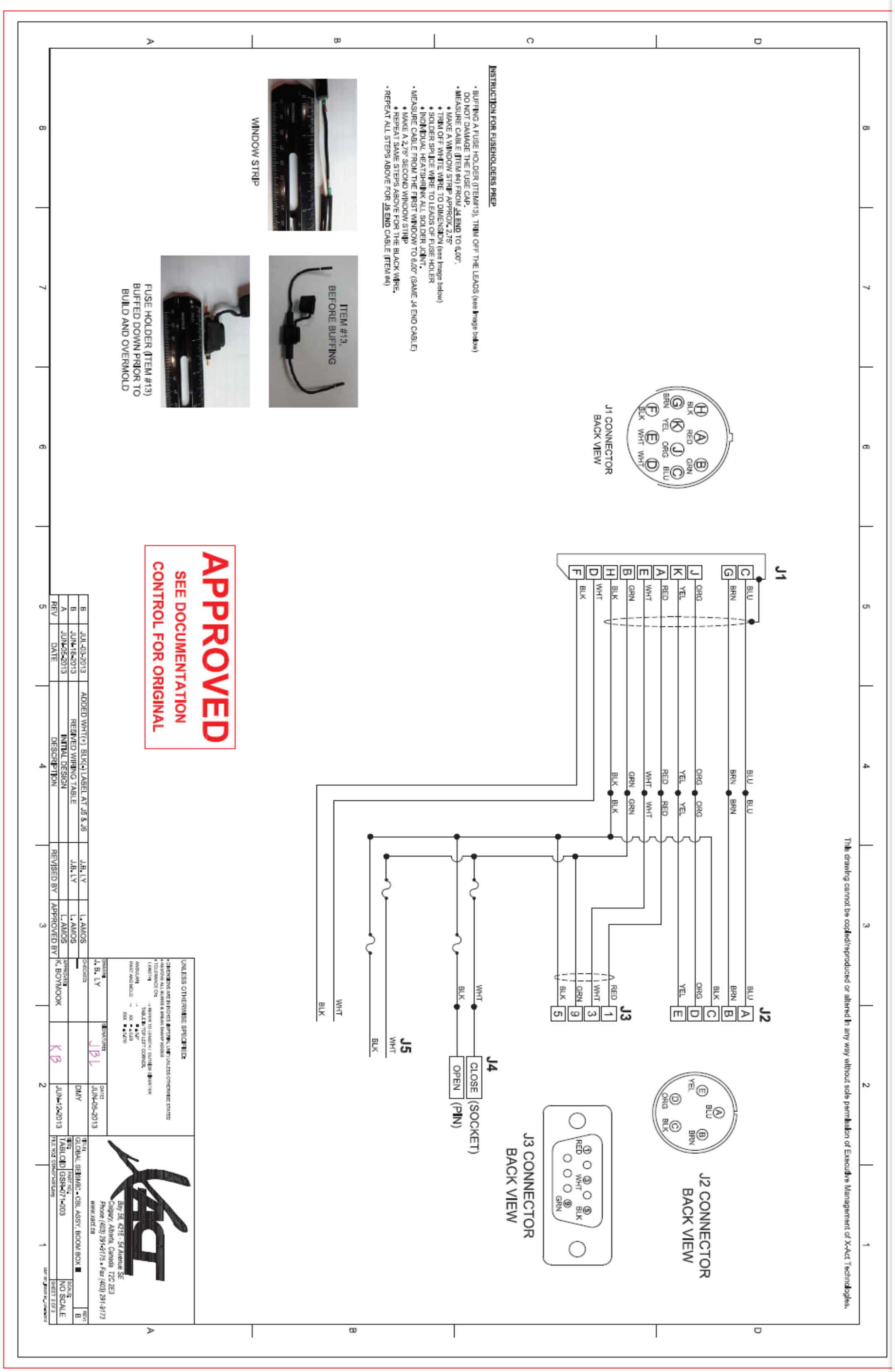
C Red	Mic Act
J White	PTT Active
BLK	no connect
G Green	Speaker Pos
K BLK	Speaker Return

(Optional) 5 pin Radio Cable Wiring

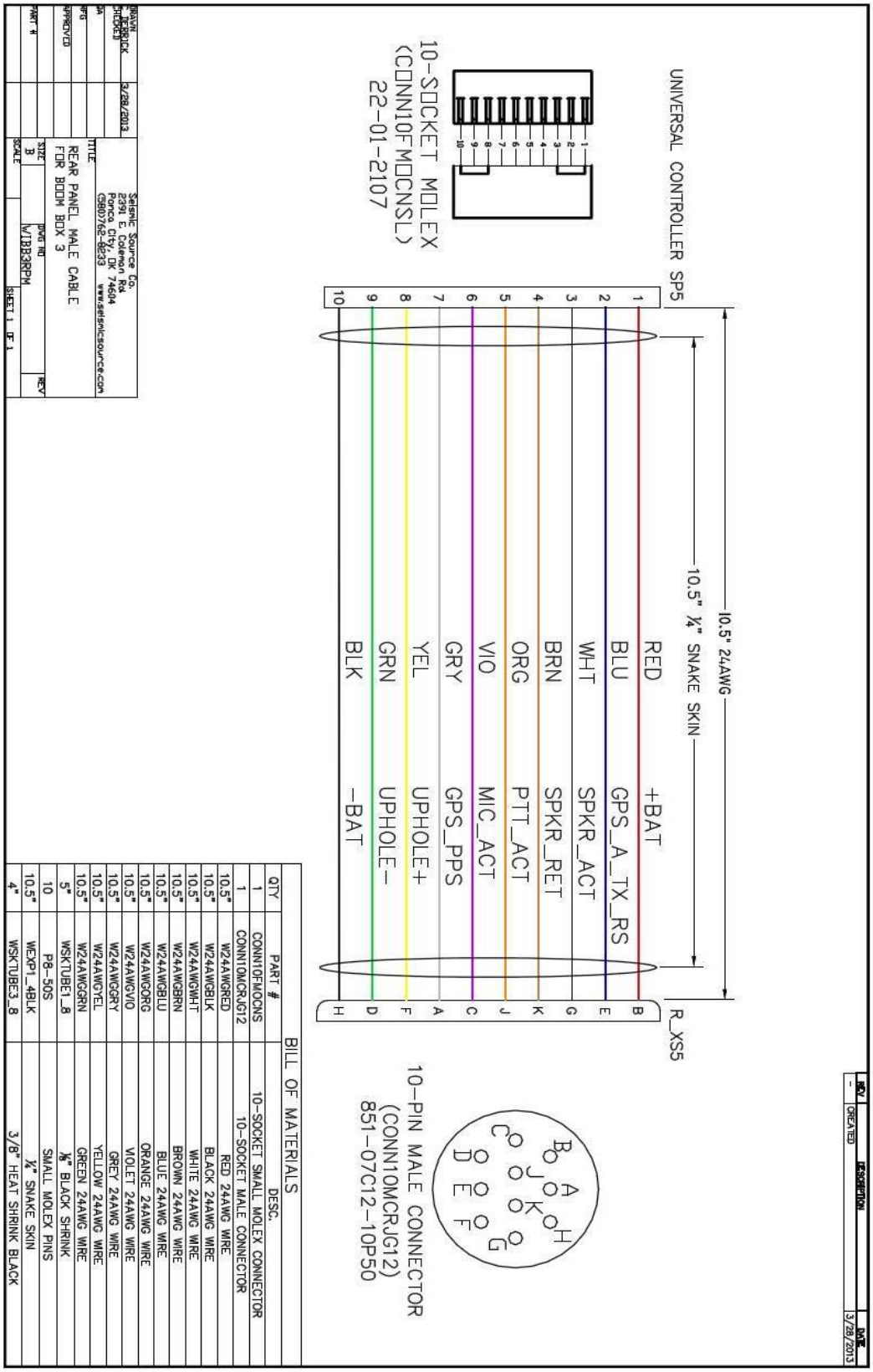
Mic Active –	A
Radio Return -	C
Speaker Act-	B
Speaker Ret-	E
PTT	D

11.2.1 Boom Box 3 Decoder Cable




INSTRUCTION FOR FUSEHOLDERS PREP
WINDOW STRIP
ITEM #13, BEFORE BUFFING
FUSE HOLDER (ITEM #13) BUFFED DOWN PRIOR TO BUILD AND OVERMOLD
J1 CONNECTOR BACK VIEW
J1
J2
J3
J4
J5
CLOSE (SOCKET)
OPEN (PIN)
J2 CONNECTOR BACK VIEW
J3 CONNECTOR BACK VIEW
APPROVED
SEE DOCUMENTATION CONTROL FOR ORIGINAL

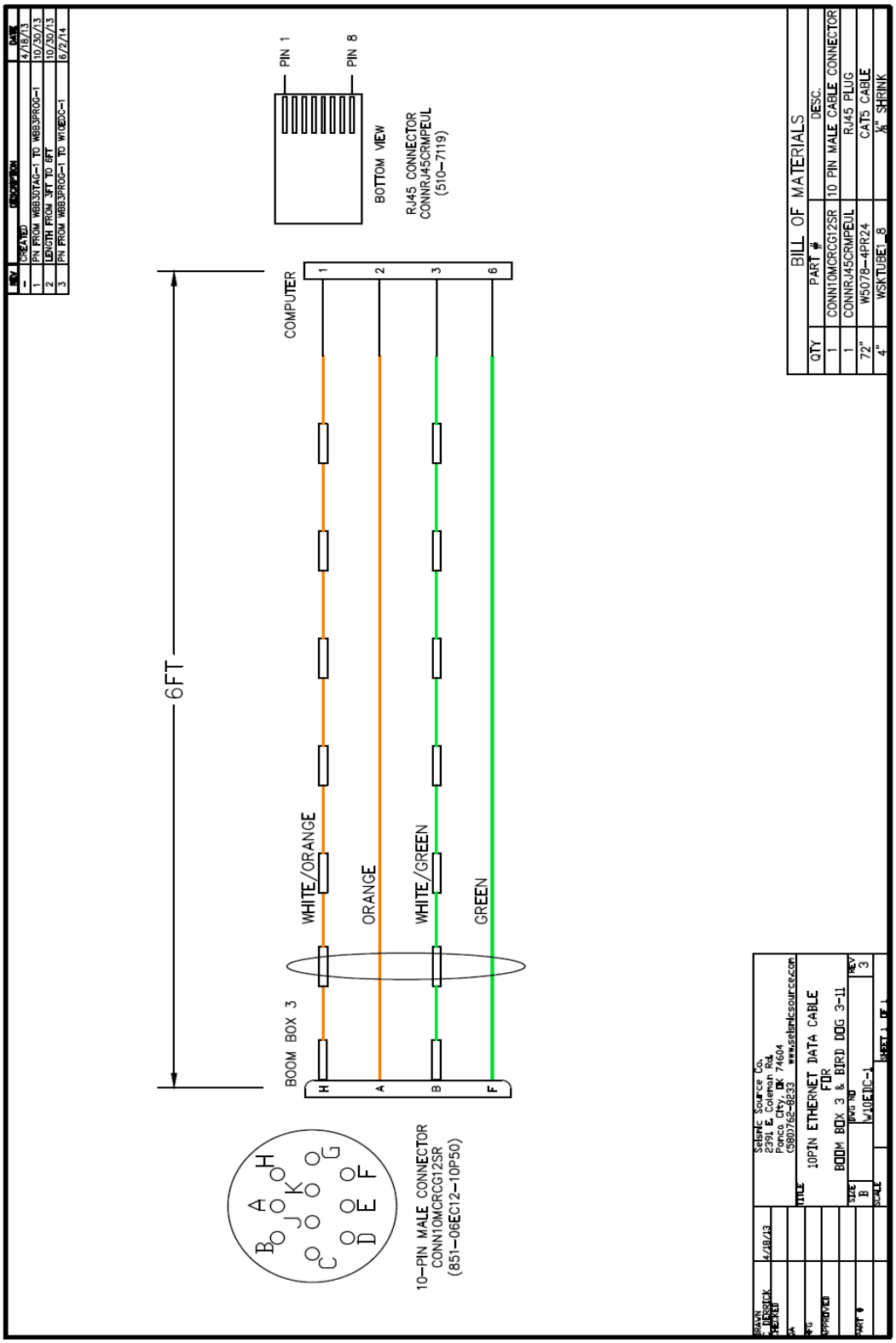
11.2.2 Boom Box 3 – 10 pin wiring



BILL OF MATERIALS

QTY	PART #	DESC.
1	CONN10FMOCNS	10-SOCKET SMALL MOLEX CONNECTOR
1	CONN10MCRJG12	10-SOCKET MALE CONNECTOR
10.5"	W24AWGRED	RED 24AWG WIRE
10.5"	W24AWGBLK	BLACK 24AWG WIRE
10.5"	W24AWGWHT	WHITE 24AWG WIRE
10.5"	W24AWGBRN	BROWN 24AWG WIRE
10.5"	W24AWGBLU	BLUE 24AWG WIRE
10.5"	W24AWGORG	ORANGE 24AWG WIRE
10.5"	W24AWGVIO	VIOLET 24AWG WIRE
10.5"	W24AWGGRY	GREY 24AWG WIRE
10.5"	W24AWGYEL	YELLOW 24AWG WIRE
10.5"	W24AWGGRN	GREEN 24AWG WIRE
5"	WSKTUBE1_8	⅛" BLACK SHRINK
10	P8-50S	SMALL MOLEX PINS
10.5"	WEXP1_4BLK	¼" SNAKE SKIN
4"	WSKTUBE3_8	3/8" HEAT SHRINK BLACK

11.3. BB3 Ethernet (10 pin to RJ45) cable



11.4. BB3 Autonomous fire switch cable